Preliminary Engineering Report

City of Osseo

2012 Street Improvements

BMI Project No. T16.104316
January 2012

BOLTON & MENK, INC.
Consulting Engineers & Surveyors
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January 19, 2012

Honorable Mayor and City Council
City of Osseo
415 Central Avenue
Osseo, Minnesota 55369

RE: 2012 Street Improvements
BMI Project No.: T16.104316

Mayor and Council Members:

In accordance with your request, the following Preliminary Engineering Report has been prepared for the 2012 Street Improvements.

As a part of the study, the various public utilities have been reviewed regarding their capacity and structural integrity. Necessary utility improvements have then been recommended where appropriate. The total estimated project cost is $1,056,378.

During the process of studying the existing conditions within the project areas, meetings were held and input was received from area residents, Public Works personnel and City staff. We would like to acknowledge the cooperation and information received and thank all parties for their support in helping us better understand the problems and concerns within the project area.

I will attend the January 23, 2012 City Council meeting for the purpose of presenting this report and responding to any questions or comments that you may have.

Respectfully submitted,

BOLTON & MENK, INC.

Sarah E. Rippke, P.E.
Project Manager

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CERTIFICATION

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 the laws of the State of Minnesota.

By: Sarah E. Rippke

Sarah E. Rippke, P.E.
License No. 46636
Bolton & Menk, Inc.

Date: January 19, 2012

INTRODUCTION

This report examines proposed street, and necessary utility, improvements along 4th Avenue East; 2nd Street SE to 4th Street NE, and 2nd Street NE; 1st Avenue NE to 5th Avenue NE.

Specifically the project considers:

1. Bituminous street reconstruction.
2. Bituminous pavement reclamation.
3. Concrete curb and gutter reconstruction.
4. Concrete curb and gutter "spot" repair.
5. Necessary utility improvements.

The proposed project area is illustrated on Figure 1 of Appendix A.

BACKGROUND

The council ordered the preparation of this feasibility report at its November 28, 2011 council meeting. The feasibility study and report has been completed to better identify the infrastructure improvements needed in the proposed project area and to better define costs associated with the improvements. This report will be used as the basis for final design and is also a required step in the State's Chapter 429 process for special assessments.

EXISTING CONDITIONS

The project corridors consist primarily of single family homes with some commercial properties. The project corridors are fully developed.

STREETS

The bituminous streets being considered for improvement are aged and exhibit wear and distress. This is evident on the surface by severe pot-holing, pavement scaling and raveling. Subgrade soil strength testing and core sampling throughout the project area was completed by American Engineering Testing, Inc., in May 2010. A summary of the existing street conditions are listed in Table 1 and the soil boring logs and geotechnical report are included in Appendix D of this report.

The majority of the existing subgrade soils were found to be sand with silt and gravel and silty sand with gravel. Sand fill appears to be above the natural soils. The existing

bituminous thickness ranges from 4.25" to 6.5". The streets being considered for improvement are generally flat with minimal longitudinal grades.

Table 1 – Existing Soil & Pavement Conditions

Location	Street Width	Bituminous Thickness	Subgrade Material
4th Avenue SE; 1st Street SE to Broadway St.	40' f/f	5.75-inches	Fill, mostly gravelly sand with silt, silty sand and sand with silt, a little gravel.
4th Avenue NE; 1st Street NE to 2nd Street NE	39' f/f	5-inches	Fill, mostly silty sand with gravel, silty sand and sand with silt, a little gravel.
4th Avenue NE; 2nd Street NE to 3rd Street NE	40' f/f	4.5-inches	Fill, mostly silty sand with gravel,
2nd Street NE; 1st Avenue NE to 2nd Avenue NE	51' f/f	6.5-inches	Fill, mostly silty sand, a little gravel, sand with silt, a little gravel and clayey sand.
2nd Street NE; 3rd Avenue NE to 5th Avenue NE	43' f/f	5 to 5.5-inches	Fill, mostly gravelly sand with silt, silty sand, a little gravel.

The project corridors are delineated with B618 concrete curb and gutter. The condition of the concrete curb and gutter varies along the corridor, but overall is in good condition. Sidewalk runs along both sides of the streets the majority of the blocks within the project area.

UTILITIES

Figure 1 in Appendix A, illustrates the existing utilities throughout the project area. Sanitary sewer and watermain run along 4th Avenue NE and portions of 2nd Street NE. Existing storm sewer runs along 4th Avenue NE from Broadway Street to 3rd Street NE. The condition of the existing watermain was determined through conversations with City Staff. City staff has indicated there have been very few service calls regarding the watermain in the project area.

The existing storm sewer was evaluated as a part of the City's storm sewer inventory completed in fall 2010. The storm sewer inventory indicates the existing mainline pipe along 4th Avenue NE, between 2nd Street NE and Broadway Street is over-capacity.

The condition of the existing sanitary sewer was determined through conversations with City staff and by reviewing the City's sanitary sewer logs and sanitary sewer inventory. The video logs did not indicate any structural issues with the pipe. A few segments have root intrusion from adjacent services and may need cleaning in the future. The sanitary

sewer inventory indicated 3 pipe segments in the project area that do not meet current and future capacity needs.

Sanitary sewer forcemain runs along 4th Avenue East from 1 ½ Street NE to 2nd Street SE (and continues on to County Road 81). The forcemain is owned by the Metropolitan (MET) Council.

PROPOSED IMPROVEMENTS

STREETS

Two methods of improvements are proposed for the streets in the project area: reconstruction and reclamation. A brief description of each method is given below.

Reconstruction: This method consists of complete removal of the existing street structural section and replacement with new materials. Existing concrete curb and gutter would also be removed and replaced with new materials as part of the reconstruction method.

Reclamation: This method consists of removal of the existing bituminous pavement by grinding it up and the mixing it with the top 8-inches of underlying base material to create an aggregate base material. This material is utilized as the aggregate base section for the new roadway. The top 4-inches is removed to allow for the placement of the new bituminous section. The existing concrete curb and gutter remains in place during the reclamation, with spot replacement as needed.

Due to necessary utility improvements, discussed in the next section, street reconstruction is proposed for 4th Avenue NE from Broadway Street to 2nd Street NE and 2nd Street NE from 4th Avenue NE to the west one-half block. The remaining streets within the project area are proposed for pavement reclamation. The proposed street improvements are illustrated in Figure 2 of Appendix A.

In general the existing curb and gutter is in good condition. “Spot” curb replacement will be completed throughout the pavement reclamation area for deficient curb panels; panels that inhibit drainage, have sunk or heaved or are severely cracked.

UTILITIES

Proposed sanitary sewer improvements include the reconstruction of the mainline pipe along 4th Avenue NE from Broadway Street to 2nd Street NE and along 2nd Street NE from 4th Avenue NE to the existing lift station, mid-block between 3rd Avenue NE and 4th Avenue NE. The existing pipe on 4th Avenue NE will be upsized from its existing 8-inch to 12-inch PVC and the existing 12-inch pipe along 2nd Street NE will be increased to 18-inch PVC to accommodate current and future sanitary sewer flows. The proposed sanitary sewer improvements are illustrated in Figure 2 of Appendix A.

Storm sewer improvements include upsizing the existing mainline pipe along 4th Avenue NE, from Broadway Street to 2nd Street NE, to meet current & future capacity needs. The existing 18-inch pipe will be replaced with 24-inch pipe.

Watermain improvements are not deemed necessary in conjunction with the proposed street improvements. City staff is reviewing the history of the existing water services within the reconstruction area, depending on age and material those services may be replaced, from the City's watermain to the right-of-way, as a part of the project.

The MET Council intends to replace the existing forcemain along the two blocks of reconstruction in conjunction with the project.

SIDEWALKS

New pedestrian ramps meeting ADA requirements will be constructed at all locations where existing ramps are removed, where no ramps currently exist, or where existing ramps do not meet ADA requirements.

Sidewalk improvements are proposed, for consideration, to enhance pedestrian traffic and provide a continuous sidewalk throughout the project area. Currently, approximately sixty-percent of the project area has sidewalk. A couple options for consideration include: constructing sidewalk along those blocks in the project area that do not currently have sidewalk, or, constructing sidewalk along only those blocks that are proposed for full reconstruction (4th Avenue NE, Broadway Street to 2nd Street NE, and 2nd Street NE, 4th Avenue NE to the west one-half block). For both options, a 6-foot wide concrete sidewalk with a 3-foot boulevard is proposed. Figure 2 illustrates the first option, walk along all blocks that do not currently have sidewalk.

The addition of sidewalks is not included in the City's CIP as a part of the street improvement projects. Sidewalk costs and assessments are included in this report for the Council's consideration. Costs associated with the new sidewalk, as illustrated in Appendix B, include the construction of 6-foot wide sidewalk, additional pedestrian ramps where required, and additional turf restoration for the construction of sidewalk along all blocks that do not currently have sidewalk.

NEIGHBORHOOD MEETING

A neighborhood meeting with residents affected by and being assessed for the improvements was held on January 4, 2012. Five (5) residents, all of which live on 4th Avenue NE between Broadway Street and 2nd Street NE (reconstruction area), were in attendance at the meeting. Following a short presentation regarding the proposed improvements residents provided their feedback on the project. A drainage concern along 4th Avenue NE, within the reconstruction area, was brought to our attention. Residents also voiced their concern with the high-speed of traffic along 4th Avenue NE and asked if the road could be narrowed. Residents were also asked to provide feedback regarding the addition of sidewalk to those blocks within the project area that do not currently have sidewalk.

Narrowing the streets in the project area was not originally considered as a part of this study because full-reconstruction is proposed for only 2.5 blocks. Following the neighborhood meeting, the cost implications of narrowing 4th Avenue NE from Broadway Street to 2nd Street NE was evaluated. The existing width of this segment of 4th Avenue NE is 39' f/f (face of curb to face of curb). In the interest of narrowing the street, a width of 32' f/f was considered. Various street widths could be considered for these two blocks, a width of 32' f/f allows for a drive lane in each direction and parking on one side of the street. While narrowing the street provides cost savings associated with the actual street materials, additional costs are incurred due to storm sewer modifications and additional driveway improvements required. For the two blocks mentioned above, the estimated cost of narrowing the road is essentially the same as the full-reconstruction at its existing width.

Overall, residents in attendance at the neighborhood were not in favor of the addition of sidewalks, in those areas that do not currently have sidewalk, if the road is reconstructed at its current width. If the street is narrowed, however, residents were more open to considering the addition of sidewalk.

PERMITS / RIGHT-OF-WAY / COORDINATION

The proposed improvements will be limited to the existing street right-of-way along all corridors. Temporary construction easements may be needed for work outside the right-of-way such as driveway apron replacement, grading and turf restoration.

Permits will be required from the Minnesota Pollution Control Agency for grading (National Pollutant Discharge Elimination System permit) and the Shingle Creek Watershed District.

Preliminary conversations with the MET Council have indicated that the existing forcemain along 4th Avenue NE will be replaced in conjunction with the City's project. During final design, we will work with the MET Council to incorporate their improvement plans into the City's project.

ESTIMATED COSTS

Estimated construction costs presented in Table 2 include a 10 percent contingency factor. Overhead costs, estimated at 25 percent, include legal, engineering, administrative and fiscal costs. Final costs will be determined using low-bid construction costs of the proposed work.

Proposed project costs for the 2012 Street Improvements are itemized in Appendix B and are summarized below. These cost estimates are based upon public construction cost information. Since the consultant has no control over the cost of labor, materials, competitive bidding process, weather conditions and other factors affecting the cost of construction, all cost estimates are opinions for general information of the client and no warranty of guarantee as to the accuracy of construction cost estimates is made. It is recommended that costs for project financing should be based upon actual, competitive bid prices with reasonable contingencies.

Table 2 - Estimated Project Costs

STREET IMPROVEMENTS	$ 566,654
SANITARY SEWER IMPROVEMENTS	$ 96,050
STORM SEWER IMPROVEMENTS	$ 72,200
WATERMAIN IMPROVEMENTS	$ 33,370
STREET & UTILITY SUBTOTAL	$ 768,274
CONTINGENCIES (10%)	$ 76,828
ENGINEERING & ADMINISTRATION (25%)	$ 211,276
TOTAL ESTIMATED COST – Street & Utility Improvements	**$1,056,378**

SIDEWALK IMPROVEMENTS	$ 72,728
CONTINGENCIES (10%)	$ 7,273
ENGINEERING & ADMINISTRATION (25%)	$ 20,001
TOTAL ESTIMATED COST – Sidewalk Improvements	**$ 100,002**

Sidewalk Improvement costs illustrated in Table 2 represents construction of sidewalk along all blocks within the project area that do not currently have sidewalk. If sidewalk was just constructed along the blocks within the reconstruction area the total estimated cost is $45,000.

PROJECT FUNDING / ASSESSMENTS

As outlined in the City's Capital Improvement Plan (CIP) the proposed improvements are scheduled to be financed by the City's General Fund, Special Assessments, and City Utility Funds.

According to the City's Special Assessment Policy all properties in the project limits that receive a benefit from the street improvements will share in the costs of the improvements through special assessments. Per the City's Special Assessment Policy, 50% of the total street improvement costs are assessed to benefitting properties. For this report, the same assessment policy is proposed for the sidewalk improvements if it is included in the final project.

According to the policy, single-family residential and duplex properties are assessed on a per unit basis. Residential corner lots shall be assessed one unit when the street it fronts, that which its address is on, is reconstructed and 0.5 units for each adjacent street being improved. Multiple housing, institutional, commercial and industrial properties shall be assessed on the actual street frontage being improved, adjacent footage basis.

For this project, 50% of the street reclamation costs are proposed to be assessed. The balance of the street improvement costs, along with the additional cost of road reconstruction over the sanitary sewer and storm sewer improvements would be funded by other sources. The sanitary sewer, watermain, and storm sewer improvements are funded by their respective enterprise funds or other City-secured funding.

Table 3 provides the estimated assessment rates for the properties included in the assessment roll. Figure 3 illustrates those properties included in the assessment roll.

Table 3 – Preliminary Assessments

	Preliminary Assessment Rate	Preliminary Sidewalk Assessment Rate
Residential Property Fronting Reconstruction (1-Unit)	$7,393.03	$1,092.33
Residential Property Adjacent to Reconstruction (0.5-Units)	$3,696.52	$546.17
Residential Property Fronting & Adjacent to Reconstruction (1.5 Units)	$11,089.55	$1,683.50
Commercial / Institutional Properties	$61.04 / lf	$9.02 / lf

The total amount to be assessed is estimated at $338,409.82 for street improvements and $50,001 for sidewalk improvements. A preliminary assessment roll is included in Appendix C of this report.

PROJECT SCHEDULE

The following schedule is proposed:

Conduct Neighborhood Informational Meeting ..... January 4, 2012

Present Preliminary Engineering Report /
Order Improvement Hearing ..... January 23, 2012

Conduct Public Hearing /
Authorize Preparation of Plans & Specs ..... February 13, 2012

Approve Final Plans & Specifications /
Authorize Advertise for Bids ..... March 26, 2012

Accept Bids /
Order Public Assessment Hearing ..... April 23, 2012

Conduct Public Assessment Hearing /
Adopt Assessment Roll / Award Project ..... May 29, 2012

Construction ..... June 2012 to October 2012

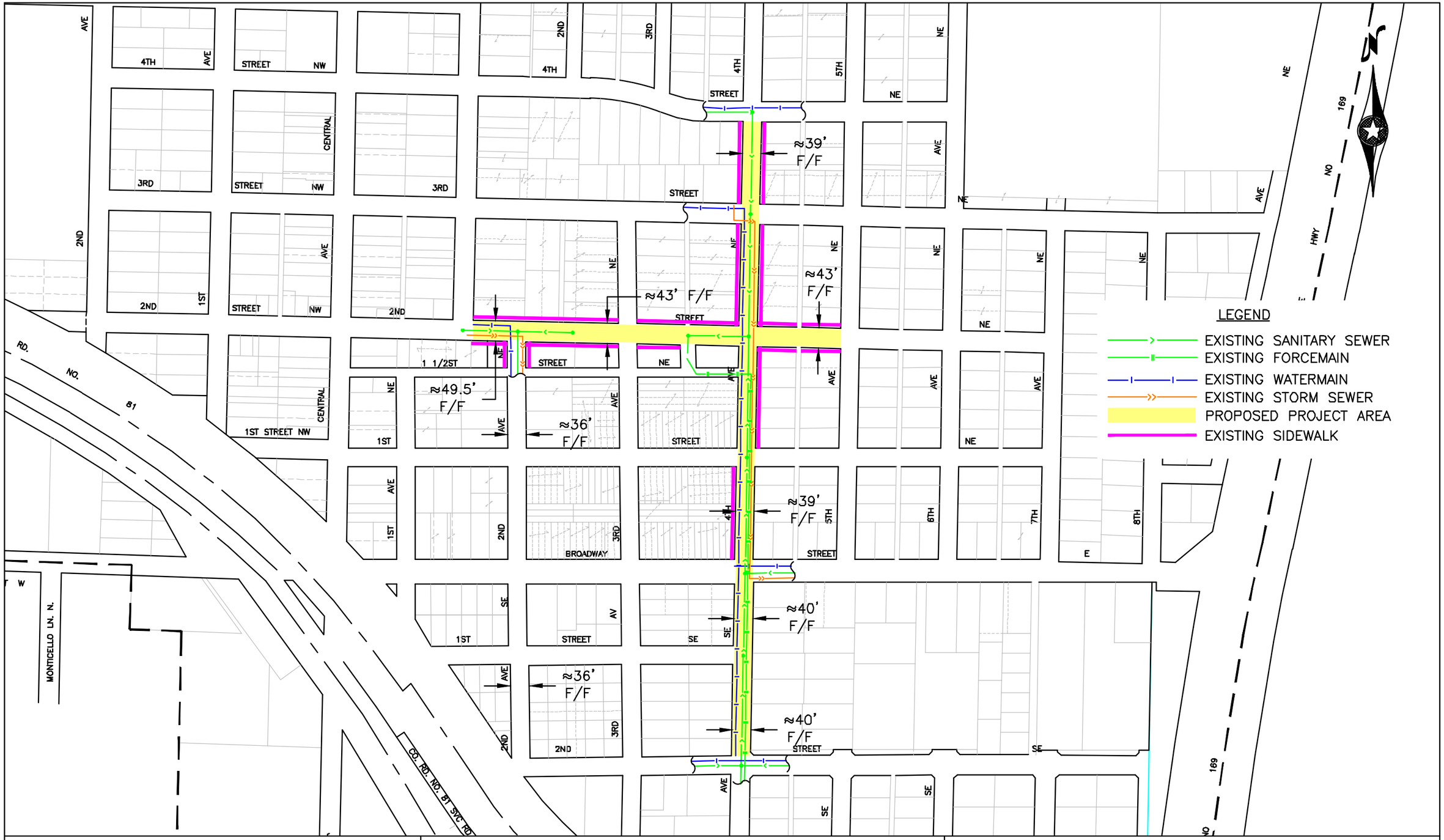
FEASIBILITY AND RECOMMENDATION

This report identifies the recommended improvements for the 2012 Street and Utility Improvement project. It also provides an estimated cost for the work. The improvements are necessary based on the existing condition of the streets. They are also cost effective, as portions of the existing infrastructure in good condition (i.e. curb, sidewalk, etc) will be preserved where possible.

From an engineering standpoint, this project, as proposed, is feasible, cost effective and necessary and it can best be accomplished by letting competitive bids for the work for 2012 construction. It is recommended that the work be done under one contract in order to complete the work in an orderly and efficient manner. The City, its financial consultant, and the persons assessed will have to determine the economic feasibility of the proposed improvements.

APPENDIX A

FIGURES



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SCALE FEET

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BOLTON & MENK, INC.
Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN BURNSVILLE, MN
CHASKA, MN RAMSEY, MN MAPLEWOOD, MN BRAINERD, MN AMES, IA

CITY OF OSSEO
2012 STREET IMPROVEMENTS
EXISTING CONDITIONS

FIGURE 1

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BOLTON & MENK, INC.

Consulting Engineers & Surveyors

MANKATO, MN FAIRMONT, MN SLEEPY EYE, MN WILLMAR, MN BURNSVILLE, MN
CHASKA, MN RAMSEY, MN MAPLEWOOD, MN BRAINERD, MN AMES, IA

CITY OF OSSEO
2012 STREET IMPROVEMENTS
PROPOSED IMPROVEMENTS

FIGURE 2

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BOLTON & MENK, INC.

Consulting Engineers & Surveyors

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CHASKA, MN RAMSEY, MN MAPLEWOOD, MN BRAINERD, MN AMES, IA

CITY OF OSSEO
2012 STREET IMPROVEMENTS
ASSESSED PROPERTIES

FIGURE 3

APPENDIX B

COST ESTIMATE

PRELIMINARY ENGINEER'S ESTIMATE

2012 STREET IMPROVEMENTS
CITY OF OSSEO, MN
BMI PROJECT NO. T16.104316

ITEM NO.	ITEM	UNIT	UNIT PRICE	QUANTITIES						COSTS						TOTAL ESTIMATED PROJECT COST
				STREET IMPROVEMENTS	SIDEWALK IMPROVEMENTS	SANITARY SEWER IMPROVEMENTS	WATERMAIN IMPROVEMENTS	STORM SEWER IMPROVEMENTS		STREET IMPROVEMENTS	SIDEWALK IMPROVEMENTS	SANITARY SEWER IMPROVEMENTS	WATERMAIN IMPROVEMENTS	STORM SEWER IMPROVEMENTS		
1	MOBILIZATION	LUMP SUM	$50,000.00	0.70		0.15	0.05	0.10		$35,000.00	$0.00	$7,500.00	$2,500.00	$5,000.00		$50,000.00
2	CLEAR & GRUB TREE	EACH	$500.00	2						$1,000.00	$0.00	$0.00	$0.00	$0.00		$1,000.00
3	REMOVE BITUMINOUS PAVEMENT- DRIVEWAY	SQ YD	$3.50	90						$315.00	$0.00	$0.00	$0.00	$0.00		$315.00
4	REMOVE CONCRETE PAVEMENT- DRIVEWAY / WALK / ALLEY	SQ YD	$5.00	750						$3,750.00	$0.00	$0.00	$0.00	$0.00		$3,750.00
5	REMOVE CONCRETE CURB & GUTTER	LIN FT	$3.50	2000						$7,000.00	$0.00	$0.00	$0.00	$0.00		$7,000.00
6	REMOVE SANITARY SEWER PIPE	LIN FT	$6.00			1025				$0.00	$0.00	$6,150.00	$0.00	$0.00		$6,150.00
7	REMOVE STORM SEWER PIPE	LIN FT	$10.00					995		$0.00	$0.00	$0.00	$0.00	$9,950.00		$9,950.00
8	REMOVE SANITARY MANHOLE	EACH	$500.00			1				$0.00	$0.00	$500.00	$0.00	$0.00		$500.00
9	REMOVE STORM STRUCTURE	EACH	$500.00					4		$0.00	$0.00	$0.00	$0.00	$2,000.00		$2,000.00
10	SALVAGE AND REINSTALL STORM SEWER PIPE	LIN FT	$30.00			110				$0.00	$0.00	$3,300.00	$0.00	$0.00		$3,300.00
11	SAWING BITUMINOUS PAVEMENT (FULL DEPTH)	LIN FT	$3.00	350						$1,050.00	$0.00	$0.00	$0.00	$0.00		$1,050.00
12	COMMON EXCAVATION	CU YD	$14.00	1500						$21,000.00	$0.00	$0.00	$0.00	$0.00		$21,000.00
13	SUBGRADE EXCAVATION	CU YD	$13.00	500						$6,500.00	$0.00	$0.00	$0.00	$0.00		$6,500.00
14	SELECT GRANULAR BORROW	CU YD	$15.00	500						$7,500.00	$0.00	$0.00	$0.00	$0.00		$7,500.00
15	TOPSOIL BORROW	CU YD	$13.00	500						$6,500.00	$0.00	$0.00	$0.00	$0.00		$6,500.00
16	EXPLORATORY EXCAVATION	HOUR	$500.00	2		6	2	4		$1,000.00	$0.00	$3,000.00	$1,000.00	$2,000.00		$7,000.00
17	GRANULAR TRENCH BACKFILL	CU YD	$9.00			350				$0.00	$0.00	$3,150.00	$0.00	$0.00		$3,150.00
18	AGGREGATE BASE CLASS 5- STREETS	CU YD	$23.00	1500						$34,500.00	$0.00	$0.00	$0.00	$0.00		$34,500.00
19	MILL BITUMINOUS PAVEMENT - FULL DEPTH	SQ YD	$2.50	4500						$11,250.00	$0.00	$0.00	$0.00	$0.00		$11,250.00
20	RECLAIM BITUMINOUS PAVEMENT - FULL DEPTH	SQ YD	$5.00	9850						$49,250.00	$0.00	$0.00	$0.00	$0.00		$49,250.00
21	BITUMINOUS WEAR COURSE- STREETS (LV4)	TON	$66.00	1740						$114,840.00	$0.00	$0.00	$0.00	$0.00		$114,840.00
22	BITUMINOUS NON-WEAR COURSE- STREETS (LV3)	TON	$63.00	2200						$138,600.00	$0.00	$0.00	$0.00	$0.00		$138,600.00
23	BITUMINOUS MATERIAL FOR TACK COAT	GAL	$2.50	1000						$2,500.00	$0.00	$0.00	$0.00	$0.00		$2,500.00
24	BITUMINOUS DRIVEWAY (3")	SQ YD	$25.00	90						$2,250.00	$0.00	$0.00	$0.00	$0.00		$2,250.00
25	15" RC PIPE SEWER CL V DESIGN 3006 (STORM)	LIN FT	$30.00					220		$0.00	$0.00	$0.00	$0.00	$6,600.00		$6,600.00
26	24" RC PIPE SEWER CL V DESIGN 3006 (STORM)	LIN FT	$38.00					775		$0.00	$0.00	$0.00	$0.00	$29,450.00		$29,450.00
27	CONNECT TO EXISTING STORM SEWER STRUCTURE	EACH	$1,000.00					1		$0.00	$0.00	$0.00	$0.00	$1,000.00		$1,000.00
28	CONNECT TO EXISTING STORM SEWER PIPE	EACH	$400.00					11		$0.00	$0.00	$0.00	$0.00	$4,400.00		$4,400.00
29	CONNECT TO EXISTING LIFT STATION	EACH	$1,000.00			1				$0.00	$0.00	$1,000.00	$0.00	$0.00		$1,000.00
30	CONNECT TO EXISTING SANITARY MANHOLE	EACH	$500.00			5				$0.00	$0.00	$2,500.00	$0.00	$0.00		$2,500.00
31	CONNECT TO EXISTING SANITARY SERVICE	EACH	$250.00			17				$0.00	$0.00	$4,250.00	$0.00	$0.00		$4,250.00
32	BYPASS PUMPING	LUMP SUM	$5,000.00			1				$0.00	$0.00	$5,000.00	$0.00	$0.00		$5,000.00
33	6" PVC SAN. SERVICE PIPE, SDR 26	LIN FT	$36.00			250				$0.00	$0.00	$9,000.00	$0.00	$0.00		$9,000.00
34	12" X 6" SDR 26 PVC SERVICE WYE	EACH	$250.00			17				$0.00	$0.00	$4,250.00	$0.00	$0.00		$4,250.00
35	12" SANITARY SEWER PIPE	LIN FT	$40.00			770				$0.00	$0.00	$30,800.00	$0.00	$0.00		$30,800.00
36	18" SANITARY SEWER PIPE	LIN FT	$50.00			255				$0.00	$0.00	$12,750.00	$0.00	$0.00		$12,750.00
37	CONSTRUCT SANITARY MANHOLE	EACH	$1,500.00			1				$0.00	$0.00	$1,500.00	$0.00	$0.00		$1,500.00
38	CASTING ASSEMBLY - SANITARY SEWER	EACH	$500.00			1				$0.00	$0.00	$500.00	$0.00	$0.00		$500.00
39	ADJUST FRAME & RING CASTING	EACH	$400.00	24						$9,600.00	$0.00	$0.00	$0.00	$0.00		$9,600.00
40	ADJUST GATE VALVE	LIN FT	$250.00	13						$3,250.00	$0.00	$0.00	$0.00	$0.00		$3,250.00
41	1" TYPE K COPPER SERVICE PIPE	EACH	$32.00				510			$0.00	$0.00	$0.00	$16,320.00	$0.00		$16,320.00
42	1" CURB STOP & BOX	EACH	$350.00				17			$0.00	$0.00	$0.00	$5,950.00	$0.00		$5,950.00
43	1" CORPORATION	EACH	$300.00				4			$0.00	$0.00	$0.00	$1,200.00	$0.00		$1,200.00
44	CONNECT TO EXISTING WATER SERVICE	EACH	$300.00				17			$0.00	$0.00	$0.00	$5,100.00	$0.00		$5,100.00
45	4" POLYSTYRENE INSULATION	SQ FT	$2.00				500			$0.00	$0.00	$0.00	$1,000.00	$0.00		$1,000.00
46	CONSTRUCT DRAINAGE STRUCTURE DES 4020 - 48"	EACH	$1,300.00					4		$0.00	$0.00	$0.00	$0.00	$5,200.00		$5,200.00
47	CONSTRUCT DRAINAGE STRUCTURE DES 4020 - 78"	EACH	$3,500.00					1		$0.00	$0.00	$0.00	$0.00	$3,500.00		$3,500.00
48	CATCH BASIN CASTING ASSEMBLY R-1733 (STORM SEWER)	EACH	$500.00					5		$0.00	$0.00	$0.00	$0.00	$2,500.00		$2,500.00
49	CONCRETE CURB AND GUTTER DESIGN B618	LIN FT	$9.50	2000						$19,000.00	$0.00	$0.00	$0.00	$0.00		$19,000.00
50	SPOT REPAIR - CONCRETE CURB AND GUTTER DESIGN B618 (INCL. R	LIN FT	$15.00	1500						$22,500.00	$0.00	$0.00	$0.00	$0.00		$22,500.00
51	6" CONCRETE DRIVEWAY & ALLEY PAVEMENT	SQ YD	$50.00	325		0				$16,250.00	$0.00	$0.00	$0.00	$0.00		$16,250.00
52	TRAFFIC CONTROL	LUMP SUM	$6,000.00	0.70		0.15	0.05	0.10		$4,200.00	$0.00	$900.00	$300.00	$600.00		$6,000.00
53	CONCRETE SIDEWALK	SQ FT	$6.00	3900	11130					$23,400.00	$66,780.00	$0.00	$0.00	$0.00		$90,180.00
54	TRUNCATED DOMES	SQ FT	$40.00	272	104					$10,880.00	$4,160.00	$0.00	$0.00	$0.00		$15,040.00
55	INLET PROTECTION - FILTER AGGREGATE	EACH	$150.00	40						$6,000.00	$0.00	$0.00	$0.00	$0.00		$6,000.00
56	SODDING TYPE LAWN	SQ YD	$2.75	2825	650					$7,768.75	$1,787.50	$0.00	$0.00	$0.00		$9,557.00
									SUBTOTAL	$ 566,654.00	$ 72,728.00	$ 96,050.00	$ 33,370.00	$ 72,200.00		$ 841,002.00
									CONTINGENCIES (10%)	$ 56,666.00	$ 7,273.00	$ 9,605.00	$ 3,337.00	$ 7,220.00		$ 84,101.00
									ENGINEERING & ADMINISTRATION (25%)	$ 155,830.00	$ 20,001.00	$ 26,414.00	$ 9,177.00	$ 19,855.00		$ 231,276.00
									TOTAL ESTIMATED PROJECT COST	**$ 779,150.00**	**$ 100,002.00**	**$ 132,069.00**	**$ 45,884.00**	**$ 99,275.00**		**$ 1,156,379.00**

APPENDIX C

PRELIMINARY ASSESSMENT ROLL

PRELIMINARY ASSESSMENT ROLL

2012 STREET IMPROVEMENTS
CITY OF OSSEO, MN
BMI PROJECT NO. T16.104316

TOTAL STREET IMPROVEMENT COST	**$**	**676,819.00**
TOTAL AMOUNT ASSESSABLE (50% STREET COST)	$	338,409.50
TOTAL FRONT FOOTAGE		5544.24
ASSESSMENT PER FRONT FOOT - COMMERCIAL	**$**	**61.04**
TOTAL ASSESSMENT BY FRONT FOOT (COMMERCIAL)	$	20,509.44
TOTAL AMOUNT REMAINING TO ASSESS BY UNIT	$	317,900.06
TOTAL NUMBER OF UNITS		43
TOTAL ASSESSMENT PER UNIT	$	7,393.03
TOTAL AMOUNT TO BE ASSESSED	**$**	**338,409.82**

2012 STREET & UTILITY IMPROVEMENTS

PID NO.	PROPERTY ADDRESS	OWNER NAME	TAXPAYER NAME	MAILING ADDRESS	CITY	STATE	ZIP CODE	FRONT FOOTAGE	ADJACENT FOOTAGE	UNIT	ASSESSMENT RATE	PRELIMINARY ASSESSMENT
1811921210054	332 4TH AVE NE	RT & DA WEBER	RICHARD T WEBER		OSSEO	MN	55369	70.00		1	$ 7,393.03	$ 7,393.03
1811921220102	325 4TH AVE NE	THOMAS L SPANIER		10580 CAIN RD	ROGERS	MN	55374	140.00		1	$ 7,393.03	$ 7,393.03
1811921210053	324 4TH AVE NE	LINDA RICHIE ET AL SUBJ/LE	RUSSEL DAHL		OSSEO	MN	55369	69.00		1	$ 7,393.03	$ 7,393.03
1811921240091	308 4TH AVE NE	OSSEO HISTORIC REDEVELOP LLC		208 4TH AVE NE	OSSEO	MN	55369	124.50		1	$ 7,393.03	$ 7,393.03
1811921230001	333 3RD ST NE	CITY-COUNTY FED CREDIT UNION	WINGS FINANCIAL CREDIT UNION	14985 GLAZIER AVE	APPLE VALLEY	MN	55124	124.50		0.5	$ 7,393.03	$ 3,696.52
1811921230148	233 4TH AVE NE	PM MCGRANE & SA MCGRANE	PATRICK M MCGRANE		OSSEO	MN	55369	66.00		1	$ 7,393.03	$ 7,393.03
1811921240105	224 4TH AVE NE	KAREN K MEYER ET AL W/L EST	KAREN MEYER		OSSEO	MN	55369	165.00		1	$ 7,393.03	$ 7,393.03
1811921230149	225 4TH AVE NE	C & S JONES	CHARLES R JONES		OSSEO	MN	55369	66.00		1	$ 7,393.03	$ 7,393.03
1811921240104	208 4TH AVE NE	DANIEL L & HOLLY A SPANIER			OSSEO	MN	55369	165.00	134.87	1.5	$ 7,393.03	$ 11,089.55
1811921230175	217 4TH AVE NE	JAMES A MCHUGH	CELIA MCHUGH		OSSEO	MN	55369	99.00		1	$ 7,393.03	$ 7,393.03
1811921230153	209 4TH AVE NE	D & M WALLGREN	DOUGLAS & MICHEALLE WALLGREN		OSSEO	MN	55369	99.00	166.35	1.5	$ 7,393.03	$ 11,089.55
1811921230190	208 3RD AVE NE	MR & JR FAIR	MICHAEL R/ JACQUELINE R FAIR		OSSEO	MN	55369	165.00		0.5	$ 7,393.03	$ 3,696.52
1811921230145	201 3RD AVE NE	WR YOUNKERS & SM YOUNKERS	WILLIAM R/ SHAUNE M YOUNKERS		OSSEO	MN	55369	193.42		0.5	$ 7,393.03	$ 3,696.52
1811921230144	201 2ND ST NE	TF NIELSEN & JM BRANCH	TIMOTHY NIELSEN/ JENNA BRANCH		OSSEO	MN	55369	110.00		1	$ 7,393.03	$ 7,393.03
1811921230187	200 1ST AVE NE	TJ WEBER PROPERTIES LLC		34 2ND ST NE	OSSEO	MN	55369	165.00			$ 61.04	$ 10,071.60
1811921230193	116 2ND ST NE	UNITED TELEPHONE CO OF MN	UNITED TELEPHONE CO OF MN PROPERTY TAX DEPT	PO BOX 7909	OVERLAND PARK	KS	66207	55.00			$ 61.04	$ 3,357.20
1811921230076	133 2ND AVE NE	UNITED TELEPHONE CO OF MN	UNITED TELEPHONE CO OF MN PROPERTY TAX DEPT	PO BOX 7909	OVERLAND PARK	KS	66207	65.00			$ 61.04	$ 3,967.60
1811921230079	132 2ND AVE NE	SHARON R SPARTZ TRUSTEE	CLARENCE J SPARTZ		OSSEO	MN	55369	156.00		0.5	$ 7,393.03	$ 3,696.52
1811921230147	133 3RD AVE NE	GR ZELENAK & AM ZELENK	GERALD R ZELENAK		OSSEO	MN	55369	140.44		0.5	$ 7,393.03	$ 3,696.52
1811921230156	132 3RD AVE NE	MICHAEL J BERRE		12440 63RD AVENUE N	MAPLE GROVE	MN	55369	138.00		0.5	$ 7,393.03	$ 3,696.52
1811921230154	324 2ND ST NE	JEFFERY SAINE & VICKI SAINE			OSSEO	MN	55369	140.00	70.10	1.5	$ 7,393.03	$ 11,089.55
1811921240103	132 4TH AVE NE	JOHN R GOTH	JOHN GOTH		OSSEO	MN	55369	68.69	134.89	1.5	$ 7,393.03	$ 11,089.55
1811921240102	125 5TH AVE NE	R & B HEINEN	RAYMOND E HEINEN		OSSEO	MN	55369	134.89		0.5	$ 7,393.03	$ 3,696.52
1811921240101	205 5TH AVE NE	JUDAH DUECK			OSSEO	MN	55369	134.87		0.5	$ 7,393.03	$ 3,696.52
1811921240015	124 4TH AVE NE	PAUL J BOSCHAERT		9804 AUSTIN ST NE	CIRCLE PINES	MN	55014	64.22		1	$ 7,393.03	$ 7,393.03
1811921240014	116 4TH AVE NE	TB SHAW & LP FERGUSON	THOMAS B SHAW/ LAURA FERGUSON		OSSEO	MN	55369	63.50		1	$ 7,393.03	$ 7,393.03
1811921240013	108 4TH AVE NE	CE DURAN & EILEEN LUNDGREN	CATHERINE E DURAN/ EILEEN LUNDGREN		OSSEO	MN	55369	63.50		1	$ 7,393.03	$ 7,393.03
1811921240012	100 4TH AVE NE	KEITH BROWN			OSSEO	MN	55369	63.50		1	$ 7,393.03	$ 7,393.03
1811921230167	117 4TH AVE NE	B KLEVEN & M KLEVEN	BRIAN KLEVEN		OSSEO	MN	55369	98.00		1	$ 7,393.03	$ 7,393.03
1811921230196	325 1ST ST NE	NORMAN E BOLLINGER ET AL TRS	NORMAN E BOLLINGER		OSSEO	MN	55369	120.00		0.5	$ 7,393.03	$ 3,696.52
1811921230117	33 4TH AVE NE	TIMOTHY P WALSH			OSSEO	MN	55369	60.00		1	$ 7,393.03	$ 7,393.03
1811921240025	408 1ST ST NE	JONATHAN R BIDLER			OSSEO	MN	55369	60.00		0.5	$ 7,393.03	$ 3,696.52
1811921240024	24 4TH AVE NE	RICHARD S & SHEREEN O'MALLEY			OSSEO	MN	55369	60.00		1	$ 7,393.03	$ 7,393.03
1811921230118	25 4TH AVE NE	KEVIN A LANE			OSSEO	MN	55369	60.00		1	$ 7,393.03	$ 7,393.03
1811921230169	17 4TH AVE NE	MICHAEL D CLANCY			OSSEO	MN	55369	60.00		1	$ 7,393.03	$ 7,393.03
1811921240023	16 4TH AVE NE	MATTHEW J LEISEN ET AL	MATTHEW J LEISEN/ JANELL M LEISEN		OSSEO	MN	55369	60.00		1	$ 7,393.03	$ 7,393.03
1811921240022	8 4TH AVE NE	MARY J GILBERTSON	MARY GILBERTSON		OSSEO	MN	55369	120.00		1	$ 7,393.03	$ 7,393.03
1811921230130	333 BROADWAY ST E	DAVID L ALEXANDER ET AL	DAVID L ALEXANDER		OSSEO	MN	55369	120.00		0.5	$ 7,393.03	$ 3,696.52
1811921320015	324 BROADWAY ST E	KEVIN G PASHINA & WIFE	KEVIN G & TINA M PASHINA		OSSEO	MN	55369	100.00		0.5	$ 7,393.03	$ 3,696.52
1811921310009	408 BROADWAY ST E	CAROL A CRONE			OSSEO	MN	55369	83.50		0.5	$ 7,393.03	$ 3,696.52
1811921310010	16 4TH AVE SE	A & D SMITH	ANDREW SMITH		OSSEO	MN	55369	81.50		1	$ 7,393.03	$ 7,393.03
1811921320017	333 1ST ST SE	CALLEE S AYDT			OSSEO	MN	55369	100.00		0.5	$ 7,393.03	$ 3,696.52
1811921310011	24 4TH AVE SE	ED SCHARBER & C SCHARBER			OSSEO	MN	55369	66.00		1	$ 7,393.03	$ 7,393.03
1811921310012	100 4TH AVE SE	GREGORY JAMES MILLER			OSSEO	MN	55369	80.00		1	$ 7,393.03	$ 7,393.03
1811921310013	108 4TH AVE SE	DANIEL A WALESCH TRUSTEE	MARCELLUS WALESCH		OSSEO	MN	55369	85.00		1	$ 7,393.03	$ 7,393.03
1811921320041	101 4TH AVE SE	KATIE L MCCOMB			OSSEO	MN	55369	60.00		1	$ 7,393.03	$ 7,393.03
1811921320042	109 4TH AVE SE	ROBERT L DENNESON			OSSEO	MN	55369	60.00		1	$ 7,393.03	$ 7,393.03
1811921320043	117 4TH AVE SE	ABIGAIL B KULAS			OSSEO	MN	55369	60.00		1	$ 7,393.03	$ 7,393.03
1811921320044	125 4TH AVE SE	SJ NEUMANN & DC PENNY	SARA J NEUMANN		OSSEO	MN	55369	60.00		1	$ 7,393.03	$ 7,393.03
1811921320045	133 4TH AVE SE	MARY C BISTODEAU	DENNIS JOHN SCHMIDTZ/ KEVIN DAVID SCHMIDTZ		OSSEO	MN	55369	60.00		1	$ 7,393.03	$ 7,393.03
1811921310015	116 4TH AVE SE	GEO W SMITH ETAL	GEORGE W SMITH		OSSEO	MN	55369	164.00		1	$ 7,393.03	$ 7,393.03
1811921230155	316 2ND STREET NE	HENNEPIN FORFEITED LAND	CITY OF OSSEO	415 CENTRAL AVENUE	OSSEO	MN	55369	51.00			$ 61.04	$ 3,113.04

APPENDIX D

GEOTECHNICAL EVALUATION

REPORT OF GEOTECHNICAL EXPLORATION AND REVIEW

2010 Street and Utility Improvements

Osseo, Minnesota

AET Project No. 28-00226

Date:

June 3, 2010

Prepared for:

City of Osseo
415 Central Avenue
Osseo, MN 55369

June 3, 2010

City of Osseo
415 Central Avenue
Osseo, MN 55369

Attn: Greg Withers, City Administrator

RE: Geotechnical Exploration and Review
2010 Street and Utility Improvements
Osseo, Minnesota
AET Project No. 28-00226

Dear Mr. Withers:

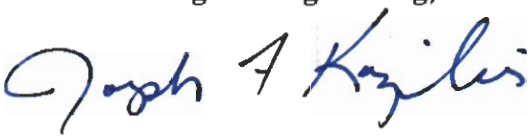
American Engineering Testing, Inc. (AET) is pleased to present the results of our subsurface exploration program and geotechnical engineering review for your Street and Utility Improvement project in Osseo, Minnesota. These services were performed according to our proposal to you dated May 19, 2010 which you accepted on May 24, 2010.

In addition to the two hard copies of the report submitted to you, an electronic copy and three hard copies are also being sent to Bolton & Menk on your behalf.

Please contact me if you have any questions about the report.

Sincerely,

American Engineering Testing, Inc.



Joseph F. Korzilius, PE
Principal Engineer
Phone: (651) 603-6632
Cell: (612) 685-6585
jkorzilius@amengtest.com

cc: (3) Bolton & Menk, Attn: Sarah Rippke

Report of Geotechnical Exploration and Review
2010 Street and Utility Improvements
Osseo, Minnesota
AET Project No. 28-00226

June 3, 2010

Prepared for:

City of Osseo
415 Central Avenue
Osseo, MN 55369
Attn: Greg Withers

Prepared by:

American Engineering Testing, Inc.
550 Cleveland Avenue North
St. Paul, Minnesota 55114
(651) 659-9001/www.amengtest.com

Report Authored By:

Joseph F. Korzilius, PE
Principal Engineer

Peer Review Conducted By:

Jeffery K. Voyen, PE
Vice President, Geotechnical Division

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

Name: Joseph F. Korzilius

Date: 6/3/2010 **License #: 19534**

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AET Project No. 28-00226

GEOTECHNICAL EXPLORATION AND REVIEW
FOR
2010 STREET AND UTILITY IMPROVEMENTS
OSSEO, MINNESOTA
AET PROJECT NO. 28-00226

1.0 INTRODUCTION

You are proposing street rehabilitation/reconstruction and utility improvements in Osseo, Minnesota. To assist planning and design, you have authorized American Engineering Testing, Inc. (AET) to conduct a subsurface exploration program at the site, conduct soil laboratory testing, and perform a geotechnical engineering review for the project. This report presents the results of the above services, and provides our engineering recommendations based on this data.

2.0 SCOPE OF SERVICES

AET's services were performed according to our proposal to you dated May 19, 2010, which you accepted on May 24, 2010. The authorized scope consists of the following:

- Eight standard penetration and auger test borings to depths of 5 feet to 20 feet.
- Soil laboratory testing (sieve analysis and water content).
- Geotechnical engineering analysis based on the gained data and preparation of this report.

Soil boring locations and depths were provided to us by Bolton & Menk, Inc.

These services are intended for geotechnical purposes. The scope is not intended to explore for the presence or extent of environmental contamination.

3.0 PROJECT INFORMATION

The project involves reconstruction or rehabilitation of the following roadway segments:

- 2nd Street North from 2nd Avenue East to 4th Avenue East
- 2nd Avenue East from 2nd Street North to 2nd Street South
- 4th Avenue East from 4th Street North to 2nd Street South

We are unaware of the depth and type of utilities being improved but have provided general recommendations for the soil conditions that you can expect to encounter.

The above stated information represents our 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 the project consisted of five standard penetration and three flight auger test borings. The logs of the borings and the details of the methods used appear in Appendix A. The logs contain information concerning soil layering, soil classification, 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 borings were drilled and sampled on May 26, 2010. The approximate locations of the soil borings are shown on Figure 1 in Appendix A. More precise boring location information, as dimensioned to existing street centerlines, appears on each individual boring log. Surface elevations at the boring locations were not measured.

4.2 Laboratory Testing

The laboratory test program included two sieve analysis tests. The sieve analysis test results appear on a data sheet following the boring logs in Appendix A also the percent passing the # 200 sieve appears on the individual boring logs adjacent to the samples upon which they were performed.

5.0 SITE CONDITIONS

5.1 Existing Pavement

At the test locations, the surface bituminous layer ranged from 4¼ inches to 6½ inches thick.

The sampling methods do not provide a large representative sample of the aggregate base. Our descriptions of 'apparent aggregate base' layer, encountered directly beneath the bituminous, are based on small sample sizes which are taken from the split-spoon, spun up from the auger, or directly taken from the side of the borehole. Where we could observe an apparent contact between the upper aggregate base-like layer and the underlying subgrade type layer, we noted the thickness of the upper layer.

A Class 5 aggregate base layer would technically have a Unified Soil Classification of sand or sand with silt (3% to 10% passing the # 200 sieve), and a gravel content description of "with gravel" to "gravelly" (or gravel with sand). Often original aggregate base layers may be classified as silty sand with gravel. It is common for aged aggregate base to be "finer" than originally specified, as the material is heavily compacted during construction and additional crushing can occur and/or the material can weather (further break down) due to freeze-thaw cycles with time. We refer you to the logs for specific details concerning our interpretation of the samples retrieved. If more accurate classifications are needed, a different (larger) sampling method would be needed.

5.2 Subsurface Soils/Geology

The soil profile consists of fill overlying sand alluvium; alluvium referring to soils deposited by water. The native alluvium is classified as sand (SP) to sand with silt (SP-SM). The fill consists of soils judged to have more fines than the native alluvium and predominately classified as silty sand or sand with silt with a little gravel and some clayey sand.

Mechanical sieve analysis testing was performed on two samples of the fill, material judged to have the largest percentage of the fine particles, classified as silty sand with a little gravel and clayey sand. Based upon the results of sieve analysis testing, both samples meet the definition of MnDOT Specification 3149.2B1, Granular Material. These soils do not meet the Select Granular Borrow specification 3149.2B2.

5.3 Ground Water

No ground water was encountered in the boreholes at the time of drilling indicating the steady-state ground-water level is deeper than the termination depths of the borings.

Ground water levels fluctuate due to varying seasonal and annual rainfall and snow melt amounts, as well as other factors.

5.4 Review of Soil Properties

5.4.1 Strength/Stability

High strength/stability is needed from the upper portion of the subgrade to resist yielding from wheel loads. Although load intensity dissipates with depth, the more critical portion requiring high strength for wheel load resistance is normally considered the upper three feet of the subgrade.

With the trenching and backfilling operation of the utility installation, it will be possible to control soils placed within the upper zone of the street subgrade. However, portions of the street

not affected by the trenching operation will need to rely on the existing subgrade soils. The soils encountered are generally granular and have served to support the existing pavement system. After surface compaction to densify disturbed soils or soils affected by past freeze-thaw action, stability should be favorable.

5.4.2 Drainage

The sand to silty sand soils are fast to moderate draining materials.

5.4.3 Frost Susceptibility

Although silty sands can be frost susceptible, it is judged that the silt content is relatively low for a silty sand classification. This judgment is based upon the results of our mechanical sieve analysis testing. Frost susceptibility is considered moderate at worst.

6.0 RECOMMENDATIONS

6.1 Utility Support, Bedding, and Backfilling

We recommend trenching, utility installation, and backfilling be performed prior to final street subgrade preparation.

We refer you to the attached standard data sheet entitled "Bedding/Foundation Support of Buried Pipe" for bedding recommendations. The sands present could potentially be used as bedding materials, except where gravel content is high, or cobbles happen to be present. These larger rock particles can result in point loads on the pipe. When significant gravel or cobbles are present, then the trench bottom should be overcut and replaced with 4 inches of Granular Bedding.

The on-site granular soils can be used as trench backfill. As the trenches will be located below streets, we recommend compacting the backfill per Mn/DOT Specification 2105.3F1 (Specified Density Method).

6.2 Existing Pavement Recycling

It may be possible to recycle the existing bituminous materials, if they are crushed to a base-like gradation specification and blended with mineral soils. Crushed bituminous, to be reused as aggregate base, must be blended with mineral soils/gravel or concrete to meet Mn/DOT Class 7 Specification 3138.2A2.

It may be more desirable to reuse the processed recycled materials as subgrade soils rather than base materials due to difficulty when blending and achieving consistent gradation control.

6.3 Subgrade Preparation

Most of the site soils are silty sand and sand. Based upon the results of sieve analysis testing, we expect most of these soils will meet MnDOT Specification 3149.2B1, Granular Material (i.e., less than 20% particles by weight passing the #200 sieve). Most soils will not likely meet the Select Granular Borrow specification 3149.2B2.

The subgrade should be prepared such that only Granular Borrow soils per Mn/DOT Specification 3149.2B1 are present within the upper 3 foot zone of the subgrade. In utility trench areas, it should be possible to control soil placement within this 3 foot zone. Soils outside of the trench zone should be observed and evaluated for soil type prior to aggregate base placement. If the soils are sands to silty sands which meet a Granular Borrow specification, then no further subcutting should be needed. Rather, these soils should be surface compacted with a minimum of 6 passes of a vibratory roller compactor having a minimum drum diameter of 3 feet. Where the soils do not meet a Granular Borrow specification, we recommend removing these soils where present within 3 feet of the top of subgrade (top of subgrade considered the contact with

the bottom of the aggregate base layer). These soils should then be replaced with soils which meet a Granular Borrow specification.

Based on the above conditions we recommend a minimum 1-foot deep Compaction Subcut be performed beneath all new pavement construction. Beneath the Compaction Subcut the bottom subcut bottom should be scarified through the use of a disc, for the purposes of blending and moisture tempering, and then recompacted to a minimum of 100% of the Standard Proctor maximum dry density.

If organic soils are found to be present, we recommend removing these soils where present.

6.4 Estimated R-value

Based on a subgrade comprised of Granular Borrow, we recommend the pavement design be based on an estimated R-value of 50.

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 sideslope erosion or running which could require slope maintenance. Maintaining excavation face slopes in accordance with OSHA requirements should be the responsibility of the contractor, and we recommend the construction documents be prepared as such. The site soils would be considered Type C soils per the OSHA document. For design purposes, we would then assume that backslopes will need to be maintained no steeper than 1½:1 (H:V) for excavations up to 20 feet in depth.

7.2 Observation and Testing

The recommendations in this report are based on the subsurface conditions found at our test boring locations. Since the soil conditions can be expected to vary away from the soil boring locations, we recommend on-site observation by a geotechnical engineer/technician during construction to evaluate these potential changes. Soil density testing should also be performed on new fill placed in order to document that project specifications for compaction have been satisfied.

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 B entitled "Geotechnical Report Limitations and Guidelines for Use."

BEDDING/FOUNDATION SUPPORT OF BURIED PIPE

GENERAL

This page addresses soil bedding and foundation support of rigid pipe, such as reinforced concrete, and flexible pipe, such as steel and plastic. This does not address selection of pipe based on loads and allowable deflections, but rather addresses the geotechnical/soil aspects of uniform pipe support. Bedding/foundation support needs relate to local conditions directly beneath and to the sides of the pipe zone, which may be influenced by soft in-situ ground conditions or by soil disturbance due to soil sensitivity or ground water. Bedding relates to granular materials placed directly beneath the bottom of the pipe (usually 4" to 6" thick), which is intended to provide increased support uniformity. We refer to foundation soils as thicker layers of sands and/or gravels (beneath the bedding zone) intended to provide increased foundation strength support, usually needed due to soft, unstable and/or waterbearing conditions.

GRANULAR BEDDING

With circular pipes, high local loads (approaching point loads) develop if pipes are placed on hard surfaces. Load distribution is improved by placing granular bedding materials beneath the pipe, which are either shaped to match the pipe bottom or are placed without compaction to allow "settling in." The bedding should be placed in such a manner that the pipe will be at the proper elevation and slope when the pipe is laid on the bedding. Common bedding material is defined in Mn/DOT Specification 3149.2F, Granular Bedding. Published documents recommend rigid pipes having a diameter of 12" to 54" be placed on a bedding thickness of 4", which increases to 6" of bedding for pipe diameters ranging from 54" to 72". Beyond a 72" diameter, the bedding thickness can be equal to the pipe outside diameter divided by 12. Typically, the need for bedding under small diameter pipes (less than 12") depends on the pipe designer's specific needs, although in obvious point loads situations (bedrock, cobbles, significant coarse gravel content), bedding is recommended. Note that bedding should also account for larger diameter bells at joints.

FOUNDATION FILL

Positive uniform strength is usually compromised in soft or unstable trench bottom conditions. In this case, deeper subcuts and foundation fill placement is needed beneath the pipe. In moderate instability conditions, improvement can likely be accomplished with a thicker bedding layer. However, in more significant instability situations, particularly where ground water is present, coarser materials may be needed to provide a stronger foundation. Thicker gravel layers can also be a favorable media from which to dewater. The following materials would be appropriate for stability improvement, with the coarser materials being appropriate for higher instability/ground water cases.

- Fine Filter Aggregate – Mn/DOT Specification 3149.2J
- Coarse Filter Aggregate – Mn/DOT Specification 3149.2H

When using a coarser material which includes significant void space, we highly recommend enveloping the entire gravel layer within a geotextile fabric. The gravel material includes open void space, and the fabric acts as a separator which minimizes the intrusion of fines into the open void space. If an additional granular bedding sand is used above foundation gravel, the fabric would also prevent downward infiltration of bedding sand into the rock void space.

Although it is preferred to not highly compact thin granular bedding zones directly beneath the pipe center, it is desirable to compact the foundation materials to prevent more significant pipe settlement. We recommend foundation fill be compacted to a minimum of 95% of the Standard Proctor density (ASTM:D698). It is not possible to test coarse rock fill, although this material should still be well compacted/ tamped.

Often, pipes entering structures such as catch basins, lift stations, etc., enter the structure at a higher elevation than the structure bottom, and are therefore placed on the structure backfill. Fill beneath these pipes should be considered foundation fill. Depending on the flexibility of the connection design, it may be necessary to increase the minimum compaction level to reduce differential settlements, particularly with thicker fills.

SIDE FILL SUPPORT

If the pipe designer requires support from the side fill, granular bedding should also be placed along the sides of the pipe. In poor soil conditions, the sand fill may need to be placed laterally up to two pipe diameters on both sides of the pipe. With rigid pipe, compacted sand placement up to the spring line (within the haunch area) is usually sufficient. With flexible pipe, side fill should be placed and compacted at least to the top of the pipe. For positive support, it is very important to properly compact the sands within the haunch area.

STANDARD RECOMMENDATIONS FOR UTILITY TRENCH BACKFILLING

GENERAL

Clayey and silty soils are often difficult to compact, as they may be naturally wet or may become wet due to ground water or surface/rain water during construction. Soils will need to be placed within a certain range of water (moisture) content to attain desired compaction levels. Moisture conditioning to within this range can be time consuming, labor intensive, and requires favorable weather.

The degree of compaction and the soil type used for backfill within open cut utility trenches depends on the function of the overlying land surface. Details are as follows:

ROADWAYS

Where trenches are located below roadways, we recommend using inorganic fill and compacting these soils per Mn/DOT Specification 2105.3F1 (Specified Density Method). This specification requires 100% of the Standard Proctor density in the upper one meter subgrade zone, and 95% below this. Note that this specification includes moisture content range requirements which are important for proper subgrade stability.

Where available soils are wet or of poor quality, it may be possible to use the "Quality Compaction Method" (Mn/DOT Specification 2105.3F2) for soils below the upper one meter subgrade zone if you can tolerate some subsidence. However, a high level of stability is still important within the upper subgrade zone and recommend that the "Specified Density Method" be used in this upper subgrade area. We caution that if backfill soils in the lower trench area are significantly unstable, it may be difficult or even impossible to properly compact soils within the upper one meter subgrade zone. In this case, placing a geotextile fabric directly over the unstable soils can aid in offsetting the instability.

STRUCTURAL AREAS

If fill is placed beneath or within the significant zone of influence of a structure (typically a 1:1 lateral oversize zone), the soil type and minimum compaction level will need to be evaluated on an individual basis. Because trenches result in variable fill depths over a short lateral distance, higher than normal compaction levels and/or more favorable (sandy) soil fill types may be needed. If this situation exists, it is important that special geotechnical engineering review be performed.

NON-STRUCTURAL AREAS

In grass/ditch areas, backfill soils should be placed in reasonable lift thicknesses and compacted to a minimum of 90% of the Standard Proctor density (ASTM:D698) and/or per the Mn/DOT "Quality Compaction Method." If lower compaction levels are attained, more noticeable subsidence at the surface can occur. Steep or high slopes require special consideration.

Appendix A

AET Project No. 28-00226

Geotechnical Field Exploration and Testing
Boring Log Notes
Unified Soil Classification System
AASHTO Soil Classification System
Figure 1 - Boring Locations
Subsurface Boring Logs
Sieve Analysis Test Results

Appendix A
Geotechnical Field Exploration and Testing
AET Project No. 28-00226

A.1 FIELD EXPLORATION

The subsurface conditions at the site were explored by drilling and sampling five standard penetration and three auger test borings. The approximate locations of the borings appear on Figure 1preceding the Subsurface Boring Logs in this appendix. More precise boring location information, as dimensioned to existing street centerlines, appears on each individual boring log.

A.2 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 it=s 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 current 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 ADS@ or ASU@ 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.

Determining the thickness of "topsoil" layers is usually limited, due to variations in topsoil definition, sample recovery, and other factors. Visual-manual description often relies on color for determination, and transitioning changes can account for significant variation in thickness judgment. Accordingly, the topsoil thickness presented on the logs should not be the sole basis for calculating topsoil stripping depths and volumes. If more accurate information is needed relating to thickness and topsoil quality definition, alternate methods of sample retrieval and testing should be employed.

A.3 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 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 LABORATORY TEST METHODS

A.5.1 Water Content Tests
Conducted in general conformance with ASTM:D2216.

A.5.2 Organic Content Tests
Conducted in general conformance with ASTM:D2974, Method C.

A.5.3 Sieve Analysis of Soils (thru #200 Sieve)
Conducted in general conformance with ASTM:D6913, Method A.

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
B, H, N:	Size of flush-joint casing
CA:	Crew Assistant (initials)
CAS:	Pipe casing, number indicates nominal diameter in inches
CC:	Crew Chief (initials)
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
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
RD:	Rotary drilling with fluid and roller or drag bit
REC:	In split-spoon (see notes) 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.
REV:	Revert drilling fluid
SS:	Standard split-spoon sampler (steel; 1⅜" 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)

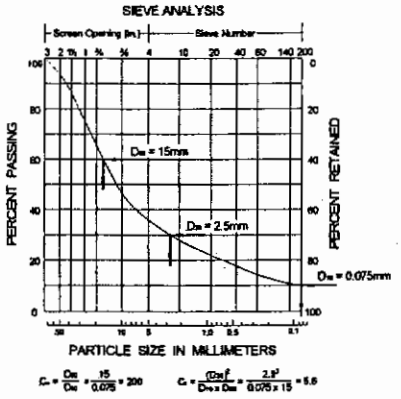
The standard penetration test consists of driving a split-spoon sampler with a drop hammer (calibrated weight varies to provide N_{60} values) and counting the number of blows applied in each of three 6" increments of penetration. If the sampler is driven less than 18" (usually in highly resistant material), 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.

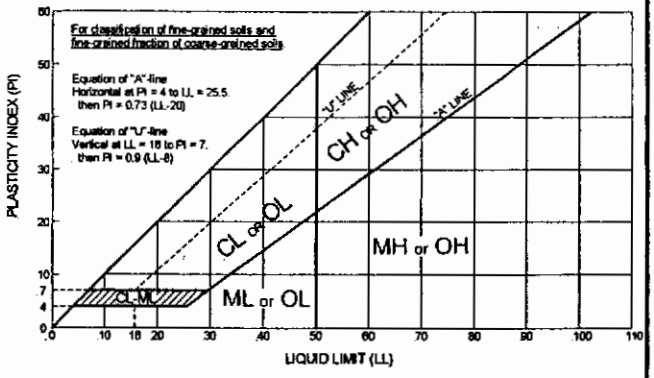
The length of sample recovered, as shown on the "REC" column, may be greater than the distance indicated in the N column. The disparity is because the N-value is recorded below the initial 6" set (unless partial penetration defined in ASTM: D1586 is encountered) whereas the length of sample recovered 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 <0.75 Liquid limit – not dried	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 <0.75 Liquid limit – not dried	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): Absense 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.

AASHTO SOIL CLASSIFICATION SYSTEM

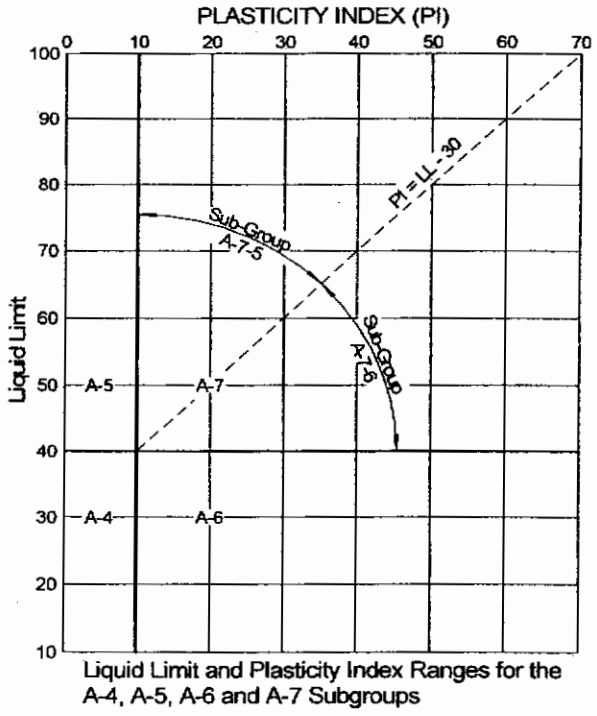
AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS

Classification of Soils and Soil-Aggregate Mixtures

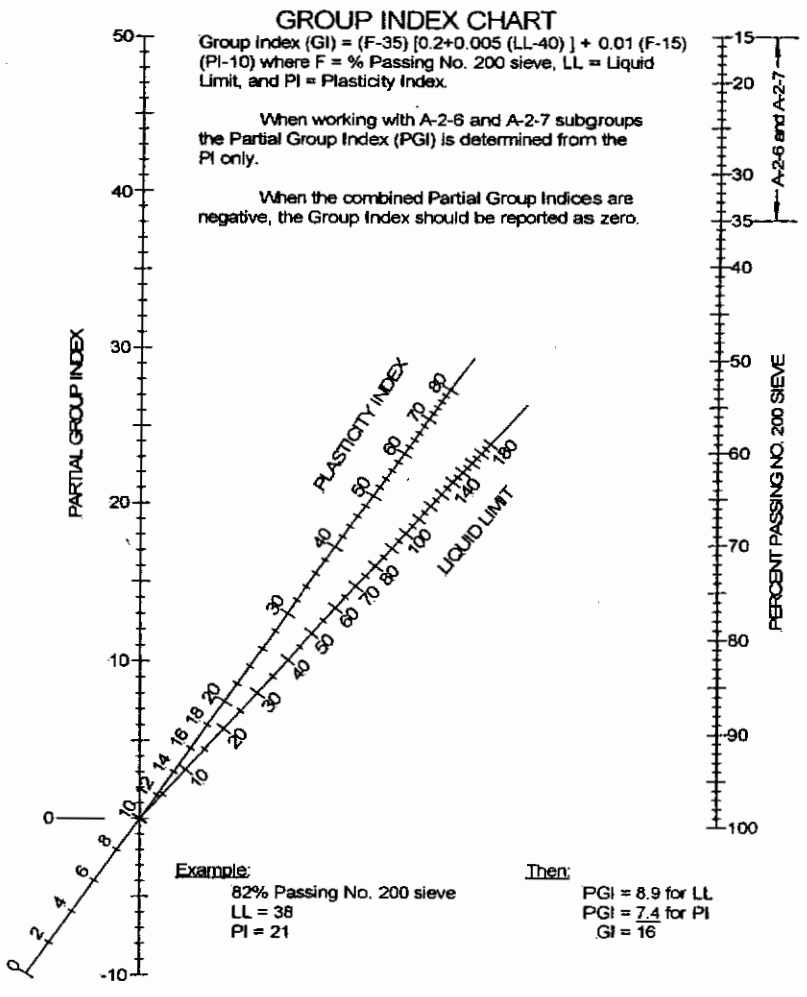
General Classification	Granular Materials (35% or less passing No. 200 sieve)							Silt-Clay Materials (More than 35% passing No. 200 sieve)			
Group Classification	A-1			A-2							A-7
	A-1-a	A-1-b	A-3	A-2-4	A-2-5	A-2-6	A-2-7	A-4	A-5	A-6	A-7-5 A-7-6
Sieve Analysis, Percent passing:											
No. 10 (2.00 mm)	50 max.	....	....	....	....	....	....	....	....	....	....
No. 40 (0.425 mm)	30 max.	50 max.	51 min.	....	....	....	....	....	....	....	....
No. 200 (0.075 mm)	15 max.	25 max.	10 max.	35 max.	35 max.	35 max.	35 max.	36 min.	36 min.	36 min.	36 min.
Characteristics of Fraction Passing No. 40 (0.425 mm)											
Liquid limit	....		....	40 max.	41 min.	40 max.	41 min.	40 max.	41 min.	40 max.	41 min.
Plasticity index	6 max.		N.P.	10 max.	10 max.	11 min.	11 min.	10 max.	10 max.	11 min.	11 min.
Usual Types of Significant Constituent Materials	Stone Fragments, Gravel and Sand		Fine Sand	Silty or Clayey Gravel and Sand				Silty Soils		Clayey Soils	
General Ratings as Subgrade	Excellent to Good							Fair to Poor			

The placing of A-3 before A-2 is necessary in the "left to right elimination process" and does not indicate superiority of A-3 over A-2.

Plasticity index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity index of A-7-6 subgroup is greater than LL minus 30.



Liquid Limit and Plasticity Index Ranges for the A-4, A-5, A-6 and A-7 Subgroups



Example:
82% Passing No. 200 sieve
LL = 38
PI = 21

Then:
PGI = 8.9 for LL
PGI = 7.4 for PI
GI = 16

Definitions of Gravel, Sand and Silt-Clay

The terms "gravel", "coarse sand", "fine sand" and "silt-clay", as determinable from the minimum test data required in this classification arrangement and as used in subsequent word descriptions are defined as follows:

GRAVEL - Material passing sieve with 3-in. square openings and retained on the No. 10 sieve.

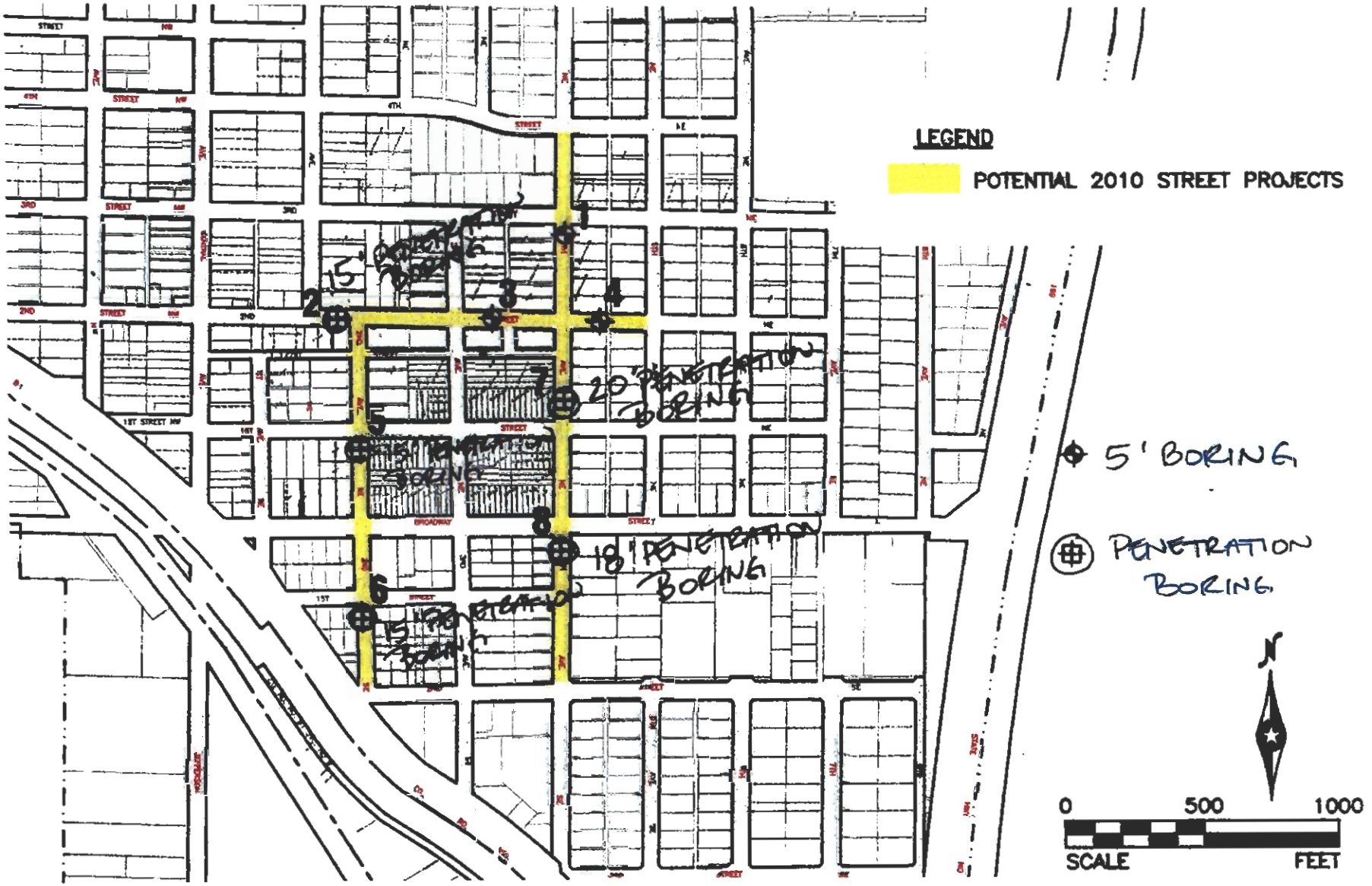
COARSE SAND - Material passing the No. 10 sieve and retained on the No. 40 sieve.

FINE SAND - Material passing the No. 40 sieve and retained on the No. 200 sieve.

COMBINED SILT AND CLAY - Material passing the No. 200 sieve

BOULDERS (retained on 3-in. sieve) should be excluded from the portion of the sample to which the classificaiton is applied, but the percentage of such material, if any, in the sample should be recorded.

The term "silty" is applied to fine material having plasticity index of 10 or less and the term "clayey" is applied to fine material having plasticity index of 11 or greater.



AMERCAN ENGINEERING TESTING, INC.	**PROJECT:** Subsurface Exploration Osseo, MN 2010 Utility and Street Improvement Project		**AET NO.** 28 – 00226
	SUBJECT Soil Boring Location Map		**DATE** June 3, 2010
	SCALE N/A	**DRAWN BY** JFK	**CHECKED BY** JKV
			FIGURE 1

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **28-00226** LOG OF BORING NO. **1 (p. 1 of 1)**

PROJECT: **Proposed Street Construction; Osseo, MN**

DEPTH IN FEET	SURFACE ELEVATION: ____ MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
	4½" Bituminous pavement	FILL			DS						
1	FILL, mostly silty sand with gravel, dark brown (A-2-4)			M	DS						
2	FILL, mostly silty sand, a little gravel, brown and dark brown (A-2-4)			M	DS						
3											
4				M	DS						
5	**END OF BORING**										

Location: 94.5'S of C/L of 3rd Street NE, 10'W of C/L of 4th Avenue NE

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS						
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-5' 6" FA	**5/26/10**	**1:20**	**5.0**	**5.0**	**5.0**		**None**
BORING COMPLETED: **5/26/10**							
DR: **DTS** LG: **TM** Rig: **33C**							

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

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **28-00226** LOG OF BORING NO. **2 (p. 1 of 1)**

PROJECT: **Proposed Street Construction; Osseo, MN**

DEPTH IN FEET	SURFACE ELEVATION: ____ MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
	6½" Bituminous pavement	FILL			SU						
1	FILL, mostly silty sand, a little gravel, dark brown (A-2-4)		23	M	SS	12					
2	FILL, mostly sand with silt, a little gravel and clayey sand, brown, a little dark brown (A-2-4)	COARSE ALLUVIUM OR FILL									
3	SAND WITH SILT, a little gravel and clayey sand, brown, a little dark brown (SP-SM) (A-1-b)		13	M	SS	14					
4											
5	SAND, a little gravel, fine to medium grained, brownish gray, moist, dense, laminations of silty sand (SP) (A-3) (possible fill)		11	M	SS	14					
6											
7	SAND, fine grained, grayish brown to brownish gray, moist, loose to medium dense (SP) (A-3)	COARSE ALLUVIUM									
8			9	M	SS	14					
9											
10			11	M	SS	16					
11											
12											
13			11	M	SS	14					
14											
15			17	M	SS	14					
16	**END OF BORING**										

Location: 14'N of C/L of 2nd Street NE, 88'W of C/L of 2nd Avenue NE

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS						
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-14½' 3.25" HSA	**5/26/10**	**10:20**	**16.0**	**14.5**	**15.7**		**None**
BORING COMPLETED: **5/26/10**							
DR: **DTS** LG: **TM** Rig: **33C**							

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

06/04

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **28-00226** LOG OF BORING NO. **3 (p. 1 of 1)**

PROJECT: **Proposed Street Construction; Osseo, MN**

DEPTH IN FEET	SURFACE ELEVATION: _____ MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
	5½" Bituminous pavement	FILL			DS						
1	7½" FILL, mostly gravelly sand with silt, dark brown (A-1-b) (apparent base)			M	DS						
2	FILL, mostly silty sand, a little gravel, brown (A-2-4)			M	DS						
3	FILL, mostly silty sand, a little gravel and clayey sand, dark brown (A-2-4)										
4				M	DS						
5	**END OF BORING**										

Location: 12'N of C/L of 2nd Street NE, 110'E of C/L of 3rd Avenue NE

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
0-5' 6" FA	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
	5/26/10	**12:30**	**5.0**	**5.0**	**5.0**		**None**	
BORING COMPLETED: **5/26/10**								
DR: **DTS** LG: **TM** Rig: **33C**								

06/04

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **28-00226** LOG OF BORING NO. **4 (p. 1 of 1)**

PROJECT: **Proposed Street Construction; Osseo, MN**

DEPTH IN FEET	SURFACE ELEVATION: ____ MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
1	5" Bituminous pavement	FILL			DS						
	5" FILL, gravelly sand with silt, dark brown (A-1-b) (apparent base)			M	DS						
2	FILL, mostly silty sand, a little gravel, brown (A-2-4)			M	DS						
3	FILL, mostly silty sand, a little gravel and clayey sand, dark brown and brown (A-2-4)										
4				M	DS						
5	**END OF BORING**										

Location: 13'N of C/L of 2nd Street NE, 91'E of C/L of 4th Avenue NE

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS						
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-5' 6" FA	**5/26/10**	**12:55**	**5.0**	**5.0**	**5.0**		**None**
BORING COMPLETED: **5/26/10**							
DR: **DTS** LG: **TM** Rig: **33C**							

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

06/04

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **28-00226** LOG OF BORING NO. **7 (p. 1 of 1)**

PROJECT: **Proposed Street Construction; Osseo, MN**

DEPTH IN FEET	SURFACE ELEVATION: ____ MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
	5" Bituminous pavement	FILL			SU						
1	FILL, mostly silty sand with gravel, dark brown (A-1-b) (apparent base)		33	M	SS	16					
2	FILL, mixture of silty sand and sand with silt, a little gravel, brown (A-2-4)										
3	FILL mostly silty sand, a little gravel and clayey sand, brown, a little black (A-2-4)		20	M	SS	16					
4											
5	FILL, mostly sand with silt, a little gravel, pieces of bituminous, dark brown (A-2-4)		6	M	SS	16					
6											
7	SAND, fine grained, gray, a little light brown, moist, loose, laminations of silt (SP) (A-3)	COARSE ALLUVIUM									
8			7	M	SS	12					
9											
10	SAND, fine grained, light brownish gray, moist, loose (SP) (A-3)		8	M	SS	14					
11											
12											
13			9	M	SS	14					
14											
15	SAND, fine to medium grained, brownish gray, a little black, moist, loose, laminations of silt (SP) (A-3)		9	M	SS	12					
16											
17											
18	SAND, a little gravel, medium to fine grained, gray, moist, medium dense (SP) (A-1-b)										
19											
20			11	M	SS	12					
21	**END OF BORING** Location: 83'N of C/L of 1st Street NE, 8'E of C/L of 4th Avenue NE										

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS						
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-19½' 3.25" HSA	**5/26/10**	**11:05**	**21.0**	**19.5**	**20.4**		**None**
BORING COMPLETED: **5/26/10**							
DR: **DTS** LG: **TM** Rig: **33C**							

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

AMERICAN ENGINEERING TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: **28-00226** LOG OF BORING NO. **8 (p. 1 of 1)**

PROJECT: **Proposed Street Construction; Osseo, MN**

DEPTH IN FEET	SURFACE ELEVATION: _____ MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
	5¾" Bituminous pavement	FILL			SU						
1	3" FILL, mostly gravelly sand with silt, brown (A-1-b) (apparent base)		29	M	SS	18					
2	FILL, mixture of silty sand and sand with silt, a little gravel, brown, a little black (A-2-4)										
3	FILL, mostly sand with silt, a little gravel and clayey sand, brown, a little gray (A-2-4)		12	M	SS	16					
4											
5	FILL, mixture of gravelly silty sand and clayey sand, dark brown (A-2-4)		8	M	SS	6					
6											
7	SAND WITH SILT, fine grained, grayish brown, moist, loose (SP-SM) (A-3)	COARSE ALLUVIUM									
8			6	M	SS	14					
9											
10	SAND, a little gravel, fine grained, gray, a little black, moist, loose, laminations of silt (SP) (A-3)		7	M	SS	14					
11											
12	SAND WITH SILT, fine grained, brownish gray, moist, medium dense, laminations of silt (SP-SM) (A-3)										
13			11	M	SS	14					
14											
15	SAND, fine grained, gray to brownish gray, moist, medium dense (SP) (A-3)		18	M	SS	14					
16											
17											
18			30	M	SS	14					
	END OF BORING										
	Location: 111'S of C/L of Broadway Street, 6'W of C/L of 4th Avenue SE										

DEPTH: DRILLING METHOD	WATER LEVEL MEASUREMENTS						
	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-17' 3.25" HSA	**5/26/10**	**11:45**	**18.5**	**17.0**	**17.7**		**None**
BORING COMPLETED: **5/26/10**							
DR: **DTS** LG: **TM** Rig: **33C**							

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

SIEVE ANALYSIS TEST RESULTS

PROJECT: 2010 Street and Utility Improvements **AET JOB NO.: 28-00226**
Osseo, Wisconsin

DATE: 6/2/2010

TEST METHODS: AET T-SOP #01-LAB-040
(General Conformance with ASTM: D6913, Method A)

RESULTS:

Boring Number	3	7
Sample Depth	2½' to 5'	2' to 4'
Dry Sample Weight (gms)	243.42	243.63
Sieve Size or Number	**Percent Passing by Weight**	
1"	100	100
3/4"	100	100
5/8"	100	100
1/2"	97	100
3/8"	96	100
#4	94	98
#10	89	94
#20	80	86
#40	56	70
#100	24	25
#200	20	16

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

AET Project No. 28-00226

Geotechnical Report Limitations and Guidelines for Use

Appendix B
Geotechnical Report Limitations and Guidelines for Use
AET Project No. 28-00226

B.1 REFERENCE

This appendix provides information to help you manage your risks relating to subsurface problems which are caused by construction delays, cost overruns, claims, and disputes. This information was developed and provided by ASFE[1], of which, we are a member firm.

B.2 RISK MANAGEMENT INFORMATION

B.2.1 Geotechnical Services are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared solely for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. And no one, not even you, should apply the report for any purpose or project except the one originally contemplated.

B.2.2 Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

B.2.3 A Geotechnical Engineering Report is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typically factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, always inform your geotechnical engineer of project changes, even minor ones, and request an assessment of their impact. Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.

B.2.4 Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. Do not rely on a geotechnical engineering report whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. Always contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

1 ASFE, 8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733: www.asfe.org

B.2.5 Most Geotechnical Findings Are Professional Opinions
Site exploration identified subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ, sometimes significantly, from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

B.2.6 A Report's Recommendations Are Not Final
Do not overrely on the construction recommendations included in your report. Those recommendations are not final, because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.

B.2.7 A Geotechnical Engineering Report Is Subject to Misinterpretation
Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

B.2.8 Do Not Redraw the Engineer's Logs
Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should never be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, but recognize that separating logs from the report can elevate risk.

B.2.9 Give Contractors a Complete Report and Guidance
Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, but preface it with a clearly written letter of transmittal. In the letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. Be sure contractors have sufficient time to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

B.2.10 Read Responsibility Provisions Closely
Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their report. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. Read these provisions closely. Ask questions. Your geotechnical engineer should respond fully and frankly.

B.2.11 Geoenvironmental Concerns Are Not Covered
The equipment, techniques, and personnel used to perform a geoenvironmental study differ significantly from those used to perform a geotechnical study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Unanticipated environmental problems have led to numerous project failures. If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. Do not rely on an environmental report prepared for someone else.