August 26, 2016

MILITARY DEPARTMENT
STATE of NEBRASKA
LINCOLN, NEBRASKA

NEBRASKA ARMY NATIONAL GUARD
CATS-M SIMULATOR BUILDING

at

1324 County Road 8, Mead, NE

PROJECT NO. 31090391

A D D E N D U M N O. 1

The original specifications and drawings on the STATE OF NEBRASKA REQUEST for PROPOSAL FORM for the project noted above are amended as noted in this Addendum No. 1.

Receipt of this Addendum shall be acknowledged by inserting its number and date in the space provided on the Bid Form.

ADDENDUM NO. 1

NOTE TO ALL PLANHOLDERS: Please insert this Addendum into your copy of the Contract Documents for the above named project.

The following changes to the Contract Documents are issued by the CFMO-CMB and shall have the same force and affect as though a part of the original issue.

THE RECEIPT DATE, TIME and LOCATION of the BID PROPOSAL submission HAS NOT CHANGED.

ITEM NO.

ADD 1-1 Pre-Bid Meeting Sign-In Sheet. Refer to the attached sign-in sheet.

ADD 1-2 Updated Nebraska Military Department Pre-Bid Conference Agenda. Refer to the attached Pre-Bid Conference Agenda.

ADD 1-3 No additional addenda will be sent prior to the bid date.

ADD 1-4 Furnish bollards with flush steel cap. Refer to attached drawing, C201.

ADD 1-5	Utility location – Include in the base bid retention of a private locating service and mark all utilities owned by the Nebraska National Guard as required for the execution of the work under this bid.
ADD 1-6	See attached Geotechnical Soils Report for building site (23 pages).
ADD 1-7	See attached aerial site plan for soil borrow pit location.
ADD 1-8	See attached Grading Plan, C101 for revised site grading requirements.
ADD 1-9	Clarification to specification section 07 22 00-3, 2.1-B: Silvercote – Energy Saver FP is an acceptable substituted manufacturer.
ADD 1-10	Clarification to specification section 07 22 03-3, 2.2-3: Revise wall insulation to be R-25;8".
ADD 1-11	Clarification to specification section 13 34 19-5, 1.7-B: Nucor Building systems and Metallic Building Systems are acceptable substituted manufacturers. Morton Building is removed from the list of acceptable manufacturers.
ADD 1-12	Refer to Sheet M100 – Details, Schedules and Specifications: #4 Air Compressor Detail shall be noted with 1" pipe in lieu of 1¼".
ADD 1-13	During the Pre-Bid Conference, it was discovered that the existing communication pull boxes at site and possibly the existing conduits are filled with dirt. Provide cost to clean out boxes and conduits as part of bid. Field verify as necessary.

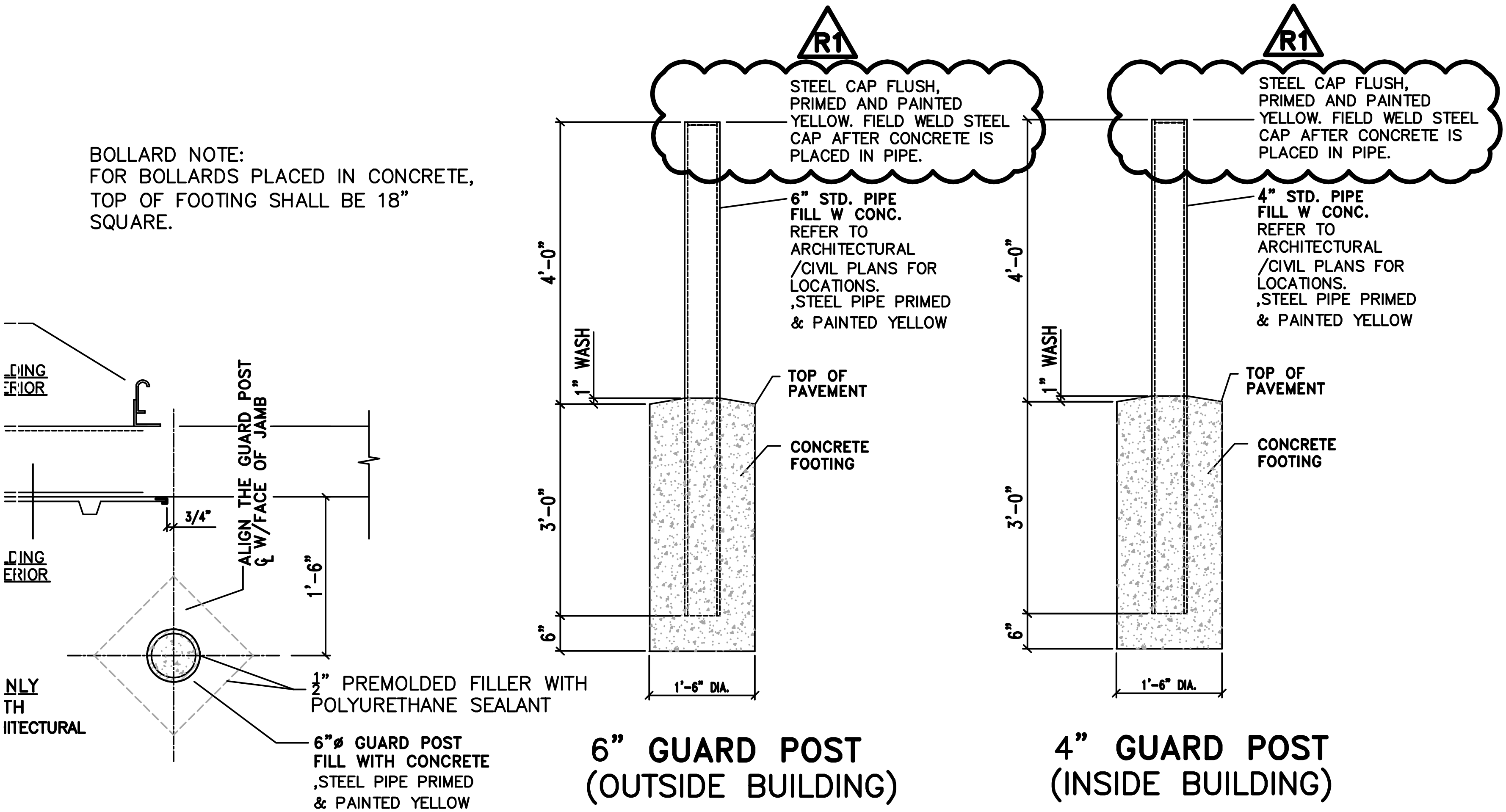
THIS ADDENDUM SHALL BE ATTACHED TO AND MADE A PART OF THE DRAWINGS AND SPECIFICATIONS AND SHALL BE ACKNOWLEDGED WITH THE BIDDER'S PROPOSAL.

for Shawn D. Fitzgerald

DARYL L. BOHAC
MAJOR GENERAL The Adjutant General

End of Addendum No. 1

BOLLARD NOTE:
FOR BOLLARDS PLACED IN CONCRETE, TOP OF FOOTING SHALL BE 18" SQUARE.



4 / C201 BOLLARD DETAIL

NO SCALE

REGA NO. 161121

ISSUED FOR:	DATE:	BY:
REVISED END OF BOLLARDS ON BOLLARD DETAIL	08/22/16	SDB

REF. SHT# C201

REGA ENGINEERING GROUP, INC.

Thiele Geotech Inc

Geotechnical Exploration Report

TADSS/Simulation Building

County Road 8 & County Road J
Mead, Nebraska

PROFESSIONAL CIVIL ENGINEER
ROBERT K.
LAPKE
E-10089
8-17-16
STATE OF NEBRASKA

Prepared for:
Erickson Sullivan Architects
209 South 9th Street
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August 17, 2016
TG Project No. 16299.02

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Geotechnical Exploration Report

TADSS/Simulation Building

Table of Contents

INTRODUCTION

Thiele Geotech, Inc. has completed a geotechnical exploration study for the proposed TADSS/Simulation Building to be located near County Road 8 and County Road J in Mead, Nebraska. The purpose of this study was to identify the general soil and ground water conditions underlying the site; to evaluate engineering properties of the existing soils; to provide earthwork and site preparation recommendations; and to recommend design criteria and parameters for foundations, pavements, and other earth supported improvements.

This study included soil borings, laboratory testing, and engineering analysis. A series of two test borings and one profile boring was spaced across the project site at strategic locations. The field and laboratory data are presented in the Appendix, along with a description of investigative methods.

The drilling and testing performed for this study were conducted solely for geotechnical analysis. No analytical testing or environmental assessment has been conducted. Any statements or observations in this report regarding odors, discoloration, or suspicious conditions are strictly for the information of our client. If an evaluation of environmental conditions is desired, a separate environmental assessment should be conducted. This study did not include biological assessment (e.g. mold, fungi, bacteria) or evaluation of measures for their control.

It should also be noted that this report was prepared for design purposes only, and may not be sufficient for a contractor in bid preparation. Prospective contractors should evaluate potential construction problems on the basis of their own knowledge and experience in the local area and on similar projects, taking into account their own intended construction methods and procedures.

This report is an instrument of service prepared for use by our client on this specific project. The report may be duplicated as necessary and distributed to those directly associated with this project, including members of the design team and prospective contractors. However, the technical approach and report format shall be considered proprietary and confidential, and this report may not be distributed in whole or in part to any third party not directly associated with this project. By using and relying on this report, all other parties agree to the same terms, conditions, and limitations to which the client has agreed.

PROJECT DESCRIPTION

Our understanding of the project is based upon information provided by Erickson Sullivan Architects.

The project consists of constructing the TADSS/Simulation Building for the CATS-M Training Aids Center located near County Road 8 and County Road J in Mead, Nebraska. The structure will be an approximately 9,000 square feet, pre-engineered metal building. A septic system will be included as part of this project and will be to the southeast of the proposed building. A paved parking lot and drive will be located north and west of the building.

Structural loading information was not provided at the time of this report. We assume maximum column loads of 30 kips and maximum continuous wall loads of 2 kips per lineal foot. The finish floor elevation of the structure is planned at 1,183 feet. This will require raising grades across the building footprint by up to 3 feet.

SURFACE AND SUBSURFACE CONDITIONS

SITE CONDITIONS

The project site is located at the CATS-M Training Aids Center near County Road 8 and County Road J in Mead, Nebraska. The site is currently a grass-covered, vacant lot. A few trees are located on the site and are to be conserved during the project. The topography of the site is sloping down gently to the south from the gravel access road adjacent north.

LOCAL GEOLOGY

The site lies in the Todd Valley in Saunders County, Nebraska. The Todd Valley represents a historic channel of the Platte River. The river was diverted and carved out the valley, and later returned to its original channel to the northeast.

The soils in the Todd Valley typically consist of alluvium which was deposited during the middle Wisconsinan period, overlain by a thin mantle of loess which was deposited during the late Wisconsinan. The alluvium consists of lean clays and silts at the surface, and grades to fine to medium sands with depth.

Beneath the alluvium lie Pleistocene glacial deposits of Kansan and Nebraskan till. The till consists of lean to fat clays mixed with sand, gravel, and occasional cobbles. The glacial deposits are generally fairly deep, but are sometimes near the surface at lower elevations on steep slopes. Cretaceous sandstone or Pennsylvanian limestone and shale forms the bedrock unit below the glacial deposits. The depth to bedrock is normally great, and rock is rarely encountered in construction.

SOIL CONDITIONS

The soils encountered in the test borings generally consisted of man-placed fill, Peoria loess, and Todd Valley alluvium.

Man-placed fill was encountered at the surface of all three borings, extending to depths of 2.5 to 7.5 feet. The fill was described as dark brown, dark grayish brown, or grayish brown, moist, firm to very hard, lean or fat clay. The fill ranged in compaction from 80 to over 100 percent, based on an assumed Standard Proctor (ASTM D698).

Peoria loess was encountered beneath the fill in all three test borings, extending to depths of 15 to 15.5 feet in borings B-1 and B-2 and extending to termination depth of profile boring P-1. The Peoria loess was described as light brown, moist to very moist, soft to firm, lean clay.

Todd Valley alluvium was encountered beneath the Peoria loess in borings B-1 and B-2, extending to termination depth. The alluvium was described as light brown, dry to moist, medium dense, silty sand.

Ranges of engineering properties from laboratory tests on selected samples are presented in Table 1.

Table 1 - Laboratory Results

Soil Layer	Moisture Content (%)	Dry Unit Weight (pcf)	Unconfined Compressive Strength (tsf)	Standard Penetration Values (N)*	Classification *(LL/PI)*
Man-placed fill	16 to 22	84 to 106	0.9 to 4.1	-	CL (visual) CH (65/45)
Peoria loess	24 to 31	86 to 95	0.5 to 1.2	-	CL (visual)
Todd Valley alluvium	3 to 4	-	-	23 to 28	SM (visual)

* Standard Penetration Values are actual field recorded values and have not been corrected for hammer energy

GROUND WATER OBSERVATIONS

Ground water was not encountered in any of the test borings during or at the end of the drilling operation. However, it must be noted that ground water levels may fluctuate due to seasonal variations and other factors.

ANALYSIS AND RECOMMENDATIONS

GENERAL

The primary geotechnical engineering concern associated with this project is the presence of low density fill and Peoria loess that was encountered near the surface of both test borings. Since the building pad is going to be raised up to 3 feet above existing grade, this low density layer will be near the bearing elevation of footings for the structure in this area. We are therefore providing recommendations for overexcavation and recompaction of these soils in order to provide a more suitable bearing surface. These recommendations are provided in the following section of this report.

SITE PREPARATION

As discussed above, the existing condition of the soils encountered near bottom of footing elevation for the structure are unsuitable to support the proposed foundation loads. In order to provide a more suitable bearing surface, we recommend that the building pad be undercut to a level that will allow placement of a minimum of three feet of controlled structural fill below all footings. The undercut should extend a minimum of 3 feet outside exterior wall lines. Should unsuitable materials be encountered at the base of the 3 feet undercut, the unsuitable material should be removed in preparation for fill placement. Acceptable structural fill properties are highlighted in the Earthwork and Excavations section below.

EARTHWORK AND EXCAVATIONS

Rubble and waste materials from site clearing and demolition should be removed from the site and lawfully disposed or recycled. Waste materials should not be buried on-site.

Relocation of any existing utility lines within the zone of influence of proposed construction areas should also be completed as part of the site preparation. The lines should be relocated to areas outside of the proposed construction. Excavations created by removal of the existing lines should be cut wide enough to allow for use of heavy construction equipment to recompact the fill. In addition, the base of the excavations should be thoroughly evaluated by a geotechnical engineering representative prior to placement of fill.

Topsoil and vegetation should be stripped to a depth of 4 to 6 inches in areas to be disturbed during grading, including borrow and fill areas. Stripping depths will likely vary and should be adjusted to remove all vegetation and root systems. A representative of the geotechnical engineer should monitor the stripping operations to observe that all unsuitable materials have been removed. Care should be exercised to separate these materials to avoid incorporation of the organic matter in structural fill sections.

Surfaces to receive fill should be broken up and recompacted to allow new fill to bond to the existing soil. Slopes steeper than 5H:1V should be benched before placing fill.

The excavated site soils will generally be suitable for reuse as structural fill, although some moisture conditioning may be required. Fat clay soil should not be used as fill within 2 feet of subgrade level. Any off-site borrow should be a clean, inorganic silt or lean clay with a liquid limit less than 45 and a plasticity index less than 20. Borrow material should not contain an appreciable amount of roots, rock, or debris, and should not contain any foreign material with a dimension greater than 3 inches.

All fills should be placed and compacted as structural fill. Fill should be placed in thin lifts not to exceed 8 inches loose thickness. Structural fill should be compacted with a sheepsfoot type roller to a minimum of 95 percent of the maximum dry density (ASTM D698, Standard Proctor). Moisture content should be controlled to between -3 and +4 percent of optimum.

Backfill soils in utility trenches should be compacted to a minimum of 95 percent of the maximum dry density at a moisture content between -3 and +4 percent of optimum. Lift thicknesses should be appropriately matched to the type of compaction equipment used. Backfill soils around foundations, basement walls, and retaining walls should be compacted to a minimum of 95 percent of the maximum dry density at a moisture content between -3 and +4 percent of optimum. Granular backfill should not be used in exterior trenches or around foundation elements.

Quality control testing is an important part of any earthwork operation. It is recommended that a representative of the geotechnical engineer periodically monitor earthwork operations to verify proper compliance with these recommendations, including compaction levels.

OSHA's Construction Standards for Excavations require that the contractor's excavation activities follow certain worker safety procedures. These include a requirement that excavations over 4 feet deep be sloped back, shored, or shielded. The soils encountered in the test borings generally classify as type B and C soils according to the OSHA standard. The maximum allowable slope for an unbraced excavation in these soils is 1H:1V and 1.5H:1V, respectively, although other provisions and restrictions apply. Excavations over 20 feet deep require specific design by a licensed Professional Engineer. The contractor is solely responsible for site/excavation safety and compliance with OSHA regulations. The geotechnical engineer assumes no responsibility for site safety, and the above information is provided only for consideration by the designers.

SHALLOW FOUNDATIONS

The site conditions identified are favorable for the use of conventional spread foundations to support structural loads. Based on our bearing capacity and settlement analysis, a net allowable bearing pressure of 2,500 pounds per square foot was determined. This allowable bearing pressure may be used to size wall footings and column pads. The bearing pressure was calculated based on a safety factor of 3 against bearing failure. Foundation settlements are estimated at less than 1 inch total and ½ inch differential over a span of 20 feet. If maximum design loads significantly exceed 30 kips for columns or 2 kips per foot for walls, these bearing pressures may not be applicable and should be reevaluated.

It is recommended that column footings be at least 3 feet square and that load bearing wall footings be at least 16 inches wide. Exterior footings and footings in unheated areas should be founded a minimum of 3.5 feet below adjacent grade to provide reasonable frost protection. It is recommended that all footings be steel reinforced.

The condition of the bearing soils can vary and should be observed by the geotechnical engineer at the time of excavation. If unsuitable bearing soils are identified, they should be improved by compaction or replaced by structural fill. As an alternative, the footing bottom could be extended through unsuitable materials if suitable material is present below.

SEISMIC SITE CLASS

Seismic structural design requirements are dictated by a site classification based on average soil properties within the top 100 feet. Based on our local experience, the soil profile was estimated below the maximum boring depth. The average undrained shear strength was then estimated based on the actual laboratory testing and on assumed soil properties for the deeper soil profile.

The site classifies as Site Class D (stiff soil profile) according to Table 1613.5.2 of the 2006 International Building Code.

FLOOR SLABS

To avoid localized slab failures, it is important that interior backfill around foundation elements and in plumbing trenches be properly compacted. Interior backfill should be compacted to a minimum of 95 percent of the maximum dry density at a moisture content between -3 and +4 percent of optimum (ASTM D698, Standard Proctor).

To provide uniform support for floor slabs, the upper 6 inches of the subgrade should be compacted to a minimum of 95 percent of the maximum dry density at a moisture content between -3 and +4 percent of optimum (ASTM D698, Standard Proctor). Care should be taken to maintain the condition of the subgrade. Areas that become saturated, frozen, or disturbed should be reworked prior to slab placement. Any unstable areas should be excavated and replaced with structural fill. A granular cushion beneath the floor slab is considered a construction convenience and may be used, but is not considered critical to proper slab performance.

A 10 mil thick vapor retarder is recommended beneath the concrete to inhibit upward migration of moisture through the slab. Care should be taken when finishing concrete placed directly on a vapor retarder to minimize potential problems with curling and blistering.

Interior partition walls weighing up to 1,000 pounds per lineal foot may be supported directly on the floor slab. It is recommended that control joints be provided between partition walls that bear on the floor slab and walls supported on footings. Entrance slabs should be designed as structural stoops with a cavity beneath the slab to accommodate frost heave.

Contraction joints are important to control the location of cracks in the floor slab that result from stresses caused by normal drying shrinkage. Joints should be cut as soon as practical after the concrete has set sufficiently to support foot traffic, and must be cut before any shrinkage cracks form. Contraction joints should be cut to a minimum of ¼ of the slab thickness (1/5 of the thickness for early entry saw method). Joints should be spaced no more than 30 times the thickness of the slab or 15 feet maximum. Panels should be kept as square as possible, with the length to width ratio limited to 125 percent. Dowel bars should be used for load transfer across construction joints where slabs are subjected to heavy loads. Joints should be carefully planned and laid out to match column lines and to meet reentrant corners. Joints should be perpendicular to edges and should not form angles less than 45 degrees or over 225 degrees. To accommodate the relative movement that commonly occurs between floors and foundations, isolation joints should be provided against walls, and diamond or circular isolation joints should be constructed around columns.

PAVEMENTS

Pavement performance is directly affected by the degree of compaction, uniformity, and stability of the subgrade. This is particularly important where traffic from heavy trucks is anticipated. The final subgrade should be reworked and compacted immediately prior to pavement construction. The subgrade should then be proof rolled, and any unstable areas should be excavated and replaced to create a uniform and stable subgrade.

For concrete pavements, it is recommended that the upper 12 inches of the subgrade be compacted to a minimum of 90 percent of the maximum dry density at a moisture content between -3 and +4 percent of optimum (ASTM D1557, Modified Proctor). Subgrade preparation should extend a minimum of 2 feet laterally beyond the edge of the pavement.

For asphalt pavements, greater stability is required due to the extreme loading conditions placed on the subgrade during laydown. Subgrades for asphalt pavements should be prepared by compacting the upper 12 inches to a minimum of 92 percent of the maximum dry density at a moisture content between -3 and +4 percent of optimum (ASTM D1557, Modified Proctor). Subgrade preparation should extend a minimum of 2 feet laterally beyond the edge of the pavement, including the concrete curb and gutter section.

Under sidewalks, the upper 6 inches of the subgrade should be compacted to a minimum of 95 percent of the maximum dry density at a moisture content between -3 and +4 percent of optimum (ASTM D698, Standard Proctor). Subgrade preparation should extend laterally 6 inches beyond the edge of the sidewalk

Based on the forgoing subgrade preparation procedures, recommended minimum pavement thicknesses are provided in Table 2. These minimum thicknesses are prescriptive values based on traffic classification, and not on a detailed analysis using traffic counts. It should be noted that life cycle costs for concrete pavements are generally lower, despite their higher initial cost. Local experience has shown that well-constructed concrete pavements typically perform better, have lower maintenance costs, and have longer service lives than comparable asphalt pavements. Note that we do not recommend using an aggregate base as part of the pavement section due to concerns over drainage and freeze/thaw deterioration of the base material.

Table 2 - Minimum Pavement Thicknesses

Pavement Category	**Pavement Type/Thickness (inches)**	
	Concrete	**Full Depth Asphalt**
Sidewalks	4	- -
Parking Areas	5	6
Drive Lanes *(concentrated traffic - occasional trucks)*	5	7
Medium Duty *(up to 3 trucks/day)*	6	8

Subgrade Support Values: CBR = 3, k=120 pci
Materials: (reference City of Omaha Standard Specifications for Public Works Construction, 2014 Edition)
concrete - mix type L65 (f'_c = 4,000 psi) (Section 500)
asphalt surface - mix type SPR w/ PG64-34 binder (Section 400)
asphalt base - mix type SPR Coarse w/ PG64-34 binder (Section 400)

Contraction joints are important to control the location of cracks in concrete pavement that result from stresses caused by normal drying shrinkage and thermal effects. A proper jointing system will enhance structural capacity and prolong the life span of a concrete pavement as well as improve ride quality. Contraction joints should be cut to a minimum of ¼ of the slab thickness (1/5 of the thickness for early entry saw method). Joints should be cut as soon as practical after the concrete has set sufficiently to support foot traffic, and must be cut before any shrinkage cracks form. Joints should be spaced no more than 24 times the thickness of the slab or 12½ feet maximum. Panels should be kept as square as possible, with the length to width ratio limited to 125 percent. Dowel bars should be used for load transfer across construction joints, and should be considered for contraction joints subjected to heavy truck traffic. Joints should be carefully planned and laid out to meet inlets, drainage structures, reentrant corners, and radiuses. Joints should be perpendicular to edges and radiuses, and should not form angles less than 45 degrees or over 225 degrees. Isolation joints should be provided around any structures.

We recommend that joints be sealed to reduce moisture infiltration and to reduce the accumulation of non-compressible materials. Joint sealing should be considered as a two part process, sealing of the exposed sawcut face of the concrete and sealing of the joint itself. Following sawcutting and cleaning the joints with compressed air, a penetrating concrete sealer (Silane, Silicate, or Siliconate based) should be spray applied to the joint extending outwards a minimum of 8 inches either side of the sawcut. This penetrating sealer will help to limit moisture infiltration along the sawcut face, helping to mitigate premature joint damage from freeze-thaw cycles. Following the spray applied sealer, a hot pour joint sealer can be used to fill the sawcut. Use of backer rods is not recommended.

Backfill behind curbs and within islands/medians should consist of relatively impervious cohesive soils. Backfill should be compacted to a minimum of 95 percent of the maximum dry density (ASTM D698) to minimize subsidence and to reduce moisture infiltration around the edges of the pavement. Granular soils should not be used for fill in islands as this can increase infiltration into the subgrade. Porous fills, including granular material and loosely placed clay soils, also act as a reservoir that can allow moisture to seep through cracks and joints onto the pavement surface, sometimes long after the water is trapped. This condition is especially pronounced when loose backfill consolidates and allows surface water to pond.

PERCOLATION TEST

The percolation test was conducted in general accordance with Nebraska Title 124, Rules and Regulations for the Design, Operation, and Maintenance of Septic Tanks. The percolation test holes were excavated and properly set at least 24 hours prior to running the test. The average percolation rate was 14 minutes per inch. The soils encountered in the test boring consisted of man-placed fill and Peoria loess. Ground water was not encountered in the test boring to a depth of 10 feet below the ground surface.

SURFACE DRAINAGE AND LANDSCAPING

The long-term performance of any project is contingent upon keeping the subgrade soils at more or less constant moisture content, and by not allowing surface drainage a path to the subsurface. Positive surface drainage away from structures must be maintained at all times. Landscaped areas should be designed and built such that irrigation and other surface water will be collected and carried away from the structure.

Construction staging and grading should provide for removal of surface water from the site. If prolonged ponding of surface water occurs, removal and replacement of wet or disturbed soils may be necessary. Temporary grades should be established to prevent runoff from entering excavations or footing trenches. Backfill should be placed as soon as structural strength requirements are met, and should be graded to drain away from the building.

The final grade of the foundation backfill and any overlying pavements should have a positive slope away from foundation walls on all sides. For grass or landscape covered areas, a minimum slope of 1 inch per foot for 5 to 10 feet away from the building is recommended. A minimum slope of 2 percent is recommended for grassed or landscaped areas of the site away from the building. For paved areas, minimum slopes of 1 percent for concrete pavements and 1½ percent for asphalt pavements are recommended. Pavements and exterior slabs that abut the structure should be carefully sealed against moisture intrusion at the joint.

OTHER RECOMMENDATIONS

During detailed design, additional issues may arise and possible conflicts may occur with our recommendations. Such issues and conflicts should be resolved through dialogue between the geotechnical engineer and designers. It is recommended that the geotechnical engineer review the final design, including the plans and specifications, to verify that our recommendations are properly interpreted and incorporated into the design.

If any changes are made in the design of the project, including the nature or location of proposed facilities on the site or significant elevation changes, the analysis and recommendations of this report shall not be considered valid unless the changes are reviewed. The analysis and recommendations of this report should not be applied to different projects on the same site or to similar projects on different sites.

The analysis and recommendations in this report are based upon borings at specific locations. The nature and extent of variation between boring locations is impossible to predict. Because of this, geotechnical recommendations are preliminary until they have been confirmed through observation of site excavation and earthwork preparation. If variations appear during subsequent exploration or during construction, we may reevaluate our recommendations and modify them, if appropriate. The geotechnical engineer should be retained during construction to observe compliance with the recommendations of this report and to provide quality control testing of earthwork construction. If these services are provided by others, including the contractor, the entity that provides construction phase observation and testing shares responsibility as the geotechnical engineer of record for implementing or modifying these recommendations.

Respectfully submitted,
Thiele Geotech, Inc.

Prepared by,

Raeanna C. Doyle, E.I.

Prepared under the supervision of,

Robert K. Lapke, P.E.
Nebraska License E-10089

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APPENDIX

SUBSURFACE EXPLORATION METHODS

The fieldwork for this study was conducted on August 1, 2016. The exploratory program consisted of three test borings drilled at the approximate locations shown on the Boring Location Plan. Boring locations were selected by the client to provide the desired site coverage and were adjusted to accommodate access conditions. The boring locations were laid out by the client. Elevations were interpolated from contours on the Grading Plan completed by Rega Engineering Group, Inc dated August 1, 2016. The boring locations and elevations should only be considered accurate to the degree implied by the methods used to define them.

Test borings were advanced using flight augers powered by a truck-mounted drill rig. Soil samples were obtained at selected depths as indicated on the boring logs. A 3-inch nominal diameter thin-walled sampler was hydraulically pushed to obtain undisturbed samples. Disturbed samples were obtained by driving a 2-inch nominal diameter split barrel sampler while conducting standard penetration tests (SPT). The SPT values presented on the boring logs are actual field recorded numbers and have not been corrected for hammer energy or overburden.

The boring logs were prepared based on visual classification of the samples and drill cuttings, and by observation of the drilling characteristics of the subsurface formations. The logs have been supplemented and modified based on the laboratory test results and further examination of the recovered samples. The stratification lines on the boring logs represent the approximate boundary between soil types, but the insitu transition may be gradual.

Water level observations were made at the times stated on the boring logs. The borings were backfilled with drill cuttings at the completion of the fieldwork.

The field boring logs were reviewed to outline the depths, thicknesses, and extent of the soil strata. A laboratory testing program was then developed to further classify the basic soils and to evaluate the engineering properties for use in our analysis.

Laboratory tests to further classify the soils included visual classification, moisture content, dry unit weight, and Atterberg limits. The shear strengths of cohesive samples were evaluated using the unconfined compression test. The percolation rate of the soil was evaluated by conducting a field percolation test.

The boring logs and related information in this report are indicators of subsurface conditions only at the specific locations and times noted. Subsurface conditions, including ground water levels, at other locations of the site may differ significantly from conditions that exist at the sampling locations. Also note that the passage of time may affect conditions at the sampling locations.

LEGEND OF TERMS

Soil Description Terms

Consistency - Fine Grained	Consistency - Coarse Grained	Moisture Conditions
Very Soft, Soft, Firm, Hard, Very Hard	Very Loose, Loose, Medium Dense, Dense, Very Dense	Dry, Slightly Moist, Moist Very Moist, Wet (Saturated)

Sample Identification

Sample Type	Sample Data	Laboratory Data
U -- Undisturbed (Shelby Tube)	No. -- Number	MC -- Moisture content
S -- Split barrel (disturbed)	SPT -- Standard penetration test	γ_d -- Dry unit weight
C -- Continuous sample	bpf -- blows per foot	q_u -- Unconfined compression
A -- Auger cuttings (disturbed)	Rec -- Recovery	LL/PI -- Liquid limit & plasticity index

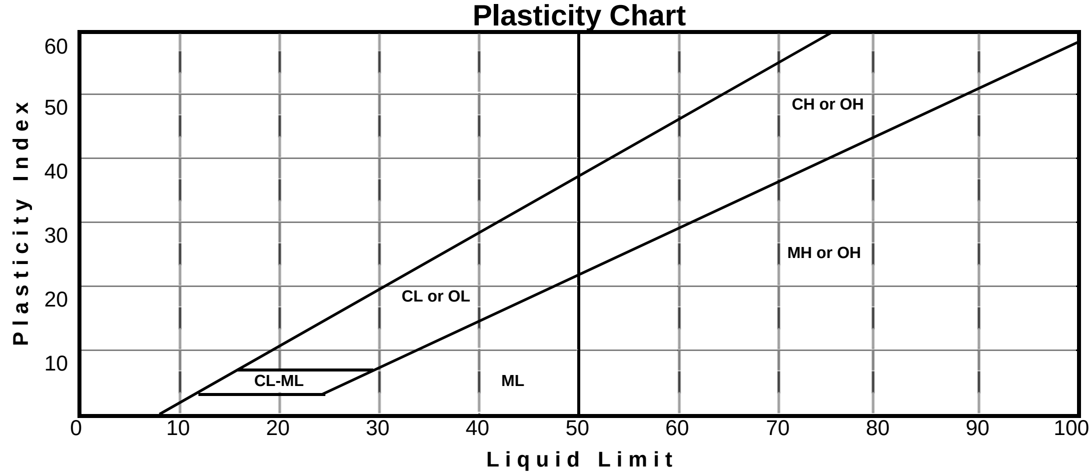
Unified Soil Classification System

Peat	Pt	Highly organic soils	50% or more smaller than No. 200 sieve
Fat Clay	CH	Clay - Liquid Limit > 50 *	
Elastic Silt	MH	Silt - Liquid Limit > 50 *	
Lean Clay	CL	Clay - Liquid Limit < 50 *	
Silt	ML	Silt - Liquid Limit < 50 *	
Silty Clay	CL-ML	Silty Clay *	
Clayey Sand	SC	Sands with 12 to 50 percent smaller than No. 200 sieve *	More than 50% larger than No. 200 sieve and % sand > % Gravel
Silty Sand	SM		
Poorly-Graded Sand with Clay	SP-SC	Sands with 5 to 12 percent smaller than No. 200 Sieve *	
Poorly-Graded Sand with Silt	SP-SM		
Well-Graded Sand with Clay **	SW-SC		
Well-Graded Sand with Silt **	SW-SM		
Poorly-Graded Sand	SP	Sands with less than 5 percent smaller than No. 200 sieve *	
Well-Graded Sand **	SW		
Clayey Gravel	GC	Gravels with 12 to 50 percent smaller than No. 200 Sieve *	More than 50% larger than No. 200 sieve and % gravel > % sand
Silty Gravel	GM		
Poorly-Graded Gravel with Clay	GP-GC	Gravels with 5 to 12 percent smaller than No. 200 sieve *	
Poorly-Graded Gravel with Silt	GP-GM		
Well-Graded Gravel with Clay **	GW-GC		
Well-Graded Gravel with Silt **	GW-GM		
Poorly-Graded Gravel	GP	Gravels with less than 5 percent smaller than No. 200 sieve *	
Well-Graded Gravel **	GW		

* *See Plasticity Chart for definition of silts and clays*

** *See Criteria for Sands and Gravels for definition of well-graded*

Plasticity Chart

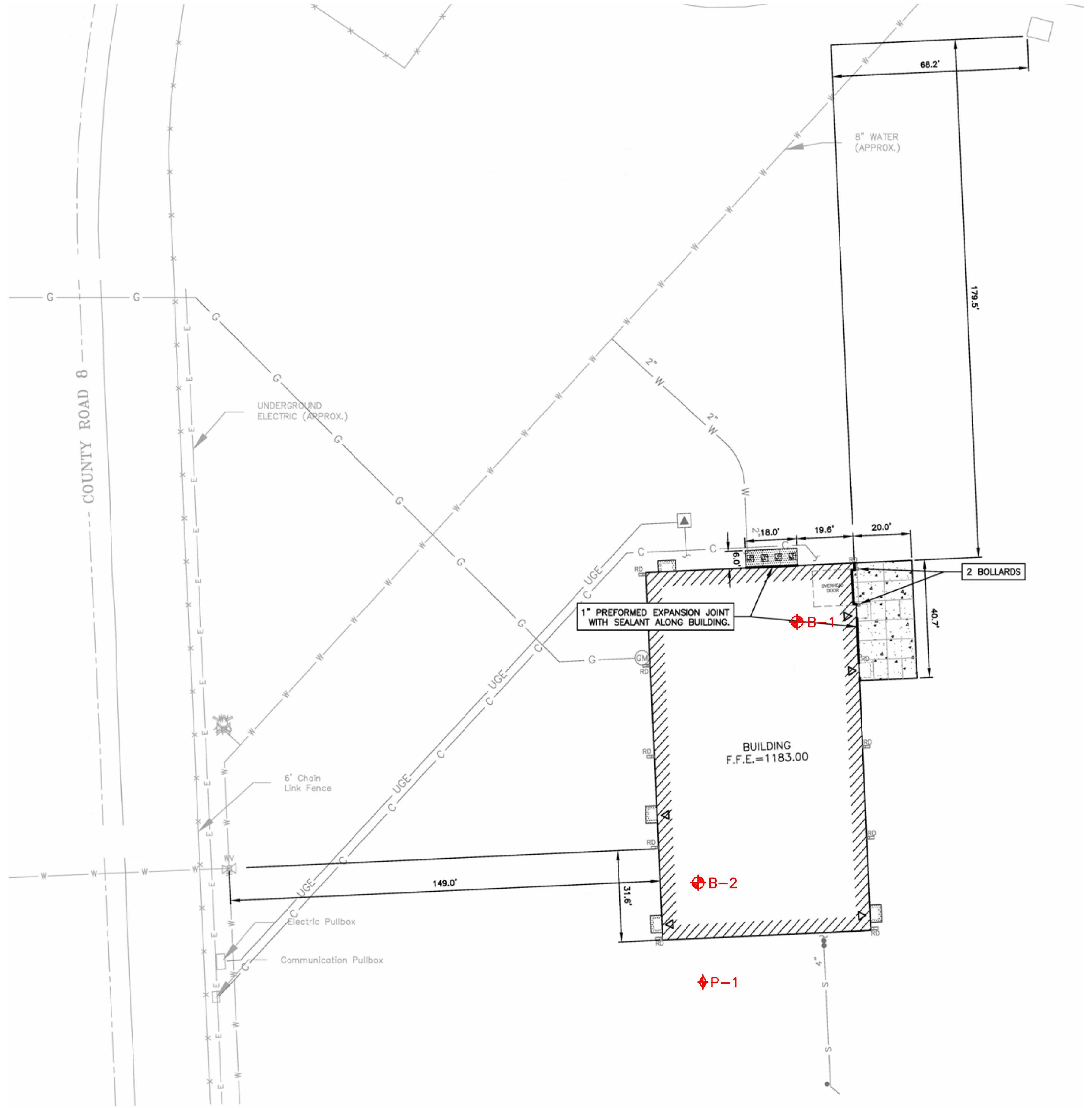


Criteria for Sands and Gravels

Boulders	Cobbles	Coarse Gravel	Fine Gravel	Coarse Sand	Medium Sand	Fine Sand	FINES (silt or clay)
Sieve size 10"	3"	¾"	#4	#10	#40	#200	

Well-graded sands (SW) $C_u=D_{60}/D_{10}\geq 6$ and $C_c=(D_{30})^2/(D_{10} \times D_{60}) \leq 3$ and ≥ 1

Well-graded gravels (GW) $C_u=D_{60}/D_{10}\geq 4$ and $C_c=(D_{30})^2/(D_{10} \times D_{60}) \leq 3$ and ≥ 1



LEGEND:

- BORING LOCATION
- PERCOLATION TEST LOCATION

Thiele Geotech Inc

PROJECT

TADSS/SIMULATION BUILDING
CO. RD. 8 & CO. RD. J
MEAD, NEBRASKA

JOB # 16299.02 | DATE: 8/8/16

BORING LOCATION PLAN

Thiele Geotech Inc

BORING LOG

WATER LEVEL OBSERVATIONS		PROJECT	DRILLER	LOGGER	JOB NO.	DATE
During Drilling	N/E	TADSS/Simulation Building	Gorham	Nelson	16299.02	8/1/20
End of Drilling	N/E	**LOCATION**	**DRILLING METHOD**		**DRILL RIG**	**BORING NO.**
(none encountered)		CO. RD. 8 & Co. Rd. J, Mead, NE	6" flight augers		CME 45B	B-1
		LOCATION OF BORING	**TYPE OF SURFACE**		**ELEVATION**	**DEPTH**
boring backfilled with cuttings		see Boring Location Plan	grass		1,180'	20'

DEP (ft.)	VISUAL/MANUAL DESCRIPTION						SAMPLE DATA			LABORATORY DATA				DEP (ft.)
	COLOR	MOIST.	CONSIST.	SOIL TYPE	GEOLOGIC ORIGIN	REMARKS	NO. & TYPE	SPT (bpf)	REC (in.)	MC (%)	γ_d (pcf)	q_u (tsf)	LL/PI CLASS	
	dark brown	moist	firm	lean clay	fill		U-1		11	21.5	86.1	0.85		
	light brown	moist	soft	lean clay	Peoria loess									
5							U-2		12	23.6	85.6	0.54		5
		very moist												
10							U-3		10	27.2	90.7	0.54		10
15							U-4		11	30.8	89.6			15
	light brown	moist	medium dense	silty sand	Todd Valley alluvium	fine sand								
		dry												
20							S-5	23		2.6				20
						bottom of hole @ 20'								
25														25

Thiele Geotech Inc

BORING LOG

WATER LEVEL OBSERVATIONS		PROJECT	DRILLER	LOGGER	JOB NO.	DATE
During Drilling	N/E	TADSS/Simulation Building	Gorham	Nelson	16299.02	8/1/20
End of Drilling	N/E	LOCATION	DRILLING METHOD		DRILL RIG	BORING NO.
(none encountered)		CO. RD. 8 & Co. Rd. J, Mead, NE	6" flight augers		CME 45B	B-2
		LOCATION OF BORING	TYPE OF SURFACE		ELEVATION	DEPTH
boring backfilled with cuttings		see Boring Location Plan	grass		1,179.7'	25'

DEP (ft.)	COLOR	MOIST.	CONSIST.	SOIL TYPE	GEOLOGIC ORIGIN	REMARKS	NO. & TYPE	SPT (bpf)	REC (in.)	MC (%)	γ_d (pcf)	q_u (tsf)	LL/PI CLASS	DEP (ft.)
	dark brown	moist	hard	lean clay	fill									
							U-1		12	15.7	84.2	1.69		
	grayish brown		very hard	fat clay										
5							U-2		12	18.5	106.4	4.10	LL=65 PI=45 CH	5
	light brown	very moist	firm	lean clay	Peoria loess									
10							U-3		12	28.7	92.2	0.82		10
15							U-4		12	27.8	94.8	1.16		15
	light brown	dry	medium dense	silty sand	Todd Valley alluvium	fine sand								
20							S-5	28		3.0				20
25						bottom of hole @ 25'	S-6	24		3.6				25

Thiele Geotech Inc

BORING LOG

WATER LEVEL OBSERVATIONS		PROJECT	DRILLER	LOGGER	JOB NO.	DATE
During Drilling	N/E	TADSS/Simulation Building	Gorham	Nelson	16299.02	8/1/20
End of Drilling	N/E	**LOCATION**	**DRILLING METHOD**		**DRILL RIG**	**BORING NO.**
(none encountered)		CO. RD. 8 & Co. Rd. J, Mead, NE	6” flight augers		CME 45B	P-1
		LOCATION OF BORING	**TYPE OF SURFACE**		**ELEVATION**	**DEPTH**
boring backfilled with cuttings		see Boring Location Plan	grass			10’

DEP (ft.)	VISUAL/MANUAL DESCRIPTION						SAMPLE DATA			LABORATORY DATA				DEP (ft.)
	COLOR	MOIST.	CONSIST.	SOIL TYPE	GEOLOGIC ORIGIN	REMARKS	NO. & TYPE	SPT (bpf)	REC (in.)	MC (%)	γ_d (pcf)	q_u (tsf)	LL/PI CLASS	
	dark grayish brown	moist	firm	lean clay	fill									
	brown			fat clay										
5	light brown	moist	soft	lean clay	Peoria loess	iron stains								5
10						bottom of hole @ 10’								10
15														15
20														20
25														25

Thiele Geotech Inc

SOIL TEST SUMMARY

Project: TADSS/Simulation Building

Job No.: 16299.02

Location: Co. Rd. 8 & Co. Rd. J, Mead, NE

Date: 8/12/2016

BORING NO.	SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLE DIA. (in.)	MOISTURE CONTENT (%)	UNIT WEIGHT WET (pcf)	UNIT WEIGHT DRY (pcf)	VOID RATIO (e)	SAT. (%)	UNCONFINED COMPRESSION q_u (tsf)	UNCONFINED COMPRESSION STRAIN (%)	SOIL CLASSIFICATION ATTERBERG LIMITS LL	PL	PI	PASS #200 (%)		REMARKS
B-1	U-1	0.5-2	2.85	21.5	104.6	86.1	0.957	61	0.85	2.4						
	U-2	3.5-5	2.85	23.6	105.8	85.6	0.969	66	0.54	1.9						
	U-3	8.5-10	2.85	27.2	115.4	90.7	0.857	86	0.54	3.5						
	U-4	13.5-15		30.8	117.1	89.6	0.881	94								
	S-5	18.5-20		2.6												
B-2	U-1	0.5-2	2.85	15.7	97.4	84.2	1.002	42	1.69	3.4						
	U-2	3.5-5	2.85	18.5	126.0	106.4	0.584	85	4.10	4.0	65	20	45		CH	
	U-3	8.5-10	2.85	28.7	118.6	92.2	0.828	93	0.82	12.8						
	U-4	13.5-15	2.85	27.8	121.1	94.8	0.778	97	1.16	4.9						
	S-5	18.5-20		3.0												
	S-6	23.5-25		3.6												

Thiele Geotech Inc

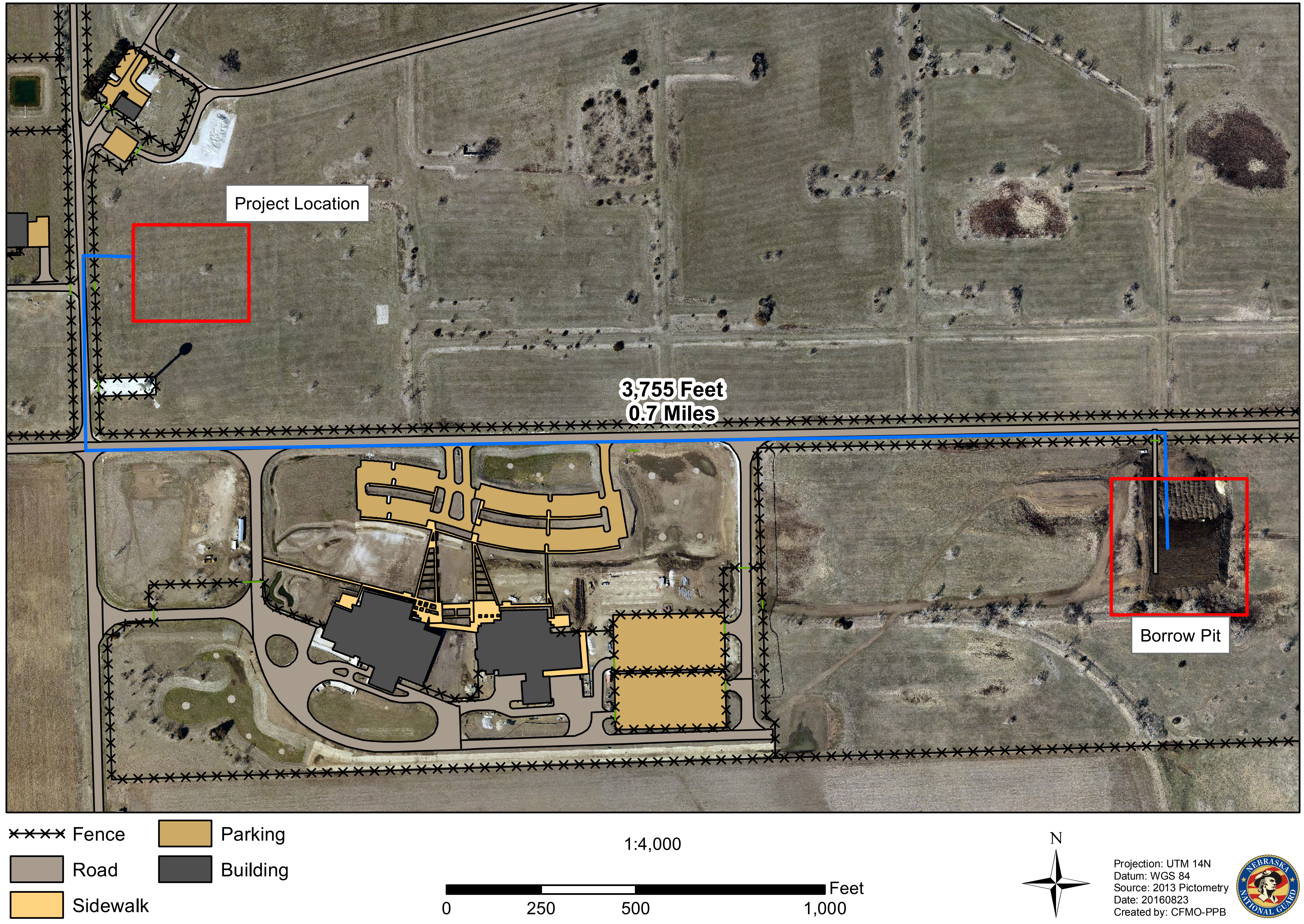
PERCOLATION TEST

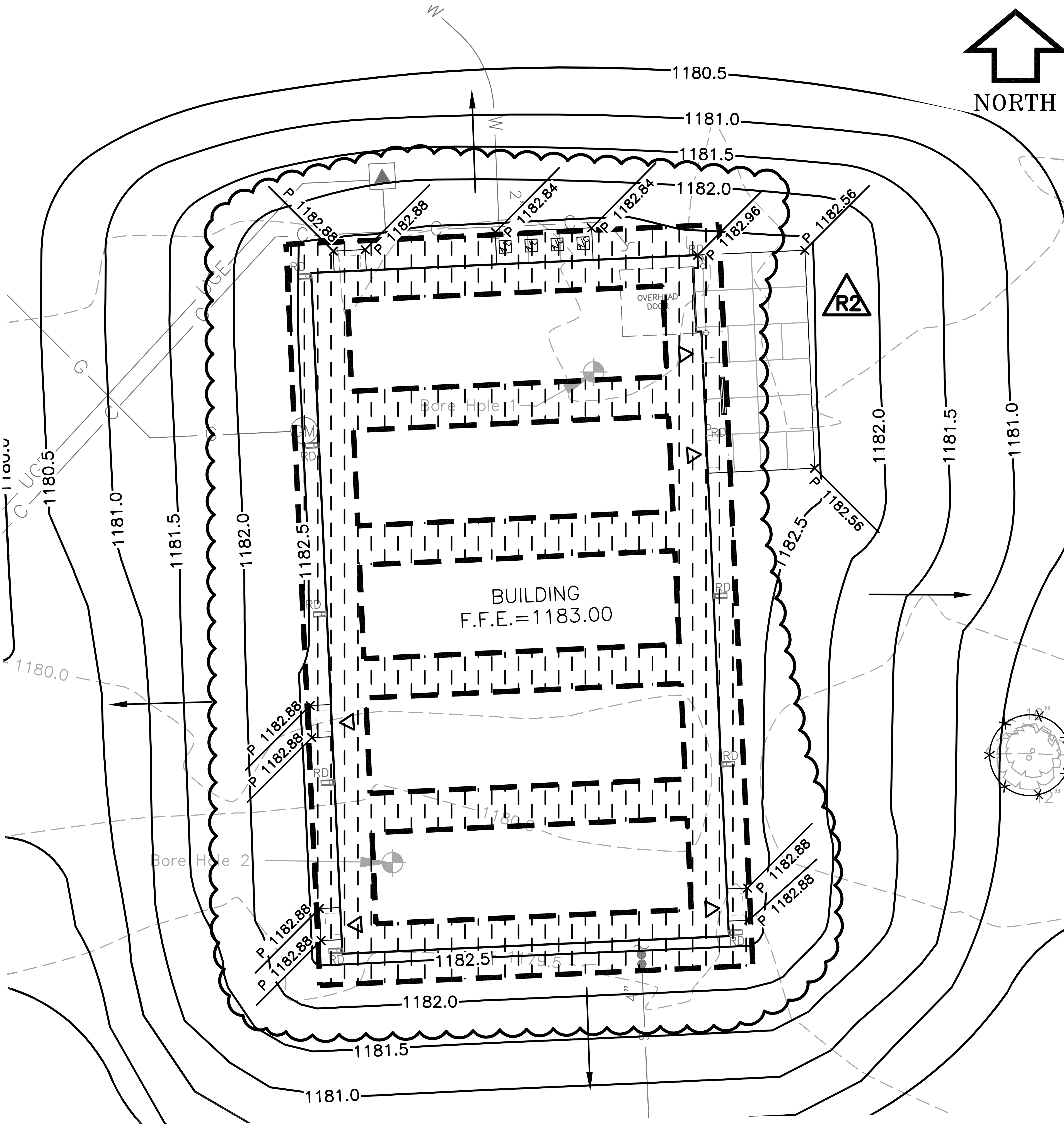
Project: TADSS/Simulation Building	Location: Co Rd 8 & Co Rd J, Mead, NE	Job # 16299.02	Date: 8/2/16	Tested by: AK

Percolation Hole # 1 (west)					Percolation Hole # 2 (middle)					Percolation Hole # 3 (east)				
Time	Time Interval (min)	Reading (in)	Drop in Water Level (in)	Perc Rate (mpi)	Time	Time Interval (min)	Reading (in)	Drop in Water Level (in)	Perc Rate (mpi)	Time	Time Interval (min)	Reading (in)	Drop in Water Level (in)	Perc Rate (mpi)
8:30		28.5			8:31		27.5			8:32		28		
9:00	30	32	4	7.5	9:01	30	29.5	2	15	9:02	30	32	4	7.5
		24.5										25		
9:30	30	28.5	4	7.5	9:31	30	31	1.5	20	9:32	30	30.5	5.9	5.5
							26.5					27.5		
10:00	30	31	2.5	12	10:01	30	28.5	2	15	10:02	30	31	3.5	8.6
		25.5					26.5					26.5		
10:30	30	28.5	3	10	10:31	30	28	1.5	20	10:32	30	30.5	4	7.5
												28		
11:00	30	31	2.5	12	11:01	30	30	2	15	11:02	30	31	3	10
		27										27.5		
11:30	30	29.5	4	7.5	11:31	30	31	1	30	11:32	30	31	3.5	8.6
		25.5					27.5					28		
12:00	30	28.5	3	10	12:01	30	29	1.5	20	12:02	30	31	3	10
		25.5					27					28		
12:30	30	28.5	3	10	12:31	30	26.5	1.5	20	12:32	30	30.5	25	12
Final Percolation Rate: 10 mpi					Final Percolation Rate: 20 mpi					Final Percolation Rate: 12 mpi				

PROFESSIONAL CIVIL ENGINEER
ROBERT K.
LAPKE
E-10089
8-17-16
STATE OF NEBRASKA

Mead Training Site - Project Location

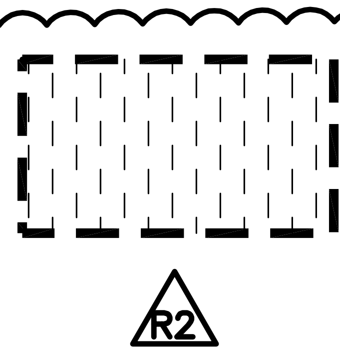




GRADING PLAN

SCALE:1"=20'

LEGEND



– OVER EXCAVATION LIMITS, OVER EXCAVATE TO 3' BELOW AND 3' OUTSIDE BUILDING FOOTING. SEE THIELE REPORT NUMBER 16299.02 DATED AUGUST 17, 2016 FOR FURTHER INFORMATION.

REGA NO. 161121

ISSUED FOR:	DATE:	BY:
ADDED OVER EXCAVATE INFO. TO PLANS AND LEGEND.	08/25/16	SDB

REF. SHT# C101

REGA ENGINEERING GROUP, INC.