Appendix B
Technical Reports

- Letter from AET to the Metropolitan Sports Facilities Commission Re: Groundwater Considerations for Metrodome Reconstruction (November 21, 2008)
- *Report of Preliminary Geotechnical Exploration and Review: Minnesota Multi-Purpose Stadium* (Report No. 01-05723) (AET, February 2013)
- *The EDR Radius Map Report with GeoCheck: The People's Stadium* (Inquiry Number: 03540142.1r) (EDR, March 2013)
  - Executive Summary, Overview Map, and Detail Map
  - Full report available upon request
- *Technical Memorandum of Environmental Review; Proposed Project Study Area for the People's Stadium* (AET, July 2013)
- *Minnesota Multi-Purpose Stadium Traffic Technical Memorandum* (Kimley-Horn, July 2013)

November 21, 2008

Metropolitan Sports Facilities Commission
900 South Fifth Street
Minneapolis, MN 55416

Attn: Mr. Steven C. Maki, PE

RE: Groundwater Considerations for Metrodome Reconstruction
Minneapolis, Minnesota
AET #01-04401

Dear Mr. Maki:

This letter presents a review of available ground water and geologic information in the vicinity of the Metrodome site and presents our opinions relating to establishment of the playing field elevation considering potential ground water impacts. The purpose is to assist your consultants preliminary planning and pricing of the potential project.

Background Information

The geologic profile at the site consists of fill, overlying both water-deposited and glacially deposited overburden soils down to the first contact with bedrock, which is dolomitic limestone of the Platteville Formation. The elevation of the top of the bedrock ranges from 792½ on the east side of the site to 794½ on the west side of the site. With the playing field being at elevation 795 feet-11 inches, the bedrock is then only about 1 to 3 feet below the on-grade slab. The soils between the slab and bedrock are predominantly granular (i.e., pervious materials).

Prior to Metrodome construction, a number of piezometers were installed within some of the pre-construction borings extending into the limestone bedrock. These piezometers measured water levels on the order of 5 feet to 7 feet beneath playing field elevation. During construction, a sump pit was constructed to a depth of about 8 feet in the limestone in the southeast corner of the field. The contractor experienced difficulty in lowering the water level in the rock to construct the sump due to the high and rapid inflow of water. The water level has continued to rise in the area with time. Near surface water has been somewhat controlled with pumps over the last number of years. In more recent years, the field became inundated near home plate, suggesting a hydrostatic water level near elevation 796 and the pumps not being able to keep up with the inflow of water. Small shallow wells drilled into the limestone have lowered the water sufficiently to keep the field dry at the present time.

AET has conducted soil borings on sites surrounding the Metrodome. A recent program immediately west of the Metrodome site (across the street) included borings extending to the limestone bedrock. These borings suggest the bedrock continues to rise to the west of the Metrodome site (elevation 794½ to 796). In addition, ground water levels were measured above the bedrock at elevations 797 and 798 at locations nearest to the Metrodome. Based on our review of the regional ground water condition, the data suggests there is a general gradient to the east, with the water generally migrating through more pervious soils and joints/weathered zones in the bedrock. Based on the data from the site across the street to the west, water levels may be in the vicinity of 1 to 2 feet above current playing field elevation. It is likely that the pumping currently occurring beneath the Metrodome slab locally draws down the water, and as is its function.

New Slab Elevation Considerations

The historical data indicates the water level has risen since the Metrodome preconstruction soil boring program in 1979. It is common for ground water levels to fluctuate. Rising of the ground water level in rock and slower draining materials can be more extreme, as there is little void space which needs to be filled to create saturation and the resulting water level rise.

Currently, water levels are within more permeable sands above the bedrock and, in some cases, above slow draining till layers just above the bedrock. This water may potentially continue to rise, although it is likely that it would not rise more than 4 feet above the current level (which was noted 2 feet above the current playing field just west of the site). Based on the current water level elevation noted to the west of the site, it is our opinion that a safe playing field elevation would be 6 feet above the current playing surface; corresponding to elevation 802 feet (4 feet above the noted level to the west).

It is our opinion the playing field can be placed at a lower elevation than 802 feet. However, in this case, it would be prudent to install an underfloor drainage system which can quickly collect and dispose of water through pumping in the event the water level does continue to rise. AET has designed underfloor drainage systems in the past, and a sample of such a system is included as Attachment A. This system involves the placement of a highly permeable drainage layer beneath the slab which includes perforated drain pipes to assist in collecting and diverting water to sump pumps. Depending on final floor elevation and the future ground water level fluctuations, there is a reasonable chance that water will not reach the underfloor drainage system. However, if the water level would ever rise, the system would be in place to allow for uniform collection beneath the slab and controlled removal of water. Once specifics of the project are known, a detailed design should be performed.

In association with the underfloor drainage system, we recommend several piezometers be installed beneath the slab to allow on-going water level checks. The actual pump system may

not be necessary, unless these checks suggest the water level is actually reaching the drainage system.

If you wish to place the slab at an elevation approaching the existing playing field or even as low as the current playing field, it would be possible to place the underfloor drainage system; although you should recognize this could result in significant pumping. It is possible to create a cut-off barrier around the perimeter of the field to seal off or at least significantly reduce water inflow which may rise up into the drainage layer zone. This could be in the form of below grade "clay dams", slurry walls, or structural walls extending to the bedrock. With this inflow control, an underfloor system and drain pipes is needed to collect seepage. However, with this perimeter control approach, pumping could be significantly reduced. This approach would be advantageous in the event there is contaminated ground water which flows to the area.

Closing

If you have any questions regarding the available data or our preliminary geotechnical opinions, please do not hesitate to contact us. As the project proceeds, AET remains very interested in providing geotechnical, environmental, materials and construction testing services for the project team.

Sincerely,

American Engineering Testing, Inc.

Jeffery K. Voyen

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Report Reviewed by:

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JKV/DDS/ak

Attachment A – Typical Underfloor Drainage System Design

Attachment A – Typical Underfloor Drainage System Design

DEFINITIONS

Materials or items used for the system are as defined below:

- **Coarse Filter Material** – This material will require high permeability properties, and we recommend use of a No. 8 Coarse Aggregate material as defined in ASTM:C33-93 (Standard Specification for Concrete Aggregates). This material has the following gradation requirements:

Sieve Size or Number	Percentage Finer than (by weight)
½"	100%
⅜"	85%-100%
#4	10%-30%
#8	0-10%
#16	0-5%

- **Fine Filter Material** – A fine filter material can also be defined by ASTM:C33-93. The gradation for this material (fine aggregate) is as follows:

Sieve Size or Number	Percentage Finer than (by weight)
⅜"	100%
#4	95%-100%
#8	80%-100%
#16	50%-85%
#30	25%-60%
#50	10%-30%
#100	2%-10%

- **Geotextile Filter Fabric** – A filter fabric should meet the minimum requirements of a Type I fabric as defined in MnDOT Specification 3733.
- **Collector Drainage Pipe** – The collector pipes are intended to be the pipes which take in the water, and therefore should be perforated. Perforations should be limited to sizes not exceeding ¼ inch. PVC pipes are acceptable.
- **Header Pipe** – The pump system should be designed to efficiently collect and dispose of water up to a rate of at least 100 gpm. We anticipate flow rates will typically be considerably lower than this, so you may wish to consider a dual or multiple pump system wherein the primary pump handles a lower capacity, and a second larger pump is used for short-term overflow and backup purposes. The pumps should be controlled with a float-actuated switch to maintain the desired ground water level in the sump.

PERIMETER DRAINAGE SYSTEM

Although water will seep from below the slab area, much of the water entering the system at the time of pumping should enter the system from the perimeter (west side in this case). Therefore, we recommend a perimeter drainage system be placed immediately outside of the slab. It will not be possible to place an "exterior" system in those areas where the existing building is currently present.

Attachment A – Typical Underfloor Drainage System Design

We recommend a collector drainage line be placed along the perimeter, with a minimum diameter of 6 inches. The line should maintain a minimum slope of 4 inch of vertical drop over a 100 foot length to promote movement to the header pipe and pump. We recommend the perimeter collector pipe be connected to a header pipe for transport to the sump pump area for direct removal without impedance from the interior pipe system. Header pipes should have a minimum diameter of 6 inches.

The exterior collector pipes should be maintained at an elevation such that the top of the pipe is at least 6 inches or more below the bottom of proposed slab elevation. The pipe should be completely surrounded with coarse filter material which is at least 6 inches thick below the pipe and 9 inches thick to the sides and above the pipe. Because the coarse filter material includes significant void space, it will be necessary to protect the coarse filter material from piping or intrusion of the finer surrounding soils. This could be accomplished by enveloping the coarse filter material within a geotextile fabric. Because a fabric may potentially become clogged or have reduced effectiveness with time, you may wish to consider using a fine filter material as a transition layer between the coarse filter material and thesurrounding soils. In this case, we again recommend a minimum thickness of 6 inches below the coarse filter material and 9 inches (to 12 inches) to the sides and above the coarse filter material.

INTERIOR UNDERFLOOR DRAINAGE SYSTEM

Upward seepage may occur from below the slab; therefore, the interior floor slab should also be provided with a drainage system. Collector pipes can have a 4 inch diameter and should be placed with a minimum spacing of about 30 feet. We suggest the use of several parallel 6 inch header pipes spaced through the interior area. The collector pipes can then be placed perpendicular to the header pipes. It is possible that this placement of draintile lines may be impacted by the presence of other mechanical, electrical, or structural members; and the pipe layout design should consider these potential obstructions.

The pipes should be sloped a minimum of 4 inches of vertical drop per 100 feet of length. We recommend all interior drainage pipes be placed such that the top of the pipe is a minimum of 6 inches below the interior floor slab.

The drainage pipes should be placed within a coarse filter material. The coarse filter material should extend to a minimum depth of 6 inches below the drainage pipes and should be the sole material used in the pipe zone up to bottom of floor grade.

To accommodate 6 inches of cover, 6 inches of bedding, a 6 inch diameter header pipe and the needed slope/vertical drop, the coarse filter material layer will then need to be on the order of 2 foot thickor more.

A filter transition zone will be needed below the coarse aggregate to prevent erosion of underlying subgrade materials. This transition can be either a geotextile filter fabric or a 6 inch minimum thickness of fine filter material. Clogging of the filter fabric is not as much of a concern in this situation as compared to the exterior situation, and the use of fabric is likely the more feasible approach in this case.

PUMP COSIDERATIONS

The pump system will need to be capable of handling the ultimate capacity flowing from the system. This may require a series of pumps at different locations. You should consider the effects of a mechanical failure of the pump and the use of a backup pump system. The backup pump could be used as a secondary pumping system to handle shorter term high capacity needs. In addition, you should consider proving abackup electrical system in the event of a power failure.

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REPORT OF PRELIMINARY GEOTECHNICAL EXPLORATION AND REVIEW

Minnesota Multi-Purpose Stadium

900 South 5th Street
Minneapolis, Minnesota

Report No. 01-05723

Date:

February 25, 2013

Prepared for:

Minnesota Sports Facilities Authority
900 South 5th Street
Minneapolis, MN 55415

www.amengtest.com

AMERICAN ENGINEERING TESTING, INC.

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• FORENSICS

February 25, 2013

Minnesota Sports Facilities Authority
900 South 5th Street
Minneapolis, MN 55415

Attn: Steve Maki, PE

RE: Preliminary Geotechnical Exploration and Review
Minnesota Multi-Purpose Stadium
Minneapolis, Minnesota
Report No. 01-05723

Dear Mr. Maki:

American Engineering Testing, Inc. (AET) is pleased to present the results of our preliminary subsurface exploration program and geotechnical engineering review for the new Minnesota Multi-Purpose Stadium to be constructed at the existing Metrodome site in Minneapolis, Minnesota. The work was completed per our proposal dated February 5, 2013 and our subsequent service agreement.

In addition to the electronic copy, we are submitting two hard copies of the report to you. Additional copies are being sent on your behalf, as shown below.

Sincerely,
American Engineering Testing, Inc.

Jeffery K. Voyen

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Vice President/Principal Engineer
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Cc: (2) HKS, Attn: Kevin Taylor, AIA
(2) Thornton Tomasetti, Attn: Robert Treece, PE
(1) EVS, Inc., Attn: Richard Koppy, PE

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SIGNATURE PAGE

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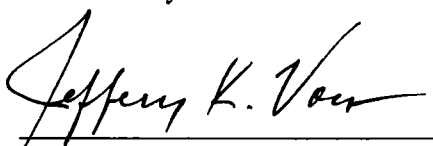

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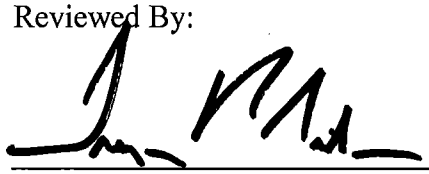


Gregory R. Reuter, PE, PG
Principal Engineer

I hereby certify that this report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under Minnesota Statute Section 326.02 to 326.15

Name: Jeffery K. Voyen

Date: 2/25/13 **License #: 15928**

TABLE OF CONTENTS

1.0 INTRODUCTION

A new Multi-Purpose Stadium is planned to be constructed at the existing Metrodome site in Minneapolis, Minnesota. To assist planning and design of the project, you have authorized American Engineering Testing, Inc. (AET) to conduct a subsurface exploration/testing program at the site, to conduct soil/rock laboratory testing, and to perform a preliminary geotechnical engineering review for the project. As the Metrodome will operate for another season, the geotechnical work will be conducted in phases, with the final phase performed during/after the current Metrodome demolition next winter. This report presents the results of the first phase on the geotechnical services and provides our associated preliminary engineering recommendations.

2.0 SCOPE OF SERVICES

The service scope was presented in the "Geotechnical Investigation Scope of Work" prepared by Thornton Tomasetti, dated January 16, 2013, and acknowledged by our February 5, 2013 proposal. Authorization to proceed with the stadium component of the services was formally received through the Project Services Agreement, dated February 11, 2013. The scope relative to the preliminary phase for the stadium consists of the following:

- Drill and sample eight standard penetration test (SPT) borings to the bedrock, following by rock coring into the underlying limestone bedrock.
- Perform geotechnical laboratory testing to evaluate soil and rock properties (water content, sieve analysis, and rock core compressive strength).
- Conduct geotechnical engineering analysis based on the gained data, and prepare this preliminary geotechnical engineering report.

These services were intended for geotechnical purposes. The scope was not intended to explore for the presence or extent of environmental contamination. During drilling, we did detect

contamination at Boring A8 by means of smell. Notes regarding this odor detection appear on the boring logs.

Also available for this review are the boring logs and tests from the pre-construction geotechnical report for the original Metrodome construction (conducted in 1978 and 1979) and from borings/temporary piezometers conducted by Braun Intertec in 2008. The logs from those reports have been included with this report in Appendix B.

3.0 PROJECT INFORMATION

The site is located on and adjacent to the existing Metrodome site in downtown Minneapolis, as shown on Figure 1. The new stadium will have an approximate footprint of 750 feet by 850 feet, located over the existing Metrodome footprint and in the current parking lot area to the east/southeast. Most of the new structure will be founded below the Event Level elevation of 797'-4½". This is slightly above the current Metrodome event level elevation of 795'-11", although much of the new Event Level will be cut into current grades outside of the Metrodome event level footprint. This new level will be roughly 35 feet to 50 feet below surrounding street grades, requiring a permanent retention system around the seating bowl area and temporary retention systems for service tunnel/below grade loading dock areas.

The structural frame will likely consist of a cast-in-place concrete seating bowl frame and a steel roof structure, with lateral loads resisted by concrete and/or structural steel framing. We understand the roof will incorporate the arch-truss scheme, which results in two highly loaded arch bearing points (located in the vicinity of recent Boring A3 and old Boring 9). Preliminary maximum column service loads are as follows:

- Arch bearing points – vertical: 14,000 kips dead and 20,600 kips total

- Arch bearing points – horizontal thrust: 8,000 kips dead and 12,000 kips total
- Seating bowl – vertical: 200 to 2,900 kips dead and 300 to 4,000 kips total
- Seating bowl (back of bowl with roof) – vertical: 5,200 kips dead and 7,500 kips total

The foundation level for the east arch bearing point is below the Event Level elevation. However, the foundation level for the west arch bearing point is higher, planned to be below the Main Concourse Level at elevation 852'-0".

We understand acceptable column/wall settlement to be ½ inch or less and acceptable stadium floor settlement of less than ¾ inch. We are assuming a minimum factor of safety of 3.0 with respect to localized shear or base failure of the foundation (whether spread footing or end bearing on a drilled pier).

New pavements are planned to be constructed, likely in the form of access drives. We assume access drives will need to accommodate heavier truck traffic. We are also providing pavement designs for light-duty traffic if "auto-only" parking areas will be constructed.

The stated information represents our current understanding of the proposed construction. This information is an integral part of our engineering review. It is important that you contact us if there are changes from that described so that we can evaluate whether modifications to our recommendations are appropriate.

4.0 SUBSURFACE EXPLORATION AND TESTING

4.1 Field Exploration Program

The subsurface exploration program conducted for this phase consisted of eight standard penetration test borings (A1 to A8) drilled to bedrock, followed by rock coring. The boring/core logs appear in Appendix A. The logs contain information concerning soil/rock layering, classification/material description, geologic description, and moisture condition. Relative density or consistency is also noted for the natural soils, which is based on the standard penetration resistance (N-value).

The boring locations appear graphically on Figure 1. The test locations were measured by AET using GPS (submeter accuracy, but not surveyor accuracy). The Hennepin County coordinates are shown on the boring logs. The boring surface elevations were measured by AET using an engineer's level and rod. The benchmarks used were the top rim of manholes which appear on the provided survey plans.

4.2 Laboratory Testing

During laboratory classification logging, water content tests were conducted on cohesive/organic soil samples. In addition, the test program included two sieve analysis tests and seven rock compressive strength tests. The test results appear on the individual boring logs. The full sieve analysis tests results are shown on the data sheet following the boring logs.

4.3 Historical Soil Boring Data

The original geotechnical report prepared in 1979 for the Metrodome project was available for our review. The report included numerous boring/rock coring logs, which we have included in Appendix B. It is important to note that site conditions have significantly changed (considerable

excavation in the Metrodome area and some filling in the east parking lot area) since those borings. Still, the logs offer good data on the elevation and condition of the deeper bedrock, which for the most part, should be relatively unchanged.

Borings were also drilled in the east parking lot area in 2008 by Braun Intertec. Two of the borings extended to the bedrock and temporary piezometers were installed. This data also appears in Appendix B.

5.0 SITE CONDITIONS

5.1 Subsurface Soils/Geology

The recent borings encountered 14 feet to 41½ feet of fill at the top of the profile. The fill is a typically silty sand, clayey sand, or sand with silt, with lesser amounts of sand and sandy lean clay. The fill includes gravel and appear to include cobbles and possibly boulders. Debris is sometimes present, such as pieces of concrete and, to a lesser degree, brick, glass, and wood. Based on N-values, the fill has variable compaction ranging from relatively high to moderately low.

The natural overburden geology includes both glacially-deposited till and water-deposited alluvium. The till includes silty sand, clayey sand, and sandy lean clay. The alluvium includes sand, sand with silt, and silty sand which often include significant gravel content. A significant portion of both the till and alluvium appears to include cobbles and likely boulders. Relatively large boulders were encountered during excavation for the original Metrodome.

In some areas, the zone just above the bedrock appears to have colluvial deposition (gravity-deposited pieces of bedrock and residual soils). Some of the colluvium appears to include

limestone slabs.

The approximate top of bedrock elevation at the recent boring locations ranges from elevation 790 feet to 795 feet. This is relatively consistent with the elevation range portrayed by the historical boring data. Figure 2 in Appendix B shows apparent top of bedrock elevation at the 1978/1979 boring locations.

The upper bedrock is limestone of the Platteville Formation. The Platteville can be subdivided into five members, although it appears the upper Carimona member is absent, leaving the fossiliferous Magnolia member as the upper zone of bedrock. The blocky and hard Magnolia member is underlain by the Hidden Falls member, which includes shaley beds and is more prone to weathering than the Magnolia. However, since the Hidden Falls member appears below elevation 783 feet, the Magnolia cap appears to have reasonably protected the Hidden Falls zone, as clay seams and shale weathering appears sufficiently low. The Hidden Falls is then underlain by competent Mifflin (below elevation 777 feet) and Pecatonica members. The Platteville Formation is underlain by Glenwood shale (about 4½ feet thick) and then St. Peter sandstone.

Six rock compressive strength tests have been conducted on limestone samples from the Magnolia member (three as a part of this program and three in 1979). The test results range from 10,240 psi to 19,550 psi, with an average of 12,600 psi. The average RQD of the upper zone is about 40%, although were as low as 20%.

5.2 Ground Water

Ground-water levels have risen in the area since the original Metrodome construction. Piezometers installed during the 1978/1979 geotechnical program found hydrostatic water levels

in the bedrock, below elevation 790 feet. The rise in the levels since then has necessitated considerable pumping efforts to control water levels below the current event level.

Review of the water levels measured in the recent soil borings suggests a hydrostatic ground-water level in the vicinity of elevation 796 feet to 798½ feet at the time of our exploration. The lower levels are is nearer to the Metrodome, and it is quite possible that water is being drawn down by the on-going pumping within the Metrodome. One of the temporary piezometers installed by Braun Intertec in 2008 indicates a water level as high as elevation 800.2 feet.

Ground-water levels should be expected to fluctuate with time due to varying seasonal and annual rainfall and snow melt amounts, as well as other factors. Ground-water levels measured at the time of our exploration may be low due to the fact that the borings were drilled in the winter during the time of reduced surface infiltration, and also the fact that the area is currently experiencing drought conditions. Ground-water levels could rise once precipitation patterns return to normal.

6.0 PRELIMINARY RECOMMENDATIONS

6.1 Spread Foundation Support

With foundations being placed below the Event Level elevation, they will be very near or into the Magnolia member of the limestone bedrock, pending location and foundation thickness. Foundations placed on the intact Magnolia member can be proportioned to exert an allowable bearing capacity of 25 tsf, but with additional penetration where needed, it should be feasible to increase this allowable bearing capacity to 50 tsf. The recent borings do indicate zones of the bedrock have reduced Rock Quality Designation (RQD) as compared to the borings associated with the original Metrodome program. The recent rock coring includes zone of rock with RQD

values in the 20% to 40% range, which limits capacity. To attain the 50 tsf allowable capacity, the bedrock should have an RQD of at least 40% within a vertical distance of 0.25B (B = footing width) of footing grade and an average RQD of 40% over a 1.0B distance of footing grade. Based on our review of the cores, which also considers RQD of partial runs, the excavation elevations shown on Table 6.1 are estimated for each boring/core location. Note that the actual depths will vary, as the rock excavation will break in blocks and along seams which may well differ from that shown at the test locations.

Table 6.1 – Estimated Depths/Elevations

Boring No.	For Allowable Bearing Capacity = 50 tsf	
	Depth (ft)	Elevation (ft)
A1	52.3	792.3
A2	46.4	786.8
A3	53.2	789.8
A4	54.6	787.8
A5	52.4	787.4
A6	48.8	793.8
A7	52.0	790.6
A8	51.2	790.9

The quality of the bedrock at each foundation should be evaluated in a probe hole within one footing width of foundation grade (1.0B). If rock quality criterion is not met, the area should be excavated further as needed to meet the criteria. This should include evaluating the intent of the above described RQD criteria. In addition, the bedrock beneath the bearing surface should not contain voids or soil filled fissures greater than ½-inch within one foundation width (1.0B).

6.2 Drilled Pier Foundation Support

Unless needed for lateral resistance reasons (such as at the arch bearing points), drilled piers will likely not be feasible as compared to spread footings. As the bedrock is at or near foundation grade, a drilled pier will not gain the advantage of skin friction (skin friction is not commonly added in the case of high end bearing piers). The pier would then have the same end bearing capabilities as the spread footing approach. Drilled shaft coring in fractured hard rock can be quite difficult, and the excavation approaches for spread footings will likely be preferred over drilled pier coring by the contractor. If higher drilled pier capacities are preferred, the piers would need to extend through the Hidden Falls member into the Mifflin member, where capacities of 100 tsf are often used.

6.3 Lateral Resistance

The arch bearing points are expected to be subjected to total thrust loads of up to 12,000 kips. The means of resisting these loads will be the subject of future supplemental correspondence and will be included in our final report. It is anticipated that we will conduct LPILE or GROUP analyses of the foundation options as the project develops.

6.4 Floor Slab/Ground Water Protection

Ground-water level measurements indicate water levels very near if not above the planned Event Level slab elevation. These measured levels may not even represent high ground-water level conditions. Accordingly, we recommend the installation of an underfloor drainage system which can adequately collect and dispose of water through pumping. The attached standard sheet entitled "Underfloor Drainage System Design Example" provides a potential design of this type of system, although modifications may be needed pending expected volume. This system

involves the placement of a highly permeable drainage layer beneath the slab which includes perforated drain pipes to assist in collecting and diverting water to sump pumps.

As the ground water migrates through relatively free-draining sands above the bedrock, it should be recognized that significant pumping flow rates are possible. It is possible to create a cut-off barrier around the perimeter of the Event Level to significantly reduce water inflow which may migrate into the drainage layer zone. This could be in the form of below grade "clay dams", slurry walls, or structural walls extending to the bedrock. With this inflow control, an underfloor system and drain pipes should still be provided to collect potential seepage, because seepage would still be expected through fractures and joints in the bedrock. However, with this perimeter control approach, we anticipate that pumping could be significantly reduced.

For other recommendations pertaining to moisture and vapor protection of interior floor slabs, we refer you to the attached standard sheet entitled "Floor Slab Moisture/Vapor Protection."

6.5 Retention Systems

Soldier pile/lagging and soil anchor tie-back earth retention systems are commonly used in the downtown Minneapolis area. This system can be used, but can be prone to sloughing and poor settlement control, and may be complicated by the cobbles and boulders which may be encountered. An alternate system having better settlement control may be a soil nail shotcrete earth retention system, wherein the wall is incrementally built from top down using shotcrete, steel reinforcement, and soil nails/tiebacks which can be in the form of helical pile anchors or grouted tiebacks. Where soils are prone to sloughing, shotcrete can be applied as an initial step to control the ground movement.

Diaphragm/slurry walls or a grouting procedure (such as jet grouting) may be a consideration, although construction may be complicated by cobbles/boulders and in-place utilities. The benefit of the reinforced shotcrete approach is that the areas worked are visible and obstacles can be openly dealt with or worked around.

The base of the wall construction will be complicated by the presence of the ground-water level. An option may be to use grouting or slurry wall construction procedures at the base of the wall once the excavation reaches an elevation just above the ground-water level. This method can then be designed and constructed to assist in "cutting off" the perimeter for ground-water reduction control as discussed in the prior section.

Retention systems are typically designed by engineers of the specialty contractors (based on performance-based specifications).

Assuming the retention system will be designed and constructed to maintain its integrity on a permanent basis, and the interior wall is built separately from this system, a narrow backfill zone would exist. Presuming water control will be needed, a gravel bed/drainage pipe system can be placed at the base, with free draining sand fill or a geosynthetic drainage board placed above this. All open-graded gravel materials should be separated from finer materials with a geotextile separation fabric to prevent internal erosion of fines into the gravel void space. It may be difficult to compact backfill due to space limitations, and alternate materials or methods may be needed to prevent surface subsidence (or a structural bridge could be created at the surface such that subsidence is not an issue).

For general backfilling of basement or imbalanced fill loads on walls, we refer you to the

attached sheet entitled "Basement/Retaining Wall Backfill and Water Control." This sheet also presents recommended lateral pressure estimates for design.

6.6 Pavements/Exterior Slabs

6.6.1 Definitions

The ensuing section uses italicized words, which have the following definitions:

Top of grading grade is defined as the grade which contacts the bottom of the aggregate base layer.

Sand subbase is a uniform thickness sand layer placed as the top of subgrade (directly below top of grading grade) which is intended to improve the frost and drainage characteristics of the pavement system by better draining excess water in the aggregate base and subbase, by reducing and "bridging" frost heaving, and by reducing spring thaw weakening effects.

Critical subgrade zone is the subgrade portion beneath and within three vertical feet of the *top of grading grade* (which can be reduced to 2½ feet for light-duty pavements). A *sand subbase*, if placed, would be considered the upper portion of the critical subgrade zone.

Select Granular Material shall meet the requirements of Mn/DOT Specification 3149.2B2.

Test roll is a means of evaluating the near-surface stability of subgrade soils (usually non-granular). Suitability is determined by the depth of rutting or deflection caused by passage of heavy rubber-tired construction equipment, such as a loaded dump truck, over the test area. Yielding of less than 1-inch is normally considered acceptable, although engineering judgment may be applied depending on equipment used, soil conditions present, and/or pavement performance expectations.

Unstable soils are those soils which do not pass a *test roll*. Unstable soils typically have water content exceeding the *standard optimum water content* defined in ASTM:D698 (Standard Proctor test).

Organic soils are those soils which have sufficient organic content such that engineering properties/stability are affected (assumed to be 3% or more organic content in this report). These soils are usually black to dark brown in color.

6.6.2 Recycling of On-site Materials

The on-site concrete and bituminous materials can be recycled if they are crushed to an aggregate base-like gradation specification. Crushed bituminous, to be reused as aggregate base, should be blended with mineral soils/gravel or crushed concrete to meet Mn/DOT Class 7 Specification 3138.2A2.

6.6.3 Subgrade Preparation

Many of the on-site soils present in potential subgrade areas are silty sands and clayey sands, with occasional inclusions of clays. These soils are frost susceptible and can have limited drainage characteristics. In these soil types, it is desired to place a *sand subbase* layer of *Select Granular Material* directly below the aggregate base layer to better reduce periods of aggregate and upper subgrade saturation and the associated frost movements and thaw weakening effects. In areas where these more silty and clayey soils are present, we recommend a 1-foot thick *sand subbase* layer of *Select Granular Material* be placed.

There may be areas where the subgrade soils already meet a *Select Granular Material* specification (soils classified as sand or sand with silt). In this case, the incorporation of a *sand subbase* would not be necessary.

Where a *sand subbase* is placed and there is a need to vary the thickness of the subbase, we recommend the thickness have a taper of no steeper than 10:1 (H:V). To the outside of paved or

slab areas, the subcut and *sand subbase* placement should extend slightly beyond the outer edge of the curb/slab edge to maintain frost uniformity. The *sand subbase* should be provided with a positive means of subsurface drainage. Where the pavement slopes, subsurface water will migrate upon the underlying slow draining soils through the *sand subbase* layer to the lower elevation points. If sufficient granular soils underlie the *sand subbase*, infiltration will occur. However, where the subbase is underlain by soils with poor infiltration properties, the design should include a means of drainage at the low elevation points, such as placing an engineered perforated drain pipe which daylights to storm sewers. In more level areas, periodically spaced drainage lines should be created.

The final subgrade should have proper stability within the *critical subgrade zone*. Granular soils should be surface compacted. In more clayey/silty areas, the stability of the soils exposed prior to *sand subbase* placement should be evaluated using the *test roll* procedure. Instability will likely be a result of wetter clayey soils. More widespread instability can be anticipated during wetter seasons. *Unstable soils* should either be subcut and replaced, or reworked in-place. If soils are reworked in-place, they may need to undergo considerable scarification and drying to reach a proper level of stability (ability to pass a *test roll*). Reworked soils should be prepared similar to new fill materials, and should meet the water content and compaction requirements outlined later for new fill placement. We caution that instability of soils present beneath the soils being reworked and compacted may limit the ability to compact the upper soils. In this case, greater depths of subcutting and stability improvement may be needed.

If *organic soils* or debris-laden soils (to the point of creating void space) are found to be present, we recommend removing these materials where present within the *critical subgrade zone*.

Following the above recommended excavations and preparation of existing soils, fill can be placed as needed to attain subgrade elevation. Fill should be placed and compacted per the requirements of Mn/DOT Specification 2105.3F1 (Specified Density Method). Using ASTM terminology, this specification requires soils placed within the *critical subgrade zone* be compacted to a minimum of 100% of the *standard maximum dry unit weight* defined in ASTM: D698 (Standard Proctor test), at a water content from 65% to 102% of the *standard optimum water content*. A reduced minimum compaction level of 95% of the standard maximum dry unit weight can be used below the *critical subgrade zone*. A *sand subbase* can be considered part of a composite subgrade; and the top of the subbase can be figured as the top of the 3-foot subgrade zone needing the 100% compaction level. However, the lower (dry) end of the water content range requirement does not need to apply to the sands.

6.6.4 Pavement Designs

We are presenting pavement designs based on two potential traffic situations (light-duty and heavy-duty). The light-duty design refers to pavements which are intended for automobiles and passenger truck/vans. The heavy-duty design is intended for pavements which will experience truck traffic.

Based on the clayey soils encountered and the recommended subgrade preparation (with a 1-foot *sand subbase* if *Select Granular Material* is not already in-place), we estimate an R-value of 30 or a k-value of 200 pci is appropriate for the pavement design. Based on these parameters and the assumed traffic, our recommended minimum design sections appear in the following tables.

Table 6.6.4a – Bituminous Pavement Thickness Designs

Material	Section Thicknesses (R=30)	
	Light Duty	Heavy Duty
Bituminous Wear	3" (2 lifts)	4.5" (2 lifts)
Class 5, 6 or 7 Aggregate Base	5"	6"

Table 6.6.4b – Concrete Pavement Thickness Designs

Material	Section Thicknesses (k=200 pci)	
	Light Duty	Heavy Duty
Concrete	3.5"	5.5"
Class 5, 6 or 7 Aggregate Base	4"	4"

The concrete design assumes that no dowels are needed for load transfer. Although the aggregate base layer is not necessarily needed for strength reasons, it was added to the concrete design to assist in controlling "mud pumping" at the joints. The design assumes a minimum concrete compressive strength (f'_c) of 4000 psi at 28 days.

The presented designs have been based on "20-year" pavement life design charts. However, the concrete design is expected to have a longer pavement life; or at least, does not require the on-going maintenance of a bituminous system. The benefit of a bituminous system is that rehabilitation techniques, such as mill and overlay procedures, can be more easily performed.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 Excavation Backsloping

Where excavation faces are not retained, the excavations should maintain maximum allowable slopes in accordance with *OSHA Regulations (Standards 29 CFR), Part 1926, Subpart P,*

"Excavations" (can be found on www.osha.gov). Even with the required OSHA sloping, water seepage or surface runoff can potentially induce side-slope erosion or running which could require slope maintenance. The responsibility for excavation face maintenance in accordance with OSHA requirements should lie with the contractor, and we recommend the construction documents be prepared as such.

7.2 Observation and Testing

The recommendations in this report are based on the subsurface conditions found at our test boring/core locations. Since the conditions are expected to vary away from the test locations, we recommend on-site observation by a representative of the geotechnical engineer-of-record during construction to evaluate these potential changes.

At each rock-bearing foundation, a 1½ inch minimum diameter probe hole should be drilled by the contractor in the presence of the geotechnical representative which extends to a depth of at least one foundation width below bottom of the foundation (whether spread footing or drilled pier). The probe hole should be evaluated for the presence of open seams or clay-filled seams using a feeler rod. Where the bedrock is found deficient, additional penetration into the rock should be performed as directed by the geotechnical representative.

Soil density and Proctor testing should be performed on new fill placed in order to document that project specifications for compaction have been satisfied. Sieve analysis tests should be conducted on soil and gravel/aggregate materials as needed to evaluate compliance with the project material specifications.

7.3 Construction Impacts on Surrounding Property

Protection of surrounding property will be an important consideration. Where construction is expected to generate vibrations, we recommend conducting pre-construction and post-construction condition surveys of the nearby structures. Vibration monitoring is also recommended during construction, depending on structure proximity and sensitivity, and on the construction methods used.

7.4 Other Potential Construction Difficulties

7.4.1 Rock Excavation

Pending final grades and foundation thicknesses, some excavation may be needed into the bedrock. Excavation into the harder intact limestone will likely require hard rock excavation techniques such as rock chipping, possibly requiring line drilling in advance of the chipping.

7.4.2 Cobbles, Boulders, and Debris

The soils at this site will include significant cobbles and probably boulders. Debris and buried slabs may also be encountered. These larger particles will make construction procedures somewhat more difficult than normal where they are encountered. They may also require the need for tieback or anchor design revisions to retention systems if they obstruct penetration during construction.

7.4.3 Water in Excavations

Ground water will likely be encountered in many of the excavations. To allow observation of excavation bottoms and to facilitate construction operations, we recommend water be removed from within the excavations during construction.

7.4.4 Disturbance of Soils

The on-site soils can become disturbed under construction traffic, especially if finer grained soils are wet. If soils become disturbed, they should be subcut to the underlying undisturbed soils. The subcut soils can then be dried and recompacted back into place, or they should be removed and replaced with drier imported fill.

7.4.5 Wet or Dry Soils

Some of the site soils available for re-use may be wet or could become wet of the "optimum water content" condition; or they may be too dry. Such soils may then need to be moisture conditioned in order to achieve specified compaction levels.

8.0 LIMITATIONS

Within the limitations of scope, budget, and schedule, our services have been conducted according to generally accepted geotechnical engineering practices at this time and location. Other than this, no warranty, either express or implied, is intended.

Important information regarding risk management and proper use of this report is given in Appendix C entitled "Geotechnical Report Limitations and Guidelines for Use."

DEFINITIONS

Materials or items used for the system are as defined below.

- **Coarse Filter Material** – This material will require high permeability properties, and we recommend use of a No. 8 Coarse Aggregate material as defined in ASTM:C33-93 (Standard Specification for Concrete Aggregates). This material has the following gradation requirements:

Sieve Size or Number	Percentage Finer than (by weight)
½"	100%
¾ "	85%-100%
#4	10%-30%
#8	0-10%
#16	0-5%

- **Fine Filter Material** – A fine filter material can also be defined by ASTM:C33-93. The gradation for this material (fine aggregate) is as follows:

Sieve Size or Number	Percentage Finer than (by weight)
⅜"	100%
#4	95%-100%
#8	80%-100%
#16	50%-85%
#30	25%-60%
#50	10%-30%
#100	2%-10%

- **Geotextile Filter Fabric** – A filter fabric should meet the minimum requirements of a Type I fabric as defined in Mn/DOT Specification 3733.
- **Collector Drainage Pipe** – The collector pipes are intended to be the pipes which take in the water, and therefore should be perforated. Perforations should be limited to sizes not exceeding ¼ inch. PVC pipes are acceptable.
- **Header Pipe -** The pump system should be designed to efficiently collect and dispose of water up to a rate of at least 100 gpm. We anticipate flow rates will typically be considerably lower than this, so you may wish consider a dual or multiple pump system wherein the primary pump handles a lower capacity, and a second larger pump is used for short-term overflow and backup purposes. The pumps should be controlled with a float-actuated switches to maintain the desired ground water level in the sump.

PERIMETER DRAINAGE SYSTEM

Although water will seep from below the slab area, much of the water entering the system at the time of pumping should enter the system from the perimeter. Therefore, we recommend a perimeter drainage system be placed immediately outside of the slab area (i.e., exterior side of perimeter wall).

We recommend a collector drainage line be placed along the perimeter, with a minimum diameter of 6 inches. The line should maintain a minimum slope of 4 inch of vertical drop over a 100 foot length to promote movement to the header pipe and pump. We recommend the perimeter collector pipe be connected to a header pipe for transport to the sump pump area for direct removal without impedance from the interior pipe system. Header pipes should have a minimum diameter of 6 inches.

The exterior collector pipes should be maintained at an elevation such that the top of the pipe is at least 6 inches or more below the bottom of proposed slab elevation. The pipe should be completely surrounded with coarse filter material which is at least 6 inches thick below the pipe and 9 inches thick to the sides and above the pipe. Because the coarse filter material includes significant void space, it will be necessary to protect the coarse filter material from piping or intrusion of the finer surrounding soils. This could be accomplished by enveloping the coarse filter material within a geotextile fabric. Because a fabric may potentially become clogged or have reduced effectiveness with time, you may wish to consider using a fine filter material as a transition layer between the coarse filter material and the surrounding soils. In this case, we again recommend a minimum thickness of 6 inches below the coarse filter material and 9 inches (to 12 inches) to the sides and above the coarse filter material.

INTERIOR UNDERFLOOR DRAINAGE SYSTEM

Upward seepage may occur from below the slab; therefore, the interior floor slab should also be provided with a drainage system. Collector pipes can have a 4 inch diameter and should be placed with a minimum spacing of about 30 feet. We suggest the use of parallel 6 inch header pipes spaced through the interior area. The collector pipes can then be placed perpendicular to the header pipes. It is possible that this placement of draintile lines may be impacted by the presence of other mechanical, electrical, or structural members; and the pipe layout design should consider these potential obstructions.

The pipes should be sloped a minimum of 4 inches of vertical drop per 100 feet of length. We recommend all interior drainage pipes be placed such that the top of the pipe is a minimum of 6 inches below the interior floor slab.

The drainage pipes should be placed within a coarse filter material. The coarse filter material should extend to a minimum depth of 6 inches below the drainage pipes and should be the sole material used in the pipe zone up to bottom of floor grade.

To accommodate 6 inches of cover, 6 inches of bedding, a 6 inch diameter header pipe and the needed slope/vertical drop, the coarse filter material layer will then need to be on the order of 2 foot thick or more.

A filter transition zone will be needed below the coarse aggregate to prevent erosion of underlying subgrade materials. This transition can be either a geotextile fabric or a 6 inch minimum thickness of fine filter material. Clogging of the filter fabric is not as much of a concern in this situation as compared to the exterior situation, and the use of a fabric is likely the more feasible approach in this case.

PUMP CONSIDERATIONS

The pump system will need to be capable of handling the ultimate capacity flowing from the system. This may require a series of pumps at different locations. You should consider the effects of a mechanical failure of the pump and the use of a backup pump system. The backup pump could be used as a secondary pumping system to handle shorter term high capacity needs. In addition, you should consider proving a backup electrical system in the event of a power failure.

FLOOR SLAB MOISTURE/VAPOR PROTECTION

Floor slab design relative to moisture/vapor protection should consider the type and location of two elements, a granular layer and a vapor membrane (vapor retarder, water resistant barrier or vapor barrier). In the following sections, the pros and cons of the possible options regarding these elements will be presented, such that you and your specifier can make an engineering decision based on the benefits and costs of the choices.

GRANULAR LAYER

In American Concrete Institute (ACI) 302.1R-04, a "base material" is recommended over the vapor membrane, rather than the conventional clean "sand cushion" material. The base layer should be a minimum of 4 inches (100 mm) thick, trimmable, compactible, granular fill (not sand), a so-called crusher-run material. Usually graded from 1½ inches to 2 inches (38 to 50 mm) down to rock dust is suitable. Following compaction, the surface can be choked off with a fine-grade material. We refer you to ACI 302.1R-04 for additional details regarding the requirements for the base material.

In cases where potential static water levels or significant perched water sources appear near or above the floor slab, an under floor drainage system may be needed wherein a draintile system is placed within a thicker clean sand or gravel layer. Such a system should be properly engineered depending on subgrade soil types and rate/head of water inflow.

VAPOR MEMBRANE

The need for a vapor membrane depends on whether the floor slab will have a vapor sensitive covering, will have vapor sensitive items stored on the slab, or if the space above the slab will be a humidity controlled area. If the project does not have this vapor sensitivity or moisture control need, placement of a vapor membrane may not be necessary. Your decision will then relate to whether to use the ACI base material or a conventional sand cushion layer. However, if any of the above sensitivity issues apply, placement of a vapor membrane is recommended. Some floor covering systems (adhesives and flooring materials) require installation of a vapor membrane to limit the slab moisture content as a condition of their warranty.

VAPOR MEMBRANE/GRANULAR LAYER PLACEMENT

A number of issues should be considered when deciding whether to place the vapor membrane above or below the granular layer. The benefits of placing the slab on a granular layer, with the vapor membrane placed **below** the granular layer, include **reduction** of the following:

- Slab curling during the curing and drying process.
- Time of bleeding, which allows for quicker finishing.
- Vapor membrane puncturing.
- Surface blistering or delamination caused by an extended bleeding period.
- Cracking caused by plastic or drying shrinkage.

The benefits of placing the vapor membrane **over** the granular layer include the following:

- A lower moisture emission rate is achieved faster.
- Eliminates a potential water reservoir within the granular layer above the membrane.
- Provides a "slip surface", thereby reducing slab restraint and the associated random cracking.

If a membrane is to be used in conjunction with a granular layer, the approach recommended depends on slab usage and the construction schedule. The vapor membrane should be placed above the granular layer when:

- Vapor sensitive floor covering systems are used or vapor sensitive items will be directly placed on the slab.
- The area will be humidity controlled, but the slab will be placed before the building is enclosed and sealed from rain.
- Required by a floor covering manufacturer's system warranty.

The vapor membrane should be placed below the granular layer when:

- Used in humidity controlled areas (without vapor sensitive coverings/stored items), with the roof membrane in place, and the building enclosed to the point where precipitation will not intrude into the slab area. Consideration should be given to slight sloping of the membrane to edges where draintile or other disposal methods can alleviate potential water sources, such as pipe or roof leaks, foundation wall damp proofing failure, fire sprinkler system activation, etc.

There may be cases where membrane placement may have a detrimental effect on the subgrade support system (e.g., expansive soils). In these cases, your decision will need to weigh the cost of subgrade options and the performance risks.

BASEMENT/RETAINING WALL BACKFILL AND WATER CONTROL

DRAINAGE

Below grade basements should include a perimeter backfill drainage system on the exterior side of the wall. The exception may be where basements lie within free draining sands where water will not perch in the backfill. Drainage systems should consist of perforated or slotted PVC drainage pipes located at the bottom of the backfill trench, lower than the interior floor grade. The drain pipe should be surrounded by properly graded filter rock. A filter fabric should then envelope the filter rock. The drain pipe should be connected to a suitable means of disposal, such as a sump basket or a gravity outfall. A storm sewer gravity outfall would be preferred over exterior daylighting, as the latter may freeze during winter. For non-building, exterior retaining walls, weep holes at the base of the wall can be substituted for a drain pipe.

BACKFILLING

Prior to backfilling, damp/water proofing should be applied on perimeter basement walls. The backfill materials placed against basement walls will exert lateral loadings. To reduce this loading by allowing for drainage, we recommend using free draining sands for backfill. The zone of sand backfill should extend outward from the wall at least 2', and then upward and outward from the wall at a 30° or greater angle from vertical. As a minimum, the sands should contain no greater than 12% by weight passing the #200 sieve, which would include (SP) and (SP-SM) soils. The sand backfill should be placed in lifts and compacted with portable compaction equipment. This compaction should be to the specified levels if slabs or pavements are placed above. Where slab/pavements are not above, we recommend capping the sand backfill with a layer of clayey soil to minimize surface water infiltration. Positive surface drainage away from the building should also be maintained. If surface capping or positive surface drainage cannot be maintained, then the trench should be filled with more permeable soils, such as the Fine Filter or Coarse Filter Aggregates defined in Mn/DOT Specification 3149. You should recognize that if the backfill soils are not properly compacted, settlements may occur which may affect surface drainage away from the building.

Backfilling with silty or clayey soil is possible but not preferred. These soils can build-up water which increases lateral pressures and results in wet wall conditions and possible water infiltration into the basement. If you elect to place silty or clayey soils as backfill, we recommend you place a prefabricated drainage composite against the wall which is hydraulically connected to a drainage pipe at the base of the backfill trench. High plasticity clays should be avoided as backfill due to their swelling potential.

LATERAL PRESSURES

Lateral earth pressures on below grade walls vary, depending on backfill soil classification, backfill compaction and slope of the backfill surface. Static or dynamic surcharge loads near the wall will also increase lateral wall pressure. For design, we recommend the following ultimate lateral earth pressure values (given in equivalent fluid pressure values) for a drained soil compacted to 95% of the Standard Proctor density and a level ground surface.

	Equivalent Fluid Density	
Soil Type	**Active (pcf)**	**At-Rest (pcf)**
Sands (SP or SP-SM)	35	50
Silty Sands (SM)	45	65
Fine Grained Soils (SC, CL or ML)	70	90

Basement walls are normally restrained at the top which restricts movement. In this case, the design lateral pressures should be the "at-rest" pressure situation. Retaining walls which are free to rotate or deflect should be designed using the active case. Lateral earth pressures will be significantly higher than that shown if the backfill soils are not drained and become saturated.

Appendix A

Geotechnical Field Exploration and Testing
Boring Log Notes
Unified Soil Classification System
Rock Description Terminology
Figure 1 – Boring Locations (A1 – A8)
Subsurface Boring Logs
Sieve Analysis Test Results

Appendix A
Geotechnical Field Exploration and Testing
Report No. 01-05723

A.1 FIELD EXPLORATION

The subsurface conditions were explored by drilling and sampling eight standard penetration test (SPT) borings. The test boring locations appear on Figure 1 preceding the Subsurface Boring Logs in this appendix.

A.2 SOIL BORING SAMPLING METHODS

A.2.1 Split-Spoon Samples (SS) - Calibrated to N_{60} Values

Standard penetration (split-spoon) samples were collected in general accordance with ASTM:D1586 with one primary modification. The ASTM test method consists of driving a 2-inch O.D. split-barrel sampler into the in-situ soil with a 140-pound hammer dropped from a height of 30 inches. The sampler is driven a total of 18 inches into the soil. After an initial set of 6 inches, the number of hammer blows to drive the sampler the final 12 inches is known as the standard penetration resistance or N-value. Our method uses a modified hammer weight, which is determined by measuring the system energy using a Pile Driving Analyzer (PDA) and an instrumented rod.

In the past, standard penetration N-value tests were performed using a rope and cathead for the lift and drop system. The energy transferred to the split-spoon sampler was typically limited to about 60% of its potential energy due to the friction inherent in this system. This converted energy then provides what is known as an N_{60} blow count.

Most newer drill rigs incorporate an automatic hammer lift and drop system, which has higher energy efficiency and subsequently results in lower N-values than the traditional N_{60} values. By using the PDA energy measurement equipment, we are able to determine actual energy generated by the drop hammer. With the various hammer systems available, we have found highly variable energies ranging from 55% to over 100%. Therefore, the intent of AET's hammer calibrations is to vary the hammer weight such that hammer energies lie within about 60% to 65% of the theoretical energy of a 140-pound weight falling 30 inches. The current ASTM procedure acknowledges the wide variation in N-values, stating that N-values of 100% or more have been observed. Although we have not yet determined the statistical measurement uncertainty of our calibrated method to date, we can state that the accuracy deviation of the N-values using this method is significantly better than the standard ASTM Method.

A.2.2 Disturbed Samples (DS)/Spin-up Samples (SU)

Sample types described as "DS" or "SU" on the boring logs are disturbed samples, which are taken from the flights of the auger. Because the auger disturbs the samples, possible soil layering and contact depths should be considered approximate.

A.2.3 Sampling Limitations

Unless actually observed in a sample, contacts between soil layers are estimated based on the spacing of samples and the action of drilling tools. Cobbles, boulders, and other large objects generally cannot be recovered from test borings, and they may be present in the ground even if they are not noted on the boring logs.

A.3 SOIL CLASSIFICATION METHODS

Soil descriptions shown on the boring logs are based on the Unified Soil Classification (USC) system. The USC system is described in ASTM:D2487 and D2488. Where laboratory classification tests (sieve analysis or Atterberg Limits) have been performed, accurate classifications per ASTM:D2487 are possible. Otherwise, soil descriptions shown on the boring logs are visual-manual judgments. Charts are attached which provide information on the USC system, the descriptive terminology, and the symbols used on the boring logs.

The boring logs include descriptions of apparent geology. The geologic depositional origin of each soil layer is interpreted primarily by observation of the soil samples, which can be limited. Observations of the surrounding topography, vegetation, and development can sometimes aid this judgment.

A.4 WATER LEVEL MEASUREMENTS

The ground-water level measurements are shown at the bottom of the boring logs. The following information appears under "Water Level Measurements" on the logs:

- Date and Time of measurement
- Sampled Depth: lowest depth of soil sampling at the time of measurement
- Casing Depth: depth to bottom of casing or hollow-stem auger at time of measurement

- Cave-in Depth: depth at which measuring tape stops in the borehole
- Water Level: depth in the borehole where free water is encountered
- Drilling Fluid Level: same as Water Level, except that the liquid in the borehole is drilling fluid

The true location of the water table at the boring locations may be different than the water levels measured in the boreholes. This is possible because there are several factors that can affect the water level measurements in the borehole. Some of these factors include: permeability of each soil layer in profile, presence of perched water, amount of time between water level readings, presence of drilling fluid, weather conditions, and use of borehole casing.

A.5 ROCK CORING/DESCRIPTION
The rock coring was performed in general accordance with ASTM:D2113, using an NQ size wireline coring system. The Rock Quality Designation (RQD) was evaluated in general accordance with ASTM:D6032.

A.5 LABORATORY TEST METHODS
A.5.1 Water Content Tests
Conducted in general accordance with ASTM:D2216.

A.5.2 Sieve Analysis Tests
Conducted in general accordance with ASTM:D6913, Method A.

A.5.3 Rock Core Compressive Strength Tests
Conducted in general accordance with ASTM:D2938.

A.6 TEST STANDARD LIMITATIONS
Field and laboratory testing is done in general conformance with the described procedures. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

A.7 SAMPLE STORAGE
Unless notified to do otherwise, we routinely retain representative samples of the soils recovered from the borings for a period of 30 days.

BORING LOG NOTES

DRILLING AND SAMPLING SYMBOLS

Symbol	Definition
AR:	Sample of material obtained from cuttings blown out the top of the borehole during air rotary procedure.
B, H, N:	Size of flush-joint casing
CAS:	Pipe casing, number indicates nominal diameter in inches
COT:	Clean-out tube
DC:	Drive casing; number indicates diameter in inches
DM:	Drilling mud or bentonite slurry
DR:	Driller (initials)
DS:	Disturbed sample from auger flights
DP:	Direct push drilling; a 2.125 inch OD outer casing with an inner 1½ inch ID plastic tube is driven continuously into the ground.
FA:	Flight auger; number indicates outside diameter in inches
HA:	Hand auger; number indicates outside diameter
HSA:	Hollow stem auger; number indicates inside diameter in inches
LG:	Field logger (initials)
MC:	Column used to describe moisture condition of samples and for the ground water level symbols
N (BPF):	Standard penetration resistance (N-value) in blows per foot (see notes)
NQ:	NQ wireline core barrel
PQ:	PQ wireline core barrel
RDA:	Rotary drilling with compressed air and roller or drag bit.
RDF:	Rotary drilling with drilling fluid and roller or drag bit
REC:	In split-spoon (see notes), direct push and thin-walled tube sampling, the recovered length (in inches) of sample. In rock coring, the length of core recovered (expressed as percent of the total core run). Zero indicates no sample recovered.
SS:	Standard split-spoon sampler (steel; 1.5" is inside diameter; 2" outside diameter); unless indicated otherwise
SU	Spin-up sample from hollow stem auger
TW:	Thin-walled tube; number indicates inside diameter in inches
WASH:	Sample of material obtained by screening returning rotary drilling fluid or by which has collected inside the borehole after "falling" through drilling fluid
WH:	Sampler advanced by static weight of drill rod and hammer
WR:	Sampler advanced by static weight of drill rod
94mm:	94 millimeter wireline core barrel
▼:	Water level directly measured in boring
▽:	Estimated water level based solely on sample appearance

TEST SYMBOLS

Symbol	Definition
CONS:	One-dimensional consolidation test
DEN:	Dry density, pcf
DST:	Direct shear test
E:	Pressuremeter Modulus, tsf
HYD:	Hydrometer analysis
LL:	Liquid Limit, %
LP:	Pressuremeter Limit Pressure, tsf
OC:	Organic Content, %
PERM:	Coefficient of permeability (K) test; F - Field; L - Laboratory
PL:	Plastic Limit, %
q_p:	Pocket Penetrometer strength, tsf (approximate)
q_c:	Static cone bearing pressure, tsf
q_u:	Unconfined compressive strength, psf
R:	Electrical Resistivity, ohm-cms
RQD:	Rock Quality Designation of Rock Core, in percent (aggregate length of core pieces 4" or more in length as a percent of total core run)
SA:	Sieve analysis
TRX:	Triaxial compression test
VSR:	Vane shear strength, remolded (field), psf
VSU:	Vane shear strength, undisturbed (field), psf
WC:	Water content, as percent of dry weight
%-200:	Percent of material finer than #200 sieve

STANDARD PENETRATION TEST NOTES

(Calibrated Hammer Weight)

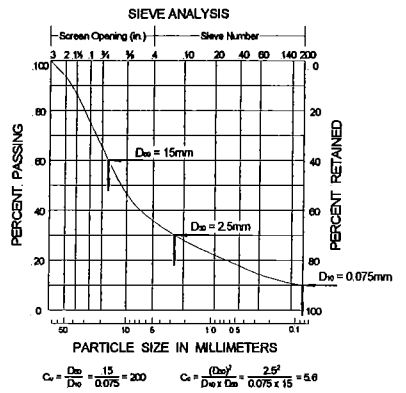
The standard penetration test consists of driving a split-spoon sampler with a drop hammer (calibrated weight varies to provide N_{60} values) and counting the number of blows applied in each of three 6" increments of penetration. If the sampler is driven less than 18" (usually in highly resistant material), permitted in ASTM: D1586, the blows for each complete 6" increment and for each partial increment is on the boring log. For partial increments, the number of blows is shown to the nearest 0.1' below the slash.

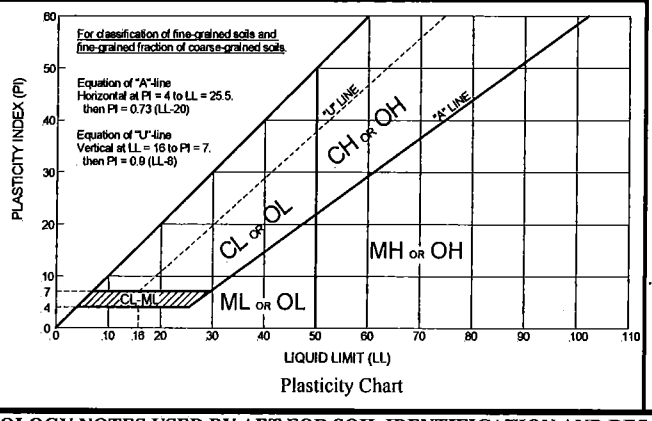
The length of sample recovered, as shown on the "REC" column, may be greater than the distance indicated in the N column. The disparity is because the N-value is recorded below the initial 6" set (unless partial penetration defined in ASTM: D1586 is encountered) whereas the length of sample recovered is for the entire sampler drive (which may even extend more than 18").

UNIFIED SOIL CLASSIFICATION SYSTEM
ASTM Designations: D 2487, D2488

AMERICAN ENGINEERING TESTING, INC.

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse-Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	Cu≥4 and 1≤Cc≤3[E]	GW	Well graded gravel[F]
			Cu<4 and/or 1>Cc>3[E]	GP	Poorly graded gravel[F]
		Gravels with Fines more than 12% fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	Cu≥6 and 1≤Cc≤3[E]	SW	Well-graded sand[I]
			Cu<6 and/or 1>Cc>3[E]	SP	Poorly-graded sand[I]
		Sands with Fines more than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve (see Plasticity Chart below)	Silts and Clays Liquid limit less than 50	inorganic	PI>7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI<4 or plots below "A" line[J]	ML	Silt[K,L,M]
		organic	Liquid limit–oven dried / Liquid limit – not dried <0.75	OL	Organic clay[K,L,M,N] / Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		organic	Liquid limit–oven dried / Liquid limit – not dried <0.75	OH	Organic clay[K,L,M,P] / Organic silt[K,L,M,Q]
Highly organic soil			Primarily organic matter, dark in color, and organic in odor	PT	Peat[R]





Plasticity Chart

Notes

[A]Based on the material passing the 3-in (75-mm) sieve.

[B]If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C]Gravels with 5 to 12% fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay

[D]Sands with 5 to 12% fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

[E]$Cu = D_{60}/D_{10}$, $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F]If soil contains ≥15% sand, add "with sand" to group name.

[G]If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H]If fines are organic, add "with organic fines" to group name.

[I]If soil contains ≥15% gravel, add "with gravel" to group name.

[J]If Atterberg limits plot is hatched area, soils is a CL-ML silty clay.

[K]If soil contains 15 to 29% plus No. 200 add "with sand" or "with gravel", whichever is predominant.

[L]If soil contains ≥30% plus No. 200, predominantly sand, add "sandy" to group name.

[M]If soil contains ≥30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N]PI≥4 and plots on or above "A" line.

[O]PI<4 or plots below "A" line.

[P]PI plots on or above "A" line.

[Q]PI plots below "A" line.

[R]Fiber Content description shown below.

ADDITIONAL TERMINOLOGY NOTES USED BY AET FOR SOIL IDENTIFICATION AND DESCRIPTION

Grain Size

Term	Particle Size
Boulders	Over 12"
Cobbles	3" to 12"
Gravel	#4 sieve to 3"
Sand	#200 to #4 sieve
Fines (silt & clay)	Pass #200 sieve

Gravel Percentages

Term	Percent
A Little Gravel	3% - 14%
With Gravel	15% - 29%
Gravelly	30% - 50%

Consistency of Plastic Soils

Term	N-Value, BPF
Very Soft	less than 2
Soft	2 - 4
Firm	5 - 8
Stiff	9 - 15
Very Stiff	16 - 30
Hard	Greater than 30

Relative Density of Non-Plastic Soils

Term	N-Value, BPF
Very Loose	0 - 4
Loose	5 - 10
Medium Dense	11 - 30
Dense	31 - 50
Very Dense	Greater than 50

Moisture/Frost Condition (MC Column)

D (Dry): Absence of moisture, dusty, dry to touch.

M (Moist): Damp, although free water not visible. Soil may still have a high water content (over "optimum").

W (Wet/ Waterbearing): Free water visible intended to describe non-plastic soils. Waterbearing usually relates to sands and sand with silt.

F (Frozen): Soil frozen

Layering Notes

Laminations: Layers less than ½" thick of differing material or color.

Lenses: Pockets or layers greater than ½" thick of differing material or color.

Peat Description

Term	Fiber Content (Visual Estimate)
Fibric Peat:	Greater than 67%
Hemic Peat:	33 – 67%
Sapric Peat:	Less than 33%

Organic Description (if no lab tests)

Soils are described as *organic*, if soil is not peat and is judged to have sufficient organic fines content to influence the Liquid Limit properties. *Slightly organic* used for borderline cases.

Root Inclusions

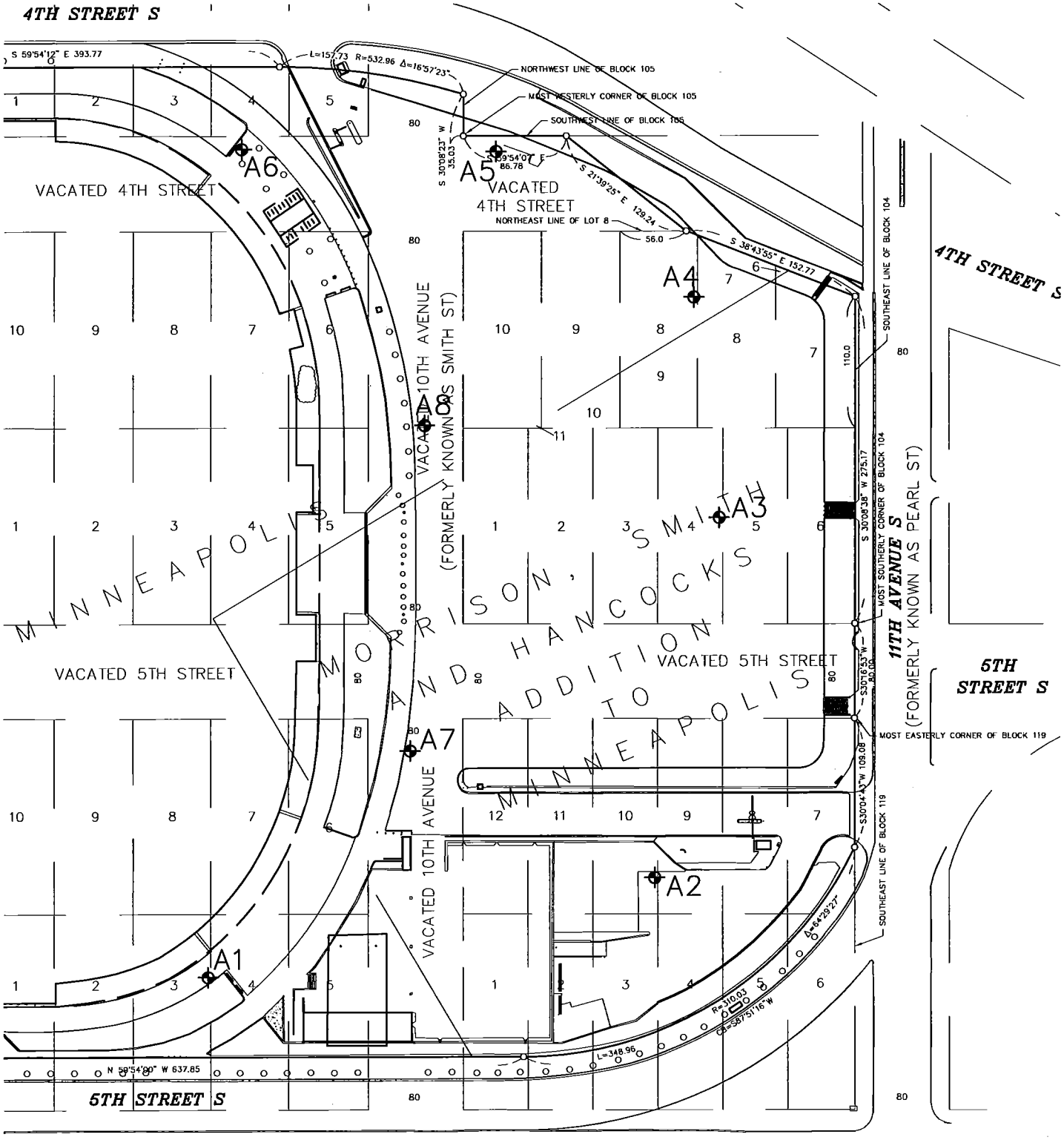
With roots: Judged to have sufficient quantity of roots to influence the soil properties.

Trace roots: Small roots present, but not judged to be in sufficient quantity to significantly affect soil properties.

ROCK DESCRIPTION TERMINOLOGY

Rock Property	Descriptive Term	Visual or Physical Properties
Weathering	Highly Weathered	Almost complete rock disintegration and decomposition. Soil-like texture with some small inclusions of hard rock.
	Very Weathered	Abundant fractures coated with oxides, carbonates, sulfates, mud, etc., thorough discoloration, rock disintegration, and mineral decomposition.
	Moderately Weathered	Some fracture coating, moderate or localized discoloration, little to no effect on cementation, slight mineral decomposition
	Slightly Weathered	A few stained fractures, slight discoloration, little to no effect on cementation, no mineral decomposition.
	Fresh	Unaffected by weathering agents, no appreciable change with depth.
Fracturing	Intensely Fractured	Less than 1" spacing
	Very Fractured	1" to 6" spacing
	Moderately Fractured	6" to 12" spacing
	Slightly Fractured	12" to 36" spacing
	Solid	36" spacing or greater
Stratification	Thinly Laminated	Less than 1/10"
	Laminated	1/10" to 2"
	Very Thinly Bedded	2" to 2"
	Thinly Bedded	2" to 2'
	Thickly Bedded	More than 2'
Hardness	Soft	Can be dug by hand and crushed by fingers.
	Moderately Hard	Friable can be gouged deeply with knife and will crumble readily under light hammer blows.
	Hard	Knife scratch leaves dust trace, will withstand a few hammer blows before breaking.
	Very Hard	Scratched with knife with difficulty, difficult to break with hammer blows.
RQD*	Very Poor	0 - 25 (%)
	Poor	25 - 50 (%)
	Fair	50 - 75 (%)
	Good	75 - 90 (%)
	Excellent	90 - 100 (%)

**Rock Quality Designation:* *Percent of core run consisting of the summation of hard, sound, and unfractured rock with core segments 4 inches or greater in length. Determination is conducted in general accordance with ASTM:D6032.*



LEGEND

= SOIL BORING LOCATION

AMERICAN ENGINEERING TESTING, INC.	SCALE 0 FEET 120'	**PROJECT** Minnesota Multi-Purpose Stadium Minneapolis, Minnesota	**AET NO.** 01-05723
		SUBJECT Boring Locations (A1 To A8)	**DATE** February 2013
		DRAWN BY VL / **CHECKED BY** JV	**FIGURE 1**

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A1 (p. 1 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

SURFACE ELEVATION: **844.6** Hennepin Co. Coordinates: N **166237** E **532415**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
0	6" Concrete pavement	FILL		F	DS						
1	FILL, mostly silty sand with gravel, brown, frozen to 2'			F	DS						
2											
3			28	M	SS	12					
4	FILL, mostly silty sand, a little gravel and clayey sand, pieces of concrete at about 10', dark brown and brown										
5			18	M	SS	6					
6											
7											
8			22	M	SS	5					
9											
10			53	M	SS	10					
11											
12											
13			30	M	SS	3					
14											
15			27	M	SS	10					
16											
17											
18			50	M	SS	18					
19											
20			50	M	SS	16					
21											
22											
23			66	M	SS	18					
24											
25			60	M	SS	18					
26											
27											
28			70	M	SS	18					
29											
30			48	M	SS	18					
31											

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS						
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-52.3' 4.25" HSA							
BORING COMPLETED: **2/18/13**							
DR: **GH** LG: **JMM** Rig: **85C**							

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A1 (p. 2 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

Hennepin Co. Coordinates: N **166237** E **532415**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
33			65	M	SS	18					
34	FILL, mostly silty sand, a little gravel, pieces of concrete, brown										
35			70	M	SS	18					
36											
37											
38			60	M	SS	18					
39	FILL, mostly silty sand, a little gravel, brown										
40			55	M	SS	18					
41											
42	SILTY SAND, a little gravel, gray, very stiff, laminations of sand (SM)	TILL									
43			16	M/W	SS	18					
44	GRAVEL WITH SAND, apparent cobbles, brown, moist to waterbearing, very dense (GP)	COARSE ALLUVIUM									
45			97	M	SS	8					
46											
47				▽							
48			100	M/W	SS	4					
49	GRAVELLY SAND, apparent cobbles, medium to coarse grained, brown, waterbearing, very dense (SP) *25/0.5 + 55/0.1										
50			*	W	SS	6					
51											
52			50/0	-	SS	0					
53	LIMESTONE, gray Weathering: Slightly weathered Fracturing: Intensely to very fractured Stratification: Very thinly bedded Hardness: Hard	PLATTEVILLE FORMATION MAGNOLIA MEMBER			NQ	36		100	22	61	
54											
55											
56	LIMESTONE, light gray and light brownish gray, fossiliferous Weathering: Slightly weathered Fracturing: Very fractured to slightly fractured Stratification: Thickly bedded Hardness: Hard				NQ	56		93	48	80	
57											
58											
59											
60											
61	LIMESTONE, gray Weathering: Slightly weathered to fresh Fracturing: Intensely to moderately fractured Stratification: Thinly bedded Hardness: Hard	PLATTEVILLE FORMATION HIDDEN**			NQ	20		83	16.5	69	
62	**END OF BORING**	**FALLS MEMBER									

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A2 (p. 1 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

SURFACE ELEVATION: **833.2** Hennepin Co. Coordinates: N **166110** E **532780**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
0	5" Bituminous pavement	FILL			SU						
1	FILL, mostly silty sand with gravel, dark brown, frozen			F	SU						
2											
3				F	SU						
4	FILL, mostly sand with silt, a little gravel, light brown			M	SU						
5	FILL, mostly sand, light brown		12	M	SS	14					
6											
7	FILL, mostly sand with silt, a little clayey sand, brown										
8			9	M	SS	14					
9											
10	FILL, mostly sand with silt, a little gravel, brown and gray		10	M	SS	6					
11											
12											
13			9	M	SS	16					
14											
15			9	M	SS	14					
16											
17	FILL, mostly sand, a little gravel, brown										
18			63	M	SS	14					
19	GRAVELLY SAND WITH SILT, possible cobble, fine to medium grained, brown, moist, dense (SP-SM)	COARSE ALLUVIUM									
20	*43/0.5 + 50/0.4		*	M	SS	4					
21											
22	SILTY SAND, a little gravel, brown, dense (SM)										
23			36	M	SS	16					
24	GRAVELLY SAND WITH SILT, fine to medium grained, brown, moist, medium dense (SP-SM)										
25											
26			30	M	SS	12					
27	CLAYEY SAND, a little gravel, brownish gray, very stiff (SC)	TILL					17				
28	SILTY SAND, a little gravel, brown, medium dense, lenses and laminations of clayey sand (SM)		19	M	SS	14					
29											
30	CLAYEY SAND, a little gravel, gray, stiff (SC/SM)		13	M	SS	16	12				
31											

DEPTH:	DRILLING METHOD
0-40.9'	**4.25" HSA**
41.4-51.4'	**NQ Core**

BORING COMPLETED: **2/16/13**

DR: **DS** LG: **JJ** Rig: **33C**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
2/16/13	**10:20**	**36.0**	**34.5**	**35.9**		**None**
2/16/13	**10:40**	**36.0**	**34.5**	**35.9**		**34.7**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A2 (p. 2 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

Hennepin Co. Coordinates: N **166110** E **532780**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
33	SAND WITH SILT, fine grained, brown, moist to wet, loose (SP-SM) *(continued)*	COARSE ALLUVIUM *(continued)*	9	M/W	SS	14					
34											
35	SANDY LEAN CLAY, a little gravel, gray, hard, laminations of silt (CL)	TILL	45	M	SS	18	17				
36											
37	GRAVELLY SAND WITH SILT, possible cobbles, coarse to medium grained, gray to brown, waterbearing, very dense (SP-SM)	COLLUVIUM OR COARSE ALLUVIUM	**	W	SS	6					9
38											
39	**9/0.5 + 50/0.3										
40	***46/0.5 + 50/0.3		***	W	SS	8					
41	LIMESTONE, light brownish gray, a little brown around 47.5', a few vuggy zones	PLATTEVILLE FORMATION MAGNOLIA MEMBER									
42	Weathering: Moderately to slightly weathered										
43	Fracturing: Very to moderately fractured										
44	Stratification: Thickly bedded				NQ	42		70	15	25	
45	Hardness: Hard										
46	Rock compressive strength at 42.2' = 12,280 psi										
47											
48											
49					NQ	60		100	45	75	
50											
51											
	END OF BORING										

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A3 (p. 1 of 3)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

SURFACE ELEVATION: **843.0** Hennepin Co. Coordinates: N **166343** E **532983**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
0	5.25" Bituminous pavement	FILL			SU						
1	FILL, mostly silty sand with gravel, dark brown, frozen			F	SU						
2	FILL, mixture of silty sand and clayey sand, with gravel, apparent cobbles, brown, frozen to 3.5'			F	SS	16	7				
3											
4											
5			21	M	SS	10	6				
6											
7											
8			6	M	SS	11	10				
9											
10	FILL, mostly silty sand, a little gravel, dark brown		25	M	SS	16					
11											
12	FILL, mostly clayey sand with organic fines, a little gravel, pieces of brick, dark brown										
13			8	M	SS	14	18				
14											
15	FILL, mostly silty sand, a little gravel, pieces of concrete, dark brown		20	M	SS	2					
16											
17	CLAYEY SAND, a little gravel, brown, very stiff (SC)	TILL									
18			19	M	SS	16	12				
19											
20	SILTY SAND WITH GRAVEL, apparent cobbles, brown, very dense (SM)		100/.9	M	SS	6					
21											
22	SILTY SAND, a little gravel, brown, medium dense (SM)										
23			23	M	SS	16					
24											
25	CLAYEY SAND, a little gravel, brown, stiff (SC)										
26			10	M/W	SS	24	15				
27											
28	SAND WITH GRAVEL, apparent cobbles, fine to medium grained, light brown, moist, medium dense (SP)	COARSE ALLUVIUM	29	M	SS	10					
29											
30	SAND, fine to medium grained, light brown, moist, dense (SP)		33	M	SS	14					
31											

DEPTH:	DRILLING METHOD
0-52'	3.25" HSA
52-52.5'	RDF w/DM
52.5-80.8'	NQ Core
BORING COMPLETED:	2/14/13
DR: SG	LG: SB Rig: 91C

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
2/14/13	11:00	48.5	47.0	47.0		46.7
2/14/13	11:15	48.5	47.0	47.0		46.4

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A3 (p. 2 of 3)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

Hennepin Co. Coordinates: N **166343** E **532983**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
33	SAND WITH GRAVEL, apparent cobbles, fine to medium grained, light brown, moist, very dense (SP) *(continued)*		71/.95	M	SS	16					
34											
35	SILTY SAND WITH GRAVEL, apparent cobble, fine grained, brown, moist, very dense (SM)		*	M	SS	5					
36											
37	*54/0.5+100/0.3		50/0.2	M	SS	1					
38											
39	SAND WITH SILT AND GRAVEL, medium to fine grained, light brown, moist, very dense (SP-SM)										
40			100/.9	M	SS	17					
41											
42											
43			100/.9	M	SS	17					
44											
45	SAND WITH SILT AND GRAVEL, apparent cobbles, fine to medium grained, brown, very dense (SP-SM)		**	M	SS	14					
46	**50/0.5 + 65/0.6 + 35/0.2			▼							
47	GRAVEL WITH SAND AND SILT, apparent cobbles, light brown, waterbearing, very dense (GP-GM)	COARSE ALLUVIUM OR COLLUVIUM	63	W	SS	16					
48											
49											
50	***22/0.5 + 40/0.5 + 60/0.2		***	W	SS	11					8
51											
52	LIMESTONE SLAB OVER GRAVEL, light gray to brownish gray	COLLUVIUM	50/0	W	SS	0					
53					NQ	2.5		104			
54	LIMESTONE, light brownish gray to about 57.5' then light gray and gray, fossiliferous above 57.6'	PLATTEVILLE FORMATION MAGNOLIA MEMBER			NQ	35		94	25	67	
55	Weathering: Slightly weathered										
56	Fracturing: Very to moderately fractured										
57	Stratification: Thickly bedded										
58	Hardness: Hard										
59	Rock compressive strength at 53.8' = 10,290 psi				NQ	57		95	40	67	
60	Rock compressive strength at 58.7' = 19,550 psi										
61	LIMESTONE, gray and light gray to about 61' then gray, 1-inch clay seam at 60.8', lenses of shale at 62.1' and 62.8'	PLATTEVILLE FORMATION HIDDEN FALLS MEMBER									
62											
63	Weathering: Slightly weathered				NQ	52		87	30	50	
64	Fracturing: Very to moderately fractured										
65	Stratification: Thickly bedded										
66	Hardness: Hard										
67	Rock compressive strength at 63.5' = 11,120 psi										
68	Rock compressive strength at 65.3' = 14,470 psi										
69	LIMESTONE, light gray and gray, crinkly bedded	PLATTEVILLE FORMATION MIFFLIN MEMBER									
	Weathering: Slightly weathered to fresh				NQ	58		97	53	88	
	Fracturing: Very fractured to slightly fractured										
	Stratification: Very thinly bedded										

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A3 (p. 3 of 3)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

Hennepin Co. Coordinates: N **166343** E **532983**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
71	Hardness: Hard Rock compressive strength at 69.5' = 7,570 psi	PLATTEVILLE FORMATION MIFFLIN MEMBER *(continued)*			NQ	60		100	57	95	
72											
73											
74	Rock compressive strength at 74.1' = 10,140 psi										
75											
76											
77											
78					NQ	35		58	30	50	
79	LIMESTONE, gray, vuggy Weathering: Slightly weathered Fracturing: Very fractured Stratification: Thinly bedded Hardness: Moderately hard (recovery ends around 79.7')	PLATTEVILLE FORMATION PECATONICA MEMBER									
80	**END OF BORING**										

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A4 (p. 1 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

SURFACE ELEVATION: **842.4** Hennepin Co. Coordinates: N **166510** E **533058**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
0	4.5" Bituminous pavement	FILL									
1	6" FILL, mostly gravelly silty sand, pieces of concrete, dark brown, frozen			F	SS	6	9				
2											
3	FILL, mixture of silty sand and clayey sand, with gravel, pieces of brick, brown, frozen			F	SS	16					
4	FILL, mostly silty sand with gravel, dark brown, frozen to 4'										
5			20	M	SS	12					
6											
7	FILL, mostly silty sand, a little gravel, pieces of concrete, glass and wood, dark brown										
8			22	M	SS	10					
9											
10			14	M	SS	14					
11											
12											
13			8	M	SS	12	10				
14	FILL, mostly clayey sand, a little gravel, brown										
15	SAND WITH SILT, a little gravel, medium to fine grained, brown, moist, medium dense (SP-SM) (possible fill)	COARSE ALLUVIUM OR FILL	13	M	SS	10					
16											
17	SAND, fine to medium grained, light brown, moist, loose (SP)	COARSE ALLUVIUM									
18			10	M	SS	10					
19											
20	SAND WITH SILT, a little gravel, apparent cobbles, fine to medium grained, dark brown, moist, very dense (SP-SM)		69/0.8	M	SS	14					
21											
22	SAND, a little gravel, fine to medium grained, brown to light brown, moist, very dense to medium dense (SP)										
23			17	M	SS	10					
24											
25			21	M	SS	14					
26											
27	SAND, a little gravel, medium to fine grained, grayish brown, moist, medium dense (SP)										
28			19	M	SS	16					
29											
30			25	M	SS	14					
31											

DEPTH:	DRILLING METHOD
0-49.9'	**3.25" HSA**
49.9-59.6'	**NQ Core**
BORING COMPLETED:	**2/15/13**
DR: **SS**	LG: **TK** Rig: **85C**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
2/14/13	**12:55**	**48.7**	**47.0**	**46.3**		**46.1**
2/14/13	**1:00**	**48.7**	**47.0**	**46.3**		**46.1**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A4 (p. 2 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

Hennepin Co. Coordinates: N **166510** E **533058**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
33	SAND, fine grained, light brown, moist, dense to very dense (SP) *(continued)*		43	M	SS	14					
34											
35			59	M	SS	12					
36											
37											
38			60	M	SS	2					
39											
40			43	M	SS	14					
41											
42	SAND WITH SILT AND GRAVEL, fine to medium grained, brown, moist, dense (SP-SM)										
43			45	M	SS	12					
44											
45	*27/0.5 + 50/0.3		*	M	SS	8					
46	GRAVEL WITH SAND, light grayish brown, moist, very dense (GP)	COARSE ALLUVIUM OR COLLUVIUM		▼							
47	GRAVELLY CLAYEY SAND, brown, hard, lenses and laminations of silty sand (SC)	COLLUVIUM									
48			79	M/W	SS	12	9				
49											
50	LIMESTONE SLAB, gray and light gray		100/0	M	SS	1					
51											
52	LIMESTONE, light brownish gray to about 57.8' then gray and light gray, fossiliferous above 57.8'	PLATTEVILLE FORMATION MAGNOLIA MEMBER			NQ	56		99	13	23	
53	Weathering: Moderately to slightly weathered										
54	Fracturing: Intensely to slightly fractured										
55	Stratification: Thickly bedded										
56	Hardness: Moderately hard to hard										
57					NQ	42		70	29	48	
58											
59											
	END OF BORING										

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A5 (p. 1 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

SURFACE ELEVATION: **839.8** Hennepin Co. Coordinates: N **166704** E **532979**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS: WC	REC %	RQD IN.	RQD %	%-#200
1	5.75" Bituminous pavement	FILL		F							
1	6" FILL, mostly gravelly silty sand, dark brown, frozen			F							
2–4	FILL, mostly silty sand with gravel, a little clayey sand, pieces of concrete around 5', dark brown, frozen to 4'			F	SS	12					
5	*13/0.5 + 60/0.2		60/.2	M	SS	6					
8			24	M	SS	10					
10			35	M	SS	12					
12–13	FILL, mixture of sandy lean clay and sand with silt, a little gravel, brownish gray and brown		23	M	SS	10	9				
14–15	FILL, mostly gravel, brown		50/.2	M	SS	1					
16–18	GRAVELLY SAND WITH SILT, fine to medium grained, brown, moist, very dense (SP-SM)	COARSE ALLUVIUM	54	M	SS	10					
20			98	M	SS	8					
22–23	SILTY SAND, a little gravel, brown, very dense (SM)	TILL	98	M	SS	14					
25			85	M	SS	16					
28			61	M	SS	14					
30	SAND WITH GRAVEL, fine to medium grained, brown, dense to very dense (SP)	COARSE ALLUVIUM	43	M	SS	12					

DEPTH:	DRILLING METHOD
0-49.7'	3.25" HSA
49.7-55.6'	NQ Core

BORING COMPLETED: **2/18/13**

DR: **SS** LG: **TK** Rig: **85C**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
2/15/13	3:00	35.6	34.5	35.3		35.0
2/15/13	4:55	47.1	46.8	46.7		44.7
2/16/13	8:30	47.1	46.8	46.7		43.6
2/16/13	1:30	49.7	49.5	48.1		46.2

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A5 (p. 2 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

Hennepin Co. Coordinates: N **166704** E **532979**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
33	SAND WITH GRAVEL, fine to medium grained, brown, dense to very dense (SP) *(continued)*	COARSE ALLUVIUM *(continued)*	68	M	SS	12					
34											
35	SAND WITH SILT AND GRAVEL, fine to medium grained, brown, waterbearing, very dense (SP-SM)		**	W/M	SS	12					
36											
37	GRAVEL WITH CLAY AND SAND, brown, moist, dense (GC)										
38	SAND, fine to medium grained, light brown, moist, very dense (SP)		55	M	SS	16					
39											
40	SILTY SAND WITH GRAVEL, fine to medium grained, brown, moist, very dense (SM)		96	M	SS	10					
41											
42	GRAVEL WITH SAND, brown, moist, very dense (GP)	TILL									
43			73	M	SS	14					
44	SILTY SAND WITH GRAVEL, dark brown, a little brown, very dense, lenses of clayey sand (SM)										
45							13				
46	SANDY LEAN CLAY, a little gravel, gray, hard (CL)	COARSE ALLUVIUM	57	M/W	SS	14					
47	GRAVELLY SILTY SAND, fine to medium grained, gray, wet, very dense (SM)	HIGHLY FRACTURED PLATTEVILLE FORMATION OR COLLUVIUM	100/.3	W	SS	1					
48	WEATHERED LIMESTONE, brown to light gray										
49											
50			100/.15	W	SS	1					
50	LIMESTONE, light brownish gray to gray, fossiliferous				NQ	8		83	7	73	
51	Weathering: Moderately to slightly weathered	PLATTEVILLE FORMATION MAGNOLIA MEMBER									
52	Fracturing: Very fractured										
53	Stratification: Thickly bedded				NQ	45		75	13	22	
53	Hardness: Hard										
54											
55											

END OF BORING

**14/0.5 + 31/0.5 + 50/0.1

Note: Core barrel became wedged and broke off. Barrel and most of core were retrieved, although bottom 0.9' remained in ground. Drillers reported coring was continuously solid with no obvious voids.

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A6 (p. 1 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

SURFACE ELEVATION: **842.6** Hennepin Co. Coordinates: N **166819** E **532796**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
0	5.5" Concrete pavement	FILL			SU						
1	FILL, mostly silty sand with gravel, dark brown, frozen			F	SU						
2											
3	FILL, mostly silty sand, a little gravel and clayey sand, dark brown, frozen to 3.5'			F	SS	16					
4											
5			7	M	SS	10					
6											
7	FILL, mostly silty sand with gravel, pieces of concrete, dark brown										
8	*6/0.5 + 17/0.5 + 50/0.2		*	M	SS	12					
9											
10	FILL, mostly clayey sand, a little gravel, dark brown		5	M	SS	12	16				
11											
12	FILL, mostly sand with silt, brown										
13			18	M	SS	13					
14											
15	FILL, mostly sand with silt, a little gravel, apparent cobble at 18', dark brown		11	M	SS	12					
16											
17											
18			20	M	SS	14					
19											
20	FILL, mostly silty sand with gravel, apparent cobbles, brown		42	M	SS	5					
21											
22	SAND, a little gravel, fine to medium grained, light brown, moist, medium dense (SP)	COARSE ALLUVIUM	17	M	SS	14					
23											
24	SAND, a little gravel, possible cobble, medium to fine grained, light brown, moist, dense (SP)										
25			32	M	SS	15					
26											
27	GRAVELLY SAND, apparent cobbles, medium to fine grained, light brown, moist, very dense (SP)										
28			59	M	SS	6					
29											
30	GRAVEL WITH SAND, apparent cobbles, brown, moist, very dense (GP)		55	M	SS	12					
31											

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-47.5' 3.25" HSA	**2/18/13**		**47.2**	**47.5**			**None****	
							****Wet**	
BORING COMPLETED: **2/18/13**								
DR: **SG** LG: **SB** Rig: **91C**								

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A6 (p. 2 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

Hennepin Co. Coordinates: N **166819** E **532796**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
33	SILTY SAND, a little gravel, apparent cobbles, brown, very dense (SM) *(continued)*	TILL *(continued)*	**	M	SS	14					
34											
35	**36/0.5 + 69/0.5 + 31/0.2		***	M	SS						
36	***35/0.5 + 68/0.5 + 32/0.1										
37											
38			74	M	SS						
39											
40	SAND WITH GRAVEL, medium to fine grained, brown, moist, dense, laminations of clayey sand (SP)	COARSE ALLUVIUM	47	M	SS	15					
41											
42	SAND WITH SILT AND GRAVEL, medium to fine grained, brown, moist, dense (SP-SM)										
43			58	M	SS	18					
44											
45	GRAVELLY SAND WITH SILT, medium to fine grained, brown, moist to waterbearing, very dense (SP-SM)	COARSE ALLUVIUM OR COLLUVIUM	64	M/W	SS	12					
46											
47	SANDY LEAN CLAY, a little gravel, gray, hard (CL)	TILL	50/.2	M	SS	2	16				
48	LIMESTONE, light gray and gray to about 49' then light brownish gray, fractured and weathered zones from 48' to 48.3' and 48.7' to 48.8', vertical fracture from 52.5' to 52.9', fossiliferous, a few vuggy zones Weathering: Moderately to slightly weathered Fracturing: Very to moderately fractured Stratification: Thickly bedded Hardness: Hard	PLATTEVILLE FORMATION MAGNOLIA MEMBER			NQ	25		72	17	49	
49											
50											
51											
52											
53					NQ	56		93	28	47	
54											
55											
56											
57	LIMESTONE, gray, vertical fractures at 57.9' and 59' Weathering: Slightly weathered Fracturing: Very to moderately fractured Stratification: Thickly bedded Hardness: Hard	PLATTEVILLE FORMATION HIDDEN FALLS MEMBER			NQ	50		83	24	40	
58											
59											
60											
	END OF BORING										

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A7 (p. 1 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

SURFACE ELEVATION: **842.6** Hennepin Co. Coordinates: N **166300** E **532654**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
0	6" Bituminous pavement	FILL			SU						
1	FILL, mostly silty sand with gravel, apparent cobbles, dark brown to brown, frozen to 4'			F	SU						
2				F	SS	3					
3											
4											
5			33	M	SS	15					
6											
7	FILL, mostly sand, a little gravel, brown										
8			20	M	SS	12					
9											
10	FILL, mostly sand, light brown		18	M	SS	12					
11											
12	FILL, mostly gravelly sand with silt, apparent cobbles, brown										
13			110	M	SS	10					
14											
15	FILL, mixture of clayey sand and silty sand, a little gravel, brown and gray		26	M	SS	16	11				
16											
17	GRAVELLY SILTY SAND, brown, dense (SM)	TILL									
18			39	M	SS	3					
19											
20	CLAYEY SAND, a little gravel, apparent cobbles, brown, hard to very stiff, laminations of silty sand (SC/SM)		88	M	SS	5	12				
21											
22											
23			16	M	SS	16	12				
24	SAND WITH SILT, fine grained, light brown, moist, medium dense (SP-SM)	COARSE ALLUVIUM									
25			13	M	SS	14					
26											
27	SILTY SAND WITH GRAVEL, fine to medium grained, brown, moist, dense (SM)										
28			36	M	SS	12					
29											
30	GRAVEL WITH SAND, brown, moist, very dense to dense (GP)		61	M	SS	13					
31											

DEPTH:	DRILLING METHOD
0-49½'	**3.25" HSA**
49½-49.8'	**RD w/DM**
BORING COMPLETED:	**2/21/13**
DR: **SG**	LG: **SB** Rig: **91C**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
2/20/13		**49.5**	**49.5**			**None**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A7 (p. 2 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

Hennepin Co. Coordinates: N **166300** E **532654**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
33	GRAVEL WITH SAND, brown, moist, very dense to dense (GP) *(continued)*		28	M	SS	10					
34											
35			99	M	SS	13					
36											
37	SILTY SAND WITH GRAVEL, apparent cobbles, dark brown, very dense (SM)	TILL									
38			*	M	SS	15					
39	**22/0.5 + 58/0.5 + 42/0.3										
40			50/0.3	M	SS	3					
41											
42			50/0.2	M	SS	2					
43											
44											
45			50/0.1	M	SS	1					
46	SILTY SAND WITH GRAVEL, possible cobbles, brown, very dense, laminations of clayey sand (SM)	COLLUVIUM									
47			83/0.5	M	SS	5					
48											
49											
50	LIMESTONE SLAB, gray		50/.05	M	SS	½					
51	LIMESTONE SLABS AND GRAVEL, gray and dark brown										
52					NQ	38		67	16	28	
53	LIMESTONE, light brownish gray, fossiliferous, a few vuggy zones, clay seam at 52.8'	PLATTEVILLE FORMATION MAGNOLIA MEMBER									
54	Weathering: Slightly weathered Fracturing: Intensely to moderately fractured Stratification: Thickly bedded Hardness: Hard										
	END OF BORING										
	Note RQD = 54% in Magnolia Member (lower 2.5')										

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A8 (p. 1 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

SURFACE ELEVATION: **842.1** Hennepin Co. Coordinates: N **166533** E **532812**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
0	4" Bituminous pavement	FILL		F	SU						
1	FILL, mostly silty sand with gravel, pieces of concrete around 2', dark brown, frozen			F	SU						
2					SU						
3				F	SS	12					
4	FILL, mostly silty sand, a little gravel, pieces of brick, apparent cobbles, dark brown										
5			25	M	SS	14					
6											
7											
8			18	M	SS	12					
9	FILL, mostly gravel and silty sand, apparent cobbles, brown										
10			48	M	SS	10					
11											
12	FILL, mostly sand with silt, brown										
13			10	M	SS	16					
14	FILL, mostly silty sand, a little gravel, apparent cobbles, brown and grayish brown										
15			19	M	SS	6					
16											
17	FILL, mostly sand, light brown										
18			15	M	SS	13					
19	FILL, mostly sand with silt, a little gravel, brown										
20			7	M	SS	10					
21											
22	FILL, mostly gravelly silty sand, apparent cobbles, dark brownish gray (petroleum-type odor)		50/.2	M	SS	2					
23											
24	SANDY LEAN CLAY, a little gravel, gray, very stiff (CL) (petroleum-type odor)	TILL									
25			16	M	SS	18	12				
26											
27											
28	SILTY SAND, a little gravel, apparent cobble, gray, dense (SM)		36	M	SS	16	16				
29											
30	SANDY LEAN CLAY WITH GRAVEL, apparent cobbles, gray, a little brownish gray, hard, a lens of silty sand around 30' (CL)		68	M	SS	15	4				
31											

DEPTH:	DRILLING METHOD
0-51.2'	**3.25" HSA**
51.2-60.2'	**NQ Core**

BORING COMPLETED: **2/16/13**

DR: **SG** LG: **SB** Rig: **91C**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
2/14/13	**2:40**	**48.5**	**47.0**	**47.0**		**46.3**
2/14/13	**2:50**	**48.5**	**47.0**	**47.0**		**46.4**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/25/13

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **01-05723** LOG OF BORING NO. **A8 (p. 2 of 2)**

PROJECT: **Minnesota Multi-Purpose Stadium; Minneapolis, MN**

Hennepin Co. Coordinates: N **166533** E **532812**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	REC %	RQD IN.	RQD %	%-#200
33	SILTY SAND, a little gravel, gray, medium dense (SM) *(continued)*		18	M	SS	13					
34											
35			19	M	SS	16					
36											
37											
38			10	M	SS	8					
39											
40	CLAYEY SAND, a little gravel, gray, very stiff (SC)		20	M	SS	17	14				
41	SAND, fine grained, light brown, moist, medium dense (SP)										
42											
43			73	M	SS	5					
44											
45	SAND WITH SILT AND GRAVEL, apparent cobbles, fine to medium grained, brown, moist, very dense (SP-SM)	COARSE ALLUVIUM	80/.5	M	SS	1					
46				▼							
47	GRAVELLY SAND WITH SILT, medium to coarse grained, brown, very dense (SM)	COLLUVIUM OR TILL									
48			51	W	SS	8					
49											
50	SAND, a little gravel, apparent cobbles, fine to medium grained, brown, waterbearing, very dense (SP)	COARSE ALLUVIUM	50/.4	W	SS	9	12				
51	GRAVELLY CLAYEY SAND, gray, hard (SC)	TILL									
52	LIMESTONE, light brownish gray, a few vuggy zones, fossiliferous	PLATTEVILLE FORMATION MAGNOLIA MEMBER									
53	Weathering: Slightly weathered				NQ	48		100	20	42	
54	Fracturing: Very fractured										
55	Stratification: Thickly bedded										
56	Hardness: Hard										
57	LIMESTONE, gray										
58	Weathering: Weathered				NQ	26		43	*	*	
59	Fracturing: Very fractured										
60	Stratification: Thickly bedded Hardness: Hard										
	END OF BORING										

**Lower 2½' of core could not be retrieved. Portion retrieved likely disturbed by retrieval attempts.*

AET_CORP W-COORDINATES 01-05723.GPJ AET+CPT+WELL.GDT 2/19/13

SIEVE ANALYSIS TEST RESULTS

PROJECT:
Minnesota Multi-Purpose Stadium
Minneapolis, Minnesota

AET NO.: 01-05723

DATE: February 19, 2013

TEST METHOD: General Conformance with ASTM: D6913, Method A

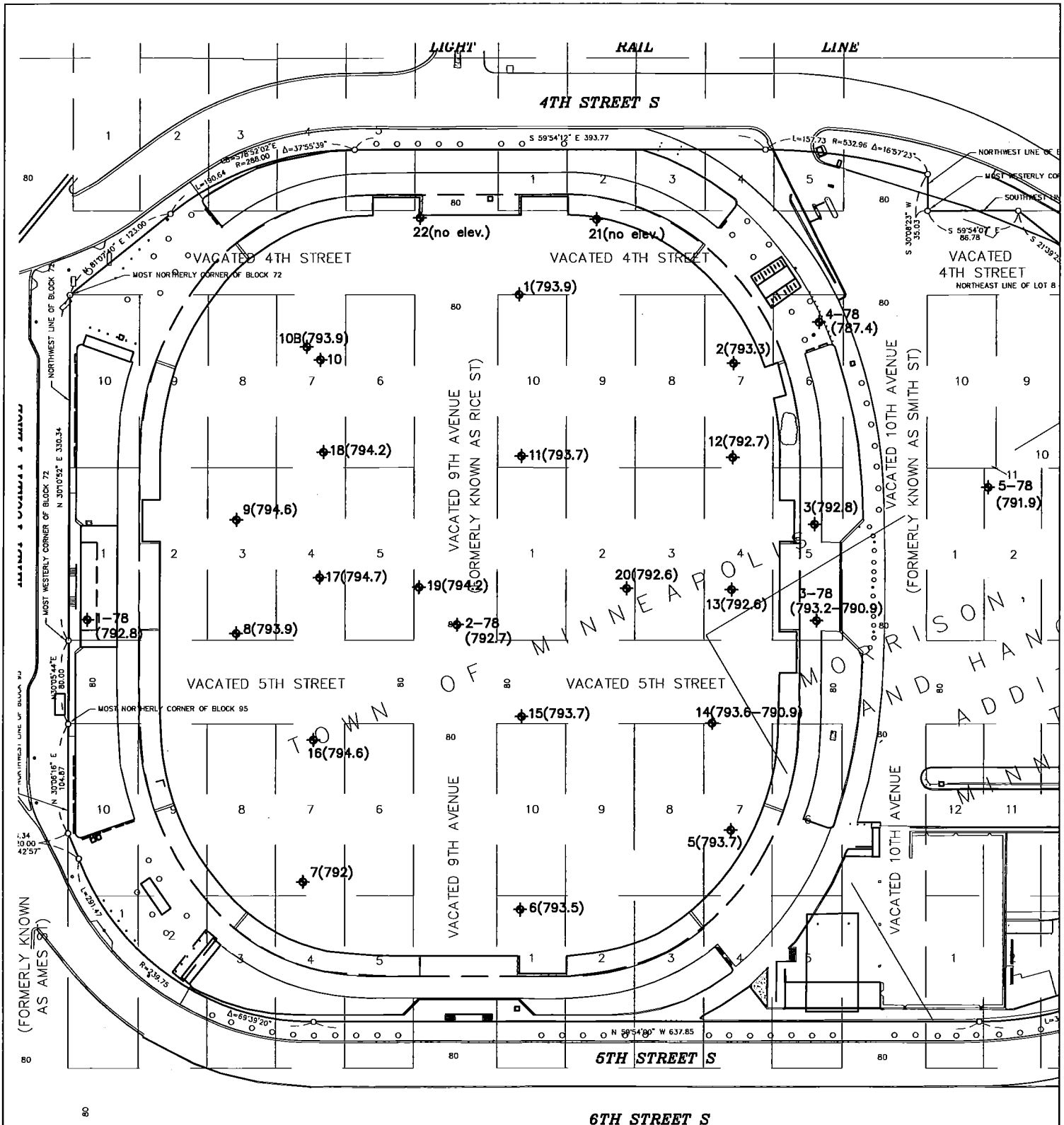
RESULTS:

Boring Number	A2	A3
Sample Depth	37'-38'	49.5'-50.7'
Dry Sample Weight (gms)	224.70	348.18
Sieve Size or Number	**Percent Passing by Weight**	
1½"	100	100
1"	100	90
3/4"	86	78
5/8"	82	73
1/2"	80	67
3/8"	69	60
#4	51	48
#10	34	37
#20	23	25
#40	18	18
#100	12	11
#200	9.4	8.2

Note: The small sample size limits the accuracy of the test, and the sample may not necessarily be representative of the entire layer shown on the boring log.

Appendix B

Figure 2 – Past Boring Locations/Top of Bedrock Elevations
1978 – 1979 Soil Exploration Co. Boring Logs
2008 Braun Intertec Boring Logs and Location Figure



LEGEND

⊕ = SOIL BORING LOCATION

AMERICAN ENGINEERING TESTING, INC.	SCALE 0 FEET 130'	**PROJECT** Minnesota Multi-Purpose Stadium Minneapolis, Minnesota	**AET NO.** 01-05723
		SUBJECT Past Boring Locations / Top of Bedrock Elevations	**DATE** February 2013
		DRAWN BY VL / **CHECKED BY** JV	**FIGURE 2**

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 1

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL — SURFACE ELEVATION 838.0' (127.7')	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	$\frac{-200}{\text{FL}}$	Qu
	SILTY SAND, a little gravel, black, frozen to 1' then moist (SM) (may be fill)	TOPSOIL or MAY BE FILL			1	HSA				
2	SILTY SAND, fine grained, a trace of gravel, dark brown, moist (SM)	COARSE ALLUVIUM			2	HSA				
4	SAND, medium grained, a little gravel, some pieces of weathered limestone, brown, moist, medium dense, a few lenses of (See#1)		10		3	SS				
6½	SILTY SAND, a little gravel, brown, moist, medium dense to dense (SM)	TILL	11		4	SS				
			17		5	SS				
			22		6	SS				
15	SAND, fine grained, light brown, moist, medium dense (SP-SM)	COARSE ALLUVIUM	14		7	SS				
19	SAND, medium to fine grained, some gravel, a few cobbles, brown, moist, very dense (SP-SM)		48		8	SS				
21½	SILTY SAND, a little gravel, a few cobbles and boulders, brown, moist, very dense (SM)	TILL	49/0.5		9	SS				
			100/0.0		-	--				
35	Continued on next page									

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO. 1 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
35	SILTY SAND (Cont.)		65/0.5		10	SS				
35½	SAND, medium grained, some gravel, brown, moist, very dense (SP)	COARSE ALLUVIUM	98		11	SS				
42	No sample recovered. Appears to be SILTY SAND, a little gravel, brown, moist, very dense based on (See#2)	TILL								
44.1±	LIMESTONE, light brownish gray with some lenses of brown to about 55' then gray to about 60½' then light gray and gray mottled, weathered above about 45½'	PLATTEVILLE FORMATION	100%		(74%)	BX				
		Magnolia Member	100%		(52%)	BX				
			100%		(73%)	BX				
		Hidden Falls Member	100%		(58%)	BX				
			100%		(0)	BX				
		Mifflin Member	100%		(55%)	BX				
			100%		(56%)	BX				
70	Continued on next page									

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO 1 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N or R	W	SAMPLE NO	SAMPLE TYPE	LAB TESTS W	D	LL/PL	Qu
70	LIMESTONE (Cont.)	PLATTEVILLE FORMATION (Cont.)								
		Pecatonica Member	100%	(14%)		BX				
74½±	SHALE, gray to about 76½' then greenish gray and brown, shaly sandstone below about 76½'	GLENWOOD FORMATION	100%	(0%)		BX				
78±	SANDSTONE, light brown to white	ST. PETER FORMATION	100/0.4		12	SS				
			100/0.15		-	--				
			100/0.15		-	--				
	#1 - silty sand and sandy clay (SP-SM)		100/0.15		-	--				
	#2 - action of drilling equipment and on evidence of material returned in drilling fluid.									
98.65	End of Boring		100/0.15		-	--				

R - percent core recovery. ()indicates RQD.

*No measurement recorded due to presence of drilling/coring fluid.

START 1-19-79 COMPLETE 1-20-79

METHOD 3¼ HSA 0' - 14½' @ 10:30

DM 14½'-45.6', BWC 0'-45.6',

BX diamond bit-cored 45.6'-77.7',

DM 77.7'-98½'

CREW CHIEF Holan

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
1-19		16'	14½'		to	None
1-20	10:30	98.65'	45.6'		to	*
1-20	11:15	98.65'	None		to	*
					to	

662 CROMWELL AVENUE SOIL EXPLORATION ST PAUL, MN 55114

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 2

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL — SURFACE ELEVATION 836.3' (126.0')	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
	FILL, mixture of SAND and SILTY SAND, a little gravel, concrete and brick, brown, dark brown and black, frozen to 1½'	FILL			1	HSA				
			17		2	SS				
			30		3	SS				
			12		4	SS				
9	SILTY SAND, some gravel, a few cobbles, brown, moist, very dense, a few lenses of clayey sand (SM)	TILL	47		5	SS				
					6	SS				
12½	SILTY SAND, a little gravel, a few cobbles and boulders, brown, moist, very dense, a few lenses of sand above 17' (SM)		45							
			37		7	SS				
			100/0.7		8	SS				
			100/0.6		9	SS	12	127		M.A.
			78		10	SS				
35	Continued on next page									

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO 2 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	SAMPLE NO	SAMPLE TYPE	N or R	WL	LAB TESTS W	LAB TESTS D	LAB TESTS LL/PL	LAB TESTS Qu
35	SILTY SAND (Cont.)		11	SS	54		9	129		M.A.
			12	SS	40					
43±	LIMESTONE, gray to about 44.3' then light brownish gray with a few lenses of brown to about 55' then gray, weathered above about 44'	SEE NOTE 1:		NQ	95%	(59%)				
		Magnolia Member		NQ	92%	(60%)				
				NQ	92%	(61%)				
		SEE NOTE 2:								
55.9	End of Boring									

R - percent core recovery. () indicates RQD.

*No measurement recorded due to presence of drilling/coring fluid.

**Piezometer installed in boring - see attached illustration/data sheet.

NOTE 1: PLATTEVILLE FORMATION Carimona Member

NOTE 2: Hidden Falls Member

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
1-17	4:15	55.9'	43.8'		to	*
1-17	4:45		**		to	
					to	

START 1-10-79 COMPLETE 1-17-79

METHOD 3¼ HSA 0'-7', @ 4:15

4C 0'-9½', DM 8½'-43.9', NWC 0'-43.8',

NQ wireline-cored 43.9'-55.9'

CREW CHIEF LeMay

662 CROMWELL AVENUE SOIL EXPLORATION ST PAUL, MN 55114

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 3

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 836.3' (126.0'))	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	F	Qu
	FILL, mixture of SAND and SILTY SAND, a little gravel and cinders, dark brown, brown and gray, frozen to ½'	FILL			1	HSA				
			21		2	SS				
					3	SS				
5			16		4	SS				
	SAND, medium grained, a little gravel, light brown, moist, dense to medium dense, a few lenses of silt above 7' (SP)	COARSE ALLUVIUM								
			9		5	SS				
9½	SILTY SAND, a little gravel, a few cobbles and boulders, brown to grayish brown, moist, very dense to dense (SM)	TILL	30		6	SS				
			34		7	SS				
			31		8	SS				
			47		9	SS				
			23		10	SS				
30	Continued on next page									

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 3 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	or N R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
30	SILTY SAND (Cont.)		90		11	SS				
			24		12	SS				
			19		-	--				
43½±	LIMESTONE, light brownish gray to about 53' then gray to about 59' then light gray and gray mottled, a 0.1' weathered seam at about 53', weathered above about 45.2'	PLATTEVILLE FORMATION Magnolia Member	50/0.0		-	--				10,240 psi
			94%		(74%)	NQ				
			100%		(0%)	NQ				
			100%		(96%)	NQ				
		Hidden Falls Member	95%		(82%)	NQ				
			96%		(88%)	NQ				
60	Continued on next page									

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO 3 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
60	LIMESTONE (Cont.)	Mifflin Member (Cont.)	100%	(95%)		NQ				
			99%	(95%)		NQ				
			100%	(64%)		NQ				
		Pecatonica Member								
73.8±	SHALE, gray to about 76' then light gray and gray mottled with a little brown, shaly sandstone below about 76'	GLENWOOD FORMATION	100%	(45%)		NQ				
77½±	SANDSTONE, brown to white	ST. PETER FORMATION	46%	(8%)		NQ				
			0%	(0%)		NQ				
			14%	(0%)		NQ				
90	Continued on next page									

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO 3 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	or N R	WL	SAMPLE NO	SAMPLE TYPE	LAB TESTS W	D	LL/PL	Qu
90	SANDSTONE (Cont.)		6%			NQ				
			0%			NQ				
100.8	End of Boring									

R = percent core recovery. () indicates RQD.

*Appears to be drilling/coring fluid.

Note: Samples No. 3 and 8 contain petroleum fuel odor.

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
1-6	10:40	11'	None	10½'	to	None
1-9	9:15	52.9'	47.0'		to	47½'*
1-9	3:30	100.8'	47.0'		to	47½'*
1-10	8:25	100.8'	None	45'	to	41½'*

START 1-6-79 COMPLETE 1-9-79

METHOD 6 FA 0'-9', 4C 0'-9½' @ 3:00

DM 11'-45.2', NC 0'-47.0',

NQ wireline-cored 45.2'-100.8'

CREW CHIEF LeMay & Francis

662 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 5

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 842.2' (131.9'))	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LAB TESTS W	D	L/PL	Qu
	FILL, mostly SILTY SAND, a little gravel, brown, frozen	FILL			1	HSA				
2	SAND, fine grained, brown, frozen to 5½' then moist, loose (SP)	COARSE ALLUVIUM			2	HSA				
					3	SS				
			6		4	SS				
9	SAND, medium to fine grained, light brown, moist, loose, a few lenses of silty sand (SP)		6		5	SS				
12	SAND, fine grained, light brown, moist, medium dense (SP)		9		6	SS				
14	SAND, medium grained, a little gravel, brown, moist, loose to dense (SP)		8		7	SS				
			22		8	SS				
23	SANDY CLAY, a little gravel, gray, stiff (CL)	TILL	18		9	SS				
28	SILTY SAND, a little gravel, a few cobbles and boulders, brownish gray, moist, medium dense (SM)									
30	Continued on next page									

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO. 5 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	Qu
30	SILTY SAND (Cont.)		15		10	SS			
34	SAND, medium grained, some gravel, a few cobbles and boulders, brown, moist, dense (SP-SM)	COARSE ALLUVIUM	25		11	SS			
40	SILTY SAND, a little gravel, a few cobbles and boulders, brown, moist, medium dense to dense (SM)	TILL	9		12	SS			
			100/0.5		-	--			
48½±	LIMESTONE, gray to about 50' then light brownish gray with a few lenses of brown to about 59½' then gray to about 64½' then light gray and gray mottled	PLATTEVILLE FORMATION (See Note:) Magnolia Member	97%		(63%)	BX			
			100%		(93%)	BX			
			96%		(73%)	BX			
60	Continued on next page								

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 5 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL	Qu
60	LIMESTONE (Cont.)	Hidden Falls Member	96%	(73%)		BX				
			100%	(83%)		BX				
		Mifflin Member	100%	(78%)		BX				
			100%	(87%)		BX				
		Pecatonica Member								
79±	SHALE, gray to about 81' then greenish gray and a little brown, shaly sandstone below about 81'	GLENWOOD FORMATION	86%	(44%)		BX				
83±	SANDSTONE, brown and a little gray mottled to white	ST. PETER FORMATION	100/0.4		13	SS				
			100/0.2		14	SS				
90	Continued on next page									

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO 5 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	or N R	W%	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
90	SANDSTONE (Cont.)									
			100/0.15		-	--				
			100/0.2		-	--				
103.7			100/0.2		-	--				
	End of Boring									
	*No measurement recorded due to presence of drilling/coring fluid.	Note: Carimona Member								

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
1-22		16'	14½'		to	None
1-23	11:00	103.7'	48.9'		to	*
1-23	12:00	103.7'	None		to	*
					to	

START 1-22-79 COMPLETE 1-23-79

METHOD 3¼ HSA 0' - 14½' @ 11:00

DM 14½'-48.9', BWC 0'-48.9',

BX diamond bit-cored 48.9'-82.8',

DM 82.8'-103½'

CREW CHIEF Holan

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 6

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 841.8' (131.5'))	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LAB TESTS W	LAB TESTS D	LAB TESTS -200	LAB TESTS Qu
	FILL, mixture of SILTY SAND, SANDY CLAY and CONCRETE, a little gravel, a few boulders, brown and black, frozen to 3'	FILL			1	HSA				
					2	HSA				
9	LEAN CLAY, grayish brown, medium (CL)	FINE ALLUVIUM	14		3	SS	28	91	37/14	
10½	SAND, fine grained, light brown, moist, medium dense (SP)	COARSE ALLUVIUM	13		4	SS				
14	SAND, medium grained, light brown to brown, moist, medium dense (SP)		10		5	SS				
17½	SILTY SAND, medium grained, some gravel, a few cobbles and boulders, brown, moist, dense to very dense, a few lenses of sandy clay and sand (SM)		25		-	--				
			32		6	SS				
28	SILTY SAND, fine to medium grained, a little gravel, a few cobbles, grayish brown, moist, dense (SM)		16		7	SS				
33	SAND, medium grained, a little gravel, a few cobbles, grayish brown, moist, dense, some lenses of gray									
35	Continued on next page									

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO 6 Cont

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LAB TESTS W	D	LL/PL	Qu
35	SAND (Cont.), sandy clay (SP-SM)		24		8	SS				
38	CLAYEY SAND, a little gravel, a few cobbles, gray, rather stiff, lenses of silty sand, a few lenses of sandy clay and sand (SC)	TILL	14		9	SS				
42	SILTY SAND, a little gravel, a few cobbles and boulders, brown, moist, very dense, a few lenses of sand (SM)		107		10	SS				
48.3±	LIMESTONE, gray to about 49½' then light brownish gray, with a few lenses of brown	SEE NOTE: Magnolia Member	92%		(75%)	BX				
			96%		(85%)	BX				
58.8	End of Boring									

R = percent core recovery. () indicates RQD.

*No measurement recorded due to presence of drilling/coring fluid.

NOTE: PLATTEVILLE FORMATION Carimona Member

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
1-12		21'	19½'		to	None
1-12	3:45	58.8'	48.8'		to	*
1-13	9:00	58.8'	None		to	*
					to	

START 1-12-79 COMPLETE 1-12-79

METHOD 3¼ HSA 0' - 19½', @ 3:45

DM 19½'-48.8', BWC 0'-48.8',

BX diamond bit-cored 48.8'-58.8'

CREW CHIEF Holan

662 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

SE-2 (77-B)

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 7

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 847.0' (136.7'))	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	Qu
	FILL, mixture of SILTY SAND (See#1)	FILL			1	FA			
1	CLAYEY SAND, a little gravel, black, frozen (SC) (may be fill)	TOPSOIL or MAY BE FILL			2	FA			
2½	SILTY SAND, fine grained, a trace of gravel, dark brown to brown, (See#2)	COARSE ALLUVIUM			3	FA			
4	CLAYEY SAND, a little gravel, brown, medium, lenses of silty sand (SC-SM)	TILL	8		4	SS			
					5	SS			
7	SILTY SAND, a little gravel, a few cobbles, boulders and slabs of limestone, brown, moist, very dense, a few lenses of sandy clay (SM)		47		6	SS			
			61		-	--			
			50/0.1		7	SS			
13	SILTY SAND, a little gravel, a few cobbles, brown, moist, dense (SM)		43		8	SS			
18	SAND, medium to coarse grained, some gravel, brown, moist, very dense (SP-SM)	COARSE ALLUVIUM	53		9	SS			
24	SAND, fine grained, brown, moist, very dense (SP-SM)		39		10	SS			
28	SAND, medium to fine grained, a little to some gravel, light brown, moist, very dense (SP)								
30	Continued on next page								

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO. 7 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	or N R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL / PL	Qu
30	SAND (Cont.)		56		11	SS				
32	SILTY SAND, some gravel, a few cobbles, brown, moist, very dense (SM)	TILL	100/0.65		12	SS				
			100/0.5		13	SS				
43	SAND, fine grained, brown, moist, very dense (SP)	COARSE ALLUVIUM	100/0.55		14	SS				
48	SAND, medium grained, with gravel, cobbles and a few boulders, brown, moist, very dense (SP-SM)		100/0.45		15	SS				
53½	No sample recovered. Appears to be LIMESTONE SLABS or BOULDERS, (See#3)									
55±	LIMESTONE, light brownish gray to about 63½' then gray to about 68½' then light gray and gray mottled, contains a lense of gray shale at about 64.7' and at about 66½'	PLATTEVILLE FORMATION Magnolia Member	99% (85%)	▼		NQ				12,820 psi
60	Continued on next page									

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 7 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	or N R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	Qu
60	LIMESTONE (Cont.)	PLATTEVILLE FORMATION (Cont.)	100%	(100%)		NQ			
		Hidden Falls Member	100%	(100%)		NQ			
			100%	(100%)		NQ			
			98%	(94%)		NQ			
		Mifflin Member	100%	(81%)		NQ			
			100%	(96%)		NQ			
		Pecatonica Member							
83±	SHALE, gray to about 85½' then greenish gray and some light brown	GLENWOOD FORMATION	96%	(81%)		NQ			
87½±	SANDSTONE, tan to white	ST. PETER FORMATION	14%	(14%)		NQ			
90									

Continued on next page

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO 7 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LAB TESTS W	D	LL/PL	Qu
90	SANDSTONE (Cont.)		100/0.05		16	SS				
			100/0.15		-	--				
			100/0.05		-	--				
			100/0.1		-	--				
110.1			100/0.1		-	--				
	End of Boring									
	#1 - and CRUSHED LIMESTONE, black, tan and dark brown, frozen, a layer of blacktop at the surface									
	#2 - frozen to 3' then moist (SM)									
	#3 - based on action of drilling equipment.									
	R - percent core recovery. () indicates RQD.									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
1-13		9'	None		to	None
1-17	9:05	110.1'	54.4'		to	58'
					to	
					to	

START 1-13-79 COMPLETE 1-16-79

METHOD 6 FA 0'-7', 4C 0'-8', @ 4:25

DM 9'-54.4', NWC 0'-54.4', JW 54.4'-55.8', NQ wireline-cored 55.8'-91.0', DM 91'-110'

CREW CHIEF LeMay

662 CROMWELL AVENUE SOIL EXPLORATION ST PAUL, MN 55114

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO. 8

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 841.4' (131.1'))	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL	Qu
2	FILL, mixture of SILTY SAND, SAND and SILTY CLAY, a little gravel, brown, frozen to 1'	FILL			1	HSA				
5	SANDY GRAVEL, a few cobbles and boulders, brown, moist, very dense (GP-GM)	COARSE ALLUVIUM			2	HSA				
	SAND, medium grained, some gravel, cobbles and boulders, brown, moist, very dense (SP)		31		-	--				
			46		3	SS				
11			40/0.5		4	SS				
	SILTY SAND, a little gravel, a few cobbles and boulders, brown, moist, very dense (SM)	TILL	50		5	SS				
					6	SS				
			60/0.5		7	SS				
			84		8	SS				
28										
30	SAND, fine to medium grained, a little gravel, brown, moist, very dense (SP-SM)	COARSE ALLUVIUM								

Continued on next page

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO 8 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	or N R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
30	SAND (Cont.)		114		9	SS				
34	SAND, coarse grained, with gravel and cobbles, brown, moist, very dense (SP-SM)		100/0.5 = 100%		10	SS				
39½	SILTY SAND, a little gravel, brown, moist, very dense, some lenses of sand (SM)		64/0.5		11	SS				
			100/0.0		-	--				
47.5±	LIMESTONE, gray to about 48' then light brownish gray	SEE NOTE: Magnolia Member	96%	(58%)		BX				
			100%	(54%)		BX				
57.5	End of Boring									

R - percent core recovery. () indicates RQD.
*No measurement recorded due to presence of drilling/coring fluid.

NOTE: PLATTEVILLE FORMATION Carimona Member

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
1-18		16'	14½'		to	None
1-18	3:40	57.5'	47.5'		to	*
1-18	4:05	57.5'	None		to	*
					to	

START 1-18-79 COMPLETE 1-18-79

METHOD 3¼ HSA 0' - 14½' @ 3:40

DM 14½'-47½', BWC 0'-47.5', BX diamond bit-cored 38.8'-39.1' and 47.5'-57.5'

CREW CHIEF Holan

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 9

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 840.1' (129.8'))	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LAB W	LAB D	LAB -200	LAB Qu
	FILL, mostly SILTY SAND, a little gravel, a trace of glass, (See#1)	FILL			1	HSA				
1½	SILTY SAND, a little gravel, a few cobbles, brown, moist, very dense, a few lenses of sand (SM)	TILL	30/0.5		2	SS				
			45		3	SS				
7	SILTY SAND, fine grained, a little gravel, brown, moist, dense (SM-SP)	COARSE ALLUVIUM	21		4	SS				
9	SANDY CLAY, a little gravel, (See#2)	TILL			5	SS				
10	SILTY SAND, a little gravel, (See#3)		22		6	SS				
10½	SAND, fine grained, a trace (See#4)	SEE NOTE:			7	SS				
11½	SILTY SAND, a little gravel, brown, moist, very dense (SM)	TILL	33		8	SS				
14	SANDY CLAY, some gravel, a few cobbles, brown, very stiff (CL-SC)		53		9	SS	10	129	22/12	
17	SAND, fine to medium grained, a little gravel, some layers of gravel, a few cobbles, brown, moist, very dense, a few lenses of silty sand (SP-SM)	COARSE ALLUVIUM	100/0.8		10	SS				
20½					11	SS				
	SILTY SAND, some gravel, a few cobbles, brown, moist, very dense (SM)	TILL	100/0.9		12	SS	7	134		M.A.
30	Continued on next page									

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 9 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	or ^{N}R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D		Qu
30	SILTY SAND (Cont.)		100/0.7		13	SS				
			100/0.2		14	SS				
38	SAND, medium grained, some gravel, a few cobbles, brown, moist, very dense (SP-SM)	COARSE ALLUVIUM	100/0.4		15	SS				M.A.
43½	SILTY SAND, some gravel, a few cobbles, grayish brown, moist, very dense (SM)	TILL	112/0.5		16	SS				
45½±	LIMESTONE, light brownish gray to about 56' then gray to about 61.3' then light gray and gray mottled, weathered above about 47.2'	PLATTEVILLE FORMATION Magnolia Member	97%	(64%)		NQ				10,420 psi
			96%	(85%)		NQ				
		Hidden Falls Member	100%	(76%)		NQ				
60	Continued on next page									

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 9 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	or N R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D		Qu
60	LIMESTONE (Cont.)	Mifflin Member	100%	(81%)		NQ				
			100%	(87%)		NQ				
			100%	(89%)		NQ				
		Pecatonica Member								
76±	SHALE, gray to about 77.7' then gray and greenish gray, shaly sandstone below about 77.7'	GLENWOOD FORMATION	91%	(75%)		NQ				
			56%	(0%)		NQ				
80½±	SANDSTONE, light gray to white and tan	ST. PETER FORMATION	16%	(0%)		NQ				
			0%	(0%)		NQ				
90	Continued on next page									

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO 9 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
90	SANDSTONE (Cont.)		0%	(0%)		NQ				
			18%	(0%)		NQ				
100.5	End of Boring									
	#1 - black and dark brown, frozen	NOTE: COARSE ALLUVIUM								
	#2 - brown mottled, medium (CL)									
	#3 - brown, moist, dense, a few lenses of sand (SM)									
	#4 - of gravel, light brown, moist, dense (SP-SM)									
	R = percent core recovery. () *indicates RQD. *Influenced by drilling fluid.									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
1-4	1:45	46.5'	46.3'		to	46'*
1-5	4:15	100.5'	47.0'		to	50'*
1-8	8:50	100.5'	None	99½'	to	51½'
1-12	11:15	100.5'	None		to	52'
1-19	12:00	100.5'	None		to	52'
					to	
					to	
					to	

START 1-3-79 COMPLETE 1-5-79

METHOD 3¼ HSA 0' - 12', @ 4:00

4C 0'-10½', DM 13½'-46.2',

NC 0'-47.0', JW 46.2'-47.2',

NQ wireline-cored 47.2'-100.5'

CREW CHIEF LeMay

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 10

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL — SURFACE ELEVATION 839.9'(129.6')	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL	Qu
	FILL, mixture of SAND and SILTY SAND, a little gravel and limestone, brown and dark grayish brown, frozen to 2'	FILL	25/0.3		1	HSA				
					2	SS				
			5		3	SS				
			4		4	SS				
			26		5	SS				
12	FILL, mostly ASHES, gray and black		1/4½'		6	SS				
18	FILL, mixture of CLAYEY SAND and SILTY SAND, a trace of gravel, wood and concrete, dark brown and brown		39		7	SS				
22	SANDY CLAY, a little gravel, brown, rather stiff (CL)	TILL	31*		8	SS				
29½	SAND, medium grained, a little gravel,									
30	Continued on next page									

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO 10 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LAB TESTS W	D	LL/PL	Qu
30	SAND (Cont.), light brown, moist, dense to very dense (SP)	COARSE ALLUVIUM	17		9	SS				
			36		10	SS				
37½	SILTY SAND, a little gravel, a few cobbles and boulders, grayish brown, wet, medium dense (SM)	TILL	13		11	SS				
43½	Poor sample recovery. Appears to be mostly GRAVEL and COBBLES		33%			BX				
45.5	End of Boring (See Note)									

R = percent core recovery

*High blow count appears to be due to encounter of pieces of coarse gravel.

**No measurement recorded due to presence of drilling fluid.

Note: Boring terminated upon unsuccessful attempt in advancing of BW casing through HSA casing due to deflection of HSA casing by boulders. Then moved 3' west for several attempts and advanced boring by spinning down BW casing with drilling mud. This attempt was obstructed and therefore terminated at depth of 43.6' upon encountering boulders below depth of 41½'

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
1-10		44'	44'		to	None
1-10	11:50	45.5'	44'		to	**
1-10	4:00	45.5'	None		to	**
					to	

START 1-10-79 COMPLETE 1-11-79

METHOD 3¼ HSA 0' - 44' @ 4:40

BX diamond bit-cored 44.0'-45.5'

BWC 0'-43.6'

CREW CHIEF Hagedorn

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO 10-A

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
	SURFACE ELEVATION 839.9' (129.6')									
	No samples taken.									
34½	SILTY SAND, some gravel and cobbles, a few boulders, brownish gray, moist, dense (SM)	TILL	50/0.3		1	SS				
39	End of Boring (See Note)									

Note: Boring terminated upon unsuccessful attempt in retrieval of drilling equipment broken off by cobbles and boulders. Then moved to boring No. 10-B.

Lost drilling equipment consisted of 3 7/8" tricone bit, adaptor, 2' section of "NW" drill rod and "NW casing.

*No measurement recorded due to presence of drilling fluid.

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					10	
1-19	9:30	39'	9½'		10	*
1-19	10:00	39'	None		10	*
					10	

START 1-18-79 COMPLETE 1-19-79

METHOD 6 FA 0' - 9½' @ 9:30

4C 0' - 9½'

DM 9½' - 39'

CREW CHIEF LeMay

642 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO 10-B

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION 839.9' (129.6'))	GEOLOGIC ORIGIN	N or R	WL	SAMPLE NO	SAMPLE TYPE	LAB TESTS W	D	LL/PL	Qu
	No samples taken. Appears to be numerous cobbles, boulders and gravel below 30' and some cobbles and boulders above 30' based on action of drilling equipment									
40½	SAND, fine grained, a trace of gravel, brown, moist, very dense (SP)	COARSE ALLUVIUM	100/0.45		1	SS				
42½	No sample recovered. Appears to be BOULDERS, COBBLES, GRAVEL and (See#1)	MAY BE SEE NOTE:								
44	SANDY CLAY, a little gravel, some cobbles, gray, very stiff (CL)	TILL	100/0.5		2	SS				
46.0±	LIMESTONE, light brownish gray with a few lenses of brown to about 56' then gray, a thin lense of shale at about 52.4'	PLATTEVILLE FORMATION Magnolia Member	98%	(79%)		NQ				
			100%	(96%)		NQ				
			93%	(59%)		NQ				
		Hidden Falls Member	85%	(30%)		NQ				
58.0	End of Boring									
	#1 - SAND based on action of drilling equipment.	NOTE: COARSE ALLUVIUM								
	R - percent core recovery. () indicates RQD.									
	*Piezometer installed in boring - see attached illustration/data sheet.									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
1-22	11:15	58'	46'		to	52½'
1-22	12:45		*		to	
					to	

START 1-19-79 COMPLETE 1-22-79

METHOD 6 FA 0'-9½', 4C 0'-9½' @ 11:00

DM 9½'-46.5', NWC 0'-46.0'

NQ wireline-cored 46.5'-58.0'

CREW CHIEF LeMay

662 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

SE 2 (77-B) 4

LOG OF TEST BORING

JOB NO. 120-4131 VERTICAL SCALE 1" = 4' BORING NO 11

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL — SURFACE ELEVATION 837.7' (127.4')	GEOLOGIC ORIGIN	or^N R	WL	SAMPLE NO	SAMPLE TYPE	LAB TESTS W	D	-200	Qu
1½	FILL, mixture of SILTY SAND, CONCRETE and BOULDERS, brown, frozen	FILL			1	HSA	-			
	SILTY SAND, a little gravel, brown, moist, dense (SM)	TILL	25		2	SS				
7	SILTY SAND, medium to fine grained, some gravel, brown, moist, dense to very dense (SM-SP)		22		3	SS				
			52		4	SS				
12	SILTY SAND, a little gravel, brown, moist, dense (SM)		25		5	SS				
15	SAND, fine to medium grained, a little gravel, a few cobbles, brown, moist, very dense (SP-SM)	COARSE ALLUVIUM	51		6	SS				
19	SILTY SAND, some gravel, a few cobbles and boulders, brown, moist, very dense (SM)	TILL	125		7	SS				
			100/0.0		-	--				
			100/0.9		8	SS				
30	Continued on next page									

LOG OF TEST BORING

JOB NO 120-4131 VERTICAL SCALE 1" = 4' BORING NO. 11 Cont.

PROJECT PROPOSED SPORTS STADIUM - MINNEAPOLIS, MN

DEPTH IN FEET	DESCRIPTION OF MATERIAL	GEOLOGIC ORIGIN	SAMPLE NO	SAMPLE TYPE	N or R	WL	LABORATORY TESTS W	D	LL/PL	Qu
30	SILTY SAND (Cont.)				100/0.0					
			-	--						
					100/0.4					
			-	--						
44.0±	LIMESTONE, light brownish gray to about 53' then gray, weathered above about 45.2'	PLATTEVILLE FORMATION Magnolia Member			100%					
					(93½%)					
				BX						
					100%					
		Hidden Falls Member			(66%)					
				BX						
55.2	End of Boring									

R = percent core recovery. () indicates RQD.
*No measurement recorded due to presence of drilling/coring fluid.

START 1-4-79 COMPLETE 1-5-79

METHOD 3¼ HSA 0' - 18' @ 1:00

DM 14½' - 45.2', BWC 0' - 45.2'

BX diamond bit-cored 45.2'-55.2'

CREW CHIEF Holan

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
1-4		16'	14½'		10	None
1-5	1:00	55.2'	45.2'		10	*
1-5	1:30	55.2'	None		10	*
					10	

662 CROMWELL AVENUE SOIL EXPLORATION COMPANY ST PAUL, MN 55114

SE-2 (77-B)-4

The Peoples Stadium
900 South 5th Street
Minneapolis, MN 55415

Inquiry Number: 03540142.1r
March 11, 2013

The EDR Radius Map™ Report with GeoCheck®

EDR® Environmental Data Resources Inc

440 Wheelers Farms Road
Milford, CT 06461
Toll Free: 800.352.0050
www.edrnet.com

TABLE OF CONTENTS

Thank you for your business.
Please contact EDR at 1-800-352-0050
with any questions or comments.

EXECUTIVE SUMMARY

A search of available environmental records was conducted by Environmental Data Resources, Inc (EDR). The report was designed to assist parties seeking to meet the search requirements of EPA's Standards and Practices for All Appropriate Inquiries (40 CFR Part 312), the ASTM Standard Practice for Environmental Site Assessments (E 1527-05) or custom requirements developed for the evaluation of environmental risk associated with a parcel of real estate.

TARGET PROPERTY INFORMATION

ADDRESS

900 SOUTH 5TH STREET
MINNEAPOLIS, MN 55415

COORDINATES

Latitude (North):	44.9728000 - 44° 58' 22.08''
Longitude (West):	93.2591000 - 93° 15' 32.76''
Universal Tranverse Mercator:	Zone 15
UTM X (Meters):	479568.7
UTM Y (Meters):	4979744.5
Elevation:	840 ft. above sea level

USGS TOPOGRAPHIC MAP ASSOCIATED WITH TARGET PROPERTY

Target Property Map:	44093-H3 MINNEAPOLIS SOUTH, MN
Most Recent Revision:	1993
East Map:	44093-H2 SAINT PAUL WEST, MN
Most Recent Revision:	1993

AERIAL PHOTOGRAPHY IN THIS REPORT

Photo Year:	2010
Source:	USDA

TARGET PROPERTY SEARCH RESULTS

The target property was identified in the following records. For more information on this property see page 7 of the attached EDR Radius Map report:

Site	Database(s)	EPA ID
XCEL - PAD MOUNT TRANSFORMER 900 SOUTH 5TH STREET MINNEAPOLIS, MN	SPILLS Spill Closure: Response Completed Financial Assurance	N/A
HHH METRODOME 900 S 5TH ST MINNEAPOLIS, MN 55415	RCRA-SQG FINDS	MND982642522
H H H METRODOME 900 S 5TH ST MINNEAPOLIS, MN 55415	UST WIMN Financial Assurance	N/A

EXECUTIVE SUMMARY

FUJI PHOTO FILM USA INC - HHH MET
900 S 5TH ST
MINNEAPOLIS, MN 55415

RCRA NonGen / NLR

MNR000103614

DATABASES WITH NO MAPPED SITES

No mapped sites were found in EDR's search of available ("reasonably ascertainable ") government records either on the target property or within the search radius around the target property for the following databases:

STANDARD ENVIRONMENTAL RECORDS

Federal NPL site list

NPL ---------- National Priority List
Proposed NPL ---------- Proposed National Priority List Sites
NPL LIENS ---------- Federal Superfund Liens

Federal Delisted NPL site list

Delisted NPL ---------- National Priority List Deletions

Federal CERCLIS list

CERCLIS ---------- Comprehensive Environmental Response, Compensation, and Liability Information System
FEDERAL FACILITY ---------- Federal Facility Site Information listing

Federal RCRA CORRACTS facilities list

CORRACTS ---------- Corrective Action Report

Federal RCRA non-CORRACTS TSD facilities list

RCRA-TSDF ---------- RCRA - Treatment, Storage and Disposal

Federal institutional controls / engineering controls registries

US ENG CONTROLS ---------- Engineering Controls Sites List
US INST CONTROL ---------- Sites with Institutional Controls
LUCIS ---------- Land Use Control Information System

State- and tribal - equivalent NPL

MN PLP ---------- Permanent List of Priorities

State- and tribal - equivalent CERCLIS

SHWS ---------- Superfund Site Information Listing

State and tribal landfill and/or solid waste disposal site lists

SWF/LF ---------- Permitted Solid Waste Disposal Facilities

LCP Closed Landfills Priority List
UNPERM LF Unpermitted Facilities

State and tribal leaking storage tank lists

INDIAN LUST Leaking Underground Storage Tanks on Indian Land

State and tribal registered storage tank lists

INDIAN UST Underground Storage Tanks on Indian Land
FEMA UST Underground Storage Tank Listing

State and tribal institutional control / engineering control registries

INST CONTROL Site Remediation Section Database

State and tribal voluntary cleanup sites

INDIAN VCP Voluntary Cleanup Priority Listing

State and tribal Brownfields sites

BROWNFIELDS Petroleum Brownfields Program Sites

ADDITIONAL ENVIRONMENTAL RECORDS

Local Brownfield lists

US BROWNFIELDS A Listing of Brownfields Sites

Local Lists of Landfill / Solid Waste Disposal Sites

DEBRIS REGION 9 Torres Martinez Reservation Illegal Dump Site Locations
ODI Open Dump Inventory
SWRCY Recycling Facilities
INDIAN ODI Report on the Status of Open Dumps on Indian Lands

Local Lists of Hazardous waste / Contaminated Sites

US CDL Clandestine Drug Labs
MN DEL PLP Delisted Permanent List of Priorities
CDL Clandestine Drug Labs
US HIST CDL National Clandestine Laboratory Register

Local Land Records

LIENS 2 CERCLA Lien Information
LIENS Environmental Liens

Records of Emergency Release Reports

HMIRS Hazardous Materials Information Reporting System
AGSPILLS Department of Agriculture Spills

Other Ascertainable Records

DOT OPS Incident and Accident Data

DOD	Department of Defense Sites
FUDS	Formerly Used Defense Sites
CONSENT	Superfund (CERCLA) Consent Decrees
ROD	Records Of Decision
UMTRA	Uranium Mill Tailings Sites
US MINES	Mines Master Index File
TRIS	Toxic Chemical Release Inventory System
SSTS	Section 7 Tracking Systems
RADINFO	Radiation Information Database
RAATS	RCRA Administrative Action Tracking System
RMP	Risk Management Plans
BULK	Bulk Facilities Database
DRYCLEANERS	Registered Drycleaning Facilities
MN HWS Permit	Active TSD Facilities
INDIAN RESERV	Indian Reservations
SCRD DRYCLEANERS	State Coalition for Remediation of Drycleaners Listing
PRP	Potentially Responsible Parties
MDA LIS	Licensing Information System Database Listing
2020 COR ACTION	2020 Corrective Action Program List
EPA WATCH LIST	EPA WATCH LIST
US FIN ASSUR	Financial Assurance Information
PCB TRANSFORMER	PCB Transformer Registration Database
COAL ASH	Coal Ash Disposal Site Listing
COAL ASH DOE	Steam-Electric Plant Operation Data
COAL ASH EPA	Coal Combustion Residues Surface Impoundments List
AGVIC	Agricultural Voluntary Investigation & Cleanup Listing

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR MGP	EDR Proprietary Manufactured Gas Plants

SURROUNDING SITES: SEARCH RESULTS

Surrounding sites were identified in the following databases.

Elevations have been determined from the USGS Digital Elevation Model and should be evaluated on a relative (not an absolute) basis. Relative elevation information between sites of close proximity should be field verified. Sites with an elevation equal to or higher than the target property have been differentiated below from sites with an elevation lower than the target property.
Page numbers and map identification numbers refer to the EDR Radius Map report where detailed data on individual sites can be reviewed.

Sites listed in ***bold italics*** are in multiple databases.

Unmappable (orphan) sites are not considered in the foregoing analysis.

STANDARD ENVIRONMENTAL RECORDS

Federal CERCLIS NFRAP site List

CERC-NFRAP: Archived sites are sites that have been removed and archived from the inventory of CERCLIS

sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and that EPA has determined no further steps will be taken to list this site on the National Priorities List (NPL), unless information indicates this decision was not appropriate or other considerations require a recommendation for listing at a later time. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based upon available information, the location is not judged to be a potential NPL site.

A review of the CERC-NFRAP list, as provided by EDR, and dated 11/02/2012 has revealed that there is 1 CERC-NFRAP site within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
MINNEAPOLIS STAR & TRIBUNE PRI	***PLYMOUTH AVE & 1ST ST N***	***NNW 0 - 1/8 (0.079 mi.)***	***U226***	***612***

Federal RCRA generators list

RCRA-LQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Large quantity generators (LQGs) generate over 1,000 kilograms (kg) of hazardous waste, or over 1 kg of acutely hazardous waste per month.

A review of the RCRA-LQG list, as provided by EDR, and dated 02/12/2013 has revealed that there are 3 RCRA-LQG sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HENNEPIN COUNTY MEDICAL CENTER	***701 PARK AVENUE***	***W 0 - 1/8 (0.113 mi.)***	***AG293***	***767***

Lower Elevation	Address	Direction / Distance	Map ID	Page
VALSPAR APPLIED SCIENCE & TECH	1101 S 3RD ST	ENE 0 - 1/8 (0.066 mi.)	S195	517
VALSPAR CORPORATION (THE)	***312 S 11TH AVE***	***ENE 0 - 1/8 (0.066 mi.)***	***S196***	***518***

RCRA-SQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Small quantity generators (SQGs) generate between 100 kg and 1,000 kg of hazardous waste per month.

A review of the RCRA-SQG list, as provided by EDR, and dated 02/12/2013 has revealed that there are 4 RCRA-SQG sites within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
SAMUEL BINGHAM CO	***900 S. 3RD ST.***	***NNE 0 - 1/8 (0.005 mi.)***	***B147***	***375***
VALSPAR CORP INDUSTRIAL LAB	***1014 S 3RD ST***	***NE 0 - 1/8 (0.029 mi.)***	***N158***	***394***
MCWHORTER TECHNOLOGIES	1028 S 3RD ST	NE 0 - 1/8 (0.034 mi.)	O162	401
VALSPAR ECOAT LAB	***1028 S 3RD ST***	***NE 0 - 1/8 (0.034 mi.)***	***O164***	***407***

EXECUTIVE SUMMARY

RCRA-CESQG: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Conditionally exempt small quantity generators (CESQGs) generate less than 100 kg of hazardous waste, or less than 1 kg of acutely hazardous waste per month.

A review of the RCRA-CESQG list, as provided by EDR, and dated 02/12/2013 has revealed that there are 14 RCRA-CESQG sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HENNEPIN COUNTY CRIME LAB UNIT	***531 PARK AVE S***	***0 - 1/8 (0.000 mi.)***	***F93***	***122***
HENNEPIN COUNTY JUVENILE DETEN	***626 S 6TH ST RM C20***	***WNW 0 - 1/8 (0.067 mi.)***	***V200***	***545***
RED DOOR CLINIC HENNEPIN CO CO	***525 PORTLAND AVE STE LL***	***NW 0 - 1/8 (0.078 mi.)***	***X213***	***566***
HENNEPIN COUNTY HEALTH SERVICE	***525 PORTLAND AVE STE MC***	***NW 0 - 1/8 (0.078 mi.)***	***X214***	***568***
MASTERWORKS OF MINNEAPOLIS INC	***1121 7TH ST S***	***SE 0 - 1/8 (0.094 mi.)***	***AE254***	***665***
DOUGLAS CORP - MPLS	***620 12TH AVE S***	***SE 0 - 1/8 (0.098 mi.)***	***AE269***	***688***
HENNEPIN COUNTY PUB SERV MINNE	***7TH AND PARK AVE S***	***W 0 - 1/8 (0.110 mi.)***	***AG285***	***737***

Lower Elevation	Address	Direction / Distance	Map ID	Page
STAR TRIBUNE	***716 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C41***	***48***
GRAINGER INDUSTRIAL SUPPLY - M	***724 3RD ST S***	***N 0 - 1/8 (0.002 mi.)***	***D110***	***145***
JOHNSTECH INTERNATIONAL - MPLS	***511 11TH AVE S***	***ESE 0 - 1/8 (0.004 mi.)***	***I127***	***205***
HENNEPIN COUNTY ENERGY CENTER	***600 10TH AVE S***	***SE 0 - 1/8 (0.004 mi.)***	***K141***	***309***
MINNEAPOLIS STAR & TRIBUNE PRI	***PLYMOUTH AVE & 1ST ST N***	***NNW 0 - 1/8 (0.079 mi.)***	***U226***	***612***
PERISCOPE INC	***921 WASHINGTON AVE S***	***NE 0 - 1/8 (0.080 mi.)***	***AA232***	***621***
GUTHRIE SCENE SHOP	212 9TH AVE S	NNE 0 - 1/8 (0.098 mi.)	AA267	686

Federal ERNS list

ERNS: The Emergency Response Notification System records and stores information on reported releases of oil and hazardous substances. The source of this database is the U.S. EPA.

A review of the ERNS list, as provided by EDR, and dated 12/31/2012 has revealed that there are 6 ERNS sites within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
Not reported	400 PARK AVE	NNW 0 - 1/8 (0.002 mi.)	C100	136
Not reported		NNE 0 - 1/8 (0.046 mi.)	L169	429
Not reported	1112 SOUTH 3RD STREET	ENE 0 - 1/8 (0.072 mi.)	S204	551
Not reported	425 PORTLAND AVE	NNW 0 - 1/8 (0.079 mi.)	U222	583
Not reported	425 PORTLAND AVE	NNW 0 - 1/8 (0.079 mi.)	U223	583
Not reported	1202 S 5TH STREET	ESE 0 - 1/8 (0.094 mi.)	R252	660

State and tribal leaking storage tank lists

LUST: The Leaking Underground Storage Tank Incident Reports contain an inventory of reported leaking underground storage tank incidents. The data come from the Minnesota Pollution Control Agency's Leak Sites list.

A review of the LUST list, as provided by EDR, and dated 11/01/2012 has revealed that there are 10

LUST sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MCDA SITE	***4TH ST & KIRBY PUCKETT***	***0 - 1/8 (0.000 mi.)***	***C80***	***97***
Complete Site Closed Date: 11/24/2004 00:00:00				
JUVENILE JUSTICE CENTER	***626 S 6TH ST***	***WNW 0 - 1/8 (0.067 mi.)***	***V199***	***535***
Complete Site Closed Date: 07/29/1999 00:00:00				
DEPENDABLE GARAGE	***619 PORTLAND***	***WNW 0 - 1/8 (0.094 mi.)***	***V253***	***661***
Complete Site Closed Date: 03/17/1999 00:00:00				

Lower Elevation	Address	Direction / Distance	Map ID	Page
STAR TRIBUNE PARKING LOT	***701 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C66***	***87***
Complete Site Closed Date: 10/15/2007 00:00:00				
AT&T MINNEAPOLIS MN0305	***511 11TH AVE S***	***ESE 0 - 1/8 (0.004 mi.)***	***I135***	***247***
Complete Site Closed Date: 08/18/1995 00:00:00				
HENNEPIN COUNTY ENERGY CENTER	***600 10TH AVE S***	***SE 0 - 1/8 (0.004 mi.)***	***K142***	***319***
Complete Site Closed Date: 10/18/1994 00:00:00				
Complete Site Closed Date: 03/31/1992 00:00:00				
VALSPAR RESEARCH LAB	***312 11TH AVE S***	***ENE 0 - 1/8 (0.059 mi.)***	***S179***	***476***
Complete Site Closed Date: 05/05/2010 00:00:00				
STAR TRIBUNE	***425 PORTLAND AVE S***	***NNW 0 - 1/8 (0.079 mi.)***	***U225***	***584***
Complete Site Closed Date: 05/10/1990 00:00:00				
Complete Site Closed Date: 12/19/1995 00:00:00				
KRELITZ BUILDING	***251 PORTLAND AVE S***	***N 0 - 1/8 (0.087 mi.)***	***T245***	***630***
Complete Site Closed Date: 07/23/2001 00:00:00				
UNIVERSITY BANK BUILDING	***720 WASHINGTON AVE***	***N 0 - 1/8 (0.095 mi.)***	***Q257***	***669***
Complete Site Closed Date: 12/09/1997 00:00:00				

LAST: A listing of leaking aboveground storage tanks.

A review of the LAST list, as provided by EDR, and dated 11/01/2012 has revealed that there is 1 LAST site within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
VALSPAR	***1028 S 3RD ST***	***NE 0 - 1/8 (0.034 mi.)***	***O163***	***403***
Complete Site Closed Date: 02/18/2010 00:00:00				

State and tribal registered storage tank lists

UST: The Underground Storage Tank database contains registered USTs. USTs are regulated under Subtitle I of the Resource Conservation and Recovery Act (RCRA). The data come from the Minnesota Pollution Control's Underground Storage Tank File.

A review of the UST list, as provided by EDR, and dated 11/01/2012 has revealed that there are 21 UST sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
MCGILL BUILDING	***501 PARK AVE***	***0 - 1/8 (0.000 mi.)***	***F85***	***105***

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
EXECUTIVE PARKING LOT - BLOCK	***NW CORNER OF 5TH ST & P***	***0 - 1/8 (0.001 mi.)***	***F96***	***129***
FORSENIC SCIENCE BUILDING	***530 CHICAGO AVE S***	***NW 0 - 1/8 (0.009 mi.)***	***G153***	***383***
HENNEPIN COUNTY MEDICAL CENTER	***626 PARK AVE***	***WNW 0 - 1/8 (0.058 mi.)***	***P178***	***467***
JUVENILE JUSTICE CENTER	***626 S 6TH ST***	***WNW 0 - 1/8 (0.067 mi.)***	***V199***	***535***
ST. BARNABAS	***906 7TH ST S***	***SSW 0 - 1/8 (0.079 mi.)***	***221***	***580***
HOPE COMMUNITY CHURCH	***704 11TH AVE S***	***SSE 0 - 1/8 (0.109 mi.)***	***AC283***	***728***
HENNEPIN COUNTY MEDICAL CENTER	***701 PARK AVE S***	***W 0 - 1/8 (0.113 mi.)***	***AG292***	***752***

Lower Elevation	Address	Direction / Distance	Map ID	Page
FLEET SERVICE GARAGE - BLOCK 7	***716 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C34***	***33***
STAR TRIBUNE	***716 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C41***	***48***
EAGLE STANDARD	***728 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C45***	***59***
TWIN CITY GEAR	***823 25 17TH AVE S***	***0 - 1/8 (0.000 mi.)***	***B51***	***74***
THRESHER SQUARE	***708 S 3RD ST***	***N 0 - 1/8 (0.002 mi.)***	***D113***	***148***
AT&T MINNEAPOLIS MN0305	***511 11TH AVE S***	***ESE 0 - 1/8 (0.004 mi.)***	***I135***	***247***
NRG/HENNEPIN COUNTY ENERGY CEN	***600 10TH AVE S***	***SE 0 - 1/8 (0.004 mi.)***	***K139***	***286***
VALSPAR CORPORATION (THE)	***312 S 11TH AVE***	***ENE 0 - 1/8 (0.066 mi.)***	***S196***	***518***
STAR TRIBUNE	***425 PORTLAND AVE S***	***NNW 0 - 1/8 (0.079 mi.)***	***U225***	***584***
KRELITZ BUILDING	***251 PORTLAND AVE S***	***N 0 - 1/8 (0.087 mi.)***	***T245***	***630***
UNIVERSITY BANK BUILDING	***720 WASHINGTON AVE***	***N 0 - 1/8 (0.095 mi.)***	***Q257***	***669***
GUTHRIE RIVERFRONT PARKING RAM	212 9TH AVE S	NNE 0 - 1/8 (0.098 mi.)	AA264	681
BLEK OIL	***1000 WASHINGTON AVE S***	***NE 0 - 1/8 (0.106 mi.)***	***W277***	***709***

AST: The Aboveground Storage Tank database contains registered ASTs. The data come from the Minnesota Pollution Control's Aboveground Storage Tank File.

A review of the AST list, as provided by EDR, and dated 11/01/2012 has revealed that there are 7 AST sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FORMER WAREHOUSE	406 CHICAGO	0 - 1/8 (0.000 mi.)	E39	46
METRODOME SQUARE BUILDING	1010 S 7TH ST	SSE 0 - 1/8 (0.079 mi.)	Z217	572

Lower Elevation	Address	Direction / Distance	Map ID	Page
LEVEL 3 MINNEAPOLIS	***511 11TH AVE S STE 210***	***ESE 0 - 1/8 (0.004 mi.)***	***I134***	***243***
AT&T MINNEAPOLIS MN0305	***511 11TH AVE S***	***ESE 0 - 1/8 (0.004 mi.)***	***I135***	***247***
NRG/HENNEPIN COUNTY ENERGY CEN	***600 10TH AVE S***	***SE 0 - 1/8 (0.004 mi.)***	***K139***	***286***
AMERICAN TRIO BUILDING	616 S 3RD ST	NNW 0 - 1/8 (0.065 mi.)	T184	494
STAR TRIBUNE	***425 PORTLAND AVE S***	***NNW 0 - 1/8 (0.079 mi.)***	***U225***	***584***

State and tribal voluntary cleanup sites

VIC: This is the Minnesota Pollution Control Agency's Voluntary Investigation and Cleanup Program list.

A review of the VIC list, as provided by EDR, and dated 01/11/2012 has revealed that there are 6 VIC sites within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
NORM MCGREW PLACE	*316 NORM MCGREW PLACE*	*0 - 1/8 (0.000 mi.)*	*B86*	*109*
MINNESOTA BUSINESS & TECH CENT	*511 ELEVENTH AVENUE S.*	*ESE 0 - 1/8 (0.004 mi.)*	*I136*	*269*
NORM MCGREW AND 3RD	*NORM MCGREW AND 3RD*	*NNE 0 - 1/8 (0.005 mi.)*	*B143*	*362*
MINNEAPOLIS ADMINSTRATION SITE	*1101 SOUTH 3RD STREET*	*ENE 0 - 1/8 (0.066 mi.)*	*S191*	*506*
PALMER'S AUTO	*600 5TH STREET NORTH*	*NW 0 - 1/8 (0.078 mi.)*	*X212*	*556*
PARCEL F	*900 WASHINGTON AVENUE S*	*NNE 0 - 1/8 (0.090 mi.)*	*AA247*	*640*

ADDITIONAL ENVIRONMENTAL RECORDS

Local Lists of Hazardous waste / Contaminated Sites

SRS: The database contains site information for sites monitored by the Site Remediation Section.

A review of the SRS list, as provided by EDR, and dated 03/11/2012 has revealed that there are 6 SRS sites within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
NORM MCGREW PLACE	*316 NORM MCGREW PLACE*	*0 - 1/8 (0.000 mi.)*	*B86*	*109*
MINNESOTA BUSINESS & TECH CENT	*511 ELEVENTH AVENUE S.*	*ESE 0 - 1/8 (0.004 mi.)*	*I136*	*269*
NORM MCGREW AND 3RD	*NORM MCGREW AND 3RD*	*NNE 0 - 1/8 (0.005 mi.)*	*B143*	*362*
MINNEAPOLIS ADMINSTRATION SITE	*1101 SOUTH 3RD STREET*	*ENE 0 - 1/8 (0.066 mi.)*	*S191*	*506*
PALMER'S AUTO	*600 5TH STREET NORTH*	*NW 0 - 1/8 (0.078 mi.)*	*X212*	*556*
PARCEL F	*900 WASHINGTON AVENUE S*	*NNE 0 - 1/8 (0.090 mi.)*	*AA247*	*640*

Records of Emergency Release Reports

SPILLS: This is the Minnesota Pollution Coontrol Agency's Spills Log.

A review of the SPILLS list, as provided by EDR, and dated 11/01/2012 has revealed that there are 37 SPILLS sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
ECSU-5	*CHICAGO & 5TH*	*0 - 1/8 (0.000 mi.)*	*G87*	*117*
UNKOWN RP	*530 CHICAGO AVENUE*	*0 - 1/8 (0.000 mi.)*	*G94*	*124*
UNKNOWN	*5TH ST AND PARK AVE S*	*NNW 0 - 1/8 (0.001 mi.)*	*F97*	*133*
Spill Closure: Response Completed				
STAR TRIBUNE	*S 5TH ST & PARK AVE S*	*NW 0 - 1/8 (0.002 mi.)*	*F104*	*138*
Spill Closure: Response Completed				
XCEL ENERGY - PAD MOUNT TRANSF	*601 CHICAGO AVENUE*	*WNW 0 - 1/8 (0.005 mi.)*	*J146*	*372*
Spill Closure: Response Completed				
FORSENIC SCIENCE BUILDING	*530 CHICAGO AVE S*	*NW 0 - 1/8 (0.009 mi.)*	*G153*	*383*
HENNEPIN COUNTY PUBLIC WORKS -	*600 PARK AVE, 7TH & PAR*	*WNW 0 - 1/8 (0.035 mi.)*	*P166*	*411*
Spill Closure: Response Completed				
METRODOME SQUARE BUILDING	*1010 S 7TH ST*	*SSE 0 - 1/8 (0.079 mi.)*	*Z219*	*575*
Spill Closure: Response Completed				
UNKNOWN	*7TH & 11TH AVE*	*SSE 0 - 1/8 (0.079 mi.)*	*AC231*	*618*

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
CHURCH	***810 S 7TH ST***	***WSW 0 - 1/8 (0.080 mi.)***	***AB237***	***626***
HCMC - EAST BASEMENT	***717 CHICAGO AVENUE***	***WSW 0 - 1/8 (0.095 mi.)***	***AB258***	***677***
Spill Closure: Response Completed				
OT	***PARK & 7TH***	***W 0 - 1/8 (0.110 mi.)***	***AG286***	***740***
Spill Closure: Response Completed				

Lower Elevation	Address	Direction / Distance	Map ID	Page
EAST CENTRAL PARKING RAMP	***425 PARK AVENUE***	***0 - 1/8 (0.000 mi.)***	***C53***	***78***
Spill Closure: Refer To Air Quality				
XCEL ENERGY - TRANSFORMER	***700 SOUTH 4TH STREET***	***0 - 1/8 (0.000 mi.)***	***C57***	***82***
Spill Closure: Response Completed				
Not reported	5TH ST & 11TH AVE-ELLIO	0 - 1/8 (0.000 mi.)	I90	120
NORTHERN STATES POWER COMPANY	***4TH ST & PARK AVE***	***0 - 1/8 (0.001 mi.)***	***C95***	***127***
NORTHERN STATES POWER	***802 3RD ST S***	***NNE 0 - 1/8 (0.002 mi.)***	***L108***	***142***
Not reported	4TH AND PARK	NNW 0 - 1/8 (0.003 mi.)	C116	155
AT&T MINNEAPOLIS MN0305	***511 11TH AVE S***	***ESE 0 - 1/8 (0.004 mi.)***	***I135***	***247***
HENNEPIN COUNTY ENERGY CENTER	***600 10TH AVE SO***	***SE 0 - 1/8 (0.004 mi.)***	***K140***	***303***
Spill Closure: Response Completed				
HENNEPIN COUNTY ENERGY CENTER	***600 10TH AVE S***	***SE 0 - 1/8 (0.004 mi.)***	***K142***	***319***
Spill Closure: Nonsignificant, No Followup				
RITZ HOTEL (FORMER)	***3RD & 4TH ST***	***NNE 0 - 1/8 (0.005 mi.)***	***B144***	***369***
HENNEPIN COUNTY ENERGY CENTER	***ADDRESS UNKNOWN***	***SE 0 - 1/8 (0.006 mi.)***	***K149***	***378***
NORTHERN STATES POWER	***640 11TH AVE S***	***SE 0 - 1/8 (0.034 mi.)***	***M160***	***397***
Spill Closure: Response Completed				
XCEL ENERGY - TRANSFORMER	***1100 5TH STREET SOUTH***	***E 0 - 1/8 (0.055 mi.)***	***R171***	***430***
Spill Closure: Response Completed				
ELLIOT PARK SUBSTATION - NSP	***1100 5TH ST S***	***ESE 0 - 1/8 (0.056 mi.)***	***R174***	***441***
VALSPAR CORPORATION (THE)	***312 SOUTH 11TH STREET***	***ENE 0 - 1/8 (0.059 mi.)***	***S180***	***481***
Spill Closure: Refer To Local/County Gov.				
Spill Closure: Response Completed				
CARGILL	***616 S 3RD ST***	***NNW 0 - 1/8 (0.065 mi.)***	***T183***	***490***
Spill Closure: Response Completed				
AUGSBURG FORTNESS PRESS	***616 W 3RD ST***	***NNW 0 - 1/8 (0.065 mi.)***	***T186***	***498***
HIGHWAY	***3RD ST S AND 11ST AVE S***	***ENE 0 - 1/8 (0.065 mi.)***	***S187***	***500***
Spill Closure: Response Completed				
RIVERSIDE PLAZA	***615 S 4TH ST***	***NNW 0 - 1/8 (0.067 mi.)***	***U197***	***531***
Spill Closure: Refer To Local/County Gov.				
TWIN CITIES STEEL TREATING PLA	***1112 S 3RD ST***	***ENE 0 - 1/8 (0.072 mi.)***	***S203***	***548***
TWIN CITY STEEL TREATING CO IN	***1114 S 3RD ST***	***ENE 0 - 1/8 (0.073 mi.)***	***S205***	***551***
Spill Closure: Closed, Other (See Remarks)				
STAR TRIBUNE	***425 PORTLAND AVE S***	***NNW 0 - 1/8 (0.079 mi.)***	***U225***	***584***
ZIEGLER BOR-SON JOB SITE (BY T	***S 9TH AVE & WASHINGTON***	***NNE 0 - 1/8 (0.090 mi.)***	***AA248***	***655***
THE STATION	***1010 WASHINGTON AVE S***	***NE 0 - 1/8 (0.109 mi.)***	***W279***	***723***
TNT HOLLAND??	***WASHINGTON & PORTLAND***	***N 0 - 1/8 (0.110 mi.)***	***AF284***	***735***

Other Ascertainable Records

RCRA NonGen / NLR: RCRAInfo is EPA's comprehensive information system, providing access to data supporting the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984. The database includes selective information on sites which generate, transport, store, treat and/or dispose of hazardous waste as defined by the Resource Conservation and Recovery Act (RCRA). Non-Generators do not presently generate hazardous waste.

A review of the RCRA NonGen / NLR list, as provided by EDR, and dated 02/12/2013 has revealed that there are 21 RCRA NonGen / NLR sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
GOPHER STATE LITHO	***501 PARK AVE***	***0 - 1/8 (0.000 mi.)***	***F83***	***102***
U OF M PARK AVE	***501 PARK AVE***	***0 - 1/8 (0.000 mi.)***	***F84***	***104***
HENNEPIN COUNTY SHERIFF'S OFFI	***626 S 6TH ST***	***WNW 0 - 1/8 (0.067 mi.)***	***V198***	***534***
MINNEAPOLIS MEDICAL RESEARCH -	***519 PORTLAND AVE***	***NW 0 - 1/8 (0.079 mi.)***	***X215***	***570***
FIRST COVENANT CHURCH	810 7TH ST S	WSW 0 - 1/8 (0.080 mi.)	AB235	624

Lower Elevation	Address	Direction / Distance	Map ID	Page
EAGLE STANDARD	***728 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C45***	***59***
BRW INC	***700 3RD ST S***	***N 0 - 1/8 (0.002 mi.)***	***D112***	***147***
BISHOP BUILDING CO	***1015 S 6TH ST***	***SE 0 - 1/8 (0.003 mi.)***	***K114***	***153***
CONTROL DATA BUSINESS AND TECH	***511 11TH AVE S***	***ESE 0 - 1/8 (0.003 mi.)***	***I121***	***175***
APPLIED ENVIRONMENTAL SCIENCES	***511 11TH AVE S STE 251***	***ESE 0 - 1/8 (0.004 mi.)***	***I129***	***213***
EXPRESS IMAGE INC	***617 11TH AVE S***	***SE 0 - 1/8 (0.017 mi.)***	***M156***	***392***
TOLOMATIC INC	***1028 S 3RD ST***	***NE 0 - 1/8 (0.034 mi.)***	***O161***	***400***
AMERICAN TRIO LOFTS	***250 PARK AVE***	***N 0 - 1/8 (0.055 mi.)***	***Q170***	***429***
CARGILL INC - 3RD ST	***616 S 3RD ST***	***NNW 0 - 1/8 (0.065 mi.)***	***T185***	***496***
TWIN CITY STEEL TREATING INC	***1114 S 3RD ST***	***ENE 0 - 1/8 (0.073 mi.)***	***S206***	***554***
DPD PRINT MANAGEMENT	***903 WASHINGTON AVE S***	***NNE 0 - 1/8 (0.079 mi.)***	***AA228***	***615***
DUPLICATE PERISCOPE INC	***921 WASHINGTON AVE S***	***NE 0 - 1/8 (0.080 mi.)***	***AA233***	***623***
LEMAR COLOR LAB	***241 PORTLAND AVE S***	***N 0 - 1/8 (0.090 mi.)***	***T251***	***658***
BRUCE PRINTING INC	***1001 WASHINGTON AVE S***	***NE 0 - 1/8 (0.094 mi.)***	***W256***	***667***
NATIONAL GUARDIAN	***1229 S 6TH ST***	***ESE 0 - 1/8 (0.104 mi.)***	***AD273***	***706***
LIQUOR DEPOT	1010 WASHINGTON AVE S	NE 0 - 1/8 (0.109 mi.)	W280	726

TSCA: The Toxic Substances Control Act identifies manufacturers and importers of chemical substances included on the TSCA Chemical Substance Inventory list. It includes data on the production volume of these substances by plant site. The United States Environmental Protection Agency has no current plan to update and/or re-issue this database.

A review of the TSCA list, as provided by EDR, and dated 12/31/2006 has revealed that there is 1 TSCA site within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
THE VALSPAR CORPORATION	1101 SOUTH THIRD STREET	ENE 0 - 1/8 (0.066 mi.)	S193	516

FTTS: FTTS tracks administrative cases and pesticide enforcement actions and compliance activities related to FIFRA, TSCA and EPCRA (Emergency Planning and Community Right-to-Know Act) over the previous five years. To maintain currency, EDR contacts the Agency on a quarterly basis.

A review of the FTTS list, as provided by EDR, and dated 04/09/2009 has revealed that there are 3 FTTS sites within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
VALSPAR CORP	1101 S THIRD ST	ENE 0 - 1/8 (0.066 mi.)	S188	503
THE VALSPAR CORP	***1101 SO THIRD ST***	***ENE 0 - 1/8 (0.066 mi.)***	***S190***	***505***
VALSPAR CO	***1101 SO THIRD ST***	***ENE 0 - 1/8 (0.066 mi.)***	***S192***	***516***

HIST FTTS: A complete administrative case listing from the FIFRA/TSCA Tracking System (FTTS) for all ten EPA regions. The information was obtained from the National Compliance Database (NCDB). NCDB supports the implementation of FIFRA (Federal Insecticide, Fungicide, and Rodenticide Act) and TSCA (Toxic Substances Control Act). Some EPA regions are now closing out records. Because of that, and the fact that some EPA regions are not providing EPA Headquarters with updated records, it was decided to create a HIST FTTS database. It included records that may not be included in the newer FTTS database updates. This database is no longer updated.

A review of the HIST FTTS list, as provided by EDR, and dated 10/19/2006 has revealed that there are 3 HIST FTTS sites within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
VALSPAR CORP	1101 S THIRD ST	ENE 0 - 1/8 (0.066 mi.)	S189	504
THE VALSPAR CORP	***1101 SO THIRD ST***	***ENE 0 - 1/8 (0.066 mi.)***	***S190***	***505***
VALSPAR CO	***1101 SO THIRD ST***	***ENE 0 - 1/8 (0.066 mi.)***	***S192***	***516***

ICIS: The Integrated Compliance Information System (ICIS) supports the information needs of the national enforcement and compliance program as well as the unique needs of the National Pollutant Discharge Elimination System (NPDES) program.

A review of the ICIS list, as provided by EDR, and dated 07/20/2011 has revealed that there are 2 ICIS sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DOUGLAS CORP	620 12TH AVENUE SOUTH	SE 0 - 1/8 (0.098 mi.)	AE270	700

Lower Elevation	Address	Direction / Distance	Map ID	Page
VALSPAR CO	1101 S 3RD ST MINNEA	ENE 0 - 1/8 (0.057 mi.)	S177	451

PADS: The PCB Activity Database identifies generators, transporters, commercial storers and/or brokers and disposers of PCBs who are required to notify the United States Environmental Protection Agency of such activities. The source of this database is the U.S. EPA.

A review of the PADS list, as provided by EDR, and dated 11/01/2010 has revealed that there are 2 PADS sites within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
BALDWIN SUPPLY CO INC	***601 11TH AVE S***	***SE 0 - 1/8 (0.006 mi.)***	***M148***	***377***
DPD PRINT MANAGEMENT	***903 WASHINGTON AVE S***	***NNE 0 - 1/8 (0.079 mi.)***	***AA228***	***615***

EXECUTIVE SUMMARY

MLTS: The Material Licensing Tracking System is maintained by the Nuclear Regulatory Commission and contains a list fo approximately 8,100 sites which possess or use radioactive materials and are subject to NRC licensing requirements.

A review of the MLTS list, as provided by EDR, and dated 06/21/2011 has revealed that there are 3 MLTS sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HENNEPIN COUNTY MEDICAL CENTER	701 PARK AVENUE SOUTH	W 0 - 1/8 (0.113 mi.)	AG290	743
HENNEPIN COUNTY MEDICAL CENTER	***701 PARK AVENUE***	***W 0 - 1/8 (0.113 mi.)***	***AG293***	***767***

Lower Elevation	Address	Direction / Distance	Map ID	Page
LIQUOR DEPOT	***1010 WASHINGTON AVE S***	***NE 0 - 1/8 (0.109 mi.)***	***W281***	***727***

FINDS: The Facility Index System contains both facility information and "pointers" to other sources of information that contain more detail. These include: RCRIS; Permit Compliance System (PCS); Aerometric Information Retrieval System (AIRS); FATES (FIFRA [Federal Insecticide Fungicide Rodenticide Act] and TSCA Enforcement System, FTTS [FIFRA/TSCA Tracking System]; CERCLIS; DOCKET (Enforcement Docket used to manage and track information on civil judicial enforcement cases for all environmental statutes); Federal Underground Injection Control (FURS); Federal Reporting Data System (FRDS); Surface Impoundments (SIA); TSCA Chemicals in Commerce Information System (CICS); PADS; RCRA-J (medical waste transporters/disposers); TRIS; and TSCA. The source of this database is the U.S. EPA/NTIS.

A review of the FINDS list, as provided by EDR, and dated 10/23/2011 has revealed that there are 50 FINDS sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
GOPHER STATE LITHO	***501 PARK AVE***	***0 - 1/8 (0.000 mi.)***	***F83***	***102***
U OF M PARK AVE	***501 PARK AVE***	***0 - 1/8 (0.000 mi.)***	***F84***	***104***
HENNEPIN COUNTY CRIME LAB UNIT	531 PARK AVE S	0 - 1/8 (0.000 mi.)	F92	122
HENNEPIN COUNTY JUVENILE DETEN	510 PARK AVE S	NW 0 - 1/8 (0.001 mi.)	F98	135
HENNEPIN COUNTY SHERIFF'S OFFI	***626 S 6TH ST***	***WNW 0 - 1/8 (0.067 mi.)***	***V198***	***534***
HENNEPIN COUNTY JUVENILE DETEN	***626 S 6TH ST RM C20***	***WNW 0 - 1/8 (0.067 mi.)***	***V200***	***545***
RED DOOR CLINIC HENNEPIN CO CO	***525 PORTLAND AVE STE LL***	***NW 0 - 1/8 (0.078 mi.)***	***X213***	***566***
HENNEPIN COUNTY HEALTH SERVICE	***525 PORTLAND AVE STE MC***	***NW 0 - 1/8 (0.078 mi.)***	***X214***	***568***
MINNEAPOLIS MEDICAL RESEARCH -	***519 PORTLAND AVE***	***NW 0 - 1/8 (0.079 mi.)***	***X215***	***570***
FIRST COVENANT CHURCH	810 7TH ST S	WSW 0 - 1/8 (0.080 mi.)	AB234	624
MASTERWORKS OF MINNEAPOLIS INC	***1121 7TH ST S***	***SE 0 - 1/8 (0.094 mi.)***	***AE254***	***665***
DOUGLAS CORP - MPLS	***620 12TH AVE S***	***SE 0 - 1/8 (0.098 mi.)***	***AE269***	***688***
HENNEPIN COUNTY PUB SERV MINNE	***7TH AND PARK AVE S***	***W 0 - 1/8 (0.110 mi.)***	***AG285***	***737***
HENNEPIN COUNTY MEDICAL CENTER	***701 PARK AVENUE***	***W 0 - 1/8 (0.113 mi.)***	***AG293***	***767***

Lower Elevation	Address	Direction / Distance	Map ID	Page
LAKE OF THE ISLES PARK IMP PHA	***SEE LOCATION DESCRIPTIO***	***0 - 1/8 (0.000 mi.)***	***B24***	***29***
HUMBOLDT AVENUE GREENWAY, PHAS	***ALONG HUMBOLDT AVE N BE***	***0 - 1/8 (0.000 mi.)***	***B29***	***31***
CHICAGO AVE BRIDGE AND PAVING	***SEE LOCATION DESCRIPTIO***	***0 - 1/8 (0.000 mi.)***	***B32***	***32***
MINNEHAHA CREEK TRAIL -CSW	200 GRAIN EXCHANGE	0 - 1/8 (0.000 mi.)	B35	44
SP 27-752-09; CP 9518 & 9621	***WASHINGTON AVE FROM PLY***	***0 - 1/8 (0.000 mi.)***	***B36***	***44***
COUNTY PROJECT 9018; SAP 27-63	***CSAH 36 (UNIVERSITY AVE***	***0 - 1/8 (0.000 mi.)***	***B40***	***47***
STAR TRIBUNE	***716 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C41***	***48***
EAGLE STANDARD	***728 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C45***	***59***
RUNWAY 17-35 WEST CARGO APRON	***MINNEAPOLIS - ST PAUL A***	***0 - 1/8 (0.000 mi.)***	***B47***	***72***
GRAINGER INDUSTRIAL SUPPLY - M	724 3RD ST S	N 0 - 1/8 (0.002 mi.)	D109	144
BRW INC	***700 3RD ST S***	***N 0 - 1/8 (0.002 mi.)***	***D112***	***147***

EXECUTIVE SUMMARY

Lower Elevation	Address	Direction / Distance	Map ID	Page
BISHOP BUILDING CO	***1015 S 6TH ST***	***SE 0 - 1/8 (0.003 mi.)***	***K114***	***153***
NEXTEL 40	511 11TH AVENUE SOUTH,	ESE 0 - 1/8 (0.003 mi.)	I118	157
CONTROL DATA BUSINESS AND TECH	***511 11TH AVE S***	***ESE 0 - 1/8 (0.003 mi.)***	***I121***	***175***
JOHNSTECH INTERNATIONAL - MPLS	***511 11TH AVE S***	***ESE 0 - 1/8 (0.004 mi.)***	***I127***	***205***
APPLIED ENVIRONMENTAL SCIENCES	***511 11TH AVE S STE 251***	***ESE 0 - 1/8 (0.004 mi.)***	***I129***	***213***
HENNEPIN COUNTY ENERGY CENTER	***600 10TH AVE S***	***SE 0 - 1/8 (0.004 mi.)***	***K141***	***309***
SAMUEL BINGHAM CO	***900 S. 3RD ST.***	***NNE 0 - 1/8 (0.005 mi.)***	***B147***	***375***
BALDWIN SUPPLY CO INC	***601 11TH AVE S***	***SE 0 - 1/8 (0.006 mi.)***	***M148***	***377***
EXPRESS IMAGE INC	***617 11TH AVE S***	***SE 0 - 1/8 (0.017 mi.)***	***M156***	***392***
TOLOMATIC INC	***1028 S 3RD ST***	***NE 0 - 1/8 (0.034 mi.)***	***O161***	***400***
MCWHORTER TECHNOLOGIES	1028 S 3RD ST	NE 0 - 1/8 (0.034 mi.)	O165	411
AMERICAN TRIO LOFTS	250 PARK AVE	N 0 - 1/8 (0.056 mi.)	Q175	450
VALSPAR CORPORATION (THE)	312 11TH AVENUE SOUTH	ENE 0 - 1/8 (0.059 mi.)	S181	489
CARGILL INC - 3RD ST	***616 S 3RD ST***	***NNW 0 - 1/8 (0.065 mi.)***	***T185***	***496***
VALSPAR CORPORATION (THE)	***312 S 11TH AVE***	***ENE 0 - 1/8 (0.066 mi.)***	***S196***	***518***
TWIN CITY STEEL TREATING INC	***1114 S 3RD ST***	***ENE 0 - 1/8 (0.073 mi.)***	***S206***	***554***
AMERICAN ACADEMY OF NEUROLOGY	201 CHICAGO AVENUE SOUT	NNE 0 - 1/8 (0.076 mi.)	Y208	555
DPD PRINT MANAGEMENT	***903 WASHINGTON AVE S***	***NNE 0 - 1/8 (0.079 mi.)***	***AA228***	***615***
PERISCOPE INC	***921 WASHINGTON AVE S***	***NE 0 - 1/8 (0.080 mi.)***	***AA232***	***621***
DUPLICATE PERISCOPE INC	***921 WASHINGTON AVE S***	***NE 0 - 1/8 (0.080 mi.)***	***AA233***	***623***
LEMAR COLOR LAB	***241 PORTLAND AVE S***	***N 0 - 1/8 (0.090 mi.)***	***T251***	***658***
BRUCE PRINTING INC	***1001 WASHINGTON AVE S***	***NE 0 - 1/8 (0.094 mi.)***	***W256***	***667***
GUTHRIE SCENE SHOP	212 9TH AVE S	NNE 0 - 1/8 (0.098 mi.)	AA265	684
NATIONAL GUARDIAN	***1229 S 6TH ST***	***ESE 0 - 1/8 (0.104 mi.)***	***AD273***	***706***
LIQUOR DEPOT	***1010 WASHINGTON AVE S***	***NE 0 - 1/8 (0.109 mi.)***	***W281***	***727***

MN LS: The List of Sites includes: Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), No Further Remedial Action Planned (NFRAP), National Priorities List (NPL), Permanent List of Priorities (PLP), Sites delisted from the Permanent List of Priorities (DPLP), Hazardous Waste Permit Unit Project Facilities (HW PERM), List of Permitted Solid Waste Facilities (SW PERM), 1980 Metropolitan Area Waste Disposal Site Inventory,1980 Statewide Outstate Dump Inventory (ODI), Voluntary and Investigation Program (VIC), and Closed Landfill Sites Undergoing Cleanup (LCP). The List of Sites comes from Minnesota Pollution Control

A review of the MN LS list, as provided by EDR, and dated 04/22/2009 has revealed that there are 9 MN LS sites within approximately 0.125 miles of the target property.

Lower Elevation	Address	Direction / Distance	Map ID	Page
NORTH THIRD STREET PROPERTY	***735 763 & 805 N 3RD ST***	***0 - 1/8 (0.000 mi.)***	***D37***	***44***
NORM MCGREW PLACE	***316 NORM MCGREW PLACE***	***0 - 1/8 (0.000 mi.)***	***B86***	***109***
MINNESOTA BUSINESS AND TECHNOL	***511 11TH AVE S***	***ESE 0 - 1/8 (0.004 mi.)***	***I124***	***190***
NORM MCGREW AND 3RD	***NORM MCGREW AND 3RD***	***NNE 0 - 1/8 (0.005 mi.)***	***B143***	***362***
ROCK ISLAND YARD FUEL OIL	***SEE LOCATION DESCRIPTIO***	***N 0 - 1/8 (0.011 mi.)***	***D155***	***392***
OLD LOCATION OF UNION SCRAP	***SEE LOCATION DESCRIPTIO***	***NE 0 - 1/8 (0.072 mi.)***	***W201***	***547***
GUTHRIE THEATER AUXILIARY	***WASHINGTON AVE S & CHIC***	***NNE 0 - 1/8 (0.089 mi.)***	***Y246***	***639***
WASHINGTON AVENUE RAILROAD PRO	***SEE LOCATION DESCRIPTIO***	***NNE 0 - 1/8 (0.105 mi.)***	***Y274***	***708***
PARCEL F	***SEE LOCATION DESCRIPTIO***	***NNE 0 - 1/8 (0.117 mi.)***	***Y298***	***785***

MANIFEST: Hazardous waste manifest data.

A review of the MANIFEST list, as provided by EDR, and dated 12/31/2011 has revealed that there are 5 MANIFEST sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HENNEPIN COUNTY MEDICAL CENTER	***PARK AVE & 6TH ST***	***W 0 - 1/8 (0.113 mi.)***	***AG291***	***744***
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
HENNEPIN COUNTY ENERGY CENTER	***600 10TH AVE S***	***SE 0 - 1/8 (0.004 mi.)***	***K142***	***319***
VALSPAR E-COAT LAB	1028 3RD ST S	NE 0 - 1/8 (0.007 mi.)	N150	381
VALSPAR CORPORATION INDUSTRIAL	1014 3RD ST S	NE 0 - 1/8 (0.007 mi.)	N151	382
VALSPAR RESEARCH LAB	***312 11TH AVE S***	***ENE 0 - 1/8 (0.059 mi.)***	***S179***	***476***

ENF: This Regulatory Compliance, Hazardous Waste Enforcement Log and Hazardous Waste Permit Unit Project Identification List comes from the Minnesota Pollution Control Agency's Generators Associated with Enforcement Logs.

A review of the ENF list, as provided by EDR, and dated 09/18/2012 has revealed that there are 3 ENF sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DOUGLAS CORPORATION	620 12TH AVENUE SOUTH	SE 0 - 1/8 (0.098 mi.)	AE272	706
HENNEPIN COUNTY MEDICAL CENTER	701 PARK AVENUE	W 0 - 1/8 (0.113 mi.)	AG294	783
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
VALSPAR CORPORATION (THE)	***312 SOUTH 11TH STREET***	***ENE 0 - 1/8 (0.059 mi.)***	***S180***	***481***

AIRS: A listing of permitted AIRS facilities.

A review of the AIRS list, as provided by EDR, and dated 12/11/2012 has revealed that there are 3 AIRS sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DOUGLAS CORP - MPLS	***620 12TH AVE S***	***SE 0 - 1/8 (0.098 mi.)***	***AE271***	***704***
Lower Elevation	**Address**	**Direction / Distance**	**Map ID**	**Page**
HENNEPIN COUNTY ENERGY CENTER	***600 10TH AVE S***	***SE 0 - 1/8 (0.004 mi.)***	***K142***	***319***
VALSPAR CORPORATION (THE)	***312 S 11TH AVE***	***ENE 0 - 1/8 (0.066 mi.)***	***S196***	***518***

TIER 2: A listing of facilities which store or manufacture hazardous materials that submit a chemical inventory report.

A review of the TIER 2 list, as provided by EDR, and dated 12/31/2011 has revealed that there are 20 TIER 2 sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HENNEPIN COUNTY PUBLIC WORKS -	***600 PARK AVE, 7TH & PAR***	***WNW 0 - 1/8 (0.035 mi.)***	***P166***	***411***
HENNEPIN COUNTY PUBLIC WORKS -	600 PARK AVE, 7TH & PAR	WNW 0 - 1/8 (0.035 mi.)	P167	416
HENNEPIN COUNTY MEDICAL CENTER	***PARK AVE & 6TH ST***	***W 0 - 1/8 (0.113 mi.)***	***AG291***	***744***

Lower Elevation	Address	Direction / Distance	Map ID	Page
MCI	511 11TH AVE S SUITE 30	ESE 0 - 1/8 (0.003 mi.)	I119	157
WORLDCOM	511 11TH AVE S SUITE 30	ESE 0 - 1/8 (0.003 mi.)	I120	169
SPRINT - MINNEAPOLIS SWITCH	511 - 11TH AVENUE S, SU	ESE 0 - 1/8 (0.004 mi.)	I122	176
SUNGARD AVAILABILITY SERVICES,	511 11TH AVENUE S #211	ESE 0 - 1/8 (0.004 mi.)	I123	186
SUNGARD AVAILABILITY SERVICES,	511 11TH AVENUE S	ESE 0 - 1/8 (0.004 mi.)	I125	191
SPRINT MINNEAPOLIS MN PCS SWIT	511 - 11TH AVENUE S, SU	ESE 0 - 1/8 (0.004 mi.)	I126	194
LEVEL 3 - MINNEAPOLIS - MPLSMN	511 11TH AVE S, SUITE 2	ESE 0 - 1/8 (0.004 mi.)	I128	208
LEVEL 3 - MINNEAPOLIS - MPLSMN	511 11TH AVE S, SUITE 2	ESE 0 - 1/8 (0.004 mi.)	I131	215
AT & T	511 11TH AVE S	ESE 0 - 1/8 (0.004 mi.)	I132	231
NEXTEL-MSO-MINNO1	511 - 11TH AVE, SUITE 2	ESE 0 - 1/8 (0.004 mi.)	I133	240
AT&T MINNEAPOLIS MN0305	***511 11TH AVE S***	***ESE 0 - 1/8 (0.004 mi.)***	***I135***	***247***
NEUTRAL TANDEM INC.	511 11TH AVE S. STE 409	ESE 0 - 1/8 (0.004 mi.)	I137	276
MINNEAPOLIS, MN MSO	511 - 11TH AVENUE SOUTH	ESE 0 - 1/8 (0.004 mi.)	I138	283
HENNEPIN COUNTY ENERGY CENTER	***600 10TH AVE S***	***SE 0 - 1/8 (0.004 mi.)***	***K142***	***319***
XCEL ENERGY - ELLIOT PARK SUBS	1100 5TH ST S	ESE 0 - 1/8 (0.056 mi.)	R172	433
XCEL ENERGY - ELLIOT PARK SUBS	1100 5TH ST S	ESE 0 - 1/8 (0.056 mi.)	R173	434
ELLIOT PARK SUBSTATION - NSP	***1100 5TH ST S***	***ESE 0 - 1/8 (0.056 mi.)***	***R174***	***441***

US AIRS: The database is a sub-system of Aerometric Information Retrieval System (AIRS). AFS contains compliance data on air pollution point sources regulated by the U.S. EPA and/or state and local air regulatory agencies. This information comes from source reports by various stationary sources of air pollution, such as electric power plants, steel mills, factories, and universities, and provides information about the air pollutants they produce. Action, air program, air program pollutant, and general level plant data. It is used to track emissions and compliance data from industrial plants.

A review of the US AIRS list, as provided by EDR, and dated 11/15/2012 has revealed that there are 2 US AIRS sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
DOUGLAS CORP - MPLS	***620 12TH AVE S***	***SE 0 - 1/8 (0.098 mi.)***	***AE269***	***688***

Lower Elevation	Address	Direction / Distance	Map ID	Page
HENNEPIN COUNTY ENERGY CENTER	***600 10TH AVE S***	***SE 0 - 1/8 (0.004 mi.)***	***K141***	***309***

WIMN: Since 2003, the PCAa??s "Whata??s in My Neighborhood?" database provides information about air quality, hazardous waste, remediation, solid waste, tanks and leaks, and water quality around Minnesota.

A review of the WIMN list, as provided by EDR, and dated 01/13/2013 has revealed that there are 130 WIMN sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FORMER WAREHOUSE	***406 CHICAGO***	***0 - 1/8 (0.000 mi.)***	***E69***	***92***
MCDA SITE	***4TH ST & KIRBY PUCKETT***	***0 - 1/8 (0.000 mi.)***	***C80***	***97***
MCGILL BUILDING	***501 PARK AVE***	***0 - 1/8 (0.000 mi.)***	***F85***	***105***
1999 STREET IMPROVEMENT PROJEC	ADDRESS UNKNOWN	0 - 1/8 (0.000 mi.)	H88	119
MINNEAPOLIS STREET IMPROV	ADDRESS UNKNOWN	0 - 1/8 (0.000 mi.)	H91	122
HENNEPIN COUNTY CRIME LAB UNIT	***531 PARK AVE S***	***0 - 1/8 (0.000 mi.)***	***F93***	***122***
HENNEPIN COUNTY JUVENILE DETEN	510 PARK AVE S	NW 0 - 1/8 (0.001 mi.)	F99	136
FORMERLY CENTRAL FOOD FACILITY	530 CHICAGO AVE S	NW 0 - 1/8 (0.009 mi.)	G154	391
HENNEPIN COUNTY MEDICAL CENTER	***626 PARK AVE***	***WNW 0 - 1/8 (0.058 mi.)***	***P178***	***467***
JUVENILE JUSTICE CENTER	***626 S 6TH ST***	***WNW 0 - 1/8 (0.067 mi.)***	***V199***	***535***

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
HENNEPIN COUNTY JUVENILE DETEN	***626 S 6TH ST RM C20***	***WNW 0 - 1/8 (0.067 mi.)***	***V200***	***545***
RED DOOR CLINIC HENNEPIN CO CO	***525 PORTLAND AVE STE LL***	***NW 0 - 1/8 (0.078 mi.)***	***X213***	***566***
HENNEPIN COUNTY HEALTH SERVICE	***525 PORTLAND AVE STE MC***	***NW 0 - 1/8 (0.078 mi.)***	***X214***	***568***
MINNEAPOLIS MEDICAL RESEARCH -	519 PORTLAND AVE	NW 0 - 1/8 (0.079 mi.)	X216	572
METRODOME SQUARE BUILDING	1010 S 7TH ST	SSE 0 - 1/8 (0.079 mi.)	Z218	574
FIRST COVENANT CHURCH	810 S 7TH ST	WSW 0 - 1/8 (0.080 mi.)	AB236	625
HOPE COMMUNITY CHURCH	704 11TH AVE S	SSE 0 - 1/8 (0.085 mi.)	AC242	630
DEPENDABLE GARAGE	***619 PORTLAND***	***WNW 0 - 1/8 (0.094 mi.)***	***V253***	***661***
MASTERWORKS OF MINNEAPOLIS INC	***1121 7TH ST S***	***SE 0 - 1/8 (0.094 mi.)***	***AE254***	***665***
DOUGLAS CORP - MPLS	***620 12TH AVE S***	***SE 0 - 1/8 (0.098 mi.)***	***AE271***	***704***
HENNEPIN COUNTY PUBLIC WORKS M	7TH & PARK AVE S	W 0 - 1/8 (0.112 mi.)	AG289	743
HENNEPIN COUNTY MEDICAL CENTER	***701 PARK AVE S***	***W 0 - 1/8 (0.113 mi.)***	***AG292***	***752***

Lower Elevation	Address	Direction / Distance	Map ID	Page
SP 027-603-031 - CP 9758 (CSAH	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B5	22
SP 2725-52 (TH 55) RECONSTRUC	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B6	22
NEAR NORTH DEVELOPMENT	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B7	23
SHINGLE CREEK EAST PAVING PROJ	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B8	23
GOLD MEDAL PARK	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B9	23
S FAIRVIEW/ N LYYNDALE AVE	LYNDALE AVE	0 - 1/8 (0.000 mi.)	B10	24
K AND K METAL RECYCLING SITE I	ADDRESS UNKNOWN	0 - 1/8 (0.000 mi.)	B11	24
EAST RIVER PKWY BRIDGE/BRIDAL	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B12	24
HIAWATHA AVE PROJ 3 (TH 55)	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B13	25
SP 2725-57, TH 55/62	HIGHWAY 55 & HIGHWAY 62	0 - 1/8 (0.000 mi.)	B14	25
SP 2726-61 (TH 47)	TH 47 FROM 27TH AVE NE	0 - 1/8 (0.000 mi.)	B15	25
DOUGLAS AVE N PAVING	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B16	26
SP 2781-289 (TH 94-392)	I-94 FROM RIVERSIDE AVE	0 - 1/8 (0.000 mi.)	B17	26
FORT SNELLING ATHLETIC COMPLEX	BTWN. HWY 55, TAYLOR AV	0 - 1/8 (0.000 mi.)	B18	26
STEVENS SQUARE PAVING PROJECT	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B19	27
ZENITH AND ALOFT	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B20	27
MET COUNCIL - MINNEAPOLIS SEWE	ADDRESS UNKNOWN	0 - 1/8 (0.000 mi.)	B21	27
CP 9754-SP 027-603-035	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B22	28
MILL RUINS PARK PHASE 4, PED C	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B23	28
LAKE OF THE ISLES PARK IMP PHA	***SEE LOCATION DESCRIPTIO***	***0 - 1/8 (0.000 mi.)***	***B24***	***29***
2000 STREET IMPROVEMENT PROJEC	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B25	29
LONGFELLOW GARDENS SITE DEVELO	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B26	30
TH 55 (HIAWATHA) HIGHWAY CONST	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B27	30
2ND AVE S & MARQUETTE AVE - MP	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B28	30
HUMBOLDT AVENUE GREENWAY, PHAS	***ALONG HUMBOLDT AVE N BE***	***0 - 1/8 (0.000 mi.)***	***B29***	***31***
TOUCH AMERICA FIBER OPTIC PROJ	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B30	31
PERKINS HILL	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B31	31
CHICAGO AVE BRIDGE AND PAVING	***SEE LOCATION DESCRIPTIO***	***0 - 1/8 (0.000 mi.)***	***B32***	***32***
FLEET SERVICE GARAGE - BLOCK 7	***716 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C34***	***33***
SP 27-752-09; CP 9518 & 9621	***WASHINGTON AVE FROM PLY***	***0 - 1/8 (0.000 mi.)***	***B36***	***44***
NORTH THIRD STREET PROPERTY	***735 763 & 805 N 3RD ST***	***0 - 1/8 (0.000 mi.)***	***D37***	***44***
EXECUTIVE PARKING LOT - BLOCK	NW CORNER OF 5TH ST & P	0 - 1/8 (0.000 mi.)	B38	45
COUNTY PROJECT 9018; SAP 27-63	***CSAH 36 (UNIVERSITY AVE***	***0 - 1/8 (0.000 mi.)***	***B40***	***47***
CO PROJECT 9020, SAP 27-637-03	CSAH 37 (4TH ST SE) BET	0 - 1/8 (0.000 mi.)	B42	58
TWIN LAKES SUBWATERSHED IMPROV	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B43	58
PEARL PARK	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B44	59
EAGLE STANDARD	***728 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C45***	***59***
SKYSCAPE - CSW	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B46	72
RUNWAY 17-35 WEST CARGO APRON	***MINNEAPOLIS - ST PAUL A***	***0 - 1/8 (0.000 mi.)***	***B47***	***72***
FOLWELL PAVING PROJECT	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B48	73
FLOOD AREA 1 - 42ND & RUSSELL	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B49	73

EXECUTIVE SUMMARY

Lower Elevation	Address	Direction / Distance	Map ID	Page
TWIN CITY GEAR	***823 25 17TH AVE S***	***0 - 1/8 (0.000 mi.)***	***B51***	***74***
MINNEAPOLIS - PORTAL, MN #5421	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B54	81
LAKE HIAWATHA FLOOD AREA 27	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B55	81
THEODORE WIRTH/EAST RIVER PKWY	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B56	81
CEDAR LAKE PARK TRL	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B58	84
WEST RIVER PKWY IMPROV	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B59	85
U OF M-HANSON HALL	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B60	85
SOUTHWEST MITIGATION	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B62	86
PEDESTRIAN & BICYCLE TRAILS	ALONG W RIVER PKWY BETW	0 - 1/8 (0.000 mi.)	B63	86
THE BRIDGEWATER - CSW	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B64	86
MILL RUINS PARK IMPROV - PHASE	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B65	87
STAR TRIBUNE PARKING LOT	***701 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C66***	***87***
MINNEHAHA AVE STREET IMPROVEME	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B67	91
2001 ST. IMPROVMENT PROJECT	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B68	91
LAKE NOKOMIS WQ IMPROVEMENT PR	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B70	94
GLENWOOD RESIDENTIAL PAVING PR	ADDRESS UNKNOWN	0 - 1/8 (0.000 mi.)	B71	94
1998 STREET IMPROVEMENT PROJEC	ADDRESS UNKNOWN	0 - 1/8 (0.000 mi.)	B72	94
RENAISSANCE ON THE RIVER	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B73	95
CENTRAL AVE NE - TH 65 PAVING	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B74	95
STAR & TRIBUNE PARKING LOT - B	SE CORNER OF 5TH AVE &	0 - 1/8 (0.000 mi.)	B75	95
LORING PARK SITE IMPROV	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B76	96
FRANKLIN AVENUE STREETSCAPE PR	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B77	96
LAKE HARRIET & LAKE CALHOUN PA	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B78	96
MNDOT I35W BRIDGE	INTERSTATE 35W	0 - 1/8 (0.000 mi.)	B79	97
N DOUGLAS (E) & GROVELAND AVE	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B81	101
EWING AVE RECONSTRUCTION - CSW	SEE LOCATION DESCRIPTIO	0 - 1/8 (0.000 mi.)	B82	101
NORM MCGREW PLACE	***316 NORM MCGREW PLACE***	***0 - 1/8 (0.000 mi.)***	***B86***	***109***
GRAINGER INDUSTRIAL SUPPLY - M	***724 3RD ST S***	***N 0 - 1/8 (0.002 mi.)***	***D110***	***145***
BRW INC	700 S 3RD ST STE 600	N 0 - 1/8 (0.002 mi.)	D111	146
THRESHER SQUARE	***708 S 3RD ST***	***N 0 - 1/8 (0.002 mi.)***	***D113***	***148***
BISHOP BUILDING CO	***1015 S 6TH ST***	***SE 0 - 1/8 (0.003 mi.)***	***K114***	***153***
MINNESOTA BUSINESS AND TECHNOL	***511 11TH AVE S***	***ESE 0 - 1/8 (0.004 mi.)***	***I124***	***190***
APPLIED ENVIRONMENTAL SCIENCES	***511 11TH AVE S STE 251***	***ESE 0 - 1/8 (0.004 mi.)***	***I129***	***213***
LEVEL 3 MINNEAPOLIS	511 11TH AVE S STE 210	ESE 0 - 1/8 (0.004 mi.)	I130	214
NRG/HENNEPIN COUNTY ENERGY CEN	***600 10TH AVE S***	***SE 0 - 1/8 (0.004 mi.)***	***K139***	***286***
HENNEPIN COUNTY ENERGY CENTER	***600 10TH AVE S***	***SE 0 - 1/8 (0.004 mi.)***	***K142***	***319***
NORM MCGREW AND 3RD	***NORM MCGREW AND 3RD***	***NNE 0 - 1/8 (0.005 mi.)***	***B143***	***362***
BALDWIN SUPPLY CO INC	***601 11TH AVE S***	***SE 0 - 1/8 (0.006 mi.)***	***M148***	***377***
SAMUEL BINGHAM CO	900 S 3RD ST	NNE 0 - 1/8 (0.007 mi.)	B152	383
ROCK ISLAND YARD FUEL OIL	***SEE LOCATION DESCRIPTIO***	***N 0 - 1/8 (0.011 mi.)***	***D155***	***392***
EXPRESS IMAGE INC	***617 11TH AVE S***	***SE 0 - 1/8 (0.017 mi.)***	***M156***	***392***
VALSPAR CORP INDUSTRIAL LAB	1014 S 3RD ST	NE 0 - 1/8 (0.029 mi.)	N159	397
VALSPAR	***1028 S 3RD ST***	***NE 0 - 1/8 (0.034 mi.)***	***O163***	***403***
AMERICAN TRIO LOFTS	***250 PARK AVE***	***N 0 - 1/8 (0.055 mi.)***	***Q170***	***429***
VALSPAR RESEARCH LAB	***312 11TH AVE S***	***ENE 0 - 1/8 (0.059 mi.)***	***S179***	***476***
CARGILL	***616 S 3RD ST***	***NNW 0 - 1/8 (0.065 mi.)***	***T183***	***490***
VALSPAR APPLIED SCIENCE & TECH	1101 S 3RD ST	ENE 0 - 1/8 (0.066 mi.)	S194	517
OLD LOCATION OF UNION SCRAP	***SEE LOCATION DESCRIPTIO***	***NE 0 - 1/8 (0.072 mi.)***	***W201***	***547***
TWIN CITY STEEL TREATING CO IN	***1114 S 3RD ST***	***ENE 0 - 1/8 (0.073 mi.)***	***S205***	***551***
AMERICAN ACADEMY OF NEUROLOGY	201 CHICAGO AVENUE SOUT	NNE 0 - 1/8 (0.076 mi.)	Y207	555
MINNEAPOLIS STAR TRIBUNE CO MC	425 PORTLAND AVE	NNW 0 - 1/8 (0.079 mi.)	U224	583
STAR TRIBUNE	***425 PORTLAND AVE S***	***NNW 0 - 1/8 (0.079 mi.)***	***U225***	***584***
DPD PRINT MANAGEMENT - MINNEAP	903 WASHINGTON AVE S	NNE 0 - 1/8 (0.079 mi.)	AA227	615
PERISCOPE INC	***921 WASHINGTON AVE S***	***NE 0 - 1/8 (0.080 mi.)***	***AA232***	***621***
KRELITZ BUILDING	***251 PORTLAND AVE S***	***N 0 - 1/8 (0.087 mi.)***	***T245***	***630***
GUTHRIE THEATER AUXILIARY	***WASHINGTON AVE S & CHIC***	***NNE 0 - 1/8 (0.089 mi.)***	***Y246***	***639***

EXECUTIVE SUMMARY

Lower Elevation	Address	Direction / Distance	Map ID	Page
LEMAR COLOR LAB	241 PORTLAND AVE	N 0 - 1/8 (0.090 mi.)	T250	658
BRUCE PRINTING INC	***1001 WASHINGTON AVE S***	***NE 0 - 1/8 (0.094 mi.)***	***W256***	***667***
UNIVERSITY BANK BUILDING	***720 WASHINGTON AVE***	***N 0 - 1/8 (0.095 mi.)***	***Q257***	***669***
MINNESOTA CENTER FOR BOOK ARTS	1011 WASHINGTON AVE S S	NE 0 - 1/8 (0.097 mi.)	W262	680
GUTHRIE SCENE SHOP	***212 9TH AVE S***	***NNE 0 - 1/8 (0.098 mi.)***	***AA266***	***684***
NATIONAL GUARDIAN	***1229 S 6TH ST***	***ESE 0 - 1/8 (0.104 mi.)***	***AD273***	***706***
WASHINGTON AVENUE RAILROAD PRO	***SEE LOCATION DESCRIPTIO***	***NNE 0 - 1/8 (0.105 mi.)***	***Y274***	***708***
BLEK OIL	***1000 WASHINGTON AVE S***	***NE 0 - 1/8 (0.106 mi.)***	***W277***	***709***
THE STATION	***1010 WASHINGTON AVE S***	***NE 0 - 1/8 (0.109 mi.)***	***W279***	***723***
MINNEAPOLIS VETERINARY HOSPITA	1030 WASHINGTON AVE S	NE 0 - 1/8 (0.114 mi.)	AH297	784
PARCEL F	***SEE LOCATION DESCRIPTIO***	***NNE 0 - 1/8 (0.117 mi.)***	***Y298***	***785***

Financial Assurance: Financial assurance is intended to ensure that resources are available to pay for the cost of closure, post-closure care, and corrective measures if the owner or operator of a regulated facility is unable or unwilling to pay.

A review of the Financial Assurance list, as provided by EDR, and dated 11/01/2012 has revealed that there are 61 Financial Assurance sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
FORMER WAREHOUSE	***406 CHICAGO***	***0 - 1/8 (0.000 mi.)***	***E69***	***92***
MCDA SITE	***4TH ST & KIRBY PUCKETT***	***0 - 1/8 (0.000 mi.)***	***C80***	***97***
MCGILL BUILDING	***501 PARK AVE***	***0 - 1/8 (0.000 mi.)***	***F85***	***105***
ECSU-5	***CHICAGO & 5TH***	***0 - 1/8 (0.000 mi.)***	***G87***	***117***
UNKOWN RP	***530 CHICAGO AVENUE***	***0 - 1/8 (0.000 mi.)***	***G94***	***124***
EXECUTIVE PARKING LOT - BLOCK	***NW CORNER OF 5TH ST & P***	***0 - 1/8 (0.001 mi.)***	***F96***	***129***
UNKNOWN	***5TH ST AND PARK AVE S***	***NNW 0 - 1/8 (0.001 mi.)***	***F97***	***133***
PROPOSED METRODOME LRT STATION	S 5TH ST & PARK AVE S	NW 0 - 1/8 (0.002 mi.)	F103	137
STAR TRIBUNE	***S 5TH ST & PARK AVE S***	***NW 0 - 1/8 (0.002 mi.)***	***F104***	***138***
XCEL ENERGY - PAD MOUNT TRANSF	***601 CHICAGO AVENUE***	***WNW 0 - 1/8 (0.005 mi.)***	***J146***	***372***
FORSENIC SCIENCE BUILDING	***530 CHICAGO AVE S***	***NW 0 - 1/8 (0.009 mi.)***	***G153***	***383***
HENNEPIN COUNTY PUBLIC WORKS -	***600 PARK AVE, 7TH & PAR***	***WNW 0 - 1/8 (0.035 mi.)***	***P166***	***411***
HENNEPIN COUNTY MEDICAL CENTER	***626 PARK AVE***	***WNW 0 - 1/8 (0.058 mi.)***	***P178***	***467***
JUVENILE JUSTICE CENTER	***626 S 6TH ST***	***WNW 0 - 1/8 (0.067 mi.)***	***V199***	***535***
METRODOME SQUARE BUILDING	***1010 S 7TH ST***	***SSE 0 - 1/8 (0.079 mi.)***	***Z219***	***575***
ST. BARNABAS	***906 7TH ST S***	***SSW 0 - 1/8 (0.079 mi.)***	***221***	***580***
UNKNOWN	***7TH & 11TH AVE***	***SSE 0 - 1/8 (0.079 mi.)***	***AC231***	***618***
CHURCH	***810 S 7TH ST***	***WSW 0 - 1/8 (0.080 mi.)***	***AB237***	***626***
DEPENDABLE GARAGE	***619 PORTLAND***	***WNW 0 - 1/8 (0.094 mi.)***	***V253***	***661***
HCMC - EAST BASEMENT	***717 CHICAGO AVENUE***	***WSW 0 - 1/8 (0.095 mi.)***	***AB258***	***677***
HOPE COMMUNITY CHURCH	***704 11TH AVE S***	***SSE 0 - 1/8 (0.109 mi.)***	***AC283***	***728***
OT	***PARK & 7TH***	***W 0 - 1/8 (0.110 mi.)***	***AG286***	***740***
HENNEPIN COUNTY MEDICAL CENTER	***701 PARK AVE S***	***W 0 - 1/8 (0.113 mi.)***	***AG292***	***752***

Lower Elevation	Address	Direction / Distance	Map ID	Page
FLEET SERVICE GARAGE - BLOCK 7	***716 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C34***	***33***
STAR TRIBUNE	***716 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C41***	***48***
EAGLE STANDARD	***728 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C45***	***59***
TWIN CITY GEAR	***823 25 17TH AVE S***	***0 - 1/8 (0.000 mi.)***	***B51***	***74***
EAST CENTRAL PARKING RAMP	***425 PARK AVENUE***	***0 - 1/8 (0.000 mi.)***	***C53***	***78***
XCEL ENERGY - TRANSFORMER	***700 SOUTH 4TH STREET***	***0 - 1/8 (0.000 mi.)***	***C57***	***82***
STAR TRIBUNE PARKING LOT	***701 S 4TH ST***	***0 - 1/8 (0.000 mi.)***	***C66***	***87***
NORTHERN STATES POWER COMPANY	***4TH ST & PARK AVE***	***0 - 1/8 (0.001 mi.)***	***C95***	***127***

Lower Elevation	Address	Direction / Distance	Map ID	Page
NORTHERN STATES POWER	*802 3RD ST S*	*NNE 0 - 1/8 (0.002 mi.)*	*L108*	*142*
THRESHER SQUARE	*708 S 3RD ST*	*N 0 - 1/8 (0.002 mi.)*	*D113*	*148*
LEVEL 3 MINNEAPOLIS	*511 11TH AVE S STE 210*	*ESE 0 - 1/8 (0.004 mi.)*	*I134*	*243*
AT&T MINNEAPOLIS MN0305	*511 11TH AVE S*	*ESE 0 - 1/8 (0.004 mi.)*	*I135*	*247*
HENNEPIN COUNTY ENERGY CENTER	*600 10TH AVE SO*	*SE 0 - 1/8 (0.004 mi.)*	*K140*	*303*
HENNEPIN COUNTY ENERGY CENTER	*600 10TH AVE S*	*SE 0 - 1/8 (0.004 mi.)*	*K142*	*319*
RITZ HOTEL (FORMER)	*3RD & 4TH ST*	*NNE 0 - 1/8 (0.005 mi.)*	*B144*	*369*
HENNEPIN COUNTY ENERGY CENTER	*ADDRESS UNKNOWN*	*SE 0 - 1/8 (0.006 mi.)*	*K149*	*378*
NORTHERN STATES POWER	*640 11TH AVE S*	*SE 0 - 1/8 (0.034 mi.)*	*M160*	*397*
VALSPAR	*1028 S 3RD ST*	*NE 0 - 1/8 (0.034 mi.)*	*O163*	*403*
XCEL ENERGY - TRANSFORMER	*1100 5TH STREET SOUTH*	*E 0 - 1/8 (0.055 mi.)*	*R171*	*430*
ELLIOT PARK SUBSTATION - NSP	*1100 5TH ST S*	*ESE 0 - 1/8 (0.056 mi.)*	*R174*	*441*
VALSPAR RESEARCH LAB	*312 11TH AVE S*	*ENE 0 - 1/8 (0.059 mi.)*	*S179*	*476*
VALSPAR CORPORATION (THE)	*312 SOUTH 11TH STREET*	*ENE 0 - 1/8 (0.059 mi.)*	*S180*	*481*
CARGILL	*616 S 3RD ST*	*NNW 0 - 1/8 (0.065 mi.)*	*T183*	*490*
AUGSBURG FORTNESS PRESS	*616 W 3RD ST*	*NNW 0 - 1/8 (0.065 mi.)*	*T186*	*498*
HIGHWAY	*3RD ST S AND 11ST AVE S*	*ENE 0 - 1/8 (0.065 mi.)*	*S187*	*500*
VALSPAR CORPORATION (THE)	*312 S 11TH AVE*	*ENE 0 - 1/8 (0.066 mi.)*	*S196*	*518*
RIVERSIDE PLAZA	*615 S 4TH ST*	*NNW 0 - 1/8 (0.067 mi.)*	*U197*	*531*
TWIN CITIES STEEL TREATING PLA	*1112 S 3RD ST*	*ENE 0 - 1/8 (0.072 mi.)*	*S203*	*548*
TWIN CITY STEEL TREATING CO IN	*1114 S 3RD ST*	*ENE 0 - 1/8 (0.073 mi.)*	*S205*	*551*
PARK AVENUE EXTENSION	PARK AVE & WASHINGTON A	NNE 0 - 1/8 (0.079 mi.)	Y220	579
STAR TRIBUNE	*425 PORTLAND AVE S*	*NNW 0 - 1/8 (0.079 mi.)*	*U225*	*584*
KRELITZ BUILDING	*251 PORTLAND AVE S*	*N 0 - 1/8 (0.087 mi.)*	*T245*	*630*
ZIEGLER BOR-SON JOB SITE (BY T	*S 9TH AVE & WASHINGTON*	*NNE 0 - 1/8 (0.090 mi.)*	*AA248*	*655*
UNIVERSITY BANK BUILDING	*720 WASHINGTON AVE*	*N 0 - 1/8 (0.095 mi.)*	*Q257*	*669*
GUTHRIE SCENE SHOP	*212 9TH AVE S*	*NNE 0 - 1/8 (0.098 mi.)*	*AA266*	*684*
BLEK OIL	*1000 WASHINGTON AVE S*	*NE 0 - 1/8 (0.106 mi.)*	*W277*	*709*
THE STATION	*1010 WASHINGTON AVE S*	*NE 0 - 1/8 (0.109 mi.)*	*W279*	*723*
TNT HOLLAND??	*WASHINGTON & PORTLAND*	*N 0 - 1/8 (0.110 mi.)*	*AF284*	*735*

EDR HIGH RISK HISTORICAL RECORDS

EDR Exclusive Records

EDR US Hist Auto Stat: EDR has searched selected national collections of business directories and has collected listings of potential gas station/filling station/service station sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include gas station/filling station/service station establishments. The categories reviewed included, but were not limited to gas, gas station, gasoline station, filling station, auto, automobile repair, auto service station, service station, etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR US Hist Auto Stat list, as provided by EDR, has revealed that there are 33 EDR US Hist Auto Stat sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
STOLTE ELMER	801 S 4TH	0 - 1/8 (0.000 mi.)	E52	78
ARNESON ALF H	704 S 5TH	0 - 1/8 (0.000 mi.)	F61	85
RISLEY ALVA	500 CHICAGO AVE	0 - 1/8 (0.000 mi.)	G89	120

EXECUTIVE SUMMARY

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
RICHARD RUCAS	829 S 6TH	WNW 0 - 1/8 (0.002 mi.)	J101	136
DE BLE SERVICE GARAGE	817 S 6TH	WNW 0 - 1/8 (0.002 mi.)	G102	136
ZAHL EQUIPMENT CO	601 CHICAGO AVE	WNW 0 - 1/8 (0.005 mi.)	J145	372
ANDERSON JOSIAH REAR	615 S 6TH	WNW 0 - 1/8 (0.077 mi.)	V210	556
BOUCHER CHAS R REAR	816 S 7TH AVE	WSW 0 - 1/8 (0.079 mi.)	AB229	618
CRANKSHAFT SUPPLY CO	1121 S 7TH	SE 0 - 1/8 (0.094 mi.)	AE255	667
CRANKSHAFT SUPPLY CO	1121 S 7TH ST	SE 0 - 1/8 (0.095 mi.)	AE259	680
SUBURBAN AUTO ELECTRIC	606 12TH AVE S	SE 0 - 1/8 (0.096 mi.)	AE260	680

Lower Elevation	Address	Direction / Distance	Map ID	Page
MAC AND ANDY WASH RACK	716 S 4TH	0 - 1/8 (0.000 mi.)	C33	32
EAGLE STANDARD	728 S 4TH ST	0 - 1/8 (0.000 mi.)	C50	74
BERG NORENS A	717 S 3D	N 0 - 1/8 (0.002 mi.)	D105	141
LUNDBERG E J	1028 S 6TH	SE 0 - 1/8 (0.002 mi.)	K106	141
RANGE OIL SUPPLY CO	433 11TH AVE S	E 0 - 1/8 (0.002 mi.)	107	142
CORDELL AND NESS	701 S 4TH	NNW 0 - 1/8 (0.003 mi.)	C115	154
AUTOSMITH GARAGE	1101 S 5TH	ESE 0 - 1/8 (0.003 mi.)	I117	157
CARLSON SERVICES INC	1128 S 6TH ST	SE 0 - 1/8 (0.026 mi.)	M157	394
YOUNGSTEDT S STANDARD SERVICE	300 11TH AVE S	ENE 0 - 1/8 (0.063 mi.)	S182	489
WOLFE ALBERT REAR	610 S 5TH	NW 0 - 1/8 (0.072 mi.)	X202	548
WESTERN AUTO SALES CO	1124 S 3D	ENE 0 - 1/8 (0.076 mi.)	S209	556
ARNOLD FRANK	600 S 4TH	NNW 0 - 1/8 (0.080 mi.)	U238	629
KAMROW SARNML C	320 PORTLAND AVE	NNW 0 - 1/8 (0.080 mi.)	T239	629
Not reported	494 PORTLAND AVE	NW 0 - 1/8 (0.081 mi.)	X240	629
LUNDIN MARTIN G	1206 S 6TH	ESE 0 - 1/8 (0.086 mi.)	AD243	630
MALONE S AUTO WORKS	1235 S 5TH ST	ESE 0 - 1/8 (0.087 mi.)	R244	630
BEN S SERVICE	1000 WASHINGTON AVE S	NE 0 - 1/8 (0.106 mi.)	W275	709
STATION THE	1000 S WASHINGTON AVE	NE 0 - 1/8 (0.106 mi.)	W276	709
Not reported	1010 WASHINGTON AVE S	NE 0 - 1/8 (0.109 mi.)	W282	728
WASHINGTON PURE OIL STATION	1026 S WASHINGTON AVE	NE 0 - 1/8 (0.113 mi.)	AH295	783
HAW JOHN R	1026 WASHINGTON AVE S	NE 0 - 1/8 (0.113 mi.)	AH296	784
THEISTANDARD SERVICE	550 S 4TH	NNW 0 - 1/8 (0.118 mi.)	299	785

EDR US Hist Cleaners: EDR has searched selected national collections of business directories and has collected listings of potential dry cleaner sites that were available to EDR researchers. EDR's review was limited to those categories of sources that might, in EDR's opinion, include dry cleaning establishments. The categories reviewed included, but were not limited to dry cleaners, cleaners, laundry, laundromat, cleaning/laundry, wash & dry etc. This database falls within a category of information EDR classifies as "High Risk Historical Records", or HRHR. EDR's HRHR effort presents unique and sometimes proprietary data about past sites and operations that typically create environmental concerns, but may not show up in current government records searches.

A review of the EDR US Hist Cleaners list, as provided by EDR, has revealed that there are 11 EDR US Hist Cleaners sites within approximately 0.125 miles of the target property.

Equal/Higher Elevation	Address	Direction / Distance	Map ID	Page
PONG SAM	714 S 6TH	WNW 0 - 1/8 (0.035 mi.)	P168	428
FORSBERG ALPHA R	1101 S 7TH	SSE 0 - 1/8 (0.079 mi.)	AC230	618
SANG CHAS W	1122 S 7TH	SSE 0 - 1/8 (0.082 mi.)	AC241	629
BOULEVARD CLEANERS AND LAUNDER	720 11TH AVE S	SSE 0 - 1/8 (0.097 mi.)	AC261	680
LINCOLN LAUNDRY	722 11TH AVE S	SSE 0 - 1/8 (0.098 mi.)	AC268	687

Lower Elevation	Address	Direction / Distance	Map ID	Page
TUB THE	815 WASHINGTON AVE S	NNE 0 - 1/8 (0.077 mi.)	Y211	556

EXECUTIVE SUMMARY

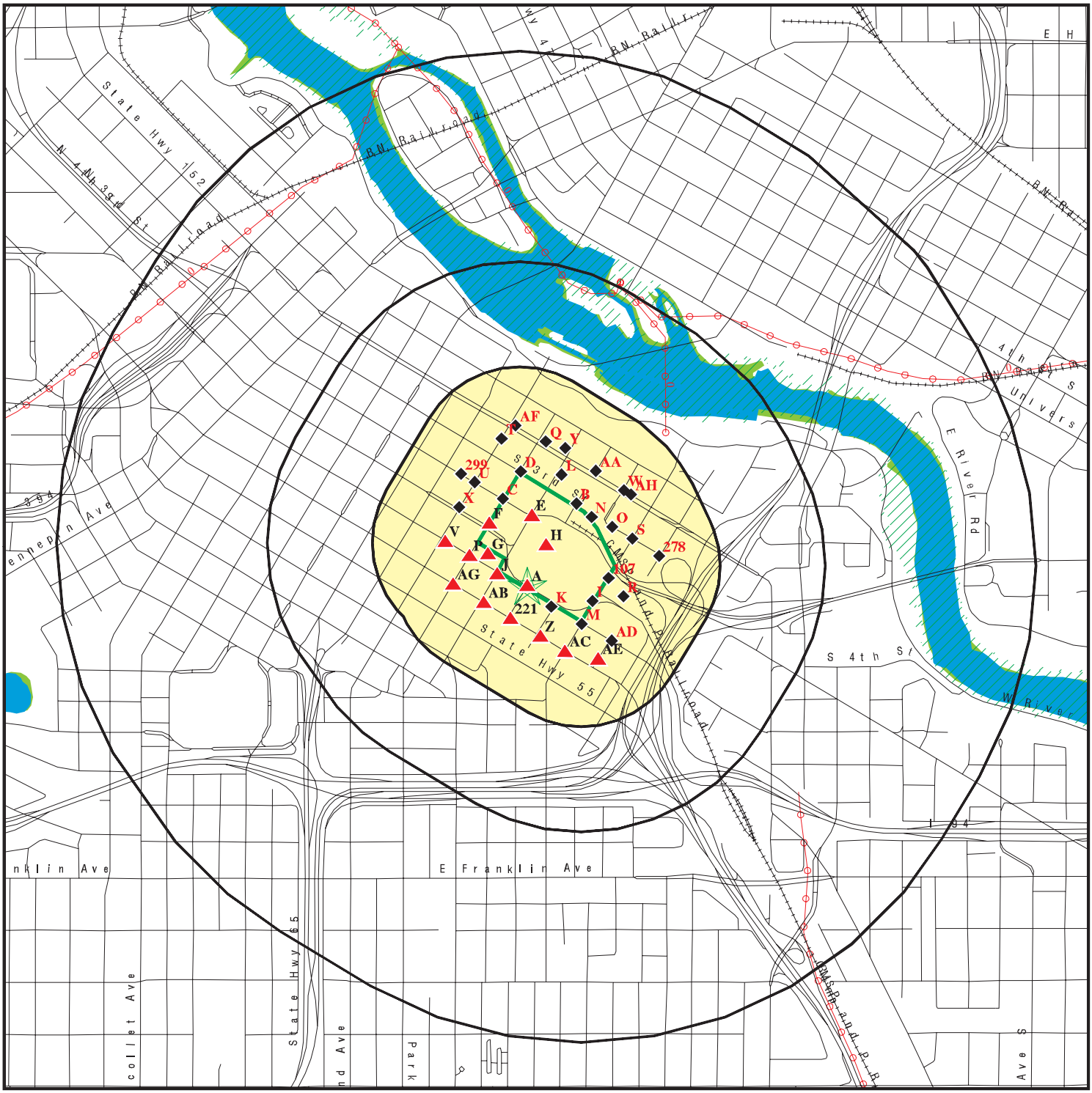
Lower Elevation	Address	Direction / Distance	Map ID	Page
DAHLGREN CLEANERS	714 WASHINGTON AVE S	N 0 - 1/8 (0.090 mi.)	Q249	658
WHITE LAUNDRY CO	1011 WASHINGTON AVE S	NE 0 - 1/8 (0.097 mi.)	W263	681
POLLARD WM	307 S 12TH	ENE 0 - 1/8 (0.108 mi.)	278	723
BACKSTROM MORGAN IT	614 WASHINGTON AVENUE S	N 0 - 1/8 (0.111 mi.)	AF287	742
BACKSTROM MORGAN R	614 S WASHINGTON AVE	N 0 - 1/8 (0.111 mi.)	AF288	743

EXECUTIVE SUMMARY

Due to poor or inadequate address information, the following sites were not mapped. Count: 39 records.

Site Name	Database(s)
DWORSKY BARREL (AKA DWORSKY/MCFARL	VIC,HWS,SRS
MNDOT I35W AND TH62 CORRIDOR PROJE	BROWNFIELDS,FINANCIAL ASSURANCE 1
MNDOT TH 55 AND 62 INTERCHANGE	BROWNFIELDS,FINANCIAL ASSURANCE 1
HENNEPIN CO LEAF RECYCLING/MINNETO	LF,FINANCIAL ASSURANCE 1
MSP AIRPORT NORTHWEST AIRLINES	SPILLS,FINANCIAL ASSURANCE 1
TRANSPORT INCORPORATED	SPILLS,FINANCIAL ASSURANCE 1
URBAN	SPILLS,FINANCIAL ASSURANCE 1
TWIN CITIES DIE CASTING CO	SPILLS,FINANCIAL ASSURANCE 1
NORTHERN CARGO	SPILLS,FINANCIAL ASSURANCE 1
MNDOT TRAFFIC ACCIDENT	SPILLS,FINANCIAL ASSURANCE 1
HIGHWAY	SPILLS,FINANCIAL ASSURANCE 1
LYLE GAMRATT TRUCKING CO	SPILLS,FINANCIAL ASSURANCE 1
NORTHERN STATES POWER	SPILLS,FINANCIAL ASSURANCE 1
MAC	SPILLS,FINANCIAL ASSURANCE 1
RURAL	SPILLS,FINANCIAL ASSURANCE 1
MORRELL TRANSFER	SPILLS,FINANCIAL ASSURANCE 1
CITY OF MPLS., DEVELOPMENT	SPILLS,FINANCIAL ASSURANCE 1
MIKES TRUCK AND TRAILER	SPILLS,FINANCIAL ASSURANCE 1
GREATLAND OIL COMPANY	SPILLS,FINANCIAL ASSURANCE 1
GOPHER OIL	SPILLS,FINANCIAL ASSURANCE 1
GROSS COMMON CARRIER	SPILLS,FINANCIAL ASSURANCE 1
HIGHWAY	SPILLS,FINANCIAL ASSURANCE 1
UNKNOWN	SPILLS,FINANCIAL ASSURANCE 1
TRUSSEL & TOWER	SPILLS,FINANCIAL ASSURANCE 1
UNKNOWN	SPILLS,FINANCIAL ASSURANCE 1
UNKNOWN	SPILLS,FINANCIAL ASSURANCE 1
UNKNOWN	SPILLS,FINANCIAL ASSURANCE 1
CHICAGO NORTHWESTERN RAILROAD	SPILLS,FINANCIAL ASSURANCE 1
UNION PACIFIC - EAST MINNEAPOLIS Y	SPILLS,FINANCIAL ASSURANCE 1
AIR FORCE RESERVE - MINNEAPOLIS	SPILLS,FINANCIAL ASSURANCE 1
AIR FORCE RESERVE BUILDING 812 - L	SPILLS,FINANCIAL ASSURANCE 1
SMITHWAY TRUCKING SPILL ON SHOULDE	SPILLS,FINANCIAL ASSURANCE 1
MNDOT STORM WATER POND ADJACENT TO	SPILLS,FINANCIAL ASSURANCE 1
NSP	SPILLS,FINANCIAL ASSURANCE 1
CONSTRUCTION SITE	SPILLS,FINANCIAL ASSURANCE 1
UNKNOWN	SPILLS,FINANCIAL ASSURANCE 1
CON-WAY FREIGHT -FRIDLEY	SPILLS,FINANCIAL ASSURANCE 1
OLD MONITORING SITE ADJ TO BOAT LA	SPILLS,FINANCIAL ASSURANCE 1
ROAD SIDE	SPILLS,FINANCIAL ASSURANCE 1

OVERVIEW MAP - 03540142.1r

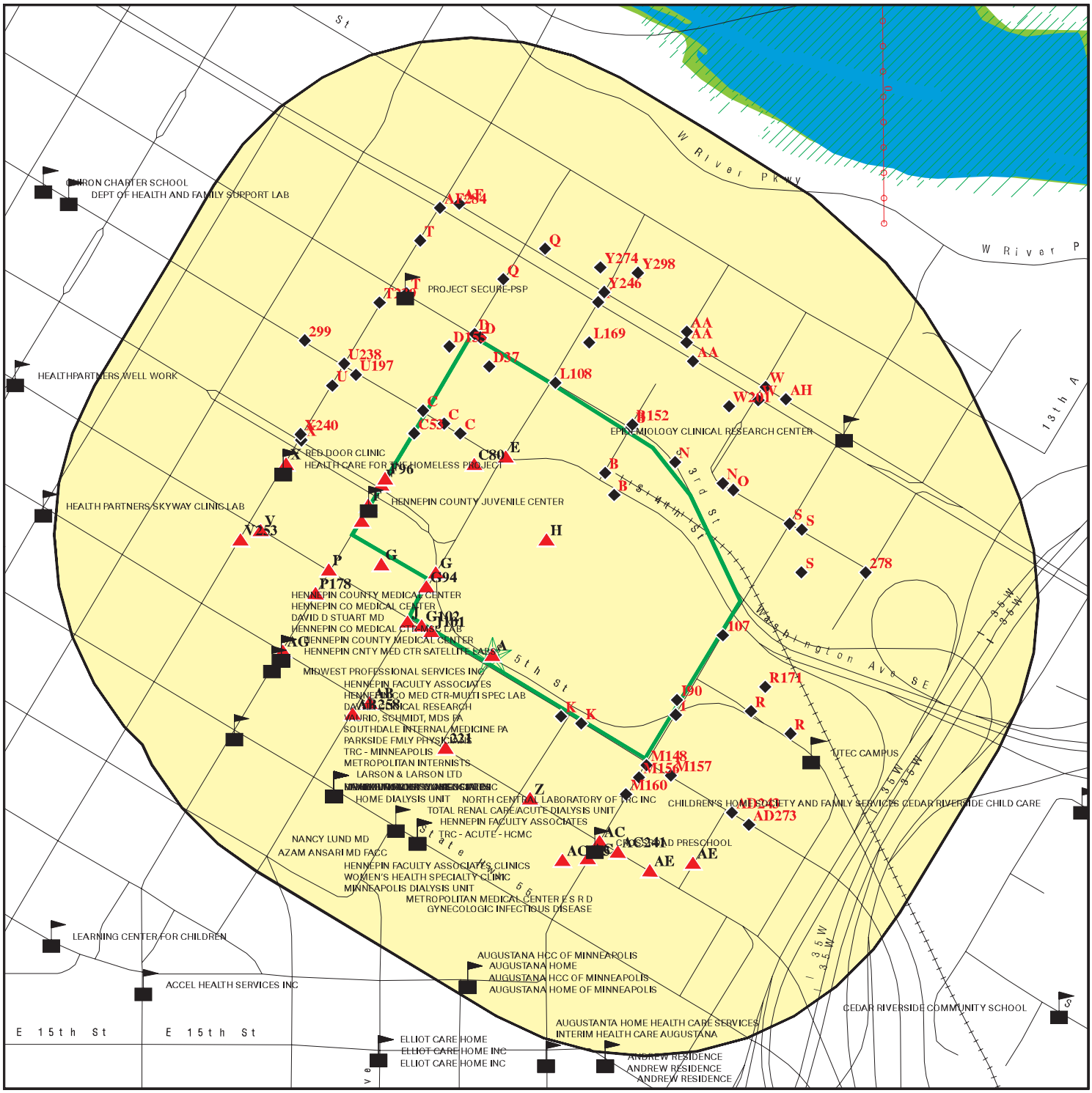


- Target Property
- Sites at elevations higher than or equal to the target property
- Sites at elevations lower than the target property
- Manufactured Gas Plants
- National Priority List Sites
- Dept. Defense Sites
- Indian Reservations BIA
- Power transmission lines
- Oil & Gas pipelines from USGS
- 100-year flood zone
- 500-year flood zone
- National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME: The Peoples Stadium ADDRESS: 900 South 5th Street Minneapolis MN 55415 LAT/LONG: 44.9728 / 93.2591	CLIENT: American Engineering Testing CONTACT: Tracey Lee INQUIRY #: 03540142.1r DATE: March 11, 2013 4:12 pm

DETAIL MAP - 03540142.1r



Target Property

Sites at elevations higher than or equal to the target property

Sites at elevations lower than the target property

Manufactured Gas Plants

Sensitive Receptors

National Priority List Sites

Dept. Defense Sites

Indian Reservations BIA

Power transmission lines

Oil & Gas pipelines from USGS

100-year flood zone

500-year flood zone

National Wetland Inventory

This report includes Interactive Map Layers to display and/or hide map information. The legend includes only those icons for the default map view.

SITE NAME:	The Peoples Stadium	CLIENT:	American Engineering Testing
ADDRESS:	900 South 5th Street Minneapolis MN 55415	CONTACT:	Tracey Lee
		INQUIRY #:	03540142.1r
LAT/LONG:	44.9728 / 93.2591	DATE:	March 11, 2013 4:13 pm

Technical Memorandum of Environmental Review; Proposed Project Study Area for The People's Stadium

Purpose

American Engineering Testing, Inc. (AET) has performed a review of environmental conditions at the Proposed Project study area for the People's Stadium. AET performed this environmental review at the request of Kimley-Horn and Associates, Inc. (Kimley-Horn), as part of the Environmental Impact Statement (EIS). This Technical Memorandum summarizes AET's findings.

Scope

AET's scope consists of performing property-specific environmental reviews for each parcel within the Proposed Project study area. The review for each property is attached to this Memorandum, along with a map showing the property locations. The information on known and potential environmental conditions has been gathered from the following documentation available to AET at this time:

- Phase I Environmental Site Assessments (ESAs)
- Phase II ESAs or comparable investigations
- *The EDR Radius Map Report with Geocheck* [governmental database records search], Environmental Data Resources, Inc. (EDR); March 11, 2013 – see accompanying document
- *What's in My Neighborhood?* [on-line governmental database], Minnesota Pollution Control Agency (MPCA); accessed March 8, 2013
- AET requested various regulatory files from the MPCA on March 8, 2013. AET has reviewed the files which were made available by the MPCA; not all files requested were available for AET to review.

Summary of identified environmental conditions in Proposed Project study area

The environmental review has identified contaminant impacts to soil, groundwater, and soil gas media on various properties within the Proposed Project study area. Contaminants include metals, petroleum, volatile organic compounds (VOCs), and other organic compounds such as polynuclear aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs). These findings are consistent with a range of identified historical operations.

The identified contaminant impacts to soil and other media result in an affected environment at the following properties within the Proposed Project study area:

- Block 71 – 300 9th Avenue South: VOCs, PAHs, and metals including barium, copper, and arsenic
- Block 73 – 424 Chicago Avenue South and 701 4th Street South (impacts in Light Rail Transit right-of-way adjacent to Block 73): petroleum
- Block 94 – 530 Chicago Avenue South: petroleum and PAHs
- Block 106 – 309 9th Avenue South: VOCs, PAHs, and metals including lead, copper, and arsenic
- Metrodome – 900 5th Street South: organic vapors (i.e., VOCs) and PCBs

The degree and distribution of contamination is not yet well defined throughout the Proposed Project study area. While contamination is not considered to be everywhere within the study area, it would be difficult to rule out contamination at any given location without further assessment.

Summary of findings in Cumulative Impacts Assessment area

At the request of Kimley-Horn, a more limited governmental database records search has been completed for the Cumulative Impacts Assessment area which consists of two city blocks bounded by Park Avenue, 5th Avenue, 4th Street, and 5th Street. The EDR report does not include that geographic area.

Based on AET's review, the identified contaminant impacts to soil and other media result in an affected environment at the following property within the Cumulative Impacts Assessment area:

- Block 74 – 425 Portland Avenue South: petroleum and VOCs

Analysis of environmental consequences, mitigation, and No Build Alternative

Environmental Consequences:
The environmental consequences of contamination in soil, groundwater, and soil gas media begin with potential risks to site workers, site users, or off-site receptors. The types, magnitudes, extents, and other characteristics of contamination conditions would require additional assessment to better define the potential risks to human health and the environment. Once more fully defined, the risks would require proper planning and mitigation during the site redevelopment process.

Even while the Proposed Project study area remains undisturbed, contamination may affect one or more environmental media at the same time. The coarse-grained natural soil deposits are considered susceptible to groundwater contamination and vapor migration if releases occur. To some degree, the prevalence of paved surfaces and thick fill in places serves to insulate the underlying natural soils and groundwater from contaminant migration. While it is possible that disturbance of the subsurface during the construction process would increase the mobilization of contamination, the anticipated redevelopment is not expected to alter the general soil conditions or enhance the potential for contaminant migration.

Mitigation:
In most cases, mitigation measures for environmental contamination in the State of Minnesota are undertaken in coordination with the MPCA. The Agency offers fee-for-service voluntary programs which can provide liability assurances to owners, prospective purchasers, or developers: Petroleum Brownfield Program (PBP) for petroleum contamination and Voluntary Investigation and Cleanup (VIC) program for non-petroleum impacts. Those voluntary programs

operate in coordination with state regulatory programs such as Superfund and Petroleum Remediation Program (PRP) to offer liability assurances consistent with both voluntary and regulatory statutes, rules, and policies. The voluntary programs offer users prescribed guidelines and using standardized approaches for investigation, response action planning, remediation, and monitoring of mitigation measures.

During site preparation and redevelopment, the presence of contamination and solid waste in fill soils may result in materials which must be properly managed to minimize risks. Soil management categories may include hazardous or solid waste for landfill disposal/management, regulated fill soil for disposal or potential reuse, unregulated fill soil for reuse or disposal, uncontaminated soil suitable or unsuitable for planned construction uses, and soil or bedrock which may remain *in situ*. Each waste management stream listed above may require unique permitting and documentation measures.

During construction dewatering, the discharge or sanitary sewer disposal of potentially contaminated waters may require advanced planning, permitting, pre-treatment, or other management measures. During stadium operations, dewatering and storm water discharge are estimated to function similarly to the current stadium and at comparable magnitudes. The effect of enlarging the stadium catchment area will be offset by the higher elevation of the field level.

The presence of the identified environmental impacts to soil, groundwater, and soil gas media would require enhanced diligence during planning and construction to manage risks associated with contaminated media, to coordinate waste stream management, to confirm the presence and degree of risks, and to mitigate any residual risks which are not remediated.

No Build Alternative:
If the No Build Alternative is selected, the contaminated media would remain undisturbed. The mitigation measures to engage regulatory authorities and to manage the waste stream would not be necessary.

Given the limited scope of previous environmental assessments, the degree of inherent risk from *in situ* contamination is not certain. The potential would remain for contaminant migration to affect human health and the environment at affected properties and potentially off-site.

Other potential environmental hazards during demolition and construction

Affected Environment:
Solid Waste:
Since the Proposed Project would involve complete demolition of a sports stadium, outlying facilities, neighboring buildings, city streets, and underground infrastructure, it is anticipated that large quantities of demolition debris and earth materials would be generated during demolition. Demolition debris is inert material such as concrete, brick, bituminous, glass, plastic, untreated wood, and rock.

AET has been notified by Kimley-Horn that Mortenson Construction estimates the demolition would generate 80,000 tons of concrete debris, 2,600 tons of separated steel, and 3,500 tons of miscellaneous demolition debris, of which 95% to 98% would be recycled. The remainder would be disposed at a state permitted landfill.

Construction of the new stadium would generate construction related waste materials such as wood, packaging, excess materials, and other wastes, which would be either recycled or disposed. Stadium operations would generate solid wastes such as food waste, packaging, beverage containers, paper, and other wastes, similar to the current stadium operation.

Hazardous and Regulated Waste:
Hazardous waste is not anticipated to be generated during demolition of the existing stadium, except through abatement and removal of regulated materials such as asbestos, lead-based paint, refrigeration equipment, lights, or other regulated wastes if they are identified. As part of the development process, a pre-demolition survey would be completed on the existing structures to determine the environmental hazards that could be encountered during demolition of the existing Metrodome and in removing and disposing of construction debris from the Metrodome site.

Site preparation for the new stadium would generate large quantities of earth materials (100,000 cubic yards or more) which would require proper management or disposal. The environmental review has identified potential contamination in soil and water within the Proposed Project study area, which would require advanced planning for proper management and disposal of impacted materials.

Stadium operations customarily use small quantities of petroleum and other toxic or hazardous substances, which would be properly managed and disposed per state and local regulations and guidelines. The EDR report identifies the current Metrodome property as a Small Quantity Generator of Waste Code D1 "ignitable hazardous wastes" amounting to less than 100kg per calendar month. These types of *de minimis* uses do not typically lead to regulated waste releases, discharges or emissions. One or more storage tanks may be used for storage of fuel for such purposes as a standby electric generator. The EDR report identifies the current Metrodome property as a registered Underground Storage Tank facility with two 1,000-gallon tanks containing diesel fuel. Registered storage tanks are required to comply with federal and state regulations for installation and system monitoring.

Environmental Consequences:
Solid Waste:
If solid waste recycling falls short of the 95% to 98% projections, the Proposed Project would require disposal of solid waste materials at area landfills, thereby shortening the operating life of those facilities. Handling, transportation, and disposal of solid wastes generated during the demolition, site preparation, and construction phases of the Proposed Project would also result in transient environmental consequences in the areas of: traffic; vehicle-related air emissions;

odors, noise, and dust; soil conditions; surface water runoff; erosion and sedimentation; and visual impacts.

Stadium operations would generate solid wastes on an ongoing basis, similar to the current stadium.

Hazardous and Regulated Waste:
If hazardous or regulated waste materials are discovered during demolition of the existing stadium, those materials are required to be handled through established federal and state abatement, mitigation, disposal, and recycling procedures. If hazardous or regulated wastes are misidentified or mismanaged, there is a potential for releases to the environment.

Site preparation for the Proposed Project would result in excavated soils which are contaminated and would require disposal at area landfills. The consequences would be identical to those stated above for solid waste.

Stadium operation would generate small quantities of hazardous wastes on an ongoing basis, similar to the current stadium as described above.

Mitigation:
Solid Waste:
Mitigation measures for the identified potential environmental hazards associated with solid waste during demolition and construction include the following:

- Solid waste materials generated during demolition, site preparation, and construction must be disposed in a MPCA approved demolition landfill, or separated and recycled. Management of solid waste would be in accordance with state regulations and guidelines.
- To the extent feasible, demolition debris and salvaged materials would be segregated into alternate waste streams for recycling/reuse:
    - Much of the concrete would be crushed for reuse on- or off-site as aggregate fill material.
    - Soils meeting MPCA unregulated fill criteria may also be reused.
    - Steel and other metals would be salvaged and recycled.
    - A plan for solid waste stream management would be prepared for the project which would emphasize recycling/reuse of demolished materials to the extent feasible.
- For the stadium operations phase, a recycling center would be designed and constructed to encourage recycling of metals, plastics, paper, and other materials. Wastes that cannot be recycled would be managed in accordance with state regulations and guidelines.

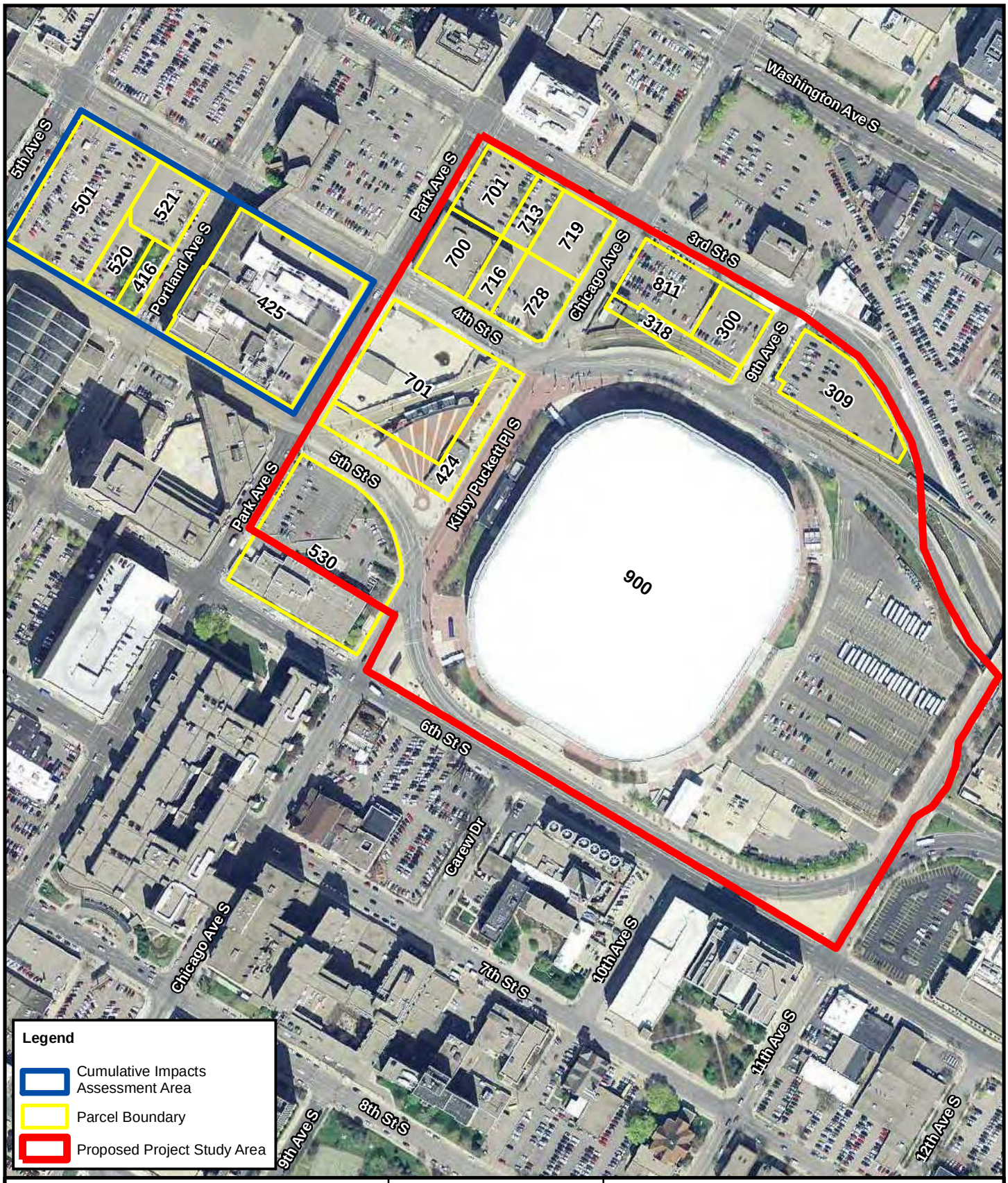
Hazardous and Regulated Waste:
Mitigation measures for the identified potential environmental hazards associated with hazardous and regulated waste during demolition and construction include the following:

- Any buildings to be removed for the project would be inspected for hazardous and regulated materials and these materials would be abated/removed prior to demolition. The removed hazardous wastes would be managed and recycled/disposed by certified contractors according to regulatory and industry standards.

- Any hazardous and regulated waste generated during construction would be managed according to federal, state, and local regulations and guidelines. Construction hazardous waste generation would be minimized by specifying non-hazardous materials where possible.
- Any contaminated soil or water discovered during assessments or removed during the construction would be managed according to state and local regulations and guidelines as well as industry practice:
    - Disposal of low-level-contaminated soils would occur at an acceptable regulated fill soil site or MPCA-approved landfill.
    - Disposal of higher-level-contaminated soils would occur at an MPCA-approved sanitary landfill.
    - Contaminated water recovered during construction (e.g., during dewatering) would be treated by a qualified contractor to state standards, prior to a permitted discharge event.
- If previous unknown regulated materials/wastes are discovered during construction, the Contractor would notify the Project Engineer immediately. The Project Engineer would notify regulatory authorities as required and take appropriate actions to manage the regulated materials or wastes.
- It is expected that temporary aboveground storage tanks (ASTs) would be utilized on-site to store petroleum products and other materials during construction.
    - Any storage tanks would be protected with secondary containment and designed to meet all regulatory requirements including spill and overfill protection, leak monitoring, corrosion protection, etc.
    - These tanks would be monitored on a regular basis and spill containment would be incorporated into the design of the tanks.
    - Spill containment and cleanup materials would be stored on-site to contain and cleanup small spills.
- If abandoned underground storage tanks (USTs) or other storage structures are encountered during site preparation activities, they and their contents would be assessed, removed, and disposed according to MPCA and local regulations and guidelines.
- A management plan would be developed for the project to minimize impacts to soils and groundwater in the event a release of hazardous substances occurs during construction. If a release were to occur, the MPCA, Minnesota Department of Health (MDH), and/or Department of Public Safety (MDPS) would be contacted immediately.
- To the extent feasible alternative non-hazardous materials would be used for facility maintenance to minimize generation of hazardous and regulated wastes resulting from facility operations.

No Build Alternative:
If the No Build Alternative is selected, additional solid waste would not be generated for disposal. The mitigation measures to manage solid, hazardous, and regulated waste would continue for the existing Metrodome as occurs today.

Given the limited scope of previous environmental assessments and building pre-demolition inspections, the degree of inherent risk from land use environmental hazards is not certain. The potential would remain for disturbance or neglect within the Proposed Project study area to affect human health and the environment at affected properties and potentially off-site.



AMERICAN ENGINEERING TESTING, INC

Map Reference:
U.S. Geological Survey and Digital Aerial Solutions, LLC: USGS High Resolution Orthoimagery, Minneapolis-St. Paul, Minnesota, Spring 2012

N

0 150 300

Feet

Figure 1

Proposed Project Location Map

The People's Stadium
Minneapolis, Minnesota

Date: 03/18/2013 AET Project No. 02-02015

File: Peoples.mxd Date: 03/18/2013

Property-Specific Environmental Review
Proposed Project Study Area for
The People's Stadium

Block 70 - 700 4th Street South

Background Information

- The property is currently owned and occupied by a Star Tribune facility and parking lot.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases. Many of the surrounding properties are identified.
- A review of historical fire insurance maps revealed various businesses occupied the property including a paper company, storage warehouse, and railroad operations.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 70 - 701 3rd Street South

Background Information

- The property is currently owned and occupied by a Star Tribune facility and parking lot.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases. Many of the surrounding properties are identified.
- A review of historical fire insurance maps revealed various businesses occupied the property including a sheet metal shop, wagon shop, and railroad operations.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 70 - 713 3rd Street South

Background Information

- The property is currently owned and occupied by a Star Tribune facility and parking lot.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases. Many of the surrounding properties are identified.
- A review of historical fire insurance maps revealed various businesses occupied the property including a sheet metal shop and railroad operations.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 70 - 716 4th Street South

Background Information

- The property is currently owned and occupied by a Star Tribune facility and parking lot.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is identified in regulatory databases.
    - Tank Site 2785
    - Hazardous Waste, Small to Minimal Quantity Generator (QG)
- A review of historical fire insurance maps revealed various businesses occupied the property including a carpenter shop and railroad operations.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 70 - 719 3rd Street South

Background Information

- The property is currently owned and occupied by a Star Tribune facility and parking lot.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases. Many of the surrounding properties are identified.
- A review of historical fire insurance maps revealed various businesses occupied the property including a tin and plating shop, welding, and railroad operations.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 70 - 728 4th Street South

Background Information

- The property is currently owned and occupied by a Star Tribune facility and parking lot.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is identified in regulatory databases.
    - Tank Site 2868
    - Hazardous Waste, Small to Minimal Quantity Generator (QG)
- A review of historical fire insurance maps revealed various businesses occupied the property including a tin shop, business college, high school, machine shop, and railroad operations.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 71 - 300 9th Avenue South

Background Information

- The property is currently occupied by a paved parking lot used for hourly and contract parking.
- Subsurface investigations conducted by EnPro Assessment Corporation (EnPro) in 1990 and Braun Intertec Corporation (Braun) in 2007 encountered fill soils to 14 feet and identified low concentrations of volatile organic compounds (VOCs) and polynuclear aromatic hydrocarbons (PAHs) below regulatory limits. Elevated concentrations of barium, arsenic, and copper exceeded regulatory limits in three soil samples collected. The groundwater sample collected was analyzed for PAHs and did not exhibit concentrations above regulatory limits.
- Due to the elevated levels of PAHs and metals identified in fill soils and historical uses of the property and adjacent sites, Braun recommended the property be enrolled in the Minnesota Pollution Control Agency (MPCA) Voluntary Investigation and Cleanup (VIC) program.
- A Phase I Environmental Site Assessment (ESA) conducted by AET in 2012 identified historical businesses (filling station, automobile dealership, and electroplating business) adjacent to the property a recognized environmental condition.
- According to Environmental Database Resources, Inc. (EDR) and the MPCA public online resource "What's in My Neighborhood?" the property is identified in regulatory databases.
    - VIC Site VP2240
        - Program participation dates are listed as May 30, 1990 through March 17, 1999.
        - A Limited No Further Action Letter was sent on October 9, 1990.
- A Petroleum Brownfields (PB) site assumed to be associated with the construction of Norm McGrew Place adjacent to the property was identified.
    - PB Site 3521 (Park Avenue Extension)
- A review of historical fire insurance maps revealed residential dwellings and a parking lot occupied the property. Adjacent land use includes filling stations, foundry, ironworks, and railroad operations.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property. AET requested a file review for the above-mentioned VIC and PB sites. These files have not been made available for review.

Block 71 - 318 9th Avenue South

Background Information

- The property is currently occupied by Hiawatha light rail tracks and associated maintenance facilities.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases. Many of the surrounding properties are identified.
- A review of historical fire insurance maps revealed various businesses occupied the property including a bottling company, plumbing & heating company, box factory, liquor warehouse, auto garage, and railroad operations.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 71 - 811 3rd Street South

Background Information

- The property is currently occupied by a paved parking lot used for hourly and contract parking.
- A Phase I Environmental Site Assessment (ESA) conducted by AET in 2012 identified historical businesses (filling station, automobile dealer and electroplating business) adjacent to the property a recognized environmental condition.
- According to Environmental Database Resources, Inc. (EDR) and the MPCA public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases. Many of the surrounding properties are identified.
- A review of historical fire insurance maps revealed residential use of the property and a piping warehouse. Adjacent land use includes a bottling company, a parking lot, plumbing & heating company, box factory, liquor warehouse, auto garage, and railroad operations.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 73 - 424 Chicago Avenue

Background Information

- The property is currently occupied by a concourse for the Metrodome Sports Facility with Hiawatha light rail tracks intersecting the property at the northeast and southwest corners.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases.
- A review of historical fire insurance maps revealed various businesses occupied the property including a machine shop, carpentry, furniture factory, and printing company.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 73 - 701 4th Street South

Background Information

- The property is currently occupied by a parking lot with Hiawatha light rail tracks intersecting the property from the northeast to the southwest corner.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is identified in regulatory databases. AET reviewed the following MPCA leaksite files:
    - Leak Site 13494
        - Petroleum-impacted soils were encountered during a geotechnical exploration conducted by STS Consultants, Ltd. (STS) for construction of the Metrodome Light Rail Transit (LRT) parking ramp in March 2000.
        - Diesel range organics (DRO) was detected in one soil boring approximately 15 feet below ground surface (bgs) at a concentration of 2,800 milligrams-per-kilogram (mg/kg).
        - STS observed the excavation and disposal of petroleum-impacted soils from the site during construction activities.
        - DRO was detected in one soil sample collected 15 feet bgs at a concentration of 130 mg/kg; petroleum impacts were not identified at the base elevation of 30 feet bgs.
        - The MPCA granted site closure on October 15, 2007.
    - Leak Site 14208 (MCDA Site)
        - STS completed an excavation report for the removal of three 500-gallon USTs discovered during construction of the Metrodome LRT parking ramp in May 2001.
        - Approximately 100 cubic yards of soil was excavated from the property for thermal treatment. There were no impacted soils observed greater than 5 feet below the tank basin.
        - Three soil samples were analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), DRO, gasoline range organics (GRO), polynuclear aromatic hydrocarbons (PAHs), and resource conservation and recovery act (RCRA) metals.
        - Lead and DRO were the only compounds detected but at levels below regulatory limits.
        - The MPCA granted site closure on November 24, 2004.

Block 73 - 701 4th Street South

Background Information (continued)

- A Petroleum Brownfields (PB) site assumed to be associated with the construction of the LRT parking ramp was identified. AET requested a file review for the PB site; however the file was not available for review.
    - PB Site 3323 (Proposed Metrodome LRT Station)
        - The site is located at 5th Street South and Park Avenue South.
- A review of historical fire insurance maps revealed various businesses occupied the property including a machine shop, carpentry, furniture factory, and printing company.

Assessment
Based on previous assessments conducted at the property and historical property use, it is expected that contamination will be encountered during redevelopment of the property.

Block 74 - 425 Portland Avenue

Background Information

- The property consists of a five-story structure with a basement, parking lots, and a subterranean storage room located north of Block 74 and under South 4th Street. The subterranean storage room is located at 350 Park Avenue and is connected to the basement of the Star Tribune office building that is located on the subject property.
- A Phase I Environmental Site Assessment (ESA) conducted by URS in 2007 identified lead-laden dust as a recognized environmental condition. The Star Tribune's historic operations included lead-smelting. A lead dust cleanup was conducted in the building; however lead-laden dust is reported to remain in the ceiling and ductwork in the basement.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is identified in regulatory databases. AET reviewed the following MPCA leaksite files:
    - Leak Site 1584
        - Impacted soil was observed during the removal of three underground storage tanks (USTs) in 1989.
        - Tank #1 was located in the southeast corner of the property and 1,100 gallons in capacity. Soil samples were collected from the tank basin approximately 6 feet below ground surface (bgs). Analytical results were non-detect for benzene, toluene, ethylbenzene, and xylene (BTEX); total hydrocarbons (THC) as fuel oil was detected at a concentration of 120 parts-per-million (ppm).
        - Tank #2 (5,000 gallons) used for gasoline storage and Tank #3 (10,000 gallons) used for fuel oil storage were located in the northeast corner of the property. Both tanks were located in the same tank basin.
        - Sidewall samples had detections of fuel oil ranging from non-detect to 1,200 ppm; base samples had fuel oil detections ranging from 3.6 to 1,500 ppm.
        - Five cubic yards of soil were excavated and a stockpile sample indicated a fuel oil detection of 2.7 ppm. Based on the small quantity and chemistry, the MPCA approved thin spreading of the soil on-site.
        - The MPCA granted site closure on May 10, 1990.

Block 74 - 425 Portland Avenue

Background Information (continued)

  - Leak Site 7981
    - Contaminated soils were discovered during the removal of two 6,000-gallon fuel oil USTs in October 1994.
    - Organic vapor readings ranged from 40.4 to 989 ppm; DRO was detected in four soil samples at concentrations ranging from 9,700 to 37,000 ppm.
    - Approximately 147 tons of contaminated soils was excavated and transported for thermal treatment.
    - A soil boring was advanced to address the vertical extent of remaining contamination. A soil sample collected from the boring just above bedrock (38 ft.) contained 210 ppm DRO and a water sample collected at 40 ft. had a low-level detection of toluene below regulatory limits.
    - The MPCA granted site closure on December 19, 1995.
  - Tank Site 2687
  - Hazardous Waste, Small to Minimal Quantity Generator (QG) - Active
- A review of historical fire insurance maps revealed various businesses occupied the property including a lumber yard, machine shop, painting, blacksmith, and a printing and publishing facility.

Assessment
Based on previous assessments conducted at the property and historical property use, it is expected that contamination will be encountered during redevelopment of the property.

Block 75 - 416 Portland Avenue

Background Information

- The property is currently paved and operated as a parking lot.
- A Phase I Environmental Site Assessment (ESA) conducted by URS in 2007 identified no recognized environmental conditions relative to the property.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases. Many of the surrounding properties are identified.
- A review of historical fire insurance maps revealed various businesses occupied the property including a machine shop, manufacturing company, and engraving facility.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 75 - 501 4th Street South

Background Information

- The property is currently paved and operated as a parking lot.
- A Phase I Environmental Site Assessment (ESA) conducted by URS in 2007 identified no recognized environmental conditions relative to the property.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases. Many of the surrounding properties are identified.
- An underground storage tank (UST) removal report referenced by URS indicated four USTs associated with a former filling station were removed from the property in 1989. Soil sampling and analysis did not detect benzene, toluene, ethylbenzene, and xylene (BTEX) or total petroleum hydrocarbons (TPH). Lead was detected at concentrations below MPCA action levels.
- A review of historical fire insurance maps revealed various businesses occupied the property including a machine shop, printing and publishing facilities, laundry company, an auto repair shop, rubber stamp manufacturing, a clothing factory, and a filling station.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 75 - 520 5th Street South

Background Information

- The property is currently paved and operated as a parking lot.
- A Phase I Environmental Site Assessment (ESA) conducted by URS in 2007 identified no recognized environmental conditions relative to the property.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases. Many of the surrounding properties are identified.
- A review of historical fire insurance maps revealed various businesses occupied the property including municipal storage and repair shops.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 75 - 521 4th Street South

Background Information

- The property is currently paved and operated as a parking lot.
- A Phase I Environmental Site Assessment (ESA) conducted by URS in 2007 identified no recognized environmental conditions relative to the property.
- According to Environmental Database Resources, Inc. (EDR) and the (MPCA) public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases. Many of the surrounding properties are identified.
- A review of historical fire insurance maps revealed various businesses occupied the property including machine shops, painting, printing, and bindery.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 94 - 530 Chicago Avenue

Background Information

- The property is currently occupied by the Hennepin County Forensic Sciences Building and the McGill parking lot.
- A Phase I Environmental Site Assessment (ESA) conducted by AET in 2012 identified the following recognized environmental conditions:
    - Petroleum contamination associated with the removed/replaced underground storage tank (UST) at the property and the former UST at 501 Park Avenue.
    - Releases of petroleum products associated with nearby and/or up-groundwater gradient sites.
    - Release potential associated with historical businesses at the property.
    - Fill soils exist at the property.
    - Release potential associated with previous and existing elevator hoists.
- A Phase II ESA conducted by AET in 2012 identified fill soils up to 10 feet thick containing demolition debris. Fill soil on the property is impacted with diesel range organics (DRO) and polynuclear aromatic hydrocarbons (PAHs) above regulatory limits.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property and associated addresses are identified in regulatory databases.
    - Tank Site 2114 (530 Chicago Avenue)
    - Tank Site 2091; Hazardous Waste, Small to Minimal Quantity Generator (QG) – Inactive (501 Park Avenue)
    - Hazardous Waste, Small to Minimal QG - Active (531 Park Avenue)
- A review of historical fire insurance maps revealed various businesses occupied the property including a lumber yard, electroplating, engraving, laundry, painting, printing, binding and lithography, and a filling station.

Assessment

Based on previous assessments conducted by AET and historical property use, it is expected that contamination will be encountered during redevelopment of the property.

Block 106 - 309 9th Avenue South

Background Information

- The property is currently occupied by a paved parking lot used for hourly and contract parking.
- Subsurface investigations conducted by EnPro Assessment Corporation (EnPro) in 1992 and Braun Intertec Corporation (Braun) in 2007 encountered fill soils to 15 feet and identified low concentrations of volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs), and metals below regulatory limits. Elevated concentrations of arsenic, copper, and lead exceeded regulatory limits in two samples collected. Groundwater samples did not exhibit concentrations above regulatory limits, with the exception of one trichloroethene (TCE) concentration slightly above its respective Minnesota Department of Health (MDH) Health Risk Limit (HRL).
- Due to the elevated levels of VOCs, PAHs and metals identified in fill soils and historical uses of the property and adjacent sites, Braun recommended the property be enrolled in the Minnesota Pollution Control Agency (MPCA) Voluntary Investigation and Cleanup (VIC) program.
- According to Environmental Database Resources, Inc. (EDR) and the MPCA public online resource "What's in My Neighborhood?" the property is identified in regulatory databases. AET reviewed
    - VIC Site VP3060
        - The program participation dates are listed as May 14, 1992 through December 25, 1996.
- A Petroleum Brownfields (PB) site assumed to be associated with the construction of Norm McGrew Place was identified.
    - PB Site 3521 (Park Avenue Extension)
- A review of historical fire insurance maps revealed various businesses occupied the property including a foundry, piping yard, machine shop, and railroad operations.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 113 – 810 7th Street South

Background Information

- The property is currently owned and occupied by the First Covenant Church of Minneapolis and a parking lot.
- According to the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is identified in a regulatory database.
    - Hazardous Waste, Small to Minimal Quantity Generator (QG) – Active
- A review of historical fire insurance maps revealed residential use of the property and a church and bible school. Adjacent land use includes a hospital, nursing home, public school, parking garage and machine shop.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 113 – 815 6th Street South

Background Information

- The property is currently owned by the First Covenant Church of Minneapolis and operated as a parking lot.
- According to Environmental Database Resources, Inc. (EDR) and the (MPCA) public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases. Many of the surrounding properties are identified.
- A review of historical fire insurance maps revealed residential use of the property. Adjacent land use includes a church and bible school, hospital, nursing home, public school, parking garage and machine shop.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Block 113 – 827 6th Street South

Background Information

- The property is currently paved and operated as a parking lot.
- According to Environmental Database Resources, Inc. (EDR) and the (MPCA) public online resource "What's in My Neighborhood?" the property is not identified in regulatory databases. Many of the surrounding properties are identified.
- A review of historical fire insurance maps revealed residential use of the property and a parking garage. Adjacent land use includes a church and bible school, hospital, nursing home, public school and machine shop.

Assessment

It is not certain that contamination will be encountered during redevelopment of the property. Since the property is located in a mature commercial business district, the potential exists for past spills or releases of hazardous materials and/or petroleum products by the former businesses on or adjacent to the property.

Metrodome Sports Facility - 900 5th Street South

Background Information

- The property is currently occupied by the Hubert H. Humphrey Metrodome and parking lot, which is owned and operated by the Minnesota Sports Facilities Authority.
- AET conducted geotechnical exploration and review in 2007, 2008, and 2013. The geologic profile at the property consists of fill, overlying alluvial and glacially deposited overburden soils down to bedrock, which is dolomitic limestone of the Platteville Formation. Glenwood Formation appears beneath the Platteville Formation, below which, St. Peter Sandstone exists to a substantial depth.
- Overburden soils consist of coarse alluvium (sand to silty sand) and glacial till (silty sand with some clayey sand and sandy lean clay).
- Petroleum odors were encountered in a soil boring at the property approximately 20 feet below ground surface (bgs) in February 2013. Organic vapors were detected in samples from 27 to 31 feet ranging in concentrations of 23 to 45 ppm. The source, degree, and extent are unknown.
- According to Environmental Database Resources, Inc. (EDR) and the Minnesota Pollution Control Agency (MPCA) public online resource "What's in My Neighborhood?" the property is identified in regulatory databases.
    - Tank Site 18117 (HHH MetroDome)
    - Spills (Xcel-Pad Mount Transformer)
        - An estimated five gallon release of mineral oil leaking from a transformer was reported. A transformer change out was performed and the spill was cleaned up.
        - Spill Closure: Response Completed.
    - Hazardous Waste, Small to Minimal Quantity Generator (QG) – Active (HHH MetroDome)
    - Hazardous Waste, Small to Minimal QG – Inactive (Fuji Photo Film)
- A review of historical fire insurance maps revealed residential dwellings and various businesses occupied the property and adjacent sites including a morgue, machine shop, ironworks, hospital, filling stations, and railroad operations.

Assessment

Based on previous assessments conducted by AET and historical property use, it is expected that contamination will be encountered during redevelopment of the property.

Memorandum

Suite 238N
2550 University Avenue West
St. Paul, Minnesota
55114

Date: July 2013

To: Steve Maki, Project Engineer

From: JoNette Kuhnau, P.E., PTOE
Kimley-Horn and Associates, Inc.

Subject: Minnesota Multi-Purpose Stadium
Traffic Technical Memorandum

1. Vehicle Traffic Analysis

This technical memorandum summarizes the detailed traffic operations analysis of the Proposed Project. To determine the impacts of the Proposed Project on the local roadway network compared to the impacts of the Metrodome, a traffic operations analysis was conducted for intersections and parking facilities within the vicinity of the new Stadium for many different event and non-event scenarios. For the purposes of this technical memorandum, the terms “event” or “NFL event” are intended to mean any capacity event at the new Stadium.

1.1 Analysis Scenarios

Several different scenarios were analyzed to identify the potential impacts of the Proposed Project compared to the Metrodome use. Those scenarios are:

- Weekday AM peak hour (non-event)
- Weekday PM peak hour (non-event)
- Weekend (Sunday) event arrival
- Weekend (Sunday) event departure
- Weekend (Sunday) event arrival with Park Avenue South/Portland Avenue South closures between 4th Street South and 5th Street South
- Weekday (Monday or Thursday evening) event arrival coinciding with the PM peak hour

Background (non-event) traffic levels for a weekend (Sunday) 12:00 PM game start compared with a 3:00 PM or 6:00 PM game start are all relatively low; therefore, only one weekend event arrival scenario was analyzed. Similarly, background traffic volumes for both weekend and weekday event departures were minimal, so only one departure scenario was analyzed. Traffic operations were analyzed for one hour of the pre-event arrival period and one hour of the post-event departure period.

Each of the above event scenarios was analyzed for the No Action (existing Metrodome) and Proposed Project conditions in year 2017 (one year after opening of the new Stadium) and 2030 (forecast year). In addition, each Proposed Project scenario was analyzed for two possible parking plans, for a total of 32 separate scenarios. The parking plans are discussed further in Section 1.4.

1.2 Assumptions and Methodology

The traffic analysis in the Proposed Project study area is generally bounded by Washington Avenue to the north, I-35W corridor to the east, 10th Street to the south, and 2nd Avenue N to the west. The specific intersections analyzed for each scenario are discussed within the following sections. Most of the intersections included in the analysis are currently signalized and are assumed to remain signalized in the future conditions.

In addition to the Proposed Project, several independent infrastructure improvements are planned within the traffic analysis study area for the Proposed Project.

- A signal timing optimization project that includes all signalized intersections in downtown Minneapolis is being led by the City of Minneapolis and will be implemented in 2013. The project includes timing plans for AM peak, PM peak, off-peak, and an event plan for Target Field. The existing event plan extends to 2nd Avenue South to the east, and therefore does not include the area around the new Stadium.
- A project led by Hennepin County will construct a new freeway entrance ramp from 4th Street South to I-35W northbound and is currently planned to be completed by 2014.
- The Central Corridor LRT line will share the existing Hiawatha LRT alignment within the study area, utilizing the same stations. This project is being led by Metro Transit and is planned to open in 2014.

The *Access Minneapolis Ten-Year Transportation Action Plan* identifies several other potential future recommended roadway improvements near the study area that have not been included in the analysis of the Proposed Project because they are not currently programmed or funded. The potential improvements as identified in the plan are as follows:

- Two-way operations on Park Avenue South and Portland Avenue South
- Two-way operations on 9th Street South and 10th Street South, east of 5th Avenue South
- New exit ramp from westbound I-94 to 7th Street South
- Changes to Washington Avenue South and 3rd Street South interchanges at I-35W

The assumptions for each of the analysis scenarios are summarized in **Tables 1.2-1** and **Table 1.2-2** below.

Table 1.2-1. Non-Event Analysis Assumptions

Analysis Parameter	Assumption
Background Growth Rate	0.5% per year
Traffic Volumes	Existing peak hour turning movement volumes, counted for all downtown Minneapolis intersections in 2011 as part of the downtown signal retiming project
Roadway Network	5th Street South closed between 11th Avenue South and either Chicago Avenue or Park Avenue All other roadways remain open
Signal Timing	AM peak – proposed AM peak plan PM peak – proposed PM peak plan

Table 1.2-2. Event Analysis Assumptions

Analysis Parameter	Assumption
Stadium Capacity	65,000 attendees No Action 73,000 attendees Build
Background Growth Rate	0.5% per year
Background Traffic	Weekday event arrival – 100% of PM peak hour Weekend event arrival – 25% of AM peak hour Weekend event departure – 25% of PM peak hour Existing peak hour turning movement volumes were based on turning movement counts conducted for all downtown Minneapolis intersections in 2011 as part of the downtown signal retiming project
Event Mode Split	500 attendees – No Action walk/bike 1,000 attendees – Proposed Project walk/bike 500 attendees – Metro Transit regular bus routes 1,850 attendees – Metro Transit express bus 2,000 attendees – charter bus 11,810 attendees – No Action LRT and Commuter Rail (2017) 16,410 attendees – Proposed Project LRT and Commuter Rail (2017) 26,410 attendees – No Action LRT and Commuter Rail (2030) 31,010 attendees – Proposed Project LRT and Commuter Rail (2030)
Event Auto Occupancy	2.75

Analysis Parameter	Assumption
Event Peak Arrival	PM peak hour (4:30-5:30 PM) coincides with peak event arrival for 7:00 PM weekday game start 50% attendees arrive in peak hour
	10:30-11:30 AM for a 12:00 PM weekend game start 50% attendees arrive in peak hour
Event Peak Departure	3:00-4:00 PM for a 3:00 PM weekend game end 70% attendees depart in peak hour
Event Signal Timing	Weekday event arrival – proposed PM peak plan Weekend event arrival – proposed AM peak plan Weekend event departure – proposed PM peak plan

The number of permanent seats in the Proposed Project's new Stadium is planned to be approximately 65,500 but with the ability to expand to 73,000 seats through the use of temporary seating inside the new Stadium. Therefore all scenarios were analyzed for a capacity event of 73,000 attendees as a worst case scenario.

The number of attendees using transit to travel to and from NFL events was based on ridership forecasts provided by Metro Transit in December 2012. The 2017 ridership forecasts include the Hiawatha LRT, Central Corridor LRT, and Northstar commuter rail lines. The 2030 ridership forecasts also include the Southwest LRT and Bottineau LRT lines.

The trip distribution and routes of vehicular traffic arriving to and departing from an NFL event were based on the distribution of existing Vikings season ticket holders, as well as traffic counts conducted during NFL events in fall 2012. The event traffic distribution is shown in **Figure 1.2-1**.

The traffic operations analysis was completed in Synchro/SimTraffic, a software program that applies the methodologies of the *Highway Capacity Manual*. This tool was used to evaluate intersection volume/capacity ratio, operations, level of service, and queuing. Level of service (LOS) is a rating system that describes how well an intersection operates. LOS A operations indicate the best traffic operations (little delay) and LOS F indicates an intersection that is failing to operate effectively. Operations of LOS D or better are generally considered acceptable to drivers under peak conditions.

1.3 Local Roadway Network – Weekday Non-Event Analysis

The analysis of the weekday peak hour non-event conditions was used to identify the impacts of the closure of 5th Street between 11th Avenue and either Chicago Avenue or Park Avenue. This segment of 5th Street currently carries approximately 2,955 vehicles per day (2010 count, according to the City of Minneapolis Transportation Data Management System) and the surrounding transportation network will need to absorb this traffic. All analysis was completed for 2017, one year after Stadium opening, and the future year 2030. The intersections included in the analysis were discussed with the City

of Minneapolis and were elected based on the available alternative routes for the 5th Street traffic, as well as known driver behavior and traffic patterns in the downtown area. The intersections included in the weekday non-event analysis are shown in **Figure 1.3-1**.

Sensitivity testing was performed using the Metropolitan Council regional travel demand model to determine if the permanent closure of this segment of 5th Street would be expected to result in changes to the traffic volumes on the regional transportation network. This could occur if, for example, a driver on westbound I-94 decided to use the 11th Street South exit rather than the 5th Street exit into downtown Minneapolis. The regional model showed that with 5th Street closed, the traffic volume change on any freeway mainline segment or ramp was less than 500 vehicles per day. The existing daily volume on the 11th Street South exit ramp is approximately 15,000 vehicles per day, and therefore even 500 vehicles per day would represent a very minor change that would likely not be distinguishable from the daily variability in volume. Therefore, the 5th Street closure would be expected to have very little, if any, impact on the regional transportation network according to the model, and no further analysis of the freeway system was completed for this scenario.

Two roadway network options were analyzed for the 5th Street South closure:

- Option 1: 5th Street closed from 11th Avenue to Chicago Avenue, with traffic rerouted to Washington Avenue and 7th Street
- Option 2A: 5th Street closed from 11th Avenue to Chicago Avenue, with traffic rerouted onto a new westbound lane ("contraflow" lane) on 6th Street, which is currently a one-way eastbound roadway
- Option 2B: 5th Street closed from 11th Avenue to Park Avenue, with traffic rerouted onto a new westbound lane ("contraflow" lane) on 6th Street, which is currently a one-way eastbound roadway

Under all options, the existing median separating 5th Street and 6th Street was assumed to be removed. The 5th Street/11th Avenue signalized intersection was assumed to be reconfigured and realigned to be a perpendicular intersection with three westbound lanes (one right-turn and two left-turn lanes) and the traffic signal would need to be reconstructed at the new location. The realignment of the intersection provides improved approach geometry on 5th Street as well as providing greater queuing distance on 11th Avenue between 5th Street and 6th Street. The segment of 11th Avenue south of 5th Street South was also assumed to be modified to include a second southbound lane to 7th Street (Option 1) or 6th Street (Options 2A/2B) to facilitate the additional traffic volumes in these blocks.

Under both of the Option 2 analyses, access to the properties on 5th Street and Chicago Avenue are planned to be maintained. The configuration or location of the access points may need to be modified based on the new Stadium and surrounding roadway and plaza design. Changes to the access

design or location would need to be coordinated with the City of Minneapolis as the roadway authority.

The assumptions regarding traffic rerouting and geometrics are described in the following paragraphs.

Option 1 Assumptions

For the purposes of the analysis, all traffic on 5th Street was assumed to use either 7th Street or Washington Avenue. This is a worst case scenario since drivers could choose other routes based on their ultimate destination. Based on existing peak hour turning movement volumes along 5th Street, in the AM peak approximately 50 percent of existing traffic on 5th Street was assumed to reroute to 7th Street and 50 percent was assumed to reroute to Washington Avenue, both via 11th Avenue. In the PM peak approximately 60 percent of existing traffic on 5th Street was assumed to reroute to 7th Street and 40 percent was assumed to reroute to Washington Avenue, both via 11th Avenue. Traffic diverted to 7th Street and Washington Avenue was assumed to turn at the intermediate intersections along the route, similar to the existing travel patterns on 5th Street. The remaining rerouted traffic on 7th Street was assumed to use Park Avenue to return to 5th Street, and traffic diverted to Washington Avenue was assumed to use Portland Avenue to return to 5th Street. Since it is likely that not all traffic has destinations on 5th Street and would choose to go back to the 5th Street corridor, this is a conservative assumption that represents the worst case.

To accommodate the increased westbound left-turn volume on 5th Street and southbound volume on 11th Avenue, an additional southbound lane was assumed that would operate as a through lane at the 6th Street intersection and would end as a right-turn only lane at 7th Street. The improved geometrics for Option 1 are shown in **Figure 1.3-2**. The 2017 and 2030 traffic volumes for Option 1 are shown in **Figure 1.3-3** and **Figure 1.3-4**.

Option 2 Assumptions

In the Option 2 scenarios, all traffic on 5th Street was assumed to use the 6th Street contraflow lane, via 11th Avenue, with the exception of traffic destined for southbound Chicago Avenue, which was assumed to use 7th Street. This assumption was made due to the difficulty of making a westbound left-turn movement from the 6th Street contraflow lane onto Chicago Avenue, which would cross three lanes of opposing eastbound traffic. This movement would likely experience delays due to the lack of gaps in eastbound traffic, and therefore drivers may choose an alternate route (7th Street). Traffic diverted from 5th Street to 6th Street was assumed to use Chicago Avenue or Park Avenue to return to 5th Street.

To accommodate the increased westbound left-turn volume on 5th Street at 11th Avenue and the southbound right-turn volume on 11th Avenue at 6th Street, an additional southbound lane was assumed to be added on 11th Avenue from 5th Street to 6th Street, which would end as a right-turn only lane

at 6th Street. The improved geometrics for Option 2A and 2B are shown in **Figure 1.3-5**. The 2017 and 2030 traffic volumes for Option 2A and 2B are shown in **Figure 1.3-6** and **Figure 1.3-7**.

Results

The results of the Weekday Non-Event scenario modeling for year 2017 are shown in **Table 1.3-1** and **Table 1.3-2**. The LOS results for year 2030 are provided in **Table 1.3-3** and **Table 1.3-4**.

As shown by the intersection LOS results, all the options have one or more intersections with poor operations. Under Option 1, the Washington Avenue /11th Avenue intersection is expected to operate over capacity in the AM and PM peak hours, primarily due to the increase in northbound left-turn traffic from 5th Street. However, the intersection would already be expected to operate at LOS F in the No Action PM Peak hour conditions, with 5th Street open to traffic.

Under Options 2A and 2B, the 5th Street/11th Avenue intersection is expected to operate over capacity in the AM peak hour and the Washington Avenue/11th Avenue intersection is expected to operate over capacity in the PM peak hour. However, both intersections were also shown to operate poorly in the No Action peak hour conditions..

Table 1.3-1. 2017 Weekday Non-Event Analysis Results – AM Peak

Intersection	Overall Intersection Delay (sec) and Level of Service			
	No Action	Option 1 – Reroute to 7th St S and Washington Ave S	Option 2A – Contraflow to Chicago Ave S	Option 2B – Contraflow to Park Ave S
Washington Ave S / 11th Ave S	50.2 D	**90.3** **F**	51.5 D	45.2 D
Washington Ave S / Chicago Ave S	14.6 B	16.7 B	15.0 B	15.2 B
Washington Ave S / Park Ave S	6.6 A	9.1 A	6.3 A	5.7 A
Washington Ave S / Portland Ave S	13.0 B	24.4 C	11.6 B	14.0 B
5th St S / 11th Ave S	**198.2** **F**	**200+** **F**	**188.1** **F**	**182.6** **F**
5th St S / Chicago Ave S	26.6 C	13.9 B	20.4 C	10.0 A

Intersection	Overall Intersection Delay (sec) and Level of Service			
	No Action	Option 1 – Reroute to 7th St S and Washington Ave S	Option 2A – Contraflow to Chicago Ave S	Option 2B – Contraflow to Park Ave S
5th St S / Park Ave S	21.6 C	33.6 C	16.2 B	29.6 C
5th St S / Portland Ave S	18.4 B	26.4 C	22.8 C	22.2 C
6th St S / 11th Ave S	10.9 B	15.5 B	13.0 B	15.5 B
6th St S / Chicago Ave S	15.0 B	20.5 C	36.0 D	30.1 C
6th St S / Park Ave S	12.3 B	20.5 C	12.4 B	23.8 C
7th St S / 11th Ave S	21.0 C	32.8 C	21.7 C	21.4 C
7th St S / Chicago Ave S	24.5 C	44.5 D	23.7 C	25.1 C
7th St S / Park Ave S	13.5 B	17.0 B	13.6 B	13.4 B
7th St S / Portland Ave S	12.9 B	12.1 B	12.8 B	14.2 B
Total Number of Intersections Operating at Each Level of Service				
Level of Service A	1	1	1	2
Level of Service B	8	5	7	5
Level of Service C	4	6	4	6
Level of Service D	1	1	2	1
Level of Service E	0	0	0	0
Level of Service F	1	2	1	1

Table 1.3-2. 2017 Weekday Non-Event Analysis Results – PM Peak

Intersection	Overall Intersection Delay (sec) and Level of Service			
	No Action	Option 1 – Reroute to 7th St S and Washington Ave S	Option 2A – Contraflow to Chicago Ave S	Option 2B – Contraflow to Park Ave S
Washington Ave S / 11th Ave S	**194.3 F**	**193.6 F**	**154.8 F**	**177.3 F**
Washington Ave S / Chicago Ave S	20.5 C	22.3 C	20.8 C	21.0 C
Washington Ave S / Park Ave S	7.4 A	7.3 A	6.9 A	7.2 A
Washington Ave S / Portland Ave S	12.1 B	15.2 B	10.8 B	11.0 B
5th St S / 11th Ave S	20.6 C	22.9 C	23.8 C	25.9 C
5th St S / Chicago Ave S	34.3 C	5.6 A	13.4 B	4.5 A
5th St S / Park Ave S	33.4 C	50.1 D	29.5 C	33.4 C
5th St S / Portland Ave S	15.0 B	12.3 B	11.0 B	12.0 B
6th St S / 11th Ave S	14.8 B	20.4 C	21.7 C	25.3 C
6th St S / Chicago Ave S	13.7 B	13.9 B	17.5 B	15.1 B
6th St S / Park Ave S	13.8 B	16.5 B	13.8 B	11.1 B
7th St S / 11th Ave S	24.1 C	21.2 C	20.2 C	21.4 C
7th St S / Chicago Ave S	22.2 C	22.5 C	23.7 C	21.5 C
7th St S / Park Ave S	8.5 A	9.5 A	8.3 A	8.4 A
7th St S / Portland Ave S	16.5 B	17.5 B	16.1 B	13.9 B
Total Number of Intersections Operating at Each Level of Service				
Level of Service A	2	3	2	3

Intersection	Overall Intersection Delay (sec) and Level of Service			
	No Action	Option 1 – Reroute to 7th St S and Washington Ave S	Option 2A – Contraflow to Chicago Ave S	Option 2B – Contraflow to Park Ave S
Level of Service B	6	5	6	5
Level of Service C	6	5	6	6
Level of Service D	0	1	0	0
Level of Service E	0	0	0	0
Level of Service F	1	1	1	1

Table 1.3-3. 2030 Weekday Non-Event Analysis Results – AM Peak

Intersection	Overall Intersection Delay (sec) and Level of Service			
	No Action	Option 1 – Reroute to 7th St S and Washington Ave S	Option 2A – Contraflow to Chicago Ave S	Option 2B – Contraflow to Park Ave S
Washington Ave S / 11th Ave S	**80.7 F**	**94.3 F**	**79.4 E**	**70.9 E**
Washington Ave S / Chicago Ave S	16.4 B	26.6 C	15.9 B	15.4 B
Washington Ave S / Park Ave S	6.6 A	14.4 B	6.8 A	6.8 A
Washington Ave S / Portland Ave S	14.3 B	30.6 C	14.8 B	15.4 B
5th St S / 11th Ave S	**200 + F**	**200 + F**	**200 + F**	**200 + F**
5th St S / Chicago Ave S	26.8 C	16.8 B	21.0 C	10.0 A
5th St S / Park Ave S	20.6 C	34.9 C	16.7 B	32.3 C
5th St S / Portland Ave S	18.8 B	43.1 D	22.7 C	22.3 C

Intersection	Overall Intersection Delay (sec) and Level of Service			
	No Action	Option 1 – Reroute to 7th St S and Washington Ave S	Option 2A – Contraflow to Chicago Ave S	Option 2B – Contraflow to Park Ave S
6th St S / 11th Ave S	12.2 B	20.0 B	18.3 B	19.4 B
6th St S / Chicago Ave S	14.1 B	17.4 B	**55.8** **E**	17.0 B
6th St S / Park Ave S	12.9 B	19.2 B	12.7 B	27.1 C
7th St S / 11th Ave S	22.6 C	32.0 C	23.4 C	25.0 C
7th St S / Chicago Ave S	25.3 C	42.0 D	24.0 C	25.1 C
7th St S / Park Ave S	15.5 B	18.4 B	14.6 B	19.8 B
7th St S / Portland Ave S	14.8 B	14.6 B	14.7 B	15.2 B
Total Number of Intersections Operating at Each Level of Service				
Level of Service A	1	0	1	2
Level of Service B	8	7	7	6
Level of Service C	4	4	4	5
Level of Service D	0	2	0	0
Level of Service E	0	0	2	1
Level of Service F	2	2	1	1

Table 1.3-4. 2030 Weekday Non-Event Analysis Results – PM Peak

Intersection	Overall Intersection Delay (sec) and Level of Service			
	No Action	Option 1 – Reroute to 7th St S and Washington Ave S	Option 2A – Contraflow to Chicago Ave S	Option 2B – Contraflow to Park Ave S
Washington Ave S / 11th Ave S	**200 + F**	**200 + F**	**200 + F**	**200 + F**
Washington Ave S / Chicago Ave S	21.7 C	23.0 C	21.6 C	21.1 C
Washington Ave S / Park Ave S	7.7 A	8.4 A	8.3 A	7.8 A
Washington Ave S / Portland Ave S	11.6 B	18.4 B	14.3 B	15.7 B
5th St S / 11th Ave S	25.5 C	40.7 D	40.5 D	44.6 D
5th St S / Chicago Ave S	25.0 C	7.3 A	13.7 B	8.2 A
5th St S / Park Ave S	45.1 D	**72.7 E**	51.9 D	39.4 D
5th St S / Portland Ave S	13.7 B	12.9 B	12.6 B	13.8 B
6th St S / 11th Ave S	19.2 B	25.5 C	31.4 C	27.6 C
6th St S / Chicago Ave S	13.6 B	15.2 B	18.0 B	13.7 B
6th St S / Park Ave S	13.1 B	23.3 C	16.9 B	14.1 B
7th St S / 11th Ave S	25.3 C	21.9 C	21.9 C	21.9 C
7th St S / Chicago Ave S	22.6 C	23.2 C	23.3 C	21.6 C
7th St S / Park Ave S	8.2 A	15.4 B	8.5 A	8.7 A
7th St S / Portland Ave S	14.6 B	14.2 B	19.8 B	19.4 B
Total Number of Intersections Operating at Each Level of Service				
Level of Service A	2	2	2	3

Intersection	Overall Intersection Delay (sec) and Level of Service			
	No Action	Option 1 – Reroute to 7th St S and Washington Ave S	Option 2A – Contraflow to Chicago Ave S	Option 2B – Contraflow to Park Ave S
Level of Service B	6	5	6	5
Level of Service C	5	5	4	4
Level of Service D	1	1	2	2
Level of Service E	0	1	0	0
Level of Service F	1	1	1	1

1.4 Local Roadway Network – Event Analysis

The event analysis was used to identify the impacts of the Proposed Project on the local roadway network, compared with the impacts of the existing Metrodome use. Field observations conducted in fall 2012 during a weekday and weekend NFL event provided the following information:

- Temporary road closures are currently used from approximately two hours before game start until about one hour after game end on the following segments:
  - 5th Street from 11th Avenue South to Park Avenue South
  - 4th Street from Park Avenue to Norm McGrew Place
  - Chicago Avenue from 3rd Street to 6th Street
  - Norm McGrew Place from 3rd Street to 4th Street
- The temporary road closures are accomplished using City of Minneapolis dump trucks, traffic control officers, and movable barricades.
- Traffic control officers are currently used at the following intersections:
  - 4th Street/Chicago Avenue (LRT crossing)
  - 4th Street/Park Avenue
  - 5th Street/11th Avenue
  - 5th Street/Park Avenue
  - 6th Street/11th Avenue
  - 6th Street/Chicago Avenue

- Event arrival was generally uncongested.
- Pedestrian flows are heaviest along 4th Street, 6th Street, and 11th Avenue. Washington Avenue, 3rd Street, and 5th Street also appeared to be secondary routes. With 4th Street closed east of Park Avenue, pedestrians utilize the roadway to walk towards the Metrodome. Pedestrian flows appeared to be highest in the ½ hour immediately before game start and 15 minutes immediately after game end.
- The large volumes of pedestrian crossings at key intersections impacted traffic turning movements, including 6th Street/Chicago Avenue, 6th Street/11th Avenue, 4th Street/Chicago Avenue, and Washington Avenue/Chicago Avenue.
- Approximately 10-12 officers are used at 4th Street/Chicago Avenue before and after games to safely control pedestrians at the LRT crossing. This has been identified by Metro Transit as a significant operational and safety concern.
- Vehicles frequently queue across the 11th Avenue LRT crossing during both arrival and departure. Officers are also used at this location.
- Bus activity and vehicle drop-offs contributed to the congestion on 11th Avenue. Queues frequently extended through the 5th Street and 6th Street intersections.
- Event departures resulted in significant congestion on Washington Avenue, 11th Avenue, 6th Street, and Park Avenue. Many intersections experienced issues with queue spillback, particularly on roadways approaching Washington Avenue and where turn movements conflict with major pedestrian movements. Vehicle congestion lasted approximately 1-1.5 hours after game end.
- Signing for transit ticket sales and signing for the boarding queues is relatively minimal and not easily seen when exiting the Metrodome.
- Passenger queues for eastbound LRT and bus boarding extended out of the platform area and occupied most of the existing plaza area. The passenger queues for the eastbound LRT platform lasted approximately one hour after game end, with the queue extending out of the existing tent on the plaza and along Chicago Avenue, to approximately the 4th Street intersection.
- There is minimal queuing space for westbound LRT on the existing platform, and there is not adjacent space for queuing due to the grade difference between the platform and the top of the parking ramp on the northwest corner of the site.
- Express buses to park-and-ride locations along the Hiawatha LRT line are used to supplement the LRT capacity during the post-event departures.

The temporary road closures used for the Metrodome are assumed to continue to be used during NFL events at the new Stadium, for approximately the same duration.

In addition to increased capacity, the Proposed Project also includes the construction or designation of 2,500 reserved parking spaces adjacent to the Stadium site. As described previously, four event scenarios were analyzed. Based on input from the City of Minneapolis, a set of intersections were identified for each analysis scenario as shown in **Figures 1.4-1** through **1.4-4**. These figures also show the local roadways that are proposed to be closed during NFL events. The roadways are temporarily closed due to NFL security guidelines, as well as traffic and pedestrian flows near and around the new Stadium site. The temporary closures generally begin two hours before the start of an NFL event and remain until one to two hours after the end of the event. However, the temporary closure of Park Avenue and Portland Avenue (East/West Plaza) are assumed to occur from approximately two hours before the start of weekend events only, and will be reopened after the start of the event. These closures are proposed to provide a continuous park and plaza space prior to events. The temporary closures on Park Avenue and Portland Avenue are assumed to not occur prior to weekday evening games because of the overlap with the PM peak hour traffic flows that heavily utilize these roadways.

In order to provide 2,500 reserved parking spaces for NFL events, a combination of new parking is proposed to be built as part of the Proposed Project as well as designating existing parking spaces for stadium use during events. Two potential parking plans have been proposed to meet the need for 2,500 reserved parking spaces, as described in **Table 1.4-1** and shown in **Figure 1.4-5**. The new parking structures have not yet been designed, but the assumed access locations were based on preliminary information provided in the Proposed Project draft design plans.

Table 1.4-1. Proposed Reserved Parking Plans

Parking Facility	Existing Spaces	Proposed Spaces – Reserved Parking Plan A*	Proposed Spaces – Reserved Parking Plan B†	Assumed Access Locations
McGrew Block	340 (surface)	600 (structure)	400 (structure)	Ingress – 3rd Street S Egress – McGrew Place and 4th Street S
McClellan Block	250 (surface)	0	1,300 (structure) 760 reserved parking 540 public parking	Ingress/Egress – 3rd Street S, Park Avenue S
Downtown East Ramp	455 (structure)	455 (structure)	455 (structure)	Ingress/Egress – Park Avenue S
1st Covenant Church Property	240 (surface)	560 (structure)	0	Ingress/Egress – Carew Drive
1010 Building Ramp	550 (structure)	585 (restriping of existing structure)	585 (restriping of existing structure)	Ingress/Egress – 10th Avenue S
511 Building Ramp	350 (structure)	300 (structure)	300 (structure)	Ingress/Egress – 5th Street S, 6th Street S

* Parking Plan A reflects proposed parking under the North/South Alternate Plaza Configuration.
† Reserved Parking Plan B reflects proposed parking under the East/West Alternate Plaza Configuration.
Note: The parking supplies for Reserved Parking Plan B shown in Table 3.4-1 reflect the concept designs as of June 2013. However, the parking supplies assumed in the traffic operations analysis were based on the concept parking plans available as of January 2013 which included 1,150 spaces on the McClellan Block and 500 spaces on the McGrew Block. Since the change in concept design reflects an increase of only 50 parking spaces, and the shifts in parking supply location were between adjacent blocks, the traffic operations were not expected to change the traffic analysis results or recommended mitigation measures. Therefore, the event traffic operations scenarios were not reanalyzed for the revised parking plan shown above. The parking analysis included in the Final Environmental Impact Statement does reflect the current parking proposal for Reserved Parking Plan B.

Based on input from the Vikings, the trip distribution of reserved parking ticket holders was assumed to be the same as the trip distribution of all event attendees. In addition, parking was assumed to be purchased or assigned based on seat location, rather than on convenience of travel routes. The

proposed ramp on the McGrew Block is assumed to have access to 4th Street east of Norm McGrew Place following events, while the segment of 4th Street to the west remains closed, in order to facilitate access out of the parking ramp and onto the freeway network. The 2017 and 2030 traffic volumes for the Weekend Event scenarios are shown in **Figures 1.4-6** to **1.4-9**. The 2017 and 2030 traffic volumes for the Weekend Event Park/Portland Closure scenarios are shown in **Figure 1.4-10** and **Figure 1.4-11**. The 2017 and 2030 traffic volumes for the Weekday Event scenarios are shown in **Figure 1.4-12** and **Figure 1.4-13**.

Results

The results of the Weekend Event scenario modeling are shown in **Tables 1.4-2** and **Table 1.4-3**. The results of the Weekend Event Park/Portland Closure scenario modeling for year 2017 are shown in **Table 1.4-4**. The results of the Weekday Event scenario modeling are shown in **Table 1.4-5**.

As shown by the intersection LOS results, the options typically have one or more intersections with poor operations. Under the Weekend Event arrival scenario, most intersections operate under capacity as a result of lower Sunday background traffic and a lower percent of peak hour arrivals due to pre-event tailgating and activities. In this scenario, the 4th Street N/2nd Avenue N intersection is expected to operate over capacity in both Reserved Parking Plan A and Plan B, primarily due to the increase in traffic from I-94 and I-394. The temporary closures of Park Avenue and Portland Avenue are anticipated to cause limited operational issues; however, signal timing modifications will likely be needed to minimize delay for southbound vehicles at the 5th Street/4th Avenue intersection.

Under the Weekend Event departure and Weekday Event arrival scenarios, several intersections operate poorly in the No Action condition. With the additional traffic generated by the larger Stadium, the 2017 Proposed Project scenarios also have several intersections over capacity. The Washington Avenue and 11th Avenue corridors have the worst delay due to the large volume of traffic destined for the I-35W and I-94 ramp accesses. Delay and spillback from these corridors impact adjacent intersections and arterials. With expected higher transit use in 2030, the Proposed Project scenarios are expected to operate with similar conditions to the No Action Alternative.

Table 1.4-2. Weekend Event Analysis Results – Arrival Peak

Intersection	Overall Intersection Delay (sec) and Level of Service					
	2017			2030		
	No Action	Reserved Parking Plan A	Reserved Parking Plan B	No Action	Reserved Parking Plan A	Reserved Parking Plan B
Washington Ave S / I-35W NB Ramp	14.1 B	14.3 B	15.4 B	11.3 B	12.8 B	12.4 B
Washington Ave S / I-35W SB Ramp	21.3 C	34.4 C	44.6 D	17.9 B	22.5 C	23.3 C
Washington Ave S / 11th Ave S	26.4 C	28.1 C	31.7 C	17.2 B	21.0 C	23.9 C
Washington Ave S / 3rd Ave S	22.3 C	26.7 C	20.6 C	19.9 B	20.9 C	20.1 C
Washington Ave N / 3rd Ave N	27.2 C	25.8 C	27.8 C	22.1 C	25.8 C	25.8 C
3rd St S / Park Ave S	11.1 B	8.0 A	8.0 A	7.6 A	8.4 A	7.5 A
4th St S / Park Ave S	10.5 B	10.9 B	17.1 B	6.6 A	6.9 A	16.7 B
4th St N / 2nd Ave N	41.1 D	**124.7 F**	**200 + F**	30.9 C	33.6 C	40.5 D
5th St S / 11th Ave S	22.1 C	17.0 B	16.3 B	18.9 B	16.9 B	16.3 B
6th St S / 11th Ave S	7.2 A	12.5 B	13.0 B	6.5 A	12.5 B	13.2 B
6th St S / Chicago Ave S	6.4 A	17.3 B	9.6 A	6.5 A	17.4 B	8.9 A
6th St S / Park Ave S	10.4 B	14.3 B	26.9 C	11.1 B	13.5 B	15.1 B
6th St S / Portland Ave S	5.7 A	9.5 A	25.8 C	7.7 A	8.9 A	9.8 A
6th St N / Hennepin Ave N	11.0 B	15.3 B	16.0 B	9.9 A	12.3 B	13.1 B
6th St N / 2nd Ave N	26.3 C	24.4 C	24.8 C	27.4 C	25.1 C	25.5 C
7th St S / 11th Ave S	25.5 C	31.8 C	32.1 C	15.7 B	21.5 C	23.3 C
7th St S / Chicago Ave S	22.9 C	20.1 C	19.4 B	18.9 B	18.6 B	18.9 B
7th St S / Park Ave S	13.9 B	12.2 B	21.0 C	8.5 A	9.7 A	9.7 A
7th St S / 5th Ave S	9.8 A	23.5 C	29.4 C	9.2 A	15.8 B	15.8 B
Total Number of Intersections Operating at Each Level of Service						
Level of Service A	4	2	2	8	4	4
Level of Service B	6	8	6	8	8	8

Intersection	Overall Intersection Delay (sec) and Level of Service					
	2017			2030		
	No Action	Reserved Parking Plan A	Reserved Parking Plan B	No Action	Reserved Parking Plan A	Reserved Parking Plan B
Level of Service C	8	8	9	3	7	6
Level of Service D	1	0	1	0	0	1
Level of Service E	0	0	0	0	0	0
Level of Service F	0	1	1	0	0	0

Table 1.4-3. Weekend Event Analysis Results – Departure Peak

Intersection	Overall Intersection Delay (sec) and Level of Service					
	2017			2030		
	No Action	Reserved Parking Plan A	Reserved Parking Plan B	No Action	Reserved Parking Plan A	Reserved Parking Plan B
Washington Ave S / Cedar Ave S	10.6 B	10.3 B	10.8 B	10.6 B	10.2 B	10.5 B
Washington Ave S / I-35W NB Ramp	28.8 C	29.6 C	29.6 C	26.8 C	27.8 C	28.4 C
Washington Ave S / I-35W SB Ramp	38.7 D	39.2 D	40.6 D	31.5 C	34.5 C	32.0 C
Washington Ave S / 11th Ave S	**136.1** **F**	**135.6** **F**	**133.7** **F**	**81.7** **F**	**119.9** **F**	**107.8** **F**
Washington Ave S / Chicago Ave S	**91.5** **F**	**101.5** **F**	**96.8** **F**	27.4 C	**58.7** **E**	48.0 D
Washington Ave S / Park Ave S	**61.7** **E**	**101.8** **F**	**77.6** **E**	12.7 B	40.5 D	42.5 D
Washington Ave S / Portland Ave S	7.7 A	41.4 D	7.1 A	6.1 A	6.4 A	6.0 A
Washington Ave S / 3rd Ave S	21.8 C	41.4 D	20.7 C	17.6 B	19.3 B	18.8 B
Washington Ave N / Hennepin Ave N	14.1 B	15.0 B	14.0 B	13.7 B	14.1 B	14.0 B
Washington Ave N / 3rd Ave N	19.2 B	18.6 B	19.6 B	17.8 B	19.5 B	19.1 B
3rd St S / Chicago Ave S	**164.0** **F**	**118.6** **F**	**200 +** **F**	12.9 B	27.6 C	27.3 C
3rd St S / Park Ave S	**135.4** **F**	**127.3** **F**	**141.0** **F**	14.2 B	48.9 D	54.0 D
3rd St S / 3rd Ave S	**57.6** **E**	**74.2** **E**	**68.2** **E**	15.8 B	45.1 D	49.7 D
3rd St N / 2nd Ave N	8.3 A	9.1 A	8.9 A	6.3 A	7.8 A	7.9 A

Intersection	Overall Intersection Delay (sec) and Level of Service					
	2017			2030		
	No Action	Reserved Parking Plan A	Reserved Parking Plan B	No Action	Reserved Parking Plan A	Reserved Parking Plan B
4th St S / Park Ave S	**175.3 F**	**200 + F**	**200 + F**	10.7 B	**59.4 E**	**73.4 E**
5th St S / 11th Ave S	35.8 D	**155.5 F**	**121.2 F**	23.1 C	**86.1 F**	**69.1 E**
6th St S / 11th Ave S	**123.7 F**	**58.2 E**	**63.7 E**	28.8 C	49.6 D	47.7 D
6th St S / Chicago Ave S	43.2 D	**64.4 E**	**71.9 E**	11.6 B	43.0 D	26.7 C
6th St S / Portland Ave S	28.9 C	55.0 D	46.9 D	9.5 A	30.3 C	13.9 B
8th St S / 11th Ave S	**55.8 E**	41.7 D	48.8 D	13.4 B	21.3 C	23.9 C
8th St S / Portland Ave S	19.2 B	19.6 B	19.8 B	17.9 B	18.3 B	19.1 B
8th St S / 4th Ave S	26.4 C	29.2 C	27.7 C	23.2 C	25.3 C	25.7 C
Total Number of Intersections Operating at Each Level of Service						
Level of Service A	2	1	2	3	2	2
Level of Service B	4	4	4	12	5	6
Level of Service C	4	2	3	5	6	6
Level of Service D	3	5	3	0	5	5
Level of Service E	3	3	4	0	2	2
Level of Service F	6	7	6	1	2	1

Table 1.4-4. 2017 Weekend Event Park/Portland Closure Analysis Results – Arrival Peak

Intersection	Overall Intersection Delay (sec) and Level of Service		
	No Action	Reserved Parking Plan A	Reserved Parking Plan B
Washington Ave S / 11th Ave S	26.4 C	29.4 C	36.5 D
Washington Ave S / Park Ave S	6.6 A	7.5 A	7.1 A
Washington Ave S / Portland Ave S	7.2 A	8.2 A	7.4 A
Washington Ave S / 5th Ave S	6.2 A	10.0 A	9.1 A
Washington Ave S / 4th Ave S	6.9 A	10.3 B	8.9 A

Intersection	Overall Intersection Delay (sec) and Level of Service		
	No Action	Reserved Parking Plan A	Reserved Parking Plan B
Washington Ave S / 3rd Ave S	22.3 C	23.7 C	24.2 C
3rd St S / Park Ave S	11.1 B	14.5 B	12.3 B
3rd St S / Portland Ave S	10.8 B	28.7 C	17.2 B
3rd St S / 5th Ave S	3.7 A	13.0 B	7.3 A
3rd St S / 4th Ave S	17.1 B	18.6 B	14.5 B
4th St S / Park Ave S	10.5 B	11.2 B	26.0 C
4th St S / Portland Ave S	10.3 B	14.1 B	19.5 B
4th St S / 5th Ave S	7.0 A	10.0 A	11.4 B
4th St S / 4th Ave S	18.6 B	33.4 C	28.0 C
5th St S / 11th Ave S	22.1 C	17.8 B	17.2 B
5th St S / Park Ave S	23.4 C	34.6 C	34.9 C
5th St S / Portland Ave S	16.1 B	14.3 B	13.5 B
5th St S / 5th Ave S	42.6 D	27.2 C	26.2 C
5th St S / 4th Ave S	**65.8** **E**	**61.6** **E**	51.3 D
6th St S / 11th Ave S	7.2 A	17.8 B	17.2 B
6th St S / Chicago Ave S	6.4 A	19.5 B	8.7 A
6th St S / Park Ave S	10.4 B	16.2 B	14.0 B
6th St S / Portland Ave S	5.7 A	4.8 A	5.4 A
6th St S / 5th Ave S	12.8 B	14.8 B	18.6 B
6th St S / 4th Ave S	5.5 A	8.1 A	8.7 A
7th St S / 11th Ave S	25.5 C	34.5 C	37.5 D

Intersection	Overall Intersection Delay (sec) and Level of Service		
	No Action	Reserved Parking Plan A	Reserved Parking Plan B
7th St S / Chicago Ave S	22.9 C	28.3 C	29.8 C
7th St S / Park Ave S	13.9 B	39.0 D	39.4 D
7th St S / Portland Ave S	16.2 B	27.3 C	27.5 C
7th St S / 5th Ave S	9.8 A	34.7 C	34.1 C
7th St S / 4th Ave S	8.0 A	8.8 A	8.3 A
Total Number of Intersections Operating at Each Level of Service			
Level of Service A	12	7	9
Level of Service B	11	12	10
Level of Service C	6	10	8
Level of Service D	1	1	4
Level of Service E	1	1	0
Level of Service F	0	0	0

Table 1.4-5. Weekday Event Analysis Results – Arrival Peak

Intersection	Overall Intersection Delay (sec) and Level of Service					
	2017			2030		
	No Action	Reserved Parking Plan A	Reserved Parking Plan B	No Action	Reserved Parking Plan A	Reserved Parking Plan B
Washington Ave S / I-35W NB Ramp	**109.5** **F**	**105.6** **F**	**112.1** **F**	**128.0** **F**	**128.0** **F**	**139.6** **F**
Washington Ave S / I-35W SB Ramp	55.0 D	**67.0** **E**	**85.9** **F**	51.2 D	**65.3** **E**	**80.9** **F**
Washington Ave S / 11th Ave S	**116.2** **F**	**146.8** **F**	**187.4** **F**	**84.3** **F**	**129.3** **F**	**149.8** **F**
Washington Ave S / 3rd Ave S	**65.7** **E**	**69.8** **E**	**70.6** **E**	**71.0** **E**	**77.4** **E**	**77.9** **E**
Washington Ave N / 3rd Ave N	34.4 C	35.4 D	35.4 D	39.4 D	40.8 D	40.8 D
3rd St S / Park Ave S	11.2 B	11.1 B	13.1 B	10.7 B	10.7 B	13.0 B
4th St S / Park Ave S	3.9 A	4.1 A	11.9 B	3.9 A	4.2 A	12.1 B
4th St N / 2nd Ave N	52.7 D	**72.0** **E**	**95.2** **F**	41.0 D	45.0 D	52.6 D

Intersection	Overall Intersection Delay (sec) and Level of Service					
	2017			2030		
	No Action	Reserved Parking Plan A	Reserved Parking Plan B	No Action	Reserved Parking Plan A	Reserved Parking Plan B
5th St S / 11th Ave S	**178.9 F**	51.8 D	**60.3 E**	**183.3 F**	52.9 D	52.7 D
6th St S / 11th Ave S	**136.2 F**	**101.2 F**	**80.1 F**	**113.8 F**	**99.1 F**	**94.1 F**
6th St S / Chicago Ave S	13.5 B	46.2 D	25.2 C	13.9 B	50.9 D	28.7 C
6th St S / Park Ave S	28.8 C	**71.7 E**	**89.7 F**	28.4 C	**73.6 E**	**91.0 F**
6th St S / Portland Ave S	15.0 B	30.9 C	35.6 D	14.8 B	28.3 C	28.5 C
6th St N / Hennepin Ave N	51.1 D	**66.1 E**	**70.4 E**	36.4 D	52.2 D	**56.1 E**
6th St N / 2nd Ave N	27.0 C	31.2 C	31.6 C	26.9 C	30.1 C	30.6 C
7th St S / 11th Ave S	45.4 D	**63.7 E**	**60.4 E**	35.3 D	45.7 D	43.2 D
7th St S / Chicago Ave S	26.7 C	25.3 C	27.0 C	27.1 C	25.7 C	26.7 C
7th St S / Park Ave S	11.9 B	13.0 B	14.4 B	12.2 B	12.6 B	13.6 B
7th St S / 5th Ave S	**63.2 E**	**77.4 E**	**83.5 F**	29.1 C	37.1 D	40.4 D
Total Number of Intersections Operating at Each Level of Service						
Level of Service A	1	1	0	1	1	0
Level of Service B	4	2	3	4	2	3
Level of Service C	4	6	3	4	3	4
Level of Service D	4	3	2	5	7	5
Level of Service E	2	7	4	1	3	2
Level of Service F	4	3	7	4	3	5

1.5 Mitigation Measures

From the traffic operations modeling, potential mitigation measures have been developed to improve the flow of vehicular traffic around the new Stadium. These mitigation measures will be further reviewed during the design process to determine their effectiveness. Additional mitigation measures and discussion of other potential transportation impacts of the Proposed Project have been included in the Final Environmental Impact Statement.

Specific Mitigation Strategies

The following potential mitigation measures for the closure of 5th Street were identified based on the non-event traffic analysis of the local roadway network:

- Option 1
  - The current phasing of the 5th Street/Park Avenue intersection limits the signal green time for the northbound Park Avenue approach due to the LRT and the resulting unique geometrics and phasing at the intersection. Signal timing adjustments at this intersection should be evaluated in detail during the development of the event signal timing plans, in order to best balance the needs of vehicle traffic with LRT station-to-station progression.
  - Additional capacity is needed on 11th Avenue from 5th Street to 7th Street to accommodate the rerouted 5th Street traffic. This will require restriping of the existing roadway section, including the existing bike lane, and removal of some the existing metered on-street parking between 5th Street and 7th Street. The additional lane would end as a right-turn only lane at 7th Street. Conflicts between the southbound bicycle lane and the southbound right-turn traffic would need to be addressed as the design plans advance.
  - Capacity improvements were analyzed at the Washington Avenue/11th Avenue intersection to better accommodate the increased northbound left-turn traffic. These improvements included adding a second northbound left-turn lane or modifying the signal phasing to split phased for northbound/southbound. While these changes increased the capacity of the northbound movements, they had significant negative operational impacts on the southbound 11th Avenue movements and on the overall intersection delay. Therefore, capacity improvements are not recommended at the Washington Avenue/11th Avenue intersection.
  - Modifications to the existing traffic signals at 5th Street/11th Avenue and 5th Street/Chicago Avenue will be needed to accommodate the changed intersection geometrics and traffic flow as a result of the 5th Street closure.
  - Conflicts due to the eastbound bicycle traffic on 6th Street crossing the pedestrian walkway on the north side of 6th Street to reach the off-street two-way bicycle facility on the stadium site will need to be addressed as the design plans advance.
- Option 2
  - Additional capacity is needed on 11th Avenue from 5th Street to 6th Street to accommodate the rerouted 5th Street traffic. This would require restriping of the existing roadway section, including the existing bike lane. The additional lane would end as a right-turn only

lane at 6th Street. The additional southbound lane is not expected to impact any on-street parking. Conflicts between the southbound bicycle lane and the southbound right-turn traffic would need to be addressed as the design plans advance.

- The existing roadway section on 6th Street from 11th Avenue to either Chicago Avenue or Park Avenue would need to be restriped to accommodate the proposed parking, vehicle, sidewalk, and bicycle lane configuration. Some loss of on-street parking spaces may occur.
- Modifications to the existing traffic signals at 5th Street/11th Avenue, 6th Street/11th Avenue, 6th Street/Chicago Avenue, 6th Street/Park Avenue (Option 2B only), and 5th Street/Chicago Avenue would be needed to accommodate the changed geometrics and traffic flow as a result of the 5th Street closure.
- Conflicts due to eastbound bicycle traffic on 6th Street crossing the westbound traffic and pedestrian walkway to reach the off-street two-way bicycle facility on the new Stadium site will need to be addressed as the design plans advance.
- Geometric design and operational considerations for left-turn movements from the westbound 6th Street contraflow lane will need to be addressed due to the potential for delay and queuing of westbound traffic during peak traffic periods.

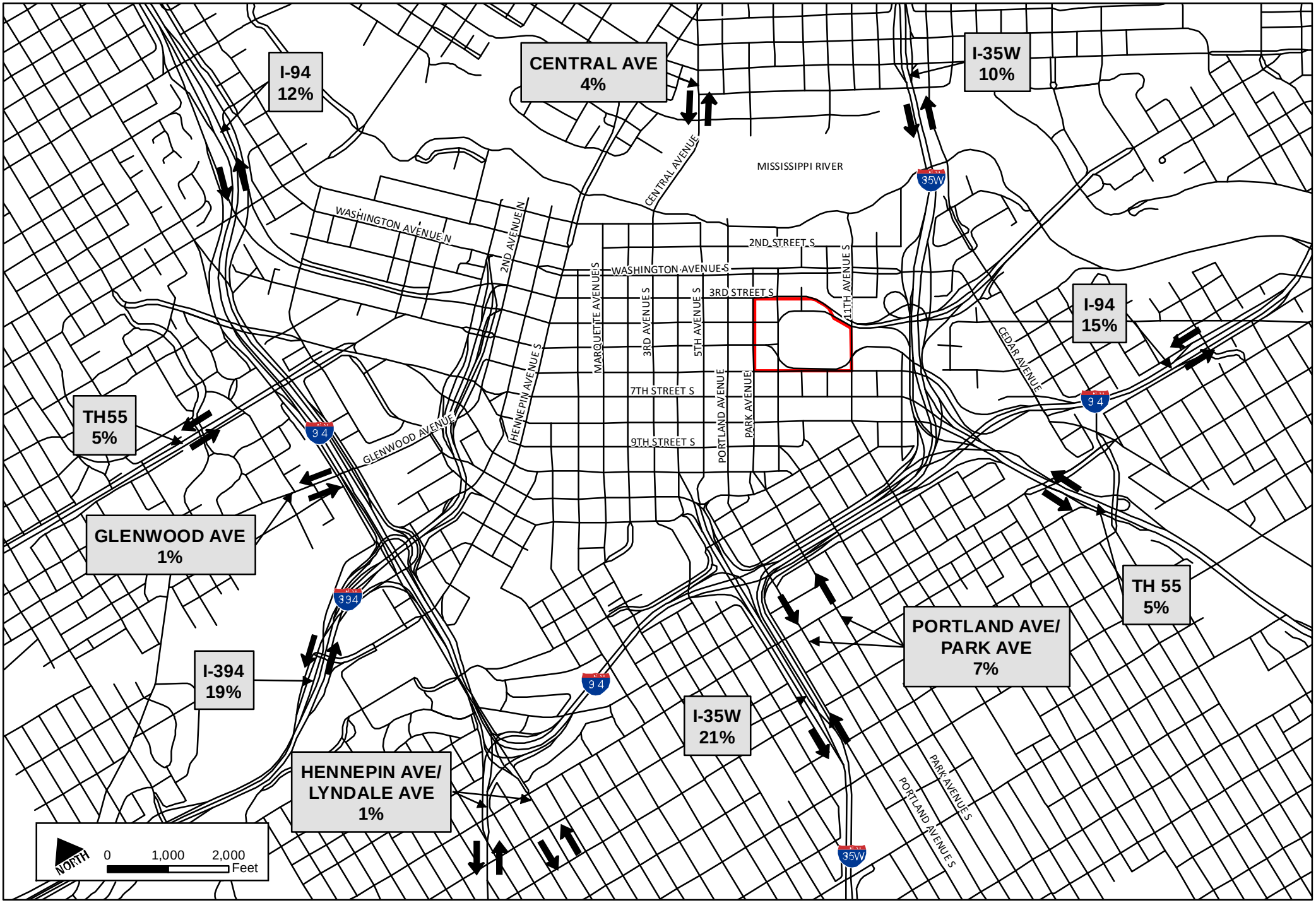
The following potential mitigation measures were identified for a capacity event at the new Stadium based on the event traffic analysis of the local roadway network:

- Reserved Parking Plan A (North/South Alternate Plaza Configuration)
  - Traffic control officers will be needed at the exits from major parking facilities in order to minimize the queuing and delay of vehicles exiting the parking ramps.
- Reserved Parking Plan B (East/West Alternate Plaza Configuration)
  - The current phasing of the 5th Street/Park Avenue intersection limits the northbound Park Avenue approach to approximately 30 seconds due to the LRT and the resulting unique geometrics and phasing at the intersection. Signal timing adjustments at this intersection should be evaluated in detail during the development of the event signal timing plans, in order to best balance the needs of vehicle traffic with LRT station-to-station progression.
  - Traffic control officers will be needed at the exits from major parking facilities, including the proposed parking structure on the McClellan Block, in order to minimize the queuing and delay of vehicles exiting the parking ramps.

- Park Avenue/Portland Avenue Closure
  - The current phasing of the 5th Street/4th Avenue intersection limits the southbound 4th Avenue approach to approximately 30 seconds due to the LRT phasing at the intersection. Signal timing adjustments would likely be needed to minimize the delay for southbound 4th Avenue traffic.
  - Additional capacity is needed on 4th Street from Portland Avenue to Park Avenue to accommodate the rerouted Park Avenue and Portland Avenue traffic under Reserved Parking Plan B. Signal timing adjustments would likely be needed to minimize delay for eastbound 4th Street traffic.
  - The closures of Park Avenue and Portland Avenue should be signed well in advance to give drivers adequate opportunity to choose alternate routes. This would be expected to result in greater dispersion of the rerouted traffic and therefore lesser traffic congestion and impacts. Advance signing would likely be needed on Washington Avenue and 4th Street (for Portland Avenue traffic) and on Park Avenue and 6th Street (for Park Avenue traffic).
  - Proposed temporary roadway closures of Park Avenue and Portland Avenue would be subject to permit approval through the City of Minneapolis. Additional conditions and mitigations could be required as part of the permit approval.
- All Proposed Project Event Scenarios
  - Traffic control officers will be needed at additional intersections compared to the No Action conditions, including Park Avenue/3rd Street and 6th Street/10th Avenue where additional parking structures or parking utilization are expected. The determination of locations for traffic control officers should be made during the development of the Traffic Management Plan, which is described in Section 3.7.1.8.
  - The methods for implementing safe and temporary road closures needs to be determined as part of the further development of the Proposed Project design, in conjunction with the City of Minneapolis. During the EIS process, the City identified the need to improve the current operations and management of the roadway closures and to incorporate the design of the closure methods or infrastructure into the stadium design. Permits for all temporary roadway closures would be subject to the approval of the City of Minneapolis.
  - Event signal timing plans will need to be developed for the arrival and departure time periods. The signal timing plans should include most of the signals within the area bounded by Washington Avenue to the north, I-35W to the east, 11th Avenue to the south, and Hennepin Avenue to the west.

- Consideration should be given to limiting or restricting vehicular turning movements at critical intersections to increase traffic flow during periods of peak event traffic (e.g., the eastbound left-turn movement at the 6th Street/11th Avenue intersection during event departure periods). Drivers should instead be directed to other routes that have available capacity.
- If Option 2A or 2B is chosen for the 5th Street permanent closure and the westbound lane on 6th Street is open during event arrival and departure, geometric design and operational considerations for left-turn movements from the westbound 6th Street contraflow lane will need to be addressed.
- Strong consideration should be given to encouraging event patrons with reserved parking to choose their parking location based on ease of arrival/departure route, rather than seat location. This would be expected to reduce traffic volumes and conflicting traffic flows at key intersections. For example, the proposed new parking structure on the McGrew Block (Reserved Parking Plan A and Reserved Parking Plan B) has very convenient access to/from I-35W before and after events; however, access to the 511 Building Ramp from I-35W results in significantly more travel time and congestion for the event patron, particularly when departing an event.
- Traffic Management Plan

  A Traffic Management Plan should be prepared by a committee consisting of members from the City of Minneapolis, Hennepin County, Metro Transit, MSFA, local business groups, and nearby residents. The Traffic Management Committee would discuss and review in detail such issues as potential changeable message signs, static sign locations and messages, locations of traffic control officers before and after events, event signal timing plans, and event traffic control plans. The Traffic Management Plan should be developed with the understanding that updates and changes will be needed based on actual event experience and maintained on a regular basis. The plan should cover various event scenarios including a capacity stadium event, a capacity stadium event combined with a capacity event at Target Field, and large non-NFL events.



Legend

Stadium Site Boundary

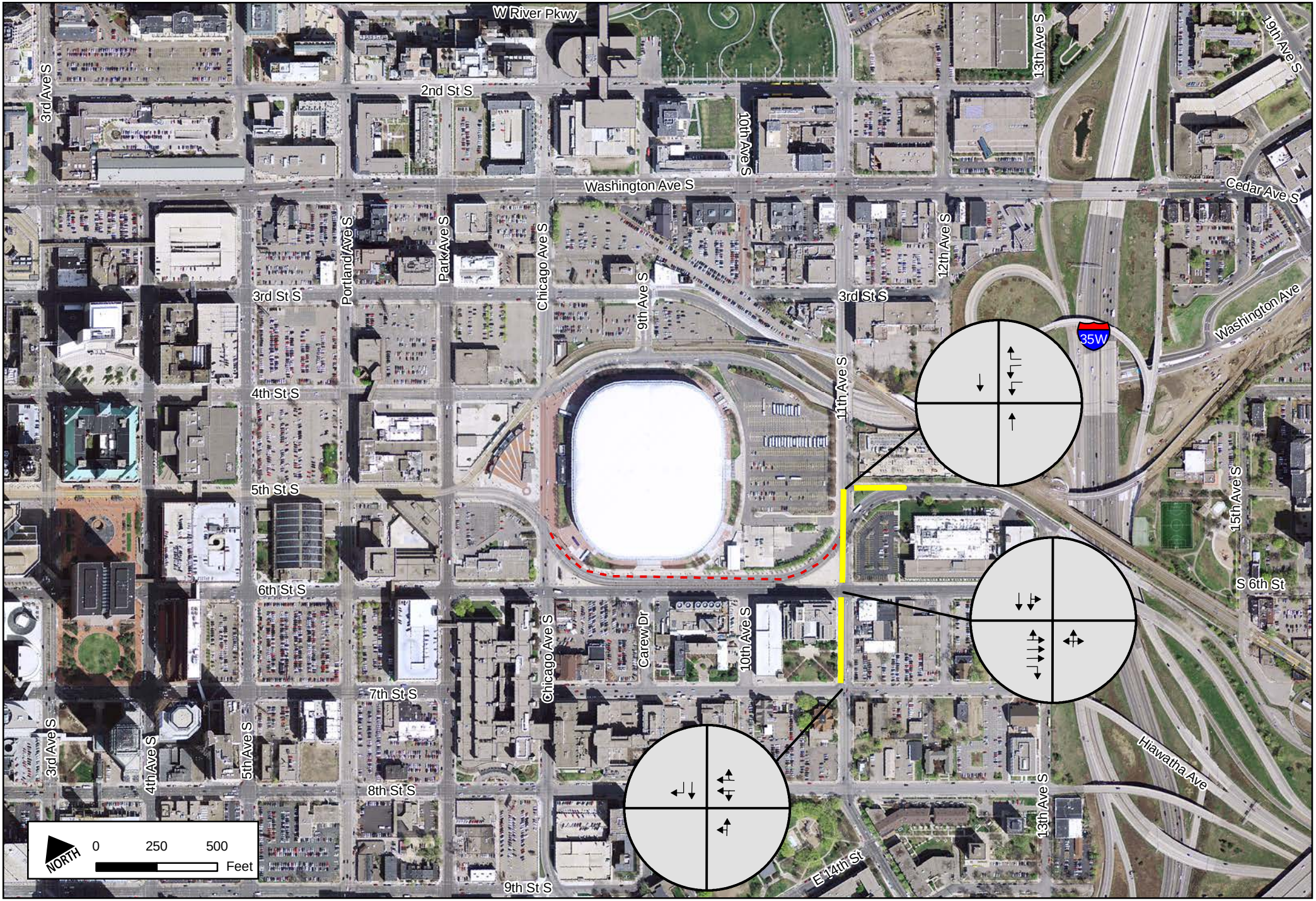
Figure 1.2-1. Proposed Event Trip Distribution

Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Permanent Road Closure

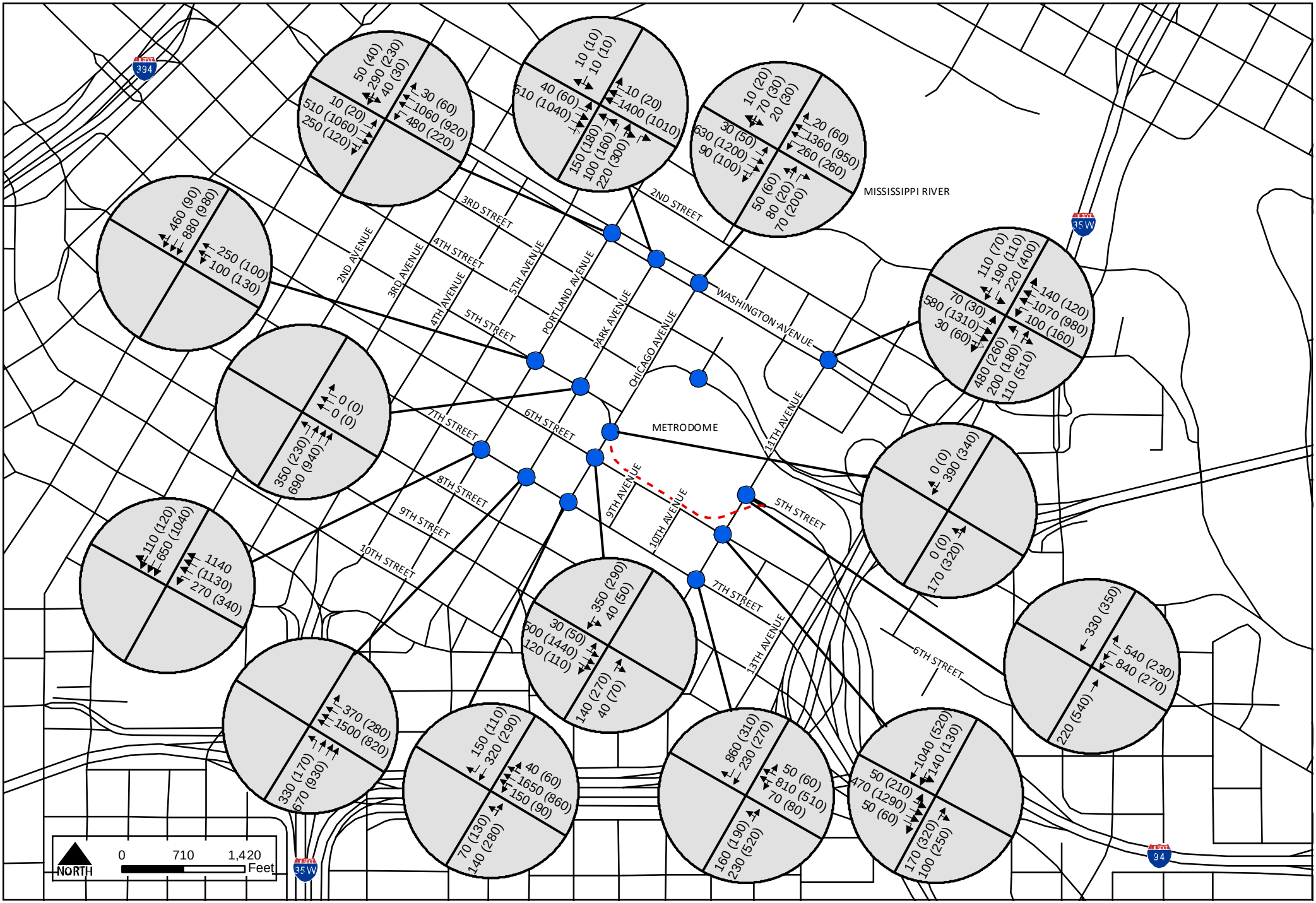
Figure 1.3-1. Proposed Weekday AM/PM Peak Analysis



Legend

- Option 1 Improved Geometry
- Proposed Permanent Road Closure

Figure 1.3-2. Proposed Option 1 Geometrics

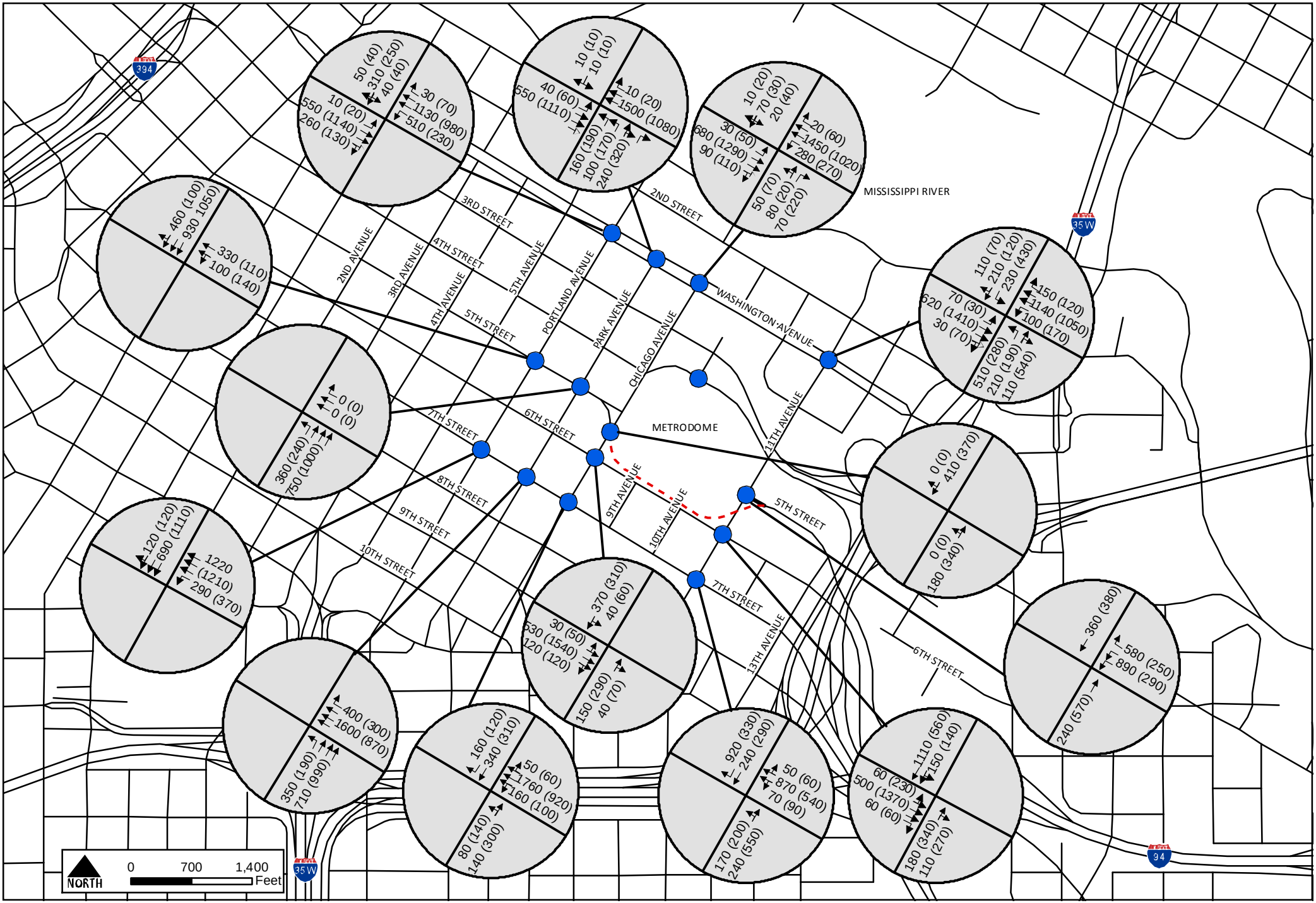


Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Permanent Road Closure
- Proposed New Roadway
- XX (XX) Traffic Volumes AM (PM)
- Lane Geometry (AM and PM)
- Lane Geometry (PM Only)

Figure 1.3-3. 2017 Option 1 Lane Geometry and Traffic Volumes

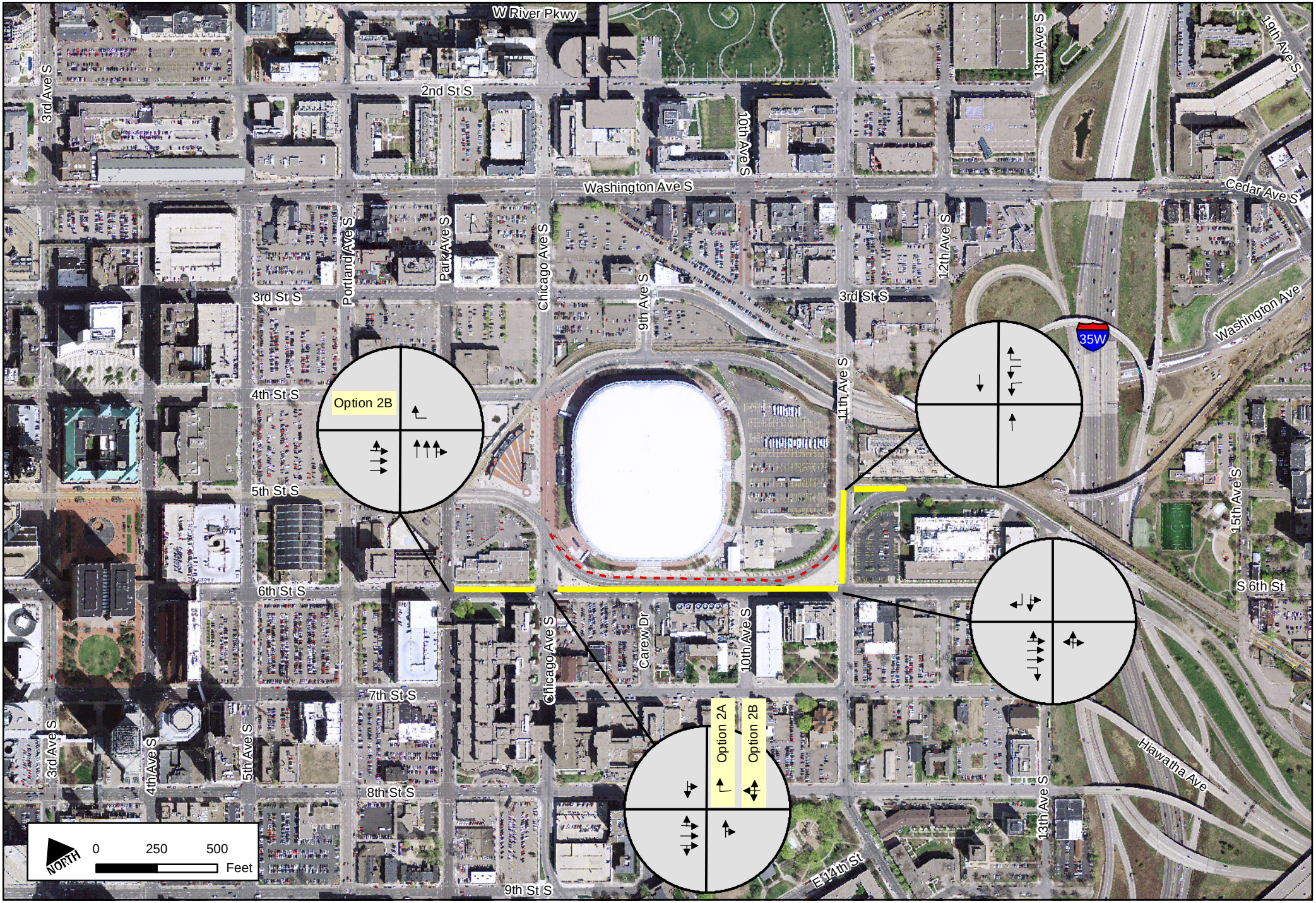


Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Permanent Road Closure
- Proposed New Roadway
- XX (XX) Traffic Volumes AM (PM)
- Lane Geometry (AM and PM)
- Lane Geometry (PM Only)

Figure 1.3-4. 2030 Option 1 Lane Geometry and Traffic Volumes

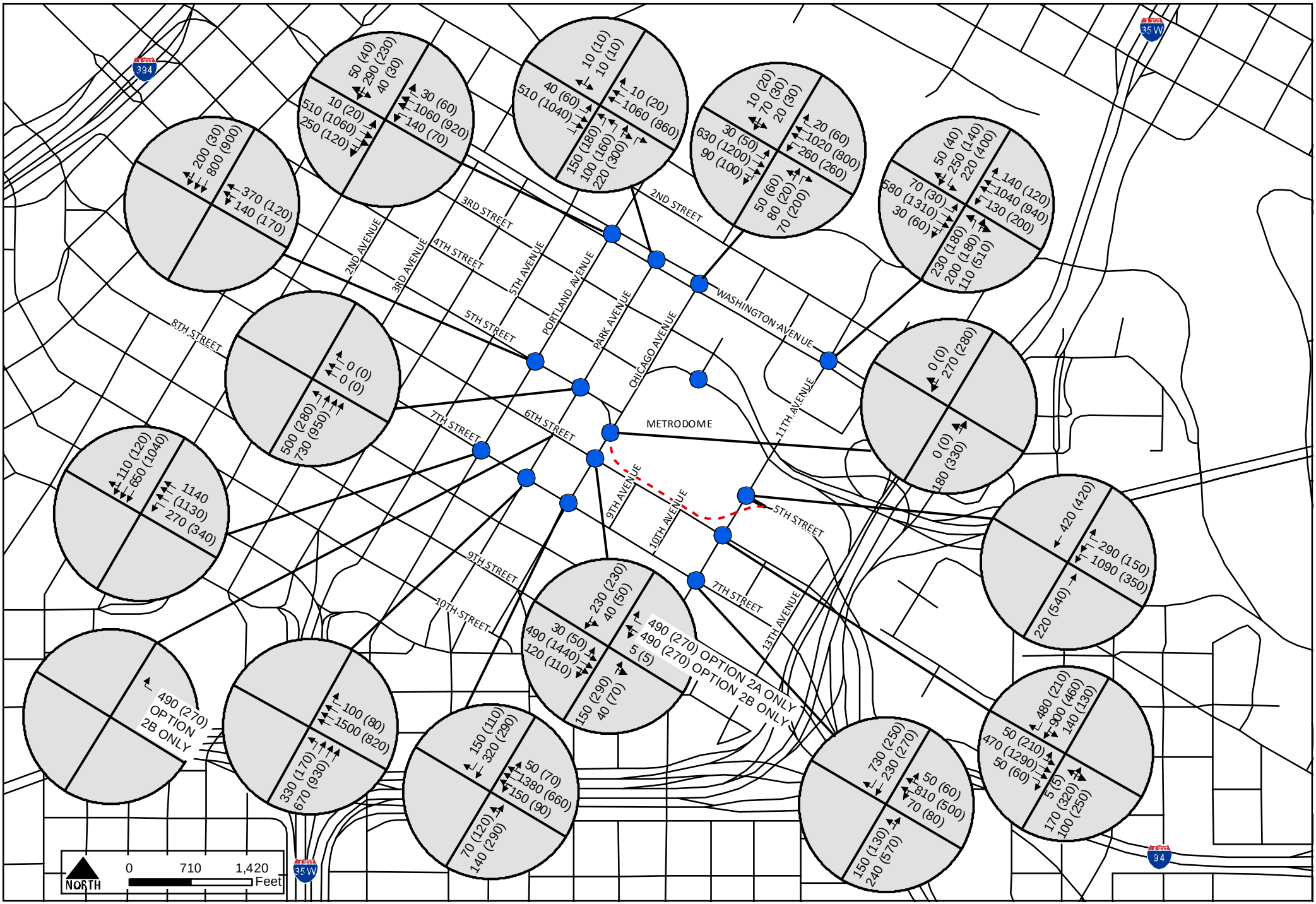


Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Option 2 Improved Geometry
- Proposed Permanent Road Closure

Figure 1.3-5. Proposed Option 2 Geometrics

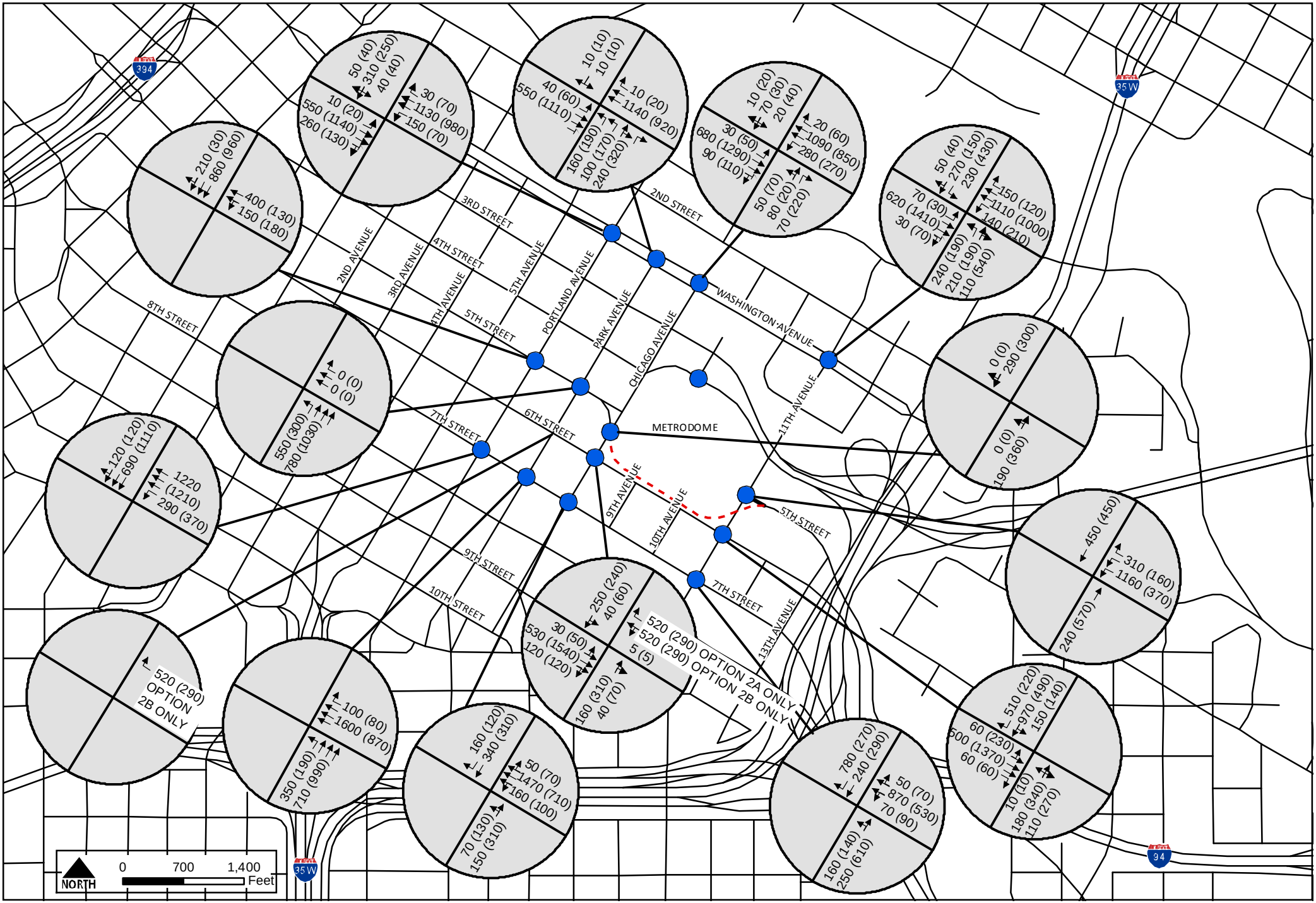


Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Permanent Road Closure
- Proposed New Roadway
- XX (XX) Traffic Volumes AM (PM)
- Lane Geometry (AM and PM)
- Lane Geometry (PM Only)

Figure 1.3-6. 2017 Option 2 Lane Geometry and Traffic Volumes



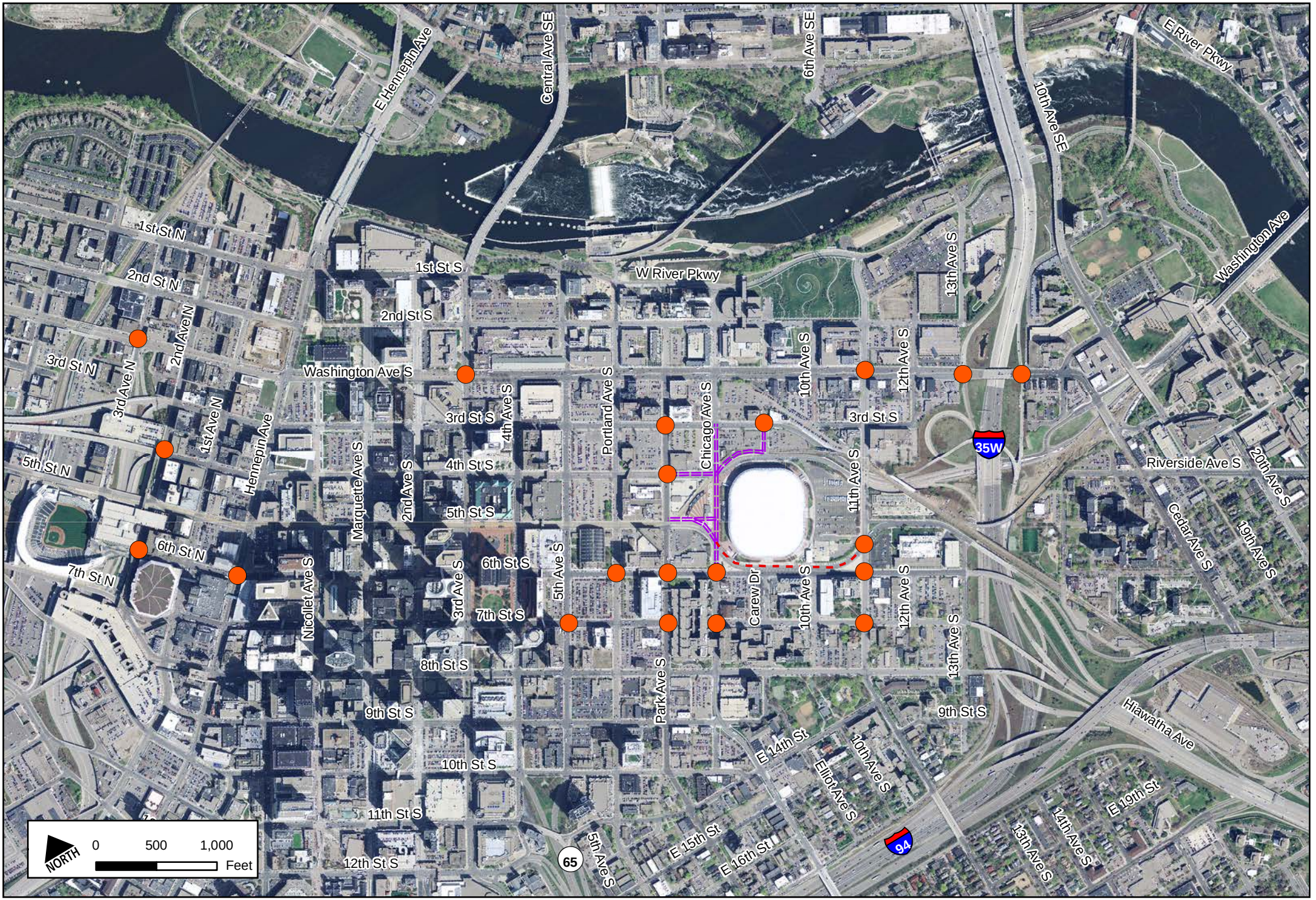
MINNESOTA SPORTS FACILITIES AUTHORITY

Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Permanent Road Closure
- Proposed New Roadway
- XX (XX) Traffic Volumes AM (PM)
- Lane Geometry (AM and PM)
- Lane Geometry (PM Only)

Figure 1.3-7. 2030 Option 2 Lane Geometry and Traffic Volumes

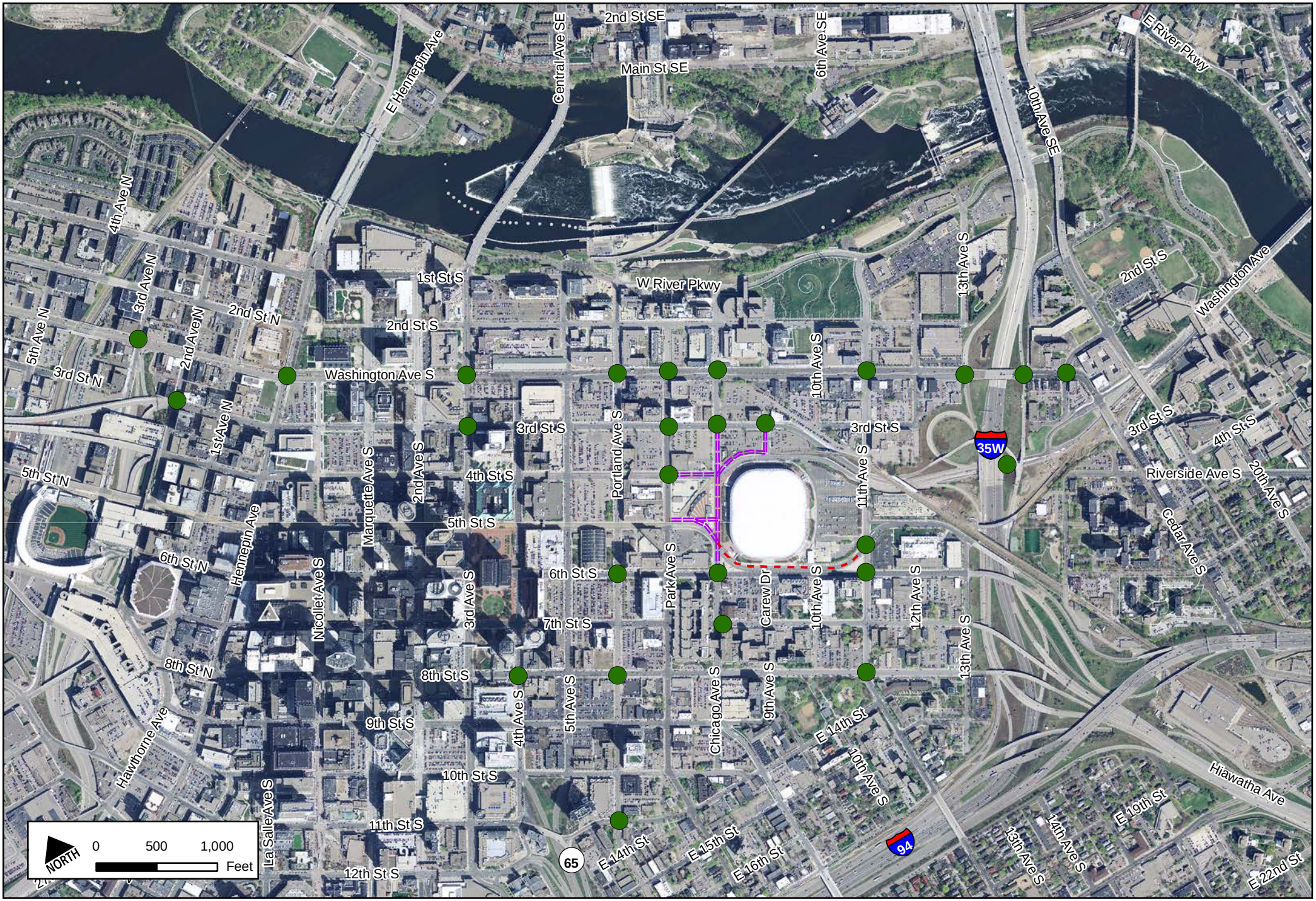


Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Permanent Road Closure
- Proposed Event Road Closure

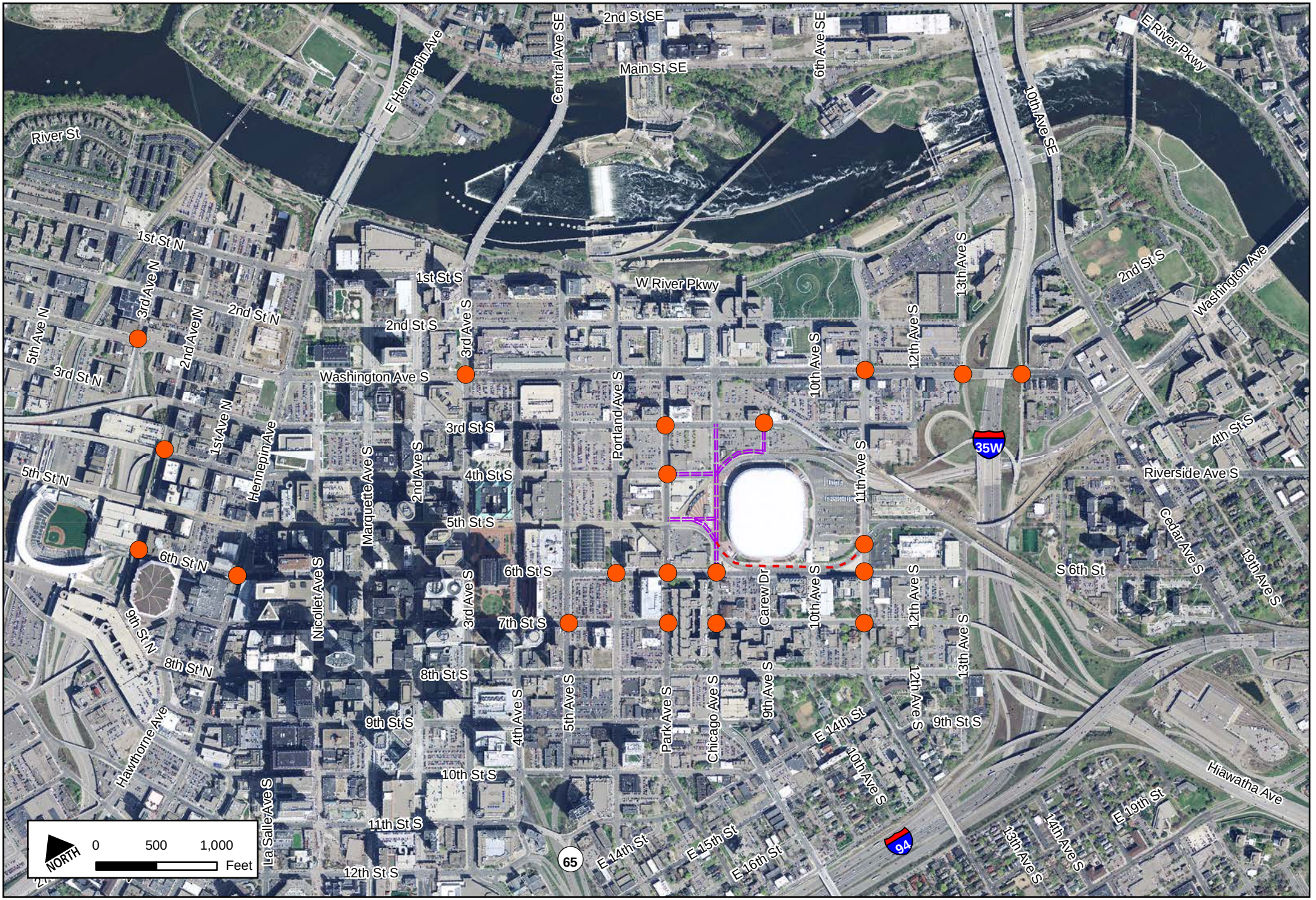
Figure 1.4-1. Proposed Weekend Event Arrival Analysis



Legend

- Intersections to be Analyzed
- Proposed Permanent Road Closure
- Proposed Event Road Closure

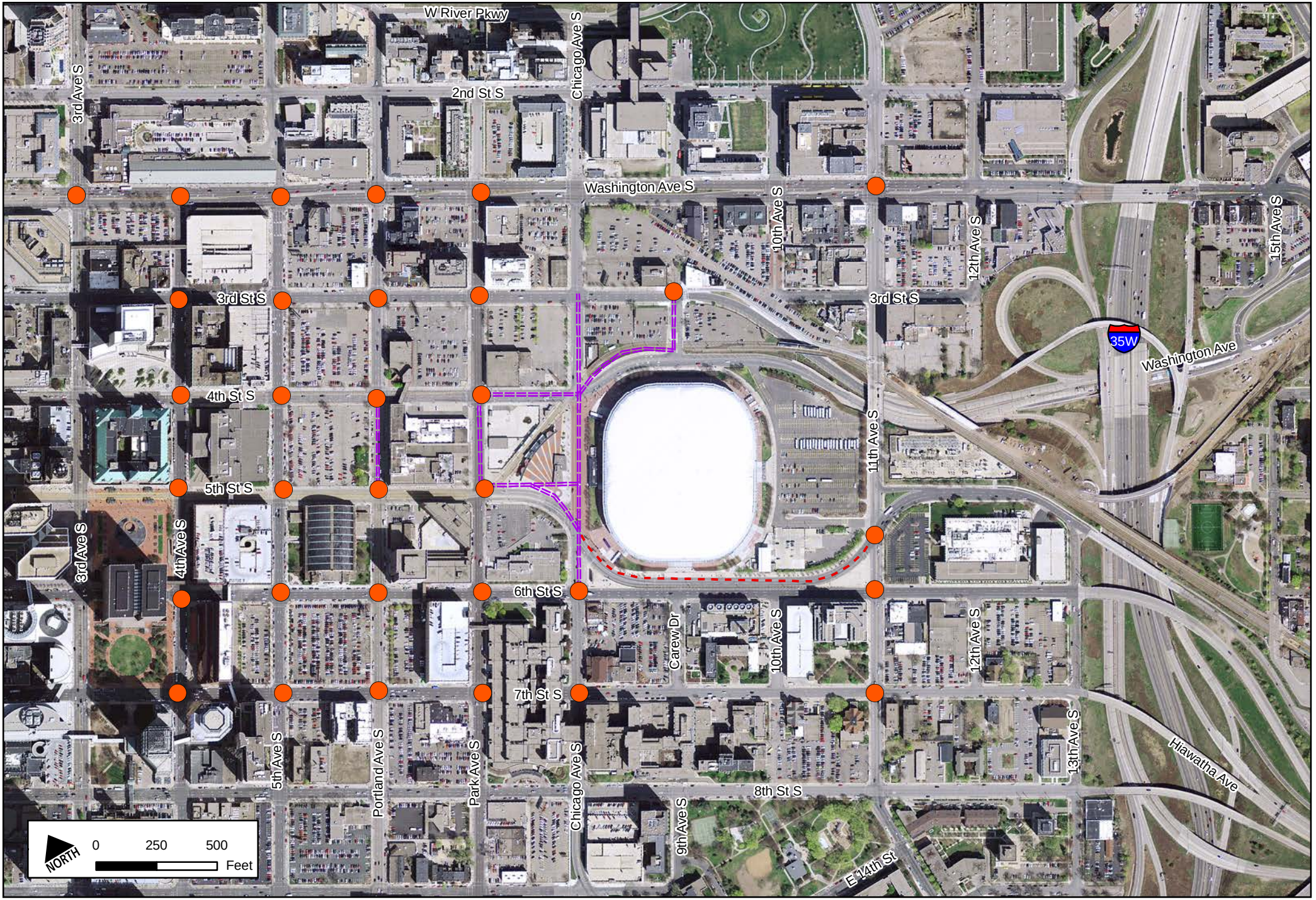
Figure 1.4-2. Proposed Weekend Event Departure Analysis



Legend

- Intersections to be Analyzed
- Proposed Permanent Road Closure
- Proposed Event Road Closure

Figure 1.4-3. Proposed Weekday Event Arrival Analysis

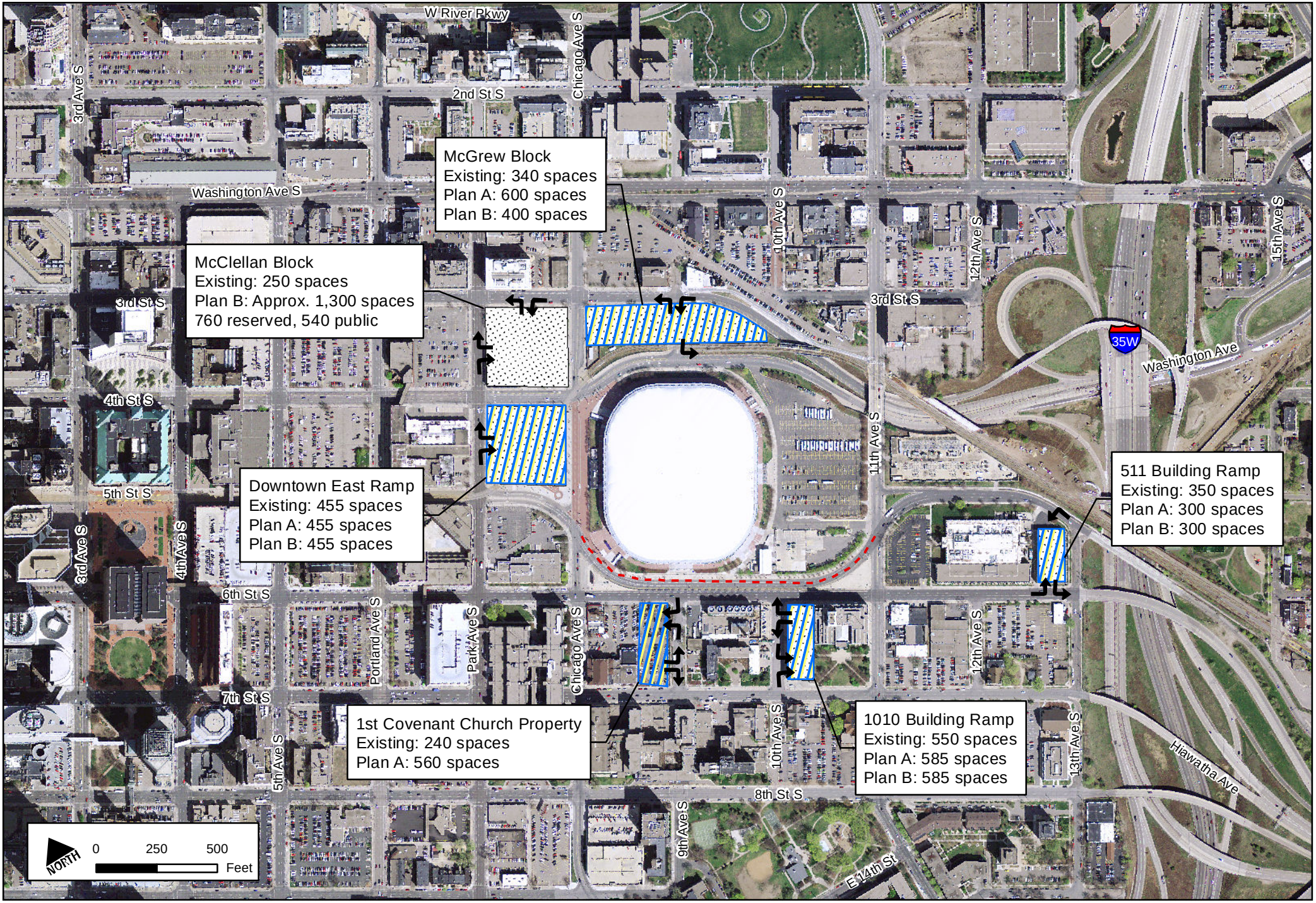


Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Event Road Closure
- Proposed Permanent Road Closure

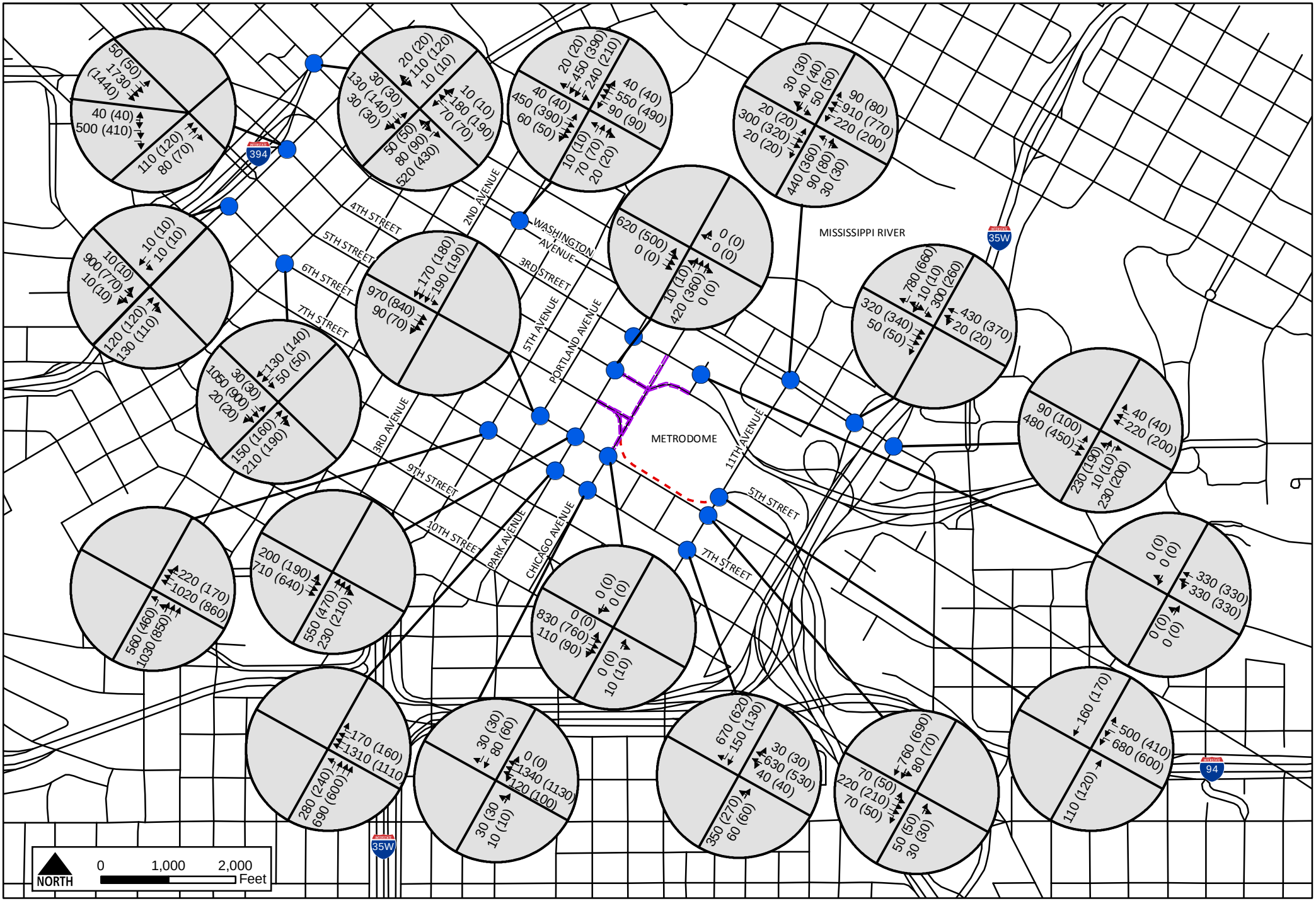
Figure 1.4-4. Proposed Park/Portland Weekend Event Arrival Analysis



Legend

- Proposed Event Road Closure
- Proposed Permanent Road Closure
- Reserved Parking Plan A
- Reserved Parking Plan B

Figure 1.4-5. Proposed Reserved Parking Plans

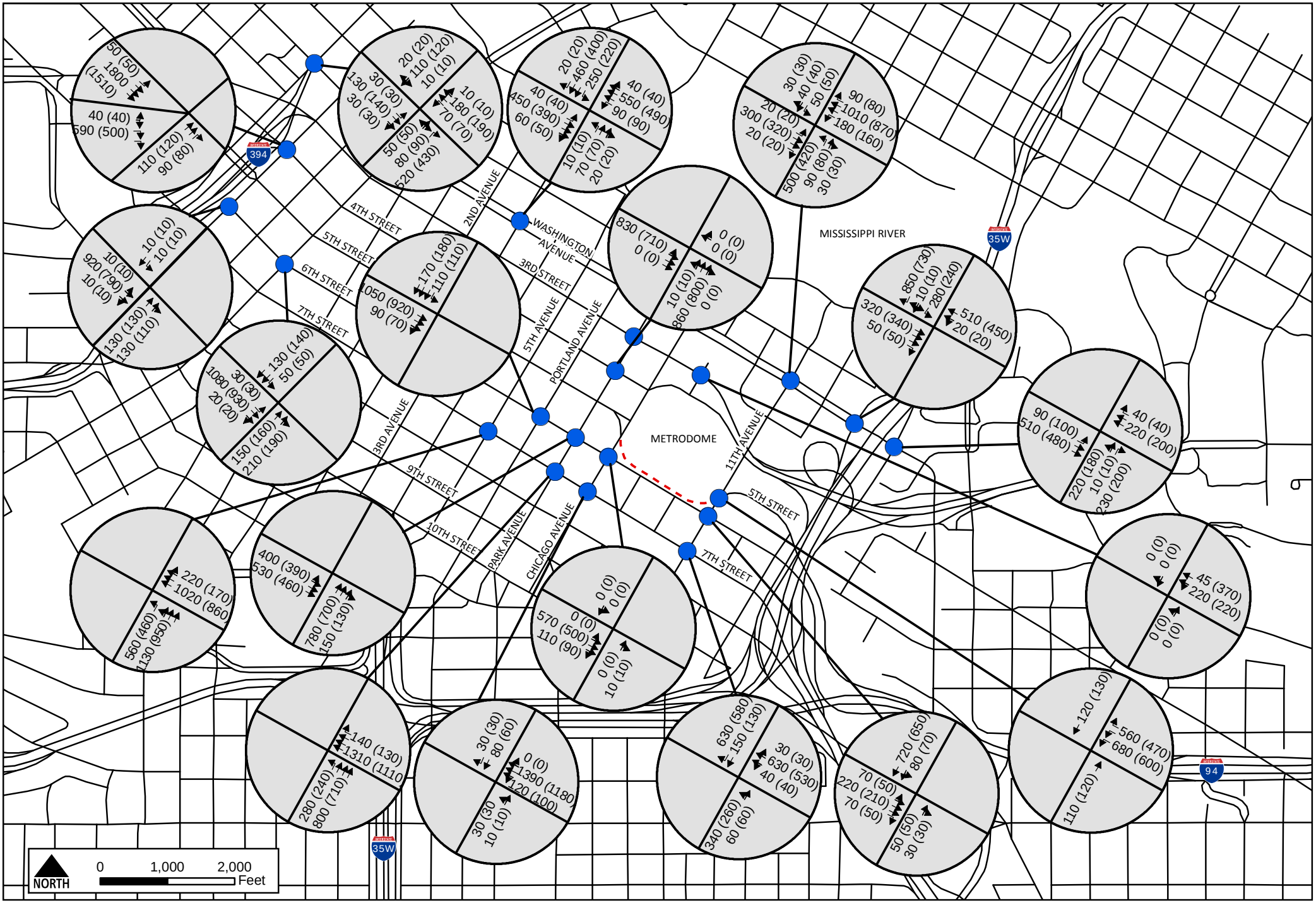


Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Event Road Closure
- Proposed Permanent Road Closure
- XX (XX) Traffic Volumes 2017 (2030)
- Lane Geometry (2017 and 2030)

Figure 1.4-6. 2017 and 2030 Weekend Build Event Plan A Arrival Peak Analysis Lane Geometry and Traffic Volumes

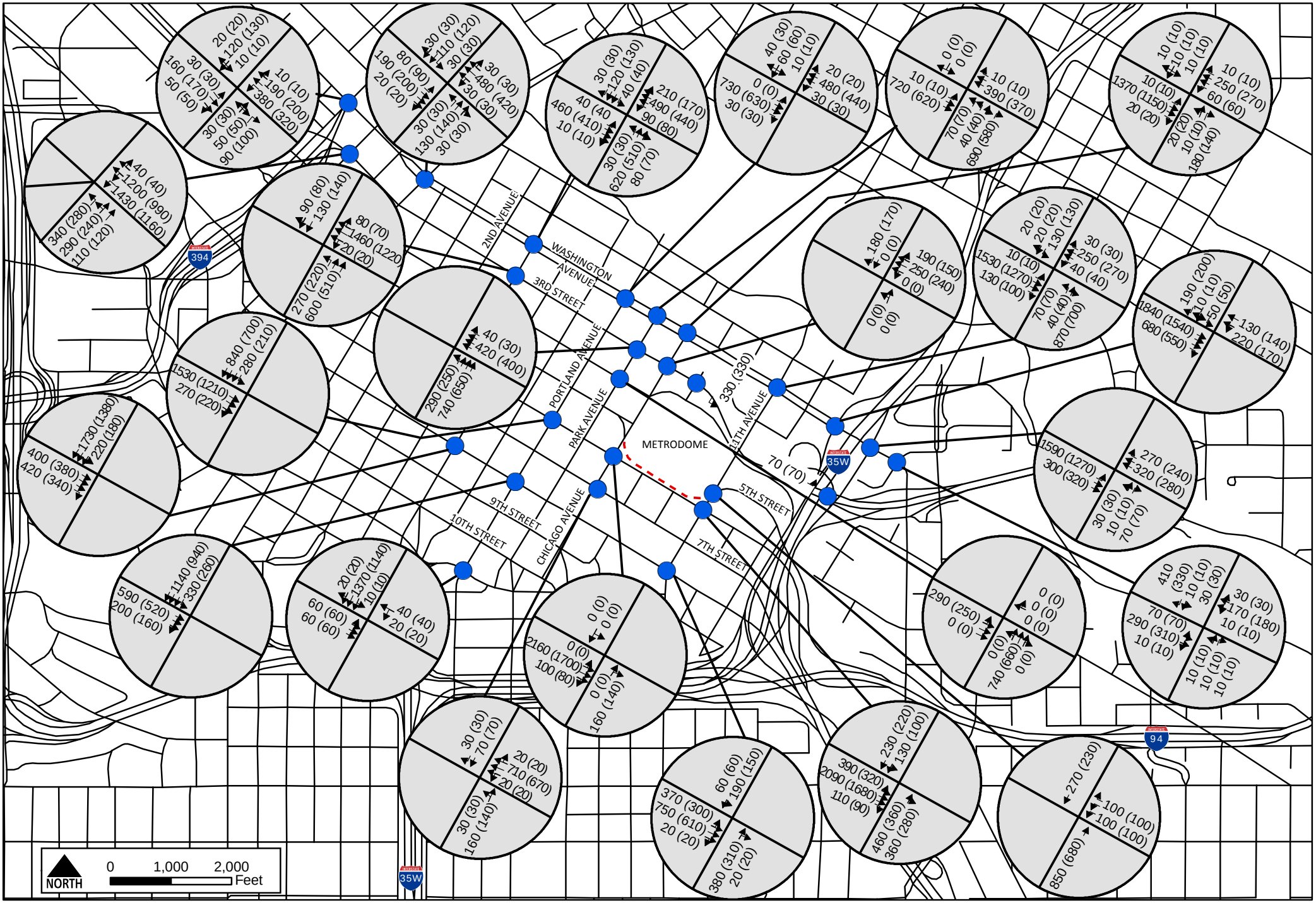


Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Event Road Closure
- Proposed Permanent Road Closure
- XX (XX) Traffic Volumes 2017 (2030)
- Lane Geometry (2017 and 2030)

Figure 1.4-7. 2017 and 2030 Weekend Build Event Plan B Arrival Peak Analysis Lane Geometry and Traffic Volumes

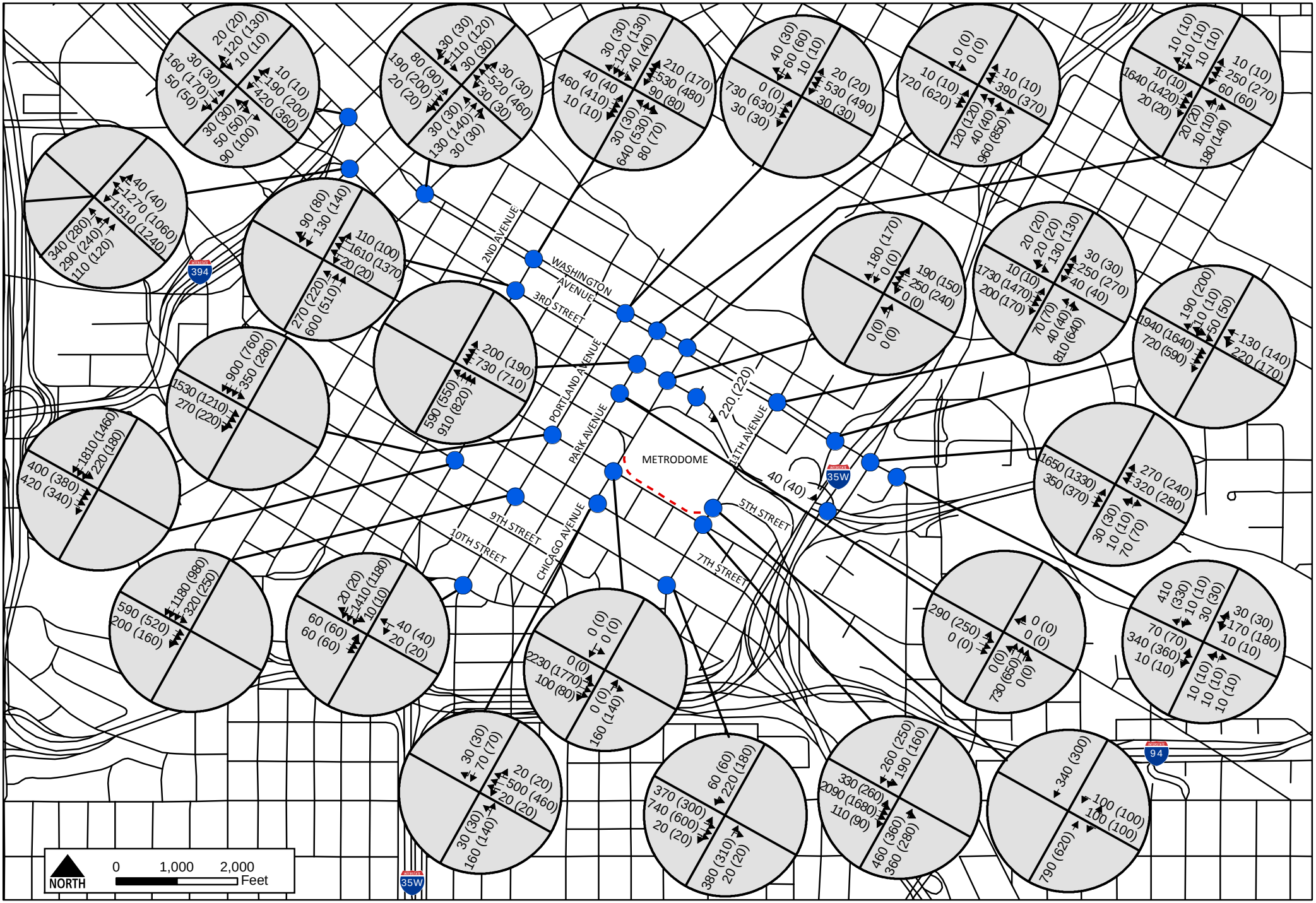


Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Event Road Closure
- Proposed Permanent Road Closure
- XX (XX) Traffic Volumes 2017 (2030)
- Lane Geometry (2017 and 2030)

Figure 1.4-8. 2017 and 2030 Weekend Build Event Plan A Departure Peak Analysis Lane Geometry and Traffic Volumes



Legend

- Intersections to be Analyzed
- Proposed Event Road Closure
- Proposed Permanent Road Closure
- XX (XX) Traffic Volumes 2017 (2030)
- Lane Geometry (2017 and 2030)

Figure 1.4-9. 2017 and 2030 Weekend Build Event Plan B Departure Peak Analysis Lane Geometry and Traffic Volumes

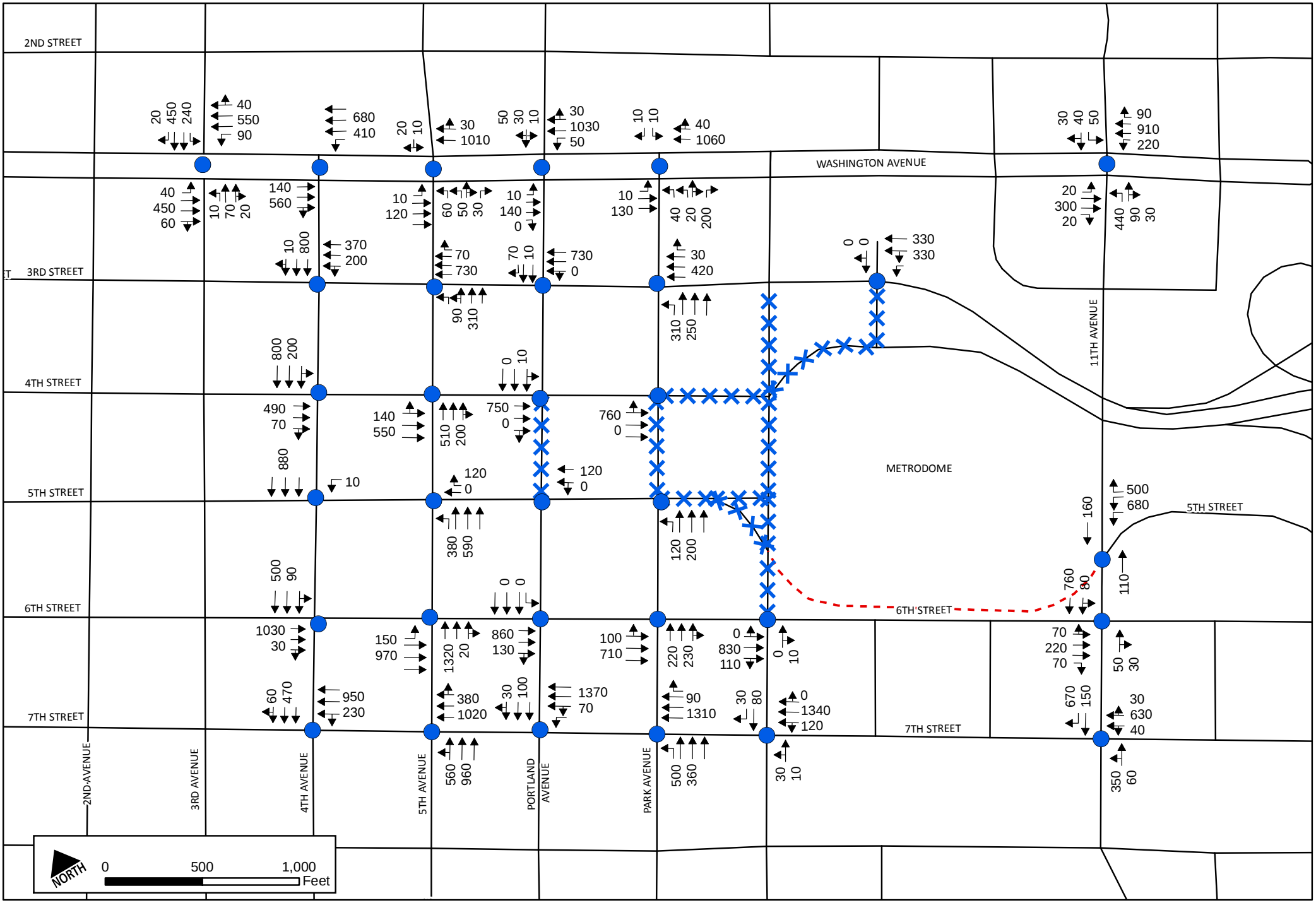
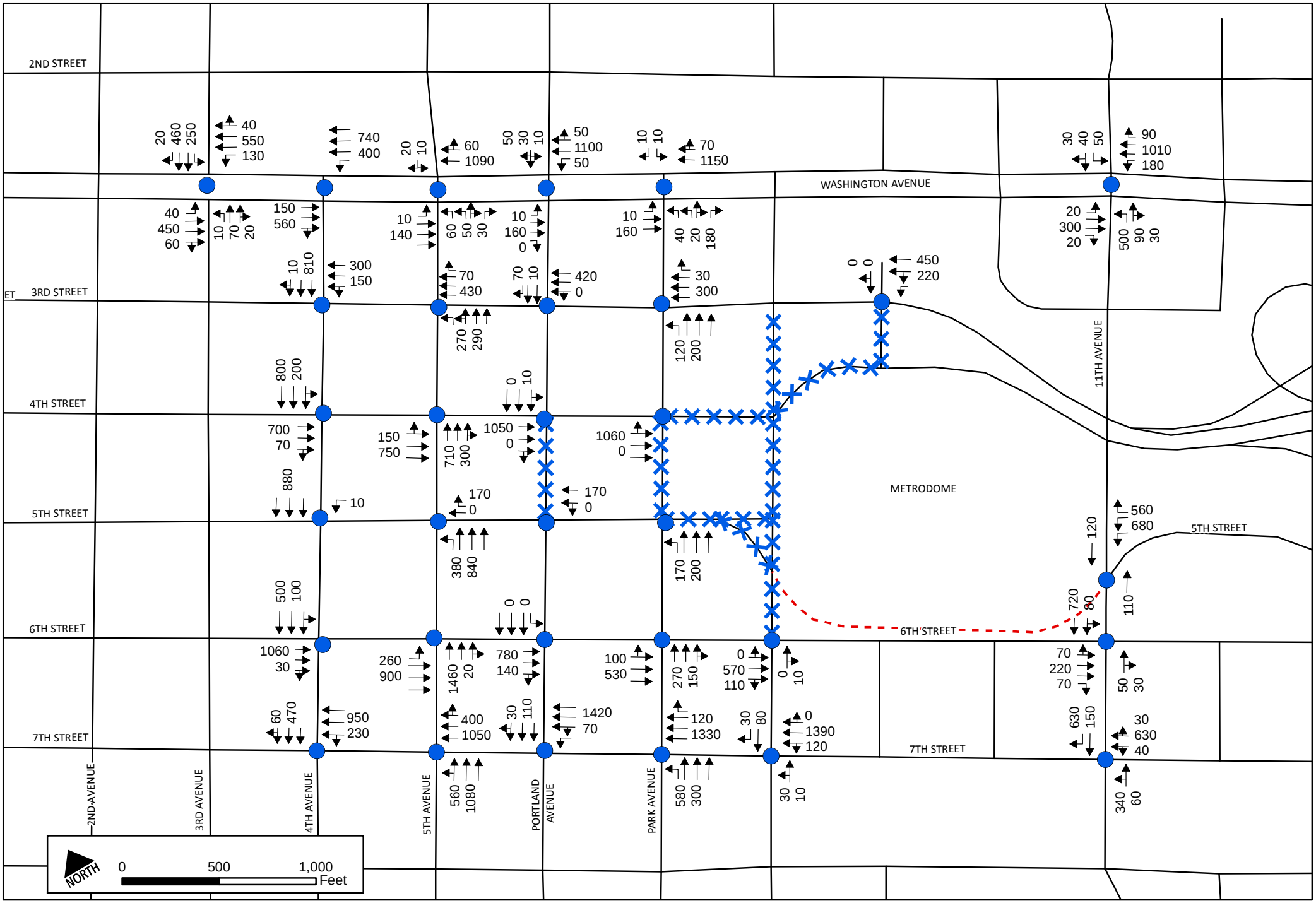


Figure 1.4-10. 2017 Park/Portland Weekend Build Event Arrival Plan A Peak Analysis Lane Geometry and Traffic Volumes

Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Event Road Closure
- Proposed Permanent Road Closure
- Proposed Event Road Closure
- XX (XX) Traffic Volumes 2017 (2030)
- Lane Geometry (2017 and 2030)

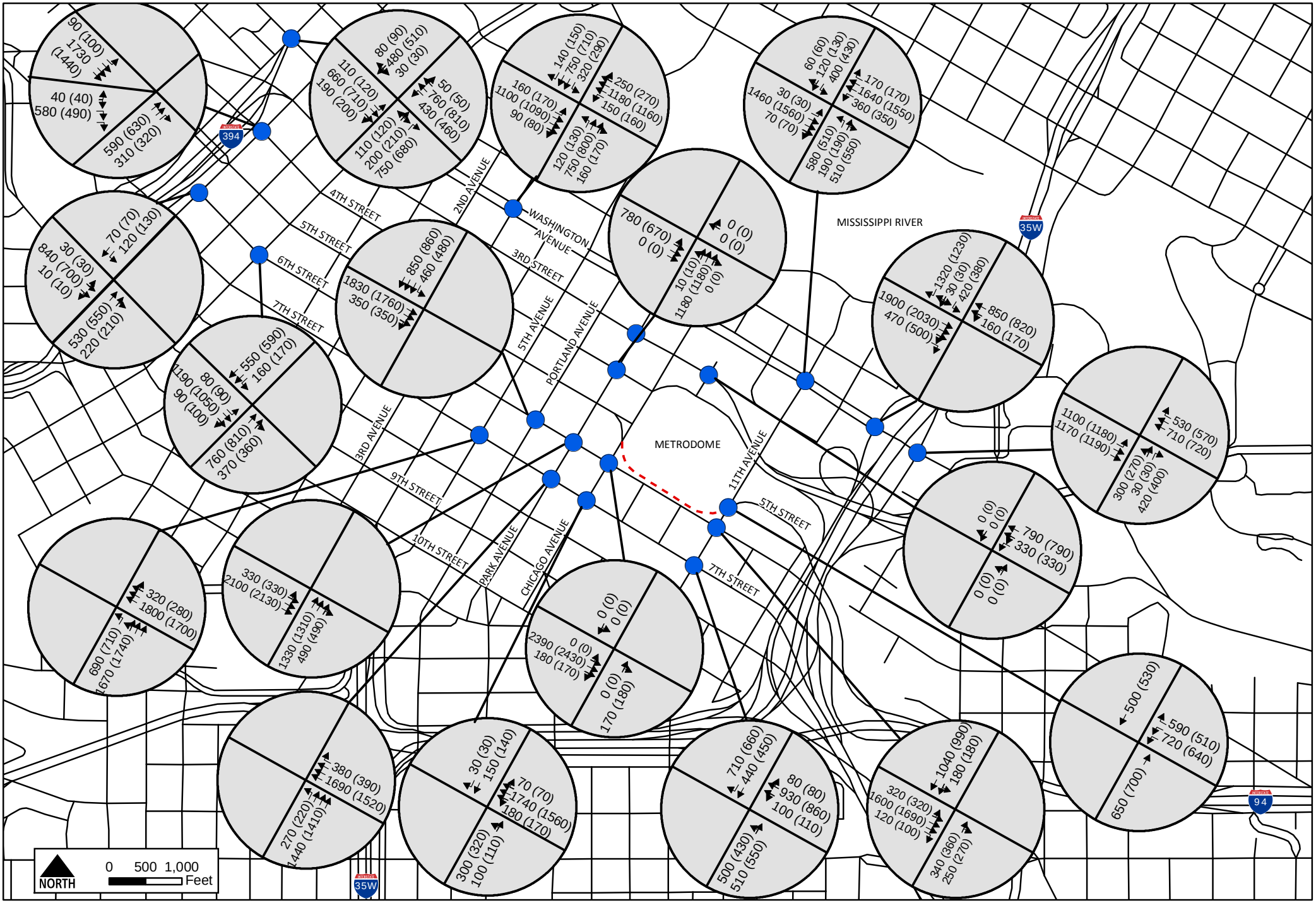


Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Event Road Closure
- Proposed Permanent Road Closure
- Proposed Event Road Closure
- XX (XX) Traffic Volumes 2017 (2030)
- Lane Geometry (2017 and 2030)

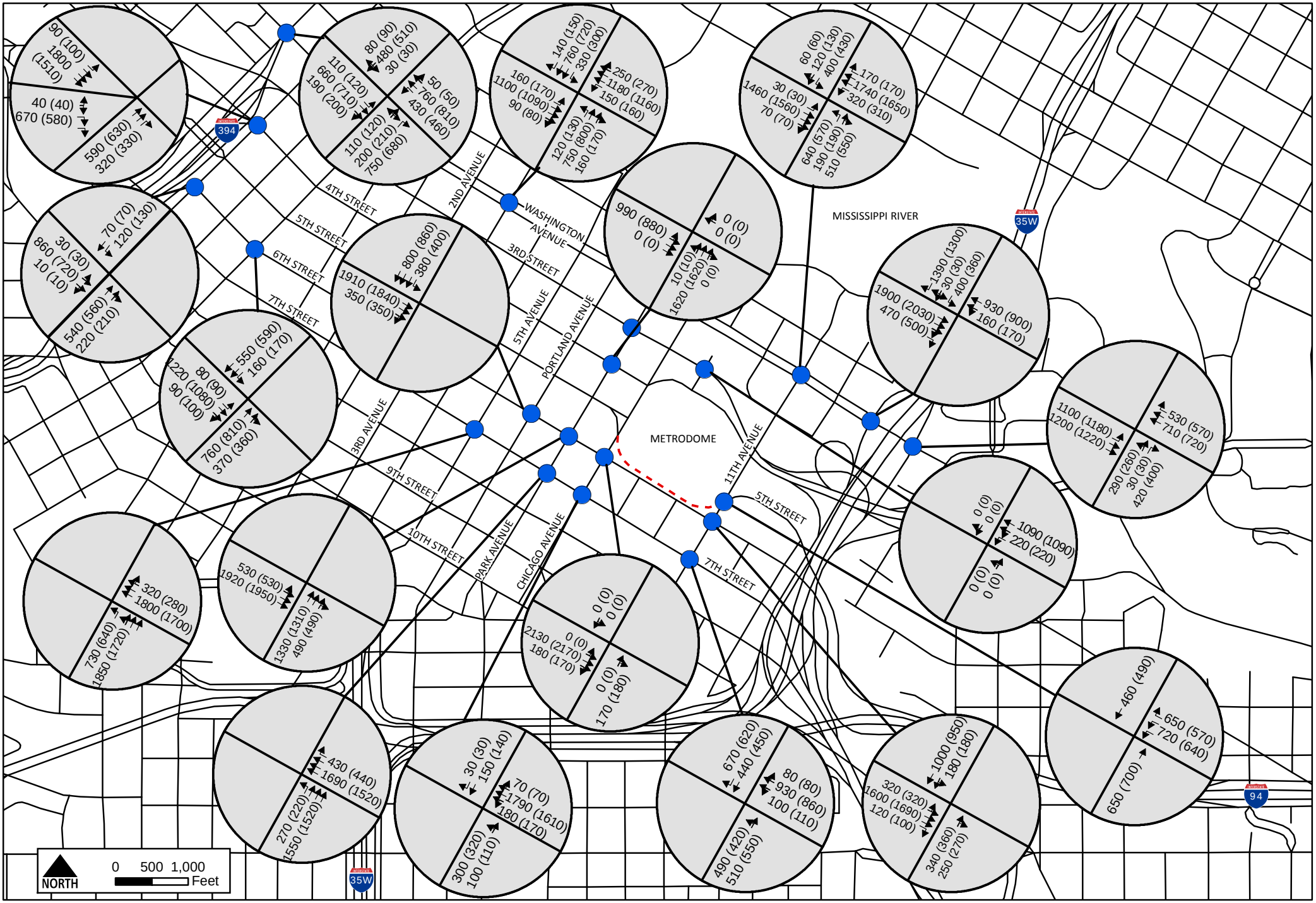
Figure 1.4-11. 2017 Park/Portland Weekend Build Event Arrival Plan B Peak Analysis Lane Geometry and Traffic Volumes



Legend

- Intersections to be Analyzed
- Proposed Event Road Closure
- Proposed Permanent Road Closure
- Proposed Event Road Closure
- XX (XX) Traffic Volumes 2017 (2030)
- Lane Geometry (2017 and 2030)

Figure 1.4-12. 2017 and 2030 Weekday Build Event Plan A Arrival Peak Analysis Lane Geometry and Traffic Volumes



Minnesota Multi-Purpose Stadium
ENVIRONMENTAL IMPACT STATEMENT

Legend

- Intersections to be Analyzed
- Proposed Event Road Closure
- Proposed Permanent Road Closure
- Proposed Event Road Closure
- XX (XX) Traffic Volumes 2017 (2030)
- Lane Geometry (2017 and 2030)

Figure 1.4-13. 2017 and 2030 Weekday Build Event Plan B Arrival Peak Analysis Lane Geometry and Traffic Volumes