Stantec Consulting Services Inc.
1409 North Forbes Road, Lexington KY 40511-2024

March 27, 2015
File: let_001_175664011

Attention: Ms. Rachel Combs
Senior Program Manager
Tennessee Valley Authority
1101 Market Street, LP 2PC
Chattanooga, Tennessee 37402

Reference: Ballfield Piezometer Installations – Kingston Fossil Plant

Dear Ms. Combs,

Stantec Consulting Services Inc. (Stantec) has completed the installation of new piezometers at the Ballfield at the Kingston Fossil Plant (KIF). This work was performed in accordance with the proposal (pro_003A_175664011) submitted January 21, 2015. The purpose of the new piezometer installations at the Ballfield was to gather information in support of the closure design for the Stilling Pond at KIF. The additional instruments will supplement the subsurface information currently available at the Ballfield.

The scope of work included the installation of six (6) new vibrating wire piezometers. The location of these piezometers is shown on the instrumentation layout presented in Attachment A. Boring logs are included in Attachment B. A summary of the piezometer installations is included in Table 1 below.

Table 1. Installation Summary

Instrument Name	Northing	Easting	Surface Elevation (ft)	Piezometer Tip Depth (ft)
KIF-BF-PZ01	554,842.35	2,439,067.33	775.0	24.3
KIF-BF-PZ02	554,783.11	2,439,383.36	771.2	20.4
KIF-BF-PZ03	554,476.24	2,439,663.84	790.8	40.2
KIF-BF-PZ04	554,257.53	2,440,058.56	769.5	18.5
KIF-BF-PZ05	553,916.41	2,439,620.61	779.9	28.5
KIF-BF-PZ06	553,542.90	2,439,248.58	769.7	18.0

Vibrating wire piezometers were installed in various locations in and around the Ballfield within borings KIF-BF-PZ01, KIF-BF-PZ02, KIF-BF-PZ03, KIF-BF-PZ04, KIF-BF-PZ05, KIF-BF-PZ06. The installation consisted of installing one vibrating wire transducer within each boring. The installation depths for each vibrating wire piezometer were determined so that the vibrating wire piezometer would be at approximate elevation 750 feet. Once the piezometer was installed, the borehole was fully grouted as depicted on the instrumentation details included in Attachment C. The vibrating wire

piezometers were calibrated prior to installation to verify that they were functioning correctly and to calculate the required parameters for reducing the data to determine water depth. These calibration sheets are included in Attachment D.

Stantec appreciates the opportunity to provide engineering services for this project. If you have any questions, or if we may be of further assistance, please contact our office.

Regards,

STANTEC CONSULTING SERVICES INC.

Chris Jones, PE
Senior Project Engineer
Phone: (859) 422-3020
Fax: (859) 422-3100
chris.jones2@stantec.com

Matt Aplin, EIT
Project Engineer
Phone: (423) 800-5342
Fax: (423) 800-5351
matthew.aplin@stantec.com

Attachment:

A. Instrumentation Layout
B. Boring Logs
C. Installation Details
D. Vibrating Wire Piezometer Calibration Sheets

ATTACHMENT A
INSTRUMENTATION LAYOUT

SURVEY CONTROL NOTE:

A GLOBAL POSITIONING SYSTEM (GPS) BASE STATION HAS BEEN ESTABLISHED AND TRANSFORMATION PARAMETERS DETERMINED BY TVA USING SELECTED SURVEY CONTROL MONUMENTS. CONTACT WITH TVA SURVEYING DEPARTMENT (423)751-8416 OR (423)751-2571 SHALL BE MADE BEFORE ANY SURVEY OR CONSTRUCTION WORK IS COMMENCED. BASE STATION FREQUENCIES AND TRANSFORMATION PARAMETERS WILL BE PROVIDED TO THE CONTRACTOR FOR USE IN CONSTRUCTION ACTIVITIES AT THE SITE. PREVIOUSLY USED OR ESTABLISHED CONTROL POINTS AND MONUMENTS SHALL NOT BE USED BY THE CONTRACTOR WITHOUT PRIOR APPROVAL BY TVA SURVEYING DEPARTMENT.

NOTES:

1. AERIAL IMAGE PROVIDED BY TVA DATED APRIL 24, 2014, PERFORMED BY TUCK MAPPING SOLUTIONS, INC.
2. CERCLA BOUNDARY CONSTITUTES BOUNDARY OF KINGSTON ASH RECOVERY PROJECT.
3. INSTALLED PIEZOMETER LOCATIONS WERE SURVEYED BY TVA SURVEYING FOLLOWING COMPLETION OF THE DRILLING ON 03/20/15 AND PROVIDED TO STANTEC ON 03/23/15.

LEGEND

- FLOW
- PIEZOMETER

TABLE OF INSTALLED PIEZOMETERS

PIEZOMETER	NORTHING	EASTING	GROUND ELEVATION (FEET)
KIF-BF-PZ-01	554842.35	2439067.33	775.0
KIF-BF-PZ-02	554783.11	2439383.36	771.2
KIF-BF-PZ-03	554476.24	2439663.84	790.8
KIF-BF-PZ-04	554257.53	2440058.56	769.5
KIF-BF-PZ-05	553916.41	2439620.61	779.9
KIF-BF-PZ-06	553542.90	2439248.58	769.7

50 0 100 200 FEET
GRAPHIC SCALE: 1"=100'
(ELEVATIONS PER NGVD29)

PLOT DATE: 10/16/2014 USER: MEGNAN, MICHELLE
V:\1756\ACTIVE\175640011\ENVIRONMENTAL\DESIGN\MODEL_FILES\WORK\PIEZOMETER_REQUEST_AMI_SURVEYED.DWG

DRAINAGE AND FLOW MANAGEMENT STILLING POND FINAL CLOSURE

PIEZOMETER LOCATIONS KINGSTON FOSSIL PLANT

Stantec
Stantec Consulting Services Inc.
1409 North Forbes Road
Lexington, Kentucky
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Tel. 859.422.3000
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KINGSTON FOSSIL PLANT
TENNESSEE VALLEY AUTHORITY
FOSSIL AND HYDRO ENGINEERING

ATTACHMENT B
BORING LOGS

SUBSURFACE LOG

Project Number	175664011	Location	554842.35 N, 2439067.33 E		
Project Name	Kingston Ballfield	Boring No.	**KIF-BF-PZ01**	Total Depth	24.8 ft
County	Harriman, TN	Surface Elevation	775.0 ft		
Project Type	Instrumentation Installation	Date Started	2/24/15	Completed	2/24/15
Supervisor	M. Aplin	Driller M. Wethington	Depth to Water	15.0 ft	Date/Time 2/24/15
Logged By	M. Aplin		Depth to Water	N/A	Date/Time N/A

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
775.0	0.0	Top of Hole							
		SILT (ML), ash, light gray, dry, very stiff		SPT-1	5.0 - 6.5	1.5	6-10-15	--	
764.5	10.5								
764.3	10.8	GRAVEL, crushed stone		SPT-2	10.0 - 11.5	1.5	11-20-23	--	
		SILT with Sand (ML), ash, light gray, moist, stiff		SPT-3	15.0 - 16.5	1.5	7-4-6	--	
				SPT-4	20.0 - 21.5	1.5	4-4-4	--	
750.2	24.8								
		No Refusal / Bottom of Hole							
		Piezometer installed at 24.3 ft depth (elev 750.7')							

STANTEC/FMSM_LEGACY 175664011_KIF_INSTRUMENTATION.GPJ FMSM-GRAPHIC LOG.GDT 3/24/15

SUBSURFACE LOG

Project Number	175664011	Location	554783.11 N, 2439383.36 E		
Project Name	Kingston Ballfield	Boring No.	**KIF-BF-PZ02**	Total Depth	24.4 ft
County	Harriman, TN	Surface Elevation	771.2 ft		
Project Type	Instrumentation Installation	Date Started	2/25/15	Completed	2/25/15
Supervisor	M. Aplin	Driller	M. Wethington	Depth to Water	15.0 ft	Date/Time	2/25/15
Logged By	M. Aplin	Depth to Water	N/A	Date/Time	N/A

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
771.2	0.0	Top of Hole							
		GRAVEL, crushed stone, roadbed							
765.7	5.5								
		SILT (ML), ash, dark gray, dry, hard to stiff		SPT-1	5.0 - 6.5	1.5	21-28-29	--	
				SPT-2	10.0 - 11.5	1.5	10-9-7	--	
756.2	15.0								
		SILT (ML), ash, dark gray, moist, soft		SPT-3	15.0 - 16.5	1.5	1-1-1	--	
				SPT-4	20.0 - 21.5	1.0	1-1-1	--	
746.8	24.4								
		No Refusal / Bottom of Hole							
		Piezometer installed at 20.4 ft depth (elev 750.8')							

STANTEC/FMSM_LEGACY 175664011_KIF_INSTRUMENTATION.GPJ FMSM-GRAPHIC LOG.GDT 3/24/15

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SUBSURFACE LOG

Project Number	175664011	Location	554476.24 N, 2439663.84 E		
Project Name	Kingston Ballfield	Boring No.	**KIF-BF-PZ03**	Total Depth	40.8 ft
County	Harriman, TN	Surface Elevation	790.8 ft		
Project Type	Instrumentation Installation	Date Started	3/17/15	Completed	3/17/15
Supervisor	M. Aplin Driller S. Bradford	Depth to Water	26.5 ft	Date/Time	3/17/15
Logged By	M. Aplin	Depth to Water	N/A	Date/Time	N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
790.8	0.0	Top of Hole							
		SILT (ML), ash, dark gray, dry, hard		SPT-1	5.0 - 6.5	1.5	12-14-30	--	
				SPT-2	10.0 - 11.5	1.5	32-24-50	--	
				SPT-3	15.0 - 16.5	1.5	34-23-30	--	
				SPT-4	20.0 - 21.5	1.5	25-30-42	--	
766.8	24.0								
765.3	25.5	GRAVEL, crushed stone							Auger refusal at 24 feet, boring offset 50 feet and continued.
		SILT (ML), ash, dark gray, moist, very stiff to stiff moist at 26.5		SPT-5	25.0 - 26.5	1.5	11-12-10	--	
				SPT-6	30.0 - 31.5	1.5	6-7-5	--	

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SUBSURFACE LOG

Project Number 175664011 | Location 554476.24 N, 2439663.84 E

Project Name Kingston Ballfield | Boring No. **KIF-BF-PZ03** | Total Depth 40.8 ft

Lithology		Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
Elevation	Depth								
		SILT (ML), ash, dark gray, moist, very stiff to stiff *(Continued)*		SPT-7	35.0 - 36.5	1.5	6-3-2	--	
750.0	40.8	No Refusal / Bottom of Hole Piezometer installed at 40.2 ft depth (elev 750.6')							

STANTEC/FMSM_LEGACY 175664011_KIF_INSTRUMENTATION.GPJ FMSM-GRAPHIC LOG.GDT 3/27/15

3/27/15

Stantec

SUBSURFACE LOG

Project Number	175664011	Location	554257.53 N, 2440058.56 E		
Project Name	Kingston Ballfield	Boring No.	**KIF-BF-PZ04**	Total Depth	19.0 ft
County	Harriman, TN	Surface Elevation	769.5 ft		
Project Type	Instrumentation Installation	Date Started	3/18/15	Completed	3/18/15
Supervisor	M. Aplin	Driller S. Bradford	Depth to Water	10.0 ft	Date/Time 3/18/15
Logged By	M. Aplin		Depth to Water	N/A	Date/Time N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
769.5	0.0	Top of Hole							
767.5	2.0	GRAVEL, crushed stone							
		SILT (ML), ash, dark gray, dry, very stiff		SPT-1	5.0 - 6.5	1.5	10-14-13	--	
759.0	10.5								
758.6	10.9	GRAVEL, crushed stone		SPT-2	10.0 - 11.5	0.4	5-5-5	--	
		SANDY SILT (ML), ash, light gray, wet, stiff							
				SPT-3	15.0 - 16.5	0.2	3-4-4	--	
750.5	19.0								
		No Refusal / Bottom of Hole							
		Piezometer installed at 18.5 ft depth (elev 751.0')							

STANTEC/FMSM_LEGACY 175664011_KIF_INSTRUMENTATION.GPJ FMSM-GRAPHIC LOG.GDT 3/27/15

SUBSURFACE LOG

Project Number	175664011	Location	553916.41 N, 2439620.61 E		
Project Name	Kingston Ballfield	Boring No.	**KIF-BF-PZ05**	Total Depth	29.2 ft
County	Harriman, TN	Surface Elevation	779.9 ft		
Project Type	Instrumentation Installation	Date Started	3/17/15	Completed	3/18/15
Supervisor	M. Aplin Driller S. Bradford	Depth to Water	15.0 ft	Date/Time	3/18/15
Logged By	M. Aplin	Depth to Water	N/A	Date/Time	N/A

Lithology Elevation	Lithology Depth	Description	Overburden / Rock Core	Sample # / RQD	Depth / Run	Rec. Ft. / Rec. Ft.	Blows / Rec. %	Mois.Cont. % / Run Depth	Remarks
779.9	0.0	Top of Hole							
		SILT (ML), ash, light gray, dry, very stiff		SPT-1	5.0 - 6.5	1.0	4-8-10	--	
769.2	10.8			SPT-2	10.0 - 11.5	1.5	5-10-13	--	
		SILT (ML), ash, dark gray, dry, very stiff							
764.4	15.5								
764.0	15.9	GRAVEL, crushed stone		SPT-3	15.0 - 16.5	1.5	11-12-14	--	
		SILT (ML), ash, light gray, moist, very stiff to firm							
				SPT-4	20.0 - 21.5	1.5	6-8-9	--	
		wet at 25 feet		SPT-5	25.0 - 26.5	0.5	2-4-3	--	
750.7	29.2								
		No Refusal / Bottom of Hole Piezometer installed at 28.5 ft depth (elev 751.4')							

STANTEC/FMSM_LEGACY 175664011_KIF_INSTRUMENTATION.GPJ FMSM-GRAPHIC LOG.GDT 3/27/15

3/27/15

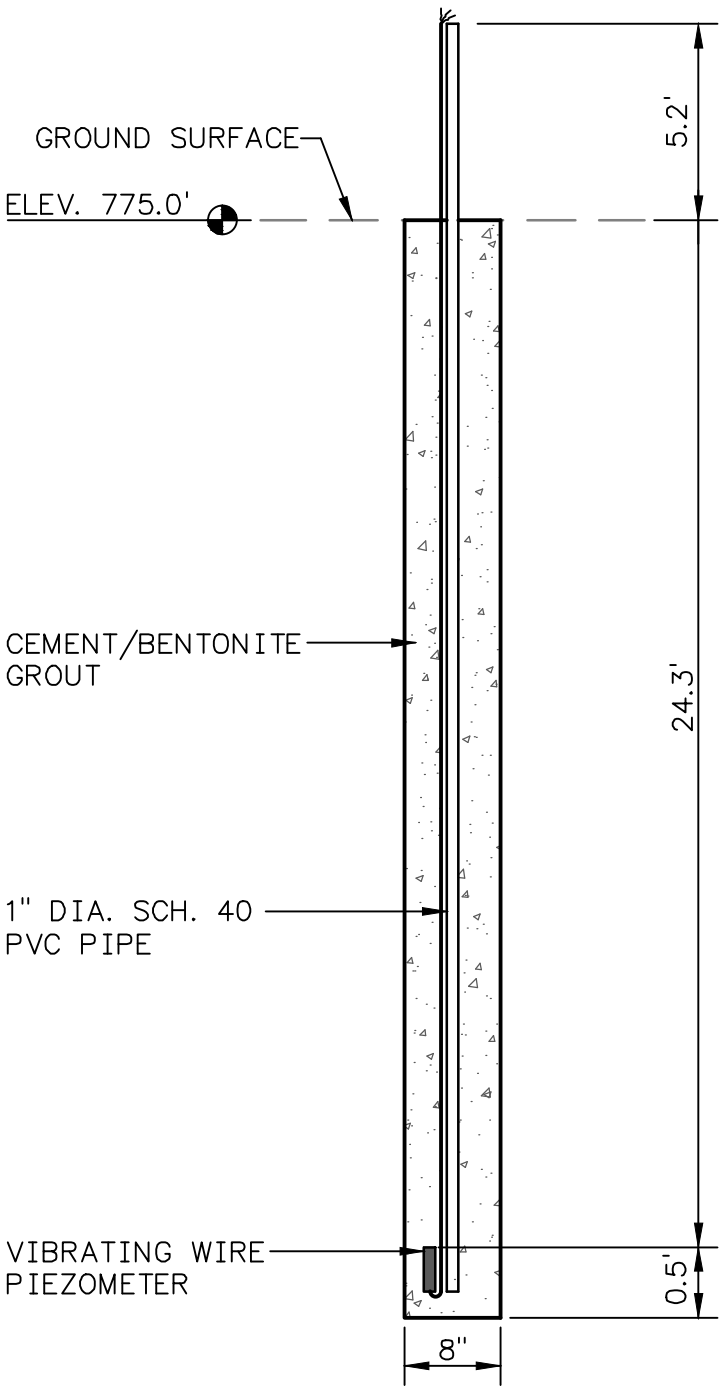
SUBSURFACE LOG

Project Number	175664011	Location	553542.90 N, 2439248.58 E		
Project Name	Kingston Ballfield	Boring No.	**KIF-BF-PZ06**	Total Depth	19.5 ft
County	Harriman, TN	Surface Elevation	769.7 ft		
Project Type	Instrumentation Installation	Date Started	2/24/15	Completed	2/24/15
Supervisor	M. Aplin	Driller M. Wethington	Depth to Water	11.5 ft	Date/Time 2/24/15
Logged By	M. Aplin		Depth to Water	N/A	Date/Time N/A

Lithology			Overburden	Sample #	Depth	Rec. Ft.	Blows	Mois.Cont. %	
Elevation	Depth	Description	Rock Core	RQD	Run	Rec. Ft.	Rec. %	Run Depth	Remarks
769.7	0.0	Top of Hole							
764.2	5.5	SILT (ML), ash, dark gray, dry, hard		SPT-1	5.0 - 6.5	1.3	13-12-20	--	
763.8	5.9	GRAVEL, crushed stone							
		SILT with Sand (ML), ash, dark gray, moist, very stiff to firm		SPT-2	10.0 - 11.5	1.5	6-6-12	--	
		wet at 11.5 feet		SPT-3	15.0 - 16.5	1.0	5-3-4	--	
750.2	19.5	No Refusal / Bottom of Hole Piezometer installed at 18.0 ft depth (elev 751.7')							

STANTEC/FMSM_LEGACY 175664011_KIF_INSTRUMENTATION.GPJ FMSM-GRAPHIC LOG.GDT 3/24/15

ATTACHMENT C
INSTALLATION DETAILS



NOTES:

1. INSTALLED ON 02/24/2015. BORING ADVANCED BY 4.25" (I.D.) HOLLOW STEM AUGERS.
2. REFER TO BORING LOG FOR OVERBURDEN STRATIGRAPHY.

LOCATION:
NORTHING: 554,842.35
EASTING: 2,439,067.33

LOCATIONS TO BE PROVIDED BY TVA, POWER SYSTEMS OPERATIONS, SURVEYING AND PROJECT SERVICES.
HORIZONTAL DATUM: NAD 27
VERTICAL DATUM: NGVD29

PIEZOMETER KIF-BF-PZ01
BALLFIELD INSTRUMENT INSTALLATION
KINGSTON FOSSIL PLANT

Stantec
1409 North Forbes Road
Lexington, Kentucky 40511-2024
www.stantec.com

DRAWN BY	DMG	DATE	MARCH, 2015
CHECKED BY	CJJ	PROJ. NO.	175664011
CHECKED BY	CJJ	SCALE	NTS

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2.	—	4.	—	

PLOT DATE: 03/24/2015 USER: GRAHAM, DAVE
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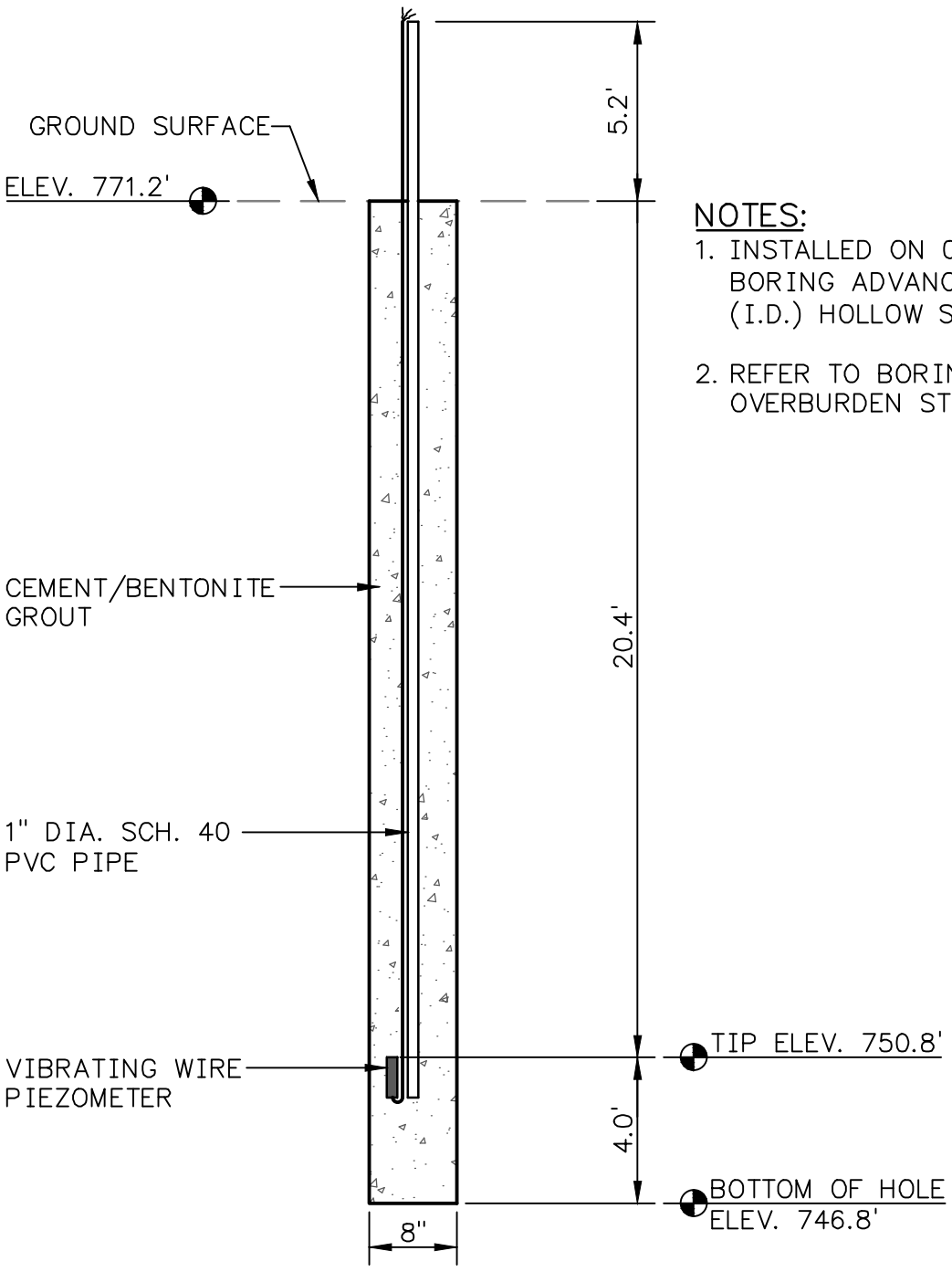

NOTES:

1. INSTALLED ON 02/25/2015. BORING ADVANCED BY 4.25" (I.D.) HOLLOW STEM AUGERS.
2. REFER TO BORING LOG FOR OVERBURDEN STRATIGRAPHY.

LOCATION:
NORTHING: 554,783.11
EASTING: 2,439,383.36

LOCATIONS TO BE PROVIDED BY TVA, POWER SYSTEMS OPERATIONS, SURVEYING AND PROJECT SERVICES.
HORIZONTAL DATUM: NAD 27
VERTICAL DATUM: NGVD29

PLOT DATE: 03/24/2015 USER: GRAHAM, DAVE
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PIEZOMETER KIF-BF-PZ02
BALLFIELD INSTRUMENT INSTALLATION
KINGSTON FOSSIL PLANT

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CHECKED BY	CJJ	SCALE	NTS

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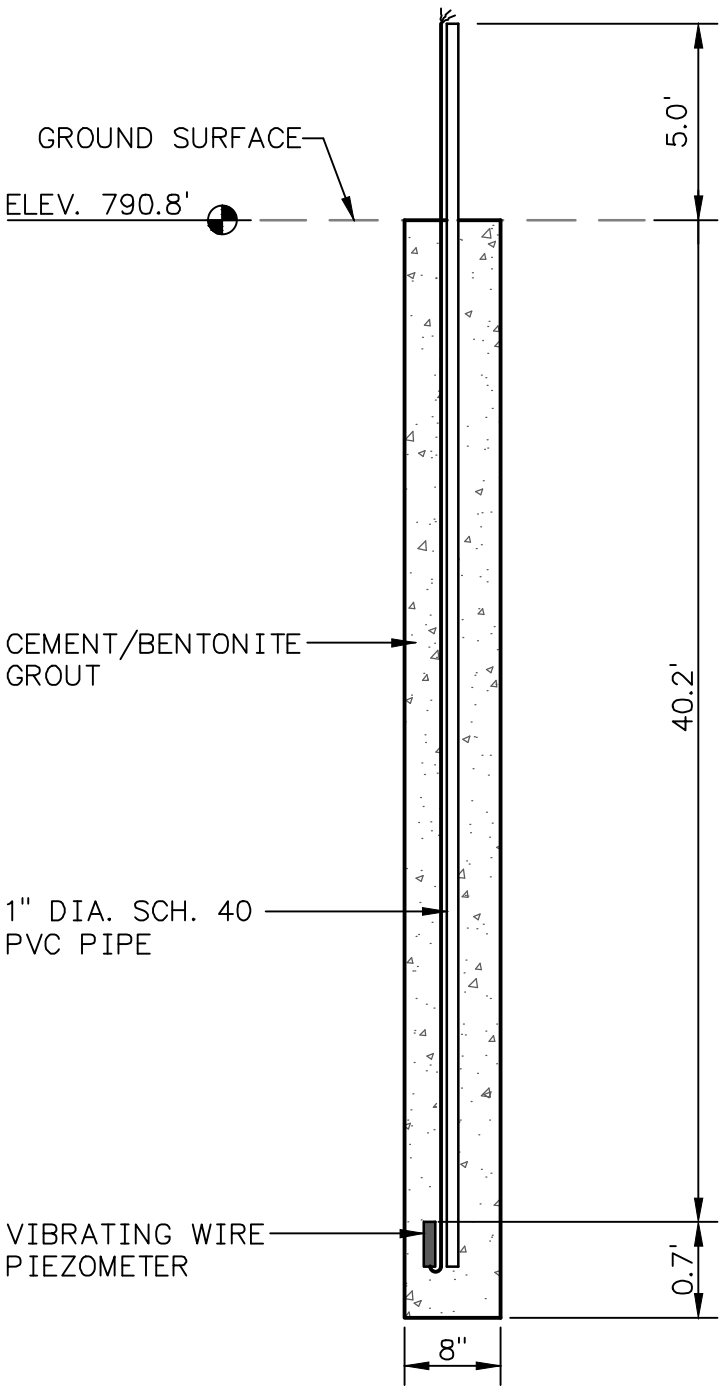

NOTES:

1. INSTALLED ON 03/17/2015. BORING ADVANCED BY 4.25" (I.D.) HOLLOW STEM AUGERS.
2. REFER TO BORING LOG FOR OVERBURDEN STRATIGRAPHY.

LOCATION:
NORTHING: 554,476.24
EASTING: 2,439,663.84

LOCATIONS TO BE PROVIDED BY TVA, POWER SYSTEMS OPERATIONS, SURVEYING AND PROJECT SERVICES.
HORIZONTAL DATUM: NAD 27
VERTICAL DATUM: NGVD29

PLOT DATE: 03/24/2015 USER: GRAHAM, DAVE
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PIEZOMETER KIF-BF-PZ03
BALLFIELD INSTRUMENT INSTALLATION
KINGSTON FOSSIL PLANT

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1409 North Forbes Road
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CHECKED BY	CJJ	SCALE	NTS

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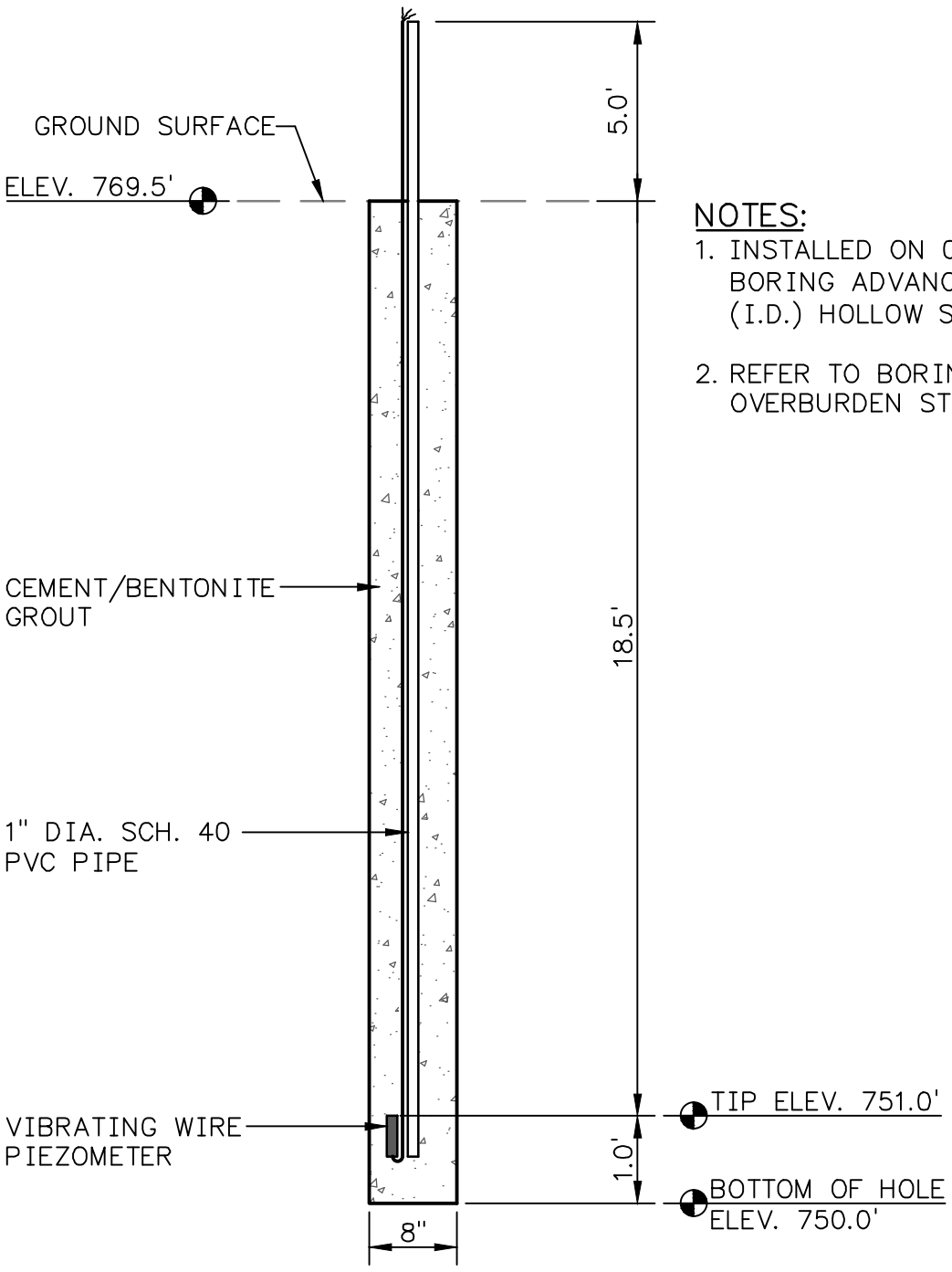
2.	—	4.	—	



NOTES:

1. INSTALLED ON 03/18/2015. BORING ADVANCED BY 4.25" (I.D.) HOLLOW STEM AUGERS.
2. REFER TO BORING LOG FOR OVERBURDEN STRATIGRAPHY.

LOCATION:
NORTHING: 554,257.53
EASTING: 2,440,058.56

LOCATIONS TO BE PROVIDED BY TVA, POWER SYSTEMS OPERATIONS, SURVEYING AND PROJECT SERVICES.
HORIZONTAL DATUM: NAD 27
VERTICAL DATUM: NGVD29

PLOT DATE: 03/24/2015 USER: GRAHAM, DAVE
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PIEZOMETER KIF-BF-PZ04
BALLFIELD INSTRUMENT INSTALLATION
KINGSTON FOSSIL PLANT

Stantec
1409 North Forbes Road
Lexington, Kentucky 40511-2024
www.stantec.com

DRAWN BY	DMG	DATE	MARCH, 2015
CHECKED BY	CJJ	PROJ. NO.	175664011
CHECKED BY	CJJ	SCALE	NTS

REVISED				SHEET
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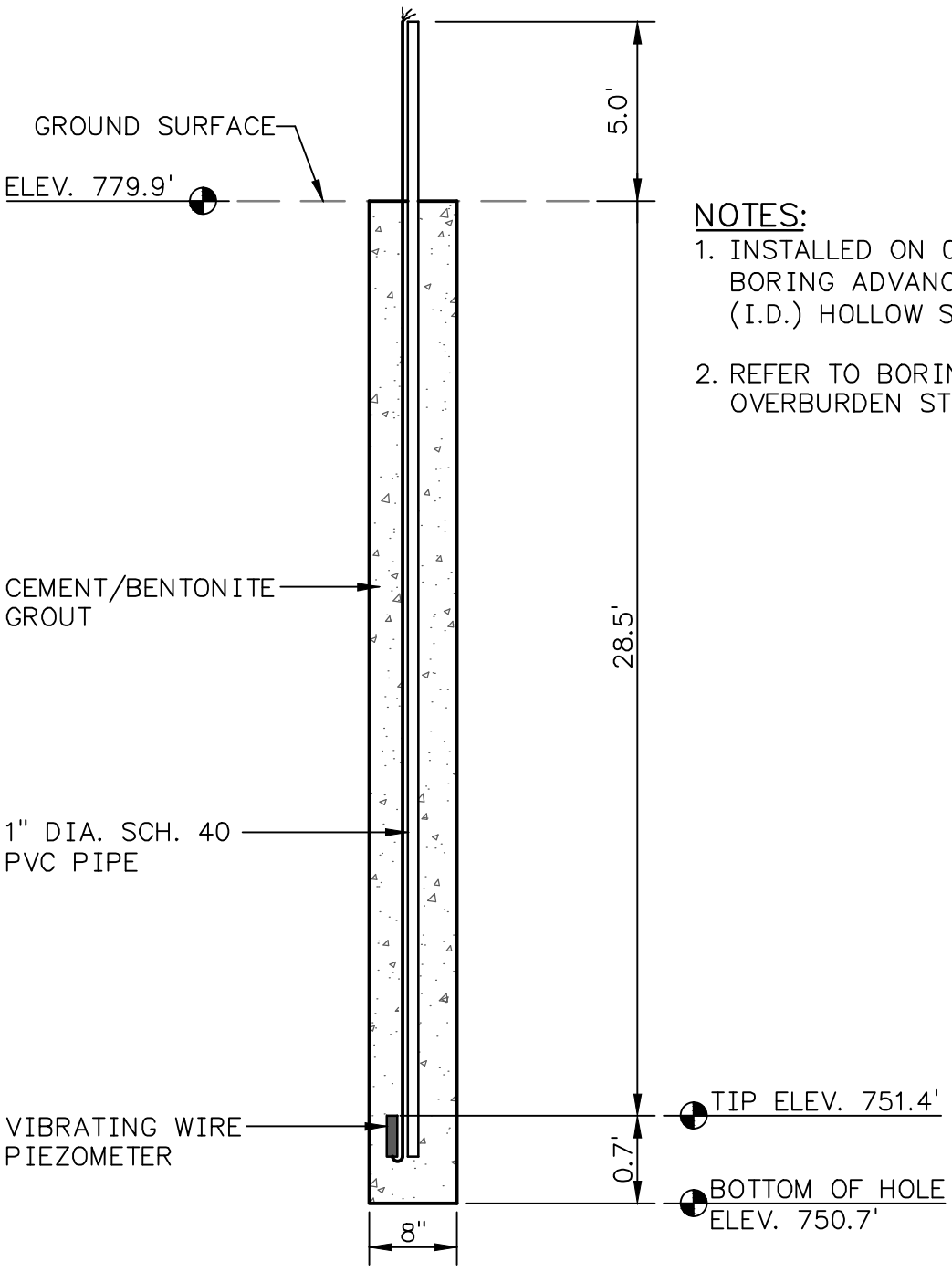

NOTES:

1. INSTALLED ON 03/18/2015. BORING ADVANCED BY 4.25" (I.D.) HOLLOW STEM AUGERS.
2. REFER TO BORING LOG FOR OVERBURDEN STRATIGRAPHY.

LOCATION:
NORTHING: 553,916.41
EASTING: 2,439,620.61

LOCATIONS TO BE PROVIDED BY TVA, POWER SYSTEMS OPERATIONS, SURVEYING AND PROJECT SERVICES.
HORIZONTAL DATUM: NAD 27
VERTICAL DATUM: NGVD29

PLOT DATE: 03/24/2015 USER: GRAHAM, DAVE
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PIEZOMETER KIF-BF-PZ05
BALLFIELD INSTRUMENT INSTALLATION
KINGSTON FOSSIL PLANT

Stantec
1409 North Forbes Road
Lexington, Kentucky 40511-2024
www.stantec.com

DRAWN BY	DMG	DATE	MARCH, 2015
CHECKED BY	CJJ	PROJ. NO.	175664011
CHECKED BY	CJJ	SCALE	NTS

REVISED				SHEET
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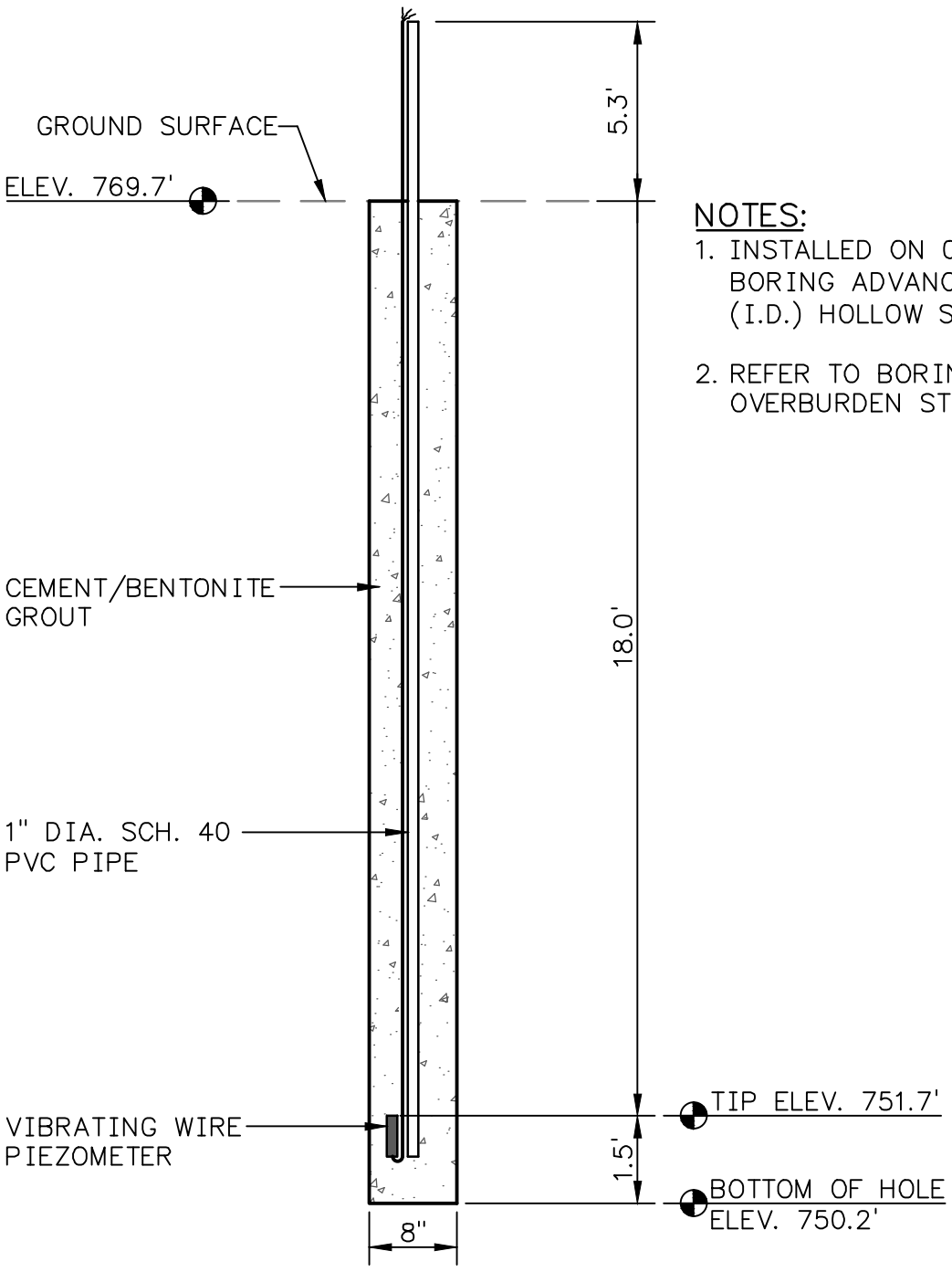
2.	—	4.	—	



NOTES:

1. INSTALLED ON 02/25/2015. BORING ADVANCED BY 4.25" (I.D.) HOLLOW STEM AUGERS.
2. REFER TO BORING LOG FOR OVERBURDEN STRATIGRAPHY.

LOCATION:
NORTHING: 553,542.90
EASTING: 2,439,248.58

LOCATIONS TO BE PROVIDED BY TVA, POWER SYSTEMS OPERATIONS, SURVEYING AND PROJECT SERVICES.
HORIZONTAL DATUM: NAD 27
VERTICAL DATUM: NGVD29

PLOT DATE: 03/24/2015 USER: GRAHAM, DAVE
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PIEZOMETER KIF-BF-PZ06
BALLFIELD INSTRUMENT INSTALLATION
KINGSTON FOSSIL PLANT

Stantec
1409 North Forbes Road
Lexington, Kentucky 40511-2024
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DRAWN BY	DMG	DATE	MARCH, 2015
CHECKED BY	CJJ	PROJ. NO.	175664011
CHECKED BY	CJJ	SCALE	NTS

REVISED				SHEET
1.	—	3.	—	1 OF 1
2.	—	4.	—	

ATTACHMENT D
VIBRATING WIRE PIEZOMETER CALIBRATION SHEETS

Vibrating Wire Piezometer (VWP) Installation Notes and Details

Project Name: KIF Ballfield Piezometer Installation
Stantec Project No: 175664011
Boring Number: KIF-BF-PZ01

VWP Make and Model: Geokon 4500S
Pressure Range: 350 kPa

Installation Type: Open Standpipe X
Direct Bearing
Fully Grouted

Installation Crew: M. Wethington/B. Jones
Inspector: **Matt Aplin**
Date: 2/24/2015
Drill Rig Model / #: CME 55

Piezometer:
Manufacturer: Geokon
Casing Type: None
Inside Diameter: N/A
Tip Type: Porous stone

INSTALLATION CHECKLIST:

X Office pressure check complete
X Field zero complete (See page 2)
X Borehole flushed with clean water
X Confirm BOH depth = 24.8 feet Below Ground Surface (BGS)
X Porous Filter Stone facing upward
N/A Attached sacrificial Tape

X Post-Installation pressure check complete
N/A Final sacrificial tape measurement (feet BGS)
X Grout proportions recorded

Checklist Performed By: Matt Aplin (printed) Date: 2/24/2015

Checklist Performed By:  (signature) Time: 10:00

Vibrating Wire Piezometer Calibration Data

VWP ID	Anticipated Install Depth	Serial No.	Gage Factors from Factory Calibration Data Sheets: T_0 (°C)	S_0 (mbar)	R_0 (digits)	G (psi/digit)	A (psi/digit^2)	B (psi/digit)	C (psi)	K (psi / °C)
KIF-BF-PZ03	22	1500621	21.3	993.4		-0.01492	-2.67E-08	-0.01454		-0.001735

NOTES:

Metal tape attached to piece of rebar was used to confirm BOH depth.

Vibrating Wire Piezometer (VWP) Installation Notes and Details

Project Name: KIF Ballfield Piezometer Installation Boring Number: KIF-BF-PZ01

Stantec Project No: 175664011

Office Check of Vibrating Wire Piezometers

Pre-installation check to verify proper operation prior to installation by taking readings at water depths of 0 feet (atmospheric pressure) and 2 feet.

$P\ (psi) = AR^2+BR+C+K(T_1-T_0)-(S_1-S_0)$ Where: A,B, and C = Polynomial Gage Factors

R = Current digits reading

K = Thermal Factor

$(T_i - T_0)$ = Temp. at time of reading minus temp. at time of initial onsite reading

$(S_i - S_0)$ = Baro. pressure at time of reading minus initial onsite baro. pressure

Depth of Water for Office Check (ft): 0.7

Barometric Pressure at time of Office Check, S_1 & S_0: 30.04 inches Hg

VWP ID: KIF-BF-PZ03 H_w: 0 feet R_0: 8799.53 T: 21.3

Serial No.: 1500621 Office C: 130.0103

H_w: 0.725 feet R_i: 8777.0 T_i: 11.3 P = 0.82 feet H_2O

Pre-Installation Check Performed By: Matt Aplin (printed) (signature) Date: 2/18/2015 Time: 11:30

Field Zero of Vibrating Wire Piezometers

Barometric Pressure, S_0 = 30.13 inches Hg

VWP ID	Installed Depth, feet	Serial No.	Reading R_0 (digits)	Temp T (deg C)	New Field C psi
KIF-BF-PZ03	24.3	1500621	8799.5	11.9	130.0103

Field Zero Performed By: Matt Aplin (printed) (signature) Date: 2/24/2015 Time: 11:30

Vibrating Wire Piezometer (VWP) Installation Notes and Details

Project Name: KIF Ballfield Piezometer Installation
Stantec Project No: 175664011
Boring Number: KIF-BF-PZ02

VWP Make and Model: Geokon 4500S
Pressure Range: 350 kPa

Installation Type: Open Standpipe X; Direct Bearing; Fully Grouted

Installation Crew: M. Wethington/B. Jones
Inspector: **Matt Aplin**
Date: 2/25/2015
Drill Rig Model / #: CME 55

Piezometer:
Manufacturer: Geokon
Casing Type: None
Inside Diameter: N/A
Tip Type: Porous Stone

INSTALLATION CHECKLIST:

X	Office pressure check complete	X	Post-Installation pressure check complete
X	Field zero complete (See page 2)	N/A	Final sacrificial tape measurement (feet BGS)
X	Borehole flushed with clean water	X	Grout proportions recorded
X	Confirm BOH depth = 24.4 feet Below Ground Surface (BGS)		
X	Porous Filter Stone facing upward		
N/A	Attached sacrificial Tape		

Checklist Performed By: Matt Aplin (printed) Date: 2/25/2015

Checklist Performed By: (signature) Time: 14:00

Vibrating Wire Piezometer Calibration Data

VWP ID	Anticipated Install Depth	Serial No.	Gage Factors from Factory Calibration Data Sheets: T_0 (°C)	S_0 (mbar)	R_0 (digits)	G (psi/digit)	A (psi/digit^2)	B (psi/digit)	C (psi)	K (psi / °C)
KIF-BF-PZ02	20	1500657	22.1	1000.1		-0.01475	-8.02E-09	-0.01464		-0.001289

NOTES:

Metal tape attached to piece of rebar was used to confirm BOH depth.

Vibrating Wire Piezometer (VWP) Installation Notes and Details

Project Name: KIF Ballfield Piezometer Installation Boring Number: KIF-BF-PZ02

Stantec Project No: 175664011

Office Check of Vibrating Wire Piezometers

Pre-installation check to verify proper operation prior to installation by taking readings at water depths of 0 feet (atmospheric pressure) and 2 feet.

$P\ (psi) = AR^2+BR+C+K(T_1-T_0)-(S_1-S_0)$ Where: A,B, and C = Polynomial Gage Factors

R = Current digits reading

K = Thermal Factor

$(T_i - T_0)$ = Temp. at time of reading minus temp. at time of initial onsite reading

$(S_i - S_0)$ = Baro. pressure at time of reading minus initial onsite baro. pressure

Depth of Water for Office Check (ft): 0.7

Barometric Pressure at time of Office Check, S_1 & S_0: 30.04 inches Hg

VWP ID: KIF-BF-PZ02 H_w: 0 feet R_0: 8613.64 T: 21.1

Serial No.: 1500657 Office C: 126.6990

H_w: 0.725 feet R_i: 8593.1 T_i: 11.2 P = 0.73 feet H_2O

Pre-Installation Check Performed By: Matt Aplin (printed) Date: 2/18/2015

(signature) Time: 11:30

Field Zero of Vibrating Wire Piezometers

Barometric Pressure, S_0 = 30.03 inches Hg

VWP ID	Installed Depth, feet	Serial No.	Reading R_0 (digits)	Temp T (deg C)	New Field C psi
KIF-BF-PZ02	20.4	1500657	8621.9	14.3	126.8204

Field Zero Performed By: Matt Aplin (printed) Date: 2/25/2015

(signature) Time: 16:00

Vibrating Wire Piezometer (VWP) Installation Notes and Details

Project Name: KIF Ballfield Piezometer Installation
Stantec Project No: 175664011
Boring Number: KIF-BF-PZ03

VWP Make and Model: Geokon 4500S
Pressure Range: 350 kPa

Installation Type: Open Standpipe X; Direct Bearing; Fully Grouted

Installation Crew: S. Bradford/L. Brandenburg
Inspector: **Matt Aplin**
Date: 3/17/2015
Drill Rig Model / #: CME 55

Piezometer:
Manufacturer: Geokon
Casing Type: None
Inside Diameter: N/A
Tip Type: Porous Stone

INSTALLATION CHECKLIST:

X	Office pressure check complete	X	Post-Installation pressure check complete
X	Field zero complete (See page 2)	N/A	Final sacrificial tape measurement (feet BGS)
X	Borehole flushed with clean water	X	Grout proportions recorded
X	Confirm BOH depth = 40.8 feet Below Ground Surface (BGS)		
X	Porous Filter Stone facing upward		
N/A	Attached sacrificial Tape		

Checklist Performed By: Matt Aplin (printed) Date: 3/17/2015

Checklist Performed By:  (signature) Time: 10:00

Vibrating Wire Piezometer Calibration Data

VWP ID	Anticipated Install Depth	Serial No.	Gage Factors from Factory Calibration Data Sheets: T_0 (°C)	S_0 (mbar)	R_0 (digits)	G (psi/digit)	A (psi/digit^2)	B (psi/digit)	C (psi)	K (psi / °C)
KIF-BF-PZ03	22	1500658	21.3	993.4		-0.01492	-2.67E-08	-0.01454		-0.001735

NOTES:

Metal tape attached to piece of rebar was used to confirm BOH depth.

Vibrating Wire Piezometer (VWP) Installation Notes and Details

Project Name: KIF Ballfield Piezometer Installation
Boring Number: KIF-BF-PZ03
Stantec Project No: 175664011

Office Check of Vibrating Wire Piezometers

Pre-installation check to verify proper operation prior to installation by taking readings at water depths of 0 feet (atmospheric pressure) and 2 feet.

$P\ (psi) = AR^2+BR+C+K(T_1-T_0)-(S_1-S_0)$

Where: A,B, and C = Polynomial Gage Factors
R = Current digits reading
K = Thermal Factor
$(T_i - T_0)$ = Temp. at time of reading minus temp. at time of initial onsite reading
$(S_i - S_0)$ = Baro. pressure at time of reading minus initial onsite baro. pressure

Depth of Water for Office Check (ft): 0.7

Barometric Pressure at time of Office Check, S_1 & S_0: 30.04 inches Hg

VWP ID: KIF-BF-PZ03 H_w: 0 feet R_0: 8825.65 T: 21.2

Serial No.: 1500658 Office C: 130.4023

H_w: 0.725 feet R_i: 8810.8 T_i: 11.3 P = 0.55 feet H_2O

Pre-Installation Check Performed By: Mat Aplin (printed)  (signature)

Date: 2/18/2015

Time: 11:30

Field Zero of Vibrating Wire Piezometers

Barometric Pressure, S_0 = 29.98 inches Hg

VWP ID	Installed Depth, feet	Serial No.	Reading R_0 (digits)	Temp T (deg C)	New Field C psi
KIF-BF-PZ03	40.2	1500658	8829.8	33.2	130.4648

Field Zero Performed By: Matt Aplin (printed)  (signature)

Date: 3/17/2015

Time: 12:00

Vibrating Wire Piezometer (VWP) Installation Notes and Details

Project Name: KIF Ballfield Piezometer Installation
Stantec Project No: 175664011
Boring Number: KIF-BF-PZ04

VWP Make and Model: Geokon 4500S
Pressure Range: 350 kPa
Installation Type: Open Standpipe X; Direct Bearing; Fully Grouted

Installation Crew: S. Bradford/L. Brandenburg
Inspector: **Matt Aplin**
Date: 3/18/2015
Drill Rig Model / #: CME 55

Piezometer:
Manufacturer: Geokon
Casing Type: None
Inside Diameter: N/A
Tip Type: Porous Stone

INSTALLATION CHECKLIST:

X	Office pressure check complete	X	Post-Installation pressure check complete
X	Field zero complete (See page 2)	N/A	Final sacrificial tape measurement (feet BGS)
X	Borehole flushed with clean water	X	Grout proportions recorded
X	Confirm BOH depth = 19.0 feet Below Ground Surface (BGS)		
X	Porous Filter Stone facing upward		
N/A	Attached sacrificial Tape		

Checklist Performed By: Matt Aplin (printed) Date: 3/18/2015

Checklist Performed By:  (signature) Time: 13:00

Vibrating Wire Piezometer Calibration Data

VWP ID	Anticipated Install Depth	Serial No.	Gage Factors from Factory Calibration Data Sheets: T_0 (°C)	S_0 (mbar)	R_0 (digits)	G (psi/digit)	A (psi/digit^2)	B (psi/digit)	C (psi)	K (psi / °C)
KIF-BF-PZ04	19.4	1500659	22.1	1000.1		-0.01504	-3.51E-08	-0.01455		-0.01007

NOTES:

Metal tape attached to piece of rebar was used to confirm BOH depth.

Vibrating Wire Piezometer (VWP) Installation Notes and Details

Project Name: KIF Ballfield Piezometer Installation
Boring Number: KIF-BF-PZ04
Stantec Project No: 175664011

Office Check of Vibrating Wire Piezometers

Pre-installation check to verify proper operation prior to installation by taking readings at water depths of 0 feet (atmospheric pressure) and 2 feet.

$P\ (psi) = AR^2+BR+C+K(T_1-T_0)-(S_1-S_0)$ Where: A,B, and C = Polynomial Gage Factors
R = Current digits reading
K = Thermal Factor
$(T_i - T_0)$ = Temp. at time of reading minus temp. at time of initial onsite reading
$(S_i - S_0)$ = Baro. pressure at time of reading minus initial onsite baro. pressure

Depth of Water for Office Check (ft): 0.7

Barometric Pressure at time of Office Check, S_1 & S_0: 30.04 inches Hg

VWP ID: KIF-BF-PZ04 H_w: 0 feet R_0: 8753.31 T: 21.3

Serial No.: 1500659 Office C: 130.0485

H_w: 0.725 feet R_i: 8737.3 T_i: 11.2 P = 0.79 feet H_2O

Pre-Installation Check Performed By: Matt Aplin (printed) (signature) Date: 2/18/2015 Time: 11:30

Field Zero of Vibrating Wire Piezometers

Barometric Pressure, S_0 = 29.98 inches Hg

VWP ID	Installed Depth, feet	Serial No.	Reading R_0 (digits)	Temp T (deg C)	New Field C psi
KIF-BF-PZ04	18.5	1500659	8755.1	13.9	130.0755

Field Zero Performed By: Matt Aplin (printed) (signature) Date: 3/18/2015 Time: 14:30

*Field Zero measurements should be performed after allowing the VWP tip to be exposed to the air (barometric pressure only) for a minimum of 15 minutes to allow all of the instrument components to equalize temperature.

Vibrating Wire Piezometer (VWP) Installation Notes and Details

Project Name: KIF Ballfield Piezometer Installation
Stantec Project No: 175664011
Boring Number: KIF-BF-PZ05

VWP Make and Model: Geokon 4500S
Pressure Range: 350 kPa
Installation Type: Open Standpipe X; Direct Bearing; Fully Grouted

Installation Crew: S. Bradford/L. Brandenburg
Inspector: **Matt Aplin**
Date: 3/18/2015
Drill Rig Model / #: CME 55

Piezometer:
Manufacturer: Geokon
Casing Type: None
Inside Diameter: N/A
Tip Type: Porous Stone

INSTALLATION CHECKLIST:

X	Office pressure check complete	X	Post-Installation pressure check complete
X	Field zero complete (See page 2)	N/A	Final sacrificial tape measurement (feet BGS)
X	Borehole flushed with clean water	X	Grout proportions recorded
X	Confirm BOH depth = 29.2 feet Below Ground Surface (BGS)		
X	Porous Filter Stone facing upward		
N/A	Attached sacrificial Tape		

Checklist Performed By: Matt Aplin (printed) Date: 3/18/2015

Checklist Performed By:  (signature) Time: 8:00

Vibrating Wire Piezometer Calibration Data

VWP ID	Anticipated Install Depth	Serial No.	Gage Factors from Factory Calibration Data Sheets: T_0 (°C)	S_0 (mbar)	R_0 (digits)	G (psi/digit)	A (psi/digit^2)	B (psi/digit)	C (psi)	K (psi / °C)
KIF-BF-PZ05	20.3	1500660	22.1	1000.1		-0.01599	-1.16E-09	-0.01598		0.008868

NOTES:

Vibrating Wire Piezometer (VWP) Installation Notes and Details

Project Name: KIF Ballfield Piezometer Installation
Boring Number: KIF-BF-PZ05
Stantec Project No: 175664011

Office Check of Vibrating Wire Piezometers

Pre-installation check to verify proper operation prior to installation by taking readings at water depths of 0 feet (atmospheric pressure) and 2 feet.

$P\ (psi) = AR^2+BR+C+K(T_1-T_0)-(S_1-S_0)$

Where: A,B, and C = Polynomial Gage Factors
R = Current digits reading
K = Thermal Factor
$(T_i - T_0)$ = Temp. at time of reading minus temp. at time of initial onsite reading
$(S_i - S_0)$ = Baro. pressure at time of reading minus initial onsite baro. pressure

Depth of Water for Office Check (ft): 0.7

Barometric Pressure at time of Office Check, S_1 & S_0: 30.04 inches Hg

VWP ID: KIF-BF-PZ05 H_w: 0 feet R_0: 8829.22 T: 13.4

Serial No.: 1500660 Office C: 141.1814

H_w: 0.725 feet R_i: 8810.2 T_i: 11.5 P = 0.66 feet H_2O

Pre-Installation Check Performed By: Matt Aplin (printed) (signature) Date: 2/18/2015 Time: 11:30

Field Zero of Vibrating Wire Piezometers

Barometric Pressure, S_0 = 29.98 inches Hg

VWP ID	Installed Depth, feet	Serial No.	Reading R_0 (digits)	Temp T (deg C)	New Field C psi
KIF-BF-PZ05	28.5	1500660	8828.6	8.8	141.1718

Field Zero Performed By: Matt Aplin (printed) (signature) Date: 3/18/2015 Time: 10:00

Vibrating Wire Piezometer (VWP) Installation Notes and Details

Project Name: KIF Ballfield Piezometer Installation
Stantec Project No: 175664011
Boring Number: KIF-BF-PZ06

VWP Make and Model: Geokon 4500S
Pressure Range: 350 kPa

Installation Type: Open Standpipe X; Direct Bearing; Fully Grouted

Installation Crew: M. Wethington/B. Jones
Inspector: **Matt Aplin**
Date: 2/25/2015
Drill Rig Model / #: CME 55

Piezometer:
Manufacturer: Geokon
Casing Type: None
Inside Diameter: N/A
Tip Type: Porous Stone

INSTALLATION CHECKLIST:

- X — Office pressure check complete
- X — Field zero complete (See page 2)
- X — Borehole flushed with clean water
- X — Confirm BOH depth = 19.5 feet Below Ground Surface (BGS)
- X — Porous Filter Stone facing upward
- N/A — Attached sacrificial Tape
- X — Post-Installation pressure check complete
- N/A — Final sacrificial tape measurement (feet BGS)
- X — Grout proportions recorded

Checklist Performed By: Matt Aplin (printed) Date: 2/25/2015

Checklist Performed By:  (signature) Time: 8:00

Vibrating Wire Piezometer Calibration Data

VWP ID	Anticipated Install Depth	Serial No.	Gage Factors from Factory Calibration Data Sheets: T_0 (°C)	S_0 (mbar)	R_0 (digits)	G (psi/digit)	A (psi/digit^2)	B (psi/digit)	C (psi)	K (psi / °C)
KIF-BF-PZ06	18	1500661	21.3	993.4		-0.01493	-3.23E-08	-0.01448		-0.003262

NOTES:

Vibrating Wire Piezometer (VWP) Installation Notes and Details

Project Name: KIF Ballfield Piezometer Installation
Boring Number: KIF-BF-PZ06
Stantec Project No: 175664011

Office Check of Vibrating Wire Piezometers

Pre-installation check to verify proper operation prior to installation by taking readings at water depths of 0 feet (atmospheric pressure) and 2 feet.

$P\ (psi) = AR^2+BR+C+K(T_1-T_0)-(S_1-S_0)$ Where: A,B, and C = Polynomial Gage Factors
R = Current digits reading
K = Thermal Factor
$(T_i - T_0)$ = Temp. at time of reading minus temp. at time of initial onsite reading
$(S_i - S_0)$ = Baro. pressure at time of reading minus initial onsite baro. pressure

Depth of Water for Office Check (ft): 0.7

Barometric Pressure at time of Office Check, S_1 & S_0: 30.04 inches Hg

VWP ID: KIF-BF-PZ06 H_w: 0 feet R_0: 8696.6 T: 21.3

Serial No.: 1500661 Office C: 128.3666

H_w: 0.725 feet R_i: 8675.4 T_i: 11.3 P = 0.81 feet H_2O

Pre-Installation Check Performed By: Matt Aplin (printed) (signature) Date: 2/18/2015 Time: 11:30

Field Zero of Vibrating Wire Piezometers

Barometric Pressure, S_0 = 30.03 inches Hg

VWP ID	Installed Depth, feet	Serial No.	Reading R_0 (digits)	Temp T (deg C)	New Field C psi
KIF-BF-PZ06	18	1500661	8696.6	2.8	128.3666

Field Zero Performed By: Matt Aplin (printed) (signature) Date: 2/25/2015 Time: 10:00

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Vibrating Wire Pressure Transducer Calibration Report

Model Number: 4500S-350 kPa

Serial Number: 1500621

Calibration Instruction: VW Pressure Transducers

Cable Length: 47 feet

Date of Calibration: February 06, 2015

This calibration has been verified/validated as of 02/12/2015

Temperature: 21.30 °C

Barometric Pressure: 993.4 mbar

Technician:

Applied Pressure (kPa)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Pressure (Linear)	Error Linear (%FS)	Calculated Pressure (Polynomial)	Error Polynomial (%FS)
0.0	8794	8794	8794	0.309	0.09	0.040	0.01
70.0	8117	8118	8118	69.89	-0.03	69.96	-0.01
140.0	7439	7439	7439	139.7	-0.09	139.9	-0.02
210.0	6757	6757	6757	209.8	-0.05	210.1	0.02
280.0	6075	6075	6075	280.0	-0.01	280.0	0.01
350.0	5392	5392	5392	350.2	0.07	350.0	-0.01

(kPa) Linear Gage Factor (G): -0.1029 **(kPa/ digit)**

Polynomial Gage factors: **A:** -1.839E-07 **B:** -0.1002 **C:**

Thermal Factor (K): -0.01196 **(kPa/ °C)**

Calculate C by setting P=0 and R_1 = initial field zero reading into the polynomial equation

(psi) Linear Gage Factor (G): -0.01492 **(psi/ digit)**

Polynomial Gage Factors: **A:** -2.667E-08 **B:** -0.01454 **C:**

Thermal Factor (K): -0.001735 **(psi/ °C)**

Calculate C by setting P=0 and R_1 = initial field zero reading into the polynomial equation

Calculated Pressures:

Linear, $P = G(R_1 - R_0) + K(T_1 - T_0) - (S_1 - S_0)^*$

Polynomial, $P = AR_1^2 + BR_1 + C + K(T_1 - T_0) - (S_1 - S_0)^*$

*Barometric pressures expressed in kPa or psi. Barometric compensation is not required with vented transducers.

Factory Zero Reading: 8790 **Temperature:** 22.2 °C **Barometer:** 1000.2 mbar

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Vibrating Wire Pressure Transducer Calibration Report

Model Number: 4500S-350 kPa

Serial Number: 1500657

Calibration Instruction: VW Pressure Transducers

Cable Length: 45 feet

Date of Calibration: February 09, 2015

This calibration has been verified/validated as of 02/12/2015

Temperature: 22.10 °C

Barometric Pressure: 1000.1 mbar

Technician:

Applied Pressure (kPa)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Pressure (Linear)	Error Linear (%FS)	Calculated Pressure (Polynomial)	Error Polynomial (%FS)
0.0	8607	8607	8607	0.000	0.00	-0.102	-0.03
70.0	7916	7917	7917	70.21	0.06	70.21	0.06
140.0	7231	7231	7231	139.9	-0.03	140.0	-0.01
210.0	6543	6543	6543	209.9	-0.04	209.9	-0.02
280.0	5854	5854	5854	279.9	-0.01	279.9	-0.01
350.0	5163	5163	5163	350.2	0.04	350.1	0.02

(kPa) Linear Gage Factor (G): -0.1017 (kPa/ digit)

Polynomial Gage factors: A: -5.531E-08 B: -0.1009 C:

Thermal Factor (K): -0.008886 (kPa/ °C)

Calculate C by setting P=0 and R_1 = initial field zero reading into the polynomial equation

(psi) Linear Gage Factor (G): -0.01475 (psi/ digit)

Polynomial Gage Factors: A: -8.023E-09 B: -0.01464 C:

Thermal Factor (K): -0.001289 (psi/ °C)

Calculate C by setting P=0 and R_1 = initial field zero reading into the polynomial equation

Calculated Pressures:

Linear, $P = G(R_1 - R_0) + K(T_1 - T_0) - (S_1 - S_0)$*

Polynomial, $P = AR_1^2 + BR_1 + C + K(T_1 - T_0) - (S_1 - S_0)$*

*Barometric pressures expressed in kPa or psi. Barometric compensation is not required with vented transducers.

Factory Zero Reading: 8602 Temperature: 22.0 °C Barometer: 1000.2 mbar

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St, Lebanon, NH 03766 USA

Vibrating Wire Pressure Transducer Calibration Report

Model Number: 4500S-350 kPa

Serial Number: 1500658

Calibration Instruction: VW Pressure Transducers

Cable Length: 54 feet

Date of Calibration: February 09, 2015

This calibration has been verified/validated as of 02/12/2015

Temperature: 22.10 °C

Barometric Pressure: 1000.1 mbar

Technician: KDRyan

Applied Pressure (kPa)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Pressure (Linear)	Error Linear (%FS)	Calculated Pressure (Polynomial)	Error Polynomial (%FS)
0.0	8817	8817	8817	0.103	0.03	-0.050	-0.01
70.0	8138	8138	8138	70.16	0.04	70.13	0.03
140.0	7462	7462	7462	139.9	-0.03	139.9	-0.02
210.0	6783	6784	6784	209.9	-0.02	209.9	-0.01
280.0	6104	6104	6104	280.0	0.01	280.0	0.01
350.0	5424	5424	5424	350.2	0.05	350.0	0.00

(kPa) Linear Gage Factor (G): -0.1032 **(kPa/ digit)**

Polynomial Gage factors: **A:** -6.799E-08 **B:** -0.1022 **C:**

Thermal Factor (K): -0.06771 **(kPa/ °C)**

Calculate C by setting P=0 and R_1 = initial field zero reading into the polynomial equation

(psi) Linear Gage Factor (G): -0.01496 **(psi/ digit)**

Polynomial Gage Factors: **A:** -9.861E-09 **B:** -0.01482 **C:**

Thermal Factor (K): -0.009821 **(psi/ °C)**

Calculate C by setting P=0 and R_1 = initial field zero reading into the polynomial equation

Calculated Pressures:

Linear, $P = G(R_1 - R_0) + K(T_1 - T_0) - (S_1 - S_0)^*$

Polynomial, $P = AR_1^2 + BR_1 + C + K(T_1 - T_0) - (S_1 - S_0)^*$

*Barometric pressures expressed in kPa or psi. Barometric compensation is not required with vented transducers.

Factory Zero Reading: 8816 **Temperature:** 21.4 °C **Barometer:** 1000.2 mbar

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Vibrating Wire Pressure Transducer Calibration Report

Model Number: 4500S-350 kPa

Serial Number: 1500659

Calibration Instruction: VW Pressure Transducers

Cable Length: 44 feet

Date of Calibration: February 09, 2015

This calibration has been verified/validated as of 02/12/2015

Temperature: 22.10 °C

Barometric Pressure: 1000.1 mbar

Technician: KD Rogers

Applied Pressure (kPa)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Pressure (Linear)	Error Linear (%FS)	Calculated Pressure (Polynomial)	Error Polynomial (%FS)
0.0	8745	8746	8746	0.363	0.10	-0.025	-0.01
70.0	8073	8074	8074	70.06	0.01	70.11	0.03
140.0	7403	7403	7403	139.6	-0.12	139.9	-0.04
210.0	6726	6727	6727	209.8	-0.07	210.0	0.01
280.0	6050	6050	6050	279.9	-0.01	280.0	0.00
350.0	5370	5371	5371	350.4	0.11	350.0	0.00

(kPa) Linear Gage Factor (G): -0.1037 (kPa/ digit)

Polynomial Gage factors: A: -2.419E-07 B: -0.1003 C:

Thermal Factor (K): -0.06940 (kPa/ °C)

Calculate C by setting P=0 and R_1 = initial field zero reading into the polynomial equation

(psi) Linear Gage Factor (G): -0.01504 (psi/ digit)

Polynomial Gage Factors: A: -3.508E-08 B: -0.01455 C:

Thermal Factor (K): -0.01007 (psi/ °C)

Calculate C by setting P=0 and R_1 = initial field zero reading into the polynomial equation

Calculated Pressures:

Linear, $P = G(R_1 - R_0) + K(T_1 - T_0) - (S_1 - S_0)$*

Polynomial, $P = AR_1^2 + BR_1 + C + K(T_1 - T_0) - (S_1 - S_0)$*

*Barometric pressures expressed in kPa or psi. Barometric compensation is not required with vented transducers.

Factory Zero Reading: 8746 Temperature: 21.7 °C Barometer: 1000.2 mbar

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St. Lebanon, NH 03766 USA

Vibrating Wire Pressure Transducer Calibration Report

Model Number: 4500S-350 kPa

Serial Number: 1500660

Calibration Instruction: VW Pressure Transducers

Cable Length: 45 feet

Date of Calibration: February 09, 2015

This calibration has been verified/validated as of 02/12/2015

Temperature: 22.10 °C

Barometric Pressure: 1000.1 mbar

Technician:

Applied Pressure (kPa)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Pressure (Linear)	Error Linear (%FS)	Calculated Pressure (Polynomial)	Error Polynomial (%FS)
0.0	8816	8816	8816	0.000	0.00	0.019	0.01
70.0	8181	8182	8182	69.97	-0.01	70.00	0.00
140.0	7547	7547	7547	139.9	-0.02	140.0	-0.01
210.0	6912	6913	6913	209.9	-0.03	209.9	-0.01
280.0	6276	6277	6277	280.0	0.02	280.1	0.03
350.0	5642	5643	5643	349.9	-0.02	350.0	-0.01

(kPa) Linear Gage Factor (G): -0.1103 (kPa/ digit)

Polynomial Gage factors: A: -8.002E-09 B: -0.1102 C:

Thermal Factor (K): 0.06114 (kPa/ °C)

Calculate C by setting P=0 and R_1 = initial field zero reading into the polynomial equation

(psi) Linear Gage Factor (G): -0.01599 (psi/ digit)

Polynomial Gage Factors: A: -1.161E-09 B: -0.01598 C:

Thermal Factor (K): 0.008868 (psi/ °C)

Calculate C by setting P=0 and R_1 = initial field zero reading into the polynomial equation

Calculated Pressures:

Linear, $P = G(R_1 - R_0) + K(T_1 - T_0) - (S_1 - S_0)$*

Polynomial, $P = AR_1^2 + BR_1 + C + K(T_1 - T_0) - (S_1 - S_0)$*

*Barometric pressures expressed in kPa or psi. Barometric compensation is not required with vented transducers.

Factory Zero Reading: 8815 Temperature: 21.8 °C Barometer: 1000.2 mbar

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.

GEOKON 48 Spencer St, Lebanon, NH 03766 USA

Vibrating Wire Pressure Transducer Calibration Report

Model Number: 4500S-350 kPa

Serial Number: 1500661

Calibration Instruction: VW Pressure Transducers

Cable Length: 43 feet

Date of Calibration: February 09, 2015

This calibration has been verified/validated as of 02/12/2015

Temperature: 22.10 °C

Barometric Pressure: 1000.1 mbar

Technician: KRogers

Applied Pressure (kPa)	Gage Reading 1st Cycle	Gage Reading 2nd Cycle	Average Gage Reading	Calculated Pressure (Linear)	Error Linear (%FS)	Calculated Pressure (Polynomial)	Error Polynomial (%FS)
0.0	8690	8690	8690	0.206	0.06	-0.105	-0.03
70.0	8011	8011	8011	70.09	0.02	70.20	0.05
140.0	7334	7335	7335	139.7	-0.08	140.0	0.01
210.0	6656	6657	6657	209.5	-0.14	209.8	-0.05
280.0	5973	5973	5973	279.9	-0.03	280.0	0.00
350.0	5288	5288	5288	350.4	0.10	350.1	0.01

(kPa) Linear Gage Factor (G): -0.1029 **(kPa/ digit)**

Polynomial Gage factors: **A:** -2.224E-07 **B:** -0.09982 **C:**

Thermal Factor (K): -0.02249 **(kPa/ °C)**

Calculate C by setting P=0 and R_1 = initial field zero reading into the polynomial equation

(psi) Linear Gage Factor (G): -0.01493 **(psi/ digit)**

Polynomial Gage Factors: **A:** -3.226E-08 **B:** -0.01448 **C:**

Thermal Factor (K): -0.003262 **(psi/ °C)**

Calculate C by setting P=0 and R_1 = initial field zero reading into the polynomial equation

Calculated Pressures:

Linear, $P = G(R_1 - R_0) + K(T_1 - T_0) - (S_1 - S_0)^*$

Polynomial, $P = AR_1^2 + BR_1 + C + K(T_1 - T_0) - (S_1 - S_0)^*$

*Barometric pressures expressed in kPa or psi. Barometric compensation is not required with vented transducers.

Factory Zero Reading: 8687 **Temperature:** 22.2 °C **Barometer:** 1000.2 mbar

The above instrument was found to be in tolerance in all operating ranges.
The above named instrument has been calibrated by comparison with standards traceable to the NIST, in compliance with ANSI Z540-1.