ADDENDUM NO. 2

City of Greenfield
Waterview Lift Station Relocation Project

Number of Pages (Including this page): 30

July 1, 2024

NOTICE TO BIDDERS – IT IS MANDATORY THAT, UPON RECEIPT OF THIS ADDENDUM, YOU 1) SIGN, 2) DATE, 3) WRITE IN YOUR COMPANY NAME, AND 4) RETURN THIS SHEET TO SAMANTHA PROULX OF AMERICAN STRUCTUREPOINT, SPROULX@STRUCTUREPOINT.COM – THANK YOU.

IF YOU HAVE ANY QUESTIONS CONCERNING THIS ADDENDUM, PLEASE CALL SAM PROULX @ (614) 901-2235.

1. Please sign below to acknowledge receipt of this addendum. _____	2. Please insert date of receipt. Date:_____	3. Please insert your company name _____	4. Please return to Samantha Proulx. sproulx@structurepoint.com

This addendum is being issued as a supplement to the specifications and drawings and shall be considered an integral part of the same. This addendum will become part of the contract documents.

ADDENDUM NO. 2

WATERVIEW LIFT STATION RELOCATION PROJECT
CITY OF GREENFIELD, INDIANA
AMERICAN STRUCTUREPOINT PROJECT NO. 2021.02592

JULY 1, 2024

PREPARED BY:

AMERICAN STRUCTUREPOINT, INC.
116 E. BERRY STREET, SUITE 1515
FORT WAYNE, IN 46802

This Addendum forms part of the Contract Documents and modifies the original Bidding Documents as noted below. Acknowledge receipt of the Addendum in the space provided in the Bid Form. Failure to do so may subject Bidder to disqualification.

REVISIONS TO PROJECT MANUAL:

1. **Replace** BID-3 and BID-4 sheets:

    - Bid item 008 - 12" Force Main, HDPE, DR 11 (Open Cut) quantity has been updated.
    - Bid Item 009 - 12" Force Main, HDPE, DR 11 (Directionally Drilled) quantity has been updated.
    - Bid Item 009A - 12" Force Main, HDPE, DR 11 (Directionally Drilled or Open Cut) has been added.

PLANS:

1. None

CLARIFICATIONS/QUESTIONS AND ANSWERS:

1. **Question:** Can the structures be produced with the dry cast method and a grouted connection instead of wet cast with a booted connection?
   Answer: No, wet cast with a booted connection shall be used. Boots shall be grouted with hydraulic cement plug both inside and out, per city standards.

2. **Question:** Is there soils report with this project?
   Answer: *Yes, see Addendum 1 for the soils report.*

3. **Question:** Is structure 113 the only precast structure to get the Epoxy Coating from Conco?
   Answer: *Yes, only the manhole with force main connection will have interior epoxy spray coating.*

4. **Question:** Will there be specifications on the generator?
   Answer: *See the city specifications titled "Sanitary Sewer Lift Station and Force Main Specifications" at city website and attached to Addendum 2.*

5. **Question:** Is any telemetry or SCADA required for the pumps?
   Answer: *Yes, see Sheet C-119 and Electrical sheets E-102 and E-105 for SCADA requirements on plans. See the city specifications titled "Sanitary Sewer Lift Station and Force Main Specifications" at city website and attached to Addendum 2.*

6. **Question:** Are domestic materials required?
   Answer: *No, but contractor must submit list of major products proposed for use, with name of manufacturer, trade name, and model number of each product.*

7. **Question:** Should quantities listed on the bid form or shown on the plans be used for bidding?
   Answer: *Quantities shown on the bid form should be used for bidding.*

8. **Question:** For Bid Item 025, Sewer Connection to Existing Manhole, should the units be each?
   Answer: *Units are a lump sum per manhole.*

9. **Question:** For Bid Item 028, Compacted Aggregate, are there pay widths available for the item? Could this be changed to tons?
   Answer: *Pay widths for this quantity use the city standards details for trenching, see sheets C-123 and C-124. Item to remain as cubic yards for bidding.*

10. **Question:** Bid Form Item 9 has a quantity of 702 LF for Directionally Drilled force main. This quantity does not match what is called out in the plans for directionally drilled. It looks like the quantity intended to be directionally drilled is from 12+88 to 19+90, however there are two sections along that line that are called out as open cut. Please confirm that entire length can be directionally drilled.
    Answer: *No, see plan Sheet C113 through C-115 for where force main may be directionally drilled. There is 510' for directional drill, 192' for open cut, and 274' for either directional drill or open cut installation before the lift station site. See updated Bid Form for updated quantities in Bid Items 008, 009 and 009A.*

11. **Question:** Bid Form Item 8 has a quantity of 274 LF, which corresponds to the quantity indicated on the plans that can be either directionally drilled or open cut. Can the bid item description be updated to reflect that option (Open Cut/Directionally Drilled)?
    Answer: *Bid Item 009A has been added reflect installation of either open cut or directional drill. Bid Items 008 and 009 have been updated to reflect directional drill and open cut installation quantities.*

12. **Question:** Sheets C-113 through C-115 show 486' of open cut installation for the force main, and 510' of directional drill installation for force main. The bid sheet shows 274' of open cut installation, and 712' of directional drill installation. Which is correct?
    Answer: *Note that Sheet C-113 also has a profile for PVC gravity sanitary sewer. There should be 192' of open cut, 510' for directional drill, and 274' for either directional drill or*

open cut installation before the lift station site. See updated Bid Form for updated quantities in Bid Items 008, 009 and 009A.

13. **Question:** Is there a profile plan for the 8" drilled pipe from structure 112 to the wet well?
    Answer: *Note that Addendum 1 updated sheet C-112. Pipe is no longer 8" directional drill, but 8" PVC SDR 35 gravity sanitary sewer, installed by open cut. Profile is shown on sheet C-112.*

14. **Question:** Please Clarify substantial Completion Date: Section ITB-7 9.1 has a substantial completion date of August 1, 2025 with final of September 5, 2025. Page A-3 Section 3. Contract Time 3.3 has a substantial completion date of March 1, 2025.
    Answer: *Project manual dates are correct:*
    For the whole project, substantial completion date is August 1, 2025 and final completion date is September 5, 2025.
    For the portion of the gravity main through the fairgrounds, substantial completion date is February 17, 2025 and final completion date is March 1, 2025. This area must be returned to use no later than March 1, 2025 for the Ag Association horse and pony practice area. Proper compaction of the disturbed area must be done in lifts and maintained throughout the course of construction by the Contractor.

15. **Question:** Section 33 32 19, Public Utility Wastewater Pumping Stations specification references a Section 406 of the City of Greenfield Public Improvement Design Standards for additional lift station standards. There do not appear to be any lift station or sanitary force main specifications in the referenced Greenfield document. If there is a City specification for lift stations and force mains, please provide the document. If not, please provide more information on what the check valve, ARV, and plug valve requirements are for this lift station.
    Answer: *See the city specifications titled "Sanitary Sewer Lift Station and Force Main Specifications" at city website and attached to Addendum 2.*

16. **Question:** On sheet C-107, there appear to be 5 sanitary structures called out to be abandoned in place. Is there a specification or detail available for how the structures are to be abandoned in place?
    Answer: *There is not an additional detail – pipe and structures are to be abandoned in place and pipes are to be capped as noted on plan sheet C-108.*

17. **Question:** On C-108, it appears that the existing lift station lid and access hatch will remain after the wet well is converted to a manhole. Should the existing lid be replaced with a sanitary manhole casting?
    Answer: *No, existing access hatch is to remain, as shown on the plans.*

18. **Question:** Sheet C-120 calls for the discharge manhole to "be treated with epoxy coating as manufactured by Conco Spray Solutions for corrosion protection." Are any other corrosion protection coating systems approved for this application?
    Answer: *No other coating systems approved at this time.*

19. **Question:** Are there any electrical or controls specifications available for this project?
    Answer: *See the city specifications titled "Sanitary Sewer Lift Station and Force Main Specifications" at city website and attached to Addendum 2.*

OTHER ITEMS ATTACHED:

1. Acknowledgement of Addendum
2. Sanitary Sewer Lift Station and Force Main Specifications

END OF ADDENDUM NO. 2

PART 3
CONTRACT ITEMS AND UNIT PRICES

Bid Item	Work Item Number	Description	Quantity	Unit	Unit Price	Item Total
001	01 11 21-A	MOBILIZATION AND DEMOBILIZATION	1	LS		
002	01 11 21-B	CONSTRUCTION CONTINGENCY	1	LS	$50,000.00	$50,000
003	01 71 16-A	VIDEO DOCUMENTATION OF CONDITIONS	1	LS		
004	01 55 26-A	MAINTENANCE AND PROTECTION OF TRAFFIC	1	LS		
005	33 05 13.16-F	ABANDON EXISTING PUMP STATION	1	LS		
006	01 11 21-C	PLUG EXISTING 6" PIPE AT MANHOLE NEAR KIRKPATRICK PL.	1	LS		
007	33 32 19-A	REGIONAL PUMP STATION AND RELATED APPURTENANCES	1	LS		
008	33 05 38.16-A	12" FORCE MAIN, HDPE, DR 11 (Open Cut)	192	LF		
009	33 05 38.16-A	12" FORCE MAIN, HDPE, DR 11 (Directionally Drilled)	510	LF		
009A	33 05 38.16-A	12" FORCE MAIN, HDPE, DR 11 (Directionally Drilled or Open Cut)	274	LF		
010		**ITEM REMOVED**				
011	33 31 11-B	18" PVC, SDR 35, SANITARY SEWER	1,732	LF		
012	33 31 11-C	12" PVC, SDR 35, SANITARY SEWER	317	LF		
013	33 31 11-D	8" PVC, SDR 35, SANITARY SEWER	171	LF		
014	33 31 11-E	6" SEWER LATERALS	700	LF		
015	33 31 11-F	CLEANOUTS	20	EA		
016	33 05 34.13-A	12" RCP, STORM SEWER	51	LF		
017	33 49 13-A	STORM PIPE, REMOVE (ALL SIZES)	50	LF		
018	33 49 13-B	DRAIN TILE REPAIR (Assumed Quantity)	5	EA		
019	33 49 13-C	CASTING, INLET, ADJUST TO GRADE	5	EA		
020	33 49 13-D	STORM SEWER INLET WITH CASTING	3	EA		
021	33 49 13-D	48" STORM SEWER MANHOLE	1	EA		
022	33 05 13.16-A	48" SANITARY MANHOLES	13	EA		
023	33 05 13.16-B	MANHOLE REMOVAL/ABANDONMENT	6	EA		
024	33 05 13.16-C	INLET, REMOVE	3	EA		
025	33 05 13.16-D	SEWER CONNECTION TO EXISTING MANHOLE	5	LS		

026	33 05 13-E	FORCE MAIN CONNECTION TO MANHOLE	1	LS		
027	31 23 17-A	STONE DRIVE REPAIR, 8" Depth	600	SY		
028	31 23 17-B	COMPACTED AGGREGATE, NO. 53 / 73	2,300	CY		
029	31 23 17-C	FLOWABLE FILL FOR PIPE ABANDONMENT	25	CY		
030	32 12 16-A	COMMON EXCAVATION (ASPHALT PAVEMENT)	396	CY		
031	32 16 23-A	PAVEMENT REMOVAL (CONCRETE PAVEMENT)	3,630	SY		
032	32 16 23-B	CURB RAMP, CONCRETE	20	SY		
033	32 16 23-C	CURB AND GUTTER, ROLL CURB	2,156	LF		
034	32 16 23-D	CURB AND GUTTER, REMOVE	2,156	LF		
035	32 16 23-E	SIDEWALK, CONCRETE	125	SY		
036	32 16 23-F	SIDEWALK, CONCRETE, REMOVE	145	SY		
037	32 12 16-B	ASPHALT SURFACE	282	TON		
038	32 12 16-B	ASPHALT INTERMEDIATE	520	TON		
039	32 12 16-B	ASPHALT BASE	1,045	TON		
040	32 12 16-C	MILLING, ASPHALT, 1 1/2 IN.	263	SY		
041	32 92 19-A	SEEDING AND RESTORATION	1	LS		
042	01 57 13-A	EROSION CONTROL	1	LS		

A. Total of Base Bid Items (in words):	*(In figures)*
	$

Sanitary Sewer Lift Station and Force Main Specifications

The Standards and Specifications contained in this section are in addition to those in previous sections of the Sanitary Sewer Standards contained in section 406 of the City of Greenfield Public Improvement Design Standards.

A. General

1. Details
    a. All details shall be shown as City of Greenfield Standard Construction details, the latest revision of which can be found in the document section of the City's website: https://www.greenfieldin.org/
2. Construction Plans
    a. The plans for the construction of a sanitary sewer lift station and/or force main shall be provided by the Design Engineer and submitted to the City Engineer and Wastewater Utility Manager for approval. Record drawings, certified by a registered Indiana Professional Engineer, shall be submitted to the Wastewater Utility after completion and startup and, at minimum, one week prior to acceptance by the City for the installed sanitary infrastructure improvements.
3. Standards
    a. Design, construction, and testing must comply with the City of Greenfield Standards, ASTM, and the IDEM Sanitary Sewer Constructions Standards.
    b. The details contained in these specifications are subject to change. It is the responsibility of the Project Engineer to confirm these specifications with the Wastewater Utility Manager or the City Engineer.
4. Permitting and Approvals
    a. Property owner/Developer is responsible for obtaining any and all necessary easements, permits, and approvals prior to the start of construction.
    b. Capacity Allocation approval must be submitted to the Wastewater Utility Manager for completion. All permits shall be submitted to the IDEM Facilities Construction and Engineering Support Section for approval. The City of Greenfield Wastewater Utility DOES NOT approve or issue sanitary sewer construction permits.

c. The Wastewater Utility shall issue an approval letter upon complete review and acceptance of the plans for the construction of sanitary sewer infrastructure improvements.

5. Pre-Construction Submittals
    a. All submittals shall be signed and sealed for compliance to the specifications by the contractor and reviewed and stamped by the Project Engineer/Designer. Compliance with the projects Plans and Specifications shall be the responsibility of the Contractor. All shop drawings for sanitary sewer materials, including pipe, fittings, structures, and equipment, once approved by the Design Engineer/Designer, shall be submitted to the Wastewater Utility Manager.
    b. Any required bypass pumping and/or connection to the existing sanitary sewer system must be approved by the Wastewater Utility.
    c. Construction sequence schedule, including bypass and connection to the existing system, shall be submitted to the Utility for approval.
    d. Copies of the completed and approved IDEM construction permit shall be filed with the City Engineer and the Wastewater Utility prior to the start of construction.
6. Submittals to the Wastewater Utility Prior to Acceptance
    a. Hydrostatic, vacuum, draw down, and start up testing results.
    b. As-built drawings shall include, but are not limited to, lateral locations, invert elevations, horizontal locations, and any other utility location information discovered during the course of construction.
7. Operation and Maintenance Manuals
    a. Two printed copies and one PDF copy of the operation and maintenance manuals shall be submitted to the Wastewater Manager upon acceptance of the improvements by the City.
    b. At minimum, the following shall be included:
        1) Operation instructions
        2) Maintenance instructions
        3) Recommended spare parts list and spare part numbers
        4) Lubrication and maintenance schedule
        5) As-built structural details
        6) As-built wiring diagrams

7) Bill of materials
8) Copy of all programming: PLC, SCADA, telemetry, etc.

c. Pump and Equipment Warranty to be provided in conjunction with Construction Plans.
   1) Control panel and backup power system warranty
   2) Pump warranty, provided by the manufacturer, shall be submitted for review and approval. Pumps shall be warranted against defects in workmanship and materials for a period of five (5) years, under normal operating conditions, from the date placed in service.

B. Design

1. Force Main Design
   a. Force mains shall be a minimum of 6 inches in diameter unless prior approval is received from the City Engineer.
   b. Grinder pump stations shall have a minimum force main diameter of 2 inches.
   c. Force mains shall be sized in order to maintain a minimum velocity of 2.5 feet per second (fps) and a maximum velocity of 6 fps.
   d. A minimum depth of cover for force mains shall be 54 inches.
   e. The minimum slope for force mains shall be greater than 0%.
2. Elevations
   a. Force main high points shall have air/vacuum relief valves (ARV's) located along the force main.
   b. Force main low points shall have cleanout valves located along the force main.
3. Lift Station Structures and Equipment to be provided in conjunction with Construction Plans
   a. Construction of new lift stations within the Greenfield Wastewater Service Territory will only be permitted upon the submittal of an economic and/or serviceability study, submitted to the City Engineer and the Wastewater Utility Manager. The study shall demonstrate that the life cycle cost of the lift station is less than that of a gravity sewer and/or the serviceability of the development requires the construction of the lift station.
   b. The design engineer shall submit the lift station, force main, and discharge location plans to the City Engineer as part of the Construction Plans for approval. The following documents shall be included with the submittal:

1) Project Plans and Specifications, signed and stamped by a registered Indiana Professional Engineer.
2) Current and future service areas to be served by the lift station and/or gravity sewer (sewer shed delineation).
3) Force main head calculations.
4) Pump and system curve; shall be provided in total dynamic head (TDH) vs. gallons per minute (gpm). Force main head calculations shall be confirmed by system curve.
5) Wet well detention and pump control settings calculations.
6) Buoyancy calculations for all structures.

c. Wet wells shall be designed to handle peak flow, as calculated in the sanitary sewer construction permit.
d. High level alarm shall be placed 6 inches below the flow line of the lowest inlet in the station.
e. Low level shut off float shall be placed so that the pumps are continuously submerged.
f. Lead pump on control shall be set to a minimum of 24” below the lowest invert and the lag pump on control shall be set to a minimum of 12” below the lowest invert.
g. Lift Station shall be located within the proposed development and be located so that it is capable of communicating with the telemetry system of the Wastewater Utility.
h. Wet Well Sizing
    1) The minimum wet well diameter shall be seven (7) feet.
    2) The minimum required depth of the wet well below the invert of the incoming sewer shall be calculated as follows: Depth = 3 feet + Operating Depth + Height of pump where:
        a. 3 feet = Difference between the lowest incoming gravity sewer invert and the lead pump on elevation. Height of Pump = Distance from the bottom of the wet well to the top of the pump, feet. Pump must be fully submerged during entire operating range. Operating Depth = Depth between the lead pump on and pump off elevations, feet. The operating depth is a function of the volume

and diameter. The volume shall be based on four (4) starts per hour and shall be calculated as follows: V = (t Q)/4, where:

- V = Volume, gallons
- t = 15 minutes (15 minute station cycle time)
- Q = Pumping rate (minimum 100 gpm)

4. Easements
    a. The developer shall provide a permanent easement for the placement of the lift station and all related structures and appurtenances, dedicated to the City of Greenfield. The dimensions and boundaries of the easement shall be submitted to the City Engineer for approval prior to execution and recording of the easement.
    b. In the case that a force main is required to be installed outside of the public right-of-way, the developer shall be responsible for obtaining permanent easements, dedicated to the City of Greenfield., The dimensions and boundaries of which shall be submitted to the City Engineer for approval prior to execution and recording of the easement.
5. Access Drive and Security
    a. An access drive shall be provided to the nearest public right-of-way.
    b. Access drive shall include a paved area around the lift station. Adequate space shall be provided for utility trucks and service equipment and for the removal of the pumps.
    c. Adequate space above the lift station shall be provided for the operation of utility crane truck (no overhead lines permitted above or around the pump access hatches).
    d. Control panel and generator receptacle shall be located within 10 feet of the access drive so that the portable generator can be readily connected to the generator receptacle.
    e. Adequate Site lighting, as approved by the Wastewater Manager, shall be provided for security. Additional lighting for maintenance shall be provided in order to provide a safe work area at all times.
    f. A perimeter fence shall be provided for site security.
        1) Fence materials and design shall be approved by the City Engineer and the Planning and Zoning director.

2) Fence construction shall meet or exceed all design standards of the City of Greenfield.
3) A vehicle access gate with a minimum width of 14 feet shall be provided.

C. Lift Station Equipment

1. Materials
    a. All electrical work, fittings, concrete pump basin and valve pit, site work, piping, valves, and specialties necessary for the complete and proper installation of the pumping station shall be provided. All miscellaneous metals shall be stainless steel.
    b. The submersible sewage lift station shall be installed complete and ready for operation as described herein, together with all accessories and appurtenances as shown on the plans, and in accordance with the specifications and the equipment manufacturer's requirements.
    c. Mechanical and electrical equipment shall be provided in an integral package supplied by the pump manufacturer. Pump manufacturer shall have, and identify, local representation to provide a sole source of responsibility for the equipment. Equipment package shall be Xylem/Flygt.
    d. Each piece of equipment shall be provided with (2) stainless steel nameplates, one securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, model number and serial number, and principal rating, the second shipped loose and provided to the Wastewater Utility Manager.
2. Pumps and Motors
    a. Requirements
        1) Each pump shall be equipped with approved, submersible electric motor connected for operation on 230 volts, 3 phase, 60 hertz, 4 wire service, with a minimum of 50 feet of submersible cable (SUBCAB) suitable for submersible pump applications. The power cable shall be sized according to NEC and ICEA standards and have P-MSHA Approval. The pump shall be supplied with a mating cast iron discharge connection of appropriate size for the specified pump and be capable of delivering the required total GPM at the specified TDH. Each pump shall be fitted with an appropriate length of stainless-steel lifting chain. The working load of the lifting system shall be 50% greater than the pump unit weight.

2) The system head curve for the force main, valves and fittings shall be provided by Project Engineer.

b. Pump Design

1) The pump(s) shall be automatically and firmly connected to the discharge connection, guided by no less than two, stainless steel guide bars (minimum 2" diameter, each) extending from the top of the station to the discharge connection. The maximum distance between guide rails brackets shall be 15 feet. There shall be no need for personnel to enter the wet-well under normal operating conditions. Sealing of the pumping unit to the discharge connection shall be accomplished by a machined metal-to-metal watertight contact. Sealing of the discharge interface with a diaphragm, O-ring or profile gasket will not be acceptable. No portion of the pump shall bear directly on the sump floor. The pumps shall be Xylem/Flygt.

c. Pump Construction

1) Major pump components shall be of grey cast iron, ASTM A-48, Class 35B, with smooth surfaces devoid of blow holes or other irregularities. The lifting handle shall be of stainless steel. All exposed nuts or bolts shall be of stainless-steel construction. All metal surfaces coming into contact with the sewage, other than stainless steel or brass, shall be protected by a factory applied spray coating of acrylic dispersion zinc phosphate primer with a polyester resin paint finish on the exterior of the pump.

2) Sealing design shall incorporate metal-to-metal contact between machined surfaces. Critical mating surfaces where watertight sealing is required shall be machined and fitted with Nitrile O-rings. Fittings will be the result of controlled compression of rubber O-rings in two planes and O-ring contact of four sides without the requirement of a specific torque limit.

3) Rectangular cross sectioned gaskets requiring specific torque limits to achieve compression shall not be considered as adequate or equal. No secondary sealing compounds, elliptical O-rings, grease, or other devices shall be used.

d. Cooling System

1) Each unit (12HP and greater) shall be provided with an integral motor cooling system. A stainless-steel motor cooling jacket shall encircle the stator housing, providing for dissipation of motor heat regardless of the type of pump installation. An impeller, integral to the cooling system and driven by the pump shaft, shall provide the necessary circulation of the cooling liquid through the jacket. The cooling liquid shall pass about the stator housing in the closed loop system in turbulent flow providing for superior heat transfer. The cooling system shall have one fill port and one drain port integral to the cooling jacket. The cooling system shall provide for continuous pump operation in liquid or ambient temperatures of up to 104°F (40°C). Operational restrictions at temperatures below 104°F are not acceptable. Fans, blowers, or auxiliary cooling systems that are mounted external to the pump motor are not acceptable.
2) Motors (1HP to 11HP) are sufficiently cooled by the surrounding environment or pumped media. A water jacket is not required.

e. Cable Entry Seal
1) The cable entry seal design shall preclude specific torque requirements to insure a watertight and submersible seal. The cable entry shall consist of a single cylindrical elastomer grommet, flanked by washers, all having a close tolerance fit against the cable outside diameter and the entry inside diameter and compressed by the body containing a strain relief function, separate from the function of sealing the cable. The assembly shall provide ease of changing the cable when necessary, using the same entry seal. The cable entry junction chamber and motor shall be separated by a stator lead sealing gland or terminal board, which shall isolate the interior from foreign material gaining access through the pump top. Epoxies, silicones, or other secondary sealing systems shall not be considered acceptable.

f. Motor
1) The pump motor shall be a NEMA B design, induction type with a squirrel cage rotor, shell type design, housed in an air filled, watertight chamber. The stator windings shall be insulated with moisture resistant Class H insulation rated for 180°C (356°F). The stator shall be insulated by the trickle impregnation method using Class H monomer-free

polyester resin resulting in a winding fill factor of at least 95%. The motor shall be inverter duty rated in accordance with NEMA MG1, Part 31.The stator shall be heat-shrink fitted into the cast iron stator housing. The use of multiple step dip and bake-type stator insulation process is not acceptable. The use of pins, bolts, screws, or other fastening devices used to locate or hold the stator and that penetrate the stator housing are not acceptable. The motor shall be designed for continuous duty while handling pumped media of up to 104°F. The motor shall be capable of no less than 30 evenly spaced starts per hour. The rotor bars and short circuit rings shall be made of aluminum. Three thermal switches shall be embedded in the stator end coils, one per phase winding, to monitor the stator temperature. These thermal switches shall be used in conjunction with and supplemental to external motor overload protection and shall be connected to the motor control panel.

2) The junction chamber shall be sealed off from the stator housing and shall contain a terminal board for connection of power and pilot sensor cables using threaded compression type terminals. The use of wire nuts or crimp-type connectors is not acceptable. The motor and the pump shall be produced by the same manufacturer.
3) The motor service factor (combined effect of voltage, frequency, and specific gravity) shall be 1.15. The motor shall have a voltage tolerance of +/- 10%. The motor shall be designed for continuous operation in up to a 40°C ambient and shall have a NEMA Class B maximum operating temperature rise of 80°C. A motor performance chart shall be provided upon request exhibiting curves for motor torque, current, power factor, input/output kW and efficiency. The chart shall also include data on motor starting and no-load characteristics.
4) The motor and cable shall be capable of continuous submergence underwater without loss of watertight integrity to a depth of 65 feet or greater.

g. Bearings

1) The pump shaft shall rotate on two bearings. Motor bearings shall be permanently grease lubricated. The upper bearing shall be a single deep groove ball bearing. The lower bearing shall be a two-row angular

contact bearing to compensate for axial thrust and radial forces. Single row lower bearings are not acceptable. The minimum L10 bearing life shall be 50,000 hours at any usable portion of the pump curve.

h. Mechanical Seal

1) Each pump shall be provided with a tandem mechanical shaft seal system consisting of two totally independent seal assemblies. The seals shall operate in a lubricant reservoir that hydro-dynamically lubricates the lapped seal faces at a constant rate. The lower, primary seal unit, located between the pump and the lubricant chamber, shall contain one stationary and one positively driven rotating, corrosion, and abrasion resistant tungsten-carbide ring. The upper, secondary seal unit, located between the lubricant chamber and the motor housing, shall contain one stationary and one positively driven rotating, corrosion, and abrasion resistant tungsten-carbide seal ring.

2) Each seal interface shall be held in contact by its own spring system. The seals shall require neither maintenance nor adjustment nor depend on direction of rotation for sealing. The position of both mechanical seals shall depend on the shaft. Mounting of the lower mechanical seal on the impeller hub will not be acceptable. For special applications, other seal face materials shall be available.

3) The following seal types shall not be considered acceptable or equal to the dual independent seal specified: shaft seals without positively driven rotating members, or conventional double mechanical seals containing either a common single or double spring acting between the upper and lower seal faces. No system requiring a pressure differential to offset pressure and to effect sealing shall be used.

4) Each pump shall be provided with a lubricant chamber for the shaft sealing system. The lubricant chamber shall be designed to prevent overfilling and to provide lubricant expansion capacity. The drain and inspection plug, with positive anti-leak seal shall be easily accessible from the outside. The seal system shall not rely upon the pumped media for lubrication. The motor shall be able to operate dry without damage while pumping under load.

5) Where a seal cavity is present in the seal chamber, the area about the exterior of the lower mechanical seal in the cast iron housing shall have cast in an integral concentric spiral groove. This groove shall protect the seals by causing abrasive particulate entering the seal cavity to be forced out away from the seal due to centrifugal action.
6) Seal lubricant shall be FDA Approved, nontoxic.

i. Pump Shaft
   1) Pump and motor shaft shall be the same unit. The pump shaft is an extension of the motor shaft. Couplings shall not be acceptable. The shaft shall be stainless steel – ASTM A479 S43100-T. If a shaft material of lower quality than stainless steel – ASTM A479 S43100-T is used, a shaft sleeve of stainless steel – ASTM A479 S43100-T is used to protect the shaft material. However, shaft sleeves only protect the shaft around the lower mechanical seal. No protection is provided in the oil housing and above. Therefore, the use of stainless-steel sleeves will not be considered equal to stainless steel shafts.

j. Impeller
   1) The impeller shall be of Hard-Iron™ (ASTM A-532 (Alloy III A) 25% chrome cast iron), dynamically balanced, semi-open, multi-vane, back swept, screw-shaped, and non-clog design. The impeller leading edges shall be mechanically self-cleaned automatically upon each rotation as they pass across a spiral groove located on the volute suction. The leading edges of the impeller shall be hardened to Rc 60 and shall be capable of handling solids, fibrous materials, heavy sludge, and other matter normally found in wastewater. The screw shape of the impeller inlet shall provide an inducing effect for the handling of up to 5% sludge and rag-laden wastewater. The impeller to volute clearance shall be readily adjustable by the means of a single trim screw. The impeller shall be locked to the shaft, held by an impeller bolt, and shall be coated with alkyd resin primer.

k. Volute/Suction Cover
   1) The pump volute shall be a single piece gray cast iron, ASTM A-48, Class 35B, non-concentric design with smooth passages of sufficient size to pass any solids that may enter the impeller. Minimum inlet and

discharge size shall be as specified. The volute shall have a replaceable suction cover insert ring in which are cast spiral-shaped, sharp-edged groove(s). The spiral groove(s) shall provide trash release pathways and sharp edge(s) across which each impeller vane leading edge shall cross during rotation so to remain unobstructed. The insert ring shall be cast of Hard-Iron™ (ASTM A-532 (Alloy III A) 25% chrome cast iron) and provide effective sealing between the multi-vane semi-open impeller and the volute housing.

l. Pump Pressure Gauges

1) Contractor shall provide and install one pressure gauge at the location as described on the Drawing (within the valve vault).
2) All indicating gauges are pipe mounted with male and brass threaded pipe connections. Gauges shall be 4 ½ inch liquid filled for maximum vibration and corrosion protection. Gauges shall have phosphor bronze Bourdon tubes, white laminated phenol dials. Gauges shall have micrometer adjustment of pointers and black phenol, black cast iron, brass, or aluminum case and ring, original rotary gear design, corrosion resistant, stainless-steel movement, blowout protection, and bronze socket with wrench flats. Accuracy shall be within ½ of 1 percent of the scale reading. They shall be as manufactured by Ashcroft.
3) All gauges shall be piped with provisions for venting pressure to allow calibration (zero) checks. Valves for gauge shutoff and zeroing shall be 1/4 turn ball valves with lever handle, corrosion resistant.
4) Liquid file diaphragm seals shall be installed on all gauges as indicated. Diaphragm seals shall be of the continuous duty type, 3-piece construction with 1/4-inch flushing connection, 1/4-inch fill connection, 316 stainless steel lower housing and diaphragm material 1/4-gauge connection and ½ inch lower connection. Housing bolts shall be stainless steel. Acceptable models are Marsh 42-01, Helicoid 100H, or equal. Viton diaphragms are required on low range pressure applications (less than 15 psig). Diaphragm seals shall be permanently attached gauges by installation of a lead sealed wire connecting the two. This is to prevent accidental loss of fill fluid. Fill fluid shall be factory-installed silicone. All gauges shall be pre-calibrated, as an assembly with the seal.

m. Protection

1) All stators shall incorporate thermal switches in series to monitor the temperature of each phase winding. The thermal switches shall open at 125°C (260°F), stop the motor and activate an alarm.
2) A leakage sensor (FLS) shall be used to detect water in the stator chamber. The Float Leakage Sensor (FLS) is a small float switch used to detect the presence of water in the stator chamber. When activated, the FLS will stop the motor and send an alarm both local and/or remote. USE OF VOLTAGE SENSITIVE SOLID-STATE SENSORS AND TRIP TEMPERATURE ABOVE 125°C (260°F) SHALL NOT BE ALLOWED.
3) The thermal switches and FLS shall be connected to a Mini CAS (Control and Status) monitoring unit. The Mini CAS shall be designed to be mounted in any control panel.

n. Lifting System

1) Each pump shall be provided with and set up for a Flygt "Grip-Eye" lifting system, with a stainless-steel lift chain of adequate strength to permit raising and lowering of the pump for inspection and removal. It is the Contractors responsibility to provide an adequate lift chain length for removal and inspection of each pump.

D. Control Center

1. The control center shall be built in a NEMA 4X stainless steel enclosure with a 3 point latching system (lugs are not permitted) and shall be rated for the horsepower and voltage of the specified pumping equipment. The outer door panel shall be a hinged dead front panel with provisions for securing with a padlock. The inner door shall be a hinged panel that separates the electrical equipment from the outer door. H-O-A controls, lights, circuit breakers, timers, etc. shall be mounted so that only the faces extend through the interior panel. No wiring shall be connected to the interior panel door.
2. There shall be a minimum of five (5) feet between the control panel and the lift station access hatch or the control panel shall be offset from the lift station opening.
3. An uninterrupted power supply (UPS) shall be provided for SCADA and telemetry.
4. Remote monitoring capabilities shall be provided.
5. Panel shall include a duplex pump controller and shall be SCADA ready.

6. A time delay relay shall be incorporated to sequence the start of additional pumps in the event of a power failure.

E. Pump Controls

1. A Multi-Trode level sensor, or equivalent, with sensor points spaced every seven inches along the rod shall be provided. Sensor points shall have discrete outputs to a duplex control/level indicator. Upon request, the Wastewater Utility Manager may approve the use of an ultra-sonic sensor, radar sensor, or pressure transducer and associated controls in place of the Multi-Trode level sensor and controller.
2. The controller shall include HAND-OFF-AUTO selectors for each pump, two alarm inputs, lead pump selector with automatic alternation, and indicators for pump over temperature and seal leak. Indicator shall display wet well level in percentage in increments of 10 percent, based upon level probe outputs. A minimum of ten inputs shall be received from the probe.
3. Four levels shall be included to control the pumps:
    a. common stop
    b. lead pump start
    c. lag pump start
    d. high level alarm
4. In the hand mode, the pumps shall run continuously. In the auto mode, the pumps shall operate based on the four levels described above or by radio telemetry control. Once a pump is started by telemetry, it must be shut down by telemetry.
5. The controller keypad shall be connected to the base unit via plug-in control cable, with the base unit mounted in the panel, and the keypad mounted in the enclosure door.
6. The level probe and controller shall be a Multi-Trode, model 2.0 / 10 probe, and Multi-Smart indicator/controller (or current model). If an ultra-sonic sensor, radar level sensor, or pressure transducer is approved and used, an appropriate controller or control sequence shall be submitted for review and approval of the Wastewater Utility Manager. The wet well level signal shall be equipped with an intrinsically safety barrier or utilize the intrinsically safe inputs on the pump controller.
7. A backup float system shall be installed. The backup controls shall include, at a minimum, a high-level alarm float and a low-level alarm/off float. The high-level float shall start and run the maximum number of pumps possible, as determined by the

design engineer, until normal operating level has been reached. The low-level alarm/off float shall stop all pumps.

8. A Benshaw electronic soft start or VFD may be required, depending on the pump selection and design conditions for the project. Confirm with the Wastewater Utility Manager prior to the panel build.
9. A 120-volt AC duplex GFI convenience receptacle shall be mounted on the inner door. A Square D, SFSA 3650 surge suppressor or equal shall provide transient voltage suppression on incoming power.
10. The control panel shall include a main circuit breaker and an individual circuit breaker for each pump. All motor control power shall be 120 VAC through a power transformer.
11. (Provided and Installed By Contractor) The control panel shall be mounted to the side of the wet well by forming an angle bracket so when the concrete pad is poured, the control panel base can be bolted into the new concrete. Support angle beams are to be supplied and installed by the Contractor.

F. Electrical

1. These specifications are intended to cover all the electrical work necessary to complete the wiring system for the pump station which is not furnished as a part of the pumping equipment and/or factory-built controls. It is not the intent to give every detail in these specifications.
2. The Contractor shall furnish and install all electrical equipment, apparatus, and appurtenances as described on the drawings and as specified which are necessary to make a complete working electrical installation. Any detail which is necessary by the City Engineer for completion of the work, shall be considered a portion of the work, even though not explicitly specified. This includes, but is not limited to all hangers, bolts, supports, grounding, and other miscellaneous items.
3. All workmanship and materials shall conform to the provisions of the "Workmanship and Materials" in the Contract Documents and to all other Sections of the specifications pertinent thereto, the State and local electrical code, and the National Electrical Code. All work in the wet well shall be rated for a Class 1 Div.1 Groups C and D location.
4. The Contractor shall furnish and install the electrical service entrance including the 200-amp service entrance rated fusible double throw safety switch (to act as the main disconnect and manual transfer switch). Provide one (1) spare set of fuses.

CONTRACTOR shall furnish and install all conduit and wiring necessary to connect to the control panel and to the individual pump motors from this panel as directed on the drawings. CONTRACTOR shall also furnish and install a 200-amp generator receptacle, Crouse Hinds Arktite ARS2041S22, or equal, and wire it to the safely switch. Confirm receptacle number with WASTEWATER UTILITY prior to ordering. If it is deemed necessary by the Wastewater Utility Manger or City Engineer, a permanent stand by power system may be required.

5. The Contractor shall furnish the conduit and wiring for the high-water visual alarm system between the pumping station control panel and its respective red warning light mounted at the pump control panel.
6. Provided power shall be 3 PH, 120/240 Volt, 60 Hz, Delta service. All electrical equipment, apparatus and appurtenances as described in the plans and specifications and any additional equipment and apparatus which are necessary to make a complete working electrical installation, are to be fully compatible with the incoming service. The use of variable speed drives to obtain three phase power will not be acceptable.
7. The following control panel items shall be incorporated into the construction of the panel and should be noted in the project submittals:
    a. Siemens ESP 200 Starters w/ phase loss protection. Soft Start controls may be required at the discretion of the Wastewater Utility Manager.
    b. Control Panel Drip Shield.
    c. Control Panel Interior Lighting.
    d. Door Stop equivalent to a Hoffman A-DSTPK.
    e. High level alarm light (no horn).
    f. 120 volt plug-in receptacle on inner door.
    g. Forced air fan heater equivalent to a Hoffman D-AH1001A
    h. NEMA 4X Exhaust fan. Provide heat load calculations with submittal.
    i. A ventilated junction box between the wet well and control panel shall be included, along with explosion proof seal off fittings.
    j. Isolation circuit breakers with lockout/tag-out capability.
    k. Lightning arrestor.
    l. HOA pump controls / with GREEN -RUN indicator lighting for each pump (separate from Multi-Trode or PLC pump controls).
    m. Separate RED Seal and Over-Temp fail lights for each pump.

n. Provide a minimum of 5 or 10% whichever is greater of each type, LED style pilot light or bulb used on project.
o. Provide a minimum of 5 or 10% whichever is greater of each color lens cap used on project.
p. Provide a minimum of 30% spare terminals, to be shown as such on-panel drawings.
q. Motor Overload reset pushbutton for each pump starter.
r. Multi-trode pump controls, or as approved by the Utility Manager.
s. Pump alternator with lead pump, automatic, or fixed sequence.
t. All pump and control wiring must use non-corrosive cord grips as they enter into the panel junction box.
u. An hour meter for each pump.
v. An 18”x18”x6” space for the telemetry shall be incorporated into the design of the control panel (telemetry noted previously must be included).
w. A 200 amp service rated, fusible, 600-volt, AC manual transfer switch disconnect in a NEMA 4X enclosure, or equivalent as approved by the Wastewater Utility Manager. Eaton Cat.# DT364NWK (DT-200)
x. An Arktite Receptacle “AR2041S22” to fit a Crouse Hinds generator plug which is to be mounted to the disconnect switch (confirm with Wastewater Utility).
y. All electrical conduits shall be thick wall PVC.

8. Motor Overload and Over Temperature shall shut down the pump and require a manual reset before restarting. Seal Fail shall be an indication only and not shut down the pump.
9. Alarm Telemetry System
    a. PLC
        1) 16 Digital Inputs, 16 Digital Outputs, 4 Analog Inputs, 2 Analog Outputs. Ethernet IP Communications, DC Powered. Allen Bradley 1769-L24ER-QBFC1B, or Wastewater Utility approved equal.
    b. Cellular Modem
        1) Sierra Wireless RV50X Cellular Modem on City of Greenfield’s Zero Tunnel cellular network. Include Din Rail Mounting Bracket Mfg. Part number 6000659, or Wastewater Utility approved equal.
    c. DC Power Supplies

1) 120 VAC to 24 VDC and 12 VDC, sized as required.

d. Antenna System
    1) Antenna can be a disguise antenna similar to Laird Black MIMO Phantom Antenna MTRA61274CB2, Airgain AP-M2M1-CC, or City approved equal. If the signal strength needs to be improved, use a Yagi antenna to boost the signal. Model shall be Wilson B00J14YEHQ (314411), Bolton BT974822-V2, or Wastewater Utility approved equal.

e. Float Switches
    1) N.O. Float switch, 40' cable min. Xylem/Flygt ENM-10 with float anchor, or Wastewater Utility approved equal.

10. Telemetry System Implementation
    a. The control panel will provide complete alarm and status reporting to the treatment plant on a report by exception and timed basis.
    b. The system shall allow manual control of lift station from plant SCADA system.
    c. Provide graphics on the existing treatment plant lift station SCADA system computer to match existing graphics. The graphics shall be developed using existing lift station graphics computer and shall include modification of the system overview screen to show the lift station, a lift station graphic showing the pump status, wet well level and general station status information and modification to the alarm selection graphic to add to the lift station.
    d. All data sent to the plant must arrive in the standard data block format.
    e. The control panel shall be provided with a dedicated pump controller for the control of the pumps. The float switches shall provide a high level upon failure of PLC or level transmitter. A low-level alarm float shall also be included in the controls.
    f. As a minimum, the following alarms/status conditions shall be reported through the alarm notification system:
        1) Level transmitter failure
        2) Individual pump failure
        3) Individual pump seal fail/ motor over temperature
        4) High level alarm
        5) Low level alarm
        6) AC power failure

7) Individual pump in Hand
8) Individual pump running/excessive runtime

g. Software features shall include the following:
   1) Remote alarm silencing and acknowledgement
   2) Remote pump control
   3) Retransmission of all alarms until they have been received by the plant
   4) Report of all status and alarms, run hours, last run time of lead and lag pump, off time, wet well level
   5) A local status light that flashes to indicate any and all alarms within the system
   6) The software shall be written such that it follows the existing programming style of the other city lift stations.
   7) The space required in the control panel shall be a minimum of 18”x18”x4”.
h. Instrumentation and Controls contractor shall coordinate with the control’s technician/engineer of the Wastewater Utility.
i. Maxim Automation is the preferred I&C technician of the Wastewater Utility.

G. Lift Station Construction

1. Wet Well and Valve Pit
   a. The wet well, valve vault, and meter pit are to be constructed of precast concrete. The actual arrangement of the structures is to be as shown in the approved plans. The wet well top shall be provided with a four (4) inch PVC vent having a downward pointing inlet and screen over the inlet opening. The City provides an option, upon request by the City Engineer or Wastewater Utility Manager, for the project specifications to require appropriate odor control equipment.
   b. Wet well shall be a minimum diameter of 84 inches and the valve vault shall be a minimum diameter of 72 inches.
   c. The wet well, valve vault, meter pit, flat tops and base slabs are to be constructed of precast reinforced concrete manhole sections conforming to ASTM C-478. All joints between precast sections shall be made with an approved rubber O-ring in accordance with ASTM C-443. In addition, the outside wall below grade is to be coated with bituminous waterproofing material. The top and bottom of the chambers shall be precast or may be

poured in place concrete if approved by the Project Engineer and the City Engineer.

d. An aluminum single door access hatch frame and door assembly shall be provided for use as entry to the valve vault and the meter pit. Valve vault access hatch size shall be large enough to allow vertical removal of all valves.
e. A rubber flapper check valve and an eccentric plug valve shall be installed in the valve vault in each pump's discharge piping. All piping from pump base elbows, through the valve vault and exiting the valve vault shall be ductile iron. All elbows, tees and cross piece fittings shall be cast iron. A PVC drainpipe and check valve shall be installed to drain the valve vault back to the wet well.
f. An additional eccentric plug valve shall be provided in the valve vault to allow access to the force main for bypass pumping. The bypass valve shall have an upward directed elbow and a 4" or 6" male aluminum Cam Lock fitting to allow attachment of City owned, or rented, bypass pumping equipment (confirm the correct size in writing or by electronic means with Wastewater Utility Manager). The wet well shall be provided with a minimum of a 12" opening to facilitate bypass pumping. The opening shall be cast in the top of the wet well and be secured with a lid (similar to that of a Type II Cleanout) and gasket to prevent infiltration through the opening.
g. The walls of the pump station and valve pit structures shall be constructed of reinforced concrete which shall conform to the latest ASTM Specifications C-76, with a minimum compressive strength of concrete equal to 4000 psi. Reinforcement of the pipes shall be of the circular type. All of the pipe for the pump chambers and the access tubes shall be Class III and of the diameter shown on the plans. Handling or lifting lugs and/or devices shall be provided in the pipe shells for ease of unloading and setting in place. All joints between pipes and between ends of pipes and concrete slabs shall be made watertight. The entire wet well shall be coated with an approved waterproofing compound. All joints on the exterior of the wet well and valve pit shall be coated with butyl rubber.
h. The pipes utilized for the pump station wet well or valve pit shall be jointed with a rubber O-ring type seal conforming to the A.S.T.M. Standard C-443

(latest revision). The joint shall be designed to provide a maximum infiltration-exfiltration limit of .158 gallons per inch of pipe diameter per 100 feet of length per hour (200 gpd/in-mile). The interior joint spaces shall be grouted to a smooth surface using a sand-cement mixture mortar. The mortar-grout shall have one part cement to two parts sand mix ratio. The completed interior joints shall have a smooth troweled waterproof finish.

i. The top concrete slab of the pump station and valve pit shall have cast into it a socket for receiving the end of each pipe. The joint shall be made watertight.

j. Concrete for the foundation and roof slabs shall be made of Class A concrete.

k. All interior exposed concrete surfaces of the pump station wet well shall be cleaned and sealed to provide hydrogen sulfide corrosion protection for the concrete surfaces as required by the City Engineer or Wastewater Utility Manager.

l. Where metal or cast-iron pipes are shown or required to pass through the walls, the Contractor shall require the pipe manufacturer to provide pre-formed openings or cut openings in the concrete pipe of just sufficient diameter to receive the smaller pipes and shall then solidly fill or patch around the pipe with non-shrink type cement mortar to watertight fit. If holes are field cut, they shall be core drilled and booted. Link seals shall be used to provide a watertight seal around the pipe.

m. The rectangular concrete slab on grade around the wet well and the valve pit shall be constructed approximately 6 months after wet well and valve pit installation.

2. Access Hatches

a. The Contractor shall furnish and install as shown on the plans for both the wet well and valve pit single leaf aluminum access doors complete with frames, hinged and recessed handle and hasp-equipped non-slam lock covers, upper guide holders, drain hole and cable holder. The frames shall be securely mounted above the pumps. The doors shall be torsion bar loaded for ease of lifting and shall have safety locking handles in the open position. The access doors shall be capable of withstanding a 300 lb. live load per square foot. The access doors shall be gasket type and watertight. The lift station

valve pit access hatches are to be single door type as shown on the plans. The wet well hatch shall be equal to a double door Flygt Light Duty Aluminum Hatch with Hinged Safety Grate. The valve pit does not require safety grating. Wet well hatches smaller than 72" x 36" may use a single door style. Access hatches shall open towards the control panel.

3. Pipe, Valves, and Fittings
    a. The station piping, valve pit, check valves and plug valves are to be furnished and installed under this Item. All other pipe, fittings and valves shall be provided as specified herein.
    b. The discharge pipe and fittings shall be ductile iron Class 350. The valves shall be Class 150.
    c. Inside pipe and fittings shall be flanged.
    d. Bell end pipes or fittings with mechanical joints shall be provided at or near the outside face of the station well.
    e. Piping shall be supported independent of the sewage flanges.
    f. All inside plug valves shall be lever operated. One lever shall be provided for each plug valve.
    g. All check valves shall be iron body, bronze mounted with outside weight and lever swing type with bolted covers and flanged ends.
    h. All metal piping other than cast or ductile iron and copper tubing shall be galvanized steel pipe.
    i. Guide rails and all interior miscellaneous metals shall be stainless steel.

H. Force Main Construction

1. Force mains shall be constructed of ductile iron pipe and shall meet ASTM A 746 or ANSI/AWWA C151/A21.51 with exterior asphaltic coating (for buried service) and interior special asphaltic lining (for buried and exposed service) conforming to all requirements for seal coat described in ANSI/AWWA C104/A21.4.
2. All exposed DI pipe must be primed and painted/coated in order to provide sufficient corrosion protection.
    a. All surfaces must be prepped in accordance with the manufacturer's specifications.
    b. Thinners shall not be used in paint or coatings.

3. Joints on DI pipe must be the integral bell type push-on joint meeting ANSI/AWWA C111/A21.11, mechanical joint (“MJ”) meeting ANSI/AWWA C111/A21.15, or flanged joint meeting ANSI/AWWA C110/A21.10, C153/A21.53 or C115/A21.15.
4. Buried accessories for mechanical and flanged joints must be alloy steel “T” head bolts (for MJ) or heavy hex head/hex head bolts (for flanged) and heavy hex nuts of coarse thread series class 2A external and class 2B internal per ASME/ANSI B1.1.
5. Accessories for flanged joints in exposed services must be cadmium plated high tensile steel meeting the thread requirements of coarse thread series class 2B.
6. All piping inside wet wells, valve vaults, and meter vaults shall be flanged, ductile iron pipe.
7. Mega Lugs shall be used for force main directional changes.

I. ARV and Cleanout Manholes and Equipment

1. Manhole structures used for ARV or cleanout valves shall conform to the same standards and specifications contained in section “406 Sanitary Sewer System” of the City of Greenfield Public Improvement Design Standards and Specifications Manual.
2. All piping inside force main air release and cleanout structures shall be flanged, ductile iron pipe.