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Groundwater Well Installation Report

Monitoring Wells B-6R and B-8R
TVA Johnsonville Fossil Plant
South Rail Loop Ash Disposal Area
Non-Registered Site, NRS 43-1232
New Johnsonville, Tennessee

Prepared for:
Tennessee Valley Authority
1101 Market Street
Chattanooga, Tennessee 37402

April 17, 2013
Revision 1

Groundwater Well Installation Report
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TVA Johnsonville Fossil Plant
South Rail Loop Ash Disposal Area
Non-Registered Site, NRS 43-1232
New Johnsonville, Tennessee

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Groundwater Well Installation Report
Monitoring Wells B-6R and B-8R
TVA Johnsonville Fossil Plant
South Rail Loop Ash Disposal Area
Non-Registered Site, NRS 43-1232
New Johnsonville, Tennessee

1. Introduction and Background Information

Stantec Consulting Services Inc. (Stantec) was retained to install two potential replacement monitoring wells (B-6R and B-8R) along the west side of the South Rail Loop Ash Disposal Area (SRL) at the Tennessee Valley Authority (TVA) Johnsonville Fossil Plant (JOF). The SRL is a Tennessee Division of Solid Waste Management (DSWM) Non-Registered Site, NRS-43-1232, with a regulated groundwater monitoring network. This report contains pertinent information to document well installation activities.

1.1. Project Background and Description

The Johnsonville Fossil Plant is located in west-central Tennessee. The plant site is in the community of New Johnsonville, which is in Humphreys County along the east bank of the Kentucky Lake reservoir. The SRL Ash Disposal Area is located along the east side of the reservation.

Two of the current groundwater monitoring network downgradient wells for the SRL NRS are screened within the underlying Chattanooga Shale formation. The existing downgradient wells are not screened in the same formations as the upgradient well they are compared to. As a result, the Tennessee Department of Environment and Conservation (TDEC) is allowing TVA to install two potential replacement wells with screened intervals within the overburden materials above the Chattanooga Shale, and consistent with the upgradient well.

TVA retained Stantec to prepare Plans for Construction and to install the new potential replacement wells. The Plans for Construction/Record Drawings are provided in Appendix E of this report.

1.2. Personnel

Stantec Consulting Services Inc. (Stantec) provided engineering consultation and well installation services for this project. A Stantec professional geologist was on site for drilling and well installation activities. Technical guidance was provided by TVA's Water and Waste Compliance group.

1.3. Timeline

Table 2 contains the approximate start and completion dates of the major installation activities.

Table 1. Timeline Summary

Activity	Start Date	Completion Date
Exploratory Borings and Temporary Piezometers	11/26/12	11/30/12
Evaluation Period and TVA Consultation with TDEC	12/3/12	12/7/12
Monitoring Well Installation	12/12/12	12/13/12
Well Development	12/31/12	

2. Design Modifications During Installation

The only change made during well construction consisted of installing conventional well screens instead of pre-packed. Pre-packed screens could not be used due to the water column identified in the field. As a result, a three-foot screen was installed in each well. This change is documented on the Record Drawings.

3. Impacts to Construction

There were no impacts to well construction.

4. Construction Narrative

4.1. Construction Quality Control

For quality control, Stantec provided a licensed professional geologist to supervise the field work. The geologist maintained communication with TVA and Stantec's Project Manager throughout the exploratory and installation phases, and maintained boring logs and well installation records.

4.2. Exploratory Borings and Temporary Piezometers

Prior to well installation, Stantec drilled four exploratory borings and installed temporary piezometers to explore subsurface conditions. Three borings (B-6R-E1 through B-6R-E3) were drilled in the vicinity of proposed well B-6R and one boring (B-8R-E1) was drilled in the vicinity of proposed well B-8R. The borings were drilled using a truck-mounted drill rig and 4¼-inch ID hollow-stem augers. Temporary piezometers were installed to explore available saturated thickness of the vicinity. The subsurface and groundwater data was provided to Ronda Hooper and Matthew Williams of TVA for final selection of well locations and target depths for the screens. The locations with the tallest water columns were selected for well installation after observing water levels for about one week. Target depths were selected to be within the clay layer just prior to reaching the underlying Chattanooga Shale. A site layout and subsurface logs for these exploratory borings are provided in Appendix A.

This exploratory phase was conducted from November 26 to November 30, 2012. An evaluation period then occurred from December 3 to December 7, 2012 so that TVA could

consult with TDEC to obtain concurrence with well locations and screen depths. Stantec field personnel temporarily demobilized from the site during this evaluation period.

4.3. Monitoring Well Construction

Stantec re-mobilized to the site on December 10, 2012 for well installation. Prior to drilling, the drill rig and down-hole equipment were decontaminated by washing with hot potable water and non-phosphate detergent delivered under high pressure and rinsed with potable water. In addition, the temporary piezometers were abandoned by removing the PVC pipe and filling the resulting surface opening with cement-bentonite grout.

Wells B-6R and B-8R were then installed at the locations and to the target depths designated by TVA (corresponding to clay layer just prior to reaching the Chattanooga Shale). The well boreholes were installed through 4¼-inch ID hollow-stem augers. Standard penetration tests were performed at selected depth intervals through the soil overburden to aid in final selection of well depths. Logs of the well boreholes (Borings B-6R and B-8R) are included in Appendix A.

Immediately following the drilling process, two-inch diameter Schedule 40 PVC well materials were installed. The well screen (three-foot length with 0.010-inch slots) and riser were lowered through the hollow-stem augers to the clay layer just above the Chattanooga Shale and the well screen was surrounded by a sand filter pack. The sand filter pack was extended to approximately two feet above the top of the well screen. Above the sand pack, a bentonite pellet seal was placed and allowed to hydrate prior to completing the annular backfill with cement-bentonite grout. The well construction details are included in Appendix A and on the Record Drawings in Appendix C.

Above-grade protective covers were set in five-foot square concrete surface pads. The top of the well risers were established approximately three feet above the existing ground surface. Four protective bollards were set within the perimeter of each concrete pad. The wellhead completions were in accordance with the construction drawings.

Photographs are included in Appendix B.

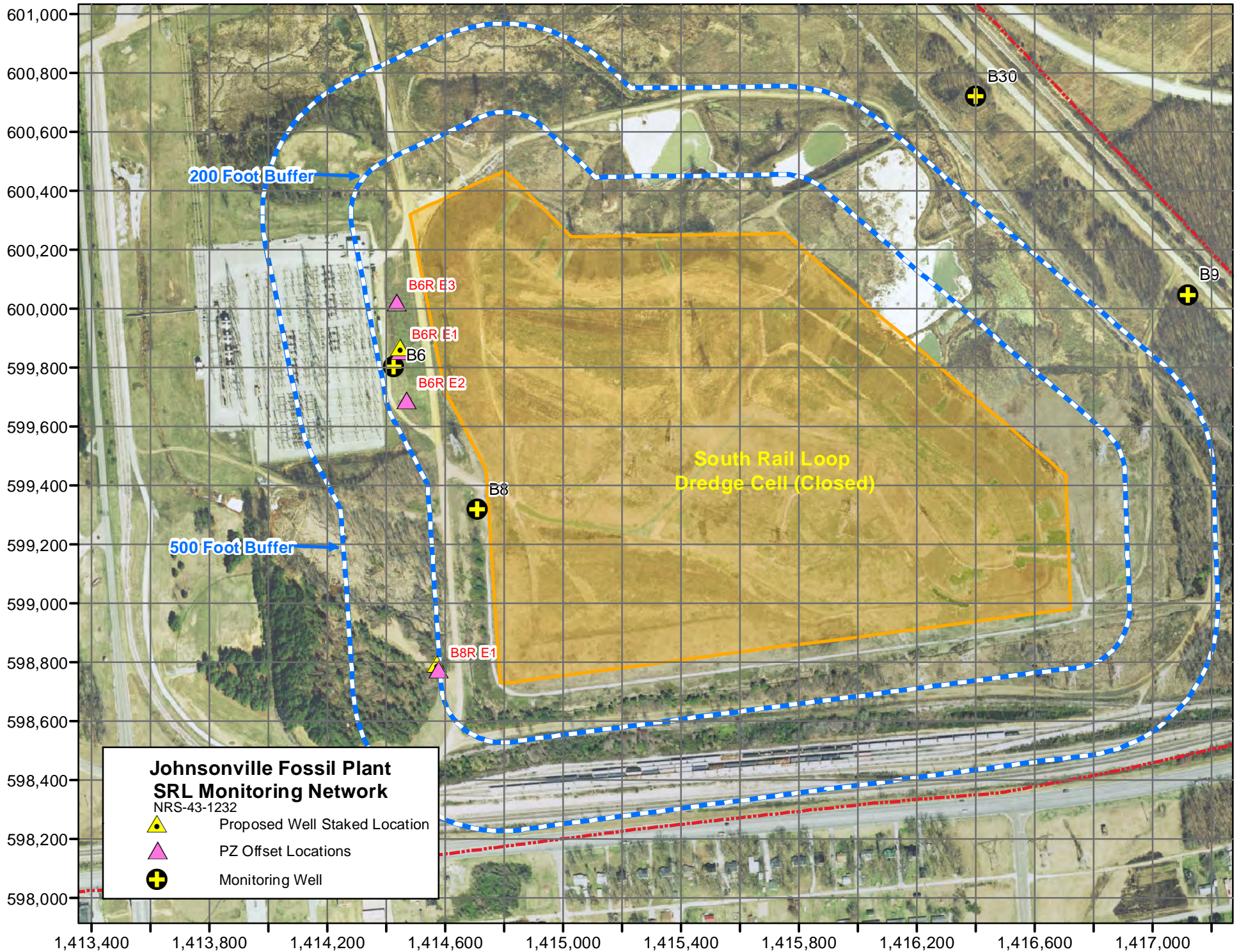
On December 31, 2012 Stantec's project geologist returned to the site for well development, which consisted of a combination of bailing, pumping and/or surging until measured parameters became stable and relatively constant (pH, temperature, conductivity) and when the turbidity was visibly reduced and constant. Well development field notes are provided in Appendix A.

4.4. Record Drawings

Record Drawings are presented in Appendix C. The drawings contain information regarding actual elevations, dimensions, and detail of the completed work. The data was compiled from records kept by Stantec's on-site geologist, and from survey data provided by TVA.

Appendix A

Boring Logs, Well
Construction
Diagrams, and
Field Notes



Project Number		175552009		Location		Station ,	
Project Name		South Rail Loop Monitoring Wells		Boring No.		B-6R Total Depth 18.5 ft	
County		TVA JOF SRL NRS-43-1232		Surface Elevation		392.2 ft	
Project Type		Geotechnical Exploration		Date Started		12/12/12 Completed 12/12/12	
Supervisor		R. Roberts Driller M. Wethington		Depth to Water		14.7 ft Date/Time 12/1/19	
Logged By		Briggs Evans		Depth to Water		N/A Date/Time N/A	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
392.2'	0.0'	Top of Hole							
		No Samples Collected							Boring advanced using 4 1/4" Hollow Stem Augers Monitoring Well Installed - see Well Installation Diagram for Details
377.2'	15.0'								Static GW level 14.7' bgs 12/19/2012
		Clayey Gravel With Sand, orange-brown, moist to wet, medium to very dense, rounded and fractured chert fragments Wet at 14.2'		SPT-1	15.0' - 16.5'	1.5'		--	
374.1'	18.1'			SPT-2	16.5' - 18.0'	1.5'		--	
373.7'	18.5'			SPT-3	18.0' - 18.5'	0.5'		--	
		Clay, brown, dry to moist, very stiff							
		No Refusal / Bottom of Hole							

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Project Number		175552009		Location		Station ,				
Project Name		South Rail Loop Monitoring Wells		Boring No.		B-6R-E1		Total Depth		16.8 ft
County		TVA JOF SRL NRS-43-1232		Surface Elevation		391.4 ft				
Project Type		Geotechnical Exploration		Date Started		11/27/12		Completed		11/27/12
Supervisor		R. Roberts		Driller		M.Wethington		Depth to Water		13.5 ft
Logged By		Briggs Evans		Date/Time		11/29/12		Depth to Water		N/A
Date/Time		N/A		Date/Time		N/A		Date/Time		N/A

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core						
391.4'	0.0'	Top of Hole							
390.9'	0.5'	Topsoil, dark brown, moist		SPT-1	0.0' - 1.5'	1.0'	2-12-12	--	Boring advanced using 4 1/4" Hollow Stem Augers
389.5'	1.9'	Clay With Sand, red-brown, moist, very stiff, cherty		SPT-2	1.5' - 3.0'	1.0'	15-15-8	--	
387.1'	4.3'	Sand With Clay, red-orange, moist, hard		SPT-3	3.0' - 4.5'	1.5'	7-8-17	--	
385.1'	6.3'	Clayey Gravel With Sand, red-orange, moist, dense, rounded and fractured chert fragments		SPT-4	4.5' - 6.0'	1.0'	35-25-17	--	
382.2'	9.2'	Clay, brown to light reddish brown, moist, very stiff to hard, trace pea gravel		SPT-5	6.0' - 7.5'	1.5'	5-7-8	--	
				SPT-6	7.5' - 9.0'	1.0'	9-13-18	--	
375.0'	16.4'	Clayey Gravel With Sand, orange-brown, moist to wet, medium to very dense, rounded and fractured chert fragments Wet at 14.2'		SPT-7	9.0' - 10.5'	1.5'	20-37-34	--	
				SPT-8	10.5' - 12.0'	1.2'	17-21-27	--	
				SPT-9	12.0' - 13.5'	1.5'	39-50-43	--	
				SPT-10	13.5' - 15.0'	1.0'	10-12-15	--	
				SPT-11	15.0' - 16.5'	1.3'	10-14-17	--	
374.8'	16.6'	Clay, dark brown, dry to moist, very stiff		SPT-12	16.5' - 16.8'	0.3'	50+/-0	--	
374.6'	16.8'								
		Shale, dark gray to black, hard, thin bedded							
		No Refusal / Bottom of Hole							
		Top of Rock = 16.4' Elevation (375.0')							

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Project Number	175552009	Location	Station ,
Project Name	South Rail Loop Monitoring Wells	Boring No.	B-6R-E2 Total Depth 16.5 ft
County	TVA JOF SRL NRS-43-1232	Surface Elevation	390.5 ft
Project Type	Geotechnical Exploration	Date Started	11/27/12 Completed 11/28/12
Supervisor	R. Roberts Driller M. Wethington	Depth to Water	13.0 ft Date/Time 11/29/12
Logged By	Briggs Evans	Depth to Water	N/A Date/Time N/A

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
390.5'	0.0'	Top of Hole							
390.0'	0.5'	Topsoil, dark brown, moist		SPT-1	0.0' - 1.5'	8.0'	6-10-11	--	Boring advanced using 4 1/4" Hollow Stem Augers
		Clay With Sand, brown to reddish brown, moist, stiff to hard, cherty		SPT-2	1.5' - 3.0'	0.0'	7-7-7	--	
				SPT-3	3.0' - 4.5'	1.5'	4-6-25	--	
384.6'	5.9'			SPT-4	4.5' - 6.0'	1.5'	25-40-47	--	
		Sand With Clay, orange-brown, moist, very dense		SPT-5	6.0' - 7.5'	1.5'	10-27-27	--	
382.3'	8.2'			SPT-6	7.5' - 9.0'	1.5'	37-30-19	--	
		Clay, brown to light reddish brown, moist, very stiff to hard		SPT-7	9.0' - 10.5'	1.5'	7-7-9	--	
379.7'	10.8'			SPT-8	10.5' - 12.0'	0.9'	9-50+/0.4	--	
		Clayey Gravel With Sand, orange-brown, moist to wet, medium to very dense, rounded and fractured chert fragments Wet at 13.6'		SPT-9	12.0' - 13.5'	0.0'	50+/0.3	--	
				SPT-10	13.5' - 15.0'	1.5'	21-43-45	--	
374.6'	15.9'			SPT-11	15.0' - 16.5'	1.5'	18-14-33	--	
374.2'	16.3'								
374.0'	16.5'	Clay, orange, dry to moist, very stiff							
		Shale, dark gray to black, hard, thin bedded							
		No Refusal / Bottom of Hole							
		Top of Rock = 16.3' Elevation (374.2')							

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Project Number		175552009		Location		Station ,	
Project Name		South Rail Loop Monitoring Wells		Boring No.		B-6R-E3 Total Depth 18.7 ft	
County		TVA JOF SRL NRS-43-1232		Surface Elevation		392.0 ft	
Project Type		Geotechnical Exploration		Date Started		11/28/12 Completed 11/28/12	
Supervisor		R. Roberts Driller M. Wethington		Depth to Water		14.5 ft Date/Time 11/29/12	
Logged By		Briggs Evans		Depth to Water		N/A Date/Time N/A	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
392.0'	0.0'	Top of Hole							
391.5'	0.5'	Topsoil, dark brown, moist							Boring advanced using 4 1/4" Hollow Stem Augers
		Clay With Gravel, brown to reddish brown, moist, stiff to hard, cherty		SPT-1	0.0' - 1.5'	1.5'	19-25-27	--	
				SPT-2	1.5' - 3.0'	0.3'	50+/0.3	--	
388.3'	3.7'			SPT-3	3.0' - 4.5'	1.5'	18-9-8	--	
		Sand With Clay, orange-brown, moist, medium, chert fragments		SPT-4	4.5' - 6.0'	1.5'	9-8-8	--	
385.7'	6.3'			SPT-5	6.0' - 7.5'	1.5'	18-25-36	--	
		Clayey Gravel With Sand, orange-brown, moist to wet, medium to very dense, rounded and fractured chert fragments Wet at 14.2'		SPT-6	7.5' - 9.0'	1.5'	11-28-31	--	
				SPT-7	9.0' - 10.5'	1.5'	23-28-28	--	
				SPT-8	10.5' - 12.0'	1.4'	24-36-50+/0.4	--	
				SPT-9	12.0' - 13.5'	1.4'	36-47-50+/0.4	--	
				SPT-10	13.5' - 15.0'	1.5'	25-37-39	--	
				SPT-11	15.0' - 16.5'	1.0'	23-27-29	--	
				SPT-12	16.5' - 18.0'	1.3'	21-29-14	--	
373.9'	18.1'			SPT-13	18.0' - 18.7'	0.7'	13-	--	
373.4'	18.6'	Clay, brown, dry to moist, very stiff					50+/0.2		Static GW level 14.5' bgs 11/29/12
373.3'	18.7'	Shale, dark gray to black, hard, thin bedded							
		No Refusal / Bottom of Hole							
		Top of Rock = 18.6' Elevation (373.4')							

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Project Number	175552009	Location	Station ,
Project Name	South Rail Loop Monitoring Wells	Boring No.	B-8R Total Depth 14.5 ft
County	TVA JOF SRL NRS-43-1232	Surface Elevation	388.0 ft
Project Type	Geotechnical Exploration	Date Started	12/12/12 Completed 12/12/12
Supervisor	R. Roberts Driller M. Wethington	Depth to Water	8.2 ft Date/Time 12/19/12
Logged By	Briggs Evans	Depth to Water	N/A Date/Time N/A

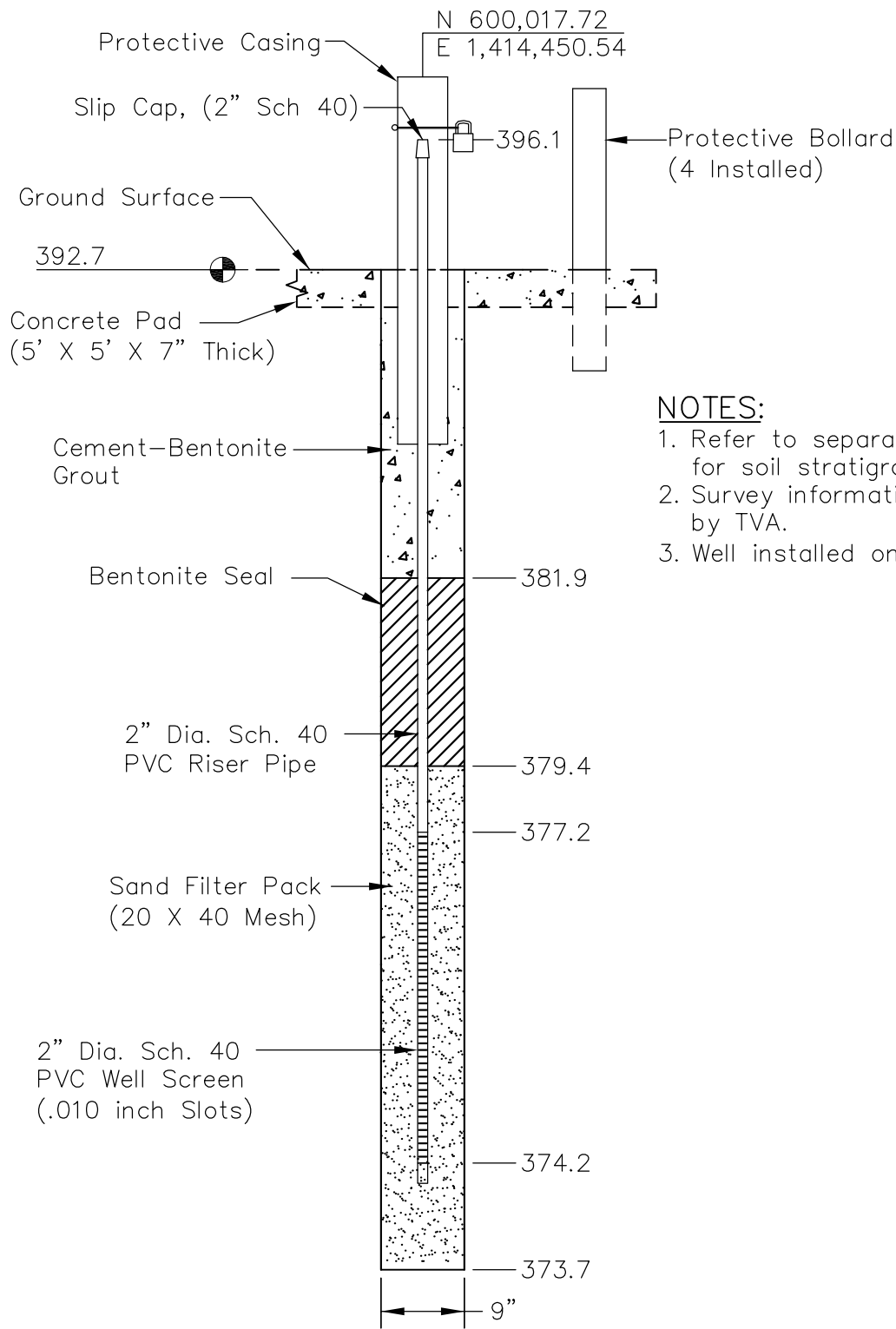
Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
388.0'	0.0'	Top of Hole							
		No Samples Collected							Boring advanced using 4 1/4" Hollow Stem Augers Monitoring Well Installed - see Well Installation Diagram for Details
378.0'	10.0'								Static GW level 8.2' bgs 12/19/2012
		Clayey Gravel With Sand, orange-brown, moist to wet, dense, rounded and fractured chert fragments Wet at 10.4		SPT-1	10.0' - 12.0'	0.5'		--	
			SPT-2	12.0' - 13.0'	1.5'		--		
			SPT-3	13.0' - 14.5'	1.5'		--		
374.0'	14.0'								
373.5'	14.5'	Clay, brown to black, dry to moist, hard							
		No Refusal / Bottom of Hole							

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Project Number		175552009		Location		Station ,	
Project Name		South Rail Loop Monitoring Wells		Boring No.		B-8R-E1 Total Depth 15.0 ft	
County		TVA JOF SRL NRS-43-1232		Surface Elevation		388.4 ft	
Project Type		Geotechnical Exploration		Date Started		11/27/12 Completed 11/27/12	
Supervisor		R. Roberts Driller M. Wethington		Depth to Water		9.4 ft Date/Time 11/29/12	
Logged By		Briggs Evans		Depth to Water		N/A Date/Time N/A	

Lithology		Description	Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	Remarks
Elevation	Depth		Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	
388.4'	0.0'	Top of Hole							
387.9'	0.5'	Topsoil, dark brown, moist		SPT-1	0.0' - 1.5'	1.3'	44-15-1	--	Boring advanced using 4 1/4" Hollow Stem Augers Static GW level 9.4' bgs 11/29/12
		Clay With Gravel, brown to reddish brown, moist, very stiff to hard, cherty		SPT-2	1.5' - 3.0'	0.5'	9-15-15	--	
384.9'	3.5'	Sand With Clay And Gravel, orange-brown, moist, medium, chert fragments		SPT-3	3.0' - 4.5'	1.1'	15-27-29	--	
				SPT-4	4.5' - 6.0'	1.3'	10-33-38	--	
				SPT-5	6.0' - 7.5'	1.5'	47-34-25	--	
379.9'	8.5'			SPT-6	7.5' - 9.0'	1.5'	12-19-31	--	
		Clayey Gravel With Sand, orange-brown, moist to wet, dense, rounded and fractured chert fragments Wet at 10.4		SPT-7	9.0' - 10.5'	1.3'	47-43-10	--	
				SPT-8	10.5' - 12.0'	1.5'	16-20-14	--	
374.4'	14.0'			SPT-9	12.0' - 13.5'	1.5'	16-25-22	--	
373.6'	14.8'	Clay, brown to black, dry to moist, hard		SPT-10	13.5' - 15.0'	1.5'	27-27-48	--	
373.4'	15.0'	Shale, dark gray to black, hard, thin bedded							
		No Refusal / Bottom of Hole							
		Top of Rock = 14.0' Elevation (374.4')							

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NOTES:

1. Refer to separate Boring Logs for soil stratigraphy.
2. Survey information provided by TVA.
3. Well installed on 12/12/12.

PLOT DATE: 03/07/2013 USER: PETTY, RICHARD V:\1755\ACTIVE\175552009\GEO\TECHNICAL\DRAWING\SHEET_FILES\REV1_RECORD\52009-MWELL-LOG_1.DWG

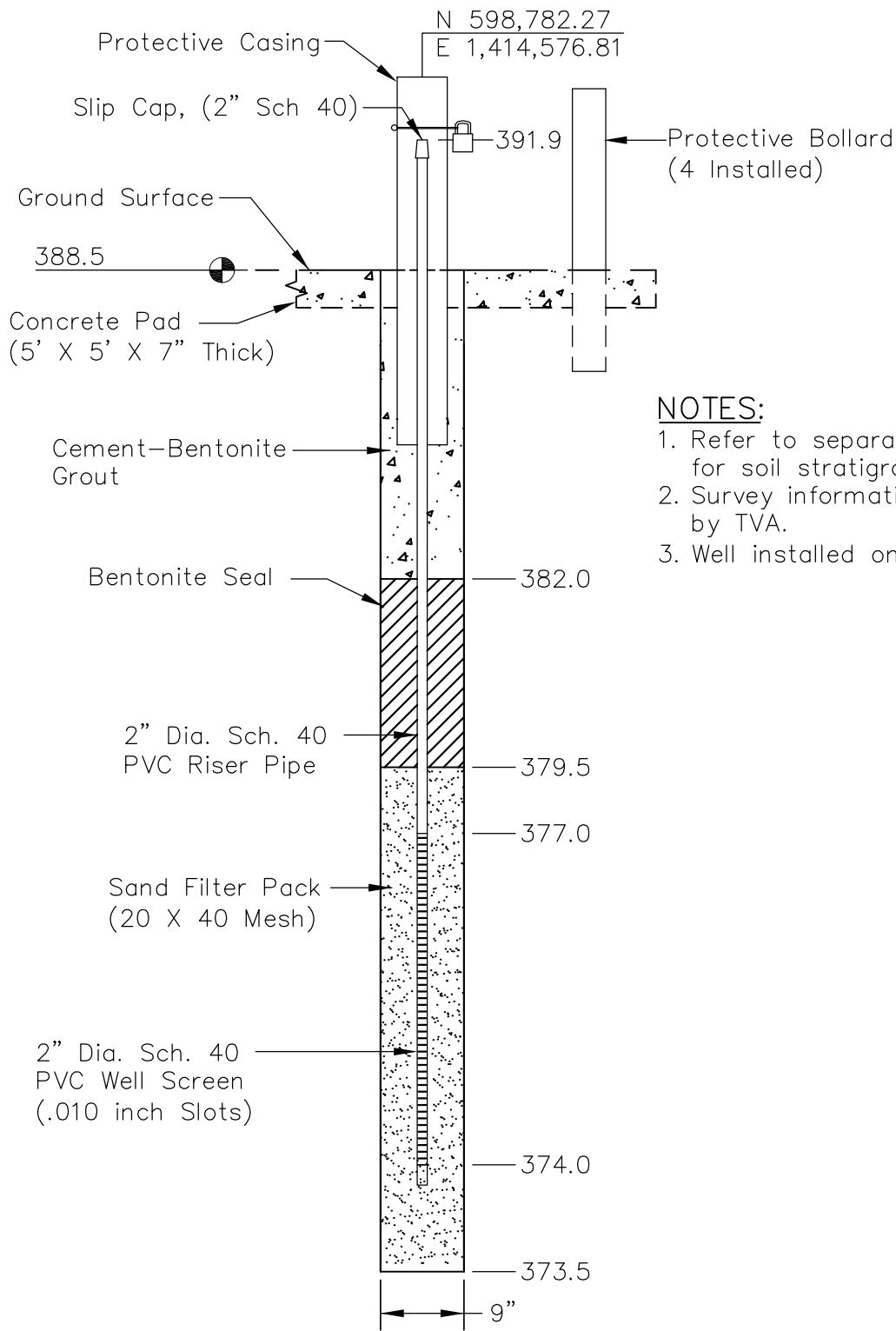
**MONITORING WELL B-6R INSTALLATION DETAIL
SOUTH RAIL LOOP ASH DISPOSAL AREA
NON-REGISTERED SITE NO. 43-1232
TVA FOSSIL PLANT**



Stantec

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DRAWN BY	RRP	DATE MAR. 5, 2013	REVISED		SHEET 1 OF 1
CHECKED BY	RLR	PROJ. NO. 175552009	1.	3.	
CHECKED BY	RLR	SCALE NTS	2.	4.	



NOTES:

1. Refer to separate Boring Logs for soil stratigraphy.
2. Survey information provided by TVA.
3. Well installed on 12/12/12.

PLOT DATE: 03/05/2013 USER: PETTY, RICHARD V:\1755\ACTIVE\175552009\GEO\TECHNICAL\DRAWING\SHEET_FILES\REV1_RECORD\52009-MWELL-LOG_2.DWG

**MONITORING WELL B-8R INSTALLATION DETAIL
SOUTH RAIL LOOP ASH DISPOSAL AREA
NON-REGISTERED SITE NO. 43-1232
TVA FOSSIL PLANT**



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DRAWN BY	RRP	DATE MAR. 5, 2013	REVISED		SHEET
CHECKED BY	RLR	PROJ. NO. 175552009	1.	3.	1 OF 1
CHECKED BY	RLR	SCALE NTS	2.	4.	

Well Development Field Notes
Wells B-6R and B-8R
JOF SRL Ash Disposal Area
TDEC Non-Registered Site 43-1232

Well Development Date: 12/31/2012

By: Briggs Evans, PG

General:

Wells developed using 12V down hole pump. Initially purged the wells of 2 to 3 well volumes. After this, permitted wells to recharge before surging for about 5 min to flush sediment from sand pack. The purge/surge process was completed several times.

Well B-6R:

B-6R recharged slower than B-8R. Initially purged dry after about 1 to 1.5 gal. Recharge took 30 min to return to better than 90% of the original level. Limited discharge rate to 0.10 gal/min. Stable GW parameters were measured and water clarity was visibly consistent.

Well B-8R:

B-8R developed well with good recharge. Initially purged dry after 3 gal. The well recharged to within 90% of the initial level after about 5 to 10 min. Eventually pumped continuously at 1.5gal/min. Discharge water mostly clear after 10 well volumes. Stable GW parameters were measured and water clarity was visibly consistent.

Well Development Parameters:

Well	Depth to Water	Water Column	Water Volume	GW Parameters collected at 3 min intervals					
				Parameter	1	2	3	4	5
B-6R	17.84'	3.46'	0.58 gal	pH	5.76	5.75	5.71	5.71	5.72
				Temp (Celsius)	14.2	15	15.1	15.2	15.1
				Conductivity (microSiemens, uS)	520	445	441	439	440
B-8R	11.05'	6.0'	1.02 gal	pH	5.94	5.95	5.73	5.72	5.71
				Temp (Celsius)	13.1	13.9	15.7	15.5	15.5
				Conductivity (microSiemens, uS)	807	761	793	803	794

Appendix B
Photographic Log



Photo 1 Typical slotted well screen.



Photo 2 Typical completed well.



Photo 3 Typical surface protection construction.



Photo 4 Completed Well B-6R.



Photo 5 Completed Well B-8R.

Appendix C

Record Drawings

PLANS FOR CONSTRUCTION JOHNSONVILLE FOSSIL PLANT SOUTH RAIL LOOP ASH DISPOSAL AREA TDEC NON-REGISTERED SITE NO. 43-1232 MONITORING WELLS B-6R AND B-8R

NEW JOHNSONVILLE, HUMPHREYS COUNTY, TENNESSEE

PREPARED FOR

TENNESSEE VALLEY AUTHORITY

PREPARED BY



Stantec Consulting Services Inc.
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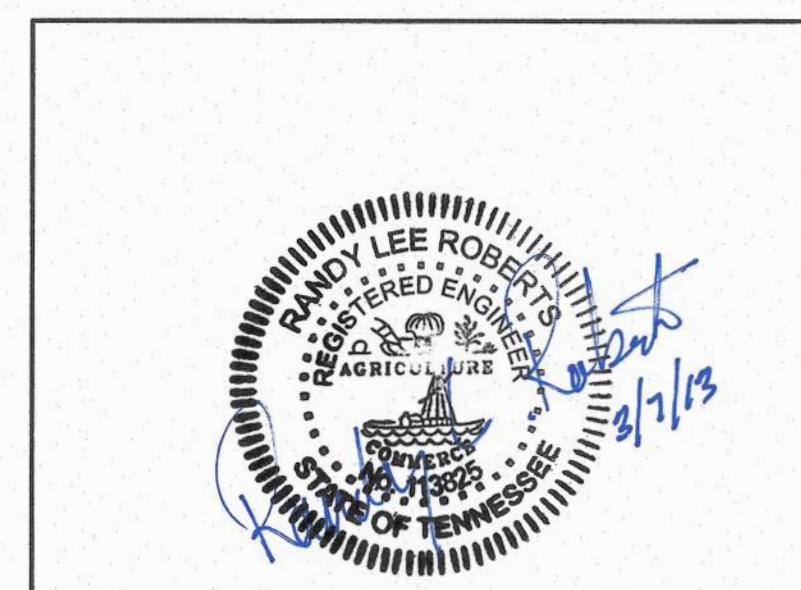
COMPANION DRAWINGS:

- 10W221-01 COVER SHEET
- 10W221-02 SITE PLAN
- 10W221-03 WELL CONSTRUCTION DETAILS



VICINITY MAP
NOT TO SCALE

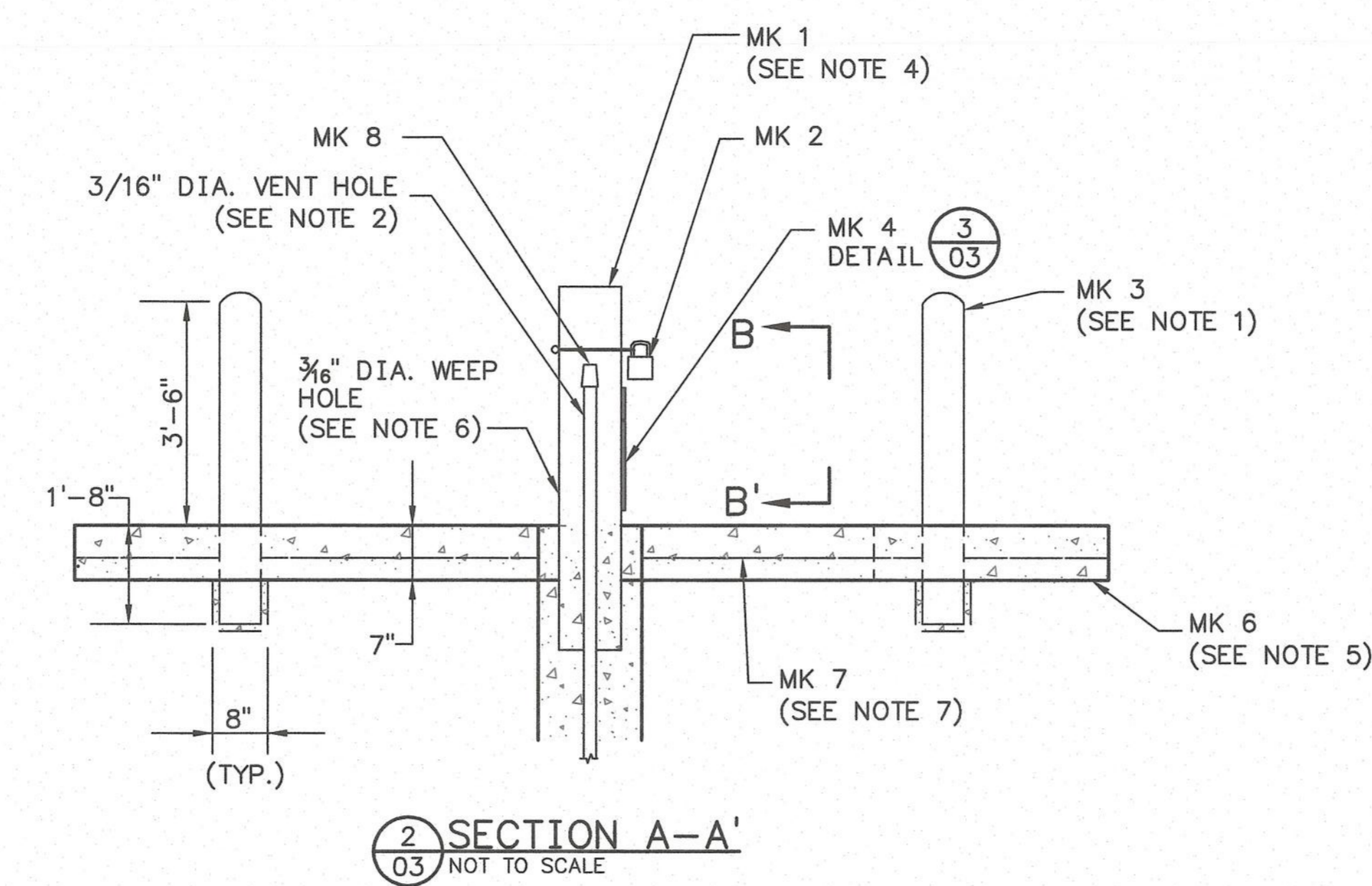
RECORD DRAWING



R 1	03/07/13	RLR	RRP	RLR	RLR	RLH	MST	JCK	-	-	-
ISSUED AS-BUILT											
R 0	11/27/12	RLR	RRP	RLR	RLR	RLH	MST	JCK	-	-	-
ISSUED FOR CONSTRUCTION											
REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVSD	APPD	ISSD	PROJECT ID	AS CONST	BY
SCALE: NONE EXCEPT AS NOTED											
YARD SOUTH RAIL LOOP - NON-REGISTERED SITE NO. 43-1232											
MONITORING WELLS B-6R AND B-8R											
COVER SHEET											
DESIGNED BY:	DRAWN BY:	CHECKED BY:	SUPERVISED BY:	REVIEWED BY:	APPROVED BY:	ISSUED BY:					
R.L. ROBERTS	R.R. PETTY	R.L. ROBERTS	R.L. ROBERTS	R.L. HOOPER	M.S. TURNBOW	J.C. KAMMEYER					
JOHNSONVILLE FOSSIL PLANT TENNESSEE VALLEY AUTHORITY FOSSIL AND HYDRO ENGINEERING											
AUTOCAD R 2000	DATE	11/27/12	30	C	10W221-01	R 1					

A
B
C
D
E
F
G
H

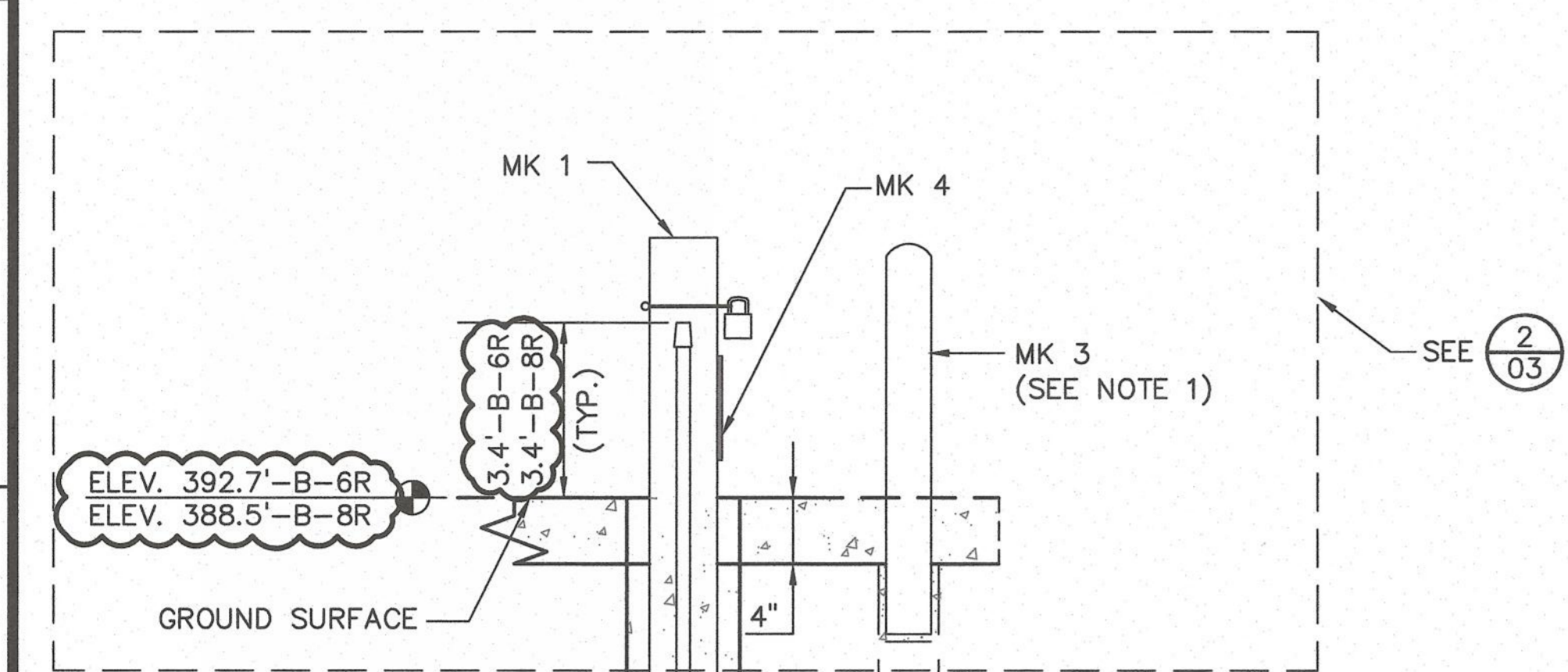
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WELLHEAD NOTES:

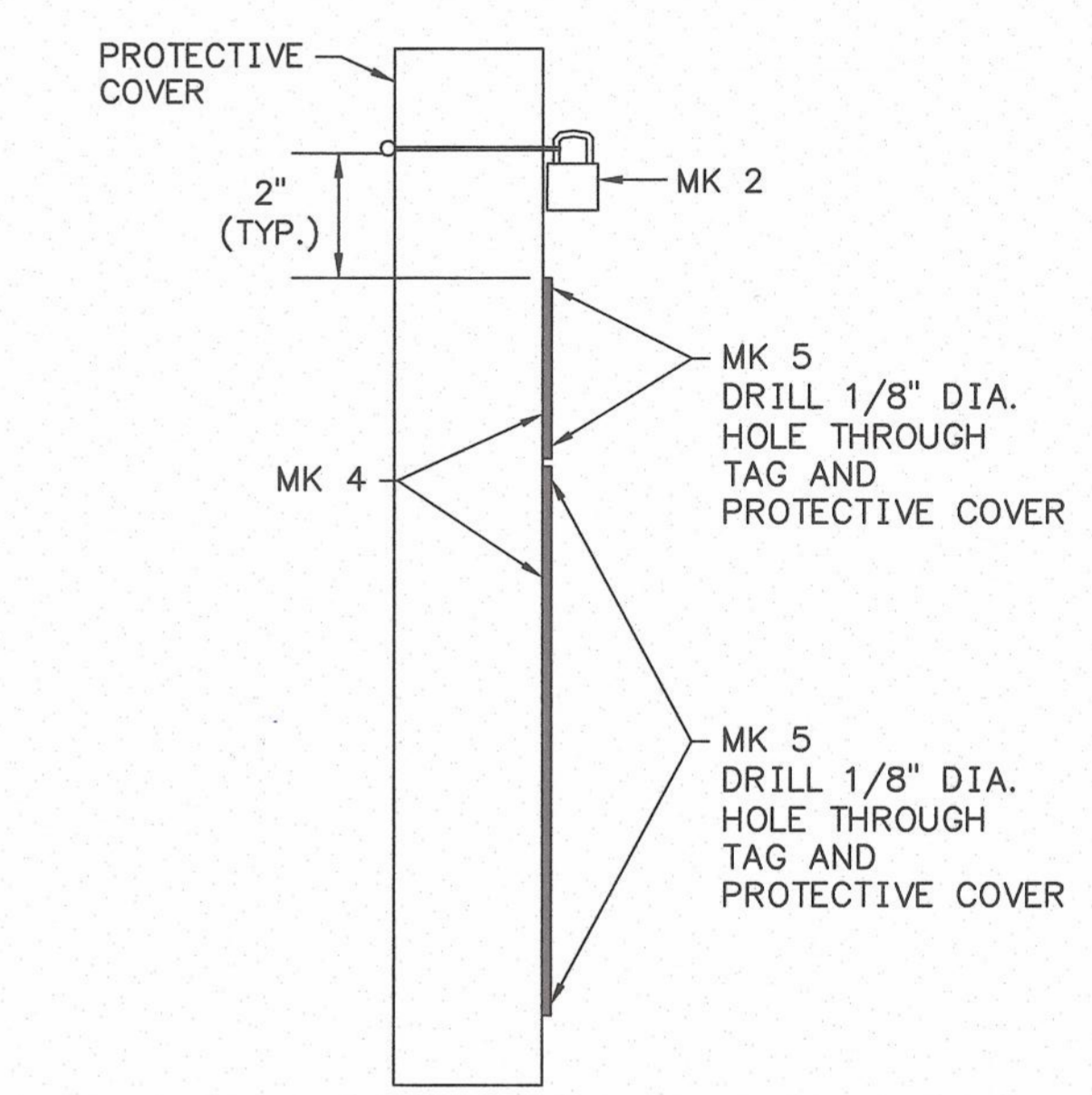
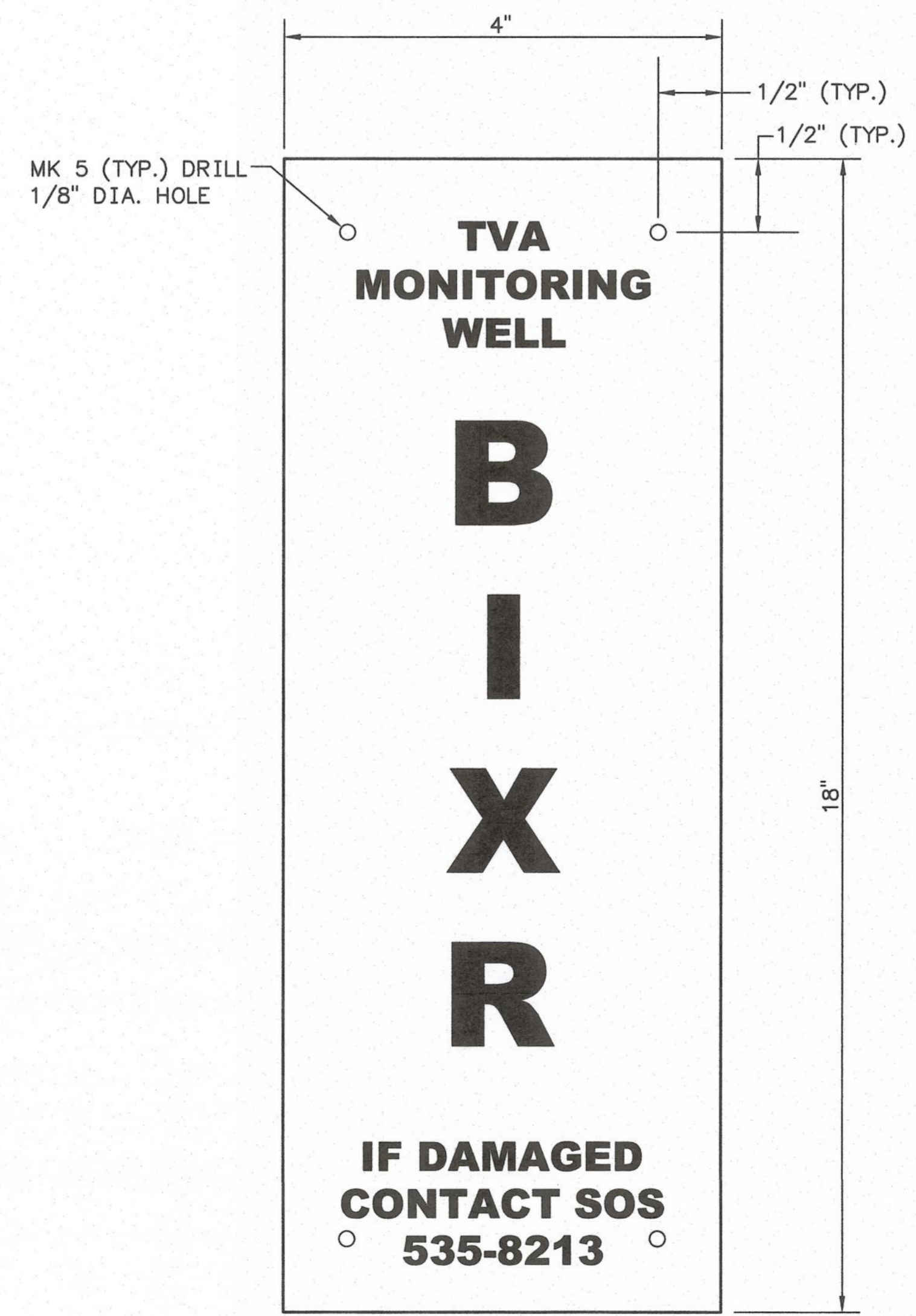
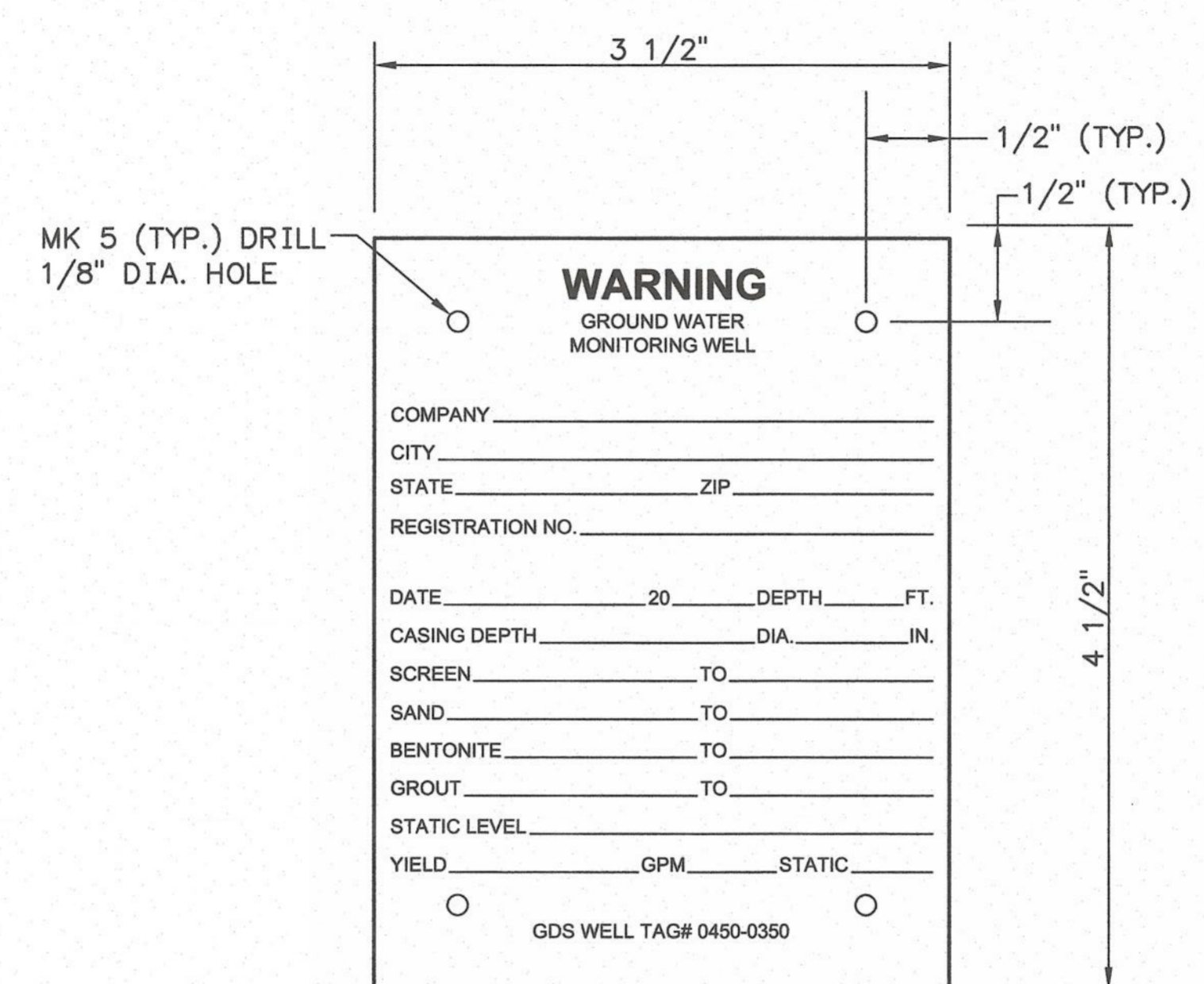
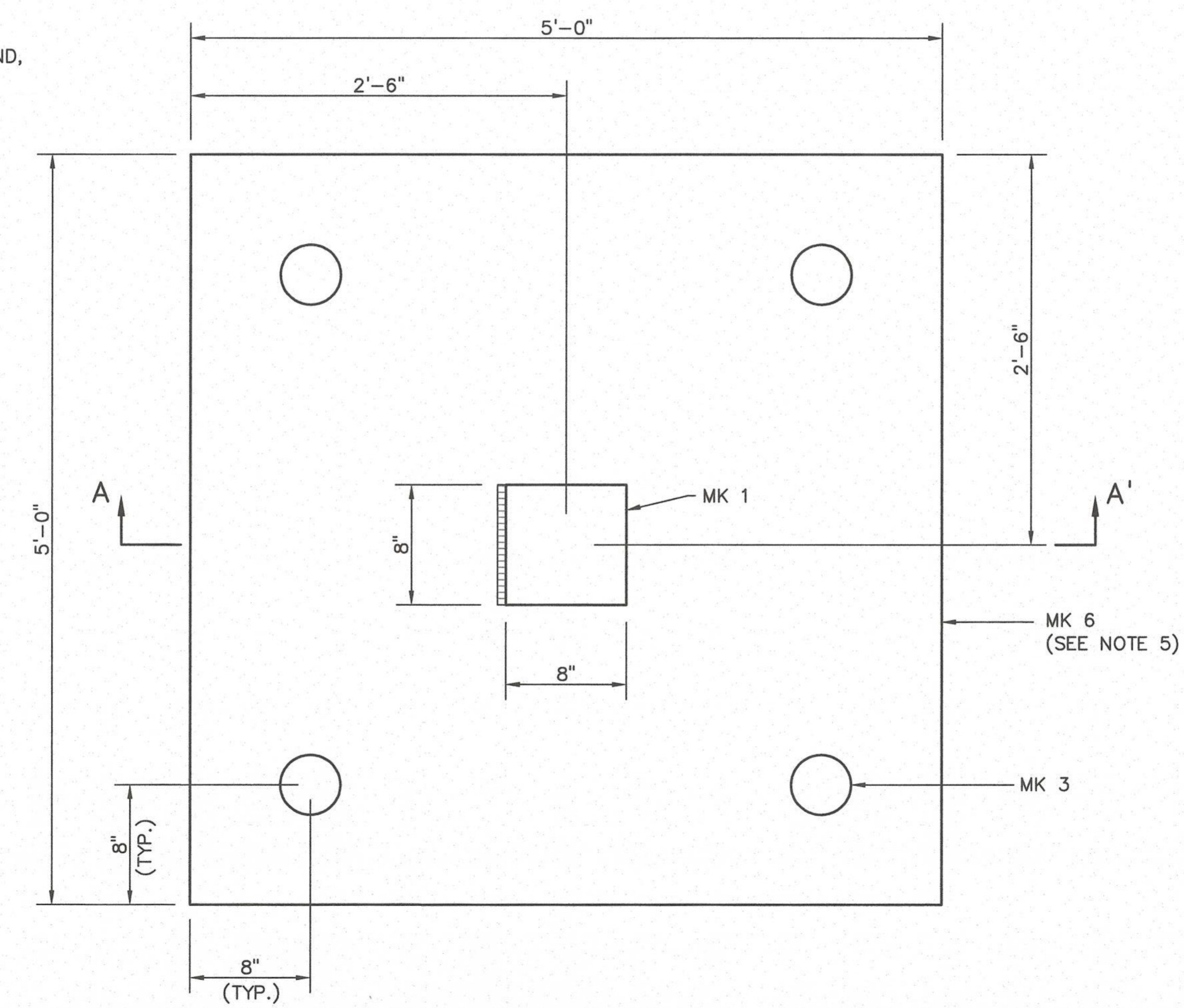
1. PROTECTIVE BOLLARDS TO BE FILLED WITH 3000 PSI CONCRETE, AND CONE-TAPER THE TOP.
2. DRILL 3/16" DIA. VENT HOLE. 2" BELOW TOP OF PVC RISER.
3. NEW PROTECTIVE COVERS DO NOT REQUIRE PAINTING.
4. POSITION PROTECTIVE COVER WITH HINGE AT SAME ELEVATION AS TOP OF PVC RISER. FILL INSIDE OF PROTECTIVE COVER WITH CEMENT GROUT TO SAME LEVEL AS CONCRETE PAD.
5. SLOPE CONCRETE PAD SURFACE UPWARD TO PROTECTIVE COVER TO PREVENT PONDING WATER.
6. DRILL 3/16" DIA. WEEP HOLE AT TOP OF GROUT INSIDE PROTECTIVE COVER.
7. PLACE WIRE MESH 2" MINIMUM FROM ALL CONCRETE EDGES.

MARK NUMBERS AND MATERIAL LIST		
MARK NO.	QUANTITY PER WELL	DESCRIPTION
1	2 EACH	GLOBAL SQUARE STEEL PROCOVER, GALVANIZED, GDS SQ-PC, 8"x8"x5', PROVIDED BY GLOBAL DRILLING SUPPLY, OR EQUIVALENT.
2	2 EACH	BRASS MASTER LOCK, KEYED 0896
3	8 EACH	4" DIA. STEEL PIPE BOLLARD-PAINTED YELLOW, GDS GUARD PIPE 4"x5', PROVIDED BY GLOBAL DRILLING SUPPLY, OR EQUIVALENT.
4	2 EACH	WELL ID TAGS
5	8 EACH	DOME HEAD ALUMINUM RIVET #PASD403E, PROVIDED BY HANSON RIVET & SUPPLY CO., OR EQUIVALENT.
6	AS REQ.	CONCRETE, 3000 PSI.
7	AS REQ.	3/16"x4"x4" WELDED WIRE. OVERLAPPED 4" AT JOINTS.
8	2 EACH	2" SCH. 40 PVC SLIP CAP
9	AS REQ.	2" DIA. SCH. 40 PVC RISER. JSF 2"x10"-R "FLUSH THREAD", PROVIDED BY GLOBAL DRILLING SUPPLY, OR EQUIVALENT.
10	2 EACH	2" DIA. SCH. 40 PVC WELL SCREEN. JSF 2"x3"-010 "FLUSH THREAD", PROVIDED BY GLOBAL DRILLING SUPPLY, OR EQUIVALENT.
11	2 EACH	2" DIA. SCH. 40 PVC BOTTOM CAP. 2" FEM CAP "FLUSH THREAD", PROVIDED BY GLOBAL DRILLING SUPPLY, OR EQUIVALENT.
12	AS REQ.	GROUT-PORTLAND TYPE I OR II CEMENT WITH 5% BENTONITE BY WEIGHT.
13	AS REQ.	BENTONITE SEAL-PDS TR 30/38 COATED PELLET, PROVIDED BY GLOBAL DRILLING SUPPLY, OR EQUIVALENT. PARTIALLY PRE-HYDRATED BEFORE PLACING IN BORING.
14	AS REQ.	FILTER SAND-GLOBAL NO. 7 (20X40MESH), PROVIDED BY GLOBAL DRILLING SUPPLY, OR EQUIVALENT.

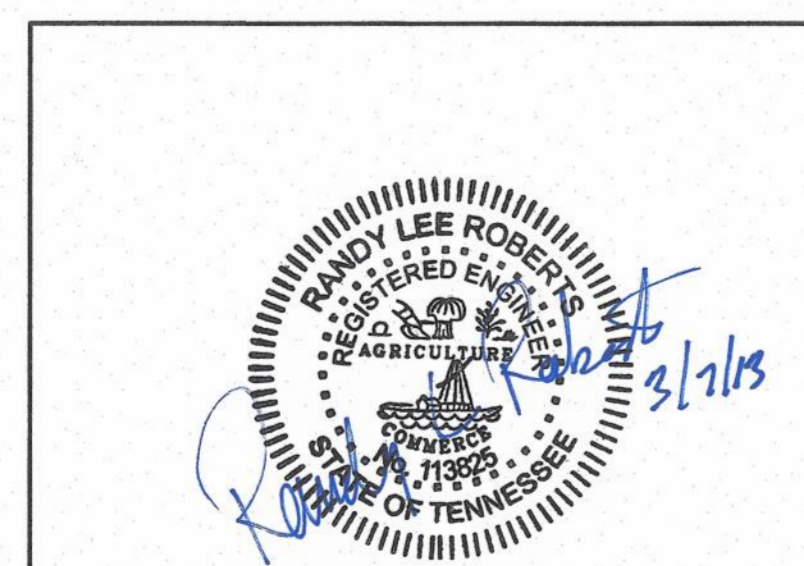


MONITORING WELL NOTES:

1. BORING TO BE ADVANCED WITH HOLLOW STEM AUGERS THROUGH OVERBURDEN TO THE TARGET DEPTHS.
2. TARGET TIP ELEVATIONS TO BE DETERMINED FROM PRE-INSTALLATION EXPLORATORY BORINGS.
3. ANNULAR BACKFILL MATERIALS (SAND, BENTONITE, AND GROUT) TO BE TREMMIE-PLACED WITH SOUNDING MEASUREMENTS DURING AND AFTER CONSTRUCTION.



RECORD DRAWING



R 1	03/07/13	RLR	RRP	RLR	RLR	RLH	MST	JCK	-	-	-
R 0	11/27/12	RLR	RRP	RLR	RLR	RLH	MST	JCK	-	-	-
ISSUED FOR CONSTRUCTION											
REV.	NO.	DATE	DSGN	DRWN	CHKD	SUPV	RVWD	APPD	ISSD	PROJECT	AS CONST
SCALE: AS SHOWN EXCEPT AS NOTED											
YARD SOUTH RAIL LOOP - NON-REGISTERED SITE NO. 43-1232											
MONITORING WELLS B-6R AND B-8R											
WELL CONSTRUCTION DETAILS											
DESIGNED BY:	R. ROBERTS	DRAWN BY:	R. PETTY	CHECKED BY:	R. ROBERTS	SUPERVISED BY:	R. ROBERTS	REVIEWED BY:	R.L. HOOPER	APPROVED BY:	M.S. TURNBOW
JOHNSONVILLE FOSSIL PLANT											
TENNESSEE VALLEY AUTHORITY											
FOSSIL AND HYDRO ENGINEERING											
AUTOCAD R 2000	DATE	11/27/12	30	C	10W221-03			R 1			

3 DETAIL - WELL ID TAGS (MK4) NOT TO SCALE