

**TECHNICAL SPECIFICATIONS
CONSTRUCTION-BID SET
REPLACEMENT WWTS**

**THOMPSON HOUSE AND SHOP
(EAST END IMPROVEMENTS)
FWP PROJECT # 7176131**

**Bannack State Park
4200 Bannack Rd
Dillon, MT 59725**

Beaverhead County, Montana



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TECHNICAL SPECIFICATIONS

EAST END WWTS IMPROVEMENTS BANNACK STATE PARK BEAVERHEAD COUNTY, MT

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Section 02111
Clearing, Rehabilitation, & Seeding

1. General

Bannack is a unique cultural and historical landmark. No structure, regardless of appearance, can be moved or impacted while building the septic system replacement. If conflict with any structure is unavoidable, Contractor to stop work and notify Owner immediately. If any object other than expected soil, rock, and existing septic components is unearthed, Contractor to stop work and notify Owner immediately.

Contractor shall practice jobsite good housekeeping. All waste and trash shall be picked up and properly stored, daily. If odors arise, trash shall be removed immediately.

The wastewater treatment system, along with all associated earthwork, shall be cleared and stripped of surface vegetation to a width necessary for excavation equipment to complete the job. The term vegetation includes such material as brush, trees, grass and weeds, and all other objectionable matter as determined by the Owner or Engineer's Representative. The stripped material, tree roots, and grass root mass shall not be incorporated within the embankment/backfill. Upon completion of the work, all work areas shall be cleaned up, re-graded, re-topsoiled, seeded, and mulched.

2. Materials

All seed and plant materials shall be in accordance with AIA specifications for Number One Grade. Prior to installation of plant materials, areas that have been compacted shall be thoroughly loosened. Soil shall be amended with organic compost at a rate of 3 CY/1000 SF and tilled to a depth of at least 8 inches.

All seeding shall be accomplished using the following Native Seed Mix:

Name: Low Grow Mix
Manufacturer: Arkansas Valley Seed Solutions

Ephram Crested Wheat Grass:	30%
Perennial Rye Grass:	15%
Blue Fescue:	20%
Canada Blue Grass:	20%
Chewing's Fescue	15%

Seed shall be drilled at a rate of 40 lbs/acre to depth of ½ - ¾” depth.

3. Execution

3.1 Protection of Existing Properties

Take precautions to protect all adjoining private and public property and facilities, including underground and overhead utilities, curbs, sidewalks, driveways, structures, and fences. Contact Montana One Call System for utility locates before starting work (1-800-424-5555 minimum of two days prior to excavation). Restore and replace all disturbed or damaged facilities to its original condition at Contractor’s expense.

3.2 General

Prior to installation of plant materials, areas that have been compacted shall be thoroughly loosened. Soil shall be amended with organic compost at a rate of 3 CY/1000 SF and tilled to a depth of at least 8 inches.

The topsoil shall be stripped to a minimum depth of 4-inches. To the maximum extent feasible, topsoil that is removed during construction shall be stockpiled on the job site and replaced when the trench excavation and backfill procedures are completed.

Unsatisfactory backfill & waste materials from clearing operations shall be disposed of off-site at the expense of the Contractor. The work of clearing shall be kept well in advance of the pipe laying operations.

Section 02221
Trench Excavation and Backfill for Pipelines and
Appurtenant Structures

1. General

Bannack is a unique cultural and historical landmark. No structure, regardless of appearance, can be moved or impacted while building the septic system replacement. If conflict with any structure is unavoidable, Contractor to stop work and notify Owner immediately. If any object other than expected soil, rock, and existing septic components is unearthed, Contractor to stop work and notify Owner immediately.

Contractor shall practice jobsite good housekeeping. All waste and trash shall be picked up and properly stored, daily. If odors arise, trash shall be removed immediately.

This work is the excavation, trenching and backfilling for pipeline and appurtenances. It includes all clearing, grubbing, site preparation, removal and disposal of debris from the excavation, handling and storing materials for fill and backfill, all bracing, shoring and trench protection, construction dewatering, all backfill, subgrade preparation, final grading, site dressing, pavement patching and cleanup.

1.2 References and Standard Drawings

The current publications listed in the Montana Public Works Standard Specifications (MPWSS), Seventh Edition, April 2021. Standard drawings within the aforementioned documents shall also apply to this project.

1.3 Testing

Compaction & in-place density testing is required. The Contractor shall be responsible for ensuring a qualified individual completes compaction testing. In addition, any costs associated with testing shall be the sole responsibility of the Contractor.

2. Products

2.1 Pipe Bedding Materials

A. Type 1 Pipe Bedding

1. Type 1 Pipe Bedding includes the material placed from 4 inches (100mm) below the bottom of the pipe, around the pipe, and up to the spring line of the pipe. Provide Type 1 Bedding consisting of sand, sandy gravel, or fine gravel having a maximum 3/4 inch size (19mm) and a maximum plasticity index of 6, determined by AASHTO T89 and T90 or by ASTM D4318. Where trench excavation encounters wet or unstable material, Type 1 Pipe Bedding must be free draining and non-plastic. Refer to MPWSS Standard Drawing 02221-1 and Special Provisions for other requirements. Type 1 Bedding shall be replaced with on-site materials only if specifically stated on the Project Drawings.

B. Select Type 1 Bedding

1. Select Type 1 Bedding includes the material placed from the spring line of the pipe to 6 inches (15cm) over the pipe. Select Type I Bedding shall consist of soil, sand or fine gravel, free from clods, lumps of frozen material, or rock exceeding 1-1/2 inches (38mm) in its greatest dimension. Excavated trench material may be screened or sorted for use as backfill subject to approval of the Engineer. Where trench excavation encounters wet or unstable material, Select Type 1 Bedding must be free draining and non-plastic. Select Type 1 Bedding shall be replaced with on-site materials only if specifically stated on the Project Drawings.

C. Pipe Bedding Alternate

1. Pipe Bedding Alternate material is described on Standard Drawing 02220-2, and is applicable only if specified in the contract documents.

D. Type 2 Pipe Bedding

Type 2 Pipe Bedding issued as directed by the Engineer replace unsuitable material encountered in the trench bottom. Place Type 2 Pipe Bedding from the bottom of the Type 1 Bedding material to the depth required to adequately support the pipe. The Type 2 Bedding consists of granular material meeting the following gradation. Type 2 Bedding shall be replaced with on-site materials only if specifically stated on the Project Drawings.

<u>Sieve Opening</u>	<u>% Passing</u>
3 Inch	100
No. 4	0 - 25
No. 8	0 - 10

2.2 Trench Backfill Materials

A. Materials from Trench Excavations

1. Backfill material obtained from trench excavations must be free of cinders, ash, refuse, organic or frozen material, boulders, or other deleterious materials. Backfill materials and placement are further described in the EXECUTION Section of this specification.

B. Imported Backfill Material

1. Imported backfill material is from borrow source(s) outside the project limits and is used when, in the opinion of the Engineer, an adequate volume of suitable backfill material is not available within the project limits. Imported Backfill Materials must comply with the requirements of Section 2.2.A, MATERIALS FROM TRENCH EXCAVATION

2.3 Detectable Buried Warning Tape

- A. Detectable buried warning tape is to have a minimum 6-inch (15cm) width and 5 mil (0.12mm) thickness and a solid aluminum core running the full, length and width of the tape enclosed in a color coded insert plastic jacket, impervious to alkalis, chemical reagents and solvents in the soil. The tape is to meet APWA/ULCC Color Code requirements and is to have a maximum 36 inches (90cm) imprint.

3. Execution

A. Protection of Existing Properties

A. General

- A Take precautions to protect all adjoining private and public property and facilities, including underground and overhead

utilities, curbs, sidewalks, driveways, structures, and fences. Restore or replace all disturbed or damaged facilities to its original condition at Contractor's expense.

- B Contact utility owners using the Montana One Call System for utility locate before starting work (1-800-551-8344 or 1-800-424-5555). Protect the utilities exposed during the work and prevent damaging underground utilities adjacent to excavations. Immediately notify the utility owner of any construction damage. Repairs of damage to marked utilities are at the expense of the Contractor.
- C Re-locate existing water mains, sanitary sewers and storm drains shown on the plans, which conflict with new pipelines or structures as indicated in the contract documents.
- D Notify the Engineer of existing service lines interfering with trenching operations. Show all repaired and/or adjusted water and sewer lines on the As-Built Plans.
- E Protect existing water and sewer mains and water and sewer services from freezing at all times during construction.

B. Existing Overhead Utilities

- A Use extreme caution to avoid conflict, contact or damage to overhead utilities during the work.

3.2 Pavement Removal and Stripping

- A. Where trench excavation or appurtenant structure excavation requires removing curb and gutter, concrete sidewalks, asphalt concrete pavement, or Portland cement concrete pavement, cut the concrete or pavement in a straight line parallel to the excavations edge using a spade-bitted air hammer, concrete saw or other suitable equipment to produce a straight, square and clean break. Re-cut edges broken during construction, before concrete or paving operations. For trenches passing through existing pavement, cut the pavement along a neat vertical line at least 112 inches (300cm) from the trench edge. Where the neat line cut is less than 3 feet (0.9m) from the edge of the existing pavement, remove and replace the entire pavement section between trench and edge of pavement. Dispose of the asphalt

concrete and/or Portland cement concrete debris off-site according to applicable state and local regulations.

2. Before cutting of any existing pavement or curb, the Contractor shall obtain any necessary permits.
3. When excavating across existing gravel streets or other developed surfaces, remove the surfacing material full depth and stockpile for inclusion as trench backfill or legally dispose of the surfacing material.
4. When excavating across cultivated or sodded areas, remove topsoil full depth or to a maximum 12-inch (30cm) depth, whichever is less, and stockpile for possible project use.
5. Re-sod or reseed, as specified in the contract documents, all established lawn acres cut by trenching or damaged during the construction, in accordance with the contract documents, to the satisfaction of the Engineer.

3.3 Maintenance of Flows

- A. Maintain the flow of sewers, drains and water courses encountered during construction. Restore culverts, ditches, fences, crosswalks and structures disturbed by construction to their original condition upon completion of the work.

3.4 TRENCH EXCAVATION

A. General

- A. Meet current OSHA Safety and Health Standards for all excavation, trenching, shoring and related work.
- B. Excavate at the specified locations for pipeline installations and appurtenant structures.
- C. Crossings under sidewalks or curbs may be made by tunneling, if approved by the Engineer. If a portion of a sidewalk or curb is removed, use a concrete saw to make joints, compact the backfill as specified, and replace the removed section with new concrete sidewalk or curb.

- D. During excavation, stockpile backfill materials away from the trench banks to assure trench wall stability. Stockpile excavated materials on only one side of the trench without obstructing existing fire hydrants, valves, manholes and other appurtenances. Assure surface drainage of adjoining areas is unobstructed.
- E. Remove and dispose of all excess or unsuitable excavated materials.
- F. Prevent surface water from flowing into excavations. Promptly remove all water accumulating in trench excavations. Do not permit water to accumulate in any open trench. Remove and re-lay all pipe out of alignment or grade caused by trench flooding.
- G. Grade the trench bottoms to the specified lines and grades. Assure bedding material provides uniform bearing and support for each pipe section along its entire length. Excavate for bell and joints after the trench bedding is graded, limiting the excavation to the required length, depth and width for making the particular type of joint used. Backfill over-excavations with Type 2 Bedding Material.
- H. **No differentiation between common and rock trench excavation is made, except when listed as separate bid items on the bid proposal or bid form.** Excavation includes removing and subsequent handling of all earth, gravel, bedrock or other material encountered regardless of the type, character, composition or condition of the material.
- I. The use of trench digging machinery is permitted, except in places where its operation is likely to cause damage to existing structures or features, in which case hand methods are to be employed.

B. Trench Dimensions

3.1 Width

Excavate to provide room to install and join the pipe as specified. The minimum trench width is 3'-6" (1.1m), for outside pipe diameters of 18 inches (0.5m) or less. The minimum trench width is 2'0" (0.6m) plus the outside pipe diameter, for pipe sizes

exceeding 18 inches (0.5m). Maximum trench width may be specified in the contract documents.

3.2Depth

Excavate the trench as required for the invert grade or pipe bury as specified in the contract documents, plus 4 inches (10cm) for the Type 1 Pipe Bedding. If bedrock, boulders or large stones are encountered at the bottom of the trench, excavate at least 6 inches (15cm) below the bottom of the pipe for backfilling with Type 1 Pipe Bedding.

C. Soft or Unstable Trench Subgrade

1. When soft or unstable material is encountered at the trench subgrade which will not uniformly support the pipe, excavate the material to the depth directed by the Engineer and backfill to trench subgrade elevation with Type 2 Pipe Bedding.

D. Pavement Damage Caused by Equipment

1. Equip all track mounted equipment operated on pavement surfacing with pads to prevent pavement damage. Restore all pavement damaged by construction to its original condition.

E. Shoring, Bracing and Sheeting

1. Provide all shoring, bracing and tight sheeting required to prevent caving and protect workers, meeting current Occupational Safety and Health Act Requirements, and to protect adjacent property and structures. The cost of this work is included in the cost for trench excavation.

F. Excavations for Appurtenances

1. Make excavations for manholes, hydrants, structures and other appurtenances of the size and depth to permit compacting of backfill on all sides to the specified density. The requirement for removing water and other applicable portions of these specifications apply to excavation for appurtenances.

E. DEWATERING

Groundwater is not anticipated at this project site. Any groundwater encountered in trench excavations must be removed. The cost of dewatering operations is considered a part of the excavation cost.

F. EXCAVATION STABILITY AND SAFETY

1. The stability of construction excavations and associated worker safety, including slope geometry and shoring/bracing considerations, are the responsibility of the Contractor. Meet current OSHA regulations. This may require design of temporary slopes and/or shoring by a licensed professional engineer.

G. TRENCH FILLING AND BACKFILLING

1. General

Backfill all trenches as specified immediately after grade, alignment and pipe jointing has been inspected and approved by the Engineer. Conduct any pipe testing as specified in the respective water distribution, sewerage/drainage sections. Correct all defects discovered by tests.

A. Pipe Bedding Placement

3.1 Type 1 Bedding.

Place Type 1 Pipe Bedding material 4 inches (10cm) under the pipe, around the pipe and up to the spring line of the pipe. Place in maximum lifts of 6 inches (15cm), using hand or other compaction methods without damaging or disturbing the pipe. Thoroughly compact each layer. Use special care to assure compaction under the pipe haunches. Place backfill material in equal lifts on both sides of the pipe for the full trench width. Take care to prevent migration of Type 1 Bedding into surrounding soils during placement and compaction. Type 1 Bedding shall be replaced with on-site materials only if specifically stated on the Project Drawings.

B. Select Type 1 Bedding

Place Select Type 1 Bedding material from the spring line to 6 inches (15cm) over the pipe. Where wet or unstable material exists, assure the material is free draining and non-plastic. Place

in maximum lifts of 6 inches (15cm) using hand or other compaction methods without damaging or disturbing the pipe. Thoroughly compact each layer. Place backfill in equal lifts on both sides of the pipe for the full trench width. Take care to prevent migration of Select Type 1 Bedding into surrounding soils during placement and compaction. Select Type 1 Bedding shall be replaced with on-site materials only if specifically stated on the Project Drawings.

C. Type 2 Pipe Bedding

Use Type 2 Pipe Bedding described in PRODUCTS SECTION 2.1.D as specified or as directed by the Engineer to replace unsuitable material encountered in the trench bottom, placing it from the bottom of the Type 2 Bedding material to the depth required to adequately support the pipe. Type 1 Bedding shall be replaced with on-site materials only if specifically stated on the Project Drawings.

D. Pipe Bedding Alternate

Place and compact the pipe bedding alternate material on Standard Drawing 02221-1, where specified in the contract documents and/or where directed by the Engineer.

3. Trench Backfill

1. After the pipe bedding materials are placed and compacted as specified, backfill the trench. Use backfill material free of cinders, ash, refuse, organic or frozen material, boulders, or other deleterious materials. From the top of the Select Type 1 Pipe Bedding to 6 inches (15cm) below the ground surface, or the subgrade elevation, material containing rock up to 8 inches (20cm) in the greatest dimension may be used.
2. Trench backfill from the top of the pipe bedding to ground surface or the street subgrade is separated into three classifications. Type A Trench Backfill is compacted backfill typically used in streets or paved areas. Type B Trench Backfill is typically used for alleys, cultivated areas; borrow pits, unimproved streets or other un-surfaced areas, and other areas where compaction is less critical. Type C Trench Backfill is typically used in open and unimproved areas outside of the public right-of-way. Meet the

backfill and compaction requirements for all of the backfill types described in contract documents.

3. Remove, replace, and re-compact backfill in trenches where settlement has occurred as directed by the Engineer at the Contractor's expense.

D Type A Trench Backfill. Place trench backfill in maximum 8-inch compacted lifts within 3 percent of optimum moisture content, and compact to at least 95 percent of maximum dry density determined by AASHTO T99 or by ASTM D698.

E Type B Trench Backfill. Place backfill in maximum 8-inch (205mm) lifts, within 3 percent of optimum moisture content, and compact to at least 90 percent of maximum dry density, as determined by AASHTO T99 (ASTM D698). Cultivated areas are to be backfilled with Type B Trench Backfill. In cultivated areas, place stripped topsoil uniformly over the backfill trench to the original depth. Do not compact the topsoil, but grade to provide a smooth surface conforming to the adjoining ground surfaces. Remediate any settlement of the trench surface below final surface grade throughout the contract warranty period.

F Type C Trench Backfill. Place and compact Type C Trench Backfill in maximum 12-inch lifts at densities equal to or greater than the densities of adjoining undisturbed soil. Mound earth over the trench top, if so directed by the Engineer.

4. Replacement of Unsuitable Backfill Materials

Remove and dispose of excavated soils that are saturated, contain deleterious materials or have characteristics that, in the opinion of the Engineer, render the soils unsuitable as backfill. Replace unsuitable soils with material obtained from trench excavations within the project limits at the expense of the Contractor. If suitable replacement material is not available within project limits, obtain material from an approved borrow source, to be paid for as Imported Backfill Material. Place and compact all imported material according to the applicable specification.

A Backfill for Appurtenances

1. Place and compact backfill for appurtenances to finished grade around manholes, inlets, valve boxes and other underground items without disturbing appurtenance alignments. Meet the backfill material, placement, and compaction requirements specified for the adjoining trench.

B Detectable Buried Warning Tape

1. **The use of warning tape is mandatory on all water & sewer lines.** Provide warning tape as described in PRODUCTS Section 2.3. Bury tape a maximum 18 inches (45cm) below finish surface grade.

C Tracer Wire

1. **The use of tracer wire is mandatory on all water lines.**

5. Pavement Patching

Any asphalt pavement removed for trench excavation shall be replaced with compacted hot-mix asphalt pavement to a depth equal to or greater than original.

H SURVEY MARKERS AND MONUMENTS

1. Protect all survey markers and monuments. Protection includes marking with flagged high lath and supervising work near markers and monuments. Do not disturb monuments without prior approval from the Engineer. Replace all Contractor disturbed or destroyed survey markers or monuments, not approved during construction, using a licensed land surveyor.

I CLEANUP

1. As work progresses, remove debris and complete to finish grade each portion of the work. Once the works is complete, clear debris and finish the entire site to smooth, uniform slopes presenting a neat and workmanlike appearance. Remove and dispose of all rocks brought to the surface during excavation or backfilling. Remove any deleterious material, including any concrete or asphalt spoils, from the site upon completion.

END OF SECTION 02221

Section 02732 Force Mains

1. General

Bannack is a unique cultural and historical landmark. No structure, regardless of appearance, can be moved or impacted while building the septic system replacement. If conflict with any structure is unavoidable, Contractor to stop work and notify Owner immediately. If any object other than expected soil, rock, and existing septic components is unearthed, Contractor to stop work and notify Owner immediately.

Contractor shall practice jobsite good housekeeping. All waste and trash shall be picked up and properly stored, daily. If odors arise, trash shall be removed immediately.

1.5-inch diameter force main shall be installed between the drainfield dose tank and the pressure-dosed drainfield as shown on the *Project Plans*.

2. Material

1.5-inch diameter SCH40 PVC pressure-rated pipe & fittings shall be used. All force main piping shall meet ASTM F714, ASTM 3035 and ASTM 3350 standards.

3. Depth

The lines shall have a minimum of six-feet (6.0') of cover. Blue board is required in areas where the depth cannot be maintained.

4. Installation

4.1 Protection of Existing Properties

Take precautions to protect all adjoining private and public property and facilities, including underground and overhead utilities, curbs, sidewalks, driveways, structures, and fences. Contact Montana One Call System for utility locates before starting work (1-800-424-5555 minimum of two days prior to excavation). Restore and replace all disturbed or damaged facilities to its original condition at Contractor's expense.

4.2 General

Trenching shall be done in accordance with Section 02221 of MPWSS, these specifications and applicable OSHA regulations. The forcemain shall be bedded with Type II Bedding as specified in Montana Public Works Standard Specifications. Compaction must be at least 95% of maximum dry density as determined by AASHTO T94 or ASTM D698. Backfill shall be tested for compacted density in accordance with Section 02221 of these Specifications. An installer holding a valid County Wastewater Treatment System Installer's License shall install the forcemain piping.

At least 6.0 feet of cover is required over all forcemains. Field Density Testing shall be performed in accordance with the Montana Public Works Standard Specifications (MPWSS), Seventh Edition, April 2021 and all Addenda thereto. Tests which fail the required compaction shall be recompacted and retested at no additional cost to the Owner. OSHA trenching requirements are.

5. Testing

Hydrostatic and leakage testing shall be conducted in accordance with AWWA C605-94 Standards. Test pressure shall be at least 1.5 times the pump shut off pressure. Test duration shall be a minimum of two (2) hours.

Section 02738
Septic Tanks

1. General

Bannack is a unique cultural and historical landmark. No structure, regardless of appearance, can be moved or impacted while building the septic system replacement. If conflict with any structure is unavoidable, Contractor to stop work and notify Owner immediately. If any object other than expected soil, rock, and existing septic components is unearthed, Contractor to stop work and notify Owner immediately.

Contractor shall practice jobsite good housekeeping. All waste and trash shall be picked up and properly stored, daily. If odors arise, trash shall be removed immediately.

The Contractor is responsible for coordinating all required inspections with the Sanitarian or other designated County Health Department representative.

2. Materials & Execution

A. General: The two (2) existing 1000-gallon pre-cast concrete septic tanks are installed at the locations shown on the attached plan sheets. These tanks will be retained and incorporated into the proposed plan. Improvements will be made to the tanks as shown on the plan sheets and described herein. Caution shall be taken to avoid any damage to these tanks. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being installed.

B. Access Hatch: Two access openings are cast into the top of the existing septic tanks, with a size of 24-inch inside diameter. Each access opening shall be equipped with a tank riser adapter, 24” diameter ribbed PVC access riser and a solid fiberglass lid with 2-inches of rigid polystyrene insulation.

The insulated fiberglass lids must be secured to the riser material using factory-threaded hardware.

C. Internal Piping and Effluent Filter: All piping and fittings within the tank shall be Schedule 40 PVC. Each tank outlet shall be equipped with an NSF approved 4-inch diameter effluent filter with handle extended to within 6” of the riser lid as shown on the plans.

- D. Insulation: The existing septic tanks have very little soil cover and are currently prone to freezing during colder months. The entire lid and exterior tank walls of each septic tank shall be exposed via careful excavation. The tank lid and walls shall be covered with 2-inches of rigid polystyrene insulation (blue-board) to frost depth and carefully backfilled so as not to damage the insulation.
- E. Cover Material: The existing septic tanks must be backfilled with native material. The minimum soil cover (as measured above the insulation) shall be 12-inches. It may be necessary to mound soil over the tanks to achieve the minimum cover.

Section 02740
Dose Tanks

1. General

Bannack is a unique cultural and historical landmark. No structure, regardless of appearance, can be moved or impacted while building the septic system replacement. If conflict with any structure is unavoidable, Contractor to stop work and notify Owner immediately. If any object other than expected soil, rock, and existing septic components is unearthed, Contractor to stop work and notify Owner immediately.

Contractor shall practice jobsite good housekeeping. All waste and trash shall be picked up and properly stored, daily. If odors arise, trash shall be removed immediately.

The Contractor is responsible for coordinating all required inspections of the Sanitarian or other designated County Health Department representative.

2. Materials

A. General: Pre-cast concrete drainfield dose tank with a 500-gallon minimum capacity and non-HS-20 rating as supplied by an Engineer-approved precast tank manufacturer. The tank walls and base sections shall be constructed as a single pour, with no seams or cold joints.

B. Structural Design: Walls, bottom, and top of reinforced concrete tank shall be designed across the shortest dimension using one-way slab analysis. Tank walls, floors and lids shall be sized and reinforced to support their own weight, the weight of the liquid contents, and soil pressure including four feet of soil cover. Tank is not required to have the structural strength to withstand HS-20 design loading.

C. Concrete: Concrete shall be ready-mix with cement conforming to ASTM CI50, Type II. It shall have a cement content of not less than six (6) sacks per cubic yard and maximum aggregate size of ¾ inch. Water / cement ratio shall be kept low (0.35±), and concrete shall achieve a minimum compressive strength of 4000 psi in 28 days. The concrete tank shall be resistant to the corrosive environment found in Septic Tanks, and shall be made with sulfate-resistant cement with a tricalcium aluminate content of less than 8 percent.

The Contractor shall submit a concrete mix design to the Engineer for review and approval. Three (3) concrete sample cylinders shall be taken and tested for each tank manufactured until the manufacturer and Engineer are satisfied that the minimum compression strength is being obtained. To ensure compliance, the manufacturer shall then make and set three (3) sample cylinders for a minimum of 20% of the remaining tanks at the discretion of the Engineer. If the minimum compressive strength is not being obtained, the manufacturer shall be required to make and test sample cylinders for each tank manufactured. Calcium chloride will not be allowed in the mix design. The cost of testing cylinders shall be the tank manufacturer's responsibility. The tank manufacturer may supply a Swiss hammer for compressive testing in the field in lieu of sample cylinder.

- D. Tank Reinforcement: Reinforcing steel shall be ASTM A-615 Grade 60, $f_y = 60,000$ psi. Details and placement shall be in accordance with ACI 315 and ACI 318. Tank is not required to have the structural strength to withstand HS-20 design loading.
- E. Tank Coatings: Tanks may be protected by applying a heavy cement-base waterproof coating, on both inside and outside surfaces, in compliance with the Council of American Building Officials (CABO) report #NRB-168; 6181, however the tanks should be watertight without the addition of seal coatings.
- F. Tank Form Release: Form release used on tank molds shall not be diesel or other petroleum products.
- G. Tank Handling: Tanks shall not be moved from the manufacturing site to the job site until they have cured for a minimum of seven (7) days or have reached two-thirds of their design strength.
- H. Tank Sealant: Tank sections shall be sealed with a pre-formed flexible plastic gasket or two (2) continuous strips of flexible butyl resin sealant and shall conform to federal specifications SS-S-00210(2iOA) and AASHTO M-198.
- I. Access Hatch: A minimum of one (1) access opening shall be cast into the top of each dose tank, with minimum size of 24-inch diameter. Each access shall be brought to finished grade using ribbed PVC risers with insulated fiberglass lids that can be secured to the riser material using factory-threaded hardware.

J. Internal Piping and Related Items: All piping and fittings within the tank shall be Schedule 40 PVC. PSX or equal boot connectors shall be used on wall pipe entry/exit points. All pipe shall be solvent-welded, bell end pipe. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being installed. The pipe shall have all sand, gravel, concrete and cement grout removed that has entered the lines during construction.

Q. Pumps: The dose tank shall be set up to function as a simplex pump vault. One (1) pump shall be used. Each pump shall be a 0.33 HP, 110V or 208/230V submersible effluent pump. Pumps shall be manufactured by Liberty (model FL30), or engineer approved equal, and must produce a minimum of 15 GPM at 20-ft of total dynamic head. The pumps must be corrosion resistant and meet the requirements of the National Electric Code Class I Division.

The pump outlet piping shall be 1.5-inch diameter and be designed so that the pumping unit can be disconnected from the discharge piping via a Schedule-40 or Schedule-80 PVC union coupling.

R. Floats & Splice Boxes: Three (3) float switches are required for the recirculation tank installation. The floats must be adjustable and removable without entering the tank. The pump control floats must be attached to a 1-inch diameter PVC float tree and installed at the elevations shown on the drawings. The float leads shall be secured with a nylon strain relief bushings at the splice box. The float shall be UL or CSA listed and shall be rated for a minimum of 5.0A @ 120VAC. The splice box shall be located outside the tank riser within an approved fiberglass enclosure. The splice box shall be UL listed and approved for wet locations. UL listed waterproof butt connectors shall be used. Each splice box shall be connected to the pump control panel using an individual 1" diameter PVC electrical conduit. Entire electrical components shall comply with UL508. Septic tank gasses must be sealed out of the splice box and conduit.

S. Pump Controller: The panel enclosure shall be NEMA 4X rated, constructed of UV-resistant fiberglass, with conduit coupling provided. Source power will be single-phase, 110V or 208/230V. The panel shall be equipped with HOA switches and audio/visual high water alarm. Orenco MVP-S, or engineer approved equal.

3. Execution

3.1 DOSE TANK:

- A. General: The Dose Tank and appurtenances shall be installed as shown on the Project Drawings and as recommended by the manufacturer. Excavation shall be performed to the lines, grade, and elevations shown on the Drawings. The Engineer reserves the right to make minor adjustments or revisions in lines or grades. Perform all excavation regardless of the type, nature, or condition of the material encountered. The method of excavation used is optional; however, no equipment shall be operated within 5 feet of structures or newly completed construction. Excavation that cannot be accomplished without endangering present or new structures shall be done with hand tools. The Contractor is responsible for field staking the earthwork. No excavation shall be started until the staking is complete. Should the Contractor excavate below the designated lines through fault or negligence, the Contractor shall replace such unauthorized over-excavation with approved materials in an approved manner at his own expense.
- B. Tank Bedding: Tank bedding shall be placed as recommended by manufacturer. Place a minimum 8-inch lift of compacted base course gravel bedding under the tank, unless otherwise indicated on the Project Drawings. Place bedding material free of roots, organic matter, trash, and rocks larger than ¾ inch diameter.
- C. Native Backfill around Tanks: Deposit material in horizontal lifts of maximum 8-inch non-compacted depth and compact each lift to not less than 95 percent of maximum ASTM D698 dry density. Maintain material at optimum moisture content, plus or minus 2 percentage points. Place backfill material free of roots, organic matter, trash, and rocks larger than 3-inch diameter. Stop backfill at specified grade. Make allowance for topsoil where required. Any subsequent damage to piping, concrete structures, facilities, or other structures caused by settlement of fill material shall be corrected and repaired by the Contractor at the Contractor's sole expense.
- D. Tank Sealants: Tank sections shall be sealed with sealants listed in Products above. Sealants shall be applied in accordance with manufacturer's recommendations. Surfaces shall be clean and free of debris. Sealant shall not be applied when temperature is less than 40 degrees F. Sealant shall provide a uniform and watertight seal.

- E. Tank Handling: Tank shall be handled with care so as not to damage. If tank sections do become damaged, notify Engineer prior to installation. Tanks shall be installed as per manufacturer's recommendation.
- F. Access Lids: The access lids shall be installed to 0.25' above finish grade and provide a watertight seal with the tank.
- G. Internal Piping: All internal piping shall be of size and lengths shown, and shall be Schedule 40 PVC. All fittings shall be solvent welded or threaded with sealant.
- H. Insulation: The tank lid and walls shall be covered with 2-inches of rigid polystyrene insulation (blue-board) to frost depth and carefully backfilled so as not to damage the insulation.
- I. Testing: The dose tanks shall be tested for water tightness. All testing shall be at the Contractor's expense. A water test or vacuum test shall be used as outlined below.

Water Testing: Water testing shall be conducted by sealing the outlet, filling the tank to its operational level, and allowing the tank to stand for at least 8 hours. If there is a measurable loss (2 inches or more), the tank shall be refilled and the above procedure repeated. If a measurable loss is detected again, the tank shall be rejected and replaced at Contractor's expense.

Vacuum Testing: Vacuum testing shall be conducted by sealing all inlets, outlets and accesses, then introducing a vacuum of 4 inches of mercury. If the vacuum drops in the first 5 minutes, it shall be brought back up to 4 inches of mercury. If the tank fails to hold the vacuum at 4 inches of mercury for a second 5-minute period, the tank must be rejected and replaced at Contractor's expense.

END OF SECTION 02740

Section 02810
General Electrical Requirements

1. General

Bannack is a unique cultural and historical landmark. No structure, regardless of appearance, can be moved or impacted while building the septic system replacement. If conflict with any structure is unavoidable, Contractor to stop work and notify Owner immediately. If any object other than expected soil, rock, and existing septic components is unearthed, Contractor to stop work and notify Owner immediately.

Contractor shall practice jobsite good housekeeping. All waste and trash shall be picked up and properly stored, daily. If odors arise, trash shall be removed immediately.

The Contractor shall provide the complete electrical system needed for proper operation of the wastewater treatment system described within the Plans and these Specifications. All electrical work shall be completed by a licensed electrician. ***This shall include an electrical source feed from the existing Facilities. It is the Contractor's responsibility to provide an adequate power source to power the proposed wastewater improvements.*** The contractor is also responsible for providing a separate service disconnect, to be mounted with the pump control panels where shown on the *Project Plans*.

The Contractor shall provide all labor, materials, tools, equipment and services required to complete the furnishing, installation, wiring, connection, calibration, adjustment, testing and operation of all electrical equipment and components necessary to complete the wastewater treatment system.

2. Source Power

Power supply will be single-phase, 110V or 208/230V. The electrical main disconnect at the WWTS area shall be a 20A NEMA 3R panel located near the pump control panels. The Panel board(s) shall be sized appropriately for the pump control panels and service disconnect equipment and shall be constructed as shown on the project plans. The panel board shall provide a power source and hook up points for the pump control panel(s).

Conduit and electrical lines shall be installed from the new service location or from the feed within the Visitor's Center building to the wastewater treatment system area. One or two panel boards and backboards shall be

installed at the sewage treatment system area.

3. Electrical Equipment

It will be the Contractors responsibility to supply and install all required conduits, service disconnects/breakers, pump controller(s) for the dose tank pumps and control panel.

4. Junction Boxes & Wiring

All junction boxes shall be located outside of the tank risers and shall be housed within fiberglass irrigation control boxes. The splice boxes shall be UL listed and approved for wet locations. UL listed waterproof butt connectors shall also be used. Coat all connections with corrosion protection sealant and ensure box has a water and gas-tight seal at the cord grips and lid. The splice boxes shall be connected to the pumps, floats, and/or panels using individual 1” diameter PVC electrical conduits.

Dose Tank gasses must be sealed out of the splice boxes and conduit. Conduit shall be gas sealed in accordance with Engineer Representative’s instructions. All wire shall be color coded; tagging of wire is not an acceptable equal. The Contractor shall provide a wiring schematic for each tank upon project completion. This schematic will be integrated within the Operation & Maintenance Manual.

Entire electrical components shall comply with UL508. Adequate electrical cord length shall be provided so the floats can be removed from the tanks without breaking electrical connection with the splice box.

5. Standards and Codes

- A. Permits, licenses, approvals and other arrangements for work shall be obtained and paid for by the Contractor and included in the bid price.
- B. Electrical work shall be executed in strict accordance with the latest edition of the National Electrical Code and local ordinances and regulations.
- C. All electrical equipment, materials, construction methods, tests and definitions shall be in strict conformity with the established standards of the following in their latest adopted revision:
 - 1. Underwriters' Laboratories, Inc. (UL)
 - 2. National Electrical Manufacturers Association (NEMA)

3. Canadian Standards Association (CSA)
4. Electrical Testing Laboratories (ETL)
5. Factory Mutual (FM)

- D. All materials and equipment specified herein shall, within the scope of UL Examination Services, be approved by the Underwriter's Laboratories for the purpose for which they are used and shall bear the UL label.
- E. All materials shall be new, free from defects, of current manufacture, of quality specified or shown. Each type of material shall be of the same manufacturer throughout the work.

END OF SECTION 02810