



July 1, 2011

Jim Richmond
Oil Control Program
Maryland Department of the Environment
1800 Washington Blvd, Suite 620
Baltimore, Maryland 21230

RE: **CAP IMPLEMENTATION PLAN**
Monrovia BP/Former Green Valley Citgo
11791 Fingerboard Road
Monrovia, Maryland
OCP Case #2005-0834-FR

Dear Mr. Richmond:

Groundwater & Environmental Services, Inc. (GES), on behalf of Carroll Independent Fuels Company (Carroll), respectfully submits the *CAP Implementation Plan* for 11791 Fingerboard Road in Monrovia, Maryland (Site) requested in the *Extended Pilot Testing Approval* from the Maryland Department of the Environment (MDE), dated June 1, 2011. Please note, the CAP Implementation Plan submittal deadline was changed to July 1, 2011 per your June 6, 2011 email correspondence with a revised Site Management Schedule.

Site Monitoring

The MDE specifically requested two additions to the monitoring proposed in the Corrective Action Plan (CAP), which are discussed below:

- **Nearby Drinking Water Sampling Plan.** The six impacted private drinking water supply wells with point of entry treatment (POET) systems and public supply wells FR-94-1233 and FR-94-1282 will be sampled once prior to the start of in-situ chemical oxidation (ISCO) pilot test activities as well as during the second and fifth weeks of system operation. The samples will be collected prior to the POET systems (i.e., untreated, influent samples) and analyzed for volatile organic compounds (VOCs), total organic carbon (TOC), chemical oxygen demand (COD), dissolved and total iron, and total chromium (Cr+3 and Cr+6).
- **Groundwater Sampling Plan.** The groundwater monitoring plan presented in the CAP has been modified to include monitoring wells MW-14S and MW-16. Samples from these wells will be analyzed for TOC, COD, iron, chromium, and Total Dissolved Solids/Total Suspended Solids (TDS/TSS). The revised groundwater sampling plan is shown below:

Table 1: Groundwater Sampling Plan

Well ID	Laboratory Analytical Parameters						
	VOCs	TOC	COD	Diss. Iron	Total Iron	Total Chromium	TDS /TSS
MW-7	X	X	X	X	X	X	X



Well ID	Laboratory Analytical Parameters						
	VOCs	TOC	COD	Diss. Iron	Total Iron	Total Chromium	TDS /TSS
MW-8	X						
MW-10	X						
MW-13	X						
MW-14S	X	X	X	X	X	X	X
MW-14D	X	X	X	X	X	X	X
MW-15D	X	X	X	X	X	X	X
MW-16	X	X	X	X	X	X	X
MW-17	X	X	X	X	X	X	X
MW-18S	X	X	X	X	X	X	X
MW-18D	X	X	X	X	X	X	X

Site Remediation

As outlined in the CAP, an ISCO system is to be utilized to remediate the area of greatest groundwater impact, at the Site. GES’ patented HypeAir-EX[®] technology is to be used, which is a chemical oxidation technology that operates continuously to aggressively remediate the subsurface. The technology uses a combination of ozone and hydrogen peroxide injection. For this initial source area remediation, it is anticipated that the equipment will operate for approximately 60 days (eight weeks). In addition to aggressive oxidation of contaminants in the source area, downgradient remediation is anticipated to occur through migration of elevated dissolved oxygen (DO) levels along bedrock fractures. Throughout the remediation system operation, field parameters are to be monitored in the source area and down gradient to determine the site-specific effectiveness of the source area remediation.

For this initial source area remediation, the ISCO system is to be implemented using injection wells IW-1S, IW-1D, and IW-2S. Ozone will be the primary oxidizer and will be sparged nearly continuously during the system operation. The system will inject up to 5 lbs/day of ozone with ambient air. Hydrogen peroxide will be utilized through periodic injections. Hydrogen peroxide injections will occur not more than once per week during operation and maintenance (O&M) visits. During O&M visits in which hydrogen peroxide is injected, between 2 and 8 gallons will typically be injected. A soil vapor extraction (SVE) system will be connected to VE-1, which is to be used to mitigate potential fugitive emissions that may result from the oxidation process. Off-gas treatment will not be required for the SVE component, as hydrocarbon mass has been calculated below the permit limit of 20 pounds per day. A permit to construct a SVE system is in progress. SVE off-gas monitoring will be in accordance with the MDE’s Air Quality General Permit.

The remedial goal for the targeted ISCO remediation is to achieve a 90% or greater reduction in MTBE concentration in monitoring wells MW-15D, MW-18S, and MW-18D and provide increased downgradient DO concentrations in the groundwater. However, this will not serve as criteria for stopping operation of the ISCO system. Operation is to be based on the 60-day plan, unless later determined otherwise. Additional and/or modified operation of an ISCO remediation system in the targeted area



and/or additional areas onsite will be determined following the initial 60-day operation of the ISCO remediation system, as proposed.

If the targeted ISCO remediation system is selected to operate beyond 60 days, adjustments to the O&M schedule and monitoring program will be submitted to the MDE (via e-mail) for approval. MDE will be given advance notification of any scheduled ISCO system deactivation plans and will be provided a written summary following the deactivation including all data collected during the operation of the ISCO system. Any major adjustments to the implementation of ISCO CAP and/or consideration of additional or supplemental remedial technologies will be proposed in a CAP Addendum for MDE review and approval.

System Design

Remediation system design drawings are included as an attachment to this letter. The ISCO system will be contained within an 8-foot-wide by 10-foot-long trailer stationed to the east of the injection well network within a fenced system compound. The enclosure will include an ozone generator, hydrogen peroxide holding tank, injection pumps, flow meters, and controls that comprise the ISCO system. The fenced remediation system compound will also hold the equipment associated with the SVE system. A telemetry system will be in place that will notify GES of any alarm conditions or system shut-down.

As part of the ISCO system, each of the three injection wells will have a dedicated ozone injection line with individual flow meters. The ozone lines will be constructed of stainless steel and Teflon inside the equipment trailer, below grade and in the injection well vaults, and will be sleeved inside high density polyethylene (HDPE) tubing in the trenches. For hydrogen peroxide injection, one metered line will run to injection wells IW-1S and IW-1D, and a separate line will run to injection well IW-2S. The hydrogen peroxide injection lines will be constructed of schedule 80 PVC. The SVE line will be connected to VE-1 and constructed of schedule 40 PVC below grade and schedule 80 PVC above grade. Subgrade piping will be installed no greater than 24 inches below grade. Piping will be bedded in pea gravel, sand, or other bedding material. Trenches will then be backfilled with suitable material and will be resurfaced to meet existing conditions.

O&M

During this initial system operation period, GES will conduct routine O&M of the system on a weekly basis. During a routine O&M visit, the following data is typical of what will be measured and/or recorded:

- Ozone/air flow rate to each injection well;
- Ozone concentration to each injection well;
- Hydrogen peroxide injection flow rate to each injection well;
- Volume of hydrogen peroxide injected to each injection well;
- Volume of hydrogen peroxide in injection tank;
- Applied blower vacuum to VE-1;
- Extracted vapor flow rate from SVE system;
- Influent PID reading from SVE system;
- Influent ozone reading from SVE system;
- Headspace PID, LEL, and percent oxygen readings at monitoring wells MW-15D, MW-18S, and MW-18D; and
- Groundwater temperature, DO, ORP, conductivity, and pH at monitoring wells MW-15D, MW-18S, and MW-18D.



On an every-other week basis (starting with week one of operation), the following additional data will be collected:

- Headspace PID, LEL, and percent oxygen readings at monitoring wells MW-7, MW-8, MW-10, MW-13, MW-14S, MW-14D, MW-16, and MW-17; and
- Groundwater temperature, DO, ORP, conductivity and pH at monitoring wells MW-7, MW-8, MW-10, MW-13, MW-14S, MW-14D, MW-16, and MW-17.

Site Management Schedule

Work to be Performed	Submittal/Implementation Date	Work Completed
CIFCO – Continue execution of the Chemical Oxidation Pilot Test Work Plan	<i>March 21, 2011</i> Pilot test results due as referenced in November 18, 2010 approval letter	<i>March 16, 2011</i> CAP submitted including Chemical Oxidation pilot test results
CIFCO – Develop a Corrective Action Plan (CAP)	<i>March 31, 2011</i>	<i>March 16, 2011</i>
MDE – Issue a Site Management Schedule within 30 days of Consent Order execution	<i>April 19, 2011</i>	<i>June 1, 2011</i> CIFCO received Site Management Schedule
MDE – CAP approval/comments within 60 days of receipt of CAP	<i>May 17, 2011</i>	<i>June 1, 2011</i> Extended Pilot Testing Approval received
CIFCO – Submittal of CAP Implementation Plan within 30 days of receipt of MDE’s CAP comments	<i>July 1, 2011</i>	<i>July 1, 2011</i>
MDE – Approval of CAP Implementation Plan within 30 days of receipt of CAP revision	August 1, 2011	
CIFCO – CAP Implementation within 10 days of MDE approval	August 11, 2011	
CIFCO – Conduct baseline sampling	Week of July 11 th	
CIFCO – Remediation system installation (trenching, equipment install)	Complete by September 9, 2011	
CIFCO – System activation	Week of September 12, 2011	
CIFCO – System operation & maintenance (O&M)	Weekly during system operation	
CIFCO – O&M with additional groundwater monitoring	Every other week during system operation, starting week 1 of operation	
CIFCO – Groundwater sampling	Week 2 and week 5 of system operation and after system operation is stopped	
CIFCO - Quarterly Monitoring Reports, including sampling data, remediation progress; if OCP comments, CIFCO has 60 days to respond for final approval or submit for dispute resolution	15 th of February, May, August and November	



GES appreciates the continued guidance of the MDE on this project. If you have any questions or would like additional information please contact the undersigned at 800-220-3606, extension 3712 or 3717, respectively, or Herb Meade at 410-261-5450.

Sincerely,

Groundwater & Environmental Services, Inc.

Prepared By:

A handwritten signature in blue ink that reads "Dan R. Drennan".

Dan Drennan, EIT
Remediation Specialist

Reviewed By:

A handwritten signature in blue ink that reads "Gregory Reichart".

Gregory Reichart
Project Manager

A handwritten signature in black ink that reads "Richard K. Evans".

Richard K. Evans, PE
Director of Engineering

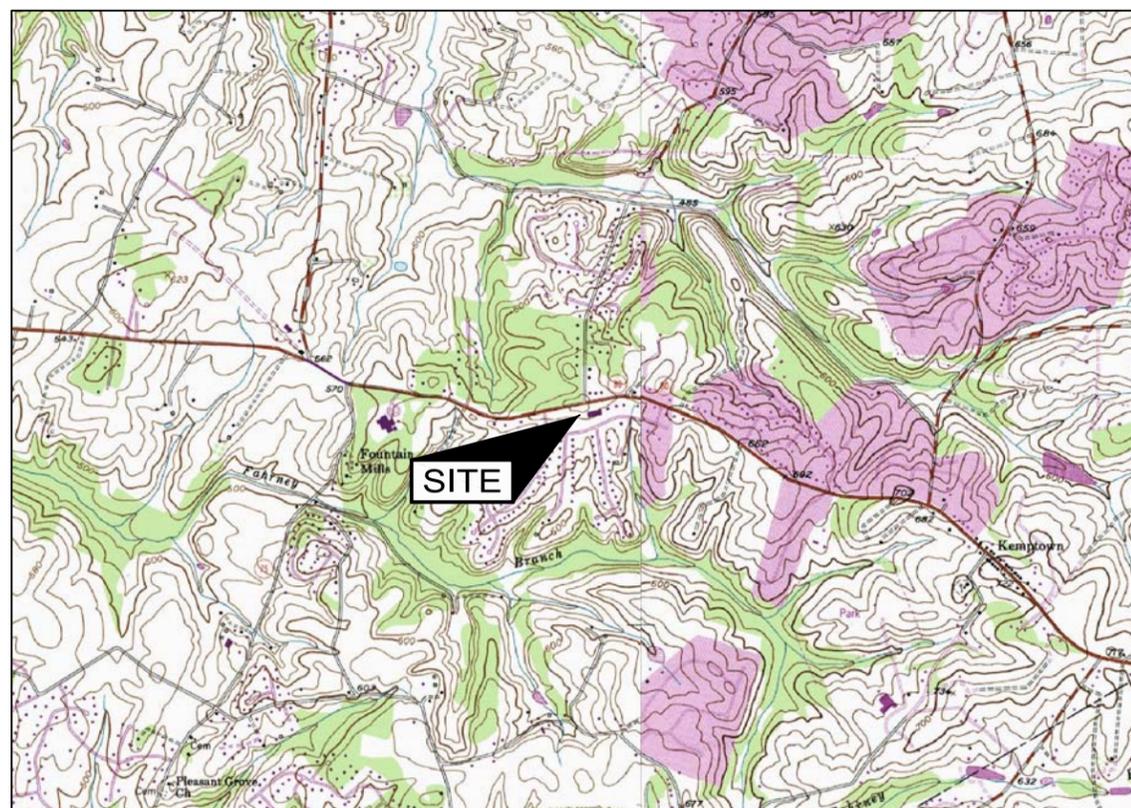
Enclosure

- c: Herb Meade – Carroll Independent Fuels Company
- Jim Richmond – MDE (additional paper copy and electronic copy on CD)
- Susan Bull – MDE
- George Keller – Frederick County Health Department
- Samir Andrawos – Timbercrest Limited Partnership
- Jennifer Andrawos – Timbercrest Limited Partnership
- Dwight W. Stone – Whiteford Taylor Preston
- Robert S. Bassman – Bassman, Mitchell & Alfano, Chtd.
- M. Albert Figinski – Law Offices of Peter Angelos
- File – GES, MD

MONROVIA BP
(FORMER GREEN VALLEY CITGO)
11791 FINGERBOARD ROAD
MONROVIA, MARYLAND

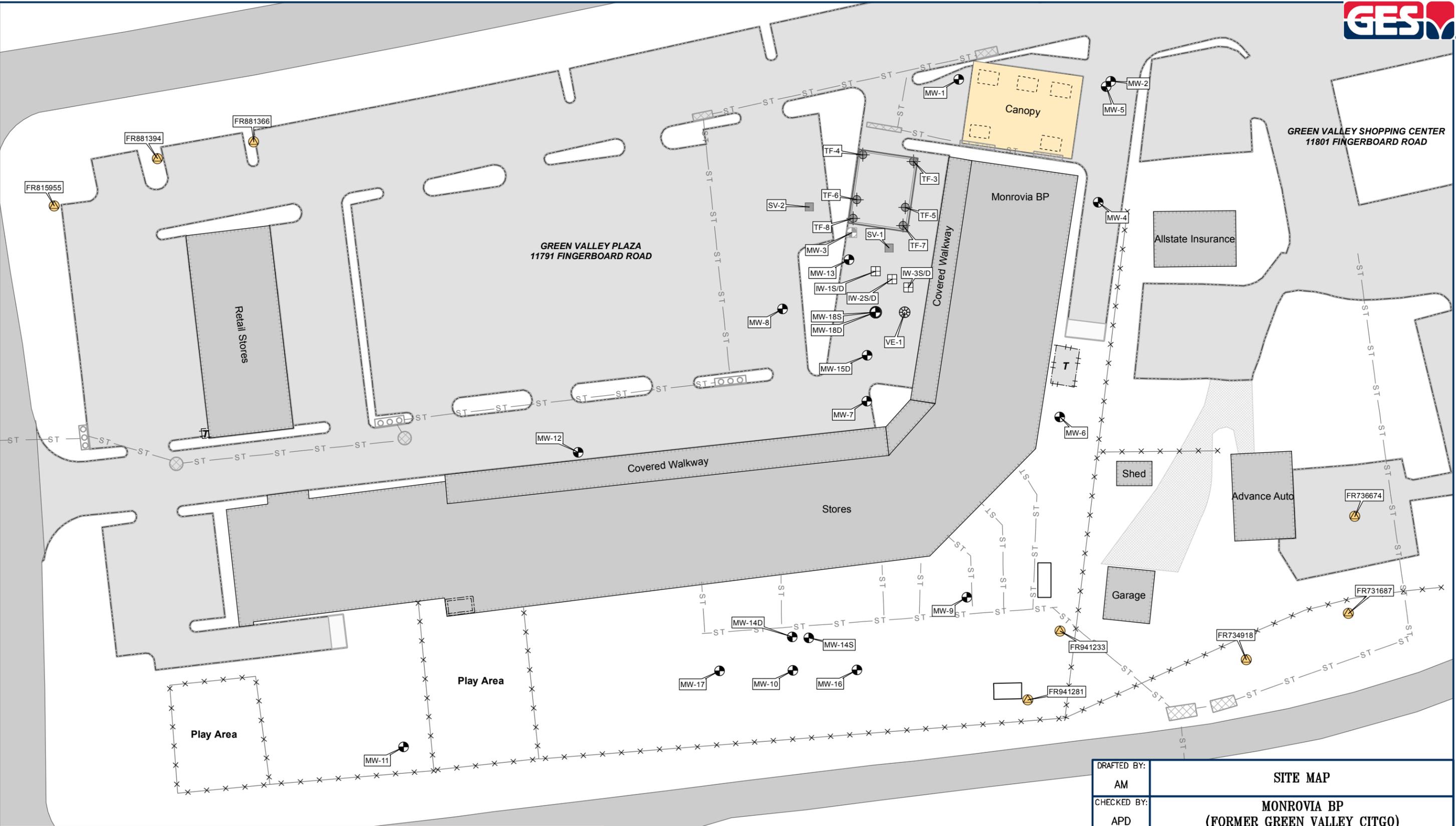


<u>FIGURE</u>	<u>DESCRIPTION</u>
1	TITLE PAGE
2	SITE MAP
3	SYSTEM LAYOUT MAP
4	TRENCH CROSS SECTIONS
5	WELL CONSTRUCTION DETAIL 1
6	WELL CONSTRUCTION DETAIL 2
7	WELL VAULT CONSTRUCTION DETAIL
8	PIPING STUB-UP DETAIL
9	EQUIPMENT COMPUND LAYOUT MAP
10	WOODEN FENCE SPECIFICATIONS
11	P&ID-INJECTION SYSTEM
12	P&ID-SVE SYSTEM



DRAFTED BY: B.C.S. (N.J.)	TITLE PAGE		
CHECKED BY:	MONROVIA BP (FORMER GREEN VALLEY CITGO) 11791 FINGERBOARD ROAD MONROVIA, MARYLAND		
REVIEWED BY: DRD	Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114		
	NOT TO SCALE	DATE 6-20-11	FIGURE 1

P:\CarrollFuels\Monrovia\GIS\Map\CarrollFuels_Monrovia_Q1_2011_Fig1_SM.mxd - Scale 1:600 - Date: 05-04-11 - Time: [01:43 PM] - amcelvey

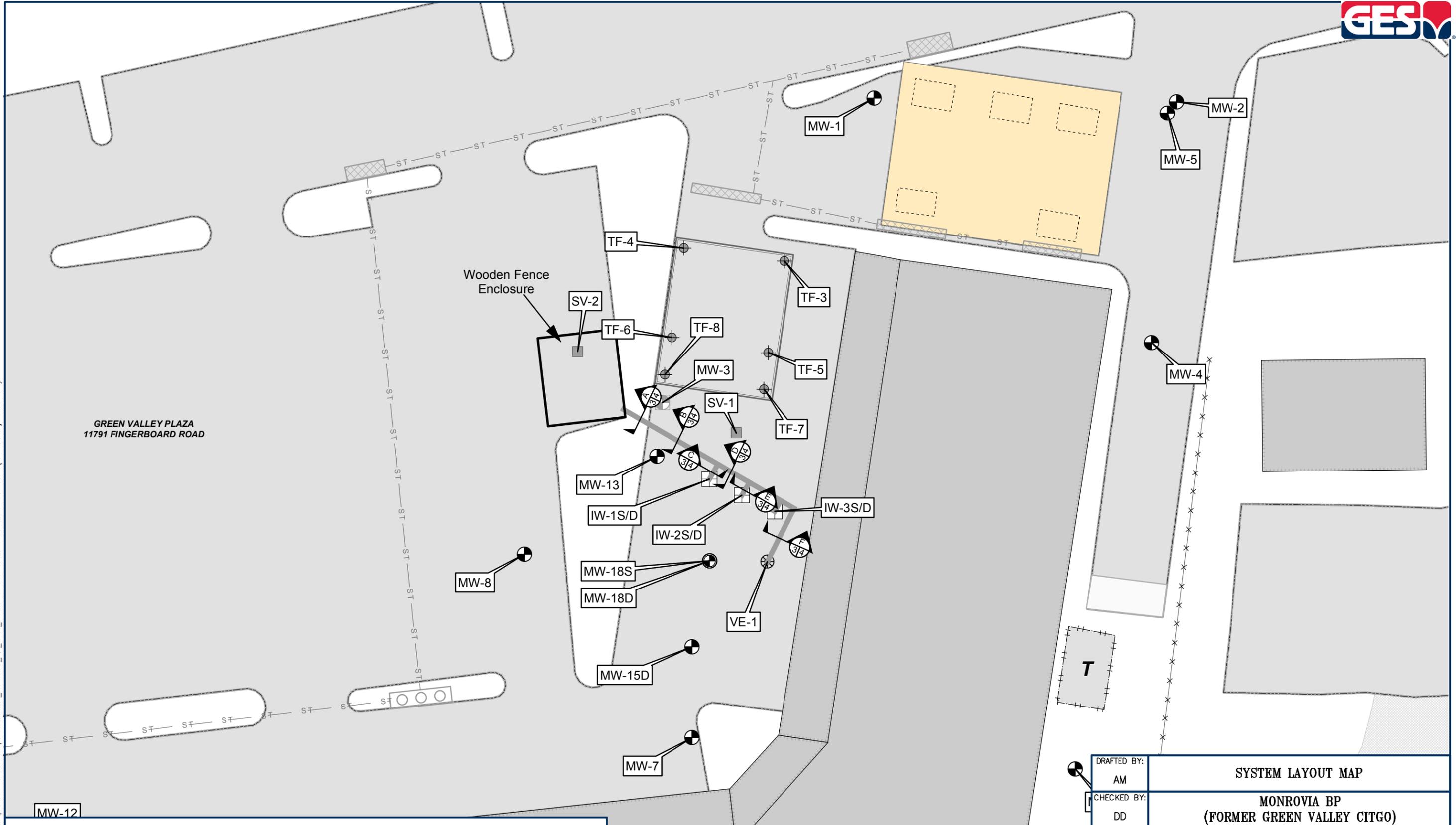


Legend			
	Abandoned Well		Abandoned Soil Vapor Point
	Monitoring Well		Injection Well
	Potable Well		Nestled Obs Well
	Tank Field Well		Vapor Extraction Well
	Fence		Storm Sewer
	Building		Curb Catch Basin
	Canopy		Catch Basin
	Dispenser		Propane AST
	Tank Field		Pump Room
	Dumpster		Transformer

Source:
NAIP aerial photograph for Frederick Co. Based on GIS data provided by Environmental Alliance, Inc.

DRAFTED BY: AM	SITE MAP	
CHECKED BY: APD		
REVIEWED BY: GR		
NORTH	Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114	
	SCALE IN FEET 	DATE 5-04-11
		FIGURE 2

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GREEN VALLEY PLAZA
11791 FINGERBOARD ROAD

Legend

- | | | | | | | | | | |
|--|-----------------|--|----------------------------|--|------------------|--|------------|--|-------------|
| | Abandoned Well | | Abandoned Soil Vapor Point | | Fence | | Building | | Propane AST |
| | Monitoring Well | | Injection Well | | Storm Sewer | | Canopy | | Pump Room |
| | Potable Well | | Nested Obs Well | | Curb Catch Basin | | Dispenser | | Transformer |
| | Tank Field Well | | Vapor Extraction Well | | Catch Basin | | Tank Field | | Dumpster |

- Trench Cross Section ID
- Figure Where Detailed
- Figure Where Identified

DRAFTED BY:
AM
CHECKED BY:
DD
REVIEWED BY:
GR
NORTH

SYSTEM LAYOUT MAP

**MONROVIA BP
(FORMER GREEN VALLEY CITGO)
11791 FINGERBOARD ROAD
MONROVIA, MARYLAND**

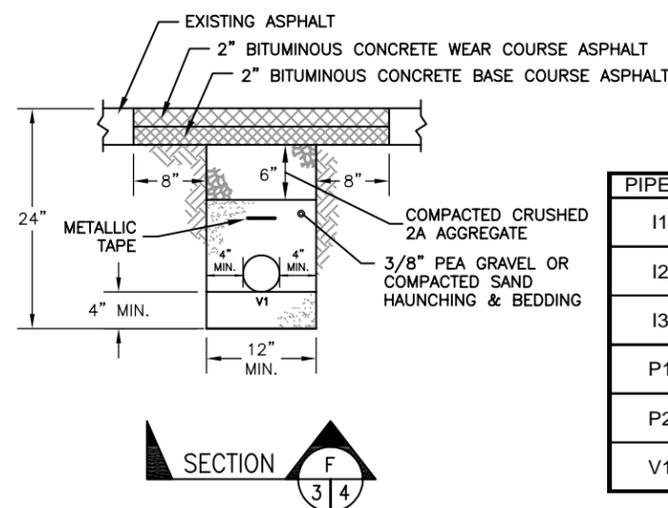
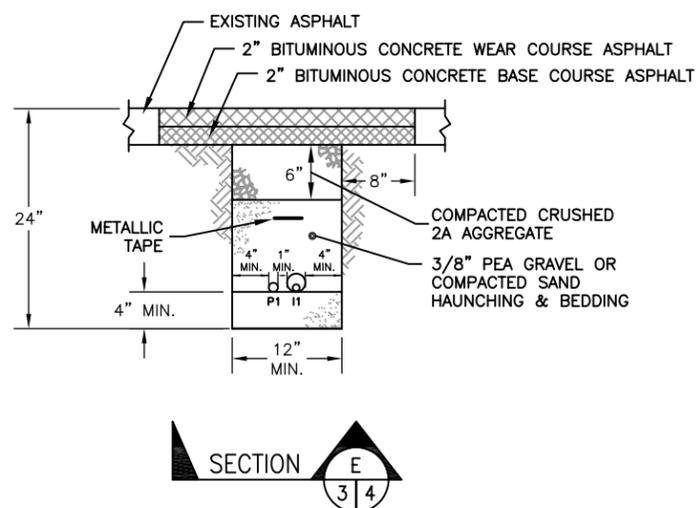
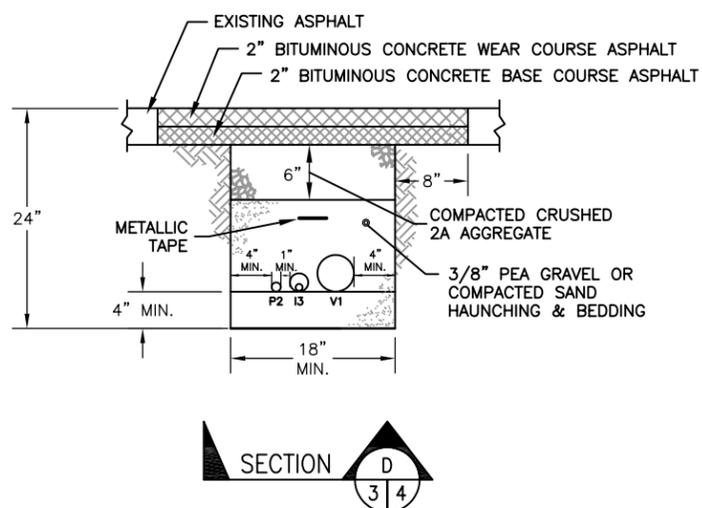
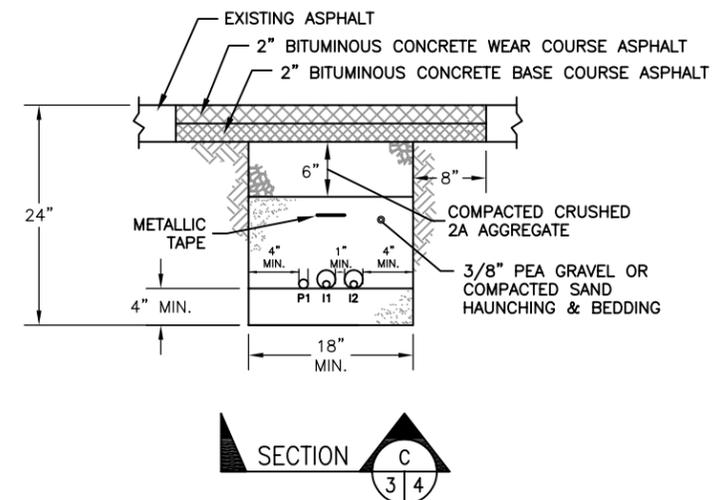
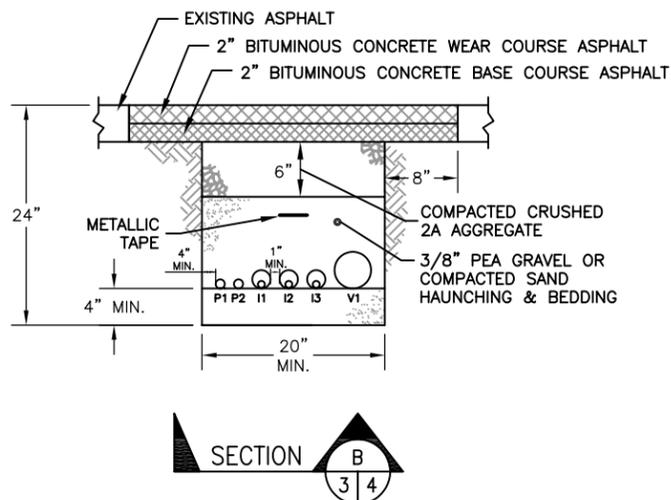
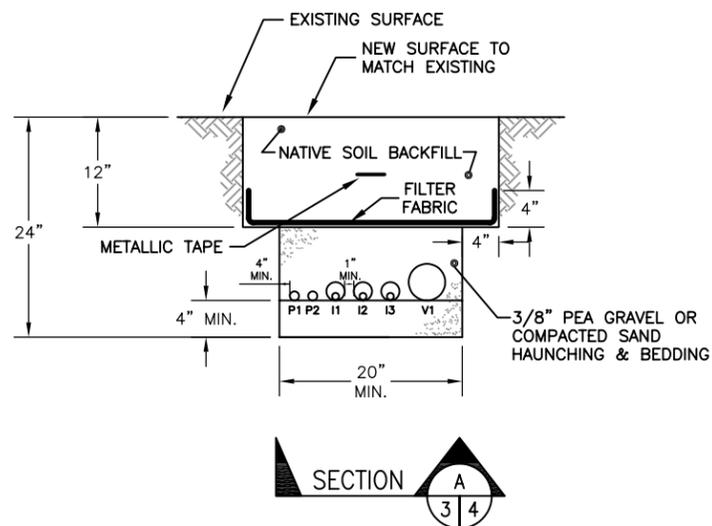
Groundwater & Environmental Services, Inc.
2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114

SCALE IN FEET

DATE
6-17-11

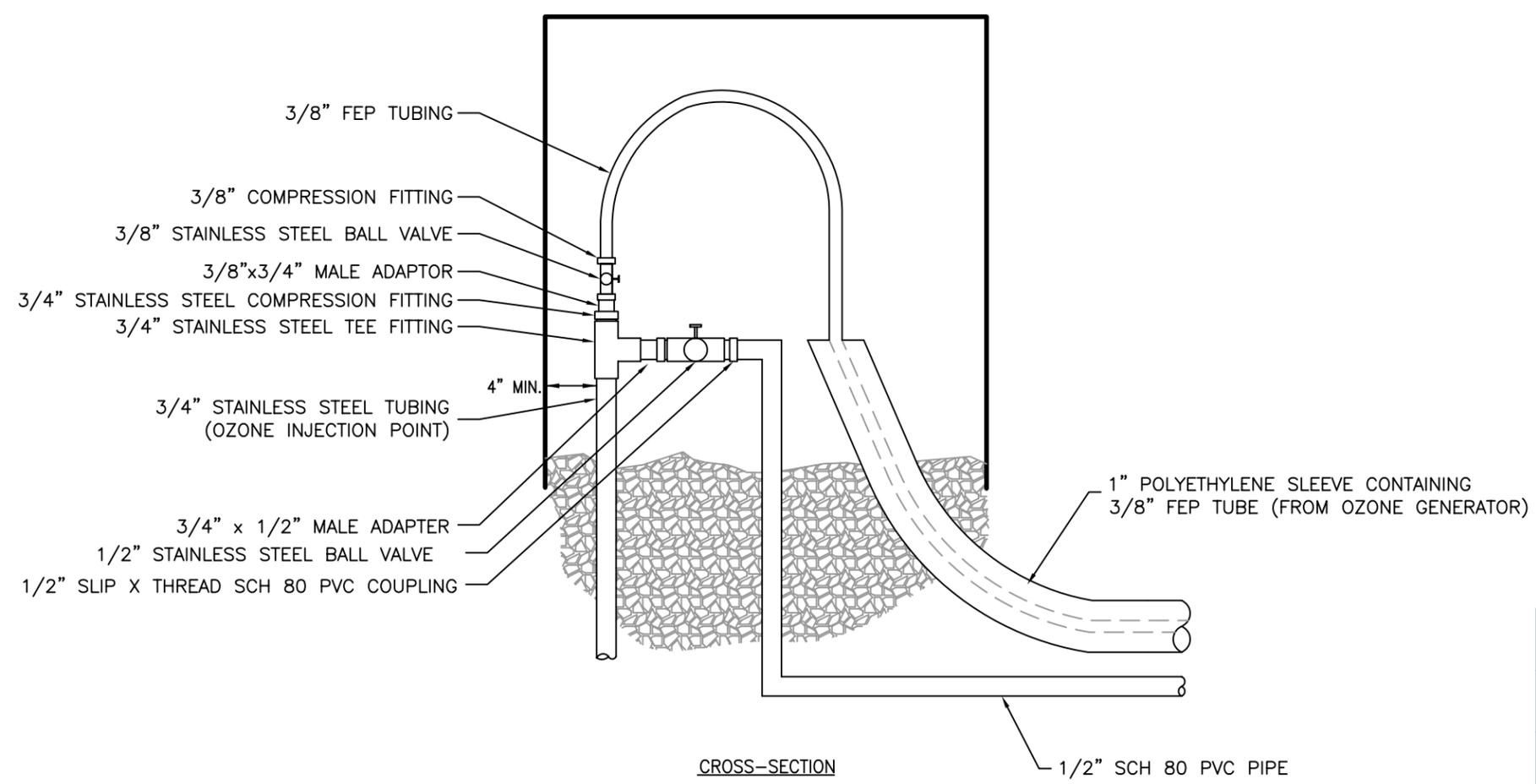
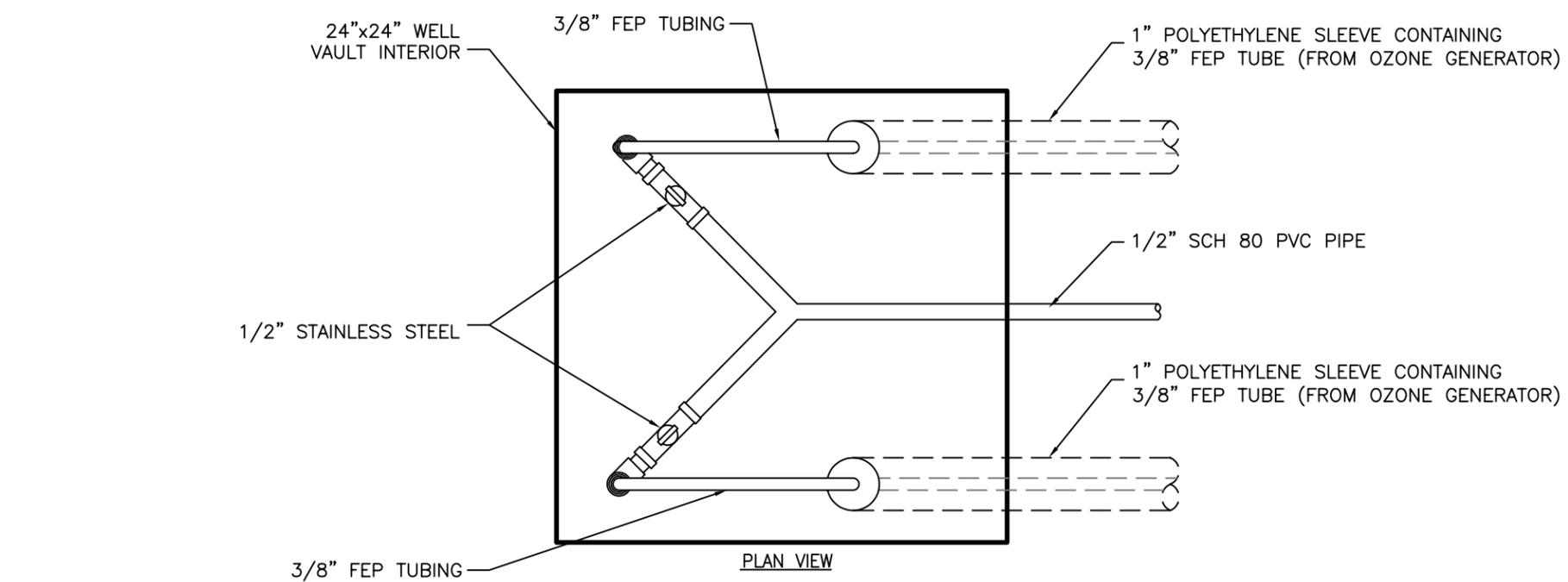
FIGURE
3

Source:
NAIP aerial photograph for Frederick Co. Based on GIS data provided by Environmental Alliance, Inc.



PIPE ID	DESCRIPTION
I1	1" Polyethylene sleeve containing 3/8" FEP tube from equipment compound to well IW-1S.
I2	1" Polyethylene sleeve containing 3/8" FEP tube from equipment compound to well IW-1D.
I3	1" Polyethylene sleeve containing 3/8" FEP tube from equipment compound to well IW-2S.
P1	1/2" schedule 80 PVC hydrogen peroxide line from equipment compound to well IW-1S and IW-1D.
P2	1/2" schedule 80 PVC hydrogen peroxide line from equipment compound to well IW-2S.
V1	2" schedule 80 PVC vapor recovery line from equipment compound to well VE-1.

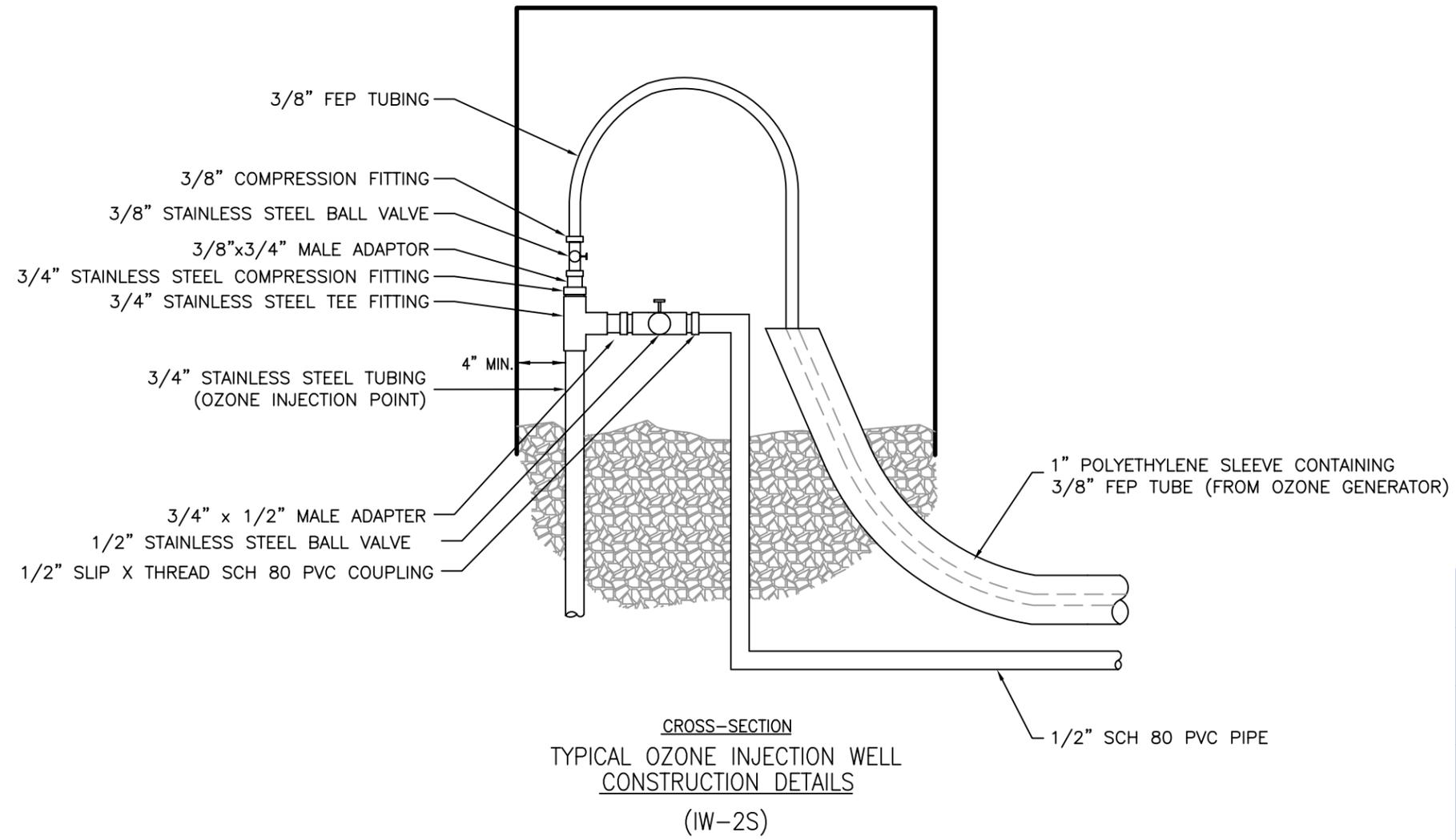
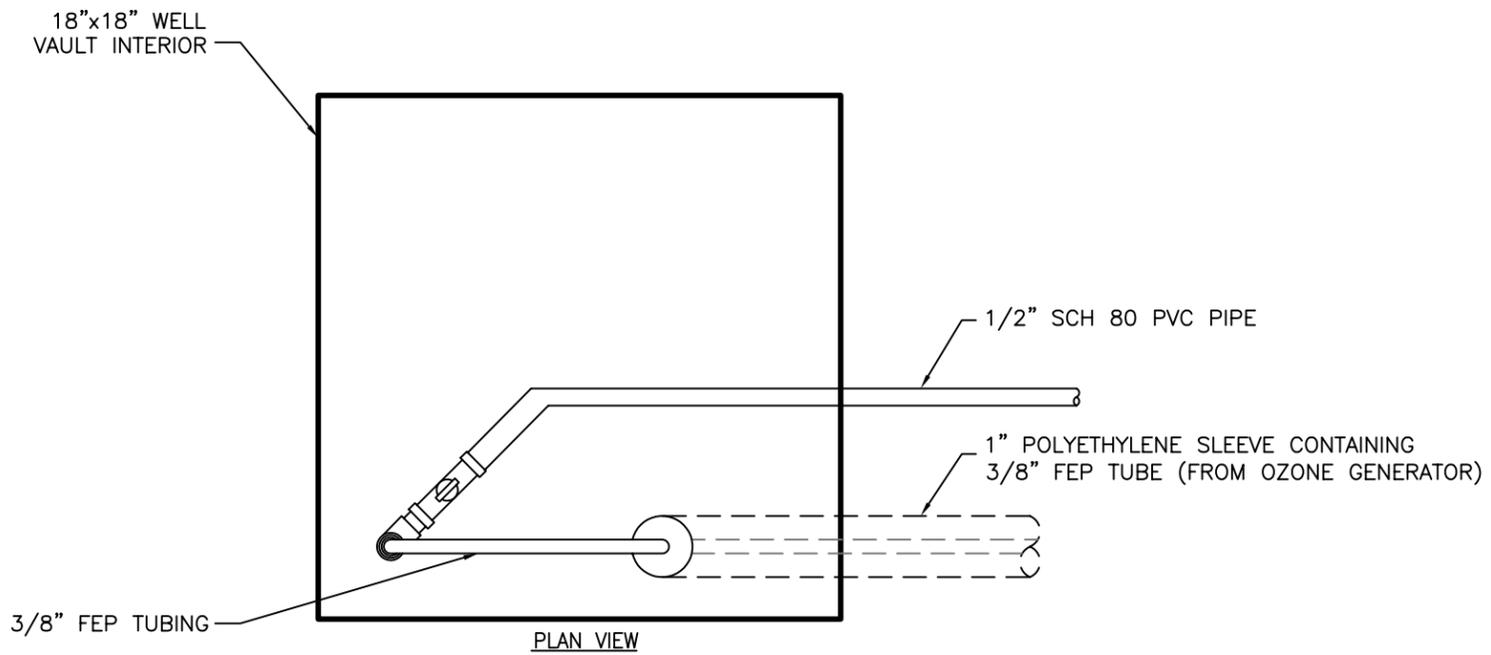
DRAFTED BY: B.C.S. (N.J.)	TRENCH CROSS SECTIONS MONROVIA BP (FORMER GREEN VALLEY CITGO) 11791 FINGERBOARD ROAD MONROVIA, MARYLAND	
CHECKED BY:		
REVIEWED BY: DRD		
Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114		
NOT TO SCALE	DATE 6-20-11	FIGURE 4



TYPICAL OZONE INJECTION WELL CONSTRUCTION DETAILS (IW-1S & IW-1D)

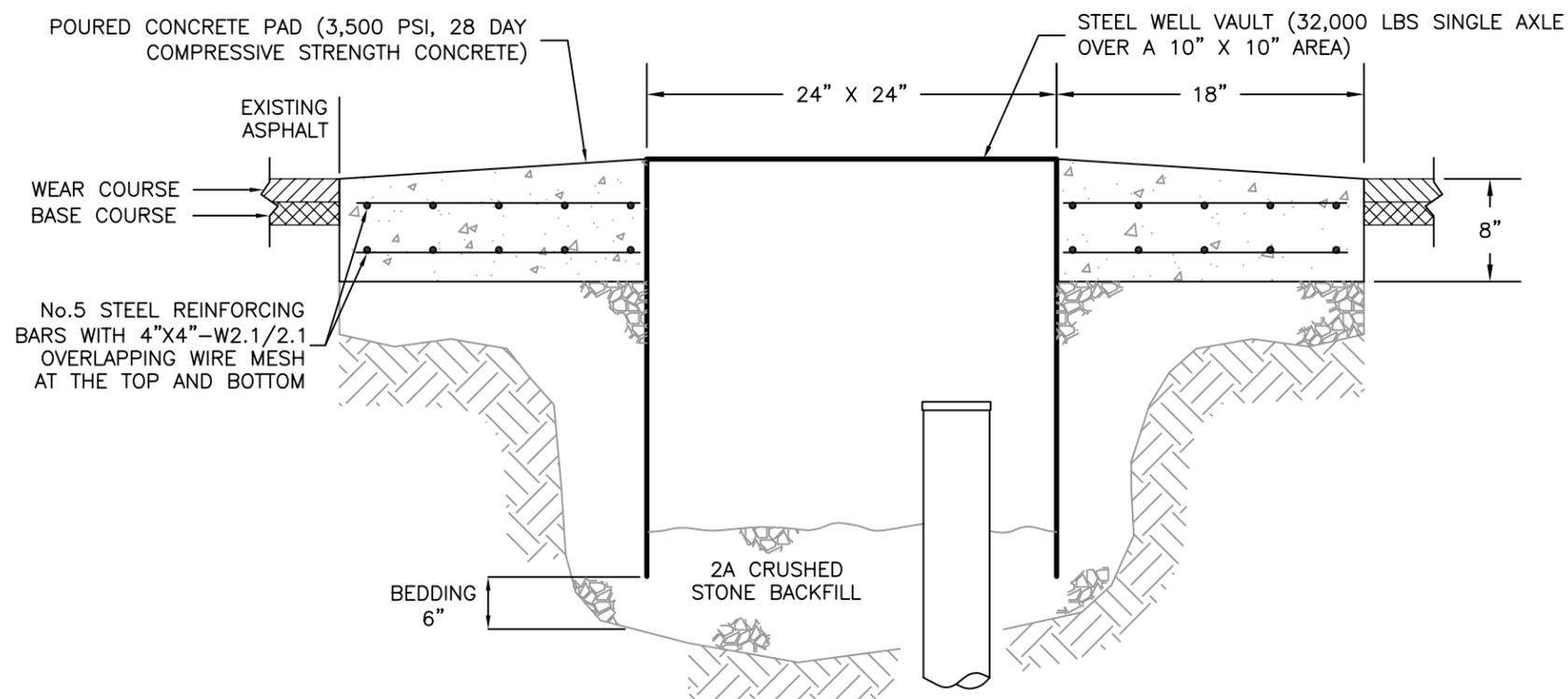
DRAFTED BY: B.C.S. (N.J.)	WELL CONSTRUCTION DETAIL 1	
CHECKED BY:	MONROVIA BP (FORMER GREEN VALLEY CITGO) 11791 FINGERBOARD ROAD MONROVIA, MARYLAND	
REVIEWED BY: DRD	Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114	
NOT TO SCALE	DATE 6-16-11	FIGURE 5

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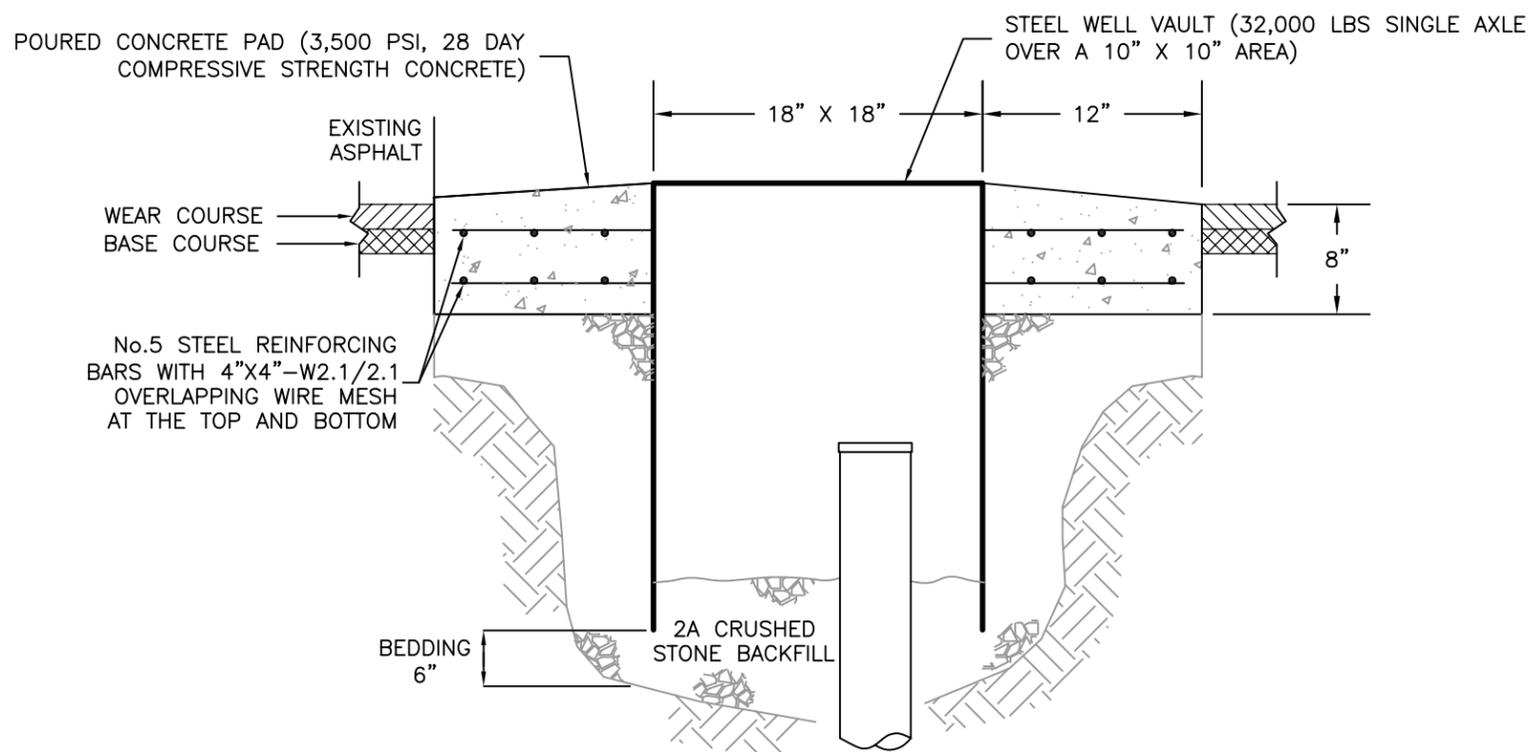


DRAFTED BY: B.C.S. (N.J.)	WELL CONSTRUCTION DETAIL 2	
CHECKED BY:	MONROVIA BP (FORMER GREEN VALLEY CITGO) 11791 FINGERBOARD ROAD MONROVIA, MARYLAND	
REVIEWED BY: DRD	Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114	
NOT TO SCALE	DATE 6-16-11	FIGURE 6

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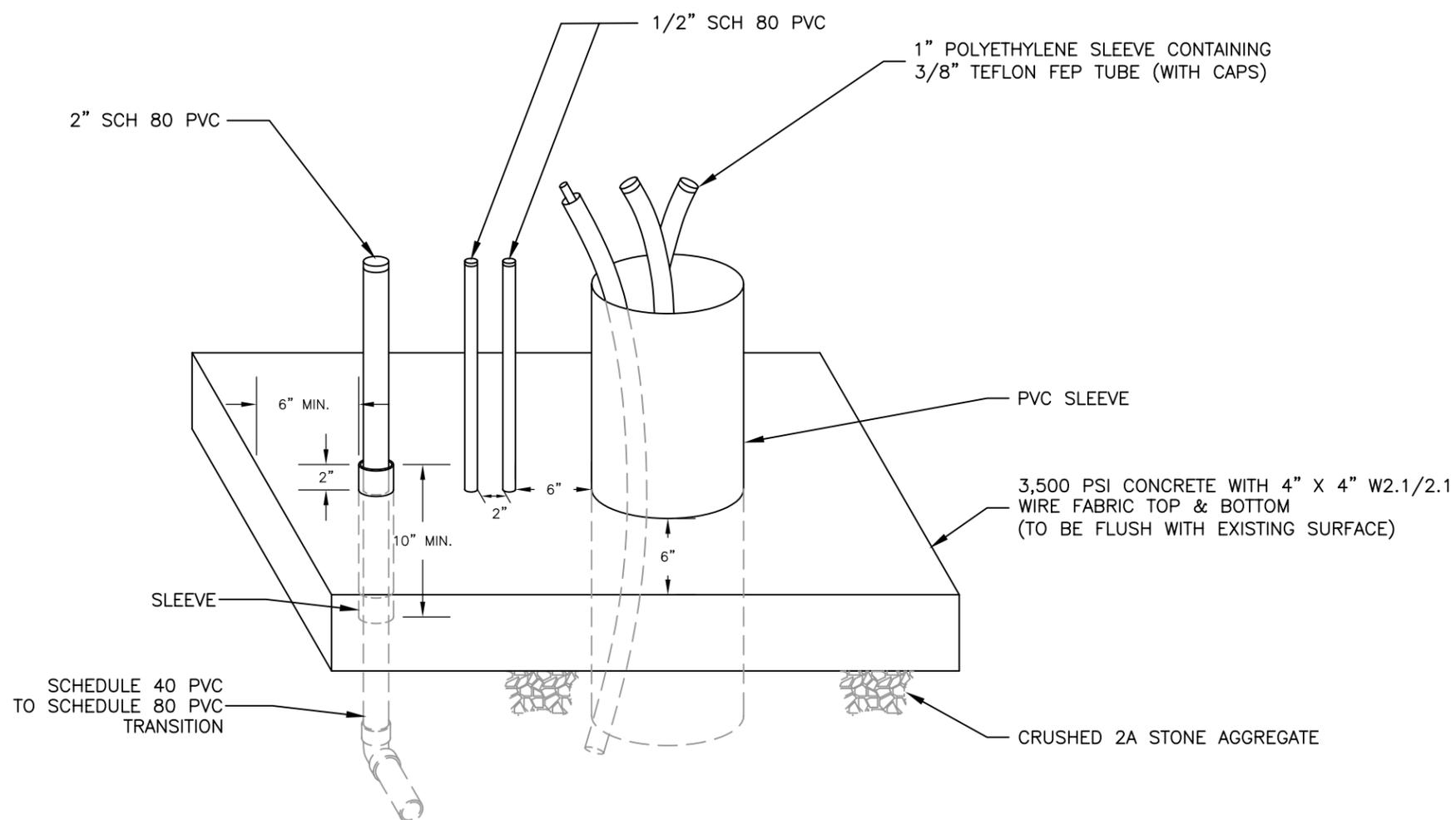


TYPICAL WELL VAULT CONSTRUCTION DETAIL
CAST-IN-PLACE IN ASPHALT
 (IW-1S & IW-1D)



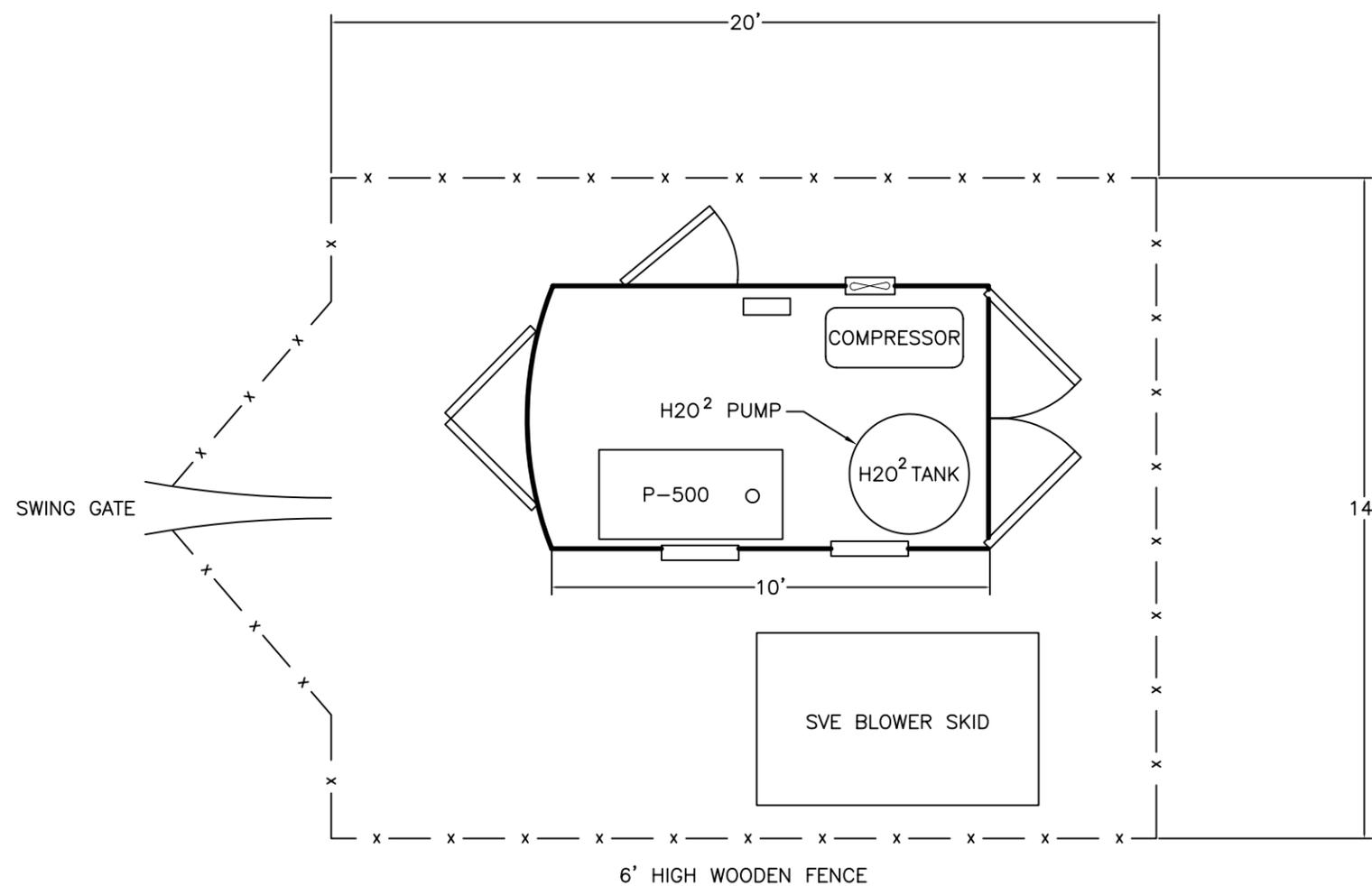
TYPICAL WELL VAULT CONSTRUCTION DETAIL
CAST-IN-PLACE IN ASPHALT
 (IW-2S & VE-1)

DRAFTED BY: B.C.S. (N.J.)	WELL VAULT CONSTRUCTION DETAIL	
CHECKED BY:	MONROVIA BP (FORMER GREEN VALLEY CITGO) 11791 FINGERBOARD ROAD MONROVIA, MARYLAND	
REVIEWED BY: DRD	Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114	
	NOT TO SCALE	DATE 6-22-11
		FIGURE 7



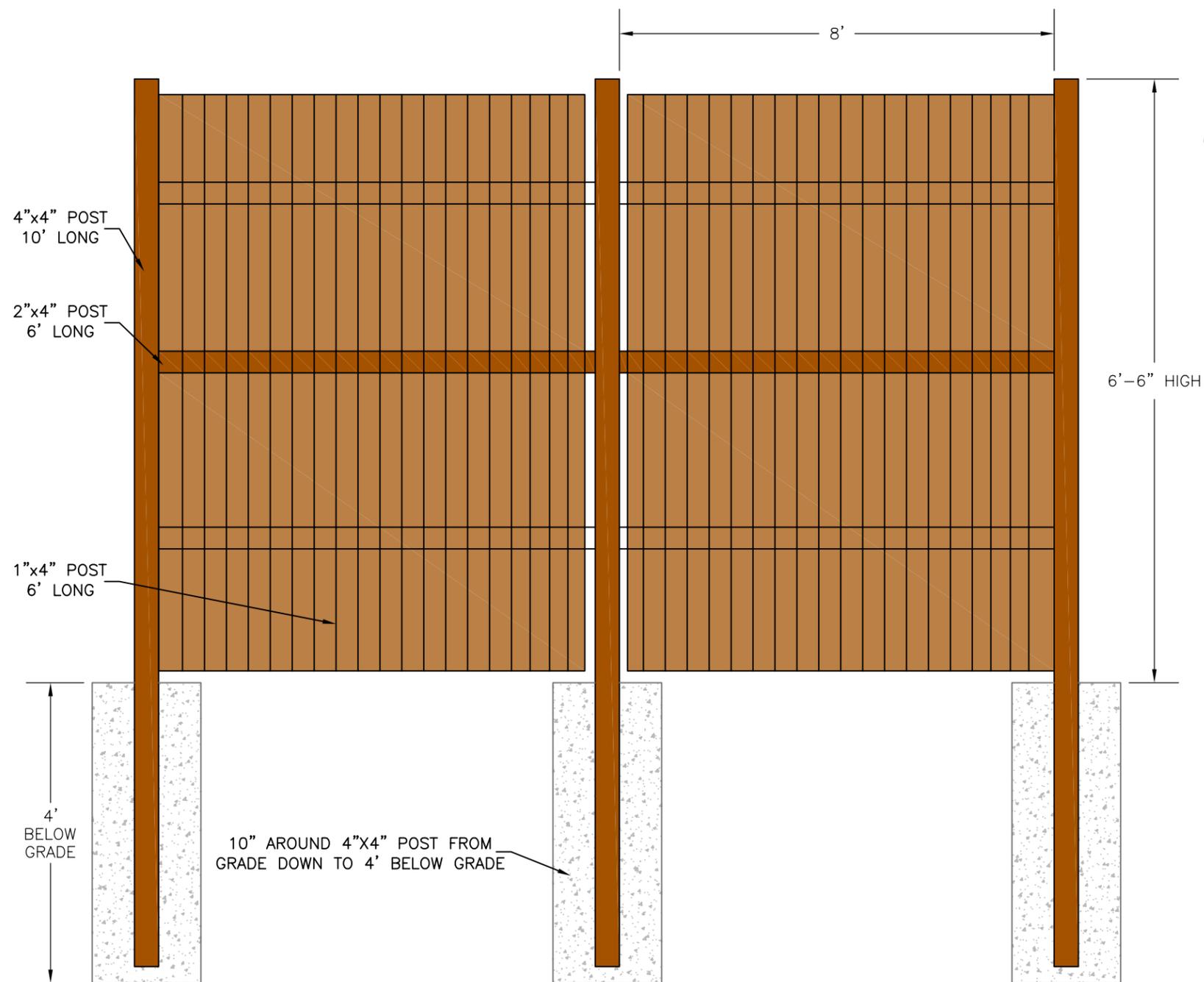
ABOVE GROUND PIPING STUB UP DETAIL

DRAFTED BY: B.C.S. (N.J.)	ABOVEGROUND STUB UP PIPING DETAIL	
CHECKED BY:	MONROVIA BP (FORMER GREEN VALLEY CITGO) 11791 FINGERBOARD ROAD MONROVIA, MARYLAND	
REVIEWED BY: DRD	Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114	
NOT TO SCALE	DATE 6-23-11	FIGURE 8

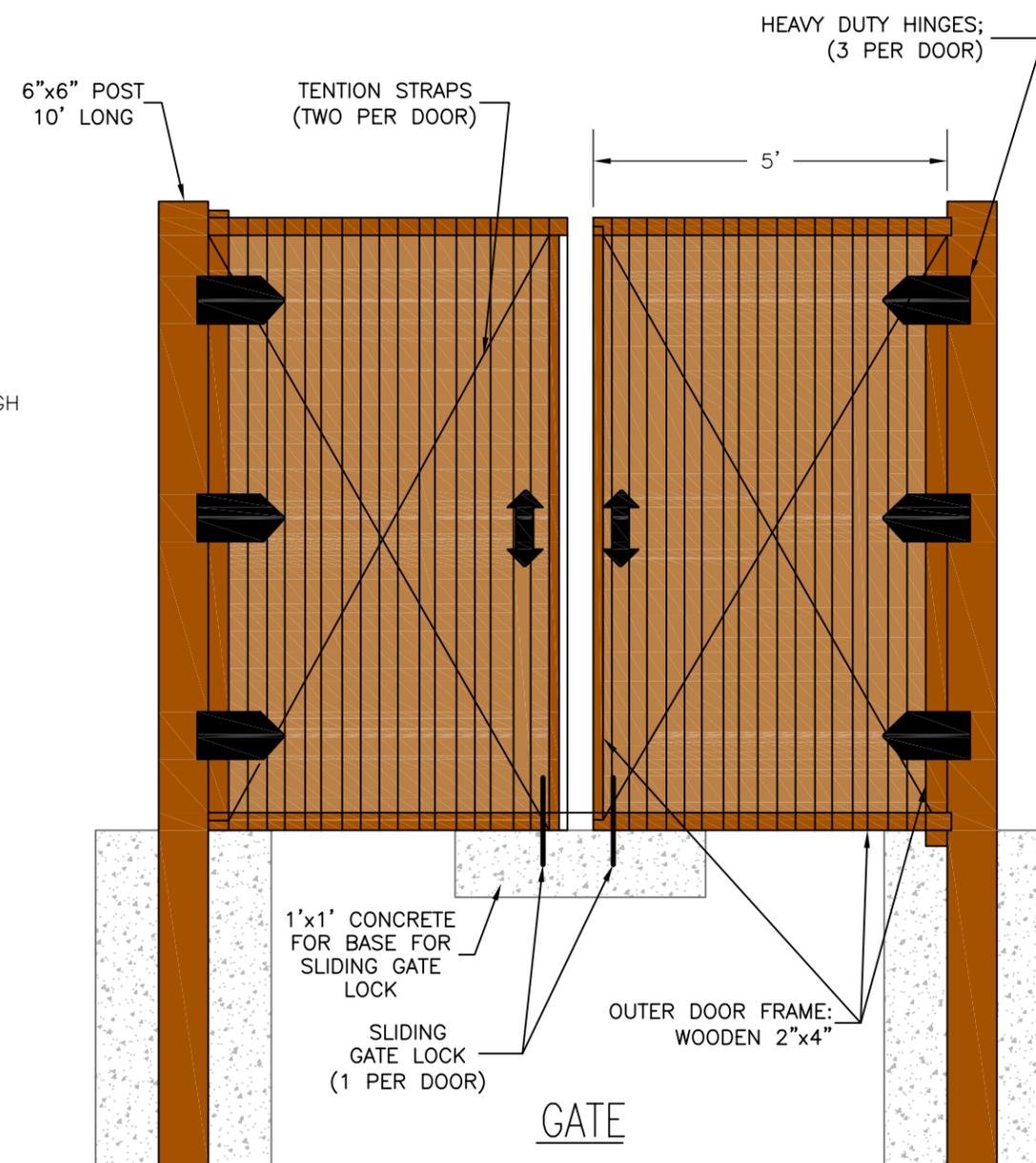


EQUIPMENT COMPOUND LAYOUT DETAIL

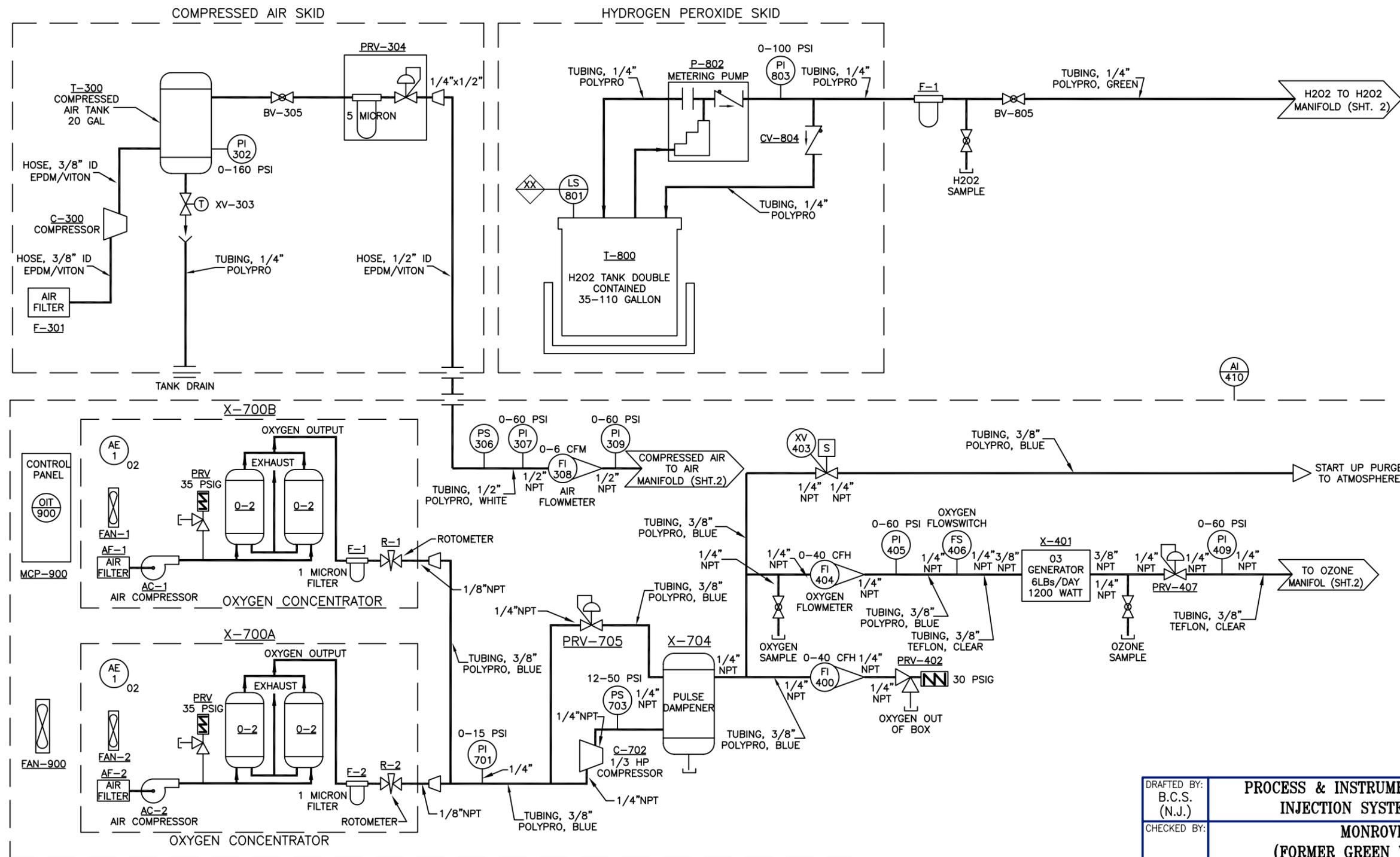
DRAFTED BY: B.C.S. (N.J.)	EQUIPMENT COMPOUNDS LAYOUT MAP	
CHECKED BY:	MONROVIA BP (FORMER GREEN VALLEY CITGO) 11791 FINGERBOARD ROAD MONROVIA, MARYLAND	
REVIEWED BY: DRD	Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114	
	NOT TO SCALE	DATE 6-16-11
		FIGURE 9



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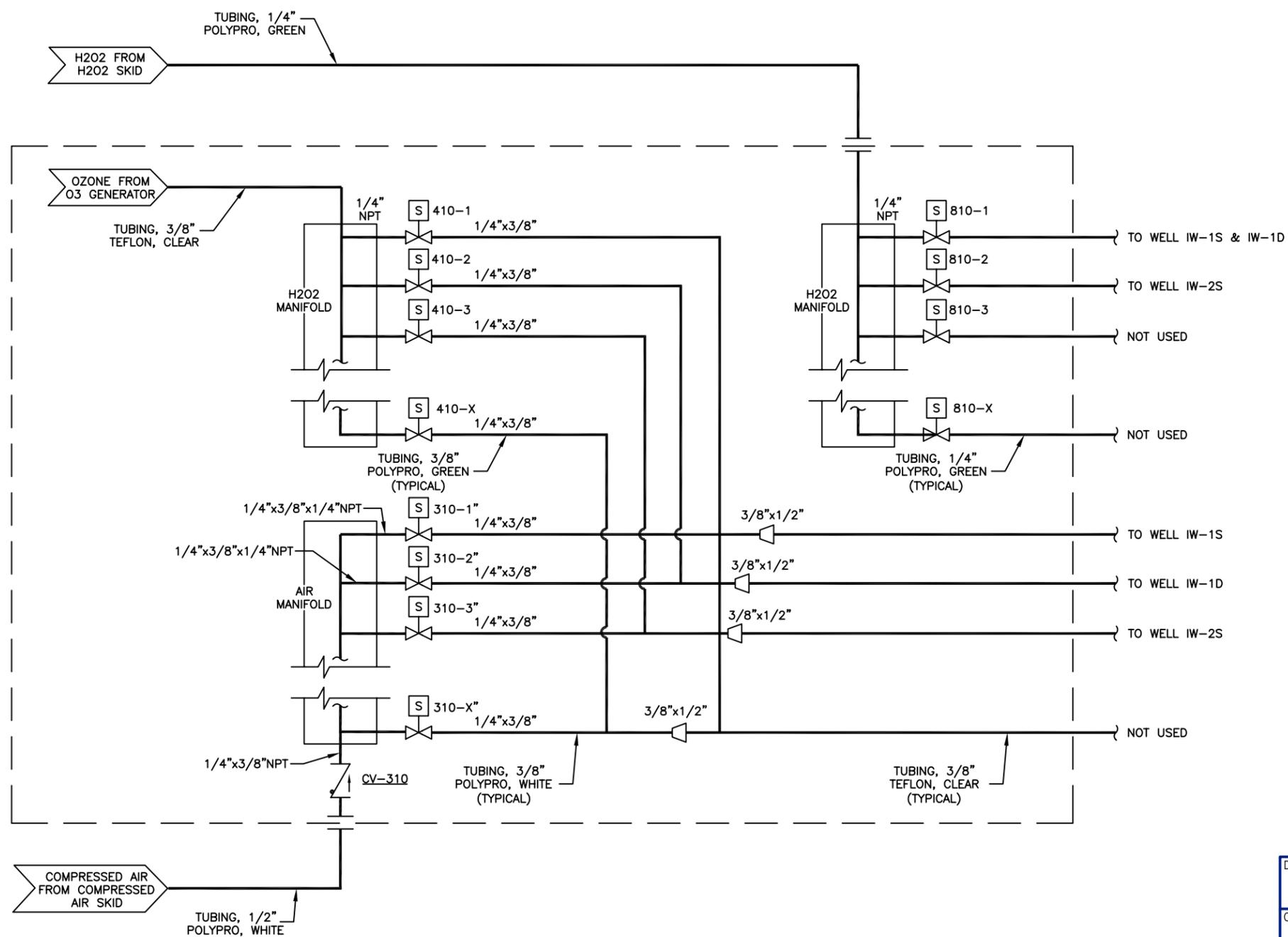


DRAFTED BY: B.C.S. (N.J.)	WOOD FENCE SPECIFICATIONS	
CHECKED BY:	MONROVIA BP (FORMER GREEN VALLEY CITGO) 11791 FINGERBOARD ROAD MONROVIA, MARYLAND	
REVIEWED BY: DRD	Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114	
NOT TO SCALE	DATE 6-20-11	FIGURE 10

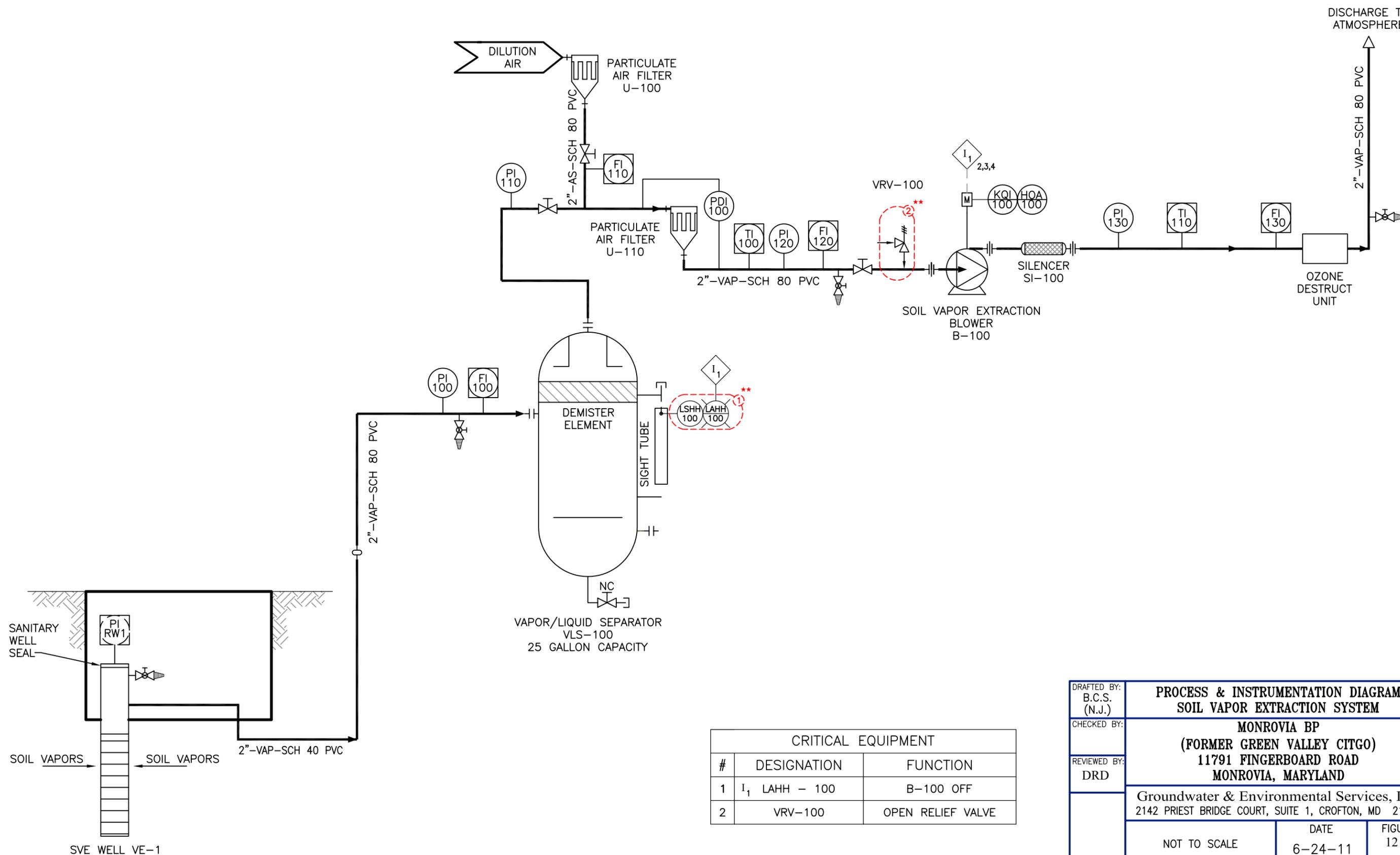


DRAFTED BY: B.C.S. (N.J.)	PROCESS & INSTRUMENTATION DIAGRAM INJECTION SYSTEM-(SHEET 1)	
CHECKED BY:	MONROVIA BP (FORMER GREEN VALLEY CITGO)	
REVIEWED BY: DRD	11791 FINGERBOARD ROAD MONROVIA, MARYLAND	
	Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114	
NOT TO SCALE	DATE 6-24-11	FIGURE 11 A

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DRAFTED BY: B.C.S. (N.J.)	PROCESS & INSTRUMENTATION DIAGRAM INJECTION SYSTEM-(SHEET 2)	
CHECKED BY:	MONROVIA BP (FORMER GREEN VALLEY CITGO) 11791 FINGERBOARD ROAD MONROVIA, MARYLAND	
REVIEWED BY: DRD	Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114	
	NOT TO SCALE	DATE 6-24-11
		FIGURE 11 B



CRITICAL EQUIPMENT		
#	DESIGNATION	FUNCTION
1	I ₁ LAHH - 100	B-100 OFF
2	VRV-100	OPEN RELIEF VALVE

DRAFTED BY: B.C.S. (N.J.)	PROCESS & INSTRUMENTATION DIAGRAM SOIL VAPOR EXTRACTION SYSTEM	
CHECKED BY:	MONROVIA BP (FORMER GREEN VALLEY CITGO) 11791 FINGERBOARD ROAD MONROVIA, MARYLAND	
REVIEWED BY: DRD	Groundwater & Environmental Services, Inc. 2142 PRIEST BRIDGE COURT, SUITE 1, CROFTON, MD 21114	
NOT TO SCALE	DATE 6-24-11	FIGURE 12

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