

Date: **01/18/2019**
RFB No: **2018-082**
Commodity: **Lockwood Lake Oaks Crestwood Sanitary Sewer Improvements Phase 5 Project**
Purchasing Agent: **Mr. Tim Cubos**

Closing Time: 2:00 P.M. CST, Wednesday, January 23, 2019
Opening Time: 2:01 P.M. CST, Wednesday, January 23, 2019

RFB Opening Location: Operations Center, Purchasing Services Office, 1415 N. 4th St., Waco, TX 76707

Addendum No: 1

The above-mentioned RFB invitation has been changed in the following manner. **Sign and return addendum to the Purchasing Office by the closing time and date with your RFB response.** Returning this page signed by your authorized agent will serve to acknowledge this change. All other requirements of the invitation remain unchanged. If you have any questions, please call or stop by the Purchasing Office at the above address.

THE FOLLOWING IS BEING ISSUED AS ADDENDUM NO. 1

The following pages has answers to questions raised, and clarifications to the specifications. Please read, review and note the changes.

Firm: _____

Address _____

Signature of Person
Authorized to Sign Bid: _____

Signor's Name and Title
(Print or type): _____

E-mail Address: _____

Date: _____ Telephone: _____ Fax: _____

SECTION 00 91 13

ADDENDUM 1

Bid Date:	January 23, 2019
Project Name:	Lockwood, Lake Oaks Crestwood Sanitary Sewer Improvements, Phase 5 Project
Project No.:	RFB No. 2018-082 / CWAC1700222
Owner:	City of Waco
Engineer:	CP&Y, Inc.

This addendum forms a part of the Contract Documents and modifies the original Project Manual dated December 2018. Bidder shall acknowledge receipt of this addendum in the space provided below and in the space provided on the Bid Form. Failure to do so may subject Bidder to disqualification.

CLARIFICATIONS:

1. ATTACHED: Pre-Bid Meeting Minutes, dated 1/14/19.
2. Work shall be conducted during daylight hours in accordance with the City of Waco Standard Construction Specifications manual: 7:00 AM to 6:00 PM, Monday through Friday.

CONTRACTOR QUESTIONS:

3. Q: What documentation would be needed to have Henry Pratt approved as a manufacturer for check valves?
A: Henry Pratt is okay for check valves as long as they meet specification 33 31 15, Submersible Wastewater Valves. The specification has been modified to state that check valves shall be weighted level type.
4. Q: What is the voltage for the pinch valve actuators?
A: This does not apply to this project and will be deleted by addendum.
5. Q: The specs and plans differ on the air valves. The specs show the standard style air valve (non anti-shock) but the specs call out Vent-O-Mat which is a stainless steel valve (with specified anti-shock protection). Can you clarify if you want the stainless valve (with anti-shock) in the spec or the regular (non anti-shock) cast iron type valve from the drawings?
A: Standard AR valves will be clarified in the addendum. No anti-shock required.

CHANGES TO PROCUREMENT REQUIREMENTS:

6. REPLACE Bid Proposal Form.
 - a. Line Item 2.04, has been edited to remove the word "Seeding" and now reads Sodding, Fertilizing, Watering & Maintenance within ROW.
 - b. Line Item 4.13, 2632 Lake Oaks Road, etc. has been added to the Base Bid. The remainder of Section 4 has been renumbered. Revised Bid Form is attached to this Addendum.

CHANGES TO TECHNICAL SPECIFICATIONS:

1. REVISE Specification 33 01 30.16 TV Inspection of Sewer Pipelines to include the existing collection system prior to grouting.
2. DELETE Specification 33 05 17.20 Submersible Fiberglass Wet Well.

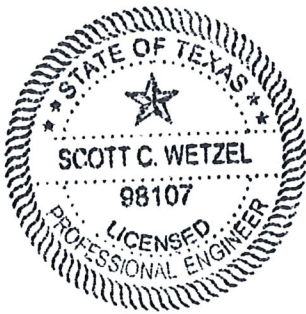
3. REPLACE Specification 33 31 15 Submersible Wastewater Valves.
4. REPLACE Specification 33 32 16. The new specification is Submersible Vortex Wastewater Pumps and all references to non-clog pumps has been removed. Revised specification is attached to this Addendum

Please acknowledge receipt of this Addendum No. 1 by signing below and submitting with the Bid.

Acknowledged: _____

By: _____

Title: _____



A handwritten signature in blue ink, appearing to read "Scott C. Wetzel", written over a horizontal line.

Scott C. Wetzel, PE
CP&Y, Inc.

Crestwood Sewer Pre-Submittal Meeting January 14, 2019

- Introduction
- City of Waco Contracting Comments
- Technical questions raised today will be addressed by addendum if warranted
- Project
 - 4800-5000 block of Lockwood Drive; 2500 block of Lake Air Drive; and, 2500-2600 block of Lake Oaks Road
 - New 8" gravity collection system, submersible lift station and 4" forcemain
- Bid Opening Wednesday, January 23, 2019 at 2:00 PM
- Technical Specifications are minimum requirements – City of Waco specifications apply
 - Submersible Pump Spec is titled at non-clog pumps – that is incorrect – should read vortex pumps. Spec is correct but the title is wrong. Will issue correction in an addendum.
- Construction must be complete (i.e., substantial completion) in 275 calendar days.
 - LD's \$500/day until SC is achieved, following the SC deadline
 - LD's \$250/day after SC is achieved, until FC is achieved
- Permits:
 - All city permits apply: building, electrical, etc.
 - City of Waco will pay for plumbing permits only.
 - Contractor will pay for all other permits, electrical, etc.
 - Contractor is responsible for acquiring all permits.
 - Erosion control plan and SWPPP required
- Utilities:
 - Coordinate with Utility Providers and Owner
 - Utilities shown on the plans are best available information at the time of project design
 - Atmos is replacing their buried steel lines in the project area with new buried PE lines. They are installing their lines behind the curb. We have coordinated with them as best possible to help avoid conflicts with their relocations and our project.
 - Atmos is scheduled to be completed by March 1, 2019
- Demolition
 - The existing 6" collection system/mains is identified to be purged ~~and grouted, plugged~~ and abandoned once the new collection system is operational.
 - The existing collection system is to be TV'd prior to grouting the line.
 - The existing collection system and sewer services shall remain operational until the new collection system is on line and all service connections have been completed.
- Testing – Contractor will be responsible for pressure, vacuum, mandrel, hydrostatic, etc., testing. Owner will be responsible for soils, concrete, asphalt, and materials testing.
- New Utility Construction:
 - Prior to construction starting the Contractor shall attend a public meeting with the neighborhood to help address neighborhood questions and comments.
 - Contractor shall notify each homeowner in the neighborhood before initiating any work on their property. A sample Notification Form is provided in the RFB package.

- All property, public and private, shall be restored to original condition or better. Any ancillary damage committed by the Contractor shall be repaired at no additional cost to the Owner(s).
- One Point of Responsibility for the entire project – the GC is responsible for the entire project and all sub-contractor work.
- The Contractor will receive a copy of all rights-of-entry and resident contact information.
- The work completed on private property for installation and connection of the new residential sewer service line shall be conducted and completed by a licensed professional plumbing contractor who is licensed to do work in the City of Waco.
- All excess excavated materials not suitable for backfill shall be removed from the site and disposed of properly on a daily basis.
- All trenches shall be backfilled and/or covered to allow traffic flow through the project. No streets or driveways shall remain closed during non-construction periods.
- All manholes, wet wells, etc. shall be treated with Conshield or equal.
- Tree limbs in the public ROW (only) may be trimmed pending approval by the City of the Contractor's submittal trimming plan, which must be submitted prior to any work being initiated.
- Bypass pumping of the existing sewer system should not be required as long as the existing collection system remains operational. However, the Contractor is responsible for his own means and methods of construction.
- Shoring/underpinning shall be installed by Contractor as required to protect adjacent streets, embankments, infrastructure, etc.
- Contractor is responsible for boring 4" conduit for electrical service to the Lift Station.
- Street Repairs
 - Pavement – areas requiring mill/overlay or reconstruction are bid as an additive alternate. Base bid for utilities includes trench repair. Deduct is provided for areas with street replacement.
 - All manhole covers and valve box covers shall receive a concrete slab as shown on the plans. This includes new and existing in areas with pavement repair or replacement.
 - Adjustment of valve boxes is subsidiary to the street repair and construction.
- Other
 - Traffic Control Plan(s) will need to be in accordance with "City of Waco Standard Detail T-1".
 - Trench Safety Plan(s) shall be designed and sealed by a licensed PE in the State of Texas.
 - Work shall be conducted during daylight hours which are determined to be 0700 hours (7:00 AM) to 1800 hours (6:00 PM). Work hours may be required to change dependent upon comments received by affected residents.
 - Cleanup and Final Grading
 - Add top soil and final grade to drain
 - Seeding/Sodding required – irrigate as necessary to establish growth
 - Homeowner is responsible for watering sod within their yards once established.

BID PROPOSAL
LOCKWOOD, LAKE OAKS CRESTWOOD SSI PH 5 (S1257)

PRICING INFORMATION

NOTE: Depending on unit prices, requirements and approved budgeted funds, quantities may be reduced or increased during the contract period.

Item No.	Description	Unit	Estimate Quantity	Bid Unit Price	Bid Price
BASE BID					
1.00 GENERAL CONDITIONS					
1.01	Mobilization (Maximum 5% of Base Bid)	LS	1		
1.02	Bonding, Insurance, Permits (including Plumbing, Building, etc.) & Incidentals (Maximum 2.0% of Base Bid)	LS	1		
1.03	Trench Safety Plan	LS	1		
1.04	Trench Safety System Implementation	LF	3345		
1.05	Confined Space Plan	LS	1		
1.06	Confined Space Implementation	LS	1		
1.07	Stormwater Pollution and Prevention Plan	LS	1		
1.08	Stormwater Pollution and Prevention Plan Implementation	LS	1		
1.09	Traffic Control Plan	LS	1		
1.10	Traffic Control Plan Implementation	LS	1		
1.11	Project Sign, including Sign Preparation, Installation, Maintenance, and Removal of a Building Waco Sign in accordance with City Requirements	EA	1		
SUBTOTAL GENERAL CONDITIONS					
2.00 SITE WORK & DEMOLITION (UTILITIES)					
2.01	Class 'A' Surface Replacement / Trench Repair	LF	2070		
2.02	Install 4-inches Temporary Trench Surfacing, Crushed Stone	LF	3345		
2.03	ROW Preparation & Tree/Vegetation Trimming (within street ROW)	STA	34		
2.04	Sodding, Fertilizing, Watering & Maintenance within ROW	LS	1		
2.05	Purge, Plug, Grout and Abandon Existing 6" Sanitary Sewer Mains	LF	3815		
2.06	Remove Existing 6" Exposed (Aerial) Gravity Sewer Mains (3 Loc's)	EA	3		
2.07	Existing Manholes to be Abandoned (removal of top 3-feet of Existing Concrete Manholes & Backfill with Flowable Concrete Fill)	EA	2		
SUBTOTAL SITE WORK & DEMOLITION (UTILITIES)					

BID PROPOSAL
LOCKWOOD, LAKE OAKS CRESTWOOD SSI PH 5 (S1257)

Item No.	Description	Unit	Estimate Quantity	Bid Unit Price	Bid Price
3.00	WASTEWATER GRAVITY MAIN IMPROVEMENTS (WITHIN PUBLIC ROW)				
3.01	8" SDR-26 PVC ASTM D2241 Pipe (0'-10' Trench) Including Excavation, Bedding, Backfill and All Incidentals	LF	579		
3.02	8" SDR-26 PVC ASTM D2241 Pipe (10'-16' Trench) Including Excavation, Bedding, Backfill and All Incidentals	LF	872		
3.03	8" SDR-26 PVC ASTM D2241 Pipe (16'-22' Trench) Including Excavation, Bedding, Backfill and All Incidentals	LF	842		
3.04	5-foot Diameter Standard Manhole & Cover (0'-5' Deep) w/ConShield	EA	8		
3.05	Extra Depth 5-foot Diameter Standard Manhole Over 5-feet Deep	VF	41.59		
3.06	6-foot Diameter Standard Manhole & Cover (0'-5' Deep) w/ConShield	EA	7		
3.07	Extra Depth 6-foot Diameter Standard Manhole Over 5-feet Deep	VF	74.37		
3.08	5-foot Diameter Manhole (0'-5' Deep) w/≤ 8" External Drop Structure, Standard Cover and ConShield	EA	1		
3.09	Extra Depth 5-foot Diameter Manhole w/≤ 8" Drop Structure, Over 5-feet Deep	VF	3.44		
3.10	6-foot Diameter Manhole (0'-5' Deep) w/≤ 8" External Drop Structure, Standard Cover and ConShield	EA	1		
3.11	Extra Depth 6-foot Diameter Manhole w/≤ 8" Drop Structure, Over 5-feet Deep	VF	13.02		
3.12	5-foot Diameter "Doghouse" Manhole (0'-5' Deep) w/Standard Cover and ConShield	EA	1		
3.13	Extra Depth 5-foot Diameter "Doghouse" Manhole, Over 5-feet Deep	VF	1.13		
3.14	5-foot Diameter "Doghouse" Manhole (0'-5' Deep) w/≤ 8" External Drop Structure, Standard Cover and ConShield	EA	1		
3.15	Extra Depth 5-foot Diameter "Doghouse" Manhole w/≤ 8" Drop Structure, Over 5-feet Deep	VF	3.8		
3.16	15" SDR-26 PVC ASTM D2241 Encasement Pipe w/Casing Spacers, End Seals and Concrete Encasement	LF	30		

BID PROPOSAL
LOCKWOOD, LAKE OAKS CRESTWOOD SSI PH 5 (S1257)

Item No.	Description	Unit	Estimate Quantity	Bid Unit Price	Bid Price
3.17	12" x 6" Service Connection at Gravity Main w/6" Sanitary Sewer Service Line and Fittings (SDR 26 PVC ASTM D2241) to ROW, 2-way Cleanout and Connection to 6" Private Service Line, Including all Appurtenances and Incidentals Complete and In Place	EA	1		
3.18	8" x 6" Service Connection at Gravity Main w/6" Sanitary Sewer Service Line and Fittings (SDR 26 PVC ASTM D2241) to ROW, 2-way Cleanout and Connection to 6" Service Line, Including all Appurtenances and Incidentals Complete and In Place	EA	5		
3.19	8" x 4" Service Connection at Gravity Main w/4" Sanitary Sewer Service Line and Fittings (SDR 26 PVC ASTM D2241) to ROW, 2-way Cleanout and Connection to 6" Service Line, Including all Appurtenances and Incidentals Complete and In Place	EA	17		
3.20	Cement Stabilized Trench Backfill for Sewer Mains that Cross Below Water Mains and Has Less Than 9-feet Separation, Complete and In-Place	EA	8		
3.21	Cement Stabilized Backfill Encompassing Manhole (1-foot minimum circumferencing entire manhole), Complete and In-Place	EA	10		
3.22	Trench/Pit Dewatering, including all Pumps, Piping, Valves, Equipment, Materials, Labor, Permits, Detention/Filtration, Maintenance, etc. for a Complete and Operational System	DAY	90		
3.23	Trench Caution Tape/Ribbon	LF	2293		
3.24	Contractor Video and Record New Sanitary Sewer Mains, All Sizes and Depths	LF	2293		
SUBTOTAL WASTEWATER GRAVITY MAIN IMPROVEMENTS (within public ROW)					
4.00 SANITARY SEWER SERVICE LINE IMPROVEMENTS (ON PRIVATE PROPERTY)					
4.01	4820 Lockwood Drive - Construct New 4" (open trench) and New 6" (directional drill) Sanitary Sewer Service Lines (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		

BID PROPOSAL
LOCKWOOD, LAKE OAKS CRESTWOOD SSI PH 5 (S1257)

Item No.	Description	Unit	Estimate Quantity	Bid Unit Price	Bid Price
4.02	4917 Lockwood Drive - Construct New 4" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.03	2509 Lake Oaks Road - Construct New 6" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.04	2517 Lake Oaks Road - Construct New 6" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.05	2525 Lake Oaks Road - Construct New 4" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.06	2608 Lake Oaks Road - Construct New 4" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		

BID PROPOSAL
LOCKWOOD, LAKE OAKS CRESTWOOD SSI PH 5 (S1257)

Item No.	Description	Unit	Estimate Quantity	Bid Unit Price	Bid Price
4.07	2609-B Lake Oaks Road - Construct New 4" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.08	2609-A Lake Oaks Road - Construct New 4" (directional drill) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.09	2616 Lake Oaks Road - Construct New 4" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.10	2617 Lake Oaks Road - Construct New 4" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.11	2624 Lake Oaks Road - Construct New 4" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		

BID PROPOSAL
LOCKWOOD, LAKE OAKS CRESTWOOD SSI PH 5 (S1257)

Item No.	Description	Unit	Estimate Quantity	Bid Unit Price	Bid Price
4.12	2625 Lake Oaks Road - Construct New 4" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.13	2632 Lake Oaks Road - Construct New 6" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.14	2633 Lake Oaks Road - Construct New 6" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.15	2508 Lake Air Drive - Construct New 6" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including Driveway Tunnel/Bore, all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Irrigation, Lamp Posts, Fencing Replacement, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.16	2516 Lake Air Drive - Construct New 4" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		

**BID PROPOSAL
 LOCKWOOD, LAKE OAKS CRESTWOOD SSI PH 5 (S1257)**

Item No.	Description	Unit	Estimate Quantity	Bid Unit Price	Bid Price
4.17	2524 Lake Air Drive - Construct New 4" (open trench) Sanitary Sewer Service Line (SDR 26 PVC ASTM D2241), Including all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
4.18	2749 Cedar Point Drive - Construct New 4" and New 6" (open trench) Sanitary Sewer Service Lines (SDR 26 PVC ASTM D2241), Including Aerial Crossing, Tree/Brush Removal, Erosion Control Features, 12" Steel Encasement Pipe, Concrete Collars, all Connections, Fittings, Bends, Cleanouts, Appurtenances, Ground Surface Restoration, Pavement Replacement, Fencing Replacement, Irrigation, Lamp Posts, and all Incidentals As Necessary to Properly Complete the Installation.	LS	1		
SUBTOTAL SANITARY SEWER SERVICE LINE IMPROVEMENTS (ON PRIVATE PROPERTY)					
5.00 LIFT STATION, FORCEMAIN, & ELECTRICAL WORK					
5.01	New Lift Station - Including Wet Well, Pumps, Valve Vault, Drum Scrubber Vault, Piping, Bollards Concrete Slab, Appurtenances, Including All Equipment and Incidentals	LS	1		
5.02	4-inch DR-14 PVC C900 Forcemain, DI Fittings and Restraints, Casing, Trenching, Bedding, Backfill, Compaction, Trench Caution Tape/Ribbon, Tracer Wire, Incidentals and Connection to Existing Manhole	LF	586		
5.03	All Electrical Work, Controls, Cabinets, Panels and Incidentals, Complete and In Place	LS	1		
SUBTOTAL LIFT STATION, FORCEMAIN, & ELECTRICAL WORK					
TOTAL BASE BID AMOUNT					
TOTAL AMOUNT OF MATERIALS FOR BASE BID					
TOTAL AMOUNT OF LABOR & EQUIPMENT FOR BASE BID					

BID PROPOSAL
LOCKWOOD, LAKE OAKS CRESTWOOD SSI PH 5 (S1257)

Item No.	Description	Unit	Estimate Quantity	Bid Unit Price	Bid Price
BID ALTERNATE NO. 1					
A1.00 ADDITIVE SITE WORK & DEMOLITION (STREETS)					
A1.01	Mill and Removal of Existing Hot Mix Asphaltic Concrete Surface	SY	770		
A1.02	Sawcut, Removal & Disposal of Existing HMAC and Base, Including Necessary Excavation to Achieve Subgrade Elevation	SY	1595		
A1.03	6" Lime Stabilization of Existing Subgrade	SY	1595		
A1.04	Hydrated Lime	TON	28		
A1.05	8" Cement Stabilized Pugmill Base	SY	1595		
A1.06	2" Hot Mix Asphaltic Concrete Pavement, Type D	SY	2365		
A1.07	8" HMAC, Type 'B' (Black Base) Material in lieu of Concrete Base (Class 'A' Trench Repair) to be Placed in Locations Receiving Mill and Overlay (only) Street Surfacing	LF	400		
A1.08	Installation of Concrete Slabs/Collars on Existing Valves, Adjust Valve Boxes, Stems to Remain (All Sizes)	EA	2		
A1.09	Remove Existing, Non-Adjustable Valve Box/Cover and Install New Adjustable Valve Box/Cover and Concrete Slab/Collar. Valve and Stem to Remain (All Sizes)	EA	2		
A1.10	Install Concrete Slabs/Collars on New Manholes	EA	9		
A1.11	Remove and Replace Existing Concrete Curb and Gutter Fillet, Including all Forming, Reinforcing Steel, Base and Subgrade Preparation, Curing, and all Incidentals	EA	4		
A1.12	Remove Existing and Install New Concrete Valley, Including all Forming, Reinforcing Steel, Base and Subgrade Preparation, Curing and all Incidentals	SY	21		
SUBTOTAL ADDITIVE SITE WORK & DEMOLITION (STREETS)					

BID PROPOSAL
LOCKWOOD, LAKE OAKS CRESTWOOD SSI PH 5 (S1257)

Item No.	Description	Unit	Estimate Quantity	Bid Unit Price	Bid Price
D1.00 DEDUCT SITE WORK & DEMOLITION (STREETS)					
D1.01	Class 'A' Surface Replacement / Trench Repair (Unit Price Shall Match that of Item 2.01)	LF	(1,275)		
SUBTOTAL DEDUCT BID ITEMS					
BID ALTERNATE NO. 2					
A2.00 UNIT PRICES					
A2.01	6-inch Standard Concrete Curb & Gutter Removal and Replacement	LF	110		
A2.02	Relocate Existing Residential Water Service Line, Including New Tapping Saddle, Corp Stop, Fittings, 1-inch Copper Line, Connection to Existing Meter, Incidentals, Excavation, Backfill, Complete and In Place	EA	1		
A2.03	Relocate Existing Water Line that Lies Below Proposed New Sewer Line to Achieve 2-foot Minimum Separation Distance Between Exterior Walls of Pipes. Installation of Water Line Relocation Shall Be as Detailed in Plans, Complete and In Place	EA	1		
A2.04	4-inch SDR 26 PVC ASTM D2241 Service Line and Fittings Installed (by open trench), Complete with Excavation, Bedding Backfill, Compaction, Testing, In Place On Private Property and Operational	LF	1		
A2.05	6-inch SDR 26 PVC ASTM D2241 Service Line and Fittings Installed (by open trench), Complete with Excavation, Bedding Backfill, Compaction, Testing, In Place on Private Property and Operational	LF	1		
A2.06	4-inch SDR 26 PVC ASTM D2241 Service Line and Fittings Installed (by directional drill), Complete with Excavation, Bedding Backfill, Compaction, Testing, In Place On Private Property and Operational	LF	1		

BID PROPOSAL
LOCKWOOD, LAKE OAKS CRESTWOOD SSI PH 5 (S1257)

Item No.	Description	Unit	Estimate Quantity	Bid Unit Price	Bid Price
A2.07	6-inch SDR 26 PVC ASTM D2241 Service Line and Fittings Installed (by directional drill), Complete with Excavation, Bedding Backfill, Compaction, Testing, In Place on Private Property and Operational	LF	1		

I WILL USE THE FOLLOWING SUBCONTRACTORS FOR THIS WORK:

<u>SUBCONTRACTOR</u>	<u>TYPE OF WORK</u>

FIRM NAME: _____

BY: _____

TITLE: _____

ADDRESS: _____

Contractor acknowledges and agrees that the official TOTAL AMOUNT OF BID is determined by multiplying the unit bid prices by the respective estimated quantities shown in this bid proposal and then totaling all of the extended amounts. Extended amounts SHOULD NOT be rounded up or down. All dollar amounts should be either written legibly or typed. Any mistakes should be rewritten and initialed by the Contractor.

SECTION 33 31 15

SUBMERSIBLE WASTEWATER VALVES

PART 1 GENERAL

1.1 SCOPE OF WORK

- A. Furnish and install wastewater valve(s) as specified herein and as shown on plans.

1.2 APPLICABLE STANDARDS AND SPECIFICATIONS

- A. ANSI, AWWA C-500 (current), AWWA C-508 (current).

1.3 ACCEPTABLE MANUFACTURERS

- A. Plug valves shall be Clow, Milliken, or approved equal.
- B. Resilient Wedge Gate Valves shall be Clow, or approved equal.
- C. Ball Valves shall be Watts, or approved equal.
- D. Check valves shall be Clow, Valmatic., or approved equal.
- E. Air Release/Vacuum Valves shall be Vent-O-Mat, Val-Matic, or Apco, or approved equal.
- F. ~~Pinch Control Valves shall be RF Valves, Inc., or approved equal~~

1.4 SUBMITTALS

- A. Submittals
 - 1. Submit drawings, specifications, and other information as required to show the materials of construction, method of operation, recommended spare parts, laying length, and other critical dimensions.
- B. Operation and Maintenance Manuals
 - 1. The contractor shall submit the following information for approval by the Engineer and Owner prior to equipment start-up.
 - a. Assembly, installation, alignment, adjustment, and checking instructions.
 - b. Lubrication and maintenance instructions.
 - c. Guide to "trouble shooting".
 - d. Parts list and predicted life for parts subject to wear. Parts list should also list part numbers.
 - e. Recommended spare parts list.
 - f. Certified dimensional drawings.
 - g. Sectional Drawings showing arrangement of internal components

1.5 WARRANTY

- A. The valve Manufacturer is to warrant the valve for one year following final acceptance against faulty or inadequate design, improper assembly and erection, defective workmanship and materials, and leakage, breakage, or other failure.

1.6 MANUFACTURER SERVICES

- A. Not applicable.

PART 2 PRODUCTS

2.1 GENERAL

- A. Detailed in this specification are the design and construction of valves suitable for domestic sewage service. The valves shall be located in an external valve vault. The discharge line from each pump shall be fitted with a check valve and an eccentric plug valve. The check valve shall be on the pump side of the plug valve. When necessary, combination air valve(s) shall be installed downstream of the plug valves. The combination air valve shall have a resilient wedge isolation gate valve, which will isolate the air release valve from the discharge piping. When applicable, surge relief valves shall be installed in the valve vault on the discharge header and equipped with a resilient wedge isolation gate valve.

2.2 CONSTRUCTION AND MATERIALS

- A. Eccentric Plug Valve
 - 1. Plug Valves shall be non-lubricated with a resilient faced eccentric plug encapsulated with Buna N rubber, and have a cast iron body and stainless steel seat rings. Pressure rating shall be not less than 50 psi. Valves shall have bolted bonnet with adjustable packing seals. Valves 8 inches and larger shall have spur gear actuator with hand wheels. Components shall withstand without damage a pull of 200 pounds on the hand wheel. All gearing shall be totally enclosed. Hand wheels shall be cast iron. Valves shall be flanged with flange dimension facing and drilling conforming to ANSI B 16.1. Eccentric plug valves shall be installed on 4-inch and larger pump discharge piping and force mains.
- B. Resilient Wedge Gate Valve
 - 1. Resilient wedge gate valves shall be non-rising stem, opening by turning stem left or right and provided with handwheel with the word Open and an Arrow cast in the metal to indicate direction to open. The wedge shall be cast iron completely encapsulated and permanently bonded (except for guide and stem nut areas) with polyurethane rubber. Stems shall be cast bronze with integral collars. The stem stuffing box shall be the o-ring seal type with two rings located above thrust collar and shall be replaceable with valve fully open. There shall be two low torque thrust bearings above and below the stem collar. The waterway shall be free of all pockets, cavities, and depressions in the seat area. The body and bonnet shall be coated with fusion bonded epoxy both interior and

exterior. Resilient wedge gate valves shall be installed as isolation valves as indicated on the Drawings.

C. Ball Valve

1. Ball valves shall be designed to operate in wastewater systems. Valves shall be 1/4 inch and constructed of stainless steel or bronze. Valves shall have glass reinforced seats, stainless steel ball and stem, adjustable stem packing gland, and have a minimum pressure rating of 400 psi WOG (non-shock). Operation of valve shall be fast one quarter turn open and close with vinyl insulators on heavy duty handles. Ball valves shall only be installed on pressure release/air vacuum break valves.

D. Check Valve

1. Horizontal Swing Check Valves with Outside Lever/Weights – Check valves shall be specifically designed to operate in wastewater systems and shall be the outside lever weight loaded type, constructed of cast iron with ANSI B 16.1 Class 125 flanged ends and shall be designed to provide full cross-sectional flow without reduction in diameter. Check valves shall be provided with a removable access cover for maintenance, service and repair/removal of internal parts and shall be designed to operate in vertical or horizontal position with a rubber stop to prevent damage to the valve body on full opening. Final sealing pressure shall be metal to metal eliminating wear on the rubber seal. The valve shall be fitted with an external swing arm and weight, with bronze seating surfaces. Valves shall be fusion bonded epoxy coated internally and externally. Outside lever weighted check valves shall be installed on force mains inside valve vaults only.
- ~~2. Resilient Hinged Check Valve – Check valves shall be specifically designed to operate in wastewater systems and shall be the inside resilient hinged type, constructed of cast/ductile iron with ANSI B 16.1 Class 125 flanged ends and shall be designed to provide full cross-sectional flow without reduction in diameter. Check valves shall be provided with a removable access cover for maintenance, service and repair/removal of internal parts and shall be designed to operate in vertical or horizontal position. Final sealing pressure shall be the resilient flapper on the valve seat. Valves shall be fusion bonded epoxy coated internally and externally. Resilient hinged check valves shall be installed on force mains outside applications only.~~

E. Sewage Air Release and Vacuum Break Valve

1. Air release valves shall be combination type air release and vacuum relief. Valves shall be designed specifically to operate in wastewater systems conveying suspended solids and particulates, to automatically release air and gas from a filling system, admit air into a draining system and continuously release accumulated air and gas in a pressurized wastewater system. Valves shall provide an air gap isolating the wastewater and have a spring-loaded float and seal plug to isolate turbulence and vibration from the sealing mechanism. The lower body of the valve shall facilitate drainage and allow valve internals to remain clean and unobstructed.

The piping of the valve shall be connected to the wet well or extend to the drain of the valve vault so that any discharge or gas will vent or drain into the wet well.

~~The Vento-O Mat RGX sewage air release and vacuum break valve shall consist~~

of a compact tubular all stainless steel single chamber body design with a hollow direct acting float and a solid cylindrical High Density Polyethylene large orifice control float – stainless steel nozzle and woven dirt inhibitor screen, EPDM rubber seals, and EPDM rubber seats. The valve shall have an integral surge alleviation mechanism which shall operate automatically to limit transient pressure rise or shock induced by closure due to high velocity air/gas discharge or the subsequent rejoining of separated liquid columns. The limitation of pressure rise must be achieved by deceleration of approaching water prior to valve closure. Relief mechanisms that act subsequent to valve closure cannot react in the low millisecond time span required and are therefore unacceptable. Valve Performance must be verified through third party **physical testing**. CFD, FEA or other type of theoretical computer modelling, or theoretical based curves are not acceptable. Discharge of pressurized air shall be controlled by the seating and unseating of a small orifice on a natural/EPDM rubber seal affixed to the control float. The intake/discharge orifice area shall be equal to the nominal size of the valve i.e. a 150mm (6") valve shall have a 150mm (6") intake/discharge orifice. The valve construction shall be proportioned with regard to material strength characteristics, so that the deformation, leaking or damage of any kind does not occur by submission to twice the designed working pressure. The valve design shall be such that it supplied as standard with ports for backflushing should it be necessary. Manufacturer shall have been producing this model and this model shall have an installed service record for a minimum period of five years to insure design integrity and performance.

F. Pinch Control Valve

1. Pinch control valves shall be specifically designed to operate in wastewater systems and shall be Ductile, cast iron or welded steel, fully enclosed, split body design, powder coated interior and exterior, ASME B 16.1 face to face dimensions, ANSI #150 flanges, bi-directional bubble tight closure on centerline at maximum working pressure, molded sleeve with polyester or stronger ply cords, non-stretch folds, and wear sensor wire for monitoring sleeve condition. Sleeve flanges shall also contain an internal steel ring, and have no bolt holes, to allow sleeve replacement without removing the valve from the pipeline. The top pinch bar shall be raised and lowered by a center actuator shaft with polished, non-threaded surface. Lower pinch bar shall be raised and lowered with two pull bars anchored to the actuator base plate extending through the valve body. Electro-mechanical and manual valves shall have an ACME threaded stem with threaded portion of stem exterior to the valve body and isolated from the process fluids in a separate housing. Pull bars, actuator shaft, threaded stem, fasteners shall be 304 s.s. Permanent factory calibration of the pinching mechanism shall be provided with lock nut system on pull bar extensions, including tamper indication seal. Actuator shall be electro-mechanical as manufactured by EIM, Limitorque or approved equal, for open/close service.

G. Discharge Line

1. The discharge line from each pump shall be fitted with check valve and eccentric plug valve, with the check valve on the pump side of the close off valve. When necessary, air release valve(s) shall be installed downstream of the eccentric plug valves.

- H. Ball Valve
 - 1. Stainless steel ball valves shall be installed as shown on the Drawings.
- I. Check Valve
 - 1. The check valves shall be positioned so that the lever stem may be removed without disabling the valve.

2.3 TOOLS, SPARE PARTS, AND ACCESSORIES

- A. Tools
 - 1. Any special tools required for maintenance shall be provided.
- B. Spare Parts
 - 1. Any spare parts recommended by the manufacturer shall be provided.
- C. Hardware
 - 1. All hardware shall be 316 stainless steel.

PART 3 EXECUTION

3.1 FACTORY INSPECTION AND TESTING

- A. Not applicable.

3.2 FIELD INSTALLATION AND TESTING

- A. Field Installation
 - 1. All items furnished under this section shall be installed in accordance with manufacturer's recommendations. Items shall be installed with proper support and shall not carry any weight on adjacent piping.
- B. Field Testing
 - 1. All items shall be adjusted and tested for proper operations. All shaft seals shall be checked for leakage and adjusted as required.

3.3 STORAGE AND HANDLING

- A. At all times Contractor shall take such precautions as may be necessary to properly protect all materials and equipment from damage from the time of delivery until the completion of the work.

3.4 EQUIPMENT PROTECTION AND RESTORATION

- A. All equipment must be boxed, totally enclosed with plastic sheet covering and crated, or otherwise completely enclosed and protected during shipment, handling, and storage.
- B. All equipment shall be protected from exposure to the elements and shall be kept thoroughly dry at all times.

- C. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage during shipment.
- D. All painted surfaces which are damaged prior to acceptance of equipment shall be repainted to the satisfaction of the Engineer.

END OF SECTION

SECTION 33 32 16

SUBMERSIBLE VORTEX WASTEWATER PUMPS

PART 1 - GENERAL

1.1 SUMMARY

- A. Furnish and install submersible, vortex, explosion proof pump(s) as specified herein and as shown on plans.

1.2 UNIT PRICE – MEASUREMENT AND PAYMENT

- A. Submersible vortex wastewater pumps are subsidiary to lift stations.

1.3 REFERENCES

- A. TCEQ 30 TAC Chapter 217: Design Criteria for Sewer Systems.
- B. All pump/ motor assemblies shall be designed, constructed, and tested according to the latest applicable sections of AFBMA, AISI, ANSI, ASTM, Hydraulic Institute, IEEE, NEC, NEMA MG-1, NFPA, and UL standards.
- C. Requirements listed in the drawings and specifications are considered additional to the standard requirements listed above.

1.4 DESIGN REQUIREMENTS

- A. Motor Compatibility: The manufacturer shall ensure that the motor included with the drive is compatible with driven equipment and complies with these specifications.
- B. Efficiency and Cost Effectiveness: The most efficient and cost effective premium efficiency motor shall be selected for continuous duty operation in wastewater lift stations.
- C. The minimum pump efficiency at design pumping rate shall be as follows:

GPM	Min. Eff. @ <50' TDH	Min. Eff. @ 50' to <100' TDH	Min. Eff. @ ≥ 100' TDH
<100	40%	30%	20%
100 – 500	60%	40%	30%
500 – 1,000	65%	65%	60%
1,000 – 5,000	65%	65%	65%
>5,000	70%	75%	75%

- D. Should pump manufacturers not be able to meet or exceed the above efficiencies for a specific pumping condition, a submittal with complete verification data will be required prior to acceptance of a lesser efficient pumping unit.

1.5 FUNCTIONAL REQUIREMENTS

A. Operation:

1. Pumps: Pumps shall be vortex submersible pumps capable of passing a 3-inch solid.
2. Motor:
 - a. The manufacturer shall coordinate pump operation so that all physical and operational characteristics of the motor are compatible with the requirements of the pump.
 - b. The motor shall operate efficiently, without overloading, overheating, or abnormal vibration, throughout the entire range of speed and load for the specified impeller.
 - c. There shall be no point on the pump curves at which the motor name plate rating is overloaded, even momentarily.
 - d. Motor shall be capable of bi-directional rotation by changing the electrical phase connections of the motor power lead wires.
 - e. The motor shall be capable of up to the number of evenly spaced starts per hour as follows:
 - 1) Less than 50 hp motors: 10 starts per hour
 - 2) 50 to 100 hp motors: 6 starts per hour
 - 3) Greater than 100 hp: 4 starts per hour.
 - f. The motor shall be able to operate dry without damage while pumping under load.

B. Controls: See Electrical Specifications.

C. Performance:

1. Each pump supplied shall be tested for performance prior to shipment. Testing shall be in accordance with Hydraulic Institute and NEMA MG-1 Standards.
2. Six sets of pump curves shall be provided by the Manufacturer for all operating points.
3. The pump shall operate at a minimum of 25% below its critical shaft speed.
4. Pump's capacity shall be given in gallons per minute and feet of water.
5. The lift station's firm capacity and the number of pumps operating to achieve that capacity shall also be provided.
6. Operating and design requirements shall be listed in the plans
7. The motor shall have normal starting torque and low starting current per specified motor design per NEMA MG-1.
8. All motors, regardless of size, shall have a minimum 1.15 service factor for continuous duty.

1.6 SUBMITTALS

A. Section 01 33 00 - Submittal Procedures: Requirements for submittals.

B. The Contractor is to submit the following information for approval by the Engineer and Owner prior to start of fabrication of the pumping units.

C. Product Data:

1. Pumps.
 - a. Name of pumping unit Manufacturer.
 - b. Pump model number.
 - c. Rotating speed.

- d. Proposed impeller size.
 - e. Maximum impeller size to fit proposed pump case.
 - f. Minimum impeller size to fit proposed pump case.
 - g. Performance curves for like unit showing total dynamic head, capacity, and horsepower from shutoff to beyond the minimum operating head at operating speed.
 - h. List of materials used in the construction of the pumps. Designate materials using ASTM Standards.
 - i. Type of wear rings and materials for impeller and case wear rings.
 - j. Type of pump bearings (radial and axial).
 - k. Type of mechanical seal and materials of construction.
 - l. Outline drawing of pumps showing exterior dimensions of pump.
 - m. Net weight of pump.
 - n. Net weight of base plate.
2. Motor:
- a. Motor manufacturer's name.
 - b. Type of motor and/or motor enclosure type.
 - c. Insulation class and type.
 - d. Temperature rise over 40 degrees C ambient.
 - e. Service factor.
 - f. Frame size.
 - g. Rated horsepower.
 - h. Full load speed, rpm.
 - i. Operating voltage, volts at 60 Hz.
 - j. Locked rotor current, amps and/or letter code.
 - k. Full load current, amps.
 - l. Starting inrush magnetizing current, % of full load, amps.
 - m. Complete outline drawing showing overall dimensions, location of terminal boxes, mounting provisions, and lifting provisions.
 - n. Sectional drawing of motor showing all components and a list of materials for each component per ANSI, ASTM, NEMA.
 - 1) Frame/ enclosure.
 - 2) Stator.
 - 3) Rotor/ shaft.
 - 4) Bearings.
 - 5) Paint or coatings.
 - o. Net motor weight.
 - p. Motor shaft diameter at all points.
 - q. Motor stator winding resistance, ohms.
- D. Operation and Maintenance Data: Submit the following information for approval by the Engineer and Owner prior to equipment start-up.
- 1. Assembly, installation, alignment, adjustment, and checking instructions.
 - 2. Lubrication and maintenance instructions.
 - 3. Guide to "trouble shooting".
 - 4. Parts list and predicted life for parts subject to wear. Parts list should also list part numbers.
 - 5. Recommended spare parts list.

6. Certified dimensional drawings.
 7. Sectional Drawings showing arrangement of internal components.
 8. Certified performance curves showing total dynamic head, capacity, and horsepower from shutoff to beyond the minimum operating head at operating speed.
 9. All information supplied in the submittals.
- E. Manufacturer's Certificate: Furnish 3 copies of a report prepared by the Manufacturer's technical representative certifying satisfactory installation, operation, and in-service placement of units.

1.7 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Installer: Company specializing in performing work of this section with minimum three years documented experience.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Section 01 60 00 - Product Requirements: Requirements for transporting, handling, storing, and protecting products.
- B. At all times Contractor shall take such precautions as may be necessary to properly protect all materials and equipment from damage from the time of delivery until completion of work.
- C. All equipment must be boxed, totally enclosed with plastic sheet covering and crated, or otherwise completely enclosed and protected during shipment, handling, and storage.
- D. All equipment shall be protected from exposure to the elements and shall be kept thoroughly dry at all times.
- E. Painted surfaces shall be protected against impact, abrasion, discoloration, and other damage during shipment.
- F. All painted surfaces which are damaged prior to acceptance of equipment shall be re-painted to the satisfaction of the Engineer.

1.9 FIELD MEASUREMENTS

- A. Verify field measurements prior to fabrication.

1.10 WARRANTY

- A. Section 01 70 00 - Execution And Closeout Requirements: Requirements for warranties.
- B. For new pumps, warranty shall begin upon final acceptance of Project.

1. The pumping unit Manufacturer shall warrant the entire pump unit against faulty or inadequate design, improper assembly and erection, defective workmanship and materials, and leakage, breakage, or other failure.
2. The Manufacturer shall furnish a written warranty agreeing to furnish and install FOB Project Site at his own expense, any part of the pumping unit proving defective within twelve (12) months of the acceptance of the unit.
3. The Manufacturer shall also provide a full parts and labor warranty for the motor, its components, and its accessories for one year, and an extended pro-rated 5 year warranty.

PART 2 - PRODUCTS

2.1 SUBMERSIBLE VORTEX SEWAGE PUMPS

- A. Manufacturers:
1. KSB.
 2. Fairbanks Morse.
 3. Flowserve.

2.2 PUMP PERFORMANCE

- A. Pump Parameters:
- B. Raw Sewage Duplex Lift Station

Duty Point Flow , gallons per minute	130
Duty Point Total Dynamic Head , feet	39.2
Minimum Shut-Off Pressure , feet	47.0
Maximum Nominal Motor Power , horsepower	5
Maximum Motor Speed , revolutions per minute	1750
Quantity of Pumps Required , number	2
Discharge Flange , inches	4
Impeller Type	Vortex

2.3 COMPONENTS

- A. Pump:
1. Volute: The pump volute, motor, and seal housing shall be high quality gray cast iron, ASTM A-48, minimum of Class 30. Outside of the volute shall be coated to prevent corrosion.
 2. Shaft: The pump shaft shall be constructed of solid stainless steel.
 3. Bearings:
 - a. The solid pump and motor shaft shall be rigid and kept in correct alignment by bearings.
 - b. The pump shaft shall rotate on two bearings.
 - c. The upper bearing shall be a single deep groove ball bearing.
 - d. The lower bearing shall be a two row angular contact bearing to compensate for axial thrust and radial forces.

- e. Bearings shall be anti-friction having a minimum B10 bearing life of 150,000 hours and designed to withstand all stresses to ensure a long service life.
 - f. Bearing houses are to be designed so that water cannot enter housing.
 - g. Bearings shall be permanently lubricated.
4. Impeller:
- a. Pump impellers shall be vortex type constructed of cast iron, A48 Class 35B.
 - b. The impeller shall be factory to meet specific performance conditions.
 - c. Impellers shall be statically and hydraulically balanced at the factory for smooth performance.
 - d. The impeller shall be keyed, not screwed or pinned to the shaft and shall be readily removable without the use of a special tool.
 - e. The impeller shall be locked against rotation in any direction by a stainless steel impeller nut.
5. Wear Rings: When required, the pump impeller and the adjacent casing surface shall be fitted with replaceable non-corrosive metal wear rings installed to prevent rotation.
6. Mechanical Seals:
- a. The pump shall be protected from leakage at the point that the shaft passes through the pump casing by mechanical seals.
 - b. Mechanical seals must meet the following requirements:
 - 1) The seal shall be a double mechanical seal in a cast iron seal housing constructed in two sections with a registered fit.
 - 2) The housing shall be recessed into the pump back head.
 - 3) The seal shall be constructed of **tungsten carbide**.
 - 4) The upper and lower seal assemblies shall operate in a lubricant reservoir that lubricates the lapped seal faces at a constant rate.
 - 5) Each seal interface shall be held in place by its own spring system.
7. External Hardware: All external wetted hardware shall be 316 stainless steel.
8. O-Rings: All O-rings shall be made of Buna N Rubber or approved equal.
- B. Motor: This specification details the materials and construction for a submersible pump and motor assembly.
1. Construction:
- a. The motors shall be constructed as an integral part of submersible pump/ motor assemblies.
 - b. Each motor shall be electrically and mechanically suited for the pump to which it shall be applied.
 - c. The motor shall be compatible with the pump to which it shall be applied and the motor shall operate efficiently, without overheating or abnormal vibration.
 - d. The motor shall be designed to provide a 20 year life.
 - e. Motor shall be capable of continuous operation without relying on external fluid contact for cooling.
 - f. The motor chamber shall be fitted with moisture/leak detector for signaling chamber's breach for water (See specification elsewhere herein).
2. Motor Rating:
- a. Motor shall be Underwriters Laboratories (UL) or Factory Mutual (FM) approved as explosion proof.
 - b. Rated voltage shall be per contract drawings. Motor shall be rated with a Class B temperature rise.

- c. The motor shall comply with NEMA Standard MG-1 and associated ASA and IEEE Standards unless specifically amended hereafter.
 - d. Motor shall be inverter duty rated.
- 3. Motor Housing: Motor shall be constructed of a minimum ASTM Type A-48 Class 30 Cast Iron. The housing shall be coated for corrosion resistance.
- 4. Rotor and Stator:
 - a. Stator windings shall be copper.
 - b. Rotor may be machined, rigid, one-piece aluminum or steel core with a machined or pressure cast or brazed solid end copper or aluminum ring connection.
 - c. Rotor shall be a dynamically balanced single unit.
 - d. Rotor shall be removable without disassembling stator.
 - e. Rotor shall be solidly attached or keyed to the motor shaft.
- 5. Shaft: The motor shaft shall be constructed of solid stainless steel.
- 6. Bearings: See Pump section, above.
- 7. Insulation:
 - a. Motors shall be UL listed for Class H insulation operating temperature.
 - b. Temperature rise criteria of 115°C over 40°C ambient shall be determined by resistance method or RTD's.
 - c. Method of testing shall be listed in the motor submittal.
- 8. Motor Power/ Control Wiring and Cable
 - a. Motor power lead wires shall be permanently and thermally connected to the stator for structural strength.
 - b. Motor lead wires shall be connected to the power cable in a watertight chamber and appropriate watertight seal cable entrance. Pump motor power cable shall be oil and watertight, rated for continuous submerged service. Cable conductors shall be copper, sized and rated per N.E.C. Cable shall be sized using 125 % of motor nameplate.
 - c. Motor control conductors for thermal and moisture leak sensory shall be rated for continuous submerged service and shall be run in a separate jacketed cable and conduit from the power cable.
 - d. Power cable shall include a dedicated ground conductor. All conductors shall be permanently identified at both ends.
 - e. Power/control cable shall be of sufficient length as designated with pump order to allow required power and control termination.
- 9. Motor Starting: Motors sized 75 hp and above shall be reduced voltage auto transformer type sized for starting on the 65 % tap and accelerating to full speed from the reduced voltage start without overheating or otherwise causing damage to the motor windings or bearings.
- 10. Motor Over-temperature and Moisture Protection:
 - a. Motor shall have a stator winding over-temperature (OT) sensory or switch device to detect high temperature and provide shutdown protection.
 - b. The OT device shall be rated and set to actuate providing protection and reaching the limits of the Class H insulation.
 - c. OT sensory shall actuate in the vicinity of 25-30°C before the limits of Class H insulation rating and reset dead band of about 15-20°C.
 - d. The pump/motor manufacturer shall furnish applicable OT sensory components and a complete schematic and wiring diagram.

C. Nameplate

1. Pump and Motor:

- a. The pump motor assembly shall have a stainless steel nameplate attached to its frame with stainless steel fasteners.
- b. The nameplate shall meet the requirements of NEMA MG-1.
- c. The following information shall be displayed on the nameplate:
 - 1) Pump manufacturer's name.
 - 2) Pump model number.
 - 3) Pump serial number.
 - 4) Rated capacity in gallons per minute.
 - 5) Rated total dynamic head in feet.
 - 6) Pump speed.
 - 7) Pump bearing information.
 - 8) Motor frame description.
 - 9) Motor horsepower.
 - 10) Service factor.
 - 11) Motor speed.
 - 12) Motor voltage, phases, and frequency.
 - 13) Motor wiring diagram.
 - 14) Motor amperage at full and no load.

D. CONTROL PANEL: Pumps control panel shall consist of a NEMA 4X 316 SS enclosure. The panel shall include a 100 amp main non-fused disconnect, main circuit breaker, over-voltage/under-voltage/phase loss protection, lightning arrester, NEMA starters for each pump motor, a 3 leg overload block for each pump, an alternating relay which shall cause the pumps to shut-off and the lead operating pump to change to the previously lag pump operator selectable time intervals, and a panel heater controlled by a thermostat.

1. Provide a total enclose enclosure. All panel controls including panel indication lights, pressure buttons, select switches and meters shall be installed on sub panel door. Provide pad lock for the control panel.
2. Provide all components shown on the electrical one-line diagram including motor starter, motor control relays, pump alternate relay, transformers, and lighting panel.
3. Refer to Division 26 Control Panel specification for panel requirements.
4. Provide main breaker, cables, motor starter, panel enclosure, enclosure door-mounted controls, wires, terminal blocks, surge protection device, grounding bar, panduits, control relays, labels and panel ID.
5. The control shall prevent to pumps from starting within 10 sec of each other.
6. Provide horn and beacon for the alarms.
7. A terminal block shall be furnished for connecting controls.
8. Non-resettable run time recorders (ETM) shall be provided for each pump.
9. Heater, blower and panel light shall be 115 volts.
10. All indication lights shall be LED. The light color shall match with City color scheme: red for running, open, and on, green for stopped, close and off. All lights shall have push to test function.
11. Level float switches: provide 4 level float switches for pump control and level alarm. The float switch shall be ball float switch, 316 stainless steel with 5 amp contact. Manufacturer shall be Contegra FS-90. Provide all required mounting accessories.
12. Pump Controls. Provide relay control scheme for the following functions:

- a. Each pump shall be have On-Off-Auto select switch. When select switch is at On position, pump shall be turned on. When select switch is at Off, pump shall be Off.
 - b. When select switch is on Auto position, pump shall be either controlled by SCADA PLC or pump alternate relay.
 - 1) When SCADA PLC (by other) is up running, left station pump shall be controlled by SCADA PLC based SCADA level setting.
 - 2) When SCADA PLC is stopped, control panel pump alternate relay will automatically take over pump control. When SCADA PLC is back running, pump control shall be switched to SCADA PLC.
 - 3) SCADA PLC provides primary pump control. Control panel pump alternate relay provides pump backup control. In case, PLC has an issue, the control backup alternate relay shall take over pump control.
 - c. Pump shall be controlled based on float switches:
 - 1) Float switch level low low: both pumps Off
 - 2) Level reaches above float switch level low: lead pump On
 - 3) Level reaches above float switch level high : lag pump On
 - 4) Level drops below float switch level high: lag pump On, lead pump Off
 - 5) Level drops below float switch level low low: lag pump Off
 - 6) Alarm with level reaches above Level High High. Both pump shall be On at this level.
 - d. Control relay shall automatically rotate pump running
13. Float switches installation
- a. Per plans
14. Provide following signals for SCADA monitoring
- a. Pump at Auto mode and Off mode
 - b. Any Pump fault (overload)
 - c. Level high high, level high, level low, level low low
 - d. Pump Power On
 - e. Pump Phase Fail
15. Provide panel drawing submittal. The drawing shall be designed by using latest version of AutoCAD. Panel drawing shall include panel layout, sub panel layout, table of bill of material, power distribution one line diagram, pump control schematic diagram, terminal block diagram. All wires inside panel shall be labeled with wire ID.

2.4 TOOLS, SPARE PARTS, AND ACCESSORIES

- A. Spare Nameplates: Spare nameplates shall be provided for each pump/motor assembly to be mounted on the control panel.
- B. Guide Rail System:
 - 1. Guide Rail:
 - a. A guide rail system shall be used to direct the pump in proper alignment with the stationary discharge piping.
 - b. Supports shall not interfere with removal of pump.
 - c. The rail system and supports shall be corrosion resistant and shall be fabricated of 316 stainless steel.
 - d. Guide rails for each pump must be supplied by the pump manufacturer to ensure compatibility with supplied equipment.

- e. The pump shall be easily removed for inspection or service.
 - f. Personnel shall have no reason to enter the wet well.
 - g. Supports shall be provided for the guide rail for every 8 feet of rail.
 - h. The supports shall be evenly spaced along the length of the rail.
2. Guide Brackets:
- a. The guide brackets and hardware shall be constructed of 316 stainless steel.
 - b. Guide brackets for each pump must be supplied by the pump manufacturer to ensure compatibility with supplied equipment.
- C. Pump Lifting Chain:
- 1. Each pumping unit shall be provided with a chain sling.
 - 2. The chain sling is a combination of a stainless steel cable and 3 feet of stainless steel chain, which is connected to the pump.
 - 3. All associated lifting hardware shall be stainless steel.
 - 4. The free end of the cable is connected to the top of the wet well.
- D. Pump Wire / Cable Support:
- 1. Furnish pump wire/cable support device for suspended support of pump power cables.
 - 2. Device shall be constructed of 316 stainless steel.
- E. Hardware: All hardware, fasteners, and pump mounting bolts shall be 316 stainless steel.

2.5 SOURCE QUALITY CONTROL (AND TESTS)

- A. Section 01 40 00 - Quality Requirements: Testing, inspection and analysis requirements.
- B. Factory Inspection and Testing
- 1. Each pump is to be tested at the factory to determine capacity, shut-off head, rated head, minimum head (for continuous operation), required power, efficiency and as required to develop an accurate performance curve.
 - 2. Certified copies of a report for each test are to be submitted to the Owner.
 - 3. All of the above tests are to be performed in conformity with the requirements and recommendations of the Hydraulic Institute and NEMA MG-1.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Section 01 30 00 - Administrative Requirements: Verification of existing conditions before starting work.

3.2 INSTALLATION

- A. Field Installation: The pump/motor assembly shall be installed according to the manufacturer's recommendations.

3.3 FIELD QUALITY CONTROL

- A. Section 01 40 00 - Quality Requirements: Field inspecting, testing, adjusting, and balancing.

B. Field Testing: See Electrical Specifications.

3.4 MANUFACTURER'S FIELD SERVICES

A. Section 01 40 00 - Quality Requirements: Requirements for manufacturer's field services.

B. Furnish the services of the Manufacturer's technical representative to check installation, assist Contractor in field testing, start-up testing, making adjustments, and instructing operators and contractor in maintenance and operation procedures.

END OF SECTION