

ELECTRICAL SYMBOLS

THIS IS A MASTER LEGEND AND NOT ALL SYMBOLS OR ABBREVIATIONS ARE USED. V2.00

ELECTRICAL ONE-LINE & RISER DIAGRAM

SWITCH (RATINGS AS INDICATED)
 FUSED SWITCH (RATING, POLES AND FUSE TYPE AS INDICATED)
 CIRCUIT BREAKER (RATINGS AS INDICATED)
 PANELBOARD (REFER TO SCHEDULES)
 PANELBOARD (REFER TO SCHEDULES) MULTI-SECTION
 TRANSFORMER (TYPE AND RATINGS AS INDICATED)
 SHIELDED TRANSFORMER (TYPE AND RATINGS AS INDICATED)
 SWITCHGEAR, SWITCHBOARD AND/OR DISTRIBUTION PANELBOARD (TYPE, RATING, DEVICES AND ACCESSORIES AS INDICATED)
 UTILITY METER (AS REQUIRED BY UTILITY)
 GROUND CONNECTION
 CONTACT (OPEN OR CLOSED)
 HEATER
 MOTOR
 BLOCK LOAD KW OR KVA
 FAULT POINT REFERENCED IN SHORT CIRCUIT CURRENT AND VOLTAGE DROP SPREADSHEET

WIRING DEVICES & BOXES

SINGLE POLE WALL SWITCH (NO LETTER DESIGNATION)
 SWITCH LETTER DESIGNATIONS AS FOLLOWS:
 2 = TWO POLE
 3 = THREE WAY
 K = KEYPAD
 OS = OCCUPANCY SENSOR
 P = SPST PILOT LIGHT
 CEILING MOUNTED OCCUPANCY SENSOR WITH POWER SUPPLY AND LOAD RELAY AS REQUIRED OR SPECIFIED.
 DUPLEX RECEPTACLE - NEMA 5-20R, UNO
 DOUBLE DUPLEX RECEPTACLE - NEMA 5-20R, UNO
 GFCI TYPE RECEPTACLE*
 ISOLATED GROUND TYPE RECEPTACLE*
 RECEPTACLE INSTALLED ABOVE COUNTER OR BACKSPASH*
 RECEPTACLE INSTALLED IN CEILING*
 RECEPTACLE INSTALLED IN FLOOR*
 RECEPTACLE LETTER DESIGNATIONS AS FOLLOWS:
 E = ISOLATED GROUND
 S = SWITCHED
 WP = WEATHER PROOF COVER
 WR = WEATHER RESISTANT
 TELEPHONE OUTLET
 DATA OUTLET
 THERMOSTAT/TEMPERATURE SENSOR
 JUNCTION BOX/OUTLET BOX

POWER EQUIPMENT & DEVICES

ELECTRICAL SERVICE PANELBOARD (SURFACE OR FLUSH MOUNT)
 TERMINAL CABINET (SURFACE OR FLUSH MOUNT), TYPE AS NOTED
 PLYWOOD TERMINAL BOARD FOR TELEPHONE SYSTEM, UNO, SIZE AS NOTED
 TRANSFORMER
 MOTOR
 DISCONNECT SWITCH - "200Y/150/3R" DENOTES AMPERE/POLE/FUSE NEMA RATING, NF = NON-FUSED, CB = CIRCUIT BREAKER (CIRCUIT), NO VALUE (200Y/150) FOR NEMA ENCL MEANS STANDARD NEMA 1 RATING
 COMBINATION DISCONNECT (SAFETY) SWITCH AND MOTOR STARTER "200Y/150/3R" DENOTES AMPERE/POLE/FUSE NEMA RATING, NF = NON-FUSED, CB = CIRCUIT BREAKER (CIRCUIT), NO VALUE (200Y/150) FOR NEMA ENCL MEANS STANDARD NEMA 1 RATING
 RELAY OR CONTACTOR (IN SCHEMATICS)
 MAGNETIC CONTACTOR, SIZE, COIL VOLTAGE AND NUMBER OF POLES AS INDICATED (BLANK = LTG CONTACTOR, P = POWER CONTACTOR)
 TIME SWITCH
 PHOTOCELL
 PUSH BUTTON
 MUSHROOM-TYPE PUSH BUTTON

ANNOTATION

ELECTRICAL PLAN NOTE CALLOUT
 ROUTE THROUGH ELECTRICAL CONTACTOR
 EQUIPMENT DESIGNATION (OWNER FURNISHED, CONTRACTOR INSTALLED)
 CONNECTION POINT OF NEW WORK TO EXISTING
 DETAIL REFERENCE UPPER NUMBER INDICATES DETAIL NUMBER, LOWER NUMBER INDICATES SHEET NUMBER
 SECTION CUT DESIGNATION

STANDARD MOUNTING HEIGHTS

CONTROLS (TOP OF DEVICE)
 EXIT SIGNS (WALL MOUNT)
 RECEPTABLES
 SAFETY SWITCH (TOP OF SWITCH)
 TELEPHONE OUTLETS
 TELEVISION OUTLET (TOP)
 REFER TO ARCH DRAWINGS

USE THE DEFAULT MOUNTING HEIGHTS SHOWN ABOVE UNLESS NOTED OTHERWISE IN THE SPECIFICATIONS OR OTHERWISE. MOUNTING HEIGHTS LISTED ARE ABOVE FINISHED FLOOR (AFF) OR ABOVE FINISHED GRADE (AFG) TO BOTTOM OF OUTLET BOX. ALL DEVICES SHALL BE INSTALLED IN CONFORMANCE WITH CURRENT ADA AND LOCAL REQUIREMENTS.

ABBREVIATIONS

AF	AMPERE FRAME SIZE	MCC	MAIN CIRCUIT BREAKER
AF C	ABOVE FINISHED CEILING	MCC	MOTOR CONTROL CENTER
AF F	ABOVE FINISHED FLOOR	MR	MANUFACTURER
AF G	ABOVE FINISHED GRADE	MLO	MANUFACTURER ONLY
AHJ	AUTHORITY HAVING JURISDICTION	MOCP	MAXIMUM OVERCURRENT PROTECTION
AHU	AIR HANDLING UNIT	N/A	NOT APPLICABLE
AIC	AMPERE INTERRUPTING CAPACITY	NF	NON-FUSED
AS	AMPERE SWITCH	NL	NIGHT LIGHT (24HR ON)
ATS	AUTOMATIC TRANSFER SWITCH	NRTL	NATIONALLY RECOGNIZED TESTING LAB (CSA, ETL, NSF, UL)
BAS	BUILDING AUTOMATION SYSTEM	OS	PARTIAL CIRCUIT SWITCHING
BKR	BREAKER	P	POLE
CB	CIRCUIT BREAKER	PB	PARTIAL CIRCUIT SWITCHING
CAT	CATEGORY	P	POLE
CATV	CABLE TELEVISION SYSTEM	PH	PHASE
CCTV	CLOSED CIRCUIT TELEVISION	PNL	PANELBOARD
CT	CURRENT TRANSFORMER	PNL	PANELBOARD
CVD	CUMULATIVE VOLTAGE DROP	PROVIDE	FURNISH AND INSTALL
DEMO	DEMOLITION	QTY	QUANTITY
DDPT	DOUBLE-POLE, DOUBLE-THROW	RCPT	RECEPTACLE
DPST	DOUBLE-POLE, SINGLE-THROW	RELOCATE	RELOCATE
EJ	EXISTING	RLA	RUNNING LOAD AMPS
EC	ELECTRICAL CONTRACTOR	RTU	ROOF TOP UNIT
EF	EXHAUST FAN	SCCR	SHORT CIRCUIT CURRENT RATING
EM	EMERGENCY	SP	SINGLE POLE
EMS	ENERGY MANAGEMENT SYSTEM	SFPT	SINGLE-THROW, PUSH-TO-MAKE
EIR	EXISTING TO REMAIN	SFST	SINGLE-THROW, SAFETY SWITCH
EWC	ELECTRIC WATER COOLER	SIBD	SWITCHBOARD
FAAP	FIRE ALARM ANNUNCIATOR PANEL	ISR	ISOLATED GROUND
FACP	FIRE ALARM CONTROL PANEL	IS	ISOLATED GROUND
FCA	FIRE ALARM CONTROL PANEL	IS	ISOLATED GROUND
FCC	FIRE ALARM CONTROL PANEL	IS	ISOLATED GROUND
FF	FULL LOAD	IS	ISOLATED GROUND
FLOOR	FLOOR	IS	ISOLATED GROUND
GENERAL	GENERAL	IS	ISOLATED GROUND
GROUNDING	GROUNDING	IS	ISOLATED GROUND
CONDUCTOR	CONDUCTOR	IS	ISOLATED GROUND
UNDERGROUND	UNDERGROUND	IS	ISOLATED GROUND
UNDERSLAB	UNDERSLAB	IS	ISOLATED GROUND
UNDERSLAB	UNDERSLAB	IS	ISOLATED GROUND
UNIT HEATER	UNIT HEATER	IS	ISOLATED GROUND
UNO	UNLESS NOTED OTHERWISE	IS	ISOLATED GROUND
UNINTERRUPTIBLE POWER SUPPLY	UNINTERRUPTIBLE POWER SUPPLY	IS	ISOLATED GROUND
VOLTAGE DROP	VOLTAGE DROP	IS	ISOLATED GROUND
WIRE	WIRE	IS	ISOLATED GROUND
WEATHER PROOF	WEATHER PROOF	IS	ISOLATED GROUND
WEATHER RESISTANT	WEATHER RESISTANT	IS	ISOLATED GROUND
WATER TIGHT	WATER TIGHT	IS	ISOLATED GROUND

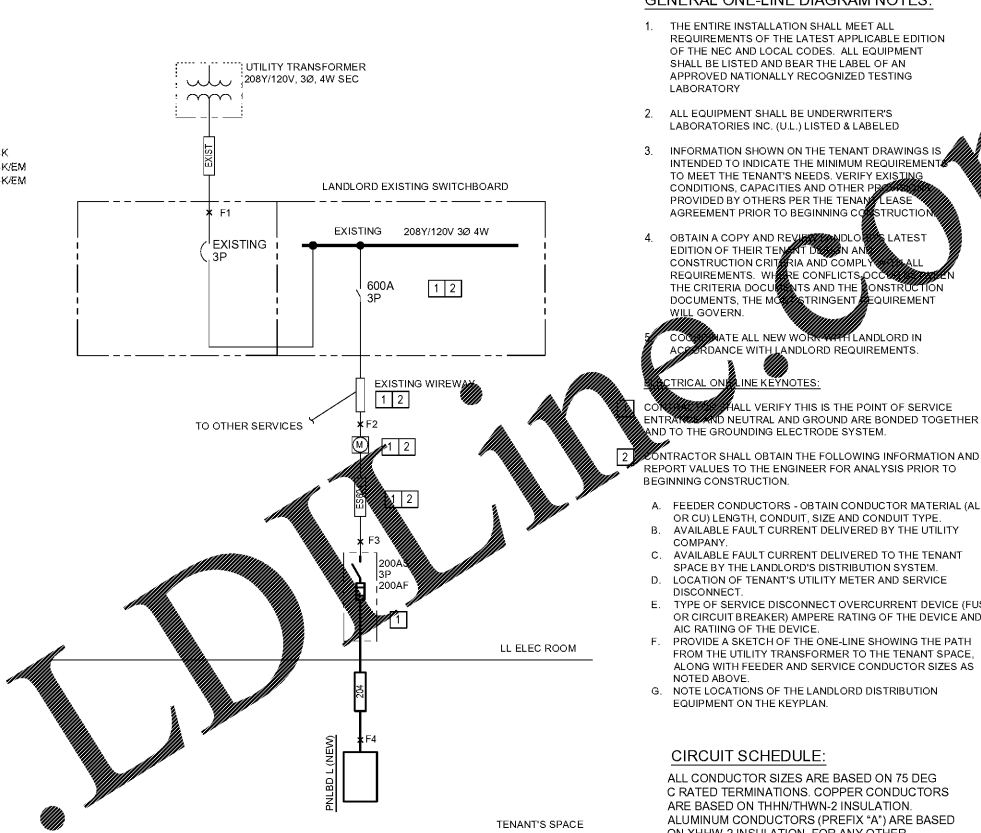
PANELBOARD: L

FED FROM: LL DISCONNECT
 BUS: AMPS: 225A
 MAIN SIZE/TYPE: 200A MCB
 VOLTS/PHASE: 208Y/120V, 3Ø, 4W, 3PH
 SECTION: 1
 LOCATION: STOCKROOM, ROOM# 104

CKT NO.	DESCRIPTION	VOLT/AMPS/PHASE			WIRE NO.	BKR NO.	P	BKR WIRE NO.	VOLT/AMPS/PHASE			DESCRIPTION	CKT NO.	
		A	B	C					A	B	C			
1	RCPT - STOREFRONT	1,080			12	20	1	15	12	882			2	
3	RCPT - SECURITY SYSTEM	180			12	20	1	15	12	1,071			4	
5	RCPT - SALES 1			900	12	20	1	1	20	12			6	
7	RCPT - SALES 2	360			12	20	1	1	20	12	342		8	
8	RCPT - SALES 3	900			12	20	1	1	20	12	342		10	
11	SPARE				20	1	1	20	12				12	
13	RCPT - CASH WRAP	720			12	20	1	1	20	12	168		14	
15	RCPT - BACK WRAP	720			12	20	1	1	20	12			16	
17	RCPT - MANAGER'S DESK 1			360	12	20	1	1	20	12	1,200		18	
19	RCPT - MANAGER'S DESK 2	360			12	20	1	1	20	12	540		20	
21	RCPT - RESTROOM	680			12	20	1	1	20	12			22	
23	RCPT - TELEPHONE BOARD			360	12	20	1	1	20	12			24	
25	RCPT - BACK OF HOUSE	360			12	20	1	1	20	12	120		26	
27	BUZZER	200			12	20	1	1	20	12			28	
29	SPARE				20	1	1	20	12				30	
31	SPARE				20	1	1	20	12				32	
33	FCU-1	4.25		6.25	12	15	3	1	20	12			34	
35	SPARE				1	20	1	20	12				36	
37	CU-1	3,014			1	20	1	20	12	200			38	
39	CU-1	3,014			10	30	3	2	20	12	1,250		40	
41	SPARE									1,250			42	
SUB-TOTAL		6,512	6,319	5,208							2,301	3,198	3,493	

TENANT ELECTRICAL SERVICE LOAD SUMMARY

LOAD DESCRIPTION	Connected KVA	Demand Factor	Demand KVA
HVAC - SUMMER	9.04	100%	9.04
HVAC - WINTER	0.00	100%	0.00
COOLING	4.99	125%	3.62
RECEPTABLES	6.66	100%/50%	6.66
MOTOR LOADS	0.67	100%	0.67
LARGEST MOTOR LOAD	1.73	125%	1.36
SUPPLEMENTAL ELECTRIC HEAT	2.60	100%	2.60
MISCELLANEOUS EQUIPMENT	1.30	100%	1.30
DISPLAY CASE/SIGNAGE	1.20	75%	0.90
SHOW WINDOW / TRACK LIGHTING	6.2	PER	7.5
TOTAL LOAD	23.5	KVA	26.0
TOTAL AMPACITY	94	AMPS	100
SERVICE AMPACITY		AMPS	
SPARE CAPACITY		AMPS	



1 ELECTRICAL ONE-LINE DIAGRAM
 NOT TO SCALE

FAULT CURRENT VALUES SHOWN ON THIS DIAGRAM WERE CALCULATED USING THE STARTING VALUE OF 55,000 FCA AT THE LANDLORD SWITCHBOARD. CONTRACTOR TO VERIFY FAULT CURRENT VALUE WITH UTILITY PRIOR TO START OF CONSTRUCTION. IF FIELD VERIFIED AIC PANEL RATINGS DO NOT EXCEED THE AMOUNT OF THE CALCULATED FAULT CURRENT VALUES. CONTRACTOR SHALL COORDINATE WITH ENGINEER TO PROVIDE NEW EQUIPMENT.

GENERAL ONE-LINE DIAGRAM NOTES:

- THE ENTIRE INSTALLATION SHALL MEET ALL REQUIREMENTS OF THE LATEST APPLICABLE EDITION OF THE NEC AND LOCAL CODES. ALL EQUIPMENT SHALL BE LISTED AND BEAR THE LABEL OF AN APPROVED NATIONALLY RECOGNIZED TESTING LABORATORY.
- ALL EQUIPMENT SHALL BE UNDERWRITERS LABORATORIES INC. (UL) LISTED & LABELED.
- INFORMATION SHOWN ON THE TENANT DRAWINGS IS INTENDED TO INDICATE THE MINIMUM REQUIREMENT TO MEET THE TENANT'S NEEDS. VERIFY EXISTING CONDITIONS, CAPACITIES AND OTHER PRE-CONSTRUCTION DOCUMENTS, THE MINIMUM REQUIREMENT WILL GOVERN.
- OBTAIN A COPY AND REVIEW THE LATEST EDITION OF THEIR TENANT DRAWINGS AND CONSTRUCTION CRITERIA AND COMPLIANCE WITH ALL REQUIREMENTS. WHERE CONFLICTS OCCUR, THE TENANT'S DRAWINGS AND CONSTRUCTION DOCUMENTS, THE MINIMUM REQUIREMENT WILL GOVERN.
- COORDINATE ALL NEW WORK WITH LANDLORD IN ACCORDANCE WITH LANDLORD REQUIREMENTS.
- CONTRACTOR SHALL VERIFY THIS IS THE POINT OF SERVICE ENTRY TO THE TENANT'S SPACE AND NEUTRAL AND GROUND ARE BONDED TOGETHER AND TO THE GROUNDING ELECTRODE SYSTEM.
- CONTRACTOR SHALL OBTAIN THE FOLLOWING INFORMATION AND REPORT VALUES TO THE ENGINEER FOR ANALYSIS PRIOR TO BEGINNING CONSTRUCTION:
 - FEEDER CONDUCTORS - OBTAIN CONDUCTOR MATERIAL (AL OR CU) LENGTH, CONDUIT, SIZE AND CONDUIT TYPE.
 - AVAILABLE FAULT CURRENT DELIVERED BY THE UTILITY COMPANY.
 - AVAILABLE FAULT CURRENT DELIVERED TO THE TENANT SPACE BY THE LANDLORD'S DISTRIBUTION SYSTEM.
 - LOCATION OF TENANT'S UTILITY METER AND SERVICE DISCONNECT.
 - TYPE OF SERVICE DISCONNECT/OVERCURRENT DEVICE (FUSE OR CIRCUIT BREAKER) AMPERE RATING OF THE DEVICE AND AIC RATING OF THE DEVICE.
 - PROVIDE A SKETCH OF THE ONE-LINE SHOWING THE PATH FROM THE UTILITY TRANSFORMER TO THE TENANT SPACE ALONG WITH FEEDER AND SERVICE CONDUCTOR SIZES AS NOTED ABOVE.
 - NOTE LOCATIONS OF THE LANDLORD DISTRIBUTION EQUIPMENT ON THE KEYPLAN.

CIRCUIT SCHEDULE:

- ALL CONDUCTOR SIZES ARE BASED ON 75 DEG C RATED TERMINATIONS. COPPER CONDUCTORS ARE BASED ON THHN/THWN-2 INSULATION. ALUMINUM CONDUCTORS (PREFIX 'A') ARE BASED ON XHHW-2 INSULATION. FOR ANY OTHER CONDITIONS ALLOWED PER SPECIFICATIONS, OR FOR TERMINATIONS OR INSULATION TYPES RATED LESS THAN 75 DEG C, MODIFY SIZES ACCORDING TO NFPA 70.
- EXIST - EXISTING TO REMAIN
 EXIST60 - EXISTING 600A, (2) 3" C, EACH W/ (4)-350KCMIL
 200 - 200A, (4)3Ø, (1)Ø60, EXISTING 2" C

Short Circuit and Voltage Drop Calculations

Distances are for calculations purposes only and shall not be used for contractor takeoff or 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:
 $I_{SC} = I_{SC} \times \frac{MVA}{MVA} \times \frac{1}{MVA}$
 $I_{SC} = \frac{V_p}{Z_{total}}$
 $I_{SC} = \frac{V_p}{Z_{source} + Z_{line} + Z_{load}}$
 $Z_{total} = Z_{source} + Z_{line} + Z_{load}$
 $Z_{source} = \frac{V_p}{I_{SC}}$
 $Z_{line} = \frac{V_p}{I_{SC}} - Z_{source} - Z_{load}$
 $Z_{load} = \frac{V_p}{I_{SC}} - Z_{source} - Z_{line}$

Feeder Types =
 NM - Non Magnetic Conduit, M - Magnetic Conduit, FB - Feeder Busway, PB - Plug-in Busway, TX - Transformer

Point (F/F#)	Bus/Feeder Description	Source (Fault Point)	Phase	Source (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)	Type	Degree Rise	KVA	Existing Xmm ²	Secondary Xmm ²	Tap Voltage Setting	f	M	Fault Current (amps)	Voltage Drop (%VD)	Cumulative Voltage Drop (%VD)	Fault Point (F/F#)	
1	Utility Service Point Motor Contribution			65,000 at the tenant metering vault/boiler			300 The connected full load motor amps (includes compressors) on the system																					1	
2	EXISTING WIREWAY	1	3	68800	M	CU	2 Sets) of 350 kcmil	19704	--	208	10	0.9	980	0.000039	0.000050	0.451027								0.141	0.88	58537	-0.23%	-0.23%	2
3	TO LL DISCONNECT	2	3	58537	M	CU	2 Sets) of 350 kcmil	19704	--	208	1	0.9	160	0.000039	0.000050	0.451027								0.012	0.89	57822	0.00%	-0.23%	3
4	TO PANEL L	3	3	57822	M	CU	1 Set) of 3/0 AWG	12844	--	208	75	0.9	160	0.000079	0.000052	0.451027								2.612	0.26	15170	-0.94%	-1.17%	4

RGLA
 robert g. lyon + associates, inc.
 5100 Schriber Park, IL 60178
 P: 847.671.7452
 F: 847.671.4200
 www.rgla.com

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robert g. lyon + associates, inc.
 5100 Schriber Park, IL 60178
 P: 847.671.7452
 F: 847.671.4200
 www.rgla.com

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VANS
 "OFF THE WALL" SINCE 1966
 VANS #522
 AVENUE MALL
 19501 BISCAYNE BLVD
 SPACE #311
 AVENUE, FL 33180

ELECTRICAL SCHEDULES, SYMBOLS, RISER DIAGRAM

DRAWN BY
 RPH
 CHECKED BY
 ELW
 JOB NUMBER
 17182-522
 SHEET NAME
 E-1.3

HENDERSON ENGINEERS
 8345 LENEVA DRIVE, SUITE 300
 LENOVA, KS 66214
 TEL (913) 742-5000 FAX (913) 742-5001
 WWW.HENDERSONENGINEERS.COM
 1750003858
 FL CERTIFICATE OF AUTHORIZATION # EB 7606
 EXPIRES 02/28/19