

August 5, 2026

Re: Airport Terminal Solar Array
Watertown Regional Airport
Watertown, South Dakota
AIP #3-46-0058-050-2026
Helms #A-10588

Bid Opening: **August 12, 2026**

2:00 pm Local Time

ADDENDUM NUMBER 1

The following modifications are made to the plans and specifications for the Airport Terminal Solar Array Project, Watertown Regional Airport:

CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

1. Instructions to Bidders, IB-7 Method of Bidding, Page 14, add the following note:

****BIDDERS MUST BID ON THE BASE BID AND ALTERNATE BID NO. 1****

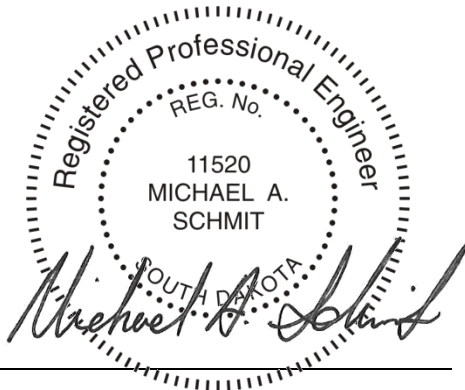
GEOTECHNICAL REPORT

1. See the attached Geotechnical Report from 2020. This report was for construction of the new Terminal, Air Carrier Ramp, Taxiway, and Parking Lot. No specific Geotechnical Report is available for Solar Array Project.

ELECTRICAL ADDENDUM

2. See the attached Electrical Addendum.

**ALL OTHER ITEMS OF THE PLANS AND SPECIFICATIONS REMAIN
UNCHANGED**



BY: _____

PROJECT ENGINEER – HELMS & ASSOCIATES

Acknowledge receipt of the Addendum by inserting its number on the Bid Form. Failure to do so may subject bidder to disqualification. This Addendum forms a part of the Contract Documents. It modifies them as above.

Soil Technologies, Inc.

28822 124th Street – Mobridge, SD 57601 – (605) 762-3406 – Fax (888) 518-2157

www.soil-technologies.com



“Building Your Success On A Solid Foundation”

April 30, 2020

Helms and Associates
Attn: Mr. Michael A. Schmit, P.E.
P.O. Box 111
221 Brown County 19 North
Aberdeen, SD 57401-5533

Subj: Geotechnical Soil Exploration Program
Proposed Regional Airport Terminal
Watertown Regional Airport
Watertown, SD
Helms A-7495
STI #20-1601

Attached for you are the results of the Soil Exploration Services performed for the above referenced project. The exploration program was performed in accordance with your authorization of our proposal dated January 8, 2020. One copy of this report is enclosed for your use. An electronic copy is also being sent to the Helms & Assoc.

When construction operations begin, a Geotechnical Engineer from Soil Technologies, Inc. (STI) is available to monitor the earthwork operations. The Geotechnical Engineer will observe the soil conditions between our borings and judge when the excavations are satisfactorily completed.

Thank you for the opportunity to perform these services for you on this project. If you have any questions regarding the contents of this report, or if we can be of further service to you, please feel free to contact me.

Sincerely,

Kim E. Stoecker, PE
President

**HELMS AND ASSOCIATES
ABERDEEN, SD**

**SOIL EXPLORATION SERVICES
PROPOSED REGIONAL AIRPORT
TERMINAL**

**WATERTOWN REGIONAL AIRPORT
WATERTOWN, SD**

STI #20-1601

April 30, 2020

TABLE OF CONTENTS

STI #20-1601

1.0 INTRODUCTION	1
1.1 Project Information	1
2.0 ENGINEERING REVIEW	1
2.1 Soil Profile	2
2.2 Discussion - Pavement Areas	3
2.3 Site Preparations - Access Road and Parking Lots	3
2.3.1 CBR & Proctor Tests	6
2.4 Site Preparations - Terminal Ramp	7
2.4.1 CBR & Proctor Tests - Terminal Ramp Area	9
2.5 Discussion - Terminal Building	11
2.5.1 Site Preparations - Terminal Building	12
2.5.2 Foundations	20
2.5.3 Exterior Backfill	21
2.5.4 Site Drainage	22
2.5.5 Lateral Earth Pressures	23
3.0 CONSTRUCTION AND DESIGN CONSIDERATIONS	25
3.1 Site Excavation	25
3.2 Excavation Observation and Testing	27
3.3 Concrete	27
4.0 GENERAL EXPLORATION INFORMATION	27
4.1 Scope of Exploration	27
4.2 Site Surface Conditions	28
4.3 Site Subsurface Conditions	28
4.4 Water Levels	28
4.5 Laboratory Test Program	29
5.0 LIMITATIONS, REVIEW, USE, AND PURPOSE OF REPORT	29
6.0 STANDARD OF CARE	30
Attachments:	
Boring Location Sketch	
Logs of Borings	
Gradations (4)	
CBR Test Reports (6)	
Proctor (3)	
Field Exploration Procedures & "Descriptions"	
Symbols and Terminology	
Precautions...During Cold Weather	
Construction Observation and Testing	
Important Information about Your Geotechnical Report	

SOIL EXPLORATION PROGRAM
PROPOSED REGIONAL AIRPORT
TERMINAL
WATERTOWN REGIONAL AIRPORT
WATERTOWN, SD
STI #20-1601

1.0 INTRODUCTION

1.1 Project Information

We understand the project will consist of the construction of an airport terminal building, a terminal ramp, parking lots, and access roads.

The analysis and recommendations provided in this report are based on the above information and the following conditions:

- The finished floor elevation of the proposed terminal building will be within 2.5 feet above the existing grades and be at an elevation between 1737.5 and 1740.0 feet.*
- The perimeter frost footings of the building will rest 5 to 6 feet below the finished floor and be at an elevation between 1731.5 to 1735.0 feet.*
- The new perimeter finished grades immediately surrounding the building will be below the finished floor elevation.
- Column loads will be a maximum of 150 kips (total dead and live loads) with continuous footing loads less than 6 kips/ft (total dead and live loads).
- Floor slab loadings exerted on the underlying soils will be a maximum 500 pounds per square foot (psf).
- The terminal ramp finished pavement elevation will be within 4 feet above the existing grades but below the terminal building floor elevation.
- The new apron pavement section will likely consist of 12" of concrete over 6" of P-209 base material over 21" of P-154 subbase material.
- The new access road pavement and potentially the parking lot sections will likely consist of 4" of asphalt over 12" of SD DOT base course.
- The proposed access roads may include salvaging of the existing pavement and granular base materials for use as subbase.



2.0 ENGINEERING REVIEW

The engineering recommendations provided in this report are based on the soil information obtained under this Soil Exploration Program along with the information and conditions of the project as described above. The recommendations are valid for the specific information and conditions listed. If there are additions, corrections, or changes to the above information or conditions, it is necessary that we be notified so that we can determine whether the new information or conditions affect our recommendations.

Our design assumptions include a minimum theoretical safety factor of 3 with respect to shearing or base failure of the building foundations. We assume an allowable total settlement of 1 inch and a differential settlement of up to 1/2 inch over a length of 30 feet.

The recommendations in this report assume the location of the proposed building is within 50 feet of the boring locations as shown on the attached sketch. If the location of the proposed building is changed so as not to be within this distance for each of the respective borings, we must be contacted for additional review and potentially additional borings.

2.1 Soil Profile

The boring logs suggest that the general soil profile at the site consists of 0.5 to 6 feet of clay “fill” soil or clay “topsoil” overlying 0.5 to 3.5 feet of clay “alluvium” (water deposited soils). The clay alluvium soils are underlain by sand “alluvium” soils which extend to the termination depth of the borings at 11 to 26 feet below the existing grades.

In general, the boring logs suggest that there are six (6) general types of materials and soils that will need to be considered when designing the proposed project. These materials from the surface down are:

- 1) the existing asphalt,
- 2) the existing base materials,
- 3) clay “fill” soils
- 4) clay “topsoil”
- 5) native clay “alluvium” soils
- 6) native sand “alluvium” soils

2.2 Discussion – Pavement Areas

- **Frost Action (Heave)**

In our opinion, one of the primary reasons for a shortened life span and distress of an asphalt or concrete pavement is the excessive movement of the pavement surfacing caused by the “frost action” (heave) of the underlying subgrade soils. Since the soils below the pavement freeze to a depth of about 5 to 6 feet below the asphalt surface, the pavement surfacing is subjected to significant frost movement during the winter season.

The amount of frost movement and subsequent distress to the pavement surfacing is dependent on the type of subgrade soils below the base materials. For example, clay subgrade soils typically have much higher frost action than do sandy subgrade soils. Also, organic clay “topsoil” has a much higher frost action than does typical clay subgrade soils. Differing types of subgrade soils will generally cause greater distress than if the subgrade soils were of the same soil type due to the differing amounts of the frost action.

To limit distress of the pavement surfacing for the access roads, parking lots and the terminal apron, uniform support of the pavement surfacing is required. Since granular soils (sand, gravel, or recycled asphalt, etc.) exhibit the least amount of frost action, it is best to provide a thick section of granular soils immediately below the pavement surfacing.

2.3 Site Preparations –Access Roads and Parking Lots

- **Soil Profile – Access Road and Parking Lots**

Table 1 below lists the thicknesses of the asphalt, base material, fill soils, and type of fill soils encountered below the base materials in the access road and parking lot areas.

TABLE 1

<u>Boring #</u>	<u>Asphalt Thickness (in.)</u>	<u>Base Material Thickness (in.)</u>	<u>Existing Fill Soil Thickness Below Base Material (ft.)</u>	<u>Type of Fill Soils Immediately below the Base Material</u>
1	-	-	4.5	--
2	6.5	3.5	5.2	Lean Clay “Fill”
3	8	3	3.0	Sandy Lean Clay “Fill”

4	8	4	1.0	Sandy Lean Clay "Fill"
5	5	4	1.2	Lean Clay "Fill"
6	5	4	3.2	Organic Lean Clay "Fill"
7	5	4	3.7	Lean Clay "Fill"
8	6	3	4.7	Lean Clay "Fill"
9	6	8	3.3	Sandy Lean Clay "Fill"
10	6	4	3.2	Sandy Lean Clay "Fill"
11	-	-	1.5	--
12	-	-	1.0	--
13	6	4	1.1	Lean Clay "Fill"
14	-	-	2.5	--

- **Subcutting**

In our opinion, site preparations for the access roads and parking lot areas should consist of the excavation (and milling) of the existing asphalt pavement and underlying soils to the depth needed to install the proposed pavement section at the design height. The exception is that if "topsoil" or black organic "fill" soils are exposed at the design subgrade elevations, we recommend that they be replaced to a depth of up to 12 inches below the subgrade elevation. The topsoil/organic fill soils should be replaced with new non-organic subgrade fills soils. Once the milling/excavation is completed, the on-site project engineer should verify that the necessary soils have been removed or removed and replaced.

- **Scarify and Recompact**

The exposed soils should then be scarified to a depth of at least 6 inches, preferably 12 inches, and recompact using a heavy self-propelled roller. The scarified soils should be recompact to a density of at least 95% of the Standard Proctor Density (ASTM: D698).

Adequate stability of the subgrade soils must exist prior to the placement of the base materials.

To help achieve stability, the moisture content of the subgrade soils at the time of scarifying/recompaction should be in the range of -2% to +3% as determined by the Standard Proctor. If weak soil areas develop during the compaction, they should be removed and replaced with engineered fill as per the on-site project engineer.

The final compaction should be evaluated by a test rolling program conducted with rubber-tired heavy construction equipment (a loaded dual axle truck is preferable). Deflections or

rutting of the subgrade soils by 1 inch or more should be reworked or replaced with a suitable fill soil compacted to the specified density and moisture so that a deflection of less than 1 inch is achieved. The test rolling program should be documented and accepted by the project engineer.

Alternatively, if soil moisture conditions, shallow utilities, etc. do not permit adequate compaction and stability of the subgrade soils to be achieved, a high strength geotextile fabric or geogrid can be placed at the bottom of the subcut to aid in improving the subgrade strength and stability. In our opinion, a high strength geotextile fabric such as a Marafi HP 370, or functionally equivalent, should be considered.

- **Geotextile Fabric**

It is our opinion that a geotextile fabric should be considered as part of the design pavement section. For general purposes, we recommend a light to medium weight geotextile fabric such as a Linq GTF-200, Marafi 170N, or functionally equivalent. The primary purpose of geotextile fabrics is to help limit the clay and silt particles of the subgrade soils from migrating up into the granular base materials. This migration of the clay and silt particles often weakens the granular base materials and shortens the design life of the pavement section. Geotextile fabrics can also help increase the structural strength of the subgrade soil and overall pavement section. The fabric should be placed below the granular base materials. Please note that the “piping ratio” and “size ratio” of the geotextile fabric should be checked to verify that the type of fabric is appropriate for the particle sizes of the subgrade soils present at the site and the base material planned to be used.

- **Subgrade and Surface Drainage**

We recommend that extra care be taken in the design and construction process to help ensure that adequate surface and subgrade drainage is maintained throughout the road and parking lot areas. The pavement surface should be uniformly sloped to facilitate its drainage. In addition, the subgrade surfaces should be uniformly sloped to facilitate drainage of the base material within the pavement system and to avoid any ponding of water beneath the pavement. Edge drains and center drain tile and/or center storm sewer drains should be used where possible. The purpose of the drainage is to minimize saturation of the subgrade soils and to minimize potential distress due to moisture and frost related movement of the underlying soils. Timely maintenance such as crack filling, seal coats, and localized patching should be routinely performed in all pavement areas.

- **Additional Subgrade Fill Soils (Engineered Fill)**

If additional subgrade fill is required to meet design grade elevations of the pavement section, we recommend a suitable subgrade material be used. Ideally, a granular material (sand, gravel, or recycled asphalt) should be used. Alternatively, non-organic and non-expansive clay having a liquid limit of 45 or less and plasticity index between 16 and 28 could be used. The subgrade fill soils should be placed in maximum 8-inch loose lifts and compacted to the project specifications.

2.3.1 CBR & Proctor Tests – Access Road and Parking Lots

Three soil samples obtained from the site were selected to perform a series of 3 proctor and 3 CBR (California Bearing Ratio) tests. The soil samples consisted of **clay soils**. The samples were taken from the borings and depths listed in Table 2 below.

Prior to performing the CBR tests, the moisture content of each of the 3 soil samples was adjusted to be near the optimum moisture content as per the Standard Proctor Density (ASTM: D698). After compacting each soil sample to the density of 95% of the Standard Proctor Density (ASTM: D698), they were water soaked over several days and allowed to swell prior to determining the CBR values. The results of the three CBR test values are shown in the tables below. The CBR test sheets and Proctor Test sheets are attached to this report.

TABLE 2

Boring # & Depth	Moisture Content (%)	CBR Test Value (0.1-inch penetration)	CBR Test Value (0.2-inch penetration)	Swell (%)
#2 @ 2' to 4.5'	16.3	1.9*	1.8*	2.7
#7 @ 2' to 4.5'	20.2	6.1	5.1	1.7
#14 @ 2' to 4.5'	22.7	5.1	4.3	1.8

*Sample likely contained significant organic soils.

Please keep in mind that the CBR test values are based on the clay subgrade soils being re-worked and compacted to at least 95% of ATSM: D698. Based on the anticipated site preparations, only the top 6 to 12 inches of the subgrade soils will be re-worked and compacted to 95%. Thus, the CBR values listed above only apply to the top 6 or 12 inches of the subgrade soils.

We estimate that the CBR values of the clay subgrade soils in their current conditions are on the order of 1.25% to 2%. However, in our opinion, the overall CBR value will increase due to the

scarify/recompaction of 6 to 12 inches of subgrade soils, placement of geotextile fabric, and the placement of the several inches of “milled asphalt & existing base materials” above the 6 to 12 inches of re-worked subgrade soils. Based on this method of site preparations, the removal of at least 12 inches of any exposed topsoil below the design subgrade elevation, and if clay subgrade soils are placed and compacted within 2% below and 3% above the optimum moisture content (ASTM D1557), we estimate that a subgrade CBR value of about 5% can be used for design of the access roads and parking lot pavement section.

2.4 Site Preparations – Terminal Ramp

• Soil Profile - Terminal Ramp Area

The boring logs suggest that the general soil profile in the terminal ramp area consists of the following. Please see the attached boring logs.

- Clay “fill” soils and/or clay “topsoil” to depths of 0.5 to 4.5 feet below the existing grades.
- Native clay “alluvium” (water deposited soils) to depths of 2.0 to 7.5 feet below the existing grades.
- Sand “alluvium” soils which extend to the termination depths of the borings at 11 feet below the existing grades.

• FAA Circular Recommendations

The FAA pavement circular recommends that all, or at least a sufficient depth, of the clay soils (frost susceptible soils) be replaced with granular soils (non-frost-susceptible soils). Using the Limited Method, the FAA recommends that the asphalt plus the granular subgrade soils extend to a depth equal to 65% of the normal frost depth. For example, if the frost depth is 5 feet (60 inches), the granular soils should extend to a depth of 39 inches.

Also, the FAA circular recommends that the subgrade soils below the pavement section be designated into frost groups, i.e. soils that are frost susceptible. Relative to the terminal apron area, it is our opinion, the non-organic native clay soils (alluvium) encountered at the site are in frost group **FG-4**. The native sand soils (alluvium soils) are in frost group **FG-2**. The organic clay soils (topsoil) are in frost group **FG-4**.

• Subcutting

In our opinion, site preparations for the terminal ramp area should consist of the excavation of the existing clay “topsoil” and organic lean clay “fill” soils. Also, portions of the existing native clay “alluvium” soils should be excavated if required to achieve the design subgrade

elevation. Once the excavation is completed, the on-site project engineer should verify that the necessary soils have been removed.

- **Scarify and Recompact**

Following the excavation, the exposed soils should be scarified to a depth of at least 6 inches, preferably 12 inches, and recompact using a heavy self-propelled roller. The scarified soils should be recompact to a density of at least 95% of the Modified Proctor Density (ASTM: D1557).

Adequate stability of the subgrade soils must exist prior to the placement of the base materials.

To help achieve stability, the moisture content of the subgrade soils at the time of scarifying/recompaction should be in the range of -2% to +3% as determined by the Modified Proctor. If weak soil areas develop during the compaction, they should be removed and replaced with engineered fill as per the on-site project engineer.

The final compaction should be evaluated by a test rolling program conducted with rubber-tired heavy construction equipment (a loaded dual axle truck is preferable). Deflections or rutting of the subgrade soils by 1 inch or more should be reworked or replaced with a suitable fill soil compacted to the specified density and moisture so that a deflection of less than 1 inch is achieved. The test rolling program should be documented and accepted by the project engineer.

Alternatively, if soil moisture conditions, shallow utilities, etc. do not permit adequate compaction and stability of the subgrade soils to be achieved, a high strength geotextile fabric or geogrid can be placed at the bottom of the subcut to aid in improving the subgrade strength and stability. In our opinion, a high strength geotextile fabric such as a Marafi HP 370, or functionally equivalent, should be considered.

- **Geotextile Fabric**

It is our opinion that a geotextile fabric should be considered as part of the design pavement section for the terminal ramp. For general purposes, we recommend a light to medium weight geotextile fabric such as a Linq GTF-200, Marafi 170N, or functionally equivalent. The primary purpose of geotextile fabrics is to help limit the clay and silt particles of the subgrade soils from migrating up into the granular base materials. This migration of the clay and silt particles often weakens the granular base materials and shortens the design life of the pavement section.



- **Subgrade and Surface Drainage**

- **Additional Subgrade Fill Soils (Engineered Fill)**

2.4.1 CBR & Proctor Tests – Terminal Ramp Area

Prior to performing the CBR tests, the combined soil sample was split into three separate “sub samples” in order to run the three CBR tests of the same soil at three different moisture contents. The moisture contents of the three “sub samples” were adjusted to approximately 3% below

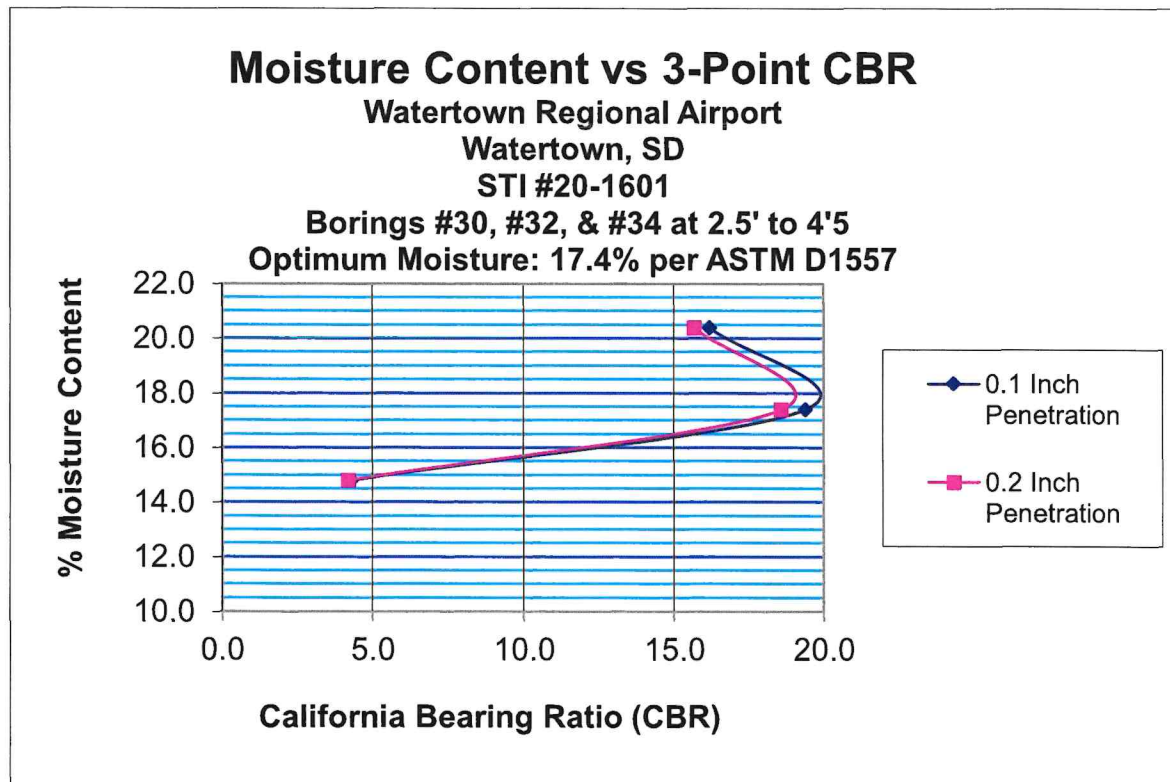
optimum, at optimum, and 3% above optimum, as per the Modified Proctor Density (ASTM: D1557). After compacting the three “sub samples” to the specified density and at the three different moisture contents, they were water soaked over several days and allowed to swell prior to determining the CBR values. The CBR tests were then run at 95% ($\pm 0.2\%$) of the Standard Proctor Density. The results of the three CBR test values are shown in the table below. The CBR test sheets are attached to this report.

TABLE 3

Boring # (Depth –ft)	Moisture Content	CBR Test Value (0.1-inch penetration)	Swell (%)
(#30, #32 and #34 (2'-4.5'))	14.8% (2.6% below optimum*)	4.3	4.4
	17.4% (optimum*)	19.4	1.3
	20.4% (3% above optimum*)	16.2	0.4

*As per the Modified Proctor Density (ASTM: D1557)

The results of the three CBR test values at 95% compaction and at the 3 different moisture contents are shown in graphical form below.



As can be seen in the tables and graph above, the CBR values of the soils change significantly with changes in the moisture content. A low moisture content dramatically decreases the CBR value. Thus, since the moisture contents of the subgrade soils vary at the site during construction, the CBR value chosen for design is typically less than the optimum value.

Also, please keep in mind that the CBR test values are based on the clay subgrade soils being re-worked and compacted to at least 95% of ATSM: D1557. If the “alternative pavement section” is used, only the top 6-12 inches of the subgrade soils will be re-worked and compacted to 95%. Thus, the overall CBR value will not reach the values listed in the CBR test reports.

It is our opinion that the CBR values of the clay subgrade soils in their current conditions are on the order of 1.5% to 2.0%. However, the subgrade CBR value will increase with the scarifying/recompaction of the top 6 to 12 inches of exposed subgrade soils, the placement of the geotextile fabric, and the likely placement of additional subgrade fill soils. Based on this method of site preparations and if the subgrade soils are placed and compacted within 2% below and 3% above the optimum moisture content (ASTM D1557), we estimate that a subgrade CBR value of about 8% can be used for design of the terminal ramp pavement section.

2.5 Discussion – Terminal Building

• Soil Profile - Terminal Building Area

The boring logs suggest that the general soil profile in the terminal building area consists of the following. Please see the attached boring logs.

- Clay “fill” soils and/or clay “topsoil” to depths of 1 to 4 feet below existing grade.
- Native clay “alluvium” (water deposited soils) to depths of 2.8 to 6.5 feet below the existing grades. (Note: Clay “alluvium” was not encountered in boring #25.)
- Sand “alluvium” soils which extend from below the clay “alluvium” to the termination depths of the borings at 16 to 26 feet below the existing grades.

• General

Based on the subsurface conditions encountered at the boring locations, it is our opinion that the soils at the site will support the proposed structure on shallow spread footing foundations, provided the recommendations in this report are performed and the estimated settlements are acceptable. Listed below are some of the more prominent site conditions.

- **FOOTING AREAS:** “Fill” soils and “topsoil” were encountered at the site and extended from the surface to depths of 1 to 4 feet below the exiting grades. Also, somewhat weak native clay “alluvium” soils exist immediately below the “fill” soils and “topsoil” and extended to depths of 2.8 to 6.5 feet below existing grade. In our opinion, these soils are not suitable for support of the footings and should be removed from the footing areas to expose the native sand “alluvium” soils.
- **FLOOR AREA:** As mentioned above, “fill” soils and “topsoil” were encountered at the site and extended from the surface to depths of 1 to 4 feet below the exiting grades. Similar to the footing areas, the “fill” soils and “topsoil” are not suitable for support of the floor slab and should be removed from the floor areas. The native clay “alluvium” soils below the topsoil can be used for support of the floor slab.
- **SOIL DISTURBANCE:** The clay soils encountered at the site are sensitive to disturbance and care must be taken to not disturb them. If they become disturbed, they must be replaced with engineered fill.

2.5.1 Site Preparations – Terminal Building

FOOTINGS (Interior, Exterior, & Thickened Edged): In our opinion, the existing “fill” soils and “topsoil” should not be used for support of the footings. In addition, the underlying native clay soils are somewhat weak and should not be used for support of the footings. Therefore, we recommend that the excavations for the footings extend through the existing “fill” soils, “topsoil.” and native clay “alluvium” soils to expose competent native sand “alluvium” soils at the minimum depths shown in Table 4 below.

The footings can rest on the competent native sand soils or, they can rest on engineered fill soils (soils that have been compacted and tested to the specified density) placed above the native sand soils to meet the design footing grades. However, prior to placement of the footings or additional engineered fill, the exposed native sand “alluvium” soils should be wetted and then surface compacted using a self-propelled vibratory roller. They should be compacted to a minimum of 97% of the Standard Proctor Density as per ASTM: D698.

During the footing area excavation, the exposed soils should be observed by STI’s on-site Geotechnical Engineer. Soft, or otherwise weak soils should be excavated as directed by the Geotechnical Engineer. Once adequate excavation depths are reached and the exposed native

sand soils are approved by STI's on-site Geotechnical Engineer, the footings or engineered fill can be placed.

The approximate minimum recommended footing area excavation depths and corresponding elevations at each boring location are shown in Table 4 below. They are also noted on each of the attached boring logs. Also, refer to Figure #1 on page 15 showing the "Typical Site Preparations." Please note that the required footing excavation depths may be significantly different at other locations at the site.

TABLE 4 – FOOTING AREA EXCAVATIONS

Boring #	FOOTING EXCAVATION DEPTHS	FOOTING EXCAVATION ELEVATIONS
	Minimum Depths of Excavation Below Existing Grade (Feet)	Corresponding Minimum Excavation Elevations (Feet)*
15	4.8	1733.6
16	6.0	1732.6
22	2.8	1734.0
23	3.0	1733.7
24	6.5	1731.5
25	1.5	1733.7
26	5.5	1732.4
27	5.5	1732.0
28	4.5	1733.3

**Elevations based on the surface elevations provided by Helms and Assoc.*

FLOOR SLAB: In our opinion, the existing "fill" soils and "topsoil" should not be used for support of the floor slabs. Therefore, we recommend that site preparations for the floor slab area consist of excavating through the existing "fill" soils and "topsoil" to expose the competent native clay "alluvium" soils at the minimum depths shown in Table 5 below.

During the floor area excavation, the exposed soils should be observed by STI's on-site Geotechnical Engineer. Soft, or otherwise weak soils should be excavated and replaced with engineered fill as directed by the Geotechnical Engineer. Once adequate excavation depths are reached and the exposed native clay soils are approved by STI's on-site Geotechnical Engineer, engineered fill soils (soils that have been compacted and tested to the specified density) should be placed above the native clay soils to meet the design floor grades. (See Engineered fill recommendations on page 18.)

Note: The native clay soils encountered at the site are sensitive to disturbance and care must be taken to not disturb them. If they are disturbed or weakened by construction traffic or other causes, they should be excavated to deeper depths. Alternatively, it may be possible to re-work and compact the weak or disturbed soils in-place. If so, they must be density tested to verify that adequate compaction has been achieved.

The approximate minimum recommended floor area excavation depths and corresponding elevations at each boring location are shown in Table 5 below. They are also noted on each of the attached boring logs. Also, refer to Figure #1 on page 15 showing the “Typical Site Preparations.” Please note that the required floor excavation depths may be significantly different at other locations at the site.

TABLE 5 – FLOOR AREA EXCAVATIONS

Boring #	<u>FLOOR</u> <u>EXCAVATION DEPTHS</u>	<u>FLOOR</u> <u>EXCAVATION ELEVATIONS</u>
	Minimum Depths of Excavation Below Existing Grade (Feet)	Corresponding Minimum Excavation Elevations (Feet)*
15	1.5	1736.9
16	3.0	1735.6
22	1.0	1735.8
23	1.5	1735.2
24	4.0	1734.0
25	1.5	1733.7
26	3.0	1734.9
27	2.5	1735.0
28	1.8	1736.0

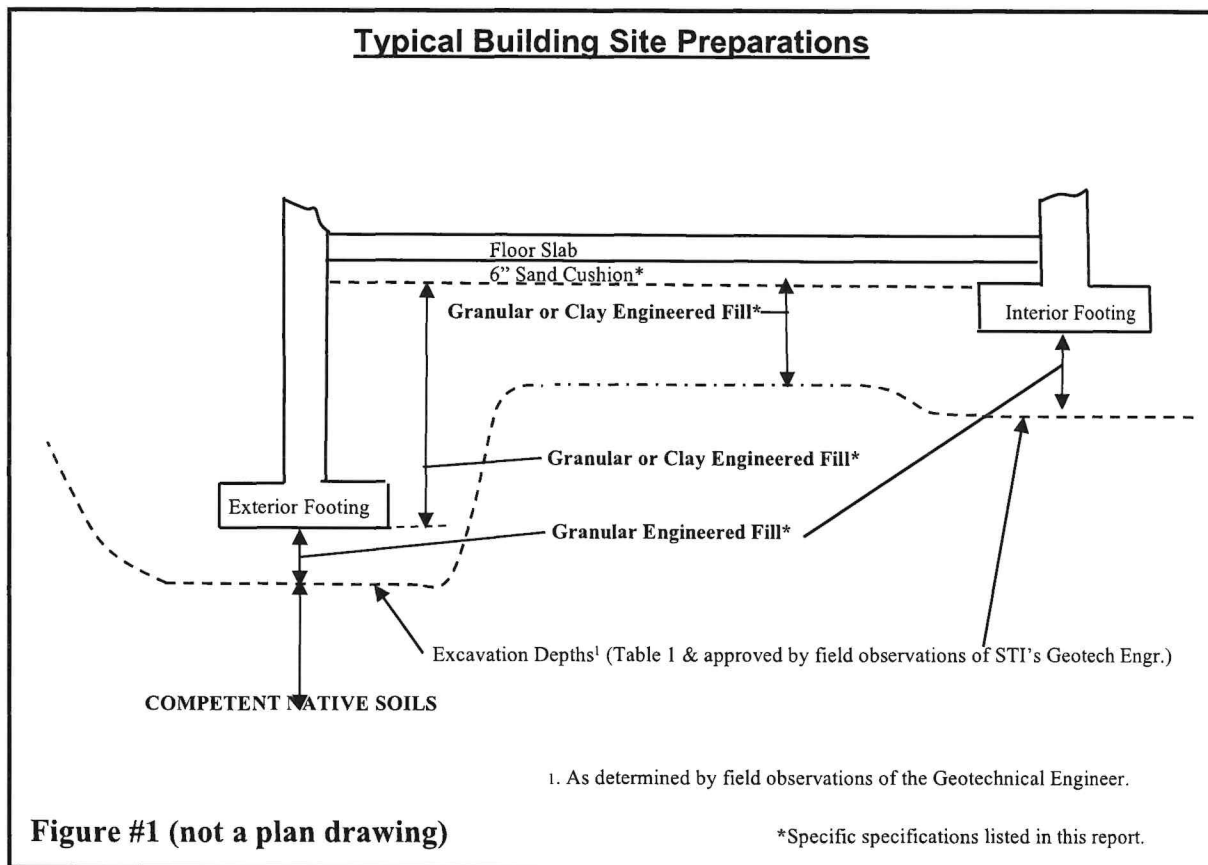
****Elevations based on the surface elevations provided by Helms and Assoc.**

- **Geotechnical Engineer’s Observations**

Soil types and strengths can sometimes vary around and in-between the borings. Some soils may not be as competent as those encountered in the borings. Therefore, we recommend that the soils exposed in the final footing and floor area excavations of the proposed structure(s) be observed in the field by a Geotechnical Engineer from Soil Technologies, Inc (STI). The Geotechnical Engineer will compare the exposed soils with the soils listed on the boring logs of this report to determine if they are the correct soil types and strengths. Once the type and strength of the soils exposed in the excavations are judged competent by STI’s Geotechnical Engineer, the engineered

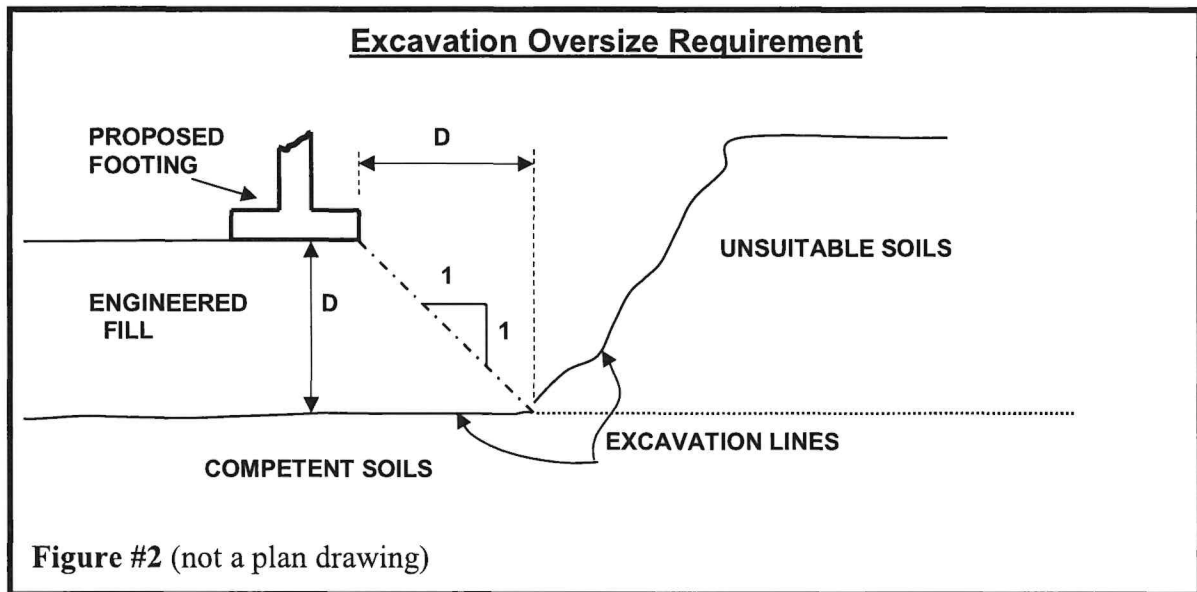
fill, concrete footings, and floors can be placed as needed. STI's Geotechnical Engineer will provide a written report detailing the observations of the exposed soils in the footings and floor slab areas. **The general contractor or owner's representative should contact STI's Geotechnical Engineer to perform these field observations prior to the earthwork phase of the project.**

Note: This report and its recommendations are a **two-step process**. The first step is the implementation of the recommendations of this report during the design of the project. The second step is the implementation of these recommendations during construction. **The second step is critical to the success of the project, and it must include the field observations by STI's Geotechnical Engineer.** It has been our experience that the lack of field observations by the Geotechnical Engineer during the earthwork phase of the project can result in oversight, in part or in whole, of the recommendations of the soils report. Therefore, in the absence of our field observations for the entire footprint of the proposed structure(s), we make no representation and assume no responsibility for the proposed structure(s).



- **Excavation Oversize Requirements**

Engineered fill placed below the footings should be oversized one foot laterally for each foot of fill placed below the footings (extend the excavation outwards from the outer edges of the footings a distance of 1 foot for every 1 foot of fill placed below the footings). Please see Figure #2 below illustrating the excavation oversize requirement.



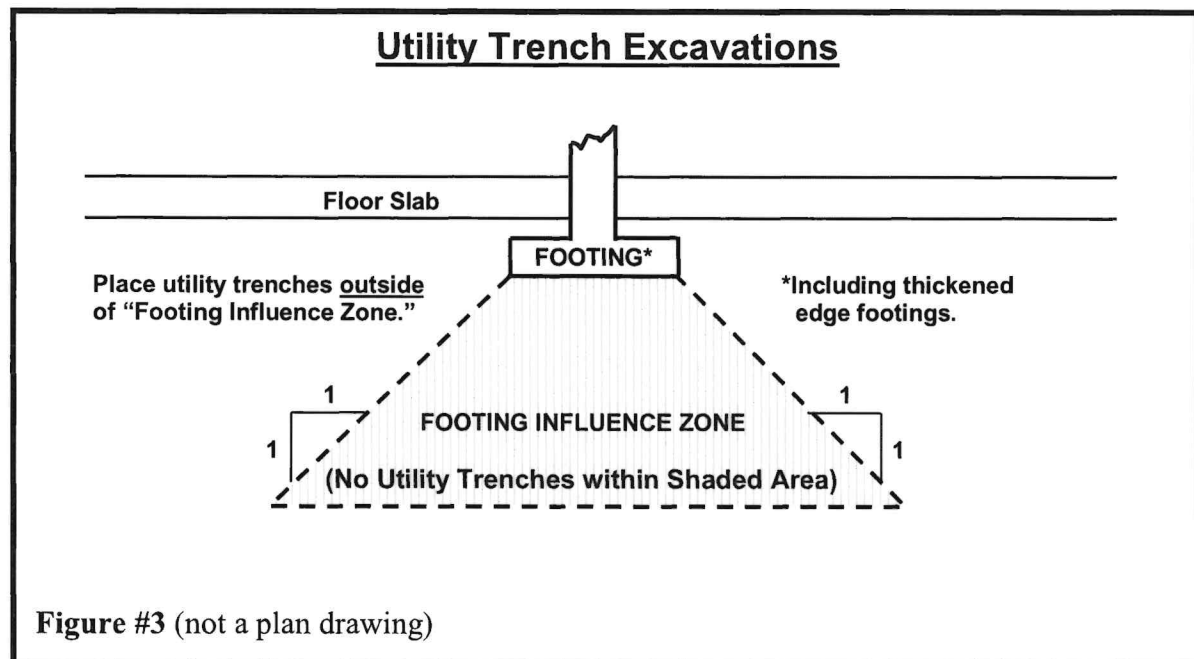
- **Soil Disturbance**

The soils encountered at the site can be sensitive to disturbance, especially when their moisture conditions are high. Care should be taken not to disturb the soils underlying the footings, floor slabs, or other structural units. If disturbed, they should be completely excavated from these areas and replaced with engineered fill, or if the disturbance is shallow, recompact in-place and density tested. Also, the site preparations should include complete removal of all remnants of any previously existing structures, utilities, tree roots, etc. Excavations to remove these items, or other intrusions (accidental, deliberate, or otherwise) into the soils underlying the footings or floor slab, should be backfilled with engineered fill and compacted to the specified density.

- **Utility Trenches**

Utility trenches within the building footprint (and in structural areas outside the building footprint) should be refilled with engineered fill. The engineered fill should be compacted and tested to the specified density. In addition, utility trenches should not be placed within the influence zone of the footings, including the influence zone of thickened edge footings. Please

see to Figure 3 below. If it is necessary to install a utility by crossing beneath a footing, that portion of the utility trench below the footing should be refilled with a lean concrete mix (flowable fill).



- **Compaction Equipment and Placement of Engineered Fill**

Engineered fill should be compacted in maximum 12-inch loose lifts using heavy, self-propelled compaction equipment, or maximum 6-inch loose lifts using hand-operated compaction equipment. Smooth-faced, vibratory compaction equipment should be used for compaction of granular engineered fill. Clay engineered fill should be placed at a moisture content ranging from -4% to +2% of the optimum moisture content as determined by the Standard Proctor (ASTM: D698). The moisture content of granular engineered fill (sand) should be such to achieve the specified compaction. The moisture content of the clay soils should be maintained until placement of the footings and floor slabs. The engineered fill should be free of frost and should not be placed on frozen soils. Please refer to the attached "Precautions...During Cold Weather."

- **Engineered Fill Below Foundation and Floor Areas**

We recommend the following types of engineered fill be used.

Above the footings and more than 6 inches below the bottom of the floor slab (including utility trenches):	<u>If moist to dry soil conditions exist in the excavation,</u> use a granular engineered fill such as a pit run or processed sand or sand with gravel (SP, SW, SM, and SC) or a clay engineered fill such as a non-organic and non-expansive lean clay (CL). The pit run and processed sand should have a maximum gravel/cobble size of 3 inches. The clay should have a liquid limit of less than 45. <u>If wet or saturated soil conditions exist in the excavation,</u> a clean and medium to coarse grained sand (SP or SW) will likely be required until at least 2 feet above the wet or saturated soil level in order to achieve the required compaction. The clean sand should have a maximum gravel/cobble size of 3 inches, a maximum 40% passing the #40 sieve, and a maximum 5% passing the #200 sieve. <u>NOTE the following:</u> - The on-site, non-organic lean clay soils (brown) are acceptable as CL engineered fill. - Organic soils (topsoil) should not be used for engineered fill.	
Below the footings:	<u>If moist to dry soil conditions exist in the excavation,</u> use a granular engineered fill such as a pit run or processed sand or sand with gravel (SP, SW, SM, and SC). The pit run and processed sand should have a maximum gravel/cobble size of 3 inches and less than 15% fines passing the #200 sieve. <u>If wet or saturated soil conditions exist in the excavation,</u> use a clean and medium to coarse grained sand (SP or SW) will likely be required until at least 2 feet above the wet or saturated soil level in order to achieve the required compaction. The clean sand should have a maximum gravel/cobble size of 3 inches, a maximum 40% passing the #40 sieve, and a maximum 5% passing the #200 sieve.	
6-inch sand cushion below floor slab:	The final 6" of engineered fill (fill directly beneath the floor slab) should consist of free draining sand (SP or SW) having a maximum gravel size of 1" and with less than 10% passing the #200 sieve by weight. The purpose of the sand cushion is to provide a working surface for the placement of concrete and also to serve as a capillary barrier.	
Compaction of engineered fill: (Less than 5 feet total thickness)	Below Footings <u>and within the footing influence zone:</u> Below Floor Slabs: Utility Trenches (inside & within 10' outside of the building):	97% of the ASTM: D698* 95% of the ASTM: D698* 95% of the ASTM: D698* *Standard Proctor Density

- **Polyethylene Vapor Membrane (Slab-on-grade)**

We recommend that consideration be given to placing a polyethylene vapor membrane beneath the floor slab, especially if there are areas where moisture/sensitive floor coverings are planned. If used, consideration should be given to the potential of curling of the concrete floor due to the presence of the membrane. Placing the membrane at least 2 inches beneath the surface of the sand cushion can help to minimize the potential for curling of the concrete floor. The use and placement of the membrane should be decided by the architect or structural engineer of record.

- **Subgrade Modulus**

Placement of engineered fill soils from the bottom of the excavation to the design slab elevation will generally increase the overall modulus. The amount of increase is dependent on the type and depth of engineered fill placed. A granular engineered fill would generally provide a higher modulus than clay engineered fill. For design purposes, we have provided estimated subgrade modulus (“K”) values as listed below in Table 6. The subgrade modulus values are assumed to be at the surface of the described soil type compacted to at least 95% of the Standard Proctor density (ASTM: D698). Please note that these values are only estimates based on soil types and densities. “Plate Load Tests” should be performed to provide specific “K” values.

TABLE 6

<u>Soil Type</u> (Minimum 95% Compaction) and/or approved by the on-site Geotechnical Engineer)	<u>Depth of</u> <u>Engineered Sand</u> <u>Soils</u>	<u>Estimated</u> <u>Subgrade</u> <u>Modulus (pci)*</u>
Engineered Sand Soils over Lean Clay Soils	6” to 9”	130
Engineered Sand Soils over Lean Clay Soils	9” to 12”	170
Engineered Sand Soils over Lean Clay Soils	15” to 18”	200
Engineered Sand Soils over Lean Clay Soils	More than 20”	230

*Values should be reduced (up to 40%) for exterior pavements used for traffic during frost melting periods.

- **Frost Movement Below Slabs**

The existing clay soils likely have a moderate to high susceptibility of frost related movement. Therefore, if limited frost movement is desired below movement sensitive surfaces, such as unheated interior or exterior slabs, sidewalks, driveways, etc., significant depths (at least 30”) of free-draining granular fill having less than 12% passing the #200 sieve should be placed for their support. Placement of rigid insulation sheeting under at least 10 inches of free draining granular fill might also be considered to limit frost related movements of the unprotected surfaces.

2.5.2 Foundations

- **Allowable Soil Bearing Pressure**

In our opinion, the proposed structure can be supported on a shallow spread footing foundation system (column pads and/or strip footings). We recommend that the footings be designed using **an allowable soil bearing pressure of up to 4000 psf.**

The allowable soil bearing pressure listed above assumes that the site is prepared as recommended in section 2.2 Site Preparations and that the project is constructed as per the information and conditions listed in section 1.1 Project Information. **If the project information or conditions are changed, STI must be notified in writing for additional review.**

The allowable soil bearing pressure is based on our judgment of the soil conditions at the boring locations along with recommended compaction levels and our experience with similar soil conditions. The allowable soil bearing pressure is a net pressure and can be increased 30% for short-term loadings such as wind loads.

- **Foundation Settlement**

The recommendations in this report should provide a theoretical safety factor of at least 3.0 against localized shear failure. Long term total settlements of the building footings are estimated to be less than 1 inch with estimated differential settlements less than ½ inch over a 30-foot length.

Please note that the total and differential settlement of the footings and floor slab could be significantly greater than the above estimates if improper construction practices are used. These practices may include but are not limited to: allowing snow or ice to be incorporated into the engineered fill soils, allowing the soils below the footings or floor to be saturated or freeze prior to or after their placement, supporting the footings or floor slab on expansive soils such as fat clay (CH) or on soils that were inadvertently loosened during construction, etc.

- **Frost Depth**

For structures that are heated during their entire life, the exterior footings should be placed at a frost depth as per city code, or a minimum 4½ feet below finished grade. Interior footings can be placed at shallower depths provided they are protected from frost during and after construction.

For unheated structures, canopies, etc., both the exterior and interior footings should be placed at least 5½ feet below the finished exterior grade or the floor slab, as appropriate.

- **Seismic Category**

Based on IBC 2015, the subsurface conditions encountered at the site, and our experience with other general geologic conditions for this area, it is our opinion that Site Class D should be used to determine site coefficients and seismic design category.

- **Soil/Concrete Sliding Friction**

For horizontal loads, we recommend a soil-concrete friction factor of 0.35. The frictional factor should be applied only to the base (bottom) of the concrete foundation units and only the net downward vertical load should be used to determine the friction. An appropriate safety factor should be applied to the calculated lateral values.

2.5.3 Exterior Backfill

- **Soil Type**

Assuming the absence of retaining or below grade (basement or lower level) walls, the on-site or imported non-organic lean clay (CL) soils could be used for exterior backfill soils (fill soils placed along the outside the exterior foundation walls and adjacent areas). However, if high moisture conditions prevent the use of clay backfill, granular (sand) backfill soils could be used. Please refer to Figure #4 on page 23.

Organic soils (usually black colored) should not be used for exterior backfill, except for cover material. Also, soils that can expand, such as fat clay (CH), should not be used for backfill against retaining type structures or below slabs/sidewalks. Utility trenches or other excavations leading to the building foundations or floor areas should be backfilled with the on-site or imported non-organic clay or sand soils. If the on-site clay soils are used, the moisture content of some may have to be adjusted to near the optimum moisture content (as per ASTM: D698) prior to placement in order to achieve the specified density.

- **Compaction and Placement of Exterior Backfill**

Exterior backfill soils placed along foundation walls and in adjacent areas such as beneath lawns, sidewalks, traffic areas, or in utility line trenches, should be compacted to the following minimum densities:

TABLE 7

<u>Compaction of Exterior Backfill</u>	Light Traffic Areas (autos, driveways, sidewalks, etc. - below granular base):	95% of the ASTM: D698*
	Heavy Truck Traffic Areas (below granular base):	97% of the ASTM: D698*
	Utility lines and other backfill within 10 feet of the proposed structure(s) but not within the influence zone of the footings.	95% of the ASTM: D698*
	Non- Traffic Areas (lawns, landscaping areas, etc.) greater than 10 feet of the proposed structure(s)	92% of the ASTM: D698*

*Standard Proctor Density

Exterior backfill soils should be compacted in maximum 12-inch loose lifts using heavy, self-propelled compaction equipment, or maximum 6-inch loose lifts using hand-operated compaction equipment. Clay exterior backfill soils should be placed at a moisture content ranging from -4% to +2% of the optimum moisture content as determined by the Standard Proctor. The moisture content of granular engineered fill (sand) should be such to achieve the specified compaction. Smooth-faced, vibratory compaction equipment should be used for compaction of granular backfill soils. The backfill material should be free of frost and should not be placed on frozen soils. Please refer to the “Precautions...During Cold Weather” attached to this report.

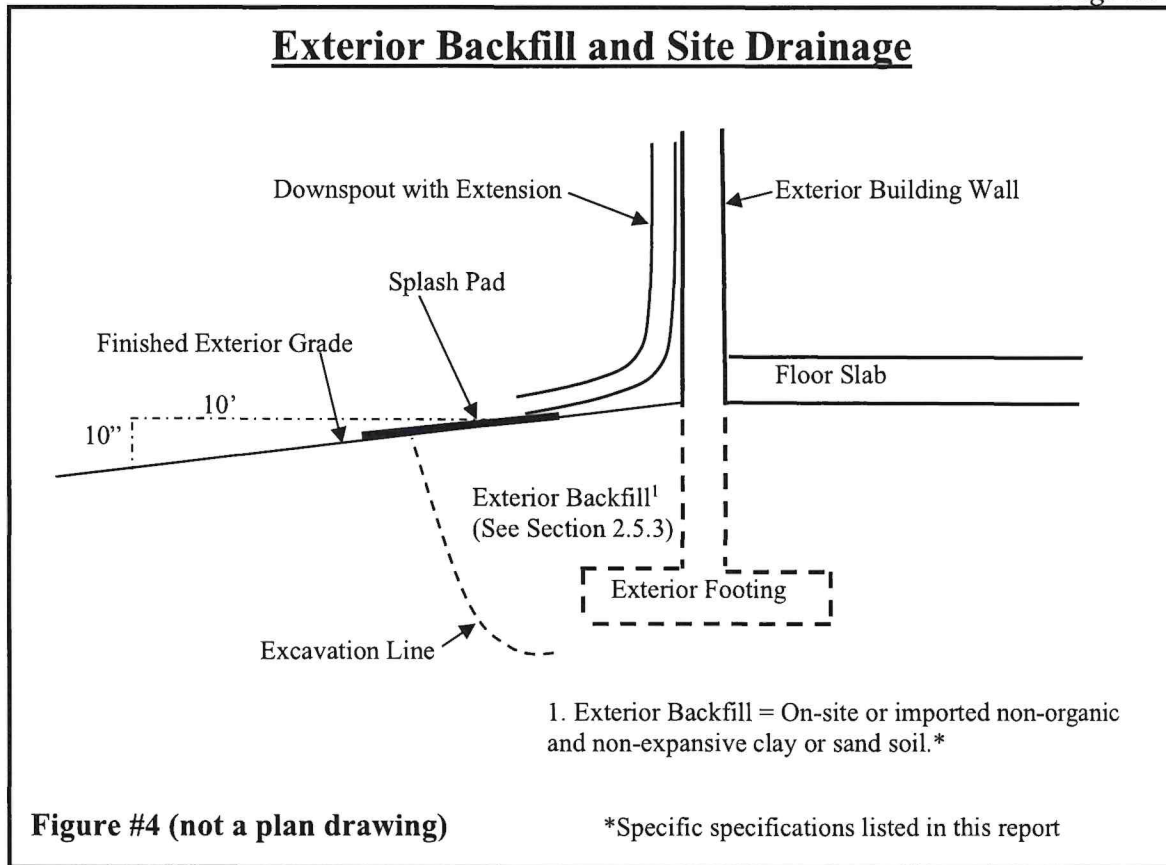
2.5.4 Site Drainage

- **Site Grading**

Proper drainage should be maintained during and after construction. General site grading should not allow water to pond in the building area or in the excavations. Any ponded water should be removed immediately. Finished grades around the perimeter of the structure should be sloped away from the structure with a minimum slope of 1 inch per foot for at least 10 feet beyond the excavation lines. (Please refer to Figure #4 below.) The slope can be reduced to ¼ inch per foot in areas that are completely surfaced and properly sealed with asphalt or concrete. The slope and proper drainage should be maintained throughout the life of the structure.

- **Roof Runoff**

Roof runoff water should be controlled by a system of downspouts and gutters with proper extensions to remove the runoff water away from the structure. The gutters and downspouts, as well as splash pads and extensions, should be maintained so that leakage does not occur adjacent to the structure. (Please refer to Figure #4 below.)



2.5.5 Lateral Earth Pressures

For calculation of lateral earth pressures, we recommend the following estimated ultimate pressure values listed in the tables below. The pressure values are equivalent to that generated by a fluid.

TABLE 8

Equivalent Fluid Pressures (Above Groundwater Conditions – Drained Condition)

Soil Type	Active Pressure (pcf)*	At Rest Pressure (pcf)*
Free Draining Sands (SP, SW, SP-SM, SW-SM)	35	55
Silty Sands & Clayey Sands (SM & SC)	42	63
Lean Clay Soils (CL)	42	65

*pcf = pounds per cubic foot

TABLE 9
Equivalent Fluid Pressures (Submerged Conditions)

Soil Type	Active Pressure (pcf)*	At Rest Pressure (pcf)*
Free Draining Sands (SP, SW, SP-SM, SW-SM)	78	87
Silty Sands and Clayey Sands (SM & SC)	83	92
Lean Clay Soils (CL)	85	95

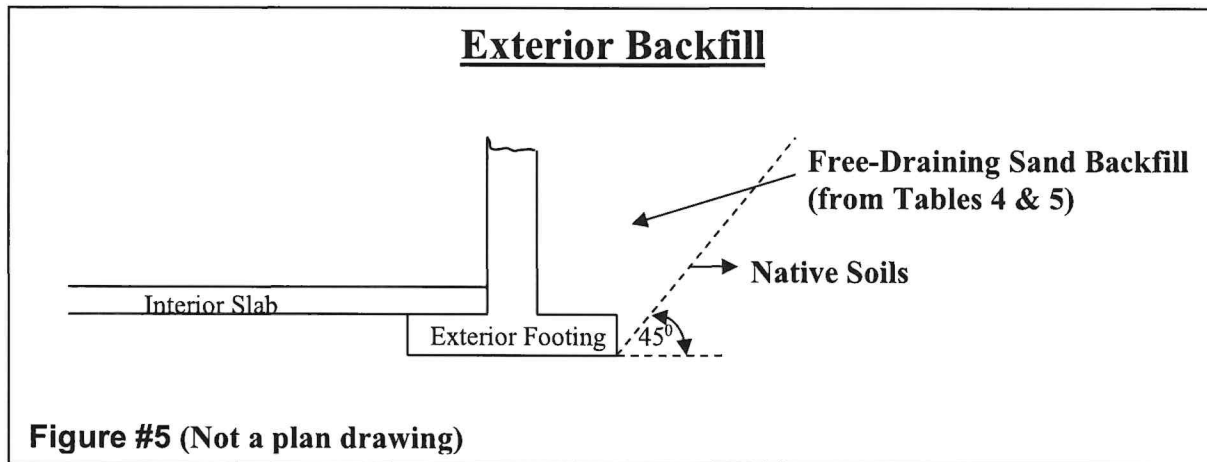
*pcf = pounds per cubic foot

Please note that if the pressures listed for the free-draining sands (SP), (SW), (SP-SM) or (SW-SM) are used in the design, we suggest that full time on-site observations and soil tests of the backfill be performed to insure that only free-draining sands are actually used for all the backfill. If there is some doubt that the observations and testing is going to be performed, we suggest that the more conservative pressures listed for the (SM, SC or CL) be used in design.

The values calculated for the above parameters would provide ultimate values. An appropriate safety factor should be applied to the calculated design values. Also, the above values are not applicable to dynamic loading conditions. Additionally, the stated parameters for the submerged conditions should be used according to high ground water records which can be as high as 3 feet below grade during the spring thaw or high rainfall events.

The below grade structures should be waterproofed if possible. Drintile should be incorporated in the design for below grade structures. Design considerations should be given to buoyancy factors in the case that dewatering is interrupted during the life of the structure. Unit weights of 95 pcf and 31 pcf can be used for the soil above and below the groundwater level, respectively.

The above values assume that the on-site soils adjacent to the retaining structure are in their undisturbed state or, if laterally over-excavated and backfilled, compacted to a density of 95% to 102% of the Standard Proctor density. Also, if the walls are designed using the equivalent fluid pressures for a “free-draining sand” (SP, SW, SP-SM, SW-SM), the free-draining sand backfill soils around the perimeter of the structure and related components should extend outward at a 45° (or greater) “wedge” angle. Please see figure #5 below. The placement of the free-draining sand backfill should be verified in the field by the geotechnical engineer. Also, based on the design of the retaining wall(s), the structural engineer should specify on the structural plans the type of soil(s) that is permitted for exterior backfill of the retaining walls (SP, SW, SP-SM, SW-SM, SM, SC, or CL) and if a 45° “wedge” is required.



For lateral pressure exerted on the below grade walls due to the weight of an adjacent foundation, we recommend using a coefficient of at-rest lateral earth pressure of 0.4 for the sand backfill and 0.5 for the native lean clay or lean clay “fill” soils.

3.0 CONSTRUCTION AND DESIGN CONSIDERATIONS

3.1 Site Excavation

- **Soil Disturbance & Moisture Changes**

The soils encountered at the site can be sensitive to disturbance and will experience strength loss under the influence of construction traffic and/or additional moisture. Construction traffic in areas where these soils are used for structural support should be limited. If self-propelled compaction equipment is used, extra care should be taken so as not to disturb (weaken) the native soils, especially if the compaction equipment is used in a vibratory mode. Disturbance or saturation of the soils will require additional excavation and backfilling. Also, the excavations should be done with an excavation bucket having a smooth cutting edge.

The excavations should be left open a minimal amount of time to prevent strength loss of these soils by ponding of water or changes in their in-situ moisture content. In addition, surface drainage away from the excavations should be provided during construction.

- **Dewatering**

We do not anticipate that the excavations will extend below the groundwater level, and thus, dewatering techniques for proper placement of engineered fill and/or the footings/floor slab

system are not anticipated, but it should not be ruled out. Please refer to the groundwater measurements listed at the bottom of the attached boring logs.

If the excavations do extend below the groundwater level and immediate placement and compaction of the first 2-3 feet of engineered fill can be performed, dewatering may not be necessary. Alternatively, if the engineered fill cannot be immediately placed and compacted, dewatering the excavations (lowering the ground water level within and below the bottom of the excavations) should be provided during the excavations, and the excavations should remain dewatered until placement of the engineered fill, foundations, and lower portions of the exterior backfill are completed. Dewatering will also help limit the potential softening or loosening of the native clay soils prior to placement of the engineered fill and footings

- **Existing Structure**

Although not anticipated, if the foundations for the proposed building are placed next to an existing structure, care should be taken not to undermine the foundations of the existing structure. Also, to prevent additional loading on the existing foundations, the new foundations should rest at or below the depth of the existing foundations. If the new foundations rest within a 45° envelope below the existing foundations, the new foundations may need to be designed for increased loading. Please contact us if this situation develops in the design.

- **Exterior Movement**

Exterior architectural features, slabs, and utilities can experience moisture or frost related movement which can result in distress. The risk of this potential movement and subsequent distress can be reduced (but not necessarily eliminated) by:

1. The use of control joints.
2. The use of self-adjusting utility connections.
3. Allowing for movement for exterior features attached to structural elements.
4. The use of significant depths of granular fill material beneath slabs-on-grade.
5. Proper drainage away from exterior slabs-on-grade.
6. Placement of rigid insulation sheeting under at least 10 inches of free draining granular fill.

- **OSHA**

Excavations must comply with the requirements of local, state, federal and other prescribed safety regulations, e.g., OSHA 29 CFR Part 1926, Subpart P, "Excavations." Reference to these requirements should be included in the project specifications.

3.2 Excavation Observation and Testing

The recommendations contained in this report are based on the subsurface conditions found at the boring locations. It is possible that there are soil conditions on the site that were not represented by the borings. Consequently, on-site observation by a qualified Geotechnical Engineer during construction is considered integral to the successful implementation of the recommendations.

We recommend that a Geotechnical Engineer from Soil Technologies, Inc. be on-site during the excavation operations. The engineer will judge if the soils exposed at the bottom and along the sidewalls of the excavations are adequate for support of the floor slab and for the foundations designed with the allowable soil bearing pressure recommended in this report. The engineer will also verify that the site preparation recommendations of this report have been implemented during construction. In addition, we recommend that density testing be performed within the sequence of the engineered fill.

3.3 Concrete

The concrete should be composed of a quality mix that has proven success, or a mix design should be established for proper proportions of aggregate, cement, water, and any admixtures. The concrete should be handled, placed, and cured according to the recommendations in the current ACI manual. Improper mix designs, placement methods, saw joints, curing methods, temperatures, etc. could result in the concrete experiencing excessive shrinkage, cracking, curling, pop-outs, and other distress. These items should be monitored by a qualified engineer during construction. Also, floor covering should not be placed on the slab until it is near fully cured. Typically, flooring manufactures require 3 to 4 weeks or more of curing time at room temperature (60° F or more) prior to placement of flooring.

4.0 GENERAL EXPLORATION INFORMATION

4.1 Scope of Exploration

We have conducted a soil exploration program for the proposed project. The scope of our services under this exploration is limited to the following:

1. To perform test hole borings to explore the subsurface soil and groundwater conditions.
2. To perform nominal laboratory tests to aid in judging the soil properties.
3. To provide a geotechnical engineering report including the results of the field and



laboratory tests as well as geotechnical engineering opinions and recommendations that are relative to the project.

Thirty-four (34) standard penetration borings were performed at the site on March 16th - 19th, 2020. The borings were performed at the locations staked by *Helms & Associates* and as shown on the attached sketch. Some settlement of the soils used to fill the open bore holes should be anticipated and closure of the holes is the responsibility of the client or property owner.

4.2 Site Surface Conditions

The site of the proposed construction is located at the Watertown Regional Airport in Watertown, SD. The site is bordered on the northwest by Airport Drive West. The surfaces at the boring locations consisted of asphalt and grass at the time of our soil exploration program. The overall general topography of the site is relatively level. The ground surface elevations at the boring locations were provided by *Helms & Associates*. The elevations are listed at the top of the boring logs.

4.3 Site Subsurface Conditions

The subsurface conditions encountered at each boring location are illustrated on logs attached to this report. The logs also indicate the possible geologic origin of the materials encountered. A description of the general soil profile is also provided in section **2.1 Discussion**. We wish to point out that the subsurface conditions at other times and locations at this site may differ from those found at our boring locations. If different subsurface conditions are encountered during construction, it is necessary that you contact us so that our recommendations can be reviewed.

4.4 Water Levels

Observations for subsurface groundwater were made at the boring locations during our field operations. Groundwater was encountered at some of the boring locations during our sampling operations. Specific information relative to the groundwater observations is shown at the bottom of the attached boring logs.

Please note that in order to accurately determine the static groundwater level, observations over a long period are usually required. Such periods of observation are normally not available in a

typical soil exploration program. Seasonal and annual fluctuations of the groundwater levels should be expected to occur. It is possible that the subsurface groundwater levels during or after construction could be significantly different than at the time the borings were performed.

4.5 Laboratory Test Program

Soil samples were selected for laboratory tests to determine the engineering and index properties. Where applicable, the tests were performed in accordance with the American Society for Testing and Materials (ASTM) procedures. The test results are shown on the test hole boring logs opposite the samples upon which the tests were made or, they are attached.

5.0 LIMITATIONS, REVIEW, USE, AND PURPOSE OF REPORT

- **Limitations**

The data obtained from the sampling and testing of the soils encountered at the boring locations are the basis of the recommendations submitted in this report. However, variations can occur between these borings and between the samples. Thus, no exploration program can totally reveal the exact subsurface conditions for the entire site. If the subsurface conditions encountered at the time of construction differ from those represented by our borings, it is necessary to contact us so that our opinions and recommendations can be reviewed. Differing subsurface conditions may result in altering our recommendations which may affect construction costs. It is suggested that a contingency be provided for this purpose.

- **Review of Report**

This report is founded on the information and conditions listed in this report for design of the proposed project(s). We recommend that we be retained to briefly review the geotechnical aspects of the final design and specifications to determine whether any changes in design may have had an effect on the validity of the recommendations contained in this report, and whether our recommendations have been correctly communicated so that their intent has been implemented in the design and specifications. Divergence from our recommendations by the design, specifications, or field applications shall relieve us of the responsibility unless our written agreement with such divergence has been obtained. Also, we recommend that this report be provided to all owners along with the architects, engineers, contractors, etc. chosen for design and construction of the project.

- **Use of Report**

This report is intended for the Client's sole use and benefit and solely for the Client's use in design and construction of the proposed project described herein and preparation of construction documents. The data, analysis, and recommendations in this report may not be appropriate for other extensions of the proposed project or for any other project or purposes. Thus, this report shall not be used or relied on by any other person or entity for extensions of the proposed project or for any other project or purpose. Parties contemplating extensions of the proposed project or for any other projects or purposes must contact us for additional review. In the absence of our written review and approval, we make no representation and assume no responsibility for extensions of the proposed project or for any other projects or purposes. Also, this report is not a bidding document and is only an aid in design and construction of the proposed project. Contractors and others involved in the project must draw their own conclusions regarding the site conditions and construction methods.

- **Purpose of Report**

The purpose of this report is to present the results of our field and laboratory tests as well as our geotechnical engineering review and recommendations for the project. Our work is intended for geotechnical purposes only and not to verify the presence or extent of any contamination at the site. If environmental information is desired, an environmental assessment should be conducted.

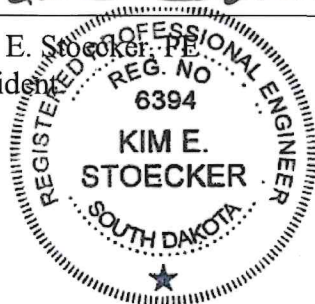
6.0 STANDARD OF CARE

The recommendations contained in this report represent our professional opinions. These opinions were arrived at in accordance with currently accepted engineering procedures at this time and location. Other than this, no other representation, guarantee, or warranty, either expressed or implied, is made.

This report was prepared by:



Kim E. Stoecker, P.E.
President



BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 1
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= **Longitude (West)=** **SURFACE ELEVATION =** 1742.5

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.7	1741.8	Fill, mostly Silty Sand, fine grained, a trace of Gravel, dark brown and brown, frozen	FILL		10	1	SPT	14						
		Fill, mostly Lean Clay, brown and black, frozen			13	2	SPT	26						
3.5	1739.0													
4.5	1738.0	Organic Lean Clay, black, moist (CL-OL)	TOPSOIL											
		Lean Clay, dark brown, moist, firm (CL)	FINE ALLUVIUM		8	3	SPT	26						
6.5	1736.0													
		Sand, fine to medium grained, a little Gravel, light brown, dry, medium dense to dense (SP)	COARSE ALLUVIUM		21	4	SPT							
					30	5	SPT							
11	1731.5	END OF BORING												
		"Moved boring 6" off of asplatt"												

WATER LEVEL MEASUREMENTS						▼	Boring Started: 3/19/2020 at 13:13		
							Boring Completed: at		
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
3/19/2020					NONE	Drilling Method: 3 1/4" HSA to 9.5			
						Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: R.H. Logged By: R.H.			
						Backfill Method:			

SOIL TECHNOLOGIES, INC 28822 124TH ST., MOBRIDGE, SD
 TELEPHONE: (605) 762-3406 FAX: 888-518-2157

Electronic File Copy Sent 4-30-2020

BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 2
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= **Longitude (West)=** **SURFACE ELEVATION =** 1740.2

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.8	1739.4	Fill, 6.5" of Asphalt over 3.5" of Sand	FILL		9	1	SPT							
		Fill, mostly Lean Clay, dark brown and brownish gray, a layer of Sand at 3'-3.5', frozen			21	2	SPT	15	117	4.5+		35	18	
3.5	1736.7	Organic Lean Clay, black, moist (CL-OL)	TOPSOIL		7	3	SPT	30						
6	1734.2	Lean Clay, brown, moist, stiff (CL)	FINE ALLUVIUM		11	4	SPT							
8	1732.2	Sand, fine to medium grained, a little Gravel, light brown, dry, dense (SP)	COARSE ALLUVIUM		33	5	SPT							
11	1729.2	END OF BORING												

WATER LEVEL MEASUREMENTS ▼						Boring Started: 3/19/2020 at 12:40			
						Boring Completed: at			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
3/19/2020					NONE	Drilling Method: 3 1/4" HSA to 9.5			
						Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: R.H. Logged By: R.H.			
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 3
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1739.6

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1	1738.6	Fill, 8" of Asphalt over 3" of Sand	FILL		7	1	SPT	22						
2	1737.6	Fill, mostly Sandy Lean Clay, a trace of Gravel, black and brown, frozen												
		Fill, mostly Lean Clay, black and brown, frozen to 3.5' then moist			18	2	SPT	24	94	0.9				
4	1735.6	Lean Clay, brown, moist, firm (CL)	FINE ALLUVIUM		5	3	SPT							
6.5	1733.1	Sand, fine to medium grained, a little Gravel, light brown, dry, dense to medium dense (SP)	COARSE ALLUVIUM		27	4	SPT	4						4
11	1728.6	END OF BORING			17	5	SPT							

WATER LEVEL MEASUREMENTS						Boring Started: 3/19/2020 at 11:41		
						Boring Completed: at		
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to		
3/19/2020			1'		NONE	Drilling Method: 3 1/4" HSA to 9.5		
						Jet with Drilling Mud: to		
						Hammer Type: Auto Hammer (140 lb)		
						Crew Chief: R.H. Logged By: R.H.		
						Backfill Method:		

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BORING LOG

STI JOB #: 20-1601		Project: Proposed Regional Airport Terminal		BORING #: 4													
		Location: Watertown, SD		Sheet 1 of 1													
Latitude (North)=		Longitude (West)=		SURFACE ELEVATION = 1741.7													
Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS									
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)			
1	1740.7	Fill, 8" of Asphalt over 4" of Sand	FILL		12	1	SPT										
2	1739.7	Fill, mostly Sandy Lean Clay, a trace of Gravel, black and brown, frozen															
		Lean Clay, brown, frozen to 3' then moist, stiff (CL)	FINE ALLUVIUM		11	2	SPT	24	91	0.8		38	22				
4	1737.7	Sand, fine to medium grained, a little Gravel, light brown, dry, medium dense (SP)	COARSE ALLUVIUM		19	3	SPT										
						23	4	SPT									
11	1730.7					21	5	SPT									
		END OF BORING															
WATER LEVEL MEASUREMENTS				▼													
				Boring Started: 3/19/2020 at 11:08													
				Boring Completed: at													
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to											
3/19/2020					NONE	Drilling Method: 3 1/4" HSA to 9.5											
						Jet with Drilling Mud: to											
						Hammer Type: Auto Hammer (140 lb)											
						Crew Chief: R.H. Logged By: R.H.											
						Backfill Method:											
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BORING LOG

STI JOB #: 20-1601		Project: Proposed Regional Airport Terminal		BORING #: 5	
		Location: Watertown, SD		Sheet 1 of 1	
Latitude (North)=		Longitude (West)=		SURFACE ELEVATION = 1741.3	

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS							
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)	
0.8	1740.5	Fill, 5" of Asphalt over 4" of Sand	FILL			1	HSA	18							
2	1739.3	Fill, mostly Lean Clay, dark brown and brown, frozen													
		Lean Clay, brown, frozen to 3' then moist, stiff (CL)	FINE ALLUVIUM		11	2	SPT	35							
5.3	1736.0				10	3	SPT								
		Sand, fine to medium grained, a little Gravel, light brown, dry, medium dense (SP)	COARSE ALLUVIUM			24	4	SPT							
10	1731.3				18	5	SPT								
		END OF BORING													

WATER LEVEL MEASUREMENTS						▼			
						Boring Started: 3/16/2020 at 14:53			
						Boring Completed: 3/16/2020 at 15:19			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
3/16/2020	15:20	10'	10'	8.5'	NONE	Drilling Method: 3 1/4" HSA to 8.5			
						Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: R.H. Logged By: R.H.			
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 6
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1739.3

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.8	1738.5	Fill, 5" of Asphalt over 4" of Sand	FILL		10	1	SPT	25	95	1.3		42	20	
2	1737.3	Fill, mostly Organic Lean Clay, black, frozen												
		Organic Lean Clay, black, frozen (CL-OL)	TOPSOIL		13	2	SPT	29	85					
4	1735.3	Lean Clay, brown, moist, firm (CL)	FINE ALLUVIUM		6	3	SPT							
6	1733.3	Sand, fine to medium grained with Gravel, light brown, dry, dense (SP)	COARSE ALLUVIUM		26	4	SPT							
11	1728.3	END OF BORING			28	5	SPT							

WATER LEVEL MEASUREMENTS ▼						Boring Started: 3/18/2020 at 17:52	
						Boring Completed: at	
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to	
3/18/2020		11'		9.5'	NONE	Drilling Method: 3 1/4" HSA to 9.5	
						Jet with Drilling Mud: to	
						Hammer Type: Auto Hammer (140 lb)	
						Crew Chief: R.H. Logged By: R.H.	
						Backfill Method:	

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 7
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1740.6

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.8	1739.8	Fill, 5" of Asphalt over 4" of Sand and Gravel	FILL		11	1	SPT							
2.5	1738.1	Fill, Mostly Lean Clay, a trace of Gravel, dark brown and black, frozen												
		Fill, mostly Lean Clay, black, frozen to 3.5' then moist			14	2	SPT	29	89	0.5				
4.5	1736.1	Sandy Lean Clay, a little Gravel, brown, moist, soft (CL)	MIXED ALLUVIUM		3	3	SPT							
7.3	1733.3	Sand, fine to medium grained, a little Gravel, light brown, dry, medium dense (SP)	COARSE ALLUVIUM		21	4	SPT							
11	1729.6	END OF BORING			24	5	SPT							

WATER LEVEL MEASUREMENTS						Boring Started: 3/16/2020 at 15:33			
						Boring Completed: 3/16/2020 at 15:50			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
3/16/2020	15:57	11'	11'	9.5'	NONE	Drilling Method: 3 1/4" HSA to 9.5			
						Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: R.H. Logged By: R.H.			
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 8
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1740.1

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.8	1739.3	Fill, 6" of Asphalt over 3" of Sand	FILL		7	1	SPT							
		Fill, mostly Lean Clay, black and brown, frozen												
3	1737.1	Organic Lean Clay, black, moist (CL-OL)	TOPSOIL		9	2	SPT	26	91	1.2		45	22	
5.5	1734.6				8	3	SPT							
6	1734.1	Lean Clay, dark brown, moist, firm (CL)	Fine Alluvium											
		Sand, fine to medium grained, a little Gravel, light brown, dry, medium dense (SP)	COARSE ALLUVIUM		15	4	SPT							
11	1729.1				18	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼						Boring Started:	3/18/2020	at	16:07
						Boring Completed:	3/16/2020	at	16:24
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method:			
3/16/2020	16:25	11'	11'	9.5'	NONE	Drilling Method:	3 1/4" HSA	to	9.5
						Jet with Drilling Mud:			
						Hammer Type:	Auto Hammer (140 lb)		
						Crew Chief:	R.H.	Logged By:	R.H.
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 9
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= **Longitude (West)=** **SURFACE ELEVATION =**

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.2	-1.2	Fill, 6" of Asphalt over 8" of Sand	FILL		5	1	SPT							
2	-2.0	Fill, mostly Sandy Lean Clay, brown, frozen												
		Fill, mostly Sand with Silt with Gravel, fine to medium grained, brown, frozen to 2.5' then moist			5	2	SPT							
4.5	-4.5	Lean Clay, brown, moist, soft (CL)	FINE ALLUVIUM		4	3	SPT							
6	-6.0	Sand, fine to medium grained, a trace of Gravel, light brown, moist, medium dense (SP)	COARSE ALLUVIUM		16	4	SPT							
11	-11.0	END OF BORING			16	5	SPT							

WATER LEVEL MEASUREMENTS ▼						Boring Started:	3/18/2020	at	8:15
						Boring Completed:	3/18/2020	at	8:32
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method:			
3/18/2020	8:33	11'	11'	9.5'	NONE	Drilling Method:	3 1/4" HSA	to	9.5
						Jet with Drilling Mud:		to	
						Hammer Type:	Auto Hammer (140 lb)		
						Crew Chief:	R.H.	Logged By:	R.H.
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 10
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= **Longitude (West)=** **SURFACE ELEVATION =** 1739.8

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.8	1739.0	Fill, 6" of Asphalt over 4" of Sand	FILL		7	1	SPT	24	98	1.9				
2	1737.8	Fill, mostly Sandy Lean Clay, a little Gravel, dark brown, frozen												
		Organic Lean Clay, black, frozen to 3' then moist (CL-OL)	TOPSOIL		9	2	SPT	32	79					
4	1735.8	Lean Clay, brown, moist, firm (CL)	FINE ALLUVIUM		7	3	SPT							
6.5	1733.3	Sand, fine to medium grained, a little Gravel, light brown, dry, medium dense to dense (SP)	COARSE ALLUVIUM		17	4	SPT							
11	1728.8				25	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS						Boring Started: 3/16/2020 at 16:44			
						Boring Completed: 3/16/2020 at 17:06			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
3/16/2020	17:07	11'	11'	9.5'	NONE	Drilling Method: 3 1/4" HSA to 9.5			
						Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: R.H. Logged By: R.H.			
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601		Project: Proposed Regional Airport Terminal		BORING #: 11	
		Location: Watertown, SD		Sheet 1 of 1	
Latitude (North)=		Longitude (West)=		SURFACE ELEVATION = 1737.2	

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS							
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)	
1.5	1735.7	Organic Lean Clay, a trace of Gravel, dark brown, wet (CL-OL)	TOPSOIL		4	1	SPT								
		Sand with Silt, fine to medium grained, a little Gravel, dark brown, moist, loose (SP-SM)	MIXED ALLUVIUM		9	2	SPT	8							8
4	1733.2	Sand, fine to medium grained, a little Gravel, light brown, dry, medium dense and loose (SP)	COARSE ALLUVIUM		19	3	SPT								
					10	4	SPT								
					14	5	SPT								
11	1726.2	END OF BORING													

WATER LEVEL MEASUREMENTS						Boring Started: 3/16/2020 at 17:25 Boring Completed: 3/16/2020 at 17:49			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to Drilling Method: 3 1/4" HSA to 9.5 Jet with Drilling Mud: to Hammer Type: Auto Hammer (140 lb) Crew Chief: R.H. Logged By: R.H. Backfill Method:			
3/16/2020	17:50	11'	11'	9.5'	NONE				

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 12
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1740.3

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1	1739.3	Organic Lean Clay, dark brown, frozen (CL-OL)	TOPSOIL			1	HSA							
		Lean Clay, brown, moist, firm (CL)	FINE ALLUVIUM		14	2	SPT							
3.5	1736.8													
		Sand, fine to medium grained, a little Gravel, light brown, dry, dense to loose to medium dense (SP)	COARSE ALLUVIUM		26	3	SPT							
					9	4	SPT							
					11	5	SPT							
11	1729.3	END OF BORING												

WATER LEVEL MEASUREMENTS ▼						Boring Started: 3/19/2020 at 13:52	
						Boring Completed: at	
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to	
3/19/20		11'	11'	9.5'	NONE	Drilling Method: 3 1/4" HSA to 9.5	
						Jet with Drilling Mud: to	
						Hammer Type: Auto Hammer (140 lb)	
						Crew Chief: R.H. Logged By: R.H.	
						Backfill Method:	

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 13
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= **Longitude (West)=** **SURFACE ELEVATION =** 1740.8

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.9	1739.9	Fill, 6" of Asphalt over 4" of Sand	FILL		11	1	SPT							
2	1738.8	Fill, mostly Lean Clay, dark brown, frozen												
		Lean Clay, a trace of Gravel, brown, frozen to 3' then moist, stiff (CL)	MIXED ALLUVIUM		10	2	SPT							
4	1736.8	Sand, fine to medium grained, a little Gravel, light brown, dry, medium dense (SP)	COARSE ALLUVIUM		12	3	SPT							
					20	4	SPT							
11	1729.8				12	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS						Boring Started: 3/17/2020 at 7:56			
						Boring Completed: 3/17/2020 at 8:16			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
3/17/2020	8:17	11'	11'	9.5'	NONE	Drilling Method: 3 1/4" HSA to 9.5			
						Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: R.H. Logged By: R.H.			
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 14
Location: Watertown, SD Sheet 1 of 1

Latitude (North)=		Longitude (West)=		SURFACE ELEVATION = 1738.8										
Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
2.5 														

WATER LEVEL MEASUREMENTS						Boring Started: 3/17/2020 at 15:52			
						Boring Completed: at			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
						Drilling Method: 3 1/4" HSA to 9.5			
						Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: R.H. Logged By: R.H.			
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 15
Location: Watertown, SD Sheet 1 of 2

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1738.4

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.5	1736.9	Organic Lean Clay, black, frozen (CL-OL)	TOPSOIL			1	HSA							
		Lean Clay, brown, frozen to 2' then moist, soft (CL)	FINE ALLUVIUM			2	SPT	23		1.2		36	20	
4.8	1733.6	Sand, fine to medium grained, a little Gravel, light brown, dry to 13' then brown and waterbearing, medium dense (SP)	COARSE ALLUVIUM			3	SPT							
						4	SPT	3						4
						5	SPT							
						6	SPT							
						7	SPT							
						8	SPT							

Floor Areas: Excavate the "Topsoil" to expose competent native Clay "Alluvium" soils at a depth of at least 1.5 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill to meet the design floor grade elevation.

For Footings: Excavate the "Topsoil" and Clay "Alluvium" soils to expose competent native Sand "Alluvium" soils at a depth of at least 4.8 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill if needed to meet the design footing grade elevation.

WATER LEVEL MEASUREMENTS						Boring Started: 3/18/2020 at 11:40			
						Boring Completed: 3/18/2020 at 12:28			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
3/18/2020	12:29	26'	26'	24.5'	14'	Drilling Method: 3 1/4" HSA to 24.5'			
3/18/2020	12:41		14'		13.3'	Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: Logged By:			
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 15
Location: Watertown, SD Sheet 2 of 2

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =**

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
26	1712.4	(Continued from Sheet 1)												
		END OF BORING			13	9	SPT							

WATER LEVEL MEASUREMENTS ▼						Boring Started: at	
DATE: TIME: SAMPLED TO: CAVE IN: CASING: DEPTH:						Boring Completed: at	
(SEE SHEET ONE)						Drilling Method: to	
						Drilling Method: to	
						Jet with Drilling Mud: to	
						Hammer Type: Auto Hammer (140 lb)	
						Crew Chief: Logged By:	
						Backfill Method:	

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BORING LOG

STI JOB #: 20-1601		Project: Proposed Regional Airport Terminal		BORING #: 16	
		Location: Watertown, SD		Sheet 1 of 1	
Latitude (North)=		Longitude (West)=		SURFACE ELEVATION = 1738.6	

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS								
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)		
3	1735.6	Fill, Mostly Organic Lean Clay, black and dark brown, frozen to 2' then moist	FILL			1	HSA									
						2	SPT									
6	1732.6	Sandy Lean Clay, light brown, moist, firm (CL)	FINE ALLUVIUM		7											
					6	3	SPT	9					29	15		
16	1722.6	Sand, fine to medium grained, a little Gravel, light brown, dry to 13.2' then brown and waterbearing, medium dense (SP)	COARSE ALLUVIUM		20	4										
					12	5	SPT									
					12	6	SPT									
					12	7	SPT									
		END OF BORING														

Floor Areas: Excavate the "Fill" to expose competent native Clay "Alluvium" soils at a depth of at least 3.0 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill to meet the design floor grade elevation.

For Footings: Excavate the "Topsoil" and Clay "Alluvium" soils to expose competent native Sand "Alluvium" soils at a depth of at least 6 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill if needed to meet the design footing grade elevation.

WATER LEVEL MEASUREMENTS						Boring Started: 3/18/2020 at 13:25 Boring Completed: at	
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to Drilling Method: 3 1/4" HSA to 14.5' Jet with Drilling Mud: to Hammer Type: Auto Hammer (140 lb) Crew Chief: R.H. Logged By: R.H. Backfill Method:	
3/18/2020	13:46	16'	16'	14.5'	13.4'		

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 17
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1736.0

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
2	1734.0	Organic Lean Clay, black, frozen (CL-OL)	TOPSOIL			1	HSA							
3.8	1732.2	Lean Clay, brown, moist, soft (CL)	FINE ALLUVIUM		4	2	SPT							
		Sand, fine to medium grained, a little Gravel, light brown, dry to 9' then waterbearing, medium dense and dense (SP)	COARSE ALLUVIUM		14	3	SPT							
					26	4	SPT							
11	1725.0				11	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼						Boring Started:	3/19/2020	at	10:41
						Boring Completed:		at	
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method:			to
3/19/20	10:50	11'	11'	9.5'	NONE	Drilling Method:	3 1/4" HSA		to 9.5
						Jet with Drilling Mud:			to
						Hammer Type:	Auto Hammer (140 lb)		
						Crew Chief:	R.H.	Logged By:	R.H.
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 18
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1734.8

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
2.5	1732.3	Organic Lean Clay, black, frozen to 2' then moist (CL-OL)	TOPSOIL			1	HSA							
		Lean Clay, brown, firm (CL)	FINE ALLUVIUM		6	2	SPT							
5.6	1729.2				6	3	SPT	24	101	0.8				
		Sand with Silt, fine to medium grained, a little Gravel, dark brown, wet, loose (SP-SM)	MIXED ALLUVIUM											
8.5	1726.3				4	4	SPT	18						
		Sand with Silt, fine to medium grained, a little Gravel, brown, wet to 9' then waterbearing, loose (SP-SM)	COARSE ALLUVIUM	▼										
11	1723.8				5	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS						▼	Boring Started: 3/19/2020 at 9:45		
							Boring Completed: at		
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
319/20	9:52		11'		9'	Drilling Method: 3 1/4" HSA to 9.5			
						Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: R.H. Logged By: R.H.			
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 19
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1733.9

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
0.5	1733.4	Organic Lean Clay , black, frozen (CL-OL)	TOPSOIL											
		Sand , fine to medium grained, a little Gravel, brown, moist (SP)	COARSE ALLUVIUM			1	HSA							
2	1731.9	Sand , fine to medium grained, a little Gravel, light brown, dry, medium dense (SP)			13	2	SPT	4						6
					13	3	SPT							
7	1726.9	Sand , fine grained, a trace of Gravel, brown, wet to 9' then waterbearing, loose (SP)			10	4	SPT							
					9	5	SPT							
11	1722.9	END OF BORING												

WATER LEVEL MEASUREMENTS						Boring Started: 3/19/2020 at 9:10		
						Boring Completed: 3/19/2020 at 9:22		
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to		
319/20	9:29	11'	11'	9.5'	9'	Drilling Method: 3 1/4" HSA to 9.5		
						Jet with Drilling Mud: to		
						Hammer Type: Auto Hammer (140 lb)		
						Crew Chief: R.H. Logged By: R.H.		
						Backfill Method:		

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 20
Location: Watertown, SD Sheet 1 of 1

Latitude (North)=		Longitude (West)=		SURFACE ELEVATION = 1736.2										
Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
2.3	1733.9	Fill, Mostly Organic Lean Clay, black, frozen	FILL			1	HSA							
		Lean Clay, brown, moist, soft (CL)	FINE ALLUVIUM		4	2	SPT	21		2.2		43	20	
5	1731.2	Sand, fine to medium grained, a little Gravel, light brown, dry, medium dense (SP)	COARSE ALLUVIUM		12	3	SPT							
23					4	SPT								
11					10	5	SPT							
	1725.2	END OF BORING												

WATER LEVEL MEASUREMENTS ▼						Boring Started: 3/19/2020 at 8:40	
						Boring Completed: at	
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to	
319/20			11'		NONE	Drilling Method: 3 1/4" HSA to 9.5	
						Jet with Drilling Mud: to	
						Hammer Type: Auto Hammer (140 lb)	
						Crew Chief: R.H. Logged By: R.H.	
						Backfill Method:	

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 21
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= **Longitude (West)=** **SURFACE ELEVATION =** 1735.9

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
2	1733.9	Organic Lean Clay, black to dark brown, moist, frozen (CL-OL)	TOPSOIL			1	HSA							
4	1731.9	Lean Clay, brown, moist, soft (CL)	FINE ALLUVIUM		4	2	SPT							
		Sand, fine to medium grained, a little Gravel, light brown, moist, loose to medium dense (SP)	COARSE ALLUVIUM		7	3	SPT	5						8
					22	4	SPT							
11	1724.9				15	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼						Boring Started:	3/19/2020	at	10:16
						Boring Completed:		at	
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method:			to
319/20	10:29	11'	11'	9.5'	NONE	Drilling Method:	3 1/4" HSA		to 9.5
						Jet with Drilling Mud:			to
						Hammer Type:	Auto Hammer (140 lb)		
						Crew Chief:	R.H.	Logged By:	R.H.
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 22
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1736.8

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1	1735.8	Organic Lean Clay, black, frozen (CL-OL)	TOPSOIL			1	HSA							
		Lean Clay, brown, frozen (CL)	FINE ALLUVIUM											
2.8	1734.0	Sand with Silt, fine to medium grained, a little Gravel, light brown to brown at 11.5', dry to 11.5' then waterbearing, loose to medium dense (SP-SM)	COARSE ALLUVIUM		13	2	SPT							
					11		SPT	4						7
					10	4	SPT							
					10	5	SPT							
				▼	7	6	SPT							
					13	7	SPT							
16	1720.8	END OF BORING												

Floor Areas: Excavate the "Topsoil" to expose competent native Clay "Alluvium" soils at a depth of at least 1.0 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill to meet the design floor grade elevation.

For Footings: Excavate the "Topsoil" and Clay "Alluvium" soils to expose competent native Sand "Alluvium" soils at a depth of at least 2.8 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill if needed to meet the design footing grade elevation.

WATER LEVEL MEASUREMENTS						Boring Started:		3/17/2020		at	16:32
						Boring Completed:				at	
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method:				to	
3/17/2020		13.5'	13'	12'	13'	Drilling Method:		3 1/4" HSA		to 14.5'	
						Jet with Drilling Mud:				to	
						Hammer Type:		Auto Hammer (140 lb)			
						Crew Chief:		R.H.		Logged By: R.H.	
						Backfill Method:					

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 23
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1736.7

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.5	1735.2	Organic Lean Clay, black, frozen (CL-OL)	TOPSOIL			1	HSA							
3	1733.7	Lean Clay, brown, moist, firm (CL)	FINE ALLUVIUM		8	2	SPT							
		Sand, fine to medium grained, a little Gravel, brown, moist to 11.5' then waterbearing, medium dense (SP)	COARSE ALLUVIUM		15	3								
					13	4	SPT							
					13	5	SPT							
					13	6	SPT							
					11	7	SPT							
16	1720.7	END OF BORING												

Floor Areas: Excavate the "Topsoil" to expose competent native Clay "Alluvium" soils at a depth of at least 1.5 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill to meet the design floor grade elevation.

For Footings: Excavate the "Topsoil" and Clay "Alluvium" soils to expose competent native Sand "Alluvium" soils at a depth of at least 3.0 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill if needed to meet the design footing grade elevation.

WATER LEVEL MEASUREMENTS						Boring Started: 3/17/2020 at 17:08			
						Boring Completed: 3/17/2020 at 17:41			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
3/17/2020	17:42	16'	14.5'	14.5'	11.5'	Drilling Method: 3 1/4" HSA to 14.5'			
						Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: R.H. Logged By: R.H.			
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 24
Location: Watertown, SD Sheet 1 of 2

Latitude (North)= **Longitude (West)=** **SURFACE ELEVATION =** 1738.0

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
4	1734.0	Fill, Mostly Organic Lean Clay, black and brown, frozen to 2.5' then moist	FILL			1	HSA							
					13	2	SPT							
6.5	1731.5	Lean Clay, brown, moist, soft (CL/ML)	FINE ALLUVIUM		3	3	SPT							
					2	4	SPT	2						6
		Sand, fine to medium grained, a little Gravel, brown, dry to 13' then waterbearing, medium dense to loose (SP)	COARSE ALLUVIUM		18	5	SPT							
					9	6	SPT							
					9	7	SPT							
					12	8	SPT							

Floor Areas: Excavate the "Fill" to expose competent native Clay "Alluvium" soils at a depth of at least 4.0 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill to meet the design floor grade elevation.

For Footings: Excavate the "Topsoil" and Clay "Alluvium" soils to expose competent native Sand "Alluvium" soils at a depth of at least 6.5 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill if needed to meet the design footing grade elevation.

WATER LEVEL MEASUREMENTS						Boring Started: 3/18/2020 at 14:05			
						Boring Completed: at			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
3/18/2020		16'		14.5'	13.2'	Drilling Method: 3 1/4" HSA to 24.5'			
						Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: Logged By:			
						Backfill Method:			

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BORING LOG

STI JOB #: **Project:** *Proposed Regional Airport Terminal* **BORING #:** **24**
Location: *Watertown, SD* Sheet 2 of 2

Latitude (North)= **Longitude (West)=** **SURFACE ELEVATION =**

Depth (ft.)	Elev. (ft.)	<u>DESCRIPTION OF MATERIAL</u>	<u>GEOLOGIC ORIGIN</u>	Water Level	N. Value	<u>SAMPLE</u>		<u>LABORATORY TESTS</u>						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
26	1712.0	(Continued from Sheet 1)												
		END OF BORING			10	9	SPT							

WATER LEVEL MEASUREMENTS ▼						Boring Started: at	
						Boring Completed: at	
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to	
(SEE SHEET ONE)						Drilling Method: to	
						Jet with Drilling Mud: to	
						Hammer Type: Auto Hammer (140 lb)	
						Crew Chief: Logged By:	
						Backfill Method:	

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 25
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= **Longitude (West)=** **SURFACE ELEVATION =** 1735.2

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.5	1733.7	Fill, Mostly Organic Lean Clay, dark brown, frozen	FILL			1	HSA							
		Sand with Silt, fine grained, a little Gravel, light brown, dry to moist, medium dense to loose (SP-SM)	COARSE ALLUVIUM			12	SPT	4						7
						16	3 SPT							
						8	4 SPT							
9	1726.2					12	5 SPT							
		Sand, fine to coarse grained, a little Gravel, brown, waterbearing, medium dense (SP)				12	6 SPT							
						12	7 SPT							
16	1719.2	END OF BORING												

For Footings and Floor Areas:
Excavate the "Fill" soils to expose competent native Sand "Alluvium" soils at a depth of at least 1.5 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill as needed to meet the design footing and floor grade elevations.

WATER LEVEL MEASUREMENTS						Boring Started: 3/18/2020 at 11:00			
						Boring Completed: 3/18/2020 at 11:23			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
3/18/2020	11:24				12'	Drilling Method: 3 1/4" HSA to 14.5'			
3/18/2020	11:34		11.00		9.8'	Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: R.H. Logged By: R.H.			
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 26
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1737.9

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL		Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.5	1736.4	Fill, Mostly Organic Lean Clay, dark brown, frozen	FILL			1	HSA							
3	1734.9	Fill, Mostly Lean Clay, light brown, frozen to 2.5' then moist			5	2	SPT							
4.5	1733.4	Lean Clay, brown, moist, stiff (CL)	FINE ALLUVIUM											
5.5	1732.4	Clayey Sand, fine grained, moist, medium dense, (SC)	MIXED ALLUVIUM		12	3	SPT	11	116					41
		Sand, fine to medium grained, a little Gravel, light brown, dry to 12.5' then waterbearing and brown, medium dense and loose (SP)	COARSE ALLUVIUM		20	4								
					14	5	SPT							
				▼	9	6	SPT							
16	1721.9				16	7	SPT							
		END OF BORING												

Floor Areas: Excavate the "Fill" to expose competent native Clay "Alluvium" soils at a depth of at least 3.0 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill to meet the design floor grade elevation.

For Footings: Excavate the "Topsoil" and Clay "Alluvium" soils to expose competent native Sand "Alluvium" soils at a depth of at least 5.5 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill if needed to meet the design footing grade elevation.

WATER LEVEL MEASUREMENTS ▼						Boring Started:	3/18/2020	at	15:01
						Boring Completed:	3/18/2020	at	15:26
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method:			
3/18/2020	15:27	16'	16'	14.5'	13'	Drilling Method:	3 1/4" HSA	to	9.5
						Jet with Drilling Mud:			
						Hammer Type:	Auto Hammer (140 lb)		
						Crew Chief:	R.H.	Logged By:	R.H.
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601		Project: Proposed Regional Airport Terminal		BORING #: 27	
		Location: Watertown, SD		Sheet 1 of 1	
Latitude (North)=		Longitude (West)=		SURFACE ELEVATION = 1737.5	

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS								
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)		
2.5	1735.0	Fill, Mostly Organic Lean Clay, dark brown to brown, frozen	FILL			1	HSA									
		Lean Clay, light brown, moist, soft to stiff (CL)	FINE ALLUVIUM		4	2	SPT	24				41	21			
5.5	1732.0	Sand, fine to medium grained, a little Gravel, light brown, moist, medium dense (SP)	COARSE ALLUVIUM		9	3	SPT									
					23		SPT	4								7
11.5	1726.0	Sand, fine to medium grained, light brown, waterbearing a 2" lense of Silty Sand at 13', very loose (SP)			15	5	SPT									
14	1723.5	Sand, fine to coarse grained, a little Gravel, brown, waterbearing, medium dense (SP)			4	6	SPT									
16	1721.5	END OF BORING			15	7	SPT									

Floor Areas: Excavate the "Fill" to expose competent native Clay "Alluvium" soils at a depth of at least 2.5 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill to meet the design floor grade elevation.

For Footings: Excavate the "Topsoil" and Clay "Alluvium" soils to expose competent native Sand "Alluvium" soils at a depth of at least 5.5 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill if needed to meet the design footing grade elevation.

WATER LEVEL MEASUREMENTS						▼			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Boring Started:	3/18/2020	at	15:40
3/18/2020	16:21	16'	16'	14.5'	13'	Boring Completed:	3/18/2020	at	16:20
3/18/2020	16:31		13.5'		12.3'	Drilling Method:	to		
						Drilling Method:	3 1/4" HSA to 14.5'		
						Jet with Drilling Mud:	to		
						Hammer Type:	Auto Hammer (140 lb)		
						Crew Chief:	R.H.	Logged By:	R.H.
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 28
Location: Watertown, SD Sheet 1 of 2

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1737.8

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1.8	1736.0	Fill, Mostly Organic Lean Clay, black and brown, frozen	FILL			1	HSA							
4.5	1733.3	Lean Clay, brown, moist, soft (CL)	FINE ALLUVIUM		4	2	SPT	25						
		Sand with Silt, fine to medium grained, a little Gravel, brown, dry/moist to 12.1' then waterbearing, medium dense to dense to loose (SP-SM)	COARSE ALLUVIUM		13	3	SPT	6						5
					31	4	S							
					12	5	SPT							
					15	6	SPT							
					15	7	SPT							
					16	8	SPT							

Floor Areas: Excavate the "Fill" to expose competent native Clay "Alluvium" soils at a depth of at least 1.8 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill to meet the design floor grade elevation.

For Footings: Excavate the "Topsoil" and Clay "Alluvium" soils to expose competent native Sand "Alluvium" soils at a depth of at least 4.5 feet below existing grade. Final excavation depth to be approved on-site by STI's Geotechnical Engineer. Place engineered fill if needed to meet the design footing grade elevation.

WATER LEVEL MEASUREMENTS						Boring Started: 3/18/2020 at 9:51			
						Boring Completed: 3/18/2020 at 10:39			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
3/18/2020	10:40	26'	26'	24.5'	14'	Drilling Method: 3 1/4" HSA to 24.5'			
3/18/2020	10:52		13'		12.2'	Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: Logged By:			
						Backfill Method:			

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BORING LOG

STI JOB #:		Project: Proposed Regional Airport Terminal				BORING #: 28											
		Location: Watertown, SD				Sheet 2 of 2											
Latitude (North)=		Longitude (West)=		SURFACE ELEVATION =													
Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS									
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)			
26	1711.8	(Continued from Sheet 1)															
		END OF BORING			8	9	SPT										
WATER LEVEL MEASUREMENTS				▼													
DATE:				TIME:				SAMPLED TO:				CAVE IN:		CASING:		DEPTH:	
(SEE SHEET ONE)				Boring Started:				at									
				Boring Completed:				at									
				Drilling Method:				to									
				Drilling Method:				to									
				Jet with Drilling Mud:				to									
				Hammer Type:				Auto Hammer (140 lb)									
				Crew Chief:				Logged By:									
				Backfill Method:													
SOIL TECHNOLOGIES, INC				28822 124TH ST., MOBRIDGE, SD TELEPHONE: (605) 762-3406 FAX: 888-518-2157													

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 29
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1737.8

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
2.3 <														

WATER LEVEL MEASUREMENTS ▼						Boring Started: 3/18/2020 at 9:00		
						Boring Completed: at		
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to		
3/18/2020					12.6'	Drilling Method: 3 1/4" HSA to 14.5'		
						Jet with Drilling Mud: to		
						Hammer Type: Auto Hammer (140 lb)		
						Crew Chief: R.H. Logged By: R.H.		
						Backfill Method:		

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BORING LOG

STI JOB #: 20-1601		Project: Proposed Regional Airport Terminal		BORING #: 30	
		Location: Watertown, SD		Sheet 1 of 1	
Latitude (North)=		Longitude (West)=		SURFACE ELEVATION = 1735.6	

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS							
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)	
1.5	1734.1	Fill, a mixture of Sand, Gravel and Sandy Lean Clay, 2" of Topsoil at the surface, frozen	FILL			1	HSA								
3	1732.6	Organic Lean Clay, dark brown, frozen to 2.5' then moist (CL-OL)	TOPSOIL		7	2	SPT	20		4.5+		45	25		
5.8	1729.8	Lean Clay, brown, moist, firm (CL)	FINE ALLUVIUM		6	3	SPT	15		3					
		Sand, fine to medium grained, a little Gravel, light brown, dry to 10' then wet, medium	COARSE ALLUVIUM		13	4	SPT								
11	1724.6				11	5	SPT								
		END OF BORING													

WATER LEVEL MEASUREMENTS						Boring Started: 3/18/2020 at 17:05 Boring Completed: 3/18/2020 at 17:18			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to Drilling Method: 3 1/4" HSA to 9.5 Jet with Drilling Mud: to Hammer Type: Auto Hammer (140 lb) Crew Chief: R.H. Logged By: R.H. Backfill Method:			
3/18/2020			9.5'		NONE				

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 31
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1734.6

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
1	1733.6	Organic Lean Clay, dark brown, frozen (CL-	TOPSOIL			1	HSA							
2	1732.6	Lean Clay, brown, frozen (CL)	FINE ALLUVIUM											
		Sand, fine to medium grained, a little Gravel, light brown, dry to 9' then waterbearing, medium dense to loose (SP)	COARSE ALLUVIUM		11	2	SPT	3						6
					15	3	SPT							
					12	4	SPT							
					8	5	SPT							
11	1723.6	END OF BORING												

WATER LEVEL MEASUREMENTS						Boring Started:		3/19/2020	at	8:21
						Boring Completed:		3/19/2020	at	8:30
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method:				
3/19/20	8:31	11'	11'	9.5'	9'	Drilling Method:				
						Jet with Drilling Mud:				
						Hammer Type:				
						Crew Chief:				
						Backfill Method:				

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 32
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1736.9

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
2	1734.9	Fill, mostly Organic Lean Clay, dark brown, frozen	FILL			1	HSA							
		Fill, mostly Lean Clay, dark brown and black, moist			6	2	SPT							
5	1731.9	Lean Clay, light brown, moist, stiff (CL)	FINE ALLUVIUM		9	3	SPT							
7.5	1729.4	Sand, fine to medium grained, a little Gravel, light brown, dry to 9' then moist, medium dense (SP)	COARSE ALLUVIUM		13	4	SPT							
11	1725.9				13	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS						Boring Started: 3/18/2020 at 15:40			
						Boring Completed: at			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
3/20/2020					NONE	Drilling Method: 3 1/4" HSA to 9.5			
						Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: R.H. Logged By: R.H.			
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601		Project: Proposed Regional Airport Terminal		BORING #: 33	
		Location: Watertown, SD		Sheet 1 of 1	
Latitude (North)=		Longitude (West)=		SURFACE ELEVATION = 1735.5	

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS							
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)	
		Fill, mostly Lean Clay, dark brown and black, frozen to 2.5' then moist	FILL			1	HSA								
4.5	1731.0				14	2	SPT	16		4.5+					
		Lean Clay, light brown, moist/dry, stiff (CL)	FINE ALLUVIUM		12	3	SPT	9		4.5+					
6.5	1729.0														
		Sand, fine to medium grained, a little Gravel, light brown, dry to 10.8' then waterbearing, loose (SP)	COARSE ALLUVIUM		6	4	SPT								
11	1724.5				6	5	SPT								
		END OF BORING		▼											

WATER LEVEL MEASUREMENTS						▼			
						Boring Started: 3/19/2020 at 8:00			
						Boring Completed: 3/19/2020 at 8:10			
DATE:	TIME:	SAMPLED TO:	CAVE IN:	CASING:	DEPTH:	Drilling Method: to			
319/20		11'	11'	9.5'	10.8'	Drilling Method: 3 1/4" HSA to 9.5			
						Jet with Drilling Mud: to			
						Hammer Type: Auto Hammer (140 lb)			
						Crew Chief: R.H. Logged By: R.H.			
						Backfill Method:			

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BORING LOG

STI JOB #: 20-1601 **Project:** Proposed Regional Airport Terminal **BORING #:** 34
Location: Watertown, SD Sheet 1 of 1

Latitude (North)= Longitude (West)= **SURFACE ELEVATION =** 1737.1

Depth (ft.)	Elev. (ft.)	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	Water Level	N. Value	SAMPLE		LABORATORY TESTS						
						Sample No.	Sample Type	Moisture (%)	Dry Density (pcf)	Pocket Pen (tsf)	Qu (psf)	Liquid Limit	Plastic Limit	200 Sieve (%)
2.5	1734.6	Fill, mostly Lean Clay, black and dark brown, frozen	FILL			1	HSA							
3	1734.1	Lean Clay, dark brown, moist, firm (CL)	FINE ALLUVIUM		6	2	SPT	21		3.6				
		Lean Clay, light brown, moist, firm (CL)												
5.8	1731.3				6	3	SPT							
		Sand, fine to medium grained, a little Gravel, light brown, dry, medium dense (SP)	COARSE ALLUVIUM		12	4	SPT	3						6
11	1726.1				14	5	SPT							
		END OF BORING												

WATER LEVEL MEASUREMENTS ▼

Boring Started: 3/18/2020 at 17:34
Boring Completed: at
Drilling Method: to
Drilling Method: 3 1/4" HSA to 9.5
Jet with Drilling Mud: to
Hammer Type: Auto Hammer (140 lb)
Crew Chief: R.H. **Logged By:** R.H.
Backfill Method:

SOIL TECHNOLOGIES, INC

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Material Test Report

Report No: MAT:20-03387-S1

Issue No: 1

Client: SOIL TECHNOLOGIES, INC

CC:

Project: WATERTOWN AIRPORT
WATERTOWN, SD

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Date of Issue:

3/25/2020

Reviewed By:

Adam Johnson

Senior Engineering Technician

Job No: 32-20467

Sample Details

Sample ID 20-03387-S1
Field Sample ID Subbase Material
Date Sampled 3/19/2020
Source Boring
Material SAND W/CLAY, F-M GR., W/GRAVEL, BR. (SP-SC)
Specification NO SPECIFICATION
Sampling Method Auger
Location Boring #4

Date Submitted 3/20/2020

Other Test Results

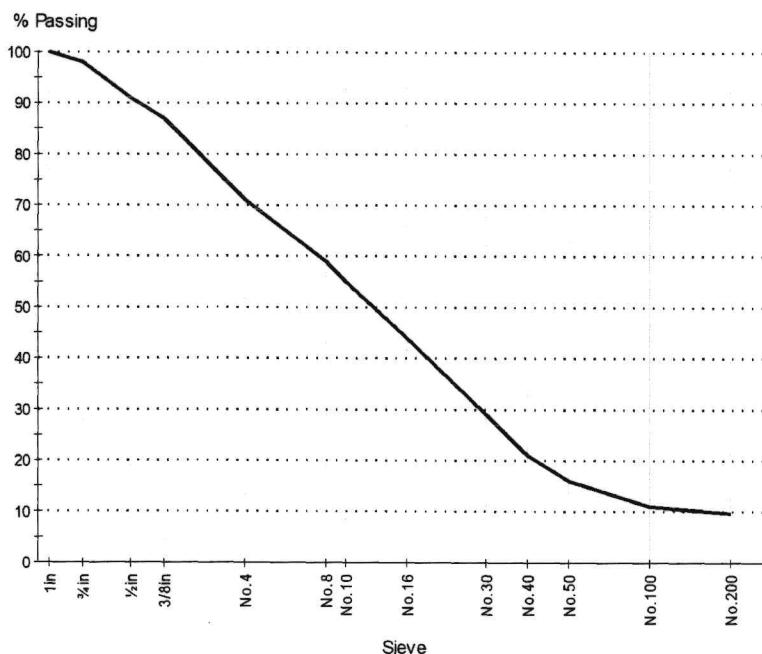
Description	Method	Result	Limits
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Particle Size Distribution

Method: ASTM C 136, ASTM C 117

Date Tested: 3/25/2020

Tested By: Adam Johnson



Sieve Size	% Passing	Limits
1in (25.0mm)	100	
3/4in (19.0mm)	98	
1/2in (12.5mm)	91	
3/8in (9.5mm)	87	
No. 4 (4.75mm)	71	
No. 8 (2.36mm)	59	
No. 10 (2.0mm)	55	
No. 16 (1.18mm)	44	
No. 30 (600µm)	29	
No. 40 (425µm)	21	
No. 50 (300µm)	16	
No. 100 (150µm)	11	
No. 200 (75µm)	9.8	

Comments

N/A



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601 E. 48th St. N.
Sioux Falls, SD 57104
Phone: (605) 332-5371 | Toll Free: (800) 972-6364
Email: bcard@amengtest.com
www.amengtest.com

Report No: MAT:20-03387-S2

Issue No: 1

CC:

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Date of Issue: 3/25/2020
Reviewed By: Adam Johnson
Senior Engineering Technician

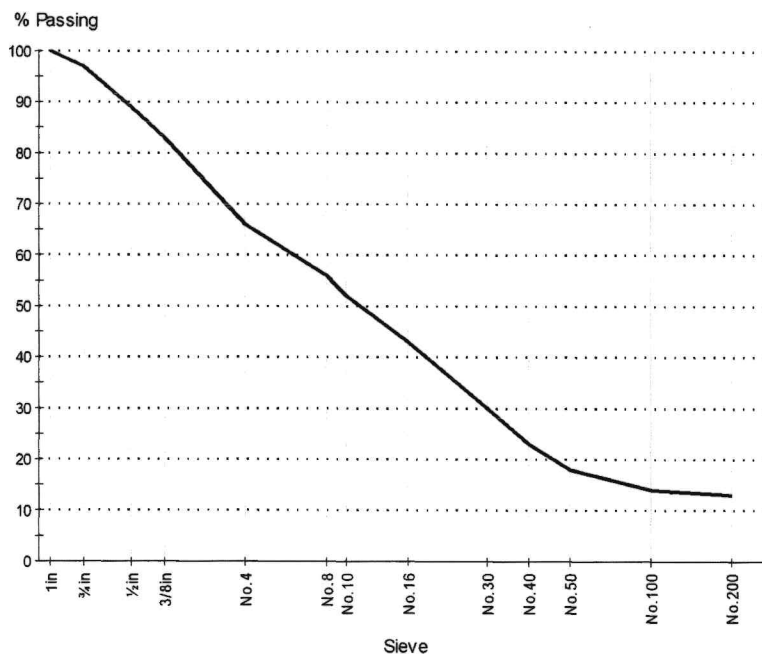
Job No: 32-20467

Other Test Results

Sample ID	20-03387-S2
Field Sample ID	Subbase Material
Date Sampled	3/18/2020
Source	Boring
Material	SAND W/CLAY, F-M GR., W/GRAVEL, BR. (SP-SC)
Specification	NO SPECIFICATION
Sampling Method	Auger
Location	Boring #6
Date Submitted	3/20/2020

Description	Method	Result	Limits
-------------	--------	--------	--------

Particle Size Distribution



Method: ASTM C 136, ASTM C 117

Date Tested: 3/25/2020
Tested By: Adam Johnson

Sieve Size	% Passing	Limits
1in (25.0mm)	100	
¾in (19.0mm)	97	
½in (12.5mm)	89	
3/8in (9.5mm)	83	
No.4 (4.75mm)	66	
No.8 (2.36mm)	56	
No.10 (2.0mm)	52	
No.16 (1.18mm)	43	
No.30 (600µm)	30	
No.40 (425µm)	23	
No.50 (300µm)	18	
No.100 (150µm)	14	
No.200 (75µm)	12.9	

Comments

N/A

[illegible]

Material Test Report

Report No: MAT:20-03387-S3
Issue No: 1
Client: SOIL TECHNOLOGIES, INC

CC:
Project: WATERTOWN AIRPORT
WATERTOWN, SD

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Date of Issue:

3/25/2020

Reviewed By:

Adam Johnson

Senior Engineering Technician

Job No: 32-20467

Sample Details

Sample ID 20-03387-S3
Field Sample ID Subbase Material
Date Sampled 3/18/2020
Source Boring
Material SAND W/CLAY, F-M GR., W/GRAVEL, BR. (SP-SC)
Specification NO SPECIFICATION
Sampling Method Auger
Location Composite of Borings #8 & #10

Date Submitted 3/20/2020

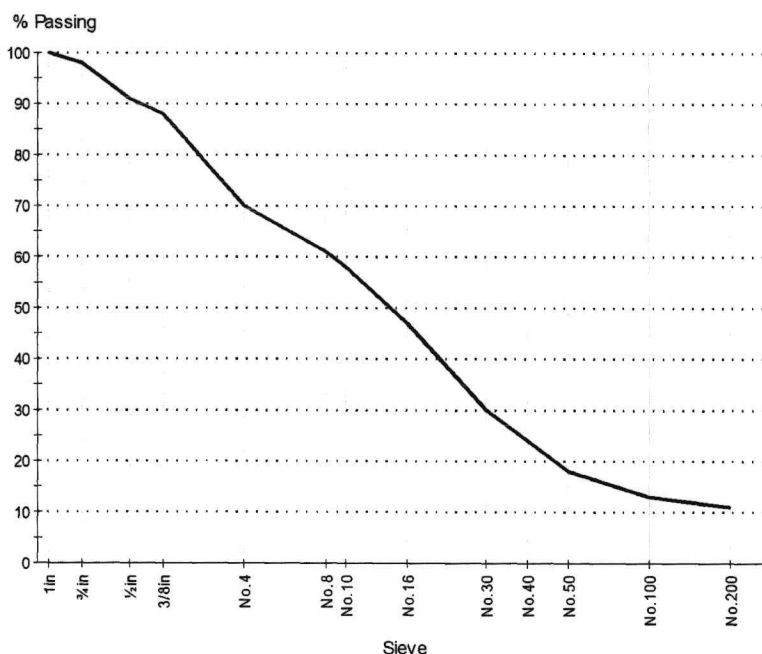
Other Test Results

Description	Method	Result	Limits
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Particle Size Distribution

Method: ASTM C 136, ASTM C 117

Date Tested: 3/25/2020

Tested By: Adam Johnson


Sieve Size	% Passing	Limits
1in (25.0mm)	100	
3/4in (19.0mm)	98	
3/8in (9.5mm)	91	
No. 4 (4.75mm)	88	
No. 10 (2.0mm)	70	
No. 20 (0.85mm)	61	
No. 40 (0.425mm)	47	
No. 60 (0.25mm)	30	
No. 100 (0.15mm)	24	
No. 200 (0.075mm)	13	

Comments

N/A

Material Test Report

Report No: MAT:20-03387-S4

Issue No: 1

Client: SOIL TECHNOLOGIES, INC

CC:

Project: WATERTOWN AIRPORT
WATERTOWN, SD

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Date of Issue:

3/25/2020

Reviewed By:

Adam Johnson

Senior Engineering Technician

Job No: 32-20467

Sample Details

Sample ID 20-03387-S4
Field Sample ID Subbase Material
Date Sampled 3/17/2020
Source Boring
Material SAND W/CLAY, F-M GR., W/GRAVEL, BR. (SP-SC)
Specification NO SPECIFICATION
Sampling Method Auger
Location Boring #13

Date Submitted 3/20/2020

Other Test Results

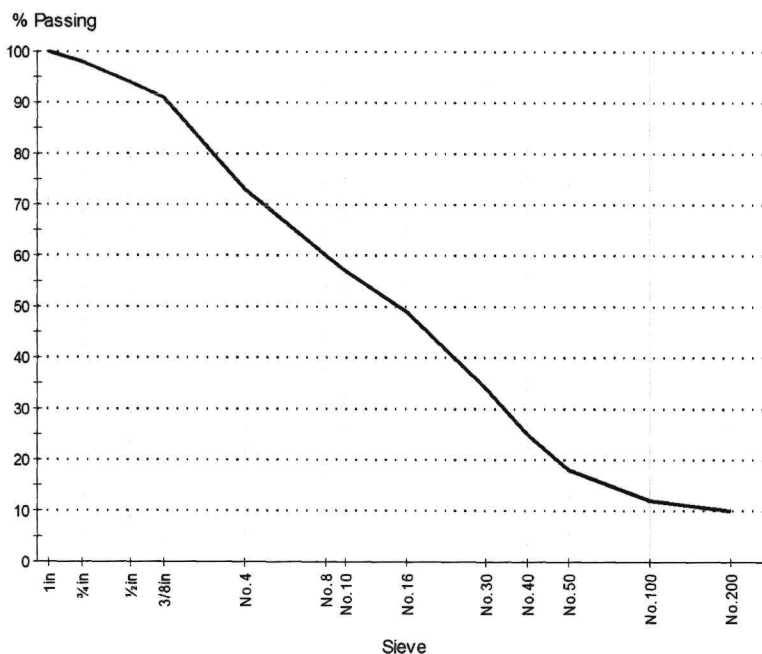
Description	Method	Result	Limits
-------------	--------	--------	--------

Particle Size Distribution

Method: ASTM C 136, ASTM C 117

Date Tested: 3/25/2020

Tested By: Adam Johnson



Sieve Size	% Passing	Limits
1in (25.0mm)	100	
3/4in (19.0mm)	98	
1/2in (12.5mm)	94	
3/8in (9.5mm)	91	
No. 4 (4.75mm)	73	
No. 8 (2.36mm)	60	
No. 10 (2.0mm)	57	
No. 16 (1.18mm)	49	
No. 30 (600µm)	34	
No. 40 (425µm)	25	
No. 50 (300µm)	18	
No. 100 (150µm)	12	
No. 200 (75µm)	10.0	

Comments

N/A



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Sioux Falls, SD 57104
Phone: (605) 332-5371 | Toll Free: (800) 972-6364
Email: bcard@amengtest.com
www.amengtest.com

California Bearing Ratio Test Report

Report No: CBR:20-03785-S1

Issue No: 2

Client: SOIL TECHNOLOGIES, INC

CC:

Project: WATERTOWN AIRPORT
WATERTOWN, SD

Job No: 32-20467

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Date of Issue:

4/2/2020

Reviewed By:

Scott Dumdei

Sample Details

Sample ID: 20-03785-S1

Field ID: Boring #2 2'-4.5'

Date Sampled: 3/19/2020

Sampled By: Sean Van Heuveln

Sampling Method: Boring

Source: In-Place Material

Material: Lean Clay, Brown(CL)

Specification:

Location: Airport Boring #2

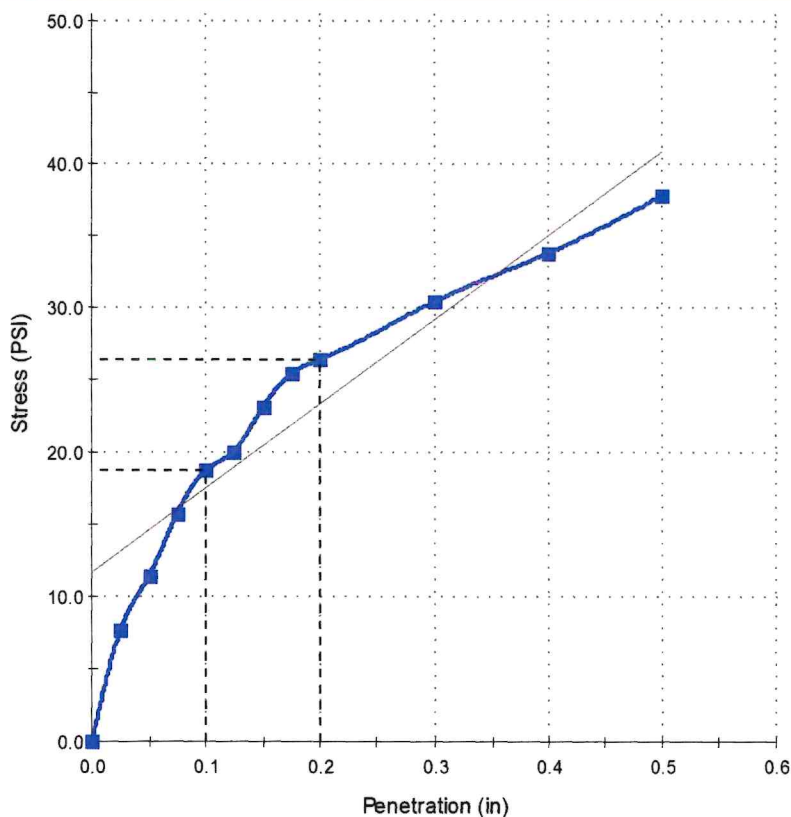
Tested By: Sean Van Heuveln

Date Tested: 3/30/2020

CBR At 0.1in (%): 1.9

CBR At 0.2in (%): 1.8

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%): 1.9

CBR At 0.2in (%): 1.8

Compactive Effort: ASTM D 698

Number of Blows: 14

% of Maximum Dry Density: 95.2

Dry Density Before Soaking (lb/ft³): 101.7

Dry Density After Soaking (lb/ft³): 104.0

MC Before Compaction (%): 16.3

MC After Compaction (%):

Moisture Content of Top 1in (%): 25.3

Average Moisture Content (%): 17.7

Maximum Dry Density (lb/ft³): 106.8

Optimum Moisture Content (%): 16.9

Sample Condition: Soaked

Immersion Period (h): 96

Swell (%): 2.7

Surcharge Mass (lb): 9.97

Date Tested: 3/30/2020

Comments



California Bearing Ratio Test Report

Report No: CBR:20-03785-S2

Issue No: 1

Client: SOIL TECHNOLOGIES, INC

CC:

Project: WATERTOWN AIRPORT
WATERTOWN, SD

Job No: 32-20467

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Date of Issue:

4/2/2020

Reviewed By:

Scott Dumdei

Sample Details

Sample ID: 20-03785-S2

Date Sampled: 3/16/2020

Sampling Method: Boring

Source: In-Place Material

Specification:

Tested By: Sean Van Heuveln

CBR At 0.1in (%): 6.1

Field ID: Boring #7 2'-4.5'

Sampled By: Sean Van Heuveln

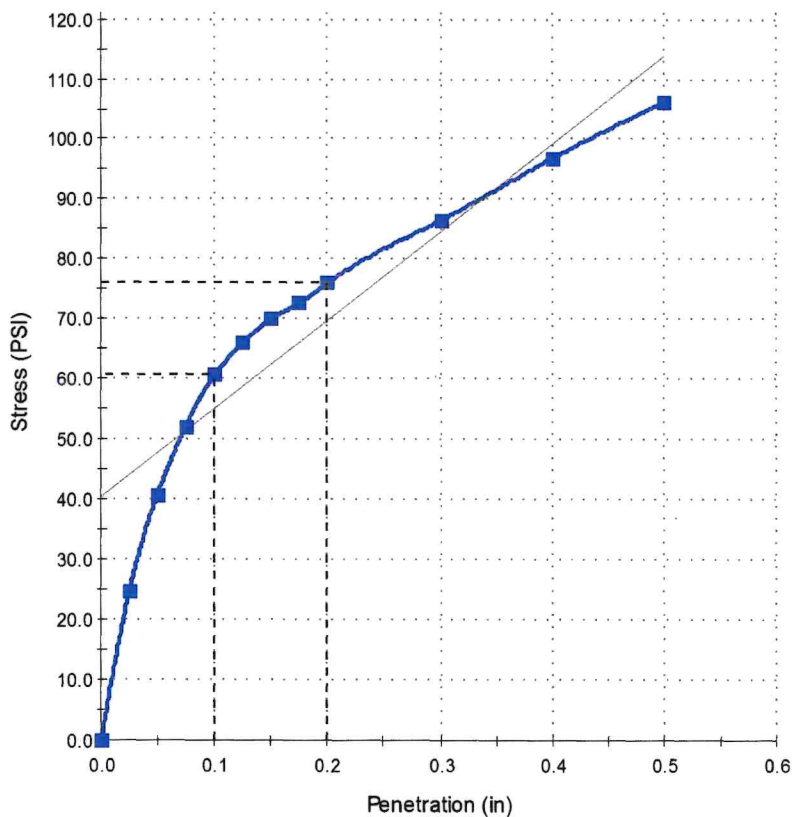
Material: Lean Clay, Brown(CL)

Location: Airport Boring #7

Date Tested: 3/30/2020

CBR At 0.2in (%): 5.1

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%): 6.1
CBR At 0.2in (%): 5.1
Compactive Effort: ASTM D 698
Number of Blows: 25
% of Maximum Dry Density: 94.9
Dry Density Before Soaking (lb/ft³): 98.7
Dry Density After Soaking (lb/ft³): 101.7
MC Before Compaction (%):
MC After Compaction (%): 20.2
Moisture Content of Top 1in (%): 20.7
Average Moisture Content (%): 19.8
Maximum Dry Density (lb/ft³): 104.1
Optimum Moisture Content (%): 20.0
Sample Condition: Soaked
Immersion Period (h): 96
Swell (%): 1.7
Surcharge Mass (lb): 10.03
Date Tested: 3/30/2020

Comments



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California Bearing Ratio Test Report

Report No: CBR:20-03785-S3

Issue No: 1

Client: SOIL TECHNOLOGIES, INC

CC:

Project: WATERTOWN AIRPORT
WATERTOWN, SD

Job No: 32-20467

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Date of Issue:

4/2/2020

Reviewed By:

Scott Dumdei

Sample Details

Sample ID: 20-03785-S3

Field ID: Boring #14 2'-4.5'

Date Sampled: 3/17/2020

Sampled By: Sean Van Heuveln

Sampling Method: Boring

Source: In-Place Material

Material: Lean Clay, Brown (CL)

Specification:

Location: Airport Boring #14

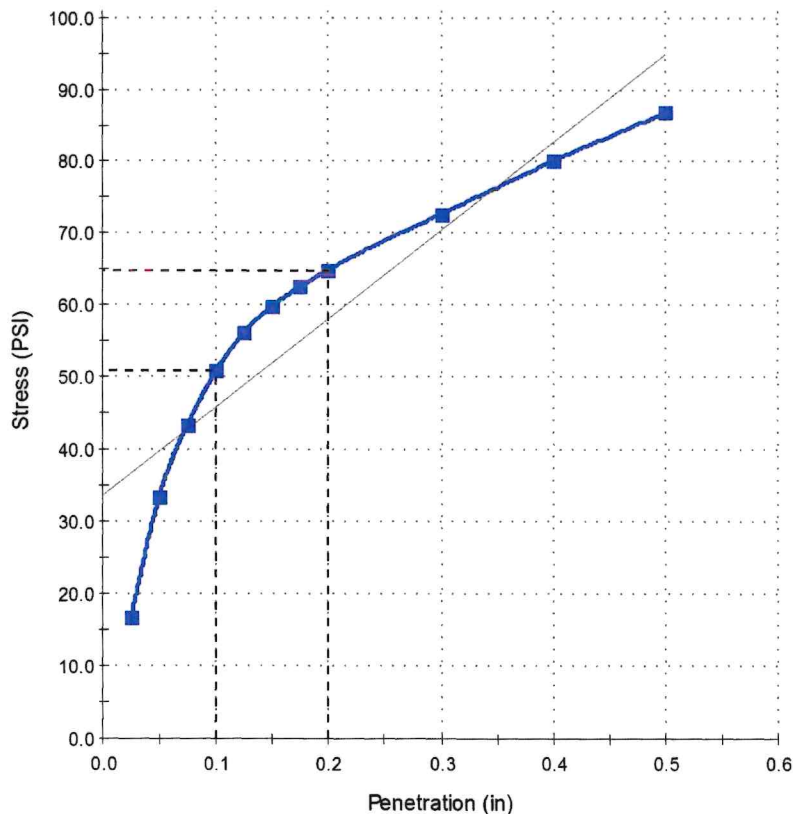
Tested By: Sean Van Heuveln

Date Tested: 3/30/2020

CBR At 0.1in (%): 5.1

CBR At 0.2in (%): 4.3

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%): 5.1
CBR At 0.2in (%): 4.3
Compactive Effort: ASTM D 698
Number of Blows: 18
% of Maximum Dry Density: 95.0
Dry Density Before Soaking (lb/ft³): 92.9
Dry Density After Soaking (lb/ft³): 96.2
MC Before Compaction (%):
MC After Compaction (%): 22.7
Moisture Content of Top 1in (%): 24.2
Average Moisture Content (%): 22.2
Maximum Dry Density (lb/ft³): 97.8
Optimum Moisture Content (%): 22.8
Sample Condition: Soaked
Immersion Period (h): 96
Swell (%): 1.8
Surcharge Mass (lb): 10.01
Date Tested: 3/30/2020

Comments



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California Bearing Ratio Test Report

Report No: CBR:20-03785-S4

Issue No: 2

Client: SOIL TECHNOLOGIES, INC

CC:

Project: WATERTOWN AIRPORT
WATERTOWN, SD

Job No: 32-20467

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Date of Issue:

4/17/2020

Reviewed By:

Adam Johnson

Senior Engineering Technician

Sample Details

Sample ID: 20-03785-S4

Field ID: #30,32 & 34 2'-4.5'

Date Sampled: 3/18/2020

Sampled By: Sean Van Heuveln

Sampling Method: Boring

Source: In-Place Material

Material: Sandy Lean Clay, Brown (CL)

Specification:

Location: Borings #30, 32 & 34, 3% Below Optimum

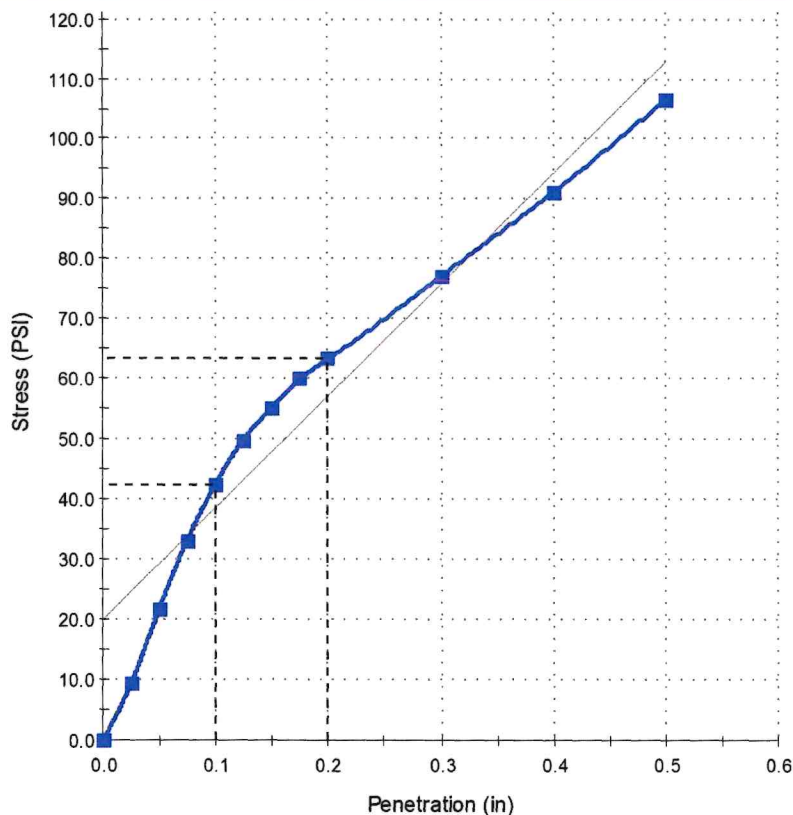
Tested By: Sean Van Heuveln

Date Tested: 3/31/2020

CBR At 0.1in (%): 4.3

CBR At 0.2in (%): 4.2

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%): 4.3

CBR At 0.2in (%): 4.2

Compactive Effort: ASTM D 1557

Number of Blows: 20

% of Maximum Dry Density: 94.8

Dry Density Before Soaking (lb/ft³): 106.0

Dry Density After Soaking (lb/ft³): 103.4

MC Before Compaction (%): 14.8

MC After Compaction (%): 14.1

Moisture Content of Top 1in (%): 24.3

Average Moisture Content (%): 21.4

Maximum Dry Density (lb/ft³): 111.8

Optimum Moisture Content (%): 17.4

Sample Condition: Soaked

Immersion Period (h): 96

Swell (%): 4.4

Surcharge Mass (lb): 10.00

Date Tested: 3/31/2020

Comments



California Bearing Ratio Test Report

Report No: CBR:20-03785-S5

Issue No: 2

Client: SOIL TECHNOLOGIES, INC

CC:

Project: WATERTOWN AIRPORT
WATERTOWN, SD

Job No: 32-20467

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Date of Issue:

4/17/2020

Reviewed By:

Adam Johnson

Senior Engineering Technician

Sample Details

Sample ID: 20-03785-S5

Field ID: #30,32 & 34 2'-4.5'

Date Sampled: 3/18/2020

Sampled By: Sean Van Heuveln

Sampling Method: Boring

Source: In-Place Material

Material: Sandy Lean Clay, Brown (CL)

Specification:

Location: Borings #30, 32 & 34, @ Optimum Moisture

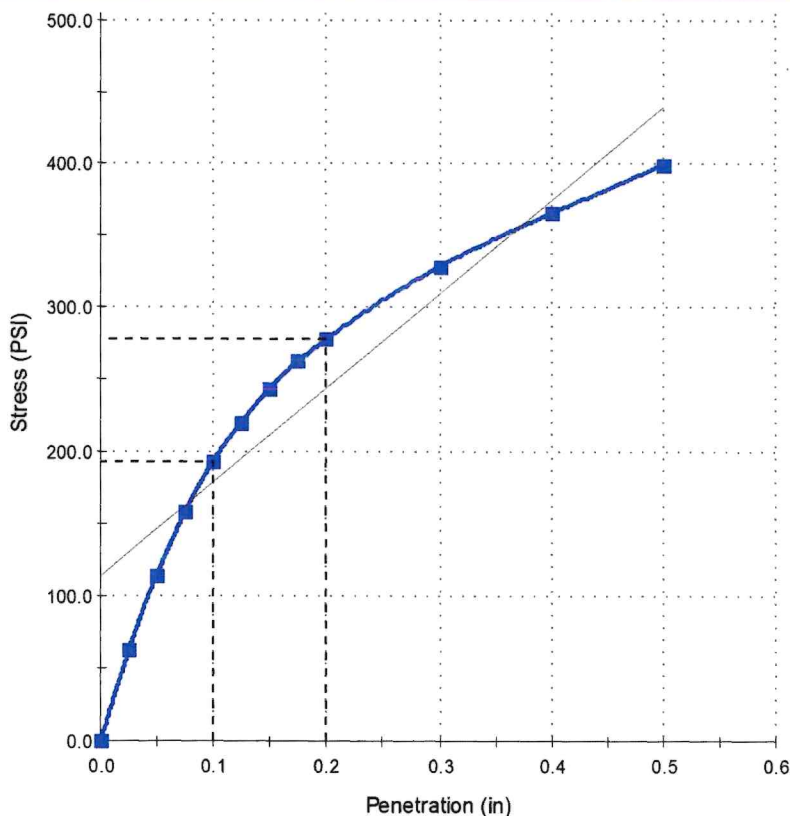
Tested By: Sean Van Heuveln

Date Tested: 3/31/2020

CBR At 0.1in (%): 19.4

CBR At 0.2in (%): 18.6

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%): 19.4
CBR At 0.2in (%): 18.6
Compactive Effort: ASTM D 1557
Number of Blows: 21
% of Maximum Dry Density: 90.2
Dry Density Before Soaking (lb/ft³): 106.4
Dry Density After Soaking (lb/ft³): 108.6
MC Before Compaction (%):
MC After Compaction (%): 17.4
Moisture Content of Top 1in (%): 18.1
Average Moisture Content (%): 17.4
Maximum Dry Density (lb/ft³): 118.0
Optimum Moisture Content (%): 17.4
Sample Condition: Soaked
Immersion Period (h): 96
Swell (%): 1.3
Surcharge Mass (lb): 9.99
Date Tested: 3/31/2020

Comments



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California Bearing Ratio Test Report

Report No: CBR:20-03785-S6

Issue No: 2

Client: SOIL TECHNOLOGIES, INC

CC:

Project: WATERTOWN AIRPORT
WATERTOWN, SD

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Date of Issue:

4/17/2020

Reviewed By:

Adam Johnson

Senior Engineering Technician

Job No: 32-20467

Sample Details

Sample ID: 20-03785-S6

Date Sampled: 3/18/2020

Sampling Method: Boring

Source: In-Place Material

Specification:

Tested By: Sean Van Heuveln

CBR At 0.1in (%): 16.2

Field ID: #30,32 & 34 2'-4.5'

Sampled By: Sean Van Heuveln

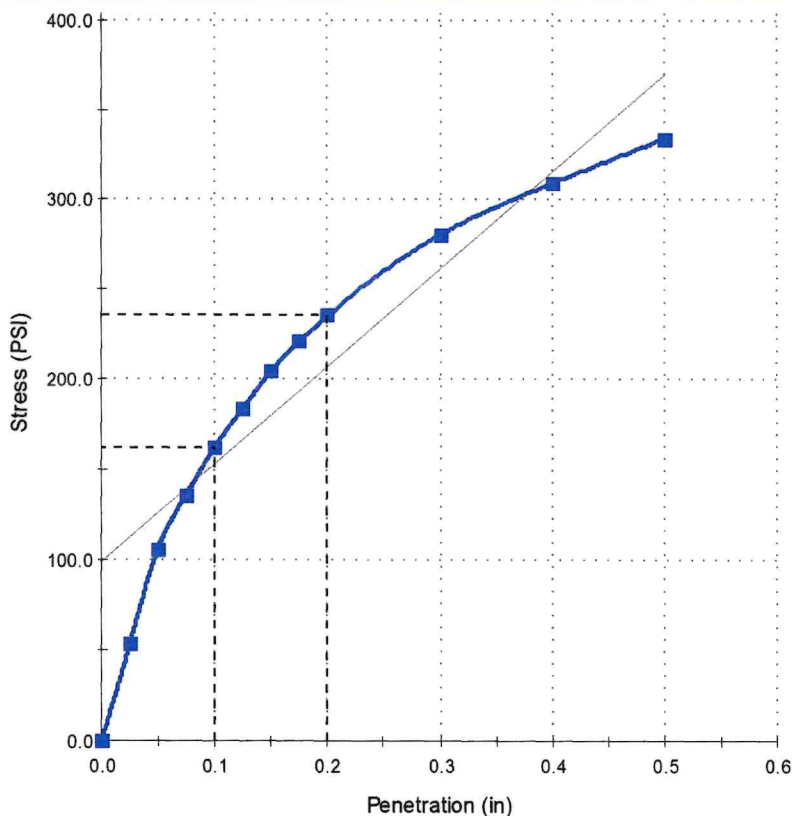
Material: Sandy Lean Clay, Brown (CL)

Location: Borings #30, 32 & 34, 3% Above Optimum

Date Tested: 3/31/2020

CBR At 0.2in (%): 15.7

Stress vs Penetration



Test Results

ASTM D 1883

CBR At 0.1in (%): 16.2
CBR At 0.2in (%): 15.7
Compactive Effort: ASTM D 1557
Number of Blows: 18
% of Maximum Dry Density: 95.0
Dry Density Before Soaking (lb/ft³): 106.2
Dry Density After Soaking (lb/ft³): 108.3
MC Before Compaction (%):
MC After Compaction (%): 20.4
Moisture Content of Top 1in (%): 20.5
Average Moisture Content (%): 19.2
Maximum Dry Density (lb/ft³): 111.8
Optimum Moisture Content (%): 17.4
Sample Condition: Soaked
Immersion Period (h): 96
Swell (%): 0.4
Surcharge Mass (lb): 9.99
Date Tested: 3/31/2020

Comments



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Report No: PTR:20-03403-S1

Issue No: 1

CC:

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Date of Issue:

3/25/2020

Reviewed By:

Scott Dumdei

Job No: 32-20467

Sample Details

Field ID:

Boring #2

Date Sampled: 3/19/2020

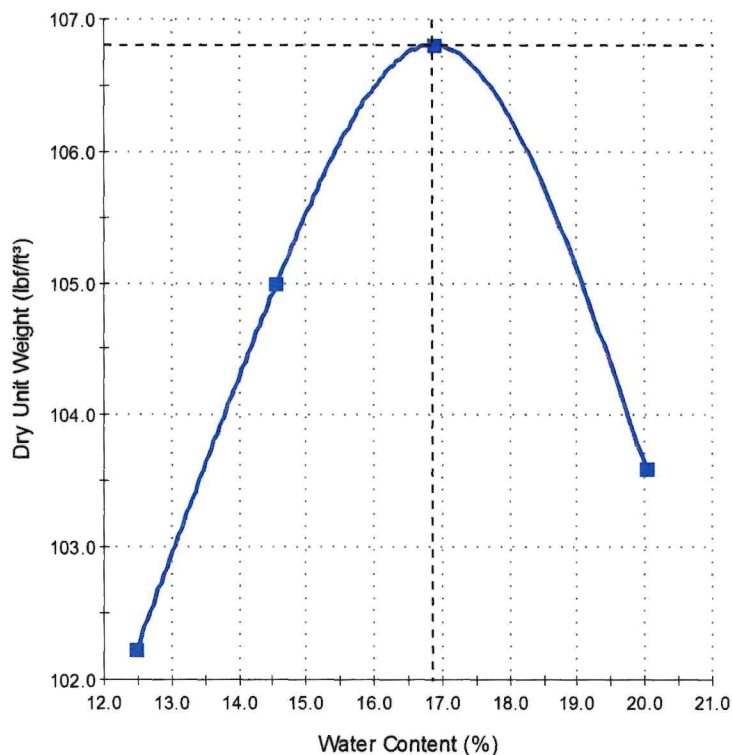
Sampling Method: Boring

Source: In-Place Material

Location: Boring #2, 2'-4.5'

Sampled By: Scott Dumdei

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 698

Maximum Dry Unit Weight (lb/ft ³):	106.8
--	-------

Optimum Water Content (%): 16.9

Method:

A

Preparation Method:

Moist

Tested By:

Scott Dumdei

Date Tested:

3/25/2020

Comments

[illegible]



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Proctor Report

Report No: PTR:20-03403-S2

Issue No: 2

Client: SOIL TECHNOLOGIES, INC

CC:

Project: WATERTOWN AIRPORT
WATERTOWN, SD

Job No: 32-20467

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Date of Issue:

3/25/2020

Reviewed By:

Scott Dumdei

Sample Details

Sample ID: 20-03403-S2

Field ID:

Boring #7

Date Sampled: 3/16/2020

Sampling Method: Boring

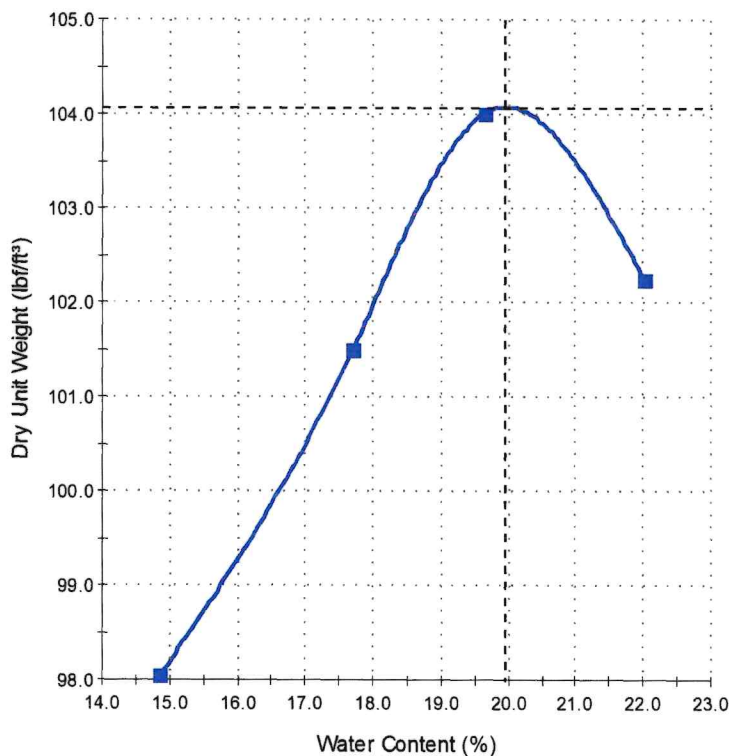
Source: In-Place Material

Material: Lean Clay, Brown (CL)

Location: Boring #7, 2'-4.5'

Sampled By: Scott Dumdei

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 698

Maximum Dry Unit Weight (lb/ft³): 104.1

Optimum Water Content (%): 20.0

Method: A

Preparation Method: Moist

Tested By:

Scott Dumdei

Date Tested:

3/25/2020

Comments



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Proctor Report

Report No: PTR:20-03403-S3

Issue No: 1

Client: SOIL TECHNOLOGIES, INC

CC:

Project: WATERTOWN AIRPORT
WATERTOWN, SD

Job No: 32-20467

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Date of Issue:

3/25/2020

Reviewed By:

Scott Dumdei

Sample Details

Sample ID: 20-03403-S3

Field ID:

Boring #14

Date Sampled: 3/17/2020

Sampling Method: Boring

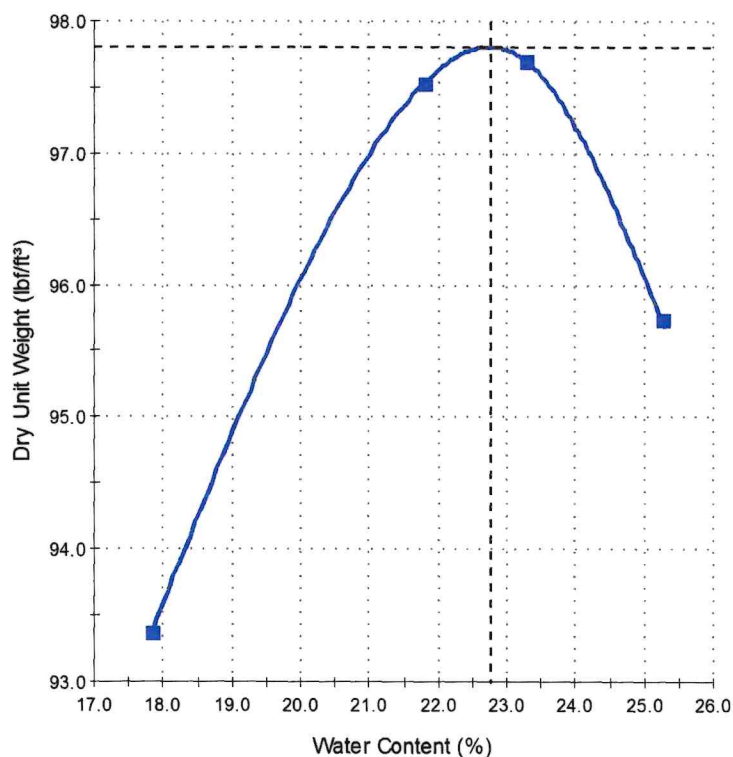
Source: In-Place Material

Material: Lean Clay, Brown(CL)

Location: Boring #14, 2'-4.5'

Sampled By: Scott Dumdei

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 698

Maximum Dry Unit Weight (lb/ft³): 97.8

Optimum Water Content (%): 22.8

Method: A

Preparation Method: Moist

Tested By: Scott Dumdei

Date Tested: 3/25/2020

Comments



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Proctor Report

Report No: PTR:20-03406-S1

Issue No: 1

Client: SOIL TECHNOLOGIES, INC

CC:

Project: WATERTOWN AIRPORT
WATERTOWN, SD

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Date of Issue:

3/25/2020

Reviewed By:

Scott Dumdei

Job No: 32-20467

Sample Details

Sample ID: 20-03406-S1

Field ID:

Borings 30,32 &34

Date Sampled: 3/18/2020

Sampling Method: Boring

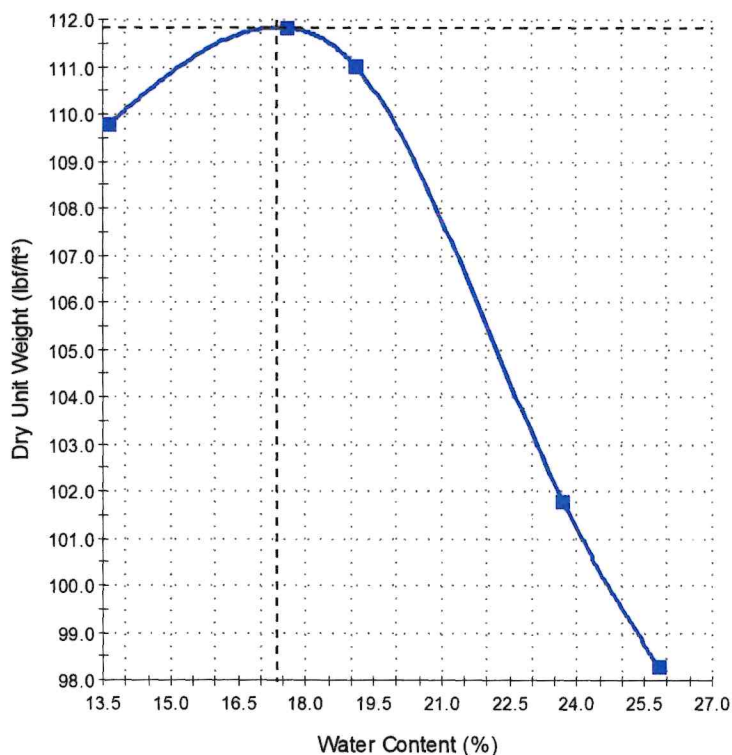
Source: In-Place Material

Material: Sandy Lean Clay, Brown (CL)

Location: Boring #30, 32 & 34, 2'-4.5'

Sampled By: Roger Hanson

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 1557

Maximum Dry Unit Weight (lb/ft³): 111.8

Optimum Water Content (%): 17.4

Method: A

Preparation Method: Moist

Tested By: Richard Petersen

Date Tested: 3/25/2020

Comments

020-064-1603 400 913 6444

FIELD EXPLORATION PROCEDURES

Soil Sampling

Soil sampling was performed in accordance with ASTM: D1586. Using this procedure, a 2" O.D. split barrel sampler is driven into the soil by a 140-lb. weight falling 30". After an initial set of 6", the number of blows required to drive the sampler an additional 12" is known as the penetration resistance or N value. The N value is an index of the relative density of the cohesionless (sandy) soils and the consistency of cohesive (clayey) soils. Thin walled tube samples, if taken, were obtained according the ASTM: D1587 where indicated by the appropriate symbol on the test hole (boring) logs. Rock core samples, if taken, were obtained by rotary drilling in accordance with ASTM: D2113. Power auger borings, if performed, were done in general accordance with ASTM: D1452.

Soil Classification

As the samples were obtained in the field, they were visually and manually classified by the crew chief in general accordance with ASTM: D2487. Representative portions of the samples were then returned to the laboratory for further examination and for verification of the field classification. Logs of the test holes (borings) indicating the depth and identification of the various strata, the N value, water level information and pertinent information regarding the method of maintaining and advancing the drill holes are attached. Charts illustrating the descriptive terminology and the symbols used on the test hole logs are also attached.

LOG OF TEST HOLE – "DESCRIPTIONS"

Depth - Depth below the existing grade at the location and time the sampling was performed.

Description of Material – Soil type based on visual and manual methods and/or laboratory tests (see "Soil Classification" above).

Surface Elevation – Elevation of the existing grade at the location and time the sampling was performed.

Geologic Origin - A description of the most likely source of the soil deposit.

WL - The highest groundwater measurement at the time and location the sampling was performed marked by the symbol ▼. (Also see "Water Level Measurements" on test hole log).

N - The number of blows required to drive the sampler 12" (see "Soil Sampling" above).

NO. – The sample number.

TYPE – The type of equipment used to sample the soil (SB = Split Barrel Sampler).

W, D, LL, PL and QU – Test symbols. (See the attached "Symbols and Terminology.")

Method – The type of equipment used in to advance (drill) the test hole.

SYMBOLS AND TERMINOLOGY

DRILLING AND SAMPLING SYMBOLS

<u>SYMBOL</u>	<u>DEFINITION</u>
N	Standard Penetration – blows per foot
WOH	Weight of Hammer
B	Bag Sample
DM	Drilling Mud
FA	Flight Auger
HA	Hand Auger
HSA	Hollow Stem Auger
JW	Jetting Water
NSR	No Sample Recovered
_Q	BQ, NQ or PQ Wireline System
SB	Split Barrel Sampler
SPT	Standard Penetration Test
3TW	3" Thin Walled Tube Sample
CS	California Sampler
▼	Water Level Symbol

TEST SYMBOLS

<u>SYMBOL</u>	<u>DEFINITION</u>
W	Water Content by weight (ASTM:D2216)
D	Dry Density - pounds per cubic foot
LL	Liquid Limit (ASTM: D4318)
PL	Plastic Limit (ASTM: D438)
Qu	Unconfined Compressive Strength – pounds per square foot (ASTM: D2166)
Pq	Penetrometer Reading – tons/square ft.
Su	Undrained Shear Strength
R	Laboratory Resistivity
G	Specific Gravity – ASTM: D854
OC	Organic Content
K	Coefficient of Permeability
VS	Field Vane Shear (ASTM: D2573)
RQD	Rock Quality Designation - percent
CR	Core Recovery (percent)

WATER LEVELS

Water levels shown on the test hole (boring) logs are the water levels measured in the test holes at the time and under the conditions indicated. In sand soil, the indicated levels may be considered fairly reliable ground water levels. In clay soil, it may not be possible to determine the ground water level within the normal time required for the test hole, except where lenses or layers of more pervious waterbearing soil are present. Even then, an extended period of time may be necessary to reach equilibrium. Therefore, the water levels shown on the test hole logs for cohesive or mixed texture soils may not indicate the true level of the ground water table. Perched water refers to water above an impervious layer, thus impeded in reaching the water table. The available water level information is given at the bottom of the log sheet.

DESCRIPTIVE TERMINOLOGY

<u>RELATIVE DENSITY</u>	<u>"N" VALUE</u>	<u>CONSISTENCY</u>	<u>"N" VALUE</u>
very loose	0-4	very soft	0-1
loose	5-10	soft	2-4
medium dense	11-24	firm	5-8
dense	25-50	stiff	9-15
very dense	>50	very stiff	16-30
		hard	31-60
		very hard	>60

"N" is the Standard Penetration, in blows per foot, of a 140 pound hammer falling 30 inches onto a 2 inch OD split barrel sampler.

Lamination	Up to ½" thick stratum
Layer	½" to 6"
Lens	½" to 6" discontinuous stratum, pocket
Varved	Alternating laminations of clay, silt and/or fine grained sand, or colors thereof
Dry	Powdery, no noticeable water
Moist	Below saturation
Wet	Saturated, above liquid limit
Waterbearing	Pervious - soil is below water

RELATIVE GRAVEL PROPORTIONS

<u>TERM</u>	<u>RANGE</u>
A trace of gravel	Less than 4%
A little gravel	5 – 15%
With gravel	16 – 50%

RELATIVE SIZES

Boulder	Over 12"
Cobble	3" - 12"
Gravel - Coarse	¾" - 3"
Gravel - Fine	#4 - ¾"
Sand - Coarse	#4 - #10
Sand - Medium	#10 - #40
Sand - Fine	#40 - #200
Silt & Clay	-#200, Based on Plasticity

PRECAUTIONS FOR EXCAVATING AND REFILLING DURING COLD WEATHER

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

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

In many cases, final grade cannot be attained in one day's time, even though small areas are worked. In the event final grade cannot be attained in one day's time, frost can be expected to develop overnight. The depth of frost penetration can be minimized by leaving a layer of loose soil on top of the compacted material overnight. However, any frost which forms in this loose layer, or snow which accumulates, should be completely removed from the fill area prior to compaction and additional soil placement. Frozen soils, or soils containing frozen material or snow should never be used as fill material.

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

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

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

CONSTRUCTION OBSERVATIONS AND TESTING

- **Geotechnical Engineer's Observation**

- **Field Density Tests**

- Footings Trench Areas: At least one density test should be performed for each 1½ foot depth of engineered fill placed. The lateral spacing between each 1½ foot test should not exceed 30 lineal feet.
- Floor Slab Areas: At least one density test should be performed for each 1½ foot of engineered fill depth. The density tests should be spaced so that there is a minimum of one test performed for every 2000 square feet of engineered fill placed.
- Exterior Backfill Areas: At least one density test should be performed for each 2 feet of engineered fill depth and at least one test for every 30 lineal feet of engineered fill placed.
- Utility Trench Areas: At least one density test should be performed for each 2 feet of engineered fill depth and at least one test for every 50 lineal feet of engineered fill placed.

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL ENGINEERING REPORT

More construction problems are caused by site subsurface conditions than any other factor. As troublesome as subsurface problems can be, their frequency and extent have been lessened considerably in recent years, due in large measure to programs and publications of ASFE/The Association of Engineering Firms Practicing in the Geosciences:'

The following suggestions and observations are offered to help you reduce the geotechnical-related delays, cost-overruns and other costly headaches that can occur during a construction project.

A GEOTECHNICAL ENGINEERING REPORT IS BASED ON A UNIQUE SET OF PROJECT-SPECIFIC FACTORS

A geotechnical engineering report is based on a subsurface exploration plan designed to incorporate a unique set of project-specific factors. These typically include: the general nature of the structure involved, its size and configuration, the location of the structure on the site and its orientation; physical concomitants such as access roads, parking lots, and underground utilities, and the level of additional risk which the client assumed by virtue of limitations imposed upon the exploratory program. To help avoid costly problems, consult the geotechnical engineer to determine how any factors which change subsequent to the date of the report may affect its recommendations.

Unless your consulting geotechnical engineer indicates otherwise, *your geotechnical engineering report should not be used:*

- When the nature of the proposed structure is changed, for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one;
- when the size or configuration of the proposed structure is altered;
- when the location or orientation of the proposed structure is modified;
- when there is a change of ownership, or
- for application to an adjacent site.

Geotechnical engineers cannot accept responsibility for problems which may develop if they are not consulted after factors considered in their report's development have changed.

MOST GEOTECHNICAL "FINDINGS" ARE PROFESSIONAL ESTIMATES

Site exploration identifies actual subsurface conditions only at those points where samples are taken, when they are taken. Data derived through sampling and subsequent laboratory testing are extrapolated by geo-

technical engineers who then render an opinion about overall subsurface conditions, their likely reaction to proposed construction activity, and appropriate foundation design. Even under optimal circumstances actual conditions may differ from those inferred to exist, because no geotechnical engineer, no matter how qualified, and no subsurface exploration program, no matter how comprehensive, can reveal what is hidden by earth, rock and time. The actual interface between materials may be far more gradual or abrupt than a report indicates. Actual conditions in areas not sampled may differ from predictions. *Nothing can be done to prevent the unanticipated, but steps can be taken to help minimize their impact.* For this reason, *most experienced owners retain their geotechnical consultants through the construction stage, to identify variances, conduct additional tests which may be needed, and to recommend solutions to problems encountered on site.*

SUBSURFACE CONDITIONS CAN CHANGE

Subsurface conditions may be modified by constantly-changing natural forces. Because a geotechnical engineering report is based on conditions which existed at the time of subsurface exploration, *construction decisions should not be based on a geotechnical engineering report whose adequacy may have been affected by time.* Speak with the geotechnical consultant to learn if additional tests are advisable before construction starts.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes or ground-water fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical report. The geotechnical engineer should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

GEOTECHNICAL SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND PERSONS

Geotechnical engineers' reports are prepared to meet the specific needs of specific individuals. A report prepared for a consulting civil engineer may not be adequate for a construction contractor, or even some other consulting civil engineer. Unless indicated otherwise, this report was prepared expressly for the client involved and expressly for purposes indicated by the client. Use by any other persons for any purpose, or by the client for a different purpose, may result in problems. *No individual other than the client should apply this report for its intended purpose without first conferring with the geotechnical engineer. No person should apply this report for any purpose other than that originally contemplated without first conferring with the geotechnical engineer.*

A GEOTECHNICAL ENGINEERING REPORT IS SUBJECT TO MISINTERPRETATION

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a geotechnical engineering report. To help avoid these problems, the geotechnical engineer should be retained to work with other appropriate design professionals to explain relevant geotechnical findings and to review the adequacy of their plans and specifications relative to geotechnical issues.

BORING LOGS SHOULD NOT BE SEPARATED FROM THE ENGINEERING REPORT

Final boring logs are developed by geotechnical engineers based upon their interpretation of field logs (assembled by site personnel) and laboratory evaluation of field samples. Only final boring logs customarily are included in geotechnical engineering reports. *These logs should not under any circumstances be redrawn* for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process. Although photographic reproduction eliminates this problem, it does nothing to minimize the possibility of contractors misinterpreting the logs during bid preparation. When this occurs, delays, disputes and unanticipated costs are the all-too-frequent result.

To minimize the likelihood of boring log misinterpretation, *give contractors ready access to the complete geotechnical engineering report* prepared or authorized for their use. Those who do not provide such access may proceed un-

der the *mistaken* impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes which aggravate them to disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY

Because geotechnical engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against geotechnical consultants. To help prevent this problem, geotechnical engineers have developed model clauses for use in written transmittals. These are *not* exculpatory clauses designed to foist geotechnical engineers' liabilities onto someone else. Rather, they are definitive clauses which identify where geotechnical engineers' responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your geotechnical engineering report, and you are encouraged to read them closely. Your geotechnical engineer will be pleased to give full and frank answers to your questions.

OTHER STEPS YOU CAN TAKE TO REDUCE RISK

Your consulting geotechnical engineer will be pleased to discuss other techniques which can be employed to mitigate risk. In addition, ASFE has developed a variety of materials which may be beneficial. Contact ASFE for a complimentary copy of its publications directory

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PRACTICING IN THE GEOSCIENCES

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ELECTRICAL ADDENDUM

Airport Terminal Solar Array
Watertown, SD

DATE: 8/5/26

Professional Design Engineers
48371 265th Street
Brandon, SD 57005

SCOPE OF THIS ADDENDUM:

The following becomes a part of the original Drawings and Project Manual, taking precedence over those items that may conflict.

The Bidder shall note receipt and make acknowledgement of the addendum on the bid form, incorporating its provisions in their bid.

This addendum has been issued to all bidders and to all others to whom the Drawings and Project Manuals have been issued by the office of the Architect/Engineer.

Specifications Items:

Item No. 1

Section 262413 - Switchboards
Page 5
Paragraph 2.3.A

Add the following paragraph:

2.3 MANUFACTURERS

A Switchboard shall be manufactured by Eaton Corporation to match existing electrical distribution equipment.

Item No. 2

Section 263100 – Photovoltaic Collectors
Page 3
Subparagraph 2.3.A.1

Delete “500KW” and substitute “solar array 633KW DC and inverter system of 500KW AC”

Item No. 3

Section 263100 – Photovoltaic Collectors
Page 4
Subparagraph 2.3.A.2.g

Add the following subparagraph:

2.3.A.2.g Solar array shall provide real-time production data and history of power generation to the Airport Terminal for use by owner via computer and display monitoring.

Item No. 4

Section 263100 – Photovoltaic Collectors
Page 8
Subparagraph 3.3.E

Add the following subparagraph:

3.3.E Upon completion of project contractor shall provide witness testing where loss of utility power occurs to confirm timely shut down of solar array. Testing shall be performed with Utility Company representatives, Owner and Engineers present.

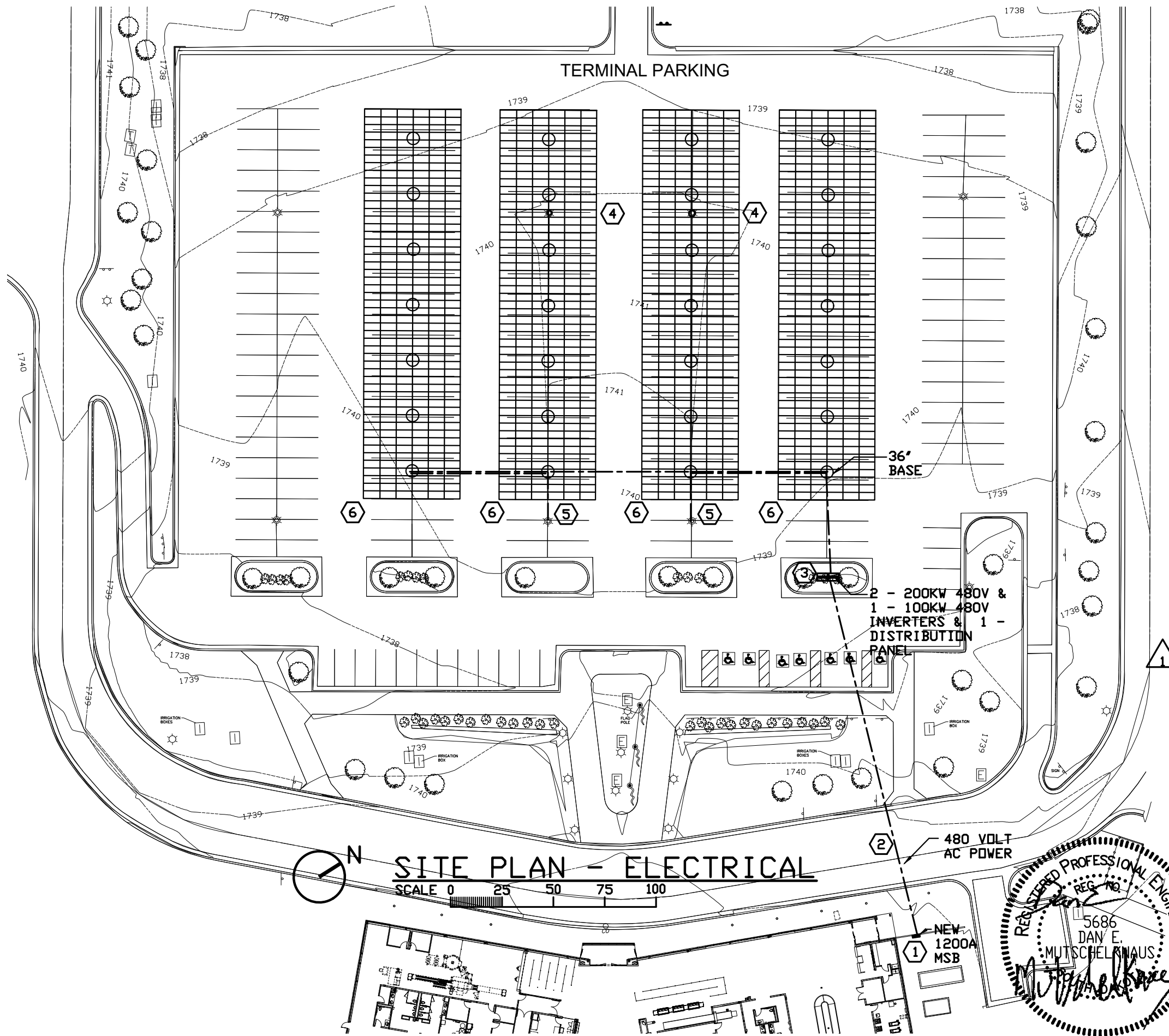
Drawing Items:

Item No. 5

Sheets E100 & E103

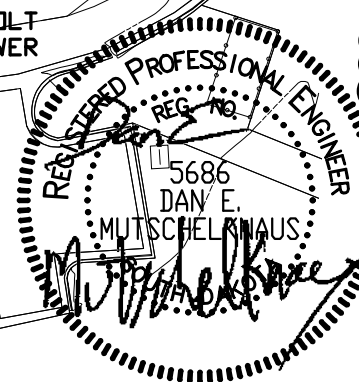
Replace existing sheets E100 and E103 with revised sheets dated 8-5-26.

End of Addendum.



ELECTRICAL NOTES

1. CONCRETE SHALL BE REMOVED BETWEEN NEW MSB AND CT CABINET FOR INSTALLATION OF NEW SECONDARY SERVICE.
2. CONTRACTOR SHALL UTILIZE DIRECTIONAL BORING UNDER EXISTING HARD SURFACES FOR INSTALLATION OF CONDUITS SERVING THE INVERTERS AND POWER DISTRIBUTION PANEL.
3. LOCATE POWER INVERTERS AND DISTRIBUTION PANEL IN THIS AREA. PROVIDE CONCRETE PAD AND C-CHANNEL STRUT FOR MOUNTING OF EQUIPMENT.
4. CONTRACTOR SHALL REMOVE EXISTING LIGHT POLE, CONCRETE BASE AND SECURITY CAMERA. POLE, LIGHT FIXTURES AND SECURITY CAMERA SHALL BE TURNED OVER TO THE OWNER. EXISTING CONDUCTORS AND CABLING SHALL BE REMOVED BACK TO THE LIGHT POLE TO REMAIN AND THE SECURITY EQUIPMENT BOX. COORDINATE WITH AIRPORT IT DEPARTMENT FOR ADDITIONAL INFORMATION.
5. PROVIDE NEW 1" CONDUITS FROM EXISTING SECURITY CAMERA EQUIPMENT BOXES MOUNTED ON EXISTING LIGHT POLES TO EACH CARPORT FOR OWNER FURNISHED AND INSTALLED SECURITY CAMERAS. CONDUITS SHALL BE CONCEALED IN NEW CONCRETE BASES FOR CARPORTS AND EXPOSED AT EXISTING CONCRETE BASES FOR LIGHT POLES. PROVIDE RGS CONDUIT WHERE EXPOSED.
6. 47'X190' CARPORT STRUCTURE WITH 288 SOLAR PANELS. CARPORT SHALL HAVE 14' VEHICLE CLEARANCE UNDER STRUCTURE. CONCRETE BASES SHALL BE A MINIMUM OF 30" ABOVE FINISHED GRADE. HEIGHT OF CONCRETE BASES SHALL BE INCREASED BASED ON EXISTING PARKING LOT CONTOURS TO MAINTAIN A LEVEL CARPORT STRUCTURE. CARPORT STRUCTURE SUPPLIER SHALL INCLUDE ENGINEERING OF STRUCTURE AND CONCRETE BASES BASED ON EXISTING SOIL CONDITIONS AND ENVIRONMENTAL CONDITIONS FOR WATERTOWN, SD.



Professional Design Engineers
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 Brandon, SD 57005
 (605)582-5717
 Fax 582-5717

No. Revision 1 REVISED NOTE	Date	416 Production St. N. Aberdeen, S.D. 57402 Phone: 605.225.1212 Fax: 605.225.3189 Email: bob@helmsengineering.com
	I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the law of the State of South Dakota. Registration No.	
SPN Helms CIVIL ENGINEERS & LAND SURVEYORS		
ATY Terminal Parking Lot Watertown, SD SITE PLAN - ELECTRICAL		
Drawn By: RKK Chk' By: DEM Proj. No: 2026016 Dwg. No: - VP. No: - Date: 7/31/26	E100 1 OF 6	



ELECTRICAL NOTES

1. FLOOR TYPICAL FOR FOUR CARPORTS, SEE SHEET E100 FOR ADDITIONAL INFORMATION.

2. TYPE A LIGHT FIXTURE SHALL BE EQUAL TO NLS LIGHTING NO. DRX-2-T5-32L-7-40K8-UNV-CM-GRY-DPCL SURFACE MOUNT 18" DIAMETER, TYPE 5 DISTRIBUTION, 7600 LUMENS, 4000K, 80CRI, UNIVERSAL VOLTAGE. LITHONIA AND HUBBELL SHALL BE CONSIDERED EQUAL.

No.	Revision	Date
1	REVISED CARPORT LIGHTING	8-3-26

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the law of the State of South Dakota.
Registration No.

416 Production St N.
Aberdeen, S.D. 57402
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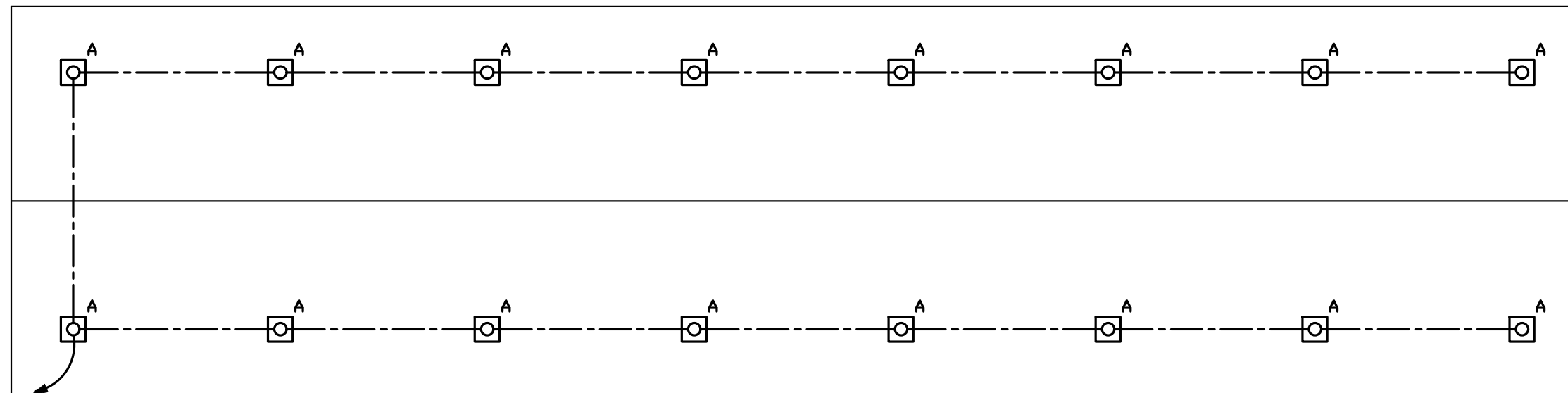
ATY Terminal Parking Lot
Watertown, SD

SITE PLAN - ELECTRICAL

Drawn By: RKK
Chk By: DEM
Proj. No: 2026016
Dwg. No: -
VP. No: -
Date: 7/31/26

E103

4 OF 6



B-20A/2P
#6 TO FIRST FIXTURE,
#10 TO REMAINING
LIGHT FIXTURES
VIA CONTACTOR

CARPORT PLAN - LIGHTING

SCALE 0 8 16 24 32



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