

ABBREVIATIONS		
AIC	=	SHORT-CIRCUIT AMPS INTERRUPTING CAPACITY
BSC	=	BIO-SAFETY CABINET
C.O.	=	CONDUIT ONLY
EM	=	EMERGENCY (OPTIONAL STANDBY)
NEC	=	NATIONAL ELECTRICAL CODE
PNL	=	PANEL
RECEPT.	=	RECEPTACLE
U.C.	=	UNDER COUNTER
U.O.N.	=	UNLESS OTHERWISE NOTED
W.P.	=	WEATHERPROOF

LAB ELECTRICAL GENERAL NOTES		
A.	CONTRACTOR SHALL FAMILIARIZE HIMSELF WITH LAYOUT AND DETAIL CONDITIONS BY CONSULTING THE LABORATORY FURNISHINGS AND PLUMBING DRAWINGS WHICH SHOW SPACE LIMITATIONS AND EQUIPMENT MODIFICATIONS, RACEWAYS, UMBILICALS, REAGENT SHELVES, HOODS, ETC.	
B.	CONTRACTOR SHALL VERIFY EXACT REQUIREMENTS WITH OTHER TRADES PRIOR TO ANY JOB DIMENSIONS, FABRICATION AND INSTALLATION OF ELECTRICAL EQUIPMENT.	
C.	ALL CONDUIT AND J-BOXES IN CEILING AREA SHALL BE RUN IN A FUNCTIONAL PATTERN OR DIRECT UNIFORMITY (PARALLEL TO OR VERTICAL) WITH OTHER TRADES. (SPRINKLERS, PLUMBING LINES, DUCTS, STRUCTURAL MEMBERS, ETC.)	
D.	NO MORE THAN FOUR 90° BENDS SHALL EXIST IN ANY CONDUIT RUN. ELECTRICAL CONTRACTOR SHALL PROVIDE ADDITIONAL JUNCTION BOXES WHERE REQUIRED.	
E.	ALL RECEPTACLES SHALL BE IDENTIFIED AS TO PANEL AND CIRCUIT DESIGNATION (I.E., 1LPA-22) LOCATED NEAR BOTTOM OF RECEPTACLE. ALL RECEPTACLES EXCEPT FOR THE REGULAR 20A, 125V RECEPTACLES SHALL BE IDENTIFIED AS TO VOLTAGE, PHASE AND AMPERAGE (I.E., 208V, 1Ø, 30A) LOCATED NEAR TOP OF RECEPTACLE. USE ENGRAVED 1/8" BLACK LETTERS. RECEPTACLES ON EMERGENCY CIRCUITS SHALL BE LABELED "EMERG."	
F.	ALL CONDUITS AND SURFACE RACEWAYS SHALL CONTAIN SEPARATE EQUIPMENT GROUNDING CONDUCTOR SIZED PER N.E.C. TABLE 250.95.	
G.	ELECTRICAL RECEPTACLES SHALL BE SPACED AS SHOWN ON LABORATORY ELECTRICAL PLANS. RECEPTACLES SHALL NOT BE LOCATED BEHIND CUP SINKS OR SINKS. ALL RECEPTACLES SHALL BE OF GRAY COLOR.	
H.	ALL METALLIC OSHA AND FLAMMABLE STORAGE CABINETS SHALL BE GROUNDED. RUN AND CONNECT WITH 1/2" C, 1 #10 TO GROUND BUS OF NEARBY LABORATORY ELECTRICAL PANELBOARD SERVING RESPECTIVE AREA. SEE LAB FURNITURE DRAWINGS AND SPECIFICATIONS FOR TYPE OF CABINETS, LOCATIONS AND TERMINATIONS.	
I.	FURNISH AND INSTALL COMPLETE ELECTRICAL WORK FOR POWER CIRCUITS FOR ENVIRONMENTAL ROOM UP TO AND INCLUDING JUNCTION BOX OUTSIDE AND ABOVE ENVIRONMENTAL ROOM. ALSO FURNISH AND INSTALL COMPLETE ELECTRICAL WORK FOR POWER RECEPTACLES SHOWN IN ENVIRONMENTAL ROOMS AND COORDINATE ENTRANCE INTO ROOM WITH ENVIRONMENTAL ROOM MANUFACTURER. EXCEPT FOR REQUIREMENTS STATED ABOVE, ENVIRONMENTAL ROOM MANUFACTURER SHALL PROVIDE A COMPLETE PACKAGED ELECTRICAL WORK INCLUDING CONTROL PANEL WITH OVERCURRENT DEVICES AND COMPLETE WIRING UP TO POWER CIRCUIT JUNCTION BOX. ENVIRONMENTAL ROOM MANUFACTURER SHALL ALSO PROVIDE A COMPLETE ELECTRICAL WORK INCLUDING FUSED DISCONNECT SWITCHES AND MOTOR STARTERS FOR REMOTE COMPRESSORS. POWER CIRCUITS FOR REMOTE COMPRESSORS ARE PROVIDED UNDER CATEGORY "E" BUILDING ELECTRICAL DRAWINGS.	
J.	SURFACE METALLIC RACEWAYS SHALL BE COMPLETE, INCLUDING BASES, COVERS, END PLATES, WIRING, RECEPTACLES, FITTINGS AND CONNECTIONS, AND OF EXACT LENGTHS TO MATCH THE LENGTHS OF THE CABINETS AND SHELVINGS OR FLUSH WITH OUTSIDE FACES OF CENTER SHELF SUPPORTS FOR ISLAND BENCHES AS INDICATED ON LABORATORY FURNITURE SHOP DRAWINGS SINCE THE LENGTHS SHOWN ON ELECTRICAL DRAWINGS ARE ILLUSTRATIVE AND DIAGRAMMATIC ONLY AND ARE NOT ACCURATE. RACEWAY SHALL BE INSTALLED SO THAT NOTCH PROVIDED FOR REMOVING FACEPLATE SHALL BE AT BOTTOM.	
K.	WHERE ELECTRICAL WORK IS INDICATED FOR CONTRACTOR TO "PROVIDE" MEANS TO "FURNISH AND INSTALL".	
L.	CONDUCTORS SHALL BE TYPE "THHN" (DRY LOCATION) OR "THWN" (DRY AND WET LOCATIONS), RATED 600 VOLTS, COPPER.	
M.	ALL INDIVIDUAL WALL OUTLETS INCLUDING WALL OUTLETS FOR SURFACE METALLIC RACEWAYS SHALL BE RECESSED WALL TYPE, EXCEPT WHERE LOCATED ON SOLID CONCRETE WALLS AND INSIDE ENVIRONMENTAL ROOMS, SHALL BE SURFACE MOUNTED. SURFACE MOUNTED OUTLET BOXES SHALL BE CAST TYPE CROUSE HINDS "FS" OR "FD" TYPE, OR EQUAL. EXPOSED CONDUITS INSIDE ENVIRONMENTAL ROOMS SHALL BE RIGID STEEL.	
N.	RECESSED WALL OUTLETS LOCATED IN OPPOSITE SIDES OF COMMON WALL SHALL NOT BE INSTALLED BACK-TO-BACK.	
O.	FOR AIC RATINGS AND TYPE OF PANELBOARDS, SEE BUILDING ELECTRICAL DRAWINGS AND SPECIFICATIONS.	
P.	FOR CIRCUITING OF MULTI-OUTLET CIRCUITS FOR GENERAL PURPOSE RECEPTACLES IN RACEWAYS, SEE BASIC CIRCUITING METHOD ILLUSTRATIVE DETAIL 1/LE-12.	
Q.	FOR EVERY RECESSED WALL TYPE LABORATORY POWER PANELBOARD, PROVIDE SPARE 3/4-INCH CONDUITS FROM PANEL STUBBED UP INTO NEARBY ACCESSIBLE SPACE ABOVE CEILING OF RESPECTIVE LABORATORY AREA BEING SERVED. ONE CONDUIT FOR EVERY THREE SINGLE POLE SPARES AND SPACES INDICATED ON PANELBOARD SCHEDULE.	
R.	EACH LABORATORY POWER PANELBOARD SHALL BE PROVIDED COMPLETE WITH A 98 PERCENT CONDUCTIVITY COPPER GROUND BUS, SECURED TO THE INTERIOR OF THE ENCLOSURE, RATED NOT LESS THAN 25 PERCENT OF THE MAIN BUS AMPACITY. THE GROUND BUS SHALL HAVE A SEPARATE LUG FOR EACH GROUND CONDUCTOR.	
S.	AT CONDUIT TERMINATIONS, PROVIDE INSULATED BUSHINGS FOR CONDUCTOR PROTECTION.	

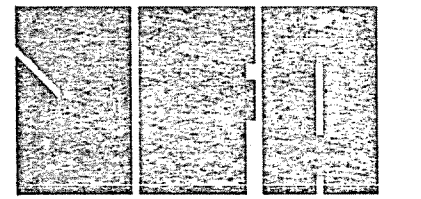
LABORATORY ELECTRICAL SYMBOLS LIST																						
SYMBOL	DESCRIPTION	REMARKS																				
	FLUSH FLOOR BOX WITH ELBOW AND FLUSH FLOOR COUPLING.																					
	DUPLEX RECEPTACLE OUTLET IN FLUSH FLOOR BOX.	A. PROVIDE MATCHING TYPE PLUGS FOR EACH RECEPTACLE EXCEPT FOR THE NEMA 5-20R (STRAIGHT BLADE) RECEPTACLE. B. INDIVIDUAL RECEPTACLES SHALL BE @ +45" U.O.N. C. WHERE INSTALLED IN SURFACE METALLIC RACEWAY, RECEPTACLES RATED 30A AND LARGER SHALL BE TWISTLOCK TYPE, INSTEAD OF THE STRAIGHT BLADE TYPE. D. RECEPTACLES WITH SUBSCRIPT "EM" ARE ON EMERGENCY CIRCUITS (OPTIONAL STANDBY) AND OF RED COLOR. SEE GENERAL NOTES. INSTALL IN WALL AT +50"																				
	DUPLEX OUTLET - 20A, 125V, 2 POLE, 3 WIRE, NEMA 5-20R																					
	GROUND FAULT CIRCUIT INTERRUPTER (GFCI) DUPLEX OUTLET - 20A, 125V																					
	DOUBLE DUPLEX OUTLET																					
	SINGLE OUTLET 20A, 125V, 2 POLE, 3 WIRE, NEMA 5-20R. SUBSCRIPT INDICATES THE FOLLOWING: A = 30A, NEMA 5-30R																					
	SINGLE OUTLET 20A, 250V, 1 PHASE 2 POLE, 3 WIRE NEMA 6-20R. SUBSCRIPT INDICATES THE FOLLOWING: A = 30A, NEMA 6-30R																					
	SINGLE OUTLET- 20A, 125/250V, 3 POLE, 4 WIRE, GROUNDING, NEMA 14-20R. SUBSCRIPT INDICATES THE FOLLOWING: A = 30A, NEMA 14-30R																					
	OUTLET PROVIDED BY OTHER SECTION OF WORK	WHERE LOCATED IN FUME HOOD SHALL BE PROVIDED BY FUME HOOD MANUFACTURER																				
	TYPE "A" SURFACE MOUNTED DOUBLE COMPARTMENT METALLIC RACEWAY, SEE SPECS. AND REFERENCE NOTES BELOW.																					
	PEDISTAL MOUNTED RECEPTACLE OUTLETS. PEDESTAL COMPLETE WITH SAME FINISH FACEPLATE FURNISHED AND INSTALLED BY LABORATORY FURNISHING CONTRACTOR. RECEPTACLES FURNISHED AND INSTALLED BY ELECTRICAL CONTRACTOR.																					
	CIRCUIT BREAKER PANEL. SEE PANEL SCHEDULES FOR SIZE, PHASE, AMPS, AND VOLTAGE	MAX. +6'- 6" TO TOP																				
	2P OR 3P (AS REQUIRED) DISCONNECT SWITCH. LETTER SUBSCRIPTS INDICATE SWITCH SIZES AND NUMBER SUBSCRIPTS INDICATE DUAL-ELEMENT TIME DELAY FUSE SIZES, AS FOLLOWS: <table><tr><th>SWITCH SIZE</th><th>FUSE SIZE</th></tr><tr><td>A = 30 AMPS</td><td>15 = 15 AMP</td></tr><tr><td>B = 60 AMPS</td><td>20 = 20 AMP</td></tr><tr><td>C = 100 AMPS</td><td>30 = 30 AMP</td></tr><tr><td></td><td>35 = 35 AMP</td></tr><tr><td></td><td>40 = 40 AMP</td></tr><tr><td></td><td>45 = 45 AMP</td></tr><tr><td></td><td>50 = 50 AMP</td></tr><tr><td></td><td>60 = 60 AMP</td></tr><tr><td></td><td>ETC.</td></tr></table>	SWITCH SIZE	FUSE SIZE	A = 30 AMPS	15 = 15 AMP	B = 60 AMPS	20 = 20 AMP	C = 100 AMPS	30 = 30 AMP		35 = 35 AMP		40 = 40 AMP		45 = 45 AMP		50 = 50 AMP		60 = 60 AMP		ETC.	PROVIDE 250 VOLT, HEAVY DUTY TYPE +5'-0".
SWITCH SIZE	FUSE SIZE																					
A = 30 AMPS	15 = 15 AMP																					
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	ETC.																					
	REFERENCE NOTE DESIGNATION																					
	PANEL DESIGNATION																					
	INDICATES MOUNTING HEIGHT OF 45" FROM FINISHED FLOOR TO CENTER (U.O.N.) OF OUTLET BOX OR DEVICE	REFERENCE POINT AT FLOOR SHALL BE AT SAME FLOOR HIGH POINT SELECTED BY LAB FURNISHING CONTRACTOR AND SHALL BE THE COMMON ROOM REFERENCE POINT. COORDINATE WITH GENERAL CONTRACTOR.																				
	TV OUTLET	SHOWN FOR REFERENCE LOCATION ONLY. SEE BUILDING ELECTRICAL DRAWINGS FOR REQUIREMENTS.																				

REFERENCE NOTES (SURFACE METALLIC RACEWAYS):

- ALL SURFACE METALLIC RACEWAYS SHOWN (AT WALLS AND AT ISLAND BENCHES) SHALL BE DOUBLE COMPARTMENT TYPE. SEE SPECS. TOP COMPARTMENT SHALL BE COMMON FOR BOTH NORMAL POWER AND EMERGENCY (OPTIONAL STANDBY) POWER AND BOTTOM COMPARTMENT FOR TELCO/DATA SYSTEM. EACH COMPARTMENT SHALL HAVE SEPARATE COVER PLATES (IN 12-INCH SECTIONS).
- WHERE RACEWAYS ARE SHOWN WITH TELCO/DATA OUTLETS, PROVIDE CUTOUTS AND/OR OUTLETS IN THE TELCO/DATA COVERPLATES AS REQUIRED UNDER THE CATEGORY "E" BUILDING ELECTRICAL DRAWINGS.
- WHERE RACEWAYS ARE NOT SHOWN WITH TELCO/DATA OUTLETS, FOR EACH LENGTH OF RACEWAY RUNNING ALONG A WALL OR THE LENGTH OF AN ISLAND BENCH, PROVIDE ONE CUT-OUT SMOOTH KNOCKOUT TYPE FOR FUTURE PUNCH-OUT CENTERED ALONG THE LENGTH OF THE RACEWAY IN THE TELCO/DATA COVER PLATE. TYPE OF CUTOUT SHALL BE AS REQUIRED UNDER THE CATEGORY "E" BUILDING ELECTRICAL DRAWINGS.
- FOR EACH LENGTH OF RACEWAY RUNNING ALONG A WALL, STUB UP ONE 1-1/4" CONDUIT FROM THE OUTLET BOX FOR THE TELCO/DATA COMPARTMENT, UP IN WALL AND IN ACCESSIBLE CEILING AND TERMINATE IN NEARBY TELCO/DATA CLOSET.
- FOR EACH ISLAND BENCH, STUB ONE 1-1/4" CONDUIT AT TOP OF ISLAND BENCH UMBILICAL IN ACCESSIBLE CEILING SPACE AND RUN TO NEARBY TELCO/DATA CLOSET.
- SEE CATEGORY "E" BUILDING ELECTRICAL DRAWINGS FOR LOCATIONS OF TELCO/DATA CLOSETS.
- WALL MOUNTED RACEWAYS SHALL BE MOUNTED AT +45" U.O.N.
- SEE ISLAND BENCH DETAILS ON LAB FURNISHING DRAWINGS FOR LOCATIONS OF RACEWAYS AT ISLAND BENCHES.
- WHERE TELCO/DATA CABLING ARE REQUIRED, SEE CATEGORY "E" BUILDING ELECTRICAL DRAWINGS.

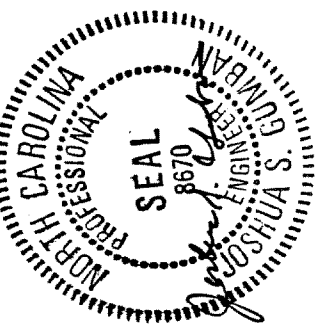
LABORATORY ELECTRICAL SYMBOLS LIST		
SYMBOL	DESCRIPTION	REMARKS
	CONDUIT RUN CONCEALED IN CEILING OR IN WALL U.O.N.	
	CONDUIT RUN EXPOSED	
	CONDUIT RUN IN OR BELOW FLOOR SLAB	
	FLEXIBLE CONDUIT	
	CONDUIT SEAL - VAPORPROOF	
	HOMERUN TO PANELBOARD "1LPA" WITH 4 #12 (PLUS EQUIPMENT GROUND - NOT SHOWN), 3/4" C AND CONNECT TO CIRCUITS 1, 3 AND 5. USE SIZE #10 CONDUCTORS FOR ANY 20A-120V BRANCH CIRCUIT RUN OVER 100 FT. IN LENGTH	PROVIDE ALL CONDUIT RUNS WITH GREEN EQUIPMENT GROUNDING CONDUCTORS SIZED PER NEC TABLE 250-95. ALLOW FOR THE ADDITIONAL EQUIPMENT GROUNDING CONDUCTORS IN DETERMINING PROPER CONDUIT SIZES. LONGER HASHMARK INDICATES NEUTRAL CONDUCTOR.
	CONDUIT RUNS WITHOUT HASHMARKS SHALL INDICATE 2 #12 (PLUS GROUND), 3/4" C, U.O.N.	
	ALL CONDUCTORS SHALL BE AWG SIZE #12 UNLESS OTHERWISE NOTED. WHERE SO NOTED, NUMBER DESIGNATED SHALL INDICATE THE AWG SIZE FOR CONDUCTORS TO BE USED. CONDUIT SIZE PER CONDUIT TABLE.	
	CONDUIT SIZE TABLE FOR #12 CONDUCTORS (3/4" C MIN.)	
	UP TO 8 #12 — = 3/4" C 9 #12 TO 13 #12 — = 1" C	
	CONDUIT SIZE TABLE FOR #10, #8, #6 AND #4 CONDUCTORS (3/4" C MIN.):	
	UP TO 6 #10 — = 3/4" C 7 #10 TO 11 #10 — = 1" C	
	UP TO 3 #8 — = 3/4" C 4 #8 TO 5 #8 — = 1" C 6 #8 TO 10 #8 — = 1-1/4" C	
	UP TO 2 #6 — = 3/4" C 3 #6 TO 4 #6 — = 1" C 5 #6 TO 7 #6 — = 1-1/4" C	
	UP TO 3 #4 — = 1" C 4 #4 TO 5 #4 — = 1-1/4" C 6 #4 TO 7 #4 — = 1-1/2" C	
	"IN USE" WARNING SIGN, RECESSED WALL AT +7'-6", WITH A 25W INC. LAMP.	C.W. COLE NO. S152 OR EQUAL.
	PUSHBUTTON STATION - "SQUARE D" CLASS 9001, TYPE KR-2R (RED)-H5 COMPLETE WITH KN-700 SERIES ENGRAVED LEGEND PLATE. OR APPROVED EQUAL. +4"-0"	ENGRAVE PLATE WITH RED LETTERS "POWER EMERGENCY OFF" COORDINATE LOCATION WITH BUILDING ELECTRICAL LIGHT SWITCHES
	TOGGLE SWITCH, +48". SUBSCRIPT INDICATES THE FOLLOWING: a, b, c, ...etc.= NUMBER OF SWITCHES.	
	WALL MOUNTED JUNCTION BOX, +45" U.O.N.	PIGTAIL INDICATES CONNECTION TO EQUIPMENT AS REQUIRED
	JUNCTION BOX IN ACCESSIBLE CEILING SPACE, U.O.N.	
	DATA OUTLET	INDIVIDUAL TELEPHONE AND DATA OUTLETS SHOWN ON LAB ELECTRICAL DRAWINGS FOR REFERENCE LOCATION ONLY. SEE BUILDING ELECTRICAL DRAWINGS FOR TYPE OF RESPECTIVE OUTLETS, CONDUIT AND WIRING REQUIREMENTS.
	TELEPHONE OUTLET	
	TELEPHONE OUTLET WALL MOUNTED +54"	

ADD ALTERNATE NOTES	
A. IN ROOMS DESIGNATED AS ADD ALTERNATE, THE BASE BID SHALL INCLUDE:	
1. ALL PANELBOARDS DESIGNATED TO SUCH ROOMS, COMPLETE AS INDICATED ON THE DRAWINGS.	
2. ALL BRANCH CIRCUIT WIRING FOR NORMAL AND EMERGENCY POWER AS INDICATED ON THE DRAWINGS FROM ASSIGNED PANELBOARDS TO:	
o. RECESSED WALL OUTLET BOXES FOR INDIVIDUAL RECEPTACLES AND WALL MOUNTED SURFACE METALLIC RACEWAYS. TAPE CONDUCTORS IN WALL OUTLET BOXES AND PROVIDE BLANK COVERS IN OUTLET BOXES.	
b. JUNCTION BOXES ABOVE CEILING NEAR UMBILICALS FOR ISLAND BENCHES AS INDICATED ON THE DRAWINGS. WHERE JUNCTION BOXES ARE NOT INDICATED, PROVIDE SUCH TERMINATING JUNCTION BOXES NEAR THE UMBILICALS. TAPE CONDUCTORS IN THE JUNCTION BOXES.	
3. FOR TELCO/DATA CONDUIT RUNS, PROVIDE 1-1/4" CONDUITS:	
o. FROM RECESSED WALL OUTLETS FOR SURFACE METALLIC RACEWAYS UP TO NEARBY TELCO/DATA CLOSETS.	
b. FROM TOP OF UMBILICALS FOR ISLAND BENCHES TO NEARBY TELCO/DATA CLOSETS.	
4. "EMERGENCY OFF" POWER PUSHBUTTONS COMPLETE WITH CONDUIT AND WIRING TO RESPECTIVE PANELBOARDS.	
B. ADD ALTERNATE BID SHALL INCLUDE:	
1. COMPLETE SURFACE METALLIC RACEWAYS AS INDICATED ON THE WALLS AND ON THE ISLAND BENCHES AND THE EXTENSION OF THEIR RESPECTIVE BRANCH CIRCUITS TO THE RECEPTACLES IN THE SURFACE METALLIC RACEWAYS.	
2. INDIVIDUAL RECEPTACLES AS INDICATED AND CONNECTION OF RESPECTIVE CIRCUITS.	
3. EXTENSION OF TELCO/DATA SYSTEM AS REQUIRED.	



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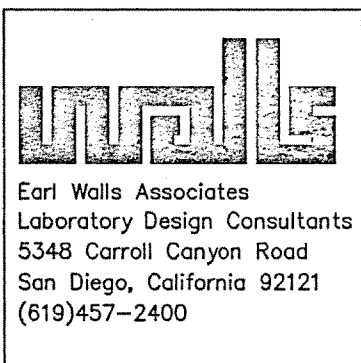


SCIENCE BUILDING
UNIVERSITY OF NORTH CAROLINA AT WILMINGTON
CODE 44888 ITEM 301 ID#6089280301A

SHEET TITLE:

LAB ELECTRICAL
KEY SHEET

AS BUILT



DRAWING REVISIONS:		
NO.	DATE	REMARKS

DATE:	5/16/84
PROJECT#:	8962
DESIGNED BY:	JSG
DRAWN BY:	GRM
CHECKED BY:	JSG

SHEET NO.:

