Geotechnical Evaluation

Proposed Culvert Replacements
E Washington Street and N Spruce Avenue over Flinton Creek
Everett Township, Newaygo County, Michigan

Prepared for

Trout Unlimited
May 28, 2025
2250583

Prein&Newhof

Prein&Newhof
Engineers ▪ Surveyors ▪ Environmental ▪ Laboratory

May 28, 2025
2250583

Dr. Jeremy Geist
Trout Unlimited
PO Box 991
Cadillac, MI 49601

RE: Report on Geotechnical Exploration
Proposed Flinton Creek Culvert Replacements
Everett Township, Newaygo County, MI

Dear Dr. Giest,

Prein&Newhof has completed a geotechnical exploration for the proposed culvert replacements for E Washington Street and N Spruce Avenue over Flinton Creek. The purpose of our exploration was to determine subsurface conditions at the culvert locations and to provide recommendations for culvert replacement. The data developed during our exploration along with our evaluations and recommendations are presented in the subsequent sections of this report.

Design Considerations

We understand that the culverts carrying E Washington Street and N Spruce Avenue over Flinton Creek are to be replaced. This section of E Washington Street features an aggregate surface and is located east of N Spruce Avenue and west of N Poplar Avenue. Flinton Creek intersects with E Washington Street twice in this section, and this report concerns the westernmost culvert crossings closest to N Spruce Avenue. N Spruce Avenue is paved with asphalt at this section and is located south of E Washington Street and north of E Baseline Avenue. These areas are located in Everett Township in Newaygo County, Michigan.

The crossing at E Washington Street consists of a triple ellipse, with each culvert being approximately 4 feet in height. No concrete headwalls or armoring is present at this culvert crossing. These culverts have approximately 3-feet of cover to the road surface.

The crossing at N Spruce Avenue consists of a triple ellipse, with each culvert being approximately 4-feet in height. No concrete headwalls or armoring is present at this culvert crossing. These culverts have approximately 2.5-feet of cover to the road surface.

Field Investigation

We investigated subsurface conditions by drilling two soil borings adjacent to each culvert crossing, for a total of four soil borings. These boring locations are shown on the attached Soil Boring Location Plan. The location of each boring is also noted on the boring logs.

Borings SB-1 and SB-2 were drilled on opposite sides of N Spruce Avenue over Flinton Creek. SB-1 was drilled to a depth of 40-feet and was performed south of the culvert crossing, and on the western side of N Spruce Avenue. SB-2 was drilled to a depth of 15-feet and was performed north of the culvert crossing, and on the eastern side of N Spruce Avenue.

Borings SB-3 and SB-4 were drilled on each side of the culvert crossing, both on the southern side of E Washington Street. SB-3 was drilled to a depth of 40-feet, and SB-4 was drilled to a depth of 15-feet.

All soil boring locations are shown on the attached Soil Boring Location Plan.

The soil borings were drilled by Envirotech Drilling Company under the full-time observation of a geotechnical engineer from Prein&Newhof. Within each boring, soil samples were taken at regular depth intervals of 2.5 feet within the upper 10 feet and 5 feet below that depth. Samples were obtained by the Standard Penetration Test (SPT) method, ASTM D1586, whereby a 2-inch outside diameter split-spoon sampler is driven three successive 6-inch increments, with the number of blows for each increment being recorded. The number of blows required to drive the sampler the second and third 6-inch increment is defined as the Standard Penetration Resistance (N). At the completion of drilling and groundwater measurements, the boreholes were backfilled with excavated soils.

The soil samples obtained at the site were classified in the field by our representative, then sealed in containers and transported to our laboratory for further classification and testing. We will retain these soil samples for a period of 60 days after the date of this report, at which time we will dispose of the samples unless we are otherwise instructed.

Soil Conditions

The soil conditions encountered at each area of the culvert crossings are described separately below:

E Washington Street: At the location of the culvert crossings, the roadway is surfaced with gravel, which is approximately 1-foot in thickness. The aggregate is underlain by fill consisting of fine to medium sand with varying silt and clay content, and occasional seams of clay. This fill material is in a very loose to medium dense condition, with SPT N-values which range from 4 to 17. The fill extends to depths of approximately 4.1 to 5.5 feet below the ground surface. However, in the area adjacent to the culvert, we anticipate that the fill extends to the culvert invert, which is approximately 7-feet below the road surface.

In the area of SB-3, the fill is underlain by very soft silty clay with organics. This organic soil extends to a depth of approximately 5.5 feet.

The fill and organic soils are underlain by alternating layers of granular and cohesive soils. The granular soils consist of loose to dense fine to coarse sand with varying silt and clay content. The SPT N-values of these soils range from 9 to 42. The cohesive soils consist of very stiff silty clay with occasional layers of silt. Pocket penetrometer tests performed on the clay soil samples indicate unconfined compressive strengths ranging from 5,000 to 6,000 pounds per square foot. The alternating sand and clay layers extend to the explored boring depths.

N Spruce Avenue: At the location of this culvert, the roadway is covered with approximately 4-inches of aggregate, while the areas adjacent to the roadway are covered with topsoil that varies in thickness from 4 to 8 inches.

The road gravel and topsoil are underlain by fill deposits consisting of very loose fine sand with variable silt and clay content. SPT N-values within the fill range from 3 to 4. The fill extends to depths of approximately 4.9 to 5.5 feet; however, in the area of SB-3, the fill is underlain by a layer of very soft silty clay with organics. This organic soil extends to a depth of approximately 5.5 feet. However, in the area adjacent to the culvert, we anticipate that the fill extends to the culvert invert, which is approximately 6.5-feet below the ground surface.

The fill soils are underlain by deposits of organic soil. Within the area of SB-1, this layer generally consists of sand with trace silt and organic content, and extends from a depth of approximately 5.5-feet to 8-feet below the ground surface. This sand layer is in a loose condition, with an SPT N-value of 6. Within the area of SB-2, the fill soils are underlain by a deposit of peat with trace sand content. This deposit of peat is in a very soft to soft condition, with an SPT N-value of 3.

Within the area of SB-1, the organic soils are underlain by deposits of primarily sandy soils, which extend to the 40-foot of depth explored by the boring. These soil layers generally consist of sand with trace gravel and fines content, are in loose to dense conditions, with SPT N-values ranging from 8 to 39. From depths of approximately 8 to 10-feet below the ground surface, the sandy soil generally consisted of a clayey sand.

Within the area of SB-2, the organic peat is underlain by a layer of gravel with variable sand and fines content. This layer of gravel is in a medium dense condition, with SPT N-values of 18 and 29. The gravel extends below the peat from a depth of approximately 5.5-feet to a depth of approximately 12-feet.

Below the gravel layer of SB-2, lies a deposit of primarily sandy soil similar to that encountered in SB-1.

Evaluation of Subsoils

The predominantly organic soils are considered to be compressible and thereby not suitable for the support of the proposed culverts. In general, we do not recommend that organic soils be left in place beneath the culverts. We consider the road gravel and underlying sand base to be suitable for reuse as fill. However, the remainder of the existing culvert backfill soils are compromised by the presence of wood and other organics and thereby not suitable for reuse as backfill for the new culverts. Therefore, these soils should be removed from the site.

We consider the non-organic native sand and silty clay to be suitable for the support of the new culverts. However, we recommend that these soils be reinforced by the placement of a geotextile and a layer of crushed aggregate.

Groundwater Conditions and Control

Water level observations were made during soil boring operations. Water was encountered at depths ranging from 4.3 to 7.5-feet within the soil borings, corresponding to elevations of approximately 752 to 754 Feet. At the completion of drilling operations, water was measured at depths ranging from approximately 4 to 5-feet, corresponding to elevations of approximately 754 to 755-feet. It should be noted that groundwater levels can fluctuate with seasonal variations and following periods of prolonged precipitation or draught and with variations of the surface water levels of Flinton Creek.

Based on the encountered subsurface conditions, we anticipate that groundwater control will be required during culvert replacement. In addition to temporarily blocking the flow within the creek and bypass pump it around the work area. We anticipate that it will be necessary to control water within the excavation by pumping from sumps formed at the base of the excavation. Based on these considerations, we recommend that steel sheet piling be extended about the perimeter of the work area to allow for the removal and replacement of the culverts.

Recommendations for Culvert Placement

As indicated above, it will be necessary to temporarily block the flow of water in the creek and bypass pump it around the work area. We recommend that the excavation area be surrounded with steel sheet piles to allow for culvert removal and excavation. The design of the temporary sheet pile enclosure should only be performed by a licensed engineer.

Following the removal of the existing culvert we recommend that the excavation be extended to the depth required for the new culvert and through any remaining organic soils that may be found beneath the existing culverts.

At E Washington Street we anticipate that the soils which will be exposed following organic soil removal will consist of medium dense sand with variable gravel and silt content in a wet condition, or very stiff silty clay with trace sand.

At N Spruce Avenue, we anticipate that the soils which will be exposed following organic soil removal will consist of loose clayey fine to coarse sand and medium dense sandy gravel with variable fines content.

We recommend placing a heavy filter grade geotextile followed by a layer of MDOT 6AA crushed stone, that is at least 12 inches in thickness and extended up to the invert of the culvert. The backfill from the invert of the culvert up to its spring-line (half-height) should consist of MDOT 6A natural stone.

From the spring-line to the road gravel, the culvert can be backfilled with MDOT Class II material. The Class II fill should be placed in uniform horizontal layers that are not more than 12 inches in loose thickness and compacted to achieve a density of at least 95 percent of the maximum dry density as determined by the Modified Proctor Compaction Test (ASTM D1557). All fill material should be placed and compacted at or near the optimum moisture content. Frozen material should not be used as fill, nor should fill be placed on a frozen subgrade.

We recommend the following pavement cross section **for the culvert crossings at N Spruce Avenue:**

4-inches of 4EL Hot Mix Asphalt

6-inches of 22A or 21AA Aggregate Base

12-inches of clean, free-draining sand (such as MDOT Class II Sand)

For the culvert crossings at E Washington Street we recommend that the road surface consist of MDOT 22A that is at least 8 inches in thickness and compacted to achieve a density of at least 95 percent of the maximum dry density as determined by the Modified Proctor Compaction Test (ASTM D1557).

Excavations

Construction excavations should comply with the current OSHA and MIOSHA requirements and other applicable local codes. The sides of all excavations should be sloped or benched as necessary for safety purposes. If sloping is not practical, properly designed sheeting/shoring systems will be necessary to provide safety in these soils for workers. Additionally, at no time should the excavation spoil material be placed directly adjacent to excavations. Reference to OSHA and MIOSHA requirements should be included in the job specifications.

Data Review and Field Monitoring

The evaluations and recommendations presented in this report relative to culvert replacement and site preparation have been developed on the basis of the currently available information regarding the proposed development and/or on the assumptions stated herein. Any significant changes in this information, particularly with respect to design grades and structural loadings,

should be brought to our attention for review with respect to the prevailing subsurface conditions.

Experience indicates that soil conditions at a site could vary from those generalized on the basis of test borings made at specific locations. It is therefore recommended that a knowledgeable soils consultant be retained to provide soil engineering services during the earthwork and foundation installation phases of the proposed project. This is to observe compliance with the design concepts, specifications and recommendations. Also, field monitoring allows design changes to be made in a timely manner, in the event that subsurface conditions differ from those anticipated prior to the start of construction.

This report is intended for specific use in the design and construction of proposed developments at the site, as described in this report. The work was performed in accordance with the prevailing standard of practice in this area at the time the work was performed. No other warranty, expressed or implied, is provided or intended.

The scope of the present investigation was limited to evaluation of subsurface conditions for the support of the proposed culverts and other related aspects of the proposed development. Considerations relating to environmental concerns or other possible regulatory restrictions on development were not included in the scope of this study.

Prein&Newhof appreciates the opportunity to have been of service to you, and we look forward to continue working with you on this project. Should you have any questions regarding this report, or require additional information, please call.

Sincerely,

Prein&Newhof

Karl J. Heindlmeyer, E.I.T.

Christopher J. Cruickshank, P.E.

Enclosures

Prein&Newhof

J:\GIS_Client\Newaygo-GD\00-Client\2250583_Trout Unlimited\2250583_Soil Boring Location Plan.aprx - 5/28/2025 10:25 AM - edempsey

SCALE: 1" = 200'

LEGEND

Soil Boring by Midwest Envirotech on 5/8/2025 under the observation of Prein&Newhof

TROUT UNLIMITED

Everett Township, Newaygo County, Michigan

SOIL BORING LOCATION PLAN

SPRUCE AVE. & WASHINGTON ST. OVER FLINTON CREEK

Prein&Newhof

2250583

GENERAL NOTES

DRILLING & SAMPLING DESIGNATIONS:

SS : Split Spoon - 1 3/8" I.D., 2" O.D., unless otherwise noted
ST : Shelby Tube - 2" O.D., unless otherwise noted
PA : Power Auger
DB : Diamond Bit - NX: BX: AX
AS : Auger Sample
JS : Jar Sample
VS : Vane Shear
OS : Osterberg Sampler = 3" Shelby Tube
HS : Hollow Stem Auger
WS : Wash Sample
FT : Fish Trail
RB : Rock Bit
BS : Bulk Sample
PM : Pressuremeter test - in situ

STANDARD PENETRATION TEST (ASTM D-1586): A 2.0" outside diameter, 1-3/8"inside diameter split barrel sampler is driven into undisturbed soil by means of a 140 pound hammer falling 30 inches. The sampler is driven three successive 6-inch increments, with the total number of blows required for the final 12 inches of penetration is termed the Standard Penetration Resistance (N).

GRADATION DESCRIPTION & TERMINOLOGY:

Coarse Grained or Granular Soils have more than 50% of their dry weight retained on a #200 sieve: they are described as: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are described as: clays or clayey silts if they are cohesive, and silts if they are non-cohesive. In addition to gradation, granular soils are defined on the basis of their relative in-place density and fine grained soils on the basis of their strength or consistency, and their plasticity.

Major Component of Sample	Size Range	Descriptive Term(s) (Of Components Also Present in Sample)	Percent of Dry Weight
Boulders	Over 8 in (200 mm)	Trace	1 - 9
Cobbles	8 in. to 3 in. (200 mm to 75 mm)	Little	10 - 19
Gravel	3 in. to #4 sieve (75 mm to 2 mm)	Some	20 - 34
Sand	#4 to #200 sieve (2mm to .074mm)	And	35 - 50
Silt	Passing #200 sieve (0.074 mm to 0.005 mm)		
Clay	Smaller than 0.005 mm		

CONSISTENCY OF COHESIVE SOILS:

Unconfined Comp Strength, Qu, tsf	Consistency
<0.25	Very Soft
0.25 - 0.49	Soft
0.50 - 0.99	Medium (firm)
1.00 - 1.99	Stiff
2.00 - 3.99	Very stiff
4.00 - 8.00	Hard
>8.00	Very Hard

RELATIVE DENSITY OF GRANULAR SOILS:

N - Blows/ft.	Relative Density
0 - 3	Very Loose
4 - 9	Loose
10 - 29	Medium Dense
30 - 49	Dense
50 - 80	Very Dense
80+	Extremely Dense

WATER LEVEL MEASUREMENT:

Water levels indicated on the boring logs are the levels measured in the boring at the times indicated. It should be noted that groundwater level observations within predominantly cohesive soils are not necessarily indicative of the static groundwater level. This is due to the low permeability of clayey soils and the tendency of drilling operations to seal off the natural paths of groundwater flow. Fluctuations in groundwater levels should be anticipated due to seasonal variations and following periods of heavy or prolonged precipitation or draught.

Prein&Newhof
Engineers • Surveyors • Environmental • Laboratory
3355 Evergreen Drive NE Grand Rapids, Michigan 49525
Telephone : (616) 364-8491 Fax : (616) 364-6955

LOG OF SB-1

DESCRIPTION : Newaygo County Culvert Replacement
LOCATION : White Cloud, Newaygo County, MI
WATER ENCOUNTERED AT : 7' PROJECT NO. : 2250583 INSPECTOR : K. Heindlmeyer
WATER AFTER COMPLETION : Wet Cave-in at 6' DRILLING CONTRACTOR: Midwest Envirotech DRILLER : J. Spaans
START DATE : 5/8/2025 CHECKED BY : KJH DRILL RIG : CME-75 BORING METHOD : 3.25" HSA w/ SPT
SURFACE ELEVATION : 759 +/- TOTAL DEPTH : 40'

SAMPLE	PENETRATION (BLOWS/6")	STD. PEN. N-VALUE	MOISTURE (%)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	PID READING (PPM)	DEPTH (FT.)	SYMBOL	SUBSURFACE PROFILE	ELEVATION (FT.)
									0.7' TOPSOIL	
SS-1	3 1 2	3							1.6' FILL: VERY LOOSE BROWN FINE TO MEDIUM SAND, TRACE SILT, TRACE CLAY (SP-FILL)	
									FILL: VERY LOOSE BROWN CLAYEY FINE SAND, TRACE SILT (SC-FILL)	
SS-2	2 2 1	3					5		3.0' FILL: VERY LOOSE BROWN FINE SAND, TRACE SILT, TRACE CLAY (SP-FILL)	755
SS-3	2 3 3	6							5.5' LOOSE LIGHT GRAY/BLACK FINE SAND, TRACE SILT, TRACE ORGANICS (SP-O)	
SS-4	2 2 6	8					10		8.0' LOOSE LIGHT GRAY/LIGHT BROWN CLAYEY FINE TO COARSE SAND, TRACE TO LITTLE SILT, TRACE GRAVEL (SW-SC)	750
									10.0' LOOSE TO MEDIUM DENSE BROWN FINE TO COARSE SAND, TRACE GRAVEL, TRACE SILT (SW)	
SS-5	4 6 7	13					15		12.0' MEDIUM DENSE TO DENSE LIGHT BROWN FINE SAND,TRACE GRAVEL, TRACE SILT, OCCASIONAL LAYERS OF SILTY CLAY (SP)	745
SS-6	4 9 14	23					20			740
SS-7	6 13 21	34					25			735
SS-8	4 10 14	24					30			730
										725

NOTES : *Pocket Penetrometer Value
Location: Adjacent to Flinton Creek on west side of Spruce avenue and south side of culvert.

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LOG OF SB-1

DESCRIPTION : Newaygo County Culvert Replacement
LOCATION : White Cloud, Newaygo County, MI
WATER ENCOUNTERED AT : 7' PROJECT NO. : 2250583 INSPECTOR : K. Heindlmeyer
WATER AFTER COMPLETION : Wet Cave-in at 6' DRILLING CONTRACTOR: Midwest Envirotech DRILLER : J. Spaans
START DATE : 5/8/2025 CHECKED BY : KJH DRILL RIG : CME-75 BORING METHOD : 3.25" HSA w/ SPT
SURFACE ELEVATION : 759 +/- TOTAL DEPTH : 40'

SAMPLE	PENETRATION (BLOWS/6")	STD. PEN. N-VALUE	MOISTURE (%)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	PID READING (PPM)	DEPTH (FT.)	SYMBOL	SUBSURFACE PROFILE	ELEVATION (FT.)
SS-9	4 8 16	24								
										720
SS-10	9 18 21	39					40		MEDIUM DENSE TO DENSE LIGHT BROWN FINE SAND,TRACE GRAVEL, TRACE SILT, OCCASIONAL LAYERS OF SILTY CLAY (SP)	
							40.0		END OF BORING	
										715
							45			
										710
							50			
										705
							55			
										700
							60			
										695
							65			
										690

NOTES : *Pocket Penetrometer Value
Location: Adjacent to Flinton Creek on west side of Spruce avenue and south side of culvert.

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LOG OF SB-2

DESCRIPTION :	Newaygo County Culvert Replacement		
LOCATION :	White Cloud, Newaygo County, MI		
WATER ENCOUNTERED AT :	4.3'	PROJECT NO. : 2250583	INSPECTOR : K. Heindlmeyer
WATER AFTER COMPLETION :	Wet Cave-in at 6'	DRILLING CONTRACTOR: Midwest Envirotech	DRILLER : J. Spaans
START DATE : 5/8/2025	CHECKED BY : KJH	DRILL RIG : CME-75	BORING METHOD : 3.25" HSA w/ SPT
		SURFACE ELEVATION : 758 +/-	TOTAL DEPTH : 15'

SAMPLE	PENETRATION (BLOWS/6")	STD. PEN. N-VALUE	MOISTURE (%)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	PID READING (PPM)	DEPTH (FT.)	SYMBOL	SUBSURFACE PROFILE	ELEVATION (FT.)
									0.3' TOPSOIL	
SS-1	2 2 2	4							FILL: BROWN CLAYEY FINE SAND, TRACE SILT (SC-FILL)	
									1.9' FILL: VERY LOOSE BROWN FINE SAND, TRACE SILT, TRACE CLAY, TRACE ROOTS, FREQUENT LENSES OF WOOD (SP-FILL)	755
SS-2	2 1 2	3					5		4.9'	
									5.5' VERY SOFT TO SOFT BLACK FIBROUS PEAT, TRACE SAND (PT)	
SS-3	8 14 15	29							MEDIUM DENSE LIGHT BROWN SANDY GRAVEL, TRACE TO LITTLE CLAY, TRACE SILT (SEAM OF CLAY AT 10') (GW-SW)	750
SS-4	9 7 11	18					10			
									12.0' MEDIUM DENSE LIGHT BROWN FINE SAND, TRACE SILT (SP)	745
SS-5	7 8 10	18					15		15.0' END OF BORING	
										740
							20			735
							25			730
							30			725

NOTES : *Pocket Penetrometer Value Location: Adjacent to Flinton Creek on east side of Spruce Avenue and north side of culvert.

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LOG OF SB-3

DESCRIPTION :	Newaygo County Culvert Replacement
LOCATION :	White Cloud, Newaygo County, MI
PROJECT NO. : 2250583	INSPECTOR : K. Heindlmeyer
WATER ENCOUNTERED AT : 7.5'	
WATER AFTER COMPLETION : Wet Cave-in at 6'	DRILLING CONTRACTOR: Midwest Envirotech DRILLER : J. Spaans
START DATE : 5/8/2025 CHECKED BY : KJH	DRILL RIG : CME-75 BORING METHOD : 3.25" HSA w/ SPT
	SURFACE ELEVATION : 760' +/- TOTAL DEPTH : 40'

SAMPLE	PENETRATION (BLOWS/6")	STD. PEN. N-VALUE	MOISTURE (%)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	PID READING (PPM)	DEPTH (FT.)	SUBSURFACE PROFILE	ELEVATION (FT.)
								1.0' FILL: BROWN SANDY GRAVEL, TRACE SILT, TRACE CLAY (GP-SP-FILL)	
SS-1	10 10 7	17						2.1' FILL: MEDIUM DENSE BROWN FINE TO MEDIUM SAND, TRACE SILT, TRACE CLAY (SP-FILL)	
SS-2	2 2 2	4			500*		5	4.1' FILL: LOOSE TO VERY LOOSE DARK BROWN FINE SAND, TRACE SILT, TRACE CLAY (SEAM OF CLAY AT 3.8') (SP-FILL)	755
SS-3	4 8 10	18						5.5' VERY SOFT BLACK SILTY CLAY, TRACE ORGANICS (CL-O)	
SS-4	3 3 5	8			6000*		10	6.8' MEDIUM DENSE LIGHT BROWN FINE SAND, TRACE SIILT (SP)	
								8.0' MEDIUM DENSE LIGHT BROWN FINE TO COARSE SAND, TRACE TO LITTLE GRAVEL, TRACE SILT (SW)	
								VERY STIFF LIGHT REDDISH-BROWN SILTY CLAY, TRACE SAND (CL)	750
								12.0' MEDIUM TO STIFF GRAY CLAYEY SILT (ML)	
SS-5	11 13 14	27					15	14.2' MEDIUM DENSE LIGHT BROWN FINE SAND, OCCASIONAL SEAMS OF CLAY, OCCASIONAL LENSES OF CLAYEY SAND (SP)	745
SS-6	4 6 10	16					20	19.1' MEDIUM DENSE LIGHT BROWN FINE TO MEDIUM SAND, TRACE SILT (SP)	740
SS-7	10 13 18	31					25	24.2' DENSE LIGHT BROWN FINE TO COARSE SAND, TRACE GRAVEL, TRACE SILT (SW)	735
SS-8	5 9 13	22					30	27.0' MEDIUM DENSE LIGHT BROWN FINE SAND, TRACE SILT (LENSE OF CLAYEY SAND AT 29.5') (SP)	730
								32.0' MEDIUM DENSE TO DENSE GRAY CLAYEY FINE TO MEDIUM SAND, OCCASIONAL SEAMS OF SILT, OCCASIONAL LENSES OF SILTY FINE SAND (SC)	

NOTES : *Pocket Penetrometer Value
Location: Adjacent to Flinton Creek on south side of Washington Street and west side of culvert.

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LOG OF SB-3

DESCRIPTION : Newaygo County Culvert Replacement
LOCATION : White Cloud, Newaygo County, MI
WATER ENCOUNTERED AT : 7.5'
PROJECT NO. : 2250583 INSPECTOR : K. Heindlmeyer
WATER AFTER COMPLETION : Wet Cave-in at 6'
DRILLING CONTRACTOR: Midwest Envirotech DRILLER : J. Spaans
START DATE : 5/8/2025 CHECKED BY : KJH
DRILL RIG : CME-75 BORING METHOD : 3.25" HSA w/ SPT
SURFACE ELEVATION : 760' +/- TOTAL DEPTH : 40'

SAMPLE	PENETRATION (BLOWS/6")	STD. PEN. N-VALUE	MOISTURE (%)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	PID READING (PPM)	DEPTH (FT.)	SYMBOL	SUBSURFACE PROFILE	ELEVATION (FT.)
SS-9	6 10 11	21								
SS-10	14 18 24	42					40		MEDIUM DENSE TO DENSE GRAY CLAYEY FINE TO MEDIUM SAND, OCCASIONAL SEAMS OF SILT, OCCASIONAL LENSES OF SILTY FINE SAND (SC)	720
							40.0		END OF BORING	
							45			715
							50			710
							55			705
							60			700
							65			695

NOTES : *Pocket Penetrometer Value
Location: Adjacent to Flinton Creek on south side of Washington Street and west side of culvert.

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LOG OF SB-4

DESCRIPTION :	Newaygo County Culvert Replacement		
LOCATION :	White Cloud, Newaygo County, MI		
WATER ENCOUNTERED AT :	6'	PROJECT NO. : 2250583	INSPECTOR : K. Heindlmeyer
WATER AFTER COMPLETION :	Wet Cave-in at 6'	DRILLING CONTRACTOR: Midwest Envirotech	DRILLER : J. Spaans
START DATE : 5/8/2025	CHECKED BY : KJH	DRILL RIG : CME-75	BORING METHOD : 3.25" HSA w/ SPT
		SURFACE ELEVATION : 758 +/-	TOTAL DEPTH : 15'

SAMPLE	PENETRATION (BLOWS/6")	STD. PEN. N-VALUE	MOISTURE (%)	DRY DENSITY (PCF)	UNCONF. COMP. STRENGTH (PSF)	PID READING (PPM)	DEPTH (FT.)	SYMBOL	SUBSURFACE PROFILE	ELEVATION (FT.)
									1.0' FILL: LIGHT BROWN FINE SANDY GRAVEL, TRACE SILT, TRACE CLAY (GP-SP-FILL)	
SS-1	9 7 6	13							1.8' FILL: MEDIUM DENSE BROWN SILTY FINE SAND (SM-FILL)	
SS-2	2 2 2	4					5		FILL: MEDIUM DENSE TO LOOSE INTERBEDDED LAYERS OF PEAT AND LIGHT GRAY/DARK GRAY FINE SAND, TRACE SILT, TRACE ORGANICS (SP-O/PT)	755
SS-3	5 7 8	15							5.5' MEDIUM DENSE TO LOOSE LIGHT GRAY/LIGHT BROWN FINE TO COARSE SAND, TRACE TO LITTLE GRAVEL, TRACE SILT, OCCASIONAL SEAMS OF CLAY (SW)	
SS-4	4 5 6	11					10			750
SS-5	6 4 5	9					15			745
									15.0' END OF BORING	
							20			740
							25			735
							30			730
										725

NOTES : *Pocket Penetrometer Value
Location: Adjacent to Flinton Creek on south side of Washington Street and east side of culvert.