ALLEY·POYNER
MACCHIETTO
ARCHITECTURE

ADDENDUM #2

Lincoln Regional Center Building #10 Kitchen
APMA Project #12166
31 May 2013

801 West Prospector Place & Folsom

This addendum is issued by the Owner to all known bidders prior to receipt of Proposal. Bidders shall acknowledge receipt of this Addendum by so indicating on the Proposal Form. All information and instruction given herein shall become a part of the Contract Documents.

This addendum contains the following information:

Addendum #2		02 Sheet
Structural SDS-001	(8.5x11)	01 Sheet
Structural SDS-002	(8.5x11)	01 Sheet
Structural SDS-003	(8.5x11)	01 Sheet
Mechanical Addendum	(vary)	3 Sheet(s)
Section 31 2100 Building Earthwork	(8.5x11)	08 Sheet
Geotechnical Report	(8.5x11)	20 Sheet(s)
	Total	**36 sheets**

If this addendum appears incomplete, notify the architect immediately.

PROJECT MANUAL

1. Section 07 8100 & 07 8413
    a. STI Products is an approved Mfr. for substitution
2. Add Section 31 2100 building earthwork

PROJECT DRAWINGS

Sheet S1.0

Within Note '2' of the General Structural Notes, the Allowable Soil Bearing for Design should be '2000 psf' in place of '1500 psf.'

Under 'Existing Work' add Note '4', "Over-cutting of new openings into existing wall is is not permitted."

Sheet S1.2

On the Framing Plan at the new area well, section cut '3/S1-0' should be '2C/S1-0.'

Within Mark 'D' of the Construction Notes, "See 9/S3.1" should read "See 10/S3.1."

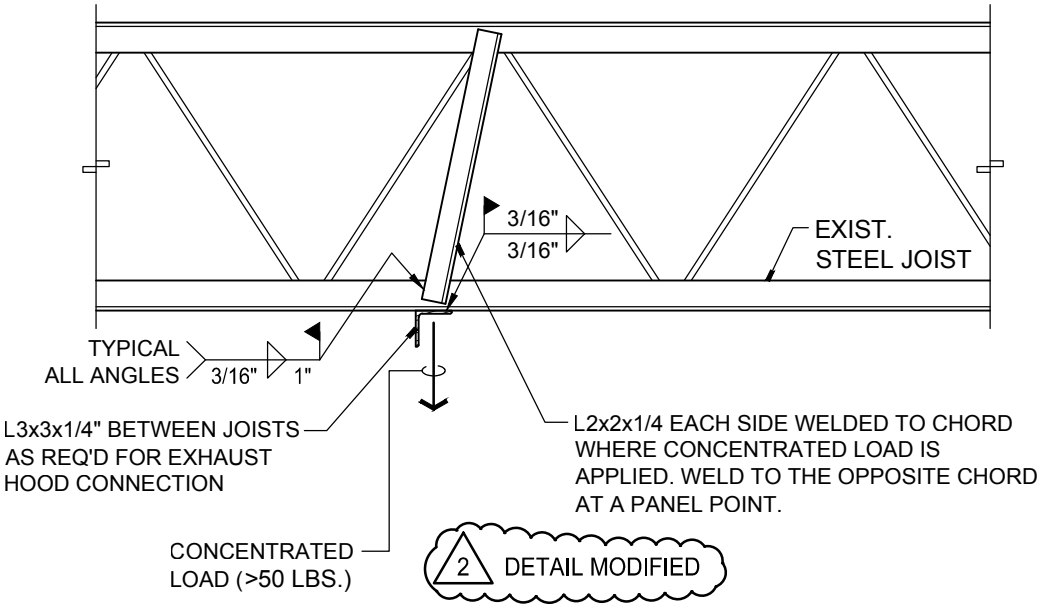
Within Mark 'E' of the Construction Notes, "See 8/S3.1" should read "See 9/S3.1."

Sheet S3.1

On Detail '3' (Beam to Wall Connection), the steel plate underneath the column and above the concrete wall should be a 8" x 8" x 1/2" steel plate.

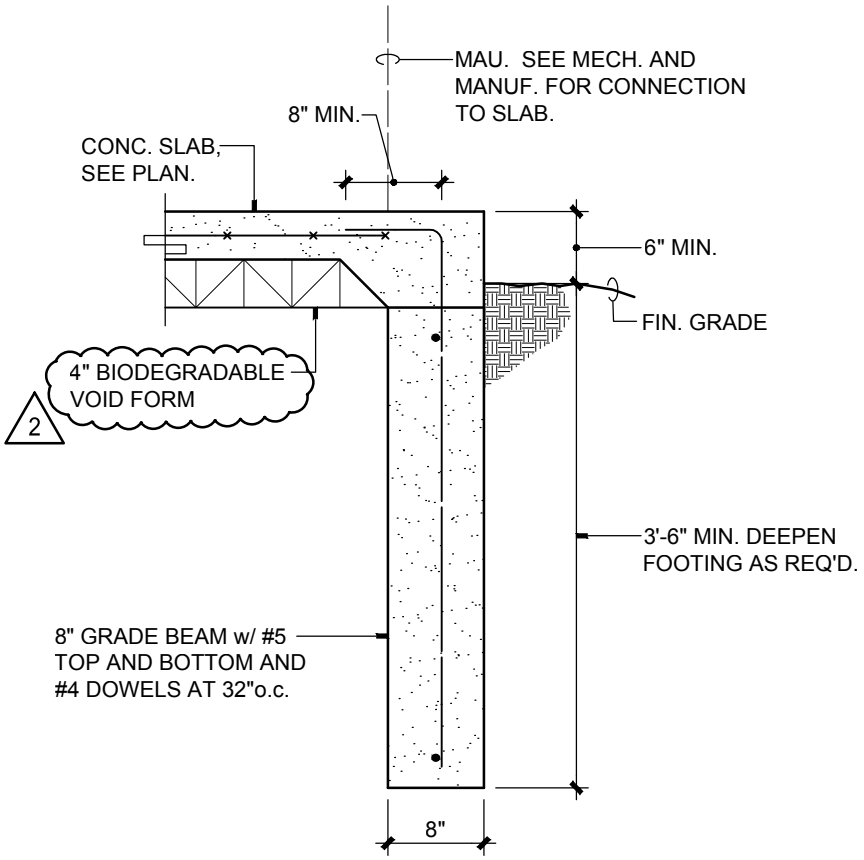
On Detail '5' (Edge Beam Connection), "See 10/S3.1 for connection information" should read "See 11/S3.1 for connection information."

End of Addendum #2



10 JOIST REINFORCING DETAIL

NO SCALE



12 FOUNDATION DETAIL

3/4" = 1'-0"

TD2 engineering & surveying
thompson, dreessen & dorner, inc.
10836 Old Mill Rd
Omaha, NE 68154
p.402.330.8860 www.td2co.com

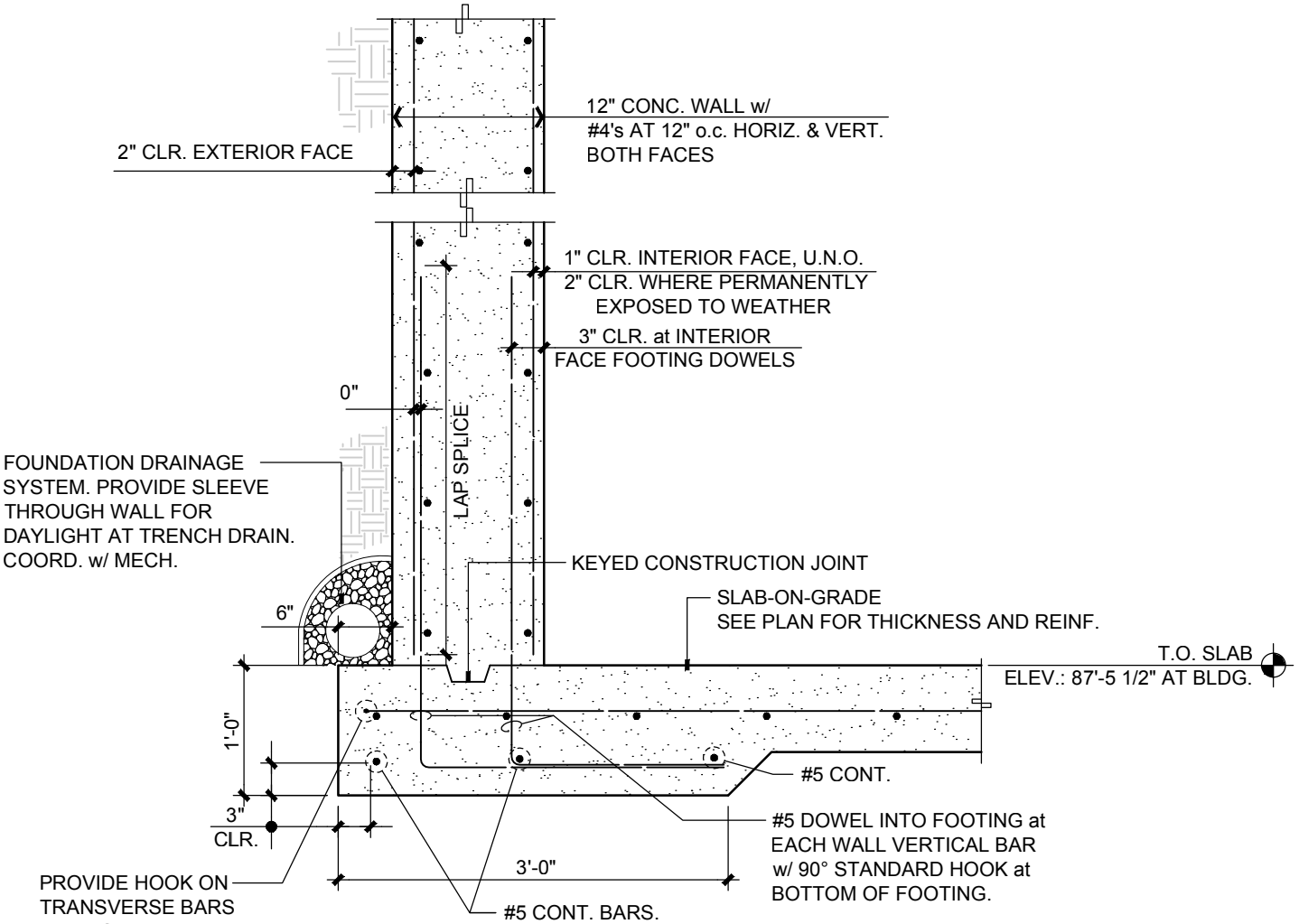
Job Number: 748-406

Addendum:	Addendum #2
Date:	05-31-13
Drawn By:	CGK
Sheet:	S3.1

LRC Building #10 Kitchen

Structural Details

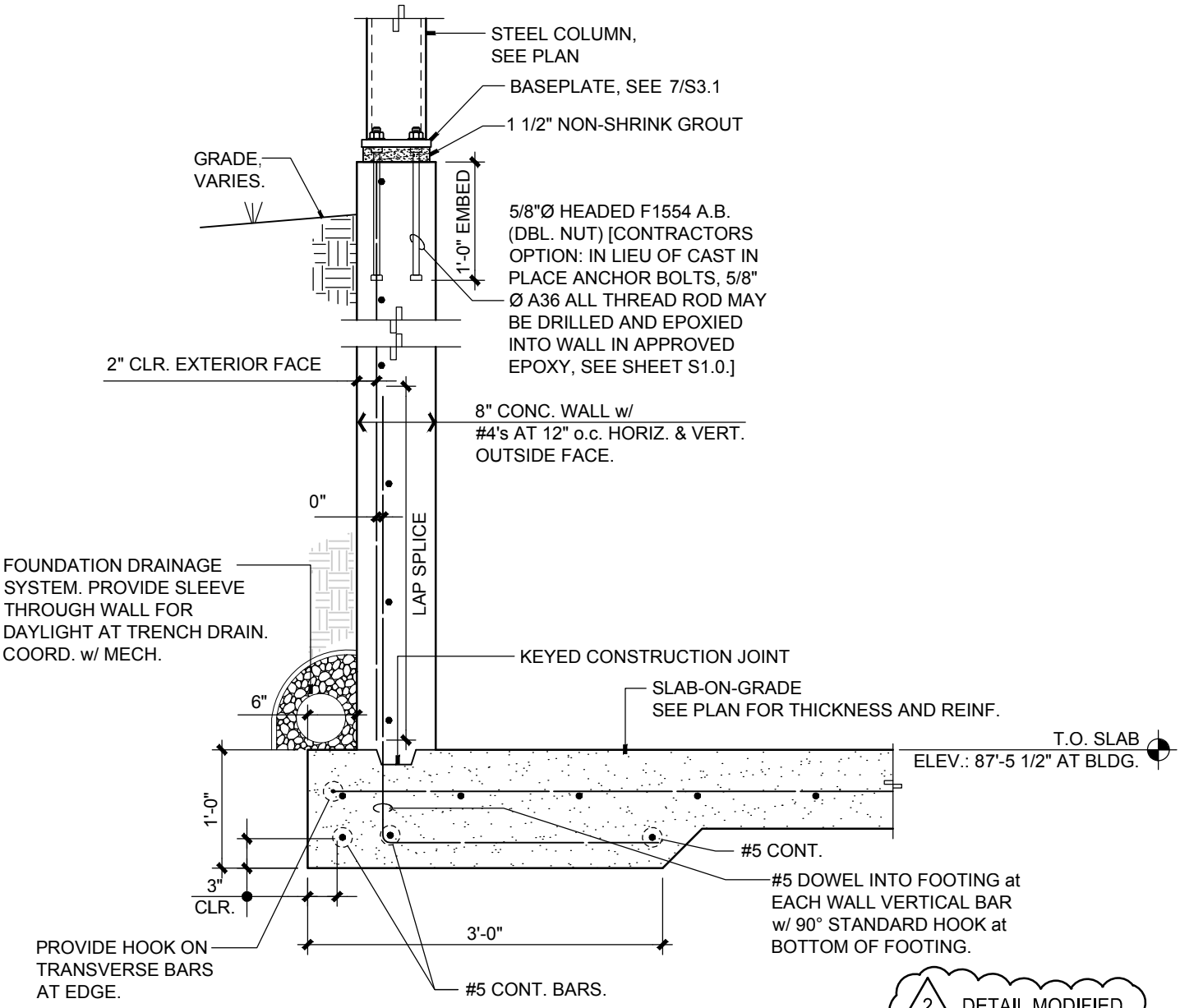
SDS-001



2 DETAIL MODIFIED

3 FOOTING AT CONCRETE WALL

3/4" = 1'-0"



4 FOOTING AT CONCRETE WALL

3/4" = 1'-0"

TD2 engineering & surveying
Job Number: 748-406
thompson, dreessen & dorner, inc.
10836 Old Mill Rd
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Addendum:	Addendum #2
Date:	05-31-13
Drawn By:	CGK
Sheet:	S3.2

LRC Building #10 Kitchen

Structural Details

SDS-003

Addendum 2

SPECIALIZED ENGINEERING SOLUTIONS

Date: 05/31/13

Project Name: Lincoln Regional Center Building 10 Kitchen **Project #:** 12205

Electrical Drawing Items:

ED1. The following sheet is reissued in its entirety:

A. Sheet E3.3 – Electrical Schedules and Details

ED2. Sheet E2.1 – Power Plan

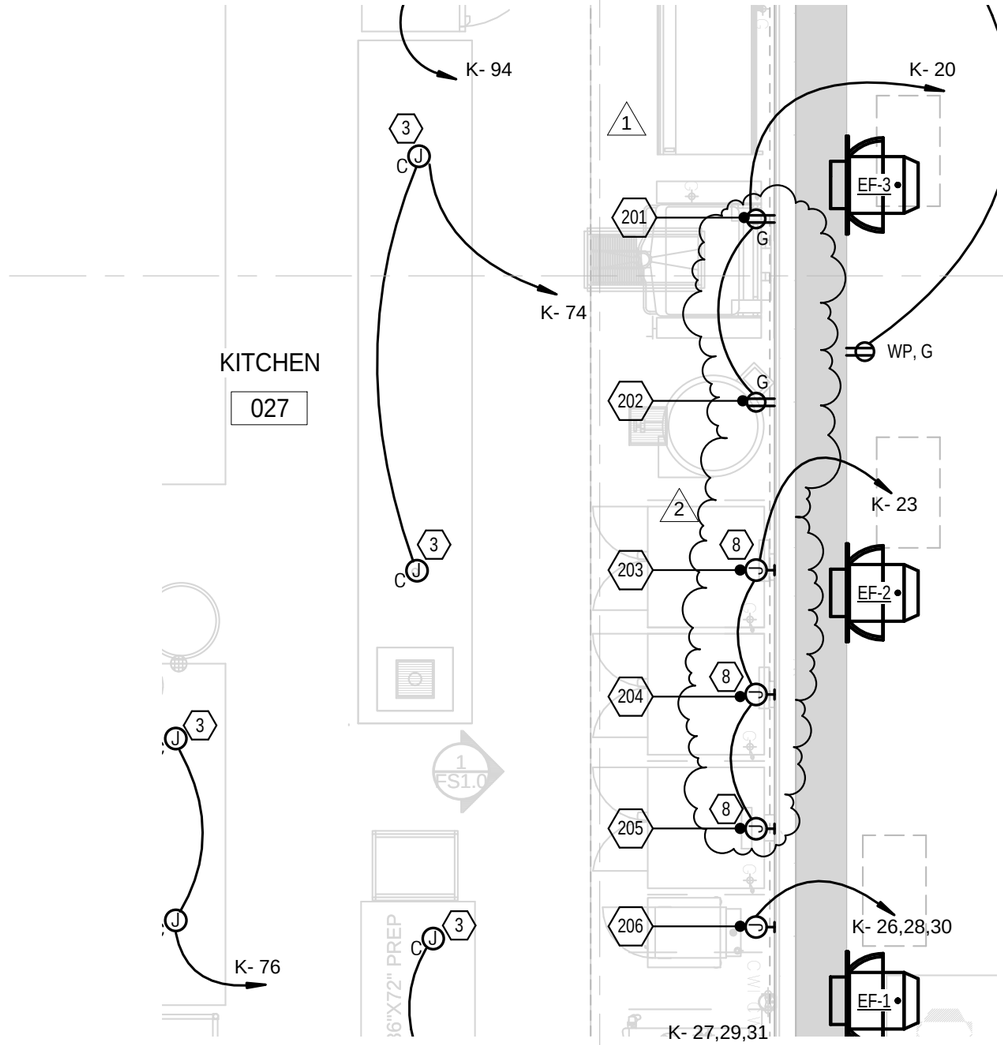
A. Refer to Sketch Sheet ESK-001 for added note and circuit changes.

Submitted By: Brad Carne

10360 Ellison Circle
Omaha, Nebraska 68134
Phone: (402) 991.5520

www.specializedeng.com

333 East 2nd Street, Suite 16
Ogallala, Nebraska 69153
Phone: (308) 284.7323



SHEET NOTES

8 PROVIDE REMOTE GFI PROTECTION OF DEVICE. 2

1 POWER PLAN

ESK-001 SCALE: 1/4" = 1'-0"

LRC BUILDING #10 KITCHEN

SKETCH ESK-001

DRAWING REF. E2.1

TYPE Addensum #2

DATE 05-31-2013

PROJECT NO. 12166

SPECIALIZED ENGINEERING SOLUTIONS
10360 Ellison Circle
Omaha, NE 68134
Phone: 402.991.5520
www.specializedeng.com

Lighting Panel: K

Location: MECH 019 | **Volts:** 120/208 Wye | **Rating:** 600 A
Supply From: | **Phases:** 3 | **Mains Type:** MCB
Branch: Normal | **Wires:** 4 | **Panel Poles:** 126
Mounting: Surface | **Available SCC (kA):** 16000 | **Sections:** 3

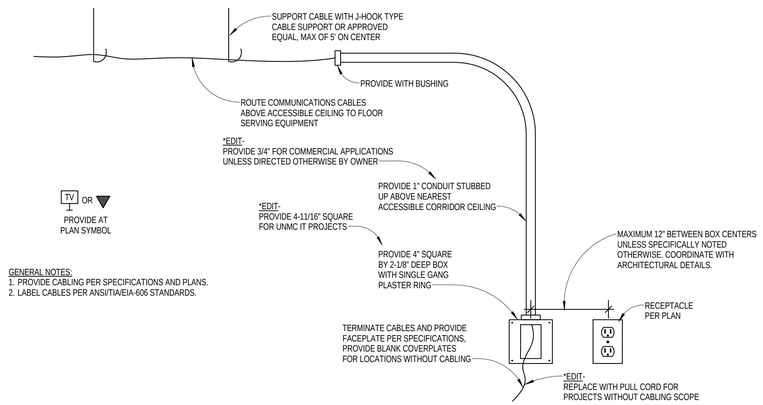
Ckt	Circuit Description	Opt	Trip	Poles	A	B	C	Poles	Trip	Opt	Circuit Description	Ckt
1	Power - Convenience Mech 019	G	20 A	1	540 VA	1980 VA		1	20 A		Power - Convenience Room 020,...	2
3	Power - Convenience Room 020,...		20 A	1			1440 VA	1080 VA			Power - Convenience Room 017,...	4
5	Power - Convenience Room 029,...	G	20 A	1			1080 VA	1404 VA				6
7	Power Cooler 031	G	20 A	1	492 VA	1404 VA		3	15 A		Power	8
9	Lighting Receiving 028	G	20 A	1			684 VA	1404 VA				10
11												12
13	Power		20 A	3	1944 VA	905 VA		2	20 A		Power Freezer 032	14
15							1944 VA	408 VA				16
17	Lighting Cook 027	G	20 A	1					968 VA	984 VA	1	20 A	G	Power Prep 025	18
19	Power Prep 025	G	20 A	1	1440 VA	360 VA					1	20 A	S	Power Cook 027	20
21	Power Prep 025	G	20 A	1			2000 VA	0 VA			--	--	--	Shunt Trip Space	22
23	Power Cook 027	S	20 A	1					360 VA	275 VA	1	20 A	G	Lighting Entry 017	24
25	Shunt Trip Space	--	--	--	0 VA	3480 VA									26
27							5316 VA	3480 VA			3	50 A	S	Power Cook 027	28
29	Power Cook 027	S	60 A	3					5316 VA	3480 VA					30
31					5316 VA	0 VA					--	--	--	Shunt Trip Space	32
33	Shunt Trip Scape	--	--	--			0 VA	1224 VA			1	20 A	G	Power Cook 027	34
35									672 VA	1032 VA	1	20 A	G	Power Prep 025	36
37	Power Cook 027		20 A	3	672 VA	984 VA					1	20 A	G	Power Prep 025	38
39							672 VA	1440 VA			1	20 A	G	Power Prep 025	40
41	Power Prep 025	G	20 A	1					1200 VA	600 VA	1	20 A	G	Power Prep 025	42
43	Power Wash 030	G	20 A	1	600 VA	14640 VA									44
45							1800 VA	14640 VA			3	175 A	1	Booster Heater	46
47	Power Dry Storage 029		20 A	3					1800 VA	14640 VA					48
49					1800 VA	396 VA									50
51							1692 VA	396 VA			3	20 A		Power Wash 030	52
53	Power Receiving 028		20 A	3					1692 VA	396 VA					54
55					1692 VA	1692 VA									56
57							2004 VA	1692 VA			3	30 A		Other	58
59	Other Mech 019		20 A	3					2004 VA	1692 VA					60
61					2004 VA	364 VA					1	20 A	G	Lighting	62
63							2568 VA	2568 VA							64
65	Other		30 A	3					2568 VA	2568 VA	3	30 A		Other	66
67					2568 VA	2568 VA									68
69	Power	G	20 A	1			300 VA	8000 VA			1	20 A		Power Staff 018	70
71									288 VA	180 VA	1	20 A		Power Receiving 028	72
73	Hvac		20 A	3	288 VA	360 VA					1	20 A		Power Cook 027	74
75							288 VA	360 VA			1	20 A		Power Cook 027	76
77	Power Cook 027		20 A	1					540 VA	216 VA	2	20 A		Other Receiving 028	78
79	Other Cust 026		20 A	1	192 VA	216 VA									80
81	Hvac		20 A	1			120 VA	1716 VA			2	20 A		Other	82
83									792 VA	1716 VA					84
85	Hvac		20 A	3	792 VA	792 VA									86
87							792 VA	792 VA			3	20 A		Hvac	88
89	Hvac		15 A	2					0 VA	792 VA					90
91					0 VA	2000 VA					1	20 A	G	Power Cook 027	92
93	Lighting Mech 019	G	20 A	1			598 VA	1440 VA			1	20 A	G	Power Cook 027	94
95	Power Prep 025	G	20 A	1					1440 VA	0 VA	1	20 A	--	Spare	96
97	Spare	--	20 A	1	0 VA	0 VA					1	20 A	--	Spare	98
99	Spare	--	20 A	1			0 VA	0 VA			1	20 A	--	Spare	100
101	Spare	--	20 A	1					0 VA	0 VA	1	20 A	--	Spare	102
103	Spare	--	20 A	1	0 VA	0 VA					1	20 A	--	Spare	104
105	Spare	--	20 A	1			0 VA	0 VA			1	20 A	--	Spare	106
107	Spare	--	20 A	1					0 VA	0 VA	1	20 A	--	Spare	108
109															110
111															112
113															114
115															116
117															118
119															120
121															122
123															124
125															126
			Total Load:		52481 VA		62858 VA		53544 VA						
			Total Amps:		437 A		525 A		448 A						

Lighting Panel Remarks:

1. Provide subfeed breakers:

General Lighting Panel Notes:

1. Panel AIC (Interrupting) Rating shall be minimum 120% of the available SCC (Short Circuit Current).
2. Circuit Breaker Options: 'S' or 'ST' - Provide Shunt Trip Circuit Breaker / 'G' or 'GFCI' - Provide GFCI Circuit Breaker / 'GFP' - Provide GFP Circuit Breaker.



GENERAL NOTES:
1. PROVIDE CABLING PER SPECIFICATIONS AND PLANS.
2. LABEL CABLES PER ANSI/TIA/EIA-606 STANDARDS.

1 Communications or CATV Outlet
E3.3 SCALE: NOT TO SCALE

Lighting Panel: BQA

Location: CUST 026 | **Volts:** 480/277 Wye | **Rating:** 30 A
Supply From: | **Phases:** 3 | **Mains Type:** MCB
Branch: Equipment | **Wires:** 4 | **Panel Poles:** 18
Mounting: Surface | **Available SCC (kA):** 10,000 | **Sections:** 1

Ckt	Circuit Description	Opt	Trip	Poles	A	B	C	Poles	Trip	Opt	Circuit Description	Ckt
1					552 VA	552 VA						2
3	Hvac		20 A	3			552 VA	552 VA			Hvac	4
5												6
7	BQB		20 A	2	100 VA	552 VA						8
9							0 VA	552 VA			Hvac	10
11												12
13												14
15												16
17												18
			Total Load:		1756 VA		1656 VA		1656 VA			
			Total Amps:		6 A		6 A		6 A			

Lighting Panel Remarks:

General Lighting Panel Notes:

1. Panel AIC (Interrupting) Rating shall be minimum 120% of the available SCC (Short Circuit Current).
2. Circuit Breaker Options: 'S' or 'ST' - Provide Shunt Trip Circuit Breaker / 'G' or 'GFCI' - Provide GFCI Circuit Breaker / 'GFP' - Provide GFP Circuit Breaker.

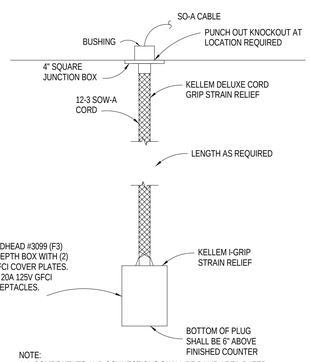
LIGHTING FIXTURE SCHEDULE

FIXTURE NO.	MANUFACTURER	SUBS	CATALOG NO. (NOTE A)	LAMP	VOLTS	INPUT WATTS	MOUNTING	DESCRIPTION	REMARKS
A1	LITHONIA	Y	2SP8 3 32 A12125 1/3 ADDE	3 - 32W T8	120 V	88 W	RECESSED	2'x4' LENSED TROFFER	
A2	LITHONIA	Y	2AL8 2 32	2 - 32W T8	120 V	46 W	RECESSED	2'x4' DIRECT/INDIRECT	
A3	LITHONIA	Y	DMW 232 120 GEB10IS MSI8	2 - 32W T8	120 V	48 W	SURFACE	1X4 WET LOCATION	
D1	GOTHAM	Y	EVO 35/14 6AR MVOLT	LED	120 V	25 W	RECESSED	6" DOWNLIGHT - 1400 LUMEN	
P1	RAB LIGHTING	Y	PLED78	LED	120 V	91 W	PENDANT	LED PENDANT	
S1	LITHONIA	Y	C232 MVOLT GEB10ISWGCUN NST	2-32W T8	120 V	46 W	CHAIN	STRIP LIGHT	
W1	TECH	Y	700BCLYNN-W-S-LED	LED	120 V	20 W	SURFACE	VANITY	
X1	LITHONIA	Y	LE S W 2 R 120/277	LED	120 V	30 W	UNIVERSAL	DOUBLE FACE EXIT	

KEY NOTES:
#. WALL MOUNTING - COORDINATE EXACT MOUNTING LOCATION WITH ARCHITECT AND ARCHITECTURAL DETAILS.
#. COVE - COORDINATE EXACT QUANTITIES WITH ARCHITECTURAL DETAILS TO PROVIDE CONTINUOUS ILLUMINATION FOR ENTIRE LENGTH OF COVE.
#. PENDANT/SUSPENSION MOUNTING - COORDINATE EXACT LOCATION, MOUNTING ELEVATION, AND REQUIRED PENDANT/SUSPENSION LENGTH WITH ARCHITECT AND ARCHITECTURAL DETAILS.
#. EXIT SIGNS - REFER TO ELECTRICAL PLANS FOR DIRECTION INDICATORS AND MOUNTING TYPE.
#. (HEIGHT) POLE MOUNT - PROVIDE (HEIGHT) (STEEL/ALUMINUM), (STRAIGHT/TAPERED), (ROUND/SQUARE) POLE WITH FINISH TO MATCH FIXTURE. PROVIDE (HEIGHT) POLE BASE PER DETAIL (#) ON SHEET (#).

GENERAL NOTES:
A. CATALOG NUMBER VERIFICATION - CONTRACTOR SHALL VERIFY LIGHTING FIXTURE INSTALLATION REQUIREMENTS AND CATALOG NUMBER PRIOR TO ORDERING.
B. SUBSTITUTIONS - WHERE INDICATED WITH 'N' (NO), NO SUBSTITUTIONS WILL BE ACCEPTED. WHERE INDICATED WITH 'P' (PRIOR APPROVAL), SUBSTITUTIONS MUST BE APPROVED PRIOR TO BID WITH ACCEPTANCE ISSUED BY ADDENDUM. WHERE INDICATED WITH 'Y' (YES), THE FOLLOWING MANUFACTURER'S ARE CONSIDERED ACCEPTABLE EQUIVALENT MANUFACTURER'S, PROVIDED THE EQUIVALENT FIXTURE IS OF THE SAME QUALITY, EFFICIENCY, PERFORMANCE AND CHARACTERISTICS AS THAT SCHEDULED:
   1. ACUITY BRANDS
   2. COOPER
   3. HUBBELL
   4. WILLIAMS

   SEE PROJECT SPECIFICATIONS FOR SPECIFIC MANUFACTURER/MODEL EQUIVALENCY OF COMMONLY USED LIGHTING FIXTURE TYPES. ABSENCE OF A SELECTION INDICATES THAT PRIOR APPROVALS ARE REQUIRED.
C. FIXTURE NUMBER SUFFIX 'M' (SEE PLANS) - PROVIDE FIXTURE WITH TWO BALLASTS AND CONNECT TO PROVIDE UNIFORM MULTI-LEVEL LIGHTING CONTROL.
D. FIXTURE NUMBER SUFFIX 'D' (SEE PLANS) - PROVIDE FIXTURE WITH DIMMING BALLAST (LINEAR FLUORESCENT - 1% DIM, COMPACT FLUORESCENT - 1% DIM). COORDINATE BALLAST AND DIMMER COMPATIBILITY.
E. FIXTURE NUMBER SUFFIX 'F' (SEE PLANS) - PROVIDE FIXTURE WITH GYPSUM BOARD FLANGE MOUNTING IN LIEU OF ACOUSTICAL GRID MOUNTING.
F. FIXTURE NUMBER SUFFIX 'B' (SEE PLANS) - PROVIDE FIXTURE WITH INTEGRAL 90 MINUTE BATTERY BALLAST WITH SELF-DIAGNOSTICS TO ILLUMINATE A MINIMUM OF ONE LAMP WITH A TOTAL OUTPUT OF 1400 LUMENS. CONNECT BATTERY SENSING SOURCE INPUT TO UNSWITCHED PORTION OF LOCAL LIGHTING BRANCH CIRCUIT. UNDER NORMAL OPERATION, FIXTURE SHALL BE CONTROLLED (ON/OFF) SIMILAR TO OTHER ROOM LIGHTING FIXTURES UNLESS NOTED FOR 24-HOUR ILLUMINATION.
G. DOWNLIGHT CEILING TRIM FINISH/COLOR SELECTION: PROVIDE DOWNLIGHT REFLECTOR FINISH/COLOR AS SPECIFIED IN THE LIGHTING FIXTURE SCHEDULE. SELECT CEILING TRIM FINISH/COLOR TO COORDINATE WITH CEILING TYPE. "WHITE" TRIM FOR DOWNLIGHTS MOUNTED IN WHITE ACOUSTICAL TILE CEILINGS. "CLEAR" (TO MATCH REFLECTOR FINISH/COLOR) FOR DOWNLIGHTS MOUNTED IN PAINTED GYPSUM BOARD CEILINGS.
H. ZONE OCCUPANCY SENSOR. INDICATED ZONE # (Z#) SHALL CONTROL CORRESPONDING LIGHTING ZONE INDICATED. (TYPICAL)
I. COVE – DRAWINGS PROVIDE GENERAL ILLUSTRATION OF COVE LAYOUT. COORDINATE EXACT UNIT LENGTHS AND QUANTITIES WITH ARCHITECTURAL DETAILS TO PROVIDE CONTINUOUS ILLUMINATION FOR ENTIRE LENGTH OF COVE. LED COVE LIGHTING FIXTURES SHALL BE INSTALLED END-TO-END (NO GAP BETWEEN FIXTURES) WITH A MAXIMUM 6" GAP AT COVE ENDS AND CORNERS. STAGGERED LINEAR FLUORESCENT COVE LIGHTING FIXTURES SHALL BE INSTALLED EVENLY SPACED (WHILE MAINTAINING LAMP OVERLAP) WITHOUT GAPS AT COVE ENDS AND CORNERS. SELECT UNIT LENGTHS AND QUANTITIES TO ACHIEVE THE ABOVE REQUIRED PERFORMANCE (SHORTER UNIT LENGTHS IN GREATER QUANTITIES MAY BE REQUIRED).
J. TRACK – PROVIDE SINGLE-CIRCUIT TRACK SYSTEM WITH ALL NECESSARY COMPONENTS FOR A COMPLETE INSTALLATION, INCLUDING, BUT NOT LIMITED TO: POWER FEEDS, STAND OFFS, CONNECTORS, END CAPS, AND TRANSFORMERS. TRACK AND ACCESSORY FINISH SHALL MATCH FINISH OF SPECIFIED TRACK HEAD. PROVIDE TRACK LENGTHS AND TRACK HEAD QUANTITIES PER PLANS. COORDINATE TRACK TYPE FOR COMPATIBILITY WITH SPECIFIED TRACK HEAD FIXTURE. PROVIDE REMOTE TRANSFORMER QUANTITIES AND SIZES TO ACCOMMODATE LOAD OF TRACK HEADS INDICATED. PROVIDE POWER FEEDS AND TRACK CONNECTORS AS NEEDED TO PROVIDE TRACK LENGTH INDICATED. MOUNT REMOTE TRANSFORMER ABOVE NEAREST ACCESSIBLE CEILING. COORDINATE LENGTH OF STANDOFFS AND POWER FEEDS AND EXACT SHAPE OF CURVED TRACKS WITH ARCHITECT.



NOTE:
ALL COMPONENTS AND CONNECTIONS SHALL BE DAMP AREA RATED.

3 Drop Cord
E3.3 SCALE: 1/8" = 1'-0"

DO NOT SCALE DRAWING. ALL DIMENSIONS AND CLEARANCES SHALL BE VERIFIED FROM APPROPRIATE SOURCES. ALL WORK SHALL BE COORDINATED PRIOR TO INSTALLATION. SEE SPECIFICATIONS.

SPECIALIZED ENGINEERING SOLUTIONS
10360 Ellison Circle
Omaha, NE 68134
Phone: 402.991.5520
www.specializedeng.com

SES PROJECT # 12205

INSTALL GREEN INSULATED GROUND WIRE WITH LIGHTING, RECEPTACLE AND EQUIPMENT BRANCH CIRCUITS.

INSTALL INDIVIDUAL (DEDICATED) NEUTRAL CONDUCTORS FOR EACH 120V OR 277V PHASE CONDUCTOR SERVED FROM A SINGLE POLE CIRCUIT BREAKER

LRC BUILDING #10 KITCHEN

ALLEY·POYNER MACCHIETTO ARCHITECTURE
1516 Cuming Street
Omaha, NE 68102
Ph: 402.341.1544
Fx: 402.341.4735
alleypoyner.com

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P (402) 330-8860 / F (402) 330-5866

STRUCTURAL ENGINEER
Thompson, Dreesen, & Dorner, Inc.
Old Mill Road
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P (402) 330-8860 / F (402) 330-5866

MECHANICAL ENGINEER
Specialized Engineering Solutions
10360 Ellison Circle
Omaha, NE 68134
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ELECTRICAL ENGINEER
Specialized Engineering Solutions
10360 Ellison Circle
Omaha, NE 68134
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FOOD SERVICE CONSULTANT
FOODLINES
209 South 9th St.
Lincoln, NE 68508
P (402) 475-1787 / F (402) 475-1800

PROFESSIONAL ELECTRICAL ENGINEER — TRAVIS J. THOMPSON — E-11315 — 05/15/2013 — STATE OF NEBRASKA

2	Addensum #2	05-31-2013
1	Addendum #1	05-29-2013
REVISION		DATE

PROJECT NUMBER: 12166

DATE: 05/15/2013

ELECTRICAL SCHEDULES AND DETAILS

E3.3

SECTION 312100 -BUILDING EARTHWORK

PART 1- GENERAL

1.1 RELATED DOCUMENTS: Drawings and General Provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections apply to this Section.

1.2 WORK INCLUDED: Provide all labor, materials, equipment, services, etc., necessary for and incidental to the completion of earthwork specified herein, or shown on the drawings, or necessary for completion of other work. Building Earthwork includes, but is not necessarily limited to all work within and 5'-0" from the building additions:

A. Topsoil removal.

B. Excavation.

C. Fill placement.

D. Excavation for foundation construction.

E. Backfill placement.

F. Rough grading.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Division 3 Section "Cast-in-Place Concrete"

1.4 REFERENCES

A. ANSI/ASTM D698 - Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures, Using 5.5 lb Rammer and 12 inch Drop.

B. ANSI/ASTM D1586-84 - Penetration Test and Split Barrel Sampling of Soil.

C. ANSI/ASTM D1587-83 - Thin Walled Tube Sampling of Soils.

D. ASTM D2488-84 - Description of Soils (Visual-Manual Procedure).

1.5 QUALITY ASSURANCE: Comply with all applicable and/or pertinent specifications, standards, laws, codes, regulations, and other requirements promulgated by any governmental subdivision or agency having jurisdiction as well as those imposed by the insurance carrier providing coverage for the project.

1.6 SUBSURFACE INVESTIGATIONS: Subsurface soils investigation reports have been completed for the owner by Terracon Consultants in 1998. The investigations were made for the purpose of providing information for design. A copy of the boring logs and investigation report may be examined at the office of the Owner. These documents are not part of the Contract Documents. They are made available only as information and without any warranty of actual conditions.

1.7 TESTING AND INSPECTION:

A. The "geotechnical engineer" referred to herein shall be Terracon Consultants Inc. or another qualified geotechnical engineer approved by the owner and architect.

B. All earthwork shall be tested and inspected by the geotechnical engineer. In general, the services of the geotechnical engineer shall include whatever may be necessary to determine that all earthwork meets the requirements of the contract documents, and to provide written reports covering tests made, inspection work completed, and conclusions concerning the acceptability of the work.

C. Testing and inspection services provided by the geotechnical engineer shall include, but is not necessarily limited to:

1. Evaluation and approval of all fill materials including any proposed off site materials.
2. Evaluation and approval of all methods and equipment used for earthwork.
3. Observation of excavated surfaces.
4. Inspect footing excavations.
5. Observation and testing of fill and backfill.
6. Evaluation and approval of completed work.
7. Recommendations for correction of unacceptable work.
8. Providing copies of all evaluations and approvals of material methods, and completed work, together with recommendations and daily inspection reports for the Architect's, Engineer's, and Owner's file.

D. Soil Density Tests. Inspection and frequent testing by the Soils Engineer shall be provided during compaction of fill and preparation of subgrade to insure proper moisture content and degree of compaction. The following minimum number of compaction and moisture tests, in accordance with appropriate ASTM procedures, shall be made, where directed, in the designated areas:

1. Filled Areas: Make at least one field density test of subgrade for every 1000 square feet of building area. In each compacted fill layer, make one field density test for every 500 square feet of fill area.
2. Foundation Wall and Utility Trench Backfill: Make at least one test for each 20 linear feet of wall per two feet of depth of backfill.
3. Test Failure: When fill or backfill does not meet the required compaction, remove, recompact and retest at no expense to the Owner.

E. The geotechnical engineer shall be present at all times when earthwork is underway. The Contractor shall provide sufficient notice prior to starting earthwork operations and provide access to the site for testing and inspection.

1.8 COST OF TESTING AND INSPECTION SERVICES: The cost of Testing and Inspection services shall be paid by the Owner.

1.9 PREBID CONSIDERATIONS: Prior to submitting his/her proposal, the Contractor shall make whatever on-site and off-site studies of surface and subsurface conditions he/she considers necessary to assure himself/herself that conditions are known to the degree he/she considers acceptable. Arrangements to make on-site studies (borings, test pits, etc.) before bids are submitted shall be made through the Architect. If the site is disturbed by such studies, appropriate repairs shall be made by the party making such studies.

1.10 LAYOUT OF THE WORK: The Contractor shall provide the services of a competent Civil Engineer or Land Surveyor to provide horizontal and vertical control of the limits of excavation and fill areas and shall be responsible for the correctness and accuracy of such work.

1.11 PROTECTION OF PERSONS AND PROPERTY

A. Barricade open excavations occurring as part of this work and post with warning lights.

1. Operate warning lights as recommended by authorities having jurisdiction.

B. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

C. Perform excavation within drip-line of large trees to remain by hand, and protect the root system from damage or dryout to the greatest extent possible. Maintain moist condition for root system and cover exposed roots with burlap. Paint root cuts of 1" diameter and larger with emulsified asphalt tree paint.

D. Protect excavations by shoring, bracing, sheet piling, or other methods, as required to prevent cave-ins or loose dirt from falling into excavations.

E. Notify Soils Engineer of unexpected sub-surface conditions and discontinue work in area until notification to resume work.

F. Protect bottom of excavations and soils around and beneath foundations from frost.

G. Grade around excavation to prevent surface water runoff into excavated area.

H. Repair damage.

1.12 PROTECTION OF EXISTING STRUCTURES

A. Perform earthwork requirements using appropriate methods and equipment as necessary to avoid damaging existing structures.

B. Heavy construction equipment should not be operated within 10 to 15 feet of any existing building.

C. Do not excavate beneath existing footings. Excavations shall not extend below a 1 horizontal to 1 vertical line from the edge of the existing footings.

PART 2 - PRODUCTS

2.1 FILL MATERIAL – GENERAL

A. All fill material shall be free from excessive moisture, frozen or perishable material, debris, sod or stones larger than 1 1/2 inches across.

B. All materials proposed for use as fill shall be evaluated and approved by the Geotechnical Engineer.

C. It is expected that most existing old fill will be acceptable for reuse as structural fill after conditioning. The man placed fills are expected to contain varying degrees of non-suitable material that must be excluded from re-use. The Contractor shall provide all additional fill material from off-site to complete the work.

2.2 FILL MATERIALS – PROPERTIES

A. All structural fill and backfill shall exhibit a liquid limit less than 43 and a plastic limit less than 23.

B. Granular fill under floor slabs shall be clean sand-gravel or clean crushed concrete with less than 5 percent passing the No. 200 U.S. Standard Sieve. Granular fill shall be free from clay, silt, loam, friable or soluble materials, and organic matter.

1. Granular fill and backfill which can provide an avenue for water reaching the bearing soils is not permitted within 10 feet of the structure.

C. Other Materials: All other materials not specifically described but required for proper completion of the work of this Section, shall be as selected by the Contractor subject to approval of the Architect/Engineer.

PART 3 - EXECUTION

3.1 PREPARATION AND LAYOUT

A. The Contractor will stake out the project work and shall erect and maintain batter boards at all corners, and shall establish an exterior benchmark.

B. Carefully preserve benchmarks and reference points; in case of their destruction, replace them and be responsible for any mistake that may be caused by their loss or disturbance.

3.2 UTILITY LINES

A. Utility lines installed by other Contractors shall be protected during excavating and backfilling operations; if damaged, they shall be repaired at the Contractor's expense.

B. When encountered in the work or as indicated, protect existing active sewer, water, gas, electric, or other utility services; where required for the proper execution of the work, relocate them as directed.

C. Any existing active utility lines, the location of which are not known to the Contractor in sufficient time to avoid damage, if inadvertently damaged, shall be repaired by the Contractor and extra payment will be allowed.

D. Remove abandoned utility service lines from areas of excavation. Cap, plug or seal lines and identify at grade.

3.3 STRIPPING

A. Upon completion and approval of all clearing and grubbing operations, all acceptable topsoil shall be stripped to a minimum depth of 6” to 10” and placed in an approved stockpile area for later placement in landscape areas. Acceptable topsoil shall be considered the surface layer of soil that is representative of soils in the vicinity that produce native vegetation as determined by the Geotechnical Engineer.

1. Topsoil stockpiles shall not be more than 20 feet in height and shall have side slopes no steeper than two (2) horizontal to one (1) vertical.

2. The Contractor shall insure that this material is reasonably free from underlying subsoil, lumps, objectionable weeds, litter, brush, organic matter, roots, toxic substances or any materials that might be harmful to plant growth or be a hindrance to grading, planting or maintenance operations. Topsoil shall not contain more than five percent by volume of stones, stumps or other objects larger than 3/4 inch in any dimension.

B. Removal of trees and shrubs shall include the root ball. Overexcavation may be necessary to completely remove root networks of trees.

C. Remove any unused existing utilities.

D. Remove surplus materials from site.

3.4 EXCAVATING

A. All excavating shall be unclassified and the Contractor shall remove whatever materials are encountered in excavating to the lines and grades as indicated on the drawings.

B. Excavated materials which are suitable and required for filling and backfilling shall be stockpiled at a convenient location. All material which is not suitable or which is not required shall be removed and satisfactorily disposed of off site.

C. Excavation shall extend a sufficient distance from foundation walls to allow additional space as required for construction operations, for the removal of forms, installation of utilities, inspections, etc. Excavations shall be left open until the concrete work has been inspected and approved, and the work of other trades concerned completed.

D. Excavation shall not interfere with normal 45 degree bearing splay of any foundation.

E. Hand trim excavation and leave free of loose matter.

F. Excavated surfaces will not be permitted for use as forms for placing concrete for foundation walls. Trenches for foundation footings may be excavated to dimensions of the concrete work if the nature of the soil will permit. Undercutting will not be permitted.

G. Maintain excavation in good order, provide necessary bracing and shoring, protect excavations against frost and freezing or excessive drying until concrete can be placed.

H. Maintain excavation free of water at all times. Water that has accumulated in the excavation shall be removed. Bottoms and sides of excavations affected by water shall be corrected by removal of additional material to sound surfaces.

I. In the event that any part of the excavation is carried through error, or to correct water damage, below the depth required by the drawings, the Contractor shall maintain the excavation at that level. Bottom of footings shall be extended to the excavation bottom, without altering required top elevation. No claim for extra work will be allowed because of careless excavating to depths beyond those required.

J. The base of foundation excavations shall be free of water and loose soil prior to placing concrete. Concrete shall be placed as soon as practical after excavating. Saturated or disturbed soils at bearing level shall be removed and replaced prior to placing concrete.

3.5 FILL PLACEMENT

A. Provide and place any additional fill material required to bring the work to the designated grades. The Contractor shall notify the Soils Engineer when ready for filling and compacting. In no case shall fill be placed on a subgrade that is muddy, frozen or that contains frost.

B. All fill and backfill shall be placed in lifts not exceeding 8 inches in loose thickness with moisture content within the specified limits. Backfill in utility trenches shall be placed in 6 inch loose lifts.

C. Each layer of fill shall be mixed and spread evenly after it is placed.

D. Prior to placing interior slab on grade, the upper 12" of subgrade shall meet the requirements for fill.. Obtain soils engineer testing and approval of subgrade prior to slab on grade placement. Over-excavate and recompact the subgrade as necessary.

E. Granular cushion/leveling course under floor slabs shall be placed to the designated thickness, and thoroughly compacted to a reasonable smooth, even surface.

F. Any compacted fill, backfill, or subgrade that does not meet the requirements of this specification at the time slabs are placed shall be reworked or removed and properly replaced at the expense of the Contractor.

G. The Contractor is cautioned to exercise care during compaction so as not to damage adjacent construction.

3.6 FILL AND BACKFILL PLACEMENT REQUIREMENTS

1. All fill shall be placed to meet the following requirements concerning fill material type, compaction, and moisture content.

Location	Compaction	Moisture Content
▪ Building area and within 5' of Building Including utility backfill	90%	-1% to +5%

2. Compaction and moisture requirements given are expressed as a percentage of maximum dry density as determined by ASTM procedure D-1557, Modified Proctor.

3. Compaction requirements shall be accomplished by means of sheeps-foot rollers or other rollers capable of compacting the soil to the densities specified. Rolling shall be done while the soil is within the moisture limits specified and shall be continuous over the entire area being filled with sufficient passes to achieve the densities specified.

3.7 BACKFILL

A. All backfill shall meet the requirements for fill.

B. Before placing backfill, remove all debris, trash, material subject to termite attack, rot or corrosion, and other objectionable matter. Ensure that ground surfaces are not in a frozen condition. Recompact sides and bottoms of excavations to condition required for backfill. Do not backfill over existing subgrade surfaces that are porous, wet or spongy.

C. Backfilling shall commence as soon as possible after permanent installations are approved. Exercise care to avoid damage to adjacent construction, walls, and other work in place. In compacting adjacent to walls after walls are built to grade, compact on both sides at the same time, or brace walls to avoid displacing or rupturing any portion of wall.

D. Maintain optimum moisture content of backfill materials to attain required compaction density.

E. Heavy, self-propelled or towed power-operated mechanical equipment used for spreading and compacting backfill shall not be operated closer to foundation or retaining walls than a distance equal to the height of the backfill above the top of the footing. Areas where other equipment cannot be operated shall be compacted by power-driven hand operated equipment.

F. Field quality control – backfilling: if tests indicate Work does not meet specified requirements, remove Work, replace and retest at no cost.

3.8 ROUGH GRADING

A. Unless otherwise shown, the subgrade shall be evenly sloped to provide drainage away from the building in all directions at a grade of not less than 1/4 inch per foot. No slopes shall exceed 1 foot in 3 feet. Eliminate uneven areas and low spots.

B. Remove debris, roots, stones, etc., in excess of 1 1/2 inches in size. Remove subsoil that has been contaminated with petroleum products.

C. Cultivate subgrade to a depth of 3 inches where topsoil is to be placed.

D. Rough grading shall be completed as soon as practicable, but final or finish grading shall be delayed until construction is nearing completion.

3.9 FINISH GRADING

A. After all filling, compaction and rough grading have been carried out, bring all unpaved surfaces up to the required finish surfaces with the last 6" consisting of topsoil previously stripped and stockpiled. Topsoil shall be evenly spread to the true contours ready for seeding.

B. Use topsoil in relatively dry state. Place during dry weather.

C. Remove stones, roots, grass, weeds, debris and other foreign materials while spreading. Lightly compact placed topsoil.

D. Grades, not otherwise shown, shall be uniform levels or slopes between elevation points or between elevation points and existing finish grades, shaped to drain away from building walls.

E. All areas generally, including fill areas and transition areas, shall be uniformly graded. The finish surfaces shall be reasonably smooth, free from irregular surface changes, and free from depressions in which water might accumulate.

F. Protect all newly graded areas from damage, from construction operation, and from actions of the elements. Any settlement or washing that occurs prior to acceptance of the work shall be repaired and grades reestablished to the required elevations and slopes.

G. Leave stockpile areas and entire job site clean and raked, ready to receive landscaping.

3.10 DISPOSAL OF MATERIALS

A. Remove from site all earthwork and vegetative debris which is not to be incorporated into the completed work.

B. Excess and unsuitable soils material shall be removed from the site and disposed of in an appropriate legal manner.

C. All debris resulting from pavement and sidewalk removal and construction operations shall be removed from the site and disposed of in an appropriate legal manner.

END OF SECTION 312100

REPORT OF GEOTECHNICAL EXPLORATION
BUILDING #10 DOCK AND CANOPY ADDITION
LINCOLN REGIONAL CENTER
801 PROSPECTOR PLACE
LINCOLN, NEBRASKA
MAY 31, 2013
TD2 FILE NO. 748-414

REPORT OF GEOTECHNICAL EXPLORATION
BUILDING #10 DOCK AND CANOPY ADDITION
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EXECUTIVE SUMMARY

The proposed project includes the construction of a new depressed ramp and loading dock at the new kitchen addition and a new canopy over the loading area and a portion of the ramp at Building #10 of the Lincoln Regional Center located at 801 Prospector Place in Lincoln, Nebraska. Alley Poyner Macchietto has provided a preliminary site plan for the project referenced for this report. The dock area is anticipated to have cast-in-place concrete walls to retain differential soil grades and a concrete pad for the loading area. The concrete pad and wall foundations will be cast integrally and the walls will be cast upon the slab. We anticipate foundation loads of 3 kips per foot or less, and the pad loading to be about 250 psf. The ramp and driveway will also be Portland cement concrete.

One (1) soil boring was advanced to investigate the soil conditions and characteristics at the site. A Boring Location Plan is enclosed. Soils encountered included natural Peoria loess consisting of clays. The detailed Boring Logs are also enclosed.

Free ground water was not encountered in the boring. Free ground water is not anticipated to be a factor for construction.

The encountered soils are anticipated to be suitable for direct support of the foundations without modification. A subgrade under the pad, ramp, and driveway should be prepared with 12 inches of structural fill to support the pavements.

A significant amount (>3') of new fill is not anticipated, however, a cut up approximately 4 feet is expected. Settlements under the completed structure are expected to be related to the structure weight itself and not a new fill load. Anticipated settlements are within the tolerable range for the project's construction type with the recommended soil improvement.

This executive summary is not intended to relate all geotechnical findings and conclusions provided in this report. The entire report should be read and consulted by the project design professionals for application to the project as described herein.

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1.0 INTRODUCTION

This Report summarizes subsoil exploration work, laboratory findings, and geotechnical engineering conclusions and recommendations by Thompson, Dreessen & Dorner, Inc. (TD2) for the above-referenced project. This work was based on our written agreement through Mr. Albert Macchietto of Alley Poyner Macchietto Architecture on behalf of the Nebraska Department of Health and Human Services, Lincoln Regional Center. This investigation was made to evaluate geotechnical properties of the soil at the proposed Dock and Canopy addition at Building #10 site. The report presents the results of the boring and testing program and discusses special precautions for the design and construction of the project as it relates to geotechnical issues.

2.0 PROJECT DESCRIPTION

The proposed project includes the construction of a new depressed ramp and loading dock at the new kitchen addition at the building, and a new canopy over the loading area and a portion of the ramp. The site is at Building #10 of the Lincoln Regional Center located at 801 Prospector Place in Lincoln, Nebraska. Alley Poyner Macchietto has provided a preliminary site plan for the project referenced for this report. We anticipate the dock area to have cast-in-place concrete walls to retain differential soil grades and a concrete pad for the loading area. We understand the concrete pad and wall foundation will be cast integrally and the walls will be cast upon the slab, therefore, the foundations are more of a thickened slab type. We anticipate foundation loads of 3 kips per foot or less, and the pad loading to be about 250 psf. The ramp and driveway will also be Portland cement concrete.

The area of the proposed project is currently grass landscaped. The site is generally level in topography. Significant new fills are not anticipated but an excavation for the depressed area will be needed. Minor grading is expected to be needed for the sidewalks and driveways.

3.0 EXPLORATION RESULTS

3.1. Field Work

A total of one (1) test borings, numbered B-1 was advanced across the proposed addition footprint. The boring locations are shown on the Boring Location Plan included in the Appendix of this Report. Boring B-1 was advanced to a depth of 15 feet below existing ground surface.

The boring was made with continuous flight augers and no drill hole stabilization techniques, such as hollow stem augers or drilling fluid, were used. Samples were attempted for recovery every 2.5 feet in the top 10 feet of boring and every 5 feet thereafter. Field boring logs were prepared as drilling progressed. More details of the field work can be found in Section 6.1 of this Report.

3.2. Laboratory Test Program

Selected samples were tested in the laboratory to define pertinent geotechnical properties necessary for the analysis. Laboratory tests included moisture content, density determination, unconfined compressive strength, and visual classification of the soil according to the Unified Soil Classification System (USCS). A complete table of laboratory test results is included in the Appendix. Each test was performed in general conformance with current ASTM procedures. More details of the laboratory testing program can be found in Section 6.2 of this Report.

Based on the results of the testing program, the field boring logs were reviewed and supplemented as presented in the Appendix. These final logs represent our interpretation of the in-place soil conditions.

3.3. Site Conditions

The site lies within the loess hills of eastern Nebraska. Loess deposits are composed of silt and clay sized particles that were transported to (and deposited in) the area by prevailing winds. The loess surface was subsequently eroded into the typical divide and drainage way topography of today. The loess mantle was deposited over the eroded glacial till surface. The erosion of the loess mantel generally conforms to the drainage patterns of the till surface. The till generally overlies limestone bed rock. In major drainage ways, the till or loess materials have been eroded and subsequent re-deposition of upstream materials has occurred. These materials are collectively called Alluvium.

Currently, the specific building footprint is covered with grass and is immediately adjacent to the existing Building #10 structure. We do not expect that the area has been used for any other use than landscaping since the building was constructed.

3.4. Subsurface Conditions

The subsurface conditions encountered in the borings have been used to infer the general soil conditions at the site. We assume the soil conditions between borings are fairly represented by the borings. However, variations between borings may become apparent during construction. During construction, if conditions are encountered other than that described below and as shown on the boring logs, it is important that we be informed to evaluate the exposed conditions with respect to their effect on our recommendations.

The USDA Web Soil Survey identifies the typical natural surface soils at the site are mapped as Aksarben silty clay loam, 2 to 6 percent slopes (7206). This soil mapping suggests that the natural near surface soils formed in loess deposits. This mapping is generally found on hilltops in uplands.

The following is a brief review of the various layers of soil encountered in the borings. All depths given are relative to the ground surface at the time of drilling. The Appendix contains the detailed boring logs. The immediate ground surface was covered with landscaped grass. A moderate topsoil was apparent immediately under the grass in the boring.

Peoria loess was encountered underlying the moderate topsoil in the boring. The boring was terminated in the Peoria loess. The Peoria loess was described as dark brown to gray brown to light brown, moist to very moist, and stiff to hard. Visual classification of this material type generally suggested Lean Clay (CL) according to the USCS. Recovered samples were tested in the laboratory. Test samples were found to exhibit moisture contents from 15.0% to 25.1%, dry unit weights from 84.3 to 96.3 pounds per cubic foot, and unconfined compressive strengths from 0.49 to 2.57 tons per square foot.

3.5. Groundwater Data

Free water was not encountered during or after the drilling operations in the boring. The boring was left open after drilling operations and water levels were measured prior to abandoning the boring. Water levels were measured in the open, uncased bore hole at the time noted on the boring logs. The moisture content profiles observed in the borings suggest that free water has not recently been present in the profile.

It should be noted that groundwater levels may fluctuate seasonally and yearly from the readings noted on the boring logs. Factors affecting groundwater levels can include precipitation, flow direction, nearby pumping, and temperature changes.

4.0 ENGINEERING RECOMMENDATIONS

4.1. Discussion

The following analyses, conclusions, and recommendations are based on our field investigation, laboratory test results, engineering analysis, and experience. The engineering recommendations made in this Report are based on our understanding of the project as discussed in the preceding paragraphs. The following sections provide a brief discussion of the geotechnical aspects of the site followed by project specific recommendations and conclusions.

4.2. Site Preparation

Prior to on-site earthwork, topsoil, including the root crown and other trees, shrubs, organic materials and debris should be stripped, cleared, and grubbed. Topsoil should be stockpiled for distribution after construction completion. Removal of trees and shrubs should include the removal of the root ball. We recommend that the upper 5" to 8" of topsoil be removed with the grass stubble and root crown. A greater excavation depth may be required below any trees or shrubs. The soils engineer should be consulted during stripping and reserves the right to adjust the depth of stripping based on observations at the time of construction.

Any existing structure elements or utilities should be completely removed from the building footprint. The excavations should be refilled to the requirements of structural fill.

Shallow foundations for the proposed structure are anticipated to bear in the Peoria loess encountered at the site. The moisture content at the assumed bearing level is moist but not excessively dry or wet. The exposed loess is expected to be suitable for direct support of foundations. Subgrades for the pad and pavement system should include a compacted subgrade as described in later sections of this report.

4.3. Earthwork

The on-site excavations are expected to encounter low plastic loess soils. The vast majority of the anticipated on-site excavation will generate materials that are considered suitable for reuse as structural fill or backfill following processing and moisture conditioning. For the purposes of estimating earthwork quantities, 1 cubic yard of compacted structural fill can be expected to require 1.3 cubic yards of on-site excavation. Compaction of all fill placed is necessary to minimize post-construction compression (settlements) of the fill.

The soils encountered in the borings are somewhat above and below optimum moisture content; therefore, processing and blending of the on-site soils prior to compaction will be necessary. Processing should include the removal of particles larger than 1 ½ inches and any encountered debris or deleterious materials. If the contractor does not have adequate space, time, or weather conditions, the use of imported fill or backfill may become necessary.

Imported fill may be required for use as structural fill or backfill or as a blending or replacement material. Imported fill should exhibit a liquid limit less than 43 and a plasticity index less than 23, be free of organics, debris, particles larger than 1½", and other deleterious materials.

Compaction requirements for cohesive fills should be referenced to the ASTM D1557 (Modified Proctor) test method. The expected on-site borrow materials will be of a clayey nature. Therefore, compaction is expected to be best accomplished by a sheep's foot type compactor because of its kneading effect during compaction. Moisture conditioning prior to compaction helps make the compactive effort more effective and efficient.

Structural fill should be compacted to an in-place dry unit weight at least 90 percent of the maximum dry unit weight at a water content at the time of compaction to within -1 and +5 percent of the optimum water content.

Backfill for shallow utilities should be compacted to an in-place dry unit weight at least 85 percent of the maximum dry unit weight at a water content at the time of compaction to within -2 and +6 percent of the optimum water content. Backfill placed with a zone of subgrade preparation should be compacted to the requirements of the subgrade for the full depth of the backfill.

All fill should be placed in thin, horizontal lifts, and moisture conditioned prior to compaction. Loose lift thickness should be adjusted depending on the contractor's construction equipment, however, should generally not exceed 8 inches. Fill placed to create an embankment slope should be compacted in horizontal layers, with compactive effort extending to the slope face. In many cases, overbuilding the slope may be needed to facilitate slope face compaction prior to cutting to the required shape. When fill is placed adjacent to an existing embankment slope, the existing slope should be stepped or benched to allow the placement of horizontal layers to eliminate a shear plane. Steps or benches should be no greater than 4 feet in height.

4.4. Excavations

Vertical cuts and excavations may stand for short periods of time, however, should not be considered stable in any case. All excavations should be sloped back, shored, benched, or shielded for protection of workers. All workers should use adequate safety precautions. Trenching and excavation activities should conform to federal and local regulations as a minimum.

The soils encountered in the test borings generally classify as Type B soils according to OSHA's Construction Standards for Excavations. In general, the maximum allowable slope for shallow excavations in a Type B soil is 1H:1V, although other provisions and restrictions may apply. If different soil types are encountered, the maximum allowable slope may be different. All excavation work should be completed in accordance with OSHA standards. Where safe back-slopes cannot be provided, bracing or shoring designed by competent professionals should be installed. Parallel excavations should be avoided because an unstable column of soil can form between the excavations, especially the excavations that are close and if one of the excavations is backfilled before the other.

Surface water seepage may cause excavations to be less stable. Therefore, the amount of open trenches exposed should be kept to a minimum. Backfill should be placed as soon as possible after structural strength requirements are met after installation is complete. Groundwater seepage into open shallow excavations is not a concern based on the observed water levels in the borings and the anticipated shallow excavation depths.

4.5. Seismic Conditions

Seismic design conditions for this project should utilize a Site Class of "D" according to 2006 International Building Code. The IBC Site Class determination is based on the top 100 feet of soil and rock profile. Although the borings performed at the site are much shallower than 100', generalized information of the site subsurface conditions suggest this Site Class. The structural engineer should perform the seismic design, using the recommended Site Class.

4.6.Foundation Analysis

In light of the subsurface conditions revealed by the boring and testing program and the recommended soil improvement method, this site appears suitable for use of a shallow spread foundation system. The selection of an allowable soil bearing pressure for shallow foundation elements must fulfill two requirements. First, the load must be sufficiently less than the ultimate bearing capacity of the foundation to insure stability. Second, the differential settlement must not exceed an amount which will produce adverse behavior of the superstructure.

In order to meet the previous criteria, we have explored both the bearing capacity and the load settlement characteristics of the site soils assuming typical wall loads of 3 kips per foot and pad loadings of 250 pound per square foot. The bearing capacity is based on a factor of safety of 3 against the full dead load plus normal live load. The allowable bearing pressure is expressed in terms of the net pressure transferred to the soil.

A net allowable soil bearing pressure of 2,000 pounds per square foot may be used to size both continuous wall footings and isolated spread column footings in areas where the existing site soils are relied upon. In no case should footings be smaller than local code sizes.

Exterior footings and footings in unheated areas should be founded at a minimum depth of 3.5 feet below surrounding grade to provide frost protection. Isolated interior footings in heated areas may be founded such that the floor slab subgrade preparation does not disturb bearing level soils. All footings should be reinforced with steel reinforcement. Structural stoops should be provided at all entrances.

Because of the clayey nature of the anticipated on-site foundation soils, it is expected that shallow foundations may be trench formed. This type of footing has the advantage of quicker construction, it eliminates the need to backfill the foundation, and it distributes stresses much more evenly to the soil. Trench formed footing excavations should be made with a smooth edge bucket excavator to reduce bearing surface disturbance. Care should be exercised to avoid overexcavating below the grade required by the plans. It is not recommended that fill be placed at the base of footing excavations to replace accidental overexcavation.

Trenched "grade beam" type footings are acceptable for exterior walls. Trenched "grade beam" footings should be reinforced with top and bottom reinforcement, be designed to be capable of spanning 10 feet under applied loads and have a minimum width of 16 inches where supporting load bearing walls. For this purpose, a "grade beam" footing is defined as any footing with a thickness at least two times its width.

Lateral loads acting against the footings can be resisted by friction against the footing bearing surface using normal dead loads and an allowable friction coefficient of 0.23. Alternatively, lateral resistance can be developed by assigning an allowable adhesion of 400 psf to the net contact area. Additional lateral resistance can be developed by assigning an allowable passive resistance to the portions of the footings or grade beams more than 1.5 feet below the slab. The allowable passive resistance can be approximated by an equivalent fluid weight of 160 pcf. Passive resistance should only be used with trench footings or formed footings that have been backfilled to the requirements of structural fill.

4.7.Below Grade Wall

The loading dock walls will be subjected to unbalanced lateral soil loads. The lateral pressures acting against the basement walls are a function of the properties of the natural soil and the backfill, backfill placement procedures, drainage, and wall movements. The encountered soil properties and the estimated properties of the compacted fill on-site were used to determine the lateral pressure properties of the site soils. The design lateral pressures presented in this report are consistent with backfill compacted using light equipment. Some compaction procedures and equipment can generate significantly higher lateral pressures, which should be recognized by the contractor.

Below grade walls can be designed using the equivalent fluid pressure method. The drained at-rest equivalent fluid pressure should be used as 55 pounds per cubic foot. The drained active equivalent fluid pressure should be used as 45 pcf. The drained allowable passive equivalent fluid pressure should be used as 160 pcf. Passive pressure should be used for resistance for portions of the footings or grade beams more than 12 inches below the slab subgrade or exterior grade. Passive resistance should only be used with trench footings or formed footings that have been backfilled to the requirements of structural fill. Surcharge loads should be transformed to an equivalent height of soil weighing 110 pcf to determine the lateral earth pressure on the wall.

Backfill should be properly compacted to reduce future subsidence, and proper surface drainage should be provided to reduce the amount of moisture infiltration into the backfill. The contractor should evaluate the backfill procedure to determine if temporary supports are needed. Sand backfill is not recommended, except as required around the perimeter drain system. The top 12" of wall backfill on an exterior wall side and in landscaped areas should consist of low plastic silty clay suitable to promote vegetative cover.

The lateral pressure recommended for design of the below grade walls is based on the assumption that hydrostatic pressures do not act in conjunction with soil loads. Installation of a foundation drain is appropriate to relieve hydrostatic pressure from the wall and to reduce the potential for water entry into the building. An exterior perimeter drain system should be provided to prevent hydrostatic pressure from acting on the wall. The drain system should be routed to daylight outlets or the storm sewer system in a manner to prevent backup during full flow events in the sewer or should be directed to a sump for discharge.

4.8.Settlement Analysis

A significant amount of new fill (>3') is not expected to be needed at the site to create a level building pad. The depressed ramp excavation is expected to be about 4 feet deep. Therefore, settlement under the completed structure is anticipated to be related only to the structure itself and not a new fill load. A maximum total settlement of 1 inch and a differential settlement of ½ to ¾ inch are generally considered acceptable for this type of construction and were used in our analysis. Based on the analysis of footings bearing on the existing natural soil conditions, total settlements up to about ½ inch are anticipated. Differential settlements are expected to be less than ½ inch across 30 feet.

Some Peoria loess materials are collapse susceptible. Collapse is the sudden consolidation (settlement) upon increasing moisture contents. The results of collapse are generally manifested as non-uniform, differential settlements under foundation and slab-on-grade elements. Based on the laboratory analysis of the recovered samples, the encountered loess has a low probability for collapse and should not affect the proposed construction.

The encountered soil properties exhibit a low swell potential. Swell occurs with increasing moisture content and can be followed by shrinkage with decreasing moisture content. Differential settlements are associated with swell and shrinkage. The low potential for swell should not be a factor for foundation construction.

In any case, care should be exercised during construction so as not to leave foundation trenches open for more time than necessary. If foundation excavations become saturated due to precipitation, or dry out excessively, the excavation should be evaluated by the geotechnical engineer prior to use to determine suitability and corrective action.

The soils at the site are frost susceptible. As such, foundations in unheated areas should be founded at a frost free depth. Structural stoops should be provided at all entrances. Overhead door slab entrances may consider a thickened edge where the exterior slab abuts the interior slab of the structure. The effective drainage of surface features and reduction of infiltration of water adjacent to pavements and structure foundations can aid in reducing frost heave. This will be important at the trench drain in the loading pad.

Reliably-predicted settlement estimates cannot be made for extraneous causes of settlement such as poor backfill or fill compaction, saturating of subsoils through excessive irrigation, precipitation, or broken piping. Therefore, this report provides recommendations for the proper compaction of fill and backfill and surface drainage to reduce potential extraneous settlement.

4.9.Pavement Subgrades

The Site Preparation Section of this report recommended that the pavement subgrade should be prepared under the loading pad. A properly prepared subgrade should be composed of 12 inches of structural fill. The subgrade materials should be moisture conditioned prior to compaction. For pavements, the subgrade should extend beyond the edge of pavement or back of curb by at least 1 foot for edge support. Subgrade extension beyond the loading dock wall is not necessary.

The compaction for the subgrade is expected to occur early in the construction process. The completed subgrade is expected to be subjected to disturbances from under slab utility construction, precipitation, construction traffic, or freezing conditions prior to slab pavement placement. Therefore, the subgrade should be reworked and compacted immediately prior to concrete placement. The disturbances should be repaired by scarification and recompaction. Extensive disturbances should be repaired by overexcavation and recompaction.

It should be noted that the above subgrade compaction requirements are minimum recommended values. More stringent requirements based on a specific pavement design should supersede these recommendations.

Provided the above subgrade compaction requirements are followed and applied, a subgrade modulus, k, of 120 pounds per cubic inch or a CBR value of 5 can be used for design of the floor slab or pavement.

Due to the moderate slab loading, some structural reinforcement is anticipated for the floor slab. A specific slab design may yield additional reinforcing requirements. The thickness design of the slab should account for parking and aisle locations, fork truck types and traffic patterns and uniformly-distributed open area loads.

The pad slab should also be designed with consideration to isolation joints at columns, expansion joints at abutting pavement, and construction and control joints as needed. Appropriate joint spacing to account for the rack layout should be considered. All control joints should be made to a depth of ¼ of the slab thickness as a minimum, unless special provisions for a joint-less floor are included in the design. Where exterior pavements abut the pad, full depth expansion joints should be used. All joints should be sealed with a flexible sealant and re-sealed periodically as needed.

PCC pavements are anticipated for use in the driveways, parking areas, and garage floor slab of the project. The pavement thickness design used assumed traffic loading, the recommended subgrade preparation methods, ACI 330, and our local experience. A minimum thickness of PCC concrete of 8 inches is recommended to be used in all areas.

The pavement must be properly jointed, and curbs backfilled as soon as structural strength requirements are met. The concrete used must have a minimum 28-day compressive strength of 3,500 psi and from 5.5% to 7.5% air-entrainment and meet City of Omaha specifications (Section 501). PCC pavements should utilize transverse joint spacing not exceeding about 12 to 15 feet, and made to a depth of at least ¼ of the slab depth. Tie bars should be used for longitudinal joints. Dowel bars should be considered where new pavements abut existing pavements to allow for improved load transfer.

Surface drainage around the pavement is also important to long term performance. Curbs should be backfilled as soon as possible after construction of the pavement. Backfill should be compacted and should be sloped to prevent water from ponding and infiltrating under the pavement. All pavement joints should be caulked and any cracks should be promptly sealed to prevent moisture intrusion into the subgrade.

4.10. Surface Drainage and Landscaping

The success of the shallow foundation system and slab on grade floor system is contingent upon keeping the subgrade soils at more or less constant moisture content, and by not allowing surface drainage a path to the subsurface. Positive surface drainage away from the structure must be maintained at all times. Typical sources of water that could cause water content gains in the subgrade soils include infiltration of surface water, irrigation water, and utility line leaks. Utilities within the building footprint should be verified as leak-tight prior to service.

The final grade of the foundation backfill and any overlying pavements should have a positive slope away from foundation walls on all sides. A minimum slope of 1 inch per foot for the first 5 to 10 feet is recommended. However, the slope may be decreased if the ground surface adjacent to foundations is covered with concrete slabs or asphalt pavements. Pavements and exterior slabs that abut structures should be carefully sealed against moisture intrusion at the joint. Exterior pavement and slabs should be sloped to promote drainage. A minimum slope of 2 percent is recommended for other landscaped areas of the site.

No final graded slopes should be made steeper than 3H:1V due to erosion and maintainability concerns. If steeper slopes are proposed, additional slope stability analyses and design measures will be required. Redistribution of topsoil and final seeding are recommended for all exposed surfaces. Erosion protection and controls should be installed for all exposed slopes of 5H:1V or steeper.

Landscaped areas should be designed and built such that irrigation and other surface water will be collected and carried away from foundation elements. Irrigation within ten feet of the foundation should be carefully controlled and minimized. All downspouts and faucets should discharge onto splash blocks that extend at least 3 feet from the building line or pavements. These features are not as susceptible as soil to erosion from the drainage. Splash blocks should slope away from the foundation walls. The encountered site soils, when exposed, are considered highly erodible.

During construction, temporary grades should be established to prevent runoff from entering excavations. Backfill should be placed as soon as possible after structural strength requirements are met and installation is complete. The length of open trench should be minimized during non-working hours to reduce potential runoff from entering the trench.

The soils found at this site are typical of the area. Past experience indicates that corrosion potential of buried metallic pipes in these soils is moderate; therefore, it is recommended that polyethylene wrap be provided for ductile iron piping. Sulfate corrosion potential of Portland cement is minimal, and Type I Portland cement is suitable for use. All concrete used for this project should be air-entrained to reduce damage from frost action.

5.0 PLAN REVIEW AND CONSTRUCTION OBSERVATION

Since a project of this nature requires many soil-related judgments and decisions, we recommend that TD2 be retained as part of the construction team. The geotechnical engineer should be provided the opportunity for general review of the final design and specifications in order that earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

Implementation of the site preparation and design recommendations presented in this report requires evaluation of the soil conditions encountered during construction. Therefore, we recommend that the geotechnical engineer be retained to inspect all fill placement and footing trench excavations. We also recommend that a limited number of compaction tests be performed to document the degree of compaction obtained in backfill and structural fill.

6.0 EXPLORATION PROCEDURES

6.1. Soil Sampling

The test borings were made with a CME 45-B drill rig equipped with 4" continuous flight augers to advance the borings. Relatively undisturbed samples of cohesive soils were obtained with thin-walled tube samplers in accordance with ASTM D1587. Cohesionless soils were sampled using a split barrel sampler while performing the Standard Penetration Test (SPT) in conformance with ASTM D1586. As the samples were obtained in the field, they were visually and manually classified by the drill crew chief in general accordance with ASTM D488. Logs of the borings, indicating the depth and identification of the various strata, water level information, and pertinent information regarding the method of maintaining and advancing the drill holes are included in the Appendix.

Recovered samples of cohesive material were tested in the field using a hand penetrometer to estimate the unconfined compressive strength and to aid in describing the consistency of the recovered sample. The field boring logs were supplemented with the laboratory test results for the preparation of the final boring logs. The final boring logs present the interpreted soil profile at each boring location.

6.2. Laboratory Testing

Recovered samples were extruded in the field, sealed in plastic, labeled, and protected for transportation to the laboratory for further testing and verification of field classification according to ASTM D4220. A chart illustrating the soil classification procedure is included in the Appendix. Select samples were evaluated in the laboratory and summarized on a Summary of Soil Testing Results report included in the appendix. Laboratory tests included moisture content (ASTM D2216), density determination (ASTM D2937), unconfined compressive strength (ASTM D2166), and classification by Unified Soil Classification System (ASTM D2487). All tests were conducted in substantial conformance with ASTM requirements. Laboratory results are reported on the Summary of Soils Tests Results report included in the appendix.

7.0 STANDARD OF CARE

This report was prepared under the supervision of a professional registered engineer. This Report has been prepared for the exclusive use of our client and their agents for application to the proposed project as described. The recommendations contained in this Report represent our professional opinions. These opinions were arrived at in accordance with currently-accepted engineering procedures at this time and location. Other than this, no warranty, either expressed or implied, is intended. Additive conclusions or recommendations made from these data by others are their responsibility.

In the event that any changes in the nature, design, or location of the structure are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing. Because of special mechanical or structural details, it is sometimes necessary to deviate from our recommendations. These problems can usually be reconciled by a brief conference between us and the designing architects and engineers.

If any soil conditions become notably different during construction, from those described here, TD2 should be notified immediately. This geotechnical engineering report does not relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site or in the subsurface. If potential hazardous materials are believed to exist at the site, a geo-environmental investigation should be performed.

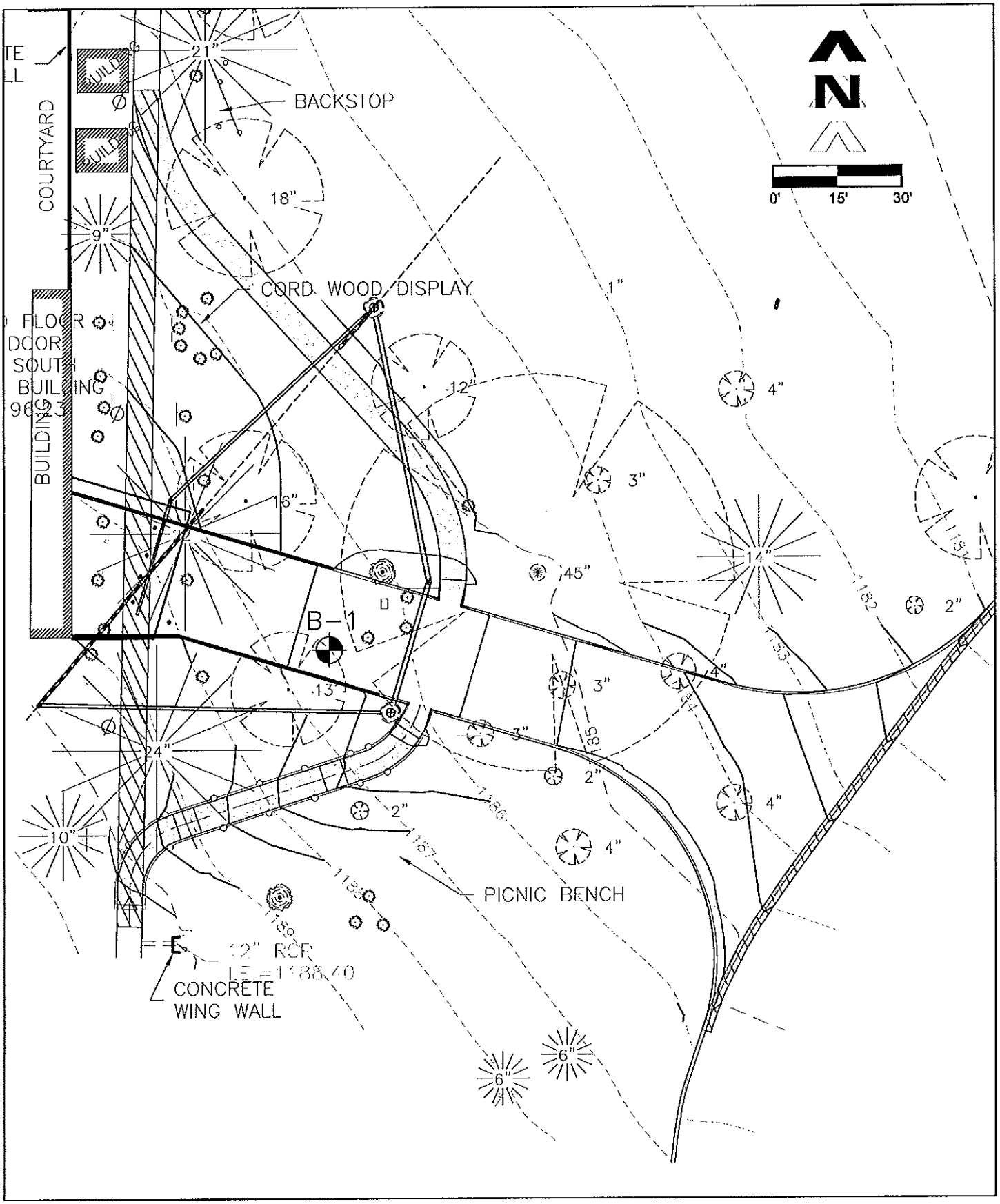
Prepared and submitted by:

THOMPSON, DREESSEN & DORNER, INC.

Kurtis L. Rohn, P.E.
Geotechnical Engineer

KLR/bam

APPENDIX



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Date:	5-30-13
Drawn By:	KLR
Reviewed By:	KLR
Revision Date:	..

Loading Dock and Canopy Addition
Building# 10 - Lincoln Regional Center

Boring Location Plan

TD2 engineering & surveying

THOMPSON, DREESSEN & DORNER, INC.
CONSULTING ENGINEERS & LAND SURVEYORS

GEOTECHNICAL ENGINEERING DIVISION

PROJECT:	Building# 10 Dock and Canopy Addition
LOCATION:	Lincoln Regional Center, 801 Prospector Place, Lincoln, NE
CLIENT:	LRC c/o Alley Poyner Macchietto Architecture
JOB No. :	748-414
DATE:	5/9/13

BORING LOG

BORING No. : B- 1

WEATHER CONDITIONS	BORING LOCATION	SURFACE ELEV.	ELEVATION DATUM	DRILLER	LOGGER
	See Boring Location Plan			T. Eggert	S.Yakel

GROUNDWATER LEVEL OBSERVATIONS				TYPE OF SURFACE	SPT HAMMER	DRILL RIG
WHILE DRILLING	END OF DRILLING	24 HOURS AFTER DRILLING	- HOURS		NA	CME-45
				DRILLING METHOD	BIT USED	TOTAL DEPTH
NE	NE	HBED		4" Continuous Flight Augers	Fish	15.0 feet

SAMPLE DATA				DESCRIPTION OF SOIL						LABORATORY RESULTS				
DEPTH FT	SAMPLE No. & Type	Penetrometer Strength (tsf)	% REC	COLOR	MOIST	CONS	USCS	GEOLOGICAL DESCRIPTION	GRAPHICAL LOG	MC (%)	DRY DENSITY (pcf)	q_u tsf	SOIL CLASS	DEPTH FT
								Top Soil 6"						
	U-1	2.75	90	Dark Brown	Very Moist	Stiff	CL	Peoria loess (developed), Lean Clay, Low Plasticity, Root Holes, Root Hairs		25.1	84.3	0.49		
5	U-2	>4.5	90	Grayish Brown	Moist	Hard		Slightly Blocky, Some Silt		15.0	88.7	2.01		5
	U-3	>4.5	60							21.3	96.3	2.57		
10	U-4	3.5	90	Light Brown		Very Stiff		Silty, Layered, Root Hairs, Root Holes, Trace Rust Stains		23.4	85.6	1.96		10
15	U-5	2.75	90		Very Moist	Stiff				24.0	90.9			15
								Bottom of Boring @ 15'						
20														20
25														25
30														30

SOIL BORING LOGS

Water Level Observations: Water level observations were made under the conditions noted in the open, uncased bore holes. Fluctuations in the water levels may occur with time, precipitation, and other factors.

Samples: Samples types are identified by letter and by consecutive number within a boring:

- U Thin-walled tube sample 3-inch diameter, unless otherwise noted.
- S Split spoon sample, 2-inch OD unless otherwise noted.
- A Auger disturbed sample obtained from auger cuttings.
- CC Continuous core sample from Macro Core® sampler.

N-Blows per Foot: Resistance as measured while performing the Standard Penetration Test. The number indicates blows for the last 12 inches of penetration of the split spoon sampler. Multiple numbers indicate blows per 6 inches of penetration or blows per length driven.

Penetrometer Strength: The hand penetrometer resistance in tons per square foot determined in the field for the recovered sample.

Recovery: Recovery is shown as a ratio of inches of sample recovered to inches of sample attempted.

Physical Description: The description includes; color, moisture condition, consistency, and Unified Soil Classification System description. The USCS description is either interpreted or determined as noted. Includes other pertinent comments from field observations.

Geologic Description: A brief geologic interpretation and observations of the recovered samples and/or exposed cuttings.

Graphical Log: The symbols suggest the observed variations in the geologic formations or soils layers showing similar attributes. The soil boring log Geologic Description contains detailed descriptions. A symbol legend follows the soil boring logs.

Laboratory Results: Brief summary of selected laboratory results. A separate Summary of Soil Testing Results provides more complete information.

Limitations: The profiles indicated on the logs are an idealized description of the subsurface soil materials based on the observations of the recovered samples. The boundary lines shown represent approximate boundaries between material types and the actual changes may be gradual.

CLASSIFICATION OF SOILS FOR ENGINEERING PURPOSES

(Based on Unified Soil Classification System) ASTM: D2487

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				oil 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 Less than 5% fines[C]	Cu ≥ 4 and 1 ≤ Cc ≤ 3[E]	GW	Well-graded gravel[F]
			Cu < 4 and/or 1 > Cc > 3[E]	GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML of MH	GM	Silty gravel[F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel[F, G, H]
	Sands50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	Cu ≥ 6 and 1 ≤ Cc ≤ 3[E]	SW	Well-graded sand
			Cu < 6 and/or 1 > Cc > 3[E]	SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH	SM	Silty sand[G, H, I]
			Fines classify as CL or CH	SC	Clayey sand[G, H, I]
Fine-Grained Soils50% or more passes 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[O]	ML	Silt[K, L, M]
		Organic	Liquid limit -- oven dried / Liquid limit -- not dried < 0.75	OL	Organic clay[K, L, M, N] / Organic silt[K, L, M, O]
	Silts and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay[K, L, M]
			PI plots below "A" line	MH	Elastic silt[K, L, M]
		Organic	Liquid limit -- oven dried / Liquid limit -- not dried < 0.75	OH	Organic clay[K, L, M, P] / Organic silt[K, L, M, Q]
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

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

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

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

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

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

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

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

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

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

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

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

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

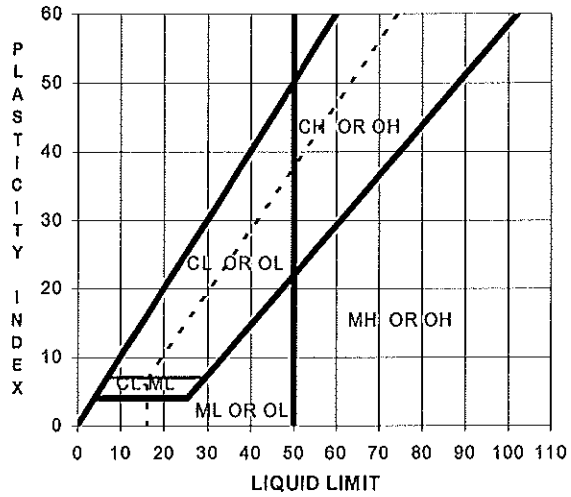
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

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

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

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

[Q] PI plots below "A" line.



THOMPSON, DREESSEN & DORNER, INC.
CONSULTING ENGINEERS & LAND SURVEYORS

GEOTECHNICAL ENGINEERING DIVISION

SUMMARY OF SOIL TEST RESULTS

PROJECT: Building# 10 Dock and Canopy Addition

TD2 JOB NO: 748-414

CLIENT: LRC c/o Alley Poyner Macchietto Architecture

DATE: 5/14/13

LOCATION: Lincoln Regional Center, 801 Prospector Place
Lincoln, NE

BORING No.	SAMPLE NO.	SAMPLE DEPTH (ft.)	SAMPLE DIAM. (in.)	SAMPLE LENGTH (in.)	MOISTURE CONTENT (%)	DENSITY WET (pcf)	DENSITY DRY (pcf)	VOID RATIO (e)	SAT. (%)	UNCONFINED COMPRESSION qu (tsf)	UNCONFINED COMPRESSION STRAIN (%)	SOIL CLASSIFICATION ATTERBERG LIMITS LL	ATTERBERG LIMITS PL	ATTERBERG LIMITS PI	GROUP SYMBOL	PASSING #200 (%)	REMARKS
B-1	U-1	1-2.5	2.86	5.88	25.1	105.5	84.3	0.984	68	0.49	2.1						
	U-2	3.5-5	2.84	5.88	15.0	102.0	88.7	0.885	45	2.01	2.6						
	U-3	7-8.5	2.83	5.89	21.3	116.8	96.3	0.737	78	2.57	3.0						
	U-4	8.5-10	2.85	5.91	23.4	105.6	85.6	0.954	66	1.96	1.9						
	U-5	13.5-15	2.84	5.88	24.0	112.7	90.9	0.839	77								