

**TELECOMMUNICATIONS LEGEND**

- TELEPHONE OUTLET  
 \*W\* INDICATES WALL PHONE  
 \*P\* INDICATES PAY PHONE  
 \*C\* INDICATES COUNTER HEIGHT  
 \*FX\* INDICATES FAX MACHINE
- CEILING MOUNTED BOX WITH DATA OUTLET
- COMBINATION TELEPHONE/DATA OUTLET
- TV OUTLET, WALL MOUNTED  
 \*TP\* INDICATES TEACHER PRESENTATION  
 \*V1\* INDICATES QUANTITIES OF DATA, VOICE, S-VIDEO, RCA AND CATV

TYPICAL FOR ALL TELECOMMUNICATION DEVICES:  
 PROVIDE 4" SQUARE x 2 1/2" DEEP OUTLET BOX WITH SINGLE-GANG PLASTER-RING, AND 1" C WITH NYLON PULL STRING FROM OUTLET BOX EXTENDED UP INTO THE CEILING SPACE TERMINATED WITH AN INSULATED BUSHING.

**ONE LINE SYMBOLS LEGEND**

- DISCONNECT SWITCH, UNFUSED
- CIRCUIT BREAKER, FIXED  
 \*XXAF\* INDICATES FRAME SIZE \*XXAT\* INDICATES TRIP  
 \*160KA\* INDICATES MAXIMUM SURGE CURRENT RATING.
- SURGE-PROTECTIVE DEVICE \*2\* INDICATES NEGUL TYPE.  
 \*160KA\* INDICATES MAXIMUM SURGE CURRENT RATING.
- GROUND CONNECTION
- CURRENT TRANSFORMER  
 \*3\* - INDICATES QUANTITY  
 \*500:5A\* - INDICATES PRIMARY TO SECONDARY TURNS RATIO
- TRANSFORMER
- PANELBOARD

**MOTOR & CONTROLS LEGEND**

- MANUAL MOTOR STARTING SWITCH WITH THERMAL OVERLOAD PROTECTION
- MAGNETIC MOTOR STARTER, REFER TO MAGNETIC MOTOR STARTER & VFD SCHEDULE FOR TYPE, SIZE AND ENCLOSURE
- COMBINATION FUSED DISCONNECT MAGNETIC MOTOR STARTER, REFER TO MAGNETIC MOTOR STARTER AND VFD SCHEDULE FOR TYPE, SIZE AND ENCLOSURE
- EQUIPMENT CONTROL PANEL
- VARIABLE SPEED DRIVE
- MOTOR, NUMERAL INDICATES HORSEPOWER  
 \*2\* - INDICATES HORSEPOWER RATING
- DISCONNECT SWITCH RATED 30AMP, 3-POLE, IN NEMA TYPE 1 ENCLOSURE, UNLESS OTHERWISE NOTED  
 \*3R\* - INDICATES NEMA TYPE 3R ENCLOSURE  
 \*3P\* - INDICATES 2 POLE SINGLE PHASE DISCONNECT  
 \*60AS\* - INDICATES 60A SWITCH
- FUSED DISCONNECT SWITCH, 3-POLE, IN NEMA TYPE 1 ENCLOSURE, UNLESS OTHERWISE NOTED.  
 \*3R\* - INDICATES NEMA TYPE 3R ENCLOSURE  
 \*60AS\* - INDICATES 60AMP SWITCH  
 \*50AF\* - INDICATES 50AMP FUSES
- ENCLOSED CIRCUIT BREAKER IN NEMA TYPE 1 ENCLOSURE, UNLESS OTHERWISE NOTED  
 \*100AF\* - INDICATES 100AMP, 3-POLE FRAME CIRCUIT BREAKER  
 \*90AT\* - INDICATES 90AMP TRIP

**BRANCH CIRCUIT & FEEDER LEGEND**

- BRANCH CIRCUIT OR FEEDER CONCEALED IN FINISHED AREAS
- BRANCH CIRCUIT OR FEEDER, CONCEALED IN OR UNDER FLOOR SLAB
- BRANCH CIRCUIT OR FEEDER TURNING UP TOWARDS OBSERVER
- BRANCH CIRCUIT OR FEEDER TURNING DOWN AWAY FROM OBSERVER
- CONDUIT STUBBED ABOVE CEILING
- BRANCH CIRCUIT HOME RUN TICKS INDICATE QUANTITY OF CONDUCTORS, GROUND CONDUCTORS ARE NOT INDICATED, NO TICKS INDICATES 2#12 & 1#12G IN 3/4" MINIMUM, R22A-1,3,5 INDICATES PANEL AND CIRCUIT DESIGNATION FROM WHICH HOMERUN SHALL ORIGINATE. EACH CIRCUIT SHALL BE 20A-1P (20AMP SINGLE POLE) UNLESS NOTED OTHERWISE.
- FEEDER HOMERUN, REFER TO LEGEND OF FEEDER SIZES FOR CONDUCTOR AND RACEWAY REQUIREMENTS DESIGNATED INSIDE TAG. H42B-1 INDICATES PANEL AND CIRCUIT NUMBER DESIGNATION FROM WHICH HOMERUN SHALL ORIGINATE, 100A-3P INDICATES 100 AMPERE, 3 POLE CIRCUIT BREAKER.
- FLEXIBLE CONNECTION TO EQUIPMENT, RACEWAY AND CONDUCTOR RATING TO MATCH ASSOCIATED BRANCH CIRCUIT OR FEEDER
- BRANCH CIRCUIT FOR EMERGENCY BATTERY DC CIRCUIT, MINIMUM 2#10 IN 3/4" C. UNLESS OTHERWISE NOTED

**POWER DISTRIBUTION**

- 208Y/120 VOLT PANELBOARD, SURFACE MOUNTED REFER TO SCHEDULE OF PANELBOARDS
- 208Y/120 VOLT PANELBOARD, RECESSED MOUNTED REFER TO SCHEDULE OF PANELBOARDS
- GROUND BAR
- CURRENT TRANSFORMER CABINET
- CUSTOMER METER
- UTILITY METER AND SOCKET

**EXISTING EQUIPMENT LEGEND**

- EXISTING EQUIPMENT TO REMAIN
- EXISTING EQUIPMENT TO BE REMOVED
- EXISTING EQUIPMENT TO BE RELOCATED
- NEW LOCATION OF EXISTING RELOCATED EQUIPMENT
- EXISTING EQUIPMENT TO BE REMOVED AND NEW EQUIPMENT TO BE INSTALLED ON EXISTING BRANCH/FEEDER
- EXISTING EQUIPMENT FOR INFORMATION ONLY, INDICATED BY SYMBOL WITH LIGHT AND OUT OF FUNCTION LINE TYPE
- EXISTING EQUIPMENT TO BE REWORKED, INDICATED BY SYMBOL WITH DASHED AND IN FUNCTION LINE TYPE

**LIGHTING FIXTURE LEGEND**

- LIGHTING FIXTURE (SEE LIGHTING FIXTURE SCHEDULE)  
 \*FR2\* - INDICATES LIGHTING FIXTURE TYPE  
 \*2\* - INDICATES CIRCUIT NUMBER  
 \*a\* - INDICATES SWITCH CONTROL  
 \*NL\* - INDICATES NIGHT LIGHT (UNSWITCHED) CIRCUIT
- LIGHTING FIXTURE WALL MOUNTED
- EXIT SIGN LIGHTING FIXTURE, CEILING, PENDANT MOUNTED, ARROWS AND EXIT FACE (SHADED) AS INDICATED
- EXIT SIGN LIGHTING FIXTURE, WALL MOUNTED, ARROWS AND EXIT FACE AS (SHADED) AS INDICATED.
- EMERGENCY LIGHTING BATTERY UNIT WITH DOUBLE LAMP HEADS

**SWITCH LEGEND**

- SINGLE POLE SWITCH, RATED 20A, 120/277V  
 \*a\* LOWER CASE LETTER INDICATES FIXTURE SWITCH CONTROL
- LOW VOLTAGE SWITCH
- SINGLE POLE SWITCH, WEATHERPROOF
- OCCUPANCY SENSOR, RECESS WALL MOUNTED  
 \*O1\* INDICATES SINGLE CIRCUIT OUTPUT
- OCCUPANCY SENSOR, CEILING MOUNTED  
 \*O1\* INDICATES TYPE AS DEFINED IN NOTES/SCHEDULES.

**WIRING DEVICE LEGEND**

- DUPLEX RECEPTACLE, GROUNDING TYPE, RATED 20A, 125V  
 \*0\* - INDICATES CIRCUIT NUMBER  
 \*GFI\* - INDICATES INTEGRAL GROUND FAULT CIRCUIT INTERRUPTER  
 \*USB\* - INDICATES USB RECEPTACLE  
 \*WP\* - INDICATES WEATHERPROOF  
 \*C\* - INDICATES COUNTER HEIGHT
- DOUBLE DUPLEX RECEPTACLE, GROUNDING TYPE, RATED 20A, 125V
- SPECIAL PURPOSE RECEPTACLE,  
 \*15\* - INDICATES TAG NUMBER  
 REFER TO SPECIAL PURPOSE RECEPTACLE SCHEDULE
- CORD DROP WITH DOUBLE DUPLEX RECEPTACLE
- CORD DROP WITH DUPLEX RECEPTACLE
- JUNCTION BOX
- PULLBOX
- SURFACE MOUNTED MULTI-OUTLET RACEWAY SYSTEM, PROVIDE DEVICES AS SHOWN ON FLOOR PLANS.  
 \*P1\* - INDICATES TYPE

**ABBREVIATIONS**

A/AMP	AMPERE	KWH	KILOWATT HOURS
AC	ALTERNATING CURRENT	LTG	LIGHTING
ADA	AMERICAN WITH DISABILITIES ACT	MCB	MAIN CIRCUIT BREAKER
AF	AMPERE FRAME	MEC	MASSACHUSETTS ELECTRICAL CODE
AFB	ABOVE FINISHED FLOOR	MG	MOTOR/GENERATOR SET
AFG	ABOVE FINISHED GRADE	MH	MANHOLE
AIC	AMPERE INTERRUPTING CAPACITY	MLO	MAIN LUGS ONLY
AL	ALUMINUM	MTD	MOUNTED
AT	AMPERE TRIP	MTG	MOUNTING
ATS	AUTOMATIC TRANSFER SWITCH	NC	NORMALLY CLOSED CONTACT
AWG	AMERICAN WIRE GAUGE	NEC	NATIONAL ELECTRICAL CODE
B	BURIED	NO	NORMALLY OPEN CONTACT
C	CONDUIT	NTS	NOT TO SCALE
CA	CABLE	#	NUMBER
CATV	CABLE TELEVISION	OPD	OVER CURRENT PROTECTION DEVICE
CCTV	CLOSED CIRCUIT TELEVISION SYSTEM	POS	PROVIDED UNDER OTHER SECTIONS
CB	CIRCUIT BREAKER	PVC	POLYVINYL CHLORIDE
CKT	CIRCUITS	PWR	POWER
CPU	CENTRAL PROCESSING UNIT	RGS	RIGID GALVANIZED STEEL
ℓ	CENTERLINE	RMS	ROOT MEAN SQUARE VALUE
dB	DECIBEL	RPM	REVOLUTIONS PER MINUTE
DC	DIRECT CURRENT	SPD	SURGE PROTECTIVE DEVICE
DWG	DRAWING	SN	SOLID NEUTRAL
EC	ELECTRICAL CONTRACTOR	SWBD	SWITCHBOARD
EMT	ELECTRIC METALLIC TUBING	TB	TERMINAL BLOCK
FDR	FEEDER	TEL	TELEPHONE
FLMT	FLEXIBLE LIQUID TIGHT METALLIC TUBING	TERMIN	TERMINAL
FREQ	FREQUENCY	TSP	TWISTED SHIELDED-PAIR
GEC	GROUNDING ELECTRODE CONDUCTOR	TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSER
GFI	GROUND FAULT INTERRUPTING	TYP	TYPICAL
GND	GROUND	UG	UNDERGROUND
HH	HANDHOLE	UNO	UNLESS NOTED OTHERWISE
HP	HORSEPOWER	UPS	UNINTERRUPTIBLE POWER SUPPLY
HVAC	HEATING, VENTILATING AND AIR CONDITIONING	UTP	UNSHIELDED TWISTED-PAIR
HZ	HERTZ	V	VOLTS
IG	ISOLATED GROUND	VA	VOLT-AMPERE
JB	JUNCTION BOX	VSD	VARIABLE SPEED DRIVE
KVA	KILOVOLT-AMPERE	W	WATTS
KW	KILOWATT	WP	WEATHERPROOF



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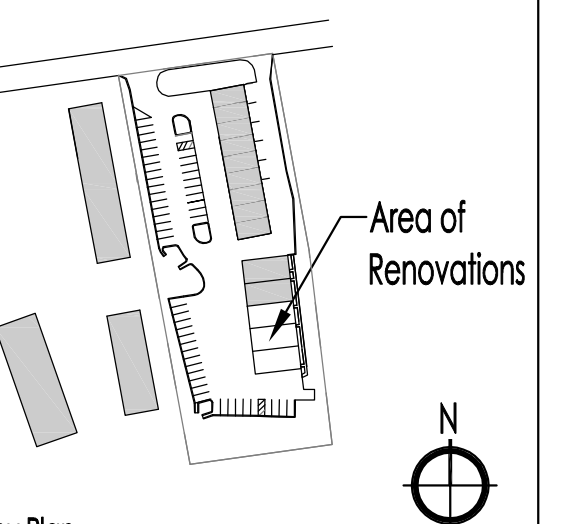


NON-CONSTRUCTION  
 REVISED: 09/2018/09  
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Seal

**charles river**  
 Charles River Microbial Solutions  
 Processing Facility Renovations  
 Harwich, MA

Project Info



Key Plan

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1.4	
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1	ISSUED FOR CONSTRUCTION 02-28-2022

No.	Description	Date
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Drawn By:	MW
Checked By:	MS
Approved By:	MS
Scale:	NONE
Project No.:	0220048.00

Drawing Title:  
 ELECTRICAL  
 LEGEND, NOTES &  
 ABBREVIATIONS

Drawing No.:

**E-000**

Owner's Drawing No.:



SHORT-CIRCUIT/COORDINATION STUDY/ARC FLASH HAZARD ANALYSIS

- 1. THE CONTRACTOR SHALL FURNISH SHORT-CIRCUIT AND PROTECTIVE DEVICE COORDINATION STUDIES AS PREPARED BY THE ELECTRICAL EQUIPMENT MANUFACTURER OR AN APPROVED ENGINEERING FIRM.
2. THE CONTRACTOR SHALL FURNISH AN ARC FLASH HAZARD ANALYSIS STUDY PER THE REQUIREMENTS SET FORTH IN NFPA 70E STANDARD FOR ELECTRICAL SAFETY IN THE WORKPLACE.
3. THE SCOPE OF THE STUDIES SHALL INCLUDE ALL NEW DISTRIBUTION EQUIPMENT SUPPLIED BY THE EQUIPMENT MANUFACTURER UNDER THIS CONTRACT AS WELL AS ALL DIRECTLY AFFECTED EXISTING DISTRIBUTION EQUIPMENT AT THE CUSTOMER FACILITY.
4. THE SHORT-CIRCUIT AND PROTECTIVE DEVICE COORDINATION STUDIES SHALL BE SUBMITTED TO THE DESIGN ENGINEER PRIOR TO RECEIVING FINAL APPROVAL OF THE DISTRIBUTION EQUIPMENT SHOP DRAWINGS AND/OR PRIOR TO RECEIVING EQUIPMENT DRAWINGS FOR MANUFACTURING.
5. THE RESULTS OF THE SHORT-CIRCUIT, PROTECTIVE DEVICE COORDINATION AND ARC FLASH HAZARD ANALYSIS STUDIES SHALL BE SUMMARIZED IN A FINAL REPORT.
6. THE REPORT SHALL INCLUDE THE FOLLOWING SECTIONS:
a. EXECUTIVE SUMMARY
b. DESCRIPTIONS, PURPOSE, BASIS AND SCOPE OF THE STUDY
c. TABULATIONS OF CIRCUIT BREAKER, FUSE AND OTHER PROTECTIVE DEVICE RATINGS VERSUS CALCULATED SHORT CIRCUIT DUTIES
d. PROTECTIVE DEVICE TIME VERSUS CURRENT COORDINATION CURVES, TABULATIONS OF RELAY AND CIRCUIT BREAKER TRIP UNIT SETTINGS, FUSE SELECTION
e. FAULT CURRENT CALCULATIONS INCLUDING A DEFINITION OF TERMS AND GUIDE FOR INTERPRETATION OF THE COMPUTER PRINTOUT
f. DETAILS OF THE INCIDENT ENERGY AND FLASH PROTECTION BOUNDARY CALCULATIONS
g. RECOMMENDATIONS FOR SYSTEM IMPROVEMENTS, WHERE NEEEDED
h. ONE-LINE DIAGRAM
i. ARC FLASH LABELS

ELECTRICAL SPECIFICATIONS

- PART 1 - GENERAL
NECESSARY CONSTRUCTION REQUIRED TO SECURE SAFETY OF LIFE AND PROPERTY.
1. GENERAL PROVISIONS: DRAWINGS ARE DIAGRAMMATIC AND INDICATE GENERAL ARRANGEMENTS...
2. SCOPE: PERFORM WORK AND PROVIDE NEW MATERIAL AND EQUIPMENT AS SHOWN ON DRAWINGS...
3. SITE VISIT: VISIT AND CAREFULLY EXAMINE SITE TO IDENTIFY EXISTING CONDITIONS...
4. RELATED WORK: THE FOLLOWING WORK IS NOT INCLUDED IN THIS SECTION...
5. CODES, STANDARDS, AUTHORITIES AND PERMITS: ALL WORK SHALL BE PERFORMED IN ACCORDANCE WITH THE LATEST EDITIONS OF THE STATE BUILDING CODE...
6. INTERPRETATION OF DOCUMENTS: ADVISE THE ENGINEER IN WRITING (RFI) PRIOR TO PROCEEDING WITH PROCUREMENT OR INSTALLATION...
7. REQUEST FOR INFORMATION: RFI ISSUED TO RESOLVE A CONFLICT OR DISCREPANCY...
8. SUBMITTALS: PROVIDE SPECIFIED MATERIALS AND EQUIPMENT UNLESS "EQUAL" OR "APPROVED EQUAL" IS EXPLICITLY INDICATED...
9. OPERATION AND MAINTENANCE DATA: SUBMIT (3) SETS OF OPERATING AND MAINTENANCE MANUALS...
10. RECORD DRAWINGS: CAD RECORD DRAWING FILES SHALL BE SUBMITTED AT THE COMPLETION OF THE PROJECT...
11. WARRANTIES: WARRANTY INSTALLATION IN WRITING FOR ONE YEAR FROM DATE OF OWNER'S ACCEPTANCE...
12. COORDINATION: CONFER WITH ALL OTHER TRADES RELATIVE TO LOCATION OF ALL APPARATUS AND EQUIPMENT...
13. PROVIDE A SET OF COORDINATION DRAWINGS FOR USE IN VERIFYING REQUIRED CURE CLEARANCES...
14. SUPPORTS: INCLUDE ALL STRUCTURAL STEEL SUPPORTS, HANGER BRACKETS, ETC.
15. CUTTING AND PATCHING: INCLUDE ALL CORING, CUTTING, PATCHING AND FIREPROOFING...
16. HOISTING, SCAFFOLDING AND PLANKING: INCLUDE THE FURNISHING, SET-UP AND MAINTENANCE...
17. SAFETY PRECAUTIONS: LIFE SAFETY AND ACCIDENT PREVENTION SHALL BE A PRIMARY CONSIDERATION...
PART 2 - PRODUCTS
1. IDENTIFICATION: NAMEPLATES SHALL INDICATE EQUIPMENT TAG, VOLTAGE CHARACTERISTICS AND SOURCE OF POWER...
2. RACEWAYS AND CONDUIT: RIGID GALVANIZED STEEL CONDUIT (RGS) SHALL BE UTILIZED WITH THREADED FITTINGS ONLY...
3. WIRE AND CABLE: ALL CONDUCTORS SHALL BE TYPE THHN/THWN OR XHHW...
4. WIRING DEVICES AND PLATES: ALL DEVICES SHALL BE SPECIFICATION GRADE WITH NYLON PLATE...
5. SAFETY DISCONNECT SWITCHES: DISCONNECT SWITCHES SHALL BE THREE-POLE HEAVY DUTY...
6. MOTOR STARTERS: COMBINATION MOTOR STARTER/DISCONNECTS SHALL BE 600V NEMA RATED...
7. VARIABLE SPEED DRIVES (VFD): COMBINATION VFD/DISCONNECTS SHALL BE SUITABLE FOR STARTING AND SPEED CONTROL...
8. PANELBOARDS: PANELBOARDS SHALL BE CIRCUIT BREAKER TYPE WITH THERMAL MAGNETIC BOLT-ON MOLDED CASE CIRCUIT BREAKERS...
9. LIGHTING: LED LUMINAIRES SHALL HAVE A LUMINOUS EFFICACY OF AT LEAST 90 LUMENS/WATT...
PART 3 EXECUTION
1. GENERAL: ALL INTERRUPTIONS AND SHUTDOWNS OF EXISTING ELECTRICAL SYSTEMS AND SERVICES SHALL BE AS SHORT AS POSSIBLE...
2. IDENTIFICATION: FURNISH AND INSTALL NAMEPLATES ON ALL ELECTRICAL EQUIPMENT INCLUDING PANELS, JUNCTION BOXES, DISCONNECT SWITCHES...
3. RACEWAYS AND CONDUIT: REFER TO POWER, LIGHTING AND FIRE ALARM DRAWINGS...
4. WIRE AND CABLE: BRANCH CIRCUIT WIRING IS NOT ILLUSTRATED ON THE DRAWINGS...
5. WIRING DEVICES AND PLATES: ALL DEVICES OTHER THAN 20A 120V SHALL BE CLEARLY LABELED WITH PERMANENTLY APPLIED NAMEPLATES...
6. SAFETY DISCONNECT SWITCHES: FUSES SHALL BE CLASS RK-1 SIZED PER DRAWING...
7. MOTOR STARTERS: SELECT CLASS R FUSING IN ACCORDANCE WITH NEC REQUIREMENTS...
8. VARIABLE SPEED DRIVES: MOTOR OVERLOADS SHALL BE ADJUSTED IN ACCORDANCE WITH NEC...
9. PANELBOARDS: THE CONTRACTOR SHALL BALANCE PANELBOARD LOADS TO WITHIN 10% PHASE TO PHASE...
10. LIGHTING: ALL LIGHT FIXTURES SHALL BE SUPPORTED IN AN APPROVED MANNER TO THE BUILDING STRUCTURE...
11. LIGHTING CONTROL EQUIPMENT: PROGRAM CONTROL PANELS IN ACCORDANCE WITH THE SCHEDULE INCLUDED...
12. FIRE ALARM SYSTEM MODIFICATIONS:
A. ALL NEW DETECTORS SHALL BE LABELED WITH ASSIGNED ADDRESS ON BOTH THE DETECTOR HOUSING AND THE BASE WITH A BLACK ON CLEAR TYPED LABEL...

- DETECTOR: THE DETECTOR ADDRESS SHALL BE CONCEALED WHEN PLACED INTO THE BASE.
B. ALL JUNCTION BOXES SHALL BE SPRAYED RED AND LABELED "FIRE ALARM" CONTACT COUPLINGS SHALL BE SPRAY PAINTED RED PRIOR TO INSTALLATION.
C. CONNECTIONS AND SPLICES SHALL BE MADE USING SCREW TERMINAL BLOCKS. THE USES OF WIRE NUT TYPE CONNECTORS ARE PROHIBITED IN THE SYSTEM.
D. PERFORM INSULATION TESTING (MEGGER), CONTINUITY AND LOOP RESISTANCE CHECKS ON ALL SYSTEM CONDUCTORS...
E. THE FIRM WHO HOLDS THE EXISTING SYSTEM MAINTENANCE CONTRACT SHALL PERFORM FINAL CONNECTIONS, PROGRAMMING, AND TESTING...
F. CERTIFY INSTALLATION WITH THE SUCCESSFUL COMPLETION OF ALL ASSOCIATED NFPA 72 TESTS, MEASURE SOUND PRESSURE LEVELS IN ALL ROOMS WITHIN THE SCOPE...
13. EQUIPMENT TESTING AND CLEANING:
A. CLEAN THE INTERIOR AND EXTERIOR OF ALL EQUIPMENT AT PROJECT COMPLETION...
B. TEST THE INSULATION RESISTANCE BETWEEN EACH PHASE AND GROUND OF ALL FEEDERS...
C. VERIFY VOLTAGE AT THE ASSOCIATED PANELBOARD UNDER LOAD AND ADJUST TAP SETTINGS AS REQUIRED...

- PART 4 PROJECT CLOSEOUT
1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL ITEMS ASSOCIATED WITH PROJECT CLOSEOUT. ALLOW SUFFICIENT TIME IN THE CONSTRUCTION SCHEDULE TO ENSURE THAT THE INSTALLATION IS SUBSTANTIALLY COMPLETE AND ALL MATERIALS AND EQUIPMENT ARE FULLY COMPLETED...
2. PROVIDE THE CONTRACTOR CERTIFICATE OF COMPLETION IN ACCORDANCE WITH 780CMR 107.6.3 INDICATING THAT THE INSTALLATION IS IN CONFORMANCE WITH THE CONSTRUCTION DOCUMENTS AND ALL APPLICABLE LOCAL, STATE AND FEDERAL STATUTES AND CODES...
3. PROVIDE FIRE ALARM SYSTEMS DOCUMENTATION (INCLUDING BUT NOT LIMITED TO TIER II SHOP DRAWINGS AND TIER II RECORD DRAWINGS) IN ACCORDANCE WITH 780 CMR 901.2.1. RECORD DRAWINGS MUST BE PRODUCED BY THE CONTRACTOR...
4. PROVIDE "SYSTEM RECORD OF COMPLETION" AND "SYSTEM INSPECTION AND TESTING FORM" IN ACCORDANCE WITH NFPA 72 REQUIREMENTS...
5. PROVIDE BACKUP DOCUMENTATION TO NFPA 72 TESTING INCLUDING AMBIENT AND ALARM SOUND PRESSURE LEVELS THROUGHOUT THE PROTECTED AREA...
6. NO FUNCTIONAL DEFICIENCIES IN THE EGRESS OR EXIT LIGHTING SYSTEMS, FIRE ALARM SYSTEM OR THE EMERGENCY POWER SYSTEM SHALL BE PRESENT WHEN REQUESTING SUBSTANTIAL COMPLETION SITE VISIT...
7. SUBSTANTIAL COMPLETION SITE VISIT BY THE ENGINEER SHALL BE CONDUCTED AFTER RECEIPT AND REVIEW OF THE CONTRACTOR'S CERTIFICATE OF COMPLETION AND ALL CODE MANDATED TEST REPORTS AND SUBMISSIONS LISTED ABOVE...
8. PREMATURE REQUESTS THAT REQUIRE ADDITIONAL/FOLLOW UP SITE VISITS BY THE ENGINEER OF DEFICIENT ITEMS (AREAS INCOMPLETE, SYSTEMS NOT OPERATIONAL, ETC.) WILL RESULT IN BACK CHARGES OF THE COSTS ASSOCIATED WITH ANY ADDED VISITS.

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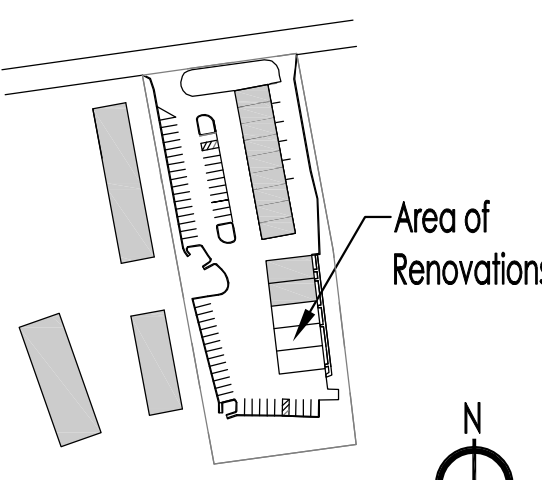
NV5

NECA-IBEC
NFPA 70E
NFPA 72

Seal

charles river
Charles River Microbial Solutions
Processing Facility Renovations
Harrwich, MA

Project Info



Key Plan

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1 ISSUED FOR CONSTRUCTION 02-28-2022

No. Description Date

Drawn By: MW

Checked By: MS

Approved By: MS

Scale: NONE

Project No.: 0220048.00

Drawing Title: ELECTRICAL SPECIFICATIONS

Drawing No.: E-001

Owner's Drawing No.:



LIGHTING FIXTURE SCHEDULE - LED									
TYPE	MANUFACTURERS	CATALOG NUMBER	DESCRIPTION	COLOR	CRI	LUMENS	INPUT		REMARKS
							WATTS	VOLTS	
LP1	DAYBRITE								
	LITHONIA	VAP 600LM PCL WD MVOLT GZ10 35K 60CRI WL FEND2	4' PENDANT MOUNTED LED FIXTURE SUITABLE FOR WET/ROUGH LOCATIONS	3500	80	6000	49	MVOLT	
LR1	DAYBRITE								
	LITHONIA	GTL4 40L E21 LP835	1'x4' RECESSED LED LENSED TROFFER	3500	80	4000	34	MVOLT	
LW1	DAYBRITE								
	LITHONIA	WSQ LED P2 50K SR3 120 PE E20WC DDBXD	EXTERIOR LED WALL MOUNTED FIXTURE WITH PHOTO CONTROL WITH EMERGENCY BATTERY BACKUP	5000	70	3000	29	MVOLT	
EW1	DAYBRITE								
	LITHONIA	LQM S 3 R 120/277 EL N SD	SINGLE FACE WALL MOUNTED EXIT SIGN, SELF CONTAINED BATTERY	-	-	-	1	120/277	
ES1	DAYBRITE								
	LITHONIA	LQM S 3 R 120/277 EL N SD	SINGLE FACE CEILING MOUNTED EXIT SIGN, SELF CONTAINED BATTERY	-	-	-	1	120/277	
EB1	DAYBRITE								
	LITHONIA	ELM2L UVOLT SDRT	EMERGENCY BATTERY UNIT	-	-	220	1.09	120/277	

- NOTES:**
- NOTES 2-10 APPLY TO ALL APPLICABLE LIGHTING FIXTURES. THE REMARKS COLUMN SHALL NOTE ADDITIONAL REQUIREMENTS.
  - FIXTURES SPECIFIED WITH CATALOG NUMBERS ARE THE BASIS OF DESIGN AND ESTABLISH QUALITY LEVEL FOR EQUAL FIXTURES FROM MANUFACTURERS LISTED WITHOUT CATALOG NUMBERS. WHERE ONLY ONE MANUFACTURER LISTED, THERE SHALL BE NO SUBSTITUTION.
  - VERIFY EXACT MOUNTING CONDITIONS AND PROVIDE APPROPRIATE ACCESSORIES AND HARDWARE TO ACCOMMODATE REQUIREMENTS.
  - FIXTURE TYPE INDICATED ONCE ON A CONTINUOUS ROW SHALL BE TYPICAL OF ALL FIXTURES IN THE ROW UNLESS NOTED OTHERWISE.
  - CONTINUOUS ROWS OF FIXTURES SHALL BE PROVIDED WITH ALL NECESSARY HARDWARE AND TIE-BARS TO PROVIDE THE EXACT LENGTHS AS INDICATED ON THE PLANS. FIXTURES IN SOFFITS SHALL BE CONTINUOUS END TO END.
  - FIXTURES WITH MAXIMUM THD OF 15%, PF GREATER THAN 90%. DRIVERS SHALL BE UL LISTED.
  - EFFICIENCY SHALL BE GREATER THAN THAT REQUIRED TO ENSURE THAT THE VALUE LISTED FOR INPUT WATTS IS NOT EXCEEDED.
  - MINIMUM CRI SHALL BE 80.
  - PROVIDE EXIT SIGNS WITH ARROWS AND MOUNTING ACCESSORIES AS INDICATED ON THE PLANS.
  - DRIVERS SHALL HAVE FULL RANGE DIMMING CAPABILITIES FROM 10% TO 100% UNLESS NOTED OTHERWISE.
  - BATTERY BACKED DRIVERS SHALL PROVIDE A MINIMUM OF 90 MINUTES. DRIVERS SHALL UL LISTED AND HAVE A 5 YEAR WARRANTY.

- LIGHTING NOTES:**
- REFER TO DRAWING E-000 FOR LEGEND, SYMBOLS AND GENERAL NOTES.
  - REFER TO ARCHITECTURAL DRAWINGS, INCLUDING BUT NOT LIMITED TO, REFLECTED CEILING PLANS AND ELEVATIONS FOR ASSOCIATED NOTES, MOUNTING DETAILS AND EXACT LOCATIONS OF ALL LIGHTING FIXTURES.
  - PROVIDE COMMON FACE PLATE AND REQUIRED METAL INTERIOR BOX BARRIERS FOR ALL MULTIPLE GANG SWITCH LOCATIONS.
  - CIRCUIT NUMBERS ARE DIAGRAMMATIC. EXACT NUMBERS SHALL BE DETERMINED IN THE FIELD AND REFLECTED ON AS-BUILT DOCUMENTATION BY THE ELECTRICAL CONTRACTOR. THE ASSOCIATED CIRCUIT NUMBER AND SWITCH LEG NOMENCLATURE THAT ARE APPLIED TO EACH LIGHTING FIXTURE AND CONTROLLING DEVICE INFER INTERCONNECTING BRANCH CIRCUITRY.
  - VOLTAGE DROP HAS BEEN CONSIDERED IN THE DESIGN OF ALL BRANCH CIRCUIT AND FEEDER SIZES BASED UPON THE ILLUSTRATED EQUIPMENT LAYOUTS AND SHORTEST CONDUCTOR/RACEWAY ROUTING. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DEVIATIONS TAKEN THAT WILL INCREASE CONDUCTOR/RACEWAY ROUTING LENGTHS. BRANCH CIRCUITS LONGER THAN 75' FOR 120V AND 175' FOR 277V FROM PANEL TO LAST OUTLET SHALL BE INCREASED A MINIMUM OF ONE SIZE ABOVE THAT SPECIFIED TO LIMIT VOLTAGE DROP TO LESS THAN 3%.
  - COORDINATE THE PLACEMENT OF ALL PENDENT, SURFACE OR SEMI-FLUSH FIXTURES AND DEVICES WITH THE FIRE PROTECTION CONTRACTOR TO MAINTAIN NFPA 13 REQUIRED SEPARATION BETWEEN SPRINKLER HEADS AND OBSTRUCTIONS.
  - PROVIDE CONSTANTLY ENERGIZED (UNSWITCHED) BRANCH CIRCUIT TO ALL EXIT SIGNS AND EGRESS LIGHTS FROM THE DESIGNATED SOURCE.
  - LIGHTING BRANCH CIRCUITRY SHALL BE INSTALLED IN CONDUIT FROM THE PANELBOARD TO THE FIRST OUTLET AND/OR WHERE EXPOSED LIGHTING BRANCH CIRCUITRY MAY BE TYPE MC CABLE WHERE CONCEALED ABOVE SUSPENDED CEILINGS OR IN METAL STUD WALLS.
  - MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL EXISTING LIGHTING TO REMAIN.

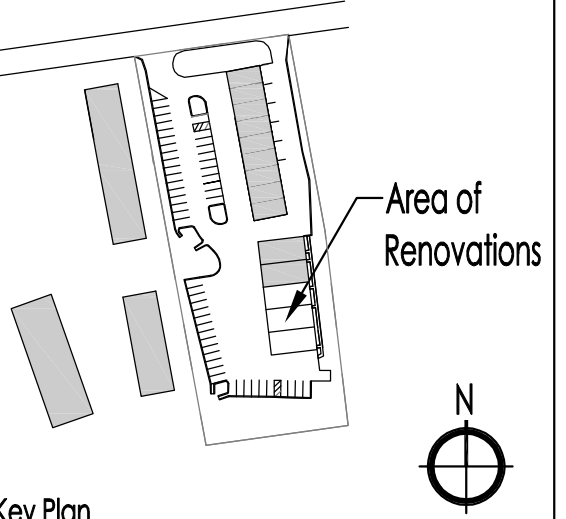
IECC 2018 SECTION 505.5	
INTERIOR LIGHTING SYSTEM POWER ALLOWANCE COMPLIANCE	
TOTAL CONNECTED INTERIOR LIGHTING POWER:	2032W
TOTAL ALLOWED INTERIOR LIGHTING POWER:	4993W
VERIFIED UTILIZING COMCHECK SOFTWARE TOOLS BY US DOE	



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 3 Logan Square  
 1717 Arch Street, Suite 200  
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 267.809.8400 F  
 215.557.7984 F  
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 1000 Locust Street  
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 Philadelphia, PA 19106  
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Seal  
**charles river**  
 Charles River Microbial Solutions  
 Processing Facility Renovations  
 Harwich, MA  
 Project Info



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1	ISSUED FOR CONSTRUCTION	02-28-2022

Drawn By: MW  
 Checked By: MS  
 Approved By: MS  
 Scale: 1/4" = 1'-0"  
 Project No.: 0220048.00  
 Drawing Title:  
**ELECTRICAL LIGHTING  
 FIRST FLOOR NEW  
 WORK PLAN**

Drawing No.:  
**E-210**  
 Owner's Drawing No.:

N:\01-WB\2022\0220048\0220048.dwg - CH, Nashed, Bernal, Kelly\2022\0220048.dwg - PLOT FILED IN: N:\01-WB\2022\0220048\0220048.dwg - February 28, 2022 - 2:07pm, Michael Wong

EQUIP TAG	DESCRIPTION	LOAD				POWER SOURCE		BRANCH CIRCUIT	CONNECTION				REMARKS
		HP	KVA	VOLT	PH	PANEL	C/B		FLEX	JB	REC	DISC	
BAL-1	BALANCE TABLE	-	.08	120V	1	2	P22(16)	20A/1P	-	-	-	X	NOTE 7
C-1	CENTRIFUGE	-	6.36	208V	1	2	P21(2,4)	30A/2P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 6
C-2	CENTRIFUGE	-	6.36	208V	1	2	P21(6,8)	30A/2P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 6
C-3	CENTRIFUGE	-	6.36	208V	1	2	P21(10,12)	30A/2P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 6
C-4	CENTRIFUGE	-	6.36	208V	1	2	P21(14,16)	30A/2P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 6
C-5	CENTRIFUGE	-	6.36	208V	1	2	P21(18,20)	30A/2P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 6
C-6	CENTRIFUGE	-	6.36	208V	1	2	P21(22,24)	30A/2P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 6
C-7	CENTRIFUGE	-	6.36	208V	1	2	P21(26,28)	30A/2P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 6
INC-1	INCUBATOR	-	2.2	120V	1	2	P21(30)	30A/1P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
LH-1	LAMINAR FLOW HOOD	-	4.93	208V	1	2	P22(1,3)	20A/2P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
LH-2	LAMINAR FLOW HOOD	-	4.93	208V	1	2	P22(5,7)	20A/2P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
LH-3	LAMINAR FLOW HOOD	-	4.93	208V	1	2	P22(9,11)	20A/2P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
LH-4	LAMINAR FLOW HOOD	-	4.93	208V	1	2	P22(13,15)	20A/2P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
LH-5	LAMINAR FLOW HOOD	-	4.93	208V	1	2	P22(17,19)	20A/2P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
FH-1	FUME HOOD	-	1.2	120V	1	2	P22(29)	20A/1P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
		-	1.2	120V	1	2	P22(31)	20A/1P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
OVN-1	OVEN	-	9.98	208V	1	2	DP21(40,42)	60A/2P	2#4 & 1#8G. IN 3/4".	X	X	-	X

NOTES:

- BRANCH CIRCUIT WIRING METHODS SHALL BE AS NOTED ON THE DRAWINGS FOR THE APPLICABLE LOCATION.
- "FLEX" - DENOTES THAT THE FINAL THREE FEET (MAXIMUM) OF RACEWAY SHALL BE FLEXIBLE METAL OR LIQUIDTIGHT FLEXIBLE METAL CONDUIT. LIQUIDTIGHT FLEXIBLE METAL CONDUIT SHALL BE USED FOR ALL APPLICATIONS BELOW COUNTER HEIGHT.
- "JB" - JUNCTION BOX DENOTES FINAL CONNECTION TO BOX OR CONTROL PANEL PRE-WIRED TO THE EQUIPMENT. BOX SHALL BE FS TYPE.
- "REC" - RECEPTACLE IN THE NEMA CONFIGURATION NOTED. ALL COVERS BELOW COUNTER HEIGHT SHALL BE WP TYPE. ALL OTHER PLATES SHALL BE SMOOTH STAINLESS STEEL. REFER TO DETAILS AND SPECIFICATIONS FOR LABELING REQUIREMENTS.
- DISCONNECTING MEANS FOR APPLIANCES SHALL BE IN ACCORDANCE WITH NEC 422.31. PROVIDE LOCKING PROVISIONS ON THE ASSOCIATED CIRCUIT BREAKER WHERE RECEPTACLE CONNECTIONS OR A STAND-ALONE DISCONNECT ARE NOT SPECIFIED. LOCKING PROVISIONS SHALL BE UL LISTED AND REMAIN IN PLACE WITH WITHOUT THE LOCK.
- POWER DEVICE MOUNTED IN WIREMOLD.

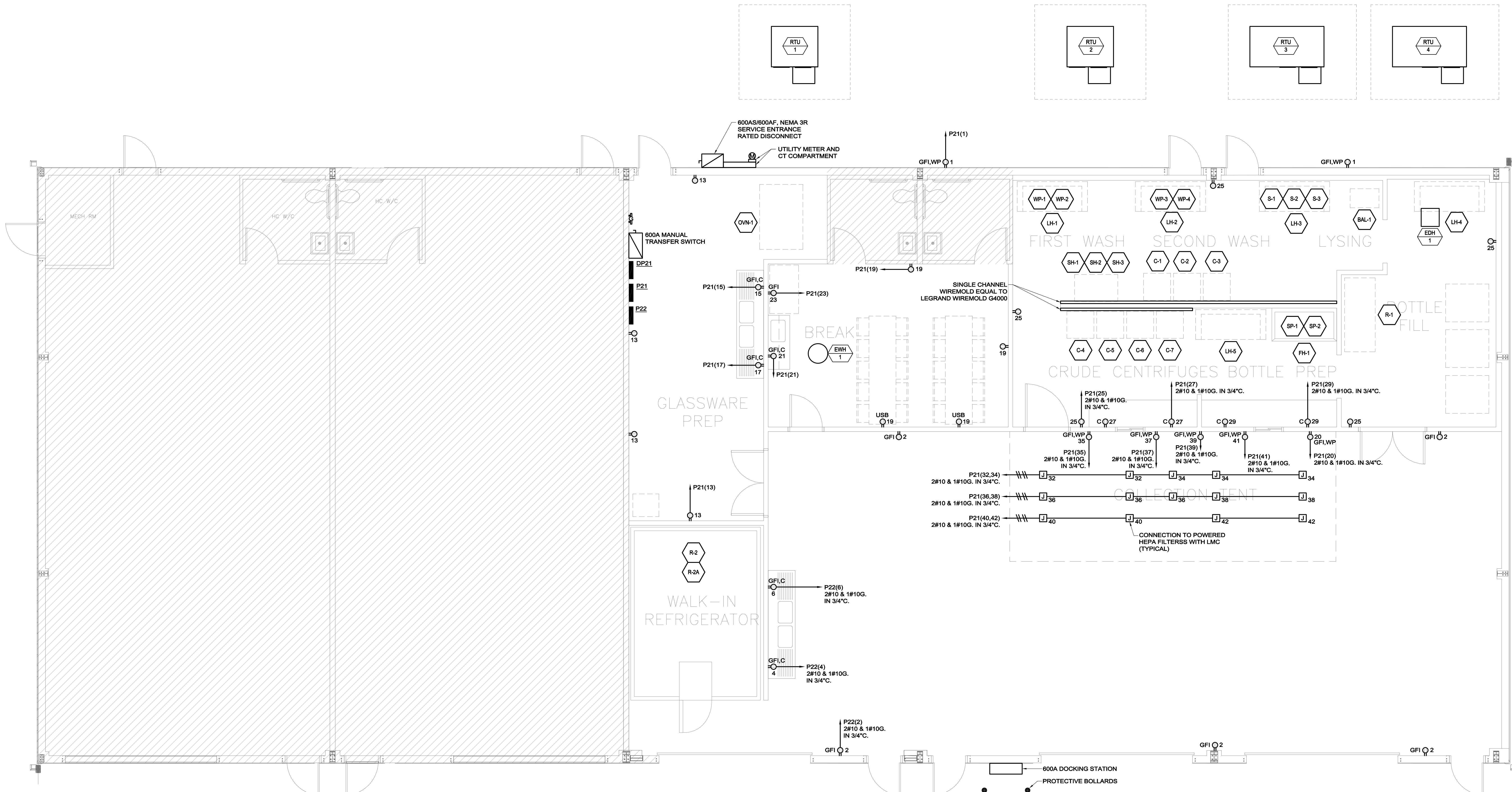
EQUIP TAG	DESCRIPTION	LOAD				POWER SOURCE		BRANCH CIRCUIT	CONNECTION				REMARKS
		HP	KVA	VOLT	PH	PANEL	C/B		FLEX	JB	REC	DISC	
R-1	3-DOOR REFRIGERATOR	-	1.0	120V	1	2	P22(33)	20A/1P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
R-2	WALK-IN REFRIGERATOR	-	6.24	208V	1	2	P22(25,27)	50A/2P	2#6 & 1#8G. IN 3/4".	X	X	-	X
R-2A	WALK-IN LIGHTING	-	.6	120V	1	2	P22(18)	20A/1P	2#10 & 1#10G. IN 3/4".	X	X	-	-
S-1	SONICATOR	-	.24	120V	1	2	P21(10)	20A/1P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
S-2	SONICATOR	-	.24	120V	1	2			2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
S-3	SONICATOR	-	.24	120V	1	2			2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
SH-1	SHAKER	-	.07	120V	1	2	P21(8)	20A/1P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 6
SH-2	SHAKER	-	.07	120V	1	2			2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 6
SH-3	SHAKER	-	.07	120V	1	2			2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 6
SP-1	STIR PLATES	-	.24	120V	1	2	P21(12)	20A/1P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
SP-2	STIR PLATES	-	.24	120V	1	2			2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
WP-1	1RST WASH PUMP	-	.17	120V	1	2	P22(14)	20A/1P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
WP-2	1RST WASH PUMP	-	.17	120V	1	2			2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
WP-3	1RST WASH PUMP	-	.17	120V	1	2	P22(12)	20A/1P	2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7
WP-4	1RST WASH PUMP	-	.17	120V	1	2			2#10 & 1#10G. IN 3/4".	-	-	X	NOTE 7

NOTES:

- BRANCH CIRCUIT WIRING METHODS SHALL BE AS NOTED ON THE DRAWINGS FOR THE APPLICABLE LOCATION.
- "FLEX" - DENOTES THAT THE FINAL THREE FEET (MAXIMUM) OF RACEWAY SHALL BE FLEXIBLE METAL OR LIQUIDTIGHT FLEXIBLE METAL CONDUIT. LIQUIDTIGHT FLEXIBLE METAL CONDUIT SHALL BE USED FOR ALL APPLICATIONS BELOW COUNTER HEIGHT.
- "JB" - JUNCTION BOX DENOTES FINAL CONNECTION TO BOX OR CONTROL PANEL PRE-WIRED TO THE EQUIPMENT. BOX SHALL BE FS TYPE.
- "REC" - RECEPTACLE IN THE NEMA CONFIGURATION NOTED. ALL COVERS BELOW COUNTER HEIGHT SHALL BE WP TYPE. ALL OTHER PLATES SHALL BE SMOOTH STAINLESS STEEL. REFER TO DETAILS AND SPECIFICATIONS FOR LABELING REQUIREMENTS.
- DISCONNECTING MEANS FOR APPLIANCES SHALL BE IN ACCORDANCE WITH NEC 422.31. PROVIDE LOCKING PROVISIONS ON THE ASSOCIATED CIRCUIT BREAKER WHERE RECEPTACLE CONNECTIONS OR A STAND-ALONE DISCONNECT ARE NOT SPECIFIED. LOCKING PROVISIONS SHALL BE UL LISTED AND REMAIN IN PLACE WITH WITHOUT THE LOCK.
- POWER DEVICE MOUNTED IN WIREMOLD.
- RECEPTACLES SHALL BE INSTALLED IN WALL, COORDINATE MOUNTING HEIGHT AND EXACT LOCATION WITH OWNER/ARCHITECT.

POWER NOTES:

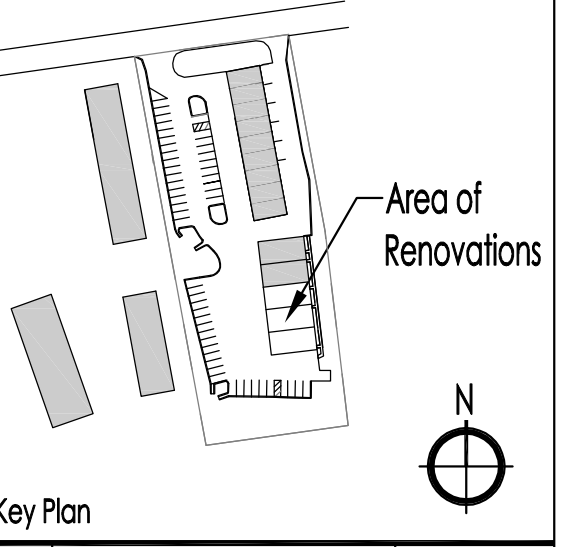
- REFER TO DRAWING E-000 FOR LEGEND, SYMBOLS AND GENERAL NOTES.
- REFER TO ARCHITECTURAL DRAWINGS FOR ASSOCIATED NOTES, MOUNTING DETAILS, HEIGHTS AND EXACT LOCATIONS OF ALL DEVICES.
- CIRCUIT NUMBERS ARE DIAGRAMMATIC. EXACT NUMBERS SHALL BE DETERMINED IN THE FIELD AND REFLECTED ON AS-BUILT DOCUMENTATION BY THE ELECTRICAL CONTRACTOR. THE ASSOCIATED CIRCUIT NUMBERS THAT ARE APPLIED TO EACH DEVICE AND PIECE OF EQUIPMENT INFERS INTERCONNECTING BRANCH CIRCUITRY. INTERCONNECTING BRANCH WIRING SHALL BE SIZED EQUAL TO THE HOMERUN UNLESS NOTED OTHERWISE.
- VOLTAGE DROP HAS BEEN CONSIDERED IN THE DESIGN OF ALL BRANCH CIRCUITRY AND FEEDER SIZES BASED UPON THE ILLUSTRATED EQUIPMENT LAYOUTS AND SHORTEST CONDUCTOR/RACEWAY ROUTING. THE ELECTRICAL CONTRACTOR SHALL BE RESPONSIBLE FOR DEVIATIONS TAKEN THAT WILL INCREASE CONDUCTOR/RACEWAY ROUTING LENGTHS. BRANCH CIRCUITS LONGER THAN 75' FOR 120V FROM PANEL TO LAST OUTLET SHALL BE INCREASED A MINIMUM OF ONE SIZE ABOVE THAT SPECIFIED TO LIMIT VOLTAGE DROP TO LESS THAN 3%. FEEDERS SHALL FOLLOW SIMILAR GUIDELINES AND BE LIMITED TO 2% DROP.
- POWER BRANCH CIRCUITRY SHALL BE INSTALLED IN CONDUIT FROM THE PANEL TO THE FIRST DEVICE AND/OR WHERE EXPOSED. POWER BRANCH CIRCUITRY MAY BE TYPE MC CABLE WHERE CONCEALED ABOVE SUSPENDED CEILING AND IN METAL STUD WALLS.
- MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL EXISTING POWER DEVICES TO REMAIN.
- PANELBOARDS AND METER SOCKET ENCLOSURES SHALL BE FIELD MARKED TO WARN QUALIFIED PERSONS OF POTENTIAL ELECTRIC ARC FLASH HAZARDS. THE MARKING SHALL BE LOCATED SO AS TO BE CLEARLY VISIBLE TO QUALIFIED PERSONS BEFORE EXAMINATION, ADJUSTMENT, SERVICING, OR MAINTENANCE OF THE EQUIPMENT.
- ALL EXTERIOR EXPOSED BRANCH CIRCUITRY SHALL BE INSTALLED IN RIGID METAL CONDUIT WITH FLEXIBLE CONNECTIONS TO ALL MECHANICAL EQUIPMENT UTILIZING LIQUID TIGHT FLEXIBLE METAL CONDUIT NOT TO EXCEED 18". ALL PENETRATIONS OF WEATHER TIGHT BOXES SHALL UTILIZE WEATHERPROOF HUBS. ALL CONDUIT SUPPORTS SHALL BE HOT DIPPED GALVANIZED. ALL FASTENERS, MISCELLANEOUS SUPPORTS (UNISTRUT OR EQUAL) AND HARDWARE UTILIZED FOR THE ELECTRICAL INSTALLATION SHALL BE STAINLESS STEEL.
- THE HOT WATER SYSTEM CIRCULATION PUMP IS CONTROLLED VIA WATER TEMPERATURE BY EQUIPMENT SUPPLIED AND INSTALLED BY THE PLUMBING CONTRACTOR. PROVIDE WITH 120V BRANCH CIRCUIT AS ILLUSTRATED AND INTERCONNECT THE CIRCULATION PUMP AND THE AGUASTAT WITH 2#10-3/4".
- THE HOT WATER HEATER MOUNTED ABOVE THE SUSPENDED CEILING IS PROVIDED WITH A LEAK DETECTION SYSTEM BY THE PLUMBING CONTRACTOR. INSTALL THE CONTROL PANEL AND PROVIDE WITH 120V BRANCH CIRCUIT AS ILLUSTRATED. INSTALL THE LEAK DETECTION SENSORS IN THE DRIP PAN IN ACCORDANCE WITH THE MANUFACTURERS INSTRUCTIONS. INTERCONNECT THE CONTROL PANEL WITH THE COLD WATER SUPPLY SHUTOFF SOLENOID VALVE WITH 2#10-3/4".



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Harwich, MA



Key Plan

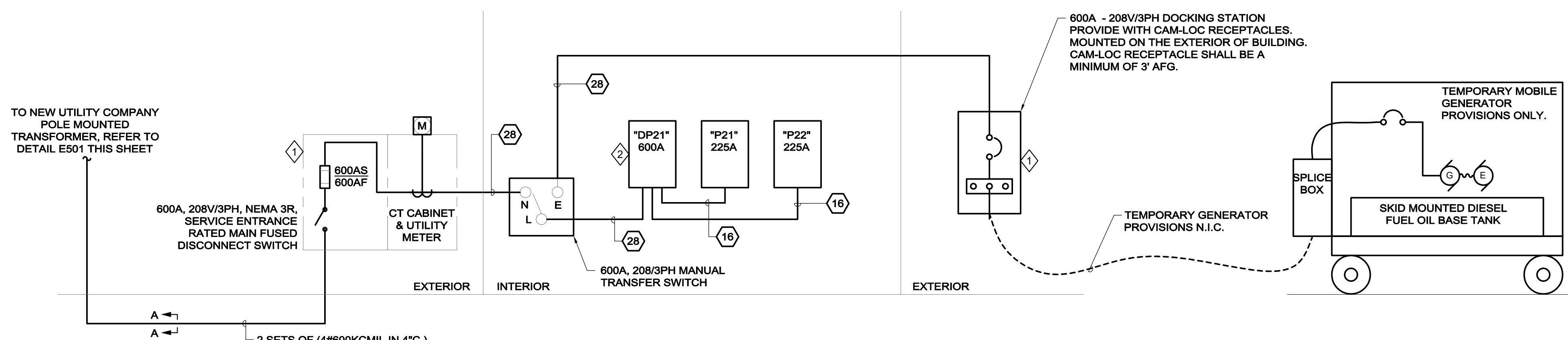
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1	ISSUED FOR CONSTRUCTION	02-28-2022
No.	Description	Date

Drawn By:	MW
Checked By:	MS
Approved By:	MS
Scale:	1/4" = 1'-0"
Project No.:	0220068.00
Drawing Title:	ELECTRICAL POWER FIRST FLOOR NEW WORK PLAN

Drawing No.: **E-310**  
Owner's Drawing No.:

NV5-18-WAL20190603022020206 - CH - Nevada Biotech Facility Renovation Project - Power Panel 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100





POWER RISER KEYNOTES	
1	WHERE THE BUILDING CONTAINS MORE THAN ONE SERVICE DISCONNECTING MEANS AND/OR HAS MULTIPLE BRANCH CIRCUIT OR FEEDER DISCONNECTING MEANS IN ACCORDANCE WITH NEC 225, EACH REQUIRED DISCONNECTING MEANS SHALL BE CLEARLY LABELED AS TO ITS PURPOSE AND IDENTIFY THE LOCATION OF ALL OTHER DISCONNECTING MEANS ON THE PROPERTY. IDENTIFICATION SHALL BE ON YELLOW ENGRAVED NAMEPLATES PERMANENTLY AFFIXED TO EACH DISCONNECTING MEANS.
2	DISTRIBUTION PANEL TVSS SHALL HAVE A MAXIMUM SURGE RATING CAPACITY OF 65KA PER MODE (130KA PER PHASE). TVSS SHALL BE INDIVIDUALLY MOUNTED IN A NEMA 1 ENCLOSURE CONNECTED TO THE PANEL VIA A 30A-3P CIRCUIT BREAKER. PROVIDE WITH INDICATING LAMPS AND FORM C CONTACT FOR CONNECTION TO THE BUILDING AUTOMATION SYSTEM AS A GENERAL ALARM. TVSS SHALL BE TO SERIES AS MANUFACTURED BY CURRENT TECHNOLOGY. ACCUVAR BY LIEBERT OR CPS SERIES FROM CUTLER HAMMER.

NOTES:  
1. REFER TO SPECIFICATIONS, DETAILS, AND CONTROL DRAWINGS FOR ADDITIONAL INFORMATION.

**POWER RISER NOTES:**

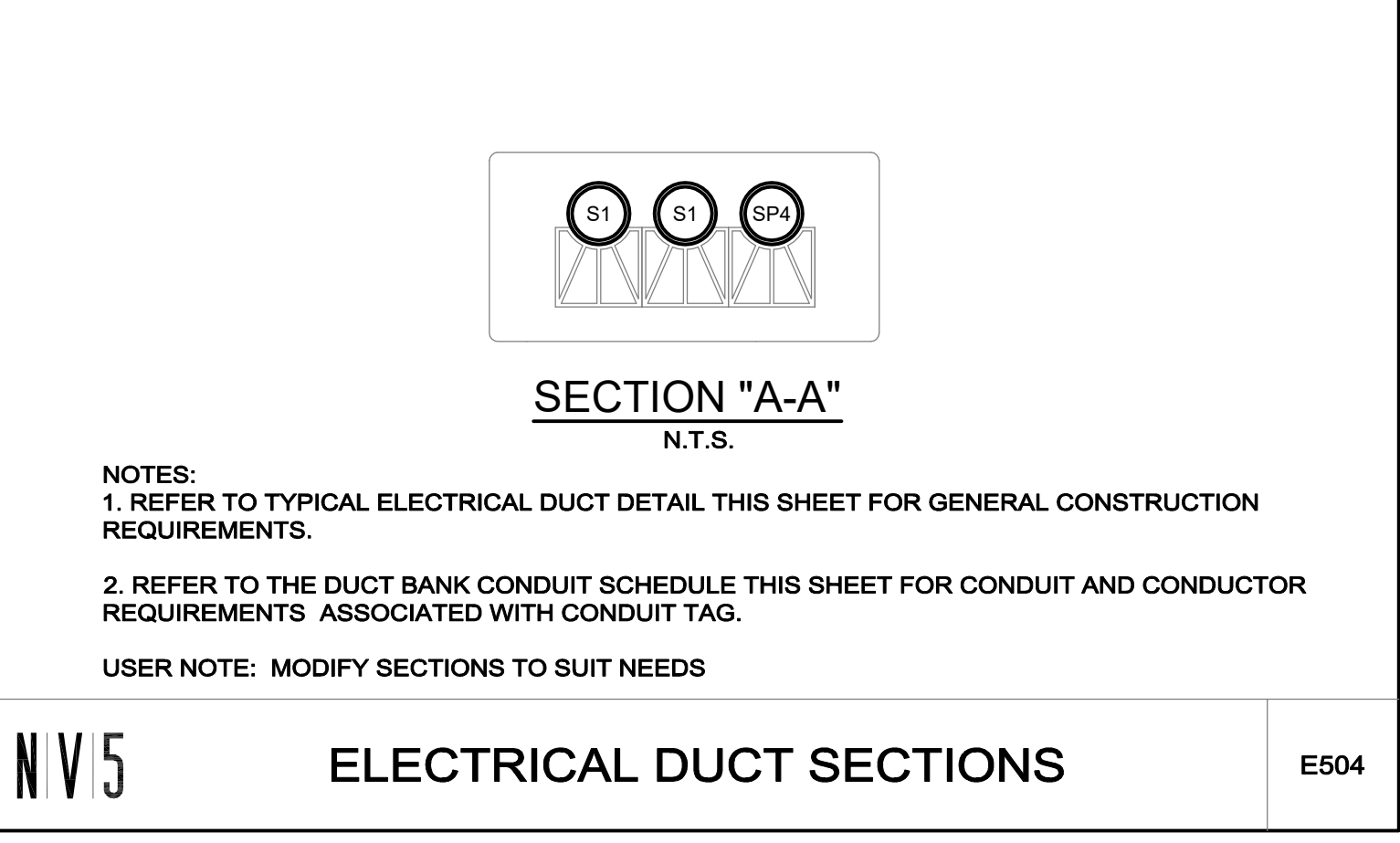
- REFER TO DRAWING E-000 FOR LEGEND, SYMBOLS AND GENERAL NOTES THAT MAY PERTAIN TO THIS DRAWING.
- THIS DRAWING IS INTENDED TO ILLUSTRATE MAJOR EQUIPMENT AND REQUIRED INTERCONNECTIONS. REFER TO THE FLOOR PLANS FOR EXACT LOCATIONS AND THE SPECIFICATIONS FOR ADDITIONAL INSTALLATION REQUIREMENTS.
- THE SERVICE AND ALL SEPARATELY DERIVED SYSTEMS SHALL BE GROUNDED IN ACCORDANCE WITH THE REQUIREMENTS OF ARTICLE 250 OF THE NEC. BOND ALL ELECTRICALLY CONDUCTIVE MATERIALS SUCH AS METAL PIPING SYSTEMS AND STRUCTURAL STEEL TO THE GROUNDING SYSTEM. REFER TO DETAILS FOR ADDITIONAL INFORMATION.



**LEGEND OF FEEDER SIZES - COPPER CONDUCTORS**

FEEDER SYMBOL	CONDUCTORS (3 PHASE, 3 WIRE) WITH GROUND	RACEWAY SIZE	CONDUCTORS (3 PHASE 4 WIRE) WITH GROUND	RACEWAY SIZE	NOMINAL AMPERE RATING
1	3#6 & 1#10G.	3/4"	4#6 & 1#10G.	1"	60
2					
3	3#4 & 1#8G.	1"	4#4 & 1#8G.	1 1/4"	70
4					
5	3#2 & #8G.	1 1/4"	4#2 & 1#8G.	1 1/2"	100
6					
7	3#1 & 1#6G.	1 1/2"	4#1 & 1#6G.	1 1/2"	125
8					
9	3#1/0 & 1#6G.	1 1/2"	4#1/0 & 1#6G.	2"	150
10					
11	3#2/0 & 1#6G.	2"	4#2/0 & 1#6G.	2"	175
12					
13	3#3/0 & 1#6G.	2"	4#3/0 & 1#6G.	2"	200
14					
15	3#4/0 & 1#4G.	2"	4#4/0 & 1#4G.	2 1/2"	225
16					
17	3#250kcmil & 1#4G.	2 1/2"	4#250kcmil & 1#4G.	3"	250
18					
19	3#350kcmil & 1#4G.	3"	4#350kcmil & 1#4G.	3"	300
20					
21	3#500kcmil & 1#3G.	3"	4#500kcmil & 1#3G.	4"	350
22					
23	3#600kcmil & 1#3G.	3"	4#600kcmil & 1#3G.	4"	400
24					
25	2 SETS (3#250kcmil & 1#2G.)	(2) 2 1/2"			500
26			2 SETS (4#250kcmil & 1#2G.)	(2) 2 1/2"	
27	2 SETS (3#350kcmil & 1#1G.)	(2) 3"			600
28			2 SETS (4#350kcmil & 1#1G.)	(2) 3"	

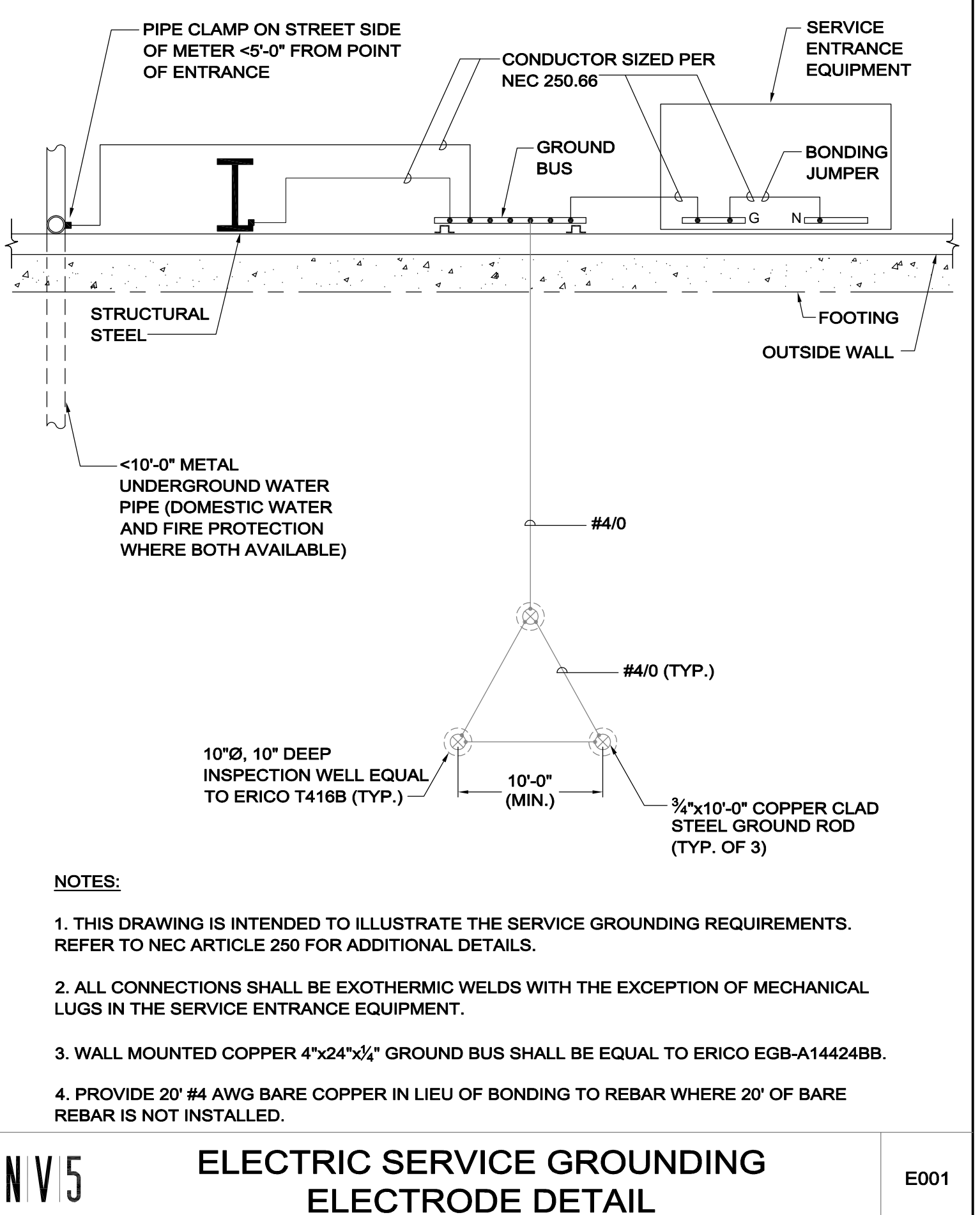
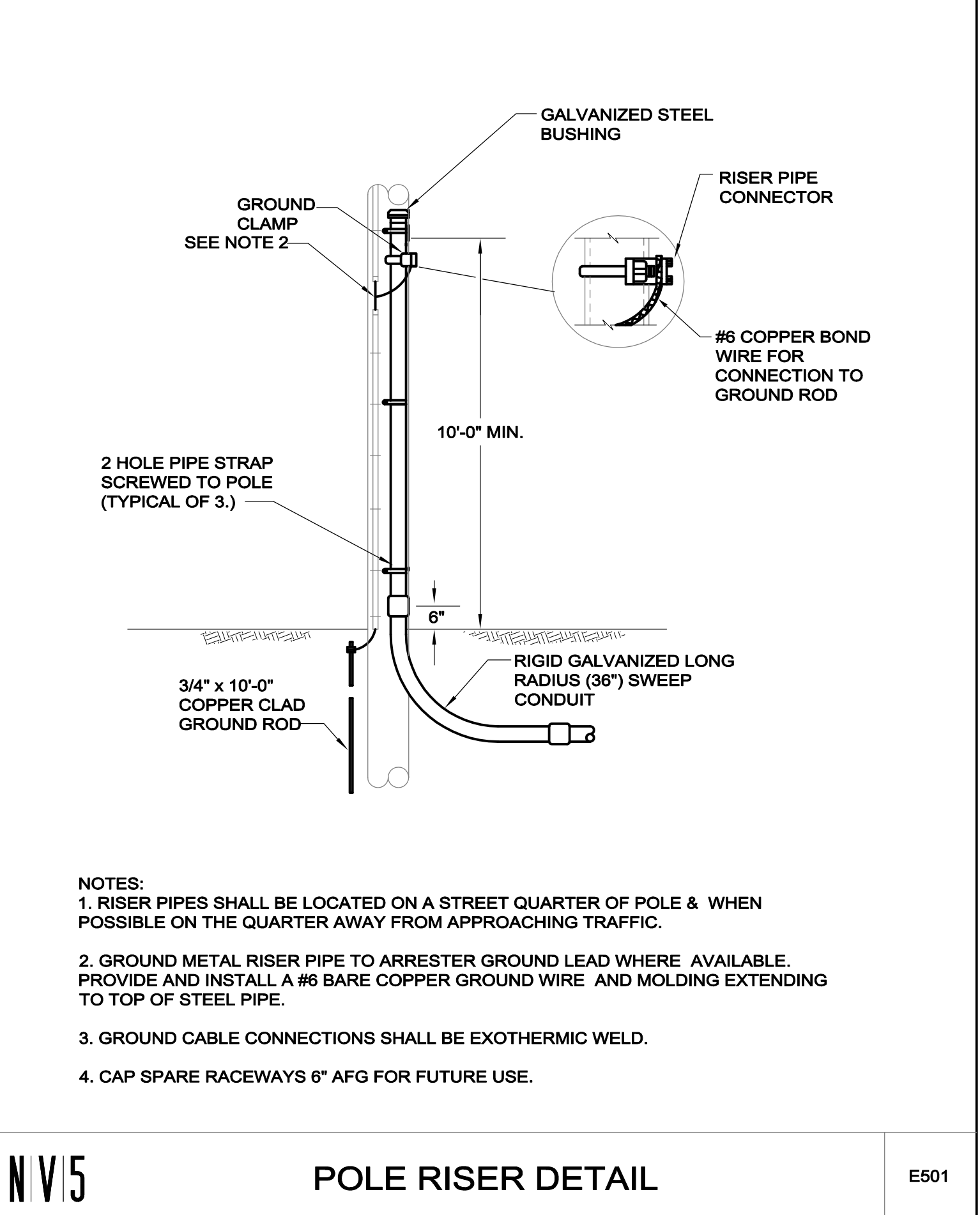
NOTES:  
1) CONDUCTOR SIZES FOR THE ASSOCIATED NOMINAL AMPERE RATING ARE THE MINIMUM ALLOWED BASED UPON NEC TABLE 310.16 WITH NO GREATER THAN THREE CURRENT CARRYING CONDUCTORS PER RACEWAY IN AN AMBIENT NOT TO EXCEED 30 DEGREES C. FEEDER TAGS MAY BE OVERSIZED FOR THE ASSOCIATED OVERCURRENT PROTECTION TO ACCOUNT FOR DERATING FACTORS OR LIMIT VOLTAGE DROP.  
2) RACEWAY SIZES ARE THE MINIMUM ALLOWED BASED UPON NEC TABLE C1 FOR THHN/THWN CONDUCTORS IN EMT. RACEWAY SIZES SHALL BE INCREASED TO ACCOMMODATE DIFFERING INSULATION SYSTEMS AND RACEWAY TYPES TO LIMIT RACEWAY FILL TO LESS THAN 40%.  
3) FEEDERS DESIGNATED IN MULTIPLE SETS SHALL HAVE THE REQUIRED SETS INSTALLED IN PARALLEL.



**DUCT BANK CONDUIT SCHEDULE**

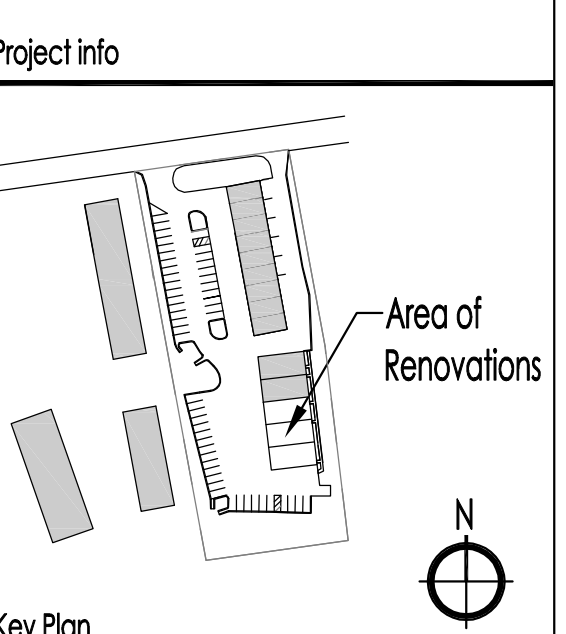
TAG	DESCRIPTION	CONDUIT	CONDUCTORS
S1	SECONDARY CONDUCTOR	4"	4#600KCMIL
SP1	SPARE	1"	
SP2	SPARE	2"	
SP3	SPARE	3"	
SP4	SPARE	4"	
SP5	SPARE - CAP AT POLE BASE	5"	

NOTES:  
1. REFER TO DUCT BANK SECTIONS FOR CORRESPONDING CONDUIT AND CONDUCTOR.  
2. REFER TO THE TYPICAL DUCT BANK SECTION FOR DETAILS REQUIRED IN THE CONSTRUCTION OF THE DUCT BANK ENVELOPE.  
3. REFER TO THE SPECIFICATIONS FOR ADDITIONAL INFORMATION INCLUDING BUT NOT LIMITED TO DUCT BANK REINFORCEMENT REQUIRED UNDER PAVED AREAS INTENDED FOR VEHICULAR TRAFFIC AND AT MANHOLE/BUILDING INTERFACES.  
4. ALL CONDUCTORS INSTALLED IN DUCT SHALL BE SUITABLE FOR WET LOCATIONS.  
5. ALL SERVICE ENTRANCE AND GENERATOR OUTPUT CONDUCTORS INSTALLED IN DUCT SHALL BE TYPE USE.  
6. PROVIDE ALL EMPTY/SPARE CONDUIT WITH NYLON PULL STRING.



Seal

charles river  
Charles River Microbial Solutions  
Processing Facility Renovations  
Harwich, MA



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1	ISSUED FOR CONSTRUCTION	02-28-2022

No. Description Date

Drawn By: MW

Checked By: MS

Approved By: MS

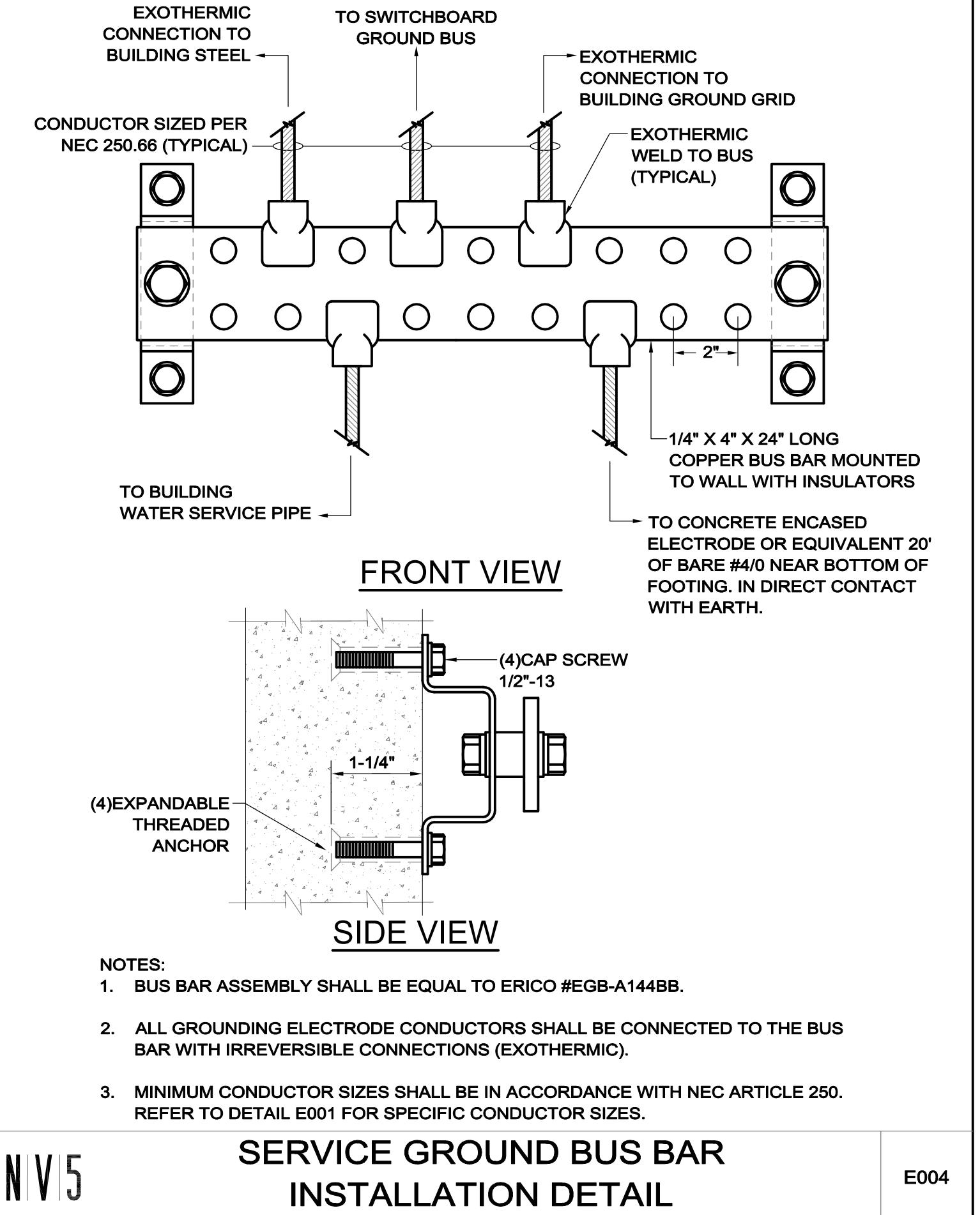
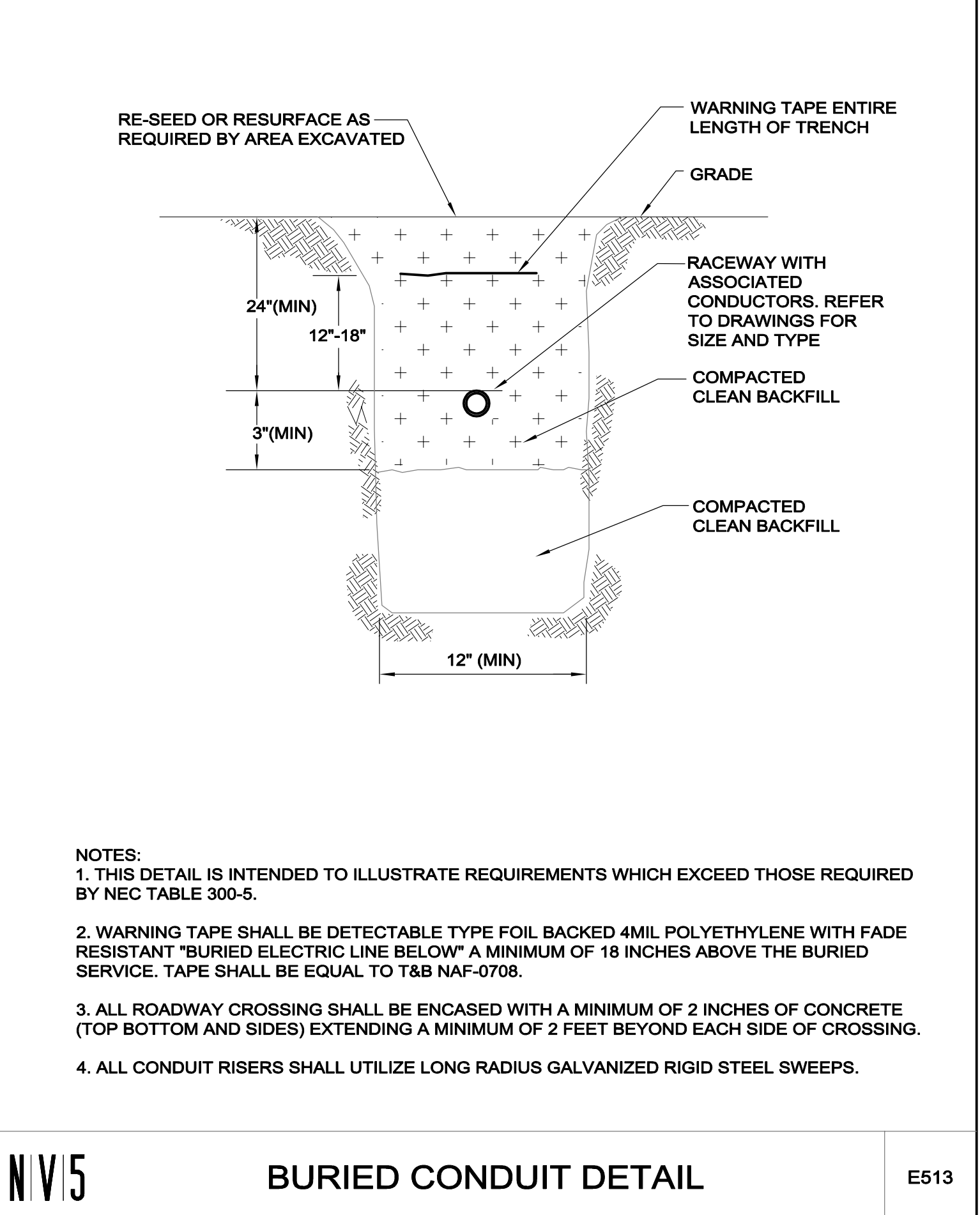
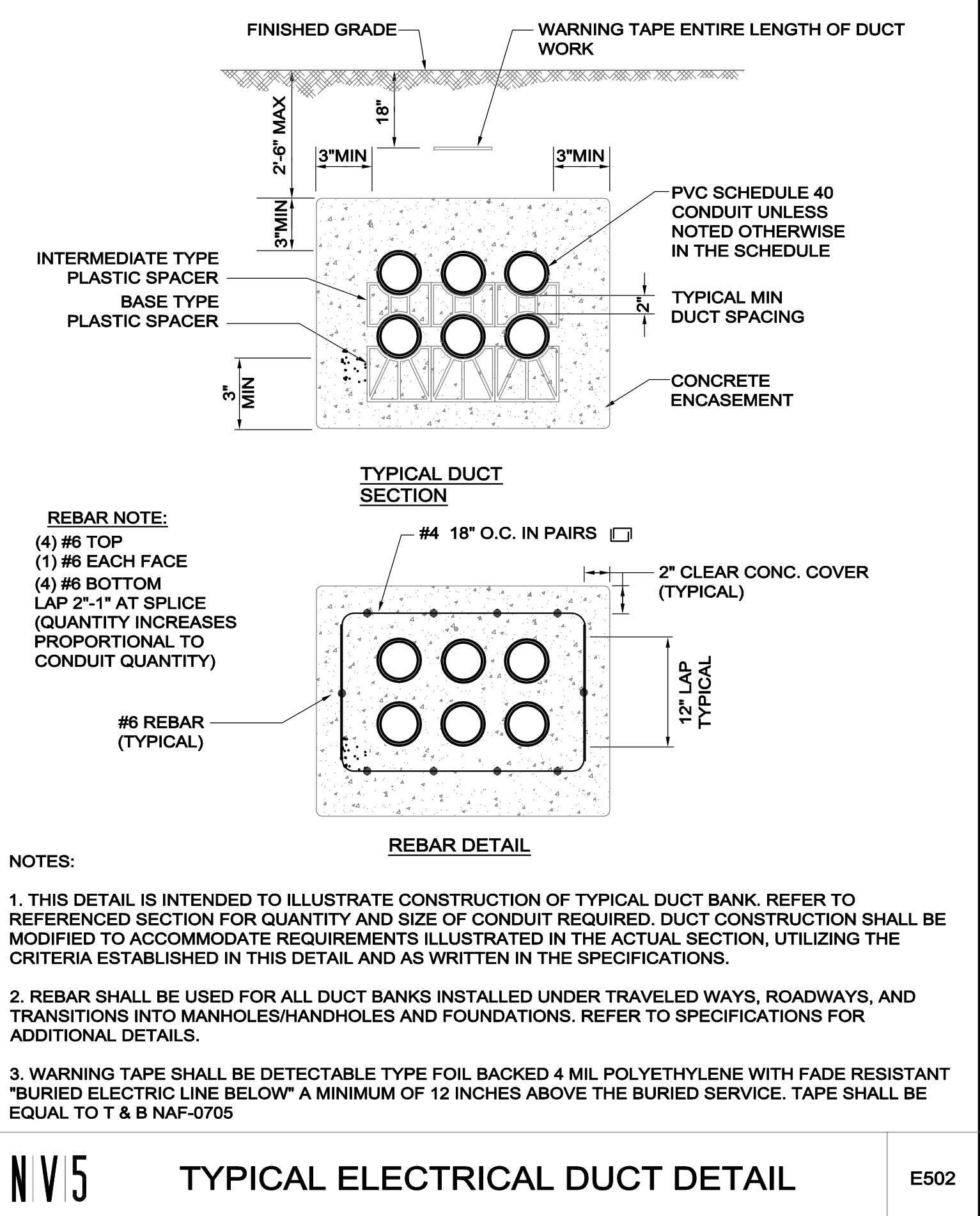
Scale: NONE

Project No.: 0220048.00

Drawing Title: ELECTRICAL ONE-LINE RISER DIAGRAM & SITE DETAILS

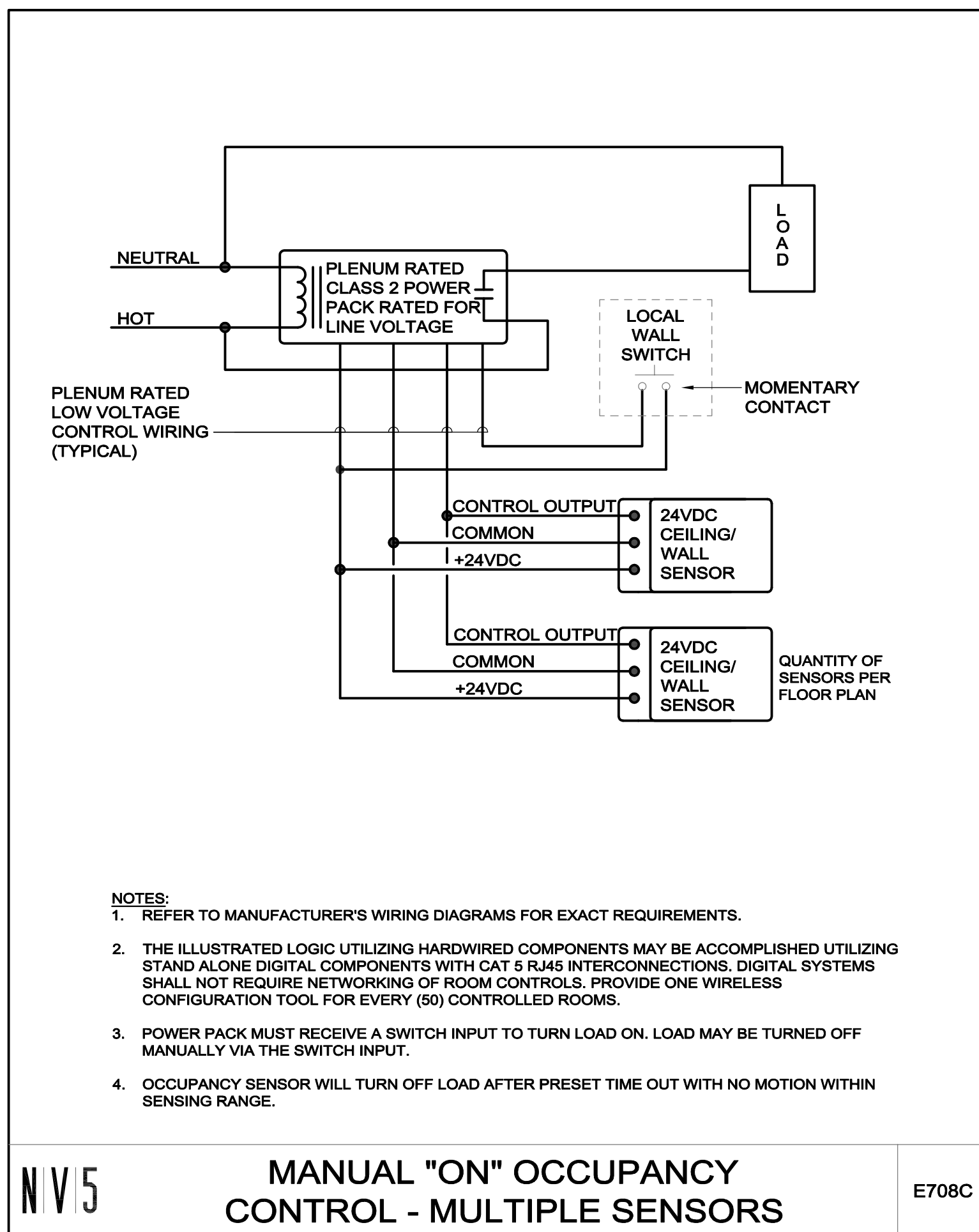
Drawing No.: E-700

Owner's Drawing No.:

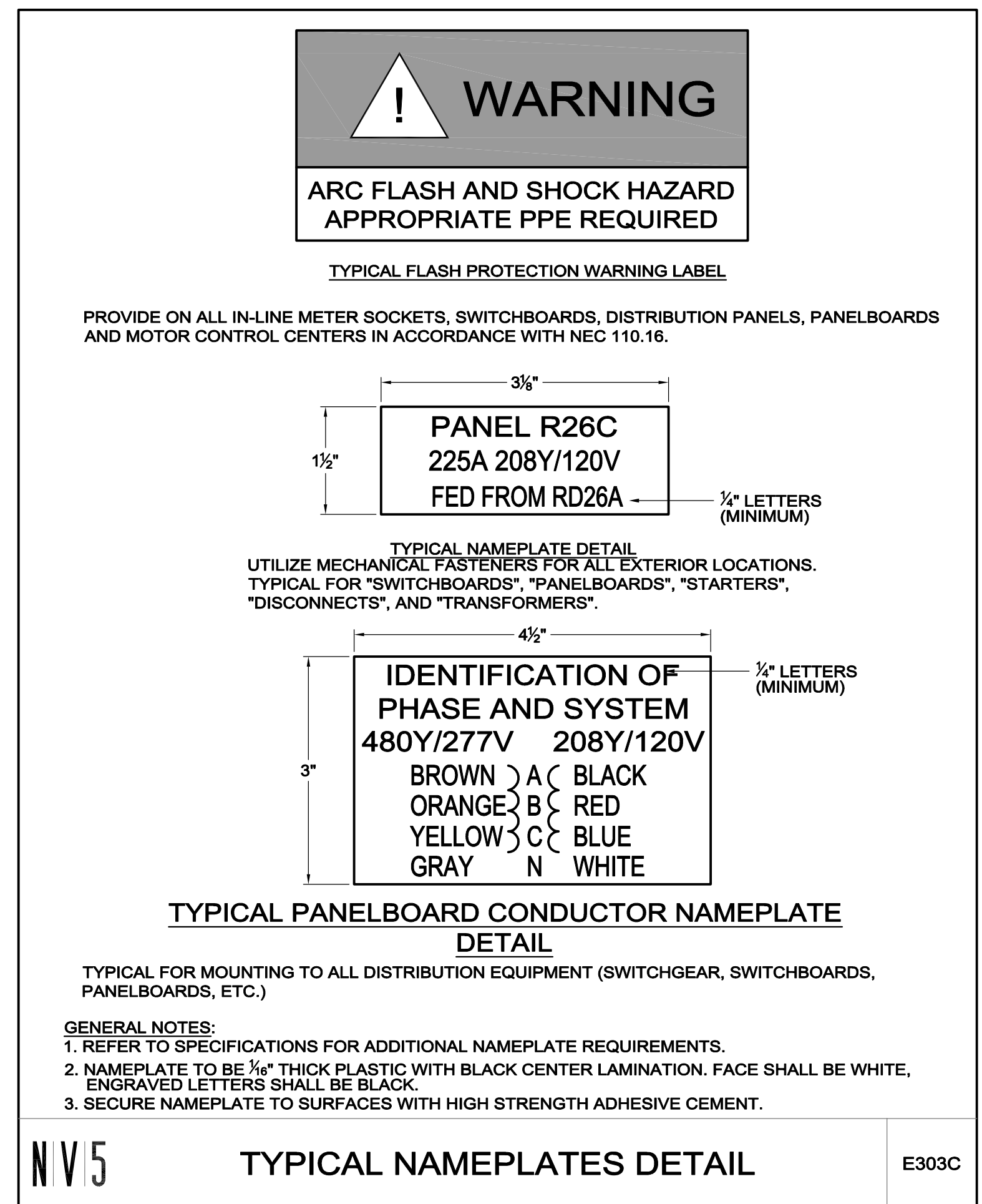


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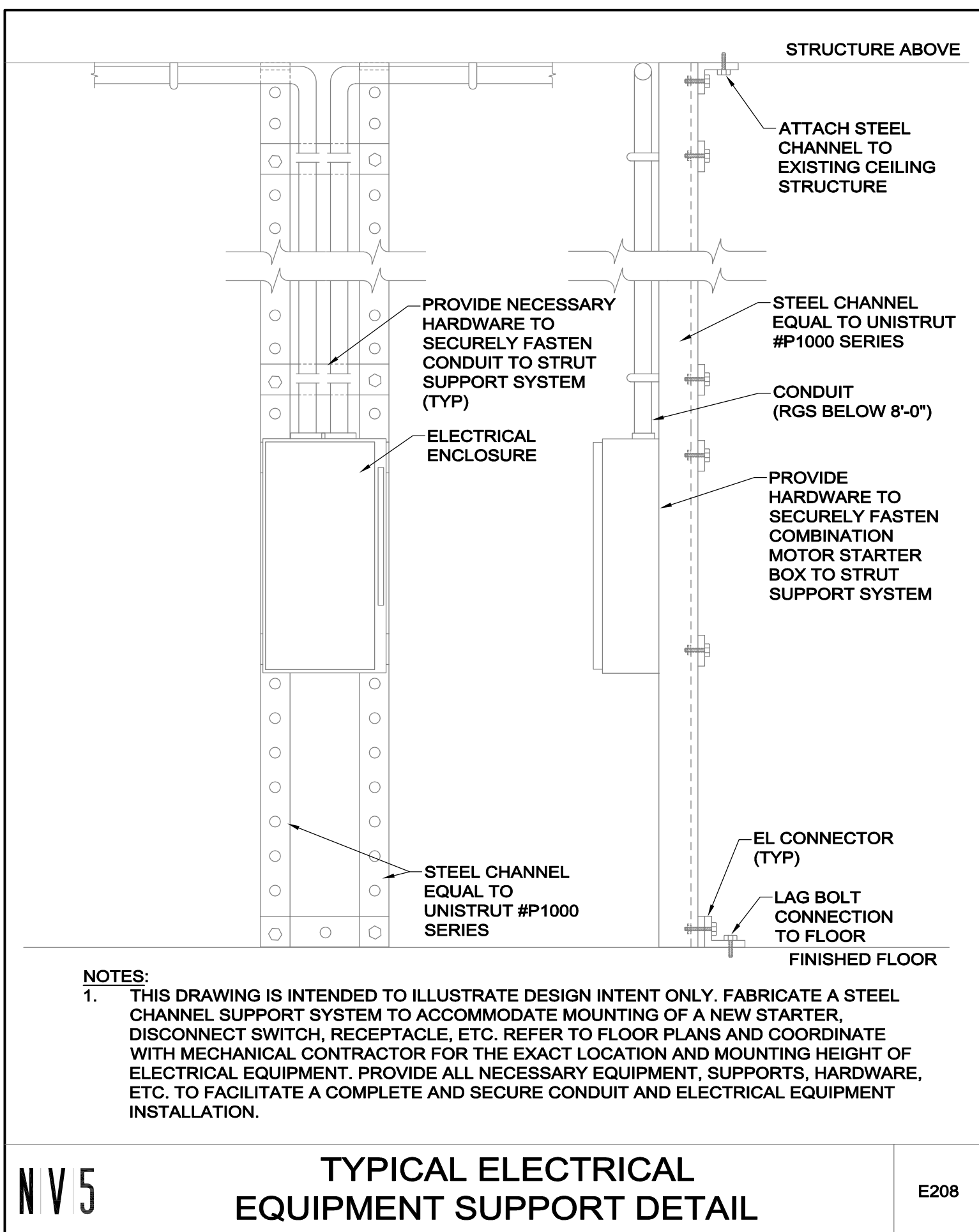




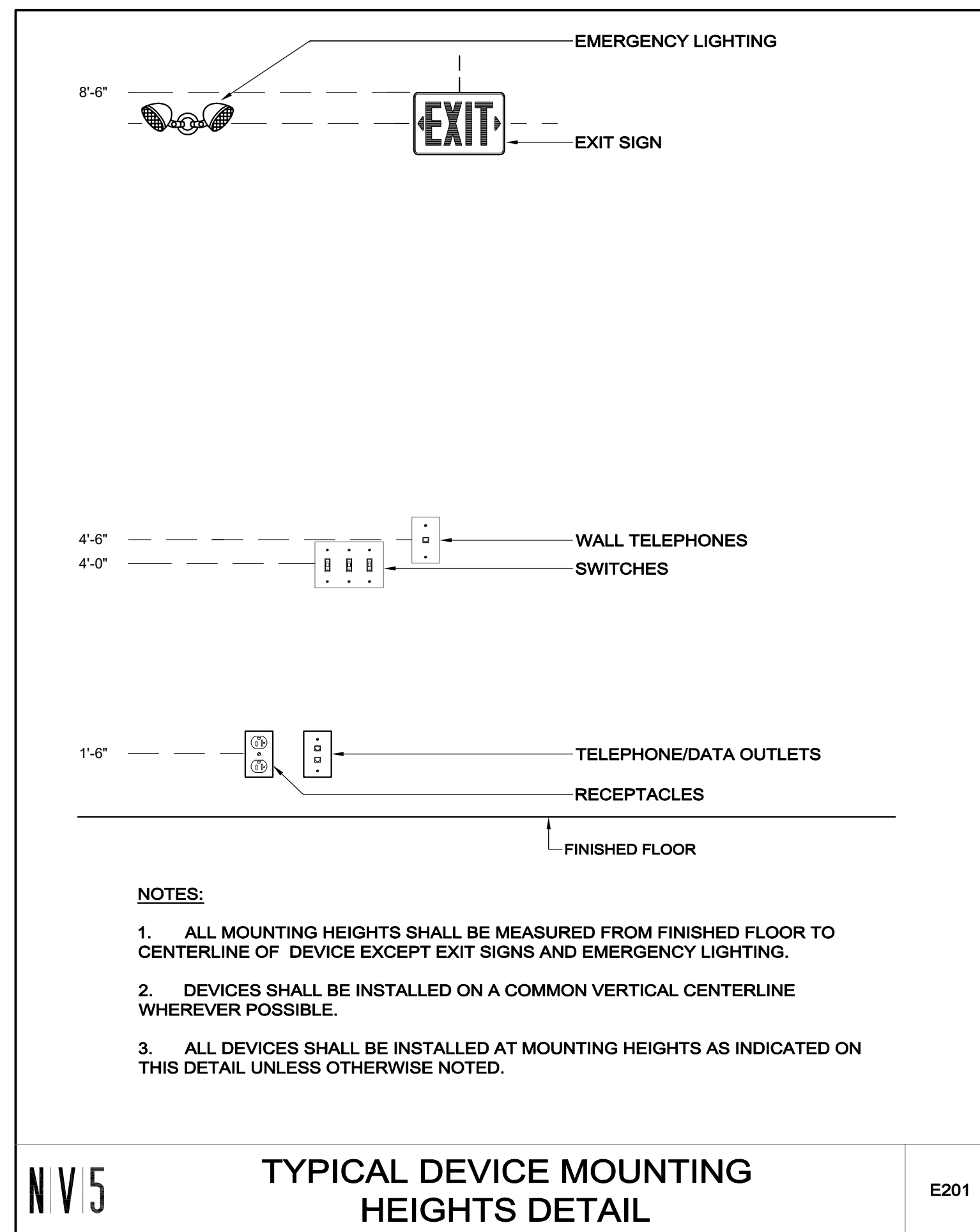
**NV5** **MANUAL "ON" OCCUPANCY CONTROL - MULTIPLE SENSORS** E708C



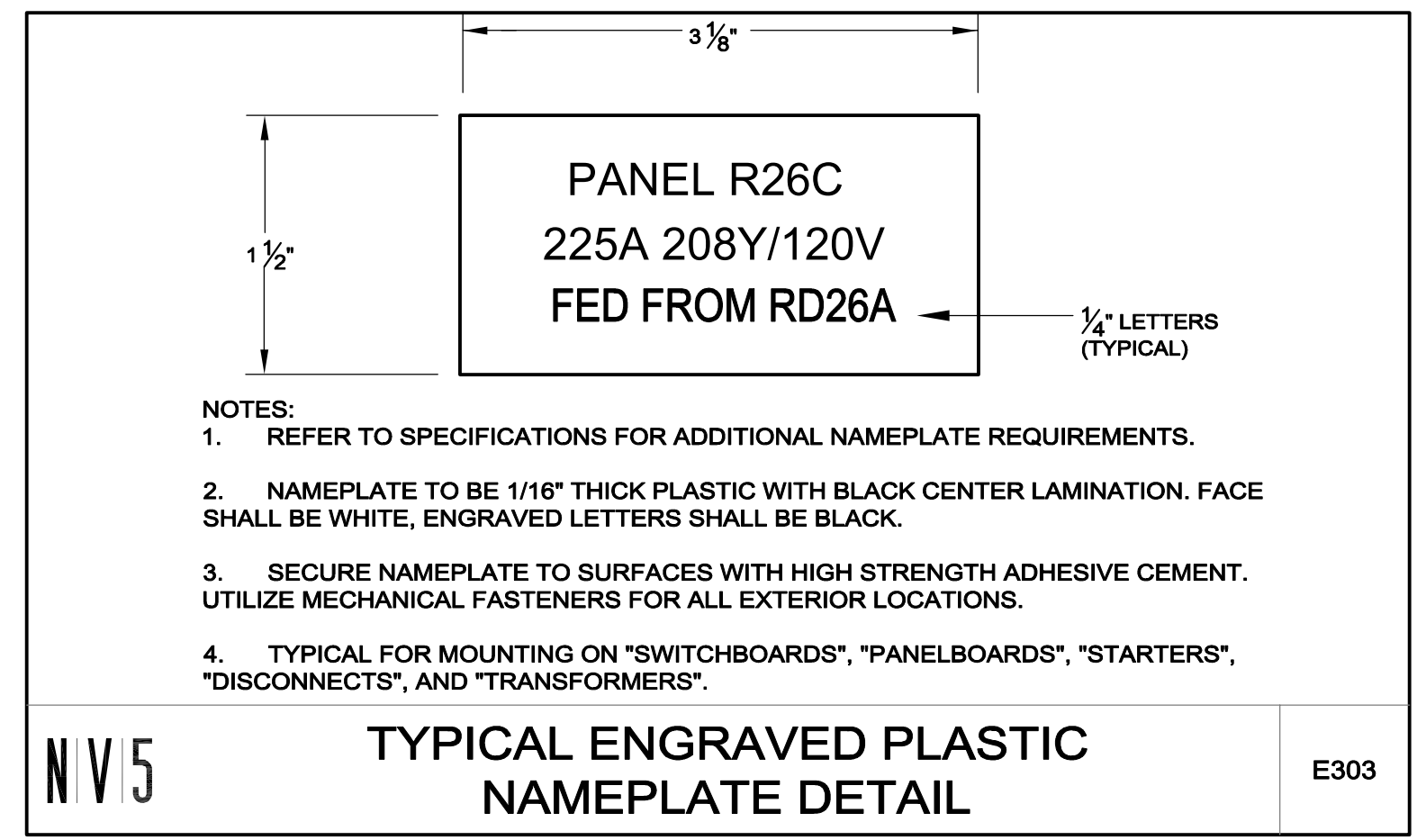
**NV5** **TYPICAL NAMEPLATES DETAIL** E303C



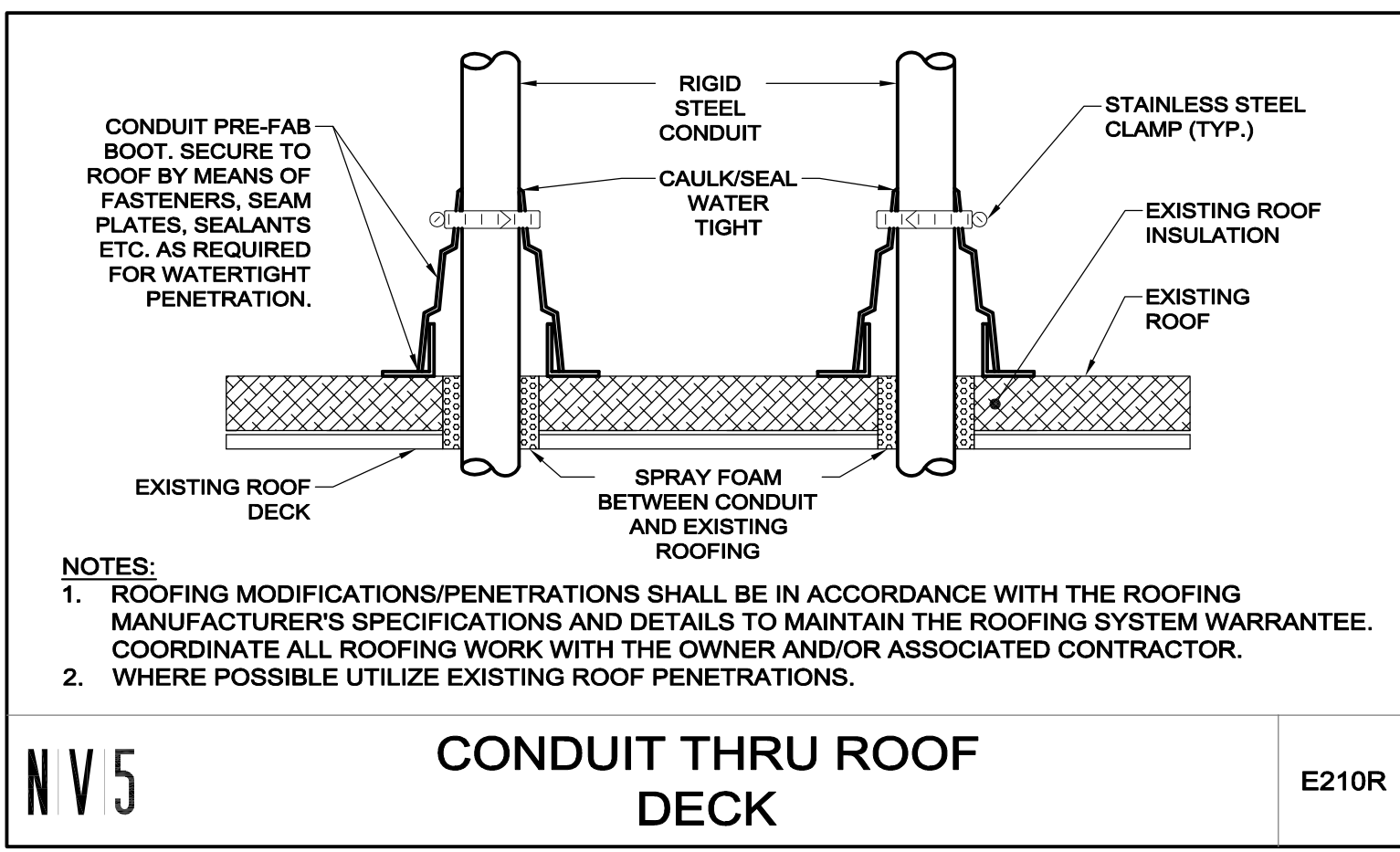
**NV5** **TYPICAL ELECTRICAL EQUIPMENT SUPPORT DETAIL** E208



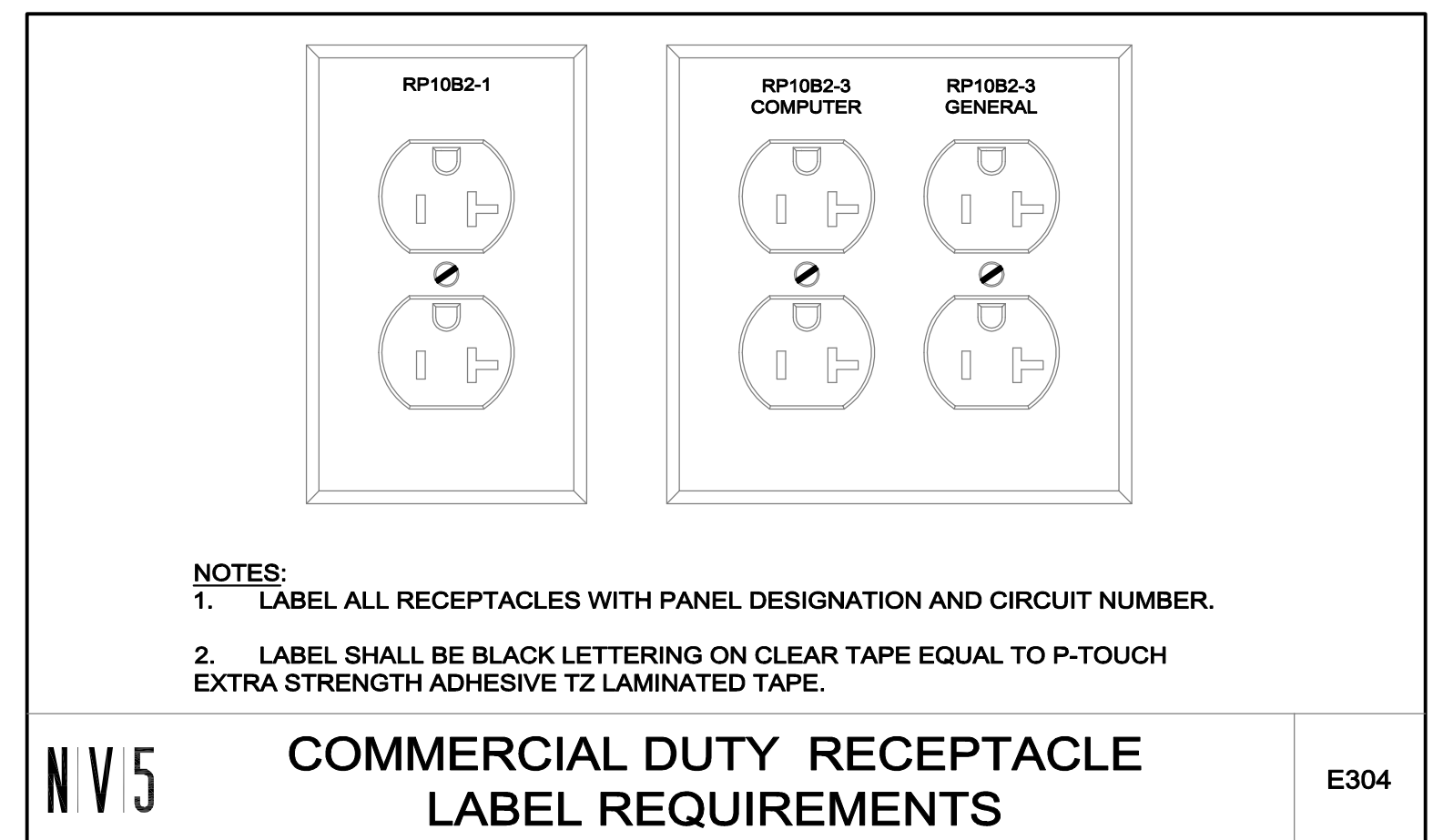
**NV5** **TYPICAL DEVICE MOUNTING HEIGHTS DETAIL** E201



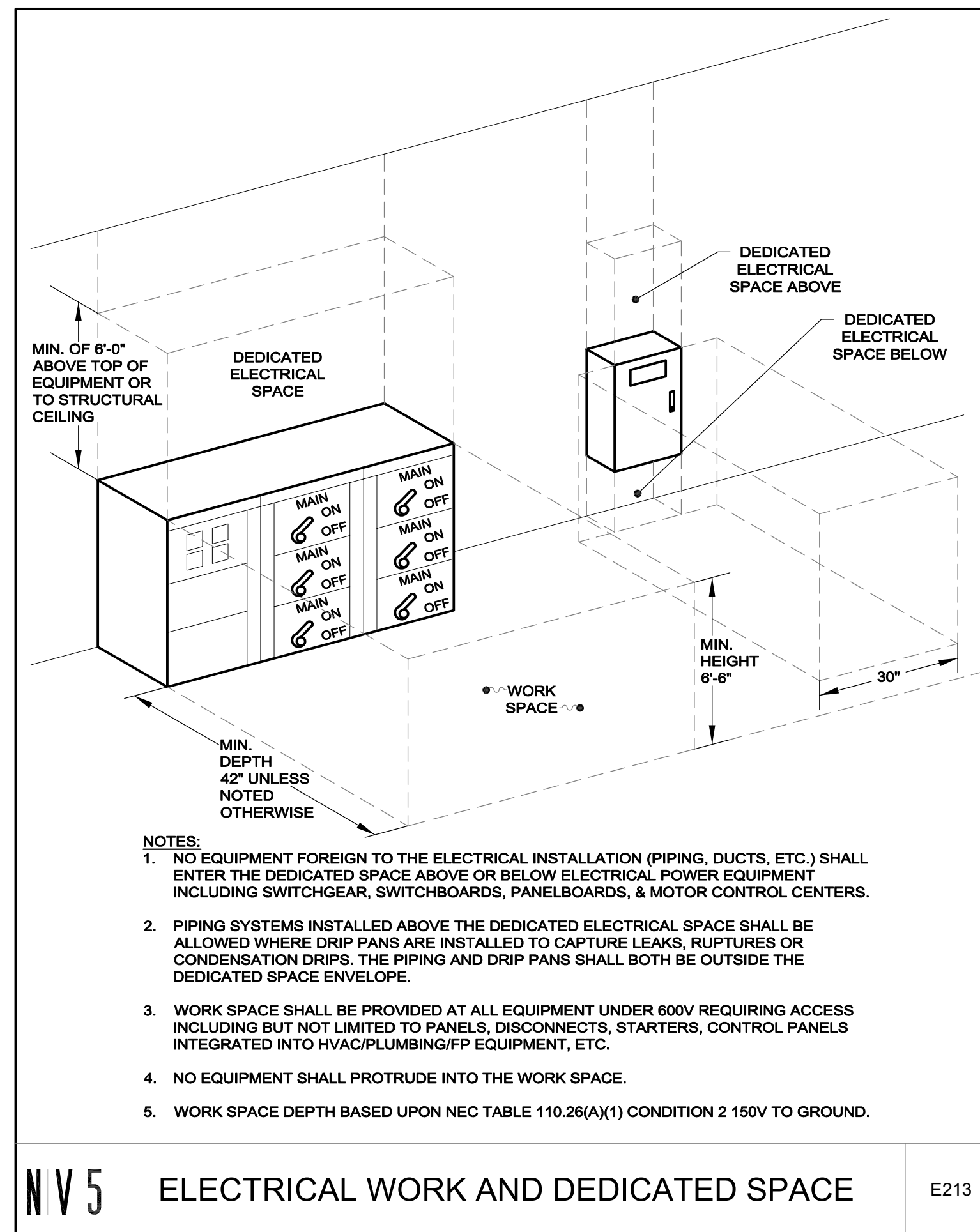
**NV5** **TYPICAL ENGRAVED PLASTIC NAMEPLATE DETAIL** E303



**NV5** **CONDUIT THRU ROOF DECK** E210R



**NV5** **COMMERCIAL DUTY RECEPTACLE LABEL REQUIREMENTS** E304



**NV5** **ELECTRICAL WORK AND DEDICATED SPACE** E213

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1	ISSUED FOR CONSTRUCTION 02-28-2022
No.	Description Date
Drawn By: MW	
Checked By: MS	
Approved By: MS	
Scale: NONE	
Project No.: 0220048.00	
Drawing Title: ELECTRICAL DETAILS	
Drawing No.: E-800	
Owner's Drawing No.:	



### MECHANICAL EQUIPMENT SCHEDULE

LOAD TAG	STARTER LOCATION	LOAD							STARTER								POWER SOURCE								CONNECTION								REMARKS
		HP	FLA	KVA	VOLT	PH	NEMA SIZE	TYPE	OVERCURRENT CB	RK1 FUSE	MCP	PB	HOA	INDICATING LIGHTS R	G	A	CPT	AUXILIARY CONTACTS NO	NC	PANEL	CB	FLEX	JB	REC	AS	DISC AF	NEMA	BRANCH CIRCUIT					
EMH-1		-	16.7	6.0	208	3	-	-	-	-	-	-	-	-	-	-	-	-	DP21	30A3P	X	X	-	60	35	1	4#10 & #10G-3/4"	NOTES 10					
RTU-1		-	15.6	5.6	208	3	-	NOTE 8	-	-	-	-	-	-	-	-	-	-	DP21	25A3P	X	-	-	-	-	-	4#10 & #10G-3/4"	NOTES 7 & 10					
RTU-2		-	15.6	5.6	208	3	-	NOTE 8	-	-	-	-	-	-	-	-	-	-	DP21	25A3P	X	-	-	-	-	-	4#10 & #10G-3/4"	NOTES 7 & 10					
RTU-3		-	22.2	8.0	208	3	-	NOTE 8	-	-	-	-	-	-	-	-	-	-	DP21	35A3P	X	-	-	-	-	-	4#10 & #10G-3/4"	NOTES 7 & 10					
RTU-4		-	22.2	8.0	208	3	-	NOTE 8	-	-	-	-	-	-	-	-	-	-	DP21	35A3P	X	-	-	-	-	-	4#10 & #10G-3/4"	NOTES 7 & 10					
EDH-1		-	20.8	7.5	208	3	-	-	-	-	-	-	-	-	-	-	-	-	DP21	30A3P	X	-	-	60	30	1	3#10 & #10G-3/4"						
NOTES		1. NOTES 2-6 APPLY TO ALL APPLICABLE LOADS. 2. PROVIDE THERMAL OVERLOAD UNITS FOR ALL STARTERS SIZED TO MATCH LOAD NAMEPLATE AND NEC REQUIREMENTS. 3. BRANCH CIRCUIT WIRING METHODS SHALL BE AS NOTED ON THE DRAWINGS AND/OR SPECIFICATIONS FOR THE APPLICABLE LOCATION. THE FINAL THREE FEET (MINIMUM) SHALL BE FLEXIBLE METAL OR LIQUID TIGHT FLEXIBLE METAL CONDUIT. 4. COPPER BRANCH CIRCUIT CONDUCTOR SIZING BASED UPON NEC TABLE 310.15(B)(16). MAKE ADJUSTMENTS TO CONDUCTORS FOR TEMPERATURE OR VOLTAGE DROP THAT EXCEEDS NEC AND SPECIFICATION CRITERIA. 5. RADIWAY SIZES ARE BASED UPON GRCS AND LFMC WITH THHN CONDUCTORS. 6. VFD SHALL BE CONTROLLED W/REMOTE 4-20mA OR 0-5V SIGNAL PROVIDED BY THE HVAC ATC CONTRACTOR. 7. REQUIRED DISCONNECT IS PROVIDED INTEGRAL PREMIEDED TO MECHANICAL EQUIPMENT. 8. REQUIRED STARTER IS PROVIDED INTEGRAL PREMIEDED TO MECHANICAL EQUIPMENT. 9. DISCONNECT FOR 251W AND 252W MOTORS SHALL BE SIX POLE. 10. PROVIDE NEUTRAL FROM SOURCE TO STARTER ONLY FOR 120V CONTROL POWER OF 208V 3PH UNITS. 11. FUSES FOR DISCONNECT SWITCHES SHALL BE CLASS RK5.																										KEY: FV/R FULL VOLTAGE NON-REVERSING F/R FULL VOLTAGE REVERSING 2S1W TWO SPEED SINGLE WINDING 2S2W TWO SPEED TWO WINDING RVAT REDUCED VOLTAGE AUTOTRANSFORMER RVFW REDUCED VOLTAGE PART WINDING RVWDT REDUCED VOLTAGE WYE DELTA OPEN TRANSITION RVWDT REDUCED VOLTAGE WYE DELTA CLOSED TRANSITION MMS MANUAL MOTOR STARTER CB CIRCUIT BREAKER MCP MOTOR CIRCUIT PROTECTOR PB START AND STOP PUSH BUTTON HOA HAND-OFF-AUTOMATIC SELECTOR SWITCH CPT CONTROL POWER TRANSFORMER VFD VARIABLE FREQUENCY DRIVE W/O BYPASS VFD VARIABLE FREQUENCY DRIVE W/ BYPASS CNTCR CONTACTOR - NO THERMAL OVERLOAD					

### PANELBOARD SCHEDULE

PANEL DP21				VOLTS: 208Y/120		MOUNT: SURFACE		GROUND BUS: Y	
MAIN: MCB				AMPS: 600		AIC: 22,000		ISOLATED GROUND BUS: N	
				PH/WIRE: 3/4		LOC: CRL		200% NEUTRAL: N	
CIR.	POLES	DESCRIPTION OF LOAD	LOAD KVA	LOAD BY PHASE KVA	LOAD KVA	DESCRIPTION OF LOAD	AMPS/POLES	CIR.	
1			21.02	38.98	17.98			2	
3	225A3P	PANEL "P21"	21.53	41.29	19.76	PANEL "P22"	225A3P	4	
5			21.34	39.62	18.28			6	
7			1.87	1.87	0.00			8	
9	25A3P	RTU-1	0.00	1.87	0.00	TVSS	30A3P	10	
11			1.87	1.87	0.00			12	
13			1.87	1.87	0.00			14	
15	25A3P	RTU-2	1.87	1.87	0.00	SPARE	20A3P	16	
17			1.87	1.87	0.00			18	
19			2.66	2.66	0.00			20	
21	35A3P	RTU-3	2.66	2.66	0.00	SPARE	20A3P	22	
23			2.66	2.66	0.00			24	
25			2.66	2.66	0.00			26	
27	35A3P	RTU-4	2.66	2.66	0.00	SPARE	20A3P	28	
29			2.66	2.66	0.00			30	
31			2.50	2.50	0.00			32	
33	30A3P	EDH-1	2.50	2.50	0.00	SPARE	20A3P	34	
35			2.50	2.50	0.00			36	
37			2.00	2.00	0.00	SPARE	20A1P	38	
39	30A3P	EDH-1	2.00	6.99	4.99	OVEN, OVN-1	60A2P	40	
41			2.00	6.99	4.99			42	
CONNECTED KVA BY PHASE:			62.54	69.84	58.17		TOTAL CONNECTED KVA:	170.56	
							DEMAND FACTOR:	1.00	
							TOTAL DEMAND KVA:	170.56	
							TOTAL DEMAND AMPERES:	473.45	

### PANELBOARD SCHEDULE

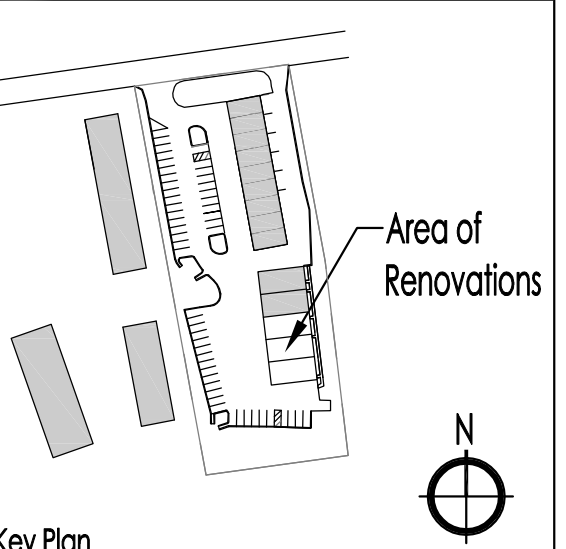
PANEL P21				VOLTS: 208Y/120		MOUNT: SURFACE		GROUND BUS: Y	
MAIN: MCB				AMPS: 225		AIC: 22,000		ISOLATED GROUND BUS: N	
				PH/WIRE: 3/4		LOC: CRL		200% NEUTRAL: N	
CIR.	POLES	DESCRIPTION OF LOAD	LOAD KVA	LOAD BY PHASE KVA	LOAD KVA	DESCRIPTION OF LOAD	AMPS/POLES	CIR.	
1	20A1P	EXTERIOR SERVICE RECEP	0.38	3.54	3.18	CENTRIFUGE C-1	30A2P	2	
3	20A1P	LEAK DETECTION	0.20		3.18			4	
5	20A1P	LIGHTING - LAB. BREAK RM	0.62		3.80	CENTRIFUGE C-2	30A2P	6	
7	20A1P	LIGHTING - LAB	0.98	4.16	3.18			8	
9	20A1P	LIGHTING - OPEN AREA	0.53		3.81	CENTRIFUGE C-3	30A2P	10	
11	20A1P	COLLECTION TENT LIGHTING	1.00		4.18	CENTRIFUGE C-4	30A2P	12	
13	20A1P	GLASS PREP RECEP	0.72	3.90	3.18			14	
15	20A1P	GLASS PREP RECEP	1.00		4.18	CENTRIFUGE C-5	30A2P	16	
17	20A1P	GLASS PREP RECEP	1.00		4.18			18	
19	20A1P	BREAK RM GEN RECPTS	0.72	3.90	3.18	CENTRIFUGE C-6	30A2P	20	
21	20A1P	BREAK RM COUNTER REC	1.00	4.18	3.18			22	
23	20A1P	BREAK RM REFRIG.	1.00		4.18	CENTRIFUGE C-7	30A2P	24	
25	20A1P	LAB GEN RECEP	0.90	4.08	3.18			26	
27	20A1P	LAB COUNTER RECEP	1.00		4.18			28	
29	20A1P	LAB COUNTER RECEP	1.00		3.20	INCUBATOR	20A1P	30	
31	20A1P	SPARE	0.00	0.72	0.72	COLLECT TENT HEPAS	20A1P	32	
33	20A1P	SPARE	0.00	1.08	1.08	COLLECT TENT HEPAS	20A1P	34	
35	20A1P	SPARE	0.00	1.08	1.08	COLLECT TENT HEPAS	20A1P	36	
37	20A1P	SPARE	0.00	0.72	0.72	COLLECT TENT HEPAS	20A1P	38	
39	20A1P	SPARE	0.00	0.72	0.72	COLLECT TENT HEPAS	20A1P	40	
41	20A1P	SPARE	0.00	0.72	0.72	COLLECT TENT HEPAS	20A1P	42	
CONNECTED KVA BY PHASE:			21.02	21.53	21.34		TOTAL CONNECTED KVA:	63.89	
							DEMAND FACTOR:	1.00	
							TOTAL DEMAND KVA:	63.89	
							TOTAL DEMAND AMPERES:	177.35	

### PANELBOARD SCHEDULE

PANEL P22				VOLTS: 208Y/120		MOUNT: SURFACE		GROUND BUS: Y	
MAIN: MCB				AMPS: 225		AIC: 22,000		ISOLATED GROUND BUS: N	
				PH/WIRE: 3/4		LOC: CRL		200% NEUTRAL: N	
CIR.	POLES	DESCRIPTION OF LOAD	LOAD KVA	LOAD BY PHASE KVA	LOAD KVA	DESCRIPTION OF LOAD	AMPS/POLES	CIR.	
1	30A2P	6' HORIZ FLOW HOOD	2.50	3.50	1.00	OPEN AREA GEN RECEP	20A1P	2	
3	30A2P	6' HORIZ FLOW HOOD	2.50		3.50	OPEN AREA COUNTER REC	20A1P	4	
5	30A2P	6' HORIZ FLOW HOOD	2.50		3.50	OPEN AREA COUNTER REC	20A1P	6	
7	30A2P	6' HORIZ FLOW HOOD	2.50	2.72	0.22	SHAKERS	20A1P	8	
9	30A2P	6' HORIZ FLOW HOOD	2.50		3.22	SONICATORS	20A1P	10	
11	30A2P	6' HORIZ FLOW HOOD	2.50		2.98	STR PLATES	20A1P	12	
13	30A2P	6' HORIZ FLOW HOOD	2.50	2.84	0.34	1ST WASH PUMPS WP-1&2	20A1P	14	
15	30A2P	6' HORIZ FLOW HOOD	2.50		2.58	BALANCES	20A1P	16	
17	30A2P	6' HORIZ FLOW HOOD	2.50		3.10	WALKIN REFLTS/RECORDR	20A1P	18	
19			2.50	3.50	1.00	TENT RECEP	20A1P	20	
21	60A2P	OVEN	5.00	5.34	0.34	1ST WASH PUMPS WP-3&4	20A1P	22	
23			5.00		5.50	DOCKING STATION	20A1P	24	
25	50A2P	WALKIN COOLER	3.12	3.12	0.00	SPARE	20A1P	26	
27			3.12		3.12	SPARE	20A1P	28	
29	20A1P	FUME HOOD	1.20		1.20	SPARE	20A1P	30	
31	20A1P	FUME HOOD	1.20	1.20	0.00	SPARE	20A1P	32	
33	20A1P	3-DOOR REFRIG	1.00		1.00	SPARE	20A1P	34	
35	20A1P	TENT RECEP	1.00		1.00	SPARE	20A1P	36	
37	20A1P	TENT RECEP	1.00		1.00	SPARE	20A1P	38	
39	20A1P	TENT RECEP	1.00		1.00	SPARE	20A1P	40	
41	20A1P	TENT RECEP	1.00		1.00	SPARE	20A1P	42	
CONNECTED KVA BY PHASE:			17.96	19.76	18.28		TOTAL CONNECTED KVA:	56.00	
							DEMAND FACTOR:	1.00	
							TOTAL DEMAND KVA:	56.00	
							TOTAL DEMAND AMPERES:	155.45	

Seal

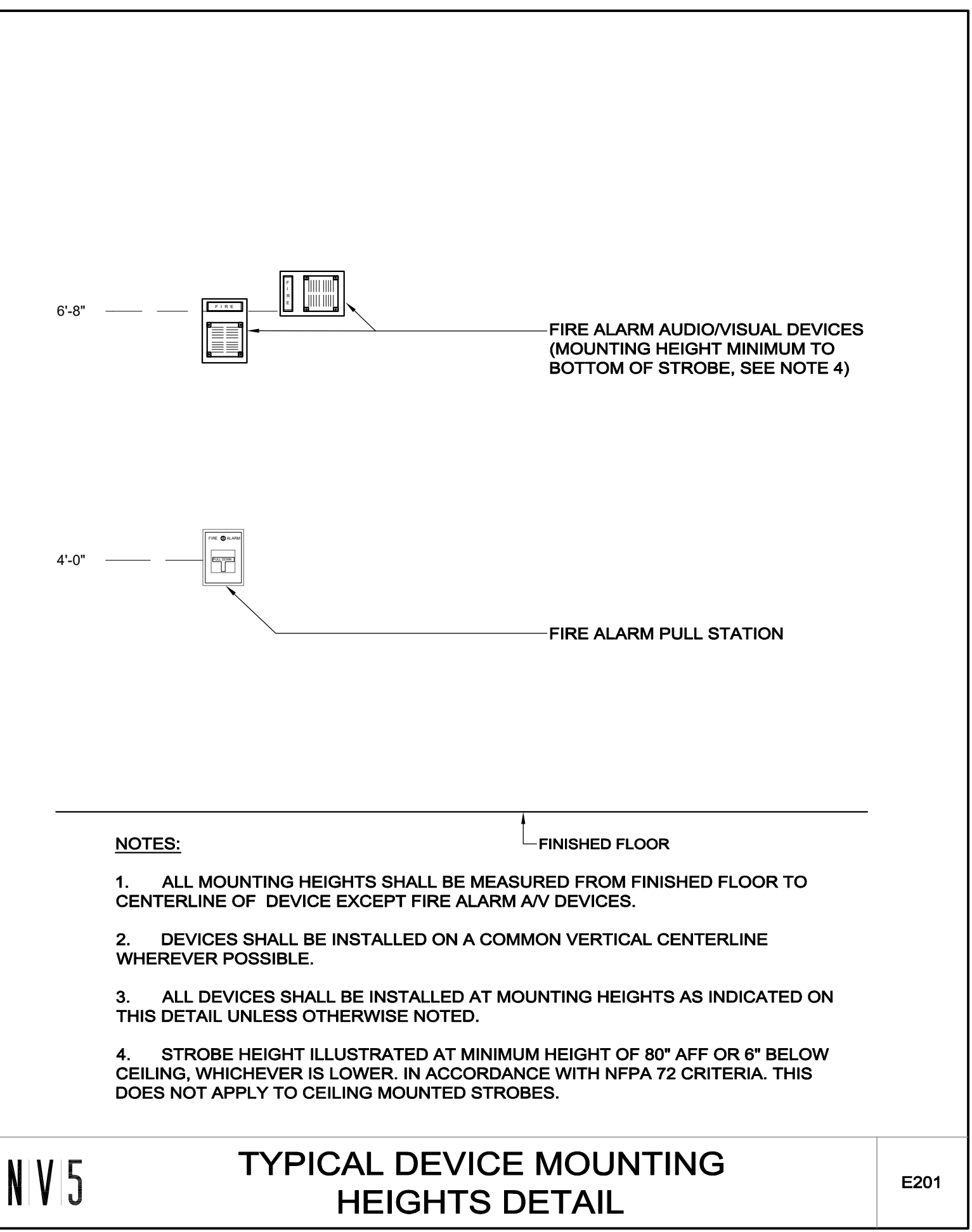
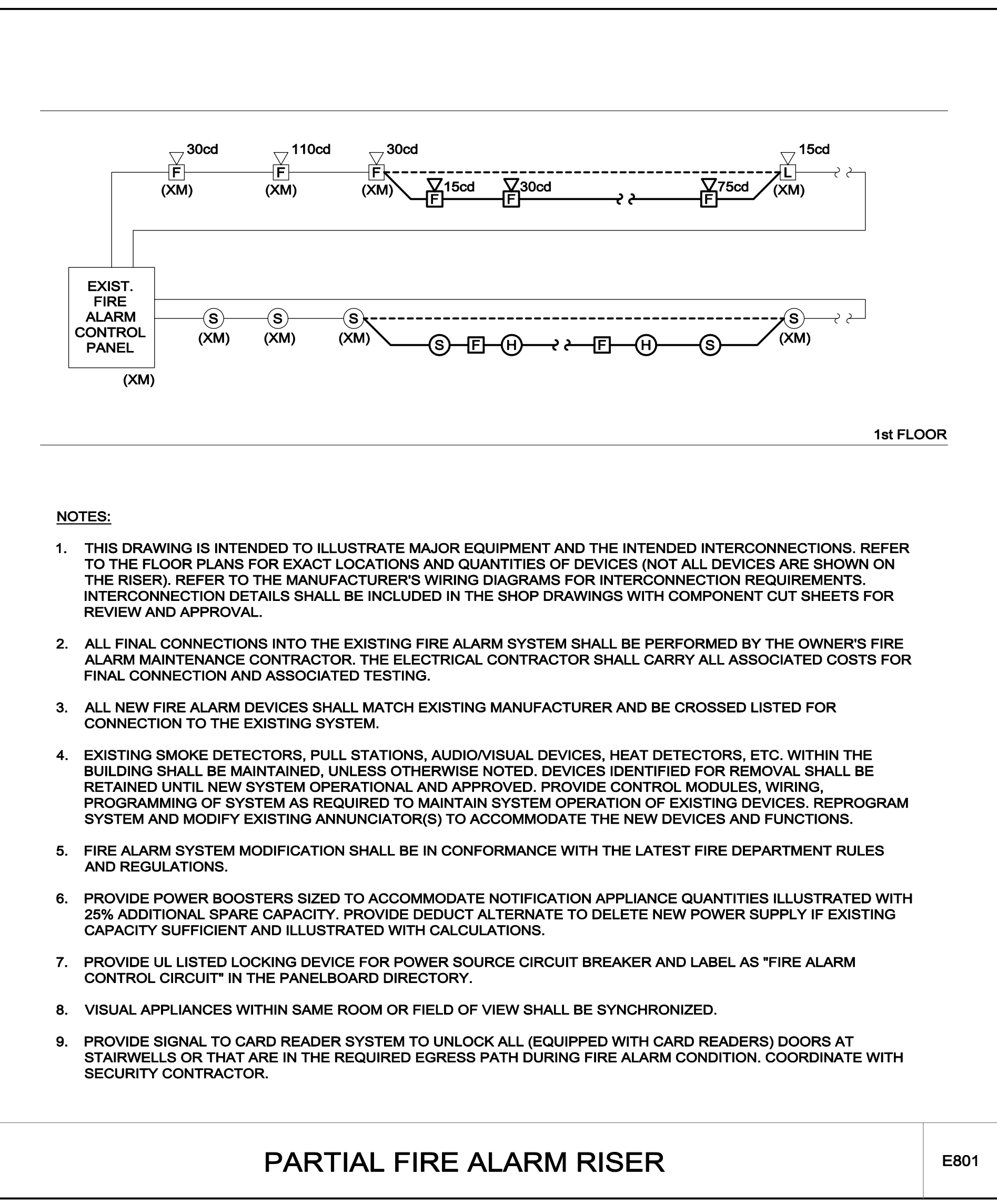
**charles river**  
Charles River Microbial Solutions  
Processing Facility Renovations  
Harwich, MA



No.	Description	Date
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1	ISSUED FOR CONSTRUCTION	02-28-2022

Drawn By: MW  
Checked By: MS  
Approved By: MS  
Scale: NONE  
Project No.: 0220048.00  
Drawing Title: ELECTRICAL SCHEDULES





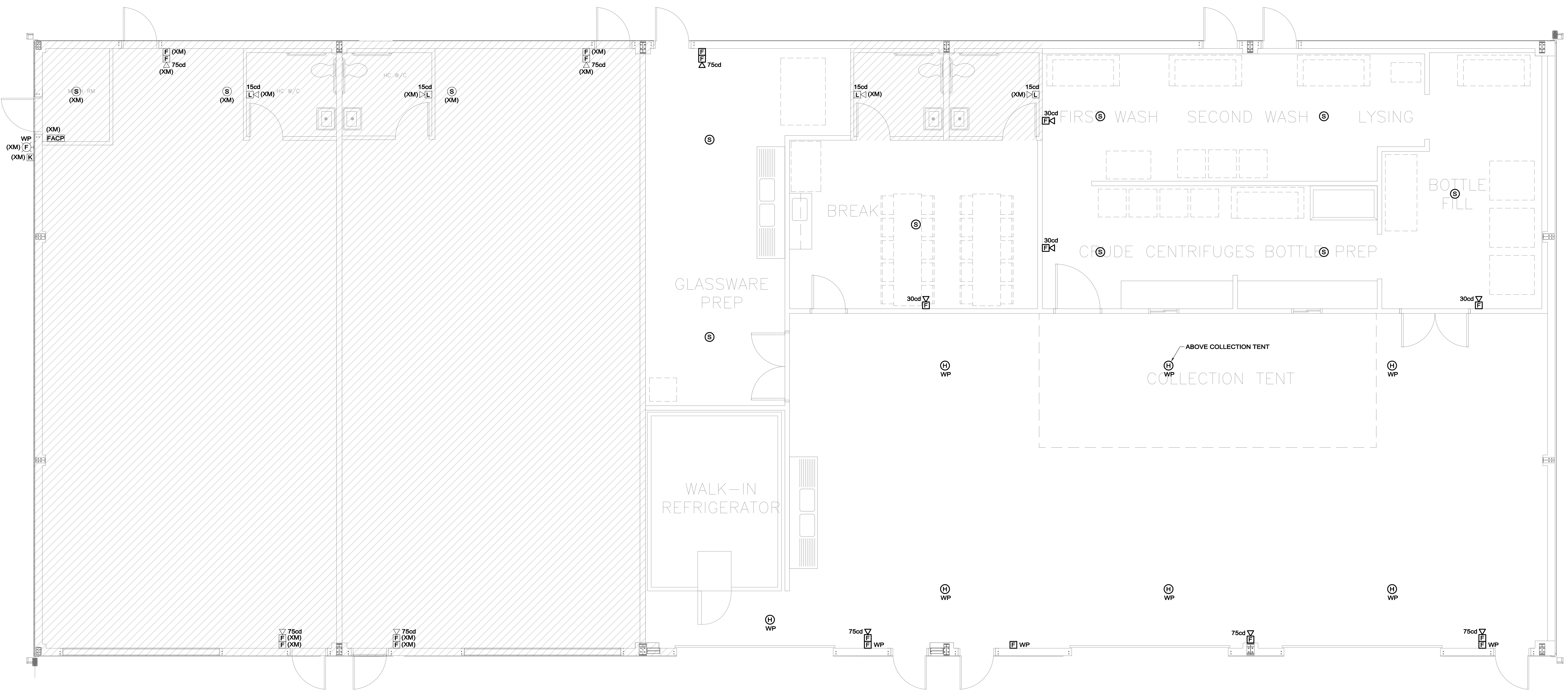
**FIRE ALARM LEGEND**

<b>FACP</b>	FIRE ALARM CONTROL PANEL
<b>FAP</b>	FIRE ALARM ANNUNCIATOR PANEL
<b>FATC</b>	FIRE ALARM TERMINAL CABINET
<b>MB</b>	FIRE ALARM MASTER BOX
<b>RR</b>	FIRE ALARM RED ROTATING BEACON, EXTERIOR MOUNTED, WEATHERPROOF
<b>V15cd</b>	FIRE ALARM VISUAL DEVICE
<b>K</b>	KEY BOX
<b>SC</b>	FIRE ALARM MANUAL PULL STATION "SC" INDICATES STOPPER COVER
<b>RAI</b>	REMOTE ALARM INDICATOR
<b>RST</b>	REMOTE TEST STATION
<b>ACM</b>	INDIVIDUAL ADDRESSABLE CONTROL MODULE
<b>ZMM</b>	ZONE MONITORING MODULE
<b>V110cd</b>	FIRE ALARM AUDIBLE AND VISUAL DEVICE, NUMERAL INDICATES CANDELA VALUE "WG" INDICATES WIRE GUARD "WP" INDICATES WEATHERPROOF
<b>ER</b>	FIRE ALARM SMOKE DETECTOR, PHOTO ELECTRIC UNLESS NOTED OTHERWISE "ER" INDICATES ELEVATOR RECALL "SC" INDICATES SELF-CONTAINED, SINGLE STATION TYPE "I" INDICATES IONIZATION TYPE DETECTOR "M" INDICATES MULTI-SENSOR "WG" INDICATES WIRE GUARD
<b>RR</b>	FIRE ALARM HEAT DETECTOR, 135° FIXED TEMPERATURE UNLESS NOTED OTHERWISE "RR" INDICATES RATE OF RISE "RV" INDICATES RATE OF RISE AND FIXED TEMPERATURE "200" INDICATES 200° TEMPERATURE "WG" INDICATES WIRE GUARD

- FIRE ALARM NOTES:**
- REFER TO DRAWING FA-000 FOR LEGEND, SYMBOLS AND GENERAL NOTES.
  - REFER TO ARCHITECTURAL DRAWINGS FOR ASSOCIATED NOTES, MOUNTING DETAILS, HEIGHTS AND EXACT LOCATIONS OF ALL DEVICES.
  - FIRE ALARM BRANCH CIRCUITRY SHALL BE INSTALLED IN CONDUIT FROM THE PANEL TO THE FIRST DEVICE AND/OR WHERE EXPOSED. FIRE ALARM BRANCH CIRCUITRY MAY BE TYPE MC CABLE WHERE CONCEALED ABOVE SUSPENDED CEILINGS AND IN METAL STUD WALLS.
  - MC CABLE FOR FIRE ALARM SERVICE SHALL HAVE A RED IDENTIFIER ALONG ITS ENTIRE LENGTH. JUNCTION BOX COVERS AND CONDUIT COUPLINGS FOR ALL FIRE ALARM WIRING RACEWAYS SHALL BE PAINTED RED PRIOR TO INSTALLATION.
  - MAINTAIN CONTINUITY OF BRANCH CIRCUITRY ASSOCIATED WITH ALL EXISTING FIRE ALARM DEVICES TO REMAIN.

**L2P**  
 3 Logan Square  
 1717 Arch Street, Suite 200  
 Philadelphia, PA 19103  
 267.809.8400 T  
 215.557.7984 F  
 www.l2p.com

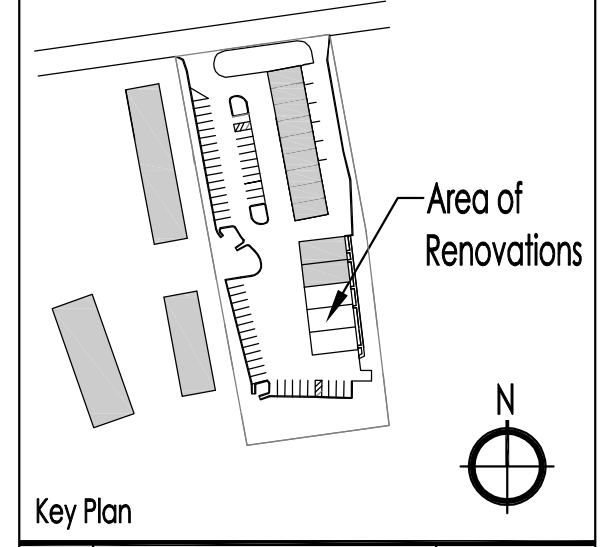
**NV5**  
 4 1/2" x 6 1/2" x 1/4"  
 1/4" x 1/4" x 1/4"  
 1/4" x 1/4" x 1/4"



Seal

**charles river**  
 Charles River Microbial Solutions  
 Processing Facility Renovations  
 Harwich, MA

Project Info



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1	ISSUED FOR CONSTRUCTION	02-28-2022

Drawn By: MW  
 Checked By: MS  
 Approved By: MS  
 Scale: 1/4" = 1'-0"  
 Project No.: 0220068.00  
 Drawing Title:  
**FIRE ALARM FIRST FLOOR NEW WORK PLAN**

Drawing No.:  
**FA-110**  
 Owner's Drawing No.:

NV5 - 10/18/2022 10:00:00 AM - CHL - Harwich - Charles River Microbial Solutions - Processing Facility Renovations - Harwich, MA - FA-110 - ELECTRICAL - FIRE ALARM FIRST FLOOR NEW WORK PLAN.dwg - 42303 - February 28, 2022 - 2:27 PM - l2p.com