Purchasing Division

ADDENDUM NO. 1

DATE: **August 12, 2015**
FROM: **City of Grand Junction Purchasing Division**
TO: **All Offerors**
RE: **IFB-4079-15-DH CLETC Water Line Project**

Offerors responding to the above referenced solicitation are hereby instructed that the requirements have been clarified, modified, superseded and supplemented as to this date as hereinafter described.

Please make note of the following clarifications:

1. See attachments.

The original solicitation for the project noted above is amended as noted.

All other conditions of subject remain the same.

Respectfully,

Duane Hoff Jr., Senior Buyer
City of Grand Junction, Colorado

SIGN-IN SHEET

Solicitation Name:	CLETC Water Line Project
Solicitation #:	IFB-4079-15-DH
Date:	8/10/2015
Time:	10:00am

	Company Name	Representative Name	Phone	Email	
1	Grand Junction Pipe	Duwayne Hall	970-243-4604	duwayne.hall@gjpipe.com	
2	Sorter Construction, Inc	Scott Baumgartner	242-1436	Scott@sorterdigs.com	
3	Doug Skoe	T-Bone Construction	719 570 1456	doug.skoe@tbone construction.com	/
4	Bret Guillory	City of Grand Jct	970-244-1590	BretG@GJCity.org	/
5	HD Supply	Jimmy Street	970-683-7104	Jimmy.Street@Hdsupply.com	
6	Skyline Contracting	John Chlutka	(970) 434-9121	JChlutka@SkyConInc.com	/
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CLETC Water Line Project

List of Addendum #1 Items – August 12, 2015

1. Appendix A - Typical water storage tank installation guidelines.
2. Appendix H – CDOT Construction Permit
3. Special Conditions and Special Provisions
4. Plan Set Clarifications indicated by notation of number 1 inside a triangle.
5. Bid Schedule additions

Appendix A

Single Wall
NSF Approved
20,000 Gallon Water Storage Tanks (Typ)

FIBERGLASS TANK INSTALLATION INSTRUCTIONS

Table of Contents

1. INTRODUCTION

1.1. The purpose of this manual is to provide specifiers, owners and contractors with detailed instructions for installing and operating Containment Solutions, Inc. (CSI) single and double-wall fiberglass underground storage tanks and oil/water separators.

1.2. CSI Tank installation is a specialized business. If you do not have the proper experience and have not completed CSI training for tank installation in the last 24 months, please contact a trained contractor or call CSI for a list of trained contractors.

1.3. These instructions have been developed and refined from the experience of over 300,000 tank installations.

1.4. Proper installation is required to assure the long-term performance of CSI Storage Tanks. These instructions must be followed. Failure to comply will void the limited warranty and may cause tank failure.

1.5. It is the responsibility of the owner, installer and operator to understand and follow all installation requirements.

1.6. Safety

1.6.1. These instructions should not be interpreted in any way to put one's health at risk, or to harm property and/or the environment.

1.6.2. Keep this manual available at the installation site and refer to safety procedures as needed.

1.6.3. The following definitions will serve as a guide when reading this manual:

⚠WARNING

Indicates a potentially hazardous situation, which if not avoided could result in death or serious injury.

⚠CAUTION

Indicates a potentially hazardous situation, which if not avoided may result in minor or moderate injury.

NOTICE

Indicates a potentially hazardous situation, which if not avoided may result in property damage.

1.7. Important Information

1.7.1. Proper installation of each tank is essential:

1.7.1.1. To ensure the safety of all the individuals involved in the tank installation.

1.7.1.2. To prevent tank damage and/or failure, which could lead to product loss and environmental contamination.

1.7.1.3. To validate the tank limited warranty.

1.8. Important Reminders

1.8.1. In addition to these instructions, the installation must comply with NFPA (30, 30A, and 31), OSHA and all applicable Federal, State, Local, or Provincial, construction, safety and environmental codes and regulations.

1.8.2. Any variances or deviations which are in direct conflict with these published installation instructions must be approved in writing prior to the installation by Containment Solutions Tank Technical Support.

1.8.3. U.S. federal law (the Resource Conservation and Recovery Act (RCRA), as amended (Pub. L. 98-616)) requires owners of certain underground storage tanks to notify designated state or local agencies by May 8,1986, of the existence of their tanks. Notifications for tanks brought into use after May 8, 1986, must be made within 30 days. Consult EPA's latest regulations to determine if you are affected by this law.

1.8.4. These instructions provide the minimum requirements for the successful installation of a fiberglass underground storage tank. CSI does not design or engineer the actual installation. The owner's Engineer of Record for the installation can exceed these minimum requirements and is responsible for the final design.

1.8.5. The presence of any CSI representative at the job site does not relieve the contractor of responsibility to follow these installation instructions.

1.9. Tank Limited Warranty Activation

1.9.1. These instructions must be followed.

1.9.2. Installing contractor must be trained in accordance with the CSI contractor training course in effect at the time of the installation.

1.9.3. The Tank Installation Checklist must be properly completed and signed by the tank owner's representative and the installing contractor at the time of installation.

1.9.4. The tank installation checklist, these instructions, and any correspondence related to the tank installation must be retained by the tank owner. The checklist will be required and must be provided to CSI when making a warranty claim.

1.9.5. The limited warranty in effect at the time of tank delivery will apply and is available online at www.containmentsolutions.com.

1.9.6. The CSI limited warranty applies only to a tank installed according to these instructions.

1.9.7. It is the responsibility of the owner and operator to follow all CSI operating guidelines and all limitations in the tank warranty.

1.10. Before You Begin

1.10.1. Read, understand and follow these instructions.

1.10.2. Barricade the tank area until the job is completed.

1.10.3. Review and prepare to complete the installation checklist.

1.10.4. Check with local authorities for building codes, underground utilities and testing requirements.

1.10.5. If you have installation questions or need alternate installation methods, contact CSI Tank Technical Support.

1.10.6. If you have other questions regarding tank modifications, such as adding fittings or manways or tank repair, contact Containment Solutions Field Services.

1.10.7. A list of supplemental documents is found in Section 21.

⚠WARNING

Do not enter tank or sumps unless following OSHA guidelines for confined space entry. Failure to follow OSHA guidelines could result in death or serious injury.

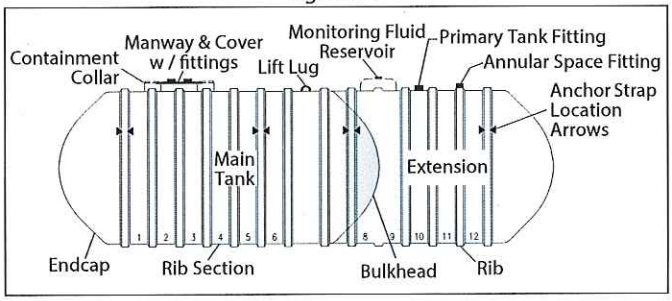
ASPHYXIATION FIRE EXPLOSION

2. HANDLING & STORAGE

2.1. Common Terms for:

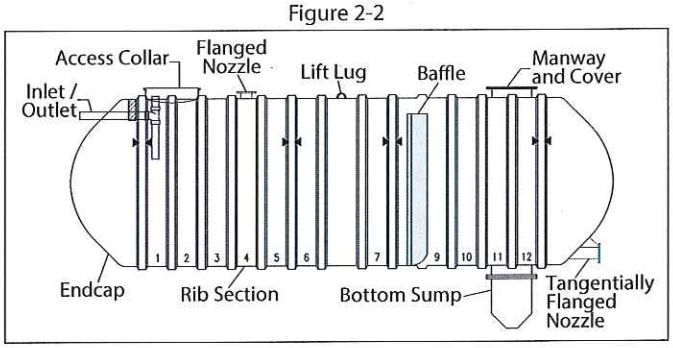
2.1.1. Petroleum Tanks (see Figure 2-1).

Figure 2-1



2.1.2. Non Petroleum Tanks (see Figure 2-2)

Figure 2-2



⚠WARNING

Straps securing the tank to the truck should never be released before the appropriate lifting equipment is properly secured to the tank's lift lugs, and until everyone is positioned in a safe location to avoid injuries. Failure to do so could result in personal injury or death.

2.1.3. The contractor is responsible for rigging, unloading and securing the tank.

2.1.4. Tanks must be mechanically unloaded under the direction of a qualified rigger. Insure lifting equipment is rated to handle the load before lifting.

2.1.5. Upon tank delivery and when lifting tank, visually inspect entire exterior surface of the tank for shipping or handling damage. If the tank has a wet annular space, inspect for monitoring fluid on the exterior surface.

2.1.6. Sign all shipping papers accepting the tank as delivered. Any damage observed must be noted in these papers.

2.1.7. Before unloading a tank from the truck, the contractor must make sure all deadmen, tools, hardware, supplies and anything else capable of damaging the tank are removed from the trailer bed.

2.1.8. The contractor is responsible for making sure the tank is secure before removing shipping straps so the tank does not roll off the truck or trailer.

2.1.9. For tanks with a bottom sump or bottom fittings, be sure the bottom sump or fittings are not damaged by contact with any object. Refer to Supplemental Documents (Section 21) for additional information.

2.1.10. Tank must be properly unloaded prior to air/soap testing.

2.1.11. For temporary storage of tanks at job site:

2.1.11.1. Set on smooth ground (no protruding rocks or hard objects) or on the shipping pads oriented to allow for tank rotation as needed.

2.1.11.2. Chock with sandbags.

2.1.11.3. If high winds are anticipated, tie the tank down to prevent damage. Do not use wire ropes or chains, and do not place straps over collars or reservoirs.

2.1.11.4. When the tank must be rolled for air/soap test, roll only on shipping pads or smooth surface free of protruding rocks or hard objects. Ensure fittings and/or collars do not come in contact with the ground.

2.1.11.5. Protect collars from water accumulation in freezing conditions or tank damage may occur.

2.2. To Avoid Tank Damage

2.2.1. Do not allow tank to rotate or swing during unloading.

2.2.2. Do not use chains or cables around tanks.

2.2.3. Do not allow metal hardware to contact the tank.

2.2.4. Do not allow fittings, collars, manways, reservoirs, or any accessory to contact ground during rotation.

2.2.5. Do not drop tank.

2.3. Lifting Tanks

⚠WARNING

Do not stand on or under tank while tank is being lifted. This could result in personal injury or death.

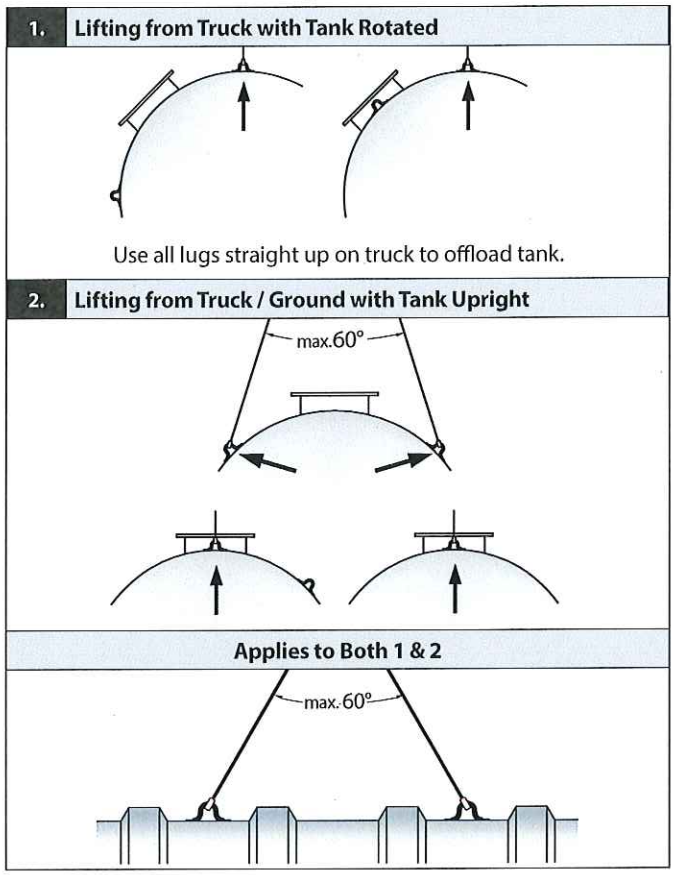
2.3.1. To lift the tank, always use the number of lift lugs indicated on the label adjacent to the lift lugs. Apply equal tension to all lift lugs simultaneously. Slings may also be used to lift the tank. Refer to Supplemental Documents (Section 21) for additional information.

Slings around the tank must be used if the tank is to be handled in a non-level or angled position.

2.3.2. Tanks may be provided with guide lugs for attachment of guide ropes during lifting and positioning operations. Do not use guide lugs for lifting.

2.3.3. Identify the tank lift lug orientation and use the appropriate method to lift the tank. Lift tank as shown in Figure 2-3.

Figure 2-3



2.3.4. Rotate tank after unloading to upright position for lifting into excavation.

2.4. Lifting CSI Deadmen

⚠WARNING

Use only the anchor points when lifting and positioning CSI deadmen. Failure to do so could result in personal injury or death.

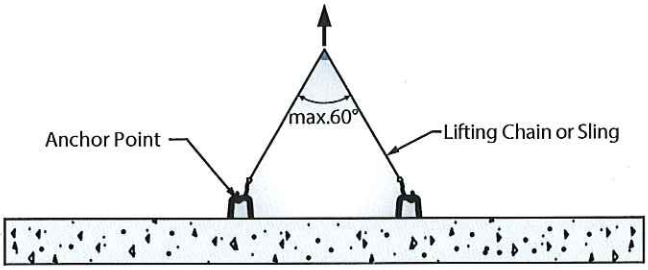
2.4.1. Insure lifting equipment is rated to handle the load before lifting. For deadmen sizes and weights use Table 2-1.

Table 2-1

Deadmen Anchors			
12" x 12"	18" x 8"	Pounds	Kilograms
Length (ft)		Weight	
12		1,655	750
16		2,250	1,020
18		2,550	1,156
20		2,850	1,293
	14	1,686	765
	18	2,100	952
	22	2,500	1,134

2.4.2. Lift deadman using a minimum of two equally spaced anchor points (see Figure 2-4).

Figure 2-4



2.4.3. The deadmen type, lengths, and the number of anchor points are dependent upon the tank diameter, model and capacity. See customer specific drawing for deadman placement and anchoring location details.

2.5. Lifting Tank Sumps or Risers

2.5.1. Visually inspect the sump components for shipping damage. If damage is found, contact CSI Field Services.

2.5.2. Wear gloves.

2.5.3. Do not roll, drop or bounce.

2.5.4. Set on smooth surface.

2.5.5. The sump must be secured to prevent damage from high winds. Proper precautions should be taken to protect adhesive channels.

2.5.6. Refer to Supplemental Documents (Section 21) for additional information on tank sumps.

3. BED & BACKFILL

3.1. The use of approved backfill material is critical to long term tank performance.

3.2. Do not mix approved backfill with sand or native soil.

3.3. Do not backfill tank with sand or native soil.

3.3.1. Replace all excavated native soil with approved backfill of proper size and gradation. Use backfill which meets ASTM C-33 for quality and soundness.

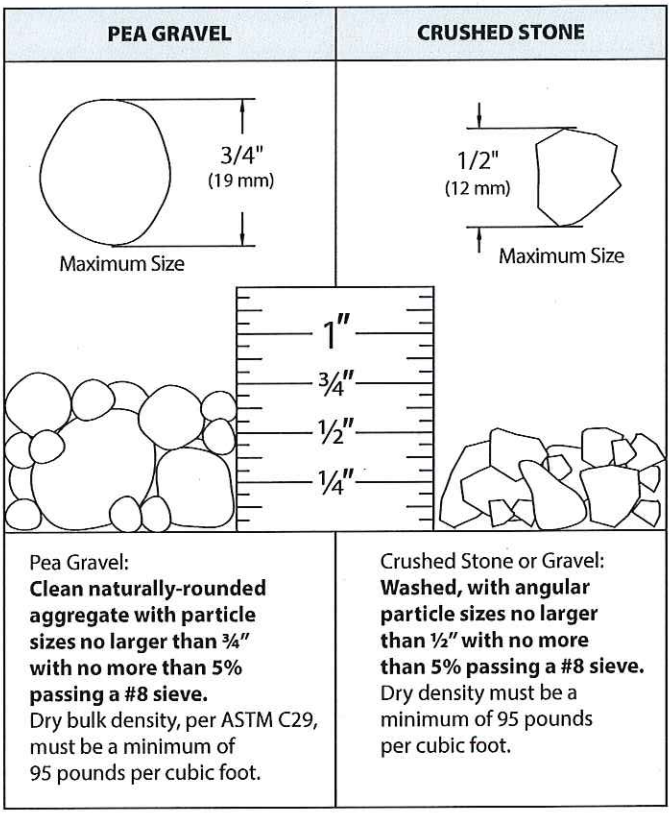
3.3.2. Require your backfill supplier to certify, with a sieve analysis, that the backfill meets this specification.

3.3.3. Sieve analysis must be attached to the Tank Installation Checklist.

3.3.4. Keep backfill dry and free of ice in freezing conditions.

3.3.5. Use only approved pea gravel or crushed stone (see Figure 3-1):

Figure 3-1



3.4. To check your backfill size and receive a job specific email acknowledgment, go to www.containmentsolutions.com, in the search box, use term "backfill".

4. PRE-INSTALLATION TESTING

⚠WARNING

Do not pressurize 4', 6', 8' and 10' diameter tanks over 5 psig (35 kPa). Do not pressurize 12' diameter tanks over 3 psig (21 kPa). Tank damage or physical injury may result.

4.1. The following instructions apply to all air tests described in Section 5 - Testing Tanks.

4.2. Visual Air/Soap Test

4.2.1. To be performed on all tanks after unloading from the truck.

4.2.1.1. Single-Wall and Dry Annular Space Tanks air/soap tests must be performed at the job site prior to installation to verify the absence of damage (Sections 5.1 to 5.6).

4.2.1.2. Liquid Filled Annular Space Tanks - air/soap tests on accessories and fittings can be performed after the tank is in the excavation before or after backfilling (Sections 5.6 to 5.7).

4.2.1.3. Dry annular space tank shipped under vacuum (Section 5.8).

4.2.1.4. Some Non Petroleum tanks are not field air-testable and require a post installation water test (Section 5.9).

4.2.1.5. All tanks must be vented at all times except as defined during testing.

4.3. Prepare for testing.

NOTICE

Do not connect air supply directly to the bulkhead monitor fitting or tank damage will result.

4.3.1. Replace all fitting plugs with plugs suitable for the product to be stored in the tank.

4.3.2. Clean factory pipe dope from plugs and fittings.

4.3.3. Apply pipe dope suitable for the material being stored in the tank.

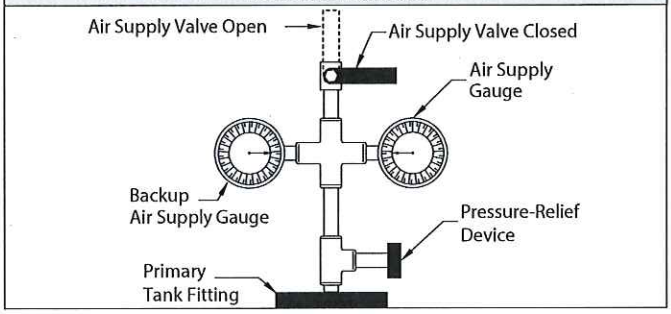
4.3.4. Reinstall and tighten fitting plugs.

4.3.5. Assemble the required number of "Tank Test Manifolds" (Figure 4-1) and "Annular Space Gauge and Valves" (Figure 4-2).

4.3.5.1. Use a contractor supplied "Tank Test Manifold" connected to a tank primary fitting (see Figure 4-1).

Figure 4-1

Tank Test Manifold



4.3.6. Gauges must have a maximum full-scale reading of 15 psig (40 kPa) with ½ psig (3 kPa) or smaller increments.

4.3.7. Pressure-relief device must be sized and set to prevent the tank from being pressurized in excess of the maximum allowed test pressure (6 psig / 41 kPa maximum or 4 psig / 28 kPa for 12' tanks).

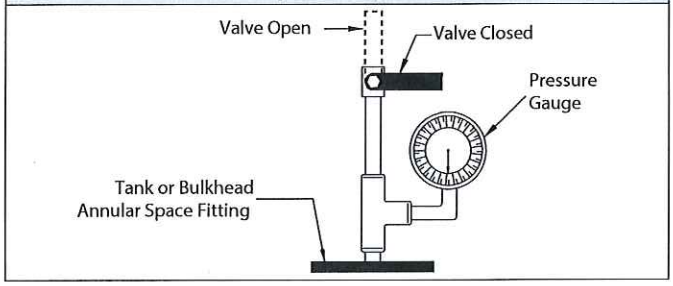
⚠WARNING

Do not stand on or approach endcaps, manways, or fittings while pressurizing tanks. Do not lift or hoist tank under pressure. These actions could result in death or serious injury.

4.3.8. For tanks with any dry annular space configurations, use a contractor supplied "Annular Space Gauge and Valve" connected to the annular space fitting (see Figure 4-2).

Figure 4-2

Annular Space Gauge and Valve



4.4. Do not pressurize 4', 6', 8' and 10' diameter tanks over 5 psig (35 kPa). Do not pressurize 12' diameter tanks over 3 psig (21 kPa).

4.5. Pressure gauge readings can be affected by changes in ambient air temperature. Allow for pressure fluctuations when tanks are subject to temperature changes.

4.6. Prepare Soap Solution.

4.6.1. Warm weather soap solution

- 5 gallons of water
- 8 ounces of household dish washing detergent

4.6.2. Freezing conditions soap solution

- 4 gallons of water
- 8 ounces of household dish washing detergent
- 1 gallon of windshield washer solution

4.7. The entire tank surface must be covered with the soap solution and visually inspected for leaks, as indicated by the presence of active air bubbles.

4.8. Anytime bubbles are observed around fittings, plugs, and gaskets; tighten and retest.

4.9. In the unlikely event a tank leak is discovered, discontinue the installation and immediately call CSI Field Services to schedule a repair.

5. TESTING TANKS

5.1. Testing Single-Wall Tank(s)

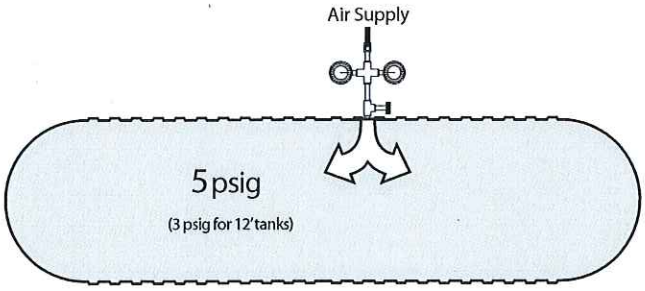
5.1.1. Comply with the requirements of Section 4.

5.1.2. Connect "Tank Test Manifold" to a tank fitting.

5.1.3. Connect the pressure source to the "Tank Test Manifold."

5.1.4. Pressurize tank to 5 psig maximum (3 psig for 12' tanks)(see Figure 5-1).

Figure 5-1



5.1.5. Close the air supply valve to the primary tank.

5.1.6. Disconnect the air supply.

5.1.7. Monitor the pressure readings for 30 minutes for any loss in pressure from the initial reading which may indicate a leak.

5.1.8. While under pressure, cover tank outer surface, including fittings and manway(s), with soap solution and inspect.

5.1.9. After completing air test, release pressure.

5.1.10. Remove all gauges, valves, and hose assemblies.

5.1.11. Replace and tighten fitting plug(s).

5.1.12. Replace the plastic vent plugs in the open fittings.

5.1.13. Refer to INST 6038 for procedure to remove factory equipped on-site pressure test components.

5.2. Double-Wall Tanks Shipped Under Vacuum

NOTICE

Vacuum monitoring is less sensitive and less reliable than the air/soap test. Several variables can affect the accuracy of vacuum monitoring including environmental conditions (e.g. temperature, pressure, altitude) and/or equipment failure.

5.2.1. Pre Installation

5.2.1.1. CSI double-wall tanks may be shipped from the factory with the annular space under vacuum. The vacuum serves to confirm the integrity of the primary and secondary (outer) walls prior to shipment, during shipment, handling, and off loading. This option may expedite tank installation by minimizing testing procedures.

5.2.1.2. Vacuum monitored tanks must be under minimum vacuum for at least 7 days. If this requirement is not met, and air/soap test is required (see Section 4). The date the vacuum was applied to the tank is located on or near the vacuum gauge.

5.2.1.3. Upon arrival of the tank at the job-site, the contractor must record the vacuum date, the arrival date, and the vacuum level from the gauge. This should be done while the tank is on the truck or immediately after off loading.

5.2.1.4. A tank shipped under vacuum can be installed and backfilled with the vacuum intact if both of the following conditions are met:

- The vacuum date precedes the tank installation by at least 7 days.
- The vacuum gauge reads at least 10"Hg (34kPa).

5.2.1.5. If the tank installation date is 7 days or less from the vacuum date OR if the vacuum level is less than 10"Hg, the vacuum on the annular space must be released and both the primary tank and the secondary tank must be tested for tightness before installation and backfilling.

5.2.1.6. If the tank installation date is more than 7 days from the vacuum date and the vacuum level is at least 10" HG, the tank may be backfilled to the tank top while holding vacuum on the annular space.

5.2.2. After backfilling to tank top

5.2.2.1. Pressurize only the primary tank and all compartments while maintaining vacuum on the annular space. Cover fittings and manway(s) with soap solution and inspect.

5.2.2.2. In the unlikely event a tank leak is discovered, discontinue the installation and immediately call CSI Field Services to schedule a repair.

5.2.2.3. After the soap test is complete, release the pressure on the primary tank, release the vacuum on the annular space and remove the gauge, and the gauge piping and seal the annular space fitting.

5.2.2.4. If the vacuum level is ever less than 10"Hg, immediately call CSI Field Services.

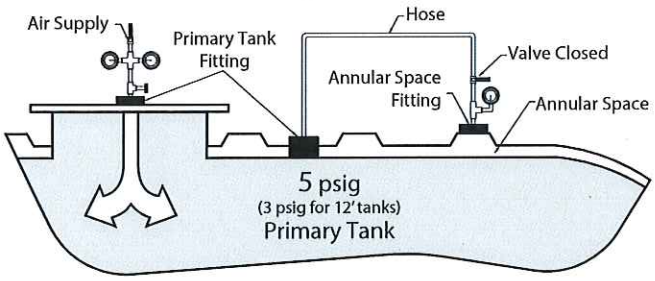
5.3. Testing Double-Wall Tank(s) With Dry Annular Space

NOTICE

Do not connect the air supply directly to the annular space monitoring fitting or tank damage will result.

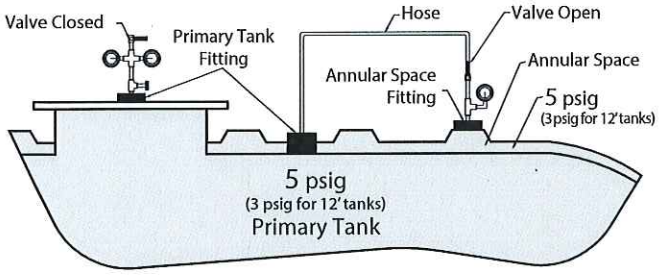
5.3.1. Comply with the requirements of Section 4.
5.3.2. Connect "Tank Test Manifold" to a primary tank fitting.
5.3.3. Connect hose between a primary tank fitting and "Annular Space Gauge and Valve."
5.3.4. Close valve between primary tank and annular space.
5.3.5. Connect the pressure source to the "Tank Test Manifold" on the main tank.
5.3.6. Pressurize primary tank to 5 psig maximum (3 psig for 12' tanks) (see Figure 5-2).

Figure 5-2



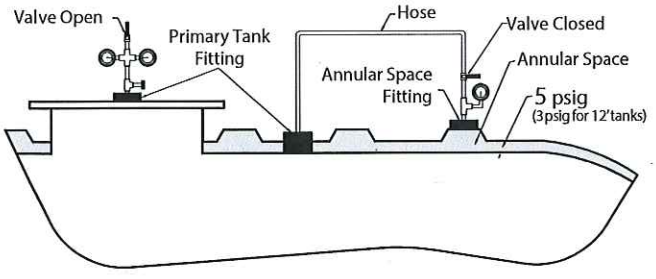
5.3.7. Close the air supply valve to the primary tank.
5.3.8. Disconnect the air supply.
5.3.9. Open valve between primary tank and annular space in order to pressurize the annular space using the existing pressure in the primary tank (pressure in the primary tank may drop slightly) (see Figure 5-3).

Figure 5-3



5.3.10. While under pressure, cover fittings and manway(s), with soap solution and inspect.
5.3.11. Close valve to annular space.
5.3.12. Open valve to vent primary tank.
5.3.13. Maintain pressure on the annular space (see Figure 5-4).

Figure 5-4



5.3.14. Observe and monitor the gauge on the annular space for 30 minutes for any loss of pressure which may indicate a leak.
5.3.15. While under pressure, cover tank outer surface, including fittings and manway(s) with soap solution and inspect.
5.3.16. After completing air test, release pressure.
5.3.17. Remove all gauges, valves, and hose assemblies.
5.3.18. Replace and tighten fitting plug(s).
5.3.19. Replace the plastic vent plugs in the open fittings.

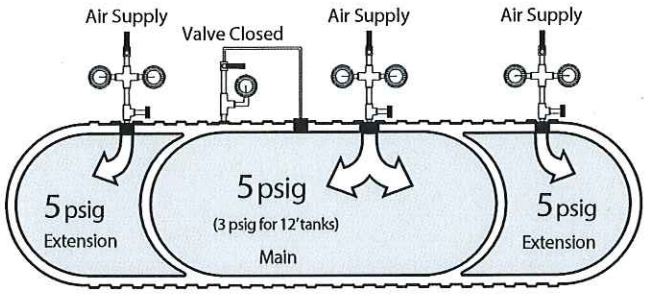
5.4. Testing Double-Wall Compartment Tank(s) With A Dry Annular Space And Double-Wall Bulkhead(s)

NOTICE

Do not connect the air supply directly to the annular space monitoring fitting or tank damage will result.

5.4.1. Comply with the requirements of Section 4.
5.4.2. Connect "Tank Test Manifolds" to each compartment.
5.4.3. Connect hose between a primary tank fitting and "Annular Space Gauge and Valve" (refer to Figure 5-2).
5.4.4. Close valve between primary tank and annular space.
5.4.5. Connect the pressure source to the "Tank Test Manifold" on each compartment.
5.4.6. Pressurize all compartments to 5 psig (3 psig for 12' tanks) (see Figure 5-5).

Figure 5-5

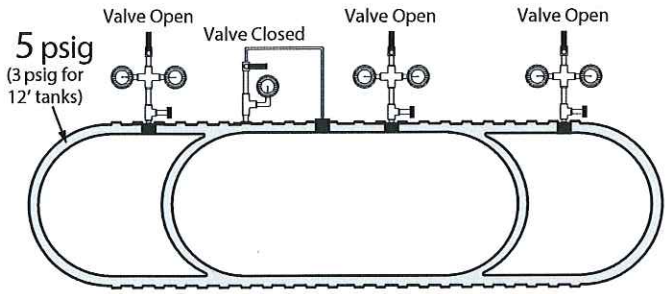


5.4.7. Close valve on each compartment "Tank Test Manifold." Disconnect the air supply line.
5.4.8. Monitor the pressure for 30 minutes for any loss in pressure from the initial reading which may indicate a leak.
5.4.9. With all compartments under pressure, cover fittings and manway(s) with soap solution and inspect.
5.4.10. Open valve between primary tank and annular space in order to pressurize the annular space using the existing pressure in the primary tank (pressure in the primary tank may drop slightly).

5.4.11. Close valve to annular space.

5.4.12. Open valves to vent all compartments (maintain 5 psig on annular space) (see Figure 5-6).

Figure 5-6



5.4.13. Monitor the pressure for 30 minutes for any loss in pressure from the initial reading which may indicate a leak.

5.4.14. While under pressure, cover tank outer surface, including fittings and manway(s), with soap solution and inspect.

5.4.15. After completing air test, release pressure.

5.4.16. Remove all gauges, valves, and hose assemblies.

5.4.17. Replace and tighten fitting plug(s).

5.4.18. Replace the plastic vent plug in the open fittings.

5.5. Testing Double-Wall Tank(s) With Liquid Filled Annular Space (Hydrostatically Monitored)

NOTICE

Never pressurize a wet annular space. Doing so may damage the tank or cause tank failure.

5.5.1. This tank has a hydrostatic monitoring system that includes a green monitoring fluid pre-installed between the tank walls.

5.5.2. In the unlikely event of a tank leak, this monitoring fluid will leave a green trace on the tank.

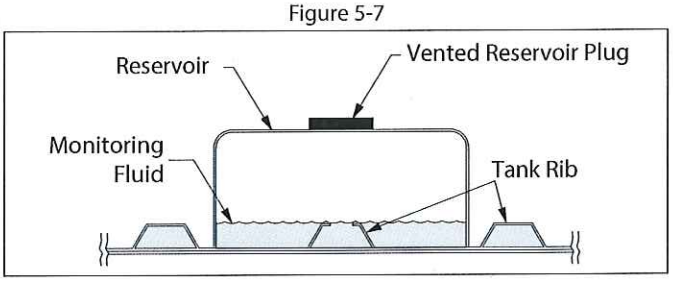
5.5.3. If monitoring fluid is found on the tank inner or outer surface during any test, discontinue the installation and immediately contact Containment Solutions Field Services.

5.5.4. Comply with the requirements of Section 4.

5.5.5. With tank in upright position, remove the 4" vented plug from the reservoir fitting.

5.5.6. Add only enough monitoring fluid to cover the rib inside the reservoir. Do not overfill past the rib at this time (see Figure 5-7). Final monitoring fluid levels will be set later in the installation process.

Figure 5-7



5.5.7. Reinstall vented reservoir plug to ensure annular space is vented at all times.

5.5.8. Remove enough tank fitting plugs to see inside the primary tank.

5.5.9. With a light, look inside for any monitoring fluid.

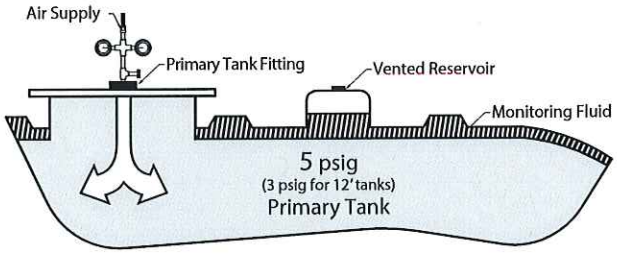
5.5.10. Replace and tighten fitting plug(s).

5.5.11. Connect "Tank Test Manifold" to a primary tank fitting.

5.5.12. Connect the pressure source to the "Tank Test Manifold."

5.5.13. Pressurize primary tank to 5 psig maximum (3 psig for 12' tanks) (see Figure 5-8).

Figure 5-8



5.5.14. Close valve on "Tank Test Manifold." Disconnect the air supply line.

5.5.15. Monitor the pressure for 30 minutes for any loss in pressure from the initial reading which may indicate a leak.

5.5.16. While under pressure, cover fittings and manway(s) with soap solution and inspect.

5.5.17. After completing air test, release pressure.

5.5.18. Remove all gauges, valves, and hose assemblies.

5.5.19. Replace and tighten fitting plug(s).

5.5.20. Replace the plastic vent plugs in the open fittings.

5.6. Testing Double-Wall Compartment Tank(s) With Double-Wall Bulkheads (Hydrostatically Monitored)

NOTICE

Never pressurize a wet annular space. Doing so may damage the primary tank or cause tank failure.

5.6.1. This tank has a hydrostatic monitoring system that includes a green monitoring fluid pre-installed between the tank walls.

5.6.2. In the unlikely event of a tank leak, this monitoring fluid will leave a green trace on the tank.

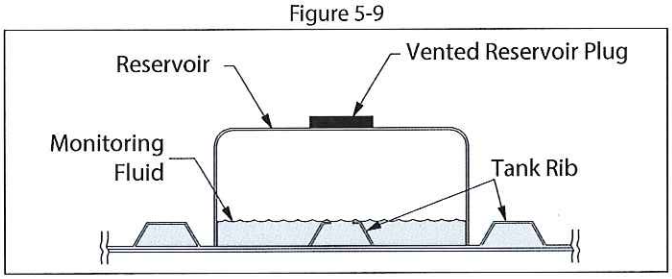
5.6.3. If monitoring fluid is found on the tank inner or outer surface during any test, discontinue the installation and immediately contact Containment Solutions Field Services.

5.6.4. Comply with the requirements of Section 4.

5.6.5. With tank in upright position, remove the 4" vented plug from the reservoir fitting.

5.6.6. Add only enough monitoring fluid to cover the rib inside the reservoir. Do not overfill past the rib at this time (see Figure 5-9). Final monitoring fluid levels will be set later in the installation process.

Figure 5-9



5.6.7. Reinstall vented reservoir plug to ensure annular space is vented at all times.

5.6.8. Remove enough tank fitting plugs to see inside each compartment.

5.6.9. With a light, look inside for monitoring fluid.

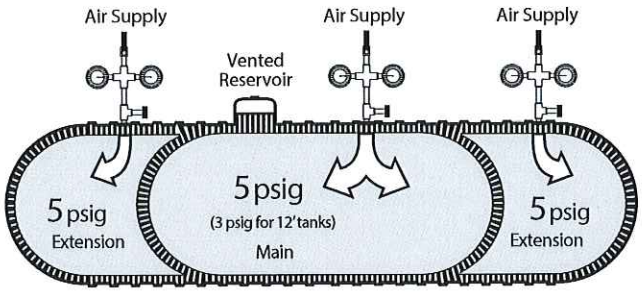
5.6.10. Replace and tighten fitting plug(s).

5.6.11. Connect "Tank Test Manifold(s)" to each compartment.

5.6.12. Connect the pressure source to the "Tank Test Manifold" on each compartment.

5.6.13. Pressurize all compartments to 5 psig (3 psig for 12' tanks) (see Figure 5-10).

Figure 5-10



5.6.14. Close valve on each "Tank Test Manifold." Disconnect the air supply line.

5.6.15. Monitor the pressure for 30 minutes for any loss in pressure from the initial reading which may indicate a leak.

5.6.16. With all compartments under pressure, cover fittings and manway(s) with soap solution and inspect.

5.6.17. After completing air test, release pressure.

5.6.18. Remove all gauges, valves, and hose assemblies.

5.6.19. Replace and tighten fitting plug(s).

5.6.20. Replace the plastic vent plug in the open fittings.

5.7. For Tanks That Cannot Be Air Tested (May Apply For Certain Non-UL Tanks)

NOTICE

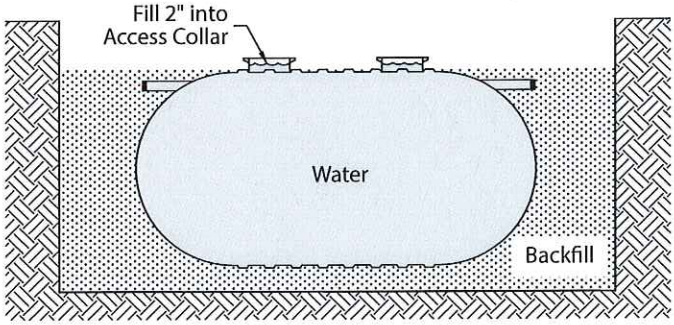
If the tank is to be water tested, it must be supported by backfill on all sides to the top of the tank. Failure to do so may result in tank damage.

5.7.1. These instructions are for tanks that require a post installation water test.

5.7.2. Comply with the requirements of Section 4.

5.7.3. Tanks may only be water tested if the backfill is at tank top (see Figure 5-11).

Figure 5-11



5.7.4. Expose tank penetrations on tank top by temporarily removing backfill.

5.7.5. So water does not exit the inlet/outlet pipe, install a turned up elbow or plug.

5.7.6. Completely fill the tank with water to a level 2" into the access collar(s).

5.7.7. Wait at least 30 minutes, if the water level in the collar does not drop more than ¼", the tank is considered acceptable and leak free.

5.7.8. If the level drops more than the ¼", ensure that inlet and outlet pipe caps or plugs and collars are not leaking, then refill the tank and retest.

5.7.9. After the tank is proven to be watertight, remove the water in the tank to below the pipe invert.

6. EXCAVATION & TANK CLEARANCE

⚠WARNING

Do not enter the tank excavation unless in compliance with OSHA regulations. Follow OSHA guidelines for tank excavation. Collapsing excavation walls can cause injury or death.

6.1. Stable Excavations

6.1.1. For different diameter tanks that are adjacent to each other, refer to Supplemental Documents (Section 21).

6.1.2. When your excavation is in stable, undisturbed soil; use the minimum spacings (per Figure 6-1 and Table 6-1).

Figure 6-1

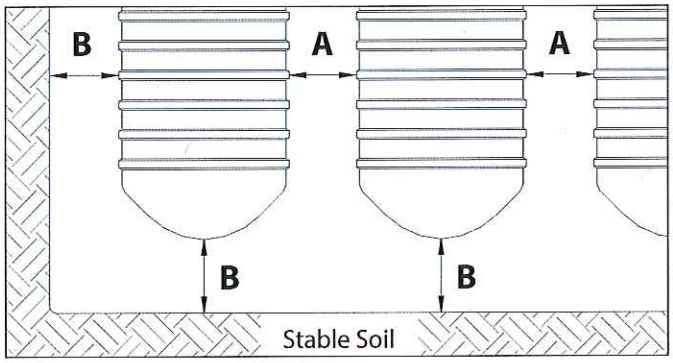


Table 6-1

8' Diameter Tanks		
	Minimum	w/ 12" x12" CSI Deadmen
A	18" (457mm)	24" (610mm)
B	18" (457mm)	24" (610mm)
4', 6', 10' Diameter Tanks		
	Minimum	w/ 18" x8" CSI Deadmen
A	18" (457mm)	36" (914mm)
B	24" (610mm)	24" (610mm)
12' Diameter Tanks		
	Minimum	w/ 18" x8" CSI Deadmen
A	24" (610mm)	36" (914mm)
B	24" (610mm)	24" (610mm)
Spacing between tanks placed end to end will follow the "B" spacing minimum value.		

6.2. Unstable Excavations

6.2.1. An unstable excavation is any of the following:

6.2.1.1. Muck, bog, peat, swamp, quick sand, flowing water, landfill type areas or any other situations where the soil is inherently unstable.

6.2.1.2. Soil less than 750 lbs./sq. ft. cohesion per ASTM D2166 (Test Method for Unconfined Compressive Strength of Cohesive Soil), or have an ultimate bearing capacity less than 3,500 lbs./sq. ft.

NOTICE

If the soil is unstable, the tank owner should consult a professional engineer to ensure a proper installation and avoid the potential for tank or property damage.

6.2.2. A soils consultant can provide additional recommendations, including when a reinforced pad is needed under the tank.

6.2.3. When a bottom pad is used, it should extend to the excavation walls.

6.2.4. Unstable excavations may also require geotextile fabric (see Section 7).

6.2.5. When the soil is unstable, with or without shoring, use the minimum spacings (per Figure 6-2 and Table 6-2).

Figure 6-2

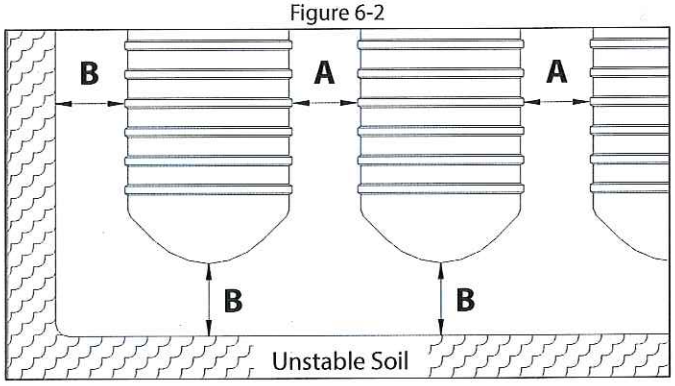


Table 6-2

8' Diameter Tanks		
	Minimum	w/ 12" x12" CSI Deadmen
A	18" (457mm)	24" (610mm)
B	½ Tank Dia.	½ Tank Dia.
4', 6', 10' Diameter Tanks		
	Minimum	w/ 18" x8" CSI Deadmen
A	18" (457mm)	36" (914mm)
B	½ Tank Dia.	½ Tank Dia.
12' Diameter Tanks		
	Minimum	w/ 18" x8" CSI Deadmen
A	24" (610mm)	36" (914mm)
B	½ Tank Dia.	½ Tank Dia.
Spacing between tanks placed end to end will follow the "B" spacing minimum value.		

6.3. Shoring Removal

NOTICE

Removal of shoring can cause backfill to move and tank to lose support, resulting in an excessive tank deflection. Tank and/or property damage can occur.

6.3.1. After the backfill is properly placed completely around the tank(s):

6.3.1.1. Vibrate shoring and pull slowly to top of backfill.

6.3.1.2. Fill any voids created by the pulled shoring with approved backfill.

6.3.2. All shoring should be removed and all voids must be filled using a long handled probe before continuing installation.

6.3.3. If side shoring is left in place, the shoring must not degrade over the life of the installation.

6.3.4. Shoring system components cannot be placed under the tank.

6.4. Tank Location - Nearby Structures

6.4.1. CSI recommends that the tank owner seek the advice of a local foundation professional engineer to determine the proper placement of a tank excavation near any slabs or foundations.

6.4.2. The location of a tank can be affected by the location of nearby structures. When selecting a tank site, care must be taken to avoid undermining the foundations of new or existing structures.

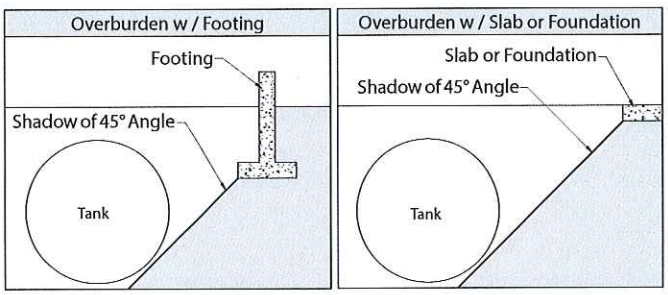
6.4.3. Ensure that downward forces from loads carried by the foundations and supports of nearby structures (constructed before or after tank installation) are not transmitted to the tanks. (Refer to NFPA 30 for additional details).

6.4.4. The placement of the installed underground tank is not designed for any of the following:

6.4.4.1. Additional static loads on the slab that will cause the load at the tank top to exceed 936 lbs/cubic ft.

6.4.4.2. Adjacent slab, footing or foundation that will place loads on the tank top or sides. This is typically accomplished by insuring that the tank is not located within the load distribution of any adjacent slabs or foundations using 45° as the angle of the projected loads (see Figure 6-3).

Figure 6-3



6.4.4.3. Equipment creating vibrations must be placed outside the boundaries of the excavation.

7. GEOTEXTILE FABRIC

7.1. Geotextile fabric (filter fabric) allows the passage of water but prevents the migration of approved backfill into the native soil and native soil into the approved backfill. Migration may compromise the backfill support of the tank.

7.2. Geotextile Fabrics are required for any of the following installations

7.2.1. Areas subject to tidal conditions.

7.2.2. Areas subject to frequently changing ground water levels.

7.2.3. Water conditions with silty soil.

7.2.4. Muck, bog, peat, swamp, landfill type areas or any other situations where the soil is inherently unstable.

7.2.5. Soils with less than 250 lbs./sq. ft cohesion or with ultimate bearing capacity of less than 500 lbs./sq. ft.

7.2.6. Alternate installation methods may also require geotextile fabrics. Refer to Supplemental Documents (Section 21) for additional information.

7.3. The tank owner or tank owner's representative may also specify the use of geotextile fabrics.

7.4. Non-degradable geotextile fabric can be either woven or non-woven and should have the following properties:

- Minimum grab tensile strength of 120 lbs (ASTM D4632).
- Maximum apparent opening size of 0.300 mm #50 US sieve (ASTM D4751).
- Minimum flow rate of 18 gallons/min/ft2 (ASTM D4491).
- Minimum permittivity of 0.28 sec-1 (ASTM D4491).

7.5. Do not use plastic, or any other material that may tear or degrade over time, as a replacement for geotextile fabric.

7.6. Geotextile Fabric Installation

7.6.1. Line the side and bottom of the excavation with geotextile fabric.

7.6.2. Overlap adjoining geotextile panels a minimum 12".

7.6.3. Place backfill on top of the geotextile fabric to hold it in place.

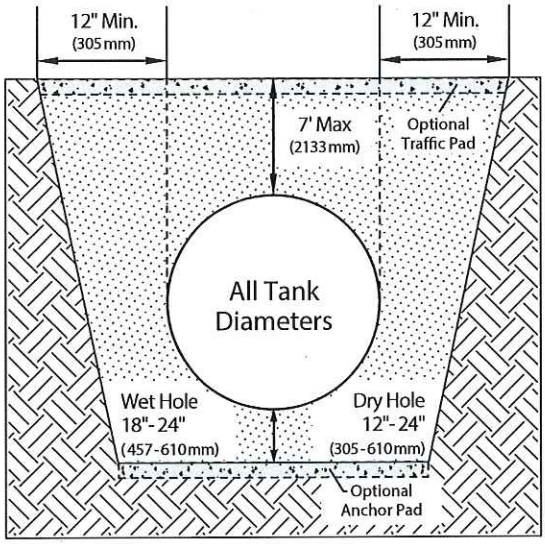
7.6.4. In wet hole conditions, backfill on top of the geotextile fabric is necessary to sink and hold it in place.

8. BURIAL DEPTH & COVER

8.1. Adhere to the minimum and maximum dimensions in this section.

8.2. In wet conditions, sufficient overburden and/or an appropriate anchoring system must be used to offset buoyancy of the tank. Minimum burial depth (section 8) may not be sufficient to anchor the tank in buoyant conditions. Refer to the "Anchor Chart" (Appendix A) for minimum burial depth in buoyant conditions.

Figure 8-1



8.2.1. Traffic pad must extend at least 12" beyond tank perimeter in all directions.

8.2.2. The maximum burial depth is 7' from the tank top to grade elevation. Tanks can be designed for burial depths greater than 7'. Contact your local CSI representative prior to tank purchase.

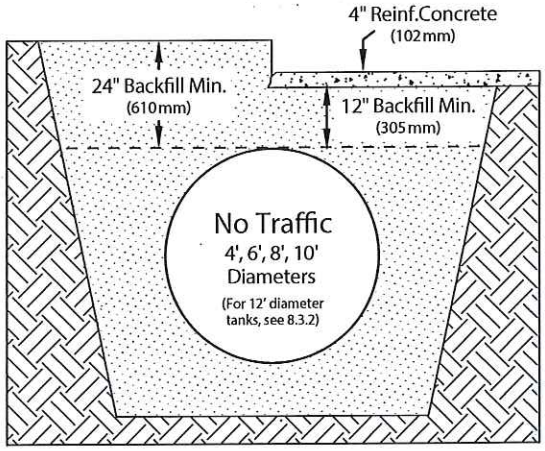
8.2.3. Dry hole excavations must have a minimum of 12" and a maximum of 24" backfill between the bottom of the tank and either the bottom of the excavation or the top of the concrete anchor pad.

8.2.4. Wet hole excavations must have a minimum of 18" and a maximum of 24" backfill between the bottom of the tank and either the bottom of the excavation or the top of the concrete anchor pad.

8.3. Minimum Burial Depth - No Traffic Load

8.3.1. 4' - 10' tanks need a minimum cover of 24" backfill or 12" backfill plus 4" reinforced concrete (see Figure 8-2).

Figure 8-2



8.3.2. 12' tanks need a minimum cover of 42" backfill or 38" backfill plus 4" reinforced concrete.

8.3.3. Local codes may require deeper minimum burial depth.

8.4. Minimum Burial Depth -Traffic Loads

NOTICE

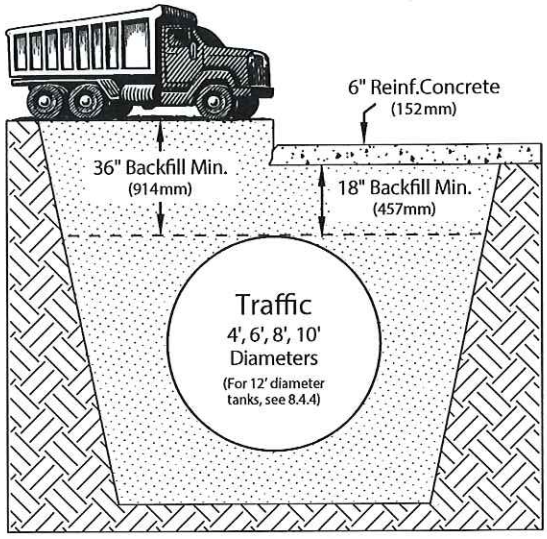
Without a concrete traffic pad, soil must be consolidated such that rutting of the soil will not occur from any equipment or vehicles.

8.4.1. The following burial depths are suitable for HS20 traffic loads (32,000 lbs/axle).

8.4.2. The concrete traffic pad, reinforcement and thickness, must be designed for job conditions and traffic loads to assure concrete traffic pad integrity. It is the responsibility of the tank owner or tank owner's representative to design the traffic pad for all loads.

8.4.3. 4' - 10' tanks need a minimum cover depth of 36" backfill or 18" of backfill plus 6" of reinforced concrete (see Figure 8-3).

Figure 8-3



8.4.4. 12' tanks need a minimum cover of 48" backfill or 36" backfill plus 6" reinforced concrete.

9. ANCHORING

NOTICE

Every site should be evaluated for buoyant conditions including but not limited to local water tables, flooding and trapped water. Failure to provide sufficient overburden and/or appropriate anchoring may result in tank failure and property damage may occur.

9.1. It is the responsibility of the tank owner or tank owner's representative to determine the appropriate anchoring method and to design the anchoring system.

9.2. CSI has provided an "Anchor Chart" at the end of this instruction booklet (Appendix A) that covers the minimum burial depths for the three common methods of anchoring tanks.

9.3. The three common methods are:

- Deadmen Anchors
- Concrete Anchor Pad
- Overburden (no mechanical anchoring)

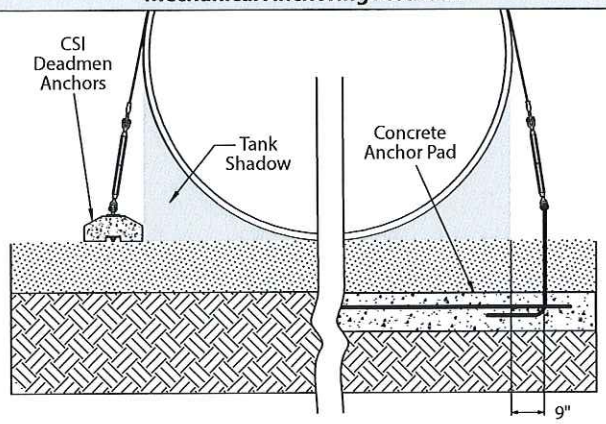
9.4. CSI offers an engineered mechanical anchoring system designed for each size tank consisting of deadman anchors, straps, and hardware.

9.5. Burial depth, straps, turnbuckles, shackles, wire rope, deadmen and anchor pads can be combined to provide anchoring using the information provided in this section.

9.6. The mechanical anchoring methods are shown in Figure 9-1.

Figure 9-1

Mechanical Anchoring Methods



9.7. General Anchoring Requirements

NOTICE

Metal hardware (strap ends, wire rope, and turnbuckles) should never be in direct contact with any portion of the tank or tank damage may occur.

9.7.1. Prior to anchoring, take the first deflection measurement after the tank is lowered into the excavation. If mechanical anchoring is used, take the second deflection measurement of the tank after the anchoring is complete and record the results on the Tank Installation Checklist (Additional information on deflection measurements can be found in Section 11).

9.7.2. Use only CSI anchor straps

9.7.3. Use correct length anchor straps for each diameter tank.

9.7.4. Anchor points must be aligned with designated anchor ribs ▶ ◀ (±1"). Do not use straps between ribs except on 4' tanks.

9.7.5. Maintain proper distance between anchor points across the diameter of the tank:

9.7.5.1. For deadmen, place inside edge of deadman at the tank shadow.

9.7.5.2. For bottom anchor pad, position anchor point 6" from tank shadow for 4', 6', and 8' tanks; 9" for 10' and 12' tanks.

9.7.6. All anchor straps must be uniformly tightened with turnbuckles or come-a-longs. Straps should be snug, but not cause tank deflection.

9.8. Anchor Point Loads

9.8.1. For any anchoring system, the tank strap and all hardware should be designed for the following maximum working loads which will provide a minimum 3:1 factor of safety (see Table 9-1).

Table 9-1

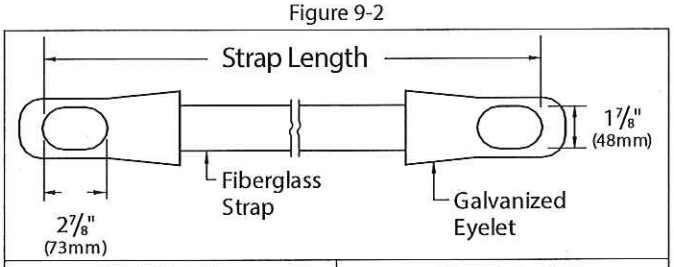
Anchor Point Load Allowed	
Tank Diameter	Maximum Load
4'	1,261 lbs (572 kg)
6'	5,405 lbs (2,452 kg)
8'	7,508 lbs (3,406 kg)
10'	7,508 lbs (3,406 kg)
12'	7,508 lbs (3,406 kg)

9.8.2. The installing contractor is responsible for providing hardware and anchor points of sufficient size and strength.

9.8.3. For specific information on hardware and usage, consult the hardware manufacturer or supplier.

9.9. Standard Eye by Eye Hold Down Strap

Figure 9-2

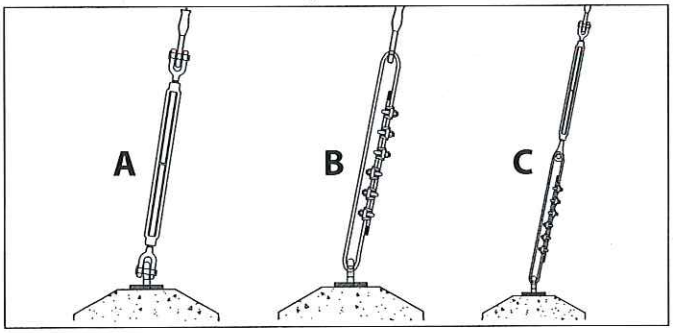


Tank Diameter	Strap Length
4'	100" (2,546mm)
6'	141" (3,185mm)
8'	176" (4,464mm)
10'	238" (6,045mm)
12'	271" (6,877mm)

9.10. When connecting the end of a hold-down strap to the anchor, common methods include: (see Figure 9-3)

- Drop-forged turnbuckle (A)
- Looped wire rope (B)
- Combination of both A and B (C)

Figure 9-3



9.10.1. After hardware is installed, all exposed metal on the anchoring system must be coated or galvanized to protected against corrosion.

9.11. Drop-Forged Turnbuckles

9.11.1. May be used in place of all or a portion of wire rope described in this section.

Table 9-2

Tank	Minimum Turnbuckle Diameter (by type)			
Dia.	Hook	Jaw	Eye	Minimum Working Load Limit*
4'	½"	⅜"	⅜"	1,200 lbs
6'	¾"	½"	½"	2,200 lbs
8'	1¼"	¾"	¾"	5,200 lbs
10'	1¼"	¾"	¾"	5,200 lbs
12'	1¼"	¾"	¾"	5,200 lbs
* ultimate load should be 5 times working load limit.				

9.12. Wire Rope

9.12.1. A method to use wire rope on the ribs over the tank top is available. Refer to Supplemental Documents (Section 21) for additional information.

9.12.2. Use 6 x 19 Improved Plow Steel IWRC, or better, wire rope.

9.12.3. Refer to Table 9-3 for minimum wire rope diameter and strength.

Table 9-3

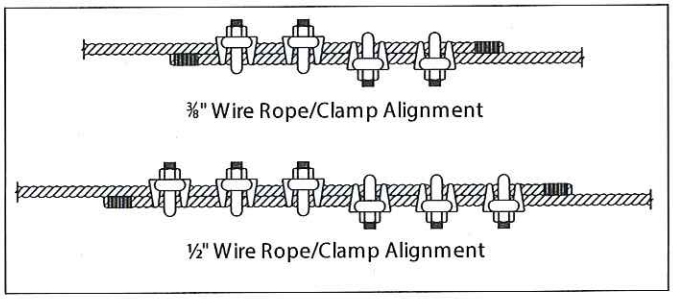
Wire Rope		
Tank Diameter	Minimum Diameter	Minimum Ultimate Strength
4'	⅜" (10mm)	13,120 lbs (5,951 kg)
6', 8', 10', 12'	½" (13mm)	23,000 lbs (10,433 kg)

9.12.4. Follow recommendations of the wire rope manufacturer, as well as all industry standards when selecting, handling, attaching or connecting wire rope.

9.12.5. Tighten all hardware uniformly and follow the manufacturer's torque specifications. Double check the tightness once the anchoring system is complete.

9.12.6. When forming a loop in the wire rope, a splice is required for connecting the two ends together. Use a minimum of four clamps for ⅜" wire rope and a minimum of six clamps for ½" wire rope. Place the rope ends parallel to each other and install the clamps as shown in Figure 9-4.

Figure 9-4



9.13. Deadmen Anchors

9.13.1. Deadmen are made of reinforced concrete, designed according to the American Concrete Institute (ACI) code, placed end to end equal to tank length, and with at least two anchor points per deadman.

9.13.1.1. Refer back to Table 2-1 for CSI deadmen dimensions and weight.

9.13.1.2. Each tank requires its own deadman on both sides, or if one deadman is used between adjacent tanks, it must be doubled in width.

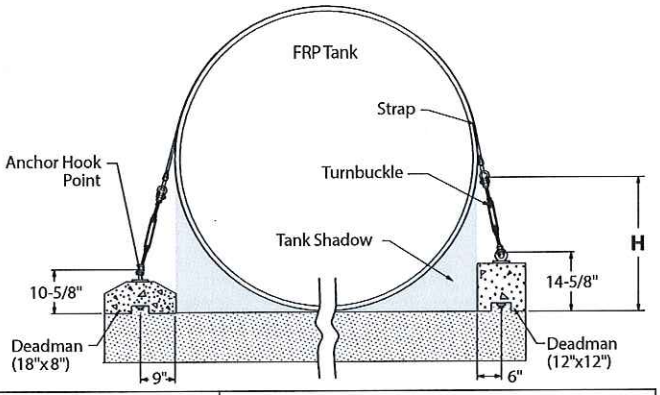
9.13.1.3. A separate anchor point must be provided for each strap.

9.13.1.4. CSI deadmen are engineered and sized to the tank ordered.

9.13.1.5. Placement of CSI deadmen is the same as standard deadmen.

9.13.1.6. Lay the deadmen in the excavation parallel to the tank and at the outside edge of the tank shadow (see Figure 9-5).

Figure 9-5



Tank Diameter	*Dimension H
4'	See supplemental documents in section 21
6'	27"
8'	36"
10'	42"
12'	50"

* This dimension is the distance from the hook point on the anchor strap to the bottom of the deadman.

9.13.1.7. CSI deadmen are supplied with ¾" diameter, galvanized, adjustable anchor points.

9.13.1.8. Move anchor points to match the hold-down strap locations on the tank ▶◀ ±1" with CSI split straps. This must be done before placing deadmen in the hole.

9.13.1.9. Place multiple deadmen, in contact, end to end.

9.13.1.10. Use one anchor point per strap end.

9.14. Concrete Anchor Pad

9.14.1. The weight of the overburden acting on the concrete anchor pad and the tank provides the anchoring force (not the weight of the concrete anchor pad).

9.14.1.1. As a minimum, to counteract buoyancy, the anchor pad for stable excavations must be at least 8" thick, with #6 rebar on 12" centers each way, constructed per current ACI code.

9.14.1.2. For stable conditions the pad must extend a minimum of 18" beyond the tank shadow. The pad must also be at least the same length as the tank.

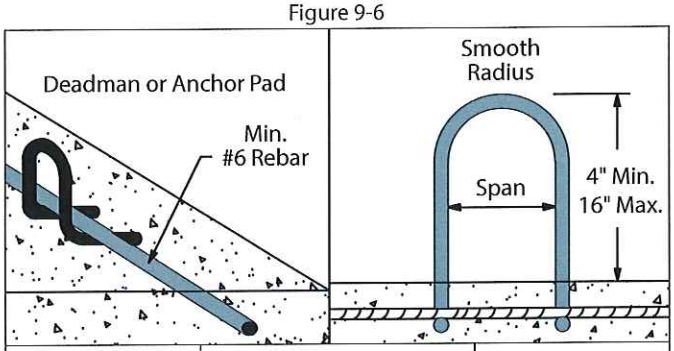
9.14.1.3. For unstable excavations, it is the responsibility of the tank owner or tank owner's representative to design the bottom pad thickness and reinforcement. Regardless of design, the anchor pad should extend to the excavation walls.

9.14.1.4. Poor soil conditions, local codes, seismic activity, etc. may require increased reinforcement and anchor pad thickness. Contact a soils consultant for specifications.

9.14.2. Embedded anchor points should be designed for the working loads in Table 9-1.

9.14.3. When embedding anchor points at the time the pad is fabricated, the following design will meet the minimum required anchor points (see Figure 9-6).

Figure 9-6



Tank Diameter	Minimum Rebar Loop Size (1 strap/anchor point)	Rebar* Span
4'	#6	7½"
6'	#8	10½"
8'	#8	10½"
10'	#10**	13½"
12'	#10**	13½"

* Note: Wider or narrower span will reduce the strength of the anchor points below the required value.

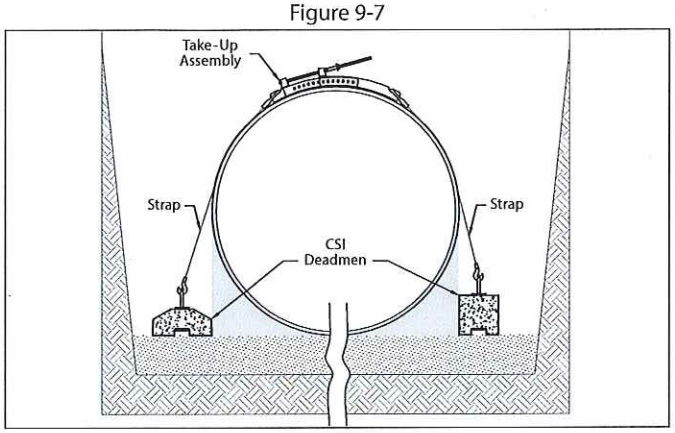
** ¾" turnbuckles require a wire rope loop or shackle between turnbuckle and rebar anchor point because #10 rebar will not fit into ¾" eye turnbuckle.

9.15. Split Strap Anchoring System

9.15.1. The CSI split strap anchor system is designed for use in installations when personnel may not enter the hole. This system includes a two part strap and take-up assembly at the tank top that may be used in conjunction with CSI deadmen.

9.15.2. When using the split strap anchoring system, the placement of components is critical (see Figure 9-7). For detailed instructions on using the split strap anchor system refer to Supplemental Documents (Section 21).

Figure 9-7



10. BALLASTING TANKS (ADDING LIQUID)

10.1. A tank is not adequately protected against flotation until the tank is backfilled to subgrade and the top slab is in place.

10.2. For a tank that is not fully installed, water can enter the hole and the tank will float unless it has been ballasted with fluid to offset buoyancy.

10.3. Use water or fluid heavier than water as ballast. Be sure the ballast will not contaminate the product being stored or clean the tank before product is added. This is especially important for potable water, chemical and diesel exhaust fluid (DEF) tanks.

10.4. Do not make a direct (hard) connection of the ballast fill line to any tank fitting.

10.5. Adding ballast:

NOTICE

Do not have the annular space connected to the primary space during ballasting or tank damage will occur.

NOTICE

When adding ballast, precautions must be taken so that the tank cannot completely fill. Keep tank vented to prevent pressurization of the tank when adding ballast. As the tank nears full, reduce the fill rate to prevent sudden pressurization or tank damage will occur.

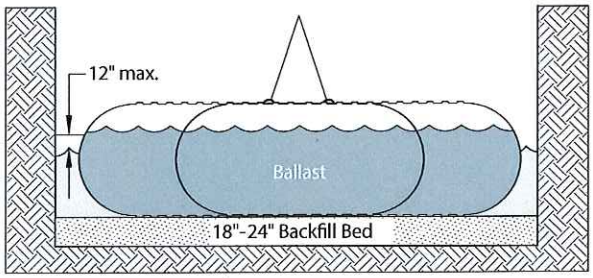
10.5.1. At the moment the tank is full, the pressure in the fill line will result in an instant pressurization of the tank which will damage the tank.

10.5.2. This problem can be avoided by providing adequate tank venting or removing the fill line and manually bringing the tank to full capacity.

10.6. Dry Hole - add ballast only after backfill is placed at least 75% of the tank diameter.

10.7. Wet Hole - Add enough ballast to sink the tank. Ballast level inside the tank and in all compartments should be equal (to keep tank level) and not more than 12" above the ground water level outside the tank (see Figure 10-1).

Figure 10-1



11. TANK INSTALLATION

⚠WARNING

Do not enter the tank excavation unless all OSHA requirements are followed. Collapsing excavation walls may cause death or serious injury.

11.1. Before You Begin

11.1.1. It is important to review all instructions to make sure you are compliant with the proper procedures. This includes:
- Bed and Backfill
- Pre-Installation Testing
- Hole Size/Burial Depth
- Anchoring

11.2. Tank Vertical Diameter Measurements

11.2.1. Each vertical diameter measurement is used to determine the tank's deflection. If at any point the deflection measurements exceed the values in Table 11-1, stop the installation and contact Tank Technical Support.

11.2.2. During installation, vertical diameter measurements must be taken and recorded on the Tank Installation Checklist after each of the following steps:

11.2.2.1. "First Vertical Diameter Measurement"
- Placement of tank on backfill bed

11.2.2.2. "Second Vertical Diameter Measurement"
- Anchoring completed (only applicable if mechanical anchoring is used).

11.2.2.3. "Third Vertical Diameter Measurement"
- Backfill to tank top.

11.2.2.4. "Fourth and Fifth Vertical Diameter Measurements"
- Backfill to subgrade, before the concrete pad.

11.2.3. Separate vertical diameter measurements must be recorded for each tank compartment.

11.2.3.1. All measurements for vertical deflection are made from the bottom of the tank to the bottom of the fitting.

11.2.3.2. All measurements should be made in inches or millimeters using a standard nonmetallic gauge stick.

11.2.3.3. All measurements should be made through the fitting closest to center of tank or each compartment.

11.2.4. Refer to Table 11-1 for maximum deflection values.

11.3. Installation Procedure

Table 11-1

Tank Diameter	Maximum Deflection	
4'	½"	(12mm)
6'	¾"	(19mm)
8'	1¼"	(31mm)
10'	1½"	(38mm)
12'	1¾"	(44mm)

11.3.1. Determine if geotextile fabric is required for your installation (see Section 7 for details).

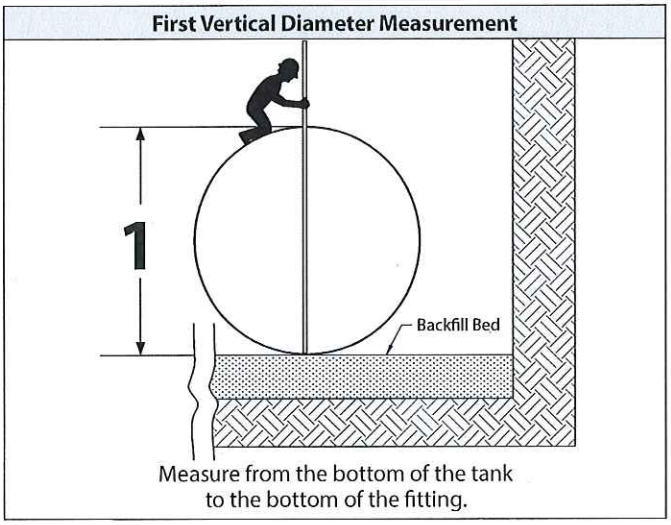
11.3.2. All tank holes must have a minimum of 12" (18" for wet holes) and a maximum of 24" of approved backfill between the bottom of the tank and the bottom of the excavation or concrete anchor pad.

11.3.3. Place tank in excavation with lifting cables attached to lift lugs provided on tank, while maintaining control of tank with guide ropes.

11.3.4. Set tanks directly on backfill bed.

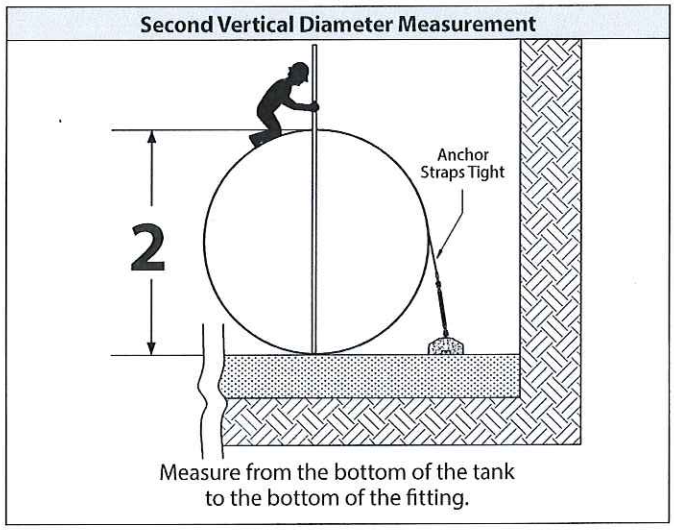
11.3.5. Take the "First Vertical Diameter Measurement" and record the value on the Tank Installation Checklist (see Figure 11-1).

Figure 11-1



11.3.6. If mechanical anchoring is used, after anchoring is completed, take the "Second Vertical Diameter Measurement" and record the value on the Tank Installation Checklist. If this value does not equal the "First Vertical Diameter Measurement", loosen the anchor straps (see Figure 11-2).

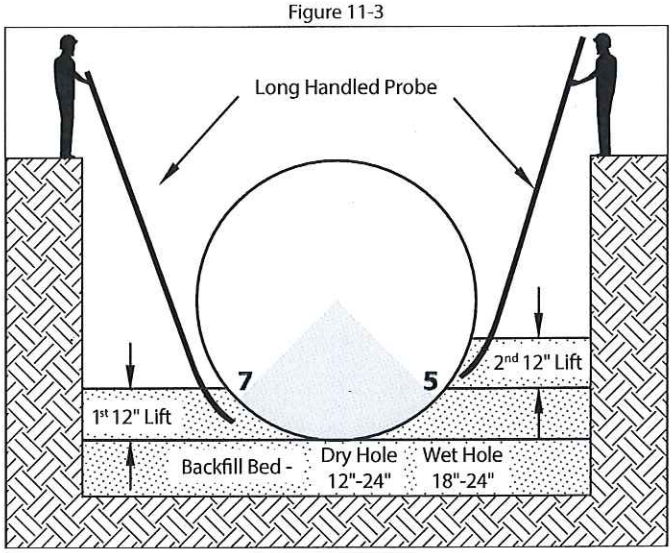
Figure 11-2



11.3.7. Proper backfilling is required to provide necessary support for the tank.

11.3.8. Place the first 12" lift of approved backfill material evenly around the tank. From the edge of the hole or the top of an adjacent tank, push the backfill in place by using a probe long enough to reach beneath the tank. Work the backfill material under the entire length of the tank between and around ribs and endcaps, eliminating all voids, so the tank is fully supported (see Figure 11-3).

Figure 11-3



NOTICE

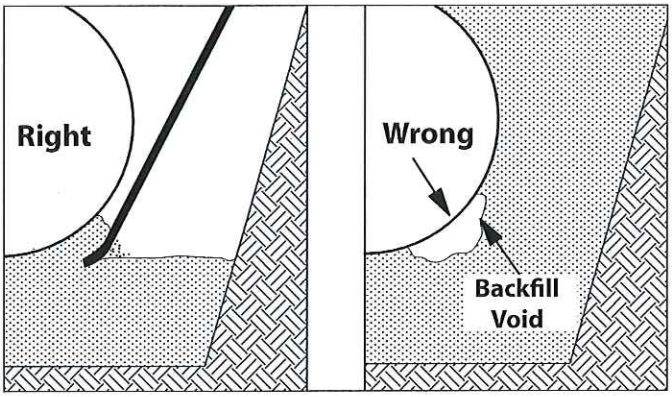
Do not strike the tank with the probe or tank damage may result.

11.3.9. Eliminate all voids by using a long handled probe to push backfill:

11.3.9.1. Completely beneath tank bottom.

11.3.9.2. Completely between the 5 o'clock and 7 o'clock positions along the entire length of the tank between and around all ribs and endcaps. It is critical to tank performance that this area offers full support under the tank and end caps (see Figure 11-4).

Figure 11-4



11.3.10. Repeat this process with a second 12" lift.

11.3.11. After completion of second lift, backfill can be brought to tank top without additional handwork.

11.3.12. Special Instructions for a wet hole installation:

11.3.12.1. Water level in the excavation should be maintained at lowest practical level by using pumps.

⚠CAUTION

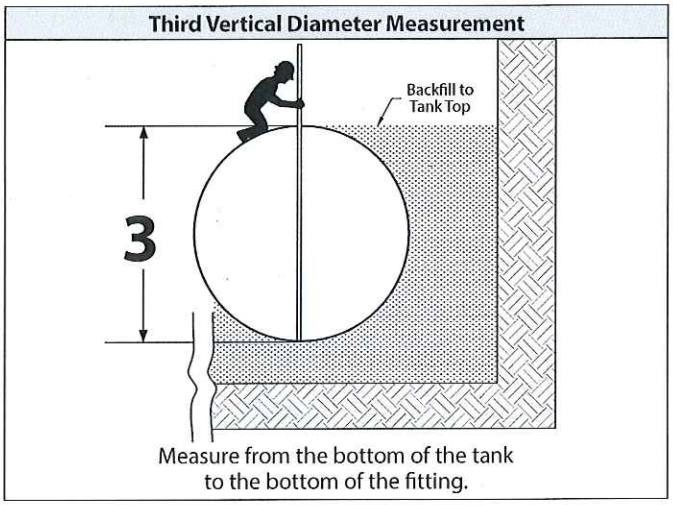
Keep tank vented to prevent pressurization of tank when adding ballast. As the tank nears full, reduce the fill rate to prevent pressurization or tank damage may occur. This may result in personal injury or property damage.

11.3.12.2. Ballast the tank if ground water cannot be lowered. Ballast the tank per section 10.

11.3.13. Backfill to the tank top.

11.3.14. Take the Third Vertical Diameter Measurement and record the value on the Tank Installation Checklist and verify measurement A does not exceed the value in Table 11-1 (see Figure 11-6).

Figure 11-6



NOTICE

Do not ballast tank until backfill is even with tank top or tank damage can occur.

11.3.15. After backfill is even with tank top, CSI recommends filling all tank compartments with ballast to minimize chance of buoyancy.

11.3.16. Additional information on alternate installation techniques is available. Refer to Supplemental Documents (Section 21) for additional information.

11.4. Backfill To Subgrade

11.4.1. When the tank has been lowered into the excavation and all testing, backfilling, venting and piping has been completed; add the remaining backfill material to subgrade.

11.4.2. Approved pea gravel or crushed stone must be used to backfill the tank a minimum of 75% up the side wall of the tank(s).

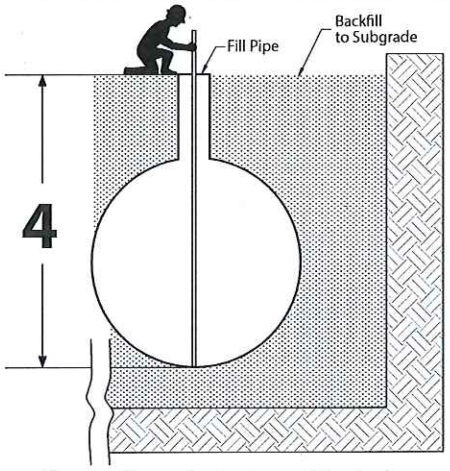
11.4.3. If alternative smaller or finer backfill material is used to subgrade, geotextile fabric is required. Refer to Supplemental Documents (Section 21) for additional information.

11.4.4. Once the tank has been backfilled to subgrade, before placement of concrete pad, take the fourth vertical diameter measurement.

11.4.5. Take the Fourth Vertical Diameter Measurement and record the value on the Tank Installation Checklist (see Figure 11-7).

Figure 11-7

Fourth Vertical Diameter Measurement

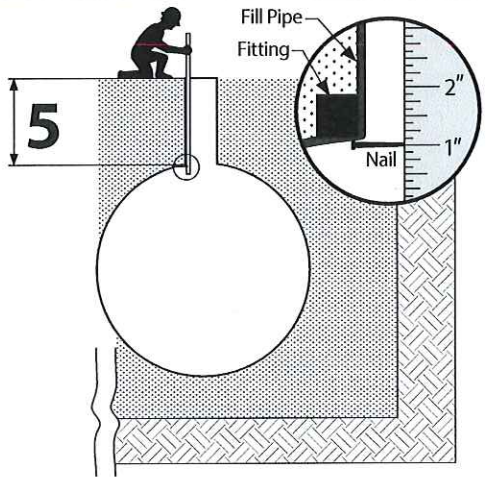


Measure from the bottom of the tank to the top of the fill pipe.

11.4.6. Take the Fifth Vertical Diameter Measurement and record the value on the Tank Installation Checklist (see Figure 11-8).

Figure 11-8

Fifth Vertical Diameter Measurement



This measurement is taken by:

1. Driving a nail into the 1" point at a right angle to the gauge stick.
2. Lower the gauge stick down the fill pipe far enough to extend below the bottom of the fitting.
3. Lift the gauge stick until the nail catches on the lip of the fitting.
4. Read the measurement at the top of the fill pipe.
5. Subtract 1" to allow for the point where the nail is in the gauge stick.

11.4.7. The inner diameter measurement is calculated by subtracting the "Fourth Vertical Diameter Measurement" and "Fifth Vertical Diameter Measurement".

11.4.8. After the final measurement has been recorded, complete the Vertical Diameter Measurement section of the Tank Installation Checklist. Verify the values in Table 11-1 have not been exceeded.

11.4.9. If the final deflection measurement exceeds the values in Table 11-1 you should stop the installation, prior to pouring the concrete pad, and immediately contact CSI Tank Technical Support for directions.

12. ADDING TANKS AT EXISTING LOCATIONS

NOTICE

Avoid surface loads that may result in a collapse of the excavation or disturb any existing tanks.

12.1. Additional tanks may be installed at existing locations using one of the following methods:

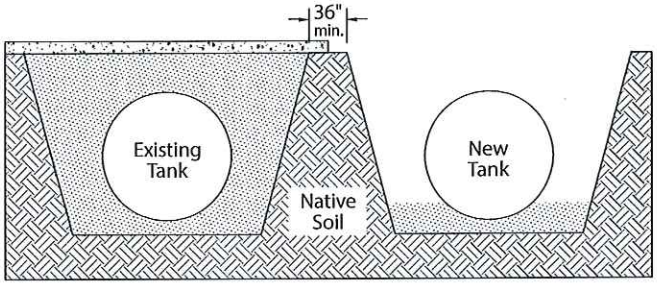
12.2. Preferred Method

12.2.1. Install a new tank in a separate hole at least 36" from the original excavation.

12.2.2. Follow procedures outlined in this Installation Manual.

12.2.3. Maintain a minimum 36" at grade of native soil between existing and new installation (see Figure 12-1).

Figure 12-1



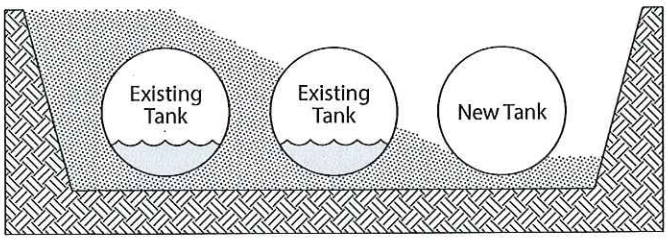
12.3. Alternate Method For Dry Hole Excavation

12.3.1. Lower ballast in existing tanks to less than 25% capacity.

12.3.2. Remove the surface slab.

12.3.3. Enlarge the excavation for the new tanks, leaving as much backfill as possible around the existing tanks (see Figure 12-2).

Figure 12-2



12.3.4. Install shoring, if necessary, to make sure that existing tanks do not move and sufficient backfill remains.

12.3.5. Install all tanks following the instructions outlined in this manual.

12.3.6. Follow and complete the Tank Installation Checklist for all new and existing tanks.

13. PIPING & BOTTOM SUMP CLEARANCES

NOTICE

All connections to the tank must be flexible. Provisions must be made to accommodate movement and misalignment between the piping and the tank. Failure to do this may damage the tank or surrounding property.

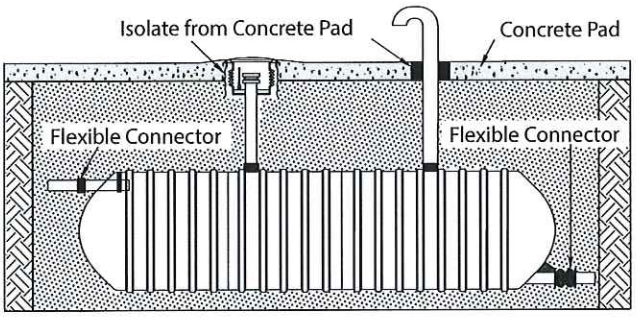
13.1. Tanks with Bottom Sumps / Fittings

13.1.1. To install a tank with a bottom sump or fitting, the excavation and backfill must be modified as follows. Refer to Supplement Documents (Section 21) for additional information:

13.2. External Piping

13.2.1. Isolate the piping from the concrete pad (see Figure 13-1).

Figure 13-1



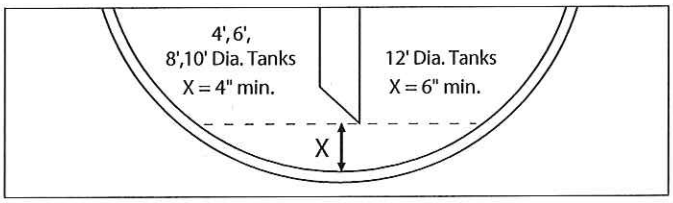
13.2.2. A flexible connector must be directly installed on all tangentially mounted fittings, nozzle or pipe. The flexible connector must allow for ½" of offset, angular, expansion, and compression movement. Refer to Supplemental Documents (Section 21) for additional information.

13.2.3. Nozzle bolt torque can be found in Flexible Connector supplemental document. Refer to Supplemental Documents (Section 21) for additional information.

13.2.4. Take precaution during construction to make sure no damage occurs to the exposed pipe(s).

13.2.5. Internal piping must terminate a minimum of 4" from tank bottom for 4', 6', 8', and 10' diameter tanks and 6" from the bottom for 12' diameter tanks to allow for tank deflection (see Figure 13-2).

Figure 13-2



14. VENTING

14.1. All primary tanks and compartments that contain product must be vented at all times, except as defined during pre-installation testing.

14.2. Tanks are designed for operation at atmospheric pressure (except for use with vapor recovery systems provided the pressure or vacuum does not exceed 1 psig).

14.3. For tanks with inlet or outlet piping that will result in pressure at the tank top, the pressure should be limited to 1 psig.

14.4. The tank's venting system must be adequately sized to ensure that the pressure or vacuum at the tank top will not exceed 1 psig at the tank top at all times, including when filling and emptying the tank.

14.5. Annular space vents must be independent of tank vents.

14.6. For hydrostatically monitored double-wall tanks, the annular space must be vented at all times.

14.7. For dry monitored double-wall tanks, annular space does not need to be vented.

15. FILLING TANKS

NOTICE

Pressurized product deliveries may pressurize the tank and result in tank damage.

15.1. If the delivery vehicle uses pumps to fill the tank:

15.1.1. Install positive shut-off equipment in the lines and on the truck to prevent the tank from being overfilled.

15.1.2. Pressurization from overfilling will damage the tank, even if the tank vent is unrestricted.

15.2. Do not use a ball float valve for overfill protection.

16. MANWAYS

⚠WARNING

Do not enter tank unless following OSHA guidelines for confined space entry. Failure to follow OSHA guidelines could result in death or serious injury.

ASPHYXIATION **FIRE** **EXPLOSION**

16.1. The load bearing capacity for a standard 22" manway installed is 1,200 lbs. for single-wall tanks and 2,400 lbs. for double-wall tanks.

16.2. All 30" and 36" manways have a load bearing capacity of 2,400 lbs.

16.3. Do not exceed 50 ft./lb. torque during bolt tightening or manway flange damage may occur.

17. TANK ANNULAR SPACE MONITORING

17.1. Hydrostatic Monitoring

17.1.1. Because of its superior leak detection capability, Containment Solutions recommends the Hydrostatic Tank Monitor for continuous monitoring of the annular space. However, the tank owner or the tank owner's representative is responsible for selecting the monitoring system.

17.1.2. Tanks with hydrostatic monitoring systems normally arrive with monitoring fluid installed in the annular space and some fluid in the reservoir.

17.1.2.1. After installation, the fluid level in the reservoir must be filled to the proper level.

17.1.2.2. Additional monitoring fluid is supplied with the tank for this purpose.

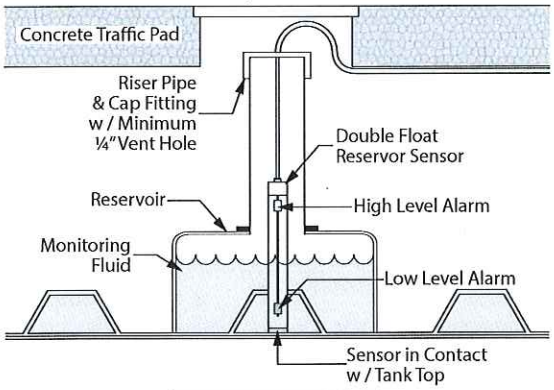
NOTICE

Hydrostatic monitoring space between the inner and outer tank must be vented to the atmosphere. If unvented, pressure buildup can cause tank damage.

17.1.3. Vent annular space with a minimum ¼" hole at riser top.

17.1.4. When installing a double float sensor, the bottom of the sensor must be in contact with the tank top (see Figure 17-1).

Figure 17-1



⚠WARNING

Always wear safety glasses and protective clothing when handling monitoring fluid. Monitoring fluid spillage may cause surfaces to be slippery. Refer to MSDS sheet for additional information.

17.1.5. The standard monitoring fluid is a calcium chloride in water with a biodegradable green tint.

17.1.6. Add brine to the reservoir until the fluid level matches the following table values in Table 17-1:

17.1.7. During or after, if the reservoir sensor indicates a high or low level alarm, it is necessary to first determine that the alarm is not the result of an incorrect initial fluid level setting.

17.1.7.1. Remove the sensor.

17.1.7.2. Test the sensor for proper operation.

17.1.7.3. Check that the float sensor is positioned on the tank top. The bottom float should be within 2" of the bottom and floats are spaced a minimum of 11" apart.

17.1.7.4. Reset the fluid level in the reservoir by adding or removing fluid as indicated in Table 17-1.

17.1.7.5. Reinstall the sensor.

17.2. Note: If a second alarm occurs, additional instructions for setting the brine level are available from Containment Solutions Field Services.

TABLE 17-1

Tank Diameter & Capacity	Reservoir Fluid Level Measurement		
	Tank is Empty	Tank is Half Full	Tank is Full
4' (1M and less)	5¼"	7"	8¾"
4' (over 1M)	4¼"	4¾"	5"
6' (6M and less)	4"	4¾"	5½"
6' (over 6M)	3½	4¾"	6"
8' (6M and less)	4¼"	4¾"	5¼"
8' (over 6M)	4¼"	5"	6"
10' (12M and less)	4½"	5¼"	6"
10' (13M thru 20M)	5¼"	6½"	8"
10' (21M thru 35M)	3¾"	6½"	9½"
10' (36M thru 50M)	4"	5¾"	7½"
12' (25M and less)	4"	6½"	9¼"
12' (26M thru 40M)	4¼"	5¾"	7¼"
12' (41M thru 50M)	3½"	5¾"	8"

17.3. Dry Annular Space Monitoring with Sensor

17.3.1. Consult monitoring equipment manufacturer for proper installation.

17.3.2. When liquid or vapor sensors are used, the tank may be sloped at time of installation.

17.3.3. If tank is sloped, place tank so that the lowest elevation is at monitoring end.

17.3.4. Calibration charts are designed for level tank installation. Sloped tanks will affect the tank calibration chart accuracy.

17.3.5. Use a wire puller to position sensor at the tank bottom.

17.3.6. For ease of installation insert the sensor in the tank cavity before installing the monitoring riser pipe to grade. Use a minimum 4" riser to grade for removal and replacement of sensor.

17.3.7. CSI recommends a permanent pull cable be installed and accessible at grade to facilitate periodic sensor inspections.

17.3.8. For dry monitored double-wall tanks, annular space does not need to be vented.

17.4. Dry Annular Space Vacuum or Air Pressure Monitoring

17.4.1. Consult monitoring equipment manufacturer for proper installation.

17.4.2. Maximum vacuum for continuous monitoring is 5 psig utilizing an approved vacuum monitoring system with a vacuum make-up pump.

17.4.3. Maximum pressure for continuous air pressure monitoring is 3 psig utilizing an approved monitoring system with a make-up pump. Ensure the system is designed to prevent over pressurization of the annular space as tank damage may occur.

18. CONTAINMENT COLLARS, TANK SUMPS & TANK RISERS

NOTICE

In freezing conditions, protect collar and sump from water accumulation. Freezing water may cause damage.

NOTICE

Secondary containment collar must be continuously monitored for potential spills or leaks.

18.1. CSI single and double-wall containment collars are factory installed to the tank top to provide a means of secondarily containing leaks from pumps and piping.

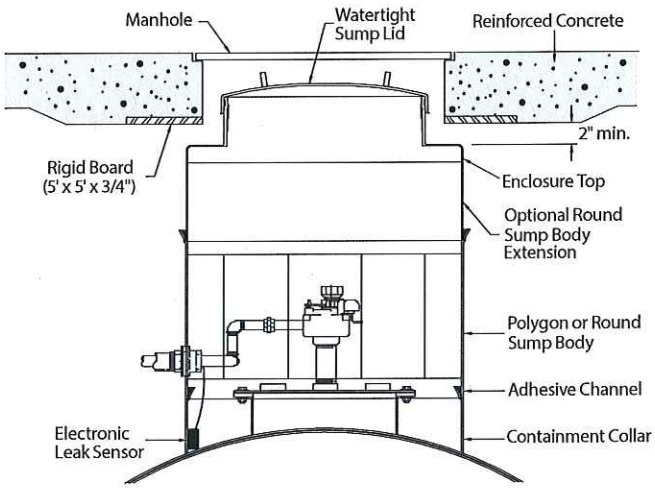
18.2. CSI tank sumps are designed to provide a watertight connection to the tank collar utilizing an adhesive joint.

18.3. All Tank Collars And Sumps:

18.3.1. Must be continuously monitored for leaks using an electronic leak monitoring sensor.

18.3.2. Must be isolated from direct traffic loading (see Figure 18-1).

Figure 18-1



18.4. Single and Double-Wall Tank Sump Installation Instructions are available. Refer to Supplemental Documents (Section 21) for additional information.

18.5. Collar Test Instructions

NOTICE

DO NOT pressure test sump. If applying vacuum, DO NOT apply more than 25 inches water vacuum to sump enclosure or damage may occur.

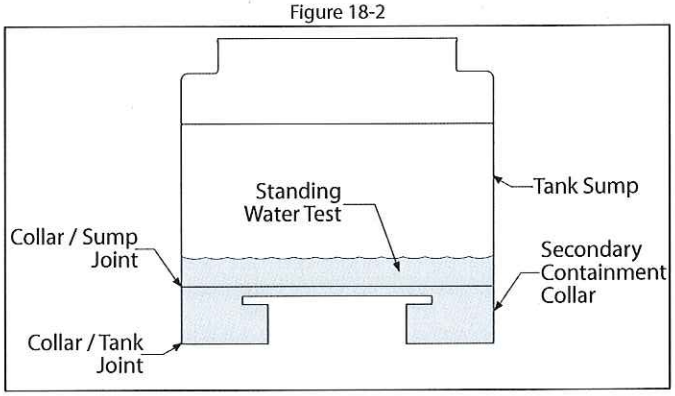
18.5.1. Fill sump with water at least 4" above highest joint or penetration.

18.5.2. Record the liquid level.

18.5.3. Wait a minimum of 1 hour.

18.5.4. Re-measure and record the liquid level. A liquid change of more than ⅛" (0.125") indicates a possible leak (see Figure 18-2).

Figure 18-2



18.5.5. Visually inspect for leaks in the following locations:

- All penetrations
- All fittings
- At each sump joint
- Where collar connects to tank wall

18.5.6. Test liquids must be disposed of properly.

18.5.7. Initial jobsite testing:

18.5.7.1. At installation, the contractor must leak test this collar and sump before the tank installation is complete.

18.6. Access Risers (Non Petroleum Tanks)

18.6.1. Access Riser Installation Instructions are available. Refer to Supplemental Documents (Section 21) for addition information.

19. OPERATING GUIDELINES

19.1. General

19.1.1. The tank installation checklist, these instructions, and any correspondence related to the tank installation must be retained by the tank owner. The checklist will be required and must be provided to CSI when making a warranty claim.

19.1.2. For the life of the installation, the installed tank must comply with NFPA (30, 30A, and 31) and all applicable Federal, State, Local or Provincial codes and regulations.

19.1.3. It is the responsibility of the tank owner/ operator to follow these instructions and operating guidelines and all limitations as stated in the limited warranties in effect at time of delivery.

19.1.4. The limited warranty in effect at the time of tank delivery will apply and is available online at www.containmentsolutions.com.

19.2. Fiberglass Tanks Intended Use

19.2.1. Each tank is designed and manufactured to store products for the intended use as outlined in the applicable limited warranty. Storing products that were not disclosed to CSI in writing prior to the manufacture of the tank may damage the tank and could result in tank failure and/or damage to surrounding property.

19.2.2. The temperature of stored product must not exceed the temperature limits defined in the applicable limited warranty.

19.2.3. Product delivery temperatures must not exceed the temperature limits defined in the applicable limited warranty.

19.2.4. Ensure that downward forces from nearby structures are not transmitted to existing tanks (refer to NFPA 30 for additional details).

19.2.5. Additional tanks may be installed adjacent to existing tanks by using the methods described in these installation instructions.

19.3. Confined Space Entry

⚠WARNING

Do not enter tank unless following OSHA guidelines for confined space entry. Failure to follow OSHA guidelines could result in death or serious injury.

ASPHYXIATION **FIRE** **EXPLOSION**

19.3.1. Tanks, containment sumps, manway extensions and access risers are confined spaces.

19.3.2. The tank owner should not allow anyone other than properly trained and equipped personnel to enter an underground tank.

19.3.2.1. Proper permits and industry accepted minimum standards must be followed before anyone can enter a sump or riser.

19.3.2.2. Contact Containment Solutions Field Services at (800) 822-1997 if repairs or modifications are required.

19.3.3. Tank entry by unqualified personnel can lead to fire, explosion, asphyxiation and/or death. Manways and access risers are for use by qualified personnel with proper training and safety equipment.

19.3.4. Do not attempt to repair or modify your tank. Any repairs or modifications will void the tank limited warranty.

19.3.5. If tank entry is required for tank repairs, modifications or inspections, contact Containment Solutions Field Services at (800) 822-1997.

19.4. Filling / Venting Tanks (General)

⚠WARNING

Over-pressurizing the tank could result in tank failure and could result in death or serious injury.

NOTICE

Pressurized product deliveries may pressurize the tank and result in tank damage.

19.4.1. Underground tanks are designed to operate at atmospheric pressure. Tanks may be damaged by pressurized product deliveries or situations in which hydrostatic head pressure exceeds tank design safety factors.

19.4.2. All products must be gravity fed into the tank unless positive shut-off equipment is installed in the lines and on the truck.

19.4.3. If the delivery vehicle uses pumps to fill the tank, precautions must be taken as outlined in the "Filling Tanks" section of this manual.

19.4.3.1. Product delivery from vehicles using pressure in the ullage is not allowed.

19.4.4. The tank's venting system must be adequately sized to ensure that atmospheric pressure is maintained at all times, including when filling and emptying the tank.

19.4.4.1. For tanks with inlet or outlet piping that will result in pressure at the tank top, the pressure should be limited to 1 psig.

19.5. For UL/ULC tanks, The Petroleum Equipment Institute has published several recommended practices (PEI/RP900 and PEI/RP1200) that address proper maintenance, inspection and testing of overfill prevention equipment. Tank owners should obtain a copy of the documents at http://www.pei.org. In addition, the Fiberglass Tank and Pipe Institute has published a white paper on the adverse effects of using vent restriction devices such as ball-float valves and the unintended consequences that may occur see http://www.fiberglasstankandpipe.com.

19.6. The owner must make sure the tank is properly vented at all times as described in the venting section of this manual. Vent piping should be properly installed and unobstructed.

19.7. Do not use ball float valve for overfill protection.

19.8. For tanks with vapor recovery systems, the pressure or vacuum cannot exceed 1 psig.

19.9. It is strongly recommended that the tank be gravity filled and that the owner regularly inspect the automatic shut off device or vent restriction device for proper operation.

19.10. Proper grounding of the drop tube/fill line is important to prevent static discharge during filling.

19.11. If flooding may occur, precautions should be taken to prevent tank float and equipment damage. See EPA "Underground Storage Tanks Flood Guide". See Ballasting section in these instructions should ballasting tanks be required.

19.12. Containment Sumps, Manway Extensions, and Access Risers

19.12.1. Tank owner must leak test the collar and containment sump after any damage, repairs, modifications or to meet regulatory requirements.

19.12.2. UL/ULC sumps must be continuously monitored with an electronic leak detector for potential spills or leaks.

19.12.3. Gaskets are consumable products which will have to be replaced periodically or when it shows a leak during a tightness test.

20. CONVERSION FORMULAS

20.1. Use this as a guide if a dimension does not have a metric conversion printed.

LENGTH
mm = millimeters
- 1" = 25.4 mm
- 1' = 304.8 mm

WEIGHT
kg = kilogram
- 1lb= 0.454 kg

PRESSURE
kPa = kilopascals
- 1 psi = 6.894 kPa

CAPACITY
L = liters
- 1 gal = 3.785 L

21. SUPPLEMENTAL DOCUMENTS

21.1. Supplemental documents, which may apply to specific installations and / or conditions, are available upon request from Containment Solutions Technical Support.

- Single-Wall Tank Sump Installation Instructions (Pub. No. INST 6030)
- Double-Wall Tank Sump Installation Instructions (Pub. No. INST 6034)
- Access Riser Installation Instructions w/ Adhesive Channels (Pub. No. INST 6056)
- Standard Hold Down Strap Anchor System (Pub. No. INST 6062)
- Split Strap Anchor System (Pub. No. INST 6063)
- Wire Rope over Tank Top (Pub. No. INST 6047)
- Fiberglass Tanks Shipping into Canada Installation Instructions (Pub. No. INST 6043-CAN)
- Urea DEF Installation Instructions (Pub. No. INST 6052)
- Triple-Wall Tank Installation Instructions (Pub. No. INST 6045)
- NYC Special Installation Instructions (Pub. No. INST 6008)
- Fiberglass Oil/Water Separator Tank Installation and Start-Up Instructions (Pub. No. OWS 2013)
- Alternate Backfill Above Tank Top Installation Instructions (Pub. No. INST 6014)
- Berm Installation Instructions (Pub. No. 6022)
- Bottom Sump Installation Instructions (Pub. No. INST 6044)
- Flexible Connector Specification (SPEC 9005)
- Brine Monitoring Fluid MSDS Sheet (Pub. No. 15002)
- Lifting Tanks with Slings (Pub. No. 6021)

Appendix A - Anchor Chart (4', 6', 8' Diameter Tanks)

Anchor Chart

Minimum burial depth to achieve 1.2 safety factor against flotation assuming worst case conditions of water to grade and the tank empty. Assumes multiple tank installation.

	Tank Diameter & Nominal Capacity in Gallons (Including all Compartments)	Space Between Tanks	# of Anchor Straps	# of Sumps or Risers (Backfill to Grade No Traffic / Backfill with 6" Concrete Traffic Pad)				
				0	1	2	3	4
4' Diameter Tanks	up to 1,000 w/ 12"x12" DM	24"	2	24" / 24"	33" / 24"	-	-	-
	up to 1,000 w/ 8" Pad	24"	2	24" / 24"	33" / 24"	-	-	-
	up to 1,000 No Mech	18"	0	29" / 26"	58" / 53"	-	-	-
	1,100 - 1,500 w/ 12"x12" DM	24"	2	24" / 24"	33" / 24"	81" / 68"	-	-
	1,100 - 1,500 w/ 8" Pad	24"	2	24" / 24"	45" / 38"	81" / 68"	-	-
	1,100 - 1,500 No Mech	18"	0	29" / 26"	51" / 46"	74" / 68"	-	-
	1,600 - 2,000 w/ 12"x12" DM	24"	4	24" / 24"	35" / 26"	35" / 26"	-	-
	1,600 - 2,000 w/ 8" Pad	24"	4	24" / 24"	35" / 26"	35" / 26"	-	-
	1,600 - 2,000 No Mech	18"	0	30" / 27"	46" / 41"	57" / 52"	-	-
6' Diameter Tanks	up to 4,000 w/ 12"x12" DM	24"	2	28" / 24"	43" / 38"	52" / 46"	-	-
	up to 4,000 w/ 8" Pad	24"	2	28" / 24"	43" / 38"	52" / 46"	-	-
	up to 4,000 No Mech	18"	0	44" / 41"	62" / 58"	73" / 69"	-	-
	4,100 - 6,000 w/ 12"x12" DM	24"	4	27" / 24"	33" / 29"	36" / 31"	65" / 57"	-
	4,100 - 6,000 w/ 8" Pad	24"	4	26" / 24"	31" / 28"	34" / 28"	65" / 57"	-
	4,100 - 6,000 No Mech	18"	0	46" / 43"	59" / 55"	62" / 58"	75" / 71"	-
	6,100 - 10,000 w/ 12"x12" DM	24"	6	29" / 26"	33" / 30"	36" / 32"	41" / 36"	45" / 39"
	6,100 - 10,000 w/ 8" Pad	24"	6	29" / 26"	33" / 30"	36" / 32"	41" / 36"	45" / 39"
	6,100 - 10,000 No Mech	18"	0	47" / 44"	56" / 52"	57" / 54"	64" / 60"	68" / 64"
8' Diameter Tanks	up to 7,000 w/ 12"x12" DM	24"	2	36" / 32"	47" / 43"	53" / 48"	-	-
	up to 7,000 w/ 8" Pad	24"	2	36" / 32"	47" / 43"	53" / 48"	-	-
	up to 7,000 No Mech	18"	0	58" / 55"	73" / 69"	82" / 78"	-	-
	7,100 - 12,000 w/ 12"x12" DM	24"	4	39" / 35"	45" / 41"	47" / 43"	65" / 60"	65" / 60"
	7,100 - 12,000 w/ 8" Pad	24"	4	38" / 35"	42" / 39"	42" / 39"	65" / 60"	65" / 60"
	7,100 - 12,000 No Mech	18"	0	61" / 58"	72" / 68"	76" / 72"	84" / 81"	NA
	13,000 - 16,000 w/ 12"x12" DM	24"	6	41" / 38"	46" / 42"	47" / 43"	52" / 47"	68" / 61"
	13,000 - 16,000 w/ 8" Pad	24"	6	38" / 35"	42" / 39"	42" / 39"	52" / 47"	68" / 61"
	13,000 - 16,000 No Mech	18"	0	62" / 59"	71" / 68"	73" / 70"	80" / 76"	84" / 81"
	17,000 - 20,000 w/ 12"x12" DM	24"	8	42" / 38"	46" / 42"	47" / 43"	50" / 42"	52" / 48"
	17,000 - 20,000 w/ 8" Pad	24"	8	34" / 31"	38" / 35"	41" / 37"	41" / 37"	41" / 37"
	17,000 - 20,000 No Mech	18"	0	63" / 60"	70" / 66"	71" / 67"	76" / 72"	79" / 75"

Contact Tank Technical Support for alternate anchoring methods.

Note: DM = Concrete Deadman Anchors
Pad = Concrete anchor pad under tank
No Mech = No mechanical anchoring
NA = Not allowed

Appendix A - Anchor Chart (10', 12' Diameter Tanks)

Anchor Chart

Minimum burial depth to achieve 1.2 safety factor against flotation assuming worst case conditions of water to grade and the tank empty. Assumes multiple tank installation.

	Tank Diameter & Nominal Capacity in Gallons (Including all Compartments)	Space Between Tanks	# of Anchor Straps	# of Sumps or Risers (Backfill to Grade No Traffic / Backfill with 6" Concrete Traffic Pad)				
				0	1	2	3	4
10' Diameter Tanks	up to 10,000 w/ 18"x8" DM	36"	3	44" / 39"	50" / 44"	57" / 51"	-	-
	up to 10,000 w/ 8" Pad	24"	3	33" / 29"	39" / 35"	57" / 51"	-	-
	up to 10,000 No Mech	18"	0	78" / 75"	NA	NA	-	-
	10,000 - 18,000 w/ 18"x8" DM	36"	4	47" / 43"	53" / 49"	55" / 50"	76" / 70"	80" / 75"
	10,000 - 18,000 w/ 8" Pad	24"	4	47" / 43"	53" / 49"	55" / 50"	76" / 70"	80" / 75"
	10,000 - 18,000 No Mech	18"	0	83" / 80"	NA	NA	NA	NA
	19,000 - 23,000 w/ 18"x8" DM	36"	6	44" / 40"	49" / 45"	51" / 47"	62" / 60"	72" / 67"
	19,000 - 23,000 w/ 8" Pad	24"	6	41" / 37"	51" / 47"	51" / 47"	62" / 60"	72" / 67"
	19,000 - 23,000 No Mech	18"	0	84" / 81"	NA	NA	NA	NA
	24,000 - 35,000 w/ 18"x8" DM	36"	8	51" / 47"	57" / 53"	70" / 66"	70" / 66"	70" / 66"
	24,000 - 35,000 w/ 8" Pad	24"	8	51" / 47"	57" / 53"	69" / 65"	69" / 65"	69" / 65"
	24,000 - 35,000 No Mech	18"	0	84" / 81"	NA	NA	NA	NA
	36,000 - 40,000 w/ 18"x8" DM	36"	10	49" / 46"	54" / 51"	59" / 55"	60" / 56"	60" / 56"
	36,000 - 40,000 w/ 8" Pad	24"	10	47" / 46"	54" / 51"	59" / 55"	62" / 58"	65" / 60"
	36,000 - 40,000 No Mech	18"	0	84" / 81"	NA	NA	NA	NA
12' Diameter Tanks	up to 25,000 w/ 18"x8" DM	36"	8	59" / 56"	65" / 61"	66" / 63"	72" / 68"	76" / 72"
	up to 25,000 w/ 8" Pad	24"	8	43" / 40"	54" / 49"	62" / 58"	62" / 58"	62" / 58"
	up to 25,000 No Mech	24"	0	80" / 77"	NA	NA	NA	NA
	26,000 - 35,000 w/ 18"x8" DM	36"	10	62" / 59"	67" / 63"	68" / 64"	71" / 68"	75" / 71"
	26,000 - 35,000 w/ 8" Pad	24"	10	49" / 46"	63" / 59"	63" / 59"	63" / 59"	66" / 62"
	26,000 - 35,000 No Mech	24"	0	83" / 80"	NA	NA	NA	NA
	36,000 - 45,000 w/ 18"x8" DM	36"	12	64" / 61"	68" / 64"	68" / 65"	72" / 68"	74" / 71"
	36,000 - 45,000 w/ 8" Pad	24"	12	53" / 50"	63" / 59"	63" / 59"	67" / 63"	67" / 63"
	36,000 - 45,000 No Mech	24"	0	84" / 81"	NA	NA	NA	NA
	46,000 - 50,000 w/ 18"x8" DM	36"	14	64" / 61"	68" / 65"	69" / 65"	72" / 68"	73" / 70"
	46,000 - 50,000 w/ 8" Pad	24"	14	49" / 46"	63" / 59"	63" / 59"	63" / 59"	63" / 59"
	46,000 - 50,000 No Mech	24"	0	84" / 81"	NA	NA	NA	NA

Contact Tank Technical Support for alternate anchoring methods.

Note: DM = Concrete Deadman Anchors
Pad = Concrete anchor pad under tank
No Mech. = No mechanical anchoring
NA = Not allowed

Appendix B - Standard Tank Sizes

Standard Tank Sizes

The following table represents the most popular tank sizes at the various tank diameters.

Tank Diameter	Capacity		Length		Single-Wall Weight		Double-Wall Weight*	
	Nominal	Liters	Feet/Inch	Millimeter	Pound	Kilogram	Pound	Kilogram
4'	600 gal	2,297 L	7' 3"	2,210	320	145	975	442
4'	1,000 gal	3,661 L	11' 1"	3,378	400	181	1,235	560
6'	2,500 gal	10,191 L	13' 9"	4,191	1,300	589	2,650	1,202
6'	3,000 gal	12,594 L	16' 9"	5,105	1,500	680	3,000	1,361
6'	4,000 gal	15,001 L	19' 9"	6,020	1,650	748	3,550	1,610
6'	5,000 gal	19,007 L	24' 9"	7,544	2,000	907	4,350	1,973
6'	6,000 gal	23,418 L	30' 3"	9,220	2,300	1,043	5,100	2,313
8'	5,000 gal	18,749 L	16' 9"	5,105	1,800	816	3,600	1,633
8'	6,000 gal	22,350 L	19' 6"	5,944	2,050	930	4,050	1,837
8'	8,000 gal	29,547 L	25' 0"	7,620	2,450	1,111	5,000	2,268
8'	10,000 gal	36,748 L	30' 6"	9,296	2,900	1,520	5,950	2,699
8'	12,000 gal	43,945 L	36' 0"	10,972	3,350	10,947	7,050	3,198
8'	15,000 gal	55,126 L	44' 6"	13,576	4,500	2,041	9,350	4,241
10'	10,000 gal	38,874 L	20' 11"	6,388	3,600	1,633	7,500	3,402
10'	12,000 gal	44,999 L	23' 8"	7,226	4,000	1,814	8,600	3,901
10'	15,000 gal	57,244 L	29' 2"	8,903	4,750	2,155	10,500	4,762
10'	20,000 gal	75,614 L	37' 5"	11,417	6,100	2,767	13,550	6,146
10'	25,000 gal	94,636 L	46' 0"	14,021	7,550	3,425	17,100	7,756
10'	30,000 gal	113,003 L	54' 3"	16,535	8,750	3,969	20,400	9,253
10'	35,000 gal	132,025 L	62' 9"	19,139	10,050	4,559	24,350	1,1045
10'	40,000 gal	151,047 L	71' 4"	21,742	11,600	5,262	27,750	1,2587
12'	20,000 gal	75,974 L	27' 6"	8,382	8,600	3,900	21,500	9,755
12'	25,000 gal	96,588 L	34' 6"	10,516	10,400	4,717	26,100	11,840
12'	30,000 gal	114,257 L	40' 6"	12,344	11,900	5,398	30,350	13,770
12'	35,000 gal	134,378 L	47' 4"	14,427	13,850	6,282	35,100	15,925
12'	40,000 gal	152,047 L	53' 4"	16,256	15,400	6,985	39,050	17,715
12'	45,000 gal	172,452 L	60' 4"	18,390	17,200	7,802	43,650	19,800
12'	50,000 gal	189,841 L	66' 2"	20,168	18,850	8,550	47,650	21,615

*The double-wall weights are based on hydrostatically monitored tanks filled with monitoring fluid prior to delivery.

APPENDIX H

CDOT Construction Permit

COLORADO DEPARTMENT OF TRANSPORTATION

UTILITY PERMIT

PERMITTEE	APPLICANT	DEPARTMENT USE ONLY	
Name: CLIFTON WATER DISTRICT	City of Grand Junction	Date Issued **8/6/2015**	
David Reinertsen	Bret Guillory	Permit # **3150253-U**	Milepost
Address: **510 34 Road**	250 N 5th Street	S.H.# **141 B**	157.00
Clifton, CO 81520	Grand Junction, CO 81501	Region **03**	
		Section **02**	
Telephone: **(970) 434-7328**	(970) 244-1590	Patrol 02-2 James Livermore	

NOTICE TO PERMITTEE: For underground facility location information, contact the Utility Notification Center of Colorado (UNCC). Pursuant to 9-1.5-103 C.R.S. you shall not make or begin excavation without first notifying the UNCC and if necessary, then notifying the tier two members having underground facilities in the area of such excavation. Notification shall also be given to the CDOT regional permitting office, or as otherwise directed by this Permit's Special Provisions. Notice of the commencement, extent and duration of the excavation work shall be given at least two business days prior thereto, not including the day of actual notice. The UNCC may be called at 1-800-922-1987. CDOT shall be called at (970) 683-6271.

ACTIVITY DESCRIPTION (Furnished by Permittee)

PURPOSE ☑ Installation ☐ Adjustment ☐ Removal ☐ Maintenance of existing Facility

FACILITY (Type, size, class of transmittant, design pressure or etc.) **6" potable water line, 12" DR-11 HDPE casing**

DESCRIPTION OF WORK **Bore across highway & install water line**

NATURE OF INSTALLATION ☐ Longitudinal (Parallel) ☑ Transverse (Crossing) ☑ Buried ☐ Aerial/Ground-mounted ☐ Attach. To Hwy. Str. No. _____

LOCATION: **Colorado Law Enforcement Training Center, White Water Hill**

County: Mesa City/Town: Grand Junction Project Info: n/a

ADDITIONAL REMARKS **Traffic control must conform to and meet the requirements of MUTCD and the Colorado Supplements.**

SPECIAL PROVISIONS (completed by the Department) The Special Provisions are terms and conditions of this permit.

Any work shall only be in accordance with the approved plans and special provisions as set forth in this permit and its attachments.

The CDOT inspector is **Ken Mackey 2J3** Telephone: **(970) 270-4114**

Work is to be completed on or before: **8/6/2016** or within _____ days, (as applicable) kenneth.mackey@state.co.us

Work time restrictions: **Daylight hours only. No weekends, holidays, or during special events**

Designated minimum cover is **See Special Provision 21** Designated overhead clearance is **N/A**

(ALSO SEE ATTACHED STANDARD PROVISIONS, AND ADDITIONAL SPECIAL PROVISIONS), (TRAFFIC CONTROL MUST CONFORM TO THE MUTCD)

Other: **FIELD INSPECTOR SHALL BE NOTIFIED 48 HOURS PRIOR TO BEGINNING WORK OR PERMIT IS VOID UNLESS PRIOR APPROVAL IS OBTAINED. NOTIFY INSPECTOR FOR FINAL INSPECTION AND SIGN OFF.**

Permittee is prohibited from commencing any work within highway ROW prior to issuance of a fully endorsed and validated permit. Permit, plan exhibit, insurance certificate(s), and traffic control plan must be available on site during work. High visibility vests are required at all times during working hours.

1. **Your request to use and/or occupy state highway system rights of way as described above is granted subject to the terms and conditions of this permit, including the Standard and Special Provisions as shown on the permit and all attachments hereto.**
2. **To the extent authorized by law, Permittee hereby assumes, releases and agrees to indemnify, defend, protect, and save the State of Colorado harmless from and against any loss and/or damages to the property of the State of Colorado, third parties or the Permittee's facilities, and all loss and/or damage on account of injury to or death of any person whomsoever, arising at any time, caused by or growing out of the occupation of Colorado State Highway rights of way by Permittee's facilities or any part thereof, including but not limited to installation, adjustment, relocation, maintenance or operation, or removal of existing facilities, unless such loss and/or damage arises from the sole negligence or willful conduct of the State of Colorado or its employees or agents.**
3. **Failure by the Permittee to comply with any of the included terms or conditions may subject this permit to suspension or cancellation, at the discretion of the Department of Transportation.**
4. **THIS PERMIT IS NOT VALID UNTIL FULLY ENDORSED BY ALL PARTIES, WITH DATE OF ISSUE AFFIXED BY AN AUTHORIZED REPRESENTATIVE OF THE DEPARTMENT. A FULLY EXECUTED COPY OF THIS PERMIT MUST BE ON FILE AT THE TRANSPORTATION REGION OFFICE.**
5. **In accepting this permit the undersigned, representing the Permittee, verifies that he or she has the authority to sign for and bind the Permittee, and that he or she has read, understands and accepts all the included conditions.**

Attested	Date	Signature	Date
Title		Title	
Print Name:		Print Name:	
COLORADO DEPARTMENT OF TRANSPORTATION Chief Engineer		By Regional Transportation Director or Designee	Date

Distribution: Region File (Original)
Permittee/Applicant
Mtce Patrol Supvr. 02-2 James Livermore
Mtce Landscaping Supvr
Inspector Ken Mackey 2J3

CDOT Form # 0333 01/09
Previous versions are obsolete and should not be used.

CDOT UTILITY/RELOCATION/SPECIAL USE PERMIT STANDARD PROVISIONS

The following Standard Provisions are terms and conditions of this permit:

Effective January 1, 2008

Utility work authorized under this permit shall comply with the requirements of the State Highway Utility Accommodation Code, and applicable federal, state, local, and industry codes and regulations.

Construction of any portion of the highway facility, including the pavement structure, subsurface support, drainage, landscaping elements and all appurtenant features, shall comply with the provisions of the CDOT Standard Specifications for Road and Bridge Construction, and with the Colorado Standard Plans (M & S Standards).

1. COMMENCEMENT AND COMPLETION

Work on highway Right of Way (ROW) shall not commence prior to issuance of a fully endorsed and validated permit.

Permittee shall notify the CDOT inspector:

a. At least 2 working days prior to commencing work, or resuming operations which have been suspended for five or more consecutive working days
b. When suspending operations for 5 or more working days
c. Upon completion of work.

Work shall not proceed beyond a completion date specified in the Special Provisions without written approval of the Department.

2. PLANS, PLAN REVISIONS, ALTERED WORK

Plans or work sketch (EXHIBIT A) are subject to CDOT approval. A copy of the approved plans or sketch must be available on site during work. Plan revisions or altered work differing in scope or nature from that authorized under this permit, are subject to CDOT prior approval. Permittee shall promptly notify the CDOT inspector of changed or unforeseen conditions, which may occur on the job.

3. INSURANCE

Insurance Requirements for Utility and Special-Use Permits (Revised 7-05 per State Requirements)

A. The Permittee shall obtain, and maintain at all times during the performance of work authorized by this Permit, insurance in the following kinds and amounts. The Permittee shall require any Contractor working for them within the State Highway Right of Way to obtain like coverage. The Permittee shall also require any Contractor or Consultant performing work described in sub-paragraph 4) below, to obtain Professional Liability Insurance.

1) Workers' Compensation Insurance as required by state statute, and Employer's Liability Insurance covering all employees acting within the course and scope of their employment and work on the activities authorized by this Permit.

2) Commercial General Liability Insurance written on ISO occurrence form CG 00 01 10/93 or equivalent, covering premises operations, fire damage, independent Consultants, products and completed operations, blanket contractual liability, personal injury, and advertising liability with minimum limits as follows:

a. $1,000,000 each occurrence;

b. $2,000,000 general aggregate;

c. $2,000,000 products and completed operations aggregate; and

d. $50,000 any one fire;

e. For any permanent Permittee-owned installations located within the State Highway Right of Way, highway repairs, or site restoration, Completed Operations coverage shall be provided for a minimum period of one year following final acceptance of work.

If any aggregate limit is reduced below 1,000,000 because of claims made or paid, the Permittee, or as applicable - their Contractor, shall immediately obtain additional insurance to restore the full aggregate limit and furnish to CDOT a certificate or other document satisfactory to CDOT showing compliance with this provision.

3) Automobile Liability Insurance covering any auto (including owned, hired and non-owned autos) with a minimum limit as follows: $1,000,000 each accident combined single limit.

4) For any: a) engineering design; b) construction inspection; or, c) traffic control plans approved by a Traffic Control Supervisor; done in association with the operations or installations authorized by this permit, Professional Liability Insurance with minimum limits of liability of not less than $1,000,000 Each Claim and $1,000,000 Annual Aggregate. If the policy is written on a Claims Made form, the Permittee, or, as applicable – their Consultant or Contractor, shall renew and maintain Professional Liability Insurance for a minimum of two years following final acceptance of the work, or provide a project specific Policy with a two year extended reporting provision.

5) Pollution Legal Liability Insurance with minimum limits of liability of $1,000,000 Each Claim and $1,000,000 Annual Aggregate. CDOT shall be named as an additional insured to the Pollution Legal Liability policy. If the Policy is a component of the Professional Liability Policy, the Additional Insured requirement is waived, and the Policy shall be written on a Claims Made form, with an extended reporting period of at least two year following final acceptance of the work.

6) Umbrella or Excess Liability Insurance with minimum limits of $1,000,000. This policy shall become primary (drop down) in the event the primary Liability Policy limits are impaired or exhausted. The Policy shall be written on an Occurrence form and shall be following form of the primary. The following form Excess Liability shall include CDOT as an additional insured.

B. CDOT shall be named as additional insured on the Commercial General Liability and Automobile Liability Insurance policies. Completed operations additional insured coverage shall be on endorsements CG 2010 11/85, CG 2037, or equivalent. Coverage required by the Permit will be primary over any insurance or self-insurance program carried by the State of Colorado.

C. The Insurance shall include provisions preventing cancellation or non-renewal without at least 30 days prior notice to CDOT by certified mail.

D. The Permittee, or, as applicable – their Contractor or Consultant, will require all insurance policies in any way related to the Permit and secured and maintained by the Permittee, Contractor or Consultant, to include clauses stating that each carrier will waive all rights of recovery, under subrogation or otherwise, against CDOT, its agencies, institutions, organizations, officers, agents, employees and volunteers.

E. All policies evidencing the insurance coverages required hereunder shall be issued by insurance companies satisfactory to CDOT.

F. The Permittee, or as applicable - their Contractor or Consultant, shall provide certificates showing insurance coverage required by this Permit to CDOT prior to commencing work. No later than 15 days prior to the expiration date of any such coverage, the Permittee, Contractor or Consultant, shall deliver CDOT certificates of insurance evidencing renewals thereof. At any time during the term

of this contract, CDOT may request in writing, and the Permittee, Contractor or Consultant, shall thereupon within 10 days supply to CDOT, evidence satisfactory to CDOT of compliance with the provisions of this section.

G. Notwithstanding subsection A of this section, if the Permittee is a "public entity" within the meaning of the Colorado Governmental Immunity Act CRS 24-10-101, et seq., as amended ("Act'), the Permittee shall at all times during the term of this permit maintain only such liability insurance, by commercial policy or self-insurance, as is necessary to meet its liabilities under the Act. Upon request by CDOT, the Permittee shall show proof of such insurance satisfactory to CDOT. Public entity Permittees are not required to name CDOT as an Additional Insured.

H. If the Permittee engages a Contractor and/or Consultant to act independently from the Permittee on the permitted work, that Contractor and/or Consultant shall be required to provide an endorsement naming CDOT as an Additional Insured on their Commercial General Liability, Auto Liability, Pollution Legal Liability and Umbrella or Excess Liability policies.

4. WORK WHERE DEPARTMENT LACKS AUTHORITY

Utility work within municipal boundaries (pursuant to 43-2-135 CRS), on certain public lands, or on private property, may require separate approval of the appropriate jurisdictional agency or property owner.

5. INSTALLATIONS ON FREEWAYS

CDOT may permit utility accommodations on freeways, including but not limited to the Interstate System, only in accordance with Utility Accommodation Code provisions. Special case exceptions as defined therein may be permitted only in accordance with FHWA-approved Departmental policy.

6. JOINT USE ALTERNATIVES

As directed or approved by CDOT, if necessary for the safe and efficient use of the ROW, Permittee shall utilize joint use facilities such as the placement of two or more separate lines in a common trench, or attachment to the same overhead support. The Permittee will be responsible for proper coordination with other affected utilities.

7. ATTACHMENT TO HIGHWAY STRUCTURES

Permittee is responsible for designing structure attachments, subject to the approval of the CDOT Staff Bridge Design Engineer.

8. DRAINAGEWAYS AND WATERCOURSES

The flow of water shall not ever be impaired or interrupted. Where possible, crossings of ditches, canals or water-carrying structures shall be bored or jacked beneath. Irrigation ditch or canal crossings require approval of the ditch company or owner. Permittee shall repair damage to any drainage facility to the satisfaction of the owner.

9. TRAFFIC CONTROL PLAN

a. Prior to commencing work, the Permittee shall develop and submit to the Department for acceptance, a Traffic Control Plan (TCP) for any accommodation work that will affect traffic movement or safety. The Permittee shall implement the TCP and utilize traffic control devices as necessary to ensure the safe and expeditious movement of traffic around and through the work site.

b. The Permittee shall develop the TCP, and Methods of Handling Traffic (MHT's) included therein, in conformance with the Manual on Uniform Traffic Control Devices (MUTCD), the Colorado Supplement thereto adopted by the Commission pursuant to sections 42-4-104 and 42-4-105 CRS, the Department's standard specifications for temporary traffic control and the Department's standard plans for signing - Standard Plans S 630-1 and S 630-2. The TCP shall include provisions for the passage of emergency vehicles through the work zone, and shall conform to the requirements of the Americans with Disabilities Act. The TCP and MHT's shall contain sufficient detail to demonstrate conformity with all applicable requirements.

c. The Permittee shall have a competent person at the work site at all times in responsible charge of temporary traffic control. In situations where the TCP goes beyond any Typical Application shown in the MUTCD, or particularly dangerous roadway or traffic conditions exist, the Department may require the Permittee to have a Traffic Control Supervisor (TCS) develop or approve the TCP or to have a TCS on-site during work. The TCS shall be certified as a worksite traffic supervisor by either the American Traffic Safety Services Association (ATSSA) or the Colorado Contractors Association (CCA), and shall have a current CDOT flaggers' certification card. The TCS shall be responsible for the planning, preparation, coordination, implementation, and inspection of the TCP.

d. The Permittee shall not start the permitted work before the Department accepts the TCP.

e. The Department may review and order changes to the TCP and MHT's during performance of the work, as required.

f. The Permittee shall comply with the TCP at all times during performance of the work.

g. The Permittee shall keep a copy of the TCP at the work site at all times during performance of the work for inspection.

h. The TCP shall ensure that closure of intersecting streets, road approaches and other access points is minimized. On heavily traveled highways, the Department will not permit operations that interfere with traffic during periods of peak traffic flow.

i. When Permittee operations coincide with highway construction or maintenance operations, the Permittee shall develop and implement the TCP in cooperation and coordination with the highway agency and/or its contractors and as otherwise directed by the Department in the permit.

j. All flaggers shall have a current CDOT flagger certification card and shall be capable of communicating with the traveling public and others at the work site.

10. NCHRP 350 CRASHWORTHINESS REQUIREMENTS FOR WORK ZONE TRAFFIC CONTROL DEVICES

Work zone devices designated by FHWA as: Category I, including but not limited to single-piece drums, tubes, cones and delineators; Category II, including but not limited to barricades, vertical panels with light, drums or cones with light, portable sign supports, intrusion detectors and type III barricades; or as Category III, including but not limited to concrete barriers, fixed sign supports, crash cushions, and other work zone devices not meeting the definitions of Category I or II; shall meet NCHRP 350 crash test requirements. The Permittee, or their contractor shall obtain and make available upon request, the manufacturer's written NCHRP 350 certification, or as applicable, the FHWA Acceptance Letter, for each type of device. FHWA Acceptance Letters for Category II or Category III Work Zone Devices may be accessed through the FHWA website at http://safety.fhwa.dot.gov/roadway_dept/road_hardware/wzd.htm

11. WORKER SAFETY AND HEALTH

a. All workers within the State Highway right of way shall comply with their employer's safety and health policies/procedures and all applicable U.S. Occupational Safety and Health Administration (OSHA) regulations - including, but not limited to the applicable sections of 29 CFR Part 1910 - Occupational Safety and Health Standards and 29 CFR Part 1926 - Safety and Health Regulations for Construction.

b. Personal protective equipment (PPE) (e.g. head protection, footwear, high visibility apparel, safety glasses, hearing protection, respirators, gloves, etc.) shall be worn as appropriate for the work being performed, and as specified in regulation. At a minimum, all workers in the SH ROW, except when in their vehicles, shall wear the following personal protective equipment:

1) Head protection that complies with the ANSI Z89.1standard;

2) At all construction sites or whenever there is danger of injury to feet, workers shall comply with OSHA's PPE requirements for foot protection per 29 CFR 1910.136, 1926.95, and 1926.96. If required, such footwear shall meet the requirements of ANSI Z41;

3) High visibility apparel, which shall, at a minimum comply with the Class 2 specifications of the ANSI/ISEA 107standard. Class 3 apparel shall be considered for use at night or in particularly hazardous situations.

4) The most recent version of the ANSI standards listed above shall apply.

12. ADA REQUIREMENTS

The Permittee shall comply with the applicable provisions of the Americans With Disabilities Act, with respect to both permanent facilities installations and temporary work zones.

13. CLEAR ROADSIDE CONSIDERATIONS

a. CDOT is committed to provide a roadside area that is as free as practical from non-traversable hazards and fixed objects ("clear zone"). New above ground installations may be permitted within the clear zone only upon a showing that no feasible alternate locations exist. Permittee must utilize appropriate countermeasures to minimize hazards.

b. Permittee shall remove materials and equipment from the highway ROW at the close of daily operations. The traffic control plan must include protective measures where materials and equipment may be stored on ROW. Protection of open trenches and other excavations within highway ROW shall be addressed in the Permittee's traffic control plan. All excavations shall be closed at the end of daily operations, and no open excavation will be allowed in the clear zone after dark. The Permittee agrees to promptly undertake mitigating or corrective actions acceptable to the Department upon notification by CDOT that the installation permitted herein has resulted in a hazardous situation for highway users.

14. GENERAL CONSTRUCTION REQUIREMENTS

a. Work shall not be performed at night or on Saturdays, Sundays, or holidays without prior authorization or unless otherwise specified in this permit. CDOT may restrict work on ROW during adverse weather conditions or during periods of high traffic volume.

b. Those areas within ROW, which must be disturbed by permit operations, shall be kept to a practical minimum. Permittee shall not spray, cut, or trim trees or other landscaping elements within highway ROW, unless such work is otherwise specified in this permit, or clearly indicated on the approved plans. Cleated or tracked equipment shall not work on or move over paved surfaces without mats, or pads on tracks.

c. Material removed from any portion of the roadway prism must be replaced in like kind with equal or better compaction. Segregation of material is not permitted. The permitted facility shall be of durable materials in conformity with accepted practice or industry standards, designed for long service life, and relatively free from routine servicing or maintenance.

d. Construction or compaction by means of jetting, puddling, or water flooding is prohibited within all highway ROW.

e. Thrust blocks are required on all vertical and horizontal bends in pressure pipes.

f. Meters shall not be placed on highway ROW except within corporate limits where municipal regulations allow such use.

15. ALIGNMENT, COVER, CLEARANCE

a. Location and alignment of Permittee's facilities shall only be as specified in this permit or as otherwise indicated in the approved plans or work sketch (EXHIBIT A).

b. Parallel installations will not be permitted under roadways (including curbing and/or shoulders) or median areas, except within corporate boundaries, subject to municipal regulations.

c. Parallel installations should be located as near as practicable to the ROW line. Crossings shall be as nearly perpendicular to the highway as feasible.

d. Where no feasible alternate locations exist, the Department may permit parallel installations along roadside areas within 15 feet from edge of shoulder or back of curb. In these cases, the facility must be so located and safeguarded as to avoid potential conflict with necessary highway appurtenances (signs, guard rail, delineators, etc.). Specific safeguards such as increasing depth of cover to 60 inches, capping, or encasement, shall be specified in this permit's Special Provisions.

e. Parallel installations shall follow a uniform alignment, wherever practical. Due consideration must be given to conserving space available for future utility accommodations. The standard allowable deviation from the approved horizontal alignment is ± 18 inches.

f. Minimum cover shall conform to the Special Provisions. Normal specified cover will be 48 inches or greater; reduced cover may be approved where site conditions warrant, subject to other safeguards as may be specified or approved in the permit. Minimum overhead clearance shall conform to the Special Provisions, consistent with Utility Accommodation Code criteria.

16. PAVEMENT CUTS AND REPAIRS

Paved surfaces shall not be cut unless otherwise specified in this permit. No more than one half the width of the roadbed may be opened at a time, when otherwise permitted. Pavement shall be sawed or wheel-cut to a neat line. Pavement shall be replaced to a design equal to or greater than that of the surrounding undisturbed pavement structure. Pavement repair shall conform to the Special Provisions or the approved plans.

17. BORING, JACKING, ENCASEMENT

Unless otherwise specified, buried crossings shall be bored or jacked beneath the roadway, at least from toe of slope to toe of opposite slope. Portals for untrenched crossings more than 5 feet in depth shall be bulk headed in conformance with OSHA construction and safety standards. Portal limits of untrenched crossings shall be established safely beyond the highway surface and clear zone and in no case shall the lateral distance from the surfaced area of the highway to the boring or jacking pit be less than the vertical difference in elevation between such surface and the bottom of the pit. Water jetting or tunneling is not permitted. Water assisted boring may be permitted as determined by the CDOT Inspector. Boring hole shall be oversized to the minimum amount required to allow pull-through of the conduit being installed. Resultant voids shall be grouted or otherwise backfilled, subject to CDOT approval. Ends of bored sections shall not be covered before being inspected. Encasement shall be consistent with Utility Accommodation Code provisions. CDOT may require protective casing for shallow installations or certain conduit materials. Encased crossings shall extend at least from toe of slope to toe of slope, or the full width

between access-control lines on freeways, including the Interstate System.

18. INSPECTION AND ACCEPTANCE

a. CDOT will determine the extent of inspection services necessary for a given installation. Permittee shall attend final inspection as may be required. If the initial performance of permitted work was unacceptable, as determined by the Department, the Permittee shall perform any reconstruction or improvement of that work as ordered by the Department, in a timely manner and prior to any further construction. If permitted operations are not being carried out in compliance with the terms and conditions of this permit, the Department may order the Permittee to perform whatever corrective measures are necessary to attain compliance with the permit. If there is an immediate danger to the public's health, safety or welfare, the Department may order the Permittee to cease all operations and if necessary, to remove all equipment and facilities from the SHROW.

b. Final acceptance does not relieve Permittee of maintenance obligations toward those elements of the highway facility constructed under this permit. Final acceptance begins the two-year warranty period (see requirement under "Operation and Maintenance" below).

19. ENVIRONMENTAL CLEARANCES/PERMITS

a. It is the responsibility of the Permittee to determine which environmental clearances and/or regulations apply to their activities and to obtain any clearances that are required directly from the appropriate regulatory agency prior to commencing work. Please refer to or request a copy of the "CDOT Environmental Clearance Information Summary" (ECIS) for details. The ECIS may be obtained from CDOT Permitting Offices or may be accessed via the CDOT webpage at http://www.dot.state.co.us/UtilityProgram/Forms.cfm. Failure to comply with regulatory requirements may result in suspension or revocation of your CDOT permit, or enforcement actions by other agencies.

b. The Special Provisions of this permit shall list any specific environmental clearances or permits that the Department has been notified by the Permittee or by the administering regulatory agency apply to the operations authorized by this permit. The Special Provisions shall require the Permittee obtain the listed environmental clearances/permits prior to beginning work.

c. The Permittee shall comply with all requirements described in the CDOT Environmental Clearances Information Summary, including those pertaining to:

1) Ecological Resources
2) Cultural Resources
3) Discharges of Stormwater or Process Water
4) Hazardous Materials
5) Discharges of Dredged or Fill Material
6) Erosion and Sediment Control
7) Disposal of Drilling Fluids
8) Concrete Washout
9) Spill Reporting
10) Transportation of Hazardous Materials

d. Disturbance of any wildlife shall be avoided to the maximum extent practicable. If threatened or endangered species or archeological or historical artifacts are encountered during the progress of a project, work in the subject area shall be halted and the CDOT regional permitting office shall be contacted immediately for direction as to how to proceed.

e. All discharges of stormwater or process water are subject to the applicable provisions of the Colorado Water Quality Control Act and the Colorado Discharge Permit Regulations.

f. There shall be no disposal of hazardous materials in the state highway right of way. Solid waste shall be removed from the state highway right of way and disposed of at a permitted facility or designated collection point (such as the Permittee's own dumpster). Drilling fluids must be disposed of as described in the ECIS.

g. If pre-existing solid waste or hazardous materials contamination (including oil or gasoline contaminated soil, asbestos, chemicals, mine tailings, etc.) are encountered during the performance of work, the Permittee shall halt work in the affected area and immediately contact the CDOT regional permitting office for direction as to how to proceed.

h. Spills shall be reported immediately using the CDOT Illicit Discharge Hotline (303) 512-4446. Spills on the highway, into waterways, or that may otherwise present an immediate danger to the public, shall be reported by calling 911 or the Colorado State Patrol at (303) 239-4501, and the Colorado Department of Public Health and Environment at 1-(877) 518-5608.

20. RESTORATION OF RIGHT OF WAY

Prior to final acceptance, all disturbed portions of highway right of way shall be cleaned up and restored to their original condition, subject to CDOT approval. Seeding, sodding, and planting shall be as specified, or otherwise approved by CDOT. Construction, maintenance and watering requirements shall conform to the CDOT Standard Specifications. Where landscape restoration must be delayed due to seasonal requirements, such work may be authorized by separate permit. Permittee shall use only certified weed-free seed and mulch. Permittee shall clean equipment before transporting it into or out of the state to prevent the migration of noxious weeds.

21. OPERATION AND MAINTENANCE

a. Permittee agrees to own and maintain the installation permitted herein. The facility shall be kept in an adequate state of repair and maintained in such a manner as to cause the least interference with the normal operation and maintenance of the highway.

b. If any element of the transportation facility, constructed or replaced as a condition of this permit, fails within 24 months due to improper construction or materials, Permittee shall make all repairs immediately as notified in writing by CDOT.

c. Routine, periodic maintenance and emergency repairs may be performed under the general terms and conditions of this permit. CDOT shall be given proper advance notice whenever maintenance work will affect the movement or safety of traffic. In an emergency, the CDOT Region office and the State Patrol shall immediately be notified of possible traffic hazards. Emergency procedures shall be coordinated beforehand, where possible.

d. Maintenance activities requiring new excavation or other disturbance within highway ROW may require separate permit. Where highway construction or maintenance operations so require, Permittee will shut off lines, remove all combustible materials from the highway right of way, or provide other temporary safeguards.

22. MARKERS, LOCATION AIDS, LOCATION ASSISTANCE

a. The utility shall take all practical measures to ensure that buried utility facilities are surface-detectable by standard geophysical methods. Where the utility facilities, by the nature of their material properties, burial depth or other factors, may by themselves not be surface-detectable, the utility shall, where feasible, incorporate detection wire or other detection aids in the installation of those facilities. In instances where detection aids are not feasible or would be ineffective and surface-detectability cannot be ensured, surface markers shall be installed as directed by the Department and as-constructed plans and showing the accurate horizontal and vertical location of the buried facilities shall be provided to the Department.

b. All plowed or trenched installations must include color-coded (using the American Public Works Association color coding system) warning tape placed not less than 12 inches vertically above the top of the line. The warning tape shall be surface-detectable if needed to facilitate detection of the line.

c. The utility shall place readily identifiable markers at the right of way line where it is crossed by pipelines carrying transmittants which are flammable, corrosive, expansive, energized, or unstable, particularly if carried at high pressure or potential, except where a vent will serve as a marker.

d. The utility shall place markers for longitudinal underground facilities vertically above the facilities or at a known horizontal offset, unless otherwise approved in writing by the Department. Each marker shall provide a fore- and backsight to succeeding and preceding markers. Markers shall be installed at suitable intervals along tangent sections, at angle points or points of curvature and at reasonable intervals along curves.

e. The utility shall maintain any markers required by this Code for the life of the installation.

f. The Department may require the utility to submit "as-constructed" plans. The Department may enter into an agreement with the utility whereby the Department can rely on those plans for the exact location of the utility for any future excavations, and need not give notice to the utility under Article 1.5 of Title 9, C.R.S.

g. The utility will comply with the applicable requirements of Article 1.5 of Title 9 C.R.S., including any requirement to participate in the State's Notification Association pursuant to 9-1.5-105 C.R.S.. All owners of underground utilities within the SHROW, with the exception of the Department itself, must become members of the UNCC Notification Association.

h. In addition to complying with the provisions of Article 1.5 of Title 9 C.R.S (One-Call Statute) in response to the Department's notification of planned excavations, utility owners shall surface-mark their buried utility facilities that are located within the SHROW in order to facilitate Departmental engineering and design activities, upon reasonable request from the Department, and at no cost to the Department. The Permittee shall respond to such request within a reasonable timeframe acceptable to the Department, but no longer than 14 calendar days from the date of request, and the accuracy of the surface marking shall be within 18 inches of either side of the actual location of the buried facility.

23. ADJUSTMENTS DUE TO HIGHWAY CONSTRUCTION

If for any transportation purpose it becomes necessary to remove, adjust, or relocate this facility, Permittee will do so promptly, at no cost to the CDOT except as provided by law, upon written notice from CDOT and in accordance with the utility relocation permit issued to cover the necessary work. The utility shall perform the relocation at or within a time convenient to and in proper coordination with the project or transportation-related activity, to minimize public inconvenience and cost, as directed by the Department in the permit authorizing the relocation. The utility company shall pay for damages caused by the company's delay in the performance of utility relocation work or interference with the performance of transportation project work done by others. Such damages include, but are not limited to, payments made by the Department to any third party based on a claim that performance of the transportation project work was delayed or interfered with as a direct result of the utility company's failure to timely perform the utility relocation work. Damages resulting from delays in the performance of the utility relocation work or interference with the transportation project work that are caused by events beyond the utility company's ability to reasonably foresee or control (a force majeure) shall not be charged to the utility company.

24. ABANDONMENT, RETIREMENT, CHANGE IN OWNERSHIP

a. The Permittee shall notify the Department in writing of the planned retirement or abandonment of its facility or any portion thereof. The Department will notify the Permittee in writing if it determines that the facilities may be retired or abandoned in place, along with any special conditions that may apply.

b. Retired facilities shall remain the Permittee's sole responsibility, subject to all provisions of the Utility Accommodation Code and all of the terms and conditions of the permit issued for that facility, including maintenance and relocation requirements.

c. The Permittee shall promptly remove all abandoned facilities from the SH ROW and promptly restore the SH ROW to pre-existing or other conditions prescribed by the Department unless the Department in writing expressly allows the facility to remain in place. Written notice from the Department, allowing an abandoned facility to remain in place, may include special conditions.

d. If utility facilities are retired or abandoned in place, the utility shall comply with that decision if directed by the Department:

1) cap, plug or fill lines,
2) furnish suitable location records for any such buried facilities,
3) maintain its own records of such facilities and respond to locate notices/requests from the UNCC and/or excavators, In providing such locates, the utility will indicate to the requesting entity whether or not the subject facilities are retired or abandoned.
4) perform any other actions as deemed necessary by the Department to protect the transportation facility and/or the traveling public.

e. If the ownership of utility facilities is transferred, both the original Permittee and the new owner shall notify the Department in writing prior to the change in ownership, and such notice shall state the planned date of change in ownership. The notice from the new owner shall include a written statement accepting all terms and conditions of the existing permit, effective upon the planned date of the change in ownership.

f. Utility facilities containing asbestos may not be abandoned in-place. Ordinarily, such facilities must be removed from the SHROW when take out of service. On a case-by-case basis, the Department may allow such facilities to be retired in-place, with the owner retaining full legal ownership and responsibility for the facilities.

25. SUSPENSION AND CANCELLATION

a. The CDOT inspector may suspend operation due to:

1) Non compliance with the provisions of this permit
2) Adverse weather or traffic conditions
3) Concurrent transportation construction or maintenance operations in conflict with the permitted work.
4) Any condition deemed unsafe for workers or for the general public.

b. Work may resume when grounds for suspension no longer exist.

This permit is subject to cancellation due to:
1) Persistent noncompliance with permit provisions
2) Abandonment or transfer of ownership
3) Superseded by new permit covering the same installation
4) Conflict with necessary planned transportation construction.

c. Permittee must promptly terminate occupancy upon notice of cancellation of permit, unless a new permit is applied for and granted.

d. Where Permittee does not fulfill an obligation to repair or maintain any portion of the highway facility, or control and safely maintain the flow of traffic thereon, CDOT reserves the right, in lieu of canceling this permit, to accomplish the required work by any other appropriate means, and Permittee shall be liable for the actual costs thereof.

COLORADO DEPARTMENT OF TRANSPORTATION
Environmental Clearances Information Summary

PURPOSE - This summary is intended to inform entities external to CDOT that may be entering the state highway right-of-way to perform work related to their own facilities (such as Utility, Special Use or Access Permittees), about some of the more commonly encountered environmental permits/clearances that may apply to their activities. This listing is not all-inclusive - additional environmental or cultural resource permits/clearances may be required in certain instances. Appropriate local, state and federal agencies should be contacted for additional information if there is any uncertainty about what permits/clearances are required for a specific activity. **IMPORTANT – Please Review The Following Information Carefully – Failure to Comply With Regulatory Requirements May Result In Suspension or Revocation of Your CDOT Permit, Or Enforcement Actions By Other Agencies**

CLEARANCE CONTACTS - As indicated in the permit/clearance descriptions listed below, the following individuals or agencies may be contacted for additional information:

- Colorado Department of Public Health and Environment (CDPHE): General Information – (303) 692-2035
  Water Quality Control Division (WQCD): (303) 692-3500
  Environmental Permitting Website https://www.colorado.gov/pacific/cdphe/all-permits
  CDOT Water Quality Program Manager: (303) 757-9343 http://www.coloradodot.info/programs/environmental/water-quality
- CDOT Asbestos Project Manager: Theresa Santangelo-Dreiling, (303) 512-5524
- Colorado Office of Archaeology and Historic Preservation: (303) 866-3395
- U.S. Army Corps of Engineers, District Regulatory Offices:
  Omaha District (NE CO), Denver Office (303) 979-4120
  http://www.nwo.usace.army.mil/Missions/RegulatoryProgram/Colorado.aspx
  Sacramento Dist. (Western CO), Grand Junction Office (970) 243-1199
  http://www.spk.usace.army.mil/Missions/Regulatory.aspx
  Albuquerque District (SE CO), Pueblo Office (719)-543-9459
  http://www.spa.usace.army.mil/Missions/RegulatoryProgramandPermits.aspx
- CDOT Utilities, Special Use and Access Permitting: (303) 757-9654 http://www.coloradodot.info/business/permits

Ecological Resources - Disturbance of wildlife shall be avoided to the maximum extent practicable. Entry into areas of known or suspected threatened or endangered species habitat will require special authorization from the CDOT permitting office. If any threatened or endangered species are encountered during the progress of the permitted work, work in the subject area shall be halted and the CDOT Regional Permitting Office and Region Planning and Environmental Manager shall be contacted immediately. Authorization must be provided by CDOT prior to the continuation of work. Information about threatened or endangered species may be obtained from the CDOT website, http://www.coloradodot.info/programs/environmental/wildlife/guidelines, or the Colorado Parks and Wildlife (CPW) website, http://www.cpw.state.co.us/learn/Pages/SOC-ThreatenedEndangeredList.aspx. Additional guidance may be provided by the appropriate Region Planning and Environmental Manager (RPEM).

Cultural Resources - The applicant must request a file search of the permit area through the Colorado Office of Archaeology and Historic Preservation (OAHP), Denver, to ascertain if historic or archaeological resources have previously been identified. Inventory of the permit area by a qualified cultural resources specialist may be necessary, per the recommendation of CDOT. If archaeological sites/artifacts or historic resources are known to exist prior to the initiation of the permitted work or are encountered as the project progresses, all work in the subject area shall be halted and the CDOT Regional Permitting Office and Region Planning and Environmental Manager shall be contacted immediately. Authorization must be provided by CDOT prior to the continuation of work. Additional guidance may be provided by the Regional Permitting Office and RPEM. ***Contact Information:*** Contact the OAHP for file searches at (303) 866-3395.

Paleontological Resources - The applicant must request a fossil locality file search through the University of Colorado Museum, Boulder, and the Denver Museum of Nature and Science to ascertain if paleontological resources have been previously identified. Inventory of the permit area by a qualified paleontologist may be necessary, per the recommendation of CDOT. If fossils are encountered during the permitted work, all work in the subject area shall be halted and the CDOT Regional Permitting Office and Region Planning and Environmental Manager shall be contacted immediately. Authorization must be provided by CDOT prior to the continuation of work. Additional guidance may be provided by the Regional Permitting Office in the Permit Special Provisions. **Contact Information:** Contact the CDOT Paleontologist at (303) 757-9632.

Hazardous Materials, Solid Waste - The Solid Wastes Disposal Sites and Facilities Act C.R.S. 30-20-100, et al, and Regulations Pertaining to Solid Waste Disposal Sites and Facilities (6 CCR 1007-2), prohibit solid waste disposal without an approved Certificate of Designation (a landfill permit). The Colorado Hazardous Waste Act C.R.S. 25-15-301 et al, and the Colorado Hazardous Waste Regulations (6 CCR 1007-3) prohibit the transfer, storage or disposal (TSD) of hazardous waste except at permitted TSD sites. There are no permitted landfills or TSD sites within the State Highway Right of Way. Therefore, all solid or hazardous wastes that might be generated by the activities of entities entering the State Highway Right of Way must be removed from the ROW and disposed of at a permitted facility or designated collection point (e.g., for solid waste, a utility or construction company's own dumpster). If pre-existing solid waste or hazardous materials contamination (including oil or petroleum contaminated soil, asbestos, chemicals, mine tailings, etc.) is encountered during the performance of work, the permittee shall halt work in the affected area and immediately contact the CDOT Regional Permitting Office for direction as to how to proceed. ***Contact Info:*** Andy Flurkey, CDOT Hazardous Materials Project Manager, (303) 512-5520.

Asbestos Containing Materials, Asbestos Contaminated Soil - All work on asbestos containing materials (ACM) must comply with the applicable requirements of the CDPHE Air Pollution Control Division's (APCD) Regulation 8. Disposal of ACM, and work done in asbestos-contaminated soil, must comply with the CDPHE Hazardous Materials and Waste Management Division's (HMWMD) Solid Waste Regulations. The application for any CDOT permit must specifically identify any ACM involved in the work for which authorization is being requested. Additional guidance or requirements may be specified in the permit special provisions. ***Contact Info:*** CDPHE APCD and HMWMD Regulations can be accessed via the CDPHE Environmental Permitting Website listed above.

Additional information **concerning clearance on CDOT projects** is available from the CDOT Asbestos Project Manager (303) 512-5519, or Theresa Santangelo-Dreiling, Property Management Supervisor (303) 512-5524.

Transportation of Hazardous Materials - No person may offer or accept a hazardous material for transportation in commerce unless that person is registered in conformance with the United States Department of Transportation regulations at 49 CFR, Part 171. The hazardous material must be properly classed, described, packaged, marked, labeled, and in condition for shipment as required or authorized by applicable requirements, or an exemption, approval or registration has been issued. Vehicles requiring a placard, must obtain authorization and a State HAZMAT Permit from the Colorado Public Utilities Commission. ***Contact Information:*** For authorization and more info call the Federal Motor Safety Carrier Administration, US DOT for inter- and intra-state HAZMAT Registration (303) 969-6748. Colorado Public Utilities Commission: (303) 894-2868.

Discharge of Dredged or Fill Material – 404 Permits Administered By the U.S. Army Corps of Engineers, and Section 401 Water Quality Certifications Issued by the CDPHE WQCD - Corps of Engineers 404 permits are required for the discharge of dredged or fill materials into waters of the United States, including wetlands. There are various types of 404 permits, including nationwide permits, which are issued for activities with relatively minor impacts. For example, there is a nationwide permit for utility line activities (nwp #12). Depending upon the specific circumstances, it is possible that either a "general" or "individual" 404 permit would be required. If an individual 404 permit is required, section 401 water quality certification from the CDPHE WQCD is also required. Contact the appropriate Corps District Regulatory Office for information about what type of 404 permit may be required (contact information above). Contact the CDPHE Water Quality Control Division at (303) 692-3500.

Working on or in any stream or its bank - In order to protect and preserve the state's fish and wildlife resources from actions that may obstruct, diminish, destroy, change, modify, or vary a natural existing stream or its banks or tributaries, it may be necessary to obtain a Senate Bill 40 certification from the Colorado Department of Natural Resources. A stream is defined as 1) represented by a solid blue line on USGS 7.5' quadrangle maps; and/or 2) intermittent streams providing live water beneficial to fish and wildlife; and/or 3) segments of streams supporting 25% or more cover within 100 yards upstream or downstream of the project; and/or 4) segments of streams having wetlands present within 200 yards upstream or downstream of the project measured by valley length. The CPW application, as per guidelines agreed upon by CDOT and CPW, can be accessed at http://www.coloradodot.info/programs/environmental/wildlife/guidelines.

Stormwater Construction Permit (SCP) and Stormwater Discharge From Industrial Facilities - Discharges of stormwater runoff from construction sites disturbing one acre or more - or certain types of industrial facilities, such as concrete batch plants - requires a CDPS Stormwater Construction Permit. ***Contact Information:*** Contact the CDPHE Water Quality Control Division at (303) 692-3500. Website: https://www.colorado.gov/pacific/cdphe/wq-construction-general-permits.

Construction Dewatering (Discharge or Infiltration) - Discharges of water encountered during excavation or work in wet areas may require a Construction Dewatering Discharge Permit. ***Contact Information:*** For Construction Dewatering Discharge Permits, contact the CDPHE WQCD at (303) 692-3500. For Dewatering Application and Instructions, see Section 3 at the CDPHE website: https://www.colorado.gov/pacific/cdphe/wq-construction-general-permits.

Municipal Separate Storm Sewer System (MS4) Discharge Permit - Discharges from the storm sewer systems of larger municipalities, and from the CDOT highway drainage system that lies within those municipalities, are subject to MS4 Permits issued by the CDPHE WQCD. For facilities that lie within the boundaries of a municipality that is subject to an MS4 permit, the owner of such facility should contact the municipality regarding stormwater related clearances that may have been established under that municipality's MS4 permit. All discharges to the CDOT highway drainage system or within the Right of Way (ROW) must comply with the applicable provisions of the Colorado Water Quality Control Act and the Colorado Discharge Permit Regulations Permit # COS-000005 (http://www.coloradodot.info/programs/environmental/water-quality/documents/ms4-program-area-maps) and COR-030000 (https://www.colorado.gov/pacific/cdphe/wq-municipal-ms4-permits). Discharges are subject to inspection by CDOT and CDHPE. Contact the CDPHE Water Quality Control Division at (303) 692-3500 for a listing of municipalities required to obtain MS4 Permits, or go to https://www.colorado.gov/pacific/cdphe/wq-municipal-ms4-permits.

General Prohibition – Discharges - All discharges are subject to the provisions of the Colorado Water Quality Control Act and the Colorado Discharge Permit Regulations. Prohibited discharges include, but are not limited to, substances such as wash water, paint, automotive fluids, solvents, oils or soaps and sediment. Allowable non-stormwater discharges can be found at http://www.coloradodot.info/programs/environmental/water-quality/glossary.html. ***Contact Information:*** Contact the Colorado Department of Public Health and Environment, Water Quality Control Division at (303) 692-3500.

General Authorization - Allowable Non-Stormwater Discharges - Unless otherwise identified by CDOT or the WQCD as significant sources of pollutants to the waters of the State, the following discharges to stormwater systems are allowed without a Colorado Discharge Permit System permit: landscape irrigation, diverted stream flows, uncontaminated ground water infiltration to separate storm sewers, discharges from potable water sources, foundation drains, air conditioning condensation, irrigation water, uncontaminated springs, footing drains; water line flushing, flows from riparian habitats and wetlands, and flow from firefighting activities. ***Contact Information:*** The CDPHE Water Quality Control Division (telephone #'s listed above).

Erosion and Sediment Control Practices - For activities requiring a Stormwater Construction Permit, erosion control requirements will be specified through that permit. In those situations where a stormwater permit is not required, all reasonable measures should be taken in order to minimize erosion and sedimentation according to CDOT Standard Specifications 107.25 and 208. All disturbances require a stabilization plan, native seeding or landscape design plan. In any case, the CDOT Erosion Control and Stormwater Quality Guide (most recent version) should be used to design erosion controls and to restore disturbed vegetation. ***Contact Information:*** The CDOT Erosion Control and Stormwater Quality Guide may be obtained from the Bid Plans Office at (303) 757-9313 or from: http://www.coloradodot.info/programs/environmental/landscape-architecture/erosion-storm-quality.

Disposal of Drilling Fluids - Drilling fluids used in operations such as Horizontal Directional Drilling may be classified as "discharges" or "solid wastes", and in general, should be pumped or vacuumed from the construction area, removed from the State Highway Right of Way, and disposed of at permitted facilities that specifically accept such wastes. Disposal of drilling fluids into storm drains, storm sewers, roadside ditches or any other type of man-made or natural waterway is prohibited by Water Quality Control and/or Solid Waste regulations. Small quantities of drilling fluid solids (less than 1 cubic yard of solids) may be left on-site after either being

separated from fluids or after infiltration of the water, provided: 1) the drilling fluid consists of only water and bentonite clay, or, if required for proper drilling properties, small quantities of polymer additives that are approved for use in drinking water well drilling; 2) the solids are fully contained in a pit, and are not likely to pose a nuisance to future work in the area, 3) the solids are covered and the area restored as required by CDOT permit requirements (Utility, Special Use, or Access Permits, etc.). ***Contact Information:*** Contact CDPHE (telephone #'s listed above).
Noxious Weeds and Invasive Species Management Plan – Noxious Weeds and Invasive Species guidance can be found by contacting the Colorado Department of Agriculture (https://www.colorado.gov/pacific/agconservation/noxiousweeds) and the Colorado Division of Parks and Wildlife (http://cpw.state.co.us/aboutus/Pages/RS-NoxiousWeeds.aspx). In either case, management plans involving the control of noxious weeds associated with the permitted activity and cleaning of equipment will be required.
Concrete Washout - Waste generated from concrete activities shall NOT be allowed to flow into the drainage ways, inlets, receiving waters, or in the CDOT ROW. Concrete waste shall be placed in a temporary concrete washout facility and must be located a minimum of 50 feet from state waters, drainageways, and inlets. Concrete washout shall only be performed as specified by the CDOT Environmental Program and shall be in accordance to CDOT specifications and guidelines. ***Contact Information:*** Contact CDPHE or find additional information on the CDOT website: *Revision of Sections 101, 107, 208, 213 and 620 Water Quality Control One or More Acres of Disturbance*.
Spill Reporting - Spills shall be contained and cleaned up as soon as possible. Spills shall NOT be washed down into the storm drain or buried. All spills shall be reported to the CDOT Illicit Discharge Hotline at (303) 512-4446 (4H20), as well as the Regional Permitting Office and Regional Maintenance Supervisor. Spills on highways, into waterways, any spill in the highway right-of-way exceeding 25 gallons, or that may otherwise present an immediate danger to the public shall be reported by calling 911, and shall also be reported to the CDPHE at 1-877-518-5608.
About This Form - Questions or comments about this Information Summary may be directed to Alex Karami, CDOT Safety & Traffic Engineering, Utilities Unit, at (303) 757-9841, alex.karami@state.co.us.

COLORADO
Department of Transportation
Region 3 Traffic Section
222 South 6th Street Room 100
Grand Junction, Colorado 81501
(970) 683-6288 Fax: (970) 683-6290

LATE FALL, WINTER AND SPRING SPECIAL PROVISIONS FOR WORK WITHIN CDOT ROW

Due to Northwest Colorado's unpredictable weather, work in the ROW can create several types of hazards for the traveling public, contractors, and their personnel. The condition of the highway can change quickly. Mud tracked onto the highway by equipment, ice and snowpack are just a few of the conditions that make the roadway more hazardous for all concerned. The terrain within the ROW must be kept clear of hazards as well. Holes, trenches, equipment and materials can make the terrain "unrecoverable" for a driver should his/her vehicle leave the highway. Activities must be shut down when the roadway is other than dry. The use of frozen materials for backfilling will only lead to settlement. The contractor must make extra effort to compact the excavation. In the spring, any settlement of backfill shall be repaired. The re-vegetation shall take place this fall or early next spring.

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3150253-U	Permit No
141B	Highway No
157mm	Mile Marker
2JOHN3	Patrol No

SPECIAL PROVISIONS FOR UTILTY INSTALLATIONS

THE SPECIAL PROVSIONS ARE TERMS AND CONDTIONS OF THIS PERMIT

CDOT IS NOT A UNCC MEMBER AND UNCC WILL NOT LOCATE CDOT FACILITIES.
PERMITTED WORK REQUIRES PERMITTEE OR CONTRACTORS TO CONTACT CDOT (970) 384-3354, FOR LOCATES IF ANY CDOT SIGNALS, FLASHING BEACONS, ELECTICAL SIGNS, LUMINARIES, AND WEATHER STATIONS ARE LOCATED WITHIN 3000 FEET OF CONSTRUCTION AREA

NOTICE- NO UNDERGROUND INSTALLATIONS SHALL BE PERFORMED FROM 15 NOVEMBER TO 15 APRIL, UNLESS THE CDOT INSPECTOR ON THE PERMIT HAS APPROVED OF THE INSTALLATION DURING THIS TIME FRAME. REVIEW & COMPLY WITH THE ATTACHED "SPECIAL PROVISIONS FOR LATE FALL, WINTER AND SPRING".

TRAFFIC CONTROL

1. The complete permit for this work, including approved Colorado Department of Transportation (to be known as CDOT or the Department) permit, construction and traffic control plans, will be kept at the work site at all times. *The permittee is responsible for providing traffic control plans that conforms to and meets the requirements of the **Manual on Uniform Traffic Control Devices (MUTCD) and the Colorado supplements**.*

2. To meet conditions encountered in the field, minor changes or additions may be ordered and approved by the CDOT Field Inspector.

3. All CDOT employees shall be considered as inspectors when the safety of the traveling public, safety of contractors, employees, or integrity of the property of CDOT is at risk.

4. All work shall cease when weather creates a safety hazard for the traveling public and/or barrow ditch is wet enough to leave tire or cleat marks.

5. Advanced warning and construction signs, flashers, barricades and flag people must conform to the Manual on Uniform Traffic Control Devices and, Colorado Supplements, and must be in place before work starts each day.

6. Any advance warning signs not in use for a particular activity shall be removed, placed outside of the clear zone, or laid flat at least 4' from the edge of the shoulder and not on landscaped areas or sidewalks. This applies to both signs and structures.

7. Lane closures must be as short as possible and as per the MUTCD. Flaggers are required for each lane closure. Advance warning signs must be placed as per MUTCD. All temporary traffic control signs shall be removed, covered or laid on the ground during non-working hours.

8. Two-way traffic shall be maintained at all times in the construction area in accordance with the MUTCD and Colorado Supplements.

GENERAL

9. The permittee must notify the CDOT inspector no less than two (2) days prior to any work on highway right-of-way. The CDOT Inspector's name, phone number, and email is on the permit. If a break in work exceeds 7 days, the CDOT inspector shall be notified of the changed work schedule. Notification may be given by phone or email.

10. No work shall proceed beyond the expiration date specified on the permit without written approval of the Department.

11. On three (3) day weekend holidays, the project shall be shut down by 12:00 Noon on Friday, and not resume prior to the following Tuesday morning.

12. Work hours for this permit are from one hour after sunrise to one hour before sunset, unless otherwise stated in the permit.

13. Permittee is responsible for the safety of the traveling public at all times when work is being done.

14. Forty-eight (48) hour notification must be given for the underground location of CDOT owned facilities. Phone 970.384.3354.

15. Any damage to highway facilities, such as traffic lights, streetlights, concrete walkways, bike paths, asphalt, signing, etc., shall be repaired and reported immediately and notification must be given to the CDOT Inspector or contact CSP Dispatch 970.824.6501 Craig & 970.249.4392 Montrose.

16. Should any excavation encounter plant or animal fossils, the remains of historic or prehistoric structures, historic or prehistoric artifacts (bottle dumps, charcoal from subsurface hearths, pottery, potsherds, stone tools, arrowheads, etc.), the operation shall cease at once and the permittee shall contact the CDOT Environmental Office 970.683.6251 for guidance.

17. Permittee assumes all responsibility for any and all land survey monuments within the permitted area of the right-of-way. If disturbed or destroyed, the permittee bears full cost for replacement. Construction may need to be re-routed to avoid disturbing High Accuracy Reference Network Survey Land Markers Direct any questions within five (5) days prior to construction to: Region Survey Coordinator at 970.683.6231.

18. If petroleum or other potentially hazardous material is encountered during excavation, work shall cease immediately and the permittee shall contact the CDOT Environmental Office 970.683.6251 for guidance. The proper disposal of any soils or other material determined to be hazardous and/or contaminated by fugitive petroleum uncovered or excavated during the performance of utility construction shall be the sole responsibility of the Utility and shall be accomplished in accordance with all applicable Federal, State and Local laws and regulations. Such clean up and disposal shall be at no cost to CDOT.

19. All construction vehicles, delivery vehicles and traffic control vehicles shall be equipped with flashing amber/yellow beacons, which are visible from all directions. Only construction vehicles involved in the construction are to be at the work site. It is important to limit the number of extraneous vehicles at each work site. Staging areas shall be pre-approved.

20. Staging and material storage areas, within the right of way must be pre-approved and beyond the clear zone. Employee parking within the right of way shall be restricted and shall not be allowed, except in pre-approved contractor staging areas and beyond the clear zone. The only vehicles allowed within the highway clear zone are the construction vehicles necessary for the operation. Parking along the shoulder of the highway is not allowed.

21. Minimum depth for this installation shall be 54 inches or 60 inches if within 15 feet of roadway or below local frost line, whichever is greater.

22. All utilities located at inlets or outlets of all major or minor structures and roadway drainage and irrigation ditches shall be encased or placed at a cover depth of forty-eight (48) inches or 60 inches if within 15 feet of roadway below the finished ditch grade.

23. All above ground structures, (poles, pedestals, anchors, guys, etc.) will be placed outside of, or within five (5) feet of the right of-way line.

24. Valve and manhole covers will be set ½ inch below finished grade.

25. All backfill is subject to AASHTO standard compaction T-99 or T-180 as appropriate. Compaction and materials testing may be required at the discretion of the Department of Transportation. Flow fill shall be used for all parallel installations within 6 feet of the asphalt.

26. The installed line shall be encased in pipe, which shall be steel at least ¼ inch wall thickness or comparable material. This encasement for the highway crossing shall be a minimum of forty-eight inches below ditch surface. Encasement may be required to go from right-of-way (ROW) line to right-of-line.

27. No bore pits allowed within **15'** of the roadway pavement or curb line.

28. All work shall stop and CDOT shall be notified immediately if any problems occur during the bore; including but not limited to, surfacing of frac material, over pressuring of frac mud, loss of bore heads, etc. CDOT shall determine the next course of action.

29. All county roads, asphalt driveways, bike path crossings required because of this construction shall be bored. Graveled driveway crossings may be bored rather than cut. Immediate access shall be provided in the event of an emergency on all open cut road/driveway crossings.

30. No open cut allowed inside the toe of fill slopes or barrow ditch line or within 15 feet of the paved shoulder or curb line, whichever is further from the centerline.

31. All pavement markings removed or damaged during the utility installation will be replaced.

32. No open pits or trenches are allowed within thirty (30) feet of any traveled lane at night, weekends or holidays, unless protected by type VII barriers, as required by MUTCD and Colorado Supplements.

33. Safety devices as per the AASHTO and the Colorado M & S Standards must protect all construction equipment that cannot be transported from the work area, and is within the "Clear Zone". Protective guardrail/barrier devices shall meet the requirements of the State of Colorado M Standards, section 606-12. Clear Zone requirements are found in AASHTO Road Side Design Guide, Section 3. Equipment that can be transported to a location that is not within the Clear Zone or otherwise protected by existing guardrail, shall be clearly delineated as per the MUTCD manual.

34. Areas of roadway and right-of-way disturbed during this installation will be restored to the original contour and condition by grading to drain, top soiled, fertilized, mulched and reseeded with approved material at specified proportions. Mulch, fertilizer and seed shall be "certified weed free". Refer to Section 212 & 213 of the "***Colorado Department of Transportation Standard Specifications for Road and Bridge Construction***".

35. Permittee shall develop and implement a two-year noxious weed control plan for areas within the Highway right-of-way disturbed by this installation/construction.

36. No equipment or materials will be allowed on the main lanes or the roadway during construction.

37. The utility shall be marked at the right-of-way line on both sides of the highway.

38. Highway right of way fences shall not be cut.

39. All work and materials to meet or exceed the most current issue of the ***Colorado Department of Transportation Standard Specifications for Road and Bridge Construction & Colorado Department of Transportation Standard Plans- M & S Standards***.

40. Unacceptable work shall be promptly removed and replaced in an acceptable manner.

41. If proposed utility is not placed in area applied for, the utility permit is void, and the utility is deemed illegal.

42. All procedures and work are subject to CDOT approval.

43. All work to be as per permit and submitted plans.

MISCELLANEOUS

44. The permittee hereby assumes, releases and agrees to indemnify, defend, protect and save the State of Colorado harmless from and against any loss of and/or damage to the property of the State of Colorado, third parties or the permittee's facilities including loss of services, loss and/or damage on account of injury to or death of any person, whosoever, arising at any time, caused by or growing out of the occupation of Colorado State Transportation rights-of-way the permittee's facilities or any part thereof, unless such loss and/or damage is the direct result of any willful and wanton act of the State of Colorado or its employees.

45. Permittee is prohibited from any illicit or non-storm water discharges that are prohibited by State Water Quality laws. Permittee agrees that it shall be responsible for obtaining all necessary environmental clearances and permits from all agencies (U.S. Army Corps of Engineers, Colorado Divisions of Wildlife, U.S. Forrest Service, U.S. Bureau of Land Management, Colorado Department of Health & Environment, county health department, etc.) before commencing any work under this permit. Without these clearances & permits, this permit shall be not in effect.

Permittee also agrees to assume all responsibility and liability in connection with potential environmental hazards encountered in connection with its work under this permit. The permittee must show all environmental permits and clearances to CDOT (Utility Inspector or Environmental Officer) on request and prior to construction.

46. In the event of extreme fire danger and/or fire bans in Colorado Counties, permittee shall develop a fire plan. Plan shall include fire protection/prevention equipment at the work site & the accountability of personnel.

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PERMIT FINAL INSPECTION

INSPECTION AND ACCEPTANCE

Final acceptance begins the two-year warranty period

I, Ken Mackey, have inspected the area regarding Permit 3150253-U for the Colorado Department of Transportation. I find the area to be in satisfactory condition.

CDOT INSPECTOR: _____ DATE: _____

PHONE: 970.270.4114 EMAIL: kenneth.mackey@state.co.us

PERMITTEE: Clifton Water Department / City of Grand Junction

PERMITTEE REPRESENTATIVE: _____

RETURN THIS PERMIT FINAL INSPECTION TO THE ADDRESS LISTED ABOVE

ACORD™ CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YY): 12/22/2014

PRODUCER LIC #N/A 1-303-757-5475
CIRSA
3665 Cherry Creek North Drive
Denver, CO 80209

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

INSURERS AFFORDING COVERAGE

INSURED
City of Grand Junction
250 North Fifth Street
Grand Junction, CO 81501-2668

INSURER A: CIRSA
INSURER B:
INSURER C:
INSURER D:
INSURER E:

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	LIMITS	
A	GENERAL LIABILITY	LIAB 01-2015	01/01/15	01/01/16	EACH OCCURRENCE	$ 5,000,000
	X COMMERCIAL GENERAL LIABILITY				FIRE DAMAGE (Any one fire)	$ 5,000,000
	X CLAIMS MADE ☐ OCCUR				MED EXP (Any one person)	$ 0
	X $10m POL E&O Aggregate				PERSONAL & ADV INJURY	$ 5,000,000
					GENERAL AGGREGATE	$
	GEN'L AGGREGATE LIMIT APPLIES PER:				PRODUCTS - COMP/OP AGG	$ 5,000,000
	☐ POLICY ☐ PRO-JECT ☐ LOC					
A	AUTOMOBILE LIABILITY	LIAB 01-2015	01/01/15	01/01/16	COMBINED SINGLE LIMIT (Ea accident)	$ 5,000,000
	X ANY AUTO				BODILY INJURY (Per person)	$
	ALL OWNED AUTOS				BODILY INJURY (Per accident)	$
	SCHEDULED AUTOS				PROPERTY DAMAGE (Per accident)	$
	HIRED AUTOS					
	NON-OWNED AUTOS					
	GARAGE LIABILITY				AUTO ONLY - EA ACCIDENT	$
	ANY AUTO				OTHER THAN AUTO ONLY: EA ACC	$
					AGG	$
	EXCESS LIABILITY				EACH OCCURRENCE	$
	☐ OCCUR ☐ CLAIMS MADE				AGGREGATE	$
						$
	☐ DEDUCTIBLE					$
	☐ RETENTION $					$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY				WC STATU-TORY LIMITS ☐ OTH-ER	
					E.L. EACH ACCIDENT	$
					E.L. DISEASE - EA EMPLOYEE	$
					E.L. DISEASE - POLICY LIMIT	$
	OTHER					$
						$
						$

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/EXCLUSIONS ADDED BY ENDORSEMENT/SPECIAL PROVISIONS
With respects to CDOT permit for City of Grand Junction to work on CDOT right-of-ways.

CERTIFICATE HOLDER | N | ADDITIONAL INSURED; INSURER LETTER:

Colorado Department of Transportation (CDOT)
Alan Clubb
222 South 6th Street
Grand Junction, CO 81501
USA

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL 30 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE Jill Rudbury

ACORD 25-S (7/97) AmandaR
42451685

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SPECIAL CONDITIONS

CITY OF GRAND JUNCTION
DEPARTMENT OF PUBLIC WORKS AND PLANNING
ENGINEERING DIVISION

CLETC Water Line
SPECIAL CONDITIONS

The performance of the Work for this Project shall conform to the General Contract conditions presented in the City of Grand Junction's *Standard Contract Documents for Capital Improvements Construction,* July 2010, except as specifically modified or supplemented herein or on the Construction Drawings.

SC-1 **Project Description:** The project generally consists of installation of approximately 6,700 lineal feet of 6" DR-18 C-900 PVC Water line, relocation and painting of a 100,000 gallon steel water tank, installation of two owner supplied Baker pitless booster pumps and appurtenances, installation of one owner supplied 50 Hp Barmesa Inline Centrifugal fire pump and appurtenances, installation of electrical service conduits and wire for two service locations (one at the booster pumps and one at the fire pump), completion of 150 foot directionally bored 10" diameter HDPE casing pipe, miscellaneous grading and site work. The tank is approximately 32 feet in diameter and 17 feet in height at the side, rising to 22 feet in height at the center.

SC-2 **Project Engineer:** The Project Engineer for the Project is Bret Guillory, who can be reached at (970) 244-1590. All notices, letters, submittals, and other communications directed to the City shall be addressed and mailed or delivered to:

City of Grand Junction
Department of Public Works and Planning
Attn: Bret Guillory, Utility Engineer
250 North Fifth Street
Grand Junction, CO 81501

SC-3 **Pre-Bid Meeting:**
There will be a pre-bid meeting for this project. The pre-bid meeting is mandatory. A pre-bid meeting will be held at 10:00 a.m. on Monday August 10, 2015, in the City Hall Auditorium located at 250 North 5th Street. The Pre-Bid Meeting will include a site visit.

SC-4 **Pre-Qualification Requirement for Bidders:** Contractors submitting bids over $50,000 must be prequalified in accordance with the City's "Rules and Procedures for Prequalification of Contractors." Application forms for prequalification are available at the Administration Office of the Department of Public Works and Utilities (970-244-1575) or on the Public Works & Planning/Engineering page at www.gjcity.org. Prequalification applications must be submitted by Tuesday June 23, 2015. Bids received from non-prequalified contractors will not be opened.

In addition to the requirements detailed in the City's "Rules and Procedures for Prequalification of Contractors," in order to be pre-qualified and approved the Contractor shall demonstrate that they have successfully completed a minimum of five projects in the past five years that are of similar magnitude to this project and involved the application of specified products to the surfaces of steel water tanks. The Contractor shall substantiate this requirement by furnishing a list of references.

SC-5 **Affirmative Action:** The Contractor is not required to submit a written Affirmative Action Program for the Project.

SC-6 **Time of Completion:** The scheduled time of Completion for the Project is (November 9, 2015) **56 Calendar Days** from the starting date specified in the Notice to Proceed. Completion is achieved when site clean-up and all punch list items (resulting from the final inspection) have been completed. Final Completion and Substantial Completion shall have the meaning set forth in Article I, Section 3 (Definitions and Terms) of the General Contract Conditions.

The anticipated schedule for the Project is as follows:

Advertise for Bids:	Sunday, July 30, August 2 & 9
Pre-Bid Meeting:	Monday, August 10, 2015
Bid Opening:	Tuesday, August 18, 2015
City Council approval:	Wednesday, September 2, 2015
Notice of Award:	Thursday, September 3, 2015
Contractor delivers Contract, Bond and Insurance Cert.	Thursday, September 10, 2015
Preconstruction meeting:	Thursday, September 10, 2015
Begin work:	Monday, September 14, 2015
Final Completion:	Monday, November 9, 2015

- City observed holidays during construction period:
  Labor Day — Monday September 7, 2015

SC-7 **Liquidated Damages:**

If the Contractor does not achieve Final Completion (entire project) or Substantial Completion (of the crossing of Highway 6) by the required dates, whether by neglect, refusal or any other reason, the parties agree and stipulate that the Contractor shall pay liquidated damages to the City for each such day that final completion or substantial completion is late. As provided elsewhere, this provision does not apply for delays caused by the City. The date for Final Completion or Substantial Completion may be extended in writing by the Owner.

The Contractor agrees that as a part of the consideration for the City's awarding of this Contract liquidated damages in the daily amount of **$500.00** is reasonable and necessary to pay for the actual damages resulting from such delay. The parties agree that the real costs and injury to the City for such delay include hard to quantify items such as: additional engineering, inspection and oversight by the City and its agents; additional contract administration; inability to apply the efforts of those employees to the other work

of the City; perceived inefficiency of the City; citizens having to deal with the construction and the Work, rather than having the benefit of a completed Work, on time; inconvenience to the public; loss of reputation and community standing for the City during times when such things are very important and very difficult to maintain.

The Contractor must complete the Work and achieve final completion included under the Bid Schedule in the number of consecutive calendar days after the City gives its written Notice to Proceed. When the Contractor considers the entire Work ready for its intended use, Contractor shall certify in writing that the Work is substantially complete. In addition to the Work being substantially complete, Final Completion date is the date by which the Contractor shall have fully completed all clean-up, and all items that were identified by the City in the inspection for final completion. Unless otherwise stated in the Special Conditions, for purposes of this liquidated damages clause, the Work shall not be finished and the Contract time shall continue to accrue until the City gives its written Final Acceptance.

If the Contractor shall fail to pay said liquidated damages promptly upon demand thereof after having failed to achieve Final Completion on time, the City shall first look to any retainage or other funds from which to pay said liquidated damages; if retainage or other liquid funds are not available to pay said liquidated damages amounts, the Surety on the Contractor's Performance Bond and Payment Bond shall pay such liquidated damages. In addition, the City may withhold all, or any part of, such liquidated damages from any payment otherwise due the Contractor.

Liquidated damages as provided do not include any sums to reimburse the City for extra costs which the City may become obligated to pay on other contracts which were delayed or extended because of the Contractor's failure to complete the Work within the Contract Time. Should the City incur additional costs because of delays or extensions to other contracts resulting from the Contractor's failure of timely performance, the Contractor agrees to pay these costs that the City incurs because of the Contractor's delay, and these payments are separate from and in addition to any liquidated damages.

The Contractor agrees that the City may use its own forces or hire other parties to obtain Substantial or Final Completion of the work if the time of completion has elapsed and the Contractor is not diligently pursuing completion. In addition to the Liquidated Damages provided for, the Contractor agrees to reimburse the City for all expenses thus incurred.

SC-8 **Working Days and Hours:** The working days and hours shall be as stated in the General Contract Conditions, Section VI, or as mutually agreed upon in the preconstruction meeting.

SC-9 **Permits:** The following permits are required for the Project and will be obtained by the City at no cost to the Contractor:

CDOT Construction Permit

The following permits are required for the Project and shall be obtained and paid for by the Contractor, with the costs included in the total bid price for the Project:

State Storm Water Permit

SC-10 **Insurance Limits:** The minimum insurance limits for the Project are as stated in the General Contract Conditions, Section IV. The City of Grand Junction shall be listed as additionally insured on the insurance policy.

SC-11 **City Furnished Materials:** The City will furnish the following materials for the Project:

Tank Booster Station Equipment
Fire Flow Pump Equipment
Communication Equipment for Tank Level Control
Water Storage Tanks (2)

SC-12 **Authorized Representatives of the City:** Those authorized to represent the City shall include engineers and inspectors employed or contracted by the City, only.

SC-13 **Uranium Mill Tailings:** It is anticipated that radioactive mill tailings will not be encountered on this project.

SC-14 **Fugitive Petroleum or Other Contamination:** It is anticipated that soil contamination from fugitive petroleum or other contaminants will not be encountered with the Project.

SC-15 **Schedule of Submittals:** As a minimum, the Contractor shall submit the following information for review by the Engineer prior to the start of construction.

1. Initial Project Schedule. Schedule shall be updated as necessary to reflect actual conditions.
2. Product and material descriptive literature for each material or product used on the project, including certification of conformance with referenced specifications. Submittal shall be made prior to material delivery.

SC-16 **Staging Area:** Area is available on site adjacent to the tanks. Any materials, equipment or construction vehicles stored or used on site shall be placed in locations that do not interfere with normal traffic or plant operations.

SC-17 **Coordination of Work:** The booster pump station, will have cathodic protection systems installed in conjunction with this construction project. The City's contractor in charge of cathodic protection services, Anode Systems, will perform the installation of the cathodic protection systems. The Contractor shall coordinate their work with Anode Systems and give a minimum of two weeks' notice prior to the start of work in the area of the booster pumps, to allow time for the systems to be installed. The contact information for Anode Systems is:

Anode Systems, 124 N. 22nd Court, Grand Junction, CO 81501
(970) 243-4149; Anodesystems.com, Hans Schmoldt, Manager,
hans@anodesystems.com

Munro Supply will be providing the Baker booster pumps and the Fire Pump Equipment that will be pre-purchased by the City and installed by the Contractor. The contact at Munro Supply for coordination of delivery of this equipment is:

Justin McDaniel
Munro Supply
Cell 970-260-3758
Office 970-263-2206

Mountain Peak Controls, Inc. will be providing the tank level controls and communication equipment that will be pre-purchased by the City and installed by Mountain Peak Controls. The contact at Mountain Peak Controls for coordination of installation of this equipment is:

Brian Mitchem
Mountain Peak Controls, Inc.
303-885-5967 (cell)

SC-18 **Warranty Period** The warranty period for this project shall be extended to eighteen (18) months in accordance with Section XI. Warranty and Guarantee 76. IV., of the Standard Contract Documents.

SPECIAL PROVISIONS

CITY OF GRAND JUNCTION
DEPARTMENT OF PUBLIC WORKS AND PLANNING
ENGINEERING DIVISION

CLETC Water Line
SPECIAL PROVISIONS

The performance of the Work for this Project shall conform to the General Contract conditions presented in the City of Grand Junction's *Standard Contract Documents for Capital Improvements Construction,* July 2010, except as specifically modified or supplemented herein or on the Construction Drawings.

SPECIAL PROVISIONS

GENERAL:

The descriptions of the pay items listed in the Bid Schedule for this Project may not agree with those listed in the Standard Specifications. Payment for all Work performed, as required in the Contract Documents, will be in accordance with the items and units listed in the Bid Schedule.

STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION:

The ***City of Grand Junction Standard Specifications for Road and Bridge Construction*** are hereby modified or supplemented for this Project by the following modifications to ***The Standard Specifications for Road and Bridge Construction***, State Department of Highways, Division of Highways, State of Colorado:

SP-1 SECTION 601 – STRUCTURAL CONCRETE

Section 601 of the Standard Specifications is hereby revised for this project as follows:

This CDOT Specification has been added to this Project:

The Contractor shall furnish a batch ticket (delivery ticket) with each load for all concrete. Concrete delivered without a batch ticket containing complete information as specified shall be rejected. The Contractor shall collect and complete the batch ticket at the placement site and deliver all batch tickets to the Engineer or his representative at the end of each day. The Engineer or his representative shall have access to the batch tickets at any time during the placement. The following information shall be provided on each ticket:

1. Suppliers name and date
2. Truck number
3. Project name and location
4. Concrete class and designation number
5. Cubic yards batched

6. Type brand and amount of each admixture
7. Type, brand, and amount of cement and fly ash
8. Weights of fine and course aggregates
9. Moisture of fine and course aggregates
10. Gallons of batch water

The contractor shall add the following information to the batch ticket at time of placement:

1. Gallons of water added by the truck operator.
2. Number of revolutions of the drum for mixing
3. Discharge time

SP-2 SECTION 608 – CURBS, GUTTERS, SIDEWALKS, AND BIKEWAYS

Section 608 of the Standard Specifications is hereby revised for this project as follows:

Subsections 608.06, Basis of Payment shall include the following:

> The Contract Unit Price for the various concrete items shall be full compensation for all equipment, labor, materials, and incidentals required for the complete installation. Incidental items include clearing; excavating to subgrade, subgrade compaction, cutting and removal of asphalt in areas where concrete will be installed; removal of existing concrete, disposal of excavated and removed materials; furnishing, placement and compaction of Aggregate Base Course; forming, furnishing and placement, finishing, curing and protection of the concrete; reinforcing steel and joint filler.

STANDARD SPECIFICATIONS FOR CONSTRUCTION OF WATER LINES, SANITARY SEWERS, STORM DRAINS, UNDERDRAINS AND IRRIGATION SYSTEMS

The City of Grand Junction ***Standard Specifications for Construction of Water Lines, Sanitary Sewers, Storm Drains, Underdrains and Irrigation Systems*** are hereby modified for this Project as follows:

SP-3 SECTION 102 – MATERIALS

Section 102 of the Standard Specifications is hereby revised for this project as follows:

Subsection 102.7b, PVC Water Distribution Pipe, shall include the following material specification:

PART 1 – GENERAL

1.01 DESCRIPTION

A. SCOPE

1. This material specification covers requirements of fusible polyvinylchloride (PVC) pipe, including Fusible C-900.

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

Pipe Description	Nominal Diameter (in.)	DR	Color	Pressure Class (psi)	Required Inner Diameter (in.)
AWWA C-900 Fusible PVC	**6"**	**18**	**Blue**	**235**	**6.09"**

1.02 QUALITY ASSURANCE

A. REFERENCES

1. References indicated shall mean the latest revision or issuance, unless specifically indicated in the table below:

Reference	Title
AWWA C900-97	Standard for Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4 in. through 12 in. (100mm through 300mm), for Water Distribution
AWWA C905-97	Standard for Polyvinyl Chloride (PVC Pressure Pipe and Fabricated Fittings, 14 in. through 48 in. (350mm-1200mm), for Water Distribution
AWWA M23	AWWA Manual of Supply Practices PVC Pipe—Design and Installation, Second Edition
ASTM D1784	Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D1785	Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120

Reference	Title
ASTM D2152	Test Method for Degree of Fusion of Extruded Poly(Vinyl Chloride) (PVC) Pipe and Molded Fittings by Acetone Immersion
ASTM D2241	Poly (Vinyl Chloride) (PVC) Plastic Pipe (SDR-PR)
ASTM D3034	Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM F679	Standard Specification for Poly(Vinyl Chloride) (PVC) Large Diameter Plastic Gravity Sewer Pipe and Fittings
NSF-14	Plastics Piping System Components and Related Materials
NSF-61	Drinking Water System Components--Health Effects
PPI TR-2	PVC Range Composition Listing of Qualified Ingredients

B. MANUFACTURER REQUIREMENTS

1. Fusible polyvinylchloride pipe shall be tested at the extrusion facility for properties required to meet all applicable parameters as outlined in either AWWA C900, AWWA C905, applicable sections of ASTM D2241, ASTM D3034, or ASTM F679 . Testing priority shall be in conformance with AWWA C900 and AWWA C905, except for pipe made to the ASTM D3034 or ASTM F679 standards, which shall be tested to those standards. All piping shall be made from a PVC compound conforming to cell classification 12454 per ASTM D1784.

C. FUSION TECHNICIAN REQUIREMENTS

PART 1 Fusion Technician shall be fully qualified by the pipe supplier to install fusible polyvinylchloride pipe of the type(s) and size(s) being used. Qualification shall be current as of the actual date of fusion performance on the project.

D. SPECIFIED PIPE SUPPLIERS

1. Fusible polyvinylchloride pipe shall be used as manufactured under the trade names Fusible C-900®, for Underground Solutions, Inc., Poway, CA, (858) 679-9551. Fusion process shall be as patented by Underground Solutions, Inc., Poway, CA, Patent No. 6,982,051.

E. WARRANTY

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

F. PRE-CONSTRUCTION SUBMITTALS

1. The following PRODUCT DATA is required from the pipe supplier and/or fusion provider:
    1. Pipe Size
    2. Dimensionality
    3. Pressure Class per applicable standard
    4. Color
    5. Recommended Minimum Bending Radius
    6. Recommended Maximum Safe Pull Force
    7. Pipe and fusion services warranty information
    8. Fusion technician qualification indicating conformance with this specification.

G. POST-CONSTRUCTION SUBMITTALS

1. The following AS-RECORDED DATA is required from the contractor and/or fusion provider to the Owner or pipe supplier upon request:
    - Fusion report for each fusion joint performed on the project, including joints that were rejected. Specific requirements of the Fusion Technician's joint report shall include:
        a. Pipe Size and Thickness
        b. Machine Size
        c. Fusion Technician Identification
        d. Job Identification
        e. Fusion Joint Number
        f. Fusion, Heating, Drag Pressure Settings
        g. Heat Plate Temperature
        h. Time Stamp
        i. Heating and Cool Down Time of Fusion
        j. Ambient Temperature

PART 2 – PRODUCTS

2.01 FUSIBLE PVC PIPE FOR POTABLE WATER

A. Fusible polyvinylchloride pipe shall conform to AWWA C900 or AWWA C905, and/or ASTM D2241 or ASTM D1785 for IPS standard dimensions if applicable. Testing shall be in accordance with AWWA standards for all pipe types.

B. Rework material shall be allowed per AWWA C900 and AWWA C905 standards.

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

D. Fusible polyvinylchloride pipe shall be manufactured in a standard 20', 30' or 40' nominal length.

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

F. Pipe generally shall be marked per AWWA C900 or AWWA C905, and shall include as a minimum:

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

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

2.02 FUSION JOINTS

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

PART 3 – EXECUTION

3.01 DELIVERY AND OFF-LOADING

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

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

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

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

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

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

3.02 HANDLING AND STORAGE

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

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

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

D. Pipe shall be handled and supported with the use of woven fiber pipe slings or approved equal. Care shall be exercised when handling the pipe to not cut, gouge, scratch or otherwise abrade the piping in any way.

E. If pipe is to be stored for periods of 1 year or longer, the pipe should be shaded or otherwise shielded from direct sunlight. Covering of the pipe which allows for temperature build-up is strictly prohibited. Pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required preventing excess heat accumulation.

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

3.03 FUSION PROCESS

A. GENERAL

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

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

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

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

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

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

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

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

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

   a. Pipe rollers shall be used for support of pipe to either side of the machine.

   b. A weather protection canopy that allows full machine motion of the

heat plate, fusion assembly and carriage shall be provided for fusion in inclement and /or windy weather.

c. Fusion machine operations and maintenance manual shall be kept with the fusion machine at all times.

d. Facing blades specifically designed for cutting fusible polyvinylchloride pipe shall be used.

e. An infrared (IR) pyrometer for checking pipe and heat plate temperatures.

B. JOINT RECORDING

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

3.04 GENERAL INSTALLATION

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

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

C. Where fusible PVC pipe is installed by pulling tension, the recommended Safe Pulling Force, according to the pipe supplier, will not be exceeded.

D. The Contractor shall use the Grand Avenue and Ouray Avenue roadway alignment for pipe fusion and laying the pipe on the ground prior to Horizontal Directional Drilling. Traffic control will have to take into account the length of fused pipe laying on top of the roadway and accommodate the lane closures accordingly.

-END OF SECTION-

SP-4 SECTION 104 – INSTALLATION OF PIPE AND APPURTENANCES

Section 104 of the Standard Specifications is hereby revised for this project as follows:

Include the following specification into Subsection 104.3j, Installation of Pressure Pipe using Horizontal Directional Drilling:

PART 1 –GENERAL

1.01 DRILLING SYSTEM EQUIPMENT

A. GENERAL

1. The directional drilling equipment, as a minimum, shall consist of a directional drilling rig of sufficient capacity to perform the bore(s) and pull-back of the pipe(s), a drilling fluid mixing & delivery system of sufficient capacity to successfully complete the crossing, a guidance system to accurately guide boring operations, and trained and competent personnel to operate the system. All equipment shall be in good, safe operating condition with sufficient supplies, materials and spare parts on hand to maintain the system in good working order for the duration of this project. All required equipment shall be included in the emergency and contingency plan as submitted per these specifications.

B. DRILLING RIG

1. The directional drilling machine shall consist of a hydraulically powered system to rotate, push and pull drill pipe while delivering a pressurized fluid mixture to a drill head. The machine shall be anchored to withstand the pulling, pushing and rotating forces required to complete the project.
2. The drilling rig hydraulic system shall be of sufficient pressure and volume to power drilling operations. The hydraulic system shall be free from leaks.
3. The drilling rig shall have a system to monitor pull-back hydraulic pressure during pull-back operations.

C. DRILL HEAD

1. The horizontal directional drilling equipment shall produce a stable fluid lined tunnel with the use of a steer-able drill head and any subsequent pre-reaming heads.
2. The system must be able to control the depth and direction of the drilling operation.
3. Drill head shall contain all necessary cutters and fluid jets for the operation, and shall be of the appropriate design for the ground medium being drilled.

D. DRILLING FLUID SYSTEM

1. DRILLING FLUID (DRILLING MUD)

a. Drilling fluid shall be composed of clean water and the appropriate additive(s) for the fluid to be used. Water shall be from a clean source and shall meet the mixing requirements of the mixture manufacturer(s).

b. The water and additives shall be mixed thoroughly to assure the absence of any clumps or clods. No hazardous additives may be used.

c. Drilling fluid shall be maintained at a viscosity sufficient to suspend cuttings and maintain the integrity of bore wall(s).

d. Drilling fluid shall be disposed of off-site in accordance with local, state and federal requirements and/or permit conditions.

e. No additional chemicals or polymer surfactants shall be allowed to be added to the drilling fluid unless they have been submitted per this specification.

2. MIXING SYSTEM

a. A drilling fluid mixing system shall be of sufficient size to mix and deliver drilling fluid for the project.

b. The mixing system shall be able to ensure thorough mixing of the drilling fluid. The drilling fluid reservoir tank shall be sized for adequate storage of the fluid.

c. The mixing system shall continually agitate the drilling fluid during drilling operations.

3. DRILLING FLUID DELIVERY AND RECOVERY SYSTEM

a. The drilling fluid pumping system shall have a minimum capacity to supply drilling fluid in accordance with the drilling equipment pull-back rating at a constant required pressure.

b. The delivery system shall have filters or other appropriate in-line equipment to prevent solids from being pumped into the drill pipe.

c. Used drilling fluid and drilling fluid spilled during drilling operations shall be contained and properly disposed of. The use of spill containment measures shall be maintained around drill rigs, drilling fluid mixing system, entry and exit pits and drilling fluid recycling system (if used) to prevent spills into the surrounding environment. Pumps, vacuum truck(s), and/or storage of sufficient size shall be in place to contain excess drilling fluid.

d. A closed-loop drilling fluid system and a drilling fluid cleaning system should be used to whatever extent practical, depending upon project size and conditions. Under no circumstances shall

drilling fluid that has escaped containment be reused in the drilling system.

E. DRILLING CONTROL SYSTEM

1. Calibration of the electronic detection and control system shall be verified prior to the start of the bore.

2. The drilling head shall be remotely steer-able by means of an electronic or magnetic detection system. The drilling head location shall be monitored in three dimensions:

   a. Offset from the baseline,

   b. Distance along the baseline, and

   c. Depth of cover.

3. Point of rotation of the head shall also be monitored.

4. For gravity application and on-grade drilling, sonde/beacon or approved equipment applicable for grade increments of $1/10^{th}$ of one percent shall be used.

1.02 PIPE PULL HEADS

A Pipe pull heads shall be utilized that employ a positive through-bolt design assuring a smooth wall against the pipe cross-section at all times.

B Pipe pull heads shall be specifically designed for use with fusible polyvinylchloride pipe, and shall be as recommended by the pipe supplier.

1.03 PIPE ROLLERS

A Pipe rollers, if required, shall be of sufficient size to fully support the weight of the pipe during handling and pullback operations.

B A sufficient quantity of rollers and spacing, per the pipe supplier's guidelines shall be used to assure adequate support and excessive sagging of the product pipe.

PART 2 – EXECUTION

2.01 DRILLING OPERATIONS

A GENERAL

1. Bore path and alignment are as indicated in the contract documents. The path of the bore may be modified based on field and equipment conditions. Entry and exit locations and control-point elevations shall be maintained as indicated in the contract documents.

2. Bend radii shown in the contract documents are minimum allowable radii and shall not be reduced.

B LOCATION AND PROTECTION OF UNDERGROUND UTILITIES

1. Correct location of all underground utilities that may impact the HDD

installation is the responsibility of the Contractor, regardless of any locations shown on the drawings or previous surveys completed.

2. Utility location and notification services shall be contacted by the Contractor prior to the start of construction.

3. All existing lines and underground utilities shall be positively identified, including exposing those facilities that are located within an envelope of possible impact of HDD installation as determined for the project specific site conditions. It is the Contractor and HDD system operator's responsibility to determine this envelope of safe offset from existing utilities. This will include, but is not limited to, soil conditions and layering, utility proximity and material, HDD system and equipment, and foreign subsurface material.

C SITE LOCATION PREPARATION

1. Work site as indicated on drawings shall be graded or filled to provide a level working area. No alterations beyond what is required for operations are to be made

2. Contractor shall confine all activities to designated work areas.

D DRILLING LAYOUT AND TOLERANCES

1. The drill path shall be accurately surveyed with entry and exit areas placed in the appropriate locations within the areas indicated on drawings. If using a magnetic guidance system, drill path will be surveyed for any surface geomagnetic variations or anomalies.

2. Instrumentation shall be provided and maintained at all times that accurately locates the pilot hole, measures drill-string axial and torsional loads and measures drilling fluid discharge rate and pressure.

3. Entry and exit areas shall be drilled so as not to exceed the bending limitations of the pipe as recommended by the pipe supplier.

E PILOT HOLE BORE

1. Pilot hole shall be drilled along bore path. In the event that the pilot bore does deviate from the bore path, it may require contractor to pull-back and re-drill from the location along bore path before the deviation.

2. The Contractor shall limit curvature in any direction to reduce force on the pipe during pull-back. The minimum radius of curvature shall be no less than that specified by the pipe supplier and as indicated on the drawings.

F REAMING

1. After successfully completing the pilot hole, the bore hole shall be reamed to a diameter which meets the requirements of the pipe being installed. The following table is offered as an estimated guide:

Nominal Pipe Diameter	Bore Hole Diameter
< 8 inches	Pipe Dia. + 4 inches
8 inches to 24 inches	Pipe Dia. X 1.5
> 24 inches	Pipe Dia. + 12 inches

2. Multiple reaming passes shall be used at the discretion of the Contractor and shall conform to this specification.

3. In the event of a drilling fluid fracture, returns loss or other loss of drilling fluid, the Contractor shall be responsible for restoring any damaged property to original condition and cleaning up the area in the vicinity of the damage or loss.

2.02 PIPE PULL-BACK INSERTION

A Pipe shall be fused prior to insertion, if the site and conditions allow, into one continuous length.

B Contractor shall handle the pipe in a manner that will not over-stress the pipe prior to insertion. Vertical and horizontal curves shall be limited so that the pipe does not bend past the pipe supplier's minimum allowable bend radius, buckle, or otherwise become damaged. Damaged portions of the pipe shall be removed and replaced.

C The pipe entry area shall be graded as needed to provide support for the pipe and to allow free movement into the bore hole.

1. The pipe shall be guided into the bore hole to avoid deformation of, or damage to, the pipe.

2. The fusible polyvinylchloride pipe may be continuously or partially supported on rollers or other Owner and Engineer approved friction decreasing implement during joining and insertion, as long as the pipe is not over-stressed or critically abraded prior to, or during installation.

3. A swivel shall be used between the reaming head and the fusible polyvinylchloride pipe to minimize torsion stress on the pipe assembly.

D Buoyancy modification shall be at the sole discretion of the Contractor, and shall not exceed the pipe supplier's guidelines in regards to maximum pull force or minimum bend radius of the pipe. Damage caused by buoyancy modifications shall be the responsibility of the Contractor.

E Once pull-back operations have commenced, the operation shall continue without interruption until the pipe is completely pulled through the bore hole.

F The pipe shall be installed in a manner that does not cause upheaval, settlement, cracking, or movement and distortion of surface features. Any damages caused by the Contractor's operations shall be corrected by the Contractor.

2.03 INSTALLATION CLEAN-UP

A Following the installation, the project site shall be returned to a condition equal to or better than the pre-construction condition of the site. All excavations will be backfilled and compacted per the construction documents and City of Grand Junction standards. All pavement and hardscape shall be repaired per applicable jurisdictional standards, excess materials shall be removed from the site, and disturbed areas shall be re-landscaped. All drilling fluid shall be properly disposed of per these specifications and all applicable jurisdictional laws.

B Contractor shall verify that all utilities, structures, and surface features in the project area are sound.

2.04 TESTING

A PARTIAL TESTING

1. Segments of the pipe may be tested separately in accordance with standard testing procedure, as approved by the owner and engineer. Testing of each HDD installation prior to connection to the system or other piping is preferred.

-END OF SECTION-

SP-5 INSTALLATION OF TANK BOOSTER PUMP AND APPURTENANCES

Method of Measurement:
The Tank Booster Pump Assembly shall include all materials and installation to provide a complete pump assembly as shown on the project plan set, and as required to meet all current electrical code. This will include all items from, and including, the 4" x 6" reducer to 4" x 6" reducer, as shown on the project plan set. Mega Lug joint restraint shall be used on all fittings within the assembly that are not flanged. This work shall include all electrical work as needed to meet current code, as shown on the plan set, and as needed per Grand Valley Power agreement included in Appendix F.

Method of Payment:
This item will be paid as a lump sum for the Booster Pump Assembly.

SP-6 INSTALLATION OF FIRE PUMP AND APPURTENANCES

Method of Measurement:
The Fire Pump Assembly shall include all materials and installation to provide a complete pump assembly as shown on the project plan set, and as required to meet all current electrical code. This will include all items from the 8" gate valve to 8" gate valve, as shown on the project plan set. Mega Lug joint restraint shall be used on all fittings within the assembly that are not flanged.

Method of Payment:
This item will be paid as a lump sum for the Fire Pump Assembly.

SP-7 INSTALLATION OF PIPE LINE AND APPURTENANCES

Method of Measurement:
The 6" and 8" C-900 DR-18 PVC water lines will be measured by the lineal foot, and will include all joint restraint appurtenances and installation per City of Grand Junction specification. Mega Lug restraints shall be utilized on all fittings, and on all bell and spigot joints within 30 feet of any fitting.

Fusible C-900 PVC may be used in lieu of standard bell and spigot pipe.

Method of Payment:
This item will be paid by the lineal foot.

SP-8 INSTALLATION OF CASING AND CARRIER PIPE LINE AND APPURTENANCES

Method of Measurement:
The 12" DR-11 HDPE Casing Pipe and 6" C-900 DR-18 PVC carrier pipe shall be measured by the lineal foot together, as shown on the plan set, and will not be measured separately. This will in include all appurtenances and installation per City of Grand Junction specification and/or project specification. Either Certa-Loc DR-17 or fusible C-900 DR-18 pipe may be utilized as carrier pipe for this installation. Casing end seals will be included in the per foot cost of this pay item.

Method of Payment:
This item will be paid by the lineal foot.

SP-9 INSTALLATION OF 20,000 GALLON WATER TANKS AND APPURTENANCES

Method of Measurement:
The installation of the two 20,000 gallon water tanks shall be measured by the lump sum to install both tanks and will not be measured separately. Measurement shall include all excavation, appurtenances, back fill and bedding materials required for installation per City of Grand Junction specification and/or project specification included in Appendix A

Method of Payment:
This item will be paid by the lump sum.

Bid Schedule: CLETC Water Line

Company Name:_____

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
1	103/104	Booster Pump Assembly	1.	LS	$_____	$_____
2	103/104	Fire Pump Assembly and Sump	1.	LS	$_____	$_____
3	103/104	Meter Vault Assembly	1.	LS	$_____	$_____
4	102.8	Fire Hydrant assembly (includes 8"x6" rducer)	1.	Ea	$_____	$_____
5	108.2	6" DR-18 C-900 Water Line	7,060.	LF	$_____	$_____
6	108.2	8" DR-18 C-900 Water Line	100.	LF	$_____	$_____
7	108.2	32 Road Bore, Casing (12" HDPE DR-11 Casing) and Carrier (DR-18 C-900) Pipe, and casing end seals	150.	LF	$_____	$_____
8		20,000 Gallon Water Tank(s) includes bedding and back fill (no anchoring needed)	1.	LS	$_____	$_____
9	108.3	6" Gate Valve	5.	Ea	$_____	$_____
10	108.3	6" 11 1/4 degree bend	2.	Ea	$_____	$_____
11	108.3	6" 22 1/2 degree bend	2.	Ea	$_____	$_____
12	108.3	6" 45 degree bend	8.	Ea	$_____	$_____
13	108.3	6" 90 degree bend	2.	Ea	$_____	$_____
14	108.3	6" tee	4.	Ea	$_____	$_____
15	108.3	6" Solid sleeve	1.	Ea	$_____	$_____
16	108.3	8" 45 degree bend	5.	Ea	$_____	$_____
17	108.3	8" 90 degree bend	1.	Ea	$_____	$_____
18	108.3	8" tee	3.	Ea	$_____	$_____
19	100	6" Ultra Sphere Twin Expansion Joint with Cover	4.	Ea	$_____	$_____
20	100	8" Ultra Sphere Twin Expansion Joint with Cover	2.	Ea	$_____	$_____
21	108.3	8" gate valve	2.	Ea	$_____	$_____
22	108.3	8" x 6" tee	1.	Ea	$_____	$_____
23	103/104	2" Combination Air vac / relief assembly (A.R.I. D-040) and vault	1.	LS	$_____	$_____

Bid Schedule: CLETC Water Line

Company Name:_____

Item No.	CDOT, City Ref.	Description	Quantity	Units	Unit Price	Total Price
24	625	Survey	1.	LS	$_____	$_____
25		Sanitary Facility	1.	LS	$_____	$_____
26	630	Traffic Control	1.	LS	$_____	$_____
27	208	Storm Water Management	1.	LS	$_____	$_____
28		Drain Outlet Structure (includes 20' length CI-52 DIP, rip rap/bedding & fabric, flap gate, headwall)	2.	Ea	$_____	$_____
29		Six (6) foot tall commercial grade chain link fence with Four (4) foot wide Lockable man gate. All materials to be hot dip galvanized.	62.	LF	$_____	$_____
MCR		Minor Contract Revisions	1.	LS		$ 10,000.00
					Bid Amount:	**$**_____

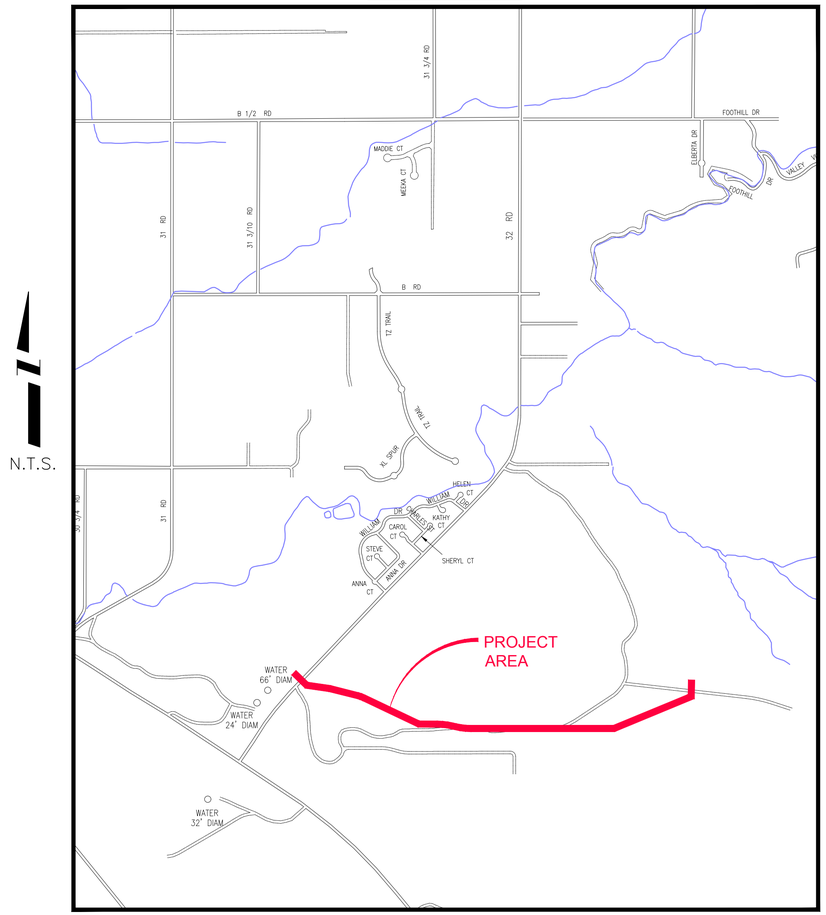
Bid Amount:

_____ **dollars**

PROJECT NO. XXXX-FXXXX

WHITEWATER HILL TRAINING FACILITY JULY, 2015

VICINITY MAP



UTILITIES AND AGENCIES

AGENCY	NAME	POSITION	ROLE	MAILING ADDRESS	STREET ADDRESS	CITY, STATE	VOICE–WK	FAX
GRAND JUNCTION, CITY OF	BRET GUILLORY	UTILITY ENGINEER	PROJECT ENGINEER	250 N. 5th STREET	250 N. 5th STREET	GRAND JCT., CO 81501	(970) 244–1590	(970) 256–4022
GRAND JUNCTION TRAP CLUB	LARRY BEUPREZ	BOARD MEMBER					(970) 380–9001	
GRAND JUNCTION MODELIERS	LEE SIMCOX	————	————	————	————	————	(970) 216–8073	
	HEATHER SIMCOX	————	————	————	————	————	(970) 216–0818	
GRAND JUNCTION DRAG STRIP	TAMMY BAILEY	MANAGER	————	————	————	GRAND JCT., CO	(970) 640–3987	n/a
GRAND VALLEY POWER	PERRY RUPP	FIELD ENGINEER	ELECTRIC	PO BOX 190	845 22 ROAD	GRAND JCT., CO 81502	(970) 242–0400	(970) 242–0612
CLIFTON SANITATION DISTRICT	BRIAN WOODS	MANAGER	SANITARY SEWER	3217 D ROAD	3217 D ROAD	CLIFTON, CO 81520	(970) 434–7422	
U.S. WEST/QWEST	CHRIS JOHNSON	ENGINEER	TELEPHONE	2524 BLICHMANN AVE	2524 BLICHMANN AVE	GRAND JCT., CO 81504	(970) 244–4311	(970) 240–4349
CLIFTON WATER	DAVE REINERTSON	SYSTEM SUPERVISOR	WATER	510 34 ROAD	510 34 ROAD	CLIFTON, CO 81520	(970) 434–7328	
MESA COUNTY	GREG LINZA	PARKS & LANDSCAPE MANAGER	MANAGER	200 S SPRUCE ST	200 S SPRUCE ST	GRAND JCT., CO 81502	(970) 244–3232	(970) 244–3240

COORDINATE SYSTEM:
The coordinate system used for this Project is the Mesa County LCS (Local Coordinate System) zone "GVALCS" being a Transverse Mercator Coordinate Projection where as the Point of Origin (N50,000/E100,000) and Central Meridian being the SIMS point SN01 and GLO6 (Initial Point – Ute Meridian). The Geodetic Coordinates of said SIMS point SN01 being Lat. 39°06'22.72746 N and Long. -108°32'01.43552" W. Basis of Bearings is True Geodetic North at the Central Meridian.

CITY OF Grand Junction COLORADO

Public Works & Utilities
Engineering Division

NOTE: NOTIFY AFFECTED UTILITY VENDOR 48 HOURS PRIOR TO EXCAVATIONS THAT WILL EXPOSE UTILITY LINES. THE COVER SHEET WILL HAVE A LISTING OF UTILITY VENDORS AND TELEPHONE NUMBERS.

	DESCRIPTION	DATE
REVISION 1	RIM/INVERT ELEVATIONS, AND MATERIAL CHANGES	08-12-2015
REVISION 2		
REVISION 3		
REVISION 4		

DRAWING STATUS:
- ○ PROGRESS
- ● FINAL CONSTRUCTION DRAWINGS
- ○ ASBUILT

DESIGNED BY:
BRET GUILLORY, PROJECT ENGINEER DATE

REVIEWED BY:
BRET GUILLORY, UTILITY ENGINEER DATE

AUTHORIZED FOR CONSTRUCTION
TRENTON C. PRALL, CITY ENGINEER DATE

ACCEPTED AS CONSTRUCTED
BRET GUILLORY, PROJECT ENGINEER DATE

WHITEWATER HILL TRAINING FACILITY, JULY, 2015, Plan Set No. —

N:\Landdev\FIRE TRAINING CENTER\dwg\WhiteWater Hill.dwg, 1: 8/12/2015 9:43:51 AM

PROJECT NO. xxxx-Fxxxxx

ABBREVIATIONS

AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY & TRANSPORTATION OFFICIALS
ABC	AGGREGATE BASE COURSE
AC	ASBESTOS CEMENT
AP	ANGLE POINT
ASB	ANCHORED STRAW BALES
ASP	ALUMINIZED STEEL PIPE
ASTM	AMERICAN SOCIETY FOR TESTING MATERIALS
AWWA	AMERICAN WATER WORKS ASSOCIATION
BC	BACK OF CURB
BF	BUTTERFLY VALVE
BOW	BACK OF WALK
BCR	BEGIN CURB RETURN
BOT	BOTTOM
BSWMP	BETTER STORM WATER MANAGEMENT PRACTICES
CH	CHORD
CAP	CORRUGATED ALUMINUM PIPE
CDOT	COLORADO DEPARTMENT OF TRANSPORTATION
CI	CAST IRON
C,G,& SW	CURB, GUTTER & SIDEWALK
℄	CENTER LINE
CL	CLEAR
CMP	CORRUGATED METAL PIPE
CO	CLEAN OUT
COMB	COMBINATION (AS IN STORM SEWER AND SANITARY SEWER)
CONC	CONCRETE
CSM	CITY SURVEY MONUMENT
CSP	CORRUGATED STEEL PIPE
CU	COPPER
DI	DUCTILE IRON
DWY	DRIVEWAY
E	ELECTRIC
ECR	END CURB RETURN
EG	EDGE OF GUTTER
EL	ELEVATION
EP	EDGE OF PAVEMENT
EX	EXISTING
FB	FULL BODY
FC	FACE OF CURB
FG	FINISHED GRADE
℄	FLOW LINE
FL	FLANGE
FM	FORCE MAIN
FO	FIBER OPTICS
FS	FAR SIDE
FTG	FOOTING
G	GAS
GB	GRADE BREAK
GM	GAS METER
GV	GATE VALVE
HBP	HOT BITUMINOUS PAVEMENT
HDPE	HIGH DENSITY POLYETHYLENE
INV	INVERT
IRR	IRRIGATION
L	LENGTH OF ARC
LC	LONG CHORD
LF	LINEAR FEET
LL	LONG ARC
LS	SHORT ARC
LT	LEFT
MB	MAILBOX
MCSM	MESA COUNTY SURVEY MONUMENT
MH	MANHOLE
MJ	MECHANICAL JOINT
MW	MILL WRAP
N/A	NOT APPLICABLE
NIC	NOT IN CONTRACT
NOP	NO ONE PERSON
NRCP	NON-REINFORCED CONCRETE PIPE
NS	NEAR SIDE
NTS	NOT TO SCALE
OHP	OVERHEAD POWER
OHT	OVERHEAD TELEPHONE
PC	POINT OF CURVATURE
PCC	POINT OF COMPOUND CURVATURE
PE	POLYETHYLENE
PERF	PERFORATED
PI	POINT OF INTERSECTION
PIP	PLASTIC IRRIGATION PIPE
POC	POINT ON CURVE
POT	POINT ON TANGENT
PR	PROPOSED
PRC	POINT OF REVERSE CURVATURE
PT	POINT OF TANGENCY
PVC	POLYVINYL CHLORIDE
R	RADIUS
RCP	REINFORCED CONCRETE PIPE
REQ'D	REQUIRED
RG	RESTRAINED GLANDS
RL	LONG RADIUS
ROW	RIGHT OF WAY
RP	RADIUS POINT
RR	RAIL ROAD
RS	SHORT RADIUS
RT	RIGHT
S	SLOPE
SAN	SANITARY
SC	SHORT CHORD
SCD	STANDARD CONTRACT DOCUMENTS
SCH	SCHEDULE
SF	SILT FENCE
SL	SECTION LINE
SSRB	STANDARD SPECIFICATIONS FOR ROAD & BRIDGE CONSTRUCTION
SSUU	STANDARD SPECIFICATIONS FOR CONSTRUCTION OF UNDERGROUND UTILITIES
STA	STATION
STL	STEEL
STM	STORM
T	TELEPHONE
TAN	LENGTH OF TANGENT
TC	TOP OF CURB
TH	TEST HOLE
TV	TELEVISION
(TYP)	TYPICAL
UU	UNDERGROUND UTILITIES
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VPC	VERTICAL POINT OF CURVATURE
VPCC	VERTICAL POINT OF COMPOUND CURVATURE
VPRC	VERTICAL POINT OF REVERSE CURVATURE
VPI	VERTICAL POINT OF INTERSECTION
VPT	VERTICAL POINT OF TANGENCY
W	WATER
△	DELTA ANGLE

LEGEND

BSWMP DRAINAGE BASIN BOUNDARY

BSWMP ANCHORED STRAW BALES — ASB ASB ASB ASB ASB ASB ASB

BSWMP SILT FENCE — SF SF SF SF SF SF SF

BUILDING

CONCRETE CURB AND GUTTER — 2' CURB AND GUTTER

CONCRETE CURB,GUTTER, & SIDEWALK — 7' C, G, & SW

CONCRETE DITCH — CONCRETE

CONCRETE SIDEWALK — 4' SW

CULVERT — 18" RCP

EARTH DITCH — EARTH EARTH EARTH

EDGE OF GRAVEL

EDGE OF PAVEMENT

FENCE (BARBED WIRE)

FENCE (CHAIN LINK)

FENCE (IRON)

FENCE (PLASTIC)

FENCE (TEMPORARY CONSTRUCTION)

FENCE (WOOD)

FENCE (WOVEN WIRE)

GUARD RAIL

HATCHING: INDICATES ASPHALT REMOVAL

HATCHING: INDICATES CONCRETE REMOVAL

HATCHING: INDICATES STAGING AREA — ~STAGING AREA~

LINE (CENTER OF IMPROVEMENTS) — CENTERLINE

LINE (CITY LIMITS) — CITY LIMITS

LINE (CONTROL) — CONTROL LINE

LINE (EASEMENT)

LINE (MONUMENT/SECTION) — MONUMENT/SECTION LINE

LINE (PROPERTY)

LINE (RIGHT OF WAY)

MATCH LINE — MATCH LINE SEE SHEET NO ?

PIPE (IRRIGATION) — 4" IRR

PIPE (SIPHON) — 4" SIPHON

PROPOSED CONCRETE CURB AND GUTTER

PROPOSED CONCRETE CURB,GUTTER,& SIDEWALK

PROPOSED CONCRETE SIDEWALK

PROPOSED "WET" UTILITIES (CONSTRUCTION NOTE WILL INDICATE TYPE, SIZE, AND MATERIAL OF NEW MAIN) — 8" PVC SANITARY SEWER

ALL PROPOSED FEATURES NOT SHOWN IN LEGEND WILL BE SHOWN THE SAME AS THEIR EXISTING COUNTERPART, BUT INDICATED BY BOLDER LINETYPE

RAIL ROAD

RETAINING WALL — 1' RETAINING WALL

STRIPING (CONTINUOUS WHITE) — WHITE

STRIPING (DASHED WHITE) — WHITE

STRIPING (CONTINUOUS YELLOW) — YELLOW

STRIPING (DASHED YELLOW) — YELLOW

TOP OF SLOPE

CONTOUR LINES (SHOWN BETWEEN TOP & TOE) — 4580 / 4570

TOE OF SLOPE

TRAFFIC DETECTOR LOOP

UTILITY LINE (ABANDON) (THIS CASE A WATER LINE) — W (ABANDONED) 8" W

UTILITY LINE (CABLE TV) — TV TV

UTILITY LINE (ELECTRIC) — E E

UTILITY LINE (FIBER OPTIC) — FO QWEST FO

UTILITY LINE (GAS) — G 1 1/4" MW G

UTILITY LINE (HIGH VOLTAGE OVERHEAD POWER) — HVOHP

UTILITY LINE (OVERHEAD POWER) — OHP

UTILITY LINE (OVERHEAD TELEPHONE) — OHT

UTILITY LINE (SANITARY SEWER) — 8" SAN

UTILITY LINE (SANITARY SEWER FORCE MAIN) — 8" FM

UTILITY LINE (SANITARY SEWER SERVICE) — SS

UTILITY LINE (STORM SEWER) — 8" STM

UTILITY LINE (STORM SEWER, PERFORATED) — 6" PERF

UTILITY LINE (STORM/SANITARY SEWER SEWER COMBINATION) — 18" COMB

UTILITY LINE (TELEPHONE) — T T

UTILITY LINE (WATER) — W 8" W

SYMBOLS

BENCH MARK — A

CATCH BASIN

CLEAN OUT — SSCO

CURB STOP

FIRE HYDRANT

GUY WIRE ANCHOR

HEADGATE

IRRIGATION PUMP — P

MAILBOX — MB

MANHOLE (ELECTRIC) — E

MANHOLE (GAS) — G

MANHOLE (SANITARY/STORM)

MANHOLE (TELEPHONE) — T

MANHOLE (TV) — tv

MANHOLE (WATER) — W

METER (GAS) — GM

METER (WATER)

PEDESTAL (TELEPHONE) — △

PEDESTAL (TV) — △TV

PROPERTY PIN — •

PULL BOX — ⊠

REDUCER FITTING

SIGN OR POST (SIGN TYPE NOTED) — STOP

SPRINKLER HEAD — ⊗

STREET LIGHT

SURVEY MONUMENT (CITY) — CSM

SURVEY MONUMENT (TYPE NOTED) — MCSM

TEST HOLE

TRAFFIC PAINT MARKING

TRAFFIC SIGNAL POLE AND MAST ARM

UTILITY POLE

VALVE (GAS) — GV

VALVE (IRRIGATION) — IRR

VALVE (WATER) — ⋈

VEGETATION (HEDGE OR BUSH)

VEGETATION (TREE STUMP)

VEGETATION (TREE) (CALIPER SIZE NOTED) — 6"

WATER HYDRANT — WH

WEIR

YARD LIGHT

NORTH ARROW:

BAR SCALE:

GRAPHIC SCALE

10 0 20 60

(IN FEET)
1 inch = 20 ft.

DESCRIPTION	DATE
REVISION 1	
REVISION 2	
REVISION 3	
REVISION 4	

DRAWN BY	JCS	DATE	4-02
DESIGNED BY		DATE	
CHECKED BY		DATE	
APPROVED BY		DATE	

SCALE			
PLAN		PROFILE	
HORIZ.	1"=20'	HORIZ.	
		VERT.	

CITY OF Grand Junction COLORADO

PUBLIC WORKS AND UTILITIES ENGINEERING DIVISION

CITY OF GRAND JUNCTION STANDARD ABBREVIATIONS, LEGEND, AND SYMBOLS SHEET

2

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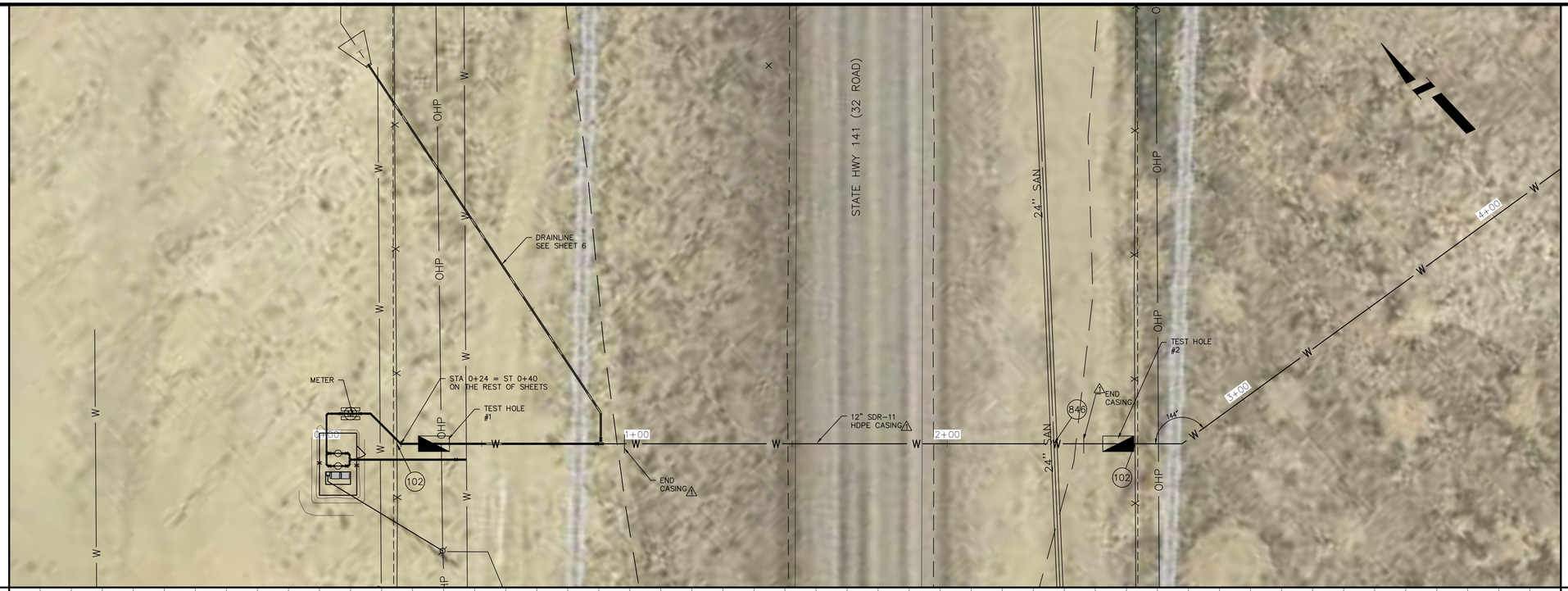
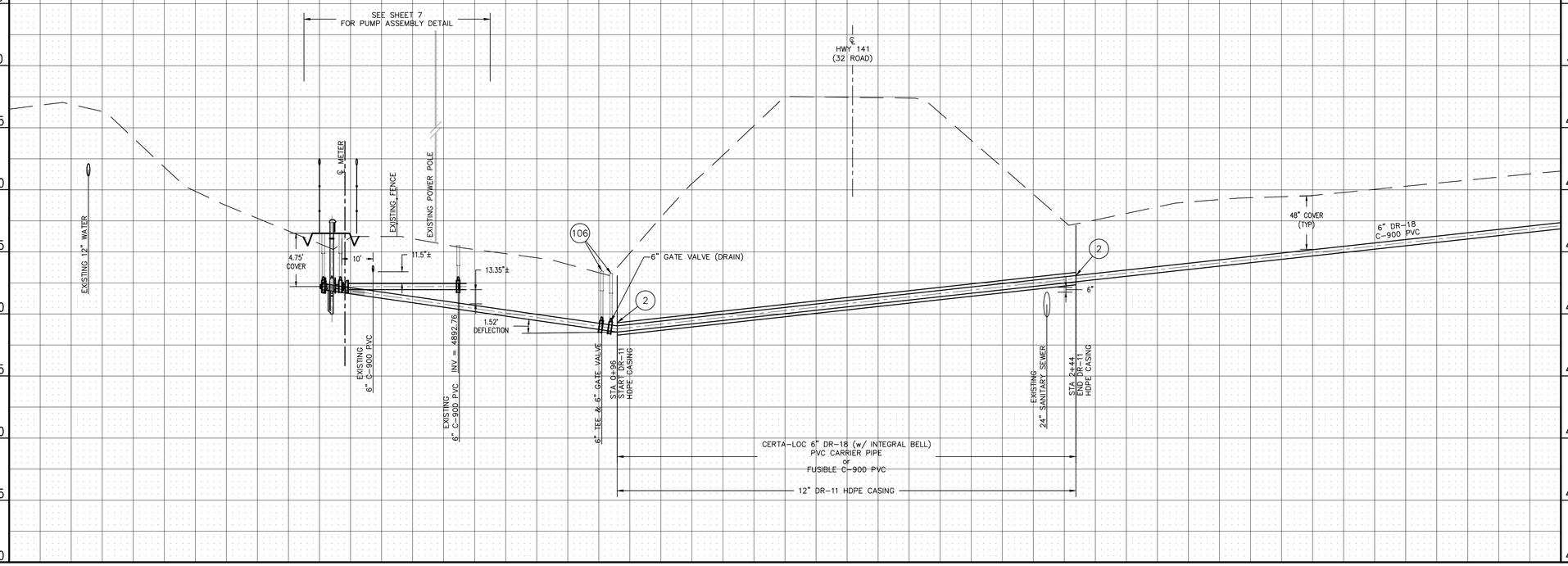
PROJECT NO. XXXX-FXXXX

CONSTRUCTION NOTES

1. GRAND VALLEY POWER TRANSFORMER PAD
2. CASCADE MODEL CCES END SEAL
102. 210 – REMOVE AND REPLACE FENCE IN EXISTING CONDITION – COST INCIDENTAL TO WATER LINE CONSTRUCTION.
106. 210 – SET TOP OF VALVE BOX 6" ABOVE ADJACENT GRADE
846. EXISTING CLIFTON SANITATION DISTRICT SEWER LINE TO BE POT HOLED DURING DIRECTIONAL BORE INSTALLATION OF CASING PIPE TO INSURE THAT NO DAMAGE OCCURS TO THE EXISTING PIPE.





DESCRIPTION	DATE
REVISION 1 RIM/INVERT ELEVATIONS, AND MATERIAL CHANGES	08-12-2015
REVISION 2	
REVISION 3	
REVISION 4	

DRAWN BY HMC DATE 2015
DESIGNED BY SBG DATE 2015
CHECKED BY DATE
APPROVED BY DATE

SCALES:
PLAN HORIZONTAL 0 5 10 20
PROFILE HORIZONTAL 0 5 10 20, VERTICAL 0 2.5 5

CITY OF Grand Junction COLORADO

PUBLIC WORKS AND UTILITIES ENGINEERING DIVISION

WHITEWATER HILL TRAINING FACILITY
32 ROAD CROSSING FOR DIRECTIONAL BORE
STA 0+00 TO STA 4+00

3

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CONSTRUCTION NOTES

(102) 210 – REMOVE AND REPLACE EXISTING FENCING AS NEEDED TO FACILITATE CONSTRUCTION.

(402) 102.7/108.2 – 6" WATER MAIN PIPE (SDR–18 PVC). INCLUDES TYPE A BEDDING AND HAUNCHING MATERIAL AND BACKFILL OF TRENCH WITH NATIVE MATERIALS MEETING 103.16 EARTH BACKFILL MATERIAL.

(672) 304 – REPLACE GRAVEL ROAD SURFACE WITH 12" C1–6 BASE COMPACTED TO 95%.

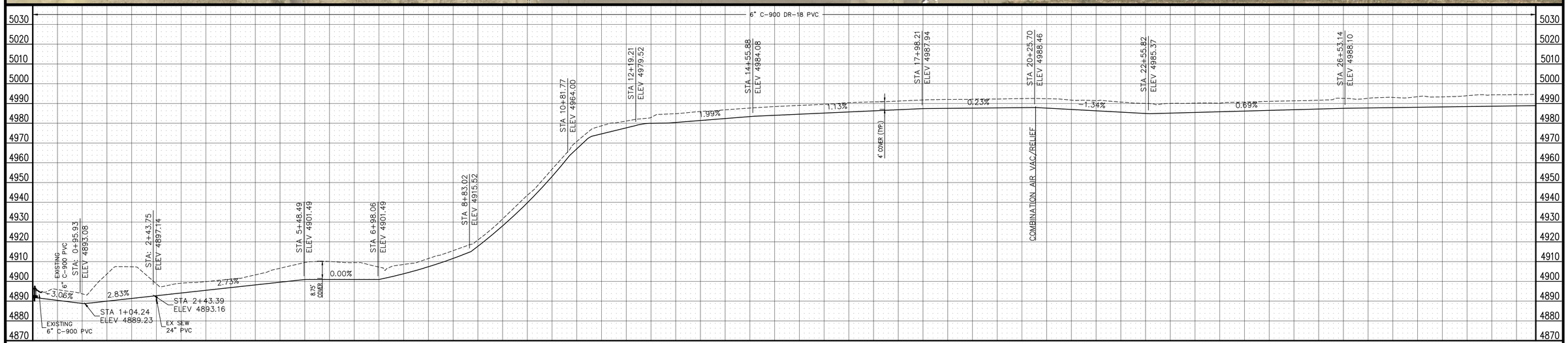
(817) PROTECT SURVEY MONUMENT IN PLACE

(827) PROTECT EXISTING WATER SERVICE IN PLACE.

(829) PROTECT EXISTING TELEPHONE/COMMUNICATION SERVICE IN PLACE.

(846) EXISTING CLIFTON SANITATION DISTRICT SEWER LINE TO BE POT HOLED DURING DIRECTIONAL BORE INSTALLATION OF CASING PIPE TO INSURE THAT NO DAMAGE OCCURS TO THE EXISTING PIPE.

(851) MAINTAIN ACCESS TO GRAVEL ROAD AT ALL TIMES. PROTECT GRAVEL ROAD SURFACE FROM SPOIL MATERIAL OR STAGED MATERIALS.



DESCRIPTION	DATE
REVISION 1	
REVISION 2	
REVISION 3	
REVISION 4	

DRAWN BY HMC DATE 2015
DESIGNED BY SBG DATE 2015
CHECKED BY DATE
APPROVED BY DATE

SCALES:
PLAN
HORIZONTAL 0 25 50 100

CITY OF Grand Junction COLORADO

PUBLIC WORKS AND UTILITIES ENGINEERING DIVISION

WHITEWATER HILL TRAINING FACILITY PROJECT AREA OVERVIEW PLAN AND PROFILES STA 0+00 TO STA 30+00

4

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CONSTRUCTION NOTES

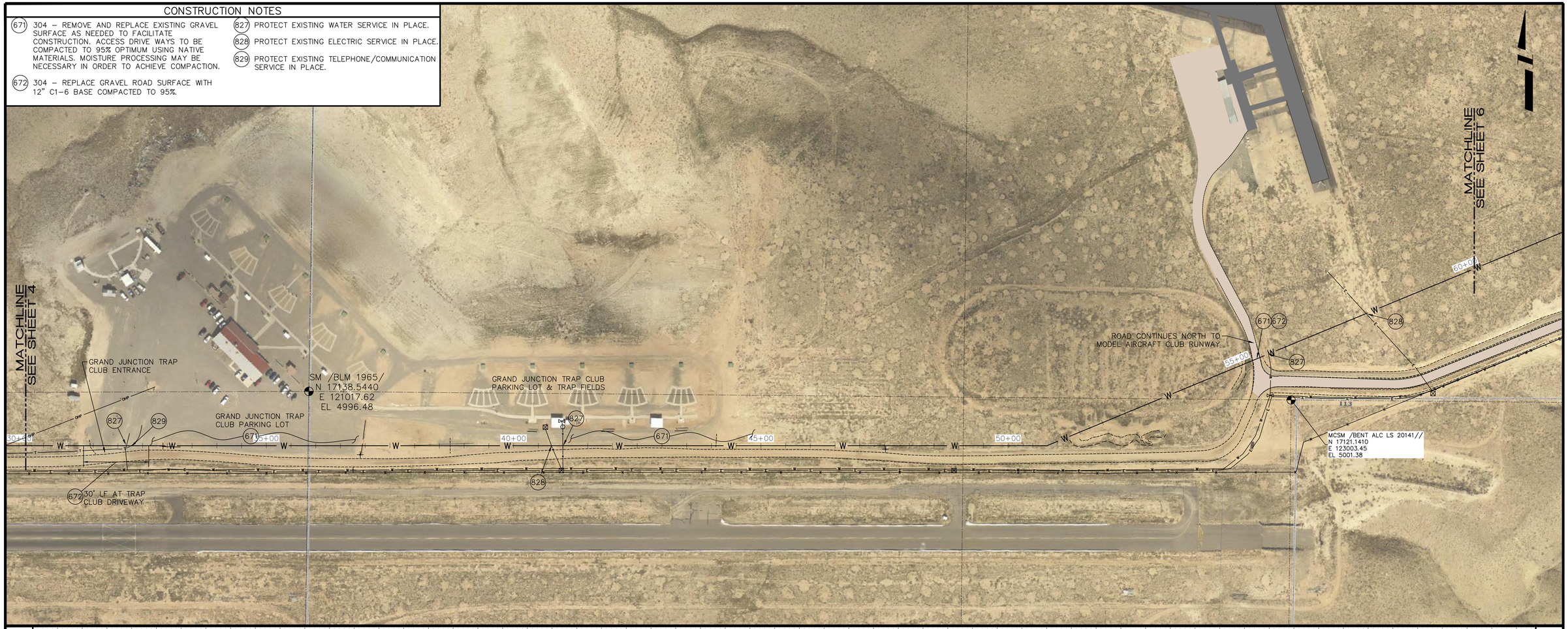
671 304 – REMOVE AND REPLACE EXISTING GRAVEL SURFACE AS NEEDED TO FACILITATE CONSTRUCTION. ACCESS DRIVE WAYS TO BE COMPACTED TO 95% OPTIMUM USING NATIVE MATERIALS. MOISTURE PROCESSING MAY BE NECESSARY IN ORDER TO ACHIEVE COMPACTION.

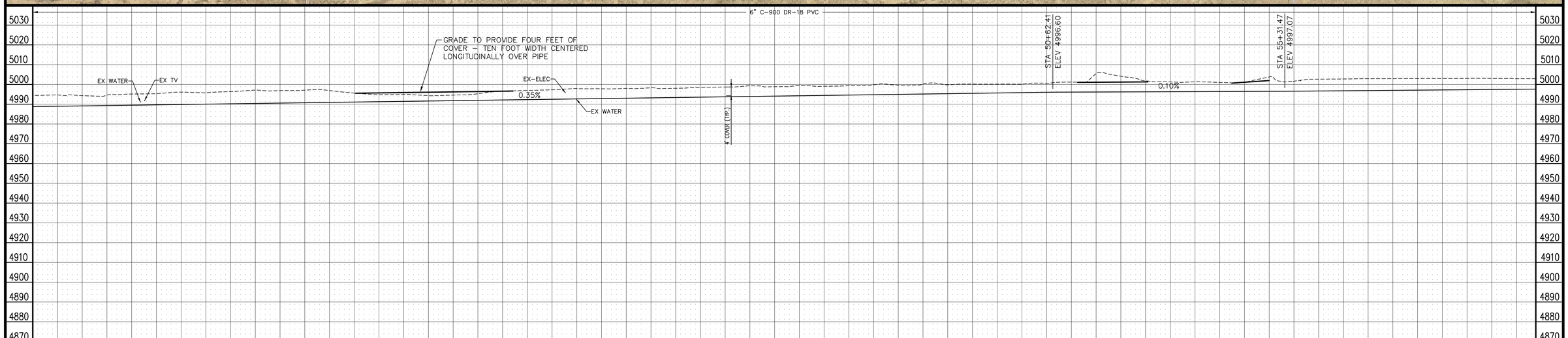
672 304 – REPLACE GRAVEL ROAD SURFACE WITH 12" C1-6 BASE COMPACTED TO 95%.

827 PROTECT EXISTING WATER SERVICE IN PLACE.

828 PROTECT EXISTING ELECTRIC SERVICE IN PLACE.

829 PROTECT EXISTING TELEPHONE/COMMUNICATION SERVICE IN PLACE.





DESCRIPTION	DATE
REVISION 1	
REVISION 2	
REVISION 3	
REVISION 4	

DRAWN BY HMC DATE 2015
DESIGNED BY SBG DATE 2015
CHECKED BY DATE
APPROVED BY DATE

SCALES:
PLAN
HORIZONTAL
0 25 50 100

CITY OF Grand Junction COLORADO

PUBLIC WORKS
AND UTILITIES
ENGINEERING DIVISION

WHITEWATER HILL TRAINING FACILITY
PROJECT AREA OVERVIEW PLAN AND PROFILES
STA 30+00 TO STA 60+00

5

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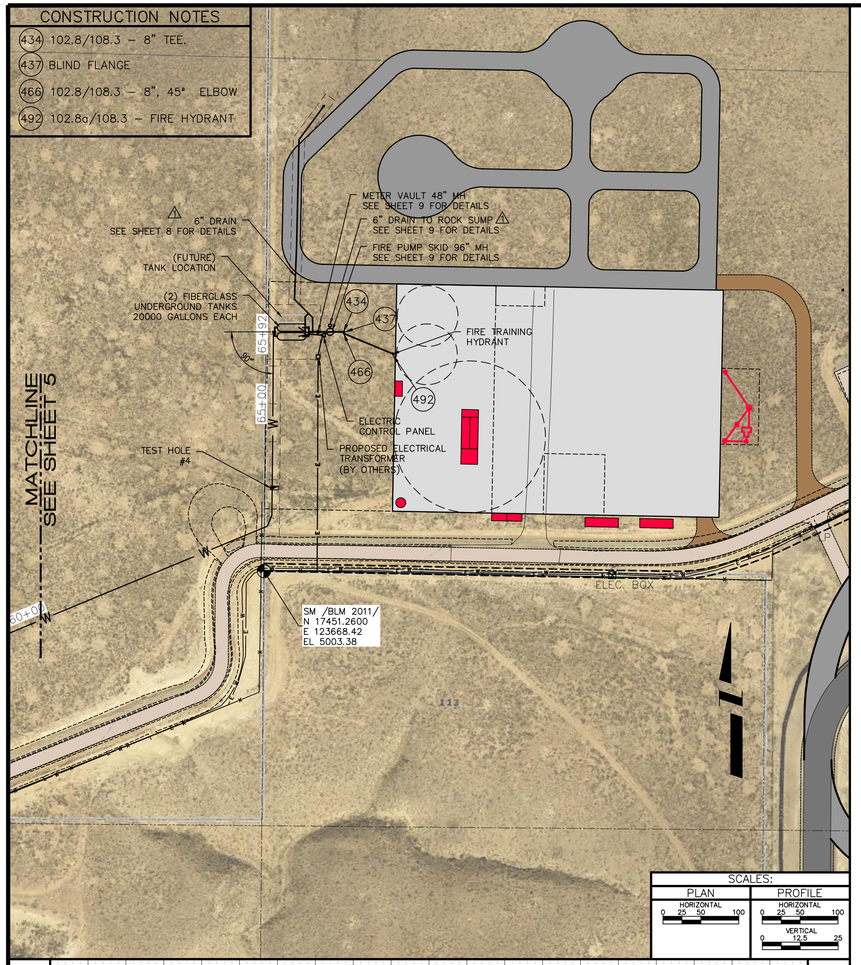
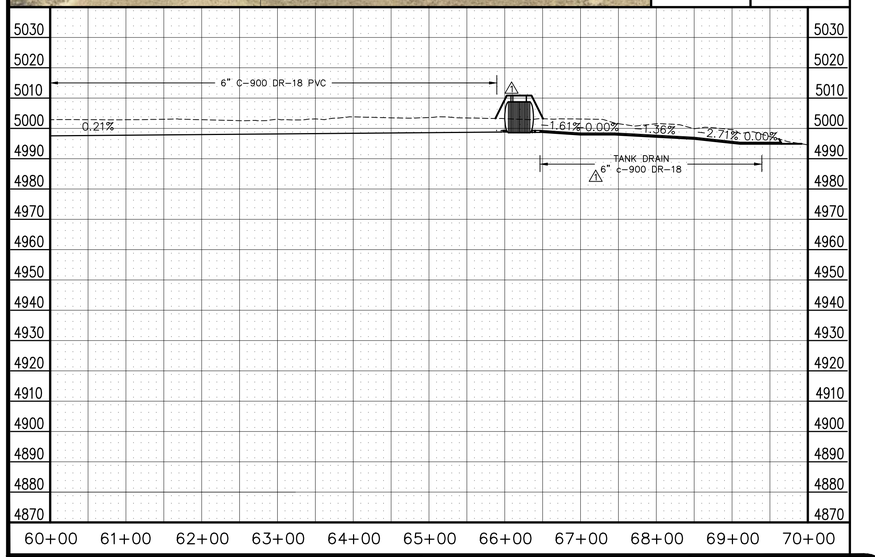
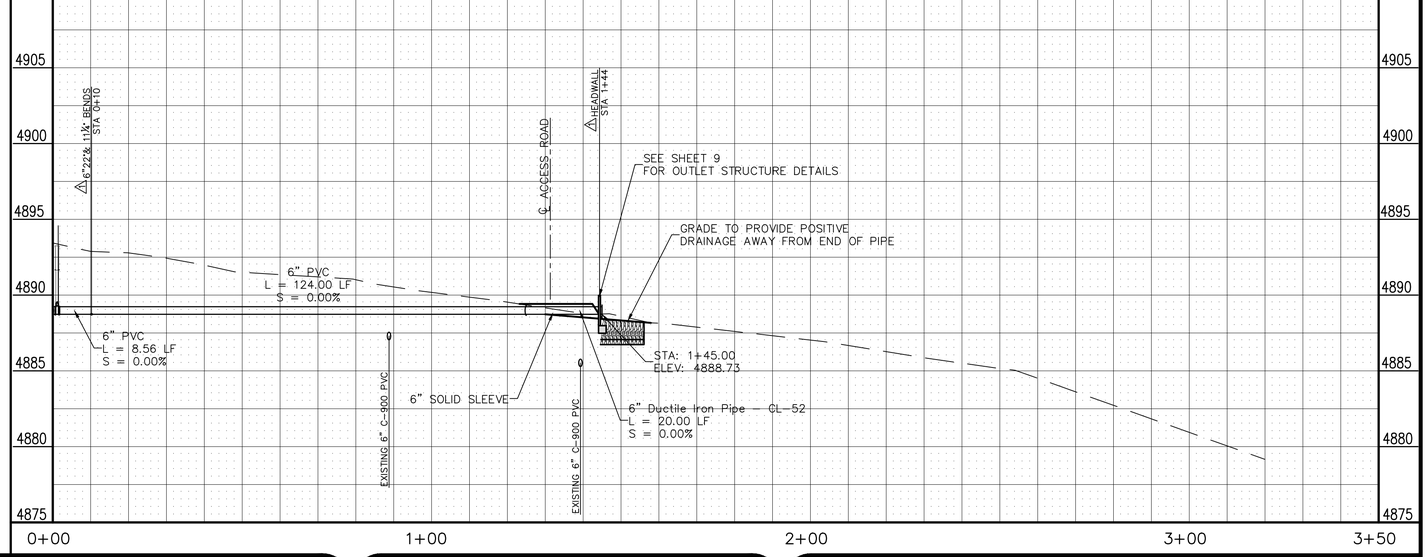
CONSTRUCTION NOTES

(434) 102.8/108.3 – 8" TEE.
(437) BLIND FLANGE
(466) 102.8/108.3 – 8", 45° ELBOW
(492) 102.8a/108.3 – FIRE HYDRANT







DESCRIPTION		DATE
REVISION 1	RIM/INVERT ELEVATIONS, AND MATERIAL CHANGES	08-12-2015
REVISION 2		
REVISION 3		
REVISION 4		

DRAWN BY HMC DATE 2015
DESIGNED BY SBG DATE 2015
CHECKED BY DATE
APPROVED BY DATE

SCALES:

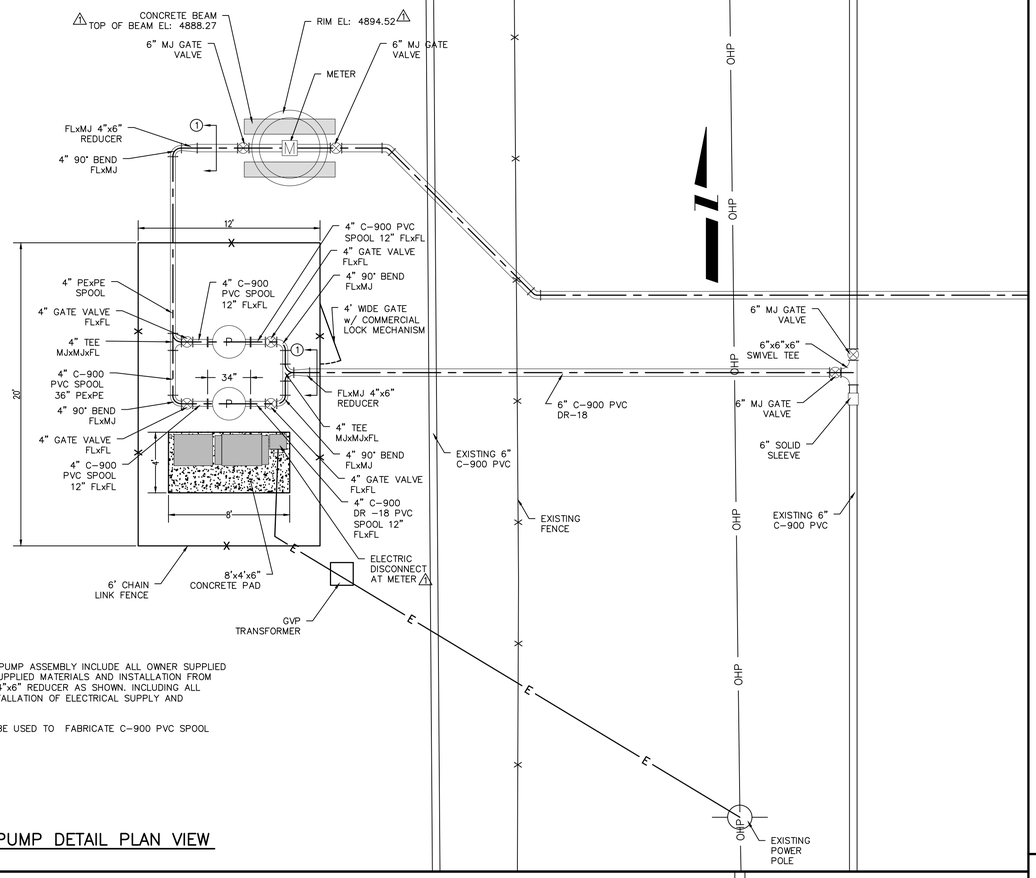
CITY OF Grand Junction COLORADO

PUBLIC WORKS
AND UTILITIES
ENGINEERING DIVISION

WHITEWATER HILL TRAINING FACILITY
PROJECT AREA OVERVIEW PLAN AND PROFILES
STA 60+00 TO STA 70+00

6

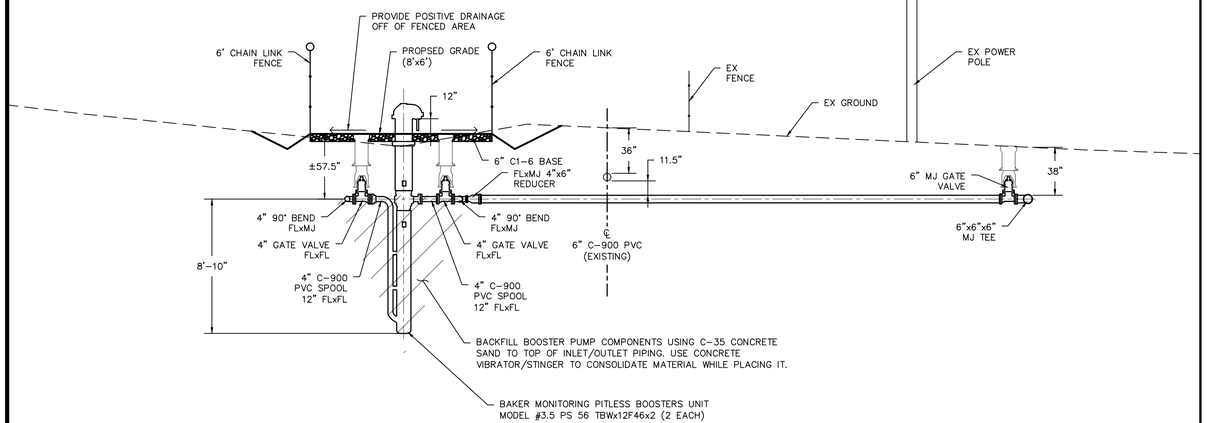
N:\Londoro\FIRE TRAINING CENTER\Data\WhiteWater Hill.dwg, 6 WL overview (3), 8/12/2015 10:00:26 AM



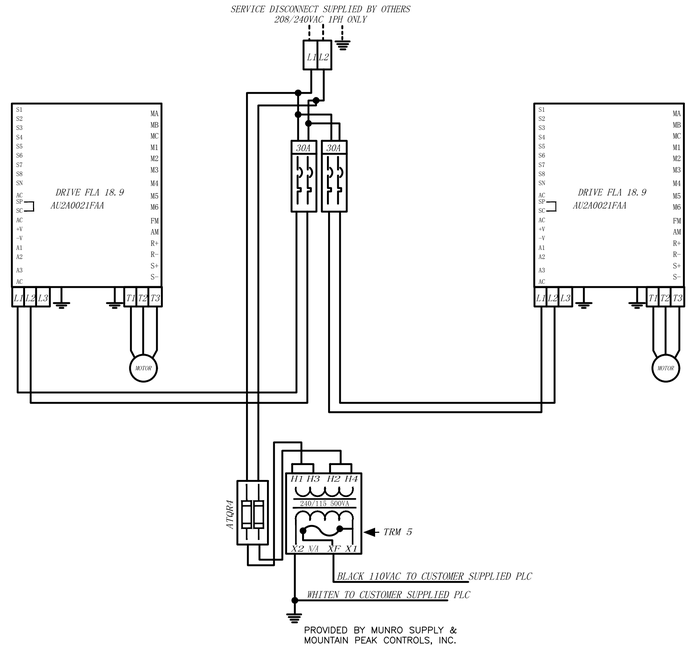
TANK BOOSTER PUMP DETAIL PLAN VIEW
1" = 5'

① LIMITS OF BOOSTER PUMP ASSEMBLY INCLUDE ALL OWNER SUPPLIED AND CONTRACTOR SUPPLIED MATERIALS AND INSTALLATION FROM 4"x6" REDUCER TO 4"x6" REDUCER AS SHOWN. INCLUDING ALL MATERIALS AND INSTALLATION OF ELECTRICAL SUPPLY AND COMPONENTS.

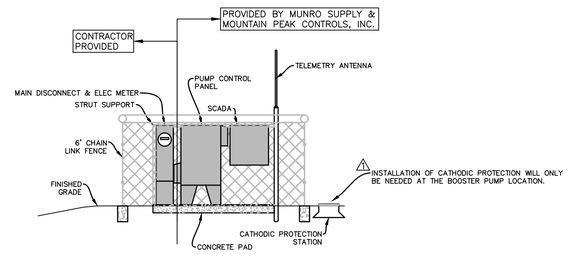
⚠② MEGA FLANGE MAY BE USED TO FABRICATE C-900 PVC SPOOL PIECES.



TANK BOOSTER PUMP DETAIL PROFILE VIEW LOOKING NORTH
1" = 5'



BOOSTER PUMP STATION – STA 0+00
ONE LINE DIAGRAM
PROVIDED BY MUNRO SUPPLY & MOUNTAIN PEAK CONTROLS, INC.



TYPICAL ELECTRICAL CONTROL PANEL
SCALE: NTS

DESCRIPTION	DATE
REVISION ⚠1 RIM/INVERT ELEVATIONS, AND MATERIAL CHANGES	– 08-12-2015
REVISION ⚠2	–
REVISION ⚠3	–
REVISION ⚠4	–

DRAWN BY HMC DATE 2015
DESIGNED BY SBG DATE 2015
CHECKED BY DATE
APPROVED BY DATE

SCALES: PLAN HORIZONTAL 0 2.5 5

CITY OF Grand Junction COLORADO

PUBLIC WORKS AND UTILITIES ENGINEERING DIVISION

WHITEWATER HILL TRAINING FACILITY
PUMP DETAILS

7

N:\Landers\FIRE TRAINING CENTER\dwg\WhiteWater Hill.dwg, 7 Pump Station Details, 8/12/2015 9:50:01 AM

DESCRIPTION	DATE
REVISION 1 RIM/INVERT ELEVATIONS, AND MATERIAL CHANGES	08-12-2015
REVISION 2	
REVISION 3	
REVISION 4	

DRAWN BY HMC DATE 2015
DESIGNED BY SBG DATE 2015
CHECKED BY DATE
APPROVED BY DATE

SCALES: PLAN HORIZONTAL 2.5 5 — PROFILE HORIZONTAL 2.5 5, VERTICAL 2.5 5

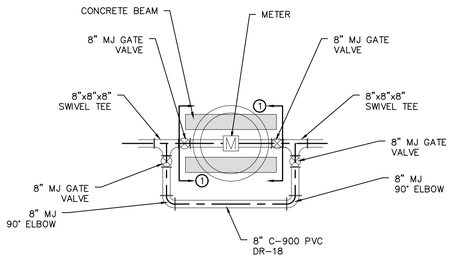
CITY OF Grand Junction COLORADO

PUBLIC WORKS AND UTILITIES ENGINEERING DIVISION

WHITEWATER HILL TRAINING FACILITY TANK PLAN & PROFILE & FOUNDATION DETAILS

8

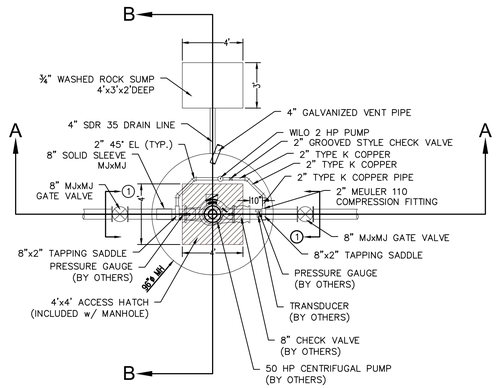
⚠1 LIMIT OF METER VAULT ASSEMBLY



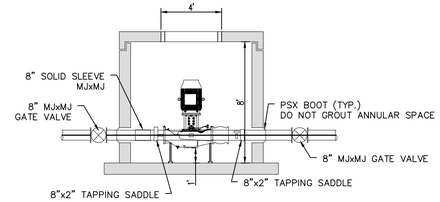
TYPICAL METER ASSEMBLY w/ BY PASS
1"=5'

⚠ METER NEAR BOOSTER PUMP WILL NOT HAVE A BYPASS

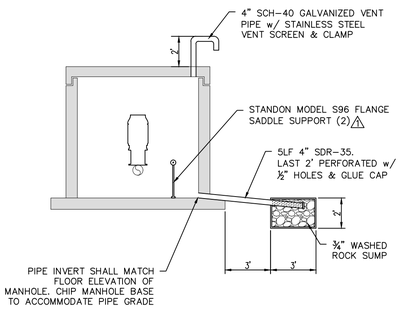
① LIMITS OF FIRE PUMP ASSEMBLY INCLUDE ALL OWNER SUPPLIED, AND CONTRACTOR SUPPLIED, MATERIALS AND INSTALLATION FROM GATE VALVE TO GATE VALVE AS SHOWN BELOW AND IN SECTIONS AA AND BB. INCLUDING MATERIALS AND INSTALLATION OF ELECTRICAL SUPLLY AND COMPONENTS.



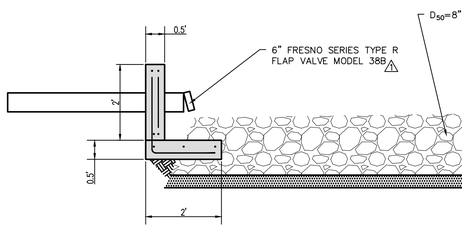
FIRE PUMP PLAN VIEW
STA: 0+49
1"=5'

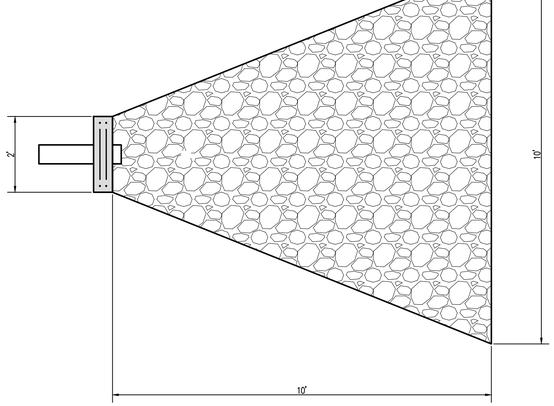


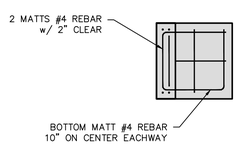
FIRE PUMP SECTION AA
1"=5'

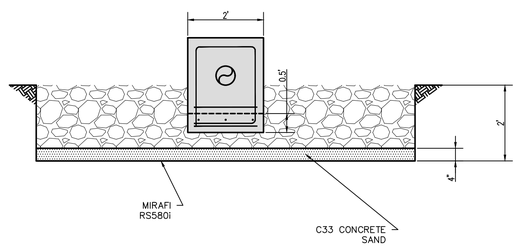


FIRE PUMP SECTION BB
1"=5'

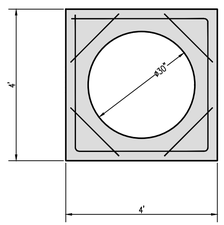








TYPICAL DRAIN OUTLET STRUCTURE
1"=2'



4'x4'x6" CONCRETE PAD FOR TANK ACCESS
1"=2'

DESCRIPTION	DATE
REVISION ⚠1 RIM/INVERT ELEVATIONS, AND MATERIAL CHANGES	08-12-2015
REVISION ⚠2	
REVISION ⚠3	
REVISION ⚠4	

DRAWN BY HMC DATE 2015
DESIGNED BY SBG DATE 2015
CHECKED BY DATE
APPROVED BY DATE

SCALES:
PLAN
HORIZONTAL 0 2.5 5
UNLESS OTHERWISE NOTED

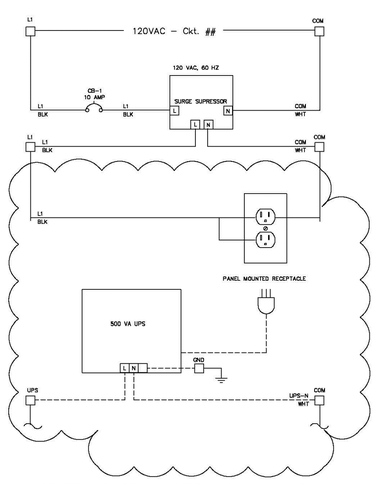
CITY OF Grand Junction COLORADO

PUBLIC WORKS AND UTILITIES ENGINEERING DIVISION

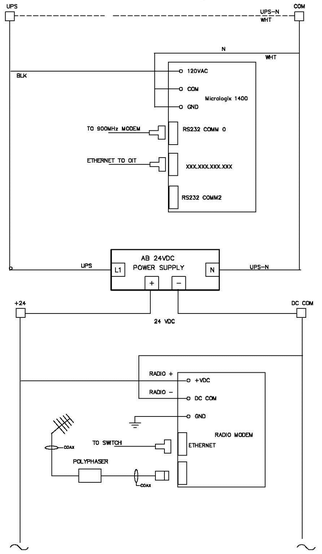
WHITEWATER HILL TRAINING FACILITY
TANK FOUNDATION DETAILS

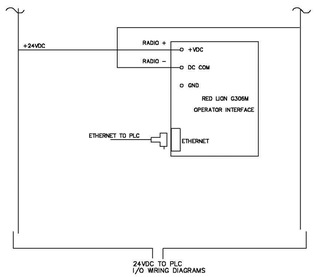
9

N:\Londeen\FIRE TRAINING CENTER\Dwgs\WhiteWater Hill.dwg, 9 Tank Foundation Details, 8/12/2015 9:53:12 AM



UPS & RECEPTACLE OPTIONAL DEPENDING ON AVAILABLE PANEL SPACE





24VDC TO PLC I/O WIRING DIAGRAMS

PROPRIETARY INFORMATION	NUMBER	REVISION	BY	DATE
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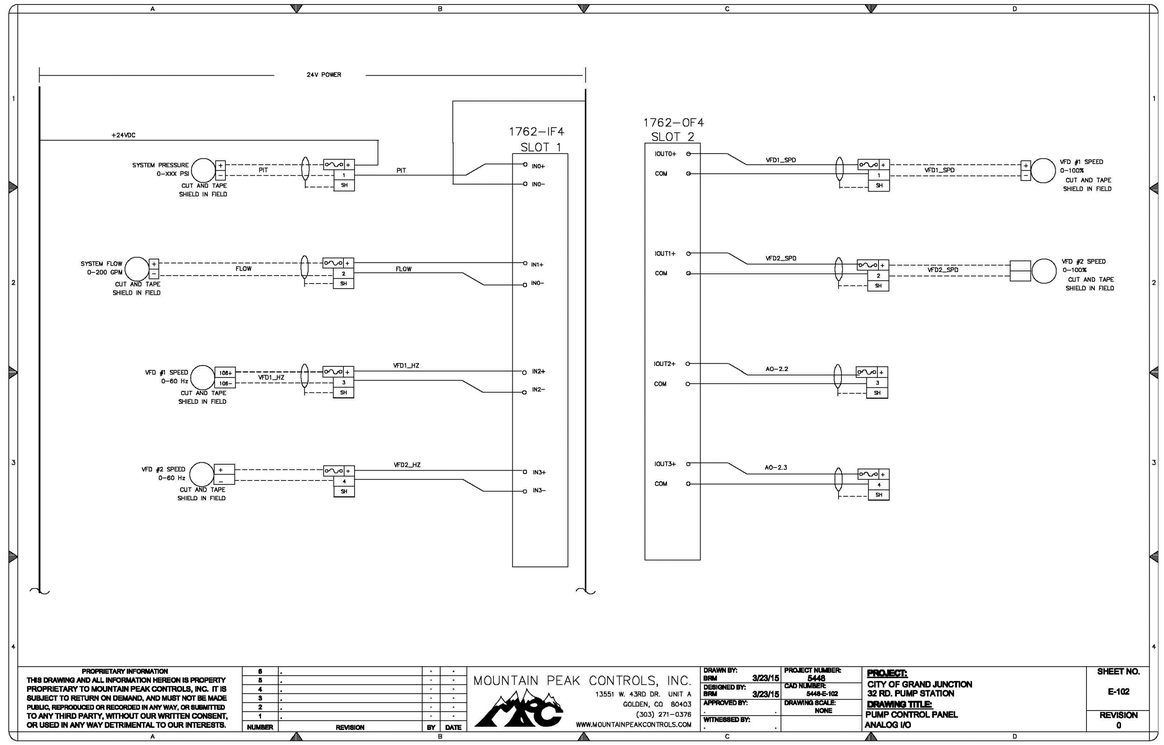
	2	.	.	.
	1	.	.	.

MOUNTAIN PEAK CONTROLS, INC.
13551 W. 43RD DR. UNIT A
GOLDEN, CO 80403
(303) 271-0376
WWW.MOUNTAINPEAKCONTROLS.COM

DRAWN BY: BRM 3/23/15	PROJECT NUMBER: 5448
DESIGNED BY: BRM 3/23/15	CAD NUMBER: 5448-E100
APPROVED BY: . .	DRAWING SCALE: NONE
WITNESSED BY: . .	

PROJECT: CITY OF GRAND JUNCTION
32 RD. PUMP STATION
DRAWING TITLE: PUMP CONTROL PANEL
PRIMARY POWER WIRING

SHEET NO. E-100
REVISION 0



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	5	.	.	.
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	3	.	.	.
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	1	.	.	.

MOUNTAIN PEAK CONTROLS, INC.
13551 W. 43RD DR. UNIT A
GOLDEN, CO 80403
(303) 271-0376
WWW.MOUNTAINPEAKCONTROLS.COM

DRAWN BY: BRM 3/23/15	PROJECT NUMBER: 5448
DESIGNED BY: BRM 3/23/15	CAD NUMBER: 5448-E-102
APPROVED BY: . .	DRAWING SCALE: NONE
WITNESSED BY: . .	

PROJECT: CITY OF GRAND JUNCTION
32 RD. PUMP STATION
DRAWING TITLE: PUMP CONTROL PANEL
ANALOG I/O

SHEET NO. E-102
REVISION 0

PROPRIETARY INFORMATION	NUMBER	REVISION	BY	DATE
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MOUNTAIN PEAK CONTROLS, INC.
13551 W. 43RD DR. UNIT A
GOLDEN, CO 80403
(303) 271-0376
WWW.MOUNTAINPEAKCONTROLS.COM

DRAWN BY: BRM 3/23/15	PROJECT NUMBER: 5448
DESIGNED BY: BRM 3/23/15	CAD NUMBER: 5448-E-101
APPROVED BY: . .	DRAWING SCALE: NONE
WITNESSED BY: . .	

PROJECT: CITY OF GRAND JUNCTION
32 RD. PUMP STATION
DRAWING TITLE: PUMP CONTROL PANEL
IO BASE DISCRETE I/O WIRING

SHEET NO. E-101
REVISION 0

DESCRIPTION	DATE
REVISION 1	
REVISION 2	
REVISION 3	
REVISION 4	

DRAWN BY HMC DATE 2015
DESIGNED BY SBG DATE 2015
CHECKED BY DATE
APPROVED BY DATE

SCALES:

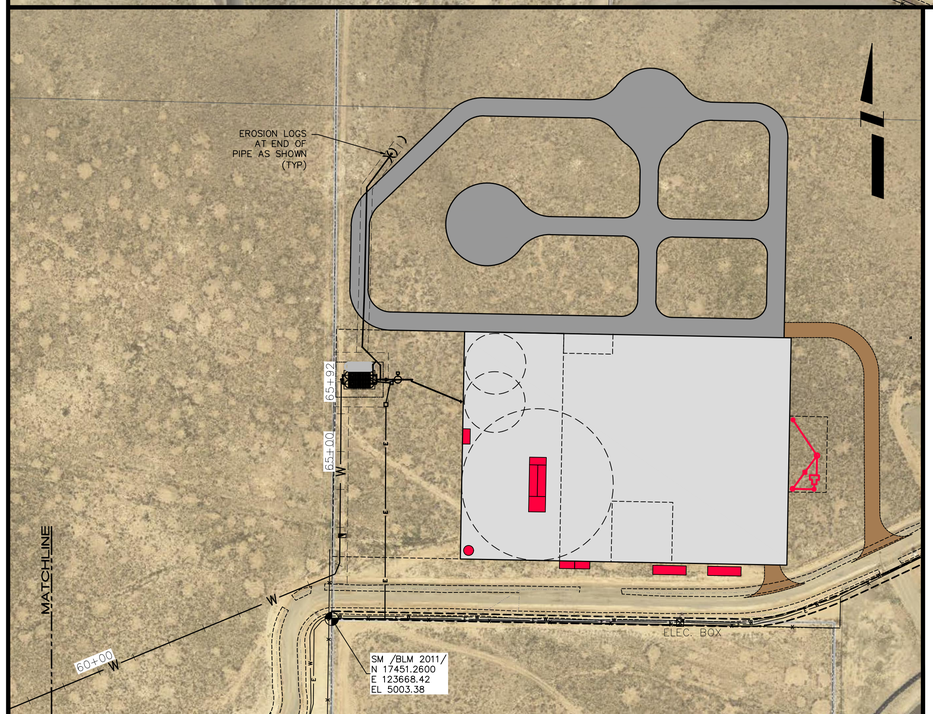
CITY OF Grand Junction COLORADO

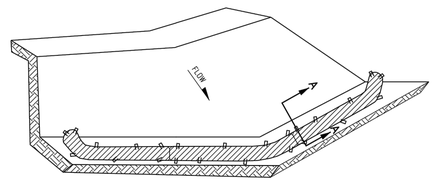
PUBLIC WORKS
AND UTILITIES
ENGINEERING DIVISION

WHITEWATER HILL TRAINING FACILITY
TANK LEVEL CONTROL ONE LINE DIAGRAM

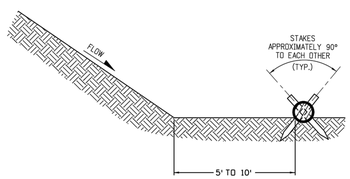
10

N:\Landers\FIRE TRAINING CENTER\Dwgs\WhiteWater Hill.dwg, 10 Tank 1 Line Diagram, 8/12/2015 9:54:17 AM





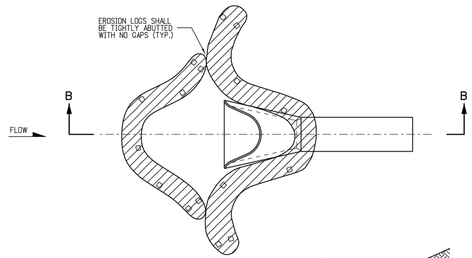
ISOMETRIC VIEW



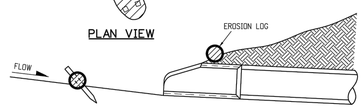
SECTION A-A

NOTES:
1. EROSION LOGS USED AT TOE OF SLOPE SHALL BE PLACED 5 TO 10 FEET BEYOND TOE OF SLOPE TO PROVIDE STORAGE CAPACITY.
2. EROSION LOGS SHALL BE PLACED ON THE CONTOUR, WITH ENDS FLARED UP SLOPE.

EROSION LOG TOE OF SLOPE PROTECTION

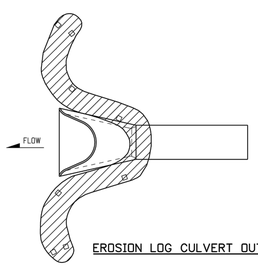


PLAN VIEW



SECTION B-B

EROSION LOG CULVERT INLET PROTECTION



EROSION LOG CULVERT OUTLET PROTECTION

EROSION LOG APPLICATIONS
NOT TO SCALE

DESCRIPTION	DATE
REVISION 1	
REVISION 2	
REVISION 3	
REVISION 4	

DRAWN BY HMC DATE 2015
DESIGNED BY SBG DATE 2015
CHECKED BY DATE
APPROVED BY DATE

SCALES:
PLAN
HORIZONTAL 0 25 50 100

CITY OF Grand Junction COLORADO

PUBLIC WORKS AND UTILITIES ENGINEERING DIVISION

WHITEWATER HILL TRAINING FACILITY
STORM WATER MANAGEMENT PLAN

11

N:\Landdev\1\FIRE TRAINING CENTER\1\dwg\WhiteWater Hill.dwg, 11 SWMP, 8/12/2015 9:55:04 AM