

Preliminary Geotechnical Evaluation Report

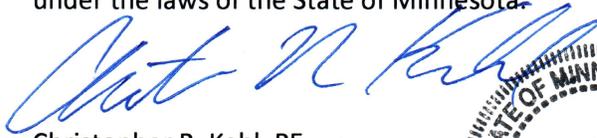
Upper Harbor Terminal
Between 33rd Avenue North and Dowling Avenue
Minneapolis, Minnesota

Prepared for

City of Minneapolis CPED

Professional Certification:

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



Christopher R. Kehl, PE
Principal – Senior Engineer
License Number: 43459
January 27, 2016



Project B1511785

Braun Intertec Corporation

January 27, 2016

Project B15011785

Mr. Abdulkadir Jama
City of Minneapolis CPED
105 5th Avenue South, Suite 200
Minneapolis, MN 55401

Re: Preliminary Geotechnical Evaluation
Upper Harbor Terminal
Between 33rd Avenue North and Dowling Avenue
Minneapolis, Minnesota

Dear Mr. Jama:

We are pleased to present this Preliminary Geotechnical Evaluation Report for the Upper Harbor Terminal in Minneapolis, Minnesota. More detailed information and recommendations follow.

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, or if there are other services that we can provide in support of our work to date, please call Evan Zik at 952.995.2233 (EZik@BraunIntertec.com) or Chris Kehl at 952.995.2386 (CKehl@BraunIntertec.com).

Sincerely,

BRAUN INTERTEC CORPORATION



Evan A. Zik, EIT
Staff Engineer



Christopher R. Kehl, PE
Principal – Senior Engineer

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Appendix A

Soil Boring Location Sketch
 Log of Boring Sheets ST-1101 through ST-1107
 Descriptive Terminology of Soil

Appendix B

Previous Soil Boring Location Sketch (2 pages)
 Log of Previous Boring Sheets
 Historical Aerial Photographs

A. Introduction

A.1. Purpose

The purpose of our geotechnical evaluation will be to characterize subsurface geologic conditions at selected exploration locations and review existing information on previously obtained on the site, evaluate their impact, and provide preliminary geotechnical recommendations for use in planning the design and construction of the project.

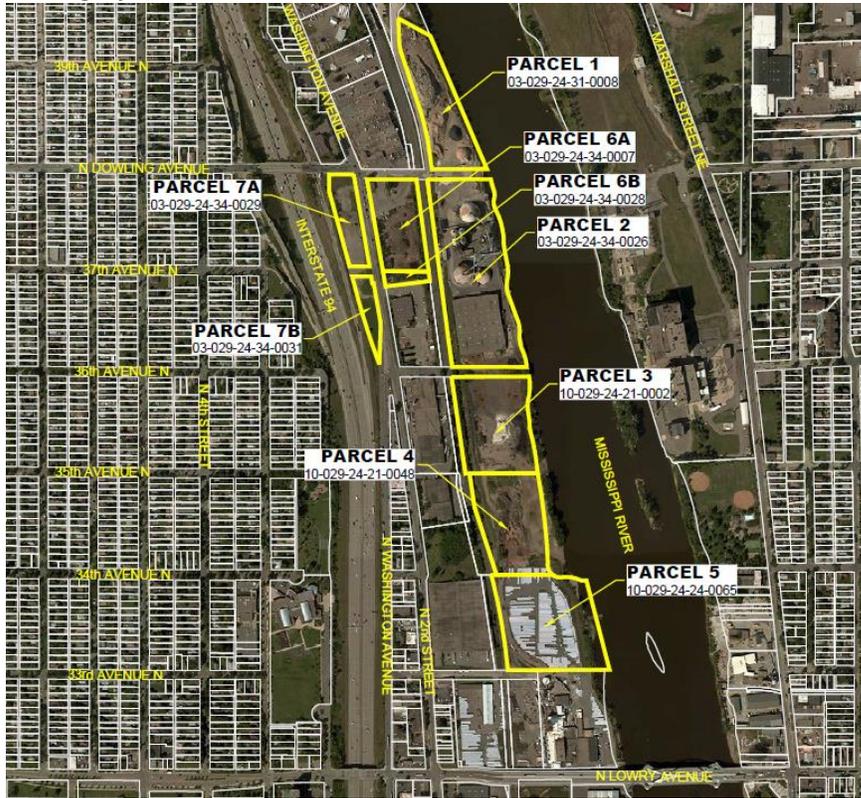
A.2. Project Description

This Preliminary Geotechnical Evaluation Report addresses the geotechnical considerations for preliminary planning of several parcels at the Upper Harbor Terminal (UHT) in Minneapolis, Minnesota. The UHT is a 48-acre industrial property on the Mississippi River between Lowry Avenue and the Camden Bridge in North Minneapolis. It is owned by the City of Minneapolis and has been operated as a barge shipping terminal since 1968. The proposed redevelopment is divided into the following parcels:

- 3800 1st Street North (5.71 Acres), PIN 03-029-24-31-0008 (Parcel 1)
- 2 36th Avenue North (12.47 Acres), PIN 03-029-24-34-0026 (Parcel 2)
- 51 36th Avenue North (6.86 Acres), PIN 10-029-24-21-0002 (Parcel 3)
- 51 34th Avenue North (6.23 Acres), PIN 10-029-24-21-0048 (Parcel 4)
- 3360 1st Street North (8.82 Acres), PIN 10-029-24-24-0065 (Parcel 5)
- 3700 (aka 3750) Washington Avenue North (4.25 Acres), PIN 03-029-24-34-0007 (Parcel 6A)
- 3648 Washington Avenue North (0.54 Acres), PIN 03-029-24-34-0028 (Parcel 6B)
- 3701 Washington Avenue North (2.15 Acres), PIN 03-029-24-34-0029 (Parcel 7A)
- 3639 Washington Avenue North (1.13 Acres), PIN 03-029-24-34-0031 (Parcel 7B)

The locations of these parcels is shown in Photograph 1 below.

Photograph 1. Aerial View of the Site



A.3. Background Information and Reference Documents

To facilitate our evaluation, we were provided with or reviewed the following information or documents:

- Previously conducted soil borings on Parcel 6A by Wenk Associates, dated May 27, 2015.
- Previously conducted soil borings on Parcel 6A by Pinnacle Engineering, dated June 10, 2013.
- Previously conducted Environmental Assessment on Parcel 5 by STS Consultants, dated May 19, 1993.
- Previously conducted soil borings and a Factual Soil Boring Report by Braun Intertec, dated January 27, 2014.
- A Phase II Environmental Assessment containing 48 push probe borings by Braun Intertec, dated October 14, 2015.
- A Geologic Atlas of Hennepin County containing the surficial geology by the University of Minnesota Geological Survey, dated 1989.

A.4. Site Conditions and History

Like many urban riverfronts, this stretch of the Mississippi River has been used for industrial purposes since the beginning of the city's history; first with intensive lumber milling and later with a mix of industrial uses that has evolved to what is seen today.

We reviewed available historical aerial photographs of the property dating back to 1934. Prior to the shipping industry, the historical photographs show the overall area was used for agricultural purposes until 1966. Site grading and stockpiling appeared on the site between 1957 and 1966. These aerial photographs are attached in Appendix B for your review and use.

Several soil borings and push probe borings were conducted throughout the project site over the past few decades. Descriptions of each parcel and the soils encountered on the parcels are described below.

A.4.a. Parcel 1

Based on the available historical aerial photographs, construction activity on Parcel 1 appears to be limited to site grading activities and stockpiling. A storage building appeared on the parcel in 1984. We performed 8 push probe borings to depths varying from 8 to 20 feet below existing grades. The fill within Parcel 1 generally consisted of poorly graded sand with silt (SP-SM), silty sand (SM), clayey gravel (GC), and lean clay (CL) and varied from the surface to approximately 3 1/2 feet below existing grades. Below the fill, native sands and/or clays were encountered to boring termination depths.

A.4.b. Parcel 2

The historical aerial photographs show that construction activity was most active on Parcel 2. The parcel was generally used for agricultural purposes until approximately 1966, when site grading and stockpiling started to occur. In 1972, a warehouse type building is present on the south portion of the parcel while the north half of the parcel appears to be used for ground level storage. Various storage buildings were constructed on Parcel 2 to the north of the warehouse building from 1984 to 1991. Upon completion of the storage buildings, construction activity appears to be minimal.

We performed 12 push probe borings as well as 5 standard penetration test (SPT) borings within Parcel 2 in 2014. The push probes were extended to depths of 8 to 25 feet below existing grades, while the SPT borings were extended to 40 to 60 feet below existing grades. Fill depths varied throughout the site from the surface to 15 feet below existing grades. The fill was generally comprised of sandy soils with occasional clay layers. The fill was placed on top of the native alluvium, glacial till and/or outwash soils.

A.4.c. Parcel 3

The historical aerial photographs show that Parcel 3 generally remained free of construction, however, a bituminous paved surface existed during the time of the push probes. Stockpiling of what appears to be imported materials started to accumulate on Parcel 3 in 1991. The stockpiles still appear to occupy most of the parcel.

We performed 8 push probes on the parcel in 2014. The push probe borings extended from 8 to 25 feet below existing grades and encountered primarily SP-SM and SM fill soils placed above the native alluvium, glacial till and/or outwash soils. The fill soils generally extended from 2 1/2 to 5 feet below existing grades, the native soils extended to the boring termination depths.

A.4.d. Parcel 4

Based on the historical aerial photographs, Parcel 4 appears to be similar to Parcel 3 with construction activities limited to site grading and stockpiling. The surface at the time of the push probe borings was not paved.

We conducted 6 push probe borings extending to depths of 8 to 25 feet below existing grades. The push probes encountered existing fill in 3 of the borings extending from 2 to 2 1/2 feet below existing grades. The fill generally consisted of SP-SM and SM and contained gravel. The fill was placed above the alluvium and/or glacial till soils which extended to boring termination depths.

A.4.e. Parcel 5

The historical aerial photographs show Parcel 5 had some of the earliest development with various structures already present in the 1934 photograph. The development is no longer present in the 1953 photograph. Significant is the presence of what appears to be fill placement into the river in the 1966 photograph. Two storage tanks, buildings, and various drive lanes appear in the aerial photographs in 1979 which were demolished between 1991 and 1997. Following the demolition of the storage buildings, the parcel was used as storage for stockpiles and various other objects.

STS Consultants performed 6 SPT borings in 1993 extending 14 to 18 feet below existing grades. We performed 7 push probe borings on Parcel 5 in 2014 from depths of 8 to 20 feet below existing grades. A large portion of the surface at the time of the push probe borings was covered in bituminous pavement that was placed above 2 1/2 to 3 feet of silty sand fill or alluvium. The fill was placed above the native alluvium and/or outwash soils.

A.4.f. Parcel 6 (A&B)

Similarly, the site was used for agriculture the 1960s when it appears a large stockpile was present on the site. The historical aerial photographs show that two storage tanks were built on Parcel 6 between 1972 and 1979. The storage tanks were demolished between 2008 and 2013. Following the demolition of the storage buildings, the parcel appears to be left undeveloped.

We have previously conducted 3 push probe borings on the site, Pinnacle Engineering conducted 4 push probe borings in 2013, and Wenk Associates conducted 4 push probe borings on the parcel. The borings were extended from 7 to 9 feet below existing grades and generally encountered 3 to 4 feet of existing fill placed above native alluvium or outwash sands.

A.4.g. Parcel 7 (A&B)

Based on the historical aerial photographs of Parcel 7, the parcel has contained various houses and streets throughout the history of the site. Between 1972 and 1979, the houses on the property were demolished and Interstate I-94 was constructed along the eastern part of the property. Upon demolition of the houses, the area was prepared for what appears to be a parking lot for large trucks and automobiles.

We have previously conducted 2 push probe borings on Parcel 7A and 2 additional push probe borings on Parcel 7B. The borings were extended to 8 feet below existing grades. The borings encountered 5 feet of fill in some locations above native alluvium or glacial soils.

A.5. Scope of Services

Our scope of services for this project was originally submitted as a Proposal for a *Preliminary Geotechnical Evaluation and Limited Environmental Sampling*, dated November 11, 2015. Tasks completed in accordance with our authorized scope of services are described below.

- Locating and staking the soil boring locations and determining the ground surface elevations at the boring locations. The surface elevations and locations were acquired with GPS technology through the use of the State of Minnesota's permanent GPS base station network. The approximate locations of the borings are shown on the Soil Boring Location Sketch in the Appendix.
- Preparing a sketch showing boring locations.

- Performing soil borings and preparing logs of the borings describing the materials encountered and presenting the results of our groundwater measurements and laboratory tests.
- Preparing a summary of the subsurface profile and groundwater conditions.
- Providing discussion regarding the reuse of onsite materials during construction and the impact of groundwater on construction.
- Providing preliminary recommendations for preparing structure subgrades, including excavation support, if applicable, and the selection, placement, and compaction of excavation backfill and other structural fill.
- Providing preliminary recommendations for the use in design of preparation of building pads and at-grade concrete slabs (interior and exterior).
- Providing preliminary recommendations for pavement thickness sections based on an assumed R-value (lab R-value testing not included).
- Providing preliminary recommendations for support of new underground utilities.
- Providing preliminary recommendations for the design of below grade walls.

B. Results

B.1. Soil Borings

Subsurface conditions were evaluated with 7 soil borings drilled in the parcels as requested. The borings are denoted as ST-1101 through ST-1107 and their approximate locations are shown on the Soil Boring Location Sketch provided in Appendix A.

B.2. Boring Logs

B.2.a. General

Log of Boring sheets for our penetration test borings are included in Appendix A. The logs identify and describe the geologic materials that were penetrated, and present the results of penetration resistance, laboratory tests performed on penetration test samples retrieved from them, and groundwater measurements.

Strata boundaries were inferred from changes in the penetration test samples and the auger cuttings. Because sampling was not performed continuously, the strata boundary depths are only approximate. The boundary depths likely vary away from the boring locations, and the boundaries themselves may also occur as gradual rather than abrupt transitions.

B.2.b. Geologic Origins

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

B.3. Geologic Profile

The soils encountered in the borings are described below. The soils are generally described in the order they were encountered (i.e., from the ground surface down). Please reference the Log of Boring Sheets in Appendix A for more detailed descriptions.

B.3.a. Pavement

Borings ST-1103, ST-1104 and ST-1106 encountered a layer of pavement consisting of 3 to 6 inches of bituminous placed over 3 to 5 inches of aggregate base.

B.3.b. Existing Fill

Topsoil fill was encountered in borings ST-1101 and ST-1102. The topsoil fill generally consisted of silty sand (SM). The topsoil thickness ranged from 1/2-foot in ST-1101, and 4 feet in ST-1102.

Existing fill was encountered at all of the boring locations below the pavement or topsoil fill. The existing fill extended approximately 4 to 7 feet below existing grades and generally consisted of poorly graded sand with silt (SP-SM) and silty sand (SM) with varying amounts of organics.

B.3.c. Alluvial Deposits

Alluvial deposited soils were encountered in borings ST-1101, ST-1102, ST-1103, ST-1104, and ST-1106 below the existing fill layers. The alluvial deposits generally consisted of poorly graded sand (SP), poorly graded sand with silt (SP-SM), and silty sand (SM).

The alluvial deposits generally extended from 7 to 14 feet below existing grades, however, alluvial deposits in Boring ST-1101 extended to the boring termination depth of 36 feet. Surficial geology maps generally indicate that alluvial sands should be expected along the river channel.

B.3.d. Glacial Deposits

Glacial till was encountered in borings ST-1103 and ST-1104 consisting of silty sand (SM), lean clay with sand (CL), sandy lean clay (CL), and clayey sand (SC). The till extended from 14 to 41 feet below existing grades. Glacial till deposits commonly contain varying amounts of gravel and boulders.

Glacially deposited outwash soils were encountered in borings ST-1102, ST-1103, ST-1104, and ST-1106 below the alluvium or glacial till. The glacial outwash generally consisted of poorly graded sand (SP), poorly graded sand with silt (SP-SM), and silty sand (SM). The glacial outwash soils were encountered at depths between 7 to 14 feet below grade and extended to 51 feet below existing grades. The outwash samples contained varying amounts of gravel and likely cobbles. Geology maps show that glacial deposits are more prevalent to the west of the site and were likely prevalent in the area until the river channel cut through the area and deposited the alluvial sands.

B.3.e. Bedrock

The bedrock closest to the surface and underlying the metropolitan area are sedimentary types: limestone, sandstone, and shale. In descending order, the upper four formations are the Decorah Shale, the Platteville Limestone, the Glenwood Shale, and the St. Peter Sandstone.

The Decorah Shale is frequently missing as this softer rock is more readily eroded away. Usually the first bedrock encountered is the Platteville Limestone, which is further subdivided into five different geologic members. In descending order they are: the Carimona, Magnolia, Hidden Falls, Mifflin and Pecatonica. In general, the average thickness of the Platteville Limestone in the Twin Cities area ranges from 27 to 35 feet.

Below the Platteville Limestone, the greenish gray Glenwood Shale is present. The Glenwood Shale is typically about 2 feet thick and is relatively impermeable. This shale unit generally is not considered to have a high load-carrying capacity as compared to the overlying limestone or the underlying sandstone. As a result, foundations near or on this shale unit are generally extended through it and supported on the sandstone.

The St. Peter Sandstone follows after the Glenwood Shale. It is light tan to white in color though upper portions are often stained greenish gray where it transitions from the shale.

The sandstone can be poorly cemented and very friable, making recovery of the sandstone samples by coring quite difficult. The sandstone is on the order of 150 feet thick, below which is another limestone-like bedrock, the Prairie du Chien formation.

We have reviewed the county geology map, with an excerpt shown below in Figure 4 showing the bedrock formations present. Please note that this is intended to be a high level view of overall geology, but generally appears consistent with our soil boring results. Figure 5 contains a depth to bedrock map which indicates the site is on the western edge of a historic river valley that the Mississippi River closely follows in this location. When the river eroded away the harder Platteville limestone, it could easily cut through the more erodible sandstone. Western portions of the site may encounter shallow sandstone, but this can quickly drop off to the east.

Figure 4. Bedrock Composition

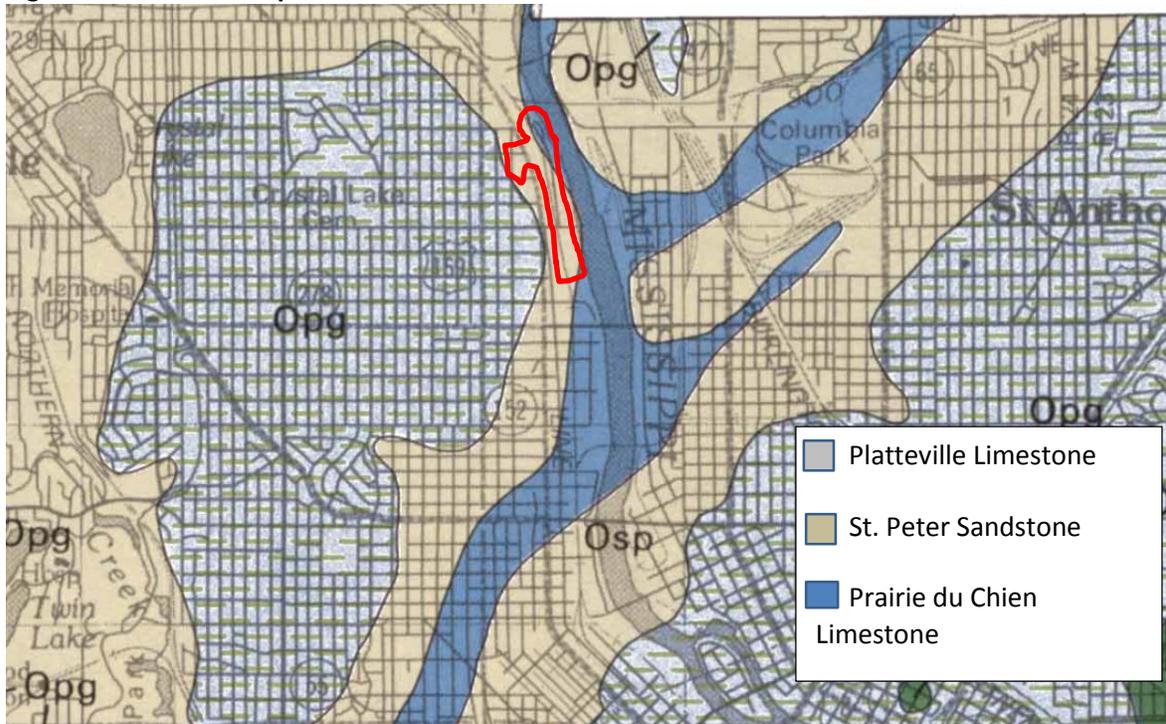
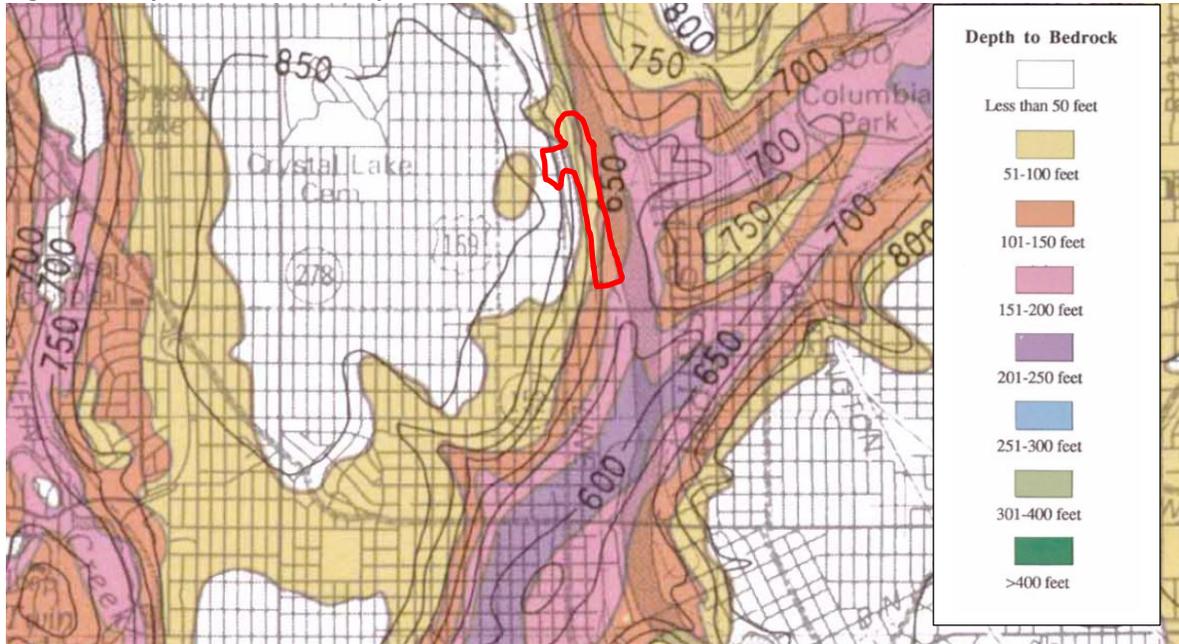


Figure 5. Depth to Bedrock Map



The soil borings on the north western portion (Parcels 6 & 7) of the project site encountered sandstone and/or shale bedrock. We anticipate bedrock is quite deep on the eastern portion and southern portions (Parcels 1 through 5) of the project site.

Boring ST-1106 encountered a layer of highly weathered shale extending from 18 feet below grade to 21 feet below grade. Based on our experience in the area and the location of the shale, we anticipate the recovered samples consisted of the Glenwood formation. The degree of weathering and degradation of the bedrock may be gradual and will vary across the site. Typically the surface will be more weathered and at greater depth weathering, if any, may be limited to naturally occurring joints or faults.

B.3.f. Penetration Resistance Values

The results of our penetration resistance testing from the borings are summarized in Table 1. Comments are provided to qualify the significance of the results.

Table 1. Penetration Resistance Data

Geologic Material	Classification	Penetration Resistances (N, BPF*)	Comments
Existing Fill	SP-SM, SM	8 to 36	Variably compacted
Alluvial Deposits	SP, SP-SM, SM	5 to 72	Loose to very dense, generally medium dense
Glacial Till (Cohesive)	CL, SC	10 to 22	Rather stiff to very stiff, generally stiff
Glacial Till (Non-Cohesive)	SM	51 to 62	Very dense
Glacial Outwash	SP, SP-SM, SM	17 to 37	Medium dense to dense, generally medium dense
Shale	Shale	39	Hard
Sandstone	Sandstone	54 to 50+ 1"	Dense locally uncemented

*Blows per foot

B.3.g. Groundwater

Groundwater was measured or estimated to be located at the depths shown below in Table 2.

Corresponding groundwater elevations were determined from comparisons of the measured depths to groundwater and surface elevations, and were rounded to the highest 1/2-foot. Based on information from the Army Corps of Engineers, we understand the normal pool elevation of the Mississippi River near the location of the site is approximately 799 feet MSL.

Table 2. Groundwater Summary

Location	Surface Elevation (ft MSL)	Measured Depth to Groundwater (ft)	Corresponding Groundwater Elevation (ft MSL)
ST-1101	818.5	20 1/2	798
ST-1102	819.3	20	799 1/2
ST-1103	818.4	10	808 1/2
ST-1104	818.3	7 1/2	811
ST-1105	824.5	15	809 1/2
ST-1106	829.2	20	809 1/2
ST-1107	843.6	35	809

Given the range of elevations presented above, it appears our borings penetrated the hydrostatic groundwater surface. With the approximate elevation of the river, we anticipate the hydrostatic groundwater level will be no lower than 799 feet MSL. Groundwater levels may be higher where perched water exists above the less permeable clay layers or areas of recharge. Longer term monitoring, beyond the time to perform soil borings, would be useful for estimating current and future water elevations.

The depths/elevations at which perched groundwater accumulates changes seasonally and annually, and could be shallower/higher at the exploration locations and between the exploration locations. We expect that the groundwater levels will be heavily influenced by the level of the adjacent Mississippi River.

B.4. Laboratory Test Results

We performed moisture content, sieve analysis, and percent of particles, by weight, passing the #200 sieve on select samples recovered from the borings in accordance with ASTM procedures. The laboratory test results are shown on the Log of Boring Sheets included in Appendix A across from the associated soil sample.

B.5. Previous Soil Borings

We used information obtained from previous soil borings and/or push probe borings performed on the site by STS Consultants, Pinnacle Engineering, Wenk Associates, and Braun Intertec from 1993, 2013, and 2015 in our analyses and to help formulate our recommendations. The following summary of soils only includes the current soil borings drilled during this evaluation; however, the historic boring logs are provided in Appendix B of this report. The soils encountered by the previous soil borings are generally consistent with those encountered in our current soil borings, with the exception of the sandstone, which was encountered in the current soil borings. Groundwater encountered in the previous borings varied from 798 feet MSL to 812 feet MSL with the majority of the borings encountering groundwater near 799 feet MSL. This is consistent with the anticipated elevation of the Mississippi River at this location and with the groundwater encountered in borings ST-1101 and ST-1102 in the current evaluation.

C. Basis for Preliminary Recommendations

C.1. Building Structure Loads

Based on the information provided to us, typical structures that may occupy the site may vary from proposed retail buildings, multi-unit housing buildings, and commercial buildings.

We assume the buildings will vary from single-story, slab-on-grade structures to buildings containing 1 to 2 levels below grade. Most of the residential units are assumed to be constructed of wood or a combination of precast concrete framing below grade and 4 to 6 stories of wood framing above grade. Some steel framed buildings may be present in mixed use or commercial type buildings

Based on those building types and our experience with similar projects, we assume that structural loads will be light to moderate and will not exceed and vary from 150 kip (single-story) to 500 kip (multi-story) column loads or 5 to 10 kips/foot perimeter loads. These assumptions should be further validated in the final geotechnical evaluation.

C.2. Pavements and Traffic Loads

Based on the provided information, we have assumed the pavements required for parking lots will be subjected to primarily automobile traffic, however, main streets would have more frequent vehicles and larger vehicles such as buses, garbage trucks and delivery trucks. Thus, we anticipate light duty pavements (automobile traffic) will experience less than 75,000 Equivalent Single Axel Loads (ESALs), and heavy duty pavements (delivery/garbage trucks) will experience less than 500,000 ESALs.

C.3. Anticipated Grade Changes

Potential grade changes from existing have not been determined at the time of this preliminary evaluation. The existing grades generally slope uphill as the land moves away from the river. Most of the parcels near the river are around elevation 820, while Parcels 6 and 7 raise in grade with elevations of up to about 840 to 850.

C.4. Utilities

Standard below grade utilities, including storm sewer, sanitary sewer, and water main pipes, are anticipated for construction as part of the project. Proposed invert elevations have not been provided at this time. Utilities are generally anticipated to bear within 8 feet of final surface grades, however, sewer lines may be deeper.

C.5. Precautions Regarding Changed Information

We have attempted to describe our understanding of the proposed construction to the extent it was reported to us by others.

Depending on the extent of available information, assumptions may have been made based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, we should be notified. New or changed information could require additional evaluation, analyses and/or recommendations.

C.6. Additional Geotechnical Evaluation

Final design of the proposed UHT has not been established at this time. The recommendations provided in the following sections of this report are preliminary in nature for use in preliminary design and construction estimating of this project. We recommend a more detailed geotechnical evaluation including more borings throughout each parcel be performed once final design is established. We are available to discuss the scope of the additional geotechnical evaluation with you once the project has advanced toward final design. Final recommendations for this project will be provided once the design of the proposed development has progressed and additional geotechnical evaluation has been performed.

D. Preliminary Recommendations

The following recommendations are preliminary in nature for use in conceptual design and construction estimating of this project. These recommendations should be refined once this project is closer to final design and additional borings and geotechnical evaluation can be performed for each structure.

D.1. Design Considerations

Generally, the site is well suited for the anticipated redevelopment and soil conditions are suitable for development. There are some geotechnical considerations across the parcels which will influence design. Among them are:

- Depending on the elevation of the lowest level of structures, groundwater on the parcels along the river (Parcels 1 through 5) may be encountered. The elevation of the Mississippi River near the project site will largely control the groundwater encountered at the site.
- Unless significant design provisions are made to accommodate considerations of hydrostatic pressures and drainage, we recommend the lowest level of structures be kept at least 4 feet above the maximum flood stage to avoid significant groundwater issues.

- Given the amount of previous development onsite, there may still be some structures which remain in place. These structures whether they be slabs, foundations, walls, utilities, etc. should be removed from within proposed building pads. It is possible to leave these structures in place in some paved and landscape areas, but they should be capped with 2 to 5 feet of fill. If left in place, provisions for drainage should be made, if necessary, and voids should be filled so that subsidence does not occur over the long term.
- The in-place fill is comprised of a variety of materials and is at a variable level of compaction. This variability creates the potential for irregular, and in some cases poor, support. The risk of irregular performance exists unless the fill is excavated and removed or recompacted. It should be assumed fill would need to be removed from building footprints, but it may be possible to leave in place below some pavements.
- The native soils at depths in some areas may be soft or loose, but in general appear to be in a medium dense to stiff condition. The support capabilities of these soils generally appear to be adequate after the fill soils are removed to support the structures described in Section C.1.
- In areas of clay soils, grade increases of more than 5 feet should be considered as the weight of the soil can cause long-term settlements of the soil which need to be considered.
- Clay soils were encountered within Parcel 2 approximately 14 to 18 feet below grade. If clay soils are encountered in the excavation bottoms, moisture conditioning and recompaction of the subgrade soils will likely be required. When the clay is near optimum moisture content, it is suited to support construction and foot traffic. When the soil is wet, however, it loses strength and is subject to pumping from vehicle traffic and repeated foot traffic. Consequently, we recommend the site grading be completed during the warmer months when the best dry conditions are typically available. This generally occurs between the months of June and September.
- Sands, especially those described as poorly graded or poorly graded with silt, are most desirable for reuse elsewhere on the project site.
- Based discussions with Ann Calvert with the City of Minneapolis, we anticipate many of the proposed structures on the site will be 1 to 6 levels. To support these structures, soil corrections and spread footings will most likely be sufficient to support these structures. Supporting the foundations on spread footings will require corrections to remove and replace or recompact fill soil.

- Zones of deeper fill generally assumed to be beyond 10 feet thick may be more cost effective by leaving in place and using an in place improvement process like rammed aggregate piers or deep foundations. Other techniques which could be used to improve native sands include in place vibration techniques or deep dynamic compaction which can result in relatively high bearing pressures.
- Sandstone bedrock was encountered near the surface in Parcels 6 and 7. The contractors should exercise construction techniques appropriate for the bedrock removal during excavations in these parcels for basements or utilities. The sandstone provides excellent load-carrying capacities and is often used for support of structures. The upper several feet of sandstone could be weathered or mixed with shale, but the lower zones are generally more uniformly unweathered sandstone, though the degree of cementation can vary. The sandstone bedrock can be excavated, provided it is excavated with larger more powerful equipment and a toothed bucket. Mechanical chipping or drilling is generally not needed.

D.2. Site Grading Considerations

D.2.a. Site Grading

Based on the soil borings conducted across the site, the fill appears to be generally in a range of 5 to 10 feet below existing grades. However, based on the previously conducted borings on the site, existing fill depths could potentially extend to 15 feet below existing grades. Areas containing deeper fill appear to be localized and onsite sands could replace the existing fill soils.

Standard penetration test borings were limited throughout the site. Many excavations could contain soft or loose soils. Fill soils can consist of sand, silty sand, clayey sand, sandy lean clay or lean clay. We recommend, however, the plastic index of these materials not exceed 15. However, non-organic sand having less than 12 percent of the particles by weight passing a #200 sieve is preferred, which appears to be available onsite. We anticipate this sand would largely be used as the source of fill.

D.2.b. Excavation Support

The existing fills and sands near the surface generally classify as Type C soils allowing excavation side walls with slopes of 1 1/2:1 (horizontal:vertical). Slopes constructed in this manner may still exhibit surface sloughing. If site constraints do not allow the construction of temporary slopes with these dimensions, then temporary shoring may be required, and we should be consulted for additional recommendations. OSHA requires slopes or excavations over 20 feet in depth need to be evaluated by an engineer.

Retention systems if needed, should consider that vibrations of the soils from instillation can cause the soils to subside. This subsidence can damage structures in close proximity that are supported on the soils.

D.2.c. Reuse of Onsite Soils

The onsite sand is a good source of fill, from dredged sands or the native sands. Some of the existing fill is also reusable but may contain clay, organics, and debris that will limit reuse. Environmental considerations will also limit reuse potential on site. Stormwater ponds, if placed in areas of sand to maximize water infiltration, could provide good sources of sand for fill elsewhere on site.

Pockets of clay exist throughout the site but mostly near Parcels 1, 2, 3, and 4. We anticipate the clays that are present on these parcels will be limited and the parcels will be mostly underlain with sands. Clay soils can be reused, however, the clay soils appeared to be above the optimum moisture content and can be challenging to work with. For that reason, we recommend reusing the onsite sands to the extent possible for fill. Using sand on top of the clay may result in some drainage or grading considerations so that water does not pond on the clay subgrade.

Soils containing 3 percent or greater organic content or containing debris should not be considered for support of structures, but limited amounts can be used to support parking lots or pavements.

If site grading and construction is anticipated during cold weather, any snow and ice should be removed from cut and fill areas prior to additional grading.

D.2.d. Groundwater

Groundwater can be expected to be relatively shallow matching the elevation of the river or may be higher when perched upon fill or clay. Excavations approaching the current elevation of the river will likely need well points in order to remove groundwater from the excavations. Given the granular nature of the sands, this could yield large amounts of water resulting several logistical and permitting considerations.

D.3. Foundation Support

D.3.a. Spread Footings

To support buildings, existing fill, topsoil, and soft or weak soils will need to be removed from below foundations. Existing fills throughout the site appear to extend 5 to 10 feet below existing grades with localized areas extending to approximately 15 feet or more below grades.

To provide lateral support and control settlement to the structural loads they will support, we recommend oversizing (widening) the excavations 1-foot horizontally beyond the footings for each foot the excavations extend below bottom-of-footing elevations.

Shale was encountered in boring ST-1106 above the sandstone. Shale is not considered suitable for foundations support, and when encountered, will need to be removed prior to the placement of foundations.

D.3.b. Embedment Depth

We recommend footings for heated structures are embedded at least 42 inches below the lowest finished exterior grade. We recommend embedding building footings not heated during winter construction, and other unheated footings associated with canopies, stoops or sidewalks a minimum depth of 60 inches below the lowest exterior grade. Interior footings in heated buildings can be placed immediately below the slab.

D.3.c. Net Allowable Bearing Capacity

We recommend sizing spread footings based on the bearing pressures presented in Table 3. Final bearing pressures will need to be established as plans for structures are developed.

Table 3. Bearing Capacities

Material that the Foundation Bears On	Anticipated Allowable Bearing Pressure (pounds per square foot)	Comments
Engineered select granular fill soils or native medium dense sands	4,000 to 8,000 psf	
In-situ improvement of sands with vibroflotation or deep dynamic compaction	8,000 to 16,000 psf	Anticipate as an option for sand with up to 12 percent fines. Option for supporting high rise structures.
Common engineered fills and medium native clay	2,000 to 5,000 psf	
Sandstone Bedrock	10,000 psf or greater	Negligible settlements

D.4. Below Grade Walls

D.4.a. Drainage Control

Collecting runoff and discharging it well away from the foundations and sloping the ground surface down and away from the walls will greatly aid in reducing infiltration and percolation of water along the buildings. We recommend the site be graded to provide a positive run-off away from the proposed buildings. We recommend landscaped areas be sloped a minimum of 6 inches within 10 feet of the building, and slabs be sloped a minimum of 2 inches. We recommend concentrated runoff from the building's scuppers, gutters, irrigation system, and downspouts be diverted away from the building or be otherwise disposed of appropriately.

We recommend installing subdrains behind the walls, adjacent to the wall footings, and below the slab elevation. Preferably, the subdrains should consist of perforated pipes embedded in washed gravel, which in turn is wrapped in filter fabric. Perforated pipes encased in a filter "sock" and embedded in washed gravel, however, may also be considered. We recommend routing the subdrains to a sump and pump capable of routing any accumulated groundwater to a storm sewer or other suitable disposal site.

General waterproofing of walls surrounding occupied or potentially occupied areas is recommended even with the use of free-draining backfill because of the potential cost impacts related to seepage after construction is complete.

Unless a drainage composite is placed against the backs of the exterior perimeter below-grade walls, we recommend retaining backfill placed within 2 horizontal feet of those walls consist of sand having less than 50 percent of the particles by weight passing a #40 sieve and less than 5 percent of the particles by weight passing a #200 sieve.

D.4.b. Selection, Placement, and Compaction of Backfill

After any sand required for drainage has been placed, we recommend the balance of the backfill placed against exterior perimeter walls also consist of sand, though it is our opinion the sand may contain up to 20 percent of the particles, by weight, passing a #200 sieve. This will also allow for the use of lower lateral pressures on the walls, when compared to clays.

D.5. Interior Slabs

Interior slabs would be well supported after the same corrections used to prepare the building pads.

Excess transmission of water vapor could cause floor dampness, certain types of floor bonding agents to separate, or mold to form under floor coverings. If floor coverings or coatings less permeable than the concrete slab will be used, we recommend a vapor retarder or vapor barrier be placed immediately beneath the slab. We recommend consulting with floor covering manufacturers regarding the appropriate type, use, and installation of the vapor retarder or barrier to preserve warranty assurances.

We recommend that buildings be placed so the lowest level slab is at least 4 feet above the groundwater table.

D.6. Exterior Slabs

For general exterior slabs we recommend subgrades prepared as described in Section D.7 for pavements. If portions of the exterior surface will have higher expectations for performance, for example a paver patio or trails where high performance is needed for activities (rollerblading), additional preparations would be recommended to limit frost heave and post-construction settlement.

The near-surface soils contain zones of soils including silty sands and clays that are considered moderately to highly frost susceptible, especially if these soils are in place and become saturated and freeze, excessive heave may occur. This heave would be a nuisance for slabs in front of doors or in other critical grade areas. Even limited amounts of movement can create tripping hazards or affect drainage patterns. One way to help limit the potential for heaving to occur is to remove frost-susceptible soils present below the overlying slab “footprints” down to bottom-of-footing grades, and replace the excavated material with non-frost-susceptible fill (sand having less than 50 percent of the particles by weight passing a #40 sieve and less than 5 percent of the particles by weight passing a #200 sieve). We recommend providing drainage at the base of the subcut, and transitions from this subcut should be gradual (less than 3:1 horizontal:vertical or flatter gradient).

D.7. Pavements

D.7.a. Pavement Subgrade Preparation

At much of the surface, fill is present and comprised of a variety of materials and is at a variable level of compaction. This variability creates the potential for irregular, and in some cases, poor support for pavement. The risk of irregular performance exists unless the fill is excavated and removed or recompacted. Due to the cost associated with this approach, reengineering the fill, it is rarely if ever taken.

Occasionally, a subcut to 1 to 3 feet below the pavement is performed and the soils are removed or recompacted. More commonly the site is brought to grade, the exposed soils are surface compacted and proofrolled to identify weak spots in the subgrade, which are then corrected.

In roadways, at a minimum, we recommend the existing pavements, organic soils, and fill be removed from the upper 3 feet below the pavement section. In areas of automobile parking or trails, if the owners are more tolerant to risk, an alternative would be to perform little or no subcut and then surface compact and proofroll. Limited correction and surface compaction of the subgrade is, in our opinion, an acceptable approach, provided the subgrade can pass a proofroll. Areas of questionable soils exposed in the subcuts should be evaluated to determine if it would be prudent to perform additional subcuts at that time.

In areas requiring engineered fill to establish pavement grades, the excavation should be oversized at least 1-foot beyond the outside edge of the paved areas for each foot of fill placed below the roads or parking lot.

Prior to the placement of engineered fill or pavements, we recommend the exposed soils in the bottoms of the excavations be brought within a few percentage points of the optimum moisture content and then thoroughly compacted by a minimum of 5 passes with a large (3 1/2-foot-diameter drum minimum), self-propelled drum compactor. This is recommended to further densify the underlying fill or native soils and to provide a more uniform base to place additional fill or pavement.

D.7.b. Design Sections

Laboratory tests to determine an R-value for pavement design were not included in the scope of this project. The near surface soils are generally underlain by existing silty sand fill soils, though locally, the soil may consist of anything from clays or poorly graded sand. Based on our experience with similar soils, it is our opinion that an R-value of 12 to 70 may be applicable. For planning purposes, a value of 25 can be assumed for the silty sands that are most prevalent on the site.

As no anticipated traffic loads were provided, it is early to recommend a specific bituminous or concrete pavement design section. However, for planning purposes, tables 4 and 5 below give an understanding of the magnitude of likely pavement sections.

Table 4. Preliminary Bituminous Pavement Sections

Use	Trail Section	Light Duty	Medium Duty	Heavy Duty
Loading	Pedestrians and bikes with occasional light maintenance vehicles	Mostly automobiles for parking lots	Residential street Includes occasional buses and trucks	Commercial vehicle traffic
ESALs	---	50,000	200,000	500,000
Minimum Asphalt Thickness (inches)	2 1/2	3 1/2	3 1/2	4 1/2
Minimum Aggregate Base Thickness (inches)	6	8	9	10

Table 5. Preliminary Concrete Pavement Sections

Use	Light Duty Silty Sand Subgrade	Medium Duty Silty Sand Subgrade	Heavy Duty Silty Sand Subgrade
Loading	Mostly automobiles for parking lots	Residential street Includes occasional buses and trucks	Commercial vehicle traffic
ESALs	50,000	200,000	500,000
Minimum Concrete Thickness (inches)	4	5	6
Minimum Aggregate Base Thickness (inches)	4	4	6

This pavement design assumes the aggregate base is properly drained. At a minimum, finger drains for the aggregate base should be tied into drains or catch basins in low areas if clays are present at the subgrade. The above pavement designs are based upon a 20-year performance life and 35-year performance life for concrete. This is the amount of time before major reconstruction is anticipated. This performance life assumes maintenance, such as seal coating and crack sealing, is routinely performed. The actual pavement life will vary depending on variations in weather, traffic conditions, and maintenance.

D.8. Utilities

D.8.a. Excavation and Bedrock

Based on the borings, we anticipate some of the soils at typical invert elevations should be suitable for utility support.

However, sandstone bedrock may be encountered in Parcels 6 and 7 while a high water table and/or perched water could be encountered in the remaining parcels at invert grades. The bedrock will be suitable for utility support but will need to be subcut to allow for sand bedding to provide full support the pipe.

Utilities should not be placed within the 1:1 oversizing of foundations. If it is necessary to place utilities within the oversizing of the footings, we should review the documents prior to construction as it may be necessary to backfill with lean concrete or lower the footing elevations near the utility trenches.

D.8.b. Dewatering

Based on the soil boring logs, groundwater could be encountered during the construction of utilities. Because the onsite soils are primarily sands, it is anticipated well points will be needed to draw the water table down below the excavation bottoms.

D.8.c. Corrosion Protection

Based on our past experience, sands can be considered non-corrosive. The silt sands and clays are generally slightly to moderately corrosive to metallic conduits, but only marginally corrosive to concrete. We recommend specifying non-corrosive materials or providing corrosion protection unless additional tests are performed to demonstrate the soils are not corrosive.

D.9. Stormwater Infiltration

We understand onsite stormwater management will be required for this project. Infiltration rates were estimated for some of the soils we observed in our soil borings and are listed in Table 6. These infiltration rates represent the long-term infiltration capacity of a practice, and are not meant to exhibit the capacity of the soils in their natural state. Higher infiltration rates can be used based on field testing with Double Ring Infiltrometer testing (ASTM D3385), however, these rates should be adjusted by the appropriate correction factor as provided for within the Minnesota Stormwater Manual or as allowed by the local watershed. We recommend the Minnesota Stormwater Manual should be consulted for further design best practices.

Table 6. Estimated Design Infiltration Rates Based on Soil Classification

Soil Type	Infiltration Rate (in/hr)
Sands with less than 12% fines Poorly graded or well graded sands (SP/SP-SM)	0.8
Clayey sands and clays (SC/CL)	0.06

Infiltrating stormwater through existing fill onsite should be avoided, due to the inherent unknowns usually related to fill. Also note these systems require a 3-foot separation from the seasonal high water table, bedrock, or imbedding layer which is a consideration on this site.

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

D.10. Additional Evaluation

This preliminary geotechnical evaluation is not considered sufficient to provide detailed geotechnical design recommendations for the project as only conceptual designs have been provided. Once the location, framing systems, structural loads, building layouts, etc. of the redevelopment have been finalized, additional borings and evaluation should be done. The information contained in this report should be reviewed as part of the design evaluation. For planning purposes, plan on soil borings or test pits on 100-foot centers throughout buildings, and every 500 feet for trails and pavements.

During construction, we recommend having a geotechnical engineer observe any excavations related to subgrade preparation and spread footing, slab-on-grade and pavement construction. The purpose of the observations is to evaluate the competence of the geologic materials and evaluate the actual conditions to what was anticipated by the geotechnical evaluation to validate the recommendations of this and other future evaluations.

E. Procedures

E.1. Penetration Test Borings

The penetration test borings were drilled with a truck-mounted core and auger drill equipped with hollow-stem auger. The borings were performed in accordance with ASTM D 1586.

Penetration test samples were taken at 2 1/2- or 5-foot intervals. Actual sample intervals and corresponding depths are shown on the Log of Boring Sheets.

E.2. Material Classification and Testing

E.2.a. Visual and Manual Classification

The geologic materials encountered were visually and manually classified in accordance with ASTM Standard Practice D 2488. A chart explaining the classification system is attached. Samples were placed in jars and returned to our facility for review and storage.

E.2.b. Laboratory Testing

The results of the laboratory tests performed on geologic material samples are noted on or follow the appropriate attached exploration logs. The tests were performed in accordance with ASTM procedures.

E.3. Groundwater Measurements

The drillers checked for groundwater as the penetration test borings were advanced, and again after auger withdrawal. The boreholes were then backfilled as noted on the boring logs.

F. Qualifications

F.1. Variations in Subsurface Conditions

F.1.a. Material Strata

Our evaluation, analyses, and recommendations were developed from a limited amount of site and subsurface information. It is not standard engineering practice to retrieve material samples from exploration locations continuously with depth, and therefore strata boundaries and thicknesses must be inferred to some extent. Strata boundaries may also be gradual transitions, and can be expected to vary in depth, elevation, and thickness away from the exploration locations.

Variations in subsurface conditions present between exploration locations may not be revealed until additional exploration work is completed, or construction commences. If any such variations are revealed, our recommendations should be re-evaluated. Such variations could increase construction costs, and a contingency should be provided to accommodate them.

F.1.b. Groundwater Levels

Groundwater measurements were made under the conditions reported herein and shown on the exploration logs, and interpreted in the text of this report. It should be noted that the observation periods were relatively short, and groundwater can be expected to fluctuate in response to rainfall, flooding, irrigation, seasonal freezing, and thawing, surface drainage modifications and other seasonal and annual factors.

F.2. Continuity of Professional Responsibility

F.2.a. Plan Review

This report is based on a limited amount of information, and a number of assumptions were necessary to help us develop our recommendations. It is recommended that our firm review the geotechnical aspects of the designs and specifications, and evaluate whether the design is as expected, if any design changes have affected the validity of our recommendations, and if our recommendations have been correctly interpreted, and implemented in the designs and specifications.

F.2.b. Construction Observations and Testing

It is recommended that we be retained to perform observations and tests during construction. This will allow correlation of the subsurface conditions encountered during construction with those encountered by the borings, and provide continuity of professional responsibility.

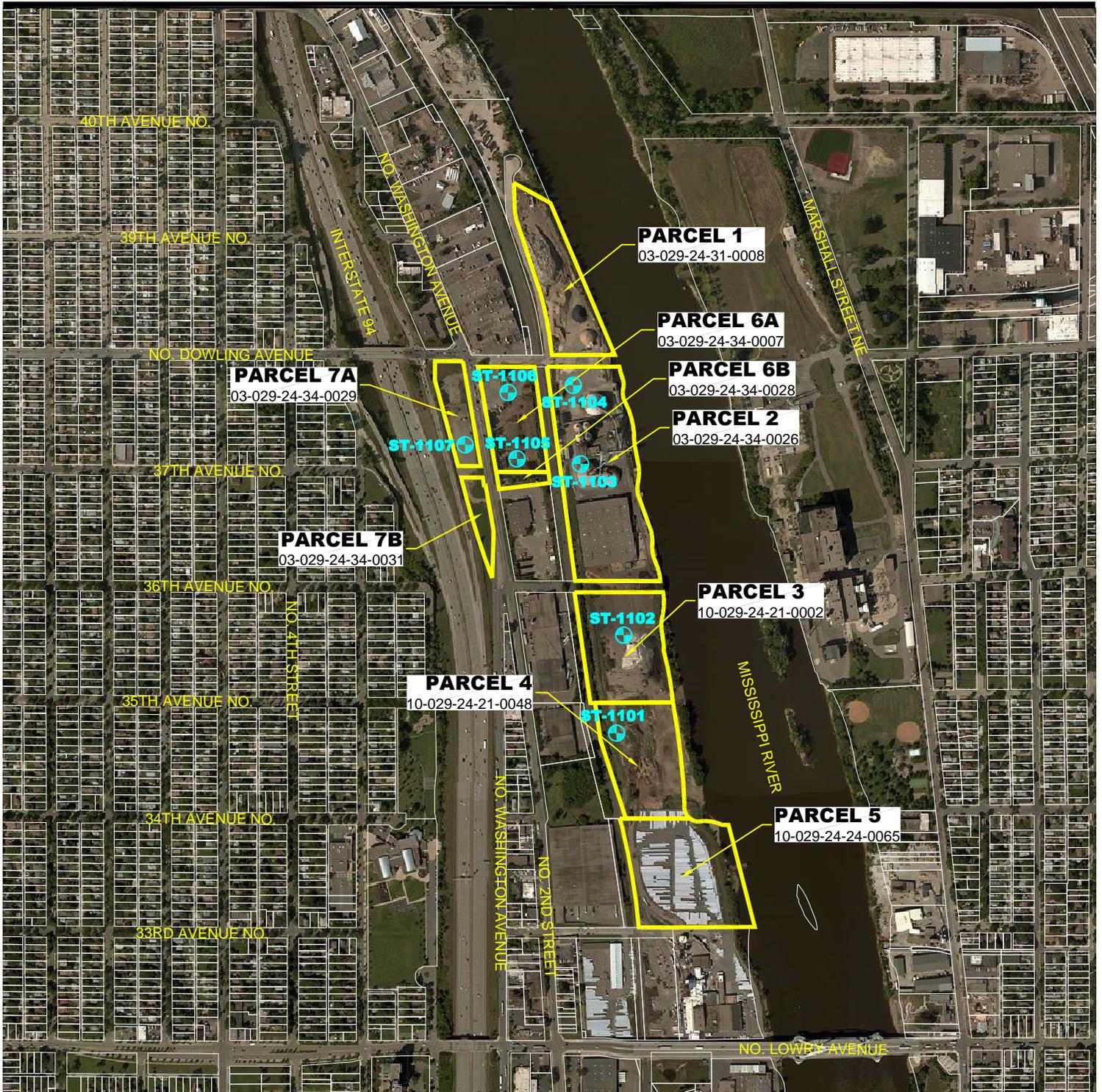
F.3. Use of Report

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

F.4. Standard of Care

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

Appendix A



 DENOTES APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING



SCALE: 1" = 800'

Sheet of Fig:	Project No:	B1511785
	Drawing No:	B1506758
	Scale:	1" = 800'
	Drawn By:	BJB
	Date Drawn:	8/14/15
	Checked By:	EZ
	Last Modified:	12/22/15

SOIL BORING LOCATION SKETCH
 GEOTECHNICAL EVALUATION
 CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
 MINNEAPOLIS, MINNESOTA

BRAUN
INTERTEC

The Science You Build On.

11001 Hampshire Avenue S
 Minneapolis, MN 55438
 PH. (952) 995-2000
 FAX (952) 995-2020

LOG OF BORING (See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota					BORING: ST-1101				
DRILLER: S.N.			METHOD: 3 1/4" HSA, Autohammer		DATE: 12/22/15		SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes	
818.5	0.0								
817.8	0.7	FILL	FILL: Silty Sand, fine- to medium-grained, with Clay lenses, with wood, black, wet.						
		FILL	FILL: Silty Sand, fine- to medium-grained, with Gravel, brown, moist.	36		9	24		
				14*					*No recovery.
811.5	7.0	SP	POORLY GRADED SAND, fine- to medium-grained, with Gravel, brown, dry to waterbearing at 20 1/2 feet, loose to very dense. (Alluvium)	72					
				30					
				18		3	4		
				25					
				7					
					▽				An open triangle in the water level (WL) column indicates the depth at which groundwater was observed while drilling. Groundwater levels fluctuate.
				5					
				7					

(See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota					BORING: ST-1101 (cont.) LOCATION: See attached sketch.				
DRILLER: S.N.		METHOD: 3 1/4" HSA, Autohammer			DATE: 12/22/15		SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes	
786.5	32.0								
			POORLY GRADED SAND, fine- to medium-grained, with Gravel, brown, dry to waterbearing at 20 1/2 feet, loose to very dense. (Alluvium) (continued)						
782.5	36.0			19					
			END OF BORING. Water observed at 20 1/2 feet with 21 feet of hollow-stem auger in the ground. Boring then grouted.						

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 4/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1102 LOCATION: See attached sketch.		
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/22/15	SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
819.3	0.0					
817.3	2.0	FILL	FILL: Silty Sand, fine- to medium-grained, with Gravel, dark brown, moist.			
815.3	4.0	FILL	FILL: Silty Sand, fine-grained, slightly organic, black, moist.	8		
811.3	8.0	SM	SILTY SAND, fine-grained, brown, moist, loose. (Alluvium)	8		
807.3	12.0	SP-SM	POORLY GRADED SAND with SILT, fine- to coarse-grained, with Gravel, brown, moist, medium dense. (Glacial Outwash)	7 15		
		SP	POORLY GRADED SAND, fine- to medium-grained, grayish brown, moist, loose to medium dense. (Glacial Outwash)	16 15		
				7	▽	
				9		
				8		

(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1102 (cont.) LOCATION: See attached sketch.		
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/22/15	SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
787.3	32.0					
			POORLY GRADED SAND, fine- to medium-grained, grayish brown, moist, loose to medium dense. (Glacial Outwash) <i>(continued)</i>			
783.3	36.0			7		
			END OF BORING. Water observed at 20 feet with 20 1/2 feet of hollow-stem auger in the ground. Boring then grouted.			

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1103 LOCATION: See attached sketch.			
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/22/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
818.4	0.0						
817.5	0.9	PAV	4 1/2 inches of bituminous over 6 inches of aggregate base.				
		FILL	FILL: Silty Sand, fine-grained, dark brown, moist.				
814.4	4.0			11			
		SM	SILTY SAND, fine-grained, brown, moist, loose. (Alluvium)				
811.4	7.0			6			
		SP-SM	POORLY GRADED SAND with SILT, fine- to coarse-grained, with Gravel, brown, moist, medium dense. (Glacial Outwash)				
				13			
				12	▽		
804.4	14.0			24*			*No recovery.
		CL	LEAN CLAY, with Sand, dark gray, wet, rather stiff to very stiff. (Glacial Till)				
				22			
				10			
795.4	23.0						
		SC	CLAYEY SAND, brown, moist, stiff. (Glacial Till)				
				13		13	
790.4	28.0						
		SM	SILTY SAND, fine- to coarse-grained, with Gravel, brownish gray, waterbearing, very dense. (Glacial Till)				
				51			
786.4	32.0						

(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota					BORING: ST-1103 (cont.) LOCATION: See attached sketch.		
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/22/15	SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials <small>(Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)</small>	BPF	WL	MC %	Tests or Notes
786.4	32.0	SM	SILTY SAND, fine-grained, brown, wet, very dense. (Glacial Till)				
782.4	36.0		END OF BORING. Water observed at 10 feet with 10 1/2 feet of hollow-stem auger in the ground. Boring then grouted.	62			

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 4/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1104 LOCATION: See attached sketch.				
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/21/15		SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
818.3	0.0							
817.6	0.7	PAV FILL	3 inches of bituminous over 5 inches of aggregate base. FILL: Silty Sand, fine-grained, with Clay seams, brown, wet.					
				8		18		
				8		20	35	
811.3	7.0	SM	SILTY SAND, fine- to coarse-grained, with Gravel, gray, waterbearing, medium dense to dense. (Alluvium)		▽			
				28				
				33				
				11				
804.3	14.0	SM	SILTY SAND, fine- to medium-grained, gray, waterbearing, dense. (Glacial Outwash)					
				37		16	15	
800.3	18.0	SC	CLAYEY SAND, gray, moist, stiff. (Glacial Till)					
				14		15		
796.3	22.0	CL	SANDY LEAN CLAY, gray, wet, stiff to very stiff. (Glacial Till)					
				22				
				15				

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota					BORING: ST-1104 (cont.)				
DRILLER: M. Niesen			METHOD: 3 1/4" HSA, Autohammer		DATE: 12/21/15		SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes	
786.3	32.0		SANDY LEAN CLAY, gray, wet, stiff to very stiff. (Glacial Till) <i>(continued)</i>						
				10					
777.3	41.0			16					
		SM	SILTY SAND, fine-grained, brown, waterbearing. (Glacial Outwash)						
				9					
767.3	51.0			24					
			END OF BORING. Water observed at 7 1/2 feet with 8 feet of hollow-stem auger in the ground. Boring then grouted.						

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota					BORING: ST-1105 LOCATION: See attached sketch.				
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/18/15		SCALE: 1" = 4'			
Elev. feet 824.5	Depth feet 0.0	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes	
824.0	0.5	FILL	FILL: Silty Sand, fine-grained, brown, moist.						
		FILL	FILL: Poorly Graded Sand with Silt, fine- to medium-grained, with Gravel, brown, moist.	18		7	15		
820.5	4.0	FILL	FILL: Silty Sand, fine- to medium-grained, dark brown, moist.	9		12			
817.5	7.0	SS	SANDSTONE, fine-grained, white, moist to waterbearing at 15 feet, very dense. (St. Peter Sandstone)	73					
				50/6"					
				50/4"					
				50/6"					
803.5	21.0			50/6"					
			END OF BORING. Water observed at 15 feet with 15 1/2 feet of hollow-stem auger in the ground. Boring then grouted.						

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1106 LOCATION: See attached sketch.			
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/21/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
829.2	0.0						
828.3	0.9	PAV	6 inches of bituminous over 3 inches of aggregate base.				
		FILL	FILL: Silty Sand, fine- to medium-grained, black, wet.	12			
				6		20	
822.2	7.0	SP-SM	POORLY GRADED SAND with SILT, fine-grained, brown, moist, medium dense. (Alluvium)	15			
				17			
817.2	12.0	SP-SM	POORLY GRADED SAND with SILT, fine- to medium-grained, with Gravel and Cobbles, very dense. (Glacial Outwash)	50/1"			
				50/2**			*No recovery.
811.2	18.0	SH	SHALE, highly weathered, green to brown, wet, hard. (Glenwood Shale)				
808.2	21.0	SS	SANDSTONE, fine-grained, white to brown, waterbearing, medium dense to very dense. (St. Peter Sandstone)		39		
				14			
				50/3"			

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 4/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota					BORING: ST-1106 (cont.) LOCATION: See attached sketch.		
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/21/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials <small>(Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)</small>	BPF	WL	MC %	Tests or Notes
797.2	32.0	•••••	SANDSTONE, fine-grained, white to brown, waterbearing, medium dense to very dense. (St. Peter Sandstone) <i>(continued)</i>				
				X	50/6"		
				X	50/1"		
788.2	41.0		END OF BORING. Water observed at 20 feet with 21 feet of hollow-stem auger in the ground. Boring then grouted.				

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1107 LOCATION: See attached sketch.			
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/18/15		SCALE: 1" = 4'	
Elev. feet 843.6	Depth feet 0.0	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
		FILL 	FILL: Silty Sand, fine- to medium-grained, with Gravel and Cobbles, brown, moist.	18 14		12	
836.6	7.0	SS 	SANDSTONE, fine-grained, white, dry to waterbearing at 35 feet, very dense. (St. Peter Sandstone)	50/1" 50/0" * 50/3" 50/5" 50/5" 50/3"			*No recovery. *No recovery. *50/1/2". No recovery.

(See Descriptive Terminology sheet for explanation of abbreviations)

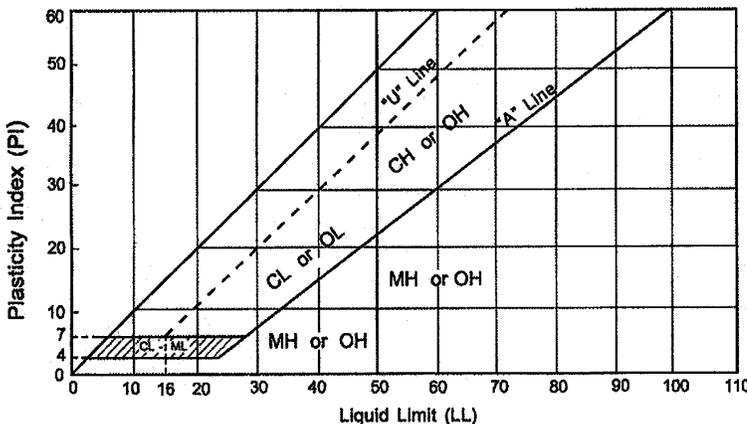
LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1107 (cont.) LOCATION: See attached sketch.			
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/18/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials <small>(Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)</small>	BPF	WL	MC %	Tests or Notes
811.6	32.0						
			SANDSTONE, fine-grained, white, dry to waterbearing at 35 feet, very dense. (St. Peter Sandstone) <i>(continued)</i>	50/3"			
807.6	36.0		END OF BORING. Water observed at 35 feet with 35 feet of hollow-stem auger in the ground. Boring then grouted.				



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

- Based on the material passing the 3-inch (75mm) sieve.
- If field sample contains cobbles or boulders, or both, add "with cobbles or boulders or both" to group name.
- $C_u = D_{60}/D_{10}$, $C_c = (D_{30})^2 / (D_{10} \times D_{60})$
- If soil contains $\geq 15\%$ sand, add "with sand" to group name.
- 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
- If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
- If fines are organic, add "with organic fines" to group name.
- If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.
- Sand 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
- If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
- If soil contains 10 to 29% plus No. 200, add "with sand" or "with gravel" whichever is predominant.
- If soil contains $\geq 30\%$ plus No. 200, predominantly sand, add "sandy" to group name.
- If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.
- $PI \geq 4$ and plots on or above "A" line.
- $PI < 4$ or plots below "A" line.
- PI plots on or above "A" lines.
- 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 limits, %	ϕ	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, PI < 4 or below "A" line
Clay	<No. 200, PI ≥ 4 and on or about "A" line

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. All samples were taken with the standard 2" OD split-tube samples, except where noted.

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.

Hand auger borings were advanced manually with a 1 1/2" or 3 1/4" diameter auger and were limited to the depth from which the auger could be manually withdrawn.

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.

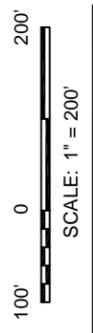
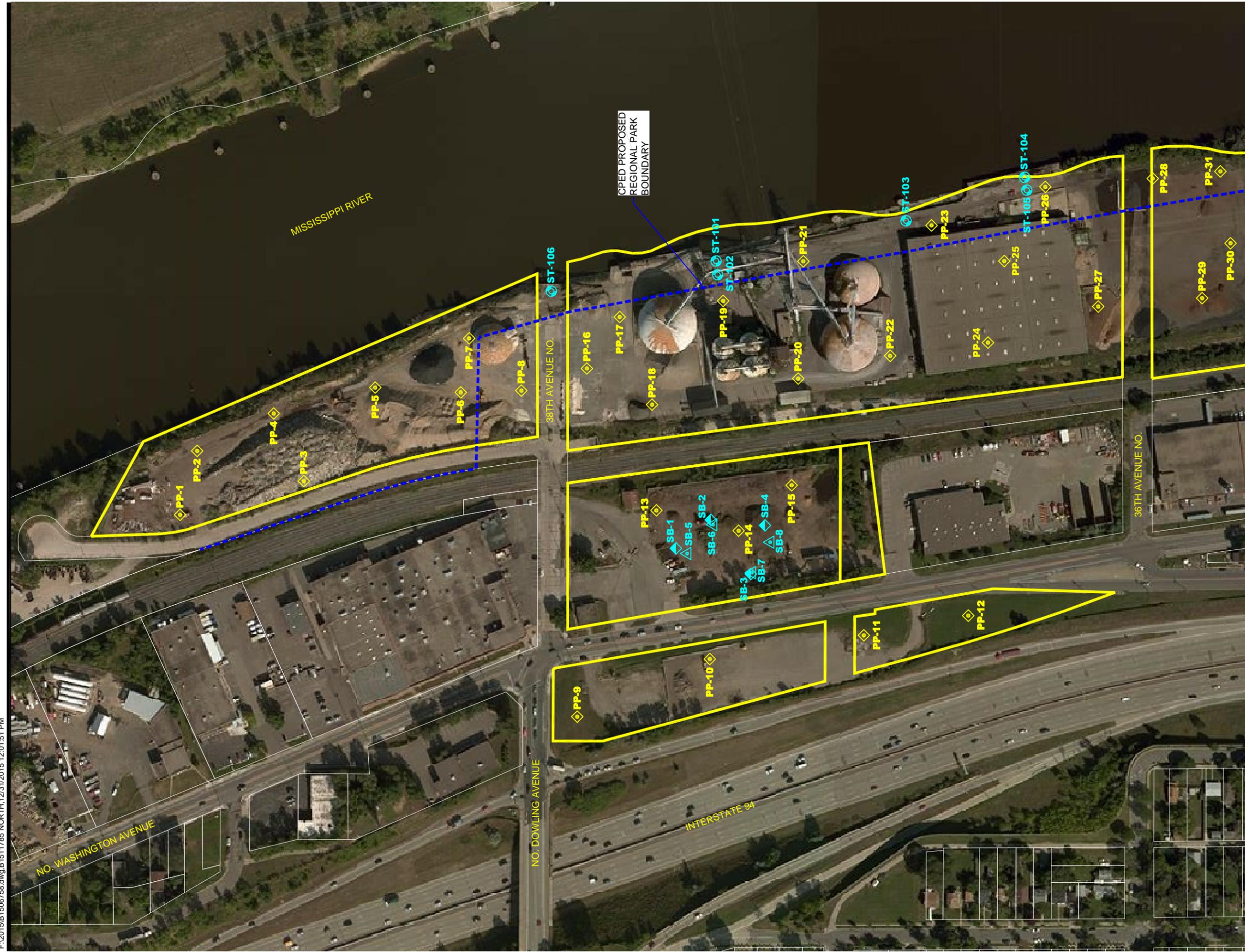
WR: WR indicates the sampler penetrated soil under weight of rods alone; hammer weight, and driving not required.

TW: TW indicates thin-walled (undisturbed) tube sample.

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

Appendix B

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- PUSH PROBE BORING LOCATION
- PREVIOUSLY COMPLETED SOIL BORING LOCATION (PINNACLE ENGINEERING, 2013)
- PREVIOUSLY COMPLETED SOIL SAMPLE LOCATION (WENCK ASSOCIATES, 2015)
- PREVIOUSLY COMPLETED STANDARD PENETRATION TEST BORING (BRAUN INTERTEC, 2014)
- PREVIOUSLY COMPLETED SOIL BORING LOCATION (STS CONSULTANTS, 1993)

BRAUN INTERTEC
 The Science You Build On.
 11001 Hampshire Avenue S
 Minneapolis, MN 55438
 PH. (952) 995-2000
 FAX (952) 995-2020

SITE DIAGRAM - NORTH
 PHASE II ENVIRONMENTAL SITE ASSESSMENT
 CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
 BETWEEN 33RD AVENUE NO. AND DOWLING AVENUE
 MINNEAPOLIS, MINNESOTA

Project No: B1506758.01	
Drawing No: B1506758	
Scale: 1" = 200'	
Drawn By:	BJB
Date Drawn:	8/14/15
Checked By:	RR
Last Modified:	12/31/15
Sheet: 1 of 2	Fig: 2



- PUSH PROBE BORING LOCATION**
- PREVIOUSLY COMPLETED SOIL BORING LOCATION (PINNACLE ENGINEERING, 2013)**
- PREVIOUSLY COMPLETED SOIL BORING LOCATION (ST CONSULTANTS, 1993)**
- PREVIOUSLY COMPLETED STANDARD PENETRATION TEST BORING (BRAUN INTERTEC, 2014)**
- PREVIOUSLY COMPLETED SOIL SAMPLE LOCATION (WENCK ASSOCIATES, 2015)**

SITE DIAGRAM - SOUTH
 PHASE II ENVIRONMENTAL SITE ASSESSMENT
 CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
 BETWEEN 33RD AVENUE NO. AND DOWLING AVENUE
 MINNEAPOLIS, MINNESOTA

Project No: B1506758.01	
Drawing No: B1506758	
Scale:	1" = 200'
Drawn By:	BJB
Date Drawn:	8/14/15
Checked By:	RR
Last Modified:	12/31/15
Sheet:	Fig:
2 of 2	2

Parcel 1

Push Probe Logs: PP-1 through PP-8

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:12

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-1					
DRILLER: M. Barber				METHOD: Push Probe		DATE: 8/24/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes		
818.5	0.0								
		FILL	FILL: Lean Clay, some Sand and Gravel, brown, moist.					Gravel surface.	
816.0	2.5					0.4		Note: Soil sample (0-5') tested for PAH, RCRA metals.	
		CL	LEAN CLAY, some Sand, trace Gravel, brown, moist. (Possible Fill)			0.5			
812.0	6.5					0.4			
		CL	LEAN CLAY, gray, wet, soft. (Alluvium)			0.5			
810.5	8.0								
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.						

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:13

Braun Project B1506758.01					BORING: PP-2		
PHASE II ESA					LOCATION: See attached sketch.		
Upper Harbor Terminal							
Minneapolis, Minnesota							
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/24/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
816.4	0.0						
		FILL	FILL: Poorly Graded Sand, fine- to coarse-grained, some Gravel, trace Clay, dark brown, moist.			1.3	Gravel surface. Piece of asphalt at 0.5'.
813.9	2.5						
		SM	SILTY SAND, fine- to medium-grained, trace Clay and Gravel, brown to gray, moist. (Alluvium)			1.5	Note: Soil sample (0-2.5') tested for PAH, RCRA metals.
812.4	4.0						
		ML	SILT, trace Sand and Clay, dark gray, moist to wet. (Alluvium)			1.4	
						1.6	Piece of wood at 6'.
808.4	8.0					1.3	
			END OF PUSH PROBE.				
			Water not encountered while probing.				
			Push Probe then grouted.				

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:13
 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota					BORING: PP-3	
					LOCATION: See attached sketch.	
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/24/15		SCALE: 1" = 4'
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
819.3	0.0	CL	LEAN CLAY, trace Sand and Gravel, gray, moist. (Possible Fill)	0.8		Gravel and bituminous surface. Note: Soil sample (4-8') tested for PAH, RCRA metals.
815.3	4.0	SM	SILTY SAND, fine-grained, black to dark brown at 5 feet, moist. (Alluvium)	1.1		
811.3	8.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.	0.6 0.9		

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:14

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-4 LOCATION: See attached sketch.		
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/24/15		SCALE: 1" = 4'
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
816.7	0.0					
814.7	2.0	FILL	FILL: Clayey Gravel, some Sand, dark brown to black, moist.			Gravel surface.
		CL	LEAN CLAY, with Sand, trace Gravel, stiff. dark gray, moist, stiff. (Possible Fill)	1.1		Piece of asphalt and brick at 1'. Note: Soil sample (2.5-5') tested for PAH, RCRA metals.
809.7	7.0	SP	POORLY GRADED SAND, fine- to coarse-grained, trace Gravel, brown, moist to wet at 10 feet. (Glacial Outwash)	1.0		
804.7	12.0			1.6		
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.	0.7		

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:15

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota					BORING: PP-5	
					LOCATION: See attached sketch.	
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/24/15	SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
817.6	0.0	SP	POORLY GRADED SAND, fine- to coarse-grained, trace Gravel, brown, moist. (Glacial Outwash)	1.7		Gravel and bituminous surface. Note: Soil sample (0-5') tested for PAH, RCRA metals.
				2.6		
				2.0		
				1.8		
807.6	10.0	CL	LEAN CLAY, with Sand, brown with rust staining, wet, soft. (Glacial Till)	1.6		
805.6	12.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			

LOG OF BORING (See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-6 LOCATION: See attached sketch.		
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/24/15	SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
818.5	0.0					
816.0	2.5	FILL	FILL: Lean Clay, with Sand and Gravel, dark brown, moist.	0.5		Bituminous surface.
		SP	POORLY GRADED SAND, fine- to coarse-grained, trace Gravel, brown, moist. (Glacial Outwash)	1.6		Piece of brick at 2'. Note: Soil sample (0-2.5') tested for PAH, RCRA metals.
810.5	8.0			1.0		
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.	1.2		

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:15

(See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-7 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/25/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes	
814.9	0.0					Bituminous surface.	
812.4	2.5	FILL	FILL: Silty Sand, some Gravel, brown, moist.	0.8		Note: Soil samples (5-7.5') tested for DRO, VOC and (5-10') tested for PAH, RCRA metals, pesticides. A solid triangle indicates the groundwater level observed in the temporary well. Groundwater levels fluctuate. Water sample tested for DRO, VOC.	
		SP	POORLY GRADED SAND, fine- to medium-grained, some Gravel, brown, moist. (Glacial Outwash)	1.5			
		CL	LEAN CLAY, trace Sand and Silt, gray, wet. (Glacial Till)	2.1			
804.9	10.0	CL	SANDY LEAN CLAY, interbedded with Silty Sand, trace Gravel, gray and brown, wet. (Glacial Till)	2.4	▼		
799.9	15.0	CL		1.1			
				2.4			
				2.8			
794.9	20.0			2.5			
				2.6			
			END OF PUSH PROBE.				
			Temporary well installed in probe hole with screen set from 15 feet to 20 feet.				
			Water observed at 14.7 feet in temporary well.				
			Water sample collected for analytical testing and temporary well removed.				
			Push Probe then grouted.				

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:15
 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-8					
DRILLER: M. Barber				METHOD: Push Probe		DATE: 8/24/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes		
819.0	0.0								
		FILL	FILL: Silty Sand, fine- to coarse-grained, some Gravel, dark brown to black, moist.			1.2	Gravel surface.		
815.5	3.5					1.9	Note: Soil samples (0-2.5') tested for pesticides and (5-8') tested for PAH, RCRA metals.		
814.0	5.0	SP	POORLY GRADED SAND, fine- to medium-grained, trace Gravel, brown, moist. (Glacial Outwash)			1.4			
		ML	SILT, trace Sand, dark brown, moist. (Alluvium)			1.0			
811.0	8.0					1.2			
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.						

Parcel 2

Standard Penetrating Test Logs: ST-1103 through ST-1104

Standard Penetrating Test Logs: ST-101 through ST-106

Push Probe Logs: PP-16 through PP-27

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1103 LOCATION: See attached sketch.			
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/22/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
818.4	0.0						
817.5	0.9	PAV	4 1/2 inches of bituminous over 6 inches of aggregate base.				
		FILL	FILL: Silty Sand, fine-grained, dark brown, moist.				
814.4	4.0	SM	SILTY SAND, fine-grained, brown, moist, loose. (Alluvium)	11			
811.4	7.0	SP-SM	POORLY GRADED SAND with SILT, fine- to coarse-grained, with Gravel, brown, moist, medium dense. (Glacial Outwash)	6			
				13			
				12	▽		
804.4	14.0	CL	LEAN CLAY, with Sand, dark gray, wet, rather stiff to very stiff. (Glacial Till)	24*			*No recovery.
				22			
				10			
795.4	23.0	SC	CLAYEY SAND, brown, moist, stiff. (Glacial Till)				
				13		13	
790.4	28.0	SM	SILTY SAND, fine- to coarse-grained, with Gravel, brownish gray, waterbearing, very dense. (Glacial Till)				
				51			
786.4	32.0						

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota					BORING: ST-1103 (cont.)		
					LOCATION: See attached sketch.		
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/22/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials <small>(Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)</small>	BPF	WL	MC %	Tests or Notes
786.4	32.0	SM	SILTY SAND, fine-grained, brown, wet, very dense. (Glacial Till)				
782.4	36.0		END OF BORING.	62			
			Water observed at 10 feet with 10 1/2 feet of hollow-stem auger in the ground.				
			Boring then grouted.				

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 4/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1104 LOCATION: See attached sketch.				
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/21/15		SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
818.3	0.0							
817.6	0.7	PAV FILL	3 inches of bituminous over 5 inches of aggregate base. FILL: Silty Sand, fine-grained, with Clay seams, brown, wet.					
				8		18		
				8		20	35	
811.3	7.0	SM	SILTY SAND, fine- to coarse-grained, with Gravel, gray, waterbearing, medium dense to dense. (Alluvium)		▽			
				28				
				33				
				11				
804.3	14.0	SM	SILTY SAND, fine- to medium-grained, gray, waterbearing, dense. (Glacial Outwash)					
				37		16	15	
800.3	18.0	SC	CLAYEY SAND, gray, moist, stiff. (Glacial Till)					
				14		15		
796.3	22.0	CL	SANDY LEAN CLAY, gray, wet, stiff to very stiff. (Glacial Till)					
				22				
				15				

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota					BORING: ST-1104 (cont.) LOCATION: See attached sketch.				
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer			DATE: 12/21/15		SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes	
786.3	32.0		SANDY LEAN CLAY, gray, wet, stiff to very stiff. (Glacial Till) <i>(continued)</i>						
				10					
777.3	41.0			16					
		SM	SILTY SAND, fine-grained, brown, waterbearing. (Glacial Outwash)						
				9					
767.3	51.0			24					
			END OF BORING. Water observed at 7 1/2 feet with 8 feet of hollow-stem auger in the ground. Boring then grouted.						

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2014\08798.GPJ BRAUN_V8_CURRENT.GDT 12/10/15 11:08

Braun Project B14-08798 GEOTECHNICAL EVALUATION Minneapolis Upper Harbor Terminal on the Mississippi River 3750 Washington Avenue North Minneapolis, Minnesota		BORING: ST-101					
DRILLER: J. Chermak		METHOD: 3 1/4" HSA, Autohammer					
DATE: 12/10/14		SCALE: 1" = 4'					
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
0.0	PAV	9 inches of bituminous over 8 1/2 inches of aggregate base.					
1.4	FILL	FILL: Silty Sand, fine- to medium-grained, possible creosole-like odor, dark brown, moist.	26				An open triangle in the water level (WL) column indicates the depth at which groundwater was observed while drilling. Groundwater levels fluctuate.
		Poorly Graded Sand layer, with trace Gravel at 5 feet.	21				
9.0			17				
	SP-SM	POORLY GRADED SAND with SILT, fine-grained, trace roots, dark gray, wet, loose. (Alluvium)	8	▽			
12.0	SP	POORLY GRADED SAND, fine- to medium-grained, trace Gravel, brown, waterbearing, medium dense. (Alluvium)	13*				*Switched to mud rotary drilling method.
			17		17	4	
			12				
			12				
			21				
			18				
		Trace Gravel at 29 feet.	15				
			15				
32.0		Cobbles and Gravel at 31 feet.					

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2014\08798.GPJ BRAUN_V8_CURRENT.GDT 12/10/15 11:08

Braun Project B14-08798 GEOTECHNICAL EVALUATION Minneapolis Upper Harbor Terminal on the Mississippi River 3750 Washington Avenue North Minneapolis, Minnesota				BORING: ST-101 (cont.) LOCATION: See attached sketch.			
DRILLER: J. Chermak		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/10/14		SCALE: 1" = 4'	
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
32.0	CL	LEAN CLAY, gray, wet, with Sand seams, medium to rather stiff. (Alluvium)	6				No recovery.
			10		32		LL=47 PI=26
			11				
		3 inches of Poorly Graded Sand at 40 feet.	12		37		
			6		29		LL=35 PI=12
47.0			TW				No recovery.
		END OF BORING.					
		Water observed at a depth of 12 1/2 feet while drilling.					
		Water observed at 10 feet with 15 feet of hollow-stem auger in the ground.					
		Boring collapsed to a depth of 15 feet.					
		Boring immediately backfilled with bentonite grout.					

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2014\08798.GPJ BRAUN_V8_CURRENT.GDT 12/10/15 11:08

Braun Project B14-08798 GEOTECHNICAL EVALUATION Minneapolis Upper Harbor Terminal on the Mississippi River 3750 Washington Avenue North Minneapolis, Minnesota				BORING: ST-102			
DRILLER: J. Chermak		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/11/14		SCALE: 1" = 4'	
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
0.0							
0.9	PAV	11 inches of aggregate base.					
	FILL	FILL: Silty Sand, fine- to medium-grained, shredded wood, trace Gravel, possible creosole-like odor, brown to dark brown, moist.	35				
			23				
			23				
10.0				▽			
10.5	FILL	FILL: Lean Clay, trace Gravel, gray, wet.	22				
	SP	POORLY GRADED SAND, fine- to medium-grained, light brown to brown, waterbearing, medium dense. (Alluvium)	15*				*Switched to mud rotary drilling method.
			24		20	5	
			23				
			14				
			13				
			14				
27.0	SW-SM	WELL-GRADED SAND with SILT, fine- to coarse-grained, trace Gravel, brown, waterbearing, medium dense to very dense. (Alluvium)	17		12	6	
			74				
31.0	CL						

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2014\08798.GPJ BRAUN_V8_CURRENT.GDT 12/10/15 11:08

Braun Project B14-08798 GEOTECHNICAL EVALUATION Minneapolis Upper Harbor Terminal on the Mississippi River 3750 Washington Avenue North Minneapolis, Minnesota				BORING: ST-102 (cont.) LOCATION: See attached sketch.			
DRILLER: J. Chermak		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/11/14		SCALE: 1" = 4'	
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
32.0		LEAN CLAY, Poorly Graded Sand seams, gray, wet, medium to stiff. <i>(Alluvium) (continued)</i>	15				No recovery.
		4 inches of gray Poorly Graded Sand layer at 35 feet.	10				
		Layer of Fat Clay at 37 feet.	12		37		LL=53 PI=34
		Silt and Poorly Graded Sand seams at 40 feet.	7				
			11		32		
			8				
			12		31		
51.0			10				
END OF BORING. Water observed at a depth of 10 feet while drilling. Water observed at 13 feet with 15 feet of hollow-stem auger in the ground. Boring immediately backfilled with bentonite grout.							

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2014\08798.GPJ BRAUN_V8_CURRENT.GDT 12/10/15 11:08

Braun Project B14-08798 GEOTECHNICAL EVALUATION Minneapolis Upper Harbor Terminal on the Mississippi River 3750 Washington Avenue North Minneapolis, Minnesota				BORING: ST-103			
DRILLER: J. Uremovich		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/10/14		SCALE: 1" = 4'	
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
0.0							
0.3	PAV FILL	3 inches of bituminous. FILL: Fibrous wood, possible creosole-like odor.					
2.5	FILL	FILL: Poorly Graded Sand with Silt, fine- to medium-grained, trace fibrous wood, with Gravel, dark brown, moist, possible creosole-like odor.					
5.0	SW- SM	WELL-GRADED SAND with SILT, fine- to coarse-grained, with Gravel, brown, moist, medium dense. (Alluvium)	15		5	6	
9.0	SP- SM	POORLY GRADED SAND with SILT, fine- to medium-grained, brown, moist to waterbearing, medium dense. (Alluvium)	13				
			11		8	7	
			16				
			11	▽			*Switched to mud rotary drilling method.
17.0	CL- ML	SILTY CLAY, gray, wet, rather stiff to stiff. (Alluvium)	15		24		LL=23 PI=4
			10				
22.0	SM	SILTY SAND, fine- to medium-grained, gray, waterbearing, medium dense. (Alluvium)	15				
25.0	SP- SM	POORLY GRADED SAND with SILT, fine- to coarse-grained, brown, waterbearing, medium dense. (Alluvium)	15				
27.5	CL	SANDY LEAN CLAY, trace Gravel, gray, wet, rather stiff. (Alluvium)	12		25		
29.0	CL	LEAN CLAY, with Silt seams, gray, wet, rather soft to rather stiff. (Alluvium)	11		30		

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2014\08798.GPJ BRAUN_V8_CURRENT.GDT 12/10/15 11:08

Braun Project B14-08798 GEOTECHNICAL EVALUATION Minneapolis Upper Harbor Terminal on the Mississippi River 3750 Washington Avenue North Minneapolis, Minnesota		BORING: ST-103 (cont.)					
DRILLER: J. Uremovich		METHOD: 3 1/4" HSA, Autohammer					
DATE: 12/10/14		SCALE: 1" = 4'					
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
32.0		LEAN CLAY, with Silt seams, gray, wet, rather soft to rather stiff. (Alluvium) (continued)	10				
42.0	CL	SANDY LEAN CLAY, trace Gravel, gray, wet, rather stiff to very stiff. (Glacial Till)	9		16		
47.0	SP-SM	POORLY GRADED SAND with SILT, fine- to coarse-grained, with Gravel, gray, waterbearing, medium dense. (Glacial Outwash)	30		24		LL=27 PI=10
49.0	CL	SANDY LEAN CLAY, with Gravel, gray and reddish brown, wet. (Glacial Till)	*		15		Estimated between 20 and 30 BPF.
51.0		END OF BORING. Water observed at a depth of 15 feet while drilling. Boring immediately backfilled with bentonite grout.					

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2014\08798.GPJ BRAUN_V8_CURRENT.GDT 12/10/15 11:08

Braun Project B14-08798 GEOTECHNICAL EVALUATION Minneapolis Upper Harbor Terminal on the Mississippi River 3750 Washington Avenue North Minneapolis, Minnesota				BORING: ST-104			
DRILLER: J. Uremovich		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/1/14		SCALE: 1" = 4'	
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
0.0	PAV	12 inches of Concrete slab.					
1.0	FILL	FILL: Poorly Graded Sand with Silt, fine-grained to medium-grained, trace Gravel, Silty Sand layers, light brown to brown, dry to moist.					
9.0	FILL	FILL: Silty Sand, fine- to medium-grained, trace Gravel, dark brown, moist.	33				
12.0	FILL	FILL: Poorly Graded Sand, with Gravel, brown, moist.	9				
15.0	SP	POORLY GRADED SAND, fine- to coarse-grained, with Gravel, brown to grayish brown, moist to waterbearing, loose to medium dense. (Alluvium)	9				
			8				*Switched to mud rotary drilling method.
			15				
			15		13	4	
			13				
			26				
			17				
32.0							

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2014\08798.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:29

Braun Project B14-08798 GEOTECHNICAL EVALUATION Minneapolis Upper Harbor Terminal on the Mississippi River 3750 Washington Avenue North Minneapolis, Minnesota				BORING: ST-104 (cont.)			
DRILLER: J. Uremovich		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/1/14		SCALE: 1" = 4'	
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
32.0	CL	LEAN CLAY, with Silt and Silty Sand lenses, gray, wet, moist to stiff. (Alluvium)	13				
			11		34		LL=38 PI=19
			12				No recovery.
			7				
42.0	CL-ML	SANDY SILTY CLAY, trace Gravel, gray, wet, very stiff. (Glacial Till)	18		15		LL=21 PI=7
			23				
47.0	SC	CLAYEY SAND, fine- to medium-grained, trace Gravel, gray, wet, dense. (Glacial Till)	40		19		
49.0	SM	SILTY SAND, fine-grained, gray, wet, medium dense. (Glacial Till)	30				
52.0	CL	SANDY LEAN CLAY, trace Gravel, gray, wet, very stiff. (Glacial Till)	22				
			28		14		
57.0	SP-SM	POORLY GRADED SAND with SILT, grayish brown, waterbearing, medium dense. (Glacial Outwash)	25				
		Lean Clay inclusions.	25				*Water observed at a depth of 17 feet while drilling.
61.0		END OF BORING.*					Boring immediately backfilled with bentonite grout.

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2014\08798.GPJ BRAUN_V8_CURRENT.GDT 12/10/15 11:08

Braun Project B14-08798 GEOTECHNICAL EVALUATION Minneapolis Upper Harbor Terminal on the Mississippi River 3750 Washington Avenue North Minneapolis, Minnesota		BORING: ST-105					
DRILLER: J. Uremovich		METHOD: 3 1/4" HSA, Autohammer					
DATE: 12/8/14		SCALE: 1" = 4'					
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
0.0							
0.3	PAV	3 inches of bituminous.					
	FILL	FILL: Poorly Graded Sand with Silt, fine- to medium-grained, trace Gravel, dark brown, moist.					
4.0	FILL	FILL: Silty Sand, fine- to medium-grained, with Gravel, dark brown, moist.	27				
7.5	SW-SM	WELL-GRADED SAND with SILT, fine- to coarse-grained, with Gravel, brown to grayish brown, moist to waterbearing, medium dense. (Alluvium)	16				
			14				
			11				
			20		5	5	
			20	▽			
19.0	SW	WELL-GRADED SAND, fine- to coarse-grained, with Gravel, brown to grayish brown, waterbearing, medium dense. (Alluvium)	25		14	4	
			17				
			22				
			13				
			17				
							*Switched to mud rotary drilling method.

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2014\08798.GPJ BRAUN_V8_CURRENT.GDT 12/10/15 11:09

Braun Project B14-08798 GEOTECHNICAL EVALUATION Minneapolis Upper Harbor Terminal on the Mississippi River 3750 Washington Avenue North Minneapolis, Minnesota				BORING: ST-105 (cont.) LOCATION: See attached sketch.			
DRILLER: J. Uremovich		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/8/14		SCALE: 1" = 4'	
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
32.0							
	•••••	WELL-GRADED SAND, fine- to coarse-grained, with Gravel, brown to grayish brown, waterbearing, medium dense. (Alluvium) <i>(continued)</i>	17				
			15				
			16				
41.0			19				
		END OF BORING. Water observed at a depth of 17 feet while drilling. Boring immediately backfilled with bentonite grout.					

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2014\08798.GPJ BRAUN_V8_CURRENT.GDT 12/10/15 11:09

Braun Project B14-08798 GEOTECHNICAL EVALUATION Minneapolis Upper Harbor Terminal on the Mississippi River 3750 Washington Avenue North Minneapolis, Minnesota		BORING: ST-106					
DRILLER: J. Uremovich		METHOD: 3 1/4" HSA, Autohammer					
DATE: 12/10/14		SCALE: 1" = 4'					
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
0.0	FILL	FILL: Silty Sand, fine- to medium-grained, with cinders and Gravel, black and brown, moist.					
2.0	FILL	FILL: Well-Graded Sand with Silt, fine- to coarse-grained, with Gravel, dark brown, moist.					
			18		4	8	
			19				
			16				
			18				
14.0	SW-SM	WELL-GRADED SAND with SILT, fine- to coarse-grained, with Gravel, brown, waterbearing, medium dense. (Alluvium)	18	▽			
			11				
			18				
			23				
			12				
			18		13	6	
			14				

*Switched to mud rotary drilling method.

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

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2014\08798.GPJ BRAUN_V8_CURRENT.GDT 12/10/15 11:09

Braun Project B14-08798 GEOTECHNICAL EVALUATION Minneapolis Upper Harbor Terminal on the Mississippi River 3750 Washington Avenue North Minneapolis, Minnesota			BORING: ST-106 (cont.)					
DRILLER: J. Uremovich			METHOD: 3 1/4" HSA, Autohammer		DATE: 12/10/14		SCALE: 1" = 4'	
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes	
32.0								
34.0		WELL-GRADED SAND with SILT, fine- to coarse-grained, with Gravel, brown, waterbearing, medium dense. (Alluvium) <i>(continued)</i>	16					
	CL	LEAN CLAY, with Silt Lenses, gray, wet, rather stiff to very stiff. (Alluvium)	9		35		LL=37 PI=17	
38.5			24					
	SP-SM	POORLY GRADED SAND with SILT, fine-grained, gray, waterbearing, medium dense. (Alluvium)	19					
42.0	CL	LEAN CLAY, with Silt and Silty Sand lenses, gray, wet, medium. (Glacial Till)	7		29		LL=35 PI=13	
			8					
			8		32			
51.0			8					
		END OF BORING. Water observed at a depth of 15 feet while drilling. Boring immediately backfilled with bentonite grout.						

(See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota	BORING: PP-16 LOCATION: See attached sketch.
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DRILLER: M. Barber	METHOD: Push Probe	DATE: 8/24/15	SCALE: 1" = 4'
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Elev. feet	Depth feet	Symbol	Description of Materials <small>(Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)</small>	BPF	WL	PID PPM	Tests or Notes
817.8	0.0	FILL	(Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)				
815.3	2.5	SM	FILL: Silty Sand, fine- to medium-grained, trace Gravel, dark brown to black, moist.			0.4	Bituminous surface.
812.8	5.0	CL	SILTY SAND, fine-grained, dark brown, moist. (Alluvium)			1.7	Note: Soil sample (2.5-5') tested for PAH, RCRA metals.
810.8	7.0	SP	LEAN CLAY, trace Sand, brown, moist. (Glacial Till)			0.7	
809.8	8.0	SP	POORLY GRADED SAND, fine- to coarse-grained, some Gravel, light brown, moist. (Glacial Outwash)			2.0	
			END OF PUSH PROBE.				
			Water not encountered while probing.				
			Push Probe then grouted.				

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:12

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:12

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-17 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/25/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
812.8	0.0						
809.8	3.0	FILL	FILL: Silty Sand, fine- to medium-grained, some Gravel, brown, moist.			2.1	Bituminous surface.
807.8	5.0	FILL	FILL: Lean Clay, black, moist.			3.0	Note: Soil samples (3-5') tested for RCRA metals, pesticides and (5-10') tested for PAH, RCRA metals.
802.8	10.0	SM	SILTY SAND, fine-grained, trace Silt, gray, moist. (Alluvium)			2.7	
						3.2	
800.3	12.5	SP	POORLY GRADED SAND, fine- to medium-grained, brown, moist. (Glacial Outwash)			0.9	
		SP	POORLY GRADED SAND, fine- to coarse-grained, brown, wet to waterbearing. (Glacial Outwash)		▼	3.1	Water sample tested for DRO, VOC.
						2.8	
792.8	20.0					2.8	
			END OF PUSH PROBE. Temporary well installed in probe hole with screen from 13 to 18 feet. Water observed at 12.5 feet in temporary well. Water sample collected for analytical testing and temporary well removed. Push Probe then grouted.				

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(See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01				BORING: PP-18			
PHASE II ESA				LOCATION: See attached sketch.			
Upper Harbor Terminal							
Minneapolis, Minnesota							
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/25/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
819.7	0.0						
		FILL	FILL: Silty Sand, fine-grained, dark brown, moist.				Bituminous surface.
817.2	2.5					1.6	Note: Soil sample (0-5') tested for SVOC, RCRA metals, pesticides.
		SM	SILTY SAND, fine-grained, brown, moist. (Alluvium)			2.8	
812.2	7.5				▼	2.2	Water sample tested for DRO, VOC.
		SP	POORLY GRADED SAND, fine- to coarse-grained, some Gravel, brown, moist to waterbearing at 9 feet. (Glacial Outwash)			2.5	
804.7	15.0					2.4	
			END OF PUSH PROBE.				
			Temporary well installed in probe hole with screen from 10 to 15 feet.				
			Water observed at 9 feet in temporary well.				
			Water sample collected for analytical testing and temporary well removed.				
			Push Probe then grouted.				

(See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-19 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/25/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
813.3	0.0	FILL	FILL: Silty Sand, fine- to medium-grained, some Gravel, dark brown, moist.				Bituminous surface.
810.8	2.5	SP	POORLY GRADED SAND, fine- to coarse-grained, some Gravel, brown, moist. (Glacial Outwash)			1.1	Note: Soil sample (0-2.5') tested for SVOC, RCRA metals, pesticides.
808.3	5.0	CL	LEAN CLAY, trace Sand and Gravel, gray, wet, stiff. (Glacial Till)			2.1	
805.3	8.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			2.0 1.9	

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(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-20					
DRILLER: M. Barber				METHOD: Push Probe		DATE: 8/25/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes		
819.1	0.0								
818.1	1.0	FILL	FILL: Poorly Graded Sand, fine- to coarse-grained, trace Gravel, brown, wet.			2.5	Bituminous surface.		
817.1	2.0	SM	SILTY SAND, fine-grained, black, moist. (Alluvium)			2.0	Note: Soil samples (1-2.5') tested for SVOC, RCRA metals, pesticides and (2.5-5') tested for PAH, RCRA metals.		
		CL	LEAN CLAY, trace Sand, dark brown to gray at 5 feet, wet. (Alluvium)			2.1			
						1.5			
811.6	7.5	SP	POORLY GRADED SAND, fine- to coarse-grained, some Gravel, brown, wet to waterbearing. (Glacial Outwash)		▼	1.5	Water sample tested for DRO, VOC.		
809.1	10.0	CL	LEAN CLAY, trace Sand and Gravel, gray, wet. (Glacial Till)			2.0			
804.1	15.0		END OF PUSH PROBE.			2.3			
			Temporary well installed in probe hole with screen from 5 to 10 feet. Water observed at 8.3 feet in temporary well. Water sample collected for analytical testing and temporary well removed. Push Probe then grouted.						

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(See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01					BORING: PP-21		
PHASE II ESA					LOCATION: See attached sketch.		
Upper Harbor Terminal							
Minneapolis, Minnesota							
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/27/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
813.3	0.0	FILL	FILL: Silty Sand, fine-grained, some Gravel, dark brown, moist.				Bituminous surface.
808.3	5.0	CL	LEAN CLAY, trace Sand, brown, wet, stiff. (Glacial Till)		▼		Note: Soil sample (0-5') tested for SVOC, RCRA metals.
793.3	20.0	SM	SILTY SAND, fine-grained, with Clay, wet, gray. (Glaciofluvium)				
790.8	22.5	CL	LEAN CLAY, trace Sand, gray, moist, stiff. (Glacial Till)				
788.3	25.0		END OF PUSH PROBE.				
<p>Temporary well installed in probe hole with screen from 19 to 24 feet.</p> <p>Water observed at 8.3 feet in temporary well.</p> <p>Water sample collected for analytical testing and temporary well removed.</p> <p>Push Probe then grouted.</p>							

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 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-22					
DRILLER: M. Barber				METHOD: Push Probe		DATE: 8/26/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes		
818.3	0.0	FILL	FILL: Silty Sand, fine- to medium-grained, trace Gravel, brown, moist.				Bituminous surface.		
815.8	2.5	SC	CLAYEY SAND, fine- to medium-grained, trace Gravel, dark brown, moist. (Alluvium)			1.3	Note: Soil sample (0-5') tested for PAH, RCRA metals, pesticides.		
813.3	5.0	SP	POORLY GRADED SAND, fine- to medium-grained, some Gravel, brown, moist. (Glacial Outwash)			1.6			
810.3	8.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			1.1 1.0			

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota					BORING: PP-23 LOCATION: See attached sketch.		
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/26/15	SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
815.4	0.0	FILL	FILL: Silty Sand, fine- to medium-grained, trace Gravel, dark brown, moist.				
810.4	5.0	SP	POORLY GRADED SAND, fine- to medium-grained, some Gravel, brown to reddish brown, moist. (Glacial Outwash)			2.1 1.4	Note: Soil sample (0-5') tested for PAH, RCRA metals, pesticides.
803.4	12.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			2.1 2.2 2.0	

(See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-24 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/27/15		SCALE: 1" = 4'	
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes	
0.0	SM	SILTY SAND, fine-grained, trace Gravel, brown, moist. (Alluvium)				Concrete surface.	
8.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			0.6 1.0 1.3 1.2	Note: Soil sample (0-5') tested for PAH, RCRA metals.	

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(See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-25 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/27/15		SCALE: 1" = 4'	
Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes	
0.0	SM	SILTY SAND, fine-grained, brown, moist. (Alluvium)					Concrete surface.
					0.9		Note: Soil sample (0-5') tested for PAH, RCRA metals.
					1.2		Piece of concrete at 5'.
					1.6		
8.0		END OF PUSH PROBE.			1.5		
		Water not encountered while probing.					
		Push Probe then grouted.					

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(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1506758.01				BORING: PP-26			
PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/26/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
815.2	0.0						
812.7	2.5	FILL	FILL: Silty Sand, fine- to medium-grained, some Gravel, brown, moist.			2.3	Bituminous surface. Note: Soil samples (2.5-7.5') tested for SVOC, RCRA metals, pesticides and (5-7.5') tested for DRO, VOC.
		SM	SILTY SAND, fine-grained, some Gravel, dark brown, moist. (Possible Fill)			2.9	
807.7	7.5	SP	POORLY GRADED SAND, fine- to medium-grained, trace Gravel, brown, moist to wet to waterbearing. (Glacial Outwash)			5.7	
						2.6	
						33	
						2.0	
					▼	4.0	
						3.3	
795.2	20.0		END OF PUSH PROBE.				
			Temporary well installed in probe hole with screen from 15 to 20 feet.				
			Water observed at 16.7 feet in temporary well.				
			Water sample collected for analytical testing and temporary well removed.				
			Push Probe then grouted.				

(See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-27 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/26/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
817.5	0.0						
815.5	2.0	FILL	FILL: Silty Sand, fine-grained, some Gravel, dark brown, moist.				Bituminous surface.
813.5	4.0	ML	SILT, trace Sand, dark brown, moist. (Alluvium)			1.9	Note: Soil sample (0-4') tested for PAH, RCRA metals.
812.5	5.0	CL	LEAN CLAY, trace Sand and Gravel, brown, moist, soft.			2.9	
		SP	(Glacial Till) POORLY GRADED SAND, fine- to medium-grained, trace Gravel, brown, moist. (Glacial Outwash)			2.9	
809.5	8.0					3.3	
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			2.8	

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Parcel 3

Standard Penetrating Test Logs: ST-1102
Push Probe Logs: PP-28 through PP-35

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 4/26/16 09:03
 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1102 LOCATION: See attached sketch.		
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/22/15	SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
819.3	0.0					
817.3	2.0	FILL	FILL: Silty Sand, fine- to medium-grained, with Gravel, dark brown, moist.			
815.3	4.0	FILL	FILL: Silty Sand, fine-grained, slightly organic, black, moist.	8		
811.3	8.0	SM	SILTY SAND, fine-grained, brown, moist, loose. (Alluvium)	8		
807.3	12.0	SP-SM	POORLY GRADED SAND with SILT, fine- to coarse-grained, with Gravel, brown, moist, medium dense. (Glacial Outwash)	7 15		
		SP	POORLY GRADED SAND, fine- to medium-grained, grayish brown, moist, loose to medium dense. (Glacial Outwash)	16 15		
				7	▽	
				9		
				8		

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1102 (cont.) LOCATION: See attached sketch.		
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/22/15	SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
787.3	32.0					
			POORLY GRADED SAND, fine- to medium-grained, grayish brown, moist, loose to medium dense. (Glacial Outwash) <i>(continued)</i>			
783.3	36.0			7		
			END OF BORING. Water observed at 20 feet with 20 1/2 feet of hollow-stem auger in the ground. Boring then grouted.			

(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1506758.01					BORING: PP-28		
PHASE II ESA					LOCATION: See attached sketch.		
Upper Harbor Terminal							
Minneapolis, Minnesota							
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/26/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
813.8	0.0	FILL	FILL: Silty Sand, fine-grained, trace Gravel, black to brownish black, moist.				Bituminous surface.
						2.8	Note: Soil sample (0-5') tested for SVOC, RCRA metals.
808.8	5.0	SP	POORLY GRADED SAND, fine- to medium-grained, trace Gravel, brown, moist. (Glacial Outwash)			3.2	
						1.7	
801.8	12.0					1.5	
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.				

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 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-29					
DRILLER: M. Barber				METHOD: Push Probe		DATE: 8/26/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes		
819.6	0.0								
817.1	2.5	FILL	FILL: Silty Sand, fine- to medium-grained, trace Gravel, brown, moist.			4.1	Bituminous surface. Note: Soil samples (2.5-6.5') tested for PAH, RCRA metals and (2.5-5') tested for DRO, VOC.		
813.1	6.5	ML	SILT, trace Sand, dark gray, moist. (Alluvium)			4.4	Piece of bituminous at 4'.		
811.6	8.0	SP	POORLY GRADED SAND, fine- to medium-grained, light brown, moist. (Glacial Outwash)			3.3 2.5			
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.						

(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1506758.01				BORING: PP-30			
PHASE II ESA				LOCATION: See attached sketch.			
Upper Harbor Terminal							
Minneapolis, Minnesota							
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/26/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
818.9	0.0						
816.4	2.5	FILL	FILL: Silty Sand, fine-grained, trace Gravel, black, moist.			2.2	Bituminous surface.
813.9	5.0	SM	SILTY SAND, fine-grained, dark gray, moist. (Alluvium)			2.5	Note: Soil sample (0-5') tested for SVOC, RCRA metals, pesticides.
810.9	8.0	SP	POORLY GRADED SAND, fine-grained, trace Gravel, brown, moist. (Glacial Outwash)			1.4	
			END OF PUSH PROBE.			1.3	
			Water not encountered while probing.				
			Push Probe then grouted.				

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-31 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/26/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
816.5	0.0	FILL	FILL: Silty Sand, fine- to medium-grained, some Gravel, dark brown, moist.				Bituminous surface.
814.0	2.5	CL	LEAN CLAY, fine-grained, trace Sand and Gravel, brown, moist. (Glacial Till)			3.2	Note: Soil sample (0-2.5') tested for PAH, RCRA metals.
810.0	6.5	SP	POORLY GRADED SAND, fine- to medium-grained, trace Gravel, brown, moist. (Glacial Outwash)			2.4	
808.5	8.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			2.1	
						1.5	

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-32 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/26/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
820.2	0.0	FILL	FILL: Silty Sand, fine-grained, some Gravel, black, moist.				Bituminous surface.
815.2	5.0	FILL				1.4	Note: Soil sample (0-5') tested for SVOC, RCRA metals.
		SM	SILTY SAND, fine-grained, dark gray to gray, moist. (Alluvium)			1.4	
812.2	8.0	SM				1.7	
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			2.1	

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:14

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-34					
DRILLER: M. Barber				METHOD: Push Probe		DATE: 8/26/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes		
819.5	0.0								
817.0	2.5	FILL	FILL: Silty Sand, fine-grained, dark brown to brown, moist.			2.4	Bituminous surface.		
814.5	5.0	SM	SILTY SAND, fine-grained, some Clay, brown, moist. (Alluvium)			0.9	Note: Soil sample (0-5') tested for PAH, RCRA metals, pesticides.		
813.0	6.5	SP	POORLY GRADED SAND, fine- to medium-grained, brown, moist. (Glacial Outwash)			1.9			
811.5	8.0	SP	POORLY GRADED SAND, fine- to coarse-grained, trace Gravel, brown, moist. (Glacial Outwash)			2.2			
			END OF PUSH PROBE.						
			Water not encountered while probing.						
			Push Probe then grouted.						

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:14
 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-35 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/26/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
819.7	0.0	FILL	FILL: Poorly Graded Sand, fine-grained, trace Gravel, moist. (Glacial Outwash)				Vegetated surface and gravel.
814.7	5.0	SC	CLAYEY SAND, fine- to medium-grained, trace Gravel, dark gray, moist. (Glacial Outwash)			3.2 2.9	Pieces of wood at 0-1'. Note: Soil sample (0-5') tested for PAH, RCRA metals.
811.7	8.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			2.3 1.7	

Parcel 4

Standard Penetrating Test Logs: ST-1101
Push Probe Logs: PP-36 through PP-41

LOG OF BORING (See Descriptive Terminology sheet for explanation of abbreviations)

N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota					BORING: ST-1101				
DRILLER: S.N.			METHOD: 3 1/4" HSA, Autohammer		DATE: 12/22/15		SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes	
818.5	0.0								
817.8	0.7	FILL	FILL: Silty Sand, fine- to medium-grained, with Clay lenses, with wood, black, wet.						
		FILL	FILL: Silty Sand, fine- to medium-grained, with Gravel, brown, moist.	36		9	24		
				14*					*No recovery.
811.5	7.0	SP	POORLY GRADED SAND, fine- to medium-grained, with Gravel, brown, dry to waterbearing at 20 1/2 feet, loose to very dense. (Alluvium)	72					
				30					
				18		3	4		
				25					
				7					
					▽				An open triangle in the water level (WL) column indicates the depth at which groundwater was observed while drilling. Groundwater levels fluctuate.
				5					
				7					

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota					BORING: ST-1101 (cont.) LOCATION: See attached sketch.				
DRILLER: S.N.		METHOD: 3 1/4" HSA, Autohammer			DATE: 12/22/15		SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes	
786.5	32.0								
			POORLY GRADED SAND, fine- to medium-grained, with Gravel, brown, dry to waterbearing at 20 1/2 feet, loose to very dense. (Alluvium) (continued)						
782.5	36.0			19					
			END OF BORING. Water observed at 20 1/2 feet with 21 feet of hollow-stem auger in the ground. Boring then grouted.						

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-36					
DRILLER: M. Barber				METHOD: Push Probe		DATE: 8/27/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes		
819.8	0.0	FILL	FILL: Silty Sand, some Gravel, dark brown, moist.				Vegetated surface.		
817.8	2.0					1.6			
816.8	3.0	SM	SILTY SAND, fine- to medium-grained, trace Gravel, dark brown, moist.			0.9	Note: Soil sample (3-5') tested for PAH, RCRA metals.		
		SP	(Alluvium) POORLY GRADED SAND, fine- to coarse-grained, trace Gravel, brown, moist.			2.1			
814.8	5.0		(Glacial Outwash)						
		CL	LEAN CLAY, trace Sand, brown, moist. (Glacial Till)			1.0			
812.3	7.5					2.1			
811.8	8.0	SM	SILTY SAND, fine-grained, brown, wet. (Glacial Outwash)						
			END OF PUSH PROBE.						
			Water not encountered while probing.						
			Push Probe then grouted.						

(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-37			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/27/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
820.7	0.0	FILL	FILL: Poorly Graded Sand, fine- to coarse-grained, trace Gravel, brown, wet.				Sand at surface.
818.2	2.5	CL	SANDY LEAN CLAY, trace Sand and Gravel, dark gray, moist. (Glacial Till)			1.6	Note: Soil samples (2.5-7.5') tested for SVOC, RCRA metals and (2.5-5') tested for DRO, VOC.
813.2	7.5	SP	POORLY GRADED SAND, fine- to medium-grained, trace Gravel, brown, moist to waterbearing. (Glacial Outwash)			2.2	
						2.0	
						1.6	
						2.3	
800.7	20.0	SP	POORLY GRADED SAND, fine- to coarse-grained, trace of Gravel, brown, moist. (Glacial Outwash)			2.7	
798.2	22.5	SP	POORLY GRADED SAND, fine- to coarse-grained, trace Gravel, brown, wet. (Glacial Outwash)		▼	2.6	
795.7	25.0	SP	POORLY GRADED SAND, fine- to coarse-grained, trace Gravel, brown, wet. (Glacial Outwash)			3.0	Water sample tested for DRO, VOC.
			END OF PUSH PROBE.			1.9	
			Temporary well installed in probe hole with screen from 20 to 25 feet. Water observed at 22.3 feet in temporary well. Water sample collected for analytical testing and temporary well removed. Push Probe then grouted.				

(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-38					
DRILLER: M. Barber				METHOD: Push Probe		DATE: 8/27/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes		
818.6	0.0								
816.6	2.0	FILL 	FILL: Silty Sand, fine- to coarse-grained, with Gravel, dark brown, moist.				Wood chips at surface.		
		SP 	POORLY GRADED SAND, fine-grained, brown, moist. (Alluvium)			2.1	Note: Soil sample (2-6.5') tested for PAH, RCRA metals.		
						2.3			
812.1	6.5					1.8			
810.6	8.0	SP 	POORLY GRADED SAND, fine- to coarse-grained, with Gravel, dark brown, moist. (Alluvium)			2.3			
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.						

(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-39 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/27/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials <small>(Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)</small>	BPF	WL	PID <small>PPM</small>	Tests or Notes
818.8	0.0	SP	POORLY GRADED SAND, fine- to medium-grained, trace Gravel, brown, moist. (Glacial Outwash)				Vegetated surface and sand.
816.3	2.5	SP	POORLY GRADED SAND, fine- to medium-grained, some Clay and Gravel, brown, moist. (Glacial Outwash)			2.1	Piece of concrete at 2'.
813.8	5.0	SP	POORLY GRADED SAND, fine- to medium-grained, trace Gravel, brown, moist. (Glacial Outwash)			2.0	Note: Soil sample (0-2.5') tested for PAH, RCRA metals.
		CL	LEAN CLAY, with Sand, trace Gravel, dark brown, moist. (Glacial Till)			1.5	
808.8	10.0	CL	LEAN CLAY, with Sand, trace Gravel, dark brown, moist. (Glacial Till)			1.4	Piece of bituminous at 8.5'.
806.8	12.0	SP	POORLY GRADED SAND, fine- to medium-grained, trace Gravel, brown, moist. (Glacial Outwash)			1.2	
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.				

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:14

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota					BORING: PP-40		
					LOCATION: See attached sketch.		
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/27/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
820.2	0.0	SP	POORLY GRADED SAND, fine- to medium-grained, brown, moist. (Glacial Outwash)				Vegetated surface and sand.
						1.8	Note: Soil sample (0-5') tested for PAH, RCRA metals.
815.2	5.0	SM	SILTY SAND, fine- to medium-grained, dark gray, moist. (Glacial Outwash)			1.8	
						0.7	
812.2	8.0					1.1	
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.				

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:14

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota					BORING: PP-41 LOCATION: See attached sketch.		
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/27/15	SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials <small>(Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)</small>	BPF	WL	PID PPM	Tests or Notes
819.5	0.0	SP	POORLY GRADED SAND, fine-grained, brown, moist. (Alluvium)				Sand at surface.
814.5	5.0	SP	POORLY GRADED SAND, fine- to coarse-grained, some Gravel, brown, moist. (Glacial Outwash)			1.5 1.8	Note: Soil sample (0-5') tested for SVOC, RCRA metals, pesticides.
811.5	8.0	SP	END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			2.5 2.6	

Parcel 5

Push Probe Logs: PP-42 through PP-48
Boring Logs from STS Consultants Ltd.: B-1 through B-6

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-42					
DRILLER: M. Barber				METHOD: Push Probe		DATE: 8/28/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes		
816.0	0.0								
		FILL	FILL: Silty Sand, fine- to medium-grained, little Gravel, dark brown, moist.					Bituminous surface.	
813.0	3.0					0.6		Note: Soil sample (0-3') tested for PAH, RCRA metals.	
812.0	4.0	CL	LEAN CLAY, little Sand, dark brown, moist, stiff. (Glacial Till)			1.9			
		SP	POORLY GRADED SAND, fine- to medium-grained, trace Gravel, dark brown, moist. (Glacial Outwash)			1.8			
808.0	8.0					1.7			
			END OF PUSH PROBE.			1.5			
			Water not encountered while probing.						
			Push Probe then grouted.						

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-43 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/28/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
815.0	0.0						
812.5	2.5	FILL	FILL: Silty Sand, fine- to medium-grained, little Gravel, dark brown, moist.			0.8	Vegetated surface. Note: Soil sample (2.5-8') tested for PAH, RCRA metals.
		SP	POORLY GRADED SAND, fine- to medium-grained, trace Gravel, brown, moist. (Glacial Outwash)			1.2	
807.0	8.0					1.5 1.8	
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.				

(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-44					
DRILLER: M. Barber				METHOD: Push Probe		DATE: 8/28/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes		
818.1	0.0	FILL	FILL: Silty Sand, fine- to coarse-grained, some Gravel, brown, moist.				Bituminous surface.		
815.6	2.5	SM	SILTY SAND, fine-grained, brown, moist. (Alluvium)			1.6	Note: Soil sample (5-7.5') tested for PAH, RCRA metals.		
813.1	5.0	SP	POORLY GRADED SAND, fine- to medium-grained, little Gravel, brown, moist to waterbearing. (Glacial Outwash)			1.5			
						1.5			
						1.9			
						1.7			
						1.4			
						1.4			
						1.4			
798.1	20.0		END OF PUSH PROBE.			1.6	Water sample tested for DRO, VOC.		
			Temporary well installed in probe hole with screen from 15 to 20 feet. Water observed at 18.8 feet in temporary well. Water sample collected for analytical testing and temporary well removed. Push Probe then grouted.						

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 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota					BORING: PP-45 LOCATION: See attached sketch.		
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/28/15	SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
816.1	0.0	SM	SILTY SAND, fine-grained, brown, moist. (Alluvium)			0.9	Bituminous surface.
811.1	5.0	SP	POORLY GRADED SAND, fine- to medium-grained, light brown, moist. (Glacial Outwash)			1.2	Note: Soil sample (0.5-5') tested for PAH, RCRA metals.
808.1	8.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			2.2 2.4	

(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota					BORING: PP-46 LOCATION: See attached sketch.		
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/28/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
809.0	0.0	SP	POORLY GRADED SAND, fine- to medium-grained, trace Gravel, brown, moist. (Glacial Outwash)				Vegetated surface.
						3.8	Note: Soil samples (0-2.5') tested for DRO, VOC and (0-5') tested for SVOC, RCRA metals. Water sample tested for DRO, VOC.
						1.7	
						2.4	
						2.2	
799.0	10.0	SP	POORLY GRADED SAND, fine- to coarse-grained, some Gravel, brown, wet. (Glacial Outwash)		▼		
						1.9	
794.0	15.0	SP	POORLY GRADED SAND, fine- to coarse-grained, some Gravel, gray, wet. (Glacial Outwash)				
						1.8	
						1.3	
789.0	20.0	SP	POORLY GRADED SAND, fine- to coarse-grained, some Gravel, gray, wet. (Glacial Outwash)				
						1.3	
			END OF PUSH PROBE. Temporary well installed in probe hole with screen from 15 to 20 feet. Water observed at 11 feet in temporary well. Water sample collected for analytical testing and temporary well removed. Push Probe then grouted.				

LOG OF BORING (See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota					BORING: PP-47 LOCATION: See attached sketch.		
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/27/15	SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
817.5	0.0	FILL	FILL: Silty Sand, fine-grained, trace Gravel, dark brown, moist.				Gravel surface.
						2.4	Note: Soil sample (0-5') tested for PAH, RCRA metals.
812.5	5.0	SP	POORLY GRADED SAND, fine- to coarse-grained, brown, moist. (Glacial Outwash)			1.6	
809.5	8.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			2.0 1.9	

(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota					BORING: PP-48 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/28/15		SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes	
808.5	0.0	SP	POORLY GRADED SAND, fine- to medium- to coarse-grained, some Gravel, brown, moist. (Glacial Outwash)			6.3	Note: Soil samples (0-2.5') tested for DRO, VOC and (0-5') tested for SVOC, RCRA metals.	
798.5	10.0	SP	POORLY GRADED SAND, fine- to coarse-grained, brown, wet. (Glacial Outwash)			3.5		
796.5	12.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			2.8		



STS Consultants Ltd.

CLIENT
Minneapolis Community Development Agency

LOG OF BORING NUMBER B-1

PROJECT NAME
Anderson Oil Lease Site

ARCHITECT-ENGINEER
STS Consultants, Ltd.

SITE LOCATION
Port of Minneapolis, Minnesota

DEPTH (FT) ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PHOTO-IONIZATION DETECTOR READING (PPM)	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²				
							1	2	3	4	5
							PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
							X	---	●	---	△
							10	20	30	40	50
							⊗	STANDARD PENETRATION		BLOWS/FT.	
							10	20	30	40	50
					SURFACE ELEVATION						
	S1	AS			Gravelly sand, some to little silt - dark brown - moist - (SM) - fill	5					
	S2	SS			Sandy gravel, some to little silt - dark brown - moist - extremely dense - (GM) - fill	3					
		HS									
5.0	S3	SS			Fine to coarse sand, trace gravel, trace silt - brown - moist to 13.6 feet then saturated - medium dense to loose - (SP)	1					
		HS									
		HS									
	S4	SS									
10.0		HS									
	S5	SS									
		HS									
14.0	S6	SS									
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STS Consultants Ltd.

CLIENT
Minneapolis Community Development Agency

LOG OF BORING NUMBER **B-2**

PROJECT NAME
Anderson Oil Lease Site

ARCHITECT-ENGINEER
STS Consultants, Ltd.

SITE LOCATION
Port of Minneapolis, Minnesota

DEPTH (FT) ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PHOTO-IONIZATION DETECTOR READING (PPM)	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²				
						1	2	3	4	5
						PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
						X	-----	●	-----	△
						10	20	30	40	50
						⊗	STANDARD PENETRATION		BLOWS/FT.	
						10	20	30	40	50
				SURFACE ELEVATION						
	S1	AS		Fine to medium sand, trace silt - brown - moist to 15.7 feet then saturated - loose to medium dense - (SP)	1					
	S2	SS			1					
5.0	S3	SS			1					
		HS								
	S4	SS			1					
10.0		HS								
	S5	SS			1					
		HS								
	S6	SS		1						
15.0		HS								
16.5	S7	SS		1						
				End of boring 16.5 feet Drilled and sampled with 3 1/4 inch ID hollow stem augers to full depth. Grouted boring upon completion. Photoionization readings obtained with a Hnu Photoionization meter equipped with a 10.2 ev lamp, calibrated to a benzene reference gas. Hnu background readings 0 - 2 Hnu meter units. Sample S7 15.0 to 16.5 feet prepared and submitted for chemical analysis						

The stratification lines represent the approximate boundary lines between soil types: in-situ, the transition may be gradual.

WL	15.5 ft	WS OR WD WS	BORING STARTED 03/15/93	STS OFFICE Minnesota
WL	15.7 ft	BCR ACR	BORING COMPLETED 03/15/93	ENTERED BY DCJ
WL			RIG/FOREMAN CME750/ Glen D.	SHEET NO. 1 OF 1 APP'D BY DCJ
				STS JOB NO. 95735-XA



CLIENT
Minneapolis Community Development Agency

LOG OF BORING NUMBER **B-3**

PROJECT NAME
Anderson Oil Lease Site

ARCHITECT-ENGINEER
STS Consultants, Ltd.

SITE LOCATION
Port of Minneapolis, Minnesota

DEPTH (FT) ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PHOTO-IONIZATION DETECTOR READING (PPM)	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²				
						1	2	3	4	5
						PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %
						X - - - - -		●		△
						10	20	30	40	50
						STANDARD PENETRATION BLOWS/FT.				
						10	20	30	40	50
				SURFACE ELEVATION						
	S1	AS		Organic sandy silt - black - topsoil	1					
	S1A	AS		Fine to medium sand, trace silt, trace gravel - brown - moist - loose to medium dense - (SP) Note: 6.5 to 8.0 feet iron stained 8.0 feet color change to light brown	1					
	S2	SS				1				
5.0	S3	SS			1					
		HS								
	S4	SS			1					
10.0		HS								
	S5	SS			1					
		HS								
	S6	SS		Fine to coarse sand, trace gravel, trace silt - dark brown - moist to saturated - medium dense - (SW-SM)	1					
15.0		HS								
	S7	SS			3					
18.0	S8	SS			1					
				End of boring 18.0 feet Drilled with 3 1/4 inch ID hollow stem augers. Grouted boring upon completion. Photoionization readings obtained with a Hnu Photoionization meter equipped with a 10.2 ev lamp, calibrated to a benzene reference gas. Hnu background readings 0 - 2 Hnu meter units. Sample S7 15.0 to 16.5 feet prepared and submitted for chemical analysis						

The stratification lines represent the approximate boundary lines between soil types: in-situ, the transition may be gradual.

WL	16.3 ft	WS OR WD WS	BORING STARTED 03/15/93	STS OFFICE Minnesota
WL	16.5 ft	BCR ACR	BORING COMPLETED 03/15/93	ENTERED BY DCJ
WL			RIG/FOREMAN CME750/ Glen D.	SHEET NO. 1 OF 1 STS JOB NO. 95735-XA



CLIENT
Minneapolis Community Development Agency

LOG OF BORING NUMBER **B-4**

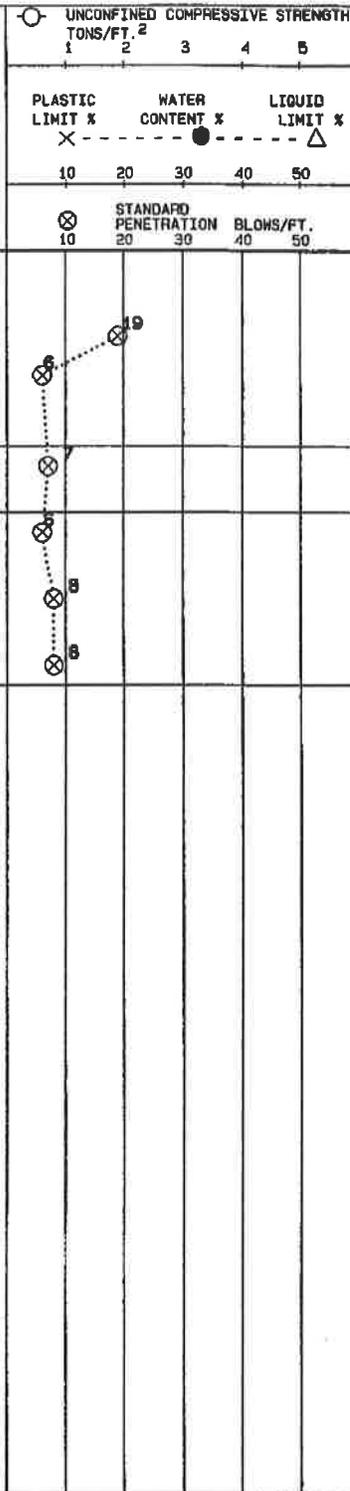
PROJECT NAME
Anderson Oil Lease Site

ARCHITECT-ENGINEER
STS Consultants, Ltd.

STS Consultants Ltd.

SITE LOCATION
Port of Minneapolis, Minnesota

DEPTH (FT) ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PHOTO-IONIZATION DETECTOR READING (PPM)	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²				
						1	2	3	4	5
SURFACE ELEVATION						PLASTIC LIMIT % WATER CONTENT % LIQUID LIMIT % X ----- ● ----- △ 10 20 30 40 50 STANDARD PENETRATION BLOWS/FT. 10 20 30 40 50				
	S1	AS		Fine to coarse sand, some gravel, little silt - dark brown - moist - medium dense to loose - (SM) - fill	1					
	S2	SS			1					
5.0	S3	SS			1					
		HS								
	S4	SS		Fine to coarse sand, little gravel, trace silt - brown - moist - loose - (SW-SM) Note: Seams stained dark brown.	1					
10.0		HS								
	S5	SS		Fine to medium sand, trace gravel, trace silt - brown - moist to 16.0 feet then saturated - loose - (SP)	1					
		HS								
15.0		HS								
16.5	S7	SS			3					
				End of boring 16.5 feet Drilled and sampled with 3 1/4 inch ID hollow stem augers to full depth. Grouted boring upon completion. Photoionization readings obtained with a Hnu Photoionization meter equipped with a 10.2 ev lamp, calibrated to a benzene reference gas. Hnu background readings 0 - 2 Hnu meter units. Sample S7 15.0 to 16.5 feet prepared and submitted for chemical analysis.						



The stratification lines represent the approximate boundary lines between soil types: in-situ, the transition may be gradual.

WL	16 ft	WS OR WD WS	BORING STARTED 03/15/93	STS OFFICE Minnesota
WL	16 ft	BCR	ACR	BORING COMPLETED 03/15/93
WL			RIG/FOREMAN CME750/ Glen D.	ENTERED BY DCJ
				SHEET NO. 1 OF 1
				APP'D BY DCJ
				STS JOB NO. 95735-XA



STS Consultants Ltd.

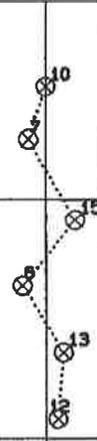
CLIENT
Minneapolis Community Development Agency
 PROJECT NAME
Anderson Oil Lease Site

LOG OF BORING NUMBER **8-5**
 ARCHITECT-ENGINEER
STS Consultants, Ltd.

SITE LOCATION
Port of Minneapolis, Minnesota

DEPTH (FT) ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE RECOVERY	DESCRIPTION OF MATERIAL	PHOTO-IONIZATION DETECTOR READING (PPM)	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²					
						1	2	3	4	5	
						PLASTIC LIMIT %			WATER CONTENT %		LIQUID LIMIT %
						X - - - - -			●		△
						10 20 30 40 50					
						STANDARD PENETRATION BLOWS/FT.					
						⊗ 10 20 30 40 50					
				SURFACE ELEVATION							
	S1	A5		Fine to coarse sand, little gravel, trace silt - brown - moist - medium dense to loose - (SP-SM)	1						
	S2	SS			1						
5.0	S3	SS			10						
		HS									
	S4	SS		Fine to medium sand, trace gravel, trace silt - brown - moist to 16.2 then saturated - medium dense to loose - (SP)	1						
10.0		HS									
	S5	SS			1						
		HS									
	S6	SS			1						
15.0		HS									
16.5	S7	SS		1							

End of boring 16.5 feet
 Drilled and sampled with 3 1/4 inch ID hollow stem augers to full depth.
 Grouted boring upon completion.
 Photoionization readings obtained with a Hnu Photoionization meter equipped with a 10.2 ev lamp, calibrated to a benzene reference gas.
 Hnu background readings 0 - 2 Hnu meter units.
 Samples S2 2.5 to 4.0 feet and sample S7 15.0 to 16.5 feet, prepared and submitted for chemical analysis.



The stratification lines represent the approximate boundary lines between soil types: in-situ, the transition may be gradual.

WL	15.5 ft	WS OR WD WS	BORING STARTED 03/15/93	STS OFFICE Minnesota
WL	16.2 ft	BCR	ACR	BORING COMPLETED 03/15/93
WL			RIG/FOREMAN CME750/ Glen D.	ENTERED BY DCJ
				SHEET NO. 1 OF 1
				APP'D BY DCJ
				STS JOB NO. 95735-XA



CLIENT
Minneapolis Community Development Agency
 PROJECT NAME
Anderson Oil Lease Site

LOG OF BORING NUMBER **B-6**
 ARCHITECT-ENGINEER
STS Consultants, Ltd.

SITE LOCATION
Port of Minneapolis, Minnesota

DEPTH (FT)	ELEVATION (FT)	SAMPLE NO.	SAMPLE TYPE	SAMPLE DISTANCE	RECOVERY	DESCRIPTION OF MATERIAL	PHOTO-IONIZATION DETECTOR READINGS (PPM)	UNCONFINED COMPRESSIVE STRENGTH TONS/FT. ²									
								1	2	3	4	5					
								PLASTIC LIMIT %		WATER CONTENT %		LIQUID LIMIT %					
								X - - - - -		●		△					
								10 20		30 40		50					
								⊗		STANDARD PENETRATION		BLOWS/FT.					
								10		20 30		40 50					
						SURFACE ELEVATION											
		S1	AS			Fine to coarse sand, some gravel, little silt - dark brown - moist - medium dense - (SM) - fill	1										
		S2	SS				1										
	5.0	S3	SS			Fine to coarse sand, little gravel, trace silt - brown - moist - loose - (SP)	1										
		S3A	SS				1										
			HS														
		S4	SS			Fine to medium sand, trace gravel, trace silt - brown - moist - loose - (SP)	1										
	10.0		HS				1										
		S5	SS				1										
			HS														
		S6	SS				1										
	15.0		HS														
		S7	SS			Fine to coarse sand, trace gravel, trace silt - brown - moist - loose - (SW)	1										
	18.0	S8	SS				1										
						End of boring 18.0 feet Drilled and sampled with 3 1/4 inch ID hollow stem augers to full depth. Grouted boring upon completion. Photoionization readings obtained with a Hnu Photoionization meter equipped with a 10.2 ev lamp, calibrated to a benzene reference gas. Hnu background readings 0 - 2 Hnu meter units. Samples S3 5.0 to 6.5 feet and S8 16.5 to 18.0 feet prepared and submitted for chemical analysis											

The stratification lines represent the approximate boundary lines between soil types: in-situ, the transition may be gradual.

WL	17 ft	NS OR WD WS	BORING STARTED 03/15/93	STS OFFICE Minnesota
WL	17.2 ft	BCR	ACR	BORING COMPLETED 03/15/93
WL			RIG/FOREMAN CME750/ Glen O.	ENTERED BY DCJ
				APP'D BY DCJ
				SHEET NO. 1 OF 1
				STS JOB NO. 95735-XA

Parcel 6A

Standard Penetrating Test Logs: ST-1105 through ST-1106
Push Probe Logs: PP-13 through PP-15
Boring Logs from Pinnacle Engineering, Inc.: SB-1 through SB-4
Boring Logs from Wenk Associates: SB-5 through SB-8

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota					BORING: ST-1105 LOCATION: See attached sketch.				
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer			DATE: 12/18/15		SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes	
824.5	0.0								
824.0	0.5	FILL	FILL: Silty Sand, fine-grained, brown, moist.						
		FILL	FILL: Poorly Graded Sand with Silt, fine- to medium-grained, with Gravel, brown, moist.	18		7	15		
820.5	4.0								
		FILL	FILL: Silty Sand, fine- to medium-grained, dark brown, moist.	9		12			
817.5	7.0								
		SS	SANDSTONE, fine-grained, white, moist to waterbearing at 15 feet, very dense. (St. Peter Sandstone)	73					
				50/6"					
				50/4"					
				50/6"					
803.5	21.0			50/6"					
			END OF BORING.						
			Water observed at 15 feet with 15 1/2 feet of hollow-stem auger in the ground.						
			Boring then grouted.						

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1106 LOCATION: See attached sketch.			
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/21/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
829.2	0.0						
828.3	0.9	PAV	6 inches of bituminous over 3 inches of aggregate base.				
		FILL	FILL: Silty Sand, fine- to medium-grained, black, wet.	12			
				6		20	
822.2	7.0						
		SP-SM	POORLY GRADED SAND with SILT, fine-grained, brown, moist, medium dense. (Alluvium)	15			
				17			
817.2	12.0						
		SP-SM	POORLY GRADED SAND with SILT, fine- to medium-grained, with Gravel and Cobbles, very dense. (Glacial Outwash)	50/1"			
				50/2**			*No recovery.
811.2	18.0						
		SH	SHALE, highly weathered, green to brown, wet, hard. (Glenwood Shale)				
808.2	21.0						
		SS	SANDSTONE, fine-grained, white to brown, waterbearing, medium dense to very dense. (St. Peter Sandstone)				
				14			
				50/3"			

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 4/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota					BORING: ST-1106 (cont.) LOCATION: See attached sketch.		
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/21/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials <small>(Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)</small>	BPF	WL	MC %	Tests or Notes
797.2	32.0	•••••	SANDSTONE, fine-grained, white to brown, waterbearing, medium dense to very dense. (St. Peter Sandstone) <i>(continued)</i>				
				X	50/6"		
				X	50/1"		
788.2	41.0		END OF BORING. Water observed at 20 feet with 21 feet of hollow-stem auger in the ground. Boring then grouted.				

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:12

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-13 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/25/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
826.2	0.0						
823.7	2.5	FILL	FILL: Silty Sand, fine- to medium-grained, brown, moist.			1.2	Vegetated surface. Note: Soil samples (0-2.5') tested for pesticides and (4-6.5') tested for PAH, RCRA metals, DRO.
822.2	4.0	FILL	FILL: Silty Sand, fine-grained, black, moist.			1.1	
821.2	5.0	SP	POORLY GRADED SAND, fine- to medium-grained, brown, moist.			1.3	
819.7	6.5	SM	(Alluvium) SILTY SAND, fine-grained, dark brown to black, moist.			1.2	
818.2	8.0	SP	(Alluvium) POORLY GRADED SAND, fine- to medium-grained, brown, moist.			0.5	
			(Glacial Outwash) END OF PUSH PROBE.				
			Water not encountered while probing.				
			Push Probe then grouted.				

(See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota					BORING: PP-14 LOCATION: See attached sketch.		
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/25/15	SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
824.8	0.0	FILL	FILL: Silty Sand, fine- to medium-grained, some Gravel, brown, moist.				Vegetated surface and gravel.
822.3	2.5	SM	SILTY SAND, fine-grained, trace Gravel, reddish brown, moist. (Alluvium)			0.5	Piece of concrete at 2'. Note: Soil sample (2.5-5') tested for PAH, RCRA metals.
819.8	5.0	SP	POORLY GRADED SAND, fine- to coarse-grained, with Gravel, brown, moist. (Glacial Outwash)			1.0	
816.8	8.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			1.0 1.3	

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 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01				BORING: PP-15			
PHASE II ESA				LOCATION: See attached sketch.			
Upper Harbor Terminal							
Minneapolis, Minnesota							
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/25/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
824.1	0.0						
823.1	1.0	FILL 	FILL: Lean Clay, trace Sand and Gravel, reddish brown, moist.			1.3	Vegetated surface and gravel.
821.6	2.5	FILL 	FILL: Silty Sand, fine- to medium-grained, trace Gravel, black, moist.			1.5	Note: Soil sample (1-2.5') tested for PAH, RCRA metals.
		SM 	SILTY SAND, fine-grained, white, moist. (Alluvium)			1.0	
						1.6	
816.1	8.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			1.7	

Project: CPED	Boring Log SB-1	Pinnacle Engineering, Inc.
Project Location: 3750 North Washington Ave. Minneapolis MN		11541 95th Avenue N Maple Grove, MN 55369
Project Number: R013117.000		(763) 315-4501

Date(s) Drilled: 5/2/13	Logged By: Matt Witzel	Checked By:
Drilling Method: Macro Core	Drill Bit Size/Type: 2"	Total Depth of Borehole: 8 feet bgs
Drill Rig Type: Push Probe	Drilling Contractor: NA	Elevation:
Groundwater Level: NA	Sampling Method(s):	Weather: Over cast 37
Borehole Backfill: Bentonite	PID and Calibration Date: 5/2/13	

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Depth (feet)	Sample	Sample ID	PID Reading, PPM	Material Type	Graphic Log	MATERIAL DESCRIPTION	REMARKS
0				SW		Medium grained sand and gravel.	
1.3			13	SW-SM		Fine to medium grained sand with gravel, light brown, moist.	
5		SB-11(8 5-5)		Concrete		Concrete fill.	
0.1			0.1	GW SP		Medium grained, sand, and gravel, brown, dry. Fine grained sand, light brown, moist.	
						Note: End of boring.	
10							
15							
20							
25							
30							

Project: CPED	Boring Log SB-2	Pinnacle Engineering, Inc.
Project Location: 3750 North Washington Ave. Minneapolis MN		11541 95th Avenue N Maple Grove, MN 55369
Project Number: R013117.000		(763) 315-4501

Date(s) Drilled 4/30/13-5/2/13	Logged By Matt Witzel	Checked By
Drilling Method Hand Auger/Macro	Drill Bit Size/Type 2"	Total Depth of Borehole 8 feet bgs
Drill Rig Type Flight auger/push probe	Drilling Contractor NA	Elevation
Groundwater Level NA	Sampling Method(s)	Weather Over cast 37
Borehole Backfill Bentonite	PID and Calibration Date 4/30/13-5/2/13	

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Depth (feet)	Sample	Sample ID	PID Reading, PPM	Material Type	Graphic Log	MATERIAL DESCRIPTION	REMARKS
0							
5.3				Fill		Fill: Fine to medium grained sand and organic top soil, black, wet.	
16				SW-SM		Fine to medium grained sand, with gravel, and silts, light brown.	
8.1							
16.1							
40		SB-2 (4-5)		GW		Medium grained sand with gravel, moist, light brown.	
6.8				SW-SM		Fine to medium grained sand, brown, moist.	
				SM		Silty sand, moist, red.	
						Note: End of boring.	
10							
15							
20							
25							
30							

Project: CPED	Boring Log SB-3	Pinnacle Engineering, Inc. 11541 95th Avenue N Maple Grove, MN 55369 (763) 315-4501
Project Location: 3750 North Washington Ave. Minneapolis MN		
Project Number: R013117.000		

Date(s) Drilled: 5/2/13	Logged By: Matt Witzel	Checked By:
Drilling Method: Macro Core	Drill Bit Size/Type: 2"	Total Depth of Borehole:
Drill Rig Type: Push Probe	Drilling Contractor: NA	Elevation:
Groundwater Level: NA	Sampling Method(s):	Weather: Over cast 37
Borehole Backfill: Bentonite	PID and Calibration Date: 5/2/13	

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Depth (feet)	Sample	Sample ID	PID Reading, PPM	Material Type	Graphic Log	MATERIAL DESCRIPTION	REMARKS
0				SW-SM		Fine to medium grained sand, and gravel, brown, moist.	
3.5				SP		Fine sand, with coarse gravel, brown, moist.	
5		SB-3 (2.5-5)	3.4				
			0.3	SP		Fine sand, white, moist.	
10						Note: End of boring	
15							
20							
25							
30							

Project: CPED	Boring Log SB-4	Pinnacle Engineering, Inc.
Project Location: 3750 North Washington Ave. Minneapolis MN		11541 95th Avenue N Maple Grove, MN 55369 (763) 315-4501
Project Number: R013117.000		

Date(s) Drilled: 5/2/13	Logged By: Matt Witzel	Checked By:
Drilling Method: Macro Core	Drill Bit Size/Type: 2"	Total Depth of Borehole:
Drill Rtg Type: Push Prove	Drilling Contractor: NA	Elevation:
Groundwater Level: NA	Sampling Method(s):	Weather: Over cast 37
Borehole Backfill: Bentonite	PID and Calibration Date:	

J:\Projects\Clients\COPED Minneapolis Community Planning and Economic Development\2013\R013117.000 CPED Phase II and Piping Removal Overlay\Boring Logs\Boring Log SB-4 (Pinnacle Template.rtf)

Depth (feet)	Sample	Sample ID	PID Reading, PPM	Material Type	Graphic Log	MATERIAL DESCRIPTION	REMARKS
0				SW		Medium sand and gravel, brown, moist.	
		SB-4 (0-2.5)	25				
			0.9				
5				SW		Medium grained sand, brown, moist.	
			3.1				
						Note: Refusal at 7' end of boring.	
10							
15							
20							
25							
30							



SOIL BORING SB-5

Responsive partner. Exceptional outcomes.

Organic Technologies
3750 Washington Avenue North
Minneapolis, MN

Date Started : 5/20/15
Date Completed : 5/20/15
Hole Diameter : 3 1/4 in.
Drilling Method : Direct Push Probe
Sampling Method : MacroCore

Ground Elevation :
Northing Coord. :
Easting Coord. :
Survey By :
Logged By : KEM

Project # 5472-0001

Depth in Feet	Approx. Elevation	USCS	GRAPHIC	DESCRIPTION	SAMPLE DATA			
					Sample Interval	Recovery (Inches)	PID (PPM)	Soil Analytical Sample
0		SM		SILTY SAND, with organics and rock				
1				Dark brown GRAVELLEY/SILTY SAND		Full	0.2	
2		SM						
3		CL		Brown LEAN CLAY				
4		SP		Brown SAND, fine to medium grained, trace silt		Full	0	Sample
5		SM		Dark brown, GRAVELLEY/SILTY SAND				
6		SP		GRAVELLEY SAND, fine to coarse grained		Full	0	
7		SP		Light brown, SAND, very fine grained				
8				EOB @ 8'				



SOIL BORING SB-6

(Page 1 of 1)

Responsive partner. Exceptional outcomes.

Organic Technologies
3750 Washington Avenue North
Minneapolis, MN

Date Started : 5/20/15
Date Completed : 5/20/15
Hole Diameter : 3 1/4 in.
Drilling Method : Direct Push Probe
Sampling Method : MacroCore

Ground Elevation :
Northing Coord. :
Easting Coord. :
Survey By :
Logged By : KEM

Project # 5472-0001

Depth in Feet	Approx. Elevation	USCS	GRAPHIC	DESCRIPTION	SAMPLE DATA			
					Sample Interval	Recovery (Inches)	PID (PPM)	Soil Analytical Sample
0		SM		Dark brown SILTY SAND, with organics and rock				
1				Gray SAND with ROCK, fine to coarse grained		Full	1.0	
2				changes to darker gray				
3		SP		Light brown		Full	0.1	Sample
4				Light brown to brown SAND, fine to medium grained				
5		SP		Light brown to brown SAND, fine to medium grained		Full	1.9	
6		CL		Red LEAN CLAY				
7		SP		Brown SAND, fine to medium grained				
8								



SOIL BORING SB-7

(Page 1 of 1)

Responsive partner. Exceptional outcomes.

Organic Technologies
3750 Washington Avenue North
Minneapolis, MN

Date Started : 5/20/15
Date Completed : 5/20/15
Hole Diameter : 3 1/4 in.
Drilling Method : Direct Push Probe
Sampling Method : MacroCore

Ground Elevation :
Northing Coord. :
Easting Coord. :
Survey By :
Logged By : KEM

Project # 5472-0001

Depth in Feet	Approx. Elevation	USCS	GRAPHIC	DESCRIPTION	SAMPLE DATA			
					Sample Interval	Recovery (Inches)	PID (PPM)	Soil Analytical Sample
0				Brown SILTY SAND, with gravel and rock				
1		SM				Full	0	
2								
3				Brown SAND with gravel and rock, trace silt, fine to coarse grained.				
4		SP				Full	0.1	Sample
5				Brown SAND, fine to medium grained				
6		SP				Full	0	
7				Light brown SAND, very fine grained				
8		SP				Full	0	
9				EOB @ 9'				



SOIL BORING SB-8

(Page 1 of 1)

Responsive partner. Exceptional outcomes.

Organic Technologies
3750 Washington Avenue North
Minneapolis, MN

Date Started : 5/20/15
Date Completed : 5/20/145
Hole Diameter : 3 1/4 in.
Drilling Method : Direct Push Probe
Sampling Method : MacroCore

Ground Elevation :
Northing Coord. :
Easting Coord. :
Survey By :
Logged By : KEM

Project # 5472-0001

Depth in Feet	Approx. Elevation	USCS	GRAPHIC	DESCRIPTION	SAMPLE DATA			
					Sample Interval	Recovery (Inches)	PID (PPM)	Soil Analytical Sample
0		SM		Dark brown SILTY SAND, with organics/peat				
1				Dark brown SILTY SAND with gravel and rock, fine to coarse grained.		Full	1.1	Sample
2								
3								
4		SP		Crushed rock from 3.8-4		Full	0.1	
5								
6								
7								
8		SP		Brown SAND, fine to coarse grained (very moist)		Full	0.3	

Parcel 7A

Standard Penetrating Test Logs: ST-1107
Push Probe Logs: PP-9 through PP-10

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 4/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1107 LOCATION: See attached sketch.			
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/18/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
843.6	0.0	FILL	FILL: Silty Sand, fine- to medium-grained, with Gravel and Cobbles, brown, moist.				
				18			
				14		12	
836.6	7.0	SS	SANDSTONE, fine-grained, white, dry to waterbearing at 35 feet, very dense. (St. Peter Sandstone)				
				50/1"			*No recovery.
				50/0"			*No recovery.
				*			*50/1/2". No recovery.
				50/3"			
				50/5"			
				50/5"			
				50/3"			

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\11785.GPJ BRAUN_V8_CURRENT.GDT 1/26/16 09:03

Braun Project B1511785 GEOTECHNICAL EVALUATION City of Minneapolis Upper Harbor Terminal Between 33rd Avenue North and Dowling Avenue Minneapolis, Minnesota				BORING: ST-1107 (cont.) LOCATION: See attached sketch.			
DRILLER: M. Niesen		METHOD: 3 1/4" HSA, Autohammer		DATE: 12/18/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
811.6	32.0						
			SANDSTONE, fine-grained, white, dry to waterbearing at 35 feet, very dense. (St. Peter Sandstone) <i>(continued)</i>				
807.6	36.0			50/3"			
			END OF BORING. Water observed at 35 feet with 35 feet of hollow-stem auger in the ground. Boring then grouted.				

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:15
 (See Descriptive Terminology sheet for explanation of abbreviations)

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota					BORING: PP-9 LOCATION: See attached sketch.		
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/24/15	SCALE: 1" = 4'		
Elev. feet	Depth feet	Symbol	Description of Materials <small>(Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)</small>	BPF	WL	PID PPM	Tests or Notes
848.1	0.0	SM	SILTY SAND, fine-grained, trace Gravel, brown to light brown, moist. (Alluvium)			1.0	Grass surface. Note: Soil sample (0-5') tested for PAH, RCRA metals.
840.1	8.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			0.9 0.8 1.0	

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:12

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-10 LOCATION: See attached sketch.			
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/24/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
841.6	0.0	FILL	FILL: Silty Sand, some Gravel, black, moist.				Gravel surface.
						4.0	Note: Soil samples (0-2.5') tested for DRO, VOC and (0-5') tested for PAH, RCRA metals.
836.6	5.0					2.2	
835.6	6.0	CL	LEAN CLAY, with Sand and Gravel, brown, wet. (Glacial Till)				
		SM	SILTY SAND, fine- to medium-grained, some Gravel, brown, moist. (Glacial Outwash)			1.8	
833.6	8.0					1.2	
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.				

Parcel 7B

Push Probe Logs: PP-11 through PP-12

(See Descriptive Terminology sheet for explanation of abbreviations)

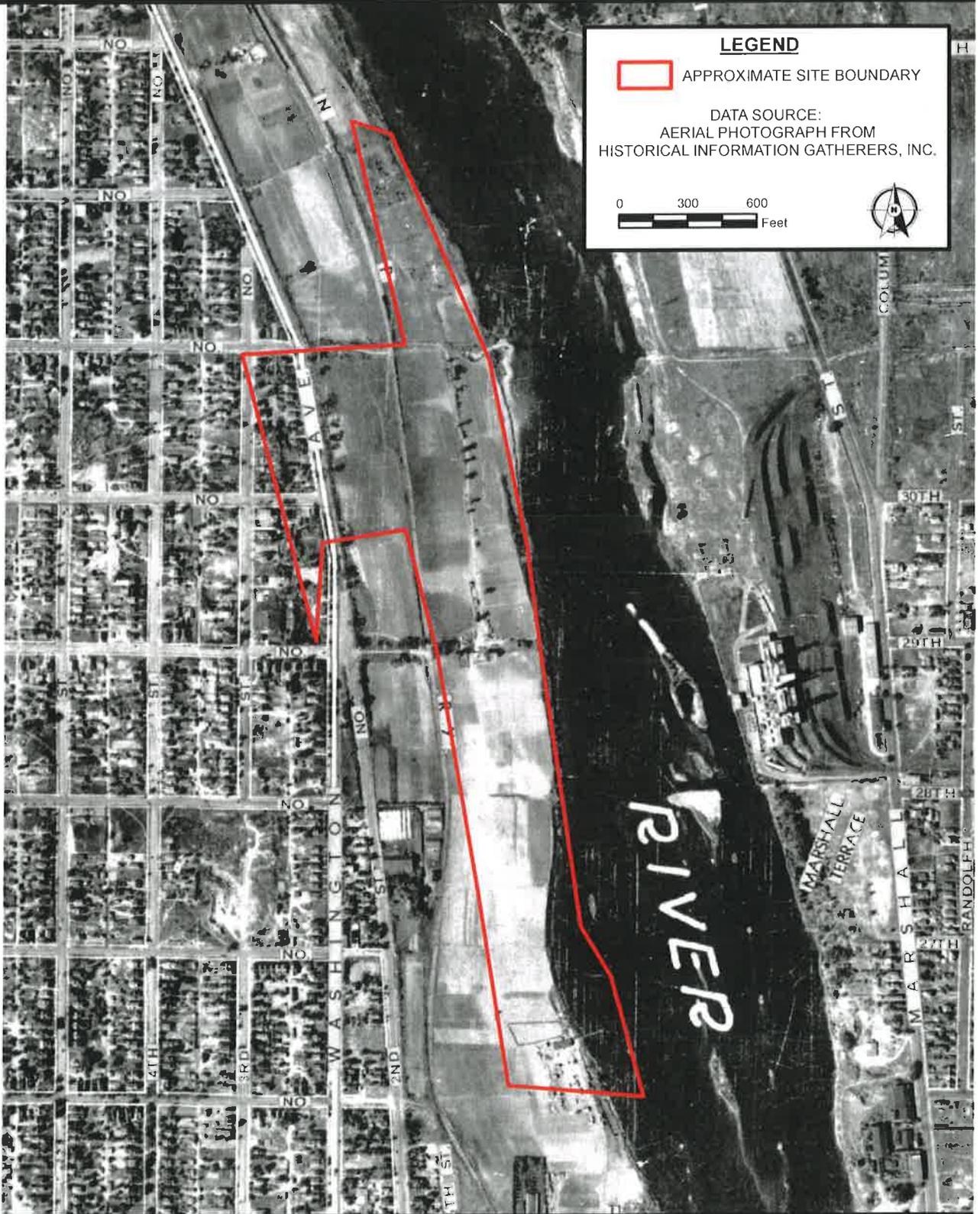
LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:12

Braun Project B1506758.01 PHASE II ESA Upper Harbor Terminal Minneapolis, Minnesota				BORING: PP-11					
DRILLER: M. Barber				METHOD: Push Probe		DATE: 8/25/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes		
848.5	0.0	FILL	FILL: Silty Sand, some Gravel, dark brown, moist.				Grass surface.		
						1.6	Piece of glass, concrete and plastic at 2'.		
843.5	5.0	SM	SILTY SAND, fine- to medium-grained, dark brown, moist. (Alluvium)			0.7	Note: Soil sample (0-5') tested for PAH, RCRA metals.		
842.0	6.5	CL	LEAN CLAY, some Gravel, brown to reddish brown, wet. (Glacial Till)			0.9			
840.5	8.0		END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.			0.8			

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF BORING N:\GINT\PROJECTS\AX PROJECTS\2015\06758.01.GPJ BRAUN_V8_CURRENT.GDT 10/13/15 15:12

Braun Project B1506758.01				BORING: PP-12			
PHASE II ESA				LOCATION: See attached sketch.			
Upper Harbor Terminal							
Minneapolis, Minnesota							
DRILLER: M. Barber		METHOD: Push Probe		DATE: 8/25/15		SCALE: 1" = 4'	
Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	PID PPM	Tests or Notes
850.2	0.0						
849.2	1.0	FILL	FILL: Silty Sand, trace Gravel, reddish brown, moist.			0.5	Vegetated surface.
847.7	2.5	SM	SILTY SAND, fine- to medium-grained, some Gravel, brown, moist. (Alluvium)			1.5	
		CL	LEAN CLAY, trace Sand and Gravel, brown with some rust staining, wet. (Glacial Till)			0.8	
843.7	6.5					0.8	
842.2	8.0	SM	SILTY SAND, fine-grained, moist. (Glacial Outwash)			1.5	
			END OF PUSH PROBE. Water not encountered while probing. Push Probe then grouted.				



LEGEND

APPROXIMATE SITE BOUNDARY

DATA SOURCE:
AERIAL PHOTOGRAPH FROM
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0 300 600
Feet



Sheet 1 of 15 Fig.	Project No:	B1506758
	Drawing No.	B1506758_Historic
	Scale:	1 in = 600 ft
	Drawn By:	CMF
	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

HISTORICAL AERIAL PHOTOGRAPH - 1934
CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
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DATA SOURCE:
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Feet

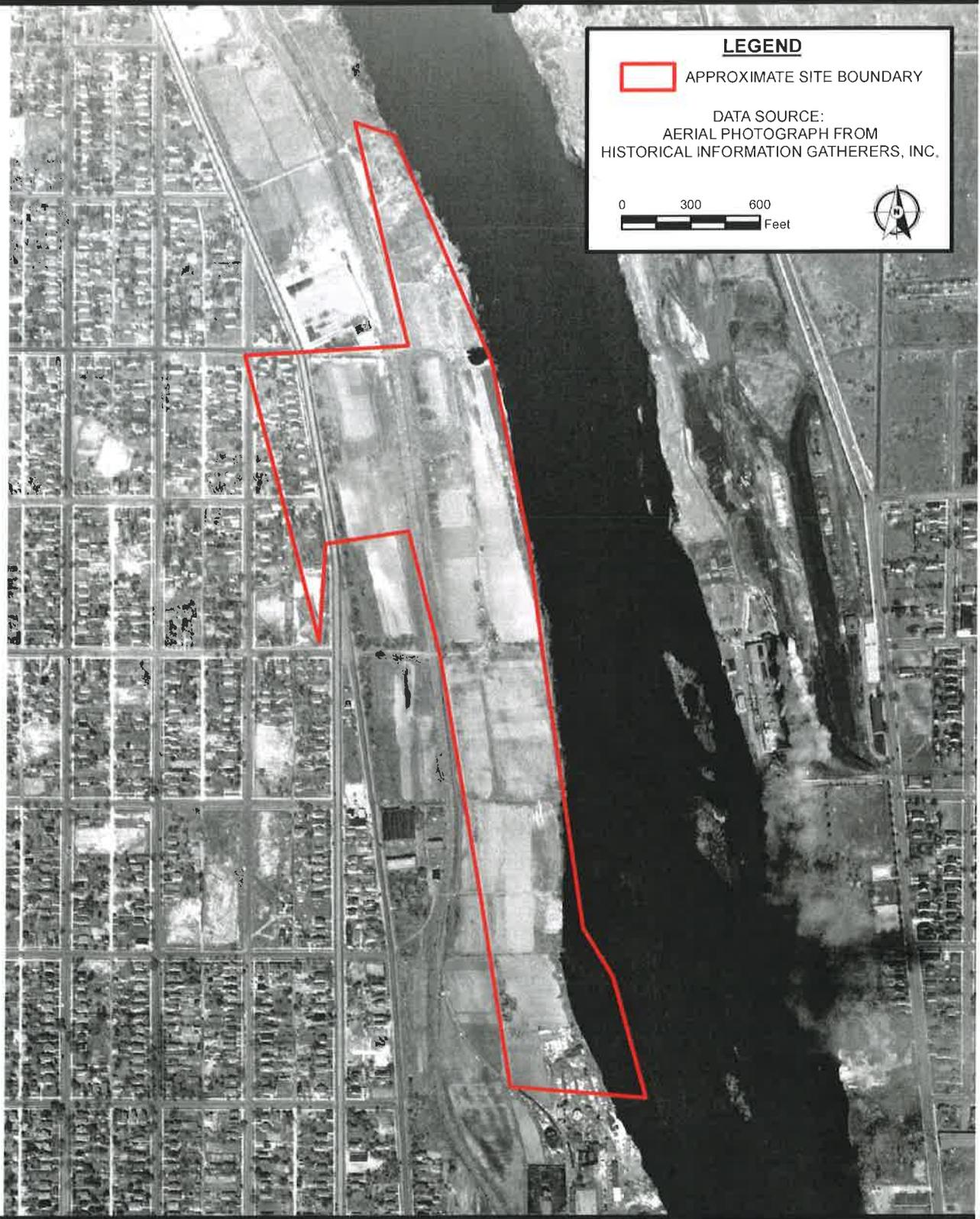


Sheet: 2 of 15 Fig.	Project No. B1506758
	Drawing No. B1506758_Historic
	Scale: 1 in = 600 ft
	Drawn By: CMF
	Date Drawn: 7/29/15
	Checked By: EC
	Last Modified: 7/29/15

**HISTORICAL AERIAL PHOTOGRAPH - 1940
CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
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0 300 600
Feet



Sheet: 3 of 15 Fig:	Project No:	B1506758
	Drawing No.	B1506758_Historic
	Scale:	1 in = 600 ft
	Drawn By:	CMF
	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

**HISTORICAL AERIAL PHOTOGRAPH - 1947
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APPROXIMATE SITE BOUNDARY

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0 300 600

Feet

Sheet 4 of 15 Fig.	Project No:	B1506758
	Drawing No.	B1506758_Historic
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	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

HISTORICAL AERIAL PHOTOGRAPH - 1953
CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
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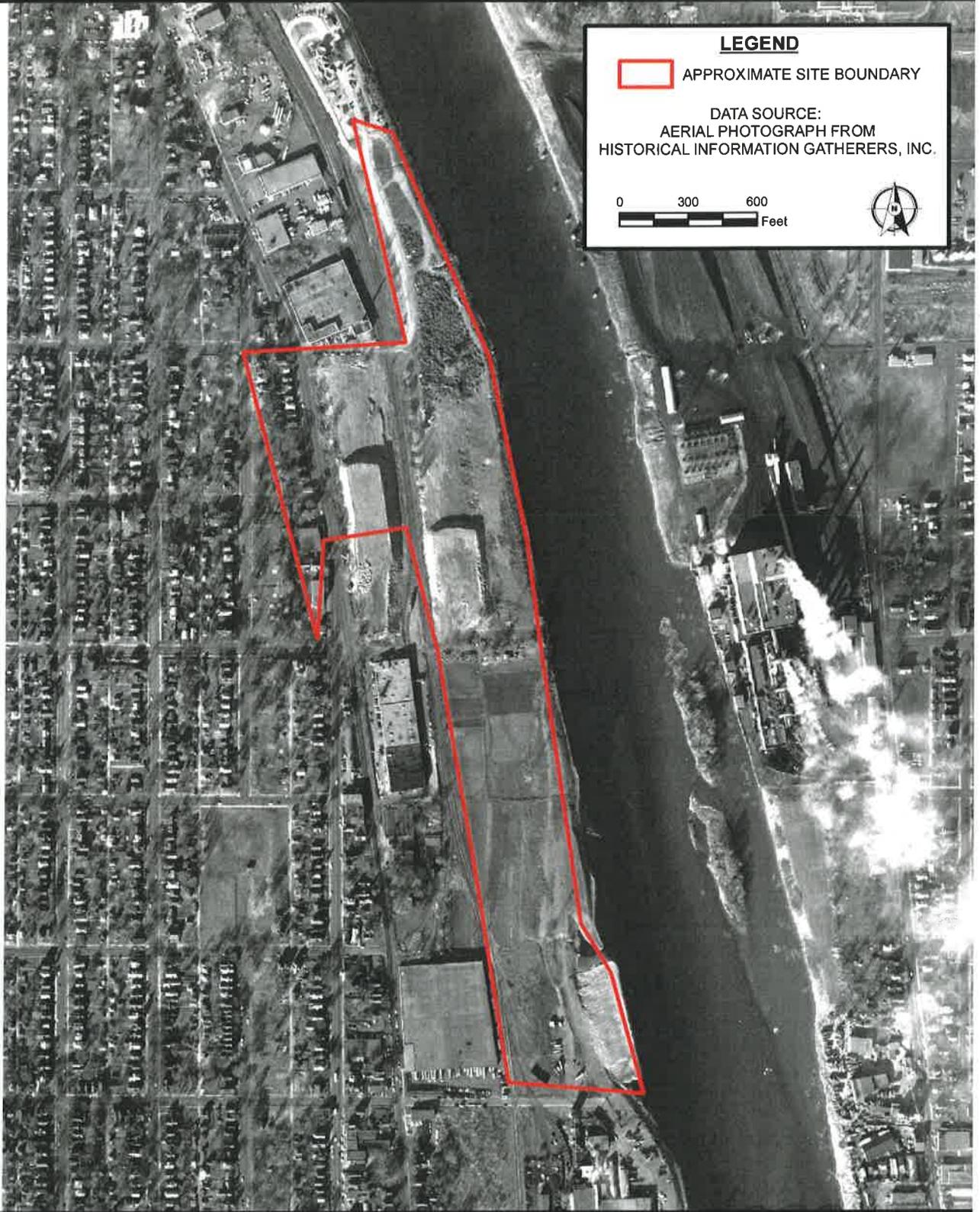


Sheet 5 of 15 Fig.	Project No:	B1506758
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	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

HISTORICAL AERIAL PHOTOGRAPH - 1957
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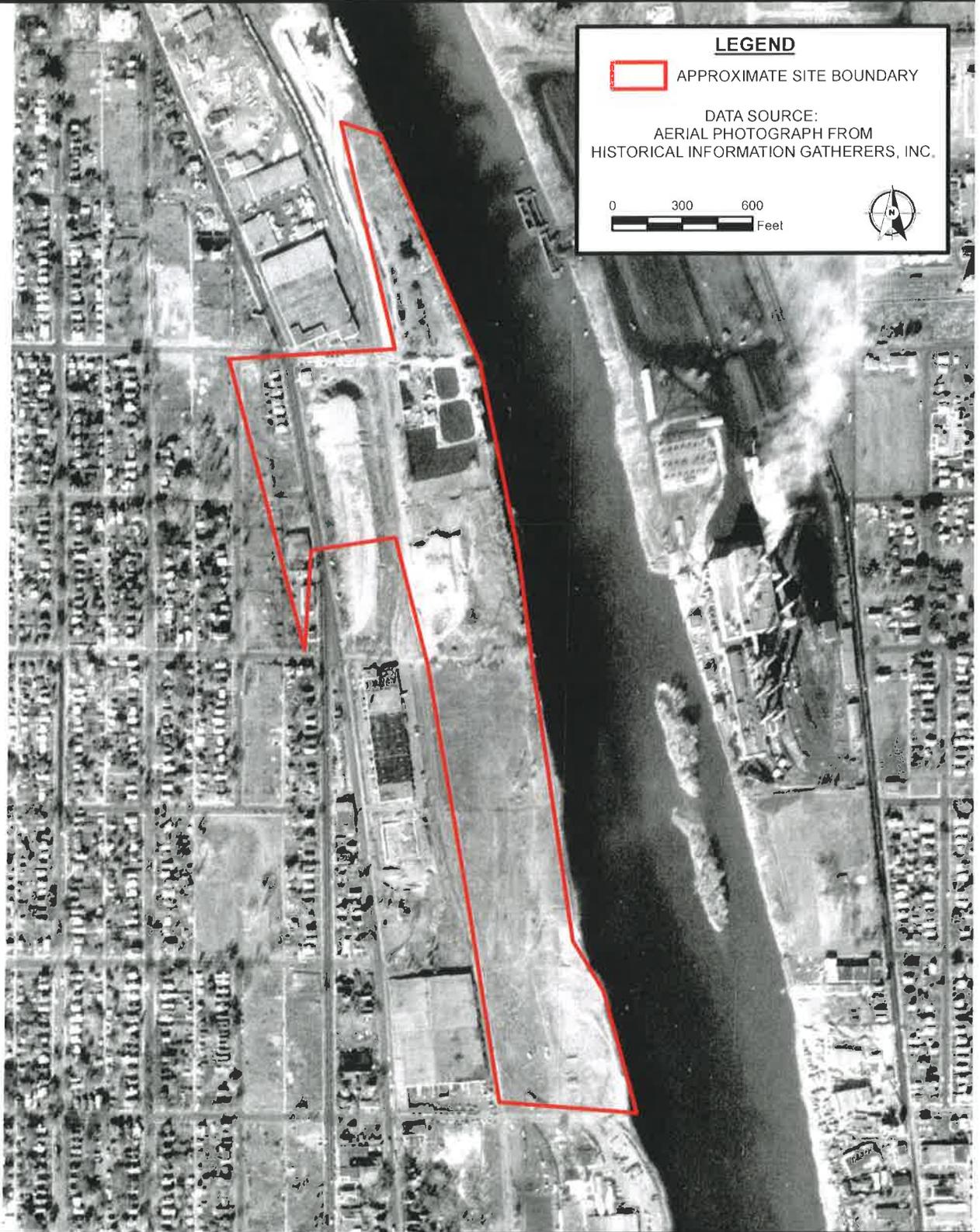


Sheet 6 of 15 Fig.	Project No:	B1506758
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	Date Drawn:	7/29/15
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	Last Modified:	7/29/15

HISTORICAL AERIAL PHOTOGRAPH - 1966
CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
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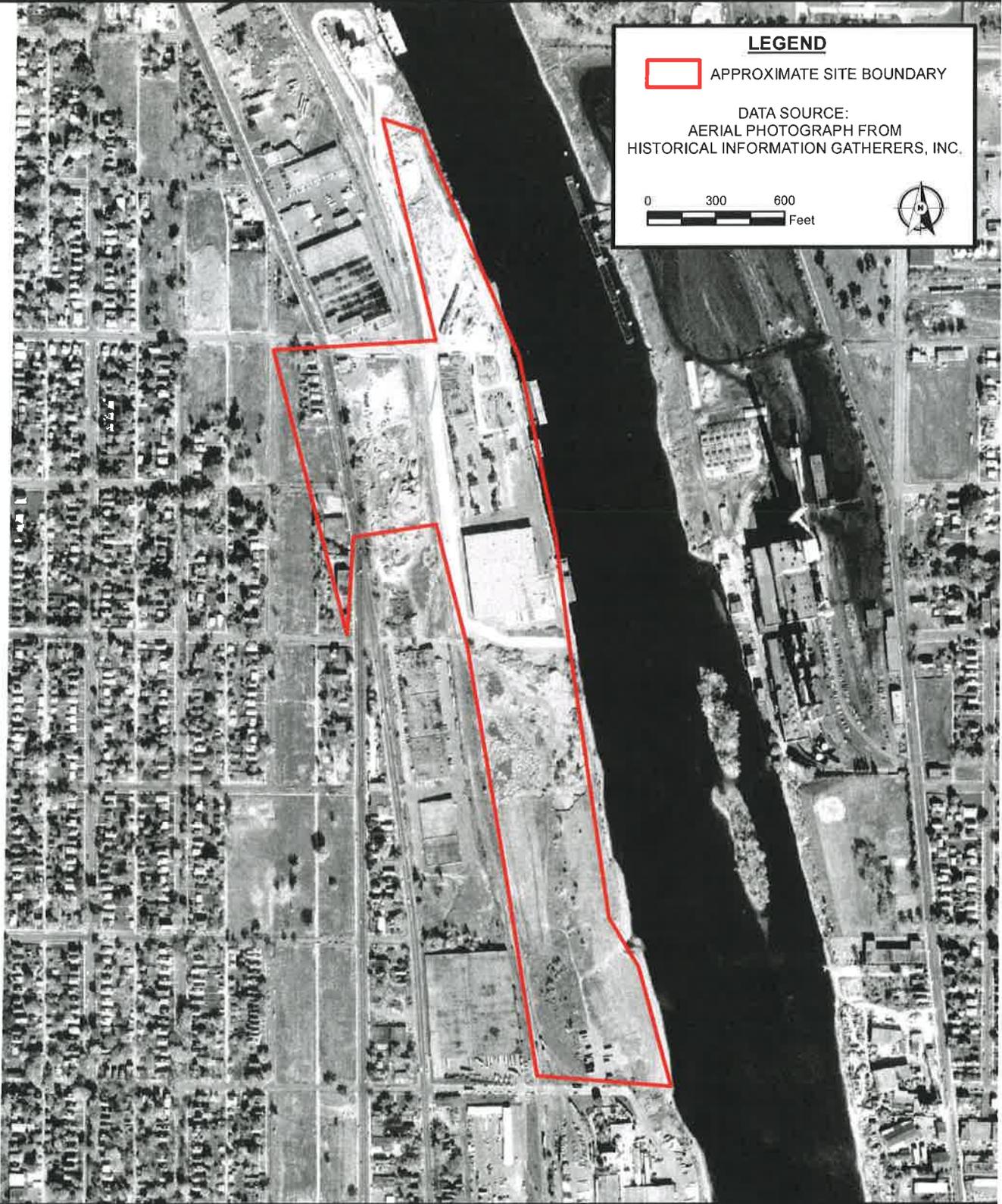


Sheet: 7 of 15 Fig.:	Project No:	B1506758
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	Scale:	1 in = 600 ft
	Drawn By:	CMF
	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

HISTORICAL AERIAL PHOTOGRAPH - 1969
 CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
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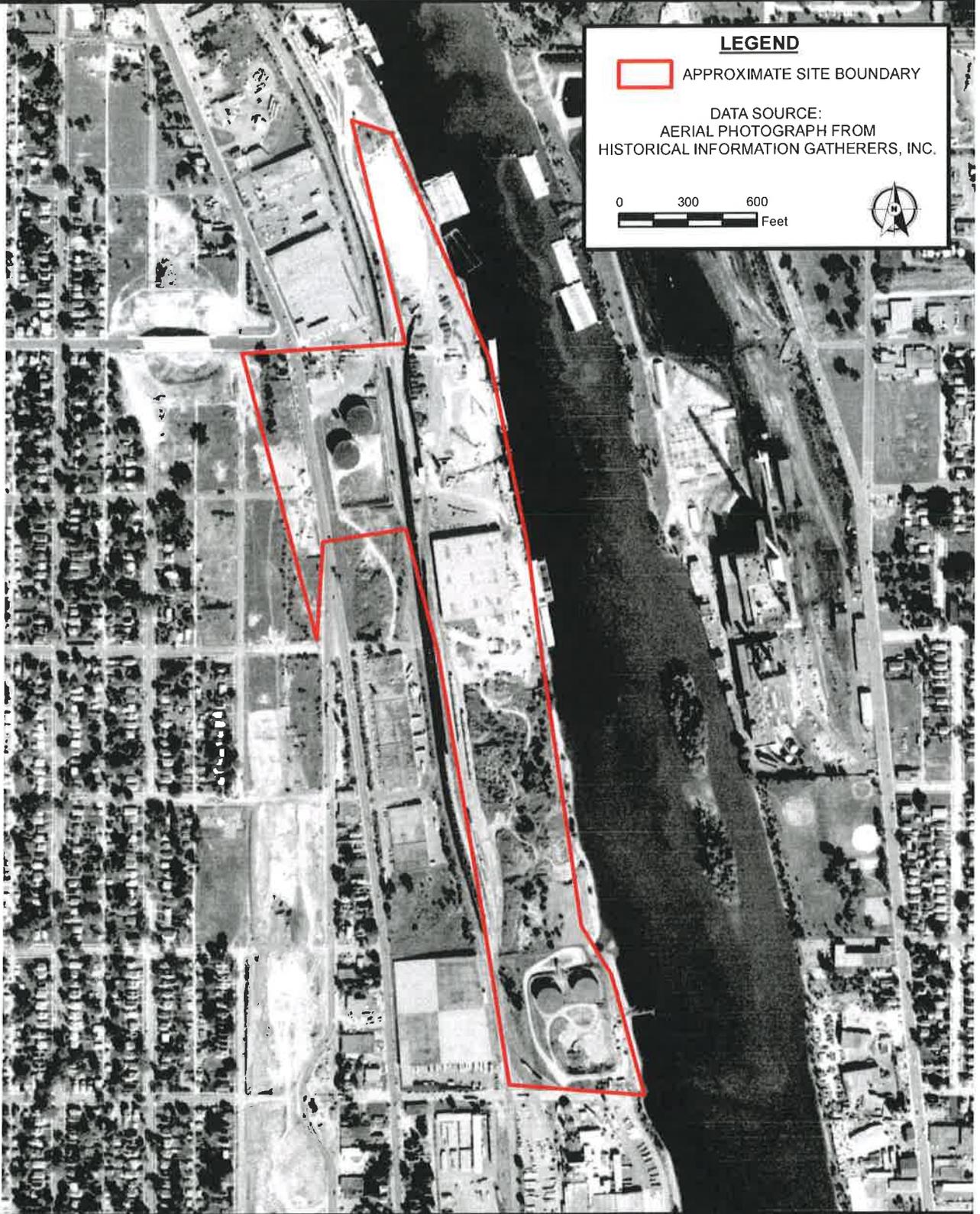


Sheet: 8 of 15 Fig:	Project No:	B1506758
	Drawing No.	B1506758_Historic
	Scale:	1 in = 600 ft
	Drawn By:	CMF
	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

**HISTORICAL AERIAL PHOTOGRAPH - 1972
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0 300 600
Feet



Sheet 9 of 15 Fig.	Project No:	B1506758
	Drawing No.	B1506758_Historic
	Scale:	1 in = 600 ft
	Drawn By:	CMF
	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

HISTORICAL AERIAL PHOTOGRAPH - 1979
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Feet

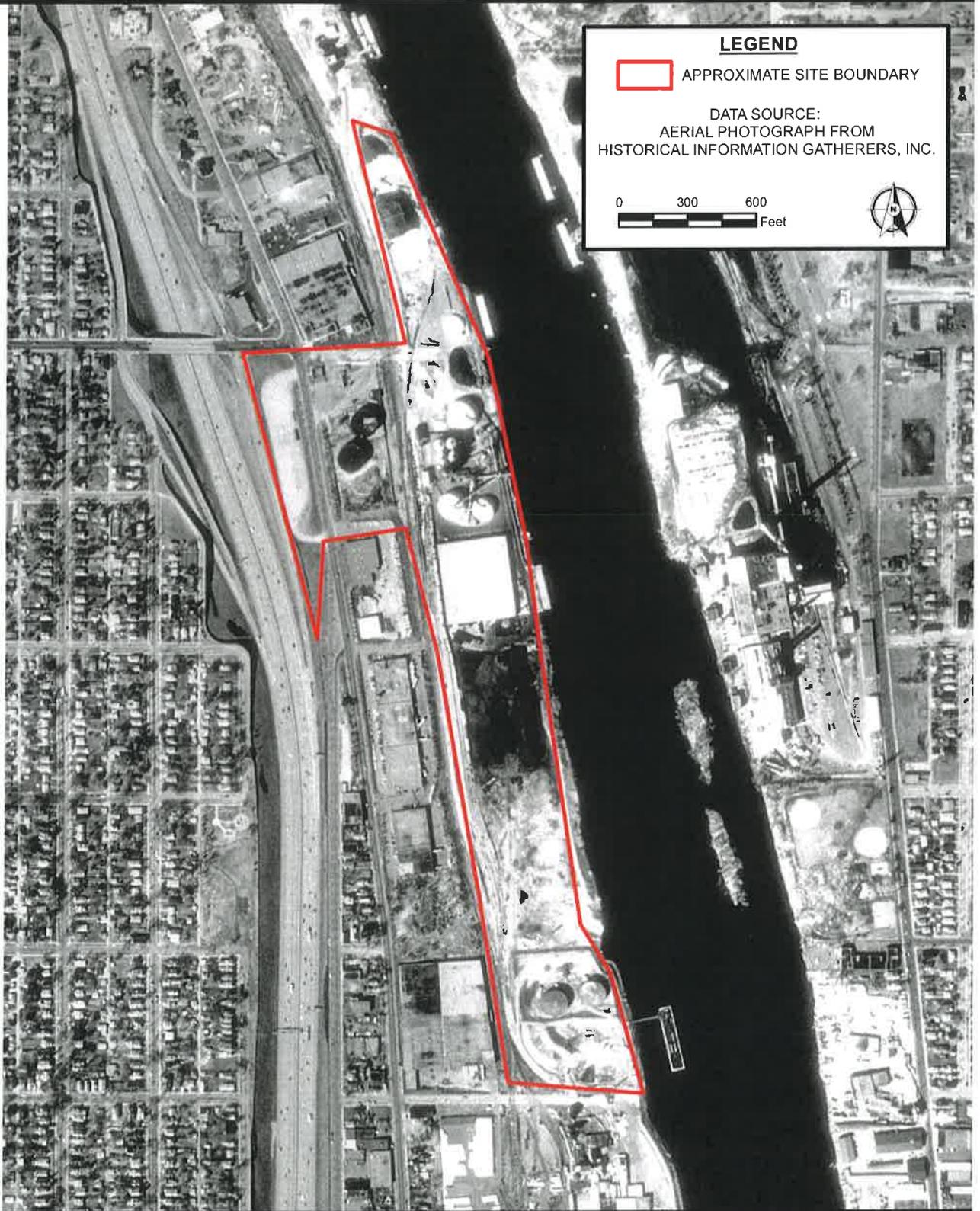


Sheet 10 of 15 Fig.	Project No:	B1506758
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	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

**HISTORICAL AERIAL PHOTOGRAPH - 1984
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Feet

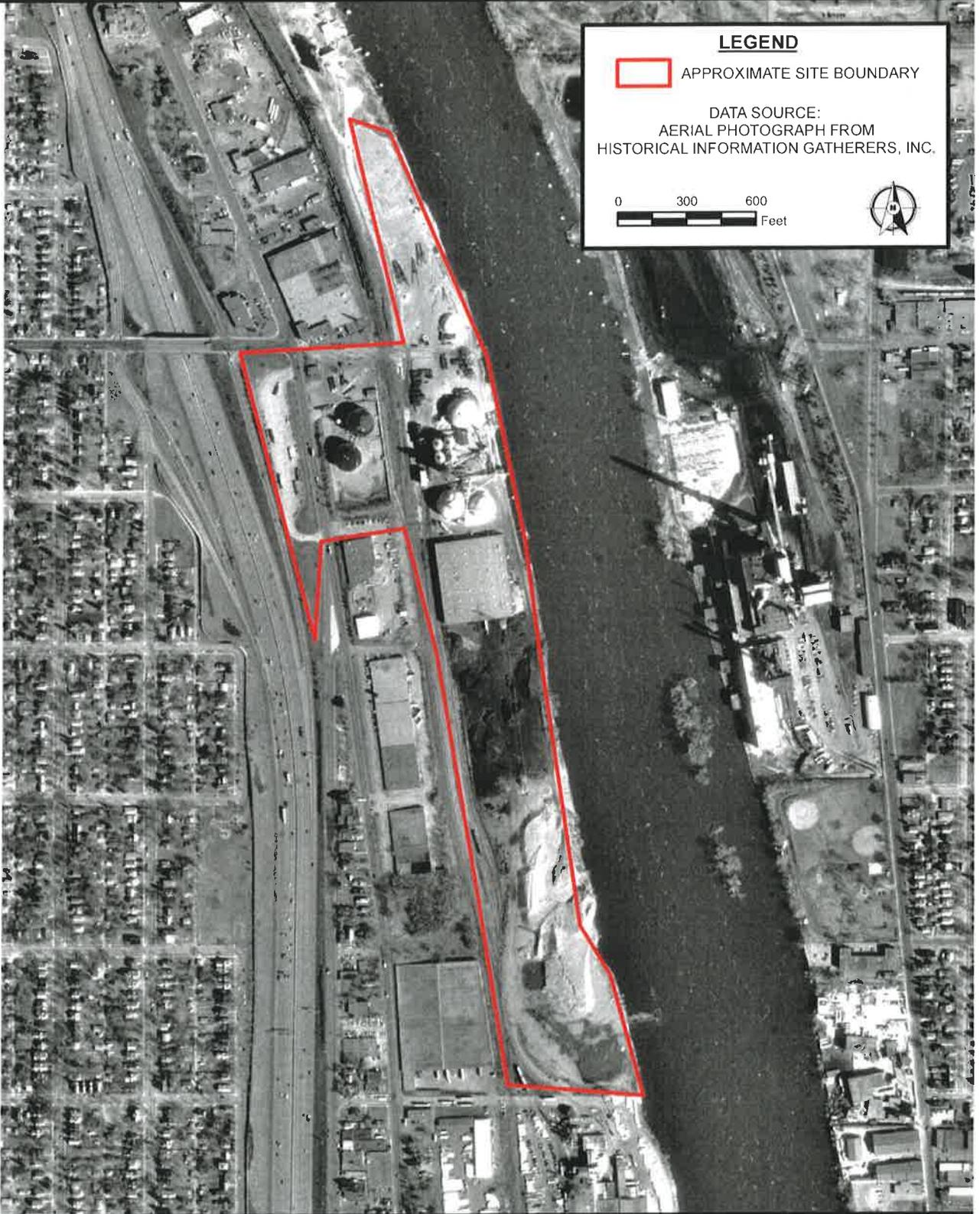


Sheet: 11 of 15 Fig:	Project No:	B1506758
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	Drawn By:	CMF
	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

**HISTORICAL AERIAL PHOTOGRAPH - 1991
CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
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Sheet 12 of 15 Fig.	Project No:	B1506758
	Drawing No.	B1506758_Historic
	Scale:	1 in = 600 ft
	Drawn By:	CMF
	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

HISTORICAL AERIAL PHOTOGRAPH - 1997
CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
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DATA SOURCE:
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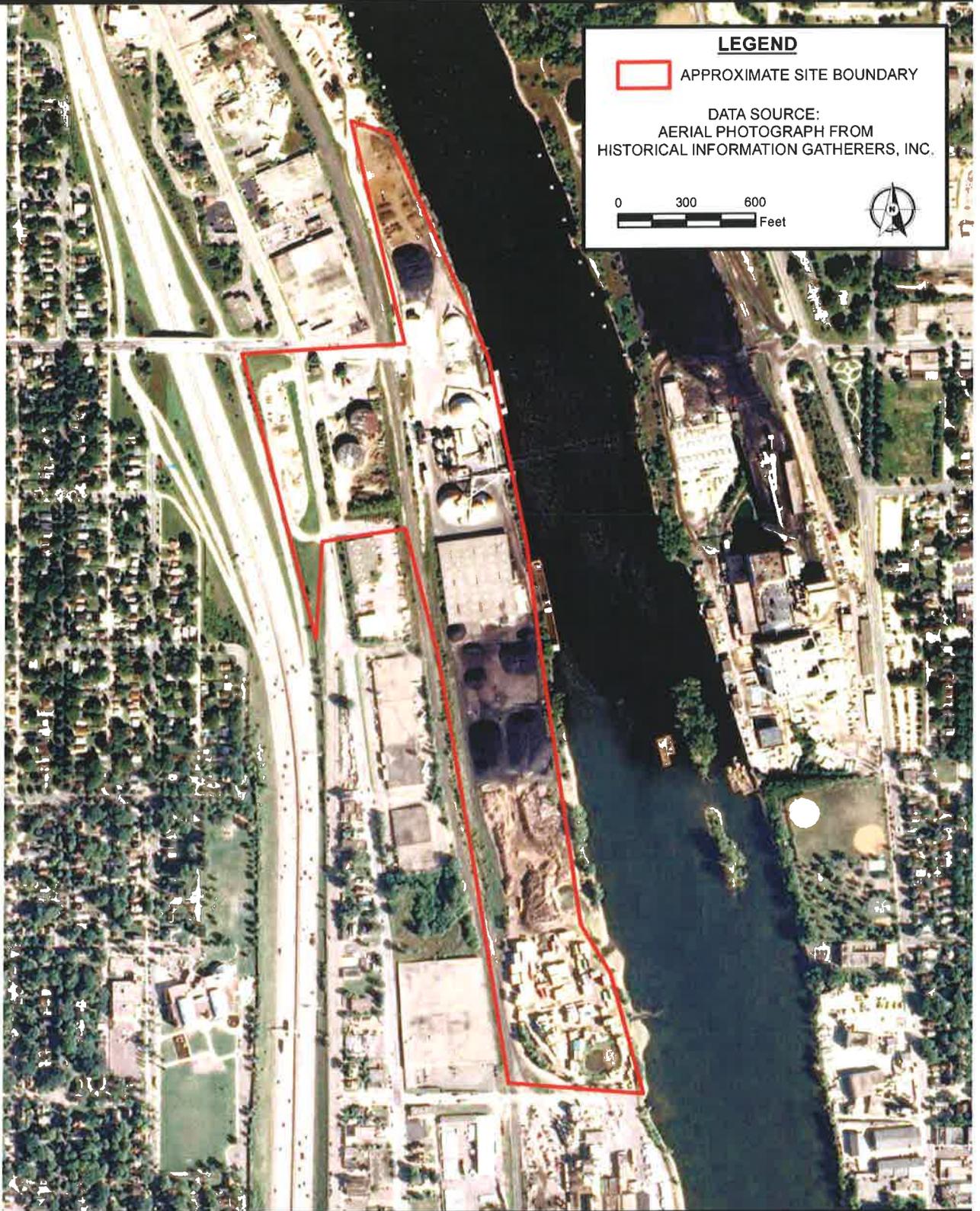


Sheet 13 of 15 Fig.	Project No:	B1506758
	Drawing No.	B1506758_Historic
	Scale:	1 in = 600 ft
	Drawn By:	CMF
	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

HISTORICAL AERIAL PHOTOGRAPH - 2003
CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
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DATA SOURCE:
AERIAL PHOTOGRAPH FROM
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Feet

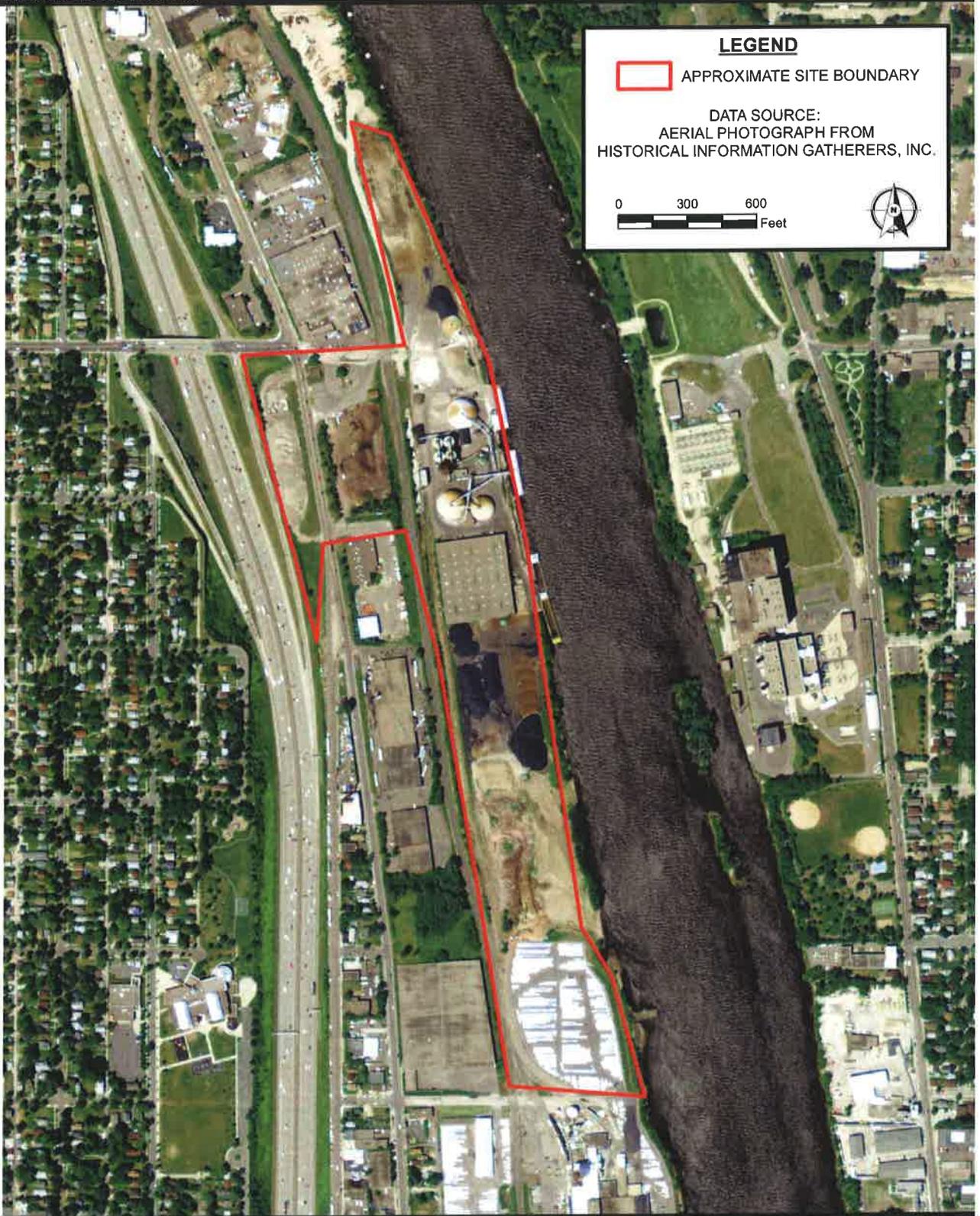


Sheet: 14 of 15 Fig.	Project No:	B1506758
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	Scale:	1 in = 600 ft
	Drawn By:	CMF
	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

**HISTORICAL AERIAL PHOTOGRAPH - 2008
CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
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 APPROXIMATE SITE BOUNDARY

DATA SOURCE:
 AERIAL PHOTOGRAPH FROM
 HISTORICAL INFORMATION GATHERERS, INC.

0 300 600
 Feet



Sheet 15 of 15 Fig.	Project No:	B1506758
	Drawing No.	B1506758_Historic
	Scale:	1 in = 600 ft
	Drawn By:	CMF
	Date Drawn:	7/29/15
	Checked By:	EC
	Last Modified:	7/29/15

HISTORICAL AERIAL PHOTOGRAPH - 2013
CITY OF MINNEAPOLIS UPPER HARBOR TERMINAL
ALONG MISSISSIPPI RIVER
MINNEAPOLIS, MINNESOTA

BRAUN
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