

GROUNDING ELECTRODE SYSTEM DIAGRAM
SCALE : NO SCALE

ELECTRICAL LIGHTING SCHEDULE (OR EQUAL. VERIFY ALL SELECTIONS AND FINISHES WITH OWNER AND ARCHITECT PRIOR TO ORDERING).

FIXTURE TYPE	MANUFACTURER		VOLT AMPS	MOUNTING	LAMP TYPE	REMARKS	VOLT
	NAME	SERIES					
A	LITHONIA	EPANL	31	RECESSED/GRID	INCLUDED 4000K LED	LED 2X4' FLAT PANEL - 4000LM OUTPUT HIGH EFFICIENCY	MVOLT
B	LITHONIA	WF6	14	RECESSED	INCLUDED 2700K LED	WAFER-STYLE 6" LED DOWNLIGHT	MVOLT
C	LSI	RHB-LED-18L-UNV-DIM-40-BLK	147	SUSPENDED	INCLUDED 4000K LED	COMPACT HIGH-BAY LED WAREHOUSE FIXTURE - 18000 LUMEN OUTPUT	MVOLT
D	JUNO	JSF-7IN-10LM-40K-90CRI-MVOLT ZI-WH	13	SUFACE	INCLUDED 4000K LED	SUMFORM SURFACE MOUNT 7" LED DOWNLIGHT	MVOLT
W	LITHONIA	WDGE3	59	WALL	INCLUDED 4000K LED	EXTERIOR WALL PACK - P2 PACKAGE - PROVIDE WITH 'PE' PHOTOCELL OPTION	MVOLT
Ⓜ	LITHONIA	ELM2L-SDRT	5	SURFACE	INCLUDED LED	EMERGENCY EGRESS LIGHTING UNIT WITH 90 MIN. BATTERY PACK	120
Ⓜ	LITHONIA	LHQM-LED-R-SD	5	SURFACE	INCLUDED LED	EMERGENCY EXIT EGRESS COMBO LIGHTING UNIT WITH RED FACE EXIT SIGN AND 90 MIN. BATTERY PACK	120
Ⓜ	LITHONIA	ELA-B-T-QWP-L0309-SD	5	SURFACE	INCLUDED LED	OUTDOOR EMERGENCY REMOTE EGRESS LIGHTING UNIT	120

Short-Circuit and Voltage Drop Calculations
Distances are for calculation purposes only and shall not be used for contractor takeoffs nor bidding - Contractor shall notify Engineer of any field condition that results in a change of 10% or greater circuit distance

The following calculations are based on the "Point-to-Point" method where:
 $ISC_{(1)} = ISC_{(1)} \times M_{(1)}$
 $ISC_{(2)} = \text{short circuit current at fault point 1}$
 $ISC_{(3)} = \text{short circuit current at fault point 2}$

Feeder: $f_{(10)} = \frac{1.732 \times L \times I_{sc}}{C \times E}$
 Feeder: $f_{(10)} = \frac{2 \times L \times I_{sc}}{C \times E}$

XFMR: $f_{(10)} = \frac{P(\text{sc}) \times V_p \times 1.73 \times \%Z}{100,000 \times KVA}$
 XFMR: $f_{(10)} = \frac{P(\text{sc}) \times V_p \times \%Z}{100,000 \times KVA}$

$IS_{(10)} = \frac{V_p \times M \times I_{sc}}{V_s}$

VOLTAGE DROP (30):
 $\%VD = (R \times \cos(\arccos(\text{pf})) + X \times \sin(\arccos(\text{pf}))) \times L \times I \times 1.73 / E$
 VOLTAGE DROP (10):
 $\%VD = (R \times \cos(\arccos(\text{pf})) + X \times \sin(\arccos(\text{pf}))) \times 2 \times L \times I / E$

$\%VD \text{ CUM} = \text{Cumulative Voltage Drop from Fault Point 1 to Fault Point \#}$
 R = resistance in ohms per LF
 X = reactances in ohms per LF

Date of Calculations: 08/20/23
 System Voltage: 240/120V-1 phase
 Source Isc = 63,000 at the secondary of the utility transformer
 Source Isc = 6X Motor Contribution = 65160

Fault Point (FP)	Bus/Feeder/Description	Source (Fault Point)	Phase	Source Isc (amps)	Conduit Type/TX	Material	Quantity of Parallel Sets and Bus Phase & Neutral Size	Conductor 'C' Value	Busway 'C' Value	L-L Voltage (E)	Circuit Length (L)	Load Power Factor (pf)	Circuit Load (Amperage)	Resistance (R)	Reactance (X)	Arccos (pf) (Radians)	Type	Degree Rise	kVA	New X _{mv} Z	Existing X _{mv} Z	Secondary Voltage	Tap Voltage	Tap Setting	f	M	Fault Current (amps)	Voltage Drop (NVD)	Cumulative Voltage Drop (%VD)	Fault Point (FP)		
																															Conductor	Transformer
1	Utility Service Point			63,000																												
2	TO TENANT METER MAIN 'A'	1	1	85160	NM	AL	2 Sets of 250 kcmil	12862	--	240	285	0.9	82	0.000085	0.000041	0.451027											8287	-0.69%	-0.69%	2		
3	TO TENANT METER MAIN 'B'	1	1	85160	NM	AL	2 Sets of 250 kcmil	12862	--	240	190	0.9	82	0.000085	0.000041	0.451027										13004	-0.46%	-0.46%	3			
4	TO TENANT METER MAIN 'C'	1	1	85160	NM	AL	2 Sets of 250 kcmil	12862	--	240	230	0.9	51	0.000085	0.000041	0.451027										11129	-0.46%	-0.46%	4			
5	TO TENANT METER MAIN 'D'	1	1	85160	NM	AL	2 Sets of 250 kcmil	12862	--	240	250	0.9	51	0.000085	0.000041	0.451027										10380	-0.50%	-0.50%	5			
6	TO PNL BD 'A'	2	1	9287	M	AL	2 Sets of 250 kcmil	12122	--	240	10	0.9	82	0.000086	0.000052	0.451027										9000	-0.03%	-0.72%	6			
7	TO PNL BD 'B'	3	1	13004	M	AL	2 Sets of 250 kcmil	12122	--	240	10	0.9	82	0.000086	0.000052	0.451027										12448	-0.03%	-0.49%	7			
8	TO PNL BD 'C'	4	1	11129	M	AL	2 Sets of 250 kcmil	12122	--	240	10	0.9	51	0.000086	0.000052	0.451027										10719	-0.02%	-0.48%	8			
9	TO PNL BD 'D'	5	1	10380	M	AL	2 Sets of 250 kcmil	12122	--	240	10	0.9	51	0.000086	0.000052	0.451027										10023	-0.02%	-0.52%	9			

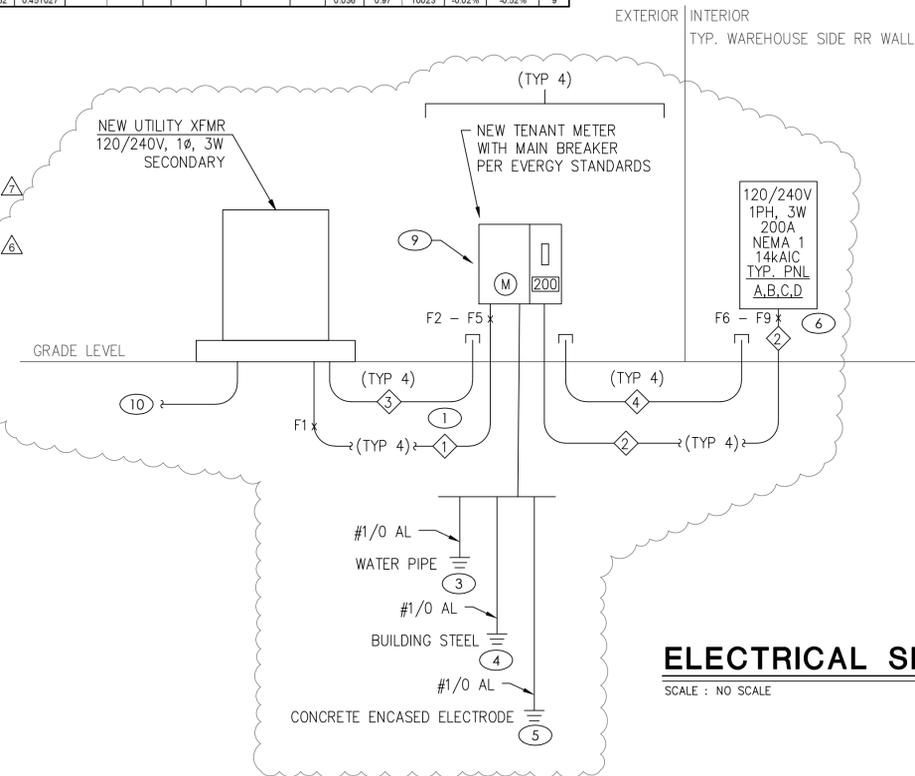
SC / VD CALCULATIONS
SCALE : NO SCALE

FEEDER SCHEDULE

FEEDER NUMBER	CONDUIT AND CONDUCTOR SIZES
1	(1) 2" EACH W/ 3 #250KCM AL
2	(1) 2-1/2" EACH W/ 3 #250KCM AL & 1 #2AWG AL GND
3	(1) 2" SPARE CONDUIT
4	(1) 2-1/2" SPARE CONDUIT
5	REMOVED FROM PROJECT

THE DESIGN PROFESSIONAL HAS PERFORMED ALL THE REQUIRED VOLTAGE DROP CALCULATIONS FOR ALL BRANCH CIRCUITS AND FEEDERS PER THE NATIONAL ELECTRICAL CODE, ARTICLE 210.19(A)(1) FPN NO. 4.

THE DESIGN PROFESSIONAL HAS PERFORMED ALL THE REQUIRED SHORT CIRCUIT CALCULATIONS AND THE AIC RATING INDICATED FOR EACH DEVICE IS ADEQUATE TO PROTECT THE EQUIPMENT AND THE ELECTRICAL SYSTEM.



ELECTRICAL SINGLE LINE DIAGRAM
SCALE : NO SCALE

KEYED SLD NOTES

- PROVIDE NEW CONDUIT AND CONDUCTORS TO UTILITY SOURCE. VERIFY EXACT LOCATION AND REQUIREMENTS WITH UTILITY PRIOR TO ROUGH-IN.
- REMOVED FROM PROJECT.
- PROVIDE NEW GROUND PER NEC 250.52(A)(1).
- PROVIDE NEW GROUND PER NEC 250.52(A)(2).
- PROVIDE NEW GROUND PER NEC 250.52(A)(3).
- NEW 120/208V PANELBOARD. SEE PANELBOARD SCHEDULES ON SHEET E-302 FOR MORE INFORMATION.
- NOT USED.
- NOT USED.
- MOUNT ON UNI-STRUT RACK. COORDINATE EXACT LOCATION WITH UTILITY PRIOR TO ROUGH-IN.
- ROUTE (1) 4" CONDUIT UNDERGROUND FOR PRIMARY CONDUCTOR ROUTING BY UTILITY. COORDINATE EXACT ROUTING WITH UTILITY PRIOR TO CONSTRUCTION.

Architect:

MIDWEST ARCHITECTS
1120 NW EAGLE RIDGE BLVD
GRAIN VALLEY, MO 64029
t: (816) 229-8115

Client:
Ward Development
1120 NW Eagle Ridge Blvd.
Grain Valley, Missouri 64029
t: (816) 229-8115

Consultants:
Civil Engineering:
Quist Engineering, Inc.
821 NE Columbus St.
Lee's Summit, Missouri 64063
t: (816) 550-5675

Structural Engineering:
Structura Logica
18901 E. 299th Street
Harrisonville, MO 64701
t: (816) 872-4883

MEP Engineering:
JSC Engineers
1925 Central Street, Suite 201
Kansas City, MO 64108
t: (816) 272-5289

MO COA NO. 2012006786 / KS COA NO. E-2818
1925 CENTRAL STREET, SUITE 201
KANSAS CITY, MO 64108
phone: (816) 272-5289
email: jsmothers@jscengineers.com

Revisions to technical submissions which are not made or approved by the licensee are prohibited.



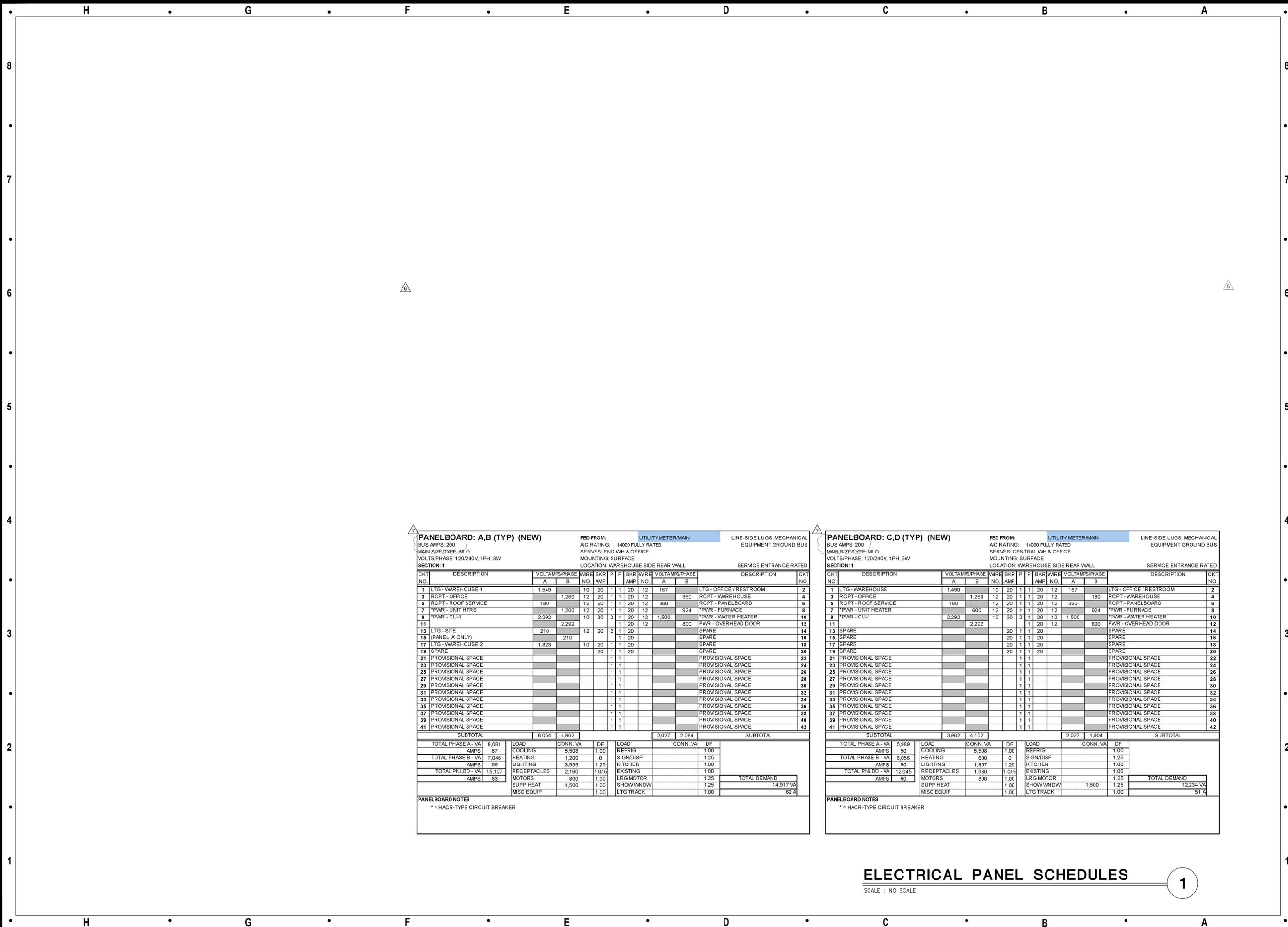
Project Number: 22-215
Project Type: NEW CONSTRUCTION
Project Name and Address:

I-470 B&T CENTER, LOT 7
2701 NE McBaine Drive
Lee's Summit, Missouri 64064

Issue:	Date:
Plan Review	09.30.22
Plan Review Revisions	11.17.22
Plan Review Revisions	01.02.23
Owner Comments	01.17.23
Owner Comments	02.14.23
Owner Revisions	06.22.23
Owner Revisions	12.07.23

Sheet Title:
ELECTRICAL SCHEDULES AND DIAGRAMS

E-301



PANELBOARD: A,B (TYP) (NEW)

BUS AMPS: 200
MAIN SIZE TYPE: MLO
VOLTS/PHASE: 120/240V, 1PH, 3W

FED FROM: UTILITY METER/MAIN
AC RATING: 14000 FULLY RATED
SERVES: END WH & OFFICE
MOUNTING: SURFACE
LOCATION: WAREHOUSE SIDE REAR WALL
SERVICE ENTRANCE RATED

CKT NO	DESCRIPTION	VOLTAMPS/PHASE		WIRE NO	BKR AMP	P	BKR AMP	WIRE NO	VOLTAMPS/PHASE		DESCRIPTION	CKT NO	
		A	B						A	B			
1	LTG - WAREHOUSE 1	1,549		10	20	1	1	20	12	167	LTG - OFFICE / RESTROOM	2	
3	RCPT - OFFICE		1,260	12	20	1	1	20	12	360	RCPT - WAREHOUSE	4	
5	RCPT - ROOF SERVICE	180		12	20	1	1	20	12	360	RCPT - PANELBOARD	6	
7	*PWR - UNIT HTRS		1,200	12	20	1	1	20	12	924	*PWR - FURNACE	8	
9	*PWR - CU-1	2,292		10	30	2	1	20	12	1,500	*PWR - WATER HEATER	10	
11			2,292					1	20	12	800	PWR - OVERHEAD DOOR	12
13	LTG - SITE	210		12	20	2	1	20			SPARE	14	
15	(PANEL 'A' ONLY)		210					1	20		SPARE	16	
17	LTG - WAREHOUSE 2	1,823		10	20	1	1	20			SPARE	18	
19	SPARE							20	1	20	SPARE	20	
21	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	22	
23	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	24	
25	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	26	
27	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	28	
29	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	30	
31	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	32	
33	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	34	
35	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	36	
37	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	38	
39	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	40	
41	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	42	
SUBTOTAL		6,054	4,962					2,027	2,084		SUBTOTAL		
TOTAL PHASE A - VA		8,081											
AMPS		67											
LOAD			5,508	1.00									
COOLING			5,508	1.00									
TOTAL PHASE B - VA		7,046											
AMPS		59											
LOAD			1,200	0									
HEATING			1,200	0									
TOTAL PNLBD - VA		15,127											
AMPS		63											
LOAD			3,959	1.25									
LIGHTING			3,959	1.25									
RECEPTACLES			2,160	1.0/5									
MOTORS			800	1.00									
SUPP HEAT			1,500	1.00									
MISC EQUIP			1,500	1.00									
LARG MOTOR													
SHOW WNDW													
LTG TRACK													
TOTAL DEMAND												14,917 VA	
												62 A	

PANELBOARD NOTES
* = HACR-TYPE CIRCUIT BREAKER

PANELBOARD: C,D (TYP) (NEW)

BUS AMPS: 200
MAIN SIZE TYPE: MLO
VOLTS/PHASE: 120/240V, 1PH, 3W

FED FROM: UTILITY METER/MAIN
AC RATING: 14000 FULLY RATED
SERVES: CENTRAL WH & OFFICE
MOUNTING: SURFACE
LOCATION: WAREHOUSE SIDE REAR WALL
SERVICE ENTRANCE RATED

CKT NO	DESCRIPTION	VOLTAMPS/PHASE		WIRE NO	BKR AMP	P	BKR AMP	WIRE NO	VOLTAMPS/PHASE		DESCRIPTION	CKT NO	
		A	B						A	B			
1	LTG - WAREHOUSE	1,490		10	20	1	1	20	12	167	LTG - OFFICE / RESTROOM	2	
3	RCPT - OFFICE		1,260	12	20	1	1	20	12	180	RCPT - WAREHOUSE	4	
5	RCPT - ROOF SERVICE	180		12	20	1	1	20	12	360	RCPT - PANELBOARD	6	
7	*PWR - UNIT HEATER		600	12	20	1	1	20	12	924	*PWR - FURNACE	8	
9	*PWR - CU-1	2,292		10	30	2	1	20	12	1,500	*PWR - WATER HEATER	10	
11			2,292					1	20	12	800	PWR - OVERHEAD DOOR	12
13	SPARE							20	1	20	SPARE	14	
15	SPARE							20	1	20	SPARE	16	
17	SPARE							20	1	20	SPARE	18	
19	SPARE							20	1	20	SPARE	20	
21	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	22	
23	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	24	
25	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	26	
27	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	28	
29	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	30	
31	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	32	
33	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	34	
35	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	36	
37	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	38	
39	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	40	
41	PROVISIONAL SPACE							1	1		PROVISIONAL SPACE	42	
SUBTOTAL		3,982	4,152					2,027	1,904		SUBTOTAL		
TOTAL PHASE A - VA		5,989											
AMPS		50											
LOAD			5,508	1.00									
COOLING			5,508	1.00									
TOTAL PHASE B - VA		6,056											
AMPS		50											
LOAD			600	0									
HEATING			600	0									
TOTAL PNLBD - VA		12,045											
AMPS		50											
LOAD			1,657	1.25									
LIGHTING			1,657	1.25									
RECEPTACLES			1,980	1.0/5									
MOTORS			800	1.00									
SUPP HEAT													
MISC EQUIP													
LARG MOTOR													
SHOW WNDW													
LTG TRACK													
TOTAL DEMAND												12,234 VA	
												51 A	

PANELBOARD NOTES
* = HACR-TYPE CIRCUIT BREAKER

ELECTRICAL PANEL SCHEDULES
SCALE : NO SCALE

1

Architect:
MIDWEST ARCHITECTS
1120 NW EAGLE RIDGE BLVD
GRAIN VALLEY, MO 64029
t: (816) 229-8115

Client:
Ward Development
1120 NW Eagle Ridge Blvd.
Grain Valley, Missouri 64029
t: (816) 229-8115

Consultants:
Civil Engineering:
Quist Engineering, Inc.
821 NE Columbus St.
Lee's Summit, Missouri 64063
t: (816) 550-5675

Structural Engineering:
Structura Logica
18901 E. 299th Street
Harrisonville, MO 64701
t: (816) 872-4883

MEP Engineering:
JSC Engineers
1925 Central Street, Suite 201
Kansas City, MO 64108
t: (816) 272-5289

MO COA NO. 2012006786 / KS COA NO. E-2818
1925 CENTRAL STREET, SUITE 201
KANSAS CITY, MO 64108
phone: (816) 272-5289
email: jsmothers@jscengineers.com

Revisions to technical submissions which are not made or approved by the licensee are prohibited.



Project Number: 22-215
Project Type: NEW CONSTRUCTION
Project Name and Address:

I-470 B&T CENTER, LOT 7
2701 NE McBaine Drive
Lee's Summit, Missouri 64064

Issue:	Date:
Plan Review	09.30.22
Plan Review Revisions	11.17.22
Plan Review Revisions	01.02.23
Owner Comments	01.17.23
Owner Comments	02.14.23
Owner Revisions	06.22.23
Owner Revisions	12.07.23

Sheet Title:
E-302