

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

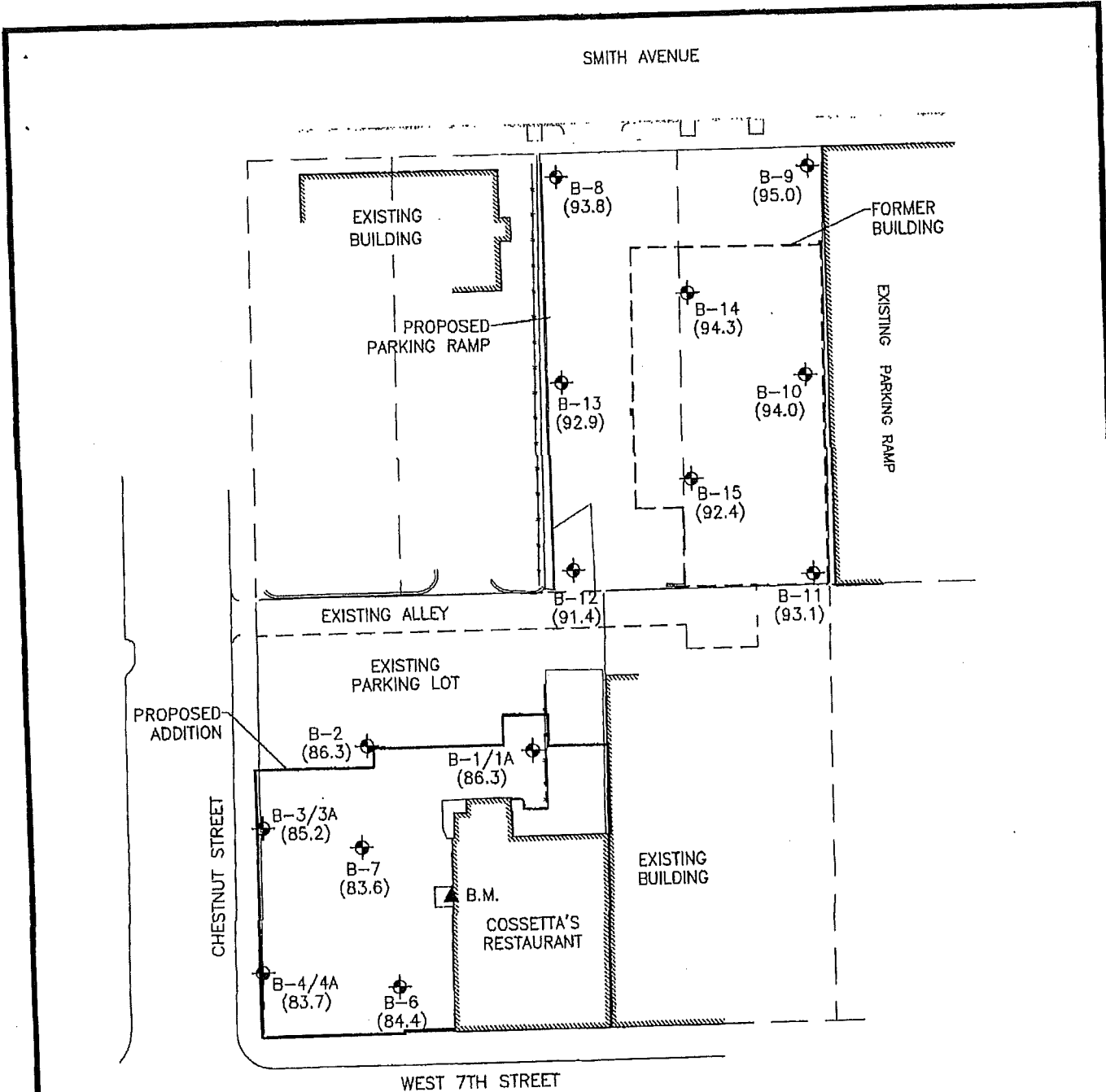
If fill is placed beneath or within the significant zone of influence of a structure (typically a 1:1 lateral oversize zone), the soil type and minimum compaction level will need to be evaluated on an individual basis. Because trenches result in variable fill depths over a short lateral distance, higher 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

Figure 1 – Boring Locations
Logs of 2007 Test Borings
Logs of 2006 Test Borings
Exploration/Classification Methods
Boring Log Notes
Unified Soil Classification System



LEGEND

- ⊕ = APPROXIMATE SOIL BORING LOCATION (AND GROUND SURFACE ELEVATION)
- ▲ = BENCHMARK: FIRST FLOOR SLAB OF EXISTING BUILDING
ELEVATION = 85.23 FEET SPCD DATUM

NOTE: BORING 5 WAS NOT DRILLED DUE TO CONFLICT WITH UNDERGROUND UTILITIES



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APPROXIMATE
SCALE



FIGURE 1: BORING LOCATIONS

Proposed Cossetta's Restaurant
Addition & Parking Ramp
211 7th Street West/212 Smith Avenue
St. Paul, Minnesota

DRAWN BY: VJL

CHECKED BY: CAU

DATE: 04/18/07

AET JOB NO. 05-03034



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SUBSURFACE BORING LOG

AET JOB NO: 05-03034 LOG OF BORING NO. 1A (p. 1 of 1)
 PROJECT: Cossetta's Restaurant Addition and Parking Ramp; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>86.3</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS			
							REC %	RQD IN.	RQD %	
1	No samples taken; refer to log of Boring #1				6" FA					
2										
3										
4	LIMESTONE, light gray and gray, crinkly bedded, rubble zone from about 6' to 6.7' Weathering: Moderately weathered Fracturing: Very fractured Stratification: Very thinly bedded Hardness: Hard	PLATTEVILLE FORMATION MIFFLIN MEMBER			NQ	14.5	101	5.5	38	
5										
6										
7	LIMESTONE, light gray Weathering: Slightly weathered Fracturing: Slightly fractured Stratification: Very thinly bedded Hardness: Hard	PLATTEVILLE FORMATION PECATONICA MEMBER			NQ	60	100	18.5	31	
8										
9	SHALE, gray to about 10.9 then light gray sandy shale to light brown and light gray shaley sandstone	GLENWOOD FORMATION								
10										
11	SANDSTONE, light gray and light brown, well cemented	ST. PETER FORMATION				NQ	24.5	41		
12										
13	END OF BORING									
14										
15										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS						NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	
0-4'	6" FA							
4'-15'	NQ Core							
BORING COMPLETED: 3/12/07								
DR:	LG:	Rig:						



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SUBSURFACE BORING LOG

AET JOB NO: 05-03034

LOG OF BORING NO. 3A (p. 1 of 1)

PROJECT: Cossetta's Restaurant Addition and Parking Ramp; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>85.2</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS		
							REC %	RQD IN.	RQD %
1	No samples taken; refer to log of Boring #3								
2	LIMESTONE, light gray and gray, crinkly bedded, rubble zone from 5.2' to 6.3' Weathering: Slightly weathered Fracturing: Very fractured Stratification: Very thinly bedded Hardness: Hard	PLATTEVILLE FORMATION MIFFLIN MEMBER			NQ	36	100	10.5	29
3									
4									
5	LIMESTONE, light gray Weathering: Fresh Fracturing: Slightly fractured Stratification: Very thinly bedded Hardness: Hard	PLATTEVILLE FORMATION PECATONICA MEMBER GLENWOOD FORMATION			NQ	60	100	19.5	32
6									
7	SHALE, gray to about 10.2' then light gray sandy shale	ST. PETER FORMATION			NQ	13	22		
8									
9									
10	SANDSTONE, light gray and light brown, well cemented								
11									
12									
13									
14									
15	END OF BORING								

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS						NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	
0-2.2'	6" FA							
2.2'-15.2'	NQ Core							
BORING COMPLETED: 3/12/07								
DR:	LG: Rig:							



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SUBSURFACE BORING LOG

AET JOB NO: 05-03034 LOG OF BORING NO. 4A (p. 1 of 1)
 PROJECT: Cossetta's Restaurant Addition and Parking Ramp; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>83.7</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS		
							REC %	RQD IN.	RQD %
1	No samples taken; refer to log of Boring #4								
2									
3									
4									
5									
6									
7									
8									
9									
10	FILL, mixture of lean clay, sandy lean clay, silty sand and gravel, brown, grayish brown and dark brown	FILL OR COLLUVIUM	19	M	SS	6			
11									
12									
13									
14			49	M	SS	10			
15									
16									
17			100/0.1	M	SS	0.5			
18									
19			132	M	SS	13			
20									
21	SANDSTONE, brown, moist, very dense, Textural Classification: Sand with silt, fine grained (SP-SM) END OF BORING								
22									

DEPTH: DRILLING METHOD		WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
DEPTH	DRILLING METHOD	DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-17½'	3.25" HSA	3/12/07						None	
BORING COMPLETED: 3/12/07									
DR:	LG:	Rig:							



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SUBSURFACE BORING LOG

AET JOB NO: 05-03034 LOG OF BORING NO. 8 (p. 1 of 1)
 PROJECT: Cossetta's Restaurant Addition and Parking Ramp; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>93.8</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS			
							REC %	RQD IN.	RQD %	
1	2.75" Bituminous pavement	FILL	16	M	SU	16				
	FILL, mostly gravelly sand with sand, a little silty sand, black to dark brown, frozen				SU					
2	FILL, mostly lean clay with sand, a little silty sand, black to dark brown, frozen				SS					
3	FILL, mixture of clayey sand, silty sand, lean clay, limestone fragments sand, a little gravel, brown, dark brown and gray, frozen to 3'				SS					
4			53/9	M	SS	14				
6	LIMESTONE, light gray waterbearing, moderately weathered, Hardness: Hard, Obstructed to split spoon at 5.9', Obstructed to HSA at 6.1'	PLATTEVILLE FORMATION								
7	LIMESTONE, light gray and gray, crinkley bedded, rubble zone from about 13.6' to about 14.4'	PLATTEVILLE FORMATION								
8	Weathering: Moderately weathered Fracturing: Very fractured Stratification: Very thinly bedded Hardness: Hard	MIFFLIN MEMBER			NQ	47.5	101	24	51	
12					NQ	60	100	42	70	
15	LIMESTONE, light gray Weathering: Slightly weathered Fracturing: Moderately fractured Stratification: Very thinly bedded Hardness: Hard	PLATTEVILLE FORMATION								
16		PECATONICA MEMBER								
17	SHALE, gray to about 18' then light gray sandy shale to light gray and light brown shaley sandstone	GLENWOOD FORMATION			NQ	55.5	92	5.5	9	
20	SANDSTONE, light gray and light brown, well cemented	ST. PETER FORMATION								
END OF BORING										

DEPTH	DRILLING METHOD	WATER LEVEL MEASUREMENTS						NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG	
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL		WATER LEVEL
0-6.1'	3.25" HSA				6.1'	6'			None
6.1'-20.3'	NQ Core	3/1/07	9:50		None	3'			None
		3/1/07	9:55						
BORING COMPLETED: 3/1/07									
DR: DS LG: BZ Rig: 33C									



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SUBSURFACE BORING LOG

AET JOB NO: 05-03034 LOG OF BORING NO. 9 (p. 1 of 1)
 PROJECT: Cossetta's Restaurant Addition and Parking Ramp; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>95.0</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS						
							WC	DEN	LL	PL	%-#200		
1	4.25" Bituminous pavement	FILL											
2	FILL, mostly gravelly sand with silt, brown, frozen												
3	FILL, mostly gravelly clayey sand, dark brown and brown, frozen to 17"		9	M	SS	8							
4	FILL, mixture of silty sand and clayey sand, a little gravel, brown												
5			3	M	SS	12							
6													
7	FILL, mixture of sand with silt and gravel, pieces of concrete, brown and gray, Obstructed to split spoon at 8.1', Obstructed to HSA at 8.5'		100/0.1	M	SS	7							
8	END OF BORING												

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS							NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL	
0-8½'	3.25" HSA	3/1/07	10:11	8.1'	8.5'	8.5'		None	
		3/1/07	10:15	8.1'	0.0	6.2'		None	
BORING COMPLETED: 3/1/07									
DR: SG LG: EW Rig: 91C									



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SUBSURFACE BORING LOG

AET JOB NO: 05-03034 LOG OF BORING NO. 10 (p. 1 of 1)
 PROJECT: Cossetta's Restaurant Addition and Parking Ramp; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>94.0</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS		
							REC %	RQD IN.	RQD %
1	2.75" Crushed limestone base, light brown FILL, mostly silty sand with gravel, dark brown, frozen	FILL							
2	FILL, mixture of gravelly silty sand and clayey sand, a little concrete, brick and grass, dark brown and brown, frozen to 19"		20	F/M	SS	11			
3									
4									
5	FILL, mostly sandy silt with gravel, dark brown and gray		70/0.3	M	SS	10			
6	HIGHLY WEATHERED DOLOSTONE, grayish brown, moist, very dense, (Textural Classification: Sandy silt with gravel) (ML)	PLATTEVILLE FORMATION							
7	LIMESTONE, light gray, moderately weathered, hard, Obstructed to split spoon at 7.1'		50/0.1	M	SS	1			
8	LIMESTONE, light gray and gray, crinkly bedded, rubble zone from about 14.5' to about 15.5'	PLATTEVILLE FORMATION MIFFLIN MEMBER							
9	Weathering: Slightly weathered Fracturing: Very fractured Stratification: Very thinly bedded Hardness: Hard				NQ	35	101	9	26
10									
11									
12									
13					NQ	60	100	42	70
14									
15									
16	LIMESTONE, light gray Weathering: Fresh Fracturing: Slightly fractured Hardness: Hard	PLATTEVILLE FORMATION PECATONICA MEMBER							
17		GLENWOOD FORMATION							
18	SHALE, gray to about 18.9' then light gray sandy shale				NQ	56.5	94	9	15
19									
20	SANDSTONE, light gray and light brown, well cemented END OF BORING	ST. PETER FORMATION							

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS					DRILLING FLUID LEVEL	WATER LEVEL	NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH			
0-7½'	3.25" HSA							None	
7½'-20.8'	NQ Core	3/1/07	9:07	7.1'	7.5'	7.5'		None	
		3/1/07	9:09	7.1'	0.0	4'			
BORING COMPLETED: 3/1/07									
DR: SG LG: EW Rig: 91C									



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SUBSURFACE BORING LOG

AET JOB NO: 05-03034 LOG OF BORING NO. 11 (p. 1 of 1)
 PROJECT: Cossetta's Restaurant Addition and Parking Ramp; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>93.1</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS		
							REC %	RQD IN.	RQD %
1	2.25" Crushed limestone base, light brown FILL, mostly silty sand with gravel, brick and concrete fragments	FILL	37	M	SS	11			
2									
3									
4	CLAYEY SAND, a little gravel, brown, hard (SC) (may be fill), Obstructed to spilt spoon at 4.9', Obstructed to HSA at 5.5'	MIXED ALLUVIUM OR FILL	50/0.4	M	SS	2			
5									
6	LIMESTONE, light gray and gray, crinkly bedded, rubble zone from about 13' to 13.6' Weathering: Moderately weathered Fracturing: Very fractured Stratification: Very thinly bedded Hardness: Hard	PLATTEVILLE FORMATION MIFFLIN MEMBER			NQ	53	100	15	28
7									
8									
9									
10									
11	LIMESTONE, light gray Weathering: Slightly weathered Fracturing: Very fractured Stratification: Very thinly bedded	PLATTEVILLE FORMATION PECATONICA MEMBER			NQ	60	100	31	52
12									
13									
14	SHALE, gray to about 17.2' then light gray sandy shale to about 18.2' then light brown and light gray shaley sandstone	GLENWOOD FORMATION			NQ	53	88		
15									
16	SANDSTONE, light gray and light brown, well cemented	ST. PETER FORMATION							
17									
18	END OF BORING								

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS						NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	
0-5½'	3.25" HSA	3/1/07	10:40	4.9'	5.5'	5.5'		None
5½'-20.4'	NQ Core	3/1/07	10:43	4.9'	0.0	2.7'		None
BORING COMPLETED: 3/1/07								
DR: SG LG: EW Rig: 91C								



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SUBSURFACE BORING LOG

AET JOB NO: 05-03034 LOG OF BORING NO. 12 (p. 1 of 1)
 PROJECT: Cossetta's Restaurant Addition and Parking Ramp; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>91.4</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS						
							WC	DEN	LL	PL	%-#200		
1	3.0" Bituminous pavement	FILL											
	4.25" FILL, crushed limestone base, light brown, frozen				F/M	SU							
2	FILL, mixture of clayey sand, sand and sandy silt with gravel, ashes, dark brown, brown, and black, frozen to 22"	PLATTEVILLE FORMATION	88	M		12							
3	HIGHLY WEATHERED LIMESTONE, light gray, Textural classification: Silty clay with sand, very stiff (CL-ML)												
4	LIMESTONE, light brown, Weathering: Very weathered, Hardness: Soft to moderately hard, Obstructed to HSA at 4.0'												
	END OF BORING												

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS						NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	
0-4'	3.25" HSA	3/1/07	9:30	3.5'	4.0'	4.0'		None
		3/1/07	9:31	3.5'	0.0	2.0'		None
BORING COMPLETED: 3/1/07								
DR: SG LG: EW Rig: 91C								



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SUBSURFACE BORING LOG

AET JOB NO: 05-03034 LOG OF BORING NO. 13 (p. 1 of 1)
 PROJECT: Cossetta's Restaurant Addition and Parking Ramp; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>92.9</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS					
							WC	DEN	LL	PL	%-#200	
1	2.5" Bituminous pavement FILL, mixture of clayey sand and silty sand with gravel, cinders and ashes, black and brown, frozen	FILL			F	SU	19					
2	FILL, mostly sandstone sand, light gray and white, frozen		19	F/M	SS	16	40					
3	FILL, mostly sandy silt, a little gravel, black											
4	HIGHLY WEATHERED LIMESTONE, light brownish gray, Textural classification: Lean clay with sand, a little gravel, firm (CL)	PLATTEVILLE FORMATION	50/0.4	M	SS	8						
5	LIMESTONE, light brown, Weathering: Moderately weathered, Hardness: Moderately hard, Obstructed to SS at 5.4', obstructed to HSA at 5.8'											
END OF BORING												

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS						NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	
0-5.8'	3.25" HSA	3/1/07			5.8'	5.8'		None
		3/1/07			0.0	4.5'		None
BORING COMPLETED: 3/1/07								
DR: DB LG: BZ Rig: 33C								



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SUBSURFACE BORING LOG

AET JOB NO: 05-03034 LOG OF BORING NO. 14 (p. 1 of 1)
 PROJECT: Cossetta's Restaurant Addition and Parking Ramp; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>94.3</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS					
							WC	DEN	LL	PL	%-#200	
1	FILL, 6.0" crushed limestone base, light brown, frozen	FILL			SU		19					
2	FILL, mostly clayey sand, a little gravel, pieces of brick and nails, brown, frozen											
3	FILL, mostly silty sand, a little gravel, pieces of brick, black, fozen											
4	FILL, mixture of silty sand and clayey sand, a little gravel, pieces of brick, ashes and cinders, brown and brownish gray, frozen to 3'											
5	HIGHLY WEATHERED LIMESTONE, brownish gray, Textural Classification: Lean clay with sand, a little gravel, stiff (CL)	PLATTEVILLE FORMATION	20		M	SS	16					
6	HIGHLY WEATHERED LIMESTONE, light brownish gray and brown mottled, Textural Classification: gravelly clayey sand, very stiff (SC), Obstructed to HSA at 6.4' END OF BORING											

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS					NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG	
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		DRILLING FLUID LEVEL
0-6.4'	3.25" HSA	3/1/07	10:20		6.4'	6'		None
		3/1/07	10:25		None	3'		None
BORING COMPLETED: 3/1/07								
DR: DS LG: BZ Rig: 33C								



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SUBSURFACE BORING LOG

LOG OF BORING NO. 15 (p. 1 of 1)

AET JOB NO: 05-03034

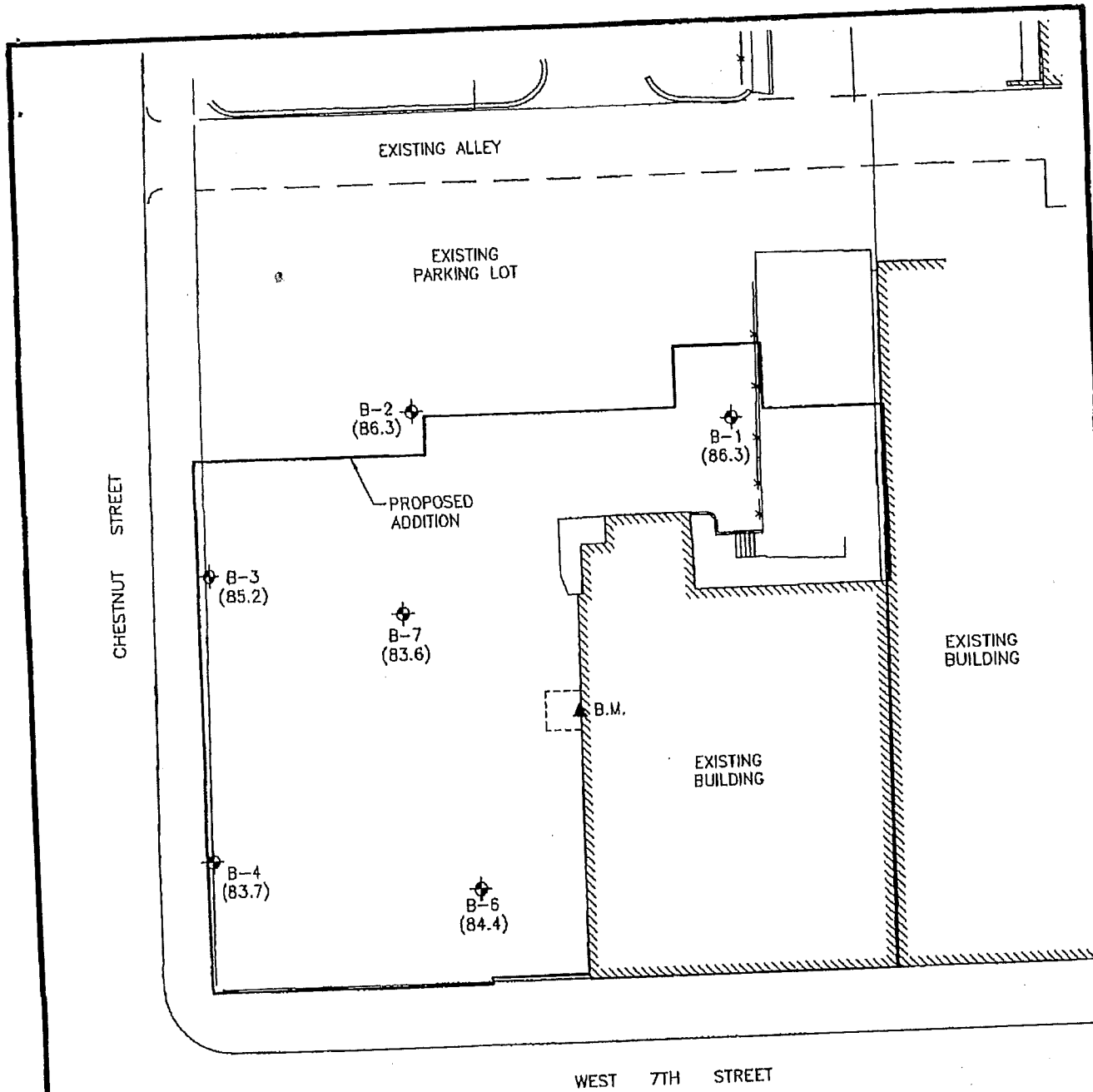
PROJECT: Cossetta's Restaurant Addition and Parking Ramp; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>92.4</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS		
							REC %	RQD IN.	RQD %
1	6.75" FILL, crushed limestone base, light brown, frozen	FILL			SU				
2	FILL, mixture of clayey sand, silty sand and lean clay with sand, and with gravel, pieces of brick, brown, grayish brown and black, frozen								
3	HIGHLY WEATHERED LIMESTONE, light gray, Textural Classification: Silty clay with sand, a little gravel, very stiff (CL-ML)	PLATTEVILLE FORMATION	16	F/M	SS	16			
4	LIMESTONE, light brown, Weathering: Moderately weathered, Hardness: Moderately Hard Obstructed to SS at 4.65', Obstructed to HSA at 4.8'	PLATTEVILLE FORMATION	50/0.15	M	SS	0.1			
5	LIMESTONE, light gray and gray, crinkly bedded, rubble zone from about 12.4' to 13'	PLATTEVILLE FORMATION MIFFLIN MEMBER							
6	Weathering: Weathered to moderately weathered								
7	Fracturing: Intensely fractured to very fractured Stratification: Very thinly bedded Hardness: Hard				NQ	60	100	20.5	34
8									
9									
10									
11									
12									
13									
14	LIMESTONE, light gray, a few vugs Weathering: Slightly weathered Fracturing: Moderately fractured Stratification: Very thinly bedded Hardness: Hard	PLATTEVILLE FORMATION PECATONICA MEMBER							
15		GLENWOOD FORMATION							
16	SHALE, gray to about 16.4' then light gray sandy shale to about 17.4' then shaley sandstone								
17									
18									
19	SANDSTONE, light brown and light gray, well cemented to about 19.2'	ST. PETER FORMATION							
20	END OF BORING								

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS					DRILLING FLUID LEVEL	WATER LEVEL
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH		
0-4.8'	3.25" HSA							None
4.8'-20.2'	NQ Core	3/1/07	10:40	4.65'	4 1/2'	4 1/2'		None
		3/1/07	10:45	4.65'	None	3'		None
BORING COMPLETED: 3/1/07								
DR: DS LG: BZ Rig: 33C								

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

LOGS OF 2006 BORINGS



LEGEND

⊕ = APPROXIMATE SOIL BORING LOCATION (AND GROUND SURFACE ELEVATION)

▲ = BENCHMARK: FIRST FLOOR SLAB OF EXISTING BUILDING
ELEVATION = 85.58 FEET SPCD DATUM

NOTE: BORING 5 WAS NOT DRILLED DUE TO CONFLICT WITH UNDERGROUND UTILITIES



**AMERICAN
ENGINEERING
TESTING, INC.**

550 Cleveland Avenue North
St. Paul, Minnesota 55114

- CONSULTANTS
- GEOTECHNICAL
 - ENVIRONMENTAL
 - MATERIALS

Phone: 651-659-9081
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APPROXIMATE
SCALE

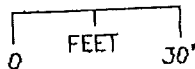


FIGURE 1: BORING LOCATIONS

Proposed Addition to Cossetta's Restaurant
211 7th Street West
St. Paul, Minnesota

DRAWN BY: VJL

CHECKED BY: CAU

DATE: 08/23/06

AET JOB NO. 05-02680



AMERICAN
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SUBSURFACE BORING LOG

AET JOB NO: 05-02680 LOG OF BORING NO. 1 (p. 1 of 1)
 PROJECT: Proposed Addition to Cossetta's Restaurant; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>86.3</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
1	5" Bituminous pavement FILL, mixture of silt, silty sand and gravel, pieces of glass, black, brown and gray	FILL	52	M	SU SS	12					
2	WEATHERED DOLOSTONE, light gray, moist, very dense, Textural Classification:	PLATTEVILLE FORMATION		M	SS	2					
3	Gravel with sand and silt (GP-GM) REFUSAL TO HSA AT 3'										

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS					WATER LEVEL
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	
0-3'	3.25" HSA	8/8/06	6:20				None
BORING COMPLETED: 8/8/06							
DR: SB LG: TM Rig: IC							

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



AMERICAN
ENGINEERING
TESTING, INC.

SUBSURFACE BORING LOG

AET JOB NO: 05-02680 LOG OF BORING NO. 2 (p. 1 of 1)
 PROJECT: Proposed Addition to Cossetta's Restaurant; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>86.3</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
1	2.5" Bituminous pavement FILL, mostly limestone gravel with sand, grayish brown	FILL	16	M	SS	12					
2			13	M	SS	12					
3											
4	FILL, mostly silty sand with gravel, pieces of concrete, brown		2	M	SS	2					
5											
6											
7	SILTY SAND, a little gravel, brown, moist (SM) (may be fill) LIMESTONE, gray, very dense REFUSAL TO HSA AT 7.6'	COARSE* PLATTEVILLE FORMATION *ALLUVIUM OR FILL		M	SS	1					

DEPTH:	DRILLING METHOD	WATER LEVEL MEASUREMENTS						
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
0-7.6'	3.25" HSA	8/8/06	6:40					None
BORING COMPLETED: 8/8/06								
DR: SB LG: TM Rig: IC								

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



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SUBSURFACE BORING LOG

AET JOB NO: 05-02680 LOG OF BORING NO. 3 (p. 1 of 1)

PROJECT: Proposed Addition to Cossetta's Restaurant; St. Paul, MN

DEPTH IN FEET	SURFACE ELEVATION: <u>85.2</u> MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS				
							WC	DEN	LL	PL	%-#200
1	FILL, mostly gravelly silty sand, pieces of limestone, brown	FILL		M	SS R	4					
	REFUSAL TO HSA AT 1½'										

DEPTH: DRILLING METHOD		WATER LEVEL MEASUREMENTS						NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG	
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL		WATER LEVEL
0-1½'	3.25" HSA	8/8/06	8:45						None
BORING COMPLETED: 8/8/06									
DR: SB LG: TM Rig: 1C									



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SUBSURFACE BORING LOG

DEPTH IN FEET		SURFACE ELEVATION: <u>83.7</u>	GEOLOGY		N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS						
		MATERIAL DESCRIPTION							WC	DEN	LL	PL	%#200		
1		FILL, mostly silty sand with gravel, pieces of dolostone, brown	FILL		20	M	SS	8							
2															
3							25	M	SS	4					
4															
5					13	M	SS	12							
6															
7		WEATHERED DOLOSTONE, brown, moist, very dense, Textural Classification: gravel with silt and sand (GP-GM) REFUSAL TO HSA AT 7.6'	PLATTEVILLE FORMATION			M	SS	4							
DEPTH: 0-7.6'		DRILLING METHOD: 3.25" HSA		WATER LEVEL MEASUREMENTS					NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG						
		DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL							
		8/8/06	7:05					None							
BORING COMPLETED: 8/8/06															
DR: SB LG: TM Rig: 1C															