

# GEOSCIENCE

Project: RBF/MPWSP  
Monitoring Well  
Project No.: 13027-14

## LOG OF BORING

SHEET 1 OF 12

Location	MW-8 DOGP	Date(s) Drilled	4-14-2015	Drilling Contractor	CASCADE	Bearing (Azimuth)
Ground Surface Elevation (ft)		Logged by	AZAD KHALIGHI	Drill Rig Type	ProSonic Goot	Plunge (Degrees) Vert
Horizontal/Vertical Datum		Reviewed by		Borehole Diameter (in)		Total Depth (ft)

### CONFIDENTIAL DRAFT

Subject to Revision

#### MATERIAL DESCRIPTION

SOIL COLOR

Depth (ft)	Notes	Penetration (Graphic)	Type and No.	Blows per 6 in.	Penetration (in)	Recovery (in)	Geologic Unit	Material Description	Soil Color
0								TOP SOIL w/ VEGETATION	
1									
2									
3									
4			SP					SAND w/ TRACE SILT; 95% SAND + 5% SILT; F-C SAND; POORLY GRADED; SUBANG-SUBRND; UNCONSOLIDATED; QFA; MOIST.	10YR 3/2 Very Dark Brown
5									
6									
7									
8									
9			SP					SAND w/ SILT; 90% SAND + 10% SILT; F-C SAND; POORLY GRADED; SUBANG-SUBRND; UNCONSOLIDATED; QFA; SATURATED.	10YR 6/2 BROWNISH YELLOW
10									
11			SP					SAND w/ SILT; 90% SAND + 10% SILT; F-C SAND; POORLY GRADED; SUBANG-SUBRND; UNCONSOLIDATED; QFA; SATURATED.	10YL 5/4 YELLOWISH BROWN
12									
13									
14			SP					SAND w/ SILT & TRACE GRAVEL; 85% SAND + 10% SILT + 5% GRAVEL; F-C SAND & GRAVEL; SUBANG-SUBRND; QFA; SATURATED.	75YR 3/4 DARK BROWN
15									
16			SW					GRAVELLY SAND w/ SILT & TRACE COBBLES; 60% SAND + 20% GRAN 15%; SILT + 5% COBBLES; F-C SAND + F. GRAVEL; SUBANG-SUBRND SAND; RND GRAVEL COBBLES; UNCONSOLIDATED; QFA; GRAVELLY SAND w/ TRACE COBBLES; SATURATED.	10YR 3/6 DARK YELLOWSH BROWN
17									
18			SP					COBBLES; 65% SAND + 30% GRAVEL + 5% COBBLES; F-C SAND; F GRAVEL; SUBANG-SUBRND SAND; RND GRAVEL; SAND w/ QFA; IGNEOUS ROCK COBBLES; SATURATED	10YR 5/4 YELLOWISH BROWN
19									
20			SP					GRAVEL & TRACE COBBLES; 85% SAND + 10% GRAVEL + 5% COB; F-C SAND & F. GRAVEL; POORLY GRADED; SUBANG-SUBRND SAND; SUBRND-RND COBBLES; UNCONSOLIDATED; QFA; IGNEOUS & SEDIMENTARY ROCK COBBLES;	2.5Y 5/6 LIGHT OLIVE BROWN
21									
22									
23			SP					SAND w/ TRACE COBBLES; 95% SAND + 5% COBB; F-C SAND; POORLY GRADED; SUBANG-SUBRND SAND; RND COBBLES; UNCONSOLIDATED; QFA; IGNEOUS & SEDIMENTARY ROCK COBBLES; Wet	2.5Y 6/4 LIGHT YELLOWISH BROWN
24									
25									
26									
27			SP					SAND; 100% SAND; M-C GRAINED; POORLY GRADED; SUBANG-SUBRND; UNCONSOLIDATED; QFA; SATURATED.	2.5Y 6/4 LIGHT YELLOWISH BROWN
28									
29			SP					SEE BELOW.	SEE BELOW
30									

HAND AUGER FORM  
0'-6' BGS

16'-6' Core

26'-26'

26.5'

8'  
9.4'  
14'  
15'  
17'  
19'  
21'

26.5'  
28.5'

# GEOSCIENCE

Project: RBF/MPWSP  
Exploratory Boreholes  
Project No.: 13017-13

## LOG OF BORING

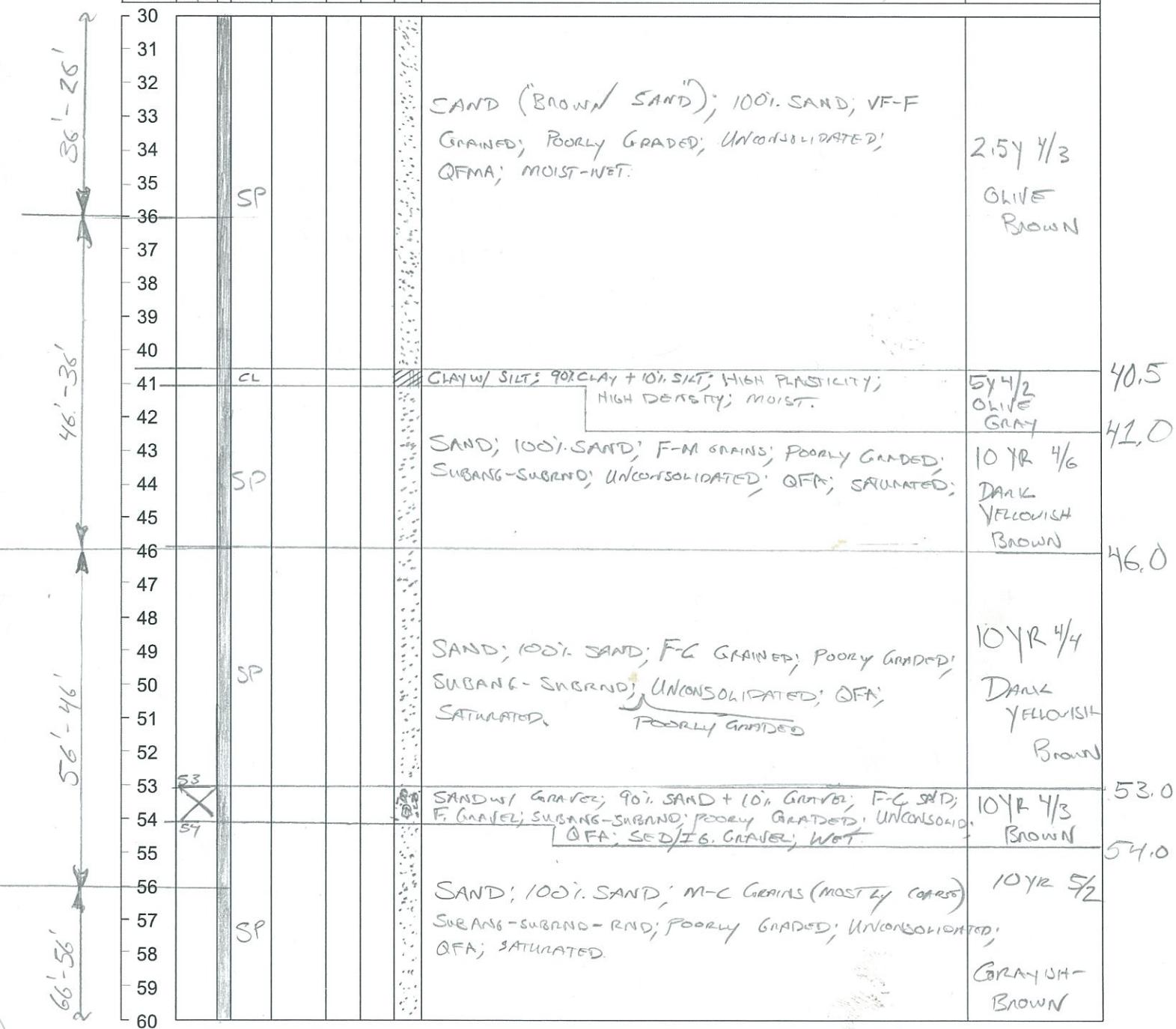
SHEET 2 OF 12

Location MW - 8D		Date(s) Drilled 4/16	Drilling Contractor Cascade Drilling	Bearing (Azimuth)	
Ground Surface Elevation (ft)		Logged by	Drill Rig Type	Plunge (Degrees) Vert	
Horizontal/Vertical Datum		Reviewed by	Borehole Diameter (in)	Total Depth (ft)	
Depth (ft)	Notes - M.G.	Sample Information	Geologic Unit	SOIL COLOR	
Penetration (Graphic)	Type and No.	Blows per 6 in.	Penetration (in)	Recovery (in)	Material Description

### CONFIDENTIAL DRAFT

Subject to Revision

#### MATERIAL DESCRIPTION



# GEOSCIENCE

Project: RBF/MPWSP  
Exploratory Boreholes  
Project No.: 13017-13

## LOG OF BORING

SHEET 3 OF 12

Location	MW-8D	Date(s) Drilled	4/14/15 - 4/15/15	Drilling Contractor	Cascade Drilling	Bearing (Azimuth)
Ground Surface Elevation (ft)		Logged by	AZAD KHALIGHI	Drill Rig Type	Pro Sonic 600T	Plunge (Degrees) Vert
Horizontal/Vertical Datum		Reviewed by		Borehole Diameter (in)		Total Depth (ft)

### CONFIDENTIAL DRAFT

Subject to Revision

#### MATERIAL DESCRIPTION

SOIL COLOR

Depth (ft)	Notes	Sample Information						
		Penetration (Graph)	Type and No.	Blows per 6 in.	Penetration (in)	Recovery (in)	Geologic Unit	
60	G1							
61	X							
62	62	SP						SEE ABOVE
63								
64								
65								
66								
67								
68								
69								
70								
71								
72	X							
73	72	SP						
74								
75								
76								
77								
78								
79								
80								
81	X							
82	81	SP						
83								
84								
85								
86								
87								
88								
89								
90								

PLASTICITY; MOIST.

# GEOSCIENCE

Project: RBF/MPWSP  
Exploratory Boreholes  
Project No.: 13017-13

## **LOG OF BORING**

SHEET 4 OF 12

Location	MW - 8D	Date(s) Drilled	4-15-2015	Drilling Contractor	Cascade Drilling	Bearing (Azimuth)
Ground Surface Elevation (ft)		Logged by	ARAD KHALIGHI	Drill Rig Type	Pro Sonic 600T	Plunge (Degrees) Vert
Horizontal/Vertical Datum		Reviewed by		Borehole Diameter (in)		Total Depth (ft)
Depth (ft)	Notes	Sample Information				
		Penetration (Graphic)	Type and No.	Blows per 6 in.	Penetration (in)	Recovery (in)
						Geologic Unit

**CONFIDENTIAL DRAFT**  
**Subject to Revision**  
MATERIAL DESCRIPTION

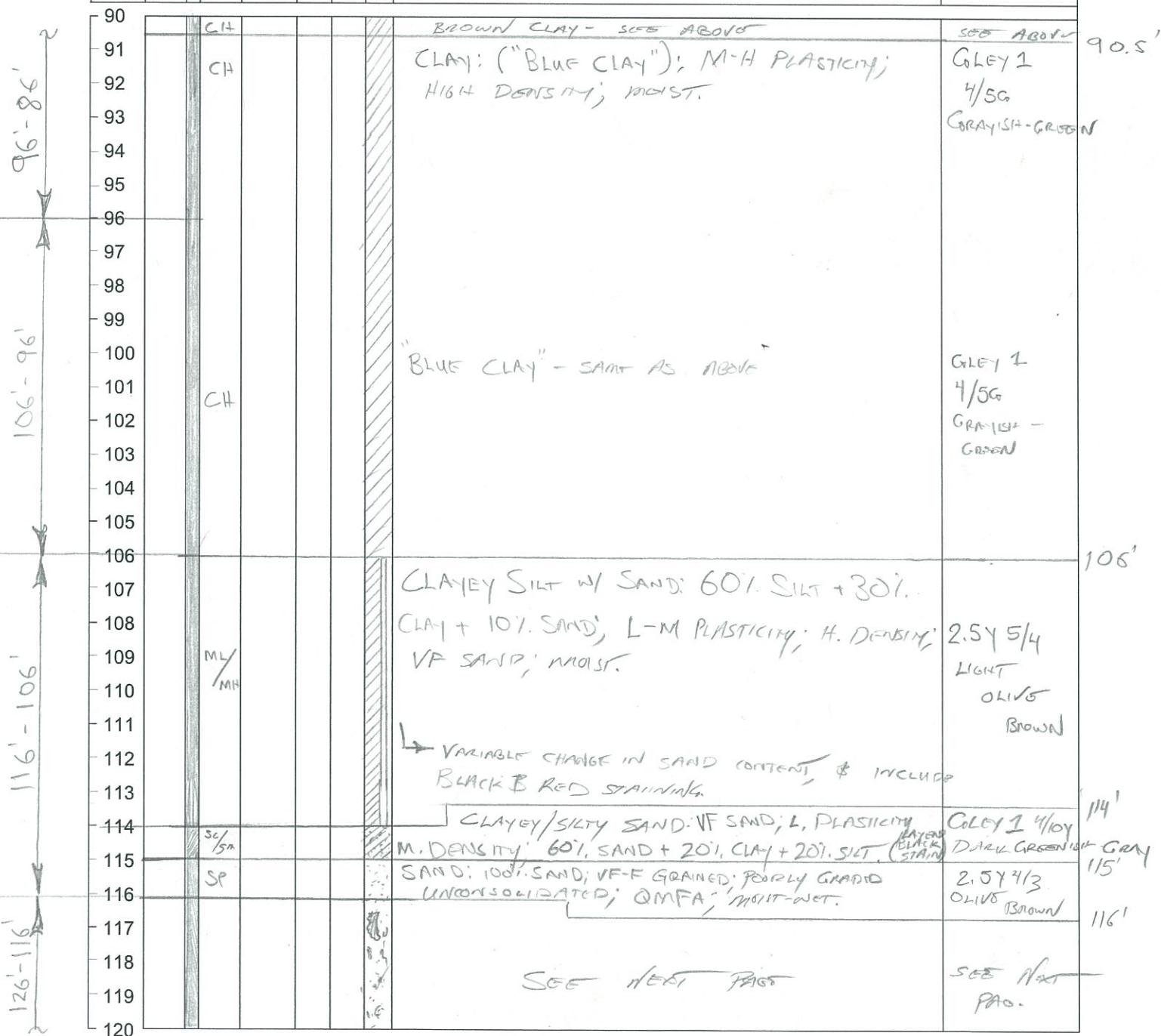
SOIL COLOR

**CONFIDENTIAL DRAFT**

Subject to Revision

#### MATERIAL DESCRIPTION

### SOIL COLOR



# GEOSCIENCE

Project: RBF/MPWSP  
Exploratory Boreholes  
Project No.: 13017-13

## LOG OF BORING

SHEET 5 OF 12

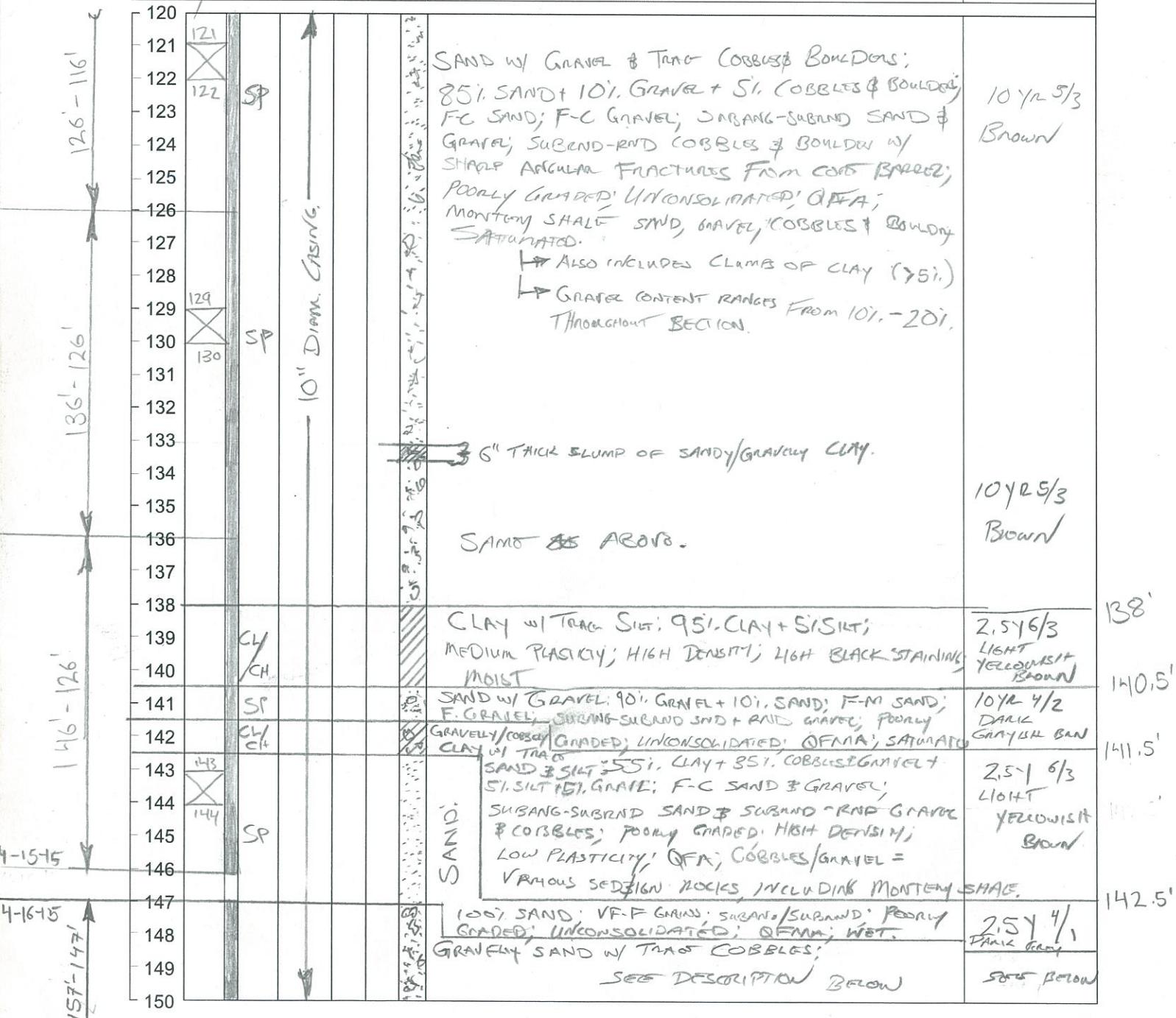
Location MW-8D			Date(s) Drilled 4-15-2015	Drilling Contractor Cascade Drilling	Bearing (Azimuth)
Ground Surface Elevation (ft)			Logged by ABD KHALIGHI	Drill Rig Type Pro Sonic 600T	Plunge (Degrees) Vert
Horizontal/Vertical Datum			Reviewed by	Borehole Diameter (in)	Total Depth (ft)
Depth (ft)	MGA Notes	Sample Information			
Depth (ft)	MGA Notes	Type and No. Fwd. Blows per 6 in.	Penetration (in)	Recovery (in)	Geologic Unit

### CONFIDENTIAL DRAFT

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#### MATERIAL DESCRIPTION

SOIL COLOR



# GEOSCIENCE

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Exploratory Boreholes  
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## LOG OF BORING

SHEET 6 OF 12

Location	MW - 8 DOBT	Date(s) Drilled	4-16-2015	Drilling Contractor	Cascade Drilling	Bearing (Azimuth)
Ground Surface Elevation (ft)		Logged by	AZAD KHALICHI	Drill Rig Type	Pro Sonic 600T	Plunge (Degrees) Vert
Horizontal/Vertical Datum		Reviewed by		Borehole Diameter (in)		Total Depth (ft)

### CONFIDENTIAL DRAFT

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#### MATERIAL DESCRIPTION

SOIL COLOR

Depth (ft)	Notes	Sample Information	Geologic Unit	Description	Soil Color
150				* INCLUDES MONTEY SHALE.	
151	151	SP-GP		GRAVELY SAND w/ TRAFO COBBLES; 70% SAND + 25% GRAVEL + 5% COBBLES; FC SAND & GRAVEL; SUBANG-SUBAND SAND; SABUND-RAD GRAVEL & COBBLES; POORLY GRADED; UNCONSOLIDATED; QFA; VARIOUS SED & IG. ROCKS AS COBBLES & GRAVEL.	10 YR 4/6 DARK YELLOWISH BROWN
152	152	GP-GC	10" Diam. Core		
153				GRAVELY Gravel w/ TRAFO SAND & SILT; 45% GRAVEL + 30% CLAY; 15% COBBLES + 5% SAND + 5% SILT; FC SAND & GRAVEL; SUBANG-SUBAND SAND - COBBLES; 11/14 DENSITIES; M-H PLASTICITY; QFA; SED & IG. Gravel + COBBLES SUBLATE (MONTEY SHALE).	5Y 3/2 DARK OLIVE
154					Gray
155				GRAVELY SAND w/ TRAFO COBBLES; 70% SAND + 25% GRAVEL + 5% COBBLES; SAME AS 147-152.5' - INCLUDES MONTEY SHALE.	10 YR 4/6 DARK YELLOWISH BROWN
156					152.5'
157					
158					155'
159					
160					
161					
162	163	SP-GP		INCREASED PORTIONS OF CLAY & GRAVEL/CLUMPS OF CLAY.	163'
163	164	SP	9" Diam. Core	SAND w/ TRAFO GRAVEL & COBBLES; 90% SAND + 5% GRAVEL + 5% COBBLES; F. SAND; FC GRAVEL; SUBANG-SUBAND GRAVEL; RAD COBBLE FRACURES INTO HALVES; VARIOUS SED & IG. ROCKS, INCLUDING MONTEY SHALE; MOST-WET.	10 YR 5/4
164	165	SP-GP			Yellowish-Brown
165					
166					
167					165'
168					
169					
170					
171	172	GP	9" Diam. Core	SANDY GRAVEL w/ TRAFO COBBLES; 80% GRAVEL + 15% SAND + 5% COBBLES; FC SAND & GRAVEL; SUBANG-RAD; POORLY GRADED; UNCONSOLIDATED; QFA; INCLUDES GRAVEL & COBBLES SIZE MONTEY SHALE; WET.	10 YR 3/6
172	173				DARK YELLOWISH BROWN
173	174	SP		SAND; 100% SAND ("Brown/SAND"); F. GRAINED; POORLY GRADED; UNCONSOLIDATED; & INCLUDES SOME SANDSTONE CLUMPS (FRIABLE) AT GRAVEL SIZE.	10 YR 3/2
174	175				Very Dark Grayish Brown
175					
176					
177					
178					
179					
180					

# GEOSCIENCE

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## LOG OF BORING

SHEET 7 OF 12

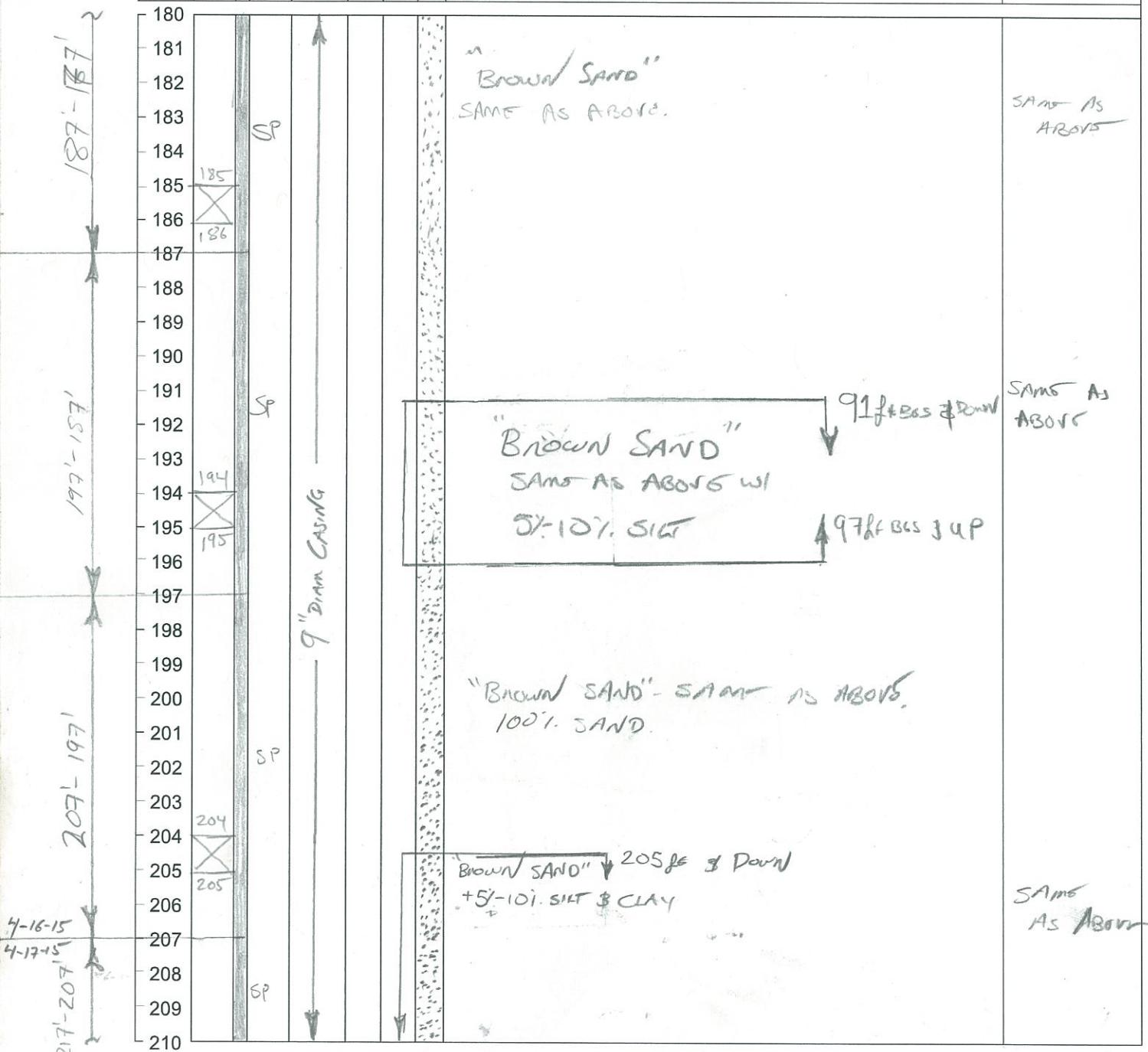
Location	MW-8	Date(s) Drilled	4-16-2015	Drilling Contractor	Cascade Drilling	Bearing (Azimuth)
Ground Surface Elevation (ft)		Logged by	AZAD KHALID	Drill Rig Type	ProSonix 600T	Plunge (Degrees) Vert
Horizontal/Vertical Datum		Reviewed by		Borehole Diameter (in)		Total Depth (ft)

### CONFIDENTIAL DRAFT

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MATERIAL DESCRIPTION

SOIL COLOR



# GEOSCIENCE

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Exploratory Boreholes  
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## LOG OF BORING

SHEET 8 OF 12

Location	MW-8D	Date(s) Drilled	4-17-2015	Drilling Contractor	Cascade Drilling	Bearing (Azimuth)
Ground Surface Elevation (ft)		Logged by	AZAD KHALIGHI	Drill Rig Type	ProSonic 600T	Plunge (Degrees) Vert
Horizontal/Vertical Datum		Reviewed by		Borehole Diameter (in)		Total Depth (ft)

### CONFIDENTIAL DRAFT

Subject to Revision

#### MATERIAL DESCRIPTION

SOIL COLOR

Depth (ft)	Notes 	Sample Information				
	Penetration (Graphic)	Type and No.	Blows per 6 in.	Penetration (in)	Recovery (in)	Geologic Unit
210						
211						
212						
213						
214						
215		SP				"Brown SAND"
216						SAM AS ABOVE. 85% SAND + 10% SILT + 5% CLAY
217						* INCLUDES SOME GRAVEL & COBBLE SIZED, FAIRLY SAND SPACES (COMPRESSED) OF BROWN SAND.
218						
219						
220						
221						
222						
223						
224		SP	9" DIA	CLAY		"Brown SAND"
225						SAM AS ARO15. 85% SAND + 10% SILT + 5% CLAY
226						
227						
228						
229						
230						
231		CL				SANDY CLAY; 80% CLAY + 20% SAND; F. SAND; POORLY GRADED; L-M PLASTICITY; HIGH DENSITY; MOIST.
232						
233						
234						
235		SM				SILTY SAND w/ CLAY; 60% SAND + 30% SILT + 10% CLAY; F. SAND; POORLY GRADED; LOW-NONE PLASTICITY; POORLY GRADED; UNCONSOLIDATED QFM; MOIST-WET.
236						
237		CL				SANDY CLAY w/ THIN SILT & GRAVEL; 70% CLAY + 20% SAND + 5% Gravel + 5% Silt; F-m SAND; F. Gravel; Subang-Subang; Unconsolidated; L-M PLASTICITY; H. DENSITY; MOIST. (INCLUDES MONTEY SHALE)
238						
239		SM				GRAVELLY & SILTY SAND w/ CLAY; 60% SAND + 15% GRAVEL + 15% SILT + 10% CLAY; F-C SAND + C. Gravel; Subang-Subang; POORLY GRADED; L-M PLASTICITY; H. DENSITY; QFM; INCLUDES MONTEY SHALE CAUSE: MOIST-WET
240		ML				SILTY SAND w/ THIN CLAY; 75% SAND + 20% SILT + 5% CLAY; 2.5% SILT F. SAND; POORLY GRADED; UNCONSOLIDATED; LOW DENSITY; QFM; LIGHT OLIVE BROWN
						SANDY SILT w/ CLAY; 60% SILT + 30% SAND + 10% CLAY; F. SAND; POORLY GRADED; LOW-NON PLASTIC; L-M DENSITY; QFM; MOIST.

# GEOSCIENCE

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Exploratory Boreholes  
Project No.: 13017-13

## LOG OF BORING

SHEET 9 OF 12

Location	MW - 8 Deep	Date(s) Drilled	4-17-2015	Drilling Contractor	Cascade Drilling	Bearing (Azimuth)
Ground Surface Elevation (ft)		Logged by	AZAD KHALIGHI	Drill Rig Type	ProSonic 600T	Plunge (Degrees) Vert
Horizontal/Vertical Datum		Reviewed by		Borehole Diameter (in)		Total Depth (ft)

### CONFIDENTIAL DRAFT

Subject to Revision

#### MATERIAL DESCRIPTION

#### SOIL COLOR

Depth (ft)	Notes	Type and No.	Blows per 6 in.	Penetration (in)	Recovery (in)	Geologic Unit	Material Description	Soil Color
240		ML					SEE ABOVE	240'
241		SC					CLAYEY SAND w/ SILT; 70% SAND + 10% SILT + 20% CLAY; F-M SAND; POORLY GRADED; SURFACED; NON-PLASTIC; UNCONSOLIDATED; QFMA;	2.5 Y 5/3 LIGHT OLIVE BROWN
242								
243								
244								
245								
246		CL					SANDY CLAY w/ GRAVEL & TRACE SILT; 70% SILT + 10% GRAVEL + 15% SAND + 5% SILT; F-M SAND; F-GRAVEL; SUBGRD-RND; POORLY GRADED; L-M PLASTICITY; (UNCONSOLIDATED); CLAY (MONTANY SHALE GRAY) QFMA.	2.5 Y 5/3 LIGHT OLIVE BROWN
247								
248		SC					SAND w/ SILT GRAVEL; 3 COBBLES; 70% SAND + 20% CLAY + 5% SILT + 5% COBBLES & GRAVEL; F-C SAND & GRAVEL; SURFACE-SUBRND SAND; SUBRND-RND GRAVEL; POORLY GRADED; UNCONSOLIDATED; QFMA; (Montany Shale Gray)	2.5 Y 5/3 LIGHT OLIVE BROWN
249								
250		SP-GP						
251	253						SAND w/ GRAVEL, COBBLES & TRACE SILT; 80% SAND + 15% COBBLES & GRAVEL + 5% SILT; F-C SAND & GRAVEL; SURFACED-SUBRND SAND; SUBRND-RND GRAVEL & COBBLES; SHALE GRAVEL & COBBLES; MOIST - WET.	2.5 Y 5/3 LIGHT OLIVE BROWN
252	254							
253	255							
254	256							
255	257							
256	258							
257	259							
258	260							
259	261							
260	262							
261	263							
262	264							
263	265							
264	266							
265	267							
266	268							
267	269							
268	270							
269								
270								

Poorly GRADED; UNCONSOLIDATED; LOW PLASTICITY; LOW DENSITY; MOIST

OLIVE BROWN

# GEOSCIENCE

Project: RBF/MPWSP  
Exploratory Boreholes  
Project No.: 13017-13

## LOG OF BORING

SHEET 10 OF 12

Location	MW-80	Date(s) Drilled	4-17-15	Drilling Contractor	Cascade Drilling	Bearing (Azimuth)						
Ground Surface Elevation (ft)		Logged by	AZAD KHALIGHI	Drill Rig Type	ProSonic 600T	Plunge (Degrees) Vert						
Horizontal/Vertical Datum		Reviewed by		Borehole Diameter (in)		Total Depth (ft)						
Depth (ft)	Notes	Sample Information										
	Penetration (Graphic)	Type and No.	Blows per 6 in.	Penetration (in)	Recovery (in)	Geologic Unit	<b>CONFIDENTIAL DRAFT</b> Subject to Revision MATERIAL DESCRIPTION					SOIL COLOR

270	SC						CLAYEY SAND; SEE ABOVE.	2.5Y 4/3 OLIVE BROWN	271
271	CL						CLAY; 100% CLAY; Medium Plasticity; High Density; Dry-Moist.	2.5Y 4/2 DARK GRAYISH BROWN	
272									
273									
274									
275									
276									
277	CL	9" DIA. CASING							
278							CLAY; SAME AS ABOVE w/ HIGH PLASTICITY.	10YR 3/6 DARK YELLOWISH BROWN	
279									
280									
281	CL	9" DIA. CASING							
282									
283							CLAY; SAME AS ABOVE.	10YR 3/6 DARK YACOVICCI BROWN	
284									
285									
286									
287	SM	8" DIA. CASING					SILTY SAND w/ TRACE CLAY; 80% SAND + 15% SILT + 5% CLAY; VFF-F SAND; poorly Graded; Low-Non-PLASTIC; UnCONSOLIDATED; MoIST.	2.5Y 5/4 LIGHT OLIVE BROWN	
288									
289									
290									
291									
292									
293									
294									
295							SILTY CLAY w/ TRACE SAND; 80% CLAY + 15% SILT + 5% SAND; V.F. SAND; L. PLASTICITY; Very Dense; MoIST - Dry.	2.5Y 5/3 LIGHT OLIVE BROWN	295'
296									
297									
298									
299									
300							SAND w/ Gravel; SEE BELOW	2.5Y 5/1 GRAY	296'

# GEOSCIENCE

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Exploratory Boreholes  
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## **LOG OF BORING**

SHEET 11 OF 17

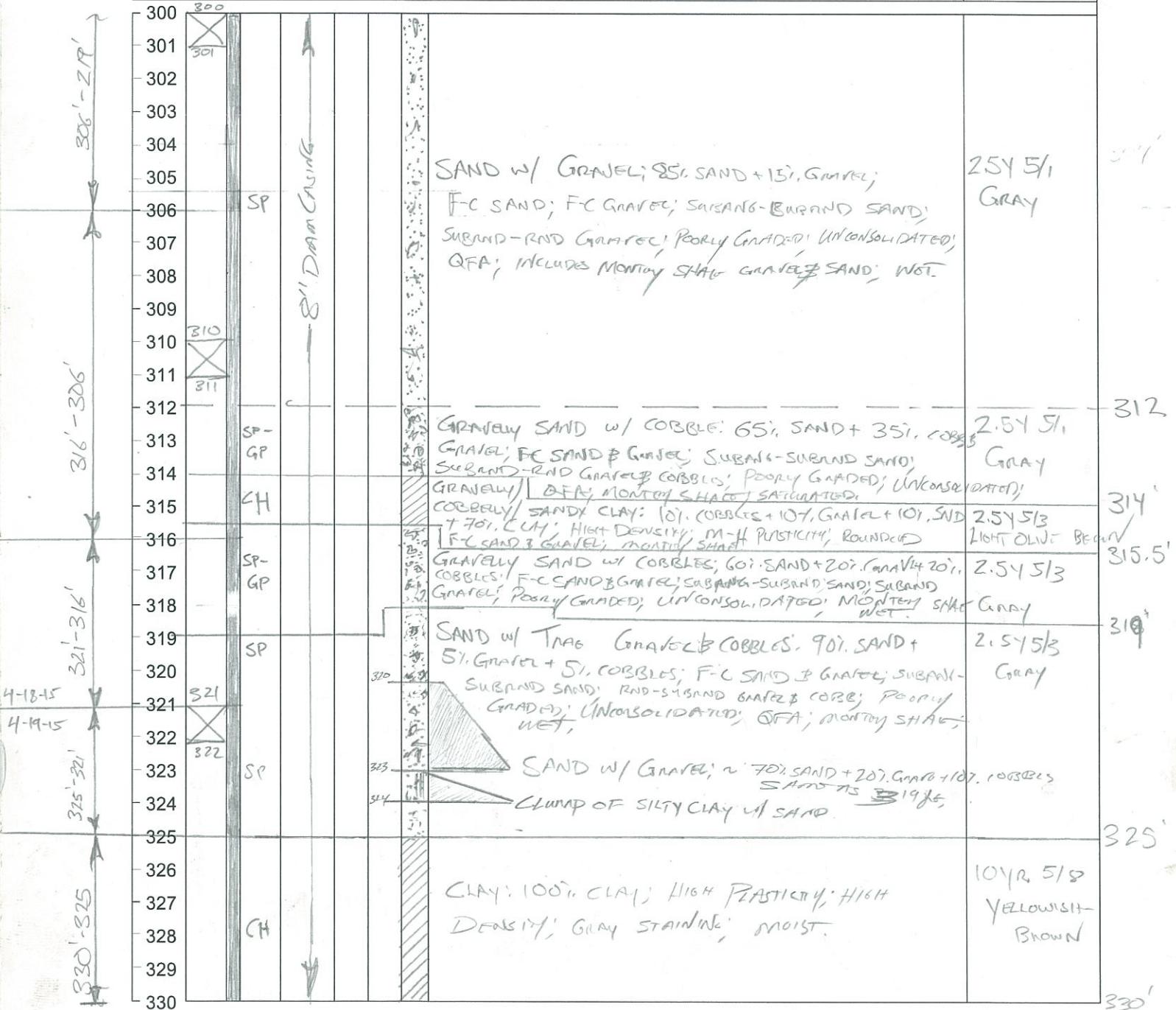
Location		MW-8D	Date(s) Drilled	4-18-2015	Drilling Contractor	Cascade Drilling	Bearing (Azimuth)
Ground Surface Elevation (ft)		Logged by		AZAD KHALIGHI	Drill Rig Type	Pro Sonic 600T	Plunge (Degrees)
Horizontal/Vertical Datum		Reviewed by		Borehole Diameter (in)	Total Depth (ft)		
Depth (ft)	Notes <i>MW-8D</i>	Sample Information		<b>CONFIDENTIAL DRAFT</b> Subject to Revision MATERIAL DESCRIPTION			SOIL COLOR
Penetration (Graphic)	Type and No.	Blows per 6 in.	Penetration (in)	Recovery (in)	Geologic Unit		

**CONFIDENTIAL DRAFT**

Subject to Revision

## MATERIAL DESCRIPTION

### **SOIL COLOR**



# GEOSCIENCE

Project: RBF/MPWSP  
Exploratory Boreholes  
Project No.: 13017-13

## LOG OF BORING

SHEET 12 OF 12

Location MW-8D		Date(s) Drilled 4-18-2015	Drilling Contractor Cascade Drilling	Bearing (Azimuth)
Ground Surface Elevation (ft)		Logged by AZAD KHALIQI	Drill Rig Type Pao Sonic 600	Plunge (Degrees) Vert
Horizontal/Vertical Datum		Reviewed by	Borehole Diameter (in)	Total Depth (ft)
Depth (ft)	Notes	Sample Information	MATERIAL DESCRIPTION	SOIL COLOR
Penetration (Graphic)	Type and No.	Blows per 6 in.	Penetration (in)	Geologic Unit

### CONFIDENTIAL DRAFT

Subject to Revision

MATERIAL DESCRIPTION

330			SAND: 100% SAND; VF-F GRAINS; POORLY GRADED; UNCONSOLIDATED; WET	10 YR 4/4 DRMIC YELLOWISH BROWN
331	SP			330'
332				
333				332.5'
334	SP		SAND w/ Fine Gravel; 90% SAND + Si. Gravel; F-C SAND; F-GRAN; SUBANG-SUBGRAN; POORLY GRADED; UNCONSOLIDATED; WET	2.5Y 5/3 GRAY
335				
336				
337				
338				
339				
340	SP		SAME AS ABOVE	
341				
342				
343				
344	SP	8' Dmn. Casng	SAND: 100% SAND; F-M GRAINS w/ FINE C. GRAINS; SUBANG-SUBGRAN; UNCONSOLIDATED; POORLY GRADED; OFMA; WET	2.5Y 4/4 OLIVE BROWN
345				
346				
347				
348				
349	SP		SAND: SAME AS ABOVE CONSIST. CHNG.	
350				
351	CH		GRAVELLY/SANDY CLAY; 70% CLAY + 15% GRAVEL + 10% SAND + 5% COBBLE; F-C SAND & GRAN; SUBGRAN-RND M-H PLASTICITY; H DENSITY; QFA; MONTG SHALE; MOIST	2.5Y 5/3 LIGHT OLIVE BROWN
352				
353				
354	CH		CLAY; 100% CLAY; M-H PLASTICITY; H DENSITY; MOIST.	2.5Y 5/3 LIGHT OLIVE BROWN
355				
356				
357	SP		SAND w/ SILT & GRAVEL; 70% CLAY & COBBLES; 10% SILT + 10% GRAVEL + 5% COBBLE + 5% CLAY; F-C SAND & GRAN; SUBGRAN-RND GRAINS; POOR GRADED; UNCONSOLIDATED; QFA	2.5Y 4/1 DARK GRAY
358				
359	CH		CLAY w/ GRAVEL/COBBLES; 10% CLAY + 15% COBBLES; ROUNDED; F-C GRAVEL; M-H PLASTICITY; H DENSITY; INCLUDES MONTG SHALE; MOIST.	2.5Y 5/3 LIGHT OLIVE BROWN
360				

T.D. = 360 ft

T.D. = 360 ft BGS. @ 11:45 AM ON 4/19/2015