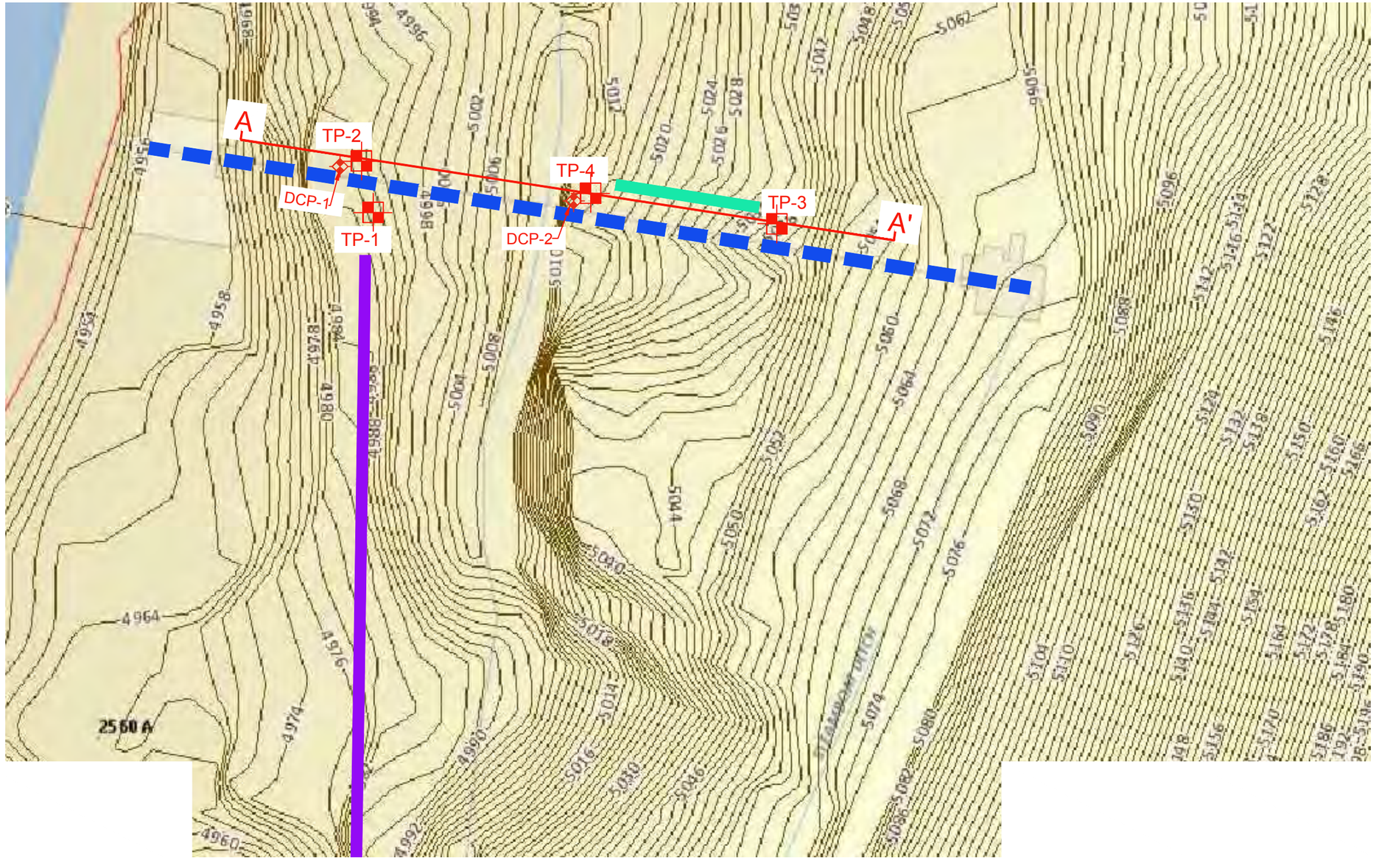
CME CONSTRUCTION MATERIALS ENGINEERS, INC.

APPENDIX A



SCALE 1"~50 '

50 25 0 25 50

REFERENCE: BASE MAP IS TOPOGRAPHIC IMAGE FROM THE WASHOE COUNTY GIS QUICK MAP APPLICATION AVAILABLE AT http://wcgisweb.washoecounty.us/quickmap/

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

SHAW ENGINEERING
FLEISH PENSTOCK REPLACEMENT
FIELD EXPLORATION LOCATION MAP
WASHOE COUNTY, NEVADA

PROJECT NO.: 1858 DATE: 4/19/2016

LEGEND

- TP-1 — APPROXIMATE TEST PIT LOCATION
- APPROXIMATE LOCATION REMI LINE 1
- APPROXIMATE LOCATION REMI LINE 2/REFRACTION LINE 1
- A — A' GEOLOGIC CROSS SECTION (PLATE A-4)
- APPROXIMATE PENSTOCK ALIGNMENT
- DCP-1 — APPROXIMATE DCP LOCATION

PLATE

A-1

V:\Active\1858\DRAWINGS\PLATES revised 4-26-16.dwg

LOG OF TEST PIT NO. TP-1

PROJECT FLEISH PENSTOCK-TMWA **EQUIPMENT TYPE** CASE 9020 TRACK EXCAVATOR
CLIENT SHAW ENGINEERING
LOCATION SOUTHWEST SIDE OF THE PENSTOCK WEST OF THE STEAMBOAT DITCH
PROJECT NO. 1858 **DATE** 04/14/16 **LOGGED BY:** SAM **SURFACE ELEVATION (ft)** ≅4,990' (PLATE A-1)

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM						MOIST	0'-8': SITLY SAND, mostly fine to coarse sand, non-plastic, strong brown							
				B	1A										
4															
8	SM						MOIST	8'-11': SILTY SAND WITH GRAVEL AND COBBLES, some fine to coarse sand, some fine to coarse subrounded to rounded gravel and cobbles, trace boulders up to 21" nominal diameter, non-plastic, brown							
	GP-GM						MOIST	Note: Redox staining visible at 7½'-8'							
12								11'-13': POORLY GRADED GRAVEL AND COBBLES WITH SILT AND SAND, mostly rounded fine to coarse gravel and cobbles, little fine to coarse sand, non-plastic.							
	GP						MOIST	13'-19': POORLY GRADED GRAVEL WITH BOULDERS, COBBLES, AND SAND, mostly coarse gravel and nested cobbles and boulders, boulders greater than 4½ nominal diameter encountered, little fine to coarse sand, non-plastic, brown							
16															
				B	1B				3.8					4.6	G
								TERMINATED AT 19 FEET, NO FREE WATER ENCOUNTERED.							
20															
24															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS
SG - Bulk Specific Gravity
A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

PLATE NO.: A-2a

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-2

PROJECT FLEISH PENSTOCK-TMWA **EQUIPMENT TYPE** CASE 9020
CLIENT SHAW ENGINEERING
LOCATION NW SIDE OF THE PENSTOCK, E. OF THE ACCESS ROAD
PROJECT NO. 1858 **DATE** 04/14/16 **LOGGED BY:** SAM **SURFACE ELEVATION (ft)** ≅4,992' (PLATE A-1)

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM						MOIST	0'-9½': SILTY SAND, mostly fine to coarse sand, non-plastic, trace fine roots, dark brown to strong brown							
4				B	2A				21.0					11.8	G
8															
	SM						MOIST	9½'-13': SILTY SAND WITH GRAVEL, COBBLES AND BOULDERS, mostly fine to coarse sand, little rounded cobbles and boulders up to 18" nominal diameter, non-plastic, strong brown							
12															
	GP-GM			B	2B		MOIST	13'-16': POORLY GRADED GRAVEL WITH COBBLES, BOULDERS, SILT AND SAND, some fine to coarse rounded gravel and cobbles, few rounded boulders up to 20" nominal diameter, non-plastic, strong brown							
16								TERMINATED AT 16 FEET, NO FREE WATER ENCOUNTERED							
20															
24															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS
SG - Bulk Specific Gravity
A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

PLATE NO.: A-2b

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-3

PROJECT FLEISH PENSTOCK-TMWA **EQUIPMENT TYPE** CASE 9020
CLIENT SHAW ENGINEERING
LOCATION NE SIDE OF THE PENSTOCK,≅100' S OF THE INLET
PROJECT NO. 1858 **DATE** 04/14/16 **LOGGED BY:** SAM **SURFACE ELEVATION (ft)** ≅5,038' (PLATE A-1)

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SP-SM						MOIST	0'-7': POORLY GRADED SAND WITH SILT AND GRAVEL, mostly medium to coarse sand, little subangular gravel, few boulders up to 20 inches nominal diameter, non-plastic, brown Note: Sparse surface boulders up to 36" nominal diameter present at the ground surface.							
4				B	3A				11.9					9.0	G
8	GM						MOIST	7'-11': SILTY GRAVEL WITH SAND AND COBBLES, some fine to coarse subrounded to angular gravel and cobbles up to 10" nominal diameter, some fine to coarse sand ,non-plastic, brown to greyish brown							
12	ROCK							11'-13': WEATHERED GRANODIORITE, crushed to intensely fractured, moderately hard to hard, friable to moderately strong, moderately weathered, light grey							
								PRATICAL REFUSAL AT 13 FEET, NO FREE WATER ENCOUNTERED							
16															
20															
24															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS
SG - Bulk Specific Gravity
A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

PLATE NO.: A-2c

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

LOG OF TEST PIT NO. TP-4

PROJECT FLEISH PENSTOCK-TMWA **EQUIPMENT TYPE** CASE 9020
CLIENT SHAW ENGINEERING
LOCATION NE SIDE OF THE PENSTOCK ADJACENT TO STEAM BOAT DITCH
PROJECT NO. 1858 **DATE** 04/14/16 **LOGGED BY:** SAM **SURFACE ELEVATION (ft)** ≅5,015' (PLATE A-1)

Depth in Feet	Unified Soil Classification	Graphic Log	Sample	Sample Type	Sample No.	Consistency/ Density	Moisture	Visual Description	%-200	Liquid Limit	Plasticity Index	Pocket Pen. (tsf)	Dry Density (pcf)	Moisture Content %	Laboratory Tests
0	SM						MOIST	0'-1½': SILTY SAND FILL, mostly fine to medium sand, non-plastic, strong brown							
	SM						MOIST	Note: Barbed wired encountered in upper 1 foot of the soil profile 1½'-5': SILTY SAND, mostly fine to medium sand, non-plastic, strong brown							
4	SM		X	B	4A		MOIST	5'-7': SILTY SAND WITH GRAVEL, some fine to coarse sand, little fine angular gravel, few weathered weak granodiorite cobbles, non-plastic, brown	19.0					11.1	G
8	GM						MOIST	7'-12': SILTY GRAVEL WITH SAND, some fine to coarse angular gravel, few cobbles and boulders up to 18" nominal diameter, non-plastic, brown							
12	ROCK							12'-18': WEATHERED GRANODIORITE, crushed, friable, deeply weathered, grey brown Note: Excavates similar to a silty sand with weak gravel (SM)							
16								TERMINATED AT 18 FEET, NO FREE WATER ENCOUNTERED							
20															
24															

GROUNDWATER

	DEPTH	HOUR	DATE
▽	N.E.		
▼			

SAMPLE TYPE
B - Bulk Sample

LABORATORY TESTS
SG - Bulk Specific Gravity
A - Atterberg Limits
G - Grain Size
C - Consolidation
MD - Moisture/Density
DS - Direct Shear

PLATE NO.: A-2d

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

UNIFIED SOIL CLASSIFICATION CHART

COARSE-GRAINED SOILS
(more than 50% of material is larger than No. 200 sieve size.)

GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)	GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)	SW	Well-graded sands, gravelly sands, little or no fines
		SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)	SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures

FINE-GRAINED SOILS
(50% or more of material is smaller than No. 200 sieve size.)

SILTS AND CLAYS Liquid limit less than 50%	ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	CH	Inorganic clays of high plasticity, fat clays
	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

ESTIMATED PERCENTAGES OF GRAVEL, SAND, AND FINES BASED ON VISUAL DESCRIPTION

TRACE	<5%
FEW	5%-15%
LITTLE	15%-30%
SOME	30%-50%
MOSTLY	>50%

SOIL STRUCTURE COMMON DESCRIPTIVE TERMS

FISSURED: SHRINKAGE OR RELIEF CRACKS OFTEN FILLED WITH SILT OR SAND

POCKET: INCLUSION OF MATERIAL WITH EITHER A DIFFERENT TEXTURE OR CLASSIFICATION FROM THE MAIN SOIL LAYER

LAMINATED: THIN ALTERNATING SOIL LAYERS WITH EITHER A DIFFERENT TEXTURE OR CLASSIFICATION.

SEAM: THIN LAYER OF MATERIAL WITH EITHER A DIFFERENT TEXTURE OR CLASSIFICATION FROM MAIN SOIL LAYER.

MOTTLED: SOILS WITH IRREGULAR MARKS OR SPOTS OF DIFFERENT COLORS. USUALLY INDICATES POOR AERATION AND LACK OF GOOD DRAINAGE. MAY INDICATE A MARKER HORIZON OF A PREVIOUS GROUNDWATER LEVEL.

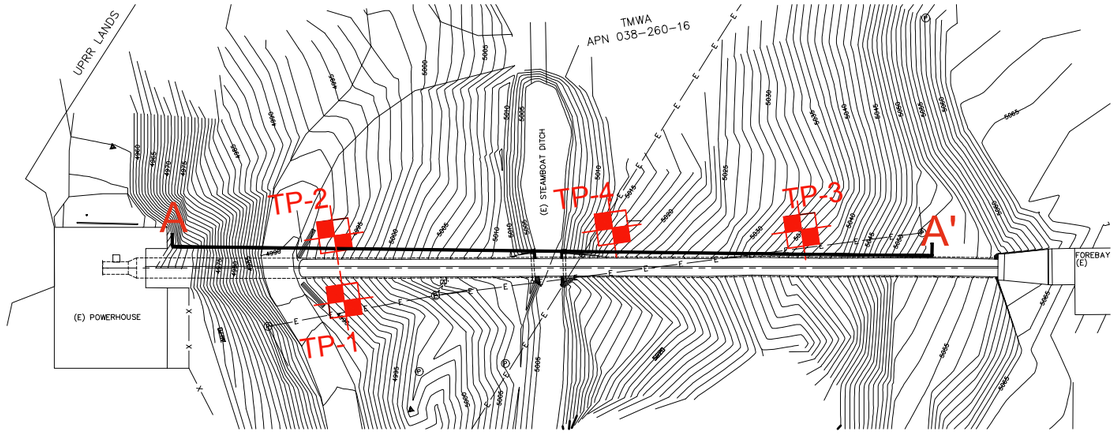
CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

SHAW ENGINEERING
FLEISH PENSTOCK
SOIL CLASSIFICATION CHART
WASHOE COUNTY, NEVADA

PROJECT NO.:1858 DATE: 05/10/16

PLATE
A-3

V:\Active\1858\DRAWINGS\soil classification chart and rock description.dwg



TP-1 APPROXIMATE TEST PIT LOCATION

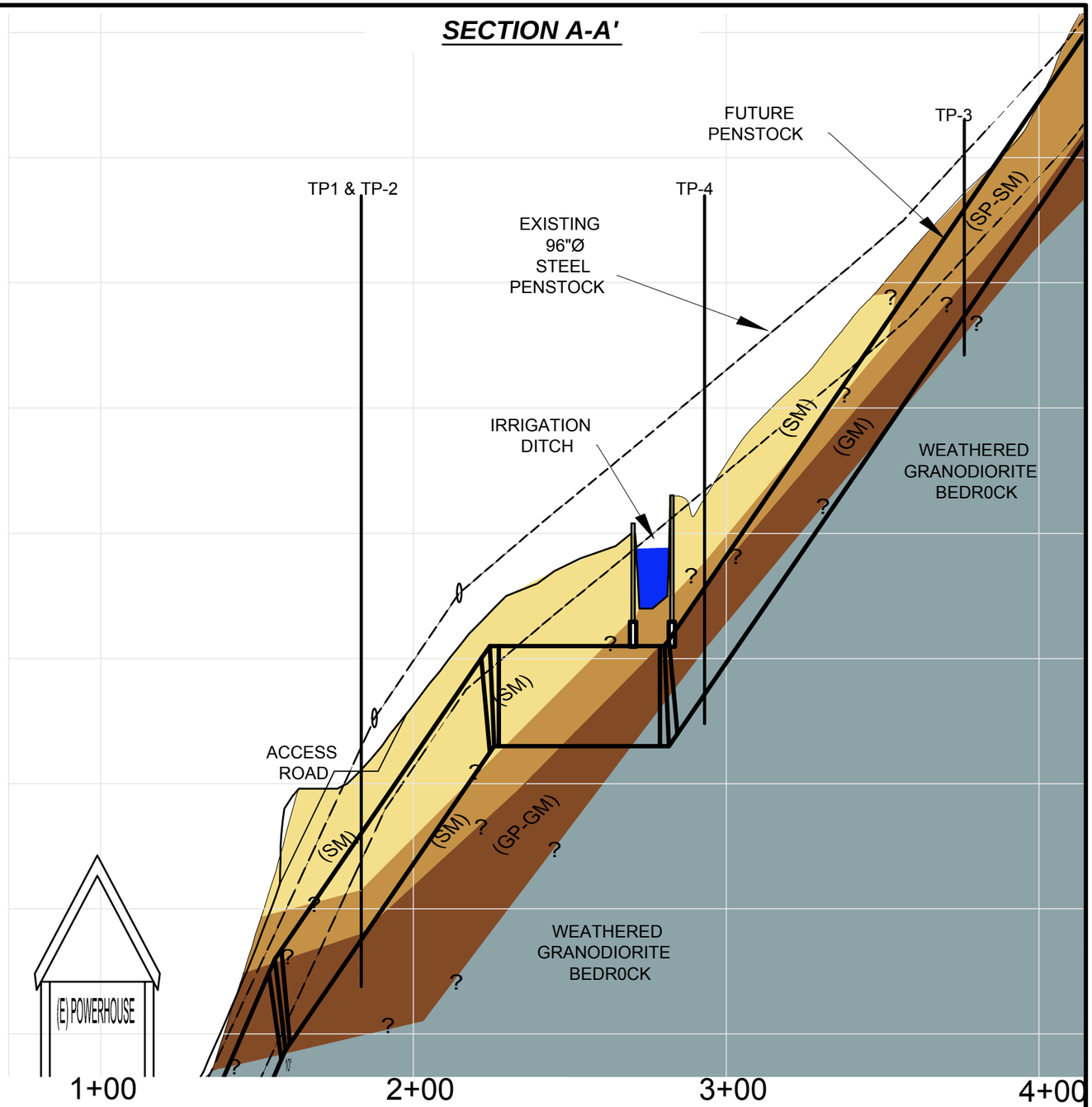
APPROXIMATE PENSTOCK ALIGNMENT

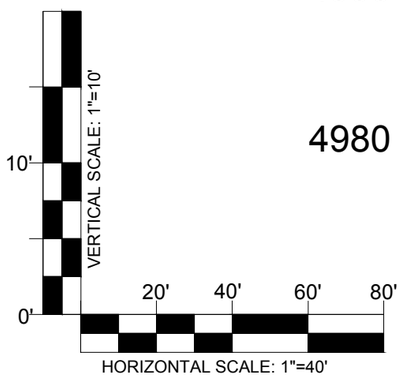
REFERENCE: BASE MAP IS TOPOGRAPHIC MAP PROVIDED BY SHAW ENGINEERING ON PLAN SHEET ENTITLED, VERDI, WASHOE COUNTY, NEVADA, PLAN AND PROFILE, STATION 0+00 TO 5+00

SITE PLAN

SCALE:1"=60'

SECTION A-A'





NOTES:

1. GEOLOGIC CROSS SECTION IS FOR REFERENCE ONLY AND IS BASED ON RANDOMLY SPACED TEST PIT EXCAVATIONS.
2. REFER TO TEST PIT LOGS FOR EXPANDED GEOLOGIC UNIT DESCRIPTIONS.

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

SHAW ENGINEERING
FLEISH PENSTOCK REPLACEMENT
SITE PLAN AND GEOLOGIC CROSS SECTION EXHIBIT
WASHOE COUNTY, NEVADA

PROJECT NO.: 1858 DATE: 4/19/2016

LEGEND

- WEATHERED GRANODIORITE BEDROCK
- SILTY SAND WITH GRAVEL (SM) TO POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)
- SILTY SAND (SM)
- SILTY GRAVEL WITH SAND AND COBBLES (GM) TO POORLY GRADED GRAVEL WITH COBBLES BOULDERS AND SAND (GP-GM)
- ? SOIL/BEDROCK LITHOLOGY QUERIED WHERE APPROXIMATELY LOCATED OR INFERRED

PLATE A-4

V:\Active\1858\DRAWINGS\PLATES revised 4-26-16.dwg

WILDCAT DYNAMIC CONE LOG

CME, Inc.
6980 Sierra Center Parkway, Suite 90
Reno, Nevada 89511

PROJECT NUMBER: 1858
DATE STARTED: 04-21-2016
DATE COMPLETED: 04-21-2016

HOLE #: DCP-1
CREW: SAM
PROJECT: TMWA FLEISH PENSTOCK
ADDRESS: WASHOE COUNTY
LOCATION: FLEISH, NEVADA

SURFACE ELEVATION: ~4,990 (TOPO)
WATER ON COMPLETION: NO
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	TESTED CONSISTENCY COHESIVE
-	14	62.2	••••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
-	13	57.7	•••••••••••••••••	16	MEDIUM DENSE	VERY STIFF
- 1 ft	11	48.8	••••••••••••••	13	MEDIUM DENSE	STIFF
-	14	62.2	••••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
-	15	66.6	•••••••••••••••••••	19	MEDIUM DENSE	VERY STIFF
- 2 ft	11	48.8	••••••••••••••	13	MEDIUM DENSE	STIFF
-	6	26.6	•••••••	7	LOOSE	MEDIUM STIFF
-	11	48.8	••••••••••••••	13	MEDIUM DENSE	STIFF
- 3 ft	12	53.3	•••••••••••••••	15	MEDIUM DENSE	STIFF
- 1 m	8	35.5	•••••••••••	10	LOOSE	STIFF
-	8	30.9	••••••••	8	LOOSE	MEDIUM STIFF
- 4 ft	5	19.3	•••••	5	LOOSE	MEDIUM STIFF
-	6	23.2	••••••	6	LOOSE	MEDIUM STIFF
-	5	19.3	•••••	5	LOOSE	MEDIUM STIFF
- 5 ft	8	30.9	••••••••	8	LOOSE	MEDIUM STIFF
-	18	69.5	•••••••••••••••••••	19	MEDIUM DENSE	VERY STIFF
-	8	30.9	••••••••	8	LOOSE	MEDIUM STIFF
- 6 ft	16	61.8	•••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
-	26	100.4	••••••••••••••••••••••••••••	25+	MEDIUM DENSE	VERY STIFF
- 2 m	33	127.4	••••••••••••••••••••••••••••••••••	25+	DENSE	HARD
- 7 ft	33	112.9	••••••••••••••••••••••••••••••	25+	DENSE	HARD
-	50	171.0	••	25+	DENSE	HARD
-						
- 8 ft						
-						
-						
- 9 ft						
-						
-						
- 3 m 10 ft						
-						
-						
-						
- 11 ft						
-						
-						
- 12 ft						
-						
-						
- 4 m 13 ft						

C:\My Documents\Wildcat\WC_XL97.XLS

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

SHAW ENGINEERING
FLEISH PENSTOCK
LOG OF DCP-1
WASHOE COUNTY, NEVADA

PROJECT NO.:1858 DATE: 05/10/16

PLATE
A-5a

V:\Active\1858\DRAWINGS\soil classification chart and rock description.dwg

WILDCAT DYNAMIC CONE LOG

CME, Inc.
6980 Sierra Center Parkway, Suite 90
Reno, Nevada 89511

PROJECT NUMBER: 1858
DATE STARTED: 04-21-2016
DATE COMPLETED: 04-21-2016

HOLE #: DCP-2
CREW: SAM
PROJECT: TMWA FLEISH PENSTOCK
ADDRESS: WASHOE COUNTY
LOCATION: FLEISH, NEVADA

SURFACE ELEVATION: ~5,016 (TOPO)
WATER ON COMPLETION: NO
HAMMER WEIGHT: 35 lbs.
CONE AREA: 10 sq. cm

DEPTH	BLOWS PER 10 cm	RESISTANCE Kg/cm²	GRAPH OF CONE RESISTANCE 0 50 100 150	N'	TESTED CONSISTENCY NON-COHESIVE	TESTED CONSISTENCY COHESIVE
-	3	13.3	•••	3	VERY LOOSE	SOFT
-	5	22.2	••••••	6	LOOSE	MEDIUM STIFF
- 1 ft	3	13.3	•••	3	VERY LOOSE	SOFT
-	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
-	4	17.8	•••••	5	LOOSE	MEDIUM STIFF
- 2 ft	5	22.2	••••••	6	LOOSE	MEDIUM STIFF
-	9	40.0	••••••••••	11	MEDIUM DENSE	STIFF
-	13	57.7	••••••••••••••	16	MEDIUM DENSE	VERY STIFF
- 3 ft	29	128.8	••••••••••••••••••••••••••••••••••	25+	DENSE	HARD
- 1 m	14	62.2	••••••••••••••••	17	MEDIUM DENSE	VERY STIFF
-	13	50.2	•••••••••••••	14	MEDIUM DENSE	STIFF
- 4 ft	15	57.9	••••••••••••••	16	MEDIUM DENSE	VERY STIFF
-	10	38.6	••••••••••	11	MEDIUM DENSE	STIFF
-	14	54.0	•••••••••••••	15	MEDIUM DENSE	STIFF
- 5 ft	15	57.9	••••••••••••••	16	MEDIUM DENSE	VERY STIFF
-	40	154.4	••	25+	DENSE	HARD
-	29	111.9	••••••••••••••••••••••••••••••	25+	DENSE	HARD
- 6 ft	37	142.8	••••••••••••••••••••••••••••••••••••	25+	DENSE	HARD
-	50	193.0	••	25+	VERY DENSE	HARD
- 2 m						
- 7 ft						
-						
-						
- 8 ft						
-						
-						
- 9 ft						
-						
-						
- 3 m 10 ft						
-						
-						
-						
- 11 ft						
-						
-						
- 12 ft						
-						
-						
- 4 m 13 ft						

C:\My Documents\Wildcat\WC_XL97.XLS

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

SHAW ENGINEERING
FLEISH PENSTOCK
LOG OF DCP-2
WASHOE COUNTY, NEVADA

PROJECT NO.:1858 DATE: 05/10/16

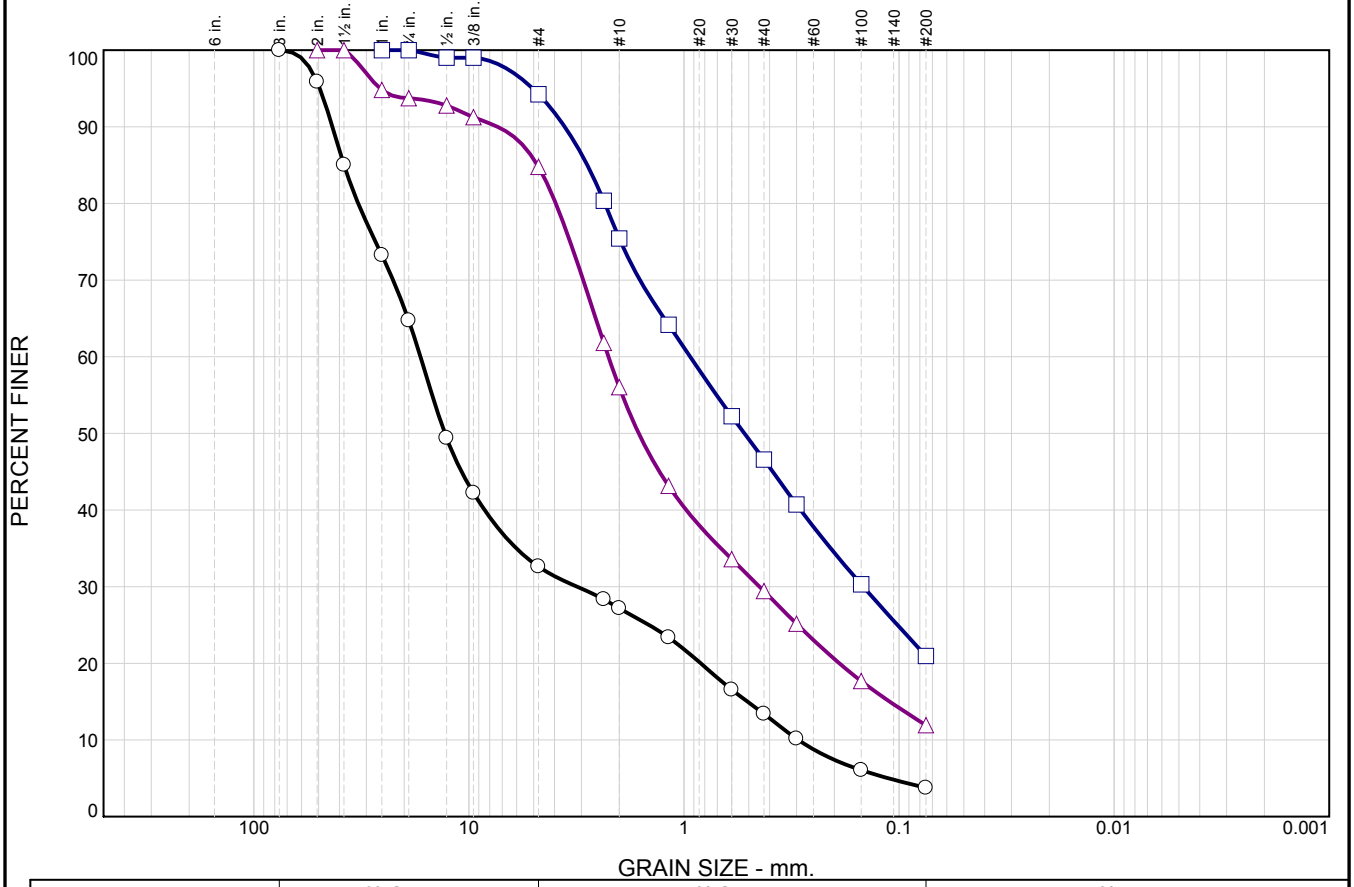
PLATE
A-5b

V:\Active\1858\DRAWINGS\soil classification chart and rock description.dwg

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

APPENDIX B

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	35.3	32.1	5.4	13.8	9.6	3.8	
□	0.0	0.0	5.8	18.8	28.8	25.6	21.0	
△	0.0	6.3	8.9	28.8	26.6	17.5	11.9	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			38.0622	16.8062	12.9328	3.1388	0.5068	0.2941	1.99	57.15
□			2.8149	0.9358	0.5237	0.1467				
△			4.8001	2.2450	1.6233	0.4455	0.1105			

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○ WELL-GRADED GRAVEL WITH SAND (GW)	4/20/2016	GW	4.6
□ SILTY SAND (SM)	4/20/2016		11.8
△ POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)	4/20/2016		9.0

Project No. 1858 **Client:** TRUCKEE MEADOWS WATER AUTHORITY

Project: FLEISH PENSTOCK

○ **Location:** TEST PIT 1 AT 18.5'-19.0' **Sample Number:** 30242

□ **Location:** TEST PIT 2 2A AT 4.0'-6.0' **Sample Number:** 30242

△ **Location:** TEST PIT 3 3A 4.0'-5.0' **Depth:** 4.0'-5.0' **Sample Number:** 30242

Remarks:

○ Moisture Content - 4.6%

□ Moisture Content - 11.8%

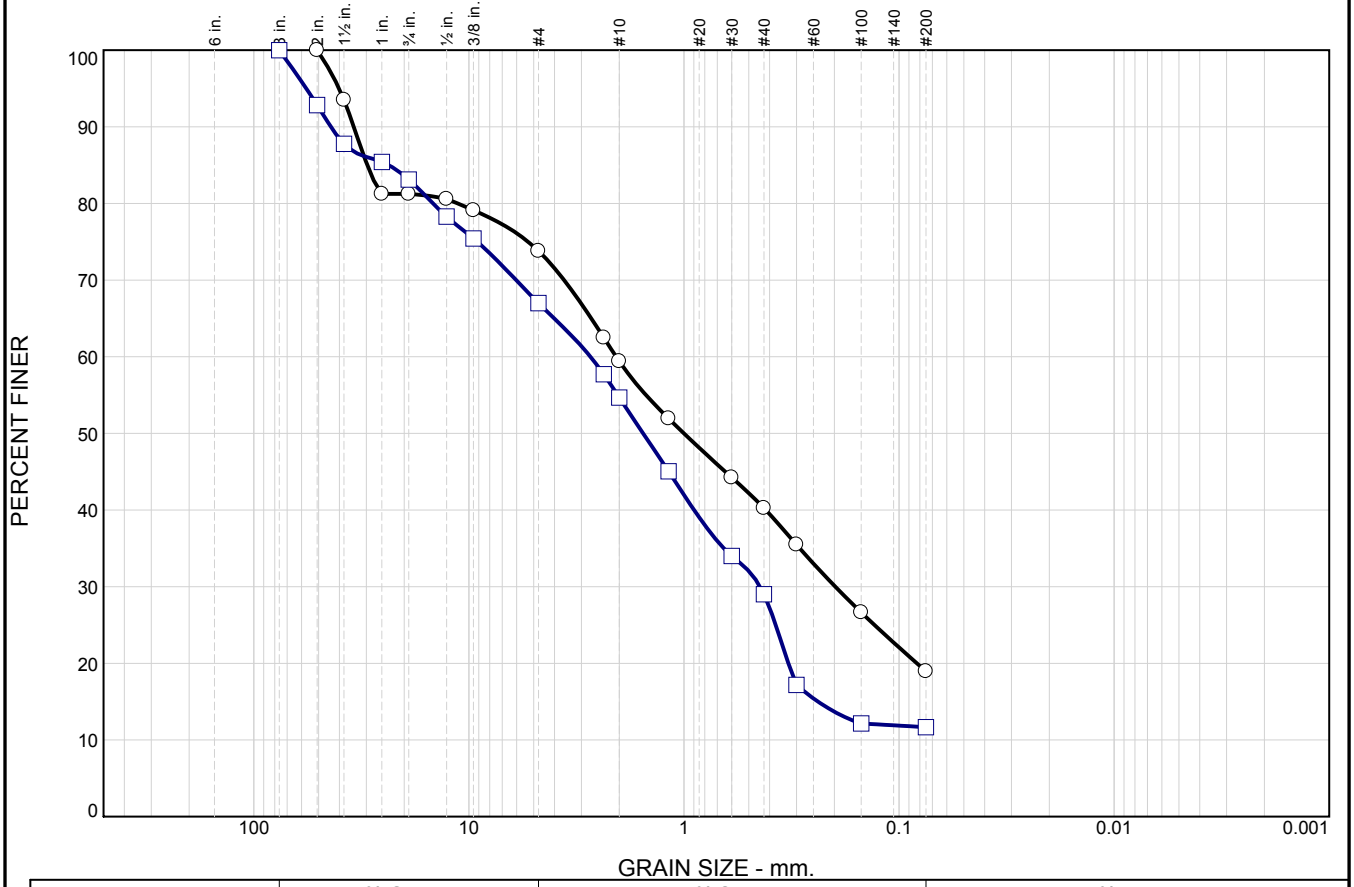
△ Moisture Content - 9.0%

CME

Plate B-1a

Tested By: M. Pontoni **Checked By:** S. Hein

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	18.8	7.4	14.4	19.1	21.3	19.0	
□	0.0	16.9	16.1	12.3	25.7	17.3	11.7	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_C	C_u
○			29.7047	2.0671	1.0003	0.1980				
□			23.6046	2.7217	1.5486	0.4427	0.2381			

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○ SILTY SAND WITH GRAVEL (SM)	4/20/2016		11.1
□ POORLY GRADED SAND WITH SILT AND GRAVEL (SP-SM)	05/25/16		5.2

Project No. 1858 **Client:** TRUCKEE MEADOWS WATER AUTHORITY

Project: FLEISH PENSTOCK

○ **Location:** TEST PIT 4 4A 5.5'-6.0' **Depth:** 5.5'-6.0' **Sample Number:** 30242

□ **Location:** STOCKPILE AT FLEISH TUNNEL **Sample Number:** 30373

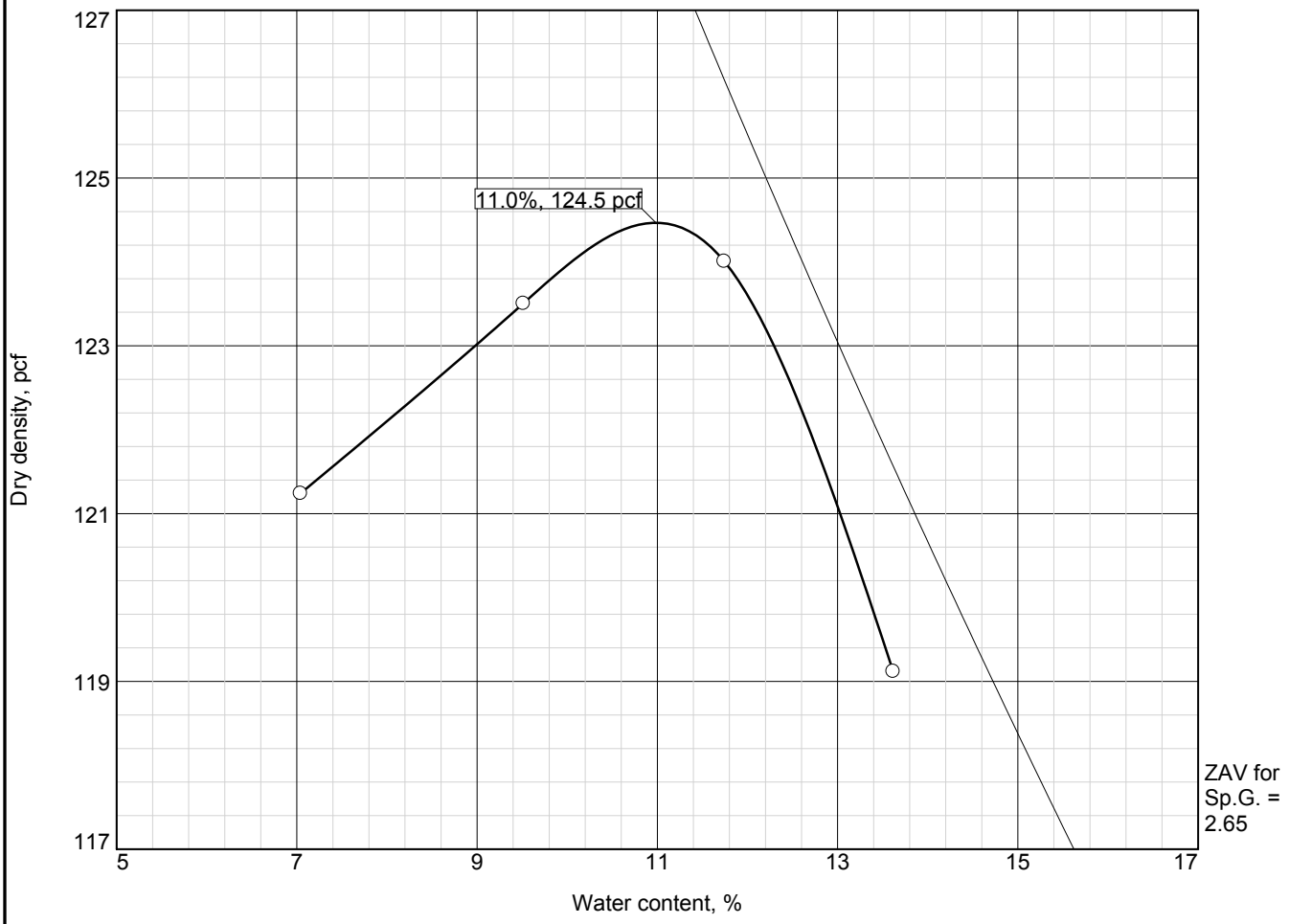
Remarks:

○Moisture Content - 11.1%

Plate B-1b

Tested By: ○ M. Pontoni □ TL **Checked By:** S. Hein

COMPACTION TEST REPORT



Test specification: ASTM D 1557-07 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
	GW						67.4	3.8

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 124.5 pcf Optimum moisture = 11.0 %	NATIVE MATERIAL

Project No. 1858 **Client:** TRUCKEE MEADOWS WATER
Project: FLEISH PENSTOCK
Date:
○ **Location:** TEST PIT 1 AT 18.5'-19.0' **Sample Number:** 30242

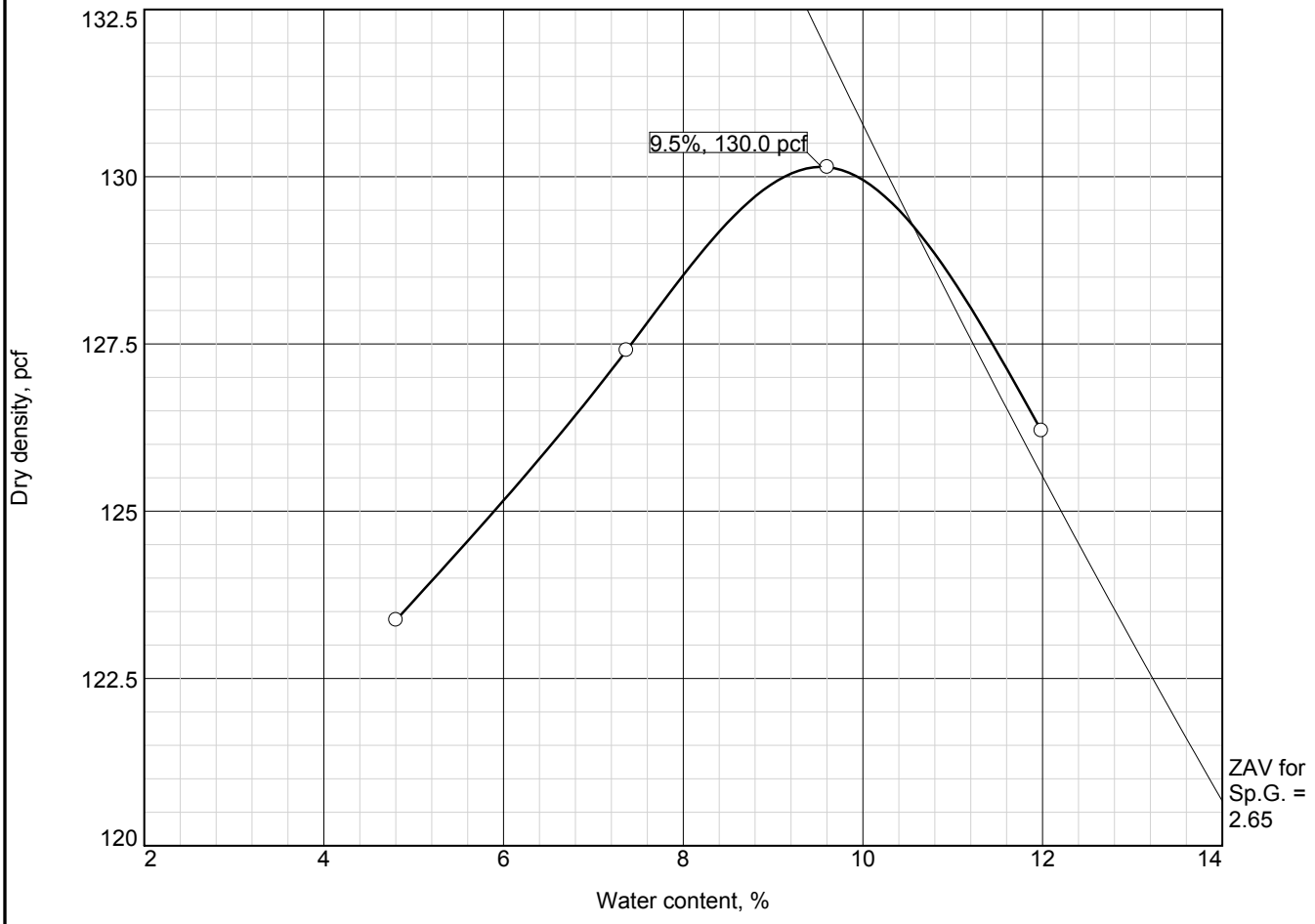
Remarks:
RECEIVED 4/14/2016

CME

Plate B-2a

Tested By: G. MORALES **Checked By:** S. VINEIS

COMPACTION TEST REPORT



Test specification: ASTM D 1557-07 Method A Modified

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > #4	% < No.200
	USCS	AASHTO						
							5.8	21.0

TEST RESULTS	MATERIAL DESCRIPTION
Maximum dry density = 130.0 pcf Optimum moisture = 9.5 %	NATIVE MATERIAL

Project No. 1858 **Client:** TRUCKEE MEADOWS WATER

Project: FLEISH PENSTOCK

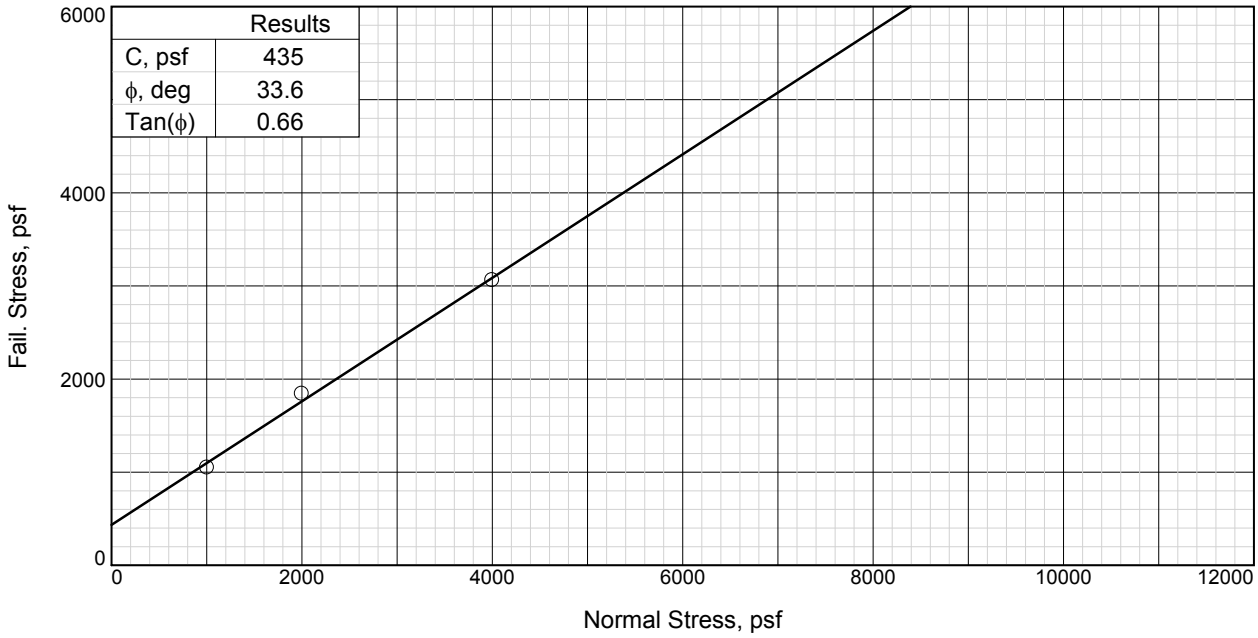
Date:

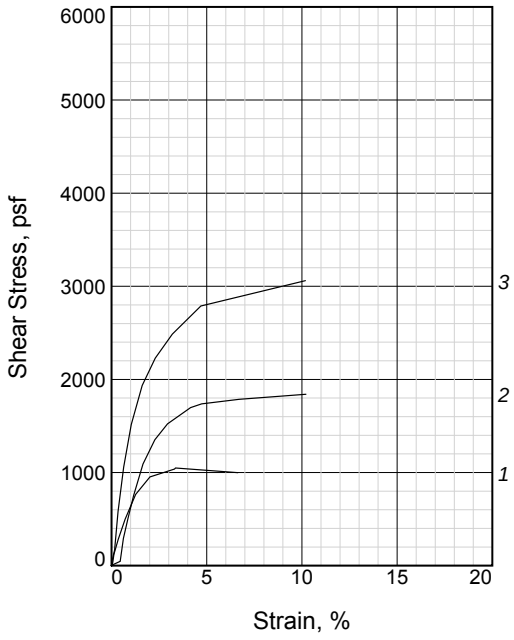
○ **Location:** TEST PIT 2 2A AT 4.0'-6.0' **Sample Number:** 30242

Remarks:
RECEIVED 4/14/2016

Plate B-2b

Tested By: S. SCHWEITZER **Checked By:** S. VINEIS





Sample No.		1	2	3
Initial	Water Content, %	9.3	9.3	9.3
	Dry Density, pcf	116.4	115.0	116.1
	Saturation, %	57.9	55.7	57.4
	Void Ratio	0.4269	0.4438	0.4306
	Diameter, in.	2.420	2.420	2.420
	Height, in.	1.010	1.020	1.010
At Test	Water Content, %	16.0	16.6	16.1
	Dry Density, pcf	116.4	115.0	116.1
	Saturation, %	99.9	99.7	99.7
	Void Ratio	0.4269	0.4438	0.4306
	Diameter, in.	2.420	2.420	2.420
	Height, in.	1.010	1.020	1.010
Normal Stress, psf		1005	2001	4000
Fail. Stress, psf		1048	1841	3061
Strain, %		3.4	10.2	10.2
Ult. Stress, psf				
Strain, %				
Strain rate, in./min.		0.003	0.003	0.003

Sample Type:
Description: NATIVE MATERIAL

Specific Gravity= 2.660
Remarks: Sample was inundated and cosolidated prior to performing direct shear.

Plate B-3

Client: TRUCKEE MEADOWS WATER AUTHORITY

Project: FLEISH PENSTOCK

Location: TEST PIT 2 2A AT 4.0'-6.0'
Sample Number: 30242
Proj. No.: 1858 **Date Sampled:** 4/14/2016

CME

Tested By: S. Hein **Checked By:** S. Montalvo

SilverState Analytical Laboratories

Sierra Environmental Monitoring | EnviroTech.

Revised Laboratory Report

Report ID: 147681

CME-Construction Materials Engineers, Inc
Attn: Stella Montalvo
69800 Sierra Center Parkway, Suite 90
Reno, Nevada 89511

Date: 4/27/2016
Client: CON-160418
Taken by: Client
PO #: 1858

Analysis Report

Laboratory Accreditation Number: NV-00015

Laboratory Sample ID	Customer Sample ID	Date Sampled	Time Sampled	Date Received
S201604-0816	TP-1, 1B	4/18/2016		4/18/2016

Parameter	Method	Result	Units	Reporting Limit	Analyst	Date Analyzed	Data Flag
Chloride - Ion Chromatography	SW-846 9056A	<10	mg/Kg	10	Faulstich	4/20/2016	
pH - Saturated Paste	SW-846 9045D	7.86	pH Units		Bergstrom	4/20/2016	
pH - Temperature	SW-846 9045D	22.5	°C		Bergstrom	4/20/2016	
Redox Potential	SM 2580 B	522	MV		Bergstrom	4/20/2016	
Resistivity ASTM	ASTM G57	10250	ohm cm		Bergstrom	4/22/2016	
Sulfate ASTM 1580C	ASTM 1580C	<0.02	%	0.02	Bergstrom	4/20/2016	

Laboratory Accreditation Number: NV-00015

Laboratory Sample ID	Customer Sample ID	Date Sampled	Time Sampled	Date Received
S201604-0817	TP-2, 2A	4/18/2016		4/18/2016

Parameter	Method	Result	Units	Reporting Limit	Analyst	Date Analyzed	Data Flag
Chloride - Ion Chromatography	SW-846 9056A	<10	mg/Kg	10	Faulstich	4/21/2016	
pH - Saturated Paste	SW-846 9045D	6.94	pH Units		Bergstrom	4/20/2016	
pH - Temperature	SW-846 9045D	22.7	°C		Bergstrom	4/20/2016	
Redox Potential	SM 2580 B	541	MV		Bergstrom	4/20/2016	
Resistivity ASTM	ASTM G57	6780	ohm cm		Bergstrom	4/22/2016	
Sulfate ASTM 1580C	ASTM 1580C	<0.02	%	0.02	Bergstrom	4/20/2016	

Laboratory Accreditation Number: NV-00015

Laboratory Sample ID	Customer Sample ID	Date Sampled	Time Sampled	Date Received
S201604-0818	TP-3, 3A	4/18/2016		4/18/2016

Parameter	Method	Result	Units	Reporting Limit	Analyst	Date Analyzed	Data Flag
Chloride - Ion Chromatography	SW-846 9056A	<10	mg/Kg	10	Faulstich	4/21/2016	
pH - Saturated Paste	SW-846 9045D	7.07	pH Units		Bergstrom	4/20/2016	
pH - Temperature	SW-846 9045D	23.0	°C		Bergstrom	4/20/2016	
Redox Potential	SM 2580 B	563	MV		Bergstrom	4/20/2016	
Resistivity ASTM	ASTM G57	6470	ohm cm		Bergstrom	4/22/2016	
Sulfate ASTM 1580C	ASTM 1580C	<0.02	%	0.02	Bergstrom	4/20/2016	

Carly Wood
Laboratory Director

1135 Financial Blvd.
Reno, NV 89502-2348
Phone (775) 857-2400 Fax (888) 398-7002
jnava@sem-analytical.com

John Faulstich
Quality Assurance Manager

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

SHAW ENGINEERING
FLEISH PENSTOCK
CORROSION TEST RESULTS
WASHOE COUNTY, NEVADA

PROJECT NO.:1858 DATE: 05/10/16

PLATE
B-4a

SilverState Analytical Laboratories

Sierra Environmental Monitoring EnviroTech

Revised Laboratory Report

Report ID: 147681

CME-Construction Materials Engineers, Inc		**Date:**	4/27/2016
Attn: Stella Montalvo		**Client:**	CON-160418
69800 Sierra Center Parkway, Suite 90		**Taken by:**	Client
Reno, Nevada 89511		**PO #:**	1858

Analysis Report

Laboratory Accreditation Number: NV-00015

Laboratory Sample ID	Customer Sample ID	Date Sampled	Time Sampled	Date Received
S201604-0819	TP-4, 4A	4/18/2016		4/18/2016

Parameter	Method	Result	Units	Reporting Limit	Analyst	Date Analyzed	Data Flag
Chloride - Ion Chromatography	SW-846 9056A	<10	mg/Kg	10	Faulstich	4/21/2016	
pH - Saturated Paste	SW-846 9045D	7.27	pH Units		Bergstrom	4/20/2016	
pH - Temperature	SW-846 9045D	22.8	°C		Bergstrom	4/20/2016	
Redox Potential	SM 2580 B	555	MV		Bergstrom	4/20/2016	
Resistivity ASTM	ASTM G57	6150	ohm cm		Bergstrom	4/22/2016	
Sulfate ASTM 1580C	ASTM 1580C	<0.02	%	0.02	Bergstrom	4/20/2016	

Data Flag Legend:

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

SHAW ENGINEERING
FLEISH PENSTOCK
CORROSION TEST RESULTS
WASHOE COUNTY, NEVADA

PROJECT NO.:1858 DATE: 05/10/16

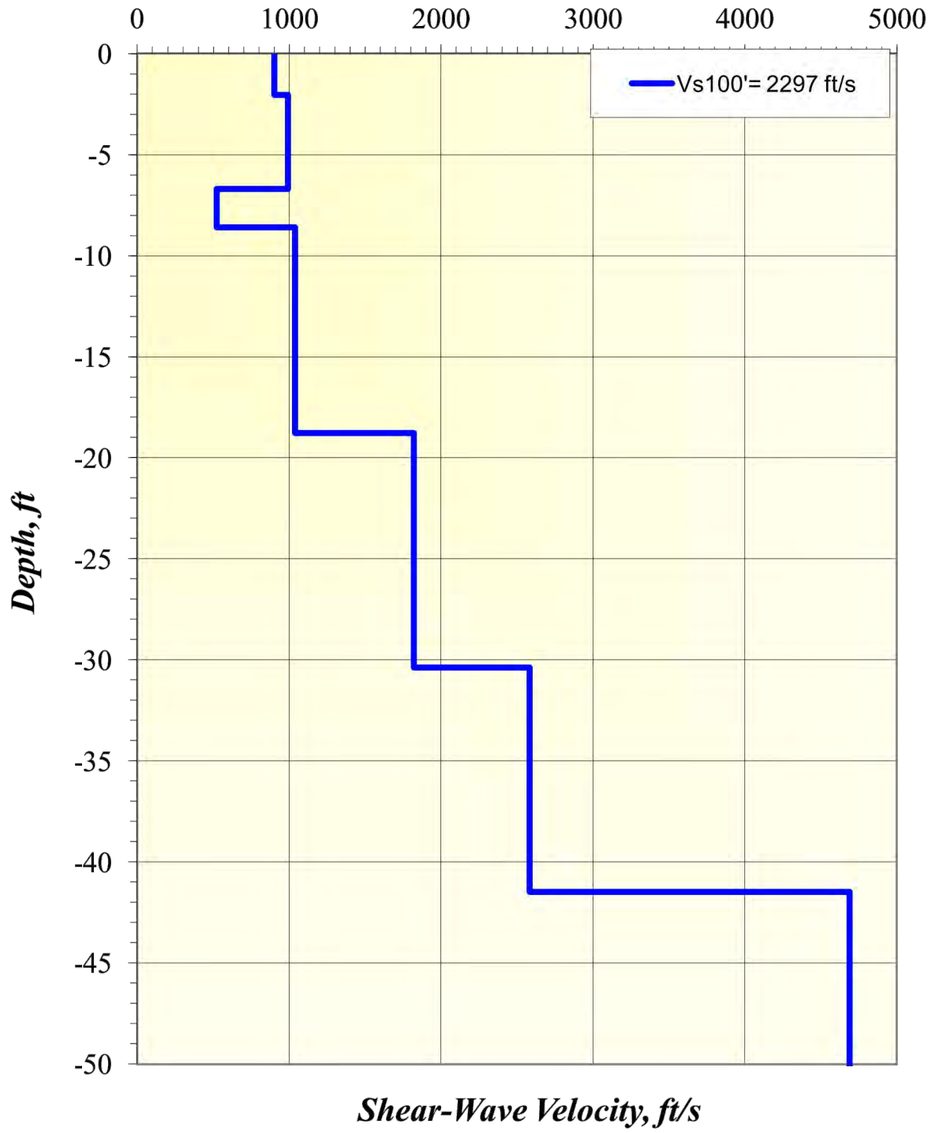
PLATE

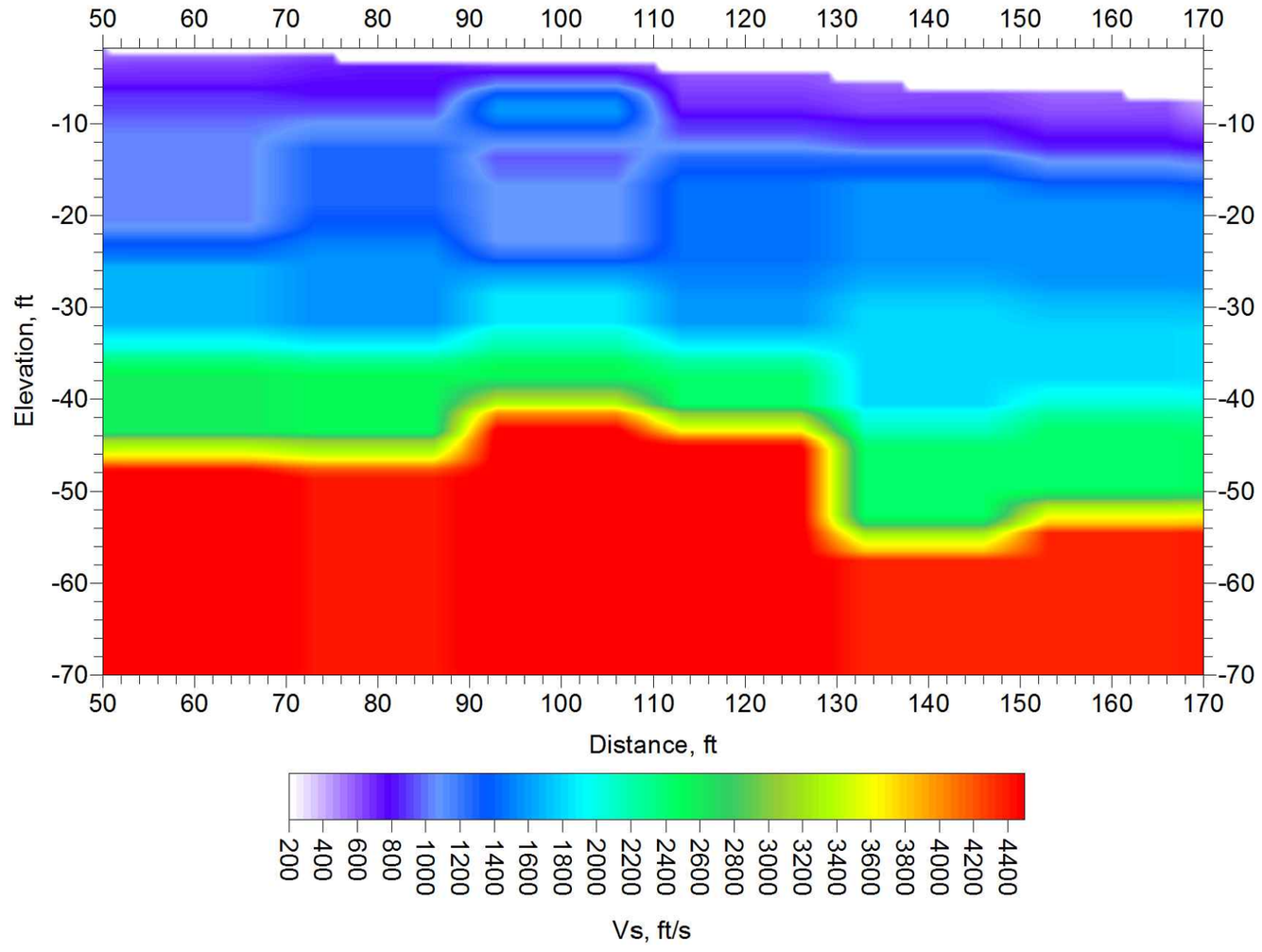
B-4b

CONSTRUCTION MATERIALS ENGINEERS, INC.

APPENDIX C

Line 1: Vs Model





REMI LINE 1-1 DIMENSIONAL PROFILE

N.T.S

REMI LINE 1- 2 DIMENSIONAL PROFILE

N.T.S

CME CONSTRUCTION MATERIALS ENGINEERS INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

SHAW ENGINEERING
FLEISH PENSTOCK REPLACEMENT
REMI LINE 1
WASHOE COUNTY, NEVADA

PROJECT NO.: 1858 DATE: 5/2/2016

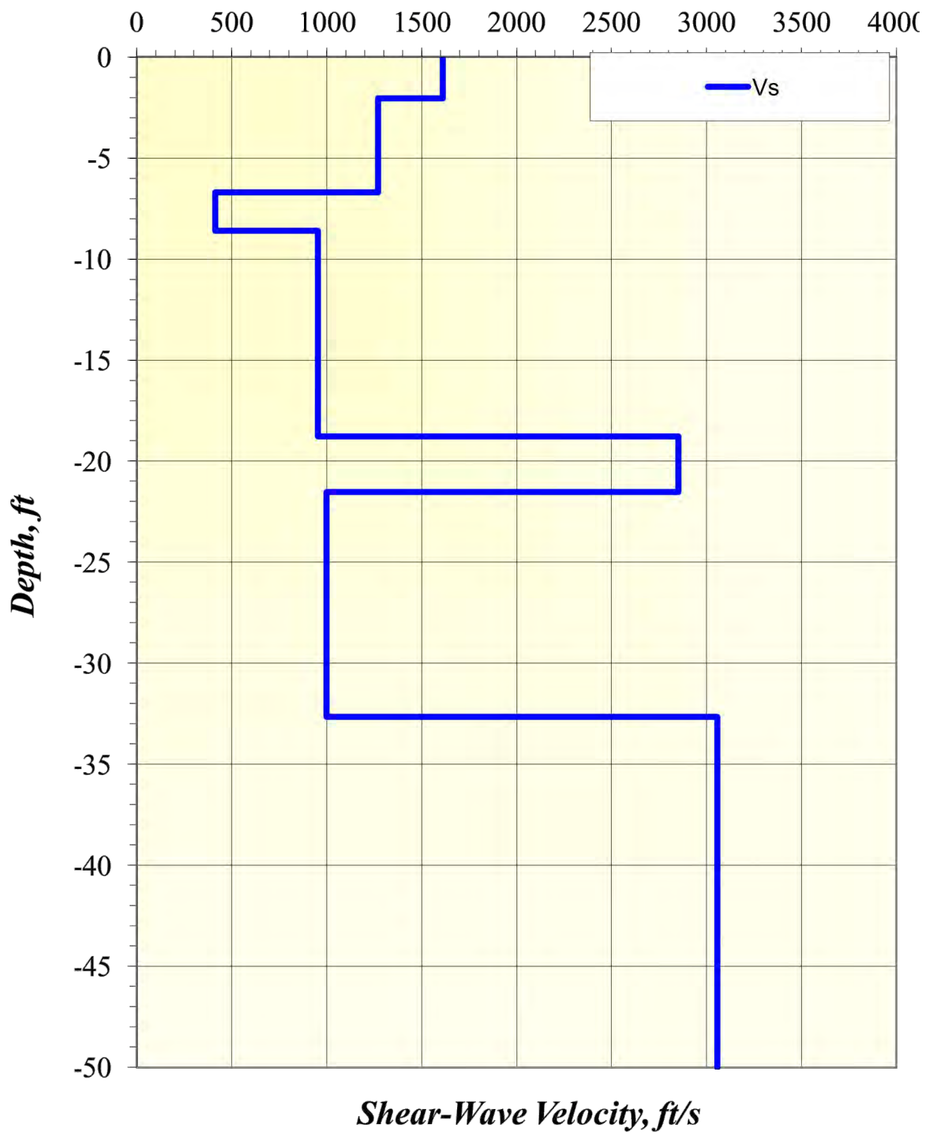
LEGEND

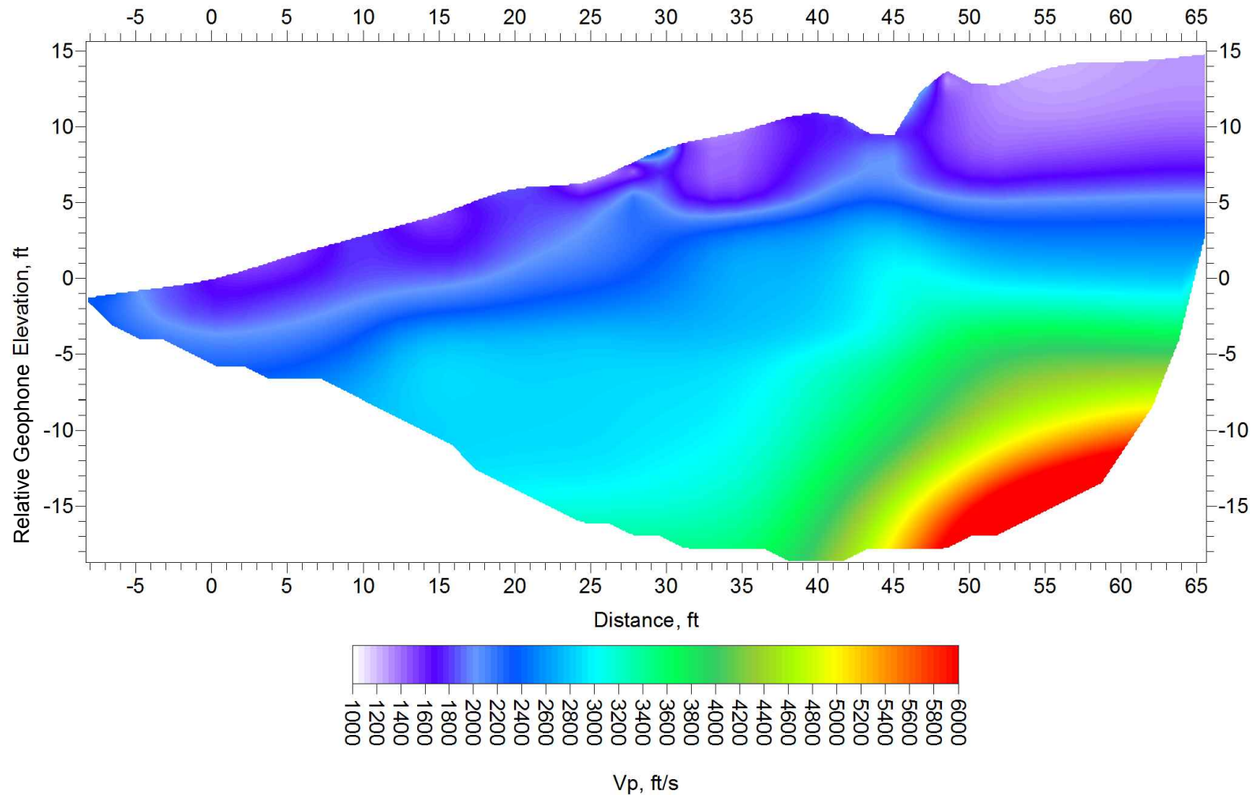
PLATE

C-1

V:\Active\1858\DRAWINGS\PLATES revised 4-26-16.dwg

Line 2: Vs Model





REMI LINE 2-1 DIMENSIONAL PROFILE

N.T.S

REFRACTION LINE 1- 2 DIMENSIONAL PROFILE

N.T.S

CME CONSTRUCTION MATERIALS ENGINEERS INC.

6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

SHAW ENGINEERING
FLEISH PENSTOCK REPLACEMENT
REMI LINE 2 (1-D PROFILE), REFRACTION LINE 1 (2-D PROFILE)
WASHOE COUNTY, NEVADA

PROJECT NO.: 1858 DATE: 5/2/2016

LEGEND

PLATE

C-2

V:\Active\1858\DRAWINGS\PLATES revised 4-26-16.dwg

CONSTRUCTION MATERIALS ENGINEERS, INC.

APPENDIX D

USGS Design Maps Summary Report

User-Specified Input

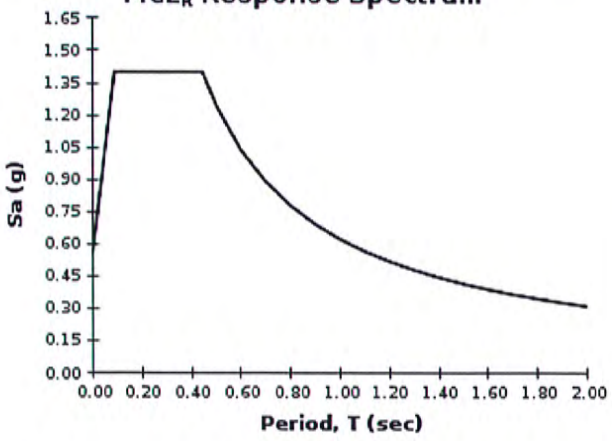
Report Title	Fleish penstock replacement Wed April 6, 2016 21:32:00 UTC
Building Code Reference Document	ASCE 7-10 Standard (which utilizes USGS hazard data available in 2008)
Site Coordinates	39.481°N, 119.9923°W
Site Soil Classification	Site Class C – "Very Dense Soil and Soft Rock"
Risk Category	I/II/III

USGS-Provided Output

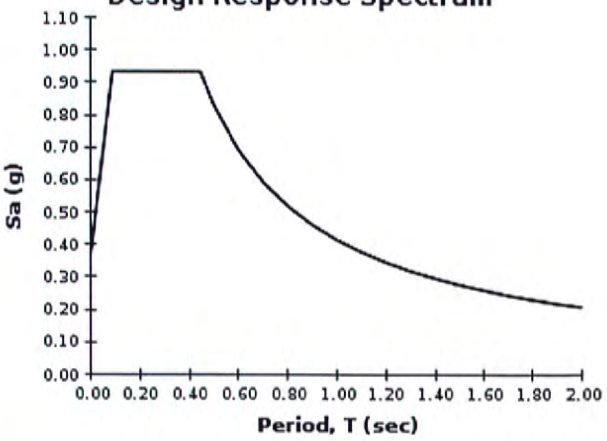
S_S =	1.401 g	S_{MS} =	1.401 g	S_{DS} =	0.934 g
S_1 =	0.467 g	S_{M1} =	0.623 g	S_{D1} =	0.415 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.

MCE_R Response Spectrum



Design Response Spectrum



For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

USGS Design Maps Detailed Report

ASCE 7-10 Standard (39.481°N, 119.9923°W)

Site Class C – "Very Dense Soil and Soft Rock", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_s) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1] S_s = 1.401 g

From Figure 22-2 [2] S_1 = 0.467 g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class C, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index PI > 20, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\bar{s}_u$ < 500 psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk-Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4-1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \leq 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \geq 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_S

For Site Class = C and S_S = 1.401 g, F_a = 1.000

Table 11.4-2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1-s Period				
	$S_1 \leq 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \geq 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = C and S_1 = 0.467 g, F_v = 1.333

Equation (11.4–1): $S_{MS} = F_a S_S = 1.000 \times 1.401 = 1.401$ g

Equation (11.4–2): $S_{M1} = F_v S_1 = 1.333 \times 0.467 = 0.623$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

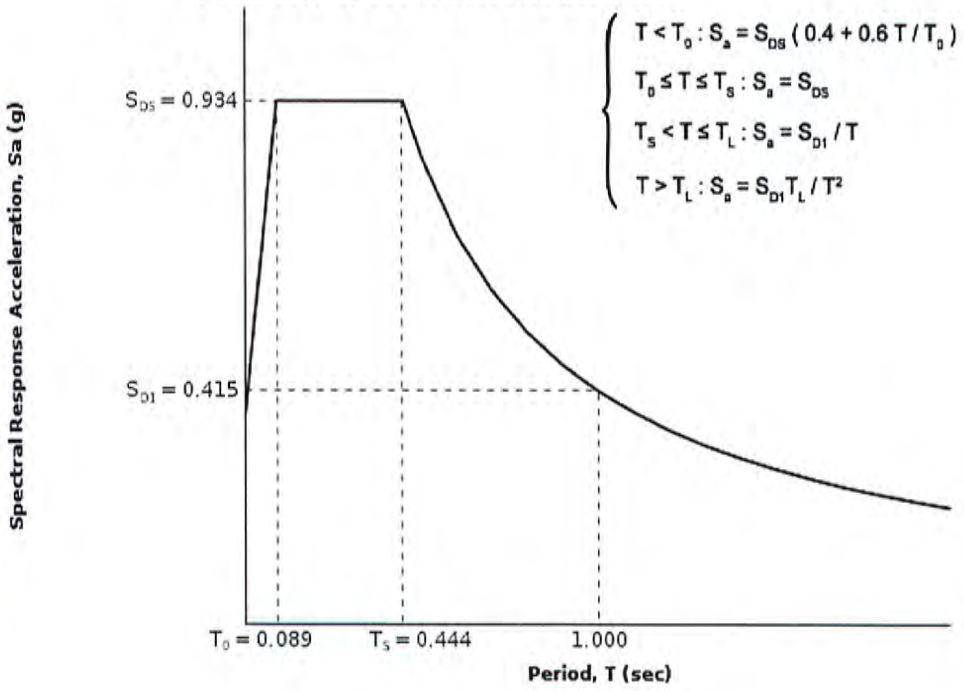
Equation (11.4–3): $S_{DS} = \frac{2}{3} S_{MS} = \frac{2}{3} \times 1.401 = 0.934$ g

Equation (11.4–4): $S_{D1} = \frac{2}{3} S_{M1} = \frac{2}{3} \times 0.623 = 0.415$ g

Section 11.4.5 — Design Response Spectrum

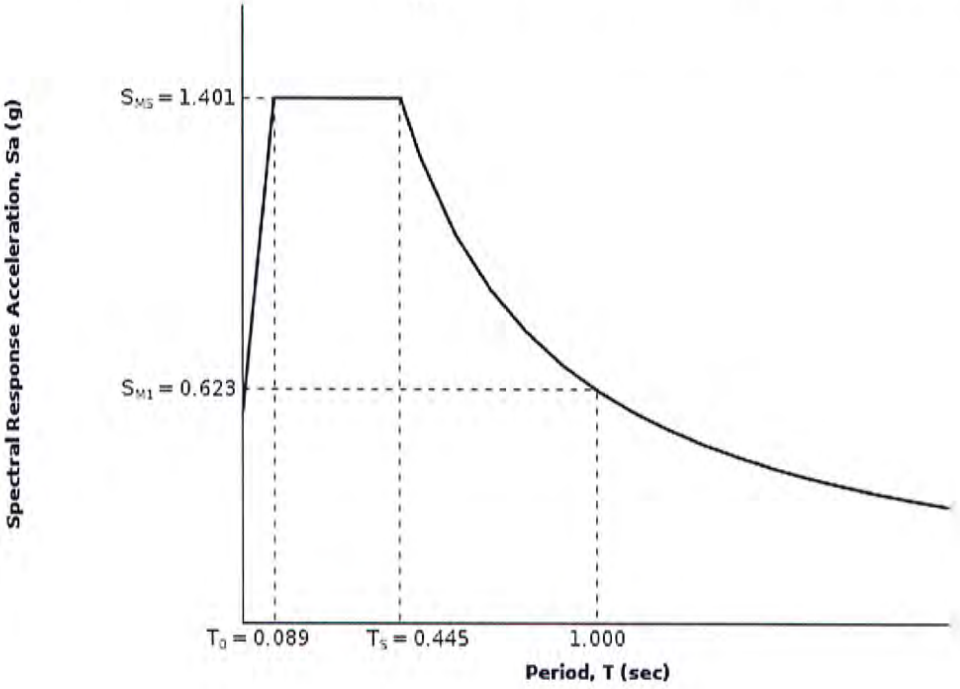
From Figure 22-12 [3] $T_L = 6$ seconds

Figure 11.4–1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7[4] PGA = 0.500

Equation (11.8-1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.500 = 0.5$ g

Table 11.8-1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of PGA

For Site Class = C and PGA = 0.500 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17[5] C_{RS} = 0.986

From Figure 22-18[6] C_{R1} = 0.971

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 0.934 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.415 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = D

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: http://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

CME CONSTRUCTION MATERIALS ENGINEERS, INC.

APPENDIX E

TMWA Penstock Replacement

PROJECT IDENTIFICATION

Title: TMWA Penstock Replacement
Project Number: 1858 -
Client: Shaw Engineering
Designer: Randy Reynolds

Description:
Static analysis with surcharge load

Company's information:

Name: CME
Street:

Telephone #:
Fax #:
E-Mail:

Original file path and name: V:\Active\ ..... enstock profile access road moved 15 feet east.MSE
Original date and time of creating this file: Fri May 06 08:13:38 2016

PROGRAM MODE: Analysis of a General Slope using NO reinforcement material.

INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ^{3}]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ^{2}]
....1.....Uppermost alluvium layer	125.0	34.0	400.0
....2.....Glacial Outwash deposit.....	135.0	38.0	100.0
....3.....granitic bedrock.....	145.0	42.0	10000.0

REINFORCEMENT

Analysis of slope WITHOUT reinforcement.

WATER

Water is not present

SEISMICITY

Not Applicable

DRAWING OF SPECIFIED GEOMETRY - GENERAL - Quick Input

-- Problem geometry is defined along sections selected by user at x,y coordinates.
-- X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.

GEOMETRY

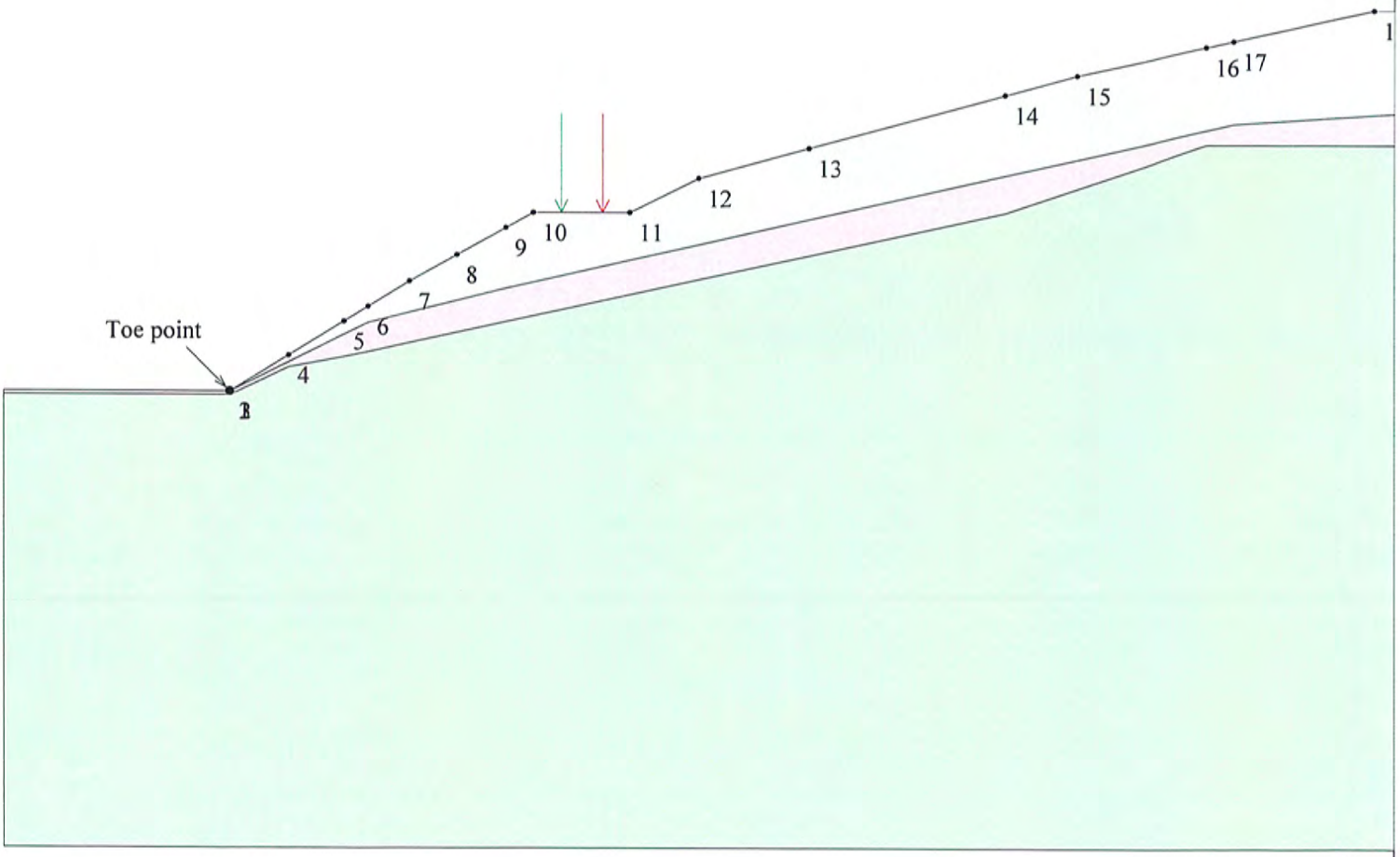
Soil profile contains 3 layers (see details in next page)

UNIFORM SURCHARGE

Load Q1 = 7000.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X1s = 376.00 and ends at X1e = 377.50 [ft].
Load Q2 = 7000.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X2s = 382.00 and ends at X2e = 383.50 [ft].
Surcharge load, Q3 .....None

STRIP LOAD

.....None.....



SCALE:

0246 [ft]

TABULATED DETAILS OF QUICK SPECIFIED GEOMETRY

Soil profile contains 3 layers. Coordinates in [ft.]

	#	Xi	Yi
Top of Layer 1	1	328.00	394.00
	2	354.00	410.00
	3	372.00	420.00
	4	386.00	420.00
	5	396.00	425.00
	6	451.00	440.00
	7	474.00	445.00
	8	494.50	449.50
Top of Layer 2	9	328.00	394.00
	10	348.00	404.00
	11	368.00	409.00
	12	412.00	419.00
	13	474.00	433.00
	14	504.00	435.00
Top of Layer 3	15	328.08	393.50
	16	336.50	397.50
	17	344.49	399.00
	18	440.50	420.00
	19	470.00	430.00

TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 3 layers. Coordinates in [ft.]

#	X	Y1	Y2	Y3
1	328.00	394.00	394.00	393.50
2	328.08	394.05	394.04	393.50
3	328.08	394.05	394.04	393.50
4	336.50	399.23	398.25	397.50
5	344.49	404.15	402.24	399.00
6	348.00	406.31	404.00	399.77
7	354.00	410.00	405.50	401.08
8	360.89	413.83	407.22	402.59
9	368.00	417.78	409.00	404.14
10	372.00	420.00	409.91	405.02
11	386.00	420.00	413.09	408.08
12	396.00	425.00	415.36	410.27
13	412.00	429.36	419.00	413.77
14	440.50	437.14	425.44	420.00
15	451.00	440.00	427.81	423.56
16	470.00	444.13	432.10	430.00
17	474.00	445.00	433.00	430.00
18	494.50	449.50	434.37	430.00
19	504.00	449.50	435.00	430.00

RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	376.10	420.00	334.07	397.91	333.46	450.12	52.21	2.28	
2	377.67	420.00	367.90	417.76	371.78	423.24	6.71	1.57	OK
3	379.23	420.00	334.00	397.89	329.75	463.90	66.15	1.67	
4	380.79	420.00	337.88	400.09	342.03	447.34	47.43	1.76	
5	382.35	420.00	339.44	401.20	343.89	449.42	48.43	1.71	
6	383.92	420.00	335.95	399.01	337.22	461.40	62.40	1.69	
7	385.48	420.00	334.09	397.90	330.18	477.80	79.99	1.72	
8	387.04	420.52	334.11	397.90	330.03	480.71	82.90	1.76	
9	388.60	421.30	332.42	396.80	313.64	516.54	121.20	1.82	
10	390.16	422.08	333.93	397.86	318.45	511.18	114.37	1.88	
11	391.73	422.86	334.13	397.90	327.83	491.36	93.67	1.86	
12	393.29	423.64	332.42	396.80	308.51	533.44	138.71	1.91	
13	394.85	424.43	333.98	397.86	317.35	519.01	122.28	1.95	
14	396.41	425.11	335.95	398.99	324.66	508.13	109.73	2.01	
15	397.98	425.54	337.87	400.09	339.30	480.42	80.34	2.10	
16	399.54	425.96	337.86	400.09	339.35	483.00	82.92	2.18	
17	401.10	426.39	332.51	396.81	304.53	556.03	161.66	2.16	
18	402.66	426.82	334.04	397.86	305.60	561.05	165.64	2.25	
19	404.23	427.24	332.54	396.82	302.58	567.08	172.88	2.31	
20	405.79	427.67	334.15	397.89	316.85	540.57	143.72	2.31	
21	407.35	428.10	332.57	396.83	300.59	578.35	184.31	2.41	
22	408.91	428.52	332.59	396.83	299.59	584.05	190.11	2.42	
23	410.48	428.95	331.77	396.69	298.57	589.81	195.96	2.45	
24	412.04	429.37	332.44	396.79	272.71	656.25	266.25	2.45	
25	413.60	429.80	332.58	396.83	289.45	618.84	226.16	2.51	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	326.95	394.01	383.92	420.00	328.56	465.91	71.92	10.34	
2	328.61	394.49	377.67	420.00	257.65	590.88	208.81	2.07	
3	330.53	395.65	383.92	420.00	265.97	607.89	221.84	1.87	
4	332.37	396.79	383.92	420.00	315.91	502.21	106.69	1.69	
5	334.05	397.91	377.67	420.00	332.36	455.34	57.46	1.64	
6	335.95	399.00	377.67	420.00	335.20	452.43	53.43	1.66	
7	337.62	400.09	377.67	420.00	337.90	449.76	49.67	1.70	
8	339.46	401.21	377.67	420.00	344.90	438.39	37.58	1.66	
9	341.39	402.27	377.67	420.00	345.94	438.95	36.95	1.67	
10	342.96	403.38	377.67	420.00	346.46	440.61	37.40	1.68	
11	344.75	404.50	377.67	420.00	352.19	431.40	27.91	1.72	
12	346.52	405.58	383.92	420.00	354.70	440.05	35.43	1.73	
13	348.13	406.69	383.92	420.00	355.37	441.97	36.02	1.79	
14	349.90	407.85	383.92	420.00	360.28	432.49	26.73	1.83	
15	351.75	408.89	383.92	420.00	361.14	433.82	26.64	1.84	
16	353.70	409.88	377.67	420.00	355.79	438.37	28.57	1.89	
17	355.33	410.88	377.67	420.00	357.02	438.66	27.82	1.92	
18	357.19	411.91	377.67	420.00	362.95	427.28	16.42	1.92	
19	359.04	412.85	377.67	420.00	363.65	428.69	16.49	1.86	
20	360.85	413.82	377.67	420.00	365.86	426.17	13.32	1.81	
21	362.57	414.83	377.67	420.00	367.56	424.89	11.23	1.74	
22	364.37	415.79	377.67	420.00	369.11	423.93	9.42	1.69	
23	366.10	416.80	377.67	420.00	370.49	423.42	7.95	1.62	
24	367.90	417.76	377.67	420.00	371.78	423.24	6.71	1.57	OK
25	369.68	418.74	377.67	420.00	373.22	422.24	4.98	1.60	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

Minimum Factor of Safety = 1.57

Critical Circle: Xc = 371.78[ft], Yc = 423.24[ft], R = 6.71[ft]. (Number of slices used = 51)

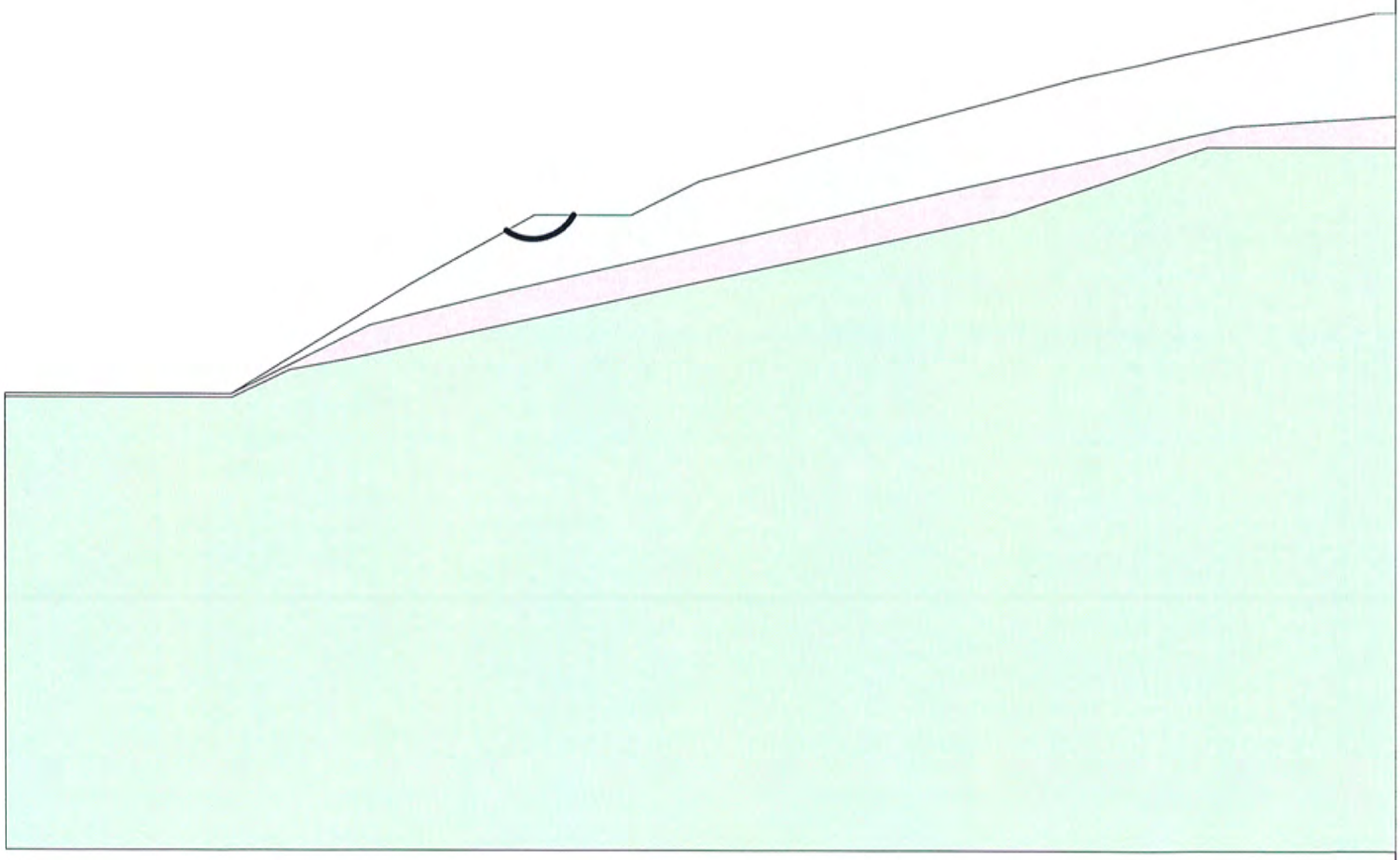
Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

N O T C O N D U C T E D

Three-Part Wedge Stability Analysis

N O T C O N D U C T E D

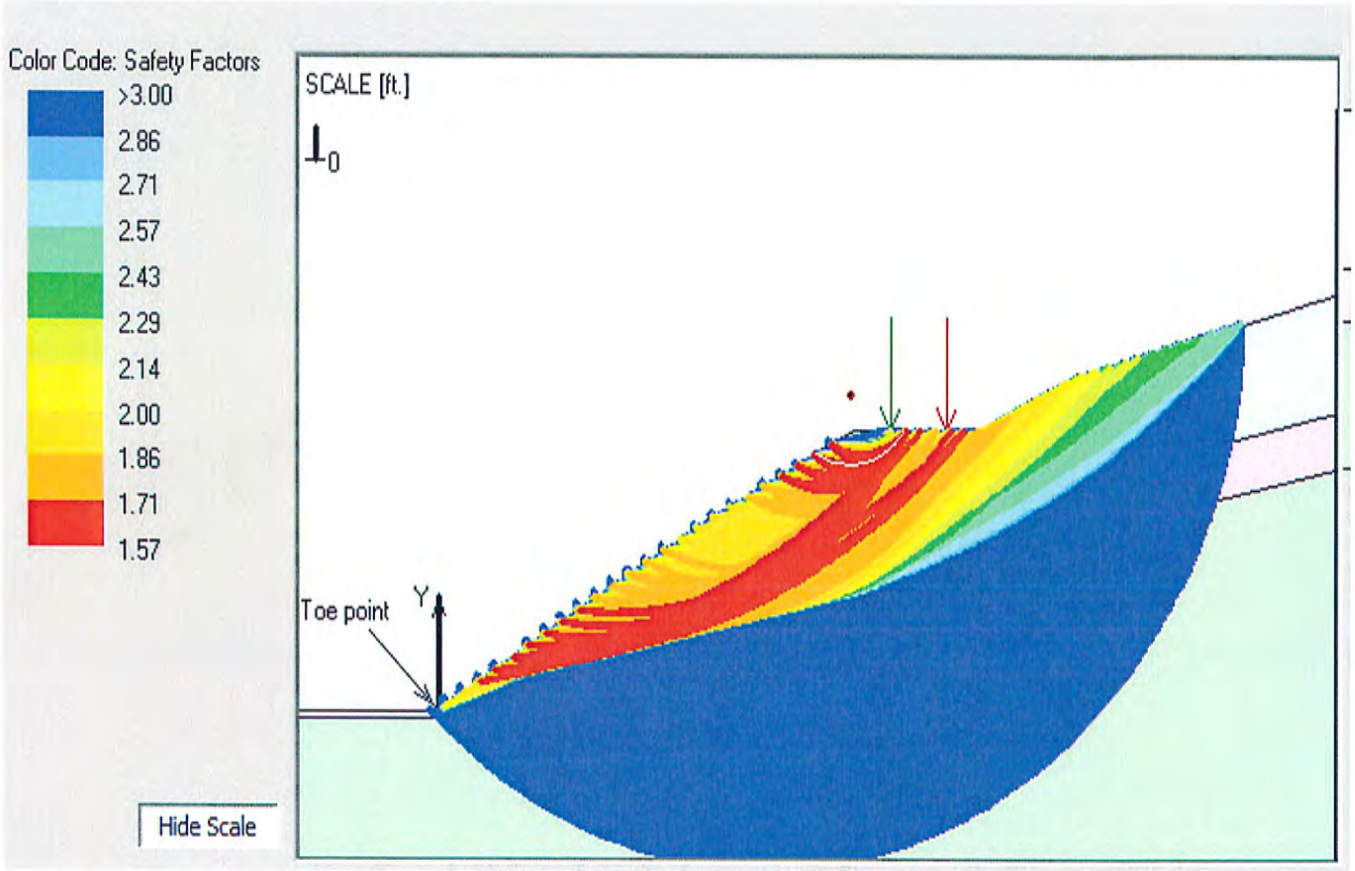
REINFORCEMENT LAYOUT: DRAWING



SCALE:

0246[ft]

SAFETY MAP: BISHOP ROTATIONAL ANALYSIS MODE



TMWA Penstock Replacement

PROJECT IDENTIFICATION

Title: TMWA Penstock Replacement
Project Number: 1858 -
Client: Shaw Engineering
Designer: Randy Reynolds

Description:
Seismic analysis with surcharge load

Company's information:

Name: CME
Street:
,
Telephone #:
Fax #:
E-Mail:

Original file path and name: V:\Active\ ..... enstock profile access road moved 15 feet east.MSE
Original date and time of creating this file: Fri May 06 08:13:38 2016

PROGRAM MODE: Analysis of a General Slope using NO reinforcement material.

INPUT DATA (EXCLUDING REINFORCEMENT LAYOUT)

SOIL DATA

========== Soil Layer #: ==========	Unit weight, γ [lb/ft ^{3}]	Internal angle of friction, ϕ [deg.]	Cohesion, c [lb/ft ^{2}]
....1.....Uppermost alluvium layer	125.0	34.0	400.0
....2.....Glacial Outwash deposit.....	135.0	38.0	100.0
....3.....granitic bedrock.....	145.0	42.0	10000.0

REINFORCEMENT

Analysis of slope WITHOUT reinforcement.

WATER

Water is not present

SEISMICITY

Horizontal peak ground acceleration coefficient, Ao = 0.500
Design horizontal seismic coefficient, kh = Am = 0.50 x Ao = 0.250 & design vertical seismic coefficient, kv (down) = 0.000 x kh = 0.000

DRAWING OF SPECIFIED GEOMETRY - GENERAL - Quick Input

-- Problem geometry is defined along sections selected by user at x,y coordinates.
-- X1,Y1 represents the coordinates of soil surface. X2,Y2 represent the coordinates of the end of soil layer 1 and start of soil layer 2, and so on.

GEOMETRY

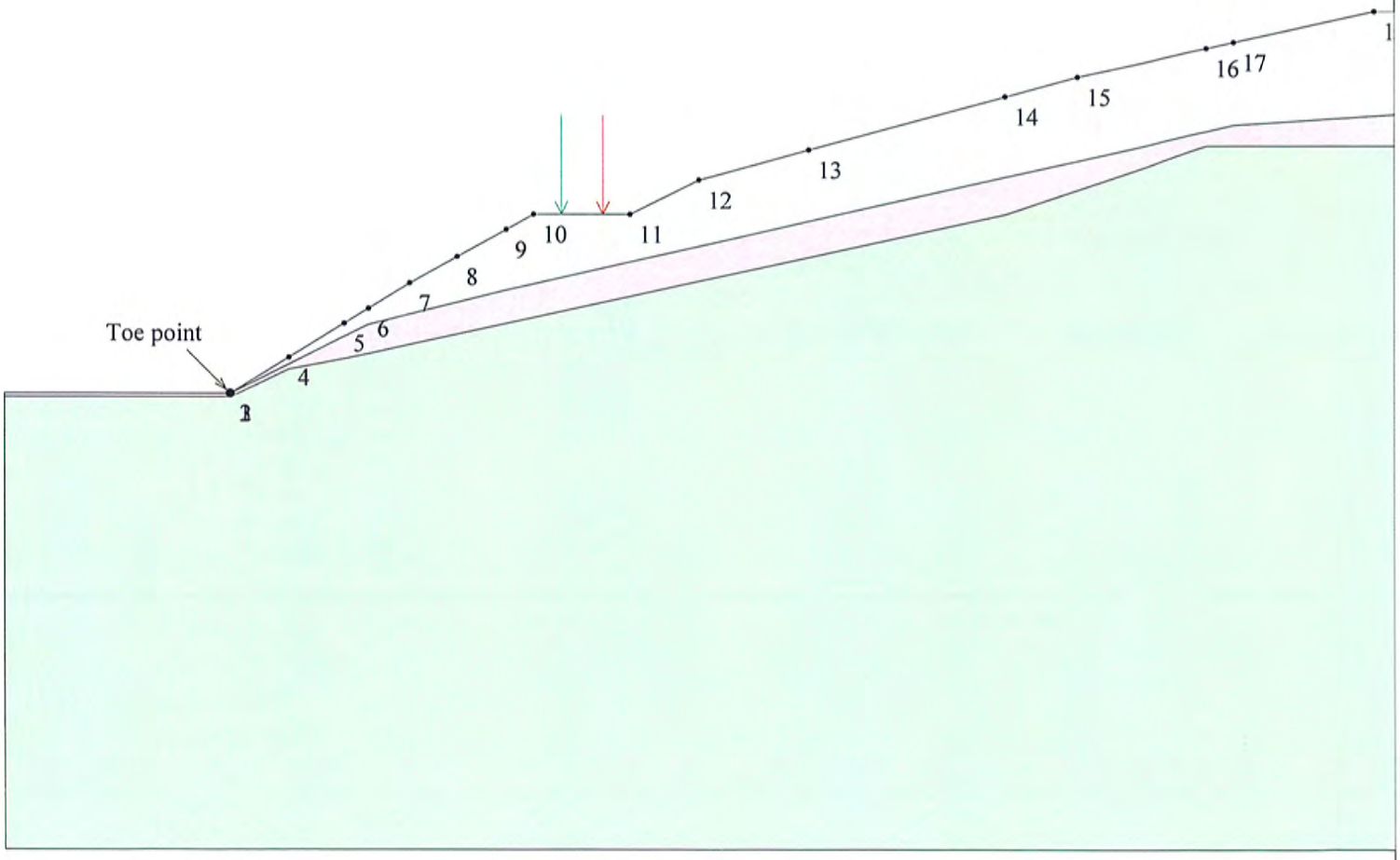
Soil profile contains 3 layers (see details in next page)

UNIFORM SURCHARGE

Load Q1 = 7000.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X1s = 376.00 and ends at X1e = 377.50 [ft].
Load Q2 = 7000.00 [lb/ft²] inclined from verical at 0.00 degrees, starts at X2s = 382.00 and ends at X2e = 383.50 [ft].
Surcharge load, Q3.....None

STRIP LOAD

.....None.....



SCALE:

0246[ft]

TABULATED DETAILS OF QUICK SPECIFIED GEOMETRY

Soil profile contains 3 layers. Coordinates in [ft.]

	#	Xi	Yi
Top of Layer 1	1	328.00	394.00
	2	354.00	410.00
	3	372.00	420.00
	4	386.00	420.00
	5	396.00	425.00
	6	451.00	440.00
	7	474.00	445.00
	8	494.50	449.50
Top of Layer 2	9	328.00	394.00
	10	348.00	404.00
	11	368.00	409.00
	12	412.00	419.00
	13	474.00	433.00
	14	504.00	435.00
Top of Layer 3	15	328.08	393.50
	16	336.50	397.50
	17	344.49	399.00
	18	440.50	420.00
	19	470.00	430.00

TABULATED DETAILS OF SPECIFIED GEOMETRY

Soil profile contains 3 layers. Coordinates in [ft.]

#	X	Y1	Y2	Y3
1	328.00	394.00	394.00	393.50
2	328.08	394.05	394.04	393.50
3	328.08	394.05	394.04	393.50
4	336.50	399.23	398.25	397.50
5	344.49	404.15	402.24	399.00
6	348.00	406.31	404.00	399.77
7	354.00	410.00	405.50	401.08
8	360.89	413.83	407.22	402.59
9	368.00	417.78	409.00	404.14
10	372.00	420.00	409.91	405.02
11	386.00	420.00	413.09	408.08
12	396.00	425.00	415.36	410.27
13	412.00	429.36	419.00	413.77
14	440.50	437.14	425.44	420.00
15	451.00	440.00	427.81	423.56
16	470.00	444.13	432.10	430.00
17	474.00	445.00	433.00	430.00
18	494.50	449.50	434.37	430.00
19	504.00	449.50	435.00	430.00

RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each entry point (considering all specified exit points)

Entry Point #	Entry Point (X, Y) [ft]		Exit Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	376.10	420.00	334.07	397.91	333.46	450.12	52.21	1.45	
2	377.67	420.00	334.09	397.91	333.40	453.31	55.40	1.19	OK
3	379.23	420.00	334.00	397.89	329.75	463.90	66.15	1.22	
4	380.79	420.00	337.88	400.09	342.03	447.34	47.43	1.26	
5	382.35	420.00	335.95	399.01	338.12	456.00	57.03	1.25	
6	383.92	420.00	335.95	399.01	337.22	461.40	62.40	1.23	
7	385.48	420.00	334.09	397.90	330.18	477.80	79.99	1.25	
8	387.04	420.52	334.11	397.90	330.03	480.71	82.90	1.28	
9	388.60	421.30	335.95	399.01	336.13	471.89	72.89	1.31	
10	390.16	422.08	334.11	397.90	327.99	489.15	91.46	1.36	
11	391.73	422.86	334.13	397.90	327.83	491.36	93.67	1.34	
12	393.29	423.64	334.15	397.90	327.68	493.58	95.89	1.38	
13	394.85	424.43	334.13	397.90	325.37	500.70	103.17	1.41	
14	396.41	425.11	334.18	397.91	327.35	498.32	100.64	1.43	
15	397.98	425.54	334.20	397.91	327.11	501.68	104.02	1.48	
16	399.54	425.96	332.54	396.82	309.83	540.62	145.58	1.50	
17	401.10	426.39	332.55	396.82	309.04	545.57	150.60	1.50	
18	402.66	426.82	334.21	397.90	323.87	517.87	120.41	1.52	
19	404.23	427.24	334.23	397.91	323.55	521.56	124.11	1.54	
20	405.79	427.67	334.24	397.91	323.23	525.27	127.84	1.55	
21	407.35	428.10	334.26	397.91	322.90	529.00	131.58	1.56	
22	408.91	428.52	334.23	397.90	319.38	540.52	143.39	1.59	
23	410.48	428.95	334.25	397.91	318.95	544.58	147.47	1.59	
24	412.04	429.37	334.27	397.91	318.52	548.66	151.57	1.57	
25	413.60	429.80	334.28	397.91	318.09	552.76	155.69	1.60	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-entry' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

RESULTS OF ROTATIONAL STABILITY ANALYSIS

Results in the tables below represent critical circles identified between specified points on entry and exit. (Theta-exit set to 50.00 deg.) The most critical circle is obtained from a search considering all the combinations of input entry and exit points.

Critical circles for each exit point (considering all specified entry points).

Exit Point #	Exit Point (X, Y) [ft]		Entry Point (X, Y) [ft]		Critical Circle (Xc, Yc, R) [ft]			Fs	STATUS
1	326.95	394.01	383.92	420.00	328.56	465.91	71.92	7.94	
2	328.61	394.49	377.67	420.00	257.65	590.88	208.81	1.57	
3	330.53	395.65	383.92	420.00	265.97	607.89	221.84	1.44	
4	332.37	396.79	383.92	420.00	315.91	502.21	106.69	1.26	
5	334.09	397.91	377.67	420.00	333.40	453.31	55.40	1.19	OK
6	335.95	399.01	377.67	420.00	337.82	447.25	48.27	1.21	
7	337.55	400.11	377.67	420.00	339.52	446.52	46.46	1.24	
8	339.46	401.21	377.67	420.00	344.90	438.39	37.58	1.23	
9	341.39	402.27	377.67	420.00	345.94	438.95	36.95	1.24	
10	342.96	403.38	377.67	420.00	347.00	439.49	36.34	1.27	
11	344.75	404.50	377.67	420.00	352.19	431.40	27.91	1.30	
12	346.52	405.58	383.92	420.00	354.70	440.05	35.43	1.34	
13	348.13	406.69	383.92	420.00	355.37	441.97	36.02	1.40	
14	349.90	407.85	383.92	420.00	360.28	432.49	26.73	1.43	
15	351.75	408.90	383.92	420.00	361.38	433.14	26.09	1.47	
16	353.70	409.93	383.92	420.00	364.23	428.70	21.52	1.55	
17	355.40	410.96	383.92	420.00	365.31	429.19	20.75	1.58	
18	357.19	411.91	377.67	420.00	362.95	427.28	16.42	1.60	
19	359.04	412.85	377.67	420.00	363.65	428.69	16.49	1.58	
20	360.85	413.82	377.67	420.00	365.86	426.17	13.32	1.56	
21	362.57	414.83	377.67	420.00	367.56	424.89	11.23	1.54	
22	364.37	415.79	377.67	420.00	369.11	423.93	9.42	1.51	
23	366.10	416.80	377.67	420.00	370.49	423.42	7.95	1.48	
24	367.90	417.76	377.67	420.00	371.78	423.24	6.71	1.47	
25	369.68	418.74	377.67	420.00	373.22	422.24	4.98	1.52	

Note: In the 'Status' column, OK means the critical circle was identified within the specified search domain. 'On extreme X-exit' means that the critical result is on the edge of the search domain; a lower Fs may result if the search domain is expanded.

CRITICAL RESULTS OF ROTATIONAL AND TRANSLATIONAL STABILITY ANALYSES

Rotational (Circular Arc; Bishop) Stability Analysis

Minimum Factor of Safety = 1.19

Critical Circle: Xc = 333.40[ft], Yc = 453.31[ft], R = 55.40[ft]. (Number of slices used = 56)

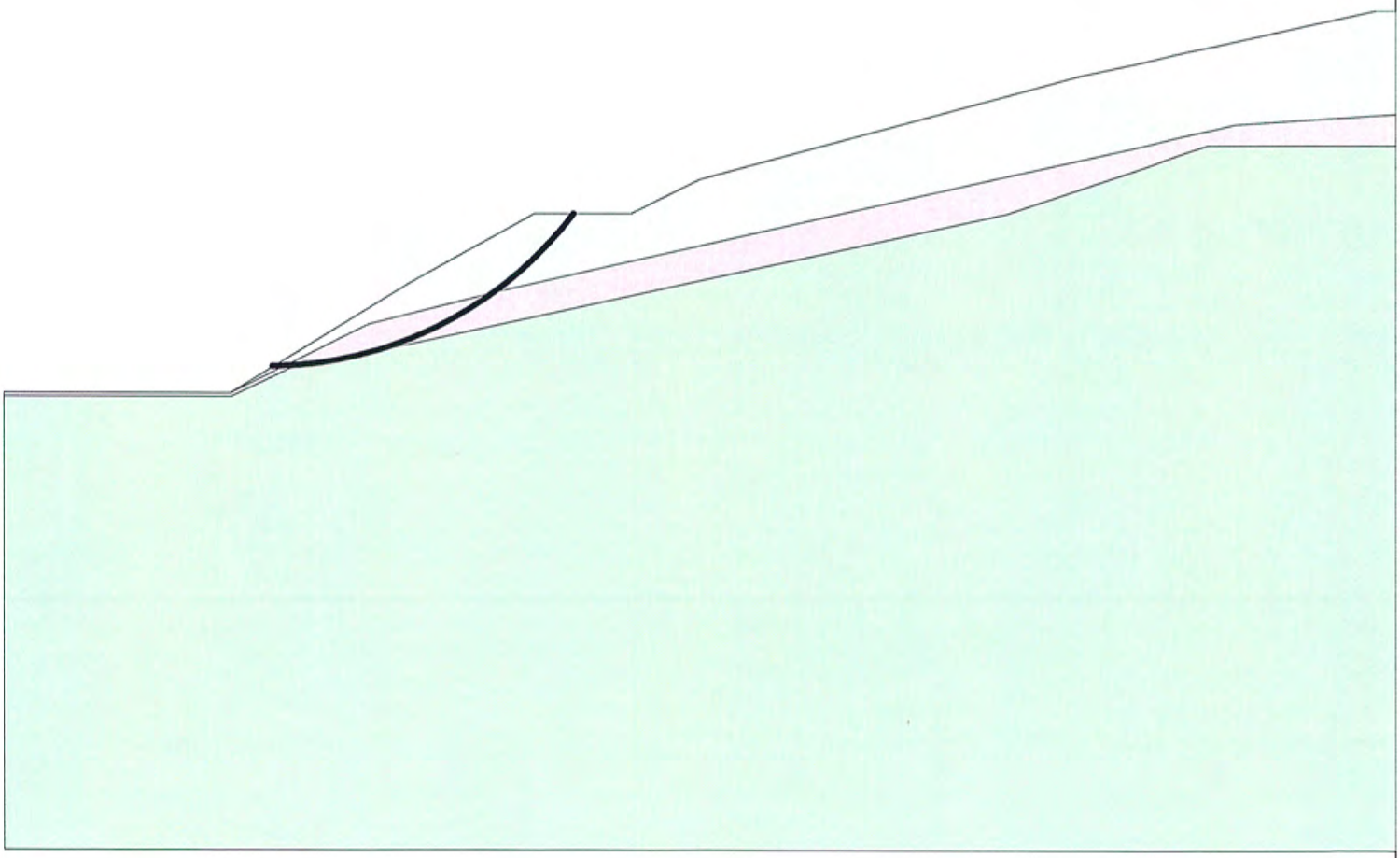
Translational (2-Part Wedge; Spencer), Direct Sliding, Stability Analysis

N O T C O N D U C T E D

Three-Part Wedge Stability Analysis

N O T C O N D U C T E D

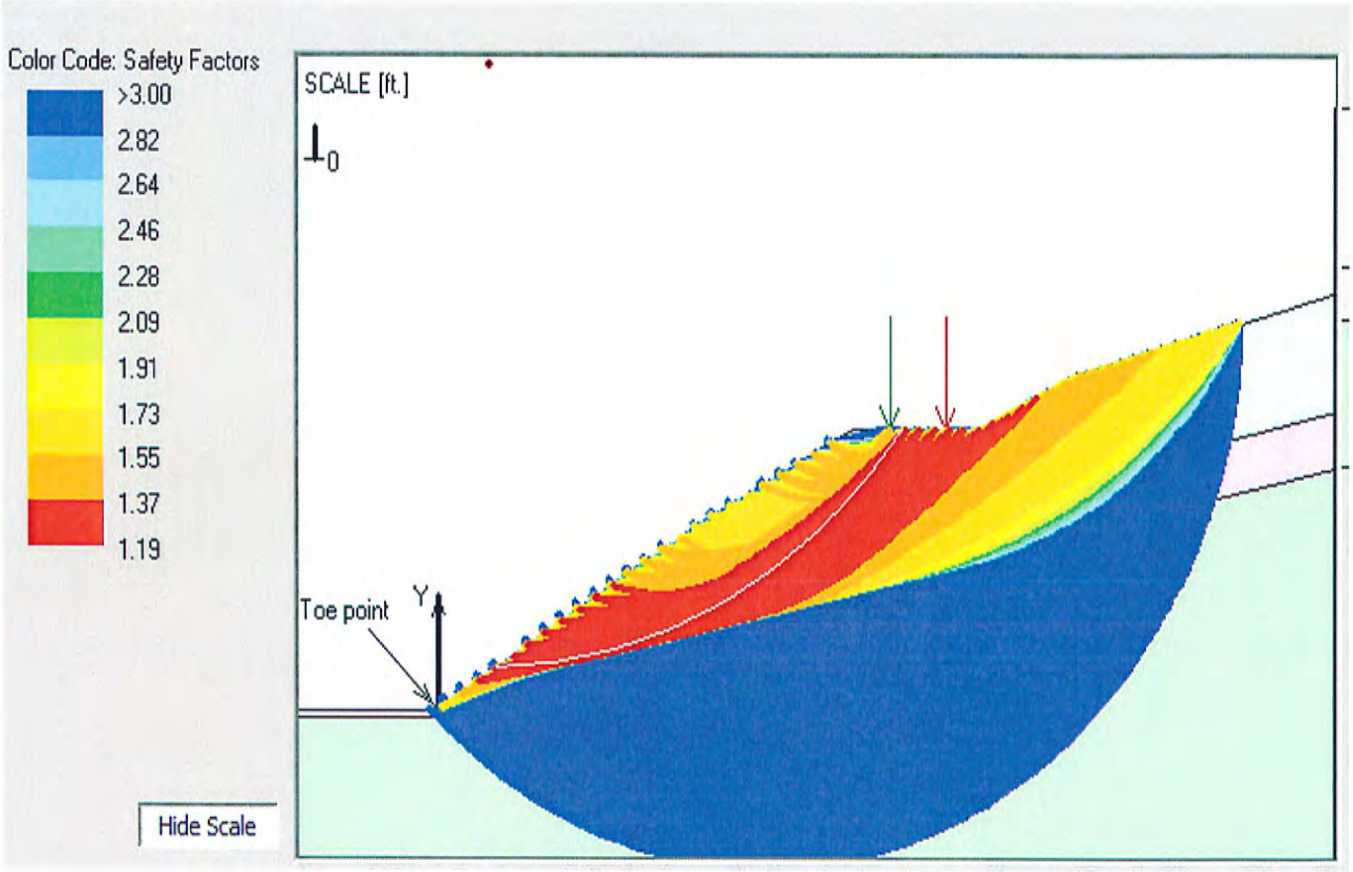
REINFORCEMENT LAYOUT: DRAWING



SCALE:

0246[ft]

SAFETY MAP: BISHOP ROTATIONAL ANALYSIS MODE



CME CONSTRUCTION MATERIALS ENGINEERS, INC.
6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

July 21, 2016
Project No: 1858
Addendum 1

Mr. Paul Winkelman, P.E.
SHAW ENGINEERING
Reno, Nevada 89503

RE: Geotechnical Investigation
TMWA Fleish Penstock Waterline Replacement
Fleish, Washoe County, Nevada

Dear Mr. Winkelman,

Presented herein is an addendum to our geotechnical investigation, dated May 31, 2016, for the proposed TMWA Fleish Penstock Waterline Replacement located in Fleish, Washoe County, Nevada. The purpose of this addendum is to provide foundation grade soil preparation recommendations for the Flow Meter foundations and the RCB wing wall foundations.

FLOW METER FOUNDATIONS

Based on the current plans, dated July 2016, Flow Meter foundation grade elevations vary from 5012.2 feet to 5015 feet. Based on the existing grading plans, the west side of the Flow Meter is located overlying fill soils directly over the RCB. The east side of the Flow Meter Box is located overlying shallow cut soils. The geologic profile in this area is anticipated to consist of shallow fill soils overlying native loose to medium dense silty sands.

It is recommended that Flow Meter foundations bear directly on at least 1 foot of structural fill prepared in accordance with recommendations provided in the referenced geotechnical investigation. Existing fill soils as well as the uppermost 2 feet of the native soil profile shall be removed below foundations. Removal shall extend laterally at least 2 feet beyond the edge of the foundation. Consequently, structural fill thicknesses below foundations may be thicker than 1 foot and will be based on the soil profile encountered.

Since the Flow Meter structure straddles the proposed penstock and the penstock will be constructed prior to the Flow Meter, removal of existing fill soils and the uppermost 2 feet of the native soil profile will likely be completed with the installation of the Penstock. It is recommended that foundation soils preparation be completed with the Penstock installation. A representative from our firm should inspect foundation soil preparation.

RCB WINGWALL FOUNDATIONS

The RCB will be constructed in Steamboat Ditch. Wing walls will be constructed on both the downstream and upstream sides of the box. Based on current grading plans, foundation grade elevation is about 5003 feet. Based on our field investigation, at proposed foundation grade elevation, foundations should bear on either granitic bedrock or glacial outwash deposits.

Foundations can bear directly on bedrock. If glacial outwash deposits are encountered, it is recommended to place foundations on at least 1 foot of structural fill to create a uniform bearing surface. Voids or surface irregularities created by the excavation process can either be filled by structural fill or additional concrete.

RCB WINGWALL AND FLOW METER FOUNDATION STRUCUTRAL FILL

Structural fill placed below foundations can consist of a 6-inch minus granular native soil free of vegetation, organic matter, and other deleterious material. Structural fill should be placed in maximum 8-inch thick (loose) level lifts or layers and densified to at least 90 percent relative compaction. The required moisture content of the soils, prior to densification, shall range between plus or minus 3 percent of optimum moisture, as determined by moisture-density relationship test results (ASTM D1557). Moisture contents greater than 3 percent of optimum moisture are acceptable if the soil lift is stable and required relative compaction can be attained in the soil lift and succeeding soil lifts.

RETAINING WALL BACKFILL

Retaining wall backfill should be free of vegetation, organic matter, and other deleterious material and shall comply with the material specifications presented in Table 1 (Guideline Specifications for Retaining Wall Backfill).

Table 1 - Guideline Specification for Retaining Wall Backfill

Sieve Size	**Percent by Weight Passing**
6 Inch	100
¾ Inch	70 – 100
No. 40	15 – 60
No. 200	5 – 35
Maximum Liquid Limit	**Maximum Plastic Index**
40	10

Soluble sulfates:< 0.10 percent by weight of soil

Backfill should be placed in maximum 8-inch thick (loose) level lifts or layers and densified to at least 90 percent relative compaction. Over-compaction should be avoided as it will increase the lateral forces exerted on the wall by the soil. Heavy equipment should not be used for placing and/or compacting backfill adjacent to the retaining wall and should be kept a minimum of three feet or at a distance determined by a1H:1V slope away from the base of the wall whichever is greater. Hand compaction equipment should be used adjacent to the wall.

The required moisture content of the soils, prior to densification, shall range between plus or minus 3 percent of optimum moisture, as determined by moisture-density relationship test results (ASTM D1557). Moisture contents greater than 3 percent of optimum moisture are acceptable if the soil lift is stable and required relative compaction can be attained in the soil lift and succeeding soil lifts.

It is understood that weep holes will be used for retaining wall drainage. Drain rock is recommended to be placed directly behind the retaining wall and should have a thickness of at least 12 inches, extending upward behind the retaining wall to 1 foot below finish grade. Drain rock should be encapsulated with non-woven geotextile drainage fabric (refer to Table 2). Drain rock shall meet the requirements of Section 200.03 (SSPWC, 2012) for a Class C backfill.

Table 2 – Drainage Geotextile Minimum Strength and Hydraulic Properties	
Trapezoid Tear Strength (ASTM D 4533)	80 lbs.
Puncture Strength (ASTM D 4833)	80 lbs.
Grab Strength (ASTM D 4632)	200 lbs.
Burst Strength (ASTM D 3786)	250 psi.
Minimum permittivity (ASTM D 4491)	≥ 0.2 sec^{-1}
AOS (ASTM D4751)	≤ 0.25 mm

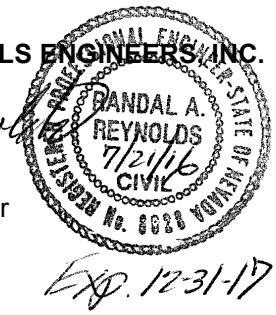
Based on the required use of this geotextile, strength properties are based on Class 1 survivability rating (AASTHO M288). Products such as a Mirafi 180N, or approved equal can be utilized for this project.

Unless stated in this addendum letter, all recommendations presented in our original investigation remain valid.

If you have any questions or require further information, please contact the undersigned.

Sincerely,

CONSTRUCTION MATERIALS ENGINEERS, INC.



Randal A. Reynolds, PE
Senior Geotechnical Engineer
rreynolds@cme-corp.com
Direct: 775-737-7576
Cell: 775-527-3264

EXP. 12-31-17

V:\Active\1858\report\final report\Addendums\Addendum 1 7-21-16.docx