March 12, 2021

ADDENDUM NO. 02

PROJECT NUMBER 1110061R
WATER REUSE – EFFLUENT PUMP BACK
DUNDEE FISH HATCHERY

NOTICE TO ALL BIDDERS:

This addendum shall be considered part of the Bid Documents and is issued to change, amplify, or delete from or otherwise explain the documents where provisions of this addendum differ from those of the original contract documents. This addendum shall have precedence over the original bid documents and shall govern.

Bidders are hereby notified that they shall incorporate this addendum in their bid, and it shall be construed that the Contractor's bid shall reflect with full knowledge, all items, changes and modifications to the bid documents herein specified.

Bidders are advised to check for updates, addenda issuance, and bid opening date changes at the TPWD Infrastructure Division Website:

http://www.tpwd.state.tx.us/business/bidops/current_bid_opportunities/construction/

Please see attached revisions to clarify the specifications and drawings.

1. SPECIFICATIONS (REISSUED SHEETS WITH MODIFICATIONS)

   SECTION 05530 – ALUMINUM GRATING
   SECTION 11311 – SUBMERSIBLE PUMPS

2. DRAWINGS (REISSUED SHEETS WITH MODIFICATIONS)

   Sheet G-02 (2 of 70) – GENERAL ABBREVIATIONS, SYMBOLS & DRAWING LEGEND
   Sheet G-03 (3 of 70) – TAG Table Index 1 of 3
   Sheet G-04 (4 of 70) – TAG Table Index 2 of 3
   Sheet G-05 (5 of 70) – TAG Table Index 3 of 3
   Sheet C-15 (21 of 70) – Yard Piping Details
   Sheet C-16 (22 of 70) – Force Main Discharge Details Sheet 1 of 3
   Sheet C-17 (23 of 70) – Force Main Discharge Details Sheet 2 of 3
3. QUESTIONS WITH ANSWERS:

Q: I have a question about the acceptable pump manufacturers for the lift station on the project listed above. There are several listed at accepted, but it does not state or equal. Are the manufacturers listed the only acceptable brands or can we use an or equal?

A: Approved equals are acceptable with contractor to submit documentation for BGE approval.

Q: How frequent and what distance requirements would density testing be required for this project? This is important to know so we know how much trenching can be opened up at one time due to the high probability of ground water.

A: The distance required for the density testing is 1 density test per 150 ft per lift.

Q: Borings B-1 and B-2 indicate groundwater at 7'-0” and 3’-0” respectively. Densities may not be achievable where continuous water seepage has occurred. How will TPWD or engineer handle this as it is anticipated that existing saturated material will be used for backfill for all areas except where Berms (per C-08) require import?

A: For pipe installation in areas represented by borings B-1 and B-2, see sheet C-15 detail 1. For structure installation in areas represented by borings B-1 and B-2, see Subgrade Preparation Notes on sheet S-05.
Q: The Staging Area on Sheet C-03 is not large enough to support this project. An extensive storage area for bedding material, pipe, berm material, etc. will be required to be stored near the site to accommodate schedule. Are there other areas that could be used for storage. There appears to be an area with an existing gate that allows for better access, logistics to allow large trucks to turnaround, and staging (See attached). This area can be restored after use, but provides access to the site from an alternate direction and a better means for emergency access and egress?

A: See note 4 under Construction Notes on sheet C-03.

Q: The roads on top of the fish pond levees adjacent to the work area will be a necessity to complete the construction proposed on this project due to lack of access up and down the gravity fed area. There is a significant grade that is extremely steep which may prevent empty trucks from getting up the road between the toll road and pump station. The condition between the toll road and the gravel road near the dam is not suitable for all construction traffic, even with improvement as grade of the road adjacent to the dam is the issue. This is not shown on the drawings. Please verify that the hatchery roads could be used for access to accommodate some trucks, cranes, etc. as there is not a turnaround for heavy construction traffic near the pump station. Roads around hatchery ponds could be improved after use. Constructability without use of these roads in unstable soils is not ideal. Please advise if these can be used to ensure the project can be constructed.

A: See note 3 under Construction Notes on sheet C-03.

Q: If the manholes are being constructed, do the manholes have to be in monolithic pours or can these be supplied in sections since protective coatings are called out. Please advise if manholes can be provided in sections. There is very limited access for setting these manholes.

A: Manholes to be monolithic pours as shown on detail 2 of sheet C-15.

Q: Would fiberglass manholes be accepted as an substitute for concrete manholes?

A: Fiberglass manholes would not be accepted as a substitute for concrete manholes.

Q: Would boring be an acceptable practice to install 24” gravity feed in lieu of excavation and laying pipe in trench. Due to significant water in the area, access, logistics, etc. this would be a potential viable solution to install the pipe. The pump station pit could be used a the boring hole.

A: 18” to be installed; Boring is be an acceptable practice if contractor is able to maintain alignment and grade. Contractor would need to submit boring plan for design engineer review that ensures that alignment and grade can be met and showing location of bore pits.
Q: Currently, the site does not appear to have overhead electrical service as indicated on E-07 and E-08. What is the timeline for this service to be installed? How long will it take for this service to commence once TPWD orders this to commence from the electrical utility?

A: Currently, TPWD anticipates service to be connected within 2 months from when the request is submitted to the provider; power should be available prior to the end of July 2021. Contractor to be responsible for coordination and costs related to temporary power – including usage. When appropriate (contractor notification that all new electrical work is in place), TPWD will coordinate connection of permanent power and transfer of billing with the provider.

Q: We have the following question regarding 12-inch discharge pipe penetrations through the Lift Station 2-inch aluminum grating (Sheet No. S-05 (34). Mechanical drawings (M-01 (47) thru M-03 (49) indicate there is now only 1 pump located within the Lift Station. Normally, pipe penetrations require banded, split grating panels and maybe additional grating supports depending upon pipe opening requirement. If openings are required, we will have to provide a no-tripping closure or cover over the openings. Please advise.

A: Yes, please provide openings and non-tripping closures over the openings.

Q: Are there any timelines where work will not be allowed due to Migratory Birds?

A: See Natural Resources Clearance Memorandum dated August 7, 2019 attached.

Q: Drawing page S-05 calls for a removable grating to cover the pump, however spec section 11311 2.03.A states an access hatch is to be supplied. Can you please clarify which is to be supplied?

A: Specification section 11311 2.03 has been edited to reference the relevant specification. Additionally, sheet S-15 has been updated to include this reference as well.

Q: Regarding Base Bid/18” Gravity Line 001 (GL1), Base Bid/16” Force Main 001 (FM1), and Alternate Bid/18” Gravity Line 001 (AT1), per the Pipe Tag Number Schedule (Plan Sheets G-03 & G-04), and per Specification Sections 15064 and 15065, please clarify and confirm that the two acceptable pipe materials for the 18” Gravity Line and 16” Force Main are either Fusible PVC or Certalok.

A: The two acceptable materials for the 18” Gravity Line and 16” Force Main are either Fusible PVC or Certalok.
BIDDERS SHALL ACKNOWLEDGE RECEIPT OF THIS ADDENDUM IN THE SPACE PROVIDED ON THE CONTRACTOR’S BID FORM.

WARNING: BIDDER’S FAILURE TO ACKNOWLEDGE RECEIPT OF ADDENDA MAY RESULT IN REJECTION OF BID.

End of Addendum Number 02

Sincerely,

Michael Polendo, CTCD, CTCM
Contract Manager, Infrastructure Division

MICHAEL POLENDRO, CTCD CTCM
Contract Manager, Infrastructure Division
PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install aluminum grating and frames.

2. The Work includes:

   a. Providing grating, frames, and appurtenances.
   b. Providing openings in aluminum grating to accommodate the Work under this and other Sections, and attaching to aluminum grating all items such as sleeves, bands, studs, fasteners, and items required for which provision is not specifically included under other Sections.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before aluminum grating Work.

C. Related Sections:

1. Section 05500, Miscellaneous Metal Fabrications.
2. Section 09900, Paints and Painting.
3. Section 09901, Protective Coatings.

1.02 REFERENCES

A. Standards referenced in this Section are:

4. NAAMM MBG 531, Metal Bar Grating Manual.
5. NAAMM MBG 533, Welding Specifications for Fabrication of Steel, Aluminum and Stainless Steel Bar Grating.

1.03 QUALITY ASSURANCE
A. Qualifications:
1. Manufacturer: Shall have at least five years experience manufacturing products substantially similar to those required and shall be able to submit documentation of at least five installations in satisfactory operation for at least five years each.

B. Component Supply and Compatibility:

1. Obtain all products and materials included in this Section regardless of component manufacturer from a single aluminum-grating manufacturer.

2. Aluminum grating manufacturer shall review and approve or prepare all Shop Drawings and other submittals for all products and materials furnished under this Section.

3. Components shall be suitable for the specified service conditions and be integrated into overall assembly by aluminum grating manufacturer.

4. Provide only one type of aluminum grating exclusively throughout the Project.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
   a. Fabrication and erection of all Work. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items.
   b. Setting drawings and templates for location and installation of anchorage devices.

2. Product Data:
   a. Manufacturer’s specifications, load tables, dimension diagrams, anchor details and installation instructions.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Shipping, Handling and Unloading:

1. Deliver materials to the Site to ensure uninterrupted progress of the Work. Deliver anchor bolts and anchorage devices to be embedded in cast-in-place concrete in ample time to prevent delaying the Work.

B. Storage and Protection:

1. Protect materials from corrosion and deterioration.

2. Do not store materials in contact with concrete or other materials that might cause corrosion, staining, scratching, or damage materials or finish.
PART 2  PRODUCTS

2.01  SYSTEM PERFORMANCE

A.  Aluminum Grating: Provide aluminum grating complying with the following:

1.  Grating Design Loads: Uniform live load shall be as shown or indicated in the Contract Documents. Where live load is not shown or indicated, uniform live and concentrated loads shall be as indicated below, whichever results in the greater design stresses.
   a.  Live Load: 100 psf; Concentrated Load: 500 lbs per foot of grating width at center span.

2.  Maximum Clear Span Deflection for Uniform Live Loads: 1/120 of span, but not more than 1/4-inch.

3.  Maximum Fiber Stress: 12,000 psi.

4.  Do not install aluminum grating in areas subject to vehicular traffic.

5.  Minimum Size of Members:
   a.  Minimum size of bearing bars shall be within standard mill tolerance as indicated in load tables in NAAMM MBG 531 for applicable loading and deflection requirements.
   b.  Minimum dimensions of cross bars shall be as indicated in tables of Minimum Standard Cross Bars and Connecting Bars in NAAMM MBG 531.

6.  Banding bar shall be 1/4-inch thick minimum. Top of banding bar shall be flush with top of grating, unless otherwise shown or indicated. Banding bar shall be 1/4-inch shorter than the bearing bar height.


2.02  MANUFACTURERS

A.  Grating, Products and Manufacturers: Provide one of the following:


2.  Swage-Locked I-Bar Grating, by AMICO.


4.  Or equal.
2.03 MATERIALS

A. Bearing Bars: Aluminum alloy 6061-T6 or alloy 6063-T6, complying with ASTM B221.

B. Cross Bars or Bent Connecting Bars: Aluminum alloy 6061-T6 or alloy 6063-T6, complying with either ASTM B221 or ASTM B210.

C. Frames: Aluminum alloy 6061-T6 or alloy 6063-T6, complying with ASTM B221.

D. Stud anchors welded to steel supports and other fasteners shall be Type 316 stainless steel.

2.04 FABRICATION

A. Use materials of minimum depth and thickness specified and required to comply with performance criteria in the Contract Documents.

B. Provide grating as follows:

1. Grating Type: Aluminum I-bar with swage-locked cross bars at right angles to bearing bars.

2. Depth: Two-inch minimum.


4. Cross-Bars: Swage-locked to bearing bars at maximum spacing of four inches on centers.

5. Surface: Grooved.

6. Finish: Mill.

C. Provide cutouts in grating for passage of piping, electrical conduit, valve stems, columns, ducts, and similar work. Where more than two bearing bars are included in a cut out, provide banding bars of same dimensions as bearing bars around opening welded to grating component parts.

D. Gratings shall be accurately fabricated, free from warps, twists, and other defects that would affect grating appearance and grating serviceability.

E. Welding shall conform to requirements of NAAMM MBG 533. Welds shall be ground smooth at top surfaces and bearing surfaces.

F. Openings in and edges of gratings sections shall be banded with banding bars. Weld bands to intersecting members.
G. Size each section of grating to weigh not more than 100 pounds, unless otherwise indicated in the Contract Documents.

PART 3 EXECUTION

3.01 EXAMINATION

A. Examine conditions under which Work is to be performed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with installation until unsatisfactory conditions are corrected.

B. Check all dimensions at the Site after piping and equipment are in place and determine exact locations of openings and cutouts.

3.02 INSTALLATION

A. Fastening to In-Place Construction:

1. Use anchorage devices and fasteners to secure aluminum grating to supporting members or prepared openings, as recommended by manufacturer.

2. Weld Type 316 stainless steel stud bolts to receive saddle clip or flange block anchors to supporting steel members. Drill for machine bolts when supports are aluminum.

B. Cutting, Fitting, and Placing:

1. Perform cutting, drilling and fitting required for installation. Set the Work accurately in location, alignment and elevation, plumb, level, true, and free of rack. Do not use wedges or shimming devices.

2. Where gratings are penetrated by piping, electrical conduit, ducts, structural members, or similar protrusions, cut openings neatly and accurately to size and attach banding bar as specified.

3. Divide panels into sections only to extent required for installation where aluminum grating is to be installed around previously installed piping, electrical conduit, ducts, structural members, or similar protrusions.

C. Aluminum gratings in concrete floors shall be removable and arranged in sizes to be readily lifted. Provide aluminum gratings in concrete with aluminum angle frames with mitered corners and welded joints. Grind exposed joints smooth. Frames shall have welded anchors set into concrete. Angle size shall match grating depth selected for flush fit.

D. Clearance at ends or between sections of grating shall be a maximum of 1/4-inch.

E. Tops of aluminum gratings shall be set flush with surrounding construction.
F. Aluminum gratings shall be set with full and uniform end bearing on frames to preclude rocking movement; do not use wedges or similar shimming devices.

G. Protection of Aluminum from Dissimilar Materials: Coat aluminum surfaces in contact with dissimilar materials such as concrete, masonry, steel, or other metals, in accordance with Section 05500, Miscellaneous Metal Fabrications, Section 09900, Paints and Painting and Section 09901, Protective Coatings.

END OF SECTION
PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Placing into operation 1 submersible pump, with discharge connections, lifting chains and guide bars as specified herein and as indicated on the drawings. The pump station shall be complete and operational with motors and accessories as shown on the plans and as specified:

1. Review installation procedures under other Sections and coordinate with the Work related to this Section.
2. Coordinate pumps and motors with electrical work as specified in Division 16, Electrical.

1.02 MEASUREMENT AND PAYMENT

A. No separate payment will be made for work required under this section. Contractor will include all costs of the requirements of this section in the appropriate bid item(s) on the bid form.

1.03 REFERENCES

A. Reference Standards: Comply as a minimum with applicable provisions and recommendations of the following:

1. American National Standards Institute (ANSI)


3. Anti-Friction Bearing Manufacturers Association (AFBMA)

   b. HI 11.6: Submersible Pump Tests

5. Institute of Electrical and Electronic Engineers (IEEE)
7. National Electrical Manufacturers Association (NEMA)
8. Steel Structures Painting Council (SSPC)

1.04 PERFORMANCE REQUIREMENTS

A. Furnish and install the submersible, non-clog pumps capable of handling unscreened surface water with solids in accordance with these Specifications and as shown on the Drawings.

B. Number of pumps, minimum and maximum operating capacities, TDH, and other pump design data are tabulated on the Drawings.

C. Pumps shall be designed for continuous operation without cavitation within the specified operating range. The pump shall have a minimum hydraulic efficiency of 77 percent at the rated capacity. The NPSHR at the maximum operating capacity shall not exceed 26 feet. The pump shall have a performance identical to the Base Bid Pump Characteristics, and Base Bid Pump Performance and System Curve shown on sheet M-02 of the Final Re-Bid plan set.

1.05 SUBMITTALS

A. Submit a list of not less than 5 installations where pumping equipment of the type and approximate size specified has been in successful operation for at least 5 years.

B. Standard submittal data for approval must consist of:
   1. Pump Performance Curves.
   2. Pump Outline Drawing.
   3. Station Drawing for Accessories.
   4. Electrical Motor Data.
   5. Typical Installation Guides.
   6. Technical Manuals and Parts List.
   8. Printed Warranty.
   10. Manufacturer's Equipment Storage Recommendations.
   11. Manufacturer's Standard Recommended Start-Up Report Form.

C. Submit locations of the nearest permanent service headquarters of the pump and motor manufacturer for the size of pump and motor submitted.

D. Submit descriptive literature, including a cross-sectional view of each pump and motor combination, which indicates materials of construction, weights, principal dimensions, and other important details. Submit dimensioned, to-scale drawings showing placement of pumps, base ells, rail, rail mountings, and access frame and cover. Submit Shop Drawings for access frame and cover.

E. Submit certified characteristic curves showing the head-capacity relationship, brake horsepower, NPSH requirements, pump efficiency (ratio of the water horsepower to brake horsepower) and pump speed. The curves shall be complete for the entire range of operation from shutoff to minimum head.
conditions. Where pumps are to be used in VFD service, submit curves showing performance at 100% of rated speed and at decreasing speeds that would be expected. Label curves in terms of rpm and Hz. Indicate the minimum rpm, Hz, and gpm for the pump under the conditions shown on the drawings. Submit manufacturer's calculation of radial and thrust bearing L-10 life at the design head and flow indicated on the Drawings.

F. If the proposed pumping equipment is supplied with electrical equipment and components of larger capacity than specified or shown on the Contract Drawings, the shop drawings for the equipment listed in the following Sections shall be submitted in the same package as the shop drawings submitted for this Section.

G. Manufacturer's Certifications:

1. Submit manufacturer's certification that he has carefully examined the Contract Documents in detail, including the arrangement and conditions of proposed electrical, mechanical 3 water level settings and structural systems affecting the performance of the pumping equipment units, and the detailed requirements of manufacturing and subsequent installation of the pumping equipment units.

2. Submit manufacturer's certification that there are no omissions, ambiguities or conflicts in the Contract Documents or in the pumping station piping layout that affects the pumping unit, as shown on the Drawings, which have not already been clarified in writing.

3. Submit manufacturer's certification that the running amperes of the motor will not exceed the nameplate rating of the motor under all expected operating conditions. Submit motor manufacturer's maximum allowed KVAR.

4. Submit manufacturer's certification that spare parts, seals, bearings, O-rings and power cable shall be available locally for models to be supplied.

5. Submit manufacturer's certification that motors are explosion proof and labeled so, approved by Underwriters Laboratories (UL) or Factory Mutual (FM).

H. Factory Tests: Submit 3 copies of certified test reports to the Engineer for review.

1. The pump manufacturer shall perform the following inspections and tests on each pump before shipment:
   
a. Impeller, motor rating and electrical connections shall first be checked for compliance to the customer's purchase order.
   
b. A motor and cable insulation test for moisture content or insulation defects shall be made.
   
c. Prior to submergence, the pump shall be run dry to establish correct rotation and mechanical integrity.
   
d. Each pump shall be run submerged in water.
e. After running pump submerged in water, retest motor and cable insulation.

2. If tests do not meet performance specifications, Contractor shall correct deficiencies to provide the specified performance.

3. A written report stating the foregoing steps have been done must be supplied with each pump at the time of shipment. This report must be approved by the Engineer prior to payment.

I. Maximum Allowable Distance Data: Where pumps will be in VFD service (remotely located), submit maximum allowable installation distance data for motor and VFD drives.

1.06 QUALITY ASSURANCE

A. All materials used shall be new, of high grade, and with properties best suited to the work required.

B. Manufacturer’s Qualifications:

1. Pumping equipment provided under this Section shall be a standard product in regular production by manufacturers with 20 or more years of experience whose products have proven reliable in at least 5 similar services for at least 5 years each.

2. Manufacturer shall satisfy the Engineer that it is capable of the following:

   a. Providing factory trained personnel to service the pumps and allied equipment when needed within a 48-hour period.
   b. Providing all needed spare parts for the pumps within a 48-hour period.

3. Provide a written manufacturer's certification that spare parts, seals, bearings, O-rings and power cable shall be available locally for models to be supplied.

C. Coordination Responsibility:

1. In order to ensure equipment compatibility, one manufacturer shall be responsible for providing all submersible pumping equipment, including pump and motor, access frame and guides.

2. The Contractor shall name a pump manufacturer, who will have responsibility for the function of the complete system in accordance with the intent of these Specifications. The named manufacturer shall be experienced in similar work.

3. Contractor shall retain overall responsibility for equipment coordination, installation, testing and operation.

D. Substitution: The engineering design is based on a certain manufacturer's equipment. If the Contractor's choice of equipment is approved but requires
modifications to plant, equipment or piping for installation, the Contractor is responsible for submitting revised engineering design and drawings to make the proposed equipment compatible with the project, at no additional cost to the Owner.

1.07 DELIVERY, STORAGE AND HANDLING

A. Deliver equipment to site, and store and protect off the ground in enclosed shelter.

B. The pump cable end shall be sealed with a high-quality protective covering to make it impervious to moisture or water seepage from submersion or other causes prior to electrical installation.

1.08 EVALUATION AND SELECTION

A. The Owner reserves the right to select any equipment, which is deemed to be in its best interest.

1.09 WARRANTY

A. Pump manufacturer shall furnish to the Owner a warranty written expressly from the manufacturer to the Owner, covering workmanship and material for 5 years or 10,000 hours of operation under normal use and service. The warranty shall cover 100 percent of parts and labor for at least one full year. The warranty period shall commence on the day of Final Acceptance. Warranty shall be in printed form and previously published as the manufacturer's Standard Warranty for all similar units manufactured. Pumps repaired under warranty will be returned to the job site freight pre-paid.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Through shop drawing submittals, the following named manufacturers or equal will be considered, provided the submitted equipment meets the specified requirements and system operating conditions:

1. Fairbanks-Morse
2. Ebara
3. KSB
4. Xylem
5. Flow Serve
6. Grundfos

B. Listing as an acceptable manufacturer will not relieve the manufacturer from conforming to Contract Specifications.
2.02 PUMP CONSTRUCTION

A. The Materials of construction shall be as follows (or equal materials will be considered):

1. Pump housing: ASTM A-48, Class 35B
2. Impeller and insert ring: A 532 ALLOY III A (25% Chrome)
3. Cooling jacket: Stainless steel AISI 316
5. Shaft: ASTM A479 S43100-T.
6. Shaft seal: Pump side: - Corrosion resistant Tungsten carbide WCCR
7. Shaft seal Motor side: - Corrosion resistant Tungsten carbide WCCR

B. Casing:

1. Major pump components shall be of fine-grained gray cast iron, ASTM A48, Class 30 or better, with smooth surfaces devoid of blow holes and other irregularities. Surfaces coming into contact with water containing solids or long-fibered material, other than stainless steel shall be protected by an approved resistant coating.
2. Mating surfaces where watertight sealing is required shall be machined and fitted with nitrile rubber O-rings. Fitting shall be such that sealing is accomplished by metal-to-metal contact between machined surfaces. This will result in controlled compression of nitrile rubber O-rings without the requirement of a specific torque limit. No secondary sealing compounds, rectangular gaskets, elliptical O-rings, grease or other devices shall be used.
3. Pump suction flange shall be drilled to ANSI standard, class 125.

C. Power Cable:

1. The cable entry water seal design shall preclude specific torque requirements to ensure a watertight and submersible seal. The cable entry shall be sealed by an elastomer grommet, epoxy potting material, or a combination of both. The cable entry sealing system shall provide strain relief for the terminal connections and allow access to the terminal connections without adversely affecting the integrity or function of the seal system.
2. Cables shall be oil, grease and abrasion resistant, and meet applicable standards. The outer jacket shall be polyurethane or other material equally suitable for immersion in unclean water.
3. Cables shall be capable of operating on either 230 volt or 460-volt, 3 phase service and under continuous submergence without loss of watertight integrity to a depth of 65 feet.
4. No parallel power cables are acceptable unless they are size #1/0 or larger.
5. Motors 7.5 HP and over shall have reconnectable terminal blocks. All leads shall be numbered.
D. Submersible Motor:

1. The pump motor shall be a NEMA Design B squirrel-cage, induction, shell type design, housed in an oil-filled or air-filled watertight chamber. The stator winding and stator leads shall be insulated with moisture resistant Class F insulation which will resist a temperature of 155 degrees C (311 degrees F). The use of bolts, pins or other fastening devices requiring penetration of the stator housing shall be rejected. The rotor bars and short circuit rings shall be of aluminum. The motor shall be designed for continuous duty, capable of sustaining a minimum of 15 starts per hour, evenly spaced. The pump/motor shall be capable of operating at liquid temperature of 104 degrees F per FM requirements—without overheating or operating in the service factor. Motor shall be non-overloading over the entire range of the operating curve within the nameplate HP. A performance chart shall be provided showing curves for torque, current, a minimum service factor of 1.15, input/output kw and efficiency.

2. The motor shall be UL listed or FM approved as explosion-proof, suitable for NEC Class I, Division 1, Group C and D environments.

3. Each unit shall be provided with an adequately designed cooling system totally self-contained with no external mechanical devices. Pumps shall be designed to operate continuously with the fluid level at the top of the pump volute.

4. Maximum motor speed shall be 1760 rpm for pumps with discharge diameter greater than or equal to 6-inches.

5. For sizes 20 HP and smaller, the motor shall be equipped with dual voltage connections for 230/460 volts.

6. Thermal sensors shall be used to monitor stator temperatures. The stator shall be equipped with 3 thermal switches, embedded in the end coils of the stator winding (one switch in each stator phase). These shall be used in conjunction with and supplemental to external motor overload protection and wired to the control panel.

7. For motor sizes larger than 100 HP, an independent thermal switch shall be included to monitor the lower motor bearing temperature.

8. The pump shall be equipped with moisture sensors in the oil-filled seal chamber to indicate seal leakage. Motors larger than 20 HP shall be equipped with a leakage sensor to detect water in the stator chamber.

E. Shaft: Each pump shaft shall be one piece of AISI type 420 stainless steel, or heat-treated carbon steel C 1035 protected by a stainless-steel shaft sleeve. The shaft shall be of sufficient diameter to assure rigid support of the impeller and to prevent excessive vibration at all speeds.

F. Pump Seal: Each pump shall be provided with a tandem mechanical shaft seal system. The upper seal of the tandem set of seals shall operate in an oil chamber located just below the stator housing. This set shall contain one stationary tungsten-carbide ring and one positively driven rotating carbon (or better) ring, and functions as an independent secondary barrier between the pumped liquid and the stator housing. The lower seal of the tandem set of seals
functions as the primary barrier between the pumped liquid and the oil housing. This set shall consist of a stationary ring and a positively driven rotating ring, both of which shall be silicon carbide or tungsten carbide. Shaft seals without positively driven rotating members or conventional double mechanical seals containing either a common single or double spring action between upper and lower seal faces shall not be acceptable.

G. Bearings: Bearings shall be permanently lubricated ball or roller type rated in accordance with AFBMA for an L-10 duty life of at least 50,000 hours at the rated capacity.

H. Impeller:
1. The impeller shall be wear resistant and made of high chromium cast iron with at least 24% chrome against sand and grit which is expected to enter the pump station with the sewage or the storm water. Impellers that have surface hardening (by thermal, coating, etc.) will not be allowed. The impeller shall be dynamically or statically balanced, double shrouded non-clogging design having a long thrulet without acute turns. The impeller shall be capable of handling 3-inch minimum diameter solids, fibrous materials, heavy sludge and other matter found in normal sewage application. The impeller hub shall be accurately fitted and mechanically secured to the motor shaft.

2. The volute shall be of a single piece, concentric or non-concentric design, and shall have smooth fluid passages large enough at all points to pass any size solids which can pass through the impeller. The volute bottom shall be of a suction bell design for pumps with 12-inch discharge and larger.

3. A replaceable wear ring shall be installed to provide efficient sealing between the volute and impeller. The wear rings shall consist of A 532 Alloy III A (25% Chrome). For pumps 10 HP and below the pump shall be equipped with brass or nitrite rubber volute wear ring only.

2.03 ACCESSORIES

A. Access Frames and Covers:

1. See Specification Section 05530 for pump station aluminum grating cover shown on sheet S-05.

B. Pump Guide System: Pump manufacturer shall provide a guide rail system complying with the following requirements:

1. Type 316 stainless steel rails, replaceable without man entry into the wet well.

2. Lower bracket integral with pump support/discharge fitting.

3. Type 316 stainless steel upper bracket bolted to access cover frame.

4. Intermediate brackets as shown on the Drawings, if required.
C. Bolts, Studs and Nuts:

1. All bolts, studs and nuts shall have American National form right-hand machine cut threads which shall be in conformity with the current ANSI B1.1, "Screw Threads", Coarse Thread Series, unless otherwise specified.

2. Bolt heads and nuts shall be semi-finished and shall be in conformity with ANSI B18.2, "Wrench-Head Bolts and Nuts and Wrench Openings", Heavy Series, unless otherwise specified. All nuts shall be hexagonal in shape.

3. Anchor bolts, flange bolts, studs and nuts shall be Type 316 stainless steel in conformity with ASTM A276.

2.04 PUMP PROTECTION SYSTEM

A. Manufacturer shall furnish a complete pump monitoring and protection system consisting of an intrinsically safe solid-state monitoring system to be installed in the motor starter cubicle, and independent probes integral to the pump/motor wired to a sealed cable entry terminal box for connection of submersible control cables.

B. Monitoring unit shall be solid state, intrinsically safe system designed for mounting within the motor starter cubicle. Monitoring system shall accept inputs from the sensors specified and shall output independent contacts which close to alarm each condition, or separate independent output terminals suitable for direct connection to interposing relays for alarm contact development. Provide a separate N.C. alarm contact, rated at 120V, 5A inductive, which opens on any failure. Monitor system shall be suitable for operation from a 24VAC unregulated, unlimited power supply. Provide any additional equipment or appurtenances required to provide current and voltage limited intrinsically safe installation as specified. The monitoring system shall accept separate isolated N.O. contacts, which close to indicate pump running and to reset after pump trip.

C. Sensors shall be independently wired to the monitoring system. Provisions for the following sensors for each pump:

1. Stator leak (one required).
2. Bearing temperature for pumps over 100 HP. (one required)
3. Stator temperature (one per phase, field test and connect to highest reading obtained)

2.05 SHOP PAINTING

A. Pump motor size up to 100 HP:

1. Pump Exterior:
   b. Primer: One coat of alkyd resin primer, 1.6 mils minimum.
c. Finish: Chloric rubber paint, 2.4 mils minimum.

2. Machine Finished Surfaces:
   a. Machined parts are cleaned to remove all dirt and grease.
   b. Cleaning is done so as not to affect primer or deteriorate adherence to finish paint.
   c. Storage and transport are carried out in such a way that rust attack on machined surfaces does not occur.
   d. At assembly, surfaces are coated with a corrosion preventive paint.

B. Pump motor size greater than 100 HP:
   1. Pump Exterior:
      a. Pre-treatment: Sandblast cleaning and removal of all oil and dust.
      b. Primer: One coat of alkyd resin primer, 1.6 mils minimum.
      c. Finish coat: Two coats of chloric rubber paint, 2.1 mils each coat.
   2. Machine finished surfaces:
      a. Machined parts are cleaned to remove all dirt and grease.
      b. Cleaning is done so as not to affect primer or deteriorate adherence to finish paint.
      c. Storage and transport are carried out in such a way that rust-attack on machined surfaces does not occur.
      d. At assembly, surfaces are coated with a corrosion preventive paint.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Installation of the pumping equipment shall conform to the manufacturer's instructions and recommendations and reviewed shop drawings.

B. Field Tests:
   1. Each pump will be subjected to a 6-hour field operational test before acceptance as follows:
      a. After installation, a pump station start-up shall be performed by the installing contractor under the supervision of the manufacturer’s authorized representative. 16 hours of field service shall be provided by an authorized, factory trained representative of the pump manufacturer. Services shall include, but not be limited to, inspection of the completed pump station installation to ensure that it has been performed in accordance with the manufacturer’s instructions and recommendations, supervision of all field-testing and activation of the Pump Manufacturer’s Warranty. The test shall demonstrate to the
satisfaction of the Owner that the equipment meets all specified performance criteria, is properly installed and anchored, and operates smoothly without exceeding the full load amperage rating of the motor. The Contractor shall be responsible for coordinating the required field services with the Pump Manufacturer.

b. The unit under test shall be properly installed in the wet well, firmly upon its discharge connection after determination of (a) proper service voltage is being supplied and (b) proper rotation of the impeller. No cooling by forced or circulated air shall be allowed.

c. Capacity Test: On four occasions, wet well shall be filled with liquid to an elevation sufficient to allow each single pump to operate for 3 minutes, independent of the control regime. Time required to pump down known volume shall be measured as evidence of each pump’s capacity. All portions of the force main must have been constructed and tested prior to this test.

d. Snore Tests: Snore is defined as that state when the pump is alternately pumping liquid and air and usually occurs when the pump pumps the liquid down to expose its inlet. The unit(s) under test shall be submerged with just enough liquid to accomplish "snore" and allowed to run two times for 10 minutes minimum.

C. Start-up Data: Contractor shall complete and submit the start-up records and maintenance data sheets.

END OF SECTION
<table>
<thead>
<tr>
<th>TRAIN NUMBER</th>
<th>SECTION DESCRIPTION</th>
<th>FEATURE ID</th>
<th>TYPE</th>
<th>MATERIAL</th>
<th>SURFACE FINISH</th>
<th>PRESSURE CLASS</th>
<th>MINIMUM WALL THICKNESS</th>
<th>Lining</th>
<th>Coating</th>
<th>PIPE END Finish</th>
<th>PIPE END SPEC</th>
<th>SCHEDULE NUMBER</th>
<th>PIPE DIA (in)</th>
<th>PIPE WALL THICKNESS (in)</th>
<th>LENGTH (FT)</th>
<th>Fitting</th>
<th>Fitting Size (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
<tr>
<td>T-06-01-10-120</td>
<td>DUNDEE FISH HATCHERY</td>
<td>TFC</td>
<td>GROOVED COUPLING</td>
<td>ALUMINUM PIPE</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>0.005</td>
<td>N/A</td>
<td>N/A</td>
<td>0</td>
<td>1041</td>
<td>10</td>
<td>1.0</td>
<td>NA</td>
<td>1.0</td>
<td>NA</td>
</tr>
</tbody>
</table>
1. ALL CONCRETE SHALL BE PL +400 INCHES.
2. ALL REINFORCING STEEL SHALL BE GRADE 60.
3. ALL STUD ANCHORS SHALL CONFORM TO ASTM F594 GRADE 55.
4. PIPE STRAPS TO RESIST THRUST FORCES TO BE DESIGNED AND PROVIDED BY OTHERS.
6. ALL BOLTS, NUTS, HOOK ANCHOR BOLTS AND WASHERS TO BE TYPE 316 STAINLESS STEEL.
7. ALL BOLTS, NUTS, HOOK ANCHOR BOLTS AND WASHERS TO BE OF MILL SPECIFICATION FOR FABRICATION. COAT ALL FIELD CUTS WITH A ZINC RICH GICLIEE SPRAY.
8. ALL REBAR CLEARANCE TO BE 2" UNLESS NOTED OTHERWISE.
9. ALL STUD ANCHORS SHALL BE HOT DIP GALVANIZED ACCORDING TO ASTM A325.

EMBEDMENT DETAIL

2 MANHOLE DETAIL

CONCRETE PIPE SUPPORT DETAIL
I have reviewed the construction plan for the proposed Dundee Fish Hatchery Pump Back System, for potential impacts to natural resources, including a Texas Natural Diversity Database search and a rare, threatened and endangered species review. Based on the information provided, the Wildlife Habitat Assessment Program offers the following comments and recommendations.

To comply with Chapter 64 of the Parks and Wildlife Code and the Migratory Bird Treaty Act, the Wildlife Habitat Assessment Program recommends excluding vegetation clearing activities during the general bird nesting season, March 15 through September 15, to avoid adverse impacts to birds. If clearing vegetation during the migratory bird nesting season is unavoidable, the Wildlife Habitat Assessment Program recommends surveying the area proposed for disturbance to ensure that no nests with eggs or young will be disturbed by operations. Any vegetation (trees, shrubs, and grasses) or bare ground where occupied nests are located should not be disturbed until the eggs have hatched and the young have fledged.

The state-listed threatened Texas horned lizard can be found in open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees. Suitable habitat exists in portions of the project area and this species has been observed on site. If Texas horned lizards are observed during construction, the Wildlife Habitat Assessment Program recommends allowing them to safely leave the site. During pipeline installation open trenches should be inspected to ensure no Texas horned lizards or other reptiles have been trapped. Disturbed areas within suitable habitat for the Texas horned lizard should be revegetated with site-specific native, patchy vegetation rather than sod-forming grasses.