

GENERAL REQUIREMENTS FOR SUBSURFACE INVESTIGATION AND GEOTECHNICAL SUBMITTALS

This document is intended to be used as supplemental requirement to provisions in WSSC’s pipe line design manual.

a. General Requirements

1. All geotechnical investigations shall be planned and performed under the direct supervision of a Professional Geotechnical Engineer registered in the State of Maryland with a minimum of five (5) years’ experience in the performance and supervision of geotechnical engineering projects. All field and laboratory test data report shall be reviewed and verified by the Geotechnical Engineer.
2. Determine the coordinate location, station and offset from baselines as shown on the Plans, and ground surface elevation, for each boring and other test probes and show the information on the individual logs. Refer to (d) “General Guidelines and Checklist for Subsurface Investigations”.
3. Visual soil identification as reported on the boring logs shall be in accordance with ASTM D-2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). For description for soil samples with laboratory test results, the description shall also include Unified Soil Classification System (USCS).
4. Final boring and rock core logs shall be prepared and submitted using gINT software as supplied by Bentley Systems, Inc. Boring and test pit logs shall use WSSC’s Standard letter size boring and test pit log forms. Use the latest versions of gINT library, data templates and files available on WSSC’s website. See (f) “Example WSSC gINT reports.”
5. The Commission may request to inspect soil and rock samples obtained by the consultant.
6. The Geotechnical Engineer shall determine groundwater table depth/elevation and seepage conditions at the project site.
7. All drilling equipment and Standard Penetration Test (SPT) apparatus used for WSSC projects should be calibrated per ASTM D 4633 within the last two years of drilling date. Hammer energy efficiency shall be recorded on all boring logs for each drilling rig/SPT apparatus used.
8. All laboratory testing shall be performed by laboratories with AASHTO Materials Reference Laboratory (AMRL) certification for each specific test performed.

b. Geotechnical Reports

All geotechnical reports (draft, interim or final) shall be prepared, signed and sealed by a professional geotechnical engineer registered in the State of Maryland. All relevant design calculations and computer program results should be checked and initialed by the Geotechnical Engineer. The Geotechnical Engineer must certify all data. Geotechnical Reports shall include the following items at a minimum as applicable:

1. Project contract number, description and scope,
2. A detailed description of geological and subsurface conditions for each Project element (including a description of site stratigraphy);



3. Field investigation procedures;
4. A description of groundwater conditions and if ground water impacts the construction, means of dewatering and/or other solutions;
5. Complete discussions of all geotechnical analyses and design including interpretation and analysis of the subsurface data and values assigned to all applicable soil parameters for design;
6. Conclusions and recommendations for foundation types for structures, fill and cut slopes, retaining walls, ground improvement, requirements for backfill materials;
7. Pipe lines: Corrosion evaluation for pipes (as applicable), special construction requirements, backfill and bedding material, thrust restraint calculations.
8. Foundations: Shallow foundations calculations including allowable bearing capacity, estimated differential and total settlements, and rotations. If deep foundations are proposed, individual pile and pile group design calculations including axial and lateral capacity for the pile type, size, and length to achieve the required capacities (including any effects of liquefaction and down drag); estimated pile and pile group settlement;
9. Retaining Walls: Wall design calculations including the results of the global and internal stability analyses; analyses of total, differential, and secondary settlements; and, calculations for analyses of sliding, overturning, and bearing pressure for live and seismic loadings;
10. Cut/fill slopes: The results of the slope stability analyses, including external loading from live and seismic loading, the recommended side-slopes of all slopes and the search limits and the most critical failure surface should be highlighted; input and output files should be included. For fill slopes (if applicable), results of settlement analyses, including predictions of the magnitude and duration of primary, secondary, and post-construction settlements. Evaluation of rock cut slopes shall clearly describe the rock bedding characteristics, including strike and dip and a detailed description of the analysis completed to assure stability.
11. Potential settlement, bearing capacity, stability or other geotechnical problems and analysis results;
12. Plans, cross sections and Geotechnical soil profiles analyzed
13. Locations plan and results of borings, test pits, rock coring, in-situ, laboratory test results and other pertinent geotechnical tests;
14. Copies of any other geotechnical report referenced/referred in the report;
15. Specific engineering recommendations for design;
16. Recommended geotechnical special provisions;
17. Limitation of Geotechnical investigation and recommendations

c. Electronic Submittals

1. Submit Geotechnical reports (interim/draft/final) in pdf format. The reports should be signed and sealed by the Geotechnical engineer of record for the project. The report should include the minimum items listed in the section above as applicable.
2. Submit final borings, test pits and applicable laboratory data in gINT format. The final gINT data should be the same as the data contained in the final Geotechnical report. Use the latest versions of gINT library, template and project files available on the WSSC website. Final gINT file shall include applicable laboratory and soil corrosion test results.



d. General Guidelines and Checklist for Subsurface Investigations

Purpose: The purpose of the following check list is to ensure that consistent geotechnical test data is collected for all WSSC projects. The items contained in the following check list should only be considered as a minimum. Detailed investigation requirements shall be set based on the project design and construction requirements. The project Geotechnical consultant should make sure all data included in the test logs are collected in accordance with the applicable ASTM standards.

Applicable to: Boreholes, Test pits, Cone Penetration Tests, Flat Dilatometer Tests

No.	CHECK LIST ITEMS	YES	NO	N/A	REMARK
1	General				
1.1	Record names of the project prime consultant, and geotechnical consultant/contractor on all test logs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.2	Record Contract No. and Project description on all test logs consistent with project plans.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.3	Record start and finish dates of tests on all logs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
1.4	Use consistent test identifications or designations. See examples below.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	* BH - Bore Hole (BH-1, BH-2.....)				
	* TP - Test Pit (TP-1, TP-2.....)				
	* CPT - Cone Penetration Test (CPT-1, CPT-2....)				
	* DMT - Dilatometer Test (DMT-1, DMT-2.....)				
* MW - Ground Water Monitoring Well (MW-1,...)					
1.5	Refer to ASTM D 5434 for general information that should be recorded during field subsurface explorations in soil and rock.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2	Test location and depth				
2.1	Record survey stations and offsets of all test locations on logs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.2	Record coordinates (Easting & Northing) of all test locations. Refer to WSSC Pipe design manual, Appendix D for coordinate system.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.3	Measure and record surface elevations of all test locations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.4	If tests are relocated by more than 5 ft. in any direction from their original location, record new coordinates elevations and reasons for relocation.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.5	Measure and record depth of bottom of test locations.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
2.6	Record any cave-in depths and time of cave-in (applicable to boreholes and test pits).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3	Drilling Equipment - Applicable to Boreholes				
3.1	Record the type of rig used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.2	Record the weight of standard penetration test (SPT) Hammer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



No.	CHECK LIST ITEMS	YES	NO	N/A	REMARK
3.3	Record casing auger size.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.4	Record size of core.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.5	Record size of drilling.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.6	Record SPT hammer efficiency as calibrated per ASTM D 4633 within the last 2 years of drilling date.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
3.7	Record the type of core barrel used.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4	Soil Sampling - Applicable for Boreholes /Test Pits				
4.1	Visual description of soil samples should be per ASTM D 2488.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.2	Make sure boreholes/test pits are clean prior to taking samples.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.3	Perform Standard Penetration Testing (SPT) per ASTM 1586.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.4	Disturbed soil samples : * Split spoon samples - follow ASTM D 1586	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.5	Undisturbed Soil Samples: * Thin wall tube samples - follow ASTM D 1587	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	* Piston samples - follow ASTM D 6519				
	* Block samples - follow ASTM D 4220				
4.6	Measure and record sample recovery.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.7	Use moisture proof containers to place samples per ASTM 4220.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
4.8	Label, transport and store samples per ASTM 4220.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5	Rock Sampling - Applicable to Boreholes				
5.1	Follow ASTM D 2113 for rock core drilling and sampling.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.2	Rock core specimens should be extracted, handled, placed and labeled per ASTM 5079.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.3	Mark and identify rock core breaks per ASTM 5079.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.4	Calculate and record percent recovery per ASTM D 2113.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.5	Record any loss of circulating water and addition of extra drilling water during rock coring.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
5.6	Calculate and record Rock Quality Designation (RQD) per ASTM D 6032.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6	Ground water level				
6.1	Record ground water level at the completion of drilling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
6.2	Record ground water level after stabilizing (24 hr)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



No.	CHECK LIST ITEMS	YES	NO	N/A	REMARK
6.3	Record any artesian ground water condition observed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7	Observations				
7.1	Record any obstructions encountered during drilling as remark.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7.2	Record loss of circulating water and addition of extra drilling water during rock coring.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7.3	Record any procedures used for maintaining an open bore hole.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
7.4	Record or note any difficulties during drilling (coring, boulders, surging or rise of sands in casing, and cavers).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8	Electronic Log submittal - Applicable to Boreholes and Test pits				
8.1	Use WSSC standard boring or test pit log format for reporting final boring logs. A gINT library and project files are provided for use. Use latest version of gINT library and project files available on WSSC's website.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8.2	Include laboratory index soil tests (natural moisture content, liquid limit and plasticity index) and soil corrosion tests on final gINT files.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
8.3	Submit final gINT log files with the project geotechnical report	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9	Cone Penetration Test (CPT)				
9.1	Perform Test per ASTM D 5778 and ASTM D 3441 as applicable.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9.2	Data to be collected includes corrected tip resistance, side friction and pore water pressure.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9.3	With the final geotechnical report, provide CPT test data in excel/spreadsheets.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
9.4	Provide CPT log reports in pdf format.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10	Flat Dilatometer Test (DMT)				
10.1	Perform Test per ASTM D 6635.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10.2	Data to be collected should at least include A, B, & C readings, and thrust force, depths (elevations).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10.3	Report test data in graphical and tabulated format and include at least an interpretation of the soil behavior type, Dilatometer Modulus (Ed), Material Index (Id), Horizontal Stress Index (Kd), Pore pressure Index (Ud).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
10.4	With the final geotechnical report, provide DMT test data in excel/spreadsheets format.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	



e. Commonly used ASTM Standards for Subsurface Investigation

No.	ASTM Standard	Title
1	ASTM D 1586	Standard Penetration Test (SPT) and split barrel sampling of soils
2	ASTM D 1587	Practice for thin walled tube sampling of soils
3	ASTM D 2113	Practice for diamond core drilling for soil investigation
4	ASTM D 2488	Practice for description and identification of soils (Visual-Manual Procedure)
5	ASTM D 2487	Classification of Soils for Engineering Purposes (USCS)
6	ASTM D 3441	Mechanical Cone Penetration Tests of Soil
7	ASTM D 4220	Practice for preserving and transporting soil samples
8	ASTM D 4633	Energy Measurement for Dynamic Penetrometers
9	ASTM D 4750	Test method for determining subsurface liquid levels in a borehole or monitoring well (Observation well)
10	ASTM D 5079	Practice for preserving and transporting rock samples
11	ASTM D 5092	Design and installation of ground water monitoring wells in aquifers
12	ASTM D 5778	Test Method for electronic cone penetration testing (CPT) of soils
13	ASTM D 6032	Determining Rock Quality Designation (RQD) of Rock Core
14	ASTM D 6519	Sampling of Soil Using the Hydraulically Operated Stationary Piston Sampler
15	ASTM D 6635	Performing the Flat Plate Dilatometer
16	ASTM D 4719	Standard Test Methods for Prebored Pressuremeter Testing in Soils

f. Example WSSC gINT reports

- 1) Form No. TSG/GEO/01: WSSC Standard boring log
- 2) Form No. TSG/GEO/02: WSSC Standard Test Pit log
- 3) Form No. TSG/GEO/03: Soil Corrosivity Test Summary for Metallic Pipes



WASHINGTON SUBURBAN SANITARY COMMISSION STANDARD BORING LOG



Sheet 1 of 1

Boring 1 of 8

Contract No. BA123A51 **Project Description** Example Pipe Line Project

Consultant XYZ Consultants **Geotech Consultant/Contractor** EFG Geo Consult.

Boring No. BH-1 **Station** 449+00 120 L **Ground Surface Elevation** 481.9 ft

Easting 526453 **Northing** 1295426 **Logged by** M.M

Date Started 7/24/06 **Date Completed** 7/24/06

Inspector M.M **Driller** M. Smith

Rig Type	Rubber Tire ATV
Rig No.	CME 750
Drive Hammer	140 LB
Casing Auger Size	3.25 IN
Size of Core	1.875 IN
Size of Bit OD	2.98 IN
Hammer Energy Ratio	65 %
Auger Depth	35 FT

WATER TABLE

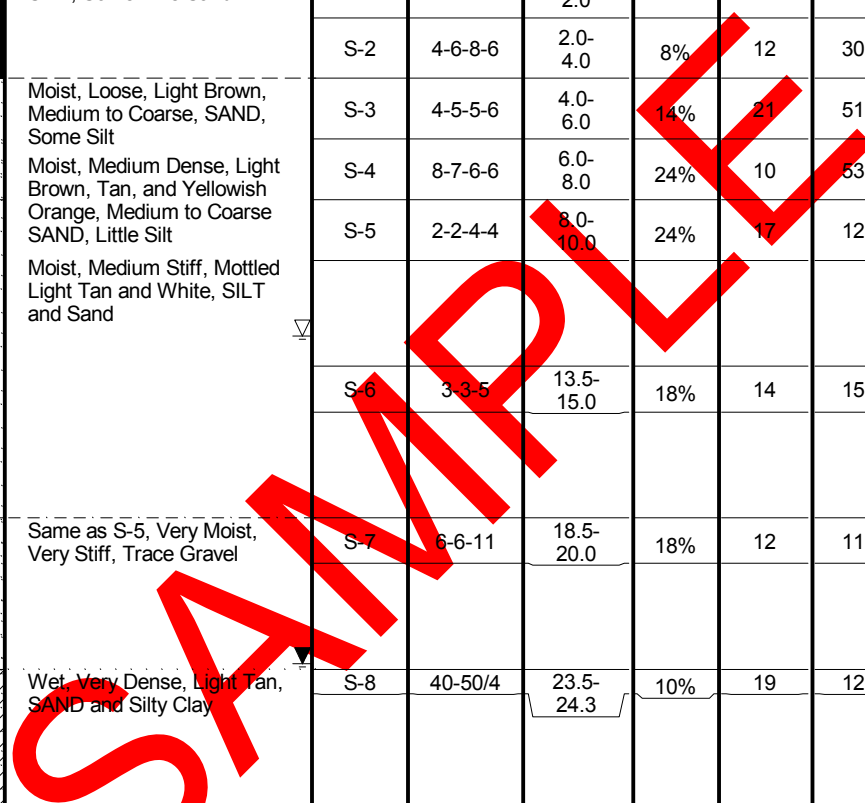
Depth Below Surface	Elev (ft)	Time (hours)	Date
▼ 23.3	458.6	0	7/24/06
▽ 12.5	469.4	24	7/25/06

CAVE-IN TABLE

Depth Below Surface	Elev (ft)	Time (hours)	Date
☒ 10.0	471.9	0 hr	7/24/07
☒ 15.0	466.9	24 hr	7/25/07

WSSC STANDARD BORING LOG (LETTER SIZE) / WSSC_TEMPLATE.GDT / EXAMPLE PIPE LINE PROJECT.GPJ - 9/30/15

DEPTH IN FEET	ELEV. IN FEET	MATL	MATERIAL DESCRIPTION	SPT SPOON/ROCK CORE			REC (%)	LAB. INDEX TESTS			REMARKS
				SAMPLE NO.	BLOWS/RQD	SAMPLE DEPTH		NMC (%)	LL (%)	PI (%)	
4.0	477.90		Moist, Medium Stiff, Tan, SILT, Some Fine Sand	S-1	3-4-4-5	0.0-2.0	11%	20	50	12	4" Topsoil
				S-2	4-6-8-6	2.0-4.0	8%	12	30	21	
8.0	473.90		Moist, Loose, Light Brown, Medium to Coarse, SAND, Some Silt	S-3	4-5-5-6	4.0-6.0	14%	21	51	10	
				S-4	8-7-6-6	6.0-8.0	24%	10	53	12	
				S-5	2-2-4-4	8.0-10.0	24%	17	12	11	
18.5	463.40		Moist, Medium Stiff, Mottled Light Tan and White, SILT and Sand	▼							
				S-6	3-3-5	13.5-15.0	18%	14	15	2	
23.5	458.40		Same as S-5, Very Moist, Very Stiff, Trace Gravel	S-7	6-6-11	18.5-20.0	18%	12	11	3	
28.5	453.40		Wet, Very Dense, Light Tan, SAND and Silty Clay	S-8	40-50/4	23.5-24.3	10%	19	12	3	
33.5	448.40		Moist, Very Dense, Mottled Light Tan and White, SAND, Little Silt	S-9	50/4	28.5-28.8	4%		24	14	
35.0	446.90		Moist, Dense, Mottled Light Tan and White, Fine to Medium SAND, Trace Silt	S-10	24-22-26	33.5-35.0	15%				Caved in at 32.2'.



Legend: NMC - Natural Moisture Content PI - Plasticity Index REC - Recovery MATL - Material Graphics SPT - Standard Penetration Test
 RQD - Rock Quality Designation LL - Liquid Limit Elev - Elevation Geotech - Geotechnical OD - Outside Diameter

Boring and Sampling
Conforms to ASTM/AASHTO:
T-206

WASHINGTON SUBURBAN SANITARY COMMISSION STANDARD TEST PIT LOG



Sheet 1 of 1

Boring of 8

Contract No. BA123A51 Project Description Example Pipe Line Project

Consultant XYZ Consultants Geotech Consultant/Contractor EFG Geo Consult.

Test Pit No. TP-1 Station 474+00 110 R Ground Surface Elevation 452.3 ft

Easting 524513 Northing 1297010

Date Started 8/9/07 Date Completed 8/9/07

Inspector Larry M Logged by Larry. M

WATER TABLE

Depth Below Surface		Time (hours)	Date
Depth (ft)	Elev (ft)		
8.0	444.3	0	8/9/07
7.0	445.3	0	8/9/07

DEPTH IN FEET	ELEV. IN FEET	MATL	MATERIAL DESCRIPTION	BAG/BLOCK SAMPLE		LAB. INDEX TESTS			REMARKS
				SAMPLE NO.	SAMPLE DEPTH	NMC (%)	LL (%)	PI (%)	
2.0	450.30		Dry, Medium Stiff, Reddish Brown, SILT, Trace Fine Sand (a-4)						
4.0	448.30		Same as S-1, Stiff, Little Quartz Gravel, Trace Organics (a-4)	1	2.0-4.0	30	40	10	
6.0	446.30		Same as S-1, Stiff, Trace Clay (a-4)						
10.0	442.30		Dry, Stiff, Orangish Tan, Micaceous SILT, Trace Fine Gravel, Trace Fine Sand (a-4)						Water encountered 6'

SAMPLE

WSSC STANDARD TESTPIT LOG (LETTER SIZE) / WSSC_TEMPLATE.GDT / EXAMPLE PIPE LINE PROJECT.GPJ - 9/30/15

WASHINGTON SUBURBAN SANITARY COMMISSION SOIL CORROSION POTENTIAL FOR METALLIC PIPES



Sheet 1 of 1

Contract No. BA123 **Project Description** Example Pipe Line Project
Consultant XYZ Consultants **Testing Company** ABBC INC.
Checked by Bill K. **Tested by** Michael A
Date reported 11/11/2015 **Pipe sizes** 20 in, 24 in

SOIL CORROSION POTENTIAL EVALUATION FOR METALLIC PIPES														
Boring/Test Pit ID	Depth (ft)	Resistivity, ohms-cm		PH		Redox Potential, millivolt		Chloride Content, ppm		Soil Sample Description		Sum of Points	Ground water @ sample depth?	Soil Corrosivity
		Results	Points	Results	Points	Results	Points	Results	Points	Results	Points			
BH-1	5 - 7	6	10	7	0	65	3.5	9000	10	Clay(Blue-Gray)	10	33.5	Yes	Severe
BH-1	8 - 9	6	10	3	3	-2	5	2000	10	Clean Sand	0	28	Yes	Severe
BH-1	9 - 12	500	10	2	5	200	0	2000	10	Clay/Stone	5	30	No	Severe
BH-1	15 - 20	600	10	4	3	-50	5	600	6	Clay	3	27	No	Severe
BH-1	20 - 22	50	10	9	3	100	3.5	8000	10	Clay/Stone	5	31.5	No	Severe
BH-1	23 - 24	100	10	6	0	-20	5	5000	10	Clay(Blue-Gray)	10	35	Yes	Severe
BH-1	26 - 27	500	10	2	5	200	0	600	6	Silt	2	23	Yes	Severe
BH-1	28 - 30	200	10	9	3	-20	5	10000	10	Clay(Blue-Gray)	10	38	Yes	Severe
BH-1	30 - 32	1000	8	2	5	-51	5	8000	10	Clay/Stone	5	33	No	Severe
BH-1	32 - 35	2000	6	5	0	75	3.5	30	0	Clay(Blue-Gray)	10	19.5	Yes	Severe
BH-2	4 - 6	5000	4	6	0	400	0	200	4	Clean Sand	0	8	Yes	Moderate
BH-2	8 - 12	2000	6	4	3	-100	5	100	2	Clean Sand	0	16	No	Severe
BH-2	10 - 15	6000	2	2	5	200	0	50	2	Clay/Stone	5	14	No	Appreciable
BH-2	20 - 25	10000	0	3.5	3	-50	5	62	2	Silt	2	12	No	Appreciable
BH-2	26 - 28	1000	8	3	3	100	3.5	70	2	Clean Sand	0	16.5	Yes	Severe
BH-2	29 - 30	10000	0	8	0	300	0	60	2	Clean Sand	0	2	Yes	Mild
BH-2	31 - 32	500	10	3	3	-50	5	60	2	Clean Sand	0	20	No	Severe
BH-2	33 - 35	8000	2	6	0	-90	5	60	2	Clay(Blue-Gray)	10	19	Yes	Severe
BH-2	35 - 36	2000	6	2	5	200	0	100	2	Clay/Stone	5	18	Yes	Severe
BH-3	2 - 4	1200	8	5	0	10	4	300	4	Clay(Blue-Gray)	10	26	Yes	Severe

RANKING SYSTEM FOR CORROSION (Table 30: "Soil Condition Analysis" WSSC's Pipe Design Manual,2008)									
Resistivity(Ohms-cm)	Points	PH	Points	Redox Potential (Mill Volt)	Points	Chloride Content (ppm)	Points	Soil Sample Description	Points
< 1,000	10	0.0 - 2.0	5	Negative	5	> 1,000	10	Clay (Blue-Gray)	10
1,000 - 1,500	8	2.0 - 4.0	3	0 - 50	4	500 - 1,000	6	Clay/Stone	5
1,500 - 2,500	6	4.0 - 8.5	0	50 - 100	3.5	200 - 500	4	Clay	3
2,500 - 5,000	4	> 8.5	3	> 100	0	50 - 200	2	Silt	2
5,000 - 10,000	2					0 - 50	0	Clean Sand	0
> 10,000	0								

OVERALL CORROSION RATING (Table 31)	
SOIL CORROSION	TOTAL POINTS
Severe	> 15.5
Appreciable	10.0 - 15.5
Moderate	5.0 - 9.5
Mild	0 - 4.5