

Manistee County Road Commission
ADDENDUM 1
High Bridge Road 2026

Monday, October 5, 2026

This addendum changes the terms of the Bid Proposal and/or plans associated with the project indicated above. By submitting a bid, any and all changes included in this Addendum are made a part of the contract.

Changes to Proposal or Plans

Add the following two (2) pdfs to the “High-Bridge-Slope-Plans-and-Specs-10-01-26.pdf” portion of the bid documents:

1. High Bridge Road Repair_Geotechnical Report_06.26.26.pdf
2. 260NB04-05.pdf

Acknowledge any and all addendum by writing “Addenda Received” with your bid.

Failure to carry out the instructions in this addendum may result in the rejection of your bid.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

NOTICE TO BIDDERS
FOR
USE OF CRUSHED CONCRETE FOR DENSE- AND OPEN-GRADED AGGREGATES

ENV:CP

1 of 1

APPR:MAS:09-28-26

Pursuant to section 902 of the 2020 Standard Specifications for Construction, the use of crushed concrete for dense-graded aggregate, open-graded aggregate is prohibited within 100 feet of a waterbody (stream, river, county drain, wetland, lake, etc.).

Waterbodies are located at the following stations:

All of Project



REPORT OF
GEOTECHNICAL INVESTIGATION FOR
HIGH BRIDGE ROAD REPAIR

DICKSON TOWNSHIP
MANISTEE COUNTY
MICHIGAN

JUNE 26, 2026



*KPM Engineering
1984 Walton Road
Kingsley, Michigan 49649*

Project No. 26TC-60X



June 26, 2026

KPM Engineering
1984 Walton Road
Kingsley, Michigan 49649

Attention: Mr. Patrick Middleton, P.E.

Regarding: High Bridge Road Repair
Geotechnical Report
Dickson Township, Manistee County, Michigan
Project No. 26TC-60X

Dear Mr. Middleton:

Soils & Structures is pleased to present this geotechnical investigation report for the High Bridge Road Repair project located along High Bridge Road in Dickson Township, Manistee County, Michigan.

The investigation included five (5) test borings drilled to a depth of 40.0 feet. The test borings were conducted in accordance with ASTM D 1586 procedures.

The report, test boring location plan, and test boring logs are enclosed. The report provides recommendations for site preparation, slope stabilization, fill, and pavement.

We appreciate the opportunity to provide engineering services to KPM Engineering. If you have any questions regarding this report, please contact our office.

Sincerely,
Soils & Structures, Inc.

A handwritten signature in black ink, reading "malea tanner".

Malea G. Tanner, E.I.T.
Staff Geotechnical Engineer

Reviewed by:

A handwritten signature in black ink, reading "Michael J. Partenio".

Michael J. Partenio, P.E.
Director of Geotechnical Services

Table of Contents

Location of Soil Investigation.....	1
Purpose of Investigation	1
Design Information	1
Tests Performed	2
Description of Soil.....	3
Description of Groundwater Conditions	4
Description of Site	4
Discussion	6
Recommendations	7
Site & Subgrade Preparation	7
Reinforced Structural Fill Stabilization.....	7
Soil Nails and Retaining Walls.....	9
Excavations.....	9
Lateral Earth Pressure.....	9
Fill	10
Groundwater Management.....	10
Hot Mix Asphalt (HMA) Pavement.....	11
Quality Control Testing.....	12
General Conditions & Reliance	13

Appendix

- Test Boring Location Plan
- General Soil Profile
- Test Boring Logs
- Laboratory Tests
- General Soil Information



Location of Soil Investigation

The soil investigation was conducted at the site located along High Bridge Road, approximately 1,400 feet north of the bridge crossing over Manistee River in Section 28 of Dickson Township, Manistee County, Michigan.

Purpose of Investigation

The purpose of this investigation is to provide geotechnical engineering recommendations for the repair and reconstruction of High Bridge Road. Survey information was obtained from the civil plan set prepared by KPM Engineering dated May 27, 2026.

Design Information

The project will consist of stabilizing the High Bridge Road embankment and adjacent slopes as well as repairing damaged pavement. The pavement and slopes have experienced significant damage and slope failures, likely due to the recent high levels of precipitation, between stations 130+50 and 138+36. The most severe failure occurred on the east embankment which was previously sloped at approximately 1.OH:1.5V (33.7 degrees) with a total height of approximately 34.0 feet. Several smaller slope failures occurred on the east cut slope and west embankment to the north. The east cut slope failure consists of a sloughing failure and washout which deposited soil into the shoulder and northbound lane. The west embankment failure resulted in cracking and settlement of the shoulder and extending into the southbound lane. Pavement for this project will include new sections required to replace the failed and damaged sections of roadway following pavement removal and stabilization of the adjacent slopes. If the actual design is significantly different than assumed in this report, then Soils & Structures should be contacted so that the recommendations included in this report may be reviewed and revised if necessary.

Excavation and backfill will be required for reconstruction of the road. The greatest depth of excavation for stabilization of the slope is anticipated to be approximately 4.0 feet below the existing road elevation for removal of failed pavement sections and disturbed soil. Further excavation may be required to cut back failed slopes for placement of geogrid reinforcing. Groundwater controls and dewatering will probably not be necessary.

An equivalent single axle load (ESAL) of 250,000 was assumed for the preliminary pavement recommendations. Pavement is assumed to be subjected to both passenger vehicle and truck traffic. A service life of twenty years was assumed for the pavement subgrade recommendations. The subgrade is assumed to be prepared as recommended in this report. The final pavement design should be based on site-specific traffic loads and volumes.

Tests Performed

The investigation included five (5) test borings drilled to a depth of 40.0 feet. The test borings are designated as Test Boring One (TB-01) through Test Boring Five (TB-05). The locations were determined by Soils & Structures. The test borings were conducted in accordance with ASTM D 1586 procedures. The ASTM D 1586 standard describes the procedure for sampling and testing soil using the Standard Penetration Test. An automatic hammer was used to obtain the soil samples.

The surface elevations at the test boring locations were obtained with a Global Navigation Satellite System (GNSS) Receiver. The receiver was connected to the local MDOT CORS base station. Through this system, vertical measurements are obtained and referenced to the North American Vertical Datum (NAVD88). Horizontal measurements are also obtained at the test boring locations which are referenced to the Michigan State Plane Coordinate System. Both the vertical and horizontal measurements typically have an accuracy of approximately 0.5 inches provided the GNSS signal was not obstructed. The measured test boring locations and surface elevations can be found in Table 1.

Table 1: Measured Test Boring Locations and Surface Elevations

Test Boring / Location	Elevation (feet)	Northing (feet)	Easting (feet)	Surface Cover
Test Boring One (TB-01)	648.2	352418.8	19253921.1	Asphalt
Test Boring Two (TB-02)	648.5	352425.6	19253945.8	Topsoil
Test Boring Three (TB-03)	655.3	352611.5	19253988.3	Asphalt
Test Boring Four (TB-04)	668.0	352890.3	19253989.7	Asphalt
Test Boring Five (TB-05)	677.8	353076.6	19253953.3	Asphalt
Base Setup VRS1	823.0	390114.1	19215367.8	-

Soil samples were classified according to the Unified Soil Classification System. This method is a standardized system for classifying soil according to its engineering properties. Please refer to the appendix of this report for the Unified Classification System Chart. The classification is shown in the "Material Description" column of the test boring logs.

The soil strength and the allowable soil bearing value were evaluated using the "N" value. The "N" value is the number of blows required to drive a soil sampler one foot with a standard 140-pound drop hammer. The sampler is driven a distance of 18.0 inches. The number of blows for each 6.0-inch increment is recorded. The sum of the second and third intervals is the "N" value. The number of blows for each 6.0-inch interval is shown on the test boring logs under the column labeled "Blow Counts". The "N" value for each sample is shown in the adjacent column.

Laboratory testing consisted of natural moisture content (ASTM D 2216), sieve analysis (ASTM D 6913), unconfined compression (ASTM D 2166), and Atterberg limits (ASTM D 4318). The tests were performed on representative soil samples. The tests were performed in accordance with the ASTM standards listed above. The moisture content documents the presence of groundwater in the soil. The sieve analysis determines the particle distribution which is used to classify the soil and estimate its properties. The unconfined compression and Atterberg limit tests aid in determining the properties of cohesive soils

The U.S. Geological Survey Topographic map and the Quaternary Geology map of Michigan were reviewed. These maps provide general geological information about the region. Publicly available well log records were reviewed to determine the depth of bedrock.

Description of Soil

The general soil profile consists of alternating layers of sand, clay, and silt which extend to a depth of at least 40.0 feet. The soil profile is part of an end moraine. A moraine is a long ridge that is formed at the end of a stationary glacier. Moraines are typically deep soil deposits consisting of glacial till. A glacial till is an unsorted mixture of clay, silt, and sand.

Asphalt is present at the surface of the site in the areas of TB-01 and TB-03 through TB-05. The asphalt thickness ranges from 3.0 to 4.0 inches and overlies 10.0 to 18.0 inches of gravel base course. Topsoil is present in the area of TB-02. The topsoil thickness is 12.0 inches.

Layers of sand are present near the surface in the test borings. Some of the sand is likely fill placed during construction of the road. The material consists of light brown to dark brown sand with varying amounts of clay, silt, and gravel. The upper sand layers extend to depths ranging from 4.0 to 17.5 feet. The “N” values of the upper sand layers range widely from 5 to 27, indicating the material is in a slightly compact to very compact state. The “N” values correspond to an internal friction angle between 28 and 33 degrees.

A layer of clay varying in thickness was encountered in TB-01 through TB-03 and TB-05. The material consists of brown clay with varying amounts of silt and sand and a trace of gravel at varying depths. The “N” values of the clay range widely from 5 to 34, indicating the material is in a firm to very stiff state. The firm portion of the clay layer is present in the areas of TB-01 and TB-02, between depths of 6.5 and 12.5 feet. The unconfined compressive strength of the clay ranges from 2,640 to 3,780 pounds per square foot, generally increasing with depth, further indicating the material is in a firm to very stiff state.

In the areas of TB-03 through TB-05, a layer of silt was encountered and consists of dark brown, sandy silt with clay, lenses of sand, and traces of gravel at varying depths. The silt layer varies in thickness between TB-03 and TB-05. The silt is present between depths of 9.0 and at least 40.0 feet in the area of TB-03. In the area of TB-05, the silt is present between depths of 9.0 and 12.5 feet. The “N” values of the silt range from 20 to 88, indicating the material is in a stiff to extremely stiff state. The undrained shear strength of the silt ranges widely from 1,880 to 9,140 pounds per square foot.

Deeper layers of sand consisting of light brown and brown, fine to medium sand with varying, typically high, amounts of clay, silt, and gravel are present beneath the clay and silt layers. Varying amounts of gravel was also encountered in the lower sand layers. The lower sand layers extend to depths of 35.0 to 40.0 feet. The “N” values of the lower sand layers range widely from 5 to 87, indicating the sand is in a slightly compact to extremely compact state. The majority of the lower sand layers are in a very compact to extremely compact state. The slightly compact portion of the sand layer is present in the area of TB-02 between depths of 12.5 and 23.0 feet. The “N” values correspond to internal friction angles between 30 and 38 degrees.

Bedrock is present below a depth greater than 122.0 feet (Well ID: 51000003360). The bedrock is part of the Coldwater Shale formation which consists of primarily bluish gray shale. The Coldwater Shale formation originated during the Mississippian period which ended approximately 323.2 million years ago.

Description of Groundwater Conditions

Perched water was encountered at varying depths ranging from 14.5 and 36.5 feet in the test borings. These depths correspond to elevations of 619.7 and 657.8 feet. The variation in elevation of the perched water is due to the relatively impermeable clay and silt layers at varying elevations. The static water table elevation is difficult to determine due to these impermeable layers but likely corresponds to the water elevation of the wetlands at the toe of the embankments. The water table is anticipated to fluctuate based on seasonal precipitation. Long term groundwater monitoring was not included as part of the investigation.

Description of Site

The site is located along High Bridge Road, approximately 1400 feet north of the bridge crossing over the Manistee River in Dickson Township, Manistee County, Michigan. The site consists of the road section between stations 130+50 and 138+36. The road descends in elevation from 677.8 feet at the northern-most boring (TB-05) to 648.2 feet at the southern-most boring (TB-01). At the north end of the area of concern, the road is bordered by a cut slope ascending to the east and by a descending road embankment to the west. At the south end, the road is bordered by descending embankment slopes on both sides. Photographs #1 through #3 show the site at the time of the investigation.



Photograph #1: Slope failure of cut slope adjacent to the north bound lane. View is to the east. (April 2026)



Photograph #2: View of road and southern slope adjacent to the northbound lane. (April 2026)



Photograph #3: Cracking in southbound lane near the north end of the area of concern. (April 2026)

Discussion

Following intense rainfall in April of 2026, High Bridge Road experienced significant damage due to failures of the adjacent slopes and embankments which support the road. The failures occurred on both ascending cut slopes and descending embankment slopes on both sides of the road. The total length of the impacted portion of the road is approximately 786 feet, between stations 130+50 and 138+36. As a result, portions of the road have been closed to traffic.

Soil borings were performed on May 7, 2026, to evaluate the subgrade conditions near the area of failure. As discussed in the 'Soil Description' section of this report, the near surface soil consists of primarily sand of varying levels of compaction. The underlying clay and silt are relatively impermeable, which will result in the accumulation of perched groundwater within the sand layers. Without an adequate flow path, the hydraulic pressure of the water makes the sand layer susceptible to sliding or localized slope failure, which appears to have been the primary cause of the damage to the road and slopes. Furthermore, wetlands are present near the toe of the descending embankment slopes. Poor support conditions at the toe of the slope may have exacerbated the slope failures.

The moisture content of the underlying clay and silt is elevated, possibly due to the intense rainfall and accumulation of perched water. In several samples, the moisture content exceeds the plastic limit of the clay indicating that the clay is nearing the point at which it would transition from a semi-solid state to a plastic state and is susceptible to compression and shear failure. Deformation of the clay layer could be a contributing cause of the settlement and slope failure.



Solutions for repairing High Bridge Road include reinforcing the slope by wrapping soils layers in bi-axial geogrid or mechanically retaining the slope utilizing steel sheeting or soil nails. The following sections will provide recommendations for each of the proposed solutions.

Recommendations

Site & Subgrade Preparation

The existing asphalt pavement in the reconstruction area should be removed as part of subgrade preparation. Further excavation and backfill will be required for removal of the existing pavement and reinforcing the slope. The maximum depth of excavation is anticipated to vary based on the location but will likely range from approximately 4.0 to 12.0 feet below existing grade. The failed slopes may need to be cut back to some degree for placement of reinforcing. Fill should be placed following the recommendations in the "Fill" section of this report. Fill should be compacted to 95.0 percent of the soil's maximum density to its full depth. In-situ sand should be compacted prior to the placement of fill. Compaction tests are recommended to verify the level of compaction.

Following completion of the slope stabilization measures, the pavement subgrade, subbase, and aggregate base should be proof-rolled prior to reconstruction of pavement. The proof roll should consist of single, overlapping passes with a fully loaded dump truck or loader. Areas that experience yielding during the proof roll should be recompacted. Areas that continue to experience yielding following recompaction may require undercutting or the placement of a geogrid to stabilize the subgrade.

Soil brought to the site for fill should be clean sand meeting MDOT Class II specifications. Fill should be placed in accordance with the "Fill" section of this report. The fill should be compacted to 95.0 percent of its maximum density, as determined by the modified proctor method per the ASTM D 1557 standard. The soil which will be used for fill should be kept free of topsoil and other organic materials. Compaction tests are recommended to check the compaction of the new fill.

Reinforced Structural Fill Stabilization

Stabilization using reinforced structural fill is a recommended option for repair of the slopes. This option consists of filling the existing failed embankment to achieve a stable slope of approximately 26.0 degrees (1.0V:2.0H). The structural fill should consist of clean sand meeting MDOT Class II specifications or approved alternate materials. The fill layers will be wrapped in bi-axial geogrid such as Miragrid 3XT or approved alternates with an equivalent tensile strength.

Beginning at the base of the existing slope, a layer of non-woven geofabric should be placed across the fill area followed by the first layer of bi-axial geogrid. The bi-axial geogrid will wrap 2.0-foot layers of fill to reinforce the slope and restrict lateral movement. Full-length geofabric is only required at the base of the slope and is not required for each wrapped soil layer. Subsequent layers will only require a layer of geofabric at the slope face, wrapped within the geogrid and extending back approximately 4.0 feet into the slope on the top and bottom. The bi-axial geogrid lengths will vary based on the distance below the crest of the slope. The height of the slope for the most severe failure to the east of the northbound lane is approximately 34.0 feet, as estimated from the plans provided, therefore seventeen (17) layers are anticipated. Following construction of the new slope, turf reinforcement should be placed on the slope face to protect it from surface erosion. Table 2 below provides the minimum geogrid lengths based on the most severe failure, but these same guidelines should be applied to the other slopes as well.

Table 2: Minimum Geogrid Lengths

Layer #	Depth at Top (feet.)	Depth at Bottom (feet)	Approximate Elevation at Top (feet)	Approximate Elevation at Bottom (feet)	Geogrid Length (feet)
1-3	0	6	652	646	6.0
4-8	6	16	646	636	10.0
9-12	16	22	636	630	12.0
12-17	22	34	630	618	15.0

Each layer of fill should be compacted to 95.0 percent of its maximum density in accordance with the recommendations in the "Fill" section of this report. A minimum soil buffer of 3.0 inches should be maintained between geogrid layers extending into the slope with the exception of the slope face where the layers should meet to prevent pass-through erosion of material. The geogrid and geofabric layers should be pulled taut to remove any slack prior to placement of fill above. Aggregate fill may be considered as an alternative to geofabric placement at the face of the slope. The aggregate should be selected such that it will not pass through the apertures in the geogrid.

It should be noted that the toe of the new slope may extend into the adjacent wetlands. The subgrade area which was below the previous slope is not anticipated to experience significant consolidation below the new slope. However, the subgrade beyond the toe of the previous slope may experience significant consolidation due to the weight of new fill, particularly if the subgrade consists of soft or organic soils typical of wetland environments. While the reinforcing is anticipated to be sufficient to prevent failure of the slope, it may be prudent to overexcavate the near-surface subgrade soils susceptible to consolidation prior to placement of fill. As such, additional soil investigation using probe rods and other hand equipment at the toe of the proposed slope is recommended to delineate the depth and lateral extent of soft soils.

Soil Nails and Retaining Walls

Mechanical stabilization of the slope using soil nails or retaining structures are alternative options for repair. The soil nail option would require placement of fill to a relatively stable angle, likely 1.0V:1.5H, and installation of the retaining system consisting of the soil nail anchors and surface netting material. The anchors typically consist of helical piers or grouted anchors which are installed in a matrix pattern and are extended into the slope to a pre-determined length beyond the potential failure plane. The anchors are then secured with a bearing plate to hold down the netting material placed across the slope face. Although this system can typically achieve steeper slope angles, the amount of fill required will be considerable, and may not be significantly less than what is required for the reinforced fill option. This, coupled with the material and mobilization costs, is anticipated to be more costly than the reinforced fill option. If this solution is desired, a qualified contractor should be consulted regarding cost and feasibility. A specialty design of this system will be required.

The most feasible retaining structure will consist of installing steel sheet piling to protect the slope toe. The sheets should extend to a minimum embedment dictated by the design along with the required section modulus. Based on the anticipated wall height, tiebacks will likely be required. This option could work in tandem with filling the slope to a stable angle discussed above, reducing the amount of geogrid wrapped soil layers and providing an even greater degree of protection against future failures. However, this option will likely be more expensive than the structural backfill option and would result in a less natural slope. Qualified contractors should be consulted regarding the cost of sheet pile installation. Soils & Structures can provide a quote for design of the retaining wall if requested.

Excavations

The in-situ soils are OSHA type "B" and "C" soils. Excavations that will be entered by personnel should be based on OSHA requirements for a type "C" soil. Based on OSHA requirements, a maximum allowable side slope of 34 degrees (1.5H:1V) is recommended for excavations 4.0 to 15.0 feet deep. Excavations less than 4.0 feet deep may have vertical side slopes.

Lateral Earth Pressure

Sand should be used as backfill around underground structures or behind potential retaining structure. The sand should meet MDOT Class II specifications. Lateral earth pressures may be calculated using a soil density of 120 pounds per cubic foot, a coefficient of active earth pressure of 0.35 for level sand backfill and a coefficient of at rest earth pressure of 0.50. The effects of any surcharge, sloping backfill, and unbalanced hydraulic pressure should also be included in the design. The passive resistance of the existing sand and silt/clay should be calculated using passive earth pressure coefficients of 2.8 and 1.0, respectively.

Fill

Fill, including the aggregate layers under pavement, should be compacted to 95.0 percent of its maximum density. The maximum density should be determined in accordance with the ASTM D 1557 standard. A maximum thickness per lift of 6.0 inches is recommended. The lift thickness may be increased to 12.0 inches for granular material if a vibratory roller or hoe-pack is used for compaction. Compaction tests are recommended to confirm that the fill is compacted to the required density. If the amount of clean sand required for the reconstruction of the road exceeds the amount of clean material generated from excavations, additional material will have to be imported. Soil brought to the site for structural fill should be sand meeting MDOT Class II requirements or ASTM requirements for a SP or SW which are the designations for clean sand.

Fill should not be placed over frozen ground, snow, or ice. Soil which contains frozen material should not be used as fill. During winter construction, removal of frozen ground may be necessary prior to placing fill.

Groundwater Management

Groundwater controls and dewatering will probably not be necessary for reconstruction of the road. If groundwater is encountered in excavations, the excavation bottom may be stabilized by placing a 6.0 to 8.0-inch layer of porous aggregate over the bottom of the excavation. The aggregate will stabilize the bottom of the excavation.

A drainage trench is recommended at the toe of the ascending cut slope to catch surface and groundwater before it can infiltrate below the road. The trench should extend at least 3.5 feet below grade. A minimum 4.0-inch diameter perforated pipe should be placed at the bottom of the trench which should be lined with filter fabric and backfilled with pea gravel. The drainage trench should extend along the shoulder of the road until the slope starts descending to the southeast, at which point the drain should transition to a non-perforated pipe and should extend down the slope to convey water to a safe area for infiltration.

Pavement areas should be properly drained to minimize the effects of frost heaving and the loss of subgrade due to water infiltration. Pavement should be sloped toward regional low points and catch basins. Underdrains below the roadway may be considered to provide a safe drainage path for groundwater to flow without eroding the near surface soils as it daylights out of the crest of the descending embankments.

Hot Mix Asphalt (HMA) Pavement

Unless otherwise specified in the project plans, the following preliminary pavement sections are recommended for the new pavement. The preliminary HMA pavement sections listed in Table 3 were developed based on the discussions and assumptions included in this report and the design procedures outlined in the “AASHTO Guide for Design of Pavement Structures.” The subgrade should be prepared as described in the “Site & Subgrade Preparation” and “Fill” sections of this report. The recommended pavement section materials listed in Table 3 refer to and should comply with the standard material designations included in applicable MDOT specifications and guidelines including the 2020 MDOT “Standard Specifications for Construction.”

Please note that the pavement sections presented in Table 3 represent the recommendations of Soils & Structures and are not a requirement. Alternatively, lighter pavement sections may be considered or utilized, provided they meet municipal, county, or state requirements, as necessary. However, such lighter pavement sections are not anticipated to achieve the same level of performance as the recommended sections.

The following recommendations assume that maintenance repairs such as joint sealing, patching, and overlays are regularly performed throughout the lifespan of the pavement and that proper drainage has been established throughout the site. Proper drainage may include the installation of stormwater controls, underdrains, and establishing positive drainage in the subgrade and pavement layers.

Table 3: Recommended Pavement Sections

Pavement Cross Section Materials	Standard Duty		Heavy Duty	
	Material	Thickness (in)	Material	Thickness (in)
HMA Wearing Course	4EML	2.0	4EML	2.5
HMA Base Course	4EML	2.0	4EML	2.5
Aggregate Base *	21AA Crushed Limestone	8.0	21AA Crushed Limestone	10.0
Sand Subbase	Class II	12.0	Class II	12.0

* Alternative materials such as 21AA crushed concrete or 22A aggregates may be utilized, but the minimum thickness should be increased by 25.0 percent to account for the lower material quality and reduced support conditions.

The recommended asphaltic binder is PG 64-28. Tier 1 recycled asphalt (RAP) specifications may be used in combination with the PG 64-28 binder for the wearing course. Tier 2 RAP may be used for the base course. A softer binder is required to achieve desired performance characteristics when utilizing Tier II RAP contents, per the MDOT Special Provision for Recycled Asphalt Pavement. The compacted asphalt should be between 94.0 and 97.0 percent of the Theoretical Maximum Density, as determined via the Superpave “Rice” Method. The target void content should be 3.5 percent for both the base and wearing course. A tack or “bond coat” of SS-1h emulsion shall be applied between the base and wearing course layers at a rate of 0.1 gallons per square yard.

The paving contractor should submit the proposed mix design to the owner for review and approval prior to placement. The HMA pavement should be placed in at least two lifts. The pavement section should be constructed in accordance with MDOT guidelines and specifications as well as applicable state and local requirements.

Paved areas that display poor workmanship, which may include segregation, “cold screed scrapes”, wearing courses not flush with curbs or rims, roller marks, shoving, smearing or tearing of the mat, flushing, or excessive cold joints should be repaired or replaced by the contractor immediately.

Pavement subgrade, subbase, and aggregate base should be proof rolled prior to aggregate base and pavement placement. The proof roll should be in accordance with the “Site & Subgrade Preparation” and “Fill” sections of this report and applicable MDOT guidelines and specifications. The in-situ sand near the surface is not suitable for use as a base material.

Quality Control Testing

Compaction tests (ASTM D 6938) are recommended to confirm that sand and fill are compacted to the specified density. While fill is being placed, compaction tests should be performed at the rate of one test per 400 cubic yards of fill and throughout the depth of the fill with a minimum of five tests at each 1.0-foot elevation interval. Full time inspection is recommended while sand and fill are compacted in the construction area. The recommended testing frequency in the pavement subgrade is one test per 2,500 square feet. The maximum density should be determined in accordance with ASTM D 1557 or ASTM D 4253 procedures.

Unless otherwise specified in the design documents, the following testing procedures and frequencies should be observed for HMA pavement. Asphalt quality testing should adhere to the 2020 MDOT Standards for Construction. Asphalt temperatures during placement should be at least 275 degrees Fahrenheit; material that arrives at temperatures below 250 degrees Fahrenheit shall be rejected. Asphalt density testing should be performed with a nuclear density gauge at a minimum rate of one test per 500 square yards of pavement. At least five total verification cores in each course are recommended to assess relative compaction, calibrate the nuclear density gauge, and evaluate thickness. A minimum of two loose mix samples per mix per day should be taken at the plant and delivered to the quality-assurance firm’s laboratory for vacuum extraction-gradations. The asphalt contractor should provide a minimum of two (2) theoretical maximum density verifications per day.

A smooth 0.5 to 0.75-inch diameter rod should be used in conjunction with compaction tests to probe for loose areas in fill. A dynamic cone should not be substituted for compaction tests for evaluating fill. Testing should be performed by technicians supervised by a registered geotechnical engineer.



General Conditions & Reliance

The report was prepared in accordance with generally accepted practices of the geotechnical engineering profession. The scope of work consisted of performing five (5) test borings and providing soil related recommendations for the stabilization and reconstruction of High Bridge Road. The scope of work did not include an environmental study or wetland determination.

The report and the associated test borings were prepared specifically for the previously described project and site. Soils & Structures should be consulted if a significant change in the scope of the project is made.

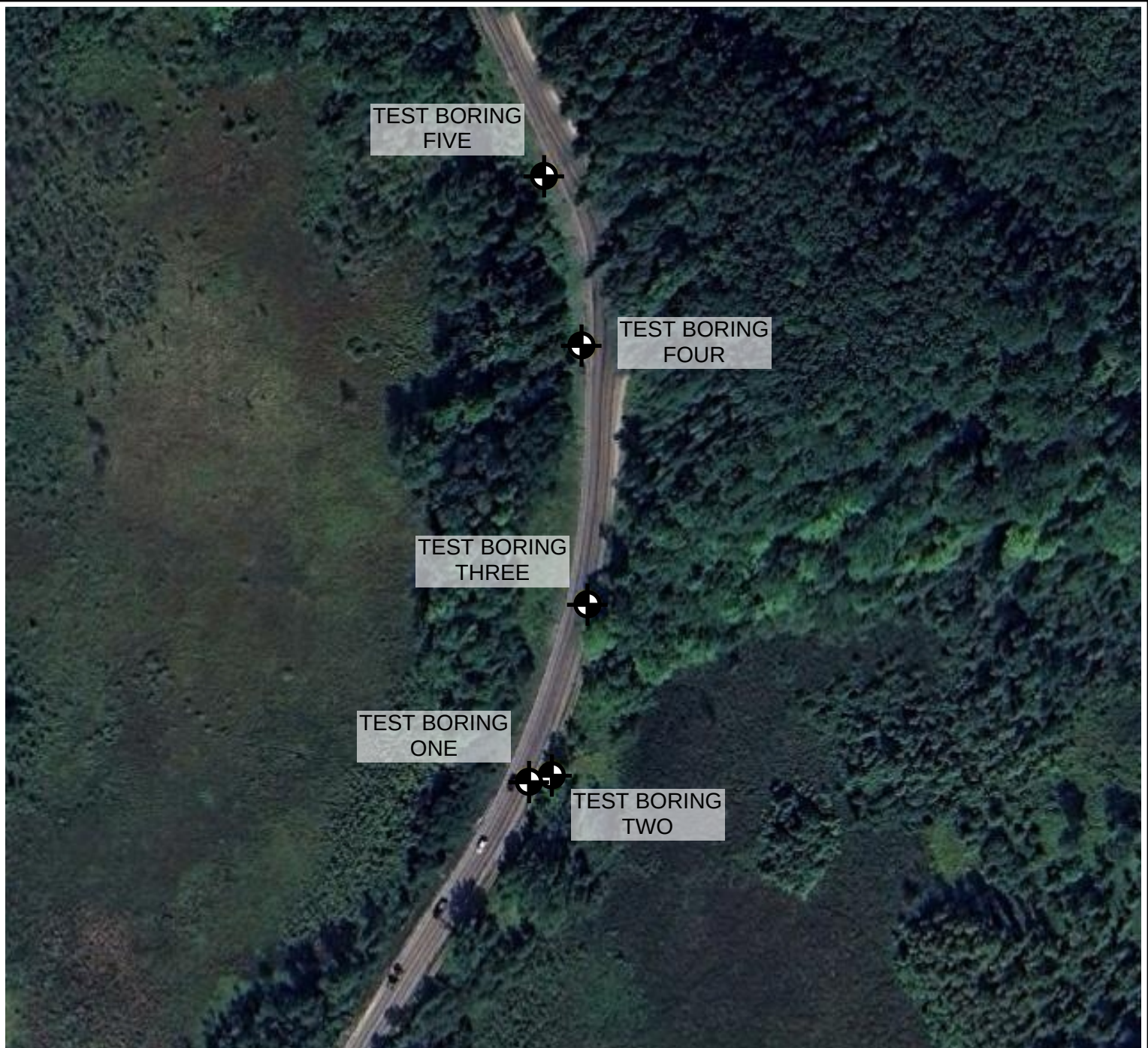
The test borings represent point information and may not have encountered all of the soil types and materials present on this site. This report does not constitute a guarantee of the soil or groundwater conditions or that the test borings are an exact representation of the soil or groundwater conditions at all points on this site.

The descriptions and recommendations contained in this report are based on an interpretation of the test borings and laboratory tests. The test borings should not be used independently of the report. If soil conditions are encountered which are significantly different from the test borings, Soils & Structures should be consulted for additional recommendations.

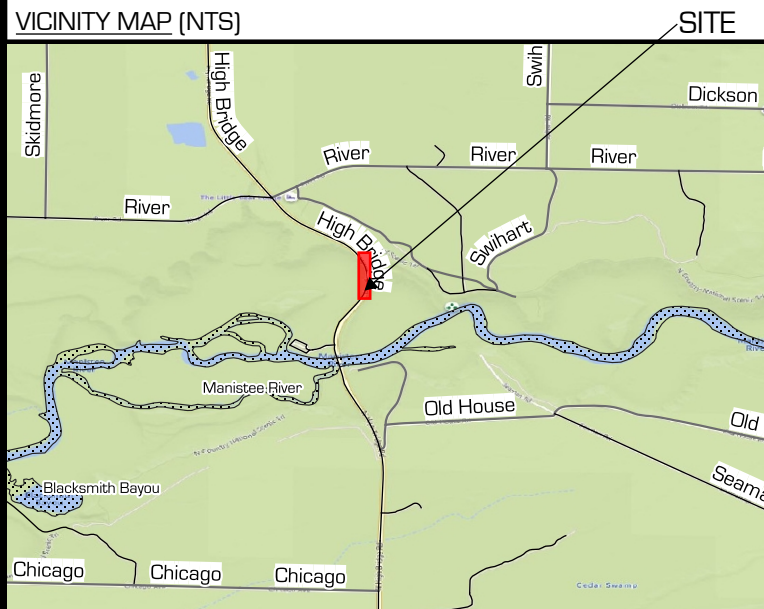
The report and test borings may be relied upon for the design, construction, permitting, and financing associated with the High Bridge Road Repair project located in Dickson Township, Manistee County, Michigan. The use of the report and test borings by third parties not associated with this project or for other sites has not been agreed upon by Soils & Structures. Soils & Structures does not recommend or consent to third party use or reliance of the report or test borings unless allowed to review the proposed use of these materials. Unless obtained in writing, consent to third party use should not be assumed. Third parties using the report or test boring logs do so at their own risk and are offered no guarantee or promise of indemnity.

Appendix

Test Boring Location Plan
General Soil Profile
Test Boring Logs
Laboratory Tests
General Soil Information



VICINITY MAP (NTS)



TEST BORING LOCATION PLAN

NTS



Note: The background of the test boring plan is a portion of an aerial photograph from Google Earth.

High Bridge Road Repair

Dickson Township, Manistee County, Michigan

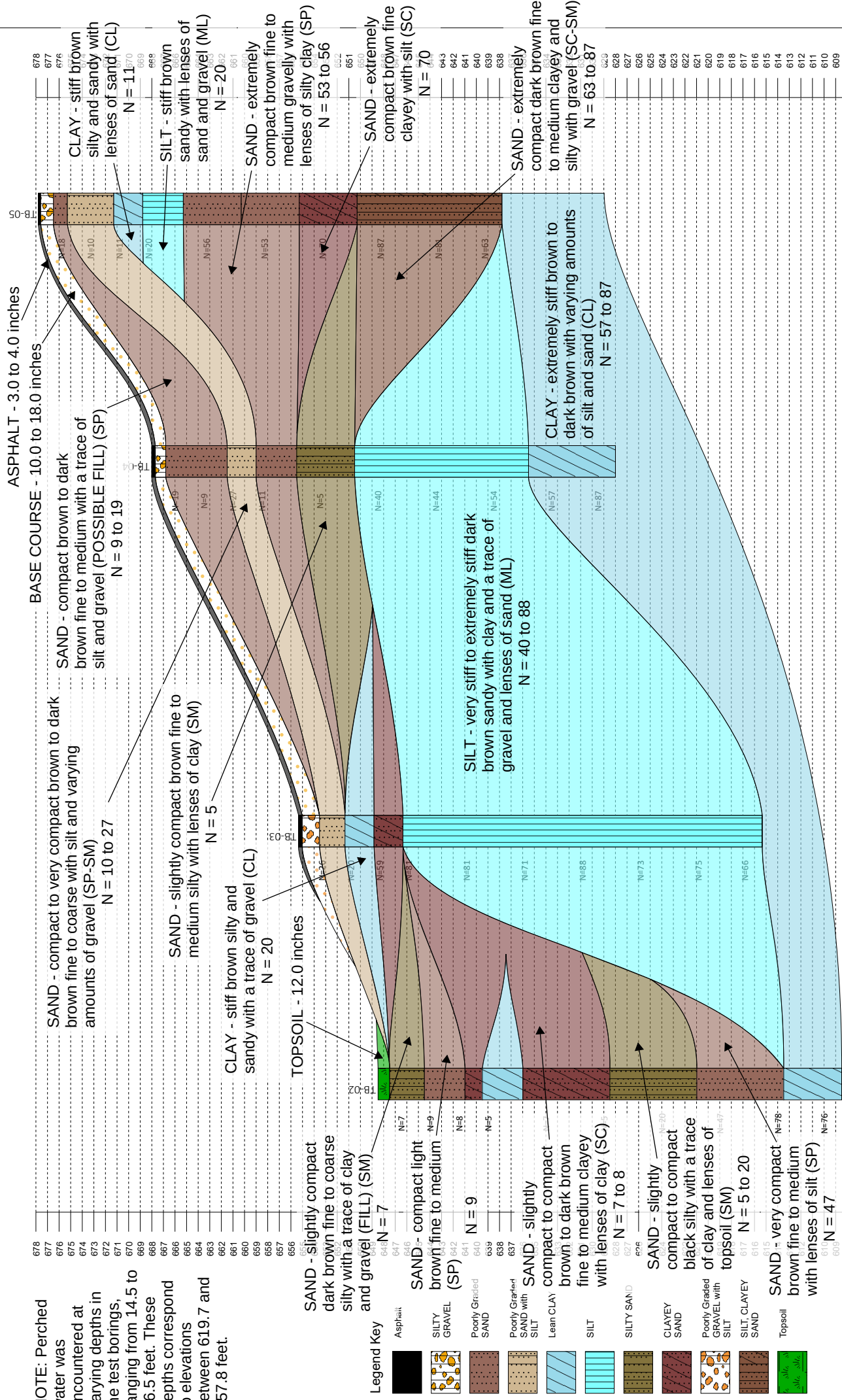
Soils & Structures, Inc.
6480 Grand Haven Road
Muskegon, Michigan 49441

JOB NO.: 26TC-60X

DATE: 06-26-2026

GENERAL SOIL PROFILE

NOTE: Perched water was encountered at varying depths in the test borings, ranging from 14.5 to 36.5 feet. These depths correspond to elevations between 619.7 and 657.8 feet.





Project Name: High Bridge Road Repair Project	Project Number: 26TC-60X
Project Location: Dickinson Township, Michigan	Logged By: I Stone Reviewed By: R Roda
Client: KPM Engineering	Survey Datum: NAD 1983 StatePlane Michigan Central Hole Depth: 40.00
Date Started: May 06 2026 Completed: May 06 2026	Northing: 352418.8 Easting: 19253921.1 Elevation: 648.19
Drilling Method: 3-1/4" Hollow Stem Auger	Frost Depth
Equipment: Diedrich D-50	Ground Water Levels
Hammer Type: Automatic Hammer	☒ At Time of Drilling 28.50' on May 06 2026 - Perched Water Encountered
Notes:	

Depth	Graphic	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits				USCS
											Liquid Limit	Plastic Limit	Plasticity Limit	Index	
1		ASPHALT - (4.0")													
2		BASE COURSE - dark brown fine to coarse sandy with silt (10.0")													
3		SAND - brown fine to medium with a trace of silt and gravel	▲	SPT-A	100	8-7-7	14			3.7					SP
4		SAND - compact light brown fine to medium with lenses of gravel and seams of silt	▲												
5		CLAY - stiff brown sandy with a trace of gravel	▲	SPT-B	100	4-4-5	9	2.0							CL
6		CLAY - firm brown with a trace of sand	▲												
7			▲	SPT-C	100	4-3-4	7	4.0	1.39	23.9					CL
8		CLAY - stiff brown with silt and sand and lenses of sand	▲												
9			▲	SPT-D	100	4-7-10	17	1.5		10.4	15	10	5		CL
10		CLAY - stiff brown silty and sandy with a trace of gravel													
11			▲												
12			▲	SPT-E	100	4-6-10	16	4.5	1.89	18.1					CL
13		CLAY - very stiff brown silty and sandy with lenses of sand	▲												
14			▲	SPT-F	67	10-15-19	34	1.5							CL
15		SAND - very compact light brown fine with seams of clay	▲												
16			▲	SPT-G	100	16-18-21	39			6.4					SP
17		SAND - extremely compact brown fine to medium silty with gravel and a trace of clay	▲												
18			▲												
19			▲												
20			▲												
21			▲												
22			▲												
23			▲												
24			▲												
25			▲												
26			▲												
27			▲												
28			▲												
29			▲												
30			▲												



Project Name:	High Bridge Road Repair Project	Project Number:	26TC-60X						
Project Location:	Dickinson Township, Michigan	Logged By:	I Stone	Reviewed By:	R Roda				
Client:	KPM Engineering	Survey Datum:	NAD 1983 StatePlane Michigan Central		Hole Depth:	40.00			
Date Started:	May 06 2026	Completed:	May 06 2026	Northing:	352418.8	Easting:	19253921.1	Elevation:	648.19
Drilling Method:	3-1/4" Hollow Stem Auger			Frost Depth					
Equipment:	Diedrich D-50			Ground Water Levels	28.50' on May 06 2026 - Perched Water				
Hammer Type:	Automatic Hammer			At Time of Drilling	Encountered				
Notes:									

Depth	Graphic	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits				USCS
											Liquid Limit	Plastic Limit	Plasticity Limit	Index	
31		SAND - extremely compact brown fine to medium silty with gravel and a trace of clay	▲	SPT-H	46	47-50	50			18.7					SM
32															
33															
34		SAND - extremely compact brown fine to medium with silt and seams of clay	▲	SPT-I	111	30-50/0.4'	50/5"								SP-SM
35															
36															
37		CLAY - extremely stiff brown to dark brown silty and sandy	▲	SPT-J	100	17-32-50	82	2.0		16.4	30	16	14		CL
38															
39															
40															
41															
42															
43															
44															
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Project Name: High Bridge Road Repair Project	Project Number: 26TC-60X
Project Location: Dickinson Township, Michigan	Logged By: I Stone Reviewed By: R Roda
Client: KPM Engineering	Survey Datum: NAD 1983 StatePlane Michigan Central Hole Depth: 40.00
Date Started: May 06 2026 Completed: May 06 2026	Northing: 352425.6 Easting: 19253945.8 Elevation: 648.48
Drilling Method: 3-1/4" Hollow Stem Auger	Frost Depth
Equipment: Diedrich D-50	Ground Water Levels
Hammer Type: Automatic Hammer	☒ At Time of Drilling 27.50' on May 06 2026 - Perched Water Encountered
Notes:	

Depth	Graphic	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits				USCS
											Liquid Limit	Plastic Limit	Plasticity Limit	Index	
1		TOPSOIL - black sandy with a trace of gravel (12.0")													
2		SAND - slightly compact dark brown fine to coarse silty with a trace of clay and gravel (FILL)	▲	SPT-A	100	3-3-4	7								SM
3			▲												
4		SAND - compact light brown fine to medium	▲	SPT-B	100	3-4-5	9			3.9					SP
5			▲												
6			▲												
7			▲												
8		SAND - compact dark brown fine to medium clayey with lenses of clay	▲	SPT-C	100	3-3-5	8								SC
9			▲												
10		CLAY - firm brown with a trace of silt and seams of sand	▲	SPT-D	100	3-2-3	5	2.0		16.3					CL
11			▲												
12			▲												
13		SAND - slightly compact brown fine to medium clayey with lenses of clay	▲												
14			▲												
15			▲	SPT-E	100	3-3-4	7								SC
16			▲												
17			▲												
18			▲												
19			▲												
20		SAND - slightly compact to compact black silty with a trace of clay and lenses of topsoil	▲	SPT-F	100	2-2-3	5			21.5					
21			▲												
22			▲												
23			▲												
24			▲												SM
25			▲	SPT-G	33	10-8-12	20								
26			▲												
27			▲												
28		SAND - very compact to extremely compact brown fine to medium with lenses of silt	▲												
29			▲												
30			▲												



Project Name:	High Bridge Road Repair Project	Project Number:	26TC-60X		
Project Location:	Dickinson Township, Michigan	Logged By:	I Stone	Reviewed By:	R Roda
Client:	KPM Engineering	Survey Datum:	NAD 1983 StatePlane Michigan Central		
Date Started:	May 06 2026	Completed:	May 06 2026	Hole Depth:	40.00
Drilling Method:	3-1/4" Hollow Stem Auger	Northing:	352425.6	Easting:	19253945.8
Equipment:	Diedrich D-50	Elevation:	648.48		
Hammer Type:	Automatic Hammer	Frost Depth			
Notes:			Ground Water Levels 27.50' on May 06 2026 - Perched Water At Time of Drilling Encountered		

Depth	Graphic	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits				USCS
											Liquid Limit	Plastic Limit	Plasticity Limit	Plasticity Index	
31		SAND - very compact to extremely compact brown fine to medium with lenses of silt		SPT-H	100	12-20-27	47			17.6					SP
32															
33															
34															
35		CLAY - extremely stiff brown sandy with a trace of silt and seams of sand		SPT-I	100	14-28-50	78	4.5	3.69	13.0					CL
36															
37															
38															
39				SPT-J	100	18-28-48	76	4.5	2.32	14.1					
40															
41															
42															
43															
44															
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Project Name: High Bridge Road Repair Project

Project Number: 26TC-60X

Project Location: Dickinson Township, Michigan

Logged By: I Stone

Reviewed By: R Roda

Client: KPM Engineering

Survey Datum: NAD 1983 StatePlane Michigan Central

Hole Depth: 40.00

Date Started: May 06 2026 **Completed:** May 06 2026

Northing: 352611.5

Easting: 19253988.3

Elevation: 655.33

Drilling Method: 3-1/4" Hollow Stem Auger

Frost Depth

Equipment: Diedrich D-50

Ground Water Levels

15.00' on May 06 2026 - Perched Water

Hammer Type: Automatic Hammer

 At Time of Drilling

~~25.00 Inter May 06 2026 - Perched Water~~

Notes:

 End of Drilling

~~Encountered~~

[illegible]



Sheet 2 of 2

[illegible]



Sheet 1 of 2

Notes: *Boring Offset 5ft East To Avoid Utilities*

[illegible]



Project Name:	High Bridge Road Repair Project	Project Number:	26TC-60X						
Project Location:	Dickinson Township, Michigan	Logged By:	I Stone	Reviewed By:	R Roda				
Client:	KPM Engineering	Survey Datum:	NAD 1983 StatePlane Michigan Central		Hole Depth:	40.00			
Date Started:	May 07 2026	Completed:	May 07 2026	Northing:	352890.3	Easting:	19253989.7	Elevation:	668.00
Drilling Method:	3-1/4" Hollow Stem Auger			Frost Depth					
Equipment:	Diedrich D-50			Ground Water Levels	14.50' on May 07 2026 - Perched Water				
Hammer Type:	Automatic Hammer			☒ At Time of Drilling	Encountered				
Notes:	*Boring Offset 5ft East To Avoid Utilities*								

Depth	Graphic	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits					USCS
											Liquid	Limit	Plastic	Limit	Plasticity Index	
31		SILT - very stiff to extremely stiff dark brown sandy with clay and a trace of gravel and lenses of sand		SPT-H	87	14-23-31	54	4.5								
32																
33		CLAY - extremely stiff dark brown silty with a trace of sand		SPT-I	93	14-24-33	57	4.5		15.6	38	20	18			CL
34																
35																
36																
37																
38				SPT-J	100	19-37-50	87	4.5	2.25	16.1						
39																
40																
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Project Name: High Bridge Road Repair Project

Project Number: 26TC-60X

Project Location: Dickinson Township, Michigan

Logged By: V Brokaw

Reviewed By: R Roda

Client: KPM Engineering

Survey Datum: NAD 1983 StatePlane Michigan Central

Hole Depth: 40.00

Date Started: May 07 2026 **Completed:** May 07 2026

Northing: 353076.6

Easting: 19253953.3

Elevation: 677.78

Drilling Method: 3-1/4" Hollow Stem Auger

Frost Depth

Equipment: Diedrich D-50

Ground Water Levels

20.00' on May 07 2026 - Perched Water

Hammer Type: Automatic Hammer

 At Time of Drilling

~~36.50-ton May 07 2026 - Perched Water~~

Notes: *Boring Offset 5ft East To Avoid Utilities*

 End of Drilling

Encountered

Depth	Graphic	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits				USCS	
											Liquid Limit	Plastic Limit	Plasticity Index			
1		ASPHALT - (3.0")														
2		BASE COURSE - dark brown fine to coarse silty and sandy (12.0")														
3		SAND - compact dark brown fine to medium with gravel and a trace of silt (FILL)	▲▼	SPT-A	80	10-9-9	18			5.3						SP-SM
4		SAND - compact brown to dark brown fine to medium with silt	▲▼													
5			▲▼	SPT-B	67	4-5-5	10									
6			▲▼													CL
7		CLAY - stiff brown silty and sandy with lenses of sand	▲▼	SPT-C	67	3-4-7	11	2.0	1.32	24.1						
8			▲▼													
9		SILT - stiff brown sandy with lenses of sand and gravel	▲▼	SPT-D	67	6-9-11	20	3.0								ML
10			▲▼													
11			▲▼													
12			▲▼													SP
13		SAND - extremely compact brown fine to coarse gravelly with lenses of silty clay	▲▼													
14			▲▼	SPT-E	87	10-19-37	56			5.8						
15			▲▼													SP
16		SAND - extremely compact brown fine to medium	▲▼													
17			▲▼	SPT-F	100	15-24-29	53									
18			▲▼													SC
19		SAND - extremely compact brown fine clayey with silt	▲▼													
20			▲▼	SPT-G	100	21-27-43	70			10.6						
21			▲▼													
22			▲▼													
23			▲▼													
24			▲▼													
25		SAND - extremely compact dark brown fine to medium clayey and silty with gravel	▲▼													
26			▲▼													
27			▲▼													
28			▲▼													
29			▲▼													
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Project Name:	High Bridge Road Repair Project	Project Number:	26TC-60X						
Project Location:	Dickinson Township, Michigan	Logged By:	V Brokaw	Reviewed By:	R Roda				
Client:	KPM Engineering	Survey Datum:	NAD 1983 StatePlane Michigan Central	Hole Depth:	40.00				
Date Started:	May 07 2026	Completed:	May 07 2026	Northing:	353076.6	Easting:	19253953.3	Elevation:	677.78
Drilling Method:	3-1/4" Hollow Stem Auger	Frost Depth							
Equipment:	Diedrich D-50	Ground Water Levels	20.00' on May 07 2026 - Perched Water						
Hammer Type:	Automatic Hammer	☒ At Time of Drilling	20.00' on May 07 2026 - Perched Water						
Notes:	*Boring Offset 5ft East To Avoid Utilities*	☒ End of Drilling	Encountered						

Depth	Graphic	Material Description	Sample Type	Number	Recovery % RQD	Blow Counts	N-Value	Pocket Pen (tsf)	Shear Strength (tsf)	Moisture Content (%)	Atterberg Limits				USCS
											Liquid Limit	Plastic Limit	Plasticity Limit	Index	
31		SAND - extremely compact dark brown fine to medium clayey and silty with gravel	▲	SPT-H	80	22-37-50	87	4.0		10.5					SC-SM
32															
33															
34															
35			▲	SPT-I	100	24-31-50	81	4.5							
36															
37															
38															
39			▲	SPT-J	67	18-17-46	63	4.5	1.70	14.2					
40															
41															
42															
43															
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Determination of Water Content (Moisture) of Soil and Rock by Mass

(ASTM D2216)

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Client KPM Engineering
Date

Sample Location

Sample ID

Depth

Sample Type

Mass of Container

Mass of Wet Soil and Container

Accepted Dry mass + container

Water Content

Remarks

	TB-01	TB-04	TB-05	TB-03	TB-02
	A	A	A	B	B
ft	2.0	2.0	2.0	4.5	4.5
	SPT	SPT	SPT	SPT	SPT
g	19.70	19.50	19.30	19.30	19.30
g	95.40	103.80	104.80	87.90	85.70
g	92.70	100.10	100.50	80.00	83.20
%	3.7	4.6	5.3	13.0	3.9

Sample Location

Sample ID

Depth

Sample Type

Mass of Container

Mass of Wet Soil and Container

Accepted Dry mass + container

Water Content

Remarks

	TB-01	TB-04	TB-05	TB-03	TB-01
	C	C	C	D	D
ft	7.0	7.0	7.0	9.5	9.5
	SPT	SPT	SPT	SPT	SPT
g	51.06	19.40	49.84	51.00	178.10
g	194.36	108.30	193.04	227.40	452.70
g	166.74	103.00	165.24	215.98	426.90
%	23.9	6.3	24.1	6.9	10.4

Sample Location

Sample ID

Depth

Sample Type

Mass of Container

Mass of Wet Soil and Container

Accepted Dry mass + container

Water Content

Remarks

	TB-02	TB-01	TB-04	TB-05	TB-03
	D	E	E	E	F
ft	9.5	14.5	14.5	14.5	19.5
	SPT	SPT	SPT	SPT	SPT
g	19.60	50.54	287.90	179.20	50.86
g	89.70	203.80	663.50	540.30	189.36
g	79.90	180.30	597.60	520.40	179.54
%	16.3	18.1	21.3	5.8	7.6

Technician

SamM

Checked

Approved



Determination of Water Content (Moisture) of Soil and Rock by Mass

(ASTM D2216)

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Client KPM Engineering
Date

Sample Location

Sample ID

Depth

Sample Type

Mass of Container

Mass of Wet Soil and Container

Accepted Dry mass + container

Water Content

Remarks

	TB-02	TB-01	TB-03	TB-04	TB-05
	F	G	G	G	G
ft	19.5	24.5	24.5	24.5	24.5
	SPT	SPT	SPT	SPT	SPT
g	174.90	19.30	177.30	50.18	177.10
g	380.20	101.00	465.70	233.52	402.30
g	343.90	96.10	432.40	217.36	380.80
%	21.5	6.4	13.1	9.7	10.6

Sample Location

Sample ID

Depth

Sample Type

Mass of Container

Mass of Wet Soil and Container

Accepted Dry mass + container

Water Content

Remarks

	TB-05	TB-01	TB-02	TB-02	TB-04
	H	H	H	I	I
ft	29.5	29.5	29.5	34.5	34.5
	SPT	SPT	SPT	SPT	SPT
g	19.60	178.00	19.50	49.90	178.70
g	73.50	455.70	115.60	208.94	424.20
g	68.40	412.00	101.20	190.68	391.00
%	10.5	18.7	17.6	13.0	15.6

Sample Location

Sample ID

Depth

Sample Type

Mass of Container

Mass of Wet Soil and Container

Accepted Dry mass + container

Water Content

Remarks

	TB-04	TB-03	TB-02	TB-01	TB-05
	J	J	J	J	J
ft	38.5	38.5	38.5	38.5	38.5
	SPT	SPT	SPT	SPT	SPT
g	49.58	49.78	51.22	176.80	50.38
g	152.12	225.94	179.10	360.70	223.70
g	137.92	198.74	163.32	334.80	202.10
%	16.1	18.3	14.1	16.4	14.2

Technician

SamM

Checked

Approved

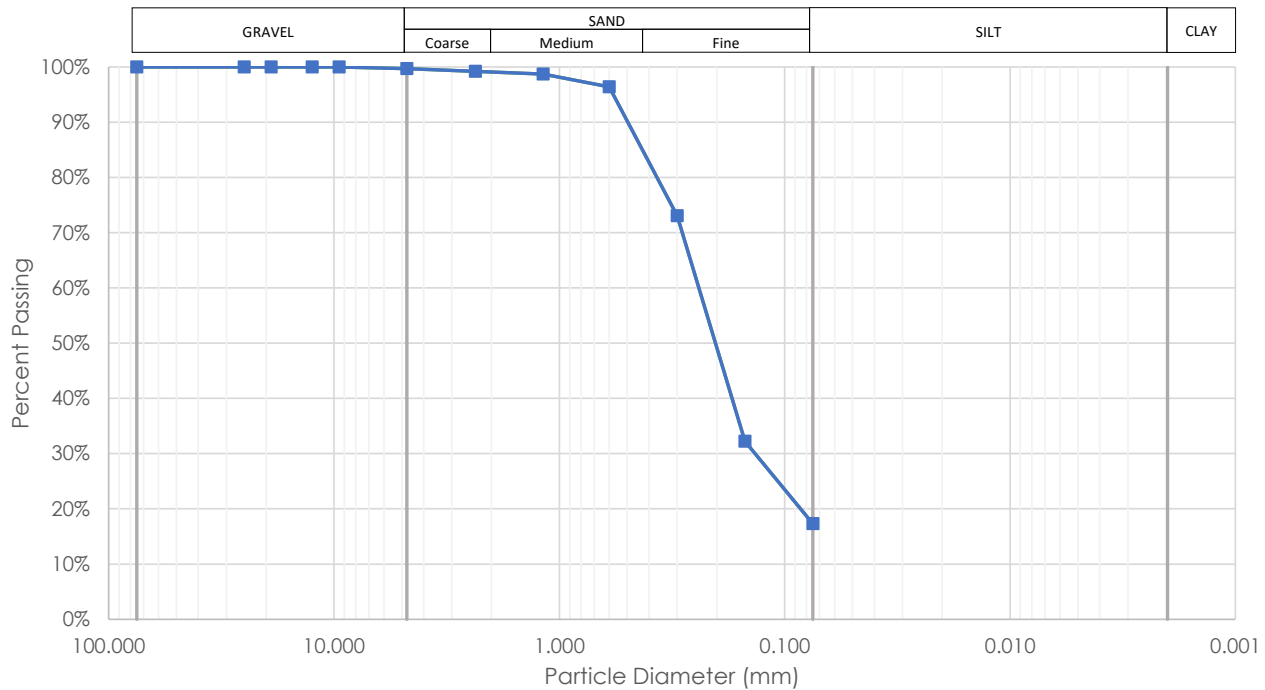


Particle Size Distribution Report

Project Name High Bridge Road Repair Project
 Project Number 26TC-60X
 Client KPM Engineering
 Date 5/29/2026
 Sample Location TB-04

Sample ID E

Depth (ft) 14.5



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	0.0%	0.3%	0.6%	16.3%	65.5%	0.0%	0.0%
D85	D60	D50	D30	D15	D10	Loss By Wash	
0.4535	0.2520	0.2153	0.1388	0.0650	0.0433	15.8%	

Particle Size		Hydrometer		Material Description
Sieve	% Passing	Particle Size (mm)	% Passing	
3 in. (75 mm)	100%			SAND - brown fine to medium silty with lenses of clay (SM)
1 in. (25 mm)	100%			
3/4 in. (19 mm)	100%			Remarks
1/2 in. (12.5 mm)	100%			
3/8 in. (9.5 mm)	100%			
No. 4 (4.75 mm)	100%			
No. 8 (2.36 mm)	99%			
No. 16 (1.18 mm)	99%			
No. 30 (0.6 mm)	96%			
No. 50 (0.3 mm)	73%			
No. 100 (0.15 mm)	32%			
No. 200 (0.075 mm)	17.3%			

Technician
SamM

Checked
SamM

Approved
SamM



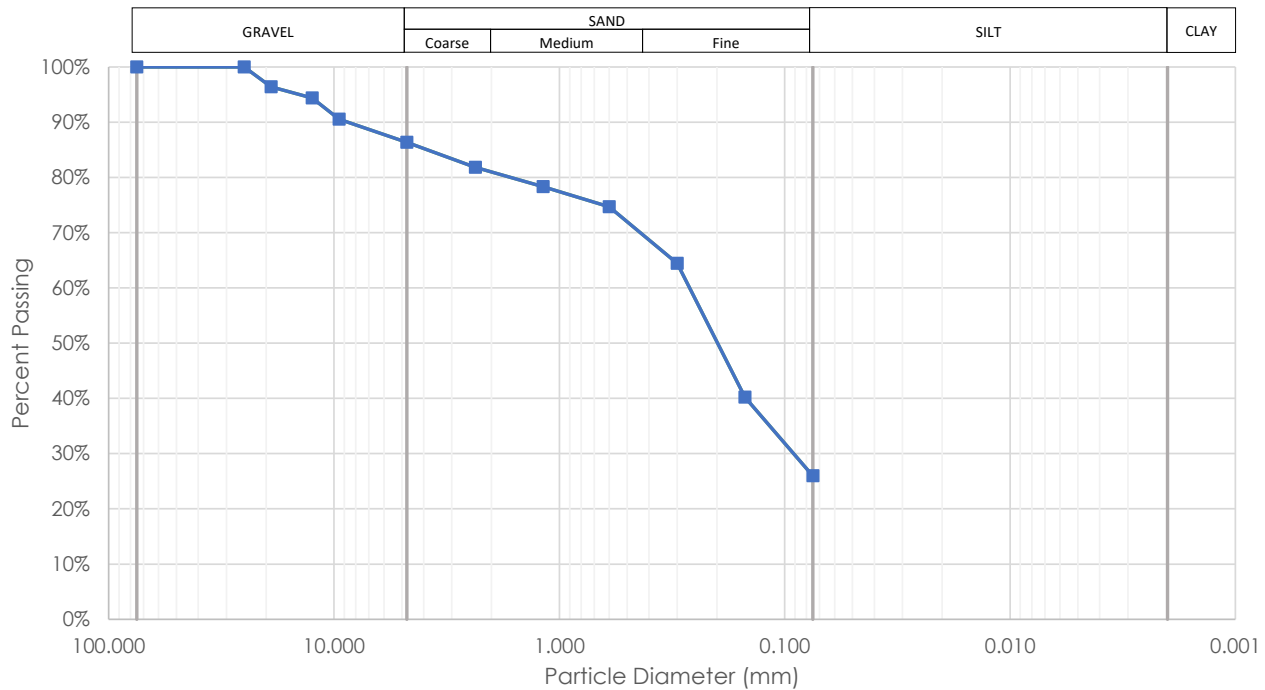
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Particle Size Distribution Report

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Client KPM Engineering
Date 5/29/2026
Sample Location TB-05

Sample ID E

Depth (ft) 14.5



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	3.6%	10.1%	5.6%	12.0%	42.8%	0.0%	0.0%
D85	D60	D50	D30	D15	D10	Loss By Wash	
4.0392	0.2725	0.2106	0.0962	0.0433	0.0289	22.8%	

Particle Size	
Sieve	% Passing
3 in. (75 mm)	100%
1 in. (25 mm)	100%
3/4 in. (19 mm)	96%
1/2 in. (12.5 mm)	94%
3/8 in. (9.5 mm)	91%
No. 4 (4.75 mm)	86%
No. 8 (2.36 mm)	82%
No. 16 (1.18 mm)	78%
No. 30 (0.6 mm)	75%
No. 50 (0.3 mm)	64%
No. 100 (0.15 mm)	40%
No. 200 (0.075 mm)	26.0%

Hydrometer	
Particle Size (mm)	% Passing

Material Description
SAND - brown fine to coarse gravelly and silty with lenses of silty clay (SP)

Remarks

Technician
SamM

Checked
SamM

Approved
SamM



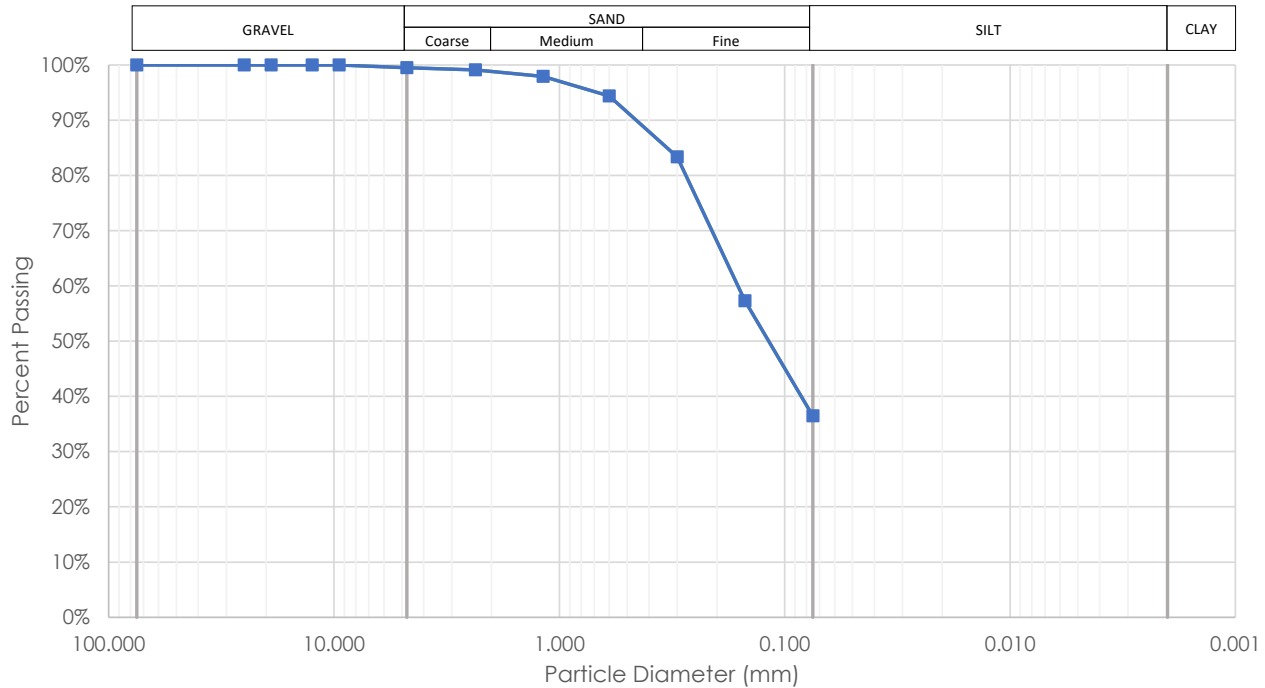
SOILS & STRUCTURES

Particle Size Distribution Report

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Client KPM Engineering
Date 5/29/2026
Sample Location TB-02

Sample ID F

Depth (ft) 19.5



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	0.0%	0.5%	0.8%	10.8%	51.5%	0.0%	0.0%
D85	D60	D50	D30	D15	D10	Loss By Wash	
0.3444	0.1656	0.1238	0.0617	0.0309	0.0206	32.9%	

Particle Size	
Sieve	% Passing
3 in. (75 mm)	100%
1 in. (25 mm)	100%
3/4 in. (19 mm)	100%
1/2 in. (12.5 mm)	100%
3/8 in. (9.5 mm)	100%
No. 4 (4.75 mm)	100%
No. 8 (2.36 mm)	99%
No. 16 (1.18 mm)	98%
No. 30 (0.6 mm)	94%
No. 50 (0.3 mm)	83%
No. 100 (0.15 mm)	57%
No. 200 (0.075 mm)	36.4%

Hydrometer	
Particle Size (mm)	% Passing

Material Description
SAND - brown fine to medium clayey with lenses of clay (SC)

Remarks

Technician
SamM

Checked
SamM

Approved
SamM



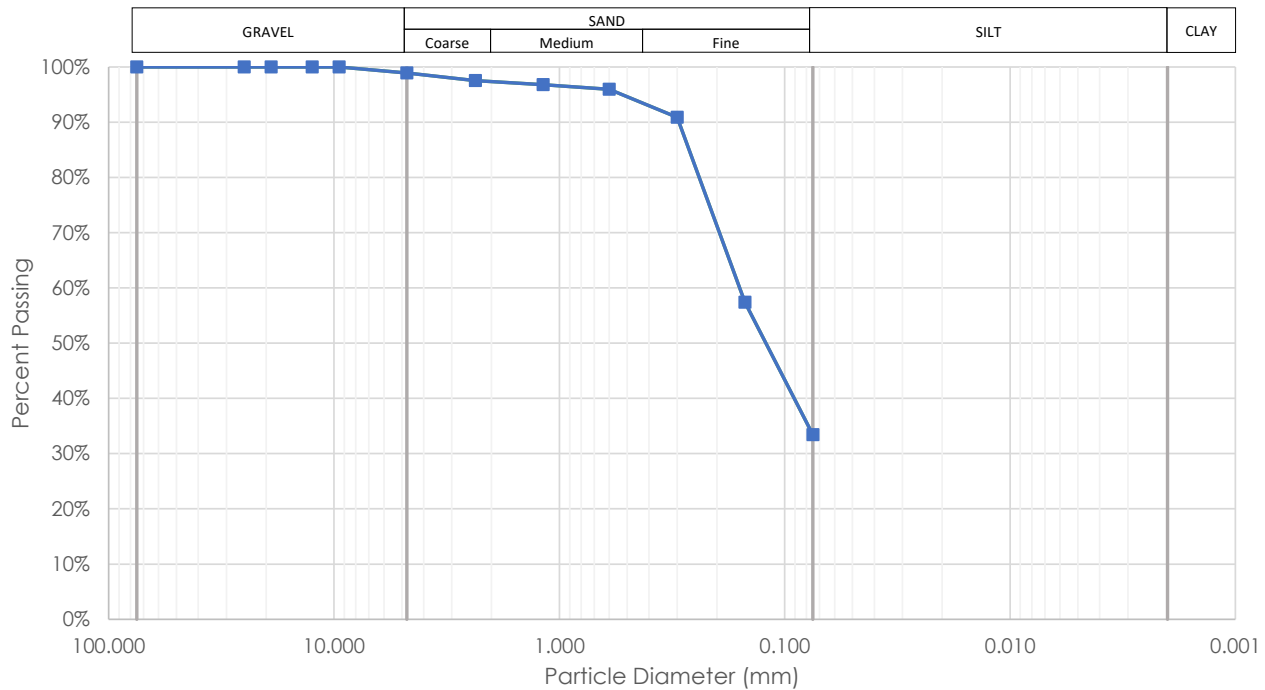
SOILS & STRUCTURES

Particle Size Distribution Report

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Client KPM Engineering
Date 5/29/2026
Sample Location TB-05

Sample ID G

Depth (ft) 24.5



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	0.0%	1.1%	1.6%	4.3%	59.6%	0.0%	0.0%
D85	D60	D50	D30	D15	D10	Loss By Wash	
0.2737	0.1617	0.1269	0.0673	0.0337	0.0224	28.4%	

Particle Size	
Sieve	% Passing
3 in. (75 mm)	100%
1 in. (25 mm)	100%
3/4 in. (19 mm)	100%
1/2 in. (12.5 mm)	100%
3/8 in. (9.5 mm)	100%
No. 4 (4.75 mm)	99%
No. 8 (2.36 mm)	98%
No. 16 (1.18 mm)	97%
No. 30 (0.6 mm)	96%
No. 50 (0.3 mm)	91%
No. 100 (0.15 mm)	57%
No. 200 (0.075 mm)	33.4%

Hydrometer	
Particle Size (mm)	% Passing

Material Description
SAND - brown fine clayey with silt (SC)

Remarks

Technician
SamM

Checked
SamM

Approved
SamM



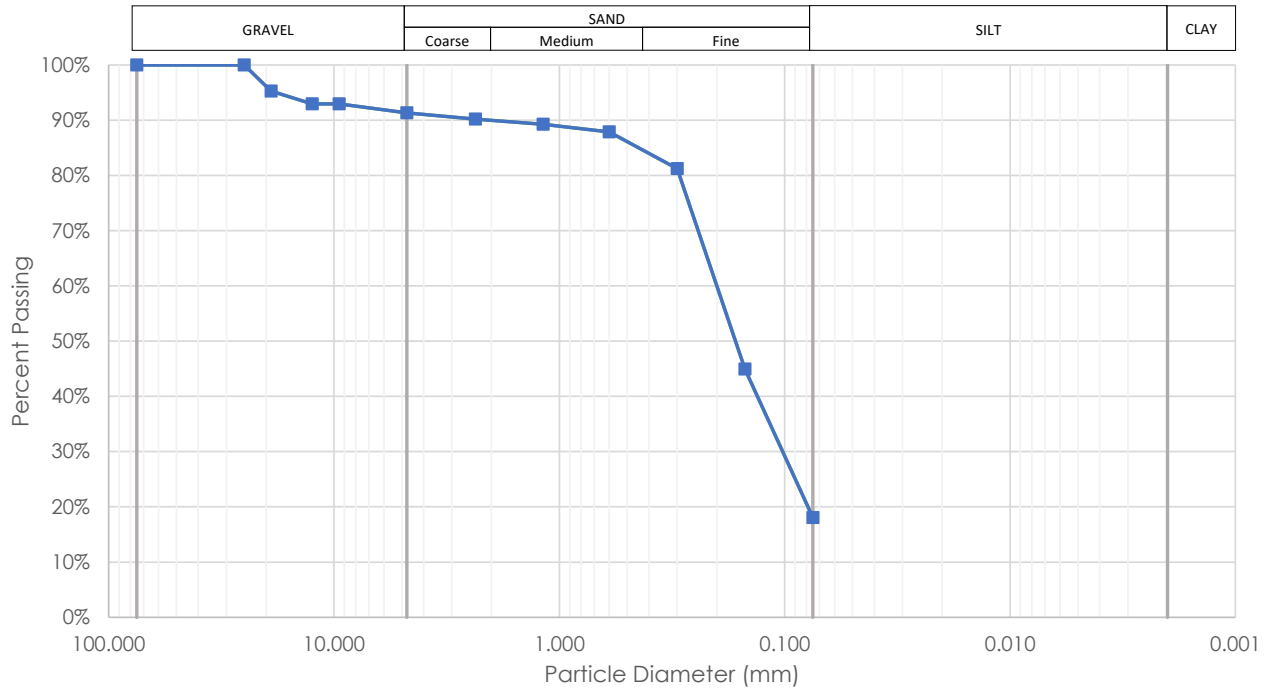
SOILS & STRUCTURES

Particle Size Distribution Report

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Client KPM Engineering
Date 5/29/2026
Sample Location TB-01

Sample ID H

Depth (ft) 29.5



% +3"	% Gravel		% Sand			% Fines	
	Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
0.0%	4.7%	3.9%	1.4%	5.9%	65.9%	0.0%	0.0%
D85	D60	D50	D30	D15	D10	Loss By Wash	
0.4703	0.2122	0.1708	0.1083	0.0622	0.0415	15.1%	

Particle Size		Hydrometer		Material Description
Sieve	% Passing	Particle Size (mm)	% Passing	
3 in. (75 mm)	100%			SAND - brown fine to medium silty with gravel and a trace of clay (SM)
1 in. (25 mm)	100%			
3/4 in. (19 mm)	95%			Remarks
1/2 in. (12.5 mm)	93%			
3/8 in. (9.5 mm)	93%			
No. 4 (4.75 mm)	91%			
No. 8 (2.36 mm)	90%			
No. 16 (1.18 mm)	89%			
No. 30 (0.6 mm)	88%			
No. 50 (0.3 mm)	81%			
No. 100 (0.15 mm)	45%			
No. 200 (0.075 mm)	18.1%			

Technician
SamM

Checked
SamM

Approved
SamM

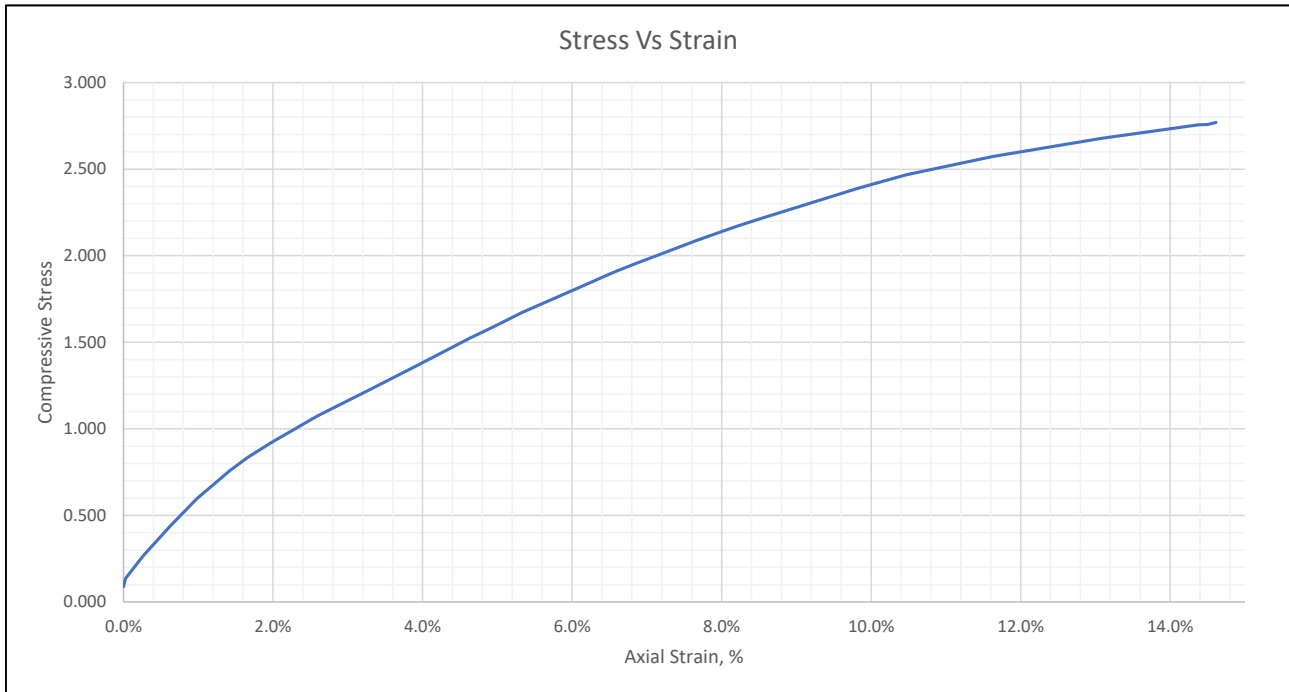


Unconfined Compressive Strength ASTM D2166

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Date 5/26/2026
Client KPM Engineering
Sample Location TB-01

Sample ID C

Depth (ft) 7.0



Sample ID	C
Unconfined Strength (tsf)	2.769
Undrained Shear Strength (tsf)	1.385
Failure Strain (%)	14.6%
Strain Rate, (in/min)	0.055
Moisture Content	23.9%
Wet Density (pcf)	125.7
Dry Density (pcf)	101.5
Void Ratio	0.6483
Saturation (%)	98.7%
Specimen Diameter (in)	1.34
Specimen Height (in)	3.08
Height/Diameter Ratio	2.30

Remarks

Technician
mvanweelden

Checked

Approved
mvanweelden

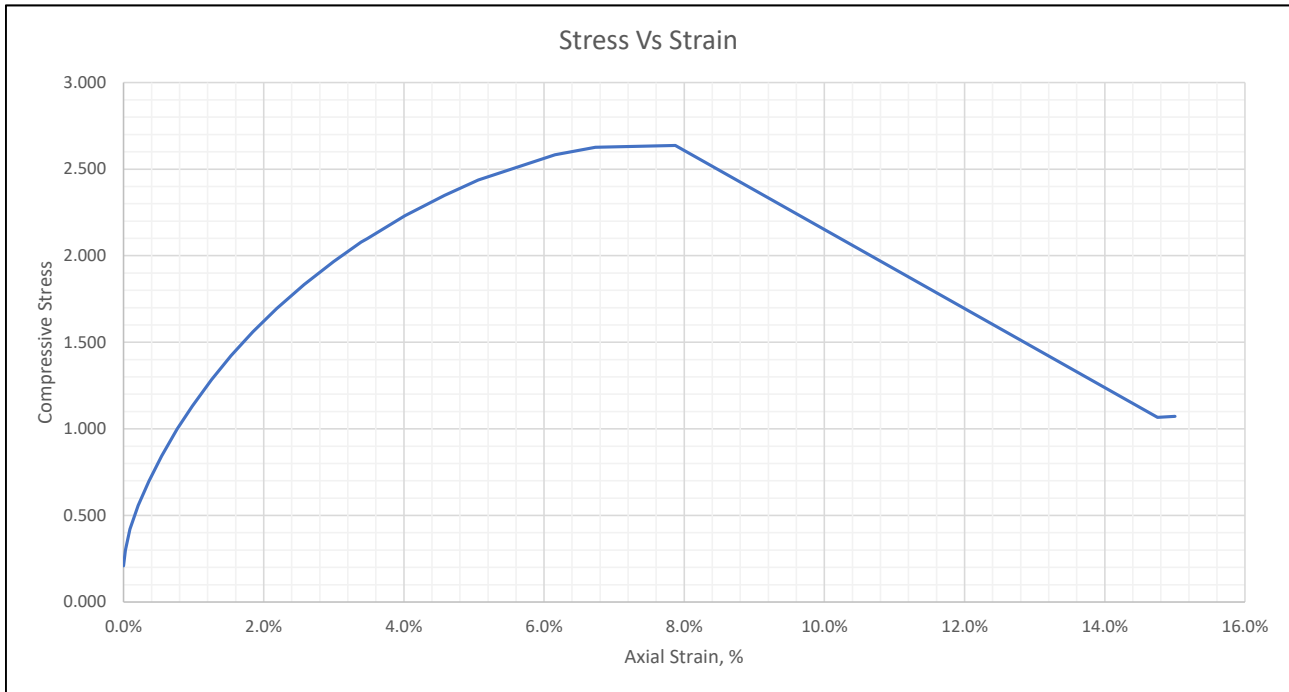


Unconfined Compressive Strength ASTM D2166

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Date 5/26/2026
Client KPM Engineering
Sample Location TB-05

Sample ID C

Depth (ft) 7.0



Sample ID	C
Unconfined Strength (tsf)	2.637
Undrained Shear Strength (tsf)	1.318
Failure Strain (%)	7.9%
Strain Rate, (in/min)	0.055
Moisture Content	24.1%
Wet Density (pcf)	123.4
Dry Density (pcf)	99.4
Void Ratio	0.6823
Saturation (%)	94.6%
Specimen Diameter (in)	1.37
Specimen Height (in)	3.00
Height/Diameter Ratio	2.19

Remarks

Technician
mvanweelden

Checked

Approved
mvanweelden

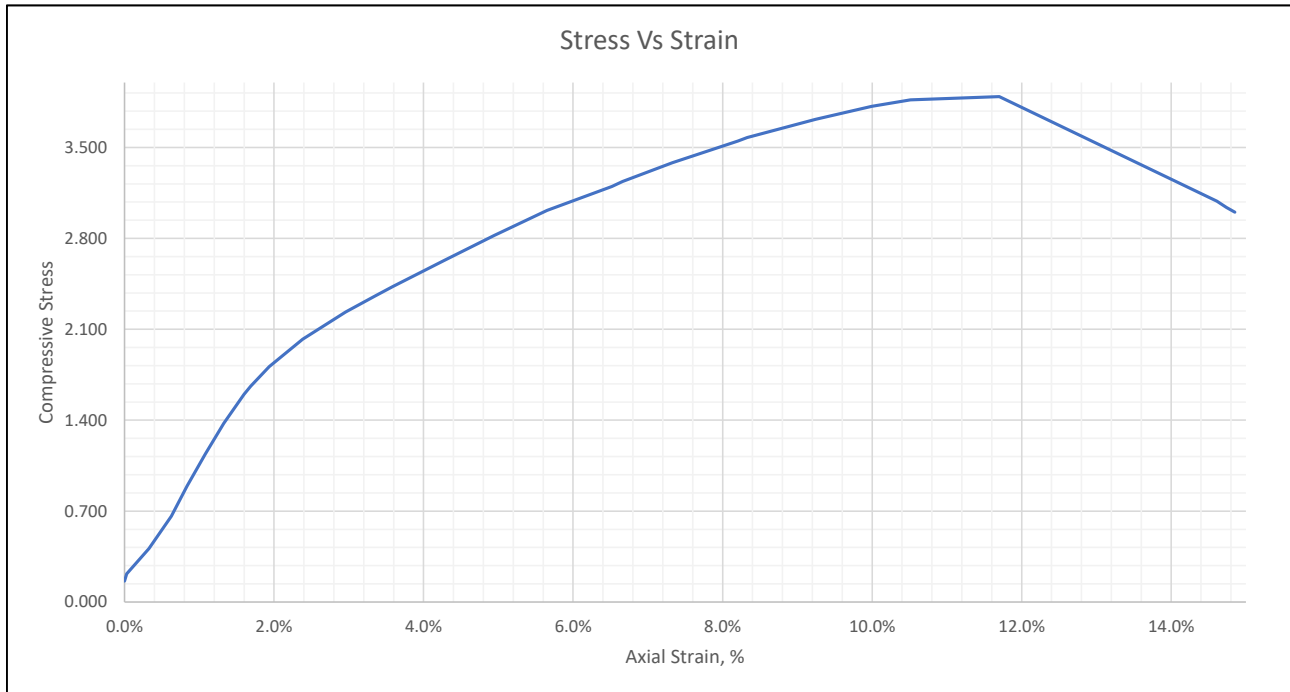


Unconfined Compressive Strength ASTM D2166

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Date 5/26/2026
Client KPM Engineering
Sample Location TB-03

Sample ID D

Depth (ft) 9.5



Sample ID	D
Unconfined Strength (tsf)	3.892
Undrained Shear Strength (tsf)	1.946
Failure Strain (%)	11.7%
Strain Rate, (in/min)	0.055
Moisture Content	6.9%
Wet Density (pcf)	150.5
Dry Density (pcf)	140.7
Void Ratio	0.1885
Saturation (%)	98.6%
Specimen Diameter (in)	1.37
Specimen Height (in)	3.03
Height/Diameter Ratio	2.21

Remarks

Technician
mvanweelden

Checked

Approved
mvanweelden

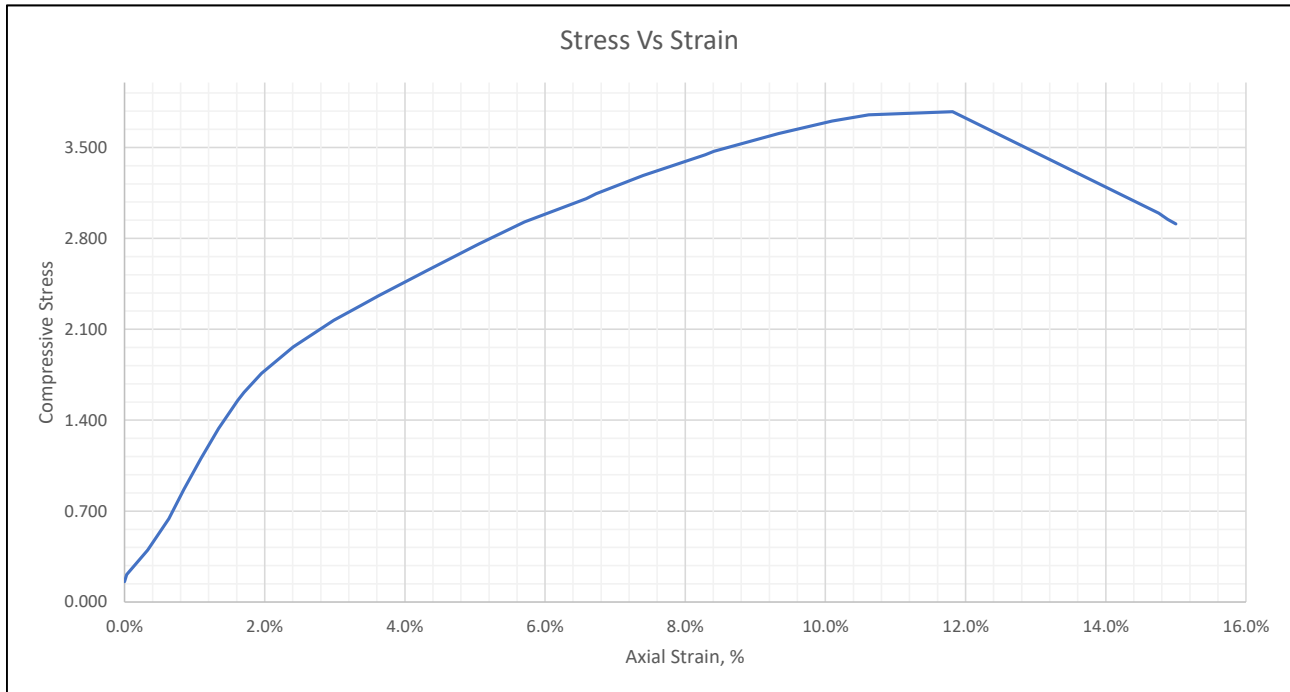


Unconfined Compressive Strength ASTM D2166

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Date 5/26/2026
Client KPM Engineering
Sample Location TB-01

Sample ID E

Depth (ft) 14.5



Sample ID	E
Unconfined Strength (tsf)	3.776
Undrained Shear Strength (tsf)	1.888
Failure Strain (%)	11.8%
Strain Rate, (in/min)	0.055
Moisture Content	18.1%
Wet Density (pcf)	128.3
Dry Density (pcf)	108.6
Void Ratio	0.5401
Saturation (%)	89.9%
Specimen Diameter (in)	1.39
Specimen Height (in)	3.00
Height/Diameter Ratio	2.16

Remarks

Technician
mvanweelden

Checked

Approved
mvanweelden

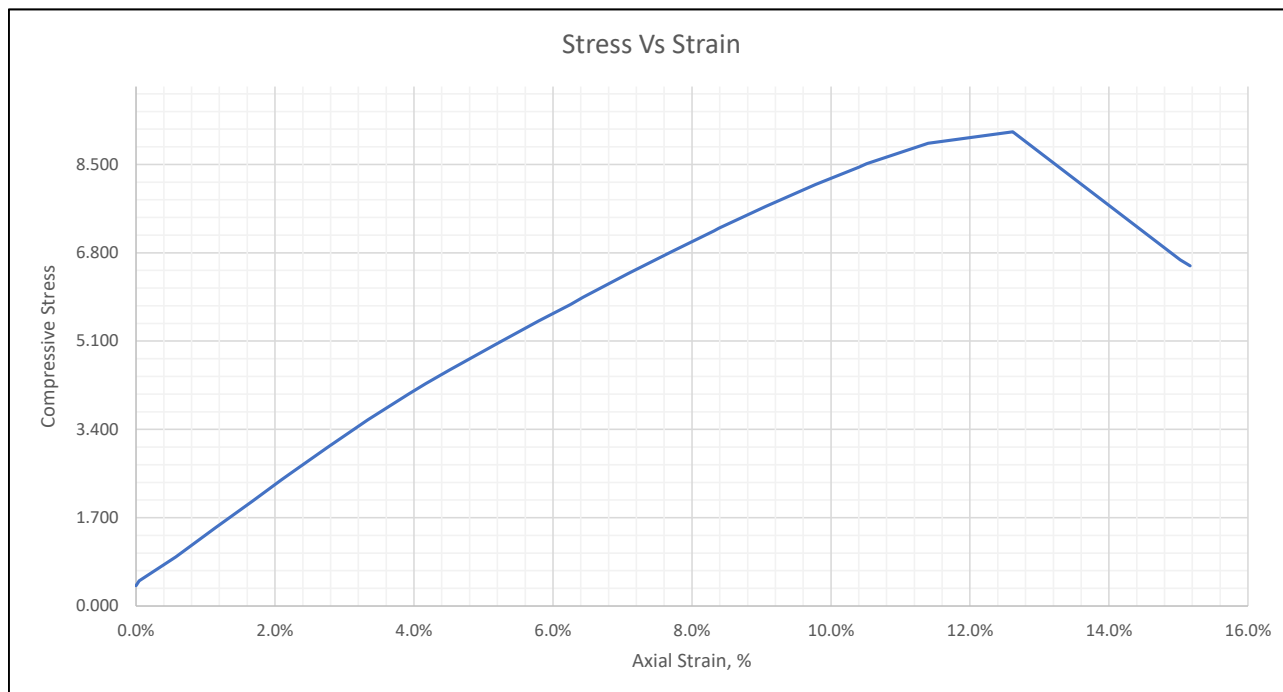


Unconfined Compressive Strength ASTM D2166

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Date 5/26/2026
Client KPM Engineering
Sample Location TB-03

Sample ID F

Depth (ft) 19.5



Sample ID	F
Unconfined Strength (tsf)	9.129
Undrained Shear Strength (tsf)	4.565
Failure Strain (%)	12.6%
Strain Rate, (in/min)	0.055
Moisture Content	7.6%
Wet Density (pcf)	142.5
Dry Density (pcf)	132.4
Void Ratio	0.2631
Saturation (%)	77.7%
Specimen Diameter (in)	1.39
Specimen Height (in)	2.44
Height/Diameter Ratio	1.76

Remarks

Technician
mvanweelden

Checked

Approved
mvanweelden

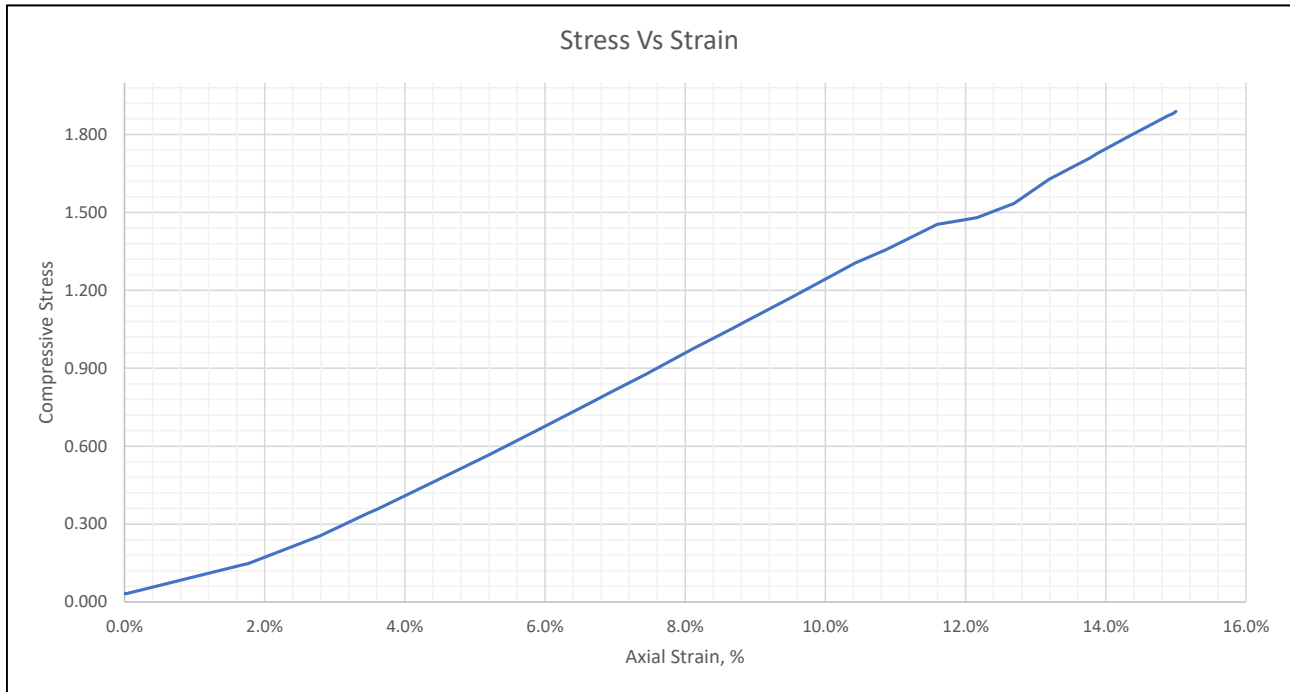


Unconfined Compressive Strength ASTM D2166

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Date 5/26/2026
Client KPM Engineering
Sample Location TB-04

Sample ID G

Depth (ft) 24.5



Sample ID	G
Unconfined Strength (tsf)	1.889
Undrained Shear Strength (tsf)	0.944
Failure Strain (%)	15.0%
Strain Rate, (in/min)	0.055
Moisture Content	9.7%
Wet Density (pcf)	137.2
Dry Density (pcf)	125.1
Void Ratio	0.3369
Saturation (%)	76.9%
Specimen Diameter (in)	1.49
Specimen Height (in)	2.92
Height/Diameter Ratio	1.96

Remarks

Technician
mvanweelden

Checked

Approved
mvanweelden

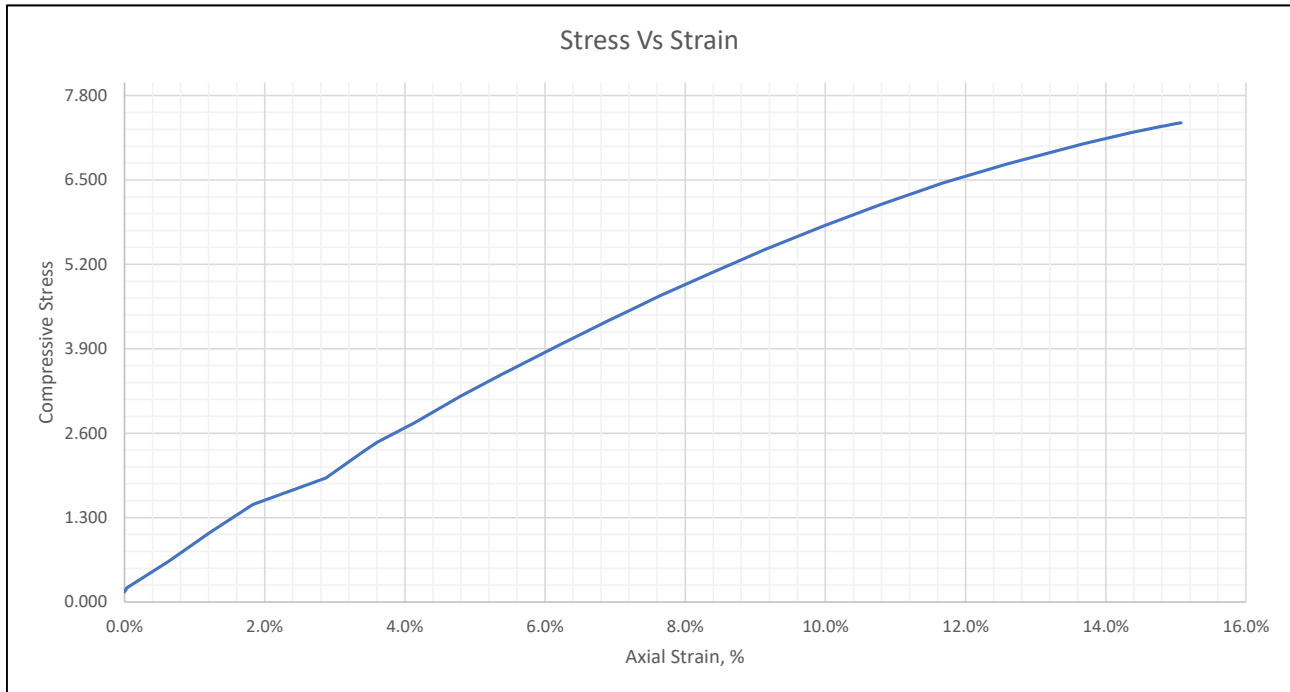


Unconfined Compressive Strength ASTM D2166

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Date 5/26/2026
Client KPM Engineering
Sample Location TB-02

Sample ID I

Depth (ft) 34.5



Sample ID	I
Unconfined Strength (tsf)	7.380
Undrained Shear Strength (tsf)	3.690
Failure Strain (%)	15.1%
Strain Rate, (in/min)	0.055
Moisture Content	13.0%
Wet Density (pcf)	133.8
Dry Density (pcf)	118.4
Void Ratio	0.4123
Saturation (%)	84.3%
Specimen Diameter (in)	1.43
Specimen Height (in)	2.82
Height/Diameter Ratio	1.97

Remarks

Technician
mvanweelden

Checked

Approved
mvanweelden

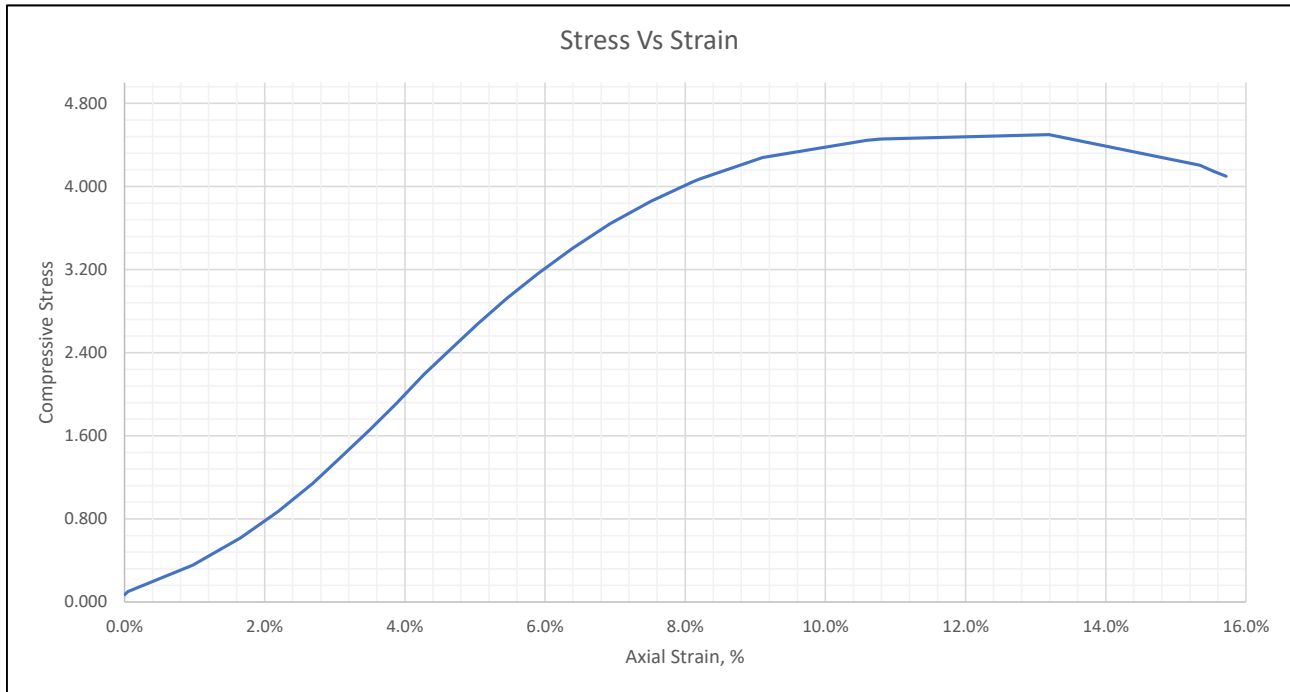


Unconfined Compressive Strength ASTM D2166

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Date 5/26/2026
Client KPM Engineering
Sample Location TB-04

Sample ID J

Depth (ft) 38.5



Sample ID	J
Unconfined Strength (tsf)	4.499
Undrained Shear Strength (tsf)	2.249
Failure Strain (%)	13.2%
Strain Rate, (in/min)	0.055
Moisture Content	16.1%
Wet Density (pcf)	130.5
Dry Density (pcf)	112.4
Void Ratio	0.4874
Saturation (%)	88.4%
Specimen Diameter (in)	1.42
Specimen Height (in)	1.89
Height/Diameter Ratio	1.33

Remarks

Technician
mvanweelden

Checked

Approved
mvanweelden

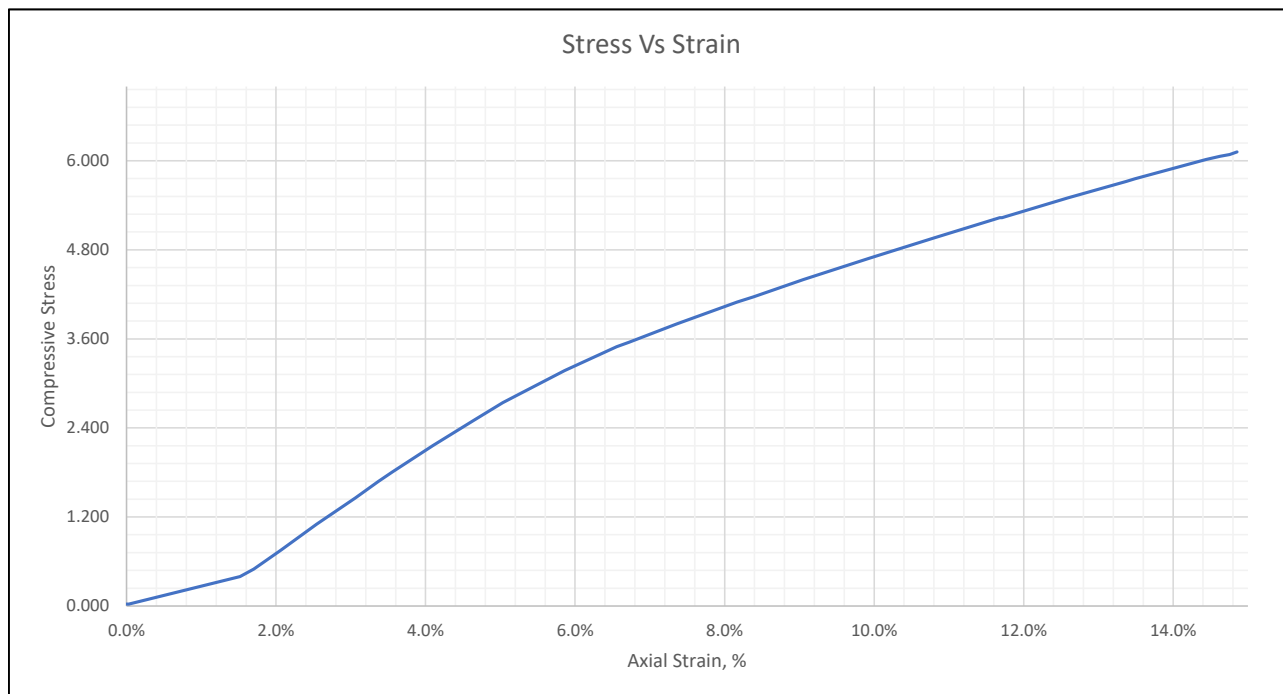


Unconfined Compressive Strength ASTM D2166

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Date 5/26/2026
Client KPM Engineering
Sample Location TB-03

Sample ID J

Depth (ft) 38.5



Sample ID	J
Unconfined Strength (tsf)	6.119
Undrained Shear Strength (tsf)	3.060
Failure Strain (%)	14.9%
Strain Rate, (in/min)	0.055
Moisture Content	18.3%
Wet Density (pcf)	132.3
Dry Density (pcf)	111.9
Void Ratio	0.4949
Saturation (%)	98.9%
Specimen Diameter (in)	1.46
Specimen Height (in)	3.03
Height/Diameter Ratio	2.08

Remarks

Technician
mvanweelden

Checked

Approved
mvanweelden

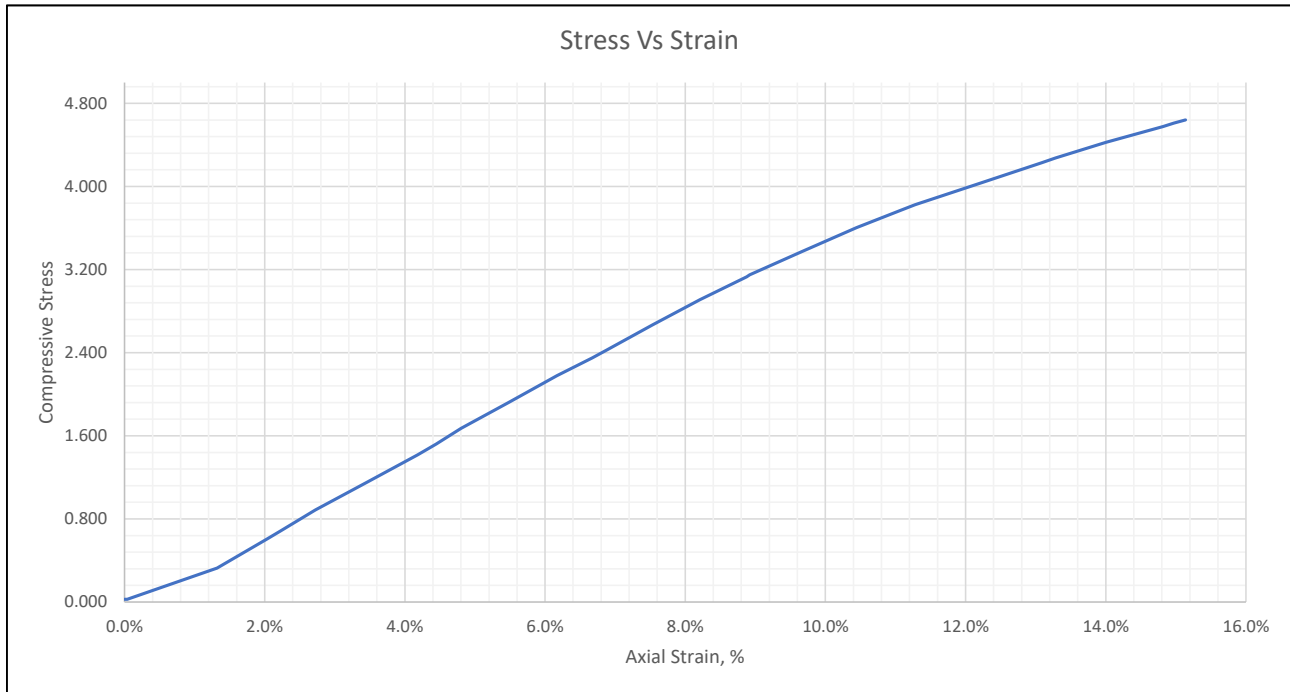


Unconfined Compressive Strength ASTM D2166

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Date 5/26/2026
Client KPM Engineering
Sample Location TB-02

Sample ID J

Depth (ft) 38.5



Sample ID	J
Unconfined Strength (tsf)	4.640
Undrained Shear Strength (tsf)	2.320
Failure Strain (%)	15.1%
Strain Rate, (in/min)	0.055
Moisture Content	14.1%
Wet Density (pcf)	133.0
Dry Density (pcf)	116.6
Void Ratio	0.4340
Saturation (%)	86.9%
Specimen Diameter (in)	1.43
Specimen Height (in)	2.28
Height/Diameter Ratio	1.59

Remarks

Technician
mvanweelden

Checked

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mvanweelden

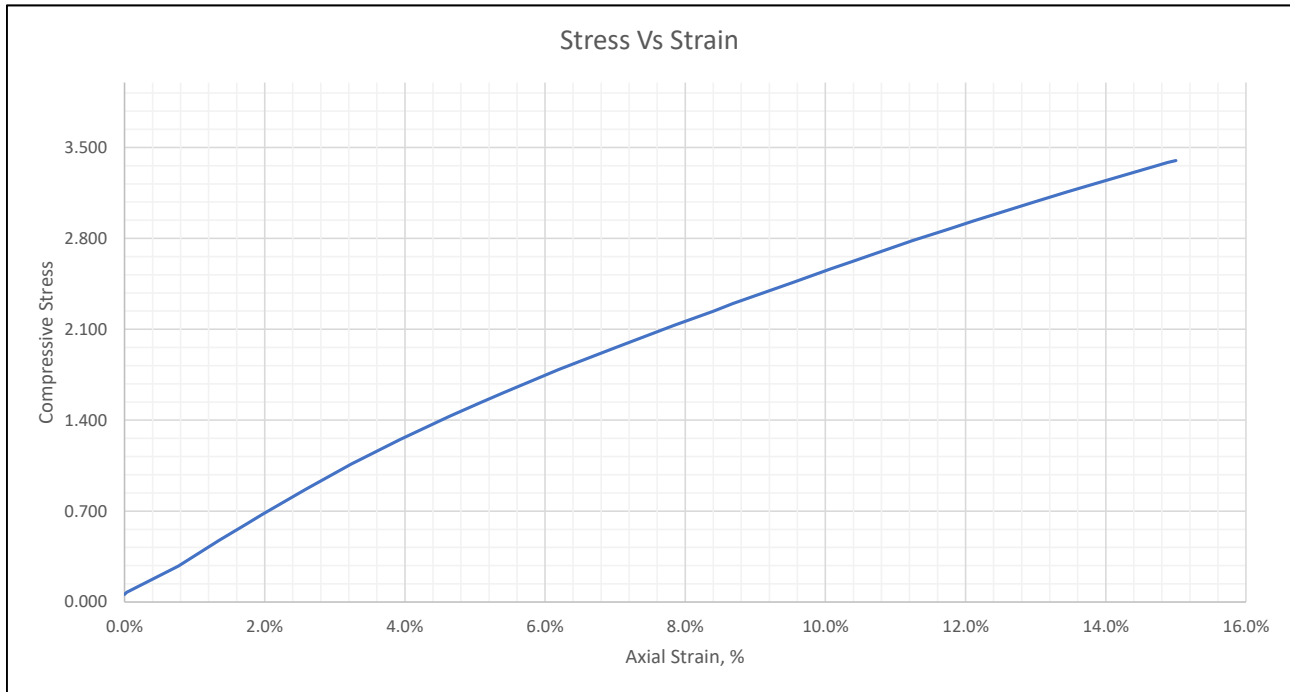


Unconfined Compressive Strength ASTM D2166

Project Name High Bridge Road Repair Project
Project Number 26TC-60X
Date 5/26/2026
Client KPM Engineering
Sample Location TB-05

Sample ID J

Depth (ft) 38.5



Sample ID	J
Unconfined Strength (tsf)	3.399
Undrained Shear Strength (tsf)	1.700
Failure Strain (%)	15.0%
Strain Rate, (in/min)	0.055
Moisture Content	14.2%
Wet Density (pcf)	126.2
Dry Density (pcf)	110.5
Void Ratio	0.5135
Saturation (%)	74.3%
Specimen Diameter (in)	1.49
Specimen Height (in)	3.00
Height/Diameter Ratio	2.01

Remarks

Technician
mvanweelden

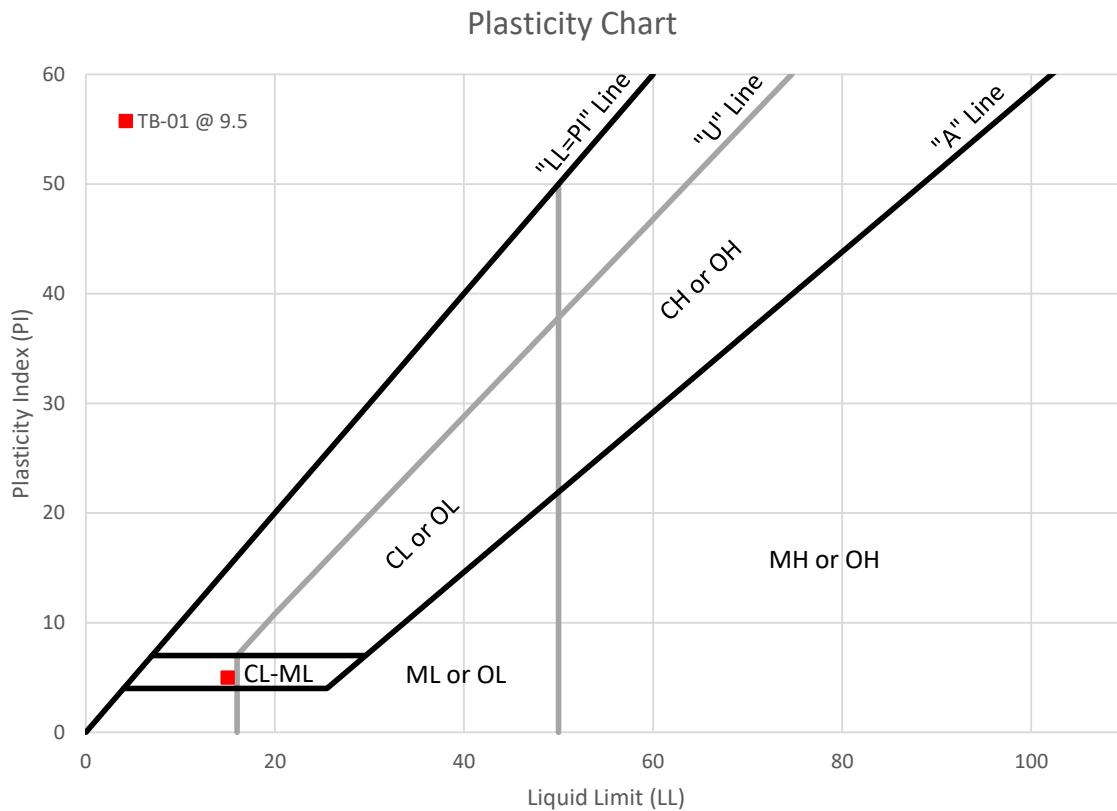
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Approved
mvanweelden

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX ASTM D4318-10, Multipoint Test

Project Name	High Bridge Road Repair Project				
Project Number	26TC-60X				
Client	KPM Engineering				
Date	5/29/2026				
Sample Location	TB-01	Sample ID	D	Depth (ft)	9.5
Sample Description	CLAY - brown with sand and silt and lenses of sand				

		Liquid Limit			Plastic Limit	
Mass of container	g	18.80	19.30	19.20	19.30	18.90
Mass of wet soil and container	g	41.80	41.70	44.90	30.90	30.70
Mass of dry soil and container	g	38.70	38.70	41.30	29.90	29.60
Water Content	%	15.58	15.46	16.29	9.43	10.28
					Average PL	
					10	
		25 - 35	20 - 30	15 - 25		
No. of blows, N		30	26	41.3		



Remarks

LIQUID LIMIT	15
PLASTIC LIMIT	10
PLASTICITY INDEX	5

Technician
SamM

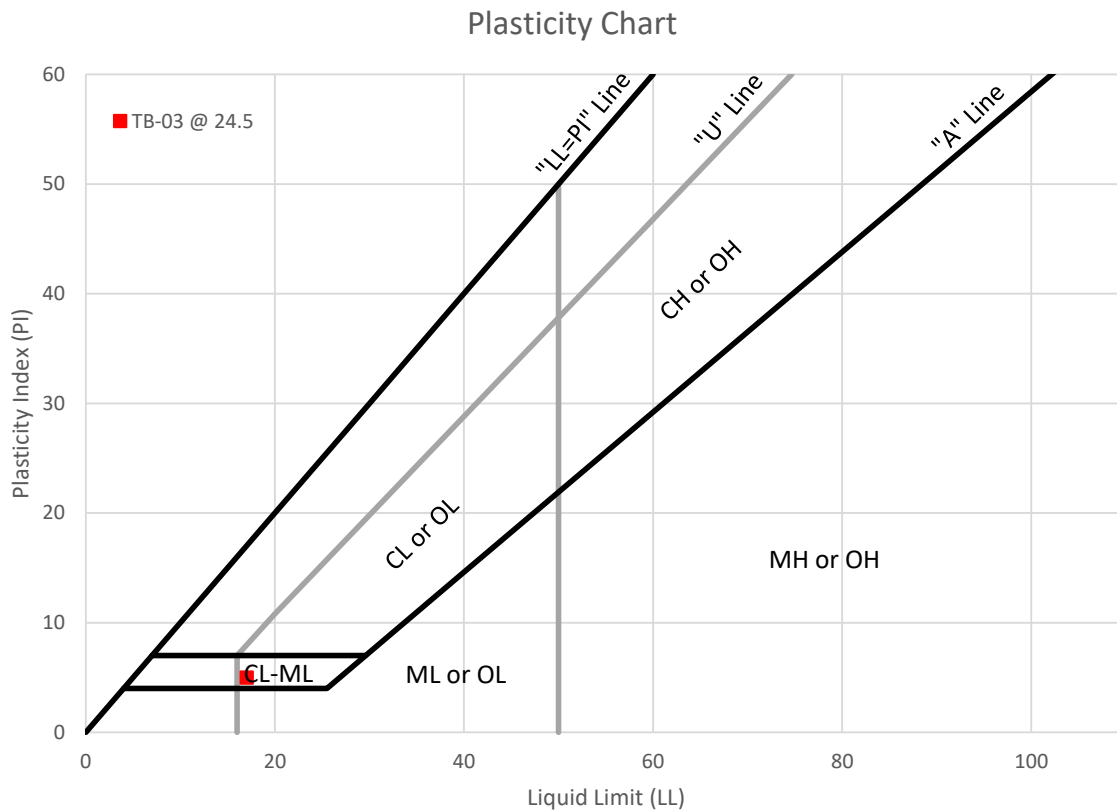
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SamM

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SamM

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX ASTM D4318-10, Multipoint Test

Project Name	High Bridge Road Repair Project				
Project Number	26TC-60X				
Client	KPM Engineering				
Date	5/29/2026				
Sample Location	TB-03	Sample ID	G	Depth (ft)	24.5
Sample Description	SILT - dark brown sandy with clay and lenses of sand				

		Liquid Limit			Plastic Limit	
Mass of container	g	19.60	19.20	19.50	19.10	19.70
Mass of wet soil and container	g	40.70	43.30	41.80	33.00	34.60
Mass of dry soil and container	g	37.60	39.80	38.40	31.60	33.00
Water Content	%	17.22	16.99	17.99	11.20	12.03
					Average PL	
					12	
		25 - 35	20 - 30	15 - 25		
No. of blows, N		26	25	19		



Remarks

LIQUID LIMIT	17
PLASTIC LIMIT	12
PLASTICITY INDEX	5

Technician
SamM

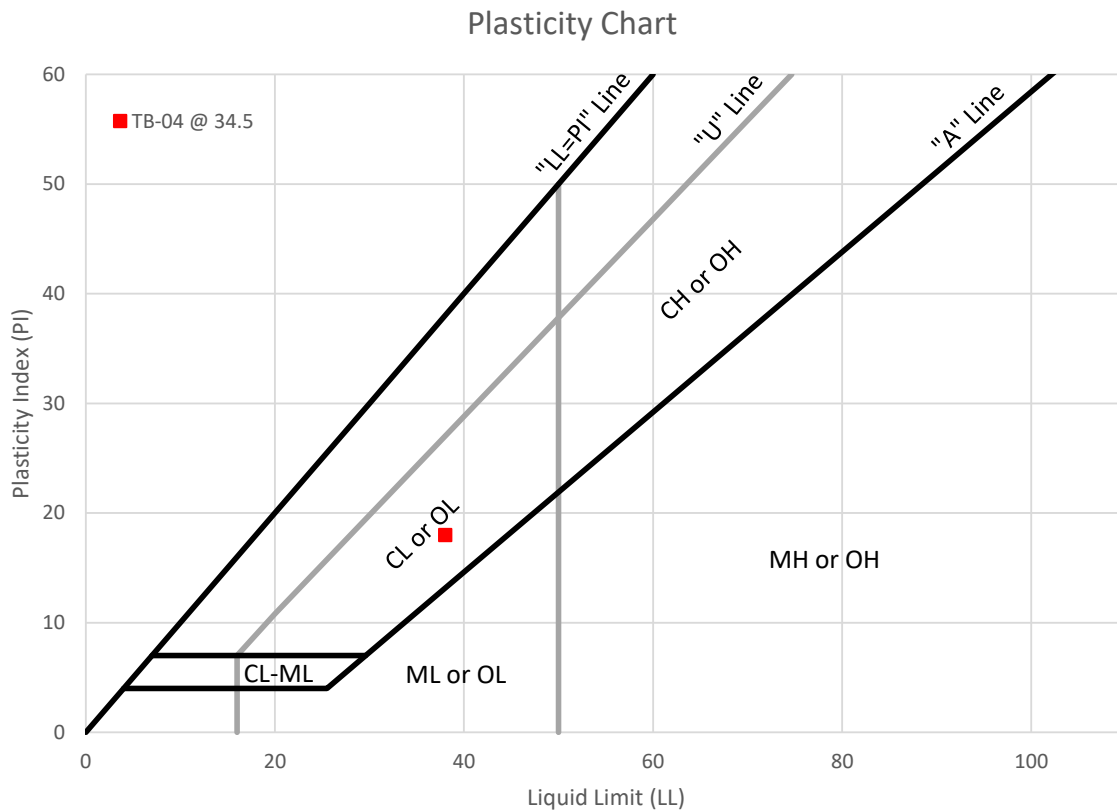
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SamM

Approved
SamM

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX ASTM D4318-10, Multipoint Test

Project Name	High Bridge Road Repair Project		
Project Number	26TC-60X		
Client	KPM Engineering		
Date	5/29/2026		
Sample Location	TB-04	Sample ID	I Depth (ft) 34.5
Sample Description	CLAY - dark brown silty with a trace of sand		

Liquid Limit				Plastic Limit		
Mass of container	g	19.50	19.50	19.40	19.30	19.40
Mass of wet soil and container	g	44.30	40.70	41.60	30.20	30.50
Mass of dry soil and container	g	37.70	34.90	35.50	28.40	28.70
Water Content	%	36.26	37.66	37.89	19.78	19.35
				Average PL		
				20		
No. of blows, N		25 - 35	20 - 30	15 - 25		
		33	27	22		



Remarks

LIQUID LIMIT	38
PLASTIC LIMIT	20
PLASTICITY INDEX	18

Technician
SamM

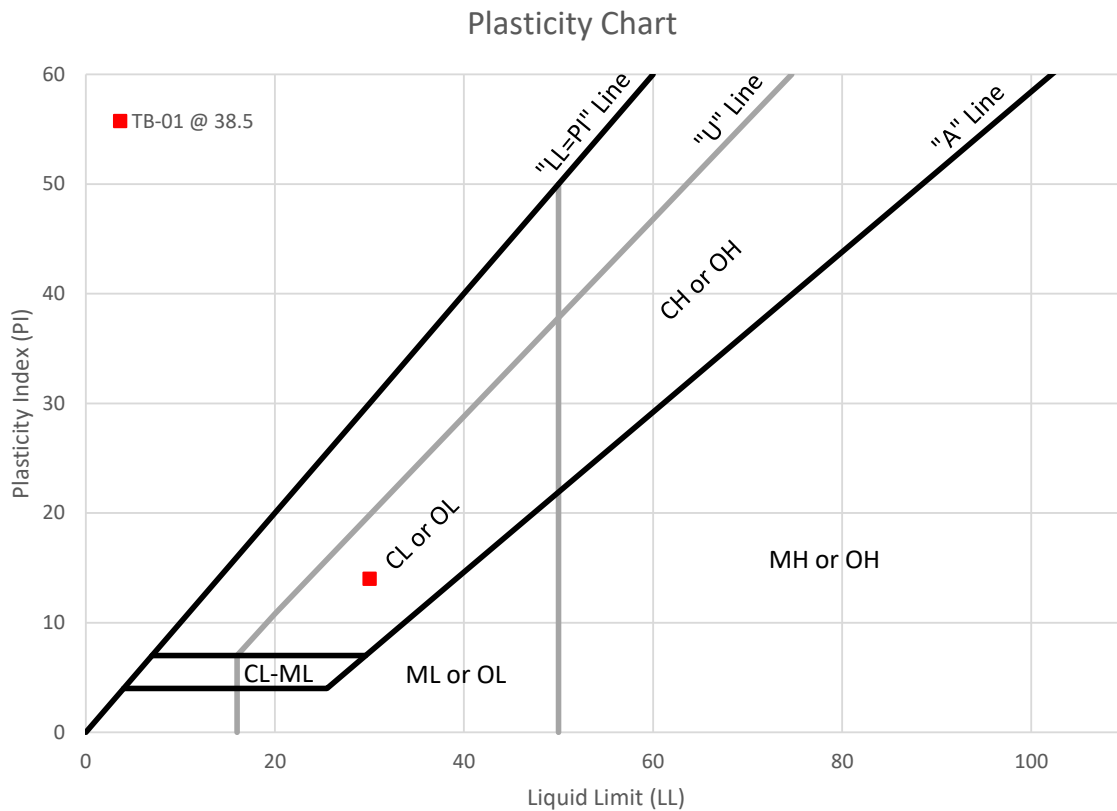
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SamM

Approved
SamM

LIQUID LIMIT, PLASTIC LIMIT AND PLASTICITY INDEX ASTM D4318-10, Multipoint Test

Project Name	High Bridge Road Repair Project		
Project Number	26TC-60X		
Client	KPM Engineering		
Date	5/29/2026		
Sample Location	TB-01	Sample ID	J
		Depth (ft)	38.5
Sample Description	CLAY - brown to dark brown sandy and silty		

		Liquid Limit		Plastic Limit
Mass of container	g	17.30	17.00	17.30
Mass of wet soil and container	g	40.60	39.90	37.80
Mass of dry soil and container	g	35.30	34.60	32.70
Water Content	%	29.44	30.11	33.12
		25 - 35	20 - 30	15 - 25
No. of blows, N		28	26	16



Remarks

LIQUID LIMIT	30
PLASTIC LIMIT	16
PLASTICITY INDEX	14

Technician
SamM

Checked
SamM

Approved
SamM

General Information for Method of Field Investigation

The soil investigation was performed in accordance with the American Society of Testing and Materials method ASTM D 1586, which is the "Standard Test Method for Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils". Samples of compressible clays or organic soils are obtained in accordance with ASTM D 1587, which is the "Standard Practice for Thin-Walled Tube Sampling of Soils for Geotechnical Purposes." Rock may be cored in conjunction with the above methods as specified in ASTM D 2113 which is the "Standard Practice for Rock Core Drilling and Sampling of Rock for Site Investigation."

Field Testing

Standard Penetration Tests (SPT) in accordance with ASTM D 1586 were generally performed at depths of 2.0', 4.5', 7.0', 9.5' and 5.0' intervals thereafter.

Laboratory Testing

Samples obtained from the Standard Penetration Test, ASTM D 1586 or thin walled tube method, ASTM D 1587, were tested in the laboratory for the moisture content and density and/or particle size, where applicable. When soils sampled possessed sufficient cohesive properties, it was tested for its compressive strength in the unconfined state.

Natural Percent Moisture content (N.P.M.) of the soil is the percentage by weight of water contained in the soil sample compared to the dry weight of the solids of which the soil is composed. The NPM of select samples is determined in accordance with ASTM D 2216.

Natural Density (N.D.) of soil as reported on the appended boring logs is the natural wet density of the soils expressed in pounds per cubic foot.

The unconfined compressive strength of cohesive soils is determined in the laboratory on "undisturbed" select samples in accordance with ASTM D 2166. This test determines the maximum load required at a specified rate to deform the cohesive soil specimen length twenty (20%) percent. The primary purpose of the unconfined compression test is to obtain approximate quantitative values of the compressive strength of soils possessing sufficient coherence to permit testing in the unconfined state. The shear strength of the cohesive soil can be calculated from the results of the unconfined compressive strength test.

Color

When the color of the soils is uniform throughout, the color recorded will be such as brown, gray, and black and may be modified by adjectives such as light and dark. If the soils predominant color is shaded by secondary color, the secondary color precedes the primary color, such as gray-brown, or yellow-brown. If two major and distinct colors are swirled throughout the soil, the colors will be modified by the term mottled; such as mottled brown and gray.

Water Observations

Depth of water recorded in the test boring is measured from the ground surface to the water surface. Initial depth indicates water level during boring, completing depth indicates water level immediately after boring, and depth after "X" number of hours indicates water level after allowing the groundwater rise or fall over a period of time. Water observations in pervious soils are considered reliable groundwater levels for accurate groundwater measurements at the time the test borings were performed unless records are made over several days' time. Factors such as weather, soils porosity, etc., will cause the groundwater level to fluctuate for both pervious and impervious soils.

Sample Type

If not otherwise indicated, the sample is a split-barrel liner sample ASTM D 1586.

"S.T." – Shelby tube sample, ASTM D 1587
"A" – disturbed augered sample
"C" – rock core sampled ASTM D 2113
N.P.M. – Natural Percent Moisture of in-situ soils sample
N.D. – Natural Density of in-situ soils sample in pcf.
S.S. – Shear Strength of cohesive soils samples as determined by the Unconfined Compression tests in ksf.

Classification Data – Laboratory data to assist in classification of soils and classification of soils characteristics; i.e., plastic limit or liquid limit

Test Boring Logs

Particle Size	Visual
Boulders	Larger than 12" (300 mm)
Cobbles	12" to 3" (300 to 75 mm)
Gravel - Coarse	3" to ¾" (75 to 19 mm)
Gravel - Fine	19.0 to 4.75 mm
Sand- Coarse	4.75 to 2.0 mm
Sand - Medium	2.0 to 0.425 mm
Sand - Fine	0.425 to 0.075 mm
Silt	0.075 to 0.002 mm
Clay	0.002 mm and smaller

Soils Components

Major Component	Minor Component
Gravel	Trace [1 - 10%]
Sand	Some [11 - 35%]
Silt/Clay	And [36 - 50%]

Condition of Soil Relative to Compactness

Granular Material	"N" Value
Loose	0 - 4
Slightly Compact	5 - 7
Compact	8 - 20
Very Compact	21 - 50
Extremely Compact	51 and above

Cohesive Material	"N" Value
Soft	0 - 4
Firm	5 - 7
Stiff	8 - 20
Very Stiff	21 - 50
Extremely Stiff	51 and above

"N" values in clay soils are not to be used as a measure of shear strength. However, they may be used as a general indication of strength.

Unified Soil Classification System Chart

Major Divisions			Letter Symbol	Typical Descriptions
Coarse Grained Soils More than 50% of material is larger than No. 200 sieve size	Gravel – Gravelly Soils more than 50% of coarse fraction retained on No. 4 sieve	Clean gravels (little or no fines)	GW	Well-Graded gravels, gravel-sand mixtures, little or no fines
			GP	Poorly-Graded gravels, gravel-sand mixtures, little or no fines
		Gravel with Fines (appreciable amount of fines)	GM	Silty gravels, gravel-sand-silt mixtures
			GC	Clayey gravels, gravel-sand-clay mixtures
	Sand and Sandy Soils More than 50% of coarse fraction passing No. 4 sieve	Clean Sand (little or no fines)	SW	Well-Graded sands, gravelly sands, little or no fines
			SP	Poorly-Graded sands, gravelly sands, little or no fines
		Sand with Fines (appreciable amount of fines)	SM	Silty sands, sand-silt mixtures
			SC	Clayey sands, sand-clay mixtures
Fine Grained Soils More than 50% of material is smaller than No. 200 sieve size	Silts and Clays Liquid limit less than 50		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays or low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays or low plasticity
	Silts and Clays Liquid limit greater than 50		MH	Inorganic silts, micaceous or diatomaceous fine sand or silty soils
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays or medium to high plasticity, organic silts
	Highly organic soils	PT	Peat, humus, swamp soils with high organic contents	

For Laboratory Classification of Fine Grained Soil Plasticity Chart

