ELECTRICAL LEGEND (NOTE: NOT ALL SYMBOLS SHOWN ARE USED ON THESE DRAWINGS)

– ONE LINE SYMBOLS –

SYMBOL	DESCRIPTION
	CIRCUIT BREAKER
	DRAW–OUT CIRCUIT BREAKER (MOLDED INSULATED CASE)
52	DRAW–OUT POWER CIRCUIT BREAKER
	CONTROL FUSE
	FUSE WITH SWITCH
	SWITCH
PANEL XXX	PANELBOARD
ATS–XX XXX A	AUTOMATIC TRANSFER SWITCH
100A4G	FEEDER DESIGNATION, SEE FEEDER SCHEDULE
	AUTOMATIC TRANSFER SWITCH WITH BY–PASS
E	ENGINE GENERATOR
TX–XXXX	TRANSFORMER
	ENCLOSED BUSWAY
	GROUND BUS
	WEATHERHEAD
M	MOTOR
	DELTA CONNECTION
	WYE CONNECTION
	GROUNDED WYE CONNECTION
	GROUNDED WYE CONNECTION WITH RESISTOR GROUND
	GROUNDED WYE CONNECTION WITH REACTOR GROUND
M	METERING DEVICE
	CURRENT TRANSFORMER
	POTENTIAL TRANSFORMER

– POWER –

SYMBOL	DESCRIPTION
	DUPLEX RECEPTACLE D = DEDICATED CIRCUIT IG = ISOLATED GROUND DEVICE ⏻ = AUTOMATICALLY CONTROLLED RECEPTACLE
GFI	GFI = GROUND FAULT CIRCUIT INTERRUPTER
	FLOOR MOUNTED DUPLEX RECEPTACLE
	FLOOR MOUNTED FOURPLEX RECEPTACLE
	FLOOR MOUNTED SPECIAL PURPOSE RECEPTACLE
	CEILING MOUNTED DUPLEX RECEPTACLE
	CEILING MOUNTED FOURPLEX RECEPTACLE
	CEILING MOUNTED SPECIAL PURPOSE RECEPTACLE
	FOURPLEX RECEPTACLE

– GROUNDING SYMBOLS –

SYMBOL	DESCRIPTION
	GROUNDING CONDUCTOR
	BONDING POINT
	ELECTRICAL GROUND
	GROUND ROD

REV: 06/29/2020

– GENERAL –

SYMBOL	DESCRIPTION
	BRANCH CIRCUIT HOME RUN TO PANELBOARD, DESIGNATION INDICATES PANEL AND CIRCUIT NUMBERS
	CONTROL WIRING
	LIGHTING, ONE–LINE, AND POWER CIRCUITING
	LIGHTING, ONE–LINE, AND POWER CIRCUITING (UNDERGROUND)
	FLEXIBLE CONDUIT
	CONDUIT BREAK SYMBOL
	CONDUIT CAP
	CONDUIT CHANGE IN ELEVATION
	CONDUIT STUB DOWN (OUT OF DRAWING LIMITS)
	CONDUIT STUB UP (OUT OF DRAWING LIMITS)
J	JUNCTION BOX
J	WALL MOUNTED JUNCTION BOX
J	FLOOR MOUNTED JUNCTION BOX
	PUSH BUTTON A = ABORT DA = DURESS ALARM EPO = EMERGENCY POWER OFF IC = INTERCOM ST = SHUNT TRIP
S#X	SWITCH SYMBOL (#) SINGLE POLE (IF BLANK) 2 = DOUBLE POLE 3 = THREE–WAY 4 = FOUR–WAY AS = ADJUSTABLE SPEED D = DIMMER K = KEY OPERATED LV = LOW VOLTAGE M = MANUAL MOTOR SWITCH OS = OCCUPANCY SENSOR P = WITH PILOT LIGHT T = TIMER TO = THERMAL OVERLOAD VS = VACANCY SENSOR WP = WEATHERPROOF x = SMALL LETTER – LUMINAIRES CONTROLLED XP = EXPLOSION PROOF
SS	DUAL SWITCH
$	INTERCOM SWITCH

– ABBREVIATIONS –

(E)	EXISTING
(N)	NEW
(PART)	PARTIAL CIRCUIT
A	AMP
AC	ABOVE COUNTER TOP
AF	AMP FRAME, AMP FUSE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
AIC	AMPS INTERRUPTING CAPACITY
AL	ALUMINUM
APL	APPLIANCE
AS	AMP SWITCH
AT	AMP TRIP
ATS	AUTOMATIC TRANSFER SWITCH
AV	AUDIOVISUAL
BJ	BONDING JUMPER
C	CONDUIT
CB	CIRCUIT BREAKER
CCT	CIRCUIT
CCTV	CLOSED CIRCUIT T.V.
CLG	CEILING
CU	COPPER
DISC	DISCONNECT
DIST	DISTRIBUTION
E/G	ENGINE/GENERATOR
ELEC	ELECTRIC, ELECTRICAL
ELEV	ELEVATOR ELEVATION
EM	EMERGENCY
EQPT	EQUIPMENT
F	FUSE
FA	FIRE ALARM
FAA	FIRE ALARM ANNUNCIATOR
FACP	FIRE ALARM CONTROL PANEL
FIXT	FIXTURE
FO	FIBER OPTIC
FLR	FLOOR
FLUOR	FLUORESCENT
G	GROUND (EQUIPMENT)
GEN	GENERATOR
GFI	GROUND FAULT CIRCUIT INTERRUPTER
GF	GROUND FAULT PROTECTION
GND	GROUND
HC	HANDICAPPED
HG	HOSPITAL GRADE
HP	HORSEPOWER
HV	HIGH VOLTAGE
INC	INCANDESCENT
IDF	INTERMEDIATE DISTRIBUTION FRAME
IG	ISOLATED GROUND
JB	JUNCTION BOX
LED	LIGHT EMITTING DIODE
LTG	LIGHTING
LV	LOW VOLTAGE
MATV	MASTER ANTENNA T.V.
MCB	MAIN CIRCUIT BREAKER
MCC	MOTOR CONTROL CENTER
MDF	MAIN DISTRIBUTION FRAME
MH	MANHOLE
MLO	MAIN LUGS ONLY
MOP	METHOD OF PROCEDURE
MTD	MOUNTED
MTG	MOUNTING
MTR	MOTOR
MV	MEDIUM VOLTAGE
N	NEUTRAL
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NF	NON–FUSED
NIC	NOT IN CONTRACT
NL	NIGHT LIGHT
NO	NORMALLY OPEN
OHE	OVERHEAD ELECTRIC
P	POLE
PA	PUBLIC ADDRESS
PB	PULL BOX
PH	PHASE
PNL	PANEL
PWR	POWER
RCPT(S)	RECEPTACLE(S)
SBC	STRANDED BARE COPPER
SPD	SURGE PROTECTIVE DEVICE
SW	SWITCH
TEL	TELEPHONE
TP	TAMPERPROOF
TV	TELEVISION
UF	UNDERFLOOR
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY
V	VOLTAGE
VFD	VARIABLE FREQUENCY DRIVE
VP	VAPOR PROOF
W	WIRE
WAP	WIRELESS ACCESS POINT
WG	WIRE GUARD
WP	WEATHERPROOF
XFMR	TRANSFORMER
XP	EXPLOSION PROOF

APPLICABLE CODES

AHJ: STATE OF COLORADO

FIRE AUTHORITY: AURORA FIRE

REMODEL ☒ NEW ☐

YEAR	CODE
2021	INTERNATIONAL BUILDING CODE
2021	INTERNATIONAL MECHANICAL CODE
2021	INTERNATIONAL PLUMBING CODE
2021	INTERNATIONAL ENERGY CONSERVATION CODE
2021	INTERNATIONAL FIRE CODE
2020	NATIONAL ELECTRICAL CODE

IS THE BUILDING FULLY SPRINKLERED? ☒ YES ☐ NO

IS THE BUILDING FULLY DETECTED? ☒ YES ☐ NO

– GRAPHIC SYMBOLS –

SYMBOL	DESCRIPTION
1	KEY NOTE
1	REVISION NUMBER
X	DETAIL NOTE
X	X = DENOTES ALL LUMINAIRES IN THE RESPECTIVE AREA ARE THE TYPE INDICATED, REFER TO LUMINAIRE SCHEDULE
TAG	PANEL FLAG
TAG	OWNER EQUIPMENT TAG
S# X	LIGHTING CONTROL SEQUENCE INDICATION, SEE LIGHTING CONTROL SEQUENCE OF OPERATION SCHEDULE FOR INFORMATION X = DENOTES ILLUMINATION SET POINT
TAG	MECHANICAL EQUIPMENT TAG
	SHADING INDICATES EQUIPMENT
	HATCHING INDICATES ITEM(S) TO BE REMOVED
A100	ROOM NUMBER
	NORTH ARROW
1 / E2.1	DETAIL BUBBLE — DETAIL NUMBER — SHEET NUMBER – WHERE DETAIL IS SHOWN
2 / E2.2	SECTION CUT — SECTION NUMBER/LETTER — SHEET NUMBER – WHERE SECTION IS SHOWN

GENERAL NOTES

SPECIFICATIONS ARE A PART OF THE CONSTRUCTION DOCUMENTS. SHOULD ANY CONFLICT ARISE BETWEEN THE DRAWINGS AND SPECIFICATIONS, BRING SUCH CONFLICT TO THE ATTENTION OF THE ENGINEER FOR RESOLUTION. UNLESS OTHERWISE DIRECTED BY ENGINEER, THE MOST STRINGENT REQUIREMENT WILL PREVAIL.

DATA ON THE DRAWINGS IS AS EXACT AS COULD BE REASONABLY SECURED. ABSOLUTE ACCURACY IS NOT GUARANTEED. VERIFY EXACT LOCATIONS, MEASUREMENTS, LEVELS, SPACE REQUIREMENTS, POTENTIAL CONFLICTS WITH OTHER TRADES. ADAPT WORK TO ACTUAL CONDITIONS AT THE SITE. BEFORE SUBMITTING COSTS VISIT THE SITE TO BECOME THOROUGHLY FAMILIAR WITH THE ACTUAL CONDITIONS OF THIS PROJECT. THESE DRAWINGS ARE DIAGRAMMATIC IN NATURE; DO NOT SCALE. THESE DRAWINGS DO NOT SHOW MATERIALS FOR A COMPLETE INSTALLATION; PLAN THE INSTALLATION AND LAYOUT OF THE WORK AS DIAGRAMMED IN THESE DOCUMENTS. REFER TO FLOOR PLANS, SCHEMATICS AND DIAGRAMS OF OTHER TRADES FOR ELECTRICAL REQUIREMENTS, BRANCH CIRCUITS AND OTHER ELECTRICAL CONNECTIONS NOT INDICATED ON THESE DOCUMENTS.

FIRE–SEAL ALL PENETRATIONS THROUGH RATED WALLS AND FLOORS WITH MATERIALS CAPABLE OF PREVENTING THE PASSAGE OF FLAMES AND HOT GASES WHEN SUBJECTED TO THE REQUIREMENTS OF THE TEST STANDARD SPECIFIC FOR FIRE STOPS ASTM E814.

JUNCTION BOXES FOR LUMINAIRES AND OUTLETS ARE NOT INDICATED. PROVIDE THE PROPER NUMBER OF JUNCTION BOXES TO MEET LOCAL CODE AND NATIONAL ELECTRICAL CODE.

EXECUTE THE WORK IN ACCORDANCE WITH SUPPORTING OBJECTS FOR SEISMIC ZONE REQUIRED BY STATE AND LOCAL CODES ALL CEILING ATTACHED OBJECTS AND FLOOR ATTACHED EQUIPMENT INCLUDING, BUT NOT LIMITED TO: PENDANT LIGHTING FIXTURES, GENERAL LIGHTING, MULTIPLE RACEWAYS, GENERATOR, TRANSFORMER, ELECTRICAL SWITCHGEAR, SWITCHBOARDS AND OTHER ELECTRICAL EQUIPMENT.

WHERE DISCONNECTS ARE INDICATED ON DRAWINGS PROVIDE FINAL CONNECTION TO EQUIPMENT BEING SERVED BY DISCONNECT. DISCONNECTING MEANS FOR ALL MECHANICAL EQUIPMENT SHALL BE ACCESSIBLE AND HAVE THE CLEARANCE REQUIRED BY NEC.

UP–TO–DATE ELECTRICAL RECORD DRAWINGS ARE NOT AVAILABLE FOR THIS PROJECT. INFORMATION FOR EXISTING CIRCUITRY IS BASED ON EXISTING PANEL DIRECTORIES, AVAILABLE DRAWINGS, AND ASSUMPTIONS. LOCATIONS AND INFORMATION FOR EXISTING ELECTRICAL DEVICES AND EQUIPMENT SHOWN ON THESE DOCUMENTS ARE APPROXIMATE AND WERE DERIVED FROM FIELD OBSERVATION AND AVAILABLE RECORD DRAWINGS. VERIFY ACTUAL FIELD CONDITIONS PRIOR TO STARTING WORK.

DIVISION 26 SECTION 26 00 10S
ELECTRICAL COMMON WORK RESULTS FOR ELECTRICAL

PART 1 – GENERAL

1.1 IT IS THE INTENT OF THESE DOCUMENTS THAT A COMPLETE AND WORKABLE ELECTRICAL INSTALLATION IS PROVIDED FOR ALL THE ELECTRICAL PRODUCTS DESCRIBED, OR SHOWN AS BEING PART OF THIS CONTRACT. PROVIDE ALL MATERIALS AND LABOR TO FURNISH AND INSTALL ALL APPARATUS, MATERIALS, EQUIPMENT AND APPURTENANCES, IN A FASHION COMPLYING WITH ALL APPLICABLE CODES, INCLUDING ITEMS REQUIRED BUT NOT NORMALLY SHOWN, SUCH AS LAMPS, COUPLINGS, HANGERS, BRACKETS, CLAMPS, BOXES, CONNECTORS, HARDWARE, MISCELLANEOUS IRON AND STEEL, WELDING, COMMISSIONING AND TESTING. APPLY FOR AND PAY FOR ALL PERMITS, FEES, LICENSES AND INSPECTIONS FOR THIS DIVISION OF WORK.

1.2 PROVIDE ALL ELECTRICAL EQUIPMENT AND MATERIAL IN ACCORDANCE WITH REQUIREMENTS OF LOCAL BUILDING CODES, GOVERNING AUTHORITIES, AND AS SPECIFIED, WHERE A CONFLICT EXISTS BETWEEN ANY CODES AND THE WORK SHOWN WITHIN THESE DOCUMENTS, THE MORE STRINGENT REQUIREMENT SHALL GOVERN.

1.3 COMPLY WITH THE REQUIREMENTS OF THE GENERAL CONDITIONS, SUPPLEMENTAL GENERAL CONDITIONS OF THE PROJECT SPECIFICATIONS, ALL CONTRACT DOCUMENTS, AND ANY BASE BUILDING SPECIFICATIONS AND BUILDING CRITERIA INCLUDED IN THIS PROJECT.

1.4 DEFINITIONS

A. INSTRUCTIONS SUCH AS "PROVIDE" SHALL MEAN THE SAME AS THOUGH THE WORDS "THE CONTRACTOR SHALL" PRECEDE EACH SUCH INSTRUCTION.

B. "PROVIDE" SHALL MEAN "FURNISH AND INSTALL, COMPLETE AND READY FOR THE INTENDED USE."

1.5 COORDINATE AND SCHEDULE THE PROGRESS OF ELECTRICAL WORK TO CONFORM TO THE OWNER'S SCHEDULE AND THE PROGRESS OF THE WORK OF OTHER TRADES. FOR CONNECTIONS TO MECHANICAL EQUIPMENT AND THE ASSOCIATED CONDUIT AND WIRE REQUIRED BUT NOT SHOWN ON THESE DOCUMENTS, REFER TO THE MECHANICAL AND PLUMBING DOCUMENTS. COORDINATE ALL SUCH CONNECTIONS WITH THE AFFECTED TRADES.

1.6 PROVIDE A ONE YEAR WARRANTY ON ALL MATERIAL, EQUIPMENT, APPURTENANCES, AND INSTALLATION, FROM THE DATE OF ACCEPTANCE. IF, AFTER HAVING RECEIVED NOTICE FROM THE OWNER, DEFECTS ARE NOT CORRECTED WITHIN A REASONABLE TIME, THE OWNER WILL HAVE THE RIGHT TO SECURE THE NECESSARY WORK FROM ANOTHER PARTY AND TO BILL THE CONTRACTOR FOR THE COST OF SUCH WORK.

1.7 PROVIDE TEMPORARY LIGHTING AND POWER AS REQUIRED.

1.8 THE LIMITS OF WORK FOR THIS EFFORT IS FOR ENTIRE FLOORS WHERE WORK IS BEING PERFORMED AS INDICATED ON THE PLAN DRAWINGS. EXTEND THE EFFORT BEYOND THE INDICATED FLOORS ONLY AS REQUIRED TO DOCUMENT BRANCH CIRCUITS FED FROM LOCAL PANELBOARDS FEEDING UTILIZATION DEVICES ON OTHER FLOORS, OR BRANCH CIRCUITS ORIGINATING ON OTHER FLOORS FEEDING UTILIZATION DEVICES ON THE INDICATED FLOORS.

1.9 PERFORM THE WORK IN COOPERATION WITH THE AREA OCCUPANTS TO MINIMIZE INTERFERENCE WITH THEIR ACTIVITIES. WORK CAN BE PERFORMED DURING NORMAL WORKING HOURS. WHEN REQUIRED BY THE OWNER, PERFORM THE WORK DURING AFTERHOURS. SCHEDULE WORK A MINIMUM OF ONE WEEK IN ADVANCE.

1.10 VISIT THE PROJECT SITE BEFORE SUBMITTING A BID; NO EXTRAS WILL BE ALLOWED FOR LACK OF KNOWLEDGE OF EXISTING CONDITIONS. THESE DRAWINGS HAVE BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. DATA PRESENTED ON THIS DRAWING IS AS ACCURATE AS CAN BE DETERMINED, BUT ACCURACY IS NOT GUARANTEED. THE ENGINEER IS NEITHER RESPONSIBLE FOR ACCURACY NOR ERRORS NOR OMISSIONS THAT MAY HAVE BEEN INCORPORATED INTO THESE DOCUMENTS. FIELD VERIFICATION OF ALL AFFECTED COMPONENTS IS REQUIRED.

1.11 THESE DRAWINGS ARE DIAGRAMMATIC IN CHARACTER AND DO NOT SHOW MATERIALS FOR A COMPLETE INSTALLATION. THESE DOCUMENTS INDICATE DESIRED LOCATIONS AND ARRANGEMENT OF ELECTRICAL COMPONENTS, CONDUIT RUNS, OUTLETS, AND EQUIPMENT; FOLLOW LOCATIONS AS CLOSELY AS POSSIBLE. TAKE ALL DIMENSIONS FROM ARCHITECTURAL DRAWINGS, CERTIFIED EQUIPMENT DRAWINGS, AND FROM THE STRUCTURE ITSELF BEFORE FABRICATING ANY WORK. PROPER JUDGEMENT MUST BE EXERCISED IN EXECUTING WORK TO SECURE THE BEST POSSIBLE INSTALLATION IN THE AVAILABLE SPACE AND TO OVERCOME LOCAL DIFFICULTIES DUE TO SPACE LIMITATIONS OR INTERFERENCE WITH STRUCTURAL OR ARCHITECTURAL CONDITIONS. PROVIDE ALL DEVIATIONS FROM THESE DOCUMENTS REQUIRED TO CONFORM TO THE STRUCTURE OR TO FIT THE INSTALLED WORK OF OTHER TRADES AND CONTRACTORS WITHOUT ADDITIONAL COST TO THE OWNER.

1.12 SUBMITTALS

A. SUBMIT SHOP DRAWINGS FOR ACCEPTANCE FOR LUMINAIRES, SWITCHBOARDS, PANELBOARDS, LIGHTING CONTROLS, DEVICES, AND FIRE ALARM SYSTEMS. AT COMPLETION OF WORK, DELIVER TO ARCHITECT/OWNER COMPLETED PROJECT RECORD DOCUMENTS MARKED WITH FIELD CHANGES; SUBMIT ALL MANUFACTURER'S DATA, HANDBOOKS, SCHEMATICS, ORDERING INFORMATION FOR ALL COMPONENTS.

B. REVIEW EACH SUBMITTAL AND CHECK FOR COORDINATION WITH OTHER WORK OF THE CONTRACT AND FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS. NOTE CORRECTIONS AND FIELD DIMENSIONS. MARK WITH APPROVAL STAMP BEFORE SUBMITTING TO THE ARCHITECT AND CONSTRUCTION MANAGER.

C. STAMP EACH SUBMITTAL WITH A UNIFORM, APPROVAL STAMP. INCLUDE PROJECT NAME AND LOCATION, SUBMITTAL NUMBER, SPECIFICATION SECTION TITLE AND NUMBER, NAME OF REVIEWER, DATE OF CONTRACTOR'S APPROVAL, AND STATEMENT CERTIFYING THAT SUBMITTAL HAS BEEN REVIEWED, CHECKED, AND APPROVED FOR COMPLIANCE WITH THE CONTRACT DOCUMENTS.

D. COORDINATE PREPARATION AND PROCESSING OF SUBMITTALS WITH PERFORMANCE OF CONSTRUCTION ACTIVITIES. COORDINATE EACH SUBMITTAL WITH FABRICATION, PURCHASING, TESTING, DELIVERY, OTHER SUBMITTALS, AND RELATED ACTIVITIES THAT REQUIRE SEQUENTIAL ACTIVITY. COORDINATE TRANSMITTAL OF DIFFERENT TYPES OF SUBMITTALS FOR RELATED PARTS OF THE WORK SO PROCESSING WILL NOT BE DELAYED BECAUSE OF NEED TO REVIEW SUBMITTALS CONCURRENTLY FOR COORDINATION. ARCHITECT AND CONSTRUCTION MANAGER RESERVE THE RIGHT TO WITHHOLD ACTION ON A SUBMITTAL REQUIRING COORDINATION WITH OTHER SUBMITTALS UNTIL RELATED SUBMITTALS ARE RECEIVED.

1.13 RECORD DOCUMENTS

A. MAKE CAREFUL REVIEW AND INVESTIGATION TO DOCUMENT THE EXISTING BRANCH CIRCUIT LAYOUT AND OUTLET LOCATIONS FOR THE FOLLOWING SYSTEMS: LIGHTING, RECEPTACLES, MOTORS, EMERGENCY SYSTEMS, ACCESS CONTROLS (POWER ONLY), SECURITY SURVEILLANCE SYSTEMS (POWER ONLY), AND THE BRANCH CIRCUITS PROVIDING POWER TO ANY OTHER COMPONENTS IN THE REQUIRED FLOORS.

B. INCLUDE DOCUMENTATION OF OUTLET LOCATION AND TYPE, BRANCH CIRCUIT, CONDUCTOR AND RACEWAY SIZE. EXECUTE DOCUMENTATION UPON DOCUMENTS PROVIDED BY THE ENGINEER, WHICH WILL INDICATE THE BEST KNOWN "AS–BUILT" CONDITIONS OF THE LIMITS OF WORK. MAKE DOCUMENTATION LEGIBLE, COMPLETE, WITH A DATE AND SIGNATURE OF THE RESPONSIBLE INDIVIDUAL DESIGNATED BY THE CONTRACTOR.

C. PERFORM THE WORK USING CIRCUIT TRACING DEVICES THAT DO NOT REQUIRE ANY INTERRUPTIONS OR INTERFERENCE WITH THE POWER ON THE SYSTEM.

D. DOCUMENT ALL PANEL SCHEDULES ON AN APPROVED FORM. AFTER REVIEW AND AUTHORIZATION BY THE ENGINEER, PROVIDE TYPEWRITTEN PANEL DIRECTORIES FOR ALL PANELBOARDS ON THE INDICATED FLOORS. FOR EACH PANELBOARD SCHEDULE INDICATE THE FOLLOWING: FEEDER SIZE, MATERIAL, ORIGIN AND CONDUIT SIZE; BUS SIZE AND MATERIAL; MAIN BREAKER SIZE; PANEL TYPE; BOLT–ON OR PLUG–IN TYPE BREAKERS; SHORT CIRCUIT RATING; BREAKER SIZES AND POLE DESIGNATION; QUANTITY OF BREAKER SPACE.

PART 2 – MATERIALS

2.1 MATERIALS SHALL BE NEW AND IN PERFECT CONDITION; ALL MATERIALS FOR SIMILAR USES SHALL BE OF THE SAME TYPE, MATERIAL, AND MANUFACTURER. MATERIALS SHALL BE LISTED BY A RECOGNIZED NRTL OR BEAR A UL LABEL WHERE SUBJECT TO SUCH APPROVAL AND COMPLY WITH ANSI, IEEE AND NEMA STANDARDS. MAKE PROVISIONS FOR SAFE DELIVERY AND SECURE STORAGE OF ALL MATERIALS.

2.2 CONNECTORS AND FITTINGS SHALL BE MANUFACTURED BY APPLETON, STEEL CITY, T & B, TOMIC, RACO, OR O.Z./GEDNEY.

2.3 FUSES SHALL BE MANUFACTURED BY BUSSMANN, LITTLEFUSE, OR MERSEN.

2.4 CONDUITS SHALL BE RIGID STEEL, INTERMEDIATE METAL CONDUIT, ELECTRICAL METALLIC TUBING, FLEXIBLE METALLIC CONDUIT, LIQUID TIGHT FLEXIBLE CONDUIT, NON–METALLIC, REINFORCED THERMOSETTING RESIN CONDUIT, AND RIGID PVC SCHEDULE 40. UNLESS SPECIFICALLY SHOWN TO BE LARGER, ALL CONDUITS SHALL BE SIZED PER THE NEC.

2.5 SURFACE RACEWAYS SHALL BE WIREMOLD OR APPROVED EQUAL. ALL WIREMOLD G–3000, G–4000, G–6000, RACEWAYS TO INCLUDE DIVIDER TO SEPARATE POWER FROM TELECOM AND DATA. PROVIDE EXPANSION JOINTS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.

2.6 LOW–VOLTAGE ELECTRICAL POWER CONDUCTORS AND CABLES

A. CONDUCTORS SHALL BE MANUFACTURED BY ALPHA, CAROL BRAND, COLONIAL, TRIANGLE, ENCORE, GENERAL CABLE, OKONITE, SENATOR, OR SOUTHWIRE.

B. CONDUCTORS SHALL BE COPPER, 600 V, TYPE THW, THWN, OR THHN. CONDUCTORS #10 AND SMALLER SHALL BE SOLID; #8 GAUGE AND LARGER SHALL BE STRANDED. MINIMUM WIRE SIZE SHALL BE #12; EXCEPT USE #14 FOR CONTROL WIRING. CONDUCTORS #1/0 AND LARGER SHALL BE THW, THWN, XHHW, OR RHW–USE. THE USE OF ALUMINUM CONDUCTORS IS PROHIBITED.

C. CONDUCTORS #1 AND SMALLER SHALL HAVE A MINIMUM 60°C RATING. FOR WET LOCATIONS, AND WHERE DERATED DUE TO HIGH AMBIENT TEMPERATURE, PROVIDE CONDUCTORS SUITABLE FOR WET LOCATIONS WITH MINIMUM 90°C RATING.

D. SIZE AND INSTALL ALL CONDUCTORS PER THE NEC.

E. INCREASE CONDUCTOR SIZE AS NECESSARY TO LIMIT BRANCH CIRCUIT VOLTAGE DROP TO 3%; AND SERVICE/FEEDER VOLTAGE DROP TO 2%.

F. WIRE CONNECTIONS:
1. PROVIDE CONNECTORS, LUGS, AND DEVICES RATED FOR 75°C.
2. MAKE CONNECTIONS FOR WIRE #8 AWG AND SMALLER WITH TWIST–ON WIRE CONNECTORS.
3. MAKE CONNECTIONS FOR WIRE #6 AWG AND LARGER WITH PROPERLY SIZED SOLDERLESS LUGS OR CONNECTORS.

G. ASD/VFD MOTOR SUPPLY CABLE:
1. MOTOR FEEDER CABLES INSTALLED BETWEEN A 3–PHASE ADJUSTABLE SPEED DRIVE (ASD) OR VARIABLE FREQUENCY DRIVE (VFD) AND A MOTOR SHALL BE SHIELDED MULTI–CONDUCTOR CABLE ASSEMBLY LISTED FOR ASD/VFD MOTOR APPLICATIONS.
2. MANUFACTURERS OF SHIELDED MULTI–CONDUCTOR CABLE ASSEMBLY LISTED FOR ASD/VFD: SERVICE WIRE COMPANY, BELDEN INC., OR APPROVED EQUAL.
3. CONDUCTOR INSULATION TYPE:
   a. 480V SYSTEMS AND LOWER: XHHW–2, RHW–2, 90°C WET/DRY
   b. 600V SYSTEMS: 1000V, XLPE, 90°C WET/DRY
4. CABLE ASSEMBLY SHIELD: HELICAL COPPER FOIL TAPE OR CORRUGATED ARMOR.

2.7 GROUNDING AND BONDING

A. GROUNDING CONDUCTOR MATERIAL: COPPER.

B. EQUIPMENT GROUNDING CONDUCTORS: INSULATED WITH GREEN–COLORED INSULATION PER COLOR CODING OF PHASE CONDUCTORS PARAGRAPH.

C. GROUNDING ELECTRODE CONDUCTORS: STRANDED CABLE.

D. UNDERGROUND CONDUCTORS: BARE, TINNED, STRANDED, UNLESS OTHERWISE INDICATED.

2.8 RACEWAYS AND BOXES FOR ELECTRICAL SYSTEMS

A. MANUFACTURERS: BOXES SHALL BE MANUFACTURED BY APPLETON, RACO, STEEL CITY, OR THOMAS & BETTS CO.

B. OUTLET BOXES:
1. FLUSH–MOUNTED OUTLET BOXES SHALL BE GALVANIZED OR ZINC COATED, PRESSED STEEL OUTLET BOXES. BOXES SHALL BE MINIMUM 4–INCHES SQUARE AND OF DEPTH REQUIRED; 1–1/2 INCHES MINIMUM BOX DEPTH. PROVIDE OUTLET BOXES OF PROPER TYPE AND DESIGN FOR THE PARTICULAR LUMINAIRE OR DEVICE TO BE INSTALLED.
2. PROVIDE SINGLE OR DOUBLE GANG MUD RING, AS REQUIRED BY THE DEVICE.
3. PROVIDE 3/8–INCHES NO–BOLT LUMINAIRE STUDS.

C. SURFACE–MOUNTED BOXES SHALL BE CAST METAL, MULTI–GANG AND OF DEPTH REQUIRED.

D. ALL PULL BOXES SHALL BE CODE GAUGE METAL, UNLESS OTHERWISE SHOWN ON THE DRAWINGS.

2.9 IDENTIFICATION

A. PROVIDE ALL LABELS REQUIRED BY THE NEC.

B. COLOR CODING OF PHASE CONDUCTORS:
1. CONDUCTORS #2 AND SMALLER SHALL BE FACTORY COLOR CODED. CONDUCTORS #1 AND LARGER MAY BE COLOR CODED BY FIELD PAINTING OR COLOR TAPING A 6–INCH LENGTH OF EXPOSED END.
2. PROVIDE THE FOLLOWING COLOR CODING FOR THE A–B–C–N–G–IG PHASE SEQUENCE:
   a. 120/240V, 1–PHASE — BLACK, RED, WHITE, GREEN
   b. 120/208V, 3–PHASE — BLACK, RED, BLUE, WHITE, GREEN, GREEN/WHITE
   c. 277/480V, 3–PHASE — BROWN, ORANGE, YELLOW, GRAY, GREEN/GRAY, GREEN/YELLOW
   d. SWITCH TRAVELERS — PINK, PURPLE, AND TURQUOISE
3. WIRING FOR CONTROL SYSTEMS SHALL BE COLOR CODED IN ACCORDANCE WITH THE WIRING DIAGRAMS FURNISHED WITH THE EQUIPMENT.

C. PROVIDE 3/8–INCHES TAPE LABELS ON ALL RECEPTACLES AND SWITCHES THAT INDICATES PANELBOARD AND CIRCUIT NUMBER. LABELS SHALL BE:
1. NORMAL BRANCH — BLACK BACKGROUND WITH WHITE LETTERING

LABELS SHALL BE OF SUFFICIENT DURABILITY TO WITHSTAND THE ENVIRONMENT. EACH PANEL SHALL HAVE A SCREW MOUNTED NAMEPLATE FABRICATED FROM LAMINATED BLACK PHENOLIC WITH WHITE CENTER. THE 3/8–INCHES HIGH VERTICAL ENGRAVED LETTERING SHALL SHOW PANEL DESIGNATION, VOLTAGE, PHASE, FREQUENCY, THE AIC RATING, AND WHERE THE PANEL IS FED FROM; I.E., PANEL AND CIRCUIT BREAKER.

D. PROVIDE UPDATED PANEL DIRECTORIES FOR ALL PANELBOARDS AFFECTED BY CONSTRUCTION. TYPE PANEL DIRECTORIES IN ACCORDANCE WITH THE DRAWING PANEL SCHEDULES, INCORPORATE CHANGES THAT WERE MADE IN THE FIELD. LIST WHERE PANEL IS FED FROM; I.E., PANEL AND CIRCUIT BREAKER.

E. PROVIDE LABELING FOR RACEWAYS AND CABLES.
1. POWER–CIRCUIT IDENTIFICATION: METAL TAGS OR ALUMINUM, WRAPAROUND MARKER BANDS FOR CABLES, FEEDERS, AND POWER CIRCUITS IN VAULTS, PULL AND JUNCTION BOXES, MANHOLES, AND SWITCHBOARD ROOMS.
2. CONDUCTORS: INDICATE SOURCE AND CIRCUIT NUMBERS.

F. MULTIPLE POWER OR LIGHTING CIRCUITS IN SAME ENCLOSURE: IDENTIFY EACH CONDUCTOR WITH SOURCE, VOLTAGE, CIRCUIT NUMBER, AND PHASE. USE COLOR–CODING TO IDENTIFY CIRCUITS' VOLTAGE AND PHASE.

2.10 WIRING DEVICES

A. DEVICE PLATES SHALL BE, SCREW–ON, BRUSHED STAINLESS STEEL. EMERGENCY POWER DEVICES SHALL BE RED COLOR. ISOLATED GROUND DEVICES SHALL BE ORANGE COLOR.

B. WALL PLATES IN UNFINISHED SPACES SHALL BE BRUSHED STAINLESS STEEL.

C. DEVICES SHALL BE AS SPECIFIED OR APPROVED EQUAL BY ARROW HART, BRYANT, GENERAL ELECTRIC, HUBBELL, LEVITON, PASS & SEYMOUR, OR SQUARE–D.
1. A–C QUIET OPERATING TYPE SWITCHES, THAT ARE NOT INTEGRAL TO LIGHTING CONTROL SYSTEM, SHALL BE: 120/277V, 20A HUBBELL HBL1221 SERIES, OR APPROVED EQUAL.
2. MOMENTARY–CONTACT LIGHT SWITCHES, THAT ARE NOT INTEGRAL TO LIGHTING CONTROL SYSTEM, SHALL BE 120/277V, 20 AMP, SPDT, NORMALLY–OPEN, CENTER–OFF, THREE–POSITION, HUBBELL CATALOG NO. HBL1557.
3. SPECIFICATION GRADE RECEPTACLES: 20A HUBBELL HBL5362 SERIES. WHERE A SINGLE DEVICE IS INSTALLED ON A BRANCH CIRCUIT THE DEVICE RATING SHALL MATCH THE CIRCUIT BREAKER RATING.
4. SPECIAL PURPOSE RECEPTACLES SHALL BE SPECIFICATION GRADE, STANDARD COLOR, AND OF THE APPROPRIATE CODE AND NEMA CONFIGURATION TO MATCH THE SUPPLY CIRCUIT AND LOAD INVOLVED.
5. HOSPITAL GRADE RECEPTACLES: 20A HUBBELL HBL8300 SERIES, OR APPROVED EQUAL.
6. GFCI RECEPTACLES: 20A HUBBELL GF20 SERIES.

PART 3 – INSTALLATION

3.1 GENERAL

A. PROVIDE ALL CORE DRILLING, CHANNELING, CUTTING, PATCHING, AND SLEEVES REQUIRED FOR INSTALLATION OF ELECTRICAL EQUIPMENT. SEAL HOLES, FIREPROOF WHERE NECESSARY, AND REFINISH ALL WORK TO ORIGINAL CONDITION WHERE DAMAGED BY ELECTRICAL WORK.

B. PROVIDE HANGERS AND SUPPORTS FOR EQUIPMENT, RACEWAYS, AND CABLES, INCLUDING WEIGHT OF WIRE IN RACEWAYS.

C. USE STEEL MATERIAL FOR DRY LOCATIONS.

D. PAINT ALL EXPOSED CONDUIT, SUPPORTS, BOXES, ETC., TO MATCH SURROUNDING CEILING AND WALLS.

E. CLEAN THE AREA AFTER WORK IS COMPLETED, AND AT THE END OF EACH WORK DAY.

F. DO NOT USE CEILING GRID SUPPORT WIRES TO SUPPORT CONDUIT.

G. PRESERVE AND PROTECT USABLE CONDITION OF ALL EQUIPMENT TO BE REMOVED AND REINSTALLED. REPLACE ANY EQUIPMENT DAMAGED AS A PART OF THIS WORK.

H. PROVIDE ALL CUTTING AND PATCHING NECESSARY FOR THE WORK. PATCH AND PAINT DAMAGED SURFACES TO MATCH EXISTING CONDITIONS DUE TO DEMOLITION AND DAMAGE CAUSED DURING WORK.

3.2 CONDUIT LOCATIONS:

A. PROVIDE ELECTRICAL METALLIC TUBING (EMT) FOR ALL DRY, ABOVE GRADE OR ABOVE FLOOR APPLICATIONS IN ACCORDANCE WITH THE NEC.

B. PROVIDE RIGID METAL CONDUIT (RMC) FOR ABOVE AND BELOW GRADE APPLICATIONS IN ACCORDANCE WITH THE NEC. PROVIDE THREADED COUPLINGS FOR RMC. PROVIDE RMC INDOORS WHERE EXPOSED BELOW 96–INCHES, ALL INSTALLATIONS EXPOSED OUTDOORS, IN CRAWL SPACES, IN LOCATIONS SUBJECT TO MECHANICAL INJURY, FOR ALL ELBOWS ON ABOVE GRADE PVC CONDUIT INSTALLATIONS, AND WHERE INDICATED ON THE DRAWINGS.

3.3 RACEWAYS

A. ROUTE ALL CONDUIT PARALLEL OR PERPENDICULAR WITH THE BUILDING WALLS. SUPPORT CONDUIT AS REQUIRED BY THE NEC. INSTALL GROUPED CONDUIT USING SWEEPS STRUCK FROM THE SAME RADIUS. PERFORM WORK BY SKILLED TRADESMEN USING THE BEST STANDARD PRACTICES OF THE TRADE.

B. CONCEAL ALL CONDUITS IN FINISHED AREAS. MINIMUM CONDUIT SIZE 3/4 INCHES.

C. UNLESS INDICATED OTHERWISE, ENCLOSE ALL CONDUCTORS IN CONDUIT SIZED IN ACCORDANCE WITH THE NEC.

D. PROVIDE SUPPORTS AND HANGARS FOR A GOOD AND SUBSTANTIAL INSTALLATION. SUPPORT CONDUIT AND RACEWAY IN ACCORDANCE WITH THE NEC. SUPPORT RACEWAYS, LUMINAIRES, CABINETS, BOXES, ETC., ON APPROVED TYPES OF TRAPEZE HANGERS OR WALL BRACKETS. PROVIDE MINIMUM 3/8–INCH STEEL HANGER RODS SECURELY FASTENED TO THE BUILDING STRUCTURE FOR ALL TRAPEZES. PROVIDE FASTENERS SUCH AS "CADDY CLIPS" OR SIMILAR TYPE OF OTHER MANUFACTURER. DO NOT SUSPEND FROM MECHANICAL PIPING OR DUCTWORK OR FROM CEILING SUSPENSION WIRE. PERFORATED PLUMBER'S STRAPS OR WIRE ARE NOT PERMITTED.

E. MAKE ALL BENDS USING AN APPROVED BENDING TOOL AND REAM ALL CUTS TO REMOVE BURRS. CLEAN AND DRY ALL CONDUITS PRIOR TO PULLING CONDUCTORS.

F. SEAL ALL FIREWALL AND FLOOR PENETRATIONS WITH APPROPRIATE SEALANT AT BOTH SIDES AFTER INSTALLATION OF CONDUITS.

G. USE STEEL COMPRESSION FITTINGS THROUGHOUT; DIE CAST ZINC FITTINGS ARE PROHIBITED.

H. DO NOT RUN ANY CONDUIT IN A SLAB WHERE THE CONDUIT DIAMETER EXCEEDS 1/3 THE THICKNESS OF THE SLAB. LOCATE EMBEDDED CONDUIT WITHIN THE INNER 1/3 OF THE SLAB. WHERE EMBEDDED CONDUITS RUN IN PARALLEL, SPACE CONDUITS NOT LESS THAN 3–INCHES APART. WHERE EMBEDDED CONDUITS CROSS, THICKEN THE SLAB PROPORTIONATELY OVER AN AREA TEN TIMES THE DIAMETER OF THE LARGEST CONDUIT.

I. IN EACH CONDUIT WITHOUT CONDUCTORS, PROVIDE A NYLON PULLING CORD WITH A TAG IDENTIFYING THE LOCATION OF THE OPPOSITE END.

J. PROVIDE EXPANSION TYPE FITTINGS FOR ALL CONDUITS WHICH CROSS EXPANSION JOINTS.

K. PROVIDE ALL REQUIRED PULL BOXES AND JUNCTION BOXES. SIZE BOXES IN ACCORDANCE WITH THE NEC.

L. PROVIDE SLEEVES WHERE RACEWAYS PASS THROUGH CONCRETE CONSTRUCTION. WHERE HORIZONTAL RACEWAYS PASS THROUGH WALLS AND VERTICAL RACEWAYS PASS THROUGH FLOORS, SEAL OFF VOID BETWEEN OPENING AND RACEWAY USING FIRE RATED SEALANTS THAT MEET THE FIRE RATING OF THE WALL OR FLOOR PENETRATED.

M. AVOID PROXIMITY OF CONDUIT TO SOURCES OF HEAT SUCH AS FLUES AND HOT WATER LINES.

3.4 CONDUCTORS

A. ROUTE ALL CONDUCTORS THROUGH RACEWAY REGARDLESS OF VOLTAGE APPLICATION, UNLESS SPECIFIED OTHERWISE.

B. UNLESS OTHERWISE INDICATED, ALL WIRING FOR BRANCH CIRCUITS SHALL BE #12 AWG PROTECTED BY 20A CIRCUIT BREAKERS. TO ACCOUNT FOR VOLTAGE DROP, INCREASE CONDUCTOR SIZE FOR ALL 120V CIRCUITS OVER 75 FEET, AND ALL 277V CIRCUITS OVER 150 FEET. PROVIDE UNIFORM CONDUCTOR SIZE FOR THE ENTIRE LENGTH OF THE CIRCUIT UNLESS NOTED OTHERWISE. HOMERUNS THAT INDICATE UPGRADING CIRCUIT CONDUCTORS FOR VOLTAGE DROP, E.G., #10 AWG WIRE ON 20A CIRCUIT, SHALL HAVE THE INDICATED CONDUCTOR SIZE CARRIED THROUGHOUT THE CIRCUIT TO ALL JUNCTION BOXES UP TO AND INCLUDING THE J–BOX NEAREST THE LAST DEVICE OR OUTLET.

C. DO NOT SPLICE FEEDERS OR DEDICATED BRANCH CIRCUITS UNLESS OTHERWISE INDICATED. INSTALL ALL WIRE CONTINUOUS FROM OUTLET TO OUTLET AND TERMINAL TO TERMINAL. PROVIDE SPLICES IN CABLES WHEN REQUIRED UTILIZING SOLDERLESS CONNECTORS IN HANDHOLES, PULL BOXES, OR JUNCTION BOXES. MAKE UP SPLICES IN OUTLET BOXES WITH 8 INCHES OF CORRECTLY COLOR–CODED TAILS LEFT IN BOX. MAKE SPLICES IN WIRES SIZE #8 AWG AND SMALLER WITH INSULATED SPRING TYPE WIRE CONNECTORS, "SCOTCHLOK." MAKE SPLICES IN LARGER WIRE AND CABLES WITH INDENT CONNECTORS. ALL INSULATING TAPE USED ON CIRCUITS OF 600V AND LESS SHALL BE 3–M #88 OR PLYMOUTH SLIPKNOT GREY.

D. MAKE CONNECTIONS, SPLICES, TAPS AND JOINTS WITH SOLDERLESS DEVICES, MECHANICALLY AND ELECTRICALLY SECURE. PROVIDE ONLY APPROVED CONNECTORS IN WET OR DAMP AREAS.

E. INSTALL COMPRESSION CONNECTORS WITH HYDRAULIC DIE, EMBOSSING DIE CODE INTO CONNECTOR. CONNECT TO BUS WITH BELLEVILLE TYPE WASHERS FOR POSITIVE PRESSURE OVER COMPLETE CONTACT AREA. INSULATE WITH 600V HEAT SHRINK HEAVY–WALL CABLE SLEEVES.

F. INSTALL WIRING FOR CONTROL SYSTEMS IN CONJUNCTION WITH MECHANICAL AND MISCELLANEOUS EQUIPMENT.

G. MAKE ALL GROUND, NEUTRAL, AND LINE CONNECTIONS TO RECEPTACLE AND WIRING DEVICE TERMINALS BY MEANS OF THE SIDE TERMINAL SCREW CONNECTIONS. DO NOT TERMINATE BRANCH CONDUCTORS TO THE DEVICE WITH BACKSIDE "PUSH–IN" CONNECTORS. PROVIDE GROUND JUMPER FROM OUTLET BOX TO GROUND TERMINAL OF RECEPTACLE.

3.5 GROUNDING

A. PROVIDE ALL BONDING JUMPERS AND WIRE, GROUNDING BUSHINGS, CLAMPS, FOR COMPLETE GROUNDING. INSTALL COMPLETE GROUNDING SYSTEM IN ACCORDANCE WITH NEC AND AS INDICATED.

B. BOND CONDUIT SYSTEMS, SUPPORTS, CABINETS, EQUIPMENT, METALLIC CABLE TRAYS, INTERIOR METAL PIPING SYSTEMS, VENT STACKS, AND METAL AIR DUCTS TO EQUIPMENT GROUNDING CONDUCTORS OF ASSOCIATED PUMPS, FANS, BLOWERS, ELECTRIC HEATERS, AND AIR CLEANERS. BOND ALL HEATING AND VENTILATION DUCT RUNS CONTAINING FLEXIBLE JOINTS IN A MINIMUM OF TWO PLACES WITH BRAIDED–TYPE BONDING STRAPS AND GROUNDING LUGS. PROVIDE CONNECTIONS WITH A MACHINE SCREW, HEX NUT, AND LOCK WASHERS.

C. GROUND CONNECTIONS SHALL HAVE CLEAN CONTACT SURFACES, TINNED AND SWEATED WHILE BOLTING.

D. INSTALL ALL GROUND CONDUCTORS IN CONDUIT. PROVIDE A SEPARATE INSULATED GROUND CONDUCTOR IN ALL FEEDERS AND BRANCH CIRCUITS.

3.6 BOXES

A. LOCATE OUTLET BOXES SO THAT TRANSMISSION OF SOUND THROUGH COMMON WALLS WILL NOT OCCUR.

B. EXCEPT WHERE INDICATED OTHERWISE, MOUNT DEVICES IN ACCORDANCE WITH THE FOLLOWING:
1. CONVENIENCE RECEPTACLES: LONG AXIS VERTICALLY 18–INCHES AFF
2. LIGHT SWITCHES: 44–INCHES AFF
3. STANDARD VOICE/DATA: LONG AXIS VERTICALLY 18–INCHES AFF
4. VOICE/DATA OUTLET MARKED AS WALL: 44–INCHES AFF

C. MOUNT TELEPHONE OUTLETS AT THE SAME HEIGHT AS ADJACENT RECEPTACLE OUTLETS, UNLESS NOTED OTHERWISE.

D. DO NOT USE "BACK–TO–BACK" OUTLETS IN THE SAME WALL, OR "THRU–WALL" TYPE BOXES. PROVIDE (MINIMUM) 12–INCH–LONG NIPPLE TO OFFSET ALL OUTLETS SHOWN ON OPPOSITE SIDES OF A COMMON WALL TO MINIMIZE SOUND TRANSMISSION.

REV.	DATE	DESCRIPTION
–	12/16/22	CONSTRUCTION DOCUMENTS
–	1/25/22	DESIGN DEVELOPMENT

Charles Basil Digitally signed by Charles Basil DN: C=US, E=cbasil@rmhgroup.com, O="RMH Group, Inc.", OU="RMH Group, Inc.", CN=Charles Basil Reason: I am the author of this document Date: 2022.12.16 10:59:52-07'00'

COLORADO LICENSED CHARLES P BASIL 55143 12/16/2022 PROFESSIONAL ENGINEER

RMH GROUP
12600 West Colfax Ave
Lakewood, CO 80215
Phone 303-239-0909
Fax 303- 235-0218
www.rmhgroup.com © 2019
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Mechanical and Electrical Engineering
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University of Colorado
Anschutz Medical Campus

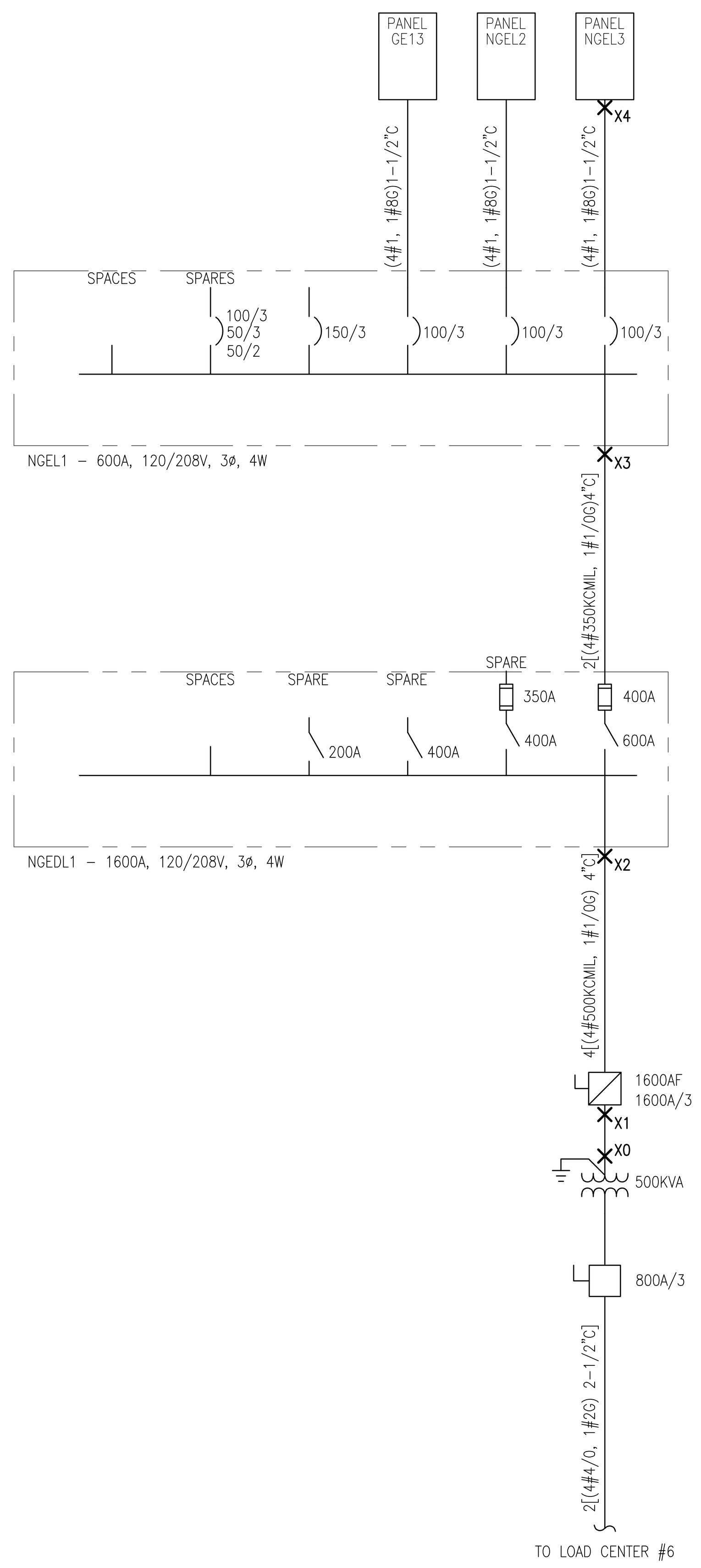
FITZSIMONS BUILDING 500 HEATING UPGRADE MASTERPLAN

ELECTRICAL LEGEND

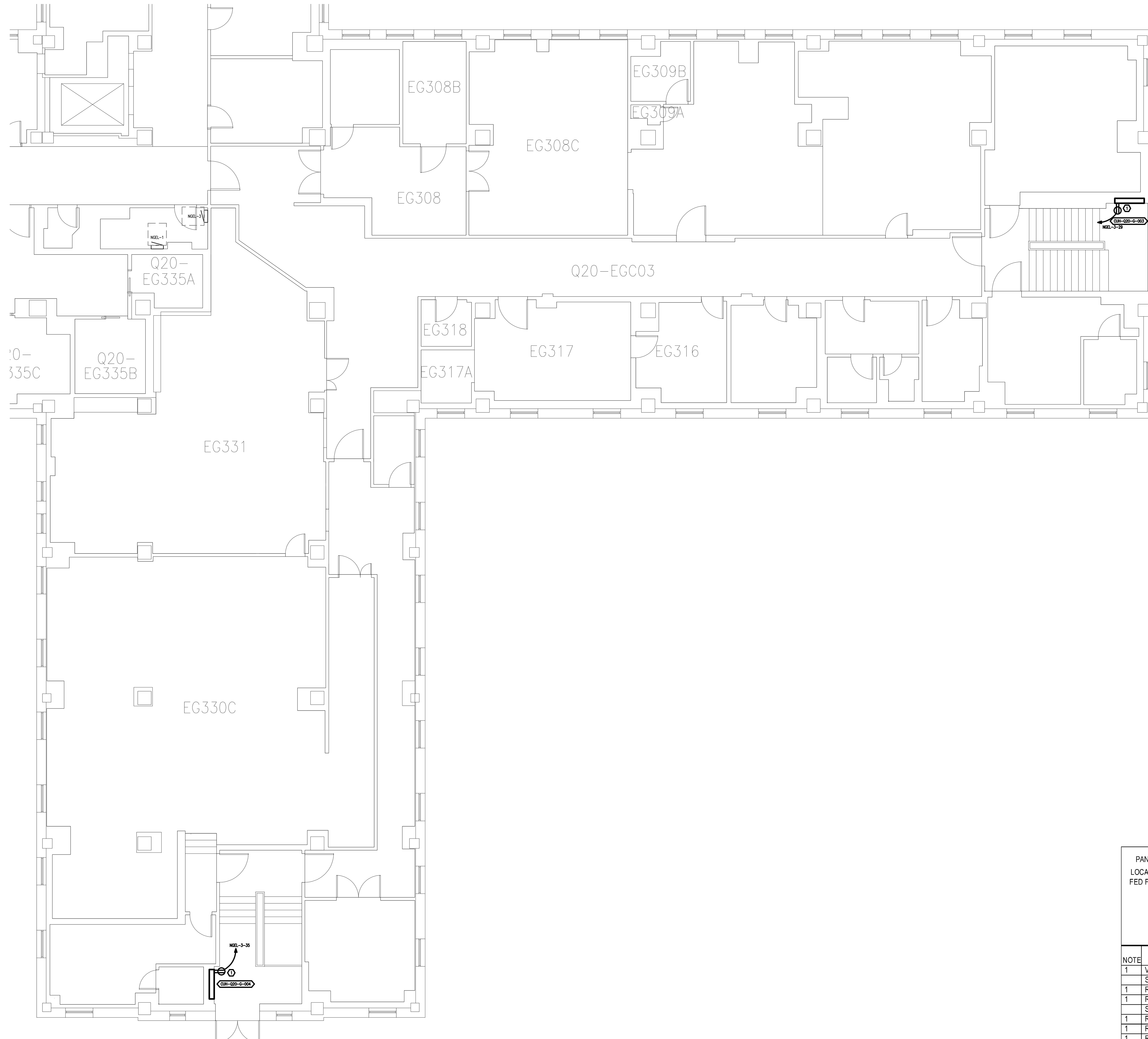
DATE: SEPTEMBER 12, 2022
SCALE: NONE
DESIGN BY: CPB
DRAWN BY: CPB
APPROVED BY: MDB
PRJ. NO: 20607

SHT.NO. E0.0
REVISION -

Created on 12/2/2022
File Path: W:\Jobs20\20607\1Dwgs\AutoCAD\Sheets\20607_E0.0 GROUND ELECTRICAL LEGEND.dwg
Save Date 16–Dec–22 by cbasil
Plotted on 12/16/2022



1 / M3.G **PARTIAL ONE-LINE DIAGRAM**
SCALE: NONE



2 / M3.G **GROUND FLOOR ENLARGED EAST ROOM EG404 AREA PIPING PLAN**
SCALE: 1/4"=1'-0"

SHEET NOTES

1. LIGHT LINE WEIGHT INDICATES EXISTING. HEAVY LINE WEIGHT INDICATES NEW CONSTRUCTION.
2. PATCH AND PAINT ANY DAMAGED SURFACES DUE TO DEMOLITION AND CONSTRUCTION TO MATCH EXISTING CONDITIONS. SEAL ALL PENETRATIONS THROUGH RATED CEILINGS AND WALLS WITH UL LISTED SEALANTS AND FIRESTOPPING MATERIALS.
3. CONFIRM EXACT MOUNTING LOCATION OF MECHANICAL EQUIPMENT WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
4. COORDINATE CEILING CONDUIT ROUGH-IN WITH MECHANICAL CONTRACTOR TO ENSURE NO CONFLICTS IN LIMITED ABOVE CEILING SPACE.
5. UPDATE PANEL SCHEDULES TO REFLECT INSTALLED CONDITIONS AFTER CONSTRUCTION IS COMPLETE.
6. THESE DRAWINGS HAVE BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. DATA PRESENTED ON THIS DRAWING IS AS ACCURATE AS CAN BE DETERMINED, BUT ACCURACY IS NOT GUARANTEED. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, THE ENGINEER IS NEITHER RESPONSIBLE FOR ITS ACCURACY, NOR ERRORS NOR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DOCUMENTS. FIELD VERIFICATION OF ALL AFFECTED COMPONENTS IS REQUIRED.
7. UNLESS OTHERWISE INDICATED, ALL CONDUCTORS FOR BRANCH CIRCUITS SHALL BE #12 AWG PROTECTED BY 20-AMPERE CIRCUIT BREAKERS. INCREASE CONDUCTOR SIZE TO ACCOUNT FOR VOLTAGE DROP FOR ALL 120-VOLT CIRCUITS OVER 75 FEET, AND ALL 277-VOLT CIRCUITS OVER 150 FEET TO THE FIRST OUTLET. CONDUCTOR SIZE SHALL BE UNIFORM FOR THE ENTIRE LENGTH OF THE CIRCUIT UNLESS NOTED OTHERWISE. HOMERUNS WHICH INDICATE UPGRADING CIRCUIT CONDUCTORS FOR VOLTAGE DROP, E.G., #10AWG WIRE ON 20-AMPERE CIRCUIT, SHALL HAVE THE CONDUCTOR SIZE INDICATED CARRIED THROUGHOUT THE CIRCUIT TO ALL JUNCTION BOXES UP TO AND INCLUDING THE J-BOX NEAREST THE LAST DEVICE OR LUMINAIRE.

KEY NOTES

1. PROVIDE RECEPTACLE LOCATED IN AVAILABLE SPACE VACATED BY THE EXISTING HOT WATER RADIATOR BEING REMOVED AS PART OF THIS PROJECT.

SHORT CIRCUIT CALCULATIONS BASED ON BUSSMANN POINT TO POINT METHOD. Version V_0222

SHORT CIRCUIT SCHEDULE

Fault Contributions

Infinite Bus Contribution: 500 kVA, 208 V, 3 PH, 5.6% Z | 24,783 A

Point Fault Calculations

POINT	DESCRIPTION	Required Short Circuit Bracing	Short Circuit Isc SYM RMS	Multiplier M	F Factor	Constant C	Line-Line Voltage V	Length of Run (Note 1)	Available Isc	Xfmr Rated kVA	Xfmr Imped % Z
X1	500kVA Xfmr to Fused Disconnect	30,000	24,220	0.977	0.023	88,740	208	10	24,783	-----	-----
X2	Fused Disconnect to NGEDL1	30,000	22,918	0.946	0.057	88,740	208	25	24,220	-----	-----
X3	NGEDL1 to NGEL1	18,000	12,912	0.563	0.775	39,406	208	160	22,918	-----	-----
X4	NGEL1 to NGEL3	14,000	9,972	0.772	0.295	7,292	208	20	12,912	-----	-----
X5	NGEL3 to HSP-301	5,000	486	0.049	19.514	617	208	145	9,972	-----	-----
X6	NGEL3 to HSP-302	5,000	659	0.066	14.131	617	208	105	9,972	-----	-----

NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR ALL QUANTITIES, FEEDER ROUTING AND INSTALLATION. INDICATED FEEDER LENGTH WAS USED TO CALCULATE FAULT CURRENT AND IS AN APPROXIMATE QUANTITY. IF THE INSTALLED FEEDER LENGTH IS 10% SHORTER OR LONGER THAN THE INDICATED FEEDER LENGTH FAULT CURRENT MUST BE RE-EVALUATED AND REQUIRED BRACING RESIZED.

EQUIPMENT SCHEDULE

Version 0722

KEY	ITEM DESCRIPTION (SEE NOTE 1)	VOLTS	PH	MOTOR HP	UNIT FLA	UNIT KVA	UNIT KW	PANEL (SEE NOTE 2)	BREAKER SIZE	FUSING (SEE NOTE 4)	MOTOR CIRCUIT	MINIMUM SCCR (kA) (SEE NOTE 1)	STARTER / CONTROLLER TYPE	STARTER / CONTROLLER SIZE	STARTER / CONTROLLER LOCATION	LOCAL DISC. SW. (SEE NOTE 3)	DISC. LOCATION (SEE NOTE 4)	REMARKS
CUH-Q20-G-003	CABINET UNIT HEATER	115	1	- -	0.9	0.1	0.1	NGEL-3	15.0	1.5	3/4" C - 2#12, 1#12G	536		-	AT UNIT	- - -	AT UNIT	- -
CUH-Q20-G-004	CABINET UNIT HEATER	115	1	- -	0.9	0.1	0.1	NGEL-3	15.0	1.5	3/4" C - 2#12, 1#12G	727		-	AT UNIT	- - -	AT UNIT	- -

NOTES:
1. COORDINATE ELECTRICAL EQUIPMENT REQUIREMENTS WITH THE ACTUAL MECHANICAL EQUIPMENT SUPPLIED. VERIFY THE COMPONENT OR EQUIPMENT MARKED NAMEPLATE SCCR IS EQUAL TO OR GREATER THAN THE AVAILABLE FAULT CURRENT INDICATED. IF THE NAMEPLATE SCCR IS LESS THAN THE AVAILABLE FAULT CURRENT, PROTECT COMPONENT OR EQUIPMENT TO AVAILABLE SHORT-CIRCUIT CURRENT INDICATED ACCORDING TO ANSI/UL 508A, SUPPLEMENT SB, USING NRTL LISTED COMPONENTS. SUBMIT FOR REVIEW COMPONENTS DATA AND TIME-CURRENT CURVES SUBSTANTIATING COMPLIANCE.
2. REFER TO PANEL SCHEDULES FOR EXACT CIRCUIT NUMBER.
3. IF A FUSE SIZE IS INDICATED, PROVIDE A FUSED DISCONNECT UNLESS INDICATED OTHERWISE.
4. FUSE SIZE INDICATED MUST BE USED IN COMBINATION WITH PROPERLY SIZED OVERLOAD RELAYS. UNLESS INDICATED OTHERWISE, FUSES SHALL BE BUSSMANN LPS-RK OR LPN-RK. CONFIRM ACTUAL NAMEPLATE DATA OF EQUIPMENT AND PROVIDE FUSES RECOMMENDED BY MANUFACTURER.

PANEL: **NGEL-3(E)** VOLTAGE: 480Y/277V, 3PH, 4W TYPE: PANELBOARD
LOCATION: EG333E 60 HZ MOUNTING: SURFACE
FED FROM: NGEL-1 PANEL COVER: SURFACE
125 AMP MAIN RATED AT 80% NEUTRAL BUS: YES
N/A AMP MAIN LUGS GROUND BUS: YES ISOLATED GND: NO
125 AMP BUS NOTE: 1. EXISTING LOAD
COPPER BUSING 2. NEW LOAD EXISTING BREAKER
10000 SYMMETRICAL RMS AMPS 3. NEW LOAD NEW BREAKER
PANEL SHORT CIRCUIT RATING 4. [

NOTE	DESCRIPTION	CCT VA	BREAKER AMF / P	CCT	PH	CCT	BREAKER AMF / P	CCT VA	DESCRIPTION	NOTE
1	VRI SYSTEM EG307	1800	20 / 1	1	A	2	20 / 1	360	RECEPT EG306	1
	SPARE	0	20 / 1	3	B	4	20 / 1	900	RECEPT EG305	1
1	RECEPT EG004	900	20 / 1	5	C	6	20 / 1	500	LTS EG040-41	1
1	RECEPT EG004	900	20 / 1	7	A	8	20 / 1	360	RECEPT EG311	1
	SPARE	0	20 / 1	9	B	10	20 / 1	1080	RECEPT EG311	1
1	RECEPT EG335A	720	20 / 1	11	C	12	20 / 1	1080	RECEPT EG041	1
1	RECEPT EG310	540	20 / 1	13	A	14	20 / 1	1000	EG311 COPIER	1
1	RECEPT EG310	900	20 / 1	15	B	16	20 / 1	1000	EG311 APPLIANCE	1
	SPARE	0	20 / 1	17	C	18	20 / 1	1000	EG311 REFRIG	1
1	RECEPT EG004-4B	1080	20 / 1	19	A	20	20 / 1	360	RECEPT EG312	1
1	RECEPT EG004	900	20 / 1	21	B	22	20 / 1	1080	RECEPT EG312	1
1	RECETP EG004-4A	720	20 / 1	23	C	24	20 / 1	0	SPARE	
	SPARE	0	20 / 1	25	A	26	20 / 1	0	SPARE	
3	**CUH-Q20-G-003**	**100**	**15 / 1**	27	B	28	20 / 1	0	SPARE	
2	**RECEPT - ENTRY EAST**	**180**	**20 / 1**	29	C	30	20 / 1	0	SPARE	
	SPARE	0	20 / 1	31	A	32	20 / 1	0	SPARE	
3	**CUH-Q20-G-004**	**100**	**15 / 1**	33	B	34	20 / 1	0	SPARE	
2	**RECEPT - ENTRY SOUTH**	**180**	**20 / 1**	35	C	36	20 / 1	0	SPARE	
	SPARE	0	20 / 1	37	A	38	20 / 1	0	SPARE	
	SPARE	0	20 / 1	39	B	40	20 / 1	0	SPARE	
	SPARE	0	20 / 1	41	C	42	20 / 1	0	SPARE	

PANEL LOADING SUMMARY

LOAD TYPE	PH A	PH B	PH C	TOTAL
LIGHTING	0.0	0.0	0.5	0.5 kVA
RECEPTACLE	3.6	4.9	3.8	12.2 kVA
COMPUTER	0.0	0.0	0.0	0.0 kVA
MOTOR	0.0	0.2	0.0	0.2 kVA
KITCHEN	0.0	1.0	1.0	2.0 kVA
HEAT	0.0	0.0	0.0	0.0 kVA
EQUIPMENT	2.8	0.0	0.0	2.8 kVA
OTHER	0.0	0.0	0.0	0.0 kVA
CONT LOAD	0.0	0.0	0.0	0.0 kVA
NONCOINCIDEN	0.0	0.0	0.0	0.0 kVA
PEAK LOAD	0.0	0.0	0.0	0.0 kVA
TOTAL	6.4	6.1	5.3	17.7 kVA

PHASE BALANCE (%)	A-B	B-C	C-A	PF
	95	87	81	92

MIN PANEL AMPACITY | 25 | AMPERES

NEC DEMAND LOAD SUMMARY

LOAD TYPE	kW	POWER FACT	kVA	DEMAND FACTOR	CALCULATED LOAD
LIGHTING	0.5	@ 95% =	0.5	@ 125% =	0.6 kVA
RECEPTACLES					
FIRST 10 kVA	9.5	@ 95% =	10.0	@ 100% =	10.0 kVA
REMAINDER	2.1	@ 95% =	2.2	@ 50% =	1.1 kVA
COMPUTER	0.0	@ 95% =	0.0	@ 125% =	0.0 kVA
MOTORS					
LARGEST	0.1	@ 80% =	0.1	@ 125% =	0.1 kVA
REMAINDER	0.1	@ 80% =	0.1	@ 100% =	0.1 kVA
KITCHEN	1.6	@ 80% =	2.0	@ 100% =	2.0 kVA
HEAT	0.0	@ 100% =	0.0	@ 125% =	0.0 kVA
EQUIPMENT	2.4	@ 85% =	2.8	@ 100% =	2.8 kVA
OTHER	0.0	@ 85% =	0.0	@ 100% =	0.0 kVA
CONT LOAD	0.0	@ 85% =	0.0	@ 125% =	0.0 kVA
NONCOINCIDEN	0.0	@ 95% =	0.0	@ 0% =	- kVA
PEAK LOAD	0.0	@ 90% =	0.0	@ 125% =	0.0 kVA
25 % SPARE	4.0	@ 90% =	4.4	@ 100% =	4.4 kVA
TOTAL	20.3 kW		22.1 kVA		21.1 kVA

Version 0822

REV.	DATE	DESCRIPTION
-	12/16/22	CONSTRUCTION DOCUMENTS
-	1/25/22	DESIGN DEVELOPMENT

COLORADO LICENSED CHARLES P BASIL 55143 12/16/2022 PROFESSIONAL ENGINEER

RMH GROUP
12600 West Colfax Ave
Lakewood, CO 80215
Phone 303-239-0909
Fax 303-235-0218
www.rmhgroup.com © 2019
engineering a greener future®
Mechanical and Electrical Engineering
Energy Consulting Sustainable Design

University of Colorado
Anschutz Medical Campus

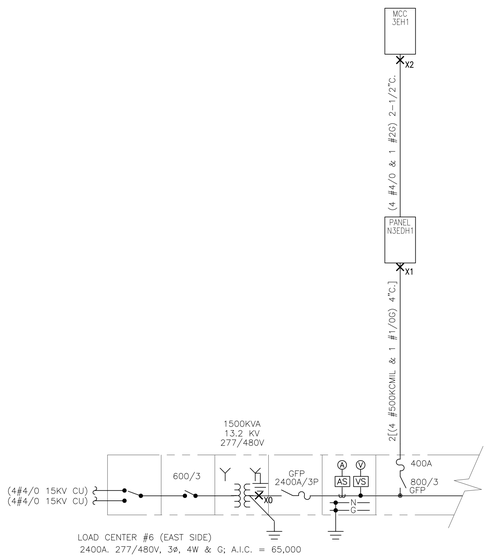
FITZSIMONS BUILDING 500 HEATING UPGRADE MASTERPLAN

GROUND ENLARGED ELECTRICAL PLANS

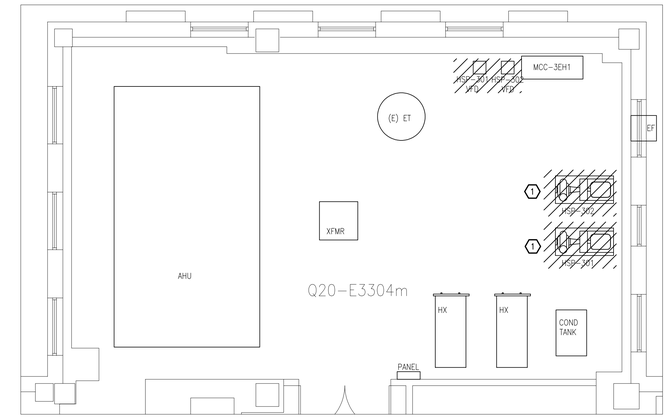
DATE: SEPTEMBER 12, 2022
SCALE: 1/4"=1'-0"
DESIGN BY: CPB
DRAWN BY: CPB
APPROVED BY: MDB
PRJ. NO: 20607

SHT.NO. E3.G
REVISION -

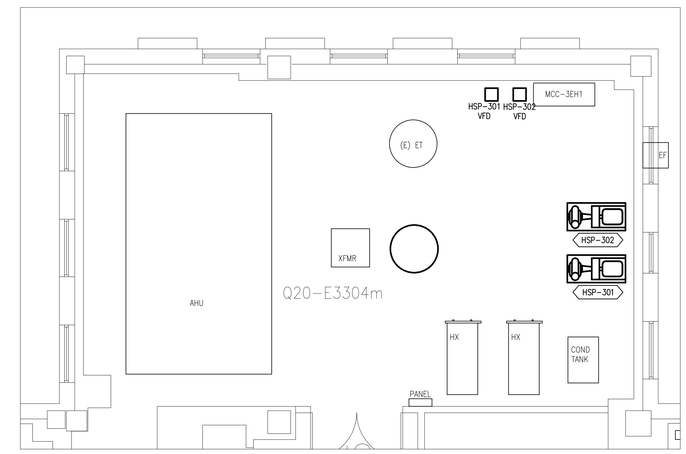
Created on 12/15/2022
File Path: W:\Jobs20\20607\1Dwgs\AutoCAD\Sheets\20607_E3.G GROUND ELECTRICAL PLANS.dwg
Save Date 16-Dec-22 by cbasil
Plotted on 12/16/2022



1 E3.3 **PARTIAL ONE-LINE DIAGRAM**
SCALE: NONE



2 E3.3 **3rd FLOOR ENLARGED EAST ROOM E3304m AREA DEMO PLAN**
SCALE: 1/4"=1'-0"



3 E3.3 **3rd FLOOR ENLARGED EAST ROOM E3304m AREA POWER PLAN**
SCALE: 1/4"=1'-0"

SHEET NOTES

1. LIGHT LINE WEIGHT INDICATES EXISTING. HEAVY LINE WEIGHT INDICATES NEW CONSTRUCTION.
2. PATCH AND PAINT ANY DAMAGED SURFACES DUE TO DEMOLITION AND CONSTRUCTION TO MATCH EXISTING CONDITIONS. SEAL ALL PENETRATIONS THROUGH RATED CEILINGS AND WALLS WITH UL LISTED SEALANTS AND FIRESTOPPING MATERIALS.
3. CONFIRM EXACT MOUNTING LOCATION OF MECHANICAL EQUIPMENT WITH THE MECHANICAL CONTRACTOR PRIOR TO ROUGH-IN.
4. COORDINATE CEILING CONDUIT ROUGH-IN WITH MECHANICAL CONTRACTOR TO ENSURE NO CONFLICTS IN LIMITED ABOVE CEILING SPACE.
5. UPDATE PANEL SCHEDULES TO REFLECT INSTALLED CONDITIONS AFTER CONSTRUCTION IS COMPLETE.
6. THESE DRAWINGS HAVE BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. DATA PRESENTED ON THIS DRAWING IS AS ACCURATE AS CAN BE DETERMINED, BUT ACCURACY IS NOT GUARANTEED. WHILE THIS INFORMATION IS BELIEVED TO BE RELIABLE, THE ENGINEER IS NEITHER RESPONSIBLE FOR ITS ACCURACY, NOR ERRORS NOR OMISSIONS WHICH MAY HAVE BEEN INCORPORATED INTO THESE DOCUMENTS. FIELD VERIFICATION OF ALL AFFECTED COMPONENTS IS REQUIRED.
7. UNLESS OTHERWISE INDICATED, ALL CONDUCTORS FOR BRANCH CIRCUITS SHALL BE #12 AWG PROTECTED BY 20-AMPERE CIRCUIT BREAKERS. INCREASE CONDUCTOR SIZE TO ACCOUNT FOR VOLTAGE DROP FOR ALL 120-VOLT CIRCUITS OVER 75 FEET, AND ALL 277-VOLT CIRCUITS OVER 150 FEET TO THE FIRST OUTLET. CONDUCTOR SIZE SHALL BE UNIFORM FOR THE ENTIRE LENGTH OF THE CIRCUIT UNLESS NOTED OTHERWISE. HOMERUNS WHICH INDICATE UPGRADING CIRCUIT CONDUCTORS FOR VOLTAGE DROP, E.G., #10AWG WIRE ON 20-AMPERE CIRCUIT, SHALL HAVE THE CONDUCTOR SIZE INDICATED CARRIED THROUGHOUT THE CIRCUIT TO ALL JUNCTION BOXES UP TO AND INCLUDING THE J-BOX NEAREST THE LAST DEVICE OR LUMINAIRE.

KEY NOTES

(1) DISCONNECT POWER FROM EXISTING MOTORS TO ACCOMMODATE REMOVAL. REMOVE CONDUIT AND CONDUCTORS BACK TO THEIR SOURCE.

SHORT CIRCUIT CALCULATIONS BASED ON BUSSMANN POINT TO POINT METHOD. Version V_0222

SHORT CIRCUIT SCHEDULE

Fault Contributions

Utility contribution: 1500 kVA, 480 V, 3 PH, 5.75% Z	31,378 A

Point Fault Calculations

POINT	DESCRIPTION	Required Short Circuit Bracing	Short Circuit Isc SYM RMS	Multiplier M	F Factor	Constant C	Line-Line Voltage V	Length of Run (Note 1)	Available Isc	Xfmr Rated kVA	Xfmr Imped % Z
X1	LOAD CENTER #6 to N3EDH1	30,000	26,337	0.839	0.191	44,370	480	75	31,378	-----	-----
X2	N3EDH1 to MCC-3EH1	25,000	20,027	0.760	0.315	15,082	480	50	26,337	-----	-----
X3	MCC-3EH1 to P-1 VFD	18,000	15,429	0.770	0.298	2,425	480	10	20,027	-----	-----
X4	MCC-3EH1 to P-2 VFD	18,000	15,429	0.770	0.298	2,425	480	10	20,027	-----	-----

NOTES:
1. CONTRACTOR IS RESPONSIBLE FOR ALL QUANTITIES, FEEDER ROUTING AND INSTALLATION. INDICATED FEEDER LENGTH WAS USED TO CALCULATE FAULT CURRENT AND IS AN APPROXIMATE QUANTITY. IF THE INSTALLED FEEDER LENGTH IS 10% SHORTER OR LONGER THAN THE INDICATED FEEDER LENGTH FAULT CURRENT MUST BE RE-EVALUATED AND REQUIRED BRACING RESIZED.

Motor Control Center Schedule

Version_0822

NAME: **MCC-3EH1**

N/A MCB
80% RATED
MLO MAIN LUGS
600 AMP BUS
COPPER BUSING
65000 SYM RMS AMPS PANEL SHORT CIRCUIT RATING
183 AMPS MINIMUM AMPACITY

FED FROM: N3EDH1
LOCATION: Q20-E3304m
VOLTAGE: 480Y/277V, 3PH, 4W
HZ: 60

TYPE: INDOOR
DEPTH: 20 INCHES
WIDTH: 20 INCHES PER SECTION
NEUTRAL BUS: YES
GROUND BUS: YES
GENERAL NOTES 1. [ ]
2. [ ]
3. [ ]
4. [ ]

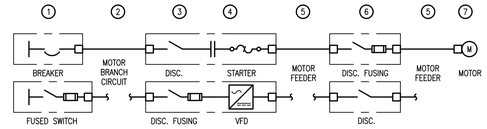
CIRCUIT #	EQUIPMENT IDENTIFICATION (SEE NOTE 1)	MOTOR DATA HP	PHASE	TERMINAL VOLTAGE	FLA	CIRCUIT TOTAL kVA	FUNCTIO CODE(S)	NEMA Size STARTER	BREAKER/FUSE SIZE TYPE	OCP SIZE			REMARKS
1	HEATING COIL PUMP	1-1/2	3	460	3.0	2.39	FVNR	1	CB	15 / 3			- -
2	HSP-302 HEAT PUMP	20	3	460	27.0	21.51	VFD	--	CB	40 / 3			- -
3	HSP-301 HEAT PUMP	20	3	460	27.0	21.51	VFD	--	CB	40 / 3			- -
4	SPACE	- -	3	460	- -	- - -	--	--	CB	- / 3			- -
5	RETURN FAN	20	3	460	27.0	21.51	VFD	--	CB	40 / 3			- -
6	SUPPLY FAN 1	- -	3	460	33.0	26.30	VFD	--	CB	50 / 3			- -
7	SUPPLY FAN 2	- -	3	460	33.0	26.29	VFD	--	CB	50 / 3			- -
8	SUPPLY FAN 3	- -	3	460	33.0	26.29	VFD	--	CB	50 / 3			- -
9	SPACE	- -	--	--	--	--	--	--	- -	-- / --			- -
[ ]	[ ]	- -	--	--	--	- -	--	--	- -	-- / --			- -

PHASE LOADING SUMMARY LOAD TYPE	PH A	PH B	PH C	TOTAL	
LIGHTING	0.0	0.0	0.0	0.0	kVA
RECEPTACLE	0.0	0.0	0.0	0.0	kVA
COMPUTER	0.0	0.0	0.0	0.0	kVA
MOTOR	48.6	48.6	48.6	146	kVA
KITCHEN	0.0	0.0	0.0	0.0	kVA
HEAT	0.0	0.0	0.0	0.0	kVA
EQUIPMENT	0.0	0.0	0.0	0.0	kVA
OTHER	0.0	0.0	0.0	0.0	kVA
CONT LOAD	0.0	0.0	0.0	0.0	kVA
NONCOINCIDENT	0.0	0.0	0.0	0.0	kVA
PEAK LOAD	0.0	0.0	0.0	0.0	kVA
TOTAL	48.6	48.6	48.6	146	kVA

Power Factor: 91%
Minimum MCC Ampacity: 183 Amps

LOAD TYPE	CONNECTED LOAD		POWER FACTOR		DEMAND FACTOR		NEC Calculated LOAD	
LIGHTING	0.0	kW @	95%	0.0	125%	0.0	kVA	
RCPT 1ST 10 kVA	0.0	kW @	95%	0.0	100%	0.0	kVA	
REMAINDER	0.0	kW @	95%	0.0	50%	0.0	kVA	
COMPUTER	0.0	kW @	95%	0.0	100%	0.0	kVA	
MOTORS LARGEST	25.8	kW @	98%	26.3	125%	32.9	kVA	
REMAINDER	108	kW @	90%	120	100%	120	kVA	
KITCHEN	0.0	kW @	80%	0.0	100%	0.0	kVA	
HEAT	0.0	kW @	100%	0.0	125%	0.0	kVA	
EQUIPMENT	0.0	kW @	85%	0.0	100%	0.0	kVA	
OTHER	0.0	kW @	85%	0.0	100%	0.0	kVA	
CONT LOAD	0.0	kW @	85%	0.0	125%	0.0	kVA	
NONCOINCIDENT	0.0	kW @	85%	0.0	0%	0.0	kVA	
PEAK LOAD	0.0	kW @	95%	0.0	125%	0.0	kVA	
0% SPARE	0.0	kW @	95%	0.0	100%	0.0	kVA	
TOTAL	133	kW		146	kVA	152	kVA	

Function Code(s):
FVNR = Full Voltage Non-Reversing
FVR = Full Voltage Reversing
2S1W = Two Speed, One Winding
2S2W = Two Speed, Two Winding
VFD = Variable Speed Drive
SSRVS = Solid State Reduced Voltage



EQUIPMENT SCHEDULE LEGEND

Rev.Date 04/15/2015

EQUIPMENT SCHEDULE

Version 0722

LEGEND KEY		⑦						①	②	③ ④			⑤	⑥		
KEY	ITEM DESCRIPTION (SEE NOTE 1)	VOLTS	PH	MOTOR HP	UNIT FLA	UNIT KVA	UNIT KW	PANEL (SEE NOTE 2)	BREAKER SIZE	MOTOR CIRCUIT	MINIMUM SCCR (kA) (SEE NOTE 1)	STARTER / CONTROLLER TYPE	SIZE	LOCATION	MOTOR FEEDER	LOCAL DISC. SW. (SEE NOTE 3)	DISC. LOCATION (SEE NOTE 4)	REMARKS
HSP-301	PUMP	460	3	20	27.0	21.5	21.1	MCC-3EH1	40.0	1" C - 3#6, 1#8G	18228	VFD	-	Q20-3304m	1" C - 3#6, 1#8G	PART OF VFD	VFD	SEE NOTE(S) 1, 5 (25 FT), 6
HSP-302	PUMP	460	3	20	27.0	21.5	21.1	MCC-3EH1	40.0	1" C - 3#6, 1#8G	16972	VFD	-	Q20-3304m	1" C - 3#6, 1#8G	PART OF VFD	VFD	SEE NOTE(S) 1, 5 (25 FT), 6

NOTES:
1. COORDINATE ELECTRICAL EQUIPMENT REQUIREMENTS WITH THE ACTUAL MECHANICAL EQUIPMENT SUPPLIED. VERIFY THE COMPONENT OR EQUIPMENT MARKED NAMEPLATE SCCR IS EQUAL TO OR GREATER THAN THE AVAILABLE FAULT CURRENT INDICATED. IF THE NAMEPLATE SCCR IS LESS THAN THE AVAILABLE FAULT CURRENT, PROTECT COMPONENT OR EQUIPMENT TO AVAILABLE SHORT-CIRCUIT CURRENT INDICATED ACCORDING TO ANSI/UL 508A, SUPPLEMENT SB, USING NRTL LISTED COMPONENTS. SUBMIT FOR REVIEW COMPONENTS DATA AND TIME-CURRENT CURVES SUBSTANTIATING COMPLIANCE.
2. REFER TO PANEL SCHEDULES FOR EXACT CIRCUIT NUMBER.
3. IF A FUSE SIZE IS INDICATED, PROVIDE A FUSED DISCONNECT UNLESS INDICATED OTHERWISE.
4. FUSE SIZE INDICATED MUST BE USED IN COMBINATION WITH PROPERLY SIZED OVERLOAD RELAYS. UNLESS INDICATED OTHERWISE, FUSES SHALL BE BUSSMANN LPS-RK OR LPN-RK. CONFIRM ACTUAL NAMEPLATE DATA OF EQUIPMENT AND PROVIDE FUSES RECOMMENDED BY MANUFACTURER.
5. COORDINATE THE REQUIREMENTS WITH THE VFD SUPPLIED. PROVIDE THE AC SUPPLY TO THE DRIVE WITH SUITABLE PROTECTION AGAINST OVERLOAD AND SHORT-CIRCUITS. MATCH OVERCURRENT PROTECTION, AND FEEDER SIZE TO THAT REQUIRED BY THE VFD NAMEPLATE DATA. IF THE INSTALLED MOTOR CIRCUIT CONDUCTOR LENGTH EXCEEDS THE INDICATED LENGTH, PROVIDE DC CHOKE IF REQUIRED BY DRIVE MANUFACTURER'S RECOMMENDATIONS.
6. PROVIDE CONTINUOUS FERROUS METAL CONDUIT WITH XHHW-2 (90 C) CONDUCTORS. IF RACEWAY IS NOT CONTINUOUS FERROUS METAL CONDUIT, PROVIDE MOTOR FEEDER USING VFD/ASD CABLE ASSEMBLY WITH XHHW-2 (90 C) CONDUCTORS SUITABLE FOR VFD APPLICATIONS. IF CABLE IS INSTALLED IN A PLENUM SPACE PROVIDE VFD/ASD CABLE ASSEMBLY IN RACEWAY. SIZE RACEWAY TO ACCOMMODATE SELECTED CABLE ASSEMBLY. SEE DETAILS FOR FURTHER INFORMATION.

REV.	DATE	DESCRIPTION
-	12/16/22	CONSTRUCTION DOCUMENTS
-	1/25/22	DESIGN DEVELOPMENT

PROFESSIONAL ENGINEER
55143
12/16/2022

RMH GROUP
12600 West Colfax Ave
Lakewood, CO 80215
Phone 303-239-0909
Fax 303-235-0218
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Anschutz Medical Campus

FITZSIMONS BUILDING 500
HEATING UPGRADE MASTERPLAN
3RD FLOOR ENLARGED
ELECTRICAL PLANS

DATE: SEPTEMBER 12, 2022
SCALE: 1/4"=1'-0"
DESIGN BY: CPB
DRAWN BY: CPB
APPROVED BY: MDB
PRJ. NO: 20607

SHT.NO. E3.3
REVISION -

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Save Date 16-Dec-22by cbosli
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