A Preliminary Geotechnical Evaluation Report for Minneapolis Community Development Agency

Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

Braun Intertec Project CMXX-01-0004
April 9, 2001

Braun Intertec Corporation

BRAUN INTERTEC

Braun Intertec Corporation
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Minneapolis, Minnesota 55439-1500
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Engineers and Scientists Serving the Built and Natural Environments®

April 9, 2001

Project CMXX-01-0004

Mr. Larry Heinz
Minneapolis Community Development Agency
600 Crown Roller Mill
105 5th Avenue South
Minneapolis, MN 55401-2534

Dear Mr. Heinz:

Re: Preliminary Geotechnical Evaluation, Bassett Creek Valley Study Area, Minneapolis, Minnesota

We have completed the preliminary geotechnical evaluation for the Bassett Creek Valley study area. The purpose of the report is to aid in evaluating soils for their effect on the general development and for foundation support of residential structures and low to midrise commercial structures

For complete results of our borings along with our preliminary engineering analyses and recommendations, we direct your attention to the attached report. If we can be of further assistance in interpreting this report or providing additional subsurface information, please contact Ray Huber at (952) 942-4831 or Henry Vloo at (952) 942-1779.

Sincerely,

Braun Intertec Corporation

Ray A. Huber, PE
Vice President

Henry Vloo, PE
Senior Engineer

Attachment:
Preliminary Geotechnical Evaluation Report

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rah/hv:paa

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BRAUN INTERTEC

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Engineers and Scientists Serving the Built and Natural Environments

A. Introduction

A.1. Project

The project is a redevelopment on what has been described as the Bassett Creek Valley Study. The site extends from Cedar Lake Road to the west, just south of Glenwood Avenue, and just west of Fremont Avenue. The southern boundary is primarily Bassett's Creek.

A.2. Purpose

The purpose of this preliminary geotechnical evaluation is to aid in providing an overview of the on-site soils. This overview will also provide preliminary recommendations for general foundation support for residential housing and light to mid-rise commercial buildings. This report will also provide a brief discussion on how the soils may affect utilities and roadway construction.

A.3. Scope

This preliminary geotechnical evaluation was based on Minneapolis Community Development Agency (MCDA) notices of Release 6 and 6A.

Our scope of services was limited to:

- staking the boring locations, and determining their surface elevations;
- coordinating the locating of underground utilities near the boring locations;
- conducting 22 penetration test borings to depths of 50 to 135 feet across the site. The deeper borings were completed in areas of deeper organics and soft clays. Please note that Boring ST-01-012 was not completed;
- classifying the samples and preparing boring logs;
- conducting moisture content, Atterberg limits and consolidation tests on selected samples;

- analyzing the results of the field and laboratory tests;
- formulating preliminary recommendations for site preparation;
- discussing the results and recommendations with MCDA and other members of the design team; and
- submitting a preliminary geotechnical evaluation report containing logs of the borings, our analysis of the field and laboratory tests, and preliminary recommendations for earthwork, spread footings, raft or piling foundations, utilities and pavements.

The geotechnical borings were completed in conjunction with environmental borings. The soil samples for the environmental borings were also evaluated for this report. Boring logs for both geotechnical and environmental borings are included with this report.

A.4. Boring Locations and Surface Elevations

Approximate locations for all 21soil borings are indicated on the included site plan. Surface elevations of the borings were referenced to a number of hydrants located across this site. The hydrants used for determining our elevations are as follows:

Hydrant Location	Top of Hydrant
Girard & 2nd Avenue	814.8
Humboldt & Currie	815.8
Humboldt & 2nd Avenue	815.8
Humboldt & Glenwood	828.8
Irving & Glenwood	841.1
Irving & 2nd Avenue	811.5
Irving & Currie	814.7

B. Results

B.1. Logs

Log of Boring sheets indicating the depths and identifications of the various soil strata, penetration resistances, laboratory test data and groundwater observations are attached. The strata changes were inferred from the changes in the penetration test samples and auger cuttings. The depths shown as changes between the strata are only approximate. The changes are likely transitions and the depths of the changes vary between the borings.

Geologic origins presented for each stratum on the Log of Boring sheets are based on the soil types, blows per foot, and available common knowledge of the depositional history of the site. Because of the complex glacial and post-glacial depositional environments, geologic origins can be difficult to ascertain. A detailed investigation of the geologic history of the site was not performed.

B.2. Soils

We have separated this site into four soil zones for planning purposes. These zones were based on constructing residential buildings and on our extrapolation between soil borings taken across the site. It should be noted that these zones are not exact and additional soil studies will be required when plans are more defined.

Zone 1, shaded green, is an area where residential buildings could be supported on spread footings with some soil correction work. Zone 2, shaded yellow, is an area that will require timber pile or possibly a raft foundation. Zone 3, shaded gold, will require deep pipe pile foundations. Zone 4, with the cross-hatching, will require either deep pipe pile or possibly a raft foundation.

B.2.a. **Fill**. Throughout the majority of the site there is a cap of fill. The fill consists primarily of silty sand or clays mixed with a wide variety of soils ranging from silts and sands mixed with some debris consisting of concrete, bituminous, ashes, cinders and glass. The fill cap ranges from 1 to 19 feet across the site with an average of 4 to 7 feet. Penetration resistances indicate the fill to be variable across the site.

B.2.b. Swamp Deposits. Primarily in the area of Zone 3 there are organic swamp deposits in a number of the borings below the fill cap. The organic swamp deposits consist of peat and organic clays intermixed with some shells. The organic soils extended to depths of 9 to 64 feet in these borings.

B.2.c. Lacustrine and Alluvial Clays. Below the fill or organic soils, the predominant soil across the site is lacustrine and alluvial clay. The clays consist primarily of fat clay with occasional layers of lean clay and silt. Penetration resistances indicate the clays range from consistencies of very soft to very stiff. However, the majority of clay was judged to have consistencies of very soft to medium. The clays extended to depths of 4 feet to as much as 100 feet in Zone 3.

B.2.d. Alluvial Silts and Sands. Below the clays, the majority of the borings encountered alluvial silts and sands. In some areas, layers of silt and sand were found within the clay. The sands were encountered near the surface in several areas of Zone 1 and not encountered in some areas of Zone 3 until 100 feet below the surface. Penetration resistances indicate the silts and sands ranged from a loose to medium dense condition.

B.2.e. Glacial Tills or Outwash. Below the lacustrine clays or the alluvial soils, the majority of the borings encountered glacially-deposited soils. The glacial soils consisted of sandy lean clay, clayey sand, silty sand or sand. Penetration resistances indicate the cohesive soils are in a rather stiff to stiff condition and the granular soils loose to medium dense.

B.3. Bedrock

Bedrock was not encountered in any of the borings during drilling. Bedrock maps of the area indicate that an old glacial river channel flowed through this site with bedrock ranging from 230 to 280 feet below existing grade. Bedrock is anticipated to be the Prairie du Chien limestone that ranges from 80 to over 100 feet thick.

B.4. Groundwater

The soil borings typically encountered groundwater from 5 to 15 feet below the surface. Based on the borings and two piezometers placed along the perimeter of this development for the proposed realignment of an existing sewer interceptor, we estimate groundwater on the site varies from elevation 800 to 807. A more detailed evaluation of the groundwater including

placement of a number of piezometers is recommended to further evaluate the depth to groundwater and its impact to this site's redevelopment. Annual and seasonal variations of the groundwater levels should be anticipated.

B.5. Laboratory Tests

A number of laboratory tests were completed on this site to aid in soil classification and to determine potential compressibility and potential swell of the soils. These tests are still being conducted and will be placed in an addendum of this report.

C. Preliminary Analyses and Recommendations

C.1. Proposed Construction

It is our understanding that the primary buildings to be constructed on this site will be residential structures. These structures will likely be slab-on-grade or have a full basement, wood framing above grade, and ranging from one to three stories in height. Structural loads for these types of buildings are relatively light usually from less than 75 kips (75,000 pounds) per column and less than 4 kips per linear foot for bearing walls.

Commercial structures to be developed on this site will likely be low to mid-rise buildings. The predominant structures will likely be one- to two-story with potentially some buildings extending up to three stories. For a typical one- to two-story commercial structure, column loads will tend to be less than 200 kips with bearing walls less than 5 kips per linear foot. For a three-story structure, column loads could reach 400 kips.

At the time of this report, housing locations, grade changes, and building types have not been determined. Therefore, this report should be considered very preliminary in nature.

C.2. Site Settlement Due to Grade Changes

Due to the extremely soft conditions of the organic swamp deposits and underlying clays and silts, there is a concern that site grade changes can impact infrastructure, housing and commercial buildings. The main concern is if grade is raised more than 2 feet above the present

grade, some additional long-term settlement will occur. The following tabulation indicates the estimated additional settlement that may occur across the four designated areas.

Table 1. Raise in Grade

Grade Change	2 Feet	5 Feet	10 Feet
Zone 1 (Green)	< 1/8'	1/8' to 1/4'	1/4' to 1/2'
Zone 2 (Yellow)*	<1/8'	1/8' to 1/3'	1/3' to 1'
Zone 3 (Gold)	1/8' to 1/4'	1/4' to 2/3'	2/3' to 2'

*Zone 4 (shaded gold/green) will perform similar to Zone 2.

As noted in the tabulation in Zones 1, 2 and 4, less than 1/8 foot of settlement will occur if grade changes on the site is 2 feet or less. The main concern is when grade changes exceed 2 feet. Due to the depth of the soft clays and their low permeability, it will take an appreciable amount of time for these soils to consolidate from a raise in grade. We have estimated the average time to complete half of the settlement will take over two years. The time can be reduced if a surcharge height equivalent to the grade change is used to help speed up the process.

It is therefore very critical to look at the amount of grade changes that are going to be completed on the site, especially in the areas designated as Zone 2, Zone 3 and Zone 4. A significant raise in grade could cause differential settlement to occur to various structures and potential problems for buried utilities and roadways. A raise in grade would also induce more negative skin friction that would have to be accounted for when designing pile foundations. Negative skin friction is the down drag on the piles caused by soft organic or clay soils that are adhering to these piles and consolidating under existing or increased fill loads.

C.3. General Residential Housing Pad Preparation

C.3.a. Zone 1 (Shaded Green). In Zone 1, it is our opinion that residential housing could be supported by spread footings with some soil correction completed. The soil correction will consist of removing the vegetation, topsoil, fill, organic soils, and soft clays and silts with less than five blows per foot (BPF). If medium to rather stiff fat clays are encountered at lowest floor grade, we recommend these soils be subcut 3 feet below floor grade. The subcut and backfill

will help provide a construction platform to build the housing and minimize potential swell or shrinkage of the fat clays.

When completing excavations for soil correction, water may seep into the excavations. In clay soils, this infiltration will likely be slow and can be controlled with sump pumps within the excavation. If soil correction work extends into waterbearing sand, well points may be needed.

Engineered fill could then be placed to proposed grades. Typical spread footings could then be used to support the structures, sized to exert a maximum soil bearing pressure of 1,500 psf. If fill is placed below footings, we recommend the excavation should be oversized 1 foot for each foot of fill placed below footings. The excavation oversizing is to provide lateral stability to the building's foundations.

Engineered fill placed below houses should consist of select granular with less than 10 percent of the soil by weight passing the number 200 sieve. Clean sand is recommended for fill below the residential structures for ease of compaction in a confined area. All fills should be compacted to a minimum of 95 percent of standard Proctor density (ASTM D 698).

Due to the potential for some long-term settlement to occur, we recommend a structural engineer evaluate structural alternatives to reduce the potential effects of differential settlement. Some alternatives would be to strengthen footings more than typical by adding additional concrete steel reinforcing, placing additional bond beams within below grade masonry walls, or using cast-in-place concrete below grade walls.

C.3.b. Zone 2 (Shaded Yellow). In this zone, it is our opinion that spread footings will likely not be suitable for residential housing but shallow timber piles could be used. In this zone, the soft clays tend to be deeper than in Zone 1. However, in this area, the underlying sands or glacial tills are shallow enough that timber piles ranging from 30 to 50 feet could be used for support of typical residential housing. We recommend the timber piles be driven to a minimum net working load of 10 tons. To achieve a 10-ton net working load, the timber piles will have to penetrate the sands or glacial tills from 10 to 15 feet.

As an alternative to using timber piles, a raft foundation could possible be used for residential housing. The use of a raft foundation versus a pile foundation would depend on the depth and softness of the on-site lacustrine/alluvial clays. In using a raft foundation, all vegetation, topsoil,

fill, and organic soils will require removal. Engineered fill would then be placed up to the proposed bottom of the raft foundation. However, the use of a raft foundation will also require the structure to have a full depth basement to provide soil unload. By removing the soil from below the basement area, the weight of a typical residential structure will be less than the soils removed. Also, the weight of the house will be spread over the entire footprint of the house area instead of loads concentrated under columns or bearing walls. Use of a raft foundation reduces the overall load on the soils and provides a more rigid structure that would settle more uniformly, thus causing less distress to the wood framing above grade. In using a raft foundation, the basement floor would have to be thickened and additional concrete steel reinforcement used. The exterior walls would have to be poured concrete with pre-cast or some type of stiffer wood framing at the first floor elevation. It is recommended that a structural engineer design the raft foundation system.

If the excavation extends below the raft foundation, the excavation needs to be oversized 1 foot for each foot of fill placed below the raft foundation. The excavation oversizing is to provide some lateral stability to the foundation and engineered fill.

If very soft fat clays (with blow counts less than 5 BPF) are encountered at the raft foundation subgrade, we recommend a 3-foot subcut and replacement with engineered fill. The engineered fill will provide a platform to construct the foundation from and to provide some overburden over the fat clays, which will help minimize the potential for swell or shrinkage.

C.3.c. **Zone 3 (Shaded Gold).** In this area, the fill, organic soils, and soft clays are quite extensive. We recommend any structures placed in this area be supported by pipe piling. The most common deep pile used in the Twin Cities area is a 12-inch diameter pipe that extends a significant distance in order to penetrate into the underlying alluvial sands or tills at depth. The length and depth of the pile would have to be determined for each structure and will depend on the depth of the bearing soil. The pile net working load could range from 20 to 100 tons depending on the structural requirements and depth of penetration into the bearing soil.

C.3.d. **Zone 4 (Shaded Gold/Green).** This small zone is a gray area between Zones 2 and 3. In this area, timber piles could not be used due to the depth of the potential bearing soil. Also, due to the depth of soft clays, a typical spread footing system is not recommended. The foundation

alternative for support of residential housing in this area are pipe piling or potentially a full-depth basement/raft foundation.

C.4. General Commercial Building Pad Preparation

For support of commercial buildings, it should be anticipated that the majority will require a deep foundation system. The main reason is these structures are heavier than residential wood-framed housing, which will result in more settlement. The exception is where the compressible soils are shallow enough that an excavation/backfill approach can be used. The area where this is most feasible is the northwest quadrant of the site (Zone 1).

Using this approach, all vegetation, topsoil, fill, soft clays and silts would require removal down to the underlying sand or glacial till soils. Engineered fill would then be required to be placed up to floor grade. The type of fill and degree of compaction would depend on the weight of the building and settlement tolerances.

For a one- or two-story commercial structure, it is possible that all of the softer clays would not need to be totally removed. If the softer clays are not too extensive in thickness, and penetration resistances are over 5 BPF, some of the clays could possibly stay in place. For 3-story or taller commercial structures, all soft to medium clays would likely require removal and replacement with engineered fill in order to control settlement.

In using this approach, the commercial buildings could be supported by spread footings. Soil bearing pressure for footing design will be dependent on building loads, final grades, and the amount of settlement that can be tolerated. Each building would have to be evaluated separately.

C.5. Utilities

The largest impact on utilities that serve either residential or commercial buildings would depend on site grade changes. If grade is changed less than 2 feet within roadways, long-term settlement should be under ¼-foot and should be acceptable for most utilities. If grade is raised more than 2 feet, the primary critical areas will be Zones 2, 3 and 4 where up to 1 to 2 feet of settlement could occur over a five-year period.

For water lines where settlement could be an issue, we recommend flexible joint piping be used to aid in minimizing the effects of differential settlement. For sanitary sewer support, the pipe

inverts should be kept as steep as possible to minimize the effects of differential settlement. If invert grades can't be kept steep enough to offset the settlement, or if the depth of organic soils are excessive (ST-01-011), these utilities will need to be supported by driven pile.

To help minimize the effects of long-term settlement for storm sewer support, we also recommend the invert grade be kept as steep as possible. The storm sewer sections could also be pinned together to try and maintain the integrity of the pipe.

If the underground utilities are to be soil supported (not piled), some subcutting of soft soils are recommended to provide a stable subgrade for pipe support. We recommend any soft subgrade be overcut from 1 to 2 feet and replaced with crushed rock to provide a stable subgrade for pipe support.

The utility trenches should be backfilled with compacted mineral fill. The fill placed below the upper 3 feet of subgrade should be compacted to a minimum of 95 percent of its standard Proctor density. Fill placed in the upper 3 feet should be compacted to a minimum of 100 percent. If fat clay is used to backfill trenches, it should only be used below the upper 3 feet of subgrade and should have a moisture content above optimum and be compacted to a density between 92 and 95 percent of the standard Proctor density. The upper compaction limit is recommended to keep the fat clay from being dried. The fat clay should be kept at a moisture content of at least 5 percentage points over the soils optimum moisture content. If the fat clay is too dry when compacted, they become more susceptible to swelling if they absorb moisture.

The on-site lacustrine and alluvial clay soils encountered by the borings are generally considered corrosive to metal conduits. We recommend specifying non-corrosive materials or providing corrosion protection unless additional tests are performed to demonstrate the soils are not corrosive.

C.6. Paved Areas

For roadways, the main concerns are a raise in grade, and in preparing the upper 3 feet of the subgrade for pavement support. If grade is raised less than 2 feet, settlement should have little affect on the pavement.

To prepare the subgrade for pavement support, subcutting of the existing fill soils is recommended. Subcutting would consist of taking the existing fill soils down a minimum of 3 feet below the aggregate base and recompacting the fill soils to a minimum of 100 percent of its standard Proctor density. This could require drying of the fill if moisture content exceeds 1 percentage point over the soil's optimum moisture content. If the soils are too wet and cannot be dried and recompacted to 100 percent of standard Proctor, these soils should be removed and replaced with a drier fill with a moisture content not exceeding 1 percentage point of optimum. After the subgrade preparation is completed, we recommend the subgrade be proofrolled to further evaluate the suitability of the subgrade soils for pavement support. If soft unstable soils are encountered, they should be subcut and replaced with compacted, stable fill.

Pavement design is dependent on the predominant subgrade soil, which will likely be silty sand to a clay fill. Silty sand and clay soils typically have Hveem stabilometer R-values ranging from 10 to 70. For pavement design, we recommend an assumed Hveem stabilometer R-value of 20 be used.

Where road grade changes are more than 2 feet, settlement of the roadway should be taken into consideration. The amount of the estimated settlement is indicated in section C.2. The areas of most concern are Zones 2, 3 and 4, where the most settlement will occur. To reduce the time frame of the settlement, a surcharge could be completed. A surcharge equal to the raise in grade would cause about half of the anticipated settlement to occur during the first year.

C.7. Exterior Slabs

The on-site silty sand and clay fills and natural clays are frost-susceptible soils. If these soils become saturated and freeze, 1 to 2 inches of heave may occur. This heave can be a nuisance for slabs or steps in front of doors and at other critical grade areas. One way to reduce this heave is to remove the frost-susceptible soils down to bottom-of-footing level and replace them with nonfrost-susceptible sand or sandy gravel. Sand or sandy gravel with less than 5 percent of the particles by weight passing a number 200 sieve is nonfrost-susceptible.

If this approach is used, we recommend a drain pipe be installed to remove any water that may collect in the sand or sandy gravel. The bottom of the subexcavation should be graded so the water flows to the center where it can be collected by the pipe and drained to a storm sewer, another drain tile, or a water collector system for discharge.

An alternative method of reducing frost heave is to place a minimum of 2 inches of extruded polystyrene foam insulation beneath the slabs and extending about 4 feet beyond the slabs. The insulation will reduce frost penetration into the underlying subgrade and thereby reduce heave. Six to 12 inches of granular material is generally placed over the insulation to protect it during construction.

A third alternative for reducing frost heave is to support the steps or slabs on frost-depth footings. A void space of at least 4 inches should be provided between the bottoms of the steps/slabs and frost-susceptible soils to allow the soils to heave without affecting the steps/slabs.

C.8. Potential Soil Expansion/Shrinkage

A large portion of this site contains soils that have some potential to swell or heave depending on seasonal variations in moisture contents.

Swell tests are being conducted on the fat clays below the fill. Visual observations indicate these soils are considered to have very low to low expansive potential based on the Uniform Building Code. Below at-grade or basement floor slabs, a vapor barrier should be placed to minimize moisture migrations through the floor slab. This will keep the lower floor dry and also prevent drying of the slightly sensitive clays.

Landscaping with large shade trees adjacent to structures can cause the sensitive clay to shrink and can cause settlement during drought conditions. Trees with deep tap roots will extend into the sensitive clays and will dry these soils during drought conditions. Drying of these clays can cause them to consolidate causing settlement to adjacent buildings supported by spread footings or a raft foundation. Trees should then be kept away from housing to approximately their drip line, or trees with shallow tap roots should be used for landscaping.

C.9. Additional Geotechnical Evaluations

Once grades, building types and locations are better defined, additional soil borings will have to be taken. Additional geotechnical evaluations will better define soil corrections, bearing pressure for foundation design, estimates of settlement, or pile lengths for specific buildings.

D. Procedures

D.1. Drilling and Sampling

We performed the penetration test borings from January 22 through February 16, 2001, with multiple truck-mounted core and auger drill equipped with 3 1/4-inch inside diameter hollow-stem auger. Sampling for the borings was conducted in general accordance with ASTM D 1586, "Penetration Test and Split-Barrel Sampling of Soils." We advanced the boreholes with the hollow-stem auger to the desired test depths. A 140-pound hammer falling 30 inches was then used to drive the standard 2-inch split-barrel sampler a total penetration of 1 1/2 feet below the tip of the hollow-stem auger. The blows for the last foot of penetration were recorded and are an index of soil strength characteristics. Samples were taken at 2 1/2- and 5-foot intervals to the termination depths of the borings. A representative portion of each sample was then sealed in a glass jar capped with a lid.

D.2. Soil Classification

Our drill crew chief visually and manually classified soils encountered in the borings in general accordance with ASTM D 2488, "Description and Identification of Soils (Visual-Manual Procedure)." A summary of the ASTM classification system is attached. All samples were then returned to our laboratory for review of the field classifications by a geotechnical engineer. Representative samples will remain in our office for a period of 60 days to be available for your examination.

D.3. Groundwater Observations

Immediately after taking the final samples in the bottoms of the borings, the holes were probed through the hollow-stem auger to check for the presence of groundwater. Immediately after withdrawal of the auger, the holes were again probed and the depths to water or cave-ins were noted. The borings were then immediately backfilled. The borings were rechecked and backfilled just prior to leaving the site.

E. General Recommendations

E.1. Basis of Recommendations

The preliminary analyses and recommendations submitted in this report are based upon the data obtained from the soil borings performed at the locations indicated on the attached plan. Often, variations occur between these borings, the nature and extent of which do not become evident until additional exploration or construction is conducted. A reevaluation of the recommendations in this report should be made after completing additional building-specific soil borings and performing on-site observations during construction to note the characteristics of any variations. The variations may result in additional grading or foundation costs, and it is suggested that a contingency be provided for this purpose.

It is recommended that we be retained to perform the observation and testing program for the site preparation phase of this project. This will allow correlation of the soil conditions encountered during construction to the soil borings, and will provide continuity of professional responsibility.

E.2. Review of Design

This report is based on the preliminary design of the site development as related to us for preparation of this report. It is recommended that we be retained to review the geotechnical aspects of the designs and specifications. With the review, we will evaluate whether any changes in design have affected the validity of the recommendations, and whether our recommendations have been correctly interpreted and implemented in the design and specifications.

E.3. Groundwater Fluctuations

We made water level observations in the borings and monitoring wells at the times and under the conditions stated on the boring logs. These data were interpreted in the text of this report. The period of observation was relatively short, and fluctuations in the groundwater level may occur due to rainfall, flooding, irrigation, spring thaw, drainage, and other seasonal and annual factors not evident at the time the observations were made. Design drawings and specifications and construction planning should recognize the possibility of fluctuations.

E.4. Use of Report

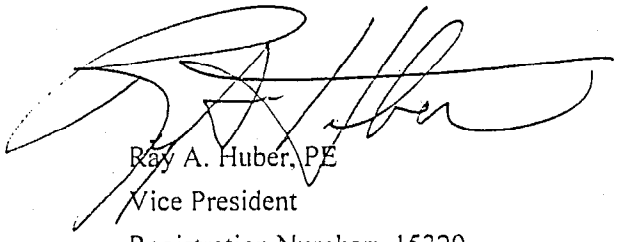
This preliminary report is for the exclusive use of the MCDA and their design team to use to design the proposed structures and prepare preliminary design documents. In the absence of our written approval, we make no representation and assume no responsibility to other parties regarding this report. The data, analyses and recommendations may not be appropriate for other structures or purposes. We recommend that parties contemplating other structures or purposes contact us.

E.5. Level of Care

Services performed by Braun Intertec Corporation personnel for this project have been conducted with that level of care and skill ordinarily exercised by members of the profession currently practicing in this area under similar budget and time restraints. No warranty, expressed or implied, is made.

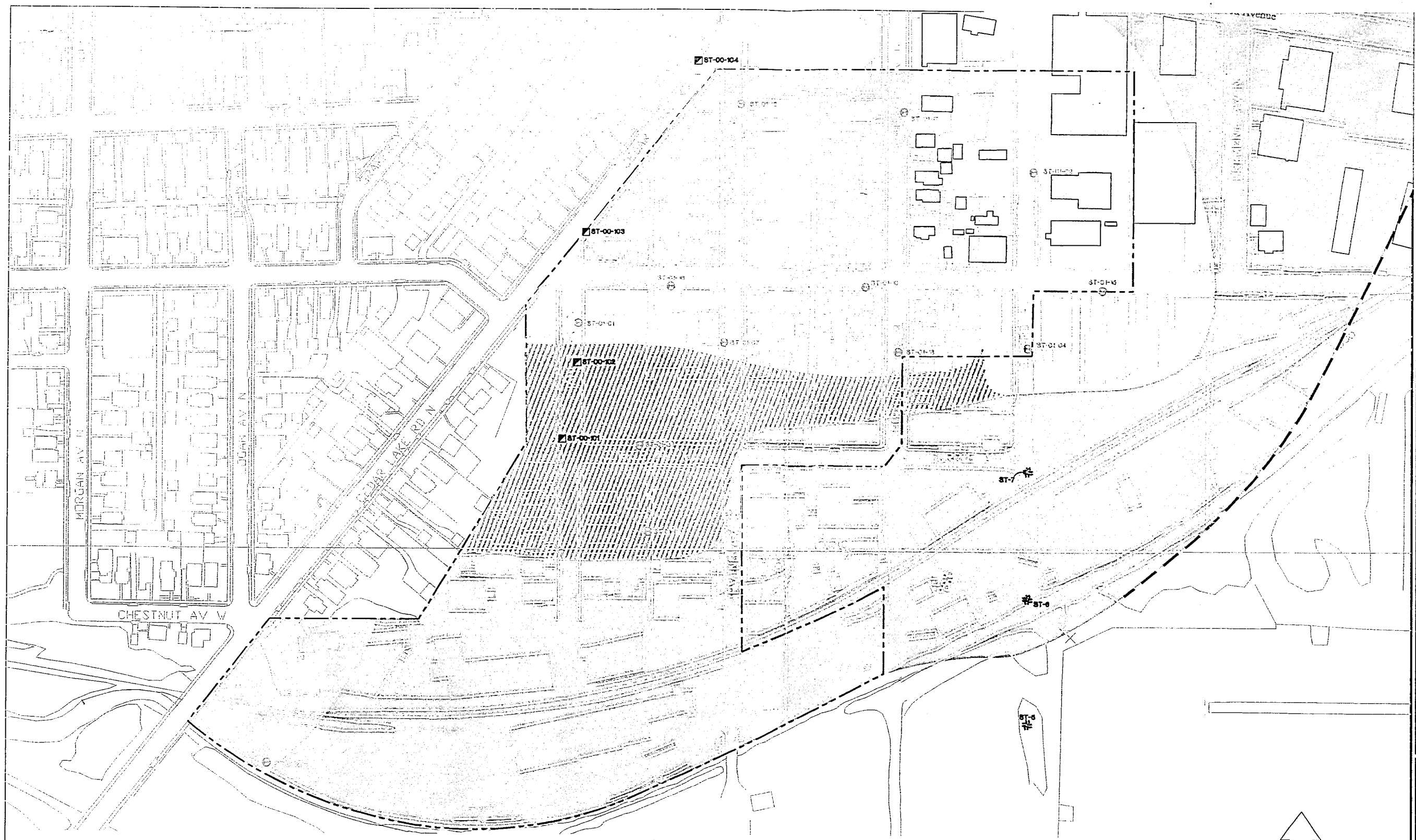
Professional Certification

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



Ray A. Huber, PE
Vice President
Registration Number: 15329
April 9, 2001

Appendix



APPROXIMATE LOCATION OF SOIL BORING BY BRAUN INTERTEC, INC. FOR MONTGOMERY WATSON (2000)

APPROXIMATE LOCATION OF SOIL BORING FOR HENNEPIN COUNTY REGIONAL RAILROAD AUTHORITY

APPROXIMATE LOCATION OF SOIL BORING BY BRAUN INTERTEC, INC. (2001)

SITE BOUNDARY

ZONE 1: SPREAD FOOTINGS WITH SOME SOIL CORRECTION

ZONE 2: TIMBER PILES/RAFT FOUNDATIONS

ZONE 3: PIPE PILES

ZONE 4: PIPE PILES/RAFT FOUNDATIONS

N

100' 0 200'

SCALE 1"= 200'

BRAUN INTERTEC

SOIL CONDITIONS MAP
NEAR NORTHSIDE REDEVELOPMENT
MINNEAPOLIS, MINNESOTA

INT		DATE	
DRAWN BY:	BJB	9-14-99	
APP'D BY:	RAH	3-9-01	
JOB NO.	CMXX-01-0004		
DWG. NO.	BASE-2	SHEET	OF
SCALE	1" = 200'		

FIGURE NO.

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: **ST-01-01**

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/22/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
823.0	0.0	FILL	FILL: 6 1/2 inches of bituminous overlying approximately 2 feet of aggregate base.			
820.5	2.5			4		
		FILL	FILL: Lean Clay, brown, wet.			
819.0	4.0					
		OL	ORGANIC CLAY, black, wet. (Topsoil)	7		MC = 37%
816.0	7.0					
		CL	LEAN CLAY, gray, wet, medium. (Alluvium)	8		
814.0	9.0					
		CH	FAT CLAY, with seams of Sand, gray, wet, rather soft to medium. (Lacustrine)	6		
				5		
809.0	14.0					
		ML	SANDY SILT, with Sand and Clay seams, gray, wet, very loose to loose. (Alluvium)	9		
					▽	An open triangle in the water level (WL) column indicates the depth at which groundwater was observed while drilling. A solid triangle indicates the groundwater level in the boring on the date indicated. Groundwater levels fluctuate.
				8		
				6		
				4		
791.0	32.0					

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Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-01 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/22/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			SANDY SILT. (Continued from previous page)			
				7		
				9		
				8		
774.0	49.0					
		CL	SANDY LEAN CLAY, with layers of Poorly Graded Sand with Silt, gray, wet, stiff. (Alluvium)	14		
772.5	50.5		END OF BORING.			
			Water observed at 19 feet with 49 feet of hollow-stem auger in the ground.			
			Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: **CMXX-01-0004**
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: **ST-01-02**

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/22/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
813.4	0.0					
812.4	1.0	FILL	FILL: Bituminous over aggregate base.			
809.4	4.0	FILL	FILL: Silty Sand, fine- to medium-grained, with Gravel and cinders, brown, moist.	5		
794.4	19.0	CH	FAT CLAY, gray, wet, rather soft to very soft. (Lacustrine)	4 2 WH* WH WH	▽	* WH = Weight of Hammer
789.4	24.0	CH	FAT CLAY, with lenses of Silty Sand, gray, wet, very soft. (Lacustrine)	2		
781.4	32.0	SP	POORLY GRADED SAND, fine-grained, brownish-gray, waterbearing, loose to medium dense. (Alluvium)	5 15		

An open triangle in the water level (WL) column indicates the depth at which groundwater was observed while drilling. A solid triangle indicates the groundwater level in the boring on the date indicated. Groundwater levels fluctuate.

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-02 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/22/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			POORLY GRADED SAND. (Continued from previous page)			
779.4	34.0					
		CL	SANDY LEAN CLAY, with Gravel, reddish-brown, wet, medium to rather stiff. (Glacial Till)	7		
				8		
				8		
762.9	50.5			10		
			END OF BORING. Water observed at 17 1/2 feet with 49 feet of hollow-stem auger in the ground. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-03

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/23/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
814.4	0.0					
813.4	1.0	FILL	FILL: 4 inches of bituminous overlying 8 inches of aggregate base.			
812.4	2.0	FILL	FILL: Silty Sand, fine- to medium-grained, dark brown, frozen.			
		CL	LEAN CLAY, black mixed with some gray, moist. (Topsoil/Fill)	5		MC = 23%
810.4	4.0					
		CL	LEAN CLAY, gray, wet, very soft. (Lacustrine)	3		
807.4	7.0					
		CL	LEAN CLAY, with Sand seams, gray, wet, very soft. (Lacustrine)	3		
				2	▽	
802.4	12.0					
		CH	FAT CLAY, gray, wet, very soft. (Lacustrine)	WH		
				WH		MC = 76%
				WH		
				WH		
782.4	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-03 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/23/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			FAT CLAY. (Continued from previous page)			
780.4	34.0					
		SM	SILTY SAND, fine-grained, gray, wet, loose. (Alluvium)	10		
775.4	39.0					
		ML	SANDY SILT with seams of Clay and Sand, gray, wet, loose to medium dense. (Alluvium)	16		
				9		
763.9	50.5			8		
			END OF BORING. Water observed at 11 feet with 49 feet of hollow-stem auger in the ground. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-04

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/23/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
808.3	0.0					
807.3	1.0	FILL	FILL: Bituminous over aggregate base.			
804.3	4.0	FILL	FILL: Lean Clay mixed with Fat Clay, non to slightly organic, gray and black, moist.	13		
802.3	6.0	FILL	FILL: Silty Sand, fine-grained, with Gravel, brown, moist.	4		
799.3	9.0	CH	FAT CLAY, with shells, slightly organic, gray, wet. (Swamp Deposit)	3		
		CH	FAT CLAY, gray, wet, very soft. (Lacustrine)	WH		
				WH		
				WH	▽	
				WH		
				WH		
779.3	29.0					
776.3	32.0	SP	POORLY GRADED SAND, fine-grained, gray, waterbearing, loose to medium dense. (Alluvium)			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: **ST-01-04 (cont.)**

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/23/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			POORLY GRADED SAND. (Continued from previous page)	8		
				20		
				14		
759.3	49.0	SC	CLAYEY SAND, fine-grained, with Gravel, brownish-gray, wet, rather stiff. (Glacial Till)	10		
757.8	50.5		END OF BORING.			

Water observed at 16 feet with 49 feet of hollow-stem auger in the ground.

Boring immediately backfilled with bentonite grout.

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: **ST-01-05**

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/23/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
813.0	0.0					
812.0	1.0	FILL	FILL: 2 inches of Bituminous over Silty Sand, fine- to medium-grained, dark brown, frozen.			
811.0	2.0	OL	ORGANIC CLAY, black, frozen. (Topsoil)	7		
809.0	4.0	CL	LEAN CLAY, gray, wet, medium. (Alluvium)			
794.0	19.0	CH	FAT CLAY, gray, wet, very soft to soft. (Lacustrine)	6 2 1 WH WH	▽	MC = 88%
789.0	24.0	SP-SM	POORLY GRADED SAND with SILT, fine-grained, gray, waterbearing, loose. (Alluvium)	5		
781.0	32.0	ML	SANDY SILT, gray, waterbearing, very loose to loose. (Alluvium)	7 3		

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-05 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/23/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		ML	CLAYEY SILT, with Clay and Sand seams, gray, wet, rather soft. (Alluvium)	5		
774.0	39.0					
		CL	SANDY LEAN CLAY, with a trace of Gravel and layers of Sand, gray, wet, medium to stiff. (Glacial Till)	8		
				16		
762.5	50.5			14		
			END OF BORING.			
			Water observed at 16 1/2 feet with 49 feet of hollow-stem auger in the ground.			
			Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-06

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/23/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
805.9	0.0					
804.9	1.0	FILL	FILL: Bituminous over aggregate base.			
		FILL	FILL: Silty Sand, with cinders and fine Gravel, dark brown, moist.	21		
801.9	4.0					
		FILL	FILL: Sandy Lean Clay, brown and gray, wet.	3		
799.9	6.0					
		OL	ORGANIC CLAY, with shells, gray, wet, very soft to soft. (Swamp Deposit)	2		
				WH		
				WH		
				WH		
					▽	
786.9	19.0					
		CH	FAT CLAY, gray, wet, very soft. (Lacustrine)	WH		
				WH		
				WH		
773.9	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-06 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/23/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			FAT CLAY. (Continued from previous page)			
				WH		
				WH		
				WH		
				WH		
			Dark gray below 55 feet.	WH		
746.9	59.0	CL	SANDY LEAN CLAY, gray, wet, very soft. (Lacustrine)	WH		
741.9	64.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004 Preliminary Geotechnical Evaluation Bassett Creek Valley Study Area Cedar Lake Road and 1st Avenue North Minneapolis, Minnesota	BORING: ST-01-06 (cont.) LOCATION: See attached sketch.
CREW CHIEF: G. Hanson / METHOD: 3 1/4" HSA Autohmr.	DATE: 1/23/01 / SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
740.4	65.5	SP-SM	POORLY GRADED SAND with SILT, fine- to medium-grained, gray, waterbearing, medium dense. (Alluvium)	28		
			END OF BORING.			
			Water observed at 18 feet with 64 feet of hollow-stem auger in the ground.			
			Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004 Preliminary Geotechnical Evaluation Bassett Creek Valley Study Area Cedar Lake Road and 1st Avenue North Minneapolis, Minnesota	BORING: ST-01-07 LOCATION: See attached sketch.
CREW CHIEF: S. McLean / METHOD: 3 1/4" HSA Autohmr.	DATE: 1/24/01 / SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
805.9	0.0					
804.7	1.2	FILL	FILL: 7 inches of Bituminous overlying 7 inches of aggregate base.			
801.9	4.0	CL	LEAN CLAY, grayish-brown, frozen. (Alluvium)	8		
798.9	7.0	CL	LEAN CLAY, brown to dark brown, wet, medium. (Alluvium)	8		
796.9	9.0	SC	CLAYEY SAND, fine-grained, with a trace of Gravel, brownish-gray, wet, rather soft. (Glacial Till)	5		
793.9	12.0	SM	SILTY SAND, fine-grained, brownish gray, wet, loose. (Glacial Till)	6		
791.9	14.0	SM-SC	SILTY TO CLAYEY SAND, fine-grained, with a trace of Gravel, brownish gray, wet, loose. (Glacial Till)	6		
786.9	19.0	CL	SANDY LEAN CLAY, with a trace of Gravel, brownish-gray to gray, wet, medium. (Glacial Till)	6		
773.9	32.0	SC	CLAYEY SAND, fine-grained, with a trace of Gravel, reddish brown, wet, medium. (Glacial Till)	6 6 8		

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-07 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/24/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			CLAYEY SAND. (Continued from previous page)			
				8		
766.9	39.0					
		ML	SANDY SILT, with a trace of Gravel, brown, waterbearing, medium dense. (Glaciofluvium)	14	▽	
				12		
757.9	48.0					
		ML	SANDY SILT, with seams of Sand, brown, waterbearing, medium dense. (Glaciofluvium)	17		
755.4	50.5					
			END OF BORING. Water observed at 40 feet with 49 feet of hollow-stem auger in the ground. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-08

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/26/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
809.0	0.0					
808.0	1.0	FILL	FILL: Bituminous over aggregate base.			
		FILL	FILL: Poorly Graded Sand with Silt, with fine Gravel, brown, moist.	36		
				5		
802.5	6.5					
		OL	ORGANIC CLAY, with shells (muck), gray, waterbearing, soft to very soft. (Swamp Deposit)	2	▽	
				WH		
797.5	11.5					
		CL	LEAN CLAY, non to slightly organic, gray, wet, very soft. (Lacustrine)	WH		
795.0	14.0					
		CH	FAT CLAY, gray, wet, very soft. (Lacustrine)	WH		
				WH		
				WH		
				WH		
777.0	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-08 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/26/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			FAT CLAY. (Continued from previous page)			
				WH		
770.0	39.0					
		CL	LEAN CLAY, gray, wet, very soft. (Lacustrine)	WH		
				WH		
760.0	49.0					
		CL	LEAN CLAY, wet, very soft. (Lacustrine)	WH		
755.0	54.0					
		SC	CLAYEY SAND, with Gravel, with lenses of Sand with Silt, gray, wet, rather stiff. (Glacial Till)	9		
750.0	59.0					
		CL	SANDY LEAN CLAY, with Gravel, gray, wet, rather stiff. (Glacial Till)	11		
748.5	60.5		END OF BORING.*			

* Water observed at 8 feet with 59 feet of hollow-stem auger in the ground.

Boring immediately backfilled with bentonite grout.

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004 Preliminary Geotechnical Evaluation Bassett Creek Valley Study Area Cedar Lake Road and 1st Avenue North Minneapolis, Minnesota	BORING: ST-01-09 LOCATION: See attached sketch.
CREW CHIEF: S. McLean / METHOD: 3 1/4" HSA Autohmr.	DATE: 1/24/01 / SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
811.9	0.0	FILL	FILL: 4 inches of Bituminous overlying aggregate base.			
				23		
808.9	3.0	CL	LEAN CLAY, gray, wet, rather soft to medium. (Lacustrine)			
				6		
				4		
802.9	9.0				▽	
		CH	FAT CLAY, gray, wet, soft to very soft. (Lacustrine)	3		
				WH		
				WH		MC = 96%
				WH		
				WH		
				WH		
779.9	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-09 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/24/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			FAT CLAY. (Continued from previous page)	WH		
774.9	37.0	ML	CLAYEY SILT, gray, waterbearing, rather soft. (Alluvium)	5		
767.9	44.0	ML	CLAYEY SILT, with lenses of Clay, gray, wet, rather soft. (Alluvium)	5		
762.9	49.0	SM	SILTY SAND, very fine-grained, with layers of Clay, gray, wet, loose. (Alluvium)	7		
757.9	54.0	CL	SANDY LEAN CLAY, with a trace of Gravel, brownish-gray, wet, medium. (Glacial Till)	7		
753.9	58.0	CL	LEAN CLAY, gray, wet, medium. (Glaciofluvium)	8		
748.9	63.0	CL	SANDY LEAN CLAY, with a trace of Gravel,*			* grayish-brown, wet, medium to rather stiff. (Glacial Till)
747.9	64.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-09 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/24/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		CL	LEAN CLAY. (continued from previous page)	7		
				11		
				11		
				11		
				8		
724.9	87.0					
		SP-SM	POORLY GRADED SAND with SILT, fine- to medium-grained, with Gravel, brown, waterbearing, medium dense. (Glacial Outwash)	24		
721.4	90.5		END OF BORING. Water observed at 9 feet with 89 feet of hollow-stem auger in the ground. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: **ST-01-10**

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/29/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
814.2	0.0					
813.2	1.0	FILL	FILL: Bituminous over aggregate base.			
		FILL	FILL: Silty Sand, fine-grained, with Gravel, dark brown, wet.	8		qp = Pocket penetrometer used to estimate unconfined compressive strength, tons per square foot (tsf).
				3		
807.7	6.5	CL	LEAN CLAY, gray, wet, medium. (Lacustrine)	6	▽	MC = 35% qp = 1 1/4 tsf
805.2	9.0	SM	SILTY SAND, fine- to medium-grained, with lenses of Sand with Silt, gray, wet, loose. (Glacial Till)	9		
802.7	11.5	SC	CLAYEY SAND, fine- to medium-grained, with layers of Sandy Lean Clay, gray, wet, loose. (Glacial Till)	6		MC = 14% qp = 1 1/2 tsf
				8		qp = 2 tsf
				8		qp = 2 1/2 tsf
				8		qp = 1 1/2 tsf
			With lenses of Sand at 30 feet.	5		qp = 1 3/4 tsf
782.2	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-10 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/29/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			CLAYEY SAND. (Continued from previous page)			
778.7	35.5			8		qp = 2 tsf
			END OF BORING. Water observed at 8 1/2 feet with 14 feet of hollow-stem auger in the ground. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-11

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/25/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
811.1	0.0	FILL	FILL: Sandy Lean Clay, with a trace of metal, dark brown to gray, frozen to 2 feet then moist.	5		
807.1	4.0	FILL	FILL: Silty Sand, fine- to medium-grained, with wood, light brown, moist.	5		
804.1	7.0	FILL	FILL: Silty Sand, fine- to medium-grained, with a trace of bituminous and concrete, black, waterbearing.	14		
				3		
799.1	12.0	FILL	FILL: Poorly Graded Sand with Silt, fine- to medium-grained, black, waterbearing.	6		
797.1	14.0	PT	PEAT, non fibrous, black, wet. (Swamp Deposit)	3		
				WH		
787.1	24.0	OL	ORGANIC CLAY, with a trace of shells, dark brown to olive, wet. (Swamp Deposit)	WH		
				WH		MC = 168% OC = 13%

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004 Preliminary Geotechnical Evaluation Bassett Creek Valley Study Area Cedar Lake Road and 1st Avenue North Minneapolis, Minnesota	BORING: ST-01-11 (cont.) LOCATION: See attached sketch.
CREW CHIEF: S. McLean / METHOD: 3 1/4" HSA Autohmr.	DATE: 1/25/01 / SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			ORGANIC CLAY. (Continued from previous page)			
				WH		
				WH		
				WH		
				WH		MC = 74% OC = 10%
				WH		
				WH		
747.1	64.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-11 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/25/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		CH	FAT CLAY, gray, wet, very soft. (Lacustrine)	WH		
				WH		
				WH		MC = 68%
				WH		
				WH		
				WH		
				3		
715.1	96.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-11 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/25/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		CH	FAT CLAY, gray, wet, very soft. (Lacustrine)			
711.1	100.0			2		
		SP-SM	POORLY GRADED SAND with SILT, fine-grained, with layers of Clayey Sand, gray, waterbearing, loose to dense. (Alluvium)			
				9		
				30		
698.1	113.0					
		SP-SM	POORLY GRADED SAND with SILT, fine- to medium-grained, with a trace of Gravel, gray, waterbearing, medium dense. (Glacial Outwash)			
				25		
				24		
				27		
685.1	126.0					
		CL	SANDY LEAN CLAY, with a trace of Gravel, gray, wet, very stiff. (Glacial Till)			
683.1	128.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-11 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/25/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		CL	SANDY LEAN CLAY, with a trace of Gravel, gray, wet, very stiff. (Glacial Till)	21		
675.6	135.5			23		
			END OF BORING. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-13

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/31/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
833.0	0.0					
832.0	1.0	FILL	FILL: 7 inches of Bituminous over aggregate base.			
		CL	LEAN CLAY, with a trace of shells, brown and gray, wet, medium. (Lacustrine)	6		MC = 7% qp = 3 tsf
				6		qp = 3 tsf
				6		qp = 3 tsf
824.0	9.0					
821.5	11.5	CH	FAT CLAY, grayish-brown, wet, medium. (Lacustrine)	6		
819.0	14.0	SC	CLAYEY SAND, with Sandy Silt, grayish-brown, wet, rather soft. (Alluvium)	5		
814.0	19.0	SM	SILTY SAND, fine-grained, with lenses of Poorly Graded Sand, brown, moist, loose. (Alluvium)	8		
		SM	SILTY SAND, gray, moist to waterbearing, loose to medium dense. (Glacial Till)	17		qp = 4 tsf
			Wet below 25 feet with lenses of Sand.	17		qp = 3 1/2 tsf
				10		

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-13 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/31/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			SILTY SAND. (Continued from previous page)			
797.5	35.5		With Gravel at 35 feet.	16		qp = 3 1/2 tsf
			END OF BORING.			
			Water not observed with 34 feet of hollow-stem auger in the ground.			
			Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-14

LOCATION:
See attached sketch.

CREW CHIEF: M. Niesen | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/30/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
809.9	0.0					
808.9	1.0	FILL	FILL: 7 inches of Bituminous over aggregate base.			
		FILL	FILL: Silty Sand, with Gravel and a trace of Bituminous, brown, moist.	54		
805.9	4.0	ML	SANDY SILT, with shells, light gray to gray, wet, loose to very loose. (Lacustrine)	7		
				1		
				WH		
798.4	11.5	CL	LEAN CLAY, gray, wet, very soft. (Lacustrine)	WH		
				WH		
790.9	19.0	CH	FAT CLAY, gray, wet, very soft to medium. (Lacustrine)	WH		
				WH		
777.9	32.0			WH		

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-14 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: M. Niesen | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/30/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		CH	FAT CLAY. (Continued from previous page)			
				WH		
				1		
				WH		
				WH		
				1		
				6		
745.9	64.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004 Preliminary Geotechnical Evaluation Bassett Creek Valley Study Area Cedar Lake Road and 1st Avenue North Minneapolis, Minnesota	BORING: ST-01-14 (cont.) LOCATION: See attached sketch.
CREW CHIEF: M. Niesen / METHOD: 3 1/4" HSA Autohmr.	DATE: 1/30/01 / SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		CH	FAT CLAY. (Continued from previous page)	5		
739.4	70.5			6		
			END OF BORING. Water not observed with 69 feet of hollow-stem auger in the ground. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-15

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/31/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
810.1	0.0					
808.6	1.5	FILL	FILL: Bituminous over Silty Sand with Gravel and and trace of Lean Clay, dark brown, moist.			
806.1	4.0	FILL	FILL: Sandy Lean Clay, slightly organic, dark gray, wet. (Swamp Deposit)	28		
801.1	9.0	OL	ORGANIC CLAY, with shells, gray, wet. (Swamp Deposit)	4 2	▽	
798.6	11.5	CL	LEAN CLAY, gray, wet, soft. (Lacustrine)	2		
781.1	29.0	CH	FAT CLAY, gray, wet, very soft. (Lacustrine)	1 WH WH WH		
778.1	32.0	SM	SILTY SAND, gray, waterbearing, loose. (Alluvium)	7		

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-15 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/31/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		SM	SILTY SAND. (Continued from previous page)			
776.1	34.0	SP	POORLY GRADED SAND, fine-grained, with fine Gravel, gray, waterbearing, loose. (Alluvium)	8		
				6		
766.1	44.0	CL	LEAN CLAY, with a trace of Gravel, brownish-gray, wet, rather stiff. (Alluvium)	10		
761.1	49.0	SP	POORLY GRADED SAND, fine- to medium-grained, with a trace of Gravel and Cobbles, brown, waterbearing, rather stiff. (Glacial Outwash)	12		
754.6	55.5			13		
			END OF BORING. Water observed at 8 feet with 54 feet of hollow-stem auger in the ground. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: **ST-01-16**

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/31/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
815.5	0.0					
814.5	1.0	FILL	FILL: 6 1/2 inches Bituminous over aggregate base.			
		SM	SILTY SAND, fine-grained, with layers of Clayey Sand, gray and brown, wet, loose. (Alluvium)	7		MC = 22%
				8		
				8		
806.5	9.0					
		MLS	SANDY SILT, with lenses of gray and dark gray, waterbearing, loose. (Alluvium)	10		MC = 29% qp = 3 1/2 tsf
				5		
				6		
796.5	19.0					
		CL	SANDY LEAN CLAY, with Gravel, brownish-gray, wet, rather soft to rather stiff. (Glacial Till)	7		qp - 2 1/4 tsf
				5		qp = 2 1/4 tsf
				8		qp = 2 tsf
783.5	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004 Preliminary Geotechnical Evaluation Bassett Creek Valley Study Area Cedar Lake Road and 1st Avenue North Minneapolis, Minnesota	BORING: ST-01-16 (cont.) LOCATION: See attached sketch.
CREW CHIEF: S. McLean / METHOD: 3 1/4" HSA Autohmr.	DATE: 1/31/01 / SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			SANDY LEAN CLAY. (Continued from previous page)			
				11		qp = 2 tsf
775.0	40.5			11		qp = 2 1/4 tsf
			END OF BORING. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-17

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/31/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
819.3	0.0					
818.3	1.0	FILL	FILL: 6 inches Bituminous over aggregate base.			
		FILL	FILL: Silty Sand, fine-grained, brown to black, moist.	14		
815.3	4.0					
		CL	LEAN CLAY, with shells, gray, wet, rather soft. (Lacustrine)	4		qp = 2 1/2 tsf
812.8	6.5					
		CH	FAT CLAY, brownish gray to gray, wet, very soft to soft. (Lacustrine)	3		
				1		qp = 3/4 tsf
				WH		
				WH		
800.3	19.0					
		CL	SANDY LEAN CLAY, with Gravel, brownish-gray, wet, rather soft to rather stiff. (Glacial Till)	5		
				6		qp = 1 3/4 tsf
				10		qp = 1 1/4 tsf
787.3	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-17 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/31/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
			SANDY LEAN CLAY. (Continued from previous page)			
				10		qp = 3 tsf
778.8	40.5			11		
			END OF BORING. Water not observed with 39 feet of hollow-stem auger in the ground. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-18

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 2/1/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
811.2	0.0	FILL	FILL: 6 inches of Bituminous over aggregate base.			
810.2	1.0	FILL	FILL: Lean Clay, gray to black, wet.	14		
806.2	5.0	FILL	FILL: Poorly Graded Sand with Silt, brown, moist.	8		
802.2	9.0	CL	LEAN CLAY, with layers of Fat Clay, gray, wet, soft to rather soft. (Lacustrine)	11		
				5		MC = 34% qp = 1 1/2 tsf LL = 47, PI = 27
797.2	14.0	CL	SANDY LEAN CLAY, with Gravel, gray, wet, rather soft to medium. (Glacial Till)	3		qp = 1 tsf
				6		MC = 17% qp = 2 1/4 tsf
				8		qp = 2 1/2 tsf
			Grayish-brown below 24 feet.	4		qap = 1 3/4 tsf
				5		qp = 2 tsf
779.2	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-18 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 2/1/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		CL	SANDY LEAN CLAY. (Continued from previous page)			
				8		qp = 1 3/4 tsf
				9		qp = 1 3/4 tsf
					▽	
767.2	44.0					
		SM	SILTY SAND, fine- to medium-grained, with Gravel, grayish-brown, wet, loose to medium dense. (Glacial Till)	10		
				14		
760.7	50.5					
			END OF BORING. Water observed at 43 feet while drilling. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: **ST-01-19**

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 2/13/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
816.2	0.0					
815.2	1.0	FILL	FILL: Bituminous over Aggregate Base.			
		FILL	FILL: Poorly Graded Sand with Silt, with Gravel, wood, brick and glass, brown, moist.	47		
812.2	4.0					
		FILL	FILL: Silty Sand, mixed with Lean Clay, with Gravel, cinders, wood, brick and glass, dark brown to black, moist to wet.	7		
				2		
				4		
				2		
802.2	14.0					
		FILL	FILL: Lean Clay, dark brown, brown and gray, wet.	WH		
800.2	16.0					
		CH	FAT CLAY, with layers of Lean Clay, with lenses of Poorly Graded Sand with Silt, gray, wet, very soft. (Lacustrine)	WH	▽	
				WH		
				WH		
784.2	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-19 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 2/13/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		CH	FAT CLAY. (continued from previous page)	WH		
				WH		
772.2	44.0	SM	SILTY SAND, mixed with Sandy Lean Clay, gray and brownish-gray, wet, very loose to medium dense. (Alluvium)	3		
				21		
762.2	54.0	SC	CLAYEY SAND, gray, wet, loose. (Glacial Till)	6		
759.2	57.0	CL	LEAN CLAY, gray, wet, rather stiff. (Glacial Till)	10		
755.7	60.5		END OF BORING. Water observed at 23 feet with 45 feet of hollow-stem auger in the ground.*			* Boring immediately backfilled with bentonite grout.

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-20

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 2/14/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
815.3	0.0	FILL	FILL: Bituminous over Aggregate Base.			
813.8	1.5	FILL	FILL: Poorly Graded Sand, with Gravel, concrete and Sandstone, with a large obstruction at 2 1/2 feet.	50/2"		No sample recovery.
				17		
				14		
806.3	9.0	PT	PEAT, black, wet. (Swamp Deposit)	2	▽	
803.8	11.5	OL	ORGANIC CLAY, with shells, gray, wet, very soft. (Swamp Deposit)	1		
				WH		
796.3	19.0	CH	FAT CLAY, with layers of Lean Clay, gray, wet, very soft. (Lacustrine)	WH		
				WH		
				WH		
783.3	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-20 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 2/14/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		CH	FAT CLAY. (continued from previous page)	WH		
				WH		
772.3	43.0	SM	SILTY SAND, brownish-gray, wet, loose. (Glacial Till)	9		
				10		
761.3	54.0	SC	CLAYEY SAND, with Gravel, brownish-gray, wet, loose. (Glacial Till)	10		
756.3	59.0	SM	SILTY SAND, brownish-gray, wet, medium dense. (Glacial Till)	11		
751.3	64.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-20 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 2/14/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		CL	SANDY LEAN CLAY, with Gravel, with layers of Silty Sand, grayish-brown, wet, rather stiff to very stiff. (Glacial Till)	9		
				10		
				16		
				13		No sample recovery.
729.8	85.5			19		No sample recovery.
			END OF BORING.			
			Water observed at 9 feet with 10 feet of hollow-stem auger in the ground.			
			Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-21

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 2/16/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
812.7	0.0					
811.7	1.0	FILL	FILL: Bituminous over Aggregate Base.			
		FILL	FILL: Lean Clay with Sand, with Gravel, dark brown, wet.	8		
				3		
806.2	6.5	FILL	FILL: Poorly Graded Sand, with Gravel, Limestone and concrete, dark brown, moist.	55		
803.7	9.0	FILL	FILL: Silty Sand, slightly organic, with Gravel and glass, black.	2	▽	
801.2	11.5	OL	ORGANIC SILT, with shells, gray and black, wet, very loose. (Swamp Deposit)	2		
				2		
				WH		
				WH		
783.7	29.0	CH	FAT CLAY, with layers of Lean Clay, gray, wet, very loose. (Lacustrine)	WH		
780.7	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-21 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 2/16/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		CH	FAT CLAY. (continued from previous page)			
				WH		
				WH		
				WH		
				WH		
				WH		
753.7	59.0					
		SC	CLAYEY SAND, gray, wet, very loose. (Alluvium)	WH		
748.7	64.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: ST-01-21 (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 2/16/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		SC	CLAYEY SAND, with Gravel, gray, wet, very loose to medium dense. (Glacial Till)	3		
				16		
737.2	75.5			12		
			END OF BORING. Water observed at 9 feet with 10 feet of hollow-stem auger in the ground. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: CMXX-01-0004
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: **ST-01-22**

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 2/16/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
816.2	0.0					
815.2	1.0	FILL	FILL: Bituminous over Silty Sand, with Gravel, brown, moist.			
		FILL	FILL: Silty Sand, with Gravel, cinders, asphalt and brick, brown, dark brown and black.	32		
				2		
				8		
807.2	9.0					
		FILL	FILL: Lean Clay, gray and brown, wet.	4		
804.7	11.5					
		FILL	FILL: Silty Sand, with Gravel, moist.	63/4"		
802.2	14.0					
		FILL	FILL: Silty Sand, with Gravel, Cobbles and boulders, with brick, waterbearing.	16		
					▽	
797.2	19.0					
		CL	LEAN CLAY, gray, wet, rather stiff. (Glacial Till)	9		
792.2	24.0					
		SM	SILTY SAND, with Gravel, grayish-brown, waterbearing, medium dense. (Glacial Till)	17		
787.2	29.0					
		CL	SANDY LEAN CLAY, with Gravel, brownish-gray, wet, rather stiff to very stiff. (Glacial Till)	10		
784.2	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: **CMXX-01-0004**
Preliminary Geotechnical Evaluation
Bassett Creek Valley Study Area
Cedar Lake Road and 1st Avenue North
Minneapolis, Minnesota

BORING: **ST-01-22 (cont.)**

LOCATION:
See attached sketch.

CREW CHIEF: G. Hanson | METHOD: 3 1/4" HSA Autohmr. | DATE: 2/16/01 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		CL	SANDY LEAN CLAY. (continued from previous page)			
				17		
775.7	40.5			24		
			END OF BORING. Water observed at 17 feet with 20 feet of hollow-stem auger in the ground. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: **BABX-00-0602** **GEOTECHNICAL EVALUATION** **New Pipe Alternative** **Near Northside** **Minneapolis, Minnesota**	BORING: **ST-101** LOCATION: **See attached sketch.**
CREW CHIEF: K. Keck	METHOD: 3 1/4" HSA Autohmr.
DATE: 11/8/00	SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
817.1	0.0					
815.6	1.5		6 inches of Bituminous over 12 inches of Aggregate Base.			
813.1	4.0	CL	FILL: Lean Clay, gray and black, wet.	6		MC = 42%
810.1	7.0	CH	FAT CLAY, gray, wet, soft. (Lacustrine)	5		
		CH	FAT CLAY, with lenses of Sand and Silt, gray, wet, very soft. (Lacustrine)	2		
				1		MC = 37%
				3		MC = 56%
				2	▽	
				1		
				2		
				2		
				3		
789.1	28.0					Approximate invert grade.
785.1	32.0	SM	SILTY SAND, fine-grained, with lenses of Clay and Silt, gray, waterbearing, loose. (Alluvium)	5		

An open triangle in the water level (WL) column indicates the depth at which groundwater was observed while drilling. A solid triangle indicates the groundwater level in the boring on the date indicated. Groundwater levels fluctuate.

BRAUN INTERTEC

LOG OF BORING

PROJECT: **BABX-00-0602**
GEOTECHNICAL EVALUATION
New Pipe Alternative
Near Northside
Minneapolis, Minnesota

BORING: **ST-101 (cont.)**

LOCATION:
See attached sketch.

CREW CHIEF: K. Keck | METHOD: 3 1/4" HSA Autohmr. | DATE: 11/8/00 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
784.1	33.0	SM	SILTY SAND. (Continued from previous page)			
		CH	FAT CLAY, with lenses of Sand and Silt, gray, wet, soft. (Lacustrine)	4		
779.1	38.0					
		SM	SILTY SAND, very fine-grained, with lenses of Clay, gray, wet, loose. (Alluvium)	7		
773.1	44.0					
		ML	CLAYEY SILT, with layers of Fat Clay and Sand seams, gray, wet, medium. (Lacustrine)	8		
768.1	49.0					
		CH	FAT CLAY, with very fine Sand lenses, gray, wet, rather stiff. (Lacustrine)	9		
763.1	54.0					
		SC	CLAYEY SAND, fine-grained, with Gravel, brownish-gray, wet, stiff. (Glacial Till)	13		
				15		
753.1	64.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: **BABX-00-0602**
GEOTECHNICAL EVALUATION
New Pipe Alternative
Near Northside
Minneapolis, Minnesota

BORING: **ST-101 (cont.)**

LOCATION:
See attached sketch.

CREW CHIEF: K. Keck | METHOD: 3 1/4" HSA Autohmr. | DATE: 11/8/00 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		SM/SC	SILTY TO CLAYEY SAND, fine- to medium-grained, with Gravel, reddish-brown, wet, medium dense. (Glacial Till)	12		MC = 11% P200 = 35%
747.1	70.0			9		
746.6	70.5	SP-SM	POORLY GRADED SAND with SILT, fine- to medium-grained, with Gravel, brown, wet, loose. (Glacial Outwash)			
			END OF BORING.			
			Water observed at 15 feet with 69 feet of hollow-stem auger in the ground.			
			Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: **BABX-00-0602**
GEOTECHNICAL EVALUATION
New Pipe Alternative
Near Northside
Minneapolis, Minnesota

BORING: **ST-102**

LOCATION:
See attached sketch.

CREW CHIEF: K. Keck | METHOD: 3 1/4" HSA Autohmr. | DATE: 11/9/00 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
826.5	0.0	CL	LEAN CLAY, black to brownish-gray, wet. (Possible Fill)			
823.5	3.0	CH	FAT CLAY, brownish-gray, wet, rather soft. (Lacustrine)	4		
818.5	8.0	ML	SILT, with Sand lenses, grayish-brown, wet, rather soft. (Alluvium)	5		
814.5	12.0	ML	SANDY SILT, with Sand lenses, brown, wet, loose. (Lacustrine)	6		
				4	▽	MC = 32%
809.5	17.0	ML	SANDY SILT, with Clay seams, gray, wet to 19 feet then waterbearing, very loose. (Lacustrine)	2		
				1		*WH = Weight of Hammer
				2		
				WH*		
799.5	27.0					Approximate invert grade.
797.5	29.0	CL	CLAYEY SILT, with seams of Sand, gray, wet, very soft. (Lacustrine)	2		
794.5	32.0	ML	SANDY SILT, gray, wet, very loose. (Lacustrine)	4		

BRAUN INTERTEC

LOG OF BORING

PROJECT: **BABX-00-0602**
GEOTECHNICAL EVALUATION
New Pipe Alternative
Near Northside
Minneapolis, Minnesota

BORING: **ST-102** (cont.)

LOCATION:
See attached sketch.

CREW CHIEF: K. Keck | METHOD: 3 1/4" HSA Autohmr. | DATE: 11/9/00 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
793.5	33.0	ML	SANDY SILT. (Continued from previous page)			
		ML	SANDY SILT, with Clay and Sand seams, gray, wet, loose. (Lacustrine)	5		
788.5	38.0					
		CH	FAT CLAY, with Sand and Silt seams, gray, wet, medium. (Lacustrine)	6		
				6		MC = 37% LL = 50 PI = 28
778.5	48.0					
		CL	SANDY LEAN CLAY, with a trace of Gravel, reddish-brown, wet, rather stiff. (Glacial Till)	9		
772.5	54.0					
		SC	CLAYEY SAND, fine-grained, with Gravel, reddish-brown, wet, rather stiff. (Glacial Till)	10		
				12		MC = 13% P200 = 40%
762.5	64.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: **BABX-00-0602** **GEOTECHNICAL EVALUATION** **New Pipe Alternative** **Near Northside** **Minneapolis, Minnesota**	BORING: **ST-102 (cont.)** LOCATION: **See attached sketch.**
CREW CHIEF: K. Keck	METHOD: 3 1/4" HSA Autohmr.
DATE: 11/9/00	SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		SP-SM	POORLY GRADED SAND with SILT, fine- to coarse-grained, with Gravel, brown, waterbearing, loose. (Glacial Outwash)	8		
				9		
756.0	70.5		END OF BORING.			
			Water observed at 15 feet with 69 feet of hollow-stem auger in the ground.			
			Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: **BABX-00-0602**
GEOTECHNICAL EVALUATION
New Pipe Alternative
Near Northside
Minneapolis, Minnesota

BORING: **ST-103**

LOCATION:
See attached sketch.

CREW CHIEF: K. Keck | METHOD: 3 1/4" HSA Autohmr. | DATE: 11/14/00 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
837.9	0.0	CL	LEAN CLAY, black wet. (Topsoil)			
835.9	2.0	CL	LEAN CLAY, brown, wet, loose. (Alluvium)	6		
829.9	8.0	ML	SANDY SILT, brown, wet, medium dense. (Alluvium)	13		MC = 29%
823.9	14.0	SM	SILTY SAND, very fine-grained, with fine Sand layers, brown, wet, medium dense. (Alluvium)	12		
818.9	19.0	ML	SANDY SILT with Fat Clay layers and Sand seams, gray, wet, loose. (Alluvium)	5		
				5		
				5		
810.9	27.0	CH	FAT CLAY, with Sand and Silt seams, gray, wet, medium. (Lacustrine)	7		
808.9	29.0	SM	SILTY SAND, very fine-grained, with layers of Silt and Clay, gray, wet, loose. (Alluvium)	9		
805.9	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: **BABX-00-0602**
GEOTECHNICAL EVALUATION
New Pipe Alternative
Near Northside
Minneapolis, Minnesota

BORING: **ST-103 (cont.)**

LOCATION:
See attached sketch.

CREW CHIEF: K. Keck | METHOD: 3 1/4" HSA Autohmr. | DATE: 11/14/00 | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
804.9	33.0	SM	SILTY SAND. (Continued from previous page)	9		
		SC to CL	CLAYEY SAND to SANDY LEAN CLAY, with a trace of Gravel, reddish-brown to brown, wet, rather stiff to stiff. (Glacial Till)	11		
				14		Approximate invert grade.
				14		
				17		
782.4	55.5			17		
			END OF BORING. Water not observed with 55 feet of hollow-stem auger in the ground. Water not observed to cave-in depth of 22 feet immediately after withdrawal of the auger. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: **BABX-00-0602** **GEOTECHNICAL EVALUATION** **New Pipe Alternative** **Near Northside** **Minneapolis, Minnesota**	BORING: **ST-104** LOCATION: **See attached sketch.**
CREW CHIEF: K. Keck / METHOD: 3 1/4" HSA Autohmr.	DATE: / SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
837.2	0.0					
836.2	1.0	CL	SANDY LEAN CLAY, dark brown. (Possible Fill)			
		SC	CLAYEY SAND, fine-grained, with a trace of Gravel, reddish-brown, wet, rather stiff. (Alluvium)	9		
829.2	8.0					
		ML	SANDY SILT, with Clay seams, reddish-brown, wet, loose. (Alluvium)	9		MC = 21%
823.2	14.0					
		SP-SM	POORLY GRADED SAND with SILT, fine- to medium-grained, with Silty Sand and Clay layers, brown, wet, medium dense. (Alluvium)	12		
818.2	19.0					
		SC	CLAYEY SAND, fine-grained, reddish-brown to brown, wet, stiff. (Glacial Till)	11		
				15		MC = 11% P200 = 43%
				17		
				16		
				18	▼	
805.2	32.0					

BRAUN INTERTEC

LOG OF BORING

PROJECT: **BABX-00-0602**
GEOTECHNICAL EVALUATION
New Pipe Alternative
Near Northside
Minneapolis, Minnesota

BORING: **ST-104 (cont.)**

LOCATION:
See attached sketch.

CREW CHIEF: K. Keck | METHOD: 3 1/4" HSA Autohmr. | DATE: | SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
		SC	CLAYEY SAND. (Continued from previous page)	16		MC = 12%
803.2	34.0					
		SC	CLAYEY SAND, fine-grained, with Gravel, with Sand lenses, gray to reddish-brown, wet, stiff. (Glacial Till)	19	▽	Approximate invert grade.
800.2	37.0					
		SM	SILTY SAND, fine- to medium-grained, with Gravel and Clay layers, brown, waterbearing, loose. (Glacial Outwash)	9		
				10		
793.2	44.0					
		SP	POORLY GRADED SAND, fine- to medium-grained, with Gravel, brown, waterbearing, loose. (Glacial Outwash)	10		MC = 17% Sieve analysis
				20		MC = 13% Sieve analysis
781.7	55.5			23		
			END OF BORING. Water observed at 35 feet with 54 feet of hollow-stem auger in the ground. Water observed at 30 feet immediately after withdrawal of the auger. Boring immediately backfilled with bentonite grout.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: BABX-98-908
Preliminary Geotechnical Evaluation
and Limited Phase II Environmental Site Assessment
Proposed Roadway and Bridges/Dunwoody Blvd to Girard Ave
Minneapolis, Minnesota

BORING: ST-5

LOCATION: See attached sketch.

DRILLER: D. Lovaasen | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/8/99 | SCALE: 1:50

(See Report and Standard Plates for elevation and descriptive terminology.)

Elev. meters	Depth meters	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	N	WL	Test or Notes
247.68	0.0	FILL	FILL: Silty Sand, brown.			
246.9	0.8	FILL	FILL: Sandy Lean Clay, with a little Gravel, with some wood debris, dark gray, moist.	9		
245.5	2.1	FILL	FILL: Organic Clays, with a little brick and glass, with a little Gravel and wood, black, moist to 3.8m.	*		* Sampler encountered wood.
				3		
				4		
			Waterbearing at 3.8m.	3		
				2		
				2		
				3		
240.1	7.6	FILL	FILL: Poorly Graded Sand, black, waterbearing.	2		
239.1	8.5	OH	ORGANIC SILT, dark brown, wet, soft. (Swamp Deposit)	2		
237.5	10.1					

BRAUN INTERTEC

LOG OF BORING

PROJECT: BABX-98-908
Preliminary Geotechnical Evaluation
and Limited Phase II Environmental Site Assessment
Proposed Roadway and Bridges/Dunwoody Blvd to Girard Ave
Minneapolis, Minnesota

BORING: ST-5 (cont.)

LOCATION: See attached sketch.

DRILLER: D. Lovaasen | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/8/99 | SCALE: 1:50

(See Report and Standard Plates for elevation and descriptive terminology.)

Elev. meters	Depth meters	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	N	WL	Test or Notes
		OH	ORGANIC SILT. (Continued from previous page)	WH		LL = 114% * PI = 46% * LL = 79% ** PI = 13% ** * Before drying ** After Oven drying
				WH		
			Brown at 45 feet.	WH		
232.3	15.4			WH		
			END OF BORING. Boring grouted immediately after withdrawal of the auger.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: BABX-98-908 Preliminary Geotechnical Evaluation and Limited Phase II Environmental Site Assessment Proposed Roadway and Bridges/Dunwoody Blvd to Girard Ave Minneapolis, Minnesota	BORING: ST-6 LOCATION: See attached sketch.
DRILLER: D. Lovaasen — METHOD: 3 1/4" HSA Autohmr.	DATE: 1/12/99 — SCALE: 1:50

(See Report and Standard Plates for elevation and descriptive terminology.)

Elev. meters	Depth meters	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	N	WL	Test or Notes
245.73	0.0	FILL	FILL: Silty Sand, brown, frozen to moist.			BM3: top of westerly bolt on top flange of hydrant in NW corner of Currie and Girard = 246.51m.
245.1	0.6	FILL	FILL: Sandy Lean Clay, with a trace of Gravel, dark brown, moist, soft to medium.	8		
				9		
				5		
				5		
			With layers of Silty Sand at 3.8m.	5		
				3		
240.2	5.5		With some glass and cinders at 5.1 to 5.5m.	3		
		OH	ORGANIC SILT, with shells, dark brown, wet, soft.			
			(Swamp Deposit)	WH		
				WH		
				WH		
235.6	10.1					

BRAUN INTERTEC

LOG OF BORING

PROJECT: BABX-98-908 Preliminary Geotechnical Evaluation and Limited Phase II Environmental Site Assessment Proposed Roadway and Bridges/Dunwoody Blvd to Girard Ave Minneapolis, Minnesota	BORING: ST-6 (cont.) LOCATION: See attached sketch.
DRILLER: D. Lovaasen — METHOD: 3 1/4" HSA Autohmr.	DATE: 1/12/99 — SCALE: 1:50

(See Report and Standard Plates for elevation and descriptive terminology.)

Elev. meters	Depth meters	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	N	WL	Test or Notes
		OH	ORGANIC SILT. (Continued from previous page)	WH		
233.4	12.3			WH		
			END OF BORING.			

BRAUN INTERTEC

LOG OF BORING

PROJECT: BABX-98-908
Preliminary Geotechnical Evaluation
and Limited Phase II Environmental Site Assessment
Proposed Roadway and Bridges/Dunwoody Blvd to Girard Ave
Minneapolis, Minnesota

BORING: ST-7

LOCATION: See attached sketch.

DRILLER: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/14/99 | SCALE: 1:50

(See Report and Standard Plates for elevation and descriptive terminology.)

Elev. meters	Depth meters	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	N	WL	Test or Notes
245.73	0.0					
245.1	0.6	FILL	FILL: Silty Sand, fine- to medium-grained, with gravel, brown, frozen to moist.			
243.6	2.1	FILL	FILL: Silty Sand, fine- to medium-grained, with little cinders, with petroleum odor, black, dry.	21 4		
243.1	2.6	FILL	FILL: Silty Sand, fine- to medium-grained, some fiber and wood, black, wet.	2		
242.7	3.0	PT	PEAT, fibrous, dark brown, wet. (Swamp Deposit)	1		
		OH	ORGANIC SILT, with shells, dark gray, wet, very soft. (Swamp Deposit)	1 1 1 1 1		
235.6	10.1					

BRAUN INTERTEC

LOG OF BORING

PROJECT: BABX-98-908
Preliminary Geotechnical Evaluation
and Limited Phase II Environmental Site Assessment
Proposed Roadway and Bridges/Dunwoody Blvd to Girard Ave
Minneapolis, Minnesota

BORING: ST-7 (cont.)

LOCATION: See attached sketch.

DRILLER: S. McLean | METHOD: 3 1/4" HSA Autohmr. | DATE: 1/14/99 | SCALE: 1:50

(See Report and Standard Plates for elevation and descriptive terminology.)

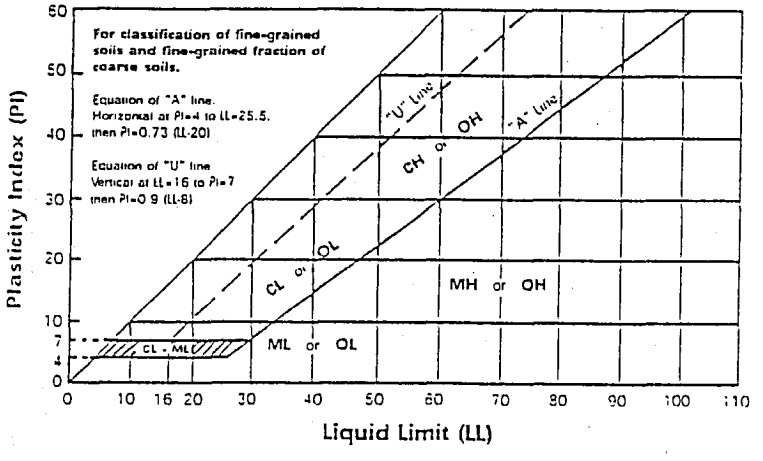
Elev. meters	Depth meters	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	N	WL	Test or Notes
235.1	10.7	OH	ORGANIC SILT. (Continued from previous page)	1		
233.4	12.3	CH	FAT CLAY, gray, wet, very soft. (Lacustrine)	1		
			END OF BORING. Boring then grouted immediately after withdrawal of auger.			

Descriptive Terminology

Standard D 2487 - 93
Classification of Soils for Engineering Purposes (Unified Soil Classiication System)

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [a]				Soil Classification [a]	
				Group Symbol	Group Name [b]
Coarse-grained Soils more than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines [c]	$C_u \geq 4$ and $1 \leq C_c \leq 3$ [e]	GW	Well-graded gravel [f]
			$C_u < 4$ and/or $1 > C_c > 3$ [e]	GP	Poorly graded gravel [f]
		Gravels with Fines More than 12% fines [c]	Fines classify as ML or MH	GM	Silty gravel [f,g,h]
			Fines classify as CL or CH	GC	Clayey gravel [f,g,h]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines [d]	$C_u \geq 6$ and $1 \leq C_c \leq 3$ [e]	SW	Well-graded sand [i]
			$C_u < 6$ and/or $1 > C_c > 3$ [e]	SP	Poorly graded sand [i]
		Sands with Fines More than 12% fines [d]	Fines classify as ML or MH	SM	Silty sand [g,h,i]
			Fines classify as CL or CH	SC	Clayey sand [g,h,i]
Fine-grained Soils 50% or more passed the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line [j]	CL	Lean clay [k,l,m]
			PI < 4 or plots below "A" line [j]	ML	Silt [k,l,m]
		organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OL	Organic clay [k,l,m,o] / Organic silt [k,l,m,o]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay [k,l,m]
			PI plots below "A" line	MH	Elastic silt [k,l,m]
		organic	Liquid limit - oven dried / Liquid limit - not dried < 0.75	OH	Organic clay [k,l,m,p] / Organic silt [k,l,m,q]
Highly Organic Soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

a. Based on the material passing the 3-in (75-mm) sieve.
b. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both," to group name.
c. Gravels with 5 to 12% fines require dual symbols:
   GW-GM well-graded gravel with silt
   GW-GC well-graded gravel with clay
   GP-GM poorly graded gravel with silt
   GP-GC poorly graded gravel with clay
d. Sands with 5 to 12% fines require dual symbols:
   SW-SM well-graded sand with silt
   SW-SC well-graded sand with clay
   SP-SM poorly graded sand with silt
   SP-SC poorly graded sand with clay
e. $C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
f. If soil contains ≥ 15% sand, add "with sand" to group name.
g. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
h. If fines are organic, add "with organic fines" to group name.
i. If soil contains ≥ 15% gravel, add "with gravel" to group name.
j. If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
k. If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
l. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.
m. If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
n. PI ≥ 4 and plots on or above "A" line.
o. PI < 4 or plots below "A" line.
p. PI plots on or above "A" line.
q. PI plots below "A" line.



Laboratory Tests

DD	Dry density, pcf	OC	Organic content, %
WD	Wet density, pcf	S	Percent of saturation, %
MC	Natural moisture content, %	SG	Specific gravity
LL	Liquid limit, %	C	Cohesion, psf
PL	Plastic limit, %	Ø	Angle of internal friction
PI	Plasticity index, %	qu	Unconfined compressive strength, psf
P200	% passing 200 sieve	qp	Pocket penetrometer strength, tsf

Particle Size Identification

Boulders	over 12"
Cobbles	3" to 12"
Gravel	
Coarse	3/4" to 3"
Fine	No. 4 to 3/4"
Sand	
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Silt	No. 200 to .005 mm
Clay	less than .005 mm

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 Cohesive Soils

very soft	0 to 1 BPF
soft	2 to 3 BPF
rather soft	4 to 5 BPF
medium	6 to 8 BPF
rather stiff	9 to 12 BPF
stiff	13 to 16 BPF
very stiff	17 to 30 BPF
hard	over 30 BPF

Drilling Notes

Standard penetration test borings were advanced by 3 1/4" or 6 1/4" ID hollow-stem augers unless noted otherwise. Jetting water was used to clean out auger prior to sampling only where indicated on logs. Standard penetration test borings are designated by the prefix "ST" (Split Tube).

Power auger borings were advanced by 4" or 6" diameter, continuous-flight, solid-stem augers. Soil classifications and strata depths were inferred from disturbed samples augered to the surface and are, therefore, somewhat approximate. Power auger borings are designated by the prefix "B"

Hand auger borings were advanced manually with a 1 1/2" diameter auger and were limited to the depth from which the auger could be manually withdrawn. Hand auger borings are indicated by the prefix "H".

Sampling: All samples were taken with the standard 2" OD split-tube sampler, except where noted. TW indicates thin-walled (undisturbed) tube sample.

BPF: Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler was set 6" into undisturbed soil below the hollow-stem auger. Driving resistances were then counted for second and third 6" increments and added to get BPF. Where they differed significantly, they are reported in the following form: 2/12 for the second and third 6" increments, respectively.

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.

Note: All tests were run in general accordance with applicable ASTM standards.

BRAUN INTERTEC

Rev 11/00