

**OPERATION, MAINTENANCE AND
MONITORING MANUAL**

**NORTH LA CHOLLA MOBILE HOME PARK WELL
5050 N. LA CHOLLA BLVD
TUCSON, ARIZONA**

DRAFT

JUNE 15, 2022

**Prepared for:
Arizona Department of Environmental Quality**



HARGIS + ASSOCIATES, INC.
HYDROGEOLOGY • ENGINEERING

OPERATION, MAINTENANCE AND MONITORING MANUAL

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
NORTH LA CHOLLA MOBILE HOME PARK WELL
5050 N. LA CHOLLA BLVD
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TABLE OF CONTENTS

Section	Page
ACRONYMS AND ABBREVIATIONS	iv
1. 0 EMERGENCY AND OTHER CONTACT NUMBERS	1
1.1 EMERGENCY CONTACTS.....	1
1.2 OTHER CONTACT NUMBERS.....	1
2. 0 INTRODUCTION/BACKGROUND	2
2.1 REMEDIAL OBJECTIVES AND REQUIREMENTS	2
3. 0 SITE AND SYSTEM DESCRIPTION	3
3.1 OWNERS, CLIENTS, AGENCIES AND UTILITIES	3
3.2 OPERATIONAL PERMITS	3
3.3 ORIGINAL WELL SYSTEM.....	3
3.4 WELL-HEAD TREATMENT SYSTEM.....	4
4. 0 OPERATING PROCEDURES.....	6
4.1 EMERGENCY PROCEDURES	6
4.2 START-UP AND SHUT-DOWN PROCEDURES	6
4.3 NORMAL OPERATING PROCEDURES	7
4.4 PERIODIC MONITORING AND MAINTENANCE	7
4.5 LPGAC VESSEL BREAK-THROUGH AND PROFILING PROCEDURE	9
4.6 CARBON CHANGE-OUT PROCEDURES	10
4.7 REPORTING PROCEDURES.....	11

TABLE OF CONTENTS (continued)

FIGURES

Figure

- | | |
|---|---------------------------|
| 1 | SITE LAYOUT |
| 2 | MANIFOLD |
| 3 | LEAD LAG VALVE SETUP |
| 4 | SINGLE VESSEL VALVE SETUP |

APPENDICES

Appendix

- | | |
|---|--------------------------|
| A | EQUIPMENT SPECIFICATIONS |
| B | INSPECTION FORMS |

ACRONYMS AND ABBREVIATIONS

ADEQ	Arizona Department of Environmental Quality
BAT	bacteria
EPA	U.S. Environmental Protection Agency
ERA	Early Response Action
gpm	gallons per minute
Lag Vessel	LPGAC vessel receiving water from the Lead Vessel
lb	pound
Lead Vessel	initial LPGAC vessel receiving groundwater
LOTO	Lock-out, Tag-out
LPGAC	liquid-phase granular activated carbon
MCL	maximum contaminant level
OMM	Operation, Maintenance and Monitoring
psi	pounds per square inch
TCE	trichloroethene
µg/l	micrograms per liter
VOC	volatile organic compound

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1.0 EMERGENCY AND OTHER CONTACT NUMBERS

1.1 EMERGENCY CONTACTS

An emergency is an uncontrolled situation, an injury that is life threatening, fire, or anything that requires immediate assistance from the fire department, emergency medical services, or police department.

- In the event of an emergency, call 911. After notification to 911, call the property owner and the Arizona Department of Environmental Quality (ADEQ).
 - ADEQ: Hazel Cox, (520) 770-3125 or (520) 784-1708
 - Administrative Contact: Dean Newton (520) 888-3883
 - Owner: Margaret Halquist (520) 245-6449

1.2 OTHER CONTACT NUMBERS

For all other non-emergency situations, contact phone numbers are:

- ADEQ: Hazel Cox, (520) 770-3125 or (520) 784-1708
- Operation, Maintenance and Monitoring Contractor: Chris Perkovac, Hargis + Associates, Inc. (619) 241-3575
- Administrative contact: Dean Newton (520) 888-3883
- Owner: Margaret Halquist (520) 245-6449
- System operator: Lorena Leal (520) 461-4919

2.0 INTRODUCTION/BACKGROUND

This Operation, Maintenance and Monitoring (OMM) Manual is prepared to provide system information required to efficiently operate, maintain and monitor the North La Cholla Mobile Home Park supply well treatment system located at 5050 N. La Cholla Boulevard, Tucson, Arizona (Figure 1). Treatment system operation is performed as an early response action (ERA) for the Miracle Mile Water Quality Assurance Revolving Fund site. In 2019, a water sample from the supply well contained trichloroethene (TCE) at a concentration of 5.5 micrograms per liter ($\mu\text{g/l}$), over the U.S. Environmental Protection Agency (EPA) primary drinking water maximum contaminant level (MCL) of 5 $\mu\text{g/l}$. The property owner was contacted and informed of the results. The existing mobile home park potable water distribution system was turned off and the City potable water connection was opened to supply water to the trailer park until installation of a well-head treatment system could be conducted. In 2022, ADEQ installed a well-head groundwater treatment system for the removal of volatile organic compounds (VOCs), including TCE, to facilitate continued use by the trailer park.

This OMM Manual is subject to change and or modification.

2.1 REMEDIAL OBJECTIVES AND REQUIREMENTS

The remedial objective of the well-head treatment system is to remove TCE to a concentration below 5.0 $\mu\text{g/l}$. The operating requirements of the treatment system are:

- Maintain a sufficient flow rate (between 10 to 100 gallons per minute [gpm]) to treat groundwater pumped from the well.
- Provide treated water with VOC concentrations below the EPA primary drinking water MCL standards.

3.0 SITE AND SYSTEM DESCRIPTION

3.1 OWNERS, CLIENTS, AGENCIES AND UTILITIES

The components of the original system are owned, maintained, and operated by the property owner and their representatives. The property owner has contracted Lorena Leal to act as the system operator whose duties include periodic monitoring and reporting. The mobile home park potable water distribution system is supplied primarily from the supply well; however, if needed, a connection to Tucson City Water can be opened to supply potable water. Electrical power is supplied by a meter located several feet west of the supply well.

The newly installed treatment system; including pipelines, manifold, and liquid-phase granular activated carbon (LPGAC) vessels is owned and operated by ADEQ. ADEQ has contracted Hargis + Associates, Inc. to operate, maintain and monitor the treatment system.

ADEQ and their contractors are not acting as water providers. The treated water is provided to the property owner for their use. The property owner, its' representatives and system operator are responsible for all the water system operations, including meeting appropriate regulations and verifying water quality and safety.

3.2 OPERATIONAL PERMITS

The existing mobile home park potable water distribution system is owned by Margaret Halquist who is responsible for maintaining permits, amending permits, monitoring, and other compliance issues. Because the treatment system was installed as part of an ERA, permits were not required.

3.3 ORIGINAL WELL SYSTEM

Prior to installation of the treatment system, the original well equipment setup included a submersible well pump. Groundwater was pumped to the surface and discharged to an above-grade storage tank. A flow meter was located on the pipe between the well and the storage tank. A pressure gauge, attached to the storage tank, measured the pressure within the tank. Once the

pressure in the tank fell below a set pressure, the well pump was automatically turned on to fill the tank. The original system included:

- Groundwater extraction well (55-599958; 8-5/8-inch diameter; total depth 500 feet);
- Submersible well pump (Grundfos 85S75-6 Submersible Well Pump);
- Electrical meter and fuse box;
- Storage tank with pressure gauges and air vents;
- Totalizer and flow meter;
- 2-inch pipeline from pump to storage tank;
- 3-inch pipeline from storage tank to residences.

Concurrent with the installation of the treatment system, the owner upgraded the well system. The upgrades include:

- Upgrading the electric panel;
- Replacing the existing pump with a Franklin Electric (Model 0176-70R75 F66-1153);
- Removing the storage tank;
- Installing two pressure tanks; and
- Installing a new pump control system.

3.4 TREATMENT SYSTEM

A treatment system was installed to remove VOCs from groundwater. Construction was completed by May 2022. Groundwater from the well and pressure tanks is directed to the treatment system. Treated water from the system is returned to the distribution system up stream of the totalizer. Water is moved through the treatment system using the pressure from the well and pressure tanks. The treatment system receives groundwater from the supply well, removes VOCs by passing it over LPGAC, and routes the treated water back to the system. The treatment system requires no booster pumps. The treatment system is designed to passively operate with the existing system and does not require day-to-day maintenance and/or oversight. The treatment system contains no automated features, nor any automated telemetry. The treatment system includes:

- A 15-foot by 9-foot and 6-inch thick concrete pad with a broom surface finish. The pad is reinforced with rebar. There is no curbing to trap or direct surface water.



- Two-inch galvanized carbon steel above-ground pipeline connected to the manifold.
- Manifold stationed between the LPGAC vessels (Figure 2) directs water to the LPGAC vessels. The manifold has three flange connections for: input, output, and washout. The manifold is fitted with eight control valves, four pressure gauges (Evoqua 0-100 pounds per square inch [psi]), and four sample collection points.
- Hoses from the manifold to the LPGAC vessels and 3-inch diameter drinking water rated hose with Camlocks.
- Two 2,000 pound (lb) LPGAC vessels manufactured by Evoqua.

The treatment system was installed by May 2022. A concrete pad was installed adjacent to the existing well for the placement of the LPGAC vessels and the manifold (Appendix A). Aboveground 2-inch pipelines were installed from the water system to the treatment system. The LPGAC vessels and manifold were placed on the concrete pad. The LPGAC vessels were loaded with granulated carbon provided by EVOQUA. Prior to being placed online, the treatment system was tested and maintained by running groundwater through the LPGAC vessels and discharging to the sewer. Water samples from the treatment system were tested for the presence of bacteria. Once the treatment system was ready for use the owner was informed. Following testing by the system operator the owner placed the system back online on May 10, 2022.

4.0 OPERATING PROCEDURES

4.1 EMERGENCY PROCEDURES

In the event of a system failure, or if it is suspected that the water quality is not meeting public health standards, the well will be immediately shut down by closing the valve from the well to the mobile home park and turning off the pump. The property owner, ADEQ, and system operator will be immediately contacted and informed of the situation. At the property owner's discretion, the connection with the municipal water system may be opened to provide water to the mobile home park. The property owner will then immediately contact appropriate authorities to inform them of the situation. ADEQ and/or the property owner will assess the system and/or water quality issues, and provide recommendations. The property owner will take necessary steps to provide water and protect human health.

4.2 START-UP AND SHUT-DOWN PROCEDURES

Start-up and shut-down procedures presented in this section shall be followed when turning on or off the treatment system. ADEQ and the property owner shall endeavor to coordinate with each other for treatment system start-ups and shut-downs. This includes a 24-hour notification by email or phone call to ADEQ and/or the property owner prior to system start-ups and shut-downs. Some of these procedures may not be required if the system is temporarily shut down for routine tasks, maintenance, trouble-shooting, or any other tasks.

Startup Procedures

- Check all valves to ensure water will flow through the system as directed (Figures 3 and 4);
- Record condition of all valves (open/closed) (Appendix B);
- Remove Lock-out, Tag-out (LOTO) safety equipment, if any;
- Turn on pump to automatic; (it may be necessary to slowly open a manifold valve to slowly start flow and prevent a water / pressure hammer);
- Once system is operational and the pump is running, check totalizer to verify flow;
- Check valves on top of LPGAC vessels for air. Open valve(s) to vent air if needed;
- Check the system for leaks; and

- Check valves to verify operating pressure (generally between 40 psi and 60 psi).

Shut Down Procedures

- Turn off the well pump;
- Close off valves as appropriate for system isolation as needed;
- Check gauges for pressure; and
- Open pressure valves to release pressure as appropriate.

4.3 NORMAL OPERATING PROCEDURES

The well-head treatment system is designed to passively operate with the existing equipment and does not require day-to-day maintenance and/or oversight. As the pump turns on, groundwater is pumped to the manifold which directs water to the top of the initial (lead) LPGAC vessel (Figure 3). Water flows from the top of the lead vessel through the LPGAC and out the tank bottom. Water leaving the bottom of the lead vessel goes to the manifold which directs the water to the top of the second (lag) vessel. Under normal operations, VOCs are removed to levels below MCLs in the lead vessel. As the capacity of the LPGAC in the lead vessel to remove contaminants decreases, break-through of contaminants will occur. For initiating change outs, break-through is defined when VOCs are detected leaving the lead vessel at concentrations equal to or greater than one-fourth of MCLs. Any contaminants leaving the lead vessel are treated in the lag vessel. When break-through from the lead vessel is detected, a LPGAC change-out of the lead vessel will be conducted. After the change-out, the manifold valves will be changed to switch the lead and lag vessels. The former lead vessel, in which new LPGAC has been filled, will become the new lag vessel (Figure 3). During a change-out, the lead vessel is isolated from system, and treatment is performed in the lag vessel. This allows for little to no disruption of service to the residents.

4.4 PERIODIC MONITORING AND MAINTENANCE

The treatment system requires periodic monitoring and maintenance to:

- Ensure system performance;
- Monitor for LPGAC vessel break-through;
- Provide maintenance as needed;
- Change-out LPGAC as needed; and

- Report observations.

The treatment system will be visited, inspected, and monitored at a regular frequency to ensure the system continues to operate properly, safely, and efficiently. The frequency of these visits are described below. However, visits can also be dependent on system flows, carbon loading rates, timing of LPGAC vessel break-through, and other operational parameters and objectives. When conducting these routine tasks, the collected information will be recorded on the appropriate form(s) (Appendix B). Additional tasks may be required based on new operational conditions identified during these routine visits or review meetings. The schedule of inspections is as follows:

- During the first six months of operation, the OMM Contractor will visit the site every two-weeks to observe and document the system operation (Appendix B). Once every quarter, water from the well, lead vessel and lag vessel will be collected and analyzed for VOCs using EPA method 8260M or 524.2 (Appendix B). A trip blank will be collected quarterly. No field blank and/or equipment blank samples will be collected. Sample collection is for the purpose of monitoring VOC in groundwater and VOC removal efficacy. The samples will be provided to an Arizona Department of Health Services licensed environmental laboratory for analysis.
- After the first six months of operation, the OMM Contractor will visit the site monthly to observe and document the system operation. Once every quarter water from the well, lead vessel and lag vessel will be collected and analyzed for VOCs using EPA method 8260M or 524.2 (Appendix B). A trip blank will be collected quarterly. No field blank and/or equipment blank samples will be collected. Sample collection is for the purpose of monitoring VOC in groundwater and VOC removal efficacy. The samples will be provided to an Arizona Department of Health Services licensed environmental laboratory for analysis.
- After break-through from the lead vessel is detected, a carbon change-out will be scheduled and performed. A sample of the LPGAC will be collected for disposal profile purposes (see below).
- It is the property owners responsibility to monitor and sample the system for all other compliance issues as needed.
- At their discretion, ADEQ and the OMM Contractor may collect and analyze groundwater and or treated water for other constituents, including total chromium.

Each routine visit should include the following tasks:

- Record the electric meter;
- Record totalizer;

- Record system pressures. LPGAC gauges should be approximately 40 to 60 psi while the well is pumping. High or low pressures and or differentials may indicate: blockage, broken gauges, leakage. The storage tank pressure should range from 30 psi to 60 psi. The well owner is responsible for setting the pump operation pressures.
- Occasionally, open valves on the top of each LPGAC vessel to check for the presence of air.
- Note any signs of leakage, damage, and/or corrosion.

ADEQ and the property owner shall endeavor to coordinate with each other for significant system maintenance. This includes a 24-hour notification by email or phone call to ADEQ and or the property owner prior to significant system maintenance. Routine visits shall include the following maintenance tasks:

- On a semiannual basis, the OMM Contractor shall conduct housekeeping at the Site including, but not limited to: sweep floors, dusting equipment, tidy all supplies and expendables, verify signage remains correct (replace if necessary), inspect for insect/rodent issues, etc.
- Exercise isolation valves on a semi-annual basis.
- Visually inspect for leaks and repair piping or equipment as needed.

4.5 LPGAC VESSEL BREAK-THROUGH AND PROFILING PROCEDURE

Treatment system analytical data shall be reviewed by ADEQ and the OMM Contractor upon receipt from the laboratory. When break-through concentrations (one-fourth of MCL) is detected from the lead vessel, the system shall be temporarily shut down and the vessel opened to collect a "profile for disposal" sample. The LPGAC change-out contractor shall be contacted to provide sampling and profile requirements. In general, a waste profile sample is collected by removal of the upper 6-inches of surface solids (crust material) and then using a decontaminated hand trowel to scoop the solid material into a laboratory provided container. This sample will be provided to the carbon supplier or laboratory for their use. In general, the sample will be analyzed for toxicity characteristic leaching procedure for VOCs, however, the sampling method and analysis may be modified by the LPGAC change-out contractor's requirements. If a valid profile already exists for the spent LPGAC, it may not be necessary to sample the vessel. When the carbon supplier has completed the analysis of the sample, or if no sample is required, the carbon supplier shall be contacted to arrange for a "remove and replace" service. The fresh LPGAC must be ordered as

pre-wetted (or “pre-soaked”) and acid-washed. Use of non-pre-wetted and non-acid-washed LPGAC will likely result in initial discharge water that exhibits a high pH. While awaiting change-out, the system can be operated in the existing Lead/Lag mode until the LPGAC in the lead vessel is changed.

4.6 CARBON CHANGE-OUT PROCEDURES

Once break-through has been established, the OMM Contractor will follow this generalized procedure:

- Isolate lead vessel from system, using only lag vessel for treatment;
- remove and replace used LPGAC (carbon supplier will be responsible for removing and replacing used LPGAC in accordance with their own procedures);
- follow carbon supplier procedures prior to re-connecting with system;
- run water through the vessel and discharge to the sewer or land;
- collect and analyze effluent from vessel for bacteria and VOCs; and
- if bacteria (BAT) is not present and VOCs are below MCLs, contact owner and ADEQ to receive permission and concurrence respectively to re-connect vessel as a lag vessel.

Prior to the scheduled LPGAC change-out service, the lead LPGAC vessel shall be isolated and the water shall be removed from the lead vessel (Figure 4). Removal may be performed by draining to the sewer or introducing air pressure. Air pressure shall be controlled with the use of a pressure regulator set no greater than 20 psi. The regulator output pressure shall be pre-set so that it cannot exceed the working pressure of the vessel. Air shall be introduced to the vessel slowly so that it approximates the normal flow parameters. Water from the lead vessel will be "pushed" by the compressed air through the lag vessel and to the sewer discharge.

When the carbon supplier arrives, an onsite safety tailgate meeting will be held with all personnel. Delivery paperwork shall be inspected to assure that the correct LPGAC type and sieve size has been delivered.

The carbon supplier will begin the removal of spent LPGAC. This LPGAC will be collected in sealed drums or truck-mounted containers. Spent carbon shall be contained in sealed containers,

super-sacks are not permitted due to the potential for water leakage. The carbon supplier shall remove the spent carbon under a bill-of-lading or manifest for off-site disposal or recycling.

When the spent LPGAC has been removed, the OMM Contractor will visually inspect the interior of the vessel to verify that all LPGAC has been removed. During this inspection, internal structures such as underdrains will be inspected to determine that no damage has occurred. The inner lining of the vessel will also be inspected to verify that the lining material is intact. The vessel shall also be inspected by the OMM Contractor after the LPGAC has been installed in the vessel to verify that the proper amount of LPGAC is in the vessel, and that the top of the LPGAC is flat and even. The manway or lid seal shall be inspected to assure it is in good condition. If required by the carbon supplier procedure, the vessel can be backwashed and water discharged to sewer. The changed-out vessel shall then be filled with water. Pressure relief valves on the LPGAC vessel shall be opened to allow air within the vessel to escape while the vessel is being filled with water. The vessel shall be inspected for leaks. Approximately 2,000 gallons of groundwater shall be run through the vessel to sewer, and then effluent from the vessel sampled for BAT and VOCs with an expedited turnaround time. The vessel shall be isolated from the treatment system while the samples are tested. If BAT is not present and VOCs are below MCLs the vessel may be reconnected to the system. The system connections controlling the flow pathway shall be configured so that the vessel with the fresh pre-wetted and acid-washed LPGAC is placed in the lag position. Signage shall be changed to reflect the new relative positions of the vessels. The system shall be observed by the OMM Contractor to verify normal operation.

If BAT is detected, the vessel shall be caustic washed by the carbon supplier until no longer detected. If VOCs are detected above MCLs the OMM Contractor and carbon supplier shall determine the cause and take appropriate measures to correct.

4.7 REPORTING PROCEDURES

The following reporting will be performed:

- Once this OMM Manual has been approved by ADEQ, the OMM Contractor shall prepare monthly reports for the treatment system on standardized formats. Reports will be provided to ADEQ, the property owner, and the system operator via email. Monthly reports will include observations from routine visit, sampling results, and anticipated future activities.

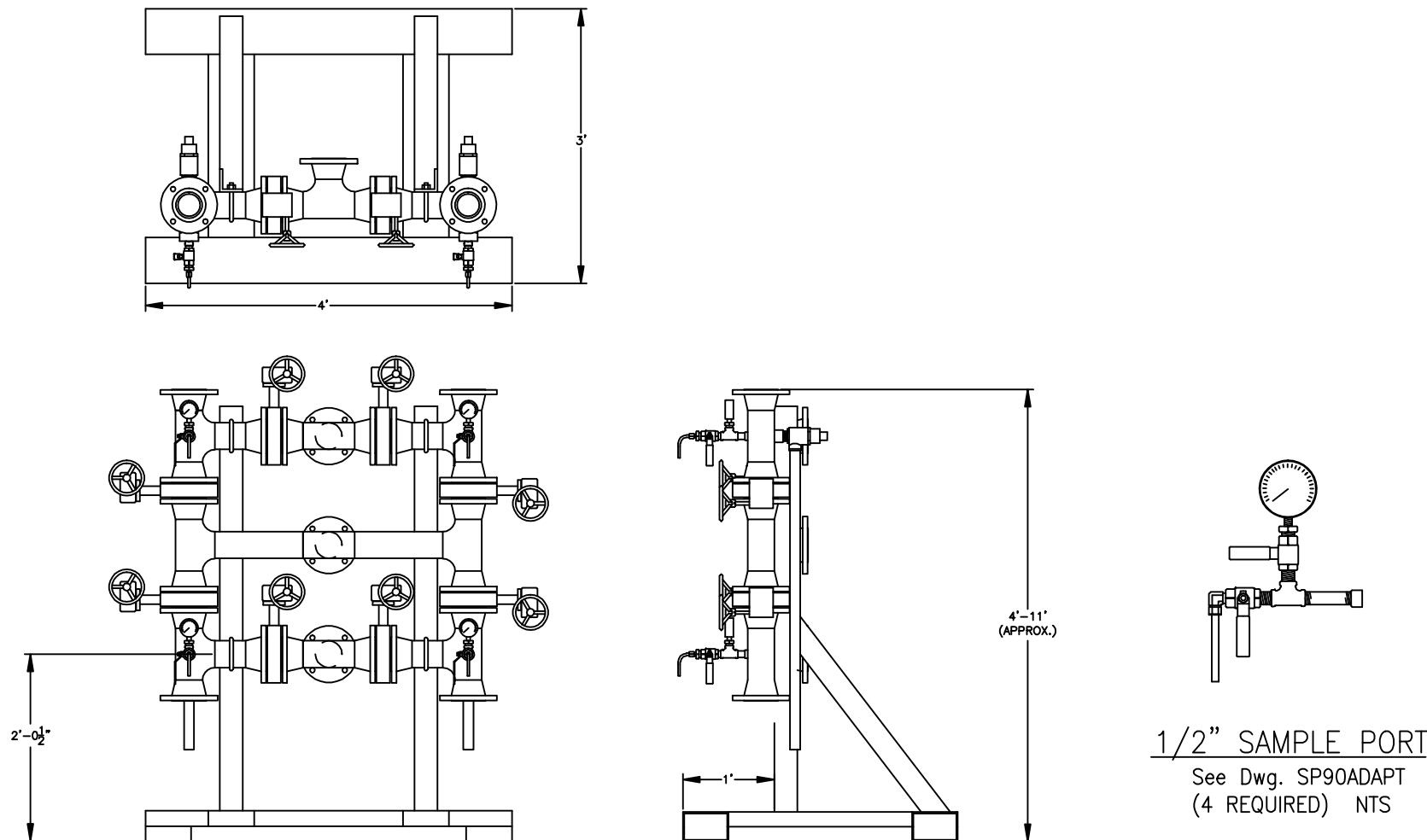
- The OMM Contractor will prepare annual reports for the treatment system on standardized formats. Reports will be provided to ADEQ, the property owner, and the system operator via email by the end of January the following year. Reports will include summary of tasks performed, system discharge summaries, break-through observations, laboratory reports, and anticipated activities over the next year.

FIGURES

STD: BORDER-0106-8X11A

INTL REF:

BAR = 1" AT PLOT SCALE



* OPTIONAL BWO VALVE LOCATION

COMPANY CONFIDENTIAL
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DESIGNER CAR	DATE 3/23/06	TITLE 3 INCH CS MANIFOLD	
CHECKER	DATE		
ENGINEER	DATE	CLIENT	
MANAGER	DATE	SIEMENS WATER TECHNOLOGIES RED BLUFF, CA 530-527-2664	
FILE:			
SCALE: NONE		PROJECT	CODE
		DRAWING MAN1003SHOP	SHEET 1 OF 1
			REV

FIGURE 2: MANIFOLD

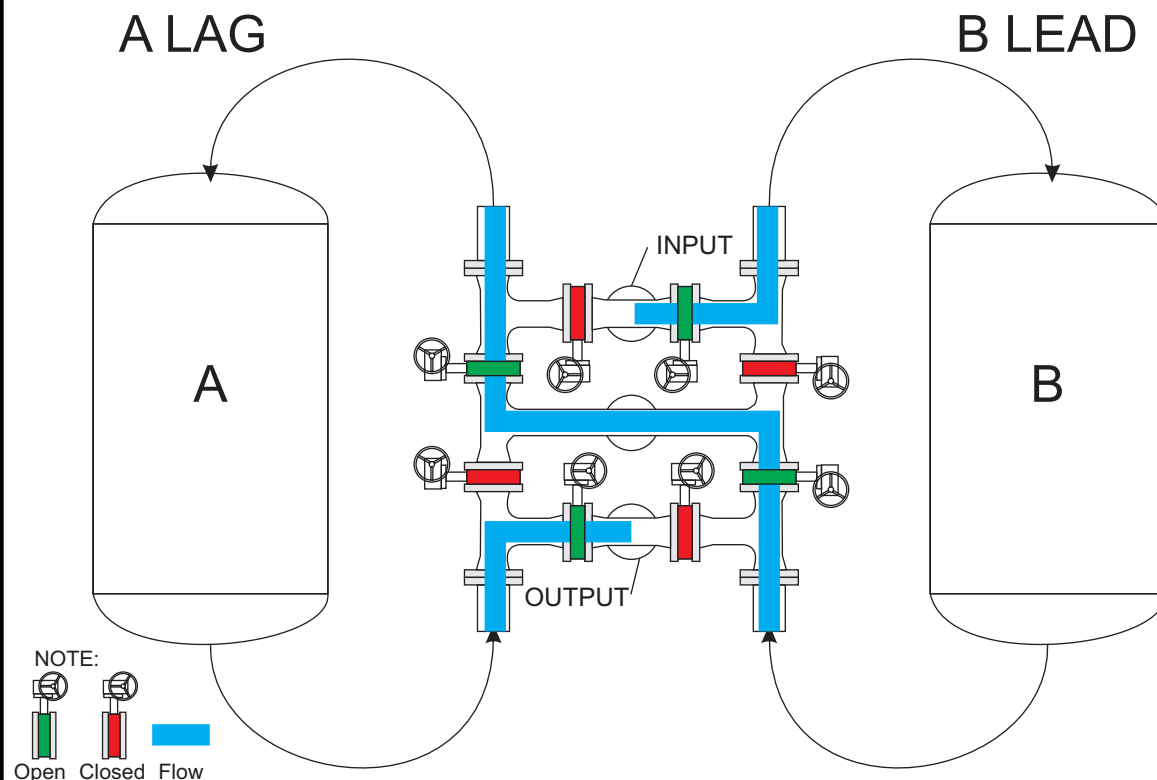
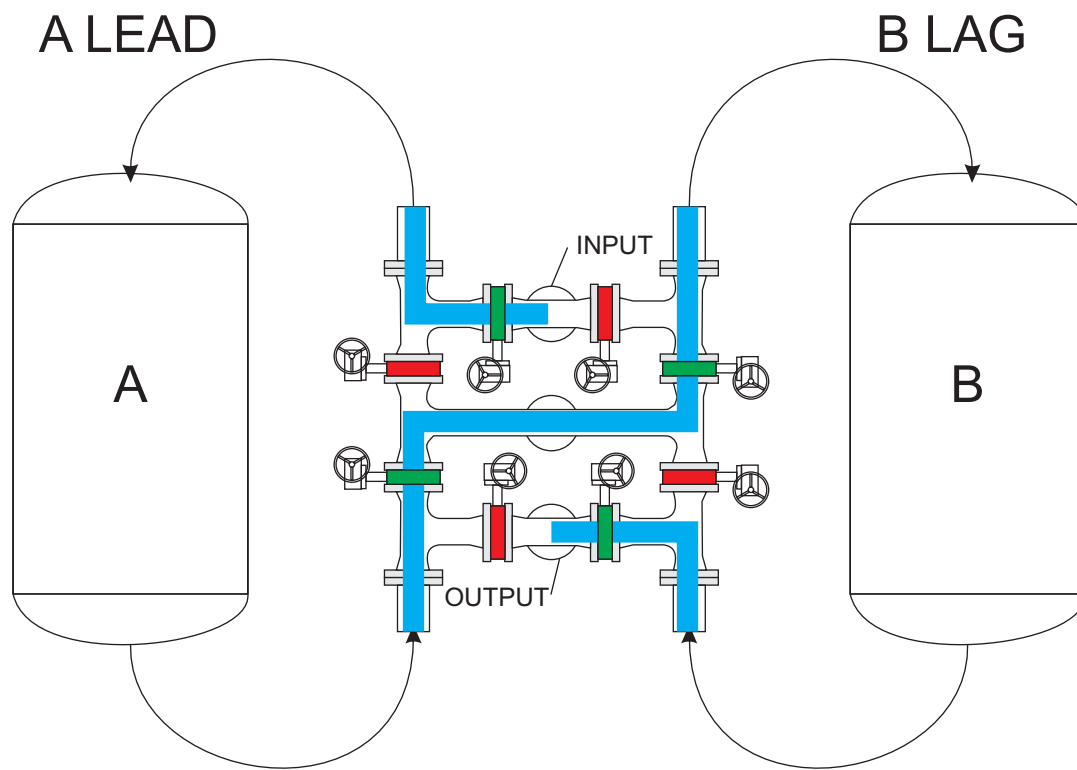
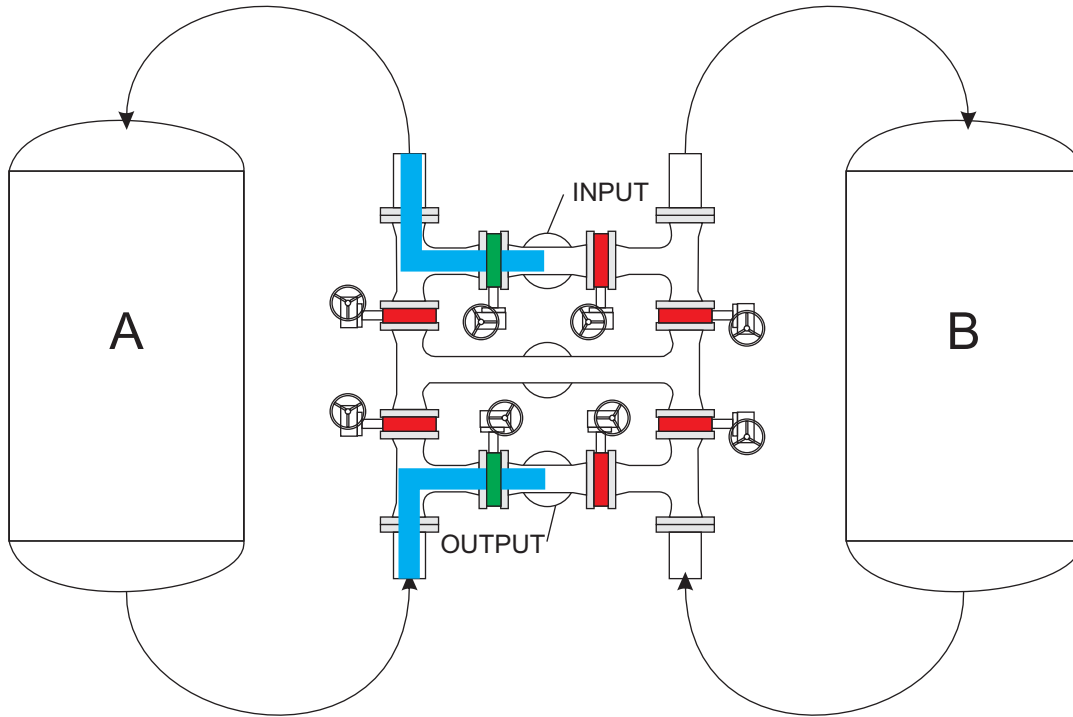
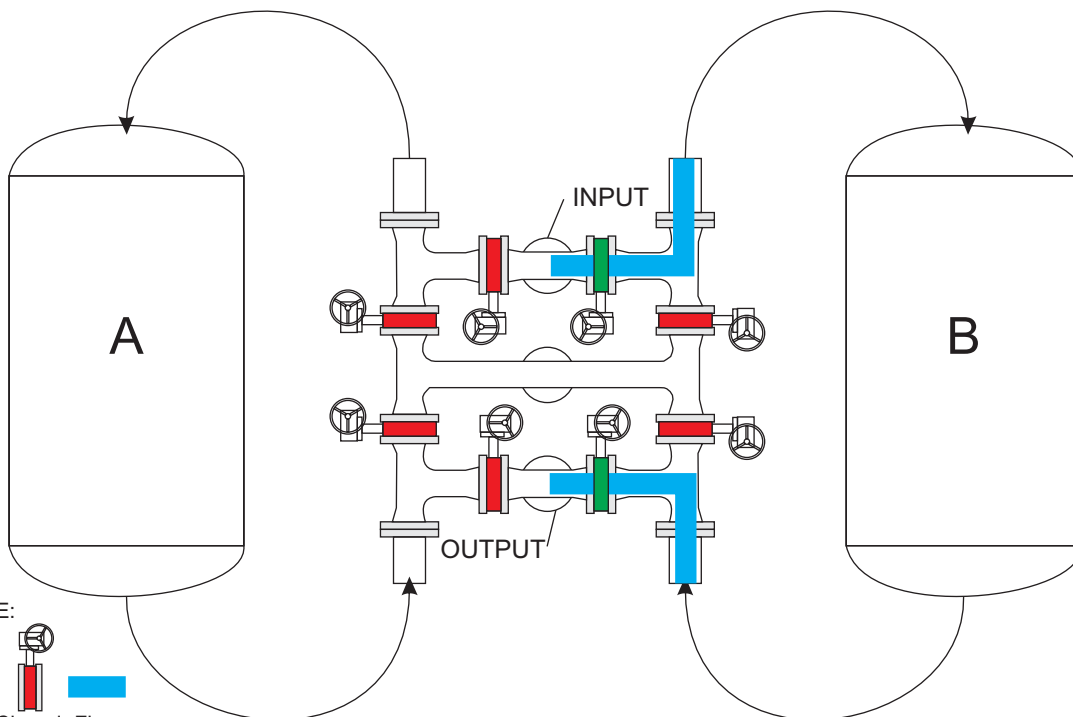


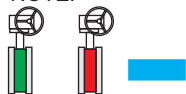
FIGURE 3: LEAD LAG VALVE SETUP

A ONLY



B ONLY



NOTE:

 Open Closed Flow



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 Hydrogeology/Engineering

06/03

RPT NO. 1233.6

Figure 2_LGAC System.cdr

VER 1.

FIGURE 4: SINGLE VESSEL VALVE SETUP

APPENDIX A
EQUIPMENT SPECIFICATIONS



HARGIS+ASSOCIATES, INC.

ENGINEERING SPECIFICATION

SECTION NO.: 01 11 00

TITLE: SUMMARY OF WORK

PROJECT: MIRACLE MILE NORTH LA CHOLLA
MOBILE HOME PARK,
PUBLIC WATER SUPPLY SYSTEM NO. AZ0420043

PROJECT NO.: 1306.01

COMPANY: ARIZONA DEPARTMENT OF ENVIRONMENTAL
QUALITY

LOCATION: 5050 N. LA CHOLLA BLVD, TUCSON, ARIZONA

1	APPROVED FOR CONSTRUCTION	8	ADEQ	TRR	CAP	RES	3/9/22
0	CLIENT REVIEW	8	ADEQ	TRR	CAP	AJJ	9/29/21
Rev.	ISSUE DESCRIPTION	PAGES	CL	EM	PM	DE	DATE

ENGINEERING SPECIFICATION	SUMMARY OF WORK SECTION 01 11 00	Project: <u>1306.01</u> Revision: <u>1</u> Date: <u>3/9/22</u> Page <u>2</u> of <u>8</u>
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PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Entities identified in this Section are defined as follows:
- Company: Arizona Department of Environmental Quality (ADEQ)
Engineer: Hargis + Associates, Inc. (H+A)
Property Owner : Halquist Family Living Trust
Contractor: Crane Machine & Pump Service, Inc.
- B. This Section identifies the minimum requirements of work to be completed for the Miracle Mile North La Cholla Mobile Home Park (MHP) Public Water Supply System at 5050 North La Cholla Boulevard, Tucson, Arizona (the "Site").
- C. The Contractor shall provide all work complete and operable, in strict accordance with the Design Drawings and Specifications. The work shall include, but not be limited to, all materials, labor and testing, whether or not specifically mentioned, but which are necessary for complete construction of the Miracle Mile North La Cholla MHP Public Water Supply System per Clean Water Act Regulations.

1.02 RELEVANT SECTIONS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and all other Specification Sections, apply to this Section.

1.03 REFERENCED STANDARDS

- A. Not applicable.

1.04 NOTED RESTRICTIONS

- A. Not applicable.

1.05 SITE LOCATION

- A. The Miracle Mile North La Cholla MHP Public Water Supply System is located at 5050 North La Cholla Boulevard, Tucson, Arizona.

1.06 PROCESS DESCRIPTION – GENERAL

- A. Groundwater from the North La Cholla well is extracted using a multi-stage centrifugal, submersible pumps and conveyed through an above-grade galvanized carbon steel pipeline to the Miracle Mile North La Cholla MHP Public Water Supply System. The extracted groundwater will be treated using liquid phase granular activated carbon (LPGAC) adsorption to remove volatile organic compounds (VOCs) and conveyed to an existing pressure vessel before entering the distribution system.

ENGINEERING SPECIFICATION	SUMMARY OF WORK SECTION 01 11 00	Project: <u>1306.01</u> Revision: <u>1</u> Date: <u>3/9/22</u> Page <u>3</u> of <u>8</u>
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1.07 SCOPE

A.

The general scope of work (SOW) for the project includes the following:

1. Attendance at a mandatory Pre-Construction Meeting. The meeting may be in person or via remote call-in. The Engineer will lead the meeting; however, the Contractor should be prepared to present on their schedule and planned approach.
2. Demolition of existing piping as identified in the job walk. Contractor shall take steps to protect all equipment, valving, electrical, and instrumentation identified as being reused. Any equipment, valving, instrumentation damaged during demolition activities shall be replaced with National Sanitation Foundation (NSF) compliant equipment at the Contractor's expense.
3. Contractor shall be responsible for securing and packaging/palletizing all equipment, valving, and instrumentation for storage as directed by the Company's Representative.
4. Installation of a concrete foundation in accordance with the Design Drawings.
5. Installation of a new LPGAC adsorbers and manifold in accordance with the Design Drawings, manufacturer's specifications, and compliant with NSF regulations for potable water systems.
6. Supply and installation of piping, pipe supports, and valving in accordance with the Design Drawings and manufacturer's specifications.
6. Provide all project submittals as required by the Design Drawings and Engineering Specifications.
7. Procurement and installation of all materials not specifically identified as being provided by the Company.
8. Installation and termination of all equipment, materials, etc. provided by the Company.
9. Contractor shall provide personnel for functional and mechanical completion and testing (leak) at construction completion. For bidding purposes, assume one day of fieldwork.
10. All work to take place in accordance with applicable regulations, including Arizona Administrative Code Title 18, Chapter 5 and Clean Water Act regulations.

B. Perform Work under a time and materials contract with the Company Representative in accordance with Conditions of Contract. If necessary and requested, perform out-of-scope work under a time and materials basis with the Company Representative, in accordance with the Contractor's schedule of rates and the Conditions of Contract.

C. Contractor shall guarantee his/her construction against any and all defects from material and workmanship for a period of one year from the date of completion and acceptance by the Company.

1.08 DIVISION OF WORK

A.

Design Drawings

1. The Design Drawings provided are intended to represent the minimum requirements for construction of the Miracle Mile North La Cholla MHP Public Water Supply System. The omission of any essential provision shall not be interpreted to relieve the Contractor of any duty or obligation necessary for the complete, reliable, working installation of this facility or for the work to be completed in a workman-like manner.
2. Applicable Design Drawings provided identify utility crossings and other features identified, if any. Although reasonable efforts have been made to assure the accuracy and completeness of these drawings, it shall be the Contractor's responsibility to verify the location, depth, and number of utility crossings and

ENGINEERING SPECIFICATION	SUMMARY OF WORK SECTION 01 11 00	Project: <u>1306.01</u> Revision: <u>1</u> Date: <u>3/9/22</u> Page <u>4</u> of <u>8</u>
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other below-grade obstructions. If any utility crossings or below-grade obstructions are discovered during the investigation, these existing features shall be pot-holed and elevations confirmed with the Engineer before excavating trenches that cross such features. The Contractor shall repair or replace any structures, including pipelines and cables, damaged by the Contractor or any of the Contractor's subcontractors at no expense to the Company.

3. In case of conflicts within the Design Drawings the more restrictive shall apply. The Contractor shall notify the Engineer of the discrepancy and the Engineer shall determine which requirement is most restrictive.

B The following will be provided by the Company, Company's Representative, or Others:

1. Access to the Site.
2. Design Drawings and specifications for the Miracle Mile North La Cholla MHP Public Water Supply System required for construction.
3. An area for the Contractor's use during construction. The area may be used for temporary field office trailers, sanitary facilities, storage of materials and equipment, and staging of construction materials and/or debris. If requested, temporary electrical power and temporary potable water connections will be provided by the Company. It is assumed the existing fenced compound will act as the staging area. Should the Contractor require additional space, Contractor to coordinate with the Engineer and Property Owner on alternate locations.
4. On-Site field representation and observation of the work performed by the Contractor. Inspection and approval by the Company and/or the Engineer of any work shall in no way relieve the Contractor of the responsibility of meeting all federal, state, or local requirements.
5. Confirmatory testing is not required. However, at the Company's discretion, confirmatory testing/inspection of compaction, concrete strength, or other work shall be performed. Confirmatory testing shall in no way relieve the Contractor of the responsibility of meeting all federal, state, or local requirements.

C. The Contractor shall furnish all labor and materials (except for services, materials and/or equipment to be furnished by Others as specifically referred to in the Contract Documents), and perform all work required for the complete and satisfactory construction of the Miracle Mile North La Cholla MHP Public Water Supply System which includes, but is not limited to, the following:

1. Performing all work in accordance with the requirements described herein, including the Design Drawings and all applicable federal, state, and local laws, rules, and regulations.
2. Furnishing all personnel required to carry out the Contractor's obligations described herein. Personnel to be provided by the Contractor include, but are not necessarily limited to, the following: purchasing personnel, expeditors, inspectors, project managers, superintendents, foreman, and skilled and unskilled labor.
3. Transport, disposal and management of excess soil in accordance with Pima County regulations.
4. Providing all construction equipment, materials, tools, vehicles, and expendables not specifically listed as being furnished by the Company that are required to execute the work described herein. Major items to be provided by the Contractor include, but are not limited to, the following:

ENGINEERING SPECIFICATION	SUMMARY OF WORK SECTION 01 11 00	Project: <u>1306.01</u> Revision: <u>1</u> Date: <u>3/9/22</u> Page <u>5</u> of <u>8</u>
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- a. All NSF 61 compliant pipe and pipe fittings, valving, bolting, and gasketing, as identified in the Design Drawings.
- b. All pipe and equipment support in accordance with applicable Design Drawings.
- c. All concrete, sand, gravel, fill material, slurry and cement.
- d. All welding rods, Teflon tape, cutting oils, grinding disks, sandpaper, wire brushes, and expendables required for piping.
- e. All replacement landscaping (if necessary).
- f. Establish temporary utilities for use during construction.
- g. Installation and maintenance of Best Management Practices (BMPs) in accordance with the Design Drawings and/or the Pima County storm water regulations.
- h. Dust control and mitigation in accordance with Pima County rules and regulations.
- i. Transport, disposal and management of excess soils in accordance with the Pima County storm water regulations.
- j. Mobilization and demobilization of temporary utilities, contractor field office, and equipment laydown areas.
- k. Trash storage and removal, sanitation facilities, and street sweeping. Provide temporary trash bins for the disposal of municipal trash, general construction debris, waste asphalt, waste concrete, etc.
- l. All mechanical components as shown in Design Drawings (pipe, pipe supports, gauges, sample ports, check valves, globe valves, butterfly valves, ball valves, pressure control valves, etc.).
- m. Housekeeping of construction work areas.
- n. All NSF 61 compliant temporary gauges, fittings, hoses, valves, pumps, compressors, test media, relief devices, and leak inspection materials required for leak testing.
- o. All NSF 61 compliant replacement materials, whether originally provided by the Company, the Contractor, or Others, that have been damaged, lost, or used to repair defects in the work performed by the Contractor.
- p. All health and safety equipment.
- q. All temporary and permanent fencing, barriers, and warning signs required by federal, state, or local laws, rules, or regulations.
- r. All temporary facilities including racks, bins, shelving, containers, sheds, pallets, tarpaulins, and visqueen, required for temporary storage of all materials, equipment provided by the Company, Contractor, and Others, temporary office trailers and facilities, and sanitation facilities.
5. Health and safety (H&S) is a top priority for all activities. Contractor, Contractor's employees, and all subcontractors are expected to be conscious of H&S best practices and use the proper personal protective equipment. All activities are to be conducted in accordance with the Contractor's company Health and Safety Plan (HASP). A Site-Specific HASP is not required. Contractor shall be responsible for the H&S of its own employees and subcontractors.
6. Maintain a safe and clean working environment. The Company's housekeeping expectations will be high, especially at the soil/equipment lay-down areas and within the road construction zones. At any time, the Company and/or the Engineer will have the authority to require the Contractor to improve the safety and cleanliness of the work areas. Should the Contractor habitually be negligent in this responsibility, the Company may obtain safety equipment/services, as

ENGINEERING SPECIFICATION	SUMMARY OF WORK SECTION 01 11 00	Project: <u>1306.01</u> Revision: <u>1</u> Date: <u>3/9/22</u> Page <u>6</u> of <u>8</u>
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necessary, and deduct the amount of such services from the Contractor's subsequent invoice or final payment.

7. Perform final cleanup of the Site in accordance with the requirements of the Company.
8. Store and handle all equipment and materials provided by the Company, Contractor, or others.
9. Collect and transport all water used during construction, including leak testing.
10. Execute changes in work only after obtaining an approved Change Order.
11. Coordinate the work of all subcontractors.
12. Notify all subcontractors of the requirements set forth herein. The Contractor shall be on-Site if any subcontractors are doing work.
13. Ensure no foreign matter enters the distribution system and coliform and E. Coli are not present in the distribution system after construction. The Engineer and the LPGAC vessel supplier will coordinate and manage any testing which may be required.

D. Items noted NIC (Not in Contract):

1. The requirement for construction permits is not anticipated.

1.09 DESCRIPTION OF WORK

The following description of work has been prepared to summarize and clarify work to be performed by the Contractor. The description shall not be construed to limit the SOW otherwise detailed in the Contract Documents.

A. Miracle Mile North La Cholla MHP Public Water Supply System

1. Civil Work and Site Preparation

- a. The Design Drawings show a conceptual pipeline alignment only. It shall be the Contractor's responsibility to layout pipeline and obtain layout approval from the Engineer prior to the start of work.
- b. The Contractor shall perform all grading, scarification, backfilling, and re-surfacing for the installation of the Miracle Mile North La Cholla MHP Public Water Supply System in accordance with the Design Drawings. Excess excavated materials shall be stockpiled in the designated areas identified during the job walk, and subsequently disposed of off-Site.
- c. The Contractor shall provide all subbase and base materials in accordance with the Design Drawings.
- d. The Contractor shall layout, form, and install all concrete elements in accordance with the Design Drawings.
- e. The Contractor shall provide and install all pipe supports and equipment anchorage in accordance with Design Drawings.

2. Mechanical Work

- a. All NSF 61 compliant galvanized carbon steel pipe and pipe fittings shall be supplied and/or installed in accordance with the Design Drawings.
- b. The Contractor shall supply, install, calibrate, and test equipment and instrumentation supplied by the Company in accordance with the requirements of the Design Drawings and manufacturer's specifications, if applicable.
- c. The Contractor shall flush and leak-test all piping and equipment (tanks) with clean potable water chlorinated in accordance with the Clean Water Act and State of Arizona regulations. Leak testing shall be performed by hydrostatic methods at the system design pressure (75 psi)..

ENGINEERING SPECIFICATION	SUMMARY OF WORK SECTION 01 11 00	Project: <u>1306.01</u> Revision: <u>1</u> Date: <u>3/9/22</u> Page <u>7</u> of <u>8</u>
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1.10 PRODUCTS SUPPLIED BY THE COMPANY

- A. Company Responsibilities:
 - 1. On delivery, inspect products jointly with Contractor.
 - 2. Submit claims for transportation damage and replace damaged, defective, or deficient items.
 - 3. Arrange for manufacturers' warranties, inspections, and service.
 - 4. The Company ordered an Evoqua package system which includes two 2,000 pound LPGAC vessels and a pipe manifold. The contract was executed on 9/13/21 with an estimated 20-22 week lead time. The purchase price includes delivery to the site, off-loading, and an initial carbon fill (4,000 pounds total).
- B. Contractor's Responsibilities:
 - 1. Arrange and pay for material and equipment delivery to Site, if required.
 - 2. Receive and unload products at Site; inspect for completeness or damage jointly with the Company and/or the Company's Representative.
 - 3. Handle, store, install, and finish products where indicated on drawings.
 - 4. Repair or replace items damaged after receipt.

1.11 PRODUCTS SUPPLIED BY THE PROPERTY OWNER

- A. The Property Owner has provided an existing chain-link fence enclosure. Any damage during construction activities shall be replaced with equivalent fence materials at the Contractor's expense.
- B. The Property Owner is responsible for upgrades to existing system, including: 1) replace existing water storage tank with two 119-gallon pressure tanks, 2) replace existing lift pump, 3) replace existing close-off bleed back system, 4) re-plumb existing system with new pipe, and 5) install new VFD-controller on lift pump.
- C. The Property Owner is responsible for electrical power upgrades (if necessary). A new electrical power meter is not required (plan to use existing).

1.12 CONTRACTOR'S USE OF SITE AND PREMISES

- A. Limit use of Site and premises to allow:
 - 1. Company and/or Engineer personnel occupancy.
 - 2. Work by the Company and Others.
- B. Construction Operations: Limited to areas noted on drawings.
- C. Time Restrictions for Performing Interior and Exterior Work: Monday through Friday 8:00 am to 5:00 pm. Work at night will not be required.

1.13 COOPERATION WITH OTHER CONTRACTORS

- A. The Contractor shall cooperate with and conduct work activities so as not to interfere with or hinder the progress of completion of the work being performed by other contractors. In case of dispute between contractors, the Company shall be the referee and the Company's decision shall be final and binding on all. The Contractor shall, as far as possible, arrange work activities, and shall place and dispose of the materials being used so as not to interfere with the operation of the other contractors at the Site. The Contractor shall coordinate work with that of other contractors in an acceptable manner and shall perform it in the proper sequence to that of other contractors. The Contractor shall so arrange work activities to effectively cooperate with other contractors and any employees of H+A or ADEQ working in the area. No additional compensation will be allowed on account of the cooperation required.

ENGINEERING SPECIFICATION	SUMMARY OF WORK SECTION 01 11 00	Project: <u>1306.01</u> Revision: <u>1</u> Date: <u>3/9/22</u> Page <u>8</u> of <u>8</u>
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1.14 OCCUPANCY

- A. The Property Owner will occupy the Site during the entire period of construction.
- B. Cooperate with the Property Owner to minimize conflict, and to facilitate the Property Owner's operations.
- C. Schedule the work to accommodate Property Owner occupancy.

PART 2 – PRODUCTS - (NOT USED)

PART 3 – EXECUTION - (NOT USED)

END OF SECTION

CONSTRUCTION NOTES:

A. PARTIES INVOLVED IN THE PROJECT:

1. COMPANY - ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY (ADEQ)
2. ENGINEER - HARGIS + ASSOCIATES, INC. (H+A)
3. CONTRACTOR - CRANE MACHINE & PUMP SERVICE, INC.
4. PROPERTY OWNER - HALLQUIST FAMILY LIVING TRUST

B. GENERAL NOTES:

1. UNLESS SPECIFICALLY IDENTIFIED AS EXISTING OR NOT-IN-CONTACT, EVERYTHING SHOWN ON THESE DRAWINGS SHALL BE PROVIDED AND INSTALLED AS PART OF THE WORK OF THE PROJECT.
2. CONTRACTOR SHALL GUARANTEE HIS CONSTRUCTION AGAINST ANY AND ALL DEFECTS FROM MATERIAL AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF COMPLETION AND ACCEPTANCE BY THE ENGINEER AND/OR THE COMPANY.
3. ANY CONTRADICTIONS OR CONFLICTING STATEMENTS CONTAINED IN THESE NOTES, OR BETWEEN THESE AND THE PROJECT DRAWINGS OR GENERAL SPECIFICATIONS SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ENGINEER. THE ENGINEER SHALL BE TO REVIEW DRAWINGS AND CONDUCT A SITE VISIT PRIOR TO THE START OF WORK. ANY CONFLICT BETWEEN THE DRAWINGS AND ACTUAL SITE CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE ENGINEER PRIOR TO START OF WORK.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING ALL FIELD DIMENSIONS WITH ENGINEER AND/OR COMPANY BEFORE BEGINNING OF WORK, THE ENGINEER SHALL BE NOTIFIED OF ANY DISCREPANCY.
5. ALL SIDEWALKS AND OTHER IMPROVEMENTS WHICH SURROUND THE PROPERTY SHALL REMAIN UNDISTURBED AND UNDAMAGED AS A RESULT OF THE PROJECT. ANY DAMAGE CAUSED BY THE CONTRACTOR SHALL BE REPAIRED AND/OR REPLACED AT THE CONTRACTORS SOLE COST.
6. BARRICADES AND SECURITY FENCING SHALL BE PROVIDED AS NEEDED AT ALL EXCAVATIONS AND DISTURBED AREAS THROUGHOUT THE PROJECT, TO ENSURE VEHICULAR AND PEDESTRIAN SAFETY.
7. CONTRACTOR AND PROPERTY OWNER SHALL MAINTAIN INSURANCE ADEQUATE TO INDEMNIFY COMPANY AGAINST LOSS, DAMAGE, AND/OR INJURY CLAIM WHICH MIGHT ARISE AS A RESULT OF THIS PROJECT.
8. CONTRACTOR'S FINAL INVOICE WILL BE PROCESSED FOR PAYMENT ONLY AFTER THE SITE HAS BEEN INSPECTED BY ENGINEER AND COMPANY WITH CONTRACTOR AND THE ENGINEER HAS ACCEPTED PROJECT AND AS-BUILT DRAWINGS AS COMPLETE. CONTRACTOR SHALL PROVIDE ENGINEER WITH AS-BUILT DRAWING MARK-UPS, THE AS-BUILT DRAWINGS SHALL BE LEGIBLE AND ACCURATELY MARKED UP COPIES OF THE ORIGINAL "D" SIZE DRAWINGS.
9. THE CITY OF DENVER OR ENGINEER MAY AUTHORIZE A CONTRACT "EXTRA" AND ISSUE AN ALTERATION FOR A CHANGE ORDER TO THE CONTRACT. SHOULD THE CONTRACTOR BELIEVE AN EXTRA IS WARRANTED, THEY SHOULD IMMEDIATELY COMMUNICATE IN WRITING WITH THE COMPANY OR ENGINEER AND BE PREPARED TO QUOTE A FIRM PRICE OR A "NOT TO EXCEED" COST.
10. SITE SHALL BE MAINTAINED IN A NEAT AND CLEAN CONDITION THROUGHOUT CONSTRUCTION ACTIVITIES. NO DEBRIS, SOIL STOCK PILES, ARTICLES, OR EXCESS MATERIAL SHALL REMAIN AFTER COMPLETION OF THE PROJECT.
11. CONTRACTOR SHALL ACCEPT THE PREMISES IN "AS IS" CONDITION. NEITHER THE COMPANY, PROPERTY OWNER, OR ENGINEER MAKES ANY WARRANTY, EXPRESSED OR IMPLIED, AS TO THE CONDITION OF THE PREMISES INCLUDING, BUT NOT LIMITED TO, FITNESS FOR ANY PARTICULAR PURPOSE, EXISTING DEBRIS, OR STORED MATERIAL(S). MATERIAL(S) WHICH REQUIRE TEMPORARY RELOCATION SHALL BE MOVED BY CONTRACTOR AND REPLACED UNDAMAGED AFTER PROJECT COMPLETION.
12. CONTRACTOR SHALL PROVIDE ALL EQUIPMENT, MATERIALS AND APPURTENANCES, UNLESS NOTED OTHERWISE. CONTRACTOR SHALL INSTALL EQUIPMENT AND APPURTENANCES IN ACCORDANCE WITH RESPECTIVE MANUFACTURERS INFORMATION MANUALS AND IN ACCORDANCE WITH INTERNATIONAL AND UNIFORM PLUMBING CODES, INTERNATIONAL MECHANICAL CODE, INTERNATIONAL BUILDING CODE, NATIONAL ELECTRICAL CODE, AND INTERNATIONAL FIRE CODE.
13. COMPANY, PROPERTY OWNER, OR ENGINEER SHALL NOT BE RESPONSIBLE FOR ANY ACTS OR OMISSIONS, CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES OR PROCEDURES, OR FOR THE SAFETY PRECAUTIONS AND PROGRAMS OF THE CONTRACTOR, SUBCONTRACTORS, OR ANY OTHER PERSONS PERFORMING WORK ON THE PROJECT.
14. CONTRACTOR SHALL COORDINATE ALL WORK WITH COMPANY, ENGINEER, AND PROPERTY OWNER TO MINIMIZE DISRUPTION TO BUSINESS OPERATIONS AND TRAFFIC.
15. A PRE-CONSTRUCTION MEETING, IF REQUIRED, BETWEEN THE COMPANY, THE CONTRACTOR, AND ENGINEER WILL BE REQUIRED BEFORE WORK BEGINS. MEETING DATE, TIME, AND LOCATION T.B.D.
16. ALL SITE INSPECTIONS REQUIRE A MINIMUM 24 HOURS NOTICE.
17. THE CONTRACTOR SHALL OBTAIN ANY PERMITS REQUIRED, IF ANY, UNLESS OTHERWISE INDICATED. COORDINATE ANY RELOCATION AND REMOVALS BY OTHERS. THE ENGINEER WILL PAY ALL PERMIT FEES.
18. LOCATIONS, ELEVATIONS AND DIMENSIONS OF EXISTING UTILITIES, STRUCTURES AND OTHER FEATURES ARE SHOWN ACCORDING TO THE BEST INFORMATION AVAILABLE AT THE TIME OF THE PREPARATION OF THESE PLANS, BUT ARE ONLY APPROXIMATE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING LOCATIONS, ELEVATIONS AND DIMENSIONS OF ALL EXISTING UTILITIES, STRUCTURES AND OTHER FEATURES AFFECTING THIS WORK AND AVOIDING DAMAGE TO SAME.
19. THE CONTRACTOR SHALL CONTACT THE UTILITY PRIOR TO PROCEEDING WITH WORK WHICH INVOLVES OR AFFECTS EXISTING FEATURES OR AFFECTS EXISTING UTILITIES. AZ811 MUST BE NOTIFIED PRIOR TO ANY DIGGING OR EXCAVATIONS (800-782-5348).
20. ALL UTILITIES SHALL BE PROTECTED FROM DAMAGE AS A RESULT OF THE WORK. THE CONTRACTOR SHALL COORDINATE WITH UTILITIES FOR RELOCATION, REPAIR, OR REPLACEMENT OF ANY UTILITIES TO THE SATISFACTION OF THE UTILITIES AND THE PROPERTY OWNER. THE CONTRACTOR SHALL ASSUME FULL RESPONSIBILITY FOR ANY DAMAGE TO EXISTING FACILITIES RESULTING FROM THE NEGLIGENT PERFORMANCE OF THE WORK. REPAIR AND REPLACEMENT OF DAMAGED FACILITIES SHALL BE PERFORMED AT THE CONTRACTOR'S SOLE COST AND IN A TIMELY MANNER.
21. ALL CONSTRUCTION WORK INSPECTIONS SHALL BE IN ACCORDANCE WITH PERMIT REQUIREMENTS, IF ANY.
22. CONTRACTOR SHALL MAINTAIN DUST CONTROL VIA COMPLIANCE WITH THE PIMA COUNTY AIR QUALITY DEPARTMENT.
23. CONTRACTOR IS RESPONSIBLE FOR COMPUTING THEIR OWN QUANTITIES FOR ALL CONSTRUCTION MATERIALS.

C. EXCAVATION AND GRADING:

1. ALL SITE GRADING ACTIVITIES SHALL BE PERFORMED IN ACCORDANCE WITH THE LOCAL CODES AND THE LATEST EDITION OF THE MARICOPA ASSOCIATION OF GOVERNMENTS UNIFORM STANDARDS SPECIFICATIONS AND DETAILS, WHERE APPLICABLE THE MORE STRINGENT REQUIREMENTS BETWEEN THE TWO SHOULD PREVAIL.
2. VEGETATION, TRASH, AND DEBRIS SHALL BE CLEARED FROM THE SITE PRIOR TO CONSTRUCTION. ALL ABANDONED UTILITIES SHALL BE DRAINED OF ALL CONTENT, IF ANY, AND PROPERLY CAPPED.
3. SOIL REMOVAL AND THE GENERAL GRADING PROCEDURES SHALL BE OBSERVED BY A REPRESENTATIVE OF THE ENGINEER.
4. AFTER EXCAVATION OF THE PLANNED SUBGRADE LEVEL, A REPRESENTATIVE OF THE ENGINEER SHALL OBSERVE THE EXPOSED SURFACE.
5. THE EXCAVATION SHALL CONTINUE UNTIL ALL UNSUITABLE MATERIAL HAS BEEN REMOVED AND A COMPETENT AND UNYIELDING SUBGRADE SURFACE IS ENCOUNTERED.
6. FOR ALL CONCRETE PADS, PRIOR TO BACKFILLING, THE EXCAVATION BOTTOM SHALL BE SCARIFIED TO A DEPTH OF 6 INCHES, MOISTURE-CONDITIONED TO 2 PERCENT ABOVE OPTIMUM, AND COMPACTED TO AT LEAST 90% RELATIVE COMPACTION. IF THE EXPOSED SUBGRADE IS TOO WET, OPEN GRADE AGGREGATE MAY BE USED TO STABILIZE THE SUBGRADE UNTIL AN UNYIELDING SURFACE IS ACHIEVED. AS AN ALTERNATIVE, STABILIZING SUBGRADE USING LIME CAN BE CONSIDERED. IF REQUIRED, CONTRACTOR SHALL CONDUCT SOIL DENSITY AND COMPACTION TESTING IN ACCORDANCE WITH THE APPLICABLE ENGINEERING SPECIFICATIONS.
7. THE NEW SITE GRADING SHALL PROVIDE POSITIVE DRAINAGE TO DIVERT SURFACE WATER AWAY FROM ALL IMPROVEMENTS TOWARDS SUITABLE, NON-EROSIVE DRAINAGE DEVICES.
8. PONDING OF WATER OR ALLOWING IRRIGATION WATER TO MIGRATE UNDER THE BUILDINGS OR ANY IMPROVED SUBGRADE SHALL NOT BE ALLOWED.
9. THE CONTRACTOR SHALL DETERMINE THE LOCATION OF UTILITY SERVICES IN AREAS TO BE EXCAVATED BEFORE BEGINNING EXCAVATION, EXERCISE EXTREME CAUTION IN EXCAVATION AND TRENCHING, DAMAGE CAUSED AS A RESULT OF FAILING TO LOCATE, IDENTIFY, AND PRESERVE ALL EXISTING UNDERGROUND UTILITIES ARE THE SOLE RESPONSIBILITY OF THE CONTRACTOR.

D. EXCAVATION, CONCRETE AND PAVING:

1. SURFACING SHALL BE REPLACED WITH IN-KIND PAVEMENT, UNLESS SHOWN OTHERWISE, AND SHALL BE RESTORED TO EXISTING CONDITIONS.
2. CONTRACTOR SHALL REMOVE, LOAD, TRANSPORT, AND DISPOSE OF ALL EXCAVATED MATERIAL FROM THE SITE. WASTE MATERIAL SHALL BE DISPOSED AT A COMPANY APPROVED FACILITY.
3. THE CONTRACTOR SHALL USE ONLY PROPERTY OWNER APPROVED ON-SITE AREAS FOR STORING CONSTRUCTION MATERIALS AND EQUIPMENT, AND FOR STOCKPILING EXCAVATED SOIL OR DEMOLITION DEBRIS.
4. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO PREVENT DAMAGE TO UNDERGROUND UTILITIES, PIPING AND ADJOINING STRUCTURES.
5. CONTRACTOR SHALL USE SIKAFLEX OR EQUIVALENT SEALANT TO SEAL CONCRETE JOINTS, IF INSTALLED.
6. IF REQUIRED BY THE SCOPE OF WORK, THE ELEVATIONS OF EXISTING FEATURES (UTILITIES AND FOUNDATIONS) SHALL BE POT-HOLED AND ELEVATIONS CONFIRMED WITH THE ENGINEER BEFORE EXCAVATING TRENCHES THAT CROSS FEATURES.

E. PLUMBING:

1. ALL PIPING RUNS ARE SHOWN SCHEMATICALLY. THE BEST ROUTE SHOULD BE DETERMINED IN THE FIELD BY THE CONTRACTOR, APPROVED BY THE ENGINEER AND SHALL BE IN ACCORDANCE WITH APPLICABLE FEDERAL, STATE, AND LOCAL CODE REQUIREMENTS.
2. ALL CONVEYANCE PIPING SHALL BE LEAK TESTED PRIOR TO BACKFILLING. ENGINEER MUST WITNESS TESTING. CONTRACTOR SHALL NOTIFY ENGINEER 24 HOURS PRIOR TO TESTING.

F. ELECTRICAL:

1. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL EQUIPMENT NECESSARY TO INSTALL ELECTRICAL POWER AS SHOWN ON ELECTRICAL "E" SHEETS.
2. THE CONTRACTOR SHALL ENERGIZE AND TEST ALL EQUIPMENT FOLLOWING THE CONNECTION OF POWER TO THE REMEDIATION SYSTEM ELECTRICAL METER.
3. THE ELECTRIC SERVICE SHALL BE EQUIPPED WITH A POWER METER AND WEATHER TIGHT MAIN PANEL WITH A LOCKABLE SHUT-OFF SWITCH LOCATED OUTSIDE THE EQUIPMENT ENCLOSURE.
4. ALL ELECTRICAL WORK SHALL BE COMPLETED IN ACCORDANCE WITH THE MOST RECENT EDITION OF THE N.E.C., THE LOCAL BUILDING DEPARTMENT, AND THE LOCAL FIRE DEPARTMENT.
5. IF NECESSARY, THE INSTALLATION WITHIN THE EQUIPMENT ENCLOSURE SHALL COMPLY WITH A CLASS I, DIVISION II ENVIRONMENT AS PER N.E.C. AND LOCAL CODES. ALL WIRING CONNECTORS, CONDUIT AND CONTRACTOR SUPPLIED EQUIPMENT SHALL COMPLY WITH CLASS I, DIVISION II REQUIREMENTS, IF REQUIRED BY THE N.E.C. OR LOCAL CODES.
6. ABOVE GROUND ELECTRICAL WIRING SHALL BE CONTAINED IN GALVANIZED RIGID CONDUIT AND ROUTED ALONG THE ENCLOSURE FLOOR AND WALLS AS ALLOWED BY LOCAL CODE. BELOW GRADE ELECTRICAL WIRING SHALL BE CONTAINED IN PVC CONDUIT.
7. BY LOCAL CODE, BELOW GRADE ELECTRICAL WIRING SHALL BE CONTAINED IN PVC CONDUIT, IN ACCORDANCE WITH LOCAL ELECTRICAL CODES.
8. ALL ELECTRICAL CONNECTIONS IN SUBSURFACE VAULTS OR PULL BOXES SHALL BE COMPLETED AT A MINIMUM IN WATERTIGHT JUNCTION BOXES. EXPOSED WIRING IS NOT ACCEPTABLE IN VAULTS OR PULL BOXES.

G. HEALTH AND SAFETY:

1. CONTRACTOR SHALL SUBMIT THEIR COMPANY HEALTH AND SAFETY PLAN TO ENGINEER AND/OR COMPANY A MINIMUM OF 10 WORKING DAYS PRIOR TO BEGINNING WORK. THE COMPANY HEALTH AND SAFETY PLAN SHALL BE IN ACCORDANCE WITH U.S. DEPARTMENT OF LABOR, 29 CFR 1910 AND INCLUDE JOB SAFETY ANALYSIS SPECIFIC TO THE GENERAL TASKS TO BE PERFORMED AT THE SITE.
2. THE CONTRACTOR AND THEIR SUBCONTRACTORS SHALL COMPLY AT ALL TIMES WITH THE COMPANY HEALTH AND SAFETY PLAN. THE CONTRACTOR MUST PROVIDE PERSONAL PROTECTIVE EQUIPMENT FOR THEIR PERSONNEL AND SUBCONTRACTOR PERSONNEL AT ALL TIMES. THE CONTRACTOR SHALL OPERATE IN A SAFE AND CONTROLLED MANNER AT ALL TIMES.
3. THE CONTRACTOR SHALL CONDUCT AND DOCUMENT A THOROUGH SAFETY TAILGATE MEETING BEFORE EACH DAY OF WORK BEGINS. THE TAILGATE MEETINGS SHALL INCLUDE DISCUSSION OF COMPANY SAFETY PROGRAMS AND ISSUES. THE CONTRACTOR SHALL BE GIVEN A DOCUMENTED SAFETY TAILGATE MEETING PRIOR TO START OF WORK. THE CONTRACTOR SHALL ENSURE ALL SUBCONTRACTORS ARE INFORMED OF THE SAFETY PROGRAMS AND BEHAVIOR AND COMPLY WITH THESE NOTES. THE CONTRACTOR SHALL PROVIDE DIRECT OVERSIGHT OF ALL SUBCONTRACTORS USED ON THIS PROJECT. IF TRANSLATION IS REQUIRED FOR ANY SUBCONTRACTOR, THE CONTRACTOR MUST UNDERSTAND THE SITE SAFETY INDICATORSHIP, THAT TRANSLATION SHALL BE PROVIDED BY THE CONTRACTOR.
4. THE CONTRACTOR SHALL FURNISH AND MAKE AVAILABLE AT ALL TIMES: FIRE EXTINGUISHER, EYEWASH STATION, FIRST AID KIT, TWO STOP/SLOW HANDHELD TRAFFIC SIGNS, AN ADEQUATE NUMBER OF 4" HIGH TRAFFIC DELINEATORS AND ORANGE CONSTRUCTION FENCING, A PORTABLE SELF CONTAINED OUTHOUSE, HEARING PROTECTION, EYE PROTECTION, ADEQUATE SHADE AND ADEQUATE DRINKING WATER.
5. CONTRACTOR AND SUBCONTRACTOR DRESS CODE ON THE WORK SITE SHALL INCLUDE AT A MINIMUM: ORANGE SAFETY VEST WITH REFLECTIVE STRIPES, HARDHAT, SAFETY GLASSES WITH SIDESHIELDS, APPROPRIATE GLOVES, LONG SLEEVE SHIRT, PANTS, HEARING PROTECTION, AND STEEL TOE BOOTS (TYPICAL LEVEL D).
6. ALL MECHANICAL EQUIPMENT USED ONSITE SHALL BE INSPECTED AND DOCUMENTED AT THE START OF EACH DAY. EQUIPMENT MAINTENANCE RECORDS SHALL BE PROVIDED TO THE ENGINEER WITH ALL MECHANICAL EQUIPMENT. EQUIPMENT USED ON SITE SHALL BE MAINTAINED IN GOOD WORKING ORDER. EQUIPMENT THAT SHALL BE REPAIRED OR REPLACED AT THE CONTRACTORS EXPENSE. ANY EMPLOYEE OF THE CONTRACTOR THAT USES A FORKLIFT SHALL PROVIDE EVIDENCE OF FORKLIFT CERTIFICATION AND TRAINING TO THE ENGINEER PRIOR TO USE. ANY OTHER SHANTY BE USED FOR ANY EQUIPMENT OPERATING IN REVERSE ON THE SITE. SEATBELTS SHALL BE WORN AT ALL TIMES WHILE OPERATING ANY MECHANICAL EQUIPMENT ON OR OFF THE SITE. CELL PHONE USE IS PROHIBITED WHILE OPERATING ANY MECHANICAL EQUIPMENT AT THE SITE.
7. ONLY APPROPRIATE CLEVIS SHALL BE USED IN LIFTING APPLICATIONS, LOADS SHALL BE SECURED USING A THREADED U-BOLT.
8. CONTRACTOR SHALL USE PROPER AND SAFE LIFTING METHODS TO INCLUDE A 50LB LIMIT PER PERSON, AKAWARD ITEMS >30 POUNDS SHALL BE LIFTED BY MORE THAN ONE PERSON.
9. ALL EXCAVATIONS WITHIN 5' LATERAL DISTANCE OF A MARKED UTILITY SHALL BE HAND DUG USING ONLY HAND TOOLS TO BREAK GROUND, MOVE SOIL OR DEBRIS, OR OTHERWISE DISTURB THE EXCAVATION FROM TOP TO BOTTOM.
10. CONTRACTOR SHALL PROVIDE AND IDENTIFY ONE PERSON WITH RESPONSIBLE CHARGE AND SUFFICIENT AUTHORITY TO ENFORCE HEALTH AND SAFETY AND ADHERENCE TO THESE NOTES AT ALL TIMES THAT WORK IS IN PROGRESS.
11. FAILURE TO COMPLY WITH ANY OF THE ABOVE STATED IS REASON FOR JOBSITE SHUT DOWN BY THE ENGINEER OR COMPANY AT CONTRACTOR'S EXPENSE TO REPAIR SITUATION.
12. ALL CONSTRUCTION AREAS SHALL BE CLEARLY MARKED WITH BARRICADES, CONES, PLATES, OR OTHER APPROVED SAFETY MARKERS TO RESTRICT ACCESS AND PROVIDE A SAFE WORK ENVIRONMENT FOR THE CONTRACTOR AND BUSINESS CUSTOMERS.
13. IF REQUESTED, CONTRACTOR SHALL PROVIDE TO THE ENGINEER DOCUMENTATION OF ALL DAILY SAFETY TAILGATE MEETINGS AND ALL DAILY EQUIPMENT CHECKS.
14. ACTIVITIES IN WHICH UNQUALIFIED PERSONS OR THINGS MAY COME WITHIN 10 FEET IN ANY DIRECTION OF LIVE OVERHEAD HIGH-VOLTAGE LINES ARE PROHIBITED. THE OPERATION OF EQUIPMENT SUCH AS A CRANE, DRILLING RIG, LOADER OR SIMILAR EQUIPMENT (ANY PART OF WHICH IS CAPABLE OF VERTICAL, LATERAL, OR SWINGING MOTION), IS FORBIDDEN TO OPERATE IN THE VICINITY OF SUCH OVERHEAD LINES. FOR WORK IN THE VICINITY OF HIGH-VOLTAGE ELECTRIC LINES, CONTRACTOR IS RESPONSIBLE FOR NOTIFICATION TO THE OPERATOR OF THE LINE(S) AT LEAST 48 HOURS BEFORE THE WORK BEGINS.

H. SCOPE OF WORK

1. THE SCOPE OF WORK INCLUDES THE INSTALLATION OF PIPING AND THE INSTALLATION OF AND ANCHORAGE OF PROCESS EQUIPMENT FOR THE PURPOSE OF WATER SUPPLY TREATMENT.
2. THE WORK UNDER THIS CONTRACT INCLUDES FURNISHING ALL LABOR, MATERIALS, AND EQUIPMENT NOT SUPPLIED BY OTHERS TO CONSTRUCT THE WATER SUPPLY SYSTEM, INCLUDING PLUMBING, ELECTRICAL AND MECHANICAL EQUIPMENT, EARTHWORKS, AND OTHER RELATED WORK TO PROVIDE A COMPLETE AND OPERABLE SYSTEM.
3. CERTAIN SPECIFIED ITEMS WILL BE SUPPLIED BY OTHERS. THE CONTRACTOR SHALL COORDINATE DELIVERY WITH THE ENGINEER AND PROVIDE LABOR AND EQUIPMENT FOR OFFLOADING OF THESE ITEMS TO FACILITATE THE CONSTRUCTION SCHEDULE. THE CONTRACTOR IS RESPONSIBLE FOR RECEIVING, UNLOADING, STAGING, INSTALLATION AND TESTING OF THESE ITEMS.
4. SPECIAL CONDITIONS, AND HOURS OF OPERATION TO BE ADDRESSED DURING JOB WALK.

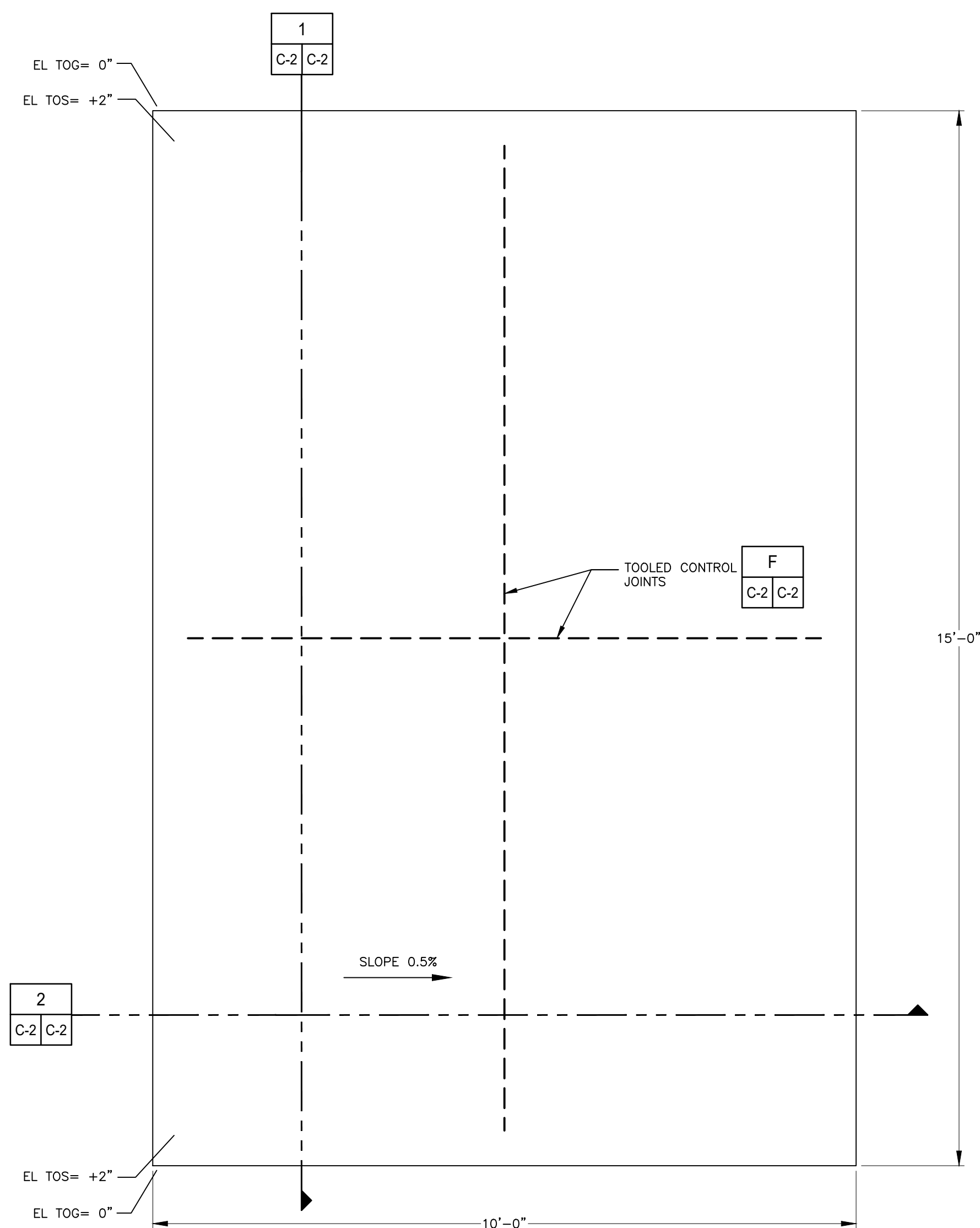
I. STORM WATER

1. ANY SURFACE WATER OR STORM WATER WHICH COLLECTS IN EXCAVATED AREAS SHALL BE CONTAINED, AND PUMPED, AND HAULED FROM SITE. THE CONTRACTOR SHALL SAMPLE, ANALYZE, AND, BASED ON THE ANALYTICAL RESULTS, APPROPRIATELY DISPOSE AT CONTRACTOR'S EXPENSE.
2. CONTRACTOR SHALL PROVIDE STORM WATER RUN-ON AND RUN-OFF CONTROLS FOR OPEN EXCAVATIONS. TEMPORARY STOCKPILES MUST BE APPROVED IN ADVANCE IN WRITING BY THE ENGINEER.
3. NON-STORM WATER RUNOFF, SEDIMENT, AND CONSTRUCTION WASTE FROM THE CONSTRUCTION SITE AND PARKING AREAS IS PROHIBITED FROM LEAVING THE SITE, INCLUDING ENTERING STORM DRAINS AND SEWER SYSTEMS.
4. WASHING OF CONSTRUCTION OR OTHER INDUSTRIAL EQUIPMENT ADJACENT TO THE CONSTRUCTION SITE IS PROHIBITED. WASH WATER IS NOT ALLOWED TO LEAVE THE CONSTRUCTION SITE, IN AN UNCONTROLLED MANNER.
5. DRAINAGE CONTROLS MAY BE REQUIRED DEPENDING ON THE EXTENT OF GRADING AND THE TOPOGRAPHY OF THE SITE, AT THE DIRECTION OF THE ENGINEER, OWNER, OR CITY.
6. IF APPLICABLE, CONTRACTOR SHALL APPLY FOR, PAY ALL FEES, AND OBTAIN ALL STORMWATER RELATED PERMITS.

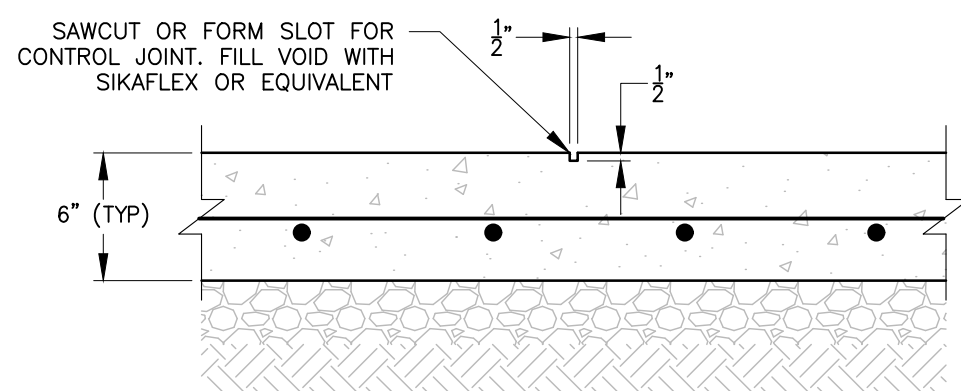
DETAILS ARE LETTERS

REFERENCE (FROM) ———— \————— DETAIL LOCATION (TO)

[illegible]



A		EQUIPMENT PAD DETAIL	
C-1 C-3	C-2	SCALE: 1"=1'-6"	



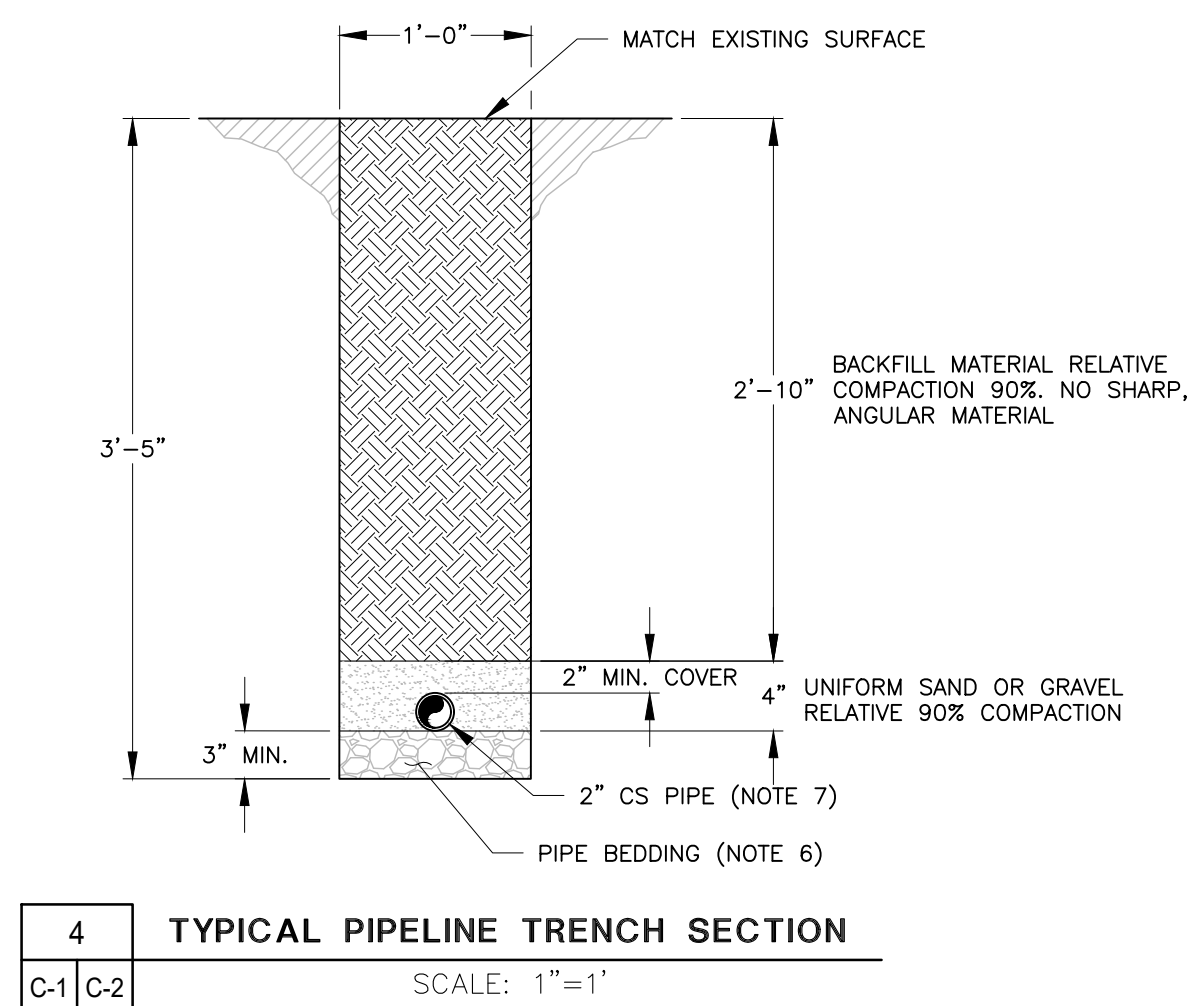
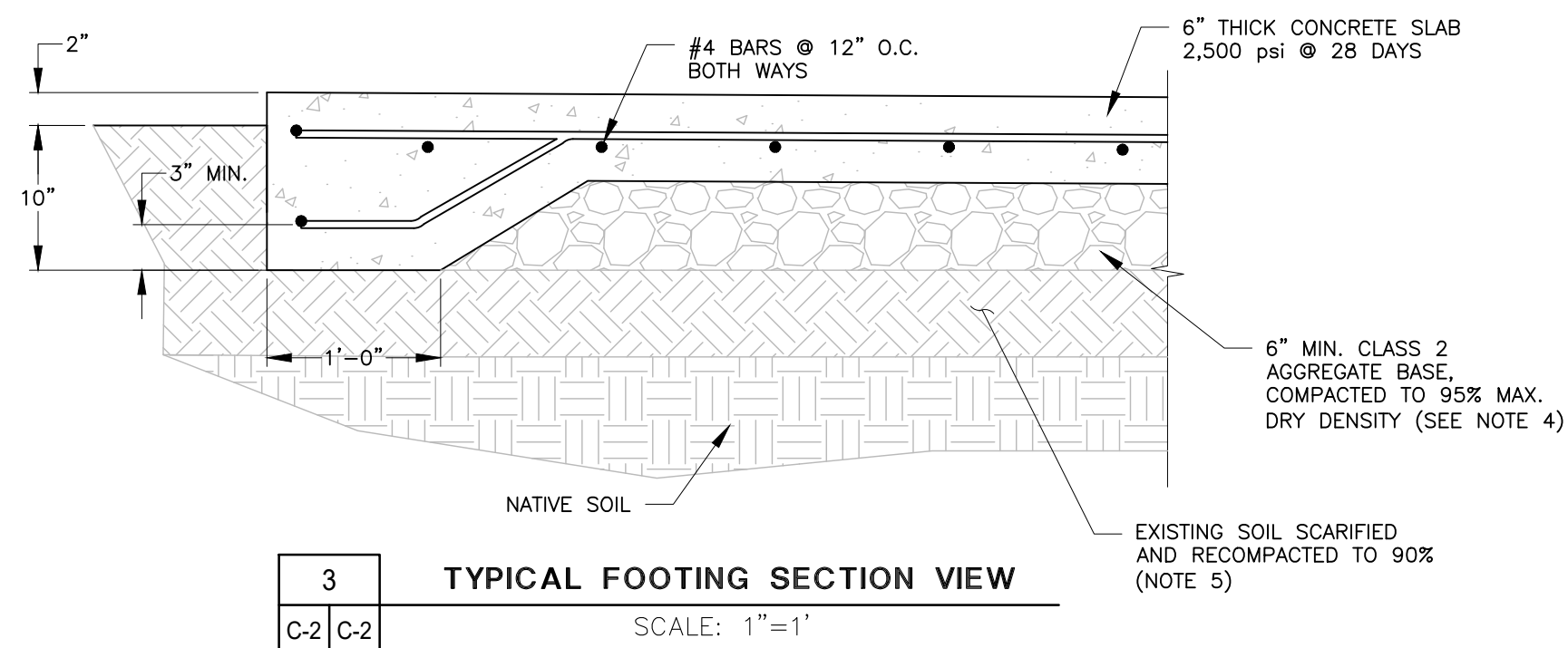
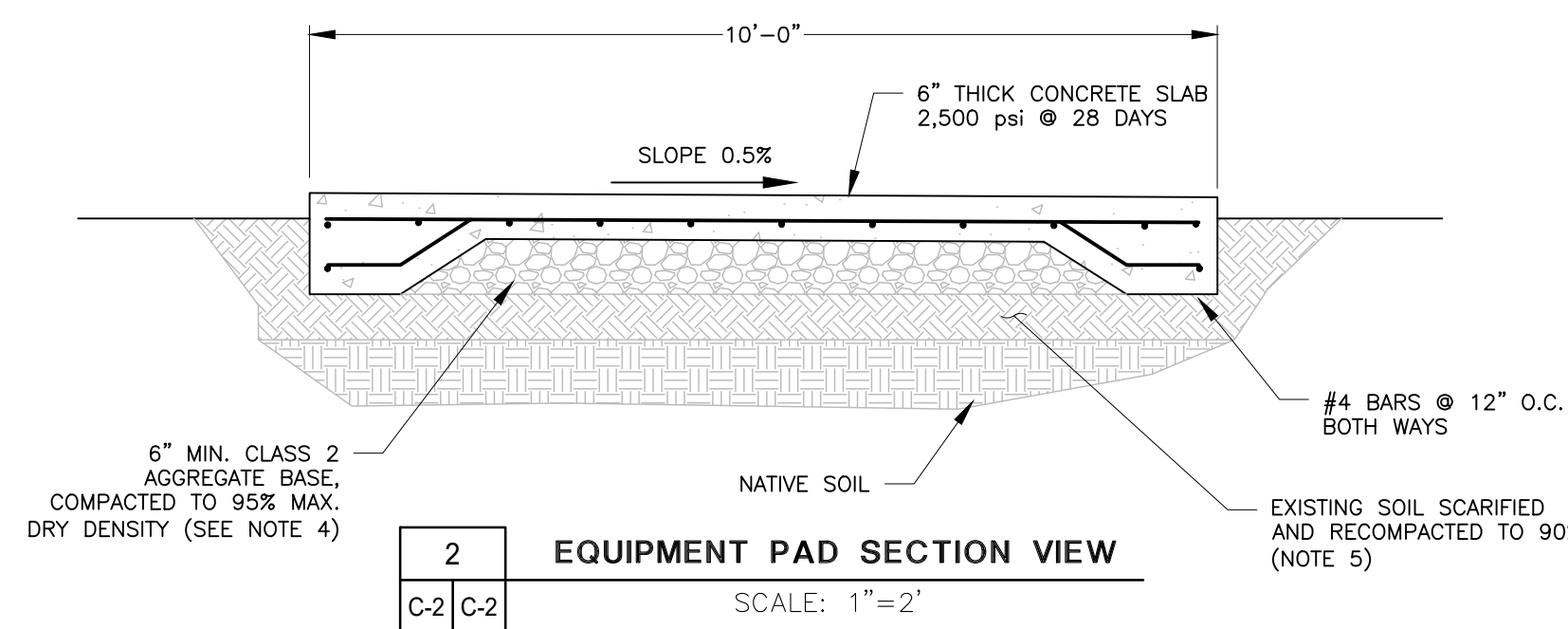
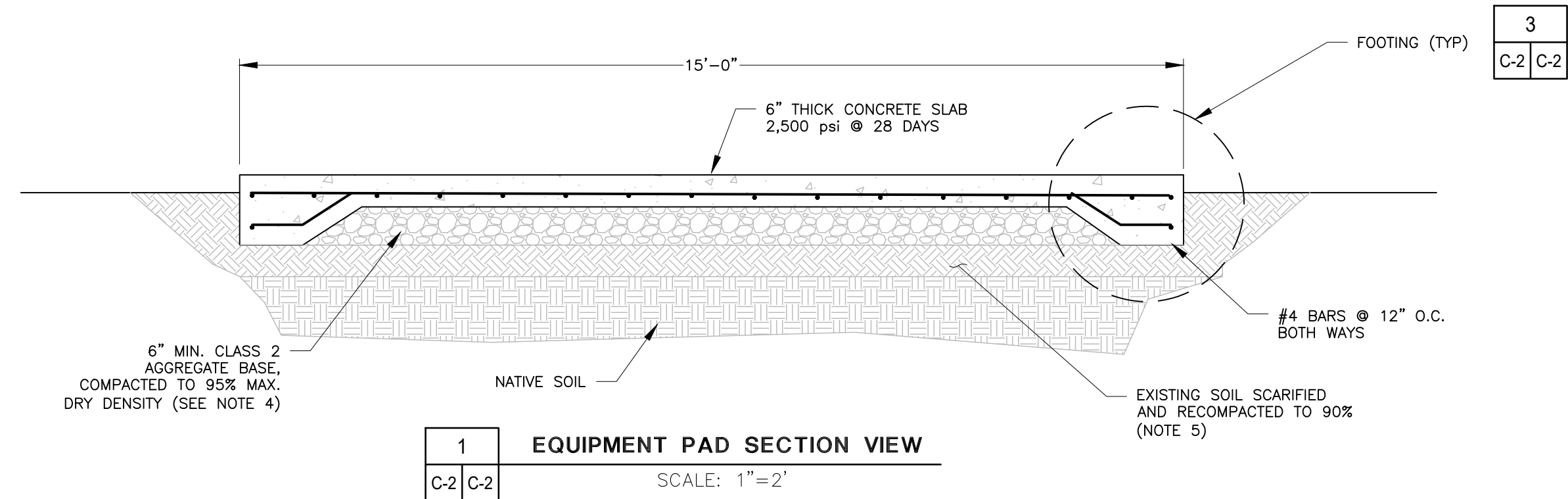
F		CONTROL JOINT DETAIL
C-2	C-2	SCALE: 1" = 1'-0"

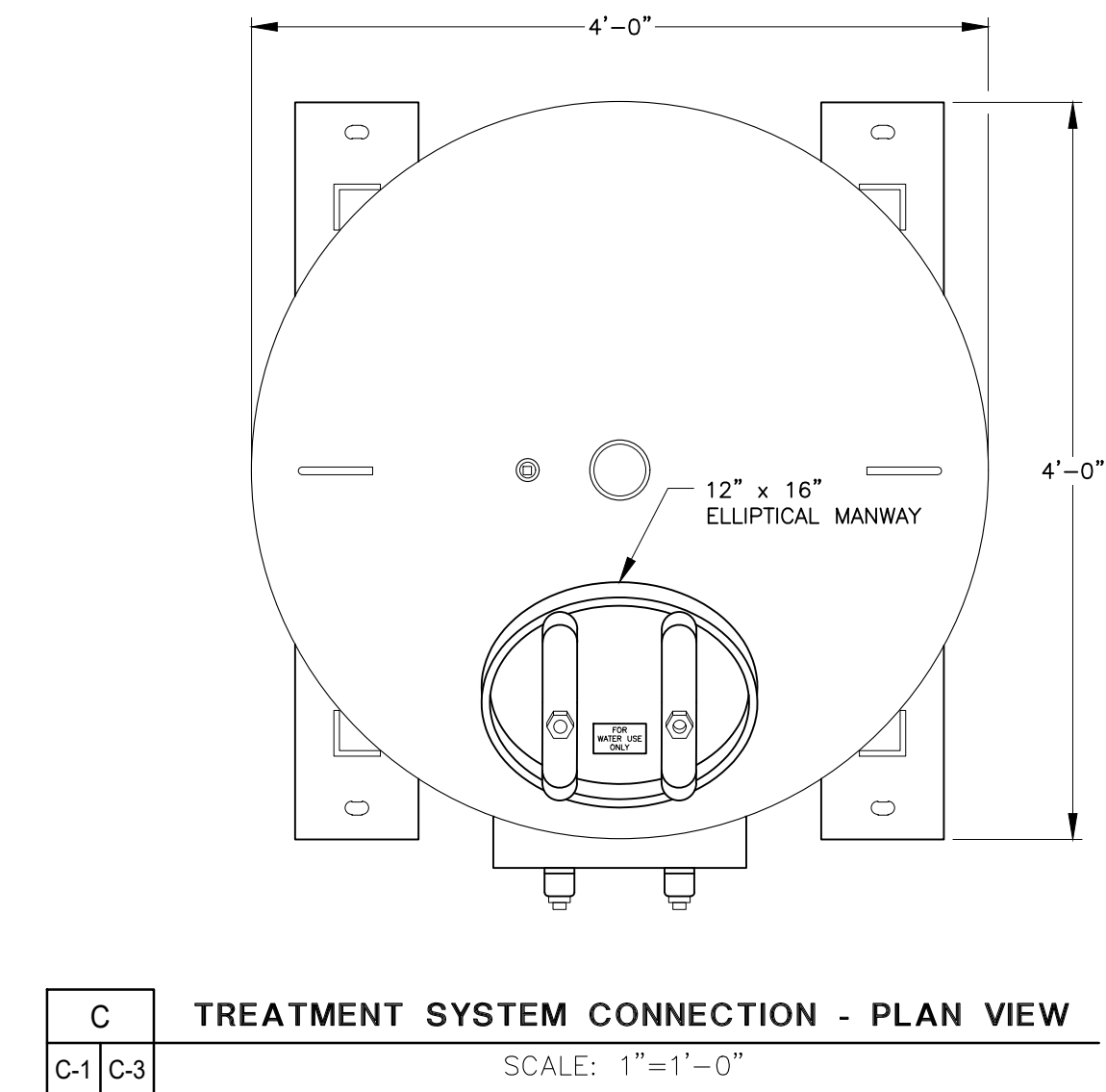
NOTES:

1. CONCRETE SHALL BE 2,500 PSI AT 28 DAYS.
2. TOOLED CONTROL JOINTS SHALL BE PLACED ALONG THE LENGTH AND WIDTH OF THE SLAB. REINFORCING STEEL SHALL BE CONTINUOUS THROUGH JOINTS. REINFORCEMENT BAR SHALL BE PLACED 3" MINIMUM FROM BOTTOM OF SLAB.
3. MINIMUM COVER FOR REINFORCEMENT BAR AT ALL LOCATIONS IS 3".
4. AGGREGATE BASE SHALL BE CLASS II AGGREGATE BASE WITH A MAXIMUM SIZE GRADATION OF 1-1/2". A MINIMUM R-VALUE OF 78 AND A MINIMUM SAND INDEX OF 22. AGGREGATE BASED SHALL BE PLACED IN A CONTINUOUS LAYER AND COMPACTED TO 95 PERCENT OF THE MAXIMUM DRY DENSITY AS DETERMINED BY ASTM D1557. MOISTURE CONTENT OF FILL SHALL BE MAINTAINED WITHIN 2 PERCENTAGE POINTS OF OPTIMUM MOISTURE CONTENT DURING COMPACTION.
5. PRIOR TO PLACING FILL MATERIAL OVER UNDISTURBED SUBSOIL, SUBSOIL SHALL BE SCARIFIED TO A DEPTH OF 6 INCHES, MOISTURE CONDITIONED, AND SUBSOIL COMPACTED A MINIMUM OF 90% OF MAXIMUM DRY DENSITY. CONTRACTOR SHALL BE RESPONSIBLE FOR DENSITY AND MOISTURE TESTING IN ACCORDANCE WITH THE APPLICABLE ENGINEERING SPECIFICATIONS.
6. PIPE BEDDING SHALL BE GRANULAR MATERIAL, WITH SAND EQUIVALENT NOT LESS THAN 30.
7. CS PIPE SHALL BE CERTIFIED FOR DIRECT BURIAL USE. IF NOT CERTIFIED, CONTRACTOR SHALL INSTALL A PHYSICAL WRAP OR APPLY A LIQUID COATING.

ACRONYMS/ABBREVIATIONS:

CS = CARBON STEEL
EL TOS = ELEVATION AT TOP OF SLAB (RELATIVE)
EL TOG = ELEVATION AT TOP OF GRADE (RELATIVE)






C		TREATMENT SYSTEM CONNECTION - PLAN VIEW
C-1	C-3	SCALE: 1"=1'-0"

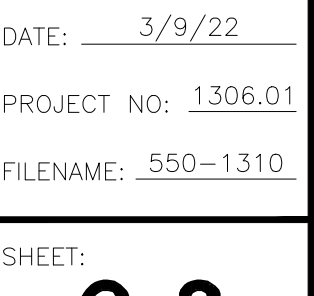
CS = CARBON STEEL
PI = PRESSURE INDICATOR IN PS
SP = SAMPLE PORT
TYP = TYPICAL

1. ALL CONTRACTOR PIPING TO BE THREADED GALVANIZED CS.
2. VESSEL DRAWINGS COURTESY EVOQUA WATER TECHNOLOGIES, DATED 9/16/21.

 **HARGIS + ASSOCIATES, INC.**

3131 CAMINO DEL RIO NORTH, STE. 355
SAN DIEGO, CA 92108
TEL (858) 455-6500
FAX (858) 455-6533

**NORTH CHOLLA PUBLIC WATER SUPPLY SYSTEM
5050 N LA CHOLLA BLVD
TUCSON, AZ 85705
PIPING DETAILS**



C-3

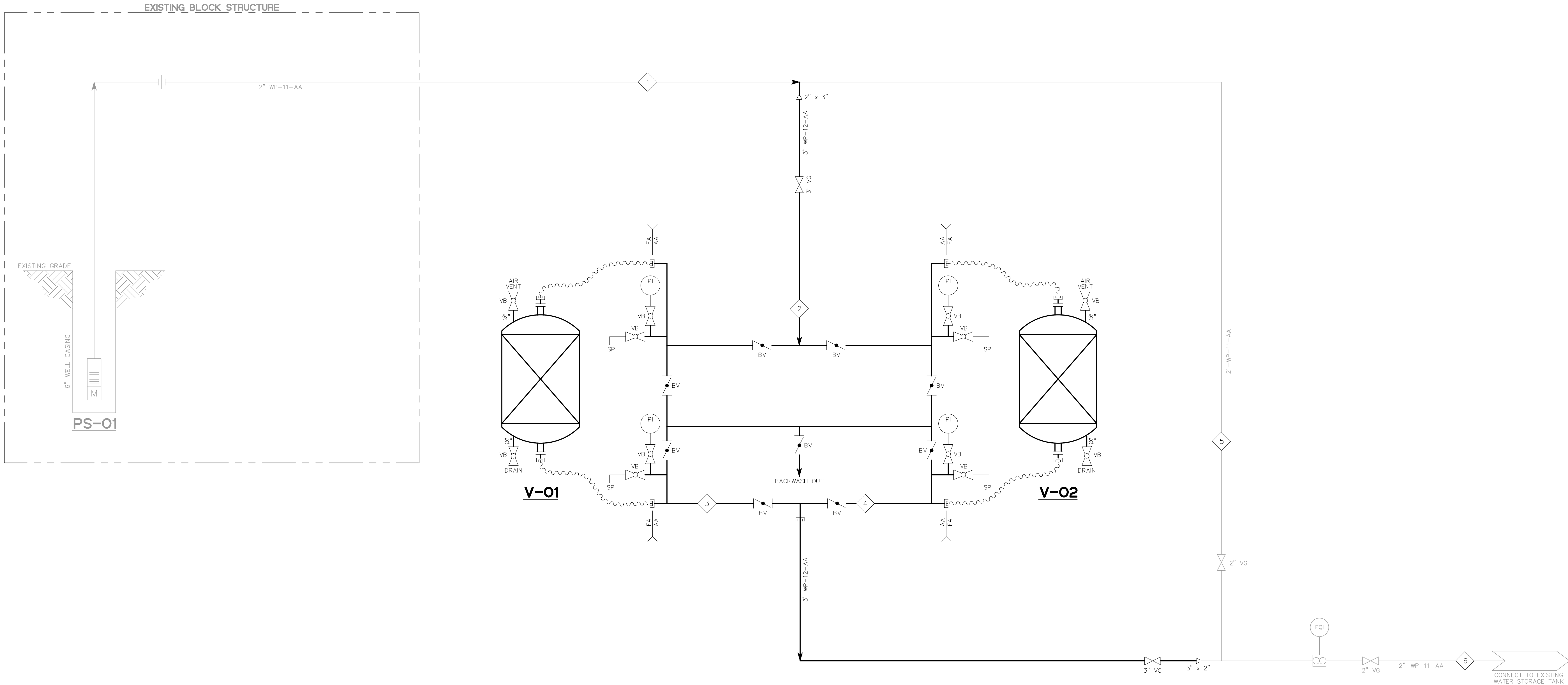
PS-01
NORTH CHOLLA EXTRACTION PUMP

DESIGN FLOW: 75 GPM
DESIGN DISCHARGE PRESSURE (OPERATING): 50 PSIG
DESIGN DISCHARGE PRESSURE (MAX): 75 PSIG

V-01, V-02
LIQUID PHASE CARBON ADSORBERS

MFG: EVOQUA
MODEL: PV-2000
SIZE: 4'0"ø x 8'-9"
CAPACITY: 2,000 LBS
WEIGHT: 7,500 LBS OPERATING, 1,200 LBS EMPTY
DESIGN PRESSURE: 75 PSIG
MAX FLOW: 100 GPM
MATERIAL: CS

TABLE P-1						
STREAM NUMBER	1	2	3	4	5	6
STREAM DESCRIPTION	GROUNDWATER FROM PS-01 WELL PUMP	PRIMARY CARBON ADSORBER INFLUENT	PRIMARY CARBON ADSORBER EFFLUENT	SECONDARY CARBON ADSORBER EFFLUENT	RECYCLE WATER	TREATED WATER TO WATER STORAGE TANK
FLOW (GPM)	75	75	75	75	N/A	75
PRESSURE (PSIG)	50	49.7	48.4	47.1	N/A	47.0
TCE (µg/L)	10	10	0	0	0	0
1,1-DCE (µg/L)	2.9	2.9	0	0	0	0



ACRONYMS/ABBREVIATIONS:

1,1-DCE = 1,1-DICHLOROETHENE

AA = CS PIPE, CLASS 150

BV = BUTTERFLY VALVE

CS = CARBON STEEL

FA = 3" NOMINAL FOOD GRADE HOSE,
150 psig MAX, CLASS 150

FQI = FLOW QUANTITY INDICATOR

GPM = GALLONS PER MINUTE

LBS = POUNDS

µg/L = MICROGRAM PER LITER

PI = PRESSURE INDICATOR

PS = SUBMERSIBLE PUMP

PSIG = POUNDS PER SQUARE INCH GAUGE

SP = SAMPLE PORT

TCE = TRICHLOROETHENE

V = VESSEL

VB = BALL VALVE

VG = GLOBE VALVE

WP = PROCESS WATER (PIPE)

NOTES:

1. ALL PIPELINES CONVEYING WATER UNDER PRESSURE SHALL BE SUBJECTED TO A HYDROSTATIC PRESSURE TEST AT A TEST PRESSURE OF 75 PSIG. THE TEST PRESSURE SHALL BE MAINTAINED FOR 2 HOURS. POTABLE WATER SHALL BE USED FOR THE TEST AND THE TESTING SHALL BE PERFORMED AFTER ALL PIPING IS INSTALLED AND PRIOR TO BEING BACKFILLED. POTABLE WATER IS AVAILABLE AT THE SITE. CONTRACTOR SHALL PROVIDE PIPE TAPS, NOZZLES AND CONNECTIONS AS NECESSARY TO PERMIT TESTING INCLUDING AIR RELIEF VALVES AT THE HIGH POINTS IN THE PIPELINE. CONNECTIONS TO DRAIN PIPELINES AFTER TESTING, ETC. PRESSURE TESTING SHALL BE PERFORMED ON ALL PIPING AT A TIME AGREED UPON AND IN THE PRESENCE OF THE ENGINEER. IF A LEAK IS DETECTED REPAIR AND RETEST SHALL BE AT CONTRACTOR'S EXPENSE. CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND DISPOSAL OF WATER USED FOR TESTING.

2. VESSEL AND PIPE MANIFOLD P&ID COURTESY EVOQUA WATER TECHNOLOGIES, DATED 10/5/21.

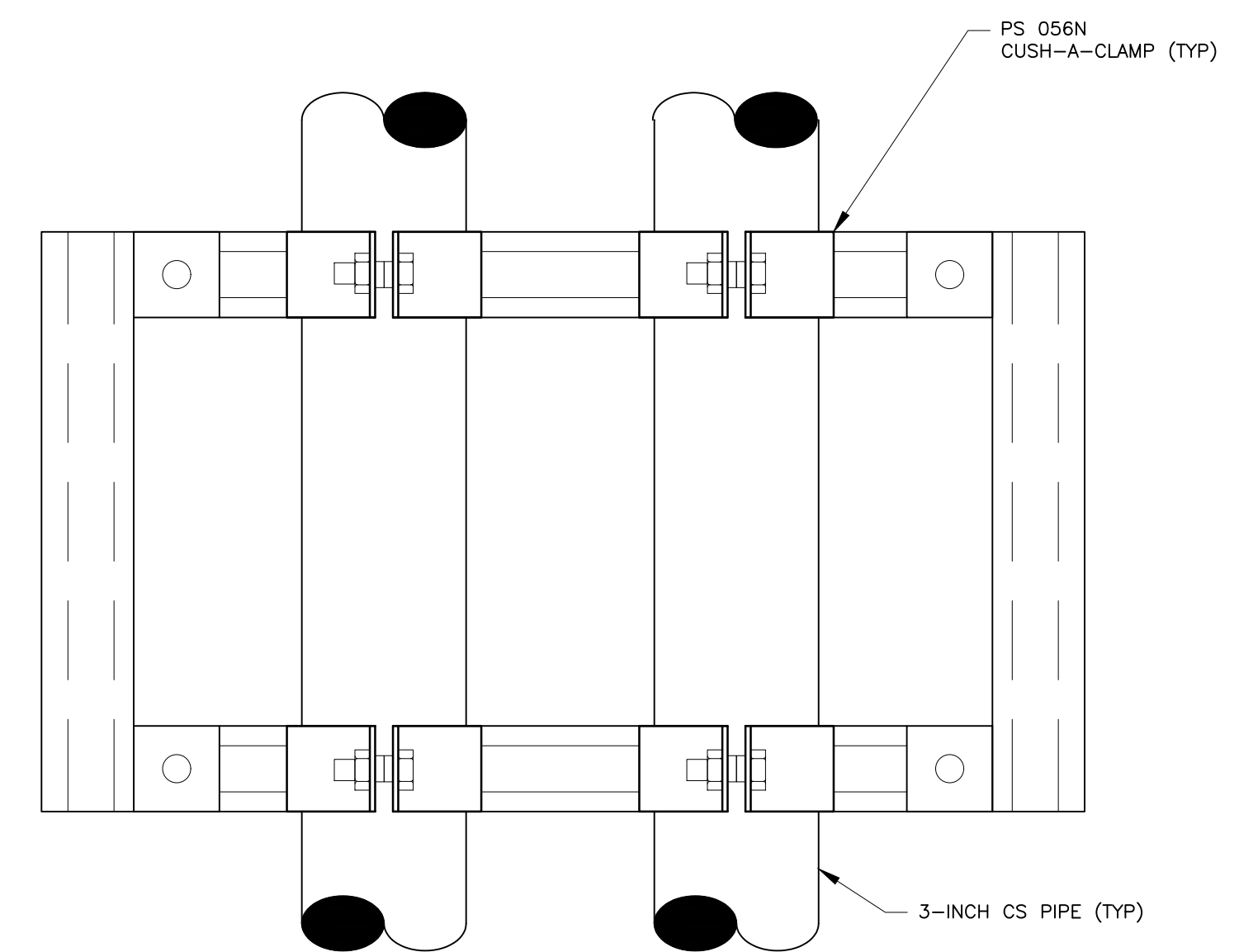


Diagram illustrating the Vessel Anchor Detail (Typical). The detail shows a cross-section of a vessel wall and its foundation. The vessel wall is shown on the left, with a horizontal line indicating the internal structure. The foundation is shown on the right, with a vertical line indicating the anchor rod. The anchor rod is labeled "ANCHOR EACH CORNER (4) WITH HILTI HVU2 ANCHOR CAPSULE WITH HAS-R 304 SS ANCHOR ROD 1/2" DIAMETER, 6-1/2" LENGTH, 4-1/2" MIN. EMBEDMENT DEPTH (NOTE 4)". The embedment depth is dimensioned as 4-1/4".

I	VESSEL ANCHOR DETAIL (TYPICAL)
C-3 S-1	NOT TO SCALE

- CS = CARBON STEEL
MIN = MINIMUM
PS = POWER STRUT
SS = STAINLESS STEEL
TYP = TYPICAL

APPENDIX B
INSPECTION FORMS

NORTH LA CHOLLA MOBIL HOME PARK SUPPLY WELL OMM MONITORING CHECKLIST

DATE: _____ INSPECTOR: _____ LEAD TANK: _____ LAG TANK: _____

MONTHLY

_____ Yes; _____ No System operating/well pumping;
 _____ Yes; _____ No Connections are water tight (no leakage);
 _____ Yes; _____ No System sounds normal (no unusual noises);
 _____ Yes; _____ No Pressure meters working;
 _____ Yes; _____ No Opened manifold sample ports to verify flow;
 _____ Yes; _____ No Open valves on top of the vessel to check for and or release air (occasionally);
 _____ Yes; _____ No Record the totalizer reading _____;
 _____ Yes; _____ No Food grade pipes are in fine condition;
 _____ Yes; _____ No Corrosion free;
 _____ Yes; _____ No Equipment firm (No loose equipment); and
 _____ Yes; _____ No Electrical Meter Reading _____.

QUARTERLY

_____ Yes; _____ No Collected water samples.

SEMI-ANNUAL

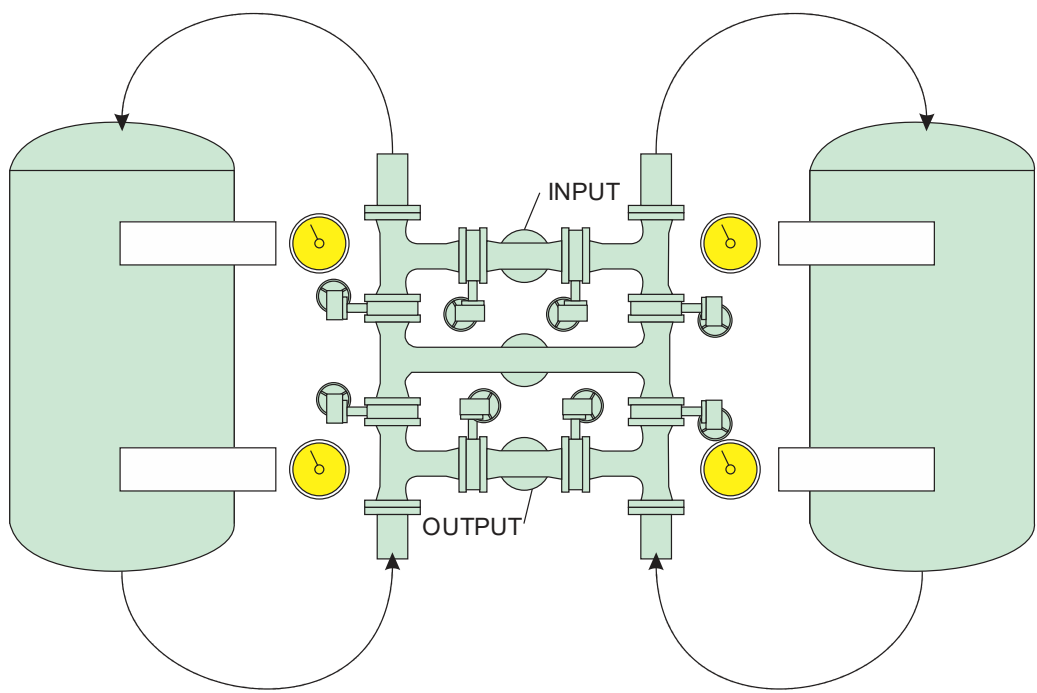
_____ Yes; _____ No Exercise isolation valves (open and close). Grease valves as appropriate;
 _____ Yes; _____ No Rodent/insect free; and
 _____ Yes; _____ No Signage present and readable.

SAMPLES

ID	TIME	BOTTLES	ANALYSIS	LOCATION/COMMENTS

DATE: _____

PRESSURE MEASUREMENTS



LEAD VESSEL

MANIFOLD

LAG VESSEL

_____PUMP PRESSURE

GROUNDWATER SAMPLE COLLECTION

SUMMARY OF METHOD

Water samples will be collected in accordance with laboratory requirements, environmental sampling standards and the requirements listed herein. Water samples will be collected at the various sample ports along the system by opening the valve(s) (while the pump is operating) and letting the water flow for 15 seconds or more to remove any stagnate water. Do not rinse or over fill containers with preservatives. Collect the samples by:

- filling clean laboratory provided bottle ware,
- labeling samples,
- store samples on ice,
- preparing chain-of-custody documentation and
- transporting to the laboratory.

HEALTH AND SAFETY WARNINGS

When working on-site, comply with all applicable OSHA requirements and the site's health/safety procedures. All proper personal protection clothing and equipment are to be worn.

PROCEDURE

PURGE: For each valve to be sampled, while the well pump is operating, field personnel will open the valve to be sampled allowing water to discharge for 15 seconds or longer, until stagnate water is discharged. At the discretion of the field personnel groundwater indicator parameter (e.g. temperature, pH, conductivity,...) may be collected. Documentation may be maintained in a detailed and well-organized format on the appropriate field data documentation forms.

SAMPLE: Collect water samples in appropriate sample containers from the valve discharge.

- Specific sample collection statements:
 - For VOC analysis by EPA Method 8260, collect headspace free water samples in pre-acidified 40 milliliter (ml) glass sample vials preserved with hydrochloric acid. Do not rinse the glass vials with discharge water prior to sample collection. To avoid aeration, hold the glass vial at an angle so the stream of water flows down the side. To eliminate any air bubbles, fill the vial until it forms a meniscus and replace the Teflon lined cap. Turn the vial upside down and tap it to check for air bubbles. If there is any headspace in samples collected for VOC analyses, discard the original vial and use a new pre acidified vial. Repeat this procedure until a sample without headspace is obtained. Collect three 40 ml vials for each VOC analysis for each well sampled. Place samples in a resealable plastic bag and store on ice in an ice chest immediately after collection.
 - For VOC analysis by EPA Method 524.2, collect headspace free water samples in pre-acidified 40 milliliter (ml) glass sample vials preserved with hydrochloric acid. Do not rinse the glass vials with discharge water prior to sample collection. To avoid aeration, hold the glass vial at an angle so the stream of water flows down the side. Add the laboratory provide ascorbic acid. To eliminate any air bubbles, fill the vial until it forms a meniscus and replace the Teflon lined cap. Turn the vial upside down and tap it to check for air bubbles. If there is any headspace in samples collected for VOC analyses, discard the original vial and use a new pre acidified vial. Repeat this procedure until a sample without headspace is obtained. Collect three 40 ml vials for each VOC analysis for each well sampled. Place samples in a re-sealable plastic bag and store on ice in an ice chest immediately after collection.
 - If coliform bacteria analysis is conducted, wear gloves when collecting samples. Do not rinse the bottles. The bottles are sterile, so care must be taken not to contaminate the bottle

or cap. Once the distribution line is flushed and the flow reduced, quickly open the bottle (but do not set the cap down), hold the cap by its outside edges only, and fill the sample bottle to just above the 100 ml line leaving 1 inch of headspace. Cap the bottle immediately and place it into a cooler with ice for delivery or overnight shipment to the laboratory.

- Attach labels to sample containers immediately after samples are collected.
- General sample collection statements:
 - If sample bottles for analytes contain preservatives or are sterile, do not rinse bottles; otherwise, triple-rinse unpreserved (not sterile) bottles prior to sample collection.
 - If samples are to be cooled, store on ice in ice chest immediately after collecting.
- Collect one field duplicate sample for every 10 samples collected during the sampling event. Analyze duplicate samples for the same compounds as original samples. Send duplicate samples along with the original samples to the primary laboratory.
- Include one trip blank sample containing reagent-free deionized water for VOC analysis to accompany each ice chest shipped each day for these analyses. The trip blanks will be prepared by the primary analytical laboratory, using reagent-free deionized water.
- Handle duplicate, trip blank, and field blank water samples in a manner identical to other water samples.
- Record all pertinent data concerning each sample on the groundwater sampling information field data form (Table SOP-I).
- Record all pertinent data concerning each duplicate, split, and blank sample.
- Complete chain of custody record.
- Package, store, and transport the samples to the laboratory at the conclusion of each sampling day. Samples will be delivered to the laboratories as quickly as possible, via laboratory courier, if available.

DATA AND RECORDS MANAGEMENT

FIELD ACTIVITY LOG: Field activities will be recorded on the appropriate field logs (attached tables) by the on-site field staff. All field data entries in the field notebook will be signed, dated, and kept as a permanent record. The field notebook will be the responsibility of the field team leader. Erroneous entries will be corrected by crossing a line through the error and entering the correct information. Corrections will be initialed by the person making the re-entry. Documented information may include:

- Project name and number;
- A description of field activities performed (e.g. procedures, field measurements, calibrations)
- Date and location of field activities
- Field Personnel
- Sub-contractors names and provided services
- Miscellaneous remarks and comments (e.g. weather conditions, significant events)

Completed field sheets and or scanned copies of completed field sheets will be maintained in the project file.

SAMPLE DOCUMENTATION: Sample identification documents will be prepared so that sample identification and chain of custody are maintained and sample disposition is controlled. The following sample identification documents are to be used:

- Sample identification label
- Chain of custody and analysis request forms

SAMPLE IDENTIFICATION LABEL: Preprinted adhesive sample labels will be secured to the sample containers by field personnel. Sample labels will be completed with waterproof ink, and contain the following information:

- Sample location/identifier
- Date and time sample was collected
- Analyses to be performed
- Preservation instructions
- Project number
- Sampler's initials
- Any other pertinent information
- Any special instructions to laboratory personnel

CHAIN-OF-CUSTODY: The chain of custody will be maintained and documented from the time of sample collection until the validation of analytical results. The chain of custody record is the document that records the transfer of sample custody and also serves to cross reference the sample identifier assigned by the QA Manager with the sample identifier assigned by the laboratory. The chain of custody record includes the following information:

- Sample location/identifier
- Project number
- Sampling date
- Sampling personnel
- Shipping method
- Sample description
- Sample volume
- Number of containers
- Sample destination
- Preservatives used
- Analyses to be performed
- Special handling and reporting procedures
- The identity of personnel relinquishing and accepting custody of the samples

The sampling personnel will be responsible for the samples and will sign the chain of custody record to document sample transferal or transport. Samples will be packaged in sealed containers for transport and dispatched to the appropriate laboratory for analysis with a separate chain of custody record accompanying each shipment. The method of transport, courier name(s), and other pertinent information will be entered on the chain of custody record. During transport, samples will be accompanied by the chain of custody record.

Once received at the laboratory, laboratory custody procedures apply. It is the laboratory's responsibility to acknowledge receipt of samples and verify that the containers have not been opened or damaged. It is also the laboratory's responsibility to maintain custody and sample tracking records throughout sample preparation and analysis.

QUALITY CONTROL AND QUALITY ASSURANCE

Quality Control and Quality assurance (QC/QA) during sampling will be accomplished by following this document. Laboratory QA procedures are specified in the laboratory's QA Manual. In addition, the Supervising Professional Geologist will review all documentation to ensure conformity with this document. In addition, the following field QC methods will be implemented during sample collection:

- Collect one field duplicate sample for every 10 samples collected during the sampling event. Send duplicate samples along with original samples to the primary laboratory. The purpose of the duplicate sample is to determine the precision of field sampling and laboratory analysis techniques. Field duplicate samples will be laboratory blind duplicates. A false well identifier will be assigned

for the sample identifier and recorded on the sample label and chain-of-custody record along with a false sample collection time. The actual sample location, sample time, and corresponding false sample identifier and sample time will be recorded.

- Include one trip blank sample containing reagent-free deionized water for VOC analyses to accompany each ice chest shipped each day for these analyses. The trip blanks will be prepared by the analytical laboratory using reagent-free deionized water. The purpose of the trip blank is to identify possible contamination associated with container preparation and sample transport.
- Identify duplicate samples in the same manner as all other samples.

CAUTIONS

The following cautions need to be considered when planning to collect groundwater samples if the below conditions occur:

- **DEGASSING:** If degassing is observed during sampling (e.g. bubbling) VOCs will be lost. Indicate on the COC that degassing was observed. When this happens, the groundwater data for VOCs will need to be qualified.
- **DEGASSING REACTION WITH PRESERVATIVE:** If a degassing reaction is observed when water contacts the preservative in a sample container (e.g. hydrochloric acid) dissolved gases and VOCs will be lost. When this happens, the groundwater data for dissolved gases and VOCs will need to be qualified. Additionally, a second sample may be collected into an unpreserved container and labeled accordingly.
- **AERATING:** When collecting the samples for VOCs analyses, avoid aerating the groundwater as it is purged. This can cause loss of the VOCs in the groundwater.
- **DIRECT SUNLIGHT/HOT CONDITIONS:** If possible avoid direct sun light and hot ambient air temperatures which may cause the groundwater to heat up. This may cause the groundwater to degas. When sampling under these conditions, the sampler will need to shade the equipment from the sunlight (e.g., umbrella, tent, etc.). If possible, sampling on hot days, or during the hottest time of the day, should be avoided.


PERSONNEL QUALIFICATIONS /RESPONSIBILITIES

All personnel collecting water samples should have the following minimum qualifications:

- First aid training;
- Medical clearance under the Hargis + Associates medical surveillance program; and
- Current respirator fit testing.

[illegible]

**FIGURE SOP-Q
SAMPLE IDENTIFICATION LABEL**

 HARGIS + ASSOCIATES, INC. Phone: 858.455.6500 9171 Towne Centre Drive, Suite 375, San Diego, CA 92122		
Client	H+A Project No.	Initials
Sample ID	Date / /	Time
Analyze for:		
Preservative/Special Instructions:		