SPN Helms
ENGINEERS & SURVEYORS

Schmucker, Paul, Nohr and Associates
2100 North Sanborn Blvd
Mitchell SD 57301-5330
Phone (605) 996-7761
www.spn-assoc.com

March 27, 2026

RE: Ohlman Utility and Street Improvements
Mitchell, South Dakota
SPN #16654

BID LETTING: Tuesday, April 14, 2026 @ 1:30 PM

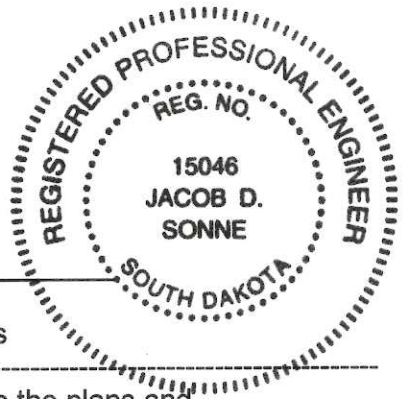
ADDENDUM NUMBER 1

The following modifications are to be made to the plans and specifications for the Ohlman Utility and Street Improvements Project.

Specifications
The following sections shall be added in their entirety:

SECTION 02 01 00 – EXISTING CONDITIONS
SECTION 02 32 00 – GEOTECHNICAL INVESTIGATION

All other items of the plans and specifications remain unchanged.



Jacob Sonne, Project Engineer
Schmucker, Paul, Nohr & Associates

The undersigned hereby acknowledges receipt of Addendum Number 1 to the plans and specifications for the *Ohlman Utility and Street Improvements Project.*

FIRM NAME_____
BY_____
TITLE_____
DATE_____

ATTACH THIS SIGNED ADDENDUM NO. 1 TO THE BID FORM WHEN SUBMITTING.

SECTION 02 01 00 EXISTING CONDITIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the contract, including General and Supplementary Conditions, shall apply to Work covered in this Section.

1.02 SCOPE

A. This Section describes, but is not limited to, the relationship of the Project to existing underground utilities and the Work associated with the location, adjustment and repair of such utilities.

B. The information and data relative to existing underground utilities are provided to assist the Contractor with the preparation of his bid. This information should not be used by the Contractor for reference during construction of the Work.

1.03 MEASUREMENT AND PAYMENT

A. The cost to relocate or repair any utilities or other obstructions damaged by the Contractor's activities shall be considered incidental Work with no separate measurement or payment to be made.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION

3.01 GENERAL

A. Existing utilities, as shown on the drawings, are located in accordance with available data, but locations may vary and cannot be guaranteed. The exact locations shall be determined by each Contractor as the Work proceeds. All work shall be done carefully so as to avoid damaging the existing utilities and Work. The Contractor shall be responsible for locating, or having located, all utilities, whether shown or not on the plans or in these specifications.

B. Each Contractor shall provide for protection, temporary removal and replacement or relocation of obstructions as required for the performance of this Work required in these contract documents.

C. Other obstructions not shown on the plans and requiring relocation shall be exposed by the Contractor without injury; or if injured, shall be repaired by Contractor at his expense. Removal of such obstruction or its relocation shall be made by the Contractor at no cost to the Owner.

3.02 UTILITY CONTACT

A. In accordance with South Dakota state law, no excavator may begin any excavation without first notifying the One-Call Notification Center at 1-800-781-7474 of any proposed excavation. For your convenience the local “One Call Center” can be reached by dialing 811.

B. Prior to Work in a specific area affecting underground utilities, the following individuals shall be notified as appropriate:

1. TELEPHONE:
   (Name of Company) CenturyLink
   Telephone Number: (800) 833-0825

2. TELEPHONE:
   (Name of Company) Mitchell Telecom
   (Mailing Address) 1691 N Main Street
   (City, State, Zip Code) Mitchell SD 57301
   Contact Person: Jon Mueller
   Telephone Number: (605) 990-1000

3. TELEPHONE:
   (Name of Company) Midcontinent Communications
   (Mailing Address) 1901 North Main Street
   (City, State, Zip Code) Mitchell SD 57301
   Contact Person: John Adams
   Telephone Number: (605) 292-2930

4. ELECTRIC:
   (Name of Company) Northwestern Energy
   (Mailing Address) 300 S. Burr Street
   (City, State, Zip Code) Mitchell SD 57301
   Contact Person: Noah Kilonzo
   Telephone Number: (605) 995-4438

5. CITY WATER / SEWER:
   (Name of Company) City of Mitchell
   (Mailing Address) 612 North Main Street
   (City, State, Zip Code) Mitchell SD 57301
   Contact Person Jon Vermeulen
   Telephone Number: (605) 993-0420

6. STREETS:
   (Name of Company) City of Mitchell
   (Mailing Address) 612 North Main Street
   (City, State, Zip Code) Mitchell SD 57301
   Contact Person: Kevin Roth
   Telephone Number: (605) 995-8465

7. COUNTY HIGHWAY:
   (Name of Company) Davison County Highway Department
   (Mailing Address) 1224 West 5th Ave
   (City, State, Zip Code) Mitchell SD 57301
   Contact Person: Rusty Weinberg
   Telephone Number: (605) 995-8625

8. RURAL WATER:

(Name of Company)	Davison-Hanson Rural Water
(Mailing Address)	2921 W 23rd Ave
(City, State, Zip Code)	Mitchell SD 57301
Contact Person	Jake Jones
Telephone Number:	(605) 996-2266

9. GAS:

(Name of Company)	Northwestern Energy
(Mailing Address)	300 S. Burr Street
(City, State, Zip Code)	Mitchell SD 57301
Contact Person:	Noah Kilonzo
Telephone Number:	(605) 995-4438

C. The failure of any utility to be present for any reason, at the Preconstruction Conference, if held, or the failure to be included in the listing of Paragraph 'B' above shall not relieve the Contractor of any responsibility described herein.

3.03 UTILITY REPAIR

A. When an existing utility is exposed or damaged, the Contractor shall comply with the repair requirements of the affected utility.

B. When an underground utility is exposed, the Contractor shall compact the backfill beneath the exposed utility before completion of the backfill operation.

3.04 SEWER AND WATER MAIN SEPARATION

A. Sewers and manholes shall be separated at least 10 feet horizontally from any existing or proposed water main, measured edge to edge, unless the water main is laid in a separate trench or on an undisturbed earth shelf located on one side of the sewer line and at such an elevation that the bottom of the water main is at least 18 inches vertical from outside of pipe to outside of pipe.

B. If it is impossible to obtain proper horizontal or vertical separation as described above, the sewer main shall be pipe equivalent to water main standards of construction and shall be pressure-tested to assure water tightness before back-filling.

C. Water mains shall be laid to provide a horizontal distance of at least 25 feet from any septic tank, seepage pit, absorption field, stabilization pond or lagoon.

1. When conditions prevent this separation, the water line must be encased in PVC, Ductile iron or cast iron for the 25 feet of separation. If PVC, ductile iron or cast iron is used as encasement material, the ends shall be adequately sealed with a flexible end seal.

D. Water mains crossing any sewers shall be laid on top of the sewer and provide a separation of at least 18 inches between the outside of pipes. One full length of water pipe must be located so both joints will be at least 10 feet from the sewer.

E. When conditions prevent such a vertical separation, the following conditions shall apply:

1. A non-perforated sewer main may cross above a water main if a minimum vertical separation of 18 inches between the bottom of the sewer and the top of the water main is provided. The water main material shall be a continuous piece at least 20 feet in length and the length of water pipe is located so both joints are as far as possible from the sewer main. Adequate structural support must be provided for the sewers to prevent excessive deflection of joints and settling on and breaking the water mains.

2. A water main may cross either above or below a non-perforated sewer line with a vertical separation of less than 18 inches if either the water or sewer line is encased for at least 10 feet each side of the crossing. Adequate structural support must be provided for the sewers to prevent excessive deflection of joints and settling on and breaking the water mains.

F. Storm sewer lines may be installed closer to water mains than the required 18-inch vertical separation and the 10 foot horizontal separation as set forth by the DANR provided the storm sewer line is constructed as follows:

1. In lieu of the encasement of the water main as specified in Paragraph E, each joint of the storm sewer within ten (10) feet of the water main may be sealed using a butyl rubber sealant meeting AASHTO M-198, and each joint is encased with a two (2) foot wide by six (6) inch thick concrete collar centered on the joint. The band shall be reinforced with the equivalent steel area as that in the RCP.

2. Each joint of the storm sewer within ten (10) feet of the water main is sealed using a rubber “O”-ring gasketed joint capable of passing a low pressure (10 psi) air test.

* * * END OF SECTION * * *

SECTION 02 32 00 GEOTECHNICAL INVESTIGATION

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the contract, including General and Supplementary Conditions, shall apply to Work covered in this Section.

1.02 SCOPE AND DESCRIPTION

A. This section describes the Contractor's requirements relative to the subsurface investigations to be completed on this project.

1.03 SOIL INFORMATION

A. For the contractor’s information and use in preparing the bid, the following reports of exploration and tests of subsurface conditions at the site that (was/were) authorized by Owner and completed by Nick Bierle of Geotek Engineering & Testing Services, Inc. and contained in the Report dated January 7, 2026, entitled Geotechnical Exploration – Proposed Street and Utility Improvements – N. Ohlman Street. The report(s) and any test results are included as an attachment at the end of this Section for informational purposes only. The samples obtained and test results reported in the above referenced investigation are not guaranteed to be indicative of any ground or subsurface condition except at the particular time of investigation and exact location of the sample or test. No claim shall be made or be considered resulting from any deviations from the sample or test data. The above referenced information is made available to the Contractor for his own use and is in no event considered as a part of the contract.

B. The Contractor shall accept the project site in its present condition. It shall be the Contractor's responsibility to determine to their own satisfaction the location and nature of all surface and sub-surface obstacles and the soils and water conditions which will be encountered during the construction of the proposed project.

C. Test borings and other exploratory operations as may be desired shall be made by the Contractor at no cost to the Owner.

1.04 MEASUREMENT AND PAYMENT

A. No separate measurement or payment for geotechnical explorations provided by the Contractor shall be provided.

PART 2 PRODUCTS - Not Applicable

PART 3 EXECUTION

3.01 GENERAL

A. Unless otherwise required, the Contractor shall return all areas disturbed by him to their original grade and seed in accordance with the specifications.

B. All testing or borings completed by the Contractor shall be scheduled and performed with the permission of the Owner.

* * * END OF SECTION * * *

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 East 50th Street North
Sioux Falls, South Dakota 57104
Phone 605-335-5512 Fax 605-335-0773

January 7, 2026

City of Mitchell
612 N. Main Street
Mitchell, South Dakota 57301

Attn: Joe Schroeder

Subj: Geotechnical Exploration
Proposed Street & Utility Improvements
N. Ohlman Street
Mitchell, South Dakota
GeoTek #25-2222

This correspondence presents our written report of the geotechnical exploration program for the referenced project. Our work was performed in accordance with your authorization. We are transmitting an electronic copy of our report for your use. An additional copy of our report is being sent as noted below.

We thank you for the opportunity of providing our services on this project and look forward to continued participation during the design and construction phases. If you have any questions regarding this report, please contact our office at (605) 335-5512.

Respectfully Submitted,
GeoTek Engineering & Testing Services, Inc.

Nick Bierle

Nick Bierle, PE
Project Manager

Cc: SPN & Associates, Attn: Camden Hofer, PE & Jacob Sonne, PE

TABLE OF CONTENTS

GEOTECHNICAL EXPLORATION
PROPOSED STREET & UTILITY IMPROVEMENTS
N. OHLMAN STREET
MITCHELL, SOUTH DAKOTA
GEOTEK #25-2222

INTRODUCTION

Project Information

This report presents the results of the recent geotechnical exploration program for the proposed street and utility improvements on N. Ohlman Street in Mitchell, South Dakota.

Scope of Services

Our work was performed in accordance with the authorization of Joe Schroeder with the City of Mitchell. The scope of work as presented in this report is limited to the following:

1. To perform 3 standard penetration test (SPT) borings to gather data on the subsurface conditions for the project.

2. To perform laboratory tests that include moisture content, dry density and standard Proctor.

3. To prepare an engineering report that includes the results of the field and laboratory tests as well as our earthwork and foundation recommendations for design and construction.

The scope of our work was intended for geotechnical purposes only. This scope of work did not include determining the presence or extent of environmental contamination at the site or to characterize the site relative to wetlands status.

SITE & SUBSURFACE CONDITIONS

Site Location & Description

The site is located on N. Ohlman Street from W. 23rd Avenue to Torrey Pines Avenue in Mitchell, South Dakota. A site location map (Figure 1) is attached showing the location of the site. The street is asphalt surfaced (no shoulders) with ditches on each side of the street.

Ground Surface Elevations & Test Boring Locations

The ground surface elevations at the test boring locations were provided by SPN & Associates. With that said, the ground surface elevations at the test boring locations were 1,302.9 feet at test boring 1, 1,302.1 feet at test boring 2 and 1,301.7 feet at test boring 3. A test boring location map (Figure 2) is attached showing the relative location of the test borings.

Existing Pavement Section Thicknesses

Table 1 summarizes the thicknesses of the existing pavement section encountered at the test boring locations.

Table 1. Thicknesses of the Existing Pavement Section

Test Boring	Street	Asphalt Thickness, in	Gravel Base, in
1	N. Ohlman Street (SBL)	3	7
2	N. Ohlman Street (NBL)	7	3
3	N. Ohlman Street (NBL)	6 ½	3

Subsurface Conditions

Three (3) test borings were performed at the site on December 18, 2025. The subsurface conditions encountered at the test boring locations are illustrated by means of the boring logs included in Appendix A.

At the test boring locations, the subgrade soils consisted of the following soil types: existing fill materials, mixed alluvium soils, glacial fluvial soils and glacial till soils. The existing fill materials were encountered at all of the test borings and extended to a depth of 4 ½ feet. The mixed alluvium soils were only encountered beneath the existing fill materials at test boring 3 and extended to a depth of 7 feet. The glacial fluvial soils were only encountered between layers of glacial till soils at test boring 1 and extended to a depth of 14 ½ feet. The glacial till soils were encountered at all of the test borings and extended to the termination depth of the test borings.

The consistency or relative density of the soils is indicated by the standard penetration resistance (“N”) values as shown on the boring logs. A description of the soil consistency or relative

density based on the "N" values can be found on the attached Soil Boring Symbols and Descriptive Terminology data sheet.

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, then it is important that you contact us so that our recommendations can be reviewed.

Soil Types

Existing Fill Materials

The existing fill materials consisted of sandy lean clay (CL) and clayey sand (SC). An "N" value of 5 was measured within the existing fill materials. The moisture condition of the existing fill materials was frozen and moist.

Mixed Alluvium Soils

Mixed alluvium soils consist of a mixture of silt, clay and sand sized particles (less than 50 percent by weight passing the #200 sieve) that have been deposited by moving water. The mixed alluvium soils consisted of clayey sand (SC). An "N" value of 3 (relative density of very loose) was measured within the mixed alluvium soils at test boring 3. The moisture condition of the mixed alluvium soils was moist.

Glacial Fluvial Soils

Glacial fluvial soils consist primarily silt and clay sized particles (more than 50 percent by weight passing the #200 sieve) that have deposited by running water from the melting ice of a glacier. The glacial fluvial soils consisted of lean clay (CL). An "N" value of 6 (consistency of firm) was measured within the glacial fluvial soils at test boring 1. The moisture condition of the glacial fluvial soils was moist.

Glacial Till Soils

Glacial till soils consist of silt and clay sized particles with sand and gravel intermixed (more than 50 percent by weight passing the #200 sieve) that have been deposited and consolidated by a glacier. The glacial till soils consisted of lean clay with sand (CL) and sandy lean clay (CL). "N" values within the glacial till soils ranged from 6 to 10 (consistency of firm and stiff). The moisture condition of the glacial till soils was moist.

Water Levels

Measurements to record the groundwater levels were made at the test boring locations. The time and level of the groundwater readings are recorded on the boring logs. Groundwater did not enter the boreholes at the test boring locations at the time of our measurements. However, if we left the boreholes open for an extended period of time, then it is our opinion that the groundwater level at the site would range between 7 feet and 10 feet below the existing ground surface.

The water levels indicated on the boring logs may or may not be an accurate indication of the depth or lack of subsurface groundwater. A long period of time is generally required for subsurface water to stabilize in the low permeable soils encountered at the test boring locations. Long term groundwater monitoring was not included in our work scope.

ENGINEERING REVIEW & RECOMMENDATIONS

Project Design Data

We understand that the project will consist of street and utility improvements on N. Ohlman Street from W. 23rd Avenue to Torrey Pines Avenue in Mitchell, South Dakota. The street improvements will consist of a new pavement section (asphalt) for N. Ohlman Street as well as a round-a-bout (concrete) at the intersection of W. 23rd Avenue and N. Ohlman Street. However, it is our understanding that the pavement section at the round-a-bout will not be needed; therefore, it will not be included within this report. The utility improvements will consist of water main and sanitary sewer. We understand that the water main and storm sewer will have an installation depth of 6 feet and the sanitary sewer will have an installation depth ranging from 10 feet to 20

feet. Cutting of up to 4 feet within the existing roadway and some filling will likely be needed within the ditches if the roadway is widened.

The information/assumptions detailed in the project design data section are important factors in our review and recommendations. If there are any corrections or additions to the information detailed in this section, then it is important that you contact us so that we can review our recommendations with regards to the revised plans.

Utility Improvements

Subgrade Soils

The subgrade soils anticipated at the invert depths for the underground utilities will consist of clay soils. Where soils having moderate moisture and density values are encountered at the bottom of the trench excavations, it is our opinion that the soils are considered suitable for support of the underground utilities, provided they are adequately dewatered and are not disturbed by construction traffic. Appropriate bedding materials should be used for the underground utilities. Localized areas of wet or soft soils may be encountered at the bottom of the trench excavations. These areas will require subexcavation and trench stabilization methods and materials. The trench stabilization material should consist of a washed and crushed rock material that meets the gradation specifications shown in Table 2. The trench stabilization material should have a thickness of 12 inches to 18 inches. In very poor areas, larger rock material may be needed to stabilize the bottom of the trench excavation.

Table 2. Trench Stabilization Material Gradation Specifications

Sieve Size	Percent Passing
2-inch	90 – 100
1 ½-inch	35 – 70
1-inch	0 – 15

Water Control

Water may enter the trench excavations as a result of subsurface water, precipitation or surface run off. Dewatering procedures may be required in order to control and remove water entering

the trench excavations. Where clay soils are encountered, it will likely be possible to remove and control water entering the excavations using normal sump pumping techniques. However, if waterbearing sand soils are encountered, then extensive dewatering techniques will likely be required due to the potentially large volumes of water. The contractor should provide appropriate dewatering methods and equipment. Any water that accumulates at the bottom of the excavations should be immediately removed and surface drainage away from the excavations should be provided during construction.

OSHA Requirements

All excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches". This document states that the excavation safety is the responsibility of the contractor. Reference to this OSHA requirement should be included in the project specifications.

Trench Backfill

The trench backfill should be placed in lifts of up to 6 inches in thickness and compacted to the levels outlined in Table 3. It is our opinion that a higher compaction specification (for backfill more than 6 feet below the finished subgrade level) will be necessary to limit (but not eliminate) the amount of settlement within the trench backfill. The compaction specifications in Table 3 are based on a material's maximum dry density value, as determined by a standard Proctor (ASTM: D698) test.

Table 3. Recommended Compaction Levels

Placement Location/Depth	Compaction Specification
Backfill within 6 feet of the finished subgrade level	95%
Backfill more than 6 feet below the finished subgrade level	97%
Below agriculture land and grass only areas	95%

Generally, it will be easier to achieve the compaction specification if the moisture content of the trench backfill is adjusted to within plus or minus 2 percent of the optimum moisture content as determined by standard Proctor (ASTM:D698). However, in order to achieve the 97 percent compaction specification, it may be necessary to adjust the moisture content of the trench

backfill to within plus or minus 1 percent of the optimum moisture content as determined by standard Proctor (ASTM:D698). In order to provide increased stability in the trench backfill areas that are within 2 feet of the finished subgrade level, we recommend that the moisture content of the soils be within a range of 1 percent to 4 percent below the optimum moisture content.

We performed 2 standard Proctor tests on the glacial till soils for the project. The results of the standard Proctor tests are shown in Table 4.

Table 4. Standard Proctor Test Results

Test Boring	Depth (ft)	Soil Type	OMC (%)	Maximum Dry Density (pcf)
3	4 ½ to 9	Sandy Lean Clay (CL) – Glacial Till	15.3	113.7
3	14 ½ to 19	Sandy Lean Clay (CL) – Glacial Till	16.2	112.0

Based on the results of the standard Proctor and moisture content tests, it is our general opinion that the majority of the existing fill materials, glacial fluvial soils and glacial till soils have in-situ moisture content levels that range from 1 percent above to 4 percent above the optimum moisture content.

In our opinion, the majority of the existing fill materials, mixed alluvium soils, glacial fluvial soils and glacial till soils can likely be reused as trench backfill. With that said, it will likely be feasible to moisture condition the on-site soils that are less than 4 percent over the optimum moisture content, during a period of favorable weather with moderate effort. Our opinions are based on our observations of the collected samples and the results of the laboratory tests. If the material cannot be adjusted within the recommended range, then the material should be replaced with an off-site borrow material or other suitable on-site materials. In regards to topsoil materials or vegetation/highly organic materials, it is our opinion that these materials should be replaced with an off-site borrow material or other suitable materials. However, the topsoil materials could be reused for “topping” along the ditches.

If needed, any off-site borrow material should consist of either a granular or clay material. If a granular material is used, then it should consist of a pit-run or processed sand or gravel having a maximum particle size of 1 inch. If a clay material is selected, then it should consist of a non-

organic lean clay (CL), lean clay with sand (CL) or sandy lean clay (CL) having a liquid limit less than 50 and a plasticity index between 15 and 35. Scrutiny on the clay material's moisture content should be made prior to the acceptance and use. If granular materials are used, then the upper 2 feet to 3 feet of the trench backfill should consist of a clay material in order to provide a consistent subgrade condition beneath the pavement section.

Settlement of Trench Backfill

Settlement of trench backfill has been known to cause pavement distress. The amount of settlement is related to the trench depth, the degree of compaction and time. If the trench backfill is placed and compacted according to our recommendations, then minimal settlement should be expected. To quantify the amount of settlement, it is our opinion that approximately 1/16 inch of settlement could occur per vertical foot of trench backfill (i.e., 1/2 inch of settlement could occur within an 8-foot-deep trench). A higher amount of settlement could occur if the trench backfill is not placed and compacted according to our recommendations. The majority of the settlement (about 70 percent) is expected to occur within 3 months to 6 months after the trench backfill is placed. If it is desired to reduce the risk of pavement distress due to trench backfill settlement, then it is our opinion that a delay in the placement of the pavement could be considered. The delay would allow the majority of the settlement to occur prior to the placement of the pavement.

Street Improvements

Subgrade Conditions

In general, existing fill materials, mixed alluvium soils and glacial till soils are expected to be encountered as subgrade soils. The existing fill materials, mixed alluvium soils and glacial till soils have Unified Soils Classification System symbols of CL and SC and AASHTO classifications of A-2, A-6 and A-7. Based on our observations of the collected samples and the results of the laboratory tests, we would categorize the subgrade condition (existing fill materials and glacial till soils) as a fair subgrade condition.

We estimate a California Bearing Ratio (CBR) value of 3.0 for the existing fill materials and glacial till soils. The CBR value is a measure of the supporting value of the subgrade soils. The

value can be determined from a soaked test or an unsoaked test. The value from a soaked test is used to simulate the worst conditions (wet periods of the year and the spring thaw), while the value from an unsoaked test is used to simulate normal field conditions (summer and fall). Values from soaked tests are much lower than values from unsoaked tests. The values discussed above represent values from soaked tests.

In our opinion, 2 subgrade preparation options could be used for the project. Option 1 would consist of scarification and recompaction without geotextile fabric and option 2 would consist of scarification and recompaction with geotextile fabric. We would like to point out that some unstable subgrade conditions may be encountered during construction with the scarification and recompaction process, especially during the spring thaw, wetter periods of the year or periods of the year when it is not feasible to dry wet soils (late fall). Also, it should be noted that once the subgrade preparation is performed, option 2 will help provide a more uniform subgrade condition than option 1 due to the presence of the geotextile fabric. Also, option 2 will provide a longer pavement life than option 1.

Stripping & Removals

We recommend removing the existing pavement section (asphalt and gravel base), topsoil materials and vegetation in order to achieve the design subgrade elevations. Low-ground-pressure construction equipment or excavators with smooth-edged buckets should be used for the stripping and removals. We recommend limiting the amount of heavy wheeled construction traffic on the subgrade.

Filling

If filling is required to achieve the design subgrade elevations, then the fill materials should consist of non-organic lean clay (CL) or sandy lean clay (CL) having a liquid limit less than 50 and a plasticity index between 15 and 35. The moisture content of the fill materials should be 1 percent to 4 percent below the optimum moisture content as determined by standard Proctor (ASTM:D698). The fill materials should be placed in compacted lifts having a maximum thickness of 6 inches. We recommend a minimum compaction specification of 95 percent of

standard Proctor (ASTM:D698) for the fill materials. Alternatively, granular materials could also be used as subgrade fill.

Subgrade Preparation Option 1 – Scarification & Recompaction w/o Fabric

For subgrade preparation option 1, the upper 8 inches of the subgrade should be scarified, moisture conditioned and recompacted. The clay soils should be moisture conditioned to a moisture level that is 1 percent to 4 percent below the optimum moisture content as determined by standard Proctor (ASTM:D698). The scarification should be performed by a disc harrow and not a road grader with teeth. The scarification will not be needed in areas where sand soils are encountered. Following the subgrade preparation (scarification and recompaction) and prior to the placement of the aggregate base course material, we recommend that a proof roll be performed on the exposed subgrade with a truck weighing 20 tons to 30 tons. During the proof roll, unstable areas in the subgrade should be delineated from stable areas. An unstable area would be considered a location with at least 1 inch of rutting or deflection. Unstable areas will need additional corrections in order to provide a uniform and stable subgrade condition. See the section entitled Unstable Subgrade with Subgrade Preparation Option 1 for detailed information regarding the additional corrections. Some unstable areas may be encountered during construction.

Unstable Subgrade with Subgrade Preparation Option 1

Areas of unstable subgrade may be encountered during construction with subgrade preparation option 1. The soils within the unstable area should be removed, and either moisture-conditioned and recompacted, or replaced with suitable subgrade soils. If the unstable area will not stabilize using this method, then alternative stabilization methods may be used such as a modified cross-section involving a geotextile fabric. With the geotextile fabric, a thicker aggregate base course section may be needed (thickness would be based on the opinion of the field personnel that observes the condition of the subgrade). For very poor subgrade conditions, granular subbase will likely be needed with the geotextile fabric. The granular subbase should consist of crushed quartzite, recycled concrete or a crushed pit-run material meeting the gradation specifications shown in Table 5. The granular subbase should be compacted to a minimum of 97 percent of

standard Proctor density (ASTM:D698). It should be noted that compaction testing may not be practical for the granular subbase due to the large aggregate.

Table 5. Granular Subbase Gradation Specifications

Sieve Size	Percent Passing
4-inch	100
3-inch	70 – 90
2-inch	60 – 80
1-inch	40 – 70
#4	10 – 50
#40	5 – 20
#200	0 – 8

The geotextile fabric should be woven and meet the requirements listed below:

- Wide Width Tensile Strength (ASTM:D4595) 3,600 lb/ft minimum;
- Wide Width Tensile Strength at 5% Strain (ASTM:D4595) 1,350 lb/ft minimum;
- Permittivity (ASTM:D4491) 0.25 sec-1 minimum;
- UV Resistance at 500 hours (ASTM:D4355) 70% minimum.

Some of the products that meet these requirements include the following: Mirafi HP370, Lumite GTF465, Winfab 3x3HF, Winfab 370HP, Carthage Mills FX-300MF, Carthage Mills FX-370MF, SRW 3x3HF, SRW 370HP, Skaps M330, Skaps W5050F, ADS 370HP, Foundation Geotextiles FG33 and Foundation Geotextiles FG57. These geotextile fabrics are considered medium strength geotextile fabrics.

Subgrade Preparation Option 2 – Scarification & Recompaction w/ Fabric

Subgrade preparation option 2 would consist of subgrade preparation option 1 with the addition of a geotextile fabric beneath the aggregate base course material. For the geotextile fabric, we recommend using the products listed above.

Asphalt Pavement Section Thicknesses

A traffic study was performed by HDR for N. Ohlman Street. We assume that N. Ohlman Street is classified as a collector. We also assume that the vehicle traffic will consist of mostly automobiles and some trucks. Table 6 summarizes the recommended asphalt section thicknesses

for the street based on an estimated target ESAL value of 463,000 (based on an ADT of 3,300, 2% growth rate, 2% trucks, 1.2 truck factor and a design life of 25 years (with routine maintenance)).

In addition, we estimated the ESALs for each asphalt pavement section thickness. Our estimates are based on the AASHTO method. Some of the input/assumptions included the following: average subgrade resilient modulus = 5,161 psi (CBR = 3.0), reliability 95%, standard deviation 0.49 and change in serviceability 2.2. The estimated ESALs are also provided in Table 6.

Table 6. Asphalt Pavement Section Thicknesses

Option	Asphalt Pavement Thickness, in	Aggregate Base Course Thickness, in	Granular Subbase Thickness, in	Subgrade Reinforcement	Estimated ESALs
1	5	12*	**	***	595,000
2	5	10*	**	Geotextile Fabric	617,000

Notes: The options are (1) scarification and recompaction w/o fabric and (2) scarification and recompaction w/ fabric. *The thickness of the aggregate base course may need to be increased with options 1 and 2 (thickness would be based on the opinion of the field personnel that observes the condition of the subgrade). **Granular subbase may be needed with options 1 and 2 if very poor subgrade conditions are encountered. ***Subgrade reinforcement may be needed with option 1.

We recommend that routine maintenance such as crack filling, localized patching and seal coating be performed.

Alternative Asphalt Pavement Section Thicknesses

If an alternative asphalt pavement section is considered, then the asphalt pavement section thicknesses shown in Table 7 could be used. However, it should be noted that a shorter pavement life will occur and more maintenance will be needed if the alternative pavement section is chosen.

In addition, we estimated the ESALs for each alternative asphalt pavement section thickness. Our estimates are based the previously mentioned method and input/assumptions. The estimated ESALs are also provided in Table 7. It should be noted that it is our opinion that they do not achieve the previously mentioned target ESALs.

Table 7. Alternative Asphalt Pavement Section Thicknesses

Option	Asphalt Pavement Thickness, in	Aggregate Base Course Thickness, in	Granular Subbase Thickness, in	Subgrade Reinforcement	Estimated ESALs
1	4	12**	*	*	267,000****
2	4	10**	***	Geotextile Fabric	278,000****

Notes: The numbers are for the following sections: (1) scarification and recompaction w/o fabric and (2) scarification and recompaction w/ fabric. The thickness of the asphalt could be increased than shown above if a higher number of trucks are expected. *Subgrade reinforcement or granular subbase may be needed with Option 1. **The thickness of the aggregate base course may need to be increased. ***Granular subbase may be needed with Option 2 if very poor subgrade conditions are encountered. ****Value does not achieve minimum target ESAL value.

We recommend that routine maintenance such as crack filling, localized patching and seal coating be performed.

Asphalt & Aggregate Base Course Materials

The asphalt pavement should meet the requirements of sections 320 and 321 for Class G. We recommend that the aggregate base course materials meet the requirements of Sections 260 and 882 of the SDDOT Standard Specifications. The aggregate base course materials should be compacted to a minimum of 97 percent of standard Proctor (ASTM:D698).

Existing Gravel Base

As indicated in Table 1, only a small amount of gravel base was encountered at the majority of the test boring locations. In our opinion, it will likely be difficult to reclaim the existing gravel base for use as aggregate base course material. However, samples of the reclaimed material could be collected for analysis during construction in order to approve the material for use as aggregate base course material.

Corrosive Potential

The test borings encountered existing fill materials, mixed alluvium soils, glacial fluvial soils and glacial till soils. These soils consisted of clayey soils. Based on previous corrosive laboratory tests on similar soils, the clayey soils would be considered corrosive. With that said, protective measures should be considered. In our opinion, protective measures should be taken in areas

where clayey soils are encountered. Corrosive laboratory tests could be performed to verify our opinion.

Drainage

Proper drainage should be maintained during and after construction. The general site grading should direct surface run-off waters away from the excavations. Water which accumulates in the excavations should be removed in a timely manner.

CONSTRUCTION CONSIDERATIONS

Groundwater & Surface Water

Water may enter the excavations due to subsurface water, precipitation or surface run off. Any water that accumulates in the bottom of the excavations should be immediately removed and surface drainage away from the excavations should be provided during construction.

Disturbance of Soils

The soils encountered at the test boring locations are susceptible to disturbance and can experience strength loss caused by construction traffic and/or additional moisture. Precautions will be required during earthwork activities in order to reduce the risk of soil disturbance. Where soft/wet soils are encountered, the excavations should be performed with low-ground-pressure construction equipment or an excavator (backhoe) having a smooth cutting edge on the bucket.

Cold Weather Precautions

If site preparation and construction is anticipated during cold weather, then we recommend all subgrades, slabs and other improvements that may be affected by frost movements be insulated from frost penetration during freezing temperatures. If filling is performed during freezing temperatures, then all frozen soils, snow and ice should be removed from the areas to be filled prior to placing the new fill. The new fill should not be allowed to freeze during transit, placement and compaction. Concrete and asphalt should not be placed on frozen subgrades. If subgrades freeze, then we recommend that the frozen soils be removed and replaced, or

completely thawed. The subgrade soils will likely require reworking and recompacting due to the loss of density caused by the freeze/thaw process.

Excavation Sideslopes

All excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches". This document states that the excavation safety is the responsibility of the contractor. Reference to this OSHA requirement should be included in the project specifications.

Observations & Testing

This report was prepared using a limited amount of information for the project and a number of assumptions were necessary to help us develop our conclusions and recommendations. It is recommended that our firm be retained to review the geotechnical aspects of the final design plans and specifications to check that our recommendations have been properly incorporated into the design documents.

The recommendations submitted in this report have been made based on the subsurface conditions encountered at the test boring locations. It is possible that there are subsurface conditions at the site that are different from those represented by the test borings. As a result, on-site observation during construction is considered integral to the successful implementation of the recommendations. We believe that qualified field personnel need to be on-site at the following times to observe the site conditions and effectiveness of the construction.

Excavation

We recommend that a geotechnical engineer or geotechnical engineering technician working under the direct supervision of a geotechnical engineer observe all excavations for utilities, slabs and pavements. These observations are recommended to determine if the exposed soils are similar to those encountered at the test boring locations, if unsuitable soils have been adequately removed and if the exposed soils are suitable for support of the proposed construction.

Testing

After the subgrade is observed by a geotechnical engineer/technician and approved, we recommend a representative number of compaction tests be taken during the placement of the backfill placed below slabs and pavements. The tests should be performed to determine if the required compaction has been achieved. As a general guideline, we recommend at least 1 test be taken for every 10,000 square feet of embankment fill placed, at least 1 test for every 500 feet in trench fill, and for every 2-foot thickness of fill or backfill placed. The actual number of tests should be left to the discretion of the geotechnical engineer. Samples of proposed fill and backfill materials should be submitted to our laboratory for testing to determine their compliance with our recommendations and project specifications.

SUBSURFACE EXPLORATION PROCEDURES

Test Borings

We performed the test borings with a truck rig equipped with hollow-stem auger. Soil sampling was performed in accordance with the procedures described in ASTM:D1586. Using this procedure, a 2-inch O.D. split barrel sampler is driven into the soil by a 140-pound 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 the penetration resistance, or “N” value. The “N” value is an index of the relative density of cohesionless soils and the consistency of cohesive soils. In addition, thin walled tube samples were obtained according to ASTM:D1587, where indicated by the appropriate symbol on the boring logs.

The test borings were backfilled with on-site materials and some settlement of these materials can be expected to occur. Final closure of the holes is the responsibility of the client or property owner.

The soil samples collected from the test boring locations will be retained in our office for a period of 1 month after the date of this report and will then be discarded unless we are notified otherwise.

Soil Classification

As the samples were obtained in the field, they were visually and manually classified by the crew chief according to ASTM:D2488. 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, select samples were then submitted to a program of laboratory tests. Where laboratory classification tests (sieve analysis and Atterberg limits) have been performed, classifications according to ASTM:D2487 are possible. Logs of the test 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 in Appendix A. Charts illustrating the soil classification procedures, the descriptive terminology and the symbols used on the boring logs are also attached in Appendix A.

Water Level Measurements

Subsurface groundwater levels should be expected to fluctuate seasonally and yearly from the groundwater readings recorded at the test boring locations. Fluctuations occur due to varying seasonal and yearly rainfall amounts and snowmelt, as well as other factors. It is possible that the subsurface groundwater levels during or after construction could be significantly different than the time the test borings were performed.

Laboratory Tests

We performed laboratory tests on select samples to aid in determining the index properties of the soils. The laboratory tests were performed in accordance with the appropriate ASTM procedures. The results of the laboratory tests are shown on the boring logs opposite the samples upon which the tests were performed or on the attached data sheets.

LIMITATIONS

The recommendations and professional opinions submitted in this report were based upon the data obtained through the sampling and testing program at the test boring locations. We wish to

point out that because no exploration program can totally reveal the exact subsurface conditions for the entire site, conditions between test borings and between samples and at other times may differ from those described in our report. Our exploration program identified subsurface conditions only at those points where samples were retrieved or where water was observed. It is not standard engineering practice to continuously retrieve samples for the full depth of the test borings. Therefore, strata boundaries and thicknesses must be inferred to some extent. Additionally, some soils layers present in the ground may not be observed between sampling intervals. If the subsurface conditions encountered at the time of construction differ from those represented by our test borings, it is necessary to contact us so that our recommendations can be reviewed. The variations may result in altering our conclusions or recommendations regarding site preparation or construction procedures, thus, potentially affecting construction costs.

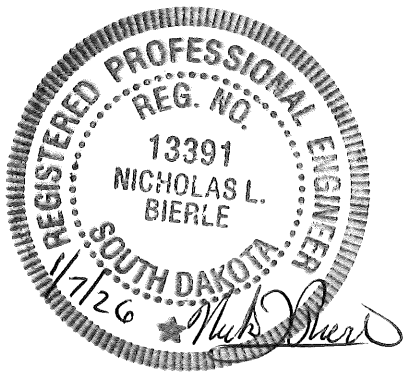
This report is for the exclusive use of the addressee and its representatives for use in design of the proposed project described herein and preparation of construction documents. Without written approval, we assume no responsibility to other parties regarding this report. Our conclusions, opinions and recommendations may not be appropriate for other parties or projects.

STANDARD OF CARE

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

This report was prepared by:
GeoTek Engineering & Testing Services, Inc.

Nick Bierle, PE
Project Manager



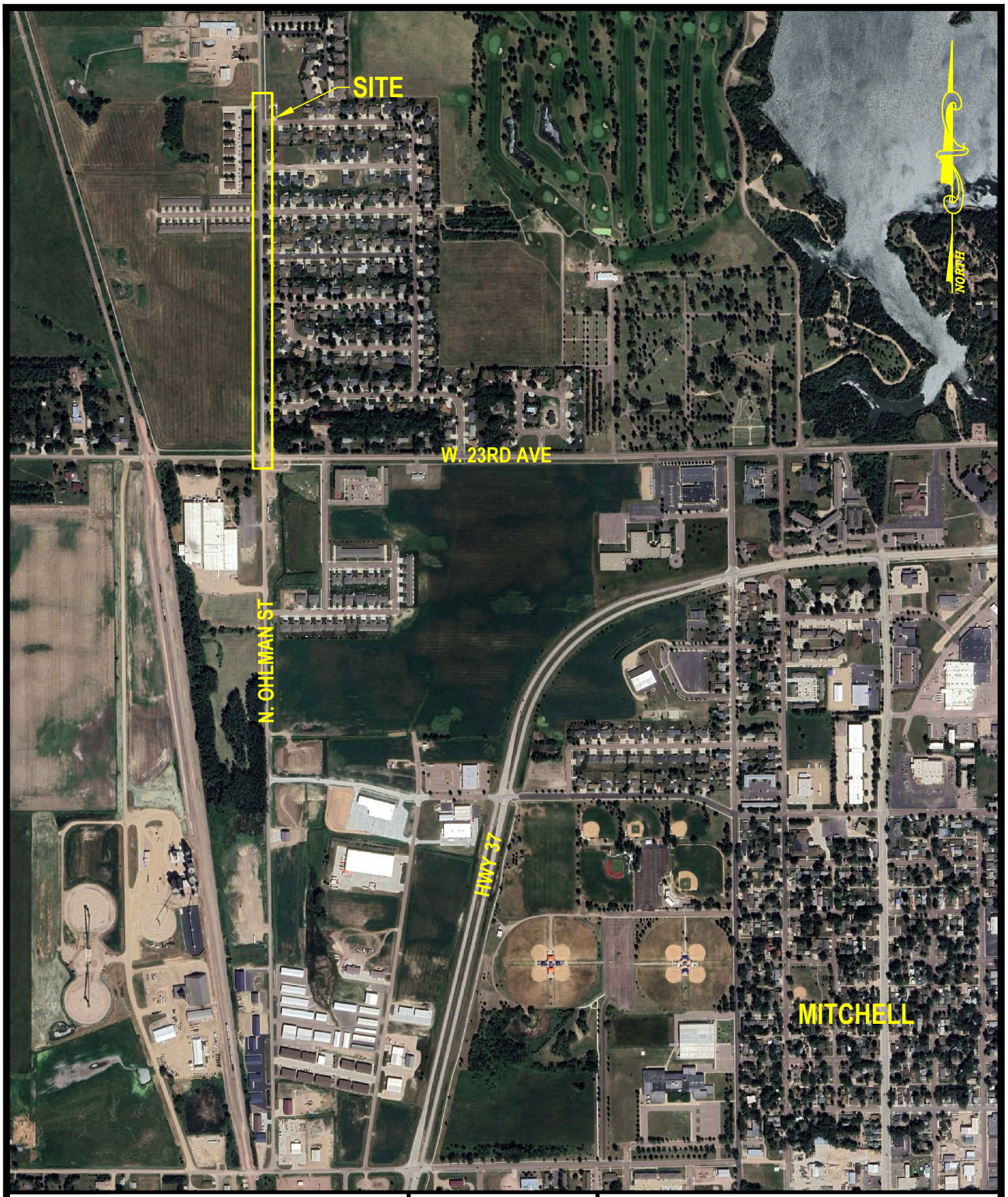


FIGURE 1
SITE LOCATION MAP
PROPOSED STREET & UTILITY IMPROVEMENTS
N. OHLMAN STREET
MITCHELL, SD

ACAD/GEOTEK/NICK/25-2222

PROJECT#: 25-2222

DRAWN BY: DHP

GEOTEK ENGINEERING & TESTING SERVICES, INC.
909 East 50th Street North
Sioux Falls, South Dakota 57104
605-335-5512 Fax 605-335-0773

FIGURE 2
TEST BORING LOCATION MAP
PROPOSED STREET & UTILITY IMPROVEMENTS
N. OHLMAN STREET
MITCHELL, SD

ACAD/GEOTEK/NICK/25-2222

PROJECT#: 25-2222

DRAWN BY: DHP

GEOTEK ENGINEERING & TESTING SERVICES, INC.
909 East 50th Street North
Sioux Falls, South Dakota 57104
605-335-5512 Fax 605-335-0773

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 E. 50th St. N
Sioux Falls, SD 57104
(605)335-5512 Fax (605)335-0773
info@geotekeng.com

GEOTECHNICAL TEST BORING LOG

BORING NO. 1

GEOTEK # **25-2222**

PROJECT: **Proposed Street & Utility Improvements - N. Ohlman Street - Mitchell, SD**

WL	Elevation / Depth (feet)	DESCRIPTION OF MATERIAL 1,301.7 ft = SURFACE ELEVATION	GEOLOGIC ORIGIN	N	SAMPLE TYPE NO.	LABORATORY TESTS MC	D	LL / PL	QU	- #200
	1,301.1 0.6	ASPHALT, 3" thick								
	1,300.9 0.8	EXISTING GRAVEL BASE: 7" thick								
	1,299.7 2.0	FILL, MOSTLY SANDY LEAN CLAY: a little gravel, very dark brown and dark brown, frozen to moist	FILL		HSA 1					
	1,297.2 4.5	FILL, MOSTLY SANDY LEAN CLAY: a trace of gravel, brown, moist	FILL	5	SPT 2	14	116			51
	1,292.2 9.5	SANDY LEAN CLAY: a little gravel, gray, moist, firm, (CL)	GLACIAL TILL	7	SPT 3	17				
					BAG 4	19				
				7	SPT 5	22				61
	1,287.2 14.5	LEAN CLAY: a trace of gravel, brown, moist, firm, (CL)	GLACIAL FLUVIAL	6	SPT 6					
				6	SPT 7	22				
	1,282.2 19.5	SANDY LEAN CLAY: a trace of gravel, brown, moist, stiff, (CL)	GLACIAL TILL	10	SPT 8	16				
					BAG 9					
	1,280.7 21.0	LEAN CLAY WITH SAND: a little gravel, dark gray, moist, stiff, (CL)	GLACIAL TILL	9	SPT 10	17				
		Bottom of borehole at 21.0 Feet.								

Water Level Measurements

DATE	TIME	SAMPLE DEPTH (ft)	CAVE-IN DEPTH (ft)	WATER LEVEL (ft)
12/18/2025	10:36 AM	21.0	19.0	None

Additional Boring Information

START:	12-18-2025 COMPLETE: 12-18-2025, 09:32 AM
METHOD:	3.25" ID Hollow Stem Auger
LATITUDE:	*(Latitude / Longitude) (Approximate Values)*
LONGITUDE:	
DRILL RIG:	B-57 Red
CREW CHIEF:	Roy Hanson

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 E. 50th St. N
Sioux Falls, SD 57104
(605)335-5512 Fax (605)335-0773
info@geotekeng.com

GEOTECHNICAL TEST BORING LOG

BORING NO. 2

GEOTEK # **25-2222**

PROJECT: **Proposed Street & Utility Improvements - N. Ohlman Street - Mitchell, SD**

WL	Elevation / Depth (feet)	DESCRIPTION OF MATERIAL 1,302.1 ft = SURFACE ELEVATION	GEOLOGIC ORIGIN	N	SAMPLE TYPE NO.	LABORATORY TESTS MC	D	LL / PL	QU	- #200
	1,301.5 0.6	ASPHALT, 7" thick								
	1,301.3 0.8	EXISTING GRAVEL BASE: 3" thick								
	1,300.1 2.0	FILL, MOSTLY SANDY LEAN CLAY: a little gravel, very dark brown and brown, frozen to moist	FILL		HSA 1					
	1,297.6 4.5	FILL, MOSTLY CLAYEY SAND: fine to medium grained, very dark brown and dark brown, moist	FILL	5	SPT 2	10				18
		LEAN CLAY WITH SAND: a trace of gravel, brown and gray, moist, firm, (CL)	GLACIAL TILL	8	SPT 3	18	109			
				8	SPT 4	21		32 / 17		
				7	SPT 5	21				
	1,288.6 13.5			10	SPT 6	20				
		Bottom of borehole at 13.5 Feet.								

Water Level Measurements

DATE	TIME	SAMPLE DEPTH (ft)	CAVE-IN DEPTH (ft)	WATER LEVEL (ft)
12/18/2025	11:16 AM	13.5	12.0	None

Additional Boring Information

START: 12-18-2025 COMPLETE: 12-18-2025, 10:44 AM
METHOD: 3.25" ID Hollow Stem Auger
LATITUDE:
LONGITUDE:
(Latitude / Longitude) (Approximate Values)
DRILL RIG: B-57 Red
CREW CHIEF: Roy Hanson

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 E. 50th St. N
Sioux Falls, SD 57104
(605)335-5512 Fax (605)335-0773
info@geotekeng.com

GEOTECHNICAL TEST BORING LOG

BORING NO. 3

GEOTEK # **25-2222**

PROJECT: **Proposed Street & Utility Improvements - N. Ohlman Street - Mitchell, SD**

WL	Elevation / Depth (feet)	DESCRIPTION OF MATERIAL 1,302.9 ft = SURFACE ELEVATION	GEOLOGIC ORIGIN	N	SAMPLE TYPE NO.	MC	D	LL / PL	QU	- #200
	1,302.4 0.5	ASPHALT: 6 1/2" thick EXISTING GRAVEL BASE: 3" thick								
	1,302.1 0.8	FILL, MOSTLY SANDY LEAN CLAY: a trace of gravel, dark brown and brown, frozen to moist, lenses of sand	FILL		HSA 1					
				5	SPT 2	16	110			
	1,298.4 4.5	CLAYEY SAND: fine to medium grained, brown, moist, very loose, (SC)	MIXED ALLUVIUM	3	SPT 3					23
	1,295.9 7.0	LEAN CLAY WITH SAND: a trace of gravel, brown and gray, moist, firm, (CL)	GLACIAL TILL	6	SPT 4	20		32 / 18		
				8	SPT 5	19				
	1,291.9 11.0	Bottom of borehole at 11.0 Feet.								

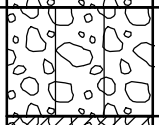
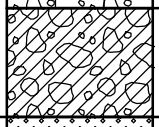
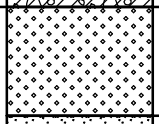
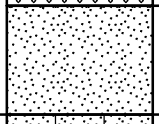
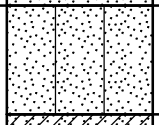
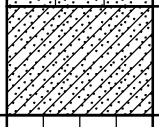
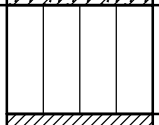
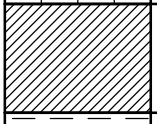
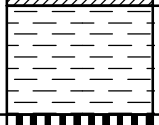
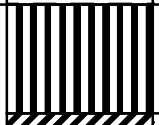
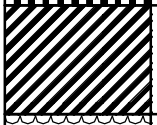
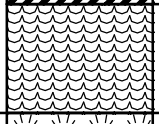
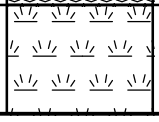
Water Level Measurements

DATE	TIME	SAMPLE DEPTH (ft)	CAVE-IN DEPTH (ft)	WATER LEVEL (ft)
12/18/2025	11:52 AM	11.0	9.0	None

Additional Boring Information

START:	12-18-2025	COMPLETE:	12-18-2025, 11:25 AM
METHOD:	3.25" ID Hollow Stem Auger		
LATITUDE:		*(Latitude / Longitude) (Approximate Values)*	
LONGITUDE:			
DRILL RIG:	B-57 Red		
CREW CHIEF:	Roy Hanson		

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
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

BORING LOG SYMBOLS AND DESCRIPTIVE TERMINOLOGY

SYMBOLS FOR DRILLING AND SAMPLING

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

SYMBOLS FOR LABORATORY TESTS

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

DENSITY/CONSISTENCY TERMINOLOGY

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

PARTICLE SIZES

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

DESCRIPTIVE TERMINOLOGY

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

GRAVEL PERCENTAGES

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

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 East 50th Street North
Sioux Falls, SD 57104
605-335-5512 Fax 605-335-0773
www.geotekeng.com

MOISTURE - DENSITY TEST REPORT

REPORTED TO:

City of Mitchell
Joe Schroeder
612 N Main Street
Mitchell, SD 57301

PROJECT: 25-2222

Proposed Street & Utility Improvements
N. Ohlman Street
Mitchell, SD

COPIES TO:

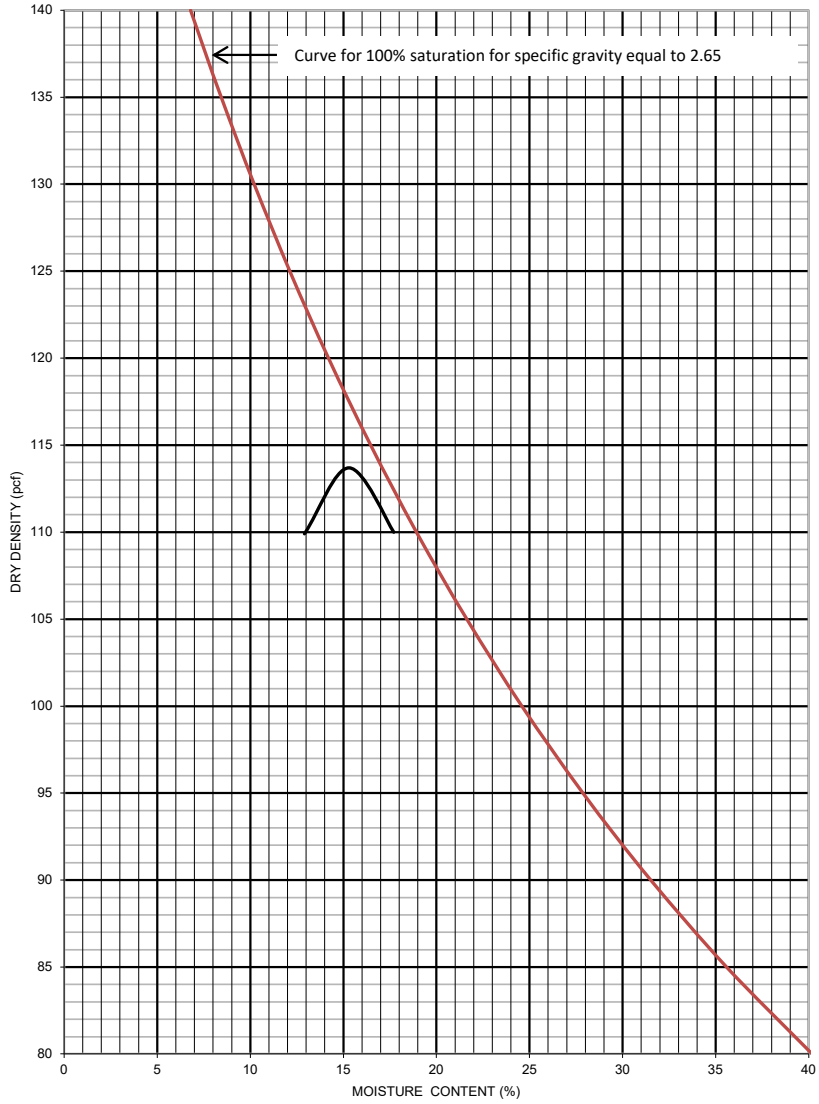
DATE REPORTED: 1/2/2026

SAMPLE DATA

Sample No.: 1
ASTM Test Method: D698B Manual
Soil Classification: Sandy Lean Clay with a little Gravel, Gray (CL)
Remarks: SB 3 (4 1/2' to 9')

Date Received: 12/18/2025
Date Tested: 12/29/2025

TEST DATA



Maximum Density, pcf: 113.7

Optimum Moisture, %: 15.3

Percent Passing, %:

3/4":	100
3/8":	98
#4:	94
#200:	61

Atterberg Limits (ASTM: D4318):
Liquid Limit:
Plastic Limit:
Plasticity Index:

Nick Bierle, Materials Lab Supervisor

GEOTEK ENGINEERING
& TESTING SERVICES, INC.
909 East 50th Street North
Sioux Falls, SD 57104
605-335-5512 Fax 605-335-0773
www.geotekeng.com

MOISTURE - DENSITY TEST REPORT

REPORTED TO:

City of Mitchell
Joe Schroeder
612 N Main Street
Mitchell, SD 57301

PROJECT: 25-2222

Proposed Street & Utility Improvements
N. Ohlman Street
Mitchell, SD

COPIES TO:

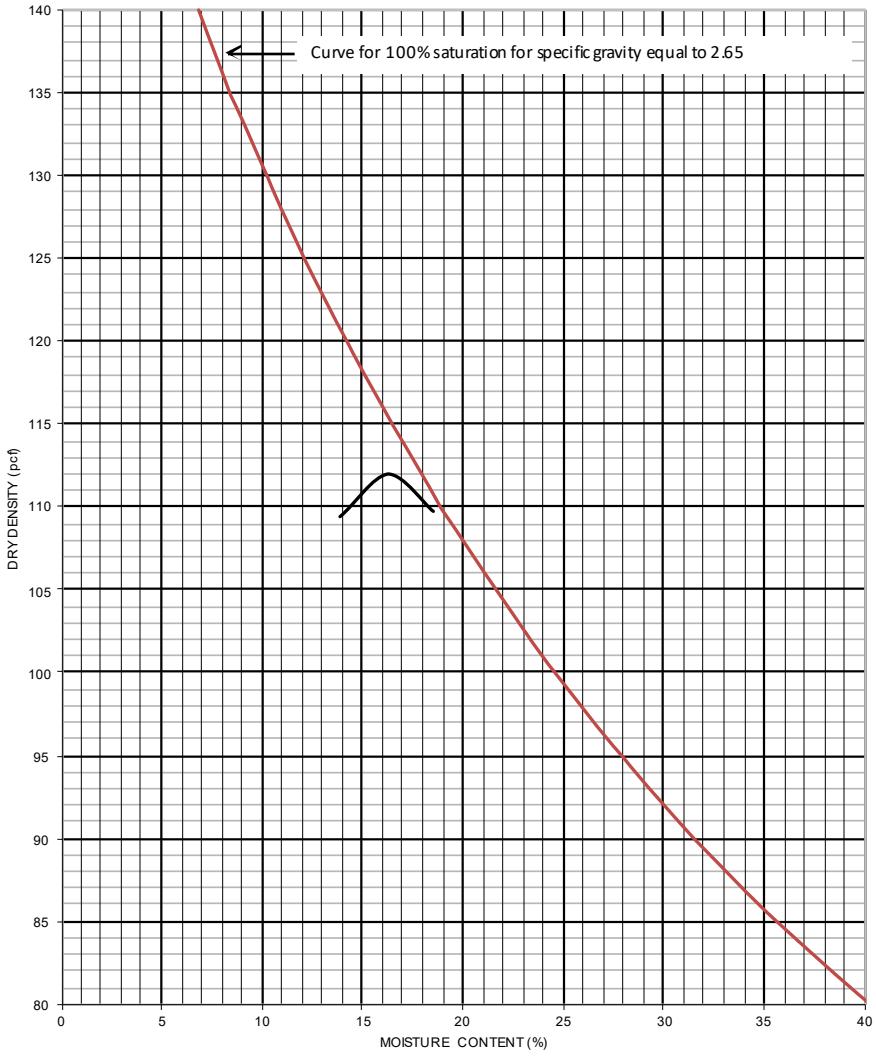
DATE REPORTED: 1/2/2026

SAMPLE DATA

Sample No.: 2
ASTM Test Method: D698B Manual
Soil Classification: Sandy Lean Clay with a trace of Gravel, Brown (CL)
Remarks: SB 3 (14 1/2' to 19')

Date Received: 12/18/2025
Date Tested: 12/29/2025

TEST DATA



Maximum Density, pcf: 112.0
Optimum Moisture, %: 16.2

Percent Passing, %:
3/4": 100
3/8": 99
#4: 97
#200: 62

Atterberg Limits (ASTM: D4318):
Liquid Limit:
Plastic Limit:
Plasticity Index:

Nick Bierle, Materials Lab Supervisor