



PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM

Questions and Answers:

P17-013: Tract W1606 Slurry Wall Storage Facility Engineering Design and Construction Administration Services

- 1) The RFP, page 1, mentions a preliminary investigation. Who performed that work? Is there a document describing that work?

The Executive Director's Office of the Platte River Recovery Implementation Program (employees of Headwaters Corporation), with the help of a special advisor and drilling contractors, performed the preliminary investigation. There are a few documents describing various portions of the work. These documents will be made available to the Consultant who wins the contract. But, in short, the site was selected largely because of its existing gravel pit, its proximity to potential water sources (i.e., the Platte River and area drainage ditches), and the existence of a low permeability layer about 30 to 40 ft below grade. Some of these results will be discussed at the pre-proposal meeting and site visit on Tuesday, August 1, 2017.

- 2) On RFP Task 7, reference is made to installing flumes and piezometers. Can we assume the flumes and piezometers can be installed by the construction contractor?

Yes. Please assume that the flumes, piezometers and other measurement equipment necessary for accurate water accounting will be installed by the contractor. The Consultant will be responsible only for the design of the system, as well as oversight during construction.

- 3) Will the diversion from the river to the Peterson Ditch need to be included in the SCADA system? If so will design modification need to be made to the river diversion structure?

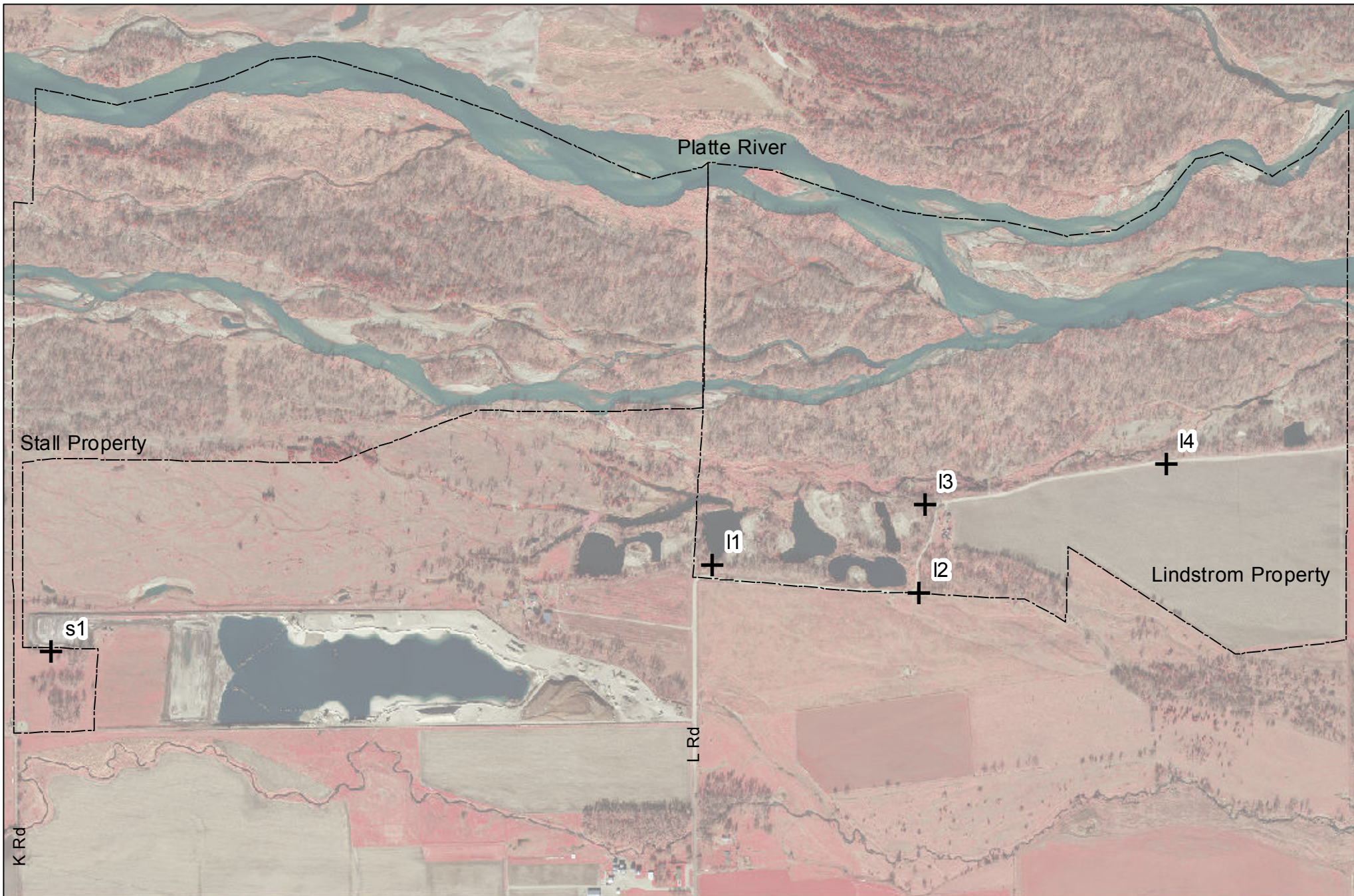
The diversion from the river to the Peterson Ditch is not a part this project. Surface water diversions from the river will be made through the Central Nebraska Public Power and Irrigation District's (CNPPID) system, where it will then be diverted to Program water projects. For purposes of this RFP, the Consultant will only be responsible for diverting surface water from the Peterson Ditch to the slurry wall storage facility (likely through ditches and/or pipes) and diverting surface water from the Platte River to the slurry wall storage facility (likely through a wellfield immediately adjacent to the river's banks). As mentioned in the meeting, please assume that 10-15 cfs will be diverted from the Peterson Ditch and 10-15 cfs will be diverted from the river through a wellfield.

- 4) During the pre-proposal meeting, you mentioned distributing the bore logs in the area of the site. Do you plan on posting them on the PRRIP website (same location as the Q&A)?

Bore logs and geotechnical lab tests from the area are attached to this document. These results are from surrounding properties and were performed to give a general sense of subsurface conditions in the area. Please understand that this campaign was exploratory in nature and





45 *Consultants will need to design and perform their own geotechnical campaign necessary for*
46 *design-level work.*



Lindstrom/Stall Geotechnical Investigation

-DRAFT-

Legend

-  Boreholes
-  Property Boundary

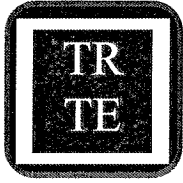
0 750 1,500 Feet



Figure:

5

Date: 1/6/2017



TWIN RIVERS TESTING AND ENVIRONMENTAL, LLC.

602 East Walker Road
North Platte, NE 69101
Phone: (308) 534-5131
Fax: (308) 534-1226

November 17, 2016

Mr. Kevin Werbylo, EIT
Headwaters Corporation
405 Urban Street
Suite 401
Lakewood, CO 80228

Subj: Report of Porosity
P-16-018 Plum Creek
TRTE# 2016-143
Sample L-1, 15ft – 25ft.

REPORT OF POROSITY AND SPECIFIC GRAVITY

Mr. Werbylo,

This report provides the calculated porosity value of the grab sample obtained from Boring location L-1 at the depth of 15 to 25 ft. below grade. The Material was classified as Well Graded Sand, medium to coarse grained. The material was remolded and the compacted unit weight determined in accordance to ASTM D4253 and ASTM D4254. A compaction of 50% of the Relative Density was used in determining the Porosity value.

Data

Remolded Maximum Density	124.6 lbs/ft³
Remolded Minimum Density	108.4 lbs/ft³
Unit weight at 50%	116 lbs/ft³
Apparent Specific Gravity	2.74

Results

SAMPLE	Value
Porosity	0.32

Thank you for choosing Twin Rivers Testing. If you have any questions or concerns, please feel free to call at (308)534-5131.

Sincerely,

Ken Kaskie
Twin Rivers Testing & Environmental LLC

CLIENT HEADWATERS CORP	ARCHITECT/ENGINEER
----------------------------------	--------------------

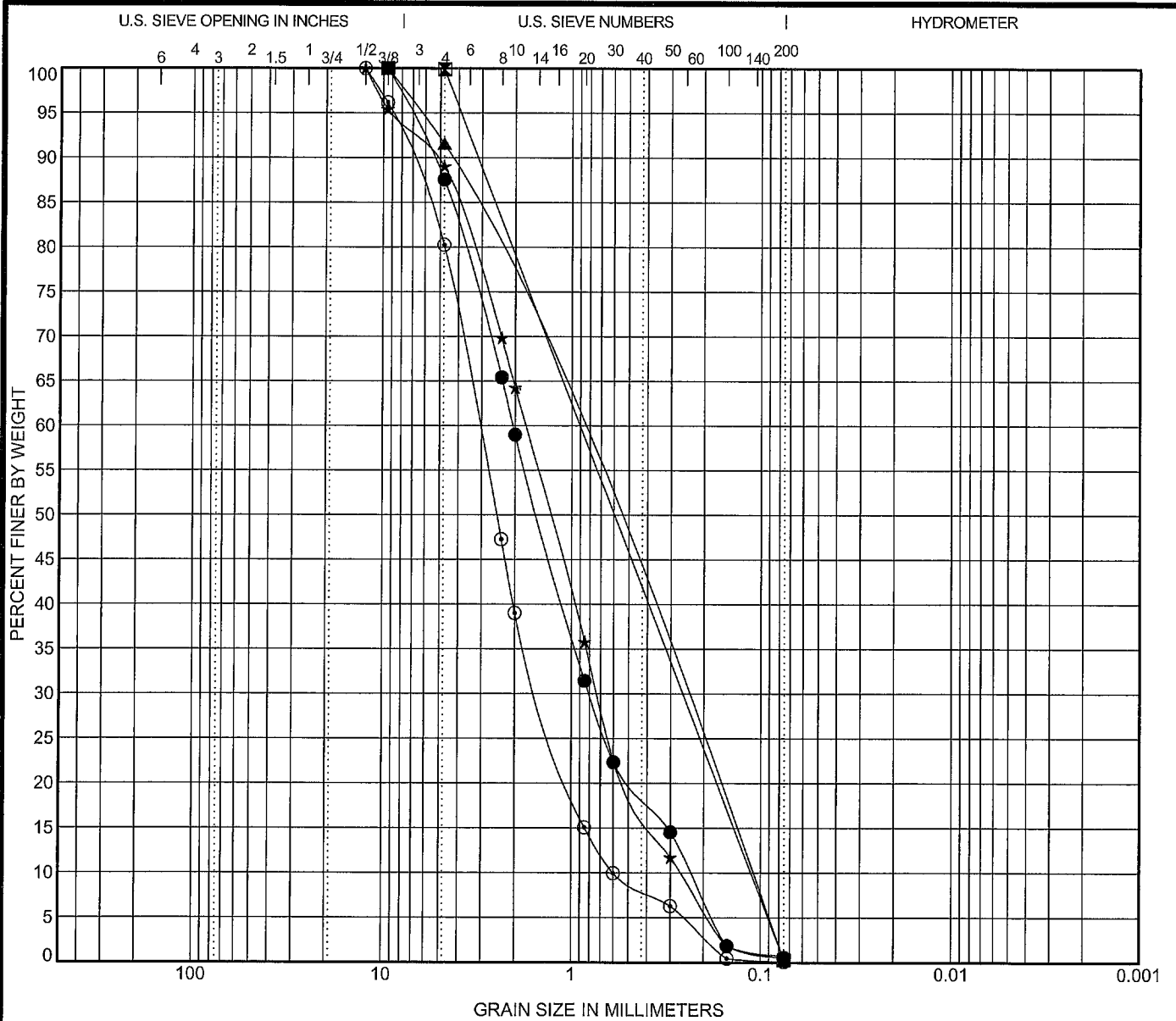
SITE PRIVATE PROPERTY	PROJECT PRRIP - ELM CREEK
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REMARKS: DRILL METHOD: 4.25" HSA	GRAPHIC LOG	SAMPLES			TESTS								
DESCRIPTION OF STRATUM		DEPTH (FEET)	TYPE	BLOWS/2 FEET N VALUE RQD	IN. DRIVEN IN. RECOVERED	WATER CONTENT (%)	DRY DENSITY PCF	LIQUID LIMIT	PLASTIC LIMIT	UNCONFINED STRENGTH(PSF)	-200 Wash (%)	Organic Content	COMPACTION (%)

Surface Elev.: WELL GRADED SAND, MEDIUM TO COARSE GRAINED, TAN, MEDIUM DENSE, SATURATED (SW) ▽		5	SS	0-0 11 N=11	24/18 75%	8					1				
10.0 POORLY GRADED SAND, MEDIUM TO COARSE GRAINED, TAN, MEDIUM DENSE, SATURATED (SP)		10	SS	0-0 13 N=13	24/18 75%	12						0			
		15	SS	0-0 10 N=10	24/18 75%	8						0			
20.0 WELL GRADED SAND, MEDIUM TO COARSE GRAINED, TAN, MEDIUM DENSE, SATURATED (SW)		20	GRAB SS	0-0 11 N=11	24/18 75%	9						1			
25.0 POORLY GRADED SAND with GRAVEL, MEDIUM TO COARSE GRAINED, TAN, MEDIUM DENSE, SATURATED (SP)		25	SS	0-0 12 N=12	24/18 75%	7						0			
30.0 CLAYEY SAND, FINE GRAINED, TAN, LOOSE, SATURATED (SC) CEMENTED SANDSTONE, HARD		30	SS	0-0 6 N=6	24/18 75%	16						41			
39.0 END OF BORING	35	CS		24/12 50%	27						32				
		SS		24/10 42%	34						21				

WATER LEVEL OBSERVATIONS		Twin Rivers Testing & Environmental 602 E Walker Rd North Platte, NE 69101 Telephone: (308) 534-5131 Fax: (308) 534-1226	STARTED	9/28/16	FINISHED	9/28/16
WL	▽ 3.5		DRILL CO.	Twin Rivers	DRILL RIG	Simco
Cave Depth	☒ N/A		DRILLER	DD	ASS'T DRILLER	EH
			LOGGED BY	EH	APPROVED	

GEOLOG 1 GINT.GPJ GEOTECH.GDT 11/17/16



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

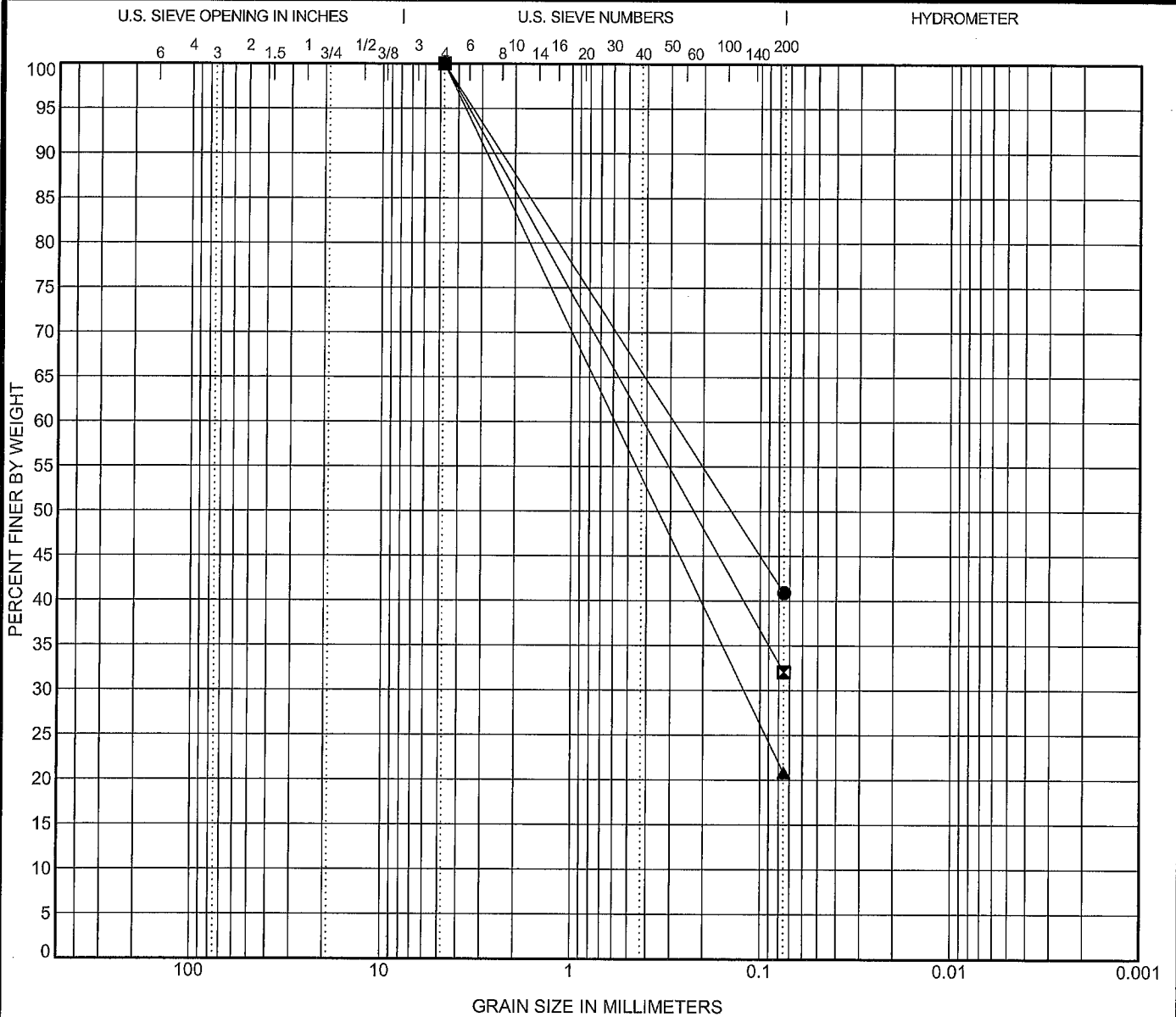
Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● L-1 5.0	WELL-GRADED SAND SW				1.35	8.78
◻ L-1 10.0	POORLY GRADED SAND SP				0.66	8.03
▲ L-1 15.0	POORLY GRADED SAND SP				0.63	9.69
★ L-1 20.0	WELL-GRADED SAND SW				1.14	6.63
⊙ L-1 25.0	POORLY GRADED SAND with GRAVEL SP				1.13	5.14

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● L-1 5.0	9.5	2.052	0.804	0.234	12.4	87.0	0.6	
◻ L-1 10.0	9.5	0.902	0.259	0.112	0.1	99.6	0.3	
▲ L-1 15.0	9.5	1.132	0.29	0.117	8.4	91.3	0.3	
★ L-1 20.0	12.5	1.758	0.73	0.265	10.9	88.3	0.8	
⊙ L-1 25.0	12.5	3.091	1.449	0.601	19.7	80.2	0.1	

Twin Rivers
Testing & Environmental
 602 E Walker Rd
 North Platte, NE 69101
 Telephone: (308) 534-5131
 Fax: (308) 534-1226

GRAIN SIZE DISTRIBUTION
 Project: PRRIP - ELM CREEK
 Location:
 Number: 2016-176

US GRAIN SIZE GINT.GPJ US LAB.GDT 11/9/16



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● L-1 30.0	CLAYEY SAND SC					
■ L-1 35.0	CLAYEY SAND SC					
▲ L-1 37.0	CLAYEY SAND SC					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● L-1 30.0	4.75	0.286			0.0	59.1	40.9	
■ L-1 35.0	4.75	0.413			0.0	67.9	32.1	
▲ L-1 37.0	4.75	0.584	0.121		0.0	79.2	20.8	

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GRAIN SIZE DISTRIBUTION

Project: PRRIP - ELM CREEK
Location:
Number: 2016-176

Twin River Testing & Environmental, LLC

602 East Walker Road
North Platte, NE 69101

Phone: 308-534-5131
Fax: 308-534-1226

REPORT OF RELATIVE DENSITY OF COHESIONLESS SOILS (Max, Min)
ASTM: D4253-83 AND 4254-83

DATE RECEIVED: 11-Oct-16

DATE SAMPLED:

REPORTED TO: KEVIN WERBYLO

CLIENT: N/A

PROJECT: PRRIP ELM CREEK

PROJECT# 2016-176

REPORT# L-1

SAMPLE LOCATION: 15-25'

SAMPLE TIME: N/A

SAMPLED BY: DD

SOIL CLASSIFICATION: Well Graded Sand (SW)

METHOD: DRY

MAXIMUM DENSITY (lbs./cu. ft.) 124.6

MINIMUM DENSITY (lbs./cu. ft.) 108.4

REMARKS: Manual Calc (%DD) : $\frac{\text{Max Dens. (Meas. Dry - Min. Dens.)}}{\text{Meas. Dry (Max Dens. - Min. Dens.)}}$

Reviewed By: _____

Ken Kaskie
Manager-North Platte Office

TWIN RIVERS TESTING & ENVIRONMENTAL, LLC.

November 5, 2016

Headwaters Corp
Project: PRRIP
Twin Rivers Project#: 2016-176

Attn: Kevin Werbylo

REPORT OF SPECIFIC GRAVITY AND ABSORPTION (ASTM C127-68 "Specific Gravity & Absorption of Aggregate by Pyc or Container")

On August 18, 2016, Twin Rivers Testing obtained several samples for testing. This test was on a sample taken from borehole L-1 at a depth of 15 – 25'. Our results are as follows:

Fine Aggregate Sample

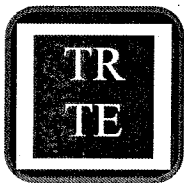
Absorption	0.456%
Bulk Specific Gravity	2.71
Bulk Specific Gravity (SSD)	2.72
Apparent Specific Gravity	2.74

Thank you for choosing Twin Rivers Testing. If you have any questions or concerns, please feel free to call at (308)534-5131.

Sincerely,



Cheryl Phelps
Lab Manager



TWIN RIVERS TESTING AND ENVIRONMENTAL, LLC.

602 East Walker Road
North Platte, NE 69101
Phone: (308) 534-5131
Fax: (308) 534-1226

November 17, 2016

Mr. Kevin Werbylo, EIT
Headwaters Corporation
405 Urban Street
Suite 401
Lakewood, CO 80228

Subj: Report of Porosity
P-16-018 Plum Creek
TRTE# 2016-143
Sample L-2, 10ft – 25ft.

REPORT OF POROSITY AND SPECIFIC GRAVITY

Mr. Werbylo,

This report provides the calculated porosity value of the grab sample obtained from Boring location L-3 at the depth of 10 to 25 ft. below grade. The Material was classified as Poorly Graded Sand, medium to coarse grained. The material was remolded and the compacted unit weight determined in accordance to ASTM D4253 and ASTM D4254. A compaction of 50% of the Relative Density was used in determining the Porosity value.

Data

Remolded Maximum Density	126.1 lbs/ft ³
Remolded Minimum Density	102.6 lbs/ft ³
Unit weight at 50%	113.3 lbs/ft ³
Apparent Specific Gravity	2.71

Results

SAMPLE	Value
Porosity	0.33

Thank you for choosing Twin Rivers Testing. If you have any questions or concerns, please feel free to call at (308)534-5131.

Sincerely,

Ken Kaskie
Twin Rivers Testing & Environmental LLC

CLIENT: HEADWATERS CORP ARCHITECT/ENGINEER

SITE: PRIVATE PROPERTY PROJECT: PRRIP - ELM CREEK

REMARKS:	GRAPHIC LOG	DEPTH (FEET)	SAMPLES				TESTS										
			TYPE	BLOWS/2 FEET N VALUE RQD	IN. DRIVEN IN. RECOVERED	WATER CONTENT (%)	DRY DENSITY PCF	LIQUID LIMIT	PLASTIC LIMIT	UNCONFINED STRENGTH(PSF)	-200 Wash (%)	Organic Content	COMPACTION (%)	REMARKS			
DRILL METHOD: 4.25" HSA																	
DESCRIPTION OF STRATUM																	
Surface Elev.: SILT, BROWN, MOIST (SM)																	
5.0 POORLY GRADED SAND, FINE TO MEDIUM GRAINED, TAN, LOOSE, WET (SP)		5	SS	3-4 4 N=8	18/12 67%	12							1				
10.0 WELL GRADED SAND with GRAVEL, FINE TO COARSE GRAINED, BROWN, LOOSE, SATURATED (SW)		10	SS	3-3 3 N=6	18/12 67%	10							1				
15.0 POORLY GRADED SAND, MEDIUM TO COARSE GRAINED, BROWN, LOOSE, SATURATED (SP)		15	SS	3-4 4 N=8	18/12 67%	15							4				
			GRAB														
		20	SS	2-3 4 N=7	18/12 67%	10							0				
		25	NR	3-2 3 N=5	18/0 0%												
30.0 POORLY GRADED SAND with CLAY, FINE GRAINED, BROWN, LOOSE, SATURATED (SP-SC)		30	SS	3-5 6 N=11	18/12 67%	10							10				
32.0 CLAYEY SAND, FINE GRAINED, GRAY, CHALKY WHITE, PARTIALLY CEMENTED, SANDSTONE, DENSE, SATURATED (SC)		35	SS	10-17 21 N=38	18/6 33%	40							22				
42.0 END OF BORING		40	CS			19							24				

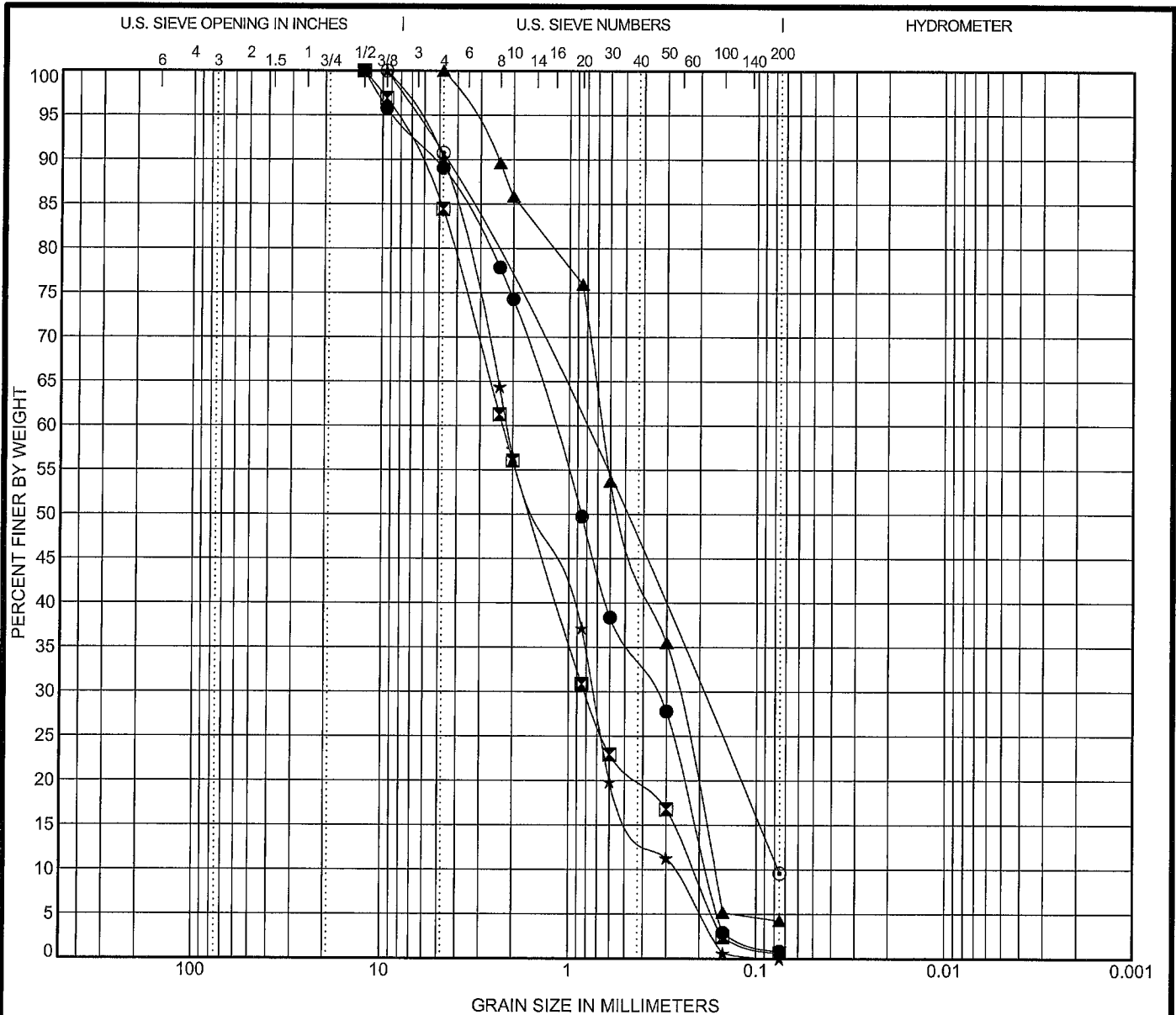
GEOLOG 1 GINT.GPJ GEOTECH.GDT 11/17/16

WATER LEVEL OBSERVATIONS

WL	▽	5
Cave Depth	⊗	N/A

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STARTED	9/29/16	FINISHED	9/29/16
DRILL CO.	Twin Rivers	DRILL RIG	Simco
DRILLER	DD	ASS'T DRILLER	EH
LOGGED BY	EH	APPROVED	



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

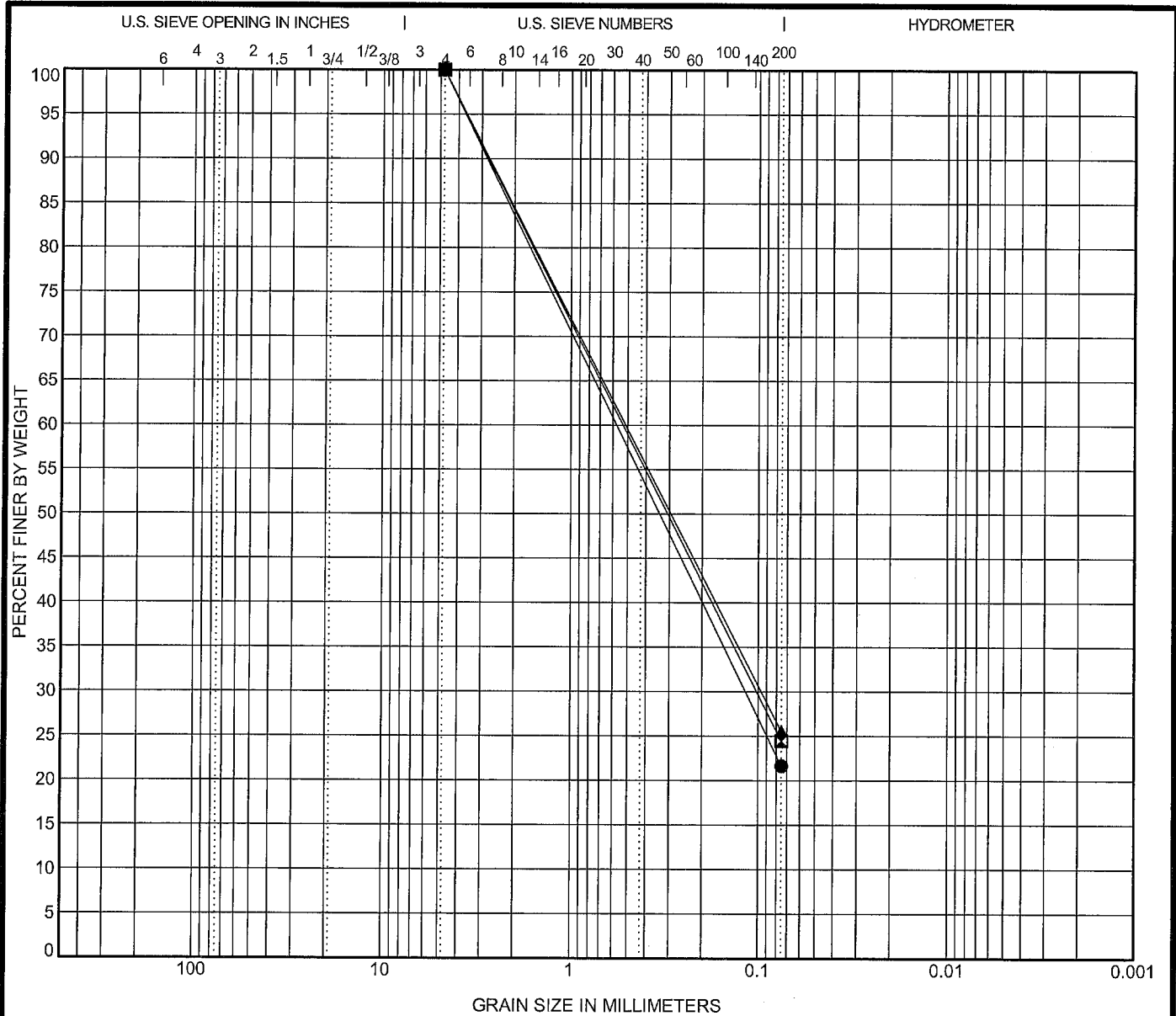
Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● L-2 5.0	POORLY GRADED SAND SP				0.54	6.65
◻ L-2 10.0	WELL-GRADED SAND with GRAVEL SW				1.36	10.49
▲ L-2 15.0	POORLY GRADED SAND SP				0.63	3.95
★ L-2 20.0	POORLY GRADED SAND SP				0.91	7.81
⊙ L-2 30.0	POORLY GRADED SAND with CLAY SP-SC				0.60	12.88

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● L-2 5.0	12.5	1.215	0.346	0.183	10.9	88.2	0.8	
◻ L-2 10.0	12.5	2.267	0.818	0.216	15.5	83.8	0.6	
▲ L-2 15.0	4.75	0.662	0.264	0.167	0.0	95.7	4.3	
★ L-2 20.0	9.5	2.153	0.736	0.276	9.8	90.2	0.0	
⊙ L-2 30.0	9.5	0.985	0.213	0.077	9.2	81.2	9.6	

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 Testing & Environmental
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GRAIN SIZE DISTRIBUTION

Project: PRRIP - ELM CREEK
 Location:
 Number: 2016-176



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification				LL	PL	PI	Cc	Cu
●	L-2	35.0	CLAYEY SAND SC								
☒	L-2	40.0	CLAYEY SAND SC								
▲	L-2	41.0	CLAYEY SAND SC								

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	L-2	35.0	4.75	0.571	0.117		0.0	78.3	21.7	
☒	L-2	40.0	4.75	0.528	0.102		0.0	75.5	24.5	
▲	L-2	41.0	4.75	0.511	0.096		0.0	74.5	25.5	

US GRAIN SIZE GINT.GPJ US LAB.GDT 11/9/16

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GRAIN SIZE DISTRIBUTION

Project: PRRIP - ELM CREEK
Location:
Number: 2016-176

Twin River Testing & Environmental, LLC

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North Platte, NE 69101

Phone: 308-534-5131
Fax: 308-534-1226

REPORT OF RELATIVE DENSITY OF COHESIONLESS SOILS (Max, Min)
ASTM: D4253-83 AND 4254-83

DATE RECEIVED: 11-Oct-16

DATE SAMPLED:

REPORTED TO: KEVIN WERBYLO

CLIENT: N/A

PROJECT: PRRIP ELM CREEK

PROJECT# 2016-176

REPORT# L-2

SAMPLE LOCATION: 10-25'

SAMPLE TIME: N/A

SAMPLED BY: DD

SOIL CLASSIFICATION: Poorly Graded Sand (SP)

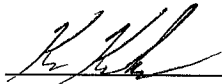
METHOD: DRY

MAXIMUM DENSITY (lbs./cu. ft.) 126.1

MINIMUM DENSITY (lbs./cu. ft.) 102.6

REMARKS: Manual Calc (%DD) : $\frac{\text{Max Dens. (Meas. Dry - Min. Dens.)}}{\text{Meas. Dry (Max Dens. - Min. Dens.)}}$

Reviewed By:



Ken Kaskie
Manager-North Platte Office

TWIN RIVERS TESTING & ENVIRONMENTAL, LLC.

November 5, 2016

Headwaters Corp
Project: PRRIP
Twin Rivers Project#: 2016-176

Attn: Kevin Werbylo

REPORT OF SPECIFIC GRAVITY AND ABSORPTION (ASTM C127-68 "Specific Gravity & Absorption of Aggregate by Pyc or Container")


On August 18, 2016, Twin Rivers Testing obtained several samples for testing. This test was on a sample taken from borehole L-2 at a depth of 10 – 25'. Our results are as follows:

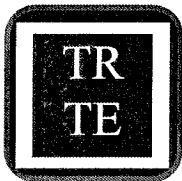
Fine Aggregate Sample

Absorption	0.512%
Bulk Specific Gravity	2.67
Bulk Specific Gravity (SSD)	2.68
Apparent Specific Gravity	2.71

Thank you for choosing Twin Rivers Testing. If you have any questions or concerns, please feel free to call at (308)534-5131.

Sincerely,


Cheryl Phelps
Lab Manager



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November 17, 2016

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Data

Remolded Maximum Density	125.5 lbs/ft ³
Remolded Minimum Density	102.7 lbs/ft ³
Unit weight at 50%	113 lbs/ft ³
Apparent Specific Gravity	2.70

Results

SAMPLE	Value
Porosity	0.33

Thank you for choosing Twin Rivers Testing. If you have any questions or concerns, please feel free to call at (308)534-5131.

Sincerely,

Ken Kaskie
Twin Rivers Testing & Environmental LLC

Project No. 2016-176

LOG OF BOREHOLE NO. L-3

Sheet 1 of 1

CLIENT

HEADWATERS CORP

ARCHITECT/ENGINEER

SITE

PRIVATE PROPERTY

PROJECT

PRRIP - ELM CREEK

REMARKS:

DRILL METHOD: 4.25" HSA

DESCRIPTION OF STRATUM

Surface Elev.:

1.0 SILT, BROWN, MOIST (SM)
SILTY CLAY, TAN TO BROWN, MOIST (CL)

5.0
5.5 POORLY GRADED SAND, FINE GRAINED,
TAN, LOOSE, MOIST (SP)
8.0 LEAN CLAY, NEAR BLACK, IRON
DEPOSITS, MEDIUM, WET TO SATURATED
(CL)

10.0 POORLY GRADED SAND, FINE TO MEDIUM
GRAINED, TAN, LOOSE, WET (SP)
POORLY GRADED SAND with GRAVEL,
FINE TO COARSE GRAINED, TAN, LOOSE,
SATURATED (SP)
15.0 POORLY GRADED SAND, MEDIUM TO
COARSE GRAINED, BROWN, LOOSE,
SATURATED (SP)

25.0 POORLY GRADED SAND with GRAVEL,
MEDIUM TO COARSE GRAINED, BROWN,
SATURATED (SP)

30.0 POORLY GRADED SAND with CLAY and
GRAVEL, FINE TO COARSE GRAINED,
BROWN, LOOSE, SATURATED (SP-SC)

35.0
35.5 CLAYEY SAND, FINE GRAINED, GRAY,
CHALKY WHITE, PARTIALLY CEMENTED,
SANDSTONE, DENSE, CONFINING LAYER,
SATURATED (SC)

40.0 POORLY GRADED SAND with GRAVEL,
MEDIUM TO COARSE GRAINED, RED,
SATURATED (SP)
SANDY LEAN CLAY, CALCIUM DEPOSITS,
TAN WITH WHITE MOTTLE, SATURATED
(CL)

45.0 CLAYEY SAND, FINE GRAINED, TAN,
SATURATED (SC)
47.0 END OF BORING

GRAPHIC LOG

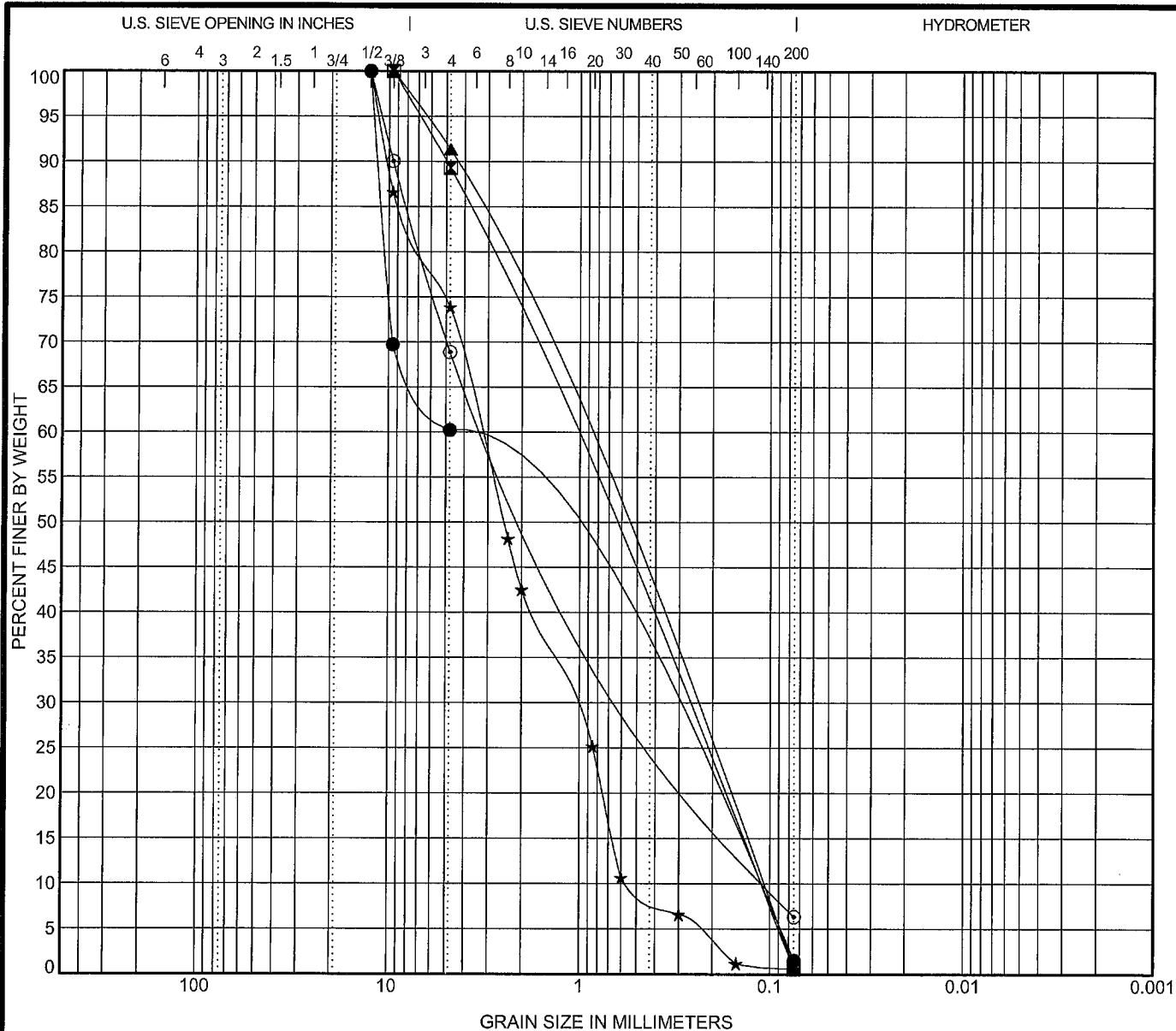
DEPTH (FEET)	TYPE	SAMPLES		TESTS								REMARKS
		BLOWS/2 FEET N VALUE RQD	IN. DRIVEN IN. RECOVERED	WATER CONTENT (%)	DRY DENSITY PCF	LIQUID LIMIT	PLASTIC LIMIT	UNCONFINED STRENGTH(PSF)	-200 Wash (%)	Organic Content	COMPACTION (%)	
0-5	SS	0-5 N=5	24/18 75%	9								
5-8	SS	0-8 N=8	24/18 75%						2			
8-15	SS	0-8 N=8	24/18 75%	10					1			
15-20	SS	GRAB	24/18 75%	10					1			
20-25	SS		24/18 75%	7					1			
25-30	SS		24/18 75%	6					6			
30-35	SS		24/12 50%	12					2			
35-40	SS		24/12 50%	27					61			
40-45	CS		24/10 42%	29					39			

GEOLOG 1 GINT.GPJ GEOTECH.GDT 11/17/16

WATER LEVEL OBSERVATIONS		
WL	▽	7
Cave Depth	■	N/A

**Twin Rivers
Testing & Environmental**
602 E Walker Rd
North Platte, NE 69101
Telephone: (308) 534-5131
Fax: (308) 534-1226

STARTED	9/28/16	FINISHED	9/28/16
DRILL CO.	Twin Rivers	DRILL RIG	Simco
DRILLER	DD	ASS'T DRILLER	EH
LOGGED BY	EH	APPROVED	



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

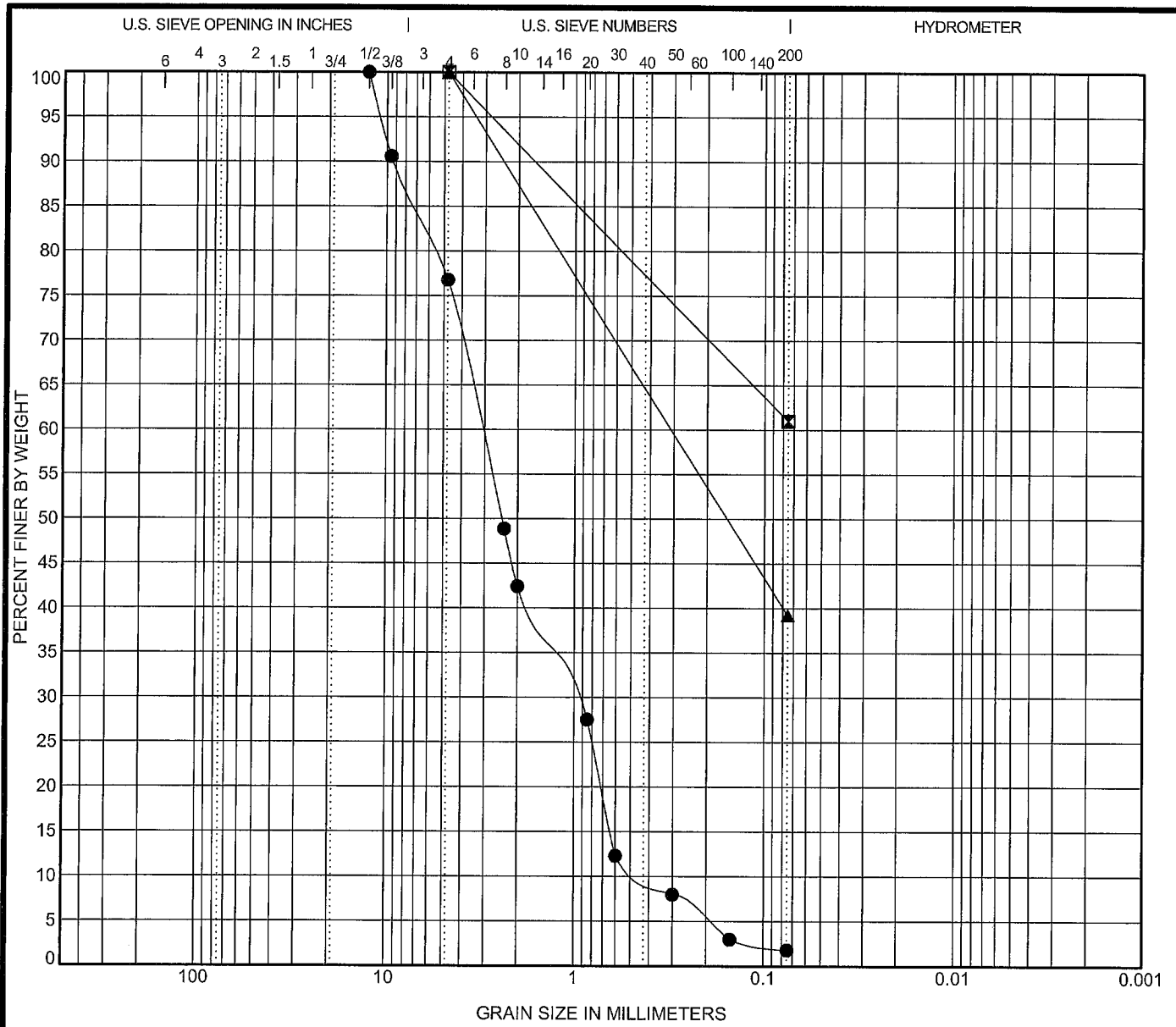
Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● L-3 10.0	POORLY GRADED SAND with GRAVEL SP				0.49	34.20
☒ L-3 15.0	POORLY GRADED SAND SP				0.63	10.35
▲ L-3 20.0	POORLY GRADED SAND SP				0.63	9.88
★ L-3 25.0	POORLY GRADED SAND with GRAVEL SP				0.67	6.07
◎ L-3 30.0	POORLY GRADED SAND with CLAY AND GRAVEL SP-SC				0.52	27.55

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● L-3 10.0	12.5	4.673	0.561	0.137	39.8	58.7	1.5	
☒ L-3 15.0	9.5	1.207	0.297	0.117	10.7	88.7	0.6	
▲ L-3 20.0	9.5	1.13	0.286	0.114	8.7	90.5	0.8	
★ L-3 25.0	12.5	3.256	1.078	0.536	26.1	73.3	0.6	
◎ L-3 30.0	12.5	2.635	0.36	0.096	31.1	62.6	6.3	

Twin Rivers
 Testing & Environmental
 602 E Walker Rd
 North Platte, NE 69101
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GRAIN SIZE DISTRIBUTION

Project: PRRIP - ELM CREEK
 Location:
 Number: 2016-176



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification		Classification				LL	PL	PI	Cc	Cu
●	L-3 35.0	POORLY GRADED SAND with GRAVEL SP							0.74	7.53
■	L-3 40.0	SANDY LEAN CLAY CL								
▲	L-3 45.0	CLAYEY SAND SC								

Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	L-3 35.0	12.5	3.119	0.98	0.414	23.2	75.0	1.8	
■	L-3 40.0	4.75				0.0	39.0	61.0	
▲	L-3 45.0	4.75	0.31			0.0	60.8	39.2	

**Twin Rivers
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GRAIN SIZE DISTRIBUTION

Project: PRRIP - ELM CREEK
Location:
Number: 2016-176

Twin River Testing & Environmental, LLC

602 East Walker Road
North Platte, NE 69101

Phone: 308-534-5131
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REPORT OF RELATIVE DENSITY OF COHESIONLESS SOILS (Max, Min)
ASTM: D4253-83 AND 4254-83

DATE RECEIVED: _____ 11-Oct-16 _____

DATE SAMPLED: _____

REPORTED TO: _____

CLIENT: _____ N/A _____

PROJECT: _____ PRRIP ELM CREEK _____

PROJECT# _____ 2016-176 _____

REPORT# _____ L-3 _____

SAMPLE LOCATION: _____ 15-25' _____

SAMPLE TIME: _____ N/A _____

SAMPLED BY: _____ DD _____

SOIL CLASSIFICATION: _____ Poorly Graded Sand (SP) _____

METHOD: _____ DRY _____

MAXIMUM DENSITY (lbs./cu. ft.) _____ 125.5 _____

MINIMUM DENSITY (lbs./cu. ft.) _____ 102.7 _____

REMARKS: Manual Calc (%DD) : _____
Max Dens. (Meas. Dry - Min. Dens.)
Meas. Dry (Max Dens. - Min. Dens.)

Reviewed By: _____

Ken Kaskie
Manager-North Platte Office

TWIN RIVERS TESTING & ENVIRONMENTAL, LLC.

November 5, 2016

Headwaters Corp
Project: PRRIP
Twin Rivers Project#: 2016-176

Attn: Kevin Werbylo

REPORT OF SPECIFIC GRAVITY AND ABSORPTION

(ASTM C127-68 "Specific Gravity & Absorption of Aggregate by Pyc or Container")

On August 18, 2016, Twin Rivers Testing obtained several samples for testing. This test was on a sampled taken from borehole L-3 at a depth of 15 – 25'. Our results are as follows:

Fine Aggregate Sample

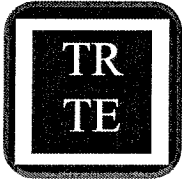
Absorption	0.429%
Bulk Specific Gravity	2.66
Bulk Specific Gravity (SSD)	2.68
Apparent Specific Gravity	2.70

Thank you for choosing Twin Rivers Testing. If you have any questions or concerns, please feel free to call at (308)534-5131.

Sincerely,



Cheryl Phelps
Lab Manager



TWIN RIVERS TESTING AND ENVIRONMENTAL, LLC.

602 East Walker Road
North Platte, NE 69101
Phone: (308) 534-5131
Fax: (308) 534-1226

November 17, 2016

Mr. Kevin Werbylo, EIT
Headwaters Corporation
405 Urban Street
Suite 401
Lakewood, CO 80228

Subj: Report of Porosity
P-16-018 Plum Creek
TRTE# 2016-143
Sample L-4, 15ft – 25ft.

REPORT OF POROSITY AND SPECIFIC GRAVITY

Mr. Werbylo,

This report provides the calculated porosity value of the grab sample obtained from Boring location L-4 at the depth of 15 to 25 ft. below grade. The Material was classified as Well Graded Sand. The material was remolded and the compacted unit weight determined in accordance to ASTM D4253 and ASTM D4254. A compaction of 50% of the Relative Density was used in determining the Porosity value.

Data

Remolded Maximum Density	121.9 lbs/ft ³
Remolded Minimum Density	100.9 lbs/ft ³
Unit weight at 50%	110.5 lbs/ft ³
Apparent Specific Gravity	2.79

Results

SAMPLE	Value
Porosity	0.36

Thank you for choosing Twin Rivers Testing. If you have any questions or concerns, please feel free to call at (308)534-5131.

Sincerely,

Ken Kaskie
Twin Rivers Testing & Environmental LLC

CLIENT: HEADWATERS CORP ARCHITECT/ENGINEER

SITE: PRIVATE PROPERTY PROJECT: PRRIP - ELM CREEK

REMARKS:	GRAPHIC LOG	DEPTH (FEET)	SAMPLES			TESTS											
			TYPE	BLOWS/2 FEET N VALUE RQD	IN. DRIVEN IN. RECOVERED	WATER CONTENT (%)	DRY DENSITY PCF	LIQUID LIMIT	PLASTIC LIMIT	UNCONFINED STRENGTH(PSF)	-200 Wash (%)	Organic Content	COMPACTION (%)	REMARKS			
Surface Elev.: SILT, BROWN, MOIST (SM)																	
3.0 POORLY GRADED SAND, FINE TO MEDIUM GRAINED, TAN, MEDIUM DENSE, MOIST ∇ TO SATURATED (SP)		5	SS	0-0 11 N=11	24/18 75%	19						1					
10.0 WELL GRADED SAND, FINE TO COARSE GRAINED, TAN, MEDIUM DENSE, SATURATED (SW)		10	SS	0-0 13 N=13	24/18 75%	8						0					
15.0 POORLY GRADED SAND, FINE TO MEDIUM GRAINED, TAN, LOOSE TO MEDIUM DENSE, SATURATED (SP)		15	SS	0-0 20 N=20	24/18 75%	14											
		20	GRAB SS	2-4 5 N=9	18/12 67%	12						0					
		25	SS	4-8 8 N=16	18/12 67%	13						1					
30.0 WITH GRAVEL		30	SS	2-5 6 N=11	18/12 67%	9						0					
33.0 CEMENTED SANDSTONE, CHALKY WHITE AND TAN (SC)		35	CS			27						27					
35.0 CLAYEY SAND, FINE GRAINED, BROWN, PARTIALLY CEMENTED, SATURATED (SC)		40	CS			29 37						46					
42.0 CONSOLIDATED END OF BORING																	

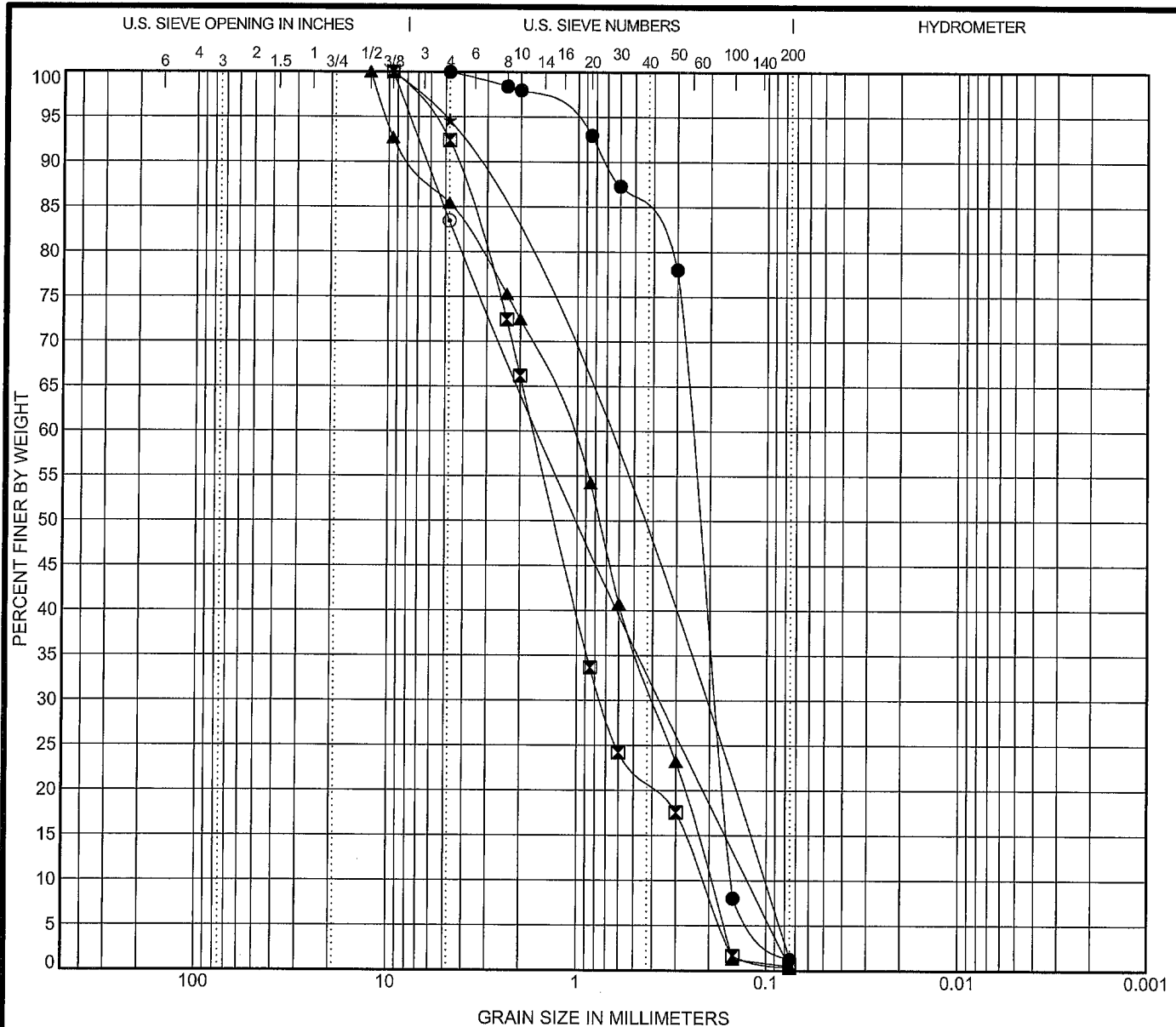
GEOLOG 1 GINT.GPJ GEOTECH.GDT 11/17/16

WATER LEVEL OBSERVATIONS

WL	∇	5
Cave Depth	⊗	N/A

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STARTED	9/28/16	FINISHED	9/28/16
DRILL CO.	Twin Rivers	DRILL RIG	Simco
DRILLER	DD	ASS'T DRILLER	EH
LOGGED BY	EH	APPROVED	



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

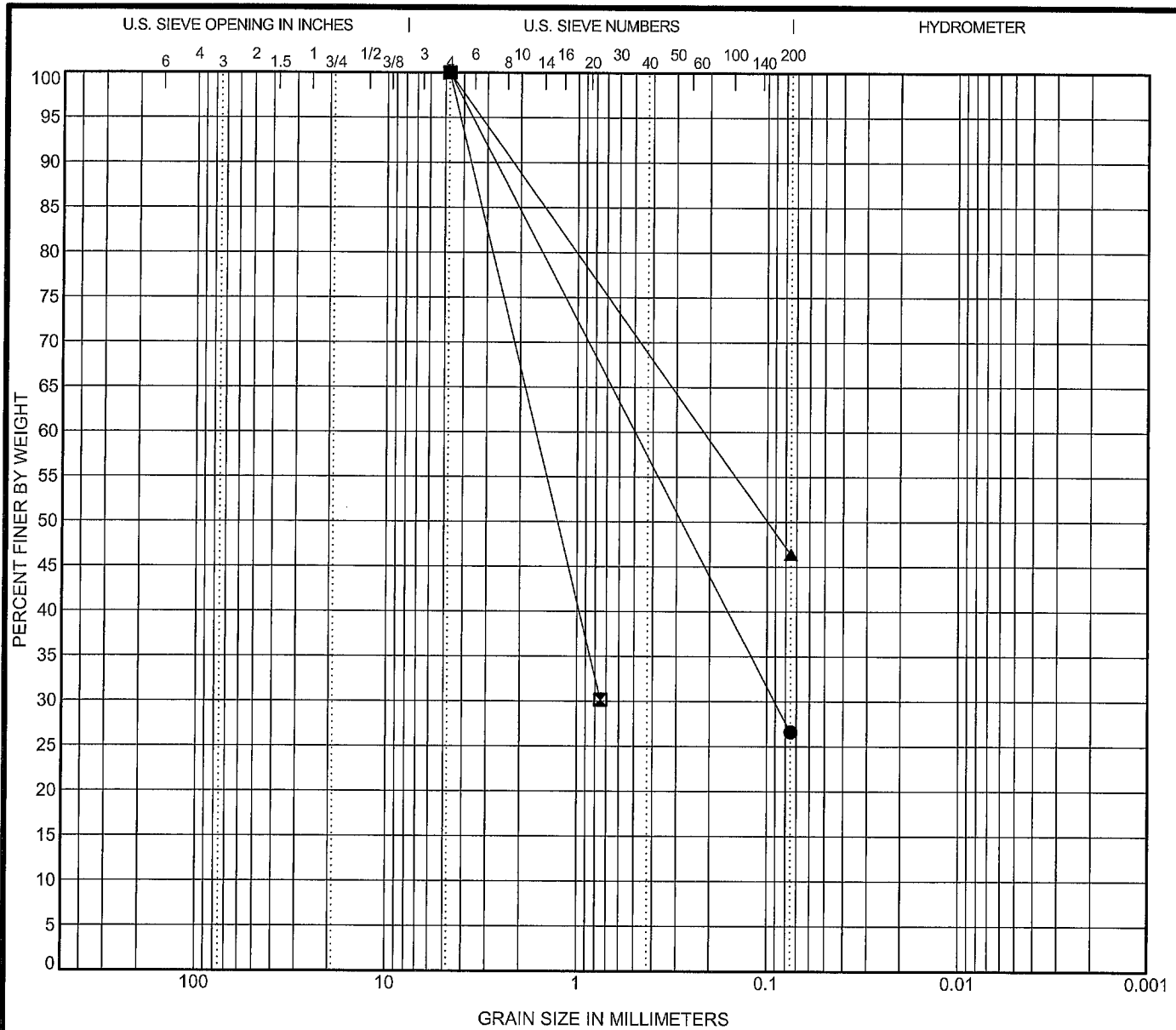
Specimen Identification	Classification					LL	PL	PI	Cc	Cu
● L-4 5.0	POORLY GRADED SAND SP								0.91	1.64
☒ L-4 10.0	WELL-GRADED SAND SW								1.50	7.88
▲ L-4 20.0	POORLY GRADED SAND SP								0.70	5.64
★ L-4 25.0	POORLY GRADED SAND SP								0.64	9.24
⊙ L-4 30.0	POORLY GRADED SAND with GRAVEL SP								0.61	12.17

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● L-4 5.0	4.75	0.251	0.186	0.153	0.0	98.7	1.3	
☒ L-4 10.0	9.5	1.699	0.743	0.216	7.6	92.0	0.4	
▲ L-4 20.0	12.5	1.114	0.392	0.198	14.6	84.9	0.5	
★ L-4 25.0	9.5	1.018	0.268	0.11	5.4	93.3	1.4	
⊙ L-4 30.0	9.5	1.471	0.328	0.121	16.5	83.0	0.4	

**Twin Rivers
Testing & Environmental**
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North Platte, NE 69101
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GRAIN SIZE DISTRIBUTION

Project: PRRIP - ELM CREEK
Location:
Number: 2016-176



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification			Classification			LL	PL	PI	Cc	Cu
●	L-4	35.0	CLAYEY SAND SC							
■	L-4	40.0	CLAYEY SAND SC							
▲	L-4	41.5	CLAYEY SAND SC							

Specimen Identification			D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	L-4	35.0	4.75	0.495	0.091		0.0	73.4	26.6	
■	L-4	40.0	4.75	1.65			0.0			
▲	L-4	41.5	4.75	0.215			0.0	53.6	46.4	

**Twin Rivers
Testing & Environmental**
602 E Walker Rd
North Platte, NE 69101
Telephone: (308) 534-5131
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GRAIN SIZE DISTRIBUTION

Project: PRRIP - ELM CREEK
Location:
Number: 2016-176

Twin River Testing & Environmental, LLC

602 East Walker Road
North Platte, NE 69101

Phone: 308-534-5131
Fax: 308-534-1226

REPORT OF RELATIVE DENSITY OF COHESIONLESS SOILS (Max, Min) ASTM: D4253-83 AND 4254-83

DATE RECEIVED: 11-Oct-16

DATE SAMPLED:

REPORTED TO: KEVIN WERBYLO

CLIENT: N/A

PROJECT: PRRIP ELM CREEK

PROJECT# 2016-176

REPORT# L-4

SAMPLE LOCATION: 15-25'

SAMPLE TIME: N/A

SAMPLED BY: DD

SOIL CLASSIFICATION: Poorly Graded Sand (SP)

METHOD: DRY

MAXIMUM DENSITY (lbs./cu. ft.) 121.9

MINIMUM DENSITY (lbs./cu. ft.) 100.9

REMARKS: Manual Calc (%DD) : $\frac{\text{Max Dens. (Meas. Dry - Min. Dens.)}}{\text{Meas. Dry (Max Dens. - Min. Dens.)}}$

Reviewed By:



Ken Kaskie
Manager-North Platte Office

TWIN RIVERS TESTING & ENVIRONMENTAL, LLC.

November 5, 2016

Headwaters Corp
Project: PRRIP
Twin Rivers Project#: 2016-176

Attn: Kevin Werbylo

REPORT OF SPECIFIC GRAVITY AND ABSORPTION

(ASTM C127-68 "Specific Gravity & Absorption of Aggregate by Pyc or Container")

On August 18, 2016, Twin Rivers Testing obtained several samples for testing. This test was on a sample taken from borehole L-4 at a depth of 15 – 25'. Our results are as follows:

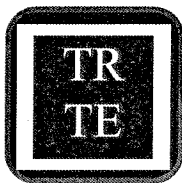
Fine Aggregate Sample

Absorption	1.377%
Bulk Specific Gravity	2.69
Bulk Specific Gravity (SSD)	2.72
Apparent Specific Gravity	2.79

Thank you for choosing Twin Rivers Testing. If you have any questions or concerns, please feel free to call at (308)534-5131.

Sincerely,

Cheryl Phelps
Lab Manager



TWIN RIVERS TESTING AND ENVIRONMENTAL, LLC.

602 East Walker Road
North Platte, NE 69101
Phone: (308) 534-5131
Fax: (308) 534-1226

November 17, 2016

Mr. Kevin Werbylo, EIT
Headwaters Corporation
405 Urban Street
Suite 401
Lakewood, CO 80228

Subj: Report of Porosity
P-16-018 Plum Creek
TRTE# 2016-143
Sample S-1, 15ft – 25ft.

REPORT OF POROSITY AND SPECIFIC GRAVITY

Mr. Werbylo,

This report provides the calculated porosity value of the grab sample obtained from Boring location S-1 at the depth of 15 to 25 ft. below grade. The Material was classified as Poorly Graded Sand, medium grained. The material was remolded and the compacted unit weight determined in accordance to ASTM D4253 and ASTM D4254. A compaction of 50% of the Relative Density was used in determining the Porosity value.

Data

Remolded Maximum Density	122.6 lbs/ft ³
Remolded Minimum Density	103 lbs/ft ³
Unit weight at 50%	112 lbs/ft ³
Apparent Specific Gravity	2.67

Results

SAMPLE	Value
Porosity	0.33

Thank you for choosing Twin Rivers Testing. If you have any questions or concerns, please feel free to call at (308)534-5131.

Sincerely,

Ken Kaskie
Twin Rivers Testing & Environmental LLC

CLIENT

HEADWATERS CORP

ARCHITECT/ENGINEER

SITE

STALL PROPERTY

PROJECT

PRRIP - ELM CREEK

REMARKS:

DRILL METHOD: 4.25" HSA

DESCRIPTION OF STRATUM

Surface Elev.: ▽

LEAN CLAY, DARK BROWN, MOIST (CL)

5.0

POORLY GRADED SAND, MEDIUM GRAINED, BROWN, LOOSE, SATURATED (SP)

10.0

WELL GRADED SAND with GRAVEL, MEDIUM TO COARSE GRAINED, BROWN, LOOSE, SATURATED (SW)

15.0

POORLY GRADED SAND, MEDIUM GRAINED, BROWN, LOOSE, SATURATED (SP)

25.0

WELL GRADED SAND, MEDIUM GRAINED, BROWN, LOOSE, SATURATED (SW)

30.0

POORLY GRADED SAND, MEDIUM GRAINED, BROWN, LOOSE, SATURATED (SP)

35.0

SANDY LEAN CLAY, GRAY, CHALKY WHITE, PARTIALLY CEMENTED, VERY STIFF, SATURATED (CL)

40.0

CLAYEY SAND, FINE GRAINED, LIGHT BROWN, SATURATED (SC)

44.0

END OF BORING

GRAPHIC LOG

DEPTH (FEET)

SAMPLES

TESTS

TYPE	BLOWS/2 FEET N VALUE RQD	IN. DRIVEN IN. RECOVERED	WATER CONTENT (%)	DRY DENSITY PCF	LIQUID LIMIT	PLASTIC LIMIT	UNCONFINED STRENGTH(PSF)	-200 Wash (%)	Organic Content	COMPACTION (%)	REMARKS
------	--------------------------------	-----------------------------	----------------------	--------------------	--------------	---------------	-----------------------------	---------------	-----------------	----------------	---------

SS	3-2 3 N=5	18/12 67%	14					2			
SS	2-4 3 N=7	18/12 67%	9					1			
SS	3-3 3 N=6	18/12 67%	13					0			
SS	2-2 2 N=4	18/12 67%	18					2			
SS	2-3 4 N=7	18/12 67%	9					1			
SS	2-4 4 N=8	18/12 67%	15					1			
SS	7-9 12 N=21	18/12 67%	37					53			
CS		12/8 67%	26					22			
CS		24/12 50%	36					22			

WATER LEVEL OBSERVATIONS

WL ▽ 5

Cave Depth ☒ N/A

Twin Rivers
Testing & Environmental
 602 E Walker Rd
 North Platte, NE 69101
 Telephone: (308) 534-5131
 Fax: (308) 534-1226

STARTED 9/29/16 FINISHED 9/29/16

DRILL CO. Twin Rivers DRILL RIG Simco

DRILLER DD ASS'T DRILLER EH

LOGGED BY EH APPROVED

Twin River Testing & Environmental, LLC

602 East Walker Road
North Platte, NE 69101

Phone: 308-534-5131
Fax: 308-534-1226

REPORT OF RELATIVE DENSITY OF COHESIONLESS SOILS (Max, Min)
ASTM: D4253-83 AND 4254-83

DATE RECEIVED: 11-Oct-16

DATE SAMPLED:

REPORTED TO:

CLIENT: N/A

PROJECT: PRRIP ELM CREEK

PROJECT# 2016-176

REPORT# S-1

SAMPLE LOCATION: S-1 15-25'

SAMPLE TIME: N/A

SAMPLED BY: DD

SOIL CLASSIFICATION: Poorly Graded Sand (SP)

METHOD: DRY

MAXIMUM DENSITY (lbs./cu. ft.) 122.6

MINIMUM DENSITY (lbs./cu. ft.) 103.0

REMARKS: Manual Calc (%DD) : $\frac{\text{Max Dens. (Meas. Dry - Min. Dens.)}}{\text{Meas. Dry (Max Dens. - Min. Dens.)}}$

Reviewed By: _____

Ken Kaskie
Manager-North Platte Office

TWIN RIVERS TESTING & ENVIRONMENTAL, LLC.

November 5, 2016

Headwaters Corp
Project: PRRIP
Twin Rivers Project#: 2016-176

Attn: Kevin Werbylo

REPORT OF SPECIFIC GRAVITY AND ABSORPTION

(ASTM C127-68 "Specific Gravity & Absorption of Aggregate by Pyc or Container")

On August 18, 2016, Twin Rivers Testing obtained several samples for testing. This test was on a sample taken from borehole S-1 at a depth of 15 – 25'. Our results are as follows:

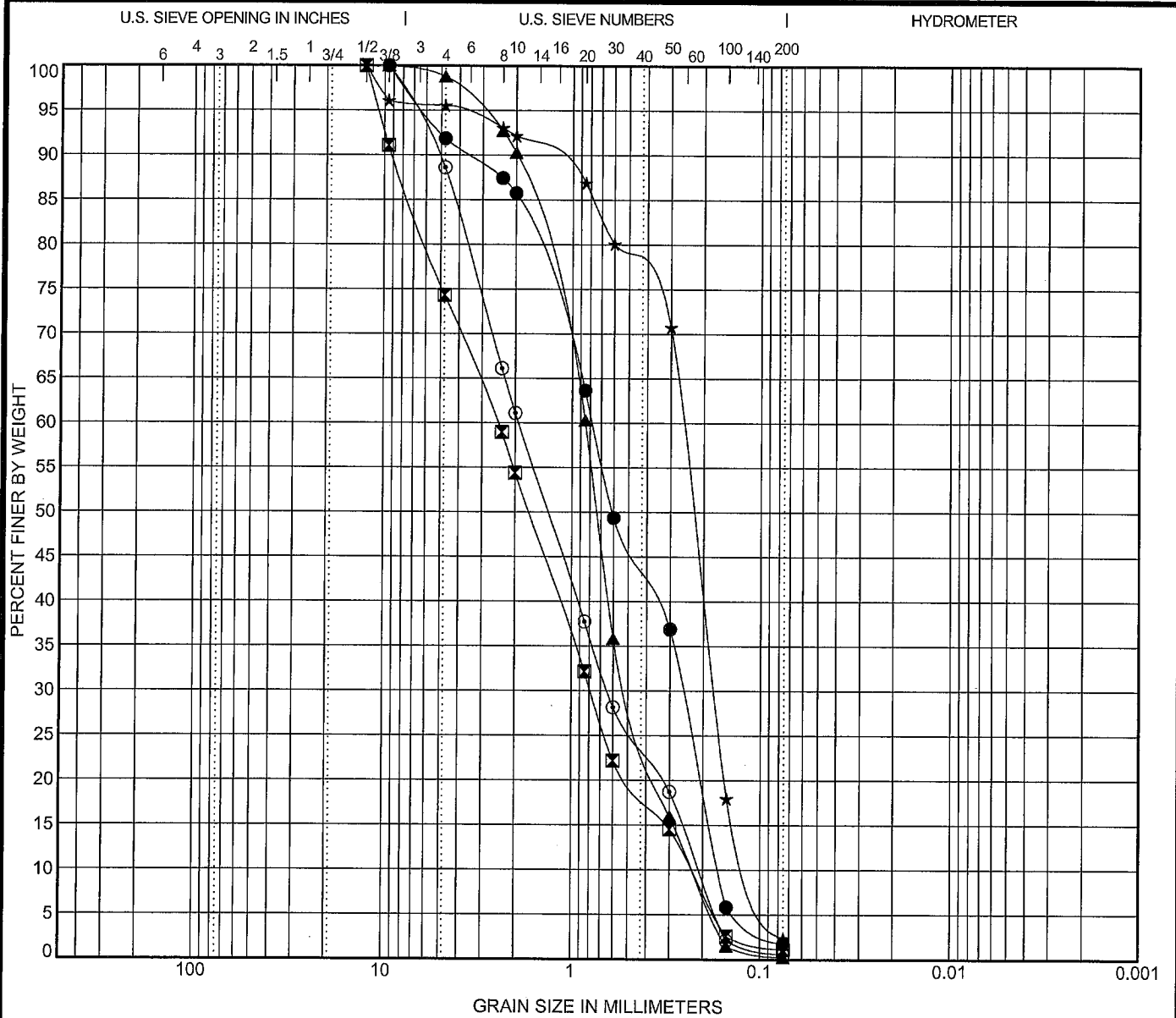
Fine Aggregate Sample

Absorption	0.546%
Bulk Specific Gravity	2.63
Bulk Specific Gravity (SSD)	2.65
Apparent Specific Gravity	2.67

Thank you for choosing Twin Rivers Testing. If you have any questions or concerns, please feel free to call at (308)534-5131.

Sincerely,

Cheryl Phelps
Lab Manager



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

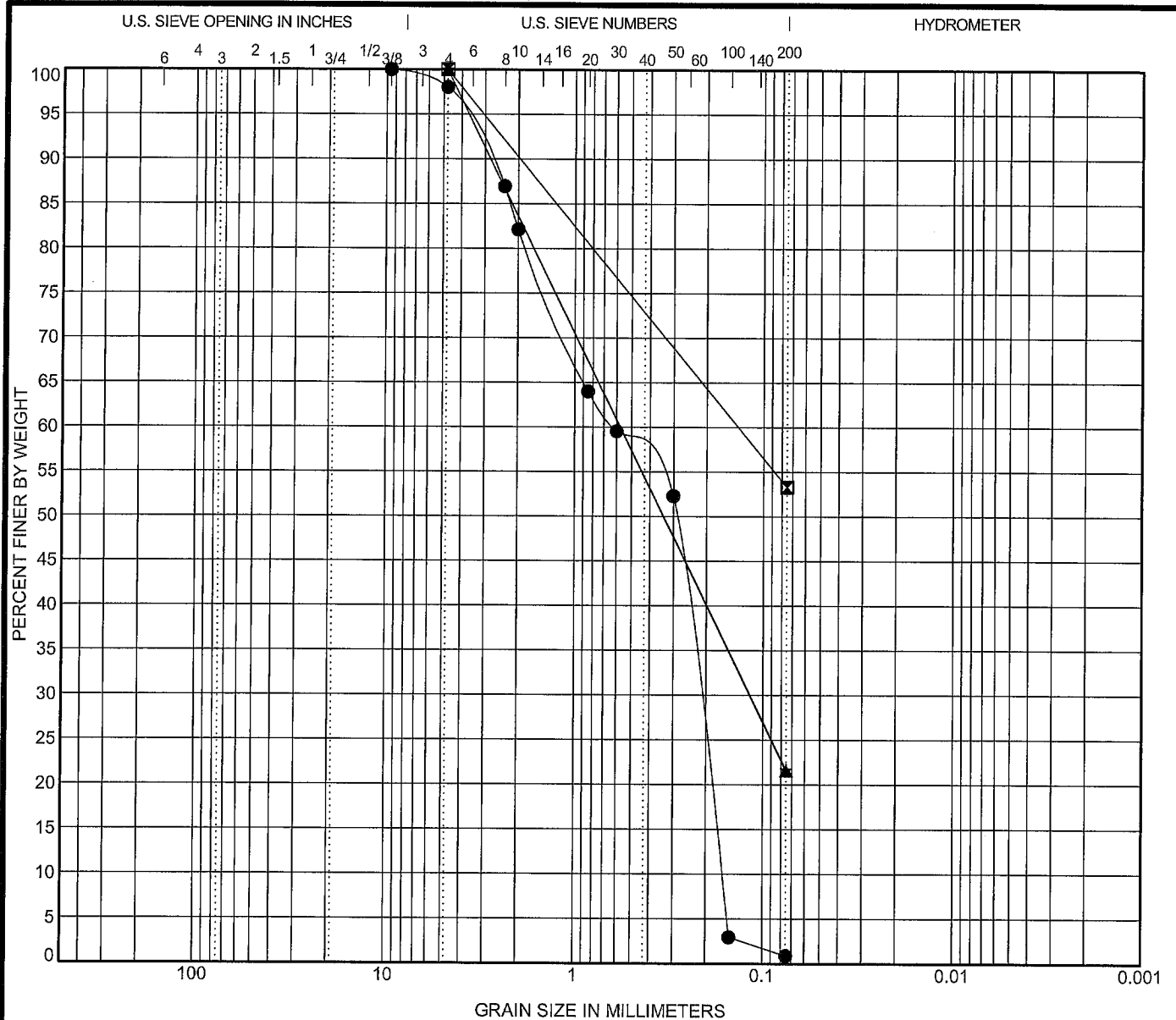
Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● S-1 5.0	POORLY GRADED SAND SP				0.52	4.73
■ S-1 10.0	WELL-GRADED SAND with GRAVEL SW				1.09	10.74
▲ S-1 15.0	POORLY GRADED SAND SP				1.26	3.76
★ S-1 20.0	POORLY GRADED SAND SP				1.13	2.48
○ S-1 25.0	WELL-GRADED SAND SW				1.03	9.22

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● S-1 5.0	9.5	0.777	0.257	0.165	8.1	90.1	1.7	
■ S-1 10.0	12.5	2.472	0.788	0.23	25.7	73.2	1.1	
▲ S-1 15.0	9.5	0.846	0.49	0.225	1.2	98.5	0.2	
★ S-1 20.0	12.5	0.26	0.176	0.105	4.5	93.2	2.4	
○ S-1 25.0	9.5	1.92	0.641	0.208	11.4	88.1	0.6	

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GRAIN SIZE DISTRIBUTION

Project: PRRIP - ELM CREEK
 Location:
 Number: 2016-176



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Specimen Identification	Classification	LL	PL	PI	Cc	Cu
● S-1 30.0	POORLY GRADED SAND SP				0.47	3.75
☒ S-1 35.0	SANDY LEAN CLAY CL					
▲ S-1 40.0	CLAYEY SAND SC					
★ S-1 42.0	CLAYEY SAND SC					

Specimen Identification	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
● S-1 30.0	9.5	0.621	0.219	0.166	2.0	97.1	0.9	
☒ S-1 35.0	4.75	0.136			0.0	46.7	53.3	
▲ S-1 40.0	4.75	0.573	0.117		0.0	78.5	21.5	
★ S-1 42.0	4.75	0.571	0.117		0.0	78.3	21.7	

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GRAIN SIZE DISTRIBUTION

Project: PRRIP - ELM CREEK
Location:
Number: 2016-176