Report of Geotechnical Exploration Program

Proposed Valvoline
Williston, North Dakota
MTS No. G26-013

For

Ackerman-Estvold

April 17, 2026

MATERIAL TESTING SERVICES, LLC

April 17, 2026

Attn: Steven Eberle, PE
Ackerman-Estvold
1907 17th Street SE
Minot, ND 58701

ref: **Geotechnical Exploration Program**
Proposed Valvoline
Williston, North Dakota
MTS No. G26-013

Dear Mr. Eberle:

Enclosed is the geotechnical exploration report for the proposed project. We are transmitting this report as an electronic file in pdf format. If you require a hard copy, please contact us. The work was conducted in general accordance with our proposal dated February 13, 2026.

Approximately 50 percent of the soil samples will be stored at the laboratory for a period of approximately 30 days from the date of this report. The samples will then be discarded unless we are requested to store them for a longer period.

We appreciate the opportunity to be of service to you on this project. If there are questions about the data or our recommendations, please contact us at 701-852-5553. Also, please contact us when you are ready for excavation observations and compaction test of controlled fill.

Sincerely,
MATERIAL TESTING SERVICES, LLC

Steven Wald, PE
President

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Williston, North Dakota
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Report of Geotechnical Exploration

Proposed Valvoline
Williston, North Dakota
MTS No. G26-013

1. INTRODUCTION

1.1. Authorization

This work was conducted in general accordance with our proposal dated February 13, 2026.

1.2. Scope of Services

The authorized scope of services included soil borings, laboratory testing and an engineering report.

Authorized drilling included a total of four soil borings to nominal depths of 10 to 20 feet. Soil sampling was to be performed using standard penetration test (SPT) procedures. Laboratory tests in the proposal included moisture content, dry density, gradation through a #200 sieve, Atterberg limits (liquid & plastic limits) and unconfined compression testing. If soft cohesive soils were encountered undisturbed 3-inch diameter thin-walled Shelby tubes were to be taken.

The authorized engineering report includes the results of the field and laboratory testing as well as engineering recommendations regarding:

a. Site preparation
b. Foundation types and depths
c. Allowable bearing capacity and estimated potential foundation settlement
d. Potential construction difficulties
e. Potential expansive or compressible soils
f. Site drainage
g. Exterior backfill
h. Floor slabs
i. Frost considerations
j. Lateral Earth Pressures
k. Pavements
k. Excavation slopes
l. Construction monitoring

Determining if there is potential on-site contamination is not included in the scope of services.

2. ENGINEERING REVIEW

2.1. Project Data

If the project information presented below is not correct or has been changed, it is necessary that the correct project data be presented to us for further review.

The proposed building will be one-story above grade with a full basement. The main floor will be precast concrete and the basement floor will be a cast-in-place slab-on-grade. The above grade framing will consist of wood or steel construction. The preliminary building footprint was provided to us by Ackerman Estvold and is approximately 2,200 square feet. Final floor elevation is proposed to be 1875.90 feet with bottom of footing elevation near 1865.9. The building is planned to be surrounded by associated parking lot and drive lanes. Grade changes appear to be less than a foot.

Strip footing loads were provided to us by CW Structural and will not exceed 8.5 kips per foot. We assume the maximum settlement under working load is 1 inch and a maximum differential settlement of ½ inch.

Light and heavy duty rigid and flexible pavement sections are provided in the report.

2.2. Special Concerns and Constructability

The main concern for the site is the high groundwater level. Groundwater was encountered in the building footprint borings during drilling at a depth of 5.8 feet and was remeasured on April 10th at a depth of 6.4 feet. We anticipate static groundwater near an elevation of 1868 feet. Adequate dewatering will be needed to place footings and foundation walls. Frequent sand lenses and sand layers were encountered in the boreholes at depths of approximately 7 feet below grade. These materials are expected to exhibit higher permeability and may result in increased groundwater seepage during excavation.

We recommend that a permanent draintile system be designed and installed. We also recommend the below grade walls be waterproofed to the extent possible to decrease the chance of groundwater penetrating the structure. Refer to section 2.7.

Fill and possible fill were encountered up to 4 feet below the proposed building footprint. The existing fill within the building footprint should be removed during the basement excavation. Traces of organics were encountered near the surface in the borings. It is likely that most of the fill will be suitable for reuse as embankment and exterior backfill. The fill consisted primarily of sandy lean clay or clayey sand with areas of trace amounts of organics. Refer to section 2.3.1 for additional recommendations.

Uncontrolled fill and possible fill were present in the proposed parking area to depths of 0.3 to 4 feet below grade. The fill consisted of sandy lean clay, lean clay or clayey sand with trace amounts of organics. Typically, we recommend that all uncontrolled fill be removed and replaced. That is likely not feasible or practical. The owner would be assuming risk of detrimental settlement but likely the risk is low. Refer to section 2.3.2 for additional recommendations.

The existing clays are susceptible to frost heave. Therefore, seasonal frost movement of pavement, sidewalks and miscellaneous structures supported above the frost depth can be expected.

2.3. Excavation and Site Preparation

2.3.1. Building

As mentioned previously, the bottom of footing elevation will be placed near 1865.9 feet. The groundwater elevation was measured at approximately 1868 feet. For exterior basement wall backfill we recommend imported sand or sand and gravel. The sand backfill should be placed against the basement walls down to a continuous drain tile system near the bottom of the footings. This will allow excess water to reach the drain tile. We recommend installing the permanent drain tile system or preparing for a temporary dewatering plan prior to excavation and placement of footings and foundation walls. To prevent migration of surface water at the foundation walls it is recommended to seal the surface with a 2-foot clay cap in areas where a solid surface (such as a sidewalk or pavement) will not be constructed.

We recommend placing a layer of compacted rock at the bottom (beneath the basement floor) of the excavation to transmit water to sump locations and to provide a working base for placing and compacting the remainder of the controlled, compacted fill or concrete and to serve as part of the permanent drain tile system. The rock layer should be 12 to 18 inches thick, depending on how much water enters the excavations. It should consist of ASTM C 33, size 57 rock, or equivalent. A geotextile stabilization/separation fabric should be placed so that it completely encapsulates the rock layer. We recommend that the fabric consists of Mirafi 180N or equivalent to provide sufficient strength, sufficient permeability through the fabric, as well as filtration. The fabric should be placed according to the manufacturer’s recommendations. Pumping should be performed continuously until the backfill has been placed to at least the original ground level or at least 2 feet above the water level. Several sump locations, consisting of perforated pipes with pumps, may be required to keep the water level below the top of the rock layer and not influence the overlying less select fill.

Table 2 – ASTM C 33, Size 57 Rock Gradation Bands

Sieve Size	Grading Band
1-1/2	100
½”	25-60
#4	0-10
#8	0-5

If excavations extend below the bottom of footing depth, we recommend providing a lateral excavation oversize of 1 foot for each 1 foot of fill required below the bottom of the new foundations. The over-size should be measured from the bottom and outside edge of the foundations.

We recommend the excavated areas be observed by the geotechnical engineer of record or their representative prior to the placement of concrete or controlled, compacted fill. The purpose of the observations would be to make sure that no existing fill or soft soil is left in place and that the exposed natural soil can support the new fill and structural loads. We wish to point out that there could be deeper excavations required away from the boring locations.

We recommend that a hydraulic excavator be used for foundation excavation. It should have a smooth cutting edge on the bucket. If the bottom of the excavation exposes native clay soil it should not be surface compacted prior to placement of controlled, compacted fill. However, any loose materials should be removed as much as possible. Exposed sands should be surface compacted with a minimum of three passes with a heavy vibratory roller. However, a final determination of compacting the soil should be made at the time of construction.

After the excavations are complete, backfill should be placed as soon as possible. Also, care should be taken so that the grades slope away from the excavations in case it rains. Although it is impossible to completely keep rainwater from the site, provisions must be made to protect the excavations as much as possible from the influx of rainwater or surface runoff both during and after construction. Water and any soft/saturated soil should be removed as soon as possible.

Basement wall backfill should consist of a free draining imported sand or sand with gravel with 100 percent passing the 1-inch sieve, less than 15 percent passing the #50 sieve and less than 5 percent passing a #200 sieve.

Loose lift thicknesses of new fill should be no more than 8 inches. Any fill that is to support footings should be compacted to at least 98% of the maximum dry density as determined according to ASTM D 698 (standard Proctor). Fill for floor slabs should be compacted to at least 95% of the maximum dry density. Sand fill should be moisture conditioned as necessary to facilitate compaction.

If earthwork is done during periods of freezing temperatures, we recommend protecting the fill from freezing once it has been placed. No frozen soils should be used as fill and fill should not be placed on frozen ground. Earthwork could be difficult in the spring or late fall when conditions are often cool and wet.

2.3.2. Parking and Driveways

Topsoil fill or fill with organics were found at depths ranging from 4 to 9 inches within the parking areas. We advise removing all topsoil or topsoil fill and storing it outside of the active construction excavation. Please note that topsoil thickness may vary in areas beyond our boring locations. The owner should be prepared for additional sub cutting if topsoil depths exceed 9 inches.

As stated in section 2.2, we assume that the existing fill will not be completely removed and replaced. However, the topsoil and any exposed soil that appears to contain appreciable organics should be removed. Then the existing grade should be cut as necessary for the new grade and pavement section. The exposed subgrade soils should be scarified a minimum of twelve inches, moisture conditioned to within three percent of optimum and re-compacted to a minimum of 98 percent of the standard Proctor density.

Any off-site fill material can consist of sand or sand with gravel as stated in section 2.3.1 or a non-expansive, non-organic lean clay with a liquid limit less than 40. The non-organic sandy lean clay removed from the building footprint appears suitable for parking lot fill but will likely need moisture conditioning. Any fill should be placed and compacted to a minimum of 98%. Clayey or cohesive soils should be placed within a moisture content range of minus 3 to plus 3 percent of optimum moisture content. Cohesionless soils should be placed at a moisture content that facilitates compaction. The existing soil appears to be near to well above their optimum moisture contents.

We recommend proof rolling the prepared subgrade with a loaded dump or water truck prior to placing the base course. Any soft spots should be stabilized prior to placing additional fill or base course.

The existing non-organic clay soils at the site are considered poor to fair as subgrade soils for pavements. The subgrade soils are frost susceptible; therefore, some frost movement and/or frost damage can be expected during the life of the pavement.

2.4. Frost Considerations

Foundations should be carried to frost depth as indicated in the following sections. Also, no frozen soil should be used as fill and no fill should be placed on frozen ground. Furthermore, the soil should be protected from freezing once it has been placed and compacted and until the building can be heated. Please note the attached information sheet "***Precautions for Excavating and Refilling During Cold Weather***" in Appendix C.

2.5. Foundation Recommendations

2.5.1. Footing Depths

Perimeter footings for heated buildings should be carried to a frost depth of 5 feet. The frost depth should be considered from final grade to the bottom of the footing. Interior footings can be placed at a convenient depth on solid ground below the floor slab. For footings which will be in an unheated environment, we recommend using a frost depth of 7 feet.

2.5.2. Bearing Capacity and Settlement

With the recommended site preparation, on-site observations by the geotechnical engineer and adequate compaction testing of the new fill, it is our opinion that continuous strip and column footings can be proportioned for a net allowable soil bearing capacity of up to 2,000 psf for continuous strip footings. This loading should provide a theoretical safety factor of 3 or more with respect to punching shear failure.

Our calculations suggest that total settlements should be 1 inch or less and that the differential settlement should be ½ inch or less. Settlement is expected to be immediate and elastic in nature.

2.5.3. Lateral Earth Pressures

Walls with unbalanced backfill will be subject to at-rest earth pressures. Above the water table, which we recommend assuming will be at elevation 1868 feet, we recommend designing the walls for an at-rest lateral earth pressures equivalent to that generated by a fluid having a total unit weight of 55 pcf for the compacted material referenced in Section 2.7 and 65 pcf for the on-site sandy lean clay. Below the water table, we recommend using a submerged value of 90 and 95 pcf for the sand and clay respectively.

To resist lateral loads, we recommend assuming the natural undisturbed clays have an ultimate passive pressure equivalent to that generated by a fluid having a total unit weight of 330 pcf. For compacted sand, we recommend using an ultimate passive pressure of 425 pcf. If compacted fill is placed on the passive side next to the foundation resisting lateral loads, it should be compacted to at least 95 percent of maximum density as determined by ASTM D 698. In addition, those portions of the foundations within five feet of final grade in unheated areas should be ignored when calculating passive resistance due to frost softening. An ultimate friction factor of 0.30 can be used between the bottom of the footing and the foundation soils. We wish to point out that these values will give the ultimate resistance to lateral loads. We recommend that a theoretical safety factor of 2.0 be applied for a safe design.

2.5.4. Methods of Analysis

The allowable foundation loading recommended was arrived at using the Terzaghi-Meyerhof bearing capacity equation with estimates using empirical correlations with the "N" values, as well as our experience with similar site and soil conditions.

Settlements were estimated using empirical correlations between the "N" values and the pressuremeter modulus, with consideration given to soil type. The pressuremeter modulus is determined with in-situ pressuremeter testing. The pressuremeter method of analysis was then used.

The equivalent passive, at-rest and active earth pressures were calculated using estimated unit weights and estimated angles of internal friction based on our experience, the laboratory testing and correlations with the Atterberg limits and soil type.

2.6. Floor Slabs

We recommend that the site be prepared as stated in ***Section 2.3***. The basement or pit slab should have 12 to 18 inches of size 57 rock beneath the slab as stated in section 2.3.1.

With the site prepared as recommended, it is our opinion that the subgrade modulus of 200 pci can be used if a minimum of 18 inches of granular fill is used below the slab. A subgrade modulus of 150 pci can be used if clay fill is used to within 6 inches of the bottom of the slab.

We recommend that slabs-on-grade be constructed structurally independent of foundation walls and columns.

2.7. Exterior Foundation Backfill

We recommend that exterior backfill for the basement walls consists of free draining sand or sand with gravel with 100 percent passing the 1-inch sieve, less than 15 percent passing the #50 sieve and less than 5 percent passing the #200 sieve.

A permanent drain tile system should be installed. As a general guideline the drainage system should consist of fabric wrapped slotted or perforated pipe extending to a sump pit or pits on the interior and exterior. The rock layer discussed in Section 2.3.1 to control groundwater during construction could be made part of the permanent draintile system. We recommend hiring a dewatering consultant to design the permanent draintile system.

We recommend providing at least a 2-foot-thick clay cap in the green areas at the surface to divert surface water away from the building.

Foundation backfill should be placed in maximum loose lift thicknesses not to exceed 8 inches. Lift sizes may have to be smaller depending on the compaction equipment that is used. Compaction should be to a minimum of 92 percent of the standard Proctor density in lawn areas. For sidewalks or lightly loaded structures such as air conditioning units, the compaction should be increased to 95 percent. If there are driveways or parking areas within the backfill zone the fill 1 foot or more below the bottom of pavements should be compacted to at least 95 percent and fill within 1 foot should be compacted to at least 98 percent. Clay fill should be placed at a moisture content of -3 to +3 percent of the optimum moisture content and sand fill should be moisture conditioned as required to facilitate compaction.

2.8. <u>Surface Drainage</u>

We advise that adequate drainage be maintained during and after construction. Unless roof drainage is internal, we also recommend that downspouts and gutters or an appropriate closed conduit system be used to control roof drainage. Downspouts should have extensions that carry roof water well past the backfill line. Splash pads should also be provided at the end of the extensions, if applicable.

The exterior clay backfill should slope away from the buildings at a rate of 1 inch per foot or greater for a distance of at least 10 feet from the building in lawn areas. In parking areas much positive surface drainage should be provided as practical.

2.9. <u>Exterior Slabs</u>

Due to the potential for frost movement for exterior slabs, precautions should be taken to minimize future post construction movement of sensitive slabs due to frost action. Options available include excavating frost susceptible soils to a depth of 5 feet below the slabs and replacing them with non-frost susceptible sand containing less than 5 percent passing the #200 sieve by weight. Another option would be to place at least 4 inches of extruded polystyrene foam insulation below the slabs and extend it at least 8 feet laterally past the edge of the slabs. Typically, 6 to 12 inches of sand is placed above the insulation for protection. A third option is to support the slabs or steps on foundations taken to frost depth. At least a 4-inch void should be provided below the slabs if this option is used.

Sensitive slabs are slabs that cannot tolerate much movement without causing some difficulties. An example would be the sidewalk or steps in front of a doorway. It is ***not*** intended to include all exterior sidewalks and driveways, etc.

2.10. Flexible Pavement Design

Flexible pavement design was based on our experience and in accordance with the "AASHTO Guide of Design of Pavement Structures 1993" using Tensar+ software. No traffic volumes for the parking lot or driveway were given. For our analysis, we assumed a traffic loading of 50,000 equivalent 18-kip axle loads (ESAL's) over a 20-year design life for the pavements. The subgrade should be prepared as described in previous sections. Parameters used in design are shown in Table 3 below.

Table 3 – Pavement Design Parameters

Parameter	Value
Reliability	85%
Standard Deviation	0.45
Initial Serviceability	4.2
Terminal Serviceability	2.2
Estimated Subgrade CBR	3.0
Resilient Modulus	4500
HBP Layer Coefficient	0.42
Aggregate Base Layer Coefficient	0.1
Drainage Factor of Base and Subbase	1.0

The granular base course should meet the specifications as outlined in Section 816 of the North Dakota Department of Transportation's (NDDOT) "Standard Specifications for Road and Bridge Construction" for Class 5 aggregate, or equivalent. The base material should be compacted to at least 98 percent of the standard Proctor density at a moisture content that facilitates compaction.

For a light duty traffic load of 50,000 ESALs, we recommend that the minimum section consists of 4 inches of hot bituminous pavement (HBP) over 8 inches of granular base course. For heavy duty pavements, we recommend that the minimum section consists of 5 inches of hot mix bituminous pavement over 10 inches of granular base.

We recommend separation fabric be placed between the subgrade soils and the aggregate base section.

Adequate drainage should be considered imperative to prolong the life of the pavement. The pavement should be properly sloped to catch basins or appropriate inlets, as necessary. We recommend a minimum slope of 1 percent and preferably 2 percent.

The bituminous pavement should be composed of a quality mix such as FAA 42 as outlined in Section 430 the NDDOT's "Standard Specifications for Road and Bridge Construction".

2.11. Rigid Pavement Design

We recommend that rigid pavement consists of a minimum 5 inches of unreinforced concrete pavement on a minimum of 6 inches of NDDOT Class 5 base course. For heavy duty pavement, we recommend a minimum of 6 inches of unreinforced concrete pavement on a minimum of 8 inches of NDDOT Class 5 base course. Depending on the actual traffic loads, a thicker concrete section may be necessary.

The concrete mix should have proven success, or a mix design should be established for proper proportions of aggregate, cement, water and any admixtures. The concrete should be handled, placed and cured according to current ACI guidelines and specifications for exterior concrete. The concrete should have a minimum compressive strength of 4000 psi. The concrete should be placed with a maximum water/cement ratio of 0.45 and should have air entrainment between 5 and 7 percent.

Maintenance should be performed on all pavements on a regular basis. Cracks should be properly sealed as soon as they are observed. Again, adequate drainage should be considered imperative to prolong the life of the pavement.

2.12. Excavation Slopes

Safe excavations must be always maintained. The excavation contractor is responsible for the safety of the excavations. Current OSHA requirements should be carefully followed when excavating for the back slope of the excavation. The OSHA soil type and excavation requirements must be verified by a competent person for the contractor at the time of construction. MTS does not assume responsibility for site safety or the contractors' activities.

2.13. Site Classification for Seismic Design

The 2024 IBC and ASCE 7-22 were used to determine the site seismic conditions. The area is in seismic design category A. The building was given a risk category of III in accordance with the IBC. The design parameters presented in Table 4 were determined using the online ASCE Hazard Tool.

Table 4 – Site Seismic Design Parameters

Location	Lat. 48.16918, Long. -103.624945, Elevation 1874 (NAVD 88)		
Soil Class	DE		
S_S	0.083	S_{D1}	0.028
S_1	0.019	T_L	4
S_{MS}	0.1	PGA_M	0.046
S_{M1}	0.042	V_{S30}	185
S_{DS}	0.07		

The probability of an earthquake with ground accelerations high enough to induce liquefaction of the soil at this site is very low due to the historical low risk of an earthquake in the area.

3. CONSTRUCTION OBSERVATION AND TESTING

The recommendations contained in this report have been made based on the subsurface conditions found at the boring locations. It is possible that there are soil conditions on site that were not represented by the borings. Also, we presumed that close construction monitoring during excavation and backfilling would be authorized. Consequently, on-site observation during construction is considered integral to the successful implementation of the recommendations.

It is imperative that the geotechnical engineer be on site at the following times to observe the site conditions and effectiveness of the construction. We recommend that the testing be performed by the geotechnical engineer as the **Owner's** representative during construction.

3.1. Excavation Observations

The geotechnical engineer should observe the entire excavation bottom of the excavation prior to the placement of engineered fill and/or concrete. He would also be available for additional consultation and recommendations if necessary.

3.2. Placement of Fill

It will also be necessary to perform a representative number of compaction tests during placement of engineered fill. The tests should be performed to determine if the required compaction was achieved. As a general guideline, tests should be taken for each 2,500 square feet of embankment fill in building areas, every 5,000 square feet in parking areas, and every 100 linear feet in trench backfill for each 2-foot thickness of fill. The actual number of tests should be left to the discretion of the geotechnical engineer.

4. EXPLORATION LIMITATIONS

The recommendations contained in this report represent our professional opinions. These opinions were arrived at according to currently accepted engineering practices at this time and location. Other than this, no warranty is intended or implied.

This report is written by:

REGISTERED PROFESSIONAL ENGINEER
TANNER M SANDERS
PE-40761
DATE 4/17/26
NORTH DAKOTA

Tanner Sanders, P.E.
Geotechnical Engineer

Reviewed by:

Steve Wald, PE
President

APPENDIX A – FIELD EXPLORATION PROGRAM

Attachments to Appendix A

Site and Boring Location Drawing
Soil Profile Drawing
Boring Logs
Symbols & Descriptive Terminology on Test Boring Logs
Soil Classification Sheet

A. FIELD EXPLORATION PROGRAM

A.1 Exploration Scope

Four borings were planned to be drilled to nominal depths between 10 and 20 feet deep for the project. They were drilled on April 8, 2026. The boring locations are shown on the attached preliminary drawing from Ackerman-Estvold and included at the end of this Appendix.

The borings were backfilled with the auger cuttings. Some settlement of these materials can be expected to occur. The final closure of the holes is the responsibility of the client or property owner.

A.2 Surface Observations

The site is located on the Northeast corner of the intersection of 26th Street W and 2nd Avenue W in Williston, ND. The lot is mostly covered with grass or vegetation. Historically, the site functioned as a trailer park indicated by historical imagery dated between 1957 and 1962. The exact duration of this use is undetermined.

The property is gentle sloping based on the grading plan provided by Ackerman-Estvold. The building site ranges in elevation between 1974 and 1975 feet. Boring elevations were assumed using a combination of google earth elevations and the site grading plan.

A.3 Subsurface Conditions

The subsurface conditions encountered at the test locations are illustrated by means of the attached boring logs and profile drawing. We wish to point out that the subsurface conditions at other times and locations at the site may differ from those found at our test boring locations. If different conditions are encountered during construction, it is necessary that you contact us so that our recommendations can be reviewed. The test boring log also shows the possible geologic origin of the materials encountered.

Topsoil fill or possible fill were encountered at all boring locations to depths of approximately 0.3 to 4 feet below existing grade. The fill consists primarily of sandy lean clay or clayey sand, with areas of trace amounts of organics. Beneath the fill, the soil consisted of glacial till deposits composed of sandy lean clay or lean clay with sand having consistency. The clays were very soft to hard in consistency. The consistency of cohesive and non-cohesive soils are based on the standard penetration resistance (“N” values).

A.4 Water Levels

Groundwater levels were recorded during or right after drilling in borings SB-2 and SB-3 at depths of 5.8 feet and 7.3 feet respectively. The water level in SB-2 was checked two days later and found to be at a depth of 6.4 feet. This data is displayed at the bottom of the attached boring logs.

Water levels should be expected to fluctuate seasonally and annually. The water levels at the time of construction could be significantly different than what was recorded on the boring logs. The time of year the borings were drilled and the history of precipitation prior to drilling should be known when using the groundwater readings on the boring logs to extrapolate water levels at other points in time.

A.5 Soil Sampling

Soil sampling was done according to the procedures described by ASTM D1586. Using this procedure, a 2-inch O.D. split barrel sampler is driven into the soil by a 140-lb weight falling 30 inches. After an initial set of 6 inches, the number of blows required to drive the sampler an additional 12 inches is known as penetration resistance or "N" value. The "N" value is an index of the relative density of cohesionless soils and the consistency of cohesive soils.

We are retaining representative samples of the soil obtained during our field operations for approximately one month. We will then discard them unless we are notified further as to their disposition.

A.6 Soil Classification Procedure

As the samples were obtained in the field, they were visually and manually classified by the crew chief according to ASTM D 2488. Representative portions of all samples were then sealed and returned to the laboratory for further examination and for verification of the field classification. In addition, selected samples were then submitted to a program of laboratory tests. Logs of the borings indicating the depth and identification of the various strata, the "N" value, the laboratory test data, water level information and pertinent information regarding the method of maintaining and advancing the drill holes are also attached. Charts illustrating the soil classification procedures, the descriptive terminology and symbols used on the boring logs are also attached.

N

10 5 0 10 20

GRAPHIC SCALE:

ATTENTION IS DRAWN TO THE FACT THAT DRAWING SCALES MAY BE ALTERED DURING REPRODUCTION PROCESSES. SCALES SHOWN HEREON ARE BASED ON A FULL SCALE SHEET SIZE OF 24" X 36".

SCALE: 1" = 20'

LEGEND

CONSTRUCTION LIMITS

OWNER:
JETT MANAGEMENT, LLC
1301 20TH AVE SW
MINOT, ND 58701
PH: (701) 839-5388

LEGAL DESCRIPTION:
MONROE SUBDIVISION, LOT 19R, BLOCK 1

ZONING: C2

PHYSICAL ADDRESS:
XX 27TH STREET WEST

PARKING CALCULATIONS:

REQUIRED:
MEET OR EXCEED AVERAGE PARKING CAPACITY PER SECTION 25 OF ZONING ORDINANCE.

VEHICLE REPAIR GARAGE 2.5 SPACES PER SERVICE BAY

4 BAYS X 2.5 = 10 SPACES

PROVIDED:
TOTAL PARKING 12 SPACES

HANDICAP PARKING (INCLUDED IN TOTAL) = 1 SPACE

SETBACKS:

FRONT ALONG HWY 2 FRONTAGE - 40'
SIDE ALONG FRONTAGE - 25'
SIDE ADJACENT TO COMMERCIAL - 0'

DATUM:

VERTICAL DATUM: NAVD88
HORIZONTAL DATUM: NAD83 ND STATE PLANE NORTH

NOTES:

1. HANDICAP SIGNS ARE TO BE INSTALLED ON THE BUILDING.

1 R7-8
R7-8P
R7-8F

ACKERMAN ESTVOLD
1907 17th St SE • Minot, ND 58701
701.837.8737 • www.ackerman-estvold.com
Minot, ND | Fargo, ND | Williston, ND | Boise, ID

PRELIMINARY
NOT FOR CONSTRUCTION

VALVOLINE INSTANT OIL CHANGE
_______, WILLISTON, NORTH DAKOTA

DRAWN BY: JJA
CHECKED BY: SLE

DATE: 3/31/2026

REVISIONS

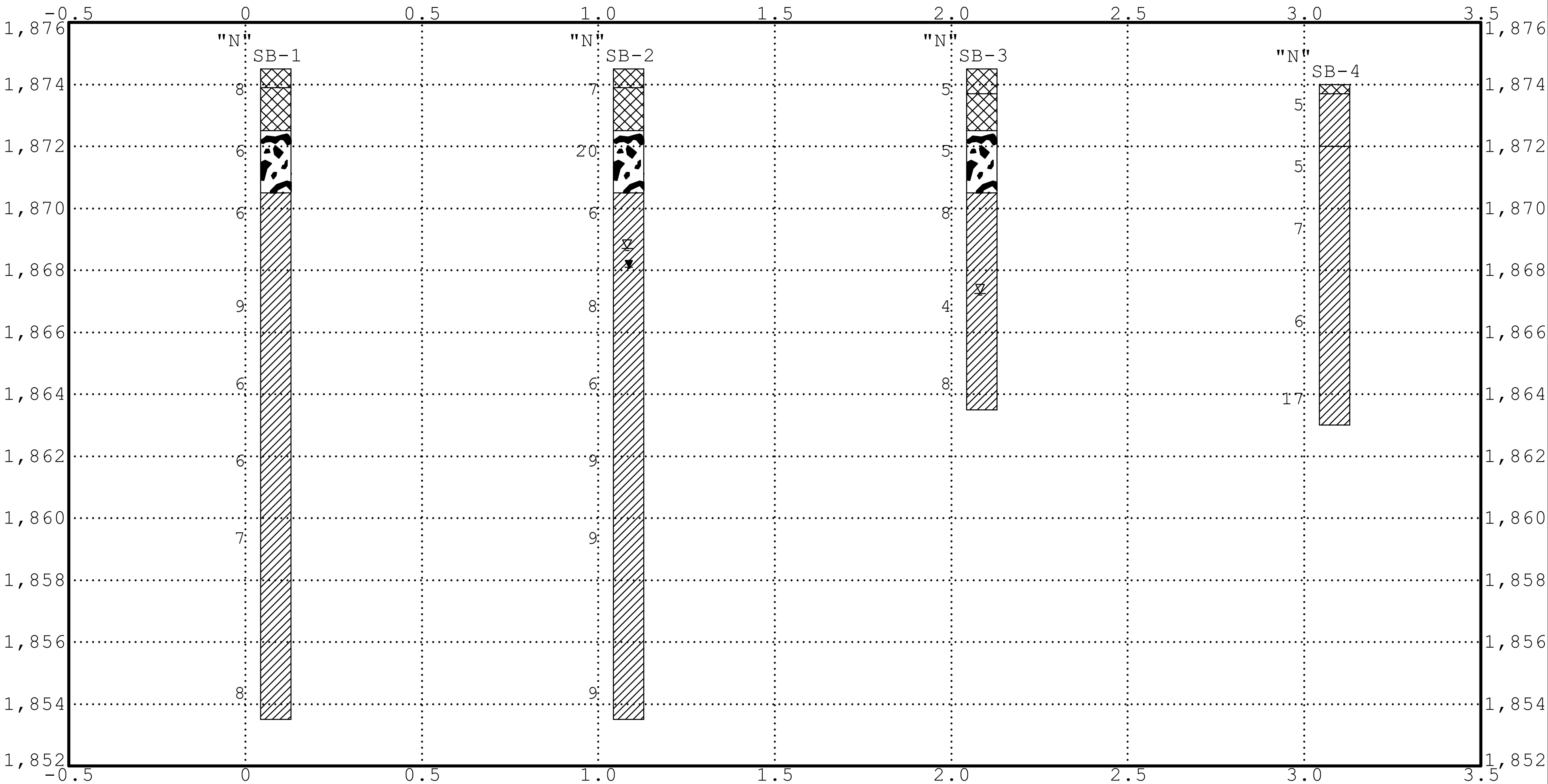
#	--/--/----
#	--/--/----
#	--/--/----
#	--/--/----

Project No. R25244

SITE PLAN

C300

Tuesday, March 31, 2026 4:05:04 PM
G:\R25244_VALVOLINE\WILLISTON\CIVIL\DWG\PLANS\R25244C-PL-SITE.DWG



SOIL PROFILE DIAGRAM		
Valvoline Williston, ND		
PROJECT # G26-013	DATE Apr 26	PLATE 1

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**SB-1**	SHEET **1** OF **1**	
PROJECT	**Valvoline**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G26-013**		
START DATE	**4/8/26**	FINISH DATE	**4/8/26**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	D (PCF)	N VALUES BLOWS/FT	WATER LEVEL	MOISTURE CONTENT(%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	Qu (psf)
0.6 / 1873.9	**Fill Topsoil / Organic Lean Clay (OL)**, black, moist	0 / 1874.5	Fill	SB		8					
2.0 / 1872.5	**Fill / Sandy Lean Clay (CL)**, brown, moist, trace organics										
4.0 / 1870.5	**Possible Fill / Clayey Sand (SC)**, brown, moist, a little gravel, trace organics, soft		Possible Fill	SB		6					
21.0 / 1853.5	**Lean Clay with Sand (CL)**, brown, moist, occasional sand lense, trace gravel, iron staining, soft to firm		Glacial Till	SB		6					
		5 / 1869.5									
				SB		9					
	Shelby tube taken on seperate boring 9-11'	10 / 1864.5		SB	116.5	6		17	39	13	3928
				SB		6					
		15 / 1859.5		SB		7					
		20 / 1854.5		SB		8					
	End of Boring NM = None Measured Boring moved 9 feet West										

DRILLER	AA (JS)
METHOD	3.25" HSA, 0-19.5'
LOGGER	KM (JS)
REVIEWER	TS
DRILL RIG	MDI B-57

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
4/8/26	1300					NM

MATERIAL TESTING SERVICES, LLC
Box 634
Minot, North Dakota 58702
(701) 852-5553

SOIL BORING RECORD

BORING NUMBER	**SB-2**	SHEET **1** OF **1**	
PROJECT	**Valvoline**		
PROJECT LOCATION	**Williston, ND**		
PROJECT NUMBER	**G26-013**		
START DATE	**4/8/26**	FINISH DATE	**4/8/26**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	N VALUES BLOWS/FT	WATER LEVEL	MOISTURE CONTENT(%)
0.6 / 1873.9	**Fill / Clayey Sand with Gravel (SC)**, brown, moist	0 / 1874.5	Fill	SB	7		
2.0 / 1872.5	**Fill / Lean Clay with Sand (CL)**, brown and gray mixed, moist, trace gravel and organics						
4.0 / 1870.5	**Possible Fill / Sandy Lean Clay (CL)**, brown, moist, a little gravel, trace organics, soft		Possible Fill	SB	*20		
21.0 / 1853.5	**Sandy Lean Clay (CL)**, brown, moist, trace gravel, iron staining, soft to firm		Glacial Till	SB	6		
		5 / 1869.5					17
	water bearing sand layer at 6 feet					▽ ▼	
				SB	8		
							14
		10 / 1864.5		SB	6		
				SB	9		
		15 / 1859.5		SB	9		
		20 / 1854.5		SB	9		
	End of Boring NM = None Measured * = High blow count likely due to frost or cobble						

Columns LEGEND, D (PCF), LIQUID LIMIT (%), PLASTIC LIMIT (%), Qu (psf): no entries.

DRILLER	AA (JS)
METHOD	3.25" HSA, 0-19.5'
LOGGER	KM (JS)
REVIEWER	TS
DRILL RIG	MDI B-57

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
4/8/26	1100		4			5.8
4/10/26						6.4

MATERIAL TESTING SERVICES, LLC **Box 634** **Minot, North Dakota 58702** **(701) 852-5553**	BORING NUMBER **SB-3** SHEET **1** OF **1** PROJECT **Valvoline** PROJECT LOCATION **Williston, ND** PROJECT NUMBER **G26-013** START DATE **4/8/26** FINISH DATE **4/8/26**

SOIL BORING RECORD

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	D (PCF)	N VALUES BLOWS/FT	WATER LEVEL	MOISTURE CONTENT (%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	Qu (psf)
0.8 1873.7	**Fill / Clayey Sand (SC)**, brown, moist, a little gravel, trace organics	0 1874.5	Fill	SB		5					
2.0 1872.5	**Fill / Lean Clay (CL)**, brown, moist, trace organics										
4.0 1870.5	**Possible Fill / Sandy Lean Clay (CL)**, brown, moist, trace gravel, trace organics, soft		Possible Fill	SB		5					
11.0 1863.5	**Sandy Lean Clay (CL)**, brown, moist, occasional sand lense, trace gravel, trace organic, very soft to soft		Glacial Till	SB		8					
		5 1869.5						18			
				SB		4	∇				
	sand layer at 8 feet							12			
		10 1864.5		SB		8					
	End of Boring NM = None Measured										

DRILLER	AA (JS)
METHOD	3.25" HSA, 0-19.5'
LOGGER	KM (JS)
REVIEWER	TS
DRILL RIG	MDI B-57

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
4/8/26	0930		7			7.25

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SOIL BORING RECORD

BORING NUMBER **SB-4** SHEET **1** OF **1**
PROJECT **Valvoline**
PROJECT LOCATION **Williston, ND**
PROJECT NUMBER **G26-013**
START DATE **4/8/26** FINISH DATE **4/8/26**

LAYER DEPTH/ ELEVATION (FT)	SOIL DESCRIPTION	ELEVATION/ DEPTH (FT)	GEOLOGY	SAMPLE TYPE	D (PCF)	N VALUES BLOWS/FT	WATER LEVEL	MOISTURE CONTENT(%)	LIQUID LIMIT (%)	PLASTIC LIMIT (%)	Qu (psf)
0.3 / 1873.7	**Fill / Clayey Sand (SC)**, brown, moist, a little gravel, trace organics	0 / 1874.0	Fill	SB		5		28			
2.0 / 1872.0	**Lean Clay (CL)**, brown, moist, soft		Fine Alluvium								
	Sandy Lean Clay (CL), brown, moist, occasional sand lense, trace gravel, soft to hard		Glacial Till	SB		5					
		5 / 1869.0		SB		7					
	wet at 7 feet			SB		6		18			
11.0 / 1863.0		10 / 1864.0		SB		17					
	End of Boring NM = None Measured										

DRILLER AA (JS)
METHOD 3.25" HSA, 0-19.5'
LOGGER KM (JS)
REVIEWER TS
DRILL RIG MDI B-57

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING MUD LEVEL	WATER LEVEL
4/8/26	0800					NM

SYMBOLS AND DESCRIPTIVE TERMINOLOGY ON TEST BORING LOG

SYMBOLS FOR DRILLING AND SAMPLING

Symbol	Description
HSA	3 1/4" I.D. hollow stem auger
_FA	4", 6" or 10" diameter flight auger
_HA	2", 4" or 6" hand auger
_DC	2 1/2", 4", 5" or 6" steel drive casing
_RC	Size A, B or N rotary casing
PD	Pipe drill or cleanout tube
CS	Continuous split barrel sampling
DM	Drilling mud
JW	Jetting water
SB	2" O.D. split barrel sampling
_L	2 1/2" or 3 1/2" O.D. SB liner sample
_T	2" or 3" thin walled tube sample
3TP	3" thin walled tube using pitcher sampler
_TO	2" or 3" thin walled tube using Osterberg sampler
W	Wash sample
B	Bag sample
P	Test pit sample
_Q	BQ, NQ, or PQ wireline system
_X	AX, BX, or NX double tube barrel
N	Standard penetration test, blows per foot
CR	Core recovery, percent
WL	Water level
?	Water level
NMR	No measurement recorded, primarily due to presence of drilling or coring fluid

SYMBOLS FOR LABORATORY TESTS

Symbol	Description
W	Water content
D	Dry density - pounds per cubic foot
LL	Liquid limit - ASTM** D 4318
PL	Plastic limit - ASTM D 4318
	--- Inserts in Last Column (Qu or RQD) ---
Qu	Unconfined compressive strength, psf - ASTM D 2166
Pq	Penetrometer reading, tsf
Ts	Torvane reading, tsf
G	Specific gravity
SL	Shrinkage limits - ASTM D 427
OC	Organic content - Combustion method
SP	Swell pressure, tsf
PS	Percent swell under pressure
FS	Free swell, percent
SS	Shrink swell, percent
pH	Hydrogen ion content - Meter Method
SC	Sulfate content, parts/million or mg/l
CC	Chloride content, parts/million or mg/l
C*	One dimensional consolidation - ASTM D 2435
Qc*	Triaxial compression
D.S.*	Direct shear - ASTM D 3080
K*	Coefficient of permeability, cm/sec
DH*	Double hydrometer - ASTM D 4221
MA*	Particle size analysis - ASTM D 422
R	Laboratory electrical resistivity, ohm-cm - ASTM G 57
E*	Pressuremeter deformation modulus, tsf
PM*	Pressuremeter test
VS*	Field vane shear - ASTM D 2573
IR*	Infiltrometer test - ASTM D 3385
RQD	Rock quality designation, percent
*	Results shown on attached data sheet or graph
**	ASTM designates American Society for Testing and Materials

DESCRIPTIONS OF N-VALUES VS. SOIL PROPERTIES

N Value	Density
0 - 4	Very loose
5 - 10	Loose
11 - 30	Medium dense
31 - 50	Dense
Over 50	Very dense

N Value	Consistency
0 - 4	Very soft
5 - 8	Soft
9 - 15	Firm
16 - 30	Hard
Over 30	Very hard

DESCRIPTIONS OF SOIL CONDITIONS

Condition	Description
Lamination	Up to 1/2" thick stratum
Layer	1/2" to 6" thick stratum
Dry	Powdery, no noticeable water
Moist	Below saturation
Wet	Saturated, above liquid limit
Waterbearing	Pervious soil below water
Varved	Alternating laminations of any combinations of clay, silt and fine grained sand

DESCRIPTIONS OF GRAVEL PROPORTIONS IN SOILS

Soil Type	Description	Range, %
Coarse grained soils	A little gravel	2 - 14
Coarse grained soils	With gravel	15 - 49
Fine grained soils:		
71-85% passing #200 sieve	A little gravel	2 - 7
71-85% passing #200 sieve	With gravel	8 - 29
70% passing #200 sieve	A little gravel	2 - 14
70% passing #200 sieve	With gravel	15 - 24
70% passing #200 sieve	Gravelly	16 - 49

DESCRIPTIONS OF PARTICLE SIZES

Material Type	Size
Boulders	Over 12"
Cobbles	3" - 12"
Coarse gravel	3/4" - 3"
Fine gravel	#4 sieve - 3/4"
Coarse sand	#4 - #10 sieve
Medium sand	#10 - #40 sieve
Fine sand	#40 - #200 sieve
Silt	100% passing #200 sieve and > 0.002mm
Clay	100% passing #200 sieve and < 0.002mm

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND 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
		GRAVELS 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 ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
		SANDS 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 OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

APPENDIX B – LABORATORY TEST PROGRAM

Attachments to Appendix B

B. LABORATORY TEST RESULTS

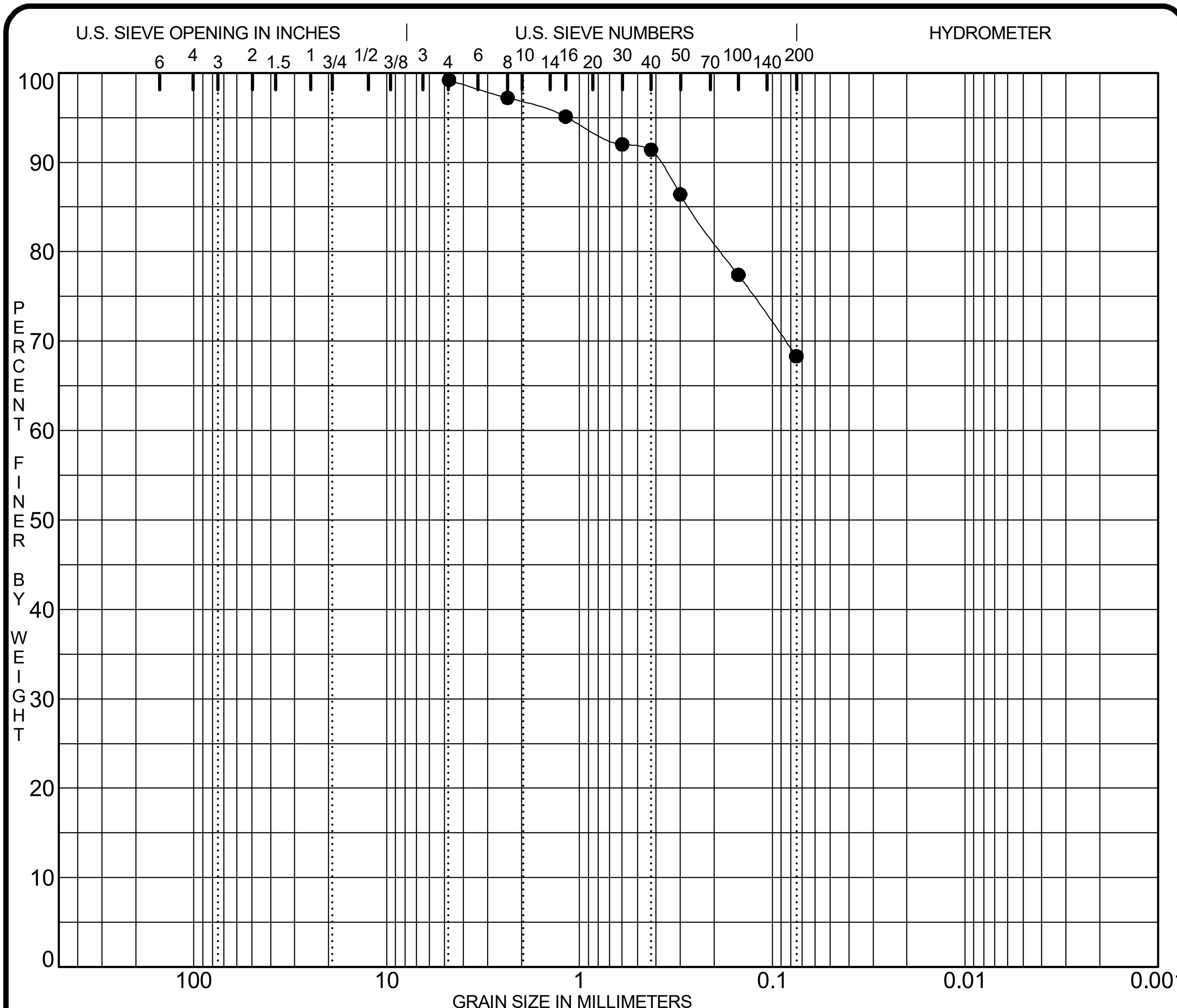
B.1 Testing Scope

Laboratory testing was conducted to characterize soil properties including Atterberg limits (liquid and plastic limits), mechanical sieve analysis, in-situ moisture content, in-situ density, and unconfined compressive strength.

B.2 Test Methods

Testing and classification of soil was performed in accordance with the following standards as applicable:

Description	ASTM Method
Unified soil classification system	D 2487
Atterberg limits	D 4318
In-situ moisture content	D 2216
Sieve analysis	D 422, C 117, C 136
Moisture-density relationship	D 698 or D 1557
In-situ dry density	Direct measurement
Unconfined compression, Qu	D 2166
CBR	D 1883



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Boring No.	Depth (ft)	Classification	MC%	LL	PL	PI	Cc	Cu
●	SB-4	8.0	Sandy Lean Clay (CL)	18					

	Boring No.	Depth (ft)	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	SB-4	8.0	4.75				0.0	30.9	68.3	

PROJECT **Valvoline, Williston, ND**

JOB NO. **G26-013**
DATE **4/14/26**

PARTICLE SIZE ANALYSIS

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MATERIAL TESTING SERVICES, LLC

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Williston, ND 58801
(701) 572-4226

UNCONFINED COMPRESSIVE STRENGTH
ASTM D 2166

PROJECT: VALVOLINE
WILLISTON, ND

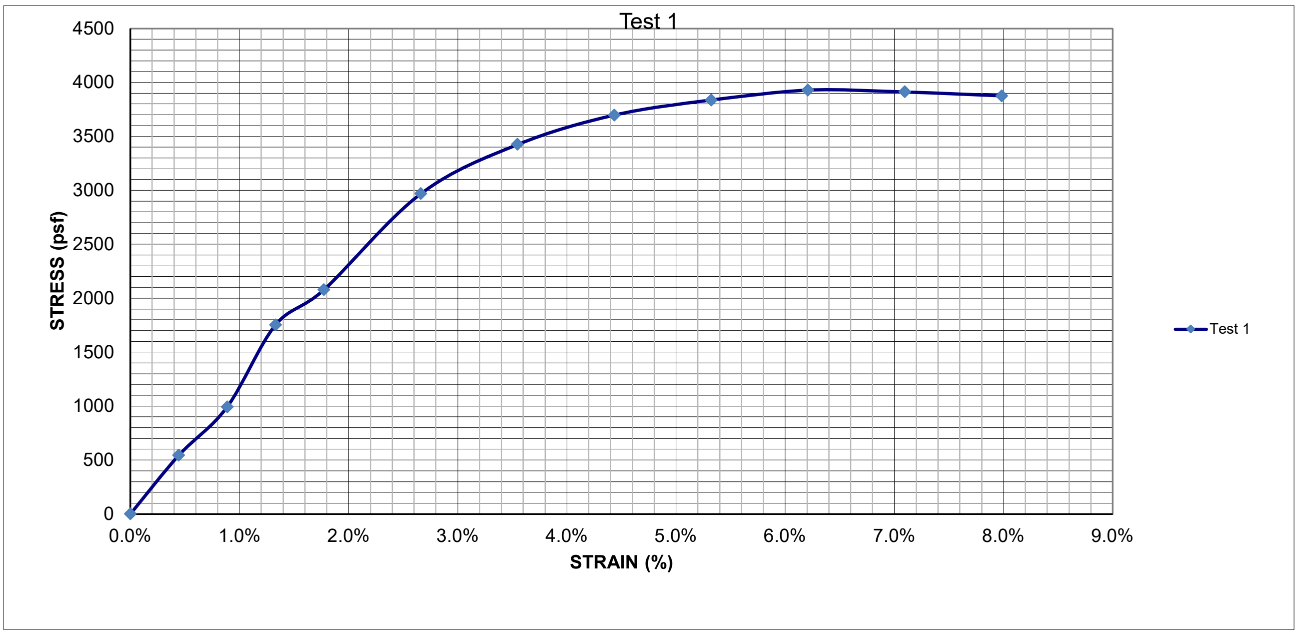
DATE: 16-Apr-26

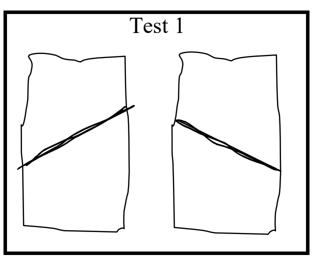
COPIES TO:

REPORTED TO: ACKERMAN-ESTVOLD

MTS No. G26-013

Specimen ID:	**Test 1** Boring 1 TW, 9-11 feet
Soil Class:	Lean Clay with Sand (CL)
Dry Density (pcf):	116.5
Water Content:	16.9%
Sample Dia. (mm):	72.1
Sample Ht (mm):	143.2
Height/Diameter:	1.99
Unc. Strength (psf):	**3928**
Strain at Failure (%):	6.2





Material Testing Services, LLC

by

APPENDIX C

Precautions for Excavating & Refilling During Cold Weather

PRECAUTIONS FOR EXCAVATING AND REFILLING DURING COLD WEATHER

The winter in North Dakota presents specific problems for foundation construction. Soils which are allowed to freeze undergo a moisture volume expansion, resulting in a loss of density. These frost-expanded soils will consolidate upon thawing, causing settlement of any structure supported on them. To prevent this settlement, frost should not be allowed to penetrate the soil below any proposed structure.

Ideally, winter excavation should be limited to areas small enough to be refilled to a grade higher than footing grade on the same day. Typically, these areas should be filled to floor grade. Trenching back down to unfrozen soils for foundation construction can then be performed just prior to footing placement. The excavated trenches should be protected from freezing by means of insulating or heating during foundation construction. Backfilling of the foundation trenches should be performed immediately after the below-grade foundation construction is finished. In addition, any interior footings, or footings designed without frost protection should be extended below frost depth, unless adequate precautions are taken to prevent frost intrusion until the building can be enclosed and heated.

In many cases, final grades cannot be attained in one day's time, even though small areas are worked. In the event final grade cannot be attained in one day's time, frost can be expected to develop overnight. The depth of frost penetration can be minimized by leaving a layer of loose soil on top of the compacted material overnight. However, any frost which forms in this loose layer, or snow, should never be used as fill material.

After the structure has been enclosed, all floor slab areas should be subjected to ample periods of heating to allow thawing of the soil system. Alternatively, the frozen soil can be completely removed and replaced with an engineered fill. The floor slab areas should be checked at random and representative locations for remnant areas of frost, and density tests should be performed to document fill compaction prior to slab placement.

Due to the potential problems associated with fill placement during cold weather, any filling operations should be monitored by a full-time, on-site soils technician. Full-time monitoring aids in detecting areas of frozen material, or potential problems with frozen material within the fill, so that appropriate measures can be taken. The choice of fill material is particularly important during cold weather, since clean granular fill materials can be placed and compacted more efficiently than silty or clayey soils. In addition, greater magnitudes of heaving can be expected with freezing of the more frost susceptible silts and clays.

If more specific frost information or cold weather data concerning other construction materials is required, please contact us.