ADDENDUM 1R

Addendum #	1R	**Date Issued**	March 21, 2023
Project Name | Job #	Fargo Fire Station #8 REISSUED, Fargo, ND		20222800
Bid Date | Time	April 5, 2023		11:30 am CST

THIS ADDENDUM AMENDS AND BECOMES PART OF THE CONTRACT DOCUMENTS FOR EAPC PROJECT 20222800 **REISSUED** DATED MARCH 9, 2023, RESPECTIVELY. EACH BIDDER SHALL ACKNOWLEDGE RECEIPT OF THIS ADDENDUM BY MARKING THE ADDENDUM NUMBER AND DATE ON **EITHER** THE OUTISDE OF THE BID ENVELOPE **OR** INSIDE THE BID BOND ENVELOPE.

SPECIFICATIONS

Section 00 0200	INVITATION TO BID	Revise Quest number to #8423814
Section 10 5030	TURNOUT GEAR LOCKERS WALL MOUNTED	Delete 2.2 A.
Section 11 3012	APPLIANCES	Exhaust Hood to be provided by Mechanical Contractor
Section 21 1313	WET/DRY-PIPE SPRINKLER SYSTEMS	Fire Suppression to be bid by Mechanical Contractor

CLARIFICATIONS

Document Clarification:

All addenda from the first issuance of the construction documents have been incorporated into the new documents issued March 9, 2023 and shall not be acknowledged in the bid as addenda. This addendum and any future addenda will be noted with the addendum number and an “R”. (For example, **this is Addendum #1R**).

ATTACHMENTS

SPECIFICATIONS
Section 00 0200

REPORTS
Geotechnical Report 10.20.2022
Plan Holders List

END OF ADDENDUM #1R

SECTION 00 0200 – INVITATION TO BID

PROJECT.	Fargo Fire Department - Station #8
BIDS CLOSE.	April 5, 2023, 11:30, AM, Central Time Zone
OPENING OF BIDS.	April 5, 2023, 11:45, AM, Central Time Zone
EAPC PROJECT #.	20222800
DATE OF ISSUE.	March 9, 2023
BY.	EAPC Architects Engineers 112 Roberts Street, Suite 300 Fargo, ND 58102 PHONE: 701.461.7222

OUTLINE OF PROJECT. Due to a bidding technicality the following project is being readvertised for bid: New construction of a 10,832 square foot, three-bay satellite station #8 for the Fargo Fire Department. Fully sprinklered, type IIB, mixed occupancy, single-story building with mezzanine at apparatus bay. Construction to be architectural precast walls with flat precast roof, steel stud partition walls in living areas and CMU partitions at industrial areas.

TYPE OF BIDS. Separate Bids will be received from qualified Bidders at the same time on the following portions of the work, separately as listed or combined at the Bidder's option:

General Contract
Mechanical Contract
Electrical Contract
or
Combined Contract

THE OWNER.	City of Fargo 225 4th Street North Fargo, ND 58102
BID PLACE.	City Auditor 225 4th Street North Fargo, ND 58102

Bids received after the designated time will **not** be accepted. All interested parties are invited to attend. Bids will be opened and publicly read aloud. It is the Bidder's responsibility to see that mailed or delivered Bids are in the hands of the Owner prior to the time of the Bid opening.

OBTAINING DOCUMENTS. Drawings and Specifications may be examined at the Architect/Engineer's office, and the Owner's office at the address shown above and:

QuestCDN (www.questcdn.com)
CMD (Construction Market Data) (www.cmdgroup.com)
Dodge Plan Room (www.construction.com)
iSqFt (www.isqft.com)
Builders Exchanges:

Minnesota:	St. Cloud; Minnesota Builders Exchange in Minneapolis
North Dakota:	Bismarck Builders Exchange; Bismarck-Mandan; Dickinson; FM Builders Exchange; Grand Forks; Minot; Williston
South Dakota:	Aberdeen; Construction Industry Center in Rapid City; Plains Builders in Sioux Falls; Sioux Falls Builders Exchange
Montana:	Builders Exchange at Billings
Wyoming:	Northeast Wyoming Plan Room at Gillette

If Contractor receives the bidding documents from a plans exchange, it is the Contractors responsibility to contact EAPC Architects Engineers to be added to the plan holders list.

Complete digital project bidding documents are available at www.questcdn.com. You may download the digital plan documents for $22.00 by inputting Quest project **#8423814** on the website's Project Search page. Please contact QuestCDN.com at 952-233-1632 or info@questcdn.com for assistance in free membership registration, downloading, and working with this digital project information.

Partial or complete sets of prints and specifications may be obtained from EAPC by other than the above. The sets or partial sets will be distributed upon receipt of payment for the information charged at the current reproduction rate. None of this payment will be refunded. Completeness and adequacy of the list of documents requested shall be the responsibility of the person making the request.

BID SECURITY. Bid Security in the amount of five (5%) percent of the Bid including all alternates, must accompany each Bid in a separate envelope in the form of a Bidders Bond in accord with 00 1000 - Instructions to Bidders. Cashier's checks or certified checks will **not** be accepted.

NORTH DAKOTA LAW. All bidders must have a Contractor's License for the highest amount of their bids, as provided by North Dakota Century Code Section 43-07-07; and no bid will be read or considered which does not fully comply with the above provisions as to bond, license, and addendum acknowledgement. All Addenda must be acknowledged inside the bid bond envelope OR outside of the bid envelope. Any bid deficient in these respects submitted will not be opened.

Attendance by prospective Bidders is not a mandatory prerequisite for submitting a Bid for this project.

BID SUBMISSION: Bids shall be submitted to the City Auditor's Office at 225 4th Street North, Fargo, ND 58102. Bids shall be submitted by 11:30 AM on April 5, 2023 – Invitation to Bid. Bids shall be packaged in accordance with 00 1000 - Instructions to Bidders.

Bids will be publicly opened and read aloud at 11:45 AM on the date bids are due in the Engineering Conference Room E258 at Fargo City Hall, 225 4th Street North, Fargo, ND 58102. The public is encouraged to view this bid opening from their computer, tablet or smartphone by using the following link: www.fargobidopenings.com

THE OWNER reserves the right to waive irregularities, to reject Bids and to hold all Bids for a period of 30 days after the date fixed for the opening thereof.

END OF SECTION 00 0200

AMERICAN
ENGINEERING TESTING

REPORT OF
GEOTECHNICAL EXPLORATION
Fargo Fire Station #8
Fargo, North Dakota

AET Project No.
P-0016525

Date:
October 20, 2022

Prepared for:

Fargo Fire Department

Geotechnical • Materials
Forensic • Environmental
Building Technology
Petrography/Chemistry

American Engineering Testing
3522 4th Avenue South
Fargo, ND 58103
TeamAET.com • 701.232.1822

AMERICAN
ENGINEERING TESTING

October 20, 2022

Fargo Fire Department
637 NP Ave N
Fargo, ND 58102

Attn: Steven J. Dirksen

RE: Fargo Fire Station #8
Fargo, North Dakota
AET Report No. P-0016525

Chief Dirksen:

American Engineering Testing, Inc. (AET) is pleased to present the results of our subsurface exploration program and geotechnical engineering review for your Fargo Fire Station #8 project in Fargo, North Dakota. These services were performed according to our proposal to you dated July 27, 2022.

We are submitting one copy of the report to you. Additional copies are being sent on your behalf as noted below.

Please contact us at (701) 232-1822 if you have any questions about the report. We can also be contacted for arranging construction observation and testing services during the earthwork phase.

Sincerely,
American Engineering Testing, Inc.

Mark Blixt, P.E.
Engineer II
mblixt@teamaet.com

Josh Holmes, P.E.
Engineer III
jholmes@teamaet.com

REGISTERED PROFESSIONAL ENGINEER
MARK BLIXT
PE-27749
DATE
NORTH DAKOTA

Mark Blixt, P.E.
Date: 10/20/2022

TABLE OF CONTENTS

1.0 INTRODUCTION

The proposed project will include construction of a new fire station located northwest of the 64th Avenue South and 33rd Street South intersection in Fargo, North Dakota. To assist planning and design, you have authorized American Engineering Testing, Inc. (AET) to conduct a subsurface exploration program at the site, conduct soil laboratory testing, and perform a geotechnical engineering review for the project. This report presents the results of the above services and provides our engineering recommendations based on this data.

2.0 SCOPE OF SERVICES

AET's services were performed according to our proposal to you dated July 27, 2022, which you authorized on September 2, 2022. The authorized scope consists of the following.

- Nine (9) standard penetration test borings to maximum depth of 31 feet
- Soil laboratory testing
- Geotechnical engineering review based on the data and preparation of this report

These services are intended for geotechnical purposes only. The scope is not intended to explore for the presence or extent of environmental contamination in the soil or groundwater.

3.0 PROJECT INFORMATION

We understand the structure will utilize conventional wood or metal framing, or structural CMU supported upon standard shallow foundations. Anticipated loads have not been provided, but for design purposes, we anticipate wall loads will not exceed 8 kips per lineal foot and column loads (if any) will not exceed 175 kips. We anticipate the site will require an increase in grade of approximately 1 foot to establish the main level finished floor at 198 feet.

Our foundation design assumptions include a minimum factor of safety of 3 with respect to the ultimate bearing capacity. We assume the structure will be able to tolerate total settlements of up to 1 inch, and differential settlements over a 30-foot distance of up to ½ inch.

The above stated information represents our understanding of the proposed construction. This information is an integral part of our engineering review. It is important that you contact us if there are changes from that described so that we can evaluate whether modifications to our recommendations are appropriate.

4.0 SUBSURFACE EXPLORATION AND TESTING

4.1 Field Exploration Program

The subsurface exploration program conducted for the project consisted of nine (9) standard penetration test borings. Number of borings, boring depths, and boring locations were provided by EAPC. The logs of the borings and details of the methods used appear in Appendix A. The logs contain information concerning soil layering, soil classification, geologic origins, and moisture condition. A density description or consistency is also noted for the natural soils, which is based on the standard penetration resistance (N-value).

The boring locations are shown on Figure 1 in Appendix A. The borings were located relative to existing site features by AET personnel. Surface elevations were measured in the field by AET personnel using an engineer's level. The benchmark reference was the top nut of the fire hydrant to the southeast of the site (reference boring diagram). The elevation of the benchmark, as designated by AET, is 200.0 feet.

4.2 Laboratory Testing

The laboratory test program included moisture-densities of native clay soils. The test results appear in Appendix A on the individual boring logs adjacent to the samples upon which they were performed, or on the data sheets following the logs.

5.0 SITE CONDITIONS

5.1 Surface Observations

The site for the proposed building is currently vacant/greenspace. We assume the property does not include demolition material from prior occupancy or from other off-site locations. Surface drainage appears to be rather poor but generally flows towards the existing municipal stormwater system. The elevation change between borings is approximately 1 foot.

5.2 Subsurface Soils/Geology

The overall subsurface soil profile at the borings consists of approximately 0.5 to 3.3 feet of topsoil underlain by soft to firm Glacial Lake Agassiz (GLA) soils that extend to termination of borings. The project soils consist of fat clay having varying color, moisture content and unit weight. A layer of sand was encountered at variable depths between 6.5 to 9 feet at select borings. Additional comment on the evaluation of recovered soil samples is presented within the report appendices.

5.3 Groundwater

Measurable groundwater was not encountered during drilling operations. However, select soil samples recovered during our exploration program were moist. The moisture content of lens soils and host clays can vary annually and per recent precipitation. Such soils and other regional dependent conditions may produce groundwater entry of project excavations. We direct your attention to other report sections and appendices concerning groundwater issues and subsurface drainage.

5.4 Review of Soil Properties

Through material composition, clay soils have a tendency to swell with absorption of moisture. This is especially true for fat clays (CH) or silty fat clays (CH-MH) due to increased montmorillonite mineral content. A major attribute contributing to swell of clays is absorption of moisture under reduced confinement. Continuous drainage of site excavations is necessary to reduce swelling impacts to your project.

6.0 RECOMMENDATIONS

6.1 Building Grading

6.1.1 Excavation

To prepare the building area for foundation and slab support, we recommend complete removal of existing topsoil thereby exposing the underlying native clay subgrade. Additional excavation may be necessary to remove desiccated clay soils with increased swell potential. This would result in excavation depths at the boring locations as shown in Table 1.

The depth/elevation indicated in Table 1 is based on the soil condition at the specific boring location. Since conditions will vary away from the boring location, it is recommended that AET geotechnical personnel observe and confirm the competency of the soils in the entire excavation bottom prior to new fill or footing placement.

Where the excavation extends below foundation grade, the excavation bottom and resultant engineered fill system must be oversized laterally beyond the planned outside edges of the foundations to properly support the loads exerted by that foundation. This excavation/engineered fill lateral extension should at least be equal to the vertical depth of fill needed to attain foundation grade at that location (i.e., 1:1 lateral oversize).

Table 1: Recommended Excavation Depths Note 1

Boring Number	Existing Ground Elevation (feet, AET Datum)	Removal of Unsuitable Materials		
		Depth of Materials (feet)		Excavation Elevation (feet)
SB-1	196.6	0.9	Topsoil*	195.7*
SB-2	197.0	0.8	Topsoil*	196.2*
SB-3	197.0	0.9	Topsoil	196.1
SB-4	196.9	0.9	Topsoil	196.0
SB-5	197.1	3.3	Topsoil*	193.8*
SB-6	197.0	0.6	Topsoil	196.4
SB-7	196.9	1.0	Topsoil*	195.9*
SB-8	196.7	0.5	Topsoil*	196.2*
SB-9	197.2	1.2	Topsoil	196.0

Note 1 Refer to report recommendations associated with excavation at, and within the vicinity of the soil borings.

* ***Additional excavation may be necessary to remove possible desiccated native clay.***

6.1.2 Fill Placement and Compaction

Engineered fill for overall corrective earthwork and for support of project perimeter footings should consist of native, non-organic clay. Engineered fill placed interior to and above the base of perimeter frost footings should consist of granular soils which comply with the material properties listed for granular fill placement below floor slab construction. ***Unless otherwise directed by the report, you should temper engineered fill for correct moisture content and then place and compact individual lifts of engineered fill to 95% relative compaction to a standard Proctor.***

6.2 Foundation Design

The structure can be supported on conventional spread foundations placed on native non-organic soil or engineered fill. We recommend perimeter foundations for heated building space is placed such that the bottom is a minimum of 5 feet below exterior grade. We recommend foundations for unheated building space (such as canopy foundations) be extended to a minimum of 7 feet below exterior grade.

Based on the conditions encountered, it is our opinion the building foundations can be designed based on a net maximum allowable soil bearing pressure of **2,000 psf**. It is our judgment this design pressure will have a factor of safety of at least 3 against the ultimate bearing capacity.

Foundations designed for this report's pressure recommendations and loaded per report assumptions may experience long term, total settlement of approximately ½ to 1 inch with the upper estimate more probable. Likewise, project footings may experience differential settlement on the order of ½ inch with greatest movement occurring between adjacent footings of greatest load variation.

We estimate the main level finished floor will be established at or near 198.0 feet. Therefore, we estimate exterior frost-level strip footings will be constructed at or near 193.0 feet. This should result in founding of exterior footings on native soil. We estimate interior spread column footings will be constructed at or near 195.0 feet. This should result in founding of interior footings on native soils or engineered fill.

Retaining walls or foundation walls with unbalanced earthen fill will experience lateral loading from retained soils. You may model this lateral loading as an equivalent earth pressure applied to the foundation wall providing site geometric and related conditions complies with the parameters supporting such modeling. We recommend use of the Table 2 "at-rest" equivalent fluid earth pressures for establishing lateral loading of foundations walls with unbalanced earthen fill.

Table 2: Retained Soil - Equivalent Fluid Weight / Coefficient of Friction

Soil Type	***"At Rest" Condition*** (pcf) [1]	***"Active" Condition*** (pcf) [1]	***"Passive Condition*** (pcf) [1]	***Coefficient of Friction*** [2]
Fat Clay (CH)	95	80	130	0.25
Sand (SP, SP-SM)	65	45	250	0.45

1 The recommendations for equivalent fluid weight based solely on assumed conditions with respect to sloping ground and/or presence of surcharge load. We caution design professional that actual loads imparted to the foundation will be dependent on soil conditions, site geometric considerations and surcharge loads imparted to the structure.

2 The determination of resistance to sliding determined based on multiplication of the respective coefficient of friction by the effective vertical stress occurring at the elevation of interest.

6.3 Floor Slab Design

For concrete slab design, we estimate the native clay subgrade should provide a Modulus of Subgrade Reaction (k-value) of at least 50 pci. This modulus can be increased to 150 pci providing a minimum of 36 inches of granular fill supports floor construction.

Fill placement for the floor slab should consist of granular fill, providing such fill has 100 percent material passing the 1 inch sieve opening, no more than 50 percent materials passing the No. 40 U.S. Sieve opening, and no more than 12 percent material passing the No. 200 U.S. Sieve opening.

The final 6 inches of fill below the concrete floor slab should consist of a "pit run" or processed sand (sand cushion) with 100 percent material passing the 1 inch sieve opening, no more than 50 percent material passing the No. 40 U.S. Sieve opening, and no more than 5 percent material passing the No. 200 U.S. Sieve opening. The moisture content of the sand cushion should be tempered to the same limiting values as for the interior granular fill. As placed, the sand cushion should be compacted until there is no more visually discernable settlement. We anticipate such compaction will be on the order or greater than 95 percent of the standard Proctor maximum dry density.

You should isolate floor slabs from other building components. It is our opinion such isolation should include installation of a ½ inch thick expansion joint between the floor and walls, and/or columns to minimize binding between construction materials. This construction should also include application of a compatible sealant after curing of the floor slab to reduce moisture penetration though the expansion joint. As a minimum, you should install bond breaker to isolate and reduce binding between building components.

For recommendations pertaining to moisture and vapor protection of interior floor slabs, we refer you to the attached standard sheet entitled "Floor Slab Moisture/Vapor Protection."

6.4 Exterior Backfill & Subsurface Drainage

Many of the on-site soils are at least moderately frost susceptible. Because of this, certain design considerations are needed to mitigate these frost effects. For details, we refer you to the attached sheet entitled "Freezing Weather Effects on Building Construction."

Exterior fill placement around the foundation and associated final grading adjacent to the building can significantly impact the performance of a structure. We understand the project ***will not*** include basement construction with foundation walls that retain soils.

We recommend you consider installing subsurface drainage at the base of foundation walls to limit moisture accumulation within granular soils placed below interior floors. As a general guideline, such drainage consists of a geotextile and coarse drainage encased slotted or perforated pipe extending to sump basin(s). We recommend that exterior drainage (if any) be separated from interior drainage to reduce risk of cross flow and moisture infiltration below structure interior. The project Architect and/or Structural Engineer of Record should determine actual need for subsurface drainage.

Exterior backfill of at-grade foundations walls should consist of native, non-organic soils for at-grade construction. Placement of exterior backfill against at-grade foundation walls should be performed concurrent with interior backfill to minimize differential loading, rotation and/or movement of the wall system.

Exterior backfill for basement foundation walls (if any) and/or retaining walls should consist of a native, coarse alluvium or “pit run” granular soil with a fine content equal to or less than 12 percent passing the No. 200 US Sieve opening (i.e. fill extending to within 2 feet of final grade). The final one and one half to two feet of exterior backfill within lawn areas should consist of clay and topsoil. Exterior backfill below sidewalks and pavements should consist of a free draining aggregate base as recommended for the respective construction. Unless otherwise directed by the report, you should temper engineered fill for correct moisture content and then place and compact individual lifts of engineered fill to 95% relative compaction to a standard proctor.

You should limit placement of exterior backfill against below grade foundations until lateral restraint of the foundation walls has been installed to the satisfaction of the Structural Engineer. Final grading of exterior backfill should provide sufficient grade for positive drainage from structure. We presented within other report section recommendations for final grading.

6.5 Surface Drainage

You should maintain positive drainage during and after construction of project and eliminate ponding of water on site soils. We recommend you include provisions within construction documents for positive drainage of site. You should install sumps at critical areas around project to assist in removal of seepage and runoff from site.

You should maintain the moisture content of site clays as close to optimum as possible as excessive changes can cause shrinkage or expansion of the soil, and lead to distress of construction.

We understand sidewalks, curbing, pavements, and lawn will direct drainage from structure. You should grade exterior to slope from building(s). We recommend that you provide a 5 percent gradient within 10 feet of building for drainage from lawn, and 2 percent minimum gradient from building for drainage of sidewalks / pavements. All pavements should drain to on-site storm collection, municipal collection system, or roadside ditching.

You should direct roof runoff from building by a system of interior roof and scupper drains, or rain gutters, down spouts and splash pads. It is our opinion interior roof drains plumbed directly to the storm water piping system provide the most favorable method of conveying drainage from the roof as interior drains do not freeze or discharge runoff onto exterior sidewalks and pavements.

6.6 Utilities

Placement of underground utilities typically includes granular bedding for support of piped systems. Placement of granular soils within underground utility construction promotes migration of subsurface moisture towards and below the bearing stratum of footing construction. This, in turn, can lead to moisture uptake by native clays producing heave of construction, loss of shear strength and/or differential settlement of footing and floors.

Therefore, we recommend that you eliminate placement of all granular bedding soils within 10 feet of project excavations creating a zone where cohesive soils or lean concrete (i.e. controlled density fill) is used for all soil replacement within utility trenches. This “zone of control” should significantly reduce moisture migration below the project foundations. All clay bedding fill within this zone should be placed and compacted as recommended for utility trench backfill.

In lieu of placing clay soils within the above referenced “zone of control”, alternate means of interception and blockage of drainage along site utilities may be provided to minimize moisture migration into and below structure foundation and floors.

Wetter soils from depth should be placed in the lower portion of utility trench construction while dryer soils from near ground surface should be placed in upper most portion of trench fill. You should temper the utility trench fill for correct moisture content and then place and compact individual lifts of trench fill to criteria established within the report appendices.

There is a high probability that fine and coarse alluvium laminations occur within site soils and may be present along utility trench excavations. Such formations and other regional dependent soil conditions may be water bearing. While it is our opinion small pumps should handle seepage resulting from utility construction, we caution that interception of a major water bearing stratum may result in significantly greater seepage into utility excavations. Therefore, we recommend that you include provisions within construction document for pumping of seepage from utility excavations.

6.7 Pavements

We assume project traffic will be separated into two distinct classes; heavy duty traffic comprised of fire trucks, buses, delivery vans, refuse trucks, and light duty traffic comprised of passenger vehicles. Our pavement recommendations are predicated on separation of this traffic.

We understand project grading will include mass earthwork activities to establish the final grade of site and expect preparation of the pavement subgrade will occur with corrective earthwork for site. In our opinion, you should remove all existing topsoil from below sidewalk and pavement construction. Subgrade preparation will need to establish a stable base for construction of project sidewalks and pavements. The cohesive soils underlying the topsoil can lose structural capacity with uptake of moisture, are easily disturbed, and may rut with excessive movement of construction equipment across bare ground. We recommend you scarify, moisture temper, and recompact no less than 12 inches of exposed subgrade prior to placement of aggregate base.

You should install geotextile separation fabric between the exposed cohesive soils and aggregate base section to limit this displacement / distress. It is our opinion this geotextile should consist of a fabric with a machine and cross direction wide width tensile strength equal to or greater than 110 lbs/in minimum average roll value (MARV).

The pavement contractor should provide you with a detailed layout diagram showing how they intend to place the geotextile. Geotextile panels should be oriented parallel with aggregate placement and occur in such a manner that the overall number of individual panels are kept to a minimum. As placed, individual panels of geotextile should have a width equal to or greater than 12 feet. The paving contractor should overlap longitudinal and butt seams of adjacent panels a minimum of 18 inches with such joints oriented to follow traffic movement (shingled profile with traffic). We recommend anchoring individual panels of geotextile to ground with systems designed to maintain position of placement panels.

Design must consider load and movement of traffic across pavement subgrade structure. With moving traffic, design must provide sufficient paving materials to resist deflection and reflective loading imparted by vehicle wheels. Static vehicles convey loads downward into the lower section of the pavement and subgrade soils. Pavement design for parked vehicles must also consider and provide adequate bearing strength to resist soil compression/displacement.

As your facility includes both types of traffic, we conclude project pavement section must provide sufficient section capacity for moving traffic while minimizing the loads transferred by static vehicles parked on site. We present with Table 3 our estimate of pavement structure necessary to support the assumed traffic loads and distribution as noted within this report.

Table 3: Recommended Pavements *

Parameter	Light Duty Pavement [Note A]	Heavy Duty Pavement [Note B]	Concrete Pavement
Estimated Subgrade CBR (Yearly/Spring)	4/2	4/2	4/2
Subgrade Scarification (in)	12	12	12
Place Geotextile Separation Fabric	Yes	Yes	Yes
Untreated Aggregate Base [Note 1] (in)	6	12	6
Asphalt Concrete Base [Note 2]	One - 2 inch lift	Two - 2 inch lifts, 4 inches total	NA
Asphalt Concrete Wear [Note 2]	One 2 inch lift	One 2 inch lift	NA
Est. Subgrade Support *k*	NA	NA	150 psi
Est. Maximum Stress from Rear Tandem Axle	NA	NA	280 psi
Stress Ratio (*based on 600 psi flexural*)	NA	NA	0.47
Heavy Duty Concrete Pavement (in)	NA	NA	Min. 8
Light Duty Concrete Pavement (in)	NA	NA	Min. 5

Note A Pavement construction for light duty passenger vehicles equal to or less than 10,000 lbs total gross weight.

Note B Pavement construction for heavy duty vehicles. No distinction between drive lanes and parking areas.

Note 1 Aggregate base shall conform to North Dakota Department of Transportation (ND DOT) Specification Section 816, Class 5 material.

Note 2 Asphalt Concrete Base and Wear shall conform to ND DOT Specification Section 430.

Note 3 Portland cement concrete pavement proportioned such that the 28 day flexural strength is equal to or greater than 600 pounds per square inch (psi).

* All pavement construction shall be completed using NAPA or ACI approved methods to optimize the performance of in-place construction. We recommend that the construction specifications include necessary controls to eliminate practices which lead to poorly performing pavements.

All pavement recommendations assume the subgrade soils and aggregate section below paved surfaces, if any, drain to subsurface piping for eventual discharge into storm sewer, above grade to ditching, or similar acceptable systems. Lack of drainage from both the surface of the pavement and subsurface will significantly reduce the capacity and longevity of the pavements.

We recommend pavements receive annual maintenance, as a minimum, to correct damages to the pavement structure, clean and infill cracks which develop, and repair or resurface areas which exhibit reduced subgrade performance. The lack of maintenance can lead to moisture infiltration of the pavement structure and softening of the subgrade soils. This, in turn, can degrade and result in poorly performing pavements with shortened life expectancy.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 Potential Difficulties

7.1.1 Runoff Water in Excavation

Water can be expected to collect in the excavation bottom during times of inclement weather or snow melt. To allow observation of the excavation bottom, to reduce the potential for soil disturbance, and to facilitate filling operations, we recommend water be removed from within the excavation during construction. Based on the soils encountered, we anticipate the groundwater can be handled with conventional sump pumping.

7.1.2 Disturbance of Soils

The on-site soils can be disturbed under construction traffic, especially if the soils are wet. If soils become disturbed, they should be subcut to the underlying undisturbed soils. The subcut soils can then be dried and recompacted back into place, or they should be removed and replaced with drier imported fill.

Native soils and any fill placed for support of footings (if required) can weaken and be displaced by construction operations. ***You should consider and, where necessary, place a lean concrete "mud slab" below project footing and floor slab construction if site conditions are / become disturbed, or if supporting soils are wet and easily compromised by site activities. This placement will reduce loss of foundation support and minimize future soil removal due to continued disturbance.***

The lean concrete for the "mud slab" should consist of a cementitious sand slurry mixture designed to provide a 28 day compressive strength on the order or slightly in excess of 300 pounds per square inch (psi). Compressive strengths below this threshold can result in premature failure of the protective system. Compressive strengths significantly in excess of this threshold make installation of staking and plumbing / electrical systems difficult. You should place the lean concrete mixture with a slump of between 5 and 7 inches.

7.2 Excavation Backsloping

If excavation faces are not retained, the excavations should maintain maximum allowable slopes in accordance with *OSHA Regulations (Standards 29 CFR), Part 1926, Subpart P, "Excavations"* (can be found on www.osha.gov). Even with the required OSHA sloping, water seepage or surface runoff can potentially induce side slope erosion or sloughing which could require slope maintenance.

7.3 Observation and Testing

The recommendations in this report are based on the subsurface conditions found at our test boring locations. Since the soil conditions can be expected to vary away from the soil boring locations, we recommend on-site observation by a geotechnical engineer/technician during construction to evaluate these potential changes. Soil density testing should also be performed on new fill placed in order to document that project specifications for compaction have been satisfied.

8.0 TEST STANDARDS

When we refer to an ASTM Standard in this report, we mean that our services were performed in general accordance with that standard. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

9.0 LIMITATIONS

Within the limitations of scope, budget, and schedule, we have endeavored to provide our services according to generally accepted geotechnical engineering practices at this time and location. Other than this, no warranty, express or implied, is intended.

Important information regarding risk management and proper use of this report is given in Appendix B entitled "Geotechnical Report Limitations and Guidelines for Use."

Standard Sheets

FLOOR SLAB MOISTURE / VAPOR PROTECTION

GENERAL

Floor slab design relative to moisture / vapor protection should consider the type and location of two elements, a granular layer and a vapor membrane (vapor retarder, water resistant barrier or vapor barrier). In the following sections, the pros and cons of the possible options regarding these elements will be presented, such that you and your specifier can make an engineering decision based on the benefits and costs of the choices.

GRANULAR LAYER

In American Concrete Institute (ACI) 302.1R-04, a "base material" is recommended over the vapor membrane, rather than the conventional clean "sand cushion" material. The base layer should be a minimum of 4 inches (100 mm) thick, trimmable, compactable, granular fill (not sand), a so-called crusher-run material. Usually graded from 1½ inches to 2 inches (38 to 50 mm) down to rock dust is suitable. Following compaction, the surface can be choked off with a fine-grade material. We refer you to ACI 302.1R-04 for additional details regarding the requirements for the base material.

In cases where potential static water levels or significant perched water sources appear near or above the floor slab, an under-floor drainage system may be needed wherein a draintile system is placed within a thicker clean sand or gravel layer. Such a system should be properly engineered depending on subgrade soil types and rate/head of water inflow.

VAPOR MEMBRANE

The need for a vapor membrane depends on whether the floor slab will have a vapor sensitive covering, will have vapor sensitive items stored on the slab, or if the space above the slab will be a humidity-controlled area. If the project does not have this vapor sensitivity or moisture control need, placement of a vapor membrane may not be necessary. Your decision will then relate to whether to use the ACI base material or a conventional sand cushion layer. However, if any of the above sensitivity issues apply, placement of a vapor membrane is recommended. Some floor covering systems (adhesives and flooring materials) require installation of a vapor membrane to limit the slab moisture content as a condition of their warranty.

VAPOR MEMBRANE / GRANULAR LAYER PLACEMENT

A number of issues should be considered when deciding whether to place the vapor membrane above or below the granular layer. The benefits of placing the slab on a granular layer, with the vapor membrane placed **below** the granular layer, include **reduction** of the following:

- Slab curling during the curing and drying process.
- Time of bleeding, which allows for quicker finishing.
- Vapor membrane puncturing.
- Surface blistering or delamination caused by an extended bleeding period.
- Cracking caused by plastic or drying shrinkage.

The benefits of placing the vapor membrane over the granular layer include the following:

- A lower moisture emission rate is achieved faster.
- Eliminates a potential water reservoir within the granular layer above the membrane.
- Provides a "slip surface", thereby reducing slab restraint and the associated random cracking.

If a membrane is to be used in conjunction with a granular layer, the approach recommended depends on slab usage and the construction schedule. The vapor membrane should be placed above the granular layer when:

- Vapor sensitive floor covering systems are used or vapor sensitive items will be directly placed on the slab.
- The area will be humidity controlled, but the slab will be placed before the building is enclosed and sealed from rain.
- Required by a floor covering manufacturer's system warranty.

The vapor membrane should be placed below the granular layer when:

- Used in humidity-controlled areas (without vapor sensitive coverings/stored items), with the roof membrane in place, and the building enclosed to the point where precipitation will not intrude into the slab area.

Consideration should be given to slight sloping of the membrane to edges where draintile or other disposal methods can alleviate potential water sources, such as pipe or roof leaks, foundation wall damp proofing failure, fire sprinkler system activation, etc.

There may be cases where membrane placement may have a detrimental effect on the subgrade support system (e.g., expansive soils). In these cases, your decision will need to weigh the cost of subgrade options & the performance risks.

FREEZING WEATHER EFFECTS ON BUILDING CONSTRUCTION

GENERAL

Because water expands upon freezing and soils contain water, soils which are allowed to freeze will heave and lose density. Upon thawing, these soils will not regain their original strength and density. The extent of heave and density/strength loss depends on the soil type and moisture condition. Heave is greater in soils with higher percentages of fines (silts/clays). High silt content soils are most susceptible, due to their high capillary rise potential which can create ice lenses. Fine grained soils generally heave about 1/4" to 3/8" for each foot of frost penetration. This can translate to 1" to 2" of total frost heave. This total amount can be significantly greater if ice lensing occurs.

DESIGN CONSIDERATIONS

Clayey and silty soils can be used as perimeter backfill, although the effect of their poor drainage and frost properties should be considered. Basement areas will have special drainage and lateral load requirements which are not discussed here. Frost heave may be critical in doorway areas. Stoops or sidewalks adjacent to doorways could be designed as structural slabs supported on frost footings with void spaces below. With this design, movements may then occur between the structural slab and the adjacent on-grade slabs. Non-frost susceptible sands (with less than 5% passing a #200 sieve) can be used below such areas. Depending on the function of surrounding areas, the sand layer may need a thickness transition away from the area where movement is critical. With sand placement over slower draining soils, subsurface drainage would be needed for the sand layer. High density extruded insulation could be used within the sand to reduce frost penetration, thereby reducing the sand thickness needed. We caution that insulation placed near the surface can increase the potential for ice glazing of the surface.

The possible effects of adfreezing should be considered if clayey or silty soils are used as backfill. Adfreezing occurs when backfill adheres to rough surfaced foundation walls and lifts the wall as it freezes and heaves. This occurrence is most common with masonry block walls, unheated or poorly heated building situations and clay backfill. The potential is also increased where backfill soils are poorly compacted and become saturated. The risk of adfreezing can be decreased by placing a low friction separating layer between the wall and backfill.

Adfreezing can occur on exterior piers (such as deck, fence or other similar pier footings), even if a smooth surface is provided. This is more likely in poor drainage situations where soils become saturated. Additional footing embedment and/or widened footings below the frost zones (which include tensile reinforcement) can be used to resist uplift forces. Specific designs would require individual analysis.

CONSTRUCTION CONSIDERATIONS

Foundations, slabs and other improvements which may be affected by frost movements should be insulated from frost penetration during freezing weather. If filling takes place during freezing weather, all frozen soils, snow and ice should be stripped from areas to be filled prior to new fill placement. The new fill should not be allowed to freeze during transit, placement or compaction. This should be considered in the project scheduling, budgeting and quantity estimating. It is usually beneficial to perform cold weather earthwork operations in small areas where grade can be attained quickly rather than working larger areas where a greater amount of frost stripping may be needed. If slab subgrade areas freeze, we recommend the subgrade be thawed prior to floor slab placement. The frost action may also require reworking and recompaction of the thawed subgrade.

Appendix A

Geotechnical Field Exploration and Testing
Boring Log Notes
Unified Soil Classification System
Figure 1 – Boring Locations
Subsurface Boring Logs

BORING LOG NOTES

DRILLING AND SAMPLING SYMBOLS

Symbol	Definition
B,H,N:	Size of flush-joint casing
CA:	Crew Assistant (initials)
CAS:	Pipe casing, number indicates nominal diameter in inches
CC:	Crew Chief (initials)
COT:	Clean-out tube
DC:	Drive casing; number indicates diameter in inches
DM:	Drilling mud or bentonite slurry
DR:	Driller (initials)
DS:	Disturbed sample from auger flights
FA:	Flight auger; number indicates outside diameter in inches
HA:	Hand auger; number indicates outside diameter
HSA:	Hollow stem auger; number indicates inside diameter in inches
LG:	Field logger (initials)
MC:	Column used to describe moisture condition of samples and for the ground water level symbols
N (BPF):	Standard penetration resistance (N-value) in blows per foot (see notes)
NQ:	NQ wireline core barrel
PQ:	PQ wireline core barrel
RD:	Rotary drilling with fluid and roller or drag bit
REC:	In split-spoon (see notes) and thin-walled tube sampling, the recovered length (in inches) of sample. In rock coring, the length of core recovered (expressed as percent of the total core run). Zero indicates no sample recovered.
REV:	Revert drilling fluid
SS:	Standard split-spoon sampler (steel; 1d" is inside diameter; 2" outside diameter); unless indicated otherwise
SU	Spin-up sample from hollow stem auger
TW:	Thin-walled tube; number indicates inside diameter in inches
WASH:	Sample of material obtained by screening returning rotary drilling fluid or by which has collected inside the borehole after Afalling@ through drilling fluid
WH:	Sampler advanced by static weight of drill rod and 140-pound hammer
WR:	Sampler advanced by static weight of drill rod
94mm:	94 millimeter wireline core barrel
▼:	Water level directly measured in boring
▽:	Estimated water level based solely on sample appearance

TEST SYMBOLS

Symbol	Definition
CONS:	One-dimensional consolidation test
DEN:	Dry density, pcf
DST:	Direct shear test
E:	Pressuremeter Modulus, tsf
HYD:	Hydrometer analysis
LL:	Liquid Limit, %
LP:	Pressuremeter Limit Pressure, tsf
OC:	Organic Content, %
PERM:	Coefficient of permeability (K) test; F - Field; L - Laboratory
PL:	Plastic Limit, %
q_p:	Pocket Penetrometer strength, tsf (approximate)
q_c:	Static cone bearing pressure, tsf
q_u:	Unconfined compressive strength, psf
R:	Electrical Resistivity, ohm-cms
RQD:	Rock Quality Designator in percent (aggregate length of core pieces 4" or more in length as a percent of total core run)
SA:	Sieve analysis
TRX:	Triaxial compression test
VSR:	Vane shear strength, remoulded (field), psf
VSU:	Vane shear strength, undisturbed (field), psf
WC:	Water content, as percent of dry weight
%-200:	Percent of material finer than #200 sieve

STANDARD PENETRATION TEST NOTES

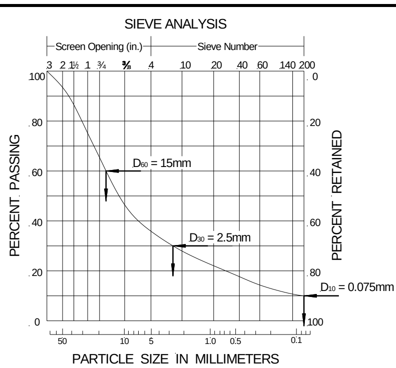
The standard penetration test consists of driving the sampler with a 140 pound hammer and counting the number of blows applied in each of three 6" increments of penetration. If the sampler is driven less than 18" (usually in highly resistant material), permitted in ASTM:D1586, the blows for each complete 6" increment and for each partial increment is on the boring log. For partial increments, the number of blows is shown to the nearest 0.1' below the slash.

The length of sample recovered, as shown on the "REC" column, may be greater than the distance indicated in the N column. The disparity is because the N-value is recorded below the initial 6" set (unless partial penetration defined in ASTM:D1586 is encountered) whereas the length of sample recovered is for the entire sampler drive (which may even extend more than 18").

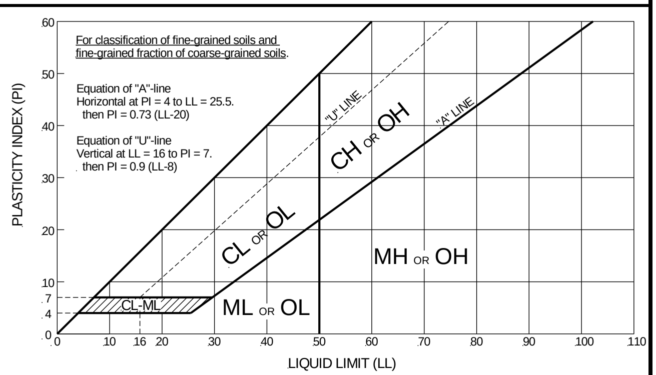
UNIFIED SOIL CLASSIFICATION SYSTEM
ASTM Designations: D 2487, D2488

AMERICAN ENGINEERING TESTING, INC.

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$[E]	GW	Well graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3$[E]	GP	Poorly graded gravel[F]
		Gravels with Fines more than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F.G.H]
			Fines classify as CL or CH	GC	Clayey gravel[F.G.H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$[E]	SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3$[E]	SP	Poorly-graded sand[I]
		Sands with Fines more than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G.H.I]
			Fines classify as CL or CH	SC	Clayey sand[G.H.I]
Fine-Grained Soils 50% or more passes the No. 200 sieve (see Plasticity Chart below)	Silts and Clays Liquid limit less than 50	inorganic	PI>7 and plots on or above "A" line[J]	CL	Lean clay[K.L.M]
			PI<4 or plots below "A" line[J]	ML	Silt[K.L.M]
		organic	Liquid limit–oven dried / Liquid limit – not dried <0.75	OL	Organic clay[K.L.M.N] Organic silt[K.L.M.O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K.L.M]
			PI plots below "A" line	MH	Elastic silt[K.L.M]
		organic	Liquid limit–oven dried / Liquid limit – not dried <0.75	OH	Organic clay[K.L.M.P] Organic silt[K.L.M.Q]
Highly organic soil			Primarily organic matter, dark in color, and organic in odor	PT	Peat[R]



$C_u = \frac{D_{60}}{D_{10}} = \frac{15}{0.075} = 200$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}} = \frac{2.5^2}{0.075 \times 15} = 5.6$



Plasticity Chart

Notes

[A]Based on the material passing the 3-in (75-mm) sieve.

[B]If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C]Gravels with 5 to 12% fines require dual symbols:
- GW-GM well-graded gravel with silt
- GW-GC well-graded gravel with clay
- GP-GM poorly graded gravel with silt
- GP-GC poorly graded gravel with clay

[D]Sands with 5 to 12% fines require dual symbols:
- SW-SM well-graded sand with silt
- SW-SC well-graded sand with clay
- SP-SM poorly graded sand with silt
- SP-SC poorly graded sand with clay

[E]$Cu = D_{60} / D_{10}$, $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F]If soil contains ≥15% sand, add "with sand" to group name.

[G]If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H]If fines are organic, add "with organic fines" to group name.

[I]If soil contains ≥15% gravel, add "with gravel" to group name.

[J]If Atterberg limits plot is hatched area, soil is a CL-ML silty clay.

[K]If soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel", whichever is predominant.

[L]If soil contains ≥30% plus No. 200, predominantly sand, add "sandy" to group name.

[M]If soil contains ≥30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N]PI≥4 and plots on or above "A" line.

[O]PI<4 or plots below "A" line.

[P]PI plots on or above "A" line.

[Q]PI plots below "A" line.

[R]Fiber Content description shown below.

ADDITIONAL TERMINOLOGY NOTES USED BY AET FOR SOIL IDENTIFICATION AND DESCRIPTION

Grain Size

Term	Particle Size
Boulders	Over 12"
Cobbles	3" to 12"
Gravel	#4 sieve to 3"
Sand	#200 to #4 sieve
Fines (silt & clay)	Pass #200 sieve

Gravel Percentages

Term	Percent
A Little Gravel	3% - 14%
With Gravel	15% - 29%
Gravelly	30% - 50%

Consistency of Plastic Soils

Term	N-Value, BPF
Very Soft	less than 2
Soft	2 - 4
Firm	5 - 8
Stiff	9 - 15
Very Stiff	16 - 30
Hard	Greater than 30

Relative Density of Non-Plastic Soils

Term	N-Value, BPF
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	Greater than 50

Moisture/Frost Condition (MC Column)

D (Dry):	Absence of moisture, dusty, dry to touch.
M (Moist):	Damp, although free water not visible. Soil may still have a high water content (over "optimum").
W (Wet/ Waterbearing):	Free water visible, intended to describe non-plastic soils. Waterbearing usually relates to sands and sand with silt.
F (Frozen):	Soil frozen

Layering Notes

Laminations:	Layers less than ½" thick of differing material or color.
Lenses:	Pockets or layers greater than ½" thick of differing material or color.

Peat Description

Term	Fiber Content (Visual Estimate)
Fibric Peat:	Greater than 67%
Hemic Peat:	33 – 67%
Sapric Peat:	Less than 33%

Organic Description (if no lab tests)

Soils are described as *organic*, if soil is not peat and is judged to have sufficient organic fines content to influence the Liquid Limit properties. *Slightly organic* used for borderline cases.

Root Inclusions

With roots:	Judged to have sufficient quantity of roots to influence the soil properties.
Trace roots:	Small roots present, but not judged to be in sufficient quantity to significantly affect soil properties.

A.1 FIELD EXPLORATION

The subsurface conditions at the site were explored by drilling and sampling nine (9) standard penetration test borings. The locations of the borings appear on Figure 1, preceding the Subsurface Boring Logs in this appendix.

A.2 SAMPLING METHODS

A.2.1 Split-Spoon Samples (SS) - Calibrated to N_{60} Values

Standard penetration (split-spoon) samples were collected in general accordance with ASTM: D1586 with one primary modification. The ASTM test method consists of driving a 2-inch O.D. split-barrel sampler into the in-situ soil with a 140-pound hammer dropped from a height of 30 inches. The sampler is driven a total of 18 inches into the soil. After an initial set of 6 inches, the number of hammer blows to drive the sampler the final 12 inches is known as the standard penetration resistance or N-value. Our method uses a modified hammer weight, which is determined by measuring the system energy using a Pile Driving Analyzer (PDA) and an instrumented rod.

In the past, standard penetration N-value tests were performed using a rope and cathead for the lift and drop system. The energy transferred to the split-spoon sampler was typically limited to about 60% of its potential energy due to the friction inherent in this system. This converted energy then provides what is known as an N_{60} blow count.

Most drill rigs today incorporate an automatic hammer lift and drop system, which has higher energy efficiency and subsequently results in lower N-values than the traditional N_{60} values. We use a Pile Driving Analyzer (PDA) and an instrumented rod to measure the actual energy generated by the automatic hammer system. The drill rig (AET rig number 103) we used for this project has an estimated energy transfer ratio of 60%-70%. The N-values reported on the boring logs and the corresponding relative densities and consistencies are from the field blow counts and have not been adjusted to N_{60} values.

A.2.2 Disturbed Samples (DS)/Spin-up Samples (SU)

Sample types described as “DS” or “SU” on the boring logs are disturbed samples, which are taken from the flights of the auger. Because the auger disturbs the samples, possible soil layering and contact depths should be considered approximate.

A.2.3 Sampling Limitations

Unless actually observed in a sample, contacts between soil layers are estimated based on the spacing of samples and the action of drilling tools. Cobbles, boulders, and other large objects generally cannot be recovered from test borings, and they may be present in the ground even if they are not noted on the boring logs.

Determining the thickness of “topsoil” layers is usually limited, due to variations in topsoil definition, sample recovery, and other factors. Visual-manual description often relies on color for determination, and transitioning changes can account for significant variation in thickness judgment. Accordingly, the topsoil thickness presented on the logs should not be the sole basis for calculating topsoil stripping depths and volumes. If more accurate information is needed relating to thickness and topsoil quality definition, alternate methods of sample retrieval and testing should be employed.

A.3 CLASSIFICATION METHODS

Soil descriptions shown on the boring logs are based on the Unified Soil Classification (USC) system. The USC system is described in ASTM: D2487 and D2488. Where laboratory classification tests (sieve analysis or Atterberg Limits) have been performed, accurate classifications per ASTM: D2487 are possible. Otherwise, soil descriptions shown on the boring logs are visual-manual judgments. Charts are attached which provide information on the USC system, the descriptive terminology, and the symbols used on the boring logs.

The boring logs include descriptions of apparent geology. The geologic depositional origin of each soil layer is interpreted primarily by observation of the soil samples, which can be limited. Observations of the surrounding topography, vegetation, and development can sometimes aid this judgment.

A.4 WATER LEVEL MEASUREMENTS

The groundwater level measurements are shown at the bottom of the boring logs. The following information appears under “Water Level Measurements” on the logs:

- Date and Time of measurement
- Sampled Depth: lowest depth of soil sampling at the time of measurement
- Casing Depth: depth to bottom of casing or hollow-stem auger at time of measurement
- Cave-in Depth: depth at which measuring tape stops in the borehole
- Water Level: depth in the borehole where free water is encountered
- Drilling Fluid Level: same as Water Level, except that the liquid in the borehole is drilling fluid

The true location of the water table at the boring locations may be different than the water levels measured in the boreholes. This is possible because there are several factors that can affect the water level measurements in the borehole. Some of these factors include: permeability of each soil layer in profile, presence of perched water, amount of time between water level readings, presence of drilling fluid, weather conditions, and use of borehole casing.

A.5 LABORATORY TEST METHODS

A.5.1 Water Content Tests

Conducted per AET Procedure 01-LAB-010, which is performed in general accordance with ASTM: D2216 and AASHTO: T265.

A.6 TEST STANDARD LIMITATIONS

Field and laboratory testing is done in general conformance with the described procedures. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

A.7 SAMPLE STORAGE

Unless notified to do otherwise, we routinely retain representative samples of the soils recovered from the borings for a period of 30 days.


Fargo Fire Station #8
Fargo, North Dakota
Project #P-0016525
Legend
Soil Boring
Temporary Benchmark
SB-07
SB-01
SB-06
SB-02
SB-09
SB-08
SB-05
SB-03
SB-04
TBM
Google Earth
N
500 ft

SUBSURFACE BORING LOG

AMERICAN ENGINEERING TESTING

AET JOB NO: **P-0016525** LOG OF BORING NO. **SB-01 (p. 1 of 1)**

PROJECT: **Fargo Fire Station #8; Fargo, North Dakota**

SURFACE ELEVATION: **196.6**

DEPTH IN FEET	MATERIAL DESCRIPTION	Elev.	REC %	SAMPLE TYPE NUMBER	BLOWS (N)	Qp	WC	DEN	LL	PL	%-#200
0.9	TOPSOIL, ORGANIC CLAY, (OH) black	195.7		AS 1							
9.0	FAT CLAY, (CH) trace laminations of silt, brown to gray, firm	187.6	61	SS 2	4-3-5 (8)	4.2					
			72	SS 3	2-3-2 (5)	2.9					
			94	SS 4	2-2-4 (6)	2.3					
16.5	FAT CLAY, (CH) dark brown to dark gray, firm to soft, mottled	180.1	133	SS 5	2-2-3 (5)	1.3					
			133	SS 6	2-2-2 (4)	1.3					
			133	SS 7	2-2-2 (4)	1.3					
31.0	FAT CLAY, (CH) dark gray, firm to soft	165.6	133	SS 8	2-2-2 (4)	0.9					
			133	SS 9	1-2-3 (5)	0.9					
			133	SS 10	1-2-2 (4)	0.8					
			133	SS 11	1-2-2 (4)	0.7					

Bottom of borehole at 31.0 feet.
Latitude: 46.788259
Longitude: -96.833443

DEPTH:	DRILLING METHOD
0-29½'	3.25" HSA

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
9/27/22	--	31.0	29.5	--	--	None

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

BORING COMPLETED: **9/27/22**

DR: **BH** LG: **MJ** Rig: **103**

06/04

SUBSURFACE BORING LOG

AMERICAN ENGINEERING TESTING

AET JOB NO: **P-0016525** LOG OF BORING NO. **SB-02 (p. 1 of 1)**

PROJECT: **Fargo Fire Station #8; Fargo, North Dakota**

SURFACE ELEVATION: **197.0**

DEPTH IN FEET	MATERIAL DESCRIPTION	ELEV.	REC %	SAMPLE TYPE NUMBER	BLOWS (N)	Qp	WC	DEN	LL	PL	%-#200
0.8	TOPSOIL, ORGANIC CLAY, (OH) black	196.2		AS 1							
4.0	FAT CLAY, (CH) brown to gray, stiff	193.0	61	SS 2	4-5-6 (11)	4.0	27	95			
9.0	FAT CLAY, (CH) with laminations of silt, brown to gray, firm	188.0	89	SS 3	4-3-5 (8)	3.1	31	88			
			67	SS 4	3-3-5 (8)	1.7	36	86			
	Sand lenses at 9 ft										
16.5	FAT CLAY, (CH) brown to dark gray, firm to soft, mottled	180.5	111	SS 5	2-3-5 (8)	2.7	38	81			
			133	SS 6	2-2-3 (5)	0.9	54	69			
			133	SS 7	1-2-2 (4)	1.4	49	72			
31.0	FAT CLAY, (CH) dark gray, firm to soft	166.0	133	SS 8	1-1-2 (3)	0.8	53	69			
			133	SS 9	1-2-2 (4)	0.7	50	72			
			133	SS 10	1-1-2 (3)	0.7	56	66			
			133	SS 11	1-2-2 (4)	0.8	53	70			

Bottom of borehole at 31.0 feet.
Latitude: 46.788151
Longitude: -96.833529

DEPTH:	DRILLING METHOD	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-29½'	**3.25" HSA**	**9/27/22**	**--**	**31.0**	**29.5**	**--**	**--**	**None**

WATER LEVEL MEASUREMENTS

BORING COMPLETED: **9/27/22**

DR: **BH** LG: **MJ** Rig: **103**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AMERICAN ENGINEERING TESTING

SUBSURFACE BORING LOG

AET JOB NO: **P-0016525** LOG OF BORING NO. **SB-03 (p. 1 of 1)**

PROJECT: **Fargo Fire Station #8; Fargo, North Dakota**

SURFACE ELEVATION: **197.0**

DEPTH IN FEET	MATERIAL DESCRIPTION	Elev.	REC %	SAMPLE TYPE NUMBER	BLOWS (N)	Qp	WC	DEN	LL	PL	%-#200
0.9	TOPSOIL, ORGANIC CLAY, (OH) black	196.1		AS 1							
	FAT CLAY, (CH) trace laminations of silt, brown to gray, firm		67	SS 2	3-3-5 (8)	3.6					
5			89	SS 3	3-3-4 (7)	2.7					
6.5		190.5									
	SILTY SAND, (SM) fine grained, brown, moist										
7.8		189.3									
	FAT CLAY, (CH) dark gray to dark brown, firm to soft, mottled		83	SS 4	10-4-5 (9)	2.0					
10			94	SS 5	2-3-4 (7)	1.3					
			133	SS 6	2-1-3 (4)	1.2					
15			133	SS 7	1-2-2 (4)	0.9					
16.5		180.5									
	FAT CLAY, (CH) dark gray, soft		133	SS 8	1-2-2 (4)	0.8					
20			133	SS 9	1-2-2 (4)	1.0					
25			133	SS 10	1-2-2 (4)	0.8					
30			133	SS 11	1-2-2 (4)	0.9					
31.0		166.0									

Bottom of borehole at 31.0 feet.
Latitude: 46.788014
Longitude: -96.833467

DEPTH:	DRILLING METHOD	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-29½'	**3.25" HSA**	**9/27/22**	**--**	**31.0**	**29.5**	**--**	**--**	**None**

WATER LEVEL MEASUREMENTS

BORING COMPLETED: **9/27/22**

DR: **BH** LG: **MJ** Rig: **103**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

SUBSURFACE BORING LOG

AMERICAN ENGINEERING TESTING

AET JOB NO: **P-0016525** LOG OF BORING NO. **SB-04 (p. 1 of 1)**

PROJECT: **Fargo Fire Station #8; Fargo, North Dakota**

SURFACE ELEVATION: **196.9**

DEPTH IN FEET	MATERIAL DESCRIPTION	REC %	SAMPLE TYPE NUMBER	BLOWS (N)	Qp	WC	DEN	LL	PL	%-#200
0.9 (196.0)	TOPSOIL, ORGANIC CLAY, (OH) black		AS 1							
6.5 (190.4)	FAT CLAY, (CH) trace laminations of silt, brown to gray, firm	67	SS 2	4-3-5 (8)	3.4	30	86			
		83	SS 3	3-4-6 (10)	2.7	34	82			
9.0 (187.9)	FAT CLAY, (CH) with lenses & layers of silt & sand, brown to gray, firm	89	SS 4	3-3-5 (8)	1.5	33	92			
22.0 (174.9)	FAT CLAY, (CH) dark brown to dark gray, firm to soft, mottled	100	SS 5	2-3-4 (7)	2.7	38	78			
		133	SS 6	2-3-3 (6)	1.3	49	71			
		133	SS 7	2-2-3 (5)	1.3	50	46			
		133	SS 8	2-2-2 (4)	1.0	42	53			
		133	SS 9	1-2-3 (5)	1.7	50	45			
31.0 (165.9)	FAT CLAY, (CH) dark gray, soft	133	SS 10	1-2-2 (4)	0.9	56	53			
		133	SS 11	1-2-2 (4)	0.7	54	43			

Bottom of borehole at 31.0 feet.
Latitude: 46.787899
Longitude: -96.833574

DEPTH:	DRILLING METHOD	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-29½'	**3.25" HSA**	**9/27/22**	**--**	**31.0**	**29.5**	**--**	**--**	**None**

WATER LEVEL MEASUREMENTS

BORING COMPLETED: **9/27/22**

DR: **BH** LG: **MJ** Rig: **103**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

SUBSURFACE BORING LOG

AMERICAN ENGINEERING TESTING

AET JOB NO: **P-0016525** LOG OF BORING NO. **SB-05 (p. 1 of 1)**

PROJECT: **Fargo Fire Station #8; Fargo, North Dakota**

SURFACE ELEVATION: **197.1**

DEPTH IN FEET	MATERIAL DESCRIPTION	REC %	SAMPLE TYPE NUMBER	BLOWS (N)	Qp	WC	DEN	LL	PL	%-#200
0 – 3.3 (El. 193.9)	TOPSOIL, ORGANIC CLAY, (OH) black		AS 1							
		56	SS 2	3-3-5 (8)	4.0	28	86			
3.3 – 7.0 (El. 190.1)	FAT CLAY, (CH) trace laminations of silt, brown to gray, firm	94	SS 3	3-3-4 (7)	1.9	36	84			
	Sand lenses at 6.5 ft									
7.0 – 17.0 (El. 180.1)	FAT CLAY, (CH) dark brown to dark gray, soft, mottled	89	SS 4	2-2-2 (4)	1.9	42	77			
		117	SS 5	2-2-2 (4)	1.3	50	71			
		133	SS 6	1-2-2 (4)	0.6	59	65			
		133	SS 7	1-2-2 (4)	1.2	52	70			
17.0 – 31.0 (El. 166.1)	FAT CLAY, (CH) dark gray, firm	133	SS 8	1-2-2 (4)	0.8	48	72			
		133	SS 9	1-2-2 (4)	0.8	53	70			
		133	SS 10	2-2-2 (4)	0.8	51	71			
		133	SS 11	1-2-2 (4)	0.7	49	71			

Bottom of borehole at 31.0 feet.
Latitude: 46.788013
Longitude: -96.833856

DEPTH:	DRILLING METHOD
0-29½'	3.25" HSA

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
9/27/22	--	31.0	29.5	--	--	None

BORING COMPLETED: **9/27/22**

DR: **BH** LG: **MJ** Rig: **103**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

SUBSURFACE BORING LOG

AMERICAN ENGINEERING TESTING

AET JOB NO: **P-0016525** LOG OF BORING NO. **SB-06 (p. 1 of 1)**

PROJECT: **Fargo Fire Station #8; Fargo, North Dakota**

SURFACE ELEVATION: **197.0**

DEPTH IN FEET	MATERIAL DESCRIPTION	ELEV.	REC %	SAMPLE TYPE NUMBER	BLOWS (N)	Qp	WC	DEN	LL	PL	%-#200
0.6	TOPSOIL, ORGANIC CLAY, (OH) black	196.4		AS 1							
	FAT CLAY, (CH) trace laminations of silt, brown to gray, firm to stiff		67	SS 2	3-4-4 (8)	3.2					
			94	SS 3	3-4-5 (9)	3.8					
7.8	Sand lenses at 7.75 ft.	189.3	83	SS 4	3-2-2 (4)	2.2					
	FAT CLAY, (CH) dark brown to dark gray, firm to soft, mottled		122	SS 5	2-3-4 (7)	1.6					
			133	SS 6	2-1-2 (3)	1.1					
			133	SS 7	1-2-1 (3)	0.7					
17.3	FAT CLAY, (CH) dark gray, soft	179.8	133	SS 8	1-2-2 (4)	0.7					
			133	SS 9	1-2-2 (4)	0.8					
			133	SS 10	1-2-2 (4)	0.6					
31.0		166.0	133	SS 11	2-1-2 (3)	0.9					

Bottom of borehole at 31.0 feet.
Latitude: 46.788140
Longitude: -96.833743

DEPTH:	DRILLING METHOD							
0-29½'	**3.25" HSA**							

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
9/27/22	**--**	**31.0**	**29.5**	**--**	**--**	**None**

BORING COMPLETED: **9/27/22**

DR: **BH** LG: **MJ** Rig: **103**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

06/04

SUBSURFACE BORING LOG

AMERICAN ENGINEERING TESTING

AET JOB NO: **P-0016525** LOG OF BORING NO. **SB-07 (p. 1 of 1)**

PROJECT: **Fargo Fire Station #8; Fargo, North Dakota**

SURFACE ELEVATION: **196.9**

DEPTH IN FEET	MATERIAL DESCRIPTION	REC %	SAMPLE TYPE NUMBER	BLOWS (N)	Qp	WC	DEN	LL	PL	%-#200
1.0	TOPSOIL, ORGANIC CLAY, (OH) black (195.9)		AS 1							
	FAT CLAY, (CH) trace laminations of silt, brown to gray, stiff to firm	72	SS 2	4-5-6 (11)	4.2					
		83	SS 3	4-3-5 (8)	1.8					
7.5	4" Sand lens at 7 ft (189.4)	89	SS 4	4-3-3 (6)	2.1					
9.0	FAT CLAY, (CH) dark brown to dark gray, firm, mottled (187.9)									
	FAT CLAY, (CH) brown to dark gray, firm to soft, mottled	94	SS 5	2-2-3 (5)	1.6					
		128	SS 6	1-2-1 (3)	0.9					
16.0	(180.9)	133	SS 7	2-1-3 (4)	1.3					

Bottom of borehole at 16.0 feet.
Latitude: 46.788280
Longitude: -96.833827

DEPTH:	DRILLING METHOD
0-14½'	3.25" HSA

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
9/27/22	--	31.0	29.5	--	--	None

BORING COMPLETED: **9/27/22**

DR: **BH** LG: **MJ** Rig: **103**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

SUBSURFACE BORING LOG

AET JOB NO: **P-0016525**

LOG OF BORING NO. **SB-08 (p. 1 of 1)**

PROJECT: **Fargo Fire Station #8; Fargo, North Dakota**

SURFACE ELEVATION: **196.7**

DEPTH IN FEET	MATERIAL DESCRIPTION	REC %	SAMPLE TYPE NUMBER	BLOWS (N)	Qp	WC	DEN	LL	PL	%-#200
0.5 (196.2)	TOPSOIL, ORGANIC CLAY, (OH) black		AS 1							
4.0 (192.7)	FAT CLAY, (CH) dark brown to dark gray, firm	72	SS 2	3-3-5 (8)	5.8					
8.5 (188.2)	FAT CLAY, (CH) trace laminations of silt, brown to gray, stiff to firm	89	SS 3	3-4-5 (9)	2.8					
		100	SS 4	3-3-4 (7)	1.4					
10.5 (186.2)	SILTY SAND, (SM) fine grained, brown, wet	78	SS 5	4-2-2 (4)	2.2					
16.0 (180.7)	FAT CLAY, (CH) dark brown to dark gray, soft, mottled	111	SS 6	2-2-2 (4)	1.1					
		133	SS 7	2-1-3 (4)	1.5					

Bottom of borehole at 16.0 feet.
Latitude: 46.788009
Longitude: -96.834102

DEPTH:	DRILLING METHOD
0-14½'	3.25" HSA

BORING COMPLETED: **9/27/22**

DR: **BH** LG: **MJ** Rig: **103**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
9/27/22	--	31.0	29.5	--	--	None

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

06/04

SUBSURFACE BORING LOG

AMERICAN ENGINEERING TESTING

AET JOB NO: **P-0016525** LOG OF BORING NO. **SB-09 (p. 1 of 1)**

PROJECT: **Fargo Fire Station #8; Fargo, North Dakota**

SURFACE ELEVATION: **197.2**

DEPTH IN FEET	MATERIAL DESCRIPTION	Depth	Elev.	REC %	SAMPLE TYPE NUMBER	BLOWS (N)	Qp	WC	DEN	LL	PL	%-#200
	TOPSOIL, ORGANIC CLAY, (OH) black	1.2	196.0		AS 1							
	FAT CLAY, (CH) dark brown, stiff			67	SS 2	5-5-5 (10)	2.5					
5		5.0	192.2	83	SS 3	4-4-6 (10)	3.2					
	FAT CLAY, (CH) trace laminations of silt, brown to gray, stiff	8.3	189.0	100	SS 4	3-3-7 (10)	0.9					
	SILTY SAND, (SM) fine grained, brown, wet, loose	9.0	188.2									
10	FAT CLAY, (CH) brown to, firm			89	SS 5	3-2-3 (5)	1.8					
		13.0	184.2	133	SS 6	2-2-2 (4)	1.3					
15	FAT CLAY, (CH) brown to dark gray, soft, mottled	16.0	181.2	133	SS 7	2-1-2 (3)	0.7					

Bottom of borehole at 16.0 feet.
Latitude: 46.788041
Longitude: -96.833273

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS						
0-14½'	**3.25" HSA**	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
		9/27/22	**--**	**31.0**	**29.5**	**--**	**--**	**None**

BORING COMPLETED: **9/27/22**

DR: **BH** LG: **MJ** Rig: **103**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

Appendix B

Geotechnical Report Limitations and Guidelines for Use

Appendix B
Geotechnical Report Limitations and Guidelines for Use
Report No. P-0016525

B.1 REFERENCE

This appendix provides information to help you manage your risks relating to subsurface problems which are caused by construction delays, cost overruns, claims, and disputes. This information was developed and provided by GBA[1], of which, we are a member firm.

B.2 RISK MANAGEMENT INFORMATION

B.2.1 Understand the Geotechnical Engineering Services Provided for this Report

Geotechnical engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical engineering services is typically a geotechnical engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

B.2.2 Geotechnical Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared solely for the client.

Likewise, geotechnical engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do <u>not</u> rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. If you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

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1 Geoprofessional Business Association, 1300 Piccard Drive, LL14, Rockville, MD 20850
Telephone: 301/565-2733: www.geoprofessional.org, 2019

B.2.3 Read the Full Report
Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. Read and refer to the report in full.

B.2.4 You Need to Inform Your Geotechnical Engineer About Change
Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, always inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

B.2.5 Most of the "Findings" Related in This Report Are Professional Opinions
Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

B.2.6 This Report's Recommendations Are Confirmation-Dependent
The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations only after observing actual subsurface conditions exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.

B.2.7 This Report Could Be Misinterpreted
Other design professionals' misinterpretation of geotechnical engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

B.2.8 Give Constructors a Complete Report and Guidance
Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical engineering report, along with any attachments or appendices, with your contract documents, but be certain to note conspicuously that you've included the material for information purposes only. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the

report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, only from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and be sure to allow enough time to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

B.2.9 Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled “limitations,” many of these provisions indicate where geotechnical engineers’ responsibilities begin and end, to help others recognize their own responsibilities and risks. Read these provisions closely. Ask questions. Your geotechnical engineer should respond fully and frankly.

B.2.10 Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a “phase-one” or “phase-two” environmental site assessment – differ significantly from those used to perform a geotechnical engineering study. For that reason, a geotechnical engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Unanticipated subsurface environmental problems have led to project failures. If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

B.2.11 Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer’s services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, proper implementation of the geotechnical engineer’s recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. Geotechnical engineers are not building-envelope or mold specialists.

EAPC

PLAN HOLDERS LIST
Fargo Fire Station #8 - REVISED/REISSUED
Fargo, ND
EAPC Project 20222800

REVISED BID DATE: April 5, 2023
BIDS CLOSE: 11:30 a.m.
BIDS READ: 11:45 a.m.

PLAN HOLDER	CONTACT PERSON	ADDRESS	CITY	STATE	ZIP	PHONE	FAX	EMAIL
BUILDERS EXCHANGES								
Aberdeen Builders Exchange		302 N. Jackson Street	Aberdeen	SD	57401	605-225-4733	605-225-4733	dakotabuild@midconetwork.com
Billings Builders Exchange		2050 Broadwater Avenue	Billings	MT	59102	406-652-1311	406-652-1391	bbx@billingsplanroom.com
Bismarck-Mandan Builders Exchange		P. O. Box 550	Mandan	ND	58554	701-667-4322	701-667-5217	bis_manbe@midconetwork.com
Construction Industry Center		Box 1227	Rapid City	SD	57709	605-343-5252	605-343-4591	cic@constructionindustrycenter.com or chrissy@constructionindustrycenter.com
Bismarck Builder Exchange		215 Airport Road	Bismarck	ND	58504	701-258-4215	701-258-1391	info@bbxnd.com
Dickinson Builders Exchange		Drawer C	Dickinson	ND	58601	701-225-5115	701-225-5116	team@dickinsonchamber.org
Duluth Builders Exchange		802 Garfield Avenue	Duluth	MN	58601			misty@mbex.org
Fargo-Moorhead Bldrs. Exchange		P. O. Box 10076	Fargo	ND	58106	701-237-6772	701-232-1653	upload
Grand Forks Builders Exchange		2211 S. Washington St. Ste D	Grand Forks	ND	58201	701-772-7798	701-772-0387	planroom@bntgf.com
iSqFt & AGC of Minnesota Planroom Partnership		525 Park Street, Suite 110	St. Paul	MN	55103	800-364-2059 x 8093	866-570-8187	AGCMinnesota@iSqFt.com
McGraw Hill Const./Dodge Plan Rm.		1401 Glenwood Avenue No.	Minneapolis	MN	55405	612-381-2290	612-381-2295	http://upload.construction.com
Minnesota Builders Exchange		1123 Glenwood Avenue	Minneapolis	MN	55405	612-381-2620	612-381-2621	new project: jb@mbex.org addendums: addenda@mbex.org
Minot Builders Exchange		2424 Burdick Expy East	Minot	ND	58701	701-838-5353	701-839-0638	mbe1@srt.com
Plains Builders Exchange		220 N. Kiwanis Ave.	Sioux Falls	SD	57104-2530	605-334-8886	605-334-0112	info@plainsbuilders.com
QuestCDN.com								www.questcdn.com
Rochester Builders Exchange		108 Elton Hills Lane NW	Rochester	MN	55901	507-282-6531	507-282-6351	audra@bexroch.com
St. Cloud Builders Exchange		110 6th Ave S / P.O. Box 746	St. Cloud	MN	56301	320-252-5832	320-251-0081	admin@stcloudbx.com
Sioux Falls Builders Exchange		1418 "C" Avenue	Sioux Falls	SD	57104	605-357-8687	605-357-8655	info@sfbx.com
Williston Builders Exchange		2108 - 4th Ave. West	Williston	ND	58801-3423	701-572-9460	701-572-2511	willistonbuildersexchange@gmail.com
GENERAL CONTRACTOR								
Border Construction	Dave Bartell	4321 14th Ave N	Fargo	ND	58102	701-478-3113		
Meinecke-Johnson Company	Connie Johnson	5 North 14th Street	Fargo	ND	58102	701-293-1040		conniej@meineckejohnsoncompany.com
Minko Construction Inc	Trevor Muchow	3335 35th Ave S.	Fargo	ND	58104	701-280-1405		
Ledgestone Inc	Josh Lessman	22930 County Highway 6	Detroit Lakes	MN	56501	218-844-4550		
Roers	Keegan Ahern	200 45th St S	Fargo	ND	58103	701-356-5050	701-282-2121	
T.F. Powers Construction Co.	Anna Erickson	910 Sixth Avenue North	Fargo	ND	58102	701-293-1312	701-293-7426	estimating@tfpowers.com
Industrial Builders	Vicky Nelson					701-282-4977		vicky@industrialbuilders.com
Gast General Contractors	Chris Ennen	3410 39th St. S.	Fargo	ND	58104	701-235-3454	701-356-0225	jaredp@gast-construction.com
MAK Construction	Zach Scott	4575 32nd Ave S Suite 5	Grand Forks	ND	58201	218-779-5589		zach@makconstructiongf.com
MECHANICAL CONTRACTOR								
ELECTRICAL CONTRACTOR								
Bergstrom Electric		4120 14th Avenue North	Fargo	ND	58102	1-800-637-8995	701-281-8993	
SUPPLIER								
Steeler Inc	Cameron Scaff		Belgrade	MT	59714	406-388-9000		
Capital Exteriors		603 52nd St NE	Bismarck	ND	58501	701-314-1458		