BRAUN INTERTEC

Braun Intertec Corporation
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La Crosse, WI 54603

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June 5, 2013

Project LC-13-02991

Bethany Lutheran Homes
c/o Mr. Bob Van Slyke
Essential Decisions, Inc.
Sent via email: bvanslyke@team-edi.com

Re: Addendum 1 to Geotechnical Evaluation
Supplemental Subsurface Exploration & Infiltration Testing
Proposed Eagle Crest South
La Crosse, Wisconsin

Dear Mr. Van Slyke:

This letter serves as Addendum 1 to our Geotechnical Evaluation Report for this project, dated August 1, 2011. This Addendum addresses supplemental subsurface data from additional borings and test pits that were extended to assist with evaluation of required earthwork for this project. The location of the building addition was moved subsequent to completion of our geotechnical evaluation report. Soil borings and test pits were completed within the relocated building footprint.

Background

We staked exploration locations by measuring dimensions from nearby buildings or other site features with a tape or surveyor's wheel at approximate right angles from those references. Surface elevations were measured using a surveyor's level. We referenced surface elevations to the fire hydrant located at Sims Place and Wollan Street, with reported top of not elevation of 654.64.

Our Geotechnical Evaluation Report discussed building recommendation based on 10 borings that were extended for the proposed building. After our report was issued, the proposed building location was moved and only one of our borings (Boring ST-5) was located within the building footprint. Based on our initial geotechnical report, soils at the site consisted of 17 to 20 feet of fill consisting primarily of poorly graded sand that was fine grained and light brown. A layer of organic clay was encountered beneath the fill in nine of the ten borings. Groundwater was observed in each of the borings, 10 ½ to 16 feet below the ground surface.

Considering the soil composition and our recommendations to remove and re-place the fill in controlled compacted lifts, the project team decided to collect additional subsurface information to help in evaluating the earthwork.

Additionally, the location of the rain garden was not known at the time we completed our Geotechnical report. We extended a continuous sample boring at the proposed rain garden location as required by the Wisconsin Department of Natural Resources (WDNR), Technical Standard 1002.

New Information

We extended four test pits and three borings for the proposed building. Based on the explorations, the general soil profile appears to be composed of fill that extended to depths of 11 to 17 feet over alluvial sand and swamp deposit soils. The swamp deposits were noted to be composed of organic clays (and tree branches/roots as noted in Test Pit TP-3). The swamp deposits were dark gray to gray and were wet to waterbearing. Below the fill and swamp deposits, the borings and test pits encountered alluvial sand soils that were composed of poorly graded sand that was gray and waterbearing.

Groundwater was noted at depths of 9 to 17 feet, corresponding to elevations within 1 foot of 635. Considering the close proximity of Swift Creek and the free draining characteristics of the alluvial sand and fill sand soils, we believe the river stage and elevation directly influence the groundwater elevation at this site.

Recommendations

Upon receive the request for additional borings, we re-visited the recommendations within our Geotechnical report and decided to provide an option for extending test pits. With this approach, we thought it may be possible to limit the amount of soil corrections and/or dewatering needed to facilitate construction while still providing the needed support for the proposed building.

This approach would work provided:

1. The fill soils were free of debris, trash and other deleterious materials,
2. Organic clay, peat and tree roots were not present below the fill and,
3. The groundwater elevation was at or below the fill and natural soil interface.

If these conditions were present, it could have been feasible to consider surcharging the site or reducing the amount of soil corrections. Based on our findings, however, organic clay soils and tree roots were noted within the borings and test pits. These soils are not suitable for building support and should be removed. Therefore, we recommend soil corrections be implemented as discussed within our Geotechnical report.

We spoke with Mr. Gary Seago of McHugh Excavation regarding the need for dewatering to facilitate soil corrections. Mr. Seago indicated if the river elevation is at 634 or lower, excavations to complete the soil corrections could be completed without dewatering. This should be evaluated at the time of construction which is expected to begin in August of 2013.

Rain Garden/Storm Water Infiltration

Soil profile for the storm water infiltration basin is composed of poorly graded sand (sand) that extended to a depth of 10 feet over silty sand (loamy sand) that extended to a depth of 14 feet and lean clay (clay) with organic debris to the termination depth of our boring.

Most of the soils encountered in the borings are well suited for rain gardens or infiltration basins. Infiltration rates in natural soils are variable based on soil type, moisture content, void space between soil particles and discontinuities in the soil structure. Discontinuities generally are not present in disturbed or compacted soils, such as existing fills, because void space between soil particles is reduced form compaction efforts. Therefore, infiltration rates in disturbed soils could be less than the values shown in the table on the WDNR Soil Evaluation Form attached to this letter.

In general, most of the soils we encountered in the borings, with the exception of the natural lean clay soils, are well suited for infiltration of storm water. The groundwater (present at about 10 feet below the surface in Boring ST-14) and the clay are considered limiting layers according the WDNR and the bottom of the rain garden will need to be 3 feet above the limiting layer.

Remarks

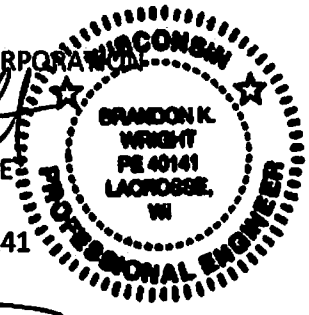
This addendum should be attached to and considered a part of our original Geotechnical Evaluation Report. With the exception of any results or recommendations changed by this Addendum, the information contained in our Geotechnical Evaluation Report remains unchanged.

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

If you have any questions about this Addendum, please contact Brandon Wright at 608.781.7277 or by email at BWright@BraunIntertec.com.

Sincerely,

BRAUN INTERTEC CORPORATION

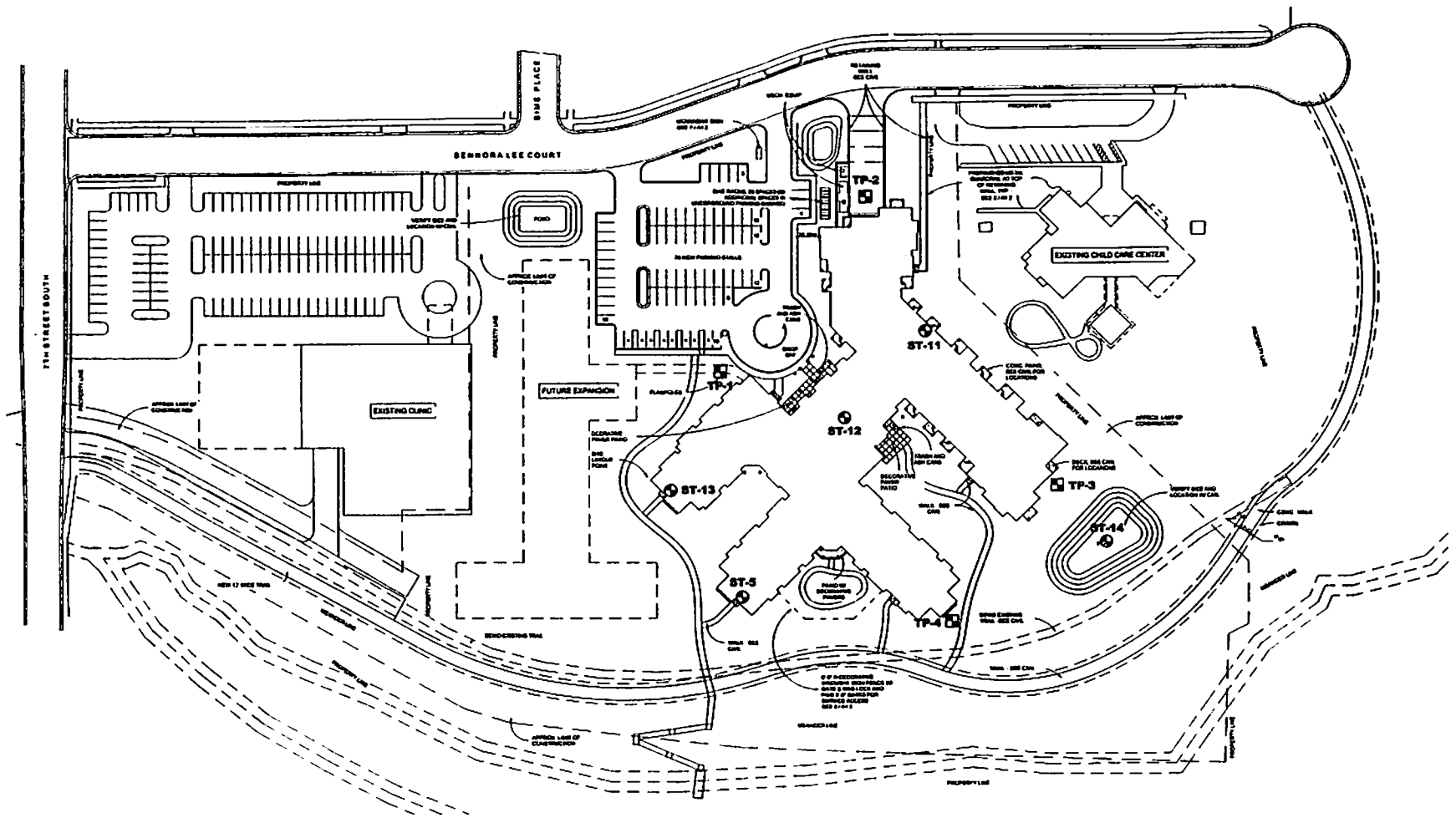


Brandon K. Wright, PE
Project Engineer
License Number: 40141

Loren W. Braun, PE
Senior Engineer

Attachments:
Exploration Location Sketch
Log of Boring Sheets
Log of Test Pit Sheets
WDNR Soil Evaluation Form
Descriptive Terminology

c: Todd Wilson, Bethany Lutheran



● DENOTES APPROXIMATE LOCATION OF STANDARD PENETRATION TEST BORING

50' 0 100'

SCALE: 1"= 100'

BRAUN INTERTEC

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

Base Dwg Provided By:

SOIL BORING LOCATION SKETCH
GEOTECHNICAL EVALUATION
PROPOSED EAGLE CREST SOUTH - BETHANY LUTHERAN HOMES
7TH STREET SO.
LACROSSE, WISCONSIN

Project No:	LC1302991
Drawing No:	LC1302991
Scale:	1"= 100'
Drawn By:	JAG
Date Drawn:	6/4/13
Checked By:	RW
Last Modified:	6/4/13
Sheet of	Fig:

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LOG OF BORING

Braun Project LC-13-02991
GEOTECHNICAL EVALUATION
Eagle Crest South - Additional Borings
7th Street South and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST- 5**

LOCATION: See Boring Location Sketch.

DRILLER: D. Bailey | METHOD: 3 1/4" HSA, Autohammer | DATE: **7/13/11** | SCALE: **1" = 6'**

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
646.7	0.0					
644.7	2.0	FILL	FILL: Poorly Graded Sand with Silt, fine-grained, with a trace of roots, brown, moist.			
		FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to waterbearing.	15		
				20		
				11		
				8	▬	
				4		
				2		
629.7	17.0					
628.7	18.0	OL	ORANIC CLAY, dark gray, wet. (Swamp Deposits)	4		
		SP	POORLY GRADED SAND, fine- to medium-grained, gray, waterbearing, medium dense to loose. (Alluvium)	13		
				6		
				5		
613.7	33.0					
		SP	POORLY GRADED SAND, medium-grained, gray, waterbearing, loose. (Alluvium)			
610.7	36.0			10		
			END OF BORING.			
			Water observed at a depth of 11 feet while drilling.			
			Water not observed to cave-in depth of 10 1/2 immediately after withdrawal of auger.			
			Boring then grouted.			

Benchmark (BM): Exploration locations were referenced to the top nut on fire hydrant near Sims Place and Wollan Street. This benchmark is said to be at an elevation of 654.64

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LOG OF BORING

Braun Project LC-13-02991
GEOTECHNICAL EVALUATION
Eagle Crest South - Additional Borings
7th Street South and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-11**

LOCATION: See Boring Location Sketch.

DRILLER: GDC | METHOD: 3 1/4" HSA, Autohammer | DATE: **5/22/13** | SCALE: **1" = 6'**

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
649.1	0.0	FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to waterbearing.	12		
				12		
				10		
				11		
635.1	14.0			12	▽	
		OL	ORGANIC CLAY, with Sand, dark gray, wet, soft (Alluvium)	4		
632.1	17.0					
		SP	POORLY GRADED SAND, fine-grained, gray, waterbearing, loose. (Alluvium)			
628.1	21.0			5		
			END OF BORING.			
			Water observed at a depth of 14 feet while drilling.			
			Boring then grouted.			

(See Descriptive Terminology sheet for explanation of abbreviations)

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LOG OF BORING

Braun Project LC-13-02991
GEOTECHNICAL EVALUATION
Eagle Crest South - Additional Borings
7th Street South and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-12**

LOCATION: See Boring Location Sketch.

DRILLER: GDC | METHOD: 3 1/4" HSA, Autohammer | DATE: **5/22/13** | SCALE: **1" = 6'**

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
647.4	0.0	FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to wet.	4		
				9		
				11		
				11		
634.4	13.0			9	▽	
633.4	14.0	FILL	FILL: Silty Sand, fine-grained, brown, waterbearing.			
		OL	ORGANIC CLAY, dark gray, wet, soft. (Alluvium)	4		
630.4	17.0	SP	POORLY GRADED SAND, fine-grained, gray, waterbearing, medium dense. (Alluvium)			
626.4	21.0			13		
			END OF BORING.			
			Water observed at a depth of 13 feet while drilling.			
			Boring then grouted.			

(See Descriptive Terminology sheet for explanation of abbreviations)

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LOG OF BORING

Braun Project LC-13-02991
GEOTECHNICAL EVALUATION
Eagle Crest South - Additional Borings
7th Street South and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-13**

LOCATION: See Boring Location Sketch.

DRILLER: GDC | METHOD: 3 1/4" HSA, Autohammer | DATE: **5/22/13** | SCALE: **1" = 6'**

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
651.1	0.0	FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to waterbearing.	13		
				12		
				14		
				16		
				16		
				12		
634.1	17.0	SP	POORLY GRADED SAND, fine-grained, gray, waterbearing, very loose. (Alluvium)		▽	
630.1	21.0			2		
			END OF BORING.			
			Water observed at a depth of 17 feet while drilling.			
			Boring then grouted.			

(See Descriptive Terminology sheet for explanation of abbreviations)

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LOG OF BORING

Braun Project LC-13-02991
GEOTECHNICAL EVALUATION
Eagle Crest South - Additional Borings
7th Street South and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-14**

LOCATION: See Boring Location Sketch.

DRILLER: GDC | METHOD: 3 1/4" HSA, Autohammer | DATE: **5/22/13** | SCALE: **1" = 6'**

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil-ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
643.1	0.0	FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to waterbearing.	2		
				5		
				6		
				8		
				10		
				22		
				12		
				20		
				10	▽	
				13		
632.1	11.0			6		
		SP	POORLY GRADED SAND, medium-grained, gray, waterbearing, loose to very loose. (Allvuium)	8		
				2		
629.1	14.0			2		
		CL	LEAN CLAY, trace of organics, dark gray, wet, soft to medium. (Alluvium)	3		
627.1	16.0			6		
			END OF BORING.			
			Water observed at a depth of 9 feet while drilling.			
			Boring then grouted.			

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LOG OF TEST PIT

Braun Project LC-13-02991
GEOTECHNICAL EVALUATION
Eagle Crest South - Additional Borings
7th Street South and Bennora Lee Court
La Crosse, Wisconsin

TEST PIT: **TP- 1**

LOCATION: See Boring Location Sketch.

DRILLER: McHugh Excavating | METHOD: Backhoe | DATE: **5/22/13** | SCALE: **1" = 6'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
650.0	0.0					
649.0	1.0	FILL	FILL: Silty Sand, with Gravel, fine- to medium-grained, dark brown, moist.			
		FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to wet.			
634.5	15.5				▽	
633.0	17.0	SP	POORLY GRADED SAND, fine-grained, gray, waterbearing. (Alluvium)			
			BOTTOM OF TEST PIT.			
			Water observed at 15 feet while excavating.			
			Test pit then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF TEST PIT N:\GINT\PROJECTS\LACROSSE\2013\LC-13-02991.GPJ BRAUN_V8_CURRENT.GDT 6/5/13 14:46

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LOG OF TEST PIT

Braun Project LC-13-02991
GEOTECHNICAL EVALUATION
Eagle Crest South - Additional Borings
7th Street South and Bennora Lee Court
La Crosse, Wisconsin

TEST PIT: **TP- 2**

LOCATION: See Boring Location Sketch.

DRILLER: McHugh Excavating | METHOD: Backhoe | DATE: **5/22/13** | SCALE: **1" = 6'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
649.4	0.0					
648.9	0.5	FILL	FILL: Silty Sand, fine-grained, dark brown, moist.			
		FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to wet. (Alluvium)			
635.9	13.5					
		SM	SILTY SAND, fine-grained, gray, waterbearing. (Alluvium)		▽	
633.9	15.5					
			BOTTOM OF TEST PIT.			
			Water observed at 14 feet while excavating.			
			Test pit then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF TEST PIT N:\GINT\PROJECTS\LACROSSE\2013\LC-13-02991.GPJ BRAUN_V8_CURRENT.GDT 6/5/13 14:46

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LOG OF TEST PIT

Braun Project LC-13-02991
GEOTECHNICAL EVALUATION
Eagle Crest South - Additional Borings
7th Street South and Bennora Lee Court
La Crosse, Wisconsin

TEST PIT: **TP- 3**

LOCATION: See Boring Location Sketch.

DRILLER: McHugh Excavating | METHOD: Backhoe | DATE: **5/22/13** | SCALE: **1" = 6'**

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
645.2	0.0	FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to wet.			
631.7	13.5	OL	ORGANIC CLAY, with large Roots, black, wet. (Swamp Deposits)		▽	
629.7	15.5					
629.2	16.0	SP	POORLY GRADED SAND, fine-grained, gray, waterbearing. (Alluvium)			
			BOTTOM OF TEST PIT.			
			Water observed at 11 feet while excavating.			
			Test pit then backfilled.			

(See Descriptive Terminology sheet for explanation of abbreviations)

LOG OF TEST PIT N:\GINT\PROJECTS\LACROSSE\2013\LC-13-02991.GPJ BRAUN_V8_CURRENT.GDT 6/5/13 14:46

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LOG OF TEST PIT

Braun Project LC-13-02991
GEOTECHNICAL EVALUATION
Eagle Crest South - Additional Borings
7th Street South and Bennora Lee Court
La Crosse, Wisconsin

TEST PIT: **TP- 4**

LOCATION: See Boring Location Sketch.

DRILLER: McHugh Excavating | METHOD: Backhoe | DATE: **5/22/13** | SCALE: **1" = 6'**

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	ASTM Symbol	Description of Materials (ASTM D2488 or D2487)	BPF	WL	Tests or Notes
645.1	0.0	FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to wet.		▽	
632.6	12.5					
631.6	13.5	SP	POORLY GRADED SAND, fine-grained, gray, waterbearing. (Alluvium)			
			BOTTOM OF TEST PIT.			
			Water observed at 11 feet while excavating.			
			Test pit then backfilled.			

LOG OF TEST PIT N:\GINT\PROJECTS\LACROSSE\2013\LC-13-02991.GPJ BRAUN_V8_CURRENT.GDT 6/5/13 14:46

Wisconsin Department of Commerce
Division of Safety and Buildings

SOIL EVALUATION - STORM

in accordance with Comm 82.365 & 85, Wis. Adm. Code

Attach complete site plan on paper not less than 8 1/2 x 11 inches in size. Plan must include, but not limited to: vertical and horizontal reference point (BM), direction and percent slope, scale or dimensions, north arrow, and BM referenced to nearest road.

Please print all information.

Personal information you provide may be used for secondary purposes (Privacy Law, s. 15.04 (1) (m)).

County	
Parcel I.D.	
Reviewed by	Date

Property Owner				Property Location			
Gundersen Lutheran Medical Center				Govt. Lot	1/4	1/4 S T N R E (or) W	
Property Owner's Mailing Address				Lot #	Block #	Subd. Name or CSM#	
1910 South Avenue						2301 7th Street South, La Crosse, WI 54601	
City	State	Zip Code	Phone Number	☒ City ☐ Village ☐ Town		Nearest Road	
La Crosse	WI	54601	(608) 782-7300	La Crosse		Sims Place	

Drainage area _____ ☐ sq. ft. ☐ acres
Optional:
Test Site Suitable for (check all that apply)

☐ Irrigation ☒ Bioretention trench ☐ Trench(es)
☒ Rain garden ☐ Grassed swale ☐ Reuse
☒ Infiltration trench ☐ SDS (> 15' wide) ☐ Other _____

Hydraulic Application Test Method:

☒ Morphological Evaluation
☐ Double-Ring Infiltrometer
☐ Other (specify) _____

ST14 Obs. # ☒ Boring ☐ Pit Ground surface elev. _____ ft. Depth to limiting factor 120 in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr
Fill	0-120	10YR 4/4	None	f.s	0.f.sg	ml	cs	0	0.50
A	120-168	10YR 3/1	None	m.s	0.m.sg	ml	cs	0	3.60
O	168-192	10YR 2.5/1	None	sc	1.c.pr	mfi	cs	0	0.04

Obs. # ☐ Boring ☐ Pit Ground surface elev. _____ ft. Depth to limiting factor _____ in.

Horizon	Depth in.	Dominant Color Munsell	Redox Description Qu. Sz. Cont. Color	Texture	Structure Gr. Sz. Sh.	Consistence	Boundary	% Rock Frag.	Hydraulic App. Rate Inches/Hr

CST/PSS Name (Please Print)	Signature	CST/PSS Number
Brandon K. Wright	Brandon K Wright	1158379
Address: 2309 Palace Street, La Crosse, WI 54603	Date Evaluation Conducted: 5/30/2013	Telephone Number: 608.781.7277

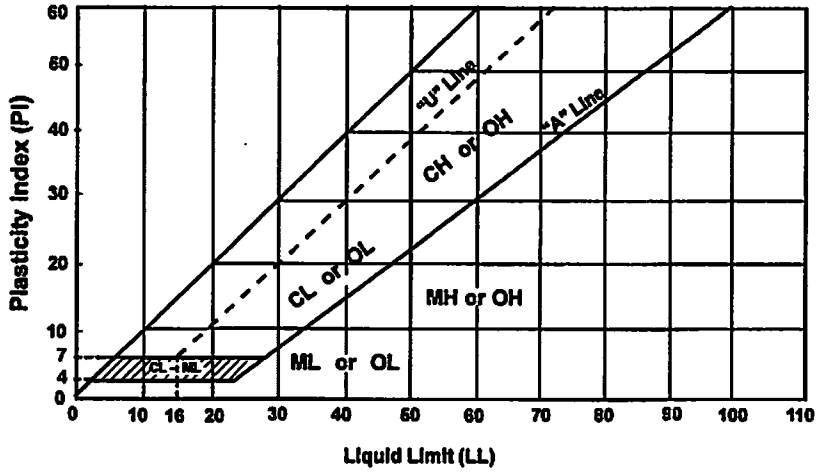
BRAUN
INTERTEC

Descriptive Terminology of Soil

Standard D 2487 - 00
Classification of Soils for Engineering Purposes (Unified Soil Classification System)

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

a. Based on the material passing the 3-in (75mm) sieve.
b. If field sample contained cobbles or boulders, or both, add "with cobbles or boulders or both" to group name.
c. $C_u = D_{60} / D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
d. If soil contains ≥15% sand, add "with sand" to group name.
e. 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
f. If fines classify as CL-ML, use dual symbol GC-GM or SC-SM.
g. If fines are organic, add "with organic fines" to group name.
h. If soil contains ≥ 15% gravel, add "with gravel" to group name.
i. 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
j. If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.
k. If soil contains 10 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.



Laboratory Tests

DD	Dry density, pcf	OC	Organic content, %
WD	Wet density, pcf	S	Percent of saturation, %
MC	Natural moisture content, %	SG	Specific gravity
LL	Liquid limit, %	C	Cohesion, psf
PL	Plastic limit, %	∅	Angle of internal friction
PI	Plasticity index, %	qu	Unconfined compressive strength, psf
P200	% passing 200 sieve	qp	Pocket penetrometer strength, tsf

Particle Size Identification

Boulders	over 12"
Cobbles	3" to 12"
Gravel	
Coarse	3/4" to 3"
Fine	No. 4 to 3/4"
Sand	
Coarse	No. 4 to No. 10
Medium	No. 10 to No. 40
Fine	No. 40 to No. 200
Silt	< No. 200, PI < 4 or below "A" line
Clay	< No. 200, PI ≥ 4 and on or above "A" line

Relative Density of Cohesionless Soils

Very loose	0 to 4 BPF
Loose	5 to 10 BPF
Medium dense	11 to 30 BPF
Dense	31 to 50 BPF
Very dense	over 50 BPF

Consistency of Cohesive Soils

Very soft	0 to 1 BPF
Soft	2 to 3 BPF
Rather soft	4 to 5 BPF
Medium	6 to 8 BPF
Rather stiff	9 to 12 BPF
Stiff	13 to 16 BPF
Very stiff	17 to 30 BPF
Hard	over 30 BPF

Drilling Notes

Standard penetration test borings were advanced by 3 1/4" or 6 1/4" ID hollow-stem augers unless noted otherwise, Jetting water was used to clean out auger prior to sampling only where indicated on logs. Standard penetration test borings are designated by the prefix "ST" (Split Tube). All samples were taken with the standard 2" OD split-tube sampler, except where noted.

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

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

BPF: Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler was set 6" into undisturbed soil below the hollow-stem auger. Driving resistances were then counted for second and third 6" increments and added to get BPF. Where they differed significantly, they are reported in the following form: 2/12 for the second and third 6" increments, respectively.

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

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

TW indicates thin-walled (undisturbed) tube sample.

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

Geotechnical Evaluation Report

Bethany Lutheran Senior Community
7th St., South and Bennora Lee Court
La Crosse, Wisconsin

Prepared for

Bethany Lutheran Homes Incorporated

Loren W. Braun, PE
Senior Engineer
License Number: 28299
August 1, 2011

Project LC-11-03498

Braun Intertec Corporation

BRAUN
INTERTEC

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August 1, 2011 Project LC-11-03498

Mr. Todd Wilson
Bethany Lutheran Homes Incorporated
2575 7th St.
La Crosse, WI 54601

Re: Geotechnical Evaluation
Proposed Senior Community
7th Street South and Bennora Lee Court
La Crosse, Wisconsin

Dear Mr. Wilson:

We are pleased to present this Geotechnical Evaluation Report for the proposed senior community development in La Crosse, Wisconsin. The proposed community is located in the southeast quadrant of 7th Street South and Bennora Lee Court in La Crosse Wisconsin. In this letter, we present a summary of our results and recommendations. Details regarding our results, methods and recommendations are provided in the attached report.

Summary of Results

The soil borings initially encountered 17 to 20 feet of fill consisting primarily of poorly graded sand that was fine grained and light brown. A layer of organic clay was encountered beneath the fill in nine of the ten borings. The thickness of this layer varied from 1 to 2 feet. Poorly graded sands were encountered beneath the fill. Groundwater was observed in each of the borings, 10 ½ to 16 feet below the ground surface.

Summary of Evaluation

Based on the soil borings, it is feasible to support the building on shallow spread footings. For the building areas without underground parking, this will involve some risk since the building will be supported on uncontrolled fill and a thin layer of organics/buried topsoil. The building area with underground parking will require subexcavation to remove the fill and organic layer. This will require dewatering in order to remove the material and to place compacted backfill.

Remarks

Thank you for making Braun Intertec your geotechnical consultant for this project. If you have questions about this report, please contact Loren Braun at 651.48 7.7011 or by e-mail at LBraun@BraunIntertec.com. We would also appreciate the opportunity to provide follow-up construction observation and testing services during construction.

Sincerely,

BRAUN INTERTEC CORPORATION

Loren W. Braun, PE
Senior Engineer

Daniel B. Mahrt, PE
Senior Engineer

Table of Contents

Table of Contents (continued)

A. Introduction

A.1. Project Description

Bethany Lutheran Homes is proposing to construct a new senior retirement community in La Crosse, Wisconsin. The proposed facility will be constructed in the southeast quadrant of 7th Street South and Bennora Lee Court. The proposed building will contain various wings and varying building heights. Underground parking is proposed for a portion of the building.

A.2. Purpose

The purpose of this geotechnical evaluation is to provide opinions and recommendations regarding foundation and slab support for the proposed building and pavement sections for parking and drive areas.

A.3. Background Information and Reference Documents

To facilitate our evaluation, we were provided with a schematic site plan showing the layout of the proposed buildings. The schematic drawing was untitled and undated.

A.4. Site Conditions

The site is currently undeveloped and covered with sparse grass vegetation and a few smaller trees. The site is relatively level with the exception of the eastern edge which is approximately 2 to 3 feet lower.

A.5. Scope of Services

Our scope of services for this project was originally submitted as a Proposal to Essential Decisions, Incorporated on July 7, 2011. We received authorization to proceed from Mr. Todd Wilson with Bethany Lutheran Homes Incorporated on July 8, 2011. Tasks performed in accordance with our authorized scope of services included:

- Performing a reconnaissance of the site to evaluate equipment access to boring locations.
- Staking and clearing boring locations of underground utilities.

- Performing ten penetration test borings to a nominal depth of 35 feet.
- Performing laboratory tests on selected penetration test samples.
- Preparing this report containing a CAD sketch, boring logs, a summary of the soils encountered, results of laboratory tests, and recommendations for structure and pavement subgrade preparation and the design of foundations, floor slabs and pavements.

We staked boring locations by measuring dimensions from adjacent site features with a tape at approximate right angles from those references. Surface elevations were measured using a surveyor's level. We referenced surface elevations to the top nut of a fire hydrant located at the northwest corner of the intersection of Bennora Court and Simms Place. We assumed an elevation of 150 for this reference. Bur scope of services was performed under the terms of our June 15, 2006, General Conditions.

B. Results

B.1. Soil Boring Logs

B.1.a. Log of Boring Sheets

Log of Boring sheets for our penetration test borings are included in the Appendix. The logs identify and describe the geologic materials that were penetrated, and present the results of the penetration resistance and groundwater measurements.

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

B.1.b. Geologic Origins

Geologic origins assigned to the materials shown on the logs and referenced within this report were based on: (1) visual classification of the various soil samples retrieved during the course of our subsurface boring, (2) penetration resistance testing performed for the project, and (3) available common knowledge of the geologic processes and environments that have impacted the site and surrounding area in the past.

B.2. Soil Profile

The soil borings initially encountered 17 to 20 feet of fill consisting primarily of poorly graded sand that was fine grained and light brown. A layer of organic clay was encountered beneath the fill in nine of the ten borings. The thickness of this layer varied from 1 to 2 feet. Poorly graded sands were encountered beneath the fill. A more detailed description is provided below.

B.2.a. Fill

Each of the soil borings initially encountered a layer of poorly graded sand fill. The fill is considered uncontrolled, meaning it was not placed in uniform lifts or was adequately compacted for building or pavement support. The presence of organic material below the fill indicated the fill is uncontrolled. The sand was fine-grained, light brown, moist to wet about the groundwater level and then waterbearing. Penetration resistances within the fill varied from 2 to 20 blows per foot but typically varied from about 10 to 15 blows per foot. The lower penetration resistances were typically nearer the bottom of the fill layer.

B.2.b. Organic Soils

Organic soil was encountered beneath the fill in every boring except Boring ST-9. The thickness of the organic soils varied from 1 to 2 feet. The organic soil consisted of organic clay that varied from dark gray to black and was wet. Penetration resistances varied from 3 to 7 blows per foot. The moisture content of one sample was 62 percent.

B.2.c. Alluvial Sand

Alluvial poorly graded sands were encountered beneath the fill and organic clays. The sands extended to the boring termination depths of approximately 35 feet. The sand was typically fine to medium grained, gray and waterbearing. Penetration resistances of the sand varied from 5 to 15 blows per foot, indicating the soil was loose to medium dense.

B.2.d. Groundwater

Groundwater was observed in each boring at depths varying from 10 ½ to 16 ½ feet, corresponding to elevations varying between 129.5 and 134.1. We anticipate that the groundwater level will fluctuate in unison with the adjacent river.

C. Basis for Recommendations

C.1. Design Details

C.1.a. Building Structure Loads

Specific structural information was not available at the time this report was prepared. We have assumed that bearing wall loads associated with the proposed buildings will be between 3 and 10 kips per linear foot. We have also assumed that column loads will be between 60 and 300 kips and that floor loads will not exceed 250 pounds per square foot

C.1.b. Anticipated Grade Changes

Based on the existing ground elevations at the boring locations, we assume that the finished floor elevation of the proposed buildings will be approximately 147 and that the garage level elevation will be approximately 137. Thus, the building without underground parking will require typical cuts of less than 1 foot and fills of up to 4 feet. Approximately 8 to 10 feet of cut will be required for the below grade parking areas.

C.1.c. Pavements and Traffic Loads

We assume the parking and drive areas will have a bituminous section. We have assumed the pavement areas will be used mostly be cars and light trucks with occasional heavier trucks. Based on this, we estimate no more than 40,000 equivalent 18-kip single axle loads (ESALs) will occur over an assumed design life of 20 years.

C.1.d. Precautions Regarding Changed Information

We have attempted to describe our understanding of the proposed construction to the extent it was reported to us by others. Depending on the extent of available information, assumptions may have been made based on our experience with similar projects. If we have not correctly recorded or interpreted the project details, we should be notified. New or changed information could require additional evaluation, analyses and/or recommendations.

C.2. Design and Construction Considerations

Development of the proposed project is complicated by the presence of significant fill and a layer of buried topsoil/organic soil. No debris or other deleterious material was encountered within the fill and the penetration resistance suggests that it is somewhat compacted.

For the buildings without below grade parking, we are providing recommendations based on a limited subcut below the bottom of footings to densify the existing fill. Foundations in the area where below grade parking is included will result in both heavier foundation loads and the placement of foundations closer to the organic clay layer. Consequently, we recommend removing the fill and organic clays below proposed foundation areas. This will require dewatering in order to remove the fill and organic material and replace it with compacted backfill. We assume that the floor slab of garage will be placed on the existing fill and over the organic layer.

The owner should be aware of inherent risk associated with constructing on existing fill and organic soil. The extent of organic soils could be greater in some areas or if there is debris within the fill, excessive settlement could occur. To eliminate this problem, it would be necessary to completely remove the existing fill and organic soil layer. Alternately, the building could be supported on deep foundations and a structural floor slab.

Prior to commencement of site grading, test pits should be completed within the existing fill to better determine the suitability of the existing fill to support the proposed structures. If unsuitable material is encountered, additional removal or use of deep foundations and structural slabs would be required.

D. Recommendations

D.1. Building and Pavement Subgrade Preparation

D.1.a. Excavations and Subexcavations

Initial site preparation for the building pad and pavement areas should consist of removal of vegetation and surface topsoil. We anticipate that about a 6-inch removal would typically be required. For areas of the building pad without below grade parking, we recommend subcutting the building pad and oversize area to a minimum depth equal to three-fourths of the footing width or a minimum depth of 3 feet, whichever is greater.

For areas with below grade parking, we recommend subcutting foundation excavations to the bottom of the fill, or to the bottom of the organic deposits, where present. This will require excavation depths of between 17 and 21 feet below existing grade. Below proposed garage floor slabs, we recommend a minimum subcut of 3 feet.

To provide lateral support to replacement backfill, additional required fill and the structural loads they will support, we recommend oversizing (widening) the excavations 1 foot horizontally beyond the outer edges of the building perimeter footings, or column footing edges, for each foot the excavations extend below bottom-of-footing elevations.

For pavement areas, a subexcavation will not be required. Any debris or organic material exposed by topsoil removal or cutting to obtain grade should be removed, however. We recommend surface-compacting the pavement subgrade prior to placement of fill in the pavement section. The surface compaction should consist of four passes with a vibratory roller with a minimum dynamic force of 40,000 pounds. Half of the passes should be completed perpendicular to the other half.

D.1.b. Excavation Dewatering

We recommend removing groundwater from the foundation excavations for the below grade parking areas. The contractor should review our logs to determine if wells are required, how many will be required, and to what depths they will need to be installed. We anticipate significant seepage into the excavations because of the relatively permeable sands soils.

D.1.c. Backfill and Fill

Based on the soil borings, it appears that the existing fill should be suitable for reuse as structural backfill and fill. It will be necessary to further evaluate this material at the time the excavation is completed, however. The organic soil layer beneath the fill would not be suitable for reuse as structural backfill. We recommend that imported material needed to replace excavation spoils or balance cut and fill quantities, consist of sand having less than 20 percent of the particles by weight passing a #200 sieve.

D.1.d. Placement and Compaction of Backfill and Fill

We recommend spreading backfill and fill in loose lifts of approximately 10 inches. Backfill and fill should be conditioned within 3 percentage points of its optimum moisture content and be compacted to a minimum of 95 percent of its maximum dry density based on ASTM International Standard Specification D698 (standard Proctor).

In pavement areas, fill placed greater than 3 feet below finished subgrade elevation should be conditioned within 3 percentage points of its optimum moisture content and be compacted to a minimum of 95 percent of its standard Proctor maximum dry density. In the upper 3 feet, the soil should be conditioned between 2 percentage points below and 1 percentage point above its optimum moisture content and compacted to a minimum of 100 percent of its standard Proctor maximum dry density.

D.2. Spread Footings

D.2.a. Embedment Depth

For frost protection, we recommend embedding perimeter footings 48 inches below the lowest exterior grade. Interior footings may be placed directly below floor slabs.

D.2.b. Net Allowable Bearing Pressure

We recommend sizing spread footings to exert a net allowable bearing pressure of up to 3,000 pounds per square foot (psf). This value includes a safety factor of at least 3.0 with regard to bearing capacity failure.

D.2.c. Settlement

We estimate that total and differential settlements among the footings will amount to less than 1 inch and ½ inch, respectively, under the assumed loads.

D.3. Interior Slabs

D.3.a. Subgrade Modulus

We recommend using a modulus of subgrade reaction, k, of 250 pounds per square inch per inch of deflection (pci) to design the slabs.

D.3.b. Moisture Vapor Protection

If floor coverings or coatings less permeable than the concrete slab will be used, we recommend that a vapor retarder or vapor barrier be place immediately beneath the slab. Some contractors prefer to bury the vapor retarder or barrier beneath a layer of sand to reduce curling and shrinkage, but this practice risks trapping water between the slab and vapor retarder or barrier.

Regardless of where the vapor retarder or barrier is placed, we recommend consulting with floor covering manufacturers regarding the appropriate type, use and installation of the vapor retarder or barrier to preserve warranty assurances.

D.4. Below Grade Walls

Below-grade wall design should be based on at-rest earth pressure conditions. For the at-rest case, we recommend designing for an equivalent fluid pressure of 55 pounds per square foot per foot of depth (pcf). Our recommended design values are based on a wet unit backfill weight for sand of about 120 pcf, an internal friction angle of 33 degrees, and assume a level backfill with no surcharge. Our design values will need to be revised for sloping backfill or other dead or live loads that are placed within a horizontal distance behind the walls that is equal to the height of the walls. Our design values also assume that the walls are drained so that water cannot accumulate behind the walls.

Resistance to lateral earth pressures will be provided by passive resistance against the retaining wall footings, and by sliding resistance along the bottoms of the wall footings. We recommend assuming a passive pressure equal to 400 pcf and a sliding coefficient equal to 0.4. These values are un-factored.

D.5. Pavements

D.5.a. Subgrade Proof-Roll

Prior to placing aggregate base material, we recommend proof-rolling pavement subgrades to determine if the subgrade materials are loose; needing additional compaction. A second proof-roll should be performed after the aggregate base material is in place, and prior to placing pavement.

D.5.b. Design Sections

Laboratory tests to determine a CBR value for pavement design were not included in the scope of this project. Typical values range from 10 to 25. Based on the composition of the sand, we estimate a value of 15 would be appropriate.

Based upon the aforementioned traffic loads and a CBR value of 15, we recommend a pavement section that includes 3 inches of bituminous pavement (a 1 ½ -inch surface course over a 1 ½ -inch base course) over 6 inches of aggregate base material.

The above pavement designs are based upon a 20-year performance life. This is the amount of time before major reconstruction is anticipated. This performance life assumes maintenance, such as seal coating and crack sealing, is routinely performed. The actual pavement life will vary depending on variations in weather, traffic conditions and maintenance.

D.6. Utilities

D.6.a. Subgrade Stabilization

We anticipate that utilities can be installed per manufacturer bedding requirements. If the utility inverts lie within the organic soil layer, this material should be removed and be replaced with competent backfill.

D.6.b. Selection, Placement and Compaction of Backfill

We recommend selecting, placing and compacting utility backfill in accordance with the recommendations provided above in Section D.1.

D.7. Construction Quality Control

D.7.a. Excavation Observations

We recommend having a geotechnical engineer observe all excavations related to subgrade preparation and spread footing, slab-on-grade and pavement reconstruction. The purpose of the observations is to evaluate the competence of the geologic materials exposed in the excavations, and the adequacy of required excavation oversizing.

D.7.b. Materials Testing

We recommend density tests be taken in excavation backfill and additional required fill placed below spread footings, slab-on-grade construction, beside foundation walls behind basement walls, and below pavements.

We recommend at least one density tests for every 100 cubic yards of fill placed beneath the building with at least one test for every 2 feet of fill placed. In pavement areas, we recommend at least one density tests for every 200 cubic yards of fill placed beneath the building with at least one test for every 2 feet of fill placed.

D.7.c. Cold Weather Precautions

If site grading and construction is anticipated during cold weather, all snow and ice should be removed from cut and fill areas prior to additional grading. No fill should be placed on frozen subgrades. No frozen soils should be used as fill.

Concrete delivered to the site should meet the temperature requirements of ASTM International Standard Specification C 94. Concrete should not be placed on frozen subgrades. Concrete should be protected from freezing until the necessary strength is attained. Frost should not be permitted to penetrate below footings.

E. Procedures

E.1. Penetration Test Borings

The penetration test borings were drilled with a truck-mounted core and auger drill equipped with hollow-stem auger. The borings were performed in accordance with ASTM International Standard Test Method D 1586. Penetration test samples were taken at 2 ½- or 5-foot intervals. Actual sample intervals and corresponding depths are shown on the boring logs.

E.2. Material Classification and Testing

E.2.a. Visual and Manual Classification

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

E.3. Groundwater Measurements

The drillers checked for groundwater as the penetration test borings were advanced, and again after auger withdrawal. The boreholes were then backfilled or allowed to remain open for an extended period of observation as noted on the boring logs.

F. Qualifications

F.1. Variations in Subsurface Conditions

F.1.a. Material Strata

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

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

F.1.b. Groundwater Levels

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

F.2. Continuity of Professional Responsibility

F.2.a. Plan Review

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

F.2.b. Construction Observations and Testing

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

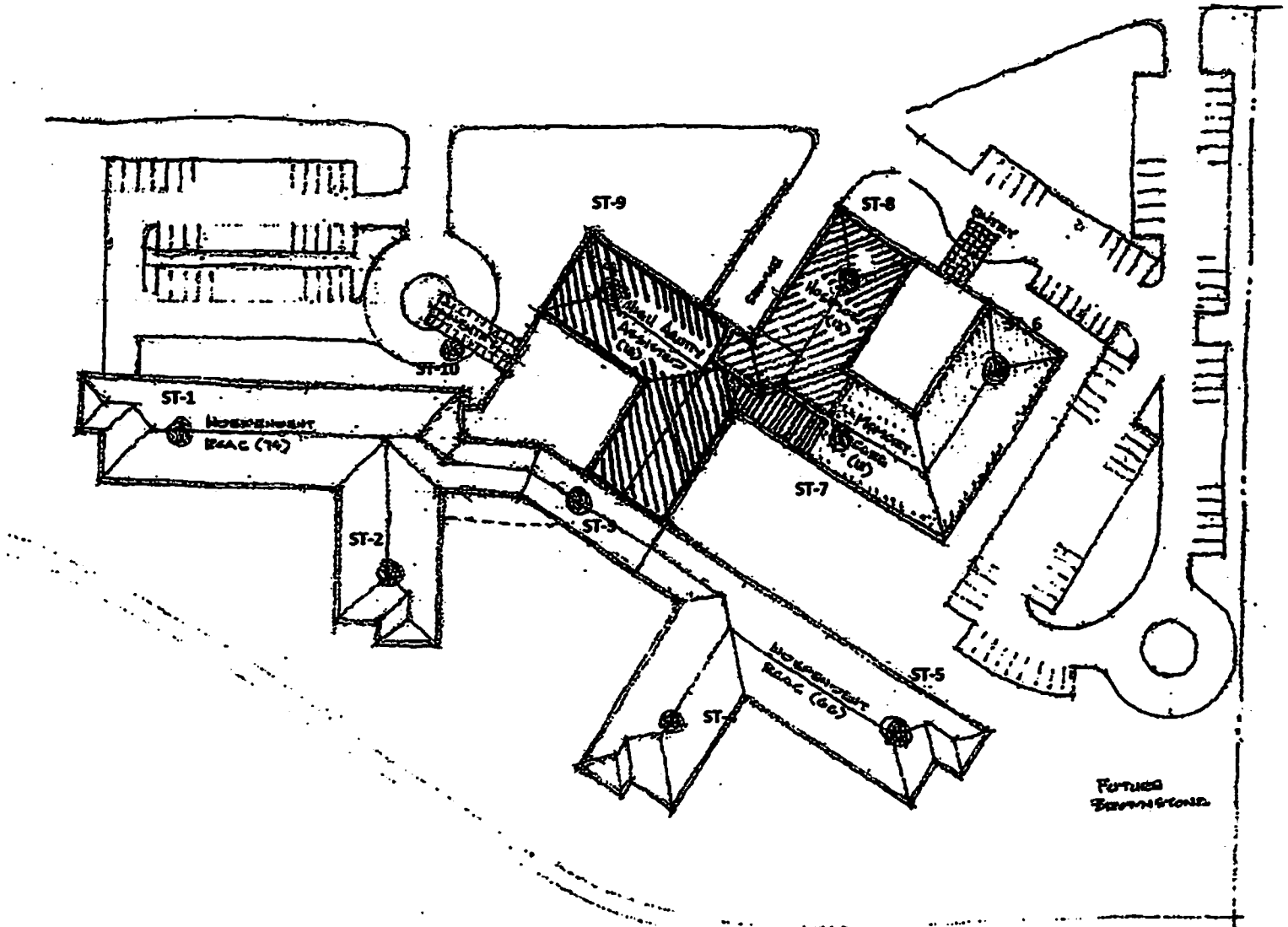
F.3. Use of Report

This report is for the exclusive use of Bethany Lutheran Homes and their consultants. Without written approval, we assume no responsibility to other parties regarding this report. Our evaluation, analyses and recommendations may not be appropriate for other parties or projects.

F.4. Standard of Care

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

Appendix



Bethany Lutheran Senior Community, Lac Crosse, Wisconsin LC-11-03498

BRAUN INTERTEC

Descriptive Terminology of Soil

Standard D 2487 - 00
Classification of Soils for Engineering Purposes (Unified Soil Classification System)

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

a Based on the material passing the 3-in (75mm) sieve
b If field sample contained cobbles or boulders, or both, add "with cobbles or boulders or both" to group name
c $C_u = D_{60}/D_{10}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
d If soil contains ≥15% sand, add "with sand" to group name
e 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
f If fines classify as CL-ML, use dual symbol GC-GM or SC-SM
g If fines are organic, add "with organic fines" to group name
h If soil contains ≥ 15% gravel, add "with gravel" to group name
i 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
j If Atterberg limits plot in hatched area, soil is a CL-ML silty clay
k If soil contains 10 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
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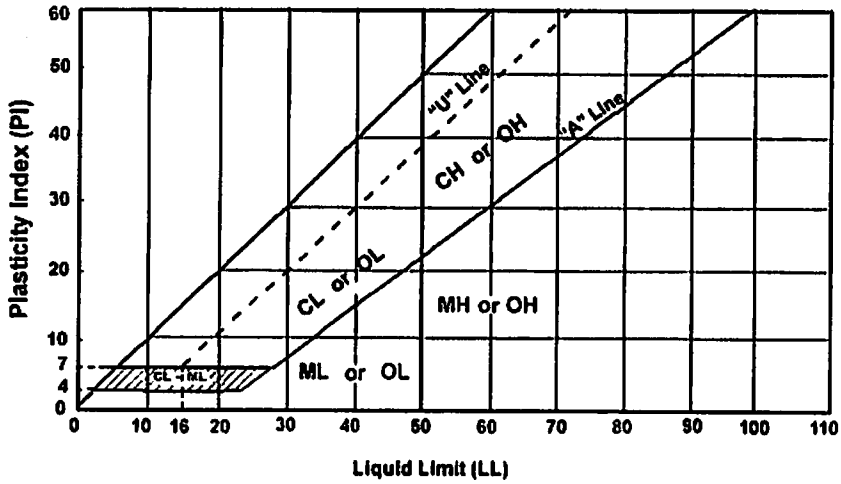

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Drilling Notes

Standard penetration test borings were advanced by 3 1/4" or 6 1/4" ID hollow-stem augers unless noted otherwise. Jetting water was used to clean out auger prior to sampling only where indicated on logs. Standard penetration test borings are designated by the prefix "ST" (Split Tube). All samples were taken with the standard 2" OD split-tube sampler, except where noted.

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

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

BPF: Numbers indicate blows per foot recorded in standard penetration test, also known as "N" value. The sampler was set 6" into undisturbed soil below the hollow-stem auger. Driving resistances were then counted for second and third 6" increments and added to get BPF. Where they differed significantly, they are reported in the following form: 2/12 for the second and third 6" increments, respectively.

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

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

TW indicates thin-walled (undisturbed) tube sample.

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

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LOG OF BORING

Braun Project LC-11-03498
Geotechnical Evaluation
Bethany Lutheran
7th Street S and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-1**

LOCATION: See attached sketch.

DRILLER: D. Bailey | METHOD: 3 1/4" HSA, Autohammer | DATE: 7/12/11 | SCALE: 1" = 5'

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil- ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
144.5	0.0	FILL	FILL: Poorly Graded Sand with Silt, fine-grained, with a trace of roots, brown, moist.					
142.5	2.0	FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist.	17				
				10				
				6		4	0	
				10				
132.5	12.0	FILL	FILL: Poorly Graded Sand, medium-grained, brown, wet to waterbearing.	16				
				19	▽			An open triangle in the water level (WL) column indicates the depth at which groundwater was observed while drilling. Groundwater levels fluctuate.
127.5	17.0	OL	ORGANIC CLAY, black, wet. (Swamp Deposit)	12				
126.5	18.0	SP-SM	POORLY GRADED SAND with SILT, fine-grained, dark gray, waterbearing, medium dense. (Alluvium)	9				
125.5	19.0	SP	POORLY GRADED SAND, fine- to medium-grained, with a trace of Gravel, gray, waterbearing, loose to medium dense. (Alluvium)	7				
				6				
108.5	36.0			13				* Boring then grouted.
			END OF BORING. Water observed at 15 feet while drilling. Water not observed to cave-in depth of 10 feet immediately after withdrawal of auger. *					

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LOG OF BORING

Braun Project LC-11-03498
Geotechnical Evaluation
Bethany Lutheran
7th Street S and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-2**

LOCATION: See attached sketch.

DRILLER: D. Bailey | METHOD: 3 1/4" HSA, Autohammer | DATE: 7/12/11 | SCALE: 1" = 5'

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil- ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
145.7	0.0	FILL	FILL: Poorly Graded Sand, fine-grained, with a trace of roots, brown, moist.				
143.7	2.0	FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist.	12			
				13			
				11			
133.7	12.0			13			
		FILL	FILL: Poorly Graded Sand, medium-grained, brown, wet.	9	▽		
128.7	17.0			4			
126.7	19.0	OL	ORGANIC CLAY, dark gray, wet. (Swamp Deposit)	7		62	
		SP	POORLY GRADED SAND, fine-grained, dark gray, waterbearing, medium dense to loose. (Alluvium)	15			
				6			
117.7	28.0	SP	POORLY GRADED SAND, fine- to medium-grained, gray, waterbearing, loose. (Alluvium)	6			
109.7	36.0			7			* Boring then grouted.
			END OF BORING. Water observed at 15 feet while drilling. Water not observed to cave-in depth of 13 feet immediately after withdrawal of auger.*				

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LOG OF BORING

Braun Project LC-11-03498
Geotechnical Evaluation
Bethany Lutheran
7th Street S and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-3**

LOCATION: See attached sketch.

DRILLER: D. Bailey | METHOD: 3 1/4" HSA, Autohammer | DATE: 7/12/11 | SCALE: 1" = 5'

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil- ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
146.6	0.0					
146.1	0.5	FILL	FILL: Poorly Graded Sand with Silt, fine-grained, with a trace of roots, brown, moist.			
		FILL	FILL: Poorly Graded Sand, fine- to medium-grained, light brown, moist to waterbearing.	10		
				14		
				10		
				15		
				16	▽	
				11		
				6		
126.6	20.0					
125.6	21.0	OL	ORGANIC CLAY, black, wet. (Swamp Deposit)	3		
		SP	POORLY GRADED SAND, fine- to medium-grained, gray, waterbearing, loose. (Alluvium)			
				7		
				7		
110.6	36.0			8		* Boring then grouted.
			END OF BORING.			
			Water observed at 14 feet while drilling.			
			Water not observed to cave-in depth of 10 feet immediately after withdrawal of auger.*			

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Braun Project LC-11-03498
Geotechnical Evaluation
Bethany Lutheran
7th Street S and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-4**

LOCATION: See attached sketch.

DRILLER: D. Bailey | METHOD: 3 1/4" HSA, Autohammer | DATE: 7/12/11 | SCALE: 1" = 5'

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil- ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	P200 %	Tests or Notes
146.8	0.0	FILL	FILL: Poorly Graded Sand with Silt, fine-grained, with a trace of roots, brown, moist.					
144.8	2.0	FILL	FILL: Poorly Graded Sand, fine-grained, ~organics at 15 feet, light brown, moist.	13				
				12				
				12				
				9		6	1	
				18				
				15	▽			
129.8	17.0							
128.8	18.0	OL	ORGANIC CLAY, black, wet. (Swamp Deposit)	7				
		SP	POORLY GRADED SAND, fine- to medium-grained, gray, waterbearing, loose to medium dense. (Alluvium)	10				
				11				
				8				
110.8	36.0			9				* Boring then grouted.
			END OF BORING.					
			Water observed at 16 1/2 feet while drilling.					
			Water not observed to cave-in depth of 14 feet immediately after withdrawal of auger.*					

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LOG OF BORING

Braun Project LC-11-03498
Geotechnical Evaluation
Bethany Lutheran
7th Street S and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-5**

LOCATION: See attached sketch.

DRILLER: D. Bailey | METHOD: 3 1/4" HSA, Autohammer | DATE: 7/13/11 | SCALE: 1" = 5'

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil- ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
142.6	0.0	FILL	FILL: Poorly Graded Sand with Silt, fine-grained, with a trace of roots, brown, moist.			
140.6	2.0	FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to waterbearing.	15		
				20		
				11		
				8	▽	
				4		
				2		
125.6	17.0					
124.6	18.0	OL	ORGANIC CLAY, dark gray, wet. (Swamp Deposit)	4		
		SP	POORLY GRADED SAND, fine- to medium-grained, gray, waterbearing, medium dense to loose. (Alluvium)	13		
				6		
				5		
109.6	33.0	SP	POORLY GRADED SAND, medium-grained, gray, waterbearing, loose. (Alluvium)			
106.6	36.0			10		* Boring then grouted.
			END OF BORING.			
			Water observed at 11 feet while drilling.			
			Water not observed to cave-in depth of 10 1/2 feet immediately after withdrawal of auger.*			

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Braun Project LC-11-03498
Geotechnical Evaluation
Bethany Lutheran
7th Street S and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-6**

LOCATION: See attached sketch.

DRILLER: D. Bailey | METHOD: 3 1/4" HSA, Autohammer | DATE: 7/12/11 | SCALE: 1" = 5'

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil- ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
142.8	0.0	FILL	FILL: Poorly Graded Sand with Silt, fine-grained, with a trace of roots, brown, moist.			
140.8	2.0	FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to waterbearing.	10		
				12		
				15		
				13	▽	
				4		
				8		
125.8	17.0					
124.8	18.0	OL	ORGANIC CLAY, black, wet. (Swamp Deposit)	4		
		SP	POORLY GRADED SAND, fine-grained, gray, waterbearing, loose to medium dense. (Alluvium)	6		
				7		
				10		
106.8	36.0			13		* Boring then grouted.
			END OF BORING. Water observed at 10 1/2 feet while drilling. Water not observed to cave-in depth of 8 feet immediately after withdrawal of auger.*			

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Braun Project LC-11-03498
Geotechnical Evaluation
Bethany Lutheran
7th Street S and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-7**

LOCATION: See attached sketch.

DRILLER: D. Bailey | METHOD: 3 1/4" HSA, Autohammer | DATE: 7/13/11 | SCALE: 1" = 5'

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil- ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
146.6	0.0					
146.1	0.5	FILL	FILL: Poorly Graded Sand with Silt, fine-grained, with a trace of roots, brown, moist.			
		FILL	FILL: Poorly Graded Sand, fine- to medium-grained, light brown, moist to waterbearing.	17		
				18		
				13		
				13		
				11		
				10	▽	
				6		
126.6	20.0	OL	ORGANIC CLAY, black, wet. (Swamp Deposit)	3		
124.6	22.0	SP	POORLY GRADED SAND, fine- to medium-grained, gray, waterbearing, medium dense to loose. (Alluvium)	17		
				6		
110.6	36.0			7		* Boring then grouted.
			END OF BORING.			
			Water observed at 16 feet while drilling.			
			Water not observed to cave-in depth of 12 1/2 feet immediately after withdrawal of auger.*			

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LOG OF BORING

Braun Project LC-11-03498
Geotechnical Evaluation
Bethany Lutheran
7th Street S and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-8**

LOCATION: See attached sketch.

DRILLER: D. Bailey | METHOD: 3 1/4" HSA, Autohammer | DATE: 7/13/11 | SCALE: 1" = 5'

Elev. feet	Depth feet	Symbol	Description of Materials (Soil- ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	Tests or Notes
145.0	0.0					
144.0	1.0	FILL	FILL: Compost, organic, black, moist.			
		FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to waterbearing.	13		
				12		
				14		
				11	▽	
				4		
				7		
128.0	17.0					
127.0	18.0	OL	ORGANIC CLAY, black, wet. (Swamp Deposit)	5		
		SP	POORLY GRADED SAND, fine- to medium-grained, gray, waterbearing, medium dense loose. (Alluvium)	11		
				8		
				8		
109.0	36.0			11		* Boring then grouted.
			END OF BORING.			
			Water observed at 11 1/2 feet while drilling.			
			Water not observed to cave-in depth of 7 1/2 feet immediately after withdrawal of auger.*			

(See Descriptive Terminology sheet for explanation of abbreviations)

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Braun Project LC-11-03498
Geotechnical Evaluation
Bethany Lutheran
7th Street S and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-9**

LOCATION: See attached sketch.

DRILLER: D. Bailey | METHOD: 3 1/4" HSA, Autohammer | DATE: 7/13/11 | SCALE: 1" = 5'

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil- ASTM D2488 or D2487, Rock-USACE EM1110-1-2808)	BPF	WL	Tests or Notes
147.7	0.0					
146.7	1.0	FILL	FILL: Poorly Graded Sand with Silt, fine-grained, with a trace of roots, brown, moist.			
		FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to waterbearing.	13		
				12		
				10		
				10		
				17		
				18	▽	
130.7	17.0	SP	POORLY GRADED SAND, medium-grained, brown, waterbearing.	5		
126.7	21.0	SP	POORLY GRADED SAND, fine-grained, gray, waterbearing, loose. (Alluvium)	6		
				6		
				9		
				5		
111.7	36.0			7		* Boring then grouted.
			END OF BORING.			
			Water observed at 16 feet while drilling.			
			Water not observed to cave-in depth of 15 1/2 feet immediately after withdrawal of auger.*			

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LOG OF BORING

Braun Project LC-11-03498
Geotechnical Evaluation
Bethany Lutheran
7th Street S and Bennora Lee Court
La Crosse, Wisconsin

BORING: **ST-10**

LOCATION: See attached sketch.

DRILLER: D. Bailey | METHOD: 3 1/4" HSA, Autohammer | DATE: 7/13/11 | SCALE: 1" = 5'

(See Descriptive Terminology sheet for explanation of abbreviations)

Elev. feet	Depth feet	Symbol	Description of Materials (Soil- ASTM D2488 or D2487, Rock-USACE EM1110-1-2908)	BPF	WL	MC %	Tests or Notes
146.7	0.0	FILL	FILL: Poorly Graded Sand, fine-grained, with a trace of roots, brown, moist.				
144.7	2.0	FILL	FILL: Poorly Graded Sand, fine-grained, light brown, moist to 17 feet then waterbearing.	15			
				10			
				12			
				11			
				13			
				19	▽		
				11			
127.7	19.0	OL	ORGANIC CLAY, dark gray, wet. (Swamp Deposit)	4		36	
125.7	21.0	SP	POORLY GRADED SAND, fine- to medium-grained, gray, waterbearing, loose. (Alluvium)	7			
				6			
110.7	36.0			7			* Boring then grouted.
			END OF BORING. Water observed at 16 feet while drilling. Water not observed to cave-in depth of 13 1/2 feet immediately after withdrawal of auger. *				

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