

Appendix B

Boring Logs

LOG OF BORING

PROJECT: CMKX-93-0202
Hennepin County Property
21st Ave. S. and 29th St. E.
Minneapolis, Minnesota

BORING: MW-1

LOCATION:
 See site map.

DATE: 12/14/93 **SCALE: 1" = 4'**

Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
846.5	0.0	CL	SANDY LEAN CLAY, black, moist. (Topsoil)			Benchmark: Top nut of fire hydrant on southwest corner of 28th St. E. and 21st Ave. S. Elevation = 847.022 feet above mean sea level.
844.5	2.0	SP	POORLY GRADED SAND with SILT and GRAVEL, fine to medium grained, brown, moist, loose. (Terrace Deposit)	5		
		SM				
840.5	6.0	SP	POORLY GRADED SAND, fine grained, light brown, moist, loose. (Terrace Deposit)	6		
837.5	9.0	SP	POORLY GRADED SAND, fine to medium grained, brown, moist, loose. (Terrace Deposit)	5		
832.5	14.0	SP	POORLY GRADED SAND with GRAVEL, fine to medium grained, brown, moist, medium dense. (Terrace Deposit)	21		
825.5	21.0	SP	POORLY GRADED SAND, fine grained, light brown, moist, medium dense. (Terrace Deposit)	19		
822.5	24.0	SP	POORLY GRADED SAND with GRAVEL, fine to medium grained, brown, waterbearing, medium dense. (Terrace Deposit)	13		
817.5	29.0	CL	LEAN CLAY, grey, wet, stiff to very stiff.	24		

LOG OF BORING

PROJECT: CMKX-93-0202 Hennepin County Property 21st Ave. S. and 29th St. E. Minneapolis, Minnesota		BORING: MW-1 (cont.) LOCATION: See site map.				
		DATE: 12/14/93	SCALE: 1" = 4'			
Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
813.5	33.0		END OF BORING Water down 25.5 feet immediately after withdrawal of auger. Monitoring well MW-1 installed in bore hole.	17		
813.0	32.5			13		
812.5	32.0			13		
812.0	31.5			13		
811.5	31.0			13		
811.0	30.5			13		
810.5	30.0			13		
810.0	29.5			13		
809.5	29.0			13		
809.0	28.5			13		
808.5	28.0			13		
808.0	27.5			13		
807.5	27.0			13		
807.0	26.5			13		
806.5	26.0			13		
806.0	25.5			13		
805.5	25.0			13		
805.0	24.5			13		
804.5	24.0			13		
804.0	23.5			13		
803.5	23.0			13		
803.0	22.5			13		
802.5	22.0			13		
802.0	21.5			13		
801.5	21.0			13		
801.0	20.5			13		
800.5	20.0			13		
800.0	19.5			13		
799.5	19.0			13		
799.0	18.5			13		
798.5	18.0			13		
798.0	17.5			13		
797.5	17.0			13		
797.0	16.5			13		
796.5	16.0			13		
796.0	15.5			13		
795.5	15.0			13		
795.0	14.5			13		
794.5	14.0			13		
794.0	13.5			13		
793.5	13.0			13		
793.0	12.5			13		
792.5	12.0			13		
792.0	11.5			13		
791.5	11.0			13		
791.0	10.5			13		
790.5	10.0			13		
790.0	9.5			13		
789.5	9.0			13		
789.0	8.5			13		
788.5	8.0			13		
788.0	7.5			13		
787.5	7.0			13		
787.0	6.5			13		
786.5	6.0			13		
786.0	5.5			13		
785.5	5.0			13		
785.0	4.5			13		
784.5	4.0			13		
784.0	3.5			13		
783.5	3.0			13		
783.0	2.5			13		
782.5	2.0			13		
782.0	1.5			13		
781.5	1.0			13		
781.0	0.5			13		

LOG OF BORING

PROJECT: CMKX-93-0202		BORING: MMW-2	
Hennepin County Property 21st Ave. S. and 29th St. E. Minneapolis, Minnesota		LOCATION: See site map.	
		DATE: 12/15/93	SCALE: 1" = 4'
Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)
846.4	0.0	SM	SILTY SAND, fine to medium grained, dark brown, moist.
845.4	1.0	SP	(Terrace Deposit)
842.4	4.0	SM	POORLY GRADED SAND with SILT, fine to medium grained, brown, moist, very loose. (Terrace Deposit)
842.4	4.0	SP	POORLY GRADED SAND with GRAVEL, fine to medium grained, brown, moist, loose to medium dense. (Terrace Deposit)
837.4	9.0	SP	POORLY GRADED SAND, fine grained, brown, moist, medium dense. (Terrace Deposit)
827.4	19.0	SP	POORLY GRADED SAND with GRAVEL, fine to medium grained, brown, moist, medium dense. (Terrace Deposit)
822.4	24.0	SP	POORLY GRADED SAND with GRAVEL, fine to medium grained, brown, waterbearing, dense to loose. (Terrace Deposit)
18	18		
36	36		
29	29		
23	23		
11	11		
10	10		
9	9		
18	18		
16	16		
6	6		
3	3		
BPF	WL	Tests	or Notes

LOG OF BORING

PROJECT: CMKX-93-0202

**Hennepin County Property
21st Ave. S. and 29th St. E.
Minneapolis, Minnesota**

BORING: **MW-2 (cont.)**

LOCATION:
See site map.

DATE: 12/15/93 SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
814.4	32.0	SP	POORLY GRADED SAND with GRAVEL, fine to medium grained, brown, waterbearing, medium dense. (Terrace Deposit)	10		
813.4	33.0	SP	END OF BORING Water down 24.8 feet immediately after withdrawal of auger. Monitoring well MW-2 installed in bore hole.	20		

LOG OF BORING

PROJECT: CMKX-93-0202			BORING: MW-3		
Hennepin County Property 21st Ave. S. and 29th St. E. Minneapolis, Minnesota			LOCATION: See site map.		
Elev.	Depth	ASTM Symbol	BPF	W/L	Tests or Notes
845.1	0.0	CL			
Description of Materials (ASTM D2488)					
844.1	1.0	CL			
SANDY LEAN CLAY, dark brown, moist. (Topsoil)					
		SP SM			
POORLY GRADED SAND with SILT, fine to medium grained, brown, moist, very loose. (Terrace Deposit)					
841.1	4.0	SP			
POORLY GRADED SAND, fine to medium grained, light brown, moist, loose. (Terrace Deposit)					
839.1	6.0	SP			
POORLY GRADED SAND with GRAVEL, fine to medium grained, brown, moist, medium dense. (Terrace Deposit)					
		SP			
834.1	11.0	SP			
POORLY GRADED SAND, fine grained, brown, moist, medium dense. (Terrace Deposit)					
831.1	14.0	SP			
POORLY GRADED SAND with GRAVEL, fine to medium grained, brown, moist, medium dense. (Terrace Deposit)					
824.1	21.0	CL			
SANDY LEAN CLAY, brown, moist, rather stiff. (Glacial Till)					
822.1	23.0	CL			
LEAN CLAY, grey, wet, rather stiff. (Glacial Till)					
819.1	26.0	SC SM			
SILTY CLAYEY SAND with GRAVEL, fine to medium grained, grey, waterbearing, medium dense. (Glacial Till)					
816.1	29.0	SP			
POORLY GRADED SAND with GRAVEL,					

LOG OF BORING

PROJECT: CMKX-93-0202 Hennepin County Property 21st Ave. S. and 29th St. E. Minneapolis, Minnesota		BORING: MW-3 (cont.) LOCATION: See site map. DATE: 12/16/93 SCALE: 1" = 4'				
Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
814.4	30.7	☐	fine to medium grained, brown, waterbearing, very dense. (Glacial Outwash) END OF BORING Auger refusal at 31 feet. Water down 28.1 feet with 31 feet of hollow-stem auger in the ground. Monitoring well MW-3 installed in bore hole.	58 *		

LOG OF BORING

PROJECT: CMKX-93-0202

Hennepin County Property
21st Ave. S. and 29th St. E.
Minneapolis, Minnesota


BORING: **ST-1**

LOCATION:
See site map.

DATE: 12/16/93 SCALE: 1" = 4'

Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
848.4	0.0	SC	SILTY CLAYEY SAND, fine to medium grained, dark brown, moist. (Terrace Deposit)			
		SM				
		SP				
			POORLY GRADED SAND with GRAVEL, fine to medium grained, brown, moist, medium dense. (Terrace Deposit)	15		
				13		
				23		
				18		
				16		
819.4	29.0	SP	POORLY GRADED SAND with GRAVEL,			

LOG OF BORING

PROJECT: CMKX-93-0202		BORING: ST-1 (cont.)				
Hennepin County Property 21st Ave. S. and 29th St. E. Minneapolis, Minnesota		LOCATION: See site map.				
DATE: 12/16/93	SCALE: 1" = 4'					
Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
817.9	30.5		fine to medium grained, brown, waterbearing, very dense. (Terrace Deposit)	64		
END OF BORING Water down 29 feet with 30 feet of hollow-stem auger in the ground. Water not observed to cave-in depth of 18 feet immediately after withdrawal of auger. Boring immediately backfilled with cuttings and bentonite.						

LOG OF BORING

PROJECT: CMKX-93-0202			BORING: ST-2
Hennepin County Property 21st Ave. S. and 29th St. E. Minneapolis, Minnesota			LOCATION: See site map.
Elev.	Depth	Description of Materials (ASTM D2488)	DATE: 12/16/93
			SCALE: 1" = 4'
			BPF
			W/L
			Tests or Notes
844.6	0.0	SC SM SILTY CLAYEY SAND, fine to medium grained, dark brown, moist. (Terrace Deposit)	
842.6	2.0	SP POORLY GRADED SAND, fine grained, light brown, moist, loose. (Terrace Deposit)	8
830.6	14.0	SP POORLY GRADED SAND, fine to medium grained, light brown to brown, moist, loose. (Terrace Deposit)	6
821.6	23.0	SP POORLY GRADED SAND, fine to medium grained, brown, waterbearing, medium dense. (Terrace Deposit)	9
820.6	24.0	CL LEAN CLAY, grey, wet, stiff. (Glacial Till)	13
819.1	25.5	END OF BORING Water not observed immediately after withdrawal of auger. Water not observed to cave-in depth of 20 feet	

LOG OF BORING

PROJECT: CMKX-93-0202		BORING: ST-3				
Hennepin County Property 21st Ave. S. and 29th St. E. Minneapolis, Minnesota		LOCATION: See site map.				
		DATE: 12/16/93	SCALE: 1" = 4'			
Elev.	Depth	ASTM Symbol	Description of Materials (ASTM D2488)	BPF	WL	Tests or Notes
845.1	0.0	SC	SILTY CLAYEY SAND, fine to medium grained, dark brown, moist. (Terrace Deposit)			
844.1	1.0	SM SP				
841.1	4.0	SP	POORLY GRADED SAND, fine to medium grained, brown, moist, loose. (Terrace Deposit)			
			POORLY GRADED SAND, fine grained, light brown, moist, loose. (Terrace Deposit)			
836.1	9.0	SP	POORLY GRADED SAND, fine to medium grained, brown, moist, loose. (Terrace Deposit)			
821.1	24.0	SP	POORLY GRADED SAND with GRAVEL, fine to medium grained, brown, waterbearing, medium dense. (Terrace Deposit)			
819.6	25.5		END OF BORING Water not observed immediately after withdrawal of auger.			
				15		
				18		
				20		

LOG OF BORING

PROJECT: CMKX-93-0202		Hennepin County Property 21st Ave. S. and 29th St. E. Minneapolis, Minnesota				
BORING: ST-4		LOCATION: See site map.				
DATE: 12/16/93		SCALE: 1" = 4'				
Elev.	Depth	ASTM Symbol	Description of Materials	BPF	WL	Tests or Notes
846.3	0.0	CL	SANDY LEAN CLAY, black, moist. (ASTM D2488) (Topsoil)			
845.3	1.0	SC SM	SILTY CLAYEY SAND, fine to medium grained, dark brown, moist. (Terrace Deposit)			
843.3	3.0	SP SM	POORLY GRADED SAND with SILT and GRAVEL, fine to medium grained, brown, moist, very loose. (Terrace Deposit)	3	XX	
838.3	8.0	SP	POORLY GRADED SAND, fine to medium grained, light brown to brown, moist, loose. (Terrace Deposit)	10	XX	
827.3	19.0	SP	POORLY GRADED SAND with GRAVEL, fine to medium grained, brown, moist to waterbearing, medium dense. (Terrace Deposit)	23	XX	
820.8	25.5		END OF BORING Water not observed immediately after withdrawal of auger. Water not observed to cave-in depth of 17 feet immediately after withdrawal of auger.	22	XX	

Descriptive Terminology



Designation D 2487 — 83

Standard Test Method for CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

CRITERIA FOR ASSIGNING GROUP SYMBOLS AND GROUP NAMES USING LABORATORY TESTS^a

FINE-GRAINED SOILS 50% or more passed the No. 200 sieve	COARSE-GRAINED SOILS more than 50% retained on No. 200 sieve	SOIL CLASSIFICATION	
		GROUP SYMBOL	GROUP NAME ^b
SLITS AND CLAYS Liquid limit less than 50% Liquid limit 50% or more	GRANULS More than 50% of coarse fraction retained on No. 4 sieve SANDS 50% or more of coarse fraction passes No. 4 sieve	CLEAN GRAVELS Less than 5% fines ^c	GM Well-graded gravel
		GRAVELS WITH FINES More than 12% fines ^c	GM Silty gravel ^{f, g, h}
		CLEAN SANDS Less than 5% fines ^d	SM Well-graded sand ⁱ
		SANDS WITH FINES More than 12% fines ^d	SM Silty sand ^{g, h, i}
SLITS AND CLAYS Liquid limit less than 50%	CLEAN SANDS Less than 5% fines ^d	PI > 7 and plots on or above "A" line ^j	SC Clayey sand ^{g, h, i}
		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}
		Liquid limit - oven dried < 0.75 Liquid limit - not dried < 0.75	OL Organic clay ^{k, l, m, n} Organic silt ^{k, l, m, n}
Highly organic soils	SANDS WITH FINES Fines classify as CL or CH	PI > 7 and plots on or above "A" line ^j	OH Fat clay ^{k, l, m}
		PI < 4 or plots below "A" line ^j	OH Elastic silt ^{k, l, m}
Highly organic soils	SANDS WITH FINES Fines classify as CL or CH	Liquid limit - oven dried < 0.75 Liquid limit - not dried	OH Organic clay ^{k, l, m, n} Organic silt ^{k, l, m, n}
		Primarily organic matter, dark in color, and organic odor	PT Peat

PARTICLE SIZE IDENTIFICATION

Boulders	over 12"
Cobbles	3" to 12"
Gravel	¾" — 3"
Coarse	No. 4 — ¾"
Fine	No. 4 — ¾"
Sand	No. 4 — No. 10
Coarse	No. 10 — No. 40
Medium	No. 40 — No. 200
Fine	No. 200 — .005 mm
Silt	No. 200 — .005 mm
Clay	less than .005 mm

RELATIVE DENSITY OF COHESIONLESS SOILS

very loose	0 — 4 BPF
loose	5 — 10 BPF
medium dense	11 — 30 BPF
dense	31 — 50 BPF
very dense	50+ BPF

CONSISTENCY OF COHESIVE SOILS

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

DRILLING NOTES

Standard penetration test borings were advanced by 3½" or 6¼" 1.D. hollow-stem augers unless noted otherwise. Jetting water was used to clean out auger prior to sampling only where indicated on logs. Standard penetration test borings are designated by the prefix "ST" (Split Tube).

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

Hand probings were advanced manually with a 1½" diameter probe and are limited to the depth from which the probe can be manually withdrawn. Hand probings are indicated by the prefix "H".

SAMPLING — All samples are taken with the standard 2" O.D. split tube sampler, except where noted. "TW" indicates thin-wall (undisturbed) sample.

BPF — Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler is set 6" into undisturbed soil below the hollow-stem auger. Driving resistances are then counted for second and third 6" increments and added to get BPF. Where they differ significantly, they are reported in the following form — 2/1/2 for the second and third 6" increments respectively.

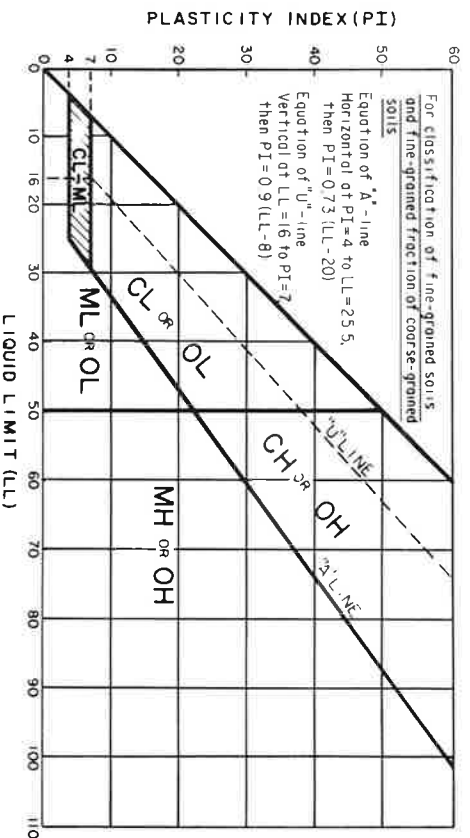
WH — WH indicates that sampler penetrated soil under weight of hammer and rods alone, driving not required.

NOTE — All tests run in accordance with applicable ASTM standards.

BRAUN
INTERTEC

- Based on the material passing the 3-in. (75-mm) sieve.
- Gravels with 5 to 12% fines, cobbles, and/or boulders, add "with cobbles and/or boulders" to group name.
- GM-GM well graded gravel with silt.
- GM-GM poorly graded gravel with silt.
- GM-GC poorly graded gravel with clay.
- GM-GC poorly graded gravel with silt.
- Sands with 5 to 12% fines require dual symbols.
- SM-SM well graded sand with silt.
- SM-SM poorly graded sand with silt.
- SP-SM poorly graded sand with silt.
- SP-SC poorly graded sand with clay.
- $C_u = D_{60}/D_{10}$ $C_c = \frac{D_{30} - D_{10}}{D_{10}(D_{60} - D_{10})}$
- If soil contains > 15% sand, add "with sand" to group name.
- If fines classification is GM or GC, add "with organic fines" to group name.
- If soil contains > 15% gravel, add "with gravel" to group name.
- If altering limits plot in hatched area, soil is a CL-MH, silty clay.
- If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel" whichever is predominant.
- If soil contains > 30% plus No. 200, predominantly sand, add "sandy" to group name.
- If soil contains > 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
- PI < 4 and plots on or above "A" line.
- PI < 4 and plots on or above "A" line.
- PI plots on or above "A" line.
- PI plots below "A" line.

For classification of fine-grained soils and fine-grained fraction of coarse-grained soils



LABORATORY TESTS

DD	Dry Density, pcf	OC	Organic Content, %
WD	Wet Density, pcf	S	Percent of Saturation, %
MC	Natural Moisture Content, %	SG	Specific Gravity
LL	Liquid Limit, %	C	Cohesion
PL	Plastic Limit, %	∅	Angle of Internal Friction
PI	Plasticity Index, %	qu	Unconfined Compressive Strength