July 24, 2020

ADDENDUM NO. 01

PROJECT NUMBER 1110061
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)

   15065 – FUSIBLE POLYVINYLCHLORIDE PIPE Section 1.01B.2.

2. DRAWINGS (ISSUED SHEETS WITH MODIFICATIONS)

   Tag Table Sheets G-03 through G-05

   Sheet G-03 – TAG TABLE INDEX 1 OF 3

   Sheet G-04 – TAG TABLE INDEX 2 OF 3

   Sheet G-05 - TAG TABLE INDEX 3 OF 3

3. QUESTIONS WITH ANSWERS:

   Q: Good afternoon I have been reviewing the project drawing's / Spec's and did notice that in Article 2 there is a clause for Buy America. We are currently doubling checking to see if we can provide the Aluminum Couplings with this Requirement. If we cannot provide the following items Buy American would we be able to get a waiver? If we can provide them I am afraid the cost of the fittings will triple.
A: No. The Buy America requirement is only for Iron and Steel used in the construction.

Q: I was recently informed of the upcoming Dundee State Fish Hatchery and noticed it calls out for 24” Fusible PVC. I was wondering if there is a specific reason that Fusible PVC was called out? Certa-Lok is an integrally PVC restrained joint solution (no external restraints) that once assembled provides a long service life with no maintenance requirements. Certa-Lok and Fusible PVC often compete against each other in certain projects. In order to provide a competitive bid process for the Dundee State Fish Hatchery, what steps would NAPCO need to perform in order to allow Certa-Lok as an equal to Fusible PVC?

A: As the Project has been designed and is currently out for bids, TPWD cannot entertain approval of alternate materials or systems. However, the awarded contractor may submit substitution requests following award of the contract. Please bid the project as designed.

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: Density testing of the trench backfill should be every 500 LF, and not less than 2 tests per lift per trench. Density testing should be performed on a full-time basis during backfilling operations, and not done by “potholing” specific locations upon completion.

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: The pipe and trench will need to be dewatered for proper installation. Density testing should be performed on a full-time basis at the time of backfilling. Therefore, the density testing will be performed in the dry.

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: If needed, additional staging areas will be established during the pre-construction conference with the successful bidder. The triangular area on the south side, and fronting on FM 1180, may be used, but access from this site to the construction site is limited. The Hatchery’s southerly property boundary does not currently allow for vehicle ingress/egress to the construction site. A
20’ temporary construction easement is shown on the plans and may be used for this access but will require improvements and restoration after construction.

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: In general, fish hatchery roads along the top of the levees are not suitable for heavy construction traffic. If needed for construction, use of heavy trucks, cranes, etc. will need to be examined on a case by case basis, submitted as an RFI with weight and duration information, reviewed and approved by the design engineer before access area.

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: Concrete manholes should be constructed monolithically per Specification 02081 – Cast-in-Place Concrete Manholes, Section 3.02.C

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

A: No. Bid the manholes as shown in the bid documents - 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: The means and methods for pipe installation to be determined by the contractor as long as the pipe is installed in accordance to the construction documents and as shown on the plans.

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: TPWD has had discussions with the Power Utility. TPWD expects to enter an agreement to extend primary electrical service to the site at approximately the same time that this construction project is awarded. TPWD estimates that electrical service will be available within 6 months of the construction start date.

Q: We would like to verify that email of bid proposals is acceptable?
A: Yes. Please refer to the Instruction To Bidders section 1.6.

Q: For the 24” Fusible PVC Gravity Line: Is internal De-Beading required? The reason I ask, is we occasionally see owners prefer the internal fusion bead on fusible pipe be removed in gravity sewer applications due to their concerns of potential solids build up. When Fusible PVC is welded together, the weld produces a small internal bead (which will stick out approximately ¼” inside a 24” pipe) every 45 LF inside the pipe. Although it’s insignificant, I just wanted to check on this for bidding purposes whether or not bead removal is required. We’ve done laboratory and independent testing on this, which confirms the internal bead is negligible from a hydraulic and friction loss standpoint (for both gravity flow and also pressured flow applications). The only time we see people requiring it’s removal is in gravity sewers with low flow, however it’s really an owners/engineers preference whether or not it needs removed. The Owner on our recent 24” Gravity Sewer project in Hurst, TX wanted it removed, however another concurrent project in Sachse, TX utilizing 16” Gravity Sewer did not require it -- We see it both ways and haven’t heard of any problems on either choice.
A: The 24” Fusible PVC Gravity Line should be de-beaded.

Q: Pump 3 has a duty point of 1550 GPM @ 78.4 TDH. Would pump 3 ever see a duty point of 2370 GPM @ 64.2 TDH?
A: Pump 3 describes whichever large pump turns on last. Since both large pumps are on when Pump 3 is on, it is always splitting flow with Pump 2 until Pump 3 turns off at elevation 1014 (TDH = 78.41 ft) to let Pump 2 run by itself between elevations 1012 and 1014 (TDH range: 64.15 ft - 65.26 ft).

Q: Would the following be acceptable for Pump 1 (10 HP)? Please refer to 2.04 and 2.02.G. a. The Sensors: Two Klixon Thermal switches and moisture switch b. Impeller material is ASTM A48 Class 35B Cast Iron without heat treatment c. Impeller / pump casing wear ring: 304 Stainless Steel w/o heat treatment
A: Grudfos is an approved manufacturer in the specifications. Bidder will need to show that they meet the specified pump performance shown in the plans.
Q: Would the following be acceptable for Pump 2 and 3? Please refer to 2.04 and 2.02.G.  
   a. The Sensor: Three Klixon Thermal switches (one per phase),  
   b. Two Moisture Switches – One in the bottom of stator housing, one in top of motor (terminal board) compartment moisture switches  
   c. WIO Sensor (see attached)  
   d. Impeller material is ASTM A48 Class 35B Cast Iron without heat treatment  
   e. NO impeller and casing wear ring. Smart Trim system instead. (see attached)  
A: Grudfos is an approved manufacturer in the specifications. Bidder will need to show that they meet the specified pump performance shown in the plans.

Q: Where is the spec for aluminum pipe?  
A: The aluminum pipe is a specific product type of schedule 40 6061-T6 and no specification was provided.

Q: The tag number schedules call out steel fitting on the fusible PVC pipe. The spec has DI MJ fittings. Please clarify.  
A: Fittings connected to fusible PVC should be DI MJ.

Q: Spec 15065. Which product spec needs to be followed for each process line? 2.01, 2.02, 2.03, 2.04, 2.05 or 2.06  
A: This project is considered non-potable water and will be conforming to AWWA C900 dimensionality. Section 2.03 applies.

Q: The pressure class for PVC is listed on the tag number schedule as 150. PC 150 is not made. Is DR25 (165 pc) acceptable?  
A: The tag table has been revised in the plans to show DR18 pipe. A revised Tag Table is provided by addendum.

Q: Tag number GL1-07A-NA-RFA is not found on the plan sheets.  
A: The tag number is shown on plan sheet M-06, Detail 1.

Q: The lining and coating on the tag schedule lists epoxy/polyurethane for PVC pipe. That is not an option.  
A: The lining column has been removed for PVC pipe on the revised tag table sheets provided by addendum.
Please see attached revisions to clarify the specifications and drawings.

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 01

Sincerely,

Michael Polendo

MICHAEL POLENDO, CTC D CTCM
Contract Manager, TPWD Infrastructure Division

cc: Doug Sauve, Project Manager
    Mark Urbanovsky, Design Manager
    Erin Magee, Brown & Gay Engineers, Inc.
SECTION 15065
FUSIBLE POLYVINYLCHLORIDE PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. SCOPE

1. This section specifies fusible polyvinylchloride pipe, including standards for
dimensionality, testing, quality, acceptable fusion practice, safe handling
and storage.

B. PIPE DESCRIPTION

1. Pipe supplier shall furnish fusible polyvinylchloride pipe conforming to all
standards and procedures and meeting all testing and material properties
as described in this specification.

2. Pipe shall conform to the following dimensionality and general
characteristics table:

<table>
<thead>
<tr>
<th>Pipe Description</th>
<th>Nominal Diameter (in)</th>
<th>DR</th>
<th>Color</th>
<th>Pressure Class (psi)</th>
<th>Required Inner Diameter (in)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Force Main</td>
<td>16</td>
<td>18</td>
<td>Green</td>
<td>235</td>
<td></td>
</tr>
<tr>
<td>Gravity Main</td>
<td>24</td>
<td>18</td>
<td>Green</td>
<td>235</td>
<td></td>
</tr>
</tbody>
</table>

1.02 QUALITY ASSURANCE

A. This section contains references to the following documents. They are a part of
this section as specified and modified. Where a referenced document contains
references to other standards, those other standards are included as references
under this section as if referenced directly. In the event of a conflict between the
requirements of this section and those of the listed documents, the requirements of
this section shall prevail.

B. Unless otherwise specified, references to documents shall mean the documents in
effect at the time of design, bid, or construction, whichever is earliest. If
referenced documents have been discontinued by the issuing organization,
references to those documents shall mean the replacement documents issued or
otherwise identified by that organization or, if there are no replacement
documents, the last version of the document before it was discontinued.

C. Where document dates are given in the following listing, references to those
documents shall mean the specific document version associated with that date,
regardless of whether the document has been superseded by a version with a later date, discontinued or replaced.

1.03 REFERENCES


E. AWWA C651: Standard for Disinfecting Water Mains

F. AWWA C900: Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4in. through 60 in. (100mm through 1500mm), for Water Distribution, latest revision.


I. ASTM D1784: Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds

J. ASTM D1785: Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, 120.


L. ASTM D2241: Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)


O. ASTM F477: Elastomeric Seals (Gaskets) for Joining Plastic Pipe.


S. UNI-B-6: Recommended Practice for Low-Pressure Air Testing of Installed Sewer Pipe

T. UNI-PUB-08: Tapping Guide for PVC Pressure Pipe.


V. NSF-61: Drinking Water System Components – Health Effects

W. PPI TR-2: PVC Range Composition Listing of Qualified Ingredients

1.04 MANUFACTURER REQUIREMENTS

A. All piping shall be made from PVC compound conforming to cell classification 12454 per ASTM D1784.

1.05 FUSION TECHNICIAN REQUIREMENTS

A. Fusion Technician shall be fully qualified by the pipe supplier to install fusible polyvinylchloride pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.

1.06 SPECIFIED PIPE SUPPLIERS

A. Fusible polyvinylchloride pipe shall be used as manufactured under the trade names Fusible C-900®, Fusible C-905®, and FPVC®, for Underground Solutions, Inc., Poway, CA, (858) 679-9551. Fusion process shall be as patented by Underground Solutions, Inc., Poway, CA, Patent No. 6,982,051. Owner and engineer are aware of no other supplier of fusible polyvinylchloride pipe that is an equal to this specified pipe supplier and products.

1.07 WARRANTY

A. The pipe shall be warranted for one year per the pipe supplier’s standard terms. In addition to the standard pipe warranty, the fusion services shall be warranted for one year per the fusion service provider’s standard terms.

1.08 PRE-CONSTRUCTION SUBMITTALS

A. The following PRODUCT DATA is required from the pipe supplier and/or fusion provider:

1. Pipe Size
2. Dimensionality
3. Pressure Class per applicable standard
4. Color
5. Recommended Minimum Bending Radius
6. Recommended Maximum Safe Pull Force
7. Fusion technician qualification indicating conformance with this specification

1.09 POST-CONSTRUCTION SUBMITTALS

A. The following AS-RECORDED DATA is required from the contractor and/or fusion provider to the owner or pipe supplier upon request:

1. Approved datalogger device reports
2. Fusion joint documentation containing the following information:
   a. Pipe Size and Thickness
   b. Machine Size
   c. Fusion Technician Identification
   d. Job Identification
   e. Fusion Joint Number
   f. Fusion, Heating, and Drag Pressure Settings
   g. Heat Plate Temperature
   h. Time Stamp
   i. Heating and Cool Down Time of Fusion
   j. Ambient Temperature

PART 2 - PRODUCTS

2.01 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FOR POTABLE WATER

A. Fusible polyvinylchloride pipe shall conform to AWWA C900, ASTM D2241 or ASTM D1785 for standard dimensions, as applicable. Testing shall be in accordance with the referenced AWWA standards for all pipe types.

B. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

C. Fusible polyvinylchloride pipe shall be manufactured in a standard 40’ nominal length, or custom lengths as specified.

D. Fusible polyvinylchloride pipe shall be blue in color for potable water use.

E. Pipe shall be marked as follows:

1. Nominal pipe size
2. PVC
3. Dimension Ratio, Standard Dimension Ratio, or Schedule
4. AWWA pressure class, or standard pressure rating for non-AWWA pipe, as applicable
5. AWWA standard designation number, or pipe type for non-AWWA pipe, as applicable
6. NSF-61 mark verifying suitability for potable water service
7. Extrusion production-record code
8. Trademark or trade name
9. Cell Classification 12454 and/or PVC material code 1120 may also be included

F. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

2.02 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FOR NON-POTABLE WATER NOT CONFORMING TO AWWA C900 DIMENSIONALITY

A. Fusible polyvinylchloride pipe shall conform to AWWA C900, ASTM D2241 or ASTM D1785 for standard dimensionality, as applicable. Testing shall be in accordance with the referenced AWWA standard.

B. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

C. Fusible polyvinylchloride pipe shall be manufactured in a standard 40’ nominal length, or custom lengths as specified.

D. Fusible polyvinylchloride pipe shall be purple in color for reclaim, reuse, or other non-potable water distribution or conveyance.

E. Pipe shall be marked as follows:

1. Nominal pipe size
2. PVC
3. Dimension Ratio, Standard Dimension Ratio, or Schedule
4. AWWA pressure class, or standard pressure rating for non-AWWA pipe, as applicable
5. AWWA standard designation number, or pipe type for non-AWWA pipe, as applicable
6. Extrusion production-record code
7. Trademark or trade name
8. Cell Classification 12454 and/or PVC material code 1120 may also be included
9. For reclaim water service, the wording: “Reclaimed Water, NOT for Potable Use”

F. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.
2.03 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FOR NON-POTABLE WATER CONFORMING TO AWWA C900 DIMENSIONALITY

A. Fusible polyvinylchloride pipe shall conform to AWWA C900 standard.

B. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

C. Fusible polyvinylchloride pipe shall be manufactured in a standard 40’ nominal length, or custom lengths as specified.

D. Fusible polyvinylchloride pipe shall be purple in color for reclaim, reuse, or other non-potable water distribution or conveyance.

E. Pipe shall be marked as follows:

1. Nominal pipe size
2. PVC
3. Dimension Ratio, Standard Dimension Ratio, or Schedule
4. AWWA pressure class
5. AWWA standard designation number
6. Extrusion production-record code
7. Trademark or trade name
8. Cell Classification 12454 and/or PVC material code 1120 may also be included
9. For reclaim water service, the wording: “Reclaimed Water, NOT for Potable Use”

F. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

2.04 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FOR WASTEWATER NOT CONFORMING TO AWWA C900 DIMENSIONALITY

A. Fusible polyvinylchloride pipe shall conform to AWWA C900, ASTM D2241 or ASTM D1785 for standard dimensionality, as applicable. Testing shall be in accordance with the referenced AWWA standard.

B. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

C. Fusible polyvinylchloride pipe shall be manufactured in a standard 40’ nominal length, or custom lengths as specified.

D. Fusible polyvinylchloride pipe shall be green in color for wastewater use.

E. Pipe shall be marked as follows:
1. Nominal pipe size
2. PVC
3. Dimension Ratio, Standard Dimension Ratio, or Schedule
4. AWWA pressure class, or standard pressure rating for non-AWWA pipe, as applicable
5. AWWA standard designation number, or pipe type for non-AWWA pipe, as applicable
6. Extrusion production-record code
7. Trademark or trade name
8. Cell Classification 12454 and/or PVC material code 1120 may also be included

F. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

2.05 FUSIBLE POLYVINYLCHLORIDE PRESSURE PIPE FOR WASTEWATER CONFORMING TO AWWA C900 DIMENSIONALITY

A. Fusible polyvinylchloride pipe shall conform to AWWA C900 standard.
B. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.
C. Fusible polyvinylchloride pipe shall be manufactured in a standard 40’ nominal length, or custom lengths as specified.
D. Fusible polyvinylchloride pipe shall be green in color for wastewater use.
E. Pipe shall be marked as follows:

1. Nominal pipe size
2. PVC
3. Dimension Ratio, Standard Dimension Ratio, or Schedule
4. AWWA pressure class
5. AWWA standard designation number
6. Extrusion production-record code
7. Trademark or trade name
8. Cell Classification 12454 and/or PVC material code 1120 may also be included

F. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

2.06 FUSIBLE POLYVINYLCHLORIDE NON-PRESSURE PIPE FOR WASTEWATER OR SURFACE WATER

A. Fusible polyvinylchloride pipe shall conform to ASTM D3034 or ASTM F679.
B. Fusible polyvinylchloride pipe may instead conform to AWWA C900, ASTM D2241 or ASTM D1785 for standard dimensionality, as applicable.

C. Fusible polyvinylchloride pipe shall be extruded with plain ends. The ends shall be square to the pipe and free of any bevel or chamfer. There shall be no bell or gasket of any kind incorporated into the pipe.

D. Fusible polyvinylchloride pipe shall be manufactured in a standard 40’ nominal length, or custom lengths as specified.

E. Fusible polyvinylchloride pipe shall be green in color for wastewater use. Fusible polyvinylchloride pipe shall be white in color for surface or storm water use.

F. Pipe shall be marked as follows:
   1. Nominal pipe size
   2. PVC
   3. Dimension Ratio, Standard Dimension Ratio, or Schedule
   4. Pressure class or standard pressure rating
   5. Standard designation number or pipe type
   6. Extrusion production-record code
   7. Trademark or trade name
   8. Cell Classification 12454 and/or PVC material code 1120 may also be included

G. Pipe shall be homogeneous throughout and be free of visible cracks, holes, foreign material, blisters, or other visible deleterious faults.

2.07 FUSION JOINTS

A. Unless otherwise specified, fusible polyvinylchloride pipe lengths shall be assembled in the field with butt-fused joints. The Contractor shall follow the pipe supplier’s written guidelines for this procedure. All fusion joints shall be completed as described in this specification.

2.08 CONNECTIONS AND FITTINGS FOR PRESSURE APPLICATIONS

A. Connections shall be defined in conjunction with the coupling of project piping, as well as the tie-ins to other piping systems.

B. DUCTILE IRON MECHANICAL AND FLANGED FITTINGS
   1. Acceptable fittings for use with fusible polyvinylchloride pipe shall include standard ductile iron fittings conforming to AWWA/ANSI C110/A21.10, or AWWA/ANSI C153/A21.53 and AWWA/ANSI C111/A21.11.
   2. Connections to fusible polyvinylchloride pipe may be made using a restrained or non-restrained retainer gland product for PVC pipe, as well as for MJ or flanged fittings.
3. Bends, tees and other ductile iron fittings shall be restrained with the use of thrust blocking or other means as indicated in the construction documents.

4. Ductile iron fittings and glands must be installed per the manufacturer’s guidelines.

5. If required, linings for Ductile Iron fittings shall meet the following requirements for the following service environments:
   
a. Wastewater:
      1) Ceramic Epoxy shall be Tnemec Perma-Shield 431.
      2) Polyurethane shall be DuraShield 210 or 310.

   b. Potable Water:
      1) Liquid Epoxy shall be 100% solids liquid epoxy, Tnemec Epoxyline Series FC22.
      2) Polyurethane shall be DuraShield 210-61 or 310-61.

6. If required, coatings for Ductile Iron fittings shall meet the following requirements for buried and/or immersion service duty:
   
a. Polyurethane shall be DuraShield 210 or 310.
   b. Liquid Epoxy shall be 100% solids liquid epoxy, Tnemec Epoxyline Series FC22.
   c. Coal tar epoxy shall be Sherwin Williams Targuard.

C. PVC GASKETED, PUSH-ON FITTINGS

1. Acceptable fittings for use with fusible polyvinylchloride pipe shall include standard PVC pressure fittings conforming to AWWA C900.

2. Acceptable fittings for use joining fusible polyvinylchloride pipe other sections of fusible polyvinylchloride pipe or other sections of PVC pipe shall include gasketed PVC, push-on type couplings and fittings, including bends, tees, and couplings as shown in the drawings.

3. Bends, tees and other PVC fittings shall be restrained with the use of thrust blocking or other restraint products as indicated in the construction documents.

4. PVC gasketed, push-on fittings and mechanical restraints, if used, must be installed per the manufacturer’s guidelines.

D. FUSIBLE POLYVINYL CHLORIDE SWEEPS OR BENDS

1. Fusible polyvinyl chloride sweeps or bends shall conform to the same sizing convention, diameter, dimensional tolerances and pressure class of the pipe being joined using the sweep or bend.

2. Fusible polyvinyl chloride sweeps or bends shall be manufactured from the same fusible polyvinyl chloride pipe being used for the installation and shall have at least 2 feet of straight section on either end of the sweep or bend to allow for fusion of the sweep to the pipe installation. There shall be no gasketed connections utilized with a fusible polyvinyl chloride sweep.
3. Standard fusible polyvinyl chloride sweeps or bend angles shall not be greater than 22.5 degrees and shall be used in nominal diameters ranging from 4-inch through 16-inch.

E. SLEEVE-TYPE COUPLINGS

1. Sleeve-type mechanical couplings shall be manufactured for use with PVC pressure pipe and may be restrained or unrestrained as indicated in the construction documents.
2. Sleeve-type couplings shall be rated at the same or greater pressure carrying capacity as the pipe itself.

F. EXPANSION AND FLEXIBLE COUPLINGS

1. Expansion-type mechanical couplings shall be manufactured for use with PVC pipe, and may be restrained or unrestrained as indicated in the construction documents.
2. Expansion-type mechanical couplings shall be rated at the same or greater pressure carrying capacity as the pipe itself.

G. CONNECTION HARDWARE

1. Bolts and nuts for buried service shall be made of non-corrosive, high-strength, low-alloy steel having the characteristics specified in ANSI/AWWA C111/A21.11, regardless of any other protective coating.

2.09 CONNECTIONS FOR GRAVITY PIPES AND NON-PRESSURE APPLICATIONS

A. The following connections are to be used in conjunction with tie-ins to other non-pressure, gravity sewer piping and/or structures, and shall be as indicated in the construction documents.

B. PVC GASKETED, PUSH-ON COUPLINGS

1. Acceptable couplings for joining fusible polyvinylchloride pipe to other sections of fusible polyvinylchloride pipe or other sections of PVC pipe shall include gasketed PVC, push-on type couplings as indicated in the construction documents.
2. PVC gasketed, push-on fittings and/or restraint hardware must be installed per the manufacturer’s guidelines.

C. FUSIBLE POLYVINYL CHLORIDE SWEEPS OR BENDS

1. Fusible polyvinyl chloride sweeps or bends shall conform to the same sizing convention, diameter, dimensional tolerances and pressure class of the pipe being joined using the sweep or bend.
2. Fusible polyvinyl chloride sweeps or bends shall be manufactured from the same fusible polyvinyl chloride pipe being used for the installation and shall have at least 2 feet of straight section on either end of the sweep or bend.
to allow for fusion of the sweep to the pipe installation. There shall be no
gasketed connections utilized with a fusible polyvinyl chloride sweep.

3. Standard fusible polyvinyl chloride sweeps or bend angles shall not be
greater than 22.5 degrees and shall be used in nominal diameters ranging
from 4 inch through 16 inches.

D. SLEEVE-TYPE COUPLINGS

1. Sleeve-type mechanical couplings shall be manufactured for use with PVC
pipe, and may be restrained or unrestrained as indicated in the
construction documents.

E. EXPANSION AND FLEXIBLE COUPLINGS

1. Expansion-type mechanical couplings shall be manufactured for use with
PVC pipe, and may be restrained or unrestrained as indicated in the
construction documents.

F. CONNECTION HARDWARE

1. Bolts and nuts for buried service shall be made of non-corrosive, high-
strength, low-alloy steel having the characteristics specified in
ANSI/AWWA C111/A21.11, regardless of any other protective coating.

G. CONNECTION TO CONCRETE MANHOLES AND STRUCTURES

1. Fusible polyvinylchloride pipe shall be connected to manholes and other
structures to provide a leak-free, properly graded flow into or out of the
manhole or structure.

2. Connections to existing manholes and structures shall be as indicated in
the construction documents.

   a. For a cored or drilled opening provide a flexible, watertight connection
      that meets and/or exceeds ASTM C923.
   b. For a knockout opening, provide a watertight connection (waterstop or
      other method) meeting the material requirements of ASTM C923 that is
      securely attached to the pipe with stainless steel bands or other means.
   c. Grout opening in manhole wall with non-shrink grout. Pour concrete
      collar around pipe and outside manhole opening. Provide flexible pipe
      joint or flexible connector within 2 feet of the collar.

3. Connections to a new manhole or structure shall be as indicated in the
construction documents.

   a. A flexible, watertight gasket per ASTM C923 shall be cast integrally
      with riser section(s) for all precast manhole and structures.
   b. Drop connections shall be required where shown on drawings.
   c. Grout internal joint space with non-shrink grout.
PART 3 - EXECUTION

3.01 DELIVERY AND OFF-LOADING

A. All pipe shall be bundled or packaged in such a manner as to provide adequate protection of the ends during transportation to the site. Any pipe damaged in shipment shall be replaced as directed by the owner or engineer.

B. Each pipe shipment should be inspected prior to unloading to see if the load has shifted or otherwise been damaged. Notify owner or engineer immediately if more than immaterial damage is found. Each pipe shipment should be checked for quantity and proper pipe size, color, and type.

C. Pipe should be loaded, off-loaded, and otherwise handled in accordance with AWWA M23, and all of the pipe supplier’s guidelines shall be followed.

D. Off-loading devices such as chains, wire rope, chokers, or another pipe handling implements that may scratch, nick, cut, or gouge the pipe are strictly prohibited.

E. During removal and handling, be sure that the pipe does not strike anything. Significant impact could cause damage, particularly during cold weather.

F. If appropriate unloading equipment is not available, pipe may be unloaded by removing individual pieces. Care should be taken to ensure that pipe is not dropped or damaged. Pipe should be carefully lowered, not dropped, from trucks.

3.02 HANDLING AND STORAGE

A. Any length of pipe showing a crack, or which has received a blow that may have caused an incident fracture, even though no such fracture can be seen, shall be marked as rejected and removed at once from the work. Damaged areas, or possible areas of damage may be removed by cutting out and removing the suspected incident fracture area. Limits of the acceptable length of pipe shall be determined by the owner or engineer.

B. Any scratch or gouge greater than 10% of the wall thickness will be considered significant and can be rejected unless determined acceptable by the owner or engineer.

C. Pipe lengths should be stored and placed on level ground. Pipe should be stored at the job site in the unit packaging provided by the manufacturer. Caution should be exercised to avoid compression, damage, or deformation to the ends of the pipe. The interior of the pipe, as well as all end surfaces, should be kept free from dirt and foreign matter.

D. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.
E. If pipe is to be stored for periods of 1 year or longer, the pipe should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excess heat accumulation.

F. Pipe shall be stored and stacked per the pipe supplier’s guidelines.

3.03 FUSION PROCESS

A. GENERAL

1. Fusible polyvinylchloride pipe will be handled in a safe and non-destructive manner before, during, and after the fusion process and in accordance with this specification and pipe supplier’s guidelines.

2. Fusible polyvinylchloride pipe will be fused by qualified fusion technicians, as documented by the pipe supplier.

3. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine.

4. Only appropriately sized and outfitted fusion machines that have been approved by the pipe supplier shall be used for the fusion process. Fusion machines must incorporate the following elements:

   a. HEAT PLATE - Heat plates shall be in good condition with no deep gouges or scratches. Plates shall be clean and free of any debris or contamination. Heater controls shall function properly; cord and plug shall be in good condition. The appropriately sized heat plate shall be capable of maintaining a uniform and consistent heat profile and temperature for the size of pipe being fused, per the pipe supplier’s guidelines.

   b. CARRIAGE – Carriage shall travel smoothly with no binding at less than 50 psi. Jaws shall be in good condition with proper inserts for the pipe size being fused. Insert pins shall be installed with no interference to carriage travel.

   c. GENERAL MACHINE - Overview of machine body shall yield no obvious defects, missing parts, or potential safety issues during fusion.

   d. DATA LOGGING DEVICE – An approved datalogging device with the current version of the pipe supplier’s recommended and compatible software shall be used. Datalogging device operations and maintenance manual shall be with the unit at all times. If fusing for extended periods of time, an independent 110V power source shall be available to extend battery life.

5. Other equipment specifically required for the fusion process shall include the following:

   a. Pipe rollers shall be used for support of pipe to either side of the machine
b. A weather protection canopy that allows full machine motion of the heat plate, fusion assembly and carriage shall be provided for fusion in inclement, extreme temperatures, and/or windy weather, per the pipe supplier’s recommendations.
c. An infrared (IR) pyrometer for checking pipe and heat plate temperatures.
d. Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.
e. Facing blades specifically designed for cutting fusible polyvinylchloride pipe shall be used.

B. JOINT RECORDING

1. Each fusion joint shall be recorded and logged by an electronic monitoring device (data logger) connected to the fusion machine. The fusion data logging and joint report shall be generated by software developed specifically for the butt-fusion of fusible polyvinyl chloride pipe. The software shall register and/or record the parameters required by the pipe supplier and these specifications. Data not logged by the data logger shall be logged manually and be included in the Fusion Technician’s joint report.

3.04 GENERAL INSTALLATION

A. Installation guidelines from the pipe supplier shall be followed for all installations.

B. The fusible polyvinylchloride pipe will be installed in a manner so as not to exceed the recommended bending radius.

C. Where fusible polyvinylchloride pipe is installed by pulling in tension, the recommended Safe Pulling Force established by the pipe supplier shall not be exceeded.

3.05 PREPARATION PRIOR TO MAKING CONNECTIONS INTO EXISTING PIPING SYSTEMS

A. Approximate locations for existing piping systems are shown in the construction documents. Prior to making connections into existing piping systems, the contractor shall:

1. Field verify location, size, piping material, and piping system of the existing pipe.
2. Obtain all required fittings, which may include saddles, sleeve type couplings, flanges, tees, or others as shown in the construction documents.
3. Have installed all temporary pumps and/or pipes in accordance with established connection plans.

B. Unless otherwise approved, new piping systems shall be completely assembled and successfully tested prior to making connections into existing pipe systems.
3.06 PIPE SYSTEM CONNECTIONS

A. Pipe connection shall be installed per applicable standards and regulations, as well as per the connection manufacturer’s guidelines and as indicated in the construction documents. Pipe connections to structures shall be installed per applicable standards and regulations, as well as per the connection manufacturer’s guidelines.

3.07 TAPPING FOR POTABLE AND NON-POTABLE WATER APPLICATIONS

A. Tapping shall be performed using standard tapping saddles designed for use on PVC piping in accordance with AWWA C605. Tapping shall be performed only with use of tap saddles or sleeves. NO DIRECT TAPPING WILL BE PERMITTED. Tapping shall be performed in accordance with the applicable sections for Saddle Tapping per Uni-Pub-8.

B. All connections requiring a larger diameter than that recommended by the pipe supplier, shall be made with a pipe connection as specified and indicated on the drawings.

C. Equipment used for tapping shall be made specifically for tapping PVC pipe:
   1. Tapping bits shall be slotted “shell” style cutters, specifically made for PVC pipe. ‘Hole saws’ made for cutting wood, steel, ductile iron, or other materials are strictly prohibited.
   2. Manually operated or power operated drilling machines may be used.

D. Taps may be performed while the pipeline is filled with water and under pressure (‘wet’ tap,) or when the pipeline is not filled with water and not under pressure (‘dry’ tap).

3.08 TESTING

A. Testing shall comply with all applicable jurisdictional building codes, statutes, standards, regulations, and laws.

B. HYDROSTATIC TESTING AND LEAKAGE TESTING FOR PRESSURE PIPING
   1. Hydrostatic and leakage testing for piping systems that contain mechanical jointing as well as fused PVC jointing shall comply with AWWA C605.
   2. Unless agreed to or otherwise designated by the owner or engineer, for a simultaneous hydrostatic and leakage test following installation, a pressure equal to 150% of working pressure at point of test, but not less than 125% of normal working pressure at highest elevation shall be applied. The duration of the pressure test shall be for two (2) hours.
   3. If hydrostatic testing and leakage testing are performed at separate times, follow procedures as outlined in AWWA C605.
   4. In preparation for pressure testing the following parameters must be followed:
a. All air must be vented from the pipeline prior to pressurization. This may be accomplished with the use of the air relief valves or corporation stop valves, vent piping in the testing hardware or end caps, or any other method which adequately allows air to escape the pipeline at all high points. Venting may also be accomplished by ‘flushing’ the pipeline in accordance with the parameters and procedures as described in AWWA C605.

b. The pipeline must be fully restrained prior to pressurization. This includes complete installation of all mechanical restraints per the restraint manufacturer’s guidelines, whether permanent or temporary to the final installation. This also includes the installation and curing of any and all required thrust blocking. All appurtenances included in the pressure test, including valves, blow-offs, and air-relief valves shall be checked for proper installation and restraint prior to beginning the test.

c. Temporary pipeline alignments that are being tested, such as those that are partially installed in their permanent location shall be configured to minimize the amount of potentially trapped air in the pipeline.

C. LEAKAGE TESTING FOR NON-PRESSURE PIPING

1. Gravity pipelines that contain mechanical jointing in addition to fused PVC joints may need to be tested for excessive leakage.

2. Gravity pipe leakage testing may include appropriate water or low-pressure air testing. The leakage outward or inward (exfiltration or infiltration) shall not exceed 25 gallons per inch of pipe diameter per mile per day for any section of the system. An exfiltration or infiltration test shall be performed with a minimum positive head of two feet. The air test, if used, shall be conducted in accordance with one of the following Standards:

   a. ASTM F1417
   b. UNI-B-6

3. The testing method selected shall properly consider the existing groundwater elevations during the test.

D. DEFLECTION TESTING FOR NON-PRESSURE PIPING

1. After completion of the backfill, the engineer or owner may require that a deflection test be performed.

2. Deflection tests should be conducted using a go/no-go mandrel. The mandrel’s outside dimension shall be sized to permit no more than 7.5 percent deflection. The percent deflection shall be established from the base inside diameter of the pipe. If the internal beading of the fused joints for the pipe is not required to be removed, the mandrel shall account for this clearance as well. The mandrel shall be approved by the owner or engineer prior to use. Lines that permit safe entry may allow other deflection test options, such as direct measurements.
E. DISINFECTION OF THE PIPELINE FOR POTABLE WATER PIPING

1. After installation, the pipeline, having passed all required testing, shall be disinfected prior to being put into service. Unless otherwise directed by the owner or engineer, the pipeline will be disinfected per AWWA C651.

F. PARTIAL TESTING

1. Segments of the pipe may be tested separately in accordance with standard testing procedure, as approved by the owner and engineer.

END OF SECTION
### Sheet Title

**DUNDEE FISH HATCHERY**

**TPWD No. 1110061**

**WATER REUSE - EFFLUENT PUMP BACK**

700 North Pearl Street, Suite 2100

BGE, Inc.

Dallas, TX 75201

TBPE Registration No. F-1046

Tel: 469-621-3200

www.bgeinc.com

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**1110061-G-02A**

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### LEGEND

- **A** - ALUMINUM LINE
- **B** - BRASS LINE
- **C** - COPPER LINE
- **D** - STEEL LINE
- **E** - OTHER METAL PIPE
- **F** - GAS LINE
- **G** - PVC PIPE
- **H** - OTHER PVC PIPE
- **I** - MUD LINE
- **J** - DRAINAGE LINE
- **K** - OTHER DRAINAGE LINE
- **L** - PIPE IN GROUND
- **M** - OTHER PIPE IN GROUND
- **N** - ANCHOR
- **O** - VALVE
- **P** - PUMP
- **Q** - MANometers
- **R** - GAUGE
- **S** - GROUNDED PLUG CHECK VALVE
- **T** - FLASH VALVE
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70

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