

# LEVI WATER SUPPLY CORPORATION



SPECIFICATIONS AND CONTRACT DOCUMENTS  
FOR

## ***FALLS COUNTY WATER PLANT SITE***

Prepared By



**KASBERG, PATRICK & ASSOCIATES, LP**  
CONSULTING ENGINEERS  
TEMPLE, TEXAS  
Texas Firm F-510

July 2026



*Ginger R. Tolbert*

07/20/2026

# FALLS COUNTY WATER PLANT SITE

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## NOTICE TO BIDDERS

Electronic bids will be received by email to [gtolbert@kpaengineers.com](mailto:gtolbert@kpaengineers.com) until **2:00 P.M. on Tuesday, August 25, 2026** for the construction of the **Falls County Water Plant Site** for the Levi WSC, Texas. The bids shall be labeled:

### FALLS COUNTY WATER PLANT SITE LEVI WATER SUPPLY CORPORATION

Bids must be submitted on the Bid Form provided and must be accompanied by a cashier's check, certified check or acceptable bidder's bond payable without recourse to the Levi WSC in an amount not less than five (5) percent of the bid submitted as a guarantee that the bidder will enter into a contract and execute a Performance Bond and a Payment Bond within ten (10) days after the notification of the award of the contract.

The bids will be opened virtually and read aloud at **2:00 P.M. on Tuesday August 25, 2026**. The Board will officially review the bids at their next regularly scheduled meeting and award the contract as soon thereafter as practical.

The Levi WSC reserves the right to accept or reject any and all bids, as the best interest of the Water Supply Corporation may require, and to waive any informality in bids received. The Levi WSC also reserves the right to award the Contract as may be advantageous to the Levi WSC.

Plans, specifications and bidding documents will be provided electronically by pdf. Hard copies may be obtained at the office of Kasberg, Patrick & Associates, LP; 11 South 2<sup>nd</sup> Street; Temple, TX 76501 for a non-refundable cost of \$100.00 per set, checks made payable to Kasberg, Patrick & Associates, LP.

Technical questions and inquiries should be directed to Ginger R. Tolbert, P.E. at [gtolbert@kpaengineers.com](mailto:gtolbert@kpaengineers.com) until 12:00 P.M. on Tuesday, August 11, 2026. The Engineer and/or Owner shall not be bound by any references obtained by the Bidders unless an addendum is produced and released.

**A Non-Mandatory Pre-bid Conference will be held at the Levi WSC Office located at 2757 Rosenthal Parkway; Lorena, TX 76655 at 3:00 P.M. on Wednesday, July 29, 2026 Although this is not a mandatory Pre-Bid Conference, it is highly recommended that all bidders attend.**

SPECIAL PROJECT INFORMATION  
TO BIDDERS/CONTRACTORS

- A. All questions and inquiries about the project should be directed to Ginger R. Tolbert, P.E., until noon on Tuesday, August 11, 2026, preferably by e-mail at [gtolbert@kpaengineers.com](mailto:gtolbert@kpaengineers.com). Questions after that time and date will not be addressed and the Engineer and/or Owner shall not be bound by any references or dates obtained by the Bidders unless an official addendum is produced and released by Kasberg, Patrick & Associates, LP.
- B. Contract Administration and Pay Estimate Approvals will be provided by Kasberg, Patrick & Associates, LP.
- C. The Bid Item for Mobilization, Bonds and Insurance shall not exceed 5% of the total amount Bid for any particular Base Bid, Add Alternate Bid or Alternate Bid.

## **INSTRUCTION TO BIDDERS FOR CONSTRUCTION**

### **1. Use of Separate Bid Forms**

These contract documents include a complete set of bid and contract forms which are for the convenience of the bidders and are not to be detached from the contract document, completed or executed. After questions and inquiries cut-off time, a separate bid form will be provided for your use.

### **2. Interpretations or Addenda**

Each request for an interpretation shall be made to the engineer. Each interpretation made will be in the form of an Addendum to the contract documents and will be distributed to all parties holding contract documents no less than one (1) day prior to the bid opening. It is, however, the bidder's responsibility to make inquiry as to any addenda issued. All such addenda shall become part of the contract documents and all bidders shall be bound by such addenda, whether or not received by the bidder.

### **3. Inspection of Site**

Each bidder should visit the site of the proposed work and fully acquaint himself with the existing conditions there and should fully inform himself as to the facilities involved, the difficulties and restrictions attending the performance of the contract. The bidder should thoroughly examine and familiarize himself with the drawings, technical specifications and all other contract documents. The contractor, by the execution of the contract, shall in no way be relieved of any obligation under it due to his failure to receive or examine any form or legal document or to visit the site or acquaint himself with the conditions there existing. The Levi WSC will be justified in rejecting any claim based on lack of inspection of the site prior to the bid.

### **4. Bids**

- a) All bids must be submitted on the forms provided and are subject to all requirements of the Contract Documents, including the Drawings.
- b) All bids must be regular in every respect and no interlineation, excisions or special conditions may be made or included by the bidder.
- c) The Levi WSC may consider as irregular any bid on which there is an alteration of or departure from the bid form and, at its option, may reject any irregular bid.
- d) If contract is awarded, it will be awarded to the lowest responsible bidder on the basis of the base bid and the selected alternate bid items, if any. The contract will require the completion of the work in accordance with the contract documents.

5. Bid Bond

- a) A bid bond in the amount of 5% of the bid issued by the acceptable surety shall be submitted with each bid. A certified check or bank draft payable to the Levi WSC may be submitted in lieu of the Bid Bond.
- b) The bid bond or its comparable will be returned to the bidder as soon as practical after the opening of the bids.

6. Unit Price

The unit price for each of the several items in the bid shall include its pro rata share of overhead so that the sum of the products obtained by multiplying the quantity shown for each item by the unit price bid represents the total bid. Any bid not conforming to this requirement may be rejected as informal. Special attention is drawn to this condition, as the unit prices will be used to determine the amount of any change orders resulting from an increase or decrease in quantities.

7. Corrections

Erasures or other corrections in the bid must be noted over the signature of the bidder.

8. Time for Receiving Bids

Bids received prior to the advertised hour of opening will be kept securely sealed. The officer appointed to open the bids shall decide when the specified time has arrived and no bid received thereafter will be considered.

9. Opening of Bids

The Levi WSC shall, at the time and place fixed for the opening of bids, open each bid and publicly read it aloud, irrespective of any irregularities therein. Bidders and other interested individuals may be present.

10. Withdrawal of Bids

Bidder may withdraw the bid before the time fixed for the opening of bids, by communicating his purpose in writing to the Levi WSC. Upon receipt of such notice, the unopened bid will be returned to the bidder. The bid guaranty of any bidder withdrawing his bid will be returned promptly.

11. Award of Contract/Rejection of Bids

- a) The contract will be awarded to the responsive, responsible Bidder submitting the lowest/best bid. The bidder selected will be notified at the earliest possible date. The Levi WSC reserves the right to reject any or all bids and to waive any informality in bids received where such rejection or waiver is in its interest.

12. Execution of Agreement/Performance and Payment Bonds

- a) The failure of the successful bidder to execute the agreement and supply the required bonds within ten (10) days after the prescribed forms are presented for signature, or within such extended period as the Levi WSC may grant, shall constitute a default and the Levi WSC may, at its option either award the contract to the next lowest responsible bidder, or re-advertise for bids. In either case, the Levi WSC may charge against the bidder the difference between the amount of the bid, and the amount for which a contract is subsequently executed irrespective of whether this difference exceeds the amount of the bid bond. If a more favorable bid is received through re-advertisement, the defaulting bidder shall have no claim against the Levi WSC for a refund.



## BID FORM

PROJECT IDENTIFICATION: Levi Water Supply Corporation  
Falls County Water Plant Sit

THIS BID IS SUBMITTED TO: Levi Water Supply Corporation  
2757 Rosenthal Parkway  
Lorena, Texas 76655

1. The undersigned BIDDER proposes and agrees, if this Bid is accepted, to enter into an agreement with OWNER in the form included in the Contract Documents to perform and furnish all Work as specified or indicated in the Contract Documents for the Contract Price and within the Contract Time indicated in this Bid and in accordance with the other terms and conditions of the Contract Documents.
2. BIDDER accepts all of the terms and conditions of the Invitation to Bid and Instructions to Bidders, including without limitation those dealing with the disposition of Bid security. This Bid will remain subject to acceptance for sixty (60) days after the day of Bid opening. BIDDER will sign and submit the Agreement with the Bonds and other documents required by the Bidding Requirements within ten days after the date of OWNER's Notice of Award.
3. In submitting this bid, BIDDER represents, as more fully set forth in the Agreement, that:
  - a. BIDDER has familiarized itself with the nature and extent of the Contract Documents, Work, site, locality, and all local conditions and Laws and Regulations that in any manner may affect cost, progress, performance or furnishing of the Work.
  - b. BIDDER has obtained and carefully studied (or assumes responsibility for obtaining and carefully studying) all such examinations, investigations, explorations, tests and studies which pertain to the subsurface of physical conditions at the site or otherwise may affect the cost, progress, performance or furnishing of the Work as BIDDER considers necessary for the performance or finishing of the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 8 of the Agreement; and no additional examinations, investigations, explorations, tests, reports, or similar information or data are or will be required by BIDDER for such purposes.

- c. BIDDER has reviewed and checked all information and data shown or indicated on the Contract Documents with respect to existing Underground Facilities at or contiguous to the site and assumed responsibility for the accurate location of said Underground Facilities. No additional examinations, investigations, explorations, tests, reports or similar information or data in respect of said Underground Facilities are or will be required by BIDDER in order to perform and furnish the Work at the Contract Price, within the Contract Time and in accordance with the other terms and conditions of the Contract Documents, including specifically the provisions of paragraph 8 of the Agreement.
- d. BIDDER has correlated the results of all such observations, examinations, investigations, explorations, tests, reports and studies with the terms and conditions of the Contract Documents.
- e. BIDDER has given OWNER written notice of all conflicts, errors or discrepancies that it has discovered in the Contract Documents and the written resolution thereof by OWNER is acceptable to BIDDER.
- f. This Bid is genuine and not made in the interest of or on behalf of any undisclosed person, firm or corporation and is not submitted in conformity with any agreement or rules of any group, association, organization or corporation; BIDDER has not directly or indirectly induced or solicited any other BIDDER to submit a false or sham Bid; BIDDER has not solicited or induced any person, firm or corporation to refrain from bidding; and BIDDER has not sought by collusion to obtain for itself any advantage over any other BIDDER or over OWNER.

4 BIDDER will complete work for the following prices:

**BID SCHEDULE**  
**LEVI WATER SUPPLY CORPORATION**  
**Falls County Water Plant Site**

***BASE BID***

| Item No. | Estimated Quantity | Unit | Description                                                                                                                                                                                                                                                                                                                                                          | Unit Price | Total Amount (in numerals) |
|----------|--------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------------|
| 1        | 100%               | LS   | Mobilization, Bonds & Insurance, not-to-exceed 5% of the Base Bid Amount, Complete For                                                                                                                                                                                                                                                                               | \$ _____   | \$ _____                   |
| 2        | 100%               | LS   | Prepare Stormwater Pollution Prevention Plan, Including Submission to & Receiving Permits from Texas Commission on Environmental Quality (TCEQ), Complete For                                                                                                                                                                                                        | \$ _____   | \$ _____                   |
| 3        | 100%               | LS   | Implement & Administer Stormwater Pollution Prevention Plan, Including Furnishing, Installing, Maintaining & Removing Erosion Control Measures and Submission to and Receiving Permits from Texas Commission of Environmental Quality (TCEQ), Complete For                                                                                                           | \$ _____   | \$ _____                   |
| 4        | 100%               | LS   | Maintain, Repair, Replace, Furnish and Install, and Remove Existing Silt Fence per TCEQ Requirements and as Shown on the Plans, Complete For                                                                                                                                                                                                                         | \$ _____   | \$ _____                   |
| 5        | 100%               | LS   | Submit Trench Safety Plan in Conformance with State Law & OSHA as Prepared by a Texas Licensed Professional Engineer, Complete For                                                                                                                                                                                                                                   | \$ _____   | \$ _____                   |
| 6        | 450                | LF   | Implement & Follow Trench Safety Plan (Piping), Complete For                                                                                                                                                                                                                                                                                                         | \$ _____   | \$ _____                   |
| 7        | 2,000              | SF   | Implement & Follow Trench Safety Plan (Structures/Excavations), Complete For                                                                                                                                                                                                                                                                                         | \$ _____   | \$ _____                   |
| 8        | 100%               | LS   | Furnish All Labor, Materials, Tools & Equipment for Constructing the Falls County Water Plant Facility including Pump Station and Chlorine Building, Chemical, Mechanical, Electrical, and Ventilation Equipment, Concrete, Painting, Piping, Valves, Pumps, Motors, Appurtenances, Site-Work & Earthwork, as Shown on the Plans, and Specified Herein, Complete For | \$ _____   | \$ _____                   |

**BID SCHEDULE**  
**LEVI WATER SUPPLY CORPORATION**  
**Falls County Water Plant Site**

***BASE BID***

| Item No. | Estimated Quantity | Unit | Description                                                                                                                                                                                                                                                                          | Unit Price | Total Amount (in numerals) |
|----------|--------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------------|
| 9        | 100%               | LS   | Furnish All Labor, Materials, Tools & Equipment for the 100,000 Gal. Ground Storage Tank, including all associated Mechanical and Electrical Equipment, Concrete, Painting, Piping, Valves, Appurtenances, as Shown on the Plans, and Specified Herein, Complete For                 | \$ _____   | \$ _____                   |
| 10       | 100%               | LS   | Furnish All Labor, Materials, Tools & Equipment for the 10,000 Gal. Hydrotank, including all associated Mechanical and Electrical Equipment, Concrete, Painting, Piping, Valves, Appurtenances, as Shown on the Plans, and Specified Herein, Complete For                            | \$ _____   | \$ _____                   |
| 11       | 100%               | LS   | Furnish All Labor, Materials, Tools & Equipment for the Well Pump and Flow Meter Assembly, including all associated Mechanical and Electrical Equipment, Concrete, Painting, Piping, Valves, Pumps, Motors, Appurtenances, as Shown on the Plans, and Specified Herein, Complete For | \$ _____   | \$ _____                   |
| 12       | 100%               | LS   | Furnish All Labor, Material, Tools & Equipment Related to Instrumentation and Programming (AutoDialer/OmniSite), Complete For                                                                                                                                                        | \$ _____   | \$ _____                   |
| 13       | 100%               | LS   | Furnish All Labor, Material, Tools & Equipment Related to Electrical Service Connection and Transformer with Foundation, Complete For                                                                                                                                                | \$ _____   | \$ _____                   |
| 14       | 520                | SY   | Furnish & Install Gravel Roadway, Complete For                                                                                                                                                                                                                                       | \$ _____   | \$ _____                   |
| 15       | 100%               | LS   | For Furninshing and Installing the Proposed Perimeter Fence including the 20 Ft Double Gate, Complete For                                                                                                                                                                            | \$ _____   | \$ _____                   |
| 16       | 3,000              | SY   | Furnish & Install Hydro Mulch Seeding For Permanent Erosion Control, Including water to Establish & Sustain Growth, Complete For                                                                                                                                                     | \$ _____   | \$ _____                   |

**BID SCHEDULE**  
**LEVI WATER SUPPLY CORPORATION**  
**Falls County Water Plant Site**

***BASE BID***

| Item No. | Estimated Quantity | Unit | Description                                                                                                                    | Unit Price | Total Amount (in numerals) |
|----------|--------------------|------|--------------------------------------------------------------------------------------------------------------------------------|------------|----------------------------|
| 17       | 100%               | LS   | Provide Project Record Drawings (As-Built), Complete For                                                                       | \$ _____   | \$ _____                   |
| 18       | 100%               | LS   | Provide Video of Pre-Construction and Post Construction Site Conditions for the Total Project, Complete For                    | \$ _____   | \$ _____                   |
| 19       | 100%               | LS   | For All Materials, Equipment, Tools & Labor Neccesarry for Pressure Testing, Including Any Necessary Repairs, Complete For     | \$ _____   | \$ _____                   |
| 20       | 100%               | LS   | For All Materials, Equipment, Tools & Labor Neccesarry for Microbiological Testing in accordance with AWWA C-651, Complete For | \$ _____   | \$ _____                   |

**TOTAL BASE BID (ITEMS 1 - 20): \$** \_\_\_\_\_ **-**  
 (numerals)

**BID SCHEDULE**  
**LEVI WATER SUPPLY CORPORATION**  
**Falls County Water Plant Site**

***ADD ALTERNATE A***

| Item No. | Estimated Quantity | Unit | Description                                                                                                       | Unit Price | Total Amount (in numerals) |
|----------|--------------------|------|-------------------------------------------------------------------------------------------------------------------|------------|----------------------------|
| A-1      | 100%               | LS   | Funish and Install Generator and Foundation, Including all Necessary Electrical and Instrumentation, Complete For | \$ _____   | \$ _____                   |

**TOTAL ADD ALTERNATE A (ITEM A-1): \$** \_\_\_\_\_ **-**  
 (numerals)

***ADD ALTERNATE B***

| Item No. | Estimated Quantity | Unit | Description                                                                                                            | Unit Price | Total Amount (in numerals) |
|----------|--------------------|------|------------------------------------------------------------------------------------------------------------------------|------------|----------------------------|
| B-1      | 100%               | LS   | Funish and Install Meter Vault and Flow Meter Assembly, including all Necessary Piping and Appurtenances, Complete For | \$ _____   | \$ _____                   |

**TOTAL ADD ALTERNATE B (ITEM B-1): \$** \_\_\_\_\_ **-**  
 (numerals)

**BID SUMMARY**

**TOTAL BASE BID \$:** \_\_\_\_\_ -  
**TOTAL ADD ALTERNATE A BID \$:** \_\_\_\_\_ -  
**TOTAL ADD ALTERNATE B BID \$:** \_\_\_\_\_ -  
**TOTAL BID \$:** \_\_\_\_\_ -

Receipt is hereby acknowledged of the following addenda to the Contract Documents.

|                            |                |
|----------------------------|----------------|
| Addendum No. 1 dated _____ | Received _____ |
| Addendum No. 2 dated _____ | Received _____ |
| Addendum No. 3 dated _____ | Received _____ |

The above prices shall include all labor, materials, overhead, profit, insurance, etc., to cover the finished work of the several kinds called for.

The work proposed to be done shall be accepted when fully completed and finished in accordance with the plans, specifications and Project Schedule shown herein to the satisfaction of the Engineer.

The undersigned bidder hereby declares that they have visited the site of the work and has carefully examined the Contract Documents pertaining to the work covered in the above bid, and that the bid prices contained in the proposal have been

Respectfully submitted: \_\_\_\_\_ Name: \_\_\_\_\_

By: \_\_\_\_\_  
Company Name \_\_\_\_\_

Address \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Seal & Authorization (if a Corporation)

Attest: \_\_\_\_\_ Telephone Number: \_\_\_\_\_  
\_\_\_\_\_

Secretary \_\_\_\_\_ Fax Number: \_\_\_\_\_

## BID BOND

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned,  
\_\_\_\_\_ as Principal,  
and \_\_\_\_\_ as  
Surety, are hereby held and firmly bound unto \_\_\_\_\_ as OWNER in the penal  
sum of \_\_\_\_\_ for payment  
of which, well and truly to be made, we hereby jointly and severally bind ourselves, successors and  
assigns.

SIGNED, this \_\_\_\_\_ day of \_\_\_\_\_, 2026. The Condition of the above obligation is  
such that whereas the Principal has submitted to \_\_\_\_\_  
a certain BID, attached hereto and hereby made a part hereof to enter into a contract in writing, for the

### Falls County Water Plant Site

NOW, THEREFORE,

- (a) If said BID shall be rejected, or
- (b) If said BID shall be accepted and the Principal shall execute and deliver a contract in the Form of Contract attached hereto (properly completed in accordance with said BID) and shall furnish a BOND for his faithful performance of said contract, and for the payment of all persons performing labor or furnishing materials in connection therewith, and shall in all other respects perform the agreement created by the acceptance of said BID,

then this obligation shall be void, otherwise the same shall remain in force and effect; it being expressly understood and agreed that the liability of the Surety for any and all claims hereunder shall, in no event, exceed the penal amount of this obligation as herein stated.

THE SURETY, for value received, hereby stipulates and agrees that the obligations of said Surety and its BOND shall be in no way impaired or affected by any extension of the time within which the OWNER may accept such BID; and said Surety does hereby waive notice of any such extension.



IN WITNESS WHEREOF, the Principal and the Surety have hereunto set their hands and seals, and such of them as are corporations have caused their corporate seals to be hereto affixed and these presents to be signed by their proper officers, the day and year first set forth above.

\_\_\_\_\_(L.S.)  
Principal

\_\_\_\_\_  
Surety

By: \_\_\_\_\_

IMPORTANT - Surety companies executing BONDS must appear on the Treasury Department's most current list (Circular 570 as amended) and be authorized to transact business in the state where the project is located.

END OF SECTION

## STANDARD FORM OF AGREEMENT

STATE OF TEXAS

COUNTY OF McLennan }

THIS AGREEMENT, made and entered into this \_\_\_\_\_ day of \_\_\_\_\_, 2026, by and between Levi Water Supply Corporation of the County of McLennan and State of Texas, acting through Jim Sheffield thereunto duly authorized so to do, Party of the First Part, hereinafter termed OWNER, and \_\_\_\_\_ of the City of \_\_\_\_\_, County of \_\_\_\_\_ and State of \_\_\_\_\_, Party of the Second Part, Hereinafter termed CONTRACTOR.

WITNESSETH: That for and in consideration of the payments and agreements hereinafter mentioned, to be made and performed by the Party of the First Part (OWNER), and under the conditions expressed in the bond bearing even date herewith, the said Party of the Second Part (CONTRACTOR), hereby agrees with the said Party of the First Part (OWNER) to commence and complete the construction of certain improvements described as follows:

### **Falls County Water Plant Site**

and all extra work in connection therewith, under the terms as stated in the General Conditions of the Agreement and at his (or their) own proper cost and expense to furnish all the materials, supplies, machinery, equipment, tools, superintendence, labor, insurance, and other accessories and services necessary to complete the said construction, in accordance with the conditions and prices stated in the Proposal attached hereto, and in accordance with the Notice to Contractors, General and Special Conditions of Agreement, Plans and other drawings and printing or written explanatory matter thereof, and the Specifications and addenda therefor, as prepared by Kasberg, Patrick & Associates, LP; 11 South 2<sup>nd</sup> Street; Temple, Texas, 76501; (254) 773-3731, herein entitled the ENGINEER, each of which has been identified by the CONTRACTOR and the ENGINEER, together with the CONTRACTOR'S written Proposal, the General Conditions of the Agreement, and the Performance and Payment Bonds hereto attached; all of which are made a part hereof and collectively evidence and constitute the entire contract.

The CONTRACTOR agrees to commence work within ten (10) days after the date written notice to do so shall have been given him, and to complete construction as required in the contract, subject to such extensions of time as are provided by the General and Special Conditions.

The OWNER agrees to pay the CONTRACTOR in current funds the price or prices shown in the proposal, which forms a part of this contract, such payments to be subject to the General and Special Conditions of the contract.

IN WITNESS WHEREOF, the parties to these presents have executed this Agreement in the year and day first above written.

Levi Water Supply Corporation  
Party of the First Part (OWNER)

\_\_\_\_\_  
Party of the Second Part (CONTRACTOR)

By: \_\_\_\_\_  
Title: General Manager

By: \_\_\_\_\_  
Title: \_\_\_\_\_

ATTEST:  
  
\_\_\_\_\_

ATTEST:  
  
\_\_\_\_\_

APPROVED AS TO FORM:  
  
\_\_\_\_\_

## PERFORMANCE BOND

KNOW ALL MEN BY THESE PRESENTS: that

\_\_\_\_\_  
(Name of Contractor or Company)

\_\_\_\_\_  
(Address)

a \_\_\_\_\_ hereinafter called Principal,  
(Corporation / Partnership)

and \_\_\_\_\_  
(Name of Surety Company)

\_\_\_\_\_  
(Address)

hereinafter called Surety, are held and firmly bound unto

\_\_\_\_\_  
Levi Water Supply Corporation  
(Name of Recipient)

\_\_\_\_\_  
2757 Rosenthal Parkway; Lorena, Texas 76655  
(Recipient's Address)

hereinafter called OWNER, in the penal sum of \$ \_\_\_\_\_  
Dollars (\$ \_\_\_\_\_) in lawful money of the United States, for the payment of which sum well and  
truly to be made we bind ourselves, successors, and assigns, jointly and severally, firmly in these presents.

THE CONDITION OF THIS OBLIGATION is such that whereas, the Principal entered into a certain  
contract with the OWNER dated the \_\_\_\_\_ day of \_\_\_\_\_, 2026 a copy of  
which is hereto attached and made a part hereof for the construction of:

### **Falls County Water Plant Site**

NOW THEREFORE, if the Principal shall well, truly and faithfully perform its duties in all the  
undertakings, covenants, terms, conditions, and agreements of said contract during the original term  
thereof, and any extensions thereof which may be granted by the OWNER, with or without notice to the  
Surety and during the one year guaranty period, and if he shall satisfy all claims and demands incurred  
under such contract, and shall fully indemnify and save harmless the OWNER from all costs and damages  
which it may suffer by reason of failure to do so, and shall reimburse and repay the OWNER all outlay  
and expense which the OWNER may incur in making good any default, then this obligation shall be void,  
otherwise to remain in full force and effect.

PROVIDED FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed there under or the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

PROVIDED, HOWEVER that this bond is executed pursuant to Chapter 2253 of the Texas Government Code, as amended, and all liabilities on this bond shall be determined in accordance with the provisions of such statute, to the same extent as if it were copied at length herein.

PROVIDED FURTHER, that if any legal action be filed on this bond, venue shall be in McLennan County, Texas.

The Surety is responsible for additional amounts authorized by any change orders.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ counterparts, each one of which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 2026.

ATTEST:

\_\_\_\_\_  
(Principal)

\_\_\_\_\_  
(Principal Secretary) By \_\_\_\_\_(s)

(SEAL)

\_\_\_\_\_  
(Witness as to Principal)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Address)

ATTEST:

\_\_\_\_\_  
(Surety)

\_\_\_\_\_  
(Witness as to Surety)

By \_\_\_\_\_  
(Attorney in Fact)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Address)

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

## PAYMENT BOND

KNOW ALL MEN BY THESE PRESENTS: that

\_\_\_\_\_  
(Name of Contractor or Company)

\_\_\_\_\_  
(Address)

a \_\_\_\_\_, hereinafter called Principal,  
(Corporation / Partnership)

and \_\_\_\_\_  
(Name of Surety Company)

\_\_\_\_\_  
(Address)

hereinafter called Surety, are held and firmly bound unto

\_\_\_\_\_  
Levi Water Supply Corporation  
(Name of Recipient)

\_\_\_\_\_  
2757 Rosenthal Parkway; Lorena, Texas 76655  
(Recipient's Address)

hereinafter called OWNER, in the penal sum of \$ \_\_\_\_\_  
Dollars (\$ \_\_\_\_\_) in lawful money of the United States, for this payment of which sum well  
and truly to be made, we bind ourselves, successors, and assigns, jointly and severally, firmly by these  
presents.

THE CONFIDENTIALITY OF THIS OBLIGATION is such that whereas, the Principal entered into a  
certain contract with the OWNER, dated the \_\_\_\_\_ day of \_\_\_\_\_, 2026, a copy of which is  
hereto attached and made a part hereof for the construction of:

### **Falls County Water Plant Site**

NOW, THEREFORE, if the Principal shall promptly make payment to all persons, firms, SUB-  
CONTRACTORS, and corporations furnishing materials for or performing labor in the prosecution of  
the WORK provided for in such contract, and any authorized extension or modification thereof,  
including all amounts due for materials, lubricants, oil, gasoline, coal and coke, repairs on machinery,  
equipment and tools, consumed or used in connection with the construction of such WORK, and all  
insurance premiums on said WORK, and for all labor, performed in such WORK whether by SUB-  
CONTRACTOR or otherwise, then this obligation shall be void; otherwise to remain in full force and  
effect.

PROVIDED, FURTHER, that the said Surety, for value received hereby stipulates and agrees that no change, extension of time, alteration or addition to the terms of the contract or to WORK to be performed there under or the SPECIFICATIONS accompanying the same shall in any way affect its obligation on this BOND, and it does hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract or to the WORK or to the SPECIFICATIONS.

PROVIDED, FURTHER, that no final settlement between the OWNER and the CONTRACTOR shall abridge the right of any beneficiary hereunder, whose claim may be unsatisfied.

PROVIDED FURTHER that if any legal action be filed on this bond, venue shall be in McLennan County, Texas.

PROVIDED FURTHER, that this bond is executed pursuant to the provisions of Chapter 2253 of the Texas Government Code, as currently amended, and all liabilities on this bond shall be determined in accordance with the provisions of said statute to the same extent as if it were copied at length herein.

The Surety is responsible for additional amounts authorized by any change orders.

IN WITNESS WHEREOF, this instrument is executed in \_\_\_\_\_ counter-parts, each on of  
(Number)  
which shall be deemed an original, this the \_\_\_\_\_ day of \_\_\_\_\_, 2026.

ATTEST:

\_\_\_\_\_  
(Principal)

\_\_\_\_\_  
(Principal Secretary) By \_\_\_\_\_(s)

(SEAL)

\_\_\_\_\_  
(Witness as to Principal)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Address)

\_\_\_\_\_

\_\_\_\_\_

ATTEST:

\_\_\_\_\_  
(Surety)

\_\_\_\_\_  
(Witness as to Surety) By \_\_\_\_\_  
(Attorney in Fact)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Address)

NOTE: Date of BOND must not be prior to date of Contract. If CONTRACTOR is Partnership, all partners should execute BOND.

## CERTIFICATE OF INSURANCE

THIS CERTIFICATE IS ISSUED FOR THE DURATION OF THE PROJECT AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES LISTED BELOW.

|                             |                                                                                           |
|-----------------------------|-------------------------------------------------------------------------------------------|
| NAME AND ADDRESS OF AGENCY  | COMPANIES AFFORDING COVERAGES<br>COMPANY A<br><u>LETTER</u><br>COMPANY B<br><u>LETTER</u> |
| NAME AND ADDRESS OF INSURED | COMPANY C<br><u>LETTER</u><br>COMPANY D<br><u>LETTER</u><br>COMPANY E<br><u>LETTER</u>    |

This is to certify that policies of insurance listed below have been issued to the insured named above and are in force at this time. Notwithstanding any requirement, term or condition of any contract or other document with respect to which this certificate may be issued or may pertain, the insurance afforded by the policies described herein is subject to all the terms, exclusions and conditions of such policies.

| COMPANY LETTER | TYPE OF INSURANCE                                                                                                                                                                                                                                                                                                                                        | POLICY NUMBER | POLICY EXPIRATION DATE | LIMITS OF LIABILITY IN THOUSANDS (000)     |                 |           |
|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|------------------------|--------------------------------------------|-----------------|-----------|
|                |                                                                                                                                                                                                                                                                                                                                                          |               |                        |                                            | EACH OCCURRENCE | AGGREGATE |
| _____          | GENERAL LIABILITY<br>_____ <b>Comprehensive Form</b><br><br>Premises-Operations<br>_____ Explosions and<br><b>Collapse Hazard</b><br><br>_____ Underground Hazard<br>_____ Products/Completed<br>Operations Hazard<br>_____ Contractual Insurance<br>_____ Broad Form<br>_____ Property Damage<br>_____ Independent Contractors<br>_____ Personal Injury |               |                        | Bodily Injury                              | \$              | \$        |
|                |                                                                                                                                                                                                                                                                                                                                                          |               |                        | Property Damage                            | \$              | \$        |
|                |                                                                                                                                                                                                                                                                                                                                                          |               |                        | Bodily Injury and Property Damage Combined | \$              | \$        |
|                |                                                                                                                                                                                                                                                                                                                                                          |               |                        | Personal Injury                            |                 | \$        |



|       |                                                                                                   |  |  |                                            |  |                   |
|-------|---------------------------------------------------------------------------------------------------|--|--|--------------------------------------------|--|-------------------|
| _____ | AUTOMOBILE LIABILITY<br>_____ Comprehensive Form<br>_____ Owned<br>_____ Hired<br>_____ Non-Owned |  |  | Bodily Injury (Each Person)                |  | \$                |
|       |                                                                                                   |  |  | Bodily Injury (Each Accident)              |  | \$                |
|       |                                                                                                   |  |  | Property Damage                            |  | \$                |
|       |                                                                                                   |  |  | Bodily Injury and Property Damage Combined |  | \$                |
| _____ | EXCESS LIABILITY<br>_____ Umbrella Form<br>_____ Other than Umbrella                              |  |  |                                            |  |                   |
| _____ | WORKERS' COMPENSATION AND EMPLOYER'S LIABILITY                                                    |  |  | Statutory                                  |  |                   |
|       |                                                                                                   |  |  |                                            |  | \$ (Each Account) |

## OTHER

### Builders Risk

Description of Operations/  
Locations/Vehicles

PROJECT TITLE: Falls County Water Plant Site

PROJECT LOCATION: Falls County, Texas

The Levi WSC is named as an additional insured under all insurance, other than Workman's Compensation.

**Cancellation:** No policies will be cancelled or reduced, restricted, or limited until ten (10) days after the owner has received written notice as evidence by return receipt or registered or certified letter.

NAME AND ADDRESS OF CERTIFICATE HOLDER:

---

DATE ISSUED: \_\_\_\_\_, 2026,

\_\_\_\_\_  
AUTHORIZED REPRESENTATIVE

END OF SECTION

**Notice of Award**

Date: \_\_\_\_\_

|                                                |                                         |
|------------------------------------------------|-----------------------------------------|
| Project: <b>Falls County Water Plant Site</b>  |                                         |
| Owner: <b>Levi Water Supply Corporation</b>    | Engineer's Project No.: <b>2024-109</b> |
| Contract: <b>Falls County Water Plant Site</b> |                                         |
| Bidder:                                        |                                         |
| Bidder's Address:                              |                                         |
|                                                |                                         |
|                                                |                                         |

You are notified that your Bid dated \_\_\_\_\_ for the above Contract has been considered. You are the Successful Bidder and are awarded a Contract for:

**Falls County Water Plant Site**

The Total Amount of your Contract is \_\_\_\_\_ Dollars (\$\_\_\_\_\_).

5 copies of the proposed Contract Documents (except Drawings) accompany this Notice of Award.

5 sets of the Drawings will be delivered separately or otherwise made available to you upon acceptance of Contract Documents by the Owner.

You must comply with the following conditions precedent within [15] days of the date you receive this Notice of Award.

- 1. Deliver to the Engineer [5] fully executed counterparts of the Contract Documents.
- 2. Deliver with the executed Contract Documents the Contract security [Bonds] as specified in the Instructions to Bidders, General Conditions), and Supplementary Conditions.
- 3. Other conditions precedent:

Failure to comply with these conditions within the time specified will entitle Owner to consider you in default, annul this Notice of Award, and declare your Bid security forfeited.

Within ten days after you comply with the above conditions, Owner will return to you one fully executed counterpart of the Contract Documents.

By: \_\_\_\_\_  
Jim Sheffield  
\_\_\_\_\_  
General Manager

## **Notice to Proceed**

Date: \_\_\_\_\_

Contract: \_\_\_\_\_

Engineer's Project No.: 2024-109

To: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

In accordance with the Agreement dated \_\_\_\_\_, by and between the Levi Water Supply Corporation (Owner) and \_\_\_\_\_ (Contractor) for work to be performed in conjunction with the Falls County Water Plant Site.

Construction shall be completed within 365 calendar days of the issuance of this Notice to Proceed.

1. Contractor is hereby notified to commence work on \_\_\_\_\_, 2026 and to complete the work on or before \_\_\_\_\_, 2027.
2. Liquidated damages to be paid by the Contractor for failure to complete the work by the completion date will be assessed at the rate of \$ 250.00 per day for each calendar day after \_\_\_\_\_, 2027. The procedure and basis for the assessment of damages will be in accordance with the Special Conditions, Section 21.

ISSUED ON BEHALF OF

ACCEPTED ON BEHALF OF

Levi Water Supply Corporation

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

(Contractor Signature)

\_\_\_\_\_  
Date

\_\_\_\_\_  
Date

# **GENERAL CONDITIONS**



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# GENERAL CONDITIONS OF AGREEMENT

## 1. DEFINITIONS OF TERMS

**1.01 ... OWNER, CONTRACTOR AND ENGINEER.** The OWNER, the CONTRACTOR and the ENGINEER are those persons or organizations identified as such in the Agreement and are referred to throughout the Contract Documents as if singular in number and masculine in gender. The term ENGINEER means the ENGINEER or his duly authorized representative. The ENGINEER shall be understood to be the ENGINEER of the OWNER, and nothing contained in the Contract Documents shall create any contractual or agency relationship between the ENGINEER and the CONTRACTOR.

**1.02 ... CONTRACT DOCUMENTS.** The Contract Documents shall consist of the Notice to Contractors (Advertisement), Special Conditions (Instructions to Bidders), Proposal, signed Agreement, Performance and Payment Bonds (when required), Special Bonds (when required), General Conditions of the Agreement, Technical Specifications, Plans, and all modifications thereof incorporated in any of the documents before the execution of the agreement.

The Contract Documents are complementary, and what is called for by any one shall be as binding as if called for by all. In case of conflict between any of the Contract Documents, priority of interpretation shall be in the following order: Signed Agreement, Performance and Payment Bonds, Special Bonds (if any), Proposal, Special Conditions of Agreement, Notice to Contractors, Technical Specifications, Plans, and General Conditions of Agreement.

**1.03 ... SUB-CONTRACTOR.** The term Sub-Contractor, as employed herein, includes only those having a direct contract with the CONTRACTOR and it includes one who furnishes material worked to a special design according to the plans or specifications of this work, but does not include one who merely furnishes material not so worked.

**1.04 ... WRITTEN NOTICE.** Written notice shall be deemed to have been duly served if delivered in person to the individual or to a member of the firm or to an officer of the corporation for whom it is intended, or if delivered at or sent by registered mail to the last business address known to him who gives the notice.

**1.05 ... WORK.** The CONTRACTOR shall provide and pay for all materials, supplies, machinery, equipment, tools, superintendence, labor, services, insurance, and all water, light, power, fuel, transportation and other facilities necessary for the execution and completion of the work covered by the Contract Documents. Unless otherwise specified, all materials shall be new and both workmanship and materials shall be of a good quality. The CONTRACTOR shall, if required, furnish satisfactory evidence as to the kind and quality of materials. Materials or work described in words, which so applied, have a well-known technical or trade meaning shall be held to refer to such recognized standards.

**1.06 ... EXTRA WORK.** The term "Extra Work" as used in this contract shall be understood to mean and include all work that may be required by the ENGINEER or OWNER to be done by the CONTRACTOR to accomplish any change, alteration or addition to the work shown upon the plans, or reasonably implied by the specifications, and not covered by the CONTRACTOR'S Proposal, except as provided under "Changes and Alterations", herein.



**1.07 ... WORKING DAY.** A “Working Day” is defined as any day not including Saturdays, Sundays or any legal holidays, in which weather or other conditions, not under the control of the CONTRACTOR, will permit construction of the principal units of the work for a period of not less than seven (7) hours between 7:00 a.m. and 6:00 p.m.

**1.08 ... CALENDAR DAY.** “Calendar Day” is any day of the week or month, no days being excepted.

**1.09 ... SUBSTANTIALLY COMPLETED.** By the term “substantially completed” is meant that the structure has been made suitable for use or occupancy or the facility is in condition to serve its intended purpose, but still may require minor miscellaneous work and adjustment.

## **2. RESPONSIBILITIES OF THE ENGINEER AND THE CONTRACTOR**

**2.01 ... OWNER - ENGINEER RELATIONSHIP.** The ENGINEER will be the OWNER’S representative during construction. The duties, responsibilities and limitations of authority of the ENGINEER as the OWNER’S representative during construction are as set forth in the Contract Documents and shall not be extended or limited without written consent of the OWNER and ENGINEER. The ENGINEER will advise and consult with the OWNER, and all of OWNER’S instructions to the CONTRACTOR shall be issued through the ENGINEER.

**2.02 ... PROFESSIONAL INSPECTION BY ENGINEER.** The ENGINEER shall make periodic visits to the site to familiarize himself generally with the progress of the executed work and to determine if such work generally meets the essential performance and design features and the technical and functional engineering requirements of the Contract Documents; provided and except, however, that the ENGINEER shall not be responsible for making any detailed, exhaustive, comprehensive or continuous on-site inspection of the quality or quantity of the work or be in any way responsible, directly or indirectly, for the construction means, methods, techniques, sequences, quality, procedures, programs, safety precautions or lack of same incident thereto or in connection therewith. Notwithstanding any other provision of this agreement or any other Contract Document, the ENGINEER shall not be in any way responsible or liable for any acts, errors, omissions or negligence of the CONTRACTOR, any subcontractor or any of the CONTRACTOR’S or subcontractor’s agents, servants or employees or any other person, firm or corporation performing or attempting to perform any of the work.

**2.03 ... PAYMENTS FOR WORK.** The ENGINEER shall review CONTRACTOR’S applications for payment and supporting data, determine the amount owed to the CONTRACTOR and approve, in writing, payment to CONTRACTOR in such amounts; such approval of payment to CONTRACTOR constitutes a representation to the OWNER of ENGINEER’S professional judgment that the work has progressed to the point indicated to the best of his knowledge, information and belief, but such approval of an application for payment to CONTRACTOR shall not be deemed as a representation by ENGINEER that ENGINEER has made any examination to determine how or for what purpose CONTRACTOR has used the moneys paid on account of the Contract price.

**2.04 ... INITIAL DETERMINATIONS.** The ENGINEER initially shall determine all claims, disputes and other matters in question between the CONTRACTOR and the OWNER

relating to the execution or progress of the work or the interpretation of the Contract Documents and the ENGINEER'S decision shall be rendered in writing within a reasonable time. Should the ENGINEER fail to make such decision within a reasonable time, appeal to arbitration may be taken as if his decision had been rendered against the party appealing.

**2.05 ... OBJECTIONS.** In the event the ENGINEER renders any decision which, in the opinion of either party hereto, is not in accordance with the meaning and intent of this contract, either party may file with the ENGINEER within thirty days his written objection to the decision, and by such action may reserve the right to submit the question so raised to arbitration as hereinafter provided.

**2.06 ... LINES AND GRADES.** Unless otherwise specified, all lines and grades shall be furnished by the ENGINEER or his representative. Whenever necessary, construction work shall be suspended to permit performance of this work, but such suspension will be as brief as practicable, and the CONTRACTOR shall be allowed no extra compensation therefor. The CONTRACTOR shall give the ENGINEER ample notice of the time and place where lines and grades will be needed. All stakes, marks, etc., shall be carefully preserved by the CONTRACTOR, and in case of careless destruction or removal by him or his employees, such stakes, marks, etc., shall be replaced at the CONTRACTOR'S expense.

**2.07 ... CONTRACTOR'S DUTY AND SUPERINTENDENCE.** The CONTRACTOR shall give adequate attention to the faithful prosecution and completion of this contract and shall keep on the work, during its progress, a competent superintendent and any necessary assistants. The superintendent shall represent the CONTRACTOR in his absence and all directions given to him shall be as binding as if given to the CONTRACTOR.

The CONTRACTOR is and at all times shall remain an independent contractor, solely responsible for the manner and method of completing his work under this contract, with full power and authority to select the means, method and manner of performing such work, so long as such methods do not adversely affect the completed improvements, the OWNER and ENGINEER being interested only in the result obtained and conformity of such completed improvements to the plans, specifications and contract.

Likewise, the CONTRACTOR shall be solely responsible for the safety of himself, his employees and other persons, as well as for the protection of the safety of the improvements being erected and the property of himself or any other person, as a result of his operations hereunder. Engineering construction drawings and specifications as well as any additional information concerning the work to be performed passing from or through the ENGINEER shall not be interpreted as requiring or allowing CONTRACTOR to deviate from the plans and specifications, the intent of such drawings, specifications and any other such instructions being to define with particularity the agreement of the parties as to the work the CONTRACTOR is to perform. CONTRACTOR shall be fully and completely liable, at his own expense, for design, construction, installation and use, or non-use of all items and methods incident to performance of the contract, and for all loss, damage or injury incident thereto, either to person or property, including, without limitation, the adequacy of all temporary supports, shoring, bracing, scaffolding, machinery or equipment, safety precautions or devices, and similar items or devices used by him during construction.

Any review of work in process, or any visit or observation during construction, or any clarification of plans and specifications, by the ENGINEER, or any agent, employee, or representative of either of them, whether through personal observation on the project site or by

means of approval of shop drawings for temporary construction on construction processes, or by other means or method, is agreed by the CONTRACTOR to be for the purpose of observing the extent and nature of work completed or being performed, as measured against the drawings and specifications constituting the contract, or for the purpose of enabling CONTRACTOR to more fully understand the plans and specifications so that the completed construction work will conform thereto, and shall in no way relieve the CONTRACTOR from full and complete responsibility for the proper performance of his work on the project, including but without limitation the propriety of means and methods of the CONTRACTOR in performing said contract, and the adequacy of any designs, plans or other facilities for accomplishing such performance. Deviation by the CONTRACTOR from plans and specifications that may have been in evidence during any such visitation or observation by the ENGINEER, or any of his representatives, whether called to the CONTRACTOR'S attention or not shall in no way relieve CONTRACTOR from his responsibility to complete all work in accordance with said plans and specifications.

**2.08 ... CONTRACTOR'S UNDERSTANDING.** It is understood and agreed that the CONTRACTOR has, by careful examination, satisfied himself as to the nature and location of the work, the conformation of the ground, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions, and all other matters which can in any way affect the work under this contract. No verbal agreement or conversation with any officer, agent or employee of the OWNER or ENGINEER either before or after the execution of this contract, shall affect or modify any of the terms or obligations herein contained.

**2.09 ... CHARACTER OF WORKMEN.** The CONTRACTOR agrees to employ only orderly and competent men, skillful in the performance of the type of work required under this contract, to do the work; and agrees that whenever the ENGINEER shall inform him in writing that any man or men on the work are, in his opinion, incompetent, unfaithful or disorderly, such man or men shall be discharged from the work and shall not again be employed on the work without the ENGINEER'S written consent.

**2.10 ... CONTRACTOR'S BUILDINGS.** The building of structures for housing men, or the erection of tents or other forms of protection, will be permitted only at such places as the ENGINEER shall direct, and the sanitary conditions of the grounds in or about such structures shall at all times be maintained in a manner satisfactory to the ENGINEER.

**2.11 ... SANITATION.** Necessary sanitary conveniences for the use of laborers on the work, properly secluded from public observation, shall be constructed and maintained by the CONTRACTOR in such a manner and at such points as shall be approved by the ENGINEER, and their use shall be strictly enforced.

**2.12 ... SHOP DRAWINGS.** The CONTRACTOR shall submit to the ENGINEER, with such promptness as to cause no delay in his own work or in that of any other Contractor, four checked copies, unless otherwise specified, of all shop and/or setting drawings and schedules required for the work of the various trades, and the ENGINEER shall pass upon them with reasonable promptness, making desired corrections. The CONTRACTOR shall make any corrections required by the ENGINEER; file with him two corrected copies and furnish such other copies as may be needed. The ENGINEER'S approval of such drawings or schedules shall not relieve the CONTRACTOR from responsibility for deviations from drawings or specifications, unless he has in writing called the ENGINEER'S attention to such deviations at the time of submission, nor shall it relieve him from responsibility for errors of any sort in shop

drawings or schedules. It shall be the CONTRACTOR'S responsibility to fully and completely review all shop drawings to ascertain their effect on his ability to perform the required contract work in accordance with the plans and specifications and within the contract time.

Such review by the ENGINEER shall be for the sole purpose of determining the sufficiency of said drawings or schedules to result in finished improvements in conformity with the plans and specifications, and shall not relieve the CONTRACTOR of his duty as an independent contractor as previously set forth, it being expressly understood and agreed that the ENGINEER does not assume any duty to pass upon the propriety or adequacy of such drawings or schedules, or any means or methods reflected thereby, in relation to the safety of either person or property during CONTRACTOR'S performance hereunder.

**2.13 ... PRELIMINARY APPROVAL.** The ENGINEER shall not have the power to waive the obligations of this contract for the furnishing by the CONTRACTOR of good material, and of his performing good work as herein described, and in full accordance with the plans and specifications. No failure or omission of the ENGINEER to discover, object to or condemn any defective work or material shall release the CONTRACTOR from the obligations to fully and properly perform the contract, including without limitations, the obligation to at once tear out, remove and properly replace the same at any time prior to final acceptance upon the discovery of said defective work or material; provided, however, that the ENGINEER shall, upon request of the CONTRACTOR, inspect and accept or reject any material furnished, and in event the material has been once accepted by the ENGINEER, such acceptance shall be binding on the OWNER, unless it can be clearly shown that such material furnished does not meet the specifications for this work.

Any questioned work may be ordered taken up or removed for re-examination, by the ENGINEER, prior to final acceptance, and if found not in accordance with the specifications for said work, all expense of removing, re-examination and replacement shall be borne by the CONTRACTOR, otherwise the expense thus incurred shall be allowed as EXTRA WORK, and shall be paid for by the OWNER; provided that, where inspection or approval is specifically required by the specifications prior to performance of certain work, should the CONTRACTOR proceed with such work without requesting prior inspection or approval he shall bear all expense of taking up, removing, and replacing this work if so directed by the ENGINEER.

**2.14 ... DEFECTS AND THEIR REMEDIES.** It is further agreed that if the work of any part thereof, or any material brought on the site of the work for use in the work or selected for the same, shall be deemed by the ENGINEER as unsuitable or not in conformity with the specifications, the CONTRACTOR shall, after receipt of written notice thereof from the ENGINEER, forthwith remove such material and rebuild or otherwise remedy such work so that it shall be in full accordance with this contract.

**2.15 ... CHANGES AND ALTERATIONS.** The CONTRACTOR further agrees that the OWNER may make such changes and alterations as the OWNER may see fit, in the line, grade, form, dimensions, plans or materials for the work herein contemplated, or any part thereof, either before or after the beginning of the construction, without affecting the validity of this contract and the accompanying Performance and Payment Bonds.

If such changes or alterations diminish the quantity of the work to be done, they shall not constitute the basis for a claim for damages, or anticipated profits on the work that may be dispensed with, except as provided for unit price items under Section 5 "Measurement and Payment." If the amount of work is increased, and the work can fairly be classified under the

specifications, such increase shall be paid for according to the quantity actually done and at the unit price, if any, established for such work under this contract, except as provided for unit price items under Section 5 "Measurement and Payment;" otherwise, such additional work shall be paid for as provided under Extra Work. In case the OWNER shall make such changes or alterations as shall make useless any work already done or material already furnished or used in said work, then the OWNER shall recompense the CONTRACTOR for any material or labor so used, and for any actual loss occasioned by such change, due to actual expenses incurred in preparation for the work as originally planned.

### **3. GENERAL OBLIGATIONS AND RESPONSIBILITIES**

**3.01 ... KEEPING OF PLANS AND SPECIFICATIONS ACCESSIBLE.** The ENGINEER shall furnish the CONTRACTOR with an adequate and reasonable number of copies of all plans and specifications without expense to him, and the CONTRACTOR shall keep one copy of the same constantly accessible on the work, with the latest revisions noted thereon.

**3.02 ... OWNERSHIP OF DRAWINGS.** All drawings, specifications and copies thereof furnished by the ENGINEER shall not be reused on other work, and, with the exception of the signed contract sets, are to be returned to him on request, at the completion of the work. All models are the property of the OWNER.

**3.03 ... ADEQUACY OF DESIGN.** It is understood that the OWNER believes it has employed competent engineers and designers. It is, therefore, agreed that the OWNER shall be responsible for the adequacy of the design, sufficiency of the Contract Documents, the safety of the structure and the practicability of the operations of the completed project; provided the CONTRACTOR has complied with the requirements of the said Contract Documents, all approved modifications thereof, and additions and alterations thereto approved in writing by the OWNER. The burden of proof of such compliance shall be upon the CONTRACTOR to show that he has complied with the said requirements of the Contract Documents, approved modifications thereof and all approved additions and alterations thereto.

**3.04 ... RIGHT OF ENTRY.** The OWNER reserves the right to enter the property or location on which the works herein contracted for are to be constructed or installed, by such agent or agents as he may elect, for the purpose of inspecting the work, or for the purpose of constructing or installing such collateral work as said OWNER may desire.

**3.05 ... COLLATERAL CONTRACTS.** The OWNER agrees to provide by separate contract or otherwise, all labor and material essential to the completion of the work specifically excluded from this contract, in such manner as not to delay the progress of the work, or damage said CONTRACTOR, except where such delays are specifically mentioned elsewhere in the Contract Documents.

**3.06 ... DISCREPANCIES AND OMISSIONS.** It is further agreed that it is the intent of this contract that all work must be done and all material must be furnished in accordance with the generally accepted practice, and in the event of any discrepancies between the separate contract documents, the priority of interpretation defined under "Contract Documents" shall govern. In the event that there is still any doubt as to the meaning and intent of any portion of

the contract, specifications or drawings, the ENGINEER shall define which is intended to apply to the work.

**3.07 ... EQUIPMENT, MATERIALS AND CONSTRUCTION PLANT.** The CONTRACTOR shall be responsible for the care, preservation, conservation, and protection of all materials, supplies, machinery, equipment, tools, apparatus, accessories, facilities, all means of construction, and any and all parts of the work, whether the CONTRACTOR has been paid, partially paid, or not paid for such work, until the entire work is completed and accepted.

**3.08 ... DAMAGES.** In the event the CONTRACTOR is damaged in the course of the completion of the work by the act, neglect, omission, mistake or default of the OWNER, or of the ENGINEER, or of any other CONTRACTOR employed by the OWNER upon the work, thereby causing loss to the CONTRACTOR, the OWNER agrees that he will reimburse the CONTRACTOR for such loss. In the event the OWNER is damaged in the course of the work by the act, negligence, omission, mistake or default of the CONTRACTOR, or should the CONTRACTOR unreasonably delay the progress of the work being done by others on the job so as to cause loss for which the OWNER becomes liable, then the CONTRACTOR shall reimburse the OWNER for such loss.

**3.09 ... PROTECTION AGAINST ACCIDENT TO EMPLOYEES AND THE PUBLIC.** The CONTRACTOR shall at all times exercise reasonable precautions for the safety of employees and others on or near the work and shall comply with all applicable provisions of Federal, State, and Municipal safety laws and building and construction codes. All machinery and equipment and other physical hazards shall be guarded in accordance with the "Manual of Accident Prevention in Construction" of the Associated General Contractors of America except where incompatible with Federal, State, or Municipal laws or regulations. The CONTRACTOR shall provide such machinery guards, safe walkways, ladders, bridges, gangplanks, and other safety devices. The safety precautions actually taken and their adequacy shall be the sole responsibility of the CONTRACTOR, acting at his discretion as an independent contractor.

**3.10 ... PERFORMANCE AND PAYMENT BONDS.** Unless otherwise specified, it is further agreed by the parties to this Contract that the CONTRACTOR will execute separate performance and payment bonds, each in the sum of one hundred percent (100%) of the total contract price, in standard forms for this purpose, guaranteeing faithful performance of the work and the fulfillment of any guarantees required, and further guaranteeing payment to all persons supplying labor and materials or furnishing him any equipment in the execution of the Contract, and it is agreed that this contract shall not be in effect until such performance and payment bonds are furnished and approved by the OWNER.

Unless otherwise approved in writing by the OWNER, the surety company underwriting the bonds shall be acceptable according to the latest list of companies holding certificates of authority from the Secretary of the Treasury of the United States.

Unless otherwise specified, the cost of the premium for the performance and payment bonds shall be included in the CONTRACTOR'S proposal.

**3.11 ... LOSSES FROM NATURAL CAUSES.** Unless otherwise specified, all loss or damage to the CONTRACTOR arising out of the nature of the work to be done, or from the action of the elements, or from any unforeseen circumstance in the prosecution of the same, or from unusual obstructions or difficulties which may be encountered in the prosecution of the work, shall be sustained and borne by the CONTRACTOR at his own cost and expense.

**3.12 ... PROTECTION OF ADJOINING PROPERTY.** The said CONTRACTOR shall take proper means to protect the adjacent or adjoining property or properties in any way encountered, which might be injured or seriously affected by any process of construction to be undertaken under this Agreement, from any damage or injury by reason of said process of construction; and he shall be liable for any and all claims for such damage on account of his failure to fully protect all adjoining property. The CONTRACTOR agrees to indemnify, save and hold harmless the OWNER and ENGINEER against any claim or claims for damages due to any injury to any adjacent or adjoining property, arising or growing out of the performance of the contract; but any such indemnity shall not apply to any claim of any kind arising out of the existence or character of the work.

**3.13 ... PROTECTION AGAINST CLAIMS OF SUB-CONTRACTORS, LABORERS, MATERIALMEN AND FURNISHERS OF MACHINERY, EQUIPMENT AND SUPPLIES.** The CONTRACTOR agrees that he will indemnify and save the OWNER and ENGINEER harmless from all claims growing out of the demands of sub-contractors, laborers, workmen, mechanics, materialmen and furnishers of machinery and parts thereof, equipment, power tools, and all supplies, including commissary, incurred in the furtherance of the performance of this contract. When so desired by the OWNER, the CONTRACTOR shall furnish satisfactory evidence that all obligations of the nature hereinabove designated have been paid, discharged or waived. If the CONTRACTOR fails so to do, then the OWNER may at the option of the CONTRACTOR either pay directly any unpaid bills, of which the OWNER has written notice, or withhold from the CONTRACTOR'S unpaid compensation a sum of money deemed reasonably sufficient to liquidate any and all such lawful claims until satisfactory evidence is furnished that all liabilities have been fully discharged, whereupon payments to the CONTRACTOR shall be resumed in full, in accordance with the terms of this contract, but in no event shall the provisions of this sentence be construed to impose any obligation upon the OWNER by either the CONTRACTOR or his Surety.

**3.14 ... PROTECTION AGAINST ROYALTIES OR PATENTED INVENTION.** The CONTRACTOR shall pay all royalties and license fees, and shall provide for the use of any design, device, material or process covered by letters patent or copyright by suitable legal agreement with the patentee or owner. The CONTRACTOR shall defend all suits or claims for infringement of any patent or copyright rights and shall indemnify and save the OWNER and ENGINEER harmless from any loss on account thereof, except that the OWNER shall defend all such suits and claims and shall be responsible for all such loss when a particular design, device, material or process or the product of a particular manufacturer or manufacturers is specified or required by the OWNER; provided however, if choice of alternate design, device, material or process is allowed to the CONTRACTOR, the CONTRACTOR shall indemnify and save OWNER harmless from any loss on account thereof. If the material or process specified or required by the OWNER is an infringement, the CONTRACTOR shall be responsible for such loss unless he promptly gives such information the OWNER.

**3.15 ... LAWS AND ORDINANCES.** The CONTRACTOR shall at all times observe and comply with all Federal, State and local laws, ordinances and regulations, which in any manner affect the contract or the work, and shall indemnify and save harmless the OWNER and ENGINEER against any claim arising from the violation of any such laws, ordinances, and regulations whether by the CONTRACTOR or his employees, except where such violations are called for by the provisions of the Contract Documents. If the CONTRACTOR observes that the plans and specifications are at variance therewith, he shall promptly notify the ENGINEER in writing, and any necessary changes shall be adjusted as provided in the contract for changes in the work. If the CONTRACTOR performs any work knowing it to be contrary to such laws,

ordinances, rules and regulations, and without such notice to the ENGINEER, he shall bear all costs arising therefrom. In case the OWNER is a body politic and corporate, the law from which it derives its powers, insofar as the same regulates the objects for which, or the manner in which, or the conditions under which the OWNER may enter into contract, shall be controlling, and shall be considered as part of this contract, to the same effect as though embodied herein.

**3.16 ... ASSIGNMENT AND SUBLETTING.** The CONTRACTOR further agrees that he will retain personal control and will give his personal attention to the fulfillment of this contract and that he will not assign by Power of Attorney, or otherwise, or sublet said contract without the written consent of the ENGINEER, and that no part or feature of the work will be sublet to anyone objectionable to the ENGINEER or the OWNER. The CONTRACTOR further agrees that the subletting of any portion or feature of the work, or materials required in the performance of this contract, shall not relieve the CONTRACTOR from his full obligations to the OWNER, as provided by this Agreement.

**3.17 ... INDEMNIFICATION.** The CONTRACTOR shall defend, indemnify and hold harmless the OWNER and the ENGINEER and their respective officers, agents and employees, from and against all damages, claims, losses, demands, suits, judgments and costs, including reasonable attorneys' fees and expenses, arising out of or resulting from the performance of the work, provided that any such damages, claim, loss, demand, suit, judgment, cost or expense:

.....(1) . . . is attributable to bodily injury, sickness, disease or death or to injury to or destruction of tangible property (other than the work itself) including the loss of use resulting therefrom; and

.....(2) . . . is caused in whole or in part by any negligent act or omission of the Contractor, any Subcontractor, anyone directly or indirectly employed by any one of them or anyone for whose acts any of them may be liable, regardless of whether or not it is caused in part by a party indemnified hereunder.

The obligation of the CONTRACTOR under this Paragraph shall not extend to the liability of the ENGINEER, his agents or employees arising out of the preparation or approval of maps, drawings, reports, surveys, Change Orders, designs or specifications, or the giving of or the failure to give directions or instructions by the ENGINEER, his agents or employees, provided such giving or failure to give is the primary cause of the injury or damage.

**3.18 ... INSURANCE.** The CONTRACTOR at his own expense shall purchase, maintain and keep in force such insurance as will protect him from claims set forth below which may arise out of or result from the CONTRACTOR'S operations under the Contract, whether such operations be by himself or by any Subcontractor or by anyone directly or indirectly employed by any of them, or by anyone for whose acts any of them may be liable:

.....(1) . . . Workmen's compensation claims, disability benefits and other similar employee benefit acts;

.....(2) . . . Claims for damages because of bodily injury, occupational sickness or disease, or death of his employees, and claims insured by usual bodily injury liability coverages;



- .....(3) . . . Claims for damages because of bodily injury, sickness or disease, or death of any person other than his employees, and claims insured by usual bodily injury liability coverages; and
- .....(4) . . . Claims for damages because of injury to or destruction of tangible property, including loss of use resulting therefrom.

**3.18.1 ... CERTIFICATE OF INSURANCE.** Before commencing any of the work, CONTRACTOR shall file with the OWNER valid Certificates of Insurance acceptable to the OWNER and the ENGINEER. Such Certificates shall contain a provision that coverages afforded under the policies will not be canceled until at least fifteen days' prior written notice has been given to the OWNER.

The CONTRACTOR shall also file with the OWNER valid Certificates of Insurance covering all sub-contractors.

## **4. PROSECUTION AND PROGRESS**

**4.01 ... TIME AND ORDER OF COMPLETION.** It is the meaning and intent of this contract, unless otherwise herein specifically provided, that the CONTRACTOR shall be allowed to prosecute his work at such times and seasons, in such order of precedence, and in such manner as shall be most conducive to economy of construction: provided, however, that the order and the time of prosecution shall be such that the work shall be substantially completed as a whole and in part, in accordance with this contract, the plans and specifications, and within the time of completion designated in the Proposal; provided, also, that when the OWNER is having other work done, either by contract or by his own force, the ENGINEER may direct the time and manner of constructing the work done under this contract, so that conflict will be avoided and the construction of the various works being done for the OWNER shall be harmonized.

The CONTRACTOR shall submit, at such times as may reasonably be requested by the ENGINEER schedules which shall show the order in which the CONTRACTOR proposes to carry on the work, with dates at which the CONTRACTOR will start the several parts of the work, and estimated dates of completion of the several parts.

**4.02 ... EXTENSION OF TIME.** Should the CONTRACTOR be delayed in the completion of the work by any act or neglect of the OWNER or ENGINEER, or of any employee of either, or by other contractors employed by the OWNER, or by changes ordered in the work, or by strikes, lockouts, fires, and unusual delays by common carriers, or unavoidable cause or causes beyond the CONTRACTOR'S control, or by any cause which the ENGINEER shall decide justifies the delay, then an extension of time shall be allowed for completing the work, sufficient to compensate for the delay, the amount of the extension to be determined by the ENGINEER, provided, however, that the CONTRACTOR shall give the ENGINEER prompt notice in writing of the cause of such delay.

**4.03 ... HINDRANCES AND DELAYS.** No claims shall be made by the CONTRACTOR for damages resulting from hindrances or delays from any cause (except where the work is stopped by order of the OWNER) during the progress of any portion of the work embraced in this contract. In case said work shall be stopped by the act of the OWNER, then

such expense as in the judgment of the ENGINEER is caused by such stoppage of said work shall be paid by the OWNER to the CONTRACTOR.

## **5. MEASUREMENT AND PAYMENT**

**5.01 ... QUANTITIES AND MEASUREMENTS.** No extra or customary measurements of any kind will be allowed, but the actual measured and/or computed length, area, solid contents, number and weight only shall be considered, unless specifically provided.

**5.02 ... ESTIMATED QUANTITIES.** This agreement, including the specifications, plans and estimate, is intended to show clearly all work to be done and material to be furnished hereunder. Where the estimated quantities are shown for the various classes of work to be done and material to be furnished under this contract, they are approximate and are to be used only as a basis for estimating the probable cost of the work and for comparing the proposals offered for the work. It is understood and agreed that the actual amount of work to be done and material to be furnished under this contract may differ somewhat from these estimates, and that where the basis for payment under this contract is the unit price method, payment shall be for the actual amount of such work done and the material furnished.

Where payment is based on the unit price method, the CONTRACTOR agrees that he will make no claim for damages, anticipated profits or otherwise on account of any differences which may be found between the quantities of work actually done, the material actually furnished under this contract and the estimated quantities contemplated and contained in the proposal; provided, however, that in case the actual quantity of any major item should become as much as twenty percent (20%) more than, or twenty percent (20%) less than the estimated or contemplated quantity for such items, then either party to this Agreement, upon demand, shall be entitled to a revised consideration upon the portion of the work above or below twenty percent (20%) of the estimated quantity.

A "Major Item" shall be construed to be any individual bid item incurred in the proposal that has a total cost equal to or greater than five percent (5%) of the total contract cost, computed on the basis of the proposal quantities and the contract unit prices.

Any revised consideration is to be determined by agreement between the parties, otherwise by the terms of this Agreement, as provided under "Extra Work."

**5.03 ... PRICE OF WORK.** In consideration of the furnishing of all the necessary labor, equipment and material, and the completion of all work by the CONTRACTOR, and on the completion of all work and of the delivery of all material embraced in this Contract in full conformity with the specifications and stipulations herein contained, the OWNER agrees to pay the CONTRACTOR the prices set forth in the Proposal hereto attached, which has been made a part of this contract. The CONTRACTOR hereby agrees to receive such prices in full for furnishing all material and all labor required for the aforesaid work, also for all expense incurred by him, and for well and truly performing the same and the whole thereof in the manner and according to this Agreement.

**5.04 ... PARTIAL PAYMENTS.** On or before the 10th day of each month, the CONTRACTOR shall prepare and submit to the ENGINEER for approval or modification a statement showing as completely as practicable the total value of the work done by the

CONTRACTOR up to and including the last day of the preceding month; said statement shall also include the value of all sound materials delivered on the site of the work that are to be fabricated into the work.

The OWNER shall then pay the CONTRACTOR on or before the 25th day of the current month the total amount of the approved statement, less ten percent (10%) of the amount thereof, which ten percent (10%) shall be retained until final payment, and further less all previous payments and all further sums that may be retained by the OWNER under the terms of this Agreement. It is understood, however, that in case the whole work be near to completion and some unexpected and unusual delay occurs due to no fault or neglect on the part of the CONTRACTOR, the OWNER may -- upon recommendation of the ENGINEER -- pay a reasonable and equitable portion of the retained percentage to the CONTRACTOR, or the CONTRACTOR at the OWNER'S option, may be relieved of the obligation to fully complete the work and, thereupon, the CONTRACTOR shall receive payment of the balance due him under the contract subject only to the conditions stated under "Final Payment".

**5.05 ... USE OF COMPLETED PORTIONS.** The OWNER shall have the right to take possession of and use any completed or partially completed portions of the work, notwithstanding the time for completing the entire work or such portions may not have expired but such taking possession and use shall not be deemed an acceptance of any work not completed in accordance with the Contract Documents. If such prior use increases the cost of or delays the work, the CONTRACTOR shall be entitled to such extra compensation, or extension of time, or both, as the ENGINEER may determine.

The CONTRACTOR shall notify the ENGINEER when, in the CONTRACTOR'S opinion, the contract is "substantially completed" and when so notifying the ENGINEER, the CONTRACTOR shall furnish to the ENGINEER in writing a detailed list of unfinished work. The ENGINEER will review the CONTRACTOR'S list of unfinished work and will add thereto such items as the CONTRACTOR has failed to include. The "substantial completion" of the structure or facility shall not excuse the CONTRACTOR from performing all of the work undertaken, whether of a minor or major nature, and thereby completing the structure or facility in accordance with the Contract Documents.

**5.06 ... FINAL COMPLETION AND ACCEPTANCE.** Within ten (10) days after the CONTRACTOR has given the ENGINEER written notice that the work has been completed, or substantially completed, the ENGINEER and the OWNER shall inspect the work and within said time, if the work be found to be completed or substantially completed in accordance with the Contract Documents, the ENGINEER shall issue to the OWNER and the CONTRACTOR his Certificate of Completion, and thereupon it shall be the duty of the OWNER within ten (10) days to issue a Certificate of Acceptance of the work to the CONTRACTOR or to advise the CONTRACTOR in writing of the reason for non-acceptance.

**5.07 ... FINAL PAYMENT.** Upon the issuance of the Certificate of Completion, the ENGINEER shall proceed to make final measurements and prepare final statement of the value of all work performed and materials furnished under the terms of the Agreement and shall certify same to the OWNER, who shall pay to the CONTRACTOR on or after the 30th day, and before the 35th day, after the date of the Certificate of Completion, the balance due the CONTRACTOR under the terms of this Agreement, provided he has fully performed his contractual obligations under the terms of this contract; and said payment shall become due in any event upon said performance by the CONTRACTOR. Neither the Certificate of Acceptance nor the final

payment, nor any provision in the Contract Documents, shall relieve the CONTRACTOR of the obligation for fulfillment of any warranty which may be required.

**5.08 ... PAYMENTS WITHHELD.** The OWNER may, on account of subsequently discovered evidence, withhold or nullify the whole or part of any certificate to such extent as may be necessary to protect himself from loss on account of:

- .....(a) .....Defective work not remedied
- .....(b) .....Claims filed or reasonable evidence indicating probable filing of claims.
- .....(c) .....Failure of the CONTRACTOR to make payments properly to subcontractors or for material or labor.
- .....(d) .....Damage to another contractor.
- .....(e) .....Reasonable doubt that the work can be completed for the unpaid balance of the contract amount.
- .....(f) .....Reasonable indication that the work will not be completed within the contract time.

When the above grounds are removed or the CONTRACTOR provides a Surety Bond satisfactory to the OWNER, which will protect the OWNER in the amount withheld, payment shall be made for amounts withheld because of them.

**5.09 ... DELAYED PAYMENTS.** Should the OWNER fail to make payment to the CONTRACTOR of the sum named in any partial or final statement, when payment is due, then the OWNER shall pay to the CONTRACTOR, in addition to the sum shown as due by such statement, interest thereon at the rate of six percent (6%) per annum, unless otherwise specified, from date due as provided under "Partial Payments" and "Final Payments", until fully paid, which shall fully liquidate any injury to the CONTRACTOR growing out of such delay in payment, but the right is expressly reversed to the CONTRACTOR in the event payments be not promptly made, as provided under "Partial Payments", to at any time thereafter treat the contract as abandoned by the OWNER and recover compensation, as provided under "Abandonment of Contract", unless such payments are withheld in accordance with the provisions of "Payments Withheld".

## **6. EXTRA WORK AND CLAIMS**

**6.01 ... CHANGE ORDERS.** Without invalidating this Agreement, the OWNER may, at any time or from time to time, order additions, deletions or revisions to the work; such changes will be authorized by Change Order to be prepared by the ENGINEER for execution by the OWNER and the CONTRACTOR. The Change Order shall set forth the basis for any change in contract price, as hereinafter set forth for Extra Work, and any change in contract time which may result from the change.

In the event the CONTRACTOR shall refuse to execute a Change Order which has been prepared by the ENGINEER and executed by the OWNER, the ENGINEER may in writing instruct the CONTRACTOR to proceed with the work as set forth in the Change Order and the CONTRACTOR may make claim against the OWNER for Extra Work involved therein, as hereinafter provided.

**6.02 ... MINOR CHANGES.** The ENGINEER may authorize minor changes in the work not inconsistent with the overall intent of the Contract Documents and not involving an increase in Contract Price. If the CONTRACTOR believes that any minor change or alteration authorized by the ENGINEER involves Extra Work and entitles him to an increase in the Contract Price, the CONTRACTOR shall make written request to the ENGINEER for a written Field Order.

In such case, the CONTRACTOR by copy of his communication to the ENGINEER or otherwise in writing shall advise the OWNER of his request to the ENGINEER for a written Field Order and that the work involved may result in an increase in the Contract Price.

Any request by the CONTRACTOR for a change in Contract Price shall be made prior to beginning the work covered by the proposed change.

**6.03 ... EXTRA WORK.** It is agreed that the basis of compensation to the CONTRACTOR for work either added or deleted by a Change Order for which a claim for Extra Work is made shall be determined by one or more of the following methods:

.....Method (A) - ... By agreed unit prices; or

.....Method (B) - ... By agreed lump sum; or

.....Method (C) - ...If neither Method (A) nor Method (B) be agreed upon before the Extra work is commenced, then the CONTRACTOR shall be paid the "actual field cost" of the work, plus fifteen percent (15%).

In the event said Extra Work be performed and paid for under Method (C), then the provisions of this paragraph shall apply, and the "actual field cost" is hereby defined to include the cost to the CONTRACTOR of all workmen, such as foreman, timekeepers, mechanics and laborers, and materials, supplies, teams, trucks, rentals on machinery and equipment, for the time actually employed or used on such Extra Work, plus actual transportation charges necessarily incurred, together with all power, fuel, lubricants, water and similar operating expenses, also all necessary incidental expenses incurred directly on account of such Extra Work, including Social Security, Old Age Benefits and other payroll taxes, and a rateable proportion of premiums on Performance and Payment Bonds and Maintenance Bonds, Public Liability and Property Damage and Workmen's Compensation and all other insurance as may be required by any law or ordinance or directed by the OWNER or by them agreed to. The ENGINEER may direct the form in which accounts of the "actual field cost" shall be kept and the records of these accounts shall be made available to the ENGINEER. The ENGINEER or OWNER may also specify in writing, before the work commences, the method of doing the work and the type and kind of machinery and equipment to be used; otherwise these matters shall be determined by the CONTRACTOR. Unless otherwise agreed upon, the prices for the use of machinery and equipment shall be determined by using one hundred percent (100%), unless otherwise specified, of the latest schedule of Equipment Ownership Expense adopted by the Associated General Contractors of America. Where practicable the terms and prices for the use of machinery and equipment shall be incorporated in the Written Extra Work Order. The fifteen percent (15%) of the "actual field cost" to be paid the CONTRACTOR shall cover and compensate him for his profit, overhead, general superintendence and field office expense, and all other elements of cost and expense not embraced within the "actual field cost" as herein defined, save that where the CONTRACTOR'S Camp or Field Office must be maintained primarily on account of such Extra Work; then the cost to maintain and operate the same shall be included in the "actual field cost".

No claim for Extra Work of any kind will be allowed unless ordered in writing by the ENGINEER. In case any orders or instructions, either oral or written, appear to the CONTRACTOR to involve Extra Work for which he should receive compensation or an adjustment in the construction time, he shall make written request to the ENGINEER for written order authorizing such Extra Work. Should a difference of opinion arise as to what does or does not constitute Extra Work, or as to the payment therefor, and the ENGINEER insists upon its performance, the CONTRACTOR shall proceed with the work after making written request for written order and shall keep an accurate account of the "actual field cost" thereof, as provided under Method (C). The CONTRACTOR will thereby preserve the right to submit the matter of payment to arbitration, as herein below provided.

**6.04 ... TIME OF FILING CLAIMS.** It is further agreed by both parties hereto that all questions of dispute or adjustment presented by the CONTRACTOR shall be in writing and filed with the ENGINEER within thirty (30) days after the ENGINEER has given any directions, order or instruction to which the CONTRACTOR desires to take exception. The ENGINEER shall reply within thirty (30) days to such written exceptions by the CONTRACTOR and render his final decision in writing. In case the CONTRACTOR should appeal from the ENGINEER'S decision, any demand for arbitration shall be filed with the ENGINEER and the OWNER in writing within ten (10) days after the date of delivery to CONTRACTOR of the ENGINEER'S final decision. It is further agreed that final acceptance of the work by the OWNER and the acceptance by the CONTRACTOR of the final payment shall be a bar to any claims by either party, except where noted otherwise in the Contract Documents.

**6.05 ... ARBITRATION.** All questions of dispute under this Agreement shall be submitted to arbitration at the request of either party to the dispute. The parties may agree upon one arbiter, otherwise, there shall be three, one named in writing by each party, and the third chosen by the two arbiters so selected; or if the arbiters fail to select a third within ten (10) days, he shall be chosen by a District Judge serving the County in which the major portion of the project is located, unless otherwise specified. Should the party demanding arbitration fail to name an arbiter within ten (10) days of the demand, his right to arbitrate shall lapse, and the decision of the ENGINEER shall be final and binding on him. Should the other party fail to choose an arbiter within ten (10) days, the ENGINEER shall appoint such arbiter. Should either party refuse or neglect to supply the arbiters with any papers or information demanded in writing, the arbiters are empowered by both parties to take ex parte proceedings.

The arbiters shall act with promptness. The decision of any two shall be binding on both parties to the contract. The decision of the arbiters upon any question submitted to arbitration under this contract shall be a condition precedent to any right of legal action. The decision of the arbiter or arbiters may be filed in court to carry it into effect.

The arbiters, if they deem the case demands it, are authorized to award the party whose contention is sustained, such sums as they deem proper for the time, expense and trouble incident to the appeal, and if the appeal was taken without reasonable cause, they may award damages for any delay occasioned thereby. The arbiters shall fix their own compensation, unless otherwise provided by agreement, and shall assess the cost and charges of the arbitration upon either or both parties. The award of the arbiters must be made in writing.

## **7. ABANDONMENT OF CONTRACT**

**7.01 ... ABANDONMENT BY CONTRACTOR.** In case the CONTRACTOR should abandon and fail or refuse to resume work within ten (10) days after written notification from the OWNER, or the ENGINEER, or if the CONTRACTOR fails to comply with the orders of the ENGINEER, when such orders are consistent with the Contract Documents, then, and in that case, where performance and payment bonds exist, the Sureties on these bonds shall be notified in writing and directed to complete the work, and a copy of said notice shall be delivered to the CONTRACTOR.

After receiving said notice of abandonment, the CONTRACTOR shall not remove from the work any machinery, equipment, tools, materials or supplies then on the job; but the same, together with any materials and equipment under contract for the work, may be held for use on the work by the OWNER or Surety on the performance bond, or another contractor in completion of the work; and the CONTRACTOR shall not receive any rental or credit therefor (except when used in Work and Claims), it being understood that the use of such equipment and materials will ultimately reduce the cost to complete the work and be reflected in the final settlement.

Where there is no performance bond provided or if the Surety should fail to commence compliance with the notice for completion herein before provided for, within ten (10) days after service of such notice, then the OWNER may provide for completion of the work in either of the following elective manners:

**7.01.1** The OWNER may thereupon employ such force of men and use such machinery, equipment, tools, materials and supplies as said OWNER may deem necessary to complete the work and charge the expense of such labor, machinery, equipment, tools, materials and supplies to said CONTRACTOR, and expense so charged shall be deducted and paid by the OWNER out of such moneys as may be due, or that may thereafter at any time become due to the CONTRACTOR under and by virtue of this Agreement. In case such expense is less than the sum which would have been payable under this contract, if the same had been completed by the CONTRACTOR, then said CONTRACTOR shall receive the difference. In case such expense is greater than the sum which would have been payable under this contract, if the same had been completed by said CONTRACTOR, then the CONTRACTOR and/or his Surety shall pay the amount of such excess to the OWNER; or

**7.01.2** The OWNER under sealed bids, after five (5) days' notice published one or more times in a newspaper having general circulation in the county of the location of the work, may let the contract for the completion of the work under substantially the same terms and conditions which are provided in this contract. In case any increase in cost to the OWNER under the new contract as compared to what would have been the cost under this contract, such increase shall be charged to the CONTRACTOR and Surety shall be and remain bound therefor. However, should the cost to complete any such contract prove to be less than what would have been the cost to complete under this contract, the CONTRACTOR and/or his Surety shall be credited therewith.

When the work shall have been substantially completed the CONTRACTOR and his Surety shall be so notified and Certificates of Completion and Acceptance, as provided in Paragraph 5.06 hereinabove, shall be issued. A complete itemized statement of the contract accounts, certified to by the ENGINEER as being correct, shall then be prepared and delivered to

the CONTRACTOR and his Surety, whereupon the CONTRACTOR and/or his Surety, or the OWNER as the case may be, shall pay the balance due as reflected by said statement, within thirty (30) days after the date of such completion.

In the event the statement of accounts shows that the cost to complete the work is less than that which would have been the cost to the OWNER had the work been completed by the CONTRACTOR under the terms of this contract; or when the CONTRACTOR and/or his Surety shall pay the balance shown to be due by them to the OWNER, then all machinery, equipment, tools, materials or supplies left on the site of the work shall be turned over to the CONTRACTOR and/or his Surety. Should the cost to complete the work exceed the contract price, and the CONTRACTOR and/or his Surety fail to pay the amount due the OWNER within the time designated hereinabove, and there remains any machinery, equipment, tools materials or supplies on the site of the work, notice thereof, together with an itemized list of such equipment and materials shall be mailed to the CONTRACTOR and his Surety at the respective addresses designated in this contract, provided, however, that actual written notice given in any manner will satisfy this condition. After mailing, or other giving of such notice, such property shall be held at the risk of the CONTRACTOR and his Surety subject only to the duty of the OWNER to exercise ordinary care to protect such property. After fifteen (15) days from the date of said notice, the OWNER may sell such machinery, equipment, tools, materials or supplies and apply the net sum derived from such sale to the credit of the CONTRACTOR and his Surety. Such sale may be made at either public or private sale, with or without notice, as the OWNER may elect. The OWNER shall release any machinery, equipment, tools, materials, or supplies, which remain on the work, and belong to persons other than the CONTRACTOR or his Surety, to their proper owners. The books on all operations provided herein shall be open to the CONTRACTOR and his Surety.

**7.02 ... ABANDONMENT BY OWNER.** In case the OWNER shall fail to comply with the terms of this contract, and should fail or refuse to comply with said terms within ten (10) days after written notification by the CONTRACTOR, then the CONTRACTOR may suspend or wholly abandon the work, and may remove therefrom all machinery, tools and equipment, and all materials on the site of work that have not been included in payments to the CONTRACTOR and have not been wrought into the work. And thereupon the ENGINEER shall make an estimate of the total amount earned by the CONTRACTOR, which estimate shall include the value of all work actually completed by said CONTRACTOR (at the prices stated in the attached proposal where unit prices are used), the value of all partially completed work at a fair and equitable price, and the amount of all Extra Work performed at the prices agreed upon, or provided for by the terms of this contract, and a reasonable sum to cover the cost of any provisions made by the CONTRACTOR to carry the whole work to completion and which cannot be utilized. The ENGINEER shall then make a final statement of the balance due the CONTRACTOR by deducting from the above estimate all previous payments by the OWNER and all other sums that may be retained by the OWNER under the terms of this Agreement and shall certify same to the OWNER who shall pay to the CONTRACTOR on or before thirty (30) days after the date of the notification by the CONTRACTOR the balance shown by said final statement as due the CONTRACTOR, under the terms of this Agreement.



## **SPECIAL CONDITIONS**



# **LEVI WATER SUPPLY CORPORATION, TEXAS**

## **Falls County Water Plant Site**

### **SPECIAL CONDITIONS**

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**LEVI WATER SUPPLY CORPORATION**  
**FALLS COUNTY WATER PLANT SITE**  
**SPECIAL CONDITIONS**

SC.01      GENERAL

The provisions of this section of the specifications shall govern in the event of any conflict between them and the “General Conditions of Agreement.”

SC.02      DEFINITIONS

Agreement. “Agreement” shall mean the contract document as herein set forth.

Calendar Day. “Calendar Day” shall mean any day of the week or month, no days being excepted.

Extra Work. “Extra Work” shall mean and include all work that may be required by the Owner to be done by the Contractor to accomplish any change, alteration, or addition to the work shown on the plans or reasonably implied by the specifications, and not covered by the Contractor’s proposal.

Parties. The parties to this agreement are the Owner and the Contractor.

Project. “Project” shall mean the work embraced by this agreement, including the Plans and Specifications, General and Special Conditions, Performance and Payment Bonds attached hereto; generally described as follows:

**FALLS COUNTY WATER PLANT SITE**

which shall be built, constructed and installed in compliance with the Contract Documents and the Plans and Specifications prepared by the Engineer.

Subcontractor. “Subcontractor” shall mean only those having a direct contract with the Contractor for performance of work on the project contemplated by these contract documents.

Substantially Completed. “Substantially Completed” shall mean that the project contemplated by the contract documents has been made suitable for use or occupancy, or the facility is in a condition to serve its intended purpose; but still may require minor miscellaneous work and adjustment, provided, however, that final payment of the contract price including retainage, shall not be made until completion of all punch list items and upon acceptance by the Owner. Acceptance by the Owner shall not impair any warranty obligation of the Contractor.

Work. “Work” or “Scope or Work” shall mean the Falls County Water Plant Site as more fully described in the Scope of Work contained in SC.06.

SC.03      ENGINEER

The word “Engineer” in these specifications shall be understood as referring to Kasberg, Patrick & Associates, LP, Consulting Engineers; 11 South 2<sup>nd</sup> Street; Temple, Texas 76501, Engineer of the Owner, or such other representatives as may be authorized by said Owner to act in any particular position.

SC.04      LOCATION OF PROJECT

The project is located in northern Falls County. A location map is provided in the plans.

SC.05      EXAMINATION OF SITE OF PROJECT

Prospective bidders shall make a careful and thorough examination of the site of the project, including all soil and water conditions to be encountered, improvements to be protected, disposal sites for surplus materials, arrangements necessary for providing ingress and egress to private properties and methods of handling traffic during prosecution of all the work involved.

SC.06      SCOPE OF WORK

The work to be performed under this contract consists of furnishing all materials, labor, supervision, tools, equipment, testing and incidentals required, and performing all work necessary for construction of the Falls County Water Plant Site.

SC.07      FORMS, PLANS AND SPECIFICATIONS

Plans, specifications and bidding documents will be provided electronically by pdf. Hard copies may be obtained at the office of Kasberg, Patrick & Associates, LP; 11 South 2<sup>nd</sup> Street; Temple, TX 76501 for a non-refundable cost of \$100.00 per set, checks made payable to Kasberg, Patrick & Associates, LP.

SC.08      COPIES OF PLANS AND SPECIFICATIONS FURNISHED

Five (5) sets of plans and specifications shall be furnished to the successful Contractor, at no charge, for construction purposes. Additional copies may be obtained at the cost of reproduction upon request.

SC.09      PRE-BID CONFERENCE

Prior to receiving bids on this project, the Owner will conduct a Non-MANDATORY pre-bid conference with all prospective bidders and other interested parties. The pre-bid conference will be at the Levi WSC Office located at 2757 Rosenthal Parkway; Lorena, TX 76655 at 3:00 p.m. on Wednesday, July 29, 2026.

SC.10      ADDENDA

Bidders desiring further information or interpretation of the plans and specifications must make request for such information to the Engineer as outlined in this Section and in the Instructions to Bidders for Construction. Answers to all such requests will be given in writing to all Plan Holders (persons who have made deposit for received plans and specifications) in addendum form and all addenda will be bound with and made a part of the contract documents. No other explanation or interpretation will be considered official or binding.

All addenda will be issued via e-mail to the e-mail address included in the "Plan Holders List".

In order that all plan holders will have equal access to information on this project, all requests to the Engineer for information or interpretation of the plans and specifications must be received before noon on Tuesday, August 11, 2026. If there is a need to clarify any requests at that time, the Engineer will issue a written addendum. After noon on Tuesday, August 11, 2026, the Engineer and Owner will not attempt to further clarify any written or oral requests.

#### SC.11 PREPARATION OF PROPOSAL

The Bidder shall submit his proposal on the forms furnished. All blank spaces in the form shall be correctly filled in and the bidder shall state the price, both in words and numerals, for which he proposes to do the work contemplated or furnish the materials required. Such prices shall be written in ink, distinctly and legibly, or typewritten. In cases of discrepancy between the price written in words and the price written in figures, the price written in words shall govern. If the proposal is submitted by an individual, his name must be signed by him or his duly authorized agent. If a proposal is submitted by a firm, association, or partnership, the name and address of each member must be given and the proposal signed by a member of the firm, association or partnership, or person duly authorized. If the proposal is submitted by a company or corporation, the company or corporate name and business address must be given, and the proposal signed by an official or duly authorized agent. Powers of attorney authorizing agents or others to sign proposal must be properly certified and must be in writing and submitted with the proposal. The proposal shall be executed in ink.

Each proposal shall be enclosed in a sealed envelope, addressed as specified in the Notice to Contractors, and endorsed on the outside of the envelope in the following manner:

- a. Bidder's name.
- b. Proposal for "Falls County Water Plant Site"

Bid proposal may be withdrawn and resubmitted at any time prior to the time set for opening of the bids, but no proposal may be withdrawn or altered after the opening of the bids.

#### SC.12 ALTERNATE BIDS

Add alternate bids are included in the Bid Schedule. The Owner reserves the right to award the project based on any combination of Base Bid and Add Alternates.

SC.13

QUALIFICATION OF LOW BIDDER

Prior to award of contract, the bidder shall submit such evidence as the Owner may require to establish the bidder's qualifications to satisfactorily perform the work included in this project. Information that may be required shall include (1) the bidder's current financial statement including amount of funds readily available to commence and carry out the work, (2) a list of equipment available for this project, (3) a list of projects that of the same general type as included in this contract, together with the names, addresses and phone numbers of persons familiar with this work, and (4) other information that may be pertinent to the bidder's qualifications.

Should the bidder fail to promptly produce evidence satisfactory to the Owner on any of the foregoing points, he may be disqualified and the work awarded to the next bidder so qualifying.

SC.14

AWARD OF CONTRACT

It is the intention of the Owner to award a contract on the basis of the lowest acceptable bid submitted by a qualified bidder as determined by the Owner. The right is reserved, as the interest of the Owner may require, to reject any and all bids and to waive any informality in bids received.

The Levi Water Supply Corporation will notify the successful bidder, in writing, within sixty (60) days of the date of receiving bids, of its acceptance of his proposal. The Contractor shall complete the execution of the required Bond and Contract within ten (10) days of such notice.

SC.15

SEQUENCE OF CONSTRUCTION

The time allotted for completion of this project is described under Section SC.16 of these Special Conditions.

Prior to beginning construction on this project, the Contractor shall prepare a written construction sequence and schedule for review by the Engineer and approval by the Owner. This construction sequence and schedule shall be followed by the Contractor unless changes are approved by the Owner.

Contractor shall take into account the necessary TCEQ and operational requirements included in the plan sheets and specifications when preparing their schedule.

No partial payment estimates will be issued until the Sequence and Schedule of Construction has been approved.

SC.16

TIME ALLOTTED FOR COMPLETION AND NOTICE TO PROCEED

The construction of the project shall be fully completed in 365 calendar days. The Notice to Proceed shall consist of a written request by the Engineer for the Contractor to proceed with the construction of the project.



SC.17      PRECONSTRUCTION CONFERENCE

After award of bid and prior to beginning construction, a conference will be held with representatives of the Contractor, Owner, Engineer, and the affected Utility Companies to discuss schedules and utility conflicts in the project. The purpose is to establish lines of communication between the parties involved. The time and place for the Preconstruction Conference shall be determined at the time of Bid Award.

SC.18      CONSTRUCTION IN PUBLIC ROADS AND PRIVATE DRIVES

No public or private road shall be entirely closed overnight. It shall be the responsibility of the Contractor to build and maintain all weather bypasses and detours, if necessary, and to properly light, barricade, and mark all bypasses and detours that might be required on and across the roads involved in the work included in this contract.

The Contractor shall be responsible for repair and maintenance of all roadways damaged as a result of the construction of this project for a period of one year after completion or acceptance of the work. Within this period of one year time, if it becomes necessary for the Owner to make such repairs, the Contractor shall reimburse the Owner for the cost of such repairs.

SC.19      REFERENCE SPECIFICATIONS

Where reference is made in these specifications to specifications compiled by others, such reference is made for expediency and standardization from the material supplier's point of view, and such specifications referred to are hereby made a part of these specifications.

SC.20      EXTENSION OF TIME

Contractor agrees he has submitted his proposal in full recognition of the time required for the completion of this project, taking into consideration the average climatic range and material manufacturing conditions prevailing in this locality, and has considered the liquidated damage provision herein, and that he shall not be entitled to, nor will he request, an extension of time on this contract, except when his work has been delayed by an act or neglect of the Owner, employees or representatives of the Owner, or other contractors employed by the Owner, or by changes ordered in the work, or reductions thereto in writing. The Contractor may apply in writing for an extension of time, submitting therewith all written justification as may be required by the Engineer for such and extension as requested by Contractor. The Engineer, within ten (10) days after receipt of a written request for an extension of time by the Contractor, which is supported by all requested documentation, shall decide if an extension of time shall be allowed.

## SC.21

LIQUIDATED DAMAGES FOR DELAY BY CONTRACTOR

The Contractor agrees that time is of the essence on this contract and that the Owner will be damaged as a result of any delay beyond the date agreed upon in the completion of all items of work herein specified and contracted for. The parties understand and agree that the actual damages will be sustained by the Owner because of such delay will be uncertain and difficult of ascertainment and it is further agreed that a reasonable estimate of the actual amount of such damages in light of the facts known to the parties at the time of execution of this contract will be two hundred and fifty dollars (\$ 250.00) per day. It is therefore agreed that the Owner may withhold permanently from the Contractor's total compensation, the total sum of \$ 250.00 per day as liquidated damages for delay for each day of delaying completion beyond the date agreed upon for completion of the items of work herein specified and contracted for (after due allowance for such extension of time as is provided for in the General Conditions of Agreement and in Paragraph SC.20).

## SC.22

DAMAGES

Article 3.08 of the General Conditions of Agreement is hereby voided and replaced with the following:

In the event the Contractor is damaged in the course of the completion of the work by the neglect, or default of the Owner, or representative of the Owner, or of any other Contractor employed by the Owner upon the work, thereby causing loss to the Contractor, the Owner agrees that he will reimburse the Contractor for such loss. In the event the Owner is damaged in the course of the work by the act, negligence, omission, mistake or default of the Contractor, or should the Contractor unreasonably delay the progress of the work being done by others on the job so as to cause loss for which the Owner becomes liable, then the Contractor shall reimburse the Owner for such loss.

## SC.23

OBJECTIONS AND TIME OF FILING CLAIMS

In Paragraph 6.04 of the General Conditions, add the following after the first sentence:

“Failure to file such an objection during such period shall constitute waiver thereof and consent to the decision rendered by the Engineer.”

Also, delete the third sentence, which deals with arbitration.

Also, in Paragraph 2.05 of the General Conditions, delete the last clause dealing with arbitration and insert:

“Failure to file such an objection during such period shall constitute waiver thereof and consent to the decision rendered by the Engineer.”

SC.24

MEDIATION

Article 6.05 of the General Conditions of Agreement is hereby voided and replaced with the following:

In an effort to resolve any conflicts that arise during the construction of the Project or following the completion of the Project, the Owner and the Contractor agree that all disputes between them arising out of or relating to this Agreement or the Project shall be submitted to nonbinding mediation unless the parties mutually agree otherwise.

The Owner and Contractor further agree to include a similar mediation provision in all agreements with their subcontractors, subconsultants, suppliers and fabricators, thereby providing for mediation as the primary method for dispute resolution between the parties to all those agreements.

SC.25

FEES AND ROYALTIES

All fees or royalties for any patented invention, process, article, or arrangement in any manner connected with the work, or with these specifications, shall be included in the price stated in the proposal.

SC.26

INDEMNITY

Contractor agrees to and shall indemnify and hold harmless Owner, its officers, agents and employees, from and against any and all claims, losses, damages, causes of action, suits, and liability of every kind, including all expenses damages, causes of action, suits, and liability of every kind, including all expenses of litigation, court costs, and attorney's fees, for injury to or death of any person, or for damage to any property, arising out of or in connection with the work done by Contractor under this contract, regardless of whether such injuries, death or damages are caused in whole or in part by the negligence of the Levi Water Supply Corporation.

Contractor assumes full responsibility for the work to be performed hereunder, and hereby releases, relinquishes and discharges Owner, its officers, agents and employees, from all claims, demands, and causes of action of every kind and character including the cost of defense thereof, for any injury to, including death of, person (whether they be third persons, contractor, or employees of either the parties hereto) and any loss of or damage to property (whether the same be that of either of the parties hereto or of third parties) caused by or alleged to be caused by, arising out of, or in connection with Contractor's work to be performed hereunder whether or not said claims, demands and causes of action in whole or in part are covered by insurance regardless of whether such loss, damage, or injury was caused by Owner. Owner, by this agreement does not give consent to litigation.

SC.27 LAWS TO BE OBSERVED

The Contractor shall, at his own expense, do those things necessary for the procurement of and shall procure all permits, certificates and licenses required of him by the law or governmental regulation for the performance of his work. He shall comply with all federal, state and local laws, ordinances or rules and regulations relating to the performance of his work. In addition to all other laws, ordinances and rules and regulations, these shall include any such laws, ordinances or rules and regulations relating to noise from the Contractor's operations.

SC.28 STATE AND CITY SALES TAXES

This contract is issued by an organization which qualifies for exemption provisions pursuant to Provisions of the Texas Tax Code. Sections 151.301, 151.307, 151.309 and 151.311. The Contractor must obtain a limited sales excise and use tax permit or exemption certificate which shall enable him to buy the materials to be incorporated into the work without paying the tax at the time of purchase.

SC.29 ANTITRUST

The Contractor hereby assigns to the Owner any and all claims for overcharges associated with this contract which arise under the antitrust laws of the United States, 15 U.S.C.A. Section 1, et seq, (1973).

SC.30 GUARANTY AGAINST DEFECTIVE WORK

The Contract shall indemnify the Owner against any repairs which may become necessary to any part of the work performed under each contract, arising from defective workmanship or material used therein, for a period of one (1) year from the date of final acceptance of the work, unless the technical specifications provide for another period.

Neither the Certificate of Acceptance nor any provision in the Contract Documents, nor partial or entire use, or occupancy of the premise by the Owner will constitute an acceptance of work not done in accordance with the Contract Documents or relieve the Contractor of liability in respect to any express warranties or responsibility for faulty materials.

SC.31 INSURANCE

Satisfactory certificates of insurance for all coverage listed herein shall be filed with the Owner prior to starting any construction work on this contract. Insurance shall include the Owner, the Engineer and the State of Texas as additional insured parties.  
Workmen's Compensation and Employer's Liability

- (A) **COMMERCIAL GENERAL LIABILITY INSURANCE:** Contractor shall maintain commercial general liability (CGL) insurance with limits of not less than \$1,000,000 each occurrence with a \$2,000,000 general aggregate, \$2,000,000 products-completed operations aggregate and \$1,000,000 personal & advertising injury. The CGL insurance general aggregate limit shall apply separately to this project. CGL insurance shall

cover liability including, but not limited to liability arising from premises, operations, independent contractors, products-completed operations, data liability, personal injury and advertising injury, broad form contractual liability and the explosion, underground and collapse hazards. Contractor, Owner and any other party required under the General Contract shall be included as an additional insured under the CGL policy with respect to ongoing and completed operations, using ISO Additional Insured Endorsements CG 20 10 10 01 and CG 20 37 10 01 or Additional Insured Endorsement(s) with equivalent coverage. A copy of the Contractor's Additional Insured Endorsement shall be provided to the Owner with the Certificate of Insurance. This insurance shall apply as primary insurance with respect to any other insurance or self-insurance programs maintained by Contractor, Owner or any other party named as an additional insured. Contractor waives all rights against Owner, and their agents, officers, directors and employees for recovery of damages to the extent these damages are covered by the CGL insurance maintained pursuant to this Attachment. The policy of insurance shall be endorsed to provide for 30 days written notice to the Owner and any other party required under the General Contract prior to the cancellation, nonrenewal or material change to the policy. Contractor shall maintain such CGL insurance as specified in this Paragraph for a period not less than the Statute of Repose of the state in which the work is performed. The General Aggregate limits applies Per Project.

- (B) **WORKERS COMPENSATION INSURANCE**: Contractor shall maintain workers compensation and employers liability insurance. The employers liability limits shall not be less than \$1,000,000 each accident for bodily injury by accident, \$1,000,000 each employee for bodily injury by disease and \$1,000,000 policy limit for bodily injury by disease. Contractor waives all rights against Owner, and their agents, officers, directors and employees for recovery of damages to the extent these damages are covered by the workers compensation policy insurance obtained by contractor pursuant to this Paragraph. The policy of insurance shall be endorsed to provide for 30 days written notice to the Cont Owner and any other party required under the General Contract prior to the cancellation, nonrenewal or material change to the policy.

The Owner and Contractor hereby acknowledge and agrees that: (a) the Contractor meets the qualifications of an independent contractor under Article 8308, Section 3.05 of the Texas Workers' Compensation Act (the "Act"); (1)) the contractor is operating as an independent contractor as that term is defined under Article 8308, Section 3.05 of the Act; (c) the contractor assumes the responsibilities of an employer for the performance of work including, but not limited to, the work required to be performed by contractor under this contract on the Project; and (d) the Contractor and Subcontractor's employees are not employees of the Owner for the purposes of the Act.

- (C) **BUSINESS AUTO LIABILITY INSURANCE**: Contractor shall maintain business auto liability insurance a limit of not less than \$1,000,000 each accident. Such insurance shall cover liability arising from the operation of

any motor vehicle (including owned, hired and non-owned autos) by contractor, its agents, employees or assigns. Owner, and any other party required under the General Contract shall be included as an additional insured under this policy. Contractor waives all rights against Owner, and their agents, officers, directors and employees for recovery of damages to the extent these damages are covered by the business auto liability insurance obtained by contractor pursuant to this Paragraph. This insurance shall apply as primary insurance with respect to any other insurance or self-insurance programs maintained by Contractor, Owner or any other party named as an additional insured. The policy of insurance shall be endorsed to provide for 30 days written notice to the Owner and any other party required under the General Contract prior to the cancellation, nonrenewal or material change to the policy.

- (D) **UMBRELLA LIABILITY INSURANCE:** If necessary, Subcontractor shall maintain umbrella liability insurance with a limit of not less than \$5,000,000 per occurrence with a \$5,000,000 aggregate. Such insurance shall be excess of the commercial general liability insurance, business auto liability insurance and employers liability insurance as specified in this Paragraph. Contractor, Owner and any other party required under the General Contract shall be included as an additional insured under this policy. This insurance will apply as primary insurance with respect to any other insurance or self-insurance programs maintained by the Contractor, Owner or any other party named as an additional insured. The policy aggregate shall apply separately to each project. Contractor waives all rights against Owner, and their agents, officers, directors and employees for recovery of damages to the extent these damages are covered by the umbrella insurance obtained by contractor pursuant to this Paragraph. The policy of insurance shall be endorsed to provide for 30 days written notice to the Owner and any other party required under the General Contract prior to the cancellation, nonrenewal or material change to the policy.
- (E) **EVIDENCE OF INSURANCE:** All policies of insurance shall be written through a company duly authorized to write that class of insurance in the state of Texas, and shall be with insurance companies acceptable to Contractor with an A.M. Best rating of A- 7 or better. Prior to commencing the contract Work, contractor shall not later than ten (10) days after execution of the subcontract deliver to the Owner certificate(s) of insurance executed by a duly authorized representative of each insurer, showing compliance with the insurance requirements set forth above. Attached to the certificates of insurance shall be the additional insured endorsements, waiver of subrogation endorsements and cancellation / material change endorsements as specified for each policy of insurance. Acceptance by Owner of a certificate of insurance provided by the contractor shall not relieve the contractor of its obligation to provide the insurance and policies with the coverages and limits as required in the Contract documents and this contract, even if said insurance policies, limits and coverages are not shown in the Certificates of Insurance. Owner acknowledges that Contractor may rely and will rely upon the contractor carrying all insurance and policies with limits and coverages as reflected in the Certificate of Insurance, even if said insurance, policies, limits and coverages are not required by the General

Contract. Contractor's failure to maintain the required insurance may result in termination of this contract at Owners option. If contractor fails to maintain the insurance as set forth herein, Owner shall have the right, but not the obligation, to purchase said insurance at contractor's expense. At the request of the Owner, the contractor shall provide certified copies of all insurance policies referred to in Paragraphs (A) through (D).

- (F) **INSURANCE INDEPENDENT OBLIGATION:** The insurance requirements set out in Paragraphs (A) through (D) are independent from any other insurance coverage required by any other provision of this contract.
- (G) **SUBCONTRACTOR'S INSURANCE:** contractor shall cause each subcontractor employed by contractor to purchase and maintain insurance of the types specified above. contractor shall furnish copies of certificates of insurance evidencing coverage for each subcontractor.
- (H) All of said policies of insurance shall also cover and include all contractually assumed liability of contractor under this contract. Contractor's liabilities under this contract shall not in any way be limited by or to the limits provided in or the risks covered by said policies of insurance.
- (I) **It is further agreed that failure of the contractor to comply with the above referenced requirements put them in default of this contract Agreement, which could, in turn, put the Contractor in default of the Contract. Therefore, any and all penalties given to the Contractor because of the failure of the Subcontractor to comply with this ruling shall be charged directly to the contractor.**
- (J) **Builders' Risk:** Contractor is responsible for all materials on job site until work is completed and accepted.

SC.32

#### PAYMENTS TO CONTRACTOR

##### Progress Payments

Article 5.04 of the General Conditions of Agreement, is hereby voided and replaced by the following:

The Contractor shall prepare a requisition for progress payment as of the last day of the month and submit it to the Engineer. On or before the 10th day of each month, the Engineer shall prepare a statement showing as completely as practicable the total value of the work done by the Contractor up to and including the last day of the preceding month; said statement shall also include the invoice value of all sound materials delivered, and properly stored and protected, on the site of the work that are to be fabricated into the work.

The Owner shall then pay the Contractor on or before the 25th day of the current month the total amount of the approved statement. The amount of the payment due the Contractor shall be determined by adding to the total

value of work completed to date, the value of materials properly stored on the site and deducting (1) five percent (5%) of the total amount, as a retainage and (2) the amount of all previous payments. The total value of work completed to date shall be based on the estimated quantities of work completed and on the unit process contained in the agreement and adjusted by approved change orders. The value of materials properly stored on the site shall be based upon the estimated quantities of such materials and the invoice prices. Copies of all invoices shall be furnished to the Engineer.

The Contractor shall be responsible for the care and protection of all materials and work upon which payments have been made until final acceptance of such work and materials by the Owner. Such payment shall not constitute a waiver of the right of the Owner to require the fulfillment of all terms of the Contract and the delivery of all improvements embraced in this Contract complete and satisfactory to the Owner in all details.

The payment of retainage shall be governed by Section 5.07 of the General Conditions.

#### Withholding Payments

The Owner may withhold from any payment otherwise due the Contractor so much as may be necessary to protect the Owner and if so elects may also withhold amounts due from the Contractor to any subcontractors or material dealers, for work performed or material furnished by them. The foregoing provisions shall be construed solely for the benefit of the Owner and will not require the Owner to determine or adjust any claims or disputes between the Contractor and his subcontractors or material dealers, or to withhold any moneys for their protection unless the Owner elects to do so. The failure or refusal of the Owner to withhold any moneys from the Contractor shall in no way impair the obligations of any surety or sureties under any bond or bonds furnished under this Contract.

#### Separate Payment

Except as modified by Change Orders subsequent to execution of the Contract for this proposed work, no separate payment shall be made for work described in these Specifications or shown on the Plans. Total compensation to the Contractor shall be as set forth in the various Bid Items in the Proposal and Bid Schedule.

The Owner, before paying the final estimate, may require the Contractor to furnish releases or receipts from all subcontractors having performed any work and all persons having supplied materials, equipment (installed on the Project) and services to the Contractor, if the Owner deems the same necessary in order to protect the Owner's interests. The Owner, however, may if it deems such action advisable make payment in part or in full to such Contractor without requiring the furnishing of such releases or receipts and any payments so made shall in no way lessen the obligations of any surety or sureties furnished under this Contract.

Withholding of any amount due the Owner, under general and/or special conditions regarding "Liquidated Damages," shall be deducted from the final payment due the Contractor.



All sentences of Article 5.07 of the General Conditions shall remain and govern the contract as stipulated.

SC.33 WAGE RATES

All employees of the Contractor on the work to be performed under this contract shall be paid the prevailing wage scale in this locality for work of similar character.

SC.34 EQUAL EMPLOYMENT OPPORTUNITY

During the performance of this contract, the Contractor agrees as follows:

- (a) The Contractor shall not discriminate against any employee or applicant for employment because of race, color, religion, sex, age or national origin. The Contractor shall take affirmative action to insure that applicants are employed, that employees are treated during employment without regard to their race, color, sex, religion, age or national origin. Such action shall include, but not be limited to the following: employment, upgrading, demotion or transfer; recruitment or recruitment advertising; layoff or termination, rates of pay or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees or applicants for employment, notices to be provided setting forth the provisions of this nondiscrimination clause.
- (b) The Contractor shall, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants shall receive consideration for employment without regard to race, color, religion, sex, national origin or age.
- (c) The Contractor shall send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice to be provided, advising the said labor union or workers' representatives of the Contractor's commitments under this section, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- (d) The Contractor shall include the provisions of this section in all subcontracts pertaining to the work.

SC.35 SUPERINTENDENCE BY CONTRACTOR

The Contractor shall have on the project at all times, as his agent, a competent Superintendent capable of reading and of thoroughly understanding the plans and specifications and thoroughly experienced in the type of work being performed. The Superintendent shall have full authority to execute orders or directions and to promptly supply such materials, equipment, tools, labor and incidentals as may be required. Such superintendence shall be furnished regardless of the amount of the work subcontracted.

The word "Inspection" or other forms of the word, as used in the contract documents for this project shall be understood as meaning the Engineer will observe and check the construction in sufficient detail to satisfy himself that the work is proceeding in general accordance with the contract documents, but he will not be a guarantor of the Contractor's performance.

Contractor shall submit shop drawings in accordance with the following:

All shop drawings submitted by subcontractors for review by the Owner shall be sent directly to the Contractor for checking. The Contractor shall be responsible for their submission at the proper time so as to prevent delays in delivery of materials.

The Contractor shall check all subcontractor's shop drawings regarding measurements, size of members, materials, and details to satisfy himself that they conform to the intent of the Drawings and Specifications. Shop drawings found to be inaccurate or otherwise in error shall be returned to the subcontractors for correction before submission thereof.

All details on shop drawings submitted for review shall show clearly the relation of the various parts to the main members and lines of the structure, and where correct fabrication of the work depends upon field measurements, such measurements shall be made and noted on the drawings before being submitted for review.

The review of shop drawings, samples or product data by the Engineer shall not relieve the Contractor from his/her responsibility with regard to the fulfillment of the terms of the Contract. All risks of error and omission are assumed by the Contractor and the Engineer will have no responsibility therefor.

No portion of the work requiring a shop drawing, sample, or product data shall be started nor shall any materials be fabricated or installed prior to the review of such item. Fabrication performed, materials purchased or on-site construction accomplished which does not conform to reviewed shop drawings and data shall be at the Contractor's risk. The Owner will not be liable for any expense or delay due to corrections or remedies required to accomplish conformity.

When the shop drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

Coordination of Submittal Times: Prepare and transmit each submittal sufficiently in advance of performing the related work or other applicable activities, or within the time specified in the individual work sections, of the Specifications, so that the installation will not be delayed by processing times including disapproval and resubmittal (if required), coordination with other submittals, testing, purchasing, fabrication, delivery and similar sequenced activities. No extension of time will be authorized because of the Contractor's failure to transmit submittals sufficiently in advance of the Work.

SC.38 TRADE NAMES AND MATERIALS

Where materials or equipment are specified by a trade or brand name, it is not the intention of the Owner to discriminate against any equal product of another manufacturer, but rather to set a definite standard of quality or performance, and to establish an equal basis for the evaluation of bids. Where the words “equivalent,” “proper,” or “equal to” are used, they shall be understood to mean that the thing referred to shall be proper, the equivalent of, or equal to some other thing. Unless otherwise specified all materials shall be of the best of their respective kinds, shall be in all cases fully equal to approved samples and shall never have been used for any temporary purpose whatsoever. Notwithstanding that the words “or equal to” or other such expressions may be used in the specifications in connection with a material, manufactured article or process specifically designated shall be used, unless a substitute shall be approved in writing before installation.

SC.39 TESTING OF MATERIALS

Testing and control of construction materials and methods used in the work shall be done by an approved local commercial laboratory employed and paid directly by the Owner, or other approved personnel employed by the Owner. Where a commercial laboratory is used, all representative testing caused by test failure will be accomplished at the Contractor’s expense.

SC.40 COORDINATION WITH OTHERS

In the event other contractors are doing work in the same area simultaneously with this project, the Contractor shall coordinate his proposed construction with that of other contractors.

SC.41 EXISTING UTILITIES AND SERVICE LINES

The Contractor shall be responsible for the protection of all existing utilities or service lines crossed or exposed by his construction operations. Where existing utilities or service lines are cut, broken, or damaged, the Contractor shall replace or pay for replacement of the utilities or service lines with the same type of original construction, or better, at his own cost and expense.

SC.42 EXISTING STRUCTURES

The plans show the location of all known surface and subsurface structures. However, the Owner assumes no responsibility for failure to show any or all of these structures on the plans, or to show them in their exact locations. It is mutually agreed that such failure shall not be considered sufficient basis for claims for additional compensation for extra work or for increasing the pay quantities in any manner whatsoever, unless the obstruction encountered is such as to necessitate changes in the lines or grades, or require the building of special work, provisions for which are not made in these plans and proposal, in which case the provisions in these specifications for extra work shall apply.

SC.43      CONNECTIONS TO EXISTING FACILITIES

Connections to existing facilities which are in service shall be thoroughly planned in advance, and all required equipment, materials and labor shall be on hand at the time of undertaking the connections. Work shall proceed continuously (around the clock if necessary) to complete connections in the minimum time. Operations of valves or other appurtenances on existing utilities, when required, shall be by or under direct supervision of the Owner.

The Contractor should anticipate that the length of time for various connections, disconnections and modifications will be minimal. Also, the time of day when connections and disconnections may be accomplished will generally be during periods of low flow. The Contractor should plan his construction sequence and schedule accordingly.

SC.44      PROPERTY LINES AND MONUMENTS

The Contractor shall protect all property corner markers, and when any such markers or monuments are in danger of being disturbed they shall be properly referenced and if disturbed shall be reset at the expense of the Contractor.

SC.45      USE OF EXPLOSIVES

Use of explosives will not be allowed.

SC.46      LINES AND GRADES

All work under this Contract shall be constructed with the lines and grades and/or minimum cover as shown on the Plans or as given by the Engineer. The full responsibility for holding to alignment and grade shall rest upon the Contractor.

The Contractor shall stockpile excavation and other materials as to cause no inconvenience in the use of the lines and grades given. He shall remove any obstruction created by him contrary to this provision.

The Contractor shall safeguard all control points and bench marks established on the site by the Engineer, shall bear the cost of reestablishing same, if disturbed, and shall assume the entire expense of rectifying work improperly constructed due to failure to maintain and protect such established control points and bench marks.

SC.47      ACCESS TO PROJECT SITE AND RIGHT-OF-WAY

The Contractor shall provide at its expense all improvements and make suitable provisions for ingress and egress. The Contractor also shall provide at its expense necessary all weather access roads to the project location as required for transporting equipment and materials. If additional area is needed by the Contractor, it shall be the responsibility of the Contractor to make all necessary arrangements and pay all costs associated with the acquisition and utilization of such area. Specific right-of-way easement arrangements between the Owner and property owners include

restrictions that may affect the Contractor's construction operations. These restrictions are summarized on a sheet included in the plans.

SC.48      BARRICADES, LIGHTS AND WATCHMEN

The Contractor shall, at his own cost and expense, furnish and erect such barricades, fences, lights and danger signals, shall provide such watchmen, and shall provide such other precautionary measures for the protection of persons or property and of work as are necessary. There shall be no open trenches not properly barricaded at the end of each workday. Barricades shall be painted in a color that will be visible at night. From sunset to sunrise, the Contractor shall furnish and maintain sufficient lights at each barricade and sufficient numbers of barricades shall be erected to keep vehicles from being driven on or into any work under construction. The Contractor shall furnish watchmen in sufficient numbers to protect the work.

The Contractor will be held responsible for all damage due to failure of barricades, signs, lights and watchmen. The Contractor's responsibility for the maintenance of barricades, signs and lights, and for providing watchmen shall not cease until the project has been accepted by the Owner.

SC.49      PROTECTION OF TREES AND LANDSCAPING

No trees or landscaping shall be removed or cut without the Owner's approval except those that provide direct interference with the installation of the utility line within the permanent and temporary easements. The Contractor shall use proper caution to minimize removal of trees within the temporary easement. Trees adjacent to the permanent and temporary easements, but not interfering with the work, shall be protected from damage by the construction operations.

SC.50      LIGHTS AND POWER

The Contractor shall provide, at his own expense, temporary lighting and power facilities required for the proper prosecution of the work.

SC.51      WATER FOR CONSTRUCTION AND TESTING

The Contractor shall make the necessary arrangements for securing and transporting all water required in the construction. Water for testing will be provided by the Owner in accordance with Technical Specification Section for Testing Pressure Pipelines.

SC.52      TRENCH SAFETY SYSTEM

Contractor shall provide a trench safety system which conforms to OSHA Standards. The trench safety system shall meet all the requirements of Trench Safety Requirements Section of the Technical Specifications.

SC.53      TOOLS AND ACCESSORIES

The Contractor shall, unless otherwise stated in the specifications, furnish with each type, kind or size of equipment, one (1) complete set of suitably marked high grade

special tools and appliances which may be needed to adjust, operate, maintain, or repair the equipment to the owner. Ordinary mechanic's tools are not considered special tools. Such special tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

Each piece of equipment shall be provided with a substantial name plate, securely fastened in place and clearly inscribed with the manufacturer's name, year or manufacture, and principal rating data.

SC.54      PROJECT MAINTENANCE

The Contractor shall maintain, and keep in good repair, the improvements covered by these plans and specifications during life of this contract.

SC.55      FENCES, IMPROVEMENTS AND DRAINAGE CHANNELS

Fencing and gates removed to permit construction shall be replaced in the same location and left in a condition as good as, or better, than that in which they were found. Fences to be removed and not replaced are noted on the plans.

Where surface drainage channels, storm sewers, or drainage structures are disturbed or altered during construction, they shall be restored to their original condition as soon as possible.

SC.56      DISPOSAL OF WASTE AND SURPLUS EXCAVATION

All trees, stumps, slashings, brush or other debris removed from the site as a preliminary to the construction shall be chipped or removed from the property. No burning will be allowed. No trash, debris or refuse from construction shall exist on the ground.

All excavated earth in excess of that required for backfilling shall be disposed of in a satisfactory manner in locations approved by the Owner.

SC.57      CLEANUP

The Contractor shall at all times keep the job site as free from all material, debris and rubbish as is practical and shall remove same from any portion of the job site as construction of that portion is completed.

Upon completion of the work, the Contractor shall remove from the site all plant, materials, tools and equipment belonging to him and leave the site with an acceptable appearance. The Contractor shall thoroughly clean all equipment and materials installed by him and shall deliver over such materials and equipment in a bright, clean, polished and new-appearing condition.

SC.58      ARCHEOLOGICAL DISCOVERIES

No activity which may affect a State Archeological Landmark is authorized until the Owner has complied with the provisions of the Antiquities Code of Texas. The Owner has previously coordinated with the appropriate agencies and impacts to known cultural or archeological deposits have been avoided or mitigated. However, the Contractor may encounter unanticipated cultural or archeological deposits during construction.

If archeological sites or historic structures are discovered after construction operations are begun, the Contractor shall immediately cease operations in that particular area and notify the Owner, and the Texas Historical Commission, (512-463-6096). The Contractor shall take reasonable steps to protect and preserve the discoveries until they have been inspected by the Owner. The Owner will promptly coordinate with the Texas Historical Commission and any other appropriate agencies to obtain any necessary approvals or permits to enable the work to continue. The Contractor shall not resume work in the area of the discovery until authorized to do so by the Owner.

Compensation to the Contractor, if any, for lost time or changes in construction resulting from the find, shall be determined in accordance with changed or extra work provisions of the Contract Documents.

SC.59      SERVICE OF MANUFACTURER'S REPRESENTATIVE

The contract price for the project shall include the cost of furnishing competent and experienced representatives from the manufacturers involved. Such representatives shall assist the Contractor, when required, to install, adjust, and test the equipment in conformity with the contract documents. After the equipment is placed in permanent operation by the Levi Water Supply Corporation, such representatives shall make all adjustments and tests as specified or required to comply with the contract documents, and shall instruct the Owner in the operation and maintenance of the equipment.

SC.60      FINAL FIELD TESTS

Upon completion of the work and prior to final payment, all items installed under this contract shall be subject to acceptance tests as specified or required to provide compliance with the contract documents.

SC.61      AS-BUILT DIMENSIONS AND DRAWINGS

Contractor shall make appropriate daily measurements of work constructed and keep accurate records of location (horizontal and vertical) of all constructed work.

Upon completion of the project, the Contractor shall furnish the Owner with one set of direct prints, marked with red pencil, to show as-built dimensions and locations of all work constructed. As a minimum, the final drawings shall include the following:

- (1) Horizontal and vertical locations of work.
- (2) Changes in material and dimensions due to substitutions.
- (3) Deletions, additions, and changes to scope of work.
- (4) Any other changes made.

This set of marked up prints shall be incorporated into record drawings prepared by the Engineer.

Separate payment will not be made for as-built drawings. Final Payment will not be made until such drawings are provided to and approved by the Engineer.



# **TECHNICAL SPECIFICATIONS**

## TECHNICAL SPECIFICATIONS

### SECTION G1 - PIPE EXCAVATION, TRENCHING, EMBEDMENT, ENCASEMENT AND BACKFILLING

#### G1.01 DESCRIPTION OF WORK

- A. This specification covers the requirements for furnishing all labor, equipment and material and performing all work necessary, in connection with excavation, trenching, embedment, encasement, and backfilling, for the installation of water lines in this project.

#### G1.02 EXCAVATION

A. General

1. Excavation shall include the removal of any trees, stumps, brush, debris, or other obstacles that may obstruct the line of work, and the excavation and removal of all earth, rock or other materials to the extent necessary to install the pipe and appurtenances in conformance with the line and grades shown in the plans, or as specified.

B. Topsoil

1. Topsoil and grass shall be stripped a minimum of twelve inches over the trench excavation site and stockpiled separately prior to start of excavation.
2. After the trench has been backfilled, topsoil shall be replaced to the extent that rock, excavated from the trench, shall be completely covered and the area returned to its original condition.

C. Maximum and Minimum Width of Trenches

1. The sides of all trenches shall be cut as nearly vertical as possible. Unless otherwise specified on the plans, the minimum clear width of trench in which the pipe may be installed shall be twelve (12) inches greater than the outside diameter of the pipe, as measured at the springline of the pipe, and the maximum width shall not be more than twenty-four (24) inches plus the outside diameter of the pipe, measured at an elevation in the trench which is twelve (12) inches above the top of the pipe when it is laid to grade.
2. Wherever the prescribed maximum trench width is exceeded, the Contractor shall use the class embedment or encasement required by the Engineer to provide the load carrying capacity for the trench width as actually cut, and the additional cost incurred will be borne by the Contractor.

D. Sheeting and Shoring

1. Sheeting and/or shoring shall be provided in accordance with the Contractor's Trench Safety Plan, or where required for other reasons in caving ground, or in wet, saturated or flowing materials, the sides of all trenches and excavations shall be adequately sheeted and braced so as to maintain the excavation free from slides or cave-ins.

E. Dewatering Excavations

1. There shall be sufficient pumping equipment, in good working order, available at all times to remove any water that accumulates in excavations. Where the pipeline crosses natural drainage channels, the work shall be conducted in such a manner that unnecessary damage or delays in the prosecution of the work will be prevented. Provisions shall be made for the satisfactory disposal of surface water pumped so as to prevent damage to public or private property. The Contractor shall be responsible for maintaining safe working conditions and suitable construction techniques.

F. Disposal of Excavated Materials

1. Suitable excavated materials may be piled adjacent to the work to be used for backfilling. Excavated materials unsuitable for backfilling, or in excess of that required for backfilling, shall be disposed of by the Contractor. Desirable topsoil, sod, etc., shall be carefully removed and piled separately adjacent to the work when required. Excavated materials shall be handled at all times in such a manner as to cause a minimum of inconvenience to public travel. Suitable selected bedding or backfill material shall be provided at no additional cost to the Owner. The Contractor shall indemnify and hold harmless the Owner and all of his officers, agents and employees from all suits, actions, or claims of any character resulting from his arrangements for and disposal of excavated materials.

G. Soft Subgrade

1. Where soft or spongy material is encountered in the excavation at subgrade level, it shall be removed to such a depth that by replacing the unsuitable material with tamped gravel, a firm and stable foundation can be secured.
2. Gravel used shall be washed gravel or crushed stone and may fit any gradation of size up to three (3) inches. The particular gradation shall take into consideration the actual field conditions.

H. Excavated Materials

1. Excavated materials shall be piled adjacent to the work to be used for backfilling as required. After the trench has been refilled, topsoil shall be replaced to the extent that rock excavated from the trench will be completely covered and the area is returned to its original condition.

2. Where required on the plans or when otherwise specified, desirable topsoil shall be piled separately in a careful manner and replaced in its original position.

I. Damage to Existing Utilities

1. Where existing utilities are damaged, they shall be replaced immediately with material equal to or better than the existing material. Such work shall be at the entire expense of the Contractor.

G1.03

EMBEDMENT AND ENCASEMENT

A. General

1. Embedment shall be as required in the plans. All embedment materials shall be free of grass, roots, vegetation, and other deleterious materials. Embedment details are shown on the Plans.
2. When the pipe has been checked for line and grade, the trench shall be backfilled with enough granular material or concrete on both sides to hold the pipe firmly in position. When placing granular material or concrete around the pipe, care shall be taken to fill all voids around the pipe. The pipe shall not be floated. The embedment or encasement material shall be carefully tamped to assure uniform pipe support and density.

B. Concrete Embedment and Encasement

1. Concrete embedment and encasement and cap shall have a minimum compressive strength of 2,000 pounds per square inch at 28 days.
2. Concrete shall be mixed to obtain a slump of not less than one (1) inch or more than four (4) inches.
3. After pipe joints are completed, the voids at the joints in the embedment section shall be filled with concrete, and the embedment shall be brought up to proper grade. Where concrete is placed over or along the pipe, it shall be placed in such manner as not to damage or injure the joints or displace the pipe. Care shall be taken in the placement of concrete to assure that a uniform pad, free of voids and of specified thickness, is constructed under the entire pipe section.
4. A cleavage line between the base concrete and the side embedment concrete will not be allowed. Backfilling shall be done in a careful manner and at such time, after concrete embedment or encasement has been placed, as not to damage the concrete in any way.
5. 2,000 psi Concrete shall be used and shall be paid for at the unit contract price per cubic yard for 2,000 psi Concrete actually placed and approved by the Engineer.

BACKFILLINGA. General

1. Backfilling shall include the refilling and consolidating of the fill in trenches and excavations up to the surrounding ground surface or road grade at crossings. No backfill shall be placed until the Owner or Owner's Representative has observed the trench and pipe in place and has authorized the placing of backfill.
2. Backfilling shall be in accordance with the plans. No material of a perishable, spongy or otherwise unsuitable nature shall be used in backfilling.

B. Select Backfill Material

1. If required by the plans, select material may be required for backfill. Select materials shall be placed over the top of the embedment/encasement material, where designated on the plans and as shown in embedment details. Select material shall be free from lumps, large stones, clay, debris, and organic materials. Select material may also include rock cuttings from a ditching machine (preferably wheel-type), provided that the largest chips shall have an average dimension in one place less than one (1) inch, and no dimension greater than two (2) inches.
2. If approved by the Engineer, good, sound excavated materials may be used as select material for backfill over the pipe. Good, sound excavated materials are defined as gravel, sandy loam or loam, free from excessive clay and having a Plasticity Index less than 22. Select material shall not have rocks with an average dimension larger than two (2) inches.
3. It shall be the full responsibility of the Contractor to explore the project and subsurface materials to determine if the trench excavation will be suitable for use as select materials and to follow as closely as possible this specification to insure a good, sound pipeline when completed.

C. Concrete Backfill

1. Where shown on the plans, concrete backfill shall consist of selected rock material or granular sand material mixed with a minimum of three sacks of cement per cubic yard. All material shall be mixed in a concrete mixer or transit mixed unless approved otherwise by the Owner.

D. Backfilling Operation

1. After the pipe and embedment have been placed to twelve (12) inches above the top of the pipe, the method of backfilling pipe trenches shall be as follows: excavated material shall be carefully placed in layers of not more than six (6) inches in loose thickness and compacted to 80% modified proctor. Select material shall be free from lumps, large stones, clay, debris,

and organic materials or excavated material from the trench which has a maximum dimension of two (2) inches, processed excavated material from the trench which has a maximum particle dimension of two (2) inches. Rock cuttings from a wheel-type ditching machine having an average dimension in one place of less than one (1) inch and no dimension greater than three (3) inches and shall be free from lumps, large stone and organic materials. The select material shall then be compacted with mechanical compactors. Select backfill material shall be compacted to 85% density ASTM D-698 unless otherwise specified.

2. All trenches under proposed or existing roadways, driveways and sidewalks, paved waterways with concrete base, gravel roadways, and roadways with gravel base and asphalt surface, shall be backfilled by hand or mechanically tamping crushed limestone flexible base (TXDOT Item 247, Type A, Grade 2) and compacted to 95% ASTM D1557 at optimum moisture.
3. In areas backfilled outside of paved area, after the trench has been refilled, topsoil shall be replaced to the extent that rock excavated from the trench will be completely covered or removed and the area is returned to its original condition, a minimum of 12 inches of topsoil shall be replaced.

#### G1.05 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work performed under this specification for excavating, trenching, embedment, and backfilling. All costs incurred shall be included in the contract price for the appropriate items in the Proposal and Bid Schedule.
- B. No separate payment will be made for sand, gravel or crushed stone used in embedment. All costs incurred shall be included in the contract price for the appropriate bid item.
- C. Separate payment will be made for implementation of the Trench Safety Plan at the contract unit price as provided in the Proposal and Bid Schedule.
- D. Separate payment will be made for 2,000-psi Concrete Encasement or Backfill at the contract unit price as provided in the Proposal and Bid Schedule.

#### **END OF SECTION**

## TECHNICAL SPECIFICATIONS

### SECTION G2 - SITE PREPARATION, STRUCTURAL EXCAVATION AND BACKFILL, AND SITE FILL

#### G2.01 GENERAL

The work to be performed under this section of the specifications shall consist of furnishing all labor, equipment and materials, and performing all operations necessary in connection with the site preparation, excavation and backfilling, as shown in the plans and as specified herein.

#### G2.02 SITE PREPARATION

Site preparation shall include the removal of trees and brush required for installation of proposed structures, pipelines and roads. Trees and brush shall be removed to a depth at least two (2) feet below the finished grade. More detailed description of site clearing and grubbing requirements are included in Section G8 of these Technical Specifications.

In addition, heavy growths of weeds or other plants shall be stripped from the surface in order to provide clear access to the work site and to prevent their inclusion in stockpiled soil which is to be reused later. Trees, stumps, surface plants and all debris removed from the site shall be disposed of off-site by the Contractor. More detailed description of site clearing and grubbing requirements are included in Section G8 of these Technical Specifications.

#### G2.03 EXCAVATION

##### A. General

Excavation shall include the removal of any stumps, debris and other obstacles that may obstruct the construction of the work and the excavation and removal of all earth, rock or other materials to the extent necessary to construct all the work shown in the Plans.

The excavation shall conform to the dimensions and elevations indicated on the drawings for each structure. Excavation shall extend a sufficient distance from walls to allow for placing and removal of forms, sheeting or shoring, installation of piping, and for inspection.

Any excavation for footings beyond the lines required by the plan dimensions, except as such may be ordered in writing by the Owner, shall be backfilled with Class "C" concrete at the Contractor's expense.

At the time concrete is to be placed, the excavation shall be free from accumulated seepage water and all loose material shall have been removed from the base area.

The Contractor shall provide suitable access and lighting for the Owner's Representative to inspect the completed foundation excavation.

B. Procedures

Excavation and pier drilling procedures shall be chosen and managed by the Contractor. Engineering information and recommendations are included in a Geotechnical Report described in this section. The Owner requires that all recommendations in that Report be followed during construction.

C. Disposal of Excavated Materials

Suitable excavated materials may be stockpiled to be used for backfilling. Excess excavated materials and unsuitable backfill materials shall be disposed of by the Contractor in the following manner:

1. Clays, sands and gravel in excess of project requirements shall be disposed of by the Contractor at such locations and under consideration arranged by the Contractor.
2. Limestone and other rock excavation shall be disposed of by the Contractor at such locations and under consideration arranged by the Contractor.

The classification of clays, sands, gravel, limestone and rock shall be made in accordance with the Unified Soil Classification System, U.S. Army Corps of Engineers, T.M. 3-357.

Desirable topsoil, sod, or area fill shall be carefully removed and piled separately adjacent to the work when required. Excavated materials shall be handled at all times in such a manner as to cause a minimum of inconvenience to the Owner's operations, and to permit safe and convenient access to private and public property adjacent to the work. The Contractor shall indemnify and hold harmless the Owner and all of his officers, agents and employees for all suits, actions or claims of any character resulting from his arrangements for and disposal of excavated materials.

G2.04 UNAUTHORIZED EXCAVATION

Whenever the excavation is carried beyond or below the lines and grades as shown on the plans, except as specified above, all such excavated space shall be refilled with such material and in such a manner, as may be directed by the Owner, so as to insure the stability of the affected structure. Beneath all structures, space excavated without authority shall be refilled by the Contractor, at his own expense, with Class "C" concrete, crushed stone or selected fill materials, as directed by the Owner.

G2.05 TRENCH SAFETY SYSTEM

Where required in the Contractor's Trench Safety System, or where required for other reasons in caving ground, or in wet, saturated or flowing materials, the sides of all trenches and excavations shall be adequately sheeted and braces do as to maintain the excavation free from slides or cave-ins.



The Contractor shall not remove any sheeting or shoring materials which are lower than twelve (12) inches above the top of the pipe.

#### G2.06 REMOVAL OF WATER

The Contractor shall, during the excavation period and as long thereafter as the condition of the work may require, provide and maintain, in good operating condition, pumping equipment fully adequate in capacity to promptly remove all water entering any excavation or other parts of the work.

All excavations shall be kept dry, and water pumped or drained from the work shall be disposed of in an approved manner. Any and all damage, of whatever nature, caused by dewatering the work shall be promptly repaired or remedied by the Contractor at his own expense.

#### G2.07 GEOTECHNICAL REPORT

A geotechnical investigation was made and pertinent results and recommendations are included in the report dated August 5, 2024. The investigation and report were prepared by:

Langerman Foster Engineering Company  
2000 South 15<sup>th</sup> Street  
Waco, Texas 76706  
(254) 235-1048

Included in the report are logs of soil borings, an introduction and description of soils investigations, a general description of site geology and site conditions, foundation design and construction considerations, recommendations on foundation design, and detailed construction recommendations.

#### G2.08 BACKFILLING AND SITE FILL

The materials to be used in backfilling, fills, engineered fills, granular underdrains, wherever indicated on the Plans or described in the Geotechnical Report shall meet all requirements of quality, gradation, quantity, method of placement and compaction as described in the Geotechnical Report.

#### G2.09 SOURCES OF FILL

Any existing topsoil which must be removed for proposed construction should be stockpiled for reuse as topsoil or site fill. If this is not done the Contractor shall provide acceptable topsoil from other sources.

The Contractor shall import such structural fill, site fill or topsoil as may be needed to complete the work as shown on the plans.

#### G2.10 MEASUREMENT AND PAYMENT

No separate payment will be made for work performed under this specification or shown on the plans, for excavating, trenching, backfilling and site fill, but the cost thereof shall be included in the proper item of the Proposal and Bid Schedule, except as provided for Trench Safety Systems.

Payment for Trench Safety System will be made per linear foot or per square foot as provided in the Proposal and Bid Schedule for Furnishing and Installing Trench Safety Systems as described in the Trench Safety System section of these specifications.

**END OF SECTION**

## TECHNICAL SPECIFICATIONS

### SECTION G3 - TRENCH SAFETY SYSTEMS

#### G3.01 DESCRIPTION OF WORK

- A. This specification covers the requirements for providing trench safety systems consisting of shoring, sheeting, trench shield, and/or laid back slopes to meet the trench safety requirements of the Occupational Safety and Health Administrations, as required for this project and specified herein.

#### G3.02 GENERAL

- A. Trench safety systems shall be provided by the Contractor as provided in Subpart P-Excavation, Trenching and Shoring, Part 10526 of the Code of Federal Regulations which describes safety and health regulation as administered by the U.S. Department of Labor Occupational Safety and Health Administration (O.S.H.A). The standard specified by the O.S.H.A. Regulation shall be the minimum allowed on this project. It shall be the responsibility of the Contractor to design and install adequate trench safety systems for all trenches excavated on this project.
- B. Before beginning construction, the Contractor shall furnish to the Owner for inclusion in the Contract Documents, a Trench Safety Plan for the entire project. The trench safety plan must be prepared and sealed by a Professional Engineer registered in the State of Texas. In addition, all trench safety systems utilized in this project must be designed by a Professional Engineer registered in the State of Texas. The Contractor shall be totally responsible for the safety of all persons involved in the construction of this project.

#### G3.03 SOIL BORINGS

- A. Any borings and soil data furnished by the Owner are for the convenience of the Contractor. The Contractor shall be responsible for any additional soil or geotechnical information required. The Contractor shall be responsible for properly designed trench safety systems to be utilized for any type or subsurface condition found on this project. The Furnishing of soil information by the Owner in no way relieves the Contractor of this obligation.

#### G3.04 MEASUREMENT AND PAYMENT

- A. Payment for Trench Safety Systems implemented shall be made per linear foot for pipe and per square foot for structural excavations as provided in the Proposal and Bid Schedule for Furnishing and Installing Trench Safety Systems. The payment shall be full compensation for all planning, engineering, materials, equipment, fabrications, installation, recovery and all incidental work required. All excavation and backfill in addition to that specified elsewhere in these specifications shall be considered subsidiary to this bid item.

**END OF SECTION**

## TECHNICAL SPECIFICATIONS

### SECTION G4 - DUCTILE IRON PIPE AND FITTINGS

#### G4.01 DESCRIPTION OF WORK

- A. This specification covers the requirements for furnishing and installing ductile-iron pipe and gray-iron or ductile-iron pipe fittings including bracing, pipe laying, jointing, testing, blocking, and any other work that is required or necessary to complete the installation as shown in the plans and as specified herein.

#### G4.02 PIPE AND FITTINGS

##### A. General

1. All pipe and fittings under this section of the specifications shall have the interior wall cement lined and seal coated, unless specified differently. A shop applied bituminous coating for underground installation, or a field or shop coating of primer for above ground installation shall be applied on the exterior surface of pipe. Coatings shall be applied in accordance with AWWA C104 and the Painting Specifications. The primer shall be compatible with the final paint system used. The interior surface of the pipe shall be polythane lined as manufactured by U.S. Pipe or Protecto 401 ceramic epoxy lined as manufactured by McWane Cast Iron Pipe Company. All linings shall have a minimum thickness of 40 mil.
2. All fittings shall be in accordance with AWWA C110. Fittings may be either Gray-Iron or Ductile-Iron and shall be pressure rated for a working pressure equal to piping.
3. Material supplied shall be equal to that manufactured by U.S. Pipe and Foundry, American Ductile Iron Pipe, James B. Clow and Son, Inc., or approved equal.
4. Ductile Iron Pipe shall be manufactured from metal having a minimum tensile strength of 60,000 pounds per square inch, minimum yield strength of 42,000 pounds per square inch, and a minimum elongation of 10 percent (60-42-10). Ductile iron pipe shall be Class 250 or greater. All such pipe shall bear a mark denoting approval by the Underwriter's Laboratory, Chicago, Illinois, so that it will be acceptable to the Texas State Fire Insurance Commission for use in fire protection lines without penalty. Pipe shall be provided in the proper class per AWWA C150, except where a higher class is shown on the plans.

5. All ductile-iron pipe and ductile-iron or cast iron fittings shall have joints as shown on the plans and as described herein. The Contractor shall furnish layout drawings which show each run of pipe and indicated the location of all bends, outlets, special fittings, joint system, and connections which are to be included as a part of the pipe to be installed on this project. The Owner shall review and approval of all joint systems shall be obtained before installation shall begin.
6. The Manufacturer shall furnish certified statements that pipe, fittings, and joints have been manufactured, tested, and inspected in accordance with these specifications.

B. Mechanical Joints and Push-On Joints

1. Ductile-Iron pipe with push-on or mechanical joints shall be Centrifugally Cast Pipe in accordance with AWWA C150 and C151. AWWA G153 Compact fittings are approved for this project.
2. All mechanical or push-on joints shall be of the type which provides a recession in the bell for the employment of a single rubber gasket to be placed before the insertion of the spigot. Joints shall be manufactured in accordance with AWWA C111. Corten T-head bolts shall be used on mechanical joint pipe.

C. Flanged Joints

1. Ductile-Iron pipe with flanges shall be supplied in accordance with AWWA C115 and C150. The minimum thickness of pipe that shall be flanged is Class 250. Larger classes of pipe shall be used as required in AWWA Specifications. Any flanges installed underground shall be enclosed in mortar.
2. Flanges shall be threaded onto pipe. Flanges shall be rated for 250 pounds per square inch working pressure, faced and drilled in accordance with AWWA C110 and C115, Gaskets for flanged joints shall be rubber with cloth inserts equal to those manufactured by the Crane Packing Company, or the U.S. Rubber Company, or approved equal. Gaskets shall extend at least to the inside of the bolt holes.

D. Restrained Joints

1. Ductile-Iron pipe with restrained joints shall be supplied in accordance with ANSI/AWWA-C111/A21.11.

E. Bolts and Nuts

1. All Flanges and Mechanical joint bolts and nuts shall be ASTM A307 Carbon Steel.

G4.03

POLYETHYLENE ENCASEMENT

- A. All buried ductile iron pipe and fittings shall be encased with 8 mil, Type I, Grade E-1, polyethylene film according to AWWA C105. Film shall be provided in sheets with width determined by pipe size according to AWWA C105. Installation shall be according to AWWA C105 Method C. Polyethylene encasement shall not be paid for separately, but the cost thereof shall be included in the appropriate item of the Proposal and Bid Schedule.

G4.04

INSTALLATION

- A. The Contractor shall obtain installation instructions, including support spacing, from the Manufacturer and shall comply with the instructions.
- B. The specified embedment shall be accurately shaped and trimmed to receive the pipe barrel and each pipe section, when in place, shall have a uniform bearing on the subgrade for the full length of the pipe barrel. Pipe shall not be laid unless the subgrade is free of water and in a satisfactory condition. Adjustments of the pipe to line and grade shall be made by scraping away of filling in with granular material, and not by wedging or blocking up the bell.
- C. The interior of the pipe shall be clean and joint surfaces shall be clean and dry when the pipe is lowered into the trench. Each pipe, fitting, valve shall be lowered in the trench carefully and laid true to line and grade.
- D. All piping on this project, regardless of size or class, shall be placed in sand embedment as shown on detail sheets in Plans unless otherwise specified or shown.

G4.05

PROTECTION OF PIPELINE

- A. Well-fitted stoppers or bulkheads shall be securely placed in all openings and in the end of the line when construction is stopped temporarily and at the end of each day's work. It shall be the responsibility of the Contractor to deliver to the Owner a pipeline which is clean throughout its entire length.

G4.06

CONCRETE AND BLOCKING

- A. 2,000 psi concrete shall be placed for blocking at each change in direction in the pipeline, in such manner as will substantially brace the pipe against undisturbed trench walls. Concrete blocking, made from Type I cement, shall have been in place four (4) days prior to testing the pipeline as hereinafter specified. Test may be made in two (2) days after completion of blocking if Type III cement is used

- B. At all points where wet connections are made to existing lines, the existing lines shall be adequately blocked and the tapping connection fittings shall be supported by blocking up to the spring line with 2,000 psi concrete.
- C. Concrete blocking will not be measured or paid for as a separate item but the cost thereof shall be included in the various items listed in the Proposal and Bid Schedule.

G4.07 TESTING AND ALLOWABLE LEAKAGE

- A. All Ductile Iron Pipe shall be leak tested and sterilized according to Section G11 – Testing for Pressure Pipelines.

G4.08 APPURTENANCES

- A. Fittings, bends, plugs and valves shall be of standard manufacture and mechanical joint type to fit AWWA pipe specifications in Classes A, B, C and D.

G4.09 MEASUREMENT AND PAYMENT

- A. Payment will be measured and paid for as provided for in the Proposal and Bid Schedule.

**END OF SECTION**

## TECHNICAL SPECIFICATIONS

### SECTION G5 - MECHANICAL PAINTING

#### G5.01 SCOPE

- A. This specification covers the requirements for painting pumps, motors, exposed pipe, valves and fittings as specified herein and shown on the Plans. Painting shall be required for existing above ground and newly installed piping and appurtenances and any areas damaged during construction.

#### G5.02 GENERAL

- A. The work to be performed under this section of the specifications shall consist of furnishing all labor, materials, and equipment necessary for painting pumps, motors, exposed pipe, valves and fittings as specified herein and shown on the Plans.
- B. Metal surfaces to be painted shall be sound, clean and free of harmful scale, rust, dirt, oil, grease, moisture, or any other foreign matter which might, in any way, lessen the life or usefulness of the coating. All metal shall be smooth and free from blisters, rough corners, pits, dents, or other imperfections before painting. Pits and dents shall be filled and the metal ground smooth where required.
- C. Paints and similar materials shall be mixed in vessels of adequate capacity. All paints shall be thoroughly stirred before being taken from containers and shall be kept stirred while using. All ready-mixed paints shall be applied exactly as received from the manufacturer without addition of any kind of a drier or thinner except in accordance with manufacturer's recommendations.
- D. All painting at the site of the work is hereby defined as field painting and the Owner's Representative shall determine where and when painting may be done. All surfaces to be painted shall have their readiness for painting approved by the Owner before work is started.
- E. No painting shall take place unless the atmospheric temperature is at least 50 degrees Fahrenheit and rising, or when the surface temperature is below the dew point, or when relative humidity is above 85%, unless approved by representatives of Owner and Paint Manufacturer. Painting shall not proceed if the temperature is expected to fall below 32 degrees Fahrenheit before the paint has dried.
- F. Painting found defective shall be removed and the surface repainted as directed by the Owner at the Contractor's expense.



- G. Before final acceptance of the project, any damaged painted surfaces shall be touched up or repainted, as directed by the Owner at the Contractor's expense.

#### G5.03 FIELD PAINTING

- A. It is the intent of this section of the specifications that all metal work be properly painted whether or not specific mention is made hereinafter of each individual part.
- B. The number of coats shall be not less than called for hereunder. Letter designation of various coatings refers to the designation given in the following listing (Section G5.04). Surfaces to be painted include, but are not limited to, the following, colors to be selected by Owner:
  - 1. All pumps, motors, base plates, exposed cast-iron or ductile-iron and steel pipe, steel members, valves, fittings and appurtenance-

#### G5.04 PAINTS

##### Coating System:

- 1st Coat: TNEMEC N69 Hi-Build Epoxoline II or Series N140 Pota-Pox Plus applied at a minimum of 4.0 dry mils to carbon steel surfaces or at a minimum of 8.0 dry mils to all ductile and cast iron surfaces.
- 2nd Coat: TNEMEC N69 Hi-Build Epoxoline II applied at a minimum of 4.0 dry mils to carbon steel surfaces or at a minimum of 8.0 dry mils to all ductile and cast iron surfaces.
- 3rd Coat: TNEMEC 1094 Endura-Shield applied at a minimum of 2.5 dry mils when items are to be exterior exposed and subject to UV light.
- A. Approved materials of other manufacturers which are equivalent in all respects to the brands named above, may be substituted.
- B. The Contractor shall furnish six (6) color samples to the Owner for selection of paint colors.

#### G5.05 CLEANING AND PREPARATION OF SURFACES

- A. General
  - 1. All surfaces to be painted shall be prepared in a workmanlike manner with the objective of obtaining a clean and dry surface. No more sandblasting or surface preparation than can be coated or painted in a normal working day will be permitted.
  - 2. The preparation of steel surfaces shall be in accordance with the applicable specifications prepared by the Association for Materials Protection and Performance (AMPP)/Society for Protective

Coatings (SSPC). Surfaces shall meet the requirements of SSPC-SP10 with a minimum 1.5 mil angular anchor profile.

3. The preparation of cast and ductile iron surfaces shall be in accordance with the applicable specifications prepared by the National Association of Pipe Fabricators (NAPF). Pipe shall meet the requirements of NAPF 500-03-04. Fittings shall meet the requirements of NAPF 500-03-05, Blast Clean #2.
4. Care shall be exercised not to damage adjacent work during sandblasting operations. Surfaces not intended to be painted shall be suitably protected from the effects of cleaning and painting operations. Fabricated, assembled items which are normally cleaned and painted in the shop in accordance with the manufacturer's standard practice will be considered for exemption from the detailed cleaning and painting requirement set forth herein. Removable equipment adjacent to surfaces to be painted shall, if necessary, be disconnected and moved to permit cleaning and painting of said surfaces, and replaced by workmen skilled in the trades involved.
5. Prime and finish coats which are listed in the Painting Schedule are compatible finishes. The Contractor shall follow the recommendations of the paint manufacturers, subject to the approval of the Engineer, to insure a good bond between coats.

- B. Inspection of Surface Preparation. All details of surface preparation may be inspected to ensure that surfaces have been properly cleaned, that treating solutions are of the specified type and concentration, and have been properly applied, that treated surfaces are free from un-neutralized residue, and that surfaces are dry and ready to receive paint.

#### G5.06

#### PAINT APPLICATION

- A. General. All work shall be done in a workmanlike manner, so that the finished coating will be free from holidays, pin holes, bubbles, runs, drips, ridges, waves, laps, unnecessary brush marks and variations in color, texture and gloss. All coats shall be applied in such manner as to produce an even film of uniform thickness.
- B. Labeling, Storage, Mixing and Film Thickness. All materials shall be brought to the painting job site in the original sealed and labeled containers of the paint manufacturer. The painter shall apply each coating at the rate and in the manner specified by the manufacturer. If material has thickened or must be diluted for application by spray gun, the coating shall be built up to the same film thickness achieved with undiluted material. Deficiencies in film thickness shall be corrected by the application of additional coats of paint. Paints which can be harmed by exposure to cold weather shall be stored in heated shelters. During application, the paint in the spray tank or other working container shall be not less than 50 degrees Fahrenheit.

- C. Atmospheric Conditions. No paint shall be applied when the surrounding air temperature, as measured in the shade, is below 40 degrees Fahrenheit. No paint shall be applied when the temperature of the surface to be painted is below 40 degrees Fahrenheit. Paint shall not be applied to wet or damp surfaces, and shall not be applied in rain, snow, fog or mist, or when the relative humidity exceeds 85 percent or when it can be anticipated that the air temperature will drop below 40 degrees Fahrenheit within 18 hours after the application of the paint. Dew or moisture condensation should be anticipated, and if such conditions are prevalent, painting shall be delayed until mid-morning to be certain that the surfaces are dry. The day's painting shall be completed well in advance of the probable time of day when condensation will occur, in order to permit the film an appreciable drying time prior to the formation of moisture. During periods of inclement weather, painting may be continued by enclosing the surface with temporary shelters and applying artificial heat, provided the minimum air, surface and paint temperatures prescribed above are maintained. Paint shall not be applied to surfaces which are hot enough to cause blistering or pin holing of the film.
- D. Protection of Paint Surfaces. Where shelter or heat is provided for paint surfaces during inclement weather, such protective measures shall be maintained until the paint film has dried, or discontinuance of the measures is authorized. Items which have been painted shall not be handled, worked on, or otherwise disturbed until the paint coat is completely dry and hard. After delivery at the site of permanent erection or installation, all shop-coated metal work shall be stored out of contact with the ground in such a manner as will minimize the formation of water-holding pockets and in such a location as will minimize soiling, contamination and deterioration of the paint film. Shop-coated metal shall be repainted or retouched from time to time with the specified paint when it becomes necessary to maintain the integrity of the film.
- E. Contacting Surfaces. When riveted or bolted contact is to exist between surfaces of ferrous or other metal parts of substantially similar chemical composition, such surfaces will not be required to be painted. Contacting surfaces formed by high-strength bolt connections shall not be painted. Where an electrical potential is apt to exist between metal surfaces or unlike chemical composition in riveted or bolted contact, each of the contacting surfaces shall be cleaned, pretreated, and given one coat of primer, all as specified for the particular metals involved. Where a non-metal surface is to be in riveted or bolted contact with a metal surface, the contacting surfaces of the metal shall be cleaned, pretreated if required, and given three coats of the specified primer.

- F. Method of Paint Application. On metal surfaces, each coat of paint shall be applied at the rate specified by the manufacturer to achieve the minimum dry mil thickness required. On concrete and/or masonry, application rates will vary according to surface texture. However, in no case shall the manufacturer's stated coverage rate be exceeded. On porous surfaces, a protective and decorative finish shall be achieved. Deficiencies in film thickness shall be corrected by the application of an additional coat(s) of paint. Where conditions are other than normal because of the weather or because painting must be done in confined spaces, longer drying times will be necessary. Additional costs of paint shall not be applied, nor shall units be returned to service until paints are thoroughly dry. Where thinning is necessary, only the products of the manufacturer furnishing the paint, and/or for the particular purpose, shall be allowed, and all such thinning shall be done strictly in accordance with the manufacturer's instructions. Where two or more coats are specified, first coat shall be tinted a minimum of three shades lighter than the color specified, and progressively to the final coat, and subject to approval. As an alternate, the intermediate coats may be white or gray, depending on the color of the finish coat.
- G. Coating Progress. Where field painting on any type of surface has commenced on any portion of the work, the complete painting operation, including priming and finishing coats, on that portion of the work, shall be completed as soon as practicable without prolonged delays. Sufficient time as recommended by the paint manufacturer shall elapse between successive coats to permit them to dry properly for recoating and this minimum drying period shall be modified as necessary to suit adverse weather conditions. Maximum elapsed time between successive coats shall not exceed the time recommended by the coating manufacturer. The application of another coat of paint shall not cause such film irregularities as lifting or loss of adhesion of the undercoat, and the undercoat shall have dried sufficiently so as not to retard the drying of the next coat. At all times prior to final acceptance of the work when, it becomes necessary, the integrity and continuity of all coats, including coats which have chalked unduly or otherwise deteriorated, shall be reestablished by retouching or repainting, using paints identical with those maintained. At the time of application of each successive coat, undercoats shall be cleaned of dust, grease or any foreign matter, which might adversely affect intercoat adhesion, by means of air blast, solvent cleaning or other approved means. Field coats on metal shall be applied after erection, except as otherwise specified and except for surfaces to be painted which will become inaccessible after erection.
- H. Drying Time Prior to Immersion. Drying time prior to immersion, installation or otherwise handling painted surfaces shall be as recommended by the paint manufacturer. Vinyl type paint systems shall be allowed a final dry as long as practicable.
- I. Coverage and Film Thickness. Coverage and film thickness shall be as recommended by the paint manufacturer, unless otherwise prescribed in the schedule. On metal surfaces, the painter shall apply each coat of paint

at the rate specified or recommended by the manufacturer to achieve the minimum dry mil thickness required.

- J. Inspection. All painting will be inspected for applied coating thickness and for pinholes and holidays. Such inspection will not relieve the Contractor of the responsibility of furnishing qualified labor and materials in strict accordance with the specifications. The Contractor shall also furnish an approved type of low voltage dry mil gauge apparatus to measure the dry film thickness. The Elcometer Thickness Gauge shall be furnished by the Contractor for inspection. The Contractor shall also furnish holiday detector devices. Holiday detector devices shall be approved low-voltage type. All of the above inspection gauges shall be furnished and on the job before painting operations to proceed, and shall remain on the job until its completion and acceptance. The Contractor or his representative shall instruct on the proper use and care of all such gauges.

The above required testing gauges furnished are returnable to the Contractor upon completion of the job. The cost of furnishing all of the above required gauges shall be borne by the Contractor.

#### G5.07 COLOR SELECTION AND PIPE MARKINGS

- A. All exposed ductile iron piping and exposed plant water piping shall be color coded with paint and labeled as follows:

| <u>LETTERS</u> | <u>COLOR OF PIPE</u> |
|----------------|----------------------|
| Potable Water  | Light Blue           |
| Raw Water      | Tan                  |

- B. In addition to color coding, exposed piping shall also be marked with colored adhesive-backed bands which include a directional arrow. Placement of bands shall be in accordance with ANSI/OSHA requirements, as well as those of the State, except where a more stringent requirement is herein required. The Contractor shall furnish and install the label bands at the locations which are clearly visible and are spaced so an observer can easily identify the contents of all pipes, and normal direction of flow. IN addition, they shall be placed at each point where the pipe enters or exits a floor, from surface, wall or ceiling. Letters shall be at least 3/4-inch in height and arrows at least 1/2 -inch in width and 4 inches long. Pipe labels shall be of the general style and quality of those supplied by Seton Name Plate Corp., New Haven, CT, or approved equal.

#### G5.08 TESTING AND OBSERVATION

- A. All surfaces prepared in the field shall be observed by the Owner for adequate surface preparation as defined above prior to application of paint coating. All surfaces to be painted in the field shall have their readiness for painting approved by the Owner before work is started.

- B. Adequate film building shall be subject to observation procedures by using a wet film gauge during painting and/or a Mikrotest or equivalent dry film gauge after painting. Contractor shall supply applicable gauges for use by Owner's representative during completion of the work.

G5.09

PAYMENT

- A. No separate payment will be made for work performed in accordance with this section of the specifications, and the cost thereof shall be included in the lump sum amount of the Proposal and Bid Schedule.

**END OF SECTION**

## TECHNICAL SPECIFICATIONS

### SECTION G6 – FLEXIBLE BASE (CRUSHED STONE)

#### G6.01 DESCRIPTION OF WORK

- A. This specification covers the requirements for the use of “Flexible Base (Crushed Stone)” for this project and includes furnishing and installing 6” thick flexible base.

#### G6.02 SUBMITTALS

- A. The Contractor shall submit to the Engineer for approval, technical product literature including binding material, additives, aggregate source, aggregate type, aggregate gradation and all other pertinent data to illustrate conformance to the specification found within.

#### G6.03 GENERAL

- A. “Flexible Base (Crushed Stone)” shall consist of a 6” thick surface course and shall be composed of crusher-run broken stone; and shall be constructed as herein specified in one or more courses in conformity with the typical sections shown on Plans and to the lines and grades as established by the Plans.

#### G6.04 MATERIAL

- A. The material shall be crushed and shall consist of durable particles of stone mixed with approved binding material. The material source shall be approved by the Representative of the Water Supply Corporation, and conform to the requirements as follows:
- B. When properly slaked and tested by standard Texas Department of Transportation laboratory methods, the flexible base material shall meet the following requirements:
- C. Physical requirements

- a. General. All types shall meet the physical requirements for the specified grade(s) as set forth in Table 1.

Additives, such as, but not limited to, lime, cement or fly ash, shall not be used to alter the soil constants or strengths shown in Table 1, unless otherwise shown on the Plans.

Unless otherwise shown on the Plans, the base material shall have a minimum Bar Linear Shrinkage of two (2) percent as determined by Test Method Tex-107-E, Part II.

b. The flexible base shall be:

1. Type A. Type A material shall be crushed stone produced from oversized quarried aggregate, sized by crushing and produced from a naturally occurring single source. Crushed gravel or uncrushed gravel shall not be acceptable for Type A material. No blending of sources and/or additive materials will be allowed in Type A material.

TABLE 1  
PHYSICAL REQUIREMENTS

| Grade 1                                                                                                           |       |
|-------------------------------------------------------------------------------------------------------------------|-------|
| Triaxial Class 1: Min. compressive strength, psi: 45 at 0 psi lateral pressure and 175 at 15 psi lateral pressure |       |
| Master Grading                                                                                                    |       |
| 1-3/4"                                                                                                            | 0     |
| 7/8"                                                                                                              | 10-35 |
| 3/8"                                                                                                              | 30-50 |
| No. 4                                                                                                             | 45-65 |
| No. 40                                                                                                            | 70-85 |

| Grade 1                 |    |
|-------------------------|----|
| Max LL.....             | 35 |
| Max PI.....             | 10 |
| Wet Ball Mill           |    |
| Max .....               | 40 |
| Max increase in passing |    |
| No. 40.....             | 20 |

1. Gradation requirements are percent retained on square sieves.
2. When a magnesium soundness value is shown on the Plans the material will be tested in accordance with Test Method Tex-411-A.

|                                                              |                   |
|--------------------------------------------------------------|-------------------|
| Sieve Analysis                                               | Tex-110-E         |
| Moisture-Density Determination                               | Tex-113-E         |
| Roadway Density                                              | Tex-115-E         |
| Wet Ball Mill                                                | Tex-116-E         |
| Triaxial Tests<br>(Part I or II as selected by the Engineer) | Tex-117-E         |
| Particle Count                                               | Tex-460-A, Part I |

Samples for testing the base material for triaxial class, soil constants, gradation and wet ball mill will be taken prior to the compaction operations.



#### G6.05 TOLERANCES

- A. The limits establishing reasonably close conformity with the specified gradation and plasticity index are defined by the following:
- B. The Water Supply Corporation may accept the material, providing not more than two (2) out of 10 consecutive gradation tests performed are outside the specified limit on any individual or combination of sieves by no more than five (5) percent and where no two (2) consecutive tests are outside the specified limit.
- C. The Water Supply Corporation may accept the material providing not more than 2 out of 10 consecutive plasticity index samples tested are outside the specified limit by no more than two (2) points and where no two (2) consecutive tests are outside the specified limit.

#### G6.06 CONSTRUCTION METHODS

##### A. Preparation of Subgrade

- 1. The roadbed shall be excavated and shaped in conformity with the typical sections, lines and grades as shown on the Plans. All unstable or otherwise objectionable material shall be removed from the subgrade and replaced with approved material. All holes, ruts and depressions shall be filled with approved material, and if required, the subgrade shall be thoroughly wetted with water and reshaped and rolled to the extent directed in order to place the subgrade in an acceptable condition to receive the base material. The surface of the subgrade shall be finished to line and grade as established and in conformity with the typical section shown on the Plans, and any deviation in excess of ½-inch in cross section and in a length of 16-feet measured longitudinally shall be corrected by loosening, adding or removing material, reshaping and recompact by sprinkling and rolling. Sufficient subgrade shall be prepared in advance to insure satisfactory prosecution of work.

##### B. First Course

- 1. Immediately before placing the base material, the subgrade shall be checked as to conformity with grade and section.
- 2. The material shall be delivered in approved vehicles of a uniform capacity and it shall be the charge of the Contractor that the required amount of specified material shall be delivered in each 100-foot station. Material deposited upon the subgrade shall be spread and shaped the same day unless otherwise directed by the Water Supply Corporation in writing. In the event inclement weather or other unforeseen circumstances render impractical the spreading of the material during the first 24-hour period, the material shall be scarified and spread as directed by the Water Supply Corporation. The material shall be sprinkled, if directed, and shall then be bladed, dragged and shaped to conform to typical sections as shown on the Plans. The base layer shall be constructed in lifts not exceeding six (6) inches compacted thickness with each course being of equal thickness. All areas and “nests” of

segregated coarse or fine material shall be corrected or removed and replaced with well graded material, as directed by the Water Supply Corporation.

3. The course shall be compacted by the method of compaction hereinafter specified as the “Density Control” method of compaction.

- a. The course shall be sprinkled as required and compacted to the extent necessary to provide not less than the percent density as hereinafter specified under “Density”. In addition to the requirements specified for density, the full depth of flexible base shown on the Plans shall be compacted to the extent necessary to remain firm and stable under construction equipment. After each section of flexible base is completed, density tests shall be taken every 750 square yards of roadbed surface or every 250 linear feet, whichever is the least. If the material fails to meet the density requirements, it shall be reworked as necessary to meet these requirements. Throughout this entire operation the shape of the course shall be maintained by blading, and the surface upon completion shall be smooth and in conformity with the typical section shown on the Plans and to the established lines and grades. In that area on which pavement is to be placed, any deviation in excess of 1/4-inch in cross section and in a length of 16-feet measured longitudinally shall be corrected by loosening, adding or removing material, reshaping and recompacting by sprinkling and rolling. All irregularities, depressions or weak spots which develop shall be corrected immediately by scarifying the areas affected, adding suitable material as required, reshaping and recompacting by sprinkling and rolling. Should the base course, due to any reason or cause, lose the required stability, density and finish before the surfacing is complete, it shall be recompacted and refinished at the sole expense of the Contractor. The base material shall be placed at the optimum moisture contents to  $\pm 3\%$ .

C. Succeeding Courses

1. Construction methods shall be the same as prescribed for the first course.

D. Density

1. When the “Density Control” method of compaction is used, each course of flexible base shall be compacted to the percent density indicated below. The testing will be as outlined in TEX 113E. It is the intent of this specification to provide in that part of the base included in the flexbase section as shown on the Plans immediately below the finished surface of the roadway, not less than 100 percent of the density as determined by the compaction ratio method. Field density determination shall be made in accordance with approved methods.

G6.07 PAYMENT

- A. Payment will be measured and paid for as provided for in the Proposal and Bid Schedule.

**END OF SECTION**

## TECHNICAL SPECIFICATIONS

### SECTION G7 - SEDIMENTATION AND EROSION CONTROL

#### G7.01 SCOPE

- A. This specification covers the requirements for installing, maintaining, removing and cleaning the areas related to sedimentation control work as shown on the Drawings and as specified herein. The work shall include, but not necessarily be limited to: installation of temporary access ways and staging areas, stone filter boxes, sediment removal and disposal, device maintenance, removal of temporary devices, temporary mulching, excelsior matting installation and final cleanup.

#### G7.02 GENERAL

- A. The Contractor shall be responsible for the timely installation and maintenance of all sedimentation control devices necessary to prevent the movement of sediment from the construction site to off site areas or into the stream system via surface runoff or underground drainage systems. Measures in addition to those shown on the Drawings necessary to prevent the movement of sediment off site shall be installed, maintained, removed, and cleaned up at the expense of the Contractor. No additional charges to the Owner will be considered.
- B. Sedimentation and erosion control measures shall conform to the requirements outlined in the Texas Commission on Environmental Quality, Chapter 313.

#### G7.03 MATERIALS

- A. Crushed stone for sediment filtration devices, access ways and staging areas shall conform to Texas Department of Transportation "Standard Specifications for Construction of Highways, Streets and Bridges."
- B. Berm structural stone shall be rip-rap as follows:
  - 1. Rip-rap shall be sound, durable rock which is roughly rectangular shape and of suitable quality to insure permanence in the condition in which it is to be used. Rounded stones, boulders, sandstone or similar soft stone will not be acceptable. Material shall be free from overburden, spoil, shale, and organic material, meet the Engineer's approval and be well graded within the following limits:

| Weight of Stone | Percent Finer by Weight |
|-----------------|-------------------------|
| 40 lb           | 100                     |
| 12 lb           | 50                      |
| 3 lb            | 0                       |

C. Silt Fence

1. Steel posts shall be a minimum of 5 feet in length, 2-1/2-in by 2-1/2-in by 1/4-in angle post with self-fastening tabs and a 5-in by 4-in (nominal) steel anchor plate at bottom.
2. Welded wire fabric shall be 4-in by 4-in mesh of 12 gauge by 12 gauge steel wire.
3. Silt fence fabric shall be a woven, polypropylene, ultraviolet resistant material such as Mirafi 100X as manufactured by Mirafi, Inc., Charlotte, NC or equal.
4. Tie wires for securing silt fence fabric to wire mesh shall be light gauge metal clips (hog rings), or 1/32-in diameter soft aluminum wire.
5. Prefabricated commercial silt fence may be substituted for built-in-field fence. Pre-fabricated silt fence shall be "Envirofence" as manufactured by Mirafi Inc., Charlotte, NC or equal.

D. One quarter inch woven wire mesh shall be galvanized steel or hardware cloth.

E. Straw mulch shall be utilized on all newly graded areas to protect areas against washouts and erosion. Straw mulch shall be comprised of threshed straw of oats, wheat, barley, or rye that is free from noxious weeds, mold or other objectionable material. The straw mulch shall contain at least 50 percent by weight of material to be 10-in or longer. Straw shall be in an air-dry condition and suitable for placement with blower equipment.

F. Latex acrylic copolymer, such as Soil Sealant with coalescing agent as manufactured by Soil Stabilization Co., Merced, CA or approved equivalent shall be used as straw mulch tackifier.

G. An asphalt tackifier shall only be used when temperatures are too low to allow the use of a latex acrylic copolymer and only with prior written approval from the Engineer.

H. Excelsior matting blanket shall be installed in all seeded drainage swales and ditches as shown on the Drawings or as directed by the Engineer. Excelsior matting shall be AMXCO Curlex Blanket as manufactured by American Excelsior Company, Arlington, TX or equal.

INSTALLATION

## A. Silt Fence Installation

1. Silt fences shall be positioned as indicated on the Drawings and as necessary to prevent off site movement of sediment produced by construction activities as directed by the Engineer.
2. Dig trench approximately 6-in wide and 6-in deep along proposed fence lines.
3. Drive metal-stakes, 8 feet on center (maximum) at back edge of trenches. Stakes shall be driven 2 feet (minimum) into ground.
4. Hang 4 by 4 woven wire mesh on posts, setting bottom of wire in bottom of trench. Secure wire to posts with self-fastening tabs.
5. Hang filter fabric on wire carrying to bottom of trench with about 4-in of fabric laid across bottom of trench. Stretch fabric fairly taut along fence length and secure with tie wires 12-in O.C. both ways.
6. Backfill trench with excavated material and tamp.
7. Install pre-fabricated silt fence according to manufacturer's instructions.

- B. Construct filter boxes as detailed on the Drawings, from 1/4-in woven wire mesh or hardware cloth and wood. Fill with crushed stone and place over all drop inlets and manholes to storm drain system as each inlet is completed. This should be done prior to setting casting, if there is a delay between installation of inlet structures or drain manholes and setting of castings. An alternate method is to ring each inlet with a silt fence.

## C. Rock Berm Installation

1. Place berm structural stone across channel just below lower sandbag wall at work area. Face upstream side of structural berm with crushed stone.

- D. Staging areas and access ways shall be surfaced with a minimum depth of 4-in of crushed stone.

MAINTENANCE AND INSPECTIONSA. Inspections

1. Contractor shall make a visual inspection of all sedimentation control devices once per week and promptly after every rainstorm. If such inspection reveals that additional measures are needed to prevent movement of sediment to offsite areas or into the vent trench, Contractor shall promptly install additional devices as needed. Sediment controls in need of maintenance shall be repaired promptly.

B. Device Maintenance

1. Silt Fences
  - a. Remove accumulated sediment once it builds up to one-half of the height of the fabric.
  - b. Replace damaged fabric, or patch with a 2-ft minimum overlap.
  - c. Make other repairs as necessary to ensure that the fence is filtering all runoff directed to the fence.
2. Filter Boxes: Replace crushed stone when it becomes saturated with silt.
3. Stone Filter Berm
  - a. Muck out trapped silt from dewatering operations when it has built up to within 6-in of the top of the berm.
  - b. Replace crushed stone filter when saturated with silt.
4. Add crushed stone to access ways and staging area as necessary to maintain a firm surface free of ruts and mudholes.

TEMPORARY MULCHING

- A. Apply temporary mulch to areas where rough grading has been completed but final grading is not anticipated to begin within 30 days of the completion of rough grading.
- B. Straw mulch shall be applied at rate of 100 lbs/1000 ft<sup>2</sup> and tackified with latex acrylic copolymer at a rate of 1 gal/1000 ft<sup>2</sup> diluted in a ratio of 30 parts water to 1 part latex acrylic copolymer mix.

G7.07     REMOVAL AND FINAL CLEANUP

- A.     Once the site has been fully stabilized against erosion, remove sediment control devices and all accumulated silt. Dispose of silt and waste materials in proper manner. Regrade all areas disturbed during this process and stabilize against erosion with surfacing materials as indicated on the Drawings.

G7.08     MEASUREMENT AND PAYMENT

- A.     Payment will be measured and paid for as provided for in the Proposal and Bid Schedule.

**END OF SECTION**



## TECHNICAL SPECIFICATIONS

### SECTION G8 – SITE CLEARING AND GRUBBING, FINISH GRADING AND GRASS PLANTING

#### G8.01 GENERAL

The Contractor shall perform site clearing and grubbing, finish grading and grass planting as shown on the plans and described herein. The Contractor shall also provide all equipment and materials required, and shall develop and present to the Owner a Bermuda grass ground cover at the plant site.

It is the intent of these specifications that areas to be grassed shall include the slopes of all new embankments, the ground surrounding proposed buildings and plant structures, and those grassed areas of the plant grounds which are disturbed during proposed construction.

It shall be understood and agreed that the actual limits of areas to be cleared of all brush and trees and grassed shall be established on the site by the Owner but will generally be within the Metal fenced area of the site.

The hydromulching system of grass planting is described herein. Other procedures such as sodding or live sprigging may be used if approved by the Owner. The system used shall prevent erosion of topsoil until adequate ground cover develops and serves to control erosion.

#### G8.02 SITE CLEARING AND GRUBBING

- A. Clearing: Clearing consists of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Cut off to a depth of 24-inches below the original ground surface trees, stumps, roots, brush, and other vegetation in areas to be cleared, except for trees and vegetation indicated or directed to be left standing.
- B. Tree Removal: Where indicated, remove designated trees and stumps from areas outside those areas specified for clearing and grubbing
- C. Pruning: Trim trees designated to be left standing within the cleared areas of dead branches 1½-inches or more in diameter; and trim branches to heights and in a manner as indicated. Neatly cut limbs and branches to be trimmed close to the bole of the tree or main branches. Paint cuts more than 1¼-inches in diameter with an approved tree wound paint.
- D. Grubbing: Remove and dispose of roots larger than 3-inches in diameter, matted roots, and designated stumps from the indicated grubbing areas. Excavate this material together with logs, organic and metallic debris, brush, and refuse and remove to a depth of not less than 24 inches below the original soil surface in areas indicated to be grubbed and in areas indicated as construction areas under this Contract.

- E. Leveling: Fill depressions made by grubbing with suitable material to make the new surface conform with the existing adjacent surface of the ground.
- F. Disposal of Cleared and Grubbed Materials: Dispose of timber, scrub, vegetation, and debris off-site. Obtain required permits from various government agencies involved. Burial of materials on the project site is strictly prohibited.

#### G8.03 FINISH GRADING

Finish grading shall involve bringing final ground surfaces to contour elevations shown on the plans, including placement of topsoil as described herein.

Placement of structural fill, road subgrade, and area or site fill is described under other sections of these Specifications.

Topsoil shall be used for the upper six (6) inches of soil in the finished plant site. It shall be supplied from stockpiled topsoil from the site or other local sources. Approximately eight (8) inches, loose measure, of topsoil shall be placed in order to obtain the 6-inch layer of consolidated topsoil. Topsoil shall be lightly compacted. The Owner may require tilling of topsoil, if he feels it is over-compacted, prior to grass planting.

#### G8.04 GRASS PLANTING

##### A. Fertilizer

Balanced fertilizer (e.g. 10-10-10) shall be applied as part of grass planting. Rate of application shall be 3-lb. per 1,000 sq. ft. (130-lb. per acre) of available nitrogen, phosphorous, and potassium. Not less than one-third of the available nitrogen shall be in an organic form. The Contractor shall insure that fertilizer is delivered to the site in original containers, or shall provide other certification of proper fertilization acceptable to the Owner.

##### B. Water

The Contractor shall provide water necessary for grass planting and maintenance until acceptance by the Owner.

##### C. Planting Seasons

Grass planting by sodding or sprigging shall normally be done between April 15 and September 15; seeding or hydromulching shall not normally be done prior to May 15.

##### D. Hydromulching

Grass planting by hydromulching shall consist of applying water, seed, fibrous mulch, and fertilizer (if desired) to initiate grass cover.

Bermuda Grass Seed shall be *Cynodon dactylon*. No coastal Bermuda will be permitted. Seed shall not have been harvested more than 2 years prior to planting, and shall be free of Johnson Grass, Nut Grass, Crab Grass, Dallis Grass, and other obnoxious weed and grass

seed, to the limit allowable under the Federal Seed Act and applicable State Seed Laws. Seed shall be hulled and have a germination and purity percent within allowable tolerances established in the Federal Seed Act.

Other materials and procedures shall generally conform to those required by the Texas Department of Highways and Public Transportation.

G8.05 MAINTENANCE OF DEVELOPING GRASS

The Contractor shall water and maintain all grassed areas until final acceptance. He shall also re-fertilize at the rate of 1 lb. of nitrogen and 1 lb. of phosphorous per 1,000 square ft. every 60 days until the grass is accepted.

Areas which, due to settling or improper leveling, do not have positive drainage shall be releveled with topsoil and replanted with grass.

Areas damaged by erosion, vehicle ruts and similar damage shall be releveled with topsoil and replanted. Finished ground surface shall be sufficiently smooth and level to facilitate mowing.

G8.06 ACCEPTANCE

Work under this section shall be considered acceptable when finish graded surfaces are level and well-drained, when grass achieves full coverage and is at least 2 inches high, and when other requirements listed herein are met.

Acceptance of work normally coincides with final acceptance of the entire project. However, seasonal factors may be cause for delay in grass planting, development, and acceptance.

The Owner will accept responsibility for normal maintenance when grass is accepted. However, the Contractor shall remain responsible for any subsequent grass damage which he causes, and for warranty of materials and workmanship as required in the Special Conditions.

G8.07 PAYMENT

- A. Payment will be measured and paid for as provided for in the Proposal and Bid Schedule.

**END OF SECTION**

## GENERAL REQUIREMENTS

### SECTION G9 - SITE CONDITIONS

#### G9.01 SUBSURFACE INFORMATION

- A. A geotechnical report is included for informational purposes only.

#### G9.02 SITE INVESTIGATION AND REPRESENTATION

- A. The Contractor acknowledges that he has satisfied himself as to the nature and location of the work; the general and local conditions, particularly those bearing upon availability of transportation, disposal, handling and storage of materials, availability of labor, water, electric power, roads, and uncertainties of weather, river/stream stages, or similar physical conditions at the site; the conformation and conditions of the ground; the character of equipment and facilities needed preliminary to and during the prosecution of the work and all other matters which can in any way affect the work or the cost thereof under this Contract.
- B. The Contractor further acknowledges that he has satisfied himself as to the character, quality, and quantity of surface and subsurface materials to be encountered from inspecting the site, as well as from information presented herein as a part of these Contract Documents. Any failure by the Contractor to acquaint himself with all the available information will not relieve him from responsibility for properly estimating the difficulty or cost of successfully performing the work. Neither the Owner nor the Engineer assume responsibility for any conclusion or interpretation made by the Contractor on the basis of the information made available by the Owner or the Engineer.
- C. Existing ground profiles shown on the Plans were plotted from field surveys.

#### G9.03 RESPONSIBILITY FOR UTILITY PROPERTIES AND SERVICE

- A. Known utilities and structures adjacent to or encountered in the work are shown on the Drawings. The locations shown are taken from existing records and the best information available from existing plans; however, it is expected that there may be some discrepancies and omissions in the locations and quantities of utilities and structures shown. Those shown are for the convenience of the Contractor only, and no responsibility is assumed by either the Owner or the Engineer for their accuracy or completeness.
- B. Neither the Owner nor his officers or agents shall be responsible to the Contractor for damages as a result of the Contractor's failure to protect utilities encountered in the work.
- C. The Contractor shall at all times provide unobstructed access to fire hydrants, underground conduit, manholes, and water or gas valve boxes.

- D. Where the Contractor's operations could cause damage which might result in considerable expense, loss, and inconvenience when his operations are adjacent to or near railway, telegraph, telephone, television, power, oil, gas, water, sewer, irrigation, or other systems, no operations shall be commenced until the Contractor has made all arrangements necessary for the protection of these utilities and services.
- E. The Contractor shall notify all utility offices that are affected by the construction operation at least 15 days in advance of commencing construction operations. The Contractor shall not expose any utility without first obtaining permission from the affected agency. Once permission has been granted, locate and, if necessary, expose and provide temporary support for all existing underground utilities in advance of operations.
- F. The Contractor shall be solely and directly responsible to the Owners and operators of such utility properties for any damage, injury, expense, loss, inconvenience, delay, suits, actions, or claims of any character brought because of any injuries or damage that may result from the construction operations under this Contract.
- G. In the event of interruption to domestic water, sewer, storm drain, or other utility services as a result of accidental breakage due to construction operations, the Contractor shall promptly notify the proper authority and cooperate with said authority in restoration of service as promptly as possible and bear all costs of repair. In no event shall interruption of any water or utility service be allowed unless prior approval is granted by the owner of the utility.
- H. The Contractor shall replace, at his own expense, any and all other existing utilities or structures removed or damaged during construction, unless otherwise provided for in these Contract Documents.
- I. Where existing utility lines or structures are so located as to physically conflict with permanent structures to be constructed under this Contract, the conflicting utility line or structure shall be permanently relocated. Such relocations shall be considered as required by this Contract.
- J. The Contractor shall give immediate notice to the Engineer, the Owner and the owner of the utility (where applicable) when a physical conflict is determined to exist. The actual relocation of a public utility will be accomplished by the owner of the utility at his expense unless otherwise specified in these Contract Documents. Any delays resulting from the required relocations of the utilities are the responsibility of the Contractor.
- K. Where existing utility lines or structures are so located as to interfere with the Contractor's prosecution of the work, but do not physically conflict with completed manholes or other permanent structures to be constructed under this Contract, any modification, alteration, or relocation of interfering utility, either permanent or temporary, shall be accomplished at the expense of the Contractor.

- L. The Contractor shall give immediate notice to the Engineer and the Owner of the utility when an interference is determined to exist and shall obtain approval to relocate such utility or to discontinue service therein from the Engineer and the owner of the utility. The owner of the utility shall have the right to do all work required to discontinue, relocate, and replace interfering utilities and charge the Contractor for all costs thereof. When approved by the Engineer and the owner of the utility, all work required to discontinue, relocate, and replace interfering utilities may be done by, or arranged for, by the Contractor. All such discontinuance, relocation, and replacement shall be accomplished in accordance with all requirements of the owner of the utility.
- M. When notified by the Contractor that an interference or conflict has been determined to exist, the Owner and the Engineer will determine whether such interference shall be considered as required by construction or as incidental to construction.

#### G9.04

#### INTERFERING STRUCTURES

- A. Take necessary precautions to prevent damage to existing structures whether on the surface, aboveground, or underground. An attempt has been made to show major structures on the Plans. While the information has been compiled from the best available sources, its completeness and accuracy cannot be guaranteed, and it is presented as a guide to avoid known possible difficulties.
- B. Protect existing structures from damage, whether or not they lie within the right-of-way or the limits of the easements obtained by the Owner. Where existing structures must be removed to properly carry out the work, or are damaged during the work, they shall be restored at the Contractor's own expense to at least their original condition and to the satisfaction of the Engineer.
- C. The Contractor may, with the approval of the Engineer and without additional compensation, remove and replace in a condition as good as or better than original, any small interfering structures such as fences and signposts that interfere with the Contractor's operations.

#### G9.05 FIELD RELOCATION

- A. During the progress of the work, minor relocations of the work may be necessary. Such relocations shall be made only by direction of the Engineer and the Owner. If existing structures are encountered that will prevent construction as shown, notify the Engineer before continuing with the work in order that the Engineer may make such field revisions as necessary to avoid conflict with the existing structures. If the Contractor shall fail to notify the Engineer when an existing structure is encountered and proceeds with the work despite this interference, he shall be responsible for any damage that may occur.

#### G9.06 LAND MONUMENTS

- A. The Contractor shall preserve or replace any existing Federal, State, County, City, and private land monuments encountered. All monument replacement by the Contractor shall be performed by a land surveyor licensed in the State of Texas.

#### G9.07 PAYMENT

- A. The work specified in this Section shall be considered incidental and payment will be included as part of the appropriate lump sum or unit prices specified in the Proposal and Bid Schedule.

**END OF SECTION**

## TECHNICAL SPECIFICATIONS

### SECTION G10 - PVC PIPE AND FITTINGS FOR PRESSURE PIPE

#### G10.01 DESCRIPTION OF WORK

The work to be performed under this specification shall consist of furnishing and installing polyvinyl chloride (PVC) water pipe and ductile iron fittings including all clearing, grubbing, excavation, sheeting, shoring, dewatering, pipe laying, jointing, testing, backfilling and any other work that is required or necessary to complete the installation as shown in the plans and as specified herein.

#### G10.02 MATERIALS

- A. Polyvinyl chloride pipe for water lines, unless otherwise specifically shown on the plans, or approved in writing, shall be AWWA C900 or C905, Class 150 psi with a dimension ratio of 18 (DR-18), and shall be extruded, be of rubber gasket type, and be furnished in 20-foot nominal laying lengths. All such pipe shall bear a mark denoting approval by the Underwriters' Laboratories of Chicago, Illinois, so that it will be acceptable to the Texas State Fire Insurance Commission for use in fire protection lines without penalty. All joints shall be of the type which provides a recession in the bell for the employment of a single rubber gasket to be placed before the insertion of the succeeding spigot. Each size of polyvinyl chloride pipe shall have the same outside diameter as the corresponding size of cast iron pipe.
- B. Ductile iron pipe joints shall be Tyton Joint or approved equivalent.

#### G10.03 INSTALLATION

- A. The Contractor shall obtain installation instructions, including support spacing and solvent welding, from the supplying manufacturer, shall comply with the instructions, and shall meet the requirements of ASTM D-2855, Standard Recommended Practice for making Solvent Cemented Joints with PVC Pipe and Fittings. The PVC solvent cement shall comply with ASTM D-2564 and shall be furnished by the pipe and fitting manufacturer for the class and type of pipe supplied to the project.
- B. Unless otherwise specified on the plans, polyvinyl chloride pipe shall be installed to clear all utility lines and shall have 3.5 feet minimum cover. For lines to be constructed under a future roadway, the cover shall be increased to allow for future paving grades. The depth of cover where shown on the Plans, is that distance from the top of the pipe to the approximate existing grade line.
- C. The specified embedment shall be accurately shaped and trimmed to receive the pipe barrel and each pipe section, when in place, shall have a uniform bearing on the subgrade for the full length of the pipe barrel. Pipe shall not be laid unless the subgrade is free of water and in a satisfactory condition. Adjustments of the pipe to line and grade shall be made by scraping away of filling in with granular material, and not by wedging or blocking up the bell.



- D. The interior of the pipe shall be clean and joint surfaces shall be clean and dry when the pipe is lowered into the trench. Each pipe, fitting, valve shall be lowered in the trench carefully and laid true to line and grade.
- E. All underground force main piping on this project, regardless of size or class, shall be placed in sand embedment as shown on detail sheets in Plans unless otherwise specified or shown.

G10.04 PROTECTION OF PIPELINE

- A. Well fitted stoppers or bulkheads shall be securely placed in all openings and in the end of the line when construction is stopped temporarily and at the end of each day's work. It shall be the responsibility of the Contractor to deliver to the Owner a pipeline which is clean throughout its entire length.

G10.05 CONCRETE AND BLOCKING

- A. 1,500 psi concrete shall be placed for blocking at each change in direction in the force main, as shown in the Standard Details and in such manner as will substantially brace the pipe against undisturbed trench walls. In no event shall this quantity of concrete blocking be less than those shown in the Plans. Concrete blocking, made from Type I cement, shall have been in place four (4) days prior to testing the pipeline as hereinafter specified. Test may be made in two (2) days after completion of blocking if Type III cement is used.
- B. Concrete blocking will not be measured or paid for as a separate item but the cost thereof shall be included in the various items listed in the Proposal and Bid Schedule.

G10.06 CONNECTION AND APPURTENANCES

- A. The Contractor shall make the alterations and the necessary connections as shown on the plans. Such connection shall be made at such time and in a manner approved by the Owner; in each case, when the work is started, it shall be prosecuted expeditiously and continuously until completed.
- B. Fittings, bends and plugs shall be of standard manufacture and mechanical joint type.
- C. Payment for fittings will be made separately under the appropriate bid items.

G10.07 TESTING AND ALLOWABLE LEAKAGE

Testing shall be in accordance with specification for Testing of Pipelines.

- A. The pipeline, complete in place, will be measured for payment in linear feet along the centerline of the pipe actually installed. Measurement shall be through all fittings, specials, valves, etc., and no deduction in length shall be made for such appurtenances. Installation of the pipeline will be paid for at the unit contract price per linear foot as provided in the Proposal and Bid Schedule.
- B. Payment of the unit contract price for the items of work performed shall be the total compensation for furnishing all labor, materials, tools, equipment and incidentals and performing all work that is necessary for the installation, testing, fittings, connections, blocking, embedment or placing in encasement pipe and all other appurtenances in accordance with the plans and the provisions of the specifications.

**END OF SECTION**

## TECHNICAL SPECIFICATIONS

### SECTION G11- TESTING FOR PRESSURE PIPELINES

#### G11.01 SCOPE OF WORK

- A. Furnish all labor, materials, tools, equipment and related items required to perform pressure and leakage testing of pressure pipelines.

#### G11.02 GENERAL

- A. Hydrostatic pressure and leakage tests shall be made on all pressure pipelines.
- B. All labor and equipment, including test pump with regulated by-pass meters and gauges required for conducting pipeline tests, shall be furnished by the Contractor.
  - 1. The Contractor shall make the necessary arrangements for securing and transporting all water used in testing.
  - 2. Water for one testing, one flushing, and one filling or a volume equal to three times the volume of the pipe line shall be furnished by the Owner. If additional water is required because of breaks, leaks, etc., the Contractor shall purchase the water from the Owner at current water rates.
- C. Time and sequence of testing shall be scheduled by the Contractor, subject to observation and approval by the Owner. The Contractor shall provide adequate labor, tools and equipment to operate valves and to locate and repair any leaks discovered during the initial filling of the pipeline prior to actual testing or during the course of the tests.

#### G11.03 CLEANING

- A. At the conclusion of the work, thoroughly clean all pipelines by flushing with water or other means to remove all dirt, stones, pieces of wood, or other material which may have entered the pipes during the construction period. Debris cleaned from the lines shall be removed from the low end of the pipeline. If after this cleaning, obstructions remain, they shall be removed. If any defective pipes or joints are discovered, they shall be repaired, and/or replaced by the Contractor at his expense.

## G11.04 TEST PROCEDURES FOR PRESSURE PIPELINES

### A. General

1. After the pipe has been laid and backfilled and the backfill has been otherwise consolidated, all newly laid pipe, or any valved section thereof, shall be subjected to the hydrostatic pressure of 180 psi. The duration of each leakage test shall be four hours.
2. The pipe shall be filled slowly with water and all air shall be expelled. If permanent air vents are not located at all high points, the Contractor shall install corporation or blow-off cocks at such points so that air can be expelled as filling takes place. After verification that all air has been expelled, the cocks shall be closed and the pipe kept filled until tested. All exposed pipe, fittings, valves, hydrants and joints shall be examined while under test pressure and all visible leaks shall be stopped. Any cracked or defective pipe, fittings, valves or hydrants discovered during testing shall be removed and replaced by the Contractor. Replacement shall be with sound material and the test shall be repeated until satisfactory to the Owner.

### B. Special Requirements

1. Where any section of pipeline is provided with concrete reaction blocking, the hydrostatic pressure shall not be made until at least 5 days have elapsed after installation of the blocking. However, if high-early-strength cement is used in the concrete, 2 days shall have elapsed prior to testing.

### C. Allowable Leakage

1. Leakage during the above test shall not exceed a rate equal to 10 gallons per inch in internal pipe diameter per mile per 24 hours.

### D. Disinfecting Water Mains

1. The Contractor shall disinfect all water mains before the new facilities are placed into service. Disinfection must be performed in accordance with AWWA C651, latest revision and water samples must be submitted to a laboratory approved by Texas Department of Health. Sample results must indicate the facility is free of microbiological contamination before it is placed into service. It shall be the Contractor's responsibility to obtain a current copy of AWWA C651 to determine the correct forms of chlorine for the disinfection, the basic disinfection procedure, preventative and corrective measures during construction, methods of chlorination, final flushing procedures, procedures for bacteriological tests, procedures for re-disinfection and disinfection procedures when cutting into existing mains. The Contractor, at its expense, will supply the concentrated chlorine disinfecting material; the

Corporation's personnel will supervise and direct the overall sterilization procedure. The Contractor, at his own expense, shall provide all other equipment, supplies and necessary labor to perform the sterilization under general supervision by the Owner.

E. General:

1. All valves shall be arranged to prevent the strong disinfecting dosage from flowing back into the existing water supply piping. The new pipeline shall then be completely filled with disinfecting solution by feeding the concentrated chlorine and approved water from the existing system uniformly into the new piping in such proportions that every part of the line has a minimum concentration of chlorine as prescribed in AWWA C651.
2. Unless otherwise identified, all quantities called for herein refer to measurements by the testing procedures in the current edition of "Standard Methods of Examination of Water and Wastewater". The chlorine concentration of each step in the sterilization procedure shall be verified by chlorine residual determinations. This disinfecting solution shall be retained in the piping for at least twenty four (24) hours, and all valves, hydrants, etc., shall be operated to disinfect all their parts. After this retention period, the water shall contain no less than the chlorine residual prescribed in AWWA C651 throughout the treated section of the pipeline.
3. This heavily chlorinated water shall then be carefully flushed from the line until the chlorine concentration is not higher than the residual generally prevailing in the existing distribution system, or approximately one (1) part per million. Proper planning and appropriate preparations to handle, dilute and dispose of this strong chlorine solution without causing injury or damage to the public, the water system, the environment must be approved by the Corporation before flushing of the line may begin, and the flushing shall be witnessed by an authorized representative of the Corporation.

G. Bacteriological Testing

1. After final flushing of the strong disinfecting solution, water samples from the line shall be tested for bacteriological quality, at the Contractor's expense, and must be found free of coliform organisms before the pipeline may be placed in service. One (1) test sample shall be drawn from the end of the main, and additional samples collected at intervals of not more than one thousand (1,000) feet long along the pipeline.

2. The Contractor, at his own expense, shall install sufficient sampling taps at proper locations along the pipeline. Each sampling tap shall consist of a standard corporation cock installed in the line and extended with a copper tubing gooseneck assembly. After samples have been collected, the gooseneck assembly may be removed and retained for future use.
3. Samples for bacteriological analysis shall be collected only from suitable taps and in sterile bottles. If the initial disinfection fails to produce acceptable sample tests, the disinfection procedure shall be repeated (without extra compensation) until satisfactory test results have been obtained, before the piping may be placed in service.

G11.06 FINAL ACCEPTANCE

- A. No pipe installation will be accepted until all known leaks have been repaired whether or not leakage is within allowable limits. Locating and repairing of leaks shall be performed by the Contractor at no additional cost to the Owner.

G11.07 MEASUREMENT AND PAYMENT

- A. Payment will be measured and paid for as provided for in the Proposal and Bid Schedule.

**END OF SECTION**

## TECHNICAL SPECIFICATIONS

### SECTION G12 – 100,000 GALLON WELDED STEEL GROUND STORAGE TANK

#### G12.01 SCOPE OF WORK

- A. The work to be performed under this section of the specifications shall comprise the furnishing of all supervision, labor, materials, tools, equipment and incidentals necessary for the construction of a 100,000 Gallon Welded Steel Ground Storage Tank, complete in place as specified herein and is indicated in the plans.
- B. The work described in this section shall only be undertaken by a company with a minimum of five years experience with tank design and construction. The company shall be able to demonstrate experience in the design and construction of this type of tank through the successful completion of at least five tank projects of equal or greater capacity in the past five years.

The following shall be submitted with the proposal:

- 1.) A list of five tank structures of equal or greater capacity which have been designed, constructed and commissioned by the Bidder. Provide the location, capacity and year completed.
- 2.) A preliminary drawing of the tank proposed for this project. The drawing shall be a Section View with sufficient detail to illustrate tank geometry, materials of construction, primary dimensions, the elevation of low and high water levels and other information required to perform an assessment of the proposal.
- 3.) Bids will be received only from experienced tank contractors who have successfully completed at least five water storage tanks of similar style and equal or greater capacity, in the last five years. A letter shall accompany the bid listing at least five such projects including contact names and phone numbers.
- 4.) The Tank Contractor shall not subcontract any of the following portions of the project:
  - 1.) Design of the steel tank and concrete support structure.
  - 2.) Construction of the concrete support structure.
  - 3.) Construction of the steel tank.
  - 4.) Application of Tank Coatings unless approved in advance by the Owner or Engineer

## G12.02

### DESIGN AND MATERIALS

Materials, design, welding, shop fabrication, erection and inspection of the clear well and reservoir shall conform with all applicable provisions of American Water Works Association (AWWA) D-100, Appendix "C", and AWS D-5.2, Standard Welded Carbon Steel Tanks for Water Storage, as jointly adopted by the American Water Works Association and American Welding Society in the latest amended form.

The design of the storage tank shall be completed and signed, sealed and dated by a Professional Engineer, licensed in the State of Texas. All design calculations shall be submitted to the Owner.

All materials, design, shop fabrication, welding, erection, inspection and testing of the storage tank along with appurtenances shall be in compliance with the latest revision of the American Water Works Association Standard Specification AWWA D 100 for "Welded Carbon Steel Tanks for Water Storage".

The materials and design shall conform to the applicable requirements of the Governing Standard Specifications. The storage tank shall be of all welded steel construction and the roof shall be watertight. A minimum thickness of steel plates in the tank shall be 1/4-inch. The structural roof support beams in the vapor zone of the tank shall be completely seal welded on both, sides to the under side of the roof and all roof plates shall be completely seal welded. All bracing which supports vertical piping shall be continuously welded at all joints.

All support structures inside the storage tank shall be steel stiffeners with a minimum depth between the roof or structural plate to a horizontal member of the stiffener shall be 12-inches to allow proper coating of the steel plate with the specified protective coating system.

The seal welding can take place on the ground and in the air. The complete erection of the roof and roof structure in place shall be completely seal welded to the roof structure and roof plates in the vapor zone.

No laminated steel plates shall be used.

## G12.03

### WELDING

All welding on this project shall be in accordance with Section 8, WELDING of AWWA D-100. Before welding begins, joints shall be properly aligned, spaced and welded. The Contractor's welding procedure and joint details shall be followed precisely in the field. The welding procedures, joint details and welding certifications shall be submitted as part of the shop drawing. All metal edges to be welded shall be wire brushed just prior to welding to remove dirt and rust, etc.

## G12.04

### PREPARATION OF SURFACES TO BE WELDED

Preparation of surfaces to be welded AWWA D-100. Tab plates shall be used at the abrupt end of a weld seam, such as the top of vertical seam in a course of shell plates. Tab plates are required to prevent brittle cracking and fatigue.



All butt-welding shall conform to Section 8.3 of AWWA D-100 for primary and secondary stresses. All lap welding shall conform to Section 8.4 of AWWA D-100. On both Sections 8.3 and 8.4 Contractor shall identify each type of stress on the shop drawings.

All burrs, welding splatter and the like shall be removed and area ground smooth. All pullouts, craters and the like shall be welded and ground smooth to match existing area on clearwell and reservoir surfaces. The definition of ground smooth shall include the removal of all weld splatter and burrs so the finished plate shall be level for proper coating of the new plate with the specified protective coating. In areas where weld is required to fill in craters and pullouts, these areas shall be free from weld splatter and burrs and the weld fill made level with the surrounding plate for proper coating of the steel plate with the specified protective coating system.

Before welding begins, joints shall be properly aligned, spaced and tacked. The Contractor's welding procedure and joint details shall be followed precisely, and this information shall be furnished as part of the shop drawing submittal process.

Metal edges to be welded shall be wire brushed prior to welding.

Tab plates shall be used at the abrupt end of a weld seam, such as the top of vertical seam in a course of shell plates.

All butt welds which require 100 percent fusion must be back gouged prior to welding the side opposite from the initial welding passes. If full fusion is not required, the backside of initial passes shall be brushed, to clean it of slag and other foreign material, prior to welding the backside.

Full fusion or complete penetration welds are required on butt welds involving top square structural tubing, bars, wind girders, and other similar items which are an integral part of the structure.

After welding, all joints shall be cleaned of slag and weld spatter. Welds shall be ground smooth and repaired where undercut or insufficient bead exists. Indentations for plate clamps, and pullout craters from temporary welding, shall also be filled and shall be ground if necessary.

## G12.05

### BOTTOM AND ROOFS

Roof welds shall not normally be tested but bottom welds shall be vacuum tested by the Contractor in the presence of the Project Representative.

Hammering lap plate breakdowns shall not be so extensive that the plates are seriously deformed or torn. Breakdowns shall be welded around the edge on the outside with two passes.

Roof support columns shall be Schedule 80 steel pipe in lieu of I-Beam or other construction.

## G12.06

### TANK SHELLS

Both horizontal and vertical joints require spacer shims. The size of these shims shall be verified and sufficient shims shall be inserted during the fitting of the plates so that the proper distance is maintained throughout.

Excessive force shall not be used during fittings and tacking of the plates. Plates which do not fit shall not be field cut without approval of the Owner's Representative.

Erected shell rings shall be inspected for roundness. The radius shall be correct to within 0.5-inch in tanks up to 40 feet in diameter. Three-quarter inch is permissible in tanks 40 feet to 150 feet in diameter. One-inch is permissible in tanks 150 feet to 250 feet in diameter.

When the entire shell is erected, the permissible out-of-plumbness at any point shall be 0.005 of the total tank height.

Vertical seams shall not be pointed or buckled more than 0.5-inch at any point from a true radius. Banding of horizontal seams shall not exceed 1/2-inch at any given point, as measured by a straight edge. Shell plates shall not have flat or protruding areas which deviate more than 0.5-inch from a true radius. The size, both horizontal and vertical, of each plate and configuration of the plates shall be the same as that of the existing tank. The actuator gearing shall be totally enclosed in an oil-filled gear-case suitable for operation at any angle. All main drive gearing must be of metal construction. Where the actuator operates gate valves or large diameter ball or plug valves, the drive shall incorporate a lost-motion hammer-blow feature. For rising spindle valves, the output shaft shall be hollow to accept a rising stem and incorporate thrust bearings of the ball or roller type at the base of the actuator, and the design should be such as to permit the gear-case to be opened for inspection or disassembled without releasing the stem thrust or taking the valve out of service. Note: For full Modulating applications, "hammer-blow" feature should be removed to increase accuracy and reduce wear. Standard SAE80EP gear oil shall be used to lubricate the gear-case. Special or exotic lubricants shall not be used, as they may be difficult to source in remote locations.

## G12.07

### ACCESSORIES

Two circular manhole 30 inches in diameter with cover hinged to shell, shall be furnished in the first ring of the tank shell.

A 3' x 3' clear opening roof hatch, located as shown on the plans. The roof hatch shall be on a raised surface above the normal roof surface, minimum height 4-inches. The hatch shall include a 1/8-inch diameter bumper and gasket. The bumper and gasket shall be on all sides of the frame. The hatch shall include a lock hasp with padlock. The hatch shall overlap the curb by 2-inches.

A roof vent shall be provided and shall have copper screen 16-mesh to prevent insects, birds or animals from entering and shall have venting capacity for a flow of 1,200 gallons per minute. The vent shall be located at center of roof.

An overflow pipe complete with weir box shall be provided for a capacity of 1,200 gallons per minute. The overflow pipe shall be 8" inches in diameter and shall be located outside the tank and shall discharge as shown on the plans. The pipe and weir shall be adequately braced to the outside shell of the tank to prevent movement.

An outside tank ladder with a ladder gate shall be provided as shown on the plans. All materials used for exterior ladders, and the like shall be painted steel on the steel tanks and hot dipped galvanized or aluminum on the bolted tanks. All ladders shall include Saf-T-Climb devices complying with OSHA Regulation 1910.27.

Saf-T-Climb devices shall be hot dipped galvanized steel or aluminum.

Four locking pawls shall be furnished and turned over to the Owner. In addition three ANSI Type 1 safety full body harnesses with Lanyards, all meeting ANSI standards shall also be furnished to the Owner.

An extension kit shall be furnished for the interior ladder with provisions for pop-up operation or storage within the safety rail on the top of the tank.

A painted steel safety gate shall be furnished and installed 10-feet above the ground on the exterior ladder of the steel tank.

Interior ladders shall be constructed at locations as shown on the plans and shall be constructed of painted welded steel for the steel tank. The interior ladder shall include a saf-t-climb device.

All ladders shall conform to OSHA Standards (29 CFR-1926-1053 Ladders). The rungs shall be corrugated, knawled or dimpled to minimize slipping.

Inlet and outlet pipe line connections shall be as shown in the drawings and as specified herein.

#### G12.08 RADIOGRAPHIC TESTING

All radiographic testing of the steel tank shall be done in accordance with AWWA D 100, Appendix "A". Radiographic testing shall be done by an independent testing laboratory which is chosen and paid for by the Contractor. All radiographics shall be delivered to the Owner. Radiographs completed in the shop shall be delivered to the Owner prior to erection.

#### G12.09 HYDROSTATIC TEST

Leakage test of the reservoir shall be made by completely filling the structure to overflow height, and observing the water surface height for the following 24 hours. Inspection for leakage will be made of the exterior surface of the structure, especially in the structure areas around construction joints and piping connections.

Leakage will be accepted as within allowable limits when there are no visible leaks, and when the water surface drops not more than 1/4-inch during the 24 hour test period.

If leakage exceeds the allowable limits, the structure shall be promptly repaired by removing or replacing the leaking portions of the structure, or by other methods approved by the Owner.

The water for the initial hydrostatic testing will be provided by the Owner. The Contractor shall provide any and all subsequent water for hydrostatic testing, or Contractor pays for at current rates.

G12.10

SHOP-APPLIED PRE-CONSTRUCTION PRIMER

- A. Surface Preparation Prior to Abrasive Blast Cleaning: Weld flux and spatter shall be removed by power tool cleaning. Sharp projections shall be ground to a smooth contour. All welds shall be ground to a smooth contour as per NACE Standard RP0178 designation "D" and herein.
- B. Surface Preparation: SSPC-SP10 Near-White Metal Blast Cleaning. Anchor profile shall be 1.5 to 2.5 mils as per ASTM D 4417, Method C or NACE Standard RP0287.
- C. Zinc-Rich Primer: Tnemec Series 94-H2O Hydro-Zinc applied at 1.0 dry mils. Thin only with approved thinner, Tnemec 41-49, Tnemec 41-2 or 41-3 Thinner.

G12.11

FIELD-APPLIED COATING SYSTEMS

A. TANK INTERIOR COATING SYSTEMS

- 1.) Surface Preparation Prior to Abrasive Blast Cleaning: Weld flux and spatter shall be removed by power tool cleaning. Sharp projections shall be ground to a smooth contour. All welds shall be ground to a smooth contour as per NACE Standard RP0178 designation "D" and herein.
- 2.) Surface Preparation: SSPC-SP10 Near-White Metal Blast Cleaning on all bare metal areas (such as weld seams, etc.) and all shop-primed areas damaged during transportation and erection. Anchor profile shall be 1.5 to 2.5 mils as per ASTM D 4417, Method C or NACE Standard RP0287. All (100%) of shop-primed areas shall be uniformly and thoroughly sweep-blasted as per SSPC-SP7 Brush-Off Blast Cleaning prior to applying coating system. Any bare metal exposed during sweep-blasting shall be prepared as per SSPC-SP10 Near White Metal Blast Cleaning and above.

Coating System:

- 1st Coat: Tnemec Series 91-H2O or Series 94-H2O Hydro-Zinc 2000 applied at 2.5 to 3.5 dry mils. Thin only with approved thinner, Tnemec 41-2 or 41-3 Thinner.
- Stripe Coat: Tnemec Series N140-15BL Tank White Pota-Pox Plus applied by brush and scrubbed into all weld seams. In addition to weld seams, all edges, corners, bolts, rivets, pits shall receive a stripe coat. This shall be a separate step. The 2<sup>nd</sup> coat or subsequent coat shall not be applied until the recoat time has been achieved.

2nd Coat: Tnemec Series 21 Tank White Pota-Pox Plus applied at 12.0 to 16.0 dry mils. Thin only with approved thinner, Tnemec 41-4 Thinner.

Total dry film thickness shall be a minimum of 14.5- 19.5 mils per SSPC-PA 2 dry film inspection standards, with exception as noted in this specification.

#### B. TANK EXTERIOR COATING SYSTEMS

- 1.) Surface Preparation Prior to Abrasive Blast Cleaning: Weld flux and spatter shall be removed by power tool cleaning. Sharp projections shall be ground to a smooth contour. All welds shall be ground to a smooth contour as per NACE Standard RP0178 designation "D" and herein.
- 2.) Surface Preparation: SSPC-SP6 Commercial Blast Cleaning on all bare metal areas (such as weld seams, etc.) and all shop-primed areas damaged during transportation and erection. Anchor profile shall be 1.5 to 2.0 mils as per ASTM D 4417, Method C or NACE Standard RP0287. All (100%) shop-primed areas shall be uniformly and thoroughly sweep-blasted as per SSPC-SP7 Brush-Off Blast Cleaning prior to applying coating system. Any bare metal exposed during sweep-blasting shall be prepared as per SSPC-SP6 Commercial Blast Cleaning and above.

#### Coating System:

- 1st Coat: Tnemec Series 90-97 Tnemec-Zinc applied at 2.5 to 3.5 dry mils. Thin only with approved thinner, Tnemec 41-2 or 41-3 Thinner. Series 91-H2O or Series 94-H2O Hydro-Zinc may be used if contractor elects.
- 2nd Coat: Tnemec Series N69-Color Hi-Build Epoxoline II applied at 4.0 to 6.0 dry mils. Thin only with approved thinner, Tnemec 41-4 Thinner. (Two coats may be required if applied by roller.)
- 3rd Coat: Tnemec Series 1094-Desert Sand Endura-Shield with UV additive applied at 3.0 to 5.0 dry mils. Thin only with approved thinner, Tnemec 41-39 Thinner for spray, brush or roller. (Two coats may be required if applied by roller.)

#### Logos (IF APPLICABLE):

Tnemec Series 700-Color Hydroflon applied at 2.0 to 3.0 dry mils. Thin only with approved thinner, Tnemec 41-39 Thinner for spray, brush or roller.

Total dry film thickness shall be a minimum of 11.0 mils per SSPC-PA 2 dry film inspection standards, with exception as noted in this specification.

APPLICATION AND OBSERVATION OF CONSTRUCTION

## A. Application

- 1.) Each coat of paint shall be applied in a uniform thickness and shall be feathered as necessary at its edges to prevent lap marks and provide a smooth paint finish. The final coat may require placing this coating in more than one (1) coat to ensure a uniform color. It shall be the Contractor's responsibility to produce the uniform cover on the exterior of this tank. If additional coats are used, they shall be placed in thickness of 1.5 mils minimum.
- 2.) Coatings shall be applied in accordance with paint manufacturer's recommendations found on the paint data sheets and are subject to inspection at all times by the on-site representative. Paint manufacturer's data sheets shall be submitted as part of the shop drawing submittal process. Contractor shall follow the Steel Structures Painting Council Good Painting Practice except where exceeded in these specifications.
- 3.) No painting shall take place utilizing the interior paint system unless the atmospheric temperature is above 50°F and metal surface temperatures is above 50°F and a minimum of 5°F above the dew point. The relative humidity shall not be greater than 80%. Painting also shall not proceed if the temperature is expected to fall below 40°F before the paint has dried to the recoat window (24 hours) or if the surface temperature is at or above 110°F.
- 4.) No painting shall take place utilizing the first coat of exterior paint system unless the atmospheric temperature is above 50°F and metal surface temperatures is above 50°F and a minimum of 5°F above the dew point. The relative humidity shall not be greater than 85%. No painting shall take place utilizing the several and final coat of the exterior paint system unless the atmospheric temperature is above 40°F and metal surface temperature is above 40°F and a minimum of 5°F above the dew point. The relative humidity shall not be greater than 80%. Painting utilizing the exterior system shall not proceed if the temperature is expected to fall below 40°F before the paint has dried to the recoat window (24 hours) or if the surface temperature is at or above 110°F.
- 5.) Contractor shall have sufficient number of compressors and adequate compressor output on site to complete the blasting and painting in a timely manner. Contractor shall have on site and utilize during the coating of the tank, two (2) 45:1 Ratio airless spray Graco Pumps or equal in working order.

- 6.) All spray equipment shall be inspected and approved by Owner's representative before any application is begun. A moisture trap shall be placed in line from air supply to pressure pot and spray gun. This trap shall be opened slightly to provide a continuous bleed. Regulators and gauges shall be provided for air to both pressure pot and spray gun.
- 7.) All abrasive and dust from blasting operations shall be removed from surfaces before paint application is begun. Blasted surfaces shall be coated with one coat of primer during the same day that blasting was done. Primer shall not be applied closer than six inches to a non-blasted area. Any subsequent blasting operation shall not result in abrasive particles embedded in the paint film. The sequence to be followed in painting shall be such that a minimum of damage to finished coatings will result.
- 8.) Spray guns must be held perpendicular to the surface being painted, handled and adjusted in such a manner so dry overspray is kept at a minimum.
- 9.) The Contractor shall at all times protect the buildings, homes, automobiles and other items from blasting and paint that is being applied to the tank. Contractor shall be solely liable for all claims of damage of whatever nature which results from the blasting and/or painting operations on this project.

B. Observation of Construction

- 1.) All work shall be done in a workmanlike manner, so that the finished coating on the interior, exterior and all painted surfaces of the tank and structures shall be free from bubbles, runs, drips, ridges, waves and unnecessary brush marks and variations in color. In addition, all surfaces that will be in contact with potable water shall be free of holidays and pinholes. With the roof structure being seal welded, the roof area (all surfaces above high water level) shall be free of holidays and pinholes.
- 2.) Observation and acceptance of the abrasive blasting shall be achieved prior to application of the prime coat of paint on the tank. The Contractor shall schedule and coordinate his work with the Owner to allow for expeditious prosecution of the construction observation and painting.
- 3.) All paint film thickness shall be received by the Contractor by measuring the wet film thickness of each coat as it is applied. The Contractor shall coordinate the use of the painting scaffolds and rigging with the Owner or his representative to provide regular access for the paint observations. A wet film thickness measurement shall be made for each 100 square feet of surface painted.

- 4.) All paint will be received for applied dry film thickness using a non-destructive magnetic gauge such as a Positector, Mikrotest Gauge or an Elkometer. Observation for dry film thickness, pinholes and holidays shall be inspected throughout the painted surface at locations determined by the Owner or Owner's Representative. Testing for dry film thickness will be done by the Owner or an independent testing laboratory which is chosen and paid by the Owner. General paint observation will be done by the Owner or Owner's Representative. All work shall be done in a workmanlike manner, so that the finished coating on the interior and exterior of the tank shall be free from bubbles, runs, drips, ridges, waves, brush marks and variations in color.

G12.13

TESTING AND DISINFECTION

- A. A minimum of seven days following the application of the final coat on the interior wet surface shall be allowed before the elevated tank is sterilized or filled with water.
- B. The tank shall be disinfected per the requirements of AWWA C652, latest edition. "Disinfection of Water Storage Facilities". Chlorination Method No. 2 or No. 3 may be used.
- C. The cost of furnishing chlorine, bacteriological tests, labor, tools and equipment shall be included in the lump sum bid price for the project; and no separate payment will be allowed. The Owner shall furnish water to fill the tank one time. If it is required to fill the tank more than once to obtain the proper sterilization, the cost of the water for water in excess of one tank full shall be born by the Contractor at prevailing rates charged by the Levi Water Supply Corporation and deducted from monies due him from the Owner. Any leaks in the tank that are disclosed by this test shall be repaired by gouging out defective areas and rewelding. No repair work shall be done on any joint unless the water in the tank is at least two feet below the joint being repaired. Any paint damaged by repairs shall be properly restored.
- D. The tank shall not be put in service until safe test results are obtained. Disposal of water used in the sterilization procedure shall be the responsibility of the Contractor.

G12.14

SAFETY PRECAUTIONS

- A. The Contractor shall be fully responsible for the safety of the workmen on this project a public in the vicinity of this tank at all times during the removal of the rust and mill scale, painting and sterilization of the tank. The Contractor shall be responsible for meeting all OSHA Safety Standards and Regulations. Protective equipment, abrasive resistant clothing, safety shoes, leather gloves, ear protection and OSHA approved respirators shall be utilized as a minimum during blasting and painting on this tank.



G12.15      IDENTIFICATION PLATE

A.      A tank identification plate shall be mounted near the personnel door. The identification plate shall be corrosion resistant and contain the following information:

- 1.)    Tank Contractor
- 2.)    Contractor's project or file number
- 3.)    Tank Capacity
- 4.)    Height to High Water Level
- 5.)    Date erected

G12.16      PAYMENT

A.      Payment will be measured and paid for as provided for in the Proposal and Bid Schedule.

**END OF SECTION**

## TECHNICAL SPECIFICATIONS

### SECTION G13 - CONCRETE

#### G13.01 DESCRIPTION OF WORK

- A. This specification covers the requirements for the manufacture, transporting, placing, jointing, finishing and curing of concrete of the structures included in the plans and specified herein.

#### G13.02 GENERAL

A. Submittals

The Contractor shall submit the following for review by the Owner:

1. Concrete mix designs prepared by a testing laboratory acceptable to the Owner.
2. Joint filler technical data.
3. Curing materials technical data.
4. Layout of construction joints locations prior to the submittal of steel reinforcement shop drawings.
5. Sieve analysis of aggregates.
6. Los Angeles Machine test results.
7. Elastomeric waterproof coating technical data.

B. Standards

The following standard specifications are a part of these specifications:

- |           |                                                       |
|-----------|-------------------------------------------------------|
| ACI 301,  | Specifications for Structural Concrete for Buildings. |
| ACI 347,  | Recommended Practice for Concrete Formwork.           |
| ACI 318,  | Building Code Requirements for Reinforced Concrete.   |
| ACI 305R, | Hot Weather Concreting.                               |
| ACI 306R, | Cold Weather Concreting.                              |
| ACI 308,  | Standard Practice for Curing Concrete.                |
| ACI 309,  | Standard Practice for Consolidation of Concrete.      |

ACI 304, Guide for Measuring, Mixing, Transporting and Placing Concrete.

ACI 304.2R, Placing Concrete by Pumping Methods.

ACI 211.1, Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete.

G13.03 MATERIALS AND PRODUCTS

A. Portland Cement

ASTM C 150, Type I cement shall be used. Portland cement used shall be made by a well-known manufacturer and produced by not more than one plant.

B. Water

Mixing water shall be potable, unless approved by Owner.

C. Fine Aggregate

1. Fine aggregate shall conform to ASTM C 33 and shall consist of natural sand or a mixture of natural sand and not more than fifty percent (50%) of stone screenings.
2. Stone screenings shall consist of clean, hard, durable un-coated fragments resulting from the crushing of stone.
3. Fine aggregates shall be free of any materials that are deleteriously reactive with the alkalies in the cement.

D. Coarse Aggregate

1. Coarse aggregate shall conform to ASTM C 33 Size No. 467, No. 57 or No. 67 for all concrete in direct contact with sewage or sewage effluent. Size No. 7 may be used in other concrete.
2. Coarse aggregates shall be free of any materials that are deleteriously reactive with the alkalies in the cement.
3. Coarse aggregates shall have a percent of wear of not more than forty-five (45) as determined in accordance with ASTM C 131, Resistance to Abrasion of Small Size Coarse Aggregate by use of the Los Angeles Machine.

4. Nominal maximum size of coarse aggregate shall not be larger than one-fifth of the narrowest dimension between sides of the forms, one-third of the depth of slabs, or three-fourths of the minimum clear spacing between reinforcing bars.
5. Where lightweight structural concrete is indicated on the drawings, coarse aggregate shall conform to ASTM C 330.

E. Admixtures

1. Only admixtures produced by established reputable manufacturers and used in compliance with the manufacturer's printed instructions may be used.
2. Only admixtures which have been incorporated and tested in the accepted mixes shall be used unless otherwise authorized in writing by the Owner.
3. Concrete admixtures shall conform to the following specifications:
4. Air Entraining Admixtures - ASTM C 260.
5. Specifications for Chemical Admixtures for Concrete - ASTM C 494.
6. Use of calcium chloride is not permitted.

F. Curing Materials

1. Water shall meet requirements for concrete mixing water and shall not stain or leave unsightly residue.
2. Liquid curing materials shall conform to specifications for Liquid Membrane-Forming Compounds for Curing Concrete - ASTM 309.
3. Sheet materials shall conform to specifications for Sheet Materials for Curing Concrete - ASTM C 101.

G. Non-Shrink Grout

Non-shrink grout shall contain no iron filings and shall be Embeco Non-Shrink Mortar, Halco Non-Shrink Grout, or an approved equal.

G13.04

STORAGE AND HANDLING OF MATERIALS

- A. Sacked cement shall be stored in a suitable ventilated, weathertight building which will protect the cement from dampness and placed in such a manner that will permit easy access for proper inspection and identification of each shipment. Store cement clear from floor or ground to prevent absorption of moisture.

- B. Suitable means shall be taken during handling and storage of aggregates to insure that intrusion of foreign materials and segregation of the coarse and fine aggregates does not occur and the grading is not affected. Store on wooden platforms, metal sheets or similar material; if stored on the ground, the sites of stockpiles shall be grubbed, cleaned of all vegetation and leveled off, the bottom six (6) inch layer of aggregate shall not be disturbed and shall not be used in the work.
- C. At the time of use, aggregates shall be free from frozen or foreign material, such as grass, wood, sticks, burlap, paper or dirt which may have become mixed with the aggregate in stockpiles or in handling.
- D. Where coarse aggregates are delivered to the job in two (2) or more sizes or types, each size or type shall be kept separate and not mixed prior to matching.

G13.05

PROPORTIONING AND DESIGN OF MIXES

- A. It shall be the responsibility of the Contractor to design the proportions of the concrete mixes within the limits indicated in Table "A" to produce concrete of the consistency and workability required, and to conform to the strength requirements specified.
- B. Concrete proportions shall be established on the basis of previous field experience or laboratory trial mixtures as specified in ACI 301, Chapter 3.

TABLE "A"

| Class<br>Concrete | "Minimum<br>or Required<br>28-Day<br>Compressive<br>Strength,<br>PSI (See<br>Quality<br>Control) | Minimum<br>Factor,<br>Sacks<br>Cement<br>(94-lbs)<br>per C.Y.<br>Concrete | Maximum<br>Water<br>per 94<br>lbs.<br>Cement,<br>Gallons* | Maximum<br>Water<br>per 94<br>lbs.<br>Cement,<br>Gallons** | Maximum<br>Size of<br>Aggregate | Slump<br>Range<br>In. |
|-------------------|--------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|-----------------------------------------------------------|------------------------------------------------------------|---------------------------------|-----------------------|
| (1)               | (2)                                                                                              | (3)                                                                       | (4)                                                       | (5)                                                        | (6)                             | (7)                   |
| "A"               | 4,000                                                                                            | 6.00                                                                      | 5.2                                                       | N/A                                                        | 1½"                             | 4"-6"                 |
| "B"               | 3,000                                                                                            | 5.00                                                                      | 7.0                                                       | 7.5                                                        | 1½"                             | 4"-6"                 |
| "C"               | 2,000                                                                                            | 4.50                                                                      | 6.5                                                       | 8.0                                                        | 3"                              | 2"-6"                 |

\* With air-entraining agent added.

\*\* Without air-entraining agent added.

- C. Class "A" concrete, as indicated in Table "A" shall be used for all reinforced concrete work included in this contract except as otherwise indicated on the Plans or as hereinafter provided.

- D. The maximum quantity of water per 94 pounds of cement as specified shall include the free water in the aggregates, not including moisture absorbed by the aggregates.
- E. In proportioning the mix and establishing the permissible slump, the Contractor shall make allowances for the water reducing potential of the admixtures, if used in the concrete, and to the use of high frequency mechanical vibration for compacting the concrete.
- F. Mix designs shall be proportioned to result in concrete slump at the point of placement as specified in Table "A".
- G. Contractor shall use an independent testing facility acceptable to the Owner for preparing and reporting proposed mix designs.
- H. Written reports of proposed concrete mixes shall be submitted to the Owner at least 15 days prior to the start of work. The Contractor shall not begin concrete production until mixes have been reviewed by the Owner. Review of the mix design does not relieve the Contractor of the responsibility for meeting all requirements specified herein.
- I. Adjustments to concrete mix designs may be requested by the Contractor when characteristics of materials, job conditions, weather, test results or other circumstances warrant; at no additional cost to and when acceptable to the Owner. Laboratory test data for revised mix designs and strength results shall be submitted to and accepted by the Owner before using the revised mixes.

G13.06

#### FORMING OF CONCRETE

##### A. General

1. Design and construction of all form work is the responsibility of the Contractor.
2. For all surfaces which are exposed in the finished work, forms shall be of steel, metal surfaces on wood, plywood, pressed boards, or well-seasoned boards, dressed all over and smooth. They shall be so built that when removed, the concrete will be left free from offsets, fins, ridges, or other unsightly defects.
3. Formwork shall be constructed so as to ensure that the concrete surfaces will conform to the tolerances of Section 3.3.1, "Recommended Practice for Concrete Formwork" (ACI 347). Forms shall be sufficiently tight to prevent leakage of mortar. The size and spacing of studs and wales shall be determined by the nature of the work and the height to which concrete is placed. Joints shall be snug, and shall occur at the designated locations only.
4. All forms shall be cleaned and inspected immediately prior to placing concrete. Deformed, broken, or defective forms shall be removed from the

work. Temporary openings shall be provided where necessary to facilitate cleaning and inspection just prior to placing concrete.

5. Should the forms show any sign of yielding, spreading or otherwise becoming displaced from correct alignment of position during or after the placing of concrete, they shall be corrected immediately by adjustment or bracing to the extent necessary, or, if required, shall be removed in part or in their entirety and rebuilt or reset.
6. The entire inside surfaces of forms shall be oiled with an approved, non-toxic form oil, or shall be thoroughly wetted just prior to placing concrete.
7. All exposed corners and edges shall have a formed  $\frac{3}{4}$ -inch chamfer unless otherwise indicated on the Plans.
8. The Contractor shall provide openings in formwork to accommodate the work under this and other sections and build into the formwork all items such as sleeves, anchor bolts, inserts and all other items to be embedded in concrete for which placement is not specifically provided under other Sections.

B. Plain Sheathing Forms

1. Wooden forms for surfaces not exposed to view may be built of sound No. 1 yellow pine, Douglas fir, or equivalent acceptable lumber, dressed on all sides and neatly fitted. Matched lumber, shiplap, or other satisfactory joint lumber shall be used throughout, and tongue and grooved material shall be used where required.
2. The sheathing shall be erected in level random courses. All vertical joints shall be squared, and all horizontal joints shall be level and matched throughout the entire job. Except for panel forms, vertical joints shall not exceed the width of one board and shall be staggered at least thirty-two inches (32") and made on the center of a stud. Inside forms shall not be placed until exterior forms have been checked, or vice versa.
3. Forms for beam and girder soffits shall be constructed with nominal 2-inch lumber, and all joints shall be tight and even. Beam and girder soffits shall be sufficiently braced, shored, and wedged to prevent deflection.

C. Plywood Forms

Forms for all interior exposed concrete surfaces and designated areas of exterior exposed concrete surfaces shall be constructed with minimum thickness  $\frac{3}{4}$ -inch plywood for straight sections and  $\frac{1}{2}$ -inch plywood for curved sections. Plywood shall be made with a waterproof glue and manufactured especially for concrete form work. Edges shall be square in both directions and adjoining panels shall match in thickness, width, and length. Full size sheets of plywood shall be used, except where otherwise required or where smaller pieces will cover an entire area. Forms shall be placed so that markings will be symmetrical. Plywood shall be thoroughly oiled on contact faces and edges with raw linseed oil or other approved

form lacquer. Surplus oil shall be wiped off forms before reinforcing steel is placed and while the surfaces are accessible.

D. Steel Forms

If steel forms are proposed, they shall be approved prior to use. The forms shall be accurately constructed in a standard size and in such minor multiple widths and lengths as required. Steel forms shall be coated before each use, with a light, clear, paraffin-base oil, or other acceptable commercial preparation which will not discolor the concrete. Plates shall be wire brushed after each use.

E. Carton Forms

1. Where indicated on the Plans, a structural void at least 6 inches deep shall be provided between the earth and concrete through the use of carton forms which will remain in place and retain their strength until after the concrete has cured. Forms shall be corrugated fiberboard carton forms as manufactured by the Container Corporation of America and fabricated by Savway Concrete Forms, Inc., Dallas, Texas or approved equal.
2. The cover, ribs, and caps of forms shall be constructed of durable-wall corrugated fiberboard, laminated with waterproof adhesive. Covers and end caps shall be coated on the outside with paraffin containing polyethylene. All fabricated forms shall be capable of supporting a minimum load of 150 pounds per square foot.
3. Forms shall be securely held in position and protected from excessive moisture or other damage prior to and during the concreting operation. Free falls of wet concrete in excess of 2 feet, 6 inches will not be permitted on carton forms.
4. Voids below grade beams, walls, and slabs shall be closed by a monolithic extension of the concrete member at its edges, or by precast concrete blocks which extend at least 6 inches into the subgrade to retain the adjacent soil.

F. Form Ties

Only form ties, hangers, and clamps indicated on the forming plans shall be used, and they shall be of such type that no metal will be closer than 1½ inches from the surface. Wire ties will not be permitted. The assembly should provide cone-shaped depressions at the forms at the surface at least one (1) inch in diameter and 1½ inches deep to allow filling and patching. The spacing of form ties, hangers, and clamps shall be strictly in accordance with manufacturer's directions.

G. Removal of Forms

In general, forms shall not be removed until the concrete has hardened sufficiently to support its own load safely plus any superimposed loads that might be placed



thereon. In any event, forms shall be left in place at least the minimum required length of time specified below, after the placing of concrete in them:

|                                        |          |
|----------------------------------------|----------|
| Columns .....                          | 48 hours |
| Side forms for girders and beams ..... | 48 hours |
| Bottom forms of slabs .....            | 7 days   |
| Bottom forms of beams and girders..... | 7 days   |
| Walls.....                             | 48 hours |

G13.07      MIXING AND PRODUCTION OF CONCRETE

A.      General

1.      All concrete not placed in the work within forty-five (45) minutes after addition of water to batch shall be rejected and disposed of by the Contractor at his own cost and expense.
2.      The Contractor shall provide access to the mixing plant for inspection by the Owner.

B.      Ready Mix Concrete

1.      All ready mix concrete shall be batched, mixed and transported in accordance with ASTM C 94.
2.      Plant equipment and facilities shall conform to National Ready-Mix Concrete Association "Plan and Delivery Equipment Specification."
3.      The production and delivery of ready-mixed concrete shall be such that will provide a continuous finishing operation and in no case more than twenty (20) minutes shall elapse between the depositing of successive batches of concrete in any monolithic unit.

C.      Job Site Mixing

Site batched and mixed concrete shall comply with the recommendations of ACI 301, Chapter 7.

D.      Control of Admixtures

1.      Admixtures shall be charged into the mixer as solutions and shall be measured by means of an acceptable mechanical dispensing device. The liquid shall be considered a part of the mixing water.
2.      If two or more admixtures are used, they shall be added separately to avoid possible interaction.
3.      Addition of retarding admixtures shall be completed within one (1) minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, which ever occurs first.

E. Cold and Hot Weather Requirements

1. The Contractor shall comply with requirements of ACI 305 "Recommended Practice for Hot Weather Concreting" during hot weather conditions and when ambient temperature is 90 degrees F or above. Concrete deposited in hot weather shall have a placing temperature (not exceeding 90 degrees F) which will not cause difficulty in loss of slump, flash set or cold joints. The ingredients shall be cooled before mixing, or well crushed ice may be substituted for all or part of the mixing water if, due to high temperatures or other climatic factors, any undesirable effects are encountered. Cement shall not be added to the mixtures of water and aggregate when the temperature of the mixture is greater than 100 degrees F.
2. The Contractor shall comply with requirements of ACI 306 during cold weather conditions. Unless the temperature is at least 40 degrees F and rising, the temperature of the concrete when placed shall be at least 55 degrees F. If water or aggregate has been heated, the water shall be combined with the aggregate in the mixer before cement is added.

G13.08 PLACING CONCRETE

A. Preparation Before Placing

1. Before placing of concrete in any portion of a structure, adequate provision shall be made for walkways from which the concrete to be placed can be worked or runways over which the concrete may be transported in buggies, when such are to be used. Buggy runways shall be clear of the reinforcements in slabs or footings. Runways or walkways used for placing or working concrete in walls shall be properly supported and adequate in width for safe use by workmen. Runways shall provide convenient access to the entire length of wall in which concrete is being placed. Hand rails shall be installed on walkways or runways in accordance with OSHA Standards.
2. The Contractor shall remove frost, snow, ice, water and any other foreign materials from forms, secure reinforcement in place, and position joint materials and other embedded items.
3. In cold weather, the Contractor shall have protective blankets ready and heaters operational and in-place prior to placing concrete.
4. In hot weather, when temperature of reinforcing or forms is above 120 degrees F, the Contractor shall spray forms and reinforcement with water just prior to placing concrete.
5. Structural concrete shall be placed only on a firm and unyielding subgrade or sub-base, which is free from all loose material and debris. Subgrade shall be free of frost. The Contractor shall keep subgrade moist at time of concreting. If necessary, dampen with water in advance of concreting. The

Contractor shall allow no free water standing on subgrade nor any muddy or soft spots when concrete is placed.

B. Conveying and Depositing in Forms

1. The Contractor shall handle concrete from mixer to place of final deposit as rapidly as practicable by methods which prevent segregation or loss of ingredients to assure that quality is maintained.
2. To prevent segregation, the Contractor shall deposit concrete in approximately horizontal layers of 18 to 24 inches as near as possible to its final position.
3. Concrete shall not be allowed to drop freely more than four (4) feet or through a cage of reinforcing steel.
4. Chutes used to transport concrete shall have a slope not exceeding one vertical to two horizontal and not less than one vertical to three horizontal. The end of each chute shall be provided with a baffle to help prevent segregation, or the concrete shall be discharged through a tremie or elephant trunk directly into the form.
5. Pumping equipment shall be a suitable type with adequate pumping capacity. Loss of slump in pumping shall not exceed 1½ inches.
6. The Contractor shall consolidate all concrete by vibration, so that concrete is thoroughly worked around reinforcement, around embedded items and into corners of forms eliminating all air or stone pockets which may cause honeycombing, pitting, or places of weakness. The Contractor shall use internal vibrators having a minimum frequency of 8,000 vibrations per minute to consolidate concrete effectively. The Contractor shall not use vibrators to transport concrete within forms. The Contractor shall insert vibrators and withdraw at points approximately 18 inches apart. At each insertion, the Contractor shall allow duration sufficient to consolidate concrete but not sufficient to cause segregation; generally from 5 to 15 seconds. Where concrete is to have an as-cast finish, bring a full surface of mortar against form by vibration process, supplemented if necessary by spading, to work coarse aggregate back from formed surface.
7. While concrete is being placed adjacent to a joint in which a waterstop is specified, care shall be taken to see that the concrete is properly placed and worked along the joint in which the waterstop is held and that the waterstop itself is in the position specified on the drawings and is firmly bedded in mortar on all sides.
8. The concrete comprising each section of wall between joints shall be deposited continuously in layers of such thickness that none will be deposited on concrete which has hardened sufficiently to cause the formation of seams or places of weakness within the section.

C. Joints

1. Joints shall be provided in slabs on grade; locate joints as indicated. If saw cut joints are required or permitted, time cutting properly with set of concrete; start cutting as soon as concrete has hardened sufficiently to prevent aggregates from being dislodged by saw. Complete before shrinkage stresses produce cracking.
2. Other construction joints, not indicated on drawings, shall be located so as to least impair strength of the structure. Place joints in locations approved by the Owner.
3. Vertical construction joints shall be prepared and bonded in accordance with ACI 301, Chapter 6.

G13.09 FINISH OF CONCRETE SURFACES

A. Scope

The provisions of this subsection shall apply to all exposed exterior concrete surfaces and all interior concrete surfaces of conduits and structures whose finish is not specified elsewhere in these specifications or specifically indicated on the Plans.

B. General

1. The exposed tops of walls of structures shall be brought to true level, floated to bring a workable grout to the surface, struck off and leveled where necessary with cement grout of the same proportions as the mortar of the concrete. The wall tops shall then be floated, finished and edged unless otherwise indicated on the Plans. The edger used shall be of ½-inch radius and shall have its flanges ground to a knife edge so as to have as little burr as possible.
2. Slabs shall be edged as appropriate.

C. Finish of Formed Surfaces

1. General

- a. Unless otherwise noted on the drawings, the following finishes shall be used as applicable:
- b. Rough form finish - For exterior wall surfaces of structures, flumes and conduits not exposed to public view up to one foot below grade.
- c. Smooth rubbed finish (or paint type finish at Contractor's option) - For exterior wall surfaces exposed to view and interior wall surfaces of structures, flumes and conduits. Interior wall surfaces which shall receive the Smooth Rubbed Finish shall be all interior surfaces to a point one (1) foot below the minimum water surface

of open vessels containing liquids. Surfaces one foot or more below minimum water surface elevation in vessels containing liquids shall receive a Rough Form Finish. Apply the same finish on all surfaces.

2. Rough Form Finish

Tie holes and defects shall be patched. Fins exceeding 1/4-inch shall be chipped or rubbed off. Otherwise, surfaces shall be left with the texture imparted by forms.

3. Smooth Form Finish

- a. Use form facing materials which shall produce a smooth, hard, uniform texture on the concrete. Arrange panels in an orderly and symmetrical manner with a minimum of seams.
- b. Tie holes and defects shall be patched and all fins shall be completely removed.

4. Smooth Rubbed Finish

- a. Provide smooth rubbed finish to surfaces which have received smooth form finish.
- b. Surfaces to be rub-finished shall be thoroughly wetted and kept in that condition until the rubbing work of each section is completed.
- c. Surfaces shall be rubbed with carborundum blocking or other abrasive and water until fins and any surplus materials have been removed and the surface is uniformly smooth. Grout or mortar shall not be used in the rubbing process and plastering of the surfaces will not be permitted. Rubbing blocks shall be driven by electric or compressed air tools except as hand rubbing is specifically permitted by the Owner.
- d. Rubbing of concrete surfaces shall commence within one (1) day after removal of forms.

5. Paint Type Finish

Finish shall be Elastomeric Waterproofing Coating 10 as manufactured by Sherwin Williams or approved equal. Apply one coat in accordance with manufacturer's recommendations, at a coverage of fifty (50) square feet per gallon.

D. Finish of Unformed Surfaces

- 1. Unless otherwise noted on the drawings, the following finishes shall be used as applicable:

2. Floated Finish - Top surfaces of slabs of all structures, water carrying conduits and liquid containers; surfaces intended to receive roofing, waterproofing membranes or sand bed terrazzo.
3. Troweled Finish - Interior floors intended as walking surfaces or for reception of floor coverings.
4. Non-Slip Broom Finish - Sidewalks, ramps and concrete paved areas (other than roadways and parking area); exterior platforms, steps and landings; exterior and interior pedestrian ramps, exposed floor areas and steps likely to be wet.

E. Finishing Tolerances

1. The following finishing tolerances shall be provided:
2. Class A Tolerance - Finishes shall be true planes within  $\frac{1}{8}$ -inch in ten (10) feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction.
3. Class B Tolerance - Finishes shall be true planes within  $\frac{1}{4}$ -inch in ten (10) feet as determined by a 10-foot straightedge placed anywhere on the slab in any direction.
4. Class C Tolerance - Finishes shall be true planes within  $\frac{1}{4}$ -inch in two (2) feet as determined by a 2-foot straightedge placed anywhere on the slab in any direction.
5. Tolerances shall be checked with a 10-foot straightedge for Class A or B tolerance and with a 2-foot straightedge for Class C tolerance applied at no less than two different angles.

F. Floated Finish

The top of the slab shall be screeded to grade and cross section. Concrete shall not be worked further until ready for floating. Begin floating when water sheen has disappeared and when surface has stiffened sufficiently to permit operation of float. Use a wood float only. Float to a surface within Class C tolerance. No further finish will be required on top slabs of structures of conduits which are to be buried. For all other slabs, float to a surface within Class B tolerance and refloat immediately to a uniform sandy texture.

G. Troweled Finish

1. Surface shall first receive floated finish. It shall next be power troweled, and finally hand troweled. Begin final troweling when the surface produces a ringing sound as trowel is moved over surface.
2. Finished surface shall be essentially free of trowel marks, and uniform in texture and appearance. Interior floor surfaces of administrative and similar

areas shall be plane to a Class A tolerance. Other surfaces shall be plane to a Class B tolerance.

H. Nonslip Broom Finish

Immediately after the concrete has received a floated finish, it shall be given a coarse transverse scored texture by drawing a fiber-bristle broom across the surface.

G13.10 CURING AND PROTECTION OF CONCRETE

A. General

1. Curing shall commence immediately following initial set or completion of surface finishing.
2. Standard Portland cement concrete surfaces normally exposed to the atmosphere shall be protected against too rapid drying by curing for a minimum period of seven (7) days. Similarly exposed high-early-strength concrete surfaces shall be cured for a minimum period of three (3) days.

B. Curing of Formed Surfaces

The Contractor shall cure formed surfaces, including the undersides of beams, supported slabs and other similar surfaces by moist curing. Minimize moisture loss from surfaces placed against forms by keeping forms wet until they can be safely removed. After form removal cure concrete until end of time prescribed. Vertical surfaces shall be protected from too rapid drying by covering with burlap.

C. Curing of Unformed Surfaces

1. For concrete surfaces not in contact with forms, one of the following procedures shall be applied immediately after completion of placement and finishing:
2. Ponding or continuous sprinkling.
3. Application of waterproof sheet materials conforming to ASTM C 101.
4. Application of curing compound conforming to ASTM C 309.
5. Apply curing materials in accordance with manufacturer's recommendations.
6. Apply curing compound immediately after water sheen has disappeared from surface. Curing compound shall not be used on any surface against which additional concrete or other material is to be bonded.
7. Curing materials shall, when tested in accordance with the method of "Test for Water Retention Efficiency of Liquid Membrane-Forming Compounds and Impermeable Sheet Materials for Curing Concrete", ASTM C 156, be

effective in limiting the water loss in the concrete test specimens to 3½ percent when applied at the rate recommended by the manufacturer.

D. Protection From Mechanical Injury

1. During the curing period, protect concrete from damaging mechanical disturbances, such as load stresses, heavy shock, and excessive vibration, and from damage by rain or flowing water.
2. Protect all finished concrete from damage by subsequent construction operations.

G13.11

CONCRETE REPAIRS

- A. All honeycomb, rock pockets and voids over ½-inch diameter shall be removed down to sound concrete. The area to be patched and an area at least six inches wide surrounding it shall be dampened to prevent absorption of water from the patching mortar.
- B. A bonding grout of 1 part cement to 1 part fine sand passing the No. 30 sieve, mixed to the consistency of thick cream, shall be brushed into the surface after surface water has evaporated. The patching mixture shall be made of the same materials as the concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than 1 part cement to 2½ parts sand by damp loose volume. The quantity of mixing water shall be no more than necessary for handling and placing. Patching mortar shall be mixed and allowed to stand with frequent manipulation with a trowel until it has reached the stiffest consistency that will permit placing.
- C. Apply patching mortar when bonding grout begins to lose water sheen. Mortar shall be thoroughly consolidated and struck off leaving patch slightly higher than surrounding area. Finish and cure in same manner as adjacent concrete.
- D. The Contractor shall thoroughly clean and dampen all tie holes.
- E. Tie holes shall be grouted solid with non-metallic non-shrinking grout. Tie holes shall be filled from the large end of the cone-shaped hole and packed solid by rodding.

G13.12

QUALITY CONTROL

A. Tests on Concrete

1. As the work progresses, concrete shall be sampled in accordance with ASTM Method of Sampling Fresh Concrete (ASTM C 102).
2. Slump tests shall be made according to ASTM Method of Test for Slump of Portland Cement Concrete (ASTM C 143).
3. Compression test specimens shall be made and cured according to ASTM Method of Mixing and Curing Concrete Test Specimens in the Field



(ASTM C 31). Not less than four compression specimens shall be made for each test at each age (Specifications for Ready-Mixed Concrete, ASTM C 94), nor less than one test for each 50 cubic yards of concrete of each class. At least one test per day shall be made for each class of concrete used that day. These specimens shall be cured under laboratory conditions. Additional specimens cured under job conditions may be required when, in the opinion of the Engineer, there is a possibility of the surrounding air temperature falling below 40 degrees F or rising above 90 degrees F.

4. Specimens shall be tested according to ASTM Method of Test for Compressive Strength of Cylindrical Concrete Cylinders (ASTM C 39).
5. Not less than two specimens shall be tested at seven (7) days and not less than two specimens at twenty-eight (28) days after pouring.
6. If the average strength of any three consecutive tests of laboratory-cured cylinders representing each class of concrete falls below required compressive strengths as indicated in Table "A", or if more than 10 percent of strength tests have values less than the required strength, the Owner shall have the right to order a change in the mix proportions for the remaining portion of the structure or project. If the average strength of the job-cured cylinders falls below the required strength, the Owner shall have the right to require changes in conditions of temperature and moisture necessary to secure the required strength. He may require test in accordance with ASTM Methods of Obtaining and Testing Drilled Cores and Sawed Beams of Concrete (ASTM C 42) or order load tests to be made on the portions of the structures so affected.
7. In the event that changes are required in the water-cement ratio specified, the cost of such changes shall be borne by the Contractor.
8. Contractor shall furnish samples of aggregates to the testing laboratory. All concrete required for testing shall be furnished by the Contractor. No additional compensation will be paid the Contractor for concrete so used.
9. Owner shall normally pay for services of testing laboratory in connection with test made in the field or laboratory on concrete. Any testing or retesting required as a result of actual or apparent failure of concrete to fulfill specification requirements shall be paid for by the Contractor.

B. Acceptance of Work

1. Completed concrete work which fails to meet one or more requirements of this specification will be considered rejected until it has been repaired in a manner acceptable to the Owner.
2. If rejected concrete work cannot be brought into compliance by repairing, work may be remedied by one of the following:
  - a. Structural analysis or testing when strength of structure is deficient.

- b. Removal and replacement of concrete.
  - c. Reinforcement of the structure.
  - d. Contractor shall pay all costs of additional testing and/or engineering at no additional expense to Owner.
- 3. Contractor shall repair or replace rejected work at no additional cost to Owner.
  - 4. Failure to detect any defective work shall not in any way prevent later rejection when such defect is discovered.

G13.13 MEASUREMENT AND PAYMENT

- A. No separate payment will be made for work in accordance with this section of the specifications, and the cost thereof shall be included in the proper item of the Proposal and Bid Schedule.
- B. The placement of concrete in excess of that shown in the Plans, which is approved in writing in advance by the Owner, will be paid for under the proper items in the Proposal and Bid Schedule.

**END OF SECTION**

## TECHNICAL SPECIFICATIONS

### SECTION G14 - GATE VALVES

#### G14.01 GATE VALVES FOR ORDINARY WATERWORKS SERVICE

##### A. General Description

1. All gate valves shall conform to the AWWA Standard for Resilient Seated Gate Valves, AWWA Standard C509, except for changes or specified alternatives as detailed in this specification or as shown on the plans and contract specifications.
2. All gate valves shall be iron body, bronze mounted, nonrising stem, internal wedging type. Valves must embody the best workmanship and finish. Valve design shall effect minimum torque designs effectively reducing friction and drag through thrust collar design and trackage for gates.

##### B. Bonnet Bolting

1. Body bolts, studs and nuts shall conform to AWWA Standard C500 except that plating shall be one of the following:

ASTM B 633 Type LS Electrodeposited Coatings for Zinc on Iron and Steel

ASTM A 123 Type LS Zinc (Hot-Galvanized) Coatings on Products

##### C. Approved Valves

1. The following valve manufacturers are acceptable.
  - Mueller
  - Clow

#### G14.02 PAYMENT

- A. Payment will be measured and paid for as provided for in the Proposal and Bid Schedule.

END OF SECTION

## TECHNICAL SPECIFICATIONS

### SECTION M01 – HORIZONTAL SPLIT CASE PUMPS AND MOTORS

M01.01

#### GENERAL

- A. Furnish two (2) horizontal single stage, double suction, double volute, axially split pumping units, complete with motors, baseplates, couplings and guards, as shown on the Contract Drawings and as specified herein.
- B. Pumps must meet NSF – 61 requirements.

M01.02

#### FIELD SERVICE AND ACCEPTANCE TESTING

- A. The Manufacturer shall include in his proposal the services of a field service technician for two (2) trips totaling four (4) working days. This service shall be for the purpose of check-out, initial start-up, and certification; at least one of the field trips and one working day shall be for instruction of the Owner after construction and start-up are completed. A written report covering the Manufacturer's findings during start-up activities and his installation approval shall be submitted to the Owner.
- B. All common labor and expendable materials necessary for supporting tests shall be furnished by the Contractor at no additional cost to the Owner.

M01.03

#### SUBMITTALS

- A. Submittals shall include the following:
  - 1. Certified dimensional drawings of each item of equipment and auxiliary apparatus to be furnished, including equipment weights and location and size of anchor bolts.
  - 2. Literature and drawings describing the equipment, including parts list and materials of construction, in sufficient detail to indicate full conformance with the detail specifications.
  - 3. Motor performance data, wiring diagrams, one-lines and conduit entry dimensions and details.
  - 4. Cut sheets on accessory items.
  - 5. Manufacturer's certified rating curves, to satisfy the specified design conditions, showing pump characteristics of discharge, head, brake horsepower, efficiency and guaranteed net positive suction head

required (NPSHR). When applicable, variable speed curves shall be provided showing at least three speeds plotted equally from maximum rpm to minimum rpm. Minimum rpm shall be no less than that required to obtain minimum flow. Curves shall show the full recommended range of performance and include shut-off head. This information shall be prepared specifically for the pump proposed. Catalog sheets showing a family of curves will not be acceptable.

B. Operation and Maintenance Data

1. Complete operating and maintenance instructions shall be furnished for all equipment specified in this Section. The maintenance instructions shall include troubleshooting data and full preventative maintenance schedules and complete spare parts lists with ordering information.
2. Include certified performance data and curves from factory tests.

M01.04

REFERENCE STANDARDS

- A. Design, manufacturing, and assembly of elements of the equipment herein specified shall be in accordance with, but not limited to, published standards of the following, as applicable:
1. American National Standards Institute (ANSI)
  2. American Society for Testing and Materials (ASTM)
  3. American Bearing Manufacturers Association (ABMA)
  4. Hydraulic Institute Standards (current edition)
  5. National Electrical Manufacturers Association (NEMA)
- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

M01.05

QUALITY ASSURANCE

- A. To assure unity of responsibility, the motors, couplings, guards and supporting base shall be furnished by the pump supplier. All pumping units specified herein shall be furnished by a single manufacturer.
- B. The equipment specified herein is intended to be of proven ability as manufactured by concerns having extensive experience in the production

of such equipment. The equipment furnished shall be designed, constructed and installed to operate satisfactorily when installed as shown on the Drawings. Pumps shall be manufactured in accordance with the Hydraulic Institute Standards, except where otherwise specified herein.

- C. Pumps designed for services other than water service, and only adapted for this use, shall only be acceptable provided they include each and every feature specified herein. Manufacturer shall modify his standard equipment as necessary to provide the materials and features specified herein.
- D. The pump manufacturer shall be fully responsible for the design, arrangement and operation of all connected rotating components as assembled and mounted on a fabricated steel base to ensure that neither harmful nor damaging vibrations occur at any speed within the specified operating range.
- E. Vibration, when measured in the direction of maximum amplitude on the pump and motor bearing housings, shall not exceed limits given in the latest ANSI/HI nomograph for the applicable pump type.

#### M01.06 DELIVERY, STORAGE AND HANDLING

- A. All parts shall be properly protected so that no damage or deterioration will occur during a prolonged delay from the time of shipment until installation is completed and the unit and equipment are ready for operation.
- B. All equipment and parts must be properly protected against any damage during shipment. The Contractor shall store equipment in accordance with the manufacturer's instruction.

#### M01.07 MAINTENANCE

- A. Furnish all special tools and test equipment required for the proper servicing of all equipment.

#### M01.08 EQUIPMENT WARRANTY

- A. Equipment warranty shall be manufacturers standard, extended to 12 months from startup, not to exceed 18 months from shipment. Manufacturer's warranty shall not relieve the Contractor from furnishing a complete system warranty as specified in the General Conditions.

M01.09

GENERAL

- A. The pumping units shall all be supplied by one manufacturer and shall be complete including pumps, motors, baseplates, couplings, guards and other accessories as specified herein.
- B. The pumps, motors, drives, couplings and base plates shall be designed and built for 24-hour continuous service at any and all points within the specified range of operation, without overheating, without damaging cavitation, and without excessive vibration or noise.
- C. Each major piece of equipment shall be furnished with a stainless steel nameplate securely mounted to the body of the equipment. As a minimum, the nameplate for the pumps shall include the manufacturer's name and model number, serial number, rated flow capacity, head and speed. As a minimum, nameplates for motors shall include the manufacturer's name and model number, serial number, horsepower, speed, input voltage, amps, number of cycles, power and service factors.

M01.10

CONDITIONS OF OPERATION

- A. The pumps shall be Pump Solutions Weinman 1200 Series Model 3L4 or engineer pre-approved equal (must be approved 10 days prior to bid).
- C. Each pump shall be designed for the conditions of service tabulated as follows

| <u>PUMP DESIGN REQUIREMENTS</u>                     |      |
|-----------------------------------------------------|------|
| Number of Pumps to be Supplied                      | 2    |
| Maximum Full Load Motor Speed (rpm)                 | 3600 |
| Maximum Motor horsepower (Hp)                       | 40   |
| Minimum Suction Size (inches)                       | 4"   |
| Minimum Discharge Size(inches)                      | 3"   |
| Minimum Shut-Off Head at Design Speed (feet)        | 267' |
| Design Point Capacity (gpm)                         | 355  |
| Minimum TDH at Design Point (feet)                  | 236  |
| Minimum Efficiency at Design Point (%)              | 74.5 |
| Maximum Allowable NPSHR at Design Duty Point (feet) | 11.3 |

- D. The above information shall be included as part of the submittal package. System head curve for this station, along with proposed pump curves have been included at the end of the Specification. Pumps shall be designed to operate satisfactorily through the range of heads.

- E. Where total head (TDH or TH) is referred to in conjunction with the specific discharge requirements, it shall be understood to consist of the sum of the pressure head plus the velocity head, in feet, at the discharge nozzle of the pump minus the pressure head and the velocity head at the suction nozzle of the pump. The efficiency of the pump shall be understood to be based upon total head as just defined.

M01.11

PUMP CONSTRUCTION

- A. The casing shall be of close-grained cast iron equivalent to ASTM A-48 or ductile iron ASTM A536 and hydro tested to 1.5 times the casing working pressure. Casing shall be split on the horizontal center line with suction nozzles, discharge nozzles and feet cast integrally with the lower half. The casing halves shall be accurately located with straight dowel pins to eliminate mismatch. The upper half of the casing shall be removable without disturbing pipe connections or pump alignment. Single volute casings are acceptable if they are manufacturers standard for given sizes. The casing shall be supplied with all necessary vents, drains and gage connections.
- B. The impeller shall be made of 316SST and be enclosed double suction type. The impeller shall be machined and polished to perform with maximum efficiency. Each impeller shall be dynamically balanced to ISO-1940; Grade 6.3 to minimize vibration and improve bearing life. The impellers shall be keyed to the shaft and secured at the hub between the shaft sleeves extending through the stuffing box with shaft nuts external to the stuffing box.
- C. Furnish 316 SST wear rings. The casing ring shall be designed to provide a smooth water flow onto the impeller eye. The impeller ring shall be locked with a positive means to prevent rotation.
- D. The pump bearings shall be heavy duty, single row anti-friction type arranged for oil or grease lubrication. Sealed for life bearings are not acceptable. The bearings shall be adequately sized for long life without the addition of external cooling. Inboard and outboard bearing interchangeability is preferred. Removable bearing housings shall be supplied with 360 degrees mounting via a register fit, or 180 degrees mounting, bolted and doweled to the pump bearing brackets cast integral with the lower half casing.
- E. The pump shaft shall be heat-treated carbon steel, accurately machined and ground over its entire length. On packed pumps, the shaft shall be protected from wear and erosion by removable sleeves secured at opposite ends with shaft sleeve nuts or retaining rings. The shaft shall have the same nominal diameter from one shaft sleeve locknut to the other to



minimize fatigue failures due to stress concentrations. Maximum shaft deflection at the stuffing box face shall not exceed .002" at 25% of BEP.

- F. Sleeves shall be bronze, key driven, and sealed with an O-Ring to prevent leakage between shaft sleeve and pump shaft. Sleeves shall extend through the stuffing box.
- G. The stuffing box may be cast separate and sealed with O-Rings at the casing, or cast solid with the upper and lower casing halves. A separate cast stuffing box design shall employ 360 degrees mounted bearing housings, with a full register fit. The stuffing box shall be suitable for use with either packing or mechanical seals. Each box shall accommodate five full rings plus the lantern ring. For this project pumps shall be furnished with packing and lantern rings.
- H. Suction and discharge nozzles shall be 180 degrees apart and shall have the same centerline axis. Integral pump nozzle sizes shall be minimum 6" discharge & 8" suction and shall be supplied with ANSI class flanges of 125/150# or 250/300# rating as made necessary by the service. Minimum nozzle sizes shall not be attained by addition of standard ACIP reducing/increasing fittings.

#### M01.12

#### PUMP MOTORS

- A. Each pump shall be driven by a horizontal variable speed squirrel cage induction electric motor with a maximum horsepower and speed as specified under Subsection M01.10.B. The pump motors shall be suitable for driving the pumps continuously over the entire pumping range. The pump motors shall be furnished by the pump manufacturer.
- B. Each pump shall be directly connected to its driver by means of a Falk; Fast's or equal all metal coupling, suitably sized to transmit the required driving torque and to accommodate unavoidable shaft misalignment.
- C. Motors driven by VFD shall have Open Drip Proof (ODP) enclosures with insulated bearings and shaft grounding brushes with a 1.15 service factor for sine wave and shall be 1.0 for non-sinusoidal wave form over the entire speed. Motors shall be 460 volt, 3 phase, 60 hertz. Motors shall be inverter duty type. Motors shall be US, Baldor, TECO/Westinghouse or approved equal.
- D. The motor shall be non-overloaded at any point in the design operating range of the pump, including run-out and shut-off. The total capacity of the motor (name plate rating), shall not be exceeded while the pump is operating at any point on the characteristic curve. The service factor shall not be used as part of the motor rating.
- E. Motors shall be suitable for Full voltage starting.

- F. Motors shall have Class F insulation with Class F temperature rise.
- G. Motors shall not exceed sound levels of 3 dBA higher than NEMA MG 1.
- H. Motors balance and vibration control shall be in accordance with NEMA MG 1, Part 7.
- I. Measure the vibration amplitude (filtered and unfiltered) at the top of the motor in five planes ( $ODE_{X,Y,Z}$ ,  $DE_{XY}$ ). Unfiltered amplitudes must be within the Hydraulic Institute Standards limit, measured in in/sec RMS at any one of these five points.

M01.13                      BASEPLATES

- A. The pump and motor shall be mounted on an extended fabricated steel baseplate of sufficient size and rigidity to support the unit and prevent harmful vibration. The steel base shall be anchored to the level surface of a concrete pad with suitably sized Type 316 stainless steel anchor bolts.
- B. Pump manufacturer shall factory mount and rough align motors on baseplates. Final alignment shall be done by Contractor in the field. Motors may be dismounted for shipment.

M01.14                      SHOP TESTS

- A. The Engineer shall have the right to witness the factory tests and inspect any equipment to be furnished under this Section prior to their shipment from place of manufacture.
  - 1. Each pump shall be given a non-witness performance test. A complete test report for each pump, including certified characteristic curves of the pump, consisting of at least all information required in Paragraph 1.03 above, and certified copies of the hydrostatic test report shall be submitted to and approved by the Engineer before the pumps are shipped.
- B. Each pump specified herein shall be factory tested in accordance with the latest edition of the Hydraulic Institute Standards. Notification of such test and a list of test equipment and procedures shall be furnished to the Engineer at least 10 working days before the schedule test date.
  - 1. Each pump shall be tested and data recorded at its operating conditions of service as listed in Paragraph 1.10 above. Sufficient test point readings shall be made to establish complete head flow capacity, efficiency and brake horsepower curves for each pump.

2. If the application is variable speed a minimum speed curve shall be plotted on the performance curve basis the affinity laws and the test data.
  3. All gauges and other test instruments shall be calibrated within 30 days of the scheduled test and certified calibration data shall be provided. All Venturi flow meters shall be calibrated as required by ANSI/HI standards.
- C. Perform NPSHR testing on the 1st unit ready for testing. Determine the Net Positive Suction Head required under both “1% head drop” and at “3% head drop” conditions and provide a composite curve for each. Conduct in accordance with Hydraulic Institute Standards, but at both the 1% head drop and 3% head drop conditions. Take at least five (5) points for NPSHR condition over the pump’s Allowable Operating Range (A.O.R.). One point shall be at each end of the A.O.R. One point will be at approximately at rated point, design point, and minimum head point for continuous operation.

M01.15

#### SURFACE PREPARATION AND SHOP PRIME PAINTING

- A. Each fabricated steel base mounted pumping unit, including base and guard, shall be shop painted in accordance with manufacturers standard paint procedure.
- B. Motors shall have manufacturers standard finish paint for corrosive environments.

M01.16

#### BASEPLATES (RECOMMENDED)

Large pumping units ( $\geq 200$  hp) to be mounted on a machined, 1/2-inch thick form bent baseplate. The base rigidity shall prevent more than 0.010-inch parallel coupling misalignment and 0.005 in/in angular misalignment when subjected to maximum motor and pump loads simultaneously.

- A. Fabrication
  1. The base shall be fabricated from A-36 steel or better materials. The base shall be constructed as a form bent channel. This form bent base shall have a minimum thickness of 1/2 inches. Both ends on the form bent base shall be capped with material equal in thickness to the rest of the base. The motor and pump pads shall be integral to the base and machined to ensure flat and parallel surfaces. The entire base shall be commercial heated stress relieved prior to machining. The mounting pads shall be machined to minimum 0.005 inches flatness and parallel to each other within 0.010 inches. The guard may be expanded metal

with maximum openings of 1/2 inch. It shall be fabricated and installed to ensure no access to the rotating shafts and coupling. The guard must be removable for maintenance purposes. The base shall be provided with a drip rim completely around the perimeter on the base plate. The rim must have a minimum width and depth of 1-1/2 inches. A minimum 1-inch NPT coupling shall be provided as a drain connection. Stainless steel drain piping shall be provided by the contractor. Anchor bolt holes may not penetrate the drip rim.

2. A minimum of four (4) anchor bolts. Anchor bolts must extend a minimum of 10 bolt diameters into concrete foundation. Anchor bolts will be provided by the contractor.
3. The base plate shall be provided with 4" minimum diameter grout holes to allow grout to be installed in the field by the contractor. The pumps and motor shall be fastened to the baseplate using Grade 5 or better plated bolting.

B. Coating:

Base plate and guard to be grit blasted to SSPC-SP10 Near White. Pump to be solvent wiped prior to painting. The base, and guard shall be coated as follows: Form bent base and guard to be given 1 coat of Tnemec N69 primer. The pump shall be coated as follows: Pump to be coated in manufacturer's standard paint.

C. Pre-Installation:

The pump and motor shafts shall be aligned in the factory prior to shipping using a laser alignment device or instrument. A minimum of 0.125 inches of shim pack thickness shall be provided under all drivers. The pump shall not be shimmed. After the factory alignment, the pump shall be pinned or blocked to prevent the pump from moving on the mounting pads. This allows the pump to be removed and reinstalled in the same position. The pump and motor may be removed to verify the base leveled during the installation process.

D. Grouting:

Grout holes, at least 4 inches in diameter, or at least 3.5-inch squares must be provided and located to allow complete grouting of the base. The holes shall be spaced such that grout is not required to be forced more than 30 inches. Vent holes, a minimum of 0.5 inches in diameter shall be provided at the end of all grout runs. The motor and pump may be removed to fill the base with grout. The base must be installed with a minimum of 1 inch of grout between the base and the concrete surface. This grout is used to support and level the baseplate. The grout shall have a minimum compressive strength of 6000 psi after 28

days. The grout shall cure at least 7 days prior to pump start-up and running.

E. Installation & Start-up:

The contractor shall ensure that the pump discharge and suction flange are not supporting the weight of the piping or valves. The motor and pump may be removed for grouting purposes. After grouting is complete and prior to start-up, the motor and pump shall be aligned with a laser device. Prior to installing the coupling, the motor rotation must be verified. The pump manufacturer's rep must be present during the start-up.

M01.17

MEASUREMENT AND PAYMENT

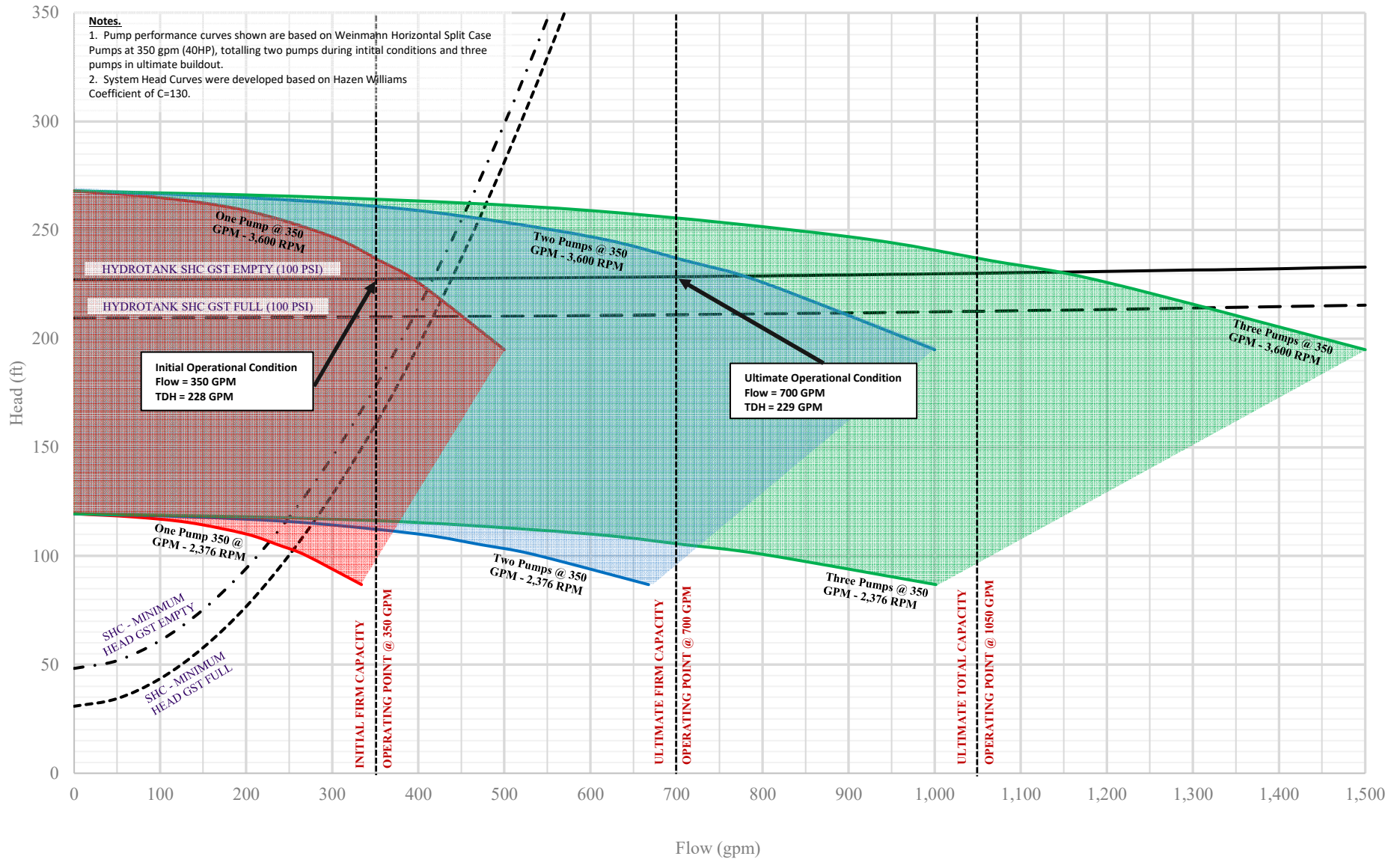
- A. No separate payment will be made for work performed in accordance with this section of the specifications, and the cost thereof shall be paid for under the proper item of the Proposal and Bid Schedule.

**END OF SECTION**

# LEVI WATER SUPPLY CORPORATION

## Falls County Water Plant

### Exhibit A - System Head Curves and Pump Capacity



## SECTION M2 – FLOW METERS

### M2.01 SCOPE OF WORK

- A. This section describes the requirements for one (1) 6” turbine meter in the Well Discharge Header, one (1) 6” turbine meter in Hydrotank Discharge Header (Add Alternate – Meter Vault).
- B. Under this item, the contractor shall furnish and install the flow meter equipment and accessories as indicated on the plans and as herein specified.

### M2.02 SUBMITTALS

- A. The following information shall be included in the submittal for this section:
  - 1. Data sheets and catalog literature for the meter.
  - 2. Connection diagrams for equipment wiring.
  - 3. List of spare parts and optional equipment.

### M2.03 TURBINE FLOW METER

- A. Meters shall conform to AWWA C704 and applicable sections of AWWA C701 for turbine meters. All wetted materials shall comply with NSF/ANSI 61 and 372.
- B. The meter shall be a flanged tube propeller (turbine) type with electronic indicator-totalizer. Meter tube shall be epoxy-coated fabricated steel with AWWA Class D flanges.
- C. Pressure rating shall be 150 psi minimum and temperature rating 140°F. Accuracy shall be  $\pm 2\%$  of reading over normal range.
- D. The meter shall include straightening vanes and require minimum 5D upstream and 1D downstream straight pipe.
- E. Register shall be battery powered with digital display, minimum 5-digit rate and 8-digit totalizer, programmable units and password protection.
- F. Outputs shall include scaled pulse output and optional 4-20 mA, data logger, and remote mount display.
- G. Meters shall EXCEED current AWWA C-701 test flow, head loss and accuracy standards as follows:
- H. Meters shall maintain  $\pm 2\%$  accuracy over normal operating range and  $\pm 5\%$  at low flow in accordance with AWWA C704.
- I. Turbine flow meters shall be Model PM04 as manufactured by TechnoFlow® or approved equal.

| SIZE | MINIMUM FLOW (GPM) | NORMAL FLOW RANGE (GPM) | MAX CONTINUOUS (GPM) | INTERMITTENT MAXIMUM FLOW (GPM) | HEAD LOSS @ SAFE MAXIMUM |
|------|--------------------|-------------------------|----------------------|---------------------------------|--------------------------|
| 4    | 55                 | 55-500                  | 500                  | 700                             | ≤3.7 psi                 |
| 6    | 120                | 120-1200                | 1200                 | 1500                            | ≤6.5 psi                 |
| 8    | 150                | 150-1500                | 1500                 | 2000                            | ≤4.5 psi                 |
| 10   | 180                | 180-2000                | 2000                 | 3000                            | ≤2.9 psi                 |
| 12   | 200                | 200-3000                | 3000                 | 3500                            | ≤2.9 psi                 |

#### M2.04 MATERIALS

- A. Meter Tube: Epoxy-coated steel
- B. Propeller: Thermoplastic
- C. Shaft: Stainless steel
- D. Bearings: Ceramic, water lubricated
- E. Housing: Aluminum

#### M2.05 INSTALLATION

- F. Contractor shall install meters in accordance with manufacturer's recommendation for the minimum upstream and downstream installation requirements for the flow sensor.
- G. Wiring between flow sensors and remote mounted signal converters shall use cable type and procedures as per the manufacturer's recommendations.

#### M2.06 PAYMENT

Unless otherwise indicated, no separate measurement or payment for work performed under this Section. Include cost of same in Contract price bid for work of which this is a component part.

**END OF SECTION**



## SECTION M3 - CHLORINATION FEED SYSTEM

### M3.01 DESCRIPTION OF WORK

- A. The chlorination feed system shall consist of one SUPERIOR Model CL-16 automatic switchover gas chlorinators, two (2) cylinder mounted vacuum regulators (integral to CL-16 system), two (2) Rate Valves with Meters (RM-1 type), two (2) hydraulic chlorine cylinder scales with digital output, one (1) chlorine gas detector (SLD-1 type), one (1) Self Contained Breathing apparatus (SCBA) and wall cabinet and one (1) emergency eyewash station and all ancillary components necessary to provide a complete and operational system.
- B. The system shall deliver a chlorine solution to the designated points of application as shown on the plans and shall be housed in the Chlorine Room.

### M3.02 VACUUM REGULATORS (AUTOMATIC SWITCHOVER)

- A. The vacuum regulator shall be mounted to 150lbs. Chlorine cylinder and rated for 100PPD.
- B. Vacuum regulators shall be integral to the SUPERIOR CL-16 chlorinator system. Units shall be vacuum-operated, cylinder-mounted, and capable of automatic switchover between chlorine cylinders without interruption of feed.
- C. Regulators shall include: diaphragm operated vacuum control, integral safety shutoff valve, fluoroplastic construction, corrosion resistant materials, and automatic mechanical detent for standby cylinder engagement.
- D. A separate switchover device will not be acceptable.

### M3.03 CONTROL UNIT (Chlorinator)

- A. Chlorinator system shall be SUPERIOR Model CL-16 vacuum-operated gas chlorinator with automatic switchover capability. System shall include dual vacuum regulators, ejector, remote flow meter/rate valve panel, and tubing connections.
- B. System shall be modular in design allowing safe remote mounting of flow meter panel. Flow control shall provide minimum turndown ratio of 20:1 and accuracy  $\pm 2\%$  of maximum capacity.
- C. Each chlorinator shall be SUPERIOR® Series CL-16 Automatic Switchover Gas Chlorinator wall mounted chlorine gas feed system with a maximum capacity of 100 PPD and size to feed 50PPD.

- D. The chlorinator shall be SUPERIOR® MODEL CL-16 manufactured by Chemical Injection Technologies, Inc., Ft. Pierce, Florida, and shall have a maximum capacity of 100 pounds per day (gr/hr) of chlorine feed and shall be equipped with a chlorine flow meter of 50 pounds per day (gr/hr).
- E. The chlorinator shall be of modular design consisting of two (2) automatic switchover vacuum regulators, one (1) pressure relief/vent valve, one (1) flow meter/rate valve panel, and one (1) ejector/check valve. Each of these assemblies shall be capable of being individually located wherever safety and/or operator convenience dictates.
- F. The vacuum regulators shall mount directly on the chlorine cylinder valves by means of a positive yoke type clamp having an integral tightening screw with slide bar handle. No wrenches or other tools shall be required to mount or dismount the vacuum regulator from the chlorine valve. The chlorine valve/chlorinator inlet adaptor shall be constructed of corrosion-proof fluoroplastic material which shall be inert to the effects of wet, dry or liquid chlorine. The inlet safety shut-off/ vacuum regulating valve shall be of capsulated design, easily removable as a unit from the outlet side of the yoke. A fluoroplastic filter shall be installed in the vacuum regulator inlet and shall be capable of removing impurities greater than microns. All external screws and nuts shall be made of Titanium to prevent corrosion.
- G. Each automatic switchover vacuum regulator shall contain its own built-in diaphragm detent mechanism, which shall be made entirely of non-metallic corrosion resistant materials. The detent mechanism shall be factory pre-set and shall not require any field adjustment. The reset knob shall be designed to automatically "ratchet" into free turning mode after the regulator has been reset, allowing no further forward pressure to be applied to the detent mechanism shaft without regard to further turning of the knob.
- H. The flow meter/rate control valve panel shall be capable of mounting wherever it is safest and most convenient for operating personnel. The panel shall be constructed of fiberglass reinforced thermoplastic material and shall incorporate a flow rate control valve made of fluoroplastic material which is inert to the corrosive effects of chlorine. The rate valve metering tip shall be constructed of metal which is completely impervious to the effects of wet, dry or liquid chlorine attack. Design shall provide for full closing of the rate valve without engaging the control surfaces, to prevent damage. Minimum calibrated feed rate shall be 1/20th of maximum flow meter scale (20:1 turndown ratio). Accuracy shall be  $\pm 2\%$  of maximum. Minimum calibrated feed rate shall be 1/20th of maximum flow meter scale (20:1 turndown ratio). Accuracy shall be  $\pm 2\%$  of maximum.
- I. Vacuum shall be created by a fixed-throat venturi/ejector system connected directly to the chlorine solution diffuser. A dual high-pressure/low-pressure check valve system shall prevent water from entering the gas system. The ejector assembly shall be capable of withstanding water pressure up to 300 PSIG (20.7 Bars). A universal-type chlorine solution diffuser shall be provided which shall allow close-coupling of the ejector to a water main, use of flexible solution hose or rigid solution pipe without the use of special adaptors.

#### M3.04 INJECTOR

- A. Each Injector shall be vacuum-producing ejector assembly sized for system capacity and designed to prevent backflow into the gas system. Unit shall include dual check valves and corrosion resistant materials.

#### M3.05 CHLORINE SCALES

- A. Scale shall be of the single hydraulic load cell design as manufactured by FORCE FLOW. Load cell shall be of the temperature stable, rolling diaphragm type. Flexible PVC coated copper tubing shall connect load cell to indicator to allow easy remote installation of the digital indicator. Tubing length shall be 6 ft. in length. Cylinder chaining bracket shall be wall mounted and use a double loop coil chain and a spring loaded snap hook to secure cylinder. Chaining bracket shall have an integral tool rack for storing cylinder change-out tools.
- B. Indicator shall have a Loop-powered (12-36 volts DC by others) 4-20mA output proportional to the net weight. An 18 inch flying lead shall be provided for termination in a users supplied junction box.
- C. Scale shall carry a Full Five (5) Year Warranty. "Limited" Warranties shall be considered unacceptable.
- D. Full scale accuracy shall be better than 1%. Scale shall be CHLOR-SCALE® 150 with TUF-COAT™ coating and SOLO™ G2 digital display, Model GR150-2, as manufactured by FORCE FLOW Concord, CA

#### M3.07 SOLENOID VALVE

The solenoid valve will be energized upon the demand to feed chlorine. The valve will have a remote control panel with an H-O-A switch. In the (H) position the valve is locally energized thus allowing water to flow to the chlorine injector. In the (A) position the valve is energized remotely, in the (O) position the valve is de-energized thus shutting off water flow to the chlorine injector.

- A. Solenoid Valve shall be a (Normally Closed) electric actuated type with true union end connections that required no differential pressure drop for normal operation.
- B. Materials of construction shall be CPVC with FPM seals
- C. Valve shall rated for 120 psi inlet pressure.
- D. Voltage shall be 115 VAC, 60 hz.
- E. Solenoid Valve shall be a 1" model SV20100STE as manufactured by Hayward Industries.

### M3.08 PRESSURE GAUGE

- A. Chlorine Solution
  1. 2 3/4" minimum diameter Stainless Steel case.
  2. PVC isolation diaphragm seal
  3. Rate for 100 psi
  4. 1/4" Gauge connection, 1/2" process connection
- B. Supply Water Service
  1. 2 3/4" minimum diameter Stainless Steel case.
  2. PVC isolation diaphragm seal.
  3. Rated for 160 psi
  4. 1/4" Gauge connection, 1/2" process connection

### M3.09 CHLORINE SOLUTION DIFFUSER

- A. Provide a 2" corporation main connection with a 2" pvc solution tube.
- B. Assembly shall be equipped with a stainless steel safety chain and pvc ball check valve as manufactured by Saf-T-Flo.

### M3.10 SYSTEM VALVES, PVC (Chlorine gas under vacuum)

- A. The valve shall be of the diaphragm type with true union end connection (threaded or socket type) and rate for a maximum pressure of 150 psi.
- B. Valve shall be manually operated with visual position indicator
- C. Valve shall be constructed of PVC with a PTFE Diaphragm. Metal wetted parts are not acceptable.

### M3.11 SCBA (Self-Contained Breathing Apparatus)

- A. The respiratory breathing apparatus shall consist of the following major components:
  1. A cylinder and valve assembly for storing breathing air under pressure.
  2. A full face-piece assembly.
  3. A removable face-piece mounted, positive pressure breathing regulator with an air saver switch and purge valve.
  4. A backframe and harness assembly for supporting the equipment on the body of the wearer.
  5. A shoulder strap mounted, remote gauge indicating cylinder pressure.

The SCBA shall be NIOSH certified and shall conform to the CODE of Federal Regulations, Title 42, part 84. This SCBA shall meet OSHA requirements.

- B. The 2216 psig cylinder and valve assembly shall be in accordance with Department of Transportation (DOT) specifications, have a working pressure of 2216 psig and a duration of 30 minutes as rated by the National Institute of Occupational Safety and Health (NIOSH). The cylinder shall be available in all aluminum or a lightweight composite cylinder consisting of an aluminum inner lining and full wrap of resin impregnated fiberglass or carbon filament. The 30-minute cylinder shall have a water capacity of 523 cubic inches and a free gas capacity of 45 cubic feet.
- C. Provide One (1) ENCON protective wall cabinet for housing the SCBA.
- D. The SCBA shall be an Airhawk MMR air Mask and Cylinder as manufactured by MSA.

#### M3.12 GAS DETECTOR

- A. The gas detection system shall monitor the gas supply storage area and gas feed equipment area for the presence of Chlorine gas in the ambient atmosphere.
- B. Gas detector shall be SUPERIOR Model SLD-1 single-channel gas detection system designed to monitor chlorine gas leakage.
- C. System shall include remote sensor with 4-20 mA signal, controller with NEMA 4X enclosure, audible alarm (minimum 95 dB), visual display, and event logging capability.
- D. Detector shall provide two alarm setpoints (warning and danger), relay outputs, and capability to locate sensor up to 1,000 ft from controller. Detector shall include battery backup and calibration reminder features.
- E. This system shall be Gas Detector Model SLD-1 Gas Detection System as manufactured by SUPERIOR® WATER SOLUTIONS.

#### M3.13 EMERGENCY EYEWASH STATION

- A. The specification for the Emergency Eyewash Station is as follows:
  - a. Model 8317CT shower and eye/face wash shall include the AXION® MSR hydrodynamic designed green ABS plastic 10-5/8" (26.9 cm) showerhead with integral self-regulating 20 gpm flow control, an AXION MSR eye/face wash head shall feature inverted directional laminar flow which achieves Zero Vertical Velocity™ supplied by an integral 4 gpm flow control, chrome-plated brass shower and eyewash ball valves equipped with stainless steel ball and stem, and separate ball valve activated hose spray. Unit shall also include a powder-coated cast-iron 9" (22.9 cm) diameter floor flange and universal sign.

#### M3.14 INSTALLATION

- A. The equipment shall be installed as shown on the plans per the contract documents and in accordance with the manufacturer's recommendations.

M3.15 WARRANTY

- A. The equipment/system warranty, unless otherwise stated, shall be one year from start-up.

M3.16 SPARE PARTS

- A. Provide Standard PM Kits for each chlorinator, injector and vacuum regulator.

M3.17 PAYMENT

- A. No separate payment will be made for work performed under this specification. All related costs incurred shall be included in the proper item of the Proposal and Bid Schedule.

**END OF SECTION**

## SECTION M4 – CHLORINE ANALYZER SYSTEM

### M4.01 SCOPE OF WORK

- A. The work described by this section consists of furnishing all equipment materials and labor to provide, install and test three (3) each Free Chlorine Analyzers.
- B. The method of measuring free or total chlorine will be colorimetric. Instrument chemistry shall employ N, N-diethyl-p-phenylenediamine (DPD) method. Other methods of chlorine measurement such as amperometric, potentiometric, and iodometric that employs electrodes or other electrochemical techniques are not acceptable.

### M4.02 FREE AND TOTAL CHLORINE ANALYZERS

- A. Function and Performance Requirements:
  - 1. Chlorine Analyzer shall use USEPA acceptable DPD method of analysis for measuring free and total chlorine.
  - 2. Measurement range:
    - a. 0 to 10 mg/L (ppm) free with an option of 0-15 mg/L (ppm)
  - 3. Accuracy
    - a. 0–6 mg/L  $\pm 5\%$  of 0.03 mg/L, whichever greater; 6–10 mg/L  $\pm 10\%$  as  $\text{Cl}_2$
  - 4. Resolution
    - a. 0.001 mg/L (ppm)
  - 5. Cycle Time
    - a. User selectable
  - 6. Analyzer will zero the sample cell before every reading.
  - 7. Analyzer will be a complete single unit with all functions, interfaces and communications integrated into the unit. A separate controller shall not be required.
- B. Outputs
  - 1. 4-20 mA
  - 2. MODBUS RTU Over RS485
  - 3. MODBUS TCP

- C. Physical
  - 1. Analyzer shall be suitable for surface mounting.
  - 2. Viewable window to the optical chamber with clear view of the sample and reaction of the reagents.
  - 3. Analyzer must not have a motor or stir bar as a mixing mechanism
  - 4. Analyzer shall be a complete stand alone unit and not require external controllers
  - 5. Enclosure shall be NEMA 4X.
- D. Power Requirements
  - 1. Analyzer shall be 120 VAC powered instrument.
- E. Accessories/Documentation Required
  - 1. Provide a certificate of conformance/calibration subsequent to installation for each analyzer.
  - 2. One (1) year supply of buffer and reagent.
- F. Warranty
  - 1. Analyzers shall have a one-year warranty from the date of start-up
- G. Approved Manufacturer
  - 1. Free Chlorine Analyzers shall be as manufactured by HF Scientific Model CLX OnLine Residual Chlorine Monitor and shall be wall mounted. Free chlorine analyzers shall be Model 28002.
  - 2. The CLX OnLine Chlorine Analyzers shall consist of a sample and reagent pump, measurement cell, and shipped with buffer and indicator solutions.

#### M4.03 INSTALLATION

- A. Contractor shall install the analyzer in strict accordance with the manufacturer's instructions and recommendation.
- B. Contractor shall include in their bid a manufacturer's representative on-site at a minimum of a half-day for start-up service by a factory-trained technician.

#### M4.05 PAYMENT

Unless otherwise indicated, no separate measurement or payment for work performed under this Section. Include cost of same in Contract price bid for work of which this is a component part.

**END OF SECTION**



## SECTION M5 – HYDROPNEUMATIC TANK SYSTEM

### M5.01 SCOPE OF WORK

- A. The work described by this Section consists of furnishing all equipment, materials, and labor to provide, install and test one (1) 10,000 gallon welded steel hydropneumatics pressure tanks and one (1) 60 gallon vertical air compressor for potable water storage and pressure control as shown on the drawings.

### M5.02 SUBMITTALS

- A. Shop Drawings and Product Data:
  - 1. Comply with general requirements of the Uniform General Conditions and the supplemental requirements herein.
  - 2. Submit drawing or illustration showing unity construction for each type and size of hydropneumatic pressure tank.
  - 3. Submit the following information for each tank:
    - a. Layout drawings shall be submitted and included the dimensions of all equipment, accessories, supports, connections, outlets, and all related piping.
    - b. Equipment weights and anchor bolt designs.
    - c. Submit tank weld x-rays and hydrostatic test in accordance with 1.05(A)(2).
  - 4. If catalog bulletins are used to communicate above information, mark out inapplicable information.
  - 5. Submit Manufacturer's operating and maintenance instructions for hydropneumatics tanks and duplex compressor system in compliance with the General Conditions for equipment furnished under this section.
  - 6. Hydropneumatic pressure tanks shall meet NSF 61 requirements for contact with potable water.
  - 7. Tank manufacturer shall submit certificate that tank material is suitable for the service conditions specified herein.

### M5.03 REFERENCE STANDARDS

- A. Standards referenced in this Section are listed below:
  - 1. American National Standards Institute, (ANSI)
  - 2. American Society of Mechanical Engineers, (ASME)
    - a. Boiler and Pressure Vessel Code, (BPVC) Section VIII, Division 1
  - 3. American Society for Testing and Materials, (ASTM)
  - 4. American Water Works Association (AWWA)

### M5.04 QUALITY ASSURANCE

- A. Manufacturer's Qualifications:

Manufacturer shall provide in-house x-rays of welds, if ASME code requires it, and hydrostatic test. ASME inspection report and UIA form shall be sent to the Engineer prior to shipping the vessel. Engineer reserves the right to inspect the vessel manufacturing facility to confirm requirement above.

- B. Acceptable Manufacturers:  
Bulldog Steel Products, Inc., or approved equal

#### M5.05 SYSTEM DESTRIPTION/DESIGN REQUIREMENTS

- A. General:
  - 1. The horizontal hydropneumatic tank must be located wholly above grade and must be of steel construction with welded seams.
  - 2. The horizontal steel hudropneumatic tank shall be provided with the manufacturer's services at the jobsite at no additional cost to the Owner. One full 8-hour day of service from manufacturer's representative shall be provided to approve the tank installation advise the Contractor during startup, testing and final adjustment of each tank.
  - 3. All facilities and components must be constructed in accordance with the Texas Commission on Environmental Quality (TCEQ) Rules and Regulations for Public Water Systems 30 Texas Administrative Code (TAC) Chapter 290.
  - 4. Tank shall be NSF-PW Standard 61 compliant for potable water storage and compliant with all requirements of TAC 290
- B. Design Criteria
  - 1. Design in accordance with AWWA Specifications D100 for dead load, live load and wind load and ASME Boiler and Pressure Vessel Code, Section VIII, Division I.
    - a. Tank shall have ASME code stamp Section VIII. Tank shall be designed with 4:1 factor of safety.
  - 2. Corrosion allowance for all steel plates in the wetted areas shall be accounted for and shall be added to the minimum thickness.
  - 3. Design pressure: 150 psig (minimum)
  - 4. Supports – two saddle-type supports
  - 5. Walls – thickness to be in accordance with ASME Boiler and Pressure Vessel Code, Section VIII, Division I.
  - 6. Design (ambient) temperature: 25° to 115°F

#### M5.06 DELIVERY, HANDLING AND STORAGE

- A. Handle materials so as to prevent damage.
- B. Store materials on skids above ground and keep clean, properly drained, and protected from elements causing corrosion.
- C. Store materials as so to prevent excessive deflection.

#### M5.07 MAINTENANCE/ACCESSORIES/SPARE PARTS

- A. Manufacturer/Supplier shall submit a complete listing of spare parts for all equipment.

#### M5.08 WARRANTY

- A. The Equipment Manufacturer shall provide a one (1) year warranty, commencing on the date of substantial completion, for all parts associated with the equipment and the labor associated with repair and/or replacement of parts. The warranty must be submitted during the shop drawing phase. Approval of the shop drawings will be contingent on the receipt of the warranty. If any part of the equipment should fail during the warranty period, it shall be replaced at no expense to the Owner.

#### M5.09 MATERIALS

- A. This specification has been developed around a horizontal steel hydropneumatic tank as manufactured by Bulldog Steel Products, Inc. Any related construction and/or design modifications necessitated due to the use of an alternate tank design shall be the responsibility of the Contractor.
- B. Hydropneumatic tanks shall be constructed of new materials as specified and shown on the drawings. No used tank will be allowed.

#### M5.10 FABRICATION

- A. Tank shall conform to AWWA D100, Section.
- B. The tank shall be a horizontal welded steel tank suitable for use with potable water.
- C. Tank shall be provided with manway for maintenance access and lifting lugs.
- D. Metal thickness shall be sufficient to withstand the highest expected working pressure with a four to one factor safety.
- E. The tank must meet the standards of the American Society of Mechanical Engineers (ASME) Section VIII, Division I Codes and construction Regulations and must have an access port for periodic inspections. An ASME nameplate must be permanently attached to those tanks.
- F. Tank hydraulic performance conditions and design criteria shall be as shown below.

|                                     |                |
|-------------------------------------|----------------|
| Tank Configurations:                | Horizontal     |
| Minimum Capacity:                   | 10,000 gallons |
| Design (Ambient) Temperature Range: | 25°F to 115°F  |
| Working Pressure:                   | 100 psig       |
| Minimum Test Pressure:              | 200 psig       |

- G. Hydropneumatic pressure tanks shall be painted, coated, disinfected, and maintained in strict accordance with current AWWA standards, Protective paint shall be applied to the outside of the tank and an NSF certified coating shall be applied to the inside portion of the tank. All painting and coatings shall be completed at the factory. Field painting and coating will not be accepted. No temporary coating, wax, grease coating or coating materials containing lead will be allowed. No other coating will be allowed which are not approved for use as a contact surface with potable water by the United States Environmental Protection Agency (EPA), National Sanitation Foundation (NSF), the United States Food and Drug Administration (FDA). All newly installed coatings must

conform to ANSI/NSF Standard 61 and must be certified by an organization accredited by ANSI. All surface areas on the vessel shall be inspected.

- H. Associated appurtenances including valves, pipes and fittings connected to pressure tanks must conform to ANSI/ NSF International Standard 61 and shall be thoroughly tight against leakage. Maximum allowable lead content of pipes, pipe fittings, plumbing fittings, and fixtures is 0.25 percent.

#### M5.11 ACCESSORIES

- A. Pipe Connections
  - 1. Inlet Provide 8" diameter flanged inlet nozzle as shown on the plans with baffle plate mounted in tank interior.
  - 2. Outlet Provide 6" diameter flanged outlet nozzle as shown on the plans with baffle plate mounted in tank interior.
  - 3. Drain – Provide 2" diameter drain and clean out with ball valve.
  - 4. Air Line and Water Line – Provide ½-inch Diameter NPT (female) nozzles on top and bottom of tank.
- B. Manway – Provide a pressure manway on one tank head end, of size to accommodate manned entry into the tank.
- C. Tank shall be provided with a pressure release device on the roof of the tank, and an easily readable pressure gauge with isolation ball valve.
- D. Facilities shall be provided for maintaining the air-water volume at the design water level and working pressure. Provide a duplex compressor air charging system as described under Section M5.12, pressure switch, and level sensing electrode. Air charging system shall be as manufactured by Champion or approved equal.
- E. Air injection lines shall be equipped with filters or other devices to prevent compressor lubricant and other contaminants from entering the pressure tank.
- F. A device to readily determine air-water volume shall be provided.
- G. Saddle supports – Tank manufacturer shall provide two saddle supports specifically designed to support the Specific Tank.

#### M5.12 VERTICAL AIR COMPRESSOR

- A. Compressor system shall be a single stage electric air compressor with a 60 gallon ASME vertical tank configuration.
- B. Max motor size of 5 HP with an operating pressure of 135 PSIG as manufactured by Ingersoll Rand SS3L3 or approved equal.

#### M5.13 DISINFECTION

Contractor shall disinfect the tank after it has been painted, and all related components affected by the work in accordance with TCEQ Chapter 290 and current AWWA Standard C655-09 or most recent.

#### M5.14 INSPECTION

- A. After the tank is completed and before it is painted, the welds shall be inspected and approved in the fabricator's shop by the Project Engineer.
- B. Welded joints shall be subjected to radiographic testing as described in Appendix A to AWWA Specification D100. Testing shall be verified in writing and shall be

#### M5.15 FIELD TESTING

- A. When tank and piping are complete and disinfected, but prior to placing tank in service, the tank will be charged with water, pressure applied to maximum operating pressure and tank, piping, valves, fittings observed for leakage or loss pressure. No leakage will be allowed.

#### M5.16 FIELD PAINTING

- A. All painting and coating shall be completed at the factory. Minor field applications for painting and coatings shall be permitted for areas that require touch up to the factory painting and coating.

#### M5.17 AIR SUPPLY

- A. Air supply includes single stage electric air compressor unit, air tank and air discharge line piping.
- B. Air compressor unit
  - 1. The air compressor unit shall include single stage electric air compressor, air tank, and motors.
  - 2. The unit shall be Ingersoll Rand SS3L3 or approved equal.
  - 3. The air compressor shall be factory filled with food grade oil, 2-stage, 2-cylinder, V-belt driven, air cooled with cast iron cylinders.
  - 4. The air compressor shall be powered by a 3 HP 230/1/60 TEFC premium efficiency electric motor with a service factor. Motor shall have a maximum rpm of 1,200.
  - 5. The unit shall supply 10.3 CFM @ 135 PSI
  - 6. The unit shall be equipped with a means to unload the compressor after stopping to insure that it does not start under load.
  - 7. The unit shall have low oil monitors to stop the unit if the oil level is low and will not allow the compressor to restart without adding oil.
  - 8. The compressor and motor shall be mounted on an 60-gallon ASME 200 psi tank with a manual tank drain and NEMA 1 rated.

#### M5.18 PAYMENT

Payment will be measured and paid for as provided for in the Proposal and Bid Schedule.

**END OF SECTION**

## SECTION M6 – SUBMERSIBLE WELL PUMPS

### M6.01 SCOPE OF WORK

- A. The Procurement and installation of one submersible pump for a public water supply well, complete in place, including but not limited to: pump, submersible motor, intake screen, submersible electrical cables and protection, submersible level transducer and carrier pipe, foot/check valve, column pipe, couplings, top flange, discharge elbow, variable frequency drive, startup services and testing (manufacturing and field) and all details relating to the pump settings as shown on the Drawings and as specified herein. Connections to piping and appurtenances within the well are included in this section, but those products are specified elsewhere.

### M6.02 REFERENCES

- A. American Water Works Association (AWWA):
  - 1. 1AWWA E102 - Submersible Vertical Turbine Pumps
- B. American Society for Testing and Materials (ASTM):
  - 1. ASTM A589/A589M-06 Seamless and Welded Carbon Steel Water-Well Pipe for use in water well applications
- C. American Society of Mechanical Engineers (ASME):
  - 1. B16.5 Class 150 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24 Metric/Inch Standard

### M6.03 SUBMITTALS

- A. Product Data
  - 1. Submersible pumps
    - a. Submit manufacturer's catalog information illustrating materials of construction and installed dimensions. Dimensions shall reference both the pump bowl diameter and the cable shape/flatness and width.
    - b. Submit certified pump curves for total dynamic head, motor horsepower, and pump efficiency. The operating point shall be indicated for the design flow rate and total dynamic head.
    - c. Or mated pump and motor assembly engineer-approved equal
  - 2. Submersible motor
    - a. Submit manufacturer's catalog information illustrating materials of construction and installed dimensions.
    - b. Submit motor performance curve for amperage, speed, and efficiency as a function of output horsepower.
    - c. Submit calculations or test data showing thrust-bearing capacity.
  - 3. Submersible pump cable

- a. Submit manufacturer's catalog information illustrating materials of construction.
    - b. Submit calculations demonstrating voltage drop under in-rush loading with cross-the-line starting.
    - c. Submit materials and methods for splicing cable to motor terminals.
  - 4. Column pipe: Submit manufacturer's catalog information on pipe materials and fittings. Submit mill test certificates indicating physical and chemical analysis.
  - 5. Column check valve: Submit manufacturer's catalog information with valve data and ratings for each service.
  - 6. Submit manufacturer's catalog information for related products as specified in related sections.
- B. Shop Drawings
- 1. Submersible pump: Provide shop drawings that illustrate the connection to the column pipe, as well as assembly of the submersible pump, motor, and pump cable.
  - 2. Check and flow control valve and control lines: Provide shop drawings that illustrate the connection to the column pipe.
  - 3. Surface plate and discharge head: Provide shop drawings that illustrate penetration of surface plate with electrical cable and flow control valve control lines.

#### M6.04 CLOSEOUT SUBMITTALS

- A. Quality assurance testing: Submit the results of field startup testing.
- B. Operation and maintenance data: Submit spare parts lists and maintenance procedures in accordance with Submittals.

#### M6.05 DELIVERY, STORAGE, AND HANDLING

- A. Packaging of Equipment: Assemble equipment in factory to largest practical components to ensure proper fit, and mark parts for shipment and assembly accordingly. Equipment and parts shall be suitably protected to ensure against breakage or damage in transit.
- B. Receiving: Equipment will be examined by the Contractor and Owner upon delivery and, if found to be in satisfactory condition, will be unloaded by the Contractor. The field examination is only for the purpose of determining apparent damage in transit. Contractor shall be responsible for storage of the equipment delivered until it is installed. Care shall be taken in handling manufacturer pre-lubricated components to avoid inadvertent loss of fluids.

#### M6.06 QUALITY ASSURANCE

- A. Field testing
  - 1. Following installation of the submersible pump and motor, field testing shall be conducted in accordance with AWWA E102.

2. Field testing shall confirm operation of motor protection features and coordination with motor control center and remote OmniSite (Auto Dialer) system.
3. A manufacturer's representative shall conduct field testing to verify proper operation of the FCV and submersible pump and to provide training upon installation.
4. Costs for field visits by the manufacturer's representatives shall be considered incidental to the Work and no separate payment will be made.

B. Perform Work in accordance with drawings and specifications.

#### M6.07 WARRANTY

- A. Furnish minimum 1-year manufacturer warranty for all materials after Water Plant start up.

#### M6.08 SUBMERSIBLE PUMP

- A. Manufacturers:
1. Grundfos
  2. Peerless
  3. Or Engineer-approved equal.
- B. Submersible pump shall meet the following performance criteria.
1. Design capacity [GPM]: 400
  2. TDH at Design Flow [ft]: 476
  3. Minimum TDH point (ft) 300
  4. Minimum pump efficiency at design point (percent): 70
- C. Pump for water supply well shall be equipped with variable frequency motor drivers (VFDs).
- D. Materials of construction:
1. Submersible multistage type, complete with motor, power cable, power cable terminus to motor, transition pieces at pump discharge, column pipe, and appurtenances. Pump bowl diameter and number of stages subject to approval by Engineer
  2. The pump bowls shall be stainless steel or close-grained cast iron. The impellers shall be bronze enclosed type or stainless steel fastened to the stainless steel shaft by stainless steel collets or stainless steel keys. Carbon or mild steel will not be permitted in the pump.
  3. Finished bowls shall be capable of withstanding a hydrostatic pressure equal to twice the head at rated capacity or 2.0 times the shutoff head, whichever is greater.
  4. Impellers are to be standard product of the pump manufacturers and not contain special workmanship, materials, thinned veins, or other modifications to temporarily increase efficiency.
  5. Intake screen shall be Type 316 stainless steel



#### M6.09 SUBMERSIBLE MOTOR

- A. Manufacturers:
  - 1. Grundfos
  - 2. Hitachi
  - 3. Or Engineer-approved equal
- B. Submersible motor: Horsepower as required to meet operating points specified, with a motor rating that is not exceeded at any point on the pump performance curve, three-phase 460-Volt 60 Hz electrical power supply, designed to operate at 3,450 revolutions per minute (rpm), compatible with the supplied VFD.
- C. Protection:
  - 1. Motor shall be provided with resistance temperature detectors (RTDs) for winding and bearing over-temperature detection.
  - 2. Motor shall be provided with integral moisture detection switch to indicate seal failure.
  - 3. RTDs and moisture switch shall be provided with cable suitable for submerged installation.
- D. Materials of construction:
  - 1. Electric motor shall be of the submersible type suitable for continuous underwater operation. Motor shall conform to the design, construction, and performance of the latest NEMA Motor Standards and have a minimum service factor of 1.15.
  - 2. Motor frame: S52 steel or Engineer-approved equal.

#### M6.10 SUBMERSIBLE PUMP CABLE

- A. Provide cable of not less than the rating indicated and of appropriate size and construction to meet the service intended. Power cable shall be sized to provide for no more than a 3 percent voltage drop under in-rush loading with across-the-line starting.
- B. Power cable assembly shall be furnished in the proper length to extend from the motor terminals to the terminal points at the motor control center. The power cable assembly design shall include a sealing terminal plug arrangement or other approved method.
- C. Materials of construction:
  - 1. Conductors: Annealed flexible stranded tin coated copper in accordance with ASTM B 172 and ICEA S-75-381.
  - 2. Conductor shielding: Semiconducting layer over the conductor.
  - 3. Grounding conductor: Annealed tin coated copper as per Table 3-21 of ICEA S-75-381.
  - 4. Insulation: Ethylene-propylene rubber (EPR). 5. Jacket: Neoprene, type extra heavy duty in accordance with Paragraph 3.21 of ICEA S-75-3581.

#### M6.11 COLUMN PIPE

- A. Materials of construction:
  - 1. Column pipe shall be epoxy-coated steel pipe conforming to ASTM A53, Class B
  - 2. Column shall be Schedule 40, with 0.28 in or greater wall thickness and connected with threaded cast steel couplings. Long couplings having 8 round threads per inch shall be used. Pipe lengths shall be approximately 20 feet to facilitate installation and future well maintenance activities.
  - 3. Column pipe shall be nominal 6-inch-diameter (internal diameter) with total length as indicated on the Drawings.
  - 4. Column connections shall allow for sufficient clearance for submersible motor cable and protection and level transducer carrier pipe within the well inner diameter.
  - 5. A stainless steel or bronze (compatible with stainless steel only) swage nipple shall be used to connect the column pipe to the pump fitting.
  - 6. Apply anti-seize or other manufacturer-recommended measures to prevent galling

#### M6.12 FOOT VALVE/CHECK VALVE

- A. Manufacturers:
  - 1. Stainless steel foot valves shall be by Flomatic Corporation or approved equal.
  - 2. Iron body foot valves shall be by Pratt or approved equal.
- B. Foot/check valve shall be full-flow globe style, with a positive seat, allowing flow only in one direction (upward flow).
- C. Materials of construction:
  - 1. Valve body shall be fusion bonded-epoxy coated ductile iron (ASTM A-536), with stainless steel trim and internals. Disc shall be Type 304 Stainless Steel and spring shall be Type 316 Stainless Steel. Alternatively, the valve can be all Type 316 Stainless Steel.
  - 2. Seal shall be as required ensure positive seating at all pressures. Seal shall be Viton or EPDM.
  - 3. Bolts shall be Type 316 stainless steel.

#### M6.13 SUBMERSIBLE LEVEL TRANSDUCER

- A. A submersible level transducer shall be provided and installed in a carrier pipe and supported to the column pipe as detailed on the Drawings, specified herein, and as recommended by pump and level transducer manufacturers.
- B. Type: Submersible, hydrostatic pressure type level transmitter.
- C. Specifications for the submersible level transducer shall be as shown on plans or Engineer-approved equal.

#### M6.14 SURFACE PLATE AND DISCHARGE HEAD

- A. Surface plate or top flange:
  - 1. Sized to accommodate well casing and column pipe diameters as shown on the Drawings
  - 2. Support the total weight of the pump, motor, and column pipe when filled with water.
  - 3. Provide lifting lugs on the top flange or discharge elbow to facilitate pump removal.
  - 4. Includes the following access ports:
    - a. 1.25" port with grommit, sized to accommodate the electrical wiring for the submersible pump.
    - b. 1" inner diameter access port for pressure transducer access into the inner casing of the well via carrier pipe.
    - c. 1" inner diameter general access port with plug lid cover, to be used for additional water level measurements.
- B. Discharge head: Long radius, 90-degree elbow with 150-pound flange having an outlet size equal to that of the aboveground discharge piping as indicated on the drawings.
- C. Sanitary seal: Provide between the surface plate and well casing flange as indicated on the drawings.

#### M6.15 INSTALLATION

- A. Install submersible pumps and appurtenances complete in place to provide for a fully functioning injection well with backwash capacity. Install pump and motor in accordance with manufacturer's written instructions.
- B. Installation depth shall be confirmed by the Engineer prior to installation of equipment associated with the submersible pump. Preliminary pump installation depth shall be 474 feet below the flange for the Casing Pipe at Elevation of 492.00' as shown on Sheet CM-01 of the plans.
- C. Pump Installation:
  - 1. Prior to installation, the connected pump assembly shall be checked for water tightness. All hydrostatic tests shall have been already provided.
  - 2. The installation of the pumping unit shall comply with AWWA E101, Vertical Turbine Pumps, Line Shafts and Submersible Types and AWWA E102 Submersible Vertical Turbine Pumps using installation equipment to ensure a proper installation without damaging the pump or any accessory items. Pumping unit installation shall comply with any applicable State Health Requirements.
  - 3. Prior to installation of pumping equipment, Contractor to ensure pump outside diameter is at least 0.78 inch less than the inside diameter of the well casing to the pump installation depth.
- D. Submersible pump cable and carrier pipe for the submersible level transducer:

1. Supported on the column pipe by means of cable clamps and stainless-steel bands. Cable clamps shall be suitable for continuous submergence and carry an NSF seal if not stainless steel. Place cable clamps every 20 feet, minimum.
  2. No submerged splices are allowed for the pump cable except where the cable attaches to the motor terminals.
  3. All cable fittings, terminals, and approved splices shall be watertight at the pressure encountered in use.
  4. Motor power and protection cables shall be terminated at terminal boxes at the wellhead, and separate cables shall be installed up to the motor control center.
- E. Column check valve: The specified check valve shall be installed 5 feet above the pump in accordance with manufacture recommendations.
- F. Surface plate: Install per ASME standard B16.5 Class 150 installation instructions and as indicated on the drawings.

**M6.16 FIELD QUALITY CONTROL**

- A. Disinfect piping and assembly in accordance with Section G11 and per AWWA C651-14 and C653-13, as well as in strict accordance with manufacturer's instructions, as certain materials may not be compatible with high doses of chlorine for long periods. Contractor shall submit pump disinfection plan to manufacturer and Engineer for approval.

**M6.17 DISINFECTION**

- A. Contractor to coordinate field quality control with submersible pump manufacturer's representative for items specified in this section. Manufacturer's representative shall certify installation was completed in accordance with manufacturer's installation instructions and the Contract Documents prior to operation.

**M6.18 MEASUREMENT AND PAYEMENT**

- B. Payment will be measured and paid for as provided for in the Proposal and Bid Schedule.

**END OF SECTION**

# GEOTECHNICAL INVESTIGATION

Levi WSC Well Number 4

Lorena, Texas

LE Project No. W24-045



## Report Prepared For:

KPA Engineers  
Temple, Texas

## Report Prepared By:



Jakob S. Elmschaeuser  
Graduate Engineer



August 5, 2024

## Report Reviewed By:



Scott M. Langerman, P.E.  
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# **GEOTECHNICAL INVESTIGATION LEVI WSC WELL NUMBER 4 LORENA, TEXAS**

## **1.0 INTRODUCTION**

**Purpose:** The purpose of this geotechnical investigation is to provide geotechnical design and construction criteria for a new Pump Station and Ground Storage Tank (GST). Geotechnical data and recommendations are provided in a brief, and hopefully user-friendly manner.

**Authorization:** Services were performed in general accordance with LE Proposal No. GEO23-094, dated July 10, 2023. Authorization to proceed was provided by Ms. Ginger Tolbert, P.E. on May 2, 2024.

## **2.0 SUBSURFACE EXPLORATION**

**Drilling Date:** July 2, 2024. We experienced significant delays in drilling due to excessive rains in April, May, and early June. Much of the site was continuously wet during that time period, and made access for our drilling equipment impractical.

**Boring Layout:** Boring locations were staked in the field by Langerman Engineering personnel based on information provided by KPA Engineers. Plates 1 and 2 show the approximate boring locations.

If precise location and elevation data are desired, then a licensed professional land surveyor should be retained to locate the borings and determine the ground surface elevations.

**Sampling Methods:** Push-tubes were used to sample the soils.

### 3.0 LABORATORY TESTS

Test Procedures: The following tests were conducted in general conformance with the standards noted in Table 3.1.

| TABLE 3.1: LABORATORY TESTS   |                    |
|-------------------------------|--------------------|
| <i>Test Name</i>              | <i>Test Method</i> |
| Atterberg Limits              | ASTM D 4318        |
| -#200 Mesh Sieve              | ASTM D 1140        |
| Moisture Content              | ASTM D 2216        |
| Soil Classification           | ASTM D 2487        |
| Unconfined Compression (clay) | ASTM D 2166        |

Test Results: Laboratory test results are shown in the Appendix, and selected test results on the boring logs.

#### 4.0 SUBSURFACE MATERIALS AND SITE OBSERVATIONS

**Stratigraphy:** Major strata types are listed in Table 4.1 for the borings. Individual boring logs are contained in the Appendix. Material descriptions are general and range of depths approximate because boundaries between different strata are seldom clear and abrupt in the field.

| TABLE 4.1: MAJOR STRATA TYPES                                                |                                    |                                     |                                                                                   |
|------------------------------------------------------------------------------|------------------------------------|-------------------------------------|-----------------------------------------------------------------------------------|
| <i>Strata</i>                                                                | <i>Depth to Top of Strata (ft)</i> | <i>Depth to Base of Strata (ft)</i> | <i>General Description</i>                                                        |
| I                                                                            | 0                                  | 20                                  | FAT CLAY AND SANDY LEAN CLAY; dark brown, brown, and tan, with gravel, calcareous |
| Strata changes are approximate, and in-situ transitions are usually gradual. |                                    |                                     |                                                                                   |

**Geology:** Based on the available geologic map<sup>1</sup> of the area, and the contents of the borings, the site is located within the *Taylor Formation*.

The Taylor Formation consists of montmorillonitic clays that were deposited in a shallow marine environment. After deposition, the clays consolidated to form a weak rock-like shale material when sufficient amounts of calcium carbonate were present as a cementing agent. This soft rock-like material is usually gray to dark gray in the unweathered state. Subsequent weathering produced highly expansive clay soils that were present in our borings.

**Groundwater:** Borings B-1 and B-2 were both drilled to a depth of 20 feet using dry drilling methods, meaning that water was not used in the drilling process. In Boring B-1, groundwater was encountered at an initial depth of 4 feet. After a 10-minute observation period, groundwater was observed at a depth of 4.6 feet. Groundwater was not observed in Boring B-2.

The borings were drilled during an extended period of rainfall, which likely influenced the groundwater readings. Transient and sometimes permanent groundwater is common in this area, and may be present during construction at depth. The water tends to percolate down through the surficial soils until encountering a relatively impervious layer, and then either flow down gradient or become trapped.

The water observations conducted for this investigation are short-term and should not be interpreted as a groundwater study. However, the presence of groundwater will affect construction and long-term performance of the proposed foundations.



## 5.0 GEOTECHNICAL FOUNDATION RECOMMENDATIONS

**Project Summary:** The project consists of a new Pump Station and Ground Storage Tank. We understand that the ground storage tank will have a diameter of approximately 25 feet.

**Expansive Soil:** Clay soils in the Central Texas area are subject to expansive soil movements, which include swelling under moist conditions and shrinking under dry conditions. Moisture fluctuations occur due to seasonal wet and dry cycles, but are also influenced after construction by site grading, drainage, landscaping, and groundwater. Actual soil movement is difficult to determine due to the many unpredictable variables involved.

TxDOT uses the Potential Vertical Rise (PVR) procedure to estimate soil movements. For purposes of this project, the results of the laboratory tests, engineering judgment, and experience have also been considered. ***The approximate PVR value is listed in Table 5.1 for the Borings.***

| TABLE 5.1: POTENTIAL VERTICAL RISE |                              |
|------------------------------------|------------------------------|
| <i>Boring</i>                      | <i>PVR at Existing Grade</i> |
| B-1                                | 3 inches                     |
| B-2                                | 4 inches                     |
| The PVR Estimates are approximate  |                              |

*In the above table, the PVR estimates are relative to the existing ground surface.*

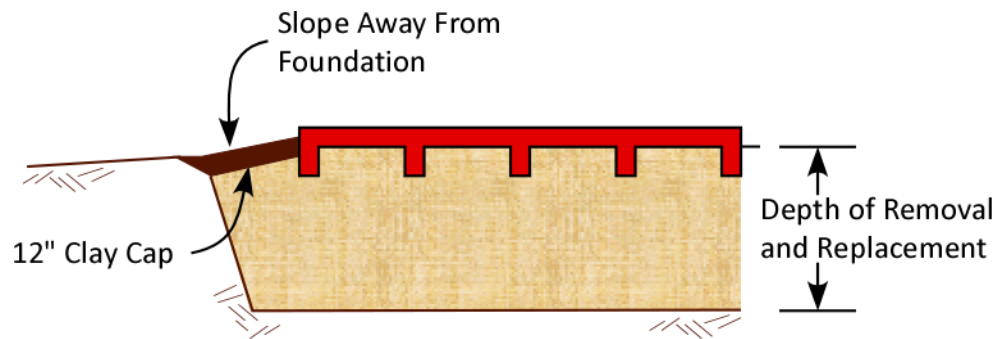
Actual soil movements will depend on the subsurface moisture fluctuations over the life of the structure. Soil movements may be less than those calculated if moisture variations are minimized after construction. However, significantly larger soil movements than estimated could occur due to inadequate site grading, poor drainage, ponding of rainfall, and/or leaking utilities.

**Foundation Type:** Based on the types of soils encountered in the borings, as well as our understanding of the project, we anticipate the Pump Station will be constructed using a stiffened slab on grade. We anticipate that a ringwall or mat foundation will be used for support for the Ground Storage Tank.

**Pump Station: Use a Stiffened Slab on Grade in conjunction with Remove and Replace.** This option consists of using a stiffened slab on grade in conjunction with removal and replacement of a portion of the existing expansive clay soils with select fill, as shown in Table 5.2.

**Ground Storage Tank: Use a Mat Slab or Ringwall on Grade in conjunction with Remove and Replace.** This option consists of using a Mat Slab on Grade in conjunction with removal and replacement of the native expansive clay soils with select fill and structural fill.

## PUMP STATION: STIFFENED SLAB ON GRADE



**Figure 5.1: Slab Foundation Sketch (not to scale)**

**Risk:** A properly designed and constructed stiffened slab on grade will offer a low to moderate amount of risk of future foundation movements, depending on the depth of removal and replacement of native soils. The adverse movements will occur as a result of shrinking and swelling of the expansive clay soils, which may result in cracking and differential movement of the slab.

Elements outside of the foundation such as flatwork, drainage features, plazas, and utilities will experience adverse movements as a result of shrinking and swelling of the expansive clay soils, which may result in cracking and differential movements.

Rigid architectural features such as masonry, stucco, CMU block walls and floor tiles often do not perform well on expansive clay soils. Allowances for differential movement including frequent movement joints will be required to reduce architectural cracking. A properly designed slab may perform satisfactorily from a structural standpoint but still experience architectural cracking.

**Bearing Stratum:** Select Fill

**Bearing Pressure:** An allowable bearing pressure of 2,000 psf can be used for Select Fill. Footings and/or grade beams should bear at a depth of at least 24 inches below the final ground surface.

**Stiffened Slab:** The Wire Reinforcement Institute has a published design procedure for slabs on expansive soils (WRI TF 700-R-07). The method utilizes an effective PI of the subsurface soils and a Regional Climatic Index of  $C_w=18$  for Lorena. The effective PI is 21.

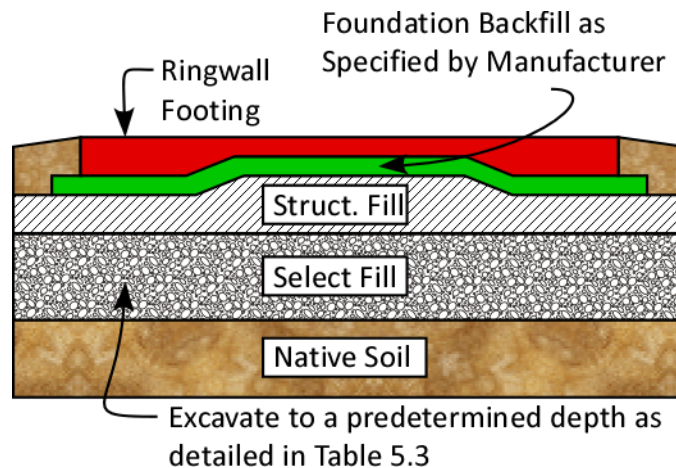
PVR Reduction: Table 5.2 is a summary of various removal and replacement depths. We recommend that at least 6 feet of the existing expansive clay soils be removed and replaced below the Pump Station. Additional removal and replacement will be beneficial; however, we believe that below a depth of 6 feet the select fill will act as a block to yield *differential* movements of roughly 1 inch. Total potential movements in the ranges listed below are still possible.

| <b>TABLE 5.2: SUBGRADE REMOVAL AND REPLACEMENT OPTIONS</b>                                                                                |                                                |                            |
|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|----------------------------|
| <b><i>Depth of Removal and Replacement (feet)</i></b>                                                                                     | <b><i>Potential Vertical Rise (inches)</i></b> | <b><i>Effective PI</i></b> |
| 6                                                                                                                                         | 2                                              | 28                         |
| 8                                                                                                                                         | 1½                                             | 25                         |
| 10                                                                                                                                        | 1                                              | 21                         |
| Note: The PVR movements listed above are approximations. Actual movements will vary depending on site grading, drainage, and maintenance. |                                                |                            |

Select fill soil must extend a minimum horizontal distance of 2 feet beyond the foundation perimeter. A modulus of subgrade reaction of 150 kcf may be used. Carton forms below the grade beams are not necessary.

*If groundwater seepage is present at the excavation level, then a temporary sump will likely be needed in conjunction with sloping the base of the excavation to a low point. Subgrade improvement as discussed on Page 13 may be needed as well.*

## GROUND STORAGE TANK: MAT SLAB OR RINGWALL ON GRADE



**Figure 5.2: Ground Storage Tank Sketch (not to scale)**

|                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Risk:             | A properly designed and constructed Mat Slab or Ringwall on Grade will offer a low to moderate amount of risk of future foundation movements. Construction of a Mat Slab or Ringwall on Grade must be used in conjunction with removal and replacement of the native highly expansive clay soils with select fill and drainage rock.                                                                                                                                           |
| Bearing Stratum:  | Structural Fill                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| Bearing Pressure: | An allowable bearing pressure of 3,000 psf may be used for a mat foundation supported in Structural Fill.                                                                                                                                                                                                                                                                                                                                                                      |
| PVR Reduction:    | Table 5.3 is a summary of various removal and replacement depths. We recommend that at least 6 feet of the existing expansive clay soils be removed and replaced below the Ground Storage Tank. Additional removal and replacement will be beneficial; however, we believe that below a depth of 6 feet the select fill will act as a block to yield <i>differential</i> movements of roughly 1 inch. Total potential movements in the ranges listed below are still possible. |
| Interior Slab:    | Use Select Fill to replace the excavated soils from the bottom of the excavation up to a depth of 2 feet below the ground storage tank. Structural Fill must be used in the top 2 feet of the pad to support the ground storage tank. Select Fill and Structural Fill specifications are contained in Section 6 of this report.                                                                                                                                                |

| <b>TABLE 5.3: SUBGRADE REMOVAL AND REPLACEMENT OPTIONS</b>                                                                                |                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| <b><i>Depth of Removal and Replacement (feet)</i></b>                                                                                     | <b><i>Potential Vertical Rise (inches)</i></b> |
| 6                                                                                                                                         | 2                                              |
| 8                                                                                                                                         | 1½                                             |
| 12                                                                                                                                        | 1                                              |
| Note: The PVR movements listed above are approximations. Actual movements will vary depending on site grading, drainage, and maintenance. |                                                |

Select fill must extend a minimum horizontal distance of 2 feet beyond the tank perimeter. A modulus of subgrade reaction of 150 kcf may be used.

*If groundwater seepage is present at the excavation level, then a temporary sump may be needed in conjunction with sloping the base of the excavation to a low point. Subgrade improvement as discussed on Page 13 may be needed as well.*

**Settlement:** The depth of the removal and replacement results in an increased potential for settlement in the select fill and structural fill under the ground storage tank. We recommend using an increased compaction effort during construction to reduce this risk, which is included in the material specifications in Section 6.

Additionally, once placement of Select Fill and Structural Fill is completed, we recommend a delay period of 2 to 3 weeks to allow initial settlement to occur before construction of the mat begins.

**Pre-stressed Tanks:** If a pre-stressed tank is used, then specifications for drainage rock between the top of the select fill and the bottom of the tank must be incorporated into the design "... when the subgrade materials do not allow free drainage"<sup>2</sup>. Specifications for ACI 372R-032 are listed below.

The gradation of the base material should be selected to permit free drainage without the loss of fines or intermixing with subgrade material. This objective is typically achieved by limiting the amount of material that passes the No. 200 (75  $\mu$ m) sieve to a maximum of 8% by weight of the total base material. If a suitable base material is unavailable, a geotextile fabric should be placed between the subgrade and base material. Base material should be compacted to 95% of the maximum laboratory density determined by ASTM D 1557. The field tests for measurement of in-placed density should be in conformance with ASTM D1556 or D2922. If the base material is cohesionless, the relative density should be measured in accordance with ASTM D4253 and D4254. A relative density of 70 to 75% is normally desirable. Alternatively, if the base layer is relatively thin (8 in. or less), ASTM compaction and density tests can be replaced by compaction performance criteria in which the maximum lift, number of passes in each direction, type, and weight of equipment are specified. Surface elevation of the base material should be +0 to  $-\frac{1}{2}$  in. over the entire floor area. All transitions in elevations should be smooth and gradual, varying no more than  $\frac{1}{4}$  in. per 10 ft.

## MISCELLANEOUS DESIGN ITEMS

Excavations: The following paragraphs contain general comments regarding below grade excavations. Excavation characteristics, design of temporary support systems, and dewatering methods are the sole responsibility of the contractor. Accordingly, the following statements should be regarded only as opinions.

Clay soils are present within the anticipated excavation depths, and can be excavated with conventional earth moving equipment.

The design of temporary excavation support systems, trench safety systems, and slope stability for temporary open cut excavations were excluded from our scope of services. The contractor is solely responsible for designing and constructing stable, temporary excavations and must shore, slope or bench the sides of the excavations as required to maintain stability of both the excavation sides and bottom. All excavations must comply with applicable local, state, and federal safety regulations including current OSHA Excavation and Trench Safety Standards. Construction site safety is generally the sole responsibility of the contractor, who shall also be responsible for the means, methods, and sequencing of construction operations. We are providing information in this report solely as a service to our client. Under no circumstances should the provided information be interpreted to mean that LE is assuming responsibility for construction site safety or the contractor's activities; such responsibility is not being implied and must not be inferred.

In no case should slope height, slope inclination, or excavation depth, including utility trench excavation depth, exceed those specified in local, state, and federal safety regulations. Specifically, the current OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926 must be followed. The contractor's "responsible person" as defined in 29 CFR Part 1926, must evaluate the materials exposed in the excavations as part of the contractor's safety procedures. If an excavation, including a trench, is extended to a depth of more than twenty (20) feet, it will be necessary to have the side slopes designed by a professional engineer licensed in the State of Texas.

The contractor's "responsible person" must establish a minimum lateral distance from the crest of the slope for vehicles, spoil piles, or other surcharge loads. Likewise, the contractor's "responsible person" shall establish protective measures for exposed slope faces.



The contractor must include the proximity to adjacent features when planning their method of excavation and support. These features include, but are not limited to, adjacent structures and utility lines. The contractor must also be prepared to manage varying amounts of subsurface water. Dewatering quantities will depend on drainage features, any groundwater, and rainfall prior to and during construction.

We have been requested to provide OSHA soil types. The predominant strata observed in the borings drilled for this investigation have been classified according to the system provided in Appendix A to Subpart P of 29 CFR Part 1926. Based on that classification system, and the results of our field and laboratory tests, the predominant strata have the classifications listed in Table 5.4.

Retention systems must be designed by a professional engineer licensed in the State of Texas with experience in designing such systems.

| <b>TABLE 5.4: OSHA SOIL CLASSIFICATIONS</b>                                                                                                                                                                                              |                                     |                                              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------|
| <i>General Description</i>                                                                                                                                                                                                               | <i>OSHA Soil Type<sup>(1)</sup></i> | <i>Maximum Allowable Slope<sup>(2)</sup></i> |
| CLAY                                                                                                                                                                                                                                     | B                                   | 1 (H) : 1 (V)                                |
| <sup>(1)</sup> All soil that is submerged or soil from which water is freely seeping is classified as Type C, which has a maximum allowable slope of 1.5 (H) : 1 (V).<br><sup>(2)</sup> Only for excavations less than 20 feet in depth. |                                     |                                              |

**Flatwork:** This site is on highly expansive soils. The recommendations provided in this report primarily address the foundations. Be aware that concrete flatwork, such as sidewalks, driveways, and equipment pads will be subject to soil movements. The owner should be prepared to repair and even replace these items over time, depending on the magnitude of movement that actually occurs. As well, where the ground is intentionally sloped and graded to provide drainage, the ground may swell and shrink sufficiently over time to reverse the intended drainage, which must be remediated when necessary.

**Seismic:** For structural designs based upon the 2018 IBC, the following criteria will apply. The Site Class is D. The Mapped Spectral Response Acceleration at short periods (SS) is about 0.08g, and the Mapped Spectral Response Acceleration at a 1 second period (S1) is about 0.04g. Site Coefficients are as follows: Fa= 1.6 and Fv= 2.4.

Hazards associated with slope stability, soil liquefaction, surface rupture, and lateral spreading are not considered an issue with this site due to the study area being in a seismically inactive area.

**Vapor Barriers:** The need for vapor barriers, and where to place them, must be determined by the architect or structural engineer based on the proposed floor treatment, building function, concrete properties, placement techniques, and the construction schedule. When moisture barriers are used, precautions should be taken during the initial floor slab concrete curing period to reduce differential curing and possible curling of the slabs.

**Subgrade Improvement:** Some of the onsite soils may be subject to pumping of the subgrade, and we should be contacted if this situation occurs. Clean crushed stone may be placed at the base of the excavations to create a firm working surface where needed and/or specified. We expect that a layer of about 6 to 8 inches in thickness will be needed if soft and/or wet subgrade conditions are present, but field conditions may dictate an increased thickness. If more than about 10 inches is needed, then a filter fabric may be needed to avoid migration of fines.

The crushed stone must be clean, and should generally range in size from 3 to 6 inches. Compaction specifications do not apply; however, the stone should be placed in such a manner that will stabilize the bottom of the excavations. This type of clean stone is normally used to stabilize construction entrances, and should be readily available. Be aware that plumbing and other features that require trenching will be difficult to install if the trenches extend into the clean stone.

**Utility Connections:** Utilities resting on or within expansive soils are subject to soil movements. Utility connections should account for such movement potential, such as by using flexible connections. Based on our previous experience, clay soils are corrosive to buried metals. Corrosion protection should be provided for such metals.

**Review by MEP:** We recommend that this report be provided to the project Mechanical, Electrical, and Plumbing engineers (MEP's). Their designs should account for the estimated soil movement potential. We are available to help with questions they may have about soil movements.

## **6.0 GEOTECHNICAL CONSTRUCTION RECOMMENDATIONS**

**Site Preparation:** Surficial vegetation, trees, root systems, existing fill, existing utilities, existing foundations, and underground structures must be removed. The stripping depth must be based on field observations with attention given to old drainage areas, uneven topography, and wet soils. If practical, proof-rolling should be used to detect soft spots or pumping subgrade areas. Proof-rolling should be performed using a heavy pneumatic tired roller, loaded dump truck, or similar piece of equipment weighing at least 25 tons.

**Grading:** Grading, landscaping, and drainage pose a significant risk factor for future performance of the foundation systems. Prevention of water ponding around the foundation is critical. We suggest the following general guidelines for perimeter drainage:

1. The finished floor elevation must be elevated from the exterior finished grade to assist in draining the surface water away from the structure.
2. Where possible, extend paved surfaces up to the building line to serve as a barrier to soil moisture evaporation and infiltration. These surfaces must slope away from the building.
3. Outlets for gutter systems must rapidly discharge water away from the foundation.
4. Roots from trees and decorative vegetation remove moisture from soils, which causes soil shrinkage (settlement). Trees should have root blockers near the foundation or be located as far away from the foundation as practical.
5. Sprinkler systems must be properly maintained and over-watering of the soils should be avoided.

**Subgrade:** Where practical, the subgrade soils should be scarified and compacted to at least 95 percent of ASTM D698 (or TEX-113-E) maximum dry density at 0 to +3% of the optimum moisture content. The placement and compaction of fill material must be observed, monitored, and tested by LE on a full-time basis. Proof-rolling may be used in lieu of compaction testing of the subgrade, but will require approval by LE on a case-by-case basis. In most cases, compaction testing will be required.

**Select Fill:** Imported Select Fill should meet the requirements of 2014 TxDOT Item 247, Type A, Grade 3 or better. The select fill material should be compacted to at least 95 percent of ASTM D1557 maximum dry density at 0 to +3% of the optimum moisture content. A maximum compacted lift thickness of six inches must be specified, with each lift tested for compliance prior to the addition of subsequent lifts. The placement and compaction of select fill material must be observed, monitored, and tested by LE on a full-time basis.

The new select fill will be subject to settlement due to the depth. As listed above, we have specified higher-than-normal compaction specifications for the select fill to reduce the potential for settlement. Once placement of select fill is completed, we recommend a delay period of 2 to 3 weeks to allow initial settlement to occur before construction of the mat for the ground storage tank begins. ***We also recommend that the tank be filled to only half capacity for the initial 3 weeks.*** For the pump station slab, a delay is not needed.

**Structural Fill:** Structural Fill should be used in the top 2 feet of the pad below the Ground Storage Tank, and meet the requirements of 2014 TxDOT Item 247, Type A, Grade 1-2 or better. The select fill material should be compacted to at least 95 percent of ASTM D1557 maximum dry density at 0 to +3% of the optimum moisture content. A maximum compacted lift thickness of six inches must be specified, with each lift tested for compliance prior to the addition of subsequent lifts. The placement and compaction of select fill material must be observed, monitored, and tested by LE on a full-time basis.

**Foundation:** Foundation construction recommendations are listed below.

1. The foundation construction must be observed by LE to determine that the proper bearing material has been reached in accordance with the recommendations given herein.
2. Prior to the placement of concrete, water must be removed from the foundation excavations. Prolonged exposure or inundation of the bearing surface with water may result in changes in bearing strength and compressibility characteristics.
3. Concrete must be placed promptly after the excavations are completed, cleaned, and observed.

## **7.0 DESIGN REVIEW AND LIMITATIONS**

**Design Review:** The recommendations contained in this report were based on preliminary site plans and design information provided by the Client. Our recommendations may not be applicable if changes have been made to the original information that formed the basis for this report, and we must be retained to make a determination if changes have been made. We also must be given the opportunity to review construction documents to affirm that our recommendations have been interpreted correctly. We cannot be responsible for misinterpretations if not given the opportunity to review aspects of the project that are based on the contents of this report. A review is considered an additional service.

**Limitations:** This report has been prepared for the exclusive use of our client and their designated project design team. Preparation of the report has been performed using that degree of care and skill ordinarily exercised under similar conditions by reputable geotechnical engineers practicing in the same locality. No warranties, express or implied, are intended or made.

As stated in the attachment “Important Information About Your Geotechnical Engineering Report”, the subsurface conditions are interpreted from samples taken only at the boring locations. During construction, variations will be encountered, and will require interpretation by LE to verify the adequacy of the geotechnical recommendations. Other concerns and limitations are discussed in the attachment.

This investigation did not include environmental testing or evaluations, and does not address whether landfilling operations, as defined by the State of Texas, have occurred on the property. An environmental professional should be retained to address environmental issues.

## **8.0 REFERENCES:**

1. Geologic Atlas of Texas, Waco Sheet, Bureau of Economic Geology, The University of Texas at Austin, Austin, Texas 1970.

## **APPENDIX**

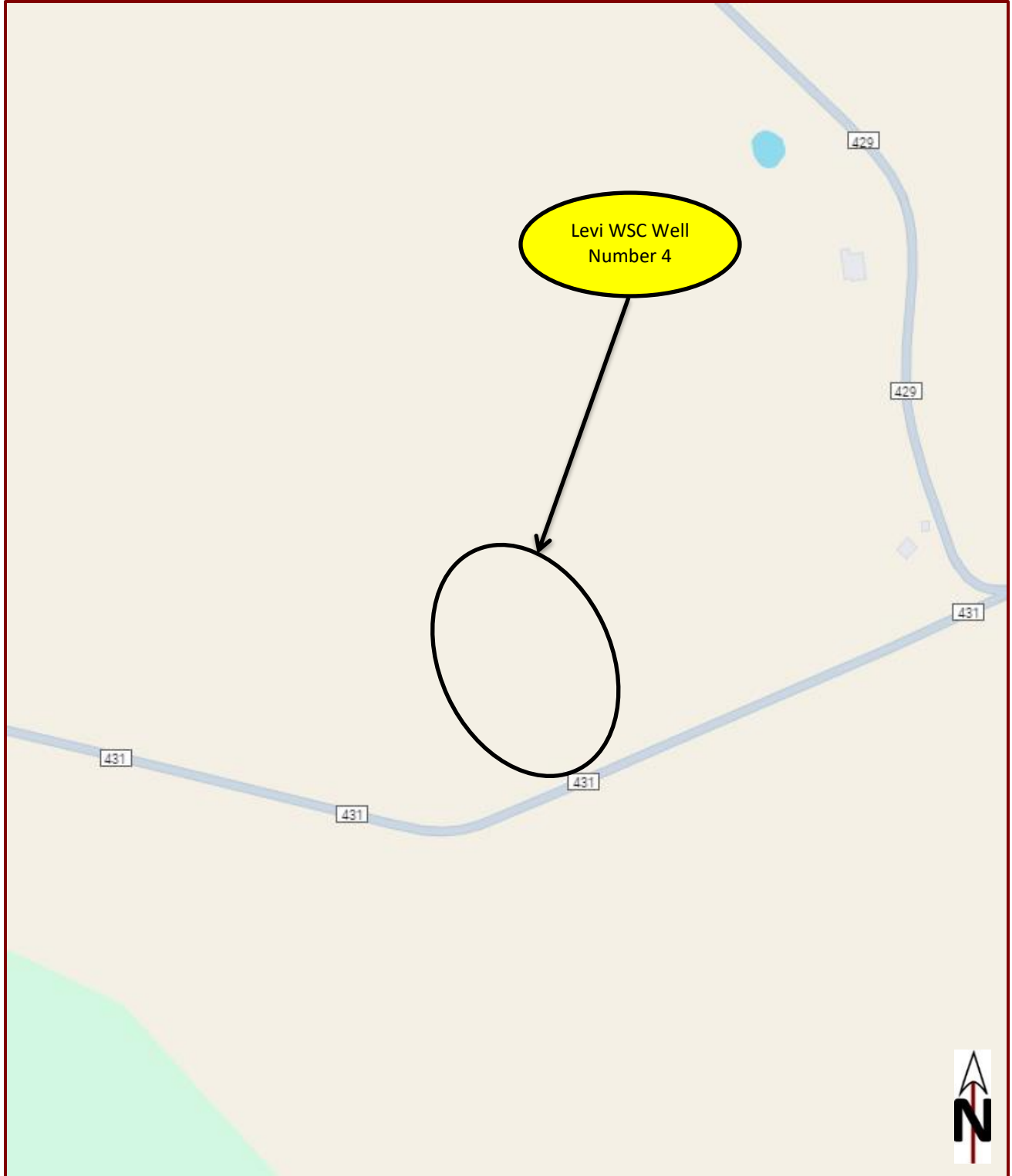
Site Location Map

Boring Location Sketch

Laboratory Test Results

Boring Logs

Important Information about Your Geotechnical Engineering Report



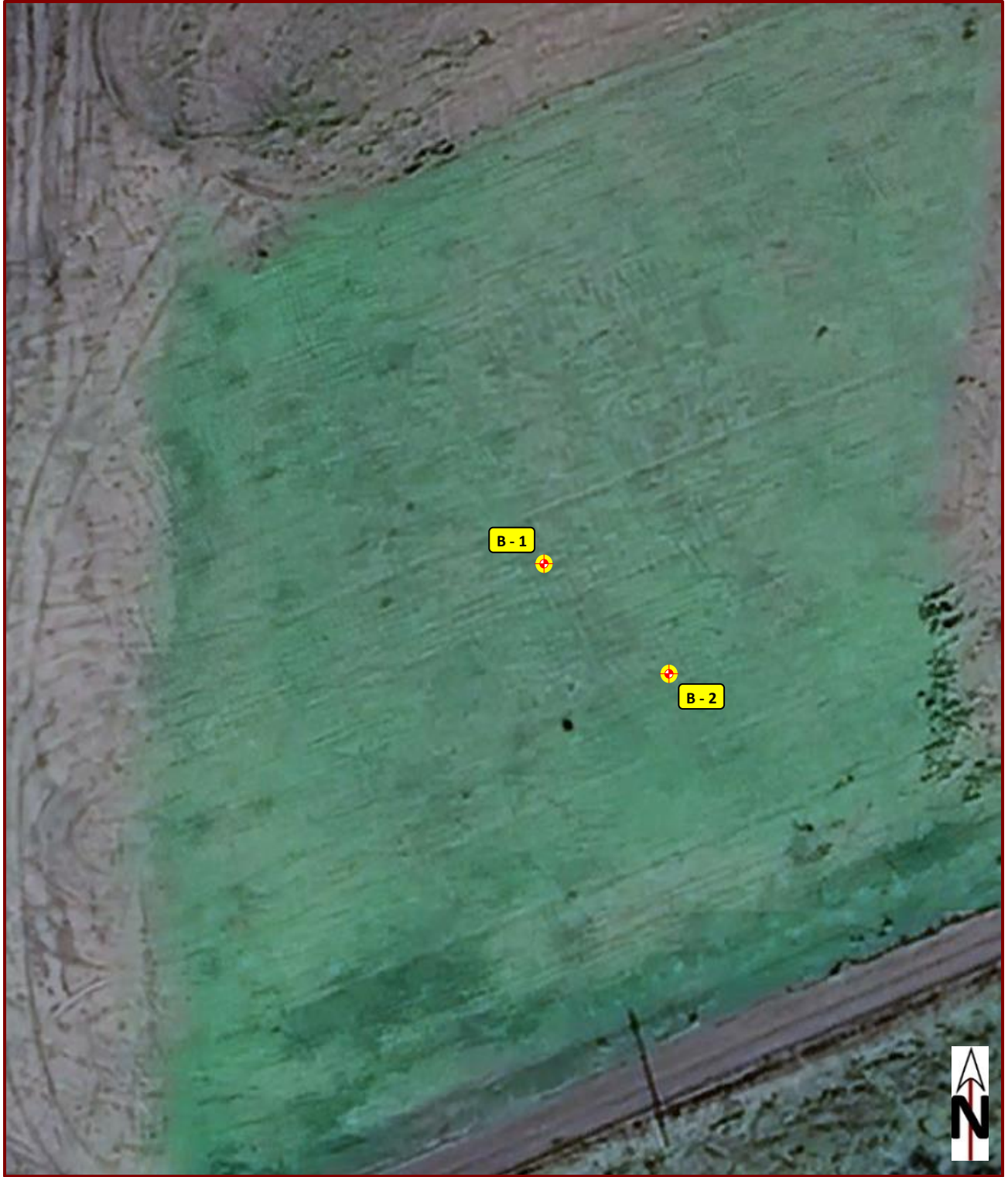
**SITE LOCATION MAP**

LEVI WSC WELL NUMBER 4  
LORENA, TEXAS  
LE PROJECT NO. W24-045

**PLATE**

**1**





**BORING LOCATION MAP**

LEVI WSC WELL NUMBER 4  
LORENA, TEXAS  
LE PROJECT NO. W24-045

**PLATE**

**2**

| Boring No. | Sample Depth (ft.) | Liquid Limit | Plastic Limit | Plasticity Index | Percent Passing No. 200 Sieve | Moisture Content (%) | Unit Dry Weight (pcf) | Unconfined Compressive Strength (tsf) | Strain at Failure (%) |
|------------|--------------------|--------------|---------------|------------------|-------------------------------|----------------------|-----------------------|---------------------------------------|-----------------------|
| B-1        | 2.0 - 4.0          | 52           | 18            | 34               | 80                            | 21                   |                       |                                       |                       |
| B-1        | 4.0 - 6.0          |              |               |                  |                               | 19                   | 98.3                  | 0.6                                   | 9.5                   |
| B-1        | 6.0 - 8.0          | 31           | 15            | 16               | 70                            | 17                   |                       |                                       |                       |
| B-1        | 10.0 - 12.0        | 78           | 24            | 54               | 99                            | 26                   |                       |                                       |                       |
| B-2        | 4.0 - 6.0          | 62           | 22            | 40               | 90                            | 27                   |                       |                                       |                       |
| B-2        | 6.0 - 8.0          |              |               |                  |                               | 16                   | 113.5                 | 3.2                                   | 14.5                  |
| B-2        | 8.0 - 10.0         | 68           | 23            | 45               | 82                            | 23                   |                       |                                       |                       |
| B-2        | 13.0 - 15.0        | 69           | 22            | 47               | 99                            | 25                   |                       |                                       |                       |



**LANGERMAN  
ENGINEERING**

### Summary of Laboratory Results

Project: Levi WSC Well Number 4

Project Number: W24-045





Langerman Engineering  
Waco and Harker Heights (Killeen), Texas  
Ph: 254-235-1048    www.LFECTX.com

# BORING NO. B-1

PAGE 1 OF 1

CLIENT KPA Engineers

PROJECT NAME Levi WSC Well Number 4

PROJECT NUMBER W24-045

PROJECT LOCATION Lorena, TX

| DEPTH<br>(ft) | GRAPHIC<br>LOG | MATERIAL DESCRIPTION             | SAMPLE TYPE | RECOVERY %<br>(RQD) | BLOW<br>COUNTS<br>(N VALUE) | POCKET PEN.<br>(tsf) | ATTERBERG<br>LIMITS |                  |                     | FINES CONTENT<br>(%) | MOISTURE<br>CONTENT (%) | DRY UNIT WT.<br>(pcf) | UNCONFINED<br>COMPRESSIVE<br>STRENGTH (tsf) | STRAIN AT<br>FAILURE (%) |
|---------------|----------------|----------------------------------|-------------|---------------------|-----------------------------|----------------------|---------------------|------------------|---------------------|----------------------|-------------------------|-----------------------|---------------------------------------------|--------------------------|
|               |                |                                  |             |                     |                             |                      | LIQUID<br>LIMIT     | PLASTIC<br>LIMIT | PLASTICITY<br>INDEX |                      |                         |                       |                                             |                          |
| 0             |                |                                  |             |                     |                             |                      |                     |                  |                     |                      |                         |                       |                                             |                          |
|               |                | FAT CLAY; brown, with sand       | ST          |                     |                             | 2.0                  |                     |                  |                     |                      |                         |                       |                                             |                          |
|               |                |                                  | ST          |                     |                             | 4.0                  | 52                  | 18               | 34                  | 80                   | 21                      |                       |                                             |                          |
| 5             |                | SANDY LEAN CLAY; tan, calcareous | ST          |                     |                             | 0.5                  |                     |                  |                     |                      | 19                      | 98                    | 0.6                                         | 9.5                      |
|               |                |                                  | ST          |                     |                             | 0.5                  | 31                  | 15               | 16                  | 70                   | 17                      |                       |                                             |                          |
|               |                |                                  | ST          |                     |                             | 4.5+                 |                     |                  |                     |                      |                         |                       |                                             |                          |
| 10            |                | FAT CLAY; tan                    | ST          |                     |                             | 4.5+                 | 78                  | 24               | 54                  | 99                   | 26                      |                       |                                             |                          |
|               |                |                                  | A           |                     |                             |                      |                     |                  |                     |                      |                         |                       |                                             |                          |
|               |                |                                  | ST          |                     |                             | 4.5+                 |                     |                  |                     |                      |                         |                       |                                             |                          |
| 15            |                |                                  | A           |                     |                             |                      |                     |                  |                     |                      |                         |                       |                                             |                          |
|               |                |                                  | ST          |                     |                             | 4.5+                 |                     |                  |                     |                      |                         |                       |                                             |                          |
| 20            |                |                                  |             |                     |                             |                      |                     |                  |                     |                      |                         |                       |                                             |                          |

Completion Depth: 20 ft.  
Date Started: 7/2/24  
Completed: 7/2/24  
Logged by: T. Jackson

Remarks: Boring was advanced to a depth of 20 feet using dry drilling techniques. Groundwater was observed at a depth of 4 feet. After a 10 minute observation period, groundwater was observed at a depth of 4.6 feet.

LANGERMAN FOSTER - NO ELEVATION - GINT STD US LAB.GDT - 8/5/24 12:18 - Z:\GINT PROJECTS\W24-045, LEVI WSC WELL NUMBER 4.GPJ



Langerman Engineering  
Waco and Harker Heights (Killeen), Texas  
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# BORING NO. B-2

PAGE 1 OF 1

CLIENT KPA Engineers PROJECT NAME Levi WSC Well Number 4  
PROJECT NUMBER W24-045 PROJECT LOCATION Lorena, TX

| DEPTH<br>(ft) | GRAPHIC<br>LOG | MATERIAL DESCRIPTION                   | SAMPLE TYPE | RECOVERY %<br>(RQD) | BLOW<br>COUNTS<br>(N VALUE) | POCKET PEN.<br>(tsf) | ATTERBERG<br>LIMITS |                  |                     | FINES CONTENT<br>(%) | MOISTURE<br>CONTENT (%) | DRY UNIT WT.<br>(pcf) | UNCONFINED<br>COMPRESSIVE<br>STRENGTH (tsf) | STRAIN AT<br>FAILURE (%) |
|---------------|----------------|----------------------------------------|-------------|---------------------|-----------------------------|----------------------|---------------------|------------------|---------------------|----------------------|-------------------------|-----------------------|---------------------------------------------|--------------------------|
|               |                |                                        |             |                     |                             |                      | LIQUID<br>LIMIT     | PLASTIC<br>LIMIT | PLASTICITY<br>INDEX |                      |                         |                       |                                             |                          |
| 0             |                |                                        |             |                     |                             |                      |                     |                  |                     |                      |                         |                       |                                             |                          |
|               |                | FAT CLAY; dark brown                   | ST          |                     |                             | 3.5                  |                     |                  |                     |                      |                         |                       |                                             |                          |
|               |                |                                        | ST          |                     |                             | 1.0                  |                     |                  |                     |                      |                         |                       |                                             |                          |
| 5             |                |                                        | ST          |                     |                             | 2.5                  | 62                  | 22               | 40                  | 90                   | 27                      |                       |                                             |                          |
|               |                |                                        | ST          |                     |                             | 3.0                  |                     |                  |                     |                      | 16                      | 113                   | 3.2                                         | 14.5                     |
|               |                | FAT CLAY; tan, with gravel, calcareous | ST          |                     |                             | 4.5+                 | 68                  | 23               | 45                  | 82                   | 23                      |                       |                                             |                          |
| 10            |                | FAT CLAY; tan                          | ST          |                     |                             | 4.5+                 |                     |                  |                     |                      |                         |                       |                                             |                          |
|               |                |                                        | A           |                     |                             |                      |                     |                  |                     |                      |                         |                       |                                             |                          |
|               |                |                                        | ST          |                     |                             | 4.5+                 | 69                  | 22               | 47                  | 99                   | 25                      |                       |                                             |                          |
| 15            |                |                                        | A           |                     |                             |                      |                     |                  |                     |                      |                         |                       |                                             |                          |
|               |                |                                        | ST          |                     |                             | 4.5                  |                     |                  |                     |                      |                         |                       |                                             |                          |
| 20            |                |                                        |             |                     |                             |                      |                     |                  |                     |                      |                         |                       |                                             |                          |

Completion Depth: 20 ft.  
Date Started: 7/2/24  
Completed: 7/2/24  
Logged by: T. Jackson

Remarks: Boring was advanced to a depth of 20 feet using dry drilling techniques. Groundwater was not observed above that depth.

LANGERMAN FOSTER - NO ELEVATION - GINT STD US LAB.GDT - 8/5/24 12:18 - Z:\GINT PROJECTS\W24-045, LEVI WSC WELL NUMBER 4.GPJ

# Important Information about This Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

**The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.**

## Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

## Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer

will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

*Do not rely on this report if your geotechnical engineer prepared it:*

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.*

## Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

## You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

### Most of the “Findings” Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site’s subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual site-wide subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

### This Report’s Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

### This Report Could Be Misinterpreted

Other design professionals’ misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals’ plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

### Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note*

*conspicuously that you’ve included the material for information purposes only.* To avoid misunderstanding, you may also want to note that “informational purposes” means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

### Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

### Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

### Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, *proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration.* Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. *Geotechnical engineers are not building-envelope or mold specialists.*



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