Geotechnical Investigation Report: TCAAP Redevelopment Area

Prepared for: Kimley-Horn and Associates, Inc.

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1.1 Background

Ramsey County and the City of Arden Hills have formed a partnership to redevelop approximately 427 acres at the former Twin Cities Army Ammunition Plant (TCAAP). The project site is located in Ramsey County, Minnesota predominately within the limits of the City of Arden Hills. The site is located within portions of Sections 9 and 16, Township 30 North, Range 23 West of the 5th Principal Meridian, (the Site). The Site is bounded by U.S. Interstate Highway 35W on the west, Minnesota State Aid Highway (CSAH) 96 to the south and U.S. Highway 10 to the Southwest (Figure 1). The Arden Hills Army Training Site (AHATS) bounds the Site to the east.

An infrastructure improvement plan was developed by Kimley-Horn and Associates, Inc. (Kimley-Horn) to prepare the site for the proposed redevelopment. In support of this plan, Wenck Associates, Inc. (Wenck) was retained to prepare a geotechnical drilling and testing program to evaluate the subsurface conditions in proposed infrastructure improvement areas. A request for quote was completed and presented to Ramsey County to issue for contractor bidding. Bids were received and a contract was subsequently awarded to Northern Technologies, Inc. (NTI) to complete the geotechnical field investigation, sample collection, and sample testing. This report summarizes the geotechnical investigation and sample analysis results completed by NTI, and includes geotechnical recommendations for each development area provided by Wenck.

Previous investigations at the site include a preliminary geotechnical investigation conducted by American Engineering Testing, Inc. and Braun Intertec Corporation for Ryan Companies US, Inc. in 2007. In that investigation, 219 soil borings were conducted on a 500-foot grid across the site to evaluate the general suitability of the site for redevelopment. Information from an interim report of that investigation entitled "*Interim Report-Preliminary Geotechnical Evaluation*" provides an overview of site geology, groundwater conditions, and unsuitable soils. A copy of the report was provided by Ramsey County and is included in Appendix A. The report is referenced herein to supplement the area-specific data collected for this investigation.



It is our understanding that the proposed Spine Road Bridge will be supported by a driven pile foundation. The design loads on this foundation were provided by the structural design engineer (Kimley-Horn) as follows:

- ▲ Vertical Reaction: 66 kips/foot
- ▲ Horizontal Reaction (Outward): 90 kips/foot
- ▲ Allowable Horizontal Movement (Outward): 0.84 inches

2.2 Soil Borings

Four soil borings (BR-600, BR-601, BR-602 and BR-603) were completed at the proposed Spine Road Bridge site in the locations shown in Figure 2. Boreholes were advanced with hollow stem auger methods using a 3.25-inch I.D. auger. Standard Penetration Testing was completed at 2.5-foot intervals to a depth of 20-feet below ground surface, then at 5-foot intervals until the end of each boring. All four soil borings were completed to a depth of approximately 75 feet below ground surface.

2.2.1 Southeast Abutment Subsurface Conditions

Borehole locations BR-600 and BR-601 represent the approximate extents of the proposed southeast abutment. In general, materials encountered below the southeast abutment location included varying amounts of fill and undisturbed alluvial and swamp deposit soils composed of fine-grained, medium dense silty sand with organics to depth of approximately 14.5 feet below the surface. A peat layer was encountered in BR-601 from 12.0- 14.5 feet. This material was underlain by sediments composed of medium-dense silty to clayey sand to a depth of approximately 35 feet below ground surface. A medium stiff to very stiff sandy lean clay material was encountered at 35 feet and continued to a depth ranging from 65-76 feet. Very dense poorly graded sand with some gravel was encountered below the sandy lean clay in both borings and continued to termination depth.

Groundwater was encountered at a depth of approximately 17 feet below the surface in BR-600 and approximately 4 feet below the surface in BR-601. The high groundwater elevation in BR-601 is apparently due to water collecting in the organic fill material encountered above the native soils. Heaving sands were also noted at the termination depth in BR-601.

2.2.2 Northwest Abutment Subsurface Conditions

Borehole locations BR-602 and BR-603 represent the approximate extents of the proposed northwest abutment. Materials encountered in these boring generally consisted of a shallow topsoil layer followed alternating layers of silty sand and sandy clay fluvial sediments to an approximate depth of 24 feet. This was underlain by stiff lean clay with sand to a depth of approximately 60 feet. A layer of stiff to very stiff silty lean clay was encountered from approximately 60 -70 feet below the surface, followed by very dense poorly graded sand with gravel to termination depth.



Groundwater was encountered in BR-602 at a depth of 17 feet below the surface, and in BR-603 at a depth of approximately 12 feet. All boreholes were grouted to the surface upon completion. A complete description of materials encountered is given on the boring logs included in Appendix B.

2.3 Sample Collection and Laboratory Testing

Shelby Tube samples of the clayey sand and sandy lean clay layers were collected at various depths in soil borings BR-600, BR-601 and BR-602. Selected samples were delivered to a soils testing laboratory and tested for the following:

- Atterberg Limits
- Moisture Content
- Mechanical Sieve Analysis
- Dry Density
- ▲ Tri-axial Compression Testing (CU with pore pressure measurements)

Soils from the samples were classified according to the Unified Soil Classification System using the test results. Summary reports of lab test results are given in Appendix C.

2.4 Driven Pile Capacity Evaluation

The proposed design calls for the installation of driven pile foundations to support the structure. An evaluation of CIP pile capacity was performed by calculating the ultimate end bearing and skin friction using information from boring log BR-600 and the soil sample data collected from the site. The top 10 feet of soil was neglected in the capacity analysis. An LRFD resistance factor ($\Phi = 0.5$) was used to determine the allowable capacity values (per MnDOT MPF12 for CIP piles). The results of the evaluation are illustrated in the chart below:





The drilled shaft capacity calculations indicate that the allowable end bearing capacity of a 12-inch diameter CIP pile is approximately 5 kips in the clayey sediments ranging from 10-65 feet below ground surface. This is likely conservative because there is typically some increase in soil strength with depth, as indicated by the N-values observed in boring logs BR-601, BR-602, and BR-603. However, there was little to no consistent increase in N-values with depth in the clayey sediments shown in BR-600. Therefore, the most conservative case was evaluated.

At approximately 65 feet, the calculated allowable end bearing capacity increases to approximately 74 kips as dense sand with gravel is encountered. Allowable skin friction increases at a rate of approximately 1.5 kips/ft over the interval from 10-65 feet below surface. According to the analysis a 12-inch CIP pile driven to the dense sand and gravel bearing strata at 65 feet below surface will provide an allowable vertical load capacity of approximately 155-160 kips.

A 16-inch CIP pile was also evaluated. As shown in the chart below, a 16-inch CIP pile driven to the dense sand and gravel bearing strata at 65 feet below surface will provide an allowable vertical load capacity of approximately 125 kips due to end bearing resistance and 114 kips due to skin friction. The total vertical load capacity is approximately 240 kips.



An analysis of lateral capacity of the proposed piles was performed using a software program called LpileCLM2.0 Version1. The analysis included an evaluation of maximum moment and pile head deflection for various piles sizes subject to a range of loads. These analyses were performed without applying load or resistance factors and represent the





ultimate expected values. The results of the maximum moment analysis are shown in the chart below:





The pile head deflection for various pile sizes was also evaluated and the results are shown in the chart below:

A resistance factor of Φ = 0.5 is recommended for use in LRFD pile design (per MnDOT MPF12 for CIP piles).

2.5 Lateral Earth Pressure

Based on the soil properties, we recommend the following coefficients of earth pressure for design purposes:

- Active: 0.42
- ▲ At Rest: 0.50
- Passive: 2.37

2.6 Shallow Foundation Bearing Capacity

If shallow foundations are needed for this area, we estimate that shallow foundations bearing on suitable or corrected soils may be designed for an allowable net bearing pressure



of approximately 2500 psf. A coefficient of friction of 0.5 is estimated between the bottom of shallow foundations and suitable base grade soils.

2.7 Soil Correction

The boring logs indicated uncontrolled fill and unsuitable organic soils from the surface to a depth of approximately 14.5 feet below the proposed southeast abutment area. Fill depths of up to 5 feet below the surface where encountered in the northwest abutment area. It is recommended that all uncontrolled fill and organic containing soils be excavated and replaced with suitable controlled fill. The following minimum excavation depths are recommended:

Boring Location	Surface Elevation (ft)	Water Level Elevation (ft)	Minimum Excavation Depth (ft)	Excavation Bottom Elevation (ft)
BR-600	884.7	867.4	14.5	870.2
BR-601	884.8	880.8	14.5	870.3
BR-602	884.4	867.4	5.0	879.4
BR-603	883.3	871.3	4.5	878.8

Excavations for foundation elements such as bridge abutments should extend laterally beyond the edges of the proposed foundation. This extension distance should equal the vertical depth of fill needed to attain foundation base grade (1:1 lateral oversize). Suitable controlled fill material should consist of a free draining graded aggregate material free from frozen soil, organics, vegetation, debris, rocks larger than three inches in diameter. Fill material placed below abutment areas should be placed in maximum eight-inch lifts and compacted to a minimum of 98% Standard Proctor dry density to within three feet of the base grade elevation. The final three feet of aggregate fill should be compacted to 100% Standard Proctor dry density.

Foundation excavations in areas where soil correction has taken place should be inspected by the project geotechnical engineer or competent representative prior to the installation of aggregate base to ensure suitable material exists at the base grade elevation. Unsuitable or soft soils found at base grade elevation in soil corrected areas should be undercut a minimum of 24 inches and backfilled to base grade elevation with a well-graded aggregate material. The aggregate material should be compacted to 100% Standard Proctor dry density.

2.8 Excavation

The stability of excavation side slopes is dependent on soil strength, site geometry, moisture content, and surcharge load from excavated soils and equipment. The Contractor is solely responsible for assessing the stability and executing underground utility and project excavations using safe methods. The Contractor is also responsible for naming the "competent individual" as per Subpart P of 29 CFR 1926.6 (Federal Register - OSHA).

Excavation depths and sidewall inclinations should not exceed those specified in local, state or federal regulations. Excavations may need to be widened and sloped, or temporarily braced, to maintain or develop a safe work environment. Temporary shoring must be designed in accordance with applicable regulatory requirements.

Slopes created by placed fill material should not exceed 3H:1V. No continuous slope face should exceed 20 feet in height. Slopes required to exceed 20 feet in height should be



benched a minimum of 6 feet horizontally for every 20 feet of height to reduce the continuous slope length.

2.9 Dewatering

Groundwater was encountered as shallow as 4-feet below the surface in the project area during completion of the subsurface investigation soil borings. Dewatering will likely be required to keep excavations dry. It is recommended that groundwater be lowered to a level at least 3 feet below the bottom of any planned excavation.

Depending on the depth of the planned excavation, the required dewatering effort may be substantial. A well point or installed well dewatering system may be necessary to reduce the groundwater elevation to the required level. A groundwater cutoff wall created by installation of a grout curtain or sheet pile wall may also be considered if site constraints limit the size of the excavation area. The grout curtain or sheet pile wall would likely need to extend to a depth of up to 35 feet to encounter the less permeably sandy lean clay layer beneath the site. Additional soil borings or CPT soundings should be conducted along the proposed grout curtain or sheet pile alignment to verify required depths if this method is to be used.

2.10 Trenching and Backfill

If utility trenches are needed for the project, they should be backfilled with non-organic suitable soils placed in eight-inch maximum depth loose lifts. Stockpiled site soils classified as clayey sand (SC), lean sandy clay (CL), silty sand (SM), and poorly graded sand (SP) are suitable for this use. Frozen soils will not be considered suitable for backfill. The utility trench backfill should be compacted sufficiently to minimize future settlement of green areas and areas that may receive pavement or structures. It is recommended that trench fill soils be compacted as follows:

- no less than 90% of the Standard Proctor maximum dry density to three feet below top of subgrade elevation
- no less than 95% of the Standard Proctor maximum dry density from three feet below top of subgrade elevation to top of subgrade elevation for green areas
- no less than 98% of the Standard Proctor maximum dry density from three feet below top of subgrade elevation to top of subgrade elevation for areas which may receive pavement or will provide foundation support



It is our understanding that the Spine Road will be the main thoroughfare of the proposed development area and is anticipated to accommodate moderate to heavy vehicle loads. The alignment investigated includes a secondary roadway north of the proposed round-about known as the Thumb Road (See Figure 3). References to the Spine Road alignment in this report include both roadways.

3.2 Soil Borings

A total of 26 soil borings (SR-200 through SR-225) were completed along the Spine Road alignment in the locations shown in Figure 3. Boreholes were advanced with hollow stem auger methods using a 3.25-inch I.D. auger. Standard Penetration Testing was completed at 2.5-foot intervals to the end of each boring at a nominal depth of 20-feet below ground surface. In some cases, the soil borings could not be completed at the staked location due to accessibility issues. Off-set direction and distances are indicated on the soil boring logs where an off-set was required. Soil boring logs for these boreholes are included in Appendix D.

A review of the soil boring logs indicates that the subsurface along the alignment generally consisted of varying depths of top soil and fill material underlain by glacial, alluvial and occasional swamp deposits. Fill material was composed of poorly graded sand, silty sand, and clayey sand. Glacial deposits consisted of clayey sand, lean sandy clay, and silty clay and were generally encountered underlying the fill material in the south half of the alignment. The alluvial deposits consisted of poorly graded sand and silty sand and were generally encountered underlying the fill material in the north half of the alignment. Localized pockets of swamp deposits (soft, silty clay and peat) were also encountered along the alignment (soil borings SR-200 and SR-218)

Groundwater observations were recorded during drilling on each boring log. Groundwater was not encountered in most soil borings on the south half of the alignment in the clayey sand and lean sandy clay deposits. Groundwater was encountered in the poorly graded sand and silty sand deposits in the north half of the alignment at depths ranging from 7 to 18 feet below ground surface.

3.3 Sample Collection and Laboratory Testing

Representative samples of the clayey soil units encountered were collected for laboratory analysis. Selected samples tested for the following:

- Atterberg Limits
- Moisture Content
- Mechanical Sieve Analysis

The test results were used to confirm the field classifications of soils encountered during the investigation and to provide additional characterization of the clayey soils present at the site.



Tests performed on samples of the clayey sand (SC) and sandy lean clay (CL) soils indicated that they are low to medium plasticity soils and are considered inactive with regard to shrink-swell potential. The results for the samples tested are shown on the soil boring logs in Appendix D.

3.4 Soil Correction

The boring logs indicated varying depths of topsoil, uncontrolled fill material, and swamp deposits along the proposed road alignment. The topsoil and swamp deposits are unsuitable for road subgrade material and it is recommended that they be excavated and replaced with suitable controlled fill. However, much of the existing fill material is of good quality. This material may be excavated approximately three feet below subgrade elevation and replaced as controlled fill. The following minimum excavation depths are estimated along the road alignment based on conditions encountered during the geotechnical investigation:

Boring Location	Soil Boring Surface	Groundwater	Estimated	Estimated Excavation
-	Elevation	Elevation	Excavation Depth	Bottom Elevation
	(ft)	Encountered (ft)	(ft)	(ft)
SR-200	925.18	911	18.0	907
SR-201	951.10		3.0	948
SR-202	955.31		1.5	954
SR-203	956.01		3.0	953
SR-204	965.60		0.0	
SR-205	951.02		0.5	950
SR-206	942.32		3.0	939
SR-207	938.51		3.0	935
SR-208	935.64		3.0	931
SR-209	911.04		3.0	908
SR-210	913.64	909	2.0	911
SR-211	907.43		3.0	904
SR-212	894.22	880	3.5	890
SR-213	890.76	879	3.0	887
SR-214	890.28	881	1.5	888
SR-215	889.66	883	3.0	886
SR-216	887.29	880	1.5	885
SR-217	886.05	879	0.0	
SR-218	883.67	869	14.5	869
SR-219	898.15		3.0	895
SR-220	884.33		3.0	881
SR-221	892.07	877	3.0	889
SR-222	897.17	880	3.0	894
SR-223	898.48	881	3.0	895
SR-224	899.93	884	3.0	897
SR-225	898.97		0.0	

3.5 Excavation

Excavations for the road subgrade soil correction should extend laterally beyond the edges of the proposed base aggregate. This extension distance should equal the vertical depth of fill needed to attain base grade (1:1 lateral oversize). Soil correction excavation areas should be inspected by the project geotechnical engineer or competent representative prior



to the installation of controlled fill to ensure suitable material exists at the base of the excavation.

3.6 Dewatering

Groundwater was generally encountered in the silty sand material in the northern half of the proposed road alignment during this investigation. However, during the preliminary investigation conducted in 2007, groundwater was encountered site wide, including the area along the southern half of the proposed road alignment. A site-wide groundwater contour map was produced based on those observations and included in the *Interim Report-Preliminary Geotechnical Evaluation, (AET and Braun, 2007)* attached in Appendix A.

Based on groundwater observations from this investigation and the 2007 preliminary investigation by AET and Braun, groundwater may be encountered during excavation for soil correction activities along the Spine Road alignment. It is recommended that groundwater be lowered to a level at least 3 feet below the bottom of any planned excavation to allow dry placement of controlled fill.

3.7 Controlled Fill

Controlled fill suitable for subgrade backfill in soil correction areas along the proposed road alignment should consist of material free of high plasticity clays, silt, organics, vegetation, debris, and rocks larger than three inches in diameter. Stockpiled site soils classified as clayey sand (SC), lean sandy clay (CL), silty sand (SM), and poorly graded sand (SP) are suitable for subgrade backfill when placed and compacted as controlled fill.

The base of the excavation should be scarified and re-compacted prior to placement of controlled fill material. Controlled fill material should be moisture conditioned to within +/- 3% of optimum moisture content and placed in maximum eight-inch lifts. Controlled fill should be compacted to a minimum of 95% of the Standard Proctor dry density to within three feet of the base grade elevation. The final three feet of controlled fill placed for subgrade backfill should be compacted to a minimum of 98% of the Standard Proctor dry density.

3.8 Estimated Subgrade R-Value

Table 5-3.3a of the MNDOT Pavement Manual indicates that typical R-Values for non-plastic sands and sandy loam soils range from 30-70, depending on the fines content. Values on the low end to middle of this range are recommended for initial pavement design purposes. However, it is recommended that samples of proposed subgrade backfill material stockpiled during site grading operations be collected and tested in a soils laboratory to verify the final design R-Value.



A portion of Rice Creek will be re-meandered to improve the alignment of the proposed Spine Road Bridge crossing the creek. The re-meander will involve excavation and placement of soil to re-locate a section of Rice Creek.

4.2 Soil Borings

A total of 4 soil borings (RC-500 through RC-503) were completed in the proposed Rice Creek re-meander alignment in the locations shown in Figure 4. Boreholes were advanced with hollow stem auger methods using a 3.25-inch I.D. auger. Standard Penetration Testing was completed at 2.5-foot intervals to the end of each boring at a nominal depth of 20-feet below ground surface. Soil borings RC-502 and RC-503 could not be completed at the staked location due to accessibility issues. These two boreholes were off-set approximately 15 feet west of the staked location. Soil boring logs for the Rice Creek boreholes are included in Appendix E.

A review of the soil boring logs indicates that the subsurface in the proposed re-meander alignment generally consisted of 1.5 to 4.5 feet of fill underlain by alluvial and swamp deposits. Fill material was composed of silty sand and gravel. The alluvial deposits consisted of silty sands with some organic material and thin peat layers. Sandy lean clay was encountered at 15 feet below the surface in borehole RC-501. Groundwater was encountered in all four of the boreholes and ranged in elevation from 875 ft. to 879 ft.

4.3 Sample Collection and Laboratory Testing

Samples of the clayey soil encountered in RC-501 and silty sand with trace organics encountered in RC-503 were collected for laboratory analysis and tested for the following:

- Atterberg Limits
- Moisture Content
- Mechanical Sieve Analysis

During testing, it was found that the silty sand material from RC-503 was non-cohesive and Atterberg Limit tests were not performed. However, the organic content of this material was determined to be 2.6%.

Tests performed on the sandy clay sample from RC-501 indicated that it is a low to medium plasticity clay soil and inactive with regard to shrink-swell potential. The results for the samples tested are shown on the soil boring logs in Appendix E.

4.4 Excavation

Soil excavated from the area should be stripped of vegetation and topsoil and sorted according to suitability for reuse. Inorganic soils suitable for controlled fill can be stockpiled for backfill material. Organic soils may be stockpiled for potential topsoil use during site restoration. Excavated areas that will receive controlled fill should be inspected by the



project geotechnical engineer or competent representative prior to the installation of controlled fill to ensure suitable material exists at the base of the excavation.

4.5 Dewatering

Based on groundwater observations in the soil borings, groundwater will likely be encountered during excavation of the new creek channel. However, because the work will largely involve excavation and shaping of existing soil rather than placement of controlled fill, it is anticipated that adequate dewatering can be achieved by directing surface water away from work areas and pumping from sumps as needed.

4.6 Controlled Fill

If controlled fill is needed for streambank construction suitable embankment material should consist of mineral soil free of high plasticity clays, silt, organics, vegetation, debris, and rocks larger than three inches in diameter. Stockpiled site soils classified as clayey sand (SC), lean sandy clay (CL), silty sand (SM), and poorly graded sand (SP) are suitable for this use.

The prepared subgrade in areas to receive controlled fill should be inspected by the project geotechnical engineer or qualified representative to verify suitability of the surface to receive fill. The subgrade surface should be scarified and re-compacted prior to placement of controlled fill material. Controlled fill material should be moisture conditioned to within +/-3% of optimum moisture content and placed in maximum eight-inch lifts. Controlled fill placed for embankment construction should be compacted to a minimum of 95% of the Standard Proctor dry density.

Material suitable for placement as general fill in non-structural areas such as constructed wetlands and green areas may consist of common excavation material free of vegetation, debris, and large rocks. This material may be placed in 1-2 foot lifts and receive quality compaction equivalent to approximately 90% Standard Proctor dry density.



A new water main is proposed to extend potable water supply to parts of the development area. The alignment was divided into two areas: A short section near a proposed water tower near the southern end of the site, and a longer alignment located in the western portion of the site.

5.2 Soil Borings

A total of 11 soil borings (WM-400 through WM-410) were completed along the proposed water main alignment in the locations shown in Figure 5. Boreholes were advanced with hollow stem auger methods using a 3.25-inch I.D. auger. Standard Penetration Testing was completed at 2.5-foot intervals to the end of each boring at a nominal depth of 15-feet below ground surface. Some of the boreholes could not be completed at the staked location due to accessibility issues. These boreholes were off-set from the staked location as indicated on the boring logs. Soil boring logs for the Rice Creek boreholes are included in Appendix F.

A review of the soil boring logs indicates that the subsurface in the proposed water main alignment generally consisted of a thin topsoil layer and 0 to 6.0 feet of fill underlain by alluvial, glacial and swamp deposits. Fill material was composed of silty sand and poorly graded sand with silt and clay. The alluvial deposits consisted of silty sands and poorly graded sand with silt. Glacial deposits included clayey sand and sandy lean clay. A 9.5 thick layer of peaty swamp deposits was encountered in borehole WM-406.

Groundwater was not encountered in soil borings WM-400 and WM-401. However, groundwater was encountered in the remaining soil borings ranging in elevation from approximately 903 ft. on the south end of the alignment to 880 ft. on the north end of the alignment.

5.3 Sample Collection and Laboratory Testing

Samples of silty sand, clayey sand, sandy lean clay, and poorly graded sand with silt were collected for laboratory analysis. Samples were tested for the following as applicable:

- Atterberg Limits
- Moisture Content
- Mechanical Sieve Analysis

Tests performed on the sandy lean clay and clayey sand materials indicated that they are low to medium plasticity clay soils and inactive with regard to shrink-swell potential. The results for the samples tested are shown on the soil boring logs in Appendix F.

5.4 Trench Excavation

It is anticipated that the water main piping will be installed using open trench methods. Excavation depths and sidewall inclinations should not exceed those specified in local, state



or federal regulations. Given the sandy, non-cohesive nature of much of the soils encountered along the proposed alignment, excavations may need to be widened and sloped, or temporarily braced to maintain or develop a safe work environment. Temporary shoring must be designed in accordance with applicable regulatory requirements.

The stability of excavation side slopes is dependent on soil strength, site geometry, moisture content, and surcharge load from excavated soils and equipment. The Contractor is solely responsible for assessing the stability and executing underground utility and project excavations using safe methods. The Contractor is also responsible for naming the "competent individual" as per Subpart P of 29 CFR 1926.6 (Federal Register - OSHA).

The sandy and clayey mineral soils encountered in the borehole locations along the alignment are generally suitable for pipe support. However, organic swamp deposits were encountered in WM-406. These soils are unsuitable for pipe support and should be removed and replaced with suitable controlled fill. If swamp deposits are encountered at the base of the excavation, they should be over-excavated a minimum of two feet and replaced with suitable controlled fill.

5.5 Dewatering

Groundwater was encountered as shallow as 5-feet below the surface along the water main alignment during completion of the subsurface investigation soil borings. Groundwater was generally found in non-cohesive sandy soils which may become unstable when unconfined if the groundwater is not controlled to an elevation below the excavation. Dewatering along the water main trench alignment will likely require a well point dewatering system in addition to sumps located in the excavation. It is recommended that groundwater be lowered to a level at least 3 feet below the bottom of the water main excavation.

5.6 Pipe Bedding

The existing silty sand and poorly graded sand with silt soils are suitable for pipe support and no additional pipe bedding is necessary where these soils are encountered at the pipe invert. However, in areas where clayey soils are encountered at the proposed pipe invert, granular bedding material should be used. Stockpiled site soils composed of silty sand (SM), and poorly graded sand (SP) are suitable for this use.

5.7 Backfill and Compaction

The water main trench should be backfilled with non-organic suitable soils placed in eightinch maximum depth loose lifts. Stockpiled site soils classified as clayey sand (SC), lean sandy clay (CL), silty sand (SM), and poorly graded sand (SP) are suitable for this use. The backfill should be compacted sufficiently to minimize future settlement of green areas and areas that may receive pavement or structures. It is recommended that trench fill soils be compacted as follows:

- no less than 90% of the Standard Proctor maximum dry density to three feet below top of subgrade elevation
- no less than 95% of the Standard Proctor maximum dry density from three feet below top of subgrade elevation to top of subgrade elevation for green areas



no less than 98% of the Standard Proctor maximum dry density from three feet below top of subgrade elevation to top of subgrade elevation for areas which may receive pavement or will provide foundation support



The natural resources corridor will consist of constructed wetlands, storm water infiltration features, and green areas. The area will be accessible by various walking trails constructed throughout the site.

6.2 Soil Borings

A total of 34 soil borings (NR-100 through NR-133) were completed in the proposed natural resources corridor in the locations shown in Figure 6. Boreholes were advanced with hollow stem auger methods using a 3.25-inch I.D. auger. Standard Penetration Testing was completed at 2.5-foot intervals to the end of each boring at a nominal depth of 20-feet below ground surface. Some soil borings could not be completed at the staked location due to accessibility issues. These boreholes were off-set as indicated on the soil boring logs. Soil boring logs for the natural resources corridor boreholes are included in Appendix G.

A review of the soil boring logs indicates that the subsurface in the natural resources corridor is similar to other areas of the site. Soils encountered generally consisted of thin layers of topsoil and/or fill ranging from 0 to 7 feet in thickness. Fill material was composed of silty sand, silty sand with gravel, and clayey sand. The fill, where present, was underlain by alluvial, glacial and swamp deposits. The alluvial deposits consisted of silty sands, poorly graded sand with gravel. Glacial sediments encountered included clayey sand, sandy lean clay, and lean clay with sand. Swamp deposits of peat material were encountered in various locations across the corridor.

Groundwater was encountered in approximately half of the boreholes in the natural resources corridor and ranged in elevation from 875 ft. to 879 ft.

6.3 Sample Collection and Laboratory Testing

Representative samples of clayey and sandy soil units encountered were collected for laboratory analysis and testing. However, upon review of the soil boring logs, it was determined that the soils encountered were already well characterized by testing performed on samples collected in other development areas surrounding the natural resources corridor. As a result, no testing was requested on samples collected from this area. Samples have been retained for future testing, should it be deemed necessary.

6.4 Infiltration Testing

Infiltration testing was performed to assess the infiltration capacity of soils in the natural resources corridor. Infiltration testing was performed according to the *Standard Test Method for Infiltration Rate of Soils in Field Using Double-Ring Infiltrometer (ASTM D3385)*.

Tests were performed in 9 locations as shown on Figure 6. The near surface soils in this area generally consist of poorly graded sand with silt and silty sand fill as shown in the water main soil boring logs (WM-402 to WM-410), spine road boring logs (SR-211 to SR-217), and natural resources corridor boring log NR-133. However, there are areas of near



surface clayey soils present as well, as indicated in natural resources corridor boring log NR-132. Graphs of the infiltration rate test results are included in Appendix H.

6.5 Excavation

It is anticipated that soil excavation activities in this area will consist of grading and shaping to create the proposed wetlands and surface water ponds. Soil excavation operations should include stripping of vegetation and topsoil and sorting excess materials according to suitability for reuse. Inorganic soils suitable for controlled fill can be stockpiled for backfill material. Organic soils may be stockpiled for potential topsoil use during site restoration. Excavated areas that will receive controlled fill should be inspected by the project geotechnical engineer or competent representative prior to the installation of controlled fill to ensure suitable material exists at the base of the excavation.

6.6 Dewatering

Based on groundwater observations in the soil borings, groundwater will likely be encountered during excavation of the pond areas. However, because the work will largely involve excavation and shaping of existing soil rather than placement of controlled fill, it is anticipated that adequate dewatering can be achieved by directing surface water away from work areas and pumping from sumps as needed.

6.7 Controlled Fill

Controlled fill is needed for pond construction suitable material should consist of mineral soil free of high plasticity clays, silt, organics, vegetation, debris, and rocks larger than three inches in diameter. Stockpiled site soils classified as clayey sand (SC), lean sandy clay (CL), silty sand (SM), and poorly graded sand (SP) are suitable for this use.

The prepared subgrade in areas to receive controlled fill should be inspected by the project geotechnical engineer or qualified representative to verify suitability of the surface to receive fill. The subgrade surface should be scarified and re-compacted prior to placement of controlled fill material. Controlled fill material should be moisture conditioned to within +/- 3% of optimum moisture content and placed in maximum eight-inch lifts. Controlled fill placed for embankment construction should be compacted to a minimum of 95% of the Standard Proctor dry density.

Material suitable for placement as general fill in non-structural areas such as constructed wetlands and green areas may consist of common excavation material from the site free of vegetation, debris, and large rocks. This material may be placed in 1-2 foot lifts and receive quality compaction equivalent to approximately 90% Standard Proctor dry density.

Slopes created by placed fill material should not exceed 3H:1V. No continuous slope face should exceed 20 feet in height. Slopes required to exceed 20 feet in height should be benched a minimum of 6 feet horizontally for every 20 feet of height to reduce the continuous slope length.



A walking trail named the Rice Creek Regional Trail will be constructed throughout the development area for recreational use. The trail is anticipated to be asphalt paved and constructed to support light duty maintenance vehicles.

A total of 10 soil borings (TR-300 through TR-309) were completed along the eastern portion of the proposed trail alignment in the locations shown in Figure 7. Other portions of the trail wind through areas which have already been characterized by soil borings. Boreholes were advanced with hollow stem auger methods using a 3.25-inch I.D. auger. Standard Penetration Testing was completed at 2.5-foot intervals to the end of each boring at a nominal depth of 12-feet below ground surface. Soil borings TR-303, TR-304, and TR-305 could not be completed at the staked location due to accessibility issues. These three boreholes were off-set as indicated on the soil boring log. Soil boring logs for the Regional Trail boreholes are included in Appendix I.

A review of the soil boring logs indicates that the subsurface along the trail alignment was similar to other areas of the site and generally consisted of varying depths of topsoil and/or fill underlain by poorly graded sand with silt/gravel, silty sand, clayey sand, and sandy lean clay. A 1-foot thick swamp deposit of peat was encountered at 7 feet below the surface in soil boring TR-308.

Groundwater was encountered in boring locations TR-305 to TR-309. The elevation of groundwater encountered ranged from approximately 927 ft. in TR-305 to 885 ft. in TR-308.

7.2 Sample Collection and Laboratory Testing

Representative soil samples were collected for laboratory analysis and tested for the following as applicable:

- Atterberg Limits
- Moisture Content
- Mechanical Sieve Analysis

Tests performed on clayey sand samples indicated that it is a low to medium plasticity clay soil and inactive with regard to shrink-swell potential. The results for the samples tested are shown on the soil boring logs in Appendix I.

7.3 Soil Correction

The boring logs indicated varying depths of topsoil, uncontrolled fill material, and swamp deposits along the proposed trail alignment. The topsoil and swamp deposits are unsuitable for trail subgrade material. However, the existing fill material, native sands and sandy clays are generally suitable for trail subgrade material if they are placed in a controlled manner.



It is recommended that the soil beneath the trail construction area be excavated to an elevation of 1 foot below the top of base grade elevation. Suitable soils found at the base of the excavation may be scarified and recompacted in preparation to receive controlled fill. If soft soil or organic soils such as topsoil or swamp deposits are encountered at the base of the excavation, it is recommended that they be over-excavated a minimum of two feet below top of subgrade elevation and replaced with suitable controlled fill.

7.4 Excavation

Excavations for the trail subgrade soil correction should extend laterally beyond the edges of the proposed base aggregate. This extension distance should equal the vertical depth of fill needed to attain base grade (1:1 lateral oversize). Soil correction excavation areas should be inspected by the project geotechnical engineer or competent representative prior to the installation of controlled fill to ensure suitable material exists at the base of the excavation.

7.5 Dewatering

Groundwater was generally encountered 4 to 12 feet below the ground surface in the soil borings along the trail alignment. If groundwater is encountered during trail construction, it is recommended that it be lowered to a level at least 1 foot below the bottom of the trail excavation to allow dry placement of controlled fill. This can likely be accomplished by pumping from sumps placed as needed along the alignment.

7.6 Controlled Fill

Controlled fill for trail subgrade will consist of mineral soil free of high plasticity clays, silt, organics, vegetation, debris, and rocks larger than three inches in diameter. Stockpiled site soils classified as clayey sand (SC), lean sandy clay (CL), silty sand (SM), and poorly graded sand (SP) are suitable for this use to within 1 foot of top of subgrade elevation. Stockpiled soil classified as silty sand (SM), and poorly graded sand (SP) are suitable use as controlled from 1 foot below top of subgrade elevation to top of subgrade elevation.

The prepared subgrade in areas to receive controlled fill should be inspected by the project geotechnical engineer or qualified representative to verify suitability of the surface to receive fill. The subgrade surface should be scarified and re-compacted prior to placement of controlled fill material. Controlled fill material should be moisture conditioned to within +/- 3% of optimum moisture content and placed in maximum eight-inch lifts. Controlled fill should be compacted to a minimum of 98% of the Standard Proctor dry density.

7.7 Estimated Subgrade R-Value

As discussed in Section 3.8, Table 5-3.3a of the MNDOT Pavement Manual indicates that typical R-Values for non-plastic sands and sandy loam soils range from 30-70, depending on the fines content. Values on the low end to middle of this range are recommended for initial pavement design purposes. However, it is recommended that samples of proposed subgrade backfill material stockpiled during site grading operations be collected and tested in a soils laboratory to verify the final design R-Value.



The Town and Creek Development Area will include potential residential and commercial development. Construction in this area is expected to include shallow foundations, utilities, and green spaces.

8.2 Soil Borings

A total of 26 soil borings (DE-800 through DE-825) were completed in the proposed development area in the locations shown in Figure 8. Boreholes were advanced with hollow stem auger methods using a 3.25-inch I.D. auger. Standard Penetration Testing was completed at 2.5-foot intervals to the end of each boring at a nominal depth of 20-feet below ground surface. Soil borings DE-802, DE-803 and DE-804 could not be completed at the staked location due to accessibility issues. These boreholes were off-set approximately as shown on each boring log. Soil boring logs for the Town and Creek Development Area boreholes are included in Appendix J.

A review of the soil boring logs indicates that the subsurface in the development area was similar to other areas of the site and generally consisted of varying depths of topsoil and/or fill material underlain by poorly graded sand with silt/gravel, silty sand, clayey sand, and sandy lean clay. Swamp deposits of peat were encountered in soil borings DE-818, DE-819, and DE-820.

8.3 Soil Correction

The boring logs indicated varying depths of topsoil, uncontrolled fill material, and organic swamp deposits in the development area. The topsoil and swamp deposits are unsuitable for foundation subgrade material. However, the existing fill material, native sands and sandy clays are generally suitable for subgrade material if they are recompacted and placed as controlled fill.

The subgrade requirements for site specific foundations should be evaluated once their type and location are known. However, in general, it is recommended that the soil beneath shallow foundations be excavated to an elevation of 3 foot below the top of base grade elevation. Suitable soils found at the base of the excavation may be scarified and recompacted in preparation to receive controlled fill. If soft soil or organic soils such as topsoil or swamp deposits are encountered at the base of the excavation, it is recommended that they be over-excavated an additional two feet below top of subgrade elevation and replaced with suitable controlled fill.

Suitable controlled fill material should consist of a free draining graded aggregate material free from frozen soil, organics, vegetation, debris, rocks larger than three inches in diameter. Stockpiled site soils classified as clayey sand (SC), lean sandy clay (CL), silty sand (SM), and poorly graded sand (SP) are suitable for this use from the bottom of excavations to within 3 feet of top of subgrade elevation. Stockpiled soil classified as silty



sand (SM), and poorly graded sand (SP) are suitable use as controlled from 3 feet below top of subgrade elevation to top of subgrade elevation.

The prepared subgrade in areas to receive controlled fill should be inspected by the project geotechnical engineer or qualified representative to verify suitability of the surface to receive fill. Controlled fill material should be moisture conditioned to within +/- 3% of optimum moisture content and placed in maximum eight-inch lifts. Controlled fill in foundation areas should be compacted to a minimum of 95% Standard Proctor dry density to within three feet of the base grade elevation. The final three feet of fill should be compacted to a minimum of 98% Standard Proctor dry density.

8.4 Bearing Capacity

We estimate that shallow foundations bearing on suitable or corrected soils may be designed for an allowable net bearing pressure of approximately 2500 psf. A coefficient of friction of 0.5 is estimated between the bottom of shallow foundations and suitable base grade soils.

8.5 Excavation

The stability of excavation side slopes is dependent on soil strength, site geometry, moisture content, and surcharge load from excavated soils and equipment. The Contractor is solely responsible for assessing the stability and executing underground utility and project excavations using safe methods. The Contractor is also responsible for naming the "competent individual" as per Subpart P of 29 CFR 1926.6 (Federal Register - OSHA).

Excavations for foundation elements should extend laterally beyond the edges of the proposed foundation. This extension distance should equal the vertical depth of fill needed to attain foundation base grade (1:1 lateral oversize). Excavation depths and sidewall inclinations should not exceed those specified in local, state or federal regulations. Excavations may need to be widened and sloped, or temporarily braced, to maintain or develop a safe work environment. Temporary shoring must be designed in accordance with applicable regulatory requirements.

8.6 Dewatering

Groundwater was encountered as shallow as 3.5 feet and as deep as 14.5 feet below the surface in the project area during completion of the subsurface investigation soil borings. Groundwater found in non-cohesive sandy soils may become unstable when unconfined if the groundwater is not controlled to an elevation below the excavation. It is recommended that groundwater be lowered to a level at least 3 feet below the bottom of foundation excavations to allow proper subgrade preparation.

Dewatering, if necessary, will likely be achieved pumping from sumps in the excavation area. However, if deep excavations are required in saturated areas, a well-point dewatering system may be required. Each excavation should be evaluated individually to assess the dewatering methods needed.

8.7 Trenching and Backfill

Utility trenches excavated in the development area should be constructed following the excavation stability recommendations in Section 8.5 and the dewatering recommendations



in Section 8.6. Where sewer and water services will be installed, the existing silty sand and poorly graded sand with silt soils are suitable for pipe support and no additional pipe bedding is necessary where these soils are encountered at the pipe invert. However, in areas where clayey soils are encountered at the proposed pipe invert, granular bedding material should be used. Stockpiled site soils composed of silty sand (SM), and poorly graded sand (SP) are suitable for this use.

Trenches should be backfilled with non-organic suitable soils placed in eight-inch maximum depth loose lifts. Stockpiled site soils classified as clayey sand (SC), lean sandy clay (CL), silty sand (SM), and poorly graded sand (SP) are suitable for this use. Frozen soils will not be considered suitable for backfill. The utility trench backfill should be compacted sufficiently to minimize future settlement of green areas and areas that may receive pavement or structures. It is recommended that trench fill soils be compacted as follows:

- no less than 90% of the Standard Proctor maximum dry density to three feet below top of subgrade elevation
- no less than 95% of the Standard Proctor maximum dry density from three feet below top of subgrade elevation to top of subgrade elevation for green areas
- no less than 98% of the Standard Proctor maximum dry density from three feet below top of subgrade elevation to top of subgrade elevation for areas which may receive pavement or will provide foundation support



9.1 Variations in Subsurface Conditions

Our evaluation, analysis and recommendations were developed from a limited amount of Owner-provided subsurface information. It is not standard practice to collect soil samples continuously with depth, and therefore the interface between soil layers and their estimated thicknesses are inferred. Soil layer boundaries may also be gradual transitions, and can be expected to vary in depth, elevation and thickness away from the exploration locations.

Variations in subsurface conditions, including the location and presence of groundwater, determined between exploration locations may not be revealed until additional exploration work is completed, or construction commences. If any such variations are revealed, they should be evaluated by the project geotechnical engineer.

9.2 Standard Of Care

In performing its services, Wenck Associates, Inc. used a degree of care and skill ordinarily exercised by similar professionals working under similar circumstances in the same general geographic area and at the same time. No warranty, express or implied, is made.



- Figure 1: Site Location Map
- Figure 2: Spine Road Bridge Borehole Location Map
- Figure 3: Spine Road Borehole Location Map
- Figure 4: Rice Creek Re-Meander Borehole Location Map
- Figure 5: Water Main Borehole Location Map
- Figure 6: Natural Resources Corridor Borehole and Infiltration Test Location Map
- Figure 7: Regional Trail Borehole Location Map
- Figure 8: Town and Creek Development Area Borehole Location Map


















Interim Report-Preliminary Geotechnical Evaluation (AET and Braun, 2007)



Spine Road Bridge Soil Boring Logs



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	-		2.0	POORLY GRADI fine grained, mois	ED SAND WITH Si st, medium dense,	ILT, (SP-SM) browr trace gravel	<u> </u>	SS 2	67	4-5-6 (11)	-						
5								SS 3	56	4-4-6 (10)	-						
	_		7.0	SILTY SAND, (S	M) gray, fine graine	ed, moist, dense	877.7	ss 4	117	6-11-10 (21)	-						
	- 0		9.5	SILTY SAND, (S dense, little organ	M) gray, fine graine nics	ed, moist, medium	875.2	SS 5	100	4-3-6 (9)							
			12.0	NOTE: Organic	materials encounte	ered at 11.0 feet.	872.7										
	-			LEAN CLAY, (CL	.) gray, moist, med	ium, little organics		SS 6	67	2-2-4 (6)	_						
	5		14.5	SANDY LEAN CI to rather stiff, trac	_AY, (CL) gray, mo ce gravel	pist to wet, medium	870.2	ss 7	78	2-2-3 (5)	-						
	_		Ţ					ss 8	100	2-3-4 (7)	-						
20	- 0 -							ss 9	100	3-3-5 (8)	-						
	- - 5 - - -							SS 10	89	4-5-5 (10)	-						

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	_		CLAYEY SAND, (SC) gray, fine grained, saturated, medium dense, trace fine gravel		SH 11	_				16	28	13	15	50
	-		35.0 SANDY LEAN CLAY, (CL) gray, wet, medium to very stiff trace fine gravel	849.7	∑ ss	33	3-4-5	_						
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	5		65.5	SANDY stiff, tra NOTE: based o POORL fine to o coarse	LEAN ce fine Driller (on distu Y GRA coarse gravel	CLAY, gravel (over-spu rbed so DED S/ grained,	(CL) gra continue in auge il. AND Wi saturat	ay, wet, ed) r at 65.0 ITH GR/ ted, very	medium) feet. N AVEL, (/ dense,	n to very N values SP) gray , fine to	819.2		SS 18	78	1-2- (4)	2							
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RTS/	NOTE	S Ele	ev. at staked location. O/S boring 10 ft S	AF	TER DRI	LLING								
NG/ENGINEERING REPC	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
NENGINEERI			D.2 POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, wet, trace gravel 2.0 (Fill)	vn, <u>884.6</u> 882.8	ss 1	100	7-7-5 (12)	-						
5.60936.100)			ORGANIC SOIL WITH SAND, (SP) brown, fine grain wet, (wood chip debris) (Fill) 4.0 V	ed, 880.8	SS 2	44	6-9-9 (18)							
S - GEO - (1	5		 ORGANIC SOIL, brown, saturated, decaying wood (Fill) NOTE: Hydrocarbon odor based on human perception 	on. 878.8	SS 3	56	6-8-7 (15)							
ECT ARDEN HILL			SILTY SAND, (SM) dark gray to gray, fine grained, saturated (Fill)			67	6-7-9 (16)	-						
TS/TCAAP PROJ			12.0	070 0	SS 5	56	8-4-3 (7)	-						
2015 PROJEC			PEAT, (Pt) dark gray to black, saturated, medium	072.0	SS 6	22	2-2-3 (5)	-						
1-PROJECTS	<u> 15 </u> - -		14.5 SILTY SAND, (SM) gray, fine grained, saturated, loos to medium dense	870.3 Se	SS 7	100	4-3-4 (7)	-						
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EK BF	PROJ		IUMBER _ 15.60936.100	PROJEC			Arden Hills	, MN						
RTS/GINT/BR - RICE CRI	05 DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
			SILTY SAND, (SM) gray, fine grained, saturated, loose to medium dense <i>(continued)</i>	9	SS 11	100	2-3-4 (7)	-						
GEO - (15.60936.100)/ENGINEE	35 -		35.0 LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff, trace gravel	849.8	SS 12	56	4-5-5 (10)							
ECT ARDEN HILLS -	<u>+0</u>		SANDY LEAN CLAY, (CL) gray, fine grained, wet, rather stiff, trace gravel	044.0	SH 13	-				16				51
TS/2015 PROJECTS/TCAAP PROJE	45		46.0 LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff to very stiff, trace fine to coarse gravel	<u>838.8</u> D	SS 14	100	4-7-7 (14)	-						
DT - 7/21/15 15:09 - H:\1-PROJEC	50				SS 15	100	6-6-8 (14)	-						
- GINT STD US LAB MAY 2012.G	<u>55</u> - - - 60				SS 16	100	5-5-6 (11)	-						
NTI GEOTECH COLUMNS					SS 17	100	6-6-7 (13)							

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOI	RIN	G N	UM	BEI	R B Page	R-6 ∃ 3 0	01 F 3
CLIE	NT <u>Ca</u>	rl Bolander and Sons, Co.	PROJEC		Ram	sey County	/ Re-D	evelo	oment	Site (TCAA	^{>})	
PRO	JECT N	JMBER	PROJEC			Arden Hills	s, MN						
DEPTH DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
		 LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff to very stiff, trace fine to coarse gravel (<i>continued</i>) NOTE: Silty sand (SM) seams at 65.0 feet. 76.0 76.0 76.5 POORLY GRADED SAND, (SP) gray to brown, fine to medium grained acturated your dense. 	B08.8 808.3	SS 18 SS 19 SS 20	100	4-6-7 (13) 6-7-9 (16) 11-19-29 (48)	-						
		Medium grained, saturated, very dense Borehole backfilled with grout. Boring terminated at 76.5 feet due to heaving sands in auger. Bottom of borehole at 76.5 feet.											

GPJ			Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOI	RIN	g n	UM	BEI	R B Page	R-6 ≞ 1 0	02 F 3
RDGE	CLIEN	NT <u>Ca</u>	rl Bolander and Sons, Co.	PROJE	CT NAME	Ram	sey County	Re-D	evelop	oment	Site (1	CAAF)	
EK BI	PROJ	ECT N	UMBER _ 15.60936.100	PROJE	CT LOCA		Arden Hills	, MN						
CRE	DATE	STAR	TED _5/28/15 COMPLETED _5/28/15	GROUN	D ELEVA		884.41 ft			HOL	E SIZ	E <u>"6</u>	1/2" in	<u>ches</u>
SICE	DRILL	ING C	ONTRACTOR NTI	GROUN	D WATEF	R LEVE	LS:							
- <u>2</u>	DRILL	ING N	ETHOD 3 1/4 in H.S.A			DRIL	LING _17.0)0 ft / E	Elev 86	67.41	ft			
	LOGO	ED B	DAS CHECKED BY DAS	A		DRILL	_ING							
RTS/G	NOTE	S Ele	v. at staked location. O/S boring 5 ft. E	A	TER DRI	LLING								
EPO											ATT	ERBE	RG	
ING/ENGINEERING R	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%	LIMIT LIMIT		PLASTICITY INDEX	FINES
ENGINEER			SILTY SAND WITH GRAVEL, (SM) brown, fine to medium grained, moist		ss 1	44	5-6-7 (13)	-						
(15.60936.100)	 				SS 2	78	11-14-15 (29)							
IILLS - GEO -	5		5.0 SILTY SAND, (SM) brown to dark gray, fine to mediur grained, moist, very dense to dense	<u>879.4</u> n	SS 3	89	8-12-15 (27)							
DJECT ARDEN H	 				SS 4	83	9-16-16 (32)	-						
CTS/TCAAP PR	<u> 10 </u>		12 0	872 4	SS 5	67	6-8-9 (17)	-						
V2015 PROJEC			CLAYEY SAND, (SC) gray, fine to medium grained, moist, very loose		SS 6	89	3-3-1 (4)							
1-PROJECTS	<u> 15 </u>		LEAN CLAY WITH SAND, (CL) gray, moist, medium, trace gravel	869.9	ss 7	78	3-3-4 (7)	-						
/21/15 15:10 - H:			 17.0 POORLY GRADED SAND, (SP) gray, fine to medium grained, saturated, medium dense 	867.4		100	9-5-7 (12)	-						
AY 2012.GDT - 7	20		CLAYEY SAND, (SC) gray, fine to medium grained, saturated, medium dense, trace fine gravel	004.0	SS 9	100	5-6-7 (13)	-						
STD US LAB M			24.0	860.4	SH 10	-				15	28	12	16	48
ECH COLUMNS - GINT {			Stiff, trace to a little gravel	lU	SS 11	100	3-5-7 (12)							
NII GEOI	30													

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R B PAGE	R-6 ∃ 2 0	02 DF 3
CLIE	NT <u>Ca</u>	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey Count	y Re-D	evelop	oment	Site (TCAAF	^{>})	
PRO.		IUMBER _15.60936.100	PROJEC	T LOCA		Arden Hills	s, MN						
5				Щ	%		ż	<u>н</u> .	(%	AT		ERG S	
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYF NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE)	POCKET PEI (tsf)	DRY UNIT W (pcf)	MOISTURE CONTENT (9	LIQUID	PLASTIC	PLASTICITY INDEX	FINES
		LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff t	0	SS 12	100	3-5-5 (10)					<u> </u>		
- · ·				SS SS	100	4-6-7	_						
- ·						(13)	_						
- ·					100	4-5-7 (12)							
 				SS 15	100	5-8-12 (20)							
_ 50				SS	83	7-8-12							
		54.5 SANDY LEAN CLAY, (CL) grav, wet, stiff, trace grave	829.9			0.0.40	-						
		50.5	924 0		67	9-9-10 (19)	_						
60		SILTY LEAN CLAY, (CL-ML) gray brown, wet, stiff	024.3	SS 18	78	7-8-9 (17)	-						

		North 1408 Meno	ern Technolog Northland Driv lota Heights, N	gies, Inc. /e, Suite 107 /N 55120						BO	RIN	G N	UM	BE	R B PAGE	R-6 ∃ 3 0	02 F 3
		Telep arl Bola	ohone: 651-38	9-4191 s, Co.			_ PROJEC	T NAME	Ram	sey County	y Re-D	evelop	oment	Site (TCAA	^{>})	
	OJECT I	NUMBE	R <u>15.60936.</u>	100				T LOCA		Arden Hills	s, MN						
RTS/GINT/BR - RICE CRE DEPTH (#)	(III) GRAPHIC LOG			MATERIAL [DESCRIPTIC	DN		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
		69.5	SILTY LEAN (continued)	I CLAY, (CL-M	IL) gray brow	n, wet, stiff	814 9	SS 19	100	9-10-11 (21)	-						
S - GEO - (15.60936.100))ENGIN		74.5	CLAYEY SA grained, wet	ND, (SC) gray , dense, trace	brown, fine s gravel	to medium	809.9	SS 20	89	11-10-9 (19)	-						
			SILTY SAND dense, trace), (SM) gray, fi gravel	ne grained, s	saturated, ver	y		89	40-50-60							
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 7/21/15 15:10 - H:/1-PROJECTS/2015 PROJECTS/TCAAP PROJECT AR				Borehole bac Bottom of bore	kfilled with gr	out. feet.											

GPJ			Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOI	RIN	g n	UM	BEI	R B PAGE	R-6	03 F 3
	LIEN	T _Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	CAAF	P)	
ä ₽	ROJ		UMBER 15.60936.100	PROJEC	T LOCA		Arden Hills	, MN						
B B D	ATE	STAR	COMPLETED _6/1/15	GROUNE	ELEVA		883.29 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	ches
	RILL	ING C	ONTRACTOR NTI	GROUNE	WATER	LEVE	LS:							
ж р	RILL	ING N	IETHOD 3 1/4 in H.S.A	AT	TIME OF	DRIL	LING							
	OGG	ED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	.ING							
N N	IOTE	S Ele	ev. at staked location. O/S boring 12 ft. E	AF	ter dri	LLING								
	o UETIN (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
	_		1.0 SILTY SAND, (SM) light brown, fine to medium grained	<u>882.3</u> d,	ss 1	100	4-8-9 (17)							
1 1	-		moist, dense to medium dense		SS 2	78	5-6-6 (12)							
(15.6	-		4.5	878.8										
- GEO -	5		SILTY SAND, (SM) gray, fine grained, moist, dense to loose		SS 3	67	6-10-12 (22)							
CT ARDEN HI	_				SS 4	89	4-8-12 (20)							
	- 10				SS 5	100	3-3-3 (6)	-						
	-		12.0 SILTY SAND, (SM) gray, fine grained, saturated, very loose to medium dense, trace gravel	871.3		33	1-0-0 (0)	-						
ECTS/2015	- 15				 		5-5-3	-						
H:/1-PROJ	_				7	100	(8)	-						
//21/15 15:10 - I I I I	-				SS 8	100	5-5-5 (10)	-						
2012.GDT - 7	20				SS 9	100	5-6-7 (13)	-						
SID US LAB MAY	-		24.5	858 8										
NS - GINI	<u>25</u>		LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff to very stiff, trace gravel)	SS 10	100	5-6-5 (11)							
	-													
	30				\times			1						

GPJ		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOI	RIN	G N	UM	BE	R B Page	R-6 ≣ 2 0	03 0F 3
	NT C	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	²)	
		IUMBER 15.60936.100	PROJEC			Arden Hills	, MN						
	<u>ں</u>			ЧРЕ IR	۲۲ %	S E)	PEN.	WT.	RE - (%)	AT	TERBE LIMITS	RG	
	GRAPH LOG	MATERIAL DESCRIPTION		SAMPLE T NUMBE	RECOVEF (RQD)	BLOW COUNT (N VALU	POCKET F (tsf)	DRY UNIT (pcf)	MOISTU	LIQUID	PLASTIC LIMIT	PLASTICIT ⁻ INDEX	FINES
		LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff to very stiff, trace gravel <i>(continued)</i>)	11	56	5-6-8 (14)	-						
				SS 12	100	4-3-7 (10)	-						
				SS 13	100	6-7-10 (17)	-						
45				SS	100	6-7-10 (17)	-						
							-						
50				SS 15	100	7-8-10 (18)	-						
10.7107 LAM 0				SS 16	100	10-24-22 (46)	-						
		59.5	823.8										
- 60 - 00 - 00		SILTY LEAN CLAY, (CL-ML) brown, moist to wet, very stiff, trace gravel		SS 17	100	18-22-24 (46)							

		North 1408	nern Technologies, Inc. Northland Drive, Suite 107				BO	RIN	G N	UM	BE	R B PAGE	R-6	03 F 3
GEGPJ		Telep	bhone: 651-389-4191			_	a i				0.10			
	NI <u>Ca</u> JECT N	IUMBE	ander and Sons, Co.	PROJEC		<u>Ram</u> FION	<u>sey County</u> Arden Hills	<u>/ Re-D</u> . MN	evelo	oment	Site (ICAAF	<u>,</u>	
	GRAPHIC LOG		MATERIAL DESCRIPTION	-	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT	PLASTIC LIMIT LIMIT	PLASTICITY Ö INDEX	FINES
			SILTY LEAN CLAY, (CL-ML) brown, moist to wet, ve stiff, trace gravel <i>(continued)</i> NOTE: Sand (SP) lenses at 65.0 feet.	у	SS 18	67	20-20-17 (37)	-						
		69.5	POORLY GRADED SAND WITH GRAVEL, (SP) gra brown, fine to coarse grained, saturated, very dense	<u>813.8</u> / to	ss 19	33	19-21-24 (45)	-						
) 0 0 0	76.0	Borehole backfilled with grout. Bottom of borehole at 76.0 feet.	807.3	SS 20	-								
וון סבט ובכון כטבטוואנא - פואו אויש עש איז געוג ישט ו - אינו-איגטיפט ואיטיפט אינויאיגטיפט איניאיג דאטי איני איני														

Spine Road Bridge Triaxial Compression Test Results















Boring:	BR-602	Sample:	Tria	xial D SH-10)ata	Depth:	2	22	Job: Date:	99 7/14	19 4/15
Sample 1	Sample	2	Sa	mple	:3	Sa	mple	e 4	Sa	mple	:5
Strain (%) Deviator Stress (tsf) Pore Pressure (tsf)	Strain (%) Deviator Stress (tsf)	Pore Pressure (tsf)	Strain (%)	Deviator Stress (tsf)	Pore Pressure (tsf)	Strain (%)	Deviator Stress (tsf)	Pore Pressure (tsf)	Strain (%)	Deviator Stress (tsf)	Pore Pressure (tsf)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 0.00\\ 0.24\\ 0.37\\ 0.44\\ 0.50\\ 0.53\\ 0.56\\ 0.58\\ 0.60\\ 0.61\\ 0.61\\ 0.61\\ 0.61\\ 0.61\\ 0.61\\ 0.61\\ 0.61\\ 0.61\\ 0.61\\ 0.61\\ 0.60\\ 0.59\\ 0.58\\ 0.58\\ 0.58\\ 0.58\\ 0.56\\ 0.55\\ 0.53\\ 0.52\\ 0.51\\ 0.49\\ 0.47\\ 0.44\\ 0.43\\ 0.42\\ 0.40\\ 0.39\\ 0.38\\ 0.37\\ 0.36\\ 0.35\\ 0.34\\ 0.33\\ 0.32\\ 0.30\\ 0.29\\ 0.27\\ 0.24\\ 0.22\\ 0.21\\ 0.22\\ 0.21\\ 0.22\\ 0.21\\ 0.22\\ 0.21\\ 0.22\\$	0.00 0.18 0.35 0.53 0.71 0.88 1.06 1.24 1.41 1.59 1.77 1.94 2.12 2.29 2.47 2.65 2.82 3.08 3.355 3.53 3.88 4.24 4.59 4.94 5.30 5.655 6.355 7.065 6.355 7.061 7.41 7.77 8.12 8.47 8.83 9.18 9.53 9.88 10.24	$\begin{array}{c} 0.00\\ 0.71\\ 0.93\\ 1.12\\ 1.23\\ 1.35\\ 1.43\\ 1.50\\ 1.56\\ 1.61\\ 1.66\\ 1.70\\ 1.75\\ 1.79\\ 1.83\\ 1.87\\ 1.89\\ 1.93\\ 1.95\\ 2.00\\ 2.03\\ 2.11\\ 2.16\\ 2.20\\ 2.24\\ 2.27\\ 2.29\\ 2.34\\ 2.37\\ 2.39\\ 2.41\\ 2.41\\ 2.43\\ 2.44\\ 2.46\\ 2.47\\ 2.49\\ 2.53\\ 2.58\\ 2.63\\ 2.65\\ 2.67\\ 2.69\\ 2.68\\ 2.67\\ 2.74\\ 2.77\\ 2.99\\ 2.58\\ 2.63\\ 2.65\\ 2.67\\ 2.69\\ 2.68\\ 2.67\\ 2.74\\ 2.77\\ 2.77\\ 2.99\\ 2.58\\ 2.63\\ 2.68\\ 2.67\\ 2.69\\ 2.68\\ 2.67\\ 2.74\\ 2.77\\ 2.99\\ 2.58\\ 2.65\\ 2.67\\ 2.69\\ 2.68\\ 2.67\\ 2.74\\ 2.77\\ 2.77\\ 2.99\\ 2.58\\ 2.65\\ 2.67\\ 2.69\\ 2.68\\ 2.67\\ 2.74\\ 2.77\\ 2.77\\ 2.99\\ 2.58\\ 2.65\\ 2.67\\ 2.74\\ 2.77\\ 2.99\\ 2.58\\ 2.65\\ 2.67\\ 2.74\\ 2.77\\ 2.99\\ 2.58\\ 2.65\\ 2.67\\ 2.74\\ 2.77\\ 2.77\\ 2.79\\ 2.58\\ 2.65\\ 2.67\\ 2.74\\ 2.77\\ 2.79\\ 2.58\\ 2.67\\ 2.74\\ 2.77\\ 2.79\\ 2.58\\ 2.67\\ 2.74\\ 2.77\\ 2.79\\ 2.58\\ 2.67\\ 2.74\\ 2.77\\ 2.99\\ 2.58\\ 2.67\\ 2.77\\ 2.79\\ 2.58\\ 2.67\\ 2.77\\ 2.79\\ 2.58\\ 2.67\\ 2.77\\ 2.79\\ 2.58\\ 2.67\\ 2.77\\ 2.79\\ 2.58\\ 2.67\\ 2.77\\ 2.79\\ 2.58\\ 2.67\\ 2.77\\ 2.79\\ 2.58\\ 2.67\\ 2.77\\ 2.79\\ 2.58\\ 2.67\\ 2.77\\ 2.79\\ 2.58\\ 2.67\\ 2.77\\ 2.79\\ 2.77\\ 2.79\\ 2.78\\ 2.77\\ 2.79\\ 2.78\\ 2.77\\ 2.79\\ 2.78\\ 2.77\\ 2.79\\ 2.78\\ 2.77\\ 2.79\\ 2.78\\ 2.77\\ 2.79\\ 2.78\\$	$\begin{array}{c} 0.00\\ 0.29\\ 0.46\\ 0.59\\ 0.67\\ 0.74\\ 0.79\\ 0.83\\ 0.83\\ 0.83\\ 0.93\\ 0.77\\ 0.76\\ 0.75\\ 0.74\\ 0.69\\ 0.66\\ 0.64\\ 0.60\\ 0.57\\ 0.56\\ 0.64\\ 0.60\\ 0.57\\ 0.56\\ 0.64\\ 0.60\\ 0.57\\ 0.56\\ 0.64\\ 0.60\\ 0.57\\ 0.56\\ 0.64\\ 0.60\\ 0.57\\ 0.56\\ 0.64\\ 0.60\\ 0.57\\ 0.56\\ 0.64\\ 0.60\\ 0.57\\ 0.56\\ 0.64\\ 0.60\\ 0.57\\ 0.56\\ 0.64\\ 0.64\\ 0.60\\ 0.57\\ 0.56\\ 0.64\\ 0.66\\ 0.57\\ 0.56\\ 0.64\\ 0.66\\ 0.57\\ 0.56\\ 0.64\\ 0.66\\ 0.57\\ 0.56\\ 0.64\\ 0.66\\ 0.57\\ 0.56\\$						







2401 W 66th Street

A OIL NGINEERING ESTING, INC.

Richfield, Minnesota 55423-2031





:	Boring:		BR600		Sample:	Tria	xial I SH-11	Data	Depth:	÷	30	Job: Date:	99 7/14	4/15
Sa	mple	21	Sa	mple	2	Sa	mple	3	Sa	mple	e 4	Sa	mple	e 5
Strain (%)	Deviator Stress (tsf)	Pore Pressure (tsf)	Strain (%)	Deviator Stress (tsf)	Pore Pressure (tsf)	Strain (%)	Deviator Stress (tsf)	Pore Pressure (tsf)	Strain (%)	Deviator Stress (tsf)	Pore Pressure (tsf)	Strain (%)	Deviator Stress (tsf)	Pore Pressure (tsf)
0.00 0.18 0.35 0.53 0.70 0.88 1.05 1.23 1.41 1.58 1.76 1.93 2.11 2.28 2.46 2.64 2.64 2.81 2.99 3.16 3.34 3.51 3.87 4.22 4.57 4.92 5.27 5.62 6.33 7.73 8.43 9.14 1.25 11.95 12.65 13.35 14.06 15.81 17.57 19.33 20.00	0.00 0.57 0.80 0.97 1.10 1.21 1.31 1.39 1.45 1.51 1.57 1.60 1.65 1.68 1.72 1.75 1.79 1.82 1.85 1.88 1.91 1.95 2.02 2.05 2.07 2.08 2.12 2.14 2.15 2.10 2.11 2.14 2.22 2.24 2.20 2.22 2.30 2.30	0.00 0.19 0.30 0.36 0.40 0.43 0.45 0.46 0.47 0.47 0.46 0.45 0.44 0.43 0.42 0.41 0.43 0.42 0.44 0.43 0.42 0.43 0.45 0.44 0.43 0.45 0.45 0.44 0.43 0.42 0.41 0.40 0.37 0.36 0.35 0.34 0.32 0.28 0.22 0.21 0.20 0.19 0.18 0.17 0.11 0.09	0.00 0.18 0.35 0.53 0.70 0.88 1.05 1.23 1.41 1.58 1.76 1.93 2.11 2.28 2.46 2.64 2.64 2.81 2.99 3.16 3.34 3.51 3.87 4.22 4.57 4.92 5.27 5.62 6.33 7.03 7.73 8.43 9.14 1.25 12.51 12.51 12.51 12.51 12.51 12.51 12.51 12.51 12.51 12.51 12.51 12.55 13.35 14.06 15.81 17.57 19.33 19.95	0.00 0.52 0.76 0.97 1.13 1.27 1.39 1.48 1.56 1.63 1.70 1.75 1.79 1.83 1.87 1.90 1.94 1.97 1.99 2.02 2.03 2.03 2.08 2.10 2.13 2.16 2.19 2.22 2.28 2.29 2.31 2.34 2.38 2.39 2.40 2.42 2.42 2.42 2.42 2.42 2.42 2.43	0.00 0.17 0.31 0.44 0.52 0.59 0.64 0.68 0.70 0.73 0.74 0.76 0.77 0.77 0.77 0.77 0.77 0.77 0.77 0.77 0.77 0.77 0.77 0.77 0.77 0.77 0.76 0.75 0.75 0.66 0.65 0.63 0.62 0.61 0.60 0.59 0.53 0.53 0.52	0.00 0.18 0.36 0.53 0.71 0.89 1.06 1.24 1.41 1.59 1.77 1.94 2.12 2.29 2.47 2.65 2.83 3.00 3.18 3.353 3.353 3.353 3.88 4.24 4.59 4.94 5.295 6.355 7.06 7.41 7.76 8.12 8.47 8.82 9.17 9.53 9.88 10.23 10.58 11.29 12.41 1.59 1.24 1.77 1.94 2.655 6.355 7.06 7.41 7.76 8.12 8.47 8.82 9.17 9.53 9.888 10.23 10.58 11.29 12.000 12.700 13.411 15.87 17.64 19.40	0.00 0.74 1.06 1.30 1.47 1.63 1.72 1.83 1.90 2.03 2.09 2.13 2.24 2.24 2.28 2.31 2.24 2.32 2.55 2.57 2.60 2.62 2.62 2.64 2.64 2.64 2.65 2.75 2.75 2.76 2.75 2.76 2.75 2.72 2.74 2.77	0.00 0.26 0.45 0.62 0.73 0.82 0.87 0.92 0.95 0.98 1.00 1.01 1.03 1.03 1.04 1.05 1.04 1.04 1.05 1.04 1.02 1.02 1.01 1.02 1.03 0.95 0.95 0.94 0.93 0.92 0.91 0.90 0.89 0.89 0.88 0.88 0.88 0.86 0.85						

Spine Road Soil Boring Logs



L'		North 1408 Mend Telep	ern Technologies Inc. Northland Dr. Ste 107 ota Heights, MN, 55120 hone: 651-389-4191				BO	RIN	G N	UM	BE	R SI PAGE	R-2	00 F 1
JAU.G	CLIENT	Carl Bola	nder and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	FCAAF))	
Y Y H	PROJEC		R 15.60936.100	PROJEC			Arden Hills	, MN						
	DATE ST		6/30/15 COMPLETED 6/30/15	GROUNE	ELEVA		925.18 ft			HOL	E SIZ	E <u>"6</u>	1/2" in	ches
	DRILLIN		ACTOR NTI	GROUNE	WATER	LEVE	LS:							
N/G	DRILLIN	IG METHOI	D 3 1/4 in H.S.A	$ar{2}$ at	TIME OF	DRIL	LING _14.0	00 ft / E	Elev 91	11.18	ft			
Y 2 1	LOGGE	DBY DAS	CHECKED BY DAS	AT	END OF	DRILL	.ING							
ש צ פ	NOTES	Elev. at st	taked location. O/S 31 ft S	AF	TER DRI	LLING								
IEERING/ENGINEERIN	DEPTH (ft) GRAPHIC	D D D D D D D D D D D D D D D D D D D	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT		ASTICITY DEX	FINES
-ID N	0	1/2· 1/ 0.0		004.0		ш.		<u> </u>				_	립	
			SILTY SAND, (SM) brown, fine grained, moist, loose to	<u>924.9</u> / 	$\bigvee SS = 1$	33	2-3-2 (5)							
(15.60936.			very loose, trace gravel			56	3-3-3 (6)							
, L														
ק ה					$\bigvee ss_3$	33	2-2-1							
				040.0	/ \ U		(0)	-						
ALLE ALLE			SILTY LEAN CLAY, (CL-ML) dark gray, moist, soft	918.2	√ ss	70	0-1-2	-						
<u>ה</u>			NOTE: Weight of Hammer at 7.0 feet.		∕ 4	/8	(3)	_						
DY N		9.5		915.7		-								
AAP	<u> </u>	<u> </u>	PEAT, (Pt) black, moist to wet, soft		SH									
21/2		<u>// \\</u>			5	-								
		<u>\\ //</u>	NOTE: Sand (SP) lenses at 12.0 feet.		V ss	67	1-2-2	1						
D Y L			,		/ 6	07	(4)	-						
GLOZ	1/, 15 [<u>\\/</u>	-				100	-						
	<u> </u>					44	(4)							
5 N					•									
-1/7=		17.5	POORLY GRADED SAND. (SP) grav. fine to medium	907.7	∑ ss	56	1-1-2							
			grained, saturated, very loose		/ 0		(3)	-						
ч.: -	20	20.0		905.2				_						
09:34		21.5	POORLY GRADED SAND, (SP) gray, fine to medium grained, saturated, very loose, trace gravel	903 7		78	1-2-2 (4)							
GL/G/			Borehole backfilled with auger cuttings.	500.1	<u> </u>		()							
α - -			Bottom of borehole at 21.5 feet.											
5														
AY ZL														
AB M														
מן														
Z D														
Ц Ц Ц														

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L-1			Northe 1408 Mende Telepl	ern Technolo Northland Di ota Heights, hone: 651-3	ogies In r. Ste 10 MN, 55 889-419	c. 07 6120 1							BO	RIN	G N	UM	BE	R SI PAGE	R-2	01 F 1
D'UK	CLIEN	NT _Ca	arl Bola	<u>nder and S</u> o	<u>ns, Co</u> .				P	ROJEC	T NAME	Ram	sey County	<u>/ Re-D</u>	<u>evelo</u> p	<u>oment</u>	Site (1		P)	
E RC	PROJ		IUMBER	R <u>15.60936</u>	6.100				P	ROJEC	T LOCA		Arden Hills	s, MN						
SPIN	DATE	STAR	RTED _	5/21/15		COMPLE	TED <u>5/2</u>	1/15	G	ROUNE	ELEVA		951.1 ft			HOI	_E SIZ	E_"6	1/2" in	ches
21/21	DRILL		ONTRA	ACTOR NT	I				G	ROUNE	WATER		LS:							
S/GIN	DRILL		IETHO	3 1/4 in H	I.S.A					AT		F DRIL	LING N	lo grou	undwa	ter ob	served			
E HO	LOGO	ED B	Y DAS	6		CHECKE	DBY DA	AS		AT	END OF		.ING							
122 10	NOTE	S Ele	ev. at st	taked locatio	n.					AF	TER DRI	LLING								
NGINEERING/ENGINEERIN	o DEPTH (ft)	GRAPHIC LOG			MAT	ERIAL DE	ESCRIPTI	ION			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
.100)\EI			0.5	TOPSOIL (SILTY SAN	6 Inche	s) H GRAVE	L, (SM) b	rown, fine	e grained,	950.6 949.6	SS 1	78	6-8-3 (11)							
5.60936			3.0	(Fill)				AV/EL (S	P) brown	948.1	X ss	78	4-5-6	-						
ы то то				fine to med (Fill)	lium gra	ined, moi	st	4VLL, (3	r) brown,		/ / 2		(11)							
	_ 5			SANDY LE trace grave	AN CLA	AY, (CL) g	ray, mois	t, mediun	n to stiff,		SS 3	33	3-4-4 (8)							
KUJECI AKDEN											SH 4	-								
CIS/ICAAP F											$\bigvee 5^{\text{SS}}$	89	3-4-6 (10)	-						
U15 PRUJE											SS 6	89	5-7-11 (18)	-						
											SS 7	78	8-11-12 (23)							
MSEY11-PR(SS 8	72	7-9-12 (21)	-						
4.H.H.	20		20.0					AV/EL (S	P) grav to	931.1	√ ss	67	8-10-13	-						
5.09:34		,	21.0	brown, fine	to med	lium grain	ed, moist,	dense	, yiay (0	930.1	/\ 9	"	(23)							
NII GEOTECH COLUMNS - GINT STD US LAB MAY 2012. GDT - 8/5/15 (Bo	orehole Botton	backfilled n of boreh	with auge ole at 21.	er cuttings 0 feet.	<u>s.</u>											

L1			Northern Technologies In 1408 Northland Dr. Ste 1 Mendota Heights, MN, 5 Telephone: 651-389-419	nc. 07 5120 01				BO	RIN	G N	UM	BE	R S PAGE	R-2	02 F 1
DAD.G	CLIEN	IT <u>Ca</u>	arl Bolander and Sons, Co		_ PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (ГСААР)	
NE NE NE	PROJ	ECT N	UMBER			T LOCA		Arden Hills	, MN						
r SPI	DATE	STAR	STED <u>5/21/15</u>	COMPLETED <u>5/21/15</u>	GROUNE	ELEVA		955.31 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	iches
	DRILL	ING C	CONTRACTOR NTI		GROUNE	WATER	R LEVE	LS:							
S/G	DRILL	ING N	METHOD 3 1/4 in H.S.A		AT	TIME OF	- DRILI	LING N	lo grou	undwa	ter ob	served	l.		
Y S	LOGO	BED B	Y DAS	CHECKED BY DAS	AT	END OF	DRILL	.ING							
Ц К С	NOTE	S Ele	ev. at staked location.		AF	ter dri	LLING								
NGINEERING\ENGINEERIN	o DEPTH (ft)	GRAPHIC LOG	MA`	TERIAL DESCRIPTION		 SAMPLE TYPE NUMBER 	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
.100)/EI			0.5 TOPSOIL (6 Inch 1.5 SILTY SAND WIT	es) H GRAVEL, (SM) brown, moist	<u>954.8</u> 953.8		33	3-4-5 (9)							
<u>) - (15.60936</u>			(Fill) LEAN CLAY WITI grained, moist, ra	H SAND, (CL) brown to gray, fine ther stiff to very stiff, trace gravel	/	SS 2	78	4-6-8 (14)	-						
HILLS - GEC	5					SS 3	78	5-7-8 (15)	-						
						SS 4	100	4-7-9 (16)	_						
	 <u>10</u>					SS 5	100	5-7-8 (15)	-						
						SS 6	100	5-10-12 (22)	-						
KUJECI SKUT	<u>15</u>					SS 7	100	5-9-11 (20)	-						
AMSEY11-PF						SS 8	100	5-15-25 (40)	-						
о 09:34 - Н:\h	20		21.5		933.8	SH 9	_								
NII GEOTECH COLUMINS - GINT STU US LAB MAY 2012.GUT - 8/5/15			Borehole Botto	backfilled with auger cuttings. m of borehole at 21.5 feet.											

2			Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R SI PAGE	R-2	03 F 1
ND.G	CLIEN	NT Ca	rl Bolander and Sons, Co.	ROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	CAAF))	
С Ч Ц	PROJ	ECT N	UMBER _15.60936.100	ROJEC			Arden Hills	, MN	•		•		-	
	DATE	STAR	TED 5/21/15 COMPLETED 5/21/15 COMPLETED 5/21/15	ROUNE	ELEVA		956.01 ft			HOI	E SIZ	E _"6	1/2" in	ches
22	DRILL	ING C	ONTRACTOR NTI	ROUNE	WATER		LS:			-				
NID/O	DRILL	ING N	ETHOD _3 1/4 in H.S.A	AT	TIME OF		LING N	lo grou	undwa	ter ob	served			
Ë YO	LOGO	ED B	DAS CHECKED BY DAS	AT	END OF	DRILL	ING							
ЦЦ	NOTE	S Ele	v. at staked location.	AF	TER DRI	LLING								
										_	ATT	ERBE	RG	
	–	<u>ں</u>			ΥPE	% ∠	s (i	U N N	MT	ня %	L		;	
NEN((f)	APH OG	MATERIAL DESCRIPTION		ЧВП ИВП	VEF OD)	ALU ALU	ET F	Scf)	ENT	≙⊢	⊒⊥	с ЭХ	NES
NIN I	D	GR/ L			NUN	Ю. В С	N COB	No.	ם פ ג	NT N	N N N	-AS'	NDE	Ē
UINE!	0				SA	R	0	L C	Б	20		Ы	PLA	
0.1UU)/EN(SILTY SAND WITH GRAVEL, (SM) brown, fine to medium grained, moist, occasional clayey sand (SC) seams		SS 1	44	1-1-1 (2)							
59093			(Fill) NOTE: Back in tip of Split Spoop		√ ss	56	8-6-6	1						
GL) -					△ 2	50	(12)	-						
С Ц С	5			951.5			7.0.40	-						
בר בר			fine to medium grained, moist	,	$\begin{pmatrix} 55\\ 3 \end{pmatrix}$	56	(19)							
			(Fill) 7.0	949.0	<u> </u>									
AKU			CLAYEY SAND, (SC) brown, fine to medium grained,		∑ ss	67	2-4-7	1						
			moist, medium dense to loose		/ 4		(11)	-						
Ú Y L	10		10.0	946.0	1 99		1_1_1	-						
I SVI CAAP			LEAN CLAY WITH SAND, (CL) brown to gray, moist, medium to stiff, trace gravel, sand lenses		5	67	(8)	-						
					SH 6									
2/201	15				√ ss	50	2-3-4	-						
LHCUECT					7	00	(7)							
AMSEY 1-						100	4-8-10 (18)							
4 - M./R	20				X ss									
2.'SU GL/G		<u> </u>	Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	935.0	N N B			<u> </u>						
Ω - Ω														
וקפר														
1 20														
א פ														
22														
מוח														
E N														
- 22														
З Ę														
5 E														
NII GEOLECH														

~	(North 1408 Mend Telep	ern Te Northla lota He hone:	chnolc and Dr eights, 651-3	ogies li : Ste 1 MN, 5 89-41	1C. 07 5120 91									BO	RIN	G N	IUM	IBE	R S PAGE	R-2 (≞ 1 0	04 F 1
10.01	CLIER		arl Bola	nder a	nd Sol	ns Co					PR			Ram	neev (Count	/ Re-D	مروام	oment	Site (ΓΩΔΔΙ	2)	
5 2	PRO			R 15	60936	100					PR				Arde	n Hills	× MN	evelo	oment	Sile (_/	
		STAR		5/21/1	5	.100	COME		5/21/1	5	GR				954	6 ft	, IVII N		но	E SIZ	F "6	1/2" in	ches
202	DRILI	ING			2 NTI		00111		0/21/1	0	GR		WATER		=I S·	0 II					<u> </u>	<u></u>	
lein l	DRILI		METHOI	D 31	/4 in H	SA					_ •	AT		F DRIL	LING	i N	lo aroi	Indwa	iter ob	served	1		
2410	LOGO	ED B	Y DAS	- <u></u>			CHEC	KED B	Y DAS			AT	END OF		LING		10 9.00						
л Т Ц	NOTE	S El	ev. at st	taked I	ocatio	n. O/S	boring	12 ft N				AF	TER DR	ILLING	;								
D N N																				AT	ERBE	RG	
NEEKING/ENGINEE	DEPTH (ft)	GRAPHIC LOG				MA	TERIAL	DESCI	RIPTION	1			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW	COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
	0			CLA	YEY S. t. med	AND, (SC) bro	wn, fine	e to med	lium grain	ied,			67	4-	-4-5		_				Ē	
.00830.1					.,								∕ ss	56	4-	-4-6							
	 			NOT				<i>.</i> .							(10)	-						
- ר ררמ			6.0	NOT	E: San	d lens	e at 4.5	teet				948.6	$\begin{vmatrix} SS \\ 3 \end{vmatrix}$	78	1-	-4-4 (8)							
				CLA	YEY S	AND, (SC) bro	wn, mc	oist, dens	se, trace (gravel						1						
													SH						14	25	13	12	
													4	-									44
74 7 7 7 7 7 7	10												SS 5	44	3-	7-10 17)							
																,	-						
- HOUEC													SS 6	100	7-6	8-10 18)							
GLUZA	15												∖∕ ss	400	5-9	9-11	-						
			17.0									-	7	100	(2	20)	-						
ч <u>ч</u> -177.			17.0	CLA	YEY S	AND, (SC) bro	wn, fine	e to coar	rse graine	ed,	937.6		68	3	2/6"							
ICINIAT/			1 <u>9</u> .5	NOT	E: Ha	rd drilli	ng due	to coars	se grave	l at 17.0 f	eet.	935.1											
J9:33 - ⊓.	20		21.0	SAN coars	DY LE.	AN CL /el	AY, bro	wn, mo	oist, stiff,	little fine	to	933.6	SS 9	44	10- (2	13-14 27)							
CI /C/Q -					BO	Botto	m of bo	ed with rehole a	auger c at 21.0 fe	eet.													
Z.GU																							
AT ZU																							
LAB M																							
- GIN																							

CLIENT _Carl Bolander and Sons, Co. PROJECT NAME _Ramsey PROJECT NUMBER _15.60936.100 PROJECT LOCATION _Ard DATE STARTED _5/21/15 COMPLETED _5/21/15 GROUND ELEVATION _954	2 County Re-D len Hills, MN 1.02 ft : G No grou	evelopm	ent Site (TCAAF	P)	
PROJECT NUMBER 15.60936.100 PROJECT LOCATION Ard DATE STARTED 5/21/15 COMPLETED 5/21/15 GROUND ELEVATION 95/25/21/25	len Hills, MN 1.02 ft : G No grot		HOLE SIZ			
DATE STARTED <u>5/21/15</u> COMPLETED <u>5/21/15</u> GROUND ELEVATION <u>95</u>	1.02 ft : G No grou		HOLE SIZ			
7	G No grou			E "6	1/2" in	ches
	G No grou					
DRILLING METHOD 3 1/4 in H.S.A AT TIME OF DRILLING	_	undwater	observe	d.		
LOGGED BY _DAS CHECKED BY _DAS AT END OF DRILLING	G					
NOTES _Elev. at staked location. O/S boring 6 ft SE AFTER DRILLING	-					
O DEPTH GRAPHIC CLOG LOG LOG RAMPLE TYPE NUMBER RECOVERY %	COUNTS (N VALUE) POCKET PEN. (tsf)	DRY UNIT WT. (pcf) MOISTLIRE	CONTENT (%)			FINES
Image: Second state sta	5-6-6 (12)					
CLAYEY SAND, (SC) brown, fine to medium grained, moist, medium dense	6-6-8 (14)					
5 LEAN CLAY WITH SAND, (CL) brown, moist, rather SS 67 4 stiff to very stiff, trace gravel, sand lenses at 12.0 feet SS 67	-7-10 (17)					
SS 4 83 6	6-8-8 (16)					
$\begin{bmatrix} 10 \\ 10 \\ 5 \end{bmatrix} = \begin{bmatrix} 10 \\ 5 \\ 78 \end{bmatrix} = \begin{bmatrix} 10 \\ 5 \\ 5 \end{bmatrix} = \begin{bmatrix} 10 \\ 10 \\ 5 \end{bmatrix}$	6-8-12 (20)					
$\begin{bmatrix} SS \\ 6 \end{bmatrix} 100 $	6-8-10 (18)					
5 15 SS 100 5	5-7-7 (14)					
	-15-19 (34)					
Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	<u>, , </u>	1	I	1	I	

L-J			Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BEI	R SI PAGE	R-2(1 0	06 F 1
DAD.G	CLIEN	NT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	CAAF	<u>)</u>	
NER	PROJ		IUMBER 15.60936.100	PROJEC	T LOCAT		Arden Hills	, MN						
122	DATE	STAR	COMPLETED 5/22/15	GROUN	DELEVA		942.32 ft			HOL	E SIZ	E <u>"6</u>	<u>1/2" in</u>	ches
N N	DRILI		CONTRACTOR NTI	GROUN	O WATER	LEVE	LS:							
5/21	DRILI	ING N	IETHOD 3 1/4 in H.S.A	A	TIME OF	DRIL	LING N	lo grou	undwa	ter ob	served	•		
ELC	LOGO	SED B	Y DAS CHECKED BY DAS	A1	END OF	DRILL	.ING							
א פע	NOTE	S Ele	ev. at staked location. O/S boring 10 ft N	AF		LLING		1	1	1				
GINEERING/ENGINEER	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
6.100)\EN			SILTY SAND WITH GRAVEL, (SM) brown, fine to medium grained, moist (Fill)		SS 1	44	9-10-10 (20)	-						
<u>= 0 - (15.6093</u>			45	937 8	SS 2	56	8-8-6 (14)	-						
N HILLS - G	 		SILTY SAND, (SM) brown, fine to medium grained, moist, medium dense, trace gravel	025.2	SS 3	100	5-6-6 (12)	-						
JUECT ARDE	 		CLAYEY SAND, (SC) brown, fine to medium grained, moist, medium dense	935.3	SS 4	78	3-5-6 (11)	-						
CIS/LCAAP PR	<u> 10 </u>		LEAN CLAY WITH SAND, (CL) brown, moist, stiff to very stiff, little gravel	932.0	SH 5			_						
					SS 6	89	7-9-10 (19)	-						
YOJECI SV					SS 7	100	8-10-11 (21)	-						
AMSEY 11-P	 		NOTE: No Recovery due to coarse gravel at 17.0 fee Sampled auger cuttings.	t.		0	13-20-25 (45)	-						
)9:35 - H:\	20		NOTE: No Recovery due to coarse gravel at 19.5 fee Sampled auger cuttings.	t. 921.3	SS 9	0	13-22-27 (49)							
111 GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5/15			Bottom of borehole at 21.0 feet.											

2			North 1408 Mende Telep	ern Technologies Inc. Northland Dr. Ste 107 lota Heights, MN, 55120 phone: 651-389-4191				BO	RIN	G N	UM	BE	R S PAGE	R-2	07 F 1
NAU.G	CLIEN	NT Ca	arl_Bola	inder and Sons, Co.	PROJEC	T NAME	Ram	sey County	<u>Re-D</u>	<u>ev</u> elor	oment	<u>Si</u> te (1		P)	
С Ч Ц	PROJ		IUMBER	R 15.60936.100	PROJEC	T LOCA		Arden Hills	, MN						
	DATE	STAF		5/22/15 COMPLETED _5/22/15	GROUNE	ELEVA		938.51 ft			HOL	E SIZ	E _"6	1/2" in	ches
	DRILI	ING C	ONTR/	ACTOR NTI	GROUNE	WATER		LS:							
NID/S	DRILI		IETHO	D 3 1/4 in H.S.A	AT	TIME OF		LING N	lo grou	undwa	ter ob	served			
E H	LOGO	ED B	Y DAS	CHECKED BY _DAS	AT	END OF	DRILL	.ING							
Ц Ц Ц	NOTE	S El	ev. at st	taked location. O/S boring 6 ft E	AF	ter dri	LLING								
						111						ATT	ERBE	RG	
GINEERING/ENGINEI	DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%	LIQUID			FINES
90. 1UU)/EN				POORLY GRADED SAND WITH GRAVEL, (SP) brow fine to medium grained, moist (Fill)	n,	SS 1	44	9-9-10 (19)	-						
2. 90 Y			3.0		935.5	V ss	56	5-9-12	1						
-				CLAYEY SAND, (SC) gray, moist, medium dense		/ / 2		(21)	-						
Ц Э	5					сц									
						3					16	29	14	15	43
LEN							-		-						
¥						$\begin{vmatrix} SS \\ 4 \end{vmatrix}$	89	3-4-5 (9)							
UEC:						/ N		(-)							
ř	10					V ss	80	4-5-4							
₹ C						∕ 5	09	(9)	-						
<u></u>			12.0		926.5				-						
				stiff, trace gravel)	$\begin{pmatrix} SS \\ 6 \end{pmatrix}$	100	3-3-3 (6)							
т С						<u> </u>									
15/20	15					V ss	44	4-5-6	1						
NEC.						/ 7		(11)	-						
Ϋ́́								7 40 44	-						
SEY						$\bigwedge 8^{55}$	44	(23)							
/HAIN		\////													
35 - H	20		01.0		047 5		33	5-8-10 (18)							
15 09:		<u>V/////</u>	121.0	Borehole backfilled with auger cuttings.	917.5	/ / -		(••)	1	I	I	I			
19/2 -				Bottom of borehole at 21.0 feet.											
- G															
2012															
MAY															
S LAB															
ñ															
n Z															
5															
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2		Mendota Heights, MN, 55120 Telephone: 651-389-4191	PAGE 1 OF	= 1
		arl Bolander and Sons, Co.	PROJECT NAME Ramsey County Re-Development Site (TCAAP)	
y PR	OJECT	IUMBER 15.60936.100	PROJECT LOCATION Arden Hills, MN	
		COMPLETED <u>5/22/15</u>	GROUND ELEVATION _935.64 ft HOLE SIZE _"6 1/2" ind	ches
	ILLING	CONTRACTOR NTI	GROUND WATER LEVELS:	
	ILLING I	IETHOD _3 1/4 in H.S.A	AT TIME OF DRILLING No groundwater observed.	
E LO	GGED B	Y DAS CHECKED BY DAS	AT END OF DRILLING	
	TES EI	ev. at staked location. O/S boring 6 ft E	AFTER DRILLING	
	(ft) GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER RECOVERY % (RQD) (RDD)	FINES
	-	POORLY GRADED SAND WITH GRAVEL, (SP) brow fine to medium grained, moist	/n, SS 39 4-6-7 (13)	
		SILTY SAND, (SM) brown, fine grained, moist, trace gravel (Fill)	933.6 SS 100 5-5-5 2 100 (10)	
- - -		4.0 CLAYEY SAND, (SC) brown, fine to medium grained,	931.6	
		moist, loose to medium dense, trace gravel	$\begin{array}{ c c c c c c } & SS & SS & 17 & 2-3-4 \\ \hline SS & 3 & 17 & (7) & $	
			SH 4	
		12.0	SS 67 3-5-6 (11)	
		LEAN CLAY WITH SAND, (CL) brown, moist, rather stiff to stiff, trace gravel	SS 89 4-5-5 6 (10)	
1: 1:	5		SS 89 5-6-6 7 (12)	
			SS 78 5-7-10	
⊑ <u>2</u> (<u>) /////</u>	20.0 POORLY GRADED SAND, (SP) brown, fine to mediu	$\begin{array}{c c} 915.6 \\ \hline m_{914.6} \\ \hline 9 \\ 56 \\ 9 \\ 56 \\ (24) \\ \hline \end{array}$	
		grained, moist, dense, trace gravel Borehole backfilled with auger cuttings.		
		Bottom of borehole at 21.0 feet.		
5012.0				
NIAT A				

	(Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telenbone: 651-389-4191				BO	RIN	G N	UM	BE	R S Page	R-2	09 F 1								
ם.קיט					-	D					0:4- (7											
ROA		П <u>Са</u> Ест N					Ardon Hills	/ Re-D	evelop	oment	Site (CAAF	<u>,</u>									
SPINE		STAR	TED 5/20/15 COMPLETED 5/20/15					, IVIIN		ноі	E SIZ	E "6	1/2" in	chos								
/SR			CONTRACTOR NTI	GROUNI			<u>911.04 IL</u>					L _ U	1/2 111	01103								
l III			IFTHOD 31/4 in HSA	ΔΤ			ING N	lo aroi	ındwa	ter ob	served											
SRIS		FD B		ΔΤ			ING	io grot	anawa													
КЕР	NOTE	S Ele	ev. at staked location. O/S boring 10 ft E	AF	TER DRI																	
RING	-		· · · · · · · · · · · · · · · · · · ·								ATT	ERBE	RG									
GINEERING/ENGINEE	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES								
00)/EN			POORLY GRADED SAND WITH SILT, (SP-SM) brow moist, trace gravel	n,	ss s	33	2-3-4 (7)															
1936.1			(Fill)				0.4.4															
=0 - (15.60			3.0 SANDY LEAN CLAY, (CL) brown to gray, moist, medium to rather stiff, trace gravel	908.0	2	67	3-4-4 (8)	-														
-rs-	5				SS 3	67	4-4-5 (9)															
							(-)															
JI ARL						100	3-4-4 (8)															
SOLEC							. ,															
CAAP PI					SH 5																	
JECI S/I					√ ss	100	1-3-4	-														
15 PRO.					6	100	(7)	-														
=C1S/20	15				SS 7	100	2-3-5 (8)															
1-PROJ							224															
AMSEY					8	100	(7)	-														
5 - H:\R	20				∬ ss	89	2-4-6	-														
5 09:3			21.0 Borehole backfilled with auger cuttings.	890.0	/\ 9		(10)															
8/5/1			Bottom of borehole at 21.0 feet.																			
- 105																						
2012.																						
MAY																						
S LAB																						
ñ																						
NIS																						
2 - C																						
NMU																						
DIEC																						
CHC CHC																						
ΞL																						
PJ			Northe 1408 Mende Telep	ern Tecl Northlar ota Heig hone: 6	hnolog nd Dr. ghts, N 351-38	gies In Ste 10 //N, 55 39-419	c. 07 5120 1								BO	RIN	G N	UM	BE	R SI PAGE	R-2′ : 1 0	10 F 1
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9.UAU	CLIEN	NT Ca	arl Bola	nder an	d Son	s, Co.					F	ROJEC		Ram	sey Count	y Re-D	evelop	oment	Site (1	CAAF	')	
NE RC	PROJ	ECT N	IUMBER	R <u>15.6</u>	0936.	100					F	PROJEC			Arden Hills	s, MN						
1202	DATE	STAR		5/20/15			COMP	PLETE	D <u>5/2</u>	0/15	(GROUNI) ELEVA		913.64 ft			HOI	_E SIZ	E_"6	<u>1/2" in</u>	ches
	DRILL	ING C	ONTRA	ACTOR	NTI						(GROUNI	WATER	R LEVE	LS:							
s/GII	DRILL	ING N	IETHOD	3 1/4	↓ in H.	S.A						${ar ar \Sigma}$ at	TIME OF	DRIL	LING _ 4.5	0 ft / El	lev 90	9.14 ft				
L NOL	LOGG	GED B	Y DAS	;			CHEC	KED E	BY DA	S		AT	END OF	DRILL	_ING							
פאב	NOTE	S Ele	ev. at st	aked lo	cation	. O/S I	boring	6 ft NE	Ξ			AF	ter dri	LLING								
INEEKING/ENGINEEKIN	DEPTH (ft)	GRAPHIC LOG				MAT	ERIAL	DESC	CRIPTI	ON			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
6.100)/ENG			2.0	POOR gravel (Fill)	LY G	RADEI	D SANI	D WIT	H SILT	", (SP-SN	M) some	911 6	SS 1	33	1-2-3 (5)							
(15.6093			3.5	POOR	LY G m gra	RADEI ined, d	D SANI lense, 1	D WIT trace g	H SILT gravel	, (SP-SN	M) fine to	910.1	SS 2	78	5-12-14 (26)							
CEC			⊻	CLAYE	EY SI	_T, (S0	C) satu	rated,	trace g	ravel			1		-							
' L			60									907 6	3	17								
I Z I				POOR	LY G	RADEI	D SAN	D WIT	H SILT	, (SP-SN	N)											
ARD				satura	ieu, ii	ace gr	avei						🛛 ss	22								
			8.5	CLAYE	EY SA	ND. (5	SC) are	av. sati	urated.	loose to	dense.	905.1	4		-							
D H L H C	10			trace g	gravel		50) gio	.y, out	urutou,	10000 10	uonoo,		/ ss		4-6-6	-						
CAAP													5	33	(12)							
1/2/1																						
ONEC														89	3-3-4							
15 PH															(.)	1						
SVZU	15												∕ ss	80	4-5-7	1						
NECI													7	09	(12)	-						
-אר															570	-						
ISEY/														17	(15)							
NKAIV:																						
H - GE:	_ 20 _		21.0									892 6		11	5-8-10 (18)							
9/15 09					Bor	ehole Botton	backfill n of bo	led wit rehole	h auge at 21.0	r cutting:) feet.	S.		<u>r 1</u>								I	
1 - 8																						
12.GL																						
4Y 20																						
AB M/																						
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U U U																						
<u>, OLU</u>																						
- E E E																						
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ני Z																						

	(Northe 1408 Mendo Teleph	ern Technologies Inc. Northland Dr. Ste 107 ota Heights, MN, 55120 one: 651-389-4191				BO	RIN	G N	UM	BE	R SI PAGE	R-2'	11 F 1
19.14	CLIER	NT Ca	rl Bolar	oder and Sons. Co	PROJEC	Τ ΝΔΜΕ	Ram	sev County	/ Re-D	evelor	ment	Site (1		2)	
5 2 2	PROJ			R 15 60936 100	PROJEC			Arden Hills	MN	evelop	ment				
NILO	DATE	STAR	TED 5	5/22/15 COMPLETED 5/22/15	GROUNE	ELEVA		907.43 ft	,		НО	LE SIZ	E "6	1/2" in	ches
201	DRILL	LING C		CTOR NTI	GROUNE	WATER		LS:				-			
NID/O	DRILI	LING M	ETHOD	0 3 1/4 in H.S.A	AT	TIME OF	- DRILI	L ING N	lo grou	undwa	ter ob	served	l.		
220	LOGO	GED B	DAS	CHECKED BY DAS	AT	END OF	DRILL	.ING							
	NOTE	S Ele	ev. at sta	aked location.	AF	TER DRI	LLING								
											_	ATT	ERBE	RG	
GINEERING/ENGINEE	DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
			0.5	TOPSOIL (6 Inches) POORLY GRADED SAND. (SP) brown, fine to medium	<u>906.9</u> n	ss s	56	3-3-2 (5)							
00820.			3.0	grained, moist, trace gravel (Fill)	904 4	∕∖ ss	0	3-4-3							
- <u>-</u>			0.0	NOTE: No recovery at 2.0 feet. Sampled auger cuttings.		2	0	(7)							
- 01	5			fine to medium grained, moist, loose to medium dense trace gravel	, ,	SS 3	56	2-3-3 (6)							
L N L						V ss		4-6-6	-					1	
			0.5		007.0	4	67	(12)							
	<u> 10 </u>		<u>9.5</u>	SILTY SAND, (SM) brown, fine grained, moist, medium dense, trace gravel	<u>897.9</u> n	SS 5	78	5-6-5 (11)	-						
			12.0	LEAN CLAY WITH SAND, (CL) gray, moist, medium t rather stiff, trace gravel	0	SS 6	83	3-4-4 (8)	-						
107010	15					011	-							1	
						5⊓ 7			-						
AINIJE 1 / I							100	6-6-7 (13)	-						
21/11 - 0	20					∑ ss	100	7-6-8	-					1	
7.10 US.C		V/////	21.0	Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet	886.4	N N B		(14)	<u> </u>		<u> </u>				
2/0 - 1/															
012.6															
MAT Z															
13 LAB															
ופו															
10 - CIN															

6P.J			Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R S PAGE	R-2 1 0	12 F 1
DAU.G	CLIEN	NT Ca	rl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	CAAF	P)	
NE RC	PROJ	ECT N	UMBER 15.60936.100	PROJEC			Arden Hills	, MN						
SPIN	DATE	STAR	TED _5/27/15 COMPLETED _5/27/15	GROUND	ELEVA		894.22 ft			НО	_E SIZ	E_"6	1/2" in	iches
1/2/1	DRILL	ING C	ONTRACTOR NTI	GROUND	WATER	LEVE	LS:							
S/GIN	DRILL	ING N	IETHOD 3 1/4 in H.S.A	$\overline{\mathbf{V}}$ at		DRIL	LING 14.5	50 ft / E	Elev 8	79.72	ft			
UK IV	LOGO	ED B	Y DAS CHECKED BY DAS	АТ	END OF	DRILL	.ING							
KEL	NOTE	S Ele	ev. at staked location. O/S boring 12 ft NW	AF	FER DRI	LLING								
RING			<u> </u>								ATT	ERBE	RG	
JGINEEKING/ENGINEE	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT			FINES
0)/EN		<u>717</u> 7	1.0 TOPSOIL (12 Inches)	893.2	∑ ss	78	1-1-1							
36.10			FILL/TOPSOIL, (SC) black, very loose to loose, with		/\ 1		(2)	-						
0.609			organics		V ss	33	2-2-2	1						
) - (1t			3.5 SANDY I FAN CLAY (CL) grav moist to wet medium	890.7	/\		(4)	-						
N HILLS - GE(to rather stiff, trace gravel		$\left \begin{array}{c} SS \\ 3 \end{array} \right $	78	1-3-3 (6)	-						
JUECT ARDE					SS 4	100	3-4-5 (9)	-						
SVI CAAP PRO	<u> 10 </u>		NOTE: Trace gravel below 9.5 feet.		SS 5	100	3-5-5 (10)	-						
					SH 6					14	23	10	13	52
OJECI S/20			¥.		SS 7	78	2-2-3 (5)	-						
MSEY/1-PR						100	2-3-4 (7)	-						
H:\KA	20						245	-						
- 35 -			21.0	873.2	$\bigvee 9$	100	3-4-5 (9)							
GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5/15 09			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

C.			Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BEI	R S PAGE	R-2′ ≟ 1 0	13 F 1
AU.G	CLIEN	NT Ca	arl Bolander and Sons. Co.	PROJEC		Ram	sev Countv	/ Re-D	evelor	oment	Site (1	CAAF	2)	
ЦКС	PROJ	ECT N	IUMBER 15.60936.100	PROJEC	T LOCA	ΓΙΟΝ	Arden Hills	, MN	<u></u> ,		<u> </u>		./	
SPIN	DATE	STAR	TED 5/28/15 COMPLETED 5/28/15	GROUNE	ELEVA		890.76 ft	,		HOL	E SIZ	E "6	1/2" in	ches
NSK NSK	DRILL	ING C	ONTRACTOR NTI	GROUND	WATER		LS:			-				
NGIN	DRILL	ING N	IETHOD 3 1/4 in H.S.A	${ar ar \Sigma}$ at			LING 12.0)0 ft / E	Elev 8	78.76	ft			
Ë S	LOGG	ED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	.ING							
Т Ц	NOTE	S_Ele	ev. at staked location.	AF	TER DRI	LLING								
S N N						_					ATT	ERBE	RG	
IGINEEKING/ENGINEE	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
5.100)/EN			SILTY SAND WITH GRAVEL, (SM) fine grained, mois (Fill) NOTE: Sampled auger cutting	t	SS 1	0	8-4-6 (10)	_						
(15.60936	· -				SS 2	78	16-12-15 (27)	_						
- - - 			4.0 LEAN CLAY WITH SAND, (CL) moist, stiff to rather	886.8										
HILLS - (<u> </u>		stiff, trace gravel		SS 3	44	8-9-11 (20)	-						
I ARDEN	· -				SS A	83	2-6-8 (14)	-						
ONEC			SILTY SAND, (SM) fine grained, moist, loose, trace	882.3	/ -		(14)							
AP PR	10		gravel		∑ ss	78	3-3-5							
NICA			11.0 LEAN CLAY WITH SAND, (CL) gray, moist to wet,	879.8	/\ 5		(8)	-						
ECIS			\checkmark medium to rather stiff, trace gravel		√ ss		3-3-4	-						
	 				6	89	(7)	-						
	15				SH 7									
SEY/1-PR(100	2-4-5 (9)	-						
H:\RAMS	20						3-5-7	-						
- 95:90			21.0 Deschole head filled with sugges outlines	869.8	X 9	100	(12)							
ITI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5/15			Bottom of borehole at 21.0 feet.											

Ľ			Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R SI PAGE	R-2′ ± 1 OI	14 F 1
אח.פ	CLIEN	T Ca	arl Bolander and Sons, Co.	ROJEC		Ram	sey County	Re-D	evelop	oment	Site (1	ГСААF))	
С Ч Ц	PROJE		IUMBER 15.60936.100 P	ROJEC			Arden Hills	, MN	•		•			
	DATE	STAR	TED 5/22/15 COMPLETED 5/22/15 G		ELEVA		890.28 ft			но	_E SIZ	E "6	1/2" in	ches
201	DRILLI	NG C	ONTRACTOR NTI G		WATER		LS:			-				
NID/0	DRILLI	NG N	IETHOD 3 1/4 in H.S.A	$\overline{\mathbf{V}}$ at	TIME OF		LING 9.50) ft / El	ev 880).78 ft				
Ű Y S	LOGGI	ED B	CHECKED BY DAS	AT	END OF	DRILL	.ING							
	NOTES	S Ele	ev. at staked location.	AF	FER DRI	LLING								
	, DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT LIMIT	PLASTICITY D	FINES
			POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to medium grained, moist, trace gravel (Fill)	888.8	SS 1	67	4-4-3 (7)							
2 - (15.0U33			SILTY SAND, (SM) brown, fine to medium grained, moist, medium dense, trace gravel	/	SS 2	56	4-5-5 (10)	-						
HILLS - GEC	5		4.5 SILTY SAND, (SM) brown to gray, fine grained, moist to saturated, medium dense to dense	885.8		67	6-7-6 (13)							
CI ARDEN						56	4-4-5 (9)							
			Σ		SS 5	56	6-7-7 (14)	-						
						89	5-5-5 (10)							
15/2019					X ss	100	6-8-7							
					/ / /	50	8-8-9	-						
I HAINDEI	[:		18.5 Borehole backfilled soil cuttings. Bottom of borehole at 18 5 feet	871.8	8	90	(17)							
NIT GEOTECH COLUMINS - GINT STU US LAB MAT ZUIZ.GUT - 2021 13 U8:33 -														

5		Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	IBE	R SI PAGE	R-2 ′ 1 0	15 F 1
אם.פו	CLIENT C	arl Bolander and Sons, Co.	PROJEC		Ram	sev County	Re-D	evelor	oment	Site (1	ГСААF))	
D L L L	PROJECT	IUMBER 15.60936.100	PROJEC		ION	Arden Hills	, MN					1	
SFIN	DATE STAF	COMPLETED 5/22/15	GROUND	ELEVA		889.66 ft			но	LE SIZ	E "6	1/2" in	ches
221	DRILLING C	CONTRACTOR NTI	GROUNE	WATER		LS:			-				
NID/O		IETHOD 3 1/4 in H.S.A	$\overline{\mathbf{v}}$ at		DRIL	L ING 7.00) ft / El	ev 882	2.66 ft				
CR12	LOGGED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	.ING							
שבי		ev. at staked location.	AF	FER DRI	LLING								
										AT1	ERBE	RG	
GINEERING/ENGINEE	DEPTH (ft) GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
O. IUU/IEIN		POORLY GRADED SAND, (SP-SM) brown, fine to coarse grained, moist, trace gravel (Fill)	888.2	SS 1	44	3-4-3 (7)	_						
- (10.0093		SILTY SAND, (SM) gray to brown, fine grained, moist (Fill)	886.2	SS 2	56	5-4-6 (10)							
C E E		SILTY SAND, (SM) brown, fine grained, moist to saturated, medium dense					-						
- CLU		NOTE: Borehole wet cave-in at 5.7 feet.		$\begin{pmatrix} SS \\ 3 \end{pmatrix}$	78	4-5-4 (9)							
		Ϋ́		SS 4	67	6-6-7 (13)							
	<u>10</u>	42.0	077 7	SS 5	100	6-8-6 (14)	-						
		SILTY SAND, (SM) light brown, fine grained, saturate dense to medium dense	d,	SS 6	100	6-8-9 (17)	-						
RUJECI 2/21				SS 7	100	6-4-10 (14)							
RAIVISET / I-F				SS 8	100	4-10-5 (15)							
18:30 - LI.V	_20	NOTE: Fine to coarse grained below 19.5 feet.	868.7	SS 9	100	5-6-6 (12)							
2/ 12 1		Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											
UTECH COLDIMINS - GINT STU US LAB MAT ZUTZ.GUT - 2/3													

		North 1408 Mend Telep	ern Technologies Inc. Northland Dr. Ste 107 ota Heights, MN, 55120 hone: 651-389-4191				BO	RIN	G N	UM	BE	R SI PAGE	R-2 ′ 1 0	16 F 1
	ENT Ca	rl Bola	nder and Sons, Co.	PROJE	CT NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	CAAF	')	
	DJECT N	UMBE	R 15.60936.100	PROJE	CT LOCA		Arden Hills	s, MN						
DA.	FE STAR	TED	5/15/15 COMPLETED <u>5/15/15</u>	GROUN	D ELEVA		887.29 ft			HO	E SIZ	E <u>"6</u>	1/2" in	<u>ches</u>
	LLING C	ONTRA	ACTOR NTI		D WATEF	R LEVE	LS:							
	LLING N	ETHO	D <u>3 1/4 in H.S.A</u>	⊻a	TIME OI	F DRIL	LING 7.00) ft / El	lev 880	0.29 ft				
	GGED B	DAS	CHECKED BY DAS	A	FEND OF	DRILL	_ING							
	TES <u>Ele</u>	ev. at si	aked location.	A		LLING	·							
	(II) GRAPHIC LOG		MATERIAL DESCRIPTION		 SAMPLE TYPE NUMBER 	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
	-	0.3_/ 1.5	SILTY SAND, (SM) brown, fine to medium grained, moist, trace gravel (Fill)	887.0		67	3-5-5 (10)	-						
1		3.5	POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, moist (Fill)	n, 883.8		56	3-6-6 (12)							
		<u>6.0</u>	POORLY GRADED SAND WITH GRAVEL, (SP) brow fine to medium grained, moist, medium dense SILTY SAND, (SM) light brown, fine grained, moist, medium dense, trace gravel	n, 		67	5-7-6 (13)	-						
		<u>-</u>	brown, fine to medium grained, moist to saturated, loose, trace gravel		SS 4	44	3-3-4 (7)	-						
		11.0	NOTE: Boring terminated at 11.0 feet due to borehole	876.3	SS 5	44	1-2-2 (4)							
			cave-in. Borehole backfilled with auger cuttings. Bottom of borehole at 11.0 feet.											

2			Northern Technologies I 1408 Northland Dr. Ste Mendota Heights, MN, 5 Telephone: 651-389-41	nc. 107 5120 91				BO	RIN	G N	IUM	IBE	R S Page	R-2 ≣ 1 0	17 F 1
AD.GF	LIEN	NT C	arl Bolander and Sons, Co).	PROJEC	T NAME	Ram	sey County	/ Re-D	evelo	oment	Site (1	ГСААР	^{>})	
о Ш Ц	ROJ		NUMBER _ 15.60936.100		_ PROJEC	T LOCA		Arden Hills	s, MN						
	ATE	STAF	RTED _ 5/22/15	COMPLETED 5/22/15	GROUN	D ELEVA		886.05 ft			HO	LE SIZ	E_"6	1/2" ir	ches
I I ST	RILI	ING C			GROUN		R LEVE	LS:							
	RILI		METHOD 3 1/4 in H.S.A			TIME O	F DRIL	LING _ 7.00) ft / El	lev 87	9.05 ft				
	OGG	GED B	Y DAS	CHECKED BY DAS	A	END OF		.ING							
ы В И	ΙΟΤΕ	S <u>E</u>	ev. at staked location.		AF	TER DR	ILLING								
	0 (ff)	GRAPHIC LOG	MA	TERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT LIMIT		FINES
00)/EN	-		SILTY SAND, (SI saturated, loose t	M) brown, fine grained, moist to o medium dense, trace gravel		SS 1	56	4-6-5 (11)							
1936.1	-							(11)	-						
1 15.60	-					2	67	4-9-7 (16)	-						
	5					SS 3	78	4-5-4 (9)							
	-		8.5 8.5		877.6	SS 4	100	3-3-2 (5)	-						
	- <u>10</u> -		fine to coarse gra	ined, saturated, medium dense, tra	ce	SS 5	89	5-7-6 (13)	-						
1 1	-		14.5		871.6	SH 6									
	-		SILTY SAND, (SI saturated, mediu	 M) brown, medium to coarse graine m dense, trace gravel 	d,	SS 7	100	4-6-7 (13)	-						
USEYVI-PF	-		POORLY GRADE	ED SAND WITH SILT, (SP-SM) bro rained, saturated, loose	wn, 867.6		78	3-3-2 (5)							
H:\RA	- 20		SANDY LEAN CI	AY, (CL) gray, saturated, medium,											
:35 - 1	20		NOTE: Silty sand	seam at 20.0 feet.	865 1	3 SS	67	3-3-4 (7)							
GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5/15 (Borehole Bottc	backfilled with auger cuttings. om of borehole at 21.0 feet.											

		Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R S PAGE	R-2 ′ ≟ 1 0	18 F 1
	INT C	arl Bolander and Sons. Co	PRO.IFC		Ram	sev County	/ Re-D	evelor	oment	Site (1	ГСААР	2)	
		IUMBER 15 60936 100	PROJEC			Arden Hills	MN		Jinoin		10/01		
	ESTAR	COMPLETED 6/8/15 COMPLETED 6/8/15	GROUNI	ELEVA		883 67 ft	,		но	E SIZ	E "6	1/2" in	ches
			GROUNI	WATER		LS:						<u></u>	
		IETHOD 3 1/4 in H S A	TA Σ			LING 14.5	50 ft / F	-lev 8	69 17	ft			
	GED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	_ING							
	ES El	ev. at staked location.	AF	TER DRI	LLING								
										ATT	ERBE	RG	
	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT		PLASTICITY INDEX	FINES
	-	POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, moist 2.0 (Fill)	n, 881.7	$\bigvee ss_1$	56	6-7-6 (13)	_						
		SILTY SAND, (SM) brown, fine grained, moist (Fill)		SS 2	56	8-8-9 (17)							
5 5				SS 3	67	7-6-9 (15)	-						
	-	7.0 POORLY GRADED SAND WITH SILT, (SP-SM) gray fine grained, moist, dense	876.7 ,	SS 4	56	10-11-13 (24)							
- 10		9.5 PEAT, (Pt) black to dark gray, moist, rather stiff	874.2	SS 5	67	4-5-6 (11)	-						
		14.5 ▽	869.2	SH 6	_								
15		SILTY SAND, (SM) gray, fine to medium grained, saturated, medium dense		SS 7	56	4-4-5 (9)	-						
				SS 8	100	6-7-7 (14)							
20		21.0	862.7	SS 9	89	7-6-6 (12)	_						
		Bottom of borehole at 21.0 feet.											

PJ			Northe 1408 I Mende Telepl	ern Technologies I Northland Dr. Ste ota Heights, MN, 5 hone: 651-389-41	nc. 107 5120 91					BO	RIN	G N	UM	IBE	R SI PAGE	R-2′ ± 1 OI	19 F 1
DAD.G	CLIEN	NT C	arl Bolai	nder and Sons, Co).		PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	ment	Site (1	CAAF	')	
Щ RO	PROJ		NUMBER	R <u>15.60936.100</u>			PROJEC	T LOCA		Arden Hills	, MN						
SPIN	DATE	STAF	RTED 6	6/4/15	COMPLETED	6/4/15	GROUNE	ELEVA		898.15 ft			HOI	LE SIZ	E "6	1/2" in	ches
IT\SR	DRILI	ING C	CONTRA				GROUNE	WATE	R LEVE	LS:							
S/GIN	DRILI	ING N	NETHOD	3 1/4 in H.S.A			AT	TIME O	F DRIL	LING N	lo grou	undwa	ter ob	served			
ORT	LOGO	ED B	Y DAS		CHECKED BY	DAS	AT	END OF		_ING							
U RE	NOTE	S El	ev. at st	aked location.			AF	TER DR	ILLING								
GINEERING/ENGINEERIN	DEPTH (ft)	GRAPHIC LOG		MA	TERIAL DESCF	RIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC TIMIT	PLASTICITY D	FINES
.100)/ENG	-		0.1	ASPHALT (1.5 Ir BASE (4 Inches)	iches)			SS 1	44	8-11-11 (22)							
(15.60936	-			POORLY GRADI brown to brown, f trace gravel	ED SAND WITH ine to medium g	SILT, (SP-SM) light rained, dry to moist,		SS 2	67	10-11-12 (23)	-						
LS - GEO -	5			(FIII)				SS	67	9-10-12	-						
	-									10-8-9	-						
	-							X 4	89	(17)	-						
TCAAP PF	<u> 10 </u>		11.0			SM) brown fine to	887.2	SS 5	78	10-11-13 (24)							
ROJECTS	-		13.5	medium grained, base material (Fill)	moist, little grav	rel, apparent roadway	/ 884.7		100	13-15-16 (31)	-						
TS\2015 P	- 15			POORLY GRAD	ED SAND WITH iined, dry, dense	SILT, (SP-SM) brow e, trace gravel	'n,	√ ss	56	8-12-11							
-PROJEC	-		17.0				881.2	7		(23)							
RAMSEY1	-			fine grained, moi	ED SAND WITH st, medium dens	SILT, (SP-SM) brow se	'n,		89	6-8-6 (14)	-						
09:35 - H:\\	20		21.0	Develo	- I I-6'11 I 'Al-		877.2	SS 9	100	6-7-7 (14)							
TI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5/1:				Botte	om of borehole a	t 21.0 feet.											

2			Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	IUM	IBE	R S PAGE	R-2	20 F 1
DAD.GI		NT <u>Ca</u>	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	FCAAF	P)	
Щ И И И И И И И И	PROJ		UMBER 15.60936.100	PROJEC	T LOCA		Arden Hills	s, MN						
ILIS I	DATE		TED <u>5/27/15</u> COMPLETED <u>5/27/15</u>	GROUND	ELEVA		884.33 ft			НО	LE SIZ	E <u>"6</u>	1/2" in	ches
	RIL	LING C	ONTRACTOR NTI	GROUNE	WATEF	LEVE	LS:							
	RIL	LING N	IETHOD 3 1/4 in H.S.A	AT	TIME O	DRIL	LING N	lo gro	undwa	ter ob	served	l.		
I N	.OGC	GED B	CHECKED BY DAS	AT	END OF	DRILL	_ING							
U RE	OTE	S Ele	ev. at staked location.	AF	TER DRI	LLING								
GINEERING/ENGINEERIN	0 UEPIH (ff)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
100)/EN	-		D2_/ TOPSOIL (2 Inches) POORLY GRADED SAND WITH SILT, (SP-SM) brow		SS 1	67	8-10-11 (21)							
5.60936.	-		2.0 fine to medium grained, trace gravel (Fill)		∬ ss	56	9-13-15	-						
3EO - (1			moist (Fill)		/		(20)	-						
HILLS - (5 -				$\left \begin{array}{c} SS \\ 3 \end{array} \right $	67	8-11-12 (23)	_						
ARDEN	-				∕ ss	67	3-5-5	-						
ROJECT	-		9.5	874.8	/ 4		(10)							
TCAAP PF	<u>10</u>		SILTY SAND, (SM) gray, fine grained, moist, asphalt pieces (Fill)		⊠ ss ₅	100	32/6"							
5 PROJECTS	-		SILTY SAND, (SM) gray, fine grained, moist, trace gravel (Fill)	872.3	SS 6	67	6-6-7 (13)	-						
DJECTS/201	15		14.5 SILTY SAND, (SM) dark gray to gray, fine grained, moist, loose, organic stain	869.8	SS 7	56	2-2-3 (5)	-						
MSEY\1-PRO	-				SS 8	100	4-3-4 (7)							
5 - H:\RA	20				∑ ss	56	3-3-5	-						
5/15 09:3			21.0 Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	863.3	V V 9		(δ)							
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - E														

L'I			Northe 1408 N Mendo Teleph	rn Technologie Northland Dr. S Na Heights, MN None: 651-389-	es Inc. te 107 I, 55120 4191					BO	RIN	G N	UM	BE	R SI PAGE	R-22	21 ೯ 1
DAD.G	CLIEN	NT <u>C</u>	arl Bolar	der and Sons,	Co.		PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	ment	Site (1	CAAF	')	
NE RC	PROJ	ECT N	NUMBER	15.60936.10	0		PROJEC			Arden Hills	, MN						
SPIN	DATE	STAF	RTED <u>5</u>	/27/15		ED _5/27/15	GROUNI	D ELEVA		892.07 ft			HOL	E SIZ	E_"6	1/2" in	ches
I \SH	DRILL	ING O	CONTRA	CTOR NTI			GROUNI		R LEVE	LS:							
S/GIN	DRILL	ING I	NETHOD	3 1/4 in H.S.	A		${ar ar \Sigma}$ at	TIME OF	- DRILI	LING _ 15.3	30 ft / E	Elev 87	76.77	ft			
UK I	LOGO	ED B	Y DAS		CHECKED	BY DAS	AT	END OF	DRILL	.ING							
3 REF	NOTE	S _EI	ev. at sta	aked location.			AF	TER DRI	LLING								
														ATT	ERBE	RG	
IGINEERING/ENGINE	o DEPTH (ft)	GRAPHIC LOG		r	MATERIAL DES	SCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%)	LIQUID		PLASTICITY INDEX	FINES
3.100)\EN			0.2_/_	TOPSOIL (2 Ir SILTY SAND,	nches) (SM) brown, fin	e to medium grained,		SS 1	56	4-2-4 (6)							
15.60936			3.5	(Fill)	avel		888 6	ss 2	89	3-3-4 (7)	-						
GEO - (SILTY SAND, loose to mediu	(SM) light brow Im dense	n, fine grained, moist,	000.0										
I HILLS -								$\begin{pmatrix} 55\\ 3 \end{pmatrix}$	67	3-4-4 (8)	-						
JECT ARDEN								SS 4	78	4-6-8 (14)	-						
I CAAP PRO								SS 5	100	4-6-8 (14)	-						
PROJECTS			12.0	SILTY SAND, saturated, loos	(SM) light brow se to medium de	n, fine grained, moist to ense	880.1	SS 6	89	3-5-4 (9)	-						
JECTS/2015	 		Ţ					SS 7	78	3-3-5 (8)	-						
MSEY1-PRC									78	4-5-7 (12)	-						
35 - H:\R/	20		21.0				871 1	SS 9	56	5-7-9 (16)	-						
8/5/15 U9.		<u>1 46194.1</u>	121.0	Boreh Bo	nole backfilled w ottom of boreho	/ith auger cuttings. le at 21.0 feet.	011.1	v N		. ,	1	1		1		I	
GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5																	

L-J	Northern Technolog 1408 Northland Dr. Mendota Heights, M Telephone: 651-38	gies Inc. Ste 107 /N, 55120 /9-4191				BO	RIN	G N	UM	BEI	R SI PAGE	R-22	22 F 1
DAU.G	CLIENT Carl Bolander and Sons	s, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	ment	Site (1	CAAF	')	
NE R	PROJECT NUMBER	100	PROJEC			Arden Hills	, MN						
1202	DATE STARTED 5/28/15	COMPLETED <u>5/28/15</u>	GROUNE	ELEVA		897.17 ft			HOL	E SIZ	E_"6	<u>1/2" in</u>	ches
	DRILLING CONTRACTOR NTI		GROUNE	WATER	LEVE	LS:							
s/GI	DRILLING METHOD 3 1/4 in H.S	S.A	$ar{ abla}$ at	TIME OF	DRIL	LING _17.7	70 ft / E	Elev 87	79.47 1	ft			
E E E E E E	LOGGED BY DAS	CHECKED BY DAS	AT	END OF	DRILL	.ING							
ש צ פ	NOTES Elev. at staked location.		AF	ter dri	LLING								
GINEERING/ENGINEERIN	o DEPTH (ft) GRAPHIC LOG LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
6.100)/EIN	1.5 POORLY GF	Inches) RADED SAND WITH SILT, (SP-SM) brow	<u>896.8</u> / vn, <u>895.7</u>	SS 1	56	2-2-2 (4)							
<u> - (15.6U33</u>	SILTY SANE moist, very lo	D, (SM) brown to light brown, fine grained pose to dense	/ ,	SS 2	78	2-3-2 (5)	-						
HILLS - GE(5			SS 3	56	2-1-2 (3)	-						
					78	5-9-9 (18)							
				SS 5	78	4-5-7 (12)							
				SS 6	67	4-6-7 (13)	-						
	14.5 15 SILTY SANE saturated, lo	D, (SM) light brown, fine grained, moist to ose to medium dense	882.7	SS 7	78	2-3-5 (8)	-						
NSEY /1-PRO				SS 8	56	4-6-7 (13)							
35 - H:\FAI	20		876 2	SS 9	78	5-6-7 (13)	-						
RU GL/G/Q -	Bor	ehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	010.2	· N								I	
Y 2012.GD1													
US LAB MA													
- GINI SID													
CULUMINS													
zl													

	(N 1 N	lorthern Technologies Inc. 408 Northland Dr. Ste 107 Iendota Heights, MN, 55120				BO	RIN	G N	UM	BE	R S I page	R-22	23 F 1
JAU.GPJ	CLIEN	п_0	Carl	elephone: 651-389-4191 Bolander and Sons, Co.		T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	CAAF	<u>)</u>	
ЧЧ	PROJ	ЕСТ	NUN	/BER 15.60936.100	PROJEC			Arden Hills	, MN						
NIN NIN	DATE	STA	RTE	D 5/28/15 COMPLETED 5/28/15	GROUNE	ELEVA		898.48 ft			HOL	E SIZ	E "6	1/2" in	ches
25	DRILI	ING	CON	TRACTOR NTI	GROUND			I S [.]							
CIN CIN			001 ME1					LUNG 17 (20 ft / F		31 28	Ft			
N Y									<u>-0 it / L</u>		51.20				
C L L C	LUGG		ы.	DAS CHECKED BY DAS	AI			ING							
י שכי	NOTE	<u>s</u> _	iev.		AF		LLING								
GINEERING/ENGINEERI	o DEPTH (ft)	GRAPHIC I OG		MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
00)/EN			10.3			SS 1	67	1-3-2							
10.10			2.0	fine to coarse grained, moist, loose, trace gravel	vn, <u>896.5</u>			(3)	-						
(15.605				SILTY SAND, (SM) brown, fine grained, moist, loose, trace medium to coarse gravel			78	2-2-3 (5)							
ż			4.5	j	894.0										
 L	5			SILTY SAND, (SM) brown, fine grained, moist to saturated, very loose to dense		3	67	1-2-2 (4)							
														1	
CI ARI						$\bigvee SS 4$	78	1-2-2 (4)						1	
E NO N															
CAAP P	<u> 10 </u> - -					SS 5	67	1-1-3 (4)							
DJECIS						∑ ss	78	2-3-4	-						
2015 PR((7)	-						
	 					SS 7	22	2-3-3 (6)	-						
-11-PHC				Ϋ́		∑ ss	67	5-8-10							
\RAMSE						/ 8		(18)							
19:35 - H	20		21	0	877.5	SS 9	78	8-10-10 (20)							
5/15				Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											
- 8/															
2.GU															
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				Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R SI PAGE	R-22	24 F 1
AU.GF	CLIEN	IT I	Са	rl Bolander and Sons. Co.	PROJEC		Ram	sev County	/ Re-D	evelor	oment	Site (1	ГСААF	2)	
Ц К С	PROJ	ECT	'N	JMBER 15.60936.100	PROJEC	T LOCA	ΓΙΟΝ	Arden Hills	, MN	<u> </u>		<u> </u>		./	
2 L L S	DATE	STA	٩R	COMPLETED 5/28/15	GROUND	ELEVA		899.93 ft			но	E SIZ	E "6	1/2" in	ches
22	DRILL	ING		DNTRACTOR NTI	GROUND	WATER		LS:			-				
NGIN	DRILL	ING	M	ETHOD 3 1/4 in H.S.A	$\overline{\mathbf{V}}$ at	TIME OF	DRIL	LING 16.0))) ft / E	Elev 88	33.93	ft			
ž S	LOGO	ED	BY	DAS CHECKED BY DAS	AT	END OF	DRILL	_ING							
Т Ц	NOTE	S	Ele	v. at staked location.	AF	TER DRI	LLING								
S N N												ATT	ERBE	RG	
	_	U				ЧРЕ	%	sω	N.	MT.	Щ%	L		;	
	ff (f	Hd	2	MATERIAL DESCRIPTION		Е Т 1ВЕ	SD)	ALU MOV	sf) F	Ц б Л	10 L		₽L	Ξ×Ι	LES
YIN N		SRA	ک			NUN	lõ <u>r</u>	ZOP ZOP	No et	ات ط ا	NTE NTE	ND N	AST IMI	STIC	Ľ
L L L	•					SAI	RE		PG	В	≥ö		Ъ	٦	
ENG.	0		n ¹	D.3_/\ TOPSOIL (3 Inches)	/\.899.7/	V ss		3-3-2						-	
.100)				POORLY GRADED SAND WITH SILT, (SP-SM) brow	vn,	1	78	(5)							
00930				2.0 tine to medium grained, moist, loose SILTY SAND. (SM) brown to light brown, fine grained		∖∕ ss		2-2-2	-						
- (15.				moist to saturated, very loose to dense	3	2	67	(4)							
- - - - - - - - - - - - - - - - - - -															
רי מי	5						56	2-2-3							
						/\ J		(3)	-						
Ц Ч Ч				NOTE: Trace gravel at 7.0 feet.		V ss		1-2-2	-						
¥ ت				C C		4	44	(4)							
- S 2															
ЧЧ ЧЧ	10						78	3-5-6							
N CA						/ 5		(11)	-						
2						22		3-4-5	-						
NOX.						$\bigwedge 6$	67	(9)							
1910															
	15						67	2-2-3							
S				$\overline{\Delta}$				(5)	-						
н Н						22		5-0-0	-						
N SE						$\left \begin{array}{c} 33\\ 8 \end{array} \right $	56	(18)							
NKAN/						·									
н Ч	20					∑ ss	56	5-9-12							
09:3				21.0 Borehole backfilled with auger cuttings.	878.9	/\ 9		(21)							
31/6/8				Bottom of borehole at 21.0 feet.											
ñ															
12.6															
4Y 20															
₩ M															
12															
Z															
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LUMI															
D D T															
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	Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191	BORING NUMBER SR-225 PAGE 1 OF 1
OAU.GF	CLIENT Carl Bolander and Sons, Co.	PROJECT NAME Ramsey County Re-Development Site (TCAAP)
ЧЧ	PROJECT NUMBER _ 15.60936.100	PROJECT LOCATION Arden Hills, MN
202	DATE STARTED 6/8/15 COMPLETED 6/8/15	GROUND ELEVATION _898.97 ft HOLE SIZE _"6 1/2" inches
101		GROUND WATER LEVELS:
	DRILLING METHOD 3 1/4 in H.S.A	AT TIME OF DRILLING No groundwater observed
Ë Y O	LOGGED BY DAS CHECKED BY DAS	AT END OF DRILLING
Т Ц	NOTES Elev. at staked location.	AFTER DRILLING
NEERING		ATTERBERG
NEEKING/ENG	H (1) MATERIAL DESCRIPTION	SAMPLE TY NUMBEF RECOVERY (RQD) (RQD) (RQD) (SC) (SC) (SC) (SC) (SC) (SC) (SC) (SC
	0 POORLY GRADED SAND WITH SILT, (SP-SM) light brown to dark brown, fine to medium grained, moist,	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
1930.1		
19.0($\begin{array}{ c c c c c c c c c c c c c c c c c c c$
N HILLS - G		SS 89 3-3-3 3 (6)
		SS 78 5-6-6 (12)
		SS 78 4-5-6 5 78 (11)
COLECT SVI (SS 67 2-2-2
1 S/2015 PF	_ <u>15</u>	$\begin{array}{ c c c c c c c c } \hline & & & & & & & \\ \hline & & & & & & & & \\ \hline & & & &$
1-PROJEC		
:\KAMSEY		879.5
D - C5:30 - D	20 CLAYEY SAND, (SC) brown, fine to medium grained, 21.0 Borehole backfilled with auger cuttings.	878.0 SS 9 67 4-4-3 (7)
2012.601 - 8/5/1	Bottom of borehole at 21.0 feet.	
IS LAB MAT .		
GINISIDU		
- CLUMINS -		
ΞĹ		

Rice Creek Re-Meander Bridge Soil Boring Logs



	Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING NUMBER RC-500 PAGE 1 OF 1
	arl Bolander and Sons, Co.	PROJECT NAME Ramsey County Re-Development Site (TCAAP)
PROJECT	NUMBER 15.60936.100	PROJECT LOCATION Arden Hills, MN
DATE STA	RTED _5/28/15 COMPLETED _5/28/15	GROUND ELEVATION 883.81 ft HOLE SIZE "6 1/2" inches
DRILLING		GROUND WATER LEVELS:
DRILLING	METHOD 3 1/4 in H.S.A	
LOGGED E	BY DAS CHECKED BY DAS	AT END OF DRILLING
NOTES _E	lev. at staked location.	AFTER DRILLING
DEPTH (ft) GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER RECOVERY % (RQD) BLOW COUNTS (N VALUE) POCKET PEN. (1sf) (1sf) (1sf) (1sf) (1sf) (1sf) DRY UNIT WT. (1sf) DRY UNIT WT. (1sf) DR
	POORLY GRADED GRAVEL WITH SAND, (GP) brown, fine to medium grained, coarse gravel (Fill) 3.0 SILTY SAND, (SM) brown, fine to medium grained, moist to saturated, medium dense to dense 7.0 SILTY SAND, (SM) gray, fine to medium grained, saturated, medium dense	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
 	14.5 SILTY SAND, (SM) gray, fine to medium grained, saturated, loose, trace gravel	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
 20	21.0 Borehole backfilled with auger cuttings.	SS 89 3-4-3 (7) 882.8 9 100 4-4-3 (7)
	Bottom of borehole at 21.0 feet.	

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BEI	R R Page	C-5 1 0	01 F 1
	CLIEN	ENT _Carl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	CAAF)	
	PROJ	JECT NUMBER 15.60936.100	PROJEC	T LOCAT		Arden Hills	, MN						
	DATE	E STARTED _5/28/15 COMPLETED _5/28/15	GROUNE	ELEVA		884.4 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	ches
	DRILL		GROUND	WATER	LEVE	LS:							
	DRILL	LING METHOD 3 1/4 in H.S.A	$ar{ abla}$ at	TIME OF	DRIL	LING 9.50) ft / El	ev 87	4.90 ft				
	LOGO	GED BY DAS CHECKED BY DAS	AT	END OF	DRILL	.ING							
	NOTE	Elev. at staked location.	AF	TER DRI	LLING								
Ī				ш	%		_;	<u> </u>		ATT	ERBE	RG	
	o DEPTH (ft)	MATERIAL DESCRIPTION		SAMPLE TYP NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WI (pcf)	MOISTURE CONTENT (%	LIMIT			FINES
		POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, dry, trace gravel (Fill)	vn, 882.9	SS 1	78	5-5-7 (12)							
IEANDER.GPJ		SILTY SAND, (SM) brown, fine to medium grained, moist, dense to medium dense, trace gravel	/	SS 2	78	6-7-10 (17)	-						
- RICE CREEK REN				SS 3	89	7-10-11 (21)	-						
PORTS\GINT\RC		PEAT, (Pt) dark gray to black, dry, rather stiff	876.4 875.9	SS 4	78	4-5-7 (12)	-						
RING/ENGINEERING REI	 		se	SS 5	67	4-5-3 (8)	-						
0936.100)/ENGINEE	 		869.9	SS 6	100	4-7-7 (14)	-						
HILLS - GEO - (15.		gravel			100	2-2-3 (5)	-						
PROJECT ARDEN				SS 8	100	3-4-4 (8)	-						
PROJECTS/TCAAP		21.0 22.0 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, loose, trace gravel	863.4	SH 9					16	26	11	15	51
M1-PROJECTS/201		Borehole backfilled with auger cuttings. Bottom of borehole at 22.0 feet.											_26_
DTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/21/15 13:44 - H													

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BEI	R R PAGE	C-5	02 F 1
CLIE	NT C	arl Bolander and Sons, Co.	PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (1	FCAAF)	
PRO	JECT I	IUMBER _15.60936.100	PROJEC			Arden Hills	, MN						
DAT	E STAF	COMPLETED 5/28/15	GROUNI) ELEVA		884.24 ft			HO	_E SIZ	E <u>"6</u>	<u>1/2" in</u>	<u>ches</u>
DRIL	LING (CONTRACTOR NTI) WATER	LEVE	LS:							
DRIL	LING I	IETHOD 3 1/4 in H.S.A		TIME OF	DRIL	_ING _7.00) ft / El	ev 87	7.24 ft				
LOG	GED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	ING							
NOT	ES EI	ev. at staked location. O/S 15 ft. W	AF	TER DRI				1	1				
o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
-	-	POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, dry 2.0 (Fill)	vn, 882.2	ss s	78	7-9-10 (19)	-						
EANDER.GPJ		SILTY SAND, (SM) brown, fine to medium grained, moist (Fill)	970 7	SS 2	56	8-9-9 (18)	-						
2		SILTY SAND, (SM) brown, fine to medium grained, moist to saturated, dense to very loose	079.7	SS 3	100	7-9-11 (20)	-						
DRTS/GINT/RC - F		$\overline{\Sigma}$		SS 4	100	3-1-1 (2)	-						
	-			SS 5	67	1-1-1 (2)	-						
36.100)/ENGINEERIN		14.5	869.7	SS 6	78	2-2-3 (5)	-						
15 - 15 - 15 - 15 - 15	-	SILTY SAND, (SM) gray, fine grained, saturated, very loose to medium dense, trace gravel	/	SS 7	56	2-2-1 (3)	-						
DJECT ARDEN HIL				SS 8	100	6-7-6 (13)	-						
DTS/TCAAP PRC		21.0	863.2	SS 9	89	4-4-5 (9)							
TI GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 8/21/15 13:44 - H/1-PROJECTS/2015 PROJE		Borenole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

				Northe 1408 Mende Telep	ern Technologies, Inc. Northland Drive, Suite 107 lota Heights, MN 55120 ihone: 651-389-4191				BO	RIN	G N	UM	BEI	R R PAGE	C-5	03 F 1
	CLIE	T	Са	rl Bola	nder and Sons, Co.	PROJE		Ram	sey County	/ Re-D	evelop	oment	Site (1	FCAAF	P)	
	PROJ	EC.	ΤN	UMBER	R 15.60936.100	PROJE			Arden Hills	, MN						
	DATE	ST	AR	TED _	5/28/15 COMPLETED 5/28/15	GROUN	D ELEVA		881.95 ft			HOI	_E SIZ	E <u>"6</u>	1/2" in	iches
	DRILI	LINC	G C	ONTRA	ACTOR NTI	GROUN	D WATEF	R LEVE	LS:							
	DRILI	LINC	ΞN	ETHO	D 3 1/4 in H.S.A	A		F DRIL	LING							
	LOGO	GED	B	DAS	CHECKED BY DAS	A		DRILL	.ING							
	NOTE	S _	Ele	ev. at st	taked location. O/S 15 ft. SW	A	TER DR	ILLING								
	o DEPTH (ft)	GRAPHIC	LOG		MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
		×	\bigotimes	2.0	POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, dry (Fill)	n,		67	3-2-3 (5)	_						
EANDER.GPJ			\propto	2.0	SILTY SAND, (SM) brown, fine grained, moist, loose, trace gravel	000.0	ss 2	67	3-3-3 (6)	-						
- RICE CREEK REM				7.0		875 (SS 3	67	3-3-3 (6)	-						
REPORTS/GINT/RC				1.0	SILTY SAND, (SM) gray to dark gray, fine grained, saturated, very loose to medium dense, trace organics		SS 4	56	2-1-3 (4)	-						
VEERING/ENGINEERING	<u>10</u> 				Note: Organic content at 10 feet = 2.6%		SH 5	-	3-3-2	_		15				16
- (15.60936.100)\ENGI							6 SS 7	78	(5) 2-2-2 (4)	-						
CT ARDEN HILLS - GEC				18.5	NOTE: Borehole wet cave-in at 17.0 feet.	863.9		78	2-4-6 (10)	-						
PROJEC		ەر بەر		19.5	POORLY GRADED GRAVEL, (GP) gray, saturated, medium dense, fine to medium gravel	862.5	5									
CTS/TCAAP	_ 20			<u>21.0</u>	POORLY GRADED SAND WITH SILT, (SP-SM) gray, fine grained, saturated, medium dense		SS 9	100	4-4-6 (10)							
TI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/21/15 13:44 - H:/1-PROJECTS/2015 PROJE					Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

Water Main Soil Boring Logs



			Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOR	RING	S NI	JME	BER	PAGE	M-4	00 F 1
	CLIEN	IT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	P)	
	PROJ		IUMBER 15.60936.100	PROJEC			Arden Hills	, MN						
	DATE	STAF	COMPLETED _5/28/15	GROUND	ELEVA		965.77 ft			HO	E SIZ	E <u>"6</u>	1/2" in	iches
	DRILL	ING C	CONTRACTOR NTI	GROUND	WATER	LEVE	LS:							
	DRILL	ING N	IETHOD 3 1/4 in H.S.A	AT	TIME OF	DRIL	LING N	lo grou	undwa	ter ob	servec	1.		
	LOGG	BED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	.ING							
	NOTE	S El	ev. at staked location.	AF	TER DRI	LLING								
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
ſ	-	<u>711</u>	0.8 TOPSOIL (10 inches)	964.9	∑ ss	56	4-5-6							
ľ			CLAYEY SAND, (SC) brown, moist, loose to medium dense, trace gravel	·	/\ 1		(11)	-						
					SS 2	100	6-4-5 (9)							
	5		4.5 SANDY LEAN CLAY, (CL) brown, moist, medium to very stiff_trace gravel	961.3	ss 3	67	3-2-3	-						
							(0)	-						
	 			r e	SS 4	100	3-4-3 (7)	-						
					SH 5	-				17	29	13	16	51
			NOTE: No recovery. Sampled auger cuttings.	952.3	SS 6	0	32							
			Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.											

Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING NUMBER WM-401 PAGE 1 OF 1
CLIENT Carl Bolander and Sons, Co.	PROJECT NAME Ramsey County Re-Development Site (TCAAP)
PROJECT NUMBER 15.60936.100	PROJECT LOCATION Arden Hills, MN
DATE STARTED _5/21/15 COMPLETED _5/21/15	GROUND ELEVATION 954.63 ft HOLE SIZE "6 1/2" inches
	GROUND WATER LEVELS:
DRILLING METHOD _3 1/4 in H.S.A	AT TIME OF DRILLING No groundwater observed.
LOGGED BY DAS CHECKED BY DAS	AT END OF DRILLING
NOTES _Elev. at staked location.	AFTER DRILLING
HLAND STREAM	FINES FINES
SILTY SAND, (SM) brown, fine to medium grained noist, little gravel (Fill)	953.1 SS 67 5-10-7 953.1 1 67 (17)
CLAYEY SAND, (SC) brown, fine grained, moist, tu 3.0 gravel (Fill)	Prace 951.6 SS 2 56 5-6-7 (13)
5 CLAYEY SAND, (SC) brown, fine grained, moist, medium dense, trace gravel	950.1 SS 67 4-3-4
CLAYEY SAND, (SC) brown, fine grained, moist, medium dense to stiff, trace gravel	
	SS 100 5-5-7 4 100 (12)
	SH 12 23 13 10 30
	45 SS 100 7-8-8 6 100 (16)
Borehole backfilled with auger cuttings.	941.1/ \ 0 (10)
Bottom of borehole at 13.5 feet.	

No 14 Me Te	rthern Technologies, Inc. 08 Northland Drive, Suite 107 Indota Heights, MN 55120 Iephone: 651-389-4191				BOR	RING	S NI	JME	BER	PAGE	M-4(= 1 O	02 F 1
CLIENT Carl B	olander and Sons, Co.	PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (1	FCAAF	>)	
PROJECT NUM	BER 15.60936.100	PROJEC	T LOCA		Arden Hills	s, MN						
DATE STARTED	<u>6/4/15</u> COMPLETED <u>6/4/15</u>	GROUND) ELEVA		915.63 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	ches
DRILLING CONT	RACTOR NTI	GROUNE	WATEF	R LEVE	LS:							
DRILLING METH	IOD 3 1/4 in H.S.A	$ar{2}$ at	TIME O	F DRILI	LING	00 ft / E	Elev 9	03.63	ft			
	AS CHECKED BY DAS	AT	END OF	DRILL	.ING							
NOTES Elev. a	t staked location.	AF	TER DRI	LLING								
o DEPTH (ft) (ft) CRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
	TOPSOIL (10 inches)	914.8	SS SS	78	3-3-2							
	POORLY GRADED SAND WITH SILT, (SP-SM) reddish brown, fine to medium grained, moist				(5)							
3.0	(Fill)	912.6	ss 2	100	4-6-5							
	POORLY GRADED SAND WITH SILT, (SP-SM) reddish brown, fine to medium grained, moist, loose				(11)	-						
5			∕∕ ss	00	4-5-3	-						
			3	89	(8)							
7.0		908.6				-						
8.0	CLAYEY SAND, (SC) moist, loose, trace gravel	907.6		78	4-3-4 (7)							
	SILTY SAND, (SM) brown, fine to medium grained, moist, medium, trace clay (CL) lenses		<u> </u>		(.)	1						
10			сц	1								
			5					11				30
	Σ											
12.8	CLAYEY SAND (SC) gray saturated medium dense	902.8		100	4-4-5 (9)							
<u> </u>	trace gravel	, <u>902.1</u>		11	(-)	1					I	
	Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.											
5												
5												
ă D D												

			North 1408 Meno Telep	ern Technologies, Inc. Northland Drive, Suite 107 lota Heights, MN 55120 phone: 651-389-4191				BOR	RING	S NI	JME	BEF	R WI PAGE	V-4	03 F 1
		IT _C	arl Bola	ander and Sons, Co.	PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF)	
F	PROJ	ECT N	UMBE	R 15.60936.100	PROJEC	T LOCA		Arden Hills	s, MN						
1	DATE	STAF	RTED _	6/4/15 COMPLETED _6/4/15	GROUNI) ELEVA		907.66 ft			HO	LE SIZ	E <u>"6</u>	<u>1/2" in</u>	<u>ches</u>
1	DRILL	ING (CONTR	ACTOR NTI		WATER	RLEVE	LS:							
	DRILL	ING N	METHO	D 3 1/4 in H.S.A	¥AT	TIME OF		LING _ 7.50) ft / El	lev 90	0.16 ft				
	LOGG		Y <u>DAS</u>	S CHECKED BY DAS	AT			.ING							
Ľ	NOTE	5 <u>E</u>	ev. at s		AF		LLING		1	1					
	o UEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
_	_		0.4	TOPSOIL (5 inches) POORLY GRADED SAND WITH SILT, (SP-SM) brow	<u>907.2</u> n, <u>906.2</u>	SS 1	67	5-4-4 (8)							
-	-		2.7	fine to medium grained, moist, trace coarse gravel (Fill) SANDY LEAN CLAY, (CL) brown, moist, rather stiff		SS 2	100	7-6-7 (13)	-						
-	5			POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, moist to saturated, medium	n,]						
			•	dense		$\begin{pmatrix} SS \\ 3 \end{pmatrix}$	100	5-6-6 (12)							
	-		7.7 🗸	LEAN CLAY WITH SAND, (CL) brown, wet, medium	900.0	SS 4	78	2-3-3 (6)							
- 10X	10		9.5		898.2										
	-			CLAYEY SAND, (SC) blue gray, saturated, very loose		SS 5	100	2-2-2 (4)							
	-		12.5	LEAN CLAY, (CL) blue gray, wet, trace gravel	895.2	SH	_								
1	-					6									
10.01	15	/////	15.0	Borehole backfilled with auger cuttings.	892.7									I	
LLS-GE				Bottom of borehole at 15.0 feet.											
NECT AF															
AF FRU															
FROME															
19/2010															
FRUIE															
43 - HM-															
:#I CI/IZ															
19-119															
7 20 12															
o LAB MI															
210.02															
- 0 I															
COLOMIN															
NI GEC															

		Northe 1408 I Mendo Teleph	ern Technologies, Inc. Northland Drive, Suite 107 ota Heights, MN 55120 none: 651-389-4191	BORING NUMBER WM-404 PAGE 1 OF 1												
CLIE	NT C	arl Bolar	nder and Sons, Co.	PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF)			
PRO		IUMBEF	R 15.60936.100	PROJEC			Arden Hills	, MN								
DAT	E STAF	RTED 6	6/5/15 COMPLETED _6/5/15	GROUNI	D ELEVA		907.25 ft			HO	LE SIZ	E <u>"6</u>	<u>1/2" in</u>	ches		
DRIL	LING C	ONTRA	CTOR NTI	GROUND WATER LEVELS: ∇ AT TIME OF DRIFT ING 12.00 ft / Elever 805.25 ft												
DRII	LING N	IETHOD	0 _3 1/4 in H.S.A	AT TIME OF DRILLING 12.00 ft / Elev 895.25 ft												
LOG	GED B	Y DAS	CHECKED BY DAS													
NOT	ES El	ev. at st	aked location.	AFTER DRILLING												
o DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES		
	7 <u>11</u>	1.0	TOPSOIL (12 Inches)	906.3	🛛 ss	78	6-5-6									
			POORLY GRADED SAND WITH CLAY, (SP-SC) dark				(11)									
			(Fill)		ss 2	89	7-8-8									
		3.5	POORLY GRADED SAND WITH SILT, (SP-SM) brown	903.8	/ <u> </u>		(10)	-								
5			fine to medium grained, moist, dense, trace gravel		∬ ss	-	11-10-8	-								
					3	89	(18)	_								
_		7.0		900.3												
-			SILTY SAND, (SM) light brown, fine grained, moist to saturated, dense to medium dense, trace gravel		SH 4	100										
10 					SS 5	100	10-10-8 (18)									
_	-	 13.5		893.8	SS 6	89	7-6-7 (13)									
		13.5	Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.	893.8												

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING NUMBER WM-405 PAGE 1 OF 1											
CLIE	ENT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	ГСААР	^{>})		
PRO		IUMBER 15.60936.100	PROJEC			Arden Hills	s, MN	•				,		
DAT	E STAF	COMPLETED _6/5/15	GROUN	D ELEVA		899.38 ft			HOI	_E SIZ	E_"6	1/2" in	ches	
DRIL	LING C		GROUN		R LEVE	LS:								
DRIL	LING N	IETHOD 3 1/4 in H.S.A	${ar ar \Sigma}$ at	TIME OF	F DRILI	LING <u>9.50</u>) ft / El	lev 88	9.88 ft					
LOG	GED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	.ING								
NOT	ES El	ev. at staked location. O/S 40 ft. E	AF	TER DRI	LLING									
				ш	%		7	<u>.</u>	()	AT1		RG		
0 DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYP NUMBER	RECOVERY ((RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT W (pcf)	MOISTURE CONTENT (%	LIMIT	PLASTIC	PLASTICITY INDEX	FINES	
	<u></u>	0.8 TOPSOIL (10 Inches)	898.6	SS 1	56	7-7-6								
		POORLY GRADED SAND WITH SILT, (SP-SM) dark brown to light brown, fine to medium grained, moist to				(13)								
	-	saturated, medium dense to loose, trace gravel		SS 2	89	6-9-7 (16)	_							
5	-			SS 3	78	3-3-4 (7)	-							
_	-			SS 4	100	8-6-7 (13)	_							
<u>10</u>	-	$\overline{\Sigma}$		ss 5	100	7-5-5 (10)	-							
	-			∬ ss	100	4-4-4	-							
	1.11	13.5 Borehole backfilled with auger cuttings.	885.9	6	100	(8)								
		Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.												

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING NUMBER WM-406 PAGE 1 OF 1												
CLIE	NT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	TCAAF	^{>})			
PRO.		UMBER _ 15.60936.100	PROJEC	T LOCA		Arden Hills	, MN								
DATE	STAR	TED6/23/15 COMPLETED6/23/15	GROUNE	ELEVA		891.68 ft			HOL	E SIZ	E <u>"6</u>	<u>1/2" in</u>	ches		
DRIL	LING C	ONTRACTOR NTI													
DRIL	LING N	IETHOD 3 1/4 in H.S.A	$ar{2}$ at	TIME OF	DRIL	LING	00 ft / E	Elev 8	79.68	ft					
LOG	GED B	CHECKED BY DAS	AT END OF DRILLING												
NOTE	S Ele	ev. at staked location.	AFTER DRILLING												
o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT	PLASTIC PLASTIC LIMIT LIMIT	PLASTICITY ² INDEX ²	FINES		
		0.5 TOPSOIL (6 Inches)			44	1-2-3									
		brown, fine to medium grained, moist, very loose to				(5)	1								
		loose 3.0	888.7	$\bigvee ss$	78	3-3-4									
		PEAT, (Pt) black, moist, soft, trace gravel		/ / 2		(7)	-								
5					-										
				SH 3											
	<u></u>														
	1. 1.1			V ss	83	2-2-2	1								
5	<u> ~~ ~</u>			4		(4)	-								
10	4 14				-										
	<u> ~~ ~</u>			SH											
	4 14	∇		5											
		12.5 $\stackrel{\checkmark}{\frown}$ NOTE: Weight of Hammer at 12.0 feet.	879.2	V ss	11	0-2-4	1								
		SILTY SAND WITH GRAVEL, (SM) gray, fine grained,		6	44	(6)	-								
			877.2				-								
		SILTY SAND, (SM) gray, fine grained, saturated, medium dense	875 7		83	4-5-6 (11)									
	1.1.1.1.	Borehole backfilled with auger cuttings.	075.7	/ \		()					I	I			
		Bottom of borehole at 16.0 feet.													

NTI GEOT

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING NUMBER WM-407 PAGE 1 OF 1												
CLIE	NT C	arl Bolander and Sons. Co.	PROJEC	T NAME	Ram	sev Countv	/ Re-D	evelor	oment	Site (ГСААІ	>)			
PROJ		IUMBER 15.60936.100	PROJEC	T LOCA	TION	Arden Hills	, MN			\		1			
DATE	STAF	COMPLETED _5/27/15	GROUNI	D ELEVA		889.12 ft			HOL	_E SIZ	E "6	1/2" in	ches		
DRILI	ING C		GROUNI			LS:									
DRILI		IETHOD _3 1/4 in H.S.A	AT TIME OF DRILLING 6.25 ft / Elev 882.87 ft												
LOGO	SED B	Y DAS CHECKED BY DAS	AT END OF DRILLING												
NOTE	S El	ev. at staked location. O/S 10 ft. E	AFTER DRILLING												
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT	PLASTIC PLASTIC LIMIT		FINES		
		POORLY GRADED SAND WITH SILT, (SP-SM) brow 1.5 fine to medium grained, moist, trace gravel (Fill)	n, 887.6	SS 1	56	8-9-11 (20)									
		SILTY SAND, (SM) brown, fine grained, moist, trace gravel (Fill)		SS 2	56	6-10-11 (21)	-								
5		 POORLY GRADED SAND WITH SILT, (SP-SM) brow fine grained, moist to saturated, dense, little organics,	<u>884.6</u> n, 882.1	SS 3	89	6-11-12 (23)	-								
		SILTY SAND, (SM) light brown to gray, fine grained, saturated, medium dense	879 6	SS 4	78	7-6-8 (14)	-								
<u> 10 </u> - -		POORLY GRADED SAND WITH SILT, (SP-SM) gray fine grained, saturated, loose to medium dense		SS 5	67	3-3-4 (7)	-		15				6		
		13.5	875.6	SS 6	67	5-4-5 (9)									
		Bottom of borehole at 13.5 feet.													

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING NUMBER WM-408 PAGE 1 OF 1												
CLIE	NT _Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	TCAAF)			
PRO	ECT N	UMBER 15.60936.100	PROJEC			Arden Hills	, MN								
DATE	STAR	COMPLETED 5/27/15	GROUNI	D ELEVA		888.74 ft			HO	LE SIZ	E <u>"6</u>	<u>1/2" in</u>	<u>ches</u>		
DRIL	LING C	ONTRACTOR NTI	_ GROUND WATER LEVELS:												
DRIL			AT TIME OF DRILLING 5.00 ft / Elev 883.74 ft AT END OF DRILLING												
	SED B	Y DAS CHECKED BY DAS	_ AT END OF DRILLING AFTER DRILLING												
			Ar								FRBF	RG			
o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES		
		POORLY GRADED SAND, (SP) brown, fine to mediur grained, moist, little fine to medium gravel	n	SS 1	33	8-9-8 (17)									
		(FIII)		ss 2	22	10-13-12									
		4.0	884.7			(23)									
		5.5 ✓ saturated, loose, little fine gravel SILTY SAND, (SM) gray, fine grained, saturated, very	883.2	3 SS	44	3-4-3 (7)									
		loose to loose, trace gravel		∕∕ ss	44	1-1-1	-								
				4	44	(2)	_								
				SS 5	44	2-1-2 (3)	-								
		10.5	075.0	SS 6	89	3-4-4	-								
	<u> </u>	Borehole backfilled with soil cuttings. Bottom of borehole at 13.5 feet.	075.2			(-)	1	I		I	I	I			

Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING NUMBER WM-409 PAGE 1 OF 1											
CLIENT Carl Bolander and Sons, Co.	PROJECT NAME Ramsey County Re-Development Site (TCAAP)											
PROJECT NUMBER _15.60936.100	PROJECT LOCATION Arden Hills, MN											
DATE STARTED _5/27/15 COMPLETED _5/27/15	GROUND ELEVATION _886.87 ft HOLE SIZE6 1/2" inches											
	GROUND WATER LEVELS:											
DRILLING METHOD 3 1/4 in H.S.A												
LOGGED BY DAS CHECKED BY DAS	AT END OF DRILLING											
NOTES _Elev. at staked location.	_ AFTER DRILLING											
HLdag O O O MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER RECOVERY % (RQD) BLOW COUNTS (N VALUE) POCKET PEN. (Isf) DRY UNIT WT. (Isf) DRY UNIT WT. (Isf) DRY UNIT WT. CONTENT (%) LIQUID LIQUID LIQUID LIQUID LIQUID LIMIT FINES FINES											
POORLY GRADED SAND WITH SILT, (SP-SM) bro fine grained, moist, trace gravel (Fill)	bwn, 885.4 SS 78 4-3-4 (7)											
SILTY SAND, (SM) brown, fine grained, moist (Fill)	SS 100 4-7-6 (13)											
<u>5</u> 6.0	880.9 SS 89 3-5-5 (10)											
SILTY SAND, (SM) light brown to gray, fine grained,	de $3.5.4$ (9)											
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$											
	873.4											
Borehole backfilled with soil cuttings. Bottom of borehole at 13.5 feet.												

				Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING NUMBER WM-410 PAGE 1 OF 1												
	CLIE	NT _	Са	rl Bolander and Sons, Co.	PROJE		Ram	sey County	/ Re-D	evelop	oment	Site (FCAAF	P)			
	PROJ	JECT	ΓN	JMBER _ 15.60936.100	_ PROJE	CT LOCA		Arden Hills	, MN								
	DATE	ST/	AR	COMPLETED 6/25/15	GROUN	D ELEVA	TION _	877.04 ft			HO	LE SIZ	E <u>"6</u>	1/2" in	iches		
	DRILI	LING	G C	ONTRACTOR NTI	GROUND WATER LEVELS: ∇ AT TIME OF DPILLING 7 00 ft / Flow 870 04 ft												
	DRILI	LING	G M	ETHOD _3 1/4 in H.S.A	AT TIME OF DRILLING _7.00 ft / Elev 870.04 ft												
	LOGO	GED	B١	DAS CHECKED BY DAS	A	F END OF	DRILL	.ING									
	NOTE	ES _	Ele	v. at staked location.	AFTER DRILLING												
	o DEPTH (ft)	GRAPHIC	LOG	MATERIAL DESCRIPTION		· SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES		
				D.5TOPSOIL (6 Inches) POORLY GRADED SAND WITH SILT. (SP-SM) bro		SS 1	78	2-3-4 (7)									
		-		fine to medium grained, moist, loose to dense, trace	,				-								
PJ		-		clay (CL) pieces			89	8-8-8 (16)									
- WATER MAIN.G		-		NOTE: Hard drilling at 5.0 feet due to coarse gravel.	970	$\left \begin{array}{c} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	56	9-20-10 (30)									
PORTS\GINT\WM				POORLY GRADED SAND WITH SILT, (SP-SM) gra fine to coarse grained, saturated, loose, trace fine gravel	y,		78	7-4-4 (8)	-								
GIENGINEERING RE						SS 5	89	4-3-2 (5)	-								
936.100)\ENGINEERII				14.5	862.5	SS 6	89	2-2-3 (5)									
LLS - GEO - (15.60	<u> 15 </u> - -			SANDY LEAN CLAY, (CL) gray, wet, medium, trace gravel	fine	SS 7	100	4-4-5 (9)									
ROJECT ARDEN H																	
OJECTS/TCAAP F				21.5	855.	SH 8											
\2015 PR				Borenole backfilled with auger cuttings. Bottom of borehole at 21.5 feet.													
3E0TECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/21/15 14:43 - H:/1-PROJECTS																	

Natural Resources Corridor Soil Boring Logs



			Northe 6160 Inver Telep	ern Technolc Carmen Ave Grove Heigh hone: 651-3	ogies, Inc. nue East ts, MN 550 89-4191	76		BORING NUMBER NR-101 PAGE 1 OF 1													
	CLIEN	IT Ca	arl Bola	nder and Sor	ns, Co.			PI	ROJEC	T NAME	Rams	sey Count	<u>/ R</u> e-D	evelor	oment	<u>Si</u> te (t <u>c</u> aaf)			
	PROJ	ECT N	UMBER	R _15.60936	.100			PI	ROJEC			Arden Hills	s, MN								
	DATE	STAR	RTED 5	5/21/15	со	MPLETED	5/21/15	GI				914.14 ft			но	LE SIZ	E "6	1/2" in	ches		
	DRILL			ACTOR NTI		-		GI		WATER		LS:			-						
	DRILL		IETHO) 3 1/4 in H	.S.A				AT TIME OF DRILLING No groundwater observed.												
	LOGO	ED B	Y		СН	ECKED BY	DAS		AT END OF DRILLING												
	NOTE	S Ele	ev. at st	aked location	n.				AFTER DRILLING												
ł		0/	<u>S 5 ft W</u>	ļ												AT	FERBE	RG			
	o DEPTH (ft)	GRAPHIC LOG			MATERI	AL DESCRI	PTION			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES		
2			0.7	TOPSOIL (CLAYEY S	8 Inches) AND, (SC)	brown to da	rk brown, fine		913.4	ss s	44	1-2-2 (4)	_								
CORRIDOR.G				gravel, lens	es of silt, ir	on oxide sta	ining	ce		SS 2	89	4-6-6 (12)									
VL RESOURCES	5									ss 3	89	5-7-7 (14)	-								
T/NR- NATUR												3_3_3	-								
REPORTS/GIN			9.5						904 6	4	89	(6)	-								
VENGINEERING		<u></u>		PEAT, (Pt)	black, mois	st, rather stif	f to soft, trace	e gravel		SS 5	78	4-6-5 (11)	_								
ENGINEERING		<u> </u>	13.3						900.8	SS 6	44	2-2-1 (3)	-								
936.100)				to wet, rath	Y WITH SA er stiff, trac	ND, (CL) gravel, org	ay and brown ganic material	, moist seams													
: - GEO - (15.60	<u>15</u>									SS 7	89	3-5-6 (11)	-								
T ARDEN HILLS										SS 8	100	3-6-5 (11)	-								
CAAP PROJEC	20									SH											
ECTS/T0			21.5						892.6	9											
H:/1-PROJECTS/2015 PROJ				Во	rehole bac Bottom of	kfilled with a borehole at	uger cuttings. 21.5 feet.														
GDT - 1/25/16 14:26 -																					
IS LAB MAY 2012.																					
IS - GINT STD U																					
TECH COLUMN																					
NTI GEO																					

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	G N	UM	BEI	R N Page	R-1 (∃ 1 0	02 F 1		
	CLIEN	T C	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	ment	Site (<u> ICAAF</u>)			
	PROJ		NUMBER 15.60936.100	PROJEC			Arden Hills	, MN								
	DATE	STAF	RTED <u>5/21/15</u> COMPLETED <u>5/21/15</u> (GROUNE	ELEVA		915.35 ft			HOL	E SIZ	E <u>"6</u>	<u>1/2" in</u>	iches		
	DRILI	ING C	CONTRACTOR NTI	GROUND WATER LEVELS: ∇ AT TIME OF DRIVEN SO $(2, 25, 6)$												
	DRILI	ING N	METHOD 3 1/4 in H.S.A													
	LOGO	ED B	SY CHECKED BY _DAS	AT	END OF	DRILL	.ING									
	NOTE	S El	lev. at staked location.	AFTER DRILLING												
	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES		
			Mode TOPSOIL (7 Inches) CLAYEY SAND, (SC) brown to light brown, fine to	914.8	SS 1	56	2-2-3 (5)									
KRIDUR.GFJ			2.0 medium grained, moist, loose SILTY SAND, (SM) brown and dark brown, fine grained	<u>913.4</u> ,	∑ ss	67	3-3-5									
			4.5	910.9	/ 2		(0)									
	5		SILTY SAND, (SM) reddish brown, fine grained, moist, medium dense		SS 3	56	4-8-8 (16)	-								
			CLAYEY SAND, (SC) black, fine grained, dry to moist, loose, some organics, organic stain	908.4		67	4-4-4 (8)									
	10		10.5	904.9	∑ ss	67	4-5-5	_								
		<u> </u>	PEAT, (Pt) black, dry to moist, rather stiff $\frac{12.0 \ \nabla}{}$	903.4	/ 5		(10)									
			SILTY SAND, (SM) gray, fine grained, saturated, medium dense		SS 6	78	5-6-6 (12)									
GEO - (15:60936	15				SS 7	67	4-5-5 (10)									
AKUEN HILLS - (X ss	89	6-6-8 (14)									
ה אומיבר ו	20						0.4.5									
			Borehole backfilled with auger cuttings.	894.4	X 9	100	3-4-5 (9)									
וון פֿבטן בטא פטראטאר - פואן אויז טוע טא אאז אוז אויגישויט ואיצט- איאי-דאטיבט ואיצע דאר			Bottom of borehole at 21.0 feet.													
		North 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, MN hone: 651-389-41	Inc. ast \ 55076 91					BOI	RIN	G N	UM	BEI	R N Page	R-1 (≞ 1 0	03 F 1
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CLIE	NT_C	arl Bola	nder and Sons, Co).		PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (1	FCAAF	²)	
PRO		NUMBE	R 15.60936.100			PROJEC			Arden Hills	, MN						
DATE	E STAF		5/21/15	COMPLETED	5/21/15	GROUND) ELEVA		924.8 ft			HOL	E SIZ	E <u>"6</u>	1/2" in	ches
DRIL	LING (CONTRA	ACTOR NTI			GROUN) WATER		LS:							
DRIL		METHO	D 3 1/4 in H.S.A			AT	TIME OF	- DRILI	LING N	lo grou	undwa	ter ob	served	Ι.		
LOG	GED B	Y		CHECKED BY	DAS	AT	END OF	DRILL	.ING							
NOT	ES EI	ev. at si	taked location.			AF	TER DRI	LLING								
o DEPTH (ft)	GRAPHIC LOG D	ys 6 ft 1	<u>Α</u> ΜΑ	TERIAL DESCR	IPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
		0.3_~	TOPSOIL (4 Inch	es)			🛛 ss	56	3-3-3							
- ·		2.0	CLAYEY SAND,	(SC) brown, fine	grained, moist, loos	se 922.8	/ 1		(6)	-						
			SANDY LEAN CI rather stiff	-AY, (CL) brown,	moist, medium to		SS 2	56	4-4-4 (8)							
5			NOTE: Sampled	auger cuttings at	4.5 feet.		SS 3	17	4-5-5 (10)	-						
		7.0				917.8				1						
			SILTY SAND, (SI grained, moist, de	√l) dark brown to ense, clay (CL) le	dark gray, fine enses		SS 4	67	4-7-12 (19)							
		12.0				912.8	SH 5	-								
		· • • • • •	SILTY SAND, (SI gravel	Λ) brown, moist,	medium dense, tra	ce	SS 6	78	6-8-8 (16)	-						
15		15.5				909.3	🛛 ss	56	7-7-7	1						
		170	CLAYEY SAND, dense, trace gray	(SC) gray, fine gr	rained, moist, medi	um			(14)	-						
		17.0	SILTY SAND, (SI loose	۷) gray, fine grai	ned, dry to moist,	907.8	SS 8	44	2-2-3 (5)	-						
20		19.5	LEAN CLAY WIT	H SAND, (CL) da	ark brown, moist,	905.3	SS o	100	5-5-7	-						
	<u> </u>	21.0	Borehole	backfilled with a	auger cuttings.	903.8	VV		(14)						1	
			Botto	m of borehole at	21.0 feet.											

			Northe 6160 (Inver (Teleph	ern Technologies, Carmen Avenue E Grove Heights, Mi none: 651-389-41	Inc. ast N 55076 91					BOI	RIN	G N	UM	BE	R N Page	R-1(1 0)4 ⊧ 1
	CLIEN	NT Car	l Bolar	nder and Sons, Co).		PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF)	
	PROJ		IMBER	t 15.60936.100			PROJEC	T LOCA	TION	Arden Hills	, MN	•		t			
	DATE	START	ED 5	/22/15	COMPLETED	5/22/15	GROUN) ELEVA		932.63 ft			но	LE SIZ	E "6	1/2" in	ches
	DRILL		NTRA	CTOR NTI			GROUN			LS:							
	DRILL	ING ME	THOD	3 1/4 in H.S.A			A	TIME O	F DRIL	LING N	lo grou	undwa	ter ob	served	1.		
	LOGO	GED BY			CHECKED BY	DAS	A	END OF		ING							
	NOTE	S Elev	. at sta	aked location.			AF	TER DR	ILLING								
		0/S	8 ft NI					щ	%		ż	<u>н</u> .	(9	AT		RG	
	o DEPTH (ft)	GRAPHIC LOG		MA	TERIAL DESCR	IPTION		SAMPLE TYF NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE)	POCKET PE (tsf)	DRY UNIT W (pcf)	MOISTURE CONTENT (9	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES
г.			0	POORLY GRAD fine to medium g (Fill)	ED SAND WITH rained, dry, fine t	GRAVEL, (SP) brov o coarse gravel	vn, 930 e	SS 1	56	10-14-15 (29)							
ם הטרגווויטרים				CLAYEY SAND fine to coarse gra	WITH GRAVEL, (ained, moist, fine	(SC) reddish brown, to coarse gravel	028.6	SS 2	78	9-10-10 (20)							
	 _ 5			SANDY LEAN C moist, medium, t	LAY, (CL) reddish race fine to coars	n brown to light brov se gravel	<u>920.c</u> vn,	ss 3	56	5-3-5 (8)	-						
NI/NR- NAIUR								∕∕ ss	00	4-4-4							
שאבו אטאבו אש			.3	CLAYEY SAND, grained, moist, d	(SC) reddish bro ense, trace fine to	wn, fine to medium o medium gravel	924.4	4	33	(8)	-						
NG/ENGINEERIN								SH 5									
								SS 6	78	9-10-13 (23)							
	15		4.5	SANDY LEAN C gravel, iron oxide	LAY, (CL) brown, staining	moist, stiff, trace fir	918.1 ne	SS 7	89	5-7-9 (16)							
EN TILLO - GE		1	7.0	SANDY LEAN C	LAY, (CL) brown	to reddish brown, di	915.6 V.	M ss		7-14-19	-						
NUEC I ARM				very stiff, little fin	e to coarse grave	91		8	56	(33)							
IEC I SIL CAAP I		2	1.0	Borehol	e hackfilled with a	auger cuttings	911.6	SS 9	78	8-16-16 (32)							
11 GEOLECH COLOMINS - GINLS ID US LAB MAT 2012.GDL - 1/23/18 14:28- H:(1-PROJEC 15/2015 PR				Botta	om of borehole at	21.0 feet.											

			North 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, MN hone: 651-389-41	Inc. ast I 55076 91					BOI	RIN	G N	UM	BEI	R N Page	R-1 (∃ 1 0	05 F 1
	CLIEN	IT Ca	arl Bola	nder and Sons, Co			PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	ment	Site (FCAAF)	
	PROJ		UMBE	R <u>15.60936.100</u>			PROJEC			Arden Hills	, MN						
	DATE	STAF	RTED	5/21/15	COMPLETED _	5/21/15	GROUNE	ELEVA		936.22 ft			HOI	LE SIZ	E <u>"6</u>	<u>1/2" in</u>	iches
	DRILL	ING C	ONTR	ACTOR NTI			GROUNI	WATER	LEVE	LS:							
	DRILL	ING N	IETHO	D 3 1/4 in H.S.A			AT	TIME OF	DRIL	LING N	lo grou	undwa	ter ob	servec	Ι.		
	LOGO	BED B	Y		CHECKED BY	DAS	AT	END OF	DRILL	.ING							
	NOTE	S El	ev. at s	taked location.			AF	ter dri	LLING								
	o DEPTH (ft)	GRAPHIC LOG		MA	TERIAL DESCRI	PTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
				POORLY GRADE	ED SAND WITH (ained, dry, some	GRAVEL, (SP) brown fine to coarse grave	ı, I	ss ss	56	4-5-5 (10)							
19.70				(FIII)			000.0	∖∕l ss	07	5-7-7	-						
			3.0	SANDY LEAN CL stiff, trace fine gra	AY, (CL) brown, avel, iron oxide st	dry to moist, rather aining	933.2	2	67	(14)	-						
	5							SS 3	72	4-4-5 (9)							
	 - 10 		9.5 18.0 19.5 20.0	SILTY LEAN CLA brown, moist, rath NOTE: Sand sear POORLY GRADE fine to coarse gra SILTY LEAN CLA stiff little medium	TY, (CL-ML) reddi ner stiff to stiff m (SP) at 11.0 fe ED SAND WITH (ined, dry, dense, iY, (CL-ML) reddi	sh brown and light et. GRAVEL, (SP) brown fine to coarse grave sh brown, dry, very	926.7 918.2 1, 916.7 916.2	SH 4 SS 5 SS 6 SS 7 SS 7 SS 8 SS 8 SS 8 SS 8 SS 8	78 56 83 56 67	(9) 3-4-12 (16) 12-14-15 (29) 4-6-7 (13) 10-12-15 (27) 32							
				NOTE: Sampled a Borehole Botto	auger cuttings. backfilled with a m of borehole at	uger cuttings. 20.0 feet.	J										

			North 6160 Inver	ern Technologies, Inc. Carmen Avenue East Grove Heights, MN 55076 hone: 651-389-4191				BOI	RIN	g n	UM	BEI	R N Page	R-1	06 0F 1
		TC					Dom	any Count		avalar	mont	Cite /		2)	
				P 15 60036 100				Ardon Hills		evelop	ment	Sile (ICAA	-)	
	DATE			E/24/15					, IVIIN			E 017	E "6	1/0" :	
				COMPLETED	GROUNI			939.00 IL				-E 312	E 0	1/2 10	icnes
					GROUNL										
					AI			LING M	io grou	unawa	ter ob	served	1.		
	LOGG		r					ING							
	NOTE	5 _ <u>E</u> E	ev. at s		AF		LLING		1	1	1				
	o DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
PJ .			0.8	TOPSOIL (10 Inches) CLAYEY SAND, (SC) light brown and dark brown, fine	939.0	SS 1	67	1-2-4 (6)	-						
ES CORRIDOR.G			2.0	grained, moist, loose CLAYEY SAND, (SC) brown, fine grained, moist, very loose	937.9	SS 2	22	1-1-1 (2)	-						
URAL RESOURC	5					SS 3	22	1-1-1 (2)							
REPORTS/GINT/NR- NAT			95		930 4	SH 4									
4G/ENGINEERING I				LEAN CLAY WITH SAND, (CL) reddish brown to light brown, moist, rather stiff to stiff, trace gravel		SS 5	100	3-5-7 (12)							
6.100)/ENGINEERII						SS 6	100	4-5-5 (10)							
-S - GEO - (15.6093			17.0		000.0	SS 7	89	5-10-7 (17)	-						
CT ARDEN HILI			18.0	SANDY LEAN CLAY, (CL) reddish brown, moist, stiff, trace gravel	922.9		67	12-13-15 (28)							
P PROJE	20			grained, dry, medium dense, little medium to coarse					-						
STCA			21.0	grave	918 9	$\bigvee SS 9$	33	7-8-8 (16)							
01 ECH COLUMNS - GINI S ID US LAB MAY 2012 (GUI - 1729/16 14:26 - H:VI-PROJEC IS/2016 PROJEC				Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

(North 6160 Inver Telep	ern Technologie Carmen Avenue Grove Heights, phone: 651-389	es, Inc. e East MN 55076 -4191					BO	RIN	G N	UM	BEI	R N Page	R-1 (1 0	07 F 1
С		пс	arl Bola	ander and Sons.	Co.		PROJEC		Ram	sev County	v Re-D	evelor	oment	Site (ГСААР	2)	
P	ROJ	ECTN		R 15.60936.10	00		PROJEC	TLOCA		Arden Hills	5. MN	010.0		0.10			
		STAF	RTED	5/21/15	COMPLETE	D 5/21/15	GROUNI) ELEVA		933 09 ft	.,		но		E "6	1/2" in	ches
	RII I	ING		ACTOR NTI			GROUNI			1.5.				0		<u></u>	
				D 3 1/4 in H S	۵		ΔΤ			LUNG N		Indwa	ter ob	server			
			v	<u> </u>			AT		ווסח		NO GIO			301 100			
	OTE	9 EI		taked location													
			<u>ev. at s</u> VS 15 f	t S			Ai				1	1	1				
DEPTH	(ff)	GRAPHIC LOG		I	MATERIAL DES	CRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
-	_			CLAYEY SAN dry to moist, li (Fill)	D, (SC) brown, fi ttle gravel	ne to medium grained,		ss 1	44	3-5-9 (14)							
	_							SS 2	28	5-5-5 (10)	-						
	5		5.0	LEAN CLAY V stiff, trace grav	VITH SAND, (CL) vel) brown, moist, rather	928.1	SS 3	67	3-4-5 (9)	-						
	-		7.0	SILTY SAND, medium dense	(SM) light brown e to loose	, fine grained, moist,	926.1	SS 4	56	4-6-7 (13)							
	10 _							SS 5	67	4-4-2 (6)							
	-		12.0	LEAN CLAY V stiff, trace grav	VITH SAND, (CL) vel) brown, moist, rather	921.1	SS 6	100	3-5-6 (11)	-						
	-							SH 7	_								
	-		17.0	SANDY LEAN dry, stiff, iron o	I CLAY, (CL) redo oxide staining	lish brown and brown,	916.1	SS 8	100	8-12-16 (28)							
2	20		19.5	POORLY GRA	ADED SAND, (SF) light brown, medium	913.6	∬ ss	78	7-7-10	-						
			21.0	Borel	hole backfilled wit	h auger cuttings.	912.1	/ 9		(17)							

			North 6160 Inver Telep	ern Technologies Carmen Avenue B Grove Heights, M hone: 651-389-4	, Inc. East IN 55076 191					BO	RIN	g n	UM	BEI	R N Page	R-1	08 F 1
	CLIEN	NT Ca	arl Bola	nder and Sons, C	0.		PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	P)	
	PROJ		UMBE	R 15.60936.100			PROJEC			Arden Hills	s, MN						
	DATE	STAR		5/20/15	COMPLETE	D 5/20/15	GROUN	D ELEVA		915.92 ft			но	E SIZ	E "6	1/2" in	ches
	DRILL	ING C	ONTR/	ACTOR NTI			GROUN			LS:							
	DRILL	ING N	IETHO	D 3 1/4 in H.S.A			AT			LING N	lo grou	undwa	ter ob	servec	l.		
	LOGO	SED B	Y		CHECKED E	Y DAS	AT	END OF	DRILL	.ING							
	NOTE	S Ele	ev. at s	taked location.			AF	TER DRI	LLING								
f			/S 10 ft	<u> </u>				ш	\$:	. ·		ATT	ERBE	RG	
	o DEPTH (ft)	GRAPHIC LOG		M	ATERIAL DESC	CRIPTION		SAMPLE TYPI NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%	LIQUID		PLASTICITY INDEX	FINES
BPJ			0.5	TOPSOIL (6 Inc CLAYEY SAND, grained moist l	hes) , (SC) brown an oose, trace fine	d dark brown, fine	915.4	SS 1	56	1-2-4 (6)							
ES CORRIDOR.C			2.0	LEAN CLAY WI medium, trace fi	TH SAND, (CL)	gray and brown, mois organics	st,	SS 2	67	3-4-4 (8)							
JRAL RESOURCE	5		4.5	LEAN CLAY WI trace fine gravel	TH SAND, (CL) , iron oxide stai	gray, moist, medium, ning	911.4	SS 3	78	2-3-3 (6)							
SINT/NR- NATU			7.0	SANDY LEAN C	CLAY, (CL) gray	brown, moist, mediun	<u>908.9</u> n	∬ ss	78	3-3-5							
NG REPORTSW	 10				ice inte gravei,	ron oxide starning		4		(8)							
NG\ENGINEERI			12.0				903.9	5	100	3-5-7 (12)							
00)/ENGINEERI				SANDY LEAN C to medium, trace	CLAY, (CL) dark e fine gravel	gray, moist, rather sti	ff	SS 6	100	3-4-5 (9)							
EO - (15.60936.1	15							SS 7	78	2-3-4 (7)							
RDEN HILLS - G								X ss	100	3-3-5							
AP PROJECT A	20							× ×		(ŏ)	-						
ROJECTSNICA			21.5	Roreho	le backfilled wit	h auger cuttings	894.4	SH 9	67								
NTI GEOTECH COLUMNS - GINT SITD US LAB MAY 2012.GDT - 1/25/16 14:26 - H:VI-PROJECI IS/2015 PRI-				Boreho Bott	le backfilled wit	h auger cuttings. at 21.5 feet.											

			Northe 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, Mi hone: 651-389-41	Inc. East N 55076 191					BO	RIN	g n	UM	BEI	R N Page	R-1 (09 F 1
	CLIEN	NT C	arl Bola	nder and Sons, Co	Э.		PROJEC	T NAME	Ram	sev Count	v Re-D	evelor	oment	Site (ГСААР))	
	PROJ		UMBER	R 15.60936.100			PROJEC		TION	Arden Hills	s, MN				-	/	
	DATE			5/19/15	COMPLETED) _5/19/15	GROUNI	D ELEVA		916.84 ft			HOL	E SIZ	E_"6	1/2" in	ches
	DRILI	LING C	CONTR/	ACTOR NTI	-		GROUNI			LS:							
	DRILL		NETHOD	D _3 1/4 in H.S.A			АТ	TIME O	F DRILI	LING N	No grou	undwa	ter ob	served	۱.		
	LOGO	GED B	Υ		CHECKED B	Y DAS	AT	END OF		ING							
	NOTE	S E	ev. at st	taked location.			AF	TER DR	ILLING								
		U						R	۲ %	s û	EN.	WT.	R (%)	ATT	ERBE	RG	
	DEPTH (ft)	GRAPHI LOG		MA	ATERIAL DESC	RIPTION		SAMPLE T NUMBE	RECOVER (RQD)	BLOW COUNT (N VALU	POCKET F (tsf)	DRY UNIT (pcf)	MOISTUR	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES
			0.7	TOPSOIL (8 Incl LEAN CLAY WIT	nes) FH SAND, (CL)	brown, moist, medium	916.2	ss 1	56	2-3-3 (6)							
ACES CORRIDOR.GF			2.0	SILTY SAND, (S moist, medium d trace lenses of s	M) light brown, ense to very loo ilt	fine to coarse grained ose, trace fine gravel,	914.8 I,	SS 2	67	2-4-5 (9)	-						
UKAL RESOUR			5.5 6.0	PEAT, (Pt) black	, moist, soft		<u>911.3</u> 910.8	SS 3	44	2-2-2 (4)							
NGIN INR- NAI				LEAN CLAY WIT medium, trace fir	FH SAND, (CL) ne to medium g	brown and gray, mois ravel	t,	SS 4	100	3-3-3							
										2-3-5	-						
NG/ENGINEEH			12.0				904.8	5	100	(8)	-						
(UU)/ENGINEEK				SANDY LEAN C fine to medium g	LAY, (CL) gray, ravel	moist, rather stiff, trad	ce	SS 6	100	3-5-5 (10)							
EU - (15.60936.	15							SH 7	-								
KUEN HILLS - G			17.0	LEAN CLAY WIT	TH SAND, (CL)	dark gray, moist, rathe	899.8 er	ss	100	4-5-6							
IN PROJECT AF	20			stin, trace line to	medium graver			8		(11)	-						
I SVI CA			21.0				895.8	9	100	5-5-5 (10)							
				Borehol Botte	e backfilled with om of borehole	n auger cuttings. at 21.0 feet.											
UN1-PHO																	
9L/GZ/L - 1/15/21																	
JS LAB MAY 20.																	
NI GEO																	

			Norther 6160 C Inver G	rn Technologies, Carmen Avenue E Grove Heights, MN	Inc. ast \ 55076					BOI	RIN	g n	UM	BE	R N PAGE	R-1 ¹ 1 0	10 F 1
			i elepn	one: 651-389-41	91				_								
	CLIE	NT <u>C</u>	arl Bolan	der and Sons, Co).		PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (ICAAF)	
	PRO		NUMBER	15.60936.100			PROJEC			Arden Hills	5, MN						
	DATE	STAF	RTED <u>5/</u>	19/15	COMPLETED _	5/19/15	GROUNI) ELEVA	TION _	919.86 ft			HO	LE SIZ	E <u>"6</u>	1/2" in	<u>ches</u>
	DRILI	LING	CONTRA	CTOR NTI) WATER	RLEVE	LS:							
	DRILI	LING	NETHOD	3 1/4 in H.S.A			⊥¥ AT	TIME OF	⁻ DRILI	LING <u>19.5</u>	50 ft / E	Elev 90	00.36	ft			
	LOGO	GED B	Υ		CHECKED BY	DAS	AT	END OF	DRILL	.ING							
	NOTE	EI	ev. at sta <u>(S 20 ft N</u>	ked location.			AF	TER DRI	LLING		1	1					
	РТН ft)	PHIC DG		МА	TERIAL DESCRI	IPTION		.E TYPE ABER	/ERY % QD)	OW JNTS ALUE)	ET PEN. sf)	NIT WT. cf)	TURE ENT (%)			RG ∑ ∠⊥∵×	NES
	o de (GRA						SAMPL	RECO' (R	COL (N COL	POCKI (t	DRY U (p	MOIS	LIMI LIQUI	PLAS1 LIMI	PLASTI0 INDE	UL L
LHi			0.5	TOPSOIL (6 Inch SILTY SAND, (SI moist_some gray	es) M) brown, fine to rel	medium grained,	919.4	SS 1	67	2-3-3 (6)							
יידא הטאאום איני				(Fill)	-			SS 2	78	5-7-8 (15)							
I UKAL KESUUK								SS 3	100	5-6-7 (13)							
SVGIN IVNK- NA			7.0	PEAT, (Pt) black,	moist, soft		912.9	SH									
NG REPORT	 10		9.5			av brown moist so	910.4	4	-	110							
NG/ENGINEEKI				to medium, trace	gravel	ay brown, moist, so	it.	5	100	(3)							
								SS 6	100	2-3-4 (7)							
05800-015-0150	_ 15							SS 7	100	3-3-4 (7)							
AKDEN HILLS -			17.5	LEAN CLAY WIT	H SAND, (CL) gr	ay, moist to wet,	902.4	SS 8	100	4-5-6 (11)							
AF FRUIEU I	 20		Ţ	rather stiff, trace	gravel					2-4-5							
JEC ISILOW			21.0	Borehole	e backfilled with a	auger cuttings.	898.9	9	22	(9)							
JOLUMNS - GINI S ID US LAB MAY 2012.GDI - 1/23/16 14:26 - H/1-PROJECTS/2015 PROJ				Botto	m of borehole at	21.0 feet.											
NII GEOLEC																	

			Nort 6160 Inve Tele	thern Technologies, Inc. 0 Carmen Avenue East r Grove Heights, MN 55076 ephone: 651-389-4191				BO	RIN	g n	UM	BE	R N Page	R-1 ′ 1 0	11 F 1
	CLIE	NT C	arl Bol	lander and Sons, Co.	PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	P)	
	PROJ		UMB	ER 15.60936.100	PROJEC			Arden Hills	s, MN						
	DATE	STAF	RTED	5/19/15 COMPLETED 5/19/15	GROUN) ELEVA		918.95 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	ches
	DRILI	LING C	ONT	RACTOR NTI	GROUN	WATER	LEVE	LS:							
	DRILI		/ETHO	DD <u>3 1/4 in H.S.A</u>	AT	TIME OF	DRIL	LING N	lo grou	undwa	ter ob	served	1		
	LOGO	GED B	Y	CHECKED BY DAS	AT	END OF	DRILL	.ING							
	NOTE	S El	ev. at	staked location.	AF	ter dri	LLING								
	DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		AMPLE TYPE NUMBER	ECOVERY % (RQD)	BLOW COUNTS (N VALUE)	OCKET PEN. (tsf)	RY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	LASTIC LIMIT	ASTICITY DEX	FINES
	0	1.3.14. 3	0.7		040.0	ν Λ	Ľ				0		ш.	Ч	
2			0.7	CLAYEY SAND, (SC) brown and dark brown, fine	918.3	$\begin{pmatrix} SS \\ 1 \end{pmatrix}$	56	1-1-2 (3)							
S CORRIDOR.GF				grained, moist, trace fine to medium gravel (FILL)		SS 2	100	4-6-7 (13)							
JHAL RESOURCE	5		5.0	LEAN CLAY WITH SAND, (CL) gray, moist, rather sti	<u>914.0</u> f,	SS 3	100	4-5-6 (11)							
SIGIN I NH- NA I			7.0	LEAN CLAY WITH SAND, (CL) blue gray, moist, medium, trace fine gravel	912.0	SS 4	89	3-3-3 (6)							
E POR			9.5	NOTE [,] Silty sand (SM) seam at 8.0 feet	909 5	<u> </u>		. ,	1						
VENGINEEKING P	<u> 10 </u>		5.5	LEAN CLAY WITH SAND, (CL) gray and dark brown, moist, medium to stiff, trace fine to medium gravel, irc oxide staining	n	SS 5	67	3-3-4 (7)							
UU)/ENGINEEKIN(SS 6	100	3-4-4 (8)	-						
0EU - (15.00305.1	15					SS 7	100	2-4-4 (8)							
I AKUEN HILLS -						SS 8	33	6-8-8 (16)							
L FRUIEU	20														
			21.5	Porobolo backfilled with auger cuttings	897.5	SH 9	75								
				Bottom of borehole at 21.5 feet.											
1/25/16 14:26 H															
- MAY 2012.GUI -															
SINI S ID US LAB															
JI ECH COLUMNS - C															
NI GEC															

			North 6160 Inver Telep	ern Techn Carmen A Grove Hei bhone: 65	ologies, venue E ights, MN 1-389-41	Inc. ast I 55076 91						BO	RIN	g n	UM	BEI	R N Page	R-1 ′ ≞ 1 0	12 F 1
	CLIEN	NT Ca	arl Bola	inder and S	Sons, Co).			PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	>)	
	PROJ		UMBE	R <u>15.609</u>	36.100				PROJEC	T LOCA		Arden Hills	s, MN						
	DATE	STAF	RTED	5/19/15		COMPLE	TED <u>5/19/15</u>	5	GROUND) ELEVA		923.3 ft			HOL	E SIZ	E <u>"6</u>	1/2" in	ches
	DRILL	ING C	ONTR/		ITI				GROUND	WATER	R LEVE	LS:							
	DRILL	ING N	IETHO	D <u>3 1/4 ir</u>	n H.S.A				AT	TIME OF	DRIL	LING N	lo grou	undwa	ter ob	served	l.		
	LOGO	GED B	Y			CHECKE	DAS		AT	END OF	DRILL	.ING							
	NOTE	S El	ev. at s	taked loca	tion.				AF	ter Dri	LLING								
	н	SH C								TYPE ER	RY %))	v TS UE)	PEN.	T WT.	JRE T (%)	AT1		RG }	S
	DEPT (ft)	GRAPI LOG			MA	TERIAL DI	ESCRIPTION			SAMPLE NUMB	RECOVE (RQE	BLOV COUN (N VAL	POCKET (tsf)	DRY UNI (pcf)	MOISTU	LIQUID	PLASTIC LIMIT	PLASTICIT INDEX	FINE
	0	<u></u>	0.6	TOPSOI	L (7 inch	es)			922.7	∕∕ ss	79	1-1-3						-	
DOR.GPJ				SILTY S medium	AND, (SI dense, tr	M) brown, f ace clay	fine grained, n	noist, loose t	0	1	10	(4)							
JRCES CORRI			4.0	NOTE: S	and sea	m (SP) at	2.0 feet.	tan moist	919.3	2	100	(10)	-						
ATURAL RESOL				rather sti	ff, trace	gravel, iron	n oxide staining	g		SH 3	83								
TS/GINT/NR- N										SS 4	100	3-4-5 (9)							
3 REPOR			9.5						913.8										
S/ENGINEERING	<u>10</u>			LEAN CI rather sti	_AY WIT ff, trace	H SAND, (fine to coar	CL) light brow rse gravel	n, moist,		SS 5	100	4-5-6 (11)							
)/ENGINEERING										SS 6	100	3-4-6 (10)							
60936.100			14.5					n maiat	908.8										
LS - GEO - (15.				rather sti	ff, trace	fine to coar	rse gravel	n, moist,		7	100	4-6-8 (14)	-						
ECT ARDEN HIL											100	3-5-7 (12)							
S/TCAAP PROJ	20		21.0						902.3	SS 9	100	3-5-7 (12)							
PROJECT		<u> </u>			Borehole	e backfilled	l with auger cu	ittings. et.	002.0	- 1									
TS\2015																			
PROJEC																			
6 - H:/1-I																			
5/16 14:2																			
DT - 1/2																			
Y 2012.G																			
AB MAY																			
STDUS																			
- GINT																			
SNMULC																			
TECH CC																			
NTI GEO																			

			Northe 6160 (Inver (Teleph	ern Technologies, Carmen Avenue E Grove Heights, MN none: 651-389-41	Inc. ast I 55076 91					BO	RIN	G N	UM	BEI	R N Page	R-1 ′ 1 0	13 F 1
	CLIE	NT C	arl Bolar	nder and Sons. Co	ı.		PROJEC	T NAME	Ram	sev Count	v Re-D	evelor	ment	Site (1	ГСААР	P)	
	PRO.		NUMBER	R 15.60936.100			PROJEC		TION	Arden Hills	s, MN	•					
	DATE		RTED 5	5/21/15	COMPLETED 5/2	1/15	GROUNI) ELEVA		900.69 ft			HOL	E SIZ	E "6	1/2" in	ches
	DRIL			CTOR NTI			GROUNI) WATEF		LS:							
	DRIL		METHOD	3 1/4 in H.S.A			$\overline{\Delta}$ at		F DRILI	LING 7.00) ft / El	ev 893	3.69 ft				
	LOG	GED B	Y		CHECKED BY DA	S	AT		DRILL	.ING							
	NOTE	ES EI	ev. at sta	aked location.			AF	TER DRI	LLING								
		U						КРЕ	× %	s (i	EN.	WT.	R (%)	ATT I		RG	
	o DEPTH (ft)	GRAPHI LOG		MA	TERIAL DESCRIPTIO	ON		SAMPLE T NUMBE	RECOVER (RQD)	BLOW COUNT (N VALU	POCKET F (tsf)	DRY UNIT (pcf)	MOISTUR	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES
GPJ.			2.0	POORLY GRADE fine to medium gr (Fill)	ED SAND WITH SILT rained, moist, trace cl	, (SP-SM) browr ay	n, 898.7	ss 1	44	3-3-2 (5)							
ES CORRIDOR.				SILTY SAND, (SI gravel, trace orga (Fill)	M) dark gray, fine gra inics	ined, moist, trac	e	ss 2	67	4-4-3 (7)							
JHAL RESOURC	5		4.5	LEAN CLAY WIT medium, trace fin	H SAND, (CL) gray, r e to coarse gravel	noist to wet,	896.2	SS 3	56	3-4-4 (8)	-						
GIN I/NK- NATI			7.0 🗸	LEAN CLAY WIT	H SAND, (CL) brown	, wet, rather stiff	893.7 ,	ss (78	4-5-5	_						
ING REPORTS					un graver			4		(10)	-						
KING/ENGINEEP			12.0				888.7	SH 5									
5.100)/ENGINEEF				LEAN CLAY WIT medium, trace fin	H SAND, (CL) gray, v e to medium gravel	wet, rather stiff to	C		44	3-5-4 (9)	-						
GEU - (15.60936								SS 7	100	4-3-3 (6)	-						
AKUEN HILLS -								SS 8	100	3-3-4 (7)	_						
CAAP PRUJEU I								∬ ss	89	2-3-5	-						
115 PRUJECION		<u> </u>	21.0	Borehole Botto	e backfilled with auge om of borehole at 21.0	r cuttings.) feet.	879.7	V		(8)	1						
-PROJECTS/20																	
VILI - 07:41 01 /07																	
VY 2012.GUI - 1/																	
AID US LAB MP																	
TUNINS - GINI :																	

			North 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, MI bhone: 651-389-41	Inc. ast N 55076 91					BO	RIN	G N	UM	BEI	R N Page	R-1 ′ ± 1 0	14 F 1
	CLIE	NT _C	arl Bola	nder and Sons, Co	D.		PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (FCAAF)	
	PRO		NUMBE	R 15.60936.100			_ PROJEC			Arden Hills	s, MN						
	DATE	STAF	RTED _	5/19/15	COMPLETED	5/19/15	GROUNE	ELEVA		921.66 ft			но	E SIZ	E _"6	1/2" in	ches
	DRIL		CONTR	ACTOR NTI			GROUNE	WATER	R LEVE	LS:							
	DRIL		ИЕТНО	D 3 1/4 in H.S.A			AT		DRIL	LING N	lo grou	undwa	ter ob	served			
	LOGO	GED B	Υ		CHECKED B	/ DAS	AT	END OF	DRILL	.ING							
	NOTE	IS _EI	ev. at s	taked location.			AF	ter dri	LLING								
		<u>ں</u>						7PE ER	۲ %)	's JE)	DEN.	. WT.	RE 「(%)	ATT	ERBE	RG } ≻	(0
	o DEPTI (ft)	GRAPH LOG		MA	ATERIAL DESC	RIPTION		SAMPLE 7 NUMBE	RECOVEF (RQD)	BLOW COUNT (N VALL	POCKET (tsf)	DRY UNIT (pcf)	MOISTU	LIQUID	PLASTIC LIMIT	PLASTICIT INDEX	FINES
L-			0.8	TOPSOIL (10 inc CLAYEY SAND,	ches) (SC) brown, fin	e to medium grained	920.8	SS 1	78	3-3-3 (6)							
ES CORRIDOR.G			4 0	ary (Fill)			917 7	SS 2	100	7-9-12 (21)							
JRAL RESOURCE	5			LEAN CLAY WIT medium, trace fir	TH SAND, (CL) the to medium gr	ight brown, dry, avel			78	2-3-4 (7)							
NR- NATL			7.0				914.7										
EPORTS/GINT/				SANDY LEAN C rather stiff, trace staining	LAY, (CL) browi fine to medium	n, moist, medium to gravel, iron oxide		$\begin{pmatrix} ss \\ 4 \end{pmatrix}$	89	2-3-5 (8)							
ENGINEERING R								SS 5	100	2-3-5 (8)							
.100)/ENGINEERING/								SH 6	_								
GEO - (15.6093								SS 7	100	3-5-7 (12)							
ARDEN HILLS -									100	2-4-7 (11)							
ROJECT			19.5				902.2	/ 1 -		()	-						
ECTS/TCAAP F	_ 20		21.0	SANDY LEAN C stiff, trace fine to	LAY, (CL) gray medium gravel	brown, moist, rather	900.7	SS 9	100	3-5-9 (14)							
VIII GEOTECH COLUMNS - GINT STD US LAB MAY 2012; GDT - 1/25/16 14:26 - H:/1-PROJECTS/2015 PROJEC				Borehol Botto	e backfilled with om of borehole a	auger cuttings. at 21.0 feet.											

			Northe 6160 (nver (Teleph	ern Technologies Carmen Avenue I Grove Heights, M none: 651-389-4	, Inc. East N 55076 191					BO	RIN	G N	UM	BE	R N Page	R-1 ′ ≞ 1 0	15 F 1
	CLIE	NT Carl	Bolar	nder and Sons, C	0.		_ PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (TCAAI	^{>})	
F	PRO	JECT NU	MBER	R <u>15.60936.100</u>			PROJEC			Arden Hills	s, MN						
	DATE	START	ED _5	/19/15		5/19/15	GROUNI) ELEVA		912.97 ft			но	E SIZ	E_"6	1/2" in	ches
	DRIL	LING CO	NTRA				GROUNI	WATER	R LEVE	LS:							
	DRIL	LING ME	тнор	3 1/4 in H.S.A			AT		F DRILI	LING N	No grou	undwa	ter ob	served	I.		
L	OGG	GED BY			CHECKED B	C DAS	AT	END OF	DRILL	.ING							
	NOTE	ES Elev	. at sta	aked location.			AF	TER DRI	LLING								
	o DEPTH (ft)	GRAPHIC LOG		M	ATERIAL DESC	RIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
-			3_7_	TOPSOIL (3 incl POORLY GRAD	hes))ED SAND, (SP)	brown, fine to medi		SS 1	56	1-2-3 (5)							
RCES CORRIDOR.GI	-	3.	0	(Fill) POORLY GRAD	ED SAND WITH grained, moist, tr	I SILT, (SP-SM) bro ace gravel	<u>910.0</u> wn,	SS 2	78	7-4-4 (8)							
- NATURAL RESOUR	5		L	LEAN CLAY WI to rather stiff, tra	TH SAND, (CL) I ace gravel	brown, moist, mediu] m	SS 3	89	3-4-5 (9)							
	-	9.	5				903.5	SH 4									
	10			LEAN CLAY WI trace gravel	TH SAND, (CL)	gray, moist, rather st	iff,	SS 5	89	3-4-5 (9)							
936.100)/ENGINEER	-			NOTE: Sand sea	am (SP) at 12.5	feet.		SS 6	100	3-5-7 (12)							
ILLS - GEO - (15.60	15							SS 7	100	3-5-7 (12)							
ROJECT ARDEN H	-								100	3-5-7 (12)							
CTS/TCAAP P	20	2	1.0				892.0	SS 9	100	4-6-9 (15)							
I GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/28/16 14:26 - H:11-PROJECTISE015 PRO.				Bott	om of borehole a	at 21.0 feet.											

GLENT Call Bolander and Sons. Co. PROJECT NAME Ramsey County Re-Development Site (TCAAP) PROJECT NUMER 15.0000 COMPLETED_\$1915 PROJECT LOCATION Arden Hills. MN Date 51ATED 31945 COMPLETED_\$1915 PROJECT LOCATION Arden Hills. MN DRELING CONTRACTOR, INIT PROJECT LOCATION 91144 H HOLE SIZE "5.12" In DRELING METHOD 3144 m H.SA AT TIME OF DRILING				Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	g n	UM	BE	R N Page	R-1 ¹ ∃ 1 0	16 ೯ 1
PROJECT NUMBER 15.00020.100 PROJECT NUMBER Moden Hills, MM DATE STARTED S1915 GROUND ELVATION J1.44 ft MOLE SIZE 5.1/2 ht DRILLING OMTRACTOR, JTL GROUND WATER LEVELS: GROUND WATER LEVELS: MOLE SIZE S1/2 ht DRILLING OMTRACTOR, JTL OHECKED BY DAS AT TIME OF DRILLING — MOLE SIZE S1/2 ht NOTES Elev, at stated location. OHECKED BY DAS AT TIME OF DRILLING — — MATERIAL DESCRIPTION USEN 000 group USEN 000 group USEN 000 group USEN 000 group No aroundwater observed. ATEM 000 group MATERIAL DESCRIPTION USEN 000 group USEN 000 group USEN 000 group No aroundwater observed. LEAN CLAY WITH SAND, (CL) most, medium, trace 901 dr SS 100 32-3 group SS 30 30-57 group SS 100 32-3 group SS 100 32-57 group 10 LEAN CLAY WITH SAND, (CL) most, rather stiff, trace SS 100 3-57 group SS 100 45-67 group SS 100 45-67 group 10 LEAN CLAY WITH SAND, (CL) most, rather stiff, trace SS 100 45-67 group SS 100 45-67 group SS 100 45-67 group 11 LEAN CLAY WITH SAND, (CL) most, rather stiff, trace SS 100 45-67 group SS 100 45-67 group SS 100 45-67 group 15 LEAN CLAY WITH SAND, (CL) most, rather		CLIEN	NT Car	rl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF)	
DATE STARTED 511015 COMPLETED 511015 GROUND ELEVATION 91144 ft HOLE SIZE '5.112' is ORLING CONTRACTOR NTI GROUND ATTER LEVELS: ATTIME OF DRILLING		PROJ	IECT NU	JMBER 15.60936.100	PROJEC	T LOCA		Arden Hills	, MN						
DRILLING CONTRACTOR, NTL GROUND WATER LEVELS: ATTIME OF DRILLING		DATE	STAR	COMPLETED 5/19/15	GROUN) ELEVA		911.44 ft			HO	LE SIZ	E <u>"6</u>	<u>1/2" in</u>	ches
DRILING METHOD 31 (In IH 5, A		DRILL		DNTRACTOR NTI	GROUN	WATER	LEVE	LS:							
LOGGED BY		DRILL	LING ME	ETHOD _3 1/4 in H.S.A	AT	TIME OF		LING N	lo grou	undwa	ter ob	served	1.		
NOTES Elev. at staked location. AFTER DRILLING		LOGO	GED BY	CHECKED BY _DAS	AT	END OF	DRILL	_ING							
Ling Material Description Material Description		NOTE	S Elev	v. at staked location.	AF	ter Dri	LLING								
0.1 TOPSOL(11(nt)) 911.4 \$\$ \$\$ 78 2.2.2 1 1 1 1 1 1 2.0 gravel, sand lense 90.4 \$\$\$ 100 3.2.3 1 LEAN CLAY WITH SAND, (CL) moist, medium, trace 90.4 \$\$\$\$ 100 3.2.3 1 1 1 \$\$\$ \$\$\$ 10 \$\$\$\$ 1 1 1 \$\$\$ \$\$\$ 10 \$\$\$\$ 1 1 \$\$\$ \$\$\$ 10 \$\$\$\$ \$\$\$\$ 1 1 \$\$\$ \$\$\$\$ 10 \$\$\$\$\$ \$\$\$\$ 1 1 \$\$\$ \$\$\$\$ 10 \$\$\$\$\$ \$\$\$\$ 1 1 \$\$\$ \$\$\$\$ 10 \$\$\$\$\$ \$\$\$\$ 1 1 \$\$\$\$ \$\$\$\$ 10 \$\$\$\$\$ \$\$\$\$ 1 \$\$\$\$ \$\$\$\$\$ 10 \$\$\$\$\$ \$\$\$\$ 10 1 1 \$\$\$\$\$ \$\$\$\$\$ \$\$\$\$\$ \$\$\$\$\$\$\$\$		o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
2.0 gravel, sand lense 99.94 SS 100 3.2-3 gravel SS 89 2.2.3 SS 89 2.2.3 90.19 SS 3.3-6-7 SS 3.3-6-7 SS 3.3-6-7 10 LEAN CLAY WITH SAND, (CL) moist, rather stiff to SS 3.3-6-7 SS 3.9-9-9 15 LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace SS 3.3-5-7 SS 3.0-7 15 LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace SS 100 3.5-7 14.5 LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace SS 100 3.5-7 20 21.0 Borehole backfilled with auger cuttings. SS 100 3.5-7 21.0 Borehole backfilled with auger cuttings. SS 100 3.5-7 Bottom of borehole at 21.0 feet. SS 100 3.5-7	5			0.1 TOPSOIL (1 Inch) LEAN CLAY WITH SAND, (CL) brown, moist, soft, tra	911.4 Ice	SS 1	78	2-2-2 (4)							
5 019 SS 89 2:2.3 019 SS 389 2:0 SS 14.5 14.5 14.5 14.5 LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace 14.5 14.5 14.5 LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace 14.5 14.5 15 019 SS 33 0-9.9 14.5 LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace 15 16 14.5 LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace 16 17 15 00 3.5.7 100 3.5.7 14.5 LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace 17 10 20 SS 100 4.6.8 10 21.0 Borehole backfilled with auger cuttings. 10 10 21.0 Borehole backfilled with auger cuttings. 10 10 10 SS 100 3.5.7 100 10 SS 100 3.5.7 100 21.0 Borehole backfilled with auger cuttings. 10 10 10 SS	S CORRIDOR.GF			LEAN CLAY WITH SAND, (CL) moist, medium, trace gravel	909.4	SS 2	100	3-2-3 (5)	-						
10 0.5 9019 S 33 3-5-7 14.5 S 53 3 1(2) 14.5 S 53 1(2) 14.5 S 53 1(2) 14.5 S 53 1(2) 14.5 S 53 1(2) 14.5 S 100 1(2) 15 S 100 4-6-8 16 S 100 4-6-8 17 S 100 4-6-8 180 S 100 1(1) 21.0 Borehole backfilled with auger cuttings. S00.4 S 180 S 100 1(2) 10 S 100	RAL RESOURCE	5				SS 3	89	2-2-3 (5)	-						
10 915 901.9 901.9 11 Stiff, trace gravel SS 33 3.5-7 12 SS 33 9.9-9 9 15 LEAN CLAY WITH SAND, (CL) moist, rather stiff to gravel SS 33 9.9-9 14.5 LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace SS 100 3.5-7 15 LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace SS 100 3.5-7 14.5 Borehole backfilled with auger cuttings. SS 100 3.5-7 20 Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet. 100 12)	DRTS/GINT/NR- NATU					SH 4	-								
15 14.5 SS 33 9-9-9 15 LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace SS 100 121 20 SS 100 4-6-8 21.0 Borehole backfilled with auger cuttings. Borehole backfilled with auger cuttings.	NGINEERING REP	 _ 10 _		D.5 LEAN CLAY WITH SAND, (CL) moist, rather stiff to stiff, trace gravel	901.9	SS 5	33	3-5-7 (12)	-						
15 14.5 LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace SS 100 3-5-7 10 SS 100 4-6-8 10 SS 100 4-6-8 10 SS 100 3-5-7 11 SS 100 3-5-7 12 SS 100 3-5-7 13 SS 100 3-5-7 14 SS 100 3-5-7 15 SS 100 3-5-7 16 SS 100 3-5-7 17 SS 100 3-5-7 18 SS 100 3-5-7 19 SS 100<	100)/ENGINEERING/EI					SS 6	33	9-9-9 (18)	-						
Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	S - GEO - (15.60936.	<u> 15 </u>		LEAN CLAY WITH SAND, (CL) moist, rather stiff, trac gravel	896.9 ce	SS 7	100	3-5-7 (12)	-						
20 21.0 Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	JECT ARDEN HILL					SS 8	100	4-6-8 (14)	-						
Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	S\TCAAP PRO	20		21.0	890 /	SS 9	100	3-5-7 (12)							
	2015 PROJECT		17/////	Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	030.4	<u>v N</u> -			1	1	1	1	1		
	1-PROJECTS														
	/25/16 14:26 - H														
	MAY 2012.GDT - '														
	INT STD US LAB														
	I GEOTECH COLUMNS - G														

			Northe 6160 Inver Telepl	ern Technologies, l Carmen Avenue Ea Grove Heights, MN hone: 651-389-419	nc. ast I 55076 91					BO	RIN	G N	UM	BEI	R N Page	R-1' 1 0	17 F 1
	CLIEN		arl Rolai	nder and Sons Co		P			Ram	sev County	/ Re-D	evelor	ment	Site (2)	
	PROJ			R 15 60936 100		r P				Arden Hills	MN	evelop	ment)	
		STAF		5/19/15		/19/15 G				008 70 ft	, 1011		ноі	F SIZ	F "6	 1/2" in	ches
						<u>13/13</u> G				<u> </u>					L _ 0	1/2 11	CIICS
						G				LO.	۲0 fi / r		06 70	F4			
				<u>3 1/4 III H.S.A</u>			-≚ AI				JU II / I		90.79	11			
	LUGG		• T			<u>JA5</u>				ING							
	NOTE	:5 <u>EI</u>	ev. at st	aked location.			AF				1	1					
	EPTH (ft)	APHIC OG		MA	TERIAL DESCRIP	TION		LE TYPE MBER	VERY % (QD)	-OW UNTS 'ALUE)	ET PEN. tsf)	JNIT WT. pcf)	STURE ENT (%)				NES
	0	GR						SAMP	RECO (F		POCK	DRY (CONT	LIQL	PLAS LIM	PLAST INDE	Ē
CHJ.			2.0	POORLY GRADE grained, moist, tra (Fill)	D SAND, (SP) bro ace gravel	wn, fine to medium	906.8	SS 1	56	2-3-3 (6)							
ICES CORRIDOR				SILTY SAND, (SM dense, trace grav	И) brown, fine grair el	ned, moist, medium	004.3	SS 2	67	3-6-6 (12)	-						
ALUKAL KESOUF			4.5	SILTY LEAN CLA stiff, trace gravel	Y, (CL-ML) tan and	d gray, moist, rather	904.3	SS 3	83	4-7-6 (13)	-						
KI S/GIN I /NK- N			7.0	LEAN CLAY WIT	H SAND, (CL) brov	vn, moist to wet,	901.8	SS 4	100	4-6-6 (12)	_						
ENGINEEKING KEPU	 _ <u>10</u>							SH 5	-								
V)/ENGINEEKING/			12.0 _	SILTY SAND, (SM medium dense	И) gray, fine graine	d, saturated,	896.8	SS 6	100	3-5-6 (11)	_						
0 - (15:60936.10	_ 15		14.5	CLAYEY SAND, (saturated, loose	(SC) gray, fine to m	nedium grained,	894.3	SS 7	0	3-3-4 (7)	-						
EN HILLS - GE				NOTE: No recove cuttings.	ry at 17.0 feet. Sa	mpled auger											
PRUJECI ARL			19.5				889.3	8									
EU Ion UANT	20		21.0	LEAN CLAY WIT stiff, trace gravel	H SAND, (CL) dark	gray, wet, rather	887.8	SS 9	100	5-4-6 (10)							
I GEOLECH COLUMNS - GINLS ID US LAB MAY 2012 GDI - 1/29/16 14:26 - H:/1-PROJECTS/2015 PROC				Botto	m of borehole at 2	1.0 feet.											

		Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	G N	UM	BE	R N PAGE	R-1 1 0	18 F 1
CLIE	NT C	arl Bolander and Sons. Co.	PROJEC	T NAME	Ram	sev Countv	/ Re-D	evelor	oment	Site (ГСААР	P)	
PRO.		NUMBER 15.60936.100	PROJEC	T LOCA		Arden Hills	, MN			0.10 (/	
DATE		RTED 5/28/15 COMPLETED 5/28/15	GROUNE	ELEVA		0 ft	,		НО	LE SIZ	E "6	1/2" in	ches
DRIL		CONTRACTOR NTI	GROUNE	WATER		LS:			-				
DRIL		METHOD 3 1/4 in H.S.A	$\overline{\Delta}$ at	TIME OF	DRIL	LING 2.00) ft / El	ev -2.0	00 ft				
LOG	GED B	Y CHECKED BY DAS	АТ	END OF	DRILL	.ING							
NOTE	ES EI	ev. not provided.	AF	TER DRI	LLING								
	B(pring not staked. Estimated location from drawing.								AT	FERBE	RG	
0 DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT			FINES
	<u> </u>	0.8 TOPSOIL (10 inches)	-0.8		67	1-1-1							
		SIL I Y SAND, (SM) brown, fine to medium grained, 2.0∇ saturated, very loose, trace gravel	-2.0			(2)							
		PEAT, (Pt) black and dark gray, saturated, soft		ss 2	78	2-2-2 (4)							
5		A.6 SILTY SAND, (SM) brown, fine grained, saturated, medium dense, trace fine to medium gravel	4.6	SS 3	67	2-6-5 (11)	-						
		CLAYEY SAND, (SC) dark gray, fine grained, saturate medium dense, trace fine gravel, trace roots	ed,	SS 4	28	6-7-5 (12)	-						
10		LEAN CLAY WITH SAND, (CL) brown and gray, wet, rather stiff, trace gravel	9.0	SS 5	100	4-6-7 (13)	-						
				SS 6	100	3-5-5 (10)	-						
15			(= 0	SH 7									
		SILTY LEAN CLAY, (CL-ML) gray, wet, rather stiff, trace fine gravel	-17.0	SS 8	100	4-4-5 (9)	-						
20		LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff,	-19.5	∕∕ ss	100	4-5-7	-						
		21.0 trace fine gravel	-21.0	9	100	(12)							
		Bottom of borehole at 21.0 feet.											

			Northern Technologies 6160 Carmen Avenue Inver Grove Heights, M Telephone: 651-389-4	s, Inc. East 1N 55076 191					BO	RIN	G N	UM	BE	R N Page	R-1 ′ ∃ 1 0	19 F 1
	CLIEN	NT Ca	arl Bolander and Sons, C	Со.		PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	^{>})	
	PROJ		NUMBER			PROJEC	T LOCA		Arden Hills	, MN						
	DATE	STAR	RTED 6/23/15	_ COMPLETED	6/23/15	GROUNE	ELEVA	TION _	0 ft			HOI	LE SIZ	E <u>"6</u>	1/2" in	ches
	DRILL	ING C	CONTRACTOR NTI			GROUNE	WATER	R LEVE	LS:							
	DRILL	ING N	IETHOD 3 1/4 in H.S.A			$ar{2}$ at	TIME OF	DRILI	_ING _2.60) ft / El	lev -2.0	60 ft				
	LOGO	ED B	Y <u>BH</u>	CHECKED BY	DAS	AT	END OF	DRILL	ING							
	NOTE	S Ele	ev. not provided.			AF	ter dri	LLING								
	т	U U H U H U	oring not staked. Estima	ted location from c	Irawing.		TYPE ER	RY %)	v JE)	PEN.	г wт.	JRE T (%)	AT	rerbe Limits	RG } ≻	S
	o DEPT (ft)	GRAPH	M	ATERIAL DESCR	IPTION		SAMPLE	RECOVE (RQE	BLOV COUN (N VALI	POCKET (tsf)	DRY UNI (pcf)	MOISTUC	LIQUID	PLASTIC LIMIT	PLASTICIT INDEX	EINE
			0.3 <u>TOPSOIL (4 Inc</u> CLAYEY SAND	ches) , (SC) brown to da	irk brown, fine	3	SS 1	33	0-1-2 (3)							
ORRIDOR.GF			iron oxide staini	very loose, trace g ng, trace roots of Hammer at Sarr	ravel, trace organics	s, <u>-2.0</u>	SS 2	100	3-5-5 (10)	-						
SOURCES C	5		POORLY GRAD brown, fine to m dense, trace gra	DED SAND WITH nedium grained, sa avel_iron oxide sta	SILT, (SP-SM) light turated, medium ining				4-6-6							
NATURAL RE			7.0	,		-7.0	3	100	(12)							
RTS/GINT/NR			SANDY LEAN (gravel	CLAY, (CL) gray, w	vet, medium, trace			100	3-3-4 (7)							
ERING REPO	10						SH									
RING/ENGINE							5	_								
00)/ENGINEEF							$\left \begin{array}{c} SS \\ 6 \end{array} \right $	100	1-3-3 (6)	1.0	_					
) - (15.60936.1	15						SS 7	100	1-3-3	_						
N HILLS - GEO							/ \ .		(0)	-						
ROJECT ARDE								100	1-3-3 (6)	0.8						
CTS/TCAAP P	20		24.5			01 E	X ss	100	1-3-3							
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:26 - H:/1-PROJECTS/2015 PROJEC		¥2//////	21.5 Boreho Bot	ole backfilled with a tom of borehole at	auger cuttings. 21.5 feet.	-21.5	/ 9		(6)							

(Northern Technologies 6160 Carmen Avenue Inver Grove Heights, M Telephone: 651-389-4	s, Inc. East MN 55076 4191					BO	RIN	G N	UM	BEI	R N Page	R-1 2 ∃ 1 0	20 F 1
c	LIE	NT Car	rl Bolander and Sons, (Co.		PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	FCAAF)	
P	RO	JECT NU	JMBER 15.60936.100)		PROJEC	T LOCA		Arden Hills	s, MN						
D	ATE	E START	ED <u>5/21/15</u>	COMPLETED 5/21	/15	GROUNE	ELEVA		885.05 ft			HOL	E SIZ	E _"6	1/2" in	ches
D	RIL	LING CO	ONTRACTOR NTI			GROUNE	WATEF	R LEVE	LS:							
D	RIL	LING ME	ETHOD <u>3 1/4 in H.S.</u>	A		AT		- DRILI	LING N	lo grou	undwa	ter ob	served	Ι.		
	OG	GED BY		CHECKED BY	8	AT	END OF	DRILL	ING							
N	ОТЕ	ES Elev	v. at staked location.			AF	ter dri	LLING								
ретн	(ff)	RAPHIC LOG	N	IATERIAL DESCRIPTIC	DN		PLE TYPE UMBER	OVERY % (RQD)	BLOW OUNTS VALUE)	:KET PEN. (tsf)	UNIT WT. (pcf)	JISTURE ITENT (%)				FINES
	0	0 V					SAM	REC	οz	POC	DRY	¥о		PLA	PLAS	
::GPJ			POORLY GRA grained, dry (Fill)	DED SAND, (SP) brown	, fine to medium	ו <u>883.6</u>	ss s	56	4-4-3 (7)							
ES CORRIDOR			SILTY SAND, ((Fill) 4.0	SM) brown, fine grained	, moist	881.1	SS 2	44	6-8-8 (16)							
JRAL RESOURC	5		SILTY SAND, (dense, little gra	SM) gray, fine grained, i ivel	moist, medium			78	4-6-4 (10)							
IR- NATU		7	7.0			878.1										
			CLAYEY SANE moist, medium), (SC) gray, fine to med dense	lium grained,		$\left \begin{array}{c} ss \\ 4 \end{array} \right $	78	4-4-5 (9)							
	10		0.5 LEAN CLAY W medium, trace	'ITH SAND, (CL) gray, m gravel	noist, soft to	875.6	SS 5	78	3-3-2 (5)	-						
							SS 6	100	2-3-2 (5)	-						
- GEO - (15.60936.1	<u>15</u>						SS 7	100	2-1-3 (4)	-						
ECT ARDEN HILLS							SS 8	100	3-3-4 (7)	-						
AP PROJ.	<u>20</u>						\ ee		2-2-3	-						
ECTSVTCA			21.0	ala kaalafii ah wiii	a	864.1	× 90	100	(5)							
GEOTECH COLUMNS - GINT S TD US LAB MAY 2012.GDT - 1/25/16 14:26 - H/1-PROJECTS/2015 PROJ			Bolein	ttom of borehole at 21.0	feet.											

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	G N	UM	BEI	R N Page	R-1 / 1 0	21 F 1
	CLIEN	NT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Rams	sey County	/ Re-D	evelop	ment	Site (TCAAF)	
	PROJ		IUMBER 15.60936.100	PROJEC			Arden Hills	, MN						
	DATE		COMPLETED <u>5/21/15</u>	GROUN	D ELEVA		884.12 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	ches
	DRILL			GROUN	O WATER	LEVE	LS:							
	DRILL		IETHOD 3 1/4 in H.S.A		TIME OF	DRILI	LING _7.00) ft / El	ev 877	7.12 ft				
	LOGO	GED B	Y CHECKED BY _DAS	A	END OF	DRILL	ING							
	NOTE	ES Ele	ev. at staked location.	AF	TER DRI	LLING								
	o DEPTH (ft)	GRAPHIC LOG C	ATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT	PLASTIC PLASTIC LIMIT LIMIT		FINES
GPJ			POORLY GRADED SAND, (SP) brown, fine to medium 1.5 grained, moist, trace gravel (Fill)	882.6	SS 1	44	3-2-1 (3)	-						
S CORRIDOR.			SILTY SAND, (SM) gray, fine grained, moist (Fill) NOTE: Clay (CL) seam at 2.0 feet.		SS 2	67	2-2-2 (4)							
URAL RESOURCE	 _ 5		SILTY SAND, (SM) gray, fine grained, moist to saturated, medium dense to loose, trace gravel	_	SS 3	56	3-6-7 (13)							
S/GINT/NR- NAT			∑ 8.0	876.1	ss 4	56	2-2-3 (5)							
REPORT.			LEAN CLAY WITH SAND, (CL) dark gray, moist, medium, trace gravel				(-)							
ENGINEERING	10 				SS 5	67	2-2-3 (5)							
()/ENGINEERING					SS 6	100	3-3-3 (6)							
D - (15.60936.10	15				SS 7	89	2-3-5 (8)	-						
EN HILLS - GEO					V ss	400	3-3-4	-						
PROJECT ARD					8	100	(7)							
DUECTS/TCAAP				000	SH 9									
2015 PR		<u> </u>	Borehole backfilled with auger cuttings.	002.1				1	I	I	I			
ONECTS			Bottom of borehole at 22.0 feet.											
H:/1-PR														
14:26 -														
- 1/25/16														
12.GDT														
MAY 20														
US LAB														
NT S TD														
MNS - G														
H COLU														
EOTEC														
J N														

Ć		North 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, M hone: 651-389-41	Inc. East N 55076 91					BOI	RIN	G N	UM	BEI	r n Page	R-1 / 1 0	22 F 1
CLIE		orl Polo	inder and Sona C		D			Dom			ovolor	mont	Site (1		2)	
			P 15 60936 100	J.	F				Arden Hills		evelop	ment	Sile (-)	
	. 97A		5/21/15		「					5, IVII N			E SIZ	E "6	1/2" in	
					<u> </u>				<u>19</u>					L _ 0	1/2 111	CIICS
			$\mathbf{D} 3 \ \frac{1}{4} \text{ in } \mathbf{H} \\ \mathbf{S} \\ \mathbf{A} $		0					50 ft / F		71 57 1	ft			
		v	<u> </u>			- AT				JU 11 / L		1.54				
NOTE	S EI	ev at st	taked location													
										1				FRRE	RG	
HL	0HC						E TYPE BER	ERY % ID)	NW NTS LUE)	T PEN. f)	IIT WT.	rure NT (%)			ΤΥ Σ	ES
DEF 0	GRAI		IVI <i>F</i>	ATERIAL DESCRIPTION	N		SAMPLI NUM	RECOV (RC	BLC COU	POCKE (ts	DRY UN (pc	MOIS ⁻	LIMIT	PLASTI LIMIT	PLASTIC INDE>	L
,	<u>x¹ 1/</u> x	· · ·	TOPSOIL (36 Ind	ches)			SS 1	28	3-1-3 (4)							
		3.0	POORLY GRAD	ED SAND WITH SILT, (SP-SM) brown,	883.0	SS 2	22	4-3-3 (6)							
5			nne to medium g				SS 3	22	3-2-3 (5)							
		7.0	SILTY SAND, (S	M) black, fine grained, n	noist, very	879.0	∑ ss	67	2-2-2	-						
			loose, nuie organ			076 F	4		(4)	-						
10		19.5	PEAT, (Pt) black	, moist, soft		070.5	SS 5	78	1-2-1 (3)							
	<u> </u>	<u>ν</u>					SH	-								
15		14.5 <u>⊽</u> ∷	SILTY SAND, (S	M) gray, fine to coarse c	rained,	871.5	V ss		2-2-2	-						
			saturated, very lo NOTE: Hydrocar feet.	bose to loose bon odor by human perc	ception at 15.0		7	78	(4)							
		17.8	SILTY LEAN CL	AY, (CL-ML) gray, wet, r	nedium, trace	868.2		33	2-3-3 (6)							
20		21.0	NOTE [,] Sand (SE	2) seam at 20.0 feet		865.0	SS 9	78	3-3-3 (6)							
			Borehol	e backfilled with auger c	uttings.											
			Bott	om of borehole at 21.0 fe	eet.											

			Northe 6160 (Inver (Teleph	ern Technologies, I Carmen Avenue Ea Grove Heights, MN none: 651-389-419	Inc. ast I 55076 91					BOI	RIN	G N	UM	BEI	R N Page	R-1 / ≞ 1 0	23 F 1
CL	IENT	Carl	Bolar	nder and Sons, Co			_ PROJE		E Ram	isey County	/ Re-D	evelop	oment	Site (TCAAF	P)	
PR	OJEC	T NU	MBER	R 15.60936.100			_ PROJE			Arden Hills	, MN						
DA	TE ST	FART	ED <u>5</u>	/21/15	COMPLETED) <u>5/21/15</u>	GROUN	D ELEV	ATION	885.83 ft			но	LE SIZ	E <u>"6</u>	1/2" in	ches
DR		G CO	NTRA	CTOR NTI			GROUN	D WATE	RLEVE	LS:							
DR		g me	THOD	3 1/4 in H.S.A			_ ⊻ A	Г ТІМЕ С	of Dril	LING 8.50) ft / El	lev 87	7.33 ft				
LO	GGED	D BY			CHECKED B	Y DAS	_ A'	r end o	F DRILI	_ING							
NC	TES _	Elev	. at sta	aked location.			_ A	TER DF	RILLING	i							
Γ	일							TYPE	() ()	LE)	PEN.	г wт.	JRE T (%)	AT1	ERBE	RG }	Ś
DEPT	(ft) GRAPH	FOG		MA	TERIAL DESC	RIPTION		SAMPLE NUMBI	RECOVE (RQD	BLOV COUN	POCKET (tsf)	DRY UNI (pcf)	MOISTUC	LIQUID	PLASTIC LIMIT	PLASTICIT INDEX	EINE
GPJ		0. 2.	.0	ASPHALT (2 Inch POORLY GRADE to coarse grained	nes) ED SAND WITI , dry, some fin	H SILT, (SP) brown, e to coarse gravel			56	1-3-1 (4)	_						
		8	.5	(Fill) POORLY GRADE	D SAND WITI	H SILT, (SP-SM) ligi	nt 882 :		56	10-12-13 (25)							
	-			brown, fine graine (Fill)	ed, moist, trace	fine gravel				0.44.40							
				moist to saturated	d, dense to ver	o gray, fine grained, y loose			67	(30)	-						
	-		¥						78	7-9-9 (18)							
	0							SS SS	89	2-1-1	-						
	-	11	2.0		A) dark grav, fi	no arainod, saturato	873.8			(2)	-						
86.100)/ENGINE	_			loose, trace peat	v) dan gray, n	ne grained, saturate	u,		2 100	(7)							
1: - 0:2:000 - 0:2:000	<u>5</u>								89	2-3-3 (6)							
ARDEN HILLS		1	7.2	SILTY LEAN CLA	Y, (CL-ML) blu	ue gray, wet, mediur	868.0 n,		89	2-3-4 (7)							
	0		0 F		s gravel, trace		005	M ss	00	2-3-2							
		////2	<u>1.0</u>	SANDY LEAN CL gravel	AY, (CL) gray,	wet, medium, trace	fine 864.8	9	89	(5)							
15/2019 PK(Borehole Botto	e backfilled with m of borehole	auger cuttings. at 21.0 feet.											
H:V1-PROJEC																	
25/16 14:26 -																	
D US LAB MAN																	
NNS - GINI SI																	
OLECH COLUN																	
B N																	

		Northe 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, M hone: 651-389-4	Inc. East N 55076 191					BOI	RIN	G N	UM	BEI	R N Page	R-1 / ≞ 1 0	24 F 1
CLIE	NT Ca	arl Bolai	nder and Sons, C	0.		PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	ment	Site (TCAAF	^{>})	
PROJ		IUMBEF	R 15.60936.100			PROJEC	T LOCA		Arden Hills	s, MN						
DATE	STAR	TED 5	5/20/15	COMPLETED 5/	20/15	GROUND	ELEVA		885.19 ft			HOI	LE SIZ	E <u>"6</u>	1/2" in	iches
DRILI	LING C	ONTRA	ACTOR NTI			GROUND	WATEF	R LEVE	LS:							
DRILI	LING N	IETHOD	3 1/4 in H.S.A			$ar{2}$ at	TIME O	F DRIL	LING 8.50) ft / El	ev 876	6.69 ft				
LOGO	GED B	ſ			AS	AT	END OF	DRILL	.ING							
NOTE	ES Ele	ev. at st	taked location.			AF	ter Dri	LLING								
o DEPTH (ft)	GRAPHIC LOG		MA	ATERIAL DESCRIPT	ΓΙΟΝ		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT	PLASTIC LIMIT LIMIT		FINES
		1.5	SILTY SAND, (S (Fill)	SM) brown, fine grain	ed, moist	883.7	ss s	56	3-3-4 (7)							
			moist to saturate	ed, dense to medium	ay, fine grained, dense		SS 2	89	4-8-10 (18)	-						
							SS 3	56	8-11-10 (21)	-						
		⊥	-				SS 4	78	8-11-12 (23)							
		11.0				874.2	SS 5	33	5-5-8 (13)							
			LEAN CLAY WI	TH SAND, (CL) gray	, wet, medium to											
				giuvoi			SS 6	89	4-3-2 (5)							
15 							SH 7									
							SS 8	78	3-3-4 (7)							
20		21.0				864.2	SS 9	89	4-6-4 (10)	_						
אוון פבט ובטין לטרטומאוא - יטואו א זיין טאראש איאן אזו גיאטי - ווגמיוס וא גיא - האיד האטבע ואיא איז איז איז איז			Bott	om of borehole at 21	l.0 feet.											

		Northern Technolo 6160 Carmen Ave Inver Grove Heigh Telephone: 651-3	ogies, Inc. enue East nts, MN 55076 389-4191				BO	RIN	G N	UM	BE	R N Page	R-1 2 E 1 0	25 F 1
CLIE	NT C	arl Bolander and So	ons, Co.	_ PROJEC	T NAME	Ram	sey County	y Re-D	evelop	oment	Site (TCAAF	>)	
PROJ		NUMBER _ 15.60936	5.100	PROJEC	T LOCA		Arden Hills	s, MN						
DATE		RTED 5/20/15	COMPLETED 5/20/15	GROUN	D ELEVA	TION	885.98 ft			но	LE SIZ	E "6	1/2" in	ches
DRILI	LING C	CONTRACTOR NT	1	GROUN			LS:			-				
DRILI		METHOD 3 1/4 in H	1.S.A	⊻ ⊿ ⊺		F DRIL	LING 11.0	00 ft / I	Elev 8	74.98	ft			
LOGO	GED B	Υ	CHECKED BY DAS	A1	END OF		_ING							
NOTE	S EI	ev. at staked locatio	 on.	A	TER DRI	LLING								
				-							AT	FERBE	RG	
	U				H H H	% ≻		И Ш	ΨT.	Щ%			3	
t)	Ηg					D D	NU	L D	E F	12 F	0.	<u>0</u> .	Ĕ	ES
	LC		WATERIAE DESCRIPTION			NOR NOR		К Щ	59	NTE	IN IN	AST IMI	DEC	<u>∠</u>
					SAN	RE		Q	DR	≥S	5-	77	ΞĘ	
		POORLY (dry, little gr	GRADED SAND, (SP) brown, fine grained ravel	,	ss 1	33	6-5-4 (9)							
		(FIII)			SS 2	44	8-11-11							
		SILTY SAN	ND, (SM) brown, fine grained, moist, dens	882.5 e,	2		(22)	-						
5		trace grave			V ss		8-13-12	-						
		• • • •			3	67	(25)							
					SS SS	78	9-12-12							
					4		(24)	-						
10			ND (SM) dark gray to black fine grained	876.5			222	-						
		10.5 moist, loos	e, trace gravel, organic stain	875.5		89	(5)							
	<u></u>	₽EAT, (Pt)	black, saturated, medium					1						
	<u></u>				🗸 ss	80	4-4-3	1						
	ित्त	13.3 SII TY SAN	ND (SM) gray fine grained saturated		6	03	(7)	-						
15		medium de	ense to loose					-						
						78	4-4-4							
 		· ·					(-)	1						
		· · · · · · · · · · · · · · · · · · ·			∕∕ ss	100	3-5-4	1						
					8	100	(9)	-						
								4						
20		21.0		865.0	SS 9	100	4-4-3 (7)							
		Во	Bottom of borehole at 21.0 feet.											
200														
07.#														
07/1														
7.90														
5														
CLOW														

	Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R N Page	R-1 2 ≞ 1 0	26 F 1
	CLIENT Carl Bolander and Sons Co	PROJE		F Ram	sev County	/ Re-D	evelor	oment	Site (тсааг	2)	
	PROJECT NUMBER 15 60936 100	PROJE			Arden Hills	MN		Smerit			_/	
	DATE STARTED 5/19/15 COMPLETED 5/19/15				883.67 ft	, 1111		но	E SIZ	'F "6	1/2" in	nches
		GROUN			=1.S:					<u> </u>	<u></u>	101100
	DRILLING METHOD 3 1/4 in H S A	∑ ∆			LING 12 (00 ft / F	Elev 8	71 67	ft			
		Δ ⁻			ING			11.01				
	NOTES Flev at staked location	A	TER DI		 i							
			E C	% ,		Z	۸T.	ц (%)	AT	TERBE	RG	
	MATERIAL DESCRIPTION		SAMPLE TY NUMBEF	RECOVER) (RQD)	BLOW COUNTS (N VALUE	POCKET PI (tsf)	DRY UNIT V (pcf)	MOISTUR CONTENT	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES
2	POORLY GRADED SAND WITH SILT, (SP-SM) fine medium grained, moist, trace gravel (Fill)	to		³ 56	3-4-4 (8)							
	 SILTY SAND, (SM) brown, fine grained, moist, dense trace gravel clay (CL) lenses 	<u>881.2</u> e,		³ 100	5-12-13 (25)	-						
				³ 89	8-14-15 (29)							
GINT/NR- NATO		875.3	,	³ 78	6-8-12	-						
ING REPORTS	PEAT, (Pt) black, moist, rather stiff, trace gravel $\frac{\sqrt{12}}{\sqrt{12}}$		4		(20)	-						
EERING/ENGINEER	$ \frac{7}{6} \frac{7}{6} \frac{7}{6}$		SH 5	1	3-5-5							
A30. IUU/JEINGIN	 SILTY SAND, (SM) gray, fine grained, saturated, loos to dense, peat (Pt) lenses 	870.7 se		, 67	(10)	_						
LO - GEU - (15.0U				³ 78	5-4-4 (8)	-						
				67	10-15-12 (27)	-						
1 3/1 UANT FRUM	20 21.0	862.7	, ss	89	10-11-11 (22)							
10 ראטערי	Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											
1 GEOLECH COLOMINS - GINLS 1D US LAB MAT 2012;GD1 - 1/2018 14:20 - H:/1-PROJECTIS/C												

		Northe 6160 Inver Telepl	ern Technologies, Carmen Avenue E Grove Heights, MN hone: 651-389-41	Inc. ast I 55076 91					BO	RIN	g n	UM	BE	R N Page	R-1 2 ≣ 1 0	27 F 1
CLIENT		arl Bolar	nder and Sons, Co			PROJE	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	P)	
PROJE		IUMBEF	R 15.60936.100			PROJE			Arden Hills	s, MN						
DATE S	STAR	TED 5	5/20/15	COMPLETED	5 /20/15	GROUN	D ELEVA		885.56 ft			HO	LE SIZ	E <u>"6</u>	1/2" in	ches
DRILLI	NG C	ONTRA	CTOR NTI			GROUN		R LEVE	LS:							
DRILLI	NG N	IETHOD	3 1/4 in H.S.A			$ar{2}$ a		F DRIL	LING 8.00) ft / El	ev 87	7.56 ft				
LOGGE	ED B'	ſ		CHECKED B	Y DAS	A	END OF	DRILL	ING							
NOTES	Ele	ev. at st	aked location.			AF	TER DRI	LLING								
o DEPTH (ft)	GRAPHIC LOG		MA	TERIAL DESC	RIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
		0.3_7_ 2.0	ASPHALT (3 Inch POORLY GRADE fine grained dry	nes) ED SAND WITH trace gravel	H SILT, (SP-SM) brow	<u>∕ 885.3</u> wn, 883.6		56	6-7-6 (13)	_						
			(Fill) SILTY SAND, (SI saturated, dense	M) brown to gra	ay, fine grained, mois	t to	SS 2	67	8-11-12 (23)							
							SS 3	89	8-11-11 (22)							
		Ţ					SS 4	78	7-10-12 (22)							
		9.5	SILTY SAND, (SI dense to loose, si	M) dark gray, fi ilt (ML) lenses	ne grained, saturated	876.1 I,	SS 5	78	6-8-9 (17)	_						
		14.5				871.1	SS 6	67	4-3-2 (5)	-						
			SILTY SAND, (SI trace to some org	M) black and gr anic materials	ay, saturated, loose,		SS 7	89	7-3-2 (5)							
		10.5				866 1	SH 8	-								
20		21.0	SILTY SAND, (SI medium dense	M) gray, fine gr	ained, saturated,	864.6	SS 9	78	4-4-5 (9)							
			Borehole Botto	backfilled with	auger cuttings. at 21.0 feet.											

		Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	G N	UM	BEI	R N Page	R-1 ∄ ≣ 1 0	28 F 1
CLIE	NT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (FCAAF	P)	
PRO		IUMBER 15.60936.100	PROJEC	T LOCA		Arden Hills	, MN						
DATE	STAR	COMPLETED 5/20/15	GROUNI) ELEVA		912.47 ft			HO	_E SIZ	E <u>"6</u>	1/2" in	ches
DRIL	LING C	CONTRACTOR NTI	GROUNI	WATER	LEVE	LS:							
DRIL	LING N	IETHOD _3 1/4 in H.S.A	${ar abla}$ at	TIME OF	DRILI	LING _ 2.00) ft / El	ev 910	0.47 ft				
LOG	GED B	Y CHECKED BY DAS	AT	END OF	DRILL	ING							
NOTE		ev. at staked location.	AF	TER DRI	LLING								
Ξ	₽,			TYPE ER	RY %))	v UE)	PEN.	T WT.	JRE T (%)			RG } ≻	S
DEP1	GRAPI LOG	MATERIAL DESCRIPTION		SAMPLE NUMB	RECOVE (RQI	BLOV COUN (N VAL	POCKET (tsf)	DRY UNI (pcf	MOISTI	LIQUID	PLASTIC LIMIT	PLASTICI INDEX	FINE
	<u>17</u> <u>17</u> <u>1</u>	TOPSOIL (24 Inches) NOTE: Weight of Hammer at Sample No. 1.	910 5	SS 1	28	0-0-0 (0)							
		SANDY LEAN CLAY, (CL) light brown and gray, wet, medium, trace fine gravel, iron oxide staining	01010	SS 2	78	2-2-3 (5)	-						
					100	2-3-4 (7)							
S/GINT/NR- NAT				ss 4	100	3-3-5 (8)	-						
				SH	_	. ,	-						
SINEERING/ENG		12.0 LEAN CLAY WITH SAND, (CL) gray, wet, medium to	900.5	√ ss	100	3-3-5	_						
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2						(8)	-						
HILLS - GEO - (1				7	100	(8)	-						
KOJECT ARDEN				SS 8	100	3-4-6 (10)	-						
				SS 9	100	3-4-4 (8)	-						
DIECTS/2015 PRC		23.5 Borehole backfilled with auger outlines	889.0	SS 10	100	3-5-7 (12)	-						
TI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1729/16 14-28 - F111-7		Bottom of borehole at 23.5 feet.											

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R N Page	R-1 ∄ ≣ 1 0	29 F 1
	CLIE	NT _C	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF)	
	PRO		NUMBER _ 15.60936.100	PROJEC	T LOCA		Arden Hills	s, MN						
	DATE	STAF	STED _ 5/20/15 COMPLETED _ 5/20/15	GROUN	D ELEVA		903.12 ft			HOI	LE SIZ	E <u>"6</u>	1/2" in	ches
	DRILI	LING C		GROUN	O WATEF	R LEVE	LS:							
	DRILI		IETHOD 3 1/4 in H.S.A	A	TIME O	F DRILI	LING N	lo grou	undwa	ter ob	served	1.		
	LOGO	GED B	Y CHECKED BY _DAS	A	END OF	DRILL	.ING							
	NOTE	ES El	ev. at staked location.	AF	TER DRI	LLING								
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
3PJ		<u>17 2117</u>	TOPSOIL (24 Inches) NOTE: Weight of Hammer at Sample No. 1. No	901 1	SS 1	0	0-0-0 (0)							
ES CORRIDOR.0			SANDY LEAN CLAY, (CL) gray, moist to wet, mediun to rather stiff, trace gravel	1	SH 2	58								
IRAL RESOURC	5					94	2-3-4 (7)							
GINT/NR- NATU					ss	100	3-3-4							
RING REPORTS					∕	01	2-4-4	-						
RING/ENGINEE					5	94	(8)							
6.100)/ENGINEE					SS 6	100	2-5-5 (10)	-						
- GEO - (15.609:	<u> 15 </u>				SS 7	100	4-4-6 (10)							
CT ARDEN HILLS						100	4-5-7 (12)							
STCAAP PROJE	20		21.0	002 1	SS 9	100	4-6-9 (15)							
I GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:26 - H:/1-PROJECTS/2015 PROJEC			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

			Northe 6160 C Inver C Teleph	ern Techn Carmen A Grove Hei none: 65	iologies, ivenue E ights, Mi 1-389-41	Inc. ast N 55076 91							BO	RIN	g n	UM	BE	R N Page	R-1 ; 1 0	30 F 1
	CLIEN	NT Ca	arl Bolan	nder and s	Sons, Co).			PF	ROJEC	T NAME	Ram	sey County	y Re-D	evelop	oment	Site (TCAAF	P)	
	PROJ		UMBER	15.609	36.100				PF	ROJEC			Arden Hills	s, MN						
	DATE	STAF	RTED _ 5/	/20/15		COMP	LETED 5	5/20/15	GF	ROUNE	ELEVA		915.53 ft			HO	LE SIZ	E_"6	1/2" in	ches
	DRILL	ING C	ONTRA		ITI				GF	ROUND	WATER	R LEVE	LS:							
	DRILL		IETHOD	<u>3 1/4 ir</u>	n H.S.A					AT		DRILI	LING N	No grou	undwa	ter ob	served	J.		
	LOGO	GED B	Y			CHEC	KED BY	DAS		AT	END OF	DRILL	.ING							
	NOTE	S El	ev. at sta	aked loca	tion.					AF	TER DRI	LLING								
ľ	т	P		ΨV							TYPE ER	۲۶ %)	rs JE)	PEN.	Γ WT.	лке т (%)	AT	TERBE LIMITS	RG }∕	(0)
	DEPT (ft)	GRAPH LOG			MA	TERIAL	DESCRIF	PTION			SAMPLE	RECOVEI (RQD	BLOV COUN ^T (N VALL	POCKET (tsf)	DRY UNIT (pcf)	MOISTL CONTEN	LIQUID	PLASTIC LIMIT	PLASTICIT INDEX	FINE
PJ			0.7	TOPSOI LEAN CI	L (8 Inch LAY WIT	ies) H SAND	, (CL) ligh	t brown to bro	own,	914.8	SS 1	44	0-0-1 (1)							
S CORRIDOR.G				NOTE: V	Veight of	f Hamme	r at Samp	le No. 1.			SS 2	67	2-3-4 (7)							
RAL RESOURCE	5										SS 3	100	3-3-5 (8)	-						
GINT/NR- NATU											∑ ss	100	4-5-7	-						
RING REPORTS	10										4		(12)	-						
RING/ENGINEEF											SH 5	92								
6.100)/ENGINEE											SS 6	100	3-5-7 (12)	_						
- GEO - (15.6093	15										SS 7	100	3-6-7 (13)	-						
T ARDEN HILLS			17.0	LEAN CI trace gra	LAY WIT	H SAND	, (CL) gra	y, moist, rathe	er stiff,	898.5	SS 8	100	3-4-6 (10)	_						
STCAAP PROJEC	20		21.0							904 5	SS 9	100	2-4-7 (11)	_						
%2015 PROJECT:		<u> </u>	<u>121.U</u>		Borehol Botto	e backfille om of bor	ed with au ehole at 2	ger cuttings. 1.0 feet.		034.0	<u>, N -</u>			1	1	1	1	1		L
- H:/1-PROJECIS																				
r - 1/25/16 14:26																				
B MAY 2012.GD																				
GINT STD US LA																				
CH COLUMNS - 1																				
NTI GEOTER																				

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	G N	UM	BE	R N Page	R-1 ; ≞ 1 0	31 F 1
	CLIE	NT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	<u>)</u>	
	PROJ		IUMBER	PROJEC	T LOCA		Arden Hills	s, MN						
	DATE	STAR	COMPLETED 5/19/15	GROUNE	ELEVA		906.2 ft			HOI	E SIZ	Έ <u>"6</u>	1/2" in	iches
	DRILI	LING C	CONTRACTOR NTI	GROUNE	WATER	R LEVE	LS:							
	DRILI	LING N	IETHOD _3 1/4 in H.S.A	AT	TIME OF		LING N	lo grou	undwa	ter ob	served	1		
	LOGO	GED B	Y CHECKED BY _DAS	AT	END OF	DRILL	.ING							
	NOTE	ES Ele	ev. at staked location.	AF	ter Dri	LLING								
	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
			0.5 TOPSOIL (6 Inches) LEAN CLAY WITH SAND, (CL) brown, moist, soft to	905.7	SS 1	0	0-0-0 (0)							
OR.GPJ			rather stiff, trace gravel				7 5 5	1						
RCES CORRID			NOTE: Weight of Hammer at Sample No. 1. No recovery. Sampled auger cuttings.		2	78	(10)	-						
TURAL RESOU					SS 3	89	5-6-6 (12)							
S/GINT/NR- N/					SS 4	94	3-5-5 (10)							
IG REPORT								1						
NG/ENGINEERIP			12.0	894.2	SH 5									
00)/ENGINEERII			LEAN CLAY WITH SAND, (CL) gray, moist, medium rather stiff, trace gravel	to	SS 6	83	2-4-5 (9)							
EO - (15.60936.1	15				SS 7	89	2-4-4 (8)							
SDEN HILLS - G					∑ ss	100	2-4-6							
PROJECT AF					8		(10)							
DIECTS/ICAA			21.0 Borehole backfilled with auger cuttings.	885.2	$\bigvee $ ^{SS} ₉	100	2-5-7 (12)							
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:26 - H:/1-PROJECTS/2015 PRC			Bottom of borehole at 21.0 feet.											

		Northe 6160 Inver Telepl	ern Technologies, Carmen Avenue E Grove Heights, Ml hone: 651-389-41	Inc. East N 55076 191				BOI	RIN	G N	UM	BE	R N Page	R-1 ≣ 1 0	32 F 1
CLI	IENT	Carl Bola	nder and Sons, Co	О.	PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (ГСААБ	>)	
PR	OJECT	NUMBER	R 15.60936.100		PROJEC		ΓΙΟΝ	Arden Hills	, MN					/	
DA	TE STA		5/27/15	COMPLETED 5/27/15	GROUNI) ELEVA		894.43 ft	,		НОІ	LE SIZ	E "6	1/2" in	ches
	ILLING		ACTOR NTI		GROUNI			LS:							
	ILLING	METHO	3 1/4 in H.S.A		∇ at			LING 12.5	50 ft / E	Elev 88	81.93	ft			
LO	GGED	BY		CHECKED BY DAS	AT	END OF	DRILL	ING							
	TES E	= · Elev. at st	taked location.		AF	TER DRI	LLING								
_	<u></u> о	O/S 20 ft	NW			RPE	× %	E)	EN.	WT.	RE (%)	AT	LIMITS	ERG	
DEPTH	(ff) GRAPHI	LUG	MA	ATERIAL DESCRIPTION		SAMPLE T NUMBE	RECOVER (RQD)	BLOW COUNT (N VALU	POCKET F (tsf)	DRY UNIT (pcf)	MOISTUI	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES
	-	. <u>.1</u> 0.8	TOPSOIL (10 ind LEAN CLAY WIT	ches) FH SAND, (CL) gray, moist, soft to	893.6	SS 1	67	0-1-3 (4)							
		3.5	rather stiff, trace	gravel	890.9	SS 2	56	5-5-7 (12)							
ESOURCES (CLAYEY SAND, moist, loose, trac	(SC) brown, fine to medium grained, ce gravel		√ ss	70	5-4-4	-						
R- NATURAL F						3	70	(8)							
						SS 4	44	3-3-3 (6)							
						SH 5	-								
		12.0	CLAYEY SAND, saturated, mediu	(SC) gray, fine to medium grained, m dense, trace gravel	882.4		89	4-6-7 (13)							
36.100)/E	-	//13.5	SILTY SAND, (S	M) gray, fine grained, saturated, dens	500.9 Se,			()	1						
- CEGO - (15:608	5		trace graver			SS 7	56	8-9-11 (20)	-						
T ARDEN HILLS						SS 8	56	7-9-11 (20)							
- 20) 					ss o	56	8-10-11	_						
		<u>⊡ 21.0</u>	Borehol Botte	e backfilled with auger cuttings. om of borehole at 21.0 feet.	873.4			(21)	I	<u> </u>	I	I	1	<u> </u>	
- H:N-PKC0EC 19/24															
1 - 1/25/16 14:26															
3 MAY 2012.GL															
I S ID US LAB															
JLUMNS - GIN															
GEOLECH CC															
z															

			Northe 6160 Inver	ern Technologies, Carmen Avenue E Grove Heights, MN	nc. ast I 55076					BOI	RIN	G N	UM	BEI	R N PAGE	R-1	33 F 1
		ノ	Telepl	hone: 651-389-41	91												
	CLIEN	T _C	arl Bolar	nder and Sons, Co		P	ROJEC	T NAME	Ram	sey County	/ Re-D	evelop	ment	Site (1	CAAF)	
	PROJ		UMBEF	R <u>15.60936.100</u>		P	ROJEC	T LOCAT		Arden Hills	s, MN						
	DATE	STAF	RTED 5	5/22/15	COMPLETED <u>5/22/15</u>	G	ROUNE) ELEVA		887.8 ft			HOL	E SIZ	E <u>"6</u>	1/2" in	ches
	DRILL	ING C	ONTRA	ACTOR NTI		G		WATER	LEVE	LS:							
	DRILL	ING N	IETHOE	0 <u>3 1/4 in H.S.A</u>			¥at	TIME OF	DRILI	LING _ 6.00) ft / El	ev 88'	1.80 ft				
	LOGG	ED B	Y		CHECKED BY DAS		AT	END OF	DRILL	.ING							
	NOTE	S _EI	ev. at st	aked location.			AF	TER DRI	LLING								
	o DEPTH (ft)	GRAPHIC LOG		MA	TERIAL DESCRIPTION			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
.GPJ			2.0	POORLY GRADE reddish brown, fir medium gravel	D SAND WITH GRAVEL, e to medium grained, moi	(SP) st, fine to	885.8	SS 1	44	3-2-3 (5)							
				(Fill) SILTY SAND, (SM (Fill)	Л) brown, fine grained, mo	ist	/	SS 2	56	4-4-5 (9)							
NUKAL KESOUK		××××	<u>4.5</u>	SILTY SAND, (SI to saturated, loos	I) gray and brown, fine gra e to medium dense	ained, moist	883.3	SS 3	67	4-3-6 (9)							
								SS 4	100	2-3-3 (6)							
NEEKING KEPO			9.5	SILTY SAND, (SI loose	Л) brown, fine grained, sat	urated,	878.3	SS 5	78	2-3-2 (5)							
GINEEKING/ENG			13.0				874.8	ss (56	3-3-4							
100)/EN		<u>, , , ,</u> <u>, , , ,</u>	-	PEAT, (Pt) black,	moist, soft					(7)							
LLS - GEU - (15		<u></u> <u></u>						7	89	(4)							
		<u></u>						SH 8									
I SVI UAAF FRU	20	<u>I, NI,</u>	19.5 21.0	SILTY SAND, (SI medium dense	Л) gray, fine grained, satur	ated,	868.3	SS 9	100	4-4-5 (9)							
אקטים דאטעבט				Borehole Botto	backfilled with auger cutti m of borehole at 21.0 feet	ings.											
INT-PROJECTS																	
1-92:41 91/62/1																	
MAY 2012.GDI -																	
OLUMINS - GIN.																	

			North 6160 Inver Telep	nern Techno Carmen Av Grove Heig phone: 651-	logies, In enue Eas hts, MN 5 389-4191	c. st 55076						BO	RIN	G N	UM	BE	R N Page	R-1 :	34 ೯ 1
	CLIEN	NT Ca	arl Bola	ander and So	ons, Co.			_ PROJE	СТ	NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF))	
	PROJ	ECT N	UMBE	R 15.6093	6.100			_ PROJE	СТ			Arden Hills	s, MN						
	DATE	STAR	TED _	6/23/15		COMPLETE	D <u>6/23/15</u>	GROUN	ID E	LEVA		949.77 ft			HO	LE SIZ	E <u>"6</u>	1/2" in	ches
	DRILL	ING C	ONTR	ACTOR NT	ΓΙ			GROUN	ID V	VATER	R LEVE	LS:							
	DRILL	ING M	IETHO	D <u>3 1/4 in l</u>	H.S.A			_ A	TT	ME OI	DRIL	LING							
	LOGO	GED BY	<u>вн</u>			CHECKED E	BY DAS	_ A	TE	ND OF	DRILL	_ING							
	NOTE	S Ele	ev. at s	staked location	on.			_ A	FTE	r Dri	LLING		1						
	DEPTH (ft)	GRAPHIC LOG			MATE	ERIAL DESC	CRIPTION			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
			0.3_/\	TOPSOIL CLAYEY S	(3 Inches SAND, (S	s) C) light brov	vn to brown, fine to		5/	SS 1	22	0-2-3 (5)							
CES CORRIDOR.GF	· -		<u>3.5</u> 4.0	gravel, irol NOTE: We	rained, m n oxide si eight of H	loist, loose to taining lammer at S noist, rather	ample No. 1.	e 946. 945.	3	SS 2	89	4-6-7 (13)	-						
NATURAL RESOUR	5			CLAYEY S coarse gra gravel, iro	SAND, (S ained, mo n oxide si	C) light brow ist to dry, de taining	vn to brown, fine to ense to very dense, li	ttle	X	SS 3	56	6-14-12 (26)							
EPORTS/GINT/NR-	· -								X	SS 4	78	9-13-14 (27)	-						
G\ENGINEERING R	10								X	SS 5	67	14-14-14 (28)							
6.100)/ENGINEERIN	· -								X	SS 6	78	6-16-20 (36)	-						
LS - GEO - (15.6093	15								X	SS 7	89	8-16-20 (36)	-						
OJECT ARDEN HIL	 		<u>19.0</u>	NOTE: Pra	actical au	iger refusal a	at 19.0 feet due to	930.	8	SS 8	83	8-19-19 (38)							
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:26 - H/1-PROJECTS/2015 PROJECTS/TCAAP PR				coarse gra B	avel. Borehole t Bottom	packfilled wit	h auger cuttings. at 19.0 feet.												

Infiltration Test Results






































Rice Creek Regional Trail Soil Boring Logs



		Norti 1408 Men Tele	hern Technologies, Inc. 3 Northland Drive, Suite 107 dota Heights, MN 55120 phone: 651-389-4191				BO	RIN	GN	IUN	IBE	R T PAGI	R-3 ≣ 1 0	00 IF 1
CLI		Carl Bol	ander and Sons, Co.	PROJEC	T NAME	Ram	sey County	y Re-D	evelop	oment	Site (TCAAI	>)	
PR	OJECT	NUMBE	R <u>15.60936.100</u>		T LOCA		Arden Hills	s, MN						
DA	TE STA	RTED	5/21/15 COMPLETED 5/21/15	GROUN	D ELEVA		955.22 ft			HO	LE SIZ	E <u>"6</u>	1/2" ir	iches
DR	LLING	CONTR	ACTOR NTI	GROUN	O WATEF	R LEVE	LS:							
DR	LLING	METHO	D <u>3 1/4 in H.S.A</u>	AT	TIME O	F DRIL	LING 1	No grou	undwa	iter ob	served	d		
LO	GGED	BY DA	S CHECKED BY DAS	AT	END OF	DRILL	_ING							
NO		Elev. at s	staked location.	AF	TER DRI	LLING								
o DEPTH	GRAPHIC	L C C C	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
	××	⊗0.3_~	BITUMINOUS PAVEMENT (4 Inches)		AU									
		2.0	POORLY GRADED SAND, (SP) brown, fine to mediu grained, moist, trace gravel	ım 953.2		-								
						67	4-4-7							
			grained, moist, medium dense to dense, trace gravel	,	<u> </u>		(11)	-						
5			iron oxide staining		∖∕ ss	100	6-6-7	-		10	04	40	10	
					<u> </u>	100	(13)	4		10	31	13	18	42
								4						
						67	7-9-9 (18)							
		0.5		945 7			(10)	1						
10			LEAN CLAY WITH SAND, (CL) reddish brown, moist	<u>343.7</u>	V ss	22	8-10-9	1						
			stiff, trace medium to coarse gravel		/ 5		(19)	-						
		12.0	CLAVEY SAND (SC) raddish brown, fing to madium	943.2			700	-						
		13.5	grained, moist, dense, trace gravel	941.7	$\int 6$	100	(17)							
			Bottom of borehole at 13.5 feet.											
כט בטיר טרטטוווינים - מווור ביני סיסי בייני ווויני איז איזיאטין - ווויני וויני וויני וויני איזיאט איזיאט איזיאט														

Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191					BO	RIN	G N	UM	BE	R TI PAGE	R-3	01 F 1
CLIENT Carl Bolander and Sons, Co.	P	ROJECT	NAME	Ram	sey County	/ Re-D	evelop	ment	Site (1	CAAF)	
PROJECT NUMBER _ 15.60936.100	P	ROJECT	LOCAT		Arden Hills	, MN						
DATE STARTED _5/21/15 COMPLETED _	5/21/15 G				960.7 ft			HOL	E SIZ	E_"6	1/2" in	ches
	G		VATER	LEVE	LS:							
DRILLING METHOD 3 1/4 in H.S.A		AT TI	ME OF	DRIL	LING N	lo grou	undwa	ter obs	served			
LOGGED BY DAS CHECKED BY	DAS	AT E	ND OF	DRILL	.ING							
NOTES _Elev. at staked location.		AFTE	R DRII	LING								
HLdJ DEV DEV DEV DEV DEV DEV DEV DEV DEV DEV	PTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
0 0.2	ches) SILT, (SP-SM) brown, fine to coarse gravel ained, moist, trace eddish brown, fine to e medium to coarse fine grained, moist, SILT, (SP-SM) ned, moist, dense, ay, moist, very stiff, uger cuttings. 12.5 feet.	956.2 956.2 953.7 951.2 948.7 948.2	AU 1 SS 2 SS 4 SS 5 SS 6	44 67 89 67 100	10-15-15 (30) 9-10-10 (20) 7-9-8 (17) 10-11-12 (23) 32							

			Northern 1408 Nor Mendota Telephor	Technolo thland Di Heights, ne: 651-3	ogies, In rive, Suit MN 551 889-4191	c. e 107 20							BO	RIN	G N	IUN	IBE	R T PAGE	R-3	02 F 1
	CLIE	NT Ca	arl Bolande	er and So	ns, Co.				PROJEC	T NA	ME	Ram	sey Count	y Re-D	evelop	oment	Site (FCAAF	P)	
	PRO.	JECT N	UMBER _	15.60936	5.100				PROJEC		CAT		Arden Hill	s, MN						
	DATE	STAR	RTED <u>5/22</u>	2/15		COMPLETE	D <u>5/22/15</u>		GROUN	D ELE	VAT		956.27 ft			HO	E SIZ	E <u>"6</u>	1/2" in	ches
	DRIL	LING C	ONTRACT	OR NT					GROUN		ER	LEVE	LS:							
	DRIL	LING N		3 1/4 in H	I.S.A				A	TIME	OF	DRIL	LING	No gro	undwa	ter ob	served	Ι.		
	LOG	GED B	Y DAS			CHECKED	BY DAS		A	END	OF	DRILL	.ING							
	NOTE	ES Ele	ev. at stake	ed locatio	n.				AF	TER	ORIL	LING								
	o DEPTH (ft)	GRAPHIC LOG			MATE	ERIAL DES	CRIPTION			SAMPLE TYPE	NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT	PLASTIC LIMIT LIMIT		FINES
			0.7 T(1.5 Cl ∖ tra	DPSOIL (_AYEY S ace grave	8 Inches AND, (S	s) C) brown, f organics	ine grained, r	moist, loose	<u>955.6</u> 9, <u>954.8</u>	X	S 1	67	2-3-3 (6)							
AIL.GPJ			S/ to	ANDY LE stiff, trac	AN CLA	Y, (CL) bro avel, iron o	wn to tan, mo xide staining	oist, mediun	n	X s	SS 2	0	2-3-3 (6)							
RICE CREEK TR			CL	ittings.	recover	y at Sample	e ino. 2. Sair	ipieu auger		X	S 3	56	3-4-4 (8)							
PORTS/GINT/TR -											S 4	100	5-5-7 (12)							
ENGINEERING RE	10									X	SS 5	100	4-5-5 (10)							
0)/ENGINEERING	 		13.5						942.8		SS 6	94	5-11-12 (23)							
(15.60936.10				Bo	brehole t Bottom	of borehol	th auger cutt e at 13.5 feet	ings.												
- CEO -																				
ARDEN HI																				
P PROJECT																				
CTS/TCAA																				
015 PROJE																				
SOJECTS																				
18 - H:\1-PF																				
0/19/15 16:																				
12.GDT - 10																				
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L STD US L																				
NNS - GINI																				
OTECH COLUI																				
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(2		North 1408 Meno Telep	nern Technol Northland D dota Heights, phone: 651-	ogies, Inc. prive, Suite 107 , MN 55120 389-4191						BO	RIN	G N	IUM	IBE	R T PAGE	R-3 ≞ 1 0	03 F 1
c	LIEN	NT <u>Ca</u>	arl Bola	ander and Sc	ons, Co.		PROJE	CT N/	AME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	^{>})	
P	ROJ	ECT N	UMBE	R <u>15.6093</u>	6.100				CAI		Arden Hills	, MN						
D	ATE	STAR	TED _	5/22/15	COMF	LETED 5/22/15	GROUN	D EL	EVA		943.65 ft			HOI	LE SIZ	E <u>"6</u>	<u>1/2" in</u>	iches
	RILL		ONTR	ACTOR NT	1		GROUN	D WA			LS:							
	RILL			D <u>31/4 in F</u>	<u>1.S.A</u>		A				LING P	lo grou	undwa	ter ob	serveo	1.		
			r <u>DA</u>	5 staked locatio	- $CHEC$		А 				_ING							
H			. ut c				7.	1							AT	TERBE	RG	
DEDTU	0 (#)	GRAPHIC LOG			MATERIAL	DESCRIPTION		SAMPLE TYPE	NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID	PLASTIC LIMIT		FINES
	-		0.5	TOPSOIL CLAYEY S moist, loos	(6 Inches) SAND, (SC) bro se to dense, tra	own, fine to coarse grained, ce fine to medium gravel, ir	943.2 on	ľ	SS 1	33	3-3-3 (6)	-						
.GPJ	-			oxide stain	iing			Д	SS 2	44	4-4-4 (8)	-		11	30	13	17	35
- RICE CREEK TRAII	5								SS 3	39	3-3-4 (7)	-						
	-								SS 4	106	8-9-10 (19)	-						
	<u>10</u>							X	SS 5	133	10-12-12 (24)	-						
	-		13.0 13.5	POORLY	GRADED SAN	D WITH CLAY AND GRAVE	930.7 EL, <u>930.2</u>		SS 6	133	11-12-12 (24)	_						
- GEO - (15.60936.				fine to coa	rse gravel orehole backfil Bottom of bo	led with auger cuttings. rehole at 13.5 feet.	e,											
T ARDEN HILLS																		
SITCAAP PROJEC																		
SV2015 PROJECTS																		
8 - HM-PROJECT																		
DT - 10/19/15 16:1:																		
LAB MAY 2012.GI																		
S - GINT STD US																		
I GEOTECH COLUMN																		
2 L																		

		Nort 1408 Men Tele	hern Technologies, Inc. 3 Northland Drive, Suite 107 dota Heights, MN 55120 phone: 651-389-4191				BO	RIN	G N	IUN	IBE	R T PAGE	R-3	04 F 1
	CLIE	NT <u>Carl Bol</u>	ander and Sons, Co.	PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	P)	
	PRO.		R <u>15.60936.100</u>	PROJEC			Arden Hills	, MN						
	DATE	STARTED	5/22/15 COMPLETED <u>5/22/15</u>	GROUNI	D ELEVA		944.04 ft			HO	LE SIZ	E_"6	1/2" in	iches
	DRILI	LING CONTR	RACTOR NTI	GROUNI) WATER	R LEVE	LS:							
	DRILI		DD <u>3 1/4 in H.S.A</u>	TA	TIME OF		LING N	lo grou	undwa	ter ob	serveo	1.		
	LOGO	GED BY <u>DA</u>	S CHECKED BY DAS	AT AE			_ING							
	NOTE			Ar							ΔΤ	FRRF	RG	
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
			SILTY SAND WITH GRAVEL, (SM) brown, fine grain dry, loose, fine to coarse gravel	ed,	ss 1	44	3-3-3 (6)	_						
.GPJ		3.5	NOTE: Sampled auger cuttings for Sample No. 2.	<u>940.5</u> n	SS 2	6	3-2-3 (5)							
E CREEK TRAIL	5		to stiff, trace fine gravel		SS 3	83	3-3-3 (6)							
PORTS/GINT/TR - RIC					ss 4	78	10-14-14 (28)	-						
JG'ENGINEERING RE	10 	9.5	POORLY GRADED SAND WITH SILT, (SP-SM) reddish brown, fine grained, moist, medium dense, trace fine gravel, iron oxide staining	934.5	SS 5	44	5-7-7 (14)	-						
0)/ENGINEERIN		13.5	SILTY LEAN CLAY, (CL-ML) reddish brown, moist, rather stiff, trace fine gravel	932.0	SS 6	100	5-6-7 (13)	-						
GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 10/19/15 16:18 - H11-PROJECTS/2015 PROJECTS/TCAAP PROJECT ARDEN HILLS - GEO - (15.60396.10			Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.											

(Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BO	RIN	G N	IUN	1BE	R T PAGE	R-3 ≣ 1 0	05 F 1
CL	IENT _Ca	arl Bolander and Sons, Co.	_ PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	^{>})	
PR	OJECT N	IUMBER _ 15.60936.100		T LOCA		Arden Hills	, MN						
DA	TE STAR	COMPLETED 5/22/15	GROUNI) ELEVA		933.8 ft			HO	LE SIZ	E <u>"6</u>	<u>1/2" in</u>	ches
DR	RILLING C	CONTRACTOR NTI	GROUN	O WATER	R LEVE	LS:							
DR		IETHOD 3 1/4 in H.S.A	. ⊻ a t	TIME OF	DRIL	LING _ 7.00) ft / E	ev 92	6.80 ft				
LO	GGED B	Y DAS CHECKED BY DAS	. AT	END OF	DRILL	_ING							
NC	DTES _Ele	ev. at staked location. O/S 8 ft. SE	. A F	TER DRI	LLING								
DEPTH	(ft) GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
-		0.3 TOPSOIL (4 Inches) SILTY SAND WITH GRAVEL, (SM) brown, fine to		SS 1	44	3-4-5 (9)							
		medium grained, moist to saturated, medium dense dense NOTE: Sand and gravel (SP) layer at 2.5 feet.	to	SS 2	44	8-11-10 (21)							
		NOTE: Sampled auger cuttings for Sample No. 3.		SS 3	22	11-11-8 (19)	_						
INTR - RIC			926.8			2.2.2							
ORTS/GIN		8.5 saturated, loose	, 925.3	$\begin{pmatrix} 55\\4 \end{pmatrix}$	56	(6)							
	<u>o (/////</u>	LEAN CLAY WITH SAND, (CL) brown to gray, wet, medium		M ss		2-2-3							
ENGINE		11.0	922.8	5	56	(5)							
TI GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 10/19/15 16:18 - H/1-PROJECTS/2015 PROJECTS/TCAAP PROJECT ARDEN HILLS - GEO - (15.60936, 100)ENGINEERIN		Bottom of borehole at 11.0 feet.											

	Nor 140 Men Tele	thern Technologies, 8 Northland Drive, S ndota Heights, MN 5 ephone: 651-389-41	Inc. Suite 107 5120 I91				BO	RIN	G N	UM	IBE	R T Page	R-3	06 F 1
	CLIENT Carl Bo	lander and Sons, Co	0.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	ment	Site (TCAAF	P)	
1	PROJECT NUME	ER 15.60936.100					Arden Hills	, MN						
1	DATE STARTED	5/19/15	COMPLETED <u>5/19/15</u>	GROUND	ELEVA		907.55 ft			HOL	E SIZ	E_"6	1/2" in	ches
	DRILLING CONT	RACTOR NTI		GROUND	WATER	R LEVE	LS:							
	DRILLING METH	OD _3 1/4 in H.S.A		${ar ar \Sigma}$ at	TIME OF	- DRILI	LING _ 12.0)0 ft / E	Elev 8	95.55	ft			
	LOGGED BY D	AS	CHECKED BY DAS	AT	END OF	DRILL	.ING							
	NOTES _Elev. at	staked location.		AF	TER DRI	LLING								
	o DEPTH (ft) GRAPHIC LOG	MA	ATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
		TOPSOIL (3 Incl	nes)			44	4-8-8 (16)							
F		grained, moist, n	nedium dense, trace fine to medium				(10)							
ALLGPJ		gravei			$\begin{pmatrix} SS \\ 2 \end{pmatrix}$	56	3-5-5 (10)	-						
	5					83	4-6-9 (15)							
	8.5			899.1	SS 4	33	5-7-8 (15)							
	10	SANDY LEAN C rather stiff, trace	LAY, (CL) blue gray, moist to wet, gravel, iron oxide staining		SS 5	78	5-6-7 (13)	-						
	13.5	Ā		894 1	SS 6	89	4-4-5 (9)	-						
936.10UJ	//////10.0	Borehol	e backfilled with auger cuttings.	004.1	/ 1		. ,							
- (15.60		Botte	om of borehole at 13.5 feet.											
s - GEO														
T ARDE														
ROJEC														
TCAAP														
DECTS														
015 PRC														
UECI SV														
044-1/3														
L - 81:9														
. GL/AL/O														
:GDT - 1														
AY 2012														
SLABA														
19-22														
COLUM														
DTECH (
NI GEC														

			Northe 1408 I Mendo Teleph	ern Techr Northland ota Heigh none: 65	ologies Drive, S ts, MN 9 1-389-4	, Inc. Suite 107 55120 191							BO	RIN	GΝ	IUN	IBE	R T PAGE	R-3 ≞ 1 0	07 0F 1
	CLIE	NT Ca	arl Bolar	nder and	Sons, C	0.				PROJEC		Ram	isey County	/ Re-D	evelop	oment	Site (TCAAI	^{>})	
	PROJ	IECT N	IUMBEF	R _15.609	36.100					PROJEC		TION	Arden Hills	s, MN						
	DATE	STAR	TED 5	6/15/15		COMP	LETED	5/15/15		GROUNI	D ELEVA	TION	898.93 ft			HO	LE SIZ	E "6	1/2" in	nches
	DRILI	LING C			ודע	_				GROUNI) WATE		LS:			-				
	DRILI	ING M	ETHOD) 3 1/4 ir	n H S A							F DRIL	LING 5.00)ft/F	lev 89	3 93 ft				
						CHEC		DAS		ΔΤ			ING							
	NOTE	S Fle	ev at st	aked loca	ation	_ 0.120				AF										
	DEPTH (ft)	RAPHIC LOG			M	ATERIAL	DESCR	RIPTION			APLE TYPE NUMBER	COVERY % (RQD)	BLOW COUNTS VALUE)	CKET PEN. (tsf)	Y UNIT WT. (pcf)	OISTURE NTENT (%)				FINES
	0	0 XXXX		POORL	Y GRAD	ED SAN	D, (SP) I	brown, fin	e to medium	1	S M ss	RE NE	2-4-7	Q	DR	≥ö		L L L	PLA:	
				grained, (Fill)	moist, l	ittle grave	el´`´				∆ 1 M ss	44	(11)	-						
TRAILGPJ	 5		50 \[\]							803 0	2	00	(48)							
R - RICE CREEK			<u>0.0 v</u>	SILTY S saturate lenses	AND, (S d, very (SM) brown dense to l	n, fine to oose, tra	coarse g ace grave	rained, I, few silt	000.0	3	67	(47)							
EPORTS/GINT/T											SS 4	44	3-3-5 (8)			6				14
IGENGINEEKING K	<u> 10 </u> -										SS 5	44	2-4-8 (12)	-						
100)/ENGINEERIN			12.0 12.5 13.0 13.5	POORLY fine grain	Y GRAD ned, sat	ED SAN urated, m	D WITH ledium d	SILT, (SF lense, little grained.	P-SM) browr e gravel saturated.	886.9 , <u>886.4</u> , <u>885.9</u> , <u>885.4</u>	SS 6	56	5-6-6 (12)	_						
- GEU - (15.60936.			L	medium POORL fine grain	dense Y GRAE ned, sat	ED SAN	D WITH redium d	SILT, (SF lense	P-SM) brown	Ι,										
CT ARDEN HILLS					Boreno Bot	om of bo	rehole a	auger cuti t 13.5 feet	tings. t.											
SVT CAAP PROJE																				
- HIVI-PROVECT																				
81:91 GL/61/01 -																				
B MAY 2012.GUI																				
SINI S ID US LA																				
H COLUMNS - G																				
NIGEOLEC																				

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BO	RIN	G N	IUN	IBE	R T Page	R-3	08 F 1
CLIE	NT Carl	Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	P)	
PRO.	JECT NU	MBER	PROJEC			Arden Hills	s, MN						
DATE	STARTI	ED _5/15/15 COMPLETED _5/15/15	GROUNE	ELEVA		894.38 ft			HO	LE SIZ	E <u>"6</u>	1/2" in	iches
DRIL	LING CO	NTRACTOR NTI		WATER	LEVE	LS:							
DRIL	LING ME	THOD 3 1/4 in H.S.A	riangle at	TIME OF	DRILI	_ ING _ 9.50) ft / El	ev 884	4.88 ft				
LOG	GED BY	DAS CHECKED BY DAS	AT	END OF	DRILL	ING							
NOTE	Elev.	. at staked location.	AF	ter Dri	LLING		1	1					
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		AMPLE TYPE NUMBER	ECOVERY % (RQD)	BLOW COUNTS (N VALUE)	OCKET PEN. (tsf)	RY UNIT WT. (pcf)	MOISTURE ONTENT (%)				FINES
0	<u>x // x x</u> 0	5TOPSOIL (6 Inches)			₽ 56	2-3-3	<u>م</u>		0			Ч	
	2.	SILLY SAND, (SM) dark brown, fine grained, moist, loose, trace gravel	892.4			(0)							
- I		POORLY GRADED SAND, (SP) brown, fine grained, moist, loose to medium dense, trace gravel		SS 2	56	4-4-4 (8)							
CE CREEK TRA				SS 3	33	3-7-9 (16)							
ллтк - 	7.	0 PEAT (Pt) black dry to mojet stiff	887.4			4 6 10	-						
RTS/GIN	8.	0 SILTY SAND (SM) grav fine grained moist to	886.4	$\begin{pmatrix} 55\\ 4 \end{pmatrix}$	89	4-6-12 (18)							
		saturated, dense $\underline{\nabla}$	880 9	SS 5 SS 6	67	5-8-14 (22) 4-8-12 (20)	-						
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GOT - 10/19/15 16:18 - H/1-PROJECT/SIZ015 PROJECT/SIZCAPP PROJECT ARDEN HILLS - GEO - (15.60936) 10		Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.											

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BO	RIN	G N	IUM	IBE	R T PAGE	R-3	09 F 1
	CLIENT Car	Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	^{>})	
	PROJECT NU	IMBER 15.60936.100	PROJEC			Arden Hills	s, MN						
	DATE START	ED 5/15/15 COMPLETED 5/15/15	GROUNE	ELEVA		890.43 ft			но	LE SIZ	Έ "6	1/2" in	ches
	DRILLING CC	DNTRACTOR NTI	GROUND	WATER		LS:			-				
	DRILLING ME	THOD 3 1/4 in H.S.A		TIME OF		L ING 4.00) ft / El	ev 886	6.43 ft				
		DAS CHECKED BY DAS	 AT		DRILI	ING							
	NOTES FLAN	at staked location	۵F										
			~				1		1			PC	
	o DEPTH (ft) GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
		.5 TOPSOIL (6 Inches) .5 CLAYEY SAND, (SC) brown, fine to medium grained, moist, loose, trace gravel	<u>889.9</u> 	SS 1	100	0-3-4 (7)							
GPJ.		NOTE: Weight of Hammer at Sample No. 1. POORLY GRADED SAND WITH SILT, (SP-SM) gray	,	SS 2	78	3-4-8 (12)			13	-			9
CE CREEK IRAIL		dense, trace gravel, few clay lenses		SS 3	89	4-6-9 (15)							
KI S/UN I/I I/I - U				SS 4	44	2-5-5 (10)							
NEERING REPU				SS 5	56	4-6-6							
RINGENG	1	2.0	878.4			(12)							
JUJJENGINEE		SANDY LEAN CLAY, (CL) gray, saturated, medium, trace gravel, few sand lenses	876.9	$\bigvee SS 6$		3-4-4 (8)							
(15.60936.10		Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.											
ILLS - GEU													
I AKUEN H													
AAP PROJEC													
81:01 CT/61/0													
2012.601 - 10													
S LAB MAY 2													
GINISIDU													
COLUMNS -													

Town and Creek Development Area Soil Boring Logs



		North 6160 Inver Telep	ern Technologies, Inc. Carmen Avenue East Grove Heights, MN 55076 hone: 651-389-4191				BO	RIN	G N	UM	BE	R D Page	E-8 ≞ 1 0	00 F 1
	CLIE	NT Carl Bola	nder and Sons. Co			Ram	sev County	/ Re-D	evelor	ment	Site (тсааг	2)	
	PRO.	JECT NUMBE	R 15.60936.100	PROJEC			Arden Hills	. MN				<u></u>	_/	
	DATE	E STARTED	5/21/15 COMPLETED 5/21/15	GROUNI	ELEVA		900.65 ft	,		НОІ	_E SIZ	Έ "6	1/2" ir	ches
	DRILI		ACTOR NTI	GROUNE	WATER		LS:							
	DRILI	LING METHO	D 3 1/4 in H.S.A	$\overline{\mathbf{V}}$ at	TIME OF	DRIL	LING 12.0)0 ft / E	Elev 88	38.65	ft			
	LOGO	GED BY DAS	CHECKED BY DAS	AT	END OF	DRILL	.ING							
	NOTE	Elev. at s	taked location.	AF	TER DRI	LLING								
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	AT LIMIT LIMIT			FINES
t).GPJ		1.5	POORLY GRADED SAND WITH SILT, (SP-SM) brown fine to coarse grained, trace gravel (Fill)	n, 899.2	SS 1	56	4-4-3 (7)	_						
VELOPMENT (2		3.5	CLAYEY SAND, (SC) brown gray, fine to medium grained, moist, trace gravel, little organics (Fill)		SS 2	67	3-3-2 (5)							
OWN AND CREEK DE			SANDY LEAN CLAY, (CL) brown, moist to wet, mediur to rather stiff, trace fine to coarse gravel, iron oxide staining	n	SS 3	78	3-3-2 (5)	-						
PORTS/GINT/DE-T					SS 4	100	3-9-6 (15)	-						
ENGINEERING RE		9.5	LEAN CLAY WITH SAND, (CL) gray to dark gray, wet, rather stiff to medium, trace fine to coarse gravel	891.2	SS 5	100	4-6-6 (12)	-						
00)/ENGINEERING/		Σ	7 		SS 6	100	4-3-4 (7)	-						
3EO - (15.60936.1	15				SS 7	100	3-3-5 (8)	-						
CT ARDEN HILLS - (100	3-4-4 (8)							
SYTCAAP PROJEC	20	21.0		879.7	SS 9	56	3-4-3 (7)	-						
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:45 - H:/1-PROJECTS/2015 PROJEC			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

			Northe 6160 (Inver (Teleph	ern Technologies, Carmen Avenue E Grove Heights, MI none: 651-389-41	Inc. East N 55076 191					BO	RIN	G N	UM	BE	R D PAGE	E-8 1 0	01 F 1
	CLIE	NT Ca	arl Bolar	nder and Sons, Co	Э.		PROJEC	T NAME	Ram	sev County	v Re-D	evelop	ment	Site (1	FCAAF))	
	PROJ		UMBEF	R 15.60936.100			PROJEC	T LOCA	TION	Arden Hills	s, MN	•		•		,	
	DATE	STAR	TED 5	/21/15	COMPLETED	5/21/15	GROUNE) ELEVA		899.36 ft	,		HOL	E SIZ	E "6	1/2" in	ches
	DRILI			CTOR NTI			GROUN	WATE	R LEVE	LS:							
	DRILI	ING N	IFTHOR	3 1/4 in H S A			Σat			ING 6.50) ft / FI	ev 892	2 86 ft				
				<u><u> </u></u>	CHECKED BY		ΔΤ			ING		01 001					
	NOTE	S FI4	v at st	aked location													
			. at 50								1	1			EDBE	PC	
								ЪЕ	%		z.	Ę.	ш%				
	HT (ΗU						BER	La C	LUE NTS	1 PE	÷ ۳	NTR NTR		υ	È.	S
	СEР (#	LCR		MA	ATERIAL DESCH	RIPTION		IPLE	No.	AUID	К Ш т Ц Ш с С	Чġ	UIS NTE	MH	MIT	E	NI
		G						SAN N	SEC.	υz	lo 0	ЛY	ĭŽŐ	5=	PLA	S ^A S	
	0	1.3 1.0 3	<u> </u>)			0,			<u> </u>					₫	
5			0.3_^_	POORLY GRAD	ies) FD SAND WITH	SILT (SP-SM) brow	<u>899.0</u>	$\begin{vmatrix} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	0	4-4-4 (8)							
T (2).GF				fine to coarse gra	ained, moist	0.2., (0. 0, 2.0.	,			(-)	1						
DPMEN				(FIII) NOTE: No recov	ery Sample No.	1. Sampled auger			17	5-4-4 (8)							
DEVELO			4 5	cuttings.			904.0			(-)	1						
CREEK	5		4.0	SANDY LEAN C	LAY, (CL) brown	, moist to wet,	094.9	∖∕ ss		2-4-3	1						
N AND (_	medium, trace gr	ravel			∆ 3	22	(7)							
E-TOW			7.0 ¥				892.4	_									
VGINT/C			~ 4	POORLY GRAD	ED SAND WITH	GRAVEL, (SP) brow	vn,	∑ ss	67	3-3-2							
PORTS		/////	8.4	LEAN CLAY WIT	TH SAND, (CL) g	ray, wet, medium,	890.9	/ \ +		(3)	-						
ING RE	10		9.5	trace fine to coar	se gravel, iron o	xide staining		1 99		2_3_1	-						
SINEER				CLAYEY SAND, saturated, loose,	(SC) gray, fine to trace fine to coa	o coarse grained, arse gravel		\bigwedge 5	56	(7)							
NG/ENC			12.0	,			887.4	_			1						
INEER				SANDY LEAN C	LAY, (CL) gray, v	wet, medium		🗸 ss	100	3-4-3	1						
00)/ENG								/ 6		(7)	-						
60936.1										0.0.5	-						
EO - (15.								$\begin{pmatrix} 55 \\ 7 \end{pmatrix}$	100	(8)							
TS-GE								<u> </u>			1						
DEN HIL								√ ss	100	3-3-4	1						
ECT ARI								8	100	(7)	-						
PROJE			19.5				879.9				4						
STCAAF	_ 20		21.0	LEAN CLAY WIT	TH SAND, (CL) g	ray, wet, medium	979 /	$\begin{vmatrix} \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\ \\$	100	3-2-5 (7)							
ONECT		<u> </u>	21.0	Borehole	e backfilled with	auger cuttings.	070.4	V N -	1		1	I		I	I		
015 PR				Botto	om of borehole a	t 21.0 feet.											
ECTSV																	
V1-PRO																	
:45 - H:																	
25/16 14																	
5DT - 1//																	
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			Northe 6160 (Inver (Teleph	ern Technologies, Carmen Avenue E Grove Heights, MN none: 651-389-41	Inc. ast I 55076 91					BO	RIN	G N	UM	BE	R D Page	E-8 1 0	02 F 1
	CLIEN	NT Ca	arl Bolar	nder and Sons, Co			PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (FCAAF)	
	PROJ		UMBER	R <u>15.60936.100</u>			PROJEC			Arden Hills	s, MN						
	DATE	STAR	TED 5	/21/15	COMPLETED	5/21/15	GROUNI) ELEVA		900.4 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	iches
	DRILL	ING C	ONTRA	CTOR NTI			GROUNI		R LEVE	LS:							
	DRILL	ING N	IETHOD	3 1/4 in H.S.A			${ar abla}$ fa	TIME O	F DRIL	LING _17.0	00 ft / E	Elev 88	33.40	ft			
	LOGO	GED B	DAS	_	CHECKED BY	DAS	AT	END O	DRILL	.ING							
	NOTE	S Ele	ev. at sta	aked location.			AF	TER DR	ILLING								
	o DEPTH (ft)	GRAPHIC LOG	ə ivi t	MA	TERIAL DESCR	IPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
).GPJ			2.0	POORLY GRADE moist, trace grave (Fill)	ED SAND, (SP) b el	prown, coarse graine	ed, 808.4	SS 1	0	3-2-3 (5)							
C DEVELOPMENT (2			2.0	NOTE: No recove cuttings. CLAYEY SAND, grained, moist, lo	ery at Sample No (SC) brown and gose, sand (SP) s	1. Sampled auger gray, fine to medium		SS 2	56	3-2-4 (6)	-						
OWN AND CREEP	5			0				3 ss	44	3-2-4 (6)							
ORTS/GINT/DE-T(7.0	CLAYEY SAND, moist, loose, trac	(SC) brown and g e gravel	gray, fine grained,	893.4	SS 4	100	3-3-3 (6)							
ENGINEERING REP	 _ 10		9.5	CLAYEY SAND, medium dense, tr	(SC) brown, fine ace organics, irc	grained, moist, n oxide staining	890.9	SS 5	44	4-4-4 (8)	-						
00)/ENGINEERING/E			12.0	LEAN CLAY WIT rather stiff to med	H SAND, (CL) gi lium, trace grave	ay, moist to wet, I	888.4		100	3-4-7 (11)	-						
GEO - (15.60936.1	 							SS 7	100	4-5-5 (10)	-						
CT ARDEN HILLS -			Ţ						89	4-5-5 (10)							
STCAAP PRUJE	20		21.0				970 4	SS 9	100	3-4-4 (8)							
GEOTECH COLUMNS - GINT SITD US LAB MAY 2012.GDT - 1/25/16 14:45 - H:/1-PrkUJEC ISIZ015 PrKUJECI		~~~//4		Botto	m of borehole at	21.0 feet.		~ 4									

			Northe 6160 (Inver (Teleph	ern Technologies Carmen Avenue I Grove Heights, M hone: 651-389-4	, Inc. East N 55076 191					BO	RIN	G N	UM	BE	R D PAGE	E-8	03 F 1
	CLIEN	NT Ca	arl Bolar	nder and Sons, C	0.		PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF)	
	PROJ	ECT N	IUMBEF	R <u>15.60936.100</u>						Arden Hills	s, MN						
	DATE	STAR	TED 5	5/27/15		5/27/15	GROUNI) ELEVA		892.97 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	ches
	DRILL	ING C	ONTRA	ACTOR NTI			GROUNI	O WATER	R LEVE	LS:							
	DRILL	ING N	IETHOD	D 3 1/4 in H.S.A			TA \overline{Y}		F DRIL	LING _14.5	50 ft / E	Elev 87	78.47	ft			
	LOGO	ED B	I DAS	3	_ CHECKED B	Y DAS	AT	END OF	DRILL	ING							
	NOTE	S Ele	ev. at st	taked location.			AF	TER DR	LLING								
ł			<u>S 25 II</u>	East				111	<u>`0</u>					ATT	ERBE	RG	
	o DEPTH (ft)	GRAPHIC LOG		M	ATERIAL DESC	RIPTION		SAMPLE TYPI NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%	LIQUID		PLASTICITY INDEX	FINES
).GPJ				SILTY SAND, (S gravel (Fill)	SM) brown, fine (grained, moist, little		SS 1	44	2-3-5 (8)							
ELOPMENT (2			3.5	· · ·			889.5	SS 2	44	7-12-14 (26)							
OWN AND CREEK DEV	 <u>5</u>			POORLY GRAE medium to coars (Fill)	DED SAND WITH se grained, mois	f GRAVEL, (SP) brov t	wn,	SS 3	56	5-9-12 (21)	-						
REPORTS/GINT/UE-I	 			NOTE: Sampled	l auger cuttings.			ss 4	11	3-4-6 (10)	-						
G\ENGINEERING	<u> 10 </u> -		10.0	LEAN CLAY WI saturated, media	TH SAND, (CL) um to rather stiff	gray, moist to , trace gravel	883.0	SS 5	67	3-3-4 (7)							
00)/ENGINEERIN				NOTE: Sampled	l auger cuttings.			SS 6	6	7-7-7 (14)							
- GEO - (15.60936.	15		₽	-				SS 7	94	3-3-4 (7)	-						
ECT ARDEN HILLS									89	3-5-7 (12)							
STCAAP PROU	20		21.0				972.0	ss 9	100	4-6-9 (15)							
2015 PROJEC I SV		<u> </u>	21.0	Boreho Bott	e backfilled with om of borehole	auger cuttings. at 21.0 feet.	872.0	N N A	<u> </u>	(13)	1						
H:\1-PROJECTS\2																	
JT - 1/25/16 14:45																	
-AB MAY 2012.GD																	
- GINT STD US L																	
LECH COLUMNS																	
NTI GEOT																	

			North 6160 Inver Telep	ern Technologies Carmen Avenue Grove Heights, M bhone: 651-389-4	, Inc. East IN 55076 191						BO	RIN	G N	UM	IBE	R D Page	E-8 ≣ 1 0	04 DF 1
		NT Ca	arl Bola	under and Sons, C	ю.		_ PROJE			Ram	sey County	/ Re-D	evelop	oment	Site (TCAA	^{>})	
F	PROJ	IECT N	UMBE	R <u>15.60936.100</u>			_ PROJE		CATIC	ON _	Arden Hills	s, MN						
	DATE	STAR	TED	5/20/15		D <u>5/20/15</u>	GROUN	D ELE	VATIO		897.51 ft			HOI	LE SIZ	E "6	1/2" ir	nches
	ORILI	LING C	ONTRA	ACTOR NTI			GROUN	D WA	ER L	EVE	LS:							
	ORILI	ING M	IETHOI	D 3 1/4 in H.S.A			A	Т ТІМЕ	OF D	RILI	LING N	lo grou	udnwa	ter ob	served	J.		
L	OGG	GED B	DAS	5	CHECKED I	BY DAS	A	T END	of d	RILL	.ING							
1	NOTE	ES Ele	ev. at st	taked location.			. A	FTER I	RILL	ING								
			э э н і	NOLUI				ш	2	\$			L.		AT		RG	
	o DEPTH (ft)	GRAPHIC LOG		Μ	ATERIAL DES	CRIPTION		SAMPLE TYP		(RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WI (pcf)	MOISTURE CONTENT (%	LIQUID	PLASTIC		FINES
2).GPJ	-		2.0	POORLY GRAL grained, moist, (Fill)	DED SAND, (SF little gravel) brown, fine to medi	um 895.		S 1	56	2-2-1 (3)							
	-			POORLY GRAD	DED SAND WIT grained, moist,	ΓΗ SILT, (SP-SM) bro trace gravel	wn,	X	S 2	44	2-3-2 (5)							
OWN AND CREEK D	5		4.5	LEAN CLAY WI medium to rathe	TH SAND, (CL er stiff, trace gra) light brown, moist, avel	893.		5S 1 3	100	2-3-5 (8)							
PORTS/GINT/DE-T	-								S 1 4	100	3-6-7 (13)	-						
	<u>10</u>								5 1	100	4-4-6 (10)							
36.100)/ENGINEERIN	-								6 1	100	5-6-6 (12)							
GEO - (15.609)	15		15.5	LEAN CLAY W	TH SAND, (CL) gray, moist, medium	882. n to		5S 1 7	100	3-4-4 (8)							
ARDEN HILLS -	-			rather stiff, trace	e gravel				SS 1	100	3-4-3							
AP PROJECT /	- 20										4-4-7							
ECTSVTC/			21.0	Doroha	lo bookfilled wit	h augor outtings	876.	5M `	9 1	100	(11)							
ITI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:45 - H:11-PROJECTS/2015 PROJ				Bot	tom of borehole	e at 21.0 feet.												

			Northe 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, MI hone: 651-389-41	Inc. ast N 55076 91					BO	RIN	G N	UM	BE	R D PAGE	E-8	05 F 1
	CLIE	NT Ca	arl Bolai	nder and Sons, Co).		_ PROJEC	T NAME	Ram	sey County	y Re-D	evelop	oment	Site (TCAAF	²)	
	PROJ	IECT N	IUMBER	R 15.60936.100			_ PROJEC			Arden Hills	s, MN						
	DATE	STAR	TED 5	5/19/15	COMPLETED	5/19/15	GROUN	D ELEVA		893.43 ft			HOI	LE SIZ	E <u>"6</u>	<u>1/2" in</u>	<u>ches</u>
	DRILI		ONTRA	ACTOR NTI						LS:							
	DRILI			0 <u>3 1/4 in H.S.A</u>		Y DAS	-¥ A1			LING <u>6.00</u>) ft / E	lev 88	7.43 ft				
	NOTE	S FI	r <u>DAS</u> evatst	aked location		T_DA5											
$\left \right $. ut st				~							AT	ERBE	RG	
	DEPTH (ft)	GRAPHIC LOG		MA	TERIAL DESC	RIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID		PLASTICITY INDEX	FINES
2).GPJ			2.0	POORLY GRAD fine to medium g (Fill)	ED SAND WITH rained, moist	H GRAVEL, (SP) bro	wn, 891.4	SS 1	33	2-2-3 (5)	_						
EVELOPMENT (2			2.7	LEAN CLAY WIT gravel (Fill)	"H SAND, (CL)	brown, moist, trace	890.8	SS 2	78	8-6-5 (11)	-						
AND CREEK D	5		6.0 🗸	POORLY GRAD fine to medium g (Fill)	ED SAND WITH rained, trace gr	H SILT, (SP-SM) brov avel	wn, 	SS 3	22	5-8-8 (16)	_						
INDE-TOW			7.5	POORLY GRAD	ED SAND WITH Irated, medium	H SILT, (SP-SM) brow dense, trace gravel	wn, 885.9			756	-						
REPORTS/GIN				SANDY LEAN C rather stiff	LAY, (CL) brow	n, wet, medium to		4	67	(11)	-						
VENGINEERING	<u>10</u>							SS 5	100	3-3-2 (5)	-						
0)/ENGINEERINC								SS 6	100	5-5-6 (11)	-						
EO - (15.60936.10	15							SS 7	100	3-5-5 (10)							
RDEN HILLS - G								X ss	89	4-5-4							
ROJECT /			19.5				873.9			(3)	1						
TS/ICAAP F	20		21.0	SANDY LEAN C lenses	LAY, (CL) gray,	wet, rather stiff, san	d 872.4	SS 9	83	6-7-6 (13)							
5 PROJEC				Borehole Botto	e backfilled with om of borehole	auger cuttings. at 21.0 feet.											
CTS/201																	
1-PROJE																	
4:45 - H:																	
1/25/16 1																	
12.GDT -																	
3 MAY 20																	
D US LAE																	
GINT STI																	
- SNMNS -																	
ECH COL																	
NTI GEOT																	

		Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R D Page	E-8	06 DF 1
CLI	ENT _C	Carl Bolander and Sons, Co.	PROJE	CT NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAA)	
PRO	JECT	NUMBER _ 15.60936.100	PROJE			Arden Hills	s, MN						
DAT	E STA	RTED 5/21/15 COMPLETED 5/21/15	GROUN	D ELEVA		901.27 ft			HOI	_E SIZ	Έ <u>"</u> 6	1/2" ir	nches
DRI	LLING	CONTRACTOR NTI		D WATEF	LEVE	LS:							
DRI	LLING	METHOD 3 1/4 in H.S.A	¥A	T TIME OF		LING <u>12.0</u>	00 ft / E	Elev 88	39.27	ft			
	GED E	BY DAS CHECKED BY DAS	A`			.ING							
NO			A		LLING		1	1	1	A T 7			
PTH	APHIC	MATERIAL DESCRIPTION		LE TYPE ABER	VERY % QD)	OW JNTS ALUE)	ET PEN. tsf)	NIT WT. ocf)	STURE ENT (%)				NES
O	GRV			SAMPI	RECO (R	BI COI	POCK	DRY U ((CONT	LIQU	PLAS ⁻	PLASTI INDE	Ē
2).GPJ		0.4 TOPSOIL (5 inches) POORLY GRADED SAND WITH SILT, (SP- fine to medium grained moist trace gravel	-SM) brown,		56	2-3-4 (7)							
		(Fill)		SS 2	33	8-10-9 (19)							
2 CREEK	-			SS 3	22	9-13-12 (25)	-						
ORTS/GINT/DE-T				SS 4	56	4-6-5 (11)	-						
		10.0 LEAN CLAY WITH SAND, (CL) gray, moist t to rather stiff, trace gravel	891.: to wet, soft	SS 5	56	2-2-2 (4)	-						
		∇		SS 6	100	3-3-6 (9)							
15.60938:10 15				SS 7	100	2-5-6 (11)							
T ARDEN HILLS - 4				SS 8	100	5-5-8 (13)							
		21.0	880.	SS 9	100	4-6-8 (14)	-						
PROJEC.		Borehole backfilled with auger cuttir Bottom of borehole at 21.0 feet	ngs.	-			-	•		-	-		-
I GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/2316 14:46- H11-PROJECTS2015													

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R D Page	E-8 ≣ 1 0	07 F 1
	CLIE	NT Ca	rl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAI	^{>})	
	PROJ		JMBER _15.60936.100	PROJEC			Arden Hills	, MN						
	DATE	STAR	COMPLETED 5/18/15	GROUNE	ELEVA	ΓΙΟΝ	898.18 ft			но	_E SIZ	E "6	1/2" in	ches
	DRILI		DNTRACTOR NTI	GROUND	WATER		LS:			-				
	DRILI	LING MI	ETHOD 3 1/4 in H.S.A	abla at	TIME OF	DRILI	LING 4.50) ft / El	ev 893	3.68 ft				
	LOGO	GED BY	DAS CHECKED BY DAS	AT	END OF	DRILL	ING							
	NOTE	S Fle	v at staked location	AF	TER DRI									
	-				PE	% /	~	л. Ш	NT.	ц (%)	AT		RG	
	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TY NUMBEF	RECOVER' (RQD)	BLOW COUNTS (N VALUE	POCKET P (tsf)	DRY UNIT ((pcf)	MOISTUR	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES
GPJ			D.5TOPSOIL (6 inches) CLAYEY SAND, (SC) brown to light brown, fine to	897.7	SS 1	78	2-2-3 (5)							
LOPMENT (2).			(Fill). (53.5	894.7	SS 2	72	3-5-5 (10)							
CREEK DEVE	5		LEAN CLAY WITH SAND, (CL) brown, wet to moist, $\[mu]$ soft to medium, trace gravel		√ ss	20	2-1-3							
E-TOWN AND					3	39	(4)							
PORTS/GINT/D					$\bigvee ss_4$	56	3-5-9 (14)							
INEERING REF	10		9.5 LEAN CLAY WITH SAND, (CL) gray, wet, medium to rather stiff, trace gravel	888.7	SS 5	100	3-4-5 (9)	-						
NEERING/ENG					√ ss	100	3-3-4	-						
1936.100)/ENG					6	100	(7)							
S - GEO - (15.60	 				SS 7	89	2-3-5 (8)							
T ARDEN HILLS					SS 8	100	2-3-4 (7)	-						
CAAP PROJEC					∑ ss	100	3-3-5							
BROJECTSV			21.0 Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	877.2	/ 9		(0)							
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:45 - H:/1-PROJECTS/2011														

	Northern Technologies, Ir 6160 Carmen Avenue Ea Inver Grove Heights, MN Telephone: 651-389-419	nc. st 55076 1				BO	RIN	G N	UM	BE	R D Page	E-8 E 1 0	08 F 1
	CLIENT Carl Bolander and Sons. Co.		PROJEC		Ram	sev Count	/ Re-D	evelor	oment	Site (TCAAF))	
	PROJECT NUMBER 15.60936.100		PROJEC			Arden Hills	, MN				_		
	DATE STARTED 5/19/15	COMPLETED 5/19/15	GROUND	ELEVA		892.29 ft	,		но	_E SIZ	E "6	1/2" in	ches
			GROUND	WATER	LEVE	LS:							
	DRILLING METHOD 3 1/4 in H S A		∑ AT		DRILI	LING 3.50) ft / Fl	ev 888	3 79 ft				
		CHECKED BY DAS	ΔΤ			ING		01 000	5.1010				
	NOTES Elev at staked location												
			7.	Щ.,	%		ż	Υ.	Е %)	AT		RG	
	TAM C C C C C C C C C C C C C C C C C C C	ERIAL DESCRIPTION		SAMPLE TY NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE	POCKET PE (tsf)	DRY UNIT V (pcf)	MOISTUR CONTENT (LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES
GPJ		s). D SAND WITH SILT, (SP-SM) browr	<u>892.0</u> / n,	SS 1	44	1-2-2 (4)							
ELOPMENT (2)	(Fill).		888.8	SS 2	56	4-5-7 (12)							
CREEK DEVE	FOORLY GRADEI fine grained, satura	D SAND WITH SILT, (SP-SM) browr ated, medium dense	n,	√ ss	67	5-7-6	-						
DE-TOWN AND	7.0		885.3	3		(13)							
PORTS/GINT/L	LEAN CLAY WITH trace gravel	I SAND, (CL) gray, wet, rather stiff,		SS 4	56	4-6-7 (13)	-						
SINEERING RE	10 10.3 SILTY SAND, (SM	l) gray, fine grained, saturated,	882.0	SS 5	44	5-6-5 (11)	-						
ING/ENG	medium dense		880.3										
00)/ENGINEER	LEAN CLAY WITH rather stiff, trace g	I SAND, (CL) gray, wet, medium to ravel		SS 6	100	6-7-7 (14)							
0 - (15.60936.	15			SS 7	100	2-4-5 (9)							
DEN HILLS - GE				√ ss	100	2-3-5	-						
PROJECT ARI				8	100	(8)	-						
JECTS/TCAAP	20 21.0 Borehole	backfilled with auger cuttings	871.3	SS 9	89	3-4-6 (10)							
TI GEOTECH COLUMNS - GINT S TD US LAB MAY 2012.GDT - 1/25/16 14:46 - H:/1-PROJECTS/2015 PRO	Bottor	n of borehole at 21.0 feet.											

			North 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, MI hone: 651-389-41	Inc. ast N 55076 91					BO	RIN	G N	UM	IBE	R D PAGE	E-8 (= 1 0	09 F 1
	CLIE	NT Ca	arl Bola	nder and Sons, Co).		PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	ment	Site (TCAAF	>)	
	PROJ		UMBER	R 15.60936.100	·		PROJEC	T LOCA	ΓΙΟΝ	Arden Hills	s, MN						
	DATE		RTED 8	5/19/15	COMPLETED	5/19/15	GROUNE	ELEVA		890.82 ft			но	LE SIZ	Έ "6	1/2" in	ches
	DRILI			ACTOR NTI			GROUN			LS:							
	DRILI		IETHO) 3 1/4 in H.S.A			∇ at	TIME OF	- DRILI	LING 7.00) ft / El	lev 883	3.82 ft				
	LOGO	GED B	Y DAS		CHECKED B	/ DAS	AT	END OF	DRILL	.ING							
	NOTE	ES Ele	ev. at st	aked location.			AF	TER DRI	LLING								
	DEPTH (ft)	GRAPHIC LOG		MA	TERIAL DESC	RIPTION		AMPLE TYPE NUMBER	ECOVERY % (RQD)	BLOW COUNTS (N VALUE)	OCKET PEN. (tsf)	RY UNIT WT. (pcf)	MOISTURE ONTENT (%)	LIMIT	LERBE LIMITS LIMIT LIMIT		FINES
	0		0.3_/	TOPSOIL (3 inch	ies).	fing to see all	<u></u>	v Ss	₽ 56	3-5-5	₽.		0			2	
(2).GPJ				grained, moist, tr	ED SAND, (SP) ace gravel	brown, fine to medi	um pereire			(10)							
DEVELOPMENT				(Fill). SILTY SAND, (S dense to dense	M) brown, fine (grained, moist, mediu	um	SS 2	0	4-6-7 (13)	-						
'N AND CREEK	5			NOTE: No recove cuttings.	ery Sample No.	2. Sampled auger			67	4-8-9 (17)	-						
\DE-TOW			7.0 💆		(CC) grou fine	arained esturated	883.8				-						
E PORT S\GINT			0.5	loose	(SC) gray, fine	grained, saturated,	001.2	$\begin{pmatrix} SS \\ 4 \end{pmatrix}$	83	3-3-3 (6)	_						
G/ENGINEERING F			5.5	LEAN CLAY WIT soft	TH SAND, (CL)	gray, wet, medium to)	SS 5	89	2-2-2 (4)	-						
3.100)/ENGINEERIN								SS 6	44	1-2-3 (5)							
- GEO - (15.6093								SS 7	100	2-2-3 (5)	-						
T ARDEN HILLS			17.0	LEAN CLAY WIT gravel	H SAND, (CL)	gray, wet, soft, trace	873.8		100	0-2-2 (4)	-						
ROJEC				NOTE: Weight of	f Hammer at Sa	mple No. 8.					1						
ECTS/TCAAP P	20		21.0	Davabal	م الحماد الحماد الم		869.8	AU 9	100								
I GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:46 - H:/1-PROJECTS/2015 PRC				Botto	om of borehole	at 21.0 feet.											

		Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R D Page	E-8 ≞ 1 0	10 F 1
CL	IENT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF)	
PR						Arden Hills	s, MN			- 017	- "0	4.00	
	TE STAR	COMPLETED 5/19/15	GROUNE			890.38 ft			HO	LE SIZ	E <u>"6</u>	1/2" in	iches
								ov 000	1 00 4				
			IA ≚_ AT			LING <u>9.50</u>	Jπ/ΕΙ	ev 880	J.88 Π				
		T DAS CHECKED BT DAS				.ING							
			Ar							AT	FERBE	RG	
DEPTH	(ff) GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
	<u> </u>	0.3 TOPSOIL (3 inches). SILTY SAND, (SM) brown, fine grained, moist, trace			56	4-5-5 (10)						₫.	
ENT (2).GI		2.0 gravel (Fill).	888.4	∖∕ ss		6-8-8							
		LEAN CLAY WITH SAND, (CL) brown, moist, trace gravel (Fill).		2	78	(16)	-						
OWN AND CRE	-			$\bigvee SS 3$	78	5-5-5 (10)							
DRTS/GINT/DE-T		SILTY SAND, (SM) brown to dark gray, fine grained, moist to saturated, medium dense to loose	883.4	SS 4	33	3-4-6 (10)							
	<u>-</u> <u>-</u> -	$\overline{\Delta}$		SS 5	83	5-6-8 (14)	-						
100)/ENGINEER		13.5 POORLY GRADED SAND WITH CLAY (SP-SC) ligh	876.9	$\left \begin{array}{c} ss \\ 6 \end{array} \right $	67	2-3-5 (8)							
12 - (12:60936.	5	brown, fine grained, saturated, very loose to medium dense, clay lenses		SS 7	44	3-1-1 (2)							
				X ss	56	5-5-6 (11)	-						
	<u> </u>			∕∖ ss	02	6-6-5							
COLECTSVTC		21.0 Borehole backfilled with auger cuttings.	869.4	9	03	(11)							
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1729/6 14.46 - HY1-PROJECTS2015 PF		Bottom of borehole at 21.0 feet.											

			Northe 6160 Inver Telep	ern Technol Carmen Ave Grove Heigl hone: 651-3	logies, In enue Eas hts, MN 389-4191	ic. st 55076 1							BO	RIN	G N	UM	BE	R D Page	E-8 ′ ≞ 1 0	11 F 1
	CLIEN	NT _Ca	arl Bola	nder and Sc	ons, Co.				PROJEC		МE	Ram	sey Count	<u>y Re-</u> D	evelop	oment	<u>Site (</u>	<u>FCAA</u> F)	
	PROJ		UMBER	R 15.60936	6.100				PROJEC		САТ	ION	Arden Hills	s, MN						
	DATE	STAR	TED 5	5/18/15		COMPLET	FED <u>5/18/1</u>	5	GROUN) ELE	VAT		897.49 ft			но	LE SIZ	E_"6	1/2" in	ches
	DRILL			ACTOR NT	1				GROUN	D WAT	ER	LEVE	LS:							
	DRILL	ING N	IETHOD) 3 1/4 in H	H.S.A				AT	TIME	OF	DRILI	LING I	No gro	undwa	ter ob	served	۱.		
	LOGO	SED B		;		CHECKED	DAS		AT	END	OF	DRILL	ING							
	NOTE	S_Ele	ev. at st	aked locatio	on.				AF	TER	DRIL	LING								
ł																_	ATT	ERBE	RG	
	DEPTH (ft)	GRAPHIC LOG			MAT	ERIAL DE	SCRIPTION			SAMPLE TYPE	NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
GPJ				SILTY SAI	ND, (SM)) brown, fir	ne grained, n	noist, trace		٤	SS 1	44	1-3-5 (8)							
AENT (2).			3.0	(=111).					80/ 5	Ms	s	56	4-4-5	-						
EK DEVELOM	 		0.0	SILTY SAI	ND, (SM) ce grave) brown, fir I	ne grained, n	noist, mediun	1		2		(9)							
OWN AND CRE			- 0	NOTE: No	recovery	y. Sample	d auger cutti	ngs.		X	3 3	0	6-6-5 (11)	-						
RTS/GINT/DE-T			7.0	POORLY (grained, m	GRADED Ioist, loos) SAND, (se, trace g	SP) brown, fi Iravel	ine to coarse	890.5	X °	SS 4	44	2-3-5 (8)							
RING REPO	10		10 5						997 0	Ms	s	70	4-2-4	-						
			10.5	LEAN CLA trace grave	AY WITH el	SAND, (C	CL) gray, moi	ist, medium,	007.0		5	78	(6)							
00)/ENGINEER										X ۹	SS 6	100	2-2-3 (5)							
:O - (15.60936.	15									X	SS 7	56	2-3-4 (7)	-						
DEN HILLS - GE											s	100	2-3-4	-						
DJECT AR										μ	8	100	(7)	-						
TCAAP PR	20		01.0						070 5	$\bigvee {}^{\mathfrak{s}}$	SS 9	89	1-4-4							
PROJEC 15		V.////	21.0	В	orehole b Bottom	ackfilled v	with auger cu ole at 21.0 fe	ittings. et.	876.5		-		(0)		<u> </u>	I	I	I		I
CTS/2015																				
-PROJE																				
46 - H:/1																				
25/16 14:																				
3DT - 1/2																				
Y 2012.0																				
LAB MA																				
STDUS																				
- GINI																				
ECH CC																				
NTI GEOT																				

		Nor 616 Inve Tele	thern Technologies, Inc. 0 Carmen Avenue East er Grove Heights, MN 55076 ephone: 651-389-4191				BO	RIN	G N	UM	BE	R D Page	E-8 ∃ 1 0	12 F 1
	CLIE	NT Carl Bo	lander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	^{>})	
	PRO.	JECT NUMB	ER 15.60936.100	PROJEC	T LOCA		Arden Hills	, MN						
	DATE	E STARTED	<u>5/19/15</u> COMPLETED <u>5/19/15</u>	GROUN	ELEVA		891.84 ft			HOI	LE SIZ	Е <u>"6</u>	1/2" in	iches
	DRIL		RACTOR NTI	GROUN	WATER	R LEVE	LS:							
	DRIL	LING METH	OD _3 1/4 in H.S.A	$\overline{\Sigma}$ at		DRIL	LING 8.00) ft / El	ev 88	3.84 ft				
	LOG	GED BY DA	AS CHECKED BY DAS	AT	END OF	DRILL	_ING							
	ΝΟΤΙ	ES Elev. at	staked location.	AF	ter dri	LLING								
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
GFJ			ROADWAY BASE (30 inches).		SS 1	0	3-2-1 (3)	-						
DEVELOPMENT (2).		2.5	NOTE: No recovery. Sampled auger cuttings. POORLY GRADED SAND, (SP) brown, fine to medium grained, moist, little gravel (Fill)	889.3	SS 2	56	9-9-9 (18)	-						
WNN AND CREEK I		6.0	POORLY GRADED SAND, (SP) brown, fine to medium grained, moist	<u>887.3</u> 1 <u>885.8</u>	SS 3	67	4-5-6 (11)	-						
EPORTS/GINT/DE-TC	- ·		POORLY GRADED SAND, (SP) brown, fine grained, moist to saturated, dense $\underline{\nabla}$		ss 4	78	7-10-12 (22)	-						
IG/ENGINEERING RI		9.5	POORLY GRADED SAND WITH SILT, (SP-SM) brown fine to medium grained, saturated, medium dense	<u>870.9</u>	SS 5	44	4-7-8 (15)	-						
6.100)/ENGINEERIN		- 14 5	SILTY SAND, (SM) brown, fine grained, saturated, loose	877.3	$\left \begin{array}{c} SS \\ 6 \end{array} \right $	89	4-3-2 (5)	-						
LS - GEO - (15.6093			LEAN CLAY WITH SAND, (CL) brown gray, wet, medium to rather stiff	011.0	SS 7	100	2-5-4 (9)	-						
OJECT ARDEN HIL					SS 8	78	3-4-3 (7)	-						
TS/TCAAP PR	_ 20	21.0		870.8	SS 9	100	2-4-6 (10)	-						
GEOTECH COLUMNS - GINT STU US LAB MAY 2012.GUL - 1/22/18 14:46 - H/11-Prevueu IS/2018 Prevue			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R D Page	E-8 = 1 0	13 F 1
	CLIEN		arl Bolander and Sons. Co	PROJEC		Ram	sev County	/ Re-D	evelor	ment	Site (тсаар	2)	
	PRO		UMBER 15.60936.100				Arden Hills	MN		ment)	
		STAR					888 00 ft	, with		ноі		'E "6	1/2" in	ches
				GROUN			<u>16</u> .					L _ 0	1/2 11	
									av 970	0 E0 #				
	DRILL			- <u>×</u> A1			LING <u>9.50</u>		evore	5.59 II				
	LOGO		Y DAS CHECKED BY DAS	AI			.ING							
	NOTE	S _ EI	ev. at staked location.	AF					1					
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
2).(Sr.u			POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, moist, some fine to coarse gravel	vn,	AU 1	-								
VELOPMENT (4			(Fill)		SS 2	100	8-9-9 (18)							
AND CREEK DE	5		NOTE: No Recovery due to gravel. Sampled auger 6.0 cuttings.	882.1	SS 3	0	4-4-5 (9)							
SIN INDE-LOWN			SILTY SAND, (SM) brown, fine grained, moist (Fill)		∬ ss	89	6-7-6							
NG KEPOKI SV	 10		8.5 SILTY SAND, (SM) gray, fine grained, moist to ⊻ saturated, medium dense	879.6	4		(13)							
NG/ENUINEER						67	6-6-7 (13)							
00)/ENGINEEKI					SS 6	100	4-6-6 (12)							
5EU - (15.60936.	15				SS 7	78	5-6-5 (11)							
NKDEN MILLS - C					ss 8	67	7-5-5							
AAP PRUJEU I /					V ss		6-5-6							
01010			21.0	867.1	9	89	(11)							
GEOLECH COLUMINS - GINI S ID US LAB MAT ZUIZIGUI - 1/23 10 14-40 - 11/11-FROVEN INVENION			Bottom of borehole at 21.0 feet.											

	Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191	BORING NUMBER DE-814 PAGE 1 OF 1												
	CLIENT Carl Bolander and Sons, Co.	PROJECT NAME Ramsey County Re-Development Site (TCAAP)												
	PROJECT NUMBER 15.60936.100	PROJECT LOCATION Arden Hills, MN												
	DATE STARTED _5/19/15 COMPLETED _5/19/15	_ GROUND ELEVATION _888.1 ft HOLE SIZE6 1/2" inche												
	DRILLING CONTRACTOR NTI	GROUND WATER LEVELS:												
	DRILLING METHOD 3 1/4 in H.S.A	▲ AT TIME OF DRILLING _4.50 ft / Elev 883.60 ft												
	LOGGED BY _DAS CHECKED BY _DAS	AT END OF DRILLING												
	NOTES _Elev. at staked location.	AF	TER DR	ILLING										
ľ	_ υ		ΥΡΕ R	% ≻	s (i	EN.	WT.	RE (%)	AT	ERBE	RG			
			SAMPLE T NUMBE	RECOVER (RQD)	BLOW COUNT (N VALU	POCKET F (tsf)	DRY UNIT (pcf)	MOISTUI	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES		
1.01-0	SILTY SAND, (SM) brown and tan, fine grained, moist (Fill)	t	AU 1											
VELOPMENI (2)			ss 2	56	3-3-4 (7)									
NN ANU CREEK UE	5 5 5 5 5 5 5 5 5 5 5 5 5 5	883.6 882.1	SS 3	100	6-8-7 (15)	_								
	POORLY GRADED SAND WITH SILT, (SP-SM) dark gray, fine grained, saturated, loose, trace gravel	879.8	SS 4	83	3-2-3 (5)									
	10 9.5 SILTY SAND, (SM) dark gray, fine grained, saturated, medium dense, trace gravel		SS 5	67	5-6-3 (9)	-								
	SANDY LEAN CLAY, (CL) dark gray, wet, medium to rather stiff, trace fine to coarse sand	876.1	SS 6	56	2-4-3 (7)	-								
- GEU - (15:60936:10			SS 7	100	3-3-4 (7)	-								
			SS 8	100	4-4-6 (10)	-								
TS/I CAAP PRO	20 21.0	867.1	SS 9	100	5-6-5 (11)									
GEOLECH COLUMNS - GINL S ID US LAB MAT 2012;601 - 1122/10 14:40 - 11:01-E-MADEO 10:2019 E-MADE	Borenole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.													

			Northe 6160 Inver Telepl	ern Technologies Carmen Avenue Grove Heights, M hone: 651-389-4	s, Inc. East /N 55076 i191					BO	RIN	G N	UM	BE	R D PAGE	E-8 ' ∃ 1 0	15 F 1		
	CLIE	NT _C	arl Bolai	nder and Sons, (Co.		PROJEC	T NAME	Ram	sey County	y Re-D	evelop	oment	Site (TCAAF	>)			
	PRO		NUMBER	R 15.60936.100)		PROJEC			Arden Hills	s, MN								
	DATE	STAF	RTED 5	5/19/15		5/19/15	GROUND ELEVATION 892.67 ft HOLE SIZE _"6 1/2" in/												
	DRILI		CONTRA	ACTOR NTI			GROUND WATER LEVELS:												
	DRILI		METHOD	D <u>3 1/4 in H.S.A</u>	۱.														
	LOGO	GED B	Y DAS	5	CHECKED B	DAS	AT END OF DRILLING												
	NOTE	ES EI	ev. at st	aked location.			AFTER DRILLING												
	T	₽						IYPE ER	אא)	LE)	PEN.	- WT.	IRE T (%)	AT		RG } ≻	(0		
	DEPT (ft)	GRAPH		N	IATERIAL DESC	RIPTION		SAMPLE '	RECOVEI (RQD	BLOV COUN ^T (N VALL	POCKET (tsf)	DRY UNIT (pcf)	MOISTL CONTEN	LIQUID	PLASTIC LIMIT	PLASTICIT INDEX	FINE		
z).GPJ				POORLY GRAI grained, moist t (Fill).	DED SAND, (SP) to saturated, som	brown, fine to mediu e fine to coarse grave	m 위	AU 1	_										
JEVELOPMENI (SS 2	44	2-2-3 (5)									
VN ANU CREEK I	5		<u>⊽</u> 6.0				886.7	SS 3	33	1-1-1 (2)	-								
RTS/GINT/DE-TO/				fine grained, sa	turated, medium	dense	//I,	SS 4	78	4-5-5 (10)									
3 REPOR			9.5				883.2												
IG/ENGINEERIN		-	12.0	POORLY GRAI fine grained, sa	DED SAND WITH turated, loose, tra	I SILT, (SP-SM) brow ace gravel	/n, 880 7	SS 5	56	3-3-2 (5)	-								
100)/ENGINEERI			12.0	LEAN CLAY W to rather stiff, tr	ITH SAND, (CL) ace gravel	dark gray, wet, mediu	m	SS 6	78	2-3-3 (6)									
GEO - (15.60936.	15							SS 7	100	3-3-3 (6)	-								
T ARDEN HILLS -								SS 8	78	4-7-3 (10)									
STCAAP PHUJEU	20		21.0				871 7	SS 9	67	5-6-5 (11)									
2015 PRUJEU I		<u> </u>	<u></u>	Boreho Bot	ble backfilled with ttom of borehole a	auger cuttings. at 21.0 feet.	0/1./	v 1		. ,	1	1		1	<u> </u>	I			
N1-PROJECIAN																			
1/25/16 14:46 - F																			
MAY 2012.GDT -																			
NI S ID US LAB																			
COLUMNS - GI																			
NTI GEOTECH																			

Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191								BORING NUMBER DE-816 PAGE 1 OF 1											
	CLIE	NT C	arl Bola	nder and Sons	s, Co.	PROJECT NAME Ramsey County Re-Development Site (TCAAP)													
	PRO.		NUMBER	R <u>15.60936.1</u>	00		PROJECT LOCATION _Arden Hills, MN												
	DATE	STAF	RTED _	5/18/15		TED <u>5/18/15</u>	GROUND ELEVATION _903.88 ft HOLE SIZE _"6 1/2" inches												
	DRILI	LING (CONTRA	ACTOR NTI			_ GROUND WATER LEVELS:												
	DRILI		NETHOD	D <u>3 1/4 in H.</u>	S.A		_ AT TIME OF DRILLING No groundwater observed.												
	LOGO	GED B	Y DAS	5	CHECKE	DAS	_ AT END OF DRILLING												
	NOTE	ES _EI	ev. at st	aked location.			_ A	TER DR	LLING		1	1	1						
	o DEPTH (ft)	GRAPHIC LOG			MATERIAL D	ESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES		
2).GPJ				SILTY SAND moist, fine to (Fill)	WITH GRAVE medium grave	EL, (SM) brown, fine grai I	ined,	SS 1	44	2-6-8 (14)									
EK DEVELOPMENT (NOTE: No re	covery. Sample	ed auger cuttings.		SS 2	0	3-3-4 (7)									
TOWN AND CREE			5.0	LEAN CLAY stiff, trace gr	WITH SAND, (avel	CL) brown, moist, rathe	<u>898.</u> r	$\frac{2}{3}$	89	2-4-5 (9)									
PORTS/GINT/DE-								SS 4	100	3-5-6 (11)									
ENGINEERING RE	10							SS 5	100	4-6-8 (14)	-								
00)/ENGINEERING			12.0	LEAN CLAY trace gravel	WITH SAND, (CL) gray, moist, rather s	891.: stiff,		100	4-5-6 (11)	-								
- GEO - (15.60936.	15							SS 7	100	3-4-6 (10)	-								
ECT ARDEN HILLS								SS 8	100	3-5-6 (11)	-								
STCAAP PRO	20		21.0				002	ss 9	100	2-5-6 (11)									
5 PROJECT		<u> </u>	<u>121.U</u>	Bo	rehole backfille Bottom of boreł	d with soil cuttings. nole at 21.0 feet.	002.1		1	,	1	I	1	1	<u> </u>		I		
UTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:46 - H:/1-PROJECTS/2015 P																			

Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191								BORING NUMBER DE-817 PAGE 1 OF 1											
	CLIEN		arl Bola	under and Sons C		DI	PROJECT NAME Ramsey County Re-Development Site (TCAAP)												
	PRO.I			R 15 60936 100	J.	FI	PROJECT LOCATION Arden Hills. MN												
		STAF		5/18/15	COMPLETED 5/18/15	CI	GROUND ELEVATION 901 99 ft HOLF SIZE "6 1/2" inches												
						GI	GROUND WATER LEVELS												
				$\mathbf{D} 3.1/4 \text{ in } \mathbf{H} \mathbf{S} \mathbf{A}$		0	GROUND WATER LEVELS: ∇ AT TIME OF DRIFTING: 4.50 ft / Elever 807.40 ft												
			v DAG	8 <u>0 114 11 11.0.7 (</u>			AT END OF DRILLING												
	NOTE	S FI	evats	taked location															
)EPTH (ft)	RAPHIC LOG		MA	TERIAL DESCRIPTION			PLE TYPE JMBER	OVERY % RQD)	BLOW DUNTS VALUE)	KET PEN. (tsf)	UNIT WT. (pcf)	ISTURE TENT (%)				INES		
	0	5						SAM	REC	ΞŬΖ	POC	DRY	CON	LIQ	PLA	PLAS ⁻			
1.GPJ			2.0	POORLY GRAD fine to medium g (Fill)	ED SAND WITH SILT, (SP rained, moist, trace gravel	P-SM) brown,	900.0	SS 1	67	2-2-2 (4)	_								
VELOPMENI (2			1.0	SILTY SAND, (S medium grained, (Fill)	M) brown and light brown, t moist, trace gravel	fine to	808.0	SS 2	56	3-3-3 (6)									
EEK UE		m	<u>4.0</u>	Z SILTY SAND, (S	M) gray, fine to coarse grai	ined,	090.0				_								
JWN AND CK				saturated, very lo	oose			$\begin{pmatrix} SS \\ 3 \end{pmatrix}$	83	1-1-1 (2)									
			7.0	SILTY SAND. (S	M) brown, fine to coarse or	ained.	895.0	ss		3-5-6	-								
AE PORT SIGIN			•	saturated, loose gravel	to medium dense, trace to	a little		4	78	(11)	-								
SNUNEEKING			•					SS 5	56	2-3-4 (7)									
ENGINEERING/								SS 6	44	4-6-7 (13)	-								
36.1001			14.5				887.5												
- GEU - (15.609				POORLY GRAD fine to coarse gra gravel	ED SAND WITH SILT, (SP ained, saturated, medium d	P-SM) brown, lense, trace		SS 7	100	1-5-4 (9)									
			17.0		(SC) brown find to opprov	arainad	885.0			0.05	-								
JUECT ARDER				saturated, loose,	trace gravel	grained,			78	3-3-5 (8)	-								
JAAP PR	20		19.5	SILTY SAND, (S	M) brown, fine to coarse gr	ained,	882.5	√ ss	80	4-3-4	-								
IEC I SVI			21.0	saturated, loose,	trace gravel	nas	881.0	/\ 9	03	(7)									
E01ECH C0C0MNS - GINI S ID 0S LAB MAT 2012 (0D1 - 1/2010 14:40 - 11:11-1200 E0 105 12:00				Botta	m of borehole at 21.0 feet														
	(Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R D Page	E-8 ∃ 1 0	18 0F 1					
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	CLIER		arl Bolandor and Sono. Co			Dom	any Count	, Do D	ovolor	mont	Sito (ור						
	PRO						Arden Hills		evelop	ment	Sile (-)						
		STAR	COMPLETED 5/18/15				807 33 ft	, IVII N		но		/F "6	1/2" ir	chee					
				GROUN			:1 S·					<u> </u>	1/2 11						
							LING 7 00) ft / El	ev 80(ר אז וו									
				Δ			ING			<u>5.55 n</u>									
	NOTE	ES EI	ev. at staked location.	A	TER DRI	LLING													
	HT (0 HIC			E TYPE BER	ERY % D)	W VTS LUE)	T PEN. f)	IT WT.	'URE NT (%)	AT		RG }	ES					
	o DEF (ft	GRAF	MATERIAL DESCRIPTION		SAMPLE	RECOV (RC	BLC COUI	POCKE (ts	DRY UN (pc	MOIST	LIQUIE	PLASTI LIMIT	PLASTIC INDEX	L					
(Z).GPJ			POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, moist, trace gravel, trace root 2.0 (Fill)	/n, ts895.3	SS 1	44	1-3-4 (7)												
DEVELOPMEN			SILTY SAND, (SM) brown, fine to medium grained, moist (Fill)	802 6	SS 2	67	5-8-7 (15)	-											
N AND CREEK	5		SANDY LEAN CLAY, (CL) gray, moist, stiff, trace gra	vel 891.3	SS 3	44	8-10-11 (21)												
			POORLY GRADED SAND, (SP) gray to brown, fine to medium grained, moist to saturated, medium dense, trace gravel	D 889 1	ss /	78	2-3-6												
ING REPORTS	 10		SANDY LEAN CLAY, (CL) gray, wet, medium, trace 9.5 gravel	887.8				-											
NG/ENGINEEK			saturated, loose, trace gravel		5	56	(6)	-											
100)/ENGINEEK			12.8 PEAT, (Pt) black, moist, soft, fibrous	884.5	SS 6	83	2-3-3 (6)	-											
GEU - (15.60936.	15			000	SS 7	78	1-1-1 (2)												
AKDEN HILLS -			SILTY SAND, (SM) gray, fine grained, saturated, loos trace gravel	e,	ss 8	56	3-3-4 (7)												
	20				∕ ss	0.2	1-6-2												
			21.0 Borehole backfilled with auger cuttings.	876.3	9	83	(8)												
MII GEOLECH COLUMINS - GINI S I'U OS LAB MAT 2012.001 - 1/2010 14:40 - 11/1-FRAALA 14:00			Bottom of borehole at 21.0 feet.																

			North 6160 Inver	ern Technologies, Carmen Avenue E Grove Heights, MI	Inc. ast N 55076					BO	RIN	G N	UM	BE	R D PAGE	E-8 ′ ≞ 1 0	19 F 1
		ン	Telep	bhone: 651-389-41	91												
		п <u>с</u>	arl Bola	inder and Sons, Co).		PROJEC		Ram	sey County	<u>y Re-D</u>	evelop	oment	Site (ICAA	<u>,)</u>	
	PROJ	ECT	NUMBE	R <u>15.60936.100</u>			PROJEC	T LOCA		Arden Hills	s, MN						
	DATE	STAF	RTED	5/18/15	COMPLETED	5/18/15	GROUNE	ELEVA	TION _	894.26 ft			HOL	E SIZ	E <u>"6</u>	<u>1/2" in</u>	ches
	DRILL	ING (CONTR	ACTOR NTI			GROUNE	WATE	R LEVE	LS:							
	DRILL	ING N	NETHO	D 3 1/4 in H.S.A			$ar{2}$ at	TIME C	F DRIL	LING 5.00	0 ft / El	ev 889	9.26 ft				
	LOGG	ED B	Y DAS	3	CHECKED BY	/ DAS	AT	END O	F DRILL	.ING							
	NOTE	S _EI	ev. at s	taked location.			AF	ter df	ILLING								
		U						ЧРЕ	۲ %	φ. Ω	EN.	WT.	КЕ (%)	ATT	ERBE	RG	
	DEPTH (ft)	GRAPHI LOG		MA	TERIAL DESCI	RIPTION		SAMPLE T NUMBEI	RECOVER (RQD)	BLOW COUNTS (N VALUI	POCKET P (tsf)	DRY UNIT (pcf)	MOISTUF	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES
LHE		***	1.0	POORLY GRAD	ED SAND, (SP) ace gravel	brown, fine to mediur	n 	SS 1	44	2-4-6 (10)						_	
EVELOPMENI (2).			2.8	POORLY GRAD grained, moist, m SANDY LEAN C	ED SAND, (SP) nedium dense, ti LAY, (CL) gray I	brown, fine to mediur race gravel prown, moist, rather	/ m <u>891.4</u> /		83	3-6-7 (13)	-						
VN AND CREEK DI	5		4.5 <u> </u>	stiff, trace gravel SILTY SAND, (S moist to saturate	M) brown to dar d, medium dens	k brown, fine grained, e, trace gravel	889.8	3	56	3-8-6 (14)	_						
JKI S/GIN I/DE-I OV								$\bigvee ss_4$	67	3-6-7 (13)	_						
NGINEEKING KEPC	 _ <u>10</u>		10.0 10.5	PEAT, (Pt) black	, moist, medium	aray, fine arained	<u>884.3</u> 883.8	SS 5	78	2-4-1 (5)	_						
VENGINEEKING/EI			· · · · ·	saturated, loose,	trace gravel	gray, nne granieu,		SS 6	56	1-3-2 (5)							
- (15:60936.100)	 15		14.5	CLAYEY SAND,	(SC) gray, fine	grained, saturated, ve	879.8 ery	∑ ss	67	2-1-1							
A HILLS - GEO			17.0			wat madium to soft	877.3		-	(2)	-						
KUJECI ARUEI				trace gravel	LAT, (CL) glay,	wet, medium to soft,		8	33	(6)	-						
ECTS/LCAAP P	20		21.0	Doroboli	bookfilled with	ourse outtings	873.3	SS 9	28	2-2-1 (3)							
I GEOLECH COLUMNS - GINLS ID US LAB MAY 2012.GUL - 1/2016 14:46 - H:VI-PROJECIS/2016 PR/				Botto	om of borehole a	at 21.0 feet.											

			Northe 6160 Inver Telepl	rn Technologies, Inc. Carmen Avenue East Grove Heights, MN 55076 tone: 651-389-4191					BO	RIN	G N	UM	BE	R D PAGE	E-82	20 F 1
		IT _Ca	arl Bolai	der and Sons, Co.		PROJEC		Ram	sey County	/ Re-D	evelop	ment	Site (1	FCAAF	')	
F	PROJ		IUMBEF	15.60936.100		PROJEC			Arden Hills	, MN						
	DATE	STAF	TED 5	/18/15 COMP	LETED <u>5/18/15</u>	GROUN	D ELEVA		894.31 ft			HOL	E SIZ	E <u>"6</u>	<u>1/2" in</u>	ches
1	ORILL	ING C	ONTRA	CTOR NTI			O WATER	R LEVE	LS:							
1	DRILL	ING N	IETHOE	3 1/4 in H.S.A		⊥¥at	TIME OF	DRIL	LING <u>5.00</u>) ft / El	ev 889	9.31 ft				
	_0G0	ED B	Y DAS	CHEC	KED BY DAS	AT	END OF		_ING							
Ľ	NOTE		ev. at st	aked location.		AF										
	0 DEPTH (ft)	GRAPHIC LOG		MATERIAL	DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
(2).6PJ	-		5	POORLY GRADED SANI fine to coarse grained, mo (Fill)	D WITH SILT, (SP-SM) brown bist, trace gravel	n,	ss 1	83	2-3-5 (8)	-						
I I I	-		2.5	POORLY GRADED SAN fine to coarse grained, mo	D WITH SILT, (SP-SM) brown bist, dense, little gravel	891.8 n,	SS 2	56	6-11-11 (22)	-						
OWN AND CREEK	5		<u>7.0</u> <u> </u>	SILTY SAND, (SM) brown moist to saturated, dense	n, fine to medium grained, , trace gravel	000.0	SS 3	78	8-11-10 (21)	-						
	-		8.0	SANDY LEAN CLAY, (CL) blue gray, wet, rather stiff,	886.3	SS 4	78	3-7-5 (12)	-						
	10		9.5	SILTY SAND, (SM) gray, trace gravel	fine grained, saturated, loose	884.8 , 883.8	SS 5	44	3-4-3 (7)							
	_	<u>1, \1,</u>		PEAT, (Pt) black, moist, s	SOIL											
36.100)/ENGINEE	-		13.0	SILTY SAND, (SM) gray, loose, trace gravel	fine grained, saturated, very	<u>881.3</u> 879.8	SS 6	67	1-1-1 (2)	-						
5 - GEO - (15.609	<u>15</u> -			SANDY LEAN CLAY, (CL gravel) gray, wet, rather stiff, trace		SS 7	89	2-5-4 (9)							
CT ARDEN HILLS	-		17.0	SILTY SAND, (SM) gray, medium dense to very loc	fine grained, saturated, ose, trace gravel	877.3	SS 8	100	4-10-2 (12)	-						
	20						SS 9	100	1-1-1 (2)	-						
TSV2015 PROJEC	-						SS 10	100	3-4-4 (8)	_						
1-PROJEC	-		24.5			869.8									1	
14:46 - Hi	25		26.0	SANDY LEAN CLAY, (CL gravel	.) gray, wet, rather stiff, trace	868.3	SS 11	100	4-4-6 (10)							
GDT - 1/25/16		/		Borehole backfill Bottom of bo	ed with auger cuttings. rehole at 26.0 feet.											
AB MAY 2012.0																
INT STD US L/																
COLUMNS - G																
NTI GEOTECH																

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	IBE	R D Page	E-8 E 1 0	21 F 1
	CLIE	NT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sev County	/ Re-D	evelor	oment	Site (ГСААР	>)	
	PROJ	IECT N	IUMBER 15.60936.100	PROJEC		TION	Arden Hills	, MN					/	
	DATE		TED 5/15/15 COMPLETED 5/15/15	GROUN			888 46 ft	,		но		Έ "6	1/2" in	ches
	DRILI			GROUN										
							LING 7.00) ft / Fl	lev 88	1 46 ft				
						ו וופח				1.40 10				
	NOTE	S FIA	av at staked location											
	Non			74				1	1	1	ΔΤ	FRRE	RG	
	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
).GPJ			POORLY GRADED SAND, (SP) brown, fine to mediur grained, moist, trace gravel (Fill)	n	ss s	33	1-1-2 (3)							
/ELOPMENT (2)			NOTE: No recovery. Sampled auger cuttings.	885.0	SS 2	0	2-3-5 (8)							
VN AND CREEK DEV			POORLY GRADED SAND WITH CLAY, (SP-SC) brown, fine to medium grained, moist, trace gravel, cla (CL) lenses 6.0 (Fill)	iy 	SS 3	33	1-1-1 (2)	-						
RTS/GINT/DE-TOW			$\overline{\nabla}$ LEAN CLAY WITH SAND, (CL) gray, moist to wet, $\overline{\nabla}$ medium, trace gravel		SS 4	56	2-2-4 (6)	-						
GINEERING REPOI	10				SS 5	94	2-3-3 (6)							
VENGINEERING/EN					SS 6	100	2-3-5 (8)							
sEO - (15.60936.100)	15				SS 7	89	2-2-3 (5)	_						
T ARDEN HILLS - G					SS 8	100	2-3-4 (7)	-						
TCAAP PROJEC	20				ss ss	100	2-3-5							
015 PROJECT SVI		<u> </u>	Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	867.5	<u> </u>		(Ծ)	<u> </u>	<u> </u>	<u> </u>		<u> </u>	<u> </u>	
3EOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:46 - H:/1-PROJECTS/2														

		Northern Te 6160 Carmo Inver Grove Telephone:	echnologies, I en Avenue Ea Heights, MN 651-389-419	nc. ast 55076 91					BO	RIN	G N	UM	BE	R D Page	E-8 2 ∃ 1 0	22 F 1
	CLIENT	Carl Bolander a	and Sons, Co			PROJEC	T NAMI	E Ram	sey County	y Re-D	evelop	oment	Site (FCAAF)	
	PROJE	CT NUMBER 15	.60936.100			PROJEC			Arden Hills	s, MN						
	DATE S	TARTED _ 5/18/1	5	COMPLETED	5/18/15	GROUNI	D ELEV		890.4 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	ches
	DRILLIN	NG CONTRACTO	R NTI			GROUNI	WATE	R LEVE	LS:							
	DRILLIN	NG METHOD 3 1	/4 in H.S.A			${ar ar \Sigma}$ at	TIME C	OF DRIL	LING _7.00) ft / El	ev 883	3.40 ft				
	LOGGE	DBY DAS		CHECKED BY	DAS	AT	END O	F DRILL	_ING							
	NOTES	Elev. at staked	location.			AF	TER DF	RILLING								
	_ (د					ΥΡΕ R	% 入	s (ji	EN.	WT.	RE (%)	AT1	ERBE	RG	
	DEPTH (ff) (ff)	LOG	MA	FERIAL DESCR	PTION		SAMPLE T NUMBE	RECOVER (RQD)	BLOW COUNT (N VALU	POCKET F (tsf)	DRY UNIT (pcf)	MOISTU	LIQUID	PLASTIC LIMIT	PLASTICIT ^V INDEX	FINES
GPJ		SAN	DY SILT, (MI) brown, moist		888.9	ss ss	44	1-2-2 (4)							
OPMENT (2).		SILT mois 3.0 (Fill)	'Y SAND, (SN st	1) brown, fine to	medium grained,	887.4	ss 2	78	2-2-3 (5)	-						
CREEK DEVE		LEA	N CLAY WITI	H SAND, (CL) gr	ay, moist, medium		 ∕∕ ss		2-3-2							
-TOWN AND		7.0 🗸				883.4	3	28	(5)	-						
JRTS/GINT/DE		POC satu	RLY GRADE	D SAND, (SP) b ose, trace gravel	rown, fine grained,			56	2-1-3 (4)							
EERING REP	 10	9.5 SILT	Y SAND, (SN	1) gray and brow	n, fine grained,	880.9	ss 5	44	3-1-1	_						
ERING/ENGIN		12.5	latea, very lot			877.9			(2)	-						
5.100)/ENGINE		LEA med	N CLAY WITI ium, trace gra	H SAND, (CL) gr avel, sand lenses	ay, wet, soft to			100	(4)	-						
3EO - (15.6093	15							83	2-3-4 (7)	-						
DEN HILLS - C							∬ ss	, 100	2-3-4	-						
PROJECT AF							8		(7)	-						
JEC I S/I CAA		21.0	Borehole	backfilled with a	uger cuttings	869.4	SS 9	100	2-3-4 (7)							
TTI GEOTECH COLUMNS - GINT S ID US LAB MAY 2012.GUL - 1/28/18 14:46 - m:nt-prevued iokavia Pr			Βοπο	m of dorenole at	21.0 Teet.											

			Northe 6160 Inver Telepl	ern Technologie Carmen Avenue Grove Heights, I hone: 651-389-	s, Inc. e East MN 55076 4191						BO	RIN	G N	UM	BE	R D PAGE	E-8 2 ≣ 1 0	23 F 1
	CLIEN	NT Ca	arl Bolai	nder and Sons,	Co.		_ PROJE		ME	Ram	sey County	/ Re-D	evelop	ment	Site (TCAAF	^{>})	
	PROJ		UMBEF	R 15.60936.10	0		PROJE	CT LO	CAT		Arden Hills	s, MN						
	DATE	STAR	RTED 5	5/18/15		ED <u>5/18/15</u>	GROUN	ID ELE	VAT		889.15 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	ches
	DRILL	LING C	ONTRA	ACTOR NTI			GROUN	ID WA	TER	LEVE	LS:							
	DRILL	ING N	IETHOE) 3 1/4 in H.S./	٩		_ <u>V</u> a	т тімі	E OF	DRIL	LING _9.50) ft / E	lev 879	9.65 ft				
	LOGO	GED B	Y DAS	6	CHECKED	BY DAS	_ A	T END	OF	DRILL	.ING							
	NOTE	S Ele	ev. at st	aked location.			_ A	FTER	DRII	LING								
	o DEPTH (ft)	GRAPHIC LOG		Ν	MATERIAL DES	SCRIPTION		SAMPLE TYPE	NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
).GPJ			0.7	TOPSOIL (8 in SILTY SAND, (Fill)	ches). (SM) brown, fin	e grained, moist	888.	5	SS 1	56	1-3-4 (7)	_						
DEVELOPMENT (2	 		3.0	POORLY GRA medium graine (Fill)	DED SAND, (S ed, dry, trace gra	P) light brown, fine to avel	886.	2	SS 2	44	6-4-3 (7)							
OWN AND CREEK	5		7.0	SANDY LEAN	CLAY, (CL) bro	own, moist, medium			SS 3	56	4-2-4 (6)							
PORTS/GINT/DE-1			7.0	SANDY LEAN	CLAY, (CL) gra	ay, moist to wet, medi	002. um		SS 4	100	3-3-3 (6)							
(ENGINEERING RE	10		₽						SS 5	100	3-3-4 (7)							
100)/ENGINEERING									SS 6	100	3-4-4 (8)	-						
GEO - (15.60936.			14.5	SANDY LEAN to coarse grave	CLAY, (CL) gra el	ay, wet, medium, little	874. fine		SS 7	100	6-5-4 (9)	_						
CT ARDEN HILLS -									SS 8	89	5-4-4 (8)							
ISTCAAP PROJE	20		21.0				868.	2	SS 9	89	3-3-2 (5)							
5 PROJECT				Boreh Bo	ole backfilled w ottom of borehol	ith auger cuttings. le at 21.0 feet.		* V				•			•	•	I	
ITI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:46 - H:\1-PROJECTS\2015																		

			North 6160 Inver Telep	ern Tech Carmen Grove H bhone: 6	nologie Avenue eights, 51-389	es, Inc. e East MN 550 -4191	076								BO	RIN	G N	UM	IBE	R D Page	E-8 2 ∃ 1 0	24 F 1
	CLIEN	гс	arl Bola	inder and	I Sons,	Co.				PI	ROJEC		NE F	Rams	sey County	/ Re-D	evelo	oment	Site (ГСААР	^{>})	
	PROJE		NUMBE	R _15.60	936.10	0				PI	ROJEC			N _	Arden Hills	s, MN						
	DATE	STAF	RTED	5/18/15		co	MPLET	ED 5/1	8/15	GI	ROUNI) N	888.51 ft			но	LE SIZ	E "6	1/2" in	ches
	DRILLI	NG		ACTOR	NTI					G	ROUNI	D WAT	ER L		LS:			-				
	DRILLI	NG N	NETHO	D 3 1/4	in H.S.	A						ТІМЕ	of d	RILI	LING 4.50) ft / E	lev 88	4.01 ft				
	LOGGI	ED B	Y DAS	S		CH	IECKED	BY DA	AS		AT	END	of Di	RILL	.ING							
	NOTES	S EI	ev. at s	taked loc	ation.				-		AF		RILL	ING								
)EPTH (ft)	ZAPHIC LOG				MATER	IAL DE	SCRIPT	ION			РЦЕ ТҮРЕ		(RQD)	alow ounts value)	KET PEN. (tsf)	UNIT WT. (pcf)	JISTURE ITENT (%)				-INES
	0					(014)		<u> </u>				SAM			_οΣ	POC	DRY	¥о	93	PLA	PLAS	
(Z).GPJ			· • •	Very loc	SAND, ose, tra	(SM) bi ce grav	rown, fin el	ie graine	ed, moist,	loose to			S	33	2-4-4 (8)	-						
DEVELOPMEN				-							004.0			56	2-2-2 (4)	-						
N AND CREEK	5		6.0	POORL fine gra	Y GRA	ADED S aturate	AND W d, very lo	ITH SIL ⁻ bose	T, (SP-SN	M) brown,	882.5	X s	S	56	3-2-1 (3)	-						
NGINT/DE-TOW			· · · ·	SILTY : loose, t	SAND, race gr	(SM) bi avel	rown, fin	e graine	ed, satura	ited, very		Xs	S (67	2-1-2	_						
RING REPORTS			10.0								878.5		s		2-2-2	-						
ING/ENGINEER				SILTY I trace gi	LEAN (ravel, lif	CLAY, (ttle san	CL-ML) d	gray, we	et, soft to	medium,			5	78	(4)	_						
100)/ENGINEER													S	33	1-2-3 (5)	_						
seo - (15.60936.	15											X s	S.	78	2-1-2 (3)							
RDEN HILLS - C												X s	S 1	00	2-3-3	-						
AP PRUJEU I A													, S		2-1-2	-						
OUECT SVI CF			21.0		Boreh	ole bac	kfilled w	ith auge	er cuttings	6.	867.5	M	5	33	(3)							
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Preliminary Geotechnical Evaluation Report

Rice Creek Commons Mass Grading Former Twin Cities Army Ammunition Plant Northeast of US Highway 10 and Highway 96 Arden Hills, Minnesota

Prepared for

Kimley-Horn and Associates, Inc.

Professional Certification:

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Robert J. Janssen, PE President – Principal Engineer License Number: 19943 August 21, 2018

Project B1706398

Braun Intertec Corporation



August 21, 2018

Project B1706398

Mr. Thomas Lincoln Kimley-Horn and Associates, Inc. 2550 University Avenue West, Suite 238N Saint Paul, Minnesota

Re: Preliminary Geotechnical Evaluation Rice Creek Commons Mass Grading Former Twin Cities Army Ammunition Plant Northeast of US Highway 10 and Highway 96 Arden Hills, Minnesota

Dear Mr. Lincoln:

We are pleased to present this Geotechnical Evaluation Report for the mass grading phase of the proposed Rice Creek Commons project in Arden Hills, Minnesota.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please contact Bob Janssen at 651.487.7017 or bjanssen@braunintertec.com or Joel Kurpius at 651.487.7006 or jkurpius@braunintertec.com.

Sincerely,

BRAUN INTERTEC CORPORATION

Robert J. Janssen, PE President – Principal Engineer

Joel C. Kurpius, PE Project Engineer

c: Ms. Carla Dunham, Alatus, LLC
 Mr. Clark Wicklund, Alliant Engineering, Inc.
 Mr. Tom Shaver, Inland Development Partners
 Mr. Alex Duval, Duval Companies

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Appendix A

Soil Boring and Cone Penetrometer Test Locations Sketch

Appendix **B**

Log of Boring Sheets, 2018 Braun Intertec Corporation Log of Boring Sheets, 2016 Wenck Log of Boring Sheets, 2007 American Engineering Testing, Inc./Braun Intertec Corporation

Appendix C

Log of CPT Sounding Sheets, Soundings CPT-1 through CPT-6

Appendix D

Descriptive Terminology of Soil Descriptive Terminology Cone Penetration Test

Appendix E

Table E1. Topsoil Table E2. Organic Swamp Deposits Table E3. Buried Topsoil Table E4. Existing Fill Table E5. Unsuitable Soil Table E6. Groundwater

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Consolidation Tests

Appendix G

Figure G1. Area 4 Figure G2. Area 3

Appendix H

Figure H1. Figure H2. Figure H3. Figure H4. Figure H5.



A. Introduction

A.1. Project Description and Key Stakeholders

Ramsey County and the City of Arden Hills have formed a partnership to redevelop approximately 427 acres at the former Twin Cities Army Ammunition Plant (TCAAP) in Arden Hills, Minnesota. The project site is generally located northwest of United States Highway 10 and Highway 96. The working title of the development is Rice Creek Commons. In addition to Ramsey County and the City of Arden Hills, current project team members also include the firms presented below in Table 1.

Stakeholder	Role
	 Current Owner of all 427 acres slated for developed
Ramsey County	 Future owner of select portions of the development
	infrastructure (roads, utilities, etc.)
	 Development partner with Ramsey County
	 Future owner of development infrastructure
City of Arden Hills	 Potential building owner within Project (possible City
	Hall)
	 Owner/operator of future Water Tower
	Project civil engineer, working on behalf of the City and
	County
Kimley-Horn and Associates, Inc.	 Focus mostly on infrastructure design and developing
	plans for the mass grading phase of the overall
	development
	Real Estate development
Alatus, LLC	 Lead private developer
Inland Development Partners	Real Estate development
Inland Development Partners	 Support of Alatus, LLC
	 Project civil engineer, working on behalf of the Alatus
Alliant Engineering, Inc.	development team
	 Focus mostly on design of building and residential
	development
	Environmental Consultant
Bay West, LLC	Lead environmental consultant for Ramsey County and
	chief liaison between Ramsey County and the former
	property owner, the US Army, and their representatives

Table 1. Project Stakeholders and Roles



A concept plan of the redevelopment furnished to us is shown below in Figure 1 (which an excerpt from a concept plan provided to us by Kimley-Horn). The concept plan shown in Figure 1 is the most up-to-date conceptual plan at the time of this report. To help provide perspective, the proposed development is shown over a recent aerial image of the property.





As shown in Figure 1, the project will be effectively divided into an East portion and a West portion, with the County-owned Spine Road separating the two. In previous incarnations of project development, differing stakeholders were responsible for grading certain portions of the site. Currently, the mass grading of the entire 427-acre site will be performed under one contract.



Kimley-Horn indicated to us that the specific site features shown in Figure 1 remain preliminary in nature and will likely change; however, the overall concept will generally remain consistent with what is shown in Figure 1. With the understanding of the high likelihood that development structures (buildings, parking lots, etc.) will shift from what is currently shown in Figure 1, it is our understanding that is desired to mass grade the site so that buildings can be constructed anywhere within the buildable limits without prompting significant subgrade preparation/improvement activities prior to construction.

Also, in recent technical reports prepared by our firm, we referenced a Northwest portion, which is also referred to as the "Thumb Property." It is our understanding that the Northwest/"Thumb" property will not be graded along with the 427-acre site.

A.2. Development Schedule

While participating in a recent project team meeting on June 5, 2018, our firm was provided with a preliminary schedule for the various phases of construction/development. Figure 2 shows how construction of the proposed development will be phased.



Figure 2. Project Phasing – Tranche 1, 2, 3, and 4 (as of May 1, 2018)



Z CON

Figure 3. Overview of Town Center Parcels

As Figure 3 shows an overview of the Town Center development, Figure 4, provided to us on July 6, 2018, shows a more-detailed plan of the Town Center development. Note that north arrow orientation has changed. The likely number of below-grade (parking) and above-grade stories are shown, as well as a building type key.







Table 3 presents the building configurations for the Town Center parcels (Blocks 15 through 25, 2A, and 3A) provided to us, as well as assumed building loads, presumed year of construction, and also the main-/street-level floor elevations. Also, for Parcels A through F, underground parking will exist below the footprint of the entire parcel, not just the building footprints. However, underground parking will not be extended below the Town Center streets.

		Buildin	g Levels	Building Loads		Construction Elev		tions
		Below	Above	Perimeter	Interior	Date	Street-	Lowest
Block	Туре	Grade	Grade	(kips)	(kips)	(Year)	level	Floor
15	R5	0	3	425	650	Not	Available	
16	R5	0	3	425	650	Not Available		
17	R5	0	3	425	650	Not	Available	
18A	R5	0	3	425	650	Not	Available	
18B	R5	0	3	425	650	Not Available		
18C	R5	0	3	425	650	Not	Available	
18D	R5	0	3	425	650	Not Available		
20 Par A	R5	0	3	425	650	2023	910	910
20 F di . A	R10	2	10	1,230	1,700	2023	910	898
	R5	0	3	425	650	2023	910.5	910.5
21 Par C	R10	2	10	1,230	1,700	2023	910.5	886.5
21 Fal. C	H10	2	10	1,050	1,450	2023	910.5	886.5
	015	2	10	2,150	2,950	2023	910.5	886.5
	R5	0	3	425	650	2020	911	911
22 Par. E	R10	2	10	1,230	1,700	2020	911	887
	H10	2	10	1,050	1,450	2020	911	887
	015	2	10	2,150	2,950	2020	911	887
	R5	0	3	425	650	2020	911	911
23 Par. F	R10	2	10	1,230	1,700	2020	911	887
	H10	2	10	1,050	1,450	2020	911	887
	015	2	10	2,150	2,950	2020	911	887
24 Par. D	R5	1	5	425	650	2020	910.5	898.5
25 Par. B	CIV	0	2	150	300	2026	910.5	910.5
2A	R5	0	3	425	650	2020	910.5	910.5
	R10	2	10	1,230	1,700	2020	910.5	898.5
	015	2	10	2,150	2,950	2020	910.5	898.5

Table 3. Town Center Building Configuration and Assumed Structural Loads



		Buildin	g Levels	els Building Loads		Construction	Eleva	levations ^a	
		Below	Above	Perimeter	Interior	Date	Street-	Lowest	
Block	Туре	Grade	Grade	(kips)	(kips)	(Year)	level	Floor	
	R5	0	3	425	650	2020	910.5	910.5	
3A	R10	2	10	1,230	1,700	2020	910.5	898.5	
	015	2	10	2,150	2,950	2020	910.5	898.5	

The assumed remaining building configurations for the reminder of the of the areas as follows:

- High-density Residential: typical wood-framed residential construction, 1 to 2 levels above grade, various lookout, walkout, and rambler designs, typically 1 to 3 kips per lineal foot.
- Retail Anchor: single story, no basement, masonry or precast walls, steel columns and roof, typically 4 to 6 kips per lineal foot, maximum column loads of about 125 kips.
- **Commercial Retail:** single story, no basement, steel-/wood-stud walls with wood or steal roofs, column loads of about 75 kips, wall loads typically 3 to 5 kips per lineal foot.
- Commercial Office Single-story: single story, no basement, masonry or precast walls, steel column and roof, typically 4 to 6 kips per lineal foot of wall, maximum column loads of about 125 kips.
- Commercial Office Multi-story: two- to three-story, no basement, masonry or precast walls, steel column and roof, typically 6 to 8 kips per lineal foot of wall, typical column loads of 125 kips, maximum column loads of about 300 kips.
- Industrial: single story "warehouse height," interior office mezzanine level, no basement, masonry or precast walls, steel columns and roof, typically 4 to 6 kips per lineal foot of wall, typical column loads of about 100 kips, maximum column loads of about 200 kips.
- Commercial Corporate Office South: located near Highway 96 within southern portion of site, likely west of Spine road, three to four stories above-grade, one below-grade, typically 6 to 8 kips per lineal foot of wall, typical column loads of about 200 kips, maximum column loads of about 500 kips.



A.3.b. Statement of Building Settlement Tolerance

As reported to us, total building settlement is to be less than 1 inch and differential settlement is to be less than 1/2 inch in 40 lineal feet.

A.3.c. Proposed Surface Grade Changes

In the fall of 2017, we were provided with a preliminary cut/fill illustration. Based on our recent conversations with the project team, we understand the cut/fill illustration generally remains valid. A copy of that diagram is shown below in Figure 5. We have added notes showing area cuts (lowering) and fills (raising) required to achieve proposed surface grades. In general, red shades are indicative of areas that will be lowered to achieve proposed grades and green shades are indicative of areas will be raised to achieve proposed grades.

Figure 5. Estimated Cut/Fill Illustration



The illustration in Figure 5, however, shows only main/street-level finished grades and does NOT incorporate basement elevations. For the Town Center parcels, cut-fill information that does incorporate under-ground parking configuration is presented in Table 4.



	Existing Surface Grades		
Parcel	Elevations ^a	Lowest Floor Elevation	Cut/Fill
A	898 to 901	898	At-grade to Cut 3 feet
В	900 to 902	898	Cut 2 to 4 feet
С	892 to 898	886.5	Cut 6 to 12 feet
D	897 to 898	898.5	At-grade to Fill 1 to 2 feet
E	890 to 891	887	Cut 3 to 4 feet
F	890 to 898	887	Cut 3 to 11 feet
West (2 buildings)	889 to 891	898.5	Fill 7 to 9 feet

Table 4. Town Center Cut/Fill Information

a From Log of Boring sheets.

NOTE: With regard to the Town Center area of the site, during our August 8, 2018, meeting with Kimley-Horn, it was reported to us that the parcels within this area would generally be graded to an elevation approximately equivalent to the surrounding street elevations. In past iterations, to help reduce the volume of soil to be excavated to achieve building subgrade elevations (for those with one or two levels of below-grade parking), the project team had considered grading all or a portion of the parcels to a surface elevation lower than adjacent street elevations.

A.3.d. Trunk Underground Utilities

Trunk sanitary sewer and water main servicing the development will be installed below the Spine Road. Based on our review of the Sanitary and Water Main Layout sketch prepared and furnished to us by Kimley-Horn, we understand the trunk sanitary sewer line will be located along the western portion of the Spine Road and the trunk water main will be installed along the eastern portion of the Spine Road.

The trunk sanitary sewer line will typically be installed about 15 to 18 feet below finished road elevations, and locally as deep as about 20 to 24 feet near the Town Center. Areas where existing surface grades will be raised along the sanitary sewer alignment are presented in Table 5. Elsewhere along the alignment, proposed surface grades will be at or lower than existing surface grades.



Alignment Location	
(Sanitary Stations)	Ground Surface Raise in Grade
124+00 to 125+00	0 to 5 feet
125+00 to 129+50	5 to 10 feet
129+50 to 132+00	0 to 5 feet
140+50 to 143+00	0 to 5 feet
143+00 to 145+00	5 to 10 feet
145+00 to 147+00 (near Town Center)	10 to 12 feet
147+00 to 163+00	5 to 10 feet

Trunk water main will typically be installed about 8 to 10 feet below proposed surface grades, with the exception to north connection point where the new trunk water main will connect with an existing line about 15 feet below existing/proposed surface grades in that area.

A.3.e. Proposed Pavements

For the this report, it was requested that we provide the project team with an estimated R-value for roadway subgrades and that we are NOT to provide specific pavement section recommendations at this time. As reported to us at a July 13, 2018, team meeting, however, we understand the Spine Road will include a concrete section, and the remainder of the roads will include bituminous sections.

A.3.f. Proposed Bridges

We understand that two road bridges will be constructed for this project. The approximate locations and names of the two bridges are shown in Figure 6.



Figure 6. Proposed Bridge Locations



A.3.g. Stormwater Infiltration

Mr. Clark Wicklund of Alliant Engineering provided us with a copy of a Regional Best Management Practices (BMP) Map prepared by Wenck Associates that shows the TCAAP redevelopment property divided into Areas 1, 2, 3, and 4, with each area having differing requirements for stormwater management. That map is shown in Figure 7.







As shown in Figure 7, on-site stormwater infiltration within Areas 3 and 4 will be required.

A.4. Overview of Site History and Existing Conditions

A.4.a. TCAAP Historical Boundaries and Pre-development Usage

From a historical perspective, TCAAP covered a total of approximately 2,370 acres. The full extent of TCAAP is bounded by Lexington Avenue on the east, Interstate 35W and US Highway 10 on the west, Highway 96 on the south, and County Road I on the north. As mentioned previously, the site that is the subject of this report encompasses about 427 acres of that total. Prior to construction of TCAAP (in 1941), this site was used mainly for agricultural purposes.



A.4.b. United States Army Activities

Construction of TCAAP started in August of 1941 by Federal Cartridge Corporation. The TCAAP facility was used for the production, storage, and testing of small arms ammunition at various intervals from the 1940s to the mid-1990s. Many of the production and support buildings were located on the 427-acre site, while certain areas in the eastern and northern portions of the larger TCAAP facility were used for weapons testing and waste disposal. In response to the discovery of off-site groundwater contamination originating from TCAAP, the facility was placed on the National Priority List in 1983 as the New Brighton/Arden Hills Superfund Site.

In 2002, the federal government declared a portion of the TCAAP facility, including but not limited to the 427-acre site, to be excess land no longer needed by the Department of Defense. Additional soil investigation and cleanup by the new owner was necessary prior to lifting land use controls at the Site to allow for redevelopment.

A.4.c. Ramsey County Activities

Ramsey County acquired 397 acres of the 427-acre Site on April 15, 2013, and leased the remaining 30 acres of the 427-acre Site until certain environmental investigation and cleanup criteria were met. Ramsey County acquired the remaining 30 acres shortly after the Certificate of Completion was issued.

Environmental oversight during removal of buildings, pavements, buried utilities, and other subsurface features was provided by Wenck Associates on behalf of Carl Bolander & Sons Co., with additional support from Bay West, LLC, on behalf of Ramsey County.

Ramsey County's response actions have achieved conditions suitable for residential or recreational use across the Site, and the existing land use controls were lifted accordingly, once Ramsey County achieved ownership of the full 427 acres.

A complete environmental cleanup history is located at the development online website at RiceCreekCommons.com/documents.



A.4.d. Braun Intertec Activities

In 2007, American Engineering Testing, Inc., and Braun Intertec Corporation completed a joint investigation for Ryan Companies and prepared a report entitled Interim Report, Preliminary Geotechnical Evaluation. As part of that investigation, 218 soil borings were performed. All of that work was done prior to the recent building and utility demolition and removal and environmental site remediation.

A.4.e. Existing Surface Conditions

As described previously, to date, the buildings have been demolished, associated known underground utilities have been removed, railroad tracks have been removed, and pavement has been removed. It is our understanding that surface grades throughout the bulk of the site have not been significantly altered since the closing of TCAAP, but portions have been graded to improve drainage and support the recently-constructed roadway interchange from US Highway 10 and associated stub road located within the northwestern portion of the site. The proposed Spine Road will connect to that roadway stub.

In general, the bulk of the 427 acres is covered in heavy surface vegetation. Several gravel roads providing access to the various portions of the site remain in-place and gravel-covered former staging areas also remain within the site (northwest and southwest areas). Stockpiles of unknown materials (presumably consisting of "clean" topsoil, soil, or recycled construction materials) are sporadically scattered across the site.

A.5. Geotechnical Background Information and Reference Documents

A.5.a. Previous Geotechnical Evaluation Reports

Geotechnical data to be reviewed was gathered as part of two major geotechnical investigations on the TCAAP site over the past decade.

 As mentioned previously, American Engineering Testing, Inc. and Braun Intertec Corporation completed a joint investigation for Ryan Companies in 2007 and prepared a report entitled Interim Report, Preliminary Geotechnical Evaluation. As part of that investigation, 218 soil borings were performed. All of that work was done prior to the recent building and utility demolition and removal and environmental site remediation.



 Wenck Associates completed a Geotechnical Investigation Report: TCAAP Redevelopment Area, August 2016. As part of that evaluation, 124 soil borings were performed for the infrastructure improvements, which were done after the recent demolition and environmental site remediation.

A.5.b. Desktop Review and Interviews

In 2017, prior to performing additional subsurface exploration for this geotechnical evaluation report, we performed a desktop review of available previous geotechnical evaluation performed for this site and conducted interviews with project team members and the earthwork contractor that performed recent demolition and earthwork services, Carl Bolander and Sons, Inc. The purpose of conducting the interview with Bolander was to determine the extent of work provided during the recent demolition and environmental site remediation. That desktop review was addressed in a report dated August 3, 2017.

A.5.c. Additional Reference Documents

The following information was furnished to us for our review.

- Various CAD/DWG files showing previous boring locations (AET/Braun and Wenck borings) and proposed development (prepared by Kimley-Horn).
- CAD/DWG file showing proposed utilities for the Spine Road (prepared by Kimley-Horn).
- Cut/Fill sketch (prepared by Kimley-Horn).
- Conceptual Tranche Sequencing diagram (provided by Kimley-Horn).
- Building finished floor elevations (FFE) sketch for buildings located within the city center "high rise" portion of the site (provided by Alliant Engineering).
- Tabulation and location sketch of known monitoring wells within TCAAP property (prepared by Wenck, and provided by Bay West, LLC).
- Potential building foundation loading for Town Center buildings, conversation with Mr. Daniel Murphy of Meyer, Borgman & Johnson, Inc. (MBJ), July 3, 2018.



- Town Center building configuration and structural loads matrix, prepared by MBJ, dated July 16, 2018.
- Meeting Minutes from meeting with Kimley-Horn, August 8, 2018.
- Building demolition, environmental soil corrections as-built information (limits of excavations) provided by Carl Bolander and Sons Co. (Bolander). This is information is also available on the project online directory at RiceCreekCommons.com/documents.
- Ramsey County's online directory, RiceCreekCommons.com, Due Diligence Documents. This website is a repository for all known environmental and geotechnical documents associated with the 427-acre property.
- Pre-TCAAP development aerial photographs dated 1937 and 1940 furnished by Bay West; geo-referenced versions of these aerials were also obtained from Historical Information Gathers (HIG).

In addition to the provided sources, we have used several publicly available sources of information, namely historical aerials obtained through Historical Gatherers Information, the Geological Atlas of Ramsey County (University of Minnesota, 1992), and Well Log Records available through the Minnesota Department of Health's County Well Index portal.

A.5.d. Document Review Statement

We have described our understanding of the historical land usage and proposed construction and site to the extent others reported it to us. Depending on the extent of available information, we may have made assumptions based on our experiences with similar projects. If we have not correctly recorded or interpreted the project details, the project team should notify us. New or changed information could require additional evaluation, analyses and/or recommendations.



A.6. Purpose

After reviewing the available historical geotechnical data, and based on input provided by the project design team, we prepared a proposal which included performing additional geotechnical borings, cone penetrometer test (CPT) soundings, and laboratory testing to help us better address the geotechnical issues associated with this site. As that additional work had been completed, this report includes geotechnical recommendations for mass grading and soil corrections to support the Mass Grading Bid Documents for the entire 427-acre property.

A.7. Scope of Services

We performed our scope of services for the project in accordance with our two Proposals addressed to Mr. Thomas Lincoln of Kimley-Horn and Associates, Inc. (Kimley-Horn), the first one dated August 4, 2017, and the second one dated March 20, 2018. Our scope of services presented in those two proposal was authorized in contracts between Kimley-Horn and us that were dated August 24, 2017, and March 21, 2018, respectively. The following list describes the geotechnical tasks completed in accordance with our authorized scope of services.

- Reviewing the background information and reference documents previously cited.
- Staking and clearing the exploration locations of underground utilities. We selected and staked the new exploration locations. We acquired the surface elevations and locations with GPS technology using the State of Minnesota's permanent GPS base station network. The Soil Boring and Cone Penetrometer Test Sounding Location Sketch included in the Appendix shows the approximate locations of the borings and soundings. Private utilities that were not the responsibility of the public agencies, namely, the underground pipes associated with the water treatment facility, were cleared by a representative from GHD.
- Preparing and submitting our work plan to the Minnesota Department of Health in accordance with the requirements of the Special Well and Boring Construction Area (SWBCA) Notification program.
- Preparing and submitting our work plan to the Minnesota Environmental Protection Agency for approval (MPCA Project Number VP22892).



- Performing 33 additional standard penetration test (SPT) borings to nominal depths ranging from about 25 to 100 feet, for a total of about 1,425 lineal feet of drilling. As discussed in our contract, it was intended to complete the borings in phases and also have the ability to modify the number and depths of borings based on the subsurface conditions encountered and also along with changes in the development plan. For this report, we have thus far completed 21 additional standard penetration test borings to nominal depths ranging from about 25 to 60 feet, for a total of about 755 lineal feet of drilling. Penetration resistance tests were performed as the borings were advanced. The depths at which the tests were performed, and the results of the tests, are shown on the attached Log of Boring sheets. Penetration resistances, measured in blows-per-foot (BPF), provide an empirical means of estimating relative material density, consistency, strength, and compaction. Drilling equipment was steam cleaned before arriving at the site and again on-site prior to demobilizing from the site. The boreholes were sealed in accordance with MDH guidelines.
- Performing 10 cone penetration tests (CPT) soundings to nominal depths ranging from about 40 to 60 feet, for a total of about 460 lineal feet of sounding. As discussed in our contract, it was intended to complete the soundings in phases and also have the ability modify the number and depths of soundings based on the subsurface conditions encountered and also along with changes in the development plan. For this report, we have thus far completed 6 CPT soundings to nominal depths ranging from about 70 to 100 feet, for a total of about 510 lineal feet of sounding. CPT equipment was steam cleaned before arriving at the site and again on-site prior to demobilizing from the site. The sounding holes were sealed in accordance with MDH guidelines.
- Installing eleven piezometers, eight within the Town Center portion of the site, and three at strategic locations across the site (two within the northeast residential area and one within the southeastern residential area). Of the eleven, six were budgeted to be installed to depths less than 15 feet (shallow piezometer) and five were budgeted to be installed to depths greater than 15 feet (MDH monitoring well). As discussed in our contract, it was intended to complete the piezometer/well installations in phases and also have the ability to modify the number and depths of piezometers/wells based on the subsurface conditions encountered and also along with changes in the development plan. For this report, we have thus far installed eight piezometers at five locations within or near the city center portion of the site; at three of the locations, both a shallow piezometer and deep monitoring well were installed.



- Performing laboratory testing on select samples to aid in soil classification and engineering analysis budgeted to include 21 Atterberg limits tests, 23 mechanical analyses (through the No. 200 sieve only), 51 moisture content tests, 6 organic content tests, 7 time-rate consolidation tests, and 5 standard Proctor tests. As discussed in our contract, it was intended to complete the laboratory testing in phases and also have the ability to modify the type and number of tests based on the subsurface conditions encountered and also along with changes in the development plan. For this report, we have thus far completed 19 Atterberg limits tests, 27 mechanical analyses (through the No. 200 sieve only), 45 moisture content tests, 3 dry density tests, and 5 time-rate consolidation tests.
- Preparing this preliminary report containing an exploration location sketch, logs of soil borings (previously and recent), logs of the CPT soundings, a summary of the soils encountered, results of laboratory tests, and recommendations for structure and pavement subgrade preparation, utility installation (water main, sanitary sewer and stormwater sewer), and stormwater improvements, and the preliminary design of foundations, floor slabs, exterior slabs, and pavements (estimated R-value, for design by others).

Our scope of services did not include environmental-related services. While we did not observe any obvious signs of environmental concerns, the Braun Intertec staff performing services for this geotechnical project are not trained environmental professionals. Please contact us if you would like us to assist in evaluating what environmental services may be required for your project.



B. Results

B.1. Geologic Overview

Based on our experiences on this site and our review of the geotechnical publications and other geotechnical data available to us, the surface soils on this site generally consist of glacial and lacustrine sands, surface fill, and some areas of organic soils and wetlands. The upper soil layers, typically referred to in previous studies as "Unit 1," consist of topsoil and surface vegetation, swamp/organic deposits, existing fill and native alluvium, and the overall thickness of the Unit 1 soil ranges from about 10 to 20 feet. Below the upper soil layers in most areas of the site, there is a cohesive and relatively impervious clay till (Unit 2) that varies in thicknesses from about 20 to 70 feet. Older glacial outwash and valley sediment materials (Unit 3) underlie the till, and extend to depths on the order of 100 to 400 feet, or to the top of bedrock. The depth to bedrock varies considerably across the site. The bedrock in this area generally consists of weathered and fractured dolomite of the Prairie du Chien Group overlying Jordan Sandstone.

Perched groundwater is present above the Unit 2 "aquitard," with deeper hydrostatic groundwater present in the Unit 3 glacial outwash above the bedrock. The bedrock also acts as a separate aquifer.

Review of historic pre-TCAAP development aerial photographs (from 1937 and 1940) indicates that depressions and wetlands existed throughout the site before TCAAP was first constructed. Many of those depressions and wetlands had been filled during the original development of the TCAAP site.

We based the geologic origins used in this report on the soil types, in-situ and laboratory testing, and available common knowledge of the geological history of the site. Because of the complex depositional history, geologic origins can be difficult to ascertain. We did not perform a detailed investigation of the geologic history for the site.



B.2. Previous Geotechnical Information

B.2.a. 2007 and 2016 Geotechnical Evaluations

As mentioned previously, Braun Intertec/AET performed soil borings on this site in 2007, the logs of which are included in Appendix A. Since then, with the demolition and associated re-grading, nearsurface conditions have changed and the near-surface conditions reported on the 2007 boring logs may not ultimately reflect current near-surface conditions. Also, because of the recent grading on this site, the surface elevations shown on the Braun/AET boring logs may be different than the current surface elevations at those locations.

It is our understanding that the Wenck borings performed in 2015 were performed after the demolition and associated re-grading had been completed. As such, the near-surface conditions shown on the Wenck boring logs, also included in Appendix B, are likely more representative of current near surface conditions.

B.2.b. Bolander Commentary

As mentioned previously in Section A.3.c, Bolander served as the general contractor during the environmental site cleanup that was performed from 2013 to 2015. In 2017, we interviewed the senior project manager, Mr. Todd Planting, from Bolander for that project. The purpose of the interview was to obtain general information about the cleanup work that had occurred since Ramsey County purchased the property in 2013. In summary, a complete description of Bolander's work is available through the RiceCreekCommons.com website, the Due Diligence Documents portal. As mentioned previously, for the most part, the excavation work that Bolander performed terminated at relatively shallow depths below existing surface grades (for slab removal, foundation removal, near-surface environmental cleanup, utility removal, etc.). However, some excavations associated with the environmental cleanup were extended to depths as great as about 20 feet below existing surface grades in certain areas of the site, namely the Site 1 and Site K areas of the site.

During the recent demolition and environmental remediation work performed by Bolander, it was reported to us that no earthwork and observations or testing services were performed by an independent geotechnical engineering firm. However, Bolander commented that material was generally backfilled in a compacted manner in accordance with industry standards. Furthermore, Kimley-Horn referred us to a select, limited number of soil borings from the 2015 Wenck borings that were specifically performed in trench/excavation backfill. From our review of those borings, the blow counts (N values) recorded in the near-surface fill suggest that the backfill was generally placed in a compacted manner.



We refer you to Section B.3.d for further discussion on existing fill.

B.3. Boring Results

As revealed by the soil borings, the site is underlain with a variety of geologic materials including, in descending order, topsoil, surface vegetation and aggregate base, existing fill, surface and buried swamp/organic deposits, native mineral alluvium, and native mineral glacial soils (glacial till and glacial outwash). For simplicity in this report, we define existing fill to mean existing and undocumented fill (with the general exception to the overall limited portions to the backfilled placed in a controlled manner by Bolander).

Due to the vast amount of soil boring data that has been obtained since 2007, the findings are generally summarized in the following sections. Note that the narrative often refers to soil data tabulations that are included in Appendix E, which are as follows:

- Table E1. Topsoil
- Table E2. Organic Swamp Deposits
- Table E3. Buried Topsoil
- Table E4. Existing Fill
- Table E5. Unsuitable Soil
- Table E6. Groundwater

B.3.a. Topsoil and Surface Vegetation (Table E1)

As mentioned previously in Section A, the site is generally covered in mature surface vegetation, with the exception to (a) localized staging and former building pad areas scattered throughout the site, especially within the northwestern and southwestern portions of the site, which are predominantly covered in gravel, and (b) gravel roadways.

As presented in Table E1 in the Appendix, about half of the geotechnical soil borings performed on this site initially encountered topsoil. In general, topsoil consists of silt- and clay-rich soil that is typically dark brown to black in coloration, contains variable concentrations of roots, and is organic in nature, typically possessing an organic content of about 5 percent or greater. Topsoil thicknesses ranged from about 1/4 to 4 feet, with an average of about 1 foot.



B.3.b. Organic Swamp Deposits (Table E2 and Figure E1)

Of the 291 geotechnical soil borings performed on this site, 33 of them encountered organic swamp deposits that typically consisted of peat and organic silt/clay. Of those 33 borings, only 1 boring encountered the organic deposits initially at the surface, whereas its thickness of 7 feet differentiated it from topsoil discussed in Section B.3.c; elsewhere, the organic deposits were concealed by existing fill. The thicknesses of the buried organic swamp deposits ranged from 2 to 12 feet, with an average thickness of about 5 feet.

B.3.c. Buried Topsoil (Table E3)

Of the 291 geotechnical soil borings performed on this site, 36 of them encountered a layer of buried topsoil that was concealed by existing fill. The thicknesses of the buried topsoil ranged from about 1/2 to 3 feet, with an average thickness of about 2 feet.

NOTE: Given the 2 1/2- to 5-foot sampling interval of standard penetration test borings, it is possible that the soil borings that initially encountered existing fill at the surface may not have encountered relatively thin layers of buried topsoil directly below the existing fill.

B.3.d. Existing Fill (Table E4)

Most of the soil borings encountered existing fill to depths ranging from about 1 to 25 feet, with an average depth of about 7 feet. The existing fill consisted of a variety of soils ranging from relatively clean poorly graded sand (SP) and poorly graded sand with silt (SP-SM) to predominantly fine-grained soils such as silty sand (SM), clayey sand (SC), and lean clay (CL).


About two-thirds of the penetration resistance values recorded in the existing fill were less than about 15 BPF, which is the threshold value that typically indicates that a soil is moderately well to well compacted. As mentioned previously, a number of the 2015 Wenck soil borings were performed in areas that were recently backfilled by Bolander as part of the environmental cleanup phase. Those borings do suggest that the backfill in those boring areas associated with the cleanup phase was typically placed in a compacted manner. However, the existing fill encountered by the 2007 soil borings was overall poorly compacted. In many cases across the site, the "2015 existing fill" was surrounded by "2007 existing fill," thus the entirety of the existing fill remains unsuitable for support of proposed structures.

Recommendations pertaining to the existing fill are discussed in further detail in Section C.

B.3.e. Unsuitable Soils (Table E5)

For planning purposes, we have summarized anticipated excavation depths to remove unsuitable soils at the soil boring locations. For the purposes of this report, unsuitable soil is defined as topsoil, organic swamp deposits, buried topsoil, and existing fill.

B.3.f. Native Alluvial and Glacial Deposits

All of the 2007 AET/Braun Intertec geotechnical soil borings were advanced through the near-surface strata of organic deposits and existing fill and were terminated in native mineral soils consisting of alluvium, generally referred to as Unit 1, and glacial deposits (glacial outwash and glacial till), generally referred to as Unit 2.

The bulk of the alluvial deposits were encountered within the northern half of the site. The alluvium typically consisted of poorly graded sand and poorly graded sand with silt and, to a lesser extent, silty sand and silt (ML). The alluvium was typically encountered to depths of less than about 10 feet below existing surface grades, but locally to depths as great as about 20 feet. The alluvium in this area was typically wet. Penetration test borings recorded in the alluvium typically ranged from about 5 to 10 BPF, indicating that the alluvium was typically loose, but was locally very loose and medium. The alluvium was typically moist above the perched groundwater and wet below.



Below the Unit 1 materials (existing fill, organic deposits, alluvium), the bulk of the borings encountered layered strata of glacial soils comprised of deposits of glacial till consisting mostly of clayey sand, silty sand, and sandy lean clay and glacial outwash consisting of poorly graded sand. In general, the glacial till encountered within the southern half of the site consisted of Superior Lobe till, which is typically reddishbrown to brown and consists mostly of silty sand and clayey sand, and the glacial till encountered within the northern half of the site consisted of Des Moines Lobe till, which is typically grayish-brown to gray and consists mostly of sandy lean clay (CL) and clayey sand. Within the southern portion of the site, the Superior Lobe till was typically capped by a relatively thin strata of Des Moines Lobe till. The layered strata of glacial outwash, consisting of poorly graded sand, was encountered within the southern portion of the site, and was typically capped by about 15 to 20 feet of glacial till.

With regard to the penetration test values recorded in the glacial soils:

- Des Moines Lobe Till: Penetration test values within the upper 10 to 25 feet of the strata were typically less than about 5 to 7 BPF, indicating that the till was typically soft to medium. Below that upper strata, the till was typically medium to stiff.
- Superior Lobe Till: Penetration test values recorded within the superior lobe till were typically greater than about 15 BPF indicating the till was overall stiff to very stiff (clays and clayey sands) and medium dense (silty sand).
- Glacial Outwash: Penetration test values recorded in the glacial outwash sands typically exceeded 10 BPF, indicating the glacial outwash was overall medium dense to dense.

B.4. Cone Penetrometer Test Soundings

Together with our soil borings, we performed Cone Penetrometer Test (CPT) soundings. The Appendix includes CPT Sounding Logs that present the tip resistance, sleeve resistance, pore pressure, and correlations based on the aforementioned data that indicates a soil boring penetration resistance (N₆₀), and soil behavior type (SBT). The SBT does not correlate to soil classification based on grain size distribution or plasticity, and the SBT is not a reliable indicator of existing fill material. We performed CPT soundings to provide a relatively continuous profile of in-situ conditions that we use to estimate soil behavior properties for our engineering analyses. Refer to the attached Descriptive Terminology Cone Penetration Test in the Appendix for more information.



The results of the soundings indicate a soil profile consistent with findings in adjacent soil borings. More specifically, the results are consistent with the results of our standard penetration tests performed as the soil borings were advanced.

We inferred strata boundaries and the SBT from changes in tip resistance, sleeve friction, and pore pressure, and while cone measurements are relatively continuous with depth, the boundaries are still only approximate, likely vary away from the sounding locations and may occur as gradual rather than abrupt transitions.

A dissipation test was performed at Sounding CPT-3 (ST-1009) at depth of 15 feet. The purpose of a dissipation test is to assist us in estimating the time-rate of consolidation factor, C_v . The result of the dissipation test was 1.2 ft²/day. The average C_v value computed from the laboratory consolidation test under similar loading conditions was about 1.25 f²/day, which correlates very well with the dissipation test data.

B.5. Groundwater

The soil boring logs included in Appendix B include groundwater information that was observed as the borings were advanced. Table E5 in Appendix E presents the groundwater information on a boring-byboring basis. As is typical with perched groundwater conditions, project planning should expect groundwater levels across this site will be highly variable and will fluctuate with time.

Within the northern portion of the site, namely the Town Center, northeastern residential, and western commercial areas of the site, it appeared that groundwater at the time our recent borings were performed, and the readings obtained on June 1, 2018, had risen on the order of about 3 to 4 feet since the AET/Braun borings were performed in 2007. The most recent readings obtained on August 17, 2018, however, indicate that the perched groundwater table has lowered about 1 to 2 feet within the central and western portion of the Town Center since our June reading. It is likely that the initial rises in groundwater levels observed from 2007 to spring of 2018 were primarily the result of site changes that had occurred since the 2007 borings were performed, such as removal of nearly all impervious materials and stormwater management features. However, with the removal of these materials, the change in the groundwater level from one season to the next may be more volatile due to an increased sensitivity to seasonal precipitation, whereas the non-pervious materials and stormwater management feature tend to regulate groundwater level fluctuation, but not necessarily eliminate fluctuations.



Table 6 includes the groundwater measurements that were observed by our firm during the drilling of our soil borings in May of 2018 and in the piezometers (P) and monitoring wells (MW) in June and, most recently, in August of 2018.

			Estimated	
		Approximate	Corresponding	
	Ground Surface or	Depth to	Groundwater	
	Top-of-Riser ^a	Groundwater	Elevation	
Location	Elevation	(feet)	(feet)	2018 Reading Date
P/ST-1	898.0	2.0	896.0	5/3/2018
P/ST-2	898.4	13.0	885.4	5/4/2018
P/ST-2 (P)	898.4	3.0	895.4	6/1/2018
P/ST-2 (P)	904.1ª	8.3	895.8	8/17/2018
P/ST-3	901.5	No	ot observed during drill	ing
P/ST-3 (P)	901.5	3.1	898.4	6/1/2018
P/ST-3 (P)	905.5ª	7.3	898.2	8/17/2018
P/ST-4	895.2	2.3	892.9	5/4/2018
P-ST-5	890.7	4.0	886.7	5/2/2018
P/ST-5 (MW)	890.7	1.9	888.8	6/1/2018
P/ST-5 (MW)	894.0	7.6	886.4	8/17/2018
P/ST-5 (P)	890.7	2.1	888.6	6/1/2018
P/ST-5 (P)	893.6	7.2	886.4	8/17/2018
P/ST-6	894.5	2.6	891.9	5/7/2018
P/ST-6 (MW)	894.5	3.3	891.2	6/1/2018
P/ST-6 (MW)	898.2ª	8.7	889.5	8/17/2018
P/ST-6 (P)	894.5	3.2	891.3	6/1/2018
P/ST-6 (P)	898.5	8.9	889.6	8/17/2018
P/ST-7	955.8	Na	ot observed during drill	ing
ST-1001	903.9	Na	ot observed during drill	ing
ST-1003	895.8	2.0	893.8	5/11/2018
ST-1004	900.9	Not observed during drilling		ing
ST-1005	893.1	2.5	890.6	5/8/2018
ST-1007	889.8	1.5	888.3	5/10/2018
ST-1008	890.7	4.0	886.7	5/2/2018
ST-1008 (MW)	890.7	2.1	888.6	6/1/2018
ST-1008 (MW)	894.1ª	7.1	887.0	8/17/2018
ST-1008 (P)	890.7	2.7	888.0	6/1/2018

Table 6. 2018 Groundwater Summary



	Ground Surface or Top-of-Riser ^a	Approximate Depth to Groundwater	Estimated Corresponding Groundwater Elevation			
Location	Elevation	(feet)	(feet)	2018 Reading Date		
ST-1008 (P)	893.7	6.7	887.0	8/17/2018		
ST-1009	890.7	4.0	886.7	5/1/2018		
ST-1010	888.1	3.0	885.1	5/9/2018		
ST-1011	888.2	2.0	886.2	5/9/2018		
ST-1017	911.7	5.0	906.7	5/4/2018		
ST-1018	928.5	Not observed during drilling				
ST-1020	946.0	Not observed during drilling				
ST-1021	944.0	Not observed during drilling				
ST-1022	944.0	7.0	937.0	5/8/2018		
a Top-of-riser pip	be elevation.					

Top-of-riser pipe elevation.

Laboratory Test Results **B.6**.

Tables 7 and 8 present the results of our laboratory tests that were performed on samples obtained from our 2018 soil borings. Laboratory tests performed on samples obtained from the 2007 (AET/Braun) and 2015 (Wenck) soil borings are included on those boring logs.

	Sample		Moisture	Percent		
	Depth		Content	Passing the	Liquid	Plastic
Location	(ft)	Classification	(%)	No. 200 Sieve	Limit	Index
	2 1/2	SM	14			
P/ST-1	5	SC	19			
	7 1/2	SC	16	46	24	11
	5	SC	13			
P/ST-2	7 1/2	SC	15			
	10	SC	15	45	23	10
D/ST_2	2 1/2	SC	5			
F/31-3	5	SC	15			
D/ST 4	2 1/2	SC	21	46	30	16
F/31-4	5	SC	16	45	26	12

Table 7. 2018 Laboratory Classification Test Results



	Sample		Moisture	Percent		
	Depth		Content	Passing the	Liquid	Plastic
Location	(ft)	Classification	(%)	No. 200 Sieve	Limit	Index
	12	SC	15	43	26	12
	5	SP-SM	15			
F/31-3	7 1/2	SP-SM	19	6		
P/ST-6	14 1/2	SC	16	45	24	11
D/ST 7	5	SM	9			
F/31-7	10	SM	8			
ST-1001	5	SM	15	19		
	15	SC	15			
	19 1/2	SC	15	48	30	17
ST-1003	25	CL	17	51	28	15
31-1003	30	CL	16			
	50	CL	15	51	29	17
	59 1/2	CL	16	53	33	19
	2 1/2	SM	16	15		
ST-1004	7 1/2	SC	15			
	10	SC	16			
ST-1007	19 1/2	SC	15	46	23	11
	2 1/2	SC	15	30		
	5	ML	36	93		
ST-1008	10	SP-SM	20	5		
	15	SP-SM	19			
	19 1/2	SM	16	35	18	Non Plastic
	2 1/2	SM	19			
	5	SP-SM	21			
	7 1/2	ML	29			
ST-1009	9 1/2	SM	19	13	19	Non Plastic
21-1003	11	SC	16	41	23	10
	13	SC	13	44	23	10
	15	SC	15			
	20	SC	15			
ST_1017	2 1/2	SM	14	32		
31-1017	5	SP-SM	18	9		
ST-1021	10	SM	7	27		



						Estimated
	Sample		Dry	Compi	ression	Pre-Consolidation
	Depth		Density	Inc	lex	Pressure
Location	(ft)	Classification	(ɣ, pcf)	Cc	Cr	(P _c , tsf)
P/ST-4	12	SC	117.1			
P/ST-6	14 1/2	SC	117.5	0.09	0.01	1.36
ST-1003	19 1/2	SC	117.2	0.11	0.01	2.27
ST-1003	59 1/2	CL	118.1	0.12	0.02	4.14
ST-1007	19 1/2	SC	119.4	0.10	0.01	1.44
ST-1008	19 1/2	SM	120.5			
ST-1009	11	SC	120.5			
ST-1009	13 1/2	SC	120.0	0.09	0.01	1.90

Table 8. 2018 Laboratory Dry Density and Compression Test Results

C. Recommendations

C.1. Special Geotechnical Considerations

C.1.a. Stormwater Infiltration

Mr. Clark Wicklund of Alliant Engineering provided us with a copy of a Regional BMP Map prepared by Wenck Associates that shows the TCAAP redevelopment property divided in to Areas 1, 2, 3, and 4, with each area having differing requirements for stormwater management. That map is shown in Illustration 1.





Illustration 1. Regional BMP Map (Wenck 2015)

As shown in Illustration 1, on-site stormwater infiltration within Areas 3 and 4 will be required.

We reviewed the available geotechnical data, namely soil classification descriptions provided on available soil boring logs (2007 Braun/AET, 2015 Wenck, and 2018 Braun) and infiltration test data performed by Wenck in 2015. A summary of that data is provided on the attached Figures H1 and H2 in Appendix H. Figure H1 is a summary of soil classification data for Area 4 and Figure H2 is a summary of soil classification test results for Area 3.

 In general, we presented our findings (on Figures H1 and H2 in Appendix H) in a color-coded Red/Amber/Green format, based on the following definitions:



- RED: subsurface infiltration not feasible due to (a) soil conditions, i.e., low permeability,
 (b) groundwater conditions/levels, (c) a likely necessity to perform extensive soil corrections and to "import" large quantities of free-draining sandy soil to facilitate infiltration, or
 (d) a combination thereof.
- AMBER: subsurface infiltration feasible with limited subsurface preparation required; however, infiltration rates will likely be rather slow, generally lower than 0.5 inch/hour.
- GREEN: subsurface infiltration feasible at those locations as the soil conditions typically consist of rather clean sands that possess infiltration rates exceeding 0.5 inch/hour. In those areas, we anticipate that virtually no engineering-specific subsurface preparation will be required, provided the system maintains the minimum separation from groundwater as typically required by the Watershed District.

Technically, Area 4 is NOT under the same grading contract as Areas 1, 2, and 3. However, we understand that there may be some contingencies placed in contract documents that allow for "sharing" of infiltration requirements. As shown in the attached Figure H1, prospects for subsurface infiltration are promising throughout most portions of Area 4, due largely to the fact that most of the near-surface sandy soils likely possess a relatively high permeability/infiltration rate and that groundwater in this area is typically deep enough to promote subsurface infiltration.

As shown on the attached Figure H2, most of the acreage in Area 3 is not conducive to subsurface infiltration due to (a) the variability of soil conditions, (b) the fine-grained nature of the bulk of the near-surface soils in this area, and (c) the relatively high groundwater table with respect to existing ground surface elevations. There are, however, limited areas where subsurface infiltration appears to be feasible, mostly in the southern portion of Area 3, where subsurface conditions are more similar to those that readily exist in Area 4, consisting largely of cleaner sands.

C.1.b. Groundwater Table in TCAAP Unit 1 Soil Strata

TCAAP Unit 1 Soil Strata consists of near-surface alluvial and lacustrine deposits of a primarily granular nature, existing fill, and localized deposits of organic soils and wetlands, with strata thicknesses generally ranging from about 10 to 20 feet. In most areas of the site, Unit 1 Soil Strata is underlain with Unit 2 Soil Strata consisting primarily of cohesive and relatively impervious clay-rich tills with strata thicknesses generally ranging from about from about 20 to 70 feet.



With this soil profile, groundwater was typically encountered within the sandy Unit 1 Soil Strata and appears to be trapped within Unit 1 Soil Strata due to the predominantly low permeability of the bulk of the underlying Unit 2 Soil Strata. As such, the groundwater table within Unit 1 is said to be "perched." In some subsurface conditions, perched groundwater can be limited/localized to a relatively small footprint, and sometimes perched water can be geo-hydrologically significant, whereas it is more or less treated as a permanent "hydrostatic" condition. The Unit 1 condition within the TCAAP is typical of the latter description (significant/hydrostatic), although some areas within TCAAP are of the former (localized).

In 2007, Braun Intertec and AET completed over 200 geotechnical soil borings. From the soil and groundwater data collected, we prepared a groundwater surface contour plan, which was included in our October 3, 2007, Preliminary Geotechnical Evaluation Report. Since those borings were performed, all of the buildings and pavements have been demolished and nearly all of the stormwater management utilities had been removed. With the demolition and removal of hard (impervious) surfaces, such as buildings and pavements, and with the elimination of most of the on-site stormwater structures, we would typically expect to see a subsequent rise in the water table. This assertion was verified during our interview with Bolander, who was earthwork contractor during the demolition/utility removal phase. During the interview Bolander remarked that shortly after the removal of the buildings/pavements, the groundwater table (within Unit 1) had risen throughout much of the northern portion of the TCAAP property.

For this evaluation, we plotted the 2015 Wenck groundwater level data (and a limited number AECOM data from their 2011 report) onto the groundwater contour map that was provided in the 2007 AET/Braun report. The attached Figures H1, H2, H3, and H4 in Appendix I show the approximate locations of the 2015 Wenck/2011 AECOM groundwater data, their estimated groundwater elevations, and the "delta" when compared to the 2007 Braun/AET estimated elevations. Figure H5 shows the Wenck "delta" with respect to the proposed site layout.



The proposed timeline for construction within each Tranche is presented in Table 2.

	Development / Construction Schedule		
Tranche	(Year)		
Tranche 1:			
 Western half of "high rise" city center 			
 Southern half of southern high- 	2020		
density residential	2020		
 Northern portion of western 			
commercial ("big box retailer)			
Tranche 2:			
 Northeastern portion of city center 			
 Central commercial/retail 	2023		
 Southern half of southern high- 			
density residential			
Tranche 3:			
 Northern high-density residential 	2020		
 Northern half of southern high- 	2029		
density residential			
Tranche 4:			
 Western office/commercial 	2032		
 Southern commercial/industrial 			

A.3. Proposed Construction

A.3.a. Assumed Building Configuration and Structural Loads

The Town Center will consist mostly of multi-level buildings consisting of five to ten above-grade levels and mostly one to two levels of below-grade parking, although certain buildings within this area will not include underground parking. The portion of the Town Center that is east of the Spine Road has been divided in to six parcels, Parcels A, B, C, D, E, and F. The portion of the Town Center that is west of the Spine Road is commonly referred to as Towne Center West (two buildings).

The location of the Town Center parcels are shown in Figure 2, which was provided to us by Alliant Engineering. Figure 3 also shows how the parcels are currently labeled.



We used this information to develop work plan for this geotechnical evaluation, which, as described previously, included the installation of five "shallow" piezometers installed to measure Unit 1 groundwater table elevations and three "deep" piezometers (monitoring wells). The upper portions of the deeper piezometers were sealed through the Unit 1 zone of soils, so that we could evaluate if the recorded groundwater levels in the Unit 1 soils were perched on top of the Unit 2 clayey soils, or if the measured water levels also extended into the Unit 2 clayey soils. That information was particularly important in the Town Center portion of the development where it is currently desired that the proposed buildings will include one to two levels of below-grade parking, which may extend into the Unit 2 clayey soils.

When compared to the 2007 Braun/AET and the 2015 Wenck/AECOM groundwater levels, it appears that the current groundwater table has generally risen within much of the north and north central portions of the development, which is generally expected after the removal of the buildings/pavements and stormwater management features. However, as discussed previously in Section B.5, with the removal of the buildings/pavements and stormwater management features, groundwater level fluctuations levels from one season to the next may ultimately be more volatile due to an increased sensitivity to seasonal precipitation, whereas the non-pervious materials and stormwater management features likely tended to regulate groundwater level fluctuations, but did not necessarily eliminate fluctuations.

With that, site grading activities to remove unsuitable soils (described in further detail in Section C.2) will likely require implementation of a temporary dewatering plan.

As presented in Table 6, the groundwater levels measured in early June of 2018 (which is when the highest groundwater levels were observed within the Town Center portion of the development) ranged in elevations from about 898.4 within the eastern edge of the Town Center to about 891.2 within the western area of the Town Center. As presented in Table 3, the lowest proposed floor elevation will be 898 within the eastern third of the Town Center, the lowest proposed floor elevation will be 886.5 within the central portion of the Town Center, and the lowest proposed floor elevation will be 887 within the western portion of the Town Center. With that, it appears that the lowest floor elevations will generally be about 4 feet below the groundwater levels observed in June of 2018. As such, it is our opinion a permanent dewatering system generally consisting of groundwater cutoff and drainage features will have to be incorporated to the design documents and, as an added measure, building designs should, in our opinion, incorporate measures to resists groundwater seepage, such as waterproofing and floor drainage system consisting of a network of drain pipe, clean aggregate and sump pumps.



C.1.c. Trunk Utilities

We have evaluated the consolidation characteristics of the foundation soils located within the area of the Spine Road between Stations 124+50 and 132+00 and between Stations 140+50 and 163+50, which are the areas where surface grades will be raised to achieve proposed surface grade elevations; it is within these areas that the proposed surface grades will be raised as much as about 15 feet above existing surface grades to achieve design subgrade elevations. Station 163+50 is the approximate location where the sanitary sewer veers to the west towards the lift station.

The soil borings performed along the Spine Road alignment in these areas (2007 AET/Braun, 2015 Wenck, and recent Braun 2018 borings) encountered near-surface loose sands and relatively soft clays, which are judged to be rather compressible. As such, it is our opinion that the soils located within the Spine Road in these areas will experience varying amounts of consolidation under the proposed fill loads. Since the fill loads and pipe invert elevations vary along the Spine Road alignment, the estimated amounts of utility pipe settlements will also vary and will be primarily a function of the amount of fill placed and the location of the pipe. The estimated amounts of utility pipe settlements for the range of fill heights and pipe invert elevations are provided in Table 9.

Fill Height	Pipe Depth Below Street Surface	Estimated Settlement of Pipe
(feet)	(feet)	(inches)
5	10 to 20	1 1/2 to 2
10	15 to 20	3 to 3 1/2
15	20	4

These estimated settlements of the sanitary sewer assume that the pipe will be installed prior to filling the Spine road to proposed grades. If it is desired to reduce settlements to the pipe, the Spine road area can be filled to grade (either partially or fully, depending on settlement tolerances) prior to installing the sanitary sewer, delaying utility construction until much of the settlement has occurred. It should be noted that there appears to be no abrupt transitions in soil conditions along the alignment in these areas and that raises-in-grades in these areas are also gradual. As such, we expect that the rates of differential settlements will be rather minimal and possibly within the tolerances of the utilities pipes.

To better evaluate estimated settlements (both total and differential), as part of our final/supplemental phase of subsurface exploration, we recommend performing a series of CPT soundings at a relatively tight spacing of approximately 100 feet within in the fill-to-grade areas along the sanitary sewer alignment of the Spine Road.



C.1.d. Town Center Grading Approach

Various grading alternatives for the Town Center portion of the development (Town Center Parcels A, B, C, D, E, F, and Town Center West, as described previously in Section A.3) were discussed at the June 5, 2018, July 13, 2018, and August 8, 2018, team meetings. Overall, it was initially preferred by the design team to "double handle" as little soil as possible during the mass grading phase of the project. (It was reported that about 500,000 cubic yards of soil would be required to fill the Town Center parcels to street level from existing grade, and that large portions of that quantity would then have to be removed to construct the below-grade portions of the buildings located in the Town Center parcels.) However, as discussed previously in Section A.3.c, the project team has decided to grade the Town Center parcels to elevations that are near to the surrounding street elevations.

C.1.e. Building Foundation Types

With regard to building loads in the Town Center area (as previously discussed in Section A.2, Table 3), the multi-story steel/concrete buildings will likely be configured to exert loads typically ranging 1,000 to 2,000, kips and as great as up to about 3,000 kips. In order for us to evaluate the various settlement estimates with each of the fill loading and structural load scenarios, we have thusly incorporated loading due to raise in grade, building loads, and loads due to below-grade wall backfill placement.

We first considered the scenario of filling the entirety of the building pad area to street level (which would require the placement of approximately 10 to 20 feet of fill) and allowing that to remain in place for a minimum of 6 months. Using bearing pressures ranging from 4,000 to 8,000 psf, we computed that buildings configurations R10, H10, and O15 supported on conventional spread footings would experience settlements that exceed the stated tolerance of 1 inch total and 1/2 inch differential.

However, for the building R5 and CIV configurations, using a bearing pressure of 5,000 psf, we estimate that the building will experience settlements of less than the stated tolerances under the scenario where the building pad is raised to street level and a construction delay of at least 6 months is incorporated.

For the building configurations R10, H10, and O15, we then considered surcharging the building pad area at various surcharge heights ranging from 10 to 20 feet above street level, which would accelerate primary and secondary components of settlement within a duration of about 6 months. However, even with the surcharge load being considered, we computed that building configurations R10, H10, and O15 supported on conventional spread footing will experience settlements exceeding the stated tolerance.



With that, in our opinion, the building configurations R10, H10, and O15 located with the Town Center development will need to be supported on deep foundation system, such as driven pile, or an intermediate foundation system, such as rammed aggregate piers (RAP). Based on the design and schedule information provided to us, Table 10 presents the recommended foundation system(s) for each of the Town Center parcels.

NOTE: With regard to floor slab construction, in our opinion, the lowest flor slabs do not need to be supported with driven pile (i.e., a "structural slab" is not warranted), provided that the parcels are indeed filled to near street level for a duration of at least 6 months prior to construction.

Parcel	Building Configuration	Foundation System
A		Driven Pile
В		Driven Pile or Aggregate Piers
C		Driven Pile
D	R10, H10, O10	Driven Pile or Aggregate Piers
E		Driven Pile
F		Driven Pile
Town Center West (2 buildings)		Driven Pile

Table 10. Recommended Foundation System within the Town Center Parcels

With the implementation of driven pile or aggregate pier foundation systems, where appropriate, in our opinion building foundations will experience total and differential settlements of less than the stated tolerances.

Elsewhere on the site outside of the Town Center parcels, assuming the range of building designs described in section A.3, and assuming a delay in building construction of at least 6 months after completion of site grading, we recommend:

- Supporting slab-on-grade buildings with no underground parking on conventional spread footings sized to exert a net allowable bearing pressure of up to 3,000 psf.
- Supporting the southern multi-story corporate office building with underground parking on conventional spread footings sized to exert a net allowable bearing pressure of up to 6,000 psf.



In our opinion, those buildings will experience total and differential settlements of less than the stated tolerance.

C.1.f. Existing Fill

As previously discussed in Section B.3.c, most of the soil borings performed on this site encountered existing fill to depths ranging from about 1 to 25 feet, with an average depth of about 7 feet. The existing fill consisted of a variety of soils consisting of clean sands, silty and clayey sands, and lean clays.

About two-thirds of the penetration resistance values recorded in the existing fill were less than about 15 BPF, which is the threshold value that typically indicates that a soil is moderately well to well compacted. Furthermore, a significant number of the soil borings encountered approximately 2 to 13 feet of compressible organic deposits beneath the existing fill.

A number of the 2015 Wenck soil borings were performed in areas that were recently backfilled by Bolander as part of the environmental cleanup phase. The penetration resistance values recorded in those borings generally suggest that the backfill tested were typically placed in a compacted manner. However, because the existing fill encountered by the 2007 soil borings was overall poorly compacted, and in most cases across the site, the "2015 existing fill was surrounded by "2007 existing fill," and because much of the fill conceals organic soils, it is our opinion the existing fill on this site should be judged to be geotechnically unsuitable for support of the proposed buildings, utilities, and pavements. As such, we recommend that the existing fill be removed and replaced with suitable compacted backfill.

C.2. Site Grading and Subgrade Preparation

C.2.a. Subgrade Excavations

We recommend removing unsuitable materials from below buildings, utilities, and pavements. We define unsuitable materials as surface vegetation, pavement materials, topsoil, root zones, existing fill, surficial and buried organic deposits, buried topsoil, frozen materials, existing structures (a limited number remain), and existing utilities. Table E4 in Appendix E (Unsuitable Soils) shows the anticipated excavation depths and bottom elevations for each of the geotechnical borings performed on this site and included in Appendix B.

NOTE: As mentioned previously, given the work that has been performed on this since 2007, it should be anticipated that near-surface conditions shown on the 2007 soil boring logs may not accurately reflect existing conditions at those locations, and the surface elevations shown on those borings may be different.



Excavation depths will vary between the borings locations. Portions of the excavations may also extend deeper than indicated by the borings.

C.2.b. Engineering Observation and Evaluation of Exposed Soils

We recommend a geotechnical representative observe the excavations to make the necessary field judgments regarding the suitability of the exposed soils.

To assist in the evaluation process, and also to help promote subgrade uniformity, in areas where excavations to remove unsuitable soils terminate within 5 feet of proposed subgrade elevations, we recommend implementing the following sequence:

- 1. Scarify the exposed materials to a depth of about 8 inches.
- 2. Moisture condition the exposed subgrade soils to near their optimum moisture contents.
- 3. Compact the subgrade soils to a minimum of 98 percent of the material's standard Proctor maximum dry density (determined in accordance with ASTM D 698).
- 4. A geotechnical representative should evaluate the suitability of the soils exposed after the removal of unsuitable soils and compactive efforts as fill is placed.

C.2.c. Excavation Oversizing

When removing unsuitable materials below building limits, we recommend the excavation extend outward and downward from the outside edges of the buildings and pavements at a slope of 1H:1V or flatter.

C.2.d. Excavated Slopes (General Excavation and Utility Excavation)

Based on the borings, we anticipate on-site soils in excavations will predominately consist of sandy lean clay, silty sand, and clayey sand. These soils are typically considered Type C Soil under OSHA (Occupational Safety and Health Administration) guidelines. OSHA guidelines indicate unsupported excavations in Type C soils should have a gradient no steeper than 1 1/2H:1V. Slopes constructed in this manner may still exhibit surface sloughing. OSHA requires an engineer to evaluate slopes or excavations over 20 feet in depth.



An OSHA-approved qualified person should review the soil classification in the field. Excavations must comply with the requirements of OSHA 29 CFR, Part 1926, Subpart P, "Excavations and Trenches." This document states excavation safety is the responsibility of the contractor. The project specifications should reference these OSHA requirements.

C.2.e. Excavation Dewatering

We recommend removing groundwater from the excavations. Project planning should include temporary sumps and pumps for excavations in low-permeability soils, such as silty sands, clayey sands, and sandy lean clays.

Dewatering of high-permeability soils (e.g., sands) from within the excavation with conventional pumps has the potential to loosen the soils, due to upward flow. A well contractor should develop a dewatering plan; the design team should review this plan.

NOTE: Dewatering plans shall be design and implemented in accordance with the approved Response Action Plan (RAP) or applicable environmental requirements.

C.2.f. Engineered Fill Materials and Compaction

Table 11 below contains our recommendations for engineered fill materials.

NOTE: Engineered fill materials should satisfy the approved Response Action Plan (RAP) or applicable environmental requirements.



Locations To Bo Used	Engineered Fill	Possible Soil Type	Gradation	Additional
	Classification	Descriptions	Gradation	Requirements
Mass Grading: At depths greater than 12 feet below proposed subgrade elevations	Structural fill	SM, SP-SM, SP	100% passing 4-inch sieve < 20% passing #200 sieve	
Mass Grading: Within 12 feet of proposed subgrade elevations	Structural fill	SM, SC, CL, SP-SM, SP	100% passing 4-inch sieve	Free of debris and contains an organic content less than
Drainage material (soil)	 Free-draining Non-frost- susceptible fill 	SP	100% passing 1-inch sieve < 50% passing #40 sieve < 5% passing #200 sieve	3 percent
Retaining Walls	Retained engineered fill	SP, SW, SP- SM, SM	100% passing 2-inch sieve < 20% passing #200 sieve	
Replacement Topsoil Only	Topsoil, Buried	Topsoil, Peat	-	_
Below landscaped surfaces, where subsidence is not a concern	Non-structural fill	SM, SC, CL, SP-SM, SP, ML, OL	100% passing 6-inch sieve	< 10% OC

Table 11. Engineered Fill Materials

We recommend that project documents not allow the contractor to use frozen material as engineered fill or to place engineered fill on frozen material.

We recommend spreading engineered fill in loose lifts of approximately 8 to 12 inches thick. We recommend moisture conditioning and compacting engineered fill in accordance with the criteria presented below in Table 12. The project documents should specify both relative moisture content and compaction levels of engineered fill.



Reference	Relative Compaction, percent (ASTM D698 – Standard Proctor)	Moisture Content Variance from Optimum at Time of Compaction, percentage points < 20% Passing #200 Sieve (typically SP, SP-SM, > 20% Passing #200 Sieve (typically SP, SP-SM, Imited SM)		
Mass Grading: At depths greater than 12 feet below proposed subgrade elevations	100	±3	-1 to +3	
Mass Grading: Within 12 feet of proposed subgrade elevations	98	±3	-1 to +3	
Utility Trench	98	±3	±3	
Below landscaped surfaces	90	±5	±4	
Adjacent to retaining wall	97	±3	-1 to +3	

Table 12. Compaction Recommendations Summary

We recommend performing moisture and density tests in engineered fill to evaluate if the contractors are effectively compacting the soil and meeting project requirements.

C.3. Pavements

C.3.a. Estimated Subgrade R-value

Our scope of services for this project did not include laboratory tests on subgrade soils to determine an R-value for pavement design. Based on our experience with similar soils anticipated at the pavement subgrade elevation, we recommend pavement design assume an R-value of 20.

C.3.b. Pavement Sections

Appropriate pavement sections are critical to the performance of rigid and flexible pavements. We can provide recommendations for pavement sections during final pavement design.

C.3.c. Bituminous Pavement Materials

Appropriate mix designs are critical to the performance of flexible pavements. We can provide recommendations for pavement material selection during final pavement design.



C.4. Utilities

C.4.a. Subgrade Stabilization

Earthwork activities associated with utility installations located inside the building area should adhere to the recommendations in Section C.2.

For exterior utilities, assuming the soils are corrected as recommended previously, we anticipate the soils at typical invert elevations will be suitable for utility support. However, if construction encounters unfavorable conditions such as soft clay, organic soils, or perched water at invert grades, the unsuitable soils may require some additional subcutting and replacement with sand or crushed rock to prepare a proper subgrade for pipe support.

C.4.b. Corrosion Potential

Based on our experience, most of the soils encountered by the borings are considered to be moderately corrosive to metallic conduits, but only marginally corrosive to concrete. We recommend specifying non-corrosive materials or providing corrosion protection, unless project planning chooses to perform additional tests to demonstrate the soils are not corrosive.

C.5. Intermediate and Deep Foundation Systems

C.5.a. Intermediate Foundation Systems: Aggregate Piers or Stone Columns

As discussed previously, where appropriate, for the proposed buildings located within the Town Center portion of the development, there is the option to support foundations for those buildings on aggregate piers or stone columns, commonly known by trade names such as: Geopier[®], Vibro Piers[®], Vibro Stone Columns[®], etc.

A foundation subgrade improved with aggregate piers or stone columns will reduce the potential for detrimental settlement, provide adequate bearing capacity, and eliminate the need for deep foundations where appropriate.



Different design firms and contractors use varying techniques to design and/or construct aggregate piers, but methods generally consist of excavating soil from a hole with an auger or vibrating a probe into the ground, and then building a column of clean, open-graded aggregate. The contractor constructs the pier by placing the aggregate in lifts from the bottom of the pier and compacting each lift before placing aggregate for the subsequent lift. The vibratory energy, and sometimes ramming action, causes the aggregate to interlock, forming a stiff pier that provides soil reinforcement and increases shear resistance. We can assist you with developing a list of pre-qualified contractors prior to bidding or with reviewing contractor experience as part of the bidding process. The aggregate pier designer will determine the allowable soil bearing capacity of footings bearing upon rammed aggregate piers. Aggregate piers are typically able to support net allowable bearing pressures of 6,000 to 8,000 pounds per square foot.

As discussed previously, it is our opinion that aggregate piers only need to be installed below footings provided the slab subgrades are preloaded by filling the building pad areas to near proposed finished street grades prior to building construction.

C.5.b. Driven Pile: Preliminary Estimated Lengths and Capacities

Based on the soils encountered in the borings near structures recommended to utilize a driven pile foundation system, for this preliminary evaluation, we evaluated design requirements for using 12-inch diameter, closed-end, driven pipe pile. Based on the soil profile and the anticipated loading, we do not recommend using a pile with a smaller diameter. If the resistances discussed herein are insufficient for design, the design team could consider using a larger diameter pile.

We used the computer program UniPile, version 5.0, to estimate the static, ultimate, geotechnical resistance of the pile sections. We utilized the Beta-method, an effective stress method, to estimate the static, geotechnical resistance for these piles. This method determines shaft resistance using Bjerrum-Burland beta coefficients (β), which are based on soil type and effective friction angle. We estimated the β values for each layer based on our experience and on Figure 9.20 from the Federal Highway Administration (FHWA) Publication No. NHI-05-042, Design and Construction of Driven Pile Foundations, April 2006. The Beta-method determines end-bearing resistance using toe bearing capacity factors (N_t), which are also based on soil type and effective friction angle. We estimated the N_t values from our experience and Table 9-6 of the April 2006 FHWA publication identified previously.



We determined allowable (working) geotechnical pile resistances by dividing the ultimate resistance value by a factor of safety reflecting the level of anticipated quality control. We recommend using a safety factor of 2.0 with the level of pile construction/quality control. If the project team implements an alternate level of quality control, we will need to reevaluate predicted pile lengths and the applicable safety factor.

Based on the anticipated grading-to-construction (buildings) sequence, which includes a minimum 6-month construction delay, we do not anticipate that drag loads will control the pile design. If no construction delay is proposed, we can re-evaluate the impact of the site grading on the driven pile sections.

The following tables summarize the anticipated pile lengths and tip elevations along with ultimate resistances, and working resistances.

	Top-of-Pile	Estimated Pile	Estimated Tip	Working F	Resistance
Boring	Elevation	Length	Elevation	tons	kips
CPT-3	895 ±	85	810 ±	50	100
CPT-3	895 ±	100	795 ±	75	150

Table 13. Anticipated Pile Lengths and Resistances, 12-inch OD Pipe Piles

These estimated pile lengths are preliminary in nature and we recommend performing building-specific analysis as final design is complete and additional deep borings are completed.

We anticipate total deformation of the pile heads will be less than 1 inch under the loads provided by discussed herein. Differential settlement of the pile heads will be less than 1/2 inch.

C.6. Retaining Walls

C.6.a. Subgrade Preparation

We recommend removing unsuitable soil from below the retaining wall and the reinforcement zone. Based on the Wenck soil borings RW-1, RW-2, and RW-3, we anticipate respective excavations depths of 7, 4, and 7 feet at those locations.

We recommend replacing the materials with engineered fill selected, placed, and compacted in accordance with the recommendations provided in Section C.2.f.



C.6.b. Drainage Control

We recommend installing drain tile to remove water behind the below-grade walls. The retaining wall drainage system should also incorporate free-draining engineered fill (as defined in Table 11) or clean drainage aggregate connected to the drain tile.

C.6.c. Lateral Earth Pressures

Below-grade wall design can use active earth pressure conditions, if the walls can rotate slightly. If the wall design cannot tolerate rotation, then design should use at-rest earth pressure conditions. Rotation up to 0.002 times the wall height is generally required for walls supporting sand (as defined in Table 11). We recommend using the estimated values presented below in Table 14 to compute lateral earth pressures. Our recommend values are un-factored and assume that the retained fill is selected and placed in conformance with Section C.2.f.

Material	Soil Unit	Internal	Pro	Pressure Coefficients		
Classification	Weight	Friction Angle	At-rest,	Active,	Passive,	Sliding
for Retained Fill	(pcf)	(deg.)	Ко	Ka	Kρ	Coefficient
SM	130	28	0.59	0.42	2.37	0.40
SP, SP-SM	120	30	0.56	0.39	2.56	0.40

Table 14. Estimated Lateral Earth Pressure Coefficients

Designs should also consider the slope of any engineered fill and dead or live loads placed behind the walls within a horizontal distance that is equal to the height of the walls. Our recommended values assume the wall design provides drainage so water cannot accumulate behind the walls. The construction documents should clearly identify what soils the contractor should use for engineered fill of walls.



C.7. Stormwater

We estimated infiltration rates for some of the soils we encountered in our soil borings, as listed in Table 15. These infiltration rates represent the long-term infiltration capacity of a practice and not the capacity of the soils in their natural state. Field testing, such as with a double-ring infiltrometer (ASTM D3385), may justify the use of higher infiltration rates. However, we recommend adjusting field test rates by the appropriate correction factor, as provided for in the Minnesota Stormwater Manual or as allowed by the local watershed. We recommend consulting the Minnesota Stormwater Manual for stormwater design.

Soil Type	Infiltration Rate ^{a,b} (inches/hour)	
Sands with less than 12% fines,		
fine- to medium-grained poorly graded sands	0.8	
(SP, such as the on-site fine- to medium-grained	0.0	
Alluvium and coarser-grained Glacial Outwash)		
Fine-grained sands		
(SP, SP-SM, such as the on-site fine-grained	0.45	
sandy Alluvium)		
Very fine sands, silty fine sands	0.2	
(SM, such as the on-site Alluvium and Till)	0.2	
Clayey sands, clays, and silts		
(CL, SC, ML, such as the on-site	0.06	
Glacial Till and Alluvium)		

Table 15. Estimated Design inilitration Rates based on 5011 Classification	Table 15.	Estimated	Design	Infiltration	Rates B	based o	n Soi	l Classificati	ion
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a From Minnesota Stormwater Manual. Rates may differ at individual sites.

b Generally assumes non-saturated conditions and the an adequate separation from the water table.

Fine-grained soils (silts and clays), topsoil or organic matter that mixes into or washes onto the soil will lower the permeability. The contractor should maintain and protect infiltration areas during construction. Furthermore, organic matter and silt washed into the system after construction can fill the soil pores and reduce permeability over time. Proper maintenance is important for long-term performance of infiltration systems.



This geotechnical evaluation does not constitute a review of site suitability for stormwater infiltration or evaluate the potential impacts, if any, from infiltration of large amounts of stormwater.

C.8. Spine Road Bridge: LRFD Design

C.8.a. Pile Resistances

Based on our conversations with the project team, and the Spine Road Bridge design provided to us, we evaluated design requirements for the following types of driven piles: 12-and 16-inch steel pipe pile (referred to as "CIP" on the project documents). Structural details, including anticipated foundation loads, are not available at this time. Based on the soils encountered in the borings, we have assumed deep foundations to support the new bridge will experience a factored design load of 100 tons (200 kips) for each 12-inch closed-ended pipe (CEP) pile and 170 tons (340 kips) for each 16-inch CEP pile.

We used the computer program UniPile, version 5.0, to estimate the static, ultimate, geotechnical resistance of the pile sections. We utilized the Beta-method, an effective stress method, to estimate the static, geotechnical resistance for these piles. This method determines shaft resistance using Bjerrum-Burland beta coefficients (β), which are based on soil type and effective friction angle. We estimated the β values for each layer based on our experience and on Figure 9.20 from the Federal Highway Administration (FHWA) Publication No. NHI-05-042, Design and Construction of Driven Pile Foundations, April 2006. The Beta-method determines end-bearing resistance using toe bearing capacity factors (N_t), which are also based on soil type and effective friction angle. We estimated the N_t values from our experience and Table 9-6 of the April 2006 FHWA publication identified previously.

Factored geotechnical pile capacities are determined by multiplying the pile driving resistance factor ($\phi_{dynamic}$) by the nominal pile resistance (R_n). The American Association of State Highway and Transportation Officials (AASHTO) and MnDOT recommend relating $\phi_{dynamic}$ to the degree of construction control. For situations where subsurface exploration and static calculations have been completed, MnDOT recommends the following $\phi_{dynamic}$ factors.

Table 16. Recommended Pile Driving Resistance Factors

Specified Construction Control	Ø dynamic
MnDOT Pile Formula 2012 (MPF12) for Pipe Pile Sections	0.50



Based on the anticipated very dense bearing layer based on the soil borings Wenck performed for the bridge structure, we evaluated the necessary pile lengths to achieve the required geotechnical resistance for the MnDOT LRFD dynamic pile capacity formula method of field control. For the MnDOT LRFD dynamic pile capacity formula method, we used a $\phi_{dynamic}$ of 0.50 to estimate the desired R_n capacities (R_n = ϕ Q_n / $\phi_{dynamic}$. If a different construction control method is performed, the pile lengths or capacities may need to be revised. The estimated lengths are provided in Table 17 of this report.

Wenck Boring	Abutment Location	Pile Diameter (inch)	Top of Pile Elevation	Estimated Tip Elevation	Pile Length (feet)	Nominal Resistance (tons)	Factored Design Load; $\phi_{dynamic}$ =0.5 using MPF12 driving formula as field quality control (tons)
BR-601	East	12	877	802ª	75	200	100
BR-603	West	12	877	807	70	200	100
BR-601	East	16	877	802ª	75	340	170
BR-603	West	16	877	807	70	340	170

Table 17. Spine Road Bridge Estimated Pile Lengths and Resistances (12- and 16-inch OD Pile)

a Estimated pile length extends beyond boring termination depth. Bottom layer extrapolated to estimate the nominal resistance.

Based on the anticipated grading-to-construction (buildings) sequence, which includes a minimum 6-month construction delay, we do not anticipate that drag loads will control the pile design. If no construction delay is proposed, we can re-evaluate the impact of the site grading on the driven pile sections.

C.8.b. Pile Specification and Driving

We anticipate the pipe piles will conform to MnDOT Specification 2452 and 3371. The minimum required wall thickness is 1/4 inch for 12-inch pile and 5/16-inch for 16-inch pile.

If a pile's resistance to driving is not obtained at the anticipated length, we recommend driving be halted, and that the capacity be evaluated on restrike after a waiting period of at least 1 day. If the pile toe is driven past the estimated toe elevations shown in Table 16, it is possible the piles have been overdriven and, after soil setup occurs, the pile capacities will be adequate.



C.8.c. Lateral Earth Pressure Calculations for P-Y Curves and Lateral Earth Forces

Table 18 and 19 provide the recommended soil parameters for lateral pile analysis and p-y curve generation, from existing grade, using the current version of the computer program LPILE. Based on the soils encountered in the borings, we recommend using the default lateral modulus of subgrade reaction values included in LPILE. For preliminary planning purposes, we have included preliminary lateral analysis using LPILE, Version 2018 in the Appendix. For our analysis, we analyzed the magnitude of shear loading that would result in 1/4, 1/2, and 1 inch of pile-top deflection under a fixed-head condition.

Layer Top Depth Below Existing Grade (feet)	Layer Bottom Depth Below Existing Grade (feet)	Moist Unit Weight (pounds per cubic foot)	Internal Angle of Friction (degrees)	Undrained Shear Strength (pounds per square foot)	Material Type
0	6	110		500	Soft Clay
6	12	115	29		Sand
12	15	80		150	Soft Clay
15	35	120	30		Sand
35	75	125		2,000	Stiff Clay w/o Free Water
75	75+	120	37		Sand

Table 18. Soil Parameters for p-y Curve Generation - East Abutment (Boring BR-601)

Layer Top Depth Below Existing Grade (feet)	Layer Bottom Depth Below Existing Grade (feet)	Moist Unit Weight (pounds per cubic foot)	Internal Angle of Friction (degrees)	Undrained Shear Strength (pounds per square foot)	Material Type
0	8	115	30		Sand
8	17	110	27		Sand
17	25	115	30		Sand
25	55	125		2,000	Stiff Clay w/o Free Water
55	70	130		5,000	Stiff Clay w/o Free Water
70	70+	120	37		Sand



C.8.d. Pile Spacing and Group Effect

The pile design does not need to consider group effects for axial loading if the pile spacing is at least 3-pile diameters center-to-center. For lateral loading, consideration of group effects is not necessary for a center-to-center pile spacing of at least 5-pile diameters. If the project team selects a closer spacing, we recommend having us evaluate the magnitude of the group effect.

C.9. Pile Settlement

We anticipate total deformation of the pile heads will be less than 1 inch under the loads discussed herein. Differential settlement of the pile heads will be less than 1/2 inch.

C.9.a. Pile Cap Embedment

We recommend foundation design include minimum pile cap embedment 60 inches below final grade for pile caps supporting unheated structures.

C.9.b. Pile Driving System

Using an under or oversized pile-driving hammer can be detrimental to the successful installation of piling. Prior to system acceptance, we therefore recommend performing a wave equation analysis modeling prospective contractors' pile installation systems. The wave equation analysis is used to estimate probable driving stresses and pile penetration resistance based on the type of hammer proposed, the specified pile type/size and the site-specific material conditions which, when combined, help evaluate system suitability. Our firm can discuss the requirements and limitations of wave equation analyses and, if needed, perform them.

C.9.c. Pile Quality Control

We based the allowable resistances determined for this project on standardized calculations and material conditions (layer thicknesses, strengths, etc.) at a limited number of boring locations. To more accurately predict actual pile lengths and resistances, and develop criteria to drive all the project piles to, we recommend designating at least 1 pile per substructure (each abutment or pier) piles as test piles.

We recommend having the remaining foundation piles driven under the continuous observation of a geotechnical engineer or a MnDOT-certified bridge inspector. Information noted for each production pile should include, but may not be limited to, driving criterion, pile length, tip elevation, driving resistance, splices and any observed damage.



After driving the piles to adequate bearing and cutting them off at design elevations, we recommend inspecting them for damage and plumbness/batter. The geotechnical and structural engineers should review their load-carrying capabilities if the inspection identifies pile damage, or if the piles do not meet the required plumbness or batter tolerances. We recommend including contingencies in the project budget for additional piles and/or longer piles.

D. Procedures

D.1. Penetration Test Borings

We drilled our 2018 penetration test borings with an all-terrain carrier-mounted core and auger drill equipped with hollow-stem auger. We performed the borings in general accordance with ASTM D6151 taking penetration test samples at 2 1/2- or 5-foot intervals in general accordance to ASTM D1586. We collected thin-walled tube samples in general accordance with ASTM D1587 at selected depths. The boring logs show the actual sample intervals and corresponding depths.

We sealed penetration test boreholes meeting the Minnesota Department of Health (MDH) Environmental Borehole criteria with an MDH-approved grout. We will forward/forwarded a sealing record (or sealing records) for those boreholes to the Minnesota Department of Health Well Management Section.

D.2. Cone Penetration Test Soundings

We performed CPT soundings by advancing a 1.75-inch diameter A.P. van den Berg piezocone with an unequal end area ratio of 0.8. We used a 15-ton track-mounted rig to advance the cone into the ground. We performed the soundings in general accordance with ASTM D5778. While advancing the cone, we digitally recorded tip resistance (Q_t), sleeve friction (F_s), and pore pressure (U_2).



D.3. Exploration Logs

D.3.a. Log of Boring Sheets (2007 and 2018 Braun Intertec Borings)

The Appendix includes Log of Boring sheets for our penetration test borings. The logs identify and describe the penetrated geologic materials, and present the results of penetration resistance and other in-situ tests performed. The logs also present the results of laboratory tests performed on penetration test samples and groundwater measurements.

We inferred strata boundaries from changes in the penetration test samples and the auger cuttings. Because we did not perform continuous sampling, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may occur as gradual rather than abrupt transitions.

D.3.b. Cone Penetration Test Sounding Logs

The Appendix also includes CPT Sounding Logs. The CPT sounding logs report the tip resistance (Q_t) , sleeve friction (F_s) and pore pressure (U_2) measured by the cone during advancement, as well as, the soil behavior type (SBT) inferred from established relationships between tip resistance, sleeve friction and pore pressure. The SBT does not indicate a soil classification based on grain size distribution. Refer to the attached Descriptive Terminology Cone Penetration Test in the Appendix for more information. The CPT logs also report the friction ratio, which calculated by dividing the sleeve friction by the tip resistance.

We inferred strata boundaries, like SBT, from changes in tip resistance, sleeve friction and pore pressure. While cone measurements are relatively continuous with depth, the boundaries are still only approximate, likely vary away from the sounding locations and may also occur as gradual rather than abrupt transitions.

D.3.c. Geologic Origins

We assigned geologic origins to the materials shown on the logs and referenced within this report, based on: (1) a review of the background information and reference documents cited above, (2) visual classification of the various geologic material samples retrieved during the course of our subsurface exploration, (3) penetration resistance testing performed for the project, (4) laboratory test results, and (5) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.



D.4. Material Classification and Testing

D.4.a. Visual and Manual Classification

We visually and manually classified the geologic materials encountered based on ASTM D2488. When we performed laboratory classification tests, we used the results to classify the geologic materials in accordance with ASTM D2487. Appendix C includes a chart explaining the classification system we used.

D.4.b. Laboratory Testing

The exploration logs (2018 Braun Intertec logs only) in the Appendix note the results of the laboratory tests we performed on geologic material samples. We performed the tests in general accordance with ASTM procedures, namely:

- Moisture Content: ASTM D 2216
- Organic Content: ASTM D 2974
- Atterberg Limits: ASTM D 4318
- Mechanical Analyses (through the No. 200 sieve only): ASTM C 117

D.5. Groundwater Measurements

The drillers checked for groundwater while advancing the penetration test borings, and again after auger withdrawal. We then filled the boreholes or allowed them to remain open for an extended period of observation, as noted on the boring logs.

E. Qualifications

E.1. Variations in Subsurface Conditions

E.1.a. Material Strata

We developed our evaluation, analyses and recommendations from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth. Therefore, we must infer strata boundaries and thicknesses to some extent. Strata boundaries may also be gradual transitions, and project planning should expect the strata to vary in depth, elevation and thickness, away from the exploration locations.



Variations in subsurface conditions present between exploration locations may not be revealed until performing additional exploration work, or starting construction. If future activity for this project reveals any such variations, you should notify us so that we may reevaluate our recommendations. Such variations could increase construction costs, and we recommend including a contingency to accommodate them.

E.1.b. Groundwater Levels

We made groundwater measurements under the conditions reported herein and shown on the exploration logs, and interpreted in the text of this report. Note that the observation periods were relatively short, and project planning can expect groundwater levels to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing and thawing, surface drainage modifications and other seasonal and annual factors.

E.2. Continuity of Professional Responsibility

E.2.a. Plan Review

We based this report on a limited amount of information, and we made a number of assumptions to help us develop our recommendations. We should be retained to review the geotechnical aspects of the designs and specifications. This review will allow us to evaluate whether we anticipated the design correctly, if any design changes affect the validity of our recommendations, and if the design and specifications correctly interpret and implement our recommendations.

E.2.b. Construction Observations and Testing

We recommend retaining us to perform the required observations and testing during construction as part of the ongoing geotechnical evaluation. This will allow us to correlate the subsurface conditions exposed during construction with those encountered by the borings and provide professional continuity from the design phase to the construction phase. If we do not perform observations and testing during construction, it becomes the responsibility of others to validate the assumption made during the preparation of this report and to accept the construction-related geotechnical engineer-of-record responsibilities.



E.3. Use of Report

This report is for the exclusive use of the addressed parties. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

E.4. Standard of Care

In performing its services, Braun Intertec used that degree of care and skill ordinarily exercised under similar circumstances by reputable members of its profession currently practicing in the same locality. No warranty, express or implied, is made.



Appendix A Soil Boring and Cone Penetrometer Test Sounding Location Sketch







11001 Hampshire Avenue S Minneapolis, MN 55438 952.995.2000 braunintertec.com

Base Drawing Provided By



	B1706398
	Drawing No: B1706398
Drawn By:	BJB
Date Drawn:	4/23/18
Checked By:	JCK
Last Modified:	5/7/18

TCAAP Redevelopment -Mass Grading

Northeast of US Highway 10 and Highway 96

Arden Hills, Minnesota

Soil Boring and CPT Sounding Sketch
Appendix B

Log of Boring Sheets

2018 Braun Intertec Corporation

Borings P/ST-1, P/ST-2, P/ST-2 (P), P/ST-3, P/ST-3 (P), P/ST-4, P/ST-5, P/ST-5 (MW), P/ST-5 (P), P/ST-6, P/ST-6 (MW), P/ST-6 (P), P/ST-7, ST-1001, ST-1003 through ST-1005, ST-1007, ST-1008, ST-1008 (MW), ST-1008 (P), ST-1009 through ST-1011, ST-1017, ST-1018, and ST-1020 through ST-1022

2016 Wenck

Borings PB-1 through PB-4, NR-100 through NR-134, SR-200 through SR-225, TR-300 through TR-309, WM-400 through WM-410, BR-600 through BR-603, and DE-800 through DE-825

2007 American Engineering Testing, Inc./Braun Intertec Corporation

Borings ST-1 through ST-55, ST-57 through ST-83, ST-83A, ST-84 through ST-125, ST-125A, ST-126, ST-126A, ST-127 through ST-132, ST-132A, ST-133 through ST-135, ST-135A, ST-136 through ST-139, ST-139A, ST-140, ST-140A, ST-141 through ST-144, ST-144A, ST-145, ST-145A, ST-146, ST-146A, ST-147, ST-147A, ST-148 through ST-153, ST-153A, ST-154, and ST-157 through ST-224





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_ she			SC		CLA oran	YEY SAND, tr ge-brown and	race of Gravel, brown with ∣gray to 12' then gray, mois	t.	_	4	<u> </u>	20	46	LL=30	
						-	(Glacial Till)			^				PI=16	
ŭ L	_														
/e Te										7		15	45	LL=26 PI=12	
Desc										7 7					
-									7	<u> </u>					
-									_						
								_		10					
-									Í	1					
-									_						
-									-	8					
-									-						
	-								-	тw		15	43	*TW - #	# 4
- 18									-					LL=26 PI=14	
/8 –									-					DD=11	7.1 pcf
									-						
	876.2	19.0	CL		SAN	DY LEAN CL	AY. trace of Gravel. grav. m	noist.							
2 2					med	ium.	(Glacial Till)	-,		7					
BKAU									4	Υ.				*Water	not
8.GPJ									_					observ	ed with 29
1									_					stem a	uger in the
									_					ground	
	_								_					Water of a depth	observed at of 2.3 feet
														with 29	1/2 feet of
														in the g	round when
														after wi	thdrawal of
														auger.	
Z DZ														Boring	then
- BOKI	864.2	<u>3</u> 1.0								7				groutet	4.
0 00					END	OF BORING	*								
B1	706398						Braun Intertec Corporation				•	•	•	P/S	T-4 page 1 of



Brau	n Proje	ect B	170	6398	3			BORING	:		P/	ST-	5	
Geote	echnical	Evalu	latio	n Ma	co Crodina			LOCATIO	DN: Se	e att	ache	d sket	ch.	
Si North	P Redev	elopr US Hi	nent øhw	: - IVIA av 10	and Highw	av 96								
Arder	h Hills, N	linne	sota	.,		.,								
	ER: B.	Kamm	ermei	er	METHOD:	3 1/4" HSA	, Autohammer	DATE:	5/2	2/18		SCA	LE:	1'' = 4'
Elev.	Depth				De	scription of	Materials		DDE	\\\/I	MC	D 200	Teet	Nistas
0017	0.0	Sym	nbol	(Soil	I-ASTM D2488	or D2487, Ro	ock-USACE EM111	0-1-2908)	DFF		%	F200 %	rest	s of notes
B89.7	1.0	FILL		FILL	: Silty Sand,	trace of roo	ts, black, wet.							
t for e		FILL		FILL	: Silty Sand,	fine- to med	dium-grained, trac	ce of	1					
				Ciuv				-						
≥ 886.7	4.0							-	μ					
		SP-		POC	ORLY GRADE	D SAND wi	ith SILT, fine- to		1	<u> </u>				
				meu	ium-grameu,	(Alluvi	um)		8		15			
- Intiv								-	Ť					
								-	- M 10		10	6		
-								-	Å '					
_								-	1					
									9					
-								-	T					
-								-	- 12					
-								-						
-								-						
16:00									4					
20/18								-	\square					
5DT 8/								-	1					
SENT.0	10.0							-	1					
	19.0	CL		SAN	DY LEAN CL	AY, trace of	f Gravel, gray, m	oist, soft					*Water	observed
87				to m	edium.	(Glacial	l Till)		<u>х</u> з				at a de feet wit	pth of 5.6 th 9 1/2 feet
BRA								-	\square				of hollo auger i	ow-stem n the
98.GP								-					ground	
								-					Water	observed at
T5/20: 								-					feet of	hollow-stem
									6				auger i ground	n the
								-					Water	observed at
								-					a depth with 29	n of 4 feet 1/2 feet of
								-					hollow-	stem auger
– –	-							-					rechec	ked 3 hours
860.7 8	30.0			END		.*			7				auger.	in in a wal of
					_			-	А				Boring	then
ğ B1706398						Braur	Intertec Corporation						grouted P/S	d. ST-5 page 1 of 1



ſ	Brau	n Proje	ect B	170	6398	8				BORING	G:			Ρ/	ST-	6	
	Geote	chnical Rodov	Evalu	iatio	n - Ma	ss Grading				LOCATI	ON	I: Se	e att	ache	d sket	ch.	
ons)	North	east of	US Hi	ghwa	ay 10	and Highw	ay 96										
eviati	Arden	Hills, N	linne	sota	-	-	-										
abbr	DRILLE	R: B.	Kamm	ermei	er	METHOD:	3 1/4" H	ISA, Autohamm	ner	DATE:		5/4	/18		SCA	LE:	1'' = 4'
n of	Elev. feet	Depth feet				De	scription	of Materials				BPF	wi	мс	P200	Tes	ts or Notes
anatic	894.5	0.0	Sym	nbol	(Soi	I-ASTM D2488	or D2487,	Rock-USACE	EM1110	0-1-2908)				%	%	100	
expla	_		FILL		FILL	.: Silty Sand,	trace of r	roots, black, w	vet.								
st for	892.5	2.0															
shee			FILL		FILL brow	.: Silty Sand, vn. wet.	trace of (Gravel, trace	of roots	s, dark	┢	10	$\overline{\Sigma}$				
Vpolo	890.5	4.0				,					Δ						
mine			SP- SM		POC med	ORLY GRADE	D SAND	with SILT, fir Gravel, brown	ne- to . wet. lo	oose.							
/e Te							(Allı	uvium)	,,		M	7					
criptiv	887.5	7.0															
Desc			SP		POC	ORLY GRADE	D SAND	, fine- to med	ium-gra	ained,	M	15					
(See	_				dens	se.	/		omean	um .	Å	10					
ľ	_						(All	uvium)									
ľ											M	6					
	- 882 5	12 0									Π						
ľ	002.0	12.0	SC		CLA	YEY SAND, t	race of G	Gravel, brown	to 14' t	hen	┢	6					
	-				gray	, moist, meait	ini. (Glad	cial Till)			Ă	0					
	-																
16:00												TW*		15	45	*TW -	#5
20/18	-										1					PI=11	
SDT 8/	-															*END	OF
RENT.G	-															BORI	NG.
CURF	-															Water a dept	observed at h of 6.2 feet
NN_V8											M	7				with 9 hollow	1/2 feet of -stem auger
BRA	-										\parallel					in the	ground.
398.GP	-										$\left \right $					Water	observed at
17\063	-															with 12	2 feet of
TS\20:	870.5	24.0	CL		SAN	IDY LEAN CL	AY, trace	e of Gravel, gi	ray, mo	oist,						hollow	-stem auger ground.
ROJEC					med	lium.	(Glad	cial Till)		_	M	6				Water	observed at
S\AX P	-						,	,			Α					a dept	h of 2.6 feet
OJECT.	-										$\left \right $					hollow	-stem auger
NT\PR	-										$\left \right $					recheo	cked 68
N:\GI	-										$\left \right $					hours withdra	atter awal of
											\mathbb{H}	7				auger.	
OF BC	863.5	31.0			END		.*				А					Boring	then d
ő	B1706398					e. Beraite	Br	raun Intertec Corn	oration							P/	ST-6 name 1 of 1



ſ	Brau	n Proje	ect B	170	6398	3			BORING:		P/	ST-6 (MW)	
tions)	Geote TCAAF North	chnical P Redeve east of l	Evalu elopn US Hig	atio nent ghwa	n : - Ma ay 10	ss Grading and Highwa	ay 96		LOCATIC)N: Se	e atta	ched sketch.	
reviat	Arden	Hills, N	linnes	sota		METHOD				= 10	4/40		411 41
f abb		R: B.	Kamme	ermei	er	METHOD:	3 1/4" HSA, Autohar	nmer	DATE:	5/24	4/18	SCALE:	1" = 4"
ation c	feet 894.5	feet	Svm	bol	(Soi	De: I-ASTM D2488 (scription of Material	s E FM111(0-1-2908)	BPF	WL	Tests or	Notes
cplan	894.5	0.0	<u> </u>		Mon	itoring well ins	stalled on 5-25-2018	b:					
PROJECTS\AX PROJECTS\2017\06398.GPJ BRAUN_V8_CURRENT.GDT 8/20/18 16:00 (See Descriptive Terminology sheet for explana	894.5 894.5 - - - - - - - - - - - - -	0.0	Sym	bol	(Soil Mon Botto Dept Elev Wato Elev Wato Elev	I-ASTM D2488 d itoring well ins om of well screen th = 23' ation = 871.5 of well screen th = 18' ation = 876.5 er level measu th = 3.3' ation = 891.2 er level measu ation = 889.5	or D2487, Rock-USAC stalled on 5-25-2018 een: ured on 6-1-2018: ured on 8-17-2018:	<u>E EM1110</u>					
GINT	_												
NG N:	_								-				
BORIN													
LOG OF	_								_				



ſ	Brau	n Proje	ect B1	170	6398	3			BORING:		F	P/ST-6 (P)	
	Geote	chnical P Redevo	Evalua elopm	atio Nent	n : - Ma	ss Grading			LOCATIC	N: Se	e atta	ached sketch.	
tions)	North	east of l	JS Hig	ghwa	ay 10	and Highwa	ay 96						
orevia	Arden	Hills, N	linnes	ota	ər	METHOD	3 1//" HSA Autohamm	or		5/2/	1/18	SCALE	1" = 4'
of abt	Elev.	Depth	Carrine			METHOD.			DATE.	5/2-	+/10	JUALL.	1 - 4
ation	feet 894 5	feet	Sym	hol	(Soil		escription of Materials	=M1110	1-1-2908)	BPF	WL	Tests or I	lotes
cplan	894.5	0.0	Oyini	501	Piez	ometer installe	ed on 5-24-2018:		J=1-2000)				
t for e)	_				Botto	om of piezome	eter screen:		_				
shee	_				Elev	ation = 887.5							
Vpolor	_				Top Dept	of piezometer th = 2'	screen:		_				
emir					Elev	ation = 892.5							
ptive T	_				Wate Dept	er level meası th = 3.2'	ured on 6-1-2018:		_				
Jescri	-				Elev	ation = 891.3			_				
See	-				Wate Elev	er level meası ation = 889.6	ured on 8-17-2018:		_				
1	-								_				
ŀ													
ľ	-								_				
ľ	-								_				
	_												
18 16:0	_								_				
8/20/	_								_				
NT.GD1	_								_				
CURRE	_								_				
8/ 2/													
J BRAL	-								_				
398.GP	-								_				
17\06	-								_				
ECTS/2(-								_				
(PROJE													
CTS/A)	_												
- PROJE	_												
J:\GINT	_								_				
OF BOF	_								_				
- DOG													



ſ	Brau	n Proje	ect B	170	6398	3			BORING:			P/	ST-7	
ations)	Geote TCAAF North	chnical P Redeve east of U	Evalu elopr US Hi	iatio nent ghwa	n : - Ma ay 10	ss Grading and Highwa	ay 96		LOCATIC)N: Se	e att	ache	d sketch.	
obrevia	DRILLE	R: B.	Kamm	ermei	er	METHOD:	3 1/4" HSA,	Autohammer	DATE:	5/7	7/18		SCALE:	1" = 4'
n of al	Elev.	Depth feet				De	scription of I	Vaterials		BPF	wi	мс	Tests	or Notes
anatic	955.8	0.0	Sym	nbol	(Soi	I-ASTM D2488	or D2487, Ro	ck-USACE EM111	0-1-2908)			%	10010	
or expla	954.3	1.5	TS		SILT	Y SAND, trac	e of roots, d (Topso	ark brown, moisl il)	t					
neet f	_		CL		SAN stiff.	DY LEAN CL	AY, trace of	Gravel, brown, n	noist, _					
ogy sl	- 051 8	10					(Glacial	Till)	_	14				
minol	951.0	4.0	SM		SILT	Y SAND, trac	e of Gravel,	reddish brown, r	moist,					
/e Ten					mea	ium dense.	(Glacial	Till)		24		9		
scriptiv	_								_					
se Des	_								_	23				
S)	_								_					
										23		8		
	- 042.0	10.0							_	Δ				
	943.8	12.0	SP		POC	RLY GRADE	D SAND, fin	ie- to coarse-gra	ined,	M 16				
	_				uace	e of Glavel, lig	(Glacial Ou	twash)						
8														
)/18 16:	_								_	28				
от 8/20	_								_					
ENT.GD	_								_					
3_CURF	_								_					
										19				
3PJ BR/	- <u>9</u> 33.8	22.0												
)6398.C			SP		POC	RLY GRADE	D SAND, fin	e-grained, light t	orown,					
\2017\(_					-	(Glaciofluv	vium)	_					
OJECTS										V 27				
AX PR	_								_	× 21				
OJECTS	928.8	27.0	SP		POC	RLY GRADE	D SAND, fin	ie- to	-					
INT/PR	-				med med	ium-grained,ti ium dense.	race of Grav	el, light brown, m	noist, _					
g/:N g	_						(Glacial Ou	twash)	_					
BORIN										23				
OG OF	-								_					
	B1706398		1				Braun	Intertec Corporation					P	/ST-7 page 1 of 2



Braun Project B170	6398				BORING:		P/\$	ST-	7 (cont.)
Geotechnical Evaluation TCAAP Redevelopmen Northeast of US Highw Arden Hills, Minnesota	n - Mass Gra ay 10 and H	ading Highwa	ay 96		LOCATIC)N: Se	e att	ache	d sketch.	,
DRILLER: B. Kammerme	er MET	HOD:	3 1/4" HSA, Autohamme	er	DATE:	5/7	//18		SCALE:	1'' = 4'
6 Elev. Depth 6 feet feet 12 923.8 32.0 Symbol	(Soil-ASTM	De: 1 D2488 (scription of Materials or D2487, Rock-USACE E	M1110	0-1-2908)	BPF	WL	MC %	Tests	or Notes
	POORLY C medium-gr medium de END OF B Water not c auger in the Boring ther	GRADE ained,tr ense. (Glac	D SAND, fine- to race of Gravel, light bro ial Outwash) <i>(continued</i> ed with 39 1/2 feet of ho d. ed.	wn, m d)	oist,	23				

B1706398



Γ	Braur	n Proje	ect B	170	6398	3			BORING:	:		ST	-100)1	
	Geote	chnical	Evalu	atio	n				LOCATIC	DN: Se	e att	ache	d sketc	 :h.	
(SL	TCAAP	Redev	elopn	nent	- Ma	ss Grading									
iatio	Arden	Hills. N	US Fili linne:	gnwa sota	ay 10	and Highwa	ay 96								
bbrev	DRILLE	R: В.	Kamme	ermeie	er	METHOD:	3 1/4" HSA, Autor	nammer	DATE:	5/10	0/18		SCAL	.E:	1" = 4'
of a	Elev.	Depth				Do	oprintion of Mator	iala		DDE					
latior	1eet 903.9	reet 0.0	Sym	bol	(Soil	-ASTM D2488	or D2487, Rock-US	ACE EM111(0-1-2908)	BPF	VVL	MC %	P200 %	lest	s or Notes
xplar	002.0	1.0	FILL		FILL	Silty Sand, 1	trace of roots, bla	ck, moist.	,						
for e	902.9	1.0	FILL		FILL	Silty Sand, f	fine- to medium-g	rained, trac	e of						
-					Grav	el, mixed darl	k brown and dark	gray, moist	t						
gy sl									_	3					
inolo –									_						
	_									Мз		15	19		
tive									-	ĂС		10			
scrip									_						
e De									_	2					
_ (Se									_						
										Wн					
									_						
									_	M 10					
-	000 0	14.0								A IO					
	009.9	14.0	SC		CLA	YEY SAND, tr	race of Gravel, br	own, moist,	stiff.						
- 16:00	-						(Glacial Till)			13					
- 18									_	Δ					
от 8/2 									_						
NT.GC									-						
- URRE				$\langle \rangle \rangle$					_						
) 8/										10					
									_	Д					
GPJ E									_						
06398.									_						
2017/(879.9	<u>24.0</u>													
ECTS/			CL		SAN		AY, trace of Grave	el, gray, mo	pist,						
PROJI	-				meu	um.	(Glacial Till)			8 🕅					
TS/AX									_						
ROJEC									_					Water	not
									_					observ 1/2 fee	ea with 29 t of hollow
9/:u									_					stem a	uger in the
										7				Borine	then
0 E B	872.9	31.0			END	OF BORING	*			М				grouted	d.
Ğ B1	1706398						Braun Intertec	Corporation						ST-1	001 page 1 of 1



Brau	n Proje	ect B	170	6398	3			BORING:			ST	-100	03	
Geote	chnical	Evalu	latio	n				LOCATIC	N: Se	e att	ache	d sket	ch.	
	P Redev	elopr US Hi	nent ghw	: - Ma av 10	ss Grading	av 96								
Arden	Hills, N	linne	sota	uy 10		uy 50								
	ER: B.	Kamm	ermei	er	METHOD:	3 1/4" HSA, Aut	ohammer	DATE:	5/1	1/18		SCA	LE: 1	" = 4'
Elev.	Depth				De	scription of Mat	erials		RPF	wi	мс	P200	Tests or	Notes
895.8	0.0	Sym	nbol	(Soil	-ASTM D2488	or D2487, Rock-U	SACE EM1110	0-1-2908)			%	%	16313 01	NOLES
expla		FILL		FILL	: Poorly Grac	led Sand with S	ilt and Gravel	l, brown,						
5 893.8	2.0			moio				_						
0.000	2.0	FILL	X	FILL	: Silty Sand,	fine- to medium	grained, trac	e of		<u>×</u>				
×	10			Grav wet.	el, mixed ora	nge-brown and	ignt brown to	brown, _	Å					
100 091.8	4.0	FILL		FILL	: Clayey San	d, mixed brown	and dark brow	wn, wet.						
									V 6					
-								_	Δ					
								-						
- De								_	16					
<u>ري 886.8</u>	9.0			DOC			UT fine to							
		SP-		medi	ium-grained, t	race of Gravel,	brown, wet, n	nedium						
_				dens	se.	(Lacustrine Dep	osit)	_	11					
_						, i	,	_						
									M 12					
881.8	14.0								Д					
		SC		CLA to sti	YEY SAND, ti	race of Gravel, g	gray, moist, m	nedium						
16:00				10 31		(Glacial Till)			6		15			
1								_						
01 8/ 								_						
– –								_						
								_						
⁸ / ₂									тw		15	48	TW - #6	
-								-					LL=30	
								_						
1								-						
871.8	24.0	C		0.4.1			val errer	int -1:55						
		CL		SAN	DY LEAN CL	Ar, trace of Gra (Glacial Till)	ivel, gray, mo	oist, stiff. 						
- X PRC								_	8		17	51	LL=28 PI=15	
PROJE								_						
								_						
/:z 2								_						
									<u>у</u> 9		16			
								_						
<u>م</u> B1706398			<i>\///</i>			Braun Intert	ec Corporation	_					ST-1003	page 1 of 2



ſ	Braur	n Proje	ect B170	6398	3			BORING:	:	ST-	100)3 (cont.)
	Geote	chnical Rodow	Evaluatio	n ∙₋Ma	ss Grading			LOCATIC	DN: Se	e att	ache	d sket	ch.
(suc	Northe	east of l	US Highwa	Ivia av 10	and Highw	av 96							
viatio	Arden	Hills, N	linnesota			- /					•		
abbre	DRILLE	R: B.	Kammermei	er	METHOD:	3 1/4" HSA, Aut	ohammer	DATE:	5/1 ⁻	1/18		SCA	LE: 1" = 4'
Jof	Elev.	Depth			De	scription of Mat	orials				MO	D 200	T (N (
natior	feet 863.8	1eet 32.0	Symbol	(Soil	-ASTM D2488	or D2487, Rock-L	ISACE EM1110)-1-2908)	BPF	VVL	WC %	P200 %	lests or Notes
<u> (plar</u>				SAN	DY LEAN CL	AY, trace of Gra	vel, gray, mo	oist, stiff.					
or e)	-				(C	Blacial I III) (cont	inued)	-					
Jeet	-							_					
<u>}v</u> s									V 9				
	_							-	Ą				
emi	-							_					
Ne -	_							_					
cript	_							_					
Des													
See									11				
]	-							_					
ŀ	_							_					
ŀ	-							_					
ŀ	_							_					
									M 10				
	-							_	Д				
3	_							_					
10: 10:	_							_					
8/20/1													
קרו א	_							_					
KEN .									11		15	51	LL=29
Ъ.	-							_	<u>v v</u>				PI=1/
87 - 27	-							_					
BKAL	-							_					
8.GPJ	-							_					
10539.													*\//otor observed
	_							_	Д				at a depth of 7 feet
	_							_					with 9 1/2 feet of hollow-stem auger
X PKO													in the ground.
	_												Water observed at
KOLEC	-							_	∏тw		15	53	a depth of 2 feet with 59 1/2 feet of
	024.0	64.0							Ň				hollow-stem auger
ا x:/c	034.8	01.0		END	OF BORING).*							Boring then
	-							_					grouted. TW - #7
	-							_					LL=33 PI=53
ĬĻ	P1706209					Braun Inter	tec Corporation						ST 10032 of 2



Bra	aun P	Proje	ect B	170	6398	3			BORING	:		ST	-100)4
Ge	otechi	nical odov	Evalu	atio	n - Ma	ss Grading			LOCATIO	DN: Se	e att	ache	d sket	ch.
(sto) No	rtheas	st of l	US Hi	ghwa	- ivia ay 10	and Highwa	ay 96							
Arc Arc	den Hi	lls, №	linne	sota	-	-	-					i		
uqe DRI	LLER:	В.	Kamm	ermeie	er	METHOD:	3 1/4" HSA,	Autohammer	DATE:	5/1	0/18		SCA	LE: 1" = 4'
ີ Ele ຣ fee	v.Det	epth eet				De	scription of N	/laterials		BPF	WL	мс	P200	Tests or Notes
00e anatic	0.9	0.0	Sym	ibol	(Soi	I-ASTM D2488	or D2487, Roc	k-USACE EM111	0-1-2908)			%	%	
899 899	9.9	1.0	FILL		FILL	: Silty Sand,	trace of roots	s, dark brown, m	noist.					
et for			FILL		FILL Grav	:Silty Sand, /el, brown, we	fine- to mediu et.	um-grained, trac	ce of					
									_	<u>у</u> 9		16	15	
<u>60 89</u>	6.9	4.0		\bigotimes						Δ				
umina			SC		CLA	YEY SAND, t	race of roots, (Buried To	, black, moist. psoil)						
Ve Te									_	13				
	3.9	7.0												
Des			SC		CLA gray	YEY SAND, t , moist, mediu	race of Grave um to stiff.	el, brown to 12'	then _	8 1		15		
_ (See					0,		(Glacial 7	Fill)	_	Δ				
				\square										
									_	13		16		
									_					
										M 13				
									_	Δ				
。									_					
8 16:00										8 🕅				
3/20/1									_					
GDT 8									_					
- 88 88	1.9	19.0							_					
			CL		SAN	DY LEAN CL	AY, trace of (Gravel, gray, mo	oist, stiff.					
							(Olacial	·,		15*				*no recovery
PJ BR/									_					*Water not
- -									_					1/2 feet of hollow
117/06									_					stem auger in the ground.
CTS/2(_					Water not
PROJE										10				observed to cave-in depth of
TS\AX 									_					29 1/2 feet when
									_					hours after
									_					withdrawal of auger.
)/: U									_					Boring then
		21 0								9				grouted
005 005	3.3	31.0			END	OF BORING	.*							
≝ L	398						Braun li	ntertec Corporation				1	1	ST-1004 page 1 of 2



ſ	Braur	n Proje	ect B	170	6398	8				BORING	:		ST-1005	
/iations)	Geote TCAAP Northe Arden	chnical Redevo east of U Hills, M	Evalı elopr JS Hi linne	iatioi nent ghwa sota	n - Ma ay 10	ss Grading and Highw	ay 96			LOCATIO	DN: Se	e atta	ached sketch.	
abbrev	DRILLE	R: B.	Kamm	ermeie	er	METHOD:	3 1/4"	HSA, Autohamn	ner	DATE:	5/7	7/18	SCALE:	1'' = 4'
anation of a	Elev. feet 893.1	Depth feet 0.0	Sym	ıbol	(Soi	De I-ASTM D2488	escriptio or D248	n of Materials 7, Rock-USACE	EM1110	0-1-2908)	BPF	WL	Tests o	r Notes
KOJECTS/AX PROJECTS/2017/06398.GPJ BRAUN_V8_CURRENT.GDT 8/20/18 16:00 (See Descriptive Terminology sheet for explan	 	3.0	SC		CLA mois	YEY SAND, trac YEY SAND, t st, medium to	AY, trac (Gla	Gravel, brown acial Till)	to 7' th	en gray, 	3 13 9 5 5 7 8 8	Σ	*Water observe of 5 feet with 7 hollow-stem au ground. Water not obse 1/2 feet of hollo in the ground.	ed at a depth feet of iger in the erved with 29 ow stem auger
BORING N:\GINT\P	- - 862 1										9		Water observe 2.5 feet with a of 29 1/2 feet w rechecked 24 h withdrawal of a	d at a depth of cave-in depth /hen nours after uger.
OG OF	002.1	31.0			END	OF BORING).*						Boring then gro	outed.
	31706398			1			I	Braun Intertec Corp	oration		1.1	1	S	T-1005 page 1 of 1



В	raur	n Proje	ect B	170	6398	3			BORING	:		ST	-100)7	
	eote CAAP	chnical Redevo	Evalu elopr	iatio nent	n ∶- Ma	ss Grading			LOCATIC	DN: Se	e att	ache	d sket	ch.	
N N	orthe	east of l	JS Hi	ghwa	ay 10	and Highw	ay 96								
DF A	rden RILLE	HIIIS, IV R: B. I	Kamm	sota ermeie	er	METHOD:	3 1/4" HSA	. Autohammer	DATE:	5/1	0/18		SCA	LE:	1" = 4'
of El	lev.	Depth	-		-										
etion 8	eet 89.8	feet 0.0	Sym	nbol	(Soil	De ASTM D2488-	or D2487, Ro	Materials ock-USACE EM111	0-1-2908)	BPF	WL	MC %	P200 %	Tests	or Notes
explai	88.8	1.0	ΤS	<u>x 17</u> 17 x 1	SILT	Y SAND, trac	e of roots, o (Tops)	dark brown, wet. oil)	7						
et for			SP- SM		POC	RLY GRADE	D SAND wi gray, wet, lo	ith SILT, fine-grain	ned, lense. –		Į₽				
IV she							(Alluvi	um)	_	10					
inoloc –									_						
										<u>у</u> 9					
-									_						
									_	M 14*				*no reco	verv
(See									_	Μ					- ,
	-									12					
_									_						
_									_						
-	75 0	14.0							_	6					
	075.0	14.0	SC		CLA	YEY SAND, t	race of Gra	vel, gray, wet to 1	6' then						
8 16:00					mois	t, son to mea	(Glacial	l Till)		3					
8/20/1 									_						
IT.GDT									_						
									_						
82 20	-									TW*		15	46	*TW - #5	5
I BRAU									_					LL=23 PI=11	
- 									_						
8	65.8	24.0													
			CL		SAN med	DY LEAN CL ium.	AY, trace of	f Gravel, gray, mo	oist,	L _					
							(Glacial	I Till)	_	7					
									_						
									_						
D/:N									_						
	-									7					
-06 OF									_						
B170	06398			*////			Braur	Intertec Corporation			•			ST-100	7 page 1 of 2



Γ	Brau	n Proje	ect B	170	6398	3			BORING:		ST-	100)7 (c	ont.)	
	Geote TCAAF	chnical P Redev	Evalu elopn	atio nent	n ∶- Ma	ss Grading			LOCATIC	N: Se	e att	ache	d sketch	ı.	
tions)	North	east of	US Hi	ghw	ay 10	and Highw	ay 96								
reviat	Arden	Hills, N	linne	sota	i	METHOD			DATE	= (4)	0/40		00415	- 41	
fabb		R: B.	Kamme	ermei	er	METHOD:	3 1/4" HSA, Autoha	mmer	DATE:	5/1	0/18		SCALE	: 1'	' = 4'
tion o	feet	feet	_			De	escription of Materia	ls		BPF	WL	MC	P200	Tests or	Notes
olana	857.8	32.0	Sym	bol	(Soil SAN	-ASTM D2488 DY I FAN CI	or D2487, Rock-USAC AY, trace of Gravel	CE EM1110	0-1-2908) bist.			%	%		
or exp	-				medi	ium.	Blacial Till) (continue	, gray, me	-						
eet fo	-					(0		<i>.u)</i>	_						
hs yp										8 1					
inolo	853.8	36.0			END		.								
Tem-	-				Wate	er observed a	at a depth of 1.5 feet	with 29 f	eet of						
ptive -	-				hollo	w-stem auge	r in the ground.		-						
escri	-				Borir	ng then grout	ed.		_						
ee D															
<u>יי</u> ן-	-								-						
-	-								_						
-	-								_						
-	-								_						
┢															
-	-								_						
16:00	-								_						
- 1 81/17	-								_						
/2 - /2 -	-								_						
YEN -															
	-								_						
	-								_						
- BKA	-								_						
1398.61	-								-						
12/21	-								_						
HKUF	-								_						
TAX	-								_						
KOJEC	-								-						
לואן- פואול															
/:z פ	-								-						
BORIN	-								_						
	-								_						
ے ا د	1706398		1				Braun Intertec C	orporation			1	I		ST-1007	page 2 of 2



ſ	Brau	n Proje	ect B	170)6398	3			BORING	:		ST	-10	08	
	Geote TCAAF	chnical P Redev	Evalu elopr	iatio nen [:]	on t - Ma	ss Grading			LOCATIO	DN: Se	e att	ache	d sket	ch.	
tions	North	east of	US Hi	ghw	ay 10	and Highwa	ay 96								
brevia	DRILLE		Kamm	sota ermei	ier	METHOD.	3 1/4" HSA Autoh	ammer	DATE	5/2	2/18		SCA	I F·	1" = 4'
of ab	Elev.	Depth				METTOD.			Britz.						
ation	feet 890.7	feet 0.0	Svm	bol	(Soi	De: I-ASTM D2488 (scription of Materi or D2487, Rock-USA	ials ACE EM111	0-1-2908)	BPF	WL	MC %	P200 %	Tests	s or Notes
xplan	889 7	10	FILL		FILL	: Silty Sand, t	trace of roots, blac	ck, wet.	,						
t for e			FILL		FILL	: Clayey San	d, fine- to medium	i-grained, ti	race of						
shee	_						.,		_	6		15	30	LL=24	
Vpolo	886.7	4.0								Δ				PI=8	
emin			ML		SILT	, light gray, w	et, loose. (Alluvium)								
tive T	_								_	A 9		30	94		
escrip	883.7	7.0	SP-		POC	RIY GRADE	D SAND with SII	T fine- to			Į₽			An ope	n triangle in
ee D	_		SM		med	ium-grained, li	ight brown to 10' t	hen gray, v	wet, _	9				the wat	ter level olumn
S) S	_						(Alluvium)		_					indicate at whic	es the depth
ŀ					•					13		19	5	ground	water was ed while
ŀ	_								_					drilling.	
·	_									M 11					
	_				· · ·				_	М					
8					•										
/18 16:(_				•				_	12		19			
т 8/20,	_								_						
NT.GD	_				· · · ·				_						
CURRE	871.7	19.0	SM		SILT	Y SAND, fine	- to medium-grain	ed, trace o	f Gravel,						
8^ NDN					gray	, moist, very lo	oose to loose. (Alluvium)			4					
J BRAI	-								_						
5398.GI	_				•				_	■ T W*		16	35	*TW/ - #	#3
017\06	_								_					LL=18 PI=NP	70
JECTS/2					· · ·									DD=12	0.5 pcf
AX PRO	_				•				_	6					
JECTS/	_				•				_						
VT\PRO	_								_						
N:\GIN	_				•				_						
ORING										2					
G OF B	-								_	М					
្ន	B1706398			LEE	4		Braun Intertec	Corporation			1			 ST-1(008 page 1 of 2



Γ	Brau	n Proje	ect B	170	6398	3					BORING	G:		ST-	100)8 (cont	t.)
	Geote	chnical Redev	Evalu	iatio nent	n t - Ma	ss Gradin	σ				LOCATI	0	N: Se	e att	ache	d sket	ch.	
ons)	North	east of l	US Hi	ghw	ay 10	and High	יא וwa	ay 96										
viatio	Arden	Hills, N	linne	sota														
	DRILLE	R: B.	Kamm	ermei	er	METHO	D:	3 1/4" HSA,	Autohammer		DATE:		5/2	2/18		SCA	LE:	1'' = 4'
Jof	Elev.	Depth					Do	corintian of	Matoriale						MO	D 200	-	
latio	858.7	32.0	Sym	nbol	(Soi	-ASTM D24	-88 (or D2487, Ro	ck-USACE EM111	10-	1-2908)		BPF	VVL	WIC %	P200 %	les	sts or Notes
xplar					SILT	Y SAND,	ine	- to medium	-grained, trace of	of (Gravel,							
for e	050 7	24.0			gray	, moist, ve	ry ic (A	Alluvium) <i>(c</i> a	e. ontinued)			_						
	830.7	34.0	CL		SAN	DY LEAN	CL/	AY, trace of	Gravel, gray, m	nois	st,	_						
la Ve	-				med	ium to stiff	•	(Glacial	Till)		_	\neg	9					
								(0.00.0	,			-1						
<u></u>												_						
live –												_						
scrip																		
e De																		
_ Sec												X	10					
-																		
-												_						
-	-										_	N	11					
-												-^						
- 8												_						
181												_						
T 8/2												_						
<u>19</u>																	*\\/_+	
												_X	14				at a d	epth of 7 feet
C																	with 9	1/2 feet of v-stem auger
																	in the	ground.
																	Wate	r observed at
6398.0																	with 5	9 feet of
	-										_	X	9				hollov in the	v-stem auger ground.
												Ť					Mate	
																	a dep	th of 4 feet
												-					with 2	9 1/2 feet of v-stem auger
												\neg					in the	ground when
												\neg	8				after \	withdrawal of
/GI	829.7	61.0			FND		NG	*				-/\					auger	•
												_					Boring	g then ed.
OF BO																	9.000	
	706209							D	Intertes Ocassation								07	1000
ът	100390							Braun	intertec corporation								31-	uuuo µaye∠0⊺⊿



ſ	Brau	n Proje	ct B	170	6398	3			BORING	:	ST	-1008 (M\	V)	
	Geote	chnical Redevi	Evalu	atio	n • - Ma	ss Grading			LOCATIO	DN: Se	e atta	ched sketch.	-	
ons)	North	east of l	JS Hi	ghw	ay 10	and Highwa	ay 96							
eviati	Arden	Hills, M	linne	sota										
abbr	DRILLE	R: B.I	Kamme	ermei	er	METHOD:	3 1/4" HSA, Autohamme	r	DATE:	5/2	5/18	SCALE:	1"	= 4'
on of	Elev. feet	Depth feet				De	escription of Materials			BPF	WL	Tests o	or Notes	
anatic	890.7	0.0	Sym	bol	(Soi	I-ASTM D2488	or D2487, Rock-USACE El	M1110	0-1-2908)			10010 0		
expla	890.7	0.0			Mon	itoring well ins	stalled on 5-25-2018:		_					
at for	_				Botto	om of well scre th = 30'	een:		_					
shee					Elev	ation = 860.7			_					
Vpolo					Тор	of well screen	1:		_					
min					Elev	ation = 25			_					
ve Te					Wate	er level meası	ured on 6-1-2018:							
criptiv					Dept Elev	th = 2.1' ation = 888.6			_					
Des					Wate	er level measi	ured on 8-17-2018 [.]		_					
(See					Elev	ation = 887.0			_					
	_								_					
ľ	_								_					
	-								_					
	_								_					
	-								_					
16:00														
/20/18	-								_					
3DT 8/	-								_					
RENT.0	-								_					
	-								_					
ΩN_N														
J BRA	-								_					
398.GF	-								_					
17\063	_								_					
TS\20	-								_					
ROJEC														
S\AX F	-								_					
COLECT	-								-					
NT/PR	-								_					
N:\G	-								-					
DNING										$\left \right $				
G OF B(-								-					
ğ	B1706398						Braun Intertec Corpora	ation				ST-100	8 (MW)	page 1 of 1



Γ	Brau	n Proje	ect B	170	6398	3			BORING:		S	Г-1008 (Р)	
	Geote	chnical Redevo	Evalu elopn	atio nent	n - Ma	ss Grading			LOCATIC	N: Se	e atta	ched sketch.	
tions)	North	east of l	JS Hi	ghwa	ay 10	and Highwa	ay 96						
revia	Arden	Hills, N	linne	sota		METHOD				= 10			411 41
fabb		R: B.	Kamme	ermele	er	METHOD:	3 1/4" HSA, Autonamm	er	DATE:	5/24	4/18	SCALE:	1" = 4"
tion o	feet	feet	_			De	scription of Materials			BPF	WL	Tests or	Notes
lana	890.7	0.0	Sym	bol	(Soi Piez	-ASTM D2488 (or D2487, Rock-USACE E ed on 5-24-2018 [.]	EM1110)-1-2908)				
r exp	. 050.7	0.0			Dette				_				
<u>et fo</u>					Dept	h = 13'	eter screen:		_				
<u>v she</u>					Elev	ation = 877.7			_				
					Top Dept	of piezometer h = 3'	screen:		_				
emir	_				Elev	ation = 887.7							
ve T(Wate	er level measu	ured on 6-1-2018:		_				
cripti					Depi Elev	n = 2.7' ation = 888			_				
e Des					Wate	er level measu	ured on 8-17-2018:		_				
_See					Elev	ation = 887.0			_				
									_				
									_				
									_				
-									_				
16:00	-												
/20/18									_				
3DT 8,									_				
RENT.O									_				
									_				
87													
BRAI									_				
98.GP									_				
7\063									_				
FS\201									_				
	-												
AX PI									_				
DJECTS									_				
UT/PRC									_				
N:\GIN									_				
RING													
OF BO									_				
	1706209						Braun Intertoc Corne	ration				QT 100	(P) page 1 of f



ſ	Brau	n Proje	ect B	3			BORING: ST-1009								
	Geote	chnical P Redev	Evalu elopr	iatio nent	n ∶- Ma	ss Grading		LOCATIO	DN: Se	e att	ache	d sket	ch.		
tions)	North	east of	US Hi	ghwa	ay 10	and Highwa	ay 96								
orevia		Hills, N	linne	sota	ar	METHOD	3 1//" HSA Autoba	ammer		5/1	/18		SCA	IE· 1	" = 4'
of abt	Elev.	Depth		enner		WETTOD.			DATE.	5/1			30A		- 4
ation	feet	feet	Svm	bol	(Soil		escription of Materia	als CE EM111	0 1 2008)	BPF	WL	MC %	P200	Tests or	Notes
<u>xplan</u>	090.7	0.0	TS		SILT	Y SAND, trac	ce of roots, black, w	/et.	0-1-2908)			70	70		
for e)	- 888.7	2.0		$\frac{1}{\sqrt{1}}$			(lopsoil)		_						
sheet	000.7	2.0	SM		SILT	Y SAND, fine	e- to medium-graine	ed, brown v	with	M 6		10			
) dogv	- 886.7	4.0			Uran	ge-brown, mo	(Alluvium)		_	Ă		13			
minc			SP- SM		POC medi	RLY GRADE	D SAND with SILT	, fine- to			<u> </u>				
ve Te	_		0			g	(Alluvium)			8		21			
cripti	883.7	7.0													
e Des	-		ML		SAN	DY SILT, gray	y to brown, wet, loo (Alluvium)	ose.	_	8 🕅		29	53	LL=24	
(Se	881.7	9.0	<u> </u>				-					PI=NP			
-			50		medi	ium.	OIT TO			16					
	-						(Giaciai Tili)		_	4					
-	-								_						
ŀ	-								_	TW*		16	41	*TW - #1 LL=23	
ŀ	-								_					PI=10	
16:00										∑ 3		15			
20/18	-								_	4					
3DT 8/	-								_	T\\/*		12	11	*T\\/ #2	
RENT.	-								_	1 V V		13	44	LL=23	
/8_CUF	-								_					PI=10	
	_									6		15			
GPJ BF	_								_						
06398.	-								_						
\2017\	866.7 24.0						AV trans of Crowel		viet						
OJECTS	— CL					ium to stiff.		i, yiay, mc	ກຣເ, 	Me					
AX PR	-								_	Å					
OJECTS	-								_						
INT\PRI	-								-						
N:/GI	-								_						
30RING										7					
JG OF E									_						
ב ר	31706398			V////			Braun Intertec C	Corporation			1		I	ST-1009	page 1 of 2



ſ	Braur	n Proje	ect B170	6398	3			BORING: ST-1009 (cont.)					
	Geote	chnical	Evaluatio	n Ma	oo Cuodina			LOCATIC	N: Se	e att	ache	d sketo	ch.
ns)	North	Redev	elopment US Highwa	: - IVIA av 10	and Highw	av 96							
/iatic	Arden	Hills, N	linnesota	uy 10	una mgnw	uy 50							
bbre	DRILLE	R: B.	Kammermei	er	METHOD:	3 1/4" HSA,	Autohammer	DATE:	5/1	/18		SCAL	_E: 1" = 4'
n of a	Elev.	Depth				escription of N	latorials				MC	D 200	Tasta an Nistan
natio	858.7	32.0	Symbol	(Soil	-ASTM D2488	or D2487, Roc	k-USACE EM111	0-1-2908)	DFF	VVL	%	F200 %	lests of notes
xpla				SAN	DY LEAN CL	AY, trace of	Gravel, gray, mo	oist,					
fore	_			meu	((Glacial Till) (c	ontinued)	_					
jeet	-							-					
gv s									8				
olo i	-							_	4				
em	_							_					
ive	_							_					
script	_							_					
Des													
(See									10				
ľ	-							_					
ľ	-							_					
ŀ	-							_					
ŀ	-							_					
ŀ									V 9				
	-							-	4				
8	_							_					
18 16:	_							_					
8/20/	_							_					
.GDT													
RENT									10				
5 2 2	-							_					*Water observed
> Z	-							_					with 7 feet of
I BKA	-							_					hollow-stem auger in the ground.
98.GP.	-							-					Water observed et
1063									V 9				5 feet with 59 feet
102/s	-							-	4 Ŭ				of hollow-stem auger in the
	_							_					ground.
X PRC	_							_					Water observed at
CI5/	_												a depth of 4 feet with 59 feet of
L KOLE													hollow-stem auger
	829 7	61.0							11				rechecked 30
בי פ	520.1	01.0		END	OF BORING	. *							minutes after withdrawl of auger.
	-							_					Boring then
	-							_					grouted.
3 L	1706208					Broup li	atortoo Corneration						ST 1000 mage 2 of 2



ſ	Brau	n Proje	ect B	170	6398	BORING: ST-1010					
	Geote TCAAF	chnical P Redev	Evalu elopr	iatio nent	n : - Mass Grading	LOCATIO	DN: Se	e att	ached sketch.		
Itions	North	east of	US Hi	ghw	ay 10 and Highway 96						
brevia		R: B	Kamm	sota ermei	er METHOD: 3 1/4" HSA Autohammer	DATE	5/9	9/18	SCALE: 1" = 4 '		
of ab	Elev.	Depth					0,0				
ation	feet 888 1	feet	Svm	bol	Description of Materials	0-1-2908)	BPF	WL	Tests or Notes		
xplan	007.1	1.0	FILL		FILL: Poorly Graded Sand with Silt, trace of G	iravel,					
for e:	007.1	1.0	SP		_ brown, moist. POORLY GRADED SAND, fine- to medium-gr	ained,					
sheet	-				brown to 12' then gray, moist to 3' then wet, ve to medium dense.	ery loose -	1				
s Vpo	-				(Lacustrine Deposit)	_	12 2	<u>⊥</u>			
minol	-					_					
e Ter							11				
:riptiv	-					_	f]				
Desc	-					_	Ма				
See	-					_	Щ				
ľ	-					_					
ľ							2				
ľ	-					_	f]				
ľ	-					_	Шwн				
ľ	-					_	Щ				
	-					_					
8 16:00							5				
3/20/1	-					_	Π				
GDT 8	-					_					
RENT	-					_					
/8_cul	_					_	1				
							6				
SPJ BR	-					_	Π				
6398.0						_					
2017\0	864.1	<u>2</u> 4.0									
ECTS/			CL		SANDY LEAN CLAY, trace of Gravel, gray, moto very stiff.	oist, stiff					
X PROJ	_				(Glacial Till)		9				
CTS/A	_							*Water observed at a depth of 5 feet with 6 1/2 feet of			
\PROJE	_					_			hollow-stem auger in the		
/GINT	_				- Water observed at a						
ż gz							Ц		3 feet with 29 1/2 feet of		
F BORI	857.1	31.0					16		ground.		
0 90 T					END OF BORING.* Boring then groute						
Ī	31706398				Braun Intertec Corporation				ST-1010 page 1 of		



ſ	Brau	n Proje	ect B	170	6398	8			BORING: ST-1011					
	Geote	chnical Rodov	Evalu	uatio	n Ma	ss Grading			LOCATIC	DN: Se	e atta	ched sketch.		
ons)	North	east of	US Hi	ghw	ay 10	and Highwa								
viatio	Arden	Hills, N	linne	sota	<u> </u>		•							
abbre	DRILLE	R: B.	Kamm	ermei	er	METHOD:	3 1/4" HSA, Au	tohammer	DATE:	5/9)/18	SCALE:	1'' = 4'	
Jof	Elev.	Depth				Πο	ecription of Ma	toriale				T (Neter	
natio	888.2	0.0	Sym	nbol	(Soi	I-ASTM D2488	or D2487, Rock-l	USACE EM111	0-1-2908)	врг	VVL	lests or	Notes	
xplai			PT		PEA	T, black, wet.	(Swamp Dong	soit)						
for⊛	_			<u>N/</u>			(Swallip Dept	55it)	_					
sheet	-			1, 1,					_	Ma	<u> </u>			
s ypo	- 004.2	4.0							_					
ninol	004.2	4.0	OL		SAN	IDY ORGANI	C CLAY, light g	ray, wet, soft.						
Ter							(Alluvium)			4				
ptive	-	= -		Ē					_					
escri	881.2	7.0	SP		POC	ORLY GRADE	D SAND, fine-	to						
ee	-				med	ium-grained,ti	race of Gravel, (Alluvium)	brown, wet.	_	9				
ω	-						(/		_					
										M 7				
	_								_	Д				
	_								_					
	_								_	6				
	_								_					
8										M 11				
/18 16	_								_	Д				
8/20/	_								_					
T.GDT	_								_					
IRREN	_								_					
n 8/														
										8				
PJ BR														
398.6	_								_					
11//06	_								_					
C15/2(-								_					
PROJE										6				
I 5 \AX	20.0				END	END OF BORING.								
NT\PROJEC	-				Water observed at a depth of 5 feet with 6 1/2 feet of hollow-stem auger in the ground.									
ואפ א:/פוו	_				Water observed at a depth of 2 feet with 24 1/ hollow-stem auger in the ground.				2 feet of –					
	_				Boriı	ng then groute	ed.		_					
2	B1706398			1			Braun Inte	rtec Corporation				S	[-1011 page 1 of 1	



ſ	Brau	n Proje	ect B	170	6398	3			BORING: ST-1017					
itions)	Geote TCAAF North	chnical Redeve east of	Evalu elopr US Hi	uatio nent ghw	n : - Ma ay 10	ss Grading and Highwa	ay 96		LOCATIC	DN: Se	e att	ache	d sket	ch.
bbrevia	DRILLE	R: B.	Kamm	ermei	er	METHOD:	3 1/4" HSA, Aut	tohammer	DATE:	5/4	/18		SCAI	LE: 1" = 4'
tion of a	Elev. feet	Depth feet				De	scription of Mat	erials		BPF	WL	MC	P200	Tests or Notes
lana	911.7	0.0	Sym	1bol XXXX	(Soil	I-ASTM D2488	or D2487, Rock-U	JSACE EM1110	0-1-2908) J. dark			%	%	
or exp	910.2	1.5			brow	/n, wet.			, uaik					
sheet f	_		SM		SILT gray	Y SAND, fine with olive, mo	- to medium-gra bist. (Alluvium)	ained, trace o	f Gravel, _	М 9		14	32	
Vpolor	907.7	4.0			DOO			UT fine to		Δ				
otive Termir			SP- SM		medi	ium-grained, t	D SAND with S trace of Gravel, (Alluvium)	brown, wet.		22	Į	18	9	
Descrip	904.7	7.0	SC		CLA	YEY SAND, tr	race of Gravel,	gray, moist, n	nedium					
(See [_				to sti	itt.)		5					
	_								_	Ň				
	_				-									
	_								_	Ă				
00:5										Ma				
20/18 16	_								_	Å				
.GDT 8/	_								_					
CURRENT	_								_					
UN_V8_										<u> у</u> Э				
GPJ BRA	_								_					
CTS\2017\06398.	_								_					*Water observed at a depth of 5 feet with 7 feet of hollow-stem auger in the ground.
AX PROJE	885.7	26.0								8				Water observed at
RING N:\GINT\PROJECTS\	- - -				END) of Boring	.*							with 29 1/2 feet of hollow-stem auger in the ground when rechecked 2 hoursr after withdrawal of auger.
LOG OF BC	-								_					Boring then grouted.



В	raur	n Proje	ect B	170	6398	3		BORING: ST-1018					
G	eote CAAP	chnical Redev	Evalu elopn	iatio nent	n - Ma	ss Grading			LOCATIC	DN: Se	e attac	hed sketch.	
N N	orthe	east of l	US Hi	ghwa	ay 10	and Highwa	ay 96						
A exiat	rden	Hills, N	linne	sota	i								
DI app	RILLE	R: B.	Kamm	ermeie	er	METHOD:	3 1/4" HSA,	Autohammer	DATE:	5/8	8/18	SCALE:	1'' = 4'
ັo E S fo	lev. eet	Depth feet				De	scription of N	/laterials		BPF	WL	Tests or	Notes
anatio	28.5	0.0	Sym	bol	(Soil	-ASTM D2488	or D2487, Roc	k-USACE EM111	0-1-2908)				
expl:			FILL		FILL medi	:Poorly Grac ium-grained, f	led Sand with trace of Grav	n Silt, fine- to el, brown, moist					
<u>6 st</u>	26.5	2.0				-							
shee			FILL		FILL mixe	: Clayey San d brown, dark	d, trace of Gi brown and d	ravel, trace of ro gray, moist.	oots, 	M 9			
						·	·		_	Δ			
uiu													
/e Te										7			
									_				
Des									_	M 11			
 									_	А			
-									_				
	-									11			
- 	16.5	12 0							_				
	/10.5	12.0	SM		SILT	Y SAND, trac	e of roots, bl	ack, moist.		Ме			
- _	145	14.0					(Buried I of	psoll)	_	N O			
9	14.5	14.0	CL		SAN	DY LEAN CL	AY, trace of	Gravel, gray and	d brown,				
					mois	t, medium to	stiff. (Glacial T	Till)		6			
20/18									_	Δ			
DT 8/									_				
ENT.G									_				
- CURR									_				
8'	-									M 11			
BRAU									_	Д			
- 8.GPJ									-				
1									-				
s/2017													
AX PR													
e lects	01.5	27.0	<u> </u>		CLAVEY SAND trace of Croupl radding brown maint								
TVPRO			30		very	stiff to hard.			n, moist, —				
							(Glacial	I III)	_				
	_												
F BOR									_	21			
106 0													
B170	06398						Braun I	ntertec Corporation				ST	-1018 page 1 of 2



Braun Proj	ect B1706	398	BORING	ST-10)18 (cont.)						
Geotechnica	l Evaluation	Mass Grading	LOCATIO	N: See attach	ied sketch.						
Northeast of	US Highway	v 10 and Highwav 96									
Arden Hills, I	Vinnesota										
од DRILLER: В	. Kammermeier	METHOD: 3 1/4" HSA, Autohammer	DATE:	5/8/18	SCALE: 1" = 4'						
ੱ Elev. Depth ਨੂ feet feet		Description of Materials		BPF WL	Tests or Notes						
100 896.5 32.0) Symbol	(Soil-ASTM D2488 or D2487, Rock-USACE EM1110	0-1-2908)								
		CLAYEY SAND, trace of Gravel, reddish brown very stiff to hard.	n, moist, 								
		(Glacial Till) (continued)	_								
shee											
892.5 36.0				40							
		END OF BORING.	ID OF BORING.								
	,	Water not observed with 34 1/2 feet of hollow s auger in the ground.	stem –								
		Boring then grouted.	_								
_			-								
_			-								
-			-								
			_								
8/20/18			_								
			_								
8 [/]			_								
			-								
			_								
			_								
			_								
			_								
			_								
			-								
			_								
⊐ L B1706398		Braun Intertec Corporation			ST-1018 page 2 of 2						



ſ	Brau	n Proje	ect B	170	6398	3			BORING	:	5	ST-1020	
	Geote	chnical P Redevi	Evalu elopr	iatio nent	n : - Ma	ss Grading			LOCATIC	DN: Se	e attac	hed sketch.	
tions)	North	east of	US Hi	ghw	ay 10	and Highwa	ay 96						
revia	Arden	Hills, N	linne	sota		METHOD	2 4/411104 4-4-1			= 10	0/4 0		<u> </u>
of abt		.rt. B. Denth	ramm	ermele	ei	IVIE I HUD:	S 1/4 HOA, AUTONA	unmer	DATE:	5/8	010	SUALE:	1 = 4
tion c	feet	feet	~			De	scription of Materia	als		BPF	WL	Tests or N	otes
lana	946.0	0.0	Sym TS	1DOI	(Soil SII T	-ASTM D2488	or D2487, Rock-USA	CE EM111(noist.	0-1-2908)				
or exp	945.0	1.0	CI		0.11		(Topsoil)	linet					
eet fc	_		02		oran	ge-brown, and	d gray, moist, medi	um to very	vn with / stiff.				
dy sh	_						(Glacial Till)		_	5			
inolo	_								_				
Tem										M 14			
otive	_								_	Д			
escri	_								_				
ee D	_								_	15			
Ω.	_								_				
ŀ										M 16			
	_								_	Α			
	_								_				
	_								_	17			
	_								_				
16:00										16			
20/18	_								_	Δ			
DT 8/2	_								_				
ENT.G	_								_				
CURR	927.0	19.0	CL		SAN	DY LEAN CL	AY, trace of Gravel	l, brown, n	noist,				
87_NL					stiff t	o very stiff.	(Glacial Till)			15			
J BRAL	_						x <i>y</i>		_	Δ			
98.GP	_								_				
17\063	_								_				
:TS\20:	-								-				
PROJEC										18			
rs\AX F	- 010.0	07.0							_				
ROJECT	919.0	27.0	SM		SILT	Y SAND, fine	- to medium-graine	d, trace o	f Gravel,				
JNT/P	-				redd	ish brown, mo	oist, medium dense (Glacial Till)	to dense.	_				
פ א:/פ	-								_				
BORIN										* X	*	50 blows for 6"	
JG OF	-								_		s	uspected cobble	S
ЧL	B1706398						Braun Intertec C	Corporation				ST-1	020 page 1 of 2



Brau	in Proje	ect B170	6398	3			BORING: ST-1020 (cont.)					
Geote	echnical P Redev	Evaluatio elonment	n - Ma	ss Grading			LOCATIC	N: Se	e attac	ched sketch.		
North	heast of	US Highwa	ay 10	and Highwa	ay 96							
Arder	n Hills, N	linnesota			-							
	ER: B.	Kammermei	er	METHOD:	3 1/4" HSA, Autoha	ammer	DATE:	5/8	/18	SCALE:	1'' = 4'	
5 Elev. 5 feet	Depth feet			De	scription of Materia	als		BPF	WL	Tests or	Notes	
10 914.0	32.0	Symbol	(Soil	-ASTM D2488	or D2487, Rock-USA	CE EM1110	0-1-2908)					
			reddi	Y SAND, fine ish brown, mc (G	- to medium-graine bist, medium dense Blacial Till) <i>(continu</i>	ed, trace of e to dense. <i>ed)</i>	f Gravel, – –					
∽ b0 910.0	36.0							30				
			END	OF BORING	i.							
			Wate auge	er not observe er in the groun	ed with 34 1/2 feet nd.	of hollow s	stem –					
			Borir	ng then groute	ed.		_					
(See												
-							_					
_							_					
_ 2 _							_					
							-					
							_					
							_					
							_					
ELI3/20.							_					
							-					
							_					
							-					
							-					
B1706398					Braun Intertec	Corporation				ST	-1020 page 2 of 2	



ſ	Brau	n Proje	ect B	170	6398	3			BORING:	:		ST	-102	21	
	Geote TCAAF	chnical 9 Redev	Evalu elopr	iatio nent	n : - Ma	ss Grading			LOCATIC	DN: Se	e att	ache	d sket	ch.	
ations	North Arden	east of Hills M	US Hi 1inne	ghw sota	ay 10	and Highwa	ay 96								
bbrevi	DRILLE	:R: В.	Kamm	ermei	er	METHOD:	3 1/4" HSA	A, Autohammer	DATE:	5/7	7/18		SCA	LE: 1	" = 4'
on of a	Elev. feet	Depth feet				De	scription of	Materials		BPF	wi	мс	P200	Tests o	r Notes
anatic	944.0	0.0	Sym	ibol	(Soil	-ASTM D2488	or D2487, Ro	ock-USACE EM111	0-1-2908)			%	%	10313 0	110105
ir expla	942.5	1.5	FILL		FILL mois	: Poorly Grac t.	led Sand w	ith Gravel, light br	rown. _						
ieet fo	-		CL		SAN verv	DY LEAN CL stiff.	AY, trace o	f Gravel, brown, n	noist, _						
ogy sh	-				- 5		(Glacia	l Till)	_	18					
minolo	-								_						
/e Ter										19					
scriptiv	937.0	7.0													
se Des	_		SP		POC trace	RLY GRADE of Gravel, lig	ained, nse	22							
S)	935.0	9.0	SM		SILT	Y SAND, fine	- to mediur	utwasn) n-grained, trace o	f Gravel.						
-					redd	ish brown, mo	oist, mediur (Glacia	n dense. I Till)		24		7	27	LL=11	
ŀ	-						,	,	_					PI=NP	
ŀ	-								_	M 26					
	_								_	М - °					
8 -										 					
)/18 16:	_								_	30					
DT 8/2(-								_						
RENT.GI	-								_						
8_CURF	-								_						
										26					
.GPJ BF	_								_						
\06398	_								_						
-S\2017	920.0	24.0	SP		POO	RLY GRADF	D SAND. fi	ne- to coarse-ora	ined.						
ROJECT					trace	e of Gravel, lig	ht brown, r (Glacial O	noist, medium dei utwash)	nse	13					
TS\AX P	-							,	_						
PROJEC	-								_						
/GINT/	_								_						
in di n															
OF BOR	_								-	23					
	31706398						Braur	Intertec Corporation						ST-1021	nage 1 of 3



Braun Project B1	706398	}	BORING: ST-1021 (cont.)							
Geotechnical Evalua TCAAP Redevelopm Northeast of US Hig Arden Hills, Minnes	ion nt - Mas way 10 a ta	ss Grading and Highwa	ay 96	LOCATIO	DN: Se	e att	ache	d sketcl	h.	,
DRILLER: B. Kammer	neier	METHOD:	3 1/4" HSA, Autohammer	DATE:	5/7	7/18		SCAL	E:	1'' = 4'
b Elev. Depth b feet feet g 912.0 32.0 Symb	l (Soil-	De ASTM D2488	escription of Materials or D2487, Rock-USACE EM1	110-1-2908)	BPF	WL	MC %	P200 %	Tests	s or Notes
912.0 32.0 Symbol 910.0 34.0 910.0 910.0 34.0 SP 910.0 34.0 SP - - SP - - SP - - - - - - - - - - - - - - SP - - - - - - - - - - - - - - - - - - - - - - - - - <td>I (Soil- POOF trace POOF moist POOF trace END Wate auger Boring</td> <td>ASTM D2488 RLY GRADE of Gravel, lig (Glac RLY GRADE t, medium de RLY GRADE of Gravel, lig OF BORING of BORING of not observe r in the ground og then groute</td> <td>or D2487, Rock-USACE EM1 D SAND, fine- to coarse-g ght brown, moist, medium of cial Outwash) (continued) D SAND, fine-grained, light nse to dense. (Glacial Till)</td> <td>110-1-2908) rrained, dense. nt brown, </td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	I (Soil- POOF trace POOF moist POOF trace END Wate auger Boring	ASTM D2488 RLY GRADE of Gravel, lig (Glac RLY GRADE t, medium de RLY GRADE of Gravel, lig OF BORING of BORING of not observe r in the ground og then groute	or D2487, Rock-USACE EM1 D SAND, fine- to coarse-g ght brown, moist, medium of cial Outwash) (continued) D SAND, fine-grained, light nse to dense. (Glacial Till)	110-1-2908) rrained, dense. nt brown,						

B1706398


LOG OF BORING

ſ	Braur	n Proje	ect B	170	6398	3			BORING:			ST-1022	
	Geote TCAAP	chnical PRedev	Evalu elopn	atior 1ent	า - Ma	ss Grading			LOCATIC	DN: Se	e atta	ched sketch.	
ations	Northe	east of l	US Hig linnes	ghwa	ay 10	and Highwa	ay 96						
bbrevi	DRILLE	R: В.	Kamme	ermeie	er	METHOD:	3 1/4" HSA, A	Autohammer	DATE:	5/8	/18	SCALE:	1'' = 4'
n of al	Elev.	Depth				Πο	scription of M	atorials		DDE	\\\/I	Tanta an	Natas
anatio	944.0	0.0	Sym	bol	(Soil	-ASTM D2488	or D2487, Rock	-USACE EM111	0-1-2908)	БГГ	VVL	lests of	NOTES
expla	_		FILL		FILL trace	 Poorly Grace of Gravel, br 	ed Sand, fine own, moist to	e- to medium-gra 7' then wet.	ained, –				
eet for	_								_				
gy sh	-								_	24			
ninolo	-								_				
e Terr										10			
criptiv									_				
e Des	_								_	7			
Se Se	_	_							_				
										V 6			
	- 022.0	932.0 12.0							_	Δ			
ŀ	932.0	932.0 12.0 SANDY LEAN CLAY, trace of Gravel, b						Gravel, brown, n	noist,	M 3			
	_	932.0 12.0 SANDY LEAN CLAY, trace of Gravel, b soft to medium. (Glacial Till)						ill)		M			
										МБ			
0/18 16	-								_	Ă			
DT 8/2	-								_				
RENT.G	925.0	19.0							_				
/8_CUR	020.0	10.0	CL		LEA	N CLAY, redd	ish brown, mo (Glaciofluvi	oist, very stiff.					
RAUN	_						(0.00101101			30			
3.GPJ B	_								_				
7\06398	-								_				
TS\201	-								_				
PROJEC		26.0								18			
CTS/AX					END	OF BORING							
	-				Wate hollo	er observed a w-stem auger	t a depth of 7 in the ground	feet with 9 1/2 d.	feet of _				
ING N:/GI	-	Water observed at a depth of 24 feet wit hollow-stem auger in the ground.							/2 feet of				
OF BOR	_				Borir	ng then groute	ed.		-				
Ö	31706398						Braun In	tertec Corporation				ST	-1022 page 1 of 1



LOG OF BORING

Γ	Brau	n Proje	ect B	170	6398	3			BORING:		S	T-5 (MW)	
	Geote	chnical P Redeve	Evalu elopn	latio nent	n : - Ma	ss Grading			LOCATIC	N: Se	e attac	ched sketch.	
ions)	North	east of l	JS Hi	ghw	ay 10	and Highwa	ay 96						
eviat	Arden	Hills, M	linne	sota									
abbr	DRILLE	R: B.I	Kamme	ermei	er	METHOD:	3 1/4" HSA, Autoh	ammer	DATE:	5/2	5/18	SCALE:	1'' = 4'
on of	Elev. feet	Depth feet				De	scription of Materi	als		BPF	WL	Tests or	Notes
anati	890.7	0.0	Sym	bol	(Soi	I-ASTM D2488	or D2487, Rock-USA	ACE EM111	0-1-2908)	-			
expl:	890.7	0.0			Mon	itoring well ins	stalled on 5-25-20	18:	_				
et for					Botte	om of well scre th = 30'	een:		_				
shee					Elev	ation = 860.7							
Vpolo					Тор	of well screen	:						
uiu	_				Elev	ation = 865.7							
ve Te					Wate	er level meası	ured on 6-1-2018:						
cripti					Dep Elev	th = 1.9' ation = 888.8							
Des					Wate	er level measi	ured on 8-17-2018	8:					
(See					Elev	ation = 886.4							
									_				
									_				
									_				
									_				
3 16:00	_												
/20/18									_				
GDT 8									_				
RENT.									_				
									_				
N N													
U BRA									_				
398.GF									_				
17\06									_				
CTS/20									_				
PROJEC	_												
- Is/ax									-				
ROJECT									_				
									_				
9/:u									_				
ORING													
0 0 B									_				
ĭL ₿	1706398						Braun Intertec	Corporation				ST-5	(MW) page 1 of 1



ſ	Brau	n Proje	ect B	170	6398	3				BORING:			ST	-5 (P)	
	Geote	chnical Podow	Evalu	atio	n Ma	ss Grading				LOCATIC	N: Se	e atta	acheo	d sketch.	
ons)	North	east of l	US Hi	ghw	ay 10	and Highwa	ay 96								
viatio	Arden	Hills, N	linne	sota			•								
abbre	DRILLE	R: B.	Kamme	ermei	er	METHOD:	3 1/4" HS	SA, Autohamme	er	DATE:	5/2	5/18		SCALE:	1'' = 4'
n of a	Elev.	Depth feet				De	scription (of Materials			RPF	wi		Tests or	Notes
natic	890.7	0.0	Sym	bol	(Soi	I-ASTM D2488	or D2487,	Rock-USACE E	M1110)-1-2908)	BIT			10313 01	10103
expla	890.7	0.0			Piez	ometer install	ed on 5-2	5-2018:							
for	_				Botto	om of piezome	eter scree	n:		_					
sheet	_				Elev	ation = 13				_					
Vpol	_				Тор	of piezometer	screen:			_					
mino	_				Depi Elev	th = 3' ation = 887.7				_					
/e Te					Wate	er level meası	ured on 6-	-1-2018:							
criptiv	_				Dept Elev	th = 2.1' ation = 888.6									
s Des					Wate	er level meası	ured on 8-	-17-2018:							
(See					Elev	ation = 886.4									
	_									_					
	_									_					
	_									_					
	_									_					
8 16:0															
3/20/1	_														
GDT															
RRENT															
/8_CU															
3PJ BR															
6398.0	_														
2017\C	_														
IECTS/.										_					
X PRO.	_														
CTS/A	_														
\PROJE	_														
/GINT	_														
і ИС															
F BORI	_														
0 901															

(NORTI	HERN VOLOGIES, LLC	Inver Grove He 6160 Carmen A Inver Grove He P: 651-389-419 www.NTIgeo.co	i ghts venue East ghts, MN 55076 1 om				E	BOR	ING	5 NU	JME	BER PAGE	έ ΡΒ Ξ 1 Ο	-1 F 3
С	IENT	г_w	enck As	sociates	-		PROJE		E Ram	sey County	/ Re-D	evelop	oment	- (TC/	AAP)		
PF	ROJE	CT N	UMBER	R <u>16.61435.1</u>	00		PROJE			Arden Hills	, MN						
D	ATE S	STAR	TED _5	/11/16		5/16/16	GROUN	D ELEV	ATION _	883.184 ft			HOL	E SIZ	E <u>6</u> 1	/2 inc	hes
DF	RILLII	NG C	ONTRA	CTOR NTI			GROUN	D WATE	R LEVE	LS:							
DF	RILLII	NG M	ETHOD	3 1/4 in H.S	5.A		⊻А	TIME C	of Dril	LING <u>17.0</u>	00 ft / E	Elev 80	56.18	ft			
	GGE	ED BY	Robe	ert Hawkins	CHECKED B	Y DAS	A	F END O	f Drili	_ING							
	DTES	5 <u>So</u>	uth Ped	lestrian Bridge	e. Elevation at stake	d location provided b	y client A	FOVERED R				1					
	(#)	GRAPHIC LOG			MATERIAL DESC	RIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
CAAP			0.8	TOPSOIL (10	0.0 Inches)		882.4										
SIGINI				to dark brown	ADED SAND WITH n, fine to medium gr	l SILT, (SP-SM) brov ained, moist, trace	vn		_								
				gravel, trace	organics				100	8 - 8-7 (15)	-						
	5								100	9-11-10 (21)	-						
61453-100)/ENG			8.0		RADED SAND WITH	I SILT (SP-SM) grav	875.2		89	6-7-6 (13)	-						
	0			fine to mediu trace gravel	m grained, moist, n	nedium dense to loos	e,	SS	89	4-4-4							
			12.0	SILTY SAND), (SM) gray, fine gra	ained, moist to	871.2			(0)	-						
				saturated, ve NOTE: Push	ry loose, trace grav ned Shelby Tube at	el, trace organics 12.0 feet. No Recove	ery.	6									
	<u>)</u>								78	1-1-1 (2)	-		26				13
			Ā														
9107 2	0		19.5	POORLY GF	RADED SAND WITH	SILT. (SP-SM) grav	863.7	' \	:	8-10-8	-						
				fine to mediu	m grained, saturate	d, dense, trace grave	ĺ	8	89	(18)	-						
2	5		24.5	SANDY LEA	N CLAY, (CL) gray,	wet, medium to rathe	858.7 er	/ M ss	100	7-7-8	-						
1 1				stiff, trace gra	avel			9	100	(15)	-						
	0								100	3-3-4 (7)			18	27	12	15	52
								<u> </u>									
- ect																	
z	V	/////						1		1	I	I	I	I	I		I



BORING NUMBER PB-1 PAGE 2 OF 3

1	CLIEN	IT W	enck Associates	PROJECT	NAME	Ram	sey County	/ Re-D	evelop	oment	- (TC/	\ AP)		
	PROJ	ECT N	UMBER16.61435.100	PROJECT	LOCA		Arden Hills	s, MN						
Γ					щ	%			Ŀ.	()	AT		RG	
	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYP NUMBER	RECOVERY ⁽ (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT W ⁻ (pcf)	MOISTURE CONTENT (%	LIQUID	PLASTIC	PLASTICITY	FINES
	35		SANDY LEAN CLAY, (CL) gray, wet, medium to rathe stiff, trace gravel (continued)	er	SS 11	100	4 - 5-5 (10)							
CAAP - ROUND 3.GPJ					1			_						
RING REPORTS/GINT/T	-				SS 12	100	4-4-5 (9)	_						
INGINEERING/ENGINEE	45				SS	100	4 - 6-5 (11)	_						
GEO (16.61453.100)/E				v	N									
AND RETAINING WALL	 			Z	SS 14	100	5 - 5-6 (11)	-						
PEDESTRIAN BRIDGES	-				/									
JUECTS/TCAAP - NEW F					SS 15	100	6-6-6 (12)	_						
11-PROJECTS/2016 PRO	60				SS	100	6-5-7 (12)	_						
54 - \\NTIDATA\RAMSE'	_			<u> </u>			()							
2012.GDT - 6/30/16 11:	 				SS 17	100	6-7-6 (13)	-						
GINT STD US LAB MAN	-													
I GEOTECH COLUMNS -	<u>70</u> - -				SS 18	100	5 - 6-6 (12)							



BORING NUMBER PB-1

PAGE 3 OF 3

CLIENT Wenck Associates

PROJECT NAME _ Ramsey County Re-Development - (TCAAP)

PROJ	IECT NUMB	BER P	ROJECT			Arden Hills	, MN					
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	AT LIMIT LIMIT		FINES
 _ 75	76.0	SANDY LEAN CLAY, (CL) gray, wet, medium to rather stiff, trace gravel <i>(continued)</i>	807.2	SS 19	100	6-5-6 (11)	_					

Bottom of borehole at 76.0 feet.



	Q		NORTHERN TECHNOLOGIES, LI	.c	Inv 610 Inv P: ww	ver Grove 60 Carmer ver Grove 651-389-4 vw.NTIgeo	Heights n Avenue East Heights, MN 55 191 .com	076				B	OR	ING	5 NU	JME	BER PAGE	₽ € 1 0	3-2 F 3
	CLIE	NT W	enck Associates	6				P	ROJEC	T NAME	Ram	sey County	Re-D	evelop	oment	- (TC/	AAP)		
	PRO	JECT N	IUMBER 16.61	435.1	00			P	ROJEC	T LOCA		Arden Hills	, MN						
	DATE	STAR	TED <u>5/9/16</u>		(COMPLET	ED <u>5/9/16</u>	G	ROUNI	D ELEVA		883.681 ft			HOI	_E SIZ	E <u>6</u>	1/2 inc	hes
	DRIL	LING C	ONTRACTOR _	NTI				G) WATE	RLEVE	LS:							
	DRIL		IETHOD <u>3 1/4 i</u>	<u>in H.S</u>	5.A				⊥×AT			LING <u>12.0</u>)0 ft / E	Elev 87	71.68	ft			
	LOG		Y Robert Hawk	ins Dictore			BY DAS		AI			_ING							
ł	NUT	-3 _ <u>50</u>	uin Pedesinan i	Snage	e. Eleva	alion at sta	iked location pr	ovided by a										PC	
DUND 3.GPJ	DEPTH (ft)	GRAPHIC LOG			MATE	ERIAL DES	SCRIPTION			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
NI/ICAAP K		-1 <u>/ \1</u> /	TOPSC	0 I L (17	7.0 Incl	hes)			882.3	AU 1									
EKING REPORTSIG			POORL fine to r	Y GR. nediur	ADED m graii	SAND Wined, moist	TH SILT, (SP-S , trace gravel	SM) brown,		SS 2	67	9-13-14 (27)							
NEEKING/ENGINEE										SS 3	83	10-12-15 (27)							
(16 61453 100)/ENG			7.0 SILT W medium	ITH S n, trace	SAND, e grav	(ML) dark el, trace or	brown, fine grai ganics	ned, moist	876.7 ,	SS 4	56	4-4-4 (8)							
AINING WALL GEU	<u> 10 </u>		12.0 \						074 7	SH 5	93				14				56
BRIDGES AND RET	 		POORL fine to r very loo	Y GR nediur se, tra	ADED m graii ace gra	SAND W ned, satura avel	TH SILT, (SP-S ated, medium d	SM) gray, ense to	0/1./	8 ss 6	67	4-4-5 (9)							
NEW PEDESIKIAN			NOTE:	Push	ied She	elby Tube	at 14.5 feet. No	Recovery.		SS 7	83	1-1-1 (2)							
PROJECTS/ICAAP	 		10.5						964 2	SS 8	100	3 -1- 6 (7)							
1 PROJECTS/2016			CLAYE saturate	Y SAN ed, me	ND, (S edium	C) gray, fir dense, trae	ne to medium g ce grave l	rained,	004.2	SS 9	100	10 - 4-5 (9)							
IN ILUA I ANKAMSEY	 		0.1.5																
30/16 11:54 - N	25		24.5 CLAYE gravel	Y SAN	ND, (S	C) gray, w	et, l oose to den	se, little	859.2	SS 10	100	4-4-4 (8)							
5 LAB MAY 2012 GDI - 6/	 																		
20 OLS	30																		
COLUMNS - GINI										SH 11	97				15	24	12	12	46
GEOLECH																			
z		11/1								1	1	1		1			1		1



NTI GEOTECH COLUMINS - GNT STD US LAB MAY 2012 GDT - 820016 11:54 - UNITDATARAMSEN1-PROJECTSZ016 PROJECTSITCAAP - NEW PEDESTRIAN BRIDGES AND RETAINING MALL - GEO - (16.61443.100)ENGINEERINGENGINEERING REPORTSGANT TCAAP - ROUND 3.GPL

Inver Grove Heights 6160 Carmen Avenue East Inver Grove Heights, MN 55076 P: 651-389-4191 www.NTIgeo.com

BORING NUMBER PB-2

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CLIEN	IT <u>W</u> e	enck Associates		AME	Ram	sey County	Re-D	evelop	ment	- (TCA	AP)		
PROJ	ECT N	UMBER	PROJECT LO	DCAT	10N _	Arden Hills	, MN			ΔΤΤ	EDBE	PC	
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
35		CLAYEY SAND, (SC) gray, wet, loose to dense, little gravel <i>(continued)</i>	X	SS 12	100	4 -5-5 (10)							
40			X	SS 13	100	4-4-4 (8)			15	25	13	12	49
			X	SS 14	100	4 - 5 - 6 (11)							
<u> </u>			X	SS 15	100	5 - 5-5 (10)							
<u>55</u> 			X	SS 16	100	10-9-9 (18)							
<u> 60 </u>			X	SS 17	100	6-7-9 (16)							
<u>65</u> 			X	SS 18	100	7 - 7-9 (16)							
 			X	SS 19	100	8 - 7-8 (15)							



BORING NUMBER PB-2

PAGE 3 OF 3

CLIENT Wenck Associates

PROJECT NAME Ramsey County Re-Development - (TCAAP)

PROJ	ECT NUMBE	R _16.61435.100	PROJEC			Arden Hills	, MN				
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)		FINES
 _ <u>75</u>	76.0	CLAYEY SAND, (SC) gray, wet, loose to dense, little gravel <i>(continued)</i>	807.7	SS 20	100	6-9-8 (17)	-				

Bottom of borehole at 76.0 feet.



GLENT Wenck Associates PROJECT NAME Ramsey County Re-Development - (TCAAP) PACE STATES S1116 COMPLETED _\$(1)/16 PROJECT LOCATIONinden Hits_NN DATE STATES S1116 COMPLETED _\$(1)/16 PROJECT LOCATIONinden Hits_NN DRELING CONTRACTOR_INTI COMPLETED _\$(1)/16 GROUND ELEVAND. 977.466 IT. MOLE SIZE _6.12 inches. DRELING METHOD _31/4 Im HSA CHECKED BY DAS AT TIME OF DRILING		(Inver Grove Heig 6160 Carmen Av Inver Grove Heig P: 651-389-4191 www.NTIgeo.co	jhts enue East hts, MN 55076 n				B	OR	ING	5 NU	JME	BER PAGE	PB 1 0	8-3 F 3
PROJECT NUMBER 15:4136:100 PROJECT LOCATION Adde Hills. NN DATE STARTED S11/16 GROUND BUCK TOON ATTEMD 5:11/16 GROUND BUCK TOON ATTEMD 5:11/16 GROUND WATER LEVELS: DRILING OWTRACTOR MIT Status		CLIEN	ит _w	enck As	sociates			PROJEC		Ram	sey County	/ Re-D	evelop	ment	- (TCA	AP)		
DATE STATED S11/10 COMPLETED GROUND BLEVATION 377.488 ft HOLE SZE 8.1/2 inches. DRILLING CONTRACTOR INTI GROUND WATER LEPELS: STATEE OF DRILLING 12.00 ft / Elev 865.47 ft LOGGED BY Actest Hawkins CHECKED BY DAS AT THEO OF DRILLING		PROJ		IUMBEF	R <u>16.61435.1</u>	00		PROJEC			Arden Hills	, MN						
DRILLING CONTRACTOR, NTL GROUND WATER LEVELS: DRILLING METHOD, 3 1/4 in H.S.A. VA TTHE OF DRILLING LOGGED BY Robert Hawkins. CHECKED BY DAS NOTES Noth Pedestrian Endge. Elevation at staked location provided by dient AFTER DRILLING HTTERBERG Watter Hawkins. Hoth Pedestrian Endge. Elevation at staked location provided by dient AFTER DRILLING Have State Sta		DATE	STAR	TED 5	5/11/16	COMPLETED	5/11/16	GROUN	D ELEVA	tion _	877.466 ft			HOL	E SIZ	E _61	/2 incl	hes
DRILING METHOD 3 14 minS.A VAIT TIME OF DRILLING 12.00 ft/Elev 365.47 ft LOGGED BY Robort Hawkins OHECKED Y DAS AT END OF DRILLING 1.200 ft/Elev 365.47 ft NOTES Noth Pedesitian Bridge. Elevation at stated location provided by dentAFTER DRILLING		DRILL	ING C	ONTRA	CTOR NTI			GROUNI) WATEF	RLEVE	LS:							
LOGGED BY Teohert Headings CHECKED BY DAS AT END OF DRUING		DRILL	ING N	IETHOD	3 1/4 in H.S	5.A		arproptat	TIME O	DRIL	LING	00 ft / E	Elev 86	65.47 1	ft			
NOTES North Pedestrian Bridge. Elevation at staked location provided by dent AFTER DRLLING		LOGO	ED B	Y Robe	ert Hawkins	CHECKED BY	DAS	AT	END OF	DRILL	_ING							
Line Line <thline< th=""> Line Line <thl< td=""><td></td><td>NOTE</td><td>S _No</td><td>orth Ped</td><td>estrian Bridge</td><td>e. Elevation at staked</td><td>location provided by</td><td>client AF</td><td>TER DR</td><td>LLING</td><td></td><td></td><td>1</td><td>1</td><td></td><td></td><td></td><td></td></thl<></thline<>		NOTE	S _No	orth Ped	estrian Bridge	e. Elevation at staked	location provided by	client AF	TER DR	LLING			1	1				
0 22: 2 TOPSOIL (15.0 Inches) 876.2 AU 1 POORLY CRADED SAND WITH SILT, (SP-SM) brown, fine to medium grained, moist, trace gravel 873.0 873.0 4.5 S 56 4-64 (8) 5 POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to medium grained, moist, dense to medium dense, trace gravel 873.0 873.0 10 9.5 SLTY SAND, (SN) dark brown, fine to medium grained, moist, dense to medium grained, moist, medium dense, trace gravel 886.0 10 10 9.5 SLTY SAND, (SN) dark brown, fine to medium grained, moist, medium grained, saturated, very loose, trace 885.7 78 4-5-6 12.0 V POORLY CRADED SAND WITH SILT, (SP-SM) gray, fine to medium grained, saturated, very loose, trace 885.7 78 2-1-2 112.0 V POORLY CRADED SAND WITH SILT, (SP-SM) gray, fine to medium grained, saturated, loose, trace gravel 885.7 10 10 112 12 12.0 V SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel 853.0 12 12 12 12 26 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel	OUND 3.GPJ	DEPTH (ft)	GRAPHIC LOG			MATERIAL DESCR	IPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to medium grained, moist, trace gravel X S 5 4-4-4 (8) 4.5 POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to medium grained, moist, dense to medium dense, trace gravel X S 67.0 8-10-11 10 9.5 SILTY SAND, (SM) dark brown, fine to medium grained, moist, dense to corganics, occasional fine roots X SS 78 4-4-5 10 9.5 SILTY SAND, (SM) dark brown, fine to medium grained, moist, dense trace gravel, trace organics, occasional fine roots X SS 78 2-4-2 11 POORLY GRADED SAND WITH SILT, (SP-SM) gray, fine to medium grained, saturated, very loose, trace gravel X SS 78 2-1-2 12 POORLY GRADED SAND WITH SILT, (SP-SM) gray, fine to medium grained, saturated, very loose, trace gravel X SS 78 2-2-2 15 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, very loose, trace gravel X SS 78 2-3-3 20 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel X SS 10 4-5-5 21 24.5 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel X SS 10 11	TCAAP R		<u>, 114</u> 1/ , 117	1.3	TOPSOIL (1	5.0 Inches)		876.2	AU									
4.5 SS 56 4-4-4 5 POORLY CRADED SAND WITH SILT, (SP-SM) brown, fine to medium grained, moist, dense to medium dense, trace gravel 85 67 8-10-11 10 Is.5 SS 78 4-5.6 (11) 10 SILTY SAND, (SM) dark brown, fine to medium grained, moist, dense to medium grained, social and fine rots 86.5 5 78 4-4-5 11 SILTY SAND, (SM) dark brown, fine to medium grained, social and fine rots 86.5 5 78 2-1-2 12.0 POORLY GRADED SAND WITH SILT, (SP-SM) grav, fine to medium grained, saturated, very loose, trace gravel SS 78 2-1-2 15 12.0 POORLY GRADED SAND with saturated, very loose, trace gravel SS 78 2-2-2 17.0 B00.5 SS 78 2-3-3 8 78 (6) 20 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, loose, trace gravel SS 78 2-3-3 12 12 20 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel SS 100 (10) 12 12 20 SS SS 100 5-5-6 11 100	TS/GINT				POORLY GR	RADED SAND WITH	SILT, (SP-SM) brown	n,		-		-						
4.5 873.0 5 9 POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to medium grained, moist, dense to medium dense, trace gravel SS 67 8-10-11 10 9.5 SS 78 4-5-6 10 SILTY SAND, (SM) dark brown, fine to medium grained, moist, medium dense, trace gravel, trace organics, occasional fine roots 865.7 67 8-4-4-5 10 SILTY SAND, (SM) dark brown, fine to medium grained, moist, medium dense, trace gravel, trace organics, occasional fine roots 865.7 78 2-1-2 110 POORLY GRADED SAND WITH SILT, (SP-SM) gray, fine to medium grained, saturated, very loose, trace SS 78 2-2-2 110 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, loose, trace gravel SS 78 2-3-3 110 CLAYEY SAND, (SC) gray, wet, rather stiff to stiff, trace gravel SS 10 4-5-5 20 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel SS 10 4-5-5 30 SS 10 5-5-6 11 12	G REPOF					in granica, molot, na			3 SS 2	56	4-4-4 (8)							
5 POORLY GRADED SAND WITH SILT. (SP-SM) brown, fine to medium grained, moist, dense to medium dense, trace gravel SS 67 8-10-11 (21) 10 9.5 988.0 SS 78 4-4-5 (11) 10 SLTY SAND. (SM) dark brown, fine to medium grained, moist, medium dense, trace gravel, trace organics, occasional fine roots 988.0 SS 78 4-4-5 (9) 10 SLTY SAND. (SM) dark brown, fine to medium grained, moist, medium grained, saturated, very loose, trace SS 78 2-1-2 (6 78 2-1-2 (6 120 POORLY GRADED SAND WITH SILT. (SP-SM) gray, fine to medium grained, saturated, very loose, trace SS 78 2-1-2 (6 SS 78 2-2-2-2 (7 10 15 CLAYEY SAND. (SC) gray, fine to medium grained, saturated, loose, trace gravel SS 78 2-3-3 (8 12 12 20 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff. SS 100 4-5-5 (10) 12 21 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff. SS 100 4-5-5 (10) 12 22 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff. SS 100 4-5-5 (NEERIN			4.5				873.0										
SS 78 4-5-6 (11) 0 SS. 78 4-5-6 (11) 10 SILTY SAND, (SM) dark brown, fine to medium grained, moist, medium dense, trace gravel, trace organics, occasional fine roots SS 78 4-4-5 (9) 12.0 POORLY GRADED SAND WITH SILT, (SP-SM) gray, fine to medium grained, saturated, very loose, trace SS 78 2-1-2 (3) 15 POORLY GRADED SAND WITH SILT, (SP-SM) gray, fine to medium grained, saturated, very loose, trace SS 78 2-2-2 (3) 15 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, loose, trace gravel SS 78 2-3-3 (6) 20 SS 78 2-3-3 (6) 12 12 21 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel SS 100 4-5-5 (10) 12 30 SS SS 100 5-5-6 (11) 100 5-5-6 (11) 11	NEERING/ENG	<u> 5 </u>			POORLY GF fine to mediu trace gravel	ADED SAND WITH moist, de	SILT, (SP-SM) brown nse to medium dense	n, e,	SS 3	67	8-10-11 (21)	-						
10 11 1 9.5 SILTY SAND, (SM) dark brown, fine to medium grained, moist, medium dense, trace gravel, trace organics, occasional fine roots SS 78 4-4-5 12.0 \nother pooRLY GRADED SAND WITH SILT, (SP-SM) gray, fine to medium grained, saturated, very loose, trace 0 SS 78 2-1-2 15 0 0 0 SS 78 2-1-2 (3) 15 0 0 SS 78 2-1-2 (3) 16 0 0 SS 78 2-1-2 (3) 17.0 0 0 SS 78 2-3-3 17.0 0 0 0 SS 78 2-3-3 20 0 0 SS 78 2-3-3 21 12 12 12 12 220 0 0 SS 78 2-3-3 24.5 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel 12 12 12 24.5 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel 10 10 10 30 0 0 55-5-6 11	(16.61453.100)/ENG								SS 4	78	4 - 5-6 (11)							
120 v moist, medium dense, trace gravel, trace organics, occasional fine roots 4 5 78 (9) 120 v POORLY GRADED SAND WITH SILT, (SP-SM) gray, fine to medium grained, saturated, very loose, trace gravel 865.5 - - 15 If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturated, very loose, trace gravel If the medium grained, saturat	GEO	10		9.5	SILTY SAND	, (SM) dark brown, fi	ne to medium graine	<u>868.0</u> d,	V ss		4-4-5							
15 12.0 V POORLY GRADED SAND WITH SILT, (SP-SM) gray, fine to medium grained, saturated, very loose, trace gravel SS 78 2-1-2 (3) 15 15 V SS 78 2-2-2 (4) 15 V SS 78 2-2-2 (4) 15 V SS 78 2-2-2 (4) 17.0 20 SS 78 2-3-3 (6) 20 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, loose, trace gravel SS 78 2-3-3 20 SS 78 78 2-3-3 (6) 21 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel SS 10 100 4-5-5 30 SS 10 100 (10) 10 11 30 SS 100 5-5-6 11 100 (11)	ANNG WALL			12.0 57	moist, mediu occasiona l fir	m dense, trace grave ne roots	el, trace organics,	, 005 5	5	78	(9)							
15 Image: star star star star star stiff to stiff, star star star stiff to stiff, star star star star stiff to stiff, star star star star star star star star	BRIDGES AND RET	 		12.0 <u>V</u>	POORLY GF fine to mediu gravel	RADED SAND WITH m grained, saturated	SILT, (SP-SM) gray, , very loose, trace	000.0	ss 6	78	2-1-2 (3)							
20 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, loose, trace gravel SS 78 2-3-3 20 SH 80 9 80 12 20 SH 9 80 12 12 24.5 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel SS 100 4-5-5 30 SS 100 5-5-6 11 10 30 SS 100 5-5-6 11 10	PEDESTRIAN	15							SS 7	78	2-2-2 (4)							
CLAYEY SAND, (SC) gray, fine to medium grained, saturated, loose, trace gravel 20 20 20 20 20 20 20 20 20 20	VEN - NEW			17.0				860.5										
20 SH 80 12 12 24.5 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel SS 100 4-5-5 30 SS 100 5-5-6 11 100 5-5-6 30 SS 100 5-5-6 11 100 11	JECTS/TCA/				CLAYEY SA saturated, loc	ND, (SC) gray, fine to ose, trace gravel	medium grained,		SS 8	78	2-3-3 (6)							
24.5 853.0 12 12 25 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel SS 100 4-5-5 (10) 30 SS 11 100 5-5-6 (11) 30 SS 11 100 5-5-6 (11)	016 PRO	20																
24.5 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, 25 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, 30 SS 100 4-5-5 (10) SS 100 4-5-5 (10) SS 100 5-5-6 (11) SS 11 100 5-5-6 (11) SS 11 100 5-5-6 (11) SS 10 100 4-5-5	ROJECTS/2								SH 9	80				12				12
24.5 853.0 25 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel 30 30	MSEV1-PI																	
25 24.5 853.0 25 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel SS 10 10 100 30 SS 110 30 SS 1100 11 100	DATAIR																	
23 SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stiff, trace gravel 30 30 30 30	54 - WNT			24.5				. 853.0				-						
30 30 30 SS 100 5-5-6 (11) 100 (11)	30/16 11:				trace gravel	N CLAY, (CL) gray, v	vet, rather stiff to stiff	,		100	4-5-5 (10)							
30 30 30 30 30 30 30 30 30 30 30 30 30 3	GDT 6																	
	MAY 2012																	
30 SS 11 100 5-5-6 (11)	US LAB I																	
	INT STD	30							V ss	100	5-5-6							
	D SNM								/\ 11	100	(11)							
	CH COLL																	
	TI GEOTE																	



BORING NUMBER PB-3 PAGE 2 OF 3

	NT _ W	enck Associates	PROJECT NA	ME	Ram	sey County	/ Re-D	evelop	ment	- (TC/	AP)		
PRC	JECT N	JMBER 16.61435.100	PROJECT LC	CAT	ION _	Arden Hills	, MN						
DEPTH (#)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)			PLASTICITY ² D INDEX	FINES
35 1 1 1 1 1 1 1 1 1 1 1 1 1		SANDY LEAN CLAY, (CL) gray, wet, rather stiff to stift trace gravel (continued)		Z SS 12 SS 13 SS 13 SS 13 SS 13 SS 14 SS 15 SS 16 SS 17 SS 16 SS 17 SS 12 SS 12 SS 12 SS 13 SS 12 SS 13 SS 13 SS 13 SS 13 SS 13 SS 13 SS 13 SS 14 SS SS 14 SS 14 SS 14 SS 14 SS 15 SS 14 SS 14 SS 14 SS 14 SS 14 SS 15 SS 14 SS 15 SS 14 SS 15 SS 14 SS 14 SS 15 SS 14 SS 15 SS 14 SS 15 SS 14 SS 15 SS 15 SS 15 SS 15 SS 15 SS 15 SS 15 SSS 15 S SS 15 SS SS 15 S 15 S 15 S 15 S 15 S 15 S 15 S 15 S 15 S 15 S SS 15 S S 15 S S 15 S 15 S S 15 S S 15 S 15 S S 15 S 15 S S 15 S S 15 S S S S	100 100 100 78 89 100	5-5-7 (12) 6-7-7 (14) 6-7-6 (13) 6-7-6 (13) 8-8-8 (16) 7-10-9 (19) 7-10-9 (19) 8-8-8 (16) 8-8-8 (16)		DRY				PLAS	
		59.5 POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, saturated, dense, trace gravel	808.0 n,	SS 19	100	9-10-10 (20)							



BORING NUMBER PB-3

PAGE 3 OF 3

CLIENT Wenck Associates

PROJECT NAME Ramsey County Re-Development - (TCAAP)

PROJ	JECT N	UMBER PROJI	ECT LOCA	ATION _	Arden Hills	s, MN						
			ЪЕ	%		z	Ч.	(%	AT	rerbe Limit:	ERG S	
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TY NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE	POCKET PE (tsf)	DRY UNIT V (pcf)	MOISTURI CONTENT (LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES
 		POORLY GRADED SAND WITH SILT, (SP-SM) brown, fine to medium grained, saturated, dense, trace gravel (continued)	3.0									
		SANDY LEAN CLAY, (CL) brown, wet, stiff, trace 76.0 gravel, occasional silt (ML) seams 807	. ₅ SS	100	8-9-8 (17)							
		Bottom of borehole at 76.0 feet.										

NEW PEDESTRIAN BRIDGES AND RETAINING WALL - GEO - (16.61453:100))ENGINEERINGKENGNEERING REPORTSIGINTITCAAP - ROUND 3.6PJ NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 6/30/16 11:54 - INITIDATAIRAMSEY11-PROJECTS/2016 PROJECTS/TCAAP

	(NORTHERN TECHNOLOGIE5, LLC	Inver Grove Heights 6160 Carmen Avenue East Inver Grove Heights, MN 55076 P: 651-389-4191 www.NTIgeo.com				B	OR	ING	5 NU	JME	BER PAGE	E 1 0	3-4 PF 3
	CLIEN	IT W	enck Associates		PROJEC	T NAME	Ram	sey County	Re-D	evelop	ment	- (TC/	AP)		
	PROJ	ECT N	UMBER <u>16.61435.1</u>	00	PROJEC	T LOCA	TION _	Arden Hills	, MN						
	DATE	STAR	TED <u>5/9/16</u>	COMPLETED _5/10/16	GROUNE) ELEVA		878.006 ft			HOL	E SIZ	E <u>6</u> 1	/2 inc	hes
			CONTRACTOR NTI	2.4				LS:		au 07/	1018				
			Robert Hawkins		IΑ <u>-</u> ΔT		DRILI	ING) IL / E I	ev ör	1.011				
	NOTE	S No	orth Pedestrian Bridge	. Elevation at staked location provided b	v dient AF	TER DRI	LLING								
			<u> </u>		, 	Ш	%		z		(%	AT1	ERBE	RG	
JUND 3.GPJ	DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		SAMPLE TY NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE	POCKET PE (tsf)	DRY UNIT V (pcf)	MOISTURI CONTENT (LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES
IT/TCAAP - RC		<u>, 1, ,</u> , <u>,</u>	TOPSOIL (1:	3.0 Inches)	876.9	AU 1								<u> </u>	
REPORTS/GIV			grained, mois occasional fir	st, very loose, trace gravel, trace organic ne roots	S,	ss	56	1-1-2 (3)							
NGINEERING	5							4.2.4	-						
GINEERING/E			7.0 57		074.0	3	67	(3)	-						
61453.100)\EN			SILTY SAND	0, (SM) gray, wet, very loose, trace grave	871.0	ss 4	100	1-1-2 (3)							
WALL GEO (16	10					SH	77				11	16	11	· ·	
D RETAINING			12.0 POORLY GF	RADED SAND WITH SILT. (SP-SM) grav	866.0	5		3-4-6	-					2	40
N BRIDGES AN			fine to mediu gravel 14.5	im grained, saturated, mediùm dense, tra	ace 863.5	6	100	(10)							
EW PEDESTRIA			SANDY LEA gravel	N CLAY, (CL) gray, wet, rather stiff, trace	9	SS 7	100	3 - 4-5 (9)							
UECTS/TCAAP - N						SS 8	100	5 - 5-6 (11)							
ECTS/2016 PRO	20					ss s	100	6-5-6 (11)	-						
RAMSEY/1-PROJI								/							
54 - \\NTIDATA\F															
T - 6/30/16 11:						SS 10	100	6 - 6-6 (12)							
3 MAY 2012 GD															
D US LAE															
GINT ST	30					SS 11	100	7-8-7							
- COMNS -								(13)							
TECH CO.															
NTI GEON															



BORING NUMBER PB-4 PAGE 2 OF 3

	Venck Associates	PROJECT NAME Ramsey County Re-Development - (TCAAP)
PROJECT	NUMBER _ 16.61435.100	PROJECT LOCATION Arden Hills, MN
DEPTH (ft) GRAPHIC	MATERIAL DESCRIPTION	AMPLE TYPE NUMBER ECOVERY % (ROD) (R
35	SANDY LEAN CLAY, (CL) gray, wet, rather stiff, trace	
	gravel (continued)	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
		$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
INNOVENCE: (10910) - CED- TINK	49.5	828.5 828.5
	LEAN CLAY, (CL) brown, wet, stiff, trace gravel, trace sand, occasional silt (ML) seams	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
		SS 100 9-15-12 (27)
		SH 17 60 21 26 18 8 97
	69.5	808.5 S 100 6-8-9 (17)
	CLAYEY SAND, (SC) brown, fine to medium grained, saturated, dense, trace gravel	SS 100 6-9-9 19 (18)



BORING NUMBER PB-4

PAGE 3 OF 3

CLIENT Wenck Associates

PROJECT NAME Ramsey County Re-Development - (TCAAP)

PROJ	ECT N	IUMBER 16.61435.100 PROJ	JECT	LOCAT		Arden Hills	, MN						
т	일			TYPE ER	RY %)	v TS UE)	PEN.	г WT.	JRE T (%)	AT1		RG } ≻	S
DEPT (ft)	GRAPH	MATERIAL DESCRIPTION		SAMPLE NUMBI	RECOVE (RQD	BLOV COUN	POCKET (tsf)	DRY UNI (pcf)	MOISTUC	LIQUID	PLASTIC LIMIT	PLASTICIT INDEX	EINE
		CLAYEY SAND, (SC) brown, fine to medium grained, saturated, dense, trace gravel <i>(continued)</i> 74.5	03.5										
75		POORLY GRADED SAND WITH SILT, (SP-SC) brown, fine to medium grained, saturated, dense, trace gravel 80	02.0	SS 20	100	8-10-9 (19)							
		Bottom of borehole at 76.0 feet.											

(Northe 6160 Inver Telepl	ern Teo Carmer Grove H none: (hnologi h Avenu Heights 551-389	ies, Inc ue East , MN 59 9-4191	5076							BC	RIN	G N	UM	IBE	R N Page	R-1 ≞ 1 0	01 0F 1
CL	JEN	IT Ca	arl Bola	nder an	d Sons	, Co.		_		P	ROJEC		E_Ram	sey Cour	t <u>y R</u> e-D)evelo	oment	<u>Si</u> te (TCAAI	>)	
PR	OJ		IUMBER	र 15.6	0936.1	00				P	ROJEC			Arden Hi	ls, MN			•			
	TE	STAR	RTED 5	5/21/15		c	OMPLE	TED 5/2 ⁻	1/15	G	ROUNI) ELEV	ATION -	914.14 ft			но		E "6	1/2" ir	nches
	NLL	ING C		CTOR	NTI					G	ROUNI) WATE		LS:			-				
	NLL	ING N	ETHO) 3 1/4	in H.S	i.A					AT)F DRIL	LING	No aro	undwa	iter ob	served	1.		
	GG	ED B	Y	<u> </u>		C	HECKEI	DBY DA	s		AT								-		
	DTE	S El	ev. at st	aked Ic	cation.						AF	TER DF	RILLING								
		 ⊇	<u>S 5 ft V</u>	<u> </u>								TYPE	RY %	LIS LIS	PEN.	г wт.	JRE T (%)	AT	TERBE	RG } ≻	
DEPT	(ft)	GRAPI LOG				MATE	RIAL DE	SCRIPTI	ON			SAMPLE NUMB	RECOVE (RQE	BLOV COUN (N VAL	POCKET (tsf)	DRY UNI (pcf)	MOISTU	LIQUID	PLASTIC LIMIT	PLASTICIT	FINE
)		0.7	TOPS CLAY	OIL (8 EY SAN	Inches) ND, (SC) C) brown	to dark b	rown, fine	;	913.4	ss 1	44	1-2-2 (4)							
DR.GPJ	_			graine	d, mois	st, very	loose to	medium o	dense, tra	ice				100							
				grave	, 1611363	5 OF SIIL			9			2	89	4-6-6 (12)	_						
URAL RESOUR	5											SS 3	89	5 -7-7 (14)							
												SS A	89	3-3-3 (6)							
	0		9.5	PFAT	(Pt) bl	ack m	oist rath	er stiff to	soft trace	aravel	904.6			(0)							
NG/ENGINEER	Ι.	<u>, ,,,</u>		,	, (, , , ,					giardi		5	78	(11)	_						
	-	<u>1, 81,</u>	13.3	LEAN	CLAY	WITH	SAND. (C	CL) grav a	nd brown	. moist	900.8		⁵ 44	2-2-1 (3)							
-(12.60936.10	5			to wet	, rather	stiff, tr	ace grav	el, organi	c materia	seams		X ss	89	3-5-6	-						
N HILLS - GEO														265							
												8	2 100	(11)	_						
	0		21.5								892 6	S⊢ 9	I								
15 PROJ.		<u>, , , , , ,</u>			Bore	hole ba	ackfilled	with auge	r cuttings	•			_ <u> </u>					1			
CTS/201					6	Soliom	or poren	ole at 21.3	b leet.												
PROJE																					
26 - H:/1																					
5/16 14:																					
3DT - 1/.																					
Y 2012.0																					
AB MA																					
STD US																					
GINT																					
ILUMNS																					
ECH CC																					
TI GEOT																					
z 🔔																					

			North 6160 Inver	ern Technologies, Carmen Avenue E Grove Heights, M	Inc. East N 55076					BOI	RIN	G N	UM	BE	R N Page	R-1 1 0	02 F 1
			arl Bolo	none: 051-309-4	9		• T NA	ME	Dom		/ Po-D	ovolor	mont	Sito (τολλι	2)	
				n 15 60026 100	0.			міс _ Саті		Ardon Hills		evelop	Jinein				
	PRUJ			K 15.00930.100							s, iviin			E 017	F "6	4/01 :	
		STAR				GROUN				915.35 IL				_E 312	.E <u>0</u>	<u>1/2 in</u>	icnes
	DRILL		JUNIRA	ACTOR NI						LS:							
	DRILL	ING I	METHOL	D <u>3 1/4 in H.S.A</u>		<u> </u>	TIME	OF	DRILI	_ING12.0)0 ft / E	=lev 90	03.35	It			
	LOGO	SED B	Y		CHECKED BY DAS	A	r end	OF [DRILL	ING							
	NOTE	:S _E	ev. at st / <u>S 20 ft</u>	taked location.		A	TER	DRIL	LING								
	DEPTH (ft)	BRAPHIC LOG		MA	ATERIAL DESCRIPTION			NUMBER	COVERY % (RQD)	BLOW COUNTS V VALUE)	CKET PEN. (tsf)	Y UNIT WT. (pcf)	OISTURE NTENT (%)			STICITY STICITY	FINES
	0						SAN		Ш Ш Ш	95	P	DR	≥ö		L L	PLAS	
			0.6	TOPSOIL (7 Incl CLAYEY SAND,	nes) (SC) brown to light brown, fine to	914.8	³ X ^s	SS 1	56	2 -2- 3 (5)							
CRRIDORIGE			2.0	medium grained SILTY SAND, (S moist, loose	, moist, loose M) brown and dark brown, fine grain	<u>913.4</u> ed,		SS 2	67	3-3-5 (8)							
SOURCES (5		4.5	SILTY SAND (S	M) reddish brown, fine grained, mois	910.9		29		1_8_8							
VAI UKAL KE				medium dense	,		Д`	3	56	(16)	-						
IS/GIN I/NK-			. 7.0	CLAYEY SAND, loose, some orga	(SC) black, fine grained, dry to mois anics, organic stain	908.4	۱ ۲	SS 4	67	4 - 4-4 (8)							
KING REPOR	 10					004		ss		4-5-5							
NGENGINEE		<u> </u>	12.0 \(\not\)	PEAT, (Pt) black	, dry to moist, rather stiff	904.9		5	67	(10)							
TUUJAENGINEEKI				SILTY SAND, (S medium dense	M) gray, fine grained, saturated,		X	SS 6	78	5 - 6-6 (12)							
GEO - (15-60936.								SS 7	67	4 - 5-5 (10)							
AKUEN HILLS -								SS 8	89	6 - 6-8 (14)							
AP PRUJEU I								29		3-4-5							
DIECISIICA			21.0	Boreho	e backfilled with auger cuttings.	894.4	ıЩ`	9	100	(9)							
II GEOLECH COLUMNS - GINLI STU US LABIMAT ZUTZIGUT - TZG/TB 14:20 - D.TFROJECH SKUTS TRV				Bott	om of borehole at 21.0 feet.												

(2		North 6160 Inver Telep	ern Technologies, Inc. Carmen Avenue East Grove Heights, MN 55076 hone: 651-389-4191				BO	RIN	g n	UM	BE	R N Page	R-1 (1 0	03 F 1
CI	JEN	л _с	arl Bola	nder and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF	²)	
PF	SOJ	ECT	NUMBER	R _15.60936.100	PROJEC	T LOCA		Arden Hills	s, MN						
D	٩ΤΕ	STAF	RTED	5/21/15 COMPLETED <u>5/21/15</u>	GROUNE	ELEVA		924.8 ft			но	LE SIZ	E <u>"6</u>	1/2" in	iches
D	RILL	ING (CONTRA		GROUNE	WATER	R LEVE	LS:							
D	RILL	ING I	NETHO	0_3 1/4 in H.S.A	АТ	TIME OF	- DRILI	LING N	lo grou	undwa	ter ob	served	1.		
	OGG	ED B	Υ	CHECKED BY DAS	АТ	END OF	DRILL	.ING							
	DTE	S E	ev. at st	aked location.	AF	ter dri	LLING								
DEPTH	(ft) 0	GRAPHIC LOG	y'S 6 # v	WATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
			0.3	TOPSOIL (4 Inches) CLAYEY SAND, (SC) brown, fine grained, moist, loos		SS 1	56	3-3-3 (6)							
	_		2.0	SANDY LEAN CLAY, (CL) brown, moist, medium to rather stiff	922.8	ss 2	56	4-4-4 (8)	-						
	5			NOTE: Sampled auger cuttings at 4.5 feet.		ss 3	17	4 - 5-5 (10)	-						
	-		7.0	SILTY SAND, (SM) dark brown to dark gray, fine grained, moist, dense, clay (CL) lenses	917.8	SS 4	67	4-7-12 (19)	-						
	0		12.0	SILTY SAND, (SM) brown, moist, medium dense, trad	912.8 Ce	SH 5	78	6-8-8	_						
	5		15.5	gravor	909.3	X ss	56	7-7-7	-						
	_		17.0	CLAYEY SAND, (SC) gray, fine grained, moist, media dense, trace gravel	um 907.8	/ /		(14)	-						
	_		• • • •	SILTY SAND, (SM) gray, fine grained, dry to moist, loose			44	2-2-3 (5)							
	20	<i></i>	19.5	I FAN CLAY WITH SAND (CL) dark brown moist	905.3			557	-						
			21.0	rather stiff	903.8	X 9	100	(12)							
				Borenole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

(North 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, Ml bhone: 651-389-41	Inc. East N 55076 191				BOI	RIN	g n	UM	BE	R N Page	R-1 (≞ 1 0	04 F 1
CLIE	NT Carl Bola	under and Sons. C	n	PROJEC		Ram	sev County	/ Re-D	evelor	oment	Site (тсаан	2)	
PRC	JECT NUMBE	R 15.60936.100					Arden Hills	. MN				10/1/1	_/	
DAT	E STARTED	5/22/15	COMPLETED 5/22/15	GROUN) ELEVA		932.63 ft	,		но	LE SIZ	2E "6	1/2" in	ches
DRII	LING CONTR	ACTOR NTI	<u> </u>	GROUN) WATEF		LS:							
DRII	LING METHO	D 3 1/4 in H.S.A		A1			LING N	lo aroi	undwa	ter ob	serveo	ł.		
LOG	GED BY		CHECKED BY DAS	A1	END OF	DRILI	_ING	<u></u>						
NOT	ES Elev. at s	taked location.		AF	TER DR	LLING								
	0/\$ 8 ft 1	↓E									AT	TERBE	ERG	
	0				L L L	۲ %	ΩΩ	Ц. И Ц	ĂT.	щ%			3	
HL €	Eg	N//) D D U U		E (j	Ê,	12 F	۵.	<u>0</u>	Ľ×	ES
		TV17			APL VUN	Q R		Ya B	5 e >	NTE	IN IN	AST	DEC	LI L
					SAL	RE		6	B	l≥S			LA:	
-		POORLY GRAD fine to medium g	ED SAND WITH GRAVEL, (SP) bro rained, dry, fine to coarse gravel	own,	ss 1	56	10-14-15 (29)							
	2.0		MITH CRAVEL (SC) roddich brown	930.6			0.40.40	1						
		fine to coarse gra	ained, moist, fine to coarse gravel	1,	2	78	(20)							
	4.0	(FIII) SANDY I FAN C	LAY (CL) reddish brown to light bro	928.6	-]						
5		moist, medium, t	race fine to coarse gravel	,	ss	56	5-3-5]						
					3		(8)	-						
					1 98		1-1-1	+						
	- 8.3		(00) and distance first to an adjust	924.4	4	33	(8)							
		grained, moist, d	ense, trace fine to medium gravel	1										
<u>10</u>					SH									
					5									
					/ ss		9_10_13	-						
					$\int 6$	78	(23)							
	14.5			918.1										
15		SANDY LEAN C	LAY, (CL) brown, moist, stiff, trace t	fine		89	5-7-9							
		gravel, non oxac	Jocannig				(10)	{						
	17.0	SANDY LEAN C	LAY, (CL) brown to reddish brown, o	915.6 dry,	/ ss		7-14-19	-						
		very stiff, little fin	e to coarse gravel	•	8	56	(33)	1						
								-						
20				011.6		78	8-16-16							
	/////21.0	Borehol	e backfilled with auger cuttings.	911.0			(02)							
		Botte	om of borehole at 21.0 feet.											
1 01 02														
010														

			North 6160 Inver Telep	ern Technologie Carmen Avenue Grove Heights, bhone: 651-389-	es, Inc. ∋ East MN 55076 4191					BOI	RIN	G N	UM	BE	R N Page	R-1 (≞ 1 0	05 F 1
	CLIEN	NT _C	arl Bola	inder and Sons,	Co.		PROJE	CT NAME	Ram	sey County	<u>/ Re-D</u>	evelop	oment	Site (<u>TCAA</u> F)	
	PROJ		UMBE	R _15.60936.10	0		PROJEC			Arden Hills	, MN						
	DATE	STAF		5/21/15		D <u>5/21/15</u>	GROUN	D ELEVA		936.22 ft			НО	LE SIZ	E <u>"6</u>	1/2" in	iches
	DRILL	ING C	CONTR/	ACTOR NTI			GROUN		R LEVE	LS:							
	DRILL		IETHO	D <u>3 1/4 in H.S.</u>	Ą		A		F DRIL	LING N	lo grou	undwa	iter ob	served	١.		
	LOGO	ED B	Y		CHECKED	BY DAS	A		DRILL	.ING							
	NOTE	S El	ev. at s	taked location.			A	TER DR	LLING								
	(ft)		'S 5 ft S	<u>.</u>	MATERIAL DES	CRIPTION		LE TYPE ABER	VERY % QD)	OW JNTS ALUE)	ET PEN. tsf)	INIT WT. ocf)	STURE ENT (%)			RG } ∕⊥⊥X	NES
	о 0	GRV GRV						SAMPI	RECO (R	(N CO BI	POCK	DRY L	MOIS		LIM PLAS	PLASTI INDE	Ľ
202				fine to medium (Fill)	grained, dry, so	ome fine to coarse grav	/n, el	SS 1	56	4-5-5 (10)							
			3.0	SANDY LEAN	CLAY, (CL) bro	wn, dry to moist, rather	933.2	$\frac{1}{2}$ ss 2	67	5 - 7-7 (14)							
	5			stiff, trace fine	gravel, iron oxid	e staining		X ss	72	4-4-5	-						
								3		(9)	-						
			95				926 7	, SH 4	_								
	10			SILTY LEAN C brown, moist, r	CLAY, (CL-ML) reacted at the stift to s	eddish brown and light f		SS 5	78	3 - 4-12 (16)							
				NOTE: Sand s	eam (SP) at 11.	0 feet.		SS 6	56	12 - 14-15 (29)	-						
	15							SS 7	83	4 - 6-7 (13)	-						
		0	18.0	POORLY GRA		TH GRAVEL, (SP) brow	918.2 /n,		56	10-12-15 (27)	-						
	20		19.5	SILTY LEAN (grained, dry, der	eddish brown dry very	916.7 916.2	, X ss	67	32	-						
				stiff, little medi NOTE: Sample	um to coarse gra ed auger cutting	avel s.	\int	9			,						
			·	Boreh Bo	ole backfilled wi	th auger cuttings. e at 20.0 feet.											
- 07:51 01/C7																	
2012.001 - 1/																	
US LAB MAY																	
NI GEC																	

			North 6160 Inver	ern Technologies, Inc. Carmen Avenue East Grove Heights, MN 55076				BOI	KIN	GΝ	UM	BEI	r n Page	R-1 E 1 0	06 F 1
			Telep	hone: 651-389-4191			Bom			ovolor	mont	Sito (רכ	
					PROJEC					evelop	ment	Sile (ICAAF	-)	
				R 15.00930.100	PROJEC				5, IVIIN			E 017		4 (0)	
		STA		<u>5/21/15</u> COMPLETED <u>5/21/15</u>	GROUNL) ELEVA	TION _	939.86 ft				LE SIZ	.E <u>"6</u>	<u>1/2" in</u>	iches
	DRILI	_ING (CONTR/		GROUNE) WATER	R LEVE	LS:							
	DRILI	ING I	NETHO	D <u>3 1/4 in H.S.A</u>	AT	TIME OF	DRIL	LING N	lo grou	undwa	ter ob	serveo	1.	-	
	LOGO	SED B	Υ	CHECKED BY DAS	AT	END OF	DRILL	_ING							
	NOTE	S _E	ev. at s	taked location.	AF	TER DRI	LLING								
	–	IC				гүре ER	א א)	/ JE)	PEN.	WT.	RE Г (%)	AT	ERBE	RG	
	DEPTI (ft)	GRAPH LOG		MATERIAL DESCRIPTION		SAMPLE 7 NUMBE	RECOVEF (RQD	BLOW COUNT (N VALU	POCKET (tsf)	DRY UNIT (pcf)	MOISTU CONTEN	LIQUID LIMIT	PLASTIC LIMIT	PLASTICIT INDEX	FINES
	0	<u>× 1/</u> ×	0.8	TOPSOIL (10 Inches)	939.0	∕ ss	67	1-2-4							
5PJ			20	CLAYEY SAND, (SC) light brown and dark brown, fine	937.9	/ 1		(6)	-						
S CORRIDOR				CLAYEY SAND, (SC) brown, fine grained, moist, very loose		SS 2	22	1-1-1 (2)							
AL RESOURCE	 5					SS 3	22	1-1-1 (2)							
VINK NATUK								(-)							
I KEPOKI SVGI			9.5		930.4	4									
VENGINEERING	<u>10</u>			LEAN CLAY WITH SAND, (CL) reddish brown to light brown, moist, rather stiff to stiff, trace gravel		SS 5	100	3-5-7 (12)	-						
UNENGINEERING						SS 6	100	4 - 5-5 (10)							
) - (15-60936-10C	 _ 15					SS 7	89	5-10-7 (17)							
LLS - GEC			17.0		922.9			(17)	-						
ECT ARDEN D			18.0	SANDY LEAN CLAY, (CL) reddish brown, moist, stiff, trace gravel POORLY GRADED SAND, (SP) light brown, fine	921.9		67	12-13-15 (28)							
AP PRO	20			grained, dry, medium dense, little medium to coarse gravel		V ss		7-8-8	-						
CIS/ICF			21.0		918.9	× 9	33	(16)							
EUTECH COLUMNS - GINT STU US LABIMAY ZUIZIGUT - 1/23/10 14/20 - H//I- EV/OEC 19/2019 EV/010				Bottom of borehole at 21.0 feet.											

			North 6160 Inver	nern Technologie Carmen Avenue Grove Heights, phone: 651-389-	es, Inc. e East MN 55076 -4191					BOI	RIN	G N	UM	BEI	R N I page	R-1 (1 0	07 F 1
			orl Role	andor and Sons	Co				Pam	sov County		ovolor	mont	Sito (1		2)	
	PRO			R 15 60036 10	0					Arden Hills		evelop	ment	Sile (I)	
		STAF		5/21/15		5/21/15				933 09 ft	5, IVII N		ноі	E SIZ	F "6	 1/2" in	ches
						3/21/13	GROUNI			<u>15</u>					L	<u>1/2 III</u>	01103
				D 3 1/4 in H S	٨							Indwa	tor ob	sonvod			
			v	<u> </u>			بت ۸۳				NO GIU	inuwa		Serveu	•		
	NOTE	S FL	ev at s	taked location													
			$\frac{0110}{15}$ f	ts			74								FRBF	RG	
	EPTH (ft)	APHIC OG		I	MATERIAL DESCF	RIPTION		LE TYPE MBER	VERY % (QD)	-OW UNTS 'ALUE)	ET PEN. (tsf)	JNIT WT. pcf)	STURE ENT (%)				NES
	ت ٥	GR						SAMP	RECC (F	SCB (NCB	POCK	DRY (((CONT	LIQL	PLAS LIM	PLAST INDI	Ш.
r lo				CLAYEY SAN dry to moist, lit (Fill)	D, (SC) brown, fine ttle gravel	to medium grained,		SS 1	44	3 - 5-9 (14)	_						
								SS 2	28	5 - 5-5 (10)							
			5.0	LEAN CLAY V stiff, trace grav	VITH SAND, (CL) b /el	rown, moist, rather	928.1	SS 3	67	3 -4- 5 (9)	-						
			7.0	SILTY SAND, medium dense	(SM) light brown, fi e to loose	ne grained, moist,	926.1	ss 4	56	4 - 6-7 (13)	-						
								SS S	67	4-4-2							
			12.0			rour moist rather	921.1			(0)	-						
				stiff, trace grav	/el			6	100	3-5-6 (11)	_						
								SH 7									
יו אעתכוא שוררכ			17.0	SANDY LEAN dry, stiff, iron c	CLAY, (CL) reddis oxide staining	h brown and brown,	916.1	SS 8	100	8-12-16 (28)	_						
			19.5				913.6										
OIL CAMP			21.0	POORLY GRA grained, dry, d	ADED SAND, (SP) ense	light brown, medium	912.1	SS 9	78	7 - 7-10 (17)							
20121120211202				Boreh Bo	nole backfilled with ottom of borehole a	auger cuttings. t 21.0 feet.		<u> </u>								I	
2 GD1 - 1/23/18 14:20 - U.VI-LVONEC10																	
ALC: CONTRACT OF ALC: C																	

			North 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, MI hone: 651-389-41	Inc. ast \ 55076 91					BO	RIN	g n	UM	BEI	R N page	R-1	08 F 1
	CLIEN	NT Ca	arl Bola	nder and Sons, Co).		PROJE		E_Ram	sey County	y Re-D	evelop	oment	Site (ГСААР)	
	PROJ		IUMBEI	R <u>15.60936.100</u>			PROJE			Arden Hills	s, MN						
	DATE	STAR	RTED	5/20/15		5/20/15	GROUN	D ELEV/		915.92 ft			HOL	_E SIZ	E <u>"6</u>	1/2" in	<u>ches</u>
	DRILI	LING C	ONTR/	ACTOR NTI			GROUN	D WATE	R LEVE	LS:							
	DRILI	LING N	IETHO	D <u>3 1/4 in H.S.A</u>			A	TIME C	F DRIL	LING N	No grou	undwa	ter ob	servec	I.		
	LOGO	GED B	Y		CHECKED BY	DAS	A	END O	F DR I LI	_ING							
	NOTE	ES _Ele	ev. at st	taked location.			AF		ILLING								
	ЭЕРТН (ft)	ZAPHIC LOG		MA	TERIAL DESCRIF	PTION		PLE TYPE UMBER	OVERY % (RQD)	BLOW OUNTS VALUE)	:KET PEN. (tsf)	UNIT WT. (pcf)	NISTURE ITENT (%)			TICITY ²² DEX ²²	FINES
	0	U 1						SAM	REC	υz	POG	DRY	₹Ö	93	PLA	PLAS INI	
GPJ			2.0	TOPSOIL (6 Inch CLAYEY SAND, grained, moist, Ic	ies) (SC) brown and da ose, trace fine gra	ark brown, fine ve l	<u>915.4</u> 913.9		56	1-2-4 (6)	_						
RCES CORRIDOR			15	LEAN CLAY WIT medium, trace fir	H SAND, (CL) gra le gravel, trace org	y and brown, moisi anics	t, 011 /		67	3 - 4-4 (8)	-						
ATURAL RESOU	5		1.0	LEAN CLAY WIT trace fine gravel,	H SAND, (CL) gra iron oxide staining	y, moist, medium,		ss 3	78	2-3-3 (6)	-						
DRTS/GINT/NR N			7.0	SANDY LEAN Cl to rather stiff, trac	_AY, (CL) gray bro ce fine gravel, iron	wn, moist, medium oxide staining	908.9 1	ss 4	78	3 - 3-5 (8)	_						
IGINEERING REP	 10							ss 5	100	3 - 5-7 (12)	-						
)/ENGINEERING/EI			12.0	SANDY LEAN Cl to medium, trace	_AY, (CL) dark gra fine gravel	y, moist, rather stif	903.9 f		100	3 - 4 - 5 (9)							
:O (15 60936 100	15								78	2 -3- 4 (7)	-						
KRDEN HILLS - GE								ss 8	100	3-3-5 (8)	_						
CAAP PROJECT /	20							SH	67								
2015 PROJEC ISV.			21.5	Borehol	e backfilled with au om of borehole at 2	iger cuttings. 21.5 feet.	894.4	9	0/								
H:/1-PROJECTS																	
F 1/25/16 14:26																	
AB MAY 2012.GD																	
- GINT STD US L																	
OTECH COLUMNS																	
NTI GEC																	

Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076	BORING NUMBER NR-109 PAGE 1 OF 1
CLIENT Carl Bolander and Sons Co	PRO IECT NAME Ramsey County Re-Development Site (TCAAP)
	_ GROUND WATER LEVELS.
	_ AFIER DRILLING
MATERIAL DESCRIPTION	
0	
TOPSOIL (8 Inches)	$\xrightarrow{916.2}$ SS 56 2-3-3
	914.8
SILTY SAND, (SM) light brown, fine to coarse grain	ed, $X S 67 2-4-5$
trace lenses of silt	
	S 2-2-2
2 2 2 2 2 2 2 2 2 2 2 3 2 3 3 5 5 5 5 5	$ \begin{array}{c c} 911.3 \\ \hline 910.8 \\ \hline \end{array} \\ \hline 3 \\ \hline 44 \\ (4) \\ \hline (4) \\ \hline \end{array} $
LEAN CLAY WITH SAND, (CL) brown and gray, mc	Dist,
medium, trace fine to medium gravel	SS 100 3-3-3
	/ 4 (6)
	$\left \begin{array}{c} 33 \\ 5 \end{array} \right 100 \left \begin{array}{c} 2-35 \\ (8) \end{array} \right $
12.0	904.8
SANDY LEAN CLAY, (CL) gray, moist, rather stiff, t	race SS 100 3-5-5
Tine to medium gravel	
	SH SH
LEAN CLAY WITH SAND, (CL) dark gray, moist, ra	ther V SS 100 4-5-6
stiff, trace fine to medium gravel	
Borehole backfilled with auger cuttings.	
Bottom of borehole at 21.0 feet.	

0	Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076				BO	RIN	G N	UM	BE	R N Page	R-1 ≞ 1 0	10 0F 1
1	Telephone: 651-389-4191											
	NT Carl Bolander and Sons, Co.	_ PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	<u>)</u>	
PRO	JECT NUMBER 15.60936.100		T LOCAT		Arden Hills	s, MN						
DAT	E STARTED <u>5/19/15</u> COMPLETED <u>5/19/15</u>	GROUNE	ELEVA		919.86 ft			HOI	_E SIZ	Έ <u>"6</u>	1/2" in	nches
DRII			WATER		LS:							
DRIL	LING METHOD 3 1/4 in H.S.A	_ ⊻ a t	TIME OF	DRIL	L ING <u>19.</u> 5	50 ft / E	Elev 90	00.36	ft			
LOG	GED BY CHECKED BYDAS	_ AT	END OF	DRILL	.ING							
NOT	Elev. at staked location.	_ AF	TER DRI	LLING								
o DEPTH (ft)	OINTERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT		PLASTICITY ²³ INDEX	FINES
_	March M	919.4	SS 1	67	2-3-3 (6)							
	moist, some gravel (Fill)			78	5 -7- 8 (15)							
Esources			V ss		5-6-7	-						
		012 0	3	100	(13)	_						
	$\begin{array}{c c} \hline & & \\ \hline \hline & & \\ \hline & & \\ \hline & & \\ \hline & & \\ \hline \hline \\ \hline & & \\ \hline \\ \hline$	012.0	SH 4	-								
	- <u><u><u>v</u></u><u>v</u><u>v</u><u>v</u><u>v</u><u>v</u><u>9.5</u></u>	910.4										
	LEAN CLAY WITH SAND, (CL) gray brown, moist, s to medium, trace gravel	oft	ss 5	100	1-1-2 (3)							
			SS 6	100	2-3-4 (7)							
 			∑ ss	100	3-3-4							
HILLS - GEO					(7)							
	LEAN CLAY WITH SAND, (CL) gray, moist to wet, rather stiff, trace gravel	902.4	SS 8	100	4 - 5-6 (11)							
		909 0	X ss	22	2 - 4-5	_						
5 PROJECT:	Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	090.9	v N -	1	<u> </u>	1	I	1	1	1		1
OUECISIZUI												
26- HM-PR												
L = 1/25/16 14												
AY 2012.GD1												
TD US LAB M												
INS - GINTS												
ECH COLUM												
NTI GEOT												

			No 61 Inv Te	rthern Technologies, Inc. 60 Carmen Avenue East rer Grove Heights, MN 55076 lephone: 651-389-4191				BO	RIN	g n	UM	BEI	R N Page	R-1 ≞ 1 0	11 F 1
	CLIEN	NT C	arl B	olander and Sons, Co.	PROJEC		Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF	P)	
	PROJ		IUMI	BER 15.60936.100	PROJEC		ΓΙΟΝ	Arden Hills	s, MN	•		`		,	
	DATE	STAF	RTEC	5/19/15 COMPLETED 5/19/15	GROUN) ELEVA		918.95 ft			HOL	_E SIZ	Έ "6	1/2" in	ches
	DRILI	_ING (GROUN) WATEF		LS:			-				
	DRILI		/ETH	HOD 3 1/4 in H.S.A	AT		- DRIL	LING N	lo arou	undwa	ter ob	served	ł		
	LOGO	ED B	Y	CHECKED BY DAS	AT		DRILL	.ING	9						
	NOTE	S EI	ev.a	t staked location.	AF	TER DR	LLING								
ł												AT1	FERBE	RG	
	DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
			0.7	TOPSOIL (8 inches) CLAYEY SAND, (SC) brown and dark brown, fine	918.3	SS 1	56	1-1-2 (3)							
CORKIDOR GF				grained, moist, trace fine to medium gravel (FILL)		SS 2	100	4 - 6-7 (13)							
RESOURCES	5		5.0	LEAN CLAY WITH SAND (CL) grav moist rather st	914.C	∬ ss	100	4-5-6							
NK- NA I UKAL			7.0	trace fine gravel, peat (Pt) lenses	912.0			(11)							
PORIS/GNI/				LEAN CLAY WITH SAND, (CL) blue gray, moist, medium, trace fine gravel		X ss 4	89	3-3-3 (6)							
ENGINEERING R	<u> 10 </u>		9.5	LEAN CLAY WITH SAND, (CL) gray and dark brown, moist, medium to stiff, trace fine to medium gravel, in oxide staining	909.5	ss 5	67	3 - 3-4 (7)	-						
JUJENGINEEKING						SS 6	100	3 -4- 4 (8)	-						
1 92609 CL	15					ss 7	100	2-4-4 (8)							
EN HILLS - GEI						M ss		6-8-8	-						
אטארין אירע						8	33	(16)	-						
JECI SULUANE			21.5		897.5	SH 9	75								
UNA GIU				Borehole backfilled with auger cuttings. Bottom of borehole at 21.5 feet											
ECISIS															
UN-H															
H 97															
25/16 14															
- 100															
VY ZUTZ															
LAB MA															
en l															
ECHC															
NI GEO															

		North 6160 Inver Telep	nern Technologies, Carmen Avenue E Grove Heights, MI phone: 651-389-41	Inc. ast N 55076 91					BOI	RIN	G N	UM	BEI	R N Page	R-1 ′ ∃ 1 0	12 F 1
	CLIENT	Carl Bola	ander and Sons, Co).			T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF	י)	
	PROJEC		R <u>15.60936.100</u>						Arden Hills	, MN						
	DATE ST	TARTED _	5/19/15	COMPLETED	5/19/15	GROUN	ELEVA	TION _	923.3 ft			HOI	_E SIZ	E <u>"6</u>	<u>1/2" in</u>	ches
	DRILLIN	IG CONTR				GROUN	WATER	LEVE	LS:							
	DRILLIN	IG METHO	D <u>3 1/4 in H.S.A</u>			AT	TIME OF	DRILI	_ING N	lo grou	undwa	ter ob	served	۱.		
	LOGGED	D BY		CHECKED BY	DAS	AT	END OF	DRILL	ING							
	NOTES	Elev. at s	taked location.			AF	ter dri	lling								
	o DEPTH (ft) GRAPHIC	900 001	MA	TERIAL DESCR	IPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
GPJ		<u>* 10.6</u>	TOPSOIL (7 inch SILTY SAND, (S medium dense, t	ies) M) brown, fine gr race clay	ained, moist, loose	<u>922.7</u> to	$\left \begin{array}{c} ss \\ 1 \end{array} \right $	78	1-1-3 (4)							
CES CORRIDOR		4.0	NOTE: Sand sea	m (SP) at 2.0 fe	et.	919.3	ss 2	100	5 - 5-5 (10)	-						
- NATURAL RESOUR	_ 5		SANDY LEAN C rather stiff, trace	LAY, (CL) light bi gravel, iron oxide	rown to tan, moist, e staining		SH 3	83								
PORTS/GINT/NR							SS 4	100	3 - 4-5 (9)							
G'ENGINEERING RI		9.5	LEAN CLAY WIT rather stiff, trace	H SAND, (CL) lig fine to coarse gra	ght brown, moist, ave l	913.8	SS 5	100	4 - 5-6 (11)	-						
86.100)/ENGINEERIN		14.5				908.8	SS 6	100	3 - 4-6 (10)	-						
LS - GEO - (15.6093			LEAN CLAY WIT rather stiff, trace	H SAND, (CL) g fine to coarse gra	ray brown, moist, avel		SS 7	100	4 - 6-8 (14)	-						
OJECT ARDEN HI								100	3 - 5-7 (12)	-						
CTS/TCAAP PK	20	21.0	Develo	- I I. (11 1 11)		902.3	SS 9	100	3-5-7 (12)							
TI GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/25/16 14:26 - H:/I-PROJECTS/2015 PRO.			Botto	om of borehole at	t 21.0 feet.											

(Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	G N	UM	BE	R N Page	R-1 ≞ 1 0	13 DF 1
CL	ENT Carl Bolander and Sons, Co.	_ PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAA	^{>})	
PR	DJECT NUMBER 15.60936.100	_ PROJEC			Arden Hills	, MN						
DA	TE STARTED _5/21/15 COMPLETED _5/21/15	GROUN) ELEVA		900.69 ft			но	LE SIZ	E "6	1/2" in	nches
DR		GROUN			LS:							
DR	ILLING METHOD _3 1/4 in H.S.A		TIME OF	DRIL	LING _7.00) ft / El	ev 893	3.69 ft				
LO	GGED BY CHECKED BY _DAS	A	END OF	DRILL	.ING							
NO	TES _Elev. at staked location.	AF	TER DRI	LLING								
	<u>ម</u>		ТҮРЕ ER	۲ %)	LE S	PEN.	г WT.	IRE Т (%)	AT	TERBE LIMITS	ERG } ≻	0
0 DEPT			SAMPLE	RECOVE (RQD	BLOV COUN (N VALI	POCKET (tsf)	DRY UNI (pcf)	MOISTUC	LIQUID	PLASTIC LIMIT	PLASTICIT INDEX	ENE E
-	POORLY GRADED SAND WITH SILT, (SP-SM) brov fine to medium grained, moist, trace clay (Fill)	wn, 898 7	SS 1	44	3 - 3-2 (5)							
	SILTY SAND, (SM) dark gray, fine grained, moist, tra gravel, trace organics (Fill)	ice	SS 2	67	4 - 4-3 (7)	-						
	4.5 LEAN CLAY WITH SAND, (CL) gray, moist to wet, medium, trace fine to coarse gravel	896.2	SS 3	56	3 - 4-4 (8)							
	7.0 LEAN CLAY WITH SAND, (CL) brown, wet, rather st trace fine to medium gravel	893.7 iff,	ss (78	4-5-5							
			4	-	(10)	-						
	12.0	888.7	SH 5	-								
	LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff medium, trace fine to medium gravel	to		44	3-5-4 (9)	-						
15 			SS 7	100	4-3-3 (6)							
			SS 8	100	3 - 3-4 (7)	_						
- 20			ss ss	89	2 - 3-5	-						
	Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	879.7			(0)	I	<u> </u>	I	<u> </u>	I	<u> </u>	I
וו הפרט הכאר אסר מווואים - פאני אום מסיבים אוויון אינו פאר אסר אין אינו איני איני איני איני איני איני איני												

			North 6160 Inver Telep	nern Technologies, Carmen Avenue B Grove Heights, M phone: 651-389-4	Inc. East N 55076 191					BO	RIN	g n	UM	BEI	R N page	R-1 ′ ≞ 1 0	14 F 1
	CLIE	NT _Ca	arl Bola	ander and Sons, C	0.		PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	ment	Site (TCAAF	<u>)</u>	
	PRO		IUMBE	R 15.60936.100			PROJEC	T LOCA		Arden Hills	s, MN						
	DATE	STAR	RTED _	5/19/15		5/19/15	GROUN) ELEVA	TION _	921.66 ft			HOL	_E SIZ	E <u>"6</u>	<u>1/2" in</u>	iches
	DRIL	Ling C	ONTR	ACTOR NTI			GROUN	WATEF	R LEVE	LS:							
	DRIL	LING N	IETHO	D 3 1/4 in H.S.A			AT	TIME O	- DRILI	L ING N	lo grou	undwa	ter ob	served	1		
	LOGO	GED B	Y		CHECKED BY	DAS	AT	END OF	DRILL	.ING							
	NOTE	ES Ele	ev. at s	taked location.			AF	TER DR	LLING								
	o DEPTH (ft)	GRAPHIC LOG		M	ATERIAL DESCI	RIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
_			0.8	TOPSOIL (10 in CLAYEY SAND,	ches) (SC) brown, fine	e to medium grained,	920.8	SS 1	78	3-3-3 (6)							
CES CORRIDOR GP			4.0	dry (Fill)			917.7	ss 2	100	7 - 9-12 (21)	-						
IATURAL RESOUR				LEAN CLAY WI medium, trace fi	TH SAND, (CL) I ne to medium gr	ight brown, dry, avel		ss 3	78	2-3-4 (7)	-						
PORTS/GINT/NR N			7.0	SANDY LEAN C rather stiff, trace staining	LAY, (CL) browr fine to medium	n, moist, medium to gravel, iron oxide	914.7	ss 4	89	2-3-5 (8)	-						
SIENGINEERING RE								ss 5	100	2-3-5 (8)	-						
6.100)/ENGINEERIN								SH 6	-								
3EO (15.6093	_ 15							SS 7	100	3 - 5-7 (12)							
SDEN HILLS - 0								∑ ss	100	2-4-7							
ROJECT AF			19.5				902.2	/ 8		(11)	-						
CTS/TCAAF F	20		21.0	SANDY LEAN C stiff, trace fine to	LAY, (CL) gray l medium gravel	prown, moist, rather	900.7	SS 9	100	3 - 5-9 (14)							
S/2015 PROJEC				Boreho Bott	le backfilled with om of borehole a	auger cuttings. at 21.0 feet.											
H:/1 PROJECT																	
DT - 1/25/16 14:26																	
5 LAB MAY 2012.G																	
VS - GINT STD US																	
NTI GEOTECH COLUM																	

		Nortl 6160 Inver Tele	hern Technologies,) Carmen Avenue E r Grove Heights, MN phone: 651-389-41	Inc. ast \ 55076 91				BO	RIN	G N	UM	BE	R N Page	R-1 ′ ≞ 1 0	15 F 1
	CLIE	NT Carl Bola	ander and Sons. Co		PROJEC		Ram	sev County	/ Re-D	evelor	oment	Site (TCAAI	5)	
	PRO.	JECT NUMBE	ER 15.60936.100	•				Arden Hills	. MN					_/	
	DATE	E STARTED	5/19/15	COMPLETED 5/19/15	GROUN) ELEVA		912.97 ft	,		но	_E SIZ	E "6	1/2" in	ches
	DRIL		ACTOR NTI		GROUN			LS:			-				
	DRIL	LING METHO	D 3 1/4 in H.S.A		- A1		DRILI	_ING N	lo arou	undwa	ter ob	served	1.		
	LOG	GED BY		CHECKED BY DAS	- A1	END OF	DRILL	ING	0						
	NOT	ES Elev. at s	staked location.		AF	TER DRI	LLING								
	O DEPTH (ft)	GRAPHIC LOG	MA	TERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
_			TOPSOIL (3 inch POORLY GRADI	es) ED SAND, (SP) brown, fine to med	<u>912.7</u> ium	SS 1	56	1 -2- 3 (5)							
CES CORRIDOR GP.	_ ·	3.0	grained, moist (Fill) POORLY GRADI fine to medium g	ED SAND WITH SILT, (SP-SM) bro rained, moist, trace gravel	911.0 910.0 910.0	ss 2	78	7 - 4-4 (8)	-						
NATURAL RESOUR	_ 5		LEAN CLAY WIT to rather stiff, trac	H SAND, (CL) brown, moist, mediu e gravel	um	ss 3	89	3 - 4 - 5 (9)	-						
REPORTS/GINT/NR-	- ·	9.5			903.5	SH 4	-								
RING/ENGINEERING			LEAN CLAY WIT trace gravel	H SAND, (CL) gray, moist, rather s	stiff,	SS 5	89	3 - 4-5 (9)	-						
936.100)/ENGINEEF			NOTE: Sand sea	m (SP) at 12.5 feet.		SS 6	100	3 - 5-7 (12)	-						
HLLS - GEO - (15.60	 					SS 7	100	3 - 5-7 (12)	-						
PROJECT ARDEN F						SS 8	100	3 - 5-7 (12)							
CTS/TCAAP I	_ 20	21.0			892.0	SS 9	100	4-6-9 (15)							
T GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:26 - HAT-PROJECTS/2015 PRO.			Botto	m of borehole at 21.0 feet.											

CLIENT Carl Bolander and Sons, Co. PROJECT NAME Ramsey County Ref PROJECT NUMBER 15.60936.100 PROJECT LOCATION Arden Hills, M DATE STARTED 5/19/15 COMPLETED 5/19/15 GROUND ELEVATION 911.44 ft DRILLING CONTRACTOR NTI GROUND WATER LEVELS: AT TIME OF DRILLING No g DRILLING METHOD 3 1/4 in H.S.A AT TIME OF DRILLING No g LOGGED BY CHECKED BY DAS AT END OF DRILLING Mog NOTES Elev. at staked location. MATERIAL DESCRIPTION Material Description Material Description Material Description Material Description Material Description Material Description 0 0.1 TOPSOIL (1 Inch) 911.4 SS 78 2-2-2 LEAN CLAY WITH SAND, (CL) brown, moist, soft, trace 909.4 SS 1 72-2-2 1 LEAN CLAY WITH SAND, (CL) moist medium trace 909.4 SS 1 3-2-3	e-Development Site (TCAAP) IN HOLE SIZE6 1/2" inches groundwater observed.
PROJECT NUMBER _ 15.60936.100 PROJECT LOCATION _ Arden Hills, M DATE STARTED _5/19/15 COMPLETED _5/19/15 GROUND ELEVATION _911.44 ft DRILLING CONTRACTOR _NTI GROUND WATER LEVELS: DRILLING METHOD _3 1/4 in H.S.A AT TIME OF DRILLING No gt LOGGED BY CHECKED BY _DAS AT END OF DRILLING MO gt NOTES _Elev. at staked location. AFTER DRILLING MO gt H_U_U_U_U_U_U_U_U_U_U_U_U_U_U_U_U_U_U_U	HOLE SIZE inches
DATE STARTED _5/19/15 COMPLETED _5/19/15 GROUND ELEVATION _911.44 ft DRILLING CONTRACTOR _NTI GROUND WATER LEVELS: DRILLING METHOD _3 1/4 in H.S.A AT TIME OF DRILLING No gt LOGGED BY CHECKED BY _DAS AT END OF DRILLING NOTES _Elev. at staked location. AFTER DRILLING H (£) SO OD	HOLE SIZE <u>"6 1/2" inches</u> groundwater observed.
DRILLING CONTRACTOR NTI GROUND WATER LEVELS: DRILLING METHOD _3 1/4 in H.S.A AT TIME OF DRILLING No c LOGGED BY CHECKED BY _DAS AT END OF DRILLING NOTES _Elev. at staked location. AFTER DRILLING H_(±) OHAVY 0 0 0.1 TOPSOIL (1 Inch) 1 CLAY WITH SAND, (CL) brown, moist, soft, trace 2.0 gravel, sand lense 0 LEAN CLAY WITH SAND, (CL) moist medium trace	Groundwater observed.
DRILLING METHOD _3 1/4 in H.S.A AT TIME OF DRILLING No generation and the second sec	ATTERBERG
LOGGED BY CHECKED BY _DAS AT END OF DRILLING NOTES _Elev. at staked location. AFTER DRILLING H_(1) OHADY AFTER DRILLING H_(1) OHADY MATERIAL DESCRIPTION AFTER DRILLING 0 0.1 TOPSOIL (1 Inch) 911.4 SS 78 2-2-2 0 0.1 TOPSOIL (1 Inch) 909.4 909.4 909.4 32-3	
NOTES Elev. at staked location. AFTER DRILLING H U <	ATTERBERG
H U	ATTERBERG LIMITS
H H	
H H	
Image: Solution Image: Solution <td< th=""><td></td></td<>	
0 0	
0 0	
LEAN CLAY WITH SAND, (CL) brown, moist, soft, trace 2.0 gravel, sand lense LEAN CLAY WITH SAND, (CL) moist, medium, trace SS, 127 SS,	
1 2.0 gravel, sand lense 909.4 2 1 EAN CLAY WITH SAND (CL) moist medium trace SS	
$\frac{1}{2}$ gravel $\left \begin{array}{c} 2 \\ 3 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5 \\ 5$	
$\frac{5}{2}$ SS 89 2-2-3	
LEAN CLAY WITH SAND, (CL) moist, rather stiff to SS 33 3-5-7	
$\frac{1}{2}$ stiff, trace gravel 5 33 (12)	
$\begin{bmatrix} 1 \\ 2 \\ 2 \\ - \end{bmatrix}$ $\begin{bmatrix} SS \\ 6 \\ 33 \\ (18) \\ (18) \end{bmatrix}$	
LEAN CLAY WITH SAND, (CL) moist, rather stiff, trace SS 100 3-5-7	
gravel (12)	
$\begin{bmatrix} 38\\ 8 \end{bmatrix} 100 \begin{bmatrix} 4-6-8\\ (14) \end{bmatrix}$	
SS 100 3-5-7	
Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.	
MAY 22	

CLIEN														
ULIEN		orl Dolor	nder and Sono. Co			Dom	aav Caunt		ovolor	mont	Cito (،	
	п <u>с</u>	ari Bolar	nder and Sons, Co.						evelop	oment	Sile (ICAAF	-)	
PRUJ								, IVIIN			E 017	F "0	4 /0!! :	
DATE	STAF		COMPLETED <u>5/19/15</u>	GROUN			<u>908.79 m</u>			HUL	.E 512	E <u>"0</u>	1/2° Ir	icnes
DRILL	ING C	ONTRA) WATER	LEVE	LS:				_			
DRILL	ING N	NETHOD	D <u>3 1/4 in H.S.A</u>	-¥- A 1			_ ING _12.0	00 ft / E	Elev 89	96.79	ft			
LOGG	ED B	Υ	CHECKED BY DAS	A	END OF	DRILL	ING							
NOTE	S _El	ev. at st	aked location.	AF	TER DR									
o DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
		2.0	POORLY GRADED SAND, (SP) brown, fine to mediu grained, moist, trace gravel (Fill)	m 906.8	ss s	56	2-3-3 (6)	-						
			SILTY SAND, (SM) brown, fine grained, moist, mediu dense, trace gravel	m	SS 2	67	3 - 6-6 (12)	-						
5		4.5	SILTY LEAN CLAY, (CL-ML) tan and gray, moist, rath stiff, trace gravel	904.3 Ner	SS 3	83	4 - 7-6 (13)							
		7.0	LEAN CLAY WITH SAND, (CL) brown, moist to wet,	901.8	∬ ss	100	4-6-6							
 10					4		(12)							
		12.0 \(\neq \)		896.8	SH 5	-								
			SILTY SAND, (SM) gray, fine grained, saturated, medium dense		SS 6	100	3 -5- 6 (11)	-						
15		14.5	CLAYEY SAND, (SC) gray, fine to medium grained, saturated, loose	894.3	SS 7	0	3 - 3-4 (7)	-						
			cuttings.		SH	-								
 20		19.5	LEAN CLAY WITH SAND (CL) dark gray, wat rather	889.3	8	-	E 4 6							
		21.0	stiff, trace gravel	887.8	9	100	(10)							
			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											
	HLGU 0 	HLdo O OHdrago		Head O MATERIAL DESCRIPTION 0 POORLY GRADED SAND, (SP) brown, fine to mediu grained, moist, trace gravel 2.0 (Fill) 3 SILTY SAND, (SM) brown, fine grained, moist, mediu dense, trace gravel 5 SILTY LEAN CLAY, (CL-ML) tan and gray, moist, rath stiff, trace gravel 7.0 LEAN CLAY WITH SAND, (CL) brown, moist to wet, rather stiff 10 12.0 ♥ 11 SILTY SAND, (SM) gray, fine grained, saturated, medium dense 12 ♥ 14.5 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, loose 15 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, loose 15 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff, trace gravel 20 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff, trace gravel 19.5 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff, trace gravel 20 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff, trace gravel 21.0 Stiff, trace gravel 21.0 Stiff, trace gravel	Hard Best Pool MATERIAL DESCRIPTION 0 POORLY GRADED SAND. (SP) brown, fine to medium grained, moist, trace gravel 2.0 (Fill) 906.8 2.0 (Fill) 906.8 5 SILTY SAND, (SM) brown, fine grained, moist, medium dense, trace gravel 904.3 5 SILTY LEAN CLAY, (CL-ML) tan and gray, moist, rather stiff, trace gravel 904.3 7.0 901.8 901.8 10 LEAN CLAY WITH SAND, (CL) brown, moist to wel, rather stiff 906.8 10 SILTY SAND, (SM) gray, fine grained, saturated, medium dense 894.3 11 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, medium dense 894.3 15 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, medium dense 894.3 15 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, medium dense 894.3 16 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff, trace gravel 897.8 20 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff, trace gravel 887.8 20 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather store gravel 887.8 20 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather store gravel 887.8 21.0	Handbare MATERIAL DESCRIPTION Handbare 0 POORLY GRADED SAND, (SP) brown, fine to medium grained, moist, trace gravel 906,8 2.0 (Fill) 906,8 5 4.5 904,3 5 4.5 904,3 6 4.5 904,3 7,0 901,8 7,0 12.0 7,0 12.0 7,0 12.0 7,0 12.0 9 12.0 <th>Hard B Material Description Hard B State 0 POORLY GRADED SAND, (SP) brown, fine to medium grained, moist, trace gravel 906.8 SS 56 2.0 (Fill) 906.8 SS 56 5 SILTY SAND, (SM) brown, fine grained, moist, medium dense, trace gravel 904.3 SS 57 4.5 904.3 SS 53 83 7.0 901.8 SS 100 10 Item CLAY WITH SAND, (CL) brown, moist to wet, rather stiff. SS 100 11 SLTY SAND, (SM) gray, fine grained, saturated, medium dense SS 100 12.0 SLTY SAND, (SC) gray, fine to medium grained, saturated, medium dense SS 100 14.5 Survey SAND, (SC) gray, fine to medium grained, saturated, medium dense SS 100 14.5 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff. SS 100 15.5 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff. SS 100 15.5 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff. SS 100 16.5 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff. SS 100</th> <th>Hard Bill Hard Bill</th> <th>Hard Bar MATERIAL DESCRIPTION Hard Bar Status Status</th> <th>Hard B MATERIAL DESCRIPTION Hard B SS GO ON ON</th> <th>Hard Bar MATERIAL DESCRIPTION MATERIAL DE</th> <th>Hard O MATERIAL DESCRIPTION Hard O State of the second seco</th> <th>Hard B MATERIAL DESCRIPTION Status <thstatus< th=""> Status <ths< th=""><th>Hard Matterial Description Matterial Structure Structure Structure Matterial Structur</th></ths<></thstatus<></th>	Hard B Material Description Hard B State 0 POORLY GRADED SAND, (SP) brown, fine to medium grained, moist, trace gravel 906.8 SS 56 2.0 (Fill) 906.8 SS 56 5 SILTY SAND, (SM) brown, fine grained, moist, medium dense, trace gravel 904.3 SS 57 4.5 904.3 SS 53 83 7.0 901.8 SS 100 10 Item CLAY WITH SAND, (CL) brown, moist to wet, rather stiff. SS 100 11 SLTY SAND, (SM) gray, fine grained, saturated, medium dense SS 100 12.0 SLTY SAND, (SC) gray, fine to medium grained, saturated, medium dense SS 100 14.5 Survey SAND, (SC) gray, fine to medium grained, saturated, medium dense SS 100 14.5 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff. SS 100 15.5 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff. SS 100 15.5 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff. SS 100 16.5 LEAN CLAY WITH SAND, (CL) dark gray, wet, rather stiff. SS 100	Hard Bill Hard Bill	Hard Bar MATERIAL DESCRIPTION Hard Bar Status Status	Hard B MATERIAL DESCRIPTION Hard B SS GO ON	Hard Bar MATERIAL DESCRIPTION MATERIAL DE	Hard O MATERIAL DESCRIPTION Hard O State of the second seco	Hard B MATERIAL DESCRIPTION Status Status <thstatus< th=""> Status <ths< th=""><th>Hard Matterial Description Matterial Structure Structure Structure Matterial Structur</th></ths<></thstatus<>	Hard Matterial Description Matterial Structure Structure Structure Matterial Structur

		Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	G N	UM	BE	R N I page	R-1 ′ ∃ 1 0	18 F 1
CLIE	NT C	arl Bolander and Sons, Co.	PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (ГСААҒ	>)	
PRO	JECT	NUMBER 15.60936.100	PROJEC			Arden Hills	s, MN			•			
DAT	E STA	COMPLETED 5/28/15	GROUNE) ELEVA		0 ft	,		но	LE SIZ	E "6	1/2" in	ches
DRIL	LING	CONTRACTOR NTI	GROUNI	WATER		LS:			-				
DRII		METHOD 3 1/4 in H S A	Σat			ING 2.00) ft / F	ev -2	00 ft				
	GFD B	Y CHECKED BY DAS	АТ		DRILL	ING	, it, <u> </u>		00.11				
NOT	ES FI	ev not provided	AF										
		pring not staked. Estimated location from drawing.	74					1			FERBE	RG	
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
	<u>×1 /y</u> <u>×</u>	0.8 TOPSOIL (10 inches)	-0.8	🛛 ss	67	1-1-1							
-	7	SILTY SAND, (SM) brown, fine to medium grained,	- 2.0	/ 1		(2)	-						
		PEAT, (Pt) black and dark gray, saturated, soft		SS 2	78	2 -2- 2 (4)							
5	- <u>***</u> -	4.6 SILTY SAND, (SM) brown, fine grained, saturated, medium dense, trace fine to medium gravel	-4.6	SS 3	67	2 -6- 5 (11)							
		7.0 CLAYEY SAND, (SC) dark gray, fine grained, saturat medium dense, trace fine gravel, trace roots	<u>-7.0</u> ed,	ss 4	28	6 -7- 5 (12)	-						
		9.5 LEAN CLAY WITH SAND, (CL) brown and gray, wet, rather stiff, trace gravel	-9.5	SS 5	100	4 - 6-7 (13)	-						
				SS 6	100	3 - 5-5 (10)	-						
15			17.0	SH 7									
	-	SILTY LEAN CLAY, (CL-ML) gray, wet, rather stiff, trace fine gravel	-17.0	SS 8	100	4 - 4 - 5 (9)	-						
20		LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff,	- 19.5	🛛 ss	100	4-5-7	-						
		Borehole backfilled with auger cuttings.	-21.0	V		(12)							
נו ספרו וברו הטרמווואים ישורו או היום וסיבום ואיז למודימתו ו וובמו הואלמי ביוויד אטובר ואמלו איז		bottom of borehole at 21.0 feet.											

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R N Page	R-1 ≞ 1 0	19 F 1
	CLIEN	NT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAA	>)	
1	PROJ		IUMBER 15.60936.100	PROJEC	T LOCA		Arden Hills	s, MN						
1	DATE	STAR	COMPLETED _ 6/23/15	GROUNE) ELEVA		0 ft			HOI	LE SIZ	E <u>"6</u>	1/2" ir	<u>iches</u>
1	DRILL	LING C	ONTRACTOR NTI	GROUND	WATER	LEVE	LS:							
1	DRILL	LING N	IETHOD _3 1/4 in H.S.A	$ar{ abla}$ at	TIME OF	DRIL	LING _2.60) ft / El	ev -2.	60 ft				
ŀ	LOGO	GED B	Y BH CHECKED BY DAS	AT	END OF	DRILL	.ING							
1	NOTE	ES Ele	ev. not provided.	AF	ter dri	LLING								
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
GPJ	-		0.3 TOPSOIL (4 Inches) CLAYEY SAND, (SC) brown to dark brown, fine 2.0 grained, moist, very loose, trace gravel, trace organics	<u>-0.3</u>	ss s	33	0-1-2 (3)	_						
URCES CORRIDOR.	-		↓ iron oxide staining, trace roots NOTE: Weight of Hammer at Sample No. 1. POORLY GRADED SAND WITH SILT, (SP-SM) light brown, fine to medium grained. saturated. medium		ss 2	100	3 - 5-5 (10)							
NATURAL RESOL	5_		dense, trace gravel, iron oxide staining	7.0	SS 3	100	4 - 6-6 (12)							
	-		SANDY LEAN CLAY, (CL) gray, wet, medium, trace gravel	7.0	ss 4	100	3 - 3-4 (7)							
					SH 5									
1 I I I	-				SS 6	100	1-3-3 (6)	1.0	-					
LS - GEO - (15.60936	15				SS 7	100	1-3-3 (6)	-						
ROJECT ARDEN HIL	-				SS 8	100	1 - 3-3 (6)	0.8	-					
	20		21.5	-21.5	SS 9	100	1-3-3 (6)	_						
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012/GDT - 1/25/16 14:26 - H:/I-PROJECTS/2015 P			Bottom of borehole at 21.5 feet.											

(North 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, MN hone: 651-389-41	Inc. ast \ 55076 91					BO	RIN	g n	UM	BEI	R N Page	R-1 2	20 F 1
CLIE	ENT Carl Bola	nder and Sons, Co		PRO	JEC		Ram	sey County	y Re - D	evelop	oment	Site (TCAAF)	
PRO		R _15.60936.100		PRO	JEC			Arden Hills	s, MN						
DAT	E STARTED	5/21/15	COMPLETED 5/21/15	GRO	UND	ELEVA		885.05 ft			но	E SIZ	Έ "6	1/2" in	ches
DRIL	_LING CONTR/	ACTOR NTI		GRO	UND	WATER		LS:			-				
DRIL	LING METHO	D 3 1/4 in H.S.A			AT		- DRILI	_ ING N	No grou	undwa	ter ob	served	1.		
LOG	GED BY		CHECKED BY DAS		АТ	END OF	DRILL	ING	9						
NOT	ES Elev. at s	taked location.			AF1	ER DRI	LLING								
						Ш	%		z	F	(%	AT1	LIMITS	RG	
O DEPTH	GRAPHIC LOG	MA	TERIAL DESCRIPTION			SAMPLE TY NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE	POCKET PE (tsf)	DRY UNIT V (pcf)	MOISTURE CONTENT (LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES
-	-	POORLY GRADE grained, dry (Fill)	ED SAND, (SP) brown, fine to me	edium 8	83.6	SS 1	56	4 - 4-3 (7)							
	4.0	SILTY SAND, (SI (Fill)	M) brown, fine grained, moist		81.1	SS 2	44	6 - 8-8 (16)	-						
		SILTY SAND, (SI dense, little grave	M) gray, fine grained, moist, mec l	ium		SS 3	78	4 - 6-4 (10)	-						
	7.0	CLAYEY SAND, moist, medium de	(SC) gray, fine to medium graine	8 [.] d,	<u>78.1</u>	SS 4	78	4 - 4-5 (9)	_						
L	1/195			8.	75.6	<u> </u>		(-)	1						
		LEAN CLAY WIT medium, trace gr	H SAND, (CL) gray, moist, soft t avel	0	/ 3.0	SS 5	78	3 - 3-2 (5)	-						
	-				4	SS 6	100	2-3-2 (5)	_						
15 15						SS 7	100	2-1-3 (4)	_						
T ARDEN HILLS -							100	3 - 3-4 (7)	_						
						x ss	100	2 - 2-3							
PROJECTS	<u>k/////</u> 21.0	Borehole	e backfilled with auger cuttings.	8	64.1/	/ J 9		(3)	1						
uti geotech columns - gint sto us lae may zorzaot - 1/2/16 (4.26 - H/1+PROJECTS/2015															

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	G N	UM	BE	R N Page	R-1 ∄ ≣ 1 0	21 F 1		
	CLIEN	NT _Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	<u>/ Re-</u> D	evelop	<u>omen</u> t	Site (TCAAF)			
	PROJ		IUMBER _15.60936.100	PROJEC			Arden Hills	s, MN								
	DATE	STAR	COMPLETED 5/21/15	GROUN) ELEVA	TION	884.12 ft			HO	LE SIZ	E "6	1/2" in	ches		
	DRILL	ING C	CONTRACTOR NTI	GROUN			LS:			_						
	DRILL		IETHOD 3 1/4 in H.S.A	$\overline{\mathbb{Y}}$ at	TIME OF	DRILL	_ING 7.00) ft / El	lev 87 [.]	7.12 ft						
	LOGO	ED B	Y CHECKED BY DAS	AT	END OF	DRILL	ING									
	NOTE	S_El	ev. at staked location.	AF	TER DRI	LLING										
ł			(\$ 26 ft NE		R PE	۲ %		EN.	NT.	۲E (%)	AT		ERG			
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TY	RECOVER' (RQD)	BLOW COUNTS (N VALUE	POCKET P (tsf)	DRY UNIT ((pcf)	MOISTUR CONTENT	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES		
GPJ			POORLY GRADED SAND, (SP) brown, fine to medium 1.5 grained, moist, trace gravel (Fill)	n <u>882.6</u>	ss s	44	3 -2- 1 (3)									
ES CORRIDOR			SILTY SAND, (SM) gray, fine grained, moist (Fill) NOTE: Clay (CL) seam at 2.0 feet.		ss 2	67	2-2-2 (4)									
IURAL RESOURC	5		SILTY SAND, (SM) gray, fine grained, moist to saturated, medium dense to loose, trace gravel		SS 3	56	3-6-7 (13)	-								
IS/GINT/NR-NA1				876.1	ss 4	56	2-2-3 (5)									
RING REPORT	10		medium, trace gravel		√ ss	67	2-2-3									
RING/ENGINEE					5	07	(5)	-								
36.100)/ENGINEE					$\bigwedge $ ss $_{6}$	100	3-3-3 (6)	-								
- GEO - (15.6090	15				SS 7	89	2 - 3-5 (8)									
CT ARDEN HILLS					SS 8	100	3-3-4 (7)									
SITCAAP PROJE	20				сц	_										
COLECT			22.0	862 1	9											
(2015 PF		<u> </u>	Borehole backfilled with auger cuttings.	002.1		<u> </u>			1	<u>I</u>	1	<u>I</u>				
DJECTS			Bottom of borehole at 22.0 feet.													
H:/1 PR(
14:26																
1/25/16																
12.GDT																
MAY 20																
US LAB																
NT STD																
INS - G																
COLUN																
OTECH																
NTI GE																
		North 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, M hone: 651-389-41	Inc. ast N 55076 91					BOI	RIN	g n	UM	BEI	R N page	R-1 / ± 1 0	22 F 1
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		orl Bolo	index and Sana C		זס			Dom	aav Count		ovolor	mont	Cito /		ר)	
	NI <u>C</u>	ari Bola).	Pi				Ardon Hills		evelop	oment	Site (I CAAF	<u></u>	
			R <u>15.00930.100</u>		PI					5, IVIIN			E 917	E "6	1/2" in	
					Gr				<u>000.04 II</u>				-E 312	E _ 0	1/2 11	icnes
					Gi					-0 # / 1	-10-	74 54	c 1			
			D <u>3 1/4 In H.S.A</u>			-≚ AI			LING <u>14.</u>		Liev 8	/1.54	π			
LUG		T							ING							
	=ə <u>_</u>	ev. at s	laked location.							1	1	1				
 E	UHC HC						TYPE	ERY % D)	UE) UE	PEN.	IT WT.	URE JT (%)				្ល
DEP'	GRAP		MA	TERIAL DESCRIPTION			SAMPLE NUME	RECOVE (RQ	BLO COUN (N VAL	POCKET (tsf	DRY UN (pci	MOIST	LIQUID	PLASTI0 LIMIT	LASTICI	FINE
0	<u></u>		TOPSOIL (36 Ind	ches)			ss 1	28	3-1-3 (4)							
	- <u></u>								4.2.2	-						
		3.0	POORLY GRAD	ED SAND WITH SILT, (SP-SM) rained, moist, loose	brown,	883.0	2	22	(6)	-						
5	-	•					$\left \begin{array}{c} SS \\ 3 \end{array} \right $	22	3-2-3 (5)							
		7.0		M) block fine evolved mainture		879.0				-						
			loose, little organ	ics	ery	070 5	$\begin{pmatrix} ss \\ 4 \end{pmatrix}$	67	2-2-2 (4)							
10		9.5	PEAT, (Pt) black	, moist, soft		8/6.5	ss 5	78	1 - 2-1 (3)							
	<u></u>							_								
						871.5	SH 6									
	-		SILTY SAND, (S saturated, very k NOTE: Hydrocar	M) gray, fine to coarse grained, lose to loose bon odor by human perception a	at 15.0		SS 7	78	2-2-2 (4)	-						
		17.8	SILTY LEAN CL	AY, (CL-ML) gray, wet, medium,	trace	868.2		33	2-3-3 (6)							
20			gravel				∕ ss	78	3-3-3							
		121.0	NOTE: Sand (SF	P) seam at 20.0 feet.	/	865.0	/\9		(6)						<u> </u>	
נוסבט וברה כטבטוואסי פווויו זיון טיט שפוואין בונגטטן - וובוו וייבט היא אין אירטבט וסגטון דראי			Borenoi Botti	e backfilled with auger cuttings. om of borehole at 21.0 feet.												

	North 6160 Inver Telep	ern Technologies, Carmen Avenue E Grove Heights, MN hone: 651-389-41	Inc. ast I 55076 91					BOI	RIN	G N	UM	BEI	R N I Page	R-1 2 ≣ 1 0	23 F 1
CLIEN	NT Carl Bola	inder and Sons, Co		P	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	CAAF	P)	
PROJ		R <u>15.60936.100</u>		F	ROJEC			Arden Hills	, MN						
DATE	STARTED	5/21/15	COMPLETED 5/2	1/15 G		ELEVA		885.83 ft			HOL	_E SIZ	E "6	1/2" in	ches
		ACTOR NTI		G		WATER		LS:							
		D 3 1/4 in H.S.A			$\overline{\mathbf{V}}$ at	TIME OF	DRIL	L ING 8.50) ft / E l	ev 877	7.33 ft				
LOGG	SED BY		CHECKED BY DA	١S	AT	END OF	DRILL	ING							
NOTE	S Elev. at s	taked location.			AF	ter dri	LLING								
L I	으					TYPE ER	RY % ()	v ∪ES	PEN.	T WT.	JRE T (%)	AT1	ERBE	RG S	S
0 DEPT	GRAPI	MA	TERIAL DESCRIPTI	ON		SAMPLE NUMB	RECOVE (RQI	BLOV COUN (N VAL	POCKET (tsf)	DRY UNI (pcf	MOISTI	LIQUID	PLASTIC LIMIT	PLASTICI INDEX	FINE
	0.2_/\ 2.0	ASPHALT (2 Inch POORLY GRADE to coarse grained	ies) D SAND WITH SIL ⁻ , dry, some fine to co	Γ, (SP) brown, fine parse gravel	<u>/\885.7</u> / e 883.8	$\left \begin{array}{c} ss \\ 1 \end{array} \right $	56	1-3-1 (4)							
	3.5	(Fill) POORLY GRADE	D SAND WITH SIL	T, (SP-SM) light	<u> </u>	SS 2	56	10-12-13 (25)							
		(Fill) SILTY SAND, (SI moist to saturated	 A) light brown to gray I, dense to very loos 	y, fine grained, e]	SS 3	67	6-11-19 (30)	-						
	i I I I I I I I I I I I I I I I I I I I	7				SS 4	78	7 -9- 9 (18)	-						
						SS 5	89	2-1-1 (2)	-						
		SILTY SAND, (SI loose, trace peat	Л) dark gray, fine gra	ained, saturated,	873.8	SS 6	100	2 - 3 - 4 (7)	-						
15 						SS 7	89	2-3-3 (6)	-						
	- 17.2	SILTY LEAN CLA little fine to coarse	Y, (CL-ML) blue gra e gravel, trace sand	y, wet, medium,	868.6		89	2-3-4 (7)	-						
	20.5	SANDY LEAN CL	AY, (CL) gray, wet,	medium, trace fine	865.3 9 864.8	SS 9	89	2-3-2 (5)	-						
CULEC I SZUTB PROV	١	Borehole Borehole Botto	backfilled with auge m of borehole at 21.	er cuttings. 0 feet.	J										
25/16 14:26 - H:/1-1-															
MAY 2012/601 - 17.															
GIN I S ID US LAB															
GEOLECH COLUMNS.															
z															

			Northe 6160 (Inver (Teleph	ern Technologies, Carmen Avenue E Grove Heights, M none: 651-389-47	Inc. East N 55076 I91					BO	RIN	G N	UM	BE	R N Page	R-1 2 ≞ 1 0	24 F 1
	CLIEI	NT Ca	arl Bolar	nder and Sons. C	р.		PROJEC		Ram	sev Count	/ Re - D	evelor	oment	Site (TCAAF	>)	
	PRO.		UMBEF	R 15.60936.100			PROJEC	T LOCA	TION	Arden Hills	s, MN					_/	
	DATE		TED 5	5/20/15	COMPLETED	5/20/15	GROUNE) ELEVA		885.19 ft	,		но	_E SIZ	Έ "6	1/2" in	ches
	DRIL	L I NG C		CTOR NTI	-		GROUN) WATEF		LS:							
	DRIL	LING N	ETHOD) 3 1/4 in H.S.A			ZAT	TIME O	- DRIL	LING 8.50) ft / El	ev 876	5.69 ft				
	LOGO	GED B	(CHECKED B	/ DAS	AT	END OF	DRILL	ING							
	NOTE	ES Ele	ev. at sta	aked location.			AF	TER DR	LLING								
								ЪЕ С	% /		Z	۸T.	Е (%)	AT	LIMITS	RG	
	o DEPTH (ft)	GRAPHIC LOG		MA	ATERIAL DESCI	RIPTION		SAMPLE TY NUMBEF	RECOVER) (RQD)	BLOW COUNTS (N VALUE	POCKET PI (tsf)	DRY UNIT V (pcf)	MOISTUR CONTENT	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES
P.			1.5	SILTY SAND, (S (Fill)	M) brown, fine g	rained, moist	883.7	SS 1	56	3-3-4 (7)							
RCES CORRIDOR C				moist to saturate	d, dense to med	J gray, fine grained, lium dense		ss 2	89	4 - 8-10 (18)	-						
NATURAL RESOU								SS 3	56	8-11-10 (21)	-						
REPORTS/GINT/NR			Ā					SS 4	78	8-11-12 (23)	-						
JG/ENGINEERING I	<u> 10 </u>		11.0	LEAN CLAY WI	TH SAND, (CL)	gray, wet, medium to	874.2	SS 5	33	5 - 5-8 (13)							
86.100)/ENGINEERI				rather stiff, trace	gravel			SS 6	89	4 - 3-2 (5)	-						
LLS - GEO - (15.609)								SH 7	_								
JECT ARDEN HI								SS 8	78	3 - 3-4 (7)							
ECTS/TCAAP PRO	20		21.0	Develo	- h L Cille el itte	44:	864.2	SS 9	89	4 - 6-4 (10)	_						
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:26 - H:11-PrOJECT IS:2015 PROJ.				Both	om of borehole a	at 21.0 feet.											

		Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	G N	UM	BEI	R N page	R-1 2 ≞ 1 0	25 F 1
CLIE	NT _C	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF	<u>)</u>	
PRO		NUMBER _ 15.60936.100	PROJEC			Arden Hills	, MN						
DATE	STAF	Step 5/20/15 COMPLETED 5/20/15	GROUN) ELEVA		885.98 ft			HOI	E SIZ	E <u>"6</u>	<u>1/2" in</u>	iches
DRIL	L I NG (GROUN	WATER	LEVE	LS:							
DRIL	LING M	METHOD 3 1/4 in H.S.A	$ar{arphi}$ at	TIME OF	DRIL	LING)0 ft / E	Elev 8	74.98	ft			
LOG	GED B	Y CHECKED BY _DAS	АТ	END OF	DRILL	.ING							
NOTE	ES _EI	ev. at staked location.	AF	ter dri	LLING								
	U			YPE R	۲ %	sш	EN.	WT.	ЧЕ (%)	AT1	ERBE LIMITS	RG	
DEPTH (ft)	GRAPHI LOG	MATERIAL DESCRIPTION		SAMPLE T NUMBE	RECOVER (RQD)	BLOW COUNT (N VALU	POCKET F (tsf)	DRY UNIT (pcf)	MOISTUI	LIQUID	PLASTIC LIMIT	LASTICITY	FINES
,		POORLY GRADED SAND, (SP) brown, fine grained, dry, little gravel (Fill)		ss 1	33	6 - 5-4 (9)							
		3.5	882.5	ss 2	44	8-11-11 (22)							
5		SILTY SAND, (SM) brown, fine grained, moist, dense, trace gravel		∕∕ ss	07	8-13-12							
				3	07	(25)							
				$\left \begin{array}{c} ss \\ 4 \end{array} \right $	78	9-12-12 (24)	-						
10		9.5 SILTY SAND, (SM) dark gray to black, fine grained, 10.5 moist, loose, trace gravel, organic stain	876.5 	ss	89	3-2-3 (5)							
		PEAT, (Pt) black, saturated, medium				(0)							
		13.3 SILTY SAND, (SM) gray, fine grained, saturated,	872.7	6	89	(7)	-						
15				ss 7	78	4 - 4-4 (8)							
				ss 8	100	3 - 5-4 (9)	-						
20				√ ss	100	4-4-3	-						
		21.0 Borehole backfilled with auger cuttings	865.0	9	100	(7)							
		Bottom of borehole at 21.0 feet.											

	Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	G N	UM	BEI	R N page	R-1 2 ± 1 O	26 F 1
	CLIENT Carl Bolander and Sons Co	PROJEC		Ram	sev County	/ Re-D	evelor	ment	Site (ГСААР	2)	
	PROJECT NUMBER 15 60936 100				Arden Hills	: MN	evelop	ment				
					883 67 ft	, IVII N			E 917	E "6	1/2" in	chos
		GROUNI			:					L _ U	<u>1/2 III</u>	
					LO.	0 4 / 1	-	74 67	c 1			
		A					ziev o	/ 1.0/	11			
	LOGGED BY CHECKED BY	<u>.</u> AI			_ING							
		Ar		LLING		1	1					
			Н	%		z	Ŀ.				RG S	
			∑ H	D RY	STS S⊟U-		> ⊑⊊	1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1. 1		O	≿	ŝ
		ON	DNE	NO RO		(tst	N g	ISI TEL	In the second s	NIT (E	NI I
			MAR	SEC.	_oz	lõ	RY	ĭ₹Ğ	95		IZ AS	
											₫	
	POORLY GRADED SAND WITH SILT medium grained, moist, trace gravel	, (SP-SM) fine to		56	3-4-4 (8)							
איפרט	(Fill)	004.0			(0)	1						
אאוחר	SILTY SAND, (SM) brown, fine grained	d, moist, dense,		100	5-12-13 (25)							
CEO CL	trace gravel, clay (CL) lenses		<u> </u>		(20)	1						
ESUUR	<u>5</u>		∕∕ ss		8-14-15	1						
URAL H	前別別 		3	89	(29)							
NA-NA												
	8.0	875.7	SS A	78	6-8-12							
- LAIS	PEAT, (Pt) black, moist, rather stiff, tra	ace gravel	<u> </u>		(20)	-						
אואפ אנ												
			SH									
			5									
	<u><u><u></u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u>	870.7	SS SS	67	3-5-5							
	SILTY SAND, (SM) gray, fine grained,	saturated, loose			(10)	-						
0.5500.0					5-4-4	-						
			7	78	(8)							
RUEN F			S ss	67	10-15-12							
UEC I A			/ / 0		(27)	-						
	20		1 99		10-11-11	-						
- ISILCH	21.0	862.7	9	89	(22)							
עמיני	Borehole backfilled with auge Bottom of borehole at 21 (r cuttings.) feet.										
ONECT												
AT-INIT												
- 07:51												
01/07/1												
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o LAB IV												
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	Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	G N	UM	BE	R N Page	R-1 2 ≞ 1 0	27 F 1
	CLIENT Carl Bolander and Sons Co			Ram	sev County	/ Ro-D	ovelor	mont	Sito ("	τοδάι	2)	
					Ardon Hillo		evelop	Jillent	Sile (-)	
						, IVIIN			E 817		1/0" in	
	DATE STARTED <u>5/20/15</u> COMPLETED <u>5/20/15</u>	GROUNI			000.00 IL					.E <u>0</u>	1/2 111	icnes
							0.7					
		¥ A I			LING <u>8.00</u>)π/Ε	ev 87	<u>/.56 ft</u>				
		AI			.ING							
		AF		LLING			1	1	A.T.7			
	HL (II) MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
	0 0.3ASPHALT (3 Inches) POORLY GRADED SAND WITH SILT, (SP-SM) brow	<u></u>	SS SS 1	56	6 - 7-6 (13)							
CORRIDOR GPJ	XXX 2.0fine grained, dry, trace gravel (Fill) SILTY SAND, (SM) brown to gray, fine grained, moist		SS 2	67	8-11-12 (23)							
L RESOURCES	saturated, dense		SS 3	89	8-11-11							
NT/NR- NATUR/			M ss	70	7-10-12	-						
IG REPORTSVG		876.1	4	78	(22)	-						
NG/ENGINEER	SILTY SAND, (SN) dark gray, the grained, saturated, dense to loose, silt (ML) lenses		SS 5	78	6-8-9 (17)							
100)/ENGINEER			SS 6	67	4 - 3-2 (5)							
- GEO - (15.60936	15 SILTY SAND, (SM) black and gray, saturated, loose, trace to some organic materials	8/1.1	ss 7	89	7 - 3-2 (5)							
CT ARDEN HILLS			SH 8									
PROJEC	19.5	866.1		-								
UECTS/TCAAF	SILTY SAND, (SM) gray, fine grained, saturated, medium dense Borehole backfilled with auger cuttings.	864.6	SS 9	78	4 - 4-5 (9)							
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:26 - H:/1-PROJECTS/2015 PRO	Bottom of borehole at 21.0 feet.											

		Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	g n	UM	BEI	R N Page	R-1 / 1 0	28 F 1
CLIEI	NT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	ment	Site (ГСААР	P)	
PRO.		IUMBER _ 15.60936.100	PROJEC	T LOCA		Arden Hills	s, MN						
DATE		STED _ 5/20/15 COMPLETED _ 5/20/15	GROUN) ELEVA	TION _	912.47 ft			HOI	_E SIZ	E <u>"6</u>	1/2" in	ches
DRIL	Ling C		GROUN	WATER	LEVE	LS:							
DRIL	LING N	IETHOD _3 1/4 in H.S.A	$ar{ abla}$ at	TIME OF	DRILI	_ING _2.00) ft / El	ev 910	0.47 ft				
LOGO	GED B	Y CHECKED BY _DAS	AT	END OF	DRILL	ING							
NOTE	ES Ele	ev. at staked location.	AF	ter dri	LLING								
o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
	<u>7, 7, 1,</u> 7 <u>, 1, 7, 1,</u>	TOPSOIL (24 Inches) NOTE: Weight of Hammer at Sample No. 1.	910 5	SS 1	28	0 - 0-0 (0)							
		SANDY LEAN CLAY, (CL) light brown and gray, wet, medium, trace fine gravel, iron oxide staining	010.0	ss 2	78	2-2-3 (5)							
				SS 3	100	2-3-4 (7)	-						
RTS(GINT)NR-NA'				SS 4	100	3-3-5 (8)							
				SH 5	_								
		LEAN CLAY WITH SAND, (CL) gray, wet, medium to rather stiff, trace gravel	900.5	SS 6	100	3 - 3-5 (8)	-						
- <u>15</u>				ss 7	100	2 - 4-4 (8)	-						
					100	3 - 4-6 (10)							
				ss 9	100	3 - 4-4 (8)	-						
JECTS/2015 PRO.		23.5	889.0	SS 10	100	3-5-7 (12)							
TI GEOTECH COLUMNS - GNLT STD US LAB MAY 2012-01 - 1/2016 14-201-11-14-		Bottom of borehole at 23.5 feet.											

		No 61 Inv Te	orthern Technologies, Inc. 60 Carmen Avenue East ver Grove Heights, MN 55076 Ilephone: 651-389-4191				BO	RIN	G N	UM	BE	R N Page	R-1 ∄ ≣ 1 0	29 F 1
	CLIE	NT Carl B	olander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAA	^{>})	
	PROJ	JECT NUM	BER	PROJEC	T LOCA		Arden Hills	s, MN						
	DATE	STARTE	COMPLETED <u>5/20/15</u>	GROUNE	ELEVA	TION _	903.12 ft			HO	le siz	E <u>"6</u>	1/2" in	iches
	DRILI			GROUNE	WATER	R LEVE	LS:							
	DRILI	LING MET	HOD _3 1/4 in H.S.A	AT	TIME OF	- DRILI	_ING N	lo grou	undwa	ter ob	served	J.		
	LOGO	GED BY _	CHECKED BY DAS	AT	END OF	DRILL	ING							
	NOTE	Elev. a	at staked location.	AF	ter dri	LLING								
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
GPJ		$\frac{\frac{\sqrt{1}}{\sqrt{1}}}{\frac{\sqrt{1}}{\sqrt{1}}} \frac{\sqrt{1}}{\sqrt{1}}$	TOPSOIL (24 Inches) NOTE: Weight of Hammer at Sample No. 1. No	_901.1	ss s	0	0 - 0-0 (0)							
CES CORRIDOR			SANDY LEAN CLAY, (CL) gray, moist to wet, medium to rather stiff, trace gravel	/ 1	SH 2	58								
TURAL RESOUR					SS 3	94	2-3-4 (7)	-						
RTS/GINT/NR N/					SS 4	100	3 - 3-4 (7)	-						
GINEERING REPO	10				SS 5	94	2 - 4-4 (8)	_						
NGINEER NG/EN						100	2 - 5-5 (10)	_						
(15 60936 100)/E	15				X ss	100	4-4-6							
DEN HILLS - GEO					∕ / ss	100	4-5-7	-						
APROJECT ARE	 20				8	100	(12)							
TS/TCAP		21.0)	882.1	$\bigvee 9$	100	4-6-9 (15)							
I GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/25/16 14:26 - H:/1-PROJECTS/2015 PROJE			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

			Northern Technologies, 6160 Carmen Avenue E Inver Grove Heights, M Telephone: 651-389-47	Inc. East N 55076 I91				BO	RIN	g n	UM	BEI	R N page	R-1 ; □ 1 0	30 F 1
	CLIER	NT _C	arl Bolander and Sons, C	0.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	ment	Site (TCAAF)	
	PROJ	ECT N	IUMBER 15.60936.100			T LOCA	FION _	Arden Hills	, MN						
	DATE	STAF	STED <u>5/20/15</u>	COMPLETED <u>5/20/15</u>	GROUN) ELEVA	TION _	915.53 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	iches
	DRILI	ING C	ONTRACTOR NTI		GROUN) WATEF	R LEVE	LS:							
	DRILI		IETHOD <u>3 1/4 in H.S.A</u>		AT	TIME O	DRIL	LING N	lo grou	undwa	ter ob	served	1.		
	LOGO	SED B	Y	CHECKED BY DAS	AT	END OF	DRILL	.ING							
	NOTE		ev. at staked location. /S 10 ft W		AF	TER DR			1	1					
	o DEPTH (ft)	GRAPHIC LOG	M#	ATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				SEINES
GPJ			0.7 TOPSOIL (8 Incl LEAN CLAY WI moist, soft to rat	nes) FH SAND, (CL) light brown to brown, her stiff, trace gravel	914.8	ss 1	44	0 - 0-1 (1)	-						
CES CORRIDOR			NOTE: Weight o	f Hammer at Sample No. 1.		SS 2	67	2 - 3-4 (7)							
TURAL RESOUR	5					SS 3	100	3 - 3-5 (8)							
RTSVGINTNR- NA						SS 4	100	4 - 5-7 (12)							
NEERING REPOR	 10					SН	92								
NEER NG/ENG						5	100	3-5-7	-						
60936-100)/ENC	 15							(12)							
HLLS - GEO - (16			17.0		898.5	7	100	(13)	-						
OJECT ARDEN H			LEAN CLAY WI trace gravel	ΓΗ SAND, (CL) gray, moist, rather sti	ff,	ss 8	100	3 - 4-6 (10)	-						
ECTS/TCAAP PK	20		21.0 Borobal	o backfilled with ourgor outtings	894.5	SS 9	100	2-4-7 (11)							
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/25/16 14:26 - H:/1-PROJECTS/2015 PROJEC			Borehol Bott	e backfilled with auger cuttings. om of borehole at 21.0 feet.											

(Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BOI	RIN	G N	UM	BE	R N Page	R-1 ≞ 1 0	31 F 1
CL	ENT	Carl Bolander and Sons, Co.	_ PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAA	^{>})	
PR	OJEC ⁻	TNUMBER _ 15.60936.100	_ PROJEC	T LOCA		Arden Hills	s, MN						
DA	TE ST	ARTED _5/19/15 COMPLETED _5/19/15	GROUNE) ELEVA	TION _	906.2 ft			HOI	LE SIZ	E <u>"6</u>	1/2" ir	<u>nches</u>
DR	ILLING	G CONTRACTOR NTI	GROUNE	WATER	LEVE	LS:							
DR	ILLING	G METHOD 3 1/4 in H.S.A	AT	TIME OF	DRIL	LING N	lo grou	undwa	ter ob	served	ł.		
LO	GGED	BY CHECKED BY _DAS	AT	END OF	DRILL	.ING							
NO	TES _	Elev. at staked location.	AF	ter dri	LLING								
O DEPTH	(II) GRAPHIC			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
-		U.5 TOPSOIL (6 Inches) LEAN CLAY WITH SAND, (CL) brown, moist, soft to rather stiff, trace gravel	905.7	ss s	0	0-0-0 (0)							
IRCES CORRIDOR.		NOTE: Weight of Hammer at Sample No. 1. No recovery. Sampled auger cuttings.		SS 2	78	7 - 5-5 (10)	-						
-NATURAL RESOU				SS 3	89	5 - 6-6 (12)							
				SS 4	94	3 - 5-5 (10)							
		12.0	894.2	SH 5	-								
6-100)ENGINEER		LEAN CLAY WITH SAND, (CL) gray, moist, medium rather stiff, trace gravel	to	SS 6	83	2 - 4-5 (9)	-						
2- GEO - (12:0003				SS 7	89	2 -4- 4 (8)							
IECT ARDEN HILLS				SS 8	100	2 - 4-6 (10)	-						
		21.0	885.2	SS 9	100	2-5-7 (12)							
HI GEORCH COLUMNS - GNT STD US LAR MAY 2012-GDT - 1/2016 14:26 - HI14-ROJECTS2016 PRC		Bottom of borehole at 21.0 feet.											

	Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191			BO	RIN	G N	UM	BE	R N Page	R-1 ∶ ≞ 1 0	32 F 1
CLIE	NT Carl Bolander and Sons. Co.	PROJECT NAM	E Ram	isev County	/ Re - D	evelor	oment	Site (TCAA	>)	
PRO	JECT NUMBER 15.60936.100	PROJECT LOC	ATION	Arden Hills	. MN			0.10 (-/	
DATI	E STARTED 5/27/15 COMPLETED 5/27/15	GROUND ELEV		894.43 ft	<u>,</u>		но		E "6	1/2" in	ches
DRIL		GROUND WAT		ELS:							
		∇ at time			50 ft / F	Elev 8	81.93	ft			
	GED BY CHECKED BY DAS			ING	00 11 / 1		01.00				
NOT	ES Elev at staked location										
	O/S 20 ft NW							AT-	FRBF	RG	
o DEPTH (ft)	OHADO HADO BADA MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
-	Model TOPSOIL (10 inches) LEAN CLAY WITH SAND, (CL) gray, moist, soft to	893.6 St	^S 67	0-1-3 (4)							
	rather stiff, trace gravel		3 50	5-5-7	-						
	3.5 CLAYEY SAND, (SC) brown, fine to medium grained	890.9 2	56	(12)	-						
5 KAL KESON	moist, loose, trace gravel		⁵ 78	5 - 4-4 (8)							
			<u> </u>	3-3-3							
		4	- 44	(6)	-						
	12.0	SI 5	+								
	∇ CLAYEY SAND, (SC) gray, fine to medium grained, saturated, medium dense, trace gravel	880.9	8 89	4-6-7 (13)							
15	SILTY SAND, (SM) gray, fine grained, saturated, dei	nse,	S 56	8-9-11							
- CEO-		7		(20)							
OJECT ARDEN H			³ 56	7-9-11 (20)							
	21.0	873.4	^S 56	8-10-11 (21)							
5/2015 PKUJE	Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.										
M+ROJEC IS											
/16 14:26 - H:											
012.GDT - 1/2											
LAB MAY 20											
COLUMNS - C											
GEOLECH											
z											

			Northe 6160 Inver Telepl	ern Technolog Carmen Aven Grove Heights hone: 651-38	jies, Inc. ue East s, MN 55076 9 - 4191					BO	RIN	G N	UM	BE	R N Page	R-1 : ≞ 1 0	33 F 1
	CLIEF		arl Bola	nder and Song	s Co				Ram	sev County		ovolor	mont	Sito (τραδι	2)	
	PRO			R 15 60936 1	<u>, 00.</u>		PROJEC			Arden Hills	MN		mont		10/0/1	_/	
		STAR		5/22/15	COMPLI	TED 5/22/15	CROUN			997 9 ft	5, IVII N			E 917	'E "6	1/2" in	chos
							CROUN			<u></u>					L _ 0	1/2 111	
				$\frac{1}{2} \frac{1}{4} \frac{1}{1} \frac{1}$								a 00	1 00 #				
	DRIL			J <u>31/4 IN H.</u> 3			- <u>+</u> A			LING <u>0.00</u>		ev oo	1.60 11				
	LUGU	эсл в	T	akad lagation		DBI DAS	A			ING							
	NOTE	:> _EI	ev. at st	aked location.	•		Ar				1	1		AT-			
	DEPTH (ft)	GRAPHIC LOG			MATERIAL D	ESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
2			2.0	POORLY GF reddish brow medium gray	RADED SAND n, fine to medi	WITH GRAVEL, (SP) um grained, moist, fine to	995 0	SS 1	44	3-2-3 (5)							
S CORRIDOR 6			2.0	(Fill) SILTY SAND (Fill)), (SM) brown,	fine grained, moist			56	4 - 4 - 5 (9)							
KAL KESOURCE			4.5	SILTY SAND), (SM) gray an loose to mediu	d brown, fine grained, mois ım dense	883.3 st	SS 3	67	4 - 3-6 (9)	_						
SVGIN I VNH- NATU								SS 4	100	2-3-3 (6)	-						
KEPOK I			9.5				878.3			(0)	1						
STENGINEEKING	 			SILTY SAND loose), (SM) brown,	fine grained, saturated,		SS 5	78	2-3-2 (5)	-						
UNENGINEEKING			13.0	PEAT, (Pt) b	lack, moist, so	ft	874.8		56	3 -3- 4 (7)	_						
(15 60936 10	15	<u>v v</u> v <u>v</u> v v						∬ ss	89	3-2-2	_						
HILLS - GEU -		<u>v v</u> v <u>v</u> v v	-							(4)	-						
CUECT ARDEN		<u>v vv</u> <u>vv</u> v	19.5				868 3	SH 8									
CISHUAAF FF	20		21.0	SILTY SAND), (SM) gray, fir se	ne grained, saturated,	866.8	ss 9	100	4-4-5 (9)							
SIZUTO PRUJEV				Bore I	ehole backfilled Bottom of bore	d with auger cuttings. hole at 21.0 feet.											
H:/1-PROJECT																	
1/25/16 14:26																	
B MAY 2012 GD																	
SINT STUUS LA																	
H COLUMNS - G																	
NII GEOLEC																	

(North 6160 Inver Tele	hern Technologies,) Carmen Avenue E r Grove Heights, MN phone: 651-389-41	Inc. ast I 55076 91				BO	RIN	G N	UM	BE	R N Page	R-1 ∶ ≞ 1 0	34 F 1
CLI	ENT Carl Bol	ander and Sons, Co		PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAI	>)	
PRO	DJECT NUMBE	ER 15.60936.100					Arden Hills	s, MN						
DAT		6/23/15	COMPLETED 6/23/15	GROUNI) ELEVA		949.77 ft			но	LE SIZ	E <u>"6</u>	1/2" in	iches
DRI				GROUNI) WATEF	R LEVE	LS:							
DR	LLING METHO	D 3 1/4 in H.S.A		AT		- DRIL	LING							
LO	GED BY BH	_	CHECKED BY DAS	AT	END OF	DRILL	.ING							
NO	TES Elev. at s	staked location.		AF	TER DR	LLING								
o DEPTH	(III) GRAPHIC LOG	MA	TERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
		TOPSOIL (3 Inch	es) (SC) light brown to brown fine to		ss 1	22	0-2-3 (5)							
R.GPJ		medium grained,	moist, loose to medium dense, little				(0)							
DES CORRIDC	3.5	NOTE: Weight of	Hammer at Sample No. 1.	946.3	SS 2	89	4 - 6-7 (13)							
ATURAL RESOUR		CLAYEY SAND, coarse grained, n gravel, iron oxide	(SC) light brown to brown, fine to noist to dry, dense to very dense, litt staining	le	SS 3	56	6-14-12 (26)	-						
					SS 4	78	9-13-14 (27)							
					SS 5	67	14-14-14 (28)	-						
					SS 6	78	6-16-20 (36)	-						
15 					ss 7	89	8-16-20 (36)	-						
KOJECT ARDEN HIL	19.0	NOTE: Practical a	auger refusal at 19.0 feet due to	<u>930.8</u>	SS 8	83	8-19-19 (38)	-						
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14.26 - H/H-PROJECTS/2015 PROJECTS/ICAAP PR		coarse gravel. Borehole Botto	e backfilled with auger cuttings. m of borehole at 19.0 feet.											

		Northern Technologi 1408 Northland Dr. S Mendota Heights, M	es Inc. Ste 107 N, 55120				BO	RIN	G N	UM	IBE	R S PAGE	R-2 1 0	00 F 1
	NT <u>Carl</u>	Bolander and Sons	-4191 . <u>Co.</u>	_ PROJEC		Ram	sey County	y Re-D	evelop	oment	Site (FCAAF	<u>)</u>	
	JECT NU	MBER	00		T LOCA		Arden Hills	5, MN						
DATE	E STARTE	ED <u>6/30/15</u>	COMPLETED	_ GROUNI) ELEVA	TION _	925.18 ft			HO	LE SIZ	E <u>"6</u>	<u>1/2" in</u>	iches
≝ DRIL ≝	LING CO	NTRACTOR NTI) WATEF	LEVE	LS:							
	LING ME	THOD <u>3 1/4 in H.S</u>	A	_ ⊻AT	TIME OF		L ING <u>14.</u>	00 ft / E	Elev 9	11.18	ft			
5 LOG	GED BY	DAS	CHECKED BY DAS	_ AT	END OF	DRILL	.ING							
	ES Elev.	at staked location.	O/S 31 ft S	_ AF	TER DRI	LLING								
	U				ΥPE R	۲ %	s Û	EN.	WT.	ЗE (%)	AT1	ERBE	RG	
	GRAPHI LOG		MATERIAL DESCRIPTION		SAMPLE T NUMBE	RECOVER (RQD)	BLOW COUNT (N VALU	POCKET F (tsf)	DRY UNIT (pcf)	MOISTUI	LIQUID	PLASTIC LIMIT	PLASTICIT) INDEX	FINES
		3TOPSOIL (4 I SILTY SAND	nches) (SM) brown, fine grained, moist, loose	<u>924.9</u> ∋ to	ss s	33	2-3-2 (5)							
		very ioose, tra	ice graver		ss 2	56	3 - 3-3 (6)	-						
5 5					SS 3	33	2-2-1 (3)	-						
	7	.0		918.2										
AKU		SILTY LEAN	CLAY, (CL-ML) dark gray, moist, soft		∬ ss	78	0-1-2							
		NOTE: Weigh	t of Hammer at 7.0 feet.		/ 4		(3)	-						
10 10		5 PEAT, (Pt) bla	ack, moist to wet, soft	915.7	SH 5	-								
		NOTE: Sand	(SP) lenses at 12.0 feet.		SS 6	67	1-2-2 (4)							
	- <u>1/ 1/ 1/</u> - <u>1/ 1// 1/</u>	<u>×</u>			SS 7	44	1-2-2 (4)	-						
		7.5 POORLY GR grained, satur	ADED SAND, (SP) gray, fine to mediu ated. very loose	<u>907.7</u> m	ss 8	56	1-1-2 (3)							
			· · ·											
- 20 	<u>20</u> 21	0.0 POORLY GR 1.5 grained, satur	ADED SAND, (SP) gray, fine to mediu ated, very loose, trace gravel	905.2 m 903.7	SS 9	78	1 -2- 2 (4)							
		Bore B	nore backfilled with auger cuttings. ottom of borehole at 21.5 feet.											

ſ			Nort 1408 Men Tele	hern T 3 North dota F phone	Fechn hland Height e: 651	ologies Dr. Ste s, MN, -389-⁄	s Inc. e 107 55120 191										BO	RIN	G N	UM	IBE	R S Page	R-2 ≞ 1 0	01 0F 1
AD.GF	CLIEN		arl Bol	ander	and S	Sons, (Co.					PRO	OJEC.		Ram	isey	County	/ Re-C	evelo	oment	Site (TCAAF	>)	
E RC	PROJ		IUMBE	ER _1	5.609	36.100)					PRO	OJEC.			Ard	len Hills	s, MN						
SPIN	DATE	STAF	RTED	5/21/	15		_ co	MPLET	ED _5/	21/15		GRO	OUND	ELEVA		951	1.1 ft			но	LE SIZ	E <u>"6</u>	1/2" in	nches
T\SR	DRILL	ING C		RACTO	DR N	TI						GRO	OUND	WATE	R LEVE	ELS:								
s/GIN	DRILL	ING N	IETHO	DD 3	1/4 in	H.S.A	\						АТ		FDRIL	LIN	G N	No gro	undwa	ter ob	served	1.		
ORTS	LOGO	ED B	Y DA	.s			СН	ECKED	BY D	AS		-	AT	END OI	- DRILL	LING	3							
REP	NOTE	S_EI	ev. at s	stakec	d l ocat	tion.							AF	ER DR	ILLING	i	-							
VGINEERING/ENGINEERING	o DEPTH (ft)	GRAPHIC LOG				M	IATERI	AL DE:	SCRIPT	ΓΙΟΝ				SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW	COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
6.100)/EN	_		0 <u>.5</u> 1.5	TOI	PSOII TY S/	_ (6 In AND W	ches) /ITH GI	RAVEL	, (SM) I	brown, t	fine grair	ned,	950.6 949.6	SS 1	78	6	5 -8- 3 (11)							
3EO - (15.6093	-		3.0	(Fill PO fine (Fill	I) ORLY e to m I)	' GRAI edium	DED SA grained	ND W	ITH GR	RAVEL,	(SP) bro	wn,	<u>948.1</u>	ss 2	78	2	4 - 5-6 (11)							
N HILLS - G	5_			SAI	NDY I De gra	EAN (vel	CLAY, (CL) gr	ay, moi	st, med	lium to st	tiff,	ź	$\begin{pmatrix} ss \\ 3 \end{pmatrix}$	33	3	3 - 4-4 (8)	-						
OJECT ARDEN	-													SH 4	_									
TS/TCAAP PF	10												Z	SS 5	89	3	3 -4- 6 (10)							
15 PROJEC	_												ź	$\begin{pmatrix} ss \\ 6 \end{pmatrix}$	89	5	-7-11 (18)							
ROJECTS/20	15												s Z	SS 7	78	8-	-11-12 (23)							
AMSEY/1-PF	-												s Z	SS 8	72	7	-9-12 (21)	-						
09:34 - H:\R	20	¢	20.0 21.0	PO bro	ORLY wn, fir	GRAI	DED SA	ND W graine	ITH GR d, mois	RAVEL, t, dense	(SP) gra	iy to	931.1 930.1	SS 9	67	8-	10-13 (23)	_						
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5/15						Boreha Bol	ble back	filled v boreho	vith aug	jer cutti .0 feet.	ngs.													

ſ			Northern Techr 1408 Northland Mendota Heigh Telephone: 65	nologies Ind d Dr. Ste 10 nts, MN, 55 51-389-4191	5. 77 120 I					BO	RIN	G N	UM	IBE	R S Page	R-2 ∃ 1 0	02 F 1
AD.GF	CLIEN	NT Ca	arl Bolander and	Sons, Co.			PROJEC	T NAME	Ram	sey County	y Re - D	evelop	oment	Site (TCAAF	P)	
NE RC	PROJ		NUMBER _ 15.609	936.100			PROJEC			Arden Hills	s, MN						
s SPII	DATE		RTED _5/21/15		COMPLETED 5/21/15		GROUND	ELEVA	TION _	955.31 ft			НО	LE SIZ	E <u>"6</u>	1/2" in	iches
NT/SF	DRILL	LING C		NTI			GROUND	WATEF	R LEVE	LS:							
TS/G	DRILL	LING N	METHOD <u>3 1/4 i</u>	in H.S.A			AT	TIME OF	FDRIL	LING N	No grou	undwa	ter ob	servec	J.		
POR	LOGO	GED B	Y DAS		CHECKED BY DAS		AT	END OF	DRILL	.ING							
NG RI	NOTE	ES <u>El</u> e	ev. at staked loca	ation.			AF	ter dri	LLING			1					
VGINEERING/ENGINEERI	o DEPTH (ft)	GRAPHIC LOG		MATI	ERIAL DESCRIPTION			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
100)/Eh			0.5 TOPSO 1.5 SILTY S	NL (6 Inches SAND WIT⊦	s) I GRAVEL, (SM) brown,	moist	<u>954.8</u> 953.8	ss s	33	3 - 4-5 (9)							
EO - (15.60936			LEAN C grained,	CLAY WITH , moist, rath	SAND, (CL) brown to gr er stiff to very stiff, trace	ay, fine gravel]	SS 2	78	4 -6- 8 (14)	-						
EN HILLS - GE									78	5 -7- 8 (15)	-						
OJECT ARDI	 							SS 4	100	4 -7- 9 (16)							
S\TCAAP PR	<u> 10 </u> -							SS 5	100	5 -7- 8 (15)							
15 PROJECI	 							SS 6	100	5-10-12 (22)	-						
ROJECTS/20	<u> 15 </u> - -							SS 7	100	5 -9- 11 (20)							
AMSEY\1-PF	 							SS 8	100	5 - 15 - 25 (40)	-						
5 09:34 - H:\F			21.5				933.8	SH 9									
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5/				Bottom	of borehole at 21.5 feet												

5			Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BEI	R SI PAGE	R-2(1 0	03 F 1
AU.G	CLIEN	NT Ca	arl Bolander and Sons. Co.	ROJEC		Ram	sev Countv	/ Re-D	evelor	oment	Site (1	CAAF	2)	
ЧYC	PROJ	ECT N	IUMBER 15.60936.100	ROJEC	T LOCA		Arden Hills	, MN			<u> </u>			
N LN	DATE	STAR	TED 5/21/15 COMPLETED 5/21/15	ROUN	ELEVA		956.01 ft	,		но	E SIZ	E "6	1/2" in [,]	ches
124	DRILL	ING C	ONTRACTOR NTI	GROUNI	WATER		LS:			-				
2 <u>0</u>	DRILL		IETHOD 3 1/4 in H.S.A	AT	TIME OF		LING N	lo grou	undwa	ter ob	served			
25	LOGO	ED B	CHECKED BY DAS	AT	END OF	DRILL	ING					-		
л Ц Ц	NOTE	S Ele	ev. at staked location.	AF	TER DRI	LLING								
D Z Z Z											ATT	ERBE	RG	
GINEERING/ENGINEE	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT		PLASTICITY INDEX	FINES
20 100)/EN(SILTY SAND WITH GRAVEL, (SM) brown, fine to medium grained, moist, occasional clayey sand (SC) seams		SS 1	44	1-1-1 (2)	-						
<u>) (15 609:</u>			(Fill) NOTE: Rock in tip of Split-Spoon		SS 2	56	8-6-6 (12)							
IJ.	5		4.5 POORLY GRADED SAND WITH GRAVEL, (SP) browr	<u>951.5</u>	M ss		7-9-10	-						
HLLU			fine to medium grained, moist (Fill)		3	56	(19)	-						
ne n			7.0	949.0				-						
			CLAYEY SAND, (SC) brown, fine to medium grained, moist, medium dense to loose		$\begin{pmatrix} ss \\ 4 \end{pmatrix}$	67	2-4-7 (11)	_						
IS/ICAAP PK	<u> 10 </u>		10.0 LEAN CLAY WITH SAND, (CL) brown to gray, moist, medium to stiff, trace gravel, sand lenses	946.0	SS 5	67	4-4-4 (8)	-						
					SH 6	-								
OJECI S/20					SS 7	56	2-3-4 (7)	-						
NSEY/1-PR					SS 8	100	4 - 8-10 (18)	-						
H:\RA	 20					-								
9:34			21.0	935.0	X 9									
<u>5/15 U</u>			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											
8														
19.2														
Y 201														
NB MA														
US LA														
s In														
U U U														
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OLU V														
З Б														
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			Northe 1408 I	ern Techr Northland	nologies Dr. Ste	Inc. 107						BO	RIN	G N	UM	BEI	R S PAGE	R-2	04 F 1
2	C	ン	Mendo Telepl	ota Heigh hone: 65	its, MN, 5 1-389-41	91 91													
	CLIEN	IT <u>Ca</u>	arl Bolai	nder and	Sons, Co).			PROJEC	CT NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	CAAF	<u>)</u>	
Ϊ	PROJ		IUMBEF	२ <u>15.609</u>	936.100				PROJEC			Arden Hills	, MN						
202	DATE	STAR		5/21/15		COMPL	ETED <u>5/21</u>	/15	GROUN	D ELEVA	TION	954.6 ft			HOL	E SIZ	E_"6	1/2" in	ches
	DRILL	ING C	ONTRA		ITI				GROUN	D WATEF	R LEVE	LS:							
0/0	DRILL	ING N	IETHOD) <u>3 1/4 ir</u>	n H.S.A				A		F DRIL	LING N	lo grou	undwa	ter obs	served	-		
Š	LOGO	ED B	Y DAS	i		CHECK	ED BY DAS	6	A		DRILL	_ING							
שבו ביושר שבו	NOTE	S <u>El</u> e	ev. at st	aked loca	ation. O/S	6 boring 12	2 ft N		AF	TER DRI	LLING								
Ϋ́										ш	%		-	<u>н</u> .	()	ATT		RG	
N D	Ŧ	₽"								¥R	R K	S⊟C	ШЧ	≥ ⊢_	HRE () ERE			, ≻	S
	(∰	APF 00-			MA		ESCRIPTIC	N		MB	NCE NCE		(ET	Dcf)	L N L N L N L N L	윽ㅂ		ΞX	Ŭ Z
Ξ Υ		- GR								NUN		<u>BO</u>	Ś	Γ Δ	NO NO	LIN	LIM	AST ND	ш
JU D	0									\$	R.		۵.		0		۵.	7	
o TUU/NEr				CLAYEY moist, m	/ SAND, redium d	(SC) brow ense to loc	n, fine to me ose	edium grained,		SS 1	67	4-4-5 (9)							
000 CL)										SS 2	56	4-4-6 (10)							
- CEC	5			NOTE: S	Sand lens	se at 4.5 fe	eet			V ss		1-4-4							
			6.0						948.6	3	78	(8)							
Ľ,				CLAYEY	′ SAND,	(SC) brow	n, moist, de	nse, trace grav	/el										
										SH 4					14	25	13	12	44
AAP A	10									SS 5	44	3 - 7-10 (17)							
											100	7 - 8-10 (18)							
	 15											5_0_11	-						
										7	100	(20)	-						
Y7=1/Y			17.0	CLAYEY	SAND,	(SC) brow	n, fine to co	arse grained,	937.6		68	32/6"							
RAINIOL			19.5	NOTE:	Hard dril	e, nace co ling due to	coarse gravel	/el at 17.0 feet	935 1										
1:35 = H:V	20		21.0	SANDY coarse g	LEAN C grave l	LAY, brow	n, moist, stil	f, little fine to	933.6	ss 9	44	10-13-14 (27)							
10 CI /C/S					Borehol Botto	e backfilled om of bore	d with auger hole at 21.0	cuttings. feet.											
2112																			
MAY.																			
IS LAB																			
SID SID																			
פוא																			

(1		Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120				BO	rin	G N	UM	BE	R SI PAGE	R-2	05 F 1
OAD.GPJ		ит <u>С</u>	Telephone: 651-389-4191 arl Bolander and Sons, Co.	PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (FCAAF	?)	
Щ Ш И И И И	PROJ		UMBER 15.60936.100	PROJEC		FION _	Arden Hills	, MN						
SPI	DATE	STAF	STED _ 5/21/15 COMPLETED _ 5/21/15	GROUN	D ELEVA	TION _	951.02 ft			HO	LE SIZ	E <u>"6</u>	1/2" in	ches
	ORILL	ING C		GROUN		R LEVE	LS:							
	ORILL	ING N	IETHOD _3 1/4 in H.S.A	AT		DRIL	LING N	lo grou	undwa	ter ob	served			
UNT ORT	.OGG	ED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	ING							
REP	NOTE	S EI	ev. at staked location. O/S boring 6 ft SE	AF	TER DRI	LLING								
RING												ERBE	RG	
GINEERING/ENGINEE	0 DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
6.100)/EN	_	0 0	TOPSOIL (4 Inches) POORLY GRADED SAND WITH GRAVEL, (SP) brow fine to medium grained moist medium dense	<u>950.7</u> /n, 949.0	SS 1	67	5-6-6 (12)							
0 - (15.6093	-		CLAYEY SAND, (SC) brown, fine to medium grained, moist, medium dense	046.5	SS 2	56	6 - 6-8 (14)	-						
N HILLS - GE	5		LEAN CLAY WITH SAND, (CL) brown, moist, rather stiff to very stiff, trace gravel, sand lenses at 12.0 feet	940.5	SS 3	67	4 -7- 10 (17)	-						
	-				SS 4	83	6-8-8 (16)	-						
TCAAP PRO	10				SS 5	78	6 - 8-12 (20)	-						
	-				SS 6	100	6 - 8-10 (18)	-						
DJECTS/2015					SS 7	100	5 -7- 7 (14)	-						
AMSEY1-PR	-				SH 8	_								
9:35 - H:\R	20		21.0	930.0	SS 9	100	9-15-19 (34)	_						
ECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5/15 (Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											
NTI GEOTECH COLUMNS -														

		North 1408 Meno	nern Technologi 8 Northland Dr. S dota Heights, Mi	əs Inc. te 107 V, 55120				BO	RIN	GN		IBE	R 3 Page	R-2 E 1 C	Ub)F 1
	NT _Ca	Telej arl Bola	phone: 651-389 ander and Sons,	-4191 Co.	PROJE		E_Ram	isey County	y Re-D	evelo	oment	Site (TCAAF	^{>})	
		IUMBE	R 15.60936.10	0	PROJE			Arden Hills	s, MN						
르) DATE		TED	5/22/15	COMPLETED 5/22/15	 GROUN	D ELEV		942.32 ft			но		E "6	1/2" ir	nches
	LING C		ACTOR NTI		GROUN	D WATE		ELS:			-				
		AETHO	D 3 1/4 in H S	Δ	Δ-			LING 1	No aro	undwa	iter oh	server	4		
	GED B	Y DA	s		Δ-			ING	10 9.0	unana		001100			
	55 51	v at s	staked location	\sim of the second seco	. ^ Al										
								·	1	1	1		FERRE	RC	
DEPTH (ft)	GRAPHIC LOG			MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
		•	SILTY SAND medium grain	WITH GRAVEL, (SM) brown, fine to ed, moist			44	9-10-10 (20)							
			(Fill)				56	8-8-6 (14)	-						
 	-	4.5	SILTY SAND, moist, mediun	(SM) brown, fine to medium grained, a dense, trace gravel	937.8		100	5-6-6 (12)	-						
		7.0	CLAYEY SAN	D, (SC) brown, fine to medium grained	<u>935.3</u> I,	M ss	70	3-5-6	-						
		9 <u>.</u> 5	moist, mediun		932.8	4	10	(11)	-						
			LEAN CLAY V very stiff, little	VITH SAND, (CL) brown, moist, stiff to gravel		S⊦ 5									
							89	7 -9- 10 (19)	-						
15							100	8-10-11 (21)	_						
			NOTE: No Re Sampled auge	ecovery due to coarse gravel at 17.0 fe er cuttings.	et.		0	13-20-25 (45)	-						
20		21.0	NOTE: No Re Sampled auge	ecovery due to coarse gravel at 19.5 fe er cuttings.	et. 921.3		0	13-22-27 (49)	_						
		21.0	NOTE: No Re Sampled auge Bore B	ecovery due to coarse gravel at 19.5 fe er cuttings. nole backfilled with auger cuttings. ottom of borehole at 21.0 feet.	et. 921.3	SS 9	0	13-22-27 (49)							

ſ			Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	IBE	R S PAGE	R-2 (≞ 1 0	07 F 1
AD.GF	CLIEN	NT Ca	arl Bolander and Sons, Co.	PROJEC		Ram	sey County	/ Re - D	evelop	oment	Site (TCAAI	>)	
JE RO	PROJ		IUMBER 15.60936.100	PROJEC			Arden Hills	, MN			•			
SPIN	DATE	STAF	COMPLETED	GROUN) ELEVA		938.51 ft			HO	LE SIZ	E <u>"6</u>	1/2" in	iches
NT/SF	DRILI	LING C	CONTRACTOR NTI	GROUN) WATEF	R LEVE	LS:							
[S/GI	DRILI	LING N	IETHOD 3 1/4 in H.S.A	AT	TIME OF	- DRILI	L ING N	lo grou	undwa	ter ob	served	1.		
POR	LOGO	GED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	.ING							
IG RE	NOTE	ES _EI	ev. at staked location. O/S boring 6 ft E	AF	ter dri	LLING								
JGINEERING/ENGINEERIN	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	AT LIMIT LIMIT			FINES
100)/EN			POORLY GRADED SAND WITH GRAVEL, (SP) brow fine to medium grained, moist	'n,	ss s	44	9 - 9-10 (19)							
60936			(Fill) 3.0	935.5	∬ ss	56	5-9-12							
E0 - (15			CLAYEY SAND, (SC) gray, moist, medium dense		2		(21)							
DEN HILLS - G	5				SH 3					16	29	14	15	43
ROJECT ARE					ss 4	89	3 - 4-5 (9)	-						
TS/TCAAP PI	 		12.0	926.5	SS 5	89	4 - 5-4 (9)	-						
015 PROJEC	 		LEAN CLAY WITH SAND, (CL) gray, moist, medium t stiff, trace gravel	0	SS 6	100	3-3-3 (6)							
PROJECTS/2					ss 7	44	4 - 5-6 (11)	_						
RAMSEY1-						44	7-12-11 (23)	_						
):35 - H:	20		21.0	917.5	SS 9	33	5 - 8-10 (18)							
TI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5/15 C			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

2			North 1408 Mend Telep	ern Technologies Inc. Northland Dr. Ste 107 lota Heights, MN, 55120 phone: 651-389-4191				BOI	RIN	g n	UM	BE	R SI PAGE	R-2(E 1 OI	08 F 1
אַריפ	CLIEN	T C	arl Bola	Inder and Sons, Co.	ROJEC		Ram	sey County	Re-D	evelop	ment	Site (1	CAAF)	
	PROJ		IUMBEI	R <u>15.60936.100</u> F	ROJEC			Arden Hills	, MN						
10	DATE	STAF	RTED _	5/22/15 COMPLETED <u>5/22/15</u> G	ROUN	ELEVA		935.64 ft			HOL	E SIZ	E_"6	1/2" in	ches
	DRILL	ING C	ONTRA	ACTOR NTI	ROUN	WATER	LEVE	LS:							
10/0	DRILL	ING N	IETHO	D 3 1/4 in H.S.A	AT	TIME OF	DRIL	_ING N	lo grou	undwa	ter obs	served			
E HO	LOGO	ED B	Y DAS	CHECKED BY DAS	AT	END OF	DRILL	ING							
	NOTE	S El	ev. at sl	taked location. O/S boring 6 ft E	AF	TER DRI	LLING								
	DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID		INDEX	FINES
				POORLY GRADED SAND WITH GRAVEL, (SP) brown fine to medium grained, moist	,	SS 1	39	4-6-7 (13)							
			2.0	SILTY SAND, (SM) brown, fine grained, moist, trace gravel (Fill)	933.6	SS 2	100	5 - 5-5 (10)							
	5		4.0	CLAYEY SAND, (SC) brown, fine to medium grained, moist, loose to medium dense, trace gravel	931.0	SS 3	17	2-3-4 (7)							
	 10					SH 4									
			12.0		923.6	SS 5	67	3-5-6 (11)							
				LEAN CLAY WITH SAND, (CL) brown, moist, rather stiff to stiff, trace gravel		SS 6	89	4-5-5 (10)							
JUEC 1 3/20						SS 7	89	5 - 6-6 (12)							
10EY/1=PR						SS 8	78	5 - 7-10 (17)							
			20.0		015.6										
	20	<u> </u>	21.0	POORLY GRADED SAND, (SP) brown, fine to medium	914.6		56	9-12-12 (24)							
20 01			<u> </u>	gramed, moist, dense, trace gravel Borehole backfilled with auder cuttings.	/	<u>, , , , , , , , , , , , , , , , , , , </u>		,							
0/0				Bottom of borehole at 21.0 feet.											
פר															
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		Ŋ	Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telenbone: 651-389-4191				BO	RIN	G N	UM	BE	R S Page	R-2	09 F 1
D.GPJ						Dama	an Cauch				Cite /		•	
: ROA							Arden Hills	/ <u>Re-D</u>	evelop	oment	Site (ICAAF	<u></u>	
SPINE		STAR	TED 5/20/15 COMPLETED 5/20/15					, IVIIN		ноі	E SIZ	E "6	1/2" in	ches
SR 3	DRILL	ING C		GROUNE	WATER		<u>s.</u> 1 S.					L	172 111	
(GIN	DRILL	ING N	IETHOD 3 1/4 in H.S.A	AT	TIME OF	DRILI	_ING N	lo aroi	undwa	ter ob	served	I.		
ORIS	LOGO	ED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	ING	<u></u> g				-		
REP	NOTE	S Ele	ev. at staked location. O/S boring 10 ft E	AF	TER DRI	LLING								
RING										_	AT1	ERBE	RG	
GINEERING/ENGINEE	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%)	LIQUID		PLASTICITY INDEX	FINES
6.100)/EN			POORLY GRADED SAND WITH SILT, (SP-SM) brov moist, trace gravel (Fill)	vn,	SS 1	33	2-3-4 (7)							
15.60930			3.0 3.0	908.0	ss 2	67	3-4-4 (8)							
EO - (SANDY LEAN CLAY, (CL) brown to gray, moist, medium to rather stiff, trace gravel		<u> </u>		. ,	1						
LLS - G	5				3	67	4-4-5 (9)							
RDEN H							244							
ECT AF					$\begin{pmatrix} 33\\ 4 \end{pmatrix}$	100	(8)							
R PRO	10				SH									
S/ICAA					5	-								
ROJEC						100	1-3-4 (7)							
S\2015	 _ 15 _				√ ss	100	2-3-5							
ROJECT					7	100	(8)							
MSEY/1-F						100	2-3-4 (7)							
H:\RA	20							-						
9:35 -			21.0	890.0	$\begin{pmatrix} 35\\ 9 \end{pmatrix}$	89	2 -4- 6 (10)							
VIT GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 8/5/15 (Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

L			Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BEI	R SI PAGE	R-2' E 1 OI	10 F 1
P I C	CLIEN	NT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sev Count	/ Re - D	evelor	oment	Site (1	CAAF	2)	
Б Б С	PROJ		UMBER 15.60936.100	PROJEC	T LOCAT		Arden Hills	. MN		-	•			
N N	DATE	STAR	TED 5/20/15 COMPLETED 5/20/15	GROUND			913 64 ft	,		ноі	F SIZ	F "6	 1/2" in	ches
25	DRILL	ING C	$\frac{1}{2} = \frac{1}{2} = \frac{1}$				IS:						<u></u>	
CIN	DRILL						ING 4.50)ft/FI		ວ 1∕I ft				
N X				יר י - אד					CV 30.	<u></u>				
Į L	NOTE		T DAS CHECKED BT DAS											
SZ	NOTE								1		ATT	CDDC		
GINEEKING/ENGINEEK	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
5 100)/EN			POORLY GRADED SAND WITH SILT, (SP-SM) some gravel (Fill)	014.0	SS 1	33	1-2-3 (5)							
(15.60936			POORLY GRADED SAND WITH SILT, (SP-SM) fine to medium grained, dense, trace gravel	911.6	ss 2	78	5-12-14 (26)	_						
- -			CLAYEY SILT, (SC) saturated, trace gravel ∇]						
יי	_ 5 _		-		V ss	17								
H			6.0 POORLY GRADED SAND WITH SILT. (SP-SM)	907.6	/_3									
RUE			saturated, trace gravel		V ss									
¥ 5			8.5	905.1	4	22								
H C C Z C Z			CLAYEY SAND, (SC) gray, saturated, loose to dense, trace gravel											
AP P	_ 10 _					33	4 -6- 6							
NICA					/ 1		(12)	-						
2					V ss		3-3-4	-						
PCX.					$\bigwedge 6$	89	(7)							
1910														
212/2	_ 15 _					89	4-5-7 (12)							
C C C L E					/ / /		(12)	-						
44-1/					∖∕ ss		5-7-8	-						
NSEY					8	17	(15)	_						
1:\RA	20							_						
9:35	20		21.0	892.6	$\bigvee SS 9$	11	5 - 8-10 (18)							
2/15 C			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											
8														
2.6U														
۲ zu1														
ΜA														
S LAI														
מ N														
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		N)	Northe 1408 Mendo Telept	ern Technologies Inc. Northland Dr. Ste 107 ota Heights, MN, 55120 oone: 651-389–4191				BO	RIN	G N	UM	BE	R SI PAGE	R-2′ 1 OI	11 F 1
10.01	CLIER	NT Ca	rl Bolar	oder and Sons. Co	PROJEC	Τ ΝΔΜΕ	Ram	sev County	/ Ro - D	evelor	ment	Site (1		2)	
Ď2	PROJ			1 5.60936.100	PROJEC			Arden Hills	MN		mont		0/01)	
N LN	DATE	STAR	TED 5	22/15 COMPLETED 5/22/15	GROUNE			907.43 ft	, .		но	E SIZ	E "6	1/2" in	ches
201	DRILI	LING C		CTOR NTI	GROUNE	WATER		LS:							
	DRILI		ETHOD	3 1/4 in H.S.A	AT	TIME OF		LING N	lo arou	undwa	ter ob	served			
240	LOGO	GED BY	DAS	CHECKED BY DAS	AT	END OF	DRILL	.ING							
בר	NOTE	S Ele	ev. at sta	aked location.	AF	TER DRI	LLING								
										. •		ATT	ERBE	RG	
	DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%)	LIQUID		PLASTICITY INDEX	FINES
U)/EIV	0		0.5	TOPSOIL (6 Inches)	906.9	∕ ss	56	3-3-2							
20.10(POORLY GRADED SAND, (SP) brown, fine to medium grained, moist, trace gravel	n	/\ 1		(5)	-						
- (I D. DUB.			3.0	(Fill) NOTE: No recovery at 2.0 feet. Sampled auger cuttings.	904.4	ss 2	0	3-4-3 (7)	-						
וררס - כבי	5			POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, moist, loose to medium dense trace gravel	n, 9,	SS 3	56	2-3-3 (6)	-						
						SS 4	67	4 - 6-6 (12)							
	 _ 10		9.5	SILTY SAND, (SM) brown, fine grained, moist, medium dense, trace gravel	<u>897.9</u> n	ss	78	5 -6- 5 (11)	-						
			12.0		805 <i>4</i>			()	-						
PROJECT			12.0	LEAN CLAY WITH SAND, (CL) gray, moist, medium t rather stiff, trace gravel	0	SS 6	83	3 - 4-4 (8)							
GL0Z/9	15														
						SH 7									
							100	6 - 6-7 (13)	-						
- H	20					V ss	100	7-6-8							
0.09:30		V/////	21.0	Borehole backfilled with auger cuttings.	886.4	/ \ 9		(14)							
1/0/0				Bottom of borehole at 21.0 feet.											
פר															
2012															
MAY															
S LAB															
ň															
n N															
2															
3															
U C L															

			North 1408 Meno Teler	nern Technolog Northland Dr. dota Heights, M	ies Inc. Ste 107 N, 55120 9-4191					BO	RIN	G N	UM	IBE	R S PAGE	R-2 ≞ 1 0	12 0F 1
AD.GPJ	CLIEI	NT C	arl Bola	ander and Sons	. Co.	PR	OJEC.		Ram	sev Count	v Re-D	evelor	oment	Site (ТСААГ	>)	
E RO	PRO.		UMBE	R 15.60936.1	00	PR	OJEC.			Arden Hills	s. MN					<i>'</i>	
SPIN	DATE	STAF		5/27/15	COMPLETED 5/27/15	GR		FI FVA		894 22 ft	-, <u>-</u>		но		′F "6	1/2" in	nches
SR	DRILL					GR		WATER		1.5.				0			101100
GINT				3 1/4 in H 9	3 Δ		∇ <u>ат</u>			ING 14	50 ft / F		70 72	ft			
RTS			V DA9	<u>ہ ، ، ، ، ، ، ، ، ، ، ، ، ، ، ، ، ، ، ،</u>			ΔT			ING	50 11 / 1		10.12				
REPC			v at a	takad location	O/S boring 12 ft NW		AE-										
DNG.											1	1	1			DC	
GINEERING/ENGINEER	o DEPTH (ft)	GRAPHIC LOG			MATERIAL DESCRIPTION			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
0)/EN		7 <u>1</u>	1.0	TOPSOIL (12	2 Inches)		893.2	∕ ss	78	1-1-1							
36.10(-			FILL/TOPSO	IL, (SC) black, very loose to loose,	with		/\ 1	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	(2)	-						
15.6093	-		25	organics			800.7		33	2-2-2 (4)	1						
	-		3.5	SANDY LEA	N CLAY, (CL) gray, moist to wet, m	edium	090.7	<u> </u>		()	1						
N HILLS - GE	5			to rather stiff	trace gravel		5 2	$\left \begin{array}{c} SS \\ 3 \end{array} \right $	78	1-3-3 (6)	-						
JECT ARDE	-							SS 4	100	3 -4- 5 (9)	-						
TCAAP PRO	10			NOTE: Trace	gravel below 9.5 feet.		r e	SS 5	100	3 -5- 5 (10)	-						
5 PROJECTS	-							SH 6					14	23	10	13	52
OJECTS/201	15		7	<u>/</u>			r e	SS 7	78	2-2-3 (5)	-						
AMSEY/1-PR	-						×	SS 8	100	2 - 3-4 (7)	-						
9:35 - H:\R	20		21.0				873.2	SS 9	100	3 - 4-5 (9)	_						
TI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5/15				Ē	Bottom of borehole at 21.0 feet.												

L'I			Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BOI	RIN	g n	UM	BE	R S PAGE	R-2′ ≟ 1 0	13 F 1
DAU.G	CLIEN	IT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (1	FCAAF	')	
Ц К	PROJ	ECT N	IUMBER 15.60936.100	PROJEC			Arden Hills	, MN						
SPIN	DATE	STAR	TED _ 5/28/15 COMPLETED _ 5/28/15	GROUN	ELEVA		890.76 ft			HO	E SIZ	E <u>"6</u>	1/2" in	ches
	DRILL	ING C	ONTRACTOR NTI	GROUN	WATER	LEVE	LS:							
2/01	DRILL	ING N	IETHOD 3 1/4 in H.S.A	$ar{arpi}$ at	TIME OF	DRIL	LING _12.0)0 ft / E	Elev 87	78.76	ft			
R S	LOGG	ED B	Y _DAS CHECKED BY _DAS	AT	END OF	DRILL	.ING							
Ц Ц Ц Ц Ц	NOTE	S Ele	ev. at staked location.	AF	ter dri	LLING								
VGINEERING/ENGINEERIN	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)			PLASTICITY Ö	FINES
5.1UU)/Er			SILTY SAND WITH GRAVEL, (SM) fine grained, mois (Fill) NOTE: Sampled auger cutting	t	ss s	0	8 - 4-6 (10)	-						
15-60936					SS 2	78	16-12-15 (27)							
- GEO	5		4.0 LEAN CLAY WITH SAND, (CL) moist, stiff to rather stiff trace gravel	886.8			8-9-11							
IN HILLS					3	44	(20)	-						
CI ARD			8.5	882.3	$\left \begin{array}{c} ss \\ 4 \end{array} \right $	83	2-6-8 (14)							
			SILTY SAND, (SM) fine grained, moist, loose, trace gravel		∑ ss	78	3-3-5	-						
VICA			11.0 LEAN CLAY WITH SAND, (CL) gray, moist to wet,	879.8	/ 5		(8)							
KUJECI			aggreen Medium to rather stiff, trace gravel		SS 6	89	3-3-4 (7)							
I S\2015 F	 _ 15 _				SH	-								
PROJEC					7									
AMSEY1					SS 8	100	2-4-5 (9)	-						
:35 = H:\K	20		21.0	869.8	ss 9	100	3-5-7 (12)	-						
T 8/5/15 09		<u>v / / / / / / / / / / / / / / / / / / /</u>	Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.		<u> </u>		. *						1	
Y 2012 GD														
S LAB MA														
il sid u														
GEOLEC														
ΞĹ														

	Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R S PAGE	R-2' : 1 O	14 F 1
10.01	CLIENT Carl Bolander and Sons Co	PRO.IF	CT NAME	Ram	sev County	/ Re - D	evelor	ment	Site (ГСААБ	2)	
E RO	PROJECT NUMBER 15.60936.100	PROJE			Arden Hills	. MN					_/	
SFIN	DATE STARTED 5/22/15 COMPLETED 5/22/15	GROUN	D ELEVA		890.28 ft	,		HOL	LE SIZ	E "6	1/2" in	ches
221	DRILLING CONTRACTOR NTI	GROUN	D WATER		LS:							
NID/0	DRILLING METHOD 3 1/4 in H.S.A	∇ A		DRILI	ING 9.50) ft / E	ev 88(0.78 ft				
CK.	LOGGED BY DAS CHECKED BY DAS	A		DRILL	ING							
Г Ц Ц Ц	NOTES Elev. at staked location.	А	TER DRI	LLING								
SINEERING/ENGINEERING	HL (J) HL (J) MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT		PLASTICITY DINDEX	FINES
NIN/INN	POORLY GRADED SAND WITH SILT, (SP-SM) brov fine to medium grained, moist, trace gravel (Fill)	wn, 888.	ss 3 1	67	4 - 4-3 (7)	_						
<u>, (10 oU93</u>	SILTY SAND, (SM) brown, fine to medium grained, moist, medium dense, trace gravel		SS 2	56	4 - 5-5 (10)							
HILLS - GE(5 SILTY SAND, (SM) brown to gray, fine grained, moist saturated, medium dense to dense	<u>885.</u> t to		67	6 -7- 6 (13)	-						
			SS 4	56	4-4-5 (9)	_						
CAAP PROJ	∑		ss 5	56	6-7-7 (14)	_						
KUJECI S/I			SS 6	89	5 - 5-5 (10)	_						
			SS 7	100	6 - 8-7 (15)	-						
		871		56	8-8-9 (17)	-						
- HINKAINIG	Borehole backfilled soil cuttings. Bottom of borehole at 18.5 feet.	071.	~		. /	1	1	1		1	1	
II GEOLECH CULUMINS - GINT STU US LAB MAT ZUTZ GUT - 0/3/13 US 33												

РJ			Northe 1408 I Mende Telepl	ern Technologies Northland Dr. Ste ota Heights, MN, hone: 651-389-4	s Inc. e 107 55120 191					BO	RIN	G N	UM	IBEI	R SI PAGE	R-2′ ∷1 OI	15 F 1
AD GI	CLIEN	пс	arl Bolai	nder and Sons, (Co.		PROJE		E Ram	sey Count	v Re - D	evelop	oment	Site (1	FCAAF	')	
E RO	PROJI		NUMBER	R 15.60936.100			PROJEC	T LOC		Arden Hills	s, MN						
SPIN	DATE	STAF	RTED 5	5/22/15	COMPLETE	D 5/22/15	 GROUN	D ELEV	ATION	889.66 ft			но	LE SIZ	E "6	1/2" in	ches
T\SR	DRILL	ING (ACTOR NTI	_		GROUN	O WATE		ELS:			-				
s/GIN	DRILL	ING N	NETHOD	D 3 1/4 in H.S.A			- ⊻ ∧	TIME	OF DRIL	.LING 7.00	0 ft / El	lev 88:	2.66 ft				
ORT	LOGG	ED B	Y DAS	6	CHECKED E	BY DAS	A		F DRIL	LING							
S REP	NOTE	S <u>E</u> l	ev. at st	aked location.			AF	TER D	RILLING	i							
BINEERING/ENGINEERING	DEPTH (ft)	GRAPHIC LOG		W	ATERIAL DES	CRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT	PLASTIC LIMIT LIMIT	PLASTICITY D INDEX D	FINES
36 100)/ENC			1.5	POORLY GRAI coarse grained, (Fill)	DED SAND, (SF moist, trace gra	P-SM) brown, fine to avel	888.2		3 44	3-4-3 (7)							
) – (15 609C			3.5	SILTY SAND, ((Fill)	SM) gray to bro SM) brown_fine	wn, fine grained, moi	st 886.2		³ 56	5-4-6 (10)							
HILLS - GE(saturated, medi NOTE: Boreho	um dense le wet cave-in a	t 5.7 feet.			³ 78	4-5-4 (9)							
JECT ARDEN			₽						³ 67	6-6-7 (13)	-						
TCAAP PRO	 10 								³ 100	6-8-6 (14)	_						
5 PROJECTS			12.0	SILTY SAND, (dense to mediu	SM) light brown m dense	, fine grained, satural	877.7 æd,		³ 100	6-8-9 (17)	-						
OJECTS/201	<u> 15 </u>								3 100	6-4-10 (14)	-						
AMSEY\1-PF									3 100	4-10-5 (15)	-						
09:35 - H:\F	_20		21.0	NOTE: Fine to	coarse grained	below 19.5 feet.	868.7		³ 100	5-6-6 (12)							
I GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 8/5/15				Bolence	tom of borehole	at 21.0 feet.											

		Nc 14 Me	orthern Technologies Inc. 08 Northland Dr. Ste 107 endota Heights, MN, 55120					BO	RIN	GΝ	UN	IBF	R S Page	R-2 ≣ 1 C	' 1)F
		Те	elephone: 651-389-4191				_					o., "		_,	
CLIEN	NT <u>C</u>	arl B	Colander and Sons, Co.	_ PROJE	CT N	AME	Ram	sey County	y Re-D	evelo	oment	Site (TCAAF	P)	_
PROJ	ECT	NUM	BER _15.60936.100	_ PROJE		OCAT		Arden Hills	s, MN						_
DATE	STA	RTED	D <u>5/15/15</u> COMPLETED <u>5/15/15</u>	GROUN	D EL	.EVA		887.29 ft			HO	LE SIZ	Έ <u>"6</u>	1/2" ir	<u>ו</u>
DRILL		CON			D W/			LS:	~ <i>~</i> / -						
DRILL				- <u>¥</u> -A				LING <u>7.00</u>	0 ft / E	ev 88	0.29 ft				-
LOGO	ED E	54 <u> </u>	DAS CHECKED BY DAS	A				ING							-
NOTE	:> _= 			A						1	1	AT-	TEDDI		-
DEPTH (ft)	GRAPHIC LOG		MATERIAL DESCRIPTION		SAMPI E TVDE	NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				
		0.3	SILTY SAND, (SM) brown, fine to medium grained, moist, trace gravel	887.		SS 1	67	3 - 5-5 (10)							
		3.5	POORLY GRADED SAND WITH SILT, (SP-SM) bro fine to medium grained, moist (Fill)	wn, 883.	R	SS 2	56	3 - 6-6 (12)							
5		6.0	POORLY GRADED SAND WITH GRAVEL, (SP) bro fine to medium grained, moist, medium dense SILTY SAND, (SM) light brown, fine grained, moist,	wn, 	M	SS 3	67	5 -7- 6 (13)							
			 medium dense, trace gravel POORLY GRADED SAND WITH SILT, (SP-SM) ligh brown, fine to medium grained, moist to saturated, 	t	M	SS	44	3-3-4							
 10			loose, trace gravel			4 SS		1-2-2							
		11.0	NOTE: Boring terminated at 11.0 feet due to boreho cave-in.	e <u>876.</u>	3	5	44	(4)							
			Borehole backfilled with auger cuttings. Bottom of borehole at 11.0 feet.												

		Northern Technologies 1408 Northland Dr. Ste Mendota Heights, MN, Telephone: 651-389-4	Inc. 107 55120 191				BO	RIN	G N	UM	IBE	R S PAGE	R-2 ≣ 1 0	17 F 1
	NT Ca	rl Bolander and Sons, C	0.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelo	oment	Site (1	FCAA I	>)	
		UMBER _15.60936.100		PROJEC	T LOCA		Arden Hills	s, MN						
		TED _5/22/15	COMPLETED _5/22/15	GROUN	D ELEVA		886.05 ft			но	LE SIZ	E_"6	1/2" in	ches
	LING CO	ONTRACTOR NTI		GROUN	O WATER		LS:							
	LING M	ETHOD _3 1/4 in H.S.A		 		F DRIL	LING _7.00) ft / El	ev 87	9.05 ft				
LOG	GED BY	DAS	CHECKED BY DAS	A	END OF	DRILL	.ING							
	ES Ele	ev. at staked location.		AF	TER DR	LLING								
	GRAPHIC LOG	M/	ATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
	-	SILTY SAND, (S saturated, loose	M) brown, fine grained, moist to to medium dense, trace gravel		SS 1	56	4-6-5 (11)							
	-					67	4 - 9-7 (16)							
5_5	-				∕∕ ss	70	4-5-4	-						
	_	Σ			3	70	(9)	-						
	-	8.5 POORLY GRAD	ED SAND WITH SILT, (SP-SM) bro	877.6	SS 4	100	3-3-2 (5)	-						
10		fine to coarse gr gravel	ained, saturated, medium dense, tra	ice	SS 5	89	5 -7- 6 (13)	-						
		14.5		871.6	SH 6									
		SILTY SAND, (S saturated, mediu	M) brown, medium to coarse graine im dense, trace gravel	d,	SS 7	100	4 - 6-7 (13)	-						
		POORLY GRAD	ED SAND WITH SILT, (SP-SM) bro	wn, 867.6	SS 8	78	3 - 3-2 (5)	-						
20		SANDY LEAN C trace gravel	LAT, (UL) gray, saturated, medium,					-						
3		21.0 NOTE: Silty san	d seam at 20.0 feet.	865.1	3 SS	67	3-3-4 (7)							
		Botenor	om of borehole at 21.0 feet.											

		Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389–4191				BO	RIN	G N	UM	BE	R S PAGE	R-2 ' ± 1 0	18 F 1
	NT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (FCAAF	<u>)</u>	
لم ليا PRO	JECT N	IUMBER 15.60936.100	PROJEC	T LOCA		Arden Hills	, MN						
b DAT		COMPLETED <u>6/8/15</u>	GROUN) ELEVA		883.67 ft			но	LE SIZ	E <u>"6</u>	<u>1/2" in</u>	iches
	LING C		GROUN) WATEF	R LEVE	LS:							
	LING N	IETHOD _3 1/4 in H.S.A			DRIL	LING _14.5	50 ft / E	Elev 80	69.17	ft			
E LOG	GED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	ING							
	ES Ele	ev. at staked location.	AF	TER DR	LLING								
H	P			гүре ER	۲۲ % (LES LES	PEN.	T WT.	IRE Т (%)	AT1	ERBE IMITS	RG } ≻	0
	GRAPH	MATERIAL DESCRIPTION		SAMPLE	RECOVE (RQD	BLOV COUN	POCKET (tsf)	DRY UNI' (pcf)	MOISTUC	LIQUID	PLASTIC LIMIT	PLASTICIT INDEX	Ű N L
	-	POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, moist 2.0 (Fill)	vn, 881.7	SS 1	56	6-7-6 (13)	-						
2609 CL) - 0		SILTY SAND, (SM) brown, fine grained, moist (Fill)		SS 2	56	8-8-9 (17)							
5 <u>5</u>	-			SS 3	67	7 -6- 9 (15)	-						
	-	7.0 POORLY GRADED SAND WITH SILT, (SP-SM) gray fine grained, moist, dense	876.7	SS 4	56	10-11-13 (24)	-						
10 10		9.5 PEAT, (Pt) black to dark gray, moist, rather stiff	874.2	SS 5	67	4 - 5-6 (11)							
		14.5 \7	869.2	SH 6	_								
15 15	-	SILTY SAND, (SM) gray, fine to medium grained, saturated, medium dense	000.2	SS 7	56	4 - 4-5 (9)	-						
					100	6 -7-7 (14)	-						
20 - 92:60		21.0	862.7	SS 9	89	7 - 6-6 (12)							
II GEOLECH COLUMNS - GINLS I'D US LAB MAY ZUIZ GUL - 8/3/1:		Bottom of borehole at 21.0 feet.											

La (1		North 1408 Mend Telep	ern Techno Northland I ota Heights hone: 651	blogies Ir Dr. Ste 1 s, MN, 55 -389-419	nc. 07 5120 91							BO	RIN	G N	UM	IBE	R S PAGE	R-2	19 F 1
	JEN	IT _C	arl Bola	nder and S	ons, Co.			F	PROJEC	T NA	ME	Ram	sey County	y Re - D	evelop	oment	Site (TCAAF	P)	
	SOJ		NUMBER	R _15.6093	36.100			F	PROJEC	T LO	САТ		Arden Hills	s, MN						
	ΤE	STAF	RTED _	6/4/15		COMPLE	TED _ 6/4/15	(GROUNE) ELE	VA		898.15 ft			но	LE SIZ	E <u>"6</u>	1/2" in	iches
	NLL	ING C	CONTRA		TI			(GROUNE	WA	TER		LS:							
	NLL	ING N	METHO	3 <u>3</u> 1/4 in	H.S.A				AT	TIME	E OF	DRIL	LING N	No gro	undwa	ter ob	served	۱.		
	GG	ED B	Y DAS	6		CHECKE	DAS		AT	END	OF	DRILL	.ING							
	DTE	S _El	ev. at st	taked locat	ion.				AF	TER	DRII	LLING								
	ر (ft)	GRAPHIC LOG			MAT	terial de	ESCRIPTION			SAMPLE TYPE	NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
00)/EV	_		0.1	ASPHALT BASE (4	T (1.5 Ind Inches)	ches)			A898.0	X	SS 1	44	8-11-11							
936.1(_			POORLY	GRADE		VITH SILT, (SF	P-SM) light]		·		(22)							
EO = (15.60	_			brown to l trace grav (Fill)	brown, fi /e l	ne to medi	ium grained, dr	y to moist,		X	SS 2	67	10-11-12 (23)	-						
	5 -									X	SS 3	67	9-10-12 (22)	-						
	_									X	SS 4	89	10-8-9 (17)	-						
	0		11.0						887.2	X	SS 5	78	10-11-13 (24)	-						
	-		13.5	POORLY medium g base mate (Fill)	GRADE grained, r eria l	D SAND, (moist, little	(SP-SM) brown gravel, appare	n, fine to ent roadway	884 7	X	SS 6	100	13-15-16 (31)	-						
11S/2015 PF	- 5	××××		POORLY fine to coa	GRADE arse grai	D SAND V ined, dry, c	VITH SILT, (SF lense, trace gra	P-SM) brown avel	,		SS	56	8-12-11	-						
	_		17.0		CRADE			-SM) brown	881.2		7		(23)	-						
I I	-		· · · · ·	fine graine	ed, mois	t, medium	dense	-Sivi) brown	3	X	8	89	6-8-6 (14)	-						
325 H	0		21.0						877.2	Ň	SS 9	100	6-7-7 (14)							
GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GUI - 802130				E	Borehole Bottor	backfilled m of boreh	with auger cut ole at 21.0 fee	tings. t.												

		Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	IBE	R S Page	R-2 2	20 F 1
	NT Ca	arl Bolander and Sons, Co.		T NAME	Ram	sey County	/ Re-D	evelo	oment	Site (TCAAF)	
	JECT N	NUMBER 15.60936.100				Arden Hills	s, MN						
		COMPLETED 5/27/15		ELEVA		884.33 ft			но	LE SIZ	E_"6	1/2" in	iches
	LING C			WATER	LEVE	LS:							
	LING N	METHOD _ 3 1/4 in H.S.A	AT		DRIL	LING N	lo gro	undwa	ter ob	served	۱.		
E LOG	GED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	.ING							
	ES _Ele	ev. at staked location.	AF	ter dri	LLING								
	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC FIMIT LIMIT		FINES
			<u></u>		67	8-10-11 (21)							
1 000		2.0 fine to medium grained, trace gravel				(21)							
	-	 (Fill) SILTY SAND, (SM) light brown to gray, fine grained, moist (Fill)]	SS 2	56	9-13-15 (28)	-						
9 <u>5</u>	-			SS 3	67	8-11-12 (23)							
	-			SS 4	67	3 - 5-5 (10)	-						
10 10		9.5 SILTY SAND, (SM) gray, fine grained, moist, asphal pieces (Fill)	<u>874.8</u> It	\times ss 5	100	32/6"							
		SILTY SAND, (SM) gray, fine grained, moist, trace gravel (Fill)	872.3	SS 6	67	6 - 6-7 (13)							
	-	SILTY SAND, (SM) dark gray to gray, fine grained, moist, loose, organic stain	009.0	SS 7	56	2-2-3 (5)							
					100	4 - 3-4 (7)							
- <u>20</u>		21.0 Borobala bookfilled with sugar outtings	863.3	SS 9	56	3 - 3-5 (8)	_						
ון פבטובכים לטרעשואס - פואן אין געוגיפעי - פאי		bottom of borehole at 21.0 feet.											

		Northern Technologies 1408 Northland Dr. Ste Mendota Heights, MN	Inc. 107 55120				BO	RIN	G N	UM	BE	R S PAGE	R-2	21 F 1
AD.GPJ		Telephone: 651-389-4	0.	PROJEC		Ram	sev County	/ Re - D	evelor	oment	Site (ГСААF))	
RO	PROJECT	NUMBER 15.60936.100		PROJEC			Arden Hills	MN					/	
SPINI	DATE STA	ARTED 5/27/15	COMPLETED 5/27/15				892 07 ft	,		ноі	E SIZ	F "6	1/2" in	ches
\SR				GROUNI			1 S.					- <u>-</u>	1/2 11	101100
UNT UNT								0.4/5	-1 0-	70 77	c 1			
RTS/	DRILLING	WETHOD <u>3 1/4 In H.S.A</u>		- <u>×</u> AI			LING	<u>suπ/</u> ε		/6.//	π			
EPO	LOGGED	BY DAS	_ CHECKED BY _DAS	AI	END OF	DRILL	.ING							
AG R	NOTES _	Elev. at staked location.		AF	TER DRI									
IGINEERING\ENGINEERII	o DEPTH (ft) GRAPHIC	М,	ATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	I I LIMIT LIMIT			SINES
6.100)/EN		©.2_/_ TOPSOIL (2 Inc SILTY SAND, (5 moist_trace gray	hes) SM) brown, fine to medium grained, /el		SS 1	56	4-2-4 (6)	-						
0 - (15.6093		(Fill) 3.5 SILTY SAND, (S	SM) light brown, fine grained, moist,	888.6	SS 2	89	3-3-4 (7)							
I HILLS - GE		loose to medium	n dense		ss 3	67	3 -4- 4 (8)	-						
ECT ARDEN					ss 4	78	4 -6- 8 (14)	-						
TCAAP PROU	 10 				ss 5	100	4 -6- 8 (14)	-						
PROJECTS		SILTY SAND, (S saturated, loose	SM) light brown, fine grained, moist to to medium dense	880.1	SS 6	89	3 - 5-4 (9)	-						
JECTS/2015	<u>15</u>	i N V V V			ss 7	78	3-3-5 (8)	-						
MSEY1-PRO					SS 8	78	4-5-7 (12)	-						
09:35 - H:\RA	20	21.0		871.1	ss 9	56	5 - 7-9 (16)	-						
3EOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5/15		Bott	om of borehole at 21.0 feet.											

	0		Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heintes, MN, 55120				BO	RIN	G N	UM	BE	R S PAGE	R-2	22 F 1
D.GPJ			Telephone: 651-389-4191			Dom	aav Causti			mont	Site (7		21	
ROA	CLIER			PROJEC		<u>Ram</u>	sey County	/ Re-D	evelop	oment	Site (ICAAF		
NIC NIC	PROJ	IECT	NUMBER 15.60936.100	PROJEC	I LOCA		Arden Hills	, MN						
SR SI	DATE	STA	COMPLETED <u>5/28/15</u> COMPLETED <u>5/28/15</u>	GROUN	DELEVA	TION _	897.17 ft			HO	_E SIZ	E <u>"6</u>	1/2" in	ches
NTN	DRILL			GROUN) WATER	RLEVE	LS:							
TS/G	DRILL	LING	METHOD _ 3 1/4 in H.S.A	¥at	TIME OF	DRIL	LING <u>17.7</u>	70 ft / E	Elev 87	79.47	ft			
OR	LOGO	GED E	Y DAS CHECKED BY DAS	AT	END OF	DRILL	.ING							
9 RE	NOTE	S _E	ev. at staked location.	AF	TER DRI	LLING								
GINEERING	т	<u>ں</u>			IYPE ER	۲۶ % (LS JE	PEN.	WT	RE Г (%)	ATT L	ERBE	RG S	~
INEERING/EN	DEPTI (ft)	GRAPH LOG	MATERIAL DESCRIPTION		SAMPLE 7 NUMBE	RECOVEF (RQD)	BLOM COUNT (N VALL	POCKET I (tsf)	DRY UNIT (pcf)	MOISTU	LIQUID	PLASTIC LIMIT	PLASTICIT	FINES
100)/ENG			0.3 TOPSOIL (4 Inches) 1.5 POORLY GRADED SAND WITH SILT, (SP-SM) brow	<u>896.8</u> /n, <u>895.7</u>	SS 1	56	2-2-2 (4)							
<u>=0 - (15 60936</u>			SILTY SAND, (SM) brown to light brown, fine grained moist, very loose to dense	/	SS 2	78	2-3-2 (5)	-						
EN HILLS - GE	5				SS 3	56	2-1-2 (3)	-						
OJECT ARDE	 				SS 4	78	5 - 9-9 (18)							
S\TCAAP PR	<u> 10 </u>				ss 5	78	4 - 5-7 (12)	-						
15 PROJECT				000 7	SS 6	67	4 - 6-7 (13)	-						
ROJECTS/20	<u>15</u> 		SILTY SAND, (SM) light brown, fine grained, moist to saturated, loose to medium dense	002.7	ss 7	78	2 - 3-5 (8)	-						
RAMSEY1-PF	 		Ϋ́		ss 8	56	4 - 6-7 (13)	-						
09:35 - H:\F	20		21.0	876.2	SS 9	78	5 - 6-7 (13)	_						
GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 8/5/15			Bottom of borehole at 21.0 feet.											
			Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120				BO	RIN	G N	UM	BEI	R SI PAGE	R-2 2	23 F 1
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647			Telephone: 651-389-4191			_								
RUAL	CLIEN	NT <u>C</u>	arl Bolander and Sons, Co.	PROJEC1		Ram	sey County	<u>/ Re-D</u>	evelop	oment	Site (1	CAAF	<u>')</u>	
H N	PROJ	ECT	NUMBER 15.60936.100	PROJECT			Arden Hills	, MN						
アドク	DATE	STAF	RTED 5/28/15 COMPLETED 5/28/15	GROUND	ELEVA		898.48 ft				.e siz	E <u>"6</u>	1/2" in	ches
	DRILL	ING (WATER	LEVE	LS:							
	DRILL	ING I	METHOD <u>3 1/4 in H.S.A</u>	- <u>⊻</u> AT '	TIME OF	DRILI	LING <u>17.2</u>	20 ft / E	Elev 88	31.28	t			
D L	LOGO	SED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	ING							
У Р	NOTE	S _EI	lev. at staked location.	AFT	ER DRI									
NEEKING/ENGINEEKI	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
10U)/EING			↓ ↓0.3_/TOPSOIL (3 Inches) POORLY GRADED SAND WITH SILT, (SP-SM) brow	<u></u>	ss 1	67	1-3-2 (5)						<u> </u>	
0930			2.0 fine to coarse grained, moist, loose, trace gravel	896.5			2.2.2	1						
0 CL)			trace medium to coarse gravel		2	78	(5)							
- L			4.5	894.0										
2	5		SILTY SAND, (SM) brown, fine grained, moist to		ss	67	1-2-2							
				4	13		(4)	-						
					ss 4	78	1-2-2 (4)	-						
Ш С С				ſ				1						
LAAP PR	<u> 10 </u>			Z	SS 5	67	1-1-3 (4)	-						
					ss 6	78	2-3-4 (7)	-						
	 15				√ ss	22	2-3-3							
-PROJEC			∇	4	7	22	(6)	-						
SAMSEY				Ź		67	5 - 8-10 (18)	-						
9:35 H:\r	20		21.0	877.5	SS 9	78	8-10-10 (20)	-						
/5/15 U			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											
ά														
2.5														
V 20														
AN D														
No LA														
2														
3														
פער														

PJ)	Northern Technologies Inc. 1408 Northland Dr. Ste 107 Mendota Heights, MN, 55120 Telephone: 651-389-4191				BO	RIN	G N	IUM	IBE	R SI PAGE	R-2 2	24 F 1
AD.G	CLIEN	NT	Ca	1 Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	y Re - D	evelop	oment	Site (CAAF	>)	
БRО	PROJ	IECT	N	JMBER 15.60936.100	PROJEC	T LOCA	ΤΙΟΝ	Arden Hills	s, MN						
SPIN	DATE	ST	٩R.	ED 5/28/15 COMPLETED 5/28/15	GROUNE) ELEVA		899.93 ft			но	LE SIZ	E "6	1/2" in	ches
T\SR	DRILI	LING	C	DNTRACTOR NTI	GROUND	WATEF		LS:							
S/GIN	DRILI	LING	М	ETHOD _3 1/4 in H.S.A	$ar{arphi}$ at		F DRIL	LING _16.0	00 ft / E	Elev 8	83.93	ft			
ORT	LOGO	GED	BY	DAS CHECKED BY DAS	АТ	END OF	DRILL	_ING							
REP	NOTE	s_I	Ele	v. at staked location.	AF	TER DR	LLING								
Ш. Х												AT1	ERBE	RG	
GINEERING/ENGINEE	o DEPTH (ft)	GRAPHIC	FUG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
36.100)/EN				D.3. TOPSOIL (3 Inches) POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, moist, loose	<u></u>	ss s	78	3-3-2 (5)							
0 - (15.609				SILTY SAND, (SM) brown to light brown, fine grained moist to saturated, very loose to dense		SS 2	67	2-2-2 (4)							
HILLS - GE	5					SS 3	56	2-2-3 (5)	_						
ECT ARDEN				NOTE: Trace gravel at 7.0 feet.		SS 4	44	1 -2-2 (4)	_						
	10					SS 5	78	3 -5- 6 (11)	-						
ROJECTS/TO						SS 6	67	3-4-5 (9)							
TS\2015 PF	15					∑ s <u>s</u>	67	2-2-3	-						
1-PROJEC	 			∇		/ / // .ss		(5) 5-9-9	-						
RAMSEY						8	56	(18)	-						
9:35 - H	20			21.0	878.9	SS 9	56	5 - 9-12 (21)							
12 GDT - 8/5/15 0				Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											
S LAB MAY 20															
GINT STD US															
OLUMNS - (
GEOTECH C															
NTI GEOTEC															

	(N 1 M T	lorthe 408 I lendo elept	ern Technol Northland D ota Heights, none: 651-3	logies In Dr. Ste 1 , MN, 55 389-419	ic. 07 5120 11					BO	RIN	GΝ	UN	IBFI	R S Page	K-2 E 1 0	25)F 1
AD.GP.	CLIEN	NT Carl	Bolar	nder and So	ons, Co.			PROJE		Ram	sey County	y Re - D	evelop	oment	Site (⁻	ГСААР	²)	
БRO	PROJ		/BEF	R 15.60936	6.100			PROJE		ΤΙΟΝ	Arden Hills	s. MN						
SPIN	DATE	STARTE	- Б 6	/8/15		COMPLET	ED 6/8/15	GROUN			898 97 ft	-,		но	E SIZ	F "6	1/2" ir	nches
\SR								GROUN								-	1/2 11	101100
UNT								GROUN										
RTS/(DRILL		HOL	<u>3 1/4 in F</u>	H.S.A			A		- DRIL	LING [[]	No gro	undwa	ter ob	served		-	
DO	LOGO	GED BY _	DAS			CHECKED	BY DAS	A	F END OF	DRILL	_ING							
IG RI	NOTE	S <u>Elev.</u>	at st	aked locatio	on.			A	TER DR	LLING								
NGINEERIN	Ξ_	HIC G							TYPE SER	ERY % D)	W VTS -UE)	r PEN.	Т WT. f)	URE \T (%)	AT1		RG } ≻⊥	S
INEERING/E	(ff)	GRAP LO			MAT	TERIAL DES	SCRIPTION		SAMPLE NUME	RECOVI (RQ	BLO COUN (N VAI	POCKE1 (tsf	DRY UN (pc	MOIST	LIQUID	PLASTI0 LIMIT		FINE
3 100)/ENG				POORLY (brown to da	GRADE	D SAND W wn, fine to n	ITH SILT, (SP-SM) ligh nedium grained, moist,	t	ss 1	56	3 -4- 3 (7)							
) - (15.60936									SS 2	78	5 - 5-5 (10)	-						
HILLS - GEC	 								SS 3	89	3-3-3 (6)							
ECT ARDEN									SS 4	78	5 -6- 6 (12)	_						
S/TCAAP PROJE	 <u>10</u> 								SS 5	78	4 - 5-6 (11)	-						
15 PROJECT									SS 6	67	2 -2- 2 (4)	_						
OJECTS/20									SS 7	56	2-3-3 (6)	-						
AMSEY\1-PR									SS 8	56	3 -2- 3 (5)	-						
9:35 H:\R	20	21	.5	CLAYEY S moist, loos	SAND, (se	SC) brown,	fine to medium grained	, , 		67	4-4-3 (7)	_						
OTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 8/5/15 0				B	orehole Bottor	backfilled v	<i>i</i> ith auger cuttings. le at 21.0 feet.											

(North 1408 Mend Telep	ern Technologies, Inc. Northland Drive, Suite 107 ota Heights, MN 55120 hone: 651-389-4191				BO	RIN	G N	IUN	IBE	R T PAGI	R-3 ≞ 1 0	00 IF 1
CLIE	NT _C	arl Bola	nder and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelo	oment	Site (TCAAI	>)	
PRO		NUMBER	R <u>15.60936.100</u>				Arden Hills	s, MN						
DAT	E STAF	RTED	5/21/15 COMPLETED <u>5/21/15</u>	GROUNI) ELEVA		955.22 ft			HO	LE SIZ	E _''6	1/2" ir	<u>iches</u>
DRIL	LING (CONTRA	ACTOR NTI	GROUNI) WATER	R LEVE	LS:							
DRIL	LING N	METHO	0 <u>3 1/4 in H.S.A</u>	AT	TIME OF	DRIL	LING N	lo gro	undwa	iter ob	served	J.		
LOG	GED B	Y DAS	CHECKED BY DAS	AT	END OF	DRILL	.ING							
NOT	es <u>e</u> l	ev. at st	aked location.	AF	TER DRI	LLING								
EPTH (ft)	APHIC LOG		MATERIAL DESCRIPTION		PLE TYPE JMBER	DVERY % RQD)	3LOW DUNTS VALUE)	KET PEN. (tsf)	UNIT WT. (pcf)	ISTURE TENT (%)				INES
	19				SAM NI	REC	ΞŬĘ	POC	DRY	NO CON CON		PLA	PLAS	
-	-	0.3	BITUMINOUS PAVEMENT (4 Inches) POORLY GRADED SAND, (SP) brown, fine to media	<u>954.9</u> Im	AU 1									
ļ		2.0	(Fill) CLAYEY SAND, (SC) reddish brown, fine to coarse		SS 2	67	4 - 4-7 (11)							
-			grained, moist, medium dense to dense, trace gravel iron oxide staining	3										
					SS 3	100	6-6-7 (13)	-		10	31	13	18	42
_					SS 4	67	7 -9- 9 (18)							
-		9.5		945.7				1						
10			LEAN CLAY WITH SAND, (CL) reddish brown, moist stiff, trace medium to coarse gravel	,	SS 5	22	8-10-9 (19)							
		12.0	CLAYEY SAND, (SC) reddish brown, fine to medium	943.2	ss s	100	7-9-8	-						
		13.5	Borehole backfilled with auger cuttings.	941.7	/ 6		(17)							
			Bottom of borehole at 13.5 feet.											

Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING NUMBER TR-301 PAGE 1 OF 1
CLIENT Carl Bolander and Sons, Co.	PROJECT NAME Ramsey County Re-Development Site (TCAAP)
PROJECT NUMBER 15.60936.100	PROJECT LOCATION Arden Hills, MN
DATE STARTED 5/21/15 COMPLETED 5/21/15	GROUND ELEVATION _960.7 ft HOLE SIZE _"6 1/2" inche
DRILLING CONTRACTOR NTI	_ GROUND WATER LEVELS:
DRILLING METHOD _3 1/4 in H.S.A	AT TIME OF DRILLING No groundwater observed.
LOGGED BY _DAS DAS	AT END OF DRILLING
NOTES Elev. at staked location.	AFTER DRILLING
HL (J) DI MATERIAL DESCRIPTION	AMPLE TYPE NUMBER RECOVERY % (RQD) BLOW BLOW (RQD) (ISP) (ISP) DOCKET PEN. (ISP) DOCKET PEN. (ISP) DOCKET PEN. (ISP) DOCKET PEN. (ISP) DOCKET PEN. (ISP) DOCKET PEN. (ISP) DOCKET PEN. (ISP) DICUTENT (%) LIMIT CONTENT (%) LIMIT CONTENT (%) LIMIT CONTENT (%) LIMIT CONTENT (%) CONTENT (%) LIMIT CONTENT (%) CONTENT (%) CO
0 BITUMINOUS PAVEMENT (2.5 Inches)	AU
POORLY GRADED SAND WITH SILT, (SP-SM) bro	own, 1 1
(Fill) CLAYEY SAND, (SC) gray, fine grained, moist, trac gravel 4.5	e SS 44 10-15-15 (30)
5 POORLY GRADED SAND, (SP) reddish brown, fine medium grained, dry to moist, trace medium to coal gravel	e to se SS 67 9-10-10 (20)
SILTY SAND, (SM) reddish brown, fine grained, mo dense, trace gravel	953.7 ist, SS 89 7-9-8 4 (17)
9.5 10 POORLY GRADED SAND WITH SILT, (SP-SM) reddish brown, fine to medium grained, moist, dens trace fine to medium gravel	951.2 e, SS 67 10-11-12 (23)
	948.7 # 948.2 × SS 100 32
trace coarse gravel	
Borehole backfilled with auger cuttings.	
NA-1	
- 10	

			Northern Technolo 1408 Northland D Mendota Heights, Telephone: 651-3	ogies, Inc. rive, Suite 107 MN 55120 389-4191					BO	RIN	G N	UM	IBE	R T I Page	R-3	02 F 1
	CLIE	NT Ca	arl Bolander and So	ns, Co.		PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	ment	Site (1	<u>rcaa</u> f	P)	
	PROJ		IUMBER _ 15.60936	6.100					Arden Hills	s, MN						
	DATE		TED <u>5/22/15</u>		ED <u>5/22/15</u>	GROUN) ELEVA		956.27 ft			HOL	E SIZ	E_"6	1/2" in	ches
	DRILI	LING C	ONTRACTOR NT	<u>I</u>		GROUN	O WATEF	R LEVE	LS:							
	DRILI	LING N	IETHOD <u>3 1/4 in H</u>	I.S.A		ΓA		- DRIL	LING N	lo grou	undwa	ter ob	served	I <u>.</u>		
	LOGO	GED B	Y DAS	CHECKED	BY DAS	ΓA	END OF	DRILL	.ING							
	NOTE	ES _Ele	ev. at staked locatio	on.		AF	TER DR	LLING								
	o DEPTH (ft)	GRAPHIC LOG		MATERIAL DES	CRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT LIMIT		FINES
+			0.7 TOPSOIL (1.5 CLAYEY S	(8 Inches) AND, (SC) brown, f el. trace organics	ine grained, moist, l oos	955.6 se, 954.8	ss 1	67	2-3-3 (6)							
L.GPJ	· -		SANDY LE to stiff, trac	AN CLAY, (CL) bro ce fine gravel, iron o	wn to tan, moist, mediu xide staining	/ JM	SS 2	0	2-3-3 (6)							
RICE CREEK TRA	5		cuttings.	recovery at Sample	e No. 2. Sampled auge	er	SS 3	56	3 - 4-4 (8)							
PORTS/GINT/TR	 						SS 4	100	5 - 5-7 (12)							
	10						SS 5	100	4 - 5-5 (10)	-						
			13.5			942.8	SS 6	94	5-11-12 (23)							
0936.100			Bo	orehole backfilled w Bottom of borehol	ith auger cuttings. e at 13.5 feet.											
EO - (15.6																
LLS - GE																
RDEN H																
NECT A																
AP PRO																
CTS/TCP																
PROJE																
CTS/2015																
PROJEC																
18 - H:/1																
19/15 16:																
DT - 10/																
Y 2012.0																
LAB MA																
STD US																
IS GN1																
COLUMN																
OTECH(
UTI GE																

	(North 1408 Meno Telep	hern Technol 3 Northland D dota Heights, phone: 651-	ogies, Inc. rive, Suite 10 MN 55120 389-4191	7					BO	RIN	GΝ	IUN	IBE	R T PAGE	R-3	03 F 1
	CLIE	NT <u>Ca</u>	arl Bola	ander and Sc	ons, Co.			PROJEC	T NAM	E_Ram	nsey Count	y Re - D	evelop	oment	Site (TCAAF)	
	PRO	IECT N	UMBE	ER _15.60936	5.100			PROJEC		ATION	Arden Hills	s, MN						
	DATE	STAR	TED _	5/22/15	COM	IPLETED 5/22/15	<u> </u>	GROUN	D ELEV	ATION	943.65 ft			HO	le siz	E <u>"6</u>	<u>1/2" in</u>	<u>iches</u>
	DRIL	LING C	ONTR	RACTOR NT	1			GROUN	O WATE	R LEVE	ELS:							
	DRIL	LING M	IETHO	D <u>3 1/4 in </u>	I.S.A			A	TIME	of Dril	LING	No gro	undwa	ter ob	served	1.		
	LOG		<u> DA</u>	<u>S</u>	CHE	CKED BY DAS		A1	END C	F DRIL	LING							
ļ	NOTE	S Ele	ev. at s	staked locatio	on. O/S 20 ft.	8		Ał		RILLING	j	1	1		A T-			
	o DEPTH (ft)	GRAPHIC LOG			MATERIA	L DESCRIPTION			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
			0.5	TOPSOIL CLAYEY S moist, loos	(6 Inches) SAND, (SC) b se to dense, tr	rown, fine to coars race fine to mediur	e grained, n gravel, iro	943.2 on		33	3-3-3 (6)							
GPJ				oxide stain	ing					³ 44	4-4-4 (8)			11	30	13	17	35
RICE CREEK TRAIL										39	3-3-4 (7)	_						
EPORTS/GINT/TR										³ 106	8-9-10 (19)	_						
VG/ENGINEERING R	<u> 10 </u>									³ 133	10-12-12 (24)	-						
100)/ENGINEER			13.0 13.5	POORLY	GRADED SAI	ND WITH CLAY AI	ND GRAVE	930.7 L, <u>930.2</u>		3 133	11-12-12 (24)							
S GEO (15.60936				(SP-SC) bi fine to coa B	rown, fine to r rse gravel orehole backf Bottom of b	filled with auger cut orehole at 13.5 fee	ttings.	,]										
JECT ARDEN HILLS																		
ECTS/TCAAP PRO																		
DJECTS/2015 PROJ																		
15 16:18 - H/1 PRC																		
/ 2012 GDT 10/19																		
F STD US LAB MAY																		
CH COLUMNS - GIN1																		
NTI GEOTE																		

(1	North 1408 Mend Telep	ern Technologies, Northland Drive, S ota Heights, MN 5 hone: 651-389-41	Inc. uite 107 5120 91					BO	RIN	G N	IUN	IBE	R T PAGE	R-3	04 F 1
c	LIE	NT <u>Carl Bola</u>	nder and Sons, Co			PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF	P)	
P	ROJ	ECT NUMBE	R <u>15.60936.100</u>			PROJEC	T LOCA		Arden Hills	, MN						
	ATE		5/22/15	COMPLETED	5/22/15	GROUNE) ELEVA		944.04 ft			HO	LE SIZ	E <u>"6</u>	1/2" in	<u>ches</u>
	RILI	LING CONTR/	ACTOR NTI			GROUNE	WATER	R LEVE	LS:							
	RILI		D <u>3 1/4 in H.S.A</u>			AT	TIME OF	DRIL	LING N	lo grou	undwa	ter ob	served	1.		
	OGC	SED BY DAS		CHECKED BY	DAS	AT	END OF		_ING							
	IOTE	S Elev. at s	aked location. 0/S	30 π. S		AF	I ER DRI			1	1		AT7			
DEDTU	0 (ff)	GRAPHIC LOG	MA	TERIAL DESCR	IPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
F	_		SILTY SAND WI dry, loose, fine to	TH GRAVEL, (S coarse gravel	M) brown, fine graine	ed,	$\int ss_1$	44	3 - 3-3 (6)	_						
.GPJ	-	3.5	NOTE: Sampled	auger cuttings fo	or Sample No. 2.	940.5	SS 2	6	3 -2- 3 (5)	-						
E CREEK TRAIL	5		to stiff, trace fine	gravel	,			83	3-3-3 (6)							
RTS/GINT/TR - RIC	-						SS 4	78	10-14-14 (28)							
SIENGINEERING REPC	- 10 -	9.5	POORLY GRADE reddish brown, fir trace fine gravel,	ED SAND WITH ne grained, mois iron oxide stainii	SILT, (SP-SM) t, medium dense, ng	934.5	ss 5	44	5 - 7-7 (14)	-						
	-	13.5	SILTY LEAN CLA rather stiff, trace	AY, (CL-ML) redo fine gravel	lish brown, moist,	932.0	ss 6	100	5 - 6-7 (13)							
GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 10/19/15 16/18 - H/1-PROJECTS/2015 PROJECTS/TCAAP PROJECT ARDEN HILLS - GEO - (15.80938, 100)			Borehole Botto	e backfilled with om of borehole a	auger cuttings. t 13.5 feet.											

(1		North 1408 Mend Telep	ern Techno Northland I ota Heights hone: 651	ologies, Inc Drive, Suit s, MN 5512 -389-4191	c. e 107 20						BO	RIN	G N	IUM	IBE	R T Page	R-3	05 F 1
		NT_C	arl Bola	nder and S	ons, Co.				PROJEC	T NAME	Ram	sey County	Re - D	evelop	oment	Site (ГСААF)	
F	PROJ	ECT	NUMBER	२ _15.6093	36.100				_ PROJEC			Arden Hills	, MN						
	DATE	STAF	RTED _	5/22/15	(COMPLET	ED <u>5/22/</u>	15	GROUNE	ELEVA	TION _	933.8 ft			HOI	_E SIZ	E <u>"6</u>	<u>1/2" in</u>	<u>ches</u>
	RILL	ING (CONTRA		TI				GROUNE	WATER	R LEVE	LS:							
	RILL	ING N	IETHO) <u>3 1/4 in</u>	H.S.A				¥AT	TIME OF	DRIL	LING _ 7.00) ft / El	ev 926	5.80 ft				
	.OGG	SED B	Y DAS	<u> </u>			BY DAS		AT	END OF		.ING							
Ľ	IOTE	S <u>- EI</u>	ev. at st	aked locat	ion. 0/S 8	ft. SE			AF	IER DRI						AT7			
	o UEPTH (ft)	GRAPHIC LOG			MATE	RIAL DES	SCRIPTIO	N		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
F	_		0.3	TOPSOIL SILTY SA	. (4 Inches) GRAVEL	, (SM) brov	wn, fine to		SS 1	44	3 - 4-5 (9)							
GPJ	-			medium g dense NOTE: Sa	rained, me	oist to satu avel (SP)	urated, me layer at 2.	dium dense f 5 feet.	to		44	8-11-10 (21)							
	5			NOTE: Sa	amp l ed au	ger cutting	is for Sam	ple No. 3.		SS 3	22	11-11-8 (19)							
PORTS/GINT/TR - F	-		7.0 <u>∨</u> 8.5	POORLY saturated	GRADED , loose	SAND, (S	P) brown,	fine grained,	926.8 925.3	SS 4	56	3 -3- 3 (6)							
	10		11.0	medium		0, 112, (0)	L) 510 m K	o gray, wor,	022.8	ss	56	2-2-3 (5)							
ING/ENG		/////	11.0	E	Borehole b	ackfilled w	vith auger	cuttings.	922.8	/ 0		(0)						I	
TI GEOTECH COLUMNS - GINT STD US L48 MAY 2012/GDT - 10/19/15 16:18 - H:11-PROJECTS/2015 PROJECTS/TCAAP PROJECT ARDEN HILLS - GEO - (15.60296, 100)ENGNEEF					Bottom	of boreno	le at 11.01	ΓΕΕΤ.											

Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING NUMBER TR-306 PAGE 1 OF 1
CLIENT Carl Bolander and Sons, Co.	PROJECT NAME Ramsey County Re-Development Site (TCAAP)
PROJECT NUMBER _ 15.60936.100	PROJECT LOCATION Arden Hills, MN
DATE STARTED _5/19/15 COMPLETED _5/19/15	GROUND ELEVATION 907.55 ft HOLE SIZE 6 1/2" inches
	GROUND WATER LEVELS:
DRILLING METHOD _3 1/4 in H.S.A	
LOGGED BY DAS CHECKED BY DAS	AT END OF DRILLING
NOTES Elev. at staked location.	AFTER DRILLING
HLAD DHATERIAL DESCRIPTION	SAMPLE TYPE NUMBER RECOVERY % (RQD) BLOW COUNTS (N VALUE) POCKET PEN. (1sf) DRY UNIT WT. (1sf) DRY UNIT WT. (1sf) DRY UNIT WT. (1sf) DRY UNIT WT. (1sf) DRY UNIT WT. (1sf) DRY UNIT WT. (1sf) DRY UNIT WT. FIMIT FINES FINES
CLAYEY SAND, (SC) gray brown, fine to medium	<u></u>
grained, moist, medium dense, trace fine to medium	
	$\begin{array}{ c c c c c c c c c c c c c c c c c c c$
	SS 83 4-6-9 (15)
	899.1 SS 33 5-7-8 4 (15)
10 SANDY LEAN CLAY, (CL) blue gray, moist to wet, rather stiff, trace gravel, iron oxide staining	SS 78 5-6-7 5 78 (13)
 	894.1 SS 89 4-4-5 6 (9)
Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.	
90 - ST	
2.2015	
191 cl	
- 10/18	
12.430	
z	

			lorthern Technologies, li 408 Northland Drive, Su Aendota Heights, MN 55 elephone: 651-389-419	nc. ite 107 120 1					BO	RIN	G N	IUM	IBE	R T PAGE	R-3 ≞ 1 0	07 F 1
	CLIEI	NT Carl	Bolander and Sons, Co.		PROJ		IAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAA	^{>})	
	PRO.		MBER 15.60936.100		PROJ	ECT L	OCA1		Arden Hills	s, MN						
	DATE		D 5/15/15	COMPLETED 5/15/15	_ GROU	ND EI			898.93 ft			но	_E SIZ	E_"6	1/2" in	iches
	DRIL				_ GROU	ND W	ATER		LS:							
	DRIL	LING MET	THOD <u>3 1/4 in H.S.A</u>		_ <u>\</u>		ME OF	DRIL	LING _5.00) ft / El	lev 893	3.93 ft				
	LOGO	GED BY	DAS	CHECKED BY DAS			ID OF	DRILL	.ING							
	NOTE	ES Elev.	at staked location.			AFTE	r dri	LLING								
	o DEPTH (ft)	GRAPHIC LOG	MAT	ERIAL DESCRIPTION			SAMPLE ITPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	FERBE LIMITS FIMIT		FINES
			POORLY GRADE grained, moist, littl (Fill)	D SAND, (SP) brown, fine to me e gravel	dium		SS 1 SS	44	2-4-7 (11) 12-24-24	-						
KEEK IKAL GPJ	 	5.0) <u>⊽</u> SILTY SAND (SM	1) brown fine to coarse grained	89:	<u>3.9</u>	2 SS	67	(48) 17-23-24	-						
SIGNIN REPORT			saturated, very de lenses	nse to loose, trace gravel, few sil	t		3 SS	44	(47) 3-3-5 (8)	-		6				14
SINEEKING KEPOKI							SS 5	44	2-4-8 (12)	-						14
U)/ENGINEEKING/EN	 	7 12 12 7 7 7 7 13 13 13	.0 .5 POORLY GRADE .0 .5 fine grained, satur	D SAND WITH SILT, (SP-SM) bi ated, medium dense, little gravel	880 own, <u>880</u> 883	6.9 6.4 5.9	SS 6	56	5-6-6 (12)	-						
HLLS - GEO - (15-60936-10			CLAYEY SAND, (medium dense POORLY GRADE fine grained, satur Borehole Bottor	SC) brown, fine grained, saturate D SAND WITH SILT, (SP-SM) bi ated, medium dense backfilled with auger cuttings. n of borehole at 13.5 feet	d, œwn,											
AP PROJECT ARDEN																
GUI5 PROJECTS/TC																
18-H://+/KOJECIS																
2.GDT - 10/19/15 16																
TD US LAB MAY 201																
- COLUMNS - GIN I S I																
NI GEOLECH																

(Northe 1408 Mende Telepl	ern Tech North l an ota Heigl hone: 65	nologies, d Drive, S nts, MN 5 51-389-41	Inc. ouite 107 5120 91					BO	RIN	G N	IUN	1BE	R T Page	R-3 ≞ 1 0	08 F 1
CLI	ENT C	arl Bola	nder and	Sons, Co).		PROJE	CT NAME	Ram	sey County	y Re-D	evelo	oment	Site (TCAAF	P)	
PR		NUMBER	२ 15.60	936.100			PROJE	CT LOCA	TION	Arden Hills	s, MN			•		,	
DA	TE STAF	RTED 5	5/15/15		COMPLETE	D 5/15/15	GROUN	D ELEVA		894.38 ft			но	LE SIZ	E "6	1/2" in	iches
	ILLING (CTOR	NTI			GROUN	D WATE		LS:			-				
		NETHO) 31/4	n H.S.A			_ ∧	T TIME O	F DRIL	L ING 9.50	0 ft / El	lev 88	4.88 ft				
LO	GGED B	Y DAS			CHECKED I	BY DAS	A	t end of		.ING							
NO	TES E	ev. at st	aked loc	ation.			A	FTER DR	ILLING								
o DEPTH	(II) GRAPHIC LOG			MA	TERIAL DES	CRIPTION	_	SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
		0.5		IL (6 Inch	ies) M) dark brown	fine grained moist	893.	a A SS 1	56	2-3-3 (6)							
		2.0	loose, t	ace grav	e l	i, fille grained, filoist	892.	4		(0)	1						
			POORL moist, l e	Y GRAD	ED SAND, (SF ledium dense,) brown, fine graine trace gravel	d,	SS 2	56	4 - 4-4 (8)	-						
5		- - - - - - -						SS 3	33	3 -7- 9 (16)							
		7.0		Dt) black	dry to moist	ctiff	887.	4		4.0.40	-						
		8.0			, dry to moist, $\overline{\mathbf{M}}$ grow find c	sun	886.	$\frac{1}{4}$	89	4-6-12 (18)							
			saturate	ed, dense	wi) gray, inte g	frained, moist to		<u> </u>			1						
		. <u>×</u>						SS 5 SS SS	67	5-8-14 (22) 4-8-12	_						
		13.5		Boreho	e backfilled wi	th auger cuttings.	880.	9// 0		(20)							
אנוסבה ביש המשווא אחתי אות אות איני היא האיני או האינים ואיני איני איני איני איני איני איני אינ				Botto	of borehole	a at 13.5 feet.											

Nort 1400 Mer Tele	thern Technologies, Inc. 8 Northland Drive, Suite 107 ndota Heights, MN 55120 aphone: 651-389-4191				BO	RIN	G N	IUM	IBE	R T PAGE	R-3 ≞ 1 0	09 F 1
CLIENT Carl Bol	lander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAI	>)	
PROJECT NUMB	ER 15.60936.100	PROJEC			Arden Hills	s, MN						
DATE STARTED	5/15/15 COMPLETED 5/15/15	GROUNE	ELEVA		890.43 ft			но	LE SIZ	E_"6	1/2" in	ches
DRILLING CONT	RACTOR NTI	GROUNE	WATER		LS:							
DRILLING METHO	DD 3 1/4 in H.S.A	$\overline{\mathbf{a}}$ at	TIME OF	DRILI	LING _4.00) ft / El	ev 886	5.43 ft				
LOGGED BY _DA	AS CHECKED BY DAS	AT	END OF	DRILL	ING							
NOTES Elev. at	staked location.	AF	TER DRI	LLING								
o DEPTH (ft) GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
	 TOPSOIL (6 Inches) CLAYEY SAND, (SC) brown, fine to medium grained, ┐ moist, loose, trace gravel 	<u>889.9</u> 888.9	ss 1	100	0 - 3-4 (7)							
P	NOTE: Weight of Hammer at Sample No. 1. POORLY GRADED SAND WITH SILT, (SP-SM) gray] ',	SS 2	78	3 - 4-8 (12)			13				9
	dense, trace gravel, few clay lenses			89	4 - 6-9 (15)							
				44	2-5-5 (10)							
			√ ss	56	4-6-6							
	SANDY LEAN CLAY (CL) grow saturated modium	878.4	5		(12)	-						
	trace gravel, few sand lenses	876.9	$\begin{pmatrix} SS \\ 6 \end{pmatrix}$		3 - 4-4 (8)							
13.5	trace gravel, few sand lenses Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.	876.9	<u>6</u>									

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOR	RING	6 NI	JME	3EF	R WI PAGE	N-4	00 F 1
CLIE	NT _C	arl Bolander and Sons, Co.	PROJEC [®]		Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF)	
PRO		IUMBER 15.60936.100	PROJEC			Arden Hills	, MN						
DAT	E STAF	COMPLETED 5/28/15	GROUND	ELEVA		965.77 ft			HO	E SIZ	E <u>"6</u>	<u>1/2" in</u>	<u>ches</u>
DRIL	LING C	CONTRACTOR NTI	GROUND	WATER	LEVE	LS:							
DRIL	LING N	IETHOD 3 1/4 in H.S.A	AT	TIME OF	DRIL	LING N	lo grou	undwa	ter ob	servec	1.		
LOG	GED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	.ING							
NOT	ES <u>El</u>	ev. at staked location.		FER DRI	LLING		1	1					
DEPTH (ft)	ZAPHIC LOG	MATERIAL DESCRIPTION		PLE TYPE UMBER	OVERY % (RQD)	BLOW OUNTS VALUE)	:KET PEN. (tsf)	UNIT WT. (pcf)	NSTURE ITENT (%)				FINES
0	Ū			SAM	REC	-oz	POO	DRY	ЪS	95	PLA	PLAS'	
-		0.8 TOPSOIL (10 inches) CLAYEY SAND, (SC) brown, moist, loose to medium dense, trace gravel	964.9	ss 1	56	4 - 5-6 (11)							
-			2	SS 2	100	6-4-5 (9)							
5		4.5 SANDY LEAN CLAY, (CL) brown, moist, medium to very stiff, trace gravel	961.3	SS 3	67	3-2-3 (5)	-						
				√ ss	100	3-4-3							
- - 10			,	/\4		(7)	-						
-				SH 5	-				17	29	13	16	51
		NOTE: No recovery. Sampled auger cuttings.	952.3,	SS 6	0	32	-						
		Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.											

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOR	RING	9 NI	JME	BEF	R WI PAGE	N-4 (01 F 1
CLIER	NT _C	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF)	
PROJ		UMBER 15.60936.100	PROJEC			Arden Hills	, MN						
DATE	STAF	COMPLETED _5/21/15	GROUNI	D ELEVA		954.63 ft			HO	LE SIZ	E <u>"6</u>	<u>1/2" in</u>	<u>ches</u>
DRILI	LING C	CONTRACTOR NTI	GROUNI) WATER	LEVE	LS:							
DRILI		IETHOD <u>3 1/4 in H.S.A</u>	AT	TIME OF	DRIL	LING N	lo grou	undwa	ter ob	served	1.		
LOGO	GED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	.ING							
NOTE	ES _EI	ev. at staked location.	AF	TER DRI	LLING								
o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
		SILTY SAND, (SM) brown, fine to medium grained, 1.5 moist, little gravel (Fill)		SS 1	67	5 - 10-7 (17)	-						
		CLAYEY SAND, (SC) brown, fine grained, moist, trace gravel (Fill)	951.6	SS 2	56	5 - 6-7 (13)							
5		14.5 CLAYEY SAND, (SC) brown, fine grained, moist, medium dense, trace gravel	950.1	∕∕ ss	67	4-3-4	-						
		CLAYEY SAND, (SC) brown, fine grained, moist, medium dense to stiff, trace gravel		3	07	(7)	-						
				SS 4	100	5 - 5-7 (12)							
10				SH					12	23	13	10	30
				√ ss	400	7-8-8	-						_45_
		13.5 Borobalo backfilled with auger outlings	941.1	6	100	(16)							
00000		Bottom of borehole at 13.5 feet.											
201													
2													
101													
2													
2													
100-710													

(Northe 1408 N Mendo Teleph	rn Technologies, Inc. Northland Drive, Suite 107 ta Heights, MN 55120 none: 651-389-4191					BOR	RING	6 NI	JME	3ER	PAGE	1 0	02 F 1
CLIE	NT Carl Bolar	ider and Sons, Co.	PROJEC	тι	NAME	Rame	sey County	/ Re-D	evelop	ment	Site (1	CAAF	<u>')</u>	
PRO	JECT NUMBER	15.60936.100	PROJEC	Т			Arden Hills	, MN						
DAT	E STARTED _6	/4/15 COMPLETED _6/4/15	GROUN	DE	LEVA	TION _	915.63 ft			HOL	E SIZ	E_"6	<u>1/2" in</u>	<u>ches</u>
DRIL	LING CONTRA	CTOR NTI		ע כ	VATER	LEVE	LS:							
DRIL	LING METHOD	3 1/4 in H.S.A	¥ AT	T	ME OF	DRILL	_ING _12.0	00 ft / E	Elev 90	03.63	ft			
LOG	GED BY DAS	CHECKED BY DAS	AT A T	E			ING							
NOT	ES Elev. at sta	aked location.	AF		R DRI			1						
DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION			MPLE TYPE NUMBER	COVERY % (RQD)	BLOW COUNTS N VALUE)	CKET PEN. (tsf)	Y UNIT WT. (pcf)	AOISTURE INTENT (%)				FINES
					SA	R	\sim	P	DR	20		Ы	PLA	
	<u>x¹/₂ x¹</u> 0.8	TOPSOIL (10 inches)	914.8	\mathbf{N}	ss	78	3-3-2							
Ľ		POORLY GRADED SAND WITH SILT, (SP-SM) reddish brown, fine to medium grained, moist		Ê	1		(5)							
-	3.0	(Fill) POORLY GRADED SAND WITH SILT, (SP-SM) reddish brown, fine to medium grained, moist, loose	912.6		SS 2	100	4 -6- 5 (11)							
5		-		∇	ss	89	4-5-3	-						
_			000.0	F	3		(8)	-						
-	10	CLAYEY SAND, (SC) moist, loose, trace gravel	908.6	\mathbb{N}	ss	79	4-3-4	1						
- - 10		SILTY SAND, (SM) brown, fine to medium grained, moist, medium, trace clay (CL) lenses	307.0		4	70	(7)	-						
					SH 5	-				11				30
	12.8		902.8	\mathbb{N}	ss	100	4-4-5	1						
	<u> </u>	CLAYEY SAND, (SC) gray, saturated, medium dense trace gravel	, <u>902.1</u>	/ `	0		(9)						l	
	_	Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.												
2														

Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191 Model Alegada Alegad											
CLIENT Carl Bolander and Sons, Co.	PROJECT NAME Ramsey County Re-Development Site (TCAAP)										
PROJECT NUMBER _ 15.60936.100	PROJECT LOCATION Arden Hills, MN	_									
DATE STARTED _ 6/4/15 COMPLETED _ 6/4/15	GROUND ELEVATION 907.66 ft HOLE SIZE 6 1/2" inche	<u>s</u>									
	GROUND WATER LEVELS:										
DRILLING METHOD _3 1/4 in H.S.A		_									
LOGGED BY DAS CHECKED BY DAS	AT END OF DRILLING	_									
NOTES _Elev. at staked location.	AFTER DRILLING	-									
HLAND OHON 0 MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER RECOVERY % (ROD)										
	907.2 SS 67 5-4-4	٦									
fine to medium grained, moist, trace coarse gravel	vn, <u>906.2/ 1 (0)</u>										
2.7 (Fill) SANDY LEAN CLAY, (CL) brown, moist, rather stiff POORLY GRADED SAND WITH SILT, (SP-SM) brow	vn, SS 100 7-6-7 (13)										
fine to medium grained, moist to saturated, medium dense	SS 100 5-6-6 (12)										
LEAN CLAY WITH SAND, (CL) brown, wet, medium	$\begin{array}{c c c c c c c c c c c c c c c c c c c $										
9.5	898.2										
CLAYEY SAND, (SC) blue gray, saturated, very loos	$3 \times 100 \times 1000 \times 100 \times 100 \times 1000 \times 100 $										
12.5	895.2										
LEAN CLAY, (CL) blue gray, wet, trace gravel	SH 6										
Borebole backfilled with auger cuttings	892.7	4									
Bottom of borehole at 15.0 feet.											
G (1/2%)											
7201											

Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING NUMBER WM-404 PAGE 1 OF 1
CLIENT Carl Bolander and Sons, Co.	PROJECT NAME Ramsey County Re-Development Site (TCAAP)
PROJECT NUMBER _ 15.60936.100	PROJECT LOCATION Arden Hills, MN
DATE STARTED _6/5/15 COMPLETED _6/5/15	GROUND ELEVATION 907.25 ft HOLE SIZE "6 1/2" inches
	GROUND WATER LEVELS:
DRILLING METHOD 3 1/4 in H.S.A	
LOGGED BY DAS CHECKED BY DAS	AT END OF DRILLING
NOTES _Elev. at staked location.	AFTER DRILLING
HL DH BO C C C C C C C C C C C C C C C C C C C	FINES SAMPLE TYPE NUMBER RECOVERY % (RQD) RECOVERY % (RQD) RCOUNTS (N VALUE) POCKET PEN. (1sf) NNIT WT. (sf) POCKET PEN. (sf) POCKET PEN. (sf) DRY UNIT WT. (sf) POCKET PEN. (sf) POCKET PEN. (sf) POCK
TOPSOIL (12 Inches)	006 2 SS 76 6-5-6
POORLY GRADED SAND WITH CLAY, (SP-SC) da brown, fine grained, moist, trace gravel (Fill)	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$
POORLY GRADED SAND WITH SIL1, (SP-SM) bro- fine to medium grained, moist, dense, trace gravel	wn, SS 89 11-10-8 (18)
SILTY SAND, (SM) light brown, fine grained, moist to saturated, dense to medium dense, trace gravel	900.3 D SH 100
	SS 100 10-10-8 (18)
	SS 89 7-6-7 6.7
Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.	

	Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING NUMBER WM-405 PAGE 1 OF 2
	arl Bolander and Sons, Co.	PROJECT NAME Ramsey County Re-Development Site (TCAAP)
PROJECT	NUMBER _ 15.60936.100	PROJECT LOCATION Arden Hills, MN
DATE STA	RTED _ 6/5/15 COMPLETED _ 6/5/15	GROUND ELEVATION _ 899.38 ft HOLE SIZE _ "6 1/2" inche
DRILLING	CONTRACTOR NTI	GROUND WATER LEVELS:
DRILLING	METHOD 3 1/4 in H.S.A	
LOGGED E	Y DAS CHECKED BY DAS	AT END OF DRILLING
NOTES E	ev. at staked location. O/S 40 ft. E	AFTER DRILLING
o DEPTH (ft) GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER RECOVERY % (RQD) (RDD)
	10.8 TOPSOIL (10 Inches) POORLY GRADED SAND WITH SILT, (SP-SM) dark	898.6 SS 56 7-7-6 (13)
	brown to light brown, fine to medium grained, moist to saturated, medium dense to loose, trace gravel	SS 89 6-9-7
		$\times \ 3 \ 78 \ (7)$
		SS 100 8-6-7 (13)
		SS
		$\times 5 100 (10) (10)$
	13.5	885.9 SS 6 100 4-4-4 (8)
	Borehole backfilled with auger cuttings. Bottom of borehole at 13.5 feet.	
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Northern Techr 1408 Northland Mendota Heigh Telephone: 65	nologies, Inc. I Drive, Suite 107 its, MN 55120 1-389-4191				BOF	RING	G NI	JME	BER	PAGE	M-4 (= 1 0	06 F 1
CLIENT Carl Bolander and	Sons, Co.	PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (1	FCAAF	P)	
PROJECT NUMBER _ 15.609	936.100	PROJEC			Arden Hills	s, MN						
DATE STARTED _6/23/15	COMPLETED <u>6/23/15</u>	GROUN) ELEVA	TION _	891.68 ft			HO	E SIZ	E <u>"6</u>	1/2" in	<u>ches</u>
	NTI	GROUNI) WATEF	R LEVE	LS:							
DRILLING METHOD 3 1/4 in	n H.S.A	${ar abla}$ at	TIME O	F DRIL	LING _12.0	00 ft / E	Elev 8	79.68	ft			
LOGGED BY DAS	CHECKED BY DAS	AT	END OF	DRILL	.ING							
NOTES _Elev. at staked loca	ation.	AF	TER DR	LLING								
o DEPTH (ft) GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
			SS 1	44	1-2-3							
POORL brown, fi	Y GRADED SAND WITH SILT, (SP-SM) dark ine to medium grained, moist, very loose to				(5)							
3.0 loose		888.7		78	3-3-4							
PEAT, (I)	Pt) black, moist, soft, trace gravel		<u> </u>		(7)	-						
			SH 3	-								
				-								
			SS SS	83	2-2-2							
			4		(4)	-						
10 / 1/				-								
			SH 5									
				-								
	Weight of Hammer at 12.0 feet.		ss s	44	0-2-4							
saturate	d, loose, fine gravel	,			(0)	-						
15	AND, (SM) gray, fine grained, saturated,	877.2	// ss		4-5-6	-						
16.0 medium	dense	875.7	7	83	(11)							
	Borehole backfilled with auger cuttings. Bottom of borehole at 16.0 feet.											

II GEOTEC

(Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191	BORING N	UMBER WM-407 PAGE 1 OF 1
C∟	IENT Carl Bolander and Sons, Co.	PROJECT NAME Ramsey County Re-Develo	pment Site (TCAAP)
PR	OJECT NUMBER _ 15.60936.100	PROJECT LOCATION Arden Hills, MN	
DA	ITE STARTED _5/27/15 COMPLETED _5/27/15	GROUND ELEVATION <u>889.12 ft</u>	_ HOLE SIZE6 1/2" inches
		$ \qquad \qquad$	2 87 ft
LO	DIGGED BY DAS CHECKED BY DAS	AT END OF DRILLING	2.07 11
NC	DTES _Elev. at staked location. O/S 10 ft. E	AFTER DRILLING	
ЕРТН		LE TYPE IMBER DVERY % RQD) LOW UNTS VALUE) (tsf) UNIT WT. (bcf)	
	5 5	SAMF NUL (N) (N) (N) (N) (N) (N) (N) (N) (N) (N)	CON CON CON CON CON
-	POORLY GRADED SAND WITH SILT, (SP-SM fine to medium grained, moist, trace gravel (Fill)	rown, 887.6 1 56 8-9-11 (20)	
_	SILTY SAND, (SW) brown, fine grained, moist, gravel (Fill)	884.6 SS 56 6-10-11 (21)	
	POORLY GRADED SAND WITH SILT, (SP-SM fine grained, moist to saturated, dense, little org ∑ iron oxide staining	rown, ics, SS 89 6-11-12 (23)	
	SILTY SAND, (SM) light brown to gray, fine gra saturated, medium dense	d, SS 78 7-6-8 (14)	
	0 9.5 POORLY GRADED SAND WITH SILT, (SP-SM fine grained, saturated, loose to medium dense	879.6 ray, SS 67 3-3-4 5 (7)	15 6
		SS 67 5-4-5 875.6 67 (9)	
EN HILLS - GEO - (15 60936 10U)	Borehole backfilled with auger cuttings Bottom of borehole at 13.5 feet.		
115 PROJECTS/TC			
M-PROJECTS/20			
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(Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOR	INC	S NI	JME	BER	PAGE	N-4	08 F 1
CLIE	NT _C	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (ГСААР	^{>})	
PRO		IUMBER 15.60936.100	PROJEC			Arden Hills	, MN						
DATE		COMPLETED _ 5/27/15	GROUN	D ELEVA		888.74 ft			HOL	E SIZ	E <u>"6</u>	<u>1/2" in</u>	iches
DRIL	L I NG C	ONTRACTOR NTI	GROUN	O WATER	LEVE	LS:							
DRIL	LING N	IETHOD _ 3 1/4 in H.S.A	${ar abla}$ at	TIME OF	DRIL	LING <u>5.00</u>) ft / E	ev 883	3.74 ft				
LOG	GED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	_ING							
NOT	ES <u>El</u>	ev. at staked location. O/S 15 ft. E	AF	TER DRI	LLING								
o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
_		POORLY GRADED SAND, (SP) brown, fine to medium grained, moist, little fine to medium gravel	n	SS 1	33	8-9-8 (17)							
-		(Fill)				10 12 12							
\mathbf{F}				2 2	22	(25)							
		4.0 POORLY GRADED SAND, (SP) brown, moist to	884.7										
	-	$5.5 \xrightarrow{4}$ saturated, loose, little fine gravel	883.2		44	3-4-3 (7)							
_		loose to loose, trace gravel											
				SS 4	44	1-1-1 (2)							
<u> 10 </u> -	-			SS 5	44	2-1-2 (3)	-						
_		13.5	875.2	SS 6	89	3 -4- 4 (8)	-						
		Borehole backfilled with soil cuttings. Bottom of borehole at 13.5 feet.	875.2			(8)							

			Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOR	RING	S NI	JME	BER	R WI PAGE	M-4 (= 1 0	09 F 1
	CLIEN	NT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (ГСААF	P)	
	PROJ		IUMBER 15.60936.100	PROJEC			Arden Hills	, MN						
	DATE	STAR	TED _5/27/15 COMPLETED _5/27/15	GROUNI) ELEVA		886.87 ft			HO	E SIZ	E_"6	1/2" in	<u>ches</u>
	DRILL	LING C	ONTRACTOR NTI	GROUNI) WATER	LEVE	LS:							
	DRILL	LING N	IETHOD 3 1/4 in H.S.A	${ar ar \Sigma}$ at	TIME OF	DRIL	LING _ 7.00) ft / E	ev 879	9.87 ft				
	LOGO	GED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	.ING							
	NOTE	ES <u>El</u> e	ev. at staked location.	AF	TER DRI	LLING								
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
			POORLY GRADED SAND WITH SILT, (SP-SM) brown fine grained, moist, trace gravel (Fill)	n, <u>885.4</u>	SS 1	78	4-3-4 (7)							
			SILTY SAND, (SM) brown, fine grained, moist (Fill)		SS 2	100	4 - 7-6 (13)	-						
TER MAIN GPJ	5		6.0	880.9	SS 3	89	3-5-5 (10)							
REPORTS/GINT/WM - W/	· -		SILTY SAND, (SM) light brown to gray, fine grained, ↓ moist to saturated, medium dense to loose, iron oxide staining		SS 4	78	3 - 5-4 (9)	-						
NG/ENGINEERING I	<u> 10 </u> -				SS 5	56	2-4-4 (8)							
))/ENGINEER			13.5	873.4	SS 6	56	2-2-3 (5)							
(15 60936 100			Borehole backfilled with soil cuttings. Bottom of borehole at 13.5 feet.											
HLLS - GEO														
UECT ARDEN														
TS/TCAAP PRC														
S/2015 PROJEC														
HM PROJECT														
8/21/15 14:43														
MAY 2012.GDT														
NT STD US LAB														
COLUMNS - GI														
NTI GEOTECH														

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389–4191				BOR	INC	S NI	JME	3ER	R WI PAGE	M-4 1 0	10 F 1
CLIEN	NT Ca	arl Bolander and Sons, Co.	PROJECT NA		Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF)	
PROJ	ECT N	IUMBER 15.60936.100		CATI	ON _	Arden Hills	, MN						
DATE	STAF	COMPLETED 6/25/15	GROUND ELI	EVAT		877.04 ft			НО	E SIZ	E <u>"6</u>	1/2" in	iches
DRILL	ING C		GROUND WA	TER I	LEVE	LS:							
DRILL	ING N	IETHOD 3 1/4 in H.S.A	$\overline{\mathbb{Y}}$ at tim	E OF I	DRILI	_ING _7.00) ft / E	ev 870	0.04 ft				
LOGO	SED B	Y DAS CHECKED BY DAS	AT END	O OF E	ORILL	ING							
NOTE	S El	ev. at staked location.	AFTER	DRIL	LING								
o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE	NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
		0.5 TOPSOIL (6 Inches)	876.5	SS	78	2-3-4							
L _		fine to medium grained, moist, loose to dense, trace	vn,	-		(7)							
		fine to coarse gravel, trace roots, iron oxide staining, clay (CL) pieces	X	SS 2	89	8-8-8 (16)	-						
5		NOTE: Hard drilling at 5.0 feet due to coarse gravel.	X	SS 3	56	9 - 20-10 (30)	-						
		7.0 POORLY GRADED SAND WITH SILT, (SP-SM) gray fine to coarse grained, saturated, loose, trace fine gravel	870.0	SS 4	78	7 -4- 4 (8)	-						
 				SS 5 SS	89	4-3-2 (5) 2-2-3	-						
 _ 15		14.5 SANDY LEAN CLAY, (CL) gray, wet, medium, trace f	862.5	6	09	(5)	-						
		gravel		7	100	(9)	-						
 		21.5	855.5	SH 8									
		Borehole backfilled with auger cuttings.	· · · · · ·				•	•	•	•			

			Northe 1408 N Mendo Teleph	rn Technologie lorthland Drive ta Heights, MN one: 651-389	es, Inc. e, Suite 107 N 55120 -4191					BOI	RIN	G N	UM	BEI	R B PAGE	R-6 1 0	00 F 3
	ENT	Ca	arl Bolan	der and Sons,	Co.			T NAME	Ram	sey County	/ Re - D	evelop	ment	Site (FCAAF	<u>)</u>	
	JEC	T N	IUMBER	15.60936.10)0					Arden Hills	, MN						
Ë DAT	E ST	ΓAR	RTED _ 6/	/8/15		ED <u>6/8/15</u>	GROUN) ELEVA		884.65 ft			НО	E SIZ	E <u>"6</u>	1/2" in	iches
	LLIN	GC	ONTRA	CTOR NTI			GROUN) WATER	R LEVE	LS:							
		GN	IETHOD	3 1/4 in H.S.	A				F DRIL	LING _17.3	30 ft / E	Elev 86	67.35	ft			
	GEL) B.	Y DAS		CHECKED	BY DAS	A		DRILL	.ING							
	ES .	Ele	ev. at sta	ked location.			A	TER DR	LLING								
5													_	AT1	ERBE	RG	
	GRAPHIC	FOG			MATERIAL DES	CRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%)	LIQUID			FINES
			2.0	POORLY GRA fine to mediun (Fill)	ADED SAND WI n grained, moist,	TH SILT, (SP-SM) brov loose, trace gravel	wn,	SS 1	78	3 - 4-3 (7)							
		Ŷ	2.0	POORLY GR/ fine grained, n	ADED SAND WI noist, medium de	TH SILT, (SP-SM) brow ense, trace gravel	wn,	SS 2	67	4 - 5-6 (11)	-						
5 								SS 3	56	4-4-6 (10)	-						
			7.0	SILTY SAND,	(SM) gray, fine	grained, moist, dense	877.7	ss 4	117	6-11-10 (21)	-						
			9.5	SILTY SAND, dense, little or	(SM) gray, fine ganics	grained, moist, mediun	<u>875.2</u> ו	ss 5	100	4 - 3-6 (9)							
			12.0	NOTE: Orgar	nic materials end	countered at 11.0 feet.	872 7										
				LEAN CLAY, ((CL) gray, moist,	medium, little organica	5	ss 6	67	2-2-4 (6)	-						
15 15			14.5	SANDY LEAN to rather stiff,	l CLAY, (CL) gra trace gravel	y, moist to wet, mediur	<u>870.2</u> n	SS 7	78	2 - 2-3 (5)	-						
1 1 1 1			Ţ						100	2 - 3-4 (7)	-						
20 - 100 - 1								SS 9	100	3 - 3-5 (8)	-						
25 52 52								SS 10	89	4 - 5-5 (10)	-						
й - - - 30			30.0				854.7										

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BO	RIN	GN	UM	BE	R B PAGE	R-6 ≣ 2 C	00 0F 3
CLIE	NT <u>Ca</u>	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAI	^{>})	
PRO	JECT N	UMBER _15.60936.100	PROJEC			Arden Hills	s, MN						
EPTH (ft)	APHIC LOG	MATERIAL DESCRIPTION		LE TYPE IMBER	DVERY % RQD)	LOW JUNTS /ALUE)	KET PEN. (tsf)	UNIT WT. (pcf)	ISTURE TENT (%)				INES
□ 30	GR			SAMF	RECO (I	۳0ź	POCI	DRY			PLAS	PLAST IND	
		CLAYEY SAND, (SC) gray, fine grained, saturated, medium dense, trace fine gravel		SH 11	-				16	28	13	15	50
35		35.0	849.7										
_ ·		SANDY LEAN CLAY, (CL) gray, wet, medium to very stiff, trace fine gravel		SS 12	33	3 - 4-5 (9)	-						
_ ·													
_ 40				SS 13	100	4 - 4 - 5 (9)	_						
45				SS 14	83	5-5-34 (39)							
_ ·													
50				Ss ss	100	4-4-4	-						
- ·				/ 15		(8)	_						
_ 55				SH 16	_								
– ·													
				SS 17	33	5-5-5 (10)	-						

	1		North 1408 Mend Telen	ern Teo Northla ota Hei	chnolo ind Dri ghts, I	gies, Ir ve, Su VN 55 ⁻ 39 - 419	nc. ite 107 120 1										BOI	rin	G N	UM	BE	R B PAGI	R-6 ∈ 3 0	00 F 3
			r cicp	nder ar	od Son		1						FCI		E Ra	mec	av County	/ Ro-F)ovolo	oment	Sito (τραδι	D)	
	ROJ	ECT N		२ <u>15.</u> 6	60936.	<u>100</u>						PROJ	ECI		ATION	A	rden Hills	, MN		Jinent			_/	
RTS/GINT/BR - RICE CREE DEPTH	(ft)	GRAPHIC LOG				МАТ	ERIAL	DESC	RIPTIC	ОN				SAMPLE TYPE NUMBER	RECOVERY %	(קאט)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	TIMIT			FINES
36.100)/ENGINEERING/ENGINEERING REPC	5 0		65.5	SANE stiff, t NOTE based POOF fine to coars	DY LEA race fii E: Drille on dia RLY G coars e grav	AN CLA ne grav er over sturbec RADEI RADEI e grain el	AY, (CL vel (cor -spun a 1 soil. D SANI ned, sa	.) gray, <i>htinued</i> auger a D WITI turated	, wet, m) at 65.0 - H GRA I, very (redium feet. N VEL, (\$ dense,	I to very I values SP) gray fine to	81! /,	9 <u>.2</u>	SS 18 X SS 19	3 78 78) 5	1-2-2 (4) 57-62-65 (127)	-						
T ARDEN HILLS - GEO - (15.6093			75.0 76.5	SILTY satura	Ý SANI ated, v	D, (SM ery der Boref) browr nse, tra nole ba	n, fine t ce gra	to medi ve l	ium gra	ained,	80	9.7 3.2 /	SS 20	3 100) 2	21 - 25 - 34 (59)	-						
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 7/21/15 15:09 - H:/1-PROJECTS/2015 PROJECTS/TCAAP PROJEC						Botton	n of bo	rehole	at 76.5	feet.														

GPJ			Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOI	RIN	G N	UM	BEI	R B PAGE	R-6 0 ≞ 1 0	01 F 3
KIDGE	CLIEN	IT _Ca	arl Bolander and Sons, Co.	_ PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (1	CAAF)	
EKB	PROJ	ECT N	IUMBER _15.60936.100	_ PROJEC			Arden Hills	, MN						
CRE	DATE	STAR	COMPLETED 6/9/15	GROUN) ELEVA	rion _	884.82 ft			HOL	E SIZ	E <u>"6</u>	<u>1/2" in</u>	<u>ches</u>
RICE	DRILL	ING C		GROUN) WATER	LEVE	LS:							
BR	DRILL	ING N	IETHOD _3 1/4 in H.S.A		TIME OF	DRIL	LING _4.00) ft / E	lev 880	0.82 ft				
LN D	LOGO	ED B	Y DAS CHECKED BY DAS	A	END OF	DRILL	.ING							
RTS	NOTE	S _Ele	ev. at staked location. O/S boring 10 ft S	AF	ter dri	LLING								
REPC					Ц	%		ż	<u>ч</u> .	(%)	ATT		RG	
ING/ENGINEERING	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYF NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE)	POCKET PE (tsf)	DRY UNIT W (pcf)	MOISTURE CONTENT (9	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES
			 POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, wet, trace gravel (Fill) 	wn, 884.6	ss s	100	7-7-5 (12)							
60936.100)			ORGANIC SOIL WITH SAND, (SP) brown, fine grain wet, (wood chip debris) (Fill)	ed,	SS 2	44	6 - 9-9 (18)							
-(15			ORGANIC SOIL, brown, saturated, decaying wood	000.0				-						
Э Э			NOTE: Hydrocarbon odor based on human perception	on. 878 9		56	6-8-7 (15)							
			SILTY SAND, (SM) dark gray to gray, fine grained,	070.0				1						
			saturated (Fill)		Ass		6-7-9	1						
T AR					4	67	(16)							
]						
A P PR	10				🛛 ss	56	8-4-3	1						
TCA					5	50	(7)	-						
CTS			12.0	872.8										
ROJE			PEAT, (Pt) dark gray to black, saturated, medium		S ss	22	2-2-3							
015 P		<u>, , , ,</u>			0		(5)	-						
CTS/2				870.3				-						
1-PROJEC			to medium dense	se	SS 7	100	4-3-4 (7)	-						
Ï								-						
15:06						100	7-7-5 (12)							
21/15							(-/	1						
7 - 7	20				1 22		566	1						
12.GD					9	100	(12)							
4X 20								1						
₿₩														
US L														
STD														
	25						6 6 7	-						
-sr						100	5-5-5 (10)							
								1						
핅														
EOH														
Z	30													

(Continued Next Page)

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telenhone: 651-389-4191				BOI	RIN	g n	UM	BEI	R B PAGE	R-6	01 F 3
	IENT _C	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF	P)	
"	OJECT	JUMBER	PROJEC			Arden Hills	, MN						
	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
		SILTY SAND, (SM) gray, fine grained, saturated, loose to medium dense <i>(continued)</i> 35.0	849.8	SS 11	100	2-3-4 (7)	-						
- GEU - (12.00330.100)/EINUIN		LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff, trace gravel	844.8	SS 12	56	4-5-5 (10)							
		SANDY LEAN CLAY, (CL) gray, fine grained, wet, rather stiff, trace gravel		SH 13	-				16				51
		46.0 LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff to very stiff, trace fine to coarse gravel	838.8 D	SS 14	100	4-7-7 (14)	-						
				SS 15	100	6-6-8 (14)	-						
				SS 16	100	5-5-6 (11)	-						
				SS 17	100	6-6-7 (13)	-						

	Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOI	RIN	G N	UM	BE	R B PAGI	R-6 ∃ 3 0	01 F 3
NT Ca	rl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAI	⊃)	
JECT N	UMBER _15.60936.100	PROJEC			Arden Hills	, MN			•			
GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
	 IEAN CLAY WITH SAND, (CL) gray, wet, rather stiff to very stiff, trace fine to coarse gravel (continued) NOTE: Silty sand (SM) seams at 65.0 feet. POORLY GRADED SAND, (SP) gray to brown, fine to medium grained, saturated, very dense Borehole backfilled with grout. Boring terminated at 76.5 feet due to heaving sands in auger. Bottom of borehole at 76.5 feet. 	D 808.8 808.3	SS 18	100 100 100	4-6-7 (13) 6-7-9 (16) 11-19-29 (48)							

GPJ			Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOI	RIN	g n	UM	BEI	R B PAGE	R-6	02 F 3
K DGE	CLIEN	NT <u>Ca</u>	rl Bolander and Sons, Co.	_ PROJE	CT NAME	Ram	sey County	/ Re - D	evelop	oment	Site (1	FCAAF)	
Н Н В Н В Н	PROJ	ECT N	UMBER 15.60936.100	_ PROJE			Arden Hills	, MN						
CRE	DATE	STAR	TED _5/28/15 COMPLETED _5/28/15	GROUN	D ELEVA	TION _	884.41 ft			HOL	E SIZ	E <u>"6</u>	1/2" in	<u>ches</u>
2 C H C H	DRILL	ING C		GROUN	D WATEF	R LEVE	LS:							
BR-	DRILL	ING N	ETHOD 3 1/4 in H.S.A	ℤѧ		- DRIL	LING	00 ft / E	Elev 80	6 7.41 (ft			
LN D	LOGO	GED B	_ DAS CHECKED BY _ DAS	A	r end of	DRILL	.ING							
RTS/(NOTE	S Ele	ev. at staked location. O/S boring 5 ft. E	AI	TER DR	LLING								
NG/ENGINEERING REPC	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
ENGINEER			SILTY SAND WITH GRAVEL, (SM) brown, fine to medium grained, moist		ss 1	44	5 - 6-7 (13)	-						
60936 100)					SS 2	78	11-14-15 (29)	-						
S GEO (15	5		5.0 SILTY SAND, (SM) brown to dark gray, fine to mediu grained, moist, very dense to dense	<u>879.4</u> m		89	8-12-15 (27)	-						
ECT ARDEN HILL					SS 4	83	9-16-16 (32)	-						
FS\TCAAP PROJ					SS 5	67	6-8-9 (17)	-						
2015 PROJEC			12.0 CLAYEY SAND, (SC) gray, fine to medium grained, moist, very loose	872.4	ss 6	89	3-3-1 (4)	-						
1-PROJECTS	<u> 15 </u>		14.5 LEAN CLAY WITH SAND, (CL) gray, moist, medium trace gravel	<u>869.9</u>	SS 7	78	3-3-4 (7)	-						
21/15 15:10 – H:\			17.0 ∑ POORLY GRADED SAND, (SP) gray, fine to mediun grained, saturated, medium dense	867.4 1	SS 8	100	9 - 5-7 (12)	-						
Y 2012 GDT 7	20		19.5 CLAYEY SAND, (SC) gray, fine to medium grained, saturated, medium dense, trace fine gravel	864.9	ss 9	100	5 -6- 7 (13)	-						
TD US LAB MA			24.0	860.4	SH 10					15	28	12	16	48
ECH COLUMNS - GINT S	<u>25</u> 		LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff stiff, trace to a little gravel	to	ss 11	100	3-5-7 (12)							
NTI GEOT	 <u>30</u>													

CLIENT Carl Bolander and Sons, Co. PROJECT NAME Ramsey County PROJECT NUMBER 15.60936.100 PROJECT LOCATION Arden Hills, PROJECT NUMBER 15.60936.100 PROJECT LOCATION Arden Hills, H 100 MATERIAL DESCRIPTION Image: Continued of the stiff, trace to a little gravel (continued) Stiff, trace to a little gravel (continued) 36 SS 100 4-6-7 13 100 4-6-7 40 SS 100 4-6-7 13 100 4-6-7 45 SS 100 5-8-12 100 5-8-12 100 50 SS 100 5-8-12 100 10 10		JMBER BR-602 PAGE 2 OF 3
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	<u>y Re-Developme</u> s, MN	ient Site (TCAAP)
L MATERIAL DESCRIPTION L Material of the second		ATTERBERG
LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff to Stiff, trace to a little gravel (continued) SS 100 3-5-5 (10) SS 100 4-6-7 (13) SS 100 4-6-7 (13) SS 100 4-6-7 (13) SS 100 4-6-7 (12) SS 100 4-5-7 (12) SS 100 4-5-7 (12) SS 100 5-8-12 (20) SS 100 5-8-12 (20) SS 100 5-8-12 (20) SS 100 5-8-12 (20) SS 100 5-8-12 (20)	POCKET PE (tsf) DRY UNIT W (pcf) MOISTURE	FINES
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	-	
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50 50 50 50 50 50 50 50 50 50 50 50 50 5	-	
	-	
55 54.5 829.9 55 SANDY LEAN CLAY, (CL) gray, wet, stiff, trace gravel SS 17 67 9-9-10 (19)	-	
59.5 824.9 60 SILTY LEAN CLAY, (CL-ML) gray brown, wet, stiff 18 78 7-8-9 10		

		North 1408 Meno	ern Technolog Northland Driv lota Heights, N	jies, Inc. /e, Suite 107 1N 55120						BO	RIN	G N	UM	BE	R B PAGE	R-6 ≣ 3 0	02 F 3
		Telep arl Bola NUMBE	ohone: 651-38 ander and Sons R <u>15.60936.1</u>	9 - 4191 s, Co. 100			PROJE	CT NAME	_ <u>Ram</u> TION _	sey County Arden Hills	<u>y Re-D</u> s, MN	evelo	oment	Site (TCAAI	^{>})	
	GRAPHIC LOG			MATERIAL	DESCRIPTI	ON		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
EKING/ENGINEEKING KEPO			SILTY LEAN (continued)	CLAY, (CL-N	ſL) gray bro∙	wn, wet, stif	f	SS 19	100	9-10-11 (21)	-						
		69.5	CLAYEY SA grained, wet,	ND, (SC) gra <u>v</u> , dense, trace	/ brown, fine gravel	e to medium	814.:	SS 20	89	11-10-9 (19)	-						
- 75 75		74.5	SILTY SANE dense, trace), (SM) gray, f gravel Borehole bac	ine grained, kfilled with g	saturated,	809.9 very 808.4	SS 1 1 21	89	40-50-60 (110)							
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDI - 7/21/19 19:10 - H:11-P:ROJECI SiZU15 P:ROJECI SI GAAP P:ROJEC																	

GPJ			Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BOI	RIN	g n	UM	BEI	R B PAGE	R-6	03 F 3
SIDGE	CLIEN	NT Ca	rl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (1	CAAF	')	
EXB	PROJ	ECT N	UMBER 15.60936.100	PROJEC		ION _	Arden Hills	s, MN						
CRE	DATE	STAR	TED6/1/15 COMPLETED6/1/15	GROUN	DELEVA		883.29 ft			HOL	LE SIZ	E_"6	1/2" in	<u>ches</u>
RICE	DRILL	ING C	ONTRACTOR NTI	GROUN	WATER	LEVE	LS:							
BR-	DRILL	ING N	IETHOD 3 1/4 in H.S.A	AT	TIME OF	DRIL	LING							
GINT	LOGO	GED B	CHECKED BY DAS	AT	END OF	DRILL	.ING							
DRTS	NOTE	S_Ele	ev. at staked location. O/S boring 12 ft. E	AF	TER DRI	LLING								
RING/ENGINEERING REPO	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	TTA L LIWIL			FINES
			TOPSOIL (12 Inches) 1.0 SILTY SAND, (SM) light brown, fine to medium graine	<u>882.3</u> ed,	ss 1	100	4 - 8-9 (17)	_						
0036.100)\E			moist, dense to medium dense		ss 2	78	5 - 6-6 (12)	-						
(15.6(4.5	878.8	•									
LS GEO	5		SILTY SAND, (SM) gray, fine grained, moist, dense to loose)	ss 3	67	6-10-12 (22)	_						
CT ARDEN HIL					ss 4	89	4 -8- 12 (20)	-						
TCAAP PROJE	 <u>10</u> 				ss 5	100	3 - 3 - 3 (6)	-						
115 PROJECTS			12.0 SILTY SAND, (SM) gray, fine grained, saturated, very loose to medium dense, trace gravel	871.3	SS 6	33	1-0-0 (0)	-						
PROJECTS/20	 15				ss 7	100	5 - 5-3 (8)							
21/15 15:10 H:\1					SS 8	100	5 - 5-5 (10)	-						
2012 GDT 7//	20				SS 9	100	5 -6- 7 (13)							
STD US LAB MAY			24.5	858.8										
ANS - GINT			LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff t very stiff, trace gravel	to	SS 10	100	5 - 6-5 (11)	-						
TI GEOTECH COLUN								-						
z۱	30	<u> </u>			\bowtie				I	I				

		Northern Technologies, Inc. 1408 Northland Drive, Suite 107 Mendota Heights, MN 55120 Telephone: 651-389-4191				BO	RIN	G N	UM	BEI	R B Page	R-6 ∃ 2 0	03 F 3
CLIE	NT _Ca	arl Bolander and Sons, Co.	PROJEC		Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	^{>})	
PRO.		IUMBER 15.60936.100	PROJEC			Arden Hills	, MN						
				щ	%		ż	<u>ا</u> ـــ	(%)	AT		ERG	
00 DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYP NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE)	POCKET PEr (tsf)	DRY UNIT W (pcf)	MOISTURE CONTENT (9	LIQUID	PLASTIC	PLASTICITY INDEX	FINES
		LEAN CLAY WITH SAND, (CL) gray, wet, rather stiff to very stiff, trace gravel (continued)	C		56	5-6-8 (14)							
_ 35					100	4-3-7 (10)							
				<u> </u>			-						
40					100	6-7-10 (17)							
				/ 13		(17)							
45				1 99		6710	-						
				14	100	(17)	-						
50				SS SS	100	7-8-10							
				/ 15		(18)	-						
55					100	10-24-22							
		59.5	823.8			(99)							
60		SILTY LEAN CLAY, (CL-ML) brown, moist to wet, very stiff, trace gravel	Ţ	SS 17	100	18-22-24 (46)							

		North 1408 Mend	ern Technologies, Inc. Northland Drive, Suite 107 ota Heights, MN 55120					BOF	RIN	G N	UM	BE	R BI PAGE	R-6(3 OF)3 = 3		
		Telep arl Bola IUMBE	hone: 651-389-4191 nder and Sons, Co. R _15.60936.100	F	PROJEC	T NAME T LOCAI	<u>Ram</u>	sey County Arden Hills	<u>′ Re-D</u> , MN	evelop	oment	Site (1	ſCAAF)			
	GRAPHIC LOG		MATERIAL DESCRI	PTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT	PLASTIC LIMIT LIMIT	PLASTICITY BU INDEX	FINES		
			SILTY LEAN CLAY, (CL-ML) brow stiff, trace gravel <i>(continued)</i> NOTE: Sand (SP) lenses at 65.0 fr	n, moist to wet, very eet.		SS 18	67	20-20-17 (37)									
		69.5	POORLY GRADED SAND WITH 0 brown, fine to coarse grained, satu	GRAVEL, (SP) gray to rated, very dense	<u>813.8</u> D	SS 19	33	19-21-24 (45)									
	0 () 0 ()	76.0	Daaskala kaalifiiladuu	ide anout	807.3	SS 20											
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 7/2/1/5 15:10 - H/1-PKOJECT S/2015 PROJECTS/I CAAP PROJECT			Bottom of borehole at	76.0 feet.													
			Northe 6160 (Inver (Teleph	ern Technologie Carmen Avenue Grove Heights, I none: 651-389-	s, Inc. ∋ East MN 55076 4191					BO	RIN	GΝ	UM	BE	R D Page	E-8 E 1 0	00 F 1
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	CLIE	NT Ca	arl Bolar	nder and Sons,	Co.		PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	ment	Site (TCAAF)	
	PROJ	IECT N	UMBER	R <u>15.60936.10</u>	0			T LOCA		Arden Hills	s, MN						
	DATE	STAR	TED _5	5/21/15		5/21/15	GROUN) ELEVA	TION _	900.65 ft			HOI	_E SIZ	E <u>"6</u>	1/2" in	iches
	DRILI	LING C	ONTRA	CTOR NTI			GROUN	WATEF	R LEVE	LS:							
	DRILI	LING M	IETHOD	3 1/4 in H.S./	۹		$ar{2}$ at	TIME O	F DRILI	L ING _12.0	00 ft / E	Elev 88	38.65	ft			
	LOGO	GED BI	DAS		CHECKED B	Y DAS	AT	END OF	DRILL	.ING							
	NOTE	ES _Ele	ev. at sta	aked location.			AF	TER DR	ILLING								
	o DEPTH (ft)	GRAPHIC LOG		Ν	MATERIAL DESC	RIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
2).GPJ			1.5	POORLY GRA fine to coarse ((Fill)	DED SAND WITH grained, trace gra	H SILT, (SP-SM) brov vel	vn, 899.2	ss s	56	4-4-3 (7)	_						
VELOPMEN I (3			<u>3.5</u>	CLAYEY SANI grained, moist, (Fill)	D, (SC) brown gra trace gravel, little	y, fine to medium organics		SS 2	67	3 - 3-2 (5)							
OWN AND CREEK DE	 			SANDY LEAN to rather stiff, t staining	CLAY, (CL) brow race fine to coars	n, moist to wet, medii e gravel, iron oxide	um	SS 3	78	3-3-2 (5)	-						
REPORTS/GINT/DE-1	 		95				891 2	ss 4	100	3 - 9-6 (15)							
SENGINEERING				LEAN CLAY W rather stiff to m	/ITH SAND, (CL) nedium, trace fine	gray to dark gray, we to coarse gravel	t,	SS 5	100	4 - 6-6 (12)							
100)/ENGINEERING			¥					ss 6	100	4 - 3 - 4 (7)	-						
GEO - (15.60936	_ 15							SS 7	100	3 - 3-5 (8)							
CT ARDEN HILLS								ss 8	100	3 - 4-4 (8)	_						
TS/TCAAP PRUJE	20		21.0				<u>879.7</u>	SS 9	56	3-4-3 (7)							
TI GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:45 - H:/I-PROJECTS/2015 PROJE				Boreh Bo	ole backfilled with	auger cuttings. at 21.0 feet.											

			Northe 6160 Inver	ern Technologies Carmen Avenue Grove Heights, M	s, Inc. East IN 55076						BO	RIN	G N	UM	BE	R D PAGE	E-8 E 1 0	01 F 1
			Telep	hone: 651-389-4	.191					-	• •				0.1			
	CLIEF	NT <u>Ca</u>	ari Bola	nder and Sons, C				ECT	NAME	Ram	sey County	<u>y Re-D</u>	evelop	oment	Site (I CAAF	<u>')</u>	
	PROJ	ECT N	IUMBER	R <u>15.60936.100</u>			PROJ	ECT	LOCA		Arden Hills	s, MN						
	DATE	STAF	RTED _	5/21/15) <u>5/21/15</u>	GROU	ND	ELEVA	TION _	899.36 ft			HOL	_E SIZ	E <u>"6</u>	<u>1/2" in</u>	<u>ches</u>
	DRILI	ING C	ONTRA	ACTOR NTI				ND	WATEF	R LEVE	LS:							
	DRILI	ING N	IETHO	0 <u>3 1/4 in H.S.A</u>			_ <u> </u>	AT 1	IME O	DRIL	LING _ 6.50	0 ft / El	ev 892	2.86 ft				
	LOGO	ED B	Y DAS	;	_ CHECKED B	Y DAS		AT E	END OF	DRILL	ING							
	NOTE	S _El	ev. at st	aked location.			_ '	AFT	er dri	LLING								
	o DEPTH (ft)	GRAPHIC LOG		Μ	ATERIAL DESC	RIPTION			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
GPJ			0.3	TOPSOIL (4 inc POORLY GRAD	hes) DED SAND WITH	⊣ SILT, (SP-SM) b	<u>~ 89</u> rown,	9.0/ /	ss s	0	4 - 4-4 (8)							
EVELOPMENT (2)				(Fill) NOTE: No reco cuttings.	very Sample No.	1. Sampled auger		T Z	SS 2	17	5 -4- 4 (8)	-						
VN AND CREEK D	5		4.5	SANDY LEAN (medium, trace g	CLAY, (CL) brow gravel	n, moist to wet,	894	<u>1.9</u>	SS 3	22	2-4-3 (7)							
S/GINT/DE-TOW			7.0 ⊻ 8.4	POORLY GRAD	DED SAND WITH rained, saturated	H GRAVEL, (SP) b I, l oose	893 rown, 890	2 <u>.4</u>	ss 4	67	3-3-2 (5)	-						
RING REPORT	 _ 10		9.5	LEAN CLAY WI trace fine to coa	TH SAND, (CL) arse gravel, iron (gray, wet, medium oxide staining to coarse grained	,889	9.9	/ ss	50	2-3-4							
ING/ENGINEE			12.0	saturated, loose	e, trace fine to co	barse gravel	88	7.4	5	56	(7)							
100)/ENGINEEF				SANDY LEAN (CLAY, (CL) gray,	wet, medium			SS 6	100	3 -4- 3 (7)	-						
GEO - (15.60936									SS 7	100	2-3-5 (8)							
- ARDEN HILLS -									ss 8	100	3 -3- 4 (7)							
P PROJECT	 20		19.5			aray wat madium	879	9.9	1		205							
ECTS/TCA ^A			21.0	Boroho	In backfilled with		878	3.4	9	100	3-2-5 (7)							
I GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/25/16 14:45 - H:/1 PROJECTS/2015 PR(Bot	tom of borehole	at 21.0 feet.												

		Northe 6160 Inver Telepl	ern Technologies, Carmen Avenue E Grove Heights, MN hone: 651-389-41	Inc. ast I 55076 91					BO	RIN	G N	UM	BE	R D Page	E-8 (1 0	02 F 1
CLIEN	NT _Ca	arl Bolai	nder and Sons, Co			PROJEC	T NAME	Ram	sey County	<u>/ Re-D</u>	<u>evelo</u> p	oment	Site (1	<u>rcaa</u> f)	
PROJ	ECT N	IUMBEF	R <u>15.60936.10</u> 0			PROJEC		ΓΙΟΝ	Arden Hills	s, MN			`			
DATE	STAR	TED 5	5/21/15	COMPLETED 5/	/21/15	GROUN) ELEVA		900.4 ft			но	E SIZ	E "6	1/2" in	ches
DRILL	ING C		CTOR NTI			GROUN			LS:			-				
DRILL	ING N	ETHOD	3 1/4 in H.S.A				TIME OF		L ING 17.0	00 ft / E	Elev 88	33.40	ft			
LOGO	SED B	Y DAS		CHECKED BY	DAS	АТ	END OF	DRILL	.ING							
NOTE	S Ele	ev. at st	aked location.			AF	TER DRI	LLING								
		/ S 10 ft	South										ATT	ERBE	RG	
o DEPTH (ft)	GRAPHIC LOG		MA	TERIAL DESCRIP	TION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
		2.0	POORLY GRADE moist, trace grave (Fill)	ED SAND, (SP) bro el	wn, coarse graine	d,	SS 1	0	3 -2- 3 (5)							
			NOTE: No recove cuttings. CLAYEY SAND, grained moist lo	ery at Sample No. 1 (SC) brown and gra	. Sampled auger		ss 2	56	3 -2- 4 (6)	-						
		7.0	granica, molet, io			802.4	ss 3	44	3 -2- 4 (6)	-						
		0.5	CLAYEY SAND, moist, loose, trac	(SC) brown and gra e gravel	ay, fine grained,	090.4	SS 4	100	3-3-3 (6)							
		9.5	CLAYEY SAND, medium dense, tr	(SC) brown, fine gra ace organics, iron o	ained, moist, oxide staining		SS 5	44	4 - 4-4 (8)							
		12.0	LEAN CLAY WIT rather stiff to med	H SAND, (CL) gray lium, trace gravel	, moist to wet,	000.4	SS 6	100	3 - 4-7 (11)	-						
							SS 7	100	4 - 5-5 (10)							
		₽					SS 8	89	4 - 5-5 (10)	-						
20							V ss	4.00	3-4-4	-						
		21.0			1.0.6	879.4	∭ 9	100	(8)							
			Botto	m of borehole at 2 [,]	1.0 feet.											
		CLIENT _CA PROJECT N DATE STAR DRILLING N LOGGED B' NOTES _EA HLdgO 0 HLdgO 0 	Northe 6160 PROJECT NUMBER DATE STARTED _6 DRILLING CONTRAD DRILLING METHOD LOGGED BY _DAS NOTES _Elev. at st 0 14 0 2.0 - 2.0 - 7.0 - 5 7.0 - 7.0 - 10 9.5 - 10 9.5 - 12.0 - 20 21.0	Northern Technologies, 6160 Carmen Avenue E Inver Grove Heights, MN Telephone: 651-389-413 CLIENT <u>Carl Bolander and Sons, Co</u> PROJECT NUMBER <u>15.60936.100</u> DATE STARTED <u>5/21/15</u> DRILLING CONTRACTOR <u>NTI</u> DRILLING METHOD <u>3 1/4 in H.S.A</u> LOGGED BY <u>DAS</u> NOTES <u>Elev. at staked location.</u> OS 10 ft South H \oplus O 0 0 0 0 0 0 0 0 0 0 0 0 0	Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191 CLIENT Carl Bolander and Sons, Co. PROJECT NUMBER 15.60936.100 DATE STARTED 5/21/15 COMPLETED 5 DRILLING METHOD 3 1/4 in H.S.A LOGGED BY DAS CHECKED BY D NOTES Elev. at staked location. OIS 10 ft South Egg MATERIAL DESCRIP 0 POORLY GRADED SAND, (SP) bromosist, trace gravel (Fill) NOTE: No recovery at Sample No. 1	Northern Technologies, Inc. Inver Grove Heights, MN 55076 Telephone: 651-389-4191 CLIENT Carl Bolander and Sons, Co. PROJECT NUMBER_15.60936.100 DATE STARTED 5/21/15 DRILLING CONTRACTOR NTI DRILLING CONTRACTOR NTI DRILLING CONTRACTOR NTI DRILLING METHOD 3 1/4 in H.S.A LOGGED BY_DAS CHECKED BY_DAS OIS 10 fl South The stated location. OIS 10 fl South The state discrete d	Northern Technologies, Inc. StB0 Camen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191 CLIENT Carl Bolander and Sons, Co. PROJECT PROJECT NUMBER 15.60936.100 PROJECT NUMBER 15.60936.100 PROJECT OPROJECT NUMBER 15.60936.100 DATE STARTED 5/21/15 GROUND GROUND DRILLING CONTRACTOR NTI DRILLING CONTRACTOR NTI GROUND OPALESTARTED 5/21/15 DRILLING METHOD 3 1/4 in H.S.A V AT LOGGED BY DAS AT NOTES Elev. at staked location. AF OS 10 8 South AT O POORLY GRADED SAND, (SP) brown, coarse grained, moist, loose, variad (SP) seam S POORLY GRADED SAND, (SP) brown, coarse grained, moist, loose, trace gravel A CLAYEY SAND, (SC) brown and gray, fine to medium grained, moist, loose, sand (SP) seam S 20 S CLAYEY SAND, (SC) brown, fine grained, moist, medium dense, trace gravel S 210 CLAYEY SAND, (SC) brown, fine grained, moist, loose, trace gravel S 20 S 210 CLAYEY SAND, (SC) brown, fine grained, moist, medium dense, trace gravel S 210 S 210 S 210	Northern Technologies, Inc. Store Area and Store Area and Store Stores Store Crove Heights, MN S5076 PROJECT NUMBER 15.60936.100 PROJECT NUMBER 15.60936.100 DATE STARTED 521/15 COMPLETED 5/21/15 GROUND ELEVA DRILLING CONTRACTOR NTI GROUND VATER GROUND VATER NOTES Elev. at staked location. ATTEN DR NOTES CLAVEY SAND, (SC) brown and gray, fine to medium GROUND VATER 0 POORLY GRADED SAND, (SC) brown and gray, fine to medium SS 10 CLAYEY SAND, (SC) brown and gray, fine to medium SS 10 CLAYEY SAND, (SC) brown, fine grained, moist, loose, trace gravel SS 10 LEAN CLAY WITH SAND, (CL) gray, moist to wet, moist, loose, trace gravel SS 10 LEAN CLAY WITH SAND, (CL) gray, moist to wet, moist, loose, sand (SP) seam SS 12.0 LEAN CLAY WITH SAND, (CL) gray, moist to wet, mather stiff to medium, trace gravel SS	Northern Technologies, Inc. Silver Grove Heights, MN 55075 Silver Grove Heights, MN 55075 PROJECT NUMBER 15.60936.100 PROJECT NUMBER 15.60936.100 Date Started 5/21/15 GROUND WATER LEVE BRILLING CONTRACTOR NTI COGGED BY DAS CHECKED BAND, (SC) brown and gray, fine grained, moist, loose, sand (SP) seam CHAYEY SAND, (SC) brown and gray, fine grained, moist, loose, trace gravel SS CLAYEY SAND, (SC) brown, fine grained, moist, loose, sand (SP) seam SS CLAYEY SAND, (SC) brown, fine grained, moist, loose, sand (SP) seam SS CLAYEY SAND, (SC) brown, f	BUD Worken Technologies, Inc. Bio Carmen A very Heights, MM S8078 There Grow Heights, MM S8078 Bio Carmen A very Heights, MM S8078 PROJECT NUMBER 1.56.0936, 100 PROJECT NUMBER 1.56.0936, 100 DATE STARTED 5.21/15 DRILLING CONTRACTOR, INT DRILLING CONTRACTOR, INT DRIGGE V DAS DISTE STEW, at taked location PODELY GRADED SAND, (SP) brown, coarse grained, CLAYEY SAND, (SC) brown and gray, fine to medum grained, moist, loose, sand (SP) seam CLAYEY SAND, (SC) brown and gray, fine grained, moist, loose, trace gravel CLAYEY SAND, (SC) brown and gray, fine grained, moist, loose, trace gravel CLAYEY SAND, (SC) brown and gray, fine grained, moist, loose, trace gravel CLAYEY SAND, (SC) brown and gray, fine grained, moist, loose, trace gravel SS 44 424 (reflu) Loo Loo	CONSISTENT CHECKNONE BEAR Inter Group Hights, MN 50005 CLENT Carl Bolander and Sons, Co. PROJECT NAME Ransov County ReD PROJECT NAMER IS:00056, 100 DATE STARTED 52/115 COMPLETED 5/21/15 CROUND VATER LEVELS: DRILLING CONTRACTOR, NTI DRILLING CONTRACTOR, NTI COUND VATER LEVELS: DRILLING CONTRACTOR, NTI DRILLING METHOD 21/14 In H.S.A CHECKED BY DAS COCCED PL DS CHECKED BY DAS Art The OF DRILLING NOTES Eller, at staked location. Art The OF DRILLING TO TO RECOVER DRY DAS NOTES Eller, at staked location. Art The OF DRILLING TO TO RECOVER DRY DAS Vote To Provide the Statistic control of the South of the South of the Statistic control of the Statistic control of the South of the Statistic control of the South of the Statistic control of the Statistico	Dirthem Technologies, Inc. PROJECT NAME Ramsey County Re-Development Group Heights, MM 55003 PROJECT NAME R_ISS0936:100 PROJECT NAME Ramsey County Re-Development Status Status DATE STARTER 5.1600366:100 PROJECT IOLATION Antion Hills, MM DATE STARTER 0 COMPLETED 5/21/15 GROUND WATER LEVELS: DRILLING CONTRACTOR, NTI COMPLETED 5/21/15 GROUND WATER LEVELS: DRILLING METHOD 3.14 in H.S.A Status FAT THE OF DRILLING 1/200.07 Here 81 COCCED PLAS CHECKED BY DAS AT THE OF DRILLING 1/200.07 Here 81 TOTES Elow, at staked location. Here 81 Status THE STATTER CONTRACTOR NTI CHECKED BY DAS AFTER DRILLING TOTES Elow, at staked location. Here 81 Status THE STATTER CONTRACTOR SAND, (SP) brown, coarse grained, most, fine grained, most, foces, trace gravel Status Status To CLAYEY SAND, (SC) brown and gray, fine grained, most, fine grained, most, fine grained, most, foces, trace gravel Status Status The Status Status Status Status Status THE VEY SAND, (SC) brown and gray, fine grained, most, fine grained, most, foces, trace gravel Status Status To CLAYEY SAND, (SC) brown and gray, fine grained, most, foces, fination data stating <td< th=""><th>Different Technologies, Inc. Project NAME Remey Courty Re-Development Project Number 16:00396:100 Project NAME Remey Courty Re-Development DellLing Contractore, NIT Create Status Project Name Remey Courty Re-Development Distance Contractore, NIT Create Status Project Name Remey Courty Re-Development Option 31/4 in M.Sa Create Status Project Name Remey Courty Re-Development Option Status Create Status Project Name Remey Courty Re-Development Option Status Create Status Project Name Remey Courty Re-Development Option Status Create Status Project Name Remey Courty Revolution Option Status Create Status Project Name Remey Courty Revolution Project Name Option Status Status Status Status Status Option Rome Grave Status Status Status Option Rome Grave Status Status Status</th></td<> <th>BORNE UNDER Image: Strategy Converts dealer to the state to the</th> <th>Define the theorem of the services in the service in the serv</th> <th>Definition of the model objects in the state of the</th>	Different Technologies, Inc. Project NAME Remey Courty Re-Development Project Number 16:00396:100 Project NAME Remey Courty Re-Development DellLing Contractore, NIT Create Status Project Name Remey Courty Re-Development Distance Contractore, NIT Create Status Project Name Remey Courty Re-Development Option 31/4 in M.Sa Create Status Project Name Remey Courty Re-Development Option Status Create Status Project Name Remey Courty Re-Development Option Status Create Status Project Name Remey Courty Re-Development Option Status Create Status Project Name Remey Courty Revolution Option Status Create Status Project Name Remey Courty Revolution Project Name Option Status Status Status Status Status Option Rome Grave Status Status Status Option Rome Grave Status Status Status	BORNE UNDER Image: Strategy Converts dealer to the state to the	Define the theorem of the services in the service in the serv	Definition of the model objects in the state of the

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R D Page	E-8 E 1 0	03 F 1
	CLIE	NT Ca	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF	^{>})	
	PROJ	IECT N	UMBER 15.60936.100	PROJEC			Arden Hills	, MN						
	DATE	STAR	TED 5/27/15 COMPLETED 5/27/15	GROUND	ELEVA		892.97 ft			но	_E SIZ	E <u>"6</u>	<u>1/2" in</u>	iches
	DRILI	LING C		GROUND	WATER	LEVE	LS:							
	DRILI	LING N	IETHOD 3 1/4 in H.S.A	$ar{arphi}$ at		DRIL	LING _14.5	50 ft / E	Elev 8	78.47	ft			
	LOGO	GED B	Mass CHECKED BY DAS	AT	END OF	DRILL	.ING							
	NOTE	ES _Ele	ev. at staked location.	AF	ter dri	LLING								
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
GPJ			SILTY SAND, (SM) brown, fine grained, moist, little gravel (Fill)		SS 1	44	2-3-5 (8)							
LOPMENT (2)			3.5	889.5	SS 2	44	7-12-14 (26)							
OWN AND CREEK DEVE	 5 		POORLY GRADED SAND WITH GRAVEL, (SP) brow medium to coarse grained, moist (Fill)	'n,	SS 3	56	5 -9- 12 (21)							
REPORTS/GINT/DE-T	 		NOTE: Sampled auger cuttings.		SS 4	11	3 - 4 - 6 (10)							
S'ENGINEERING	<u>10</u>		10.0 LEAN CLAY WITH SAND, (CL) gray, moist to saturated, medium to rather stiff, trace gravel	883.0	SS 5	67	3 - 3-4 (7)							
00)/ENGINEERIN(NOTE: Sampled auger cuttings.		SS 6	6	7-7-7 (14)							
S GEO (15 60936 1	 		$\overline{\Delta}$		SS 7	94	3 - 3-4 (7)							
JECT ARDEN HILL					SS 8	89	3-5-7 (12)							
CTS/TCAAP PRO	20		21.0	872.0	SS 9	100	4 - 6-9 (15)							
I GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/25/16 14:45 - H:/1-PROJECTS/2015 PROJE			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

			Northern Tech 6160 Carmen Inver Grove H Telephone: 6	nnologies, Ir Avenue Ea leights, MN 51-389-419	nc. st 55076 1						BO	RIN	G N	UM	BE	R D Page	E-8 E 1 0	04 F 1
	CLIE	NT C	arl Bolander and	d Sons. Co.			PF	ROJEC		Ram	sev County	/ Re - D	evelor	oment	Site (ТСААР	2)	
	PRO		UMBER 15.60				PF	ROJEC			Arden Hills	5. MN			0.110 (_/	
	DATE		TED 5/20/15		COMPLETE	D 5/20/15	GF	ROUNE	ELEVA		897.51 ft	,		HOL	_E SIZ	E "6	1/2" in	iches
	DRIL		ONTRACTOR	NTI			GF	ROUNE	WATER		LS:							
	DRIL		IETHOD 3 1/4	in H.S.A				AT	TIME OF		LING N	lo aroi	udnwa	ter ob	served	1.		
	LOG	GED B	/ DAS		CHECKED I	BY DAS		AT	END OF	DRILL	ING	<u> </u>						
	NOTE	ES EI	ev. at staked loc	cation.				AF	ter dri	LLING								
	DEPTH (ft)	GRAPHIC LOG O	/ S 5 ft North	MAT	ERIAL DES	CRIPTION			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
) GPJ			POORI grainec 2.0 (Fill)	LY GRADE d, moist, littl	D SAND, (SF e gravel	P) brown, fine to n	nedium	895 5	ss s	56	2-2-1 (3)							
/ELOPMENT (2			POORI fine to (LY GRADE medium gra	D SAND WII ained, moist,	ΓΗ SILT, (SP-SM) trace gravel) brown,		SS 2	44	2-3-2 (5)							
/N AND CREEK DE/			4.5 LEAN (mediun	CLAY WITH n to rather s	I SAND, (CL stiff, trace gra) light brown, moi: avel	st,	893.0		100	2-3-5 (8)							
RTS/GINT/DE-TOW									SS 4	100	3 - 6-7 (13)	-						
NGINEERING REPO	 10								SS 5	100	4-4-6 (10)	-						
00)/ENGINEERING/E									SS 6	100	5-6-6 (12)	-						
EO - (15.60936.1	15		15.5 LEAN(ASAND (CL) grov moist mor	dium to	882.0	SS 7	100	3 - 4-4 (8)							
SDEN HILLS - GI			rathers	stiff, trace g	ravel	y gray, moist, met			∑ ss	100	3-4-3							
AP PROJECT AF									8		(7)							
ROJECTS/TCA			21.0	Borehole	backfilled wit	h auger cuttings.		876.5	9	100	(11)							
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/25/16 14:45 - H:/1-PROJECTS/2015 I																		

	(North 6160 Inver Telep	ern Tech Carmen Grove He hone: 65	nologie Avenue eights, 51-389-	es, Inc. e East MN 550 -4191)76							BO	RIN	G N	IUM	IBE	R D Page	E-8	05 F 1
	CLIEN	NT _Ca	arl Bola	nder and	Sons,	Co.				_ PRO	JECT	NAME	Ram	sey Count	y Re - D	evelop	oment	Site (TCAAF	^{>})	
	PROJ	IECT N	IUMBEI	R <u>15.60</u>	936.10	0				_ PRO	JECT	LOCA	rion _	Arden Hills	s, MN						
	DATE	STAR		5/19/15		co	MPLETI	ED <u>5/19</u>	/15	_ GRO	UND	ELEVA	TION	893.43 ft			HO	LE SIZ	Έ <u>"</u> 6	<u>1/2" in</u>	iches
	DRILI				NTI	•				_ GRO		WATER		ELS:			7 40 0				
				<u>3 1/4 ו 3 1/4 ו</u>	IN H.S.	<u>А</u> СН		BV DAS	2		- AI - AT I		DRIL	LING	<u>Jπ/Ε</u>	ev 88	<u>/.43 π</u>				
	NOTE	ES Ele	ev. at st	, taked loca	ation.		LONED		5	-	AFT										
										_								AT	FERBE	RG	
	o DEPTH (ft)	GRAPHIC LOG			I	MATER	IAL DES	SCRIPTIC	DN			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%)	LIQUID		PLASTICITY	FINES
2) GPJ			2.0	POORL fine to n (Fill)	Y GRA	ADED S. n graine	AND WI d, moist	TH GRAV	√EL, (SP) br	own, 8	91.4	SS 1	33	2-2-3 (5)							
EVELOPMENT (2.7	LEAN C gravel (Fill)	LAY V	VITH SA	ND, (CL	L) brown,	moist, trace	8	<u>90.8</u>	SS 2	78	8-6-5 (11)							
I AND CREEK D	5		6.0 🗸	POORL fine to n (Fill)	Y GRA nedium	ADED S. n graine	AND WI d, trace	ITH SILT, gravel	(SP-SM) br	own, 8	87.4	SS 3	22	5 - 8-8 (16)							
DE-TOWN			-	POORL fine grai	.Y GR/ ined, s	ADED S. aturated	AND WI	ITH SILT, m dense,	(SP-SM) br	own,	05 0										
EPORTS/GINT/			7.5	SANDY rather s	LEAN	CLAY,	(CL) bro	own, wet,	medium to	8	<u>85.9</u>	SS 4	67	7 - 5 - 6 (11)	-						
NGINEERING RI											T Z	SS 5	100	3-3-2 (5)	-						
ENGINEERING												SS 6	100	5 - 5-6 (11)	-						
5.60936.100)	15											/ ss		3-5-5							
ILLS - GEO - (1											4	7	100	(10)							
DJECT ARDEN H										_		SS 8	89	4-5-4 (9)							
CTS/TCAAP PRC	20		<u>19.5</u> 21.0	SANDY Ienses	LEAN	CLAY,	(CL) gra	ay, wet, ra	ither stiff, sa	nd 8	73.9 72.4 /	SS 9	83	6-7-6 (13)							
5 PROJEC					Boreh Bo	ole bac	kfilled wi	ith auger le at 21.0	cuttings. feet.												
CTS/2016																					
1-PROJE																					
4:45 - H:\																					
1/25/16 1																					
2.GDT																					
MAY 201																					
O US LAE																					
GINTST																					
SNMUS																					
TECH CC																					
NTI GEO																					

(2		Northe 6160 Inver Telepl	ern Technolog Carmen Aven Grove Heights hone: 651-38	ies, Inc. ue East s, MN 55076 9-4191						BO	RIN	G N	UM	BE	R D Page	E-8 E 1 0	06 F 1
С	LIEN	NT <u>Ca</u>	arl Bola	nder and Sons	s, Co.		PI	ROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF	^{>})	
Р	ROJ	ECT N	NUMBER	R <u>15.60936.1</u>	00		PI	ROJEC	T LOCA	FION _	Arden Hills	, MN						
D	ATE	STAR	RTED _	5/21/15	COMPLET	ED <u>5/21/15</u>	GI	ROUNE	ELEVA	tion _	901.27 ft			HO	E SIZ	E <u>"6</u>	<u>1/2" in</u>	iches
D	RILI	ING C	ONTRA	ACTOR NTI			GI	ROUNE	WATER	R LEVE	LS:							
D	RILL	ING N	NETHOD) <u>3 1/4 in H.S</u>	S.A			${ar ar \Sigma}$ at	TIME OF	DRIL	LING _12.0)) ft / E	Elev 88	89.27	ft			
	OGG	BED B	Y DAS	6		BY DAS		AT	END OF	DRILL	.ING							
N	OTE	S _Ele	ev. at st	aked location.				AF	ter dri	LLING								
DEPTH	0 (ff)	GRAPHIC LOG			MATERIAL DE	SCRIPTION			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
	-		0.4	TOPSOIL (5 POORLY GR	inches) RADED SAND W	ITH SILT, (SP-SM)	brown,	<u>_ 900.9</u>	ss ss	56	2 - 3-4 (7)							
DEVELOPMENT (2).	-			(Fill)	m grained, mois	t, trace gravel			SS 2	33	8-10-9 (19)	-						
DWN AND CREEK I	5								SS 3	22	9-13-12 (25)	-						
	-								SS 4	56	4 - 6-5 (11)	-						
	10		10.0	LEAN CLAY to rather stiff,	WITH SAND, (C , trace gravel	CL) gray, moist to we	et, soft	891.3	SS 5	56	2-2-2 (4)	-						
	-		₽	-					SS 6	100	3 - 3-6 (9)	-						
S - GEO - (15.60936	15								SS 7	100	2 - 5-6 (11)	-						
DJECT ARDEN HILI	-									100	5 - 5-8 (13)	-						
	20		21.0	_				880.3	SS 9	100	4 - 6-8 (14)	-						
II GEOTECH COLUMNS - GINT STD US LAB MAY 2012/GDT - 1/26/16 14:46 - H:YI-PROJECTS/2015 PROJ				E	Bottom of boreho	ale at 21.0 feet.												

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R D Page	E-8 E 1 0	07 F 1
	CLIEN	NT C	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	ment	Site (TCAA	^{>})	
	PROJ		JUMBER _15.60936.100	PROJEC			Arden Hills	, MN						
	DATE	STAF	TED _ 5/18/15 COMPLETED _ 5/18/15	GROUNE	ELEVA	rion _	898.18 ft			HOI	_E SIZ	E <u>"6</u>	1/2" in	ches
	DRILI	LING C	CONTRACTOR NTI	GROUND	WATER	LEVE	LS:							
	DRILI	LING N	//ETHOD <u>3 1/4 in H.S.A</u>	$ar{}$ at	TIME OF	DRILI	_ING _4.50) ft / E	ev 893	3.68 ft				
	LOGO	GED B	Y DAS CHECKED BY DAS	AT	END OF	DRILL	ING							
	NOTE	ES El	ev. at staked location.	AF	TER DRI	LLING								
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
_			0.5 TOPSOIL (6 inches)			78	2-2-3							
r (2).GPJ			meter sand, (SC) blown to light blown, the to medium grained, moist, trace gravel, trace organics				(5)							
DEVELOPMENT			(Fill). 3.5 LEAN CLAY WITH SAND, (CL) brown, wet to moist,	894.7	SS 2	72	3-5-5 (10)	-						
/N AND CREEK I			\forall soft to medium, trace gravel			39	2 -1- 3 (4)	-						
TS/GINT/DE-TO/					SS 4	56	3-5-9 (14)							
REPOR			9.5	888.7										
SENGINEERING	<u>10</u>		LEAN CLAY WITH SAND, (CL) gray, wet, medium to rather stiff, trace gravel		SS 5	100	3 - 4-5 (9)	-						
00)/ENGINEERING					SS 6	100	3 - 3-4 (7)	-						
GEO - (15 60936 1	 15				SS 7	89	2 - 3-5 (8)							
T ARDEN HILLS -						100	2 - 3-4 (7)							
AP PROJECT	20						2.2.5							
ECTS/TCA/	- · -		21.0	877.2	$\bigvee 9$	100	১-১-১ (8)							
II GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/25/16 14:45 - H:/1-PROJECTS/2015 PROJ			Bottom of borehole at 21.0 feet.											

			North 6160 Inver Telep	ern Technologie Carmen Avenue Grove Heights, hone: 651-389	es, Inc. e East MN 55076 -4191					BO	RIN	G N	UM	BE	R D PAGE	E-8 (1 0	08 F 1
	CLIEN	NT C	arl Bola	nder and Sons.	Co.		PROJEC		Ram	sev Count	√ Re - D	evelor	oment	Site (ГСААГ))	
	PROJ		UMBE	R 15.60936.10	0		PROJEC			Arden Hills	s, MN						
	DATE	STAF	RTED	5/19/15	COMPLETE	D 5/19/15	GROUNI) ELEVA		892.29 ft	,		HOL		E "6	 1/2" in	ches
	DRILI	ING		ACTOR NTI			GROUNI) WATER		1.5						<u></u>	
	DRILI	ING) 3 1/4 in H S	Α		Σ ΔT			 IING 3.50)ft/FI	lev 888	3 79 ft				
				<u> </u>		Y DAS	ΔT			ING			<u>,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,</u>				
	NOTE	S FI	ev at st	, taked location													
							~								FRBF	RG	
	DEPTH (ft)	GRAPHIC LOG		I	MATERIAL DESC	RIPTION		AMPLE TYPE NUMBER	ECOVERY % (RQD)	BLOW COUNTS (N VALUE)	OCKET PEN. (tsf)	RY UNIT WT. (pcf)	MOISTURE ONTENT (%)				FINES
	0		0.3_~	TOPSOIL (4 ir	nches).			v ∑ ss	<u>م</u>	1-2-2			0				
ENT (2)-GPJ				POORLY GRA fine grained, n (Fill).	ADED SAND WIT noist	H SILT, (SP-SM) brow	'n,			(4)	-						
DEVELOPME			<u>3.5 ⊽</u>	POORLY GRA	ADED SAND WIT	H SILT, (SP-SM) brow	888.8 n,	2	56	(12)	-						
/N AND CREEK	5			fine grained, s	aturated, medium	dense		SS 3	67	5 - 7-6 (13)	-						
GINT/DE-TOV			7.0	LEAN CLAY V	VITH SAND, (CL)	gray, wet, rather stiff,	885.3	∬ ss	56	4-6-7	_						
IG REPORTS/				liace graver				4		(13)	_						
GIENGINEERIN			10.3	SILTY SAND, medium dense	(SM) gray, fine gr	ained, saturated,	882.0	SS 5	44	5 - 6-5 (11)	_						
0)/ENGINEERIN			12.0	LEAN CLAY V rather stiff, tra-	VITH SAND, (CL) ce gravel	gray, wet, medium to	000.3	SS 6	100	6 -7- 7 (14)	_						
(15.60936.10)	 15							ss 7	100	2-4-5	_						
N HILLS - GEC										225	-						
COJECT ARUE								8	100	(8)	_						
CTS/LUAAP PF	20		21.0				871.3	SS 9	89	3 - 4-6 (10)							
2015 PROJEC				Boreh Bo	ole backfilled with ottom of borehole	auger cuttings. at 21.0 feet.											
11-PROJECTS																	
5/16 14:46 - H																	
2012.GDT 1/2																	
US LAB MAY 2																	
S GINISID																	
CH COLUMN																	
NTI GEOTE																	

			North 6160 Inver Telep	ern Technologies Carmen Avenue Grove Heights, M hone: 651-389-4	, Inc. East IN 55076 191					BO	RIN	G N	UM	IBE	R D Page	E-8 (± 1 0	09 F 1
	CLIEN	NT C	arl Bola	nder and Sons. C	0		PROJEC		Ram	sev County	/ Re - D	evelor	oment	Site (тсааг	2)	
	PROJ			R 15.60936.100			PROJEC			Arden Hills	MN		Jinoin		10/01		
	DATE	STAR	RTFD f	5/19/15	COMPLETED	5/19/15) FI FVA		890 82 ft	, .		но	E SIZ	Έ "6	 1/2" in	ches
	DRILI			ACTOR NTI			GROUNI) WATER		LS:						<u></u>	
	DRILI		IETHO) 3 1/4 in H S A			Σ ΔT			ING 7.00) ft / Fl	lev 88:	3 82 ft				
		SED B	Y DAS	<u> </u>	CHECKED B	/ DAS	ΔT			ING		01 000	<u></u>				
	NOTE	S FI	ev. at st	aked location.			AF										
								ЪЕ	% ,		Ż	۸T.	ш(%)	ATT	LIMITS	RG	
	o DEPTH (ft)	GRAPHIC LOG		M	ATERIAL DESC	RIPTION		SAMPLE TY NUMBEF	RECOVER' (RQD)	BLOW COUNTS (N VALUE	POCKET PI (tsf)	DRY UNIT ((pcf)	MOISTUR	LIQUID	PLASTIC LIMIT	PLASTICITY INDEX	FINES
GPJ			0.3_/\	TOPSOIL (3 inc POORLY GRAD	hes). DED SAND, (SP)	brown, fine to mediu	<u></u>	SS 1	56	3 - 5-5 (10)							
ELOPMENT (2)				(Fill). SILTY SAND, (S	SM) brown, fine g	grained, moist, mediu	m	SS 2	0	4 - 6-7 (13)							
N AND CREEK DEV	5			NOTE: No recover cuttings.	very Sample No.	2. Sampled auger			67	4 -8- 9 (17)							
RTS/GINT/DE-TOWI			<u>7.0 </u> ∑	CLAYEY SAND loose	, (SC) gray, fine	grained, saturated,	883.8	SS 4	83	3 - 3-3 (6)	_						
RING REPOF	 _ 10		9.5	LEAN CLAY WI	TH SAND, (CL)	gray, wet, medium to	881.3	∖∕l ss	00	2-2-2							
KING/ENGINEE				soft				5	89	(4)							
100)/ENGINEEF								SS 6	44	1-2-3 (5)							
GEO - (15.60936								SS 7	100	2 -2- 3 (5)							
RDEN HILLS -			17.0	LEAN CLAY WI	TH SAND, (CL)	gray, wet, soft, trace	873.8	∑ ss	100	0-2-2							
AP PROJECT A	 20			NOTE: Weight o	of Hammer at Sa	mple No. 8.				(4)							
CTS/TCA/			21.0				869.8	9	100								
CTS/2015 PROJE				Borehol Boti	le backfilled with tom of borehole	auger cuttings. at 21.0 feet.											
46 - H:\1-PROJE																	
GDT - 1/25/16 14:																	
S LAB MAY 2012.0																	
S - GINT STD US																	
OTECH COLUMN																	
Ш																	

		Northe 6160 Inver Telept	ern Technologies, Inc. Carmen Avenue East Grove Heights, MN 55 none: 651-389-4191	076				BO	RIN	G N	UM	BE	R D Page	E-8 ≞ 1 0	10 F 1
	CLIEI	NT Carl Bola	nder and Sons, Co.		PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF	^{>})	
	PRO.		R <u>15.60936.100</u>		PROJEC			Arden Hills	, MN						
	DATE		5/19/15 C	DMPLETED 5/19/15	GROUND	ELEVA		890.38 ft			HOI	E SIZ	E <u>"6</u>	1/2" ir	iches
	DRIL		CTOR NTI		GROUND	WATER	LEVE	LS:							
	DRIL	LING METHOD	3 1/4 in H.S.A		$ar{ abla}$ at	TIME OF	DRILI	LING _9.50) ft / El	ev 880	0.88 ft				
	LOGO	GED BY DAS	CI	HECKED BY DAS	AT	END OF	DRILL	.ING							
	NOTE	ES Elev. at st	aked location.		AF	ter dri	LLING								
	Ξ	⊇ T n				TYPE ER	RY %))	v TS UE)	PEN.	T WT.	JRE T (%)	AT1		RG S	S
	DEPT (ft)	GRAPI	MATEF	RIAL DESCRIPTION		SAMPLE NUMB	RECOVE (RQE	BLOV COUN (N VAL	POCKET (tsf)	DRY UNI (pcf.	MOISTU	LIQUID	PLASTIC LIMIT	PLASTICIT INDEX	FINE
).GPJ			TOPSOIL (3 inches). SILTY SAND, (SM) b	rown, fine grained, moist, trace		SS 1	56	4-5-5 (10)							
DEVELOPMENT (2			(Fill). LEAN CLAY WITH S gravel	AND, (CL) brown, moist, trace		SS 2	78	6 - 8-8 (16)	-						
WN AND CREEK [5		(Fill).			SS 3	78	5 - 5-5 (10)	-						
ORTS/GINT/DE-TC		XXX 7.0	SILTY SAND, (SM) b moist to saturated, m	rown to dark gray, fine grained, edium dense to l oose	883.4	SS 4	33	3 -4- 6 (10)	-						
ENGINEERING REPO	 					SS 5	83	5 - 6-8 (14)	-						
0)/ENGINEERING/		13.5			876.9	SS 6	67	2 - 3-5 (8)	-						
3EO (15.60936.10	 		brown, fine grained, s dense, clay lenses	aturated, very loose to medium	τ	SS 7	44	3-1-1 (2)	_						
FARDEN HILLS - 0							56	5 - 5-6 (11)	-						
SITCAAP PROJEC	20	21.0			869.4	SS 9	83	6 - 6-5 (11)	-						
2015 PROJECT			Borehole bao Bottom c	ckfilled with auger cuttings. f borehole at 21.0 feet.	000.4	/ N				1			1		
NTI GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/25/16 14:46 - H::1-*KUJEC1S:															

			Northe 6160 Inver Telep	ern Techn Carmen A Grove Hei hone: 65°	ologies, venue Ea ights, MN 1-389-419	nc. ast 55076 91						BO	RIN	G N	IUM	IBE	R D Page	E-8 ′ ∃ 1 0	11 F 1
	CLIE	NT _Ca	arl Bola	nder and \$	Sons, Co	-			PROJEC	T NAME	Ram	sey Count	y Re - D	evelo	oment	Site (TCAAF	<u>)</u>	
	PROJ		IUMBER	२ <u>15.609</u>	36.100				PROJEC	T LOCA		Arden Hills	s, MN						
	DATE			5/18/15		COMPLET	ED <u>5/18/15</u>		GROUNE) ELEVA		897.49 ft			HO	LE SIZ	E <u>"6</u>	<u>1/2" in</u>	iches
	DRILI	LING C	ONTRA		ITI			(GROUNE	WATE	R LEVE	LS:							
	DRILI	LING N	IETHOD) _3 1/4 ir	hH.S.A				AT	TIME O	F DRIL	LING 1	No gro	undwa	ter ob	served	1.		
	LOGO	GED B	Y DAS	;		CHECKED	BY DAS		AT	END O	- DRILL	_ING							
	NOTE	ES <u>El</u> e	ev. at st	aked loca	tion.				AF	TER DR	ILLING								
f										щ	%		7	Ŀ.	(%	AT		RG	
	DEPTH (ft)	GRAPHIC LOG			MA	TERIAL DE	SCRIPTION			SAMPLE TYF NUMBER	RECOVERY (RQD)	BLOW COUNTS (N VALUE)	POCKET PEI (tsf)	DRY UNIT W (pcf)	MOISTURE CONTENT (%	LIQUID	PLASTIC	PLASTICITY INDEX	FINES
).GPJ				SILTY S gravel (Fill).	AND, (SI	/I) brown, fir	ne grained, mo	oist, trace		SS 1	44	1-3-5 (8)							
DEVELOPMENT (2	 		3.0	SILTY S	AND, (SI ace grav	/) brown, fir e l	ne grained, mo	oist, medium	894.5 1	SS 2	56	4 - 4 - 5 (9)	-						
TOWN AND CREEK	5		7.0	NOTE: N	lo recove	ry. Sampleo	d auger cutting	gs.	900 F	SS 3	0	6-6-5 (11)	-						
EPORTS/GINT/DE-	 		7.0	POORLY grained,	/ GRADE moist, l o	D SAND, (S ose, trace g	SP) brown, fin rave l	e to coarse	090.0	$\left \begin{array}{c} ss \\ 4 \end{array} \right $	44	2-3-5 (8)	_						
NG/ENGINEERING R			10.5	LEAN CI trace gra	_AY WIT	H SAND, (C	:L) gray, moist	t, medium,	887.0	SS 5	78	4 -2- 4 (6)	_						
36.100)/ENGINEER	 									SS 6	100	2-2-3 (5)	-						
LLS - GEO - (15 609	<u>15</u>									ss 7	56	2-3-4 (7)	-						
ROJECT ARDEN H	 									SS 8	100	2-3-4 (7)	-						
ECTS\TCAAP PI	20		21.0		Dorobala	bookfilled y	ith our out	ingo	876.5	SS 9	89	1 - 4-4 (8)							
TI GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/25/16 14:46 - H:11-PROJECTS/2015 PRC					Botto	m of borehc	ole at 21.0 feet	t.											

(Northe 6160 Inver Telepl	ern Technologies, Carmen Avenue E Grove Heights, MI hone: 651-389-41	Inc. ast \ 55076 91					BO	RIN	G N	UM	BE	R D Page	E-8 ≞ 1 0	12 F 1
CLI	ENT		arl Bolai	nder and Sons, Co).		PROJEC	T NAME	Ram	sey County	y Re - D	evelop	oment	Site (TCAAF	P)	
PR	OJE	СТ М	NUMBER	R <u>15.60936.100</u>			PROJEC	T LOCA	TION _	Arden Hills	s, MN						
DA	re s	STAF	RTED 5	5/19/15	COMPLETED	5/19/15	GROUNI) ELEVA		891.84 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	ches
DRI	LLII	NG	CONTRA	ACTOR NTI) WATEF	R LEVE	LS:							
DRI		NG	NETHOD	0 3 1/4 in H.S.A			arproptat	TIME O	F DRIL	L ING <u>8.00</u>) ft / El	ev 883	3.84 ft				
	GGE	DB	Y DAS	;	CHECKED B	DAS	AT	END OF	DRILL	.ING							
NO	TES	E	ev. at st	aked location.			AF	TER DR	LLING								
o DEPTH		GKAPHIC LOG		MA	TERIAL DESC	RIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
GPJ				ROADWAY BAS	E (30 inches).			SS 1	0	3-2-1 (3)							
DEVELOPMENT (2)			2.5	NOTE: No recov POORLY GRAD grained, moist, li	ery. Sampled au ED SAND, (SP) atle gravel	iger cuttings. brown, fine to mediu	<u>889.3</u> m	ss 2	56	9 - 9-9 (18)							
WN AND CREEK			6.0	POORLY GRAD grained, moist (Fill)	ED SAND, (SP)	brown, fine to mediu	<u> </u>	SS 3	67	4 -5- 6 (11)							
ORTS/GINT/DE-TC			⊻	POORLY GRAD moist to saturate	ED SAND, (SP) d, dense	brown, fine grained,		SS 4	78	7-10-12 (22)							
			9.5	POORLY GRAD fine to medium g	ED SAND WITH rained, saturate	I SILT, (SP-SM) brow d, medium dense	882.3 /n,	SS 5	44	4 -7- 8 (15)							
			12.0	SILTY SAND, (S loose	M) brown, fine g	rained, saturated,	879.8	SS 6	89	4 - 3 - 2 (5)							
- CEO - (12:00392 1			14.5	LEAN CLAY WIT medium to rather	TH SAND, (CL)	prown gray, wet,	877.3	SS 7	100	2 -5- 4 (9)							
ECT ARDEN HILLS								SS 8	78	3 -4- 3 (7)							
			21.0				870.8	SS 9	100	2 -4- 6 (10)	_						
GEOTECH COLUMNS - GNT STD US LAB MAY 2012/GDT - 1/25/16 14:46 - H11-PROJECTS2015 PRO.				Botta	om of borehole a	at 21.0 feet.											

(Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R D Page	E-8 ∃ 1 0	13 F 1
CI		arl Bolander and Sons. Co			Ram	sev County	/ Re-D	evelor	ment	Site (ГСААГ	2)	
		NUMBER 15.60936.100	PROJEC			Arden Hills	MN				<u>10/01</u>	_/	
	TE STA	RTED 5/19/15 COMPLETED 5/19/15	GROUNI			888 09 ft	, 1011 1		но		Έ "6	1/2" in	ches
			GROUNI			<u>1 S</u>					-	1/2 11	01100
								04 979	2 50 ft				
			רא <u>←</u> אד			LING <u>9.50</u>	J IL / EI		<u>5.59 n</u>				
						.ing <u></u>							
			Ar				1	1	1				
DEPTH	(π) GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)				FINES
0	-	POORLY GRADED SAND WITH SILT, (SP-SM) brow fine to medium grained, moist, some fine to coarse gravel	'n,	AU 1									
		(Fill)		SS 2	100	8-9-9 (18)							
	-	NOTE: No Recovery due to gravel. Sampled auger cuttings. SILTY SAND. (SM) brown, fine grained, moist	882.1	SS 3	0	4 - 4 - 5 (9)	-						
		(Fill) 8.5 SILITY SAND (SM) grow find ground moist to	879.6	SS 4	89	6 -7- 6 (13)	-						
		∇ saturated, medium dense		ss 5	67	6 - 6-7 (13)	-						
				SS 6	100	4 - 6-6 (12)	-						
- 15 - 15	5			ss 7	78	5 - 6-5 (11)	-						
				SS 8	67	7 - 5-5 (10)	-						
20)	21.0	867.1	SS 9	89	6 - 5-6 (11)							
GED ECH COLUMNS GNI S ID US DE WAY ZOLZGD I - 1/2010 1/30-0-1/14-KOLGES/2010 FYRAE		Bottom of borehole at 21.0 feet.											

			North 6160 Inver Telep	ern Technologie Carmen Avenue Grove Heights, hone: 651-389	es, Inc. e East MN 55076 -4191						BO	RIN	G N	UM	BE	R D PAGE	E-8 ′ ∃ 1 0	14 F 1
	CLIENT	C_Ca	arl Bola	nder and Sons,	Co.		PROJE	CT N	AME	Ram	sey County	y Re - D	evelop	oment	Site (<u> ICAAF</u>	<u>')</u>	
	PROJE	CT N	UMBE	R 15.60936.10	0		PROJE	CT L	OCA ⁻		Arden Hills	s, MN						
	DATE S	STAR	TED _	5/19/15		ED <u>5/19/15</u>	GROUN	D El	EVA	TION _	888.1 ft			HOI	E SIZ	E <u>"6</u>	<u>1/2" in</u>	iches
	DRILLII	NG C	ONTR/	ACTOR NTI			GROUN	DW	ATER	R LEVE	LS:							
	DRILLI	NG N	IETHOI	D <u>3 1/4 in H.S.</u>	A		¥A⁻	TIN	NE OF	DRIL	LING _ 4.50) ft / E	ev 883	3.60 ft				
	LOGGE	ED B	DAS	6	CHECKED	BY DAS	A	EN	D OF	DRILL	.ING							
	NOTES	i <u>El</u> e	ev. at st	taked location.			A	TE	r dri	LLING								
	т	<u>0</u>								RY % ()	LES LES	PEN.	Γ WT.	JRE T (%)		ERBE	RG } ≻	6
	DEPT	GRAPH LOG			MATERIAL DES	CRIPTION				RECOVEI (RQD	BLOV COUN ^T (N VALU	POCKET (tsf)	DRY UNIT (pcf)	MOISTL CONTEN	LIQUID	PLASTIC LIMIT	PLASTICIT INDEX	FINE
() GPJ	X			SILTY SAND, (Fill)	(SM) brown and	tan, fine grained, mois	t		AU 1									
VELOPMENI (2	X X								SS 2	56	3 - 3-4 (7)	-						
N ANU CREEK UE	5		4.5 <u>⊽</u> 6.0	SILTY SAND, saturated (Fill)	(SM) reddish bro	own, fine grained,	883.6		SS 3	100	6 - 8-7 (15)	_						
			8.3	POORLY GRA gray, fine grai	ADED SAND WI ned, saturated, I d	TH SILT, (SP-SM) dark bose, trace gravel	/ 		SS 4	83	3 -2- 3 (5)	-						
KEPOK			9.5	SANDY SILT,	(ML) dark gray,	wet, medium	878.6	5				1						
			10.0	SILTY SAND, medium dense	(SM) dark gray, e, trace gravel	fine grained, saturated	,	Д	SS 5	67	5 -6- 3 (9)							
UU)VENGINEEKIN			12.0	SANDY LEAN rather stiff, tra	CLAY, (CL) dar ce fine to coarse	k gray, wet, medium to sand	876.	X	SS 6	56	2 -4- 3 (7)	-						
									SS 7	100	3 - 3-4 (7)							
I AKUEN HILLS -									SS 8	100	4 -4- 6 (10)	_						
P PROJEC																		
ECISTICAN			21.0	Darah	ala kaskûlad	44	867.2	Х	9	100	5-6-5 (11)							
VII GEOTECH COLUMNS - GINT STU US LAB MAY ZUIZIGUT - 1/2010 14/40 - HIVI-PRUJEU IO/2010 FRUJE				Borer	ole backfilled wi	th auger cuttings. e at 21.0 feet.												

			Northe 6160 (Inver (Teleph	ern Technologies, Carmen Avenue E Grove Heights, M none: 651-389-4	Inc. East N 55076 191					BO	RIN	G N	UM	BE	R D Page	E-8 1 0	15 ^{F 1}
	CLIEI	NT_C	arl Bolar	<u>nder and S</u> ons, C	0		PROJEC	T NAME	Ram	sey County	<u>/ Re</u> -D	<u>eve</u> lop	<u>ome</u> nt	Site (<u>TCA</u> AF	P)	
	PRO.		NUMBEF	R _15.60936.100			PROJEC			Arden Hills	s, MN						
	DATE	STA	RTED 5	5/19/15	COMPLETED	5/19/15	GROUN	D ELEVA		892.67 ft			но	_E SIZ	E_"6	1/2" in	ches
	DRIL		CONTRA	CTOR NTI			GROUN	O WATEF	R LEVE	LS:							
	DRIL	LING	METHOD	3 1/4 in H.S.A			${ar ar \Sigma}$ at		F DRIL	LING _5.00) ft / El	ev 887	7.67 ft				
	LOGO	GED B	Y DAS		_ CHECKED BY	_DAS	AT	END OF	DRILL	.ING							
	NOTE	S E	lev. at st	aked location.			AF	TER DR	LLING								
		<u>0</u>						YPE	۲%	, s E	PEN.	WT.	RE '(%)	AT	FERBE LIMITS	RG	
	DEPTH (ft)	GRAPH LOG		M	ATERIAL DESCF	RIPTION		SAMPLE T NUMBE	RECOVEF (RQD)	BLOW COUNT (N VALL	POCKET F (tsf)	DRY UNIT (pcf)	MOISTU CONTENT	LIQUID	PLASTIC LIMIT	PLASTICIT INDEX	FINES
2) GPJ				POORLY GRAD grained, moist to (Fill).	ED SAND, (SP) saturated, some	brown, fine to mediu e fine to coarse grave	n I	AU 1	-							_	
								SS 2	44	2 -2- 3 (5)							
VN AND CREEK	5		⊊ 				886.7	SS 3	33	1 -1- 1 (2)	-						
RTS/GINT/DE-TO				fine grained, sat	urated, medium o	dense	,	SS 4	78	4 - 5-5 (10)	_						
IGINEERING REPO			9.5	POORLY GRAD fine grained, sat	ED SAND WITH urated, loose, tra	SILT, (SP-SM) brow ce gravel	883.2 'n,	SS 5	56	3 - 3-2 (5)							
VENGINEERING/EP			12.0	LEAN CLAY WI to rather stiff, tra	TH SAND, (CL) c ice gravel	lark gray, wet, mediu	<u>880.7</u> m	SS 6	78	2-3-3 (6)							
0 - (15.60936.100)								SS 7	100	3 - 3-3 (6)	_						
ARDEN HILLS - GE								SS 8	78	4-7-3 (10)	-						
TCAAP PRUJEU I	20							ss ss	67	5-6-5							
115 PROJECIA		<u> </u>	21.0	Boreho l Bott	e backfilled with om of borehole a	auger cuttings. It 21.0 feet.	871.7	МЛЭ		(11)		<u> </u>					
11 FRUJEC I SVEL																	
- 1/25/16 14:40 - r																	
B MAY 2012 GD1																	
ECH COLUMNS -																	
NI GEOLE																	

			Northe 6160 Inver Telepl	ern Technologies Carmen Avenue Grove Heights, N hone: 651-389-4	s, Inc. East MN 55076 4191					BO	RIN	G N	UM	BE	R D Page	E-8 ∃ 1 0	16 F 1
	CLIE	NT <u>C</u>	arl Bolai	nder and Sons, (Co.		PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF	^{>})	
	PRO.		UMBEF	R <u>15.60936.100</u>)		PROJEC	T LOCA		Arden Hills	s, MN						
	DATE	E STAF	RTED 5	5/18/15		D <u>5/18/15</u>	GROUN) ELEVA	TION _	903.88 ft			HOI	E SIZ	E <u>"6</u>	<u>1/2" in</u>	<u>iches</u>
	DRILI	L I NG (ONTRA	CTOR NTI			GROUNI) WATEF	LEVE	LS:							
	DRILI	LING N	IETHOD) <u>3 1/4 in H.S.A</u>	4		AT	TIME OF	DRIL	L ING N	lo grou	undwa	ter ob	served	1.		
	LOGO	GED B	Y DAS		CHECKED B	BY DAS	AT	END OF	DRILL	.ING							
	NOTE	ES _EI	ev. at st	aked location.			AF	TER DRI	LLING								
	o DEPTH (ft)	GRAPHIC LOG		Μ	IATERIAL DESC	CRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIMIT LIMIT			FINES
).GPJ				SILTY SAND V moist, fine to m (Fill)	VITH GRAVEL, (nedium gravel	SM) brown, fine graine	ed,	ss 1	44	2 - 6-8 (14)							
K DEVELOPMENT (2	 			NOTE: No recc	overy. Sampled a	uger cuttings.		SS 2	0	3 - 3-4 (7)	-						
OWN AND CREE			5.0	LEAN CLAY W stiff, trace grave	ITH SAND, (CL) el	brown, moist, rather	898.9	SS 3	89	2 -4- 5 (9)							
PORTS/GINT/DE-1								SS 4	100	3 - 5-6 (11)	-						
ENGINEERING RE								SS 5	100	4 - 6-8 (14)	-						
100)/ENGINEERING			12.0	LEAN CLAY W trace gravel	ITH SAND, (CL)	gray, moist, rather sti	891.9 ff,	SS 6	100	4 - 5-6 (11)	-						
S - GEO - (15.60936.	<u> </u>							ss 7	100	3 -4- 6 (10)	-						
JECT ARDEN HILLS								SS 8	100	3 -5- 6 (11)	-						
CTS/TCAAP PRC	_20		21.0				882.9	ss 9	100	2-5-6 (11)							
GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/25/16 14:46 - H:11-PROJECTS/2015 PRO.				Bo	ttom of borehole	at 21.0 feet.											

			North 6160 Inver Telep	hern Technologies, Inc.) Carmen Avenue East r Grove Heights, MN 55076 phone: 651-389-4191				BO	RIN	G N	UM	BE	R D PAGE	E-8 E 1 0	17 F 1
	CLIEN	NT C	arl Bola	ander and Sons. Co.	PROJEC	T NAME	Ram	sev County	√ Re - D	evelor	oment	Site (ГСААГ	>)	
	PROJ		NUMBE	ER 15.60936.100	PROJEC	T LOCA		Arden Hills	5. MN						
	DATE	STAF	RTED	5/18/15 COMPLETED 5/18/15	GROUN			901.99 ft	,		но	E SIZ	Έ "6	1/2" ir	ches
	DRILI	ING (CONTR	ACTOR NTI	GROUN			LS:							
				\mathbf{D} 31/4 in HSA				ING 4 50	רו ft/FI	lev 80 ⁻	7 49 ft				
								ING			<u>1.40 II</u>				
	NOTE	S EI	$\frac{D}{1}$		_ ^'										
					_ ^					1	1		FEDDE	-PC	
	HTH ()	0HIC				E TYPE BER	ERY % (D)	NV NTS LUE)	T PEN.	llT WT.	rure NT (%)				ES
	DEF (ff	GRAF		MATERIAL DESCRIPTION		SAMPLE	RECOV (RC	BLO COU (N VA	POCKE (ts	DRY UN (pc	MOIS ⁻ CONTE	LIQUI	PLASTI LIMIT	PLASTIC INDEX	NIL
GPJ				POORLY GRADED SAND WITH SILT, (SP-SM) br fine to medium grained, moist, trace gravel	rown,	SS 1	67	2-2-2 (4)							
ELOPMENI (2).			2.0	SILTY SAND, (SM) brown and light brown, fine to medium grained, moist, trace gravel (Fill)	900.0	ss 2	56	3 -3- 3 (6)							
NU CREEK DEV	 5		<u> </u>	 ✓ SILTY SAND, (SM) gray, fine to coarse grained, saturated, very loose 	898.0	ss 3	83	1-1-1 (2)	_						
NINDE-LOWN A			7.0	SILTY SAND, (SM) brown, fine to coarse grained,		V ss		3-5-6	-						
5 KEPOKIS/GI				saturated, loose to medium dense, trace to a little gravel		4	78	(11)	-						
S'ENGINEEKING	<u>10</u>					ss 5	56	2 -3- 4 (7)	-						
UJENGINEEKIN						SS 6	44	4 -6- 7 (13)	-						
20936-10			14.5		887.5				-						
-S - GEU - (15 t			17.0	fine to coarse grained, saturated, medium dense, tr gravel	rown, race	SS 7	100	1-5-4 (9)	_						
ECT ARDEN HIL			17.0	CLAYEY SAND, (SC) brown, fine to coarse grained saturated, loose, trace gravel	d,	SS 8	78	3-3-5 (8)							
I CAAP PROJ	20		19.5	SILTY SAND, (SM) brown, fine to coarse grained, saturated, loose, trace gravel	882.5	X ss	89	4-3-4 (7)	-						
AULEU IS		<u>F F </u>	121.0	Borehole backfilled with auger cuttings.	881.0		1	(י)	1			1	<u> </u>		I
COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/25/16 14:46 - H:/1-PROJECTS/2015 PRO				Bottom of borehole at 21.0 feet.											
I GEOLEC															

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R D Page	E-8 ∃ 1 0	18 F 1
	CLIE	NT_C	Carl Bolander and Sons, Co.	PROJEC		Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF	^{>})	
	PRO		NUMBER 15.60936.100	PROJEC			Arden Hills	, MN						
	DATE	STAF	RTED _5/18/15 COMPLETED _5/18/15	GROUNI) ELEVA		897.33 ft			но	_E SIZ	E <u>"6</u>	1/2" in	iches
	DRIL	LING		GROUNI			LS:							
	DRIL		METHOD _ 3 1/4 in H.S.A	$\overline{\Sigma}$ at		DRIL	LING _ 7.00) ft / El	ev 890	0.33 ft				
	LOGO	GED B	BY DAS CHECKED BY DAS	AT	END OF	DRILL	.ING							
	NOTE	ES EI	lev. at staked location.	AF	TER DRI	LLING								
	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	ATT LIMIT LIMIT			FINES
(z).			POORLY GRADED SAND WITH SILT, (SP-SM) browr fine to medium grained, moist, trace gravel, trace roots 2.0 (Fill)	1, 895.3	ss 1	44	1-3-4 (7)							
DEVELOPMENT			SILTY SAND, (SM) brown, fine to medium grained, moist (Fill)	002.0	SS 2	67	5 - 8-7 (15)	-						
WN AND CREEK			6.0 POORLY GRADED SAND (SP) gray to brown fine to	092.0 el 891.3	ss 3	44	8-10-11 (21)	-						
			∇ medium grained, moist to saturated, medium dense, trace gravel	889.1	SS 4	78	2-3-6 (9)							
NEEKING KEPUI	 _ 10		9.5 gravel CLAYEY SAND, (SC) gray, fine to medium grained, saturated, loose, trace gravel	887.8	ss	56	2-3-3 (6)	-						
INEEKINGENG			12.8	884.5	∬ ss	83	2-3-3	-						
D.DUN300-TUU/NEINC	 15		PEAT, (Pt) black, moist, soft, fibrous		6		(6)	-						
			16.5 SILTY SAND, (SM) gray, fine grained, saturated, loose	880.8	7	78	(2)	-						
			trace gravel		X SS 8	56	3-3-4 (7)	-						
JEUISIUMM -	_ 20		21.0 Borehole backfilled with auger cuttings.	876.3	SS 9	83	1 -6- 2 (8)	-						
III GEOLECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/25/16 14:46 - H:/1-PROJECTS/2015 P			Dottom of Dorefible at 21.0 feet.											

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			North 6160 Inver	nern Techno <mark>l</mark>) Carmen Ave [,] Grove Heigt	ogies, Inc. enue East nts, MN 5507	76						во	RIN	G N	UM	BE	R D Page	E-8 E 1 0	19 F 1
	1	1	Tele	phone: 651-3	389 - 4191														
	CLIEN	IT _C	arl Bola	ander and So	ons, Co.			PR	ROJEC	T NAME	Ram	sey Count	y Re-D	evelop	oment	Site (TCAAF	P)	
	PROJ	ECT	NUMBE	R <u>15.60936</u>	5.100			PR	OJEC	T LOCA	FION _	Arden Hills	s, MN						
	DATE	STAF	rted _	5/18/15	COI		5/18/15	GR	ROUND	ELEVA	tion _	894.26 ft			HOI	E SIZ	E <u>"6</u>	1/2" in	<u>ches</u>
	DRILL	ING (CONTR	ACTOR NT	1			GR	ROUND	WATER	R LEVE	LS:							
	DRILL	ING I	NETHO	D <u>3 1/4 in F</u>	I.S.A				∑ at	TIME OF	DRIL	LING _5.0	0 ft / E	lev 889	9.26 ft				
	LOGO	ED B	Y DA	S	CHE	ECKED BY	DAS		AT	END OF	DRILL	.ING							
	NOTE	S_E	ev. at s	staked locatio	on.				AF	rer dri	LLING								
										111	<u>`</u>				_	ATT	ERBE	RG	
	DEPTH (ft)	GRAPHIC LOG			MATERI	AL DESCRIF	PTION			SAMPLE TYPI NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%	LIQUID			FINES
L'GP-J		XXX	1.0	POORLY (grained, m (Fill)	GRADED SA oist, trace gi	AND, (SP) br ravel	rown, fine to me	edium ∫	893.3	SS 1	44	2 -4- 6 (10)							
ELOPMENI (Z			2.8	POORLY (grained, m	GRADED SA oist, mediun	ND, (SP) br n dense, trac	rown, fine to me ce gravel	edium	891.4	SS 2	83	3 -6- 7 (13)							
U CREEK DEV	5		4.5 <u></u>	stiff, trace	gravel ND, (SM) bro	own to dark t	prown, fine grai	ned,	889.8	ss a	56	3 - 8-6	-						
INDE-LOWN AF				moist to sa		ulum dense,	trace graver					267							
KEPOK I SVGIN										4	67	(13)	-						
NEEKING	10		10.0	PEAT, (Pt)) black, mois	t, medium			884.3 883.8	ss 5	78	2-4-1 (5)							
EKINGENG				SILTY SAN saturated,	ND, (SM) dai loose, trace	rk gray to gra grave l	ay, fine grained	l,				100							
s-TUU/JENGINE			44.5						070.0	6	56	(5)	-						
EO - (15-6093t	15		14.5	CLAYEY S loose, trace	SAND, (SC) (e gravel	gray, fine gra	ained, saturated	d, very	0/9.0	SS 7	67	2-1-1 (2)							
N HILLS - G			17.0	SANDY LE	AN CLAY	CL) grav we	et medium to s	soft	877.3			2-3-3	-						
CUEC I ARDE				trace grave	el	, g,,	- ,	,		8	33	(6)	-						
CIS/ICAAP P	20		21.0						873.3	SS 9	28	2-2-1 (3)							
ECH COLUMNS - GINT STD US LAB MAY 2012/GDT - 1/25/16 14:46 - H:/1-PROJECTS/2015 PRC					Bottom of	borehole at 2	21.0 feet.												
N I GEC																			

(2		North 6160 Inver Telep	ern Technolog Carmen Avenu Grove Heights hone: 651-389	ies, Inc. ue East , MN 55076 9-4191						BO	RIN	G N	UM	BE	R D PAGE	E-8 2	20 F 1
c		NT <u>Ca</u>	arl Bola	nder and Sons	, Co.		PR	OJEC [.]		Ram	sey County	/ Re-D	evelop	oment	Site (1	CAAF	<u>)</u>	
P	ROJ	ECT N	IUMBE	R <u>15.60936.1</u>	00		PR	OJEC.		rion _	Arden Hills	s, MN						
	ATE	STAF	RTED	5/18/15	COMPLET	ED <u>5/18/15</u>	GR	OUND	ELEVA		894.31 ft			HOL	_E SIZ	E <u>"6</u>	<u>1/2" in</u>	<u>ches</u>
	RILL	ING C	CONTR	ACTOR NTI			GR		WATER		LS:							
				D <u>3 1/4 in H.S</u>				TA ≚ ••			LING <u>5.00</u>) ft / El	ev 889	9.31 ft				
		S FI	r <u>DA</u> a	taked location							.ING <u></u>							
H															ATT	ERBE	RG	
חבסדט	0 (ff)	GRAPHIC LOG			MATERIAL DE	SCRIPTION			SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT		PLASTICITY	FINES
	-			POORLY GR fine to coarse (Fill)	ADED SAND W grained, moist,	(ITH SILT, (SP-SM) trace gravel) brown,	4	SS 1	83	2-3-5 (8)							
	-		2.5	POORLY GR fine to coarse	ADED SAND W grained, moist,	(ITH SILT, (SP-SM) dense, little gravel) brown,	891.8	SS 2	56	6-11-11 (22)	-						
	5		<u> </u>	SILTY SAND moist to satu	, (SM) brown, fir rated, dense, tra	ne to medium graine ice gravel	ed,	000.0	SS 3	78	8-11-10 (21)	-						
	-		8.0	SANDY LEA	N CLAY, (CL) bl	ue gray, wet, rather	[.] stiff,	886.3	SS 4	78	3 - 7-5 (12)							
	<u>10</u>		10.5	SILTY SAND trace gravel	, (SM) gray, fine	grained, saturated,	, loose,	884.8	SS 5	44	3 -4- 3 (7)							
	-	<u>1/ ×1/</u>		FEAT, (FI) D	ack, moist, soit			ĸ				-						
	-		13.0	SILTY SAND loose, trace g	, (SM) gray, fine jravel	grained, saturated,	, very	881.3 879.8	6	67	(2)							
	<u>15</u>			SANDY LEAI gravel	N CLAY, (CL) gr	ay, wet, rather stiff,	trace	4	SS 7	89	2 - 5-4 (9)							
	-		17.0	SILTY SAND medium dens	, (SM) gray, fine se to very l oose,	grained, saturated, trace gravel	,	877.3	SS 8	100	4-10-2 (12)							
	- 20 -		· · ·						ss 9	100	1-1-1 (2)							
	-								SS 10	100	3 - 4-4 (8)							
	25		24.5	SANDY LEAI gravel	N CLAY, (CL) gr	ay, wet, rather stiff,	trace	869.8 868.3	SS 11	100	4 - 4-6 (10)							
				Bore E	hole backfilled v Bottom of boreho	vith auger cuttings. le at 26.0 feet.				-			<u>.</u>		<u> </u>			
N II GEOLECH COLUMNS - GIN I ST																		

			Northern Technologies, Inc. 6160 Carmen Avenue East Inver Grove Heights, MN 55076 Telephone: 651-389-4191				BO	RIN	G N	UM	BE	R D Page	E-8 2 ∃ 1 0	21 F 1
	CLIE	NT <u>Ca</u>	arl Bolander and Sons, Co.	PROJEC	T NAME	Ram	sey County	/ Re-D	evelop	oment	Site (TCAAF	^{>})	
	PRO.		IUMBER 15.60936.100	PROJEC			Arden Hills	s, MN						
	DATE	STAR	TED _5/15/15 COMPLETED _5/15/15	GROUN) ELEVA		888.46 ft			НО	_E SIZ	́Е <u>"6</u>	1/2" in	ches
	DRIL	LING C		GROUN		LEVE	LS:							
	DRIL	LING N	IETHOD 3 1/4 in H.S.A	$ar{arphi}$ at		DRIL	LING _7.00) ft / El	ev 88 [.]	1.46 ft				
	LOGO	GED B	Y DAS CHECKED BY DAS	A	END OF	DRILL	.ING							
	NOTE	ES _Ele	ev. at staked location.	AF	TER DRI	LLING								
											AT	FERBE	RG	
	o DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
2).GPJ			POORLY GRADED SAND, (SP) brown, fine to mediu grained, moist, trace gravel (Fill)	m	ss 1	33	1-1-2 (3)							
VELOPMENT (3			NOTE: No recovery. Sampled auger cuttings.	885.0	SS 2	0	2-3-5 (8)							
VN AND CREEK DE	 5 		6.0 (Fill)	ay 882.5	SS 3	33	1-1-1 (2)	-						
RTS/GINT/DE-TO/			∇ medium, trace gravel		SS 4	56	2-2-4 (6)							
IGINEERING REPO	 _ 10				SS 5	94	2-3-3 (6)							
0)/ENGINEERING/EN					SS 6	100	2 - 3-5 (8)							
GEO - (15.60936.100	 _ <u>15</u>				ss 7	89	2-2-3 (5)	-						
CT ARDEN HILLS -					SS 8	100	2-3-4 (7)							
STCAAP PROJE			21.0	967 6	ss 9	100	2-3-5 (8)							
GEOTECH COLUMNS - GINT STD US LAB MAY 2012 GDT - 1/25/16 14:46 - H:/1 - PROJECTS/2015 PROJEC			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.											

			North 6160 Inver Telep	ern Te Carm Grove hone:	echnol en Av e Heig 651-	logies enue l hts, M 389 - 4	, Inc. East IN 550 191	76										BO	RIN	G N	UM	BE	R D PAGE	E-8 2 ≞ 1 0	22 F 1
	CLIE	NT Ca	arl Bola	nder a	and So	ons, C	0.						PROJE	T N	AME	Ram	sey	Count	/ Re - D	evelo	oment	Site (<u> TCAAF</u>	<u>)</u>	
	PROJ		IUMBEI	R <u>15</u>	.6093	6.100							PROJEC	T L	OCAT		Ard	en Hills	s, MN						
	DATE	STAF	RTED _	5/18/1	5		_ CO	MPLE	TED	5/18/1	15	(GROUN) EL	EVA		890	.4 ft			HOI	E SIZ	E <u>"6</u>	<u>1/2" in</u>	iches
	DRILI	LING C	CONTR/	асто	R <u>N</u>	1						0	GROUN	D W	ATER	LEVE	LS:								
	DRILI	LING N	IETHO) <u>3</u>	1/4 in I	I.S.A							¥ A⊺	TIN	1E OF	DRIL	LING	G _7.00	D ft / E	ev 88	3.40 ft				
	LOGO	GED B	Y DAS	5			_ CHI	ECKE	DBY	DAS			A	EN	d of	DRILL	ING	i							
	NOTE	ES <u>El</u>	ev. at st	taked	locatio	on.							AF	TEF	r Dri	LLING									
	HL	0HIC					ATE DI								BER L	ERY % ID)	MC	NTS LUE)	T PEN. f)	ult WT. 3f)	rure NT (%)			RG } È	ES
	OEF (f	GRAF				IVI	ATERI	AL DI	ESCR	IP HOI	N				NUM	RECOV (RC	BLO	COU (N VA	POCKE (ts	DRY UN (po	MOIS ⁻ CONTE	LIQUI	PLASTI LIMIT	PLASTIC INDE>	NIL
GPJ			1.5	SAN (Fill)	IDY SI	ILT, (N	/L) bro	wn, n	noist				888.9	М	SS 1	44	1	-2-2 (4)							
OPMENT (2)			3.0	SILT mois (Fill)	FY SAI st	ND, (S	3M) bro	own, f	ine to	mediu	m grain	ed,	887.4		SS 2	78	2	-2-3 (5)							
REEK DEVEL				LEA	N CLA	AY WI	TH SA	.ND, (CL) gi	ray, mo	oist, me	dium	_		SS		2	3.2							
TOWN AND C			70 \	,									002 /	М	3	28		(5)	-						
RTS/GINT/DE-				POC satu	ORLY rated,	GRAD very I	ED SA	AND, trace	(SP) t gravel	orown, I	fine gra	ined,	000.4		SS 4	56	2	-1-3 (4)							
G REPO			9.5										880.9												
G/ENGINEERIN				satu	rated,	ND, (S very I	iM) gra oose, f	ay and trace	d brow gravel	vn, fine I	grained	d,		Д	SS 5	44	3	-1-1 (2)	-						
()/ENGINEERIN			12.5	LEA med	N CLA	Y WI	TH SA	ND, (CL) gi lenses	ray, we	et, soft to	0	877.9		SS 6	100	2	2-2-2 (4)							
(15.60936.100	 15				,		,							M	ss	83	2	-3-4	-						
HILLS - GEO															/			(7)							
UECT ARDEN														Д	SS 8	100	2	. -3- 4 (7)							
SUTCAAP PRO	_20		21.0										869.4		SS 9	100	2	-3-4 (7)							
RULEUI		<u>x1.1111</u>			B	orehol	e back	(filled	with a	auger c	uttings.		000	<u>v 1</u>										L	
S\2015 F						Don		boron		21.01	001.														
ROJECT																									
- H:/1-F																									
/16 14:46																									
DT - 1/25																									
2012-GI																									
AB MAY																									
SID US																									
:- CIN ::																									
ECH CC																									
NTI GEO																									

(2		Northe 6160 Inver Telepi	ern Technologies, Carmen Avenue E Grove Heights, Mi hone: 651-389-41	Inc. ast N 55076 91					BO	RIN	G N	UM	IBE	R D Page	E-8 2 ∃ 1 0	23 F 1
c	LIEN	NT Ca	arl Bola	nder and Sons, Co).		PROJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF	^{>})	
P	ROJ		IUMBER	R 15.60936.100			PROJEC			Arden Hills	s, MN						
D	ATE			5/18/15	COMPLETED	5/18/15	GROUN) ELEVA		889.15 ft			но	LE SIZ	E_"6	1/2" in	iches
D	RILL	LING C	ONTRA				GROUN	WATE	R LEVE	LS:							
D	RILL	LING N	IETHO) <u>3 1/4 in H.S.A</u>			$\overline{\Sigma}$ at	TIME O	F DRIL	LING <u>9.50</u>) ft / El	ev 879	9.65 ft				
L	oge	SED B	Y DAS	3	CHECKED BY	DAS	AT		DRILL	.ING							
N	ΟΤΕ	ES _Ele	ev. at st	taked location.			AF	TER DR	ILLING								
ЛЕРТН	(#) 0	GRAPHIC LOG		MA	TERIAL DESCR	IPTION		SAMPLE TYPE NUMBER	RECOVERY % (RQD)	BLOW COUNTS (N VALUE)	POCKET PEN. (tsf)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	LIQUID LIMIT			FINES
2).GPJ	-		0.7	TOPSOIL (8 inch SILTY SAND, (SI (Fill)	nes). M) brown, fine gr	ained, moist	888.5	SS 1	56	1-3-4 (7)							
	-		3.0	POORLY GRADI medium grained, (Fill)	ED SAND, (SP) I dry, trace gravel	ight brown, fine to	886.2	SS 2	44	6 -4- 3 (7)							
TOWN AND CREEK	5		7.0	SANDY LEAN G	LAY, (CL) brown,	moist, meaium	000.0	SS 3	56	4 - 2-4 (6)	-						
	-		7.0	SANDY LEAN CI	LAY, (CL) gray, n	noist to wet, medium	002.2	SS 4	100	3 -3- 3 (6)							
	<u>10</u> -		⊥ ∑					SS 5	100	3-3-4 (7)							
100)/ENGINEERING	-							SS 6	100	3 -4- 4 (8)	-						
S - GEO - (15.60936.	<u>15</u>		14.5	SANDY LEAN CI to coarse gravel	LAY, (CL) gray, v	vet, medium, little fine	<u>874.7</u> 9	ss 7	100	6 - 5-4 (9)	-						
UECT ARDEN HILL	-							ss 8	89	5 - 4-4 (8)	-						
ECTS\TCAAP PRO	20		21.0	Dovobala	hookillod with a		868.2	SS 9	89	3 - 3-2 (5)	_						
II GEOTECH COLUMNS - GINT STD US LAB MAY 2012.GDT - 1/28/16 14:46 - H/1-PROJECTS/0015 PRO				Botto	om of borehole at	: 21.0 feet.											

(2		Northe 6160 Inver Telep	ern Techn Carmen A Grove Hei hone: 65	ologies, venue E ights, MN 1-389-41	Inc. ast \ 55076 91						BO	RIN	G N	UM	IBE	R D Page	E-8 2 ∃ 1 0	24 F 1
		ло	Carl Bola	nder and \$	Sons. Co).		Р	ROJEC		Ram	sev County	√ Re - D	evelor	oment	Site (ТСААР	>)	
P	ROJ	ECT	NUMBER	R 15.609	36.100			P	ROJEC			Arden Hills	<u>,</u> s. MN	0.010		0.10 (_/	
	ATE	STA	RTFD 5	5/18/15		COMPLET	FD 5/18/15	 G				888 51 ft	,		но	E SIZ	'F "6	 1/2" in	ches
	RILI	ING			JTI			ء م	ROUNI			1.5				0			
	RILI	ING		$3 \frac{1}{4}$ ir				0	ν Σ ΔΤ			ING 4.50	רות (הורך) רות הורך	LOV 88	1 01 ft				
	0000			<u> </u>	111.0.A	CHECKER			ΔT			ING	J 11 / L	00	1.01 I I				
			lov at et	, aked loca	tion	ONLONED													
F	012								74						1		FRRE	RG	
		0								PE	۲ %	ωŵ	Ľ.	Ň	щ ^(%)			3	
	t) T	HEG					COLDTION				ĎĜ	LUE NTS NTS	f)	cf)	IN THE	0.	<u>0</u> .	È,	ES
]£	RA RA	í		IVI/~		SCRIF HON			1PL 1UM	N N	N / A	lΥ ΠΥ Ξ	50	NTE		AST IMI	DE	ЦЦ
										SAN	RE	02	Q	DR	≥S		2	LAS LAS	
GPJ	0			SILTY S	AND, (S se, trace	M) brown, fir grave l	ne grained, moi	st, loose to		ss 1	83	2 -4- 4 (8)							
	-									∕∕ ss	50	2-2-2	1						
	_		4.5 🗸						884.0	2	56	(4)	-						
	5		6.0	FOORLY	r GRADI	ED SAND W irated, very I	ITH SILT, (SP- oose	SM) brown,	882.5	SS 3	56	3-2-1 (3)							
	_			loose, tra	AND, (Si ace grave	M) brown, fir e l	ie grained, satu	irated, very					-						
	_				-					SS 4	67	2-1-2 (3)							
I NG KET	10		10.0						878.5	1 99		222	-						
	_			SILTY LI trace gra	EAN CLA avel, little	Y, (CL-ML) sand	gray, wet, soft	to medium,		5	78	(4)	_						
	_									SS 6	83	1 -2- 3 (5)							
10.0036.01	- 15									ss 7	78	2-1-2	-						
	-											(3)	_						
	_									$\begin{pmatrix} SS \\ 8 \end{pmatrix}$	100	2-3-3 (6)	-						
SUCARP PRU	20		21.0						867.5	SS 9	83	2-1-2 (3)	-						
PROJEC					Borehole Botte	e backfilled w	vith auger cuttir	ngs.											
15/2015																			
KOJEC																			
16 14:46																			
07/1 - 1/																			
2012.61																			
AB MAY																			
GINIS																			
SNMUS																			
CH COL																			
CEO E																			
z																			

		Noi 616 Inv Tel	rthern Technologies, Inc. 60 Carmen Avenue East rer Grove Heights, MN 55076 lephone: 651-389-4191					BO	RIN	G N	UM	BE	R D Page	E-8 2 E 1 0	25 F 1
	CLIENT	T <u>Carl Bo</u>	plander and Sons, Co.	PRO	OJEC	T NAME	Ram	sey County	/ Re - D	evelop	oment	Site (TCAAF)	
	PROJE		BER 15.60936.100	PR0	OJEC			Arden Hills	s, MN						
	DATE S	STARTED	<u>5/18/15</u> COMPLETED <u>5/18/15</u>	GR0	OUND	ELEVA		893.64 ft			HOL	E SIZ	E <u>"6</u>	1/2" in	ches
	DRILLI	ING CONT	RACTOR NTI	GR0	OUNE	WATER	LEVE	LS:							
	DRILLI	ING METH	IOD <u>3 1/4 in H.S.A</u>		AT	TIME OF	DRILI	LING N	lo grou	undwa	ter ob	served	۱.		
	LOGGE	ED BY D	AS CHECKED BY DAS		AT	END OF	DRILL	ING							
	NOTES	Elev. at	t staked location.		AF	ter dri	LLING								
	DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION			MPLE TYPE NUMBER	ECOVERY % (RQD)	BLOW COUNTS (N VALUE)	DCKET PEN. (tsf)	KY UNIT WT. (pcf)	AOISTURE DNTENT (%)				FINES
	0		POORLY GRADED SAND WITH SILT, (SP-SM) b	prown,		ళ √ ss	Ч 70	2-5-4	Ц Ц	Б	28		₫	PLA PLA	
c).GPJ	(; ;;		fine to medium grained, moist, medium dense, tra- gravel	ce		∕ 1	18	(9)							
EVELOPMENT (3						SS 2	44	5 - 5-5 (10)							
VN AND CREEK [4.5	SILTY SAND, (SM) brown, fine to medium grained moist, loose, trace gravel	l,	889.1	SS 3	56	3-3-3 (6)							
TS/GINT/DE-TO/		7.5	SANDY LEAN CLAY, (CL) gray brown, moist, med	lium,	886.1	SS 4	78	3 -2- 3 (5)							
						SS	56	4-4- 4 (8)							
							28	3-3-4 (7)	-						
0936.100)/EN		14.5			879 . 1			(7)							
LS - GEO - (15.6			LEAN CLAY WITH SAND, (CL) gray to dark gray, moist, medium, trace gravel			SS 7	94	3-3-3 (6)							
ECT ARDEN HIL							100	2 - 3-4 (7)							
CTS/TCAAP PRO.	20	21.0			872.6	SS 9	100	3 - 3-4 (7)							
CTS/2015 PROJEC			Borehole backfilled with auger cuttings. Bottom of borehole at 21.0 feet.												
18 - H://-KOJEC															
3DT - 1/25/16 14															
LAB MAY 2012.0															
ECH COLUMNS															
NTI GEOTE															

Brau	n Proj	ect S	P-0	6-05871	BORING	:	ST-1	
Geote TCAA NE of Arden	cnical E AP Rede Highwa A Hills, N	valuat velopr y 10 a /linnes	tion nen ind sota	t Highway 96	LOCATIC attached s	ON: N: 21369 sketch.	00.577, E: 5506	65.094 See
DRILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	6/19/07	SCALE:	1'' = 4'
Elev. feet 908.1	Depth feet 0.0	AST Syml	M pol	Description of Materials (ASTM D2488 or D2487)		BPF WL	Tests or	Notes
	 	SM SP- SM SP- SM ML SP- SM		SILTY SAND, trace of Roots, dark brown, wet. (Topsoil) POORLY GRADED SAND with SILT, fine-gra brown to light brown, moist, loose. (Lacustrine) POORLY GRADED SAND with SILT, fine-gra brown, loose to medium dense. (Glaciofluvium) SANDY SILT, Sand seams, brown, wet, medium (Glaciofluvium) POORLY GRADED SAND with SILT, fine-grai medium dense. (Glaciofluvium) POORLY GRADED SAND with SILT, fine-grai medium dense. (Glaciofluvium)	ined, light	4 3 5 5 6 13 19 15		
				Water not observed with 24 feet of hollow-stem a the ground. Boring then grouted.	auger in			

۰.

Diaun 110	ect SP-0	6-05871	BORING	:		ST-2	
Geotecnical I TCAAP Red NE of Highw Arden Hills,	Evaluation evelopmen ay 10 and Minnesota	t Highway 96	LOCATION attached s	DN: N sketch.	: 213683	3.523, E: 55089	8.513 5
DRILLER: K	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	2/07	SCALE:	1'' =
Elev. Depth feet feet 901.3 0.0	ASTM	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
<u>892.3</u> 9.0 <u>892.3</u> 9.0 <u>892.3</u> 9.0	SM SM SM SM	SILTY SAND, fine-grained, reddish-brown to b moist, loose to medium dense. (Glaciofluvium) POORLY GRADED SAND with SILT, fine-gra brown, moist, loose to medium dense. (Glaciofluvium)	ined, light	8 16 13 11 9 7 7 14			



SUBSURFACE BORING LOG

AET JOB NO: 22-0008	1	<u></u>	1		L	OG OF	F BC	DRING N	JO.	ST	'- 3	(p. 1	of 1)
PROJECT: TCAAP	Redevelopn	nent; Ar	den H	ills, MN										<u> </u>
DEPTH SURFACE ELEVAT	TON:902.	.4		GEOLOGY			S	AMPLE	REC	FIELI) & LA	BORA	TORY	TESTS
FEET MAT	ERIAL DESCRIPT	rion			N	MC		TYPE	ÎN.	WC	DEN	LL	PL	10-#200
SILTY SAND, trac	e roots, dark bro)	own, moist	, <u> </u>]	COARSE	- ,,	M	\mathbb{N}	99	17					
2 SAND WITH SILT	, fine grained, th	race roots,		ALLUVIUM			\square	55	1/					
3 - SAND WITH SILT	fine grained, b	M) rown. moi	/				\mathbb{N}	00	14					
4 loose (SP-SM)					9	IVI	\wedge	00	14					
SILTY SAND, fine	grained, brown um dense, lamin	, light gray ations of	ish				R							
$_{6}$ - sand with silt (SM)	,				13	M	X	SS	19					
7 -		-					E							
8 -					16	м	М	99	10					
9 —				•		141	Δ	55	19					
10 - SAND WITH SILT	, fine grained, li	ght grayish	. . · ↓ ↓ ↓ ↓ ↓	•			K							
11 – laminations of silty	n, moist, mediur sand (SP-SM)	n dense,			15	М	X	SS	19					
12 SAND WITH SILT	fine entire I. I'	.1		• •			E							
13 – gray, a little brown,	moist, loose, lar	ght browni ninations c	sh f	-	10	м	M	ss	17					
14 silty sand (SP-SM)							Д							
15 - SILTY SAND, fine	grained, light br	ownish gra	ıy,	-			М							
16					7	M	X	SS	18					
17 -							R							
18 - SAND WITH SILT	fine grained lig	tht brownie					ł							
19 – gray, a little brown, i	noist, dense, lar	ninations c	of	1			ł							
20 -							$\overline{\Lambda}$							
21 -					34	м	Ŵ	SS	17					
22 -							Ł							
23 - SILT, gray, wet, dens	se (ML)			FINE	r r		뷥							
24 -				ALLUVIUM			ł							
25 —					22	X / XI/	∇	99	16	25			:	
26 -				<u> </u>	52		Μ		10	25				i
END OF BORING Northing=213682.3														
Easting=551397.5														
DEPTH: DRILLING METH	OD		WATE	R LEVEL MEA	L SURE	 MENT	L `S	[l					
0.7/1/21 2.7511 1164	DATE	TIME	SAMPLI	ED CASING	CAV	E-IN	D	RILLING	<u>;</u> ,	WATEF	N λ η	UIE: . THE AT	кегея Тасч	
<u> </u>	6/20/07	2:15	26.5	24 4	DEP 94	ін .6	rLl	ND LEV	EL	None		HEETS	SFOR	AN
					<u></u>						E>	(PLAN	ATIO	1 OF
BORING COMPLETED: 6/20/07						-+					TE	RMIN	DLOG	Y ON
DR: SG LG: SB Rig: 91C												THIS	SLOG	

BR/	VUN	5M]	LOG OF BORIN
INTE	RTEC	-						
Brau Geote TCAA NE of Arden	n Proj cnical E AP Rede Highwa Hills, N	ect S Evalua Evelop Ay 10 Minne	SP-0 ation omen and esota	6-05871 t Highway 96	BORING: LOCATIC attached sl	N: N ketch.	21398	03-02 ST-4 4.454, E: 553013.279 See
DRILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/2	3/07	SCALE: 1'' = 4'
Elev. feet 893.5	Depth feet 0.0	AS Syn	TM nbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or Notes
892.5 	<u> 1.0</u> <u> 9.0</u>	SM SP SP		SILTY SAND, fine-grained, with Organic fines, brown, moist. (Topsoil) POORLY GRADED SAND, fine-grained, brown loose. (Glacial Outwash) POORLY GRADED SAND, fine-grained, brown waterbearing, loose to medium dense. (Glacial Outwash)	dark	8 7 10 11 10 6	Σ	
870.5	23.0	SP		POORLY GRADED SAND, fine-grained, gray, waterbearing, loose. (Glacial Outwash)		9		
- 867 5	25.0	ML		SILT, gray, wet, loose. (Glaciofluvium)		7		
	20.0			END OF BORING. Water observed at 13 feet while drilling. Water not observed with 24 1/2 feet of hollow-ste in the ground. Boring then grouted.	em auger			

SP-06-05871



SUBSURFACE BORING LOG

AET	OB NO: 22-00081														
PROJE	ECT: <u>TCAAP Re</u>	- develop:	ment: Ar	·den H	ills. MN	L	OG C)F B	ORING	NO.	<u></u> S1	<u>- 5</u>	<u>(p. 1</u>	<u>of 1</u>)
DEPTH					17111 V					1					<u> </u>
IN FEFT	SURFACE ELEVATION	l:895	<u>.9</u>		GEOLOGY		м	c s	AMPLE	RE	C	D&LA	BORA	TORY	TESTS
	FILL mostly silty cond	AL DESCRIP	110N	·					TYPE	IN	wc	DEN	LL	PL	6-#20
1-	roots, black	, surface ro	ots, trace		FILL			. N	1				<u> </u>	1	1
2 -	FILL, mixture of silty s	and and cla	yey sand,			18	M	ľÅ	SS	15	7			1	
	trace roots, pieces of co	ncrete, brov	wn and ligh	t				- K	1						
	SAND WITH SILT. fin	e grained i	trace roote	<u> </u>	COARSE	- 18	M	X	SS	15					
4	light brown and brown,	moist, med	lium dense		ALLUVIUM	1		4		1					[
. 5 –	<u>(SP-SM) (possible fill)</u>				OR FILL			A A							
6 —	brown, laminations of si	e gravel, li ilty sand st	ght brown a	nd	MIXED	12	M	X	SS	18					
7	(possible fill)				OR FILL			Д							
	SAND WITH SILT, fine	e to mediur	n grained,	···]	COARSE			A A							
8 -	nght brown, moist, medi	ium dense ((SP-SM)		ALLUVIUM	15	М	X	SS	19		1			
9 -								Ц							
10 -															
11 –						11	М	X	SS	19					
12 🕂								B							
12	SANDY SILT, brownish	i gray, a litt	tle brown,		FINE		T								
13	wet, metrulin dense, iami	nations of	silt (ML)		ALLUVIUM	12	Ŵ	X	SS	14	26		ſ	ľ	
14								H						ĺ	
15 -	SILTY SAND WITH GF	RAVEL, br	own,		TILL			M						1	
16 -	medium dense (SWI)					17	W	IXI	SS	14					
17 -								B							
18								H							
10								1							
								Ł							
20 -	CLAYEY SAND, a little to firm (SC)	gravel, dar	k gray, soft					M							
21 -						4	М	IXI-	SS	21	17				
22 -								H							
23 -								H							
24								1					5	İ	
24								Ł							
25 -								∇							
26 —						7	M	ХI	SS	20	18			F	
	END OF BORING				- <u></u>	┞──┼	/	<u>/ </u>							
	Northing=214014.0														
DEPTH	: DRILLING METHOD		<u> </u>	WATER	LEVEL MEA	SUREM	(ENT	s	<u>_</u> [
0-241/2	<u>3.25" HSA</u>	DATE	TIME	SAMPLEI DEPTH	CASING DEPTH	CAVE	-IN H			G I	WATER		IE ATI	сгек АСНГ	D ID
		7/10/07	9:10	14.0	12.0	12.0	·		V. 1.1. V.		None	SF	IEETS	FOR A	N
		7/10/07	9:15	16.5	145	13 9	$\frac{1}{2}$				12.4	EXT	PLANA		
BORING COMPLET	ED: 7/10/07	7/10/07	9:25	26.5	245	10.0 72 3					12.0		MINIO	OGV	
DR: SG	LG: SB Rig 91C				44.3	20.3	-				23.9		TUIO		
04	Idg. /IC		·										THIS.	LUG	



SUBSURFACE BORING LOG

	AET J	OB NO: 22-00081						00.0						/ /		<u></u>
	PROJ	ECT: <u>TCAAP Re</u>	- develop	<u>ment; A</u>	rden Hi	lls, MN	L	OG 01	F B(DRING I	NO	S1	- 6	(<u>p. 1</u>	<u>of 1</u>)
	DEPTH	SURFACE ELEVATION	. 891	.3			1	1			1	FIELI	<u> </u>	DOD 4		
	FEET	MATERIA	AL DESCRIP	TION		GEOLOGY	N	МС	S.	AMPLE TYPE	REC		DEN			IESIS
		FILL, mixture of silty s	and and cla	iyey sand,	with	FILL				1			DEN		PL	%-#20 (
	1 -	gravel, pieces of bitumi	nous, surfa	ce roots, tr	ace		4	М	X	ss	10	12			[
	2 -	SILTY SAND, fine to n	nedium ora	y ined orau		COADEE	_	Ţ	·Д					-		
	3 -	little brown, moist, med	ium dense,	laminatior	a 1S	ALLUVIUM	14	w	\mathbb{N}	22	13					
	4	SILTY SAND fine to n	andiama ana		/[]]				\wedge	05	13				l	
	5 —	moist, medium dense (S	M)	med, brow	n, <u>[.[.].</u> //////	FINE	-		R							
	6 -	SANDY SILT, gray, we	et, medium	dense (MI	<u> デー </u>	ALLUVIUM	20	w	X	SS	16	27				
	7								Д							
		CLAYEY SAND, a littl	e gravel, da	ark gray, so	oft	TILL	1		Ħ							
		to still (3C)					4	M	X	SS	21	17				
	9-								Ы							
ľ	10 -								\square			17				
	11 -						3	IVI	\mathbb{N}	88	18					
	12 -								Д							
	13 -						4	М	M	ss	20	19				
	14								Д					ļ		
	15 -								$\overline{\mathbf{A}}$							
	16 -						5	М	X	SS	22	19				
	17 -								64			.				
	18 -								$\langle $							
	19								$\langle \langle$							
	20								4							
	21						6	м	V	SS	24	17				
	21								Δ		21	17				
	22 -								2							
	23 -															
	24 –)							
	25 -							ĥ	7							
	26 -						9	M	ΧĮ	SS	23	18				
		END OF BORING						{								
	I	Easting=553898.1								· ·			ļ			
			·····													
	DEPTH	I: DRILLING METHOD		r	WATER	LEVEL MEA	SUREN	ÆNT:	S			I)TE: R	EFER	TO
	0-4½	3.25" HSA	DATE	TIME	SAMPLEI DEPTH	CASING DEPTH	CAVE		DR			WATER	с тн	E AT	LACHF	ED
4	41/2'-241/2	' RD w/DM	7/10/07	10:15	4.0	2.0	2.0			······································			SF	IEETS	FOR A	N
							2.0		<u> </u>			1.7	EX	PLANA	TION	OF
Į	SORING	TED: 7/10/07				1 1					+		TER	MINO	LOGY	ON
Γ	DR: SG	LG: SB Rig: 91C			ļ~		<u></u>						-	THIS	LOG	
c ii	14			·	·	. <u> </u>							1		-	1



SUBSURFACE BORING LOG

AET JO	B NO: 22-00081														·
PROJEC	CT: TCAAP Re	- develoni	ment: A	rden Hi	ille MN	I	.0G ()F B(ORING	NO	ST	- 7	(p. <u>1</u>	<u>of 1</u>)
DEPTH		001													
IN FEET	SURFACE ELEVATION MATERIA	L DESCRIP	TION		GEOLOGY	/ N	M	c s	AMPLE	REC		D & LA T	BORA	TORY	TESTS
	FILL, mostly silty sand.	a little gra	vel surfac	e	FILI				λ	- IIN,	wc	DEN		PL	6-#20
1-	roots, trace roots, dark b	rown and l	black	/	I ILL	26	М	ı IV	ss	15		[
2 -	and silty sand, with gray	sand, sand	ly lean clay e cobbles	y				\square	4						
3 –	trace roots, brown, black	c and gray	• •••••••••••			39	И	N	55	5	7				
4 -								Δ							
5								K							
6						7	M	X	SS	19	16				
7	CLAVEN CAND - 141							R			i				
8	brown and black, moist,	e gravel, gr soft, lamin	ay, dark ations of		MIXED ALLUVIUM			M		1.5	10				
9 –	organic clay and silty sai	nd (SC) (po	ossible fill)		OR FILL		111	Μ	53	13	10		ĺ		
10 -								E							
11 -						1	W/N	4X	SS	NR					
12	CANDY L DANK CLASS							Ą							
13 – 8	stiff to firm (CL)	a little grav	el, brown,		TILL			\square		• •					
14 -						9	IVI	\mathbb{N}	55	18	20				
15 —								P							
16 —						7	М	X	SS	3	23				
17 -								Н							
18								KI							1
19 - to	o stiff (SC)	gravel, dar	k gray, fin	m				K							
20 -								Ц							
21 -						7	М	IXI	SS	24	18				
22 -								H	~						
23 -								K							
24 -								$\langle \langle $							
25 -								4							
26 -						9	М	X	ss	22	18				
E	ND OF BORING		<u></u>					ΖΨ_							
	orthing=214012.7 asting=554397 0														
DEPTH:	DRILLING METHOD			WATER	LEVEL MEA	SURE	MENT	'S	ł	1			TE P		
0-9½'	3.25" HSA	DATE	TIME	SAMPLEI DEPTH	D CASING DEPTH	CAVE	E-IN TH	DF FLU			WATER		E AT		ED
91/2'-241/2'	RD w/DM	7/10/07	11:20	11.5	9.5	10.	0				9.9	SH	IEETS	FOR A	N
BORNIC								_				EXE	PLAN/	TION	OF
COMPLETE	ED: 7/10/07									+-		TER	MINO	LOGY	ON
DR: SG	LG: SB Rig: 91C			L								7	THIS	LOG	



SUBSURFACE BORING LOG

AET J	OB NO: <u>22-00081</u>					T	odo				57	- 0	(1		
PROJE	ECT: TCAAP Re	- develop	<u>ment; Ar</u>	<u>den Hi</u>	lls, MN	L	.060	JF B(JRING	NO	51	- 8	(p. J	<u>ot 1</u>)
DEPTH	SURFACE ELEVATION).6							1	FIEL		DOD 4		
FEET	MATERIA	AL DESCRIP	TION		GEOLOGY	N	M	C S.	AMPLE TYPE	REC	WC	DEN			TESTS
	FILL, mixture of silty s	and and cla	iyey sand, a		FILL				1	┨┉───		DEN			%- #200
1~-	dark brown	ots, trace roo	ots, brown a	nd		10	M	X	SS	15					
2 –								\mathbb{H}			9				
3 -						9	М	X	SS	12	12				
4 -	<u> </u>							N R							
5 -	SAPRIC PEAT, black (PT)		<u></u>	SWAMP			M			229				
6 —	ORGANIC CLAY, trac	e roots, bla	ck, soft		DEI USIT	4	M	Ň	SS	17	64				
7 -	CLAYEY SAND a littl	e gravel gr	av verv cof		WEATING			B							
8 —	(SC)	e graver, gr	ay, very sor		WEATHERE TILL	1	М	M	88	10	22				
9 -								\square	55	17					
10 -	SANDY LEAN CLAY		1. 1.					R							
11 -	soft (CL)	with roots,	light gray,		TILL	3	М	X	SS	23	16				
12 -								Ю							
13 —						2	м	М	80	10	10				
14 —						2	IVI	Μ	33	18	18				
15 -								Д							
16						4	м	IXI.	SS	21	13				
17 -								H							
18 -								K							
19	0.1277777 T							KI							
20 - (SANDY LEAN CLAY, a (CL)	ı little grave	el, gray, stifi					4							
21 -	- <i>r</i>					10	М	XI.	ss	19	16				
22								Ц							
23 -								$\langle \langle$							
24 -								$\langle \langle$						[
25 -								4							
26 -						10	м	X	ss	23	16				
	END OF BORING		······································					/\							
N F	Vorthing=214013.8														
DEPTH	: DRILLING METHOD		····	WATER	LEVEL MEA	SUREN	AENT:	S	<u> </u>				⊥ 		
0-24½'	3.25" HSA	DATE	TIME S	SAMPLEE DEPTH	CASING DEPTH	CAVE	-IN				VATER	TH	E AT	TACHI	ED
		7/10/07	3:40	26.5	24.5	25.	2	201			None	SH	EETS	FOR /	N
30RING							-	·				EXF	LANA	ATION	OF
COMPLET	ED: 7/10/07							_				TER	MINO	LOGY	ON
DR: SG	LG: SB Rig: 91C												THIS	LOG	

BRA	AUN	SM S									L	OG OF	BORIN
INTE	RTEC												
Brau	n Proj	ect S	5P-0	6-058	871			BORING	:			ST-9	
Geote	cnical E	Evalua	ation	4				LOCATIO	DN:	N: 214	4014.	029, E: 55539	8.546 See
NE of	Highwa	ay 10	and]	ı Highv	vav 96			attached s	ketcl	1.			
Arden	Hills, I	Minne	esota										
DRILLI	ER: K.	Keck		,	METHOD:	3 1/4" HSA, Auto	ohmr	DATE:	7	/12/07	,	SCALE:	1'' = 4'
Elev. feet 901.0	Depth feet 0.0	AS Syn	TM nbol		Do (AS	escription of Mat STM D2488 or E	erials 02487)		BP	F W		C Tests	or Notes
900.0	1.0	FILI	· XXX	FILI	.: Silty Sand, f	ine-grained, with	o Organic fine	es, dark					
		FILL		FILI	.: Clayey Sand	, dark brown to l	olack, moist.						
								_					
-		l.						_	Å J				
896.5	4.5	CT.		0.133							ŀ		
				SAN	DY LEAN CL	AY, brown, wet, (Lacustrine)	, soft.		Ϋ́ 2		19		
								_					
894.0	7.0	CL		SAN	DY LEAN CL	AY, trace of Gra	vel, gray with	h iron					
				stain	ing, wet, rather	· soft. (Glacial Till)		_	5				
								-					
									M 5				
								_	Å J				
889.0	12.0	OT		CAN	DYLEANCY								
007.0	14.0			SAIN stain	ing, moist, rath	AY, trace of Gra er stiff. (Glacial Till)	vel, gray with	h iron –	10				
887.0	14.0	CL		SAN	DY LEAN CL	AY, trace of Gra	vel, gray, mo	ist,					
		ĺ		medi	um to rather st	iff. (Glacial Till)			V 8				
						()		_	Δ				
								-					
								_					
								_					
								-	XI '				
								_					
f								_					
875.0	26.0								9				
				END	OF BORING.								
				Wate	r not observed	during drilling.		-					
				Wate in the	r not observed ground.	with 24 1/2 feet	of hollow-ste	m auger					
-				Borin	g then grouted	.			-				
	ĺ												

뚭 SP-06-05871

Brau Cento	n Proje cnical F	ect SP-	06-05871 p	BORING	:		S	T-10	
TCAA NE of Arden	AP Rede Highwa Hills. N	velopmo y 10 an Iinneso	nt Highway 96 a	LOCATI attached s	ON: N sketch.	: 214	020.7	'05, E: 55590	1.142
DRILL	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	2/07		SCALE:	1'' =
Elev. feet	Depth feet	ASTM	Description of Materials		BPF	WL	MC	Tests	or Note
200.0	0.0	SM	SILTY SAND, fine-grained, with Organic fines,	dark			70		
<u> 899.1 </u>	1.5	CL	SANDY LEAN CLAY, brown and gray with iron staining, wet, rather soft.	n					
			(Lacustrine)		5		15		
				_					
- 893.6	70			<u></u>	Ň				
-	7.0	CL	SANDY LEAN CLAY, trace of Gravel, brown w staining, moist, rather stiff. (Glacial Till)	ith iron	9				
-									
_					9				
888.6	12.0	CL	SANDY LEAN CLAY, trace of Gravel, gray, mo	oist,					
- -			medium to rather stiff. (Glacial Till)	-	8				
					7 9				
-									
-									
-									
-	ĺ				8				
-									
-						:			
874.6	26.0				10				
			END OF BORING.						
-			Water not observed during drilling.	_					
	4 4 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8 8		in the ground.	an auger –					
 _			Boring then grouted.						


SUBSURFACE BORING LOG

AET J	OB NO: 22-00081	_)E B(ST	_11	(n 1)
PROJE	ECT: TCAAP Re	- develop	ment; A	rden Hi	lls, MN			JI. DI	UKING I	NU		-11	<u>(p. 1</u>	014	<u>)</u>
DEPTH	SURFACE ELEVATION	. 901	.0				-				FIFLE		BUD A	TORY	TLOTO
FEET	MATERIA	L DESCRIP	TION		GEOLOGY	N	М	с ^{S.}	AMPLE TYPE	REC	WC	DEN			16515
1 -	SILTY SAND, surface brown, moist, loose (SN	roots, trace (1)	roots, dar	k / []]	TOPSOIL COARSE			, V	88	14		DEN		ГL	70-#200
2 —	SAND WITH SILT, tra moist, loose (SP-SM)	ce roots, li	ght brown,		ALLUVIUN	1		Έ							
3 - 4 -	SILTY SAND, fine grai brown, moist, medium c sand with silt (SM)	ned, browi lense, lami	n, a little li nations of	ght		15	М		SS	18					
5								N R							
6-						20	M	Ň	SS	18					
8 -	SAND WITH SILT, find brown to light brownish	e grained, l gray, mois	ight grayis	h I				R							
9 -	dense to loose (SP-SM)	8,,,	i, meanin			15	М	Å	SS	16					
10 — 11 —						11	М	Ň	SS	17					
12 —								R							
13 —						6	М	M	SS	17					
14 -	SAND WITH SUT fine	grained 1	aht hasses					R							
16	gray, a little brown, mois laminations of sandy silt	t, medium	dense,	ISH		18	М	М	SS	20					
17		(51 5141)						सि							
18 -	SAND WITH SILT, fine	grained, li	ght gray, a					H							
19	(SP-SM)	aminations	of silt					团							
21 –						33	М	X	SS	17					Í
22 -								E							
23	SAND WITH SILT, fine	grained, lig	t browni	sh				H							
25 -	gray, water bearing, mean	un dense (a	5r-5141)				Ţ	I							
26 -						16	M/W	X	SS	19					
27 –							i	\sum							
28				TI	LL			21							
DEPTH	I: DRILLING METHOD			WATER	LEVEL MEA	SURE	MENT	<u>I) </u> FS	I	L					
0-241/2	' 3.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAV DEP	E-IN TH	DF FLU	RILLING ID LEVI) V EL I	VATER LEVEL		E ATT	EACHE	Ð
241/2'-991/2	RD w/DM	6/20/07	8:55	26.5	24.5	24	.5				24.4	SH	IEETS	FOR A	N
BORING		ļ 										EXI	PLANA	TION	OF
COMPLET	TED: 6/20/07	<u> </u>										TER	MINO	LOGY	ON
DR: SG	LG: SB Rig: 91C										-		THIS	LOG	



AEIJO	DB NO: <u>22-00081</u>			L	OG O	F BO	DRING I	NO	ST	<u>'-11</u>	(p. 2	2 of 4	I)
PROJEC	CT: ICAAP Redevelopment; Arde	n Hi	lls, MN										
DEPTH IN FEET	MATERIAL DESCRIPTION		GEOLOGY	N	мс	S.	AMPLE	REC	FIEL	D & LA	BORA	TORY	TESTS
	SANDY LEAN CLAY, a little gravel, grav firm					-			WC	DEN	LL	PL	6-#20
30 -	to stiff (CL) (continued)		(continued)			Ń	1						
31 -				0	М	Ň	SS	24	17				
32 -						$\sum_{i=1}^{n}$							
33 -						2							
34						2							
36 -				7	м	М	SS	24	17				
37						Д		2.					
38 -					ļ	K					i		
39 —						KI							
40 —						Н							
41				10	М	XI	SS	24	20				
42 —						Ы						i	
43 —						$\left \right\rangle$							
44 —						\sum							
45				10		V.							
46 -				10	M	Ň	SS	24	17				
47 -						$\overline{\lambda}$							
40 -						$\langle $							
50 -					ļ	4							
51 -				11	M	X	ss	24	19			• •	
52 -					ľ	Ä							
53 -					(\mathbf{S}							
54 -													
55 -					K	1							
56 -				10	м	XI.	ss	24	20				
57 -					2	Ţ							
58 -					\rangle								
59 -					\rangle								
61				10	мÑ	/	ee	22	10				
62					- μ	Y	00	~~	10				
63 -					R								
/04					/	1							



AET J	OB NO: <u>22-00081</u>			L	.0G 0	F B	ORING	NO	ST	<u>'-11</u>	(p. 3	3 of 4	Ð
PROJE	CT: <u>ICAAP Redevelopment; Arde</u>	<u>n H</u>	ills, MN						<u></u>		<u></u>		
DEPTH IN FEET	MATERIAL DESCRIPTION		GEOLOGY	N	мс	s	AMPLE	REC	FIEL	D & LA	BORA	TORY	TEST
64 —	SANDY LEAN CLAY, a little gravel, gray, firm		TILL			$\frac{1}{5}$			wc	DEN	LL	PL	%-#2
65 —	to still (CL) (continuea)		(continued)			1	7						
66 -				5	M	X	ss	24	19		1		
67 -						\mathbf{b}							
68 —	SILTY SAND, fine to medium grained,		COARSE	4		$\left \right\rangle$							
69 -	brownish gray, wet, loose (SM)		ALLUVIUM			\mathbb{Z}							
70				5	м	\mathbb{N}	SS	2	23				
72						Д	55	2	23				
73 -	Y Y 4 1 Y 49 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4 1 4					K							
74	LEAN CLAY WITH SAND, brown, hard (CL)		FINE ALLUVIUM			K							
75 -						H							
76 –				36	М	XI	SS	24	17				
77 -	i					5]							
78 +-	FAT CLAY, brown, hard to very stiff,					$\left \right\rangle$							
79 – •0 –	laminations of silty sand (CH)					\sum							
				43	м	М	SS	24	33				
82 -						Д							
83 -						$\langle $							
84 -					1	\int							
85 -					L N	J.							
86 -				27	М	X	SS	24	25				
87 —					l d	\overline{J}							
88 0	CLAYEY SAND, a little gravel, possible	Τ	TLL		Ċ								
89 - C	outles, brown, hard (SC)												
) 1 -				62	м	Λ	ss	21	13				
92					K	H							
93 -		Ŋ			K								-
94 -		Î			K								
95 -		Ø			K	1							
)6 -		D		70	м	$\langle $	SS	21	11				
'7 -					Þ								
<u> </u>		1	<u> </u>		<u>`</u>	1							



AET J	ов NO: <u>22-00081</u>			L	0G 0	F B	ORING	NO.	SI	` -11	(p. 4	4 of 4	4)
PROJE	CT: TCAAP Redevelopment; Are	<u>len H</u>	ills, MN										- A
DEPTH IN			GEOLOGY	1				REC	FIEL	D & LA	BORA	TORY	TESTS
FEET	MATERIAL DESCRIPTION			N	MC		TYPE	ÎN.	WC	DEN	LL	PL	6-#200
98 -	cobbles, brown, hard (SC) (continued)		TILL (continued)			2	1					+	
99						2	J						
100 -				08	M	\mathbb{N}		26	10			1	
101	END OF BODDYG			70		\wedge	55	20	10				
	Northing=213491.7											1	
	Easting=551397.2												
												Ì	
											ſ		
									ľ				
				ļ					ŀ				
							ĺ						
					-								
											ŀ		
				1	1	1	1		1		1		F



SUBSURFACE BORING LOG

AET.	JOB NO: 22-00081						00.0	וד חו			<u>e</u> T	12	 (n 1	1	`
PROJ	ECT: TCAAP Re	- develop	ment; A	rden Hi	ls, MN	L	.060	JF BU	JRING	NO	_51	-12	(p. 1	1 10)
DEPTH	SURFACE ELEVATION	. 893	3.1							T	FIELI				
FEET	MATERIA	AL DESCRIF	TION		GEOLOGY	N	M	c S.	AMPLE TYPE	REC IN.	TIELI	DDI	BORA		TESTS
	FILL, mixture of clayey	y sand and	silty sand,	a	FILL			+	7		WC	DEN		PL	%-# 200
1-	- little gravel, piece of bit	tuminous, s	surface root	s, / 🗍		30	М	ιIX	ss	15					
2 -	FILL, mixture of sand	with silt an	d gravel an			Ì		Δ							
3 -	silty sand, brown and li	ight brown				26		\mathbb{N}	0.0	10					
4 -	4					50		Μ	66	18					
5 -	SAND WITH SILT, tra	ce roots, fu	ne grained		COARSE			E							
6 -	light brown, moist, med	ium dense	(SP-SM)		ALLUVIUM	1 13	М	IV	ss	15					
7								Д							
	SILTY SAND, fine grai	ined, brown	ı, moist,					K							
8-	medium dense (SM)					18	M	X	SS	18					
9								Д							
10 -	SAND WITH SILT, fine moist to waterbearing at	e grained, l	ight brown	,				М			[
11 –	(SP-SM)	14.5 , meu	iuni dense			17	M	Ň	SS	17					
12 —								R							
13 -						16	м	Μ	99	19			ŀ		
14 —						10		Δ	55	10					
15 —					2			P							
16 -						16	w	IXI	SS	17					
17 -								Ц							
18 -								H							
10 -							_	Ħ							
20							Ŧ	I		[
20 -7						21	W	M	99	17					
21 -	÷							M	33	1/					
22 -								ß							
23 +-	CLAYEY SAND, a little	gravel, gra	v. stiff.		LL.			ł							
24 -	laminations of lean clay (ŠC)	<i>,</i> ,,					H							
25											17				
26 -	CLAYEY SAND, a little	gravel, darl	k brown,			15	M	X	SS	16	13				
	END OF BORING	<u> </u>		-1-1-				<u>/ Y</u>							
	Northing=213513.2														
		<u>, ,</u>													
DEPTH	I: DRILLING METHOD	ļ	····	WATER	EVEL MEA	SUREN	/ENT	S		· · ·		NO	 TE: R	EFER '	го
0-24½	a' 3.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE		DR FLII	ULLINC ID LEV	H W	ATER	Тн	E ATI	ACHE	
	· · · · · · · · · · · · · · · · · · ·	7/10/07	8:10	16.5	14.5	15.	5				<u> </u>	SH	EETS	FOR A	N
DODDIC		7/10/07	8:25	26.5	24.5	24.	7				19.2	EXF	LANA	TION	OF
COMPLET	TED: 7/10/07						-+					TER	MINO	LOGY	ON
DR: SG	LG: SB Rig: 91C										<u> </u>	-	THIS	LOG	



SUBSURFACE BORING LOG

AET IOR	NO 22-00081								-				·		•
PROJECT	TCAAP Re	- develon:	monte A	ndan II	IL NANT]	LOG	OF E	BORING	NO.	<u> </u>	<u>-13</u>	<u>(p. 1</u>	of <u>1</u>)
DEDTU		uevelop	ment; A	rden H	IIIS, IVIIN						• • • • •				
DEPTH IN FEET	SURFACE ELEVATION	: <u>89</u> 4	4.0		GEOLOG	Y N		10	SAMPLE		C FIEL	D&LA	BORA	TORY	TESTS
	MATERIA	L DESCRIP	PTION				1		TYPE	Ī	wc	DEN	LL	PL	6-#200
	andy lean clay, a little	and, clayey gravel, suri	/ sand and face roots	ļ	FILL				Λ						<u> </u>
t y	race roots, light brown,	dark brow	n and black	к [12		м /	X SS	16	5 12				
								ľ	7		j				
						15	N	м)	(ss	8	7				
	TI TI C LA TO							ł	। হ						
5 5 n	DLTY SAND, a little gr	ravel, trace	roots, brov	vn,	TILL OR			Ń	7						
6 -	,	(1) (100000				13	N	и)	(SS	18					
$7 - \frac{1}{S}$	ANDY I FAN CLAY	a little area						E	ž						
8 -	rown mottled, stiff, lam	inations of	f silty sand		TILL			. N		1.2					
9 - 10	L) LAVEV SAND - 141							<u>^</u> //	1 33	12	14				
10 - \(S	SC)	e gravel, br	own, stiff					E	Į						
	LAYEY SAND, a little	gravel, gr	ay, a little			10	M	4 IX	ss	19	15				
12 (S	C)	nations of	silty sand					Ľ	Y						ĺ
12															
13 -						5	M	1)	SS	24	15				
			<u> </u>					Ь	Y				ľ		
15 - 5F	m (CL)	i little grav	el, dark gra	iy,				. 17					ŀ		
16 —						6		ľŇ	SS	17	19				
17								1							
18 -								H							
19 —								Į							
20 -								R							
21 -					·	6	М	X	SS	24	17				
22 -							х. -	Ь							
23 -								H			[
24								Ħ							
24								Ľ							
25 -						7	3.6	Μ							
26 -						'	IVI	Μ	55	20	17			Ì	
EN Nor	DOF BORING														
East	ting=553398.0														
DEPTH-	DRILLING METHOD														
	DISCUSING METHOD	······		WATER	LEVEL MEA	SURE	VEN	TS			<u></u>	NC	TE: R	EFER	го
0-24½'	3.25" HSA	DATE	TIME	DEPTH	DEPTH	CAVI DEP	E-IN TH	FLI	RILLIN JID LEV	G EL	WATER LEVEL	TH	IE ATI	ACHE	D
<u> </u>		7/10/07	1:00	26.5	24.5	25.	0				None	SE	EETS	FOR A	N
BORING												EXE	PLANA	TION	OF
<u>COMPLETED</u>	: 7/10/07							-		_		TER	MINO	LOGY	ON
DR: SG LO	G: SB Rig: 91C			·								-	THIS	LOG	



AET JOB NO: <u>22-00081</u>		LO	G OF	BORING N	10	ST	-14	(p. 1	of 1)
PROJECT: <u>ICAAP Redevelopment; Arden Hill</u>	ls, MN								·	
IN SURFACE ELEVATION: 890.2	GEOLOGY	N	MC	SAMPLE	REC	FIELD	& LA	BORA	TORY	TESTS
FILL, mixture of clayey sand and silty sand					,,, _,, _	wc	DEN		PL	6-#2(
1 - surface roots, trace roots, dark brown		7	М	X ss	14					
² a little gravel, trace roots, brown	VEATHERED		(Δ						
3 - CLAYEY SAND, a little gravel, brown and gray mottled, firm to stiff laminations of silty and	TILL	8	M	∦ ss ∣	18	14				
4 - (SC)			ľ							
5 -			Ň			15				
6		8	M	$\langle ss \rangle$	20	13				
7			2	뫼						
8 -	1	12	м	ss	20	16				
9 -			H		ĺ					
10 - CLAYEY SAND, a little gravel, dark gray, a little brown, very stiff, laminations of silty sand			∇			17				
11 - (SC) CLAYEV SAND a little group dark error			M /	1 22	24					
stiff to stiff (SC)			ľ	1						
	1	2	м	(ss	22	15				
			Į	2						
	1:	2	м)	ss	24	15				
			- L	5						i
			Į	Į						
19			Į	[[
20 -			Ĩ	[
21 -	11	1 1	м [Х	SS	24	14				
22 -			L L	5						
23 -			H							
24 -			H							
25 -			H							
26 -	15	5 N	л Х	SS	24	15				
END OF BORING							-+			
Easting=553880.7										
WATER LI	EVEL MEASUR	EME					NO	TE: R	EFER	то
0-24½' 3.25" HSA DATE TIME SAMPLED DEPTH	DEPTH DE	VE-F EPTH	N I I FL	UND LEVI		ATER EVEL	TH	IE ATI	(ACHE	ED
7/10/07 2:00 26.5	24.5 2	26.0			1	None	SH	IEETS	FOR A	N
BORING COMPLETED: 7/10/07					_		EXI	PLANA	TION	OF
DR: SG LG: SB Rig 91C							TER	MINO	LOGY	ON
/04	<u> </u>							11115	LUG	



SUBSURFACE BORING LOG

ROURCT: ICAAP Redevelopment; Arden Hills, MN DEPTH FEET SURFACE ELEVATION: 903.1 MATERIAL DESCRIPTION GEOLOGY N MCC AMATERIAL DESCRIPTION Itele gravel, surface roots, trace roots, dark FILL IB M SS 17 I5 I PL *4-00 CLAYEY SAND, a little gravel, dark gray, stiff, laminations of silt with sand (SC) WCATHERET I2 M SS 12 5 I I I PL Itele gravel, work and brown and track gray, stiff, laminations of silt with sand (SC) WEATHERET I2 M SS 24 15 I I I I III IIII IIIII IIIII IIIII IIIII IIIIII IIIIII IIIIIII <thiiiiii< th=""> <thiiiiii< th=""> IIIIIIII <t< th=""><th>AET J</th><th>OB NO: <u>22-00081</u></th><th>-</th><th></th><th></th><th></th><th>L</th><th>.0G C</th><th>)F B(</th><th>ORING I</th><th>NO</th><th>ST</th><th>-15</th><th>(p. 1</th><th>of 1</th><th>)</th></t<></thiiiiii<></thiiiiii<>	AET J	OB NO: <u>22-00081</u>	-				L	.0G C)F B(ORING I	NO	ST	-15	(p. 1	of 1)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	PROJE	ECT: <u>TCAAP Re</u>	develop	ment; Ar	den Hi	lls, MN										
PIEL MATERIAL DESCRIPTION IN INC TYPE IN WC DEN IL PL \$4-200 1 FILL, instrue of clargey sand and silly sand, a brown and brown Intel gravel, surface roots, trace roots, dark FILL 18 M SS 17 15 IL PL \$4-200 2 - - - - 17 M SS 12 5 IL PL \$4-200 4 - - - - 17 M SS 12 5 IL PL \$4-200 5 - <td>DEPTH IN FEET</td> <td>SURFACE ELEVATION</td> <td>:903</td> <td>3.1</td> <td></td> <td>GEOLOGY</td> <td>N</td> <td>M</td> <td>~ S</td> <td>AMPLE</td> <td>REC</td> <td>FIELI</td> <td>D&LA</td> <td>BORA</td> <td>TORY</td> <td>TESTS</td>	DEPTH IN FEET	SURFACE ELEVATION	:903	3.1		GEOLOGY	N	M	~ S	AMPLE	REC	FIELI	D&LA	BORA	TORY	TESTS
1 11111 1111 1111	FEEI	MATERIA FILL mixture of clayor	L DESCRIP	TION						TYPE	IN.	WC	DEN	LL	PL	6-#200
2 orown and brown 10 M M 10 11 13 3 - - 17 M SS 12 5 5 - - 111 17 M SS 12 5 6 - 12 M SS 12 5 12 15 7 - - 12 M SS 14 15 7 - - 12 M SS 14 15 9 - - - 12 M SS 19 17 11 - - - - - - - - 12 M SS 14 - <	1 -	little gravel, surface roo	ts, trace roo	ots, dark		FILL	18	М	\mathbb{N}	1 55	17	15				
3-4 17 M SS 12 5 CLAYEY SAND, a little ight gray, stiff, laminations of silt (SC) WEATHERET 12 M SS 24 15 7- 12 M SS 19 17 8- 12 M SS 24 15 9- 12 M SS 19 17 10- CLAYEY SAND, a little gravel, grayish brown and (SC) TILL 12 M SS 24 17 11- aminations of silt with sand (SC) TILL 12 M SS 24 16 15- CLAYEY SAND, a little gravel, dark gray, stiff 13 M SS 14 15 16- 13 M SS 18 15 15 16 16 17- 13 M SS 8 14 14 14 14 16- 13 M SS 8 14 14 14 15 17- 13 M SS 8 14 16 16	2 -	brown and brown				2			Δ							
4 IIIIII IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	3 —						17	М	\mathbb{N}	90	12	5				
S- CLAYEY SAND, a little gravel, brown and light brown mottled, a little light gray, stiff, laminations of silt (SC) WEATHERED TILL 12 M SS 24 15 7- - - 12 M SS 19 17 8- - 12 M SS 19 17 9- - 12 M SS 19 17 10- CLAYEY SAND, a little gravel, gravish brown and brown mottled, a little black, stiff, laminations of silt with sand (SC) TILL 12 M SS 24 16 13- - 13 M SS 24 16 14- - 13 M SS 18 15 16- - 13 M SS 18 15 17- - - 13 M SS 18 15 18- - - - 13 M SS 8 14 19- - - - - - - - 20- - - - - - - 21- - - - - - - 22- - - -	4 —								Λ							
6 Job With Induced, a liftle gray, strift, laminations of silt (SC) 111. 12 M SS 24 15 7 - - 12 M SS 19 17 8 - - 12 M SS 19 17 9 - - 12 M SS 19 17 10 CLAYEY SAND, a little gravel, grayish brown and brown mottled, a little black, stiff, laminations of silt with sand (SC) TILL 12 M SS 24 16 12 - 13 M SS 24 16 14 - 13 M SS 18 15 16 - 12 M SS 18 15 17 - - 13 M SS 8 14 19 - - - 13 M SS 8 14 19 - - - 13 M SS 8 14 22 - - - - - <td>5 —</td> <td>CLAYEY SAND, a little</td> <td>e gravel, br</td> <td>own and lig</td> <td>tht</td> <td>WEATHERE</td> <td>ī</td> <td>[</td> <td>K</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	5 —	CLAYEY SAND, a little	e gravel, br	own and lig	tht	WEATHERE	ī	[K							
7 8 9 12 M SS 19 17 8 9 12 M SS 19 17 10 CLAYEY SAND, a little gravel, grayish brown and brown mottled, a little black, stiff, laminations of silt with sand (SC) 12 M SS 24 17 12 Image: Silt Silt Silt Silt Silt Silt Silt Silt	6 —	laminations of silt (SC)	ignt gray, s	tiff,		TILL	12	M	X	SS	24	15				
8 - 12 M SS 19 17 10 CLAYEY SAND, a little gravel, grayish brown and brown mottled, a little black, stiff, laminations of silt with sand (SC) TILL 12 M SS 24 17 11 laminations of silt with sand (SC) 13 M SS 24 16 12 GCLAYEY SAND, a little gravel, dark gray, stiff 13 M SS 18 15 13 GCLAYEY SAND, a little gravel, dark gray, stiff 12 M SS 18 15 16 18 19 19 20 21 22 <td< td=""><td>7 –</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>R</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	7 –								R							
9 CLAYEY SAND, a little gravel, gravish brown and brown mottled, a little black, stiff, laminations of silt with sand (SC) TILL 12 M SS 24 17 12 II M SS 24 16 13 II III IIII III IIII III III III III III III III III III IIII IIIIII IIIIIII IIIIIIII IIIIIIIIII IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	8 —						12	М	M	SS	19	17				
10 CLAYEY SAND, a little gravel, gravish brown and brown mottled, a little black, stiff, laminations of silt with sand (SC) 11 12 M SS 24 17 11 laminations of silt with sand (SC) 13 M SS 24 16 12 I3 M SS 24 16 14 I3 M SS 24 16 15 CLAYEY SAND, a little gravel, dark gray, stiff 12 M SS 18 15 16 I2 M SS 18 15 15 17 I2 M SS 18 15 16 I2 M SS 18 15 17 I3 M SS 8 14 19 I13 M SS 8 14 10 M SS 24 16	9 –								Д							
11 Initial constrained a futte black, stiff, 12 M X SS 24 17 13 M X SS 24 16 14 I3 M X SS 24 16 15 CLAYEY SAND, a little gravel, dark gray, stiff I2 M X SS 18 15 16 I2 M X SS 18 15 17 I2 M X SS 18 15 18 I2 M X SS 8 14 19 I3 M SS 8 14 21 I3 M SS 8 14 19 I3 M SS 8 14 10 M SS 24 16 16	10 -	CLAYEY SAND, a little	e gravel, gr	ayish brown	1	TILL	1		M							
12 - 13 M SS 24 16 13 M SS 24 16 14 - 13 M SS 24 16 15 CLAYEY SAND, a little gravel, dark gray, stiff 12 M SS 18 15 16 12 M SS 18 15 17 13 M SS 18 16 19 - 13 M SS 8 14 20 - 13 M SS 8 14 21 - - 13 M SS 8 14 22 - - - - - - - 23 - - - - - - - - 24 - - - - - - - 26 - 10 M SS 24 16 -	11 –	laminations of silt with s	and (SC)	uii,			12	M	X	SS	24	17				
13 - 13 M SS 24 16 14 - 15 CLAYEY SAND, a little gravel, dark gray, stiff 12 M SS 18 15 16 - 17 12 M SS 18 15 18 - 19 13 M SS 18 15 19 - 20 - 13 M SS 8 14 20 - 13 M SS 8 14 21 - 13 M SS 8 14 22 - 13 M SS 24 16 23 - 10 M SS 24 16	12 -								ष्ट्र							
14 - CLAYEY SAND, a little gravel, dark gray, stiff 12 M SS 18 15 17 - 12 M SS 18 15 18 - 13 M SS 8 14 20 - 13 M SS 8 14 21 - 13 M SS 8 14 22 - - 10 M SS 24 16	13 -						13	м	M	SS	24	16				
15 - CLAYEY SAND, a little gravel, dark gray, stiff 12 M SS 18 15 16 - 17 - 18 19 12 M SS 18 15 19 - 20 - 13 M SS 8 14 20 - 21 - 13 M SS 8 14 22 - 23 - 10 M SS 24 16	14 -								Д							
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	15 —	CLAYEY SAND, a little (SC)	gravel, da	rk gray, stiff	f				\mathbb{N}			15				
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	16 -	()					12	M	Ň	SS	18	15				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	17 -								E							
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20 - 13 M SS 8 14 21 - 23 - 13 M SS 8 14 23 - 24 - 10 M SS 24 16 26 - 10 M SS 24 16 16	19 -								H							
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	20 -						10		M			14				
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	21 –						13	М	Ŵ	SS	8					
23 - 24 - 25 - 26 - 10 M SS 24 16	22 -								H							
24 - 25 - 26 - 26 -	23 -								Ľ							
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	24 -								H							
	25 -						10	м	M	00		16				
END OF DODDAY	26 -	END OF BODING					10	IVI	\mathbb{N}	55	24					
Northing=213513.9	1	Northing=213513.9														
Easting=554397.3		asting=554397.3														
DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS	DEPTH	E DRILLING METHOD			WATER	LEVEL MEA	SURF	MENT					<u> </u>			
0-241/2' 3 25" HSA DATE TIME SAMPLED CASING CAVE-IN DRILLING WATER	0.241/	· 3 25" HSA	DATE	TIME	SAMPLEI	CASING	CAVI	E-IN	DI	RILLING		WATER		DTE: R	EFER	то
7/10/07 2:50 265 245 265 SUBERTS FOR AV	0-4472	<u>3.23 NSA</u>	7/10/07	2.50	26 5	DEPTH	DEP		FLU	ID LEV	EL	LEVEL	- Th - CT	IL AT	FOR	±D
Indicitie Indic						24.0	20.	3				INONE		PLANA	TUK A	OF
ORING OMPLETED: 7/10/07 TERMINOLOGY ON	BORING COMPLET	TED: 7/10/07					<u></u>		•				TER	MINO	LOGY	ON
R: SG LG: SB Rig: 91C THIS LOG	DR: SG	LG: SB Rig: 91C											-	THIS	LOG	

BRAUN"

LOG OF BORING

INTERTEC Braun Project SP-06-05871 BORING: **ST-16 Geotecnical Evaluation** LOCATION: N: 213514.810, E: 554896.627 See **TCAAP Redevelopment** attached sketch. NE of Highway 10 and Highway 96 Arden Hills, Minnesota DRILLER: K. Keck METHOD: 3 1/4" HSA, Autohmr DATE: 7/13/07 SCALE: 1'' = 4' Elev. Depth ASTM feet feet BPF WL MC P200 Description of Materials Tests or Notes 909.7 0.0 Symbol (ASTM D2488 or D2487) % % SM SILTY SAND, fine-grained, with Organic fines, dark brown, moist. 908.2 1.5 SANDY LEAN CLAY, brown, moist, rather soft. CL (Lacustrine) 5 905.7 4.0 CL SANDY LEAN CLAY, trace of Gravel, brown, wet, rather soft. 4 19 41 (Glacial Till) abbreviations 902.7 7.0 CL SANDY LEAN CLAY, trace of Gravel, brown and gray with iron staining, wet, medium. 6 (Glacial Till) explanation of 6 f leet 7 Terminology 895.7 14.0 CL SANDY LEAN CLAY, trace of Gravel, brown, wet, medium. 6 (Glacial Till) (See Descriptive 891.7 18.0 CL SANDY LEAN CLAY, trace of Gravel, gray, wet, rather stiff. (Glacial Till) 10/2/07 14:43 12 BRAUN.GDT SP0605871,GPJ 10 883.7 26.0 END OF BORING. LOG OF BORING Water not observed during drilling. Water not observed with 24 1/2 feet of hollow-stem auger in the ground. BASIC⁻ Boring then grouted. BRAUN SP-06-05871 Braun Intertec Corporation ST-16 page 1 of 1

<u>3RA</u>		14 5M						LOG OF	BORIN
NTE Brau Geote	RTEC n Proj enical E	ect S Evalue	SP-0 ation	5-05871	BORING:	DN: N	: 21351	ST-17 2.855, E: 55539	4.920 See
ICAA NE of Arden	P Rede Highwa Hills, N	velop ay 10 Minne	and	Highway 96	attached s	ketch.			
DRILLE	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	3/07	SCALE:	1'' = 4'
Elev. feet 914.3	Depth feet 0.0	AS Syn	TM nbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
913.3 910.3	<u>1.0</u> 4.0	FILL FILL CL		FILL: Silty Sand, fine-grained, with Organic fin- brown, moist. FILL: Clayey Sand, with Root Fibers, dark brow SANDY LEAN CLAY, trace of Gravel, brown	nes, dark wn, moist. 	6			
905.3	9.0			moist, medium to rather stiff. (Glacial Till)	-	7			
_		CL		SANDY LEAN CLAY, trace of Gravel, brown, medium to stiff. (Glacial Till)	moist,	9 8			
					-	13			
- 892.3	22.0					12			
		SC		CLAYEY SAND, trace of Gravel, gray, moist, r (Glacial Till)	ather stiff. - -	7 9			
<u>588.3</u>	26.0			END OF BORING. Water not observed during drilling.					
-				Boring then grouted.					

SP-06-05871

Diau	n Proj	ect S	SP-06	5-05871	BORING	:		ST-18	
Geote TCAA NE of Arden	cnical E AP Rede Highwa 1 Hills, N	valua velop y 10 /linne	tion ment and l sota	Highway 96	LOCATI attached	ON: N: sketch.	213514	.329, E: 55589	98.425 Sec
DRILL	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/12	2/07	SCALE:	1'' = 4'
Elev. feet 905.6	Depth feet 0.0	AS Sym	TM ibol	Description of Materials (ASTM D2488 or D2487)	·	BPF	WL	Tests or	Notes
905.1	0.5	FILL		FILL: Silty Sand, fine-grained, dark brown,	moist.				
		FILL		FILL: Poorly Graded Sand, fine- to coarse-g brown, moist.	rained, –	₩ 26			
-				With chunks of Silty Sand at 5 1/2 feet		28			
898.6	7.0	SC		CLAYEY SAND, black, moist. (Buried Topsoil)		₩ 6			
-	10.0	SP- SM		POORLY GRADED SAND with SILT, with Lean Clay, olive, wet, loose. (Lacustrine)	lenses of	8			
	12.0	CL		SANDY LEAN CLAY, gray, wet, rather soft (Lacustrine)		4			
888.6	17.0	CL		SANDY LEAN CLAY, trace of Gravel, gray medium to rather stiff. (Glacial Till)	, wet,				
						M 10			
379.6	26.0			END OF BORING.		W T			
				Water not observed with 24 1/2 feet of hollow in the ground.					
-				Boring then grouted.					

LOG OF BORING

BRAUN

INTE	RTEC														
Brau	n Proj	ect s	SP-(6-058	871				BORING	:		S	T-19)	
Geote	cnical E	Evalu evelor	ation) \f				ĥ	LOCATIO	ON: N	: 213	183.5	70, E: :	550700	5.966 See
NE of	Highwa	ay 10	and	 Highv	vay 96				attached s	ketch.					
Arden	Hills, I	Minn	esota	1]		·					
DRILLI	ER: K.	. Keck			METHOD:	3 1/4" HS	SA, Autohmr		DATE:	6/1	9/07		SCAL	E:	1'' = 4'
Elev. feet	Depth feet	AS	TM		D	escription	of Materials			BPF	WL	мс	P200	Tes	ts or Notes
898.1	0.0	Syr	nbol		(A	STM D24	88 or D2487))				%	%		
897.1	1.0	SM			Y SAND, trac	e of Roots: (Top	s, dark brown soil)	, moist.							
_		SP-		POO	RLY GRADE	D SAND	with SILT, fi	ne-grair	ned, light						
_				1 0104	n, moist.	(Lacu:	strine)			Mg					
894.1	4.0									Δ					
		SM		SILT	Y SAND, fine	e-grained,	brown, wet, 1	nedium	dense.						
	i					(Lacu:	sume)			11	-				
801 1	70			:					_						
0/1.1	7.0	SP-		POO	RLY GRADE	D SAND	with SILT, fi	ne-grain	ied, light						
		SM		brow	n, moist, loose	e to mediu: Lacus)	m dense. strine)		-			6	6		
						,			_						
-										M 9					
									_	Å Í					
-									-						
		ĺ								<u> </u>					
884.1	14.0	SM		CIL L	V CANTL Link	+ l									
-		SIVI			r SAIND, fign	(Glacial (noist, mediur Dutwash)	n dense.	·						
									_	15					
													ļ		
880.1	18.0										∇				
		SM		SILT	Y SAND, fine	-grained, l	ight brown, t	o gray,			-				
					oouring, mour	(Glacial C	Dutwash)	•				-			
-										35					
									-f						
									-						
									_						
		-							-						
-										60					
872.1	26.0			END	OF BORING.				· · · · /	N T					
	-			Water	observed at 1	8 feet whi	le drilling			ĺ					
		·		Traici		o icel will	ie unnig.								
				Bonn	g then grouted	1.			_						
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SP-06-05871

BRAUN

Brau	n Proj	ect S	P-0	6-05871	BORING:			S	T-20)
Geote TCAA NE of Arder	cnical E AP Rede Highwa Hills, N	valua velopi y 10 a /Iinne:	tion men and sota	t Highway 96	LOCATIC attached s	DN: N: ketch.	213	171.7	42, E:	551046.195 S
DRILL	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	1/07		SCAI	LE: 1" =
Elev. feet 900.8	Depth feet 0.0	AST Sym	M bol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC %	P200 %	Tests or No
	9.0	SP- SM		SANDY SILT, light brown, wet, loose. (Lacustrine)	ned, light edium	15 10 8 6		17	62	
	14.0	SP- SM		POORLY GRADED SAND with SILT, fine-grain brown, moist, medium dense. (Lacustrine)	ned, light	28		4	7	
 	<u>18.0</u> 22.0	SP- SM		POORLY GRADED SAND with SILT, fine-grain brown, moist, dense. (Lacustrine)	ned, light	34	Ā			
- - 	26.0	SP- SM		FOOKLY GRADED SAND with SILT, fine-grain gray, waterbearing, loose. (Lacustrine) END OF BORING.	ned,	10				
-			، در بالا الم	Boring then grouted.						

Brau	n Proj	ect S	P-0(-05871		BORING	:		ST-21	-
Geote FCAA NE of	cnical E AP Rede Highwa	valuat velopr iv 10 a	tion nent ind]	lighway 96		LOCATIC attached s	ON: N sketch.	: 213183	3.350, E: 55319	6.596 See
Arden	Hills, N	Ainnes	sota	g						
DRILLE	ER: К.	Keck		METHOD:	3 1/4" HSA, Autohmr	DATE:	6/2	1/07	SCALE:	1" = 4'
Elev. feet 900.6	Depth feet 0.0	AST Syml	M bol	De (AS	scription of Materials TM D2488 or D2487)		BPF	WL	Tests or	Notes
	0.5	SP- SM		POORLY GRADEI brown, moist, very l	(Topsoil) O SAND with SILT, fine oose to medium dense. (Lacustrine)	grained, light 	7 13 8 6 4			
76.6	24.0	SM SP- SM		SILTY SAND, fine- POORLY GRADED brownish-gray, water END OF BORING.	grained, light brown, m (Lacustrine) SAND with SILT, fine rbearing, medium dense (Lacustrine)	oist, loose.	9 10	Σ		
· · · · · · · · · · · · · · · · · · ·				Water observed at 24 Boring then grouted.	feet while drilling.					



SUBSURFACE BORING LOG

AET J	OB NO: 22-0008	1			4 -	LC	OG OF	во	RINGN	10	ST	-22	(p. 1	of 1)
PROJE	ECT: TCAAP	Redevelopm	ent; Ard	len Hi	lls, MN		<u> </u>								
DEPTH	SURFACE ELEVAT	FION:892.8	3		GEOLOGY			SA	MPLE	REC	FIELI)&L	ABORA	TORY '	FESTS
FEET	МАТ	ERIAL DESCRIPT	ION		0202001	N	MC	["]	FYPE	ÎN.	wc	DEN	I LL	PL	%-# 200
1-	FILL, mixture of si surface roots, trace	lty sand and sand roots, brown and	l with silt, light brow	n	FILL	11	м	М	e e	11					
2-			ingine or o m					Μ	22	11	:			:	
3 -						5	м	М	66	16					
4	4							Δ	55	10					
. 5 -	SILTY SAND, ligh	t brownish gray a	and brown,		TILL	-		K							
6	wet, medium dense	(SM)				18	M	Х	SS	20					
7 -	-							म							
8 –						12	w	M	SS	16					-
9 -								Д							
10 -	SANDY LEAN CL	AY, brownish gr	ay, a little					$\overline{\Lambda}$			20				
11 -	(CL)	inse of clayey san	lu al 11			13	M	Ň	SS	18	20				
12 —	SANDY LEAN CL	AY, a little grave	el, grav.					R							
13 —	stiff, laminations of	sandy silt (CL)	-, 8,,			14	M	X	SS	14	13				
14 ~								R							
15 —	CLAYEY SAND, a	little gravel, gra	y, stiff (SC)			10	м	М	SS	23	15				
16 —								Д	55	2.5					
17 -								ł							
18 -								ł							
19 -								묍							
20						9	м	X	SS	22	17				
21	-							P							
23 -								H							
24								H							
25 -								범							
26 -						10	М	X	SS	24	17				
F	END OF BORING	}													
	Northing=213032.8 Easting=552898.9														
			WAR												
DEPI	III. DRILLING MET			WATE	R LEVEL MEA	SURE	MENT	IS г	אז ז זו קו	IG	\ <i>\\</i> / ^ TT		NOTE:	REFEI	אדס
0-24	3.25" HSA	DATE	TIME	DEPTI	T DEPTH	DEI	7 Ĥ	FĽ	UIDLE	VEL	LEVE	Ê	THE A	TTACH	IED
		7/9/07	2:55	9.0	7.0	8	.5				Non	е т	SHEET	a fUR Jatio	
BORING	3 ETED: 7/0/07	//////	5:15	20.5	24.5	26	.5				Non	е ¹ Т	ERMIN	OLOG	YON
DR: SG	LG: SB Rig: 91	c											TH	S LOG	

-	NTE	RTEC	-					
ſ	Brau	ın Proj	ect S	P-00	5-05871	BORING:		ST-23
	Geote	cnical E	valua	tion		LOCATIO)N: N: 213034	4.010, E: 553395.870 See
	NE of	Highwa	velop	and l	Highway 96	attached s	ketch.	
	Arder	n Hills, N	Ainne	sota				
	DRILL	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/12/07	SCALE: 1'' = 4'
	Elev. feet 890 1	Depth feet	AST Sym	FM bol	Description of Materials		BPF WL	Tests or Notes
ŀ	889.6	0.0	FILL		FILL: Silty Sand, fine-grained, with Organic	ines, trace		
	-		FILL		of Gravel, black, moist.	/_		
	-				moist.	k brown,		
╞	-					_	11	
	886.1	4.0						
			FILL		FILL: Sandy Lean Clay, dark brown to black,	moist.		
S)	_						7	
ation	883.1	7.0		\bigotimes				
Drevi			CL		SANDY LEAN CLAY, trace of Gravel, gray v	vith iron		
ot abl	-				(Glacial Till)	-		
0. 1101						-		
lanat							5	
exp						-		
et to	878.1	12.0	CT		SANDY LEAN CLAY trace of Group group	with iron		
shee	. 1		CL		staining, moist, medium to rather stiff.		8	
2010					(Glacial Till)	_		
	_							
0 0)	6	
VI1C1	ĺ					_		
Jesci						-		
						_		
-		1				_		
10/7/						-4		
						_		
	İ					_		
220						_		
5	_ 1							
10000	<u>864.</u> 1	26.0					10	
					END OF BORING.			
					Water not observed during drilling.	-		
					Water not observed with 24 1/2 feet of hollow in the ground.	stem auger		
-	-				Boring then grouted.			
						-		
SP	-06-05871	· .	<u></u>		Braun Interteo Corporatio			ST-72 most of

LOG OF BORING

ne s Tur

BRAUN"

INTE	RTEC									
Brau Geote TCAA NE of	n Proj cnical E AP Rede Highwa	ect S valuz velop vy 10	P-0 ation men and	6-05871 t Highway 96	BORING LOCATIC attached s	DN: N ketch.	: 213	S ′ 032.3	T-24 73, E: 55390	0.008 See
DRILL	ER: K.	Keck	esota	METHOD: 31/4" HSA Autohmr	DATE	7/1	2/07		SCALE	1!! = 4!
Elev. feet	Depth feet	AS	ГМ	Description of Materials	DAIL.	BPF	WL	MC	Tests	or Notes
892.8	0.0	Syn Fii i	ibol	(ASTM D2488 or D2487)	a blash	1		%	ļ	
<u>891.8</u> - -	1.0	FILL		FILL: Siny Sand, hne-grained, with Organic fine moist. FILL: Clayey Sand, trace of Gravel, dark brown brown, moist.	es, black, to	6 7 4		13		
- 885.8	7.0					Δ				
-	0.0	OL		ORGANIC CLAY, black, moist. (Swamp Deposit)		5				
<u>- 880.8</u> 	12.0	SC		CLAYEY SAND, gray with iron staining, wet, so (Lacustrine) CLAYEY SAND, trace of Gravel, gray, wet, rathe medium. (Glacial Till)	er soft to	3				
866.8	26.0					6				
				END OF BORING. Water not observed during drilling. Water not observed with 24 1/2 feet of hollow-ster in the ground. Boring then grouted.	m auger					

SP-06-05871

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INTE	RTEC	*											
Brau	n Proj	ect S	SP-0	6-05	871			BORING	:		S	Г-25	5
Geote TCAA NE of	cnical E AP Rede Highwa	Evalua evelop ay 10	ation omen and	ı it High ^ı	way 96			LOCATIC attached s	DN: N: ketch.	2126	581.5	66, E:	550711.506 See
Arder DRILL	e Hills, I ER: K.	Minne Keck	esota	l	METHOD	3 1/4" HSA, Auto	ıhmr	DATE [,]	6/14	9/07	T	SCA	IF· 1''=4'
Elev.	Depth						, iiiii	DAIL.	0/1.		[
feet 895.9	feet 0.0	AS Syn	TM nbol		De (AS	escription of Mat STM D2488 or D	erials 2487)		BPF	WL	MC %	P200 %	Tests or Notes
894.9	1.0	SM		SIL	TY SAND, trace	e of Roots, dark 1 (Topsoil)	brown, moist	i.					
		SP- SM		POC	ORLY GRADE	D SAND with SI	LT, fine-grain	ned, light					
						•			Я 8				
-								_					
				- - - -					M				
ons)									Ň				
eviati 1													
abbr								_	8				
ion of								-		:			
olanat									7				
5 883 0	12.0								Δ				
1 1005.9	12.0	ML		SAN	DY SILT, gray	with bands of o	rangish-brow	/n, wet,	M 6				
s – 881.9	14.0			1005	с.	(Lacustrine)			Å				
		SM		SIL	TY SAND, fine brown, wet, me	-grained, Silt lam edium dense.	unations, bro	own to					
'e ler		ļ				(Glaciofluvium)		18				
878.9	17.0												
		SP- SM		POC brov	RLY GRADEI	D SAND with SI g, medium dense	LT, fine-grain	ned, light					
200		ĺ				(Glaciofluvium)						
44,44									М. 6				
1/0/7/					÷				Ă				
873.9	22.0	SC		CLA	YEY SAND. tu	ace of Gravel. g	av. wet. med	lium					
				dens	е.	(Glacial Till)							- - -
						(0140141 111)							
	26.0								6		13	42	LL = 23%
809.9	26.0		(//)	ENE	OF BORING.			·	Δ				$\mathbf{PI} = 12\%$
				Wate	er observed at 1	7 feet while drill	ing.	_					
				Bori	ng then grouted	•		-					
	1							_					

SP-06-05871

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Braun Intertee Corporation

ST-25 page 1 of 1

Brau	n Proj	ect SP-0	6-05871	BORING	•		ST-26	
Geote TCAA NE of Arder	cnical E AP Redev Highwa Hills, M	valuation velopmen y 10 and 1 linnesota	t Highway 96	LOCATIC attached s	DN: N ketch.	212751	1.010, E: 55102	24.200 S
DRILL	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	1/07	SCALE:	1"=
Elev. feet 896.2	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
895.7		SM SP- SM	SILTY SAND, trace of Roots, dark brown, mo (Topsoil) POORLY GRADED SAND with SILT, fine-gr brown to brown, rust at 15' sample depth, mois medium dense. (Lacustrine)	ist	 10 12 12 12 12 12 12 12 11 	$\overline{\nabla}$		
- - - - - - - - -	26.0	ML	SANDY SILT, gray, waterbearing, medium der (Glaciofluvium) END OF BORING. Water observed at 19 feet while drilling. Boring then grouted.	nse.	19			·

Brau	n Proj	ect S	8 P- (6-058	871			BORING	:		S	T-2 ′	7	
Geotee TCAA NE of Arden	cnical E P Rede Highwa Hills, N	valuz velop vy 10 Vinne	tion men and sota	ı ıt Highv ı	vay 96			LOCATION attached s	ON: N: sketch.	: 212	677.1	65, E:	551403.52	2 S
DRILLI	ER: K.	Keck			METHOD	: 3 J/4" HSA, A	Autohmr	DATE:	6/2	1/07		SCA	LE: 1	" =
Elev. feet 893.3	Depth feet 0.0	AS Sym	TM ibol		(Description of N ASTM D2488 c	Aaterials r D2487)		BPF	WL	MC %	P200 %	Tests c	or No
892.3	1.0	SM		SIL mois	TY SAND, v st.	very fine- to fine	-grained, dark b	prown,						
-		SP- SM		POC brow	DRLY GRAI /n, moist, ve	(Topsoil) DED SAND with ry loose to medi (Lacustrir) SILT, fine-gra um dense. e)	/ ined, light - -	4					
									9					
-									10					
881.3	12.0								11		4	5		
		SP- SM		POO brow	RLY GRAD	ED SAND with own, waterbeari (Lacustrin	SILT, fine-gra ng, loose. e)	ined, 	8					
876.3	17.0								6		22	11		
		ML		SIL] medi	Г with SANI um dense.	D, grayish-brown (Glaciofluvi	n to gray, wet, le um)	pose to						
									9					
								-						
-									24		24	82		
866.3	27.0	SP- SM		POOl gray,	RLY GRAD waterbearing	ED SAND with g, medium dense (Glaciofluvi	SILT, fine-grai e. um)	ned,						
								-	1 28				l	

. . .

Brau Geote	n Proj cnical E	ect S valua	P-00 ation	6-058	871			BORIN	IG:	Y	ST	[-2 7	7 (ce	ont.)	
TCAA NE of Arden	P Rede Highwa Hills, N	velop y 10 ⁄Iinne	ment and l sota	t Highw	vay 96			attache	d ske	N: N: etch.	: 2126	577.1	65, E: :	551403.	522 See
DRILLI	ER: K.	Keck			METHOD:	3 1/4" HSA	a, Autohmr	DATE:		6/2	1/07		SCAL	E:	1'' = 4'
Elev. feet 861.3	Depth feet 32.0	AS' Syn	TM 1bol		I (A	Description o ASTM D2488	f Materials 3 or D2487)]	BPF	WL	MC %	P200 %	Tests	s or Note
		CL		SAN stiff.	DY LEAN C	LAY, trace o	of Gravel, gray,	wet, rather							
						(Glacial	Till)								
_															
								-	M	9		-			
856.3	37.0														
		SC		CLA	YEY SAND,	trace of Gra	vel, gray, wet, r Till)	ather stiff.							
						(0.000)								
_															
									M	9		15	46		
850.3	43.0		$\langle \rangle$												
		CL		SAN	DY LEAN C	LAY, trace of (Glacial	f Gravel, wet, r	ather stiff.							
						(Oncolar	,								
								-	M	9					
									Π						
Ì							·		1						
	4										Ĺ				
-	1								X	10		18	51		
									1						
								-	M	9					
									╢						
									- -						
-								. —	M	9					
		22.22							-11						
									-						
	1														

Arden Hills, Minnesota METHOD: 3 1/4" HSA, Aushbur DATE: 6/21/07 SCALE: 1"= Eev. Degrin ASTM Description of Metrinits BPF WIL MC P200 Tests or N 829.3 64.0 Symbol CASTM D2488 or D2487) BPF WIL MC P200 Tests or N SANDY LEAN CLAY, tree of Gravel, wet, rather stiff. 9 1 4 1 4 1 S16.3 77.0 CL SANDY LEAN CLAY, trace of Gravel, redish-brown, wet, wet, wet, wet, wet, wet, wet, wet	Brau Geote TCAA NE of	n Proj cnical E AP Rede Highwa	ect SP- valuatio velopme vy 10 and	06-05871 n nt Highway 96	BORING LOCATIC attached s	DN: N: ketch.	ST- 212677	27 (c 7.165, E:	551403.522 S
Elev. Depth feet ASTM Description of Materials (ASTM D2488 or D2487) BPF Wi. MC P200 Tests or N 829.3 64.0 Symbol (ASTM D2488 or D2487) BPF Wi. MC P200 Tests or N	Arden DRILLI	Hills, N ER: K.	linnesot Keck	a METHOD: 3 1/4" HSA Autohmr	DATE	6/21	1/07	SCA	IE· 1"=
\$29.3 64.0 Symbol (ASTM D2483 or D2487) 9% % SANDY LEAN CLAY, rec of Gravel, wet, rather stiff. 9 9 9 9 Glacial Till) (continued) 9 9 9 9 10 Sandy LEAN CLAY, race of Gravel, wet, rather stiff. 9 12 12 12 Sandy LEAN CLAY, trace of Gravel, reddish-brown, wet, very stiff to hand. 12 12 12 Sandy LEAN CLAY, trace of Gravel, reddish-brown, wet, very stiff to hand. 12 14 62 Sandy LEAN CLAY, trace of Gravel, reddish-brown, wet, very stiff to hand. 14 62 Sandy LEAN CLAY, reddish-brown to gravidi-brown with laminatios of brown, very stiff to hand. 14 62	Elev. feet	Depth feet	ASTM	Description of Materials		BPF	WL M	IC P200	Tests or No
	816.3	77.0	CL	(ASIM D2488 or D2487) SANDY LEAN CLAY, trace of Gravel, wet, ra (Glacial Till) (continued) SANDY LEAN CLAY, trace of Gravel, reddist wet, very stiff to hard. (Glacial Till)	ather stiff.	9 9 12 21			
		92.0	CL	LEAN CLAY, reddish-brown to grayish-brown laminatios of brown, very stiff to hard. (Glaciofluvium)	with	41	1.	4 62	

ST-27 page 3 of 4

BRAUN"

BRAUN" INTERTEC

Brau	n Proje	ect SP-0	6-05871	BORING	:	ST	[-2]	7 (c	ont.)
Geote	cnical E	valuation		LOCATIO)N: N:	2120	577.1	65, E: :	551403.522 See
TCAA	P Redev Highwo	velopment	t Viabway 06	attached s	ketch.			,	
Arden	Hills, N	y io and j linnesota	AARIWAY 70						
DRILLI	ER: K.I	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	1/07		SCAI	.E: 1'' = 4'
Elev. feet	Depth feet	ASTM	Description of Materials		BPF	WT	MC	P200	Tests or Notes
797.3	96.0	Symbol	(ASTM D2488 or D2487)		~~~		%	%	
			LEAN CLAY, reddish-brown to grayish-brow laminatios of brown, very stiff to hard.	n with					
			(Glaciofluvium) (continued)						
792.3	101.0				30				
			END OF BORING.						
			Water observed at 12 feet while drilling.	_					
			Boring then grouted.						
	,								
				_					
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SP-06-05871		<u> </u>	Braun Intertec Corporation	. · · ·					ST-27 nage 4 of 4



AET JO	DB NO: 22-00081	_				I	.0G 0	F BC	ORING I	NO.	ST	-28	(p. 1	of	1)
PROJE	CT: TCAAP Re	develop	ment; Ai	rden Hi	lls, MN								<u> </u>		=.2
DEPTH _IN	SURFACE ELEVATION	1: 88 7	7.8		GEOLOGY	, ,		s	AMPLE	REC	FIELI) & LA	BORA	TORY	' T
FEET	MATERIA	AL DESCRIP	TION				MC]	TYPE	ÎÑ.	wc	DEN	LL	PL	Ţ
1 -	FILL, mixture of sand v little gravel, surface roo	with silt and ots, trace ro	l silty sand, ots, black,	a	FILL	10	м	M	SS	14		<u> </u>		-	
2 -	dark brown, gray and li	ght brown						\square							ĺ
3 –						7	М	N	SS	16					
4 - 5 -	SAND WITH SILT, fin gray and light brown, m (possible fill)	e grained, f oist, loose	race roots, (SP-SM)		COARSE ALLUVIUM OR FILL			R	, ,						
6	u v					8	М	X	SS	16					
7	SILTY SAND, a little g moist, medium dense (S	ravel, gray, M) (possib	light brow le fill)	n,		14	w	R	66	~					
9 -						14		A	22	3					
10 11	CLAYEY SAND, a little stiff (SC)	e gravel, gr	ay, soft to		TILL	7	м	X	SS	16	14				
12 -								R							
13 - 14 -						7	м	X	SS	24	17				
15 -								E							
16						3	М	X	SS	22	16				
17 –								R							
18								H							
20 -								I							
21 -						6	м	X	ss	22	17				
22 -								E							
23 -								ł							
25								Ц							
26 -						10	М	X	ss	22	9				
I N E	END OF BORING [orthing=212534.7 asting=552897.1							/ <u> </u>							
 DEPTH:	DRILLING METHOD			WATED											
0-241//	3.25" HSA	DATE	TIME	SAMPLE	CASING	CAVI	AENT	S DF	RILLING	3	WATER)TE: R	EFER	1
		7/9/07	1:55	9.0		DEP g	1H 7	FLU	ID LEV	EL	LEVEL		1L AI IFFTS	FOR	E] AV
		7/9/07	2:15	26.5	24.5	 7∆	5				None		PT.AN	TION	11 1
)RING)MPLETI	ED: 7/9/07						-	·	.		TAOUG		MINO	LOGY	70
<u>१</u> SG	LG: SB Rig: 91C				1	- ·					•		THIS	LOG	

<u>or my in</u>					Ι	LOG OF	BORIN		
NTERTEC	m,		· · · · · · · · · · · · · · · · · · ·						
Braun Proj Geotecnical E TCAAP Rede NE of Highwa Arden Hills, N	ect SP-0 Evaluation Evelopmen ay 10 and Minnesota	6-05871 t Highway 96	BORING: LOCATIC attached sl	N: N ketch.	S1-29 K1-3008-29 N: 212533.840, E: 553396.120 Sec ch.				
DRILLER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	9/07	SCALE:	1'' = 4'		
Elev. Depth feet feet 888.1 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes		
	PT 22 22 2 22 2 22 5 M	PEAT, dark gray, wet. (Swamp Deposit) SILTY SAND, fine-grained, gray, waterbearing dense. (Lacustrine) SANDY LEAN CLAY, trace of Gravel, gray, v soft to medium. (Glacial Till) END OF BORING. Water observed at 9 feet while drilling.	g, medium	8 4 3 9 3 4 8 7	Σ				

Geotec TCAA NE of I Arden DRILLE Elev.	meal E P Redev	valua			L				~~~~		
DRILLE Elev.	Hills. N	velopi y 10 a Iinne	tion ment and H sota	lighway 96]	LOCATIC attached s)N: N: ketch.	: 2124	475.5	59, E: 55403	5.366 See
Elev.	:R: К.	Keck		METHOD: 3 1/4" HSA, Autohmr]	DATE:	7/1	2/07		SCALE:	1'' = 4'
feet 885.9	Depth feet 0.0	AST Sym	IM bol	Description of Materials (ASTM D2488 or D2487)			BPF	WL	MC %	Tests	or Notes
		OL		ORGANIC CLAY, black, moist. (Topsoil)							
883.9	2.0										
		SP		POORLY GRADED SAND, fine- to medium brown, wet to waterbearing, loose. (Glacial Outwash)	n-grair	ned,	4				
-							7	-			
878.9	7.0					_	Ň ĺ				
		CL		SANDY LEAN CLAY, gray, wet, soft. (Lacustrine)			2		19		
_							3				
873.9	12.0						Ŋ				
		CL		SANDY LEAN CLAY, trace of Gravel, gray soft to medium.	, wet,	rather	5				
				(Olacial Till)		-					
-						_	5	7			
						-					
-	į						7 7				
						-4	1				
						-					
859.9	<u>2</u> 6.0						6				
				END OF BORING.		_					
				Boring then grouted.		_					
_						. –					

Geoteenical Evaluation TCAAP Redevelopment NE of Highway 10 and Highway 96 Arden Hills, Minnesota DRILLER. K. Kek METHOD: 31/4"HSA, Autohmur DATE: 6/21/07 SCALE: 1"= Elter, Depth SM Description of Materials 882.9 4.0 SP DORLY GRADED SAND with SILT, fine-grained, brown, moist, medium dense. (Lacustrine) SM DORLY GRADED SAND with SILT, fine-grained, ange-brown to grayish-brown, waterbearing, medium dense. (Glaciofluvium) SM SM CORLY GRADED SAND with SILT, fine-grained, ange-brown, to grayish-brown, waterbearing, medium dense. (Glaciofluvium) SM M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S66.9 26.0 M M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S66.9 26.0 M M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S66.9 26.0 M M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S66.9 26.0 M M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S66.9 26.0 M M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S66.9 26.0 M M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S66.9 26.0 M M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S66.9 26.0 M M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S66.9 26.0 M M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S66.9 26.0 M M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S66.9 26.0 M M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S66.9 26.0 M M SANDY SILT, gray, wet, medium dense. (Glaciofluvium) S67.0 S7.0	Brau	n Proj	ect S	P-0	6-05871		BORING:			ST-31	
A def mins, shiftesoda PRILLER: K. K.ek METHOD: 3 1/4" HSA, Autohmr DATE: 6/21/07 SCALE: 1" = Elev. Depth feet feet ASTM Description of Materials 922-9 0.0 Symbol (ASTM D2488 or D2487) 922-9 0.0 Symbol (ASTM D268 or D2487) 922-9 0.0 Symbol (ASTM D268 or D2487) 900RLY GRADED SAND with SILT, fine-grained, 11 11 9 11 11 11 11 11 11 11	Geote ICAA NE of Ardon	cnical E AP Rede Highwa	valua velop y 10	tion men and	t Highway 96	F	LOCATIC attached s)N: N: ketch.	: 21241:	5.495, E: 5510()3.074 See
Elev. Teet feet ASTM Constraints (ASTM Description of Materials (ASTM D2488 or D2487) 892.4 0.5 SM SILTY SAND, trace of Roots, dark brown, moist. (Topoil) POORLY GRADED SAND with SILT, fine-grained, brown, moist. (Lacustrine) 888.9 4.0 SP. SM POORLY GRADED SAND with SILT, fine-grained, brown, moist, medium dense. (Lacustrine) 888.9 12.0 SP. SM POORLY GRADED SAND with SILT, fine-grained, grayish-brown with rust at 7 ^s sample depth, loose to medium dense. (Glaciofluvium) 22 (Glaciofluvium) 466.9 26.0 ML SANDY SILT, gray, wet, medium dense. (Glaciofluvium) 366.9 26.0 ML SANDY SILT, gray, wet, medium dense. (Glaciofluvium) 367.0 ML SANDY SILT, gray, wet, medium dense. (Glaciofluvium) 37.0 ML SANDY SILT, gray, wet, medium dense. (Glaciofluvium) 37	ORILLE	ER: K.	Keck	sora	METHOD: 3 1/4" HSA, Autohmr		DATE:	6/2	1/07	SCALE:	1'' = 4'
322.2 0.01 Symbol (ASIM D2488 of D248) 392.4 0.5 SM SILTY SAND, trace of Roots, dark brown, moist. (Topsoil) POORLY GRADED SAND with SILT, fine-grained, brown, moist, medium dense. (Lacustrine) 11 888.9 4.0 SF. POORLY GRADED SAND with SILT, fine-grained, orange-brown to grayish-brown with rust at 7' sample 9 - SM POORLY GRADED SAND with SILT, fine-grained, orange-brown to grayish-brown with rust at 7' sample 9 - SM POORLY GRADED SAND with SILT, fine-grained, orange-brown, waterbearing, medium dense. (Clacustrine) 12 - SM grayish-brown, waterbearing, medium dense. (Glaciofluvium) 223 - If If 16 - SAM SANDY SILT, gray, wet, medium dense. (Glaciofluvium) 15 - If If If - If If If - SANDY SILT, gray, wet, medium dense. (Glaciofluvium) If - If If If - If If If - If If If - If If If	Elev. feet	Depth feet	AS	ΓM	Description of Materials			BPF	WL	Tests or	Notes
888.9 4.0	892.9 892.4	0.0	Syn SM SP- SM	1001	(ASTM D2488 or D2487) SILTY SAND, trace of Roots, dark brown, (Topsoil) POORLY GRADED SAND with SILT, fi brown moist medium dense	moist. ne-grair					
SM orange-brown to graysh-brown with rust at 7 sample 9 depth, loose to medium dense. 15 (Lacustrine) 15 12 12 S80.9 12.0 SM POORLY GRADED SAND with SILT, fine-grained, grayish-brown, waterbearing, medium dense. (Glaciofluvium) 22 16 16 16 16 16 11 16 15 16 16 16 15 16 15 16 16 16 15 16 16 16 16 17 15	888.9	4.0	SP-		(Lacustrine) POORLY GRADED SAND with SILT, fir	e-grain	ed,	11			
- - 15 880.9 12.0 POORLY GRADED SAND with SILT, fine-grained, grayish-brown, waterbearing, medium dense. (Glaciofluvium) 22 - - - 23 - - - - 16 - - - 16 - - - 16 - - - 16 - - - 16 - - - 16 - - - 16 - - - 16 - - - 166.9 26.0 - 15 15 - - - 16 - - - 16 - - - 16 - - - 16 - - - 16 - - - 166.9 26.0 - - 15 - - - 15 - - - 16 - - - 15 - - - 16 - - - 16 -			SM		orange-brown to grayish-brown with rust a depth, loose to medium dense. (Lacustrine)	: 7' sam	iple	9			
880.9 12.0 12 Image: Constraint of the sector of the								15			
SM Image: Signature of the section o	- 880.9	12.0	ÇĐ					12	₽		
23 23 23 - 16 - 16 - 16 - 16 - 66.9 26.0 15 - 66.9 26.0 15 - 15 - 15 - 15 - 15 - 16 -			SM		grayish-brown, waterbearing, medium dens (Glaciofluvium)	e-grain e.	ed,	22			
- 23.0 ML SANDY SILT, gray, wet, medium dense. (Glaciofluvium) - 15 - 66.9 26.0 115 - END OF BORING. Water observed at 11 feet while drilling. Boring then grouted.							 	23			
169.9 23.0 16 169.9 23.0 16 169.9 23.0 16 169.9 23.0 16 169.9 26.0 11 169.9 26.0 15 15 15 16 15 17 15 18 11 19 15 10 15 15 15 16 16 17 15 18 16 19 16	-							-			
ML SANDY SILT, gray, wet, medium dense. (Glaciofluvium) 15 66.9 26.0 15 Water observed at 11 feet while drilling. Boring then grouted. 15	69.0	23.0						X 16			
66.9 26.0 III III END OF BORING. III IIII Water observed at 11 feet while drilling. IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII			ML		SANDY SILT, gray, wet, medium dense. (Glaciofluvium)			15			
Boring then grouted.	66.9	26.0			END OF BORING. Water observed at 11 feet while drilling.						·
					Boring then grouted.						

	BRA	AUN	5M						L	DG (OF BORIN	١G
	INTE	RTEC										
	Brau	n Proj	ect S	P-0	6-05871	BORING	:		S	T-3 2	2	
	Geote	emeal E AP Rede	valua velop	men	t	LOCATIO	ON: N sketch	: 212	330.3	33, E:	551226.541 See	
	NE of	Highwa	ay 10 Minne	and	Highway 96							
	DRILLI	ER: K.	Keck	sola	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	0/07		SCA	LE: 1'' = 4'	
	Elev.	Depth							I			
	feet 893.5	feet 0.0	AS' Syn	TM 1bol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC %	P200 %	Tests or Notes	;
	892.5	1.0	SM		SILTY SAND, trace of Roots, dark brown, mois (Topsoil)	st.						
			SP- SM		POORLY GRADED SAND with SILT, fine-gra	ained,						
					(Lacustrine)	_	2					
	_						h					
									1			
as)	-					_	Д 7		5	5		:
riatio	886.5	7.0										
bbrev	_		SP- SM		POORLY GRADED SAND with SIL1, fine-gra orange-brown, moist to wet, loose to medium de	ained, ense	11					
n of a	_				(Lacustrine)	-	μ					
unatio												
expla	-					-	Å					
et for	881.5	12.0	SM		SILTY SAND fine grained gravich brown wat	terhearing						
<u>y she</u>	-		5141		very loose to medium dense.	- Lei Ocaring,	6	⊻				
nolog	-				(Lacustine)	-						
ermi							M 2		23	29		
tive	-					-	Μ -					
scrip	-					_						
ee De	-					-						
<u></u>	-					-						
14:45	—					. —	12					
10/2/07	-					-	Λ					
GDI	- 970.5	22.0				_						
KAUN	870.5	23.0	CL-		SILTY CLAY, gray, wet, loose.							
GFJ B	-		ML		(Glaciofluvium)	-						
1/800	867.5	26.0					9	Ì	23	96	LL = 27	
J 2P06	001.0	20.0		h	END OF BORING.		f i				$\mathbf{r}1 = 0$	
<u>UKIN</u>					Water observed at 13 feet while drilling.	_					' 	
a lo	-				Boring then grouted.	_						
	-					_						
N BAS	_											
DVVG												
5	D 06 06971		_	· · · -	Brown Interles Composition						CT 22	1.01

BI	R A	UN	5H.									L	DG (OF BORII	NG
N	TER	TEC	~												
B	raun	Proj	ect S	SP-()6-05	871			BORING	:		S	T-33	3	
	eoteci ∼a a f	nical E P Rede	Valu velor	ation	l st				LOCATI	ON: 1	J: 212	183.6	55, E:	550725.056 See	2
NI	E of E	lighwa	ay 10	and	n High	way 96			attached s	sketch.					
Ar	den l	Hills, I	Minn	esota	1									· · · · · · · · · · · · · · · · · · ·	
DR	ILLEI	ξ: Κ.	Keck			METHOD:	3 1/4" HSA, A	utohmr	DATE:	6/.	19/07		SCAI	LE: 1" = 4'	
Ele fe 89	ev. et 95.7	Depth feet 0.0	AS Syr	TM nbol		D (A	escription of M STM D2488 of	faterials r D2487)		BPF	WL	MC %	P200 %	Tests or Note	es
89	4.7	1.0	SM		SIL	TY SAND, trac	ce of Roots, da	rk brown, moist	-						
IIS)			SP- SM		PO	ORLY GRADE wn to light brov	D SAND with wn, moist, very (Lacustrin	SILT, fine-grain loose to loose. e)		4 6					:
ion of abbreviation 88 88	6.7	9.0	SM		SIL	TY SAND, fine	e-grained, brow	n to grayish-bro	- - own,	7					
<u>gy sheet tor explanat</u>	17	14.0			moi	st, medium den	ise. (Głaciofluvin	um)		13 13					
	77	18.0	SM		SIL	IY SAND, fine ium dense.	-grained, grayi (Glaciofluvit	sh-brown, wate	rbearing, — –	14	Ý				
		10.0	ML		SAN	IDY SILT, gray	/, wet, medium (Glaciofluvit	dense. im)							
1 10/7									_	∬ ¹⁴		22	55		
873	<u>8.7</u>	22.0	SP-		POC	RLY GRADE	D SAND with	SILT, fine-grair	red,						
			U1AI		gray	, water ocaring,	(Glaciofluvin	ım)	- - 	M 7		979, 1982, AA			
<u>3 869</u>	2.7	26.0			ENT	OFBORING				М					
		ļ			Wate	er observed at 1	4 feet while dr	illing.							
					Bori	ng then grouted	I.								
SP_06_0*	5871						Drown Inte	staa Componetion	1	1		L	<u>I</u>	CT 22	1 61

	INTE	RTEC	-								
	Brau	ın Proj	ect S	P-0	6-05871	BORING	:		S	T-3 4	
	Geote	enical E	valua	tion		LOCATI	ON: N	: 212		05, E:	550971629 See
	NE of	ar keae Highwa	veiop iv 10	men and	t Highway 96	attached	sketch.				
	Arder	n Hills, N	Ainne	sota	······································						
	DRILL	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	1/07		SCAI	LE: $1'' = 4'$
	Elev.	Depth	AC	тъя							
	894.3	0.0	Sym	npol	(ASTM D2488 or D2487)		BPF	WL	MC %	P200 %	Tests or Notes
	893.3	10	SM		SILTY SAND, dark brown, moist.						
		110	SP-		POORLY GRADED SAND with SILT, fine-gr	ained,					
	_		SIM		light brown to brown, moist, loose to medium d	ense. –					
	-				(Lacustinic)	-	<u> </u>				
	-					-					
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ons)	-						Щ.				
sviati		ļ				-					
abbre	-					-	11		11	6	
n of	885.3	9.0	CD.			• •					
natic			SM		orange-brown, moist to wet, medium dense.	inea,					
expla	-				(Lacustrine)	_	M 11				
for		ļ				_					
sheet	-	£ I				_	H 11				
ogy	880.3	14.0				-	μ				
nino			SP- SM		POORLY GRADED SAND with SILT, fine-gra	nined,]	<u>*</u>			
Ten	-		5171		(Lacustrine)		₫ 4				
ptive						_	f1				
escri	8763	18.0				-					
L See	070.5	10.0	SM		SILTY SAND, fine-grained, grayish-brown,						
Ű-					waterbearing, medium dense. (Lacustrine)	-					
14:45					(· · · · · · · · · · · · · · · · · · ·		M 13				
0/2/07						_	μ	İ			
10						_					
NUN.C		. [_					
1 8K/											
19.1	-							-			
	868.3	26.0									
	Ì				END OF BORING.						
PUK		ţ			Water observed at 14 feet while drilling.						
			Í	Ì	Boring then grouted.						
3	1										
PA3											
	1					_					
- L SP	-06-05871				Braun Interlec Corporation			Į į			ST-34 page 1 of 1

BRAUN

Br	aun	Proje	ect SP-0	6-05871	BORING	:		ST-35	•
Geo TC NE Arc	otecni AAP of Hi len H	ical Ev Redev ighwaj ills, M	valuation velopmen y 10 and linnesota	t Highway 96	LOCATIOn attached s	ON: N: sketch.	212022	2.662, E: 55114	7.722 Se
DRI	LLER:	: K.I	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	0/07	SCALE:	1"=4
Eler fee 890	7. E t 5.0	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
894	i.5	0.5	SM	SILTY SAND, trace of Roots, dark brown, moist	t. ſ				
			SM	POORLY GRADED SAND with SILT, fine-grai brown to brown, moist, very loose to loose. (Lacustrine)	ned, light	3			
						μ			
						7			
-	ł				-	10			
-						10			
-					-	V 8			
-									
- 879	0	17.0			_	Ň	Ā		
-			SM	SILTY SAND, fine-grained, grayish-brown to gra waterbearing, medium dense. (Glaciofluvium)	ay, —				
-						13			
-					-				
						11			
<u>870.</u>		26.0		END OF BORING.					
	1			Water observed at 16 feet while drilling.					
	-			Boring then grouted.	-				



SUBSURFACE BORING LOG

PROBECT: TCAAP Redevelopment; Arden Hills, MN DEPT SURVACE ELEVATION: BST.6 MATERIAL DESCRIPTION OPOLOGY N MC SAMPLE REC PIELD & LABORATORY TENTS MATERIAL DESCRIPTION PEET SURVACE ELEVATION: BST.6 MATERIAL DESCRIPTION OPOLOGY N MC SAMPLE REC DEN LL PL 4: 4820 1 C3.9 Bitminous Pavement FILL, mixture of clayey sand and silly sand, a - Initie gravel, tare oxis, brown FILL 20 M SS 16 L PL 40 SIMUTY LEAN CLAY, a little gravel, dark gray, stifl, laminations of silt at 10° (CL) FINE ALLUVIUM 9 M SS 14 20 FINE BS 20 17 M SS 14 20 SAMDY LEAN CLAY, a little gravel, dark gray, etifl, laminations of silt (CL) FINE ALLUVIUM 9 M SS 14 20 16 M SS 14 20 SAMDY LEAN CLAY, a little gravel, gray, very stiff FINE ALLUVIUM 9 M SS 14 20 17 M SS 14 20 SAMDY LEAN CLAY, a little gravel, gray, very stiff TILL 7 M SS 20 1	AET J	OB NO: 22-00081	_				T		F B(ANING 1		ST	-36	(n 1	of 1	<u> </u>
DEFTH FEET SURFACE ELEVATION: 387.6 MATERIAL DESCRIPTION OBCOLOGY N MC SAMPLS FEE FEE WC Date LL PL 1 - </td <td>PROJE</td> <td>TCAAP Re</td> <td>- developi</td> <td>ment; A</td> <td>rden Hi</td> <td>ills, MN</td> <td>L</td> <td>.000</td> <td>4 D(</td> <td></td> <td>NU</td> <td></td> <td>-30</td> <td><u>(þ. 1</u></td> <td>. 01 1</td> <td>)</td>	PROJE	TCAAP Re	- developi	ment; A	rden Hi	ills, MN	L	.000	4 D(NU		-30	<u>(þ. 1</u>	. 01 1)
IFET MATERIAL DESCRIPTION UDUDLY N MC SAMPLE Ric WC DEN LL PL % 420 1 -2.5" Efficience roots, brown FILL, mixture or cots, brown FILL 7 M SS 16 I I I YC DEN LL PL % 420 2 FILL, mixture or cots, brown mixture or cots, brown FILL 20 M SS 16 I I I YC DEN LL PL % 420 3 Initite gravel, brown and light brown FILL 20 M SS 14 I	DEPTH	SURFACE ELEVATION	. 887	7.6								FIFL) & I A	BORA	TOPV	TESTS
L.S ⁰ Bituminous Payement PILL 20 M SS 10 M SS 16 11 M SS 16 17 M SS 14 17 M SS 14 17 M SS 10 Status 10 10 Status 10 <th10< th=""> 10 <th10< th=""></th10<></th10<>	FEET	MATERIA	L DESCRIP	TION		GEOLOGY	N	М	2 S.	AMPLE TYPE	REC	wc	DEN		PI	11:515
1 FILL, mixture of clayey sand and sity sand, a 20 M SS 16 2 FILL, mixture of sand with slit and silty sand, a 17 M SS 14 3 Initie gravel, tace rooks, brown 17 M SS 14 4 17 M SS 14 5 SANDY LEAN CLAY, a liftle gravel, dark gray, siff, laminations of sit at 10 (CL) 15 M SS 20 17 10 SANDY LEAN CLAY, a liftle gravel, dark gray, siff, laminations of sit at 10 (CL) FINE 15 M SS 20 17 2 LEAN CLAY WITH SAND, a liftle gravel, dark gray, firm, laminations of sit (CL) 7 M SS 20 23 14 SUTY CLAY, a liftle gravel, light brown, mode at 15 (CL-ML) 30 M SS 15 14 15 SUTY CLAY, a liftle gravel, gray, very stiff TILL 30 M SS 20 13 16 M SS 20 13 14 14 14 14 17 modul dense (LL) 16 M SS 20 13 14 <td></td> <td>2.5" Bituminous Pavem</td> <td>ent</td> <td></td> <td></td> <td>FILL</td> <td></td> <td></td> <td></td> <td>y su</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>10-#20</td>		2.5" Bituminous Pavem	ent			FILL				y su						10-#20
2 FILL_miniture of sand with silt and silty sand, a 3 hittle gravel, brown and light brown 4 17 M SS 5 19 M SS 20 7 19 M SS 20 8 15 M SS 20 17 9 SANDY LEAN CLAY, a little gravel, dark gray, stiff, laminations of silt at 10' (CL) FINE ALLUVIUM 9 M SS 14 20 10 SANDY LEAN CLAY, a little gravel, dark gray, stiff, laminations of silt (CL) 7 M SS 14 20 11 1 EAN CLAY WITH SAND, a little gravel, dark gray, very stiff lone of clayey sand at 15' (CL-ML) 7 M SS 20 23 14 SILTY CLAY, a little gravel, gray, very stiff TIL 16 M SS 20 13 19 to stiff (SC) 10 Ittle gravel, gray, very stiff 11 16 M SS 20 13 20 12 M SS 23 15 14 15 14 15 16 M 16 <td>1</td> <td> FILL, mixture of clayey</td> <td>sand and s</td> <td>silty sand, a</td> <td>a</td> <td></td> <td>20</td> <td>М</td> <td>X</td> <td>ss</td> <td>16</td> <td></td> <td></td> <td></td> <td></td> <td></td>	1	FILL, mixture of clayey	sand and s	silty sand, a	a		20	М	X	ss	16					
3 little gravel, brown and light brown 17 M SS 14 4 - </td <td>2 –</td> <td>FILL, mixture of sand w</td> <td>vith silt and</td> <td>I silty sand.</td> <td>/</td> <td></td> <td></td> <td></td> <td>\mathbb{A}</td> <td></td> <td>[</td> <td></td> <td></td> <td></td> <td></td> <td></td>	2 –	FILL, mixture of sand w	vith silt and	I silty sand.	/				\mathbb{A}		[
4 19 M SS 20 7 8 15 M SS 20 9 SANDY LEAN CLAY, a little gravel, dark gray, stiff, laminations of silt at 10° (CL) FINE ALLUVIUM 9 M SS 12 12 LEAN CLAY WITH SAND, a little gravel, dark gray, fift, laminations of silt (CL) 7 M SS 20 17 14 Sgray, firm, laminations of silt (CL) 7 M SS 20 23 14 SLTY CLAY, a little gravel, brownish gray, irred gravel, light brown, mediau dense (ML) 30 M SS 15 14 15 SANDY SLT, a little gravel, gray, very stiff TIL 30 M SS 20 16 M SS 20 13 14 14 14 17 mediau dense (ML) 16 M SS 20 13 18 CLAYEY SAND, a little gravel, gray, very stiff TIL 16 M SS 20 13 20 12 M SS 23 15 14 15 21 24 25 12 M SS 23 15 22 12 M SS 23 15 16	3 –	little gravel, brown and	light brown	า่ั			17	М	IX	SS	14					
5 19 M SS 20 8 15 M SS 20 17 9 SANDY LEAN CLAY, a little gravel, dark gray, stiff, laminations of silt at 10' (CL) FINE ALLUVIUM 9 M SS 14 20 10 stiff, laminations of silt at 10' (CL) FINE ALLUVIUM 9 M SS 14 20 11 - LEAN CLAY WITH SAND, a little gravel, dark gray, very stiff, laminations of silt (CL) 7 M SS 20 23 15 SILTY CLAY, a little gravel, brownish gray, very stiff, lense of daycy sand at 15' (CL-ML) 30 M SS 15 14 16 SANDY SILT, a little gravel, gray, very stiff TILL 16 M SS 20 13 18 CLAYEY SAND, a little gravel, gray, very stiff TILL 16 M SS 23 15 20 12 M SS 23 15 14 14 21 12 M SS 23 15 14 22 12 12 M SS 23 15 23 12 M SS 23 15 14 24 12 M SS	4 -								Д							1
6- 19 M XSS 20 7 - - 15 M XSS 20 17 8- - - - - - - - - 10 SANDY LEAN CLAY, a little gravel, dark gray, stiff, laminations of silt at 10° (CL) FINE -	5 -								$\langle \cdot \rangle$							
7 8 9 SANDY LEAN CLAY, a little gravel, dark gray, stiff, laminations of silt at 10' (CL) 11 9 12 LEAN CLAY WITH SAND, a little gravel, dark gray, stiff, laminations of silt at 10' (CL) 13 gray, firm, laminations of silt at 10' (CL) 14 SS. TY CLAY, a little gravel, brownisht gray, with firm, laminations of silt (CL) 14 SS. TY CLAY, a little gravel, brownisht gray, with first fi	6 -						19	M	X	SS	20					
8 Is Is M SS 20 17 10 SANDY LEAN CLAY, a little gravel, dark gray, stiff, laminations of silt at 10° (CL) FINE ALLUVIUM 9 M SS 14 20 11 LEAN CLAY WITH SAND, a little gravel, dark gray, firm, laminations of silt (CL) 7 M SS 20 23 14 SILTY CLAY, a little gravel, brownish gray, very stiff, or siff (SC) 30 M SS 15 20 14 SANDY SILT, a little gravel, gray, very stiff TILL 30 M SS 15 14 19 CLAYEY SAND, a little gravel, gray, very stiff TILL 16 M SS 20 13 18 CLAYEY SAND, a little gravel, gray, very stiff TILL 16 M SS 20 13 20 Issing=52445.3 Issing=52445.3 Issing=52445.3 Issing=52445.3 Issing=52445.3 NOTE: REPER TO 204/4* J2.5* HSA DATE TIME SMEND DEPTH DEPTH DEPTH DEPTH DEPTH DEPTH DEPTH DEPTH MATER LEVEL MEASUREMENTS NOTE: REPER TO	7 -						1		ম							
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stiff, laminations of silt at 10' (ČL) ALLUVIUM 9 M SS 14 20 LEAN CLAY WITH SAND, a little gravel, dark 7 M SS 20 23 sray, firm, laminations of silt (CL) 7 M SS 20 23 SILTY CLAY, a little gravel, brownish gray, very stiff, lense of clayey sand at 15' (CL-ML) 30 M SS 15 14 14 SILTY CLAY, a little gravel, light brown, medium dense (ML) 30 M SS 15 14 18 CLAYEY SAND, a little gravel, gray, very stiff TILL 16 M SS 20 13 20 - - 16 M SS 20 13 - 19 to stiff (SC) - 16 M SS 23 15 - 20 - - 12 M SS 23 15 - - 21 - - 12 M SS 23 15 - - 22 - - 12 M SS 23 15 <td>10 -</td> <td>SANDY LEAN CLAY,</td> <td>a little gray</td> <td>vel. dark gr</td> <td>av.</td> <td>FINE</td> <td>-</td> <td></td> <td>R</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	10 -	SANDY LEAN CLAY,	a little gray	vel. dark gr	av.	FINE	-		R							
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12 14 7 M X SS 20 23 14 15 SILTY CLAY, a little gravel, brownish gray, very stiff, lense of clayey sand at 15' (CL-ML) 30 M SS 20 23 16 SANDY SILT, a little gravel, light brown, medium dense (ML) 30 M SS 15 14 18 CLAYEY SAND, a little gravel, gray, very stiff TILL 30 M SS 20 13 20 21 16 M SS 20 13 14 22 23 16 M SS 20 13 14 24 25 12 M SS 23 15 14 DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS NOTE: REFER TO THE ATTACHED 0-244': 3.25'' HSA DATE TIME SAMPLED CASING CAVE-IN DEPTH DRILLING LEVEL WATER LEVEL Nore 000PTHE: THSA DATE TIME SAMPLED DEPTH DEPTH DEPTH DEPTH DEPTH DEPTH DEPTH DEPTH DEPTH <td>12</td> <td>LEAN CLAY WITH SA</td> <td>ND, a little</td> <td>e gravel, da</td> <td>ırk</td> <td></td> <td></td> <td></td> <td>\square</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	12	LEAN CLAY WITH SA	ND, a little	e gravel, da	ırk				\square							
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13 Very stiff, lense of clayey sand at 15 (CL-ML) 16 SANDY SILT, a little gravel, light brown, 17 medium dense (ML) 18 CLAYEY SAND, a little gravel, gray, very stiff 19 CLAYEY SAND, a little gravel, gray, very stiff 19 CLAYEY SAND, a little gravel, gray, very stiff 11 16 20 16 21 16 22 16 23 16 24 16 25 12 26 12 Morthing=212032.3 12 DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS NOTE: REFER TO THE ATTACHED SET UP OF THE CAVE NOT HEASUREMENTS 0-24/2' 3.25" HSA 0ATE TIME SAMPLED CAVE N DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS NOTE: REFER TO THE ATTACHED SET UP OF THE CAVE NO DEPTH DEPTH DEPTH DEPTH DEPTH DEPTH FUND LEVEL 0.24/2' 3.25" HSA DATE 7/6/07 12:00 26.5 24.5 NOTE: REFER TO THE SAUD EXPLANATION OF THEAMATION OF THEAMATION OF THEAMATION OF THEAMATION OF THE	.14	SILTY CLAV a little ar	wal braw						R							
16 SANDY SILT, a little gravel, light brown, 17 18 13 14 17 medium dense (ML) 18 13 14 14 18 CLAYEY SAND, a little gravel, gray, very stiff TILL 16 M SS 20 13 20 - 16 M SS 20 13 14 21 - 16 M SS 20 13 22 - 16 M SS 23 15 24 - 12 M SS 23 15 DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS NOTE: REFER TO 0-24½' 3.25" HSA DATE TIME SAPPI DEPTH CAMPLED DEPTH DRILLING WATER LEVEL MEASUREMENTS NOTE: REFER TO 0-24½' 3.25" HSA DATE TIME SAPPI DEPTH CAMPLED DEPTH FUID LEVEL WATER LEVEL 7/6/07 12:00 26.5 24.5 24.5 NORE SHEETS FOR AN EXPLANATION OF SORTING - - - -	15	very stiff, lense of clayey	sand at 15	iisn gray, 7 (CL-ML)	/11111		30	M	М		10	20				
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18 CLAYEY SAND, a little gravel, gray, very stiff TILL 16 M SS 20 13 20 - 16 M SS 20 13 14 14 SS 20 13 15 16 M SS 20 13 15 16 M SS 20 13 16 16 16 M SS 20 13 16 16 16 17 13 16 16 16 17 16 17 16 17 17 17 17 17 17 17 16 17 17 16 17 18 16 17 18 18 16 17 18 1	17 -								IJ							
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END OF BORING Northing=212032.3 Easting=552445.3 Water Note: DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS NOTE: REFER TO 0-24½' 3.25" HSA DATE TIME SAMPLED DEPTH CASING DEPTH CAVE-IN DEPTH DRILLING FLUID LEVEL WATER LEVEL NOTE: REFER TO 0-24½' 3.25" HSA DATE TIME SAMPLED DEPTH CASING DEPTH CAVE-IN DEPTH DRILLING FLUID LEVEL WATER LEVEL NOTE: REFER TO 0-24½' 3.25" HSA DATE TIME SAMPLED DEPTH CASING DEPTH CAVE-IN DEPTH DRILLING FLUID LEVEL WATER LEVEL NOTE: REFER TO 0-24½' 3.25" HSA DATE TIME SAMPLED DEPTH CASING DEPTH DRILLING DEPTH BRILLING MATER None 0-24½' 3.25" HSA DATE TIME SAMPLED DEPTH CASING DEPTH CAVE-IN PETH DRILLING FLUID LEVEL WATER LEVEL SHEETS FOR AN 0-24½' 3.25" HSA I I I I I I I 0-24½' 3.25" HSA DATE I I I I I I I 0-26.5 24.5 24.5 I I I I I I I 0	26 -						12	М	X	SS	23	15				
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DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS NOTE: REFER TO 0-24½' 3.25" HSA DATE TIME SAMPLED DEPTH CASING DEPTH DRILLING WATER LEVEL NOTE: REFER TO 0-24½' 3.25" HSA DATE TIME SAMPLED DEPTH CASING DEPTH DRILLING WATER LEVEL NOTE: REFER TO 7/6/07 12:00 26.5 24.5 24.5 None SHEETS FOR AN BORING		Northing=212032.3 Easting=552445.3														
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7/6/07 12:00 26.5 24.5 None SHEETS FOR AN BORING COMPLETED: 7/9/07 Image: Signal state	0-241/2	<u>' 3.25"</u> HSA	DATE	TIME	SAMPLEI DEPTH	D CASING DEPTH	CAVE	-IN	DI		G V	VATER	m T	HE AT	TACH	ED
BORING EXPLANATION OF COMPLETED: 7/9/07 DR: SG LG: SB Rig: 91C			7/6/07	12:00	26.5	24.5	24	5	- 20		1	None		HEETS	FOR	AN
COMPLETED: 7/9/07 TERMINOLOGY ON DR: SG LG: SB Rig: 91C	DODBIG	······································								·			EX	PLAN	ATION	OF
DR: SG LG: SB Rig: 91C THIS LOG	BORING COMPLET	ED: 7/9/07												MINO	LOGY	ON
	DR: SG	LG: SB Rig: 91C					·		<u> </u>		+		-	THIS	LOG	



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081					LC	OG OF	BC	RING N	10. <u> </u>	ST	-37	(p. 1	of 1)
РКОЛ	ECT: TCAAP Red	evelopm	ent; Ard	len Hi	lls, MN										
DEPTH	SURFACE ELEVATION: .	888.	3		GEOLOGY	N		S/	AMPLE	REC	FIELI)&LA	BORA	TORY	TESTS
FEET	MATERIAL	DESCRIPT	ION			N	MC		TYPE -	ĪN.	wc	DEN	LL	PL	%-#200
1 -	 FILL, mixture of clayey s little gravel, surface roots 	and and si trace root	lty sand, a ts. brown an	d	FILL	14	м	\mathbb{N}	66	21	10				
2 -	dark brown	,	,			14	141	$ \land $	66	21	10				
3 -						7	м	\mathbb{N}	66	7	9				
4	SANDY LEAN CLAY, a	little grav	el, light		TILL	- '		Δ	00						
5 -	brown, firm (CL)							R			:				
6-	stiff (SC)	graver, gra	iy, iirm to			8	M	X	SS	21	17				
7-								ম							
8 -						12		Μ	66	15	23				
9-						12	111	\square	55	15					
10 -							ł	R							
11 -		•				11	М	X	SS	17	16				-
12 -								R							
13	stiff to very stiff (CL/SC)	little grave	el, dark gray	,		10	м	M	22	24	16				
14 -								Д	00	24					
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26 -						18	М	XI	SS	24	14				
F	END OF BORING				<u></u>			-							
	Easting=552895.2														
DEPT	TH: DRILLING METHOD	<u> </u>	· · · · · · · · · · · · · · · · · · ·	WATE	RIEVEI MEA		MENT					-			
		DATE	TIME	SAMPLI	ED CASING	CAV	E-IN	.3 D	RILLIN	G	WATE		NOTE:	REFE	₹ТО
0-24	¹ / ₂ ' 3.25" HSA	7/0/04	1.10	DEPTH	I DEPTH	DEF	ŤĤ	FLĨ	JIDLE	VEL	LÉVÉ		THE A	ITACH S FOR	
·		1/9/07	1:10	26.5	24.5	26	.5				None		XPLAN	S FUK	
BORING	ETED 7/9/07									_			ERMIN	OLOG	YON
DR: SG	LG: SB Rig: 91C									<u> </u>		\neg	THI	S LOG	
d 10 4			┉┈┈╌┸			L	ŀ			L					

Brau	n Proje	ect SP-0	5-05871	BORING	: S'	Т-38	RI-3008	8-23
Geoted TCAA NE of Arden	enical E P Redev Highwa Hills, N	valuation velopment y 10 and 1 Iinnesota	Highway 96	LOCATIO attached s	ON: Ni ketch.	: 212018	960, E: 55340	05.450 S
DRILLE	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	9/07	SCALE:	1" =
Elev. feet 885.4	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	[•] Notes
		FILL XX	FILL: Silty Sand, fine- to medium-grained, tr	ace of				
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<u> </u>					Ма			
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878.4	7.0	PT 些	PEAT, dark gray, wet.			ĮΫ		
- 876.9	8.5	<u> </u>	(Swamp Deposit)		M 2			
			END OF BORING. (Per Tetra Tech)	_				
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			bonng then grouted.	_				
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LOG OF BORING

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TCAA	AP Rede	vasua	men	t	LOCATI	ON: N sketch	: 5539	01.512, E: 55390	1.512 See
NE of Arden	Highwa Hills N	ay 10 Minne	and]	Highway 96	attached	sketen.			
DRILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	1/07	SCALE:	1'' = 4'
Elev.	Depth	AC	TNA		•	DDE			NT-+
887.9	0.0	Syn	nbol	(ASTM D2488 or D2487)		BPF	WL	1 ests or	Notes
		FILI		FILL: Silty Sand, trace of Roots, dark brown to moist	brown,				
-				moist.					
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0000	70				_	f			
000.9	/.0	FILL		FILL: Poorly Graded Sand with Silt, fine- to					
				medium-grained, trace of Gravel, gray, moist.	_	₩ 4			
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5 0750	12.0				-	Ť			
0/3.9	12.0	PT	<u> </u>	PEAT, dark grav, wet.					
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869.9	18.0	OL.		ORGANIC SILT, dark grav wet		}			
╞				(Swamp Deposit)	_		-		
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865.9	22.0		[]		_	Π			
	<u>></u>	SP		POORLY GRADED SAND, fine- to medium-gr	ained,				
				trace of Gravel, gray, waterbearing, loose. (Glacial Outwash)	_				
┣──│					-		-		
 									
861.9	26.0								
				END OF BORING.					
F				Water observed at 14 feet while drilling.	·				
				Boring then grouted.	-				
				<i></i>	_				
					_				
SP-06-05871				Braun Intertec Corporation			1.1.1.1		T.30 page Lof

Braun Pr	pject SP-0	6-05871	BORING	:		ST-40	
Geotecnical TCAAP Re NE of High Arden Hills	Evaluation levelopmen vay 10 and Minnesota	it Highway 96	LOCATIC attached s	DN: N ketch.	: 21168().392, E: 55058	9.817 See
DRILLER:	K. Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	2/07	SCALE:	1'' = 4'
Elev. Dept feet feet 893.7 0	h ASTM .0 Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
	5 SM SM 0 SP- SM 0 SM 0 SM	SILTY SAND, trace of Roots, dark brown, mc (Topsoil) SILTY SAND, fine-grained, dark brown, mois loose. (Lacustrine) POORLY GRADED SAND with SILT, fine-g brown to grayish-brown with rust at 10' sample moist, very loose to medium dense. (Lacustrine) POORLY GRADED SAND with SILT, fine-g grayish-brown to gray, waterbearing, loose to r dense. (Lacustrine) END OF BORING. Water observed at 13 feet while drilling. Boring then grouted.	rained, light e depth,	2 3 8 9 11 6 16	Σ		
Braun Proj	ect SP-06	5-05871	BORING	;		ST-41	
--	--	--	-----------------------	--	-------	----------------	------------
Geotecnical E TCAAP Rede NE of Highwa Arden Hills, I	Evaluation Evelopment ay 10 and H Minnesota	Lighway 96	LOCATIC attached s)N: N: 2 ketch.	11684	.376. E: 55089	97.834 See
DRILLER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/21/	07	SCALE:	1'' = 4'
Elev. Depth feet feet 892.5 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
<u>891.8</u> 0.7 <u>891.8</u> 0.7 <u>880.5</u> 12.0 <u>880.5</u> 12.0 <u>886.5</u> 22.0 <u>866.5</u> 26.0	SM SP- SM SM SM SM	SILTY SAND, trace of Roots, dark brown, moi (Topsoil) POORLY GRADED SAND with SILT, fine-gra brown to brown, moist, loose to medium dense. (Lacustrine) SILTY SAND, fine-grained, brownish-gray, waterbearing, loose to medium dense. (Lacustrine) POORLY GRADED SAND with SILT, fine-gra gray, waterbearing, loose. (Lacustrine) END OF BORING. Water observed at 12 feet while drilling. Boring then grouted.	st	15 8 12 12 10 17 16 7	₽		

BRAUN"

LOG OF BORING



SUBSURFACE BORING LOG

AET JOI	B NO: 22-00081			······		т	06.0	FRO			ST	_17	(n 1		<u> </u>
PROJEC	T: TCAAP Re	- develop	ment; Ai	rden H	ills, MN	L	000	יםנ	JAING I	NU		-42	(h [.] 1	<u>. 10</u>	<u>.) </u>
DEPTH IN FEET	SURFACE ELEVATION MATERIA	: 885	5.3 TION		GEOLOGY	N N	мс	s	AMPLE TYPE	REC IN.	FIELI	DEN	BORA	TORY	TESTS
1 -	FILL, mixture of sandy gravel, surface roots, tra brown	silt and sil	ty sand, wit rown and d	h ark	FILL	29	М	X	SS	14					70-#20
3 - 4	FILL, mixture of sand v clayey sand, a little grav brownish gray and gray	vith silt, sil el, brown,	ty sand and a little			23	М		SS	8					
5 - 6 - 7 -						10	м		SS	7					
8 -						20	м	X	SS	16					
10 to 11 12	SAND WITH SILT, fine o gray and black, mediu aminations of organic si	e grained, b m dense, le lt (SP-SM)	prownish gr enses and	ay	COARSE ALLUVIUM OR TOPSOII	- 17	▼ <u>M</u>	R	SS	19					
12 — S 13 — 14 —	AND, medium to fine g aterbearing, loose, lens	rained, bro es of sandy	own and gra v silt (SP)	ıy,	COARSE ALLUVIUM	5	w	M	SS	4					
15 - S 16 - 17 - 18 - 18 - 18 - 18 - 18 - 18 - 18	ANDY LEAN CLAY, a stiff (CL)	a little grav	el, gray, fir	m	TILL	7	М		SS	8	22				
18 19 20 21						8	м	ζ Υ	SS	15	16				
22 - 23 - 24 -															
25 - 26 -	ND OF BODINC	····				13	м		SS	18	16				
No Ea:	rthing=211590.1 sting=551980.4													_	
DEPTH:	DRILLING METHOD			WATER	LEVEL MEA	L SUREN	/ENT:	 S							
0-9½'	3.25" HSA	DATE	TIME	SAMPLE DEPTH	D CASING	CAVE	-IN	DR		i, V	VATER		ле: F -те ат	UEFER TACU	TO
1/2'-241/2'	RD w/DM	6/21/07	11:45	11.5	9.5	10.	3	·LU	ID LEV		_EVEL 10 1		IEETS	FOR	AN
ORING											101	EX	PLAN	ATION	OF
<u>ŎMPLĔŦĔ</u> Į	D: 6/21/07	·····							,			TER	MINC	LOGY	ON
<u>R: SG I</u>	.G: SB Rig: 91C	i					T					1	THIS	LOG	



SUBSURFACE BORING LOG

AET JOB NO: 22-00081	_				L	DG OF	7 BO	RING	JO.	ST	-43	(n. 1	of 1)
PROJECT: TCAAP Re	developi	nent; Ar	den Hi	lls, MN								<u>(p. 1</u>	. 01 1	.,
DEPTH SURFACE ELEVATION	: 890	.2		GEOLOGY			SA	MPLE	REC	FIELI) & LA	BORA	TORY	TESTS
FEET MATERIA	L DESCRIP	TION	·			MC	Î	YPE	ÎN.	wc	DEN	LL	PL	%-# 20
1 - trace roots, brown and d	' sand and s lark brown	silty sand,	[11	м	М	22	16	13				
2 - SAND WITH SILT to	a no sta hu						\square	55	10					
3 – to grayish brown, moist,	, dense, len	ses and	a : !	COARSE ALLUVIUN	1 31	м	М	88	14					
4 fill)	ilt (SP-SM)) (possible	_ <u> - </u>	OR FILL			Д							
5 - SAND WITH SILT, light mottled, waterbearing, m	it brown ar iedium den	nd gray		ALLUVIUM	E .		M			20				
6 -	loananii den	190 (DI -0191)	1		22	W	Ň	SS	16	20				
7 - SILTY SAND, a little gr	avel, gray,	medium		TILL	4	–	य							
8 - dense (SM)					25	м	X	ss	14	11				
SANDY LEAN CLAY,	a little grav	vel, gray, fir	m //				R							
					8	м	M	SS	15	18				
12							Д							
13							M.			17				
14 -					6	м	Ŵ	SS	21					
15 —							Д							
16 —					9	М	X	SS	20	18				
17 —						ľ	\sum							
18 —							\sum							
19 —							\sum							
20 -						M	7		22	15				
21 - 1							Δ	22	22					
22						k								
24 -							$\langle $							
25 -						K	4							
26 -					6	м	XI	ss	21	23				
END OF BORING	<u></u>					<u> </u> {	+							[
Easting=552398.6														
DEPTH: DRILLING METHOD	Ţ		WATER	I EVEL ME]
A 01/1 - 2 25" Trai	DATE	TIME	SAMPLE	D CASING	CAVE		DR	ILINO	, ,	WATED	NC	DTE: F	REFER	то
<u> </u>	6/25/07	8:15	DEPTH	DEPTH	DEPT	H F	LŨÌ	DIEV	EL	LEVEL		HE AT	TACHI	ED
	6/25/07	8:20	<u> </u>	- 4.5 7.0	3.5					None		PLAN	TUR /	
BORING COMPLETED: 6/25/07					/.0					0.0	TEF	2 MINC	LOGY	ON
DR: SG LG: SB Rig: 91C										·		THIS	LOG	



SUBSURFACE BORING LOG

AET JO	OB NO: 22-00081						LC	G OF	во	RING N	10	ST	-44	(p. 1	of 1	
PROJE	CT: TCAAP Rede	evelopme	ent; Ard	en Hi	ills, I	MN										
DEPTH	SURFACE ELEVATION: _	888.6			GE	OLOGY	N	MC	SA	MPLE	REC	FIELD) & LA	BORA	FORY 1	TESTS
FEET	MATERIAL	DESCRIPTIO	ON	<u> </u>				IVIC		TYPE	IN.	wc	DEN		PL	%-# 200
1 -	FILL, mixture of sand wit a little gravel, trace roots, plastic and concrete, brow	h silt and cl surface roo n and dark	layey sand, ts, pieces o brown	f	FILI	L	5	М	M	SS	16	9 13				
3 -	SANDY LEAN CLAY, a brown mottled, firm, lami (CL)	little grave nations of s	l, gray and silty sand		TILI	L	8	м	\mathbb{N}	SS	7	16				
5 -	SANDY LEAN CLAY, a brown, a little brown, stiff	little grave , lamination	l, grayish ns of silty				11	м	K	SS	19	17				
7 -	SANDY LEAN CLAY, a	little grave	l, dark gray	, ///			0	м	R		10	15		-		
8 – 9 –	(CL)	110115 01 511	ty sand				9	111	\ ₽	33	10	15				
10 — 11 —							10	М	X	SS	16	16				
12 - 13 -	SANDY LEAN CLAY, a firm to stiff (CL)	little grave	l, dark gray	, ///			9	M	X	SS	3	17				
14 -									स्रि			·				
15 -							8	м	M	SS	21	15				
16									Å							
									ł							
10									ł							
20 -									Ľ							
21							9	М	X	SS	21	14			[
22									2							
23 -									3							
24 —									3							
25 -									∇	66	200	15				
26 -							11	IVI	Λ	50	20	15				
	END OF BORING Northing=211684.3 Easting=552896.6															
DEPT	TH: DRILLING METHOD			WATI	ERLE	EVEL MEA	SURE	EMEN	TS					NOTE:	REFE	R TO
0-24	1%' 3.25" HSA	DATE	TIME	SAMPI DEPT	LED TH	CASING DEPTH	CAV DE	/E-IN PTH] FL	DRILLI UID LE	NG VEL	WAT LEVI	ER EL	THE A	TTAC	HED
		6/22/07	11:45	26.5	5	24.5	20	6.5				Nor	e	SHEE	FS FOF	R AN
]	EXPLA	NATIC	ON OF
COMPL	ETED: 6/22/07]1	TERMIN	10LOC	BY ON
DR: SG	G LG: SB Rig: 91C													TH	n2 fo	t

Brau	n Proj	ect S	P-00	6-058	871				BORING	: S	T-4	5]	RI-3008	-18
Geote TCAA NE of Arden	enical E P Rede Highwa Hills, N	valua velopi vy 10 a /linne	tion ment and J sota	t Highv	vay 96				LOCATI attached	ON: 1 sketch	V: 211)	681.8	30, E: 55339	9.700 Se
ORILLI	ER: K.	Keck			METHOD	3 1/4"	HSA, Autohi	nr	DATE:	7/	18/07		SCALE:	1'' = 4
Elev. feet 892.4	Depth feet 0.0	AST Sym	"M bol		(Descripti ASTM D	on of Mater 2488 or D24	ials 187)		BPF	WL		Tests or	Notes
888.4	4.0	FILL		FILL	.: Sity Sand rel, moist.	nd, trace	of Roots, br	own to dar	01 - - k gray. 	₩ 26		Fuel	Odor	
<u>885.4</u> 883 9	7.0	FILL		FILI dens	.: Silty Sand e.	, fine-gra	ined, waterł	earing, me	dium _	12	ĮΫ			
000.9	0.5		XXX	END) OF BORIN	G. (Per T	etra Tech).			1				
				Wate	er observed a	t 6 1/2 fe	et while dril	ling.			:			
			-	Bori	ng then grou	ted.			-					
									-					
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										11				

SP-06-05871

Brau	n Proj	ect SP-	06-05	871		BORING	:		ST-46	
Geote TCAA NE of Arden	cnical E P Rede Highwa Hills, N	valuatio velopme vy 10 and Ainnesol	n nt 1 Highv a	way 96		LOCATIC attached s	DN: N ketch.	: 211683	3.156, E: 55389	97.273 Se
DRILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr		DATE:	7/1	1/07	SCALE:	1"=4
Elev. feet 895.4	Depth feet 0.0	ASTM Symbol		Description of Materials (ASTM D2488 or D2487	,)		BPF	WL	Tests or	Notes
894.4	1.0	FILL	FILI	.: Silty Sand, trace of Roots, dark br	own, m	oist.				
883.4	12.0	FILL	FILI Grav brow	2: Silty Sand, fine- to medium-graine vel with Wood fragments at 8' sample on to gray moist to wet.	rd, trace	of reddish	12 14 5 2	Σ		
		PT 4 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2		T, dark gray, wet. (Swamp Deposit)			3			
873.4	22.0	2 <u>2</u>	4							
869.4	26.0	ST- SM	END Wate Borir	OF BORING. r observed at 11 feet while drilling.	ne- to ense.		11			



SUBSURFACE BORING LOG

AET JO	DB NO: 22-00081					L	DG OF	F BC	RING N	10.	ST	-47	(p. 1	of 1	
PROJE	CT: TCAAP Rec	levelopn	nent; Ar	den Hi	ills, MN	-				••••					
DEPTH IN FEET	SURFACE ELEVATION: MATERIA	893 L DESCRIP	.3 FION		GEOLOGY	N	мс	S/	AMPLE TYPE	REC IN.	FIELI	D&LA	BORA	TORY	TESTS
I –	SAND WITH SILT, sur fine grained, brown, a lit very loose (SP-SM) (nos	face roots, tle dark brossible fill)	trace roots own, moist	, /	COARSE ALLUVIUM OR FILL	4	M	M	SS	13					10-72
2 - 3 -	SAND WITH SILT, trac light brown and brown m (SP-SM) (possible fill)	e roots, fin ottled, mo	e grained, ist, very lo	ose		7	M	$\left \right\rangle$	SS	15					
4	SAND WITH SILT, trac light brown and brown m	e roots, fin ottled, mo	e grained, ist, loose,		COARSE ALLUVIUM			R							
6 7	(possible fill) SILTY SAND, fine grain	ied, brown	, moist, loc	se		8	M	X म	SS	17					
8	SAND WITH SILT, fine brown, a little brown mot	grained, li tled, moist	ght grayisł , loose			10	М	M	SS	16					
10 -	SAND WITH SILT, trace light grayish brown, a litt	e roots, fin le brown. 1	e grained, noist, loos	/ e,		9	м	R	SS	17					
12	SAND WITH SILT, fine	(SP-SM) grained, li	oht oravish				Ŷ	Д		17					
13 -	brown, waterbearing, loos	se to dense	(SP-SM)					Ń	60	16					
14 —						9		Д	22	16					
15 -								Н							
16 -						11	М	X	SS	15					
17 -								٦,							
18 -) I	l						
19 -								$\left \right\rangle$			1				
20 -								\forall							
21 -						41	M	X	SS	18					
22 -							ĺ	7							
23 - 5	SAND WITH SILT, a littl	e gravel fi	ine orained					\rangle							
24 - 8	gray, waterbearing, loose ((SP-SM)	B	'				$\left \right $							
25 + 6	CLAYEY SAND, a little	ravel, grav	v. stiff (SC		FFF T			$\overline{\mathbf{N}}$							
26 -	······································					10	M	Ň	SS	18	17				
N E	END OF BORING Northing=211436.0 Easting=550652.0				<u>nu , nu</u>										
DEPTH	: DRILLING METHOD	· · · ·		WATE											
0.1414	2.459.476	DATE	TIME	SAMPLE	D CASING	CAVI	E-IN	S DI	RILLING	GI	WATER	N	OTE: 1	REFEF	ιтο
U-14%	<u>3.25" HSA</u> BDw/DM	6/19/07	10.20	DEPTH	DEPTH	DEP	TH	FĹŰ	ID LËV	EL	LEVEL		HE AT	TACE	ED
		6/19/07	10:30	14.0	12.0	12.	1 5				None		OLEEL (DI AN	S FUR	
ORING COMPLET	'ED: 6/19/07			10.5	14.0	14.	3				14.4		RMIN	DLOG'	YON
R: SG	LG: SB Rig: 91C											_	THIS	SLOG	
	·····														

	BRA	AUN	ы 514 С						L) G (OF BORING
	INTE	RTEC	_								
	Brau	n Proj	ect S	SP-0	6-05871	BORING	:		S	T-48	
	Geote	cnical F	Evalua	ation	t	LOCATIO	DN: N	2114	431.9	25, E: :	550895.208 See
	NE of	Highwa	ay 10	and	Highway 96	attached s	ketch.				
	Arden	Hills, I	Minn	esota	· · · · · · · · · · · · · · · · · · ·						
	DRILLI	ER: K.	. Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	1/07	1	SCAL	LE: 1'' = 4'
	feet 890.9	feet 0.0	AS Svn	TM nbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC	P200	Tests or Notes
			FILL	-	FILL: Silty Sand, trace of Roots and concrete de	bris, dark					
	889.4	1.5	SP-	- 💥	POORLY GRADED SAND with SILT fine-grai	ined				-	
	-		SM		orange-brown to light brown, moist, losse.	incu, _	M 5			****	
	-				(Lacustinic)	_	Å,				
S)							8 🕅				
ation			1			_					
brev	_						M 10				
of ac	_						H T				
lation											
xplar	879.9	11.0					M 10	Ω			
t tor e	-		SP- SM		POORLY GRADED SAND with SILT, fine-grait brown to gray, waterbearing, very loose to loose.	ined,		-			
sheet	_				(Lacustrine)	_	M 6		ļ		
vgolo	-					_					
	_										
ve Le	-					_	M 4		22		
ndiro	-					_					
e Des	872.9	18.0	SM		ON TV CANTS for an inclusion in the				-		
ē.	-				waterbearing, medium dense.	ay, –					
4:45	_				(Lacustrine)		M Q				
1/0/7/	-					_	Å				
						_					
9'NNY						_					
Na Na						_					
5.1780	-						M 14				
21.060	864.9	26.0			END OF BORING.		M .				
				ŀ	Water observed at 11 feet while drilling						
					Boring then grouted	_					
<u>-</u>	ł				Sonng men grouten.	_					
	—										
						-					

SP-06-05871

BRA	NUN	54										L	DG	OF BC)RIN(
INTE	RTEC	-													
Brau	n Proj	ect S	P-06	6-058	371			BORI	NG:			S	T-5	0	
Geote	cnical E P Rede	valua velopi	tion ment	ŀ				LOCA	TIO	N: N	211	197.7	79, E:	550740.04	1 See
NE of	Highwa	iy 10 a	and I	Highv	vay 96			attach	ed sk	etch.					
Arden	Hills, N	Ainne	sota												
DRILLI	ЕR: К.	Keck			METHOD:	3 1/4" HSA, Au	tohmr	DATE	3:	6/2	2/07		SCA	LE: 1	" = 4'
Elev. feet 882.8	Depth feet 0.0	AST Sym	FM bol		D (A	escription of Ma STM D2488 or	aterials D2487)		-	BPF	WL	MC %	P200 %	Tests o	r Notes
881.8	1.0	FILL	\bigotimes	FILL Root	.: Silty Sand, s. dark brown	very fine- to fine . moist.	e-grained, trace	e of							
		FILL		FILL	.: Clayey San	d, asphalt and co	oncrete debris,	trace of							
				ROOI	s, dark gray, n	noist.				15		8	16	0C = 2%	
878.8	4.0								μ	15			10	00 270	
		FILL		FILL	: Poorly Grad	led Sand with Si	lt, very fine- to	0							
_				nne-	grained, brow	n, moist.				11					
- 0750	7 0								-						
073.0	7.0	SM		SILT	Y SAND, slig	ghtly Organic, da	irk gray, wet, v	very							
-				loose	2.	(Swamp Depo	sit)		-10	3					
-						(Shanp Depe	,		-						
								-		2		30	34	OC = 4	
-									_Å	2	ĮΫ	39	54	LL = 34	
870.8	12.0			0.127	DUIDING		1							PI = 1	
-		CL		SAN soft t	DY LEAN CI o rather stiff.	LAY, trace of Gi	avel, gray, we	t, rather	_ <u>_</u> 7	4					
-						(Glacial Till)								
_															
									X	10					
-															
-	l														
										5					
									-4						
	ŀ														
-										-					
856.8	26.0			T. T. T.	OFFOR					/					
				END	OF BORING.										
ĺ				Water	r observed at 1	1 feet while dri	lling.								
				Borin	g then grouted	1.									
								-							
P-06-05871		<u> </u>		· .		Prove Inter					ļ		<u> </u>	. CTT 70	

BR	AUN	544 2								L	DG	OF BO	RING
INTE	RTEC	-											
Brau	ın Proj	ect SP-()6-05	871			BORING	:		S	T-5	1	
Geote	ecnical E AP Rede	valuation	n nt				LOCATIO	DN: N	: 211	184.2	41, E:	550897.404	1 See
NE of	f Highwa	ay 10 and	Highv	vay 96			attached s	ketch.					
Arde	n Hills, N 	Ainnesot	a										
DRILL	ER: K.	Keck		METHOD:	3 I/4" HSA, Autohm	r	DATE:	6/2	1/07	 	SCA	LE: 1'	'=4'
Elev. feet 881.2	Depth feet 0.0	ASTM Symbol		De (AS	scription of Materia	ils 87)		BPF	WL	MC %	P200 %	Tests or	Notes
880.4	0.8	FILL		.: Silty Sand, v ts. dark brown	ery fine- to fine-gra	ined, trace	e of						
		FILL	FILI	.: Silty Sand, v	ery fine- to fine-gra	ined, mixe	ed dark						
			brov	/n to brown, mo	51st.		-	Й я					
			X					A Č					
			8 8										
2			8					2		13	15	OC = 2%	
1011 874.2	7.0		X										
previ		SM	SILT	Y SAND, fine-	grained, trace of fit	ers, dark	gray,	V 3		28	17	$\Omega C = 3$	
01 20			in more	, very 10030.	(Swamp Deposit)			Δ				00 5	
							_		<u>-</u> ¥				
plan:								₫ 4					
ତ୍ର ବି 869.2	12.0						_						
licet		SM	SIL	ΓΥ SAND, fine	-grained, dark gray,	waterbea	ring,	V 5				•	
1			10050	·•	(Lacustrine)		_	Ă					
1 cu								5					
864.2	17.0												
		CL	SAN	DY LEAN CLA	AY, trace of Gravel,	gray, wet	t,						
			nicui	u	(Glacial Till)								
+:+								6					
1													
-													
855 2	26.0							6					
5	20.0		END	OF BORING.				1					
-			Wate	r observed at 9	feet while drilling.								
			Borin	g then grouted.									
							-						
-							-						
SP-06-05871			L. Notice to the		Braun Intertec Co	moration		<u> </u>	I		I	ST-51	page 1 of 1

21-21 page 1 of 1



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081				-		LC	G OF	BO	RING N	10	ST	-52	(p. 1	of 1)
РROЛ	ECT: TCAAP Red	evelopm	ent; Ard	en Hi	ills	, MN										
DEPTH	SURFACE ELEVATION: .	885.9)		6	GEOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORA	FORY '	TESTS
FËËT	MATERIAL	DESCRIPT	ION					MIC			IN.	wc	DEN	LL	PL	%-# 20
1-	4.5" Bituminous Pavemen	nt and and sil	ty sand wit	<u>ь</u> /—	FI	LL	10		$\overline{\mathbb{M}}$	50	10	10				
2 -	gravel, trace roots, brown	and light t	prownish				12	м	Д	22	12					
3 -	FILL, mixture of sand, sil	ty sand and	d clayey	-			18	м	M	SS	19					
4 -	sand, a little gravel, piece	s of wood a	at about 5',						Д							
5 -		.,							H							
6 -							41	м	X	SS	19					
7 -								$ \overline{\Delta} $	8							
8							14	w	M	SS	17					
9 -									Д							
10 -									\sum							
11 -							16	T	Ŵ	SS	17					
12 -	SAND WITH SILT. fine	grained or	av a little			ARSE			P							
13	black, waterbearing, very	loose, lami	inations of		AL	LUVIUM	4	w	X	SS	14					
14 —	CLAYEY SAND, a little	gravel, dar	k gray, soft		TI	LL			H			19				
15 —	(SC)	little brow	n coft						M	66	10					
16	laminations of silty sand (SC)	n, son,				4	NI	M	35	19	20				
17 –									2							
18 -	SANDY LEAN CLAY, a	little grave	l, gray, soft						21							
19 –	to firm (CL)	_							2							
20 –							4	м	М	SS	19	20				
21	~								Д	00	17	20				
22 -									Kł							
23 -						1			$\langle \langle$							
24									Ц							
25 -							7	м	XI	SS	17	19				
20 -	END OF BORING					····			Д							
	Northing=211278.6											Ī				
	Lasting=551665.8															
DEPT	TH: DRILLING METHOD			WATE	ER L	EVEL MEA	SURE	MENI	rs				1	NOTE:	REFE	R TO
0-14	½' 3.25" HSA	DATE	TIME	SAMPL DEPT	ED H	CASING DEPTH	CAV DEF	E-IN TH	E FLI	RILLIN JID LE	IG VEL	WATE		THE A'	ITACI	ED
14½'-24	½' RD w/DM	6/21/07	10:45	14.0		12.0	12	.4				10.9	,	SHEET	S FOR	AN
סטפענ	3												E	XPLAN	JATIO	N OF
COMPL	ETED: 6/21/07												Т	ERMIN	OLOG	Y ON
DR: SG	LG: SB Rig: 91C	L								. <u> </u>				TH	S LOG	i



SUBSURFACE BORING LOG

AET JO	DB NO: 22-00081					L	og of	во	RINGN	10	ST	-53	(p. 1	of 1)
PROJE	CT: TCAAP Red	levelopn	nent; Arc	len Hi	lls, MN	•1									
DEPTH IN	SURFACE ELEVATION:	885.	5		GEOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORA	TORY	TESTS
FEET	MATERIA	L DESCRIPT	TION				WIC		ГҮРЕ	IN,	wc	DEN	LL	PL	%-# 2(
1 -	FILL, mostly sand with s roots, trace roots, dark br	silt, with gr rown and b	avel, surfac rown	e	FILL	13	м	М	SS	12					
2 -	FILL minture of alle		7 1.1 11.					Δ	00						
3	trace roots, brown, light	nd and sand brown, a lif	d with slit,			9	м	М	SS	13		:			
4								Д							
5 -								$\prod_{i=1}^{n}$							
6 -						16	M	Ŵ	SS	8					
7-	SILTY SAND, fine grain	ed, brown,	moist to	- 1	COARSE	-		म							
8	about 9.5', then wet, med laminations of sand with	ium dense, silt (SM)	lenses and		ALLUVIUM	21	W/M	ιXI	SS	17					
9 -		ont (0111)						R							
10 -						18		M	22	10					
								Д	50	17					
12	CLAYEY SAND, a little	gravel, bro	wnish gray	, ///	TILL	-		M			-				
						6	M	Ň	SS	24	19				
15 -	SANDY LEAN CLAY, a	little grave	el, brownisl					Д							
16	gray, stiff (CL)	0				13	м	XI	ss	23	19				
17 —								Н							
18 -								\mathbb{S}^{1}							
19 -								\mathbb{S}^{1}							
20 -								\mathcal{H}							
21 -						10	М	Ň	SS	21	16				
22 -								7							
23 -								$\left \right $							
24 -								2]							
25 -						12	м	M	88	24	17				
26 -	END OF BORING					12		Д	55	24	17				
. 1	Northing=211190.3														
	casting=551897.8												·		
DEPTH	: DRILLING METHOD		,	WATE	R LEVEL MEA	SURE	MENT	`S	E,	· · ·	<u></u>	<u>ו</u> א	OTE:	REFER	2 TO
0-91/2	' 3.25" HSA	DATE	TIME	SAMPLE DEPTH	D CASING DEPTH	CAVI DEP	E-IN TH	D] FLU	RILLIN	G ÆL	WATE	R	HE AT	TACH	ED,
91/2'-241/2	' RD w/DM	6/21/07	1:00	11.5	9.5	10.	.6				10.3		HEET	5 FOR	AN
BORING	·····											E	CPLAN	ATIO	N OF
<u>ČŎMPLE</u>	TED: 6/21/07			-								TE	RMIN	DLOG	Y ON
DR: SG 6/04	LG: SB Rig: 91C	i											THI	SLOG	



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081						LC)G OF	BO	RING N	10	ST	-54	(p. 1	of 1)
PROJ	ECT: TCAAP Red	evelopm	ent; Ard	en Hi	ills,	MN								_		
DEPTH	SURFACE ELEVATION: _	888.9)		GI	EOLOGY	N		SA	MPLE	REC	FIELI)&L	ABORA	TORY	TESTS
FEET	MATERIAL	DESCRIPTI	ON							TYPE	IN.	wc	DEI	1 LL	PL.	%-# 200
1 -	 FILL, mixture of silty san little gravel, trace roots, d 	id and claye ark brown :	ey sand, a and brown,		FIL	L	18	м	M	SS	16					
2 -	pieces of brick								Д							
3 -	-						56	w/M	X	SS	1	19				
4 -	1								Д							
5 -	CLAYEY SAND, brown	and gray m	nottled, very		WE	ATHERED L		way	Ň	00	17					
6	(SC)			J HII	TIL	L	4	W/M	\wedge	22	17	22				
7 -	SANDY LEAN CLAY, a to stiff (CL)	little grave	el, gray, sof						R							
8 -							5	M	X	SS	19	18				
9 -									म							
10 -	4						15	м	M	SS	19	16				
11 -									Д							
12 -								$\left \right\rangle$			17					
13 -						8	M	Ň	SS	24	1,					
14 -						1		\square				:				
16 -							9	М	X	SS	23	14				
17									\mathbb{R}							
18 —									\mathbb{S}							:
19 -									$\left \right\rangle$							
20 -			-						М	:		10				
21 -							10	M	Ň	SS	24	17				
22 –									2							
23 —									$\left \right\rangle$							
24 —									2							
25 -		·					10	м	M	SS	24	16				
26 -	END OF BODING				1		-		Д							
	Northing=211160.7															
	Easung=002421.7															
DEP	TH: DRILLING METHOD			WATE	ER LE	EVEL MEA	SURE	MEN	FS		.			NOTE	REFE	R TO
0-24	1½' 3.25" HSA	DATE	TIME	SAMPL DEPT	ED H	CASING DEPTH	CAV DEI	E-IN TH	L FL	ORILLIN UID LE	JG VEL	WATE LEVE	ER L	THE A	TTAC	HED
		9:30	9.0		7.0	8	.5				Non	e	SHEE	TS FOF	AN	
BORING	3												EXPLA	NATIC	N OF	
DR: SC	EIED: 0/25/07 LG: SB Rig: 91C									•••				T	IIS LOC	J J



SUBSURFACE BORING LOG

AET J	IOB NO: 22-00081		. <u> </u>		· · · · · · · · · · · · · · · · · · ·	LC	DG OF	BO	RINGN	10.	ST	-55	(p. 1	of 1)
PROJ	ECT: TCAAP Red	evelopm	ent; Arc	len Hi	ills, MN										
DEPTH	SURFACE ELEVATION:	892.4	<u>ا</u>		GEOLOGY	N		SA	MPLE	REC	FIELI)&L	ABORA	TORY	TESTS
FEET	MATERIAL	DESCRIPT	ION				MC		ГҮРЕ	ÎÑ.	wc	DEN	I LL	PL	%-#20 0
1 -	 FILL, mixture of clayey s little gravel, trace roots, p brown, gray and black 	sand and sil bieces of bit	ty sand, a tuminous,		FILL	12	м	M	SS	13	10				
2 -	SANDY LEAN CLAY, a	a little grave	el, gray and silty sand		WEATHEREI			\square	00		10				
4 -	and silt (CL)		Sitty Saild			'		A	55	14	18				
5 -	SANDY LEAN CLAY, a brownish gray, a little bro	wn, stiff to	el, light very stiff,		TILL	9	м	M	SS	22	17				
7 -		(CL)						R							
8 -						16	м	M	SS	22	16				
9 -	SANDY LEAN CLAY	little grave	dark gro					R							
11	a little brown, stiff to firm sand (CL)	, laminatio	ns of silty	,		14	м	X	SS	18	16				
12 -								E							
13					11	м	X	SS	20	16					
14 —							R			10					
15 —						10	м	Μ	SS	21	17				
16 ~ 17 _								Д			- /				
17								H							
19 -								Ħ							
20 -								M							
21 –						8	М	Ŵ	SS	19	15				
22 –															
23 –								抖							
24 -								뙵							
25 -						13	м	M	ss	24	15				
20 7	END OF BORING						[]					<u> </u>			
	Northin=211171.6 Easting=552889.1														
DEPT	TH: DRILLING METHOD		WATE	R LEVEL MEA	SURE	MEN	rs	i		<u></u>	L	NOTE	REFE	 2 TO	
0-24	'½' 3.25" HSA	TIME	SAMPL DEPT	ED CASING H DEPTH	CAV DEF	E-IN TH	D FLI	RILLIN JID LE	IG VEL	WATE LEVE	IR L	THE A	TTAC	ED	
		11:00	26.5	24.5	25	.0				Non	e	SHEET	'S FOR	AN	
BORING											H	EXPLAN	VATIO	N OF	
COMPL	ETED: 6/22/07											T	ERMIN	OLOG	Y ON
DR: SG	LG: SB Rig: 91C												TH	IS LOG	



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AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET J	OB NO: 22-00081					LC	G OF	BO	RING N	io	ST	-57 ((p. 1	of 2)
PROJE	ECT: TCAAP Rede	velopme	nt; Ard	en Hill	s, MN										
DEPTH	SURFACE ELEVATION: _	893.6			GEOLOGY	м	NC	SA	MPLE	REC	FIELI) & LA	BORAT	TORY '	TESTS
FEET	MATERIAL	DESCRIPTIC)N				MC	L I	YPE	IN.	wc	DEN	LL	PL	%-# 200
	4.25" Bituminous Paveme	nt hallt and all	ter and	_/ F	ILL		м	採	S 11						
1-	light brown and brown	n sin and si	ity sanu,				101	Ľ	50						
2 -						(7	M	Μ	66	10		1			
						0/		Μ	33	10					
4 -								图							
5 -						44	М	IXI	SS	18					
6 -	FILL mixture of cand with	h eilt and ei	Ity sand a					H							
7 -	little gravel, brown, dark b	prownish gra	ay and					\square	~~				1		
8~	black					64	M	M	88	23					
9 -								团							
10 -	1					78	М	IXI	SS	17					
11 -								Д							
12 -	- - -					ŀ		\square							
13 -						5	M	Ŵ	SS	14					
14	-							\mathbf{E}							
15 -						12	м	M	SS	17					
16 -								Д							
17 –	-							М							
18 -						38	W/M	٩X	SS	19					
19 -	-							R				ł			
20 —						14	М	M	SS	17					
21 -								Д							
22 –	SAND WITH SILT, trace	roots, fine	grained,		TOPSOIL OR		T	K							
23 –	brownish gray, a little blac	ck, waterbea	aring,		COARSE ALLUVIUM	19	W/M	٩X	SS	19					
24	(SP-SM)	or organit	5 311L		COARSE	1		R							
25 -	SAND, fine grained, brow	nish gray,	f fine to			14	w	M	66	22					
26 -	medium grained sand (SP))			TILL	14	**	Δ	33		15				
27 –	SANDY LEAN CLAY, a grav. stiff (CL)	little gravel	l, brownisł	1				$\sum_{i=1}^{n}$							
- 28 -								$\left \right\rangle$							
				WATE])_ TC		<u> </u>		<u> </u>	<u> </u>	<u> </u>	
DEP	TH: DRILLING METHOD			SAMPLE	D CASING	CA	VE-IN			NG	WAT	ER	NOTE:	REFI	RTO
0-2	<u>4½' 3.25" HSA</u>	DATE	TIME	DEPTH	I DEPTH	DI	EPTH	FL	UD LI	EVEL	LEV	EL	INE A	ALIAC	HED
241/2'-2	9½' RD w/DM	6/19/07	12:15	24.0	22.0		2.4	-			Noi	ne	anee EXPLA	NATIO	N OF
BORIN	NG	6/19/07	12:20	26.5	24.5	<u> 2</u>	4.1	-			22.	י <mark>ן כ</mark>	ERMI	NOLO	GY ON
COMP	LETED: 6/19/07	· ·	· · ·					+					Tŀ	IIS LO	G
DR: S 06/04	G LO: SB Rig: 91U		<u> </u>			.l						<u> </u>			<u>.</u>



SUBSURFACE BORING LOG

TCAAP Redevelopment; Arden Hills, MN DEPTH NATERIAL DESCRIPTION GBOLOGY N MC SAMPLE REST FIELD & LABORATORY 30 - 31 - gray, stiff (CL) (continued) 9 M X SS 24 15 - 8 FED OF BORING Northing=211018.6 FED OF BORING - - - - 9 M X SS 24 15 - - 9 M K K <td< th=""><th>AET JO</th><th>OB NO:</th><th>22-00081</th><th></th><th></th><th></th><th>LO</th><th>G OF</th><th>BOI</th><th>RING N</th><th>0</th><th>ST</th><th>-57 (</th><th><u>р. 2</u></th><th>of 2)</th><th><u> </u></th></td<>	AET JO	OB NO:	22-00081				LO	G OF	BOI	RING N	0	ST	-57 (<u>р. 2</u>	of 2)	<u> </u>
DEPTH PET MATERIAL DESCRIPTION GEOLOGY N MC SAMPLE TYPE REC N FIED & LABORATORY 30 - 31 - 31 - 31 - gray, stift (CL) (continued) III I Softing=211018.6 Easting=550730.8 III I Softing=21018.6	PROJE	ECT:	TCAAP Redevelop	<u>ment; Arden</u>	Hi	lls, MN							·			
FET MATERIAL DESCRIPTION IN IN WC DEN LL PL 30 - 31 - 31 - 31 - SANDY LEAN CLAY, a liftle gravel, brownish and the second state of the second	DEPTH					GEOLOGY	N	MC	SA	MPLE	REC	FIELD	& LAI	JORA T	ORY 1	TESTS
SANDY LEAN CLAY, a little gravel, brownish gray, stiff (CL) (continued) 31 - END OF BORING Northing=211018.6 Easting=550730.8 S8 24 15 I I I I I I I I I I I I I I I I I I I	FEET		MATERIAL DESCRI	TION			11	MC	r T	YPE	IN.	WC	DEN	LL	PL	%-#200
31 - RN OF BORING Northing=211018.6 Easting=550730.8	30	SANI gray, s	OY LEAN CLAY, a little gra stiff (CL) <i>(continued)</i>	avel, brownish		TILL (continued)	9	м	Ý	SS	24	15				
END OF BORING Norhing=211018.6 Easting=550730.8	31 -	l							Д							
	31 —	END Northi Eastin	OF BORING ing=211018.6 g=550730.8				2				24	1.5				
															- - -	



SUBSURFACE BORING LOG

AET J	OB NO:	22-00081		LC	OG OF	во	RING N	10	ST	-59	(p. 1	<u>of 1</u>					
PROJ	ECT:	TCAAP Rede	evelopme	ent; Ard	en Hi	ills,	MN										
DEPTH	SUR	FACE ELEVATION: _	884.4			G	EOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORAT	ORY	TESTS
FÉÉT		MATERIAL	DESCRIPTIO	NC					MC		TYPE	IN.	wc	DEN	LL	PL	%-# 200
1 -	FILL, bitum dark b	mostly silty sand, a inous, surface roots, rown	little grave trace roots	l, pieces of , brown an	d	FIL	L.	10	м	M	SS	14					
2 -	FILL, little g	mixture of sand with ravel, trace roots, br	h silt and si rown and da	lty sand, a ark brown				26	м	\mathbb{N}	SS	16					
4 -										Ы							
5	-							28	м	X	SS	19					
7 -	-									R							
8 -	- ·							23	м	X	SS	17					
9 10	FILL, trace r	mixture of organic of organic of organic of organic of the second	clay and sil	ty sand,						R			17				
11	IEAN	CLAN WITH ODG					DEOIL	13	М	X	SS	17					
12 -	black,	a little gray, stiff, la	minations of	of sand			ARSE	-	T	Þ			24				
13 -	SAND	, fine grained, light earing, medium den	gray,			LUVIUM	11	W	Ň	SS	17						
15 -	SANE gray, a), a little gravel, fine little black, waterbo		••••		4	w	\bigwedge	SS	16							
16 17	Jammia	cions of organic sit	(51)			•				$\sum_{i=1}^{n}$							
18 —	SAND	WITH SILT, fine g	grained, lig	ht brownisl	h					$\left \right\rangle$							
19 - 20	gray, v	vaterbearing, dense	(SP-SM)			•				Ц							
20								37	w	X	SS	18					
22 -							·			$\left[\right]$							
23 -	SILTY	SAND, fine graine	d, light bro	wnish gray		•				$\left \right\rangle$							
24 -	wet, de	ense (SM)	, , ,	<i>6</i> 7						Ц							
25 -								31	w	M	SS	18					
26 -	END Northi	OF BORING 19=210936 8															
	Easting	g=550917.0															
DEP	TH: D	RILLING METHOD		WATI	ER L	EVEL MEA	SURE	EMEN	TS					NOTE:	REFE	R TO	
0-14	4½' <u>3</u> .	<u>25" HSA</u>	TIME	SAMPI DEPT	.ED H	CASING DEPTH	CAV DE	YE-IN PTH	I FL	DRILLI UID LE	NG VEL	WATI LEVE	ER EL	THE A	TTAC	HED	
14½'-20	01/2' R	D w/DM	1:40	14.(0	12.0	12	2.2				12.		SHEET	S FOF	AN	
BORIN	G									-				1	EXPLA TERMIN	NATIC	IN OF
DR: SC	ETED: G LG:	0/19/07 SB Rig: 91C												'	TH	IS LOC	3



SUBSURFACE BORING LOG

AET JO	DB NO: <u>22-00081</u>									NO	ст	60	(m ·		1)
PROJE	ст: <u>ТСААР R</u>	edevelop	<u>ment; A</u>	<u>rden Hi</u>	<u>lls, MN</u>			л <u>Б</u>		NU		-00	<u>(p.</u>		1)
DEPTH IN	SURFACE ELEVATION	N:88;	3.9		GEOLOG	v				DEC	FIELI	D&LA	BORA	TORY	TE
FEET	MATERI	AL DESCRI	PTION		020200		M	c	TYPE	IN.	wc	DEN	LL	PL	10-
1 –	FILL, mixture of silty s organic silt, a little grav	sand, sandy /el, trace ro	silt and ots, brown		FILL									+	- f
2 -	dark brown and black		·····	·) M	ı X	SS	14					
3 –	clayey sand, a little gra	with silt, sil vel, organic	ty sand and clay, trace						1						
4	roots, brown, a little lig	ht brown a	nd black			16	M		SS	14					
5 - 6 -						4	W/N	м	SS	14					
7 -								ि स							
8 -						3		' [[]	SS	14					
10 -								R							
11 -						5	w	X	SS	17					
12 – 13 –								Þ							
14	SADDIC DEAT 11. 1. 1			_		13	W	M	SS	12					
15 -	waterbearing sand (PT)	aminations	of	see g See I	SWAMP DEPOSIT	7		Ħ						-	
16 -						WH	W	X	SS	19	48				
17 - S	SAND, fine grained, gra waterbearing, medium de	y to browni ense (SP)	sh gray,					Б							
18 -	0, 10, 10, 10, 10, 10, 10, 10, 10, 10, 1	(01)				12	w	M	ss	16					
20 -								Ы							
21 -						22	W	M	SS	19					
22 -								Ы							
23 -															
24 –								$\left \right\rangle$							
25 -						28	w	\square	99	21					
26 -	ND OD DODDOD	<u>.</u>						Д	33	21					
N N	orthing=210929.3												-+		
	asting=551151.1												ĺ		
DEPTH:	DRILLING METHOD	<u> </u>		WATER	LEVEL MEA	SURE	VENT	<u> </u>				L			
<u>0-9½'</u>	3.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING	CAVE	-IN		LLING	W N	VATER		TE: R	EFER	TC
2'-241/2'	RD w/DM	6/19/07	2:45	9.0	7.0	7.0)	rLU		<u>비 </u>	None		EETS	FOP	ed an
DINIC	· · · · · · · · · · · · · · · · · · ·	6/19/07	2:50	11.5	9.5	9.6	<u> </u>		<u>. </u>	- -	R D		LAN		-viv EOī
MPLETE	D: 6/19/07									_+	0.0	TER	MINO	LOGY	. or 10 1
: SG :	LG: SB Rig: 91C						$\neg +$		<u></u>	+		-	THIS	LOG	~*



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081						LC)G OF	во	RING N	10.	ST	-61	(p. 1	<u>of 1</u>)
PROЛ	ECT: TCAAP Red	evelopm	ent; Arc	len Hi	lls, MN	I										
DEPTH	SURFACE ELEVATION:	885.9)	,	GEOLO	GY	<u> </u>		SA	MPI F	REC	FIELI) & L/	BORA	TORY	TESTS
FEET	MATERIAL	DESCRIPT	ION		OLOLO		N	MC		TYPE	IN.	wc	DEN	LL	PL	%- #200
, .	5" Bituminous Pavement				FILL				स्रि	SU						
	little gravel, trace roots, b	nd and sand prown and g	l with silt, a gray	L			20	M	Х	SS	14					
2 -			<u> </u>						Ħ							
3 -							32	M	X	SS	17					
4 -									R							
5 -							30	м	М	22	10					
6 -									Δ	55	17					
7 –	CLAYEY SAND, black,	a little gray	, hard,		TOPSOI	<u>ـــــ</u>			R			13				
8 -	laminations of sand with	silt (SC)		-///	COARSE	3	38	м	X	SS	20					
9 –	moist, dense (SM)	ea, ngnt br	ownish gra	y, :::::	ALLUVI	UM		T	F							
10 -	SILTY SAND, fine grain (SM)	ed, gray, w	et, loose				0	- -	\square	00	1.0					
11 -	(5174)						°	W	Μ	22	18					
12 -	SAND WITH SILT, trace	roots fine	grained						R							
13 -	gray, a little black, waterb	earing, me	dium dense	,			12	w	X	SS	14					
14 -	anniations of clayey sam	1 (SF-SIVI)							Ą							
15 —									Ń	~ ~						
16 -								W	Ŵ	SS	10					
17 -									Д							
18 -							10	w	X	SS	15					
19 —	SAND WITH SILT fine	rained or							Ľ1							
20 -	waterbearing, medium der	ise (SP-SM	l)						Ń							
21 -							21	W	Ň	SS	17					
22 –									$\left[\right]$							
23 –									$\left \right\rangle$							
24 -									$\left \right\rangle$							
25 -									М							
26 -							22	W	Ň	SS	15					
	END OF BORING													1		
	Easting=551565.3															
		1										<u> </u>	[
DEPI	TH: DRILLING METHOD		1	WATE	R LEVEL	MEA	SURE	MEN	rs		, 			NOTE:	REFE	r to
0-9	¹ /2' 3.25" HSA	DATE	TIME	DEPTI	H DEP	ING TH	DEP	E-IN TH	FLU	JID LE	VEL	WATE LEVE	L.	THE A	TTACI	ΈD
9½'-24	½' RD w/DM	6/21/07	9:30	11.5	9.	5	9.	7	[9.4		SHEET	'S FOR	AN
BORING	3												E	EXPLAI	OITAN	NOF
COMPL	ÉTED: 6/21/07												T	ERMIN	OLOG	YON
DR: SG	LG: SB Rig: 91C	L		<u> </u>										TH	IS LOG	i I

Brat	in Proj	ect SP-0	6-05871	BORING	:		S	T-6 2	2
Geote TCA NE of Arden	ecnical E AP Rede Highwa 1 Hills, N	valuation velopmen ly 10 and Ainnesots	t Highway 96	LOCATIC attached s	ON: N: sketch.	210	796.3	68, E:	550782.855 Se
DRILL	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	5/07		SCAJ	LE: 1" = 4
Elev. feet	Depth feet	ASTM	Description of Materials		BPF	WL	мс	P200	Tests or No
884.3	0.0	FILL XX	(AS1M D2488 or D2487) FILL: Silty Sand, trace of Roots, dark brown, me	oist.			%	%	
		FILL	FILL: Silty Sand, very fine- to fine-grained, trace Gravel, mixed with Poorly Graded Sand, light brob brown, moist.	e of	18 22 14				
 	12.0	SM	SILTY SAND, fine-grained, trace of Roots, sligh	ntly	7	Σ			
- 870.3	14.0		Organic, dark gray, waterbearing, loose. (Swamp Deposit)		<u> 6</u>		25	17	OC = 2%
 - 866.3	18.0	SP- SM	POORLY GRADED SAND with SILT, fine-grai gray, waterbearing, loose. (Lacustrine)	ned, 	5				
		CL	SANDY LEAN CLAY, trace of Gravel, gray, we medium to rather stiff. (Glacial Till)	:t,			-		
					7				
858.3	26.0		END OF BORING		10				
-			Water observed at 12 feet while drilling.	-					
-			Boring then grouted.	-					

Brau	n Proj	ect SP-0	6-05871	BORING	:		ST-63	
Geote TCAA NE of Arder	cnical E AP Rede [.] Highwa 1 Hills, N	valuation velopmen y 10 and Jinnesota	t Highway 96	LOCATIOn attached s	ON: N sketch.	: 210687	7.940, E: 55063	7.026 S
DRILL	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	5/07	SCALE:	1"=
Elev. feet	Depth feet	ASTM	Description of Materials		BPF	WL	Tests or	Notes
-		FILL	FILL: Poorly Graded Sand with Silt, fine-gra of Gravel, mostly brown mixed with dark bro	ined, trace wn, moist - - - - - -	23 7 17 7 23			
877.1	9.0		POORLY GRADED SAND with SILT fine-	rained	M			
- - 	14.0	SP- SM	POORLY GRADED SAND with SILT, fine- gray, waterbearing, very loose	 grained,	6	Ţ		
	18.0		(Lacustrine)	- 	3			
			soft to rather stiff. (Glacial Till)		5			
-				-	10			
860.1	26.0		END OF BORING. Water observed at 14 feet while drilling.		X 10			
-			Boring then grouted.	. – –				



SUBSURFACE BORING LOG

AET J	JOB NO: 22-00081		LC	G OF	BO	RING N	10	ST	-64	(p. 1	of 1					
PROJ	ECT: TCAAP Red	<u>evelopm</u>	ent; Ard	en Hi	ills	, MN										
DEPTH	SURFACE ELEVATION:	883.5	;		6	FOLOGY			SA	MPLE	REC	FIELI) & LA	BORA	TORY 1	TESTS
FEET	MATERIAL	DESCRIPTI	ON				N	MC	1	TYPE	ÎN.	wc	DEN	LL	PL	%-#200
	2.25" Bituminous Pavem	ent	- 114 1		FI	LL			∇	SU				i i		
	clayey sand, trace roots, b	y sand with brown	siit and	\prod]		7	M	Ň	SS	12					
	FILL, mixture of sand wi	th silt, silty	sand and	-					\square							
	brown, gray and black	i, 010wii, a					12	M	Ŵ	88	16	11				
4 -									ষ্ট							
) - C							32	м	X	SS	19	7		:		
0-									H							
	FILL mixture of silty sar	d and orga	nic clav		-				M							
0	trace roots, brownish gray	and black	ino oluy,				25	м	М	SS	20					
10 -	SAPRIC PEAT, black (P	Г)			SW DE	VAMP POSIT			B							
11 -	SILTY SAND, trace root	s, fine grair	ied, gray		CC	ARSE	3	M	X	SS	14					
12 -	and black, wet very loose silt (SM)	, laminatior	is of organi	c	AL	LUVIUM			E							
13						3	w	M	SS	12						
14 —	-							Д								
15 —	SANDY LEAN CLAY, a	little grave	el, gray, firn	1	ΤI	LL	1		Й							
16 -	to sum, faminations of sar	ia (CL)					6	M	Ň	SS	12	14				
17 –									[D]							
18 -									$\left \right\rangle$							
19									$\left \right\rangle$							
20 -									$\overline{\mathbf{A}}$							
21 -							6	M	Ň	SS	22	16				
22 –									\sum							
23 –									$\left \right\rangle$							
24 -									$\left \right\rangle$							
25 -							10		∇			1.7				
26 -							12	M	\mathbb{N}	55	22	17				
	END OF BORING Northing=210683 3															
	Easting=550895.7															
DEP	TH: DRILLING METHOD		WATE	ER L	EVEL MEA	SURE	ILLLI MEN1	rs	•	-	1	L		ייזישט		
0.0	1/4' 3 75" HSA	TIME	SAMPL	ED H	CASING	CAV	E-IN	Г FT		JG.	WATE	R	THE A	TTACE	HED	
<u>91/2'-24</u>	1/2' RD w/DM	3:35	11.5	5	9.5	10	.9	1.17		* 121	10.2		SHEET	'S FOR	AN	
										•			EXPLAI	VATIO	N OF	
BORINO COMPL	G LETED: 6/20/07											т	ERMIN	OLOG	Y ON	
DR: SG	G LG: SB Rig: 91C													TH	S LOC	



SUBSURFACE BORING LOG

AET JOB NO	22-00081				LC	OG OF	во	RING N	10	ST	-65	(p. 1	of 1)	
PROJECT:	TCAAP Red	evelopm	ent; Arc	len Hi	lls, MN										
DEPTH SI	URFACE ELEVATION: _	886.2	· · · · · · · · · · · · · · · · · · ·		GEOLOGY	N	MC	SA	MPLE	REC	FIELI)&L/	BORA	FORY '	TESTS
FËET	MATERIAL	DESCRIPT	ON				MC]	TYPE	ĪN.	wc	DEN	LL	PL	%-# 200
$1 - \frac{4.5}{FII}$	Bituminous Pavemer	it d sand wit	h silt and	-/	FILL	14		Ŵ	SU	12					
2 - clay ligh	yey sand, with gravel, it brown and gray	trace roots,	dark brow	'n,		14		A	55	13					
$\begin{vmatrix} 3 \\ - \\ 3 \\ - \\ and \\ 4 \\ - \\ lam \end{vmatrix}$	ND WITH SILT, fine brown mottled, moist inations of silty sand (grained, lig , medium c SP-SM)	ht brown lense,		COARSE ALLUVIUM	22	M	X	SS	19					
5 – SAI moi	ND WITH SILT, fine st to waterbearing, me	grained, lig dium dens	ht brown, e (SP-SM)			23	w	X	SS	17					
	ND WITH SILT fine	wainad hr	ounich		:			R							
8 – gray then 9 – sand	, a little black, waterb moist, medium dense (SP-SM)	earing to a , laminatio	bout 9.5', ns of silty			15	М	M	SS	17					
10 -						14	▼ <u>M</u>	X	SS	20					
11 SAN 12 gray	ND WITH SILT, trace and black, moist, meanic silt (SP-SM)	roots, fine dium dense	grained, , lenses of	/				년 문							
13 - SAN $14 - brow$ (SP)	ND, fine grained, gray vn mottled, waterbeari			12	W	Å	SS	19							
15 - SAN 16 - loos	NDY SILT, gray and b e, lenses and lamination		FINE ALLUVIUM	8	м	Ń	SS	17							
17 -			• • • •					2							
18 - CLA 19 - lami	YEY SAND, a little g nations of wet silty sa	gravel, gray nd (SC)	v, stiff,		TILL			ß							
20						9	м	M	85	20	14				
21 - 22 -								A		20					
23 SAN	DY LEAN CLAY, a	little grave	l, gray, stif	f				$\left \right\rangle$							
24 - (CL) 25 -							-	Ц							
. 26 —						13	М	M	SS	19	19				
ENI Nortl Easti	DOF BORING hing=210684.0 ng=551396.3														
DEPTH:	DRILLING METHOD			WATE	R LEVEL ME	L SURE	MEN	LL rs			L				
0-12'	3.25" HSA	DATE	TIME	SAMPL DEPTI	ED CASING 1 DEPTH	CAV	E-IN 'TH	D FL1	RILLIN JID LE	IG VEL	WATE LEVE	IR L	THE A	KEFEI ITACI	ED
12'-24½'	RD w/DM	6/21/07	8:20	14.0	12.0	12	.1				10.0		SHEET	S FOR	AN
POPNIC												E	EXPLAN	JATIO	N OF
COMPLETED:	6/21/07											T	ERMIN	OLOG	Y ON
DR: SG LG	: SB Rig: 91C]										TH	S LOG	



SUBSURFACE BORING LOG

AET JOB NO: 22-00081														
PROJECT: TCAAP R	edevelop	ment; A	Arden Hi	ills, MN	L	OG C	OF BO	ORING 1	NO	ST	<u>-66</u>	<u>(p. 1</u>	<u>of 1</u>)
DEPTH SURFACE ELEVATIO	N- 88	8.9				1							<u> </u>	
FEET MATER	IAL DESCRI	PTION		GEOLOG	Y N	M		AMPLE TYPE	REC	FIEL		BORA	TORY	TESTS
FILL, mostly silty san	d, a little gr	avel, trace		FILL							DEN		PL	%-#200
I - \roots, dark brown			/[20	М	ı IV	ss	19					
2 1122 , mixture of sand	with silt and silt brow	d silty san	d, a				\square							
3 - SILTY SAND, fine gr	ained, brow	n, moist.	<u>wn / : : : :</u>	COARSE ALLUVIU	M		M							
4 - SAND WITH ON T					20	M	Å	SS	18					
$5 \rightarrow brown to brown mottle$	ne grained, d moist m	light grayi edium den	sh 🖂				E							
laminations of silty sar	d (SP-SM)	culum den	30,		15		Μ							
						11/1	Μ	55	12					
⁷ SAND WITH SILT, fi	ne grained.	light brow	nish				2							
8 – gray and brown mottle	l, moist to a	bout 9.5',	then		18	м	М	22	10					
9	dense to loo	se (SP-SN	1)				Μ	55	10					
10 -	-					V	R							
11 -					12	w.	M	SS	17					Í
12							\square	~						1
12							R						1	
					6	W	X	SS	14					
							KI.							
15 – SILTY SAND, a little g	ravel, fine to	o medium					H.			-				
16 -	10030 (5141)				2	W	IXI	SS	13					
17 -							H							
							K							
19 - 19 - 19	e gravel, gra	y, soft (S	C) T	TLL			$\langle \langle$							
20 -							4							
21 -						M	M		~					
21							\mathbb{N}	33	24	18				
22						ſ	\sum							
23 SANDY LEAN CLAY,	little grave	el grav fir)							
24 (CL)	0	-, <u>B</u> , , II				ľ	\sum							
25 -						K	4							
26 -					7	м	XI	ss i	24	21			Ì	
END OF BORING					+	/	′↓							
Northing=210683.5 Easting=551850.2														
DEPTH: DRILLING METHOD			WATER I	LEVEL MEA	L	ENTS	 S							
0-9½' 3,25" HSA	DATE	TIME	SAMPLED	CASING	CAVE-	IN	DRI	LLING	w	ATER	NO	IE: RI	EFER T	°0
9½'-24½' RD w/DM	6/21/07	2:05	11 Z	DEPTH		н F	LUI	DLEVE		EVEL		E ATT	ACHE	D
			11.5	9.5	10.2		<u> </u>			0.0		EETS F	OR Al	N
BORING COMPLETED: 6/21/07			┟── <u>─</u> ─								EXP	LANA'	FION ()F
DR: SG LG: SB Rio 91C		<u> </u>									TERN	AINOL	OGY (N
04		· · · · · · · · · · · · · · · · · · ·	l						Ì		1	THIS L	.0G	



SUBSURFACE BORING LOG

AET J	OB NO:	22-00081						LC	G OF	во	RING N	10	ST	-67	(p. 1	of 1	
PROJE	ECT:	TCAAP Red	evelopm	ent; Ard	en Hi	ills,	MN										
DEPTH	SUR	FACE ELEVATION: _	888.7			G	EOLOGY	м	MC	SA	MPLE	REC	FIELE)&L	ABORA	FORY '	FESTS
FEET		MATERIAL	DESCRIPTI	ON				N	MC		TYPE	IN.	wc	DEN	1 LL	PL	%-#20 0
1-	∣ FILL, -\roots.	mostly organic silt, dark brown and blac	surface roo k	ots, trace	/	FIL	T	8	м	М	22	15			1		
2 -	FILL,	mixture of silty san	d and claye	ey sand, a	-			0		\square	55	15					
3 -	little g	gravel, trace roots, di prown	ark brown,	brown and				17	м	М	66	14					
4 -	SANI) WITH SILT, a litt	le gravel, li	ight brown			ARSE LUVIUM	17	111	\wedge	55	14					
5 -	mediu	m dense (SP-SM)	aterbearing	, 100se to						R							
6-								17		X	SS	15					
7 -									-	मि				Į			
8-								21	w	Μ	cc	17					
9	1							21		\square	55	17					
10 -										K K							
11								9	W	X	SS	15					
12 -	CT AN									Ы							
13 —		EY SAND, a little	gravel, gray	y, stiff (CL)		TIL	.L	9	м	M	SS	10	17				
14										Д							
15 -	SAND	Y LEAN CLAY, a	little grave	l, gray, firn	n ////					枌			1.5				
16 -	to stiff							6	M	X	SS	17	15				
17 -										$[\mathcal{T}]$							
18 -										$\left \right\rangle$							
19 -)							
20 -										М			17				
21 -								11	M	Ŵ	SS	16					
22										\sum							
23 –										$\left \right\rangle$							
24 –										$\left \right\rangle$							
25								10		\square		10	18				
26 -								10	M	M	55	18					
ſ	END (Northin	OF BORING 1g=210683.4															
	Easting	=552397.5															
DEPI	TH: D	RILLING METHOD			WATF	L ER L'	EVEL MEA	SURF	MEN	Ц ГS				L	NOTT	DEEE	
			DATE	TIME	SAMPL	ED	CASING	CAV	E-IN	I	RILLI	<u>ig</u>	WAT	<u>E</u> R	THE A	REFE.	
0-9 14י24	<u>ייצי 3.</u> סד יצון	<u>25" HSA</u> D w/DM	6/22/07	8:40	DEPT.	n 		DE	91H - 8	FL	UID LE	VEL	LEVE	^{SL}	SHEET	'S FOR	AN
J/2 =44	<u> </u>		5, MM () (5.40	2.0		7.0		.0				0.0		EXPLA	NATIO	N OF
BORING COMPL	G ETED:	6/22/07											•		TERMIN	IOLOG	NO Y
DR; SG	G LG:	SB Rig: 91C													TH	IS LOC	3



SUBSURFACE BORING LOG

AET JO	OB NO: 22-00081						LC	G OF	BO	RING N	ю	ST	-68	(p. 1	of 1	
PROJE	CT: TCAAP Red	evelopm	ent; Ard	en Hi	ills,	MN										
DEPTH IN	SURFACE ELEVATION:	895.0			GE	EOLOGY	N	мс	SA	MPLE	REC	FIELI) & L/	ABORA	FORY 2	rests
FEEI	FILL, mixture of silty san	d and sand	with silt. a		FIL	L						wc	DEN		PL	%-#20 0
1 -	little gravel, surface roots	, trace roots	, light				13	М	X	SS	12					
2 -									\mathbb{H}							
3 -							16	М	Ň	SS	6					
4-								-	R							
6-							12	M	X	SS	14					
7 -	ODCINIC CLAVE			744,57					<u>ل</u>							
8 -	(OL/OH)	roots, black	, soft		SW DEF	AMP POSIT	3	м	X	SS	10	39				
. 9 -	SAND WITH SILT, a litt	le gravel, b	rown and			ARSE			E	••						
10 -	gray, waterocaring, mean	ini dense (b	1-5141)				28	w	X	SS	17					
12 -		1 1 4100 1							Ь							
13 -	LEAN CLAY, gray and b sandy lean clay, laminatio	ns of fat cla	enses of ay (CL)		TIL	L	14	м	M	SS	24	16				
14	SANDY LEAN CLAY, a	little grave	l, gray, firn	n ////					Ы							
15	to stiff, laminations of lear	n clay (CL)					5	м	M	SS	6					
16									Д							
17									5							
19 -									\mathbb{S}							
20 -									\mathbb{H}							
21 –							11	М	M	SS	19	17				
22 -									2							
23 –									$\left \right\rangle$							
_ 24 -									2							
25 -							12	м	М	SS	21	18				
26 -									Δ				<u> </u>			
	Northing=210684.3 Easting=552897.4															
DEP1	TH: DRILLING METHOD			WATI	L ER LF	EVEL MEA	SURF	L MEN'	Ц ГS		L			NOTE		
 A_4	1/21 3 75 11 HSA	DATE	TIME	SAMPI	ED	CASING	CAV	E-IN PTH	FI		NG VFI	WATI	ER	THE A	TTAC	HED
41/2'-24	1/2' RD w/DM	6/22/07	1:00	6.5		4.5	6	.0				5.2	_	SHEET	'S FOR	AN
DODDY														EXPLA	NATIC	N OF
BORING COMPL	ETED: 6/22/07													FERMIN	IOLOC	Y ON
DR: SG	LG: SB Rig: 91C													TH	IS LOO	ť

	INTE	RTEC	•				
	Brau	n Proj	ect SP-0	5-05871	BORING:	ST-69	RI-3002-05
	Geote	enical E	valuation		LOCATIC	DN: N: 210744	4.173, E: 553428.679 See
	I UAA NE of	r Kede Highwo	velopment	Tighway 96	attached s	ketch.	
	Arden	Hills, N	linnesota				
	DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/19/07	SCALE: 1'' = 4'
	Elev.	Depth			• [· · · · · · · · · · · · · · · · · · ·
	1eet 894.8	1eet 0.0	AS1M Symbol	Description of Materials (ASTM D2488 or D2487)		BPF WL	Tests or Notes
	803.8	1.0	FILL 💥	FILL: Poorly Graded Sand with Silt, trace of G	Gravel, dark		
	075.0	1.0	SM	SILTY SAND, fine-grained, grav, moist, loose.			
	-			(Lacustrine)			
						8	
	890.8	4.0	SP-	POORLY GRADED SAND with SILT trace of	f Gravel	- _ _ _ _	
	_		SM	brown, waterbearing, very loose to loose.			
us)	-			(Lacustrine)	_		
viatio	_						
obrev	_					7	
ofal	_				4		
ation							
plan						3	
or ex	-						
leet f	-				_		
gy sl	-						
inolo	880.8	14.0	CL	SANDY LEAN CLAY, trace of Gravel, gray, w	vet,		
ermi	-			medium to rather stiff.	-	10	
ive 7	-			(Oldelai Thiy	4		
script	-	ĺ					
Des	-	ļ					
(Sec	-	Ì					
45							
07 14	_					8	
10/2							
4'GD1							
RAUN	-						
E IdS	-				_		
15871.	-	200			_	10	
SP060	808.8			END OF BORING.	{		
DNIT				Water observed at 4 feet while drilling			
108 <u>1</u>				Doring then grouted	· -		
0 50				boring men grouted.			
ASIC L	_						
UN B/					-		
BRA	1.06.05071	[000 00 00 00 0000
SI			·.	Braun Intertee Corporation			SI-69 RI-3002-05 page 1 of 1

BRAUN

LOG OF BORING

INTE	RTEC	*							
Brau	n Proj	ect S	P-0	6-05871	BORING	:		ST-70	
Geote TCAA NE of Arden	cnical E AP Rede Highwa Hills, N	valua velop 1y 10 /linne	ntion men and sota	t Highway 96	LOCATIC attached s	DN: N: ketch.	210240).974. E: 55058	4.304 See
DRILL	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	5/07	SCALE:	1'' = 4'
Elev. feet 885.0	Depth feet 0.0	AS Sym	TM 1bol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
883.5	1.5	SM		SILTY SAND, trace of Roots, dark brown, mois (Topsoil)	it. 				
-		SP- SM		POORLY GRADED SAND with SILT, fine-gra orange-brown, moist, loose. (Lacustrine)	ined,	9			
878.0	7.0	SP- SM		POORLY GRADED SAND with SILT, fine-gra brown to gray with rust, waterbearing, very loose (Lacustrine)	 ined, light e to loose	4	Į ⊈		
 - 871.0	14.0					4 7 8			
-		CL		SANDY LEAN CLAY, trace of Gravel, gray,w of medium to rather stiff. (Glacial Till)	et,	9			
· · · · · · · · · · · · · · · · · · ·					- 	6			
859.0	26.0					9			
				END OF BORING. Water observed at 7 feet while drilling. Boring then grouted.					
 -									

SP-06-05871

BRAUN"

LOG OF BORING

Brau	n Proj	ect SP-0	6-05871	BORING	S	Γ-71	RI-1015	5-01
Geote	cnical E P Rede	valuation	t	LOCATIO)N: N	: 21015	1.469. E: 55092	9.912 Se
NE of	Highwa	y 10 and	Highway 96	attached s	ketch.			
Arden	Hills, N	Ainnesota						
	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	5/07	SCALE:	1''=4
feet 887.3	feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
887.1	0.3	FILL W	3" of Bituminous FILL: Poorly Graded Sand with Silt, fine-grai	ned, trace -				
	1.3	SP- SM	of Gravel, brown, moist. POORLY GRADED SAND with SILT, fine-g brown to orange-brown, moist, loose to mediu	rained, light m dense	V 16		. •	
			(Lacustrine)		Δ			
	7.0			_	7			
_		SP- SM	POORLY GRADED SAND with SILT, fine-g brownish-gray to gray, waterbearing, very loos (Lacustrine)	rained, se to loose.	4	¥		
					10			
- 875.3	12.0	CL	SANDY LEAN CLAY trace of Gravel grav	wet rather				
-			stiff to very stiff. (Glacial Till)		25			
					14			
_				_				
-	-							
-					11			
-				-				
-				-	11			
861.3	26.0		END OF BORING.					
-			Water observed at 7 feet while drilling.					
-			Boring then grouted.	_				



SUBSURFACE BORING LOG

AET JOB NO: 22-00081			•••	· · · · · · · · · · · · · · · · · · ·	L	OG OI	F BC	ORING N	10.	ST	-72	(p. 1	of 1)
PROJECT: TCAAP Rec	levelopn	<u>nent; Ar</u>	den H	ills, MN					_			11		<u> </u>
DEPTH SURFACE ELEVATION:	887.	4		GEOLOGY	T		6		PEC	FIELI)&LA	BORA	TORY	TESTS
FËET MATERIA	L DESCRIPT	TION		GLOLOGI	N	MC		TYPE	IN.	wc	DEN	LL	PL	% -#200
FILL, mixture of silty sa	nd and sand	d, light		FILL			\mathbb{N}			1				1
2					6	м	Ŵ	SS	14					
3					1	w	$\overline{\mathbb{V}}$		10					
4					5	W	Δ	- 55	12					
5						Ţ	R							
6 -					7	w	X	SS	15					
7 - SAND WITH SILT fine	to modium	omeined -		COADOD	1		E							
8 - little gravel, brown, wate	rbearing, lo	ose		ALLUVIUM	6	w	\mathbb{N}	SS	14					
9 - (SP-SM)							Д							
10 SAND WITH SILT ANI	O GRAVEI	., medium	to				\mathbb{N}							
$11 - \frac{(SP-SM)}{(SP-SM)}$	abcanng, n	ouse			5	M	M	SS	18	16				
12 - CLAYEY SAND, a little	gravel, gra	ıy, firm (Cl	L)				E							
13 —					6	М	X	SS	14	15				
14 —							H							
15 —					7	м	М	22	15	14				
16 -							Д	55	15					
1/							Ħ							
18 SANDY LEAN CLAY, a	little grave	el, gray, sti	ff				ł							
20							묍							
21 -					9	М	X	ss	23	17				
22 -							R							
23 -							¥.							
24 -							Ħ							
25 -							R							
26 -	<u>.</u>				12	М	Х	SS	23	16				
END OF BORING							\square							
Easting=551467.5														
DEPTH: DRILLING METHOD	[WATE	DIEVEL MEA				.						
	DATE	TIME	SAMPLI	ED CASING	CAV	E-IN	D	RILLIN	G	WATE		IOTE:	REFER	TO
<u>U-24¹/2' 3.25" HSA</u>	6/26/07	11.55	DEPTH	I DEPTH	DEP	TH	FLĨ	JID LEV	ΈL	LEVEI		HEAT	TACH	
	6/26/07	12:20	26.5	4.5	4. 26	5				4.8		XPLAN	ATION	AUN
BORING COMPLETED: 6/26/07					20					TONE	TE	RMIN	DLOG	YON
DR: SG LG: SB Rig: 91C											-1	THI	S LOG	



SUBSURFACE BORING LOG

PROJECT: TCAAP Redevelopment; Arden Hills, MN DEPTH IN FEET SURFACE ELEVATION:891.3 MATERIAL DESCRIPTION GEOLOGY N N FIELD & LAB DEPTH IN FEET MATERIAL DESCRIPTION GEOLOGY N N MC FIELD & LAB FILL MATERIAL DESCRIPTION	BORAT LL	ORY PL	TESTS
DEPTH IN FEET SURFACE ELEVATION: 891.3 GEOLOGY N MC SAMPLE TYPE REC FIELD & LAB IN MATERIAL DESCRIPTION FILL WC DEN	BORAT LL	ORY PL	TESTS
FEET MATERIAL DESCRIPTION N MC TYPE IN. WC DEN FILL FILL FILL M FILL	PL	1	
FILL mixture of silty sand sand with silt and FILL			%-# 200
1 - sandy silt, a little gravel, surface roots, trace			
2 - roots, dark brown, black and gray			
3 - 6 M X SS 8	1		
4 LEAN CLAY WITH ORGANICS trace roots			
5 - black, firm (CL)			
6 6 M M SS 14 23			
7 – SAND WITH SILT, fine grained, gray and brown mottled, waterbearing, medium dense			
$8 - (SP-SM)$ $13 - W \times SS - 16$			
9 SAND WITH SILT, a little gravel, fine to			
10 - medium grained, brown, a little gray mottled, waterbearing, medium dense (SP-SM)			
11 - SAND WITH SILT fine grained light brownish			
gray, waterbearing, medium dense (SP-SM)			
15 - SANDY LEAN CLAY, a little gravel, gray, firm			
$16 - (CL)$ $6 M \times SS 15 24$			
18 CLAVEY SAND a little gravel grav firm (SC)			
		-	
23 SANDY LEAN CLAY, a little gravel, gray, firm			
25 - 7 M X SS 17 18			
²⁰ END OF BORING			
Northing=210182.9 Easting=551898.2			
DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS NO	OTE:	REFE	ER TO
0-9½' 3.25" HSA DATE TIME SAMPLED CASING CAVE-IN DRILLING WATER DEPTH DEPTH DEPTH DEPTH FLUID LEVEL LEVEL T	THE AT	TTAC	HED
<u>91/2'-241/2' RD w/DM</u> 6/21/07 3:00 11.5 9.5 10.0 9.0 SI	SHEET:	S FOI	R AN
BORING	RMIN		JN OF GY ON
DR: SG LG: SB Rig: 91C	ТНІ	IS LO	G

SUBSURFACE BORING LOG

AET J	IOB NO: 22-00081				· · · · · · · · · · · · · · · · · · ·	LC	DG OF	F BC	RING 1	NO	ST	-74	(p. 1	of 1	
PROJE	ECT: TCAAP Red	levelopn	nent; Ar	den Hi	ills, MN									-	
DEPTH	SURFACE ELEVATION:	891.	8		GEOLOGY			S		REC	FIELI) & LA	BORA	TORY	TESTS
FËET	MATERIAI	. DESCRIPT	TION			N	мс		ΓΫ́́PĒ	IN.	wc	DEN	LL	PL	%-#200
1-1	 FILL, mixture of sand with little gravel, surface roots 	ith silt and s, trace roo	silty sand, : ts. brown	a	FILL	15	М	Μ	66	15					
2 -							141	Δ	00	15					
3 -	little gravel, trace roots, b	sand and si brown	ity sand, a			14	м	М	22	19	15				
4	-							Д	00	10		-			
5	SAND WITH SILT a life	la annual d			COADCE	4		M							
6 -	medium grained, light bro	own, water	bearing,		ALLUVIUM	6	₩	X	SS	13					
7 -	(SP-SM)	minations	of silty sar	nd				图							
8 -						13	w	M	SS	15					
9 –								Д							
10 -	· · · · · · · · · · · · · · · · · · ·					10		\square	~~						
11 -	SAND WITH SILT, a litt	le gravel, f	fine to se (SP-SM)		TILL	19	W	Ŵ	SS	19	17				
12 -	CLAYEY SAND, a little	gravel, gra	ly, firm to					P							
13 -	very suit (SC)					7	М	X	SS	18	17				
14 —								R							
15 -						10	м	М	SS	17	13				
16 -							1.1	Д	00	17					
17 -								Ħ							
18	SANDY LEAN CLAY, a	little grave	el, gray, stil	ff 🥢				Ŧ							
20 -								1							
20						10	М	M	SS	14	17				
22															
23 -								ł							
24 —								ł							
25 -								H H							
26						13	М	X	SS	24	14				
F	END OF BORING							/ +							
	Easting=552416.8														
DEPTI	H DRILLING METHOD	· · · ·										-1			
		DATT.	TDC	WATE SAMPLE	ED CASING			S	RIII		W/ A TE	N	IOTE:	REFER	то
0-245	/2' 3.25" HSA	DATE		DEPTH	Î DEPTH	DEP	ŤĤ	FLU	JID LEV	VEL	LEVEI		THE AT	TACH	ED
	·····	0/ //Ư/ 6/27/07	5:05 3-10	6.5 0.0	4.5	4.	8				None		онеет хрі ал	S FOR	
BORING	ETED: 6/27/07	6/27/07	3:35	26.5	24.5	26	5				0.4		ERMIN	OLOG	ZON
DR: SG	LG: SB Rig: 91C								. <u> </u>		110110		THI	S LOG	



SUBSURFACE BORING LOG

AET J	IOB NO: 22-00081											<u> </u>	·		
РКОЛ	ECT: $\underline{\mathbf{TCAAPR}}$	edevelop	ment; A	rden H	Iills, MN	j	LOG	OF B	ORING I	NO	ST	-75	(p. 1	of 1)
DEPTH	SUPEACE ELEVANO		00			<u> </u>									
IN FEET	MATERI	N: 09 IAL DESCRI	<u>о.о</u>		GEOLOG	Y N	Пм	ic s	AMPLE	REC	FIEL	D&LA	BORA	TORY	FESTS
	SAND WITH SILT. fi	ne to mediu	morained		L COADED			$- \downarrow$		IN.	WC	DEN	LL	PL	% #200
1-	little gravel, surface ro	ots, trace ro	ots, brown	1, a	ALLUVIU	М		٨N	1	1.0					
2 -	(SP-SM) (possible fill)				OR FILL			$^{\prime\prime}$	55	10					
3 -						ł	Ì	$\overline{\nabla}$	Ť						
4 -						15		<u>4 X</u>	SS	10			ĺ		
5	CLAYEY SAND, a litt	tle gravel, b	rown, ligh	t 💋	MIXED								i		
	laminations of sand wit	a, firm, lens th silt (SC)	ses and		ALLUVIUN	A a		$.\Pi$			14				
6-	SAND WITH SILT, a l	little gravel,	, trace root		COARSE	, /	W7	МŇ	SS	14					
7-	SANDY SILT a little	ose (SP-SN	<u>A)</u>	/iiii	ENE			ष्य							
8 –	wet, medium dense (MI	L)	roots, gra	у,	ALLUVIUN	4 12	w	, M	56	ND					
9 +	CLAVEV SAND - 1:41					12		Μ	55	INK					
10 -	stiff (SC)	le gravel, bi	rownish gr	ay,	TILL			ष्य							
11 -						10	w	·Μ	SS	13	14				
12	······································	_						Д							Í
13 _	SANDY LEAN CLAY,	a little grav	vel, dark g	ray,				R							
15						7	w	X	SS	21	19				
14								А							
15 -								М							
16 -						10	W	X	SS	18	18				
17							1	Ы							
18 -								K¶.							
19 -								KI							
20 -								Ц							
21 -						12	м	M	ss	18	16				
22 -								Д							
22								2							
25								$\left \right\rangle$							
24 -															
25								M							
26 -						13	М	X	SS	17					
I	END OF BORING		· · · · · · · · · · · ·		<u> </u>	╉──┤		4							
E	asting=552897.6														ļ
		<u></u>													
DEPTH:	DRILLING METHOD	<u> </u>		WATER	R LEVEL MEA	SUREN	/ENT	 `S	L						
0-4½'	3.25" HSA	DATE	TIME	SAMPLE	D CASING	CAVE	-IN	_DR	ILLING	W	ATER		E: RE	FER T	o
41/2'-241/2'	RD w/DM	6/25/07	10:30	65	DEPTH	DEP	I'H	FLUI	DLEVE		EVEL		S ATT	ACHEI	2
			10.00	0.3	4.5	4.9		·			4.3		ETS F	OR A	4
BORING COMPLETE	ED: 6/25/07		<u></u>			<u>_</u> _	-+			-		EXPI	LANA"	TION ()F
DR: SG	LG: SB Rig 91C		<u> </u>						<u> </u>			TERN	1INOL	OGY (N
	mg. /1 0			L								1 3	THIS L	OG	

Brau Geote TCAA	n Proje cnical E P Redev	ect SP-0 valuation velopmen	6-05871	BORING LOCATIC attached s	R DN: N: ketch.	I-40(210133	01-02 ST-76 3.678, E: 553362.349
NE of Arden	Highwa Hills, N	y 10 and 1 Iinnesota	Highway 96				I
DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/2	3/07	SCALE: 1" =
Elev. feet 907.0	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or Notes
906.0	10	FILL 💥	FILL: Silty Sand, fine-grained, with Organics a	nd Gravel,			
	1.0	FILL	FILL: Silty Sand, fine- to coarse-grained, with brown, moist.	Gravel,	V 19		
- 900.0 -	7.0	CL	Petroleum odor at 5 1/2 feet. SANDY LEAN CLAY, trace of Gravel, brown, medium to rather stiff. (Glacial Till)	moist, –	8		
- - -	14.0				9		
	14.0	CL	SANDY LEAN CLAY, trace of Gravel, gray, m medium. (Glacial Till)	noist,	7		
					7		
	26.0		END OF BORING		7		
			Water not observed during drilling. Water not observed with 24 1/2 feet of hollow-s in the ground. Boring then grouted.	tem auger			· · .
_							

BRAUN

LOG OF BORING

Brau	n Proj	ect SP-)6-05871	BORING	:		ST-77	
Geote TCAA NE of Arden	cnical E P Rede Highwa Hills, N	valuatio velopme y 10 and Jinnesot	n nt Highway 96 a	LOCATIC attached s	DN: N ketch.	: 20977:	5.961, E: 55069	9.340 Se
DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	6/07	SCALE:	1'' = 4
Elev. feet 892.4	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
891.4	1.0	FILL	FILL: Silty Sand, trace of Roots, dark brown,	moist.				
-		FILL	FILL: Silty Sand, fine-grained, trace of Gravel brown to brown, moist.	, dark - 	9			
885.4	7.0	SP- SM	POORLY GRADED SAND with SILT, fine-gr brown to grayish-brown, moist, loose to mediu (Lacustrine)	rained, light m dense	12			
881.4	11.0	CD	POODLY CRADED SAND with SHT fire of		7	Ţ		
		SM	brownish-gray to gray, wet, very loose to loose (Lacustrine)		4 5 V 10			
870.4	22.0		SANDY LEAN CLAY troop of Crouple group		Δ			
			stiff. (Glacial Till)		V 9			
866.4	26.0		END OF BORING. Water observed at 11 feet while drilling. Boring then grouted.					

Brau Geotee TCAA	n Proj cnical E P Rede	ect S valua velop	P-00 ition ment	6-05871 t	BO LO atta	RING: CATIC)N: N; ketch.	: 209	S ' 684.5	T-78 47, E: :	550898.325 See
Arden	Hills, M ER: K.	Iy 10 : /Iinne Keck	sota	METHOD: 3 1/4" HSA, Autohmr	DA	TE:	6/2	6/07		SCAL	.E: 1" = 4'
Elev. feet 886.1	Depth feet 0.0	AS: Sym	ГМ ibol	Description of Materials (ASTM D2488 or D2487)	I		BPF	WL	MC %	P200	Tests or Note
<u>884.6</u> - <u>879.1</u>	7.0	FILL		FILL: Silty Sand, fine-grained, dark brown light brown and gray, moist. PEAT, fibrous, dark gray, wet, very soft.	mixed wit		3				
- 872.1	14.0			(Swamp Deposit)			WH WH WH	57	421	61	
		SP- SM		POORLY GRADED SAND with SILT, fine gray, waterbearing, very loose to loose. (Lacustrine)	-grained,		4				
360.1	26.0			END OF BORING. Water observed at 14 feet while drilling. Boring then grouted.			8				

m SP-06-05871

ST-78 page 1 of 1


AET J	OB NO: 22-00081					LC	OG OF	BO	RING N	10	ST	-79	(p. 1	of 1	
PROJE	ECT: TCAAP Red	evelopm	ent; Ard	len Hi	lls, MN										
DEPTH	SURFACE ELEVATION:	888.9	· ·····		GEOLOGY	N	MC	SA	MPLE	REC	FIELI)&L	ABORAT	ORY	rests
FÉET	MATERIAL	DESCRIPTI	ON			IN .	MC	ſ	YPE	IN.	wc	DEN	1 LL	PL	%-# 200
1 -	SILTY SAND, a little gra	vel, surface loose (SM)	e roots, trac	ж /	TOPSOIL COARSE	10	м	М	88	16					
2 -	SILTY SAND WITH GR	AVEL, tra	ce roots,		ALLUVIUM			Д	55	10					
3 -	SAND, fine grained, light	brown, mo	oist, loose,			9	м	M	SS	16					
4 -	laminations of silty sand (SP)						Д							
5 -								$\sum_{i=1}^{n}$							
6 -						13	W/M	Ŵ	SS	18					
7 -	SAND, fine grained, light	brown, wa	terbearing				┸	य							
8 -	medium dense to loose (S	P)	<u>-</u> ,			11	w	XI	SS	17					
9								R							
10 -						7	w	М	SS	17					
11	SAND WITH SHIT From							Д							
12 -	waterbearing, very loose t	o very dens	se (SP-SM))				$\sum_{i=1}^{n}$							
13 -		<u>.</u>				2	W	Ŵ	SS	13					
15 -								R							
16 -						55	w	X	SS	14					
17 -								R	-						
18 -	SILTY SAND a little gray	vel orav						ł							
19 —	waterbearing, very loose (SM)			TILL			H							
20 —	SANDY LEAN CLAY, a	little grave	l. grav. sof	t ////		,	w	M	00	10					
21 –	to very stiff, laminations o	f silty sand	at 24.5'			4		Δ	20	10	15				
22 –	()							Į.							
23 -								Ŧ							
24 -								I							
23 - 26						17	м	X	SS	21	16				
20	END OF BORING							44							
	Northing=209686.5 Easting=551325.7														
		l									<u> </u>	<u> </u>			
DEP	IH: DRILLING METHOD			WATE	R LEVEL MEA	SURE	MEN	rs			WATT		NOTE:	REFE	r to
0-24	1½' 3.25" HSA	DATE	TIME	DEPTI	H DEPTH	DE	PTH PTH	FL	UID LE	VEL	LEVE		THE A	TTACI	HED
		6/26/07	1:05	9.0	7.0	7	.6				7.0		SHEET EXPLAN	S FUR JATIO	AN NOF
BORIN	3 ETED: 6/26/07										· ·		FERMIN	OLOG	Y ON
DR: SC	LG: SB Rig: 91C	·											TH	S LOG	i

Brau	n Proi	ect S	P-0	6-05871	BORING			ST	Γ-80
Geote	cnical E	valua	ition		LOCATIO	N· N·	209689	9.48	4. E: 551891 038 Se
TCAA	P Rede Highwa	velop vy 10 :	ment and]	t Highway 96	attached s	ketch.	207085	2.70	-, L. 551671.056 SC
Arden DRILLH	ER: K.	/linne Keck	esota	METHOD: 31/4" HSA, Autohmr	DATE	6/25	8/07		SCALE: $1'' = 4$
Elev.	Depth	<u> </u>			Dinit.	0720			
feet 891.1	feet 0.0	AS Sym	TM 1bol	Description of Materials (ASTM D2488 or D2487)		BPF	WL M	4C %	Tests or Notes
		FILL	\bigotimes	FILL: Silty Sand, very fine- to fine-grained, trac	e of				·····
				Gravel, brown, moist.	_				
889.1	2.0	CI		SANDY I FAN CLAY trees of Court Holds	4				
				brown and gray mixed with rust, wet.	own to	5		ł	
				(Glacial Till)		Δ			
ľ		•			-				
-					_	7		15	
					_	Δ ´			
884.1	7.0								
		CL		SANDY LEAN CLAY, trace of Gravel, grayish-	brown,			.	
			VIA	(Glacial Till)	-	X Y		14	
				<,	-				
	i					X 7			
870.1	12.0				-				
0/9.1	12.0	CL		SANDY LEAN CLAY, trace of Gravel grav we	et, rather				
		_		soft to medium.	_	5			
				(Glacial Till)					
			V//A		7				
					_	7 7	1	16	
	ļ				-				
}					_			ļ	
		1							
					-				
					-				
-									
						XI /			
	ŀ				1				
					-				
					4				
	ĺ								
265 1	260					8			
1.00	20.0			END OF BORING.	¥				
				water not observed with 24 1/2 feet of hollow-st in the ground.	em auger –				
				Boring then grouted.	-				
-									
		ĺ			_				
6-05871				Braun Intertec Corporation					ST-80 page

BRAUN[™]

LOG OF BORING



SUBSURFACE BORING LOG

AET J	юв NO: <u>22-00081</u>					L	OG OF	BC	RING N	10	ST	-81	(p. 1	of 1)
PROJ	ECT: TCAAP Red	evelopm	ent; Ard	len Hi	ills, MN										
DEPTH	SURFACE ELEVATION:	895.1	L	• •	GEOLOG	Y N		sz	AMPLE	REC	FIELI)&L	ABORA	FORY '	TESTS
FEET	MATERIAL	DESCRIPT	ION			IN .	MC		TYPE	IN.	wc	DEN	I LL	PL	%-# 200
1 -	SANDY SILT, a little gra roots, dark brown, moist,	ivel, surfac loose (ML	e roots, trac	ж ДШ	TOPSOIL	10	м	М	22	16					
2 -	SAND WITH SILT, fine	grained, a	little gravel	,	COARSE	1		Д	55						
3 -		, 100se (SP-	-5141)			6	м	М	SS	6					
4 -	CIL TV CAND trees wert	- 1						Д		Ť					
5 -	loose, laminations of lean	s, brown, w clay (SM)	vaterbearing	; , [].				M							
6 -	SANDY LEAN CLAY, and gray mottled firm (C	little grave	el, brown	_ ///	111.1.	7	M	X	SS	15	16				
7 -	SANDY LEAN CLAY	little grou	- brownia					B							
8 -	gray, a little brown, stiff,	lamination	s of silty			11	М	M	SS	19	15				
9 -	sand (CL)							Д							
10 -	CLAYEY SAND, a little	gravel, gra	y, firm (SC					М			15				
11 –	-					8	М	M	SS	22					
12 —	SANDY LEAN CLAY, a	little grave	hrownish					E							
13 -	gray, a little brown, stiff,	laminations	s of silty			13	м	X	SS	21	16				
14 -	SANDY LEAN CLAY, a	little grave	el, grav, firr	n				H							
15	to stiff (CL)	8	., 8, ,			0		M	00	10	15				
16 -	,					Ŏ	M	M	22	17					
17 -								I							
18 —								Į							
19 —								团							
20 -						11	м	М	22	20	17				
21 -								Д	00	20					
22 -								Ħ							
23 –								[]							
24 –								凶							
25						12	м	M	SS	19	14				
26 -	END OF BORING							Щ			<u> </u>				
	Northing=209624.8														
	Easting=552198./														
DEPT	TH: DRILLING METHOD			WATE	R LEVEL M	EASURE	MEN	rs			•		NOTE:	REFE	R TO
0-24	1/2' 3.25" HSA	DATE	TIME	SAMPL DEPT	ED CASING	G CAV	E-IN PTH	L FL	ORILLIN UID LE	IG VEL	WATE LEVE	R	THE A'	ITACI	ÆD
		6/26/07	2:55	26.5	24.5	26	5.0		<u>.</u>		Non	e	SHEET	S FOR	AN
- poppy													EXPLAN	JATIO	N OF
COMPL	ETED: 6/26/07											T	ERMIN	OLOG	Y ON
DR: SG	LG: SB Rig: 91C									T			THI	S LOG	



SUBSURFACE BORING LOG

AET	IOB NO: 22-00081						LC)G OF	во	RING N	10	ST	-82	(p. 1	of 1)
PROJ	ECT: TCAAP Red	<u>evelopm</u>	ent; Ard	en Hi	ills,	MN							<u></u>			
DEPTH	SURFACE ELEVATION:	898.6	;		G	FOLOGY			s	MPLE	REC	FIELI)&L/	ABORA	FORY '	TESTS
FEET	MATERIAL	DESCRIPTI	ON			LOLOGI	N	MC		FYPE	ĪN.	wc	DEN	LL	PL	%-#200
1	FILL, mostly sandy silt, s	urface root	s, trace		FIL	L	25		M		14					
2-	FILL, mixture of silty san	d and clay	ey sand, a	~			25		Μ	22	14					
3-	dark brown	ght brown,	brown and				15		Μ	50	12					
4-				:			15	IVI.	\wedge	22	13					
5 -									R				;			
6 -	-						20	М	Х	SS	16					
7	LEAN OLAN MUTH OD	0.433000				<u></u>			R							
8-	gray and black, moist, ver	JANICS, t y stiff, lens	race roots,		TO	PSOIL	19	M7W	M	SS	17	15				
9 -	laminations of silty sand (CL) vel brown	ish aray	-////	TIL	T		<u>-¥</u>	Д							
10	waterbearing, medium der	nse (SM)				-			$\sum_{i=1}^{n}$							
- 11 -	gray and brown mottled, s	gravel, trac oft (SC)	e roots,				3	М	Ň	SS	20	19				
12 -									8							
13 -							4	м	X	SS	21	17				
14 —									P				-			
, 15 —	SANDY LEAN CLAY, g	ray, firm to	stiff (CL)				c		\square	66	- 11	16				
16 —							0		\wedge	22	21	10				
17 –									ß							
18									Į							
19 -									묍							
20 -							11	м	M	SS	22	14	1			
21 –									Д							
22 –									{ }							
23 –									3							
24 -									B							
25							15	м	X	SS	22	15	:			
20 -	END OF BORING				1				$\left \right\rangle$							
ĺ	Northing=209687.1 Fasting=552381.8															
DEP	TH: DRILLING METHOD			WATI	ERL	EVEL MEA	SURE	MEN	rs					NOTE:	REFE	R TO
0-24	" <u>//' 3.25" HSA</u>	DATE	TIME	SAMPL DEPT	.ED H	CASING DEPTH	CAV DEI	E-IN PTH	r FL	ORILLIN UID LE	∛G VEL	WATE LEVE	ER L	THE A	TTACI	ÆD
•		6/28/07	8;15	11.5	5	9.5	11	.2				Non	e	SHEET	'S FOR	AN
BORING	~	6/28/07	8:30	26.5	5	24.5	26	i.5				Non	e ¹	EXPLAI	NATIO	N OF
COMPL	ETED: 6/28/07												г Т	ERMIN	IOLOG	YON
DR: SC	LG: SB Rig: 91C													TH	IS LOC	1

SUBSURFACE BORING LOG

AET	IOB NO: 22-00081					LC	OG OF	BO	RINGN	JO.	ST	-83	(p. 1	of 1)
PROJ	ECT: TCAAP Red	evelopm	ent; Ar	den Hill	s, MN								<u>, n</u>		2
DEPTH	SURFACE ELEVATION: _	903.0)		GEOLOGY	N		SA	AMPLE	REC	FIELI)&L	ABORA	FORY '	TESTS
FÊET	MATERIAL	DESCRIPT	ION	····		IN .	MC		FYPE	ĪN.	wc	DEN	1 LL	PL	%-# 20(
1 -	gravelly, trace roots, brow	th silt and s vn to dark b	silty sand, prown		TLL	25	м	М	SS	12					
2 -	Hit gas line between 1' to	2'						Д							
	Northing=209676.4														
	Easting=552900.3														
													F		
										~					
													:		
		r										Ĺ			
DEP	TH: DRILLING METHOD			WATER	LEVEL MEA	SURE	MENI	rs	<u></u>		11/ 1 777	-	NOTE:	REFEI	r to
0	-2' 3.25" HSA	DATE	TIME	DEPTH	DEPTH	DEF	Ϋ́́ΤΗ	FL	UID LE	VEL	LEVE	L	THE A	FTACH	IED
					-					-			SHEET EXPLAN	S FOR	
BORING	3 ETED: 6/25/07												ERMIN	OLOG	YON
DR: SC	LG: SB Rig: 91C				•	+					<u> </u>		TH	S LOG	

AET	JOB NO: <u>22-00081</u>		· · · · · · · · · · · · · · · · · · ·			<u> </u>					07	02.4			
PROJ	ECT: TCAAP R	edevelor	oment; A	Arden Hi	ills. MN	1	LUG	OF B	ORING I	NO	<u>ST-</u>	<u>83A</u>	<u>(p.</u>	<u>1 of</u>	1)
DEPTH			3.0			<u> </u>									
FEET	MATER	N:	PTION		GEOLOG	BY N	ſМ	ic s	AMPLE	REC	FIEL	D&LA	BORA	TORY	TESTS
	\2.5" Bituminous Paver	nent							IYPE	IN.	wc	DEN	LL	PL.	%-#2 00
1 -	FILL, mixture of claye	y sand and	silty sand	with	FILL			. 17	SU					<u> </u>	
2 -	gravel, possible cobble	s, brown	y ound			27	/ N	1 X	SS	6					
3	-							t	1]					
						37	' N	1)	SS	10				ļ	
4 -	SANDY LEAN OL IN										1.				
3-	brown and gray mottled	, a little gra	avel, light		TILL			Λ							
6	silty sand (CL)	, Juir, 1411	111110115 01			9	M	ſX	SS	16	17				
7 -	SANDY I FANLOT AV	1													
8 -	very stiff (CL)	, a little gra	wel, brown	n,				M							
9 –						18	M	١X	SS	18	16				
10	SANDY LEAN CLAY	- 12441-	<u> </u>					P							
10 7	stiff to very stiff (CL)	a nue gra	vel, dark g	ray,				\overline{M}	ĺ						
11-						15	M	Ň	SS	20	16			ſ	
12 -								R						ſ	
13 —						1.12		\mathbf{M}							
14 -						13	M	Ň	SS	20	15				
15 -								R							
16 -						12		М							
10						15		M	55	22	16				
17 -								R							
18 -								1						[
19 -								H							
20 -								24							
21 -						13	м	M	SS	17	15				
22 -							-	Д			15				
22 _								ĽI							
²³								H							
24								1							
25 –								H							
26 -						16	М	X	SS :	24	15				
	END OF BORING					╁──┼		Ц_							
	Northing=209676.4 Easting=552900.3														
DEPTH	: DRILLING METHOD		<u> </u>	WATER I	EVEL ME			 'C]
0_7/1/1	3 2511 110	DATE	TIME	SAMPLED	CASING	CAVE						NOT	E: RE	FER	ro
0-4472	<u>J.43'' HSA</u>	(//0//-		DEPTH	DEPTH	DEP	Η	FLUI	D LEVE		ATER EVEL	THE	E ATT.	ACHE	D
		0/28/07	10:00	26.5	24.5	26.)			N	lone	SHE	ETS P	OR A	N
ORING				ļ								EXPL	ANA	FION (OF
DIMPLET	ED: 6/28/07		<u> </u>					_	<u>-</u>	-		TERM	finol	OGY (ON
M 5G	LU: SB Rig: 91C										<u>.</u>	r 1	THIS L	.0G	



SUBSURFACE BORING LOG

AET JO	OB NO: 22-00081					L	OG OF	F BC	RING N	JO	ST	-84	(p. 1	of 1)
PROJE	CT: TCAAP Red	levelopn	nent; Ar	den Hi	ills, MN								·•••		·:
DEPTH IN	SURFACE ELEVATION:	911.	0		GEOLOGY	N	МС	SA	AMPLE	REC	FIELI) & LA	BORA	TORY	TESTS
FEET	MATERIAI	L DESCRIPT					IVIC		ГҮРЕ	IN.	WC	DEN	LL	PL	%-#20 0
1 -	roots, trace roots, brown	a intie grav	el, surface		FILL	13	М	\mathbb{N}	SS	14					
2	FILL, mixture of sand wi	ith silt and	sandy lean					Д							
3 -	gray and light brown	10013, 0107	•11, gruy, 11g	şını		7	М	M	SS	13	16				
4 -								Д							
5 -	SANDY LEAN CLAY, a	a little grav	el, light	r III	TILL			\square			10				
6 -	(CL)	with gray,				7	M	Ň	SS	17	15		·		
7 -								E							
8						10	М	X	SS	20	17				
9 -								R							
10 -	SANDY LEAN CLAY, a mottled, dark brown, stiff	i little grav , laminatio	el, brown ns of silt			14	M	\mathbb{N}	66	24	15				
11	(CL)							\square	50	24	1.5				
12	SANDY LEAN CLAY, a	little grav	el, dark gra	y,				R							
13 -	suif to very stiff (CL)					14	M	Х	SS	19	15				
14 -							-	团							
15 -						15	м	M	ss	16	15				
17 -								H							
18								ł							
19 -								H							
20 -								H							
21 -						19	М	XI	SS	16	14			:	
22 –								3							
23 –								Ŧ							
24 -								H	ĺ						
25 -						01		\square		10					
26 -			<u> </u>			21	M	М	22	18	16				
	END OF BORING Northing=209598.8														
	Easting=553354.1														
DEPTI	H: DRILLING METHOD			WATE	R LEVEL MEA	SURE	MENI	LL FS	I		. I		OTE I	RECO	
0-241/	4' 3.25" HSA	DATE	TIME	SAMPLE DEPTE	ED CASING I DEPTH	CAV	E-IN TH	D FLI	RILLIN JID LEV	G /EL	WATE LEVF	R 1	THE AT	TACH	ED
		7/18/07	3:35	26.5	24.5	26	.5				None	s	HEET	S FOR	AN
BORING			 						<u>.</u>			E	(PLAN	IATIO	N OF
COMPLE	TED: 7/18/07												RMIN	DLOG	YON
DK: SG	LU: 3B/BR ig: 91C												THE	S LOG	[



AET J	OB NO:	22-00081			·		L	DG OF	вс	DRING N	10.	ST	-85	(p. 1	of 1)
PROJE	ECT:	TCAAP Red	levelopn	ient; Ar	den Hi	ills, MN				<u>.</u>						<u> </u>
DEPTH IN	SUR	FACE ELEVATION:	892.	1		GEOLOGY	N	мс	s	AMPLE	REC	FIELI)&L/	BORA	TORY	TESTS
FEET	FILI	MATERIAL	DESCRIPT					MC		ГҮРЕ	IN.	wc	DEN	LL	PL	%-# 200
1 - 1	little g	gravel, surface roots	nd and sand s, trace root	d with silt, ts, brown	а	FILL	13	м	M	SS	15					
2 -	CLAY	EY SAND, a little	gravel, tra	ce roots		TILL	-		(A)							
3 -	dark t	rown, very stiff (So	C)	,			23	M	X	SS	17	8				
5 -	SILTY graine	Y SAND, trace root d, moist, very loose	s, fine to m e, laminatio	nedium ons of sand					R							
6 -	with s	ilt (SM)					4	M	Х	SS	18					
7	CLAY	EY SAND, a little	gravel, tra	ce roots					B							
8 -	gray a	nd brown mottled,	firm (SC)				5	м	X	SS	18	19				
9-	CLAY	FY SAND a little	aravel tra	00 monto					म							
10 -	dark g	ray, firm to stiff (So	C)	ce roots,			5	м	X	SS	23	17				
12 -									/\ 된							
13 -							6	м	M	SS	24	15				
14 -									/\ ਸ							
15 -			•				10	м	\mathbb{N}	SS	23	14				
16 -									A	2.2	20					
18	CANTO	17 T 17 4 3 T CY 4 Y							ł							
19 -	sand stiff (C	Y LEAN CLAY, a L)	little grave	el, dark gra	у,				Ħ							
20									M			10				
21							9	м	Ň	SS	24	17				
22 -									ł							
23 -									H							
25									内							
26 -							14	М	XI	SS	22	15				
	END (Northin	DF BORING g=209496.7														
	Easting	=551939.7														
DEPTI	H: DF	RILLING METHOD			WATE	R LEVEL MEA	SURE	I MENT	`S				~	I JOTE:	REFE	
0-245	/2' 3.2	25" HSA	DATE	TIME	SAMPLE DEPTH	ED CASING I DEPTH	CAV DEP	E-IN TH	D FLI	RILLIN JID LEV	G /EL	WATE LEVEI	R,	THE A'	TACH	IED
	<u></u>	·····	6/27/07	9:35	9.0	7.0	8.	2				None		SHEET	S FOR	AN
BORING			6/27/07	10:05	26.5	24.5	26.	.5				None	E	XPLAN	IATIO	N OF
COMPLE	ETED: 6	27/07												RMIN	OLOG	Y ON
<u></u>	r0: r				<u> </u>									1111	s roo	- 1



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081					LC	DG OF	BO	RING	10.	ST	-86	(p. 1	of 1)
РКОЛ	ECT: TCAAP Red	levelopm	ient; Arc	<u>len Hi</u>	lls, MN										
DEPTH IN	SURFACE ELEVATION:	897.	0		GEOLOGY			SA	MPLE	REC	FIELI) & LA	BORA	FORY	TESTS
FEET	MATERIAI	DESCRIPT	TON	• <u></u>			MC		ΓYPE	ĪN.	wc	DEN	LL	PL	%-#20 0
1 -	trace roots, brown, moist	grained, a , medium d	little grave. lense	l, []	ALLUVIUM	22	м	M	SS	15					
2 –	(SP-SM)							Д	•••				-		
3 -	-					22	М	M	SS	19					
4								А							
5 —	SILTY SAND, a little gra moist, medium dense (SN	avel, browr 1)	n and gray,					M	90	1.0					
6 -	,	-)				33	М	М	55	16					
7 -					i I			图							
8 -	SANDY LEAN CLAY, a	little grav	el, gray, fir	m	WEATHEREI	6	₩.	X	SS	17					
9-	to stiff, lenses of lean clay	y with sand	1 at 8' (CL)		TILL			图							
10						9	м	M	SS	20					
12 -	SANDY LEAN CLAY, a and gray mottled, stiff to	little grave	el, brown		TILL	1		H			17				
13	silty sand (CL)					0	м	Μ	99	22	15				
14 -							NI NI	Д	55	22	15				
15								M							
16 -						9	М	M	SS	24	17				
17 -								ß							
18	SANDY LEAN CLAY, a	little grave	l, dark gray					ł							
19 -	a little brown, stiff, lamina (CL)	ations of sil	lty sand					Ľ							
20 -						13	м	M	SS	21	14				
21 -								Д				ĺ			
- 22 ~								ł							
24 -	SANDY LEAN CLAY, a stiff (CL)	little grave	l, dark gray	,				ł							
25 -								님							
26 -						15	Μ	X	ss	20	15				
	END OF BORING						/	4							
	Easting=552138.3														
 DEPT	H: DRILLING METHOD			WATE		CI ID C.									
		DATE	TIME	SAMPLE	ED CASING	CAV	E-IN	D D	RILLIN	G	WATE	N	OTE: I	REFEF	ιто
0-24	<u>/2' 3.25" HSA</u>	6/26/07	3.40	DEPTH	I DEPTH	DEP	ŤĤ I	FLŨ	JID LEV	/ĒL	LEVE	T L Q	НЕ АТ НЕЕТ	TACH	
		0/20/07	5.40	7.0	/.0		U				8.1		PLAN	ATION	N OF
BORING	ETED: 6/26/07							-				TE	RMIN	DLOG	Y ON
DR: SG	LG: SB Rig: 91C					·							THIS	S LOG	



AET JO	OB NO: 22-00081						LC	og of	BO	RING N	ю	ST	-87	(p. 1	of 1	
PROJE	CT: TCAAP Rede	evelopme	ent; Ard	en Hi	ills,	MN										
DEPTH	SURFACE ELEVATION: _	898.3			GE	EOLOGY	N	мс	SA	MPLE	REC	FIELI)&L/	BORA	FORY '	TESTS
FEET	MATERIAL	DESCRIPTIO	ON				11	INC		YPE	IN.	wc	DEN		PL	⁄ 6-# 200
1 -	FILL, mixture of silty sand sand with silt, a little grave roots, dark brown and blac	d, clayey sa el, surface 1 ck	nd and oots, trace		FILI	Ĺ	19	м	M	SS	14	7				
2	SANDY LEAN CLAY, a roots, brown and gray mot	little grave ttled, firm (l, trace CL)		TIL	L	8	м	\mathbb{N}	SS	14	17				
4	SANDY LEAN CLAY, a	little grave	l, light						R			10				
5 6	brown and gray mottled, s	tiff (CL)					11	м	X	SS	19	10				
7 -									দি			14				
8 -							11	м	X	SS	20	17				
9 10	SANDY LEAN CLAY, a gray, a little brown, stiff, l	little grave aminations	l, brownish of silty						R			15				
11 –	sand (CL)						14	M	Ň	SS	21					
12 —	SANDY LEAN CLAY, a	little grave	l, grav, stif	f //					R			14				
13 ~	(CL)	5					11	M	X	SS	22					
14 —									R							
15 —							14	м	M	SS	20	15			ľ	
16 -									Д							
17 -									ł							
18									ł							
19 -									1							
20 -							15	м	X	SS	21	14				
21 -									Н							
22									ł	-						
23								1	ł							
25 -									K							
26							14	M	X	SS	19	15				
	END OF BORING Northing=209443.6 Easting=552400.6				1											
ימיזורו		ſ		11/47	 				L				<u> </u>	<u> </u>	L	1
- DEP		DATE	70.07	SAMPI		CASING	CAV	/E-IN	10	DRILLI	NG	WAT	ER	NOTE:	REFE	RTO
0-24	4½' 3.25" HSA	DATE	0.20	DEPI	ГН	DEPTH	DE	PTH	FL	UID LI	EVEL	LEV	EL	SHEE	IS FO	R AN
		0/20/07	9:20	20.	2	24.3						1901	16	EXPLA	NATIO	ON OF
BORIN	G ETED: 6/26/07			1					+	<u></u>			,	TERMI	NOLO	JY ON
DR: SC	G LG: SB Rig: 91C								\mathbf{T}					Tŀ	IIS LO	G

IOCATION: N: 209329.011, E: 550811, 898 5 IOCATION: N: 209329.011, E: 550811, 898 5 Artice Hills, Minnesota Artice Hills, Minnesota DRULEE: K. Keek METHOD: 3 J/4* HISA, Autohur DATE: 62807 SCALE: 1* Feet feet Artice Hills, Minnesota Description of Materials BPF WL Tests or Notes B89.7 6.0 Symbol Carrey, tusc of Koota at 9 sample depth, mixed ark brown to brown, molst.	Brai	ın Proje	ect SP-0	5-05871	BORING	:		ST-88	
DRILLER: K.Kask METHOD: 314* HSA, Ausohm DATE: 628:07 SCALE: 1" = Elev. Dopth feet ASTM Description of Materials (ASTM D2488 or D2487) BPF WL Tests or Notes 880.7 0.0 Symbol FILL: Sily Stand very fine- to fine-grained, brown to brown, moist. BPF WL Tests or Notes 883.7 6.0 SP- POORLY GRADED SAND with SILT, fine-grained, brown to brown, moist. 6 ¥ 881.7 8.0 SP- POORLY GRADED SAND with SILT, fine-grained, brownish-gray to gray, waterbearing, loose to medium dense. 6 ¥ 881.7 8.0 SD- POORLY GRADED SAND with SILT, fine-grained, brownish-gray to gray, waterbearing, loose to medium dense. 6 ¥ 881.7 18.0 SD- POORLY GRADED SAND with SILT, fine-grained, brownish-gray to gray, waterbearing, loose to medium dense. 10 10 871.7 18.0 SAMDY LEAN CLAY, trace of Gravel, gray, wet, rather soft to rather stiff. 10 10 863.7 26.0 END OF BORING. 4 4	Geote TCA NE o Arde	ecnical E AP Redev f Highwa n Hills, N	valuation velopment y 10 and l Iinnesota	Highway 96	LOCATIC attached s	DN: N: ketch.	209329	9.011, E: 55081	1.898 Se
Elev. Bet Depth Symbol ASTM (ASTM D2488 or D2487) BPF WL Tests or Notes - - FILL Gravel, race of Gravel, race of Gravel, race of Brown, moist. -	DRILI	.ER: K.	Keek	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/28	3/07	SCALE:	1'' = 4
FILL FILL: Sity Stand, very fine- to fine-grained, trace of Gravel, trace of Boots at 5' sample depth, mixed dark brown to brown, moist. 16 883.7 6.0 24 881.7 8.0 POORLY GRADED SAND with SILT, fine-grained, brown, moist, loose. 6 881.7 8.0 POORLY GRADED SAND with SILT, fine-grained, brown, moist, loose. 6 881.7 8.0 POORLY GRADED SAND with SILT, fine-grained, draw of the brownish-gray to gray, waterbearing, loose to medium demse. 6 881.7 8.0 SP- POORLY GRADED SAND with SILT, fine-grained, draw of the brownish-gray to gray, waterbearing, loose to medium demse. 6 881.7 8.0 SP- POORLY GRADED SAND with SILT, fine-grained, draw of the brownish-gray to gray, waterbearing, loose to medium demse. 15 881.7 10 10 10 10 871.7 18.0 CL SANDY LEAN CLAY, trace of Gravel, gray, wet, rather soft to rather stiff. 10 863.7 26.0 END OF BORING. 4 863.7 26.0 END OF BORING. 4	Elev. feet 889.7	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
871.7 18.0 871.7 18.0 CL SANDY LEAN CLAY, trace of Gravel, gray, wet, rather soft to rather stiff. (Glacial Till) 10 863.7 26.0 END OF BORING. 4 Boring then grouted. 10		6.0	SP- SM SP- SM	FILL: Silty Sand, very fine- to fine-grained, tra Gravel, trace of Roots at 5' sample depth, mixe brown to brown, moist. POORLY GRADED SAND with SILT, fine-gr brown, moist, loose. (Lacustrine) POORLY GRADED SAND with SILT, fine-gr brownish-gray to gray, waterbearing, loose to r dense. (Lacustrine)	ace of ed dark	16 24 6 15 6	Ţ		
863.7 26.0 4 863.7 26.0 4 Water observed at 8 feet while drilling. 4 Boring then grouted. 4	- 871.7 - -	18.0	CL	SANDY LEAN CLAY, trace of Gravel, gray, v soft to rather stiff. (Glacial Till)	- vet, rather - - -	10			
	 863.7 	26.0		END OF BORING. Water observed at 8 feet while drilling. Boring then grouted.		4			

LOG OF BORING

BRAUN[™]

Brau	n Proj	ect Sl	P-06	-05871	BORING	i:		ST-89	<u>.</u>
Geotee TCAA NE of	cnical E P Rede Highwa Hille N	valuat velopr y 10 a Jinnos	tion nent ind H	lighway 96	LOCATI attached	ON: N: sketch.	209181	1.170, E: 55089	95.450 Se
DRILLI	ER: K.	Keck	sota	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	7/07	SCALE:	1" = 4
Elev. feet	Depth feet	AST	M	Description of Materials	I	BPF	WL	Tests or	Notes
890.4	0.0	PAV	501 XXX	(ASTM D2488 of D2487) \2" of Bituminous	/	1			
		FILL		FILL: Silty Sand, fine-grained, trace of Gravel dark brown to brown, moist.	l, mixed - - -	21			
- 883.4	7.0	SP-		POORLY GRADED SAND with SILT fine of	-	10	ĮΣ		
-		SM		brown, waterbearing, medium dense. (Lacustrine)		14			
-					-	10			
-					- - 				
872.4	18.0				-				
· · · · · · · · · · · · · · · · · · ·	4 998 8 80 0	CL		SANDY LEAN CLAY, trace of Gravel, gray, v soft. (Glacial Till)	wet, rather 				
					-				
864.4	26.0			END OF BORING		5			
44				Water observed at 7 feet while drilling Boring then grouted	- · -				
·									

Summer of Street	VIE	KIEC	•						
Γ	Brau	n Proj	ect S	P-0	6-05871	BORING			ST-90
	Geote	cnical E	valua	tion			NV N	· 200183	3 404 E· 551399 923 See
	TCAA	P Rede	velop	men	t	attached s	ketch.	. 20910.	J. 404, E. 001000.025 BCC
	NE of	Highwa	ıy 10 : #:	and	Highway 96				
H	Aruen			sota					
	JRILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	6/07	SCALE: $1'' = 4'$
	Elev. feet 891.0	Depth feet 0.0	AST Sym	ΓM iboł	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or Notes
Γ			SM		SILTY SAND, very fine- to fine-grained, trace of	of Roots,			
					dark brown, moist.	_			
	889.0	2.0	SD		POOPLY CPADED SAND with SUT fine or	inad			
F			SM		light brown, moist, loose to medium dense.	inicu,	9		
					(Lacustrine)		Δ		
-	-						11		
(suc	885.0	6.0	SP-		POORLY GRADED SAND with SILT fine are	ined	Δ	Σ	
/iati			SM		grayish-brown with rust, waterbearing, medium	dense.			
brei					(Lacustrine)		V 15		
of ab						-	4		
ы Б						-			
anat	-						М 14		
expl	<u>880.0</u>	11.0					Å 1		
for.			SP- SM		POORLY GRADED SAND with SILT, fine-grai gray, waterbearing, loose to medium dense	ined,			
heet					(Lacustrine)		7 17		
SV S						_	X 11		
nolo T						-			
im.							1 10		
eΤe						_	X 10		
iptiv	874.0	17.0							
escr	07.110	1710	CL		SANDY LEAN CLAY, trace of Gravel, gray, we	et,			
	ľ				medium.	-			
Š_					(Olaciai Tilly	· _			
46	_					<u>.</u>			
07 14:							6		
10/2/						-	1		
Lag	·					-			
Ň-						_			
BRA									
GD									
0587	265.0	26.0					7		
SP06	0.00	20.0			END OF BORING.				
DND-					Water obcomined at 6 fact while 1-112-	_			
BOR			Ì		water observed at o reet while drifting.	_			
ő g					Boring then grouted.				
010									
BAS	-		ĺ						
S-						_			
SP-0	6-05871				Brown Interlee Companies		<u> </u>	<u> </u>	ST 00 - more 1 -61

BR



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081					L	DG OF	F BC	RINGN	 10.	ST	-91	(p. 1	of 1)
PROJE	ECT: TCAAP Red	levelopr	<u>nent; Ar</u>	den H	ills, MN			,		. <u> </u>					
DEPTH IN	SURFACE ELEVATION:	893	.1		GEOLOGY	N	MC	SA	AMPLE	REC	FIELI)&L/	BORA	TORY	TESTS
FEET	MATERIA EIL mostly conducilt	L DESCRIP	TION	<u></u>		N .	MC		FYPE	ĪN.	wc	DEN	LL	PL	%-#200
1	rots, trace roots, dark bro	a little grav	vel, surface	/	FILL	13	м	М	SS	16					
2 -	FILL, mixture of silty sa little gravel, pieces of bri	nd and san	d with silt, and black	a				Д	00	10					
3 -		,			2	26	м	M	SS	21					
4								Д							
- 5 -								M							
6 -						28	M	Ŵ	SS	23					
7 -								R							
8 –	ODO LIVIO CE LIVI					14	М	XI	ss	18					
9 -	black, stiff to very soft (C	roots, trac DL/OH)	e shells,		SWAMP DEPOSIT			म			89				
10 -	BOGLIME, trace roots, g	ray, a little	black,			2	м	M	88	23	118				
	moist, very soft to firm, l	ense of sap	oric peat (O	L)				Д	00	23	149				
							<u> </u>	M							
14 -	SAND WITH SILT, a litt	le gravel	prav		COARSE	7	W	M	SS	20					
15 -	waterbearing, loose (SP-S	SM)			ALLUVIUM			E							
16	to stiff (SC/CL)	gravei, gra	iy, very sof	t		2	М	X	SS	18	17				
17 -								H							
18 -								¥.							
19 -								1							
20 -								H							
21 -					i	6	M	XI	SS	17	15				
22 –								रि							
23 -							ľ	ł							
24 –								ł							İ
25 -						0	M	$\overline{\mathbf{N}}$		1.0	14				
26 -	ENDOFRODUNG	<u></u>				9		M	22	18					
	Northing=209184.1														
	Easting=551898.2														
DEPT	H: DRILLING METHOD			WATE	R LEVEL MEA	SUREN	 MENT	s	L		<u> </u>				
0-241/	4' 3.25" HSA	DATE	TIME	SAMPLE DEPTH	D CASING	CAVE		DI		G FI	WATE	ζ 1	THE AT	TACH	ED
		6/27/07	11:05	14.0	12.0	12.	5	~~0	V		12.0	i s	HEETS	FOR	AN
BORING												ΞEΣ	(PLAN	ATION	1 OF
COMPLE	TED: 6/27/07				-						· · · · · · · · · · · · · · · · · · ·	TE	RMIN(DLOGY	' ON
DR: SG	LG: SB Rig: 91C												THIS	LOG	



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081					LC	OG OF	во	RINGN	10.	ST	-92	(p. 1	of 1)
РROЛ	ECT: TCAAP Red	evelopm	ent; Arc	len Hi	ills, MN										
DEPTH	SURFACE ELEVATION:	898.4	4		GEOLOGY			54	MPIE	REC	FIELI	D&L/	BORA	TORY	TESTS
FEET	MATERIAL	DESCRIPT	ION		GLOLOGI	N	MC		TYPE	N.	wc	DEN	LL	PL	%-#200
₁ _	1.5" Bituminous Pavemer	nt			FILL			M	SU						
	little gravel, pieces of bitu	id and clay iminous, b	ey sand, a	Ì		26	M	M	SS	3	7				
	ORGANIC CLAY, a little	e gravel, bl	lack, a little		SWAMP	1		\square			12			1	
3-	(OL/OH)	sandy lear	i clay		DEPUSIT	10	M	Ň	SS	17	13				
4 -	ORGANIC CLAY, trace	roots, blac	k, soft					ष्ठ					1		
5	(OL/OH)					4	м	M	SS	17	46				
6-								Д							
7 -	CLAYEY SAND, a little	gravel, gra	y, soft,		TILL	-		M			10				
8 -	laminations of sand with s	silt (SC)				3	M	X	SS	18	18				
9 -	CLAYEY SAND, a little	gravel, trac	ce roots,					स्र							
10	brown and gray mottled, s	oft to firm	(SC)			4	м	М	22	17	16				
11 -						.		Д	55	17					
12 -								K							
13^-						8	М	Х	SS	23	16				
14	SANDY LEAN CLAY, a	little grave	el, brownis	h ////				ম							
15 –	gray, a little black, stiff, la (CL)	minations	of silty san	d		10	м	M	SS	23	16				
16 -								Д		25					
17 –								H							
18 -	SANDY LEAN CLAY, a	little grave	l, gray, stil	f				Ħ							
19 -	(CL)							Ľ							
_20						10	м	M	99	24	13				
21 -						10	101	\wedge	60	24					
22 -								ţ,					i.		
23 –							-	Ľ							
24 -								ł					i.		
25 -						15		\square	60		14				
26 -	······································					15	IVI	M	22	21					
	END OF BORING Northing=209185.3														
	Easting=552151.9														
DEPI	TH: DRILLING METHOD		<u> </u>	WATE	R LEVEL MEA	SURE	MENI	∟⊥ rs						nppp	
n 7 4	1/1 3 7511 118 4	DATE	TIME	SAMPL	ED CASING	CAV	E-IN	D	RILLIN	IG.	WATE	Ŗ	THE A	кегеі Ттася	
<u>U-24</u>	12 J.43 MOA	6/27/07	12:25	26.5	24.5	26	.0	rı,l	DID FF.	VEL	Non		SHEET	'S FOR	AN
											1101	E	XPLA	VATIO	N OF
BORINC COMPL	ETED: 6/27/07				••••							— т	ERMIN	OLOG	Y ON
DR: SG	LG: SB Rig: 91C												TH	S LOG	;



AET	OB NO: 22-00081					LC	DG OF	BC	RINGN	10	ST	-93	(p. 1	of 1)
PROJ	ECT: TCAAP Red	evelopm	ent; Arc	len Hi	lls, MN										
DEPTH	SURFACE ELEVATION: .	901.2	2		GEOLOGY	N	MC	S	AMPLE	REC	FIELI)&L/	ABORA	TORY	TESTS
FÊÈT	MATERIAL	DESCRIPT	ION			19	MC	·	ГҮРЕ	ĪN.	wc	DEN	LL	PL	%-# 200
1 -	FILL, mixture of sand wi	th silt and s dark brow	silty sand, n		FILL	14	м	\mathbb{N}	22	16					
2 -	FILL, mixture of clayey s	and and sil	ty sand, a				141	\triangle	55	10					
3 -	inche gravel, trace roots, b	rown and c	lark brown			8	м	Ŵ	22	14					
4 -	CLAYEY SAND, a little	gravel, bro	wn, firm to		TILL			Δ	55	14	13				
5 -	stiff (SC)							K			17				
6 -	-					8	М	X	SS	20					
7 -					e.			R							
8 -						9	м	M	SS	23	16				:
9								Д							
10 -	SANDY LEAN CLAY, a	little grave	el, light					M			1.0				
11 -	brown to brown, firm to s	tiff (CL)				7	M	X	SS	22	10				
12								मि							
13 -						11	м	V	SS	24	16				
14 —								Д							
15 —								\int			10				
16						13	М	Ň	SS	24	10				
17 —								Ł							
18 -	SANDY LEAN CLAY a	little orave	l oray stif	Ŧ				ł							
19	(CL)	Incie Brave	, gray, sti					$\{$:					
20 —								\sum	~ ~		16				
21 -							М	Ŵ	SS	22	10				
22 –								R							
23 –			·					ł							
24 –								ł							
25 -						11	м	∇	66		16				
26 -						11	IVI -	Μ	55	23					
	END OF BORING Northing=209104.1														
	Easting=552534.6														
DEP	TH: DRILLING METHOD			WATE	R LEVEL MEA	SURE	MENT	rs			I	;		DEFE	
0_24	1/2' 3.25" HSA	DATE	TIME	SAMPL	ED CASING	CAV	E-IN	E		IG VEI	WATE		THE A	TACF	TED
		6/27/07	2:10	26.5	24.5	26	.5			ىدى •	Non		SHEET	S FOR	AN
			·									E	EXPLAN	JATIO	N OF
BORING COMPL	; ETED: 6/27/07											T	ERMIN	OLOG	Y ON
DR: SC	LG: SB Rig: 91C												THI	S LOG	

Brau	n Proj	ect SP-0	6-05871	BORING	:	S	Т-94	
Geote TCAA NE of Arden	cnical E AP Rede Highwa I Hills, N	valuation velopmen y 10 and 1 /linnesota	t Highway 96	LOCATIO attached s	ON: N:2 sketch.	09180.2	73, E: 55290	2.330 See
ORILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/11/	07	SCALE:	1'' = 4'
Elev. feet 922.9	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	•	BPF V	VL MC %	Tests	or Notes
918.9	4.0	CL	SILTY SAND, trace of Roots, dark brown, moi (Topsoil) SANDY LEAN CLAY, trace of Gravel, light bi rather soft to medium. (Glacial Till)	st. 	8 5 5 7 8 8 7	16		
904.9	18.0	CL	SANDY LEAN CLAY, trace of Gravel, gray, w medium to rather stiff. (Glacial Till)		11			
<u>893.9</u> -	29.0	CL	SANDY LEAN CLAY, trace of Gravel, gray, m medium. (Glacial Till)		7			
			(Chachal IIII)	-	Å Í			

BRAUN

LOG OF BORING

	ect SP-06	5-05871	BORING:		SI	[-9 4	4 (cont.))
Geotecnical F TCAAP Rede NE of Highwa Arden Hills, I	Evaluation evelopment ay 10 and I Minnesota	lighway 96	LOCATIC attached s	DN: N ketch.	: 209	180.2	73, E: 55290	2.330 See
DRILLER: K	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	1/07		SCALE:	1'' = 4'
Elev.Depthfeetfeet890.932.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC %	Tests	or Notes
- 881.9 41.0		medium. (Glacial Till) (continued) END OF BORING. Water not observed with 39 1/2 feet of hollow- in the ground. Boring then grouted.	stem auger	7				

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	INTE	RTEC	~					
	Brau	n Proj	ect S	P-0	5-05871	BORING	:	ST-95
	Geote	cnical E	valua	tion		LOCATI	ON: N: 209184	.739, E: 553397.793 See
	TCAA NE of	AP Rede Highwa	velop: w 10-	ment and l	Highway 96	attached s	sketch.	,
	Arden	i Hills, N	Ainne	sota	Inghway 90			
	DRILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/11/07	SCALE: 1'' = 4'
	Elev.	Depth		-				
	924.0	0.0	AS. Sym	ibol	(ASTM D2488 or D2487)		BPF WL	lests or Notes
			FILL	\boxtimes	FILL: Silty Sand, trace of Roots, trace of Root	s, dark		
	- 022.0	20			brown, moist.			
	922.0	2.0	FILL	×	FILL: Sandy Lean Clay, mixed light brown, br	own and		
	_				dark brown, moist.	_	6	
	-					-		
(suo	_					_		
viatic	917.0	7.0	60	×		•		
bbre			SC		CLAYEY SAND, trace of Roots, dark gray, m (Buried Topsoil)	01st	10	
ofa	915.0	9.0					A	
ation			CL		SANDY LEAN CLAY, trace of Gravel, greeni light brown, wet	sh gray to		
cplan					(Glacial Till)		5	
or ex						_		
neet f						_		
gy sl	-					-	₩ 4 ⊻	
inolo	-					_		
ermi							M 5	
Ive 7		Í				_	\mathbb{A}	
script	907.0	17.0	CI	(IA)	SANDY LEAN CLAY trace of Grouple group	uat enthar		
e Dec	-		CL		stiff to stiff.	vei, rainer –		
š Š	-				(Glacial Till)			
46								
/07 14	_					_	13	
10/2								
CD1						_		
RAUN	-					_		
B						-		
2871.1	-						10	
SP060	898.0	26.0			END OF BORING.			
SING.	-				Water observed at 13 feet while drilling			
1. 80	-				Doring then grouted	-		
	-				Doing then grouted.	· –		
UN BY	.		ļ			_		
Ϋ́ς	D.06.055=		r					
-S	P-06-05871				Braun Intertec Corporation	and the second second second second second second second second second second second second second second second		ST.05 mage Loft

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ST-95 page 1 of 1

	INTE	RTEC	-											
	Brau	n Proj	ect S	P-06	6-058	71			BC	DRING:			ST-96	
	Geote	cnical E	valua	tion							N N	20893	4 186 E 5508	01 188 See
	TCAA	AP Rede	velop	ment		07			att	ached sl	ketch.	. 2007.	, 100, L. 5500.	1.100 Dec
	NE 01 Arder	Highwa 1 Hills N	iy 10. Ainne	and I Sota	Highw	ay 96								
	DRILL	ER: K.	Keck			METHOD	3 1/4" HSA	Autohmr		ATE	6/2	7/07	SCALE:	1'' = 4'
	Flev	Depth		1							0/2		OOALLE.	
	feet	feet	AS	FM		De	scription of	Materials			BPF	WL	Tests or	Notes
	892.3	0.0	Sym	ibol XXXI	EIL L	(AS	5TM D2488	or D2487)	·					
	-		rut		fILL.	Sandy Lean	Clay, dark o	rown to light b	vrown, v					
											10			
	888.3	4.0									N T			
			₽T	<u>₩</u>	PEAT	f, dark gray, w	et, rather so	ft to soft.						
_							(Swamp Do	posit)			5			
ions)				1						-	Y			
eviat				<u>11</u>						-				
abbr	_			1/ 3/							3			
n of	883.3	9.0	SD		POOT		CANTO with	h CH T fine a	minod		-			
natic			SM		gray,	waterbearing,	loose to me	lium dense.	raineo,					
expla	_						(Lacustri	ne)		_	≬ 7			
for e	_													
sheet											8			
Ogy 8	_									-	4			
louit	-													
Tem	—										12			
otive	-										¥			
SCLIF	-									-				
še De	-									-				
Š	-									_				
1:46														
7 17	-										∦ ×			
10/	_													
N.GD	869.3	23.0								Ì				
BRAU			CL		SANI	DY LEAN CLA	AY, trace of	Gravel, gray,	wet,					
CP.	-				meuru	A.1.4.	(Glacial I	Cill)		-				
05871	866 2	26.0									8			
SP06	000.3	20.0			END	OF BORING.		<u> </u>			1			
MING	-				Water	observed at 9	feet while d	rilling.		4				
29 ₩	-			ŀ	Boring	then arouted		J		_				
3	-				TOUN	5 aren grouteu.				_				
Aalc				Ì										
	.		ĺ							4				
, BKA	D 06 05077							~						200.07
- 5	E-UO-UNX/{						Brown I	atortoa ('omaoration					and the state of the state of the state of the state of the state of the state of the state of the state of the	SEDS mage loft

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ST-96 page 1 of 1



AET JO	OB NO: 22-00081						LC	G OF	BO	RING N	ю	ST	-97 ((p. 1	of 1	
PROJE	CT: TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION: _	891.0			GI	EOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORAT	'ORY	TESTS
FEET	MATERIAL	DESCRIPTIC)N					1110		YPE	IN.	wc	DEN	LL	PL	%-# 200
	FILL, mixture of sand with clayey sand, a little gravel, roots, dark brown and blac	h silt, silty s , surface roo k	sand and ots, trace		FIL	L	14	М	X	SS	17	12				
3	SAND WITH SILT, fine g	rained, a li	ittle gravel	,	CO.	ARSE	26	м	M	SS	10	9				
4 -	brown, moist, meanum dei	196 (91 -9141)						<u>स</u>							
5 -							12	¥	M	SS	9					
								<u> </u>	R 1							
8 -					•		2	w	M	SS	14					
9-					•				/\ स							
10 -	SILTY SAND, a little gra medium grained, gray, wa	vel, trace ro terbearing,	oots, fine te very loose	D	•		2	w	\mathbf{N}	SS	10					
	to medium dense (SM)								Å		ŀ					;
12							22	w	\mathbb{N}	SS	17					
14 -									Д	00						
15 -									Ń	00	17					
16					-		23	W	\square	55						
17 -									R							
18 —	SANDY SILT, dark gray,	waterbearin	ng, mediun	n	FIN	E			K							
19 -	dense, laminations of lean	clay at 20	(ML)		AL.	LUVIUM			H							
20 -							16	w	X	SS	15	24				
22 -									5							
23	CLAVEY SAND a little	wavel dark	aray firm		TI	1			$\left \right\rangle$							
24 —	(SC)	siavos, uaix	gray, mm						2							
25 –							7	м	\mathbb{N}	SS	19	16				
26			<u>.</u>		-		ļ		Λ			<u> </u>			_	
	END OF BORING Northing=208912.1 Easting=551143.1															
DEP	TH: DRILLING METHOD			WAT	ER L	EVEL MEA	SUR	EMEN	ITS	L				NOTE	REFI	ER TO
0-0	9½' 3.25" HSA	DATE	TIME	SAMP DEP	LED TH	CASING DEPTH	CA' DE	VE-IN PTH	FI	DRILLI LUID LI	NG EVEL	WAT LEV	ER EL	THE A	ATTAC	CHED
91/21-24	4½' 3.25" HSA	7/25/07	8:05	9.0)	7.0		7.0				6.	1	SHEE	TS FO	R AN
BUDIN	IG			<u> </u>]	EXPLA		ON OF
COMPI	LETED: 7/11/07								-				'	TH	IS LO	G UN
DR: S	G LG: SB Rig: 91C	1					1		1							

Brau Geote TCA	in Proj cnical E AP Rede	ect SP-0 valuation velopmen	6-05871 t	BORING: LOCATIC	DN: N: 208 ketch	ST-98 3927.565, E: 551670.574 Sec
NE of Arder	f Highwa n Hills, N	y 10 and Ainnesota	Highway 96			
	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/26/07	SCALE: $1'' = 4$
Elev. feet 892.8	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF WI	- Tests or Notes
- 885.8	7.0	PILL PILL PILL PILL PILL PILL PILL PILL	PEAT, dark gray, wet, medium.		5	
002.0	0.0	<u>1</u> <u>0</u> <u>1</u>	(Swamp Deposit)		0 4	
	9.0	SP- SM	POORLY GRADED SAND with SILT, fine- t medium-grained, with Gravel, light brown to g rust at 12' sample depth, waterbearing, medium dense. (Glaciofluvium)	o ray with n dense to 	X ∗ X 26	* 50 blows for 5 inches
<u>876.8</u>	16.0	CL	SANDY LEAN CLAY, trace of Gravel, gray, y medium.	wet,	18	
_			(Glacial Till)		7	
866.8	26.0					
			Water observed at 8 feet while drilling.	-		
-			Boring then grouted.			

BRAUN"

Braun Proj Geotecnical E TCAAP Rede NE of Highwa Arden Hills, N	ect SP-06 valuation velopment vy 10 and J vinnesota	6-05871 Highway 96	BORING: LOCATIC attached s	DN: N: ketch.	2086	S ′ 581.6	Г-9 9 70, Е:) 550941.756 See
DRILLER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/27	7/07		SCA	LE: 1'' = 4'
Elev. Depth feet feet 892.8 0.0	ASTM Symbol	Description of Materials		BPF	WL	MC %	P200	Tests or Notes
	PT 22 22 22 22 22 22 22 22 22 22 22 22 22	PEAT, dark gray, wet, rather soft. (Swamp Deposit) SILTY SAND, fine-grained, gray to brownish waterbearing, very loose to loose. (Lacustrine) END OF BORING. Water observed at 12 feet while drilling. Boring then grouted.	-gray,	$\begin{bmatrix} 13 \\ 5 \\ 4 \\ 5 \\ 4 \\ 7 \\ 4 \\ 7 \\ 4 \\ 7 \\ 7 \\ 7 \\ 7 \\ 7$	$\sum_{i=1}^{n}$	17	43	LL == 30% PI = 15 OC = 69

LOC OF BORING

Brau Geote	n Proj cnical E	ect S valua	P-06 tion	5-05871	BORIN	G: ION:	N	20868	ST-100 6.177. E: 55139	8.832 See
TCAA NE of Arden	AP Rede Highwa Hills, N	velop y 10 a /linne	ment and I sota	Highway 96	attached	sketo	ch.			
ORILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:		6/2	6/07	SCALE:	1'' = 4'
Elev. feet 895.7	Depth feet 0.0	AS7 Sym	FM bol	Description of Materials (ASTM D2488 or D2487)		B	PF	WL	Tests or	Notes
<u>889.7</u> 886.7	6.0	FILL PT SP- SM		FILL: Clayey Sand, fine- to medium-grained Gravel, dark brown to brown, moist. PEAT, Fibrous, dark gray, wet, rather stiff. (Swamp Deposit) POORLY GRADED SAND with SILT, fine- gray, waterbearing, loose to medium dense. (Glacial Till)	d, trace of		9 6 11	Σ		
					_		14			
873.7	22.0	CL		SANDY LEAN CLAY, trace of Gravel, gray, medium. (Glacial Till)	, wet,		6			
-	26.0			END OF BORING. Water observed at 9 feet while drilling. Boring then grouted.						



SUBSURFACE BORING LOG

AET JO	DB NO: 22-00081		LC)G OF	BO	RING N	10	ST-	101	(p. 1	of 1)				
PROJE	CT: TCAAP Rede	velopme	nt; Arde	<u>n Hi</u>	lls, l	MN										
DEPTH	SUDEACE ELEVATION.	897.9		<u></u>	CE				0		DEC	FIELD) & LA	BORAT	TORY 7	FESTS
IN FEET	MATERIAL I	DESCRIPTIC)N		GE	OLUGY	N	MC		YPE	IN.	wc	DEN	LL	PL	%-# 200
	FILL, mixture of sand with	n silt. silty s	sand and		FILL	,			\mathbf{h}					1		
1 –	clayey sand, a little gravel,	surface roo	ots, trace				28	M	X	SS	12					
2 -	roots, brown								H							
3 –							5	М	X	SS	13	10				
4 -									Ц							
5 -	CLAYEY SAND, a little g	gravel, trace	e roots,		MIX	ED			$\left[\right]$							
6-	dark gray, a little black, ve organic clay (SC)	ry soft, lan	inations of		OR 1	TOPSOIL	1	W/M	Ň	SS	4		1			
7_	organie endy (e e)								E							
,	SANDY LEAN CLAY, a	little gravel	, trace	1	TILI		1	M	M	66	2	15				
8-	with silt at 9.5' to 9.9' (CL))	3150 01 Suite				1		Μ	00	2					
9-									R			18				
10 -							5	-M-	X	SS	10	Į				
	CLAYEY SAND, a little	gravel, trace	e roots,						H							
12 –	gray and brown, still (SC)							∇		10	14					
13						10	M	Ŵ	88	19						
14 —									B					1		
15 —	stiff (CL)	nitte grave	, dark gray	· ///			10	м	Ŋ	SS	19	14				
16									Д							
17									ł	:						
18 —									ł							
19 -									1							
20 -							12	м	M	SS	23	14				
21 -									Д							
22									XI XI							
23 -									Į1						1	
24 -									团							
25 –							112	м	\mathbb{N}	22	23	15				
26 —								1.1	Λ				1			
	END OF BORING															
	Easting=551895.0				1										1	
				117.4 77						1			<u> </u>			
DEP	TH: DRILLING METHOD		[]	WAT:			CAT	VE-IN	1.5		NG	WAT	ER	NOTE:	REFE	ERTO
0-24	4½' 3.25" HSA	DATE	TIME	DEPT	ГН	DEPTH	DE	PTH	FI	UDL	ÉVEL	ĹÉV	ĒĹ	THE A	ATTAC TR ECT	HED
		6/29/07	9:40	9.0)	7.0		7.1	_			No	1e	STIER	IS PU NATW	
	G	6/29/07	9:45	11.	5	9.5	1	0.5	 			10.	4	LATLA TEDM		CV ON
COMPI	LETED: 6/29/07	6/29/07	10:00	26.	5	24.5	2	6.5	1-			Noi	1e	I EKIVIII TL		G UN
DR: S	G LG: SB Rig: 91C	-					1							11		~



AET JO	AET JOB NO: 22-00081							LOG OF BORING NO.			io	ST-	102	(p. 1	of 1	<u>)</u>	
PROJE	CT: TCAA	P Rede	evelopme	ent; Ard	en Hi	lls,	MN										
DEPTH	SURFACE ELEV	ATION: _	902.2			G	EOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORAT	FORY '	rests
FEET	М	ATERIAL	DESCRIPTIO	N				N	MC	נין	YPE	ĪN.	wc	DEN	LL	PL	∕₀- #200
1 -	FILL, mostly sar roots, trace roots	ndy silt, a , dark bro	little grave wn, possib	l, surface le cobbles		FIL	L.	10	м	M	SS	3	-				
2 -	FILL, moslty cla	yey sand,	a little grav	vel, trace		1				H							
3 -	roots, brown, dar	rk brown	and a little	gray				5	М	IXI	SS	6	12				
4										सि							
5								16	м	M	SS	7	16				: :
7_										R					1		
8 -	CLAYEY SANI to stiff (SC)	D, a little g	gravel, dark	t gray, firm		TIL	Ľ.	10	м	M	SS	19	13				
9										\\ E							
10 —								8	M	M	SS	17					
11 -										Д							
12 -								$\overline{\mathbf{N}}$	66	20	15						
13 -							9		Д	33	20						
15										K			1.				
16 -								9	M	X	SS	21	16				
17 –										ł							
18 —	SANDY LEAN	CLAY. a	little grave	l. dark grav						ł							
19	stiff (CL)	,-		-, 8,	`					묍							
20 –								9	м	M	SS	21	16				
21 -										Д							
22 –										B							
23 -										ł							
24 -										P							
25 - 26 - 100								10	M	X	SS	21	15				
20	END OF BORI Northing=208692	NG 2.0				1								 	47		·
	Easting-552595.	5										<u> </u>	1	<u> </u>			
DEP	TH: DRILLING M	ÆTHOD		<u>_</u>	WAT	ER L	EVEL MEA	SURI	EMEN	TS]	NOTE:	REFE	ER TO
0-24	1½' <u>3.25" H</u> SA		DATE	TIME	SAMPI DEP1	LED TH	CASING DEPTH	CA DE	/E-IN PTH	FI.	DRILLI UID LI	NG EVEL	WAT LEVI	ER EL	THE A	ATTAC	HED
			6/29/07	9:00	26.	5	24.5	20	6.0				Nor	ne	SHEE	TS FO	R AN
βάριτα	τορικα													TERMINOL C			JN OF
COMPL	ETED: 6/29/07											-		`	NOTE: REFE THE ATTAC SHEETS FOI EXPLANATIO ERMINOLOO THIS LO		G UN
DR: S (G LG: SB Rig;	91C	1	l	1		1	l l		1				1	× 1		-

Brau	n Proj	ect SP-0	6-05871	BORING	: <u>S</u>]	[-1()3	RI-1007	7-07
Geoted TCAA NE of Arden	nical E P Redev Highwa Hills N	valuation velopmen y 10 and J	t Highway 96	LOCATIC attached s	ON: N ketch.	: 208	804.6	74, E: 55290	6.273 Se
DRILLE	ER: К.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	9/07		SCALE:	1'' = 4
Elev. feet 924.9	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	•	BPF	WL	MC %	Tests	or Notes
923.9	1.0	FILL 💥	FILL: Silt, dark brown, moist.					1	
- - 920.9	4.0	FILL CL	FILL: Lean Clay, brown to dark brown, dry.	- moist to	18				
			wet, rather soft to rather stiff. (Glacial Till)		8				
-					4		18		
906.9	18.0	CL	SANDY LEAN CLAY, trace of Gravel, gray, me	 Dist,	10				
			(Glacial Till)		8				. *
	-		· · ·		8				
					15				

INTER	TEC												
Braun	Proje	ect SP-0	6-058	571				BORN	[-10]	3]	RI-	1007-07	(cont.)
Geotecr TCAAF NE of F Arden J	tical Ev ' Redev lighwa Hills, N	valuation velopment y 10 and 1 finnesota	t Highw	yay 96				LOCATIC attached sl)N: N: ketch.	2088	304.6	74, E: 552906	5.273 See
DRILLEI	₹: К.1	Keck		METHOD:	3 1/4" HSA	A, Autohm	r	DATE:	7/1	9/07		SCALE:	1'' = 4'
Elev. feet 892.9	Depth feet 32.0	ASTM Symbol		De (AS	escription o STM D2488	of Materia 8 or D248	ls 37)		BPF	WL	MC %	Tests c	or Notes
BRAUN BASIC LOG OF BORING SP0605871.GPI BRAUN.GDT 10/20714.42 (See Descriptive Terminology sheet for explanation of abbreviations) 6.F888 Br-00-0280.	40.0		SAN media END Wate: in the Borin	OF BORING. r not observed ground. g then grouted	AY, trace of lacial Till) with 38 1/2	2 feet of]	nollow-ste	em auger	11			ST-103 BL100	7.07 page 2 of 2

BRAUN"

BR/	AUN	5 5 M			-	LOG OF BORING
INTE	RTEC	-				
Brau	n Proj	ect SP-0	6-05871	BORING:	RI-400	3-01 ST-104
Geote	cnical E	valuatior		LOCATIO	N: N: 20868	2.011, E: 552906.273 See
NE of	Highwa	velopmer	t Highway 96	attached sk	ketch.	
Arden	Hills, N	Ainnesota				
DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/23/07	SCALE: 1'' = 4'
Elev.	Depth	ASTM	Description of Materials		BDE WI	Tests or Notes
934.9	0.0	Symbol	(ASTM D2488 or D2487)			rests of notes
934.4	0.5	FILL	FILL: Silty Sand, fine-grained, dark brown, mo	oist.		
F			with Clay layers, brown, moist.	of Gravel, –		
-	10					
950.9	4.0	FILL 💥	FILL: Silty Sand, fine-grained, mixed with Cla	y, black,		
-			moist.		8	
ous)				-f		
<u>927.9</u>	7.0		ORGANIC CLAY, black wet, very soft to rathe	ersoft		
			(Swamp Deposit)	-	2	
n or		 		_		
natio						
					5	
922.9	12.0					
leel		CL	SANDY LEAN CLAY, bluish-gray, wet, soft	o rather	7 5	
			(Lacustrine)	7		
					3	
				1		
				-		
5 916.9 8	18.0	CL	SANDY LEAN CLAY, trace of Gravel, brown	moist.		
<u> </u>			medium.	_		
			(Giaciai Tiii)			
1 10/7				<u> </u>		
				_		
911.9	23.0					
		CL	SANDY LEAN CLAY, trace of Gravel, gray, n medium.	noist,		
			(Glacial Till)			
908.9	26.0			X	6	
5	1		END OF BORING.	Í		
			Water not observed during drilling.	-		
			Water not observed with 24 1/2 feet of hollow-sin the ground.	stem auger		
	ł		Boring then grouted.			
	ĺ			-		
ST 06 05971	<u>-</u>					DI 4002 01 07 104 1 51

SP-06-05871

RI-4003-01 ST-104 page 1 of 1

Braun Pro	ject SP-0	6-05871	BORING	:	ST-105
Geotecnical TCAAP Red NE of Highw Arden Hills,	Evaluation evelopmen ay 10 and Minnesota	t Highway 96	LOCATIOn attached s	ON: N: 208435 sketch.	5.237, E: 551147.610 See
DRILLER: K	. Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/27/07	SCALE: 1'' = 4'
Elev. Depth feet feet 899.1 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF WL	Tests or Notes
- - - - - - - - - - - - - -	FILL FILL SP- SM SM	 FILL: Clayey Sand, fine- to medium-grained, Gravel, grayish-brown, moist. FILL: Silty Sand, fine-grained, dark brown, m POORLY GRADED SAND with SILT, fine-g brown, moist, loose. (Lacustrine) POORLY GRADED SAND with SILT, fine-g brown to grayish-brown, waterbearing, loose t dense. (Lacustrine) 	trace of	$ \begin{array}{c} \overline{13}\\ \overline$	
877.1 22.0	CL	SANDY LEAN CLAY, trace of Gravel, gray, stiff. (Glacial Till)	- wet, rather - -		
<u>873.1</u> 26.0		END OF BORING. Water observed at 9 feet while drilling. Boring then grouted.		9	

BRAUN™



SUBSURFACE BORING LOG

AET JOB NO: 22-00081							LOG OF BORING NO. <u>ST-106 (p. 1 of 1)</u>									
PROJE	CT: TCAAP Rede	velopme	ent; Ard	<u>en Hi</u>	lls,	MN			•			<u></u>				
DEPTH	SURFACE FLEVATION	903.4			G				SA	MPLE	REC	FIELI) & LA	BORAT	FORY T	FESTS
IN FEET	MATERIAL I	DESCRIPTIO)N			SOLOG1	N	MC	ี่ไ	ŶPĔ	ĨN.	wc	DEN	LL	PL	⁄₀-#2 00
	FILL, mixture of clayey sa	ind, silty sa	nd and		FIL	L	. .		М							
1 -	organic clay, a little gravel	, surface ro	oots, trace				11	М	IXI	SS	14	9		1		
2 -									H							
3							26	М	XI	SS	19	15				
4 -									H							
5 -				-					M			8				
6 —	black, stiff, lense of silty s	and (CL)	ace roots,		101	rsoil	14	М	M	SS	19	22			1	
7_					1				团						ľ	
, D	SILTY SAND, a little grav	vel, fine to : um dense (medium		CO/	ARSE LUVIUM	15	м	M	22	16					
°	granica, nght brown, mear	um dense (5141)				15		\mathbb{N}	00	10					
9-	SAND WITH SH T & BHL	a groual fu	na to						B							
10	medium grained, light brow	wn, waterbe	earing,				16	М	X	SS	17					
11	medium dense (SP-SM)								Ц							
12								T	$\left \right\rangle$			12				
13 –				_	23	W	X	SS	16							
14 -	CLAYEY SAND, a little g stiff to stiff (SC)		TIL	L.			E			i						
15 —	CLAYEY SAND, a little g	gravel, gray	, soft to				4		Μ	ee	17	17				
16 -	stiff (SC)						4		Μ	60	17					
17 -									Ł							
18									ł							
19									ł							
20 -									M			14				
20							7	M	X	SS	20	14				
21									ਸ਼ਿ						1	
22 -									岱							
23 –									ł							
24 -																
25 -							11	м	X	SS	23	14				
26 -					1			<u> </u>	$ \rangle$		<u> </u>			<u> </u>	<u> </u>	-
	END OF BORING															
	Easting=551647.6														1	
DED				WAT		EVEL MEA			 79	· · ·	1		<u> </u> 			
DEP				SAMD		CASING	CAV	JE-IN			NG	WAT	ER	NOTE	KEFF	LK TO
0-24	1 ¹ / ₂ ' 3.25" HSA	DATE	TIME	DEPI	ГН	DEPTH	DE	PTH	FÍ	UDL	ËVEL	LEV	EL	1 HE A	AIIA(HED
		7/11/07	9:20	14.	0	12.0	1	2.4	1-			12.	2	SHEE	15 FQ.	
DODING		7/11/07	9:30	26.	5	24.5	2	6.4				Nor	1e	EAPLA TEDM		
COMPL	LETED: 7/11/07	:							ļ							GIUN
DR: S (G LG: SB Rig: 91C			<u> </u>			L							11	113 LU	0



AET J	OB NO: 22-00081		LC	G OF	BO	RING N	10	ST-	107	(p. 1	of 1					
PROJE	CT: TCAAP Rede	velopme	ent; Ard	en Hi	ills,	MN										
DEPTH	SURFACE ELEVATION:	902.7			GE	OLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORAT	FORY 7	ESTS
FEET	MATERIAL	DESCRIPTIO	DN							TYPE	IN.	wc	DEN	LL	PL 9	%-#200
1	SILTY SAND, a little grav roots, dark brown, moist, i	vel, surface medium dei	roots, trac nse (SM)	e	TOP	SOIL	11	м	М	SS	15	4				
2 -	SAND WITH SILT, fine g	grained, tra	ce roots,	-	ALL	UVIUM			Д							
3 –	light brown, moist, meaiu	m dense (5)	P-51VI)				14	м	M	SS	20					
4					•				Д							
5 -					, ,				Ń	~~						
6 -							13	м	М	88	20					
7 -									R							
8						15	м	X	SS	21						
9									R							
10 -							11	W/M	M	SS	19					
11 -	SILTY SAND, a little grav	vel, fine to	medium						Д							
12 -	grained, brownish gray, w dense to very loose, lense	aterbearing of silt with	, medium sand at 11	•	•			_	\square							
13 —	(SM)				-		9	W	Ň	SS	15					
14 —									E							
15 —							2	w	X	SS	8					
16					-				R							
17 -									ł							
18 -	CLAYEY SAND, a little g	gravel, gray	, stiff to		TILI	L			ł							
- 19 -									범							
20							14	М	X	SS	19	12				
21									মি							
23 -									X							
24 —									Ŧ			1				
25 –									\square			15				
26 -							8	M	Ŵ	88	23					
	END OF BORING						1									
	Easting=551137.6															
DEP	TH: DRILLING METHOD			WAT	 ER LI	EVEL MEA	SURI	L EMEN	1 TS		1	1	J	J NOTE	REFE	
		DATE	TIME	SAMPI	LED	CASING	CAN	/E-IN	ا ايا		NG	WAT	ER	THE A	TTAC	HED
0-24	+72 J.23" HSA	7/11/07	10:30	14.	0	12.0		2.3	<u></u>			12.	1	SHEE	IS FOI	R AN
		7/11/07	10:40	26.	5	24.5	2	4.9	T	<u> </u>		Nor	1e	EXPLA	NATIO	ON OF
BORIN COMPI	BORING COMPLETED: 7/11/07]	rermi	NOLOG	GY ON
DR: SC	G LG: SB Rig: 91C				Ţ									TI	IIS LO	G

Geote TCAA NE of	n Proj cnical E P Rede Highwa	ect SP-0 valuation velopmen vy 10 and	6-05871 t Highway 96	BORING: RI-1011-02 ST-108 LOCATION: N: 208186.939, E: 551402.993 See attached sketch.						
Arden DRILLI	Hills, N	<mark>/linnesota</mark> Keck	METHOD: 31/4" HSA Autohmr		7/24	107	SCALE: 1"-			
Elev.	Depth			DAIL.	7724		SCALL. I -			
feet	feet	ASTM	Description of Materials		BPF	WL	Tests or Notes			
906.0	0.0	PAV	(ASTM D2488 of D2487)							
- - 902.6	4.0	FILL STATES	FILL: Silty Sand, fine- to medium-grained, da moist. POORLY GRADED SAND, fine-grained, bro iron staining, moist, loose to medium dense.	rk brown, wn with	26					
- - - 897.6	9.0		(Glacial Outwash)		5					
		SP	POORLY GRADED SAND, fine-grained, brow waterbearing, medium dense. (Glacial Outwash)	wn, wet to	15	Ā				
888.6	18.0		With Gravel layer at 15 1/2 feet.		22					
		CL	SANDY LEAN CLAY, trace of Gravel, gray, v	vet, rather						
			(Glacial Till)		5					
			· ·							
880.6	26.0		END OF BORING	X	5					
			Water observed at 12 1/2 feet while drilling. Boring then grouted.	-		-				
	**									

B ...



AET JO	AET JOB NO: 22-00081							LOG OF BORING NO. ST-109 (p. 1 of 1)								
PROJE	CT: TCAAP Red	evelopm	ent; Ard	en Hi	ills,	, MN										<u>.</u>
DEPTH IN	SURFACE ELEVATION: _	904.5			G	GEOLOGY	N	мс	SA	MPLE	REC	FIELI)&L.	ABORA	TORY	TESTS
FEET	MATERIAL	DESCRIPTI	ON	<u> </u>	EII					I YPE	IN.	WC	DEN	I LL	PL	%-# 200
1 -	roots, trace roots, dark bro	own	el, surface			LL	11	М	M	SS	12					
2	FILL, mixture of sand with clavey sand, a little grave	th silt, silty L trace root	sand and s dark					ŀ	$\left \right\rangle$			15				
3 -	brown and light brown	.,	5, uun				7	м	X	SS	11					
4 -									Ц							
5 -							11		M	00	21	16				
6							11	м	Μ	22	21					
7 -	SANDY LEAN CLAY, a	little grave	l, gray, a		TI	LL	-		R							
8 -	little brown, stiff to firm, i sand (CL)	laminations	of silty				12	м	X	SS	19	16				
9 —	5444 (02)								R							
10 -							8	м	M	SS	14	17				
11 -									Д							
12 -	SANDY LEAN CLAY, a	little grave	l, dark gray	, ///					\bigwedge							
13 -	III to suit (CL)	rm to stiff (CL)						М	Ň	SS	24	16				
14 -									R							
15 -							7	м	X	SS	17	17				
17									H H							
18									ł							
19 -									ţ							
20 -									R							
21 -							8	М	XI	SS	22	16				
22 -	2 00								रि				-			
23 -									ł							
24 -									ł							
25 -							10		∇	00		17				
26 -							10	М	Ŵ	22	20	17				
	END OF BORING Northing=208177.9															
	Easting=551886.3															
DEPT	TH: DRILLING METHOD			WATE	I ER L	EVEL MEA	L SURE	MENT	LL FS		L	I	<u> </u>	NOTE	REFE	
0.24	1/1 3 75 11 LIG A	DATE	TIME	SAMPL	.ED	CASING DEPTH	CAV	E-IN	Г FI		NG VEI	WATE	R	THE A	TTACI	HED
0-243	<u>72 5.45 110/X</u>	7/18/07	9:40	26.5	5	24.5	24	.9		نابد معدن	بديد ،	Non	e	SHEET	S FOR	AN
]	EXPLANATIO		N OF
BORING COMPLI) ETED: 7/18/07												7	FERMIN	IOLOG	Y ON
DR: SG	LG: SB/BRig: 91C													TH	IS LOC	3

INTE	RTEC	~				
Brau	n Proj	ect SP-0	6-05871	BORING	RI-100)7-05 ST-110
Geote	cnical E	valuation	•	LOCATIO	DN: N: 20818	32.321, E: 552397.605 See
NE of	Highwa	velopment y 10 and 1	Highway 96	attached s	ketch.	
Arden	n Hills, N	Ainnesota	· ·			
DRILL	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/24/07	SCALE: 1" = 4'
Elev. feet	Depth feet	ASTM	Description of Materials		BPF WL	Tests or Notes
915.2	0.0	FILL XX	FILL: Silty Sand, fine-grained, trace of Grav	el, dark		
912.2	1.0	CL	brown, moist.	un with iron		
╞			staining, wet, rather soft to medium.	vn with from _		
-			(Glacial Till)	_	6	
F				-		
—						

					8	
904.2	9.0					
		CL	SANDY LEAN CLAY, trace of Gravel, gray medium to rather stiff.	, moist,		
			(Glacial Till)		9	
				-	M 8	
â						
					8	
-				-1		
-						
				-		
1-						
					8	
				-		
-				_		
-				_		
-				_		
887.2	26.0		END OF BORING			
			Water not observed during duilting	_		
L			water not observed during drilling.	_		
			water not observed with 24 1/2 feet of hollow in the ground.	v-stem auger		
			Boring then grouted.			
	ĺ			-		
SP-06-05871	<u> </u>		Braun Intertec Corporati	n in in in in in in in in in in in in in		BL1007-05 ST-110 page 1 of 1

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BRA	AUN	8 SU 8				-	LOG OF BORING
INTE	RTEC	~					
Brau	n Proj	ect S	P-0	6-05871	BORING	r RI-100	07-06 ST-111
TCAA	AP Rede	valua	men	t	LOCATI	ON: N: 20818 sketch	4.910, E: 552896.448 See
NE of Arden	Highwa Hills, N	ay 10 : Minne	and [sota	Highway 96	attachea	sketon.	
DRILLI	ER: К.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/24/07	SCALE: 1'' = 4'
Elev. feet	Depth feet	AST	ГМ	Description of Materials		BPE WI	Tests or Notes
922.1	0.0	Sym	bol	(ASTM D2488 or D2487)		DIT	10313 07 140105
921.1	1.0	FILL		FILL: Silty Sand, fine-grained, with Roots, trace Gravel, dark brown, moist.	ace of		
-		FILL		FILL: Organic Clay, with Silty Sand layer, bla	ack to dark		
-					_	<u>7</u> 11	
918.1	4.0		***				
		SP		POOKLY GRADED SAND, fine-grained, bro loose.	own, wet,		
-				(Glacial Outwash)			
915.1	7.0						
				SANDY LEAN CLAY, trace of Gravel, brown rather soft.	n, wet, -	<u> </u>	
913.1	9.0	CI		(Glacial Till)	1		
				moist, medium to rather stiff.	n and gray,		
				(Glacial III)	-		
~					-	9	
908.1	14.0	CL		SANDY LEAN CLAY trace of Gravel gray	wet		
<u> </u>				medium.			
-					-		
╞──│							
					-		
					_		
						7	
-					-		
-							
-							
					-		
	ľ					6	
					_		
					_	MG	
893.6	28.5			END OF BORING.			
				Water not observed with 27 feet of hollow-ster the ground.	m auger in		
-				Boring then grouted.			
SP-06-05871		<u>.</u>		Braun Intertec Corporation	-		DI 1007.06 CT 112

SP-06-05871

Braun Intertec Corporation orporation RI-1007-06 ST-111 page 1 of 1
Geotecnical Evaluation 1 TCAAP Redevelopment 1 NE of Highway 10 and Highway 96 4 Arden Hills, Minnesota 1 DRILLER: K. Keck METHOD: 3 1/4" HSA, Autohmr Elev. Depth feet feet ASTM Description of Materials	LOCATIC attached s	DN: N: ketch.	2081	88.4	59 E	553395	210 500
DRILLER: K. Keck METHOD: 3 1/4" HSA, Autohmr I Elev. Depth Feet feet ASTM Description of Materials						555575.	517 500
Elev. Depth feet ASTM Description of Materials	DATE:	6/29)/07		SCAI	LE:	1'' = 4'
936.8 0.0 Symbol (ASTM D2488 or D2487)		BPF	WL	MC %	P200 %	Tests	s or Note
936.7 0.1 PAV \2" Bituminous Pavement. 935.8 1.0 FILL: Poorly Graded Sand with Silt, trace of Grave brown, moist. - SM POORLY GRADED SAND with SILT, fine- to medium-grained, trace of Gravel, reddish brown, m losse to medium dense. - . .	rel,	7 24 28 27 32 32 39		4	9		

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ST-112 page 1 of 1

LOG OF BORING

Braun Intertec Corporation

Brau	n Proj	ect S	P-06	-05871	BORING):	(ST-113	
Geote FCAA NE of Arden	enical E P Rede ^v Highwa Hills, N	valua velopi y 10 a Ainnes	tion ment and H sota	lighway 96	LOCATI attached	ON: N sketch.	: 20818:	2.505, E: 55382	8.508 See
ORILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	9/07	SCALE:	1" = 4
Elev. feet 941.8	Depth feet 0.0	AST Syml	'M bol	Description of Materials (ASTM D2488 or D2487)	• ••	BPF	WL	Tests or	Notes
		SC		CLAYEY SAND, trace of roots, dark brown, r (Topsoil)	noist. –				
939.5	2.3	SM		SILTY SAND, fine- to medium-grained, trace reddish brown, moist, medium dense.	of Gravel,	17			
				(Glacial Till)	- 	21			
						55			
-	10.0					32			
929.8	12.0	SP		POORLY GRADED SAND, fine- to medium- trace of Gravel, light brown, moist, medium de dense. (Glacial Outwash)	grained, nse to	16			
						20			
	ŀ								
-						36			
					-				
15.8	26.0					33			
				END OF BORING.					
			j	Water not observed with 24 1/2 feet of hollow- in the ground.	stem auger – –				
				Boring then grouted.					
					-				



AET JO	OB NO: 22-00081						LO	G OF	BO	RING N	10.	ST-	114	(p. 1	of 1	l)
PROJE	CT: TCAAP Rede	evelopme	ent; Ard	<u>en Hi</u>	ills,	MN										
DEPTH	SURFACE ELEVATION:	913.1			GI	EOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORAT	'ORY '	TESTS
FEET	MATERIAL	DESCRIPTIO	N					IVIC		YPE	IN.	wc	DEN	LL	PL	%-# 200
1 –	FILL, mixture of clayey sa little gravel, surface roots.	and and san trace roots	dy silt, a . black and		FIL	L	8	м	М	SS	6	8				
2-	brown		,				-		Д		-					
3-	ORGANIC CLAY, trace 1	oots, black	, a little		sw	AMP	7	м	M	SS	15	38				
4	gray, firm, laminations of	silty sand (OL/OH)		DE	POSIT			Д			24				
5	LEAN CLAY, gray, very	stiff (CL)			FIN	E			\mathbb{N}			44				
6 —	SANDY SILT, a little grav	vel, trace ro um dense 1	ots, gray, a aminations	1	AL		19	М	M	SS	12	28				
7 -	of lean clay (ML)	1.0		_ЩЦ	TI	T			团							
8 -	grained, gray, waterbearin	g, very loos	medium se (SM)			<i>.</i>	3	w	X	SS	16	1.0				
9 —		little grave	aray soft						H			19				
10 -	to very stiff (CL)	nue grave.	, gray, son				-		\square	69	1.2	10				
11 -							3	M	M	22	15	10				
12 -									B							
13 -							9	М	X	SS	16	16				
14 —									R							
15 -							11	м	М	SS	16	17				
16 -							11		Δ	00						
17 -									Į							
18 —									Į							
19 —	· · ·								I							
20 -							14	М	M	SS	24	16				
21									Д							
22 -									ł							
23 -									$\left\{ \right\}$							
24 –									P							
25							17	м	X	SS	24	16			1	
26 -	FND OF BODINC				1		<u> </u>	<u> </u>	$ \rangle$							
	Northing=207847.6						ļ									
	Easting=552482.9															
DEP	TH: DRILLING METHOD		······	WAT	ER L	EVEL MEA	SURI	EMEN	TS		,			NOTE:	REFE	ER TO
0-24	4½' 3.25" HSA	DATE	TIME	SAMPI DEP1	LED IH	CASING DEPTH	CA DE	/E-IN PTH	FL	DRILLI JUID LI	NG EVEL	WAT LEV	ER EL	THE A	TTAC	HED
		7/18/07	11:40	9.0)	7.0	7	.0				5.2	2	SHEE	TS FO	R AN
-		7/18/07	12:05	26.	5	24.5	2	6.5				Nor	1e]	EXPLA	NATI	ON OF
BORIN COMPI	G LETED: 7/18/07												1	ERMI T		GY ON
DR: SC	G LG: SB/BRig: 91C		<u> </u>							<u></u>				11		



SUBSURFACE BORING LOG

AET JO	OB NO: 22-00081						LC	G OF	BOI	RING N	10	ST-	115	<u>(p. 1</u>	of 1	<u>) </u>
PROJE	CT: TCAAP Rede	evelopme	ent; Ard	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION: _	908.2			GI	EOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORAT	FORY '	TESTS
FEET	MATERIAL	DESCRIPTIO	N				14			YPE	IN.	wc	DEN	LL	PL	%-#200
1 –	FILL, mostly silty sand, so roots, dark brown	urface roots	, trace		FIL	L.	15	м	M	SS	21	÷				
2 —	FILL, mixture of clayey sa trace roots brown and bla	and and san ck	d with silt,						H							
3 -							20	М	XI	SS	20					
4 -									ष्ट्रि							
5	SAND WITH SILT, a littl fine grained, brown, moist (SP-SM)	e gravel, m t to wet, me	edium to dium dense		AL	ARSE LUVIUM	12	м	М	SS	18					
7 –	(01-0141)								R							
8-							18	м	Μ	SS	19					
9																
10 -							11	W/M	\prod	88	17	15				
11 -	CLAYEY SAND, a little	gravel, dark	t brown,		TIL	L	11	1,4,1,1,1	Д	55	1					
12 -	stiff (SC)	mavel dark	r oray soft	- 11/					M							
13 —	to stiff (SC)	graver, uar	giay, son				4	M	М	SS	19	17				
14									मि						t	
15 —							7	M	X	SS	21	16			·	
16 -									H							
17									ł							
18						:			ł							
20 -									R							
20							8	M	X	SS	23	13				
22 -									মি							
23 -									Ŧ							
24 —									$\{\cdot\}$		1					
25 –							10		\square	00		10				
26 –							10	M	\wedge	55	24	10				
	END OF BORING Northing=207758 9															
	Easting=551498.2															
DEP	TH: DRILLING METHOD			WAT	ERL	EVEL MEA	SURI	EMEN	TS	<u></u>	•			NOTE:	REFE	ER TO
0-24	4½' 3.25" HSA	DATE	TIME	SAMPI DEP1	ED H	CASING DEPTH	CA DE	/E-IN PTH	FL	ORILLI UID LE	NG VEL	WAT LEVI	ER EL	THE A	TTAC	HED
	· · · · · · · · ·	7/11/07	11:20	11.	5	9.5	1	0.1				Nor	le	SHEE	rs foi	R AN
DOBR 7		7/11/07	11:40	26.	5	24.5	2	4.5				Nor	ie []	EXPLA	NATIO	ON OF
COMPL	LETED: 7/11/07	· ·							_				{``	EKMIN TU		JY UN G
DR: SC	G LG: SB Rig: 91C	1	i i						1					10		J

06/04



AET JO	DB NO: <u>22-00081</u>						LC	G OF	BO	RING N	io	ST-	116	(p. 1	<u>of 1</u>	
PROJE	CT: TCAAP Rede	velopme	ent; Ard	en Hi	lls,	MN						 				
DEPTH	SURFACE ELEVATION:	913.0			GI	EOLOGY	N	MC	SA	MPLE	REC	FIELD) & LA	BORA	ORY	rests
FEET	MATERIAL	DESCRIPTIO	ON							TYPE	IN.	wc	DEN	LL	PL	⁄o-#200
1 -	SILTY SAND, a little graver of the second se	vel, surface wn, moist, 1	roots, trac medium	e	TOI CO, ALI	PSOIL ARSE LUVIUM	13	м	М	SS	17					
2 3	SILTY SAND, trace roots grained, brown, medium d sand at 3.5' (SM)	, fine to me ense, lense	dium of clayey			_	20	м	\mathbb{N}	SS	18	14				
4	CLAYEY SAND, a little g	gravel, light	t brownish		TIL	L,			শ্রি							
5 — 6 —	CLAYEY SAND, a little g mottled, firm to stiff (SC)	gravel, gray	and brown	n		·	8	м	M	SS	19	18				
7 -									R			17				
8							11	M	Ň	SS	23					
9 – 10 –	SANDY LEAN CLAY, a	little grave	l, gray, firn	n ///			0	M	M	66	21	17				
11 -	to sun (CL)					ļ	0		Д	33	21					
12							6	M	\mathbb{N}	66	24	19				
13 -							0		Д	33	24					
15							7		V		24	19				
16 -							/		Å	60	24	1				
17									ł							
18								:	ł							
20			·				7		M		24	17				
21							/	M	Д	22	24					
22 -																
23 24									ł							
25 -									K	00		17				
26 —			<u>.</u>				9	м	Ŵ	55	24					
	END OF BORING Northing=207685.1															
	Lasting 551717.5												<u> </u>	_		
DEP	TH: DRILLING METHOD			WAT	ERL	EVEL MEA	SURI	EMEN	TS			117 A TT		NOTE:	REFE	R TO
_0-24	1½' 3.25" HSA	DATE	TIME	SAMPI DEPI	LED TH	CASING DEPTH	DE	/E-IN PTH	FL	UID LE	VEL	WAT LEVI		THE A	TTAC	HED
		7/11/07	1:00	26.5	5	24.5	2	4.5	-			Nor	ie .	SHEE	15 FOI Natu	CAN
BORIN	G									• •••				TERMIN	VOLO	GY ON
DR SI	ETED: 7/11/07 G LG: SB Rig: 91C								$\left \right $					TH	US LO	G



AET J	OB NO: <u>22-00081</u>					LC	DG OF	BO	RING N	io	ST-	117	(p. 1	of 1)]
PROJE	ECT: TCAAP Rede	velopme	ent; Ard	en Hi	lls, MN										
DEPTH	SURFACE ELEVATION: _	914.4			GEOLOGY	N	MC	SA	MPLE	REC	FIELD) & LA	BORAT	ORY	TESTS
FEET	MATERIAL	DESCRIPTIO	DN				INIC		TYPE	IN.	wc	DEN	LL	PL	%-#2 00
1-	4" Bituminous Pavement	and sandy	silt and		FILL	10		M	5U 50	12	8				
2	sand with silt, a little grave	el, pieces o	f			10		Д	66	14					
3-	SAND WITH SILT, fine	nd black grained, gra	v, medium	-	COARSE	19	-	М	SS	15					
4-	dense (SP-SM)				ALLUVIUM		Ţ	Д	~~						
5-	brownish gray, medium de	o medium j ense (SP-SI	grained, M)					M							
6-						13	W	X	SS	16					
7-								E							
8-						15	w	М	SS	17					
9-								Д							
10 -	SANDY LEAN CLAY, a	little grave	l, dark gray	, ///	TILL			M							
11 -	firm to stiff (CL)					8	M	XI	SS	14	17				
12								团							
13 -						8	M	M	SS	16	16				
14 -								Д							
15 —	£							M							
16 -						9	M	M	SS	22	16				
17								শ্র							
18 -								ł							
19 -								ł							
20 -								М							
21 -						10	M	Ŵ	SS	24	17				
22 -								Ł							
23 -								ł							
24								H						1	
25 –						10		\square	00		17				
26 -						12	M	M	55	24					
	END OF BORING														
	Easting=552397.2														
DEP	TH: DRILLING METHOD			 WATI	ER LEVEL MI		 EMEN	TS		1	1	<u> </u>		DEFT	
		DATE	TIME	SAMPI	ED CASING	CA	VE-IN	Ţ	<u>JRILLI</u>	NG.	WAT	ER	THE A	TTAC	HED
0-24	4½' 3.25" HSA	7/18/07	10.20	DEPT	H DEPTH	DE	55		UID LE	VEL			SHEET	rs foi	R AN
		7/18/07	10:50	26.5	4.3 5 24.5	2	 6.5	-			Nor		EXPLA	NATIO	ON OF
BORIN	G ETED 7/18/07						~						ERMI	10LO	GY ON
DR: SO	G LG: SB/BRig: 91C												TH	IS LO	G

Brau	n Proje	ect SP	-06-05	5871	B	ORING:			ST-118	
Geote FCAA NE of Arden	cnical É AP Rede Highwa Hills, N	valuati velopm y 10 ai Iinneso	ion ient id Higł ota	nway 96	LC	DCATIC ached sl	N: N: ketch.	: 20767	7.923, E: 55264	3.604 See
ORILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	D	ATE:	7/1	0/07	SCALE:	1'' = 4'
Elev. feet 914.9	Depth feet 0.0	ASTN Symb	AI ol	Description of Materials (ASTM D2488 or D2487	,		BPF	WL	Tests or	Notes
910.9	4.0	SM		TY SAND, fine-grained, gray, wet, ve. (Lacustrine)	y loose.		7	Σ		
905.9	9.0	۲۹ کے بر ۲۹ بر	<u> </u>	AT, dark gray, wet. (Swamp Deposit)			3	*****		
900.9	14.0	۷ بر SM	上 シー シー SIL Ioos	TY SAND, fine-grained, gray, waterbase. (Lacustrine)	aring, very		3			
- 392.9	22.0						3			
88.9	26.0		ENI	Glacial Till) O OF BORING.	ay, wel,		7			
		J J J J J J J J J J J J J J J J J J J	Wat Bor	ter observed at 6 feet while drilling.		_				

BRAUNS

BRA	NUN	SKI						LOG OF B	ORINO
INTE Brau Geote TCAA NE of	RTEC n Proj cnical E P Rede Highwa	ect SI valuat velopn vy 10 a	2-06- ion nent nd Hi	05871 ghway 96	BORING LOCATIC attached s	DN: N ketch.	: 2076	ST-119 578.910, E: 552897	.340 See
Arden	Hills, N	Ainnes	ota						
Elev.	ER: K. Denth	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/	9/07	SCALE:	1'' = 4'
feet 929.7	feet 0.0	AST Symb	M Iol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or N	lotes
929.2 	9.0	FILL		FILL: Silty Sand, trace of Roots, dark brown, n FILL: Silty Sand, fine- to medium-grained, trac Gravel, brown, moist to wet. SANDY LEAN CLAY, light brown to brown w and rust, wet, rather soft to rather stiff. (Glacial Till)	ith gray	20 13 12 5 8 9			
- 907.7 - - 903.7	22.0 26.0	CL	S n E	ANDY LEAN CLAY, trace of Gravel, gray, we nedium. (Glacial Till) ND OF BORING.	et,	8		*NR Suspected Co Boulder	bble or
			W ir B	Vater not observed with 24 1/2 feet of hollow-sin the ground. Foring then grouted.	tem auger			CT	119 nggs 1 n

ĺ	Brau	n Proie	ect SP-0	6-05871	BORING	•		C 7	F 170	}
	Geote TCAA NE of Arden	cnical E P Redev Highwa Hills M	valuation velopmen y 10 and	t Highway 96	LOCATIC attached s	DN: N: ketch.	2076	584.6	34, E: 5	53359.506 See
	DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	9/07		SCAL	E: 1'' = 4'
	Elev. feet 940.8	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC	P200	Tests or Notes
ļ	940.3	0.5	SM	SILTY SAND, trace of roots, dark brown, moist.				70	70	
of abbreviations)	- - - - - 931.8	9.0	CL	SANDY LEAN CLAY, trace of Gravel, yellowisl moist, rather stiff to medium. (Glacial Till)	h brown, 	7 7 5 9				
escriptive Terminology sheet for explanation	-	18.0	CL	LEAN CLAY with Sand, reddish brown, moist, v (Glaciofluvium)	~ery stiff. 	21 21 21 18		16	73	LL = 26% PI = 10%
I BRAUN.GDT 10/2/07 14:43 (See D		10.0	SM	SILTY SAND, fine- to medium-grained, trace of reddish brown, moist, medium dense to dense. (Glacial Till)	Gravel, 	48				
OG OF BORING SP0605871,GP1	911.8	29.0				27		- - -		
BASIC L(SM	SILTY SAND, fine- to medium-grained, trace of (reddish-brown, moist, medium dense to very dens (Glacial Till)	Gravel, e.	23				

BRA	<u>IUN</u>	5M						L)G	OF BORING
INTE	RTEC	-		- <u></u>						
Brau Geoter	n Proje mical F	ect S	SP-0	5-05871	BORING	:	ST	-12	0 (cont.)
TCAA NE of Arden	P Rede Highwa Hills, N	velop velop vy 10 Ainne	and]	Highway 96	LOCATIC attached s	DN: N ketch.	: 207	684.6	34, E:	553359.506 See
DRILLE	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	9/07		SCA	LE: 1'' = 4'
Elev. feet 908.8	Depth feet 32.0	AS Syn	TM nbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC %	P200 %	Tests or Notes
 904.8 	36.0	SP		SILTY SAND, fine- to medium-grained, trace of reddish-brown, moist, medium dense to very den (Glacial Till) (continued) No sample recovery at 35 1/2 feet. POORLY GRADED SAND, fine- to medium-gra brown, moist, dense. (Glacial Till)	Gravel, Ise ained,	*				* 70 blows for 12 inches
	42.0 46.0	SP		POORLY GRADED SAND, fine- to coarse-grain of Gravel, brown, moist, very dense. (Glacial Outwash)		29 7 53				
				END OF BORING. Water not observed with 44 1/2 feet of hollow-stein the ground. Boring then grouted.	em auger					
D 06 05971	<u></u>		<u> </u>			<u> </u>			L	PT 100

Geotec	n Proje mical E	ect SP valuati	·06-05871 >n	BORING	:		ST-121	
TCAA NE of Arden	P Rede Highwa Hills, N	velopm y 10 an Iinnesc	ent d Highway 96 ta	LOCATI attached s	ON: N sketch.	: 207682	2.711, E: 55389	9.659 S
DRILLE	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/2	2/07	SCALE:	1'' =
Elev. feet 944.6	Depth feet 0.0	ASTN Symbo	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
- - - - - - 935.6	4.0	CL CL	FILL: Silty Sand, trace of Gravel, trace of root foot, mixed light brown to brown, moist. SANDY LEAN CLAY, trace of Gravel, grayisl brown, with rust, wet, rather soft to rather stiff. (Glacial Till) SANDY LEAN CLAY, trace of Gravel, light b brown, rather soft to rather stiff. (Glacial Till)	is in upper	24 13 4 4			
930.6	26.0	CL- ML	SILTY CLAY, reddish brown, wet. (Glaciofluvium)		21 16			
			END OF BORING. Water not observed with 24 1/2 feet of hollow-s in the ground. Boring then grouted.					

BRAUN^{**}

LOG OF BORING

Brau Conto	n Proj	ect S	SP-0	6-05871	BORING	-		ST-122	
TCAA NE of Arden	P Rede Highwa Hills, N	valua velop y 10 Ainne	and Besota	t Highway 96	LOCATIC attached s	ON: N: sketch.	207684	4.411, E: 55427	9.817 Se
ORILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	6/2	8/07	SCALE:	1'' = 4
Elev. feet 959.5	Depth feet 0.0	AS Syn	TM 1bol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
<u>957.5</u>	2.0	CL		FILL: Silty Sand, with Gravel, brown, moist. SANDY LEAN CLAY, trace of Gravel, brown, rather soft to medium. (Glacial Till)		5 5 7 7			
945.5	14.0	SP		POORLY GRADED SAND, fine- to medium-gra reddish-brown, moist, medium dense. (Glacial Outwash)	ained,	32			
- 037.5	22.0	SC		CLAYEY SAND, trace of Gravel, reddish-brown very stiff. (Glacial Till)	ı, moist,	25			
933.5	26.0	SM		SILTY SAND, fine- to medium-grained, reddish- moist, very dense. (Glaciofluvium)	-brown, – –	70			
				END OF BORING. Water not observed with 24 1/2 feet of hollow-ste in the ground. Boring then grouted.	em auger				

쭖 SP-06-05871

Brau Cost	n Proj	ect S	P-06	5-05871	BORING	: R	[-100	7-03 ST	-123
Geotec TCAA	nical E P Rede	valua velon	tion ment	ſ	LOCATI	ON: N	: 20746	8.088, E: 55233	31.548 See
NE of]	Highwa	y 10 a	and l	Highway 96	attached	sketch.			
Arden	Hills, N	linne	sota						
ORILLE	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/2	4/07	SCALE:	1'' = 4'
Elev. feet	Depth feet	AST	ГМ	Description of Materials		BPF	WT	Tests or	Notes
913.4	0.0	Sym	ibol	(ASTM D2488 or D2487)				10363 01	Notes
912.4	1.0	FILL		FILL: Silty Sand, fine- to medium-grained, damoist	ark brown,				
		FILL		FILL: Sandy Lean Clay, trace of Gravel, brow	vn, moist.				
Ì									
					-				
						M 12			
907.4	6.0	CL		No sample recovery at 5 1/2 feet.	moist to	μ			
				wet, rather soft to medium.	moist to _				
				(Glacial Till)	_	7			
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87.4	26.0					7	<u> </u>		
		·		END OF BORING.		1			
				Water observed at 25 feet while drilling.	-				
				Boring then grouted.	_				
l					_				
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Brau	n Proj	ect Sl	P-06	5-05871	BORING	: RI-400)9-01 ST	-124
Geotec TCAA NE of Arden	nical E P Rede Highwa Hills, N	valuat velopr y 10 a /linnes	tion nent ind I sota	Highway 96	LOCATIC attached s	ON: N: 20742 sketch.	29.899, E: 55264	7.857 Se
DRILLE	: к.	Keck	<u> </u>	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/24/07	SCALE:	1" = 4
Elev. feet 923.8	Depth feet 0.0	AST Syml	M bol	Description of Materials (ASTM D2488 or D2487)		BPF WL	Tests or	Notes
922.8	1.0	FILL	\bigotimes	FILL: Silty Sand, fine- to medium-grained, trac Gravel, dark brown, moist.	ce of			
		FILL		FILL: Sandy Lean Clay, brown, moist to wet.				

			*		_	μ μ		
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					-			
914.8	9.0				-	₩		
		OL	<u> </u>	ORGANIC CLAY, black, wet.				
-		F		(Swanip Deposit)		5		
911.8	12.0				_	fi		
211.0	12.0	CL		SANDY LEAN CLAY, trace of Gravel, grayish	1-brown,			
909.8	14.0			(Lacustrine)	_			
		CL		SANDY LEAN CLAY, trace of Gravel, gray, w	vet,			
-				(Glacial Till)		7		
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071.0	26.0		<u> </u>	END OF BORING.				
				Water not observed during drilling.	-			
				Water not observed with 24 1/2 feet of hollow-s in the ground.	tem auger			
-				Boring then grouted.				
	I					1 1 1		



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081					LO	G OF	BO	RING N	io	ST-	125	(p. 1	of	D	
PROJE	TCAAP Rede	velopme	ent; Ard	en Hi	ills,	MN										
DEPTH	SURFACE ELEVATION: _	932.7			G	EOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORA	FORY	FESTS
FEET	MATERIAL	DESCRIPTIO	NC			:	PI I	IVIC		YPÉ	IN.	wc	DEN	LL	PL	⁄₀- #200
1 -	FILL, mixture of silty sand surface roots, trace roots, p brown	d and silty possible col	clay, bbles, dark		FIL	L	27	м	M	SS	9	7				
2	FILL, mostly clayey sand cobbles, trace roots, brown	with grave	l, possible		-		31	м	M	SS	11	7				
4									B							
5-							12	м	X	SS	8	9				
7-									E							
8 -							6	м	X	SS	4	10				
9-	CLAYEY SAND, a little s	gravel, trac	e roots.		TIL	L			E							
10 – 11 –	brown, firm (SC)	<u> </u>	,				7	М	M	SS	6	10				
12 —									E							
13 -							7	M	M	SS	11	10				
14	SAND WITH GRAVEL, t graded, light brownish gra dense (SW)	trace roots, y, moist, m	well iedium		CO AL TIL	DARSE LUVIUM	13	м	R	SS	16	14				
16 – 17 –	CLAYEY SAND, a little g gray, stiff (SC)	gravel, ligh	t brownish						\ ₽							
18 —	CLAYEY SAND, a little g	gravel, poss	sible						ł							
19	cobbles, brown, very stiff	(SC)							I							
20							20	M	M	SS	21	10				
22 –	~								A							
23 -	SAND WITH SILT, a little	e gravel, fi	ne to		CO AL	ARSE			Ĭ							
24 -	(SP-SM)	ioist, very v	dellise						Ľ							
26 –							66	M	Ň	SS	NR	<u> </u>				
	END OF BORING Northing=207429.3 Easting=552897.4															
DEP	TH: DRILLING METHOD			WAT	' ER L	LEVEL MEA	SURE	EMEN	TS		1	- I		NOTE:	REFF	ER TO
0-24	1½' 3.25" HSA	DATE	TIME	SAMPI DEP1	LED TH	CASING DEPTH	CAV DE	/E-IN PTH	FL I	DRILLI UID LE	NG VEL	WAT LEVI	ER EL	THE A	TTAC	HED
		7/6/07	10:30	26.	5	24.5	20	6.5				Non	ie	SHEE	rs foi	R AN
	<u> </u>													EXPLA	NATI	ON OF
COMPL	G LETED: 7/6/07] ¹	ERMI		JY ON
DR: SC	G LG: SB Rig: 91C														n2 FO	u

06/04



AET JO	OB NO:	22-00081						LC	GOF	BORING	NO	<u>ST-1</u>	<u>25A</u>	(p.	<u>1 of</u>	2)
PROJE	CT:	TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN			<u>.</u>						
DEPTH	SUR	FACE ELEVATION:	932.7			GE	EOLOGY		MC	SAMPL	E REC	FIELD)&LA	BORAT	ORY 1	ESTS
FEET		MATERIAL I	DESCRIPTIC	N				18	IVIC	TYPE	IN.	wc	DEN	LL	PL	%-#200
	No sa	nples taken to 29.5',	Refer to Lo	og of						Į.						
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DEP	'I'H; D	RILLING METHOD			WA'I	EK L	EVEL MEA	CAT			LING	WAT	ER	NOTE	REFE	ER TO
0-3	91⁄2' 3	.25" HSA	DATE	TIME	DEPI	ĨĤĨ	DEPTH	DE	PTĤ	FLUID	LEVEL	LÉV	ÊĹ	THE A		
			7/25/07	1:20	41.5	5	39.5	4	1.5			Noi	1e	EXPLA	NATIO	ON OF
BORIN	G													TERMI	NOLO	GY ON
	LETED:	BR Rig 91C												Tł	IIS LO	G



AET JO	DB NO: <u>22-00081</u>			LC	og of	BO	RING N	10	ST-1	<u>25A</u>	(p.)	2 of :	<u>2)</u>
PROJE	CT: TCAAP Redevelopment; Arde	n Hi	lls, MN]
DEPTH			GEOLOGY	N	MC	SA	MPLE	REC	FIELD	& LAI	BORAT	ORY 1	ESTS
FEET	MATERIAL DESCRIPTION			N	MC	ר	YPE	IN.	WC	DEN	LL	PL	%-# 200
30 -	SAND, a little gravel, fine to medium grained,		COARSE	21	м	М	ee	20					
31 -	nght brown, moist, medium dense to dense (51)			51		Μ	60	20					
32 -						ß							
33						ł							
34						H							
35 —				25		∇	66	10					
36 -				25		М	22	19					
_ 37 —						Ł							
38 -						Ł							
39 -						ł							
40 -				20	м	M	66	20					
41 -				50	IVI	Δ		20				-	
	END OF BORING												
	Easting=552897.4												
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Brau Geote	n Projecnical E	ect SP-0 valuation	6-05871	BORING	: ON: N: 20740	ST-126 1.256, E: 554161.240 Se
ICAA NE of Arden	AP Rede Highwa Hills, N	velopmen y 10 and 1 linnesota	t Highway 96	attached s	sketch.	
DRILL	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	6/28/07	SCALE: 1'' = 4
Elev. feet 957.0	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF WL	Tests or Notes
950.0	7.0	FILL OL 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,	FILL: Silty Sand, fine- to medium-grained, t Gravel, brown to light brown, moist. ORGANIC CLAY, dark gray, wet, soft to rat (Swamp Deposit)	race of	8 4 2 4	
-	12.0	CL	SANDY LEAN CLAY, trace of Gravel, gray, soft to medium. (Glacial Till)	, wet, rather	 4 6 9 9 9 	
-	20.0		END OF BORING. Water observed at 12 feet while drilling. Boring then grouted.	-		

LOG OF BORING

BRAUN™



SUBSURFACE BORING LOG

AET JO	OB NO: 22-00081						LC	G OF	BORING	NO	ST-1	26A	(p.	<u>1 of</u>	2)
PROJE	CT: TCAAP Rede	evelopme	ent; Ard	en Hi	lls,	MN]
DEPTH	SURFACE ELEVATION:	957.0			GE	EOLOGY	N	мс	SAMPLI	REC	FIELI) & LA	BORAT	ORY	ESTS
FÉET	MATERIAL	DESCRIPTIO	NC						TYPE	IN.	wc	DEN	LL	PL	%-# 200
1	Boring ST-126	, Refer to L	og of			:	-		1						
2 -									{}						
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DEP	TH: DRILLING METHOD		· · · · ·	WATI	ER LI	EVEL MEA	SURI	EMEN	rs TS	1	_!	<u> </u>	NOTE:	REFE	R TO
n 20)1/21 3 75" HS A	DATE	TIME	SAMPI	LED H	CASING DEPTH	CAV	/E-IN PTH	DRILI FLUID I	.ING .EVEL	WAT LEV	ER EL	THE A	TTAC	HED
<u> </u>	/// J.4J HUA	7/23/07	11:15	41.5	5	39.5	4	1.5			Nor	ie	SHEE	rs foi	R AN
] I	EXPLA	NATIO	ON OF
BORIN COMPL	G LETED: 7/23/07											. 1	ERMI	IOLO(JY ON
DR: SC	G LG: BR Rig: 91C	1											IH.	12 LO	3

06/04



AET JO	DB NO: <u>22-00081</u>		LO	G OF	BORING N	io. <u> </u>	<u>ST-1</u>	<u>26A</u>	(p.)	2 of :	2)
PROJE	CT: TCAAP Redevelopment; Arden Hi	ills, MN									
DEPTH		GEOLOGY			SAMPLE	REC	FIELD	& LAF	BORAT	ORY T	ESTS
IN FEET	MATERIAL DESCRIPTION	GEOLOGI	N	мс	TYPE	ĨŇ.	wc	DEN	LL	PL	%-#200
30 31 32	SILTY SAND, fine to medium grained, brown, moist, very dense (SM) LEAN CLAY WITH SAND, brown, hard, lense of sand with silt and gravel at 31 feet (CL)	COARSE ALLUVIUM TILL	79	M	a ss	22	7				
33	SILTY SAND WITH GRAVEL, fine to medium grained, brown, moist, very dense (SM)		148	М	SS REFERENCE	15					
39 40 41	SILTY SAND, a little gravel, fine to medium grained, brown, a little light brown, moist, very dense, lense of sand with silt and gravel at 41 feet (SM)		63	М	ss	24					
	END OF BORING Northing=207401.3 Easting=554161.2										

Braun F	roje	ect S	P-06	b-05871	BORING	: ST	-12	27	RI-	4006-21
TCAAP I NE of Hig Arden Hi	Redev ghwa Ils, N	valua velopi y 10 : Iinne	ment and I sota	t Highway 96	LOCATIC attached s	DN: N ketch.	: 207:	512.9	39, E:	554545.415 S
DRILLER:	K. 1	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/2	2/07		SCA	LE: 1" = 4
Elev. De feet feet f	epth eet	AST	FM bol	Description of Materials		BPF	WL	MC	P200	Tests or No
051.9	1.0	FILL	\boxtimes	FILL: Silty Sand, trace of Roots, dark brown, mo	ist.			70	70	
946.8	6.0	FILL		FILL: Clayey Sand, trace of Gravel, dark brown t and reddish brown, moist. CLAYEY SAND, Organic, dark gray, wet, soft to medium. (Swamp Deposit)	o brown	× 8				
-					-	3		35	42	OC = 6
938.8 - 934.8 1	14.0	CL		LEAN CLAY, olive gray, wet, rather soft. (Swamp Deposit)		3				
		CL		SANDY LEAN CLAY, trace of Gravel, gray, wet stiff. (Glacial Till)	, rather	12				
926.8 2	6.0			END OF BORING.		11		15		
				Water not observed with 24 1/2 feet of hollow-ster in the ground. Boring then grouted.	m auger					

LOG OF BORING

BRAUN"

Brau	n Proj	ect SI	P-06	-05871	BORING	ST:	-12	28	RI-4006-20
TCAA NE of Arden	cnical E AP Rede Highwa Hills, N	valuat velopn ly 10 a: /Iinnes	ion nent nd H ota	lighway 96	LOCATIC attached s	ON: N: ketch.	: 2073	347.0	78, E: 554700.746 S
DRILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/2	2/07		SCALE: 1" =
Elev. feet 954.1	Depth feet 0.0	ASTI Symb	M	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC %	Tests or Note
953.1	1.0	FILL	**	FILL: Silty Sand, trace of roots, dark brown, me	oist.				
		FILL		FILL: Sandy Lean Clay, trace of Gravel, reddisl moist.	1 brown, - - -	10 7		an men ng manana kan na kan akan akan ng mangang mangang mangang mangang mangang mangang mangang mangang mangan	
<u>947.1</u> 	7.0	CL		SANDY LEAN CLAY, slightly Organic, dark gr olive gray, soft. (Swamp Deposit)	ray to 	3			
942.1	12.0	CL		SANDY LEAN CLAY, gravish brown with rust	wet	2		21	OC = 3%
				(Glacial Till)		7			
936.1	18.0	SM		SILTY SAND, fine- to medium-grained, trace of reddish brown, moist, medium dense to dense. (Glacial Till)	Gravel,	26			
	26.0				-	.33*		-	*Suspect cobble or
		<u> -</u> }		END OF BORING	/	ľ			boulder
-			i l	Water not observed with 24 1/2 feet of hollow-st in the ground.	em auger –			-	
			1	Boring then grouted.					
06 05971					i				

LOG OF BORING

BRAUN



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081						LO	GOF	BO	RING N	io	ST-	129	(p. 1	of 1)
PROJE	CT: TCAAP Rede	velopme	nt; Arde	en Hi	lls,	MN					_ .					
DEPTH	SURFACE ELEVATION:	915.9			GI	EOLOGY	N	мс	SA	MPLE	REC	FIELD) & LA	BORAT	ORY 7	FESTS
FEET	MATERIAL I	DESCRIPTIC	DN					me	ן ריייז	TYPE	IN.	wc	DEN	LL	PL	%-# 200
1	FILL, mixture of clayey sa sand with silt, a little grave	ind, silty sa el, surface r	nd and oots, trace		FIL	L	18	М	X	SS	15	6				
2	1000s, dark brown and brow	will							$\left(\right)$							
3 –							12	М	X	SS	15					
4 -			<u> </u>						ম							
5 -	CLAYEY SAND, a little g	gravel, dark	brown and	ſ	TIL	L	5	м	M	SS	19	12				
6	CLAYEY SAND, a little g mottled, firm, laminations	gravel, brov	vn and gray sandy lean						H							
7 -	clay (SC)						0		$\overline{\mathbf{V}}$	00	10	16				
8-							ð	Mi	\wedge	99	19	10	ł			
9 – 10 –	CLAYEY SAND, a little g	zravel, brov	vn and						R							
11 -	brownish gray mottled, sti	ff (SĆ)					12	М	X	SS	18	15				
12 -	CLAYEY SAND, a little g	gravel, dark	gray, firm						R							
13 -	to stiff (SC)						5	М	M	SS	22	16				
14 -									A							
15 -									Ň		24	10		:		
16 -							8	М	\wedge	55	24	18				
17 —									Ł							
18 —									ł							
19 —									ł							
20 —							9	М	M	SS	24	18				
21 —								ĺ	Å							
22 -									ł							
23 —									H							1
24									Į¥							
25 -							11	М	X	SS	24	18				
26 -	END OF BORING					·		+	<u>/ \</u>		<u> </u>			-	-	+
	Northing=207214.0 Easting=551928 3														1	
	Lasting 551720.5															
DEP	TH: DRILLING METHOD		Įi	WAT	ER L	EVEL MEA	SURI	EMEN	TS			337.4.77		NOTE	REFE	ER TO
0-2-	4½' 3.25" <u>HSA</u>	DATE	TIME	SAMPI DEPT	LED TH	CASING DEPTH		/E-IN PTH	FI	URILLI .UID LI	EVEL	LEV	EK EL	THE A	ATTAC	CHED
		7/11/07	2:05	26.	5	24.5	2	4.5				No	1e	SHEE	IS FO	
BORIN	G												,	TERMI	NOLO	GY ON
ČŎMP	LETED: 7/11/07						<u> </u>		-					TI	IIS LO	G

06/04

Brau	1 Proj	ect S	P-0	5-05871	BO	RING	:		S	[-13	0
Geotec TCAA NE of I Arden	nical E P Rede Highwa Hills, N	valua velop y 10 : Ainne	ition ment and l sota	Highway 96	LO atta	CATIO iched s	DN: N ketch.	: 207	127.1	16, E:	552428.985 See
DRILLE	R: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DA	TE:	7/1	3/07		SCAI	LE: 1" = 4'
Elev. feet 915.1	Depth feet 0.0	AST Sym	FM ibol	Description of Materials (ASTM D2488 or D2487)	-		BPF	WL	MC %	P200 %	Tests or Notes
<u>914.8</u> 908.1 906.1	 9.0	FILL FILL CL CL		FILL: Silty Sand, fine-grained, dark brow. FILL: Silt, black, moist. SANDY LEAN CLAY, brown, wet. (Glacial Till) SANDY LEAN CLAY, trace of Gravel, br wet, rather soft to medium. (Glacial Till)	n, moist.		X 8 X 5 X 5 X 8		9	4	
901.1	14.0	CL		SANDY LEAN CLAY, trace of Gravel, gr medium. (Glacial Till)	ay, wet,		5 7 6				
							7	-			
889.1	26.0			END OF BORING. Water not observed during drilling. Water not observed with 24 1/2 feet of hol in the ground.	ow-stem at	ıger	7		A Construction of the second se		· · ·

SP-06-05871



AET JO	OB NO:	22-00081						LC	G OF	BO	RING N	ю	ST-	131	(p. 1	of 1	D
PROJE	ECT:	TCAAP Rede	velopme	nt; Arde	en Hi	lls,	MN		. <u> </u>								
DEPTH	SUR	FACE ELEVATION:	926.9			GI	EOLOGY	N	MC	SA	MPLE	REC	FIELD) & LA	BORAT	FORY '	TESTS
IN FEET		MATERIAL I	DESCRIPTIC	N				IN	MC	3	YPE	IN.	wc	DEN	LL	PL	%-# 200
	FILL,	mostly sandy silt, su	rface roots	, trace	7	FIL	L	17		M	00	17	7				
1 –	FILL	mixture of clavev sa	nd and san	dv lean]			17	M	M	22	17					
2 -	clay,	a little gravel, possibl	e cobbles,	trace roots,						\square		_	11				
3 -	grayis	sh drown and drown						11	M	M	SS	5					
4 -										团				1			
5 -	-							6	м	M	SS	19	17				1
6 -	-							v		Д			18				
7 -	FILL	mixture of sand with	silt and si	lty sand.	_					K							
8 -	trace	roots, brown and blac	.k		-/EEE		ARSE	8	М	X	SS	12					
9 -	SILT	Y SAND, trace roots,	, fine graine	ed, dark		AL				Н			1				
10 -	\(possi	ble fill)				WE	ATHERED			\square							
11 -	SANI	OY LEAN CLAY, a loray a little brown a	little gravel and black f	, trace		TIL	L.	6	M	Ň	SS	20	21				
12 -	10003,	gray, a naio orown a				1				मि							
13 -	SANI browr	DY LEAN CLAY, a l nish gray, a little broy	little gravel vn. stiff to	l, light verv stiff.			.L	12	м	M	SS	15	17				
14	lamin	ations of silty sand ((CL)	•						Д						1	
14 -			2							K							
15 -								18	М	X	SS	19	16				
16	-									4							
17 -										ł			1		1		
18 -	SANI	DY LEAN CLAY, a	little gravel	l, brownish						ł							
19 —	gray t	o dark gray, very stif	f to stiff (C	L)						12							
20 -								23	м	M	SS	24	16				
21 —	-									\square							
22 -	-									1							
23	-									比							
24 -	-							1		H			1				1
25 -	-									\prod			16				
26	-							14	M	Ņ	88	24					
	END	OF BORING				1				1	1				1		
	North Eastin	ing=207188.3 g=552633.8															
			r											<u> </u>	_		
DEF	PTH: I	DRILLING METHOD	[WAT	ER L	EVEL MEA	SUR	EMEN	ITS					NOTE	REFI	ER TO
0_2	4½' ÷	3.25" HSA	DATE	TIME	SAMP DEP	LED TH	CASING DEPTH	CA DE	VE-IN EPTH	FI	DRILLI UID LI	NG EVEL	WAI LEV	ER EL	THE	ATTA(CHED
	<u> </u>		7/6/07	11:45	26.	5	24.5	2	6.5				No	ne	SHEE	TS FO	R AN
	~ -					· · ·									EXPLA	NATI	ON OF
BORIN COMP	IG LETED:	7/6/07													TERMI	NOLO	GY ON
DR S	G LG	SB Rig: 91C													TI	HIS LC	G



AET J	OB NO: 22-00081						LC	G OF	BO	RING N	10	ST-	132	(p. 1	l of 1	<u>)</u>
PROJE	CT: TCAAP Rede	velopme	ent; Ard	<u>en Hi</u>	lls,	MN									····	
DEPTH	SURFACE ELEVATION: _	936.0			GI	EOLOGY	N	MC	SA	MPLE	REC	FIELD) & LA	BORA	FORY	TESTS
FEET	MATERIAL	DESCRIPTIO	ON				IN		1	YPE	IN.	wc	DEN	LL	PL	%-# 200
	4.25" Bituminous Paveme	nt	1 1		FIL	L			M	SU						
2	clay, a little gravel, dark by gray and black	and and san rown, light	dy lean brownish				9	M	Å	SS	5	11				
3 - 4 -	SILTY SAND, a little grav brown, medium dense to d	vel, possibl lense (SM)	e cobbles,		TIL	L	14	M	Å ₽	SS	20					
5 6							36	м	M	SS	18					
7 -									स्र							
8 -	CLAYEY SAND, a little g cobbles, brown, very stiff	gravel, poss (SC)	sible				29	м	M	SS	19	9				
9 10							28	M	R	22	14	10				
11 -							20	1.61	Д И	55						
12							19	м	M	SS	24	12				
14 -							1.		Д						1	
15 —							17	М	M	SS	24	13				
16 17									/\ स्							
18 -	SAND WITH SILT AND	GRAVEL,	fine to		CO.	ARSE					-					
19 — 20 —	(SP-SM)	wii, moisi, e	uense				36	м	¥ V	88	13					
21 -							50		А И	00	15					
22									ł							
24 —	cobbles, medium to fine gr	H SILT, po ained, ligh	t brown,													
25 —	10131, YOLY GEISC (ST-3141)	,					62	М	M	SS	15					
26 —	END OF BORING Northing=207171.7 Easting=552904.3															
DER				11/ A 771			e1 101		<u></u> те							<u> </u>
DEP	IR. DRILLING METHOD	DATE	TIME	SAMPL	EK LI	CASING	CAT	EIVIEIN		QRILLI	NG.	WAT	ER	NOTE: THE 4	REFE	ER TO
0-24	4½' 3.25" HSA	7/6/07	9:00	DEPT 26.5	н 5	24.5	DE 2	етн 5.2	FL		VEL	Nor	еL ne	SHEE	TS FOI	R AN
									1					EXPLA	NATIO	ON OF
BORIN COMPI	G LETED: 7/6/07												/,	FERMI	NOLO	GY ON
DR: SC	G LG: SB Rig: 91C													Tł	IIS LO	G



SUBSURFACE BORING LOG

AET JO	DB NO: 22-00081					LO	G OF	BORING N	o	<u>ST-1</u>	32A	(p.	1 of	2)
PROJE	ст: TCAAP Rede	velopme	nt; Ard	en Hill	s, MN									
DEPTH	SURFACE ELEVATION: _	936.0			GEOLOGY	N	MC	SAMPLE	REC	FIELI) & LA	BORAT	FORY 1	ESTS
FEET	MATERIAL	DESCRIPTIC)N			,,		TYPE		wc	DEN	LL	PL '	%-#200
1 -	No samples taken in upper Boring ST-132	· 29.5', Refe	r to Log o	f									-	
2 -	-							{}						
3 -								{}						
4								[]						
5 -								1						
6						1		ł						
7								ł						
8 —								ł						
9								H						
10 -								ł						
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25								ł						
20 -								ł						
28 -								ł						
29 -								ł	1					
DEP	TH: DRILLING METHOD			WATEF	LEVEL MEA	SURI	EMEN	TS	· ····			NOTE:	REFE	ER TO
n_30	0%' 3.25" HSA	DATE	TIME	SAMPLE DEPTH	D CASING DEPTH	CA DE	/E-IN PTH	DRILLI FLUID LI	NG VEL	WAT LEV	ER EL	THE A	ATTAC	HED
		7/25/07	2:47	41.5	39.5	4	1.0			Nor	1e	SHEE	TS FOI	R AN
												EXPLA	NATI(ON OF
BORIN COMPL	G LETED: 7/25/07											IERMI Ti		jy UN G
DR SC	LG BR Rig: 91C	ŀ									1	11	10 10	0

06/04



SUBSURFACE BORING LOG

LOG OF BORING NO. ST-132A (p. 2 of 2) 22-00081 AET JOB NO: TCAAP Redevelopment; Arden Hills, MN PROJECT: FIELD & LABORATORY TESTS DEPTH IN FEET REC IN. SAMPLE TYPE GEOLOGY MC N wc DEN LL PL MATERIAL DESCRIPTION 6-#200 SAND, a little gravel, fine to medium grained, light brown, moist, dense to medium dense (SP) COARSE 30 ALLUVIUM 49 Μ SS 19 31 32 33 34 35 39 Μ SS23 36 • 37 38 39 40 35 Μ SS19 41 **END OF BORING** Northing=207171.7 Easting=552904.3

	INTE	RTEC	e.								
	Brau	ın Proj	ect S	SP-0	6-05871	BORING:	ST	-13	33	RI-4007	7-20
	Geote	ecnical E	valua	ation		LOCATIC)N: N:	2071	181.7	41. E: 55339	7.254 See
	TCA	AP Rede	velop	ment and l	t Uishway 06	attached sl	ketch.			,	
	Arde	n Hills, N	Ainne	esota	Ingnway 90						
	DRILL	.ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/2	0/07		SCALE:	1" = 4'
	Elev.	Depth									
	feet 945 0	feet	AS	TM abol	Description of Materials		BPF	WL	MC	Tests	or Notes
	910.0	0.0	FILL		FILL: Silt, with Roots, dark brown, moist.		1		70	1	
	944.0	1.0	FILL		FILL: Sand Lean Clay, trace of Gravel, brown	moist.					
	-					-					
	- 					_	9				
	941.0	4.0	глт				2				
			FILL		FILL: Sandy Lean Clay, reddish-brown, gray an brown, moist.	id dark					
IS)	_						4				
atior											
brevi							1 2				
of ab	_										
tion (_										
olana							3				
r ex	-						1				
set fo	933.0	12.0	FILL	諁	FILL: Silty Sand, fine- to medium-grained, dark	brown.					
y she	-				wet.	_	3				
lolog	931.0	14.0	SM	XX	SILTY SAND fine to medium-grained reddish	brown	1				
ermii			5141		wet, very loose.						
ve T	-				(Glacial Till)	4	4				
ripti	-					_					
Desc	927.0	18.0									
(See	_		CL		SANDY LEAN CLAY, trace of Gravel, reddish- wet, medium	brown,					
5					(Glacial Till)						
7 14:4							7				
10/2/0	-					4					
E	022.0	22.0				-					
N N N N	922.0	23.0	SM		SILTY SAND, fine- to medium-grained, trace or	f Gravel,					
L] BI	-	ļ			reddish-brown, wet, stiff.	_					
5.12	-	1					16				
17 060.	• [-4					
	.					_	:				
ž,	917.0	28.0	<u>CD</u>								
	Í		SP- SM		FOOKLY GRADED SAND with SILT, fine- to coarse-grained, trace of Gravel, brown, wet, stiff	:]					
			,		(Glacial Till)						
NBA	ĺ						15				
3KAU	913.0	32.0				1	1				
S	2-06-05871			. 1 4 1	Braun Intertec Corporation		·	Freedor		ST 133 PL 400	7.20 page 1 of 2

Braun Intertec Corporation

ST-133 RI-4007-20 page 1 of 2

LOG OF BORING

BRAUN

Brau	n Proj	ect SP-0	6-05871	BORD	Г-13	3	RI-	4007-20	(cont.
Geote TCAA NE of Arden	cnical E JP Rede Highwa Hills, N	valuation velopmen y 10 and Jinnesota	t Highway 96	LOCATIC attached s	ON: N.	207	181.7	41, E: 553397	7.254 See
DRILLI	ER; К.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/2	0/07		SCALE:	1'' = 4'
Elev. feet 913.0	Depth feet 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC %	Tests o	or Notes
-		54	race of Gravel, brown, moist, loose. (Glacial Outwash)	ramed,	10		4		
- <u>899.0</u>	46.0		END OF BORING. Water not observed with 44 1/2 feet of hollow	-stem auger	<u>7</u> 10		3		
			In the ground. Boring then grouted.	-					
_									

BRA	NUN	514					\mathbf{L}	OG OF]	BORIN
NTE Brau Geote	RTEC n Proj cnical E	ect S valua	SP-0 ntion	5-05871	BORING	: S 7 DN: N	Г -134 : 207146.	RI-400' 617, E: 55371	7-22 9.021 See
NE of Arden	Highwa Hills, N	velop vy 10 Ainne	men and] esota	Highway 96	attached s	ketch.			
DRILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/2	0/07	SCALE:	1'' = 4'
Elev. feet 949.0	Depth feet 0.0	AS' Syn	TM 1bol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
948.0	1.0	FILL		FILL: Silt, with Root Fibers, dark brown, moist.					
-		FILL		FILL: Silty Sand, brown to dark brown, moist. With Roots and pieces of topsoil at 5 1/2 feet.		7			
942.0	7.0	CL		SANDY LEAN CLAY, trace of Gravel, reddish- wet, rather soft to rather stiff. (Glacial Till)	brown, –	4			
						₫ 4			
0.0 5 0						10			
935.0	14.0	SM		SILTY SAND, fine- to coarse-grained, trace of G reddish-brown, wet, medium dense. (Glacial Till)	Gravel,	15			
	10.0	SP		POORLY GRADED SAND, fine- to coarse-grain of Gravel, reddish-brown, wet to waterbearing, v	ned, trace ery loose				
-	ļ			(Glacial Outwash)		V 7			
						Ň			
	-								
						3			
- 					-				
						10			
6.06071			1			<u> </u>	<u>l</u>		0.0.0

Brau	n Proj	ect SP-	06-05	871	BORIN	ज् र ा-134	RI	-4007-22	(cont.)
Geote TCAA NE of Arden	enical E AP Rede Highwa Hills, N	valuatio velopmo y 10 an Iinneso	n nt 1 High a	way 96	LOCAT attached	ION: N: 2 I sketch.	07146	.617, E: 553719	2.021 See
ORILLI	ER: K.	Keek		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/20/)7	SCALE:	1''=4'
Elev. feet 917.0	Depth feet 32.0	ASTM Symbo		Description of Materials (ASTM D2488 or D2487)		BPF V	VL	Tests or N	√otes
-			POC of C to n	ORLY GRADED SAND, fine- to coarse Gravel, reddish-brown, wet to waterbearin nedium dense. (Glacial Outwash) <i>(continued)</i>	-grained, trace ng, very loose	- - - - - - - - - - - - - - - - - - -			
906.0	43.0	SP	POC wate	DRLY GRADED SAND, fine-grained, b erbearing, loose. (Glacial Till)	rown,				
903.0	46.0		ENI Wat in th Bori	D OF BORING. er down 24 feet with 44 1/2 feet of hollo be ground. ing then grouted.	w-stem auger				
-					- 				



AET JO	DB NO: 22-00081		LO	G OF I	BO	RING N	íO	ST-	135	(p. 1	of 1)				
PROJE	TCAAP Rede	velopme	nt; Arde	en Hi	lls,	MN						<u> </u>				
DEPTH	SURFACE ELEVATION:	950.5			GE	EOLOGY	N	MC	SĄ	MPLE	REC	FIELI) & LA	BORAT	ORY 1	TESTS
FEET	MATERIAL I	DESCRIPTIC	N						1	YPE	IN.	WC	DEN	LL	PL	%-#2 00
1-	FILL, mixture of sand with little gravel, pieces of bitur trace roots, dark brown	ı silt and sil ninous, sur	ty sand, a face roots,		FILI	L	36	м	X	SS	15					
3 -	FILL, mixture of silty sand little gravel, trace roots, cir brown	l and clayey iders and cl	v sand, a linkers,				18	М	M	SS	13	11				
4 — 5 —	SANDY LEAN CLAY, a roots brown very stiff to l	little gravel	, trace		TIL	L	20	м	A	SS	20	14				
6-	silt (CL)						20		A E	55						
8-							19	м	X	SS	23	15				
9 10												19				
11 -	CLAYEY SAND WITH C	RAVEL, b	orown,				31	M	Ň	SS	18	8				
12 13	hard, lense of silty sand (S SAND WITH GRAVEL, 1 grained brown moist ver	C) nedium to : v dense (SF	fine		CO. ALI	ARSE LUVIUM	56	M	∇	SS	14					- -
14		<i>y</i> uchoc (51	· .]		/\ प्र							
15 -	GRAVEL WITH SAND, I (GP)	orown, moi	st, dense				44	м	X	SS	4					
17 -	-			1 4 9 9 6 4					E							
18 – 19 –	SAND WITH GRAVEL, 1 grained, brown, moist, ver	medium to y dense (SF	fine ?)													
20							58	м	$\overline{\mathbb{V}}$	SS	8					
21					-				Д							
22 -									ł							
23 -									∦¦							
24 -						· .			K							
26 -							63	M	X	SS	12					
	END OF BORING Northing=207176.8 Easting=553896.4															
DEP	TH: DRILLING METHOD			WAT	ER L	EVEL MEA	SUR	EMEN	TS	<u> </u>	_t			NOTE	REFI	ER TO
0.2	41/41 3 25" HSA	DATE	TIME	SAMP DEP	LED TH	CASING DEPTH	CA	VE-IN PTH	FI	DRILL LUID L	NG EVEL	WAT LEV	ER EL	THE A	ATTAC	CHED
0-2	7/2 J.4J 11JA	6/28/07	1:15	26.	5	24.5	2	6.4				No	ne	SHEE	TS FO	R AN
														EXPLA		ON OF
BORIN COMPI	IG LETED: 6/28/07		<u> </u>				<u> </u>		1					і ЕКМІ. Ті	HIS LC	u i UN IG
DR. S	G LG SB Rig: 91C	1					1		I							-



AET JO	OB NO:	22-00081						LC)G OF	BORING N	10	<u>ST-1</u>	<u>35</u> A	<u>(p.</u>	<u>1 of</u>	<u>2)</u>
PROÆ	CT:	TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN									
DEPTH	SUF	FACE ELEVATION:	950.5			GI	EOLOGY	N	MC	SAMPLÉ	REC	FIELD) & L/	ABORAT	ORY	TESTS
FEET		MATERIAL I	DESCRIPTIO	N				11	MC	TYPE	IN.	wc	DEN		PL	⁄6-#200
	No sa Borir	amples taken in upper	29.5', Refe	er to Log of	f					Į.						
	Doin	.g 01 199								5						
2 ~										1						
3-										ł						
4 -										ł						
6										ł						
7										1						
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29 -										<u>}</u>						
DEP	TH: 3	DRILLING METHOD			WAT	ER L	EVEL MEA	SURI	EMEN	TS				NOTE:	REFE	R TO
0-44	11/2"	3.25" HSA	DATE	TIME	SAMPI DEPI	LED TH	CASING DEPTH		VE-IN	DRILLI FLUID LE	NG EVEL	WAT LEVI	ER EL	THE A	TTAC	HED
			7/23/07	9:12	46.	5	44.5	4	6.5			Nor	ıe	SHEE	rs foi	R AN
דמתסק	G													EXPLA		JN OF
COMPL	ETED:	7/23/07												I EKIVIII TT		G UN
DR: SC	G LG	BR Rig 91C	1					E		1						-



SUBSURFACE BORING LOG

1

AET JO	DB NO: 22-00081			LO	G OF	BO	RING N	iO	ST-1	35A	(p.)	<u>2 of</u>	2)
PROJE	CT. TCAAP Redevelopment; Arden	Hil	lls, MN										
DEPTH			GEOLOGY	N	мс	SĄ	MPLE	REC	FIELD) & LAI	BORAT	ORY 1	TESTS
FÊET	MATERIAL DESCRIPTION		COADSE						wc	DEN		PL '	⁄₀-#200
30 -	fine grained, brown, moist, dense (SP-SM)		ALLUVIUM	39	м	M	SS	20					
31 -	SAND WITH SILT, fine grained, light brown,					Д							
32 -						H							
33 -						Ł							
34 -						꿤	·						
- 35 -				40	м	IXI	SS	18					
30 -						R							
37-			·			1							
30-	SAND WITH SILT, a little gravel, medium to fine grained, brown, a little dark brown, moist.					H					1		
40	medium dense, lenses and laminations of silty					R							
41 -				29	M	X	SS	22					:
42						শ্রি							
43						ł							
44 —						ł							
45 —				25		\square	66	20					
46 —				35	M	М	22	20	<u></u>				
	END OF BORING Northing=207176 8												
	Easting=553896.4												
			:										
			-		1								
											ŀ		
			1							1			
					1								
								1		1	1		1

INIC	<u>KIEC</u>	u							
Brau	n Proje opical F	ect SP	-06	-05871	BORING	:	S	T-1 3	6
TCAA NE of Arden	P Rede Highwa Hills, N	velopm y 10 ai Ainneso	on ient id H ota	lighway 96	LOCATIC attached s	ON: N:2 sketch.	207181	.552, E:	554398.416 See
DRILLI	ER: К.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	6/28/	07	SCA	LE: 1'' = 4'
Elev. feet 956.7	Depth feet 0.0	ASTN Symb	A ol	Description of Materials (ASTM D2488 or D2487)		BPF	WL M	C P200	Tests or Notes
 	<u> </u>	FILL S		FILL: Clayey Sand, trace of Gravel, brown, moi ORGANIC SILT, trace of fibers, dark green, we soft. (Swamp Deposit) SANDY LEAN CLAY, trace of Gravel, brown a with rust, wet, medium. (Glacial Till)	t, rather	9 10 4 7			
_ 942.7 	14.0	SM		SILTY SAND, fine- to medium-grained, trace of reddish brown, moist, medium dense to dense. (Glacial Till)	f Gravel,	7 7 29			
	26.0					28	6	25	LL = 13 $PI = 1$
			I I I I	END OF BORING. Water not observed with 24 1/2 feet of hollow-st n the ground. Boring then grouted.	- em auger – – –				

LOG OF BORING

BRAUN
	INTE	RTEC	**					
	Brau	n Proj	ect S	P-00	5-05871	BORING	:	ST-137
	Geote	cnical E	valua	tion		LOCATIO		50 401 F: 554647 884 See
	TCAA	AP Rede	velop	ment		attached s	ketch.	00.401, £. 554017.004 BCC
	NE 01	Highwa	iy 10 : Minno	and I	lighway 96			
	DDIT		Vash	sota				
	DRILL	LR. K.	I Neuk		METHOD: 31/4 HSA, Autonmr	DATE:	//2/07	SCALE: $1^{\prime\prime} = 4^{\prime}$
	Elev. feet	Depth feet	AS	гм	Description of Materials		BPF WI	Tests or Notes
	956.0	0.0	Sym	ibol	(ASTM D2488 or D2487)			10000110000
	955.0	10	FILL	\otimes	FILL: Silty Sand, with Gravel, brown, moist.			
		1.0	FILL	XX	FILL: Clayey Sand, trace of Gravel, reddish-br	rown,		
	_				moist.			
						_	7	
						_		
						_		
ار			-				5	
lion	- 940 n	70		\bigotimes				
revia	J 4 9.0	7.0	OL	<u>×××</u>	ORGANIC CLAY, trace of Roots, dark brown.	moist.		
ggg	-				(Buried Topsoil)		4	
n of	947.0	9.0	SM		SILTY SAND trace of Group und tick brown	maint	-	
natio			10101		medium dense to dense.	moist,	-	
xplai	_				(Glacial Till)		M 7	
ore								
leet	-		1					
μs L	-		•			-		
	-					_		
ien i	-							
e e	_							
1DIL	939.0	17.0						
/esci			SP		POORLY GRADED SAND, fine- to medium-g	rained,		
e e	-				(Glacial Outwash)	nse.		
4	-					_		
4:43								
10/7						_		
0 -						_		
n n								
NYYO								
2	•							
1/00	-					-	18	
100116	930.0	26.0			END OF BORING			
ł								
L					water not observed with 24 1/2 feet of hollow-s in the ground.	stem auger		
5	ł				Porting then enouted			
					Doring then grouted.			
	-							
-						-		
iL SI	2.06.05871			<u> </u>	Derey Interfer Courses			07.100

BRAUN

LOG OF BORING



AET J	OB NO: 22-00081					LC)G OF	BOR	ING N	io	ST-	138	(p. 1	of 2)
PROJE	TCAAP Red	evelopme	ent; Ard	<u>en Hi</u>	lls, MN										
DEPTH	SURFACE ELEVATION: _	955.9			GEOLOGY	N	MC	SAN	MPLE	REC	FIELI) & LA	BORAT	ORY 1	TESTS
FEET	MATERIAL	DESCRIPTI	NC			14	IVIC		YPE	IN.	wc	DEN	LL	PL '	%-#2 00
1 1-	FILL, mixture of sand with surface roots.	h silt and si dark brown	ilty sand,		FILL	17	м	M	SS	14					
2-	FILL, mixture of clayey s	and and sar	d with silt	,				Д	55		8				
3-	a little gravel, trace roots, and gray	brown, ligh	it brown			13	м	M	SS	7	10			:	
4 -								Д							
5 -								M			13				
6-						15	M	XI.	SS	12					
7 -								यि							
8						9	W/M	M	SS	15	14			:	
9-								Д			14				
10								M			20				
11 -						5	M	М.	SS	14					
12 -								E			15				
13						3	W/M	X	SS	18					
14 -								H							
15 -	ORGANIC CLAY, trace i	roots, black	, very soft		SWAMP DEPOSIT	1.		M	00		41				
16					Dhiobh	4	M	M	22	20					
17 -								B							
18						2	W/M	X	SS	24	28				
19 —								R							
20 -						2	м	M	22	18	29				
21 -							101	Д	55	10					
22 -	LEAN CLAY WITH SAN	ND, trace ro	ots, pieces		FINE	1		R							
23 –	of wood, dark gray, firm (CL)			ALLUVIUM	8	W/M	IXI -	SS	4	38				
24 —						ļ	Ţ	मि							
25 -	CLAYEY SAND, a little g soft (SC)	gravel, dark	gray, very		TILL	3	W/M	M	SS	24	23			·	
26 –	CLAYEY SAND, a little g	gravel, gray	, soft,					Д			22				
27 -	Tenses and familiations of s	siny sand (50)					Ŧ							
28 -								Ŧ							
DEP	TH: DRILLING METHOD	1		WATE	R LEVEL MEA	SURI	EMEN	TS		L	_1		NOTE:	REFE	R TO
n_70)%' 3.25" HSA	DATE	TIME	SAMPL	ED CASING H DEPTH	CAU	/E-IN PTH	DI	RILLI ND LF	NG VEL	WAT LEVI	ER	THE A	TTAC	HED
0-23	712 J.4J HOA	6/29/07	11:45	26.5	24.5	2	5.0				24.	3	SHEET	IS FOF	R AN
		6/29/07	11:50	31.5	29.5	3	1.5				Non	ie 1	EXPLA	NATIC	ON OF
BORIN COMPL	G LETED: 6/29/07											1	ERMIN	IOLOC	GY ON
DR: SC	G LG: SB Rig: 91C												TH	IS LOO	G



AET JO	DB NO: 22-00081			LO	G OF	BO	RING N	0	<u>ST-</u>	138	(p. 2	of 2	<u>) </u>
PROJE	CT: TCAAP Redevelopment; Arden	Hi	lls, MN										
DEPTH			GEOLOGY			SA	MPLE	REC	FIELI) & LAI	BORAT	ORY T	ESTS
IN FEET	MATERIAL DESCRIPTION		OLOLOO1	N	мс	Ĩ	Ŷ₽Ē	ĨN.	wc	DEN	LL	PL	%-#200
	SANDY LEAN CLAY, a little gravel, brown,					শ্র			17				
30 —	stiff (CL) (continued)			14	м	M	SS	24	17				
31 —	SAND WITH SILT, a little gravel, fine to		COARSE			$[\Lambda]$							
	medium grained, brown, moist, medium dense		ALLUVIUM										
	END OF BORING												
	Northing=207165.1												
	Easting-554854.2												
								ļ					
	· · · · · · · · · · · · · · · · · · ·												
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SUBSURFACE BORING LOG

AET JO	OB NO:	22-00081						LC)G OF	во	RING N	io	ST-	<u>139</u>	(p. 1	of 1	<u>)</u>
PROJE	CT:	TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN										
DEPTH	SURFA	CE ELEVATION:	951.8			GI	EOLOGY	N	MC	SA	MPLE	REC	FIELD) & LA	BORAT	ORY '	TESTS
FEET		MATERIAL I	DESCRIPTIC)N				14			ГҮРЕ	IN.	wc	DEN	LL	PL	%-#2 00
1 -	FILL, m silty san roots, bi	ixture of clayey sa d and sand with sil own and dark brow	nd, sandy l lt, a little gr vn	ean clay, avel, trace		FIL	L,	26	м	M	SS	12	9				
3 -								21	M	M	SS	19	8				
4										E							
5 -								14	М	M	SS	14					
6-										E							
8 -								10	м	M	SS	15	20 18				
9	ORGAN		anta minana	ofwood		SW			Ţ	E			20				
10 11	dark gra sand (O	y, firm, lenses and L/OH)	lamination	s of silty		DE	POSIT	5	w	X	SS	12	38				
12 —	_ SANDY	SILT, pieces of w	vood, dark	gray, wet,		FIN	Æ			K			19				
13 —	very loo	se, laminations of	silty sand (ML)]]]]	AL: CO	LUVIUM ARSE	4	W/M	IX	SS	14	18				
14 —	very loo	se (SM)	u, gray, wa	terbearing,		AL				图							
15 —	SANDY brown n	LEAN CLAY, a nottled. stiff. lamin	little gravel ations of si	, gray and ltv sand			<i>.</i> L	10	м	Ŋ	SS	19	19				
16 -	(CL)	,,,,,,,,,								/\ म							
17 -										ł							
18	SANDY firm, lar	LEAN CLAY, a long the second sec	little gravel and (CL)	, brown,						ł							
20 -		•								M		01	10				
21 -								8	M	Ň	55	21	19				
22										ß							
23 -										KI I							
24 —										ß							
25 –	CLAYE _(SC)	Y SAND WITH C	JRAVEL, b	orown, hard			ARSE	54	м	\mathbb{N}	SS	18	11				
26 -	SAND V	WITH SILT, a little grained, brown. m	e gravel, fin noist, very o	ne to dense	- <u> : </u>] /	AL	LUVIUM			\downarrow							
	SP-SM																
	Northing Easting=	g=206844.7 =553486.0															
DEP	TH: DR	ILLING METHOD			WAT	ER I	EVEL MEA	SUR	EMEN	TS					NOTE:	REF	ER TO
£_2	41/21 37	5" HSA	DATE	TIME	SAMP DEP1	LED TH	CASING DEPTH	CA	VE-IN PTH	FI	DRILLI LUID LI	NG EVEL	WAT LEV	ER EL	THE A	ATTA	CHED
0-2-	<u>0-24/2</u> 5.25 HSA		6/28/07	10:44	11.	5	9.5	9	9.8				9.	5	SHEE	TS FO	R AN
			6/28/07	11:05	26.	5	24.5	2	6.5				Noi	ne	EXPLA	NATI	ON OF
BORIN COMPI	ig Leted: 6	/28/07]	ERMI	NOLO	GY ON
DR: S	G LG: S	B Rig: 91C													11	IIS LC	



AET JO	OB NO: <u>22-00081</u>						LO	G OF	BORING	NO	<u>ST-1</u>	<u>39A</u>	(p.	1 of :	2)
PROJE	TCAAP Rede	velopme	nt; Ard	en Hi	lls, I	MN			<u>.</u>		<u>.</u>				
DEPTH	SURFACE ELEVATION: _	951.8			GE	OLOGY	N	MC	SAMPLE	REC	FIELD) & LA	BORAT	ORY 1	ESTS
FEET	MATERIAL	DESCRIPTIC	N				IN	IVIC	TYPE	IN.	wc	DEN	LL	PL	⁄o-#200
1_	No samples taken in upper Boring ST-139	29.5', Refe	r to Log o	f					1						
1 1 ·	Lioning BT 100								1						
3_									1						
									5						
5-									ţ]						
6 -									¥I						
7									1			1			
8 -									1						
9									4						
10 -									1						
11 -									Ħ						
.12 -					1				Ħ						
13 -									Ŧ						
14 -									Ħ						
15 —									\$						
16 —									#					1	
17 –									Ħ						
18 -					1				Ħ						
19									Ħ						
20 -									Ħ						
21 -									Ħ						
22 –									Ħ						
23 -									Ħ						
_ 24									Ħ						
25 –									Ħ						
26									Ħ						
27 –									Ħ						
28 –									Ħ]	
DEP	TH: DRILLING METHOD			WATI	ER LE	EVEL MEA	SURI	EMEN	TS				NOTE:	REFE	ER TO
0-4	4½' 3.25" HSA	DATE	TIME	SAMPI DEPT	LED TH	CASING DEPTH	CA DE	VE-IN PTH	DRILI FLUID I	ING EVEL	WAT LEV	ER EL	THE A	TTAC	HED
<u> </u>	UILV AIGIA	7/23/07	1:16	46.5	5	44.5	4	6.5			Noi	ne	SHEE	TS FOI	R AN
													EXPLA	NATI(ON OF
BORIN COMPI	G LETED: 7/23/07												EKMI TL		JY UN G
DR: S	G LG: BR Rig: 91C	•		1									11		J



SUBSURFACE BORING LOG

LOG OF BORING NO. **ST-139A** (p. 2 of 2) 22-00081 AET JOB NO: **TCAAP Redevelopment; Arden Hills, MN** PROJECT: FIELD & LABORATORY TESTS DEPTH REC IN. SAMPLE TYPE GEOLOGY N MC IN FEET DEN WC LL PL. **%-#20**0 MATERIAL DESCRIPTION Н COARSE ALLUVIUM SILTY SAND WITH GRAVEL, medium to fine 30 grained, brown, moist, dense (SM) (possible 40 SS 6 М cobbles) 31 32 33 34 35 SS 47 Μ 6 36 37 38 SAND WITH SILT, a little gravel, fine to medium grained, light brown, moist, dense 39 (SP-SM) 40 SS 21 33 Μ 41 42 43 SAND, fine grained, light brown, dense (SP) 44 45 SS 20 33 Μ 46 **END OF BORING** Northing=206844.7 Easting=553486.0

	INTE	RTEC	-					
	Brau	n Proj	ect SP-	06-05871	BORING	R	-40	06-15 ST-140
	Geote	cnical E	valuatio	D. ef	LOCATIO	DN: N:	2068	836.519, E: 554906.041 See
	NE of	Highwa	y 10 and	Highway 96	attached s	ketch.		
	Arden	Hills, N	Ainnesot	a				
	DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/2	2/07	SCALE: 1" = 4'
	Elev.	Depth	ASTM	Description of Materials		שמס	w	Testa or Notes
	962.9	0.0	Symbol	(ASTM D2488 or D2487)		DFI	WL	Tests of Notes
			CL	SANDY LEAN CLAY, trace of Gravel, yellowis	h-brown			
	-			(Glacial Till)	_			
ľ	-				-			
ł	-				_	× ×		
ł	-				-			
ł	-				—	6		
ons)	-					Δ		
eviat	-				_			
abbro	-				_	8		
n of	-				_			
natic						1 17		
expl	951.9	11.0			<u> </u>			
t for			SIVI	reddish-brown, moist.	Gravel,			
shee	_			(Glacial Till)	_	42		
Vgol	.					Δ		
ininc								
e er	ĺ					*		*70 blows for 6" (set)
iptiv					-			suspected Cobble of Doulder
Jeser								
See L								
<u>۳</u> _								
14:4	-					- *		*50 blows for 1" (set)
10/2/0					-			suspected Cobble or boulder
		1			-			
	939.9	23.0	SP 1	POORLY GRADED SAND fines to medium-gra	ined			
, nu				trace of Gravel, brown, moist, very dense.				
5	-			(Giaciai Outwash)		1 5 4		
icnon	936.9	26.0				× ³⁴		
2					_			
				Water not observed with 24 1/2 feet of hollow-ste in the ground.	m auger			
				Boring then grouted				
				Doning then grouted.				
PYO N	-							
					-			
SP	-06-05871	I	· · ·	Braun Intertee Corporation		1	l	121 4006 15 ST 140 mage 1 of 1

BRAUN"

LOG OF BORING



SUBSURFACE BORING LOG

AET J	OB NO:	22-00081					LO	GOF	BOR	ING N	ю	<u>ST-1</u>	40A	(p.	1 of	<u>2) </u>
PROJE	ECT:	TCAAP Rede	velopme	ent; Ard	en Hill	ls, MN										
DEPTH	SUR	FACE ELEVATION: _	962.9			GEOLOGY	N	мс	SAN	MPLE	REC	FIELD)&L/	BORAT	ORY 1	FESTS
FEET		MATERIAL	DESCRIPTIO	ОN					TY	YPE	IN.	wc	DEN	LL	PL	%-# 200
1 -	No sa Boring	mples taken in upper g ST-140	r 19.5', Refe	er to Log o	f											
2 -	-								Ħ					:		
3 -	-								Į.							
4 -	-								Ħ							
5 -	-								Ħ							
6									1							
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13	-								Ħ							
14 —									Ħ							
15 -									Ħ							
16 —									Ħ							
17	•								Ă					r.		
18 —	-								Ħ							
19 -								:	4							
20 -	CLAY	EY SAND, a little g	gravel, brow	vn, hard		TILL	1		\square	00	20	0				
21 -							57		M	33	20	9			. <i>3</i>	
22 -									Ł							
23 -									1							
24 -									Į.							
25 -	SAND	WITH SILT, a littl	e gravel, fi	ne to		COARSE ALLUVIUM			\square	00	12					
26 -	(SP-SI	M)	wii, iii0i8t, i	uchise			44	M	\mathbb{N}	22	10					
27 -									F1							
	<u></u>		1		WATE	RIEVEIMEA	SUPT		KAL TS		I	<u> </u>	<u> </u>			
	· · · · · · ·		DATE	TRAT	SAMPLI	ED CASING	CA	/E-IN	_ D	RILLI	NG	WAT	ER	NOTE:	KEFE TTAC	UT N NED
0-44	4½' 3	.25" HSA	DATE	11.40	DEPTI	I DEPTH	DE	PTH	FLU	JID LE	EVEL	LEVI		SHEE	TS FOI	R AN
			//25/07	11:10	41.5	- 39.5	4.	1.4				INDE		EXPLA	NATIO	ON OF
BORIN	G ETED	7/25/07												TERMI	10L00	GY ON
DR: S	\mathbf{G} LG:	BR Rig: 91C												TH	IIS LO	G



AET JO	DB NO: 22-00081	LO	G OF	BORING NO.	<u>ST-1</u>	40A	(p. 2	2 of 2	2)_
PROJE	CT: TCAAP Redevelopment; Arden Hills	s, MN		u					
DEPTH		GEOLOGY		SAMPLE R	FIELD) & LAE	ORAT	ORY T	ESTS
IN FEET	MATERIAL DESCRIPTION	N N	MC	TYPE	N. WC	DEN	LL	PL	%-#200
29 -	GRAVELLY SAND WITH SILT, medium to fine grained, light brown, moist, very dense (SP-SM)								
30 —		116	м	X ss	14				
31				ि सि					
32				Į.					
34				ŧ				:	
35									
36 —		79	м	\bigwedge ss	17				
37 —				Į.					
38 —	GRAVEL WITH SILTY SAND, light brown,			E					
39 -	moist, very dense (GP)			H				-	
40		99	М	X ss	16				
	END OF BORING Northing=206836.5 Easting=554906.0								



SUBSURFACE BORING LOG

AET JO	DB NO: 22-00081						LO	GOF	BO	RING N	IO	ST-	141	(p. 1	of 1)
PROJE	CT: TCAAP Rede	velopme	<u>nt; Arde</u>	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION:	913.3			GE	EOLOGY	N	мс	SĄ	MPLE	REC	FIELI) & LA	BORAT	ORY	rests
FEET	MATERIAL	DESCRIPTIC	DN							TPE	11N.	wc	DEN	LL	PL	%-#2 00
1 –	FILL, mixture of silty sand gravel, surface roots, trace	and sandy roots, brow	silt, a little vn	`/	FILL	- I	17	М	X	SS	17					
2 —	FILL, mixture of silty sand	d, clayey sa	nd and						Д							
3 -	organic clay, brown, dark	brown, gra	y and black	<			19	М	X	SS	22	10				
4									/\ स				ļ.			
5 -							11	м	М	SS	17	9				
6 -									Д	00						
7 -	CLAYEY SAND, a little g	gravel, trace	e roots,		TIL	Ĺ			M							
8-	brown and dark gray, stiff	(SC) little gravel	. dark grav	- *////			9	М	[X]	SS	17	19				
9-	and gray mottled, a little b	rown, firm,	and (CI)						E							
10 -	ammations of sitty said a	na olayoy S					5	м	X	SS	20	22	1			
									R							
12 -	SANDY LEAN CLAY, a brown and grav mottled, s	little gravel tiff, laminat	l, light tions of				10	м	M	SS	12	19				
14 -	brown silty sand (CL)								Д							
15 —									Ń	~~		1.0				
16 -							14	M	Ŵ	SS	24	18				
17 -									ł							
18 -	CLAYEY SAND, a little	zravel, dark	gray, stiff						ł							
19	to very stiff (SC)							1	Ľ							
20							14	M	M	SS	24	15				
21	1								Д							
22 -									H							
23 -									H							
24 -									K			3				
25							18	M	X	SS	16	15				
~~	END OF BORING				×			+ ₹	ľ	ļ					1	
	Northing=206683.1 Easting=552396.6				1											
		. <u>.</u>		11/ 1/			SI TO		 T ^Q						<u> </u>	
	TH: DKILLING METHOD	DATE	TILE	SAMP	LED	CASING	CA	VE-IN		DRILLI	NG	WAT	ER	NOTE:	REFI	ER TO
0-24	4½' 3.25" HSA	DATE	1.50	DEP	TH [_]	DEPTH	DE	PTH	FI	LUID LI	EVEL	LEV 26	EL 5	SHEE	TS FO	R AN
		7/18/07	1:50	20.	3	24.0		0.3	-			40		EXPLA	NATI	ON OF
BORIN	G LETED 7/18/07		· · · · · · · · · · · · · · · · · · ·					<u> </u>	+			_		FERM	NOLO	GY ON
DR: S	G LG: BR Rig: 91C						1		Τ					TI	IIS LO	G



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081					LC	OG OF	во	RING N	10	ST-	142	(p. 1	of 2)
PROJE	CT: TCAAP Red	evelopm	ent; Ard	en Hi	lls, MN										
DEPTH IN FEET	SURFACE ELEVATION: _ MATERIAL	933.7 DESCRIPTI	 ON		GEOLOGY	N	мс	SA	MPLE TYPE	REC IN.	FIELI WC	D&LA	ABORA	FORY T	rests %-#200
1 -	FILL, mostly sandy silt, silt, silt, so the second	urface root:	s, trace		FILL	17	м	M	SS	10	9 8		-		
2 -	cobbles, trace roots, brown	, a little gra n and grayi	vel, possib sh brown	le		14	м	$\left(\right)$	SS	4	10				
4								\ म	00						
5 — 6 —						8	М	X	SS	7	13				
7 -						2	W/M	R	22	2	18			:	
9						2	¥¥ / 1¥1	र्म भ	55	2	10				
10 11	FILL, mixture of silty sand sand with silt, a little grave gray and black	d, clayey sa el, dark gra	and and yish brown	1,		18	М	M	SS	19	20				
12 – 13 –						10	м	R	SS	14					
14								Ц Ц			20				
15 — 16 —	SANDY SILT, trace roots little gray, moist, loose, let of silty sand (ML)	, dark brownses and la	vnish gray, minations	a	FINE ALLUVIUM	6	М	X	SS	18	34				
17 18	SILT WITH ORGANICS, (ML)	black, we	, loose			5	w	M	SS	23	27				
19 — 20 —	CLAYEY SAND, gray, a	little brown	n, stiff,		MIXED			R							
21 -	ammations of wet sitty sa	na (SC)			ALLOVION	9	M/W	Å स	SS	19	20				
23 -	LEAN CLAY, trace roots,	gray, a litt	le black,		FINE	-	Y								
24 – 25 –	suir, laminations of fat cla	y (CL)			ALLOVION	11	-	11 V	SS	17	32				
26 – 27 –	SILTY SAND, fine graine dense (SM) SILTY SAND, a little gray	d, gray, we	et, medium		COARSE ALLUVIUM			ł							
28 -	grained, gray, wet, mediun	n dense (SN	M)			14	w	M	SS	20					
DEPT	TH: DRILLING METHOD			WATE	R LEVEL MEA	SURF	EMEN	rs			••••		NOTE:	REFE	R TO
0-29	¹ / ₂ ' 3.25" HSA	DATE	TIME	SAMPLI DEPTI	ED CASING H DEPTH	CAV DE	/E-IN PTH	FL	ORILLIN UID LE	√G VEL	WATE LEVE	ER EL	THE A	TTAC	HED
	, , <u>, .</u>	7/5/07	9:35	26.0	24.5	24	1.8				23.7	<u> </u>	SHEET	S FOR	AN
BORING	3	7/5/07	2:00	31.5	29.5	2	9.9				24.:	5 ¹ 1	EAPLAI FRMM		N OF
ČŎMPL	ETED: 7/5/07											'	TH	IS LOC	
DR: SG	LG: SB Rig: 91C		1			1		1					**1		٠



AET JO	OB NO:	22-00081				LO	GOF	BO	RING N	0	ST-	142	(p. 2	of 2)
PROJE	CT:	TCAAP Redevelopme	nt; Arden	Hil	ls, MN										
DEPTH					GEOLOGY	N	мс	SA	MPLE	REC	FIELD	& LAE	BORAT	ORY	TESTS
FÊÊT		MATERIAL DESCRIPTIO	ON	1.1.				ו וכו	TPE	11N.	WC	DEN	LL	PL	%-#200
30 -	SANE (CL)	DY LEAN CLAY, a little grave	l, gray, firm		TILL	5	м	X	SS	14	19				
31 -	END	OF BORING													
31 -	END Northi Eastin	OF BORING ng=206683.8 g=552897.3													

0.0200000	BR	AUN	514 -			L	OG OF BORING
The second second second second second second second second second second second second second second second se	NTE	RTEC					
	Brau Geote	In Proj-	ect SP-()6-05871	BORING:	ST-143	RI-4007-02
	TCAA	AP Rede	velopme	1 1ŧ	LOCATIC attached sl)N: N: 206653. ketch.	.285, E: 553400.699 See
	NE of	Highwa	y 10 and Jinnesot	Highway 96			
╞	DRILL	ER: K.	Keck	METHOD: 31/4" HSA Autohmr	DATE	7/18/07	SCALE: $\mathbf{1''} = \mathbf{4'}$
ł	Elev.	Depth					
	feet	feet	ASTM	Description of Materials		BPF WL	Tests or Notes
ŀ	949.9	0.0	FILL X	FILL: Silty Sand, trace of Roots, dark brown,	moist.		
F	-		FILL	FILL: Clayey Sand, trace of Gravel, mixed ligh	nt brown -		
┢	-			x	_		
┢	-			X		29	
╞	945.9	4.0	SP-	2 POORLY GRADED SAND with SILT, fine- to)		
┢			SM	medium-grained, trace of Gravel, light brown,	moist	18	
ions)	-						
eviat					-		
f abbi						5	
ion o	940.9	9.0	CL	SANDY LEAN CLAY, trace of Roots, dark br	own, moist.		
lanat				(Buried Topsoil)		4	
r cxp		10.0			4		
eet fo	937.9	12.0	CL	SANDY LEAN CLAY, trace of Gravel, grayis	n-brown,		
gy sh				wet, rather soft to medium. (Glacial Till)		3	
1000					-		
l erm	_ 1					6	
puve		í					
escu					-		
1000	030.0	10.0					
-	950.9	19.0	CL	SANDY LEAN CLAY, trace of Gravel, reddisl	ı-brown,		
14:4:				(Glacial Till)		5	
10/2/01					4		
					-		
INAU					-		
20							
1 0000	-					10	
					<u>+</u>		
	921.9	28.0			-		
5		20.0	SM	SILTY SAND, fine- to medium-grained, trace of	of Gravel,		
-				(Glacial Till)	1		
					k	21	
					Ť		
SP.	06-05871	······	the second second second second second second second second second second second second second second second se	Braun Interter Corporation		<u>, , , , , , , , , , , , , , , , , , , </u>	ST 143 RI 4007 02 mage 1 of 2

LOG OF BORING

un interfec Corporation

Bran	n Proi	ect SP-0	6-05871	BOBB	Г 1 <i>4</i> 2 D	(4007.02)
Geote TCAA NE of Arden	cnical E P Redev Highwa Hills, N	valuation velopment y 10 and 1 finnesota	t Highway 96	LOCATIC attached s	1-145 K DN: N: 206653 sketch.	2.285, E: 553400.699 See
DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/18/07	SCALE: 1'' = 4'
Elev. feet 917.9	Depth feet 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF WL	Tests or Notes
	46.0		END OF BORING. Water not observed with 44 1/2 feet of hollow in the ground. Boring then grouted.	of Gravel,	 № 18 № 35 № 12 	

BRAUN"

LOG OF BORING



AET JO	DB NO: 22-00081						LO	G OF	BO	RING N	íO	ST-	144	(p. 1	of 1	
PROJE	CT: TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN								·		
DEPTH	SURFACE ELEVATION:	955.0			GE	OLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORAT	ORY	ESTS
FEET	MATERIAL I	DESCRIPTIC	N				N 	IVIC	Г	YPE	IN.	wc	DEN	LL	PL	⁄₀-#200
	Concrete	4 - 12441			FILI	L I			R	SU						
	FILL, mostly sand with sil	t, a little gra	avel, brow	a			10	М	X	SS	9					
2-	FILL, mixture of clayey sa	nd and silty	/ sand, a				21	м	M	22	20					
- 5	Inthe graver, brown						21	141	Δ	55	20					
4	SILTY SAND, a little gray	vel, fine gra	ined.		TIL	L			R			13				
	brown, medium dense (SM	1) ໌					12	М	X	SS	20					
7									म							
8	· · · · · · · · · · · · · · · · · · ·						15	м	M	SS	20	13				
0 _	SILTY SAND, a little grav	/el, fine to 1 ense (SM)	nedium						Д							
10 -	SAND WITH SILT, a littl	e gravel, m	edium to		CO	ARSE			\square							
11 -	fine grained, brown, moist (SP-SM)	, međium d	ense			LUVIUM	12	M	Ň	SS	8					
12	(22, 22.1)								B	0						
13 —							15	Ń	X	SS	12					
14							9 ⁴⁷		H	i						
15 -	SAND WITH SILT WITH	IGRAVEL	, medium				20		\square	00			-			
16 -	dense (SP-SM)	oist, mediun	1 dense to				30	M	Ň	55	0					
17 -									R							
18									X							
19 —									払							
20 -							44	M	M	22	14					
21 -									Δ	. 00						
22 -									X							
23 -								1 ·	Ħ					1		
24 -			i.						1							
25 –							40	М	N	SS	15					
26 -									Λ							
	END OF BORING Northing=206618.1															
	Easting=553935.0				1											
DEP	TH: DRILLING METHOD			WAT	ER L	EVEL MEA	SUR	EMEN	ITS					NOTE	REF	ER TO
0.2	4¼' 3 25" HSA	DATE	TIME	SAMP DEP	LED TH	CASING DEPTH	CA	VE-IN PTH	FI	DRILLI JUID LI	NG EVEL	WAT LEV	ER EL	THE A	ATTA(CHED
0-2-	1/2 0:20 110/1	7/9/07	8:55	26.	5	24.5	2	6.2				Ňo	ne	SHEE	TS FO	R AN
														EXPLA	NATI	ON OF
BORIN COMPI	G LETED: 7/9/07													ERMI	NOLO	GY ON
DR: S	G LG: SB Rig: 91C													11 	-115 LC	



AET JO	DB NO: 22-00081						LO	GOF	BORING N	10	<u>ST-1</u>	44A	(p.	<u>1 of</u>	2)
PROJE	CT: TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN									
DEPTH	SURFACE ELEVATION:	955.0			GI	EOLOGY	N	мс	SAMPLE	REC	FIELD) & LA	BORAT	ORY	ESTS
FÊET	MATERIAL	DESCRIPTIO	DN .	~ 1						·IIN.	WC	DEN		PL.	%-#200
1	No samples taken in upper Boring ST-144	- 24.5', Refe	r to Log of						1						
- 									ł						
2 -									ł						
3-									ł						
4 —									<u>}</u>					E.	
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24 -		<u>r</u>		_			1		<u>}</u>			<u> </u>			
DEP	TH: DRILLING METHOD	 	_	WATI SANDI	ER L	EVEL MEA		EMEN VE-IN		NG	WAT	ER	NOTE:	REFE	ER TO
0-44	1½' 3.25" HSA	DATE	TIME	DEPT	Η̈́	DEPTH	DE	PTH	FLUIDL	ËVEL	LEV	EÎ.	THE A	TS FO	R AN
		7/24/07	12:02	46.	5	44.5	4	6.0			INOR	1e	EXPLA	NATIO	ON OF
BORIN	G ETED: 7/24/07										-		FERMI	NOLO	GY ON
DR: SC	G LG: BR Rig: 91C	+					<u> </u>						Tŀ	IIS LO	G



SUBSURFACE BORING LOG

AET JO	OB NO: 22-00081		LO	G OF J	BORIN	NG NC	D	<u>ST-1</u>	<u>44A</u>	(p.)	<u>2 of</u>	2)
PROJE	TCAAP Redevelopment; Arden Hi	lls, MN	<u></u>									
DEPTH		GEOLOGY	N	MC	SAM	PLE	REC	FIELD	& LAI	BORAT	ORY 7	TESTS
FEET	MATERIAL DESCRIPTION		<u> </u>		TYł	PE	IN.	WC	DEN	LL	PL.	%-# 200
25 -	SAND WITH SILT, a little gravel, fine to medium grained, light brown, moist, dense to very dense (SP-SM)	ALLUVIUM	35	м	X s	ss	20					
26 -					/\ ਸ							
27 –					ł							
28 —					Ħ							
29 —					I							
30 —			51	м	VI s	ss	24					
31 —					<u> </u>							
32 —					1							
33 —	SAND WITH SILT, fine to medium grained,				ł							
34 —	light brown, moist, dense to very dense (SP-SM)				Ľ							
35			30	м	M,	22	21					
36 —					Δ`							
37 -					Ħ							
38 -					ł	·						
39 -					ł							
40			53	м	Μ,	22	22					
41				101	Δ`		22					
42 —					Ħ							
43 —	SAND WITH SILT, a little gravel, fine to				1							
44 -	medium grained, light brown, moist, very dense (SP-SM)				ł							
45 -			57	м	VI s	ss	22					
46 -					Δ_						<u> </u>	
	END OF BORING Northing=206618.1 Easting=553935.0								-			
-												



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081					LC)G OF	во	RING N	10. <u> </u>	ST-	145	(p. 1	. of 1)
PROJE	ECT: TCAAP Red	evelopm	ent; Ard	len Hi	lls, MN										[
DEPTH	SURFACE ELEVATION: _	954.7			GEOLOGY	N	MC	SA	MPLE	REC	FIELI)&L/	BORA	FORY '	FESTS
FËET	MATERIAL	DESCRIPTI	ON			14]]	ГҮРЕ	IN.	WC	DEN	LL	PL	%-#20 0
1 -	FILL, mixture of clayey sa little gravel, surface roots, brown	and and silf trace roots	y sand, a , light		FILL TILL	24	м	\mathbb{N}	SS	16	7				
3 -	brown, laminations of silt	gravel, trac y sand, very	e roots, y stiff (SC)			25	М	M	SS	13	12				
4 5							1	R		·	14				
6 -						18	M	X	SS	15	14				
7 8						67/0.9	M	ਸ \	SS	11	7				
9 —								면						:	
10 — 11 —		•				16	M	X	SS	12	δ				
12 —	SAND, a little gravel, med	lium to fine	e grained,		COARSE			R							
13 14	brown, moist, meatum der	ise to delise	ə (or)		ALLO VIONI	18	M	Å	55	14					
15 -						22	м	M	60	14					
16 -						33	M	A	33	14					
17								ł			:				
19 -	grained, brown, moist, ver	H SIL I, fii y dense (Sl	e to coars P-SM)	e				ł							
20						60	м	M	SS	12					
21 – 22 –	• •							/\ रा							
23 -	SAND WITH SILT. fine t	o medium s	prained.					ł							
24 -	brown, moist, dense (SP-S	M)	,					凶							
25 - 26 -					:	44	м	X	SS	15					
20 -	END OF BORING Northing=206685.1 Easting=554399.4														
DEP	TH: DRILLING METHOD			WATE	ER LEVEL MEA	L	L EMEN	L TS				<u> </u>		prer	
	1%' 3.25" HSA	DATE	TIME	SAMPL DEPT	ED CASING H DEPTH	CAV	'E-IN PTH	I FL	ORILLI UID LE	NG VEL	WATI LEVE	ER EL	THE A	TTAC	HED
		6/29/07	1:40	26.5	24.5	20	6.5				Non	e	SHEET	IS FOF	AN
- DAPPY													EXPLA	NATIC	ON OF
COMPL	ETED: 6/28/07]1	ERMIN		Y ON
DR: SC	G LG: SB Rig: 91C												TH	18 FOC	L



SUBSURFACE BORING LOG

AET JO	B NO:	22-00081					LC	og of	BORING NO	o	<u>ST-1</u>	<u>45A</u>	<u>(p.</u>	<u>1 of</u>	<u>2)</u>
PROJEC	CT:	TCAAP Rede	velopme	nt; Ard	en Hill	ls, MN									
DEPTH	SU	RFACE ELEVATION:	954.7		1	GEOLOGY	N	MC	SAMPLE	REC	FIELD)&L/	BORA	ORY	FESTS
FEET		MATERIAL I	DESCRIPTIC	N				IVIC	TYPE	IN.	WC	DEN	LL	PL	%- #200
1	No s Bori	amples taken in upper ng ST-145	29.5', Refe	er to Log of	f				#						
	Don								¥						
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5									Į.						
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DEPT	H:	DRILLING METHOD			WATE	R LEVEL MEA	ASURI	EMEN	ערוואט 12	JG		ER	NOTE:	REFE	ER TO
0-39	½'	3.25" HSA	DATE	TIME	DEPTH	I DEPTH		PTH	FLUIDLE	VEL	ĽÉVI	Ĩ.	THE A	TTAC	HED
			7/24/07	9:55	41.5	39.5	4	0.4			Nor	le	SHEE	ις fUI Νάτια	
BORING													TERMI	VOLO	GY ON
COMPLI	ETED:	7/24/07											TH	IIS LO	G



AET JO	DB NO: 22-00081			LC	G OF	BO	RING N	10	ST-1	<u>45A</u>	(p. 2	2 of :	2)
PROJE	CT: TCAAP Redevelopment; Arden	Hi	lls, MN										
DEPTH IN			GEOLOGY	N	мс	SA	MPLE	REC	FIELD	& LAI	BORAT	ORY 1	ESTS
FEET	MATERIAL DESCRIPTION		COADSE			י דיז	1112		wc	DEN		PL.	%-#200
30 31	little black, moist, medium dense, laminations of silt at 31 feet (SP-SM)		ALLUVIUM	25	М	X	SS	17					
32						R							
33 - 34 -	SANDY SILT, light brown, moist, dense (ML)		FINE ALLUVIUM			ł							
35 —				50	м	M	SS	19					
36 -				•••		$\prod_{i=1}^{n}$							
37 38						ł						:	
39	SAND WITH SILT, a little gravel, medium to fine grained, brown, moist, very dense (SP-SM)		COARSE ALLUVIUM			Ĭ							
40				57	М	X	SS	22					
41 —	END OF BODINC					\square							
	Northing=206685.1 Easting=554399.4									-			
	· .												
-													
				3									
									1				
													1
					<u> </u>			<u> </u>			L		<u> </u>

Brau Geote	n Proje cnical E	ect S valua	P-0 tion	6-058	871			BORING	: S]	[-14	46	RI-	4006-07
TCAA NE of Arden	P Rede Highwa Hills, M	velop y 10 /Iinne	men and] sota	t Highv	vay 96			attached s	ON: N sketch.	: 206	671.5	99, E:	554897.200
DRILLI	ER: K.	Keck			METHOL): 3 1/4" HSA,	Autohmr	DATE:	7/2	2/07	·	SCA	LE: 1"
Elev. feet 966.0	Depth feet 0.0	AS Syn	TM 1bol			Description of 1 (ASTM D2488 of	Materials or D2487)		BPF	WL	MC %	P200 %	Tests or
965.5	0.5	SM			Y SAND, t	race of Roots, d	ark brown, mois	it. Γ					
-		CL		SAN	DY LEAN	CLAY, trace of (Glacial 1	Gravel, brown, ïll)	moist. –	M 10				
962.0	4.0								h				
_		CL		SAN wet.	DY LEAN	CLAY, trace of	Gravel, yellowi	sh-brown,					
-						(Glacial T	ill)	_	7				
-								-	4		22	54	LL = 29 PI = 17
957.0	9.0	CL		SAN	DY LEAN	CLAY, trace of	Gravel, reddish	-brown,					
	11.0			mois	t, hard.	(Glacial T	ill)		33				
935.0	11.0	SM		SILT	Y SAND, f	ine- to medium-	grained, trace of	f Gravel,	ľ				
				redd	sh-brown, 1	noist, medium d (Glacial T	ense to dense. ill)	-	82				NR Suspected or Boulder
-									46		6	25	- - -
								-					
									32				
-								-					
•								-					
940 0	26.0								32				
<u>ru.u</u>	20.0			END	OF BORIN	IG.							
				Wate in the	r not observ ground.	red with 24 1/2 f	eet of hollow-st	em auger –					
				Borin	g then grou	ted.		_					
— ļ													



SUBSURFACE BORING LOG

AET JO	DB NO: 22-00081		-				LO	GOF	BORII	NG NO.		<u>ST-1</u>	46A	<u>(p.</u>	<u>1 of</u>	2)
PROJE	ст: _ TCAAP Rede	velopme	ent; Ard	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION: _	966.0			GJ	EOLOGY	N	мс	SAM	PLE R	EC	FIELD) & LA	BORAT	ORY 1	rests
FEET	MATERIAL	DESCRIPTIC	DN				14	IVIC		PE I	N.	WC	DEN	LL	PL	⁄6-#200
1_	No samples taken in upper Boring ST-146	r 27', Refer	to Log of						Ħ							
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2-									#							
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8~									ł							
9 –									ł							
10									ł							
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12 -									ł							
13									ł							
14									ł							
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16 -				-					1							
17 -									\$							
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19 —									Į							
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21 -									ł							
22 –									ł							
23 -									ł							
24 -									ţ]							
25 -									Ħ							
26 –									Ĭ							
DEP	TH: DRILLING METHOD			WATE	ER L	EVEL MEA	SURE	EMEN	rs			*		NOTE:	REFE	R TO
0-44	1½' 3.25" HSA	DATE	TIME	SAMPL DEPT	,ED H	CASING DEPTH	CAV DE	/E-IN PTH	DR FLUI	ILLING D LEVI	EL	WAT LEVI	ER EL	THE A	TTAC	HED
		7/25/07	8:46	46.5	5	44.5	40	6.0				Non	ıe	SHEE	IS FOI	R AN
DODDI	~													EXPLA	NATIO	DN OF
COMPL	ETED: 7/25/07													i dividi TH		ji UN G
DR: SC	G LG: BR Rig: 91C															



AET JO	OB NO:	22-00081				LC	G OF	BO	RING N	io	<u>ST-1</u>	46A	(p.	<u>2 of</u>	2)
PROJE	CT:	TCAAP Redeve	elopment; Arde	<u>n Hi</u>	lls, MN		·								İ
DEPTH					GEOLOGY	N	MC	SA	MPLE	REC	FIELD) & LAI	BORAT	ORY 1	FESTS
FÊET		MATERIAL DE	SCRIPTION				IVIC		TYPE	IN.	WC	DEN	LL	PL	%-#2 00
28 —	GRAV moist,	EL WITH SILTY SA dense to very dense (C	ND, light brown, iP)		COARSE ALLUVIUM	79	м	M	SS	19					
29 —								R							
30 —				1 III III		42	м	M	SS	10					
31 —								Д							
32 —								{}							
33								ł							
34								ł							
35 —				***		57	м	M	SS	14					
36 -								И							
37 -								ł							
38 - 20 -	SAND, light br	, a little gravel, fine to own, moist, dense (SP	medium grained,		· ·			ł		-					
40 -			,					R							
41 -						40	м	X	SS	17					
42 -								रा							
43 -	GPAV	ET LV SAND WITH C	WT madium to	.: 											
44 -	fine gra	ined, light brown, mo	ist, very dense					ł							
45 -	(51-514	.,						Ŵ	00	10					
46 -						56	м	\mathbb{N}	55	18					
	END (Northin Easting	DF BORING 1g=206671.6 =554897.2													

Braun Proj	ect SP-0	6-05871	BORING	RI-40	06-16 ST-147
Geotecnical E TCAAP Rede NE of Highwa Arden Hills, N	Evaluation evelopmentary 10 and 1 Minnesota	t Highway 96	LOCATIC attached s	DN: N: 206 ketch.	638.252. E:555108.351 See
DRILLER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/2/07	SCALE: 1'' = 4'
Elev. Depth feet feet 958.6 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF WL	Tests or Notes
	SM SM	SILTY SAND, trace of Roots, dark brown, moi (Topsoil) SILTY SAND, fine- to medium-grained, trace or reddish-brown, moist, medium dense. (Glacial Till) POORLY GRADED SAND, fine- to medium-g trace of Gravel, light brown, moist, medium der dense. (Glacial Outwash) END OF BORING. Water not observed with 24 1/2 feet of hollow-s in the ground. Boring then grouted.	st. of Gravel, rained, ise to very 	20 22 28 22 52 34 38 53	Suspected Cobble or Bould

BRAUN"

LOG OF BORING



AET JO	OB NO:	22-00081						LC	G OF	BORING	NO	<u>ST-1</u>	<u>47A</u>	(p.	1 of	2)_
PROJE	CT:	TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN									
DEPTH	SUR	FACE ELEVATION:	958.6			G	EOLOGY	 N!	MC	SAMPL	E REC	FIELI) & LA	BORAT	ORY	FESTS
FEET		MATERIAL	DESCRIPTIC	N				19	MC	TYPE	IN.	WC	DEN	LL	PL	%-#2 00
1 –	No sa Borin	mples taken in upper g ST-147	29.5', Refe	er to Log of	f					¥						
2-		5								\$						
3 –										#		1				
4 -							1			Į.						
5										Į.						
6										Į.						
7 -									:	Į.						
8										Į.						
9-										Į.				1		
10 -										Į.						
11										ł						
12 -										ł						
13 -										Ł						
14 -										H						
15 -								•		H						
16 -						:				H						
17 –										H						
18 -										H				1		
19										H						
20 -										ł						
21 -										ł						
22 –										1						
23 –										1					-	
24 -										ł						·
25 -										ł					[
26 -										£}						
27										R						
28 -										3						
DEP	TH: D	RILLING METHOD			WAT	ER L	EVEL MEA	SURI	EMEN	TS	- 1			NOTE:	REFE	RTO
<u>л</u> л л	11/1 2	25" 119 4	DATE	TIME	SAMPI DEP1	LED TH	CASING DEPTH	CA	VE-IN PTH	DRIL	LING LEVEL	WAT LEV	ER EL	THE A	TTAC	HED
<u> </u>	1/2 3	. <u>25 по</u> а	7/24/07	2:20	45.	5	44.5	4	5.4			Noi	ne	SHEE	rs foi	R AN
													I	EXPLA	NATIO	ON OF
BORIN COMPI	G .ETED:	7/24/07											Ĩ	ERMI	VOLO	GY ON
DR: SO	G LG:	BR Rig: 91C												TH	IIS LO	G



AET JO	DB NO: <u>22-00081</u>			LO	G OF	BOI	RING N	io	<u>ST-1</u>	<u>47A</u>	(p.)	<u>2 of</u>	2)
PROJE	CT: TCAAP Redevelopment; Arder	Hi	lls, MN										
DEPTH			GEOLOGY	N	MC	SA	MPLE	REC	FIELD	& LAI	BORAT	TORY 7	TESTS
FEET	MATERIAL DESCRIPTION	1					YPE	11N.	WC	DEN	LL	PL	%-#20 0
30 —	GRAVEL WITH SAND, brown, very dense (GP)		COARSE ALLUVIUM	119	м	M	SS	16					
31 —						Д							
32 -						ł							
33 —						Ł							
34 —				84/0.8		14 14							
35					М	X	SS	14					
36 -						R							
3/-						Į							
30-	GRAVELLY SAND WITH SILT, medium to fine grained, brown. moist. very dense (SP-SM)					H							
40			•	100/0.:	5	M		_					
41			•		М	Ŵ	SS	8					
42			•			3							
43 —			*			∦}							
44 —						X							
45 -	· · · · · · · · · · · · · · · · · · ·			62/0.5	M	Х	SS	8	ļ				-
	END OF BORING Northing=206638.3												
	Easting=555108.4												
			-										;
						1							
			1										
ļ													
							<u> </u>						



SUBSURFACE BORING LOG

AET JO	DB NO: 22-00081	* -					LO	GOF	BOI	RING N	iO	ST-	148	(p. 1	of 2)
PROJE	CT: TCAAP Rede	velopme	nt; Arde	en Hi	lls,	MN										
DEPTH	STREACE ELEVATION	957.9							54	MPIE	REC	FIELI)&LA	BORAT	ORY	TESTS
IN FEET	MATERIAL I	DESCRIPTIC	N .			SOLUG I	N	MC		YPE	ĪN.	wc	DEN	LL	PL	∕₀- #200
	6" Bituminous Pavement				FIL	L			मि	SU						
1 -	FILL, mostly gravelly silty	sand, brov	vn and ligh	ī			26	М	X	SS	9					1
2 -	brown FILL mixture of sandy lea	n clay clay	vev sand	/		1			Ħ							
3 —	and silty sand, a little grave	el, pieces of	f	;			17	M	XI	SS	10	10				
4 —	bituminous, brown, gray, d little black	lark gray ar	nd brown, a	1					E							
5 —	Intic black						20	M	М	SS	20					
6 -							20		Д	00						
7 -								T	K							
8							1	W	X	SS	14			1		
9 -									B		l					
10 -	ORGANIC CLAY, trace re	oots, black	and dark		SW.	AMP	-		$\overline{\mathbb{N}}$	66	21	26				
11 -	gray, soft (OL/OH)	n a little or				0311	2		M	22	21	182	1]
12 -	laminations of lean clay (P	T)	····,						P					1		
13 -	ORGANIC CLAY, trace re	oots, black,	, soft to				2	M	X	SS	24	102				
14	very son (OL/OR)								\square			1				
15 -									\square	~~	0.0	31				
16 -					EN	F		M	Ŵ	88	23	27				
17 -	SILTY CLAY, gray and bind for a second second second second second second second second second second second se	iack, very s CL-ML)	oft,		AL	LUVIUM			团							
18	CLAYEY SAND, a little g	ravel, gray	and		TIL	L	2	M	X	SS	16	18				
19	brownish gray, very soft to	very stiff	(SC)						Д							
20									\mathbf{n}		1					
20							1	M	X	SS	7	23				
21									মি							
22 -							ŀ		1							
25-									K				1			
24 -									۲L ۲							
25 -							18	М	X	SS	5	18				
26 -									F			1		1		
27 -							1		ł						1	1
28 -									R		1			1		
29 -				_///					Ц	1		10				
30 —	CLAYEY SAND, a little g very stiff (SC)	gravel, dark	orown,				20	M	X	ss	20	15			1	
31 -		····			1		1	<u> </u>	\mathbb{N}			<u> </u>		_	<u> </u>	<u> </u>
DEP	TH: DRILLING METHOD			WAT	ER L	EVEL MEA	ASURI	EMEN	TS			117.5		NOTE	REFI	ER TO
0-3	9½' 3.25" HSA	DATE	TIME	SAMP DEP	LED IH	CASING DEPTH	CA' DE	VE-IN PTH	FI	JUID LI	EVEL	WA1 LEV	EL	THE A	ATTA(CHED
		7/17/07	12:05	9.0)	7.0		7.4				7.	3	SHEE	TS FO	R AN
		7/17/07	12:45	36.	5	34.5	3	5.7				33.	.9	EXPLA	NATI	ON OF
BORIN	IG LETED: 7/17/07	7/17/07	12:50	41.	5	39.5	4	0.3				39.	.9	TERMI	NOLO	GY OI
DR: S	G LG: SB/BRig: 91C													T1	HS LC	G



AET J	OB NO: 22-00081			LO	GOF	BORING	NO	ST-	148	(p. 2	<u>of 2</u>)
PROJE	ECT: TCAAP Redevelopm	nent; Arden Hi	lls, MN									
DEPTH			GEOLOGY	N	MC	SAMPLE	REC	FIELD	& LAI	BORAT	ORY 1	TESTS
FÉET	MATERIAL DESCRIP	FION		14	IVIC .	TYPE	IN.	wc	DEN	LL	PL	%-# 200
DEPTH IN FEET 32 - 33 - 34 - 35 - 36 - 37 - 38 - 39 - 40 - 41 -	MATERIAL DESCRIP SANDY LEAN CLAY, a little grav brown, a little brown, very stiff, ler sand at 31.5' (CL) CLAYEY SAND, a little gravel, tra brown, hard to firm (SC) END OF BORING Northing=206425.9 Easting=554458.6	TION vel, dark ise of silty ace roots,	GEOLOGY	N 36 8	мс w	SAMPLE TYPE	REC IN. 16	FIELD WC 10	DEN DEN	BORAT LL	ORY T	rests %-#200

BRA	AUN	а 5м -					L	OG OF]	BORING
INTE	RTEC	~							
Brau	ın Proj	ect SP-(06-05871	BORING	i:		S]	Г-149	
TCA	ecnical F AP Rede	valuatio	a nt	LOCATI	ON: N	: 206	391.7	47, E: 55539	1.606 See
NE of	f Highwa	y 10 and	l Highway 96	attached	SKCICII.				
	$\frac{n \text{ Hills}, F}{FP \cdot \kappa}$	Kack		DATE:	7/1	1/07		SCALE:	111 - 41
Flev	Denth		METHOD: 33/4 HSA, Autommr	DATE:	//1	1/0/		SCALE:	1 = 4.
feet 990.9	feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC %	Tests	or Notes
989.9	1.0	FILL	FILL: Silty Sand, trace of Roots, moist.				Γ		
		FILL 🚫	FILL: SANDY LEAN CLAY, trace of GRA	VEL, mixed	1				
				-					
-			8	-	Щ Ц				
-			×	-					
			×.	_	7				
rions)			X X	-	Ĥ				
eviat T			8	-					
					- ∬ 5				
Б П			X	-					
amati			X	<u></u>	M 8				
exp			×.	-	ЩŬ				
<u>ਤੂ 978.9</u> ਡ	12.0	FIII	FILL: Silty Sand fine to medium grained to	mce of					
k she			gravel, reddish-brown to grayish-brown, mois	st to wet.	7		-		
2010 			×	-					
			8						
			8	-	Д 4				
			Q X	_					
L				-					
200			X	_					
43			X			-			
07 14:			X X		6				
968.9	22.0		X	_					
N.CD		CL	SANDY LEAN CLAY, trace of Gravel, gray,	wet.					
BIKAU				-					
1.5				-	1				
1/8000					₫ 4				
				-	Ħ				
				_					1
				-					
				_		İ			
					4	1	23		
				-	M				
5P-06-05871	<u> </u>		Braun Intertec Corporatio	on	ĻL	<u> </u>	L	S.	-149 page 1 of 2

Braun Proj	ect SP-06	5-05871	BORING	S'	Г14	9 (cont	$\overline{)}$
Geotecnical H TCAAP Rede NE of Highwa Arden Hills, I	Evaluation evelopment ay 10 and H Winnesota	Highway 96	LOCATIC attached s	ON: N: 20 ketch.	6391.7	47, E: 55539	1.606 See
DRILLER: K	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/11/0	7	SCALE:	1''=4'
Elev. Depth feet feet 958.9 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF W	L MC	Tests	or Notes
952.9 38.0	SM	SILTY SAND, fine- to medium-grained, trace o reddish-brown, moist, medium dense to hard.	-biowit,	× 30 59 29	7	*50 blows f	or 6"

BRAUN™

LOG OF BORING



AET JO	OB NO: 22-00081					LC	G OF	BOI	RING N	10	ST-	150	(p. 1	of 1)	
PROJE	TCAAP Rede	evelopme	ent; Ard	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION:	927.0			G	EOLOGY	N	MC	SĄ	MPLE	REC	FIELD) & LA	BORAT	ORY 1	TESTS
FËET	MATERIAL	DESCRIPTIO	N			-				YPE	IN.	WC	DEN	LL	PL '	⁄₀-#200
1-	FILL, mostly sandy silt, su roots, dark brownish gray	urface roots	, trace	/	FIL	.L	34	М	M	SS	12		:			
2	FILL, mixture of clayey sa	and and silt	y sand, a						Д							
· 3 -	brown		ii and				21	м	X	SS	19					
4									Ы							
5 -	CLAYEY SAND, trace ro	ots, dark bi	rown, firm		TO FIL	PSOIL OR L	7	м	M	55	3	16				
6 -							,	101	М	33	5					
7	CLAYEY SAND, a little g	gravel, brov	vn and ligh	t ////	TIL	L			R			17	1			
8-	gray mottled, stiff (SC/CL))					10	м	X	SS	16					
9-	CLAYEY SAND, a little g	gravel, light	t brownish						मि							
10	sand (SC/CL)	aminations	of silty				11	м	X	SS	21	18				
									B							
	12 - 13 -						14	м	Μ	22	21	16				
14	13 — 14 —						17		Д	00						
15 -	SANDY LEAN CLAY, a	little grave	l, brown						M			14				
16 -	and dark brown, very stiff	(CL)					16	M	M	SS	24	14				
17									I							
18									ł							
19 —									岱							
20 -							16	м	М	SS	24	14				
21 -									Д	~~~						
22 –									3							
23 —	SANDY LEAN CLAY, a	little grave	l, brown,						Ł							
24 -	very stiff, lenses and lamin	ations of s	and (CL)						꿤							
25 -							23	М	X	SS	21	14	1			
20 7	END OF BORING			////	1	:			$\left \right $	·						
	Northing=206182.3 Easting=552896.3															
								1						<u> </u>		
DEP	DEPTH: DRILLING METHOD				ERL	EVEL MEA	SURE	EMEN	TS T	חוחסר		<u></u>		NOTE:	REFE	R TO
0-24	0-24½' 3.25" HSA DATE TIME				Ή	DEPTH	DE	PTH	FL	UID LE	VEL	LEVI		THE A	TTAC	HED
	7/6/07 2:10				5	24.5	2	5.5				Non		EXPLA	NATIO	ON OF
BORIN	BORING												_1	ERMI	IOLOC	JY ON
DR: SC	G LG: SB Ríg: 91C											<u> </u>		TH	IIS LOO	3



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081	<u> </u>					LC)G OF	BO	RING N	10	ST-	151	(p. 1	of 1)
PROJ	ECT: TCAAP Red	evelopm	ent; Ard	en Hi	ills,	, MN										
DEPTH	SURFACE ELEVATION:	922.3			G	EOLOGY	N	MC	SA	MPLE	REC	FIELI)&LA	ABORA	FORY '	TESTS
FEEI	MATERIAL FILL mixture of alayay a	DESCRIPTION ond oil	UN by sand		EII	T						33	DEN		PL	Vo-#200
1 -	surface roots, trace roots,	black and b	iy sanu, prown			-1-	24	м	X	SS	14					
2	CLAYEY SAND, a little brown, very stiff (SC)	gravel, trac	e roots,		TIL	LL	18	м	$\left[\right]$	SS	24	12	r			
4 -	SAND WITH SILT, fine	to medium	grained, a			ARSE			A							
6-			196 (91 -914)				13	Ŵ	M	SS	11					
7 -	SANDVI FAN CLAV A	little grove	L aray a			тт.			E							
8 -	little reddish brown, firm t silty sand at 7.5' (CL)	to stiff, lam	inations of		111		5	м	M	SS	18	18				
9 10									R			15				
11 -							7	M	Å	SS	24					
12 –									M			16				
13						10	M	Ŵ	SS	24	10					
14									R			15				
16 -							10	М	М	SS	21	15				
17 –									H							
18 —	LEAN CLAY, brownish g	ray, a little	gray, hard	-\//	FIN	NE			ł							
19 -	to very stiff, laminations o	f silt (CL)			AL.	LUVIUM			뭑							
20 -							33	М	X	SS	21	17				
22 -									R							
23 -									H							
24 –									团							
25 -							25	м	M	SS	24	25				
26	END OF BORING Northing=206254.2 Easting=553051.5										- 					
													L_			
DEP	DEPTH: DRILLING METHOD					EVEL MEA	SURE	MEN	TS		<u></u>	117.000		NOTE:	REFE	R TO
0-24	0-24½' 3.25" HSA DATE TIME					CASING DEPTH	DEI	E-IN PTH	FL	UID LE	VEL	WATI LEVE		THE A	TTAC	HED
	7/9/07 9:35					4.5	5.	.2				5.1	,	SHEE	S FOR	
BORING	ORING OMPLETED: 7/9/07					24.5	26	.4				Non	e 1	ERMIN	IOLOG	Y ON
DR: SC	G LG: SB Rig: 91C												TH	IS LOO	3	



AET JO	DB NO: 22-00081						LO	GOF	BO	RING N	10	ST-	152	(p. 1	of 1)
PROJE	CT: TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION:	942.0			GE	EOLOGY	ุ่ง	мс	SA	MPLE	REC	FIELD	& LA	BORAT	ORY	TESTS
FEET	MATERIAL I	DESCRIPTIC	N			_	11		1	YPE	1N.	WC	DEN	LL	PL	%-#2 00
1	5" Bituminous Pavement	t and grave	brown	-/	FIL	L	21		Ц	5U 5U	-					
- 1 - 1	I ILL, MOSHY SAMA WINI SIN	and glave	», ULU YY II				21	м	Д	22	5					
2	FILL, mixture of sandy lea	n clay and nd grav	clayey				16	м	M	SS	11					
	Buildy This Brutter, Crowill a								Д			15				
4 " 5 _						,			K K					1		
у — К					1		9	М	X	SS	5	16				
									图		1					
v _							7	м	M	SS	12	24				
0							ŕ		Д							
10	SILTY SAND, fine graine	d, dark bro	wn, wet,		CO.	ARSE			M							
11	very loose (SM) (possible	fill)	·		ALI OR	LUVIUM FILL	3	W	X	SS	14	1			1	
17 -						1.0.00			团							
12	SAND WITH SILT, fine g	rained, bro m dense (S	wnish P-SM)		CO.	ARSE LUVIUM	11	w	M	SS	13					
14							=		Д							
15 -	SILTY SAND, fine graine dense (SM)	d, gray, we	t, medium						M							
16		<u> (0.000</u>			- 	т	15	W	Ň	SS	14	22			1	
17 -	CLAYEY SAND, gray, sti	itt (SC)	· 1. 1.		11L	ıL			图			22				
18	CLAYEY SAND, a little g stiff (SC)	gravel, gray	ish brown,				9	М	M	SS	21	17				
19 —									신							
20 -	CLAYEY SAND, a little g	gravel, brov	vn and gra	y (Ň							
21 -	mottled, stiff (SC)						12	M	Ŵ	SS	21	17				
22 -							1		R			1				
23 -		1:441.0		,					H							
24	SANDY LEAN CLAY, a (CL)	ntie grave	i, gray, stit	۱ <i>(()</i>					ł							
25 —									\int							
26 -							14	M	Ŵ	- 55	8	15				
	END OF BORING				1		1	1			-			1		
	Northing=206184.0 Easting= 553397.6															
		I	<u>=</u>	117.1					 TP		<u> </u>		<u> </u>			
DEP	TH: DRILLING METHOD		<u> </u>	WAT	ER L	LEVEL MEA	CAY	VE-IN	$\frac{15}{1}$	DRILL	ING	WAT	ER	NOTE	REFI	ER TO
0-2-	4½' 3.25" HSA	DATE	TIMÉ	DEP	ГН ГН	DEPTH	DE	PTH	FI	LUID L	ĒVEL	LEV	ĒĹ	1 HE A	111А(то го	D AN
		7/5/07	11:50	14.	0	12.0		2.5	-			12.	.3	EXPLA	NATE	IN AIN
BORIN	G	7/5/07	12:10	26.	5	24.5	2	6.4	+			NO	ne .	TERMI	NOLO	GY ON
COMP	LETED: 7/5/07			<u> </u>		 	┢							TI	HIS LC	G
DR: S	G LG: SB Rig: 91C	1				I	1		1_			<u> </u>	L			



AET JO	OB NO: 22-00081						LC	GOF	BO	RING N	10	ST-	153	(p. 1	of 1)
PROJE	ECT: TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION:	951.2			GE	EOLOGY	N	мс	SĄ	MPLE	REC	FIELD) & LA	BORAT	ORY	rests
FEET	MATERIAL I	DESCRIPTIC	DN		-				1	. YPE	11N.	WC	DEN	LL	PL	%-#200
1 –	cobbles, surface roots, trac	e roots, bro	sible wn		FiL	L	22	м	X	SS	12					
2 -	-								Д							
3 -	FILL, mixture of clayey sa	nd and san	dy lean			·	25	М	X	SS	10	13				
4 -	ciay, a nuce graver, orown		lown						<u>स</u>							
5	SANDY LEAN CLAY, a little grav. firm. lamination	little gravel is of sand ()	, brown, a CL)		TIL	L	5	м	М	SS	17	20				
6			,				-		Д							
7 -	CLAYEY SAND, a little g	ravel, brov	vn mottled	, ///					\int	~~						
8-	stiff (SC)						12	M	Ŵ	88	18					
9	CLAYEY SAND. a little o	ravel. light	brownish						R							
	gray, a little brown, mottle	d, stiff, len	ses and				12	М	X	SS	17	18				
12			1 • 1 .						B							
13	brownish gray and brown	nottled, sti	ff to very			·	14	М	X	SS	23	15				
14 -	stiff (CL)							:	R							
15 —							16	м	M	85	23	15				
16 —									Д							
17 -									ł							
18 -									ł							
19 -									범							
20 -	4						30	М	X	SS	22	13				
22 -									8							
23 -	CLAVEY SAND a little a	ravel noss	ible						ł							
24 -	cobbles, dark grayish brow	in to brown	n, hard (SC)					H							
25							100/0.	M	M	ss	12	7				
	END OF BORING		<u></u>	(///					ľ			<u> </u>			<u> </u>	<u> </u>
	Northing=206179.7												1			
	Easting=555901.5															
DEP	TH: DRILLING METHOD		······································	WAT	ER L	EVEL MEA	ASUR	EMEN	TS					NOTE	REFI	ER TO
0-2	0-24 ¹ / ₂ ' 3.25" HSA DATE TIME					CASING DEPTH	CA DI	VE-IN PTH	FI	DRILLI LUID LI	NG EVEL	WAT LEV	ER EL	THE A	ATTAC	CHED
 	7/5/07 11:05					24.5	2	5.3				No	ne ,	SHEE	IS FO	
BORIN	IG			<u> </u>						<u></u>			'	ERM	NOLO	GY ON
	LETED: 7/5/07 G LG SB Rig 91C												Tł	HIS LO	G	



AET JOB NO: 22-00081							LC	DG OF	BORING NO	ST-2	153/	A (p.	1 of	2)
PROJE	ст: <u>Т</u>	CAAP Red	evelopm	ent; Ar	den Hil	ls, MN								
DEPTH	SURFAC	E ELEVATION:	951.2	2		GEOLOGY	T		SAMPLE	EC	D&L	ABORA	FORY 1	rests
FEET		MATERIAI	DESCRIPT	ION			N	MC	TYPE	Ñ. WC	DEN	J LL	PL	%-# 200
	No sample Boring ST	es taken in uppo -153	er 29.5', Re	fer to Log	of				1					
, ,									H					
3-									H				:	
4-									ł					
5									ł					
6									ł					
7 -									ł					
8 —							i		ł					
9									Ł					
10 -									ł					
11 -									ł					
12 -									ł					
13 —									ł					
14 -									ł					
15 —									ł					
16 -									H					
17 -									{					
18 -									ł					
19 -									ł					
20 -									Ð					
21 -									F.					
22									3					
23 -									£					
24									ł					
25									{}		1			
20									{				ĺ	
28 -									1					
29 -									E					
DEPT	H: DRILL	ING METHOD			WATER	LEVEL MEA	LI SURE	MEN	S I I	I	<u> </u>	NOTE	DEFE	
0-444	/2' <u>3.25''</u>	HSA	DATE	TIME	SAMPLE	D CASING DEPTH	CAV	E-IN PTH	DRILLING FLUID I FVF	WATI LEVE	ER	THE A	ITACH	ED
v/			7/23/07	3:07	46.5	44.5	46	.4		Non	e	SHEET	S FOR	AN
		· · · · · · · · · · · · · · · · · · ·] ı	EXPLAN	IATIO	NOF
BORING	ETED: 7/23	/07								ו	ERMIN	OLOG	Y ON	
DR: SG	LG: BR	Rig: 91C										THI	S LOG	



AET JO	DB NO: 22-00081		LO	G OF I	BOF	RING N	0	ST-1	<u>53A</u>	(p.)	2 of	2)
PROJE	TCAAP Redevelopment; Arden Hi	lls, MN										
DEPTH	· · · · · · · · · · · · · · · · · · ·	GEOLOGY	N	MC	SA	MPLE	REC	FIELD	& LAI	3ORAT	ORY 1	ESTS
FEET	MATERIAL DESCRIPTION		IN	MC	T	YPE	IN.	WC	DEN	LL	PL	%-# 200
30 -	SILTY SAND, a little gravel, fine to medium grained, brown, moist, very dense (SM)	TILL	73	м	M	SS	22					
31		•			Д							
32					{}							
33 —	CLAYEY SAND WITH GRAVEL, brown,				[]							
34	moist, hard to very stiff, lense of silty sand, a little gravel at 46 feet (SC)				1							
35 —			56	М	XI	SS	20	11				
36					F							
37 -					ł							
38					ł							
39 -					비							
40 -			34	М	IXI.	SS	24	9				
					सि							
42 -					Ħ							
. 44 -					H							
45					М							:
46			28	M	Ŵ	SS	24	9				
	END OF BORING	q			Ħ							
	Easting=553901.3											
			-									
								1				
												1
				1				1	1			
Brau	n Proj	ect SP-)6-05871	BORING	ST :	-154	RI-400	8-15				
----------------	----------	-----------------------	--	-------------	------------	---------	--------------------------	---------				
Geote	enical E	valuatio	1	LOCATIO	 DN: N:	206184.	.030, E: 55440	8.064 S				
TCAA	P Rede	velopme	nt Hill oc	attached s	ketch.		· , · - · · · · ·					
NE 01 Arden	Highwa	iy 10 and Ainnesot	Highway 96									
DRILLI	ER: К.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE	7/1	7/07	SCALE:	1'' = 4				
Elev.	Depth											
feet	feet	ASTM	Description of Materials		BPF	WL	Tests or	Notes				
956.7	0.0	Symbol	(ASTM D2488 or D2487)									
955.7	1.0		A FILL: Silty Sand, brown, moist.									
		FILL	FILL: Sandy Lean Clay, with Sand layer, bro	wn, dark								
-			brown and reddish-brown, moist.	_								
-			X		X 30							
			8	_								
			X									
					Ž 21							
-				-	Δ							
		🕅	8									
		🕅	X		12							
	<u> </u>	🕅	With topsoil lense at 8 feet.		Å 12							
947.7	9.0	<u>ЕПТ 🕅 </u>	X FILL: Sandy Lean Clay trace of Grovel how	vn moist								
			G THE. Sandy Lean Clay, frace of Gravel, brow	wn, moist.								
945 7	11.0		X		8							
		FILL 🔆	FILL: Sandy Lean Clay, with topsoil chunks.	brown to	H							
-			dark brown, wet.									
_ 1			X		6							
Í			Â		μ Η							
-			X	_								
- [ļ				3							
940.7	16.0		With Organic Clay layer at 15 1/2 feet.		Δ J							
		SC V	CLAYEY SAND, trace of Gravel, brown and	gray with								
-			(Lacustrine)									
-			(,	_								
-												
			1		6							
-	·			_	4							
-			1									
_												
			1									
-			4									
- 1					7							
_					Ă ′							
-												
928.7	28.0	CL	SANDY LEAN CLAY trace of Gravel brow	n with iron								
.			staining, moist, stiff.									
			(Glacial Till)				·					
—					v 13							
.				_	Δ							
Į												

LOG OF BORING

BRAUN

BKAUN	-					LOG OF H	BORIN
NTERTEC Braun Proj Geotecnical E TCAAP Rede NE of Highwa Arden Hills, N	ect SP-06 valuation velopment y 10 and H dinnesota	-05871 lighway 96	BORDS LOCATIC attached sł	-15 N: N: ketch.	4 F 2061	RI-4008-15 84.030, E: 554408	(cont. 3.064 See
DRILLER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/17	7/07	SCALE:	1"=4'
Elev. Depth feet feet 924.7 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or 1	Notes
	SM	SANDY LEAN CLAY, trace of Gravel, brown staining, moist, stiff. (Glacial Till) (continued) SILTY SAND, fine- to medium-grained, trace of reddish-brown, moist, dense. (Glacial Till) END OF BORING. Water not observed during drilling. Water not observed with 39 1/2 feet of hollow- in the ground. Boring then grouted.	with iron	38			

SP-06-05871

LOG OF BORING

ßKA	<u>AUN</u>	5 KA 2 -			J	LOG OF BORING
INTE	RTEC	-				
Brau	n Proj	ect SP-0	6-05871	BORING	:	ST-157
Geote TCAA NE of Arden	cnical E P Rede Highwa Hills, N	valuation velopment vy 10 and l dinnesota	t Highway 96	LOCATIC attached s	DN: N: 20618: ketch.	5.157, E: 555395.351 See
DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/10/07	SCALE: 1" = 4'
Elev. feet 995.9	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	·	BPF WL	Tests or Notes
994.9	1.0	FILL 💥	FILL: Silty Sand, trace of Roots, dark brown,	moist.		
		FILL	FILL: Sandy Lean Clay, mixed, light brown to brown, moist.	o grayish 	12 7 12	
5 986.9	9.0	ЕП І	EII I . Silby Sand fine grained trace of Decta	at 12'		
981.9	14.0		Sample Depth, brown to dark brown, moist.		9	
		CL	SANDY LEAN CLAY, trace of Gravel, light t brown, moist, medium to very stiff. (Glacial Till)	brown to	7 18 13	
963.9	32.0		Brown Interfere Commention		14	CT 157 1 -F

Brau	n Proje	ect SP-0	6-05871	BORING	:	ST	-157 (cont.)	
Geoteo TCAA	enical E	valuation		LOCATI	ON: N	2061	185.157, E: 555395.35	1 See
NE of	Highwa	y 10 and 1	Highway 96	attached s	sketch.			
Arden	Hills, N	linnesota					- 1	
DRILLE	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	0/07	SCALE: 1'	" = 4
Elev. feet	Depth feet	ASTM	Description of Materials		BPF	WL	Tests or Note	es
963.9	32.0	Symbol	(ASTM D2488 or D2487)	. 1	 			
		IVIC	to very dense.	st, dense				
			(Glaciofluvium)	_				
				_	38			
				_				
_							-	
					38			
		는 가 다 가 가 다 고 다 다		_	Π			
ĺ				-				
				_				
				-				
					*		*50 blows to for 5" (s	et)
048.0	47.0						suspected cobble or be	oulde
		SP	POORLY GRADED SAND, fine- to medium-gra	ained,				
ļ			trace of Gravel, light brown, moist, very dense. (Glacial Outwash)					
-					V 74			
				. <u></u>	Δ			
					00			
					X ^{oo}			
.								
					*		*50 blows for 4" (set)	
				·				
				_				
						ļ		

	n Proje	ect SP-0	5-05871	BORING	:	ST	-157 (cont.)
Geote TCAA NE of Arden	cnical E P Redev Highwa Hills N	valuation velopmen y 10 and 1 finnesota	Highway 96	LOCATIC attached s	ON: N: ketch.	2061	85.157, E: 55539	5.351 \$
DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	0/07	SCALE:	1"=
Elev. feet 931.9	Depth feet 64.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or 2	Notes
914.9	81.0		END OF BORING. Water not observed with 79 1/2 feet of hollow- in the ground. Boring then grouted.	stem auger	 ₹ 52 ₹ 68 * ₹ 58 		*50 blows for 6"	(set)



AET JO	AET JOB NO: 22-00081 TCAAP Redevelopment: A						LO	GOF	BOI	RING N	10	ST-	158	(p. 1	of 1	<u>b </u>
PROJE	CT: TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION:	955.5			GE	EOLOGY	N	MC	SA	MPLE	REC	FIELL) & LA	BORAT	ORY	TESTS
FEET	MATERIAL	DESCRIPTIO	N				19	1010		YPE	IN.	wc	DEN	LL	PL	%-#200
1	FILL, mixture of sandy lea and silty sand, surface roo light brown and gray	an clay, clay ts, trave roo	ey sand ts, brown,		FIL	L	26	М	M	SS	14	7				
2 -							35	м	\mathbb{N}	SS	15	8				
4~~							55		Д	~~						
5 —							7		M	55	18	14				
6		-					,	1.01	Д	33	10					
7 -									\mathbb{N}		1.7					
8 -							12	м	Å	SS		22				
9 10									K							
11 -						15	М	Ŵ	SS	19	15					
12								R								
13 —	FILL, mixture of clayey sa	dy lean				9	М	M	SS	15	19					
14 —	clay, a little gravel, trace r a little black, lense of orga	oots, brown mic clay, la	and gray,						R							
15 -	of sandy silt						8	M	X	SS	14	20				
10									A							
18 —							10	м	X	SS	24	17				
19 —									E							
20 —							9	м	X	SS	20	19				
21	LEAN CLAY, trace roots	, gray and b	lack, stiff,		FIN	IE			R			24				
22 - 23 -	lense of organic clay, lens	e of silty sa gravel, grav	nd (CL) . soft (SC)		AL. TIL	LUVIUM .L	4	м	N	SS	24	19				
24 -	·		, ,						R							
25 —	SANDY LEAN CLAY, a little brown, stiff, laminati	little gravel	, gray, a clay (CL)				11	м	M	SS	24	21				
26 —								<u> </u>	\mathbb{P}			<u> </u>				
	Northing=206042.2 Easting=554402.2															
DEP	DEPTH: DRILLING METHOD				ER L	EVEL MEA	SUR	EMEN	ПS	ł.,.		- 1		NOTE	: REF	ER TO
0-2	0-24½' 3.25" HSA DATE TIME S			SAMP DEP	LED TH	CASING DEPTH	CA DE	VE-IN EPTH	FI	DRILLI UID L	ING EVEL	WA1 LEV	ER EL	THE	ATTA	CHED
0-2-	7/17/07 11:05				5	24.5	2	6.5				No	ne	SHEE	TS FC	R AN
nonn	10									<u></u>				EXPLA	ANATI NOLO	ION OF
COMP	LETED: 7/17/07	·		<u> </u>			-							TI	HIS LO)G I UIN
DR: S	G LG: SB/BRaig: 91C															

Brau	ın Proj	ject SP-00	6-05871		BORING	:	S	ST-159	
Geote TCA NE of Arde	ecnical E AP Rede Highwa 1 Hills, N	Evaluation Evelopment ay 10 and 1 Minnesota	t Highway 96		LOCATIC attached s	DN: N: sketch.	206043	7.880. E: 55456	3.240 Se
DRILL	ER: M	. Rowland	METHOD:	3 1/4" HSA, Autohmr	DATE:	7/1	2/07	SCALE:	1'' = 4
Elev. feet 959.4	Depth feet	ASTM Symbol	D (A)	escription of Materials STM D2488 or D2487)		BPF	WL	Tests or	Notes
AUN BASIC LOG OF BORING SP0605871.GPJ BRAUN GDT 10/2/07 14:43 (See Descriptive Terminology sheet for explanation of abbreviations) E C C C C F C C C C C C C C C C C C C C	26.0	FILL	FILL: Poorly Grad medium-grained, tr waterbearing at 20' END OF BORING. Water observed at 1 Boring then grouted	led Sand with Silt, fine- to ace of Gravel, brown, moi sample depth. (Lacustrine)	st then		∇		



SUBSURFACE BORING LOG

AET J	OB NO:	22-00081						LC	G OF	BO	RING N	10	ST-	160	(p. 1	of 1)
PROJE	CT:	TCAAP Rede	velopme	ent; Arde	en Hi	lls,	MN										
DEPTH	SUR	FACE ELEVATION:	920.2			G	EOLOGY	N	MC	SA	MPLE	REC	FIELD) & LA	BORA	TORY 7	FESTS
FEET		MATERIAL	DESCRIPTI	ON		L		1N	IVIC	[]	TYPE	IN.	WC	DEN	LL	PL ·	%-# 200
1 –	FILL,	mixture of silty sand ravel, trace roots, su	d and claye rface roots	y sand, a		FIL	LL	24	м	М	SS	13	15				
2 -	brown			, 	+			2.		Д							
3	silty s	and, a little gravel, tr	ace roots, l	y sand, and prown and				21	м	М	SS	23	10				
4	gray, j	possible cobbles								Д							
5										\square							
6 -								11	М	M	SS	12	16				
7 -	IEAN	CLAY WITH ORC	ANICS +	rana ranta						ষ্ট							
. 8 -	black,	firm (CL)	JANICS, u	ace roots,		SW	AMP	8	м	IXI	SS	20	20				
9	SILTY	(SAND, trace roots	, fine grain	ed, dark		CO	ARSE			Д				ŗ			
10 —	SILTY	SAND, trace roots	, fine grain	ed, gray,			LUVIUM	4	WAA	M		14					
11 -	watert lamina	pearing, very loose wations of lean clay water	ith lenses ith sand (S	and M)				4		\square	22	14					
12 —	SANE	SAND WITH SILT, fine grained, brown, waterbearing, medium dense (SP-SM)							<u> </u>	R							
13 -	waterbearing, medium dense (SP-SM)							11	W	X	SS	15					
14	OL AN						7			E							
15 -	Stiff, la	aminations of silty s	gravel, gray and at 26' (, soft to SC)		111	LL.	4	м	M	SS	17	16				
16 -										Д							
17 -										ł							
18 -										ł							
19										비							
20								11	М	X	SS	4	19				
21										দি							
23 -										Į							
24										1							
25 -										\square							
26 -								10	M	Ŵ	SS	22	16				
F	END	OF BORING	······														
	Easting	g=553115.1															
DEP		RILLING METHOD			WAT		EVEL MEA	SURF	MEN'								
			Б ате	TIME	SAMPI	ED	CASING	CAV	E-IN		ORILLI	NG	WAT	ĘR	NUTE: THE A	KEFE	
0-24	1/2' 3.	.25" HSA	7/0/07	10.45	DEPT	н 1	DEPTH 12 0	DE 1'	2 3 2 3	FL	UID LE	VEL	LEVE		SHEE	rs fof	R AN
<u></u>			7/9/07	11:00	26.5	5	24.5	20	5.5 5.5				Non	e 1	EXPLA	NATIC	ON OF
BORIN	G ÆTED:	7/9/07			200	-		<u> </u>							ERMI	10LOC	Y ON
DR: SC	G LG:	SB Rig: 91C													TH	IS LO	3



SUBSURFACE BORING LOG

AET JO	DB NO: 22-00081				LO	GOF	BO	RING N	0	ST-	<u>161</u>	(p. 1	of 1			
PROJE	CT: TCAAP Rede	velopme	ent; Arde	en Hi	lls,	MN				······						
DEPTH	SURFACE ELEVATION:	926.9			GI	EOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORAT	FORY '	TESTS
FEET	MATERIAL	DESCRIPTIO	ON	····			14	IVIC		YPE	IN.	WC	DEN	LL	PL	⁄₀-#200
1	FILL, mostly gravelly sand grayish brown	d with silt,	light		FIL	.L	15	М	M	SS	4					
2	FILL, mixture of sandy lea and silty sand, a little grav and brown	an clay, clay el, light bro	yey sand wnish gray	,			15	М		SS	20	12				
5 — 6 —	LEAN CLAY WITH SAN firm, laminations of organ: (CL)	ID, gray, a ic clay and	little black, silty sand		FIN ALI	IE LUVIUM	7	М	\mathbb{N}	SS	5	13				
7	CLAYEY SAND, a little g	gravel, gray	r, stiff (SC)		TIL	L	10	М	K	SS	14	18				
9 10 11	CLAYEY SAND, a little g gray and brown mottled, st laminations of silty sand (gravel, light tiff to firm, SC)	t brownish				9	м	R	SS	20	18				
12 — 13 —		,					8	м	R	SS	21	18				
14 —									日日							
15 —							12	м	M	SS	21	18				
16									/\ {{			ļ				
18 -	CLAVEY SAND a little	rravel dark	may stiff						1							
19 —	(SC)	graver, dark	Eray, Suir						X							
20 -							13	М	X	SS	20	13				
21 -									R							
23 —									H							
24 -									KI KI							
25 -							14	М	X	SS	21	16				
20	END OF BORING Northing=205683.9 Easting=553397.5			.												
DEP	TH: DRILLING METHOD			WAT	ER L	EVEL MEA	SURI	EMEN	TS		·			NOTE	REFI	ER TO
0-24	4½' 3.25" HSA	DATE	TIME	SAMP DEP	LED TH	CASING DEPTH	CA DE	/E-IN PTH	[] FL	DRILLI JUID LI	NG EVEL	WAT LEV	ER EL	THE A	ATTAC	HED
	· · · · · · · · · · · · · · · · · · ·	7/9/07	3:05	26.	5	24.5	2	6.5				Noi	ne	SHEE	TS FO	R AN
BORIN	G		 				ļ							EAPLA TERMI		JN OF GY ON
COMPI	<u>ETED: 7/9/07</u>				•	1			-]	TI	IS LO	G
\mid DR: SC	G LG: SB Rig: 91C					I					_					

-	n Proj	ect SP-0	6-05871	BORING:		ST-162	
Geote TCAA NE of Arden	cnical E AP Rede Highwa Hills, N	valuation velopmen vy 10 and Ainnesota	t Highway 96	LOCATIC attached s)N: N: 20568 ketch.	5.324, E: 55389	6.610 See
DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/3/07	SCALE:	1'' = 4'
Elev. feet 956.7	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF WL	Tests or	Notes
955.7	1.0	SM	SILTY SAND, trace of Roots, dark brown, moi (Topsoil)	ist.			
		CL	SANDY LEAN CLAY, trace of Gravel, yellow to brown with rust lenses scattered, moist, med stiff. (Glacial Till)	ish-brown ium to	7 9 13 14 15 16		· · ·
	29.0				13		

Brau Geote	n Proje cnical E	ect SP- valuatio	6-05871		BORING:		ST-1	l62 (cont	.)
TCAA NE of Arden	P Rede Highwa Hills, N	velopme y 10 and <u>Ainnesot</u>	it Highway 96 I		LOCATIC attached si)N: N ketch.	: 20568:	5.324, E: 55389	6.610 Se
DRILLI	ER: K.	Keck	METHOD: 31	/4" HSA, Autohmr	DATE:	7/3	3/07	SCALE:	1'' = 4
Elev. feet 924.7	Depth feet 32.0	ASTM Symbol	Descri (ASTM	ption of Materials [D2488 or D2487]		BPF	WL	Tests or	Notes
923.7	33.0	SM	SILTY SAND, fine- to reddish-brown, moist, c	medium-grianed, trace o lense. Glacial Till)	f Gravel, - -	35			
918.7	38.0	POORLY GRADED SA brown, moist, dense. (Gl	AND, fine- to coarse-gra acial Outwash)		40				
- 910.7	46.0		END OF BORING. Water not observed with in the ground.	n 44 1/2 feet of hollow-s	tem auger	40			
			Boring then grouted.						



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081					LC)G OF	во	RING N	io	ST-	163	(p. 1	l of]	<u>()</u>	
PROJI	ECT: TCAAP Red	<u>evelopm</u>	ent; Arc	den H	ills	, MN										
DEPTH	SURFACE ELEVATION: _	949.2	2			GEOLOGY	N		SA	MPLE	REC	FIELI) & LA	ABORA	TORY	TESTS
FEET	MATERIAL	DESCRIPTI	ION				iN	MC]]	YPE	IN.	wc	DEN		PL	%- #200
	7.5" Bituminous Pavemer	nt The silt silts	and and		FI	LL			सि	SU						
	clayey sand with gravel, b	brown and l	brownish				15	M	М	SS	12					
2	gray						1.0		\square							
	FILL, mixture of clayey s	and and sai	ndy lean				19	М	M	88	12	17				
4 -	ciay, a nule gravel, gray a	na orown							图							
5-							15	м	X	SS	8					
0									Ц			16				
7-									M			18				
8-							3	М	M	SS	8	20				
9					ŀ				षि			17				
10 -							10	м	M	SS	15	20				
11 -									Д			18				
12 -									M	_						
- 13 -						5	M	Ŵ	SS	7	19					
14 -	SAPRIC PEAT black (PT	<u>۲</u>			SU	VA MP			ষ্ট্র		:	150				
15	ORGANIC CLAY, trace r	oots, black	, firm		DE	EPOSIT	7	М	M	SS	20	35				
10 -	(OL/OH)								Ц							
17-	LEAN CLAY WITH SAN	ID, dark br	ownish		FI	NE	5	м	M	22	21					
18 -	gray, firm, faminations of	sand (CL)			AL	LUVIUM		141	Д	55	<u> </u>	25				
19	CLAVEY SAND a little	mayal area			7711				Ъ				•			
20	laminations of fine grained	l sand (SC)), son,		111		3	W/M	M	SS	14	18				
21	v								Д							
22 -									H							
23 -									Ħ							
24 –									国							
25 -							3	м	M	SS	24	17				
26 -	END OF DODING				-		Д									
	END OF BORING Northing=205683.4															
	Easting=554148.1															
DEPT	TH: DRILLING METHOD			WATE	ERL	EVEL MEA	SURE	MEN7	ш ГS			1	I .	J NOTF·	REFE.	R TO
	1/1 2 2511 115 4	DATE	TIME	SAMPL	ED	CASING	CAV	E-IN	E	RILLE	IG.	WATE	R	THE A	TTAC	HED
0-24	<u>0-24½ 3.25" HSA</u> 7/2/07 1:55					24.5	26	.4	rL	UD LE	V CL	Non	e	SHEE	IS FOR	AN
												* • • • • •	I	EXPLA	NATIO	N OF
BORING	BORING COMPLETED: 7/2/07							 -				÷	т	ERMI	IOLOG	IY ON
DR: SG	LG: SB Rig: 91C													TH	IS LOC	3



AET J	OB NO: 22-00081						LO	GOF	BOI	RING N	10	ST-	<u>164</u>	(p. 1	of 1	<u>)</u>
PROJE	TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION:	951.0			GI	EOLOGY	٦T		SA	MPLE	REC	FIELI) & LA	BORAT	FORY	TEST\$
IN FEET	MATERIAL I	DESCRIPTIC	DN				IN	INIC	I	YPE	IN.	wc	DEN	LL	PL	%-# 200
	4.25" Bituminous Pavemer	nt			FIL	L			R	SU				1		
1-	FILL, mixture of silty sand	l and clayey	y sand with				19	М	Х	SS	13	8				
2 -	SANDY LEAN CLAY, a	little gravel	, brownish		TIL	L			\square			16				
3 -	gray and brown, stiff (CL)						15	М	Ň	SS	1			1		
4	•								团							
5 -							15	м	М	88	12	14		1		
6 -							15	141	Μ	00	12	16				
7 -								ł	P							
8 -							9	м	XI	SS	19	21	1			
9-	SILTY SAND, trace roots,	, fine graine	ed, dark		co	ARSE			Д			1				
10 -	brown and gray, moist, loo	se, lenses a	ind		AL	LUVIUM										
11	SAND WITH SILT, fine g	rained, bro	wn and	-			4	W/M	X	SS	12					
	gray, very loose, moist to v	vet, lamina	tions of						E							
12 -	CLAYEY SAND, a little g	gravel, gray	, firm (SC)	$\langle 0 \rangle$	TIL	L.		M	М	66	22					
13							0		Μ	33	22	19				
14 -	OLANDY CAND - 141-		and heave						R				1			
15 -	mottled, firm (SC)	gravei, gray	and brown				5	M	X	SS	18	17		1		
16 –									Ц							
17 –									Ł							
18 -	CLAYEY SAND, a little g	ravel, brov	vn, stiff						Į					1		
19 —	(SC)								Ľ							
20 —							1.5		M		24	15				
21 -							11	IVI	Μ	22	24					
22 -								1	R							
23 -									ł							
24 -	CLAYEY SAND, a little g stiff (SC)	gravel, dark	gray, very						H							
25									K			1.0				
25							18	M	IX	SS	24	15				
20 -	END OF BORING				1		<u> </u>		<u>/.\</u>		+					
	Northing=205683.9			1	1											
	Easting=>>4395.9								ļ							
DEP	TH: DRILLING METHOD			WAT	ER L	EVEL MEA	SUR	EMEN	тs					NOTE	: REF	ER TO
	41/1 2 1EH TICA	DATE	TIME	SAMP	LED	CASING	CAT	VE-IN PTH	FI	DRILLI JUID LI	NG EVEL	WAT LEV	ER EL	THE	ATTA(CHED
0-2	472 J.25 HSA	7/5/07	10:00	26	5	24.5	2	6.5				No	ne	SHEE	TS FC	R AN
					-				\uparrow					EXPLA	NATI	ON OF
BORIN									\uparrow					TERMI	NOLO	GY ON
DR: S	G LG: SB Rig: 91C								╞					T	HIS LO	G

Brau	n Proj	ect SP-	06-05871	BORING	ST-165	RI-4008-36
Geote TCAA NE of Arden	cnical E AP Rede Highwa Hills, N	valuatio velopme v 10 and Vinnesot	a at Highway 96 a	LOCATIC attached s	ON: N: 205684 sketch.	1.892, E: 554894.762 Se
DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/16/07	SCALE: 1" = 4
Elev. feet 953.1	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF WL	Tests or Notes
952.8/ 951.1	0.3 2.0	PAV FILL	3 1/2" of Bituminous FILL: Silty Sand, fine-grained, brown, moist.			
_			Glacial Till)	, moist,	8	
				- - - 	13 19	
941.1	12.0	ML	SILT, reddish-brown, moist, medium dense.			
-	13.0	SP	POORLY GRADED SAND, fine-grained, redd moist, medium dense. (Glacial Outwash)	lish-brown, – –	23	
935.1	18.0	ML	SILT, reddish-brown, moist, medium dense. (Glaciofluvium)		22	
930.1	23.0	SM	SILTY SAND, fine-grained, with Cobbles,			
927.1	26.0		reddish-brown, moist, dense. (Glacial Till)		39	
	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		Water not observed with 24 1/2 feet of hollow-s in the ground.	stem auger –		
_			Boring then grouted.	- 		
			· · · · ·			

LOG OF BORING

BRAUN



SUBSURFACE BORING LOG

AET JO	DB NO: 22-00081						LO	G OF	BO	RING N	10	ST-	166	(p. 1	of 1	
PROJE	CT: TCAAP Rede	velopme	nt; Arde	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION:	955.0			GE	EOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORAT	ORY	FESTS
FEET	MATERIAL I	DESCRIPTIC	ON				IN	IVIC	I	YPE	IN.	WC	DEN	LL	PL	⁄₀- #200
	4.75" Bituminous Pavemer	nt			FILI	L			H	SU						
1 –	FILL, mostly gravelly sand	d with silt,	brown				19	М	XI	SS	3					
2 -	SANDY LEAN CLAY, a	little gravel	, light		TIL	L OR			Ħ			14				
3 —	grayish brown, a little light	t brown, sti	ff to very		A WE. A TILI	ATHERED L	11	M	XI	SS	7	14				
4	still, laminations of sandy	SIII (CL)							मि							
5									M							
6 -							16	M	X	SS	20	15				
									E							
7-	SANDY LEAN CLAY, a	little grave	, light		TIL	L	• •		M	~~	10				1	
8 —	yerv stiff. laminations of si	vn and ligi ilty sand an	nt brown, id sandv sil	t ////			20	М	M	88	18	15				
9	(CL)								E	۰.		15				
10 -							72	M	Μ	66	21	15				
11 –							23		\mathbb{N}	55	21				ļ	
12 -									E							
13							20	м	M	SS	17	15				
1.5									\square							1
14									R							
15 —							19	M	IX	SS	21	15			1	
16 -									Д		1					
17 —									1							
18 —	CI AVEV SAND a little o	ravel nos	the						ß							
19	cobbles, brown, a little light	it brownish	a gray, hard	ι 🥢					ł							
20	(SC)								\square			12				
20							88	₩	X	SS	14	15				
21 -								<u> </u>	R							
22 –									ł							
23 -	SAND, a little gravel, med	lium to fine	grained,		CO.	ARSE			ł							
24 -	brown, waterbearing, dens	e (SP)				LUVIUM			1							
25 -							41	117	\mathbb{N}	66	24					
26 -		d harris -	uat damas	 1.1	-		41	W	\mathbb{N}	55	24					
	(SM)	u, orown, \	wei, aense	/	<u>'</u>				Τ				1			
	END OF BORING		· · ·	-										1		
	Northing=205683.0 Easting=555397 1															
DEP	TH: DRILLING METHOD			WAT	ER L	EVEL MEA	SUR	EMEN	ITS					NOTE:	REF	ER TO
		DATE	TIME	SAMP	ĻĘD	CASING	CA	VE-IN	177	DRILLI	NG.	WAT	ER	THE A	ATTAC	HED
0-24	4½' 3.25" HSA		0.2#	DEP		DEPTH		4 1	1 1	LULL LI	UN EL	۲ تلنا 11	<u>,</u>	SHEE	TS FO	R AN
		7/5/07	8:35	26.	>	24.5	<u> </u>	4.1	╉				- <u>1</u>	EXPLA	NATI	ON OF
RÚRIN	G								╋					TERM	NOLO	GY OF
COMPL	<u>ETED: 7/5/07</u>													m	IIS LO	G
DP SC	C IG SR Dig 91C	1	1				1									-



AET JO	DB NO: 22-00081						LC	G OF	BOI	RING N	iO	ST-	167	(p. 1	of 1)_
PROÆ	CT. TCAAP Rede	velopme	nt; Arde	n Hi	lls, I	<u>MN</u>	<u>.</u>							· · · · ·	-	
DEPTH	SURFACE ELEVATION:	945.0			GE	OLOGY	N	MC	SA	MPLE	REC	FIELD) & LA	BORAT	ORY	TESTS
FEET	MATERIAL E	ESCRIPTIO	N					NIC .		YPE	IN.	wc	DEN	LL	PL	⁄ ₀- #200
	5.75" Bituminous Pavemen	t with cilt b	rown	/	FILI	-			M	S U						
	(possible base)			Л			20	M	Å.	SS	8					
3	FILL, mixture of clayey san and silty sand, a little grave	nd, sandy le l. brown ar	ean clay id gravish				9	м	M	SS	3	9	1			
	brown		99				-		Д							
5 -	SANDY LEAN CLAY, a I	ittle gravel,	, grayish		WE.	ATHERED			M			15				
6-	brown, firm (CL)	-			TIL	L	8	M	X	SS	12					
7-				_///					团							
8-	SANDY LEAN CLAY, a l firm. lenses and lamination	ittle gravel, s of organi	, gray, c clay and				5	M	M	SS	9	20				
9	sand (CL)		-						Д							
10	CLAYEY SAND, gray, a l	ittle brown	, soft (SC)						M			24				
11 -	CLAYEY SAND, a little g	ravel, gray	, a little		TIL	L	3	M	Ň	SS	15	24				
12 -	brown, soft, laminations of	silty sand	(SC)						E							
13	SANDY LEAN CLAY, a soft (CL)	ittle gravel	, brown,				4	M	X	SS	20	22				
14									Д							
15 -	SANDY LEAN CLAY W	TH GRAV	/EL, gray,				_		∇	~~~		1.0				
16	stiff (CL)						9	M	Ň	SS	17	19				
17 -									R							
18			-+:FF (P(C))						ł			:				
19 -	CLAYEY SAND, a nine g	ravei, gray	, sun (sc)						ł			ľ				
20 —								NVA.	Ń		10	16		1		
21 -	-						9		1	22	19	10				
22 -									ł							
23 -									ł							
24 -									ł							
25							12		\mathbb{N}	00	1 22	15				1
26 -							13		\wedge	22		15		_	<u> </u>	
	END OF BORING														1	
	Easting=553796.8															
				WA1	ER I	EVEL MEA		EMEN	JTS	l	1		<u> </u>	NOTE	- 855	
		DATE	TRÆ	SAMP	LED	CASING	CA	VE-IN		<u> </u>	ING	WA	TER	THE	ATTA	CHED
0-2	4½' 3.25" HSA	DATE	0.40	DEP	TH	DEPTH			F		EVEL	21	2 2	SHEE	TS FC	R AN
		7/2/07	8:40	21.	.0 5	24.5		26.5	╀		<u></u>	No	ne	EXPLA	ANATI	ON OF
BORIN	NG 7/2/07	112101	0.40				-	<u> </u>						TERM	NOLC	GY ON
DR. S	G LG: SB Rig: 91C					1			1					T	HIS LO)G



SUBSURFACE BORING LOG

AET JO	DB NO: 22-00081						LC	G OF	BO	RING N	10	ST-	168	(p. 1	of 1)
PROJE	CT: TCAAP Rede	velopme	ent; Arde	en Hi	ills,	MN										
DEPTH	SURFACE ELEVATION:	947.2			GI	EOLOGY	N	мс	SA	MPLE	REC	FIELD) & LA	BORAT	ORY	rests
FEET	MATERIAL	DESCRIPTIO	N				14	IVIC	I I	TYPE	IN.	wc	DEN	LL	PL	⁄₀-#200
	10.5" Bituminous Paveme	nt			FIL	L.			IJ	SU						
2 _	FILL, mostly gravelly san	d with silt,	brown					М	Х	SS	8					
2	FILL, mostly sandy lean c	lay, a little n a little bl	sapric peat, ack	,			5	м	M	22	14	19				
	SANDY LEAN CLAY, tr	ace roots, l	ight		WE TIL	ATHERED .L	5	141	Δ	00		16				
. + - 	∣ brownish gray and light gr ∖of silt (CL)	ay, firm, la	minations		TIL	L			R			14				
- L	SANDY LEAN CLAY, a	little grave	l, trace				15	М	X	SS	17	15				
	to very stiff, laminations o	a little ligr f silt (CL)	it gray, sum						म							
							20	м	М	88	10	16				
0							20	141	\square	00	15	10		:		
9-									P		· · · ·					
10 -							21	М	X	SS	14	14				
11 -	: چ.								মি				ŀ			
12 -	* SANDY LEAN CLAY, a	little grave	l, light				10		Μ		10	16				
13 -	laminations of silty sand (CL)	111,				10	M	Μ	33	10					
14	CLAYFY SAND a little o	rravel grav	vish brown						R			14				
15	a little brown, very stiff (S	C)	1311 010 011,				29	М	X	SS	12	14				
16 -									H							
17 —	CLAYEY SAND, a little g	gravel, brov	vn, very						M	~~						
18 -	stiff (SC)						21	М	Ŵ	SS	17	15				
19	SANDY LEAN CLAY	little errorre	hroum						E							
20 -	very stiff (CL)	nuie grave.	i, 010wii,				24	M	Х	SS	19	16				
21 -									ਸ		1					
22 -									Ł					1		
23 -	GRAVELLY SAND, med	ium graine	d, brown,		CO	ARSE			ł							
24 –	moist, medium dense (SP)					LUVIUM			ם							
25							16	М	X	SS	6					
26 –	END OF BODINC								Д							
	Northing=205519.6															
	Easting=554022.3						:									
DEP	TH: DRILLING METHOD	[WAT	ER L	EVEL MEA	SURI	EMEN	TS					NOTE:	REFE	R TO
	11/1 2 2511 110 4	DATE	TIME	SAMPI DEPT		CASING	CA DF	/E-IN PTH	I FI	ORILLI UID LE	NG VEL	WAT	ER	THE A	TTAC	HED
0-24	1/2 J.4J NJA	7/2/07	11:20	26.	5	24.5	2	6.5	1			Nor	ie	SHEE	rs foi	R AN
	· · · · ·								†	<u>.</u>				EXPLA	NATIO	ON OF
BORIN	G ETED: 7/2/07											<u> </u>]]	FERMIN	10L00	GY ON
DR: SO	G LG: SB Rig: 91C													TH	IS LO	G



AET JO	DB NO: 22-00	081						LC	G OF	BO	RING N	10	ST-	<u>169</u>	(p. 1	of 1)_
PROJE	CT: TCAA	P Rede	velopme	nt; Ard	en Hi	ills,	MN			<u></u>					<u></u> ,		<u> </u>
DEPTH	SURFACE ELEV	ATION:	948.1	·		GI	EOLOGY	N	MC	SA	MPLE	REC	FIELD) & LA	BORAT	ORY	ESTS
FEET	М	ATERIAL I	DESCRIPTIC	NN				IN	IVIC	3	TYPE	IN.	WC	DEN	LL	PL	%-#200
1 1	10.75" Bitumino	us Pavem	ent			FIL	L			I	SU	1	:				
2 -	clayey sand with	gravel, bi	n silt with j	gravei and	_	-		28	М	\mathbb{H}	SS	11	7				
3 –	FILL, mixture of limestone with g	sand with ravel, brow	n silt and cr wn and ligh	ushed it brown				26	w	Ħ	SS	6					
4 –	Ell I minture of	Condu too	n alay alay	you cond						E							
5 -	and silty sand, a	little grave	el, gray and	l brown				16	М	X	SS	12	13				
7-										E							
8-								9	М	X	SS	12	17				
9 –										E							
10	ORGANIC CLA	Y, a little	gravel. tra	ce roots.		sw	AMP	14	М	X	SS	19	39		1	1	
11	gray, very stiff to	soft (OL	/OH)	····,		DE	POSIT			E			24				
13 -	SANDY LEAN	CLAY, a	little grave	l, gray, sof	t 💋	TIL	.L	3	M	X	SS	20	22				
14	SANDY LEAN	CLAY, a	little grave	l, gray, a			·			B							
15 -	little brown, stiff	, laminatio	ons of silty	sand (CL)				15	м	X	SS	18	17				
16										<u></u>							
18 -										H							
19 —								:		H							
20 —								14	м	M	SS	19	16				
21 -										И							
22 -										ł							
23 -										H							
25 -								14		\mathbb{N}	00	20	20				
26 –								14	M	Λ	22	22		<u> </u>		<u> </u>	
	END OF BORI Northing=20558	NG 0.7															
	Easting=554087.	9															
DEP	TH: DRILLING M	IETHOD		·	WA1	ER L	EVEL MEA	SUR	EMEN	ITS	· · · · ·				NOTE:	REFI	ER TO
6.2	41/21 3 25" HQA		DATE	TIME	SAMP	LED TH	CASING DEPTH	CA	VE-IN PTH	FI	DRILLI LUID LI	NG EVEL	WAT LEV	ER EL	THE A	ATTA	THED
0-2	1/2 J.2J IIJ/I		7/2/07	12:20	26.	5	24.5	2	6.5				No	ne	SHEE	TS FO	R AN
	,						- " · ·								EXPLA	NATI	ON OF
BORIN COMPI	G LETED: 7/2/07				1		<u> </u>								I ERMI TI	NOLO IIS I C	GY ON
DR S	G LG: SB Rig:	91C	1					1							11	10 LC	J



AET JO	DB NO: 22-00081						LO	G OF	BO	RING N	io	ST-	170	(p. 1	<u>of 1</u>	
PROJE	ст: TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION:	949.7		1	GE	EOLOGY	NI	MC	SA	MPLE	REC	FIELD) & LA	BORAT	ORY	TESTS
FEET	MATERIAL I	DESCRIPTIO)N				1	MC	1	YPE	IN.	wc	DEN	LL	PL	⁄ 6-#2 00
1	6.25" Bituminous Pavemen	nt soilt and an	avaland		FIL	L			R	SU						
	clayey sand, brown and brown	ownish gra	y				14	М	Д	SS	4					
2	FILL, mixture of clayey sa	nd and san	dy lean	d			0	M	M	22	6	15				
	a little brown	o which gre	., gruy un	- I				1.11	Д	00	Ŭ	12				
5									R			15				
6-							12	М	XI	SS	17					
7									षि							
, 8							14	м	M	SS	17					
9 -									Д			14				
10												18				
11 -	LEAN CLAY WITH ORC	GANICS, tr	ace roots,		TOI	PSOIL	6	M	M	SS	12	23				
12	black, firm (CL)	1				ADSE			E							
13 —	mottled, wet, medium dens	d, gray and se (SM)	brown		ALI	LUVIUM	11	▼	X	SS	15					
14 —									\mathbb{A}							
15 -	SANDY LEAN CLAY, a	little grave	l, gray, a		TIL	L			\square		10	20				
16 -	little brown, firm, laminati	ons of silty	sand (CL)				5	M	Ŵ	88	19	20				
17									Ł							
18 -	CLAYEY SAND WITH C	RAVEL 9	rav. a little						H							
19 —	brown, stiff, laminations of	f silty sand	(SC)						ł							
20 -							13	м	Μ	22	21	17				
21								141	Δ	55	21					
22 –									H							
23 -	CLAYEY SAND, a little g	ravel, gray	, stiff (SC)						X							
24 —									I							
25 –							11	М	\mathbb{N}	SS	5	17				
26 -					1				Δ					-		
	END OF BORING Northing=205558.5															
	Easting=554273.5															
DEP	TH: DRILLING METHOD			WAT	ER L	EVEL MEA	SUR	EMEN	ITS	l	L			NOTE:	REFE	ER TO
		DATE	TIME	SAMP		CASING DEPTH	CAT	VE-IN	FI	DRILLI	NG	WAT LEV	ER EL	THE A	ATTAC	HED
0-24	+72 3.23" HSA	7/2/07	2:40	14.	0	12.0		3.2	1.			12.	6	SHEE	TS FO	R AN
		7/2/07	2:55	26.	5	24.5	2	6.5				Nor	ne l	EXPLA	NATIO	ONOF
BORIN COMPI	G LETED: 7/2/07]]	ERMI	NOLO	GY ON
DR: SC	G LG: SB Rig: 91C								T					Tł	IIS LO	G



AET JO	OB NO: 22-00081						LC	G OF	BO	RING N	10	ST-	171	(p. 1	of 1)
PROJE	CT: TCAAP Rede	velopme	nt; Ard	<u>en Hi</u>	lls,	MN						<u> </u>				
DEPTH	SURFACE ELEVATION: _	915.0			GI	EOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORAT	ORY 7	TESTS
FËET	MATERIAL	DESCRIPTIC	N	<u>.</u>					1	TYPE	IN.	WC	DEN	LL	PL	%-#2 00
1	3.25" Bituminous Paveme FILL, mostly sand with sil	nt t and grave	l. brown		FIL	,L	21	м	\mathbb{N}	SS	14					
2 —	EU L minture of condulor	- alow and	alariari						Д							
3	sand, a little gravel, light g	rayish brov	vn to light				11	м	XI	SS	8	14				
4	brownish gray								H		:	10			:	
5 -				÷			л	м	\mathbb{N}	22	16	16				
6 -							4	191	Д	55	10					
· 7									M			20				:
8 —					TO	DEOIL OD	5	X	Х	SS	17	18				
9 —	SAND, a little gravel, med brown, waterbearing, loos	lium to fine e (SP)	grained,		CO.	ARSE			团			10				
10	SILTY SAND, fine graine very loose, lenses and lam	d, gray and inations of	black, we organic sil	t iii		LUVIUM	3	w	X	SS	19					
11	and sand (SM)								R							
12 -	CLAYEY SAND, a little g	gravel, trace aterbearing	e roots, g sand with		TIL	L	1	м	M	SS	22	18				
14 -	silt (SC)		,						Д							
15 -	SANDY LEAN CLAY, a	little grave	l, gray, a 2'	•					$\prod_{i=1}^{n}$			10				
16	thick fine grained sand len	ses at 15.6'					5	M	Ň	SS	24					
17 –									Ţ							
18									ţ							
19 —									Ľ							
20 —							11	м	M	SS	17	17				
21 -	.~								Д							
22 –									ł		:					
23 -									ł							
24 -									건							
25							12	M	X	SS	23	19				
20	END OF BORING		· ·		1											
	Northing=205644.7 Easting=553192.7															
		I									<u> </u>					
DEP	TH: DKILLING METHOD	DATT	77D 47	SAMPI	EK L	CASING	CAV	/E-IN	13	ORILLI	NG	WAT	ER	NOTE:	REFE	R TO
0-24	4½' 3.25" HSA	DATE	12.50	DEPT	Ή -	DEPTH	DE	PTH	FI	UIDLE	EVEL		EL	SHEE	TS FOI	RAN
		7/6/07	12:50	26.4	5 5	9.5 24.5	2	6.4				0.0 	ne	EXPLA	NATIO	ON OF
BORIN	G ETED: 7/6/07		1.00										- 1	ERMI	VOLO	GY ON
DR: SC	G LG: SB Rig: 91C													TH	IIS LO	G

Braun F	roject al Eval	SP-0	6-05871	BORING	:		S	Γ-17	2
TCAAP F NE of Hig Arden Hi	edevelo hway 1 ls, Min	opmen 0 and 1 nesota	t Highway 96	LOCATIC attached s	ON: N: sketch.	: 205	439.1	06, E:	553392.375 Se
DRILLER:	K. Keel	k	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/9	0/07		SCAJ	LE: $1'' = 4$
Elev. De feet fe 925.1	pth et A 0.0 Sy	ASTM ymbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC %	P200 %	Tests or Not
918.1 918.1 918.1 918.1 911.1 908.1 909.1 909.1 909.1 909.1 909.1 909.1 909.1 909.1 909.1 9009.1 90090	7.0 7.0 80 4.0 7.0 7.0 7.0 6.0		FILL: Sandy Lean Clay, trace of Gravel, mixed I brown to brown, moist. CLAYEY SAND, Organic, dark gray, wet, soft to soft. (Swamp Deposit) PEAT, dark gray, soft. (Swamp Deposit) SANDY LEAN CLAY, trace of Gravel, gray, we soft to medium. (Glacial Till) END OF BORING. Water observed at 6 feet while drilling. Boring then grouted.	ight	 14 9 4 3 2 3 WH 6 		29	48	LL = 36 PI = 23

BRA	AU N	555 556								LOG OF BORI	NG
INTE	RTEC	<u> </u>									
Brau	n Proj	ect S	P-0	6-058	871		BORING	:		ST-173	
TCAA	cnical E	valuz velop	ition men	t			LOCATI	DN: N	: 205	433.823, E: 553574.478 See	3
NE of	Highwa	y 10	and	Highv	vay 96		anacheu s	KCIUII.			
Arden	Hills, N	Ainne	sota								
DRILLI	ER: K.	Keck		1	METHOD: 3 1/4" HSA, Autohmr		DATE:	7/9	9/07	SCALE: $1'' = 4'$	
feet 942.9	feet 0.0	AS' Syn	TM ibol		Description of Materials (ASTM D2488 or D2487)	1		BPF	WL	Tests or Notes	
941.9	1.0	SM			TY SAND, trace of Roots, dark brown (Topsoil)	, wet.	-				
		CL		SAN	DY LEAN CLAY, trace of Gravel, lip	ght bro	wn,				
				mois	(Glacial Till)			M 19			
							_	H i			
							_				
		ļ						46		*NR	la
035.0	7.0						_	f		Suspected Cooble of Bould	.er
	7.0	CL		SAN	DY LEAN CLAY, trace of Gravel, lig	ght bro	wn to				
				brow	n with gray and rust, wet, rather soft f (Glacial Till)	to rathe	r stiff	Щ ⁹			
-							-				
								M 5	Ì		
-								μ			
-							-				
_								7			
-											
_											
							_	Д ⁹			
							_				
								10			-
920.9	22.0						-				
/20.5	22.0	CL		SAN	DY LEAN CLAY, trace of Gravel, gr	ay, wet	, very				
				SUIT.	(Glacial Till)		_				
	, F						_				
							_	¥ 17			
916.9	26.0			END	OF BORING.			Δ			
				Wate in the	r not observed with 24 1/2 feet of hold	low-ste	m auger				
				Borin	ng then grouted.		_				
-									l		
				.*							
SP-06-05871	1.5.1			1.1.1.1.1.1	Braun Intertec Corpo	ration				ST 172 maga	1 of



AET J	DB NO: 22-00081						LO	G OF	во	RING N	IO	ST-	<u>174</u>	<u>(p. 1</u>	<u>of 1</u>	<u>) </u>
PROJE	CT: TCAAP Rede	velopme	ent; Ard	<u>en Hi</u>	ills,	MN				····						
DEPTH	SURFACE ELEVATION: _	944.9			G	EOLOGY	N	MC	SA	MPLE	REC	FIELI)&L/	BORA	FORY	FESTS
FËET	MATERIAL	DESCRIPTIO	NC				14	IVIC		TYPE	IN.	wc	DEN	LL	PL	%-#2 00
1 –	FILL, mixture of sandy sil	t and sandy obles, surfa	/ lean clay, ce roots,		FIL	L.	15	м	M	SS	12	12				
2-	trace roots, brown and ligh	it brown	,						Д	~~	•					
3-							17	М	M	SS	3	13				
4					ļ		••		Д	62	-					
5-	SANDY LEAN CLAY, a cobbles. trace roots, gray a	little grave. and brown i	l, possible mottled, a		WE TIL	EATHERED .L			K					1		
6 -	little light gray, very stiff,	lamination	s of sandy				21	М	IXI	SS	19	14				
7 –									E			1.				
, 8	SANDY LEAN CLAY, a cobbles, trace roots, light f	little grave	i, apparent wn. a little		TIL	L	77	м	M	SS	16	16				
9 –	brown, very stiff, lamination	ons of sand	ly silt (CL)				, ب	1.44	Д	00	1.					
10	(possible iii)								K							
11	CLAYEY SAND, a little §	gravel, gray	/ish brown				21	м	X	SS	NR		:	1		
12	to gray, very stiff to stiff (S	ŚC)							E		i.					
13 -							21	М	M	SS	20	15				
14 -							<u>~</u> -	***	Д	~~						
15									M							
16 -							19	M	X	SS	18	16				
17 –									सि							
18 -									1							
19 -									K.							
20 -						:			M							
21 -							15	M	ľŇ	SS	18	16				
22 -						-		1	łł							
23 -				_///					1							
24 -	CLAYEY SAND, a little g cobbles, brown and gray n	gravel, appa lottled, har	irent d,						Ŕ							
25 -	laminations of sand with si	ilt (SC)							K							
26 -							32	M	ľŇ	SS	20	13				
-	END OF BORING				1									-		
-	Northing=205436.5 Easting=553898.8															
]		.						<u> </u>								
DEP	TH: DRILLING METHOD		I	WAT	ER L	EVEL MEA	SURE	EMEN TE DI	TS T			117 4 7		NOTE:	REFE	R TO
0-24	11/2' 3.25" HSA	DATE	TIME	DEPT	CED TH	DEPTH	DE	PTH	FÍ	UID LE	VEL	LEVI	EK	THE A	TTAC	HED
<u> </u>		7/2/07	10:10	26.5	5	24.5	20	6.4				Non	le	SHEE	FS FOF	₹ AN
BORIN	G.			 										EXPLA FERMD		JN OF
COMPL	ETED: 7/2/07			<u> </u>										TH	IS LO	G

Brau Gente	in Projecnical E	ect SI	P-06- tion	05871	BORING	:		ST-174	
TCA/ NE of Arder	AP Rede Highwa 1 Hills, N	velopr y 10 a /Iinnes	nent ind Hi sota	ghway 96	LOCATIC attached s	DN: N: ketch.	20543€	5.535, E: 55389	98.789
DRILL	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/2:	5/07	SCALE:	1" =
Elev. feet 944.9	Depth feet 0.0	AST Symł	M bol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
				ower Auger to 29 feet. No samples obtained	-		a de la constante de la consta		
_					-				
-					-				
-		3 - -			-				
-		1			-				
-					-				
_									
-					_				
					_				
_	-								
-		1	-		-				
915.9	29.0	SM	S	ILTY SAND, fine-grained, trace of Gravel,					
_			re	ddish-brown, moist, medium dense to dense. (Glacial Till)		16			

LOG OF BORING

BRAUN^{**}

Brau	n Proj	ect SP-0	5-05871	BORING	: ST-	174 (cont	.)
Geote [CAA NE of Arden	cnical E P Rede Highwa Hills, N	valuation velopment y 10 and l Jinnesota	Highway 96	LOCATIC attached s	ON: N: 20543 sketch.	6.535, E: 55389	18.789 Sec
RILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/25/07	SCALE:	1'' = 4
Elev. feet 912.9	Depth feet 32.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF WL	Tests or	Notes
- 903.9	41.0		SILTY SAND, fine-grained, trace of Gravel, reddish-brown, moist, medium dense to dense. (Glacial Till) (continued) END OF BORING.		27		
			Water not observed during drilling. Water not observed with 39 1/2 feet of hollow- in the ground. Boring then grouted.	stem auger 			
				- - - - -			
			·				



AET JO	DB NO: 22-00081						LC	G OF	BO	RING N	ю	ST-	175	(p. 1	of 1)
PROJE	CT: TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN		·								
DEPTH	SURFACE ELEVATION:	948.1			GI	EOLOGY	N	мс	SA	MPLE	REC	FIELI) & LA	BORAT	'ORY	TESTS
FËET	MATERIAL I	DESCRIPTIO	И			-				YPE	IN.	wc	DEN	LL	PL	%-#200
1 2	FILL, mixture of clayey sa little gravel, surface roots, brick, brown and dark brow	ind and silt trace roots, wn	y sand, a , pieces of		FIL	L	18	м	X	SS	15	6				
3 - 4 -	SANDY LEAN CLAY, a roots, brown, very stiff (Cl	little gravel L)	, trace		TIL	.L	18	M	Å Я	SS	19	11 11				
5 -	CLAYEY SAND, a little g brown, stiff (SC)	gravel, trace	e roots,				12	м	\mathbb{N}	SS	17	12				
0 7	SANDY LEAN CLAY, a roots, gray, stiff to hard (C	little gravel L)	, trace				20		R	50	20	15 20				
8 9	CLAYEY SAND, a little g (SC)	gravel, brov	vn, hard				30	M	\ א	55	20					
10 11	CLAYEY SAND, a little g stiff to firm, laminations of	gravel, brov f silty sand	vnish gray, (SC)				10	м	\mathbb{N}	SS	7	16				
12 — 13 —							8	м	ਸ V	SS	7	13				
14 -									Å							
15 - 16 -	LEAN CLAY WITH SAN mottled, firm, laminations	ID, gray an of silty san	d brown d (CL)				7	$\left \frac{\mathbf{V}}{\overline{\mathbf{W}}} \right $	X	SS	16	31				
17 –									A A A A A A A A A A A A A A A A A A A							
18	SANDY LEAN CLAY, a laminations of brown silty	little gravel sand (CL)	, gray, sof	;		•			11			17				
20 -							8	M		SS	18					
22 – 23 –	SANDY I FAN CLAY 2	little gravel	aray soft													
24 - 25 -	(CL)		, gray, som									10				
26 –							7	M	X	SS	16	18				
	END OF BORING Northing=205434.5 Easting=554148.7															
DEP	TH: DRILLING METHOD		•	WAT	ER L	EVEL MEA	SURI	EMEN	TS			• •		NOTE:	REFE	ER TO
0-24	1½' 3.25" HSA	DATE	TIME	SAMPI DEPI	LED FH	CASING DEPTH	CAV DE	/E-IN PTH	FI	DRILLI UID LI	NG EVEL	WAT LEVI	ER EL	THE A	TTAC	CHED
		7/3/07	8:45	16.	5	14.5		5.4				15.	1	STER EXPLA	NATIO	N AIN
BORIN	G	7/3/07	8:50	21.	5	19.5		0.3				Noi Noi		ERMI	VOLO	GY ON
COMPL	ETED: 7/3/07	113/07	9:00	20.	3	24.3		0.3				1101		Ťŀ	IIS LO	G
DK: 30	J LU: 5D KIg: 71U			ŀ		l	I		1							



AET JO	OB NO: 22-00081						LO	G OF	BO	RING N	10	ST-	176	(p. 1	of 1	
PROJE	TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION:	951.0			GI	EOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORAT	ORY 1	ESTS
FEET	MATERIAL	DESCRIPTIC	DN				1 N	IVIC		YPE	IN.	wc	DEN	LL	PL	%-# 200
1-	FILL, mostly sand with sil surface roots, trace roots, trace roots, trace roots, the surface roots is the surface roots and the surface roots are surface roots.	t, a little gr brown	avel,		FIL	L	17	М	M	SS	8					
2		<u>'u 1.3</u>							Д							
3	a little gravel, trace roots, l	h silt and cl	ayey sand, k brown				23	М	X	SS	14					
4	and gray								Д		ļ					
5 -							17		M	66	~	16				
6							17	м	М	22	5					
7									四八							
8 -							13	М	X	SS	10	13				
9 –									E							
10	LEAN CLAY WITH ORC	JANICS, tr	ace roots,		TO	PSOIL	9	м	M	SS	17	13				
11 -	black and dark brown, stift sand (CL)	f, laminatio	ns of silty						\square			29				
12 —	SANDY LEAN CLAY, a	little gravel	, trace		WE	ATHERED	<u> </u>		∇		16	20				
13	roots, gray, a little black, s	uif to son ((CL)			L.	9	м	Ŵ	55	16					
14									R							
15							3	м	IX	SS	20	23				
10	SANDY LEAN CLAY, a to stiff (CL)	little gravel	, gray, sofi	t ///	TIL	L			R			22				
18									Į							
19 -									ł							
20 -									\square			18				
21 -							15	M	Ŵ	SS	22					
22 -									R						1	
23 —	CLAYEY SAND WITH C	RAVEL	ray (SC)						ł							
24 -									ł	60		16				
	END OF BORING, Obs	tructed to S	SS at 24.8'				50/0.3			_ 55_	4					
	Northing=205436.4 Easting=554397.8															
DEP	TH: DRILLING METHOD			WAT	ER L	EVEL MEA	SURF	EMEN	TS					NOTE:	REFE	R TO
0-24	4½' 3.25" HSA	DATE	TIME	SAMPI DEPT	LED TH	CASING DEPTH	CAV DE	/E-IN PTH	FI	DRILLÎ JUID LI	NG EVEL	WAT LEV	ER EL	THE A	TTAC	HED
		6/29/07	3:10	24.8	8	24.5	24	4.8				Nor	ie	SHEE	rs foi	R AN
DAND	G								ļ				_1	EXPLA		ON OF
COMPI	LETED: 6/29/07								-				·····	TH	IS LO	G
DR: S	G LG: SB Rig: 91C						1		1							



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081						LO	G OF	во	RING N	io	ST-	177	(p. 1	of 1)
PROJE	CT: TCAAP Rede	velopme	ent; Ard	en Hi	lls,	MN				 _						
DEPTH	SURFACE ELEVATION:	953.6			G	EOLOGY	N	MC	SA	MPLE	REC	FIELD) & LA	BORAT	ORY	TESTS
FEET	MATERIAL	DESCRIPTIO	N					IVIC		TYPE	IN.	wc	DEN	LL	PL	%-# 200
1 -	FILL, mixture of sand with little gravel, surface roots, metal at 3", brown	h silt and si trace roots	lty sand, a , piece of	\int	FIL	.L	28	М	M	SS	12					
2 - 3 -	FILL, mixture of sand wit a little gravel, trace roots,	h silt and cl brown and	ayey sand, gray				40	м	X	SS	17	5				
4 -									图							
5 6							11	м	M	SS	18	8				
7 -									E							
8 -							12	м	X	SS	17	11				
9							16	M	X	SS	11	13				
11 —									Д							
12 -						:	<i>c</i>		Ń	66	16	19				
13	CLAYEY SAND, trace ro	ots, black a	nd dark of silty		WE TIL	EATHERED LL OR	0		Д	00	10					
15	sand (SC)	ravel trac	a roots		TO TIL	PSOIL			K			18				
16 -	gray and brown, stiff, lami clay (SC)	inations of	sandy lean				10	M	Å Я	SS	9	10			-	
17																
19 —									Ľ							
20 21	CLAYEY SAND, a little g mottled, a little black, stiff sand (SC)	gravel, brov , lamination	vn and gray ns of silty				12	м	X	SS	24	17				
21	Sund (BO)								8			1.				
23 -									ł							
24 —																
25							14	м	M	SS	20	11				
26 –	END OF BODING								μ		 	-				
	Northing=205436.7 Easting=555146.5															
 DEP	TH: DRILLING METHOD			WAT	L ER L	EVEL MEA	SURF	L EMEN	L TS	1	<u>ا</u>	1	$\frac{1}{1}$	NOTE:	REFF	R TO
	4121 3 7511 HSA	DATE	TIME	SAMPI DEPT	LED H	CASING DEPTH	CA DE	/E-IN PTH	FI	DRILLI UID LI	NG VEL	WAT LEVI	ER EL	THE A	TTAC	HED
<u> </u>	72 3.43 HOA	7/3/07	10:15	26.5	5	24.5	20	6.5				Nor	1e	SHEE	IS FOI	R AN
														EXPLA	NATIO	ON OF
BORIN COMPI	G LETED: 7/3/07													FERMI	VOLO	GY ON
DR: SO	G LG: SB Rig: 91C													TH	us lo	G



AET JO	OB NO: 22-00081						LO	GOF	BO	RING N	0	ST-	178	(p. 1	of 1)
PROJE	TCAAP Rede	velopme	nt; Arde	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION:	948.4			GI	EOLOGY	N	MC	SA	MPLE	REC	FIELD) & LA	BORAT	TORY [TESTS
FEET	MATERIAL I	DESCRIPTIO	DN					IVIC		YPE	IN.	wc	DEN	LL	PL	%-# 200
1 -	FILL, mostly silty sand, a cobbles, brown and grayis	little gravel h brown	l, possible		FIL	L.	17	М	M	SS	6					
2									H			E				
3 -	FILL, mixture of sandy lea sand, a little gravel, possib brown and brownish gray	in clay and le cobbles,	clayey trace roots	,			14	M	Å	SS	18	11				
5-						:			M							
6							9	М	M	SS	2	13				
7									E							
8 —							27	М	X	SS	8	8				
9 —	OPGANIC SILT trace roo	ote black y	vet loose		- ASW	AMP			E							
10 11	(OL)	ots, dark bi	own, firm	ſ	DEI	POSIT	6	w	X	SS	14	47				
12	to soft, laminations of silty	sand (SC)	,		TIL	L			ম			22	ļ			
13 —	CLAYEY SAND, gray, a laminations of sand (SC)	little black,	soft,			:	4	М	X	SS	15	20				:
14 —									মি							
15 -	CLAYEY SAND, a little g light gray, very soft (SC)	gravel, trace	e roots,		TIL	L	wн	М	X	SS	19	15				
10 -									R							
1/									X							
10	CLAYEY SAND, a little g stiff (SC)	gravel, gray	, firm to						X							
20 -									K							
21 -							6	M	Ŵ	SS	24	19				
22 -									R							
23 -									H							
24									出							
25 –							15	м	\mathbb{N}	SS	22	15				
26									Λ		ļ			-		<u> </u>
	END OF BORING Northing=205431.4															
	Easting=555363.5												1			
DEP	TH: DRILLING METHOD			WAT	ER L	.EVEL MEA	SURI	EMEN	TS	1				NOTE:	REFI	ER TO
0_22	41/1 3 25" HSA	DATE	TIME	SAMP DEP	LED IH	CASING DEPTH	CAV	VE-IN PTH	FI	DRILLI .UID LI	NG EVEL	WAT LEV	ER EL	THE A	ATTAC	HED
0-2.	174 0.20 HUA	7/3/07	11:50	26.	5	24.5	2	6.5				Nor	1e	SHEE	TS FO	R AN
						l								EXPLA	NATI	ON OF
BORIN COMPI	G LETED: 7/3/07													TERMI	NOLO	GY ON
DR: SO	G LG: SB Rig: 91C													TI	IIS LO	G

Braun P Geotecnic	'roje al Ev	et SP	-06-0: m	5871			BORING:		ST-179	
TCAAP F NE of Hig Arden Hil	tedev hway lls, M	elopm y 10 an linneso	ent d Higl ta	nway 96			LOCATIC attached s)N: N: 20 ketch.	5297.766, E: 5535	01.960 Se
DRILLER:	K. I	Keck		METHOD:	3 1/4" HSA, Auto	hmr	DATE:	7/9/07	SCALE:	1'' = 4'
Elev. De feet fe 929.3	pth et 0.0	ASTN Symbo	[D	escription of Mate	erials 2487)		BPF W	L Tests of	r Notes
928.8	4.0	SM SM CL	SIJ SIJ SA gra rat	TY SAND, trac TY SAND, mo NDY LEAN CI yish-brown with her stiff.	AY, trace of Gra nust and dark bro (Glacial Till)	vel, light bro	wn to dium to	8		
915.3 1	4.0	CL	SAme	NDY LEAN CL dium to rather st	AY, trace of Grav tiff. (Glacial Till)	vel, gray, wel		8		
903.3 2	6.0							10		
-			EN. Wa in tl Bor	D OF BORING. ter not observed ne ground. ing then grouted	with 24 1/2 feet o	of hollow-ste	m auger			

BRAUN"

LOG OF BORING

Brau	n Proj	ect SP-(6-05871	BORING	:	5	ST-180	
Geote TCA NE of Arder	cnical E AP Redev Highwa 1 Hills, N	valuation velopmen y 10 and finnesot	n ht Highway 96 n	LOCATIC attached s	DN: N ketch.	: 205254	1.843, E: 55389	6.986 S
DRILL	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/3	3/07	SCALE:	1" = 4
Elev. feet 935.9	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
934.9	1.0	SM	SILTY SAND, trace of Roots, dark brown, moi	st.				
923.9	12.0	CL	(Topson) SANDY LEAN CLAY, trace of Gravel, yellow to grayish-brown with rust at 5' sample depth, r tot very stiff. (Glacial Till) SANDY LEAN CLAY, trace of Gravel, gray, w stiff to stiff. (Glacial Till)	ish-brown ather stiff	X 18 X 12 X 14 X 16 X 13			
909.9	26.0		END OF BORING. Water not observed with 24 1/2 feet of hollow-s in the ground. Boring then grouted.	stem auger	9 10 10			

STATES AND AND SHARESH

TCAAP Redevelopment LCCATION: N: 203262.130, E: 554009.221 Statached sketch. NE of Highway 10 and Highway 96 Arden Hills, Minneota DATE: 79/07 SCALE: 1* DRILLER: K. Kesk METHOD: 3 1/4* HSA, Autohm DATE: 79/07 SCALE: 1* DRILLER: K. Kesk METHOD: 3 1/4* HSA, Autohm DATE: 79/07 SCALE: 1* Perch Depth Suffy D2488 or D2487) BPF WL Tests or Notes 935.0 0.0 Symbol Carton Kits, Kitski krown, moist. 11 11 - 0.1 SM III SLTY SAND, traze of Rost, datk krown, moist. 11 11 - 0.0 Symbol Classical Till) 11 11 - 0.1 SANDY LEAN CLAY, trace of Gravel, light brown to preventiff. 13 - 0.12.0 SANDY LEAN CLAY, trace of Gravel, light brown to preventiff. 14 - 0.2 SANDY LEAN CLAY, trace of Gravel, reddish-brown to grav, stiff to very stiff. 14 - 0.2 SANDY LEAN CLAY, trace of Gravel, reddish-brown to grav, stiff. 14 - 0.2 SANDY LEAN CLAY, trace of Gravel, reddish-brown to grav, stiff. 14	Brau	n Proje	ect SP	06-05871	BORING	i:	l h	ST-181	
DRILLER: K. Kock ME1HOD: 3 /4* MSA, Autohm DATE: 79/07 SCALE: I* Elev. Depth fort ASTM Description of Materials (ASTM D2488 or D2487) BPF WL Tests or Notes 934.0 1.0 SM SILTY SAND, trace of Roots, dark brown, moist. (Topsoil) BPF WL Tests or Notes 934.0 1.0 SM SLITY SAND, trace of Roots, dark brown, moist. (Topsoil) 11 11 - CL SANDY LEAN CLAY, takes of Gravel, rather stiff to very skiff. 11 11 - 19 19 19 923.0 12.0 CL SANDY LEAN CLAY, takes of Gravel, light brown to brown, wet, stiff to very stiff. 13 - CL SANDY LEAN CLAY, takes of Gravel, reddisti-brown to gray, stiff. 16 14 - CL SANDY LEAN CLAY, trace of Gravel, reddisti-brown to gray, stiff. 14 - 24 14 14	TCAA NE of	P Rede Highwa Hills, N	valuati velopm y 10 ar Iinnesc	ent ent d Highway 96 ta	LOCATI attached	ON: N sketch.	: 205262	2.130, E: 55409	9.221 Se
Elv. post Depth cet ASTM (0.0 Description of Materials (ASTM D2488 or D2487) BFF WL Tests or Notes 934.0 1.0 SM II SILTY SAND, trace of Roots, dark brown, moist. (Topsoil) 11 1 934.0 1.0 SM II SILTY SAND, trace of Roots, dark brown, moist. (Topsoil) 11 1 934.0 1.0 SM II SANDY LEAN CLAY, light brown, moit, rather stiff to very stiff. 11 1 94.0 1.0 SANDY LEAN CLAY, light brown, moit, rather stiff to very stiff. 11 1 923.0 12.0 SANDY LEAN CLAY, trace of Gravel, light brown to brown, wet, stiff to very stiff. 13 13 933.0 12.0 SANDY LEAN CLAY, trace of Gravel, light brown to brown, wet, stiff to very stiff. 14 14 913.0 22.0 SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. 14 14 909.0 26.0 END OF BORING. 14 14 14	DRILLE	ER: К.	Keck	METHOD: 3 1/4" HSA, Autohmi	DATE:	7/	9/07	SCALE:	1'' = 4
934.0 1.0 SM I SLTY SAND, trace of Roots, dark brown, moist. (Cipesii) CL CL SANDY LEAN CLAY, light brown, moist. (Glacial Till) 11 - 15 11 - 15 19 - 19 19 - 10 11 - 12.0 CL SANDY LEAN CLAY, trace of Gravel, light brown to brown, wei, stiff to very stiff. 13 - 0 12.0 CL SANDY LEAN CLAY, trace of Gravel, light brown to brown, wei, stiff to very stiff. 13 - 0 0 24 14 - 0 0 0 24 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. 14 - 0 0 0 14 - 0 0 0 14 - 0 0 0 14 - 0 0 0 14 - 0 0 0 14 - 0 0 0 14 -	Elev. feet 935.0	Depth feet 0.0	ASTN Symbo	Description of Materia (ASTM D2488 or D248	s 7)	BPF	WL	Tests or	Notes
CL SANDY LEAN CLAY, light brown, moit, rather stiff to very stiff. (Glacial Till) 923.0 12.0 CL SANDY LEAN CLAY, trace of Gravel, light brown to brown, wet, stiff to very stiff (Glacial Till) 13 (Glacial Till) 14 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, light brown to gray, stiff. (Glacial Till) 13 16 19 13 16 14 14 14	934.0	1.0	SM	SILTY SAND, trace of Roots, dark brow (Topsoil)	n, moist.				
Glacial Till)			CL	SANDY LEAN CLAY, light brown, mc	it, rather stiff to				
- - - 15 923.0 12.0 - 19 923.0 12.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 22.0 - - 913.0 - - - 913.0 - - - 913.0 - - - 913.0 - - - 913.0 - - - <td< td=""><td></td><td></td><td></td><td>(Glacial Till)</td><td>-</td><td>11</td><td></td><td></td><td></td></td<>				(Glacial Till)	-	11			
- - 15 923.0 12.0 - CL SANDY LEAN CLAY, trace of Gravel, light brown to brown, wet, stiff to very stiff. (Glacial Till) 13 - - 16 - - 24 913.0 22.0 - CL SANDY LEAN CLAY, trace of Gravel, light brown to gray, stiff. (Glacial Till) 16 - - 24 913.0 22.0 - CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 14 - - - 909.0 26.0 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - <td></td> <td></td> <td></td> <td></td> <td>-</td> <td>A</td> <td></td> <td></td> <td></td>					-	A			
- CL SANDY LEAN CLAY, trace of Gravel, light brown to brown, wet, stiff to very stiff. (Glacial Till) - 16 - 24 913.0 22.0 - CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) - 16 - 24 909.0 26.0 - 14 - 14	_								
- IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII						15			
923.0 12.0 923.0 12.0 CL SANDY LEAN CLAY, trace of Gravel, light brown to brown, wet, stiff to very stiff. (Glacial Till) 13 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 14 909.0 26.0 END OF BORING. Water not observed with 24 1/2 feet of hollow-stem auger in the ground. Boring then grouted.					-	Π			
923.0 12.0 923.0 12.0 CL SANDY LEAN CLAY, trace of Gravel, light brown to brown, wet, stiff to very stiff. (Glacial Till) 13 14 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, light brown to brown, wet, stiff to very stiff. (Glacial Till) 14 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 END OF BORING. Water not observed with 24 1/2 feet of hollow-stem auger in the ground. Boring then grouted.					-	01			
923.0 12.0 Image: CL SANDY LEAN CLAY, trace of Gravel, light brown to brown, wet, stiff to very stiff. Image: CL Im					-	μ.			
923.0 12.0 Image: CL SANDY LEAN CLAY, trace of Gravel, light brown to brown, wet, stiff to very stiff. (Glacial Till) 13 - - - 16 913.0 22.0 - 24 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 24 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 14 909.0 26.0 END OF BORING. 14 909.0 26.0 END OF BORING. 14 Boring then grouted. - - -					-	1			
923.0 12.0 Image: SanDY LEAN CLAY, trace of Gravel, light brown to brown, wet, stiff to very stiff. (Glacial Till) 13 - - - 16 913.0 22.0 - 24 913.0 22.0 - - CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. 24 913.0 22.0 - - Q09.0 26.0 END OF BORING. 14 Water not observed with 24 1/2 feet of hollow-stem auger in the ground. 14 Boring then grouted. - -						19			
CL SANDY LEAN CLAY, trace of Gravel, light brown to brown, wet, stiff to very stiff. (Glacial Till) 13 Image: stiff to very stiff. 16 (Glacial Till) 16 Image: stiff. 16 Image: stiff. 24 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 14 909.0 26.0 END OF BORING. 14 Boring then grouted. 14	923.0	12.0			-	Ħ			
- 13 (Glacial Till) - 16 - 17 - 16			CL	SANDY LEAN CLAY, trace of Gravel,	light brown to	- M 13			
- 16 913.0 22.0 24 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 14 END OF BORING. 14 Boring then grouted. 14				(Glacial Till)	-	14 Г			
- 16 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 END OF BORING. Water not observed with 24 1/2 feet of hollow-stem auger in the ground. Boring then grouted.	_	Í			-	1			
913.0 22.0 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 H END OF BORING. Water not observed with 24 1/2 feet of hollow-stem auger in the ground. Boring then grouted.						16			
913.0 22.0 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 Value 14 Solution 14 Boring then grouted. 14	ļ				-	f]			
913.0 22.0 913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 Public END OF BORING. Water not observed with 24 1/2 feet of hollow-stem auger in the ground. Boring then grouted.	ĺ	ĺ			-	1			
- - - 24 913.0 22.0 - 24 913.0 22.0 - - 24 913.0 22.0 - - - 913.0 22.0 - - - 913.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. - 909.0 26.0 - - 14 909.0 26.0 - - 14 909.0 26.0 - - 14 909.0 26.0 - - - 14 909.0 26.0 - - - - 909.0 26.0 - - - - 909.0 26.0 - - - - 909.0 - - - - - - 909.0 - - - - - - 909.0 - - - - - - 909.0 - - - <					-				
913.0 22.0 CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 14 909.0 26.0 END OF BORING. Water not observed with 24 1/2 feet of hollow-stem auger in the ground. Boring then grouted.					-				
913.0 22.0 Image: Classical Sandy Lean CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 Image: Classical Sandy Lean CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 Image: Classical Sandy Lean CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 Image: Classical Sandy Lean CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 Image: Classical Sandy Lean CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 Image: Classical Sandy Lean CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 Image: Classical Sandy Lean CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 Image: Classical Sandy Lean CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 Image: Classical Sandy Lean CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 Image: Classical Sandy Lean CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) 909.0 26.0 Image: Classical Sandy Lean CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) - Image: Classical Sandy Lean CLAY, trace of Gravel, reddish-brown to gray, stiff. (Glacial Till) Image:	-					24			
CL SANDY LEAN CLAY, trace of Gravel, reddish-brown to gray, stiff. 14 909.0 26.0 14 END OF BORING. 14 Water not observed with 24 1/2 feet of hollow-stem auger in the ground. 14 Boring then grouted. 14	913.0	22.0			. –	Ħ			
909.0 26.0 (Glacial Till) - 14			CL	SANDY LEAN CLAY, trace of Gravel,	eddish-brown to	11			
909.0 26.0 14 END OF BORING. Water not observed with 24 1/2 feet of hollow-stem auger in the ground. Boring then grouted.				(Glacial Till)	-	1			
909.0 26.0 14 Point Provide the second s					-				
END OF BORING. Water not observed with 24 1/2 feet of hollow-stem auger in the ground. Boring then grouted.	909 0	26.0				14			
Water not observed with 24 1/2 feet of hollow-stem auger				END OF BORING.		ĥ			
- Boring then grouted				Water not observed with 24 1/2 feet of h in the ground.					
		ĺ		Boring then grouted.	-				
	-		ĺ						
		[

Brau	n Proj	ect SP-0	6-05871	BORING	:	ST-182	
Geote TCAA NE of Arden	cnical E .P Rede Highwa Hills, N	Evaluation Evelopmen By 10 and Minnesota	t Highway 96	LOCATIC attached s	ON: N: 20 ketch.	95241.842, E: 55439)5.289 Se
DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/3/07	7 SCALE:	1"=4
Elev. feet 941.8	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF W	L Tests or	Notes
		CL	(Topsoil) SANDY LEAN CLAY, trace of Gravel, yellowi to brown, rust lenses scattered, moist, very stiff (Glacial Till)	sh-brown to hard 	22 23 29 22 22 26 26		
920.8	21.0	SM	SILTY SAND, fine- to medium-grained, trace of reddish-brown, moist, medium dense. (Glacial Till)	f Gravel, – –	34 		
915.8	26.0		END OF BORING. Water not observed with 24 1/2 feet of hollow-st in the ground. Boring then grouted.	em auger	27		

BR/	AUN	5M]	LOG OF B	ORING
INTE	RTEC							
Brau	n Proj	ect SP-(06-05871	BORING:			ST-183	
Geote	cnical E AP Rede	Evaluation Evelopment) at	LOCATIC	DN: N	: 20524	0.257, E: 554898.	811 See
NE of	Highwa	ay 10 and	Highway 96	attached s	ketch.			
Arden	Hills, F	Minnesot:						
Elev	Denth		METHOD: 31/4" HSA, Autohmr	DATE:	71,	707 	SCALE:	1'' = 4'
feet 933.7	feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or N	otes
933.2	0.5	SM	SILTY SAND, trace of Roots, dark brown, mois	st.		+		
F			(Topsoll) SANDY LEAN CLAY, light to brown seams of	rust, wet				
-			rather soft to rather stiff. (Glacial Till)		7 0			
us)					8			
1				_				
				_	6			
on of a				_				
- cxbi				4	× +			
				-				
					6			
				_]			
	i			_	5			
				4	N N			
9157	18.0			-{				
213.7	10.0	SM	SILTY SAND, fine- to medium-grained, trace of	f Gravel,		¥		
			(Glaciofluvium)	-				
					12			
				1				
_	:							
	-							
907.7	26.0			γ	16			
			END OF BORLING.					
-			water observed at 18 teet while drilling.	_				
	·		Boring then grouted.	· _				
\mathbf{F}				-				
			· · · · · · · · · · · · · · · · · · ·					

SP-06-05871

Braun Intertec Corporation

ST-183 page 1 of 1



AET JO	DB NO: 22-00081						LO	GOF	BO	RING N	10	ST-	184	(p. 1	of 1	
PROJE	CT: TCAAP Rede	velopme	nt; Ard	en Hi	lls,	MN										
DEPTH	SURFACE ELEVATION:	942.1			GE	OLOGY	NI	MC	SA	MPLE	REC	FIELL) & LA	BORAT	ORY 7	ESTS
FEET	MATERIAL I	DESCRIPTIC)N				11	IVIC		YPE	IN.	wc	DEN	LL	PL	%-# 200
1 -	FILL, mixture of silty sand clayey sand, a little gravel.	l, sand with surface roo	silt and ots, trace		FILI	_	15	м	М	SS	14					
2	roots, dark brown, brown a	and black	·						Д							
3							10	м	M	SS	1	9				
4									Д							
5 —	SILTY SAND, fine graine	d, brown a	nd dark		CO/	ARSE UVIUM	10	<u> </u>	M	00	16					
6 -	(SM)	/et, mealun	i dense				12	W	М	22	10					
7 -									R							
8 —							15	w	X	SS	15					
9 —									R							
10	SANDY LEAN CLAY, a gray, stiff, laminations of v	little gravel waterbearin	, brownish g sand		TIL	Ĺ	9	M/W	M	SS	18	20				
11 -	(CL)		0						Д							
12 —	CLAYEY SAND, a little g	gravel, gray	, firm (SC)						$\left \right\rangle$							
13							7	M	Ŵ	SS	22	19				
14 —									R							
15 —							6	М	X	SS	. 23	18	1			
16									<u>म</u>	:						
17									X							
19	SANDY LEAN CLAY, a (CL)	little grave	, gray, stif	f					X							
20 -									M							
21							13	M	ľŇ	SS	21	15				
22 -									R							
. 23 -	CLAVEY SAND a little	mavel oray	very stiff						ł							
24 -	(SC)	siaroi, giay	, very sull						H							
25 –							16	м	V	88	18	14				
26 -						· · · · · · · · · · · · · · · · · · ·		101	Λ	55					ļ	ļ
	END OF BORING Northing=205236.9															
	Easting=555364.5															
DEP	TH: DRILLING METHOD		· • • • • • • • • • • • • • • • • • • •	WAT	ER LI	EVEL MEA	SUR	EMEN	TS	L		- J		NOTE:	REFE	R TO
		DATE	TIME	SAMP	LED	CASING DEPTH	CA	VE-IN PTH	FI	DRILLI JUID LI	NG EVEL	WAT LEV	ER EL	THE A	TTAC	HED
0-24	472 J.25 HSA	7/3/07	12:50	6.5	5	4.5		5.8				No	ne	SHEE	FS FO	R AN
	·	7/3/07	1:15	26.	5	24.5	2	6.5			-	No	ne	EXPLA	NATIO	ON OF
BORIN COMPI	G LETED: 7/3/07													rermi		GY ON
DR: S	G LG: SB Rig: 91C				Í									11	no ro	U

Brau Geote	n Proj	ect S	P-0 tier	6-05871	BORING:	R	I-10()1-06 ST-	185
TCAA NE of Arden	P Rede Highwa Hills, M	velopi velopi vy 10 a Minne	men and sofa	t Highway 96	LOCATIC attached sl)N: N: ketch.	20860:	3.970, E: 55229	1.002 See
ORILLI	ER: K.	Keck	~	METHOD: 3 1/4" HSA, Autohmr I	DATE:	7/2	4/07	SCALE:	1'' = 4
Elev. feet 901.0	Depth feet 0.0	AST Sym	M bol	Description of Materials (ASTM D2488 or D2487)	4 	BPF	WL	Tests or	Notes
				Redrill of Geo Probe Hole. Power Auger to 16 feet	t				
					_				
					_				
					4				
					_				
Ì					_				
					_				
					_				
					_				
	i				4				
					_				
385.0	16.0	CL		SANDY LEAN CLAY trace of Gravel gray wet					
1				(Glacial Till)	-				
					-				
					-				
-						7			
			$\langle \rangle \rangle$		<u> </u>	Ĭ			
					_				
					-				
					-				
75.0	26.0					7			
15.0	20.0	ř		END OF BORING.	/^	<u> </u>			
	ſ			Water not observed during drilling.	_				
				Water not observed with 24 1/2 feet of hollow-stem in the ground.	auger				
			l	Boring then grouted					

SP-06-05871
	INTE	RTEC	~											
	Brau	n Proj	ect S	SP-0	6-058	871				BORING	: R	I-100	07-04 ST-	186
	Geote TCAA NE of Arden	cnical E AP Rede Highwa Hills, N	valuz velop vy 10 Ainne	ation men and] esota	t Highv	vay 96				LOCATIC attached s	DN: N: ketch.	20757	9.028, E: 55273	38.508 See
	DRILLI	ER: K.	Keck			METHOD:	3 1/4" HSA	, Autohmr		DATE:	7/2	4/07	SCALE:	1'' = 4'
	Elev. feet 925.2	Depth feet	AS	TM		D	escription o	f Materials 8 or D2487)		alar den de mainte de la record de la mo	BPF	WL	Tests or	Notes
	024.2	1.0	FILL		FILL	.: Silty Sand, t	fine-grained	, dark brown	ı, moist					
	924.2	3.0	FILL		FILL Lean	: Silty Sand, t Clay, brown,	fine- to med moist.	ium-grained,	, mixed	with	18			
ns)	_					. Lean Chay, i	inixed with	Siny Sand, D	iown, n		10			
of abbreviatio	918.2 - 916.2	7.0 9.0	SM		SILT	Y SAND, wit	h Organic fi (Buried T	ines, black, m opsoil)	noist.		8			
explanation	914.2	11.0	SM CL		SILT brow	Y SAND, fine on, wet, rather	to coarse- stiff. (Glacial	grained, trace Till)	e of Gra	avel,	¥ 9			
ogy sheet for	_ _ 911.2	14.0			medi	um.	(Glacial	Till)			8			
tive Terminol			CL		SAN stiff t	DY LEAN CI to stiff.	AY, trace c. (Glacial	of Gravel, gra Till)	iy, wet,	rather	9			
iPI BRAUN.GDT 10/2/07 14:41 (See Descript	••• • • • • • • • • • • • • • • • • •										13			·
P0605871.G		26.0			ENID	OF POPINIC					9			
S DNI										_				
OG OF BORI	-				Water Water	r not observed r not observed	during drill with 24 1/2	ling. 2 feet of hollo	ow-sten	n auger		-		
JN BASIC L(Borin	g then grouted	1.					· · · · · · · · · · · · · · · · · · ·		
BRAL														

SP-06-05871

BRAUN

Codecenced if volutation TCAAP Redevelopment NE of Highway 10 and Highway 96 Arden Hills, Minnesota DRILLER: K Kock METHOD: 31/4" MSA, Autohmu DATE: 7/19/07 SCALE: Feet ASTM Description of Materials (ASTM D2488 or D2487) BPF WL Tests or Notes 913.2 1.0 PT ¹²² PEAT, mixed with Sad, black, moist. BPF WL Tests or Notes 913.2 1.0 CL SANDY LEAN CLAY, trace of Gravel, prown with iron staining, moist, medium. 8 7 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 11 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to vet, medium to rather stiff. 11 902.2 12.0 SANDY LEAN CLAY, trace of Gravel, gray, moist to vet, medium to rather stiff. 11 902.2 12.0 SANDY LEAN CLAY, trace of Gravel, gray, moist to vet, medium to rather stiff. 11 902.2 12.0 SANDY DEAN CLAY, trace of Gravel, gray, moist to vet, medium to rather stiff. 11 903.4 12.0	Brau	n Proje	ect SP-0	6-05871	BORING	: R	I-100	07-08 ST-	187
DRILLER: K. Keck METHOD: 3 1/4" HSA, Autohm DATE: 7/19/07 SCALE: 1" Elew. Depth feet ASTM Description of Materials (ASTM D2488 or D2487) BFF WL Tests or Notes 913.2 1.0 PT PZ PEAT, mixed with Sand, black, moist. (Swamp Deposit) BFF WL Tests or Notes 913.2 1.0 CL SANDY LEAN CLAY, trace of Gravel, brown with iron staining, moist, medium. (Glacial Till) 8 6 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. (Glacial Till) 7 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 11 902.2 12.0 SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 7 902.2 12.0 SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 10 903.4 10 7 10	Geote TCAA NE of Arden	cnical E AP Redev Highwa 1 Hills, M	valuation velopmen y 10 and Iinnesota	t Highway 96	LOCATIC attached s	DN: N: ketch.	208970).244, E: 55276	6.455
File Depth feet ASTM Description of Materials (ASTM D2488 or D2487) BPF WL Tests or Notes 913.2 1.0 PT 2 PEAT, mixed with Sand, black, moist. (Swamp Deposit) 8 913.2 1.0 PT 2 PEAT, mixed with Sand, black, moist. (Swamp Deposit) 8 913.2 1.0 C1 SANDY LEAN CLAY, trace of Gravel, brown with iron staining, moist, medium. (Glacial Till) 8 902.2 12.0 7 7 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. (Glacial Till) 11 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 11 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 11 900.2 12.0 Tests or not posserved with 24 1/2 feet of hollow-stem auger 7 901.2 26.0 END OF BORING. 7 888.2 26.0 END OF BORING. 7	DRILL	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	9/07	SCALE:	1'' =
913.2 1.0 PT 22 PEAT, mixed with Sand, black, moist. Guide Sandy Lean CLAY, trace of Gravel, brown with iron staining, moist, medium. 8 Guide Sandy Lean CLAY, trace of Gravel, brown with iron 8 902.2 12.0 7 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 902.2 12.0 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 903.2 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 11 903.2 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 11 903.2 CL SANDY LEAN CLAY, trace of Gravel, gray, moist to wet, medium to rather stiff. 11 903.3 <t< th=""><th>Elev. feet 914.2</th><th>Depth feet 0.0</th><th>ASTM Symbol</th><th>Description of Materials (ASTM D2488 or D2487)</th><th>• ,</th><th>BPF</th><th>WL</th><th>Tests or</th><th>Notes</th></t<>	Elev. feet 914.2	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	• ,	BPF	WL	Tests or	Notes
888.2 26.0 7 888.2 26.0 7	DF 10/2/07 14:41 (See Descriptive Leminology sheet for explanation of abbreviations)	12.0	CL	SANDY LEAN CLAY, trace of Gravel, brown staining, moist, medium. (Glacial Till) SANDY LEAN CLAY, trace of Gravel, gray, m wet, medium to rather stiff. (Glacial Till)	with iron	8 6 7 7 11 10 7			
		26.0		END OF BORING. Water not observed with 24 1/2 feet of hollow-s in the ground.	tem auger	7			

BRAUN^M

Brau	n Proj	ect Ŝ	P-0	<u>5-05871</u>	BORING	RI	_40()3-03 ST-	188
Geote TCAA NE of Arden	cnical E AP Rede Highwa Hills, N	valua velop iy 10 /Iinne	tion ment and l sota	Highway 96	LOCATIC attached s	ON: N: 2 ketch.	20940	8.636, E: 55293	5.915 See
DRILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/23/	07	SCALE:	1'' = 4'
Elev. feet 918.0	Depth feet 0.0	AS: Sym	FM ibol	Description of Materials		BPF	WL	Tests or	Notes
917.7	0.3	PAV		√3" of Bituminous					
		FILL		FILL: Silty Sand, fine- to medium-grained, trad Gravel, dark brown, moist.	ce of	28	:		
914.0	4.0	CI		SANDY LEAN CLAY trace of Gravel brown	moist				
-		CL		SANDY LEAN CLAY, trace of Gravel, brown medium to rather stiff. (Glacial Till)	, moist, 	9			
– <u>907.0</u>	11.0	CL		SANDY LEAN CLAY, trace of Gravel, reddisl moist, stiff. (Glacial Till)	h-brown, –	12			
904.0	14.0	SM		SILTY SAND, fine- to medium-grained, trace or reddish-brown, moist, medium dense. (Glacial Till)	of Gravel,	22			
899.0	19.0								
-		CL		LEAN CLAY, reddish-brown, wet to moist, me rather stiff. (Glacial Till)	edium to 	9			
					-	8			
							* W	Water observed hile drilling. Vater not observe	at 19 feet ed with 29
89.0	29.0	SM		SILTY SAND fine to medium aminad tenas	of Groval		fe th	et of hollow-ste e ground.	m auger i
-	31.0	1410		reddish-brown, moist, dense. (Glacial Till)		36	В	oring then grout	ed.
				END OF BORING. *]			

BRAUN"

Brau	n Proj	ect SP-(06-05871	BORING:	RI-40	08-35 ST-189
Geote TCAA NE of Arden	cnical E AP Redev Highwa Hills, N	valuatio) velopme y 10 and Jinnesot:	n nt 1 Highway 96 a	LOCATIC attached s	DN: N: 20575 ketch.	5.343, E: 554523.702 Se
DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/17/07	SCALE: 1'' = 4
Elev. feet 952.2	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	1	BPF WL	Tests or Notes
951.5	0.7	SM	SILTY SAND, fine-grained, with Organic fine	es, dark		
- - -		CL	brown, moist. (Topsoil) SANDY LEAN CLAY, brown, moist, mediun stiff. (Glacial Till)	n to rather -	8	
943.2	9.0	CL	With Gravel layer at 8 feet. SANDY LEAN CLAY, trace of Gravel, brown staining, moist, very stiff	with iron	19	
940.2	12.0	CL	SANDY LEAN CLAY, trace of Gravel, brown stiff.	n, moist,	14	
- 034.2	18.0		(Glacial Iill)		15	
_	18.0	SM	SILTY SAND, fine- to medium-grained, trace reddish-brown, moist, dense. (Glacial Till)	of Gravel,	35	
926.2	26.0		END OF BORING. Water not observed during drilling. Water not observed with 24 1/2 feet of hollow- in the ground. Boring then grouted.	-stem auger	40	

SP-06-05871

RRAUNSM

Brau	n Proje	ect SP-	06-05871	BORING	<u> </u>	I-4	008	<u>-36 ST-190</u>		
Geotee TCAA NE of Arden	P Rede Highwa Hills, N	valuatio velopme ly 10 and Ainnesot	n nt Highway 96 a	LOCATIC attached s	LOCATION: N: 205738.823, E: 554735.210 attached sketch.					
DRILLI	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	7/17/07 SCALE: 1'' =				
Elev. feet 952.8	Depth feet 0.0	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC	Tests or Not		
952.5	0.3	PAV	4" of Bituminous				70			
- 950.8	2.0	FILL	FILL: Poorly Graded Sand with Silt, fine- to medium-grained, trace of Gravel, brown, moist.							
- 048.8	4.0	SC	CLAYEY SAND, gray with iron staining, mois (Glacial Till)	t, stiff.	16					
-	4.0	CL	SANDY LEAN CLAY, trace of Gravel, brown with iron staining, wet, rather soft to medium. (Glacial Till)	and gray	6		15			
				-	6					
					5					
940.8	12.0	CL	SANDY LEAN CLAY, trace of Gravel, brown with iron staining, wet, soft	and gray	V 2					
938.8	14.0		(Glacial Till)		β					
		CL	SANDY LEAN CLAY, trace of Gravel, brown, medium to very stiff.	moist,	M					
- - -					₫ 19					
-				_	Δ					
929.8	23.0	SM	SILTY SAND, fine- to medium-grained, trace of reddish-brown, moist, medium dense. (Glacial Till)	of Gravel, –						
926.8	26.0		END OF BORING		26					
			Water not observed during drilling.	_			Ē			
			Water not observed with 24 1/2 feet of hollow-s in the ground.	tem auger						
			Boring then grouted.							

BRAUN"

SRA		-						LOG OF	ROKI
NIE Brau Geotec TCAA	RIEC n Proj cnical E P Rede	ect S Valua velop	P-0 ntion men	5-05871	BORING LOCATIC attached s	: R ON: N sketch.	I-40 : 20574	08-40 ST- 5.555, E: 55510	191 6.431 See
NE of Arden	Highwa Hills, N	ay 10 Minne	and] sota	Highway 96					
DRILLE	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	6/07	SCALE:	1'' = 4'
Elev. feet 956.3	Depth feet 0.0	AS: Sym	TM ibol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
955.3	1.0	FILL		FILL: Silty Sand, fine- to medium-grained, with fines, dark brown, moist. FILL: Silty Sand, fine- to medium-grained, trace Gravel and Roots, brown, moist.	n Organic e of 	33			
	4.0	CL		SANDY LEAN CLAY, trace of Gravel, brown, loose to medium dense. (Glacial Till)	moist, 	9			
_					-	17			
0.40.2					-	14			
942.5	14.0	SM	<u>(</u>]]]	SILTY SAND, fine- to medium-grained, trace of reddish-brown, moist, medium dense to dense. (Glacial Till)	f Gravel, —	23	a a martin de la constante de la constante de la constante de la constante de la constante de la constante de l		
-					-	√ 34			
030.3	26.0			END OF BORING.		25			
				Water not observed during drilling. Water not observed with 24 1/2 feet of hollow-st in the ground.	em auger				
-				Boring then grouted.					

SP-06-05871

INTE	<u>rtec</u>	~					
Brau	n Proj	ect S	SP-0	6-05871	BORING	: RI-40	08-42 ST-192
Geote	cnical E	valua	ation	L	LOCATI	ON: N: 20592	6.630, E: 555134.452 See
NE of	Highwa	vetop iv 10	and	n Highway 96	attached s	sketch.	
Arder	Hills, N	Ainne	esota				
DRILL	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/16/07	SCALE: 1'' = 4'
Elev.	Depth	4.6	TX /				
959.1	0.0	Syn	nbol	(ASTM D2488 or D2487)		BPFWL	Tests of Notes
				Soil samples taken with Geoprobe to 6 foot dep	th.		
	ţ				-		
-							
					_		
–					-		
-	6.0						
(<u>suj</u>	6.0	SM		SILTY SAND, fine-grained, trace of Gravel,			
eviat				reddish-brown, moist, medium dense.	_		
abbr					_	16	
					-		
anati						M 20	
948.1	11.0	SP		POORLY GRADED SAND fine to medium a	mined		
et for		51		brown,moist, loose to medium dense.			
/ she				(Glacial Outwash)	_	24	
					_		
irmin							
Ve Te					_		
- -							
g 0 941.1	18.0						
(See		SM		SILTY SAND, fine-grained, trace of Gravel, reddish-brown, moist, medium dense.			
54				(Glacial Till)			
5 938.1	21.0					13	
10/2/		SP		POORLY GRADED SAND, fine- to coarse-gra	ined, trace		
N,GD)				(Glacial Outwash)			
BRAU							
GPI							
280 933 1	26.0					26	
SPO				END OF BORING.			
				Water not observed during drilling.			
OF B				Water not observed with 24 1/2 feet of hollow-s	tem auger		
1				in the ground.	Ŭ _		
BASI				Boring then grouted.			
					_		
±							

SP-06-05871

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	INTE	RTEC	~				
	Brau	n Proj	ect SP-	06-05871	BORING	RI-4	008-43 ST-193
	Geote	cnical E AP Rede	valuatio velopme	n nt	LOCATIC attached s	DN: N: 206 ketch.	5148.097, E: 555162.879 See
	Arder	i Hills, N	iy 10 and Ainnesot	a			
	DRILL	ER: K.	Keck	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/16/07	SCALE: 1'' = 4'
	Elev. feet	Depth feet	ASTM	Description of Materials	•	BPF WI	- Tests or Notes
			FILL	FILL: Silty Sand, fine- to medium-grained, fines, trace of Gravel, dark brown, moist.	with Organic 	¥ 40	
tion of abbreviations)	<u>957.9</u> - - -	4.0	SM	SILTY SAND, fine- to medium-grained, tra reddish-brown, moist, medium dense to den (Glacial Till)	ce of Gravel, se 	¥ 17	
ninology sheet for explana	-			Cobble at 10 1/2 feet. Cobbles at 13 feet.	 	38 37	
scriptive Terr		16.0	SP	POORLY GRADED SAND, fine- to medium trace of Gravel, brown, moist, medium dense (Glaziel Outwards)	m-grained, e to dense.	33	
142 (See De	943.9	18.0	SP	POORLY GRADED SAND, fine- to coarse- of Gravel, brown, moist, medium dense to d (Glacial Outwash)	grained, trace ense.		
1.GPJ BRAUN.GDT 10/2/07 1/						34	
COLECTING SP060587	_				-	16	* Water not observed during drilling. Water not observed with 29 1/2 feet of hollow-stem auger in the ground
AUN BASIC LI	930.9	31.0		END OF BORING *		30	Boring then grouted.
≝ SP	-06-05871			Braun Interlec Corporat	ion		RI-4008-43 ST-193 page 1 of 1

BRAUN

Brai	ın P	rojec	t SP-06-05	871		BORI	NG:	R	I-4(008-44 ST-	194						
Geot	ecnic:	al Eva	luation			LOCA	TIOI	N: Se	e atta	ched sketch.							
NE o	AP K f Hig	eueve hwav	юршелі 10 and Hiohy	wav 96													
Arde	n Hil	ls, Mi	nnesota	11 ay 50													
DRILI	ER:	K. Ke	Keck METHOD: 3 1/4" HSA, Autohmr DATE:		eck METHOD: 3 1/4" HSA, Autohmr DATE: 7				ck METHOD: 3 1/4" HSA, Autohmr DATE: 7/1				METHOD: 3 1/4" HSA, Autohmr DATE: 7/				1"=4"
Depth		ett M		Descri						T	»						
0.0		mbol		(ASTM	D2488 or D2487)			BLŁ	WL	lests or	Notes						
0.5	FIL	L 🕅	_ FILL: Silty S	and, fine- to m	edium-grained, with Orga	mics, dark											
	FIL	l 🗱	brown, moist.				_AI										
			FILL: Sandy	Lean Clay, bro	wn, moist.												
							V	25									
- 40							-Ŭ	23									
4.0	FILI	_ 💥	FILL: Silty S	and, fine- to m	edium-grained, trace of G	ravel	-										
_			reddish-brown	ı, moist.	<i>G</i> , 1400 01 0	,	-+	25									
_	ļ						X	25									
•																	
			-				_										
_			With trace of	topsoil at 8 fee	t.		-1	56									
9.0			011 771 6 1 2 1		····		H										
	SM		SILTY SAND Gravel reddi), tine- to medi sh-brown mou	um-grained, with Sand lay	yers, trace of											
			Graves, Teuth	ar-biown, 1109 (Glacial Till)		M	68									
				`	-												
-	i i																
							X	*		* 50 blows for 6	inches						
	1						T										
							-										
_								82									
16.0	0.0		BOODING		~	~~~~	Ň	20									
	51		Gravel, brown	ADED SAND, 1. moist. dense	tine- to coarse-grained, ti	race of											
	1		,	(Gla	cial Outwash)												
							-										
-																	
	ŀ																
							M	32									
							-11										
-	[
-							-M	35									
							-4			* Water not obser	wed durin						
.								<u>~</u> ~		drilling.							
28.0							X	33		Water not observ	ed with ?						
		$ \top$	END OF BOR	ING. *						feet of hollow-ste	m auger i						
							-			the ground.							
										Boring then grow	led.						
ļ										6 <u>5</u> , 0 4							
-06-05871			•••••		Prove Intertee Company				ل ب	DI 4000 44 8	F 104						

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	INTE	RTEC	***							
	Brau	ın Proj	ect S	SP-0	6-05871	BORING:	R	I-4(009	-06 ST-195
	Geote	cnical H AP Rede	Evalu: evelor	ation	t	LOCATIC)N: N:	: 206:	589.3	15, E: 553291.605 See
	NE of	Highwa	ay 10	and	Highway 96	attached si	ketch.			
	Arder	n Hills, I	Minn	esota						
	DRILL	ER: K	. Keck	·	METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	8/07		SCALE: 1'' = 4'
	Elev. feet	Depth feet	AS	TM	Description of Materials		BPF	WT.	MC	Tests or Notes
	942.2	0.0	Syn	nbol	(ASTM D2488 or D2487)				%	10505 01 110003
	<u>941.9</u>	0.3	APAV FILI	/	3" of Bituminous FILL: Poorly Graded Sand with Silt fine graine	d brown				
			1 11.4		moist.	u, 010 wii, ¬				
							7 8			
		l								
	937.7	4.5	CI		SANDY LEAN CLAY brown wat rather and					
_			CL		(Lacustrine)		4		15	
tions	_									
revia	-					-				
fabb	-						4			
ion o:	933.2	9.0	CL		SANDY LEAN CLAY, trace of Gravel, brown w	vith iron				
lanat					staining, moist, rather stiff. (Glacial Till)		10			
r exp	-						<u> </u>			
iet fo	930.2	12.0	CL.		SANDY LEAN CLAY trace of Gravel reddish-	brown				
y she					moist, stiff to very stiff.	-	16			
lolog					(Chachar Thi)					
ernii						_	1 26			
ve T	-					4	(20			
cript	-					_				
b Des	924.2	18.0	G							
(See	-				SANDY LEAN CLAY, trace of Gravel, grayish-t moist, very stiff.	brown,				
42					(Glacial Till)					
2/07 14	921.2	21.0)	17			
70 T	_				END OF BORING.					
N.GD	_				Water not observed during drilling.					
PJ BRAU	-		2 -		Water not observed with 19 1/2 feet of hollow-steen in the ground.	em auger				
871.6	[Boring then grouted.	_				
SP060.	-					_				
ENG.	-					_				**************************************
бя-	-									
	-					_		-		
ND ND	-									
NN3										

SP-06-05871

BRAUN[™]

RI-4009-06 ST-195 page 1 of 1

Geotecnical TCAAP Red NE of Highw Arden Hills, DRILLER: 1 Elev. Depth feet feet 943.4 0. 943.1 0. 939.4 4. 939.4 4. 936.4 7.4 936.4 7.4 931.4 12.6	Evaluation levelopmen vay 10 and Minnesota C. Keck ASTM 0 Symbol 3 PAV FILL 0 FILL 0 CL	METHOD: 3 1/4" HSA, Autohmr Description of Materials (ASTM D2488 or D2487) 3" of Bituminous FILL: Poorly Graded Sand with Silt, fine-gra moist. FILL: Sandy Lean Clay, with topsoil chunks, SANDY LEAN CLAY, brown with iron stair rather soft. (Lacustrine)	LOCATION: 1 attached sketch DATE: 7, BPl ined, brown, - - 0live, wet. 4 ing, wet, - 4	N: 20640' a. / 18/07 F WL	7.349, E: 553441.134 SCALE: 1" = Tests or Notes
DRILLER: 1 Elev. Depti feet feet 943.4 0. 943.1 0 - - - - - - - - - - - - -	C. Keck ASTM 0 Symbol 3. PAV FILL 0 FILL 0 CL	METHOD: 3 1/4" HSA, Autohmr Description of Materials (ASTM D2488 or D2487) 3" of Bituminous FILL: Poorly Graded Sand with Silt, fine-gra moist. FILL: Sandy Lean Clay, with topsoil chunks, SANDY LEAN CLAY, brown with iron stair rather soft. (Lacustrine)	DATE: 7, BP) ined, brown, - - 8 olive, wet. 4 ing, wet, - 4	718/07 F WL	SCALE: 1" = Tests or Notes
Elev. Depth feet feet 943.4 0. 943.1 0. 939.4 4. 939.4 4. 936.4 7. 936.4 7. 931.4 12.0	ASTM 0 Symbol 3 PAV FILL 0 FILL 0 CL	Description of Materials (ASTM D2488 or D2487) 3" of Bituminous FILL: Poorly Graded Sand with Silt, fine-gra moist. FILL: Sandy Lean Clay, with topsoil chunks, SANDY LEAN CLAY, brown with iron stair rather soft. (Lacustrine)	BP)	F WL	Tests or Notes
	3. PAV FILL 0 FILL 0 CL	3" of Bituminous FILL: Poorly Graded Sand with Silt, fine-gra moist. FILL: Sandy Lean Clay, with topsoil chunks, SANDY LEAN CLAY, brown with iron stair rather soft. (Lacustrine)	ined, brown, - - - olive, wet. - - 4 - - 4 - - 4		
<u>939.4</u> 4. <u>936.4</u> 7.4 - - - - - - - - - - - - - - - - - - -	0 FILL 0 CL	FILL: Sandy Lean Clay, with topsoil chunks, SANDY LEAN CLAY, brown with iron stair rather soft. (Lacustrine)	olive, wet. 4		
931.4 12.0		SANDY LEAN CLAY, brown with iron stair rather soft. (Lacustrine)	ing, wet, 4		
- <u>931.4 12.0</u> - - -		SANDY I FAN CLAY trace of Gravel brow	H I		
-		with iron staining, moist, rather soft to stiff. (Glacial Till)	n and gray $$ 5		
- 925.4 18.0 -) CL	SANDY LEAN CLAY, trace of Gravel, brow (Glacial Till)	n, wet, stiff.	Σ	
		END OF BORING. Water observed at 18 feet while drilling.	13		
		Loning then grouted.			

BRAUN

Brau	n Proj	ect Sl	P-06	5-05871	BORING	R	RI-4009-08 ST-197			
Geote TCAA NE of Arden	cnical E AP Rede Highwa Hills, N	valuat velopr vy 10 a /Iinnes	tion ment and H sota	lighway 96	LOCATIC attached s)N: N ketch.	: 2062:	55.301, E: 553565.997		
DRILL	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	8/07	SCALE: 1" =		
Elev. feet 944.3	Depth feet 0.0	AST Symb	'M bol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or Notes		
 	0.3.	PAV FILL		3" of Bituminous FILL: Silty Sand, fine- to medium-grained, trace Gravel, reddish-brown, moist.	e of					
	4.0	FILL		FILL: Sandy Lean Clay, trace of Gravel, brown, olive, moist.	gray and	7				
937.3	7.0	OL		ORGANIC CLAY, black, wet.		7 2				
935.3	9.0	SM :		SILTY SAND, fine-grained, gray, waterbearing,	very		Ţ			
933.3	11.0			loose. (Lacustrine)		2				
- - <u>930.3</u>	14.0	CL		SANDY LEAN CLAY, gray with iron staining, (Lacustrine)	wet, soft. – –	3				
-		CL		SANDY LEAN CLAY, trace of Gravel, brown, v to medium. (Glacial Till)	wet, soft	3				
923.3	21.0			END OF BORING.		6				
-		1		Water observed at 9 feet while drilling. Water down 9 feet with 19 1/2 feet of hollow-ste in the ground.	m auger					
_ -				Boring then grouted.						
-			-							
 .										
-06-05871			{	Braun Intertec Corporation	· · · · ·			RI-4009-08 ST-197 p		

ß

Brau	n Proj	ect S	P-06	5-05871	BORING	R R	I-4	009	-09	ST-198
Geotee TCAA NE of Arden	enical E P Rede Highwa Hills, N	valua velopi iy 10 a /linne	tion ment and F sota	Highway 96	LOCATI attached	ON: N sketch.	: 206	068.2	55, E:	553728.185 See
DRILLI	ЕR: К.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	7/07		SCA	LE: 1" = 4
Elev. feet 944.4	Depth feet 0.0	AST Sym	M bol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC %	P200 %	Tests or Note
<u>944.1</u> - <u>936.4</u>	<u> </u>	PAV FILL		 4" of Bituminous FILL: Silty Sand, fine- to medium-grained, trace Gravel, brown, moist. No sample recovery at 5 1/2 feet. FILL: Clayey Sand, gray, brown and olive, mois 	e of			17	47	
930.4	14.0	CL		SANDY LEAN CLAY, with Organic fines, black (Swamp Deposit)		5		17	47	
925.4	19.0	CL		SANDY LEAN CLAY, gray, wet, soft. (Lacustrine)		3				
918.4	26.0	CL		SANDY LEAN CLAY, trace of Gravel, gray, we stiff. (Glacial Till) END OF BORING. Water not observed during drilling. Water not observed with 24 1/2 feet of hollow-ste in the ground.	em auger	19				

SP-06-05871

RI-4009-09 ST-198 page 1 of 1

<u>BRAUN</u>™

Brau	n Proj										
	w r r ol	ect S	P-0	5-05871	BORING	R	I-4	009	-10 \$	ST-199	
TCAA NE of Arden	cnical E P Rede Highwa Hills, N	valua velopi vy 10 a /Iinne	tion ment and J sota	Highway 96	LOCATIC attached s	DN: N ketch.	: 205	827.0	00, E: 5	553879.890 S	ee
DRILLE	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/1	7/07		SCAL	E: 1" = 4	4'
Elev. feet 944.2	Depth feet 0.0	AST Sym	TM bol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	MC %	P200 %	Tests or No	tes
<u>943.7</u> - - 940.2	4.0	FILL FILL		FILL: Silt, brown, moist. FILL: Sandy Lean Clay, brown, dry.		20					
 	7.0	FILL		FILL: Silty Sand, fine- to medium-grained, brow	n, moist. 	4		7	20		
		CL		SANDY LEAN CLAY, trace of Gravel, brown, w medium to stiff. (Glacial Till)	wet,	7					
						11					
923.2	21.0			No sample recovery at 20 1/2 feet. END OF BORING. Water not observed during drilling.	- 	16					
				Water not observed with 19 1/2 feet of hollow-ste in the ground. Boring then grouted.	em auger						
- 				·							

Brau	n Proj	ect S	P-0	5-05871	BORING	: R	I-40()9-11 ST-	200
Geote FCAA NE of Arden	cnical E AP Rede Highwa Hills, N	valua velop y 10 : /linne	ition ment and J sota	Highway 96	LOCATIC attached s	ON: N: sketch.	205748	3.933, E: 55415	6.383 See
ORILLI	ER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/11	7/07	SCALE:	1" = 4'
Elev. feet 949.2	Depth feet 0.0	AS: Sym	FM ibol	Description of Materials (ASTM D2488 or D2487)		BPF	WL	Tests or	Notes
		FILL		FILL: Silty Sand, fine- to medium-grained, tra-	ce of				
948.0	1.2	FILL		FILL: Poorly Graded Sand with Silt, fine- to medium-grained, trace of Gravel, brown, moist					
945.2	4.0	FILL		FILL: Sandy Lean Clay trace of Gravel and w	ood brown	M 21			
				to dark brown, wet.		8			
—					- 	7			
935.2	14.0	<u> </u>		CLANTY SAND Light and	_	5			
933.2	16.0	<u> </u>		(Swamp Deposit)		4			
		SC		CLAYEY SAND, gray, wet, soft. (Lacustrine)	-				
-						M 2	Į₽		
027.2	22.0	CI				Δ			
				soft. (Glacial Till)					
23.2	26.0			END OF BORING.		2			
			Ĭ	Water down 20 feet with 24 1/2 feet of hollow- in the ground.	stem auger				
				Boring then grouted.					
1					_				

LOG OF BORING

BRAUN



SUBSURFACE BORING LOG

PROJECT: TCCAAP Redevelopment; Arden Hills, MN Intervalue (Intervalue) (AET J	OB NO: 22-00081		· · · · · · · · · · · · · · · · · · ·		·····	L	DG OF	s BC	RING N	10. S ']	Γ-201	/AB	-1 (p. 1	of 2)
DEFTH FEET SURFACE FLEVATION: 956.8 GEOLOGY N MC SAMPLE REC FIELD & LABORATORY TESTS MATERIAL DESCRIPTION FILL, mixture of silly sand ad algoes sand, a little gravel, surface roots, trace, trace	PROJE	ECT: TCAAP Rec	developr	nent; Ard	en Hi	lls, MN										/
PEET MATERIAL DESCRIPTION N NC TTPE IN WC DEN LL PL &=#20 1 - Ittle gravel, surface roots, trace roots, brown and dark brown, alittle gravel, prown, a little gravel, prown, a little gravel, brown, moist, dense (SP-SM) PL	DEPTH IN	SURFACE ELEVATION:	956	.8		GEOLOGY			s	AMPLE	REC	FIELI) & LA	BORA	TORY	TESTS
1 FILL, mixture or sand and civey sand, a dark brown and dark brown and dark brown. 12 M SS 7 3 FILL, mixture of sand with silt and clayey sand, a little gravel, brown, moist, dense (SP-SM) 24 M SS 16 8 10 14 M SS 16 8 16 16 12 14 M SS 16 8 16 16 13	FEET	MATERIA	L DESCRIP	TION				MC		TYPE~	ĪN.	WC	DEN	LL	PL	%- #200
a HILL, mixture of sand with silt and clayey sand, all title gravel, brown, a little gravel, brown, all title gravel, brown, wery stiff, laminations of silt (SC) 14 M SS 15 7 SANDY LEAN CLAY, all title gravel, brown, all title gravel, brown, all title gravel, brown, all title gravel, brown, all title gravel, brown, wery stiff, laminations of silt (SC) 14 M SS 16 8 9 Light brown, wery stiff, laminations of silt (SC) 24 M SS 18 7 10 10 10 14 M SS 18 7 11 12 29 M SS 18 7 12 14 M SS 18 7 14 M SS 18 7 14 15 Fine grained, brown, moist, dense (SP-SM) 21 M SS 7	1 –	little gravel, surface root	ind and clay	yey sand, a sts, brown an	đ	FILL	12	М	\mathbb{N}	SS	7					
3 FILL, mixture of sand with silt and clayey sand, isplit 4 brown 5 SANDY LEAN CLAY, a little gravel, brown, a 14 M 8 SANDY LEAN CLAY, a little gravel, brown, a 11 Initic light brown and dark brown, a 11 Initic light brown and dark brown, a little gravel, brown, a 11 Initic light brown and dark brown, a little gravel, fine to medium grained, light brown, moist, medium drave for law light brown, moist, medium drave for law light brown, moist, medium drave for law light gravel, fine to medium grained, light brown, moist, medium drave law light gravel, fine to medium grained, light brown, moist, medium drave law light gravel, fine to medium grained, light brown, moist, medium drave law light gravel, fine to medium grained, light brown, moist, medium dravel law law law light gravel, fine to medium grained, light brown, moist, medium dravel law law law law law light gravel law law law law law law law law law la	2 -	dark brown							Δ		Í					
4 brown SANDY LEAN CLAY, a little gravel, brown, a WEATHEREE 1 Hitte light brown and dark brown, stiff. TILL 14 M SS 23 15 5 SANDY LEAN CLAY, a little gravel, brown, a TILL 14 M SS 23 15 6 Iminations of silt and silty sand (CL) SANDY LEAN CLAY, a little gravel, brown, a TILL 14 M SS 15 7 SANDY LEAN CLAY, a little gravel, brown, a TILL 14 M SS 16 8 9 CLAYEY SAND, a little gravel, brown, a TILL 29 M SS 16 8 11 Ight brown, very stiff, laminations of silt (SC) 24 M SS 18 7 12 SAND WITH SILT AND GRAVEL, medium to fine grained, brown, moist, dense (SP-SM) ICOARSE ALLUVIUM 40 M SS 7 14 14 SAND WITH SILT, a little gravel, fine to medium dense to dense (SP-SM) 26 M SS 19 14 25 47 47 M SS 19 14 14 14 14 </td <td>3</td> <td>FILL, mixture of sand w</td> <td>ith silt and</td> <td>clayey sand,</td> <td></td> <td></td> <td>14</td> <td>м</td> <td>M</td> <td>SS</td> <td>17</td> <td>7</td> <td></td> <td></td> <td></td> <td></td>	3	FILL, mixture of sand w	ith silt and	clayey sand,			14	м	M	SS	17	7				
s - SANDY LEAN CLAY, a little gravel, brown, a WEATHERED 14 M SS 23 15 - Jaminations of silt and silty sand (CL) TILL 14 M SS 23 15 - SANDY LEAN CLAY, a little gravel, brown, a IIIL 14 M SS 23 15 - Intitle light brown and dark brown, stiff, IIIL 14 M SS 16 8 - Intitle light brown, and dark brown, stiff, IIIL 29 M SS 16 8 - Ight brown, very stifl, laminations of silt (SC) 24 M SS 18 7 - SAND WITH SILT AND GRAVEL, medium to COARSE 21 M SS 7 - SAND WITH SILT, a little gravel, fine to COARSE 11.LUVIUM 40 M SS 7 - - - - - - - - - - - - - - - - - - - - - - - -	4 -	brown	nne gray a	nu light				ĺ	Д							
6 Vaminations of silt and silty sand (CL) SANDY LEAN CLAY, a little gravel, brown, a little light brown and dark brown, stiff, laminations of silt and silty sand (CL) 11 11 129 11 129 11 13 11 14 129 M 130 111 14 M 15 111 16 11 17 111 18 SAND WITH SILT AND GRAVEL, medium to fine grained, brown, moist, dense (SP-SM) 16 10 17 11 18 SAND WITH SILT, a little gravel, fine to medium grained, light brown, moist, medium dense to dense (SP-SM) 16 26 17 18 SAND WITH SILT, a little gravel, fine to medium grained, light brown, moist, medium dense to dense (SP-SM) 21 26 22 47 23 24 24 47 25 26 26 47 27 27 28 47 29 M 20 26	5 -	SANDY LEAN CLAY, little light brown and dar	a little grav	el, brown, a		WEATHERE			\square			15				
7 UstNDY LEAN CLAY, a little gravel, brown, a minimizer of silt and silty sand (CL) 9 Iaminations of silt and silty sand (CL) 9 CLAYEY SAND, a little gravel, brown, a little light brown, very stiff, laminations of silt (SC) 10 Ight brown, very stiff, laminations of silt (SC) 11 24 12 3 13 5 14 SAND WITH SILT AND GRAVEL, medium to fine grained, brown, moist, dense (SP-SM) 16 11 17 13 18 SAND WITH SILT, a little gravel, fine to medium grained, light brown, moist, medium dense to dense (SP-SM) 26 M 27 26 28 47 29 W 20 W 21 W 22 23 24 W 25 26 26 W 27 28 28 47 29 W HELLING METHOD	6 -	laminations of silt and sil	lty sand (C	L)		TILL	14	M	Ň	SS	23	15				
8 - Iaminations of silt and silty sand (CL) 29 M SS 16 8 9 - Ight brown, very stiff, laminations of silt (SC) 24 M SS 16 8 10 - 1 -	7	\little light brown and dar	a little grav k brown, si	vel, brown, a tiff,	ſ				P							
9 light brown, very stiff, laminations of silt (SC) 10 11 12 13 14 SAND WITH SILT AND GRAVEL, medium to fine grained, brown, moist, dense (SP-SM) 16 17 18 SAND WITH SILT, a little gravel, fine to medium grained, light brown, moist, medium dense to dense (SP-SM) 26 27 28 29 20 21 22 23 24 25 26 27 28 29 20 21 22 23 24 25 26 27 28 29 20 21 22 23 24 25 26 27 28 29 20 21 22 23 24 25 26 27 28 29 29 29 29 <t< td=""><td>8</td><td>laminations of silt and sil</td><td>ty sand (C</td><td>L)</td><td></td><td></td><td>29</td><td>м</td><td>X</td><td>SS</td><td>16</td><td>8</td><td></td><td></td><td></td><td></td></t<>	8	laminations of silt and sil	ty sand (C	L)			29	м	X	SS	16	8				
10 - 24 M SS 18 7 11 - - <t< td=""><td>9 —</td><td>light brown, very stiff, la</td><td>minations</td><td>of silt (SC)</td><td></td><td></td><td></td><td></td><td>R</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	9 —	light brown, very stiff, la	minations	of silt (SC)					R							
11 - 21 M SS 13 12 - 13 - 21 M SS 22 7 13 - 14 SAND WITH SILT AND GRAVEL, medium to fine grained, brown, moist, dense (SP-SM) COARSE ALLUVIUM 40 M SS 7 16 - 17 - 18 SAND WITH SILT, a little gravel, fine to medium grained, light brown, moist, medium dense to dense (SP-SM) 40 M SS 7 14 18 SAND WITH SILT, a little gravel, fine to medium dense to dense (SP-SM) 26 M SS 22 14 21 - 22 - 24 26 M SS 19 14 22 - 23 - 24 47 M SS 19 14 25 - 26 47 M SS 19 14 14 14 27 - 23 - 47 M SS 19 14	10						24	м	М	22	18	7				
12 13 14 SAND WITH SILT AND GRAVEL, medium to fine grained, brown, moist, dense (SP-SM) 21 M SS 22 7 16 16 17 18 SAND WITH SILT, a little gravel, fine to medium grained, light brown, moist, medium dense to dense (SP-SM) 40 M SS 7 18 17 18 SAND WITH SILT, a little gravel, fine to medium grained, light brown, moist, medium dense to dense (SP-SM) 26 M SS 22 7 21 22 23 24 26 M SS 19 10 22 23 24 47 M SS 19 10	11								Д	55	10					
13 21 M SS 22 7 14 SAND WITH SILT AND GRAVEL, medium to fine grained, brown, moist, dense (SP-SM) COARSE ALLUVIUM 40 M SS 7 16 -	12								M	1						
SAND WITH SILT AND GRAVEL, medium to Image: Coarse and the set of the set o	14						21	М	M	SS	22					
16 17 17 18 SAND WITH SILT, a little gravel, fine to medium grained, light brown, moist, medium dense to dense (SP-SM) 40 M 20 26 M SS 22 21 26 M SS 22 23 26 M SS 19 24 25 26 47 M SS 19 27 28 47 M SS 19	15 -	SAND WITH SILT AND fine grained, brown, mois) GRAVEI st. dense (S	., medium to P-SM)		COARSE			团							
17 - 18 SAND WITH SILT, a little gravel, fine to 19 nedium grained, light brown, moist, medium 20 21 22 23 24 25 26 47 M SS 19 26 27 28	16 -	<i>c</i> , <i>i</i> , <i>i</i> , <i>i</i> , <i>i</i> , <i>i</i> , <i>i</i> , <i>i</i> , <i>i</i>	.,	1 014)			40	м	XI	SS	7					
18 SAND WITH SILT, a little gravel, fine to medium grained, light brown, moist, medium dense to dense (SP-SM) 26 M SS 22 21 26 M SS 22 23 24 25 26 47 M SS 19 26 Provide the set of the	17 -								R							
19 - medium grained, light brown, moist, medium dense to dense (SP-SM) 20 - 21 - 22 - 23 - 24 - 25 - 26 - 27 - 28 - DEPTH: DRILLING METHOD	18 🕂	SAND WITH SUT a litt	le grouel f						#							
20 - 26 M SS 22 21 - 26 M SS 22 22 - 27 - 26 M 25 - 47 M SS 19 26 - 47 M SS 19 27 - 28 - 47 M	19 -	medium grained, light bro	wn, moist,	medium					Ħ							
21 - 26 M SS 22 22 - 23 - 24 - 25 - 47 M SS 19 25 - 26 - 47 M SS 19 10 10 27 - 28 - 47 M SS 19 10 10 DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS 10 10 10 10	20 -	dense to dense (SP-SIM)														
22 - 23 - 23 - 24 - 25 - 26 - 26 - 47 M SS 19 27 - 28 - DEPTH: DRILLING METHOD	21 -						26	M	Ň	SS	22	r.				
23 - 24 - 25 - 26 - 26 - 47 27 - 28 - DEPTH: DRILLING METHOD	22 –							ľ	I							
24 - 25 - 26 - 47 27 - 28 - DEPTH: DRILLING METHOD	23 -								ţĮ.							
25 - 26 - 47 M SS 19 27 - 28 - 47 M SS 19 DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS	24								团]				
26 27 - 28 - DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS	25 -						47	м	M	SS	19					
28 - DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS	20							4								
DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS	28 -								H							
DEPTH: DRILLING METHOD WATER LEVEL MEASUREMENTS									H		Ī					
NOTE: REFER TO	DEPTH	H: DRILLING METHOD		····	WATER	LEVEL MEA	SUREN	MENT	S				N	OTE: 1	REFER	то
0-34½' 3.25" HSA DATE TIME SAMPLED CASING CAVE-IN DRILLING WATER THE ATTACHED	0-341/	<u>4' 3.25" HSA</u>	DATE	TIME	AMPLE DEPTH	D CASING DEPTH	CAVE DEP	E-IN TH	DI FLU	RILLING	G EL	WATER	τ Υ	HE AT	TACH	ED
7/26/07 8:52 31.5 34.5 36.5 None SHEETS FOR AN		·····	7/26/07	8:52	31.5	34.5	36.	5				None	s	HEETS	FOR .	AN
BORING EXPLANATION OF	BORING			<u> </u>	-							EX	CPLAN	ATION	OF	
DR: SG LG: BR Rig: 91C	DR: SG	LG: BR Rig. 91C												KMIN(THIS	NTOG ATOG	ON



AET JOI	B NO: 22-00081			LC	OG OF	BO	RING N	0. ST	-201	<u>/AB-</u>	· 1 (p. 2 (<u>of 2)</u>
PROJEC	T: TCAAP Redevelopment; Arden	Hi	lls, MN										
DEPTH	· · · · · · · · · · · · · · · · · · ·		GEOLOGY	71	NC	SA	MPLE	REC	FIELD	& LAI	BORAT	ORY 1	ESTS
FEET	MATERIAL DESCRIPTION			N	MC	1	YPE	IN.	WC	DEN	LL	PL	%-#20
30 -	SAND WITH SILT, a little gravel, fine to medium grained, light brown, moist, medium dense to dense (SP-SM) (continued)			40	м	ष्ट्र V	88	24					
31 –						\square	00						
32						ł							
33 -						H							
34 -						1							
35 —				45	м	M	SS	20					
36 -					1.4	\square		20				:	
	END OF BORING Northing=206215.3 Easting=554201.0												



SUBSURFACE BORING LOG

AET J	ов NO: 22-00081					LC	OG OF	во	RING N	ю. S]	ſ -202	/AE	B-2 (p. 1	of 2)
PROJE	CT: TCAAP Red	evelopm	ent; Ard	en Hil	lls, MN										
DEPTH	SURFACE ELEVATION: _	955.0			GEOLOGY	N	мс	SA	MPLE	REC	FIELI) & L/	ABORA	FORY '	TESTS
FEET	MATERIAL	DESCRIPTI	ON						TYPE	IN.	WC	DEN		PL	%-#200
1 -	FILL, mostly silty sand, a roots, brown	little grave	l, trace		FILL	57	м	\mathbb{N}	SS	7					
2 -								Д							
3 —	SANDY SILT, a little gra medium dense (ML)	vel, brown,	, moist,		TILL	24	М	X	SS	17	11				
4	CLAYEY SAND, a little	gravel, brov	wn, very					B							
5 · 6	SILTY SAND, a little gra	vel, possibl	e cobbles,	-/[[[19	М	X	SS	15					
7	dense (SM)	iowii, iiiois	i, mearum		COARSE	-		E							
8	SAND, a little gravel, bro dense (SP) (possible fill)	wn, moist, :	medium		ALLUVIUM	20	М	X	SS	16					
9	brown, moist, medium der	nse (SP)	ameu,					R							
10 -	SAND WITH GRAVEL, medium to fine grained, b	bbles, t, dense			37	М	X	SS	14						
12	(SP)	-						R							
13 —	GRAVEL WITH SAND, dense (GP)	ist, mediun			27	м	М	SS	8						
14 —				** **				Д							
15 —	SAND, fine to medium gr	ained, light	brown,					\square							
16 —	moise, dense, laminations	of sifty sair	u (SF)			40	М	Ŵ	55	14					
17								X							
18 -	SAND, a little gravel, med	lium graine	d, light					Ħ							
19 -	brown, moist, dense (SP)							뙵							
20 -						43	м	M	SS	17					
21 -								R							
23								Ħ		F					
24 -	SAND, a little gravel, fine light brown, moist, very de	to medium ense (SP)	ı grained,					H							
25 -	· · · · · ·							K							
26 -						51	M	M	SS	18				1	
27 -								R							
28								ł							
DEP	TH: DRILLING METHOD			WATE	R LEVEL MEA	I ASURF	L EMEN	I원 TS		l		L	NOTE	DEEE	
		DATE	TIME	SAMPLI	ED CASING	CAV	/E-IN			NG	WAT	ER	THE A	TTAC	HED
0-39	7 <u>72</u> 3.25" HSA	7/26/07	10:55	41.5	39.5	41	 1.0	rL	OID LE	YEL	Non	ы. е	SHEET	IS FOF	R AN
									<u> </u>				EXPLA	NATIC	ON OF
BORING COMPL	ј етер: 7/26/07]	FERMIN	10LOC	Y ON
DR: SG	G LG: BR Rig: 91C												TH	IS LOO	3



AET JO	DB NO: 22-00081			LO	G OF	BO	RING N	0. <u>ST</u>	-202	<u>/AB-</u>	2 ()	p. 2 (<u>of 2)</u>
PROJE	CT: TCAAP Redevelopment; Arde	n Hil	lls, MN									<u>.</u>	
DEPTH			GEOLOGY			SA	MPLE	REC	FIELD) & LAI	BORAT	ORY 1	ESTS
IN FEET	MATERIAL DESCRIPTION		0202001	Ν	MC	Î	ŶŶPĔ	ĨN.	wc	DEN	LL	PL	%-# 200
30 -	SAND, a little gravel, medium to fine grained, light brown, moist, very dense (SP) (continued)			55	М	R	SS	19					
32 -					-	F							
33 — 34 —	SAND, fine grained, light brown, moist, dense, laminations of silt (SP)												
35 —				48	м	$\left[\right]$	88	18					
36 -				-10	1*1	Д	55	10					
37						ł							
39 –	SAND WITH GRAVEL, medium grained, brown, moist, very dense (SP)					ł							
40 —				54	м	\mathbf{v}	SS	19					
41 —						Μ							
	END OF BORING Northing=206823.0 Easting=554162.7												



AET J	OB NO: <u>22-00081</u>					LC	OG OF	во	RING N	ю. S]	-203	AB/AB	-3 (<u>р. 1</u>	of 2)
PROJE	ECT: TCAAP Red	evelopm	ent; Ard	<u>en Hi</u>	lls, MN										
DEPTH	SURFACE ELEVATION: _	954.4	·		GEOLOGY	N	MC	SA	MPLE	REC	FIELI) & LA	BORA	FORY '	TESTS
FÊÊT	MATERIAL	DESCRIPTI	ON				INIC		FYPE	IN.	wc	DEN	LL	PL	⁄ 6-#200
1 -	FILL, mostly silty sand, s roots, dark brown	urface root	s, trace		FILL	8	М	М	SS	14	10				
2 -	FILL, mostly clayey sand	, a little gra	vel, trace					Д							
3 -	Tools, light brown, dark bi	rown and d	rown			13	М	X	SS	24	12				
4 -								P							
5	CLAYEY SAND, a little (SC)	grave, brov	vn, very stif	f	TILL	22	м	\square	22	17	11				
6 -					•	24		Д	55	17					
7 -								M			_				
8-						27	М	M	SS	19	<i>'</i>				
9-								ম							
10 -						28	м	X	SS	19	6				
12 -								R							
- 13	SAND WITH SILT AND fine grained, brown, moist	GRAVEL t, medium	, medium to lense to		COARSE ALLUVIUM	47	м	М	SS	10	7				
14 -	very dense (SP-SM)							Д							
15 —								\mathbb{N}							
16 -						26	M	M	SS	14					
17 –								7							
18 —								ţ							
19 -								岱							
20 -						33	м	М	SS	16					
21 -								\square	1						
22 -								ł							
23 24 -								ł							
25								H							
26 -						74	М	Х	SS	12					
27 –								R							
28	SAND, medium to fine gra	ained, brow	n, moist,					ł							
DEDI		r)		WATE	DIEVELARA	SIDE	MENT								
	Didentition	ПАТЕ	TIME	SAMPL	ED CASING	CAV	E-IN		RILLIN	JG	WATE		NOTE:	REFE	R TO
0-49	¹ / ₂ ' 3.25" HSA	7/27/07	7.47	DEPT	H DEPTH	DE	PTH 5	FL	UID LE	VEL	LEVE		THE A	S FOR	
		112/107	4:4/	21.3	49.0	16	.5				INON	e E	XPLA	NATIO	N OF
BORINC COMPL	BETED: 7/27/07			•								Т	ERMIN	OLOG	Y ON
DR: SG	LG: BR Rig: 91C												TH	IS LOC	Э.



AET JO	DB NO: <u>22-00081</u>			LC	G OF	BO	RING N	ю. <u>ST</u>	-203	/AB-	-3 (p. 2	of 2)
PROJE	CT: TCAAP Redevelopment; Arder	1 Hi	lls, MN										
DEPTH IN			GEOLOGY	N	мс	SA	MPLE	REC	FIELC) & LAI	BORAT	'ORY '	TESTS
FEET	MATERIAL DESCRIPTION						YPE	IN.	WC	DEN	LL	PL	%-#200
30 -	sand, medium to fine grained, brown, moist, medium dense to dense (SP) (continued)					M							
31 —				24	М	Ŵ	SS	19					
32 -						3							
33 -						ł							
34 -						Ľ							
35 —		 		39	м	M	SS	16	-		•		
36 -						Д	~~						
37 -						ł							
30	SAND WITH GRAVEL, fine to medium grained, light brown, moist, medium dense (SP)					ł							
40 -						H H							
41 -				26	М	Х	SS	17					
42						Ł							
43 -						ł							
44 -						Ľ							
45 -				23	м	М	SS	20					
46						Д							
47 -						ł							
48 -					:	ł					• •		
50 -	SILTY CLAY, brown, very stiff (CL-ML)		FINE			Ъ			19				
51 -	SAND WITH SILT, fine to medium grained, brown, moist, medium dense (SP-SM)		ALLUVIUM / COARSE	23	М	X	SS	16					
F	END OF BORING	<u> . </u>	ALLUVIUM -										
	Easting=553863.2												
								-					
											•		
		1							1		L,	L	1



AET J	OB NO:	22-00081					LC)G OF	BO	RING N	10. S]	[-20 4	/AI	B-4 (p. 1	of 2)
PROJE	ECT:	TCAAP Red	evelopm	ent; Arc	<u>len Hi</u>	lls, MN										
DEPTH	SUR	FACE ELEVATION: _	938.6	·		GEOLOGY			SA	MPLE	REC	FIELI)&L	ABORA	TORY	FESTS
FEET		MATERIAL	DESCRIPTI	ON			N	MC	1	TYPE	ĪN.	wc	DEN	ILL	PL	%-# 200
1 -	FILL, roots, FILL,	mostly silty sand, s brown mixture of clayey s	urface root	s, trace		FILL	31	М	M	SS	10	7			-	-
2 - 3 -	and si light b	lty sand, a little grav rown, dark brown a	vel, trace ro ind gray	ots, brown	l,		42	М	$\left[\right]$	SS	18	9				
4-									R							
6-							13	M	X	SS	17	19				
7 -									ম							
8							2	м	X	SS	NR					
9 10									মি							
10 -							3	М	X	SS	9	14				
12 -								$ \nabla$	म							
13 -						•	4	w	X	SS	12					
14 -									R							
15 -							2	w	M	SS	17	17				
16 17									\bigwedge							
18 -	01.117	DY OAND 1101			-		- 10	м	\mathbb{N}	SS	17	19			:	
19 -	gravel,	EY SAND, a little s brown, stiff (SC)	sandy silt, a	a little		TILL			\bigwedge							
20 – 21 –	SAND brown, (CL)	Y LEAN CLAY, a a little brown, stiff	little grave , lamination	l, light ns of silt			11	м	\mathbb{X}	SS	20	27				
22 -	SAND	WITH SILT AND	GRAVEL.	medium t	o [:]];	COARSE	-		ম							
23	fine gra very de	ained, brown, a little	e dark brov / sand at 24	vn, moist, I' very		ALLUVIUM	52	м	Х	SS	14					
25 -	dense t	o medium dense (Si	P-SM)						R							
26							22	M	Ŵ	SS	7					
27 -									Z							
28 –									ł							
DEPT	TH: D	RILLING METHOD			WATE	R LEVEL MEA	L SURE	L MEN	ILAL TS		L	1		NOTE:	araa a	
0-34	1/2' 3	25" HSA	DATE	TIME	SAMPL DEPT	ED CASING H DEPTH	CAV	E-IN PTH	L FL	DRILLIN UID LE	NG VEL	WATH	ER	THE A	TTAC	HED
			7/30/07	10:00	14.0	12.0	12	2.2				Non	e	SHEE	rs for	AN
			7/30/07	10:30	36.5	34.5	36	ó.5				Non	e 1	EXPLA	NATIC	N OF
BORING COMPL	i ETED:	7/30/07											1	FERMIN	IOLOG	Y ON
DR: SG	LG:	SB Rig: 91C												TH	IS LOC	3



AET JO	DB NO: <u>22-00081</u>		LO	G OF	BORING N	10. ST	-204	/AB-	<u>4 (</u>	р. <u>2 с</u>	<u>of 2)</u>
PROJEC	CT: TCAAP Redevelopment; Arden Hi	lls, MN									
DEPTH		GEOLOGY			SAMPLE	REC	FIELD	& LAI	BORAT	ORY T	ESTS
FEET	MATERIAL DESCRIPTION	GLOLOGI	Ν	MC	TYPE	ĨN.	wc	DEN	LL	PL	%-#200
30 -	SAND WITH SILT AND GRAVEL, medium to fine grained, brown, a little dark brown, moist, very dense, lense of clayey sand at 24' very	COARSE ALLUVIUM (continued)	18	м	₽ X ss	13					
- 12	dense to medium dense (SP-SM) (continued)										
32					ł						
33 -					H						
34				:							
36 -			21	м	X ss	12					
36 -	END OF BORING Northing=207058.0 Easting=553053.9		21			12					



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081					LC)G OF	BO	RING N	ю. S]	Г -20 5	/AB	- 5 (p. 1	of 2)
PROJ	ECT: TCAAP Red	<u>evelopm</u>	ent; Ard	len Hi	lls, MN										
DEPTH	SURFACE ELEVATION:	937.1	l		GEOLOGY	N	MC	SA	MPLE	REC	FIELI)&LA	BORA	TORY '	rests
FËET	MATERIAL	DESCRIPT	ION				MC	1	YPE	IN.	wc	DEN	LL	PL	%-# 200
1 -	FILL, mixture of clayey s little gravel, surface roots light brown	and and sil , trace root	ity sand, a s, brown an	ıd	FILL	27	м	M	SS	12	6				
3 -						39	м	$\left[\right]$	SS	15	6				
4 -								R							
5	SILTY CLAY, brown, ve (CL-ML)	ry stiff to l	ıard		FINE ALLUVIUM	22	м	M	SS	20	13				
7								मि							
8 9						17	м	M	SS	24	23				
10 -						20	м	R	22	24	18				
11						20	141	Д	55	27					
12 -						00		M			17				
14 –						20	M	Д	22	24					
15 —								M			17				
16 -	SAND WITH SILT AND	GRAVEL	, medium to	0	COARSE	33	м	M	SS	14	12				
• 17 –		, dense (B1	-51417					Ħ							
18 -								Ħ							
19								国							
20						47	М	X	SS	10					
22								R							
23 -	GRAVELLY SAND WIT	H SILT. m	edium to					H							
24 -	fine grained, brown, moist (SP-SM)	, dense to v	very dense					ł							
25 -						44	м	M	SS	10					
20 -								H							
28 -								ł							
	<u>.</u>							1				····]
DEPI	H: DRILLING METHOD			WATE	R LEVEL MEA	SURE	MENT	rs r	יתוחמ		11/ A 'T'T	۲ <u>-</u>	NOTE;	REFEI	R TO
0-44	½' 3.25" HSA	DATE	TIME	DEPTI	I DEPTH	DEI	PTH	FLI	JD LE	VEL	LEVE	L	THE A'	TACH	IED
		7/30/07	8:50	46.5	44.5	46	.4				None		SHEET XPLAN	S FOR	AN N OF
BORING	ETED: 7/30/07	<u> </u>											ERMIN	OLOG	YON
DR: SG	LG: SB Rig: 91C												THI	S LOG	



AET JO	OB NO: 22-00081			LO	G OF	BO	RING N	ю. ST	-205	<u>/AB-</u>	.5 (р . 2 (o <u>f 2</u>)
PROJE	CT: TCAAP Redevelopment; Arder	n Hi	lls, MN										
DEPTH			GEOLOGY			SA	MPLE	REC	FIELD	& LAI	BORAT	ORY 7	ESTS
FEET	MATERIAL DESCRIPTION		0202001	N	MC	1	YPE	ĨN.	wc	DEN	LL	PL	%-#20 0
30 - 31 -	GRAVELLY SAND WITH SILT, medium to fine grained, brown, moist, dense to very dense (SP-SM) (continued)			60	м	ਸ 	SS	14					
32 -						F							
33 — 34 —						Ĩ							
35 —				50+	м	Ň	SS	8					
36						/\ स		_					
38 —	SAND WITH SILT, fine to medium grained,												
39 40	brown, moist, very dense (SP-SM)					Ĭ							
41 -				57	м	X	SS	16					
42 -						ł							
44 -						ł						-	
45 -				63	м	X	SS	17					
	END OF BORING Northing=207537.6 Easting=553124.1												-
				1									



SUBSURFACE BORING LOG

AET JO	OB NO: 22-00081					LO	G OF	во	RING N	ю. S Т	-206	/AB	8-6 (<u>p. 1</u>	<u>of 2)</u>	
PROJE	CT: TCAAP Rede	velopme	ent; Arde	en Hi	ills, I	MN										
DEPTH	SURFACE ELEVATION: _	916.0			GE	OLOGY	N	мс	SA	MPLE	REC	FIELI)&LA	BORA	FORY	TESTS
FÊET	MATERIAL	DESCRIPTIO	ON							YPE	IN.	wc	DEN	LL	PL.	%-# 200
1 -	FILL, mostly silty sand, su roots, dark brown	irface roots	, trace	/	FILL	,	32	М	M	SS	14	5				
2 -	FILL, mixture of clayey sa	and and silt	y sand, a	5					Д							
3 -	fittle gravel, trace roots, da	irk drown					26	м	M	SS	13	12				
4									Д							
5 -	SANDY LEAN CLAY, a brown mottled, a little blac	little gravel k, stiff, lan	l, gray and ninations of		WEA TILL	THERED			M			10				
6-	silt (CL)						12	М	X	SS	17	18				
7 -									R							
8-	SANDY LEAN CLAY, a brown and brown mottled.	little gravel stiff (CL)	l, dark		TILL	-	15	м	M	88	20	18				
0_		, ()					15	1.1	\square	55	20					
10 -	SANDY LEAN CLAY, a	little grave	l, dark						K							
10	brown, very stiff (CL)	2					16	м	X	SS	22	16				
17									R							
12	SANDY LEAN CLAY, a stiff to very stiff (CL)	little grave	l, dark gray,				15	м	M	22	10	14				
14 -							15	101	Δ	55	17					
15							4		R							
15							12	М	X	SS	20	15				
10									प्ति							
17									Ħ							
10									H							
19 - 20 -							I		円							
20							14	м	X	SS	22	16				
21									<u>।</u> म							
22 -									Ħ							
25 -								ĺ	H							
24 -									比 ()							
25 -							13	M	X	SS	24	16				
20 -									R							
27									H	i.						
28									Ľ							
DEP	TH: DRILLING METHOD	EVEL MEA	SURI	EMEN	TS					NOTE	REFI	ER TO				
0.20	9%' 3.25" HSA	CASING DEPTH	CA\ DE	/E-IN PTH	FI	DRILLI JUID LH	NG	WAT LEV	ER EL	THE A	ATTAC	HED				
	72 5.45 HOA	7/30/07	29.5	3	1.2				Nor	1e	SHEE	TS FO	R AN			
														EXPLA	NATI	ON OF
BORIN COMPL	G LETED: 7/30/07													TERMI	NOLO	GY ON
DR: S (G LG: SB Rig: 91C													Tł	IS LO	G
06/04			1.0													



AET J	OB NO: <u>22-00081</u>			L	DG OF	во	RING 1	vo. S ']	F -20 6	6/AB	-6 ((p. 2	of 2)
PROJE	ECT: TCAAP Redevelopment; Arder	n Hi	lls, MN										
DEPTH			GEOLOGY	N	MC	s/	AMPLE	REC	FIELI	D&LA	BORA	TORY	TESTS
FEET	MATERIAL DESCRIPTION						FYPE	IN.	wc	DEN	LL	PL	%-#20 0
30 -	stiff to very stiff (CL) (continued)		1			R							
31 -				18	M	Х	SS	23	13				
	END OF BORING					Í.					<u> </u>		
	Easting=552804.2												
					ļ								
F													
								:					
													ĺ
E													



AET J	ов но: <u>22-00081</u>					•••	LC	og of	BO	RINGN	10. S]	[-20 7	//AE	B- 7 (p. 1	<u>of 1</u>)
PROJ	ECT: TCAAP Red	<u>evelopm</u>	<u>ent; Ard</u>	en Hi	ills,	MN										
DEPTH	SURFACE ELEVATION:	908.5	;		G	EOLOGY	N	MC	SA	AMPLE	REC	FIELI)&L	ABORA	FORY '	TESTS
FËET	MATERIAL	DESCRIPTI	ON							ГҮРЕ	IN.	WC	DEN		PL	%-# 200
1	FILL, mixture of clayey s little gravel, surface roots brown and brown	and and sil , trace roots	ty sand, a s, dark		FIL	L	33	м	M	SS	12	4				
2 -									\mathbb{H}							
3 –							22	M	X	SS	9	6				
4-	SANDY LEAN CLAY	little group	dontr		TIT	¥	-		ष्ठ							
5 6	brown, a little brown, stiff (CL)	f, laminatio	ns of silt		111	- L -	15	М	X	SS	17	16				
7 –									म							
8 -							14	м	X	SS	18	17				
9	SANDY LEAN CLAY, a	little grave	l, dark gray	, ///					R							
10 11	stiff (CL)						10	м	M	SS	20	17				
12 —									म							
13 —	3 -						11	м	M	SS	20	15				
14 -								Д								
15 —							10	м	M	88	10	16				
16 -									Д	55	19					
17 –									ł							
18 -									}							
20 -									Ц							
21 -							10	М	X	SS	20	16				
22 -									प्त							
23 -									Ŧ							
24 -									ł							
25 -							10	M	\square	ee	24	16				
26 –							10		Д	53	²⁴					<u> </u>
	END OF BORING Northing=208187.8 Easting=552129.6															
DEPT	TH: DRILLING METHOD			 WATI	ER LI	EVEL MEA	SURE	i Ement	ГS		l	<u>l</u> .		.l NOTE:	 चन्नम् य	R TO
0-24	1/2' 3.25" HSA	DATE	TIME	SAMPL DEPT	ED H	CASING DEPTH	CAV DE	E-IN PTH	I FL	DRILLIN UID LE	NG VEL	WATI LEVE	ER EL	THE A	TTAC	HED
		1:30	26.5	5	24.5	2 4	1.9				Non	e	SHEET	'S FOR	AN	
BORING	1										······	<u> </u>	EXPLA	NATIC	N OF	
COMPL	ÉTED: 7/30/07			-+								7	ERMIN		Y ON	
DR: SG	LG: SB Rig: 91C												11	IN LUC	,	



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081	DG OF	во	RINGN	10. S]	[-208	3/AF	3-8	p. 1	of 2)					
PROJE	ECT: TCAAP Rec	levelopn	nent; Ar	<u>den Hi</u>	lls, MN										<u> </u>
DEPTH IN	SURFACE ELEVATION:	914	.5		GEOLOGY	N	MC	SA	AMPLE	REC	FIELI	D&L	ABORA	TORY	TESTS
FEET	MATERIA	L DESCRIP	FION]	TYPE	ĪÑ.	wc	DEN		PL	%-#20
1 –	little gravel, surface root	nd and clay s, trace roo	yey sand, a ts, brown,		FILL	27	м	М	22	12	4				
2 -	dark brown and black							Δ	55	12	4				
3 -						16	м	М	22	18	9				
4								Д	00	10					
5	SANDY LEAN CLAY,	a little grav	vel, light		WEATHERE	5		K				-			
6 -	brown and gray, firm (Cl	L)			TILL	5	М	IXI	SS	17	19				
7 -							i	ष्ट्र							
8 -						7	м	M	ss	19	16				
9 -								Д	0.0	.,					
10 -	SANDY LEAN CLAY, a	a little grav	el, brown,		TILL	1		M			1.5				
11 -	suir (CL)					10	М	X	SS	22	15				
12 -	SANDY LEAN CLAY	little grav	el dark ara					म्							
13 -	stiff (CL)	i nulo giut	oi, daix gia	iy,		13	М	XI	SS	22	15				
14 —								Д							
15 —								∇			15				
16 -						9	М	Ň	SS	20	1.5				
17								Z				l			
18 —								ł		i					
19								ł							
20 -						12		\overline{V}	60	00	15				
21 –						12	IVI	\wedge	22	23					
22 -							1	1							
23 -								ţ.							
24 -								岱							
25 -						11	м	$\langle $	22	24	16				
26 -						••		Λ	55	24					
27							4	4							
28 ~								Ĭ							
DEPTI	H: DRILLING METHOD			WATER	LEVEL MEA	SURE	MENT	ы S	I	[DEFF	
0-34½	2' 3.25" HSA	DATE	TIME	SAMPLE	D CASING DEPTH	CAVI	E-IN	DI	RILLIN	G T	WATE	R ,	THE AT	TACH	
		7/30/07	2:35	36.5	34.5	36.	3				None		SHEET	S FOR	AN
RODINIO								<u> </u>				ΗE	XPLAN	ATIO	1 OF
COMPLE	TED: 7/30/07											П	ERMIN	DLOG	Y ON
DR: SG	LG: SB Rig: 91C											7	THI	S LOG	



AET JO	DB NO: 22-00081		LC	G OF	BO	RING N	10. ST	-208	AB-	·8 (p. 2	of 2)	
PROJE	CT: TCAAP Redevelopment; Arder	<u>ı Hi</u>	lls, MN										
DEPTH			GEOLOGY	N	MC	SA	MPLE	REC	FIELE) & LA	BORAT	ORY 7	FESTS
FËET	MATERIAL DESCRIPTION			18	NIC.		FYPE	IN.	WC	DEN	LL	PL	%-#20 0
30 -	SANDY LEAN CLAY, a little gravel, dark gray, stiff (CL) (continued)			14	м	K	88	20	16				
31 –						Д	00	20					
32 - 33 -													
34 —						1 1							- - -
35 -				14	м	M	22	24	17				
36 -				14	IVI	Μ	33	24					
	END OF BORING Northing=208345.2 Easting=552536.3												
								-				[
												·	
	·												



	AET JO	DB NO: 22-00081		LC)G OF	во	RING N	10. S .	Г- <u>20</u> 9)/AB	-9 (<u>р. 1</u>	of 1)			
	PROJE	CT: TCAAP Red	evelopm	ient; Ard	len Hi	ills, MN									-	
ſ	DEPTH	SURFACE ELEVATION:	892.8	8		GEOLOGY			SA	MPLE	REC	FIELI) & L/	BORA	FORY	TESTS
	FÊÈT	MATERIAL	DESCRIPT	ION			N	MC]]]	TYPE	ĪN,	wc	DEN	LL	PL	%-#200
	1	FILL, mostly silty sand w ¬brown	vith gravel,	trace roots,	,	FILL	26	м	М		12					
	2 -	FILL, mixture of silty sar	nd and clay	ey sand, a			30	IVI	Μ	66	15	4				
	3	brown and black	rown, light	t brown, dai	rk	-	10		\square	66	10	11				
	4						10	M	Μ	55	16					
	5_								푄							
	6						18	М	X	SS	16	6				
	7								Д							
	,	SAND WITH SILT, a litt	le gravel, f	ine to		COARSE			М							
		medium dense (SP-SM)	n gray, wa	terbear mg,			16	W/M	Ŵ	SS	14					
								-	团							
							7	w	M	ss	14					
	12								Д							
	12	SANDY LEAN CLAY, a	little grave	el, dark gray	, ///	TILL			Й			16				
-	14					6	Μ	Ň	SS	16						
	14							E								
	15 -						9	М	M	ss	20	16				
	10								Д							
	17								ł							
	10								ł							
	20								뙤							
	20						9	М	X	SS	23	16				
		END OF BORING							Д							
·		Northing=210352.9														
		Easting-552556.5														
ļ																
	DEPTH	H: DRILLING METHOD		• ••••	WATE	R LEVEL MEA	SURE	MENT	'S					LOTE .	REER	
	0-191/	3.25" HSA	DATE	TIME	SAMPL	ED CASING	CAV	E-IN	D FI	RILLIN	G.	WATE	R	THE AT	TACH	IED
			7/31/07	7:46	9.0	7.0	-DEF 7.	9		UD LE		Non		SHEET	S FOR	AN
			7/31/07	7:43	11.0	9.5	9.	3			-+	9.1	E	XPLAN	IATIO	NOF
B C	ORING OMPLE	TED: 7/31/07	7:55	21.5	19.5	20	.0				None	TI	ERMIN	OLOG.	Y ON	
D	R: SG	LG: SB Rig: 91C					<u></u>				·			THI	S LOG	
06/0	4									I						



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081					L	OG OF	BC	RING	10 S]	[- <u>21</u> 0	/AB	-10 ((p. 1	of 1)
PROJE	ECT: TCAAP Red	levelopn	nent; Arde	en H	ills, MN										/
DEPTH	SURFACE ELEVATION:	898.	.8		GEOLOGY			s	AMPLE	REC	FIELI)& LA	BORA	TORY	TESTS
FEET	MATERIA	L DESCRIPT	[]ON			N	мс		ΓΥΡΕ	ÎN,	WC	DEN	LL	PL,	%-#20 0
1	FILL, mixture of silty sa little gravel, trace roots,	nd and clay	yey sand, a rick. brown		FILL	27	M	M	66	15					
2 -	and dark brown	•	,					\square	ەە	13					
3						11	M	М	66	12					
4 -								Δ	22	14					
5 -	SILT WITH ORGANIC	S, trace roo	ots, black,		TOPSOIL	1.	<u> </u> ⊻_	R							
6 -	SILTY SAND fine arriv	ad trace m		_[][[004000	5	W/M	Х	SS	19	19				
7 -	gray, waterbearing, loose	to mediun	oots, dark 1 dense (SM)		ALLUVIUM			E							
8 -					•	11	w	М	SS	2					
9 -					, . - •			Д		-					
10 -	SANDY LEAN CLAY, and gray mottled a little	a little grav	el, brown		WEATHERE	5					14				
11 -	laminations of silt (CL)	udik Uluwi	i, mai,		TILL	6	W	Ň	SS	16	14				
12 —	SANDY LEAN CLAY, a	little grav	el, dark grav		TILI.	-		ম							
13 -	stiff to very stiff (CL)	0	, 8,,			9	М	X	SS	16	14				
14 —							ਸ								
15 -						0	м	\bigvee	55	10	16				
16 -							171	Δ	33	10					
								Ĭ							
18								Ħ		i					
20							ŕ	Į							
20 -						20	м	VI.	SS	19	15				
	END OF BORING						/	4							
	Northing=210578.9														
	Lasting-555291.9														
					·										
															ľ
										Ē					
DEPTH	T: DRILLING METHOD		· · · · ·	WATE	R LEVEL MEA	SURE	MENT	S				N	OTE: 1	REFER	то
0-19%	2' 3.25" HSA		AMPL DEPTI	ED CASING I DEPTH	CAVE DEP	-IN TH		RILLING	G EL	WATEF LEVEL	² т	HE AT	ТАСН	ED	
		8:35	6.5	4.5	4.9)				None	s	HEETS	FOR	AN	
BORING	TED. 7/31/07	8:50	21.5	19.5	21.	5					EX	CPLAN	ATION	OF	
DR SC	IED: 7/31/07				<u> </u>						TE	KMIN(ULOGY	ON	
<i>DR.</i> 00	LU. DD RIg: 91C										THIS	LUG			



ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET J	OB NO:	22-00081				. <u></u>	L	DG OF	F BC	DRING N	vo S T	-211	/AB	-11	(p. 1	of 1)
PROJE	ECT:	TCAAP Red	levelopn	nent; Arc	len H	ills, MN										/
DEPTH	SURI	FACE ELEVATION:	892.	3		GEOLOGY			s	AMPLE	REC	FIELI)&L/	BORA	TORY	TESTS
FËET		MATERIAI	_ DESCRIPT	TION			N	мс		TYPE	ÎN.	WC	DEN	LL	PL	%-#20 0
1-	FILL, sandy	mixture of silty sa silt, surface roots,	nd, clayey trace roots.	sand and , brown, dar	k	FILL	20	м	W	ce	15					
2	brown	and gray	,	,,,			20	IVI	Ν	00	15					
3	ł				ļ		14	м	\mathbb{N}	66	14					
4								141	\square		14					
5									K							
6 -							12	Μ	X	SS	18	19				
7 -		,						-	图							
8						1	17	₩.	M	SS	18	20				
9	SILTY	CLAY, brown, ve	ry stiff (C	L-ML)		FINE	1		Д							
10 -	CLAY to firm	EY SAND, a little	gravel, dai	rk gray, stif		TILL	1		\mathbb{N}			12				
11 -	to mm	(50)					10	М	Ň	SS	14	15				
12 -									E							
13 —							7	м	X	SS	21.	15				
14									/\ म							
15 —	SAND stiff to t	Y LEAN CLAY, a firm (CL)	little grave	el, dark gray	,		0	м	M			17				
16 -							, ,	101	Δ	33	23					
17 -									\$							
18 -									\${							
20									ᆀ							
20							8	М	XI	SS	22	16				
21	END O	FBORING							/\							
	Northing	g=210737.1								Ī						
	Dasting	552015.0														
		······	Г													
DEPTI	H: DR	LLING METHOD	<u> </u>	WATE	R LEVEL MEA	SURE	MENT	S				N	JOTE:	REFEI	то	
0-19½	D½' 3.25" HSA DATE TIME				SAMPL DEPTI	ED CASING H DEPTH	CAV DEP	E-IN TH		RILLIN JID LEV	G VEL	WATE LEVEI	R -	THE A	FTACH	IED
	7/31/07 9:30				9.0	7.0	11	.8				7.6	:	SHEET	S FOR	AN
BORING	NG 7/31/07 9:40				21.5	19.5	21	.5	 _			None	E	XPLAN	IATIO	N OF
DR: SC	G_ETED: 7/31/07													KMIN TUT	ULOG	YON
DIC. 00	G LG: SB Rig: 91C					<u> </u>								1 Fil	S LUG	



AET J	OB NO: 22-00081	DG OF	во	RING N	ю S Т	-212	/AB	-12 ((p. 1	of 1)					
PROJE	ECT: TCAAP Red	levelopm	nent; Ar	den Hi	lls, MN								<u>`</u>		
DEPTH	SURFACE ELEVATION:	895.	1		GEOLOGY					DEC	FIELI) & LA	BORA	TORY '	TESTS
FEET	MATERIAI	. DESCRIPT	TON		GLOEGUI	N	MC	³	TYPE	IN.	wc	DEN	LL	PL	%-#20 0
	3.5" Bituminous pavemen	nt			FILL			H	SU						
	FILL, mostly silty sand v	with gravel,	brown			26	М	X	SS	14					
2	little gravel, organic clay,	, brown, da	irk brown,					Ħ			2				
3-	gray and black					25	М	XI	SS	15	10				
4 -								E							
6-						23	W/M	M	SS	16	11				
7								图							
8 -						33	w	M	SS	NR					
9 -	OIL TE NUTELL OD CLARKER							と 困							
10	moist, very loose (ML)	, trace root	ts, black,		SWAMP DEPOSIT OR	2	м	М	SS	17	25 23				
12 -	LEAN CLAY WITH OR black, very soft to soft (C	GAINCS, 1 L)	trace roots,		TOPSOIL	:		E			26				
13 -	SILTY SAND trace roots	ned dark	_	COADSE	5	W/M	M	SS	16	114					
14 —	gray, waterbearing, loose	ncu, uar		ALLUVIUM			N R								
15 —			•			9	w	M	SS	7					
16								A H							
18 +	CLANDY CANTE INT							ł							
19 -	(SC)	gravel, darl	k gray, firn	n	TILL			X		ĺ					
20 -								M			17				
21 -						ð	м	\mathbb{N}	55	16					
	END OF BORING Northing=211046.0 Easting=553106.0														
		-													
DEPTI	H: DRILLING METHOD		,	WATE	R LEVEL MEA	SURE	MENT	S				N	OTE: 1	REFER	то
0-24%	2' 3.25" HSA	DATE	TIME	SAMPLE DEPTH	D CASING	CAV DEP	E-IN TH	D] FLU	RILLIN JID LEV	G /EL	WATE LEVEI	R т	HE AT	TACH	ED
<u></u>		7/31/07	10:50	9.0	7.0	8.	1				7.3	s	HEETS	SFOR	AN
BORING		7/31/07	11:10	21.5	19.5	19	.5				18.9	EX	(PLAN	IOITA	V OF
DR SC	IC SR D: 01C												NIMIN(TUTT	JLOG	r ON
	LO. OD KIg. 9IC		<u> </u>	<u> </u>								Ì	1111	100	



AET J	JOB NO: 22-00081				L	OG OI	F BC	ORING 1	NOS1	-213	AB	-13	(n. 1	of 1)	
РRОЛ	ECT: TCAAP Re	develop	ment; Ar	rden Hi	ills, MN									<u>(j. 1</u>	<u> </u>
DEPTH IN FEET	SURFACE ELEVATION	890	0.2		GEOLOGY	N	мс	s	AMPLE	REC	FIELI) & LA	BORA	TORY	TESTS
TEE1	FILL mixture of silts as	L DESCRIP							TYPE	1N.	WC	DEN	LL	PL	%-#20 0
1 -	sand, a little gravel, surf	ind, sandy ace roots, t black	silt and clar	yey	FILL	26	М	M	SS	16	4				
2-								$\left \right\rangle$			0				
4 -						10	M	Å	SS	16	9				
5	SAND WITH SUT Fro				10 1 7 07	10	м	\mathbb{N}	22	16	18		:		
6 - 7 -	brownish gray, a little gr laminations of sandy silt	ay, waterb (SP-SM)	n grained, earing, loos	se,	ALLUVIUM		V	A ₽	55	10					
8 - 9 -	SILTY SAND, a little gr gray, waterbearing, medi laminations of lean clay a	avel, gray, um dense, and sandy	a little darl lenses and lean clay			12	w	M	SS	14	24				
10 - 11 -	SANDY LEAN CLAY, loose, lense of medium to at 10', laminations of san	a little grav o fine grain d with silt	vel, dark grand ned silty sar (CL)	ay, nd	TILL	8	м/w	\mathbb{X}	SS	15	19				
12 - 13 -			()			3	M/W	₽ , M	SS	20	17				
14 -								R	50	20					
16 -						4	M	M	SS	19	17				
17 -								E							
18 - 19 -								ł							
20 -								¥ М			18				
21 -						4	М	Ň	SS	20	10				1
	END OF BORING Northing=211044.1 Easting=552565.3									-					
DEPTH	H: DRILLING METHOD			WATER	I EVEL MEA	CI ID C					-				
0-19%	-19½' 3.25" HSA DATE TIME S				D CASING DEPTH	CAVI	E-IN TH	DI FLU	RILLING ID LEV	G Y	VATER	NC	DTE: F HE AT	REFER TACH	TO ED
	8/2/07 9:45				7.0	7.	2				7.1		HEETS	FOR	AN
BORNIC		21.5	19.5	19.	5				None	EX	PLAN,	ATION	OF		
COMPLE	TED: 8/2/07				_	<u></u>		·		TEF	MINC	LOGY	ON		
DR: SG	LG: SB Rig: 91C										-	THIS	LOG		



SUBSURFACE BORING LOG

AET JOB NO:	ET JOB NO: 22-00081 LOG OF BORING NOST-214/AB-14 (p. 1 of 1)														
PROJECT:]	CAAP Re	developr	nent; Ar	den H	ills, MN					_					
DEPTH IN FEET	CE ELEVATION: MATERIA	884 L DESCRIP	.9		GEOLOGY	N	мс	SA T	MPLE YPE	REC IN,	FIELI	D& LA	BORA	TORY	TESTS
FILL, min	xture of sandy sand with silt	silt, clayey	sand, silty		FILL			M			we	DEN		PL	%-#20
² – roots, trac ² – black	e roots, brown	, dark brov	vn, gray and	đ		51	м	Д	SS	10	6				
3 -						53	м	M	SS	19					
5 -								R							
6						35	M	Å	SS	20					
8						19	м	X	SS	18					
9 – 10 – SAND W	ITH SILT, fine	grained, g	ray, a little		COARSE	_		R							
11- lamination	is of silty sand	(SP-SM)			ALLOVIUM	WH	W	Å F	*SS	17					
siLTY SA gray, a littl organic cla	IND, trace root le black, waterl iy at 15.5' (SM	s, fine grai bearing, loo)	ned, dark ose, lense o	f		5	W		SS	14					
15 – SAND WI waterbeari	TH SILT, fine ng, medium de	grained, gra	ray, VI)			12	w	X	SS	17					
17 – fine graine dense (SP-	d, dark gray, w SM)	aterbearing	z, medium i g, medium	to ::::				F							
18 SANDY L 19 - (CL)	EAN CLAY, a	little grave	el, gray, fir	m	TILL										
20 21						6	м		SS	15	18				
END OF I Northing=2 Easting=55	BORING 211075.3 1748.2				·			/ \							
DEPTH: DRILLI	ING METHOD			WATE	R LEVEL MEA	SUREN	/ENT	s			L			DEEEL	
0-19½' 3.25"]	0-19½' 3.25" HSA DATE TIME						E-IN FH 1	DR FLUI	ILLINC D LEV	G EL	WATEF		HE A'I	TACH	ED
	8/2/07 8:15						;				None	S	HEETS	S FOR	AN
BORING	8/2/07 8:20					12.	0				None	EX	PLAN	ATIO	N OF
COMPLETED: 8/2/0	7	8/2/07	8:25	16.0	14.5	14.	5				12.7	TE	RMINO	DLOG	Y ON
DR: SG LG: SB	Rig: 91C	8/2/07	8:30	21.5	19.5	19.	5				18.7		THIS	S LOG	


SUBSURFACE BORING LOG

AET J	OB NO: 22-00081				7	L	OG OF	F BC	DRING 1	NOS	Г-215	/AB	-15	(p. 1	of 1)
PROJ	ECT: <u>TCAAP Re</u>	developr	nent; Ar	<u>den H</u>	ills, MN									<u></u>	
DEPTH IN	SURFACE ELEVATION:	894	.5		GEOLOGY		Τ			REC	FIELI) & LA	BORA	TORY	TESTS
FEET	MATERIA	L DESCRIP	TION			N	MC		TYPE	IN.	WC	DEN	LL	PL	%-#20 0
1 1 -	FILL, surface roots with	silty sand,	dark brown	n	FILL			$\overline{\mathbb{N}}$	1				-		
	roots, light brown	siit, a little	gravel, trac	e		5	M	ľŇ	SS	1	11				
3 -								$\overline{\nabla}$							
4							M	Δ	55	0					
5 -	FILL, mixture of silty sa	nd, clayey	sand and		-			K							
6 –	brown, brown, light brow	vn and gray	y roots, dark			9	M	M	SS	12					
7 -								শ্বি							
8						9	м	X	SS	14	15				
9-	LEAN CLAY, trace root	s, organics	, black, a		TOPSOIL	-	$ \nabla$	E							
10 -	little dark gray, stiff, lam (CL)	inations of	silty sand			9	м	М	SS	15	21				
12	SILTY SAND, a little gra	avel, fine to	o medium		COARSE	-		Д	~~						
13 -	loose, laminations of lear	i clay (SM))		ALLUVIUM			$\overline{\mathbf{M}}$							
14 —			•			17	W	Ň	SS	12					
15 —								R							
16 —						16	w	X	ss	5					
17 -								स							
18	SANDY LEAN CLAY, a	little grav	el orav fir	n ////	TH 1	4	V	ł							
19 -	(CL)	Brutt	oi, gruy, mi	"				3							ĺ
20 -								∇			17				
21 -						5	М	Ň	SS	16	17				
	END OF BORING Northing=211443.2														
	Easting=553634.2														
ł															
														-	
DEPTH	H: DRILLING METHOD		n	WATE	R LEVEL MEA	SURE	MENT	S		Ł			TE: 1	LEFER	то
0-19½	2' 3.25" HSA	DATE	TIME	SAMPLE DEPTE	ED CASING I DEPTH	CAVI DEP	E-IN TH	DI	RILLIN VID LEV	G EL	WATER	T T	HE AT	TACH	ED
		8/1/07	12:15	11.5	9.5	9.9)	-			9.3	T SI	HEETS	FOR	AN
BORING		8/1/07	12:34	21.5	19.5	20.	0				18.3	EX	PLAN	ATION	OF
COMPLE	TED: 8/1/07	······										TE	RMINC	DLOGY	ON
UR. 30	LO: 5D Rig: 91C												THIS	LOG	



SUBSURFACE BORING LOG

AET J	OB NO: <u>22-00081</u>					LO	OG OF	во	RINGN	vo S]	[-216	AB	-16	(p. 1	of 1
PROJE	CT: TCAAP Rec	levelopn	nent; Ar	den Hil	ls, MN									-	
DEPTH IN FEET	SURFACE ELEVATION: MATERIA	895.	.0		GEOLOGY	N	мс	SA	MPLE	REC	FIELI	D&LA	BORA	TORY	TESTS
	3" Bituminous pavement				FILL.				SU		wc	DEN	LL	PL	%-# 2(
1-	FILL, mostly silty sand	with gravel	, brown	-1-1'		32	M	М	50	14	8				
2	FILL, mixture of clayey and silty sand, a little gra brown, dark brown, gray	sand, sand vel, pieces and black	y lean clay of concret	e,		36	M	\bigwedge	SS	17	8				
5						46	м	R	SS	15	6				
7 8 9						26	м	R K	SS	17					
10 -	OPGANIC CLAY		1	123 23		11	M ∑	Ň	SS	16	15	-			
12	ORGANIC CLAY, trace (OL/OH) ORGANIC CLAY, trace black, a little gray, stiff, li (OL/OH)	roots, blac roots, piec aminations	k, stiff es of wood of silty sar	, , , , , , , , , , , , , , , , , , ,	WAMP DEPOSIT	15	w	N K	SS	18	74				
15 16 17	SAND WITH SILT, fine waterbearing, medium de (SP-SM)	grained, gr nse to very	ray, loose	^	LLUVIUM	7	w		SS	19					
18	CLANEW GANES - Not					3	м		SS	17	16				
	(SC) END OF BORING Northing=211426.9 Easting=553105.1	gravel, dar	k gray, sofi		UL										***
DEPTH	: DRILLING METHOD			WATER	LEVEL MEA	SUREN	AENTS	S				N	OTE: I	EFER	то
0-19%	' 3.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING	CAVE		DF	ULLING	3. 1	WATE	λ τ	HE AT	таси	FD
		8/1/07	11:00	11.5	95	11	8	·LU			Ne		HEETS	FOR	
	<u> </u>	8/1/07	11:10	14.0	12.0	11.	<u>0</u>			_	INORE		PLAN		I OF
BORING COMPLET	ED 8/1/07			14.0	12.0	14.		<u> </u>	<u> </u>		inone				
DR SG	LG: SB Dia 01C	<u>-</u>						<u> </u>		-					
5/04	Nig, 710	<u></u>			L	L			<u></u>		···,		1110		·



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081					L	DG OF	BC	RING N	NOS1	[-217	/AB	-17	(p. 1	of 1)
PROJE	ECT: TCAAP Red	levelopr	nent; Ard	<u>en H</u>	<u>ills, MN</u>										<u> </u>
DEPTH IN	SURFACE ELEVATION:		.3		GEOLOGY			s		REC	FIELI) & LA	BORA	TORY	TESTS
FEET	MATERIA	L DESCRIP	TION				MC		TYPE	ÎÑ.	WC	DEN	LL	PL	%-#20 (
1 -	brown, moist, medium d	ce roots, tra ense (SC)	ice roots, dar	k	TOPSOIL	14	м	М	22	15					
2 -	SAND WITH SILT, fine	e grained, l	ight brown, a		ALLUVIUM			\square	50	15					
3 -	of silt (SP-SM)	uni dense,	lammations		•	17	м	М	SS	16					
4 -								Д	55	10					
5 -	SAND WITH SILT, fine	grained, g	ray, a little					M							
6 -	of silt (SP-SM)	aium dens	e, lamination	s		28	MZW	Ň	SS	15					
7-	CLAYEY SAND, a little	gravel da	rk orav firm		ТП I	-		स्र							
8 -	(SC)	8- <i></i> ,,,	gruy, mm		TILL	8	м	M	SS	14	13				
9 -								Д							
10 -	CLAYEY SAND, a little (SC)	gravel, bro	own, stiff			1.10		Ń	~~		14				
11 -			• '			10	м	Ŵ	SS	13					
12	CLAYEY SAND, a little	gravel, da	rk gray, firm					R							
13	to stiff (SC)					8	М	X	SS	17	15				
14 -								R							
15 -						10	м	M	SS	16	16				
17 -								$\prod_{i=1}^{n}$		10					
18 -								ł		-					
19 -								ł							
20 -							K	Ľ٩							
21 –						11	м	XI	ss	24	15				
	END OF BORING						{	4							
	Northing=211423.6 Easting=552556.4														
					·										
j P															
 DEPTH	H: DRILLING METHOD]			
		DATE	TIME	AMPLI	ED CASING	CAVE	MENT:	5 	211 1 11	3 1 7			OTE: I	REFER	то
0-19%	2' 3.25" HSA	8/2/07	0.00	DEPTI	I DEPTH	DEP		ะเบ็	ID LEV	EL	LEVEL		HE AT	TACH	ED
		8/2/07	9:00	9.0 21.5	7.0	7.()				3.3		HEETS PLAN	FOR A	AN
BORING COMPLE	TED: 8/2/07			<u>~1.J</u>	17.3	20.	7	-			None		RMINC	LOG	
DR: SG	LG: SB Rig: 91C					<u>.</u>					<u>.</u>	-	THIS	LOG	
10.4												1			



SUBSURFACE BORING LOG

AET J	JOB NO: 22-00081						00.0				C 310	/ / 37	10		
PROЛ	ECT: TCAAP Re	develop	ment: Ar	den H	ills. MN	L	0000	r B(JKING		<u></u>	AB	-18	<u>(p. 1</u>	<u>of 1</u>)
DEPTH IN	SURFACE ELEVATION	88	5.7		GEOLOGY	,					FIELI) & LA	BORA	TORY	TESTS
FEET	MATERIA	AL DESCRIP	PTION			' N	MC	5 54	AMPLE TYPE	REC IN.	wc	DEN		PL	%-#20(
1 -	FILL, mixture of sand y little gravel, trace roots.	vith silt and brown, lie	d silty sand,	a	FILL			$\overline{\mathbf{N}}$		<u> </u>					
2 -	dark brown		, 0.0 mii ui			22	M	Ň	SS	4					
3 -	-					20		\square	00	1.6					
4						20	M	\square	22	16					
5								K							
6 ~						6	М	X	SS	18					
7	SILTY SAND, fine to m	redium ora	ined		COADSE			R							
8 -	brownish gray, waterbea	ring, loose	(SM)		ALLUVIUM	10	w	M	SS	17					
9 -					,	ľ		Å							
10 -	SANDY LEAN CLAY, little light brown, firm, l	a little grav aminations	vel, brown, of silty san	a d	TILL			М			17				
	(CL)						IVI	\mathbb{N}	SS	18					
	CLAYEY SAND, a little	e gravel, da	ırk gray, stif	ff				R						,	
14						9	М	X	SS	19	13				
15 -								B							
16						10	м	M	ss	17	15				
17								R							
18 -								Ħ							
19 -								Ħ							
20 -								M			16				
21 -	END OF BORNES					9	M	Ŵ	SS	24	10				ļ
	END OF BORING Northing=211416.5				<u> </u>					-					
	Easting=552009.6														Ì
		T													
DEPTH	I: DRILLING METHOD	<u> </u>	· · · · ·	WATER	LEVEL MEA	SUREN	AENT	s		·	<u>.</u>		DTE: R	EFER	то
0-19½	.' 3.25" HSA	DATE	TIME	SAMPLE DEPTH	D CASING DEPTH	CAVE DEP1		DR FLUI	ULLINC D LEV) V EL I	VATER LEVEL	TI	E AT	ГАСНІ	ED
		8/1/07	2:05	9.0	7.0	7.4					None	SH	IEETS	FOR A	AN
ORING	ED- 8/1/07	8/1/07	2:20	21.5	19.5	19.8	8				None	EXI	PLANA	TION	OF
R: SG	LG: SB Rig: 91C	• <u> </u>				·							MINO TLUO	LOGY	ON
			L							1		1	11112	LUG	



SUBSURFACE BORING LOG

AET JC	OB NO: <u>22-</u>	00081					L	0G 0	F BC	DRING 1	vo ST	-219	/AB	-19	(p. 1	of 1)
PROJE	ст: <u>ТСА</u>	AP Ree	developr	nent; A	rden Hi	lls, MN	<u> </u>									/
DEPTH	SURFACE EL	EVATION:	891	.3		GEOLOGY	, ,	T			DEC	FIELI) & LA	BORA	TORY	TESTS
FÉET		MATERIA	L DESCRIP	TION		GEOLOGI	N	MC		ample TYPE	REC IN,	wc	DEN	LL	PL	1/0-#200
1-	SILTY SANE), surface r	oots, trace	roots, ligh	t	TOPSOIL	-		\mathbf{N}	[<u> </u>				
2	SAND WITH	SILT, fine	e grained, b	orown, mo	ist,	COARSE		M	Ň	SS	15					
	loose to media	ım dense (SP-SM)			TELO VION			$\overline{\Lambda}$							
							18	M	Ň	SS	14					
									E							
6 -							9	М	X	SS	16					
									Д							
8 -									М							
9							18	M	M	SS	18					
10 -									R							
11 -							16	М	X	SS	18					
12									H							
13 —	little brown, wa	tine grain aterbearing	ed, grayish 3, medium	i brown, a dense,			14	w	\square	00	14					
14 —	laminations of	silt (SM)		,			14		\mathbb{N}	22	10					
15 —						-		T	R							
16 -							23	Ŵ	X	SS	14					
17 -									प्त							
18 -	SAND WITH	II T fma							Ħ							
19 –	waterbearing, d	ense (SP-S	grained, gr SM)	ay,					Į.							
20 -			÷						H							
21 -							31	W	X	SS	19					
22 -									R							
23 –									Ŧ							Í
24 -									Ŧ						į	ļ
25 -									\prod							
26 -							36	W	Ň	SS	21					
	END OF BOR	ING		·			1 1									
E	Easting=551067	.3									ĺ					
DEPTH:	: DRILLING	METHOD	l		WATER	TEVELAC										
	DEFTH. DRILLING METHOD WATER LEVEL MEASUREMENTS NOTE: REFER TO												то			
0-24½' 3.25" HSA DATE HIME DEPTH DEPTH DEPTH FLUID LEVEL LEVEL THE ATTACHED												ED				
			7/30/07	12:15	14.0	12.0	12.	5				None		HEETS DI ANI	FOR	AN
BORING COMPLET	ED: 7/30/07		7/30/07	1:00	26.5	24.5	15. 24	5				15.0		AMINC CMINC	101 LOGI	
DR: SG	LG: SB Rig:	91C					<u> </u>			<u></u>		23.1	-	THIS	LOG	
10.1					L		i						1			1



SUBSURFACE BORING LOG

AET J(DB NO: <u>22-00081</u>	<u>-</u>				L	OG OI	BO	RINGN	ю S]	Г-220	/AB	-20	(n. 1	្រឹត្រ
PROJE	CT: TCAAP R	edevelop	ment; Ar	den Hi	lls, MN									<u>(p</u>	
DEPTH IN	SURFACE ELEVATION	4: 89 '	7.0		GEOLOGY			SA	AMPLE	REC	FIELD) & LA	BORA	TORY	TES
FEET	MATERI	AL DESCRI	TION				MC		FYPE	ĨN.	wc	DEN	LL	PL	% -#
1	trace roots, light brown moist, medium dense ()	JRAVEL, s 1, brown and SMD	surface root: d dark brow	s, n,	TOPSOIL	18	М	M	SS	14					
2 -	SILTY SAND, fine gra	ined, brown	n, moist.		COARSE			А							
3	medium dense (SM)		·		ALLUVIUN	1 20	М	X	SS	14					
5 -								E							
6 -						19	М	M	SS	14					
7 + 8 -	SAND WITH SILT, fin moist, medium dense (S	e grained, l	ight brown,					R							
9 -						17	М	Å	SS	20					
10 -						14	м	M	92	10					
12								\mathcal{N}	55	19					
13 ~-						10	М	\mathbf{N}	SS	18			ĺ		
14 -	SILTY SAND fine and	nod brown						R							
16	waterbearing, medium d	ense to loos	, se (SM)			15	w	M	SS	17					
17 -								/\ {]							
18 -							_								
20 -								ij							
21 -						7	w	X	SS	16					
22 –							ľ	5							
23 S	ILT, gray, wet, medium	dense (ML	.)		INE		k	ł							
25					LLUVIUM		ľ	1							
26 -						12	w	X	SS	17	30				
27 -							Į	1					İ		
28					OARSE		{								
DEPTH:	DRILLING METHOD			WATER	LEVEL MEA	SUREN	/ENTS	5	!				L)TE: F	EFER	 та
<u>0-29½'</u>	3.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE DEP	FH F	DR LUI	ILLING D LEVI		WATER LEVEL	TH	Æ AT	TACH	ED
		8/1/07	9:05	16.5	14.5	14.	6				None	SF	IEETS	FOR	AN
RING		8/1/07	9:10	21.5	19.5	19.	5				17.8		PLAN,	ATION	10
MPLET	<u>SD: 8/1/07</u>	8/1/07	9:25	31.5	29.5	29.	5				26.3	TER	MINC	LOGY	' O]
1	LU. OD KIG: 91C	<u> </u>	L								·		THIS	LOG	

SUBSURFACE BORING LOG

AET JO	DB NO: 22-00081			LC	DG OF	BO	DRING N	NOST	[-220)/AB	-20	(n. 2	2 nf
PROJE	CT:	<u>n I</u>	Hills, MN								<u> </u>	10. 4	
DEPTH IN FEET	MATERIAL DESCRIPTION		GEOLOGY	N	мс	s,	AMPLE TYPE	REC	FIELI	D&LA	BORA	TORY	TEST
30 -	SILTY SAND, fine grained, gray, waterbearing, very loose (SM) (continued)		COARSE			22			wc	DEN		PL.	* /o-#2
31 -	END OF BORING		(continued)	4	w	И	SS	20					
ĺ	Northing=211992.3 Easting=550710.8												
							1	E.					
													I
<u>_</u>													

SUBSURFACE BORING LOG

AET JOB NO: 22-0008	1				L	DG OF	F BO	RING N	TZ OF	-221	/AR	-21	(n. 1	of 1
PROJECT: TCAAP	Redevelop	ment; Ai	rden Hill	ls, MN					<u>_</u>		<u></u> 10	<i>~</i> 1	The T	<u>, , , , , , , , , , , , , , , , , , , </u>
DEPTH SURFACE ELEVAT	ION: 89 9	.0		GEOLOGY					DEC	FIELI) & LA	BORA	TORY	TESTS
FËET MATE	RIAL DESCRIP	TION			N	MC		TYPE	IN.	wc	DEN	ĽL	PL	%-#200
SILTY SAND, a litt roots, brown, dark b medium dense (SM)	le gravel, surfa rown and blac	ice roots, tr k, moist,	ace	FOPSOIL	19	м	M	SS	16					
3 – SILTY SAND, fine to medium dense (SI 4 –	grained, brown M)	n, moist, loo	ose	COARSE ALLUVIUM	9	М	Å	SS	15					
5 - 6 - 7					13	м		SS	18					
9 – SAND WITH SILT, 8 – moist, loose (SP-SM	fine grained, l)	ight brown	· · · · · · · · · · · · · · · · · · ·		10	м		SS	17					
10 - 11 - 12					9	М		SS	18			×-,		
13 – 14 –					9	М		SS	20					
 15 – SILT WITH SAND, wet, medium dense, 1 16 – (ML) 17 – 	light brown, a aminations of	little brown lean clay	1,	INE LLUVIUM	17	w		SS	17	26				
18 SILTY SAND, fine g 19 waterbearing, loose (S	rained, brown, SM)			OARSE LLUVIUM		Ţ								
20 21 22					10	w	X E	SS	17					
23 - CLAYEY SAND, a li 24 - (SC) 25 -	ttle gravel, dar	k gray, stif	f Π	LL										-
26 -					9	м	XI	ss	8	15				
END OF BORING Northing=212465.7 Easting=550556.0						/								
DEPTH: DRILLING METHO	D		WATER I	LEVEL MEA	L SUREN	 ÆNT:	 s	l						
0-24½' 3.25" HSA	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE	-IN H	DF			VATER		ле: Б НЕ АТ	LEFER	TO ED
	8/1/07	7:55	16.5	14.5	14.	5		¥ ناب مد. 		None		HEETS	FOR	AN
BORING	8/1/07	8:00	21.5	19.5	19.2	2				18.3	- ex	PLAN	ATION	OF
COMPLETED: 8/1/07	8/1/07	8:10	26.5	24.5	24.	5				23.9	TEI	RMINC	LOGY	ON
DR: SG LG: SB Rig: 91C				[T						THIS	LOG	

SUBSURFACE BORING LOG

AET J	ов NO: 22-00081		<u>.</u>		······	L	OG OI	F BC	RING N	vo S T	-222	/AB	-22	(p. 1	of 1)
PROЛ	ECT: TCAAP Re	developr	nent; Ai	den Hi	ills, MN										
DEPTH IN	SURFACE ELEVATION	898	.6	*	GEOLOGY	N	MC	SA	AMPLE	REC	FIELI	D & LA	BORA	TORY	TESTS
FEET	MATERIA FILL mostly silty cond	L DESCRIP	TION			-			FYPE	ÎN.	WC	DEN	LL	PL	⁄₀-#200
1	roots, dark brown	a nue gra	vei, trace			21	М	M	SS	15					
2								Д					ĺ		
3 4						7	М	X	SS	14					
5 - 6 -						4	м	M	SS	16					
7 -								H							
8 -	FILL, mixture of clayey trace roots, brown and light	sand and si ght brown	ilty sand,			9	М	\mathbb{N}	SS	14	11				
10 -	SAND WITH SILT, fine light brown and brown, r	grained, tr noist, medi	ace roots, um dense		COARSE ALLUVIUM	14	м	면 M	88	16					
11	(SP-SM)							Д		10				•	
13	SAND WITH SILT, fine moist, medium dense (SF	grained, li P-SM)	ght brown,			27		M	00	10					
14 —	·					21	1/1	Д	22	19					
15 -	SILTY SAND, fine grain waterbearing medium de	ied, brown,	. (6) (0)					R		1					
16 -	waterbearing, mediant de	anse to toos	e (SM)			30	W/M	M	SS	24					
17 -									ł						
18 -							\mathbf{v}	Ħ							
20 -							<u> </u>	Į.							
21 -						6	w	X	SS	16					
- .	END OF BORING	<u>.</u>			<u></u>			4							
	Easting= 550545.4														
									,					ĺ	
DEPTH	I: DRILLING METHOD		······································	WATER	R LEVEL MEA	SURE	MENT	`S	L	L			<u> </u> ЭТЕ•_ 1		
0-19½	<u>3.25" HSA</u>	DATE	TIME	SAMPLE DEPTH	D CASING DEPTH	CAVE	IN TH	DI FLU	RILLING ID LEV	G EL	VATER		HE AT	TACH	ED
		7/31/07	3:22	21.5	19.5	20.	0				18.9	si	HEETS	FOR	AN
BORING												EX	PLAN	ATION	OF
COMPLET	TED: 7/31/07			<u> </u>	-							TEI	RMINC	LOGY	ON
DK SG	LU: SB Rig: 91C												THIS	LOG	



SUBSURFACE BORING LOG

AET JO	DB NO: 22-00081					· · · ·				00				<u> </u>	
PROJE	CT: TCAAP Re	edevelop	ment; A	rden Hi	lls. MN	L	.0G 0	F BC	ORING 1	NO S <u>I</u>	-223	/ <u>AB</u>	-23	<u>(p. 1</u>	<u>of 2</u>)
DEPTH IN	SURFACE ELEVATION	J:90	8.4		GEOLOG	v					FIELI	 D & LA	BORA	TORY	TESTS
FEET	MATERI	AL DESCRI	PTION	1	GEOLOG	N	MC		AMPLE TYPE	REC	wc	DEN	11	Pr	12313 •4.#200
1 –	FILL, mostly silty sand roots, pieces of wood a	l, surface ro	ots, trace		FILL			1	1	<u> </u>					70-#200
2	and dark brown	, biowii,	, ngin brow	vn		27	M	X	SS	15					
3 -								\mathbb{H}							
						10	Μ	X	SS	12					
5								R							
								Μ	00	1.0					
								Μ	22	12					
								R				[
8 -						3	M	X	SS	13		ŀ			
9-1	SAND WITH OUT C							R							
10	little brown, moist, loose	e grained, I e to mediun	ight brown n dense,	ца ::::(COARSE ALLUVIUM	1 5		$\overline{\mathbb{N}}$							
10	laminations of silt (SP-S	M)				5	M	Μ	55	15					
12 -								R							
13 -						17	м	X	SS	17					j
14								R							
15 -						0		M	00	10					
10							171	Μ	55	17					
10								Ħ							
								ţ]							
20 -								团							
21 -						27	м	M	88	10					
22								<u> </u>							
23								Ħ							
24 - li	AND, fine to medium gr	ained, ligh	t brown, a					#							
25 – la	minations of silt and silt	y sand (SP)					Ц							
26 -						17	м	V	ss	16					
27 -							Ī	<u> </u>				Ì			
28 —							Ś	Ą							
						.	▼Å	7							
DEPTH:	DRILLING METHOD			WATER	LEVEL MEA	SUREM	ENT:	21 21			<u> </u>				
0-34½'	<u>3.25"</u> HSA	DATE	TIME	SAMPLED DEPTH	CASING	CAVE	-IN	DR	ILLING	. W	ATER		1E: R F 477	EFER	10
	· · · · · · · · · · · · · · · · · · ·	7/31/07	2:15	31.5	29.5	29.5	; r		DLEVE		EVEL 78 0	SH	EETS	FOR A	N
ORING		7/31/07	2:25	36.5	34.5	34.5	;				 33.9	EXP	LANA	TION	OF
<u>OMPLETE</u>	D: 7/31/0 7							· ".	<u>_</u>			TER	MINOI	LOGY	ON
R: SG	LG: SB Rig: 91C											-	THIS	LOG	



SUBSURFACE BORING LOG

AET J	OB NO: 22-00081		L	OG OF	F BC	RING I	NO S]	Γ-223	3/AB	-23	(p. 2	of 2)	
PROJE	CT: TCAAP Redevelopment; Arde	n H	ills, MN										
DEPTH			GEOLOGY			S	AMPLE	REC	FIEL	D & LA	BORA	TORY	TESTS
FEET	MATERIAL DESCRIPTION			N	MC		TYPE	ÎN.	wc	DEN	LL	PL	%-# 200
30 -	SAND, fine to medium grained, gray, waterbearing, loose (SP) (continued)					R							
31 —				9	W	Ň	SS	17					
32 –						Ł							
33 -	CLAYEY SAND, a little gravel, dark grav, firm		: TILL	ļ		Ł							
34 -	(SC)			ĺ		뷢							
35 —				6		Μ	00	22	18				
36 -	END OF BORDIG			0		Μ	33	23					
	END OF BORING Northing=213465.1 Easting=550540.6												
					-						:		
							ŀ						

INI	EKIEC	•					
Bra	un Proj	ect S	SP-Ö	6-05871	BORING	: RI-40	09-5 ST-224
Geot	tecnical E	valu	ation		LOCATI	ON: See attacl	hed sketch
TCA	AP Rede	velop	men	t	LOCAIN	on. See allaci	neu sketen.
NE o	of Highwa	iy 10	and	Highway 96			
Arde	en Hills, I	linn	esota				
DRIL	LER: K.	Keck		METHOD: 3 1/4" HSA, Autohmr	DATE:	7/18/07	SCALE: 1'' = 4'
Elev.	Depth						
feet	feet	AS	TM	Description of Materials		BPF WL	Tests or Notes
938.	<u>6 0.0</u>	Syn	nbol	(AS1M D2488 or D2487)			
9.38.	<u> </u>		-1888	5" Diminious, FILL: Clayey Sand, fine- to medium-grained	trace of		
				Gravel, mixed dark brown to grayish-brown, m	noist.		
					_		r.
-					-	21	
934.0	6 4.0					9	
				SANDY LEAN CLAY, trace of Roots, dark gr	ay, moist,		
				(Buried Topsoil)		13	
<u>8 932.0</u>	0 6.0	CL.		SANDY LEAN CLAY reddish-brown moist		4	
viati				(Glacial Till)			
pre						V 56	
					-	Д	
6 <u>929.</u>	9.0	SP-		POORLY GRADED SAND with SILT, fine-t			
nati		SM		medium-grained, yellowish-brown, moist, loos	e		
xpla				(Glaciofluvium)			
8 5 0264	120				_		
g <u>720.</u> g	5 12.0	CL		SANDY LEAN CLAY, trace of Gravel, reddis	h-brown to		
' she				grayish-brown, moist to wet, rather soft to rathe	er stiff	5	
100 100				(Glacial Till)			
ouid							
					—	V 4	
<u>s</u>					_	4	
Lipt					_		
Jeso							
ee					_		
<u></u>					_		
<u></u>							and the second se
07 13						10	
10/4/					-		
<u> </u>	ĺ				_		
<u>915.6</u>	23.0	00					
BKA		SP		POORLY GRADED SAND, fine- to medium- trace of Gravel reddish-brown moist medium	grained, dense		
55				(Glacial Outwash)			
1/28/11						V 19	
<u>912.6</u>	26.0			END OF BODING		4	
	. [END OF BORING.			
OKUP				Water not observed with 24 1/2 feet of hollow-	stem auger		
а <u>–</u> 5				in the ground.	-		
3-				Boring then grouted.	-		
		İ					
N BA							
5P-06-058	71			Braun Intertes Comparation		<u></u>	RI 400P 5 ST 224 page 1 of

BRAL

LOG OF BORING

Braun Intertec Corporation

RI-4009-5 ST-224 page 1 of 1

Appendix C

Log of CPT Sounding Sheets

2018 Braun Intertec Corporation CPT-1 through CPT-6



Braun Intertec Corporation 11001 Hampshire Ave S Minneapolis, MN 55438 952-995-2000

Project: TCAAP Redevelopment - Mass Grading

Location: Arden Hills, MN Project Number: B1706398



CPeT-IT v.2.0.2.5 - CPTU data presentation & interpretation software - Report created on: 7/9/2018, 4:44:24 PM Project file: C:\Users\treich\Desktop\jelol\CPETIT.cpt

Total depth: 99.80 ft, Date: 5/18/2018

CPT: CPT-01

Cone Type: 180506 Cone Operator: Holmbo

Braun Intertec Corporation 11001 Hampshire Ave S Minneapolis, MN 55438 952-995-2000

Project: TCAAP Redevelopment - Mass Grading

Location: Arden Hills, MN Project Number: B1706398



CPT: CPT-02

Total depth: 99.80 ft, Date: 5/18/2018 Cone Type: 180506 Cone Operator: Holmbo

Braun Intertec Corporation 11001 Hampshire Ave S Minneapolis, MN 55438 952-995-2000

Project: TCAAP Redevelopment - Mass Grading

Location: Arden Hills, MN Project Number: B1706398



CPT: CPT-03

Total depth: 100.07 ft, Date: 5/18/2018 Cone Type: 180506 Cone Operator: Holmbo

Braun Intertec Corporation 11001 Hampshire Ave S Minneapolis, MN 55438 952-995-2000

Project: TCAAP Redevelopment - Mass Grading

Location: Arden Hills, MN Project Number: B1706398



CPT: CPT-04

Total depth: 70.28 ft, Date: 5/18/2018 Cone Type: 180506 Cone Operator: Holmbo

Braun Intertec Corporation 11001 Hampshire Ave S Minneapolis, MN 55438 952-995-2000

Total depth: 70.34 ft, Date: 5/18/2018 Cone Type: 180506 Cone Operator: Holmbo

CPT: CPT-05

Project: TCAAP Redevelopment - Mass Grading Location: Arden Hills, MN Project Number: B1706398



CPeT-IT v.2.0.2.5 - CPTU data presentation & interpretation software - Report created on: 7/9/2018, 4:44:26 PM Project file: C:\Users\treich\Desktop\jelol\CPETIT.cpt

Braun Intertec Corporation 11001 Hampshire Ave S Minneapolis, MN 55438 952-995-2000

Project: TCAAP Redevelopment - Mass Grading

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Total depth: 70.28 ft, Date: 5/18/2018 Cone Operator: Holmbo

CPT: CPT-06

Cone Type: 180506

Appendix D

Descriptive Terminology

Descriptive Terminology of Soil Descriptive Terminology Cone Penetration Test





Descriptive Terminology of Soil

Based on Standards ASTM D 2487-11/2488-09a (Unified Soil Classification System)

Criteria for Assigning Group Symbols and						Soil Classification	
Group Names Using Laboratory Tests ^A				Group Symbol	Group Name ^B		
-	Gravels (More than 50% of	Clean Gravels (Less than 5% fines ^C)		$C_u \ge 4$ and $1 \le C_c \le 3^D$	GW	Well-graded gravel ^E	
s sd or				$C_u < 4$ and/or $(C_c < 1 \text{ or } C_c > 3)^D$	GP	Poorly graded gravel ^E	
Soil taine e)	retained on No. 4	Gravels with Fines (More than 12% fines ^C)		Fines classify as ML or MH	GM	Silty gravel ^{EFG}	
ainec)% re) siev	sieve)			Fines Classify as CL or CH	GC	Clayey gravel ^{E F G}	
e-gra an 50	Sands	Clean Sands (Less than 5% fines ^H)		$C_u \ge 6$ and $1 \le C_c \le 3^D$	SW	Well-graded sand	
oars e tha No	(50% or more coarse fraction passes No. 4 sieve)			$C_u < 6$ and/or $(C_c < 1 \text{ or } C_c > 3)^D$	SP	Poorly graded sand	
(mor		Sands with Fines (More than 12% fines ^H)		Fines classify as ML or MH	SM	Silty sand ^{FGI}	
				Fines classify as CL or CH	SC	Clayey sand ^{FGI}	
	Silts and Clays (Liquid limit less than – 50)	PI > 7 and		plots on or above "A" line	CL	Lean clay ^{KLM}	
the		morganic	PI < 4 or plots below "A" line ^J		ML	Silt ^{KLM}	
ed Soils e passes sieve)		Organic	Liquid Limit – oven dried Liquid Limit – not dried <0.75		OL	Organic clay KLMN Organic silt KLMO	
-grai		PI plots o		n or above "A" line	СН	Fat clay ^{KLM}	
Fine % or No	Silts and Clays	PI plots be	elow "A" line	МН	Elastic silt ^{KLM}		
(50	more)	Organic	Liquid Limit – oven dried Liquid Limit – not dried <0.75		ОН	Organic clay KLMP Organic silt KLMQ	
Hig	Highly Organic Soils Primarily organic matter, dark in color, and organic odor			PT	Peat		

Based on the material passing the 3-inch (75-mm) sieve. Α.

- If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, Β. or both" to group name.
- Gravels with 5 to 12% fines require dual symbols: C.
 - GW-GM well-graded gravel with silt
 - GW-GC well-graded gravel with clay
 - GP-GM poorly graded gravel with silt
 - GP-GC poorly graded gravel with clay
- D. $C_u = D_{60} / D_{10}$ $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
- If soil contains \geq 15% sand, add "with sand" to group name. E.
- If fines classify as CL-ML, use dual symbol GC-GM or SC-SM. F.
- If fines are organic, add "with organic fines" to group name. G.
- Sands with 5 to 12% fines require dual symbols: н.
 - SW-SM well-graded sand with silt
 - SW-SC well-graded sand with clay
 - poorly graded sand with silt SP-SM
 - SP-SC poorly graded sand with clay
- ١. If soil contains ≥ 15% gravel, add "with gravel" to group name.
- If Atterberg limits plot in hatched area, soil is CL-ML, silty clay. J.
- If soil contains 15 to < 30% plus No. 200, add "with sand" or "with gravel", whichever is К. predominant.
- If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name. L.
- M. If soil contains ≥ 30% plus No. 200 predominantly gravel, add "gravelly" to group name.
- N. $PI \ge 4$ and plots on or above "A" line.
- PI < 4 or plots below "A" line. 0.
- PI plots on or above "A" line. Ρ.
- Q. PI plots below "A" line



Dry Density, pcf

Wet Density, pcf

% Passing #200 sieve

DD

WD

P200

	Laboratory rests
ос	Organic content, %
q	Pocket penetrometer strength
мс	Moisture conent, %

	Particle Size Identification
Boulders	over 12"
Doulder 3	
Cobbles	3" to 12"
Gravel	
Coarse	3/4" to 3" (19.00 mm to 75.00 mm)
Fine	No. 4 to 3/4" (4.75 mm to 19.00 mm)
Sand	
Coarse	. No. 10 to No. 4 (2.00 mm to 4.75 mm)
Medium	. No. 40 to No. 10 (0.425 mm to 2.00 mm)
Fine	. No. 200 to No. 40
	(0.075 mm to 0.425 mm)
Silt	No. 200 (0.075 mm) to .005 mm
Clay	< .005 mm

Relative Proportions^{L, M}

trace	. 0 to 5%
little	. 6 to 14%
with	.≥15%

Inclusion Thicknesses

lens	0 to 1/8"
seam	1/8" to 1"
layer	over 1"

Apparent Relative Density of Cohesionless Soils

Very loose	0 to 4 BPF
Loose	5 to 10 BPF
Medium dense	11 to 30 BPF
Dense	31 to 50 BPF
Very dense	over 50 BPF

Consistency of	Blows	Approximate Unconfined
Cohesive Soils	Per Foot	Compressive Strength
Very soft	0 to 1 BPF	< 1/4 tsf
Soft	2 to 4 BPF	1/4 to 1/2 tsf
Medium	5 to 8 BPF	1/2 to 1 tsf
Stiff	9 to 15 BPF	1 to 2 tsf
Very Stiff	16 to 30 BPF	2 to 4 tsf
Hard	over 30 BPF.	> 4 tsf

Moisture Content:

Dry: Absence of moisture, dusty, dry to the touch. Moist: Damp but no visible water. Wet: Visible free water, usually soil is below water table.

Drilling Notes:

BPF: Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler was set 6 inches into undisturbed soil below the hollow-stem auger. Driving resistances were then counted for second and third 6-inch increments, and added to get BPF.

Partial Penetration: If the sampler cannot be driven the full 12 inches beyond the initial 6-inch set, the number of blows for that partial penetration is shown as "No./X" (i.e., 50/2"). If the sampler cannot be advanced beyond the initial 6-inch set, the depth of penetration will be recorded in the Notes column as "No. to set X" (i.e., 50 to set 4").

WH: WH indicates the sampler penetrated soil under weight of hammer and rods alone; driving not required.

WR: WR indicates the sampler penetrated soil under weight of rods alone; hammer weight and driving not required.

WL: WL indicates the water level measured by the drillers either while drilling or following drilling.

Plastic limit, % PL

LL

- Liquid limit, %
- ΡI Plasticity Index, %



Descriptive Terminology Cone Penetration Test

This document accompanies Cone Penetration Test Data. Please refer to the Boring Log Descriptive Terminology Sheet for information relevant to conventional v. Cone Penetration Test (CPT) boring logs.

Cone Penetration Test (CPT) sounding was performed in general accordance with ASTM D 5778 and consistent with the ordinary degree of care and skill used by reputable practitioners of the same discipline currently practicing under similar circumstances and in the same locality. No warranty, express or implied, is made.

Since subsurface conditions outside each CPT sounding are unknown, and soil, rock and pore water conditions cannot be relied upon to be consistent or uniform, no warranty is made that conditions adjacent to each sounding will necessarily be the same as or similar to those shown on this log. Braun Intertec is not responsible for any interpretations, assumptions, projections or interpolations of the data made by others.

measurements Pore water pressure and subsequently interpreted water levels shown on CPT logs should be used with discretion as they represent dynamic conditions. Dynamic pore water pressure measurements may deviate substantially from hydrostatic conditions, especially in cohesive soils. In cohesive soils, pore water pressures often take an extended time to reach equilibrium and thus reflect their true field level. Groundwater levels can be expected to vary both seasonally and yearly. The absence of notations on this log regarding water does not necessarily mean that groundwater is not present to the depth explored, or that a contractor will not encounter groundwater during excavation or construction.

CPT Terminology

CPT Cone F	Penetration Te	st			
CPTU Cone	Penetration	Test	with	Pore	
Pressure measuren	nents				
SCPTUCone	Penetration	Test	with	Pore	
Pressure and Seisn	nic measureme	ents			
PiezoconeComm	PiezoconeCommon name for CPTU test				
Q _T	normalized cor	ne resis	stance		
Bq	pore pressure	ratio			
Frnormalized friction ratio					
σ _{νο}	overburden pre	essure			

 σ'_{vo}effective overburden pressure

q_T TIP RESISTANCE

The resistance at the cone corrected for water pressure. Data is from cone with a 60 degree apex angle and a 15 cm^2 end area.

fs SLEEVE FRICTION RESISTANCE

The resistance along the sleeve of the penetrometer.

F_r Friction Ratio

Ratio of sleeve friction over corrected tip resistance. $F_r = f_s \! / q_t$

V_s Shear Wave Velocity

A measure of the speed at which a seismic wave travels through soil/rock.

SBT SOIL BEHAVIOR TYPE

Soil Identification methods for the Cone Penetration Test are based on correlation charts developed from observations of CPT data and conventional borings. Please note that these identification charts are provided as a guide to Soil Behavior Type and should not be used to infer a soil classification based on grain size distribution.

Engineering judgment and comparison with augered borings is especially important in the proper interpretation of CPT data in certain geo-materials.

The following charts provide a Soil Behavior Type for the CPT Data. The numbers corresponding to different regions on the charts represent the following soil behavior types:

Soil Behavior Type based on friction ratio



Soil Behavior Type based on pore pressure



1 Sensitive, Fine Grained

- 2 Organic Soils Peat
- 3 Clays Clay to Silty Clay
- 4 Silt Mixtures Clayey Silt to Silty Clay
- 5 Sand Mixtures Silty Sand to Sandy Silt
- 6 Sands Clean Sand to Silty Sand
- 7 Gravelly Sand to Sand
- 8 Very Stiff Sand to Clayey Sand
- 9 Very Stiff, Fine Grained

U2 PORE WATER MEASUREMENTS

Pore water measurements reported on CPT logs are representative of pore water pressures measured at the U2 location, just behind the cone tip, prior to the sleeve, as shown in the figure below. These measurements are considered to represent dynamic pore water pressures due to the local disturbance caused by the cone tip. Dynamic pore water pressure decay and static pore water pressure measurements are reported on a Pore Water Pressure Dissipation Graph.



Appendix E

Geotechnical Data Tabulations

Table E1. Topsoil Table E2. Organic Swamp Deposits Table E3. Buried Topsoil Table E4. Existing Fill Table E5. Unsuitable Soil Table E6. Groundwater



		Topsoil /Organic Soil	
		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
2018 Braun Intertec Bori	ings	()	
P/ST-2	898.4	4	894
P/ST-3	901.5	4	897
P/ST-4	895.2	2	893
P-ST-5	890.7	1	889
P/ST-6	894.5	4	890
P/ST-7	955.8	1 1/2	954
ST-1001	903.9	1	902
ST-1004	900.9	1	899
ST-1005	893.1	3	890
ST-1007	889.8	1	888
ST-1008	890.7	1	889
ST-1009	890.7	2	888
ST-1010	888.1	1	887
ST-1017	911.7	1 1/2	910
ST-1018	928.5	2	926
ST-1020	946.0	1	945
2015 Wenck Borings			
BR-603	833.3	1	832
SR-200	925.2	1/2	924
SR-201	951.1	1/2	950
SR-202	955.3	1/2	954
SR-205	951.0	1/2	950
SR-211	907.4	1/2	906
SR-217	886.1	1	885
SR-220	884.3	1/2	883
SR-221	892.0	1/2	891
SR-222	897.2	1/4	896
SR-223	898.5	1/4	898
SR-224	899.9	1/4	899
SR-225	899.0	1	897
WM-400	965.8	3/4	965
WM-402	951.6	3/4	950
WM-403	907.7	1/2	907
WM-404	907.3	1	906
WM-405	899.4	3/4	898
WM-406	891.7	1/2	891
WM-410	877.0	1/2	876
NR-101	914.1	3/4	913
NR-102	915.4	1/2	914
NR-103	924.8	1/2	924
NR-106	939.9	1	938

		Topsoil /Organic Soil	
		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
NR-108	915.9	1/2	915
NR-109	916.8	1/2	916
NR-110	919.9	1/2	919
NR-111	919.0	1/2	918
NR-112	923.3	3/4	922
NR-114	921.7	3/4	920
NR-115	913.0	1/4	912
NR-116	911.4	1/4	911
NR-118	Not Provided	1	
NR-119	Not Provided	1/2	
NR-122	886.0	3	883
NR-128	912.5	2	910
NR-129	903.1	2	901
NR-130	915.5	3/4	914
NR-131	906.2	1/2	905
NR-132	894.4	3/4	893
NR-134	949.8	1/4	949
TR-302	956.3	3/4	955
TR-303	943.7	1/2	943
TR-305	933.8	1/2	933
TR-306	907.6	1/4	907
TR-307	898.9	1/2	898
TR-308	894.4	1/2	893
TR-309	890.4	1/2	
DE-801	899.4	1/2	898
DE-808	892.3	1/2	891
DE-810	890.4	1/4	890
DE-823	889.2	3/4	888
2007 AET / Braun Inter	tec Borings		
ST-25	895.9	1	894
ST-26	896.2	1/2	895
ST-27	893.3	1	892
ST-53	885.5	2	883
ST-66	888.9	1/2	888
ST-67	888.7	1/2	888
ST-76	907.0	1	906
ST-77	892.4	1	891
ST-78	886.1	1 1/2	884
ST-79	888.9	1/2	888
ST-80	891.1	2	889
ST-81	895.1	1	894
ST-82	898.6	1	897

		Topsoil /O	rganic Soil
		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
ST-84	911.0	1/2	910
ST-85	892.1	2	890
ST-86	897.0	1/2	896
ST-87	898.3	2	896
ST-90	891.0	2	889
ST-91	893.1	1/2	892
ST-93	901.2	1	900
ST-94	922.9	4	918
ST-95	924.0	2	922
ST-97	891.0	2 1/2	888
ST-102	902.2	2	900
ST-103	924.9	1	923
ST-104	934.9	1/2	934
ST-107	902.7	1	901
ST-109	904.5	1/2	904
ST-110	913.2	1	912
ST-111	922.1	1	921
ST-113	941.8	2 1/4	939
ST-115	908.2	1 1/2	906
ST-116	913.0	1/2	912
ST-118	914.9	4	910
ST-119	929.7	1/2	929
ST-120	940.8	1/2	940
ST-121	944.6	1	943
ST-123	913.4	1	912
ST-125	932.7	2	930
ST-127	952.8	1	951
ST-128	954.1	1	953
ST-129	915.9	1	914
ST-130	915.1	1/4	914
SI-131	926.9	1/2	926
SI-133	945.0	1	944
ST-134	949.0	1/2	948
SI-135 ST 127	950.5	1/2	950
SI-13/ ST 120	950.U	1	322
ST-130 ST 140	322.9	1	954
ST-140 ST_1/1	012.9	1/2	010
ST-141 ST_1/2	515.5	1/2	035
ST-142 ST_1/2	935.7	1/2	935
ST-145	95 <i>1</i> 7	1/2	951
ST-146	966.0	1/2	965
01 1 10	500.0	-/-	303

		Topsoil /Organic Soil	
		Approxiamte Estimated	
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
ST-147	958.6	1/2	958
ST-149	900.9	1	899
ST-150	927.0	1/2	926
ST-151	922.3	2	920
ST-153	951.2	2 1/2	948
ST-154	956.7	1	955
ST-157	995.9	1	994
ST-160	920.2	1 1/2	918
ST-162	956.7	1	955
ST-172	925.1	1/2	924
ST-173	942.9	1	941
ST-174	944.9		
ST-175	948.1	3	945
ST-176	951.0	2	949
ST-177	953.6	1/2	953
ST-178	948.4		
ST-179	929.3	1/2	928
ST-180	935.9	1	934
ST-181	935.0	1	934
ST-182	941.8	1/2	941
ST-183	933.7	1/2	933
ST-186	925.2	1	924
ST-187	914.2	1	913
ST-188	934.5	3/4	933
ST-191	956.3	1	955
ST-201	956.8	2 1/2	954
ST-202	955.0	2 1/2	952
ST-203	954.4	1 1/2	952
ST-204	938.6	1/2	938
ST-206	916.0	1/2	915
ST-209	892.8	1	891
ST-215	894.5	1/2	894
ST-217	889.3	1	888

			8
		Existing Fill	
		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
2018 Braun Intertec Bor	ings		
P/ST-1	898.0	4	894
P-ST-5	890.7	4	886
P/ST-6	894.5	4	890
ST-1001	903.9	14	889
ST-1003	895.8	9	886
ST-1004	900.9	4	896
ST-1008	890.7	4	886
ST-1018	928.5	12	916
ST-1021	944.0	1 1/2	942
ST-1022	944.0	12	932
2015 Wenck Borings			
BR-600	884.7	12	872
BR-601	884.8	12	872
BR-602	884.4	12	872
SR-200	925.2	10	915
SR-201	951.1	3	948
SR-202	955.3	2	953
SR-203	956.0	7	949
SR-206	942.3	4 1/2	937
SR-207	938.5	3	935
SR-208	935.6	4	931
SR-209	911.4	3	908
SR-210	913.6	2	911
SR-211	907.4	3	904
SR-213	890.8	4	886
SR-214	890.3	1 1/2	888
SR-217	886.1	1	885
SR-218	883.7	10	873
SR-220	884.3	15	869
SR-221	892.0	4	888
RC-500	883.8	3	880
RC-501	884.4	8	876
RC-502	884.2	5	879
RC-503	882.0	12	870
WM-401	954.6	3	951
WM-402	951.6	3	948
WM-403	907.7	3	904
WM-404	907.3	4	903
WM-406	891.7	3	888
WM-407	889.1	5	884
WM-408	888.7	4	884

		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
WM-409	886.9	6	880
NR-101	914.1	10	904
NR-102	915.4	11	904
NR-104	932.6	4	928
NR-105	936.2	3	933
NR-107	933.1	5	928
NR-108	915.9	5	910
NR-109	916.8	6	910
NR-110	919.9	7	912
NR-111	919.0	5	914
NR-113	900.7	5	895
NR-114	921.7	4	917
NR-115	913.0	3	910
NR-117	908.8	2	906
NR-118	Not Provided	2	
NR-119	Not Provided	2	
NR-120	885.1	4	881
NR-121	88/ 1	1	880
NR-121	886.0	10	876
ND 122	005 0	10	001
NR-125	000.0	4	100
NR-124	005.2	11/2	000
NR-125	880.0	11	875
NR-126	883.7	8	875
NK-127	885.6	15	870
NR-133	887.8	13	8/4
NR-134	949.8	4	945
TR-300	955.2	2	953
TR-301	960.7	7	953
TR-302	956.3	1 1/2	954
TR-303	943.7	3 1/2	940
TR-307	898.9	5	893
TR-308	894.4	7	887
DE-800	900.7	3 1/2	897
DE-801	899.4	4 1/2	894
DE-804	897.5	4 1/2	893
DE-805	893.4	6	887
DE-808	892.3	3 1/2	#REF!
DE-810	890.4	7	883
DE-811	897.5	3	894
DE-812	891.8	6	885
DE-813	888.1	8 1/2	879
DE-814	888.1	6	882
DE-815	892.7	6	886

		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
DE-816	903.9	5	898
DE-817	902.0	4	898
DE-818	897.3	4 1/2	892
DE-819	894.3	10	884
DE-820	894.3	10 1/2	883
DE-821	888.5	6	882
DE-822	890.4	3	887
DE-823	889.2	3	886
DE-824	888.5	4 1/2	884
DE-825	893.6	4 1/2	889
2007 AET / Braun Interte	ec Borings		
ST-52	885.9	12	873
ST-53	885.5	7	878
ST-54	888.9	4 1/2	884
ST-55	892.4	2	890
ST-60	883.9	14	869
ST-61	885.9	7	878
ST-64	883.5	9	874
ST-65	886.2	2 1/2	883
ST-66	888.9	2	886
ST-67	888.7	3	885
ST-68	895.0	7	888
ST-69	894.8	1	893
ST-71	887.3	1 1/2	885
ST-72	887.4	7	880
ST-73	891.3	4	887
ST-74	891.8	5	886
ST-75	898.8	4	894
ST-76	907.0	7	900
ST-77	892.4	7	885
ST-78	886.1	7	879
ST-80	891.1	2	889
ST-82	898.6	7	891
ST-83	903.0	4 1/2	898
ST-83A	903.0	4 1/2	898
ST-84	911.0	4 1/2	906
ST-87	898.3	2	896
ST-88	889.7	6	883
ST-89	890.4	7	883
ST-91	893.1	8 1/2	884
ST-92	898.4	2	896
ST-93	901.2	3 1/2	897
ST-95	924.0	7	917

		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
ST-96	892.3	4	888
ST-97	891.0	2 1/2	888
ST-98	892.3	7	885
ST-99	892.8	12	880
ST-100	895.7	6	889
ST-101	897.9	4 1/2	893
ST-102	902.2	7	895
ST-103	924.9	4	920
ST-104	934.9	7	927
ST-105	899.1	7	892
ST-106	903.4	5	898
ST-108	906.6	4	902
ST-109	904.5	7	897
ST-111	922.1	4	918
ST-112	936.8	1	935
ST-114	913.1	2 1/2	910
ST-115	908.2	4 1/2	903
ST-117	914.4	2 1/2	911
ST-119	929.7	9	920
ST-121	944.6	4	940
ST-122	959.5	2	957
ST-123	913.4	6	907
ST-124	923.8	9	914
ST-125	932.7	9 1/2	923
ST-126	957.0	7	950
ST-127	952.8	6	946
ST-128	954.1	7	947
ST-129	915.9	4 1/2	911
ST-130	915.1	7	908
ST-131	926.9	9 1/2	917
ST-132	936.0	3	933
ST-133	945.0	12	933
ST-134	949.0	7	942
ST-135	950.5	4 1/2	946
ST-136	956.7	7	949
ST-137	956.0	7	949
ST-138	955.9	14 1/2	941
ST-139	951.8	9 1/2	942
ST-141	913.3	7	906
ST-142	933.7	15	918
ST-143	949.9	4	945
ST-144	955.0	4 1/2	950
ST-148	957.9	6	951

		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
ST-149	900.9	22	878
ST-150	927.0	4 1/2	922
ST-151	922.3	2	920
ST-152	942.0	12	930
ST-153	951.2	4 1/2	946
ST-154	956.7	16	940
ST-157	995 9	14	981
ST-158	955.5	21 1/2	934
ST-159	959.5	25	934
ST-160	920.2	7	913
ST-161	026.7	/ 1/2	022
ST-161	9/9 2	1/ 1/2	93/
ST-167	951.0	2	9/9
ST-104	052.1	2	949
ST-105	955.1	2	951
ST-100	933.0	4 1 / 2	955
ST-107	945.0	4 1/2	940
ST-108	947.2	3	944
ST-169	948.1	10 1/2	937
SI-170	949.7	10 1/2	939
SI-1/1	915.0	9 1/2	905
51-1/2	925.1	1	918
SI-1/4	944.9	4	940
ST-175	948.1	3	945
ST-176	951.0	10	941
ST-177	953.6	13	940
ST-178	948.4	9 1/2	938
ST-184	942.1	4 1/2	937
ST-186	925.2	7	918
ST-188	934.5	4	930
ST-190	952.8	2	950
ST-191	956.3	4	952
ST-193	961.9	4	957
ST-195	942.2	4 1/2	937
ST-196	943.4	7	936
ST-197	944.3	7	937
ST-198	944.4	14	930
ST-199	944.2	7	937
ST-200	949.2	14	935
ST-201	956.8	4 1/2	952
ST-202	955.0	2 1/2	952
ST-203	954.4	4 1/2	949
ST-204	938.6	18	920
ST-205	937.1	4 1/2	932

		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
ST-206	916.0	4	912
ST-207	908.5	4 1/2	904
ST-208	914.5	4 1/2	910
ST-209	892.8	7	885
ST-210	898.8	4 1/2	894
ST-211	892.3	8 1/2	883
ST-212	895.1	9 1/2	885
ST-213	890.2	5 1/2	884
ST-214	884.9	9 1/2	875
ST-215	894.5	9	885
ST-216	895.0	11 1/2	883
ST-218	885.7	7	878
ST-224	938.6	4	934

Table E3. Organic Swamp Deposits

		Organic Swamp Deposits				
		Upper Bo	oundary	Lower B	Boundary	
		Approxiamte		Approxiamte		Estimated
Boring	Surface	Depth	Estimated	Depth	Estimated	Thickness
Number	Elevation	(feet)	Elevation	(feet)	Elevation	(feet)
2018 Braun Inter	tec Borings					
ST-1011	888.2	0	888	7	881	7
2015 Wenck Bori	ngs					
SR-200	925.2	9.5	916	17 1/2	907	8
SR-218	883.7	9.5	875	14 1/2	869	5
WM-406	891.7	3	889	12 1/2	879	10
NR-101	914.1	9 1/2	905	13 1/2	900	4
NR-122	886.0	9 1/2	877	14 1/2	871	5
NR-123	885.8	12	874	17	868	5
NR-126	883.7	8	876	13	870	5
NR-133	887.8	13	875	19 1/2	868	7
DE-818	897.3	12 1/2	885	16	881	4
2007 AET / Braun	Intertec Borings	5				
ST-60	883.9	14	870	17	866	3
ST-73	891.3	4	888	7	884	3
ST-78	886.1	7	880	14	872	7
ST-91	893.1	8 1/2	885	13 1/2	879	5
ST-92	898.4	2	897	7	891	5
ST-96	892.3	4	889	9	883	5
ST-98	892.3	7	886	9	883	2
ST-99	892.8	12	881	18	874	6
ST-100	895.7	6	890	9	886	3
ST-104	934.9	7	928	12	922	5
ST-118	914.9	9	906	14	900	5
ST-124	923.8	9	915	12	911	3
ST-126	957.0	7	950	12	945	5
ST-127	952.8	6	947	18	934	12
ST-128	954.1	7	948	12	942	5
ST-138	955.9	14 1/2	942	22	933	8
ST-139	951.8	9 1/2	943	12	939	3
ST-148	957.9	9.5	949	16	941	7
ST-163	949.2	14 1/2	935	17	932	3
ST-169	948.1	10 1/2	938	12 1/2	935	2
ST-172	925.1	14	912	17	908	3
ST-212	895.1	9 1/2	886	13	882	4
ST-216	895.0	11 1/2	884	14	881	3

Table E4. Buried Topsoil

		Buried Topsoil				
		Upper Boundary Lower Boundary		oundary		
		Approxiamte		Approxiamte		Estimated
Boring	Surface	Depth	Estimated	Depth	Estimated	Thickness
Number	Elevation	(feet)	Elevation	(feet)	Elevation	(feet)
2018 Braun Inte	rtec Borings					
ST-1004	900.9	4	897	7	893	3
ST-1018	928.5	12	917	14	914	2
2015 Wenck Bo	rings					
BR-600	884.7	12	873	14 1/2	870	2 1/2
BR-601	884.8	12	873	14 1/2	870	2 1/2
NR-102	915.4	10 1/2	905	12	903	1 1/2
NR-109	916.8	5 1/2	912	6	910	1/2
NR-110	919.9	7	913	9 1/2	910	2 1/2
NR-118	Not Provided	2		4 1/2		2 1/2
NR-125	886.0	10 1/2	876	12 1/2	873	2
NR-134	949.8	3 1/2	947	4	945	1/2
TR-308	894.4	7	888	8	886	1
DE-819	894.3	10	885	11	883	1
DE-820	894.3	10	885	13	881	3
2007 AET / Brau	ın Intertec Borings					
ST-61	885.9	7	879	8	877	1
ST-64	883.5	9	875	10 1/2	873	1 1/2
ST-68	895.0	7	888	9	886	2
ST-82	898.6	7	892	8 1/2	890	1 1/2
ST-95	924.0	7	917	9	915	2
ST-101	897.9	4 1/2	894	7	890	2 1/2
ST-106	903.4	5	899	7	896	2
ST-114	913.1	2 1/2	911	4 1/2	908	2
ST-136	956.7	7	950	9	947	2
ST-137	956.0	7	949	9	947	2
ST-143	949.9	9	941	12	937	3
ST-150	927.0	4 1/2	923	7	920	2 1/2
ST-160	920.2	7	914	9	911	2
ST-170	949.7	10 1/2	940	12	937	1 1/2
ST-176	951.0	10	941	12	939	2
ST-177	953.6	13	941	14 1/2	939	1 1/2
ST-178	948.4	9	940	10	938	1
ST-186	925.2	7	919	9	916	2
ST-197	944.3	7	938	9	935	2
ST-200	949.2	14	936	16	933	2
ST-210	898.8	4 1/2	895	6	892	1 1/2
ST-215	894.5	9	886	11	883	2
ST-224	938.6	4	935	6	932	2

Table E5. Unsuitable Soils

		Unsuitable Soils		
		Approxiamte	Estimated	
Boring	Surface	Depth	Bottom	
Number	Elevation	(feet)	Elevation	
2018 Braun Intertec Boi	rings			
P/ST-1	898.0	4	894	
P/ST-2	898.4	4	894	
P/ST-3	901.5	4	897	
P/ST-4	895.2	2	893	
P-ST-5	890.7	4	886	
P/ST-6	894.5	4	890	
P/ST-7	955.8	1 1/2	954	
ST-1001	903.9	14	889	
ST-1003	895.8	9	886	
ST-1004	900.9	7	893	
ST-1005	893.1	3	890	
ST-1007	889.8	1	888	
ST-1008	890.7	4	886	
ST-1009	890.7	2	888	
ST-1010	888.1	1	887	
ST-1011	888.2	7	881	
ST-1017	911.7	1 1/2	910	
ST-1018	928.5	14	914	
ST-1020	946.0	1	945	
ST-1021	944.0	1 1/2	942	
ST-1022	944.0	12	932	
2015 Wenck Borings				
BR-600	884.7	14 1/2	870	
BR-601	884.8	14 1/2	870	
BR-602	884.4	12	872	
BR-603	833.3	1	832	
SR-200	925.2	17 1/2	907	
SR-201	951.1	3	948	
SR-202	955.3	2	953	
SR-203	956.0	7	949	
SR-204	954.6	1	953	
SR-205	951.0	1/2	950	
SR-206	942.3	4 1/2	937	
SR-207	938.5	3	935	
SR-208	935.6	4	931	
SR-209	911.4	3	908	
SR-210	913.6	2	911	
SR-211	907.4	3	904	
SR-213	890.8	4	886	
SR-214	890.3	1 1/2	888	
SR-217	886.1	1	885	
		Unsuitable Soils		
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		Annroviamto	Estimated	
Boring	Surface	Approxiante	Bottom	
Number	Elevation	(foot)	Elevation	
SP-218		(leet)	260	
SR-210	884.2	14 1/2	869	
SR-220	807.0	15	803	
SP-221	892.0	1//	806	
SP-222	897.2	1/4	890	
SP-223	898.5	1/4	898	
SR-224	899.0	1	895	
BC-500	883.8	3	880	
RC-500	884.4	8	876	
RC-501	884.2	5	879	
RC-502	882.0	12	870	
WM-400	965.8	3/4	965	
WM-401	954.6	3	951	
WM-401	951.6	3	948	
WM-403	907.7	3	904	
WM-404	907.3	<u>л</u>	903	
WM-405	899.4	3/4	898	
WM-406	891.7	12 1/2	879	
WM-407	889.1	5	884	
WM-408	888.7	4	884	
WM-409	886.9	6	880	
WM-410	877.0	0.5	876	
NR-101	914 1	13 1/2	900	
NR-102	915.4	12	903	
NR-103	924.8	1/2	924	
NR-104	932.6	4	928	
NR-105	936.2	3	933	
NR-106	939.9	1	938	
NR-107	933.1	5	928	
NR-108	915.9	5	910	
NR-109	916.8	6	910	
NR-110	919.9	9 1/2	910	
NR-111	919.0	5	914	
NR-112	923.3	3/4	922	
NR-113	900.7	5	895	
NR-114	921.7	4	917	
NR-115	913.0	3	910	
NR-116	911.4	1/4	911	
NR-117	908.8	2	906	
NR-118	Not Reported	4 1/2		
NR-119	Not Reported	2		
NR-120	885.1	4	881	

		Unsuitable Soils		
		Approxiamte	Estimated	
Boring	Surface	Depth	Bottom	
Number	Elevation	(feet)	Elevation	
NR-121	884.1	4	880	
NR-122	886.0	14 1/2	871	
NR-123	885.8	17	868	
NR-124	885.2	1 1/2	883	
NR-125	886.0	12 1/2	873	
NR-126	883.7	13	870	
NR-127	885.6	15	870	
NR-128	912.5	2	910	
NR-129	903.1	2	901	
NR-130	915.5	3/4	914	
NR-131	906.2	1/2	905	
NR-132	894.4	3/4	893	
NR-133	887.8	19 1/2	868	
NR-134	949.8	4	945	
TR-300	955.2	2	953	
TR-301	960.7	7	953	
TR-302	956.3	1 1/2	954	
TR-303	943.7	3 1/2	940	
TR-304	944.0	0	944	
TR-305	933.8	1/2	933	
TR-306	907.6	1/4	907	
TR-307	898.9	5	893	
TR-308	894.4	8	886	
TR-309	890.4	1/2	889	
DE-800	900.7	3 1/2	897	
DE-801	899.4	4 1/2	894	
DE-804	897.5	4 1/2	893	
DE-805	893.4	6	887	
DE-808	892.3	3 1/2	888	
DE-810	890.4	7	883	
DE-811	897.5	3	894	
DE-812	891.8	6	885	
DE-813	888.1	8 1/2	879	
DE-814	888.1	6	882	
DE-815	892.7	6	886	
DE-816	903.9	5	898	
DE-817	902.0	4	898	
DE-818	897.3	16	881	
DE-819	894.3	11	883	
DE-820	894.3	13	881	
DE-821	888.5	6	882	
DE-822	890.4	3	887	

		Unsuitable Soils	
		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
DE-823	889.2	3	886
DE-824	888.5	4 1/2	884
DE-825	893.6	4 1/2	889
2007 AET / Braun Interte	ec Borings		
ST-25	895.9	1	894
ST-26	896.2	1/2	895
ST-27	893.3	1	892
ST-52	885.9	12	873
ST-53	885.5	7	878
ST-54	888.9	4 1/2	884
ST-55	892.4	2	890
ST-60	883.9	17	866
ST-61	885.9	8	877
ST-64	883.5	10 1/2	873
ST-65	886.2	2 1/2	883
ST-66	888.9	2	886
ST-67	888.7	3	885
ST-68	895.0	9	886
ST-69	894.8	1	893
ST-71	887.3	1 1/2	885
ST-72	887.4	7	880
ST-73	891.3	7	884
ST-74	891.8	5	886
ST-75	898.8	4	894
ST-76	907.0	7	900
ST-77	892.4	7	885
ST-78	886.1	14	872
ST-79	888.9	1/2	888
ST-80	891.1	2	889
ST-81	895.1	1	894
ST-82	898.6	8 1/2	890
ST-83	903.0	4 1/2	898
ST-83A	903.0	4 1/2	898
ST-84	911.0	4 1/2	906
ST-85	892.1	2	890
ST-86	897.0	1/2	896
ST-87	898.3	2	896
ST-88	889.7	6	883
ST-89	890.4	7	883
ST-90	891.0	2	889
ST-91	893.1	13 1/2	879
ST-92	898.4	7	891

		Unsuital	ole Soils
		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
ST-93	901.2	3 1/2	897
ST-94	922.9	4	918
ST-95	924.0	9	915
ST-96	892.3	9	883
ST-97	891.0	2 1/2	888
ST-98	892.3	9	883
ST-99	892.8	18	874
ST-100	895.7	9	886
ST-101	897.9	4 1/2	893
ST-102	902.2	7	895
ST-103	924.9	4	920
ST-104	934.9	12	922
ST-105	899.1	7	892
ST-106	903.4	7	896
ST-107	902.7	1	901
ST-108	906.6	4	902
ST-109	904.5	7	897
ST-110	913.2	1	912
ST-111	922.1	4	918
ST-112	936.8	1	935
ST-113	941.8	2 1/4	939
ST-114	913.1	4 1/2	908
ST-115	908.2	4 1/2	903
ST-116	913.0	1/2	912
ST-117	914.4	2 1/2	911
ST-118	914.9	14	900
ST-119	929.7	9	920
ST-120	940.8	1/2	940
ST-121	944.6	4	940
ST-122	959.5	2	957
ST-123	913.4	6	907
ST-124	923.8	12	911
ST-125	932.7	9 1/2	923
ST-126	957.0	12	945
ST-127	952.8	18	934
ST-128	954.1	12	942
ST-129	915.9	4 1/2	911
ST-130	915.1	7	908
ST-131	926.9	9 1/2	917
ST-132	936.0	3	933
ST-133	945.0	12	933
ST-134	949.0	7	942

		Unsuital	ole Soils
		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
ST-135	950.5	4 1/2	946
ST-136	956.7	9	947
ST-137	956.0	9	947
ST-138	955.9	22	933
ST-139	951.8	12	939
ST-140	962.9	1	961
ST-141	913.3	7	906
ST-142	933.7	15	918
ST-143	949.9	12	937
ST-144	955.0	4 1/2	950
ST-145	954.7	1/2	954
ST-146	966.0	1/2	965
ST-147	958.6	1/2	958
ST-148	957.9	16	941
ST-149	900.9	22	878
ST-150	927.0	7	920
ST-151	922.3	2	920
ST-152	942.0	12	930
ST-153	951.2	4 1/2	946
ST-154	956.7	16	940
ST-157	995.9	14	981
ST-158	955.5	21 1/2	934
ST-159	959.4	25	934
ST-160	920.2	9	911
ST-161	926.7	4 1/2	922
ST-162	956.7	1	955
ST-163	949.2	17	932
ST-164	951.0	2	949
ST-165	953.1	2	951
ST-166	955.0	2	953
ST-167	945.0	4 1/2	940
ST-168	947.2	3	944
ST-169	948.1	12 1/2	935
ST-170	949.7	12	937
ST-171	915.0	9 1/2	905
ST-172	925.1	17	908
ST-173	942.9	1	941
ST-174	944.9	4	940
ST-175	948.1	3	945
ST-176	951.0	12	939
ST-177	953.6	14 1/2	939
ST-178	948.4	10	938

		Unsuital	ole Soils
		Approxiamte	Estimated
Boring	Surface	Depth	Bottom
Number	Elevation	(feet)	Elevation
ST-179	929.3	1/2	928
ST-180	935.9	1	934
ST-181	935.0	1	934
ST-182	941.8	1/2	941
ST-183	933.7	1/2	933
ST-184	942.1	4 1/2	937
ST-185	901.0	0	901
ST-186	925.2	9	916
ST-187	914.2	1	913
ST-188	934.5	4	930
ST-189	952.2	0	952
ST-190	952.8	2	950
ST-191	956.3	4	952
ST-192	959.1	0	959
ST-193	961.9	4	957
ST-195	942.2	4 1/2	937
ST-196	943.4	7	936
ST-197	944.3	9	935
ST-198	944.4	14	930
ST-199	944.2	7	937
ST-200	949.2	16	933
ST-201	956.8	4 1/2	952
ST-202	955.0	2 1/2	952
ST-203	954.4	4 1/2	949
ST-204	938.6	18	920
ST-205	937.1	4 1/2	932
ST-206	916.0	4	912
ST-207	908.5	4 1/2	904
ST-208	914.5	4 1/2	910
ST-209	892.8	7	885
ST-210	898.8	6	892
ST-211	892.3	8 1/2	883
ST-212	895.1	13	882
ST-213	890.2	5 1/2	884
ST-214	884.9	9 1/2	875
ST-215	894.5	11	883
ST-216	895.0	14	881
ST-217	889.3	1	888
ST-218	885.7	7	878
ST-224	938.6	6	932

			Groundwater	
	Surface	Approxiamte	Corresponding	
Boring	Elevation or	Depth	Estimated	
Number	Top of Riser	(feet)	Elevation	2018 Reading Date
2018 Braun Intertec Boring	<u>js</u>			
P/ST-1	898.0	2.0	896.0	5/3/2018
P/ST-2	898.4	13.0	885.4	5/4/2018
P/ST-2 (P)	898.4	5.0	893.4	6/1/2018
P/ST-2 (P)	904.1	8.3	895.8	8/17/2018
P/ST-3	901.5	Not Observed		
P/ST-3 (P)	901.5	10.1	891.4	6/1/2018
P/ST-3 (P)	905.5	7.3	898.2	8/17/2018
P/ST-4	895.2	2.3	892.9	5/4/2018
P-ST-5	890.7	4.0	886.7	5/2/2018
P/ST-5 (MW)	890.7	1.9	888.8	6/1/2018
P/ST-5 (MW)	894.0	7.6	886.4	8/17/2018
P/ST-5 (P)	890.7	2.1	888.6	6/1/2018
P/ST-5 (P)	893.6	7.2	886.4	8/17/2018
P/ST-6	894.5	2.6	891.9	5/7/2018
P/ST-6 (MW)	894.5	3.3	891.2	6/1/2018
P/ST-6 (MW)	898.2	8.7	889.5	8/17/2018
P/ST-6 (P)	894.5	3.2	891.3	6/1/2018
P/ST-6 (P)	898.5	8.9	889.6	8/17/2018
P/ST-7	955.8	Not Observed		
ST-1001	903.9	Not Observed		
ST-1003	895.8	2.0	893.8	5/11/2018
ST-1004	900.9	Not Observed		
ST-1005	893.1	2.5	890.6	5/8/2018
ST-1007	889.8	1.5	888.3	5/10/2018
ST-1008	890.7	4.0	886.7	5/2/2018
ST-1008 (MW)	890.7	2.1	888.6	6/1/2018
ST-1008 (MW)	894.1	7.1	887.0	8/17/2018
ST-1008 (P)	890.7	2.7	888.0	6/1/2018
ST-1008 (P)	893.7	6.7	887.0	8/17/2018
ST-1009	890.7	4.0	886.7	5/1/2018
ST-1010	888.1	3.0	885.1	5/9/2018
ST-1011	888.2	2.0	886.2	5/9/2018
ST-1017	911.7	5.0	906.7	5/4/2018
ST-1018	928.5	Not Observed		
ST-1020	946.0	Not Observed		
ST-1021	944.0	Not Observed		
ST-1022	944.0	7.0	937.0	5/8/2018
2015 Wenck Borings				
BR-600	884.7	17.3	867.4	
BR-601	884.8	4.0	880.8	
BR-602	884.4	17.0	867.4	

BR-603	833.3	Not Observed		
SR-200	925.2	14.0	911.2	
SR-201	951.1	Not Observed		
SR-202	955.3	Not Observed		
SR-203	956.0	Not Observed		
SR-204	954.6	Not Observed		
SR-205	951.0	Not Observed		
SR-206	942.3	Not Observed		
SR-207	938.5	Not Observed		
SR-208	935.6	Not Observed		
SR-209	911.4	Not Observed		
SR-210	913.6	4.5	909.1	
SR-211	907.4	Not Observed		
SR-213	890.8	12.0	878.8	
SR-214	890.3	9.5	880.8	
SR-217	886.1	7.0	879.1	
SR-218	883.7	14.5	869.2	
SR-220	884.3	Not Observed		
SR-221	892.0	15.3	876.7	
SR-222	897.2	17.7	879.5	
SR-223	898.5	17.2	881.3	
SR-224	899.9	16.0	883.9	
SR-225	899.0	Not Observed		
RC-500	883.8	4.5	879.3	
RC-501	884.4	9.5	874.9	
RC-502	884.2	7.0	877.2	
RC-503	882.0	Not Observed		
WM-400	965.8	Not Observed		
WM-401	954.6	Not Observed		
WM-402	951.6	12.0	939.6	
WM-403	907.7	7.5	900.2	
WM-404	907.3	12.0	895.3	
WM-405	899.4	9.5	889.9	
WM-406	891.7	12.0	879.7	
WM-407	889.1	6.3	882.8	
WM-408	888.7	5.0	883.7	
WM-409	886.9	7.0	879.9	
WM-410	877.0	7.0	870.0	
NR-101	914.1	Not Observed		
NR-102	915.4	12.0	903.4	
NR-103	924.8	Not Observed		
NR-104	932.6	Not Observed		
NR-105	936.2	Not Observed		
NR-106	939.9	Not Observed		
NR-107	933.1	Not Observed		
ND 100	015 0	Not Observed		

NR-109	916.8	Not Observed		
NR-110	919.9	19.5	900.4	
NR-111	919.0	Not Observed		
NR-112	923.3	Not Observed		
NR-113	900.7	7.0	893.7	
NR-114	921.7	Not Observed		
NR-115	913.0	Not Observed		
NR-116	911.4	Not Observed		
NR-117	908.8	12.0	896.8	
NR-118	Not Reported	2.0		
NR-119	Not Reported	2.6		
NR-120	885.1	Not Observed		
NR-121	884.1	7.0	877.1	
NR-122	886.0	14.5	871.5	
NR-123	885.8	8.5	877.3	
NR-124	885.2	8.5	876.7	
NR-125	886.0	11.0	875.0	
NR-126	883.7	12.0	871.7	
NR-127	885.6	8.0	877.6	
NR-128	912.5	2.0	910.5	
NR-129	903.1	Not Observed		
NR-130	915.5	Not Observed		
NR-131	906.2	Not Observed		
NR-132	894.4	12.5	881.9	
NR-133	887.8	6.0	881.8	
NR-134	949.8	Not Observed		
TR-300	955.2	Not Observed		
TR-301	960.7	Not Observed		
TR-302	956.3	Not Observed		
TR-303	943.7	Not Observed		
TR-304	944.0	Not Observed		
TR-305	933.8	7.0	926.8	
TR-306	907.6	12.0	895.6	
TR-307	898.9	5.0	893.9	
TR-308	894.4	9.5	884.9	
TR-309	890.4	4.0	886.4	
DE-800	900.7	12.0	888.7	
DE-801	899.4	6.5	892.9	
DE-804	897.5	Not Observed		
DE-805	893.4	6	887.4	
DE-808	892.3	3.5	888.8	
DE-810	890.4	9.5	880.9	
DE-811	897.5	Not Observed		
DE-812	891.8	8	883.8	
DE-813	888.1	9.5	878.6	
	888 1	45	883.6	

DE-815	892.7	5	887.7	
DE-816	903.9	Not Observed		
DE-817	902.0	4.5	897.5	
DE-818	897.3	7	890.3	
DE-819	894.3	5	889.3	
DE-820	894.3	5	889.3	
DE-821	888.5	7	881.5	
DE-822	890.4	7	883.4	
DE-823	889.2	9.5	879.7	
DE-824	888.5	4.5	884.0	
DE-825	893.6	Not Observed		
2007 AET / Braun Intertec	Borings			
ST-25	895.9	17.0	878.9	
ST-26	896.2	19.0	877.2	
ST-27	893.3	12.0	881.3	
ST-52	885.9	10.9	875.0	
ST-53	885.5	10.3	875.2	
ST-54	888.9	4.5	884.4	
ST-55	892.4	9.5	882.9	
ST-60	883.9	8.0	875.9	
ST-61	885.9	9.4	876.5	
ST-64	883.5	10.2	873.3	
ST-65	886.2	10.0	876.2	
ST-66	888.9	10.0	878.9	
ST-67	888.7	6.0	882.7	
ST-68	895.0	5.2	889.8	
ST-69	894.8	4.0	890.8	
ST-71	887.3	7.0	880.3	
ST-72	887.4	4.8	882.6	
ST-73	891.3	9.0	882.3	
ST-74	891.8	6.4	885.4	
ST-75	898.8	4.3	894.5	
ST-76	907.0	14.0	893.0	
ST-77	892.4	11.0	881.4	
ST-78	886.1	7.0	879.1	
ST-79	888.9	7.0	881.9	
ST-80	891.1	12.0	879.1	
ST-81	895.1	9.5	885.6	
ST-82	898.6	14.5	884.1	
ST-83	903.0	9.5	893.5	
ST-83A	903.0	9.5	893.5	
ST-84	911.0	12.0	899.0	
ST-85	892.1	9.5	882.6	
ST-86	897.0	8.1	888.9	
ST-87	898.3	12.0	886.3	
ST-88	889.7	8.0	881.7	

ST-89	890.4	7.0	883 4	
ST-90	891.0	6.0	885.0	
ST-91	893.1	12.0	881.1	
ST-92	898.4	18.0	880.4	
ST-93	901.2	18.0	883.2	
ST-94	922.9	18.0	904.9	
ST-95	924.0	13.0	911.0	
ST-96	892.3	9.0	883.3	
ST-97	891.0	6.1	884.9	
ST-98	892.3	8.0	884.3	
ST-99	892.8	12.0	880.8	
ST-100	895.7	9.0	886.7	
ST-101	897.9	7.0	890.9	
ST-102	902.2	7.0	895.2	
ST-103	924.9	18.0	906.9	
ST-104	934.9	23.0	911.9	
ST-105	899.1	9.0	890.1	
ST-106	903.4	12.2	891.2	
ST-107	902.7	12.1	890.6	
ST-108	906.6	12.5	894.1	
ST-109	904.5	12.0	892.5	
ST-110	913.2	9.0	904.2	
ST-111	922.1	14.0	908.1	
ST-112	936.8	Not Observed		
ST-113	941.8	Not Observed		
ST-114	913.1	5.2	907.9	
ST-115	908.2	12.0	896.2	
ST-116	913.0	9.5	903.5	
ST-117	914.4	9.5	904.9	
ST-118	914.9	6.0	908.9	
ST-119	929.7	22.0	907.7	
ST-120	940.8	Not Observed		
ST-121	944.6	Not Observed		
ST-122	959.5	Not Observed		
ST-123	913.4	25.0	888.4	
ST-124	923.8	14.0	909.8	
ST-125	932.7	Not Observed		
ST-126				
ST-127	957.0	12.0	945.0	
	957.0 952.8	12.0 18.0	945.0 934.8	
ST-128	957.0 952.8 954.1	12.0 18.0 Not Observed	945.0 934.8 	
ST-128 ST-129	957.0 952.8 954.1 915.9	12.0 18.0 Not Observed 11.5	945.0 934.8 904.4	
ST-128 ST-129 ST-130	957.0 952.8 954.1 915.9 915.1	12.0 18.0 Not Observed 11.5 14.0	945.0 934.8 904.4 901.1	
ST-128 ST-129 ST-130 ST-131	957.0 952.8 954.1 915.9 915.1 926.9	12.0 18.0 Not Observed 11.5 14.0 18.0	945.0 934.8 904.4 901.1 908.9	
ST-128 ST-129 ST-130 ST-131 ST-132	957.0 952.8 954.1 915.9 915.1 926.9 936.0	12.0 18.0 Not Observed 11.5 14.0 18.0 Not Observed	945.0 934.8 904.4 901.1 908.9 	
ST-128 ST-129 ST-130 ST-131 ST-132 ST-133	957.0 952.8 954.1 915.9 915.1 926.9 936.0 945.0	12.0 18.0 Not Observed 11.5 14.0 18.0 Not Observed Not Observed	945.0 934.8 904.4 901.1 908.9 	

ST-135	950.5	Not Observed		
ST-136	956.7	Not Observed		
ST-137	956.0	Not Observed		
ST-138	955.9	14.5	941.4	
ST-139	951.8	9.5	942.3	
ST-140	962.9	Not Observed		
ST-141	913.3	18.0	895.3	
ST-142	933.7	15.0	918.7	
ST-143	949.9	Not Observed		
ST-144	955.0	Not Observed		
ST-145	954.7	Not Observed		
ST-146	966.0	Not Observed		
ST-147	958.6	Not Observed		
ST-148	957.9	7.3	950.6	
ST-149	900.9	19.0	881.9	
ST-150	927.0	Not Observed		
ST-151	922.3	5.1	917.2	
ST-152	942.0	12.3	929.7	
ST-153	951.2	23.0	928.2	
ST-154	956.7	Not Observed		
ST-157	995.9	Not Observed		
ST-158	955.5	22.0	933.5	
ST-159	959.4	18.0	941.4	
ST-160	920.2	11.8	908.4	
ST-161	926.7	18.0	908.7	
ST-162	956.7	Not Observed		
ST-163	949.2	17.0	932.2	
ST-164	951.0	23.0	928.0	
ST-165	953.1	Not Observed		
ST-166	955.0	21.2	933.8	
ST-167	945.0	21.2	923.8	
ST-168	947.2	Not Observed		
ST-169	948.1	12.5	935.6	
ST-170	949.7	12.6	937.1	
ST-171	915.0	8.6	906.4	
ST-172	925.1	6.0	919.1	
ST-173	942.9	Not Observed		
ST-174	944.9	Not Observed		
ST-175	948.1	15.1	933.0	
ST-176	951.0	16.0	935.0	
ST-177	953.6	Not Observed		
ST-178	948.4	18.0	930.4	
ST-179	929.3	14.0	915.3	
ST-180	935.9	12.0	923.9	
ST-181	935.0	Not Observed		
ST-182	941.8	Not Observed		

ST-183	933.7	18.0	915.7	
ST-184	942.1	12.0	930.1	
ST-185	901.0	Not Observed		
ST-186	925.2	14.0	911.2	
ST-187	914.2	12.0	902.2	
ST-188	934.5	19.0	915.5	
ST-189	952.2	Not Observed		
ST-190	952.8	Not Observed		
ST-191	956.3	Not Observed		
ST-192	959.1	Not Observed		
ST-193	961.9	Not Observed		
ST-195	942.2	Not Observed		
ST-196	943.4	18.0	925.4	
ST-197	944.3	9.0	935.3	
ST-198	944.4	19.0	925.4	
ST-199	944.2	Not Observed		
ST-200	949.2	20.0	929.2	
ST-201	956.8	Not Observed		
ST-202	955.0	Not Observed		
ST-203	954.4	Not Observed		
ST-204	938.6	Not Observed		
ST-205	937.1	Not Observed		
ST-206	916.0	12.0	904.0	
ST-207	908.5	9.0	899.5	
ST-208	914.5	12.0	902.5	
ST-209	892.8	9.1	883.7	
ST-210	898.8	12.0	886.8	
ST-211	892.3	7.6	884.7	
ST-212	895.1	7.3	887.8	
ST-213	890.2	7.1	883.1	
ST-214	884.9	12.7	872.2	
ST-215	894.5	9.3	885.2	
ST-216	895.0	13.5	881.5	
ST-217	889.3	3.0	886.3	
ST-218	885.7	12.0	873.7	
ST-224	938.6	Not Observed		

Appendix F

Consolidation Tests

2018 Braun Intertec Corporation

Boring P/ST-6, 14 1/2 feet Boring ST-1013, 19 1/2 feet Boring ST-1013, 59 1/2 feet Boring ST-1007, 19 1/2 feet Boring ST-1009, 13 feet













Dial Reading vs. Time Project No.: B1706398 Project: TCAAP Redevelopment - Mass Grading

Project: TCAAP Redevelopment - Mass Grading NE of US Hwy 10 and Hwy 96, Arden Hills, MN Source: Sample No.: ST-1003

Elev./Depth: 19.5-21.5'











Dial Reading vs. Time

Project No.: B1706398 Project: TCAAP Redevelopment - Mass Grading NE of US Hwy 10 and Hwy 96, Arden Hills, MN Source: Elev./Depth: 19.5-21.5 Sample No.: ST-1007 t90 tgr .4248 .4219 Load #3 Load #4 0.25 tsf 0.50 tsf .4246 .4216 C_v @ 2.59 min.= C_v @ 1.33 min.= 0.82 ft.2/day 1.58 ft.2/day .4244 .4213 .4242 .4210 .4240 .4207 Dial Reading (in.) Dial Reading (in.) .4238 .4204 .4236 .4201 .4234 .4198 .4232 .4195 .4230 .4192 .4228 0 .4189 <mark>L</mark> 32 40 4 8 12 16 20 24 28 36 3 6 12 15 18 21 24 27 30 9 Square Root of Elapsed Time (min.) Square Root of Elapsed Time (min.) t90 t90 .41004 .4176 Load #5 Load #6 1.00 tsf 2.00 tsf .4171 C_v @ 1.22 min.= .40929 C_v @ 1.04 min.= 1.71 ft.²/day 1.96 ft.²/day .4166 .40854 .4161 .40779 .40704 .4156 Dial Reading (in.) Dial Reading (in.) .4151 .40629 .4146 .40554 .4141 .40479 .4136 .40404 .4131 .40329 .4126 0 .40254 12 15 18 24 27 30 0 12 16 20 24 28 32 36 40 3 6 9 21 8 Square Root of Elapsed Time (min.) Square Root of Elapsed Time (min.) BRAUN **INTERTEC** Figure

Dial Reading vs. Time









Appendix G

Stormwater Infiltration

Figure G1: Area 4 Figure G2: Area 3



KEY: Soil Classification/Surface Elevation Upper Limit Elevation/Thickness/Lower Limit Elevation



TCAAP Northwest Property (Area 4) Figure G1 Braun Project B1706398

Infiltration Desktop Review TCAAP Redevelopment May 8, 2018 Revised July 10, 2018 (Braun 2018 Borings ST-1007, ST-1008, ST-1010, and ST-1011) п. -803 Π NR-120 ÷٤ ST-9 -80 **R-121** П **+**DE 809 T-214 ħ NR-127 Braun Boring 2018 213 SC Fill/ML (7') AET Boring 2007 ST-61 Fill: SM/SP-SM Mix WI 889 (SR-21 Braun Boring (2007) WL 883 (-5') ST-1008 -215 ____ SP-SM 20 20 ST-72 NR-12 Braun Boring 2018 WL 885 (-6') RI Test (Wenck 2015 Ŋ NR-124 SP-SM 0.2 in/hr ST-90 WL 889 (-1') ADT TI 🔶 ♦ ST-79 ORI Test (Wenck 2015 ST-1007 +RC// AET Boring (2007) 0.2 in/hr AET Boring 2007 Fill: SM/SC mix (3'), ORI Test (Wenck 2015) Fill: SM/SP-SM Mix then SP-SM (9') 0.15 in/hr WL 883 (-5') Braun Boring 2018 WL 885 (6') Ø 4 IT109 OL/PEAT (7') Û +ST-97 WL 886 (-2') Ø Braun Boring 2018 \mathbb{N} ST-1011 SP-SM Ø RI Test (Wenck 2015 WL 885 (-3') AET Boring (2007) 0.04 in/hr RC-500 SP DRI Test (Wenck 2015) ST-1010 Π **4**IT102 0.4 in/hr WL 882 (-7') 14_78 **+**ST-64 Braun Boring 2007 REST-78 -+ IT103 + ST-80--SP-SM Braun Boring (2007) Braun Boring (2007) Fill: SM Fill: CL, then Peat WL 881 (-7') ORI Test (Wenck 2015) - - - AST 88 WI 884 (-7') Braun Boring (2007 WI 885 0.25 in/hr Fill: SM WI 882 (-8') +**Ө**В-9 ST-63 OR O OR

TCAAP West of Spine Road (Area 3) Figure G2 Braun Project B1706398



Appendix H

Groundwater Level Data

Figure H1: North Figure H2: North Central Figure H3: South Central Figure H4: South Figure H5: 2018 Comparison





APPROXIMATE LOCATION OF GROUNDWATER LEVEL MEASUREMENT (AECOM 2011) XXX

XXX (± Y)

XXX: APPROXIMATE LOCATION OF GROUNDWATER LEVEL MEASUREMENT (WENCK 2015) (± Y): DELTA (FT) COMPARED TO 2007 BRAUN/AET ESTIMATED GROUNDWATER ELEVATION CONTOURS



(± Y): DELTA (FT) COMPARED TO 2007 BRAUN/AET ESTIMATED GROUNDWATER ELEVATION CONTOURS



XXX (± Y)




TCAAP South Portion Figure H4 Braun Project B1706398

(± Y): DELTA (FT) COMPARED TO 2007 BRAUN/AET ESTIMATED GROUNDWATER ELEVATION CONTOURS





11001 Hampshire Avenue S Minneepolis, MN 55438 952,995,2000 braunintertec.com

Base Drawing Provided By



	Project No B1706398
	Drawing Not B1706398
Drawn By:	BJB
Date Drawn	4/23/18
Checked By	JCK
Last Modified	5/7/18

TCAAP Redevelopment -Mass Grading

Northeast of US Highway 10 and Highway 96

Arden Hills, Minnesota

Soll Boring and CPT Sounding Sketch



SCALE; 1" - 600"

600