

#### GEOTEK ENGINEERING & TESTING SERVICES, INC.

909 East 50<sup>th</sup> Street North Sioux Falls, South Dakota 57104 Phone 605-335-5512 Fax 605-335-0773

July 18, 2023

Doug Van Zee 724 Park Lane South Canton, South Dakota 57013

Subj: Sand & Gravel Exploration

Van Zee Property

Near Platte, South Dakota

GeoTek #23-0946

#### **Introduction**

We are submitting this correspondence to present our written report detailing the sand and gravel exploration program for the referenced project. Our work was performed in accordance with your authorization.

#### **Property Location & Description**

The Van Zee property (about 800 acres in size) is located along the east side of 371<sup>st</sup> Avenue (between 269<sup>th</sup> Street and 271<sup>st</sup> Street) in Charles Mix County, South Dakota. A property location map (Figure 1) is attached showing the location of the property. The town of Platte is located about 7 miles southwest of the property. A drainageway runs through the property in an east-west direction.

#### **Borings & Ground Surface Elevations**

We performed 24 borings at the property on July 6 and July 10, 2023. The borings were advanced using 6-inch diameter flight auger to depths varying from 5 feet to 45 feet (most of the depths were between 20 feet and 35 feet). The subsurface conditions encountered at the boring locations are illustrated by means of the attached boring logs. Figure 2 (boring location map) is attached showing the relative location of the borings. The GPS coordinates (latitudes and longitudes) at the boring locations are attached (Table 1). We did not determine the ground surface elevations at the boring locations.

#### **Water Levels**

Measurements to record the groundwater levels were made at the boring locations. The time and level of the groundwater readings are recorded on the boring logs. Groundwater was measured at depths varying from 3 ½ feet to 23 feet at borings 3, 4, 10, 11, 12, 13, 14, 17, 18, 19 and 23.

Groundwater did not enter the boreholes at the other borings at the time of our measurements. Long term groundwater monitoring was not included in our work scope.

#### **Subsurface Conditions**

The subsurface profile at the boring locations consisted of the following soil types: fine alluvium soils, coarse alluvium soils and glacial till soils. The fine alluvium soils were encountered at the surface at the majority of the borings (not at boring 3). The coarse alluvium soils were encountered at the surface at boring 3 and beneath the fine alluvium soils at borings 4, 5, 6, 7, 9, 10, 11, 12, 13, 15, 17, 18, 19 and 23. The glacial till soils were encountered beneath the fine alluvium soils and coarse alluvium soils at the majority of the borings (not at boring 22). Refusal was encountered at a depth of 5 feet at boring 22. The refusal was likely a cobble within the fine alluvium soils or glacial till soils.

#### Soil Types

#### **Fine Alluvium Soils**

Fine alluvium soils are soils with more than 50 percent by weight passing the #200 sieve that have been deposited by moving water. The fine alluvium soils consisted of lean clay (CL) and sandy lean clay (CL).

#### **Coarse Alluvium Soils**

Coarse alluvium soils are soils with less than 50 percent by weight passing the #200 sieve that have been deposited by moving water. The coarse alluvium soils consisted of clayey sand (SC) and sand with silt (SP-SM).

#### **Glacial Till Soils**

Glacial till soils are soils with more than 50 percent by weight passing the #200 sieve that have been deposited and consolidated by a glacier. The glacial till soils consisted of lean clay (CL), lean clay with sand (CL) and sandy lean clay (CL).

#### **Laboratory Testing**

Select samples from the borings were submitted to the laboratory for testing. The tests consisted of sieve analysis tests. The sieve analysis tests were performed in accordance with ASTM procedures. The results of the sieve analysis tests are shown on the attached data sheet.

#### **Discussion**

As previously stated, coarse alluvium soils were encountered at borings 3, 4, 5, 6, 7, 9, 10, 11, 12, 13, 15, 17, 18, 19 and 23. Figure 3 shows the borings where the coarse alluvium soils were encountered. The coarse alluvium soils extended to depths varying from 5 feet to 35 feet. The thickness of the coarse alluvium soils varied from 4 feet to 28 feet.

Based on our observations of the collected samples and the results of the sieve analysis tests, it is our opinion that the sand and gravel could be used as structural fill within buildings and agricultural structures with limited processing (sieving and crushing). The limited processing would likely consist of removing oversized particles. Some processing would be needed for the sand and gravel to meet the SDDOT requirements of an aggregate base course material or gravel surfacing material.

#### **Standard of Care**

Our services for your project were performed in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering profession currently practicing at this time and area.

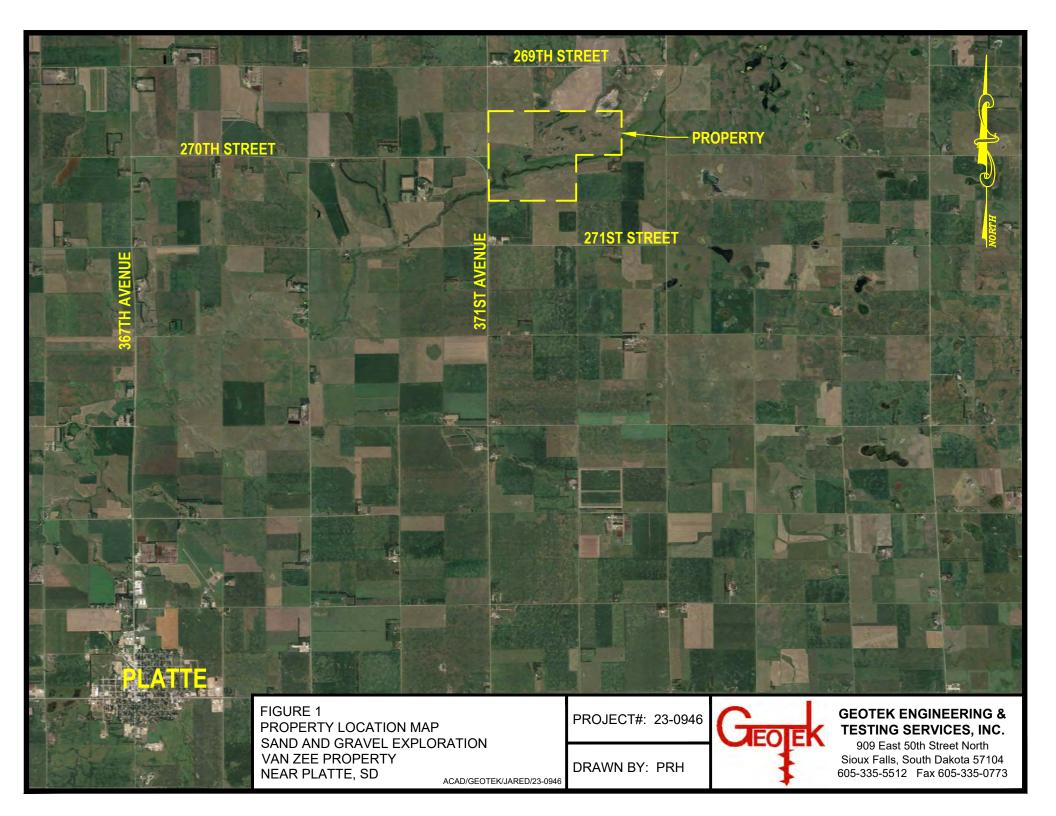
#### Remarks

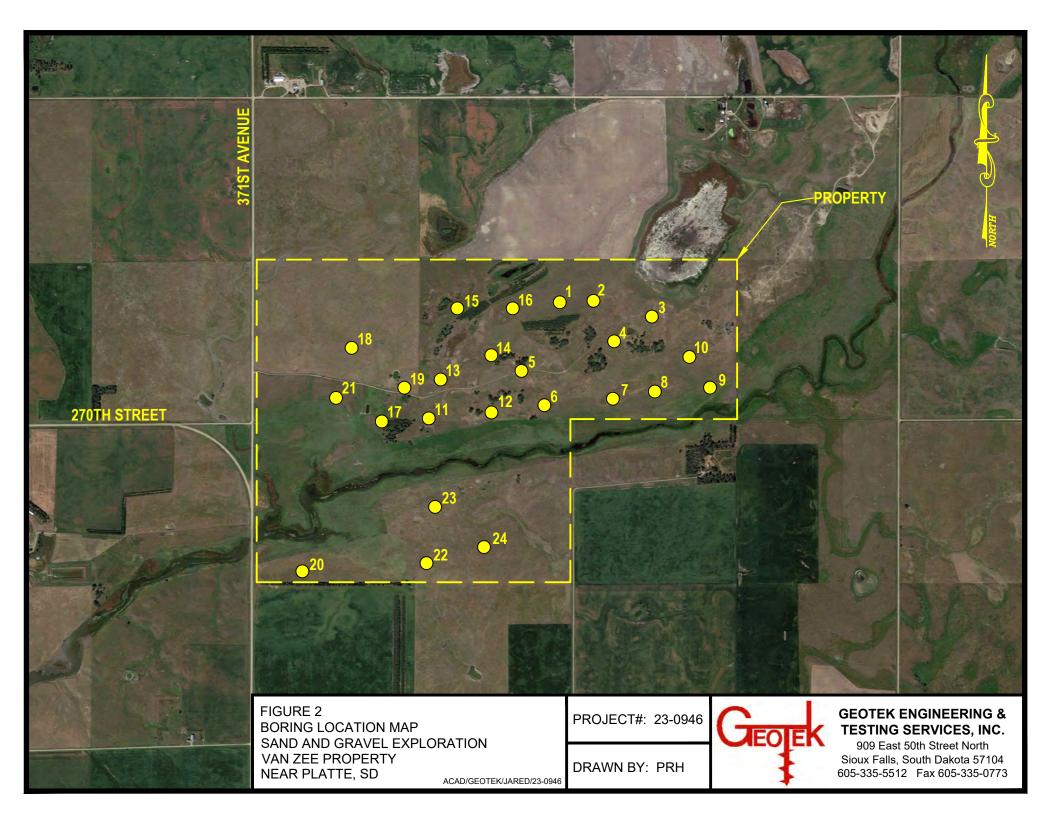
We trust this report provides you with the necessary information for the project. Please note that the samples will be discarded 30 days from the reporting date. If you have any questions or require additional information, please contact our office.

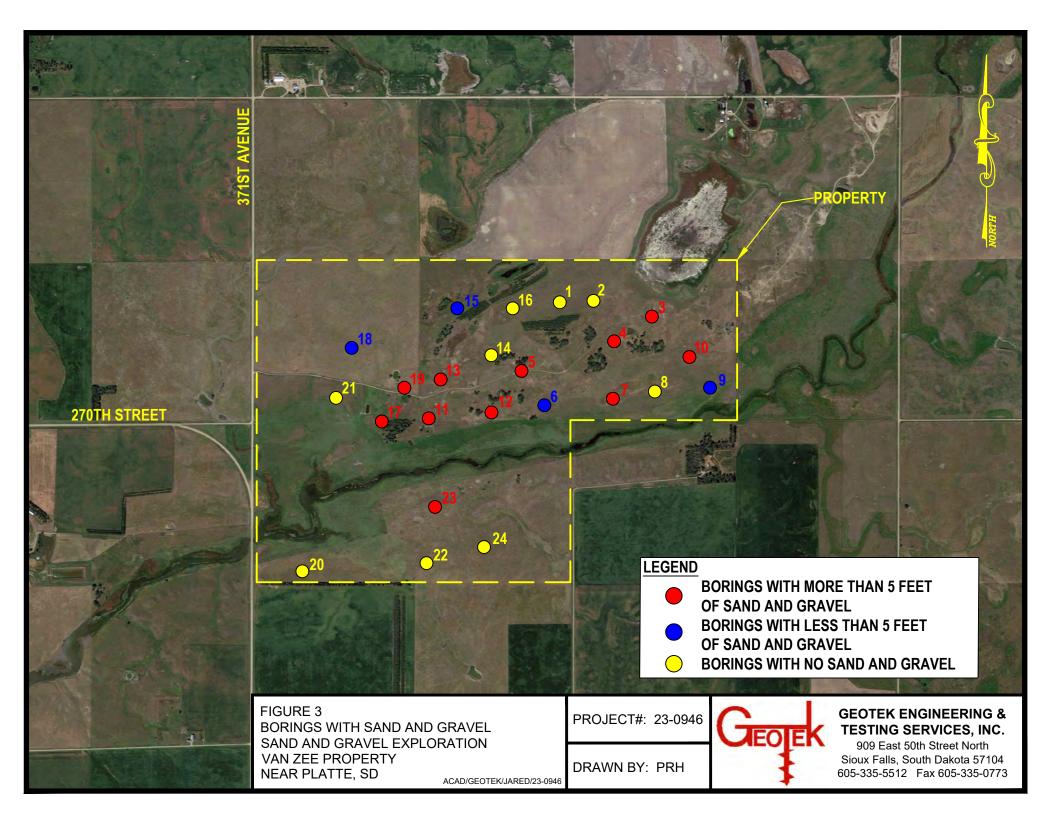
GeoTek Engineering & Testing Services, Inc.

Jared Haskins

Jared Haskins, PE Geotechnical Manager







**Table 1. GPS Coordinates** 

<b>Boring Number</b>	GPS Coo	ordinates
1	43°28'35.52"N	98°44'49.03"W
2	43°28'35.45"N	98°44'42.77"W
3	43°28'32.72"N	98°44'30.26"W
4	43°28'29.30"N	98°44'38.48"W
5	43°28'24.34"N	98°44'58.92"W
6	43°28'18.32"N	98°44'53.13"W
7	43°28'19.64"N	98°44'39.43"W
8	43°28'20.40"N	98°44'30.25"W
9	43°28'21.30"N	98°44'18.35"W
10	43°28'26.76"N	98°44'21.60"W
11	43°28'16.53"N	98°45'18.60"W
12	43°28'17.98"N	98°45'5.76"W
13	43°28'23.10"N	98°45'15.79"W
14	43°28'26.94"N	98°45'5.08"W
15	43°28'34.09"N	98°45'13.26"W
16	43°28'34.56"N	98°45'0.65"W
17	43°28'16.22"N	98°45'29.46"W
18	43°28'28.17"N	98°45'34.53"W
19	43°28'21.82"N	98°45'23.63"W
20	43°27'52.47"N	98°45'47.75"W
21	43°28'20.04"N	98°45'38.46"W
22	43°27'53.39"N	98°45'20.55"W
23	43°28'2.76"N	98°45'17.31"W
24	43°27'55.70"N	98°45'7.46"W

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GEOTE	EK# <b>23-0946</b>		_							В	ORING	S NO.		7 (	1 of 1)	
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GEOTE	EK# <b>23-094</b>	6								В	ORING	S NO.		8 (′	l of 1)	
PROJEC	CT Sand & G	avel Exploration	on, Van Zee F	Property, Nea	r Pla	atte, SD										
DEPTH	DES	CRIPTION C	OF MATERIA	Al		GEOLOGIC			SA	ΑM	PLE	L	ABOR	ATOR	Y TES	STS
in FEET	┰					ORIGIN	N	WL	NO.	T	YPE	wc	D	LL	PL	QU
	LEAN CLA	<u>′</u> : dark brown	, dry to mois	st, (CL)		FINE ALLUVIUM				I						
-						ALLOVION	_		1	ı	FA					
4	LEANCLA	/ VA/ITLL C A NIC	N 1:441			GLACIAL	+									
	brown, moi	Y WITH SAND st, (CL)	<u>r</u> : a little grav	/ei,		TILL				K	1					
									2	ı	FA					
-							_		-	1						
-							_			H	-					
									3	I	FA					
15							_									
-	Bo	tom of boreh	ole at 15 fee	t.			_									
-							_									
							_									
-							_									
							_									
							_									
							_									
-							_									
-							_									
	\	VATER LEVE	L MEASUR	EMENTS			STAR	Т	7-6-	23	C	OMPLE	TE _	7-6-2	3 10:2	3 am
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		WATER LEVEL	METH									
7-6-23	3 10:23 an			14	<u> </u>	none	6" Flig	ght A	uger	-						
							CRE	N CL	HEE		Mika V	Vagne	ır.			
					<u> </u>		LOKE	v U	пСГ		WIIKE V	vagne	71			

GEOTE	ΞK# <u>:</u>	23-0946		_							В	ORING	S NO.		9 (	1 of 1)	
PROJE	CT <u>Sa</u>	nd & Grav	el Exploration	on, Van Zee P	roperty, Nea	r Pla	atte, SD	1									
DEPTH in FEET	_	DESC	RIPTION O	F MATERIA	AL		GEOLOGIC ORIGIN	N	WL	NO.		PLE	WC	ABOR D	LL	Y TES	QU QU
15	SAN coar	et, (CL)  D WITH se graine  N CLAY V  Vn, moist,	MITH SAND (CL)	ravel, fine to ry, (SP-SM) : a little grav	/el,		FINE ALLUVIUM COARSE ALLUVIUM GLACIAL TILL			3		FA FA					
		W/	ATER LEVE	I MFASUR	<u> </u>   EMENTS			STAR	<u>L</u> Г	7-6-2	<u> </u> 23	C	II OMPLE	L	7 <b>-</b> 6-	23 9:5 <sub>4</sub>	4 am
DATE		TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		WATER LEVEL	METH 6" Flig	HOD				OIVIF LE	.16	7-0-	20 3.0	T GIII
7-6-23	3 9	9:55 am	15		14		none			<u> </u>							
		-															
								CREV	V CH	lIEF		Mike V	Vagne	er			

GEOTE	EK# <b>23-09</b>	46		_							В	ORING	S NO.		10 (	(1 of 1)	)
PROJEC	CT Sand & 0	Grav	el Exploration	on, Van Zee P	roperty, Nea	ar Pl	atte, SD	1					· ·				
DEPTH in FEET	DE	SC	RIPTION C	F MATERIA	<b>AL</b>		GEOLOGIC ORIGIN	N	WL	NO.		YPE	WC	ABOR D	LL	PL	QU
_	SANDY LI moist, (CL	<b>EAN</b> .)	<b>I CLAY</b> : dar	k brown, dry	to to		FINE ALLUVIUM	_		1	}	FA					
6 _	CLAYEY S	SAN rair	<u>ID</u> : a trace o	of gravel, fin dry, (SC)	e to		COARSE ALLUVIUM		Ā	2		FA					
10 _	SAND WIT medium g waterbear	rair	ed, brown,	e of gravel, t moist to	fine to		COARSE ALLUVIUM	-		3		FA					
15 -	SAND WIT	ΓΗ (	<b>SILT</b> : a little ed, gray, wa	gravel, med terbearing, (	dium to		COARSE ALLUVIUM	- - -		4		FA					
_								_		4		- FA					
23	LEAN CLA gray, mois	<b>AY (</b> st, (	<b>WITH SAND</b> CL)	: a little grav	/el,		GLACIAL TILL	- -		5		FA					
_								-		6		FA					
-								- -		7	1	FA					
35 -	В	otto	m of boreho	ole at 35 fee	t.	<i>¥/,7<u>/</u>,</i>		-	-								
_								_ _									
- -								- -									
		W	ATER LEVE	L MEASUR	EMENTS			STAR	Γ	7-6-2	23	C(	OMPLE	TE .	7-6-	23 9:2	7 am
DATE			SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		WATER LEVEL	METH 6" Flig		uger							
7-6-23	9:34 a	m	35 		8	Ţ	8										
<u></u>								CREV	V CH	<u>HIEF</u>		Mike V	Vagne	er			

GEOTE	EK# <b>23-09</b>	46		_							В	ORING	S NO.		11 (	1 of 1	)
PROJEC	CT Sand & O	3rav	el Exploration	n, Van Zee P	roperty, Nea	ar Pl	atte, SD	1									
DEPTH in FEET	DE	SC	RIPTION C	F MATERIA	AL		GEOLOGIC ORIGIN	N	WL	NO.		PLE YPE	WC	ABOR D	LL	PL	QU
-	LEAN CL	<b>\Y</b> :	dark brown	dry to mois	st, (CL)		FINE ALLUVIUM	-		1		FA					
7 -	medium g waterbear	rain ing,	ed, brown,	ssing the #2			COARSE ALLUVIUM	- -	Ī	2		FA					
-								-		3	}	FA FA					
23	LEAN CL	AY I	WITH SAND	: a little grav	/el.	<i>87))</i>	GLACIAL	_ _ _		5		FA					
- -	gray, mois	st to	wet, (CL)	, a muo gra	,		TILL	-		6		FA					
- 1 35	D	-#-	m of horobo	ula at 25 fac	•			-		7		FA					
	В	ΟΠΟ	iii oi borend	ole at 35 fee	ι.			- - -									
		WA	ATER LEVE	L MEASUR	EMENTS			STAR	Γ	7-6-2	23	C	OMPLE	TE	7-6-2	3 12:1	1 pm
DATE			SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		WATER LEVEL	METH 6" Flig		uger				-			
7-6-23		m	35		9.5	Ţ	9.5										
						+	<del></del>										
								CREV	V CH	lIEF	-	Mike V	Vagne	r			

GEOTI	EK# <u>2</u>	3-0946		_							В	ORING	S NO.		12 (	(1 of 1)	)
PROJE	CT <b>Sa</b> n	nd & Grav	el Exploratio	n, Van Zee P	roperty, Nea	ır Pl	atte, SD	1									
DEPTH in FEET	  -	DESC	RIPTION O	F MATERIA	<b>AL</b>		GEOLOGIC ORIGIN	N	WL	NO.		YPE	WC	ABOR D	LL	PL	QU
	SANE moist	OY LEAN , (CL)	<b>I CLAY</b> : darl	k brown, dry	v to		FINE ALLUVIUM	-		1		FA					
3 -	mediu	um grain	GILT: a little ed, brown, i (SP-SM)	gravel, fine moist to	to		COARSE ALLUVIUM	- - -	Ī	2		FA					
-	SANE moist	OY LEAN to wet,	<u>I CLAY</u> : a liti (CL)	tle gravel, b	rown,		GLACIAL TILL	- - -		3		FA FA					
20 _			m of boreho					_		4		FA					
DATE								-									
DATE		W <i>A</i> TIME	SAMPLED	CASING	CAVE-IN		WATER	STAR'	HOD	7-6-2	23		OMPLE	TE .	7-6-2	23 11:2	28 am
7-6-23		:40 am	DEPTH 20 	DEPTH 	17 	<u></u>	LEVEL 7	6" Flig	ght A	uger							
							 	CREV	W CF	lIFF	N	Mike V	Vagne	ır			

GEOTI	EK#	23-0946		<u> </u>							BORIN	G NO.		13 (	1 of 1)	)
PROJE	СТ	Sand & Grav	vel Exploratio	n, Van Zee P	roperty, Near	· Pla	ntte, SD									
DEPTH		DESC	RIPTION O	F MATERIA	λL		GEOLOGIC	N		SAN	MPLE	L,	ABOR	ATOR	Y TES	STS
in FEET	ᢏ−						ORIGIN	N	WL	NO.	TYPE	wc	D	LL	PL	QU
	LE	AN CLAY:	dark brown,	dry to mois	st, (CL)		FINE ALLUVIUM									
-								_		1 (	FA					
-	-							_								
7 -								_								
' -	CL	AYEY SAN	<b>ID</b> : a trace o n, dry, perc	f gravel, fin	e tho		COARSE ALLUVIUM	-		2	FA					
_	#2	00 sieve =	16% (from '	10' to 15') (S	SC)		ALLOVION	_								
										3	FA					
15		AID MITH	NI = 10	1.6.			004505	_		_						
-	me	edium grain	<b>SILT</b> : with gr ned, brown, o	dry to water	bearing,	$\parallel \parallel$	COARSE ALLUVIUM	_	<b>T</b>							
-	ре 25	rcent passi ' to 30') (SF	ing the #200 P-SM)	sieve = 11	% (from			-		4	FA					
_								_			H					
_					). (*			_								
_										5	FA					
											H					
_								_		6	FA					
-					Ŷ			_								
-								_								
-								_		7	FA					
	-							_								
35	SA	NDY LEAN	I CLAY: a lit	tle gravel, b	rown,		GLACIAL	-		-	1					
_	mo	oist, (CL)					TILL			8	FA					
40 _																
- 07	<u>LE</u>	AN CLAY Nay, moist, (	WITH SAND	a little grav	/el,		GLACIAL TILL									
-	911	ay, moist, (	OL)				TILL	_		9	FA					
45								_								
-		Botto	m of boreho	le at 45 fee	t.			_								
		WA	ATER LEVE	L MEASUR	EMENTS			STAR		7-6-23	3 <u> </u>	OMPLE	TE .	7-6-2	23 1:10	6 pm
DATE	[	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		WATER LEVEL	METH 6" Flig		llaer						
7-6-2	3	1:24 pm	45			Ţ	17	<u> </u>	<u>۲۱ د د و</u>	agui						
								CREV	V CH	lIEF	Mike	Wagne	er			

	GEOTE	K# <b>23-0946</b>		_							В	ORING	S NO.		14 (	(1 of 1)	
F	PROJEC	☐ Sand & Gra	vel Exploration	on, Van Zee F	roperty, Near	· Pla	atte, SD										
	DEPTH	DES	CRIPTION C	F MATERIA	AL.		GEOLOGIC			SA	١M	PLE	L	ABOF	RATOF	Y TES	STS
	in FEET	▼					ORIGIN	N	WL	NO.	-	ГҮРЕ	wc	D	LL	PL	QU
Г		SANDY LEA	<b>N CLAY</b> : dar	k brown, dry	/ to		FINE				I						
	4	moist, (CL)					ALLUVIUM	-		1	I	FA					
										'	1						
	5	LEANICLAY	MITH CAND	, a little area	(a) 6		GLACIAL				H	4					
	+	LEAN CLAY brown, moist	:, (CL)	. a illie grav	/ei,		TILL	-	I								
		,	, ,					L	<del>*</del>	2	I	FA					
											ı						
	┪										H						
	4							_				'l _,					
										3	1	FA					
	1																
	4							-									
										4	ı	FA					
	1										1						
	20 $\perp$	Botto	om of boreho	ole at 20 fee	t.	172			1								
								_									
	1							-									
	4							-									
	1																
	-							-									
								L									
	]																
_	4							-									
18/2:																	
DT 7																	
ZG.G	+							-									
H E E	4							_									
SEOT																	
JPJ (	1																
946.0	4							-									
23-C																	
GEOTECHNICAL TEST BORING 23-0946.GPJ GEOTEKENG.GDT 7/18/23																	
I BO		W	ATER LEVE			1		STAR		7-6-2	23	C	OMPLE	ETE .	7-6-	23 4:0	6 pm
TES	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		WATER LEVEL	METH									
- EAL	7-6-23	4:07 pm	15		11	¥	7	6" Flig	<u>ını A</u>	<u>uger</u>							
Z L		'															
								CDE	N C'	11		NAiles 1	Macin -				
<u>ö</u>						<u> </u>		CRE	v CF	11111		Mike V	vagne	er			

GEOTE	EK# <b>23-0</b>	946									В	ORING	NO.		15 (	1 of 1)	1
PROJEC	CT Sand 8	& Grav	el Exploration	on, Van Zee P	roperty, Nea	ar Pl	atte, SD										
DEPTH		DESC	RIPTION C	F MATERIA	AL.		GEOLOGIC			SA	٩M	PLE	L	ABOR	ATOR	Y TES	STS
in FEET	┰						ORIGIN	N	WL	NO.	T	YPE	wc	D	LL	PL	QU
	LEAN C	LAY:	dark brown	, dry to mois	t, (CL)		FINE ALLUVIUM				I						
-							ALLOVION	_		1	ı	FA					
_								_			ı						
6 _											t	1					
	CLAYEY medium	(SAN grain	<b>ID</b> : a little gr ned_brown	ravel, fine to moist, (SC)	1		COARSE ALLUVIUM			2	I	FA					
-	modiam	gran	iou, brown,				71220 710111	_		-	1	'					
10 _	LEAN C	LAY:	a little grav	el, gray, moi	st. (CL)		GLACIAL	+			H	-					
_		<u></u> .	a mao grav	oi, gray, illo	o., (OL)		TILL	_			ľ						
										3	1	FA					
								_									
-								_									
_								_		4	K	FA					
20 _											1						
		Botto	m of boreho	ole at 20 fee	t.												
-								_									
-								_									
-								-									
_								_									
_								_									
_																	
=								_									
_								_									
-																	
-								_									
_																	
		WA	ATER LEVE	L MEASUR	EMENTS			STAR	<u> </u> Г	7-6-	<u> </u> 23	C	I <b>I</b> OMPLE	L TE	7-6-2	23 1:5	3 pm
DATE	TIM		SAMPLED	CASING	CAVE-IN		WATER	METH	HOD				<b></b> -				
7-6-23			DEPTH 20	DEPTH 	DEPTH 19		LEVEL none	6" Flig	<u>ght A</u>	uger							
7-0-20	1.55																
								ODE				\ A:1. '	A / -				
		•						CREV	v CF	IIEF		viike V	Vagne	er			

GEOTE	EK# <b>23-094</b>	6							В	ORING	S NO.		16 (	(1 of 1)	)
PROJEC	CT Sand & G	avel Exploration	on, Van Zee F	Property, Near I	Platte, SD										
DEPTH	DES	CRIPTION C	F MATERIA	AL	GEOLOGIC			SA	٩М	PLE	L	ABOR	ATOF	Y TES	STS
in FEET	√				ORIGIN	N	WL	NO.	Т	YPE	wc	D	LL	PL	QU
	LEAN CLA	<u>(</u> : dark brown	, dry to mois	st, (CL)	FINE ALLUVIUM										
_					, LEE VIOL	-		1	ı	FA					
-						-			ı						
6 _									ı	1					
	brown, moi	<b>/ WITH SAND</b> st, (CL)	: a little grav	vel,	GLACIAL TILL			2	I	FA					
_	,	, ( )							ı						
_						-			H	-					
_						_		_		_					
								3	1	FA					
									H	-					
-						-			ľ						
-						-		4	1	FA					
20 _															
	Bot	tom of boreho	ole at 20 fee	t.											
-						-									
-						-									
-															
_						_									
_						_									
=															
-						-									
_						-									
-															
_											L		L		
	V	VATER LEVE		REMENTS	_	STAR		7-6-	23	C	OMPLE	TE _	7-6-	23 2:1	8 pm
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	WATER LEVEL	METH		1100							
7-6-23	3 2:18 pm			19	none	6" Flig	JIIL A	uger							
						CREV	V CH	HIEF	-	Mike \	Vagne	r			
		-									3.70				

GEOTE	ΞK#	23-0946									В	ORING	NO.		17 (	1 of 1)	)
PROJE	СТ	Sand & Grav	el Exploratio	n, Van Zee P	roperty, Nea	ır Pl	atte, SD	<u> </u>									
DEPTH in FEET	  -	DESC	RIPTION O	F MATERIA	<b>AL</b>		GEOLOGIC ORIGIN	N	WL	NO.		YPE	WC	ABOR D	LL	PL PL	QU QU
_	LE	AN CLAY:	dark brown,	dry to mois	it, (CL)		FINE ALLUVIUM	_			}	F.A.					
3 -	me pa	edium arain	SILT: a little ied, brown, i 200 sieve =	moist, perce	ent		COARSE ALLUVIUM	- - -		2		FA FA					
- 17 -	<u>LE</u>	AN CLAY I	<b>WITH SAND</b> to wet, (CL)	: a little grav	/el,		GLACIAL TILL	- - -		3 4		FA FA					
25		AN CLAVI	WITH SAND	· a little grav	امر		GLACIAL	_ - -		5	}	FA					
-	gra	ay, moist, (	CL)	. a nuic grav	, (),		TILL	-		6		FA					
30		Botto	m of boreho	ole at 30 fee	t.			-									
_								-									
		WA	ATER LEVE				\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.\.	STAR		7-10-	23		OMPLE	TE .	7-10-2	23 10:	11 am
7-10-2		TIME 10:12 am	SAMPLED DEPTH 30	CASING DEPTH	CAVE-IN DEPTH 28		WATER LEVEL none	METH 6" Flig		uger							
7-10-2	.5	10:12 am				+	none 										
								CREV	V CH	lIEF	1	Mike V	Vagne	r			
			1						- '			····•					

	K# <u>23-0946</u>				ъ.	CD				В	ORING	NO.		18 (	(1 of 1)	)
DEPTH	Sand & Gr				Pla				SA	MF	PLE	L	ABOR	RATOR	RY TES	STS
in FEET	DES	CRIPTION C	)F MATERIA	AL.		GEOLOGIC ORIGIN	N	WL	NO.		YPE	wc	D	LL	PL	QI
-	SANDY LEA moist, (CL)	<b>N CLAY</b> : dar	k brown, dry	to to		FILL	-		1		FA					
7	CLAYEY SA brown, mois	ND: a little gr t, (SC)	ravel, fine gr	rained,		COARSE ALLUVIUM	-		2		FA					
10 _	LEAN CLAY brown, mois	WITH SAND t, (CL)	ː a little grav	/el,		GLACIAL TILL	-		3		FA					
20		om of boreho					-		4		FA					
- - - - -							- - - - -									
-	110	/ATER LEVE	I MEVELL	EMENTS			STAR		7-10-	22		OMPLE	TE	7 10 1	23 10-	17 -
DATE		SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		WATER LEVEL	METH	HOD		۷3		JIVIPLE	.16 _	7-10-2	23 103	<u>+1 8</u>
7-6-23	3 7:18 pm	20		19		none	6" Flig	ınt A	uger							
							CREV					Vagne				

GEOTI	EK#	23-0946		_							В	ORING	S NO.		19 (	(1 of 1)	)
PROJE	СТ	Sand & Grav	el Exploratio	n, Van Zee P	roperty, Nea	ır Pl	atte, SD					-					
DEPTH in FEET		DESC	RIPTION O	F MATERIA	AL		GEOLOGIC ORIGIN	N	WL	NO.		PLE YPE	WC	ABOF D	RATOF LL	PL PL	QU
_	LI	EAN CLAY:	dark brown,	dry to mois	st, (CL)		FINE ALLUVIUM	_		1		FA					
5 -	m	edium grain elow 16', pe	SILT: with graded, brown, rcent passir' to 15') (SP	moist, a few	/ cobbles		COARSE ALLUVIUM	- - - -		2	}	FA					
-								_ _		3	{	FA					
20 _								_		4		FA					
-	<b>LI</b> gr	EAN CLAY Nay, moist to	WITH SAND wet, (CL)	/el,		GLACIAL TILL	_ _ _		5		FA						
30 _								-		6	ľ	FA					
-	-	Botto	m of boreho	ole at 30 fee	t.			-									
DATE 7-10-2	-							- - -									
		WA	ATER LEVE	L MEASUR	EMENTS			STAR	т _	7-10-	23	_ co	OMPLE	TE	7-10-	23 11:	14 am
DATE		TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		WATER LEVEL	METH 6" Flig		uger							
7-10-2	23	11:14 am	30		28	+	none										
						+											
						1		CREV	V CH	HIEF	ſ	Mike V	Vagne	er			
						•											

	EK# <b>23-0946</b>									В	ORING	S NO.		20 (	1 of 1	)
	Sand & Gra	vel Exploration	on, Van Zee P	roperty, Near	r Pla	atte, SD	1	1	I 6/	N N A I	PLE	II .	A D O C	ATOR	V TE	OTC
DEPTH in FEET	DES	CRIPTION C	F MATERIA	<b>AL</b>		GEOLOGIC ORIGIN	N	WL	NO.		YPE	WC	D	LL	PL	QU
-	LEAN CLAY	dark brown	, dry to mois	t, (CL)		FINE ALLUVIUM	-		1		FA					
5 . - -	LEAN CLAY brown, mois	WITH SAND	: a little grav	/el,		GLACIAL TILL	- - -		2		FA					
15							- -		3		FA					
15	Botte	Bottom of borehole at 15 feet.														
- - -							- -									
	W	ATER LEVE		EMENTS			STAR	Γ_	7-10-	-23	_ C	OMPLE	TE .	7-10-	23 12:	11 pm_
DATE		SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		WATER LEVEL	METH 6" Flig		uger							
7-10-2 	3 12:12 pm	15		14	<u> </u>	none 										
		<del></del>														
							CREV	V CH	lIEF	I	Mike \	Nagne	r			

PROJECT S	Sand & Grav									В	DRING	NO.		21 (	1 of 1)	1
	Jana & Grav	el Exploratio	n, Van Zee P	roperty, Nea	r Pla	atte, SD										
in FEET _	DESC	RIPTION O	F MATERIA	AL		GEOLOGIC ORIGIN	N	WL	NO.		YPE	WC	ABOR D	ATOR LL	Y TES	RTS QU
	INDY LEAN L)	CLAY: brov	wn, dry to m	ioist,		FINE ALLUVIUM	_		1		FA					
5	AN CLAY V own, moist,	VITH SAND: (CL)	a little grav	vel,		GLACIAL TILL	- - -		2		FA FA					
15	Datta	n of boreho	l445 f				-									
GEOTECHNICAL TEST BORING 23-0946.GPJ GEOTEKENG.GDT 7/18/23  TAYA  TAYA																
BOR	WA	TER LEVE	L MEASUR	EMENTS			STAR	Γ_	7-6-2	23	_ co	OMPLE	TE _	7-6-2	23 7:1	3 pm
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		WATER LEVEL	METH 6" Flig		uger							
∑ 7-6-23 	7:18 pm 	15 		14	+	none 										
<u></u>					+											
<u></u>					1		CREV	V CL			1:1 \/	Vagne	-			

	EK# <b>23-0</b> 9										В	ORING	S NO.		22 (	(1 of 1)	)
PROJEC	CT Sand &	Grav	el Exploratio	on, Van Zee P	roperty, Nea	r Pl	atte, SD			T 0.4				4000		W ( TE (	
DEPTH in FEET	D	ESC	RIPTION C	F MATERIA	AL		GEOLOGIC ORIGIN	N	WL	NO.		YPE	WC	D	LL	PL	QU
-	LEAN CL a few col	<u>AY</u> : obles	dark brown s (CL)	, dry to mois	st, with		FINE ALLUVIUM	-		1	1	FA					
5		Botto	Refusal at	5 feet. ole at 5 feet													
								_									
		WA	ATER LEVE	L MEASUR	EMENTS			STAR	Т _	7-10-	23	_ C	OMPLE	TE .	7-10-	23 12:	54 pm
DATE			SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		WATER LEVEL	METH 6" Flig		uger							
7-10-2		pm	5		5	-	none	-									
						-		+									
								CREV	V CH	HEF	1	Mike \	Vagne	er			

GEOT	EK#	23-0946		_							В	ORING	S NO.		23 (	1 of 1)	)
PROJE	CT S	Sand & Grav	el Exploration	n, Van Zee P	roperty, Nea	ır Pl	atte, SD										
DEPTH in FEET	  -	DESC	RIPTION O	F MATERIA	<b>AL</b>		GEOLOGIC ORIGIN	N	WL	NO.		YPE	wc	ABOR D	LL	PL PL	QU
	SA mo	NDY LEAN ist, (CL)	<b>l CLAY</b> : darl	k brown, dry	to to		FINE ALLUVIUM	_		1		FA					
3 -	me	ND WITH Straim dium grair P-SM)	SILT: a trace ned, brown,	of gravel, to dry to moist	ine to		COARSE ALLUVIUM	-  -  -		'		FA					
-								- -		2		FA					
-								-		3		FA					
17 -	LE/ bro	AN CLAY I	WITH SAND (CL)	: a little grav	/el,		GLACIAL TILL	- - -		4		FA					
-	_							- -	Ī	5		FA					
30 _	-							-		6		FA					
-		Botto	m of boreho	le at 30 fee	t.			-									
	_							-									
	-							<u>-</u>									
NG 23-0940								_									
		WA	ATER LEVE	L MEASUR	EMENTS			STAR	Γ	7-10-	23	_ co	OMPLE	TE	7-10-	23 1:2	7 pm
DATE		TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	<b>Y</b>	WATER LEVEL	METH 6" Flig		uger							
7-10-2	23	1:27 pm 	30		23	<u> </u>	23 										
								CREV	V CL	IIFF	٨	/like \/	Vagne	ır			
<u> </u>						1		LCKEV	v U		I۱	viike V	vagne	:1			

GEOTE	GEOTEK# <b>23-0946</b> BORING NO. <b>24 (1 of 1)</b>									)						
PROJECT Sand & Gravel Exploration, Van Zee Property, Near Platte, SD							1	SAMPLE LABORATORY TESTS								
DEPTH in FEET					GEOLOGIC ORIGIN	N	WL	NO.		YPE	WC	D	LL	PL PL	QU	
-	SANDY LEA (CL)	<b>IN CLAY</b> : bro	wn, dry to m	noist,		FINE ALLUVIUM			1		FA					
5 .	LEAN CLAY brown, mois	WITH SAND t, (CL)	ː a little grav	/el,		GLACIAL TILL	- - -		2		FA					
15							-		3		FA					
-	Boti	om of boreho	ole at 15 fee	t.	7.8.7.4		-									
- - - -							-									
	V	ATER LEVE			ı		STAR		7-10-	-23	C	OMPLE	ETE _	7-10-	-23 1:5	64 pm_
DATE		SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		WATER LEVEL	METHOD 6" Flight Auger									
7-10-2 	3 1:54 pm	15		14		none 										
	<del></del>	<del> </del>														
							CREW CHIEF Mike Wagner									

# **SOIL CLASSIFICATION CHART**

MAJOR DIVISIONS			SYME	BOLS	TYPICAL		
IVI	AJUR DIVISI	UNS	GRAPH	LETTER	DESCRIPTIONS		
	GRAVEL AND	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES		
	GRAVELLY SOILS	(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES		
COARSE GRAINED SOILS	MORE THAN 50% OF COARSE FRACTION	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES		
	RETAINED ON NO. 4 SIEVE	(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES		
MORE THAN 50% OF MATERIAL IS	SAND AND	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES		
LARGER THAN NO. 200 SIEVE SIZE	SANDY SOILS	(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES		
	MORE THAN 50% OF COARSE FRACTION	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES		
	PASSING ON NO. 4 SIEVE	(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES		
				ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY		
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS		
00.20				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY		
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE				МН	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS		
SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		СН	INORGANIC CLAYS OF HIGH PLASTICITY		
				ОН	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS		
HI	HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS		

#### BORING LOG SYMBOLS AND DESCRIPTIVE TERMINOLOGY

#### SYMBOLS FOR DRILLING AND SAMPLING

<u>Symbol</u>	<u>Definition</u>
Bag	Bag sample
CS	Continuous split-spoon sampling
DM	Drilling mud
FA	Flight auger; number indicates outside diameter in inches
HA	Hand auger; number indicates outside diameter in inches
HSA	Hollow stem auger; number indicates inside diameter in inches
LS	Liner sample; number indicates outside diameter of liner sample
N	Standard penetration resistance (N-value) in blows per foot
NMR	No water level measurement recorded, primarily due to presence of drilling fluid
NSR	No sample retrieved; classification is based on action of drilling equipment and/or material noted in drilling fluid or on sampling bit
SH	Shelby tube sample; 3-inch outside diameter
SPT	Standard penetration test (N-value) using standard split-spoon sampler
SS	Split-spoon sample; 2-inch outside diameter unless otherwise noted
WL	Water level directly measured in boring
<u>▼</u>	Water level symbol

#### **SYMBOLS FOR LABORATORY TESTS**

Symbol	<u>Definition</u>
WC	Water content, percent of dry weight; ASTM:D2216
D	Dry density, pounds per cubic foot
LL	Liquid limit; ASTM:D4318
PL	Plastic limit; ASTM:D4318
QU	Unconfined compressive strength, pounds per square foot; ASTM:D2166

#### **DENSITY/CONSISTENCY TERMINOLOGY**

Density		Consistency
Term	N-Value	Term
Very Loose	0-4	Soft
Loose	5-8	Firm
Medium Dense	9-15	Stiff
Dense	16-30	Very Stiff
Very Dense	Over 30	Hard

#### **DESCRIPTIVE TERMINOLOGY**

Term	<u>Definition</u>
Dry	Absence of moisture, powdery
Frozen	Frozen soil
Moist	Damp, below saturation
Waterbearing	Pervious soil below water
Wet	Saturated, above liquid limit
Lamination	Up to ½" thick stratum
Layer	½" to 6" thick stratum
Lens	½" to 6" discontinuous stratum

#### **PARTICLE SIZES**

Term	Particle Size
Boulder	Over 12"
Cobble	3" – 12"
Gravel	#4 – 3"
Coarse Sand	#10 – #4
Medium Sand	#40 – #10
Fine Sand	#200 – #40
Silt and Clay	passes #200 sieve

#### **GRAVEL PERCENTAGES**

<u>Term</u>	Range
A trace of gravel	2-4%
A little gravel	5-15%
With gravel	16-50%



# GEOTEK ENGINEERING & TESTING SERVICES, INC.

2104

SIEVE ANALYSIS TEST REPORT Page 1 of 1

909 East 50<sup>th</sup> Street North Sioux Falls, South Dakota 57104 605-335-5512 Fax 605-335-0773 www.geotekeng.com

REPORTED TO: PROJECT: 23-0946 COPIES TO:

Doug Van Zee 724 Park Lane South Canton, South Dakota 57013 Sand & Gravel Exploration Van Zee Property Near Platte, South Dakota

**DATE REPORTED:** 7/18/2023

Sample Information

Sampled By: Flight Auger Date Received: 7/6/2023 & 7/10/2023

Material Type: Sand and Gravel

Tested By: GeoTek Date Tested: 7/17/2023

#### **Laboratory Test Data (ASTM C 136)**

	Test Boring Location / Depth (ft)						
	4	5	11	13	13	17	19
	15' – 20'	10' – 15'	15' – 20'	10' – 15'	25' – 30'	10' – 15'	10' – 15'
Sieve Size	Percent Passing						
3"	100	100	100	100	100	100	100
2"	100	100	100	100	100	100	100
1 ½"	100	100	100	100	100	100	100
1"	100	100	98	100	99	99	99
3/4"	98	100	96	99	97	98	96
5/8"	97	100	93	98	93	96	94
1/2"	93	98	89	95	84	93	91
3/8"	88	94	86	92	77	88	87
#4	72	78	75	79	61	76	71
#8	49	62	65	69	49	66	55
#16	31	50	55	60	38	56	43
#40	15	28	25	47	26	37	27
#50	12	20	14	41	22	24	21
#100	8	12	8	23	15	11	14
#200	7.2	10.3	6.6	16.4	11.1	9.3	11.9

Remarks:

By:

Nick Bierle, PE