PIPING	ME
	NEW PIPING
	EXISTING PIPING TO REMAIN
	EXISTING PIPING TO BE DEMOLISHED
ю	BALL VALVE
	BUTTERFLY VALVE
<u>\</u>	CHECK VALVE
₩	CIRCUIT SETTER BALANCING VALVE
	DIRECTION OF FLOW
	DIRECTION OF PIPE PITCH, DOWN
фII	DRAIN VALVE WITH 3/4" THREADED HOS
	FLEXIBLE PIPE CONNECTOR (OR CONN
P	FLOW SWITCH
⊳	GATE VALVE
rQ1	GLOBE VALVE
& ²	MANUAL AIR VENT
	MANUAL THREE-WAY, TWO-POSITION V
₩	NEEDLE VALVE
	NEW PIPE CONNECTION
\$ \$	PIPE BREAK
	PIPE CAP
	PIPE DROP/RISE
+×,	PIPE ELBOW, 45° HORIZONTAL
t <u>1</u>	PIPE ELBOW, 90° HORIZONTAL
 1 1	PIPE ELBOW, DOWN AND 90° HORIZONT
iə	PIPE ELBOW, TURNED DOWN
ю	PIPE ELBOW, TURNED UP
	PIPE SLEEVE
,Ĩ,	PIPE TEE, BOTTOM CONNECTION, 45° O
	PIPE TEE, DOWN
,Ť,	PIPE TEE, HORIZONTAL
 	PIPE TEE, TOP CONNECTION, 45° OR 90
	PIPE TEE, UP
	PIPE UNION
	PIPE WELL
Ø PSI	PRESSURE GAUGE
—©—	PUMP
	STRAINER
ත ත	TEST PLUG
	THERMOMETER
♀ ' 	THREE-WAY, MODULATING AUTOMATIC
	VALVE THREE-WAY, TWO-POSITION AUTOMATI
	VALVE TRIPLE DUTY VALVE
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	TWO-WAY, MODULATING AUTOMATIC C
X	TWO-WAY, MODULATING AUTOMATIC C

- A. ALL WORK SHALL BE IN ACCORDANCE WITH THE CITY OF CH BUILDING CODE REQUIREMENTS. B. ALL EQUIPMENT FURNISHED AND INSTALLED SHALL BE IN FU COMPLIANCE WITH THE CURRENT STANDARDS SET BY THE C CHICAGO DEPARTMENT OF INSPECTIONAL SERVICES.
- ALL NEW DUCTWORK INSTALLED SHALL BE OF GALVANIZED SHEET METAL INSTALLATION SHALL COMPLY WITH THE LATES STANDARDS OF SMACNA AND ASHRAE.
- ALL DUCT JOINTS, SEAMS, AND CONNECTIONS SHALL BE SEA ACCORDANCE WITH THE CHICAGO ENERGY CONSERVATION ALL NEW EQUIPMENT PROVIDED SHALL BE U.L. LISTED AND

THE U.L. LABEL.

# IFSA - GUARANTEED RATE FIELD - SOUND ROOM COOLING 333 W 35TH STREET CHICAGO, ILLINOIS 60616

## ECHANICAL SYMBOLS DUCTWORK NEW DUCTWORK ____ ACCESS DOOR DIRECTION OF AIRFLOW FIRE DAMPER IOSE ADAPTOR INECTION) 6x6 NK – VD VALVE ____ $[\times]$ $\square$ GENERAL (T) P TYPE EQUIPMENT TAG NTAL FLOOR DRAIN OPT OR 90° ELBOW VFD 90° ELBOW

EXISTING DUCTWORK TO REMAIN EXISTING DUCTWORK TO BE DEMOLISHED AUTOMATIC CONTROL (OR MOTOR OPERATED) DAMPER DUCTWORK BREAK LINE (OR CONTINUATION) FLEXIBLE DUCTWORK CONNECTION GRILLE/REGISTER/DIFFUSER TAG MANUAL VOLUME (OR BALANCING) DAMPER RECTANGULAR EXHAUST/RETURN DUCTWORK DOWN RECTANGULAR EXHAUST/RETURN DUCTWORK UP RECTANGULAR SUPPLY DUCTWORK DOWN RECTANGULAR SUPPLY DUCTWORK UP DDC OR STANDALONE PROGRAMMABLE THERMOSTAT POINT OF CONNECTION OF NEW TO EXISTING WORK POINT OF DEMOLITION TO EXISTING WORK DIFFERENTIAL PRESSURE TRANSDUCER VARIABLE FREQUENCY DRIVE

	ABBREVIATIONS								
AC	AIR CONDITIONER	FV	FACE VELOCITY						
ACD	AUTOMATIC CONTROL DAMPER	G	GAS						
AD	ACCESS DOOR	GA	GAUGE						
AFF	ABOVE FINISHED FLOOR	GPM	GALLONS PER MI						
AHU	AIR HANDLING UNIT	HC	HEATING COIL						
AP	ACCESS PANEL	HP	HORSEPOWER						
APD	AIR PRESSURE DROP	HZ	HERTZ						
BAS	BUILDING AUTOMATION SYSTEM	IPLV	INTEGRATED PAR						
BASC	BUILDING AUTOMATION SYSTEM CONTRACTOR	LAT	LEAVING AIR TEM						
3FV	BUTTERFLY VALVE	LPS	LOW PRESSURE S						
3HP	BRAKE HORSEPOWER	LWT	LEAVING WATER						
30D 301	BOTTOM OF DUCT BOTTOM OF INSULATION	MBH	THOUSAND BRITI MECHANICAL COI						
301 30P	BOTTOM OF INSULATION BOTTOM OF PIPE	MC MCA	MINIMUM CIRCUIT						
SOF ST	BUFFER TANK	MOCP	MAXIMUM OVER-0						
3TU	BRITISH THERMAL UNIT	NC	NORMALLY CLOS						
ЗТОН	BRITISH THERMAL UNIT PER HOUR	NIC	NOT IN CONTRAC						
3V	BALL VALVE	NK	NECK						
С	COMMON	NO	NORMALLY OPEN						
CBV	CIRCUIT BALANCING VALVE	NPLV	NONSTANDARD F						
CC	COOLING COIL	NPSH	NET POSITIVE SU						
CF	CHEMICAL FEED	NTS	NOT TO SCALE						
CFH	CUBIC FEET PER HOUR	OA	OUTDOOR AIR						
CFM	CUBIC FEET PER MINUTE	OAD	OUTDOOR AIR DA						
CHWR	CHILLED WATER RETURN	OSD	OPEN SITE DRAIN						
CHWS	CHILLED WATER SUPPLY	P	PUMP						
00	CLEANOUT	PD	PRESSURE DROF						
COND	CONDENSATE	PG	PROPYLENE GLY						
		PHC	PREHEAT COIL						
COP		PRD	PRESSURE RELIE						
CO2 CR	CARBON DIOXIDE CONDENSATE RETURN	PRV PS	PRESSURE REDU PIPE SLEEVE						
CU	CONDENSATE RETORN CONDENSING UNIT	PS	POUNDS PER SQ						
CV	CONTROL VALVE	-R	RETURN						
CW	COLD (OR CITY) WATER	RA	RETURN AIR						
CWR	CONDENSER WATER RETURN	RF	RETURN FAN						
CWS	CONDENSER WATER SUPPLY	RH	REHEAT						
D	DRAIN	RL	REFRIGERANT LI						
ЭΒ	DRY BULB	RS	REFRIGERANT SU						
ЭНW	DOMESTIC HOT WATER	RPM	REVOLUTIONS PE						
DHWR	DOMESTIC HOT WATER RETURN	-S	SUPPLY						
DN	DOWN	SA	SUPPLY AIR						
DPT	DIFFERENTIAL PRESSURE TRANSDUCER	SCAC							
·Е	EXHAUST	SEER							
ΞA	EXHAUST AIR	SF	SUPPLY FAN						
EAD		SP	STATIC PRESSUF						
EAT		SS	STAINLESS STEE						
EBH		SST	SATURATED SUC						
EC ECM	ELECTRICAL CONTRACTOR ELECTRONICALLY COMMUTATED MOTOR	ST STR	STORM STRAINER						
	ELECTRONICALLY COMMOTATED MOTOR	SUH	SUSPENDED UNI						
EER	ENERGY EFFICIENCY RATIO	T	THERMOSTAT						
EF	EXHAUST FAN	-T	TRANSFER						
EG	ETHYLENE GLYCOL	TDH	TOTAL DYNAMIC						
EHC	ELECTRIC HEATING COIL	TYP	TYPICAL						
ΞJ	EXPANSION JOINT	TFA	TO FLOOR ABOV						
ESP	EXTERNAL STATIC PRESSURE	TFB	TO FLOOR BELO						
EWT	ENTERING WATER TEMPERATURE	TSP	TOTAL STATIC PR						
=	FAHRENHEIT	UC	UNDERCUT DOO						
-C	FLEXIBLE CONNECTOR (OR CONNECTION)	UH	UNIT HEATER						
-D	FLOOR DRAIN	V	VENT						
-CU	FAN COIL UNIT	VAV	VARIABLE AIR VO						
FID	FIRE DAMPER	VD	VOLUME DAMPE						
FFA	FROM FLOOR ABOVE	VFD							
FB	FROM FLOOR BELOW	VTR	VENT THROUGH						
-LA	FULL LOAD AMPS	WB							
FOB	FLAT ON BOTTOM	WC	WATER COLUMN						
OT		WG							
-PI	FINS PER INCH	WL							
-РМ -тр	FEET PER MINUTE	WMS WPD	WIRE MESH SCR WATER PRESSU						
-TR	FINNED TUBE RADIATION		WAIER PRESSUP						

	PROJECT SCOPE OF W
THE SC	OPE OF WORK FOR THIS PROJECT CONTAINS, BUT IS NOT LIMITED TO TH
1. SUI 1.a. 1.b.	PPLEMENTAL COOLING IN SOUND ROOM B PROVIDE (2) NEW INDOOR HEAT PUMP DUCTLESS COOLING UNITS TO S THE SOUND ROOM. COOLING SHALL BE SUPPLEMENTAL TO EXISTING A PROVIDE (2) NEW OUTDOOR HEAT PUMPS OF ROOF. ROUTE REFRIGER/ INDOOR UNIT.
2. SUI 2.a. 2.b.	PPLEMENTAL COOLING IN SOUND ROOM D PROVIDE (3) NEW INDOOR HEAT PUMP DUCTLESS COOLING UNITS TO S THE SOUND ROOM. COOLING SHALL BE SUPPLEMENTAL TO EXISTING A PROVIDE (3) NEW OUTDOOR HEAT PUMPS OF ROOF. ROUTE REFRIGER/ INDOOR UNIT.
3. SUI 3.a. 3.b.	PPLEMENTAL COOLING IN SOUND ROOM F PROVIDE (2) NEW INDOOR HEAT PUMP DUCTLESS COOLING UNITS TO S THE SOUND ROOM. COOLING SHALL BE SUPPLEMENTAL TO EXISTING A PROVIDE (2) NEW OUTDOOR HEAT PUMPS OF ROOF. ROUTE REFRIGER/ INDOOR UNIT.
4. SUI 4.a. 4.b.	PPLEMENTAL COOLING IN SOUND ROOM J PROVIDE (2) NEW INDOOR HEAT PUMP DUCTLESS COOLING UNITS TO S THE SOUND ROOM. COOLING SHALL BE SUPPLEMENTAL TO EXISTING A PROVIDE (2) NEW OUTDOOR HEAT PUMPS OF ROOF. ROUTE REFRIGER/ INDOOR UNIT.

C CONTROL TIC CONTROL

CONTROL VALVE

C CONTROL VALVE EAR IN THESE DRAWINGS.

## CITY OF CHICAGO NOTES

CHICAGO	F.	ALL OUTSIDE AIR INTAKES SHALL BE A MINIMUM DISTANCE OF 15'-0" FROM ANY EXHAUST LOUVERS, PLUMBING VENTS, OR ANY OTHER
FULL E CITY OF		POSSIBLE CONTAMINANTS AND SHALL BE A MINIMUM DISTANCE OF 10'-( ABOVE GRADE.
	G.	IF FLEXIBLE DUCTS ARE USED, DO NOT EXCEED 5'-0' IN LENGTH. ALL FLEXIBLE DUCTWORK TO BE CITY OF CHICAGO APPROVED.
D METAL. ALL TEST	H.	NOISE FROM ALL MECHANICAL EQUIPMENT INSTALLED SHALL NOT EXCEED 55 DB AT THE PROPERTY LINE.
SEALED IN DN CODE.	I.	CLEARANCES FOR ALL VENTILATION EQUIPMENT MUST CONFORM TO MANUFACTURER'S REQUIREMENTS.
D SHALL BEAR		

ACE VELOCITY
AUGE
ALLONS PER MINUTE
EATING COIL
DRSEPOWER
RTZ
TEGRATED PART LOAD VALUE
AVING AIR TEMPERATURE
W PRESSURE STEAM
AVING WATER TEMPERATURE
OUSAND BRITISH THERMAL UNITS PER HOUR
ECHANICAL CONTRACTOR
NIMUM CIRCUIT AMPACITY
AXIMUM OVER-CURRENT PROTECTION
DRMALLY CLOSED
DT IN CONTRACT
ECK
DRMALLY OPEN
ONSTANDARD PART LOAD VALUE
T POSITIVE SUCTION HEAD
DT TO SCALE
JTDOOR AIR
JTDOOR AIR DAMPER
PEN SITE DRAIN
JMP
RESSURE DROP
ROPYLENE GLYCOL
REHEAT COIL
RESSURE RELIEF DOOR
RESSURE REDUCING (OR REGULATING) VALVE
OUNDS PER SQUARE INCH
ETURN ETURN AIR
TURN FAN
EHEAT
EFRIGERANT LIQUID
FRIGERANT SUCTION
EVOLUTIONS PER MINUTE
JPPLY
JPPLY AIR
ELF CONTAINED AIR CONDITIONER
ASONAL ENERGY EFFICIENCY RATIO
JPPLY FAN
ATIC PRESSURE
AINLESS STEEL
TURATED SUCTION TEMPERATURE
RAINER JSPENDED UNIT HEATER
IERMOSTAT
ANSFER
DTAL DYNAMIC HEAD

PICAL FLOOR ABOVE FLOOR BELOW TAL STATIC PRESSURE DERCUT DOOR IT HEATER NT RIABLE AIR VOLUME

LUME DAMPER RIABLE FREQUENCY DRIVE ENT THROUGH ROOF ET BULB ATER COLUMN ATER GAUGE ALL LOUVER RE MESH SCREEN ATER PRESSURE DROP

WORK

THE FOLLOWING:

O SERVE AS SUPPLEMENTAL COOLING TO G AHU TO REMAIN. ERANT PIPING BETWEEN NEW OUTDOOR AND

D SERVE AS SUPPLEMENTAL COOLING TO G AHU TO REMAIN. ERANT PIPING BETWEEN NEW OUTDOOR AND

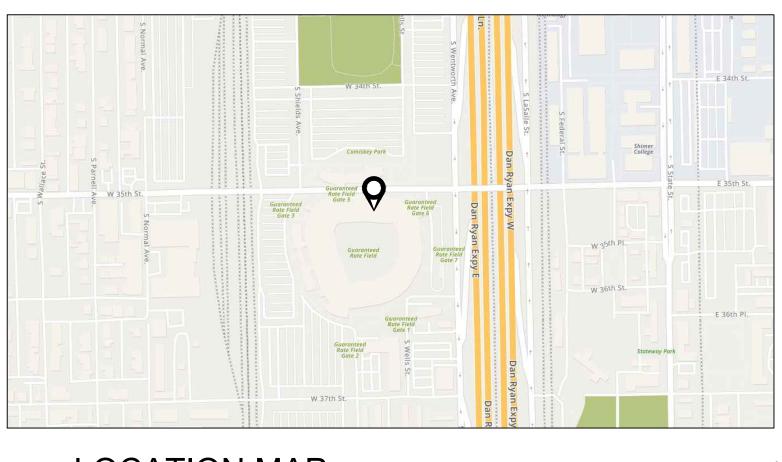
D SERVE AS SUPPLEMENTAL COOLING TO G AHU TO REMAIN. ERANT PIPING BETWEEN NEW OUTDOOR AND

) SERVE AS SUPPLEMENTAL COOLING TO G AHU TO REMAIN. ERANT PIPING BETWEEN NEW OUTDOOR AND

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SHEETLISTTABLE						
Sheet Number Sheet Title						
MECHANICAL						
M0.001 MECHANICAL NOTES, SYMBOLS, AND ABBREVIATIONS						
M1.101	MECHANICAL PLAN - LEVEL 100 AND 200 - SECTION 1					
M1.304	MECHANICAL PLAN - LEVEL 300 - SECTION 4					
M1.306	MECHANICAL PLAN - LEVEL 300 - SECTION 6					
M1.309	MECHANICAL PLAN - LEVEL 300 - SECTION 9					
M2.001	MECHANICAL SPECIFICATION, DETAILS, AND SCHEDULES					
	SHEET LIST TABLE					
Sheet Number	Sheet Title					
	ELECTRICAL - NEW SET					
E1.101	ELECTRICAL PLAN - LEVEL 100 AND 200 - SECTION 1					
E1.304	ELECTRICAL PLAN - LEVEL 300 - SECTION 4					
E1.306	ELECTRICAL PLAN - LEVEL 300 - SECTION 6					
E1.308	ELECTRICAL PLAN - LEVEL 300 - SECTION 8					
E1.309	ELECTRICAL PLAN - LEVEL 300 - SECTION 9					
E2.001	ELECTRICAL SINGLE LINES					
E2.002	ELECTRICAL SINGLE LINES					
E3.001 ELECTRICAL SPECIFICATIONS						

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E2.001	ELECTRICAL SINGLE LINES					
E2.002	ELECTRICAL SINGLE LINES					
E3.001	ELECTRICAL SPECIFICATIONS					



# 1 LOCATION MAP

ENERGY CODE COMPLIANCE STATEMENT

I certify that I am a Registered Energy Professional (REP). I also certify that to the best of my professional knowledge and belief that the plans for Address: 333 W. 35TH ST, CHICAGO, IL 60616

Fully comply with the requirements of Chapter 18-13. Energy Conservation of the Municipal Code of Chicago as effective April 22, 2009

Date: 01/21/2025 Signed: (Arch. S.E. or P.E.)

Illinois License Number: 062-056281

CHICAGO BUILDING CODE COMPLIANCE STATEMENT

I hereby certify that these plans were prepared under my direct supervision and to the best of my professional knowledge they conform to the Chicago Building Code.

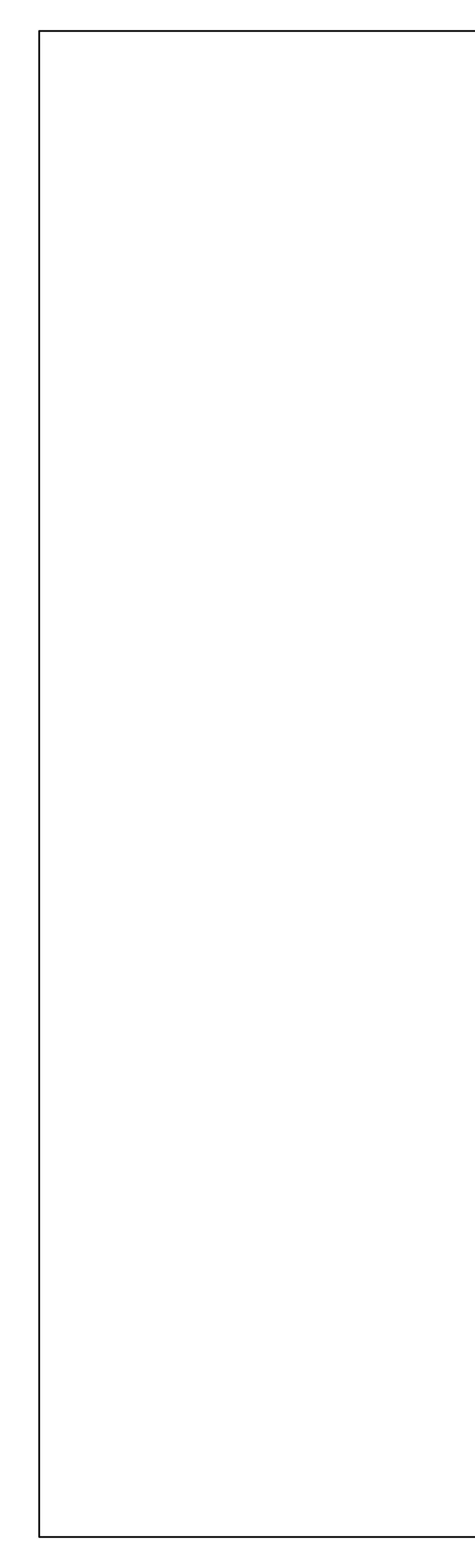
Date: 01/21/2025 Signed: (Arch. S.E. or P.E.)

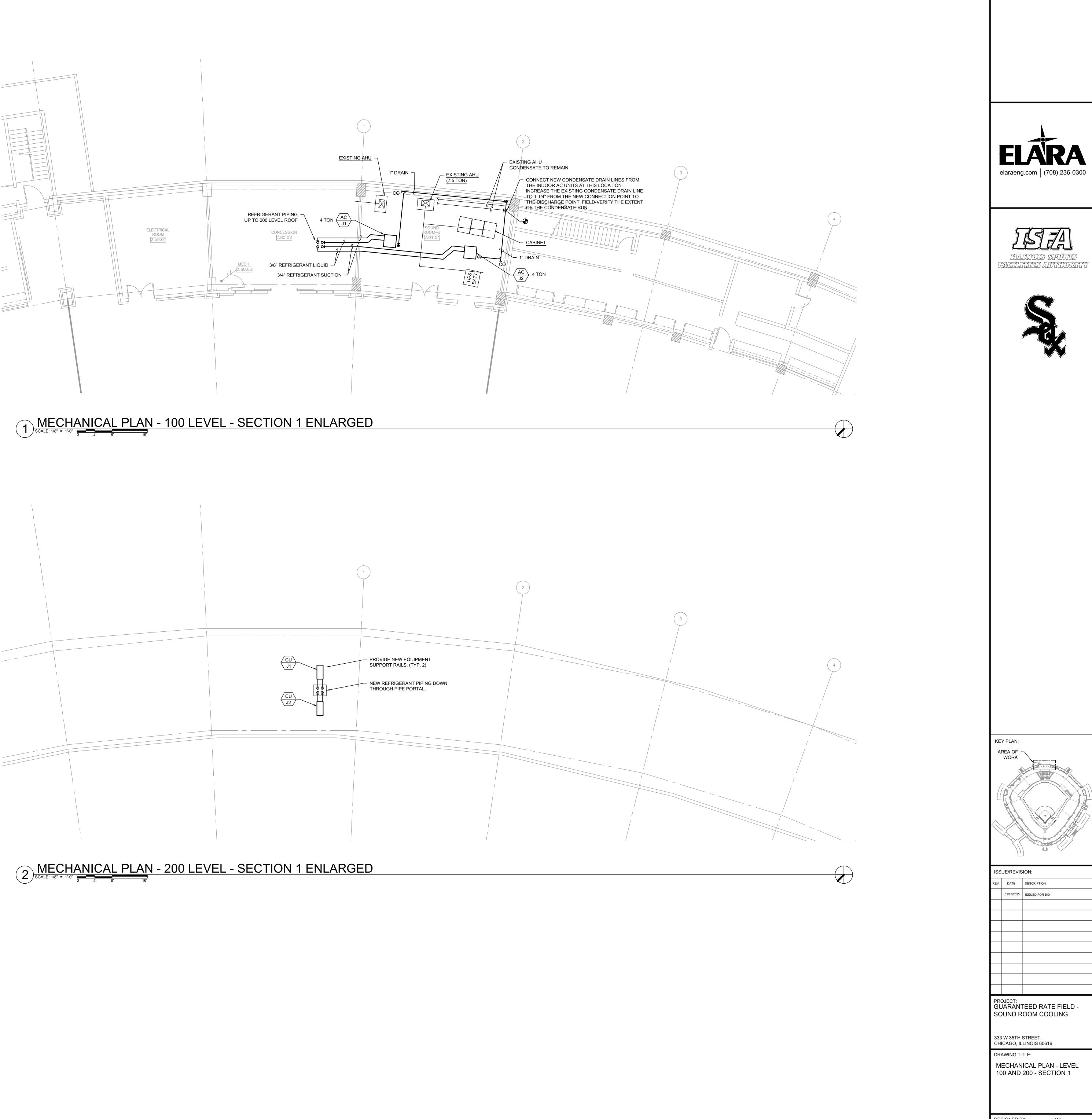
HEATING CERTIFICATION STATEMENT

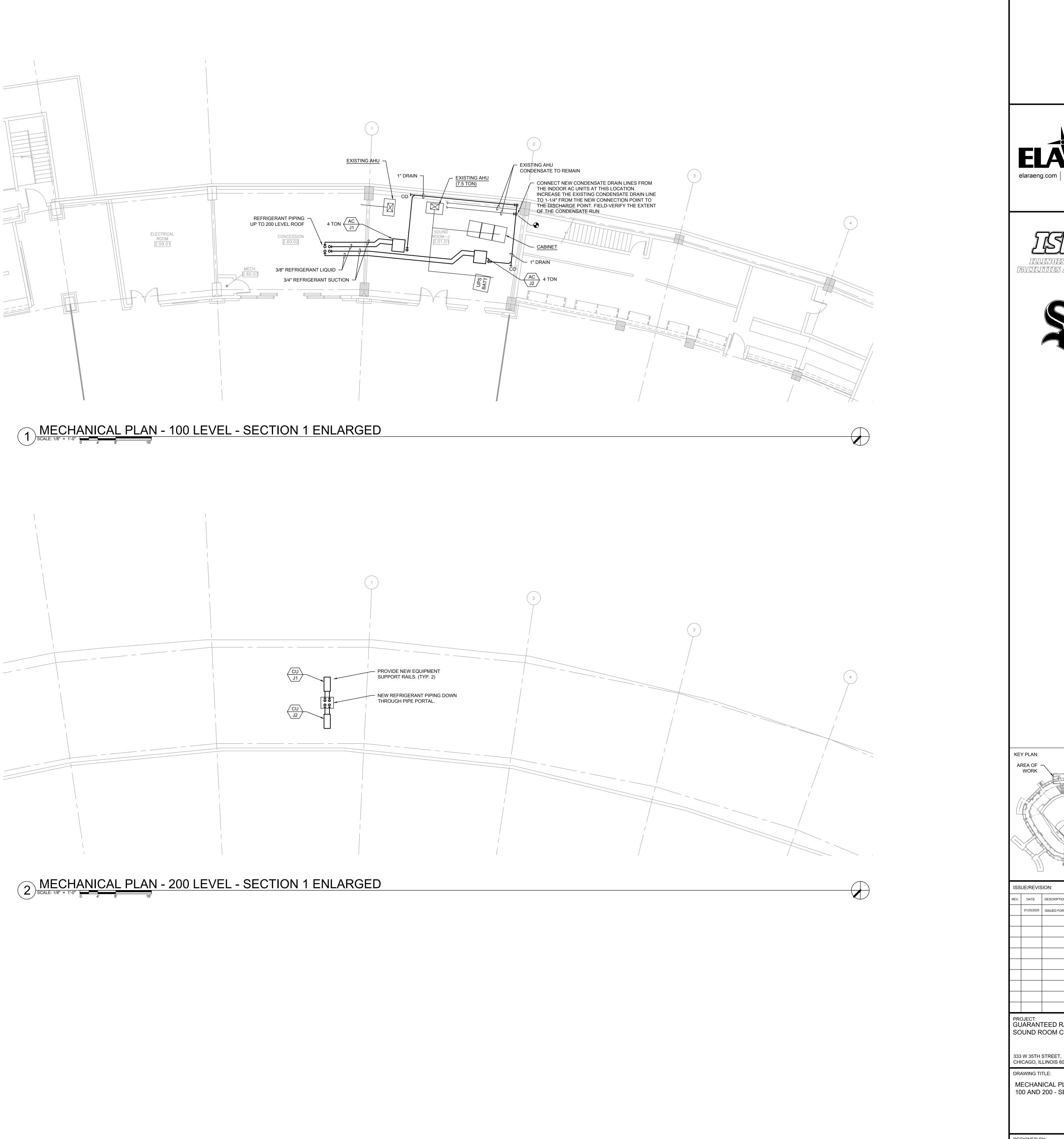
I hereby certify that the heating system will heat all rooms regularly occupied by humans to an inside temperature of 68° when the outside temperature is minus 10°F (As required by the Sections 34 (13-196-410) and 4 (5-4-270) of the 2010 Chicago Building Code and by Paragraph 1204.1 of Chapter 18-12 (Interior Environment) of the proposed Building Planning and Life Safety portion of the Code).

Signed: (Owner, Contractor, or Owner's Licensed Engineer Representative)

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[7]		IN OF		<b>R</b> DRES DORIT	TY -
KEY	Ý PLAN:				
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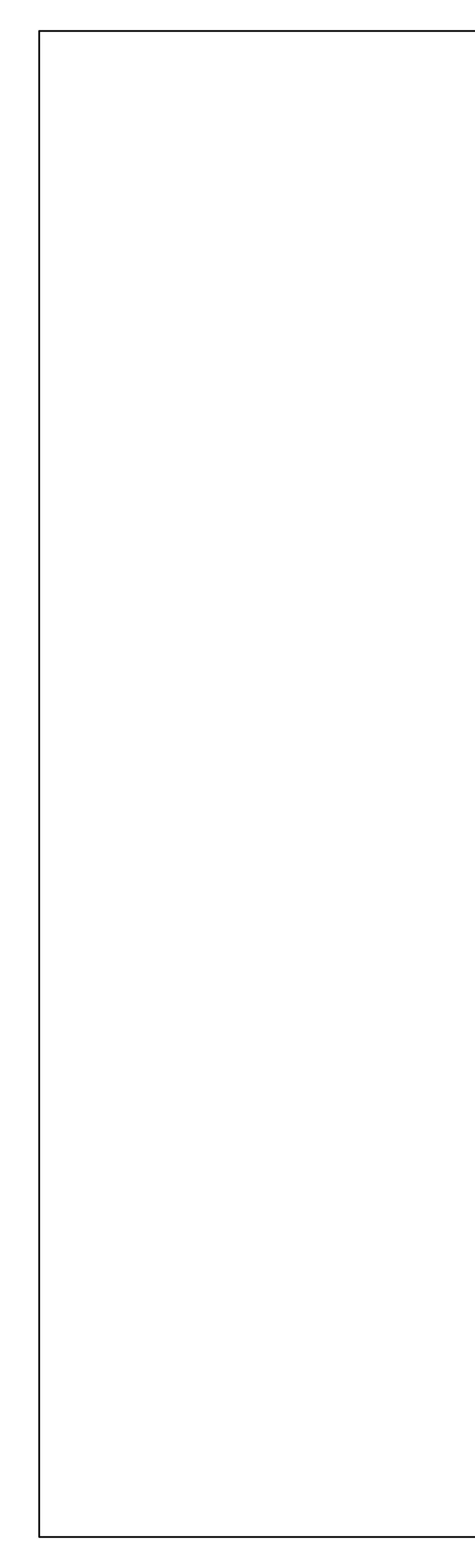




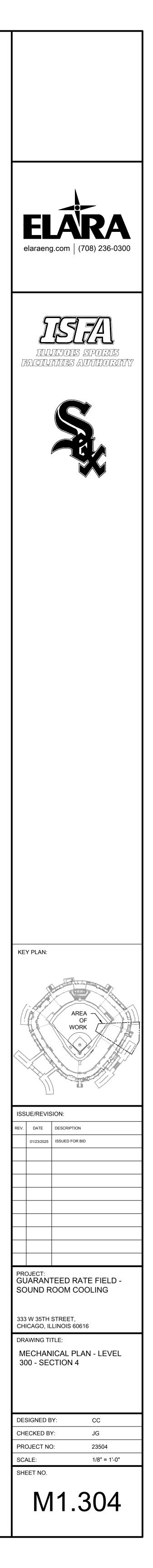


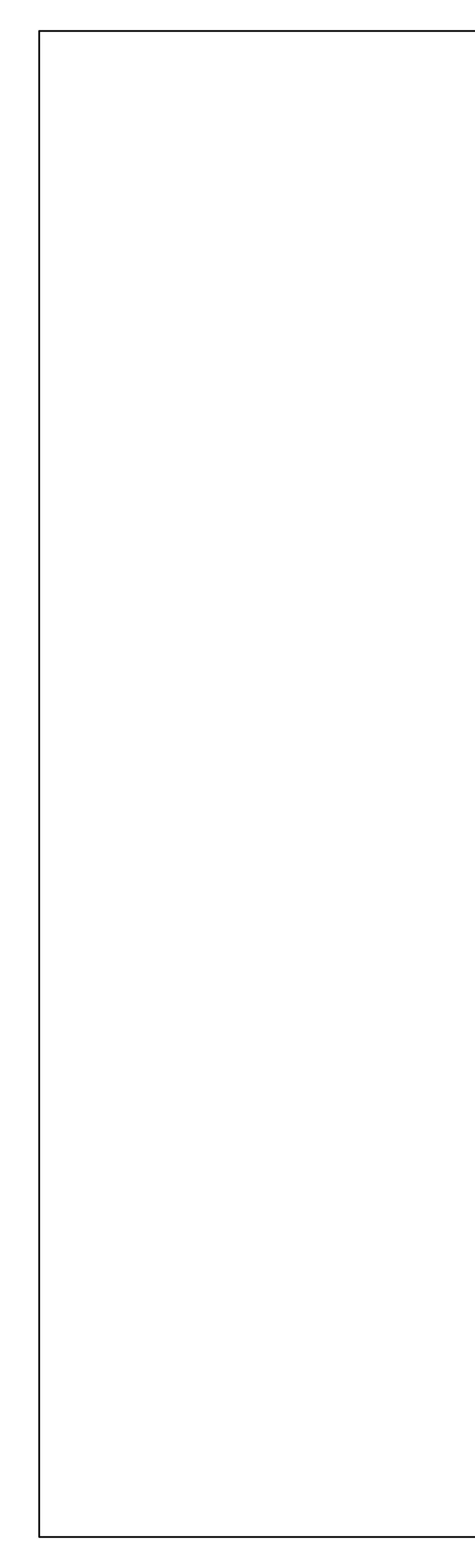


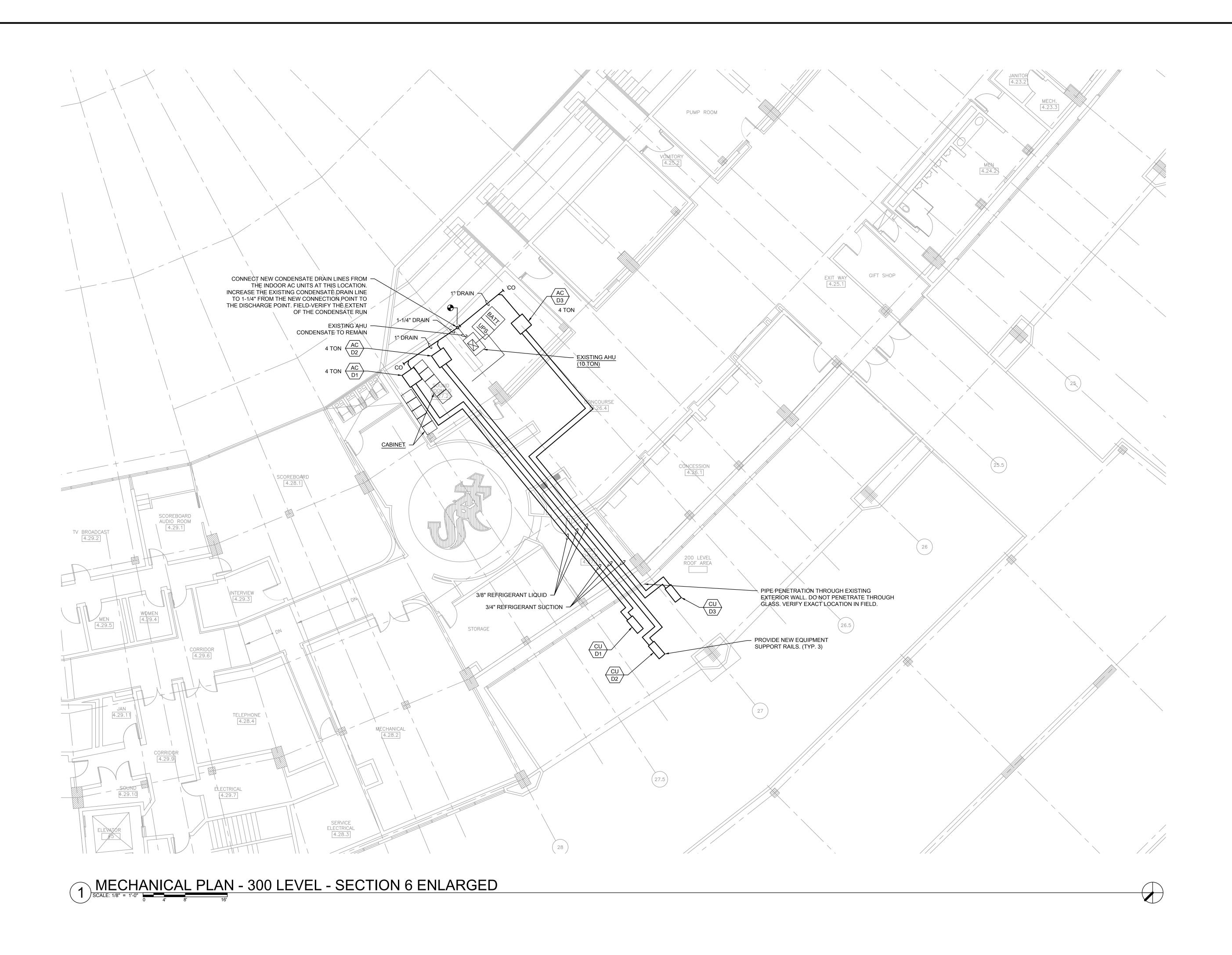
DESIGNED BY: CC CHECKED BY: JG PROJECT NO: 23504 SCALE: 1/8" = 1'-0" SHEET NO.

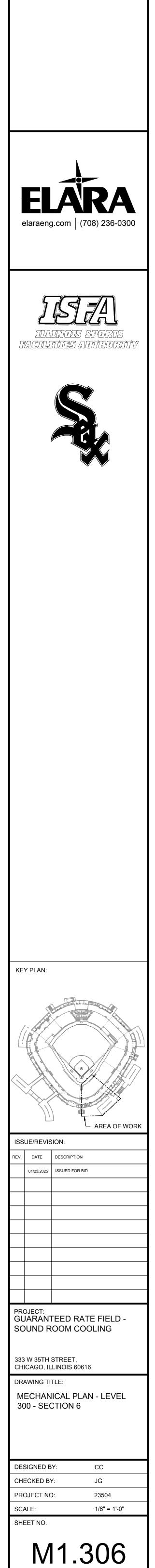














ELARAA elaraeng.com (708) 236-0300
ILLINOIS SPORTS FACILITIES AUTILORITY
KEY PLAN:
AREA OF WORK
ISSUE/REVISION: REV. DATE DESCRIPTION
01/23/2025         ISSUED FOR BID
PROJECT: GUARANTEED RATE FIELD - SOUND ROOM COOLING
333 W 35TH STREET, CHICAGO, ILLINOIS 60616 DRAWING TITLE:
DRAWING TITLE: MECHANICAL PLAN - LEVEL 300 - SECTION 9
DESIGNED BY: CC
CHECKED BY:         JG           PROJECT NO:         23504           SCALE:         1/8" = 1'-0"
SCALE: 1/8" = 1-0" SHEET NO.
M1.309

I. GENERAL NOTES	IV. OWNER TRAINING
A. ALL WORK PERFORMED UNDER THIS CONTRACT SHALL BE IN CONFORMANCE WITH ALL GOVERNING NATIONAL, STATE, AND LOCAL CODES HAVING JURISDICTION.	A. THE CONTRACTOR SHALL PROVIDE DEMONSTRATION AND TRAINING TO OWNER'S PERSONNEL FOR NEW SYSTEMS AND EQUIPMENT. THE COSTS ASSOCIATED WITH THIS SHALL BE INCLUDED AS PART OF THE BASE BID UNLESS OTHERWISE NOTED.
B. ALL EQUIPMENT FURNISHED, AND ALL WORK PERFORMED UNDER THIS CONTRACT SHALL BE IN STRICT COMPLIANCE WITH CURRENT APPLICABLE STANDARDS AS SET FORTH BY THE NATIONAL FIRE PROTECTION ASSOCIATION (NFPA), UNDERWRITERS LABORATORIES (UL), THE AMERICAN GAS ASSOCIATION (AGA), THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME), THE AMERICAN	B. ALL EQUIPMENT MANUALS, INSTALLATION OPERATION AND MAINTENANCE MANUALS, ETC. SHALL BE TURNED OVER TO THE OWNER PRIOR TO COMMENCING OWNER DEMONSTRATION AND TRAINING. REFER TO PROJECT CLOSEOUT DOCUMENT REQUIREMENTS FOR ADDITIONAL INFORMATION.
SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS (ASHRAE), SHEET METAL AND AIR-CONDITIONING CONTRACTORS NATIONAL ASSOCIATION, INC. (SMACNA), AND OTHER NATIONAL STANDARDS WHERE APPLICABLE	C. CONTRACTOR SHALL PROVIDE A MINIMUM OF 8 HOURS OF TRAINING OVER 3 SEPARATE VISITS ON SITE FOR OWNER PERSONNEL.
C. CONTRACTOR SHALL REVIEW THE ENTIRE SET OF CONTRACT DOCUMENTS INCLUDING, BUT NOT LIMITED TO, ALL MECHANICAL AND ELECTRICAL DRAWINGS, AS WELL AS ALL SPECIFICATIONS AND INSTRUCTIONS TO BIDDERS. THIS CONTRACTOR SHALL VISIT THE SITE AND MAKE A DETAILED INSPECTION OF THE SPECIFIED WORK TO DEVELOP KNOWLEDGE OF ALL CONDITIONS PERTINENT TO THE COMPLETION OF THE SPECIFIED WORK TO DEVELOP SHALL FILLY COODDINATE HIS WORK WITH	<ul> <li>D. OWNER TRAINING SHALL BE CONDUCTED AFTER FUNCTIONAL TESTING IS COMPLETE AS APPROVED BY THE ENGINEER AND (WHERE APPLICABLE) COMMISSIONING AUTHORITY.</li> <li>E. COORDINATE TRAINING WITH OWNER, ENGINEER &amp; COMMISSIONING AUTHORITY.</li> </ul>
TO THE COMPLETION OF HIS WORK. THIS CONTRACTOR SHALL FULLY COORDINATE HIS WORK WITH THE WORK PERFORMED BY OTHER TRADES AND/OR CONTRACTORS, AND SHALL MAKE SUCH FIELD ADJUSTMENTS AS ARE REQUIRED TO ACCOMMODATE FIELD CONDITIONS. ALL OF THE ABOVE SHALL BE INCLUDED IN THE SCOPE OF WORK AT NO ADDITIONAL COST TO OWNER.	V. EXISTING BUILDING MODIFICATIONS
D. SHOULD CONTRACTOR FIND DISCREPANCIES IN, OR OMISSIONS FROM, THE DRAWINGS, SPECIFICATIONS, OR OTHER CONTRACT DOCUMENTS, OR DISCREPANCIES BETWEEN ACTUAL FIELD CONDITIONS AND THOSE REPRESENTED IN THE DRAWINGS, OR CONFLICTS BETWEEN HIS WORK AND THAT OF OTHER TRADES, OR BE IN DOUBT AS TO THE MEANING OF ANY CONTRACT	A. THIS CONTRACTOR SHALL NOT REMOVE OR RELOCATE ANY EXISTING ITEMS OF OWNER'S EQUIPMENT, FOUND TO BE IN THE PATH OF NEW SYSTEMS TO BE INSTALLED, WITHOUT PRIOR APPROVAL BY THE OWNER, EXCEPT AS SPECIFICALLY INDICATED ON THE DRAWINGS. IF EXISTING EQUIPMENT IS FOUND TO BE IN THE WAY OF PROPOSED PIPE ROUTING, ETC., THE OWNER'S
DOCUMENTS, CONTRACTOR SHALL IMMEDIATELY NOTIFY THE OWNER AND THE ENGINEER IN WRITING AND SHALL OBTAIN CLARIFICATION PRIOR TO SUBMITTING ANY BID. LACK OF SUCH NOTIFICATION SHALL BE CONSTRUED AS CONTRACTOR'S REPRESENTATION THAT NO DISCREPANCIES OR CONFLICTS EXIST. ADDITIONAL COMPENSATION WILL NOT BE GRANTED AFTER	REPRESENTATIVE SHOULD BE ADVISED, AND HE SHALL MAKE THE DECISION AS TO WHETHER OR NOT THE SPECIFIC ITEM IS TO BE REMOVED AND RETAINED, REMOVED AND DISPOSED OF, OR REMOVED AND RELOCATED.
AWARD OF CONTRACT FOR ANY WORK REQUIRED TO COMPLY WITH THIS REQUIREMENT. E. THE DRAWINGS INDICATE DIAGRAMMATICALLY THE INTENT, REQUIREMENTS FOR, AND LOCATION OF THE WORK INCLUDED UNDER THIS CONTRACT. ALL WORK REQUIRED TO AFFECT THE INDICATED	B. ALL CUTTING, DRILLING AND PATCHING REQUIRED FOR THE INSTALLATION OF SYSTEMS HEREIN DESCRIBED, SHALL BE PROVIDED BY THIS CONTRACTOR. STRUCTURAL MEMBERS SHALL NOT BE DISTURBED WITHOUT PRIOR APPROVAL OF THE ENGINEER. ALL AREAS DISTURBED BY WORK PERFORMED UNDER THIS CONTRACT SHALL BE NEATLY REPAIRED AND REFINISHED TO THE CONDITION OF ADDIVINUOUS SUBFACES IN A MANINED SUITABLE TO THE FUCINE PROOF AND
DESIGN, INCLUDING DETAILS NOT SHOWN BUT WHOSE INCLUSION WOULD BE DEEMED A REQUIREMENT BY A KNOWLEDGEABLE TRADESMAN, BUILDING ENGINEER, OR TECHNICIAN, SHALL BE PROVIDED AT NO ADDITIONAL COST TO THE OWNER.	CONDITION OF ADJOINING SURFACES IN A MANNER SUITABLE TO THE ENGINEER. ROOF AND EXTERIOR WALLS TO REMAIN WEATHER TIGHT. INTERIOR WALLS TO MAINTAIN REQUIRED FIRE RATING.
F. IT IS THE INTENT OF THESE DOCUMENTS THAT THE CONTRACTOR PROVIDE ALL LABOR, MATERIAL, EQUIPMENT, AND TOOLS FOR THE COMPLETE INSTALLATION OF ALL WORK SHOWN ON THE PLANS AND/OR DESCRIBED HEREIN, INCLUDING ALL DEVICES, CONTROLS, AND APPURTENANCES REQUIRED TO SET THE NEW SYSTEMS INTO OPERATION, UNLESS OTHERWISE NOTED.	VI. SCOPE AND GUARANTEE A. THE WORK TO BE PERFORMED UNDER THIS CONTRACT SHALL INCLUDE THE INSTALLATION OF THE VENTILATING, HEATING HYDRONIC WATER, CONTROL SYSTEMS AND COMPONENTS AS INDICATED
G. CONTRACTOR SHALL VERIFY ALL MOUNTING, ARRANGEMENTS, HEIGHTS, AND LOCATIONS PRIOR TO ROUGH-IN. ANY MENTION OF A SPECIFIC MOUNTING ARRANGEMENT, WEIGHT, OR LOCATION SHALL NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO VERIFY SPECIFIC REQUIREMENTS AND BASE HIS WORK ON THEM. THE SAME CARE SHALL BE TAKEN WITH RESPECT TO INFORMATION	<ul> <li>ON THE DRAWINGS AND SPECIFIED HEREIN.</li> <li>B. BY SIGNING THE CONTRACT, THIS CONTRACTOR ACKNOWLEDGES THAT HE HAS VISITED THE SITE AND ACQUAINTED HIMSELF WITH THE CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED.</li> </ul>
FURNISHED BY THIS CONTRACTOR TO HIS SUBCONTRACTORS OR TO OTHER CONTRACTORS EMPLOYED BY THE OWNER ON THIS PROJECT. THIS CONTRACTOR SHALL BE FINANCIALLY RESPONSIBLE FOR ANY CHANGE ORDERS NECESSITATED BY INACCURATE OR INCORRECT INFORMATION FURNISHED TO OTHER CONTRACTORS. NO ADDITIONS TO THE CONTRACT AMOUNT	<ul><li>AND HE AGREES THAT HE WILL COMPLY WITH THE REQUIREMENTS AND INTENT OF ALL PERTINENT DOCUMENTS IN THE PERFORMANCE OF THE WORK.</li><li>C. THIS CONTRACTOR SHALL GUARANTEE THAT THE COMPLETE SYSTEMS AS INSTALLED UNDER THIS</li></ul>
<ul> <li>WILL BE PERMITTED FOR ITEMS INSTALLED IN WRONG LOCATIONS OR IN CONFLICT WITH OTHER WORK.</li> <li>H. CONTRACTOR SHALL BE RESPONSIBLE FOR SUBMITTING FOR AND OBTAINING ALL APPLICABLE</li> </ul>	CONTRACT SHALL BE FREE OF DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF JOB ACCEPTANCE BY THE OWNER. THIS SHALL INCLUDE A GUARANTEE OF FREE CIRCULATION OF AIR AND WATER THROUGH-OUT THEIR RESPECTIVE SYSTEMS, WITHOUT LEAKS OR UNDUE NOISE. IF DEFECTS OCCUR DURING THE ONE YEAR
PERMITS. THIS CONTRACTOR SHALL PAY ALL PERMIT FEES, PLAN REVIEW FEES, LICENSE FEES, AND INSPECTIONS APPLICABLE TO HIS WORK, AND SUCH COSTS SHALL BE INCLUDED IN HIS BID UNLESS OTHERWISE NOTED. THIS CONTRACTOR SHALL ALSO INCLUDE IN HIS BID ALL FEES ASSOCIATED WITH THE SERVICES OF A PERMIT EXPEDITER AS MAY BE REQUIRED TO MEET THE PROJECT	GUARANTEE PERIOD, THIS CONTRACTOR SHALL REPAIR OR REPLACE WITH NEW EQUIPMENT, SUCH DEFECTS, AT NO EXPENSE TO THE OWNER AND TO THE SATISFACTION OF THE ENGINEER.
SCHEDULE. I. CONTRACTOR SHALL ESTABLISH SAFE WORKING PROCEDURES FOR THE PROTECTION OF THE WORKMEN IN ALL PHASES OF WORK AND SHALL COMPLY WITH ALL APPLICABLE LOCAL, STATE, AND	<u>VII. PIPING</u> A. GENERAL
FEDERAL SAFETY LAWS, INCLUDING THE REQUIREMENTS OF OSHA. HE SHALL ALSO PROVIDE ALL NECESSARY SIGNS, LIGHTS, AND BARRICADES REQUIRED FOR THE SAFETY OF ALL OTHER PERSONS WHO MIGHT COME IN CONTACT WITH THE CONSTRUCTION BEING PERFORMED UNDER THIS CONTRACT.	<ol> <li>COMPLY WITH PROVISIONS OF ASME B31.</li> <li>SYSTEM COMPONENTS WHICH REQUIRE OBSERVATION, OPERATION, OR MAINTENANCE, SUCH AS VALVES, CONTROLS, CLEANOUTS, UNIONS, ETC., SHALL BE READILY ACCESSIBLE. THEY</li> </ol>
J. ALL PUBLIC AND PRIVATE PROPERTY DAMAGED AS A RESULT OF WORK PERFORMED UNDER THIS CONTRACT SHALL BE REPAIRED AND/OR REPLACED TO MATCH EXISTING CONSTRUCTION BY THIS CONTRACTOR AND TO THE SATISFACTION OF THE OWNER AND AUTHORITIES HAVING JURISDICTION.	<ul> <li>SHALL NOT BE CONCEALED IN CHASES OR ABOVE CEILINGS WITHOUT PROVISION FOR ACCESS.</li> <li>INSTALL EQUIPMENT AND MATERIALS HAVING PRESSURE RATING EQUAL TO OR GREATER THAN MAXIMUM SYSTEM PRESSURE.</li> </ul>
K. CONTRACTOR SHALL MAKE ALL ARRANGEMENTS WITH THE BUILDING OWNER'S REPRESENTATIVE REGARDING WORKSITE ACCESS, BUILDING RULES, AND REGULATIONS, INCLUDING WORKING HOURS, REFUSE DISPOSAL, DUMPSTER LOCATION, SECURITY, INTERRUPTIONS OF BUILDING UTILITIES OR FUNCTIONS, OWNERSHIP OF SALVAGED MATERIALS, PARKING, AND ANY OTHER ITEMS	<ol> <li>INSTALL INTERIOR AND EXTERIOR PIPING AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. DIAGONAL RUNS ARE PROHIBITED, EXCEPT WHERE INDICATED OR APPROVED PRIOR TO INSTALLATION.</li> </ol>
L. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO STORE AND PROTECT FROM DAMAGE ALL EQUIPMENT AND MATERIALS IN A MANNER THAT WILL MAINTAIN AN ORDERLY, CLEAN APPEARANCE.	<ol> <li>INSTALL PIPING TO ALLOW APPLICATION OF INSULATION PLUS 1-INCH CLEARANCE AROUND INSULATION.</li> <li>PRESSURE TESTING</li> </ol>
DAMAGED EQUIPMENT AND MATERIAL IS SUBJECT TO REJECTION BY THE OWNER'S REPRESENTATIVE. REPLACEMENT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.	<ol> <li>SUBJECT ALL NEW REFRIGERANT PIPING TO PRESSURE TESTING IN ACCORDANCE WITH ASME B31 FOR APPLICABLE REFRIGERANT BEING UTILIZED.</li> </ol>
M. PROVIDE ALL HOLES, SLEEVES, CUTTING, PATCHING, AND SEALING FOR INSTALLATION OF THIS WORK. SEALING SHALL CONFORM TO THE FIRE RATING OF ALL BUILDING ASSEMBLIES. ALL EXTERIOR PENETRATIONS SHALL BE MADE WEATHER TIGHT.	<ol> <li>PIPING SHALL NOT BE CONCEALED, INSULATED, OR SIMILAR UNTIL PRESSURE TESTING IS COMPLETE AND REVIEWED.</li> <li>C. COOLING CONDENSATE DRAIN PIPING</li> </ol>
N. CONTRACTOR IS RESPONSIBLE FOR LOCATING, INCLUDING SCANNING WHERE NECESSARY, OBSTRUCTIONS/REINFORCEMENTS WHERE PENETRATIONS ARE TO BE MADE. ANY DAMAGE RESULTING FROM PENETRATIONS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR AND SHALL BE REPAIRED AT NO ADDITIONAL COST TO THE OWNER.	1. ALL NEW COOLING CONDENSATE DRAIN PIPING SHALL BE TYPE 'M' COPPER WITH SOLDERED JOINTS.
O. CONTRACTOR SHALL NOT MODIFY OR REMOVE ANYTHING FOUND TO BE IN THE PATH OF NEW SYSTEMS TO BE INSTALLED WITHOUT PRIOR APPROVAL BY THE ENGINEER.	<ul> <li>D. REFRIGERANT PIPING</li> <li>1. PIPING: COPPER TUBING, ANSI/ASTM 280, ACR.</li> </ul>
P. ALL ROOFING WORK SHALL BE BY OWNER APPROVED ROOFING CONTRACTOR(S) TO MAINTAIN ROOF WARRANTIES. THE CONTRACTOR SHALL COORDINATE ALL WORK WITH THE ROOFING CONTRACTOR(S) TO ENSURE WEATHER TIGHT CONSTRUCTION AND TIMELY COMPLETION OF ALL WORK.	<ol> <li>FITTINGS AND UNIONS: ASME B16.22, WROUGHT COPPER.</li> <li>JOINTS: BRAZED, AWS A5.8/A5.8M, BCUP SILVER/PHOSPORUS/COPPER ALLOY WITH MELTING RANGE 1190 TO 1480 °F. FLARED JOINTS ARE NOT ACCEPTABLE.</li> </ol>
<ul> <li>Q. THE CONTRACTOR IS RESPONSIBLE FOR THE CONTINUOUS CLEANING OF ALL DUST AND DEBRIS RESULTING FROM THEIR WORK.</li> <li>R. CONTRACTOR TO DETERMINE REQUIRED SYSTEM SHUTDOWNS. MAXIMUM DURATION OF SYSTEM</li> </ul>	<ul> <li>a. REAM ENDS OF PIPES AND TUBES AND REMOVE BURRS. BEVEL PLAIN ENDS OF STEEL PIPE.</li> <li>b. REMOVE SCALE, SLAG, DIRT, AND DEBRIS FROM INSIDE AND OUTSIDE OF THE PIPE AND FITTINGS PRIOR TO ASSEMBLY.</li> </ul>
SHUTDOWN SHALL BE AT THE DISCRETION OF THE OWNER'S REPRESENTATIVE. SHUTDOWN SHALL BE COORDINATED ON THE JOB SITE WITH THE OWNER'S REPRESENTATIVE. CONTRACTOR SHALL PROVIDE A MINIMUM OF ONE (1) WEEK ADVANCE NOTICE OF SYSTEM SHUTDOWNS.	<ul> <li>c. FILL PIPE AND FITTINGS WITH INERT GAS (NITROGEN OF CARBON DIOXIDE) DURING BRAZING OR WELDING TO PREVENT SCALE FORMATION.</li> <li>4. SLOPE REFRIGERANT PIPING AS FOLLOWS:</li> </ul>
<ul> <li>S. CONTRACTOR SHALL BE PROPERLY LICENSED, BONDED, AND INSURED AND CAPABLE OF PERFORMING QUALITY WORKMANSHIP ON THIS PROJECT.</li> <li>T. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, TECHNIQUES, AND SAFETY.</li> </ul>	<ul> <li>a. INSTALL HORIZONTAL HOT GAS DISCHARGE PIPING WITH A UNIFORM SLOPE DOWNWARD AWAY FROM COMPRESSOR.</li> <li>b. INSTALL HORIZONTAL SUCTION PIPING WITH A UNIFORM SLOPE DOWNWARD TO COMPRESSOR.</li> <li>c. INSTALL TRAPS AND DOUBLE RISERS TO ENTRAIN OIL IN VERTICAL RUNS.</li> </ul>
<ul> <li>U. REMOVAL AND RESTORATION OF FINISHED SURFACES AS REQUIRED TO COMPLETE THIS SCOPE OF WORK IS THE RESPONSIBILITY OF THIS CONTRACTOR.</li> <li>V. CONTRACTOR SHALL COORDINATE USE OF THE BUILDING ELEVATOR(S) AND DELIVERIES WITH THE OWNER.</li> <li>W. MAINTAIN ALL MANUFACTURER RECOMMENDED AND CODE REQUIRED CLEARANCES.</li> </ul>	<ul> <li>d. LIQUID LINES MAY BE INSTALLED LEVEL.</li> <li>5. MOISTURE AND LIQUID INDICATORS: SINGLE PORT TYPE, UL LISTED, WITH COPPER OR FORGED BRASS BODY, SOLDERED ENDS, REPLACEABLE CLEAR FUSED GLASS WINDOW WITH INDICATING ELEMENT PROTECTED BY FILTER SCREEN, COLOR CODED MOISTURE INDICATOR TO SHOW MOISTURE CONTENT IN PPM WITH MINIMUM SENSITIVITY OF 60 PPM, REMOVABLE ELEMENT CARTRIDGE AND PLASTIC CAP; FOR MAXIMUM WORKING PRESSURE OF 600 PSIG AND MAXIMUM</li> </ul>
X. CONTRACTOR SHALL PROVIDE TRAINING TO THE OPERATING STAFF FOR NEW SYSTEMS AND EQUIPMENT. REFER TO OWNER TRAINING SPECIFICATION SECTION FOR ADDITIONAL INFORMATION.	<ul> <li>TEMPERATURE OF 275 DEGREES F.</li> <li>6. VALVES: UL LISTED, GLOBE OR ANGLE PATTERN, FORGED BRASS BODY AND BONNET, PHOSPHOR BRONZE AND STAINLESS STEEL DIAPHRAGMS, RISING STEM AND HANDWHEEL. STAINLESS STEEL SPRING, NYLON SEAT DISC, FLANGED ENDS, WITH POSITIVE BACKSEATING; FOR MAXIMUM WORKING PRESSURE OF 600 PSIG AND MAXIMUM TEMPERATURE OF 275</li> </ul>
<ul> <li><u>II. SHOP DRAWINGS, SUBMITTALS, AND AS-BUILTS</u></li> <li>A. CONTRACTOR SHALL SUBMIT TO THE ENGINEER COORDINATED SHOP DRAWINGS. SHOP DRAWINGS SHALL BE 1/4" SCALE AND SHALL INDICATE LAYOUT OF ALL EQUIPMENT, DUCTS, DIFFUSERS, BOXES,</li> </ul>	<ul> <li>DEGREES F.</li> <li>7. PACKED ANGLE VALVES: FORGED BRASS OR CAST BRONZE, FORGED BRASS SEAL CAPS, RISING STEM, PTFE SEAT WITH BACKSEATING, MOLDED STEM PACKING, FLANGED ENDS; FOR MAXIMUM WORKING PRESSURE OF 600 PSIG AND MAXIMUM TEMPERATURE OF 275 DEGREES F.</li> </ul>
PIPING, THERMOSTATS, SENSORS, GRAPHICS, CONTROLS NETWORK ARCHITECTURE, CONTROL POINTS LIST, OPERATING SEQUENCES, CONTROL DEVICES WITH SETTINGS OR ADJUSTABLE RANGES, ETC. SHOP DRAWINGS SHALL INCLUDE ALL DUCT AND PIPE SIZES, CAPACITIES, ELEVATIONS, ETC. CONTRACTOR SHALL PROCEED WITH SITE WORK ONLY AFTER RECEIVING SHOP DRAWINGS MARKED REVIEWED.	<ol> <li>CHECK VALVES: FORGED BRASS OR CAST BRONZE BODY; GLOBE PATTERN, FORGED BRASS OR CAST BRONZE BONNET, PISTON WITH REMOVABLE PTFE SEAT, STAINLESS STEEL CLOSING SPRING, MANUAL OPENING STEM WITH SEAL CAP, PLATED-STEEL STEM, AND GRAPHITE SEAL,</li> </ol>
<ul> <li>B. SHOULD CONDITIONS NECESSITATE ANY REARRANGEMENTS, CONTRACTOR SHALL SUBMIT TO THE ENGINEER SHOP DRAWINGS SHOWING SUCH CHANGES. CONTRACTOR SHALL PROCEED WITH SITE WORK ONLY AFTER RECEIVING SHOP DRAWINGS MARKED REVIEWED.</li> </ul>	<ul> <li>FLANGED ENDS; MAXIMUM OPENING PRESSURE 0.5 PSIG; FOR MAXIMUM WORKING PRESSURE OF 600 PSIG AND MAXIMUM TEMPERATURE OF 275 DEGREES F.</li> <li>9. SERVICE VALVES: FORGED BRASS BODY WITH BRASS CAP INCLUDING KEY END TO REMOVE</li> </ul>
C. CONTRACTOR SHALL SUBMIT TO THE ENGINEER MANUFACTURERS' SUBMITTALS FOR ALL EQUIPMENT AND ACCESSORIES. CONTRACTOR SHALL PROCEED WITH PROCUREMENT ONLY AFTER RECEIVING SUBMITTALS MARKED REVIEWED.	CORE, REMOVABLE BALL-TYPE CHECK VALVE WITH STAINLESS STEEL SPRING, PTFE SEAT, FLANGED ENDS; FOR MAXIMUM WORKING PRESSURE OF 600 PSIG AND MAXIMUM TEMPERATURE OF 275 DEGREES F.
D. CONTRACTOR SHALL SUBMIT TO THE ENGINEER AN ELECTRONIC FILE OF THE AS-BUILT DRAWINGS. RECORD LOCATIONS OF CONTROL COMPONENTS, INCLUDING CONTROL UNITS, THERMOSTATS, AND SENSORS. REVISE SHOP DRAWINGS TO REFLECT ACTUAL INSTALLATION AND OPERATING	<ol> <li>10. FILTER DRIERS: REPLACEABLE CARTRIDGE ANGLE TYPE, SHELL: ARI 710, UL LISTED, BRASS, REMOVABLE CAP, FOR MAXIMUM WORKING PRESSURE OF 600 PSIG.</li> <li>11. SAFETY RELIEF VALVES: COMPLY WITH 2010 ASME BOILER AND PRESSURE VESSEL CODE;</li> </ol>
<ul> <li>SEQUENCES.</li> <li>E. CONTRACTOR SHALL SUBMIT TO THE ENGINEER AN ELECTRONIC FILE OF ALL EQUIPMENT INFORMATION. INCLUDE OPERATIONAL AND MAINTENANCE INSTRUCTIONS, PARTS LISTS,</li> </ul>	LISTED AND LABELED BY AN NRTL; DUCTILE IRON AND STEEL BODY AND BONNET WITH NEOPRENE O-RING SEAL, STAINLESS STEEL PISTON, CLOSING SPRING, AND SEAT INSERT, PTFE SEAT, THREADED ENDS; MAXIMUM WORKING PRESSURE AND MAXIMUM TEMPERATURE AS REQUIRED BY CODE.
SUBMITTALS, AND DESCRIPTIVE LITERATURE.	12. THERMOSTATIC EXPANSION VALVES: COMPLY WITH AHRI 750, FORGED BRASS OR STEEL BODY, BONNET, AND SEAL CAP, STAINLESS STEEL DIAPHRAGM, PISTON, CLOSING SPRING, AND SEAT INSERT, NON-ASBESTOS PACKING AND GASKETS, CAPILLARY BULB CONSISTING OF COPPER TUBING FILLED WITH REFRIGERANT CHARGE, THREADED UNION ENDS; FOR MAXIMUM WORKING DEFOUNDE OF 200 DOLD
<ul> <li>A. ALL MATERIALS AND EQUIPMENT INSTALLED UNDER THIS CONTRACT SHALL BE NEW, UNLESS OTHERWISE STATED IN THESE CONTRACT DOCUMENTS, AND FREE FROM DEFECTS.</li> <li>B. ALL MATERIALS AND EQUIPMENT SHALL BE INSTALLED IN ACCORDANCE WITH THE</li> </ul>	PRESSURE OF 700 PSIG. 13. STRAIGHT-TYPE STRAINERS: WELDED STEEL BODY WITH CORROSION-RESISTANT COATING, 100-MESH STAINLESS STEEL SCREEN, FLANGED ENDS; FOR MAXIMUM WORKING PRESSURE OF 600 PSIC AND MAXIMUM TEMPERATURE OF 275 DECREES F
MANUFACTURERS' RECOMMENDATIONS. C. CONTRACTOR IS REQUIRED TO REVIEW ALL DRAWINGS. MATERIALS AND EQUIPMENT SHOWN ON THE SCHEDULES AND DETAILS SHALL BE INCLUDED IN BASE BID. NO MATERIAL OR EQUIPMENT	600 PSIG AND MAXIMUM TEMPERATURE OF 275 DEGREES F. 14. ANGLE-TYPE STRAINERS: FORGES BRASS OR CAST BRONZE BODY, 100-MESH STAINLESS STEEL SCREEN, BRASS HEX DRAIN PLUG, FLANGED ENDS; FOR MAXIMUM WORKING PRESSURE OF 600 PSIG AND MAXIMUM TEMPERATURE OF 275 DEGREES F.
SUBSTITUTIONS WILL BE CONSIDERED AFTER THE AWARD OF CONTRACT. IF CONTRACTOR DESIRES TO SUBSTITUTE MATERIAL OR EQUIPMENT, CONTRACTOR MUST SUBMIT AS ALTERNATE WITH HIS BASE BID A LIST OF SUCH ITEMS INDICATING ITEM, MANUFACTURER, MODEL NUMBER, AND AMOUNT TO BE ADDED TO OR DEDUCTED FROM THE BASE BID. EACH SUCH MATERIAL OR EQUIPMENT	<ol> <li>ALL REFRIGERANT PIPING SHALL BE TESTED AND INSPECTED IN COMPLIANCE WITH ASME B31.5, CHAPTER VI.</li> </ol>
SUBSTITUTION ITEM SHALL BE LISTED SEPARATELY. D. CONTRACTOR SHALL BE RESPONSIBLE FOR SCHEDULING THE PURCHASE, DELIVERY, RECEIVING, UNLOADING, UNCRATING, STORING, SETTING IN PLACE, AND PROTECTING OF ALL NEW EQUIPMENT FURNISHED BY THE CONTRACTOR OR PROVIDED TO THE CONTRACTOR BY THE OWNER, AND SHALL SECURE SUCH EQUIPMENT FROM DAMAGE UNTIL TIME OF FINAL ACCEPTANCE BY THE OWNER.	<ul> <li>E. HYDRONIC PIPING INSULATION</li> <li>1. FURNISH AND INSTALL ALL NEW PIPING, VALVES, FITTINGS, ETC. AND EXISTING PIPING AS INDICATED ON THE DOCUMENTS WITH FIBERGLASS MOLDED PIPE INSULATION APPLIED WITH AN ALL-SERVICE VAPOR BARRIER JACKET, STAPLED, WITH THE SEAMS, JOINTS, AND STAPLES DAINTED WITH WARDON PROOF MASTIC</li> </ul>
<ul> <li>E. CONTRACTOR SHALL FURNISH AND INSTALL ALL STRUCTURE, SLEEVES, SHIMS, ETC. REQUIRED TO LEVEL AND SUPPORT EQUIPMENT AND MATERIALS. INSTALL NONMETALLIC NON-SHRINK GROUT FOR LEVELING EQUIPMENT BASES.</li> </ul>	<ul> <li>PAINTED WITH VAPOR-PROOF MASTIC.</li> <li>2. ALL DAMAGED INSULATION (RESULTING FROM IMPLEMENTATION OF THIS PROJECT) ON EXISTING PIPING TO REMAIN SHALL BE REPLACED.</li> </ul>
<ul> <li>F. CONTRACTOR SHALL VERIFY ALL PHYSICAL, ELECTRICAL, INGRESS, ETC. REQUIREMENTS FOR ALL EQUIPMENT PRIOR TO ORDERING.</li> <li>C. CONTRACTOR SHALL SUBMIT TO OWNER THE PROPOSED LABEL SUPENTIEICATION PROPULCT FOR</li> </ul>	<ol> <li>MINIMUM INSULATION THICKNESS SHALL BE IN ACCORDANCE WITH THE FOLLOWING SCHEDULE AND ALL APPLICABLE CODES:</li> <li>CONDENSATE DRAIN PIPING: 1/2"</li> </ol>
<ul> <li>G. CONTRACTOR SHALL SUBMIT TO OWNER THE PROPOSED LABELS/IDENTIFICATION PRODUCT FOR EACH PIECE OF EQUIPMENT PRIOR TO ORDERING. EQUIPMENT LABELS/IDENTIFICATION SHALL CONFORM TO THE FOLLOWING:</li> <li>1. MATERIAL AND THICKNESS: MULTILAYER, MULTICOLOR, PLASTIC LABELS FOR MECHANICAL</li> </ul>	<ul> <li>4. VAPOR BARRIER JACKET SHALL HAVE FACTORY-APPLIED VAPOR RETARDER COMPOSED OF A WHITE KRAFT FACING REINFORCED WITH GLASS FIBER YARN AND BONDED TO ALUMINIZED FILM. LAP ADHESIVE SHALL BE COMPATIBLE WITH INSULATION.</li> </ul>
<ul> <li>ENGRAVING, 1/8 INCH THICK, AND HAVING PREDRILLED HOLES FOR ATTACHMENT HARDWARE.</li> <li>2. LETTER COLOR: WHITE.</li> <li>3. BACKGROUND COLOR: BLUE.</li> </ul>	<ol> <li>FURNISH AND INSTALL PVC COVERS FOR ALL VALVES AND ALL PIPE FITTINGS.</li> <li>F. REFRIGERANT PIPING INSULATION</li> </ol>
<ol> <li>MAXIMUM TEMPERATURE: ABLE TO WITHSTAND TEMPERATURES UP TO 160 DEG F.</li> <li>MINIMUM LABEL SIZE: LENGTH AND WIDTH VARY FOR REQUIRED LABEL CONTENT, BUT NOT LESS THAN 2-1/2 BY 3/4 INCH.</li> </ol>	<ol> <li>INSULATION SHALL BE A FLEXIBLE, CLOSED-CELL ELASTOMERIC PIPE INSULATION: AP ARMAFLEX, AC ACCOFLEX. ADHESIVE SHALL BE ARMAFLEX 520, 520 BLACK, OR 520 BLV ADHESIVE. THE INSULATION MUST CONFORM TO ASTM C534 GRADE 1 TYPE.</li> </ol>
6. MINIMUM LETTER SIZE: 1/4 INCH FOR NAME OF UNITS IF VIEWING DISTANCE IS LESS THAN 24 INCHES, 1/2 INCH FOR VIEWING DISTANCES UP TO 72 INCHES, AND PROPORTIONATELY LARGER LETTERING FOR GREATER VIEWING DISTANCES. INCLUDE SECONDARY LETTERING TWO-THIRDS TO THREE-FOURTHS THE SIZE OF PRINCIPAL LETTERING.	<ul> <li>2. INSULATION THICKNESS SHALL BE AS FOLLOWS:</li> <li>a. COOLING ONLY SUCTION PIPING: 1"</li> <li>b. VRF AND HOT GAS PIPING (LESS THAN 1.5 NPS): 1"</li> </ul>
<ol> <li>FASTENERS: STAINLESS-STEEL RIVETS OR SELF-TAPPING SCREWS.</li> <li>ADHESIVE: CONTACT-TYPE PERMANENT ADHESIVE, COMPATIBLE WITH LABEL AND WITH SUBSTRATE.</li> </ol>	<ul> <li>c. VRF AND HOT GAS PIPING (1.5 NPS AND GREATER): 1-1/2"</li> <li>3. INSULATION MATERIALS SHALL HAVE A FLAME-SPREAD INDEX OF LESS THAN 25 AND A SMOKE-DEVELOPED INDEX OF LESS THAN 50 AS TESTED IN ACCORDANCE WITH ASTM E 84. IN</li> </ul>
H. EQUIPMENT DATA, LABELS, AND OTHER IDENTIFICATION SHALL NOT BE OBSTRUCTED.	<ul> <li>ADDITION, THE PRODUCTS, WHEN TESTED, SHALL NOT MELT OR DRIP FLAMING PARTICLES AND THE FLAME SHALL NOT BE PROGRESSIVE.</li> <li>4. INSULATION MATERIALS SHALL HAVE A MAXIMUM THERMAL CONDUCTIVITY OF 0.27 BTU IN (H ET² °E AT A 75 °E MEAN TEMPERATURE AS TESTED IN ACCORDANCE WITH ASTM C 177</li> </ul>
I. CONTRACTOR SHALL PROVIDE FILTERS, STRAINER SCREENS, ETC. FOR ALL NEW EQUIPMENT DURING CONSTRUCTION. REPLACE FILTERS, STRAINERS SCREENS, ETC. WITH FINAL FILTERS, STRAINER SCREENS, ETC. AT COMPLETION OF PROJECT AND PRIOR TO TEST AND BALANCE.	<ul> <li>BTU-IN./H-FT²-°F AT A 75 °F MEAN TEMPERATURE AS TESTED IN ACCORDANCE WITH ASTM C 177 OR ASTM C 518.</li> <li>5. INSULATION MATERIALS SHALL HAVE A MAXIMUM WATER VAPOR TRANSMISSION OF 0.08 PERM-INCHES WHEN TESTED IN ACCORDANCE WITH ASTM E 96.</li> </ul>

- L BE A FLEXIBLE, CLOSED-CELL ELASTOMERIC PIPE INSULATION: AP COFLEX. ADHESIVE SHALL BE ARMAFLEX 520, 520 BLACK, OR 520 BLV SULATION MUST CONFORM TO ASTM C534 GRADE 1 TYPE.
- **KNESS SHALL BE AS FOLLOWS:**
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- GAS PIPING (LESS THAN 1.5 NPS): 1"
- GAS PIPING (1.5 NPS AND GREATER): 1-1/2" RIALS SHALL HAVE A FLAME-SPREAD INDEX OF LESS THAN 25 AND A
- ED INDEX OF LESS THAN 50 AS TESTED IN ACCORDANCE WITH ASTM E 84. IN
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- NOT BE PROGRESSIVE. RIALS SHALL HAVE A MAXIMUM THERMAL CONDUCTIVITY OF 0.27 T A 75 °F MEAN TEMPERATURE AS TESTED IN ACCORDANCE WITH ASTM C 177
- 5. INSULATION MATERIALS SHALL HAVE A MAXIMUM WATER VAPOR TRANSMISSION OF 0.08 PERM-INCHES WHEN TESTED IN ACCORDANCE WITH ASTM E 96.

- JRE OF 600 PSIG AND MAXIMUM TEMPERATURE OF 275 DEGREES F. NNET, PISTON WITH REMOVABLE PTFE SEAT, STAINLESS STEEL CLOSING
- ORKING PRESSURE OF 600 PSIG AND MAXIMUM TEMPERATURE OF 275 ORGED BRASS OR CAST BRONZE BODY; GLOBE PATTERN, FORGED BRASS OR

- E AND STAINLESS STEEL DIAPHRAGMS, RISING STEM AND HANDWHEEL
- SPRING, NYLON SEAT DISC, FLANGED ENDS, WITH POSITIVE BACKSEATING; LVES: FORGED BRASS OR CAST BRONZE, FORGED BRASS SEAL CAPS, RISING WITH BACKSEATING, MOLDED STEM PACKING, FLANGED ENDS; FOR MAXIMUM

- OPENING STEM WITH SEAL CAP. PLATED-STEEL STEM. AND GRAPHITE SEAL. 1AXIMUM OPENING PRESSURE 0.5 PSIG; FOR MAXIMUM WORKING PRESSURE

- LVES: COMPLY WITH 2010 ASME BOILER AND PRESSURE VESSEL CODE;
- ED BY AN NRTL; DUCTILE IRON AND STEEL BODY AND BONNET WITH
- G SEAL, STAINLESS STEEL PISTON, CLOSING SPRING, AND SEAT INSERT, PTFE

- ENDS; MAXIMUM WORKING PRESSURE AND MAXIMUM TEMPERATURE AS

- AXIMUM TEMPERATURE OF 275 DEGREES F.
- FORGED BRASS BODY WITH BRASS CAP INCLUDING KEY END TO REMOVE E BALL-TYPE CHECK VALVE WITH STAINLESS STEEL SPRING, PTFE SEAT, OR MAXIMUM WORKING PRESSURE OF 600 PSIG AND MAXIMUM = 275 DEGREES F. EPLACEABLE CARTRIDGE ANGLE TYPE. SHELL: ARI 710. UL LISTED. BRASS. FOR MAXIMUM WORKING PRESSURE OF 600 PSIG.

- TED BY FILTER SCREEN, COLOR CODED MOISTURE INDICATOR TO SHOW NT IN PPM WITH MINIMUM SENSITIVITY OF 60 PPM, REMOVABLE ELEMENT LASTIC CAP; FOR MAXIMUM WORKING PRESSURE OF 600 PSIG AND MAXIMUM 275 DEGREES F. ), GLOBE OR ANGLE PATTERN, FORGED BRASS BODY AND BONNET,
- MAY BE INSTALLED LEVEL. QUID INDICATORS: SINGLE PORT TYPE, UL LISTED, WITH COPPER OR FORGED DERED ENDS, REPLACEABLE CLEAR FUSED GLASS WINDOW WITH INDICATING
- FITTINGS WITH INERT GAS (NITROGEN OF CARBON DIOXIDE) DURING WELDING TO PREVENT SCALE FORMATION. ANT PIPING AS FOLLOWS: ZONTAL HOT GAS DISCHARGE PIPING WITH A UNIFORM SLOPE DOWNWARD OMPRESSOR. ZONTAL SUCTION PIPING WITH A UNIFORM SLOPE DOWNWARD TO AND DOUBLE RISERS TO ENTRAIN OIL IN VERTICAL RUNS.
- UBING, ANSI/ASTM 280, ACR. ONS: ASME B16.22, WROUGHT COPPER. AWS A5.8/A5.8M, BCUP SILVER/PHOSPORUS/COPPER ALLOY WITH MELTING 80 °F. FLARED JOINTS ARE NOT ACCEPTABLE. F PIPES AND TUBES AND REMOVE BURRS. BEVEL PLAIN ENDS OF STEEL E, SLAG, DIRT, AND DEBRIS FROM INSIDE AND OUTSIDE OF THE PIPE AND R TO ASSEMBLY.

- CONDENSATE DRAIN PIPING SHALL BE TYPE 'M' COPPER WITH SOLDERED
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- LE REFRIGERANT BEING UTILIZED.
- DALLOW APPLICATION OF INSULATION PLUS 1-INCH CLEARANCE AROUND REFRIGERANT PIPING TO PRESSURE TESTING IN ACCORDANCE WITH ASME
- NT AND MATERIALS HAVING PRESSURE RATING EQUAL TO OR GREATER THAN PRESSURE. AND EXTERIOR PIPING AT RIGHT ANGLES OR PARALLEL TO BUILDING WALLS. RE PROHIBITED, EXCEPT WHERE INDICATED OR APPROVED PRIOR TO
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- VISIONS OF ASME B31. ENTS WHICH REQUIRE OBSERVATION, OPERATION, OR MAINTENANCE, SUCH ROLS, CLEANOUTS, UNIONS, ETC., SHALL BE READILY ACCESSIBLE. THEY
- CIRCULATION OF AIR AND WATER THROUGH-OUT THEIR RESPECTIVE EAKS OR UNDUE NOISE. IF DEFECTS OCCUR DURING THE ONE YEAR THIS CONTRACTOR SHALL REPAIR OR REPLACE WITH NEW EQUIPMENT, SUCH INSE TO THE OWNER AND TO THE SATISFACTION OF THE ENGINEER.
- ERFORMANCE OF THE WORK. ALL GUARANTEE THAT THE COMPLETE SYSTEMS AS INSTALLED UNDER THIS FREE OF DEFECTS IN WORKMANSHIP AND MATERIALS FOR A PERIOD OF ONE ATE OF JOB ACCEPTANCE BY THE OWNER. THIS SHALL INCLUDE A
- FORMED UNDER THIS CONTRACT SHALL INCLUDE THE INSTALLATION OF THE HYDRONIC WATER, CONTROL SYSTEMS AND COMPONENTS AS INDICATED SPECIFIED HEREIN. RACT, THIS CONTRACTOR ACKNOWLEDGES THAT HE HAS VISITED THE SITE SELF WITH THE CONDITIONS UNDER WHICH THE WORK IS TO BE PERFORMED, HE WILL COMPLY WITH THE REQUIREMENTS AND INTENT OF ALL PERTINENT
- EMAIN WEATHER TIGHT. INTERIOR WALLS TO MAINTAIN REQUIRED FIRE
- INER, EXCEPT AS SPECIFICALLY INDICATED ON THE DRAWINGS. IF EXISTING TO BE IN THE WAY OF PROPOSED PIPE ROUTING, ETC., THE OWNER'S DULD BE ADVISED, AND HE SHALL MAKE THE DECISION AS TO WHETHER OR M IS TO BE REMOVED AND RETAINED, REMOVED AND DISPOSED OF, OR AND PATCHING REQUIRED FOR THE INSTALLATION OF SYSTEMS HEREIN PROVIDED BY THIS CONTRACTOR. STRUCTURAL MEMBERS SHALL NOT BE PRIOR APPROVAL OF THE ENGINEER. ALL AREAS DISTURBED BY WORK HIS CONTRACT SHALL BE NEATLY REPAIRED AND REFINISHED TO THE ING SURFACES IN A MANNER SUITABLE TO THE ENGINEER. ROOF AND
- DIFICATIONS ALL NOT REMOVE OR RELOCATE ANY EXISTING ITEMS OF OWNER'S O BE IN THE PATH OF NEW SYSTEMS TO BE INSTALLED, WITHOUT PRIOR

6. ALL INSULATION EXPOSED TO SUNLIGHT OR INSTALLED OUTDOORS SHALL BE PROTECTED WITH TWO COATS OF WB ARMAFLEX FINISH OR WEATHER RESISTANT COATING.

1. PROVIDE THE NECESSARY HANGERS AND ACCESSORIES FOR THE PROPER SUPPORT OF THE

2. ALL NEW HORIZONTAL PIPING SHALL BE SUPPORTED BY STEEL CLEVIS OR TRAPEZE HANGERS

OR BRACKETS AT SUFFICIENT INTERVALS TO MAINTAIN A STRAIGHT LINE, BUT NOT TO EXCEED

10 FEET SPACING ON CENTERS OF HANGERS IN ANY CASE, WITH A SEPARATE HANGER FOR

EACH BRANCH. HANGERS SHALL BE LOCATED TO AVOID UNDUE STRESS ON JOINTS.

3. SPRING TYPE HANGERS SHALL BE INSTALLED ON THE FIRST 20 FEET OF HORIZONTAL PIPING

4. WHERE INSULATED PIPE IS SUPPORTED, PROVIDE SADDLES, BLOCKS OR OTHER METHOD

5. PIPE SUPPORT SHALL NOT BE FROM DUCTWORK, CONDUIT, OR OTHER PIPING BUT FROM THE

6. HANGER RODS SHALL BE FULL-DIAMETER STEEL WITH THREADED ENDS FOR FIELD CUTTING

7. HANGER RODS SHALL NOT BE BENT OR ALTERED IN ANY MATTER AND SHALL BE INSTALLED

8. PROVIDE ROLLER SUPPORTS TO ALLOW FOR PIPE MOVEMENT WHEREVER THE LENGTH OF PIPE

FOR THE NATURAL MOVEMENT OF PIPING DUE TO EXPANSION ARE NOT ALLOWED UNLESS

1. STENCIL TYPE MARKERS WILL NOT BE PERMITTED. ONLY FACTORY MANUFACTURED MARKERS

. IDENTIFICATION MARKERS SHALL BE PLACED ON ALL EXPOSED AND CONCEALED PIPES AT

BE PLACED ON PIPES POINTING AWAY FROM MARKER INDICATING DIRECTION OF FLOW.

3. COORDINATE COLOR SCHEME WITH EXISTING PIPING AND SUBMIT TO ENGINEER PRIOR TO

A. ALL POWER WIRING FOR THE MECHANICAL SYSTEM HEREIN SPECIFIED, SHALL BE FURNISHED AND

REQUIREMENTS OF THE CITY OF CHICAGO. FEDERAL, STATE, OR ANY APPLICABLE OR INSPECTING

AUTHORITY. THE WORK UNDER THIS CONTRACT SHALL INCLUDE ANY REQUIRED PERMITS AND

ASPECTS OF THE REQUIRED UNDER THIS CONTRACT. THE EC SHALL NOTIFY THE ENGINEER IN

E. ALL INDOOR CONDUIT SHALL BE TYPE "EMT" WITH GLAND (COMPRESSION) TYPE CONNECTORS AND

WRITING OF ANY PORTION OF THE WORK HEREIN THAT CANNOT BE INSTALLED, FURNISHED, OR IN

INSTALLED BY THE ELECTRICAL CONTRACTOR UNDER THE MECHANICAL CONTRACTOR'S

B. ALL ELECTRICAL WORK UNDER THIS CONTRACT SHALL BE DONE IN STRICT ACCORDANCE WITH

C. THE ELECTRICAL CONTRACTOR (EC) SHALL VISIT THE SITE AND BE FULLY APPRAISED OF ALL

D. ALL PANEL BOARDS FURNISHED SHALL BE MAIN CIRCUIT BREAKER OR MLO. COPPER BUS WITH

G. FINAL CONNECTION TO ALL MOTORS AND MACHINERY SHALL BE VIA A MIN. 2'-0"LENGTH OF

H. EACH PIECE OF MECHANICAL EQUIPMENT REQUIRING ELECTRICAL POWER SHALL HAVE A LOCAL

I. VERIFY THAT THERE IS A GFI SERVICE RECEPTACLE WITHIN 25'-0" OF EQUIPMENT REQUIRING

DISCONNECT (SQUARE D CLASS 2510, HEAVY DUTY SWITCH, OR SIMILAR MAY BE NECESSARY.

J. RELOCATE OR FURNISH AND INSTALL NEW LIGHT FIXTURES THAT MAY BE REQUIRED TO FACILITATE INSTALLATION AND FUTURE SERVICING OF THE MECHANICAL EQUIPMENT UNDER THIS CONTRACT.

K. PRIOR TO OPERATING OR FINAL CONNECTION OF ANY WIRED DEVICE, EACH CABLE RUN (NEW OR

SHOWN TO BE "CLEAN" SHALL BE REPLACED PRIOR TO ENERGIZING. ALL CABLE SHALL BE

L. THE EC SHALL VERIFY ROTATION OF EACH MOTOR AND MEASURE THE RUNNING AMPERAGE OF

EACH MOTOR, OR EQUIPMENT INSTALLED UNDER THIS CONTRACT AND COMPARE WITH THE

M. THE EC SHALL WARRANTY ANY MATERIAL AND LABOR FURNISHED UNDER THIS CONTRACT FOR NOT

A. UPON SUBSTANTIAL COMPLETION OF SYSTEMS INSTALLATION, AND PRIOR TO ACCEPTANCE BY THE

ENGINEER AND OWNER, THIS CONTRACTOR SHALL SUBCONTRACT A TAB CONTRACTOR WHO'S

B. TEST PROCEDURES SHALL BE PER LATEST EDITIONS OF NEBB, AABC, OR TESTING, ADJUSTING, AND

REQUIREMENTS OF NEBB, AABC, OR ASHRAE. IF DEFICIENCIES ARE FOUND WHICH PREVENT

D. THE OWNER, ENGINEER, AND COMMISSIONING AUTHORITY SHALL BE NOTIFIED WHEN TAB SCOPE

E. THIS CONTRACTOR TO ASSIST THE TAB CONTRACTOR AS REQUIRED TO ENSURE REPEATABLE

RESULTS. THIS CONTRACTOR SHALL PROVIDE THE TAB CONTRACTOR WITH ALL REQUIRED

F. TAB CONTRACTOR SCOPE SHALL INCLUDE ALL NEW SYSTEMS AND EQUIPMENT INCLUDING AIR

G. TAB CONTRACTOR SCOPE SHALL INCLUDE EXISTING SYSTEMS AS IDENTIFIED IN THE DOCUMENTS

H. TAB CONTRACTOR SHALL PROVIDE A SUBMITTAL PRIOR TO PERFORMING ANY WORK FOR REVIEW

I. TAB CONTRACTOR SHALL PROVIDE REPORT IN ACCORDANCE WITH UTILIZED STANDARD ALONG

DEFICIENCIES, AND RECOMMENDED CHANGES. THIS REPORT SHALL BE SUBMITTED WITHIN THIRTY

WITH AN EXECUTIVE SUMMARY STATING THE EXTENT OF SYSTEM COMPLIANCE, SYSTEM

J. TAB CONTRACTOR SHALL COORDINATE WITH THE BASC AS REQUIRED TO PERFORM SCOPE OF

WORK, DETERMINE CONTROL SETPOINTS, ETC. FOR PROPER OPERATION OF THE SYSTEM.

K. ALL BALANCING PROCEDURES SHALL BE PERFORMED TO MINIMIZE ENERGY USAGE. THIS SHALL

1. THE CONTROLS CONTRACTOR SHALL BE THE CONTROLS ENGINEER FOR THIS PROJECT,

CODES, AND OPERATE IN A MANNER CONSISTENT WITH KNOWN GOOD CONTROLS

2. BASC SHALL FURNISH AND INSTALL ALL COMPONENTS REQUIRED FOR A COMPLETE AND

3. NEW CONTROLS SHALL BE INTEGRATED WITH AN EXTENSION OF THE OWNER'S EXISTING

4. EXISTING CONTROL SYSTEMS SHALL REMAIN IN OPERATION UNTIL ALL CONTROLLED

5. ALL WORK SHALL BE INSTALLED, WIRED, CIRCUIT TESTED, AND CALIBRATED BY FACTORY

CERTIFIED TECHNICIANS QUALIFIED FOR THIS WORK. SUPERVISION, CALIBRATION, AND

NOT BE SUBCONTRACTED. BASC SHALL HAVE AN IN-PLACE SUPPORT FACILITY WITHIN

ENGINEERS, SPARE PARTS INVENTORY, AND ALL NECESSARY TEST AND DIAGNOSTIC

6. BASC SHALL PROVIDE ALL LABOR NECESSARY TO INSTALL, INITIALIZE, START UP, AND

DOCUMENTATION AND ON USER AND MANUFACTURER ARCHIVED SOFTWARE DISKS.

9. INSTALL SOFTWARE IN CONTROL UNITS AND OPERATOR WORKSTATION AS NECESSARY.

ON THERMOSTATS AS REQUIRED BY OWNER OR AS INDICATED IN THE DOCUMENTS.

12. FURNISH AND INSTALL MECHANICAL ROOM SYSTEM NETWORK AND CONTROL WIRING IN

TEMPERATURE CONTROL DEVICES AND CONTROL PANELS FROM THE DESIGNATED

8. PROVIDE AN ADEQUATE NUMBER OF CONTROL UNITS AND ADEQUATE LICENSING TO ACHIEVE

10. THE BASC SHALL PROVIDE A STARTUP TECHNICIAN TO VERIFY ALL INPUTS AND OUTPUTS FOR

11. BASC SHALL COORDINATE, FURNISH AND INSTALL GUARDS AND TAMPER PROOF ENCLOSURES

CONDUIT. CONTROL CONDUIT SHALL BE PAINTED OR DYED BLUE. NON MECHANICAL ROOM LOW

VOLTAGE CONTROL WIRING CAN BE RUN IN BRIDLE RINGS ABOVE ACCESSIBLE CEILINGS. THE

BASC SHALL INSTALL ANY 120 VOLT AND 24 VOLT WIRING AND CONDUIT REQUIRED FOR ALL

PROPER READINGS AND COMMANDS WITHOUT THE PROGRAM RUNNING, TEST THE DDC

MONITORING AND CONTROL OF ALL DATA POINTS TO SATISFY THE SEQUENCE OF OPERATION.

INSTALLATION AND INTEGRATION REQUIRED FOR A SUCCESSFUL PROJECT.

7. ALL CORRECTIVE SOFTWARE MODIFICATIONS SHALL BE UPDATED ON ALL USER

PROGRAM FOR PROPER OPERATION, ETC.

DISTRIBUTION PANEL.

CHECKOUT OF THE SYSTEM SHALL BE BY THE EMPLOYEES OF THE BASC AND SERVICES SHALL

REASONABLE PROXIMITY OF THE JOB SITE WITH FACTORY CERTIFIED TECHNICIANS, CERTIFIED

EQUIPMENT FOR THE INSTALLED SYSTEM. BASC SHALL HAVE EMERGENCY SERVICE AVAILABLE

TROUBLESHOOT ALL BACNET WEB SERVER WORKSTATION SOFTWARE AND THEIR FUNCTIONS

INCLUDING ANY OPERATING SYSTEM SOFTWARE, HARDWARE, AND THIRD-PARTY SOFTWARE

BUILDING AUTOMATION SYSTEM UTILIZING THE OWNER'S NETWORK. THE BUILDING HAS AN

FUNCTIONAL DDC SYSTEM TO CONTROL DEVICES, EQUIPMENT AND SYSTEMS.

EXISTING SIEMENS FRONT END WHICH SHALL REMAIN IN USE.

EQUIPMENT HAS BEEN CUTOVER TO THE NEW CONTROL SYSTEM.

24 HOURS A DAY AND INITIAL RESPONSE TIME OF LESS THAN 1 HOUR.

RESPONSIBLE FOR DESIGN AND ENGINEERING OF ALL CONTROL SYSTEMS TO OPERATE AS

DESCRIBED IN THE SEQUENCE OF OPERATION. TO CONFORM WITH THE GOVERNING BUILDING

INCLUDE BUT NOT BE LIMITED TO RECORDING AHU AIR FLOW RATES IN FULL ECONOMIZER MODE,

BALANCING PUMPS BY REDUCING PUMP SPEED BEFORE THROTTLING BALANCING VALVE, ETC.

OR AS REQUIRED FOR A FULLY FUNCTIONAL AND FULLY BALANCED SYSTEM.

3. TEST FORMS SPECIFIC TO THIS PROJECT INCLUDING FAN AND PUMP CURVES.

1. TAB PERSONNEL QUALIFICATION AND CERTIFICATION REPORTS.

WILL BEGIN ON SITE, AUTHORIZED REPRESENTATIVE OF THE OWNER MAY BE IN ATTENDANCE IF

PROPER TAB PROCEDURES AND REPEATABLE RESULTS, THIS CONTRACTOR SHALL BE

OPERATION SHALL BE IN ACCORDANCE WITH THE CONTRACT DOCUMENTS AND PER THE MINIMUM

C. PRIOR TO ALL TAB PROCEDURES PROCEEDING, SYSTEMS INSTALLATION, STARTUP, AND

TECHNICIANS ARE NEBB OR AABC CERTIFIED. TAB SUBCONTRACTOR SHALL NOT BE AFFILIATED

EXITING) SHALL BE MEGGER TESTED WITH NOT LESS THAN A 1000 VOLT MEGGER. ANY CABLE NOT

4. FURNISH AND INSTALL NEW LABELS FOR ALL PIPING REUSED UNDER A DIFFERENT

20'-0" INTERVALS, AT ALL VALVES AND BRANCHES, AND ON BOTH SIDES OF WALLS WHERE

PIPES PASS THROUGH. ARROWS OF SAME COLOR AS IDENTIFICATION MARKERS SHALL ALSO

TAPE OF MATCHING SIZE AND COLOR SCHEME.

SERVICE/DIRECTION AS PART OF THIS PROJECT.

COMPLIANCE WITH THE WORK UNDER THIS CONTRACT.

F. ALL OUTDOOR CONDUIT SHALL BE TYPE "IMC" WITH THREADED COUPLINGS.

STRANDED COPPER, 600 VOLT, TYPE "XHHW" (WET) OR "THHN" (DRY).

LESS THAN ONE (1) YEAR FROM THE DATE OF ACCEPTANCE BY THE OWNER.

IX. SYSTEM START-UP, TESTING, ADJUSTING AND BALANCING (TAB)

BALANCING CHAPTER OF ASHRAE APPLICATIONS HANDBOOK.

RESPONSIBLE FOR ALL RESULTING COSTS.

DOCUMENTATION TO SUPPORT TAB SCOPE.

BY THE ENGINEER INCLUDING THE FOLLOWING:

2. TEST PROCEDURES SPECIFIC TO THIS PROJECT.

(30) DAYS OF COMPLETION OF THIS SCOPE OF WORK.

X. AUTOMATIC TEMPERATURE CONTROL SYSTEM

ENGINEERING PRACTICE.

A. GENERAL

FLOW STATIONS AND BTU METERS.

BOLT-ON STYLE BREAKERS RATED AT 22KA I/C.

 FOR INDOOR USE, UTILIZE ADHESIVE PIPE MARKERS - LARGEST SIZE POSSIBLE GIVEN THE PIPE OR INSULATION OUTER DIAMETER, WITH BOTH ENDS SECURED WITH ARROW

FOR OUTDOOR USE, UTILIZE "STRAP AROUND" TYPE SECURED WITH HEAVY DUTY ZIP

AND/OR THE EXPANSION OF THE PIPE REQUIRE. FIXED PIPE SUPPORTS THAT DO NOT ALLOW

PLUMB AND TRUE. THE ROD SUPPORTING THE HANGER SHALL BE NO LONGER THAN 1/2" BELOW

APPROVED BY ENGINEER TO PROTECT INSULATION FROM BEING CRUSHED.

G. PIPE HANGERS AND SUPPORTS

THE LOWER NUT.

OTHERWISE NOTED.

H. PIPE LABELING

ORDERING.

VIII. ELECTRICAL WORK

CONTRACT.

COUPLINGS.

SFRVICE.

FLEXIBLE CONDUIT.

NAMEPLATE RATING.

WITH THE CONTRACTOR.

DEEMED NECESSARY.

INSPECTION FEES.

NEW PIPING, EQUIPMENT, ETC.

ON BOTH SIDES OF ROTATING EQUIPMENT.

PERMANENT BUILDING STRUCTURE.

AS FOLLOWS WILL BE ACCEPTABLE

AND THREAD EXTENDING AS REQUIRED.

1	13. THE BASC / CONTROLS ENGINEER SHALL IDENTIFY ANY POTENTIAL CONDITIONS THAT COULD BE CONSTRUED TO DEVIATE FROM GOOD CONTROLS ENGINEERING PRACTICE PRIOR TO BIDDING AND INCLUDE ALL ENGINEERING AND INSTALLATION WORK REQUIRED TO MAKE ALL HVAC SYSTEMS COMPLETE AND OPERATIONAL, IN CONFORMANCE WITH GOOD CONTROLS ENGINEERING PRACTICE, PRIOR TO SUBMITTING HIS BID.	1. ALARMS
1	14. THE DRAWINGS AND DOCUMENTS PREPARED FOR THIS PROJECT ARE DIAGRAMMATIC AND THE SUCCESSFUL BASC MUST INCLUDE ALL EQUIPMENT, MATERIALS, LABOR, AND RELATED WORK AS REQUIRED TO COMPLETE THE PROJECT OUTLINED HEREIN. THE BASC SHALL PROVIDE A COMPLETE SUBMITTAL PACKAGE FOR ALL HARDWARE DEVICES, SEQUENCE OF OPERATION WITH PROPOSED SET POINTS, ADJUSTABILITY, CONTROL DRAWINGS, AND PROGRAMMING TEXT BLOCKS FOR REVIEW AND APPROVAL BY ELARA ENERGY SERVICES PRIOR TO PURCHASING AND INSTALLATION OF THE SAME.	1.1.       CRITICAL ALARMS         1.1.1.       CRITICAL ALARMS SI         EMAILED TO THE OW         1.1.2.       CRITICAL ALARMS SI         1.1.2.1.       THE SPACE TEM
1	15. THE BASC SHALL PROVIDE ALL CONTROL COMPONENTS, WIRING, INTERLOCKS, ELECTRICAL POWER, AND ALL OTHER DEVICES REQUIRED TO MAKE ALL HVAC EQUIPMENT INSTALLED UNDER THIS PROJECT COMPLETE AND FULLY OPERATIONAL PER THE SEQUENCE OF OPERATION AND AS REQUIRED FOR SAFE AND ACCURATE CONTROL.	1. BASC TO FURNISH AND INS BE USED FOR IT ROOM TEM
1	16. THE BASC SHALL PROVIDE THERMOSTATS FOR ALL CONTROLLED EQUIPMENT TO OPERATE AS DESCRIBED IN THE SEQUENCE OF OPERATION AND / OR PER MANUFACTURER'S REQUIREMENTS AND KNOWN STANDARDS OF GOOD CONTROL PRACTICE. INCLUDE ALL THERMOSTATS AS REQUIRED FOR EQUIPMENT TO BE COMPLETE AND FULLY OPERATIONAL, WHETHER SHOWN SPECIFICALLY ON THE PLANS OR NOT, UNLESS NOTED OTHERWISE ON DOCUMENTS.	(1) AI SPACE TEMPER
1	17. ALL UNUSED HOLES IN EXISTING AND NEW CONTROL PANELS ARE TO BE CAPPED.	
1	18. RE-USE OF EXISTING CONTROL CONDUIT, RACEWAYS, AND WIRING ACCEPTABLE IF COMPATIBLE WITH NEW SYSTEM AND IF THE CONTRACTOR INCLUDES IN THE PROJECT WARRANTY.	SOUND ROOM T
1	19. THE BASC IS RESPONSIBLE FOR ALL LOW VOLTAGE CONTROL WIRING, POWER WIRING, AND CONDUIT ASSOCIATED WITH ALL CONTROL VALVES, ACTUATORS, CONTROLLERS, ETC., BEING INSTALLED AS A PART OF THIS PROJECT.	1 CONTROLS SCH
2	20. THE BASC MAY RE-USE ANY EXISTING RELAYS, CURRENT SENSING RELAYS, AND CURRENT TRANSDUCERS PROVIDED THEY ARE COMPATIBLE WITH THE NEW CONTROLLERS. ALL HARD WIRED CONTROL POINTS ARE TO BE MAPPED TO THE SYSTEM GRAPHICS FOR EASY VIEWING BY BUILDING STAFF. ANY CONDUIT, WIRING, SENSORS, OR SWITCHES THAT ARE RE-USED BY THE BASC ARE TO BE TESTED PRIOR TO USE AND INCLUDED IN THE PROJECT WARRANTY.	
2	21. WIRING IN OCCUPIED AREAS OF THE BUILDING SHALL BE CONCEALED IN WALL AND ABOVE CEILINGS. EXPOSED WIRING AND CONDUIT IS NOT ACCEPTABLE IN OCCUPIED AREAS.	
2	22. CONTRACTOR SHALL OBTAIN POWER FOR THE NEW DDC CONTROL SYSTEM FROM THE NEAREST SOURCE.	RATED WALL (CONSTRUCTION VARIES) NOTE 2
2	23. THE BASC SHALL INCLUDE ADEQUATE TIME IN HIS BID FOR COMPLETE COMMISSIONING OF THE MECHANICAL SYSTEMS, ON SITE IN COORDINATION WITH THE MECHANICAL CONTRACTOR AND OTHER TRADES AS REQUIRED TO MAKE ALL EQUIPMENT COMPLETE AND FULLY OPERATIONAL.	FIRE SEALANT
2	24. REFER TO SCHEMATICS, SCHEDULES, AND SPECIFICATIONS FOR ADDITIONAL INFORMATION.	
. 0	GRAPHICS	
1	I. PROVIDE ROBUST GRAPHIC SCREENS THAT ARE THREE DIMENSIONAL, USE DYNAMIC SYMBOLS FOR ALL OPERABLE COMPONENTS AND MULTIPLE COLORS FOR EQUIPMENT AND SYSTEMS. GRAPHIC SCREENS MUST BE CUSTOMIZED FOR THIS PROJECT WITH HYPERLINKS TO OTHER ASSOCIATED GRAPHICS. GRAPHICS SHALL RESIDE ON THE CLIENT WEB SERVER FOR ALL SYSTEMS SHOWING CURRENT VALUE OF ALL INPUTS, OUTPUTS, SET POINTS, ALARM POINTS, SCHEDULE LINKS, ETC TO FACILITATE TESTING, MONITORING AND MAINTENANCE.	NOTE 3 NOTE 6
	a. PROVIDE THE FOLLOWING SCREENS AS A MINIMUM: BUILDING MAIN MENU SCREEN FOR QUICK REFERENCE TO INDIVIDUAL EQUIPMENT OR SYSTEMS, INDIVIDUAL SCREENS FOR EACH PIECE OF EQUIPMENT OR SYSTEM, SCREENS SUMMARIZING ALL TERMINAL UNITS FOR QUICK REFERENCE, FLOOR PLANS GRAPHICALLY DEPICTING THE LOCATION OF	<ol> <li>THIS DETAIL APPLIES TO ALL ITEN AND TO ALLOW LONGITUDINAL MO</li> <li>STD WEIGHT PIPE SLEEVE EMBED</li> </ol>
	EQUIPMENT. b. PROVIDE NAVIGATIONAL ICONS ON EACH GRAPHIC TO THE BUILDING MAIN MENU WITH ONE CLICK.	LOCATIONS AND DEBUR SLEEVE. SELECTED FIRESTOP SYSTEM.
	<ul> <li>c. PROVIDE NAVIGATIONAL ICONS ON EACH GRAPHIC TO ADVANCE THE GRAPHIC FORWARD OR BACKWARDS THROUGH EACH SIMILAR SYSTEM WITH ONE CLICK.</li> <li>d. ANY POINTS IN MANUAL OVERRIDE SHALL BE HIGHLIGHTED ON THE SYSTEM GRAPHICS TO HELP NOTIFY THE OPERATOR.</li> </ul>	3. INSTALL BACKING MATERIAL SUCH ACCORDANCE WITH FIRESTOP SY MOVEMENT OF PENETRATING ITE
	e. PROVIDE SERVICE PHONE NUMBER ON ALL GRAPHICAL SCREENS.	4. STD WEIGHT PIPE SLEEVE EXTEN STOP. INSTALL WITH NEW SLAB P
	GENERAL REQUIREMENTS FOR STAND ALONE CONTROL SYSTEMS	SEAL AND HOLD IN PLACE. FOR D GAUGE GALVANIZED ANGLE FRAM
1	<ol> <li>CONTROL OF THE EQUIPMENT OR SYSTEMS SHALL OPERATE BASED ON ITS STAND ALONE LOCAL CONTROLLER INDEPENDENT OF THE (BAS) UNLESS OTHERWISE NOTED.</li> </ol>	5. RESULTANT ASSEMBLY TO MAINT
2	<ol> <li>CONTRACTOR IS RESPONSIBLE FOR ALL REQUIRED CONDUIT, CONTROL WIRING, DAISY CHAIN NETWORK WIRING, CABLING, DEVICES, INTERLOCKS, SAFETIES, PROGRAMMING, ETC TO OPERATE THE EQUIPMENT OR SYSTEMS.</li> </ol>	6. PROVIDE ESCUTCHEON PLATES O REQUIRED WHEN LOCATED ABOV
. E	BACNET ADVANCED OPERATOR WORKSTATION DISPLAY (EXISTING)	
1	1. UTILIZE THE OWNER'S EXISTING NETWORKED PC FOR SYSTEM OPERATION.	2 SCALE: NO SCALE
2	2. AT A MINIMUM THE FOLLOWING CONTROL POINTS SHALL BE CONFIGURED FOR LONG TERM STORAGE ON THE FRONT END PC: SPACE CONDITIONS, SETPOINTS, EQUIPMENT AND SYSTEM TEMPERATURES, VALVE AND DAMPER POSITIONS, CONTROL LOOP STATUS, EQUIPMENT STATUS AND SPEED, PRESSURES, OA CONDITIONS, AIRFLOWS, ETC.	
. Т	TRAINING SHALL INCLUDE:	
1	I. LOGGING IN AND OUT OF THE SYSTEM REMOTELY AND LOCALLY.	
2	<ol> <li>BASIC THEORY ON THE INSTALLED SYSTEMS AND WALK THRU OF THE GRAPHICS. THE GRAPHICAL REVIEW SHALL COVER EACH MAJOR SYSTEM AND SHALL COVER A SAMPLING OF EACH UNIQUE TERMINAL EQUIPMENT CONFIGURATION.</li> </ol>	ABS PLASTIC -

3. REVIEWING AND ACKNOWLEDGING ALARMS.

4. LOCATIONS OF AND HOW TO RESET EQUIPMENT SAFETIES.

- ADJUSTING EQUIPMENT SCHEDULES; DEMONSTRATE PERMANENT CHANGES TO WEEKLY
- SCHEDULES AND ALSO SPECIAL EVENT AND HOLIDAY SCHEDULING. 7. ADJUSTING SETPOINTS AND SETPOINT RESETS. THE OWNER SHALL BE ABLE TO ADJUST THE OPERATION WITHOUT MANUAL OVERRIDES.
- 8. ANSWERING OWNER'S STAFF QUESTIONS

5. REVIEWING TREND LOGS.

- 9. ADJUSTMENT OF SOFTWARE, GRAPHICS, POINT NAMES OR SEQUENCE OF OPERATIONS AS REQUESTED BY THE OWNER DURING TRAINING. PRIOR TO ENACTING ANY CHANGES, APPROVAL SHALL BE OBTAINED FROM THE ENGINEER.
- F. SCOPE OF WORK
- 1. ALL WORK ASSOCIATED WITH THIS PROJECT SHALL BE INCORPORATED INTO THE EXISTING SIEMENS BUILDING AUTOMATION SYSTEM CURRENTLY IN OPERATION WITHIN GUARANTEED RATE FIELD. THE SCOPE OF WORK SHALL BE AS FOLLOWS FOR EACH COMPONENT ASSOCIATED WITH THIS PROJECT. ALL CONTROL ITEMS INDICATED BELOW SHALL BE PROVIDED IN GRAPHIC FORM ON THE BUILDING BAS SYSTEM.
- PROVIDE NEW PANELS THAT THAT COMMUNICATES BACNET OUT AS THE FIELD LEVEL NETWORK, AS REQUIRED.
- 3. BELOW IS A GENERAL SUMMARY OF BAS SCOPE OF WORK. REFER TO PLANS, DETAILS, AND SCHEDULES FOR ADDITIONAL INFORMATION.
- 4. HEAT PUMP COOLING SYSTEMS (AC / CU)
- 4.1. SYSTEM DESCRIPTION: 4.1.1. THE NEW HEAT PUMP UNIT IS OPERATED TO MAINTAIN THE COOLING SPACE TEMPERATURE VIA THEIR OWN INTERNAL CONTROLS. 4.1.2. UNIT CONTROLLER / THERMOSTAT BY EQUIPMENT MANUFACTURER

EXISTING ROOF CONSTRUCTION, VERIFY IN FIELD.

WITH RAISED OR BUILT IN CANT

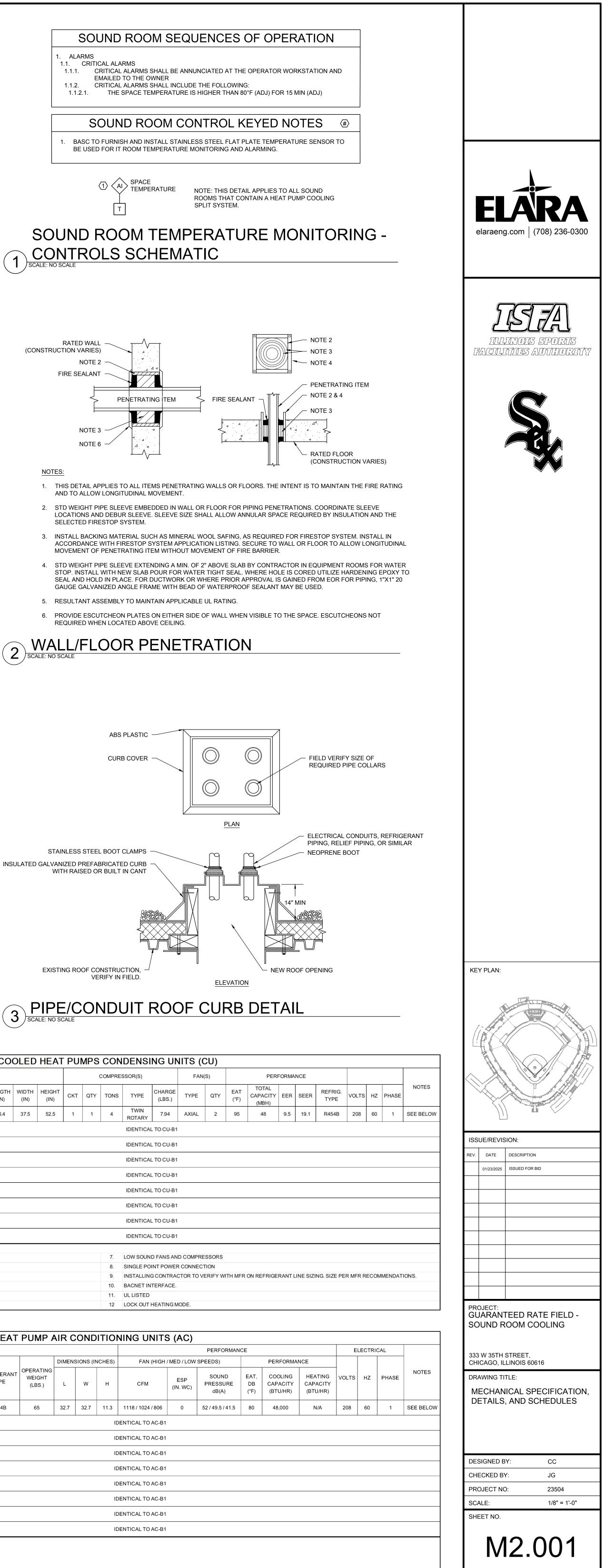
# SCALE: NO SCALE

## AIR COOLED HEAT PUMPS CONDENSING UNITS (CU)

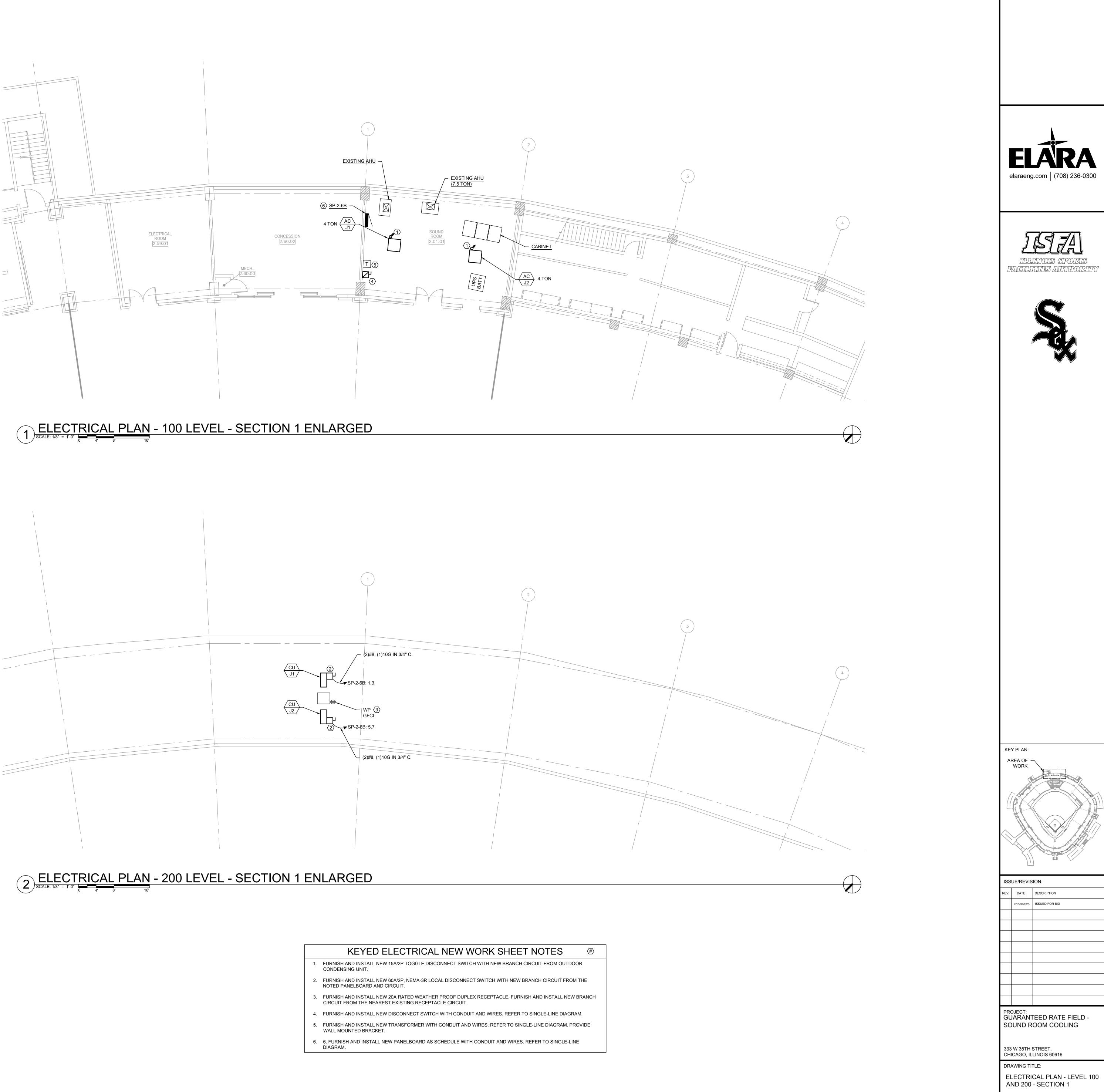
			AIR COULED HEAT							I PUMPS CONDENS				
EQUIP.	TAG	GENERAL							COMPRESSOR(S)					
ABB.	NO.	SERVICE	LOCATION	MFR	MODEL	TONS	OPERATING WEIGHT (LBS)	LENGTH (IN)	WIDTH (IN)	HEIGHT (IN)	скт	QTY	TONS	TYPE
CU	B1	AC-B1	ROOF	CARRIER	37MBRAQ48	4	209	16.4	37.5	52.5	1	1	4	TWIN ROTAR
CU	B2	AC-B2	ROOF											IDENTIC
CU	D1	AC-D1	ROOF											IDENTIC
CU	D2	AC-D2	ROOF											IDENTIC
CU	D3	AC-D3	ROOF											IDENTIC
CU	F1	AC-F1	ROOF											IDENTIC
CU	F2	AC-F2	ROOF											IDENTIC
CU	J1	AC-J1	ROOF											IDENTIC
CU	J2	AC-J2	ROOF											IDENTIC
NOTES:														
1.	VARI	ABLE SPEED	(INVERTER)										7.	LOW SOL
2.	FACT	ORY INSTALL	ED BASE PAN	HEATER AND	CRANKCASE	HEATER	ł.						8.	SINGLE F
3.	MANU	JFACTURER (	CERTIFIED STA	ART-UP									9.	INSTALL
<mark>4</mark> .	INST/	ALLING CONT	RACTOR TO PR	ROVIDE 18" E	QUIPMENT SUP	PPORT R	ROOF RAILS.						10.	BACNET
5.	CONE	DENSER HIGH	TEMP PROTE	CTION									11.	UL LISTE
6.	DISC	ISCONNECT BY EC.											12	LOCK OU

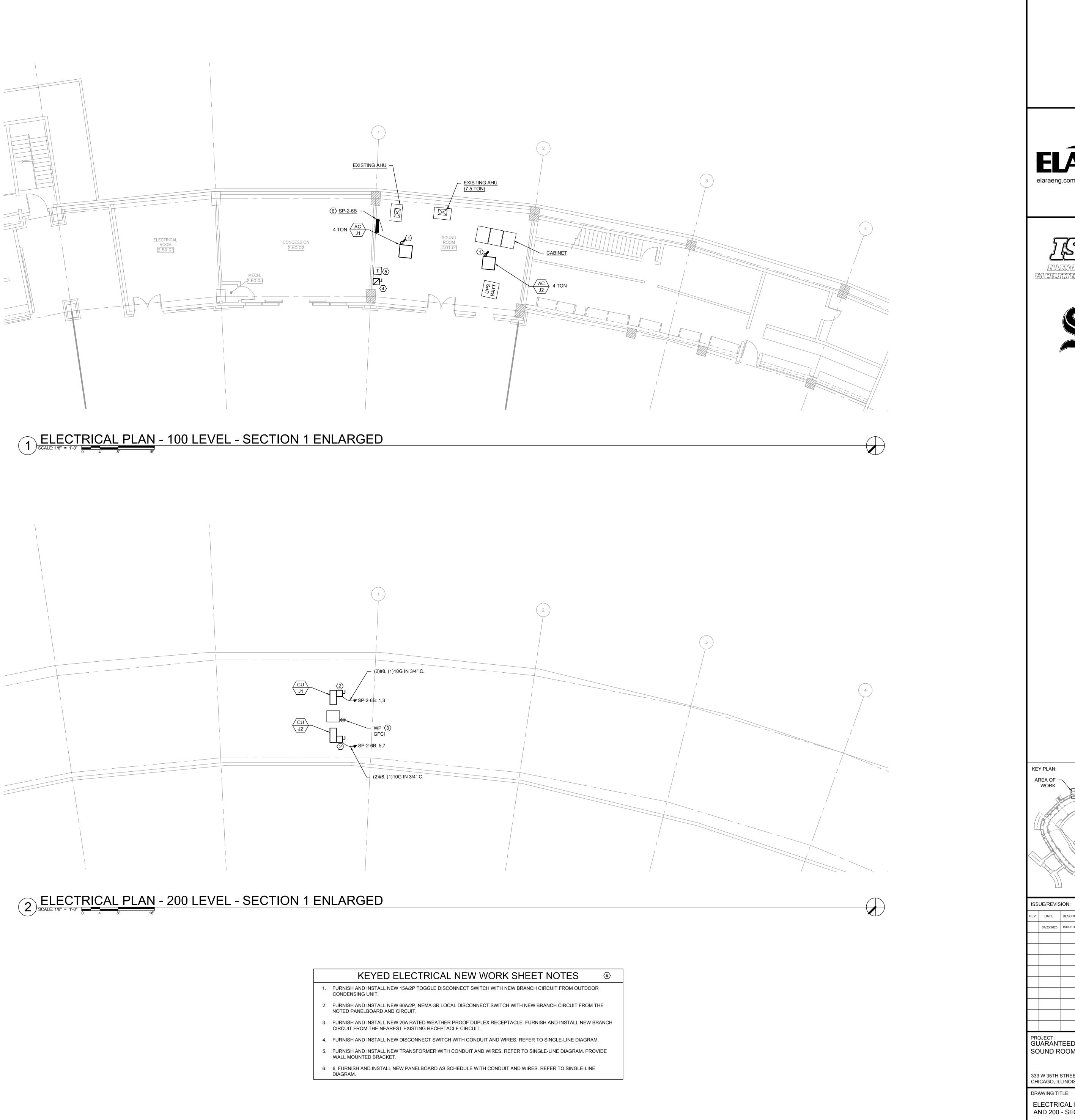
INDOOR HEAT PUMP AIR CONDITIONING UNITS (AC)

EQ	UIP. TA	AG	GENERAL												
										DIMEN	SIONS (II	NCHES)	F،		
AB	B. N	10.	SERVICE	LOCATION	MFR MODEL TYPE		ТҮРЕ	REFRIGERANT TYPE	OPERATING WEIGHT (LBS.)	L	w	Н	CF		
AC	с в	31	CU-B1	SOUND ROOM B	CARRIER	45MBCAQ48	DUCTLESS CEILING CASSETTE	R454B	65	32.7	32.7	11.3	1118 / 10		
AC	СВ	32	CU-B2	SOUND ROOM B								IC	ENTICAL		
AC		D1	CU-D1	SOUND ROOM D		IDENTICAL									
AC		D2	CU-D2	SOUND ROOM D		IDENTICAL									
AC		D3	CU-D3	SOUND ROOM D	IDENTICA										
AC	C F	F1	CU-F1	SOUND ROOM F		IDENTICA									
AC	C F	F2	CU-F2	SOUND ROOM F								IC	ENTICAL		
AC	C J	J1	CU-J1	SOUND ROOM J								IC	ENTICAL		
AC	C J	J2	CU-J2	SOUND ROOM J								IC	ENTICAL		
NOT	<u>ES:</u>														
1 INDOOR UNIT POWERED BY OUTDOOR UNIT.															
2	HA	ANG (	CASSETTES F	ROM EXISTING STRUCT	URE, PROVIDE	VIBRATION ISOLA	TION ON HANGER RO	DS.							
3.	3. MANUFACTURER PROVIDED WIRELESS REMOTE CONTROLLER.														



VOLTAGE:	208Y/120-3P	PHASE-4W									C/B TY	ГҮРЕ			BOLT-ON
MAIN TYPE:	MAIN BREA	KER									ENCLO	DSURE	:		NEMA 1
BUS TYPE:	TIN PLATED	) CU									MAX. C	CKT. P	OLES:		30
BUS AMPS.:	10	0 AMPS.									MOUN	TING:			SURFACE
OCPD AMPS:	10	0 AMPS.									CU NE	UTRAL	L BUS F	RATING:	100%
OCPD OPT.:	-										NEUTF	RAL BC	ONDING	i	-
INT.RATING:	2:	2 KA									CU EQ	. GND.	. BUS:		YES
BUS OPT:	-										INTEG	RAL T	VSS		-
SERVES		Α	В	С	C/B	POS			POS	C/B	A		В	С	SERVES
0.1	14	3744			45	1	A		2						
CU	-J1		3744		45	3		3	4	30					SPD
011	CU-J2			3744	45	5		(	C 6						-
CU	-J2	3744			45	7	A		8	20					SPACE
SPACE					20	9	I	3	10	20					SPACE
SPACE					20	11		(	C 12	20					SPACE
SPACE					20	13	A		14	20					SPACE
SPACE					20	15	I	3	16	20					SPACE
SPACE					20	17		(	C 18	20					SPACE
SPACE					20	19	A		20	20					SPACE
SPACE					20	21		3	22	20					SPACE
SPACE					20	23		(	C 24	20					SPACE
SPACE					20	25	А		26	20					SPACE
SPACE					20	27		3	28	20					SPACE
SPACE					20	29		0	C 30	20					SPACE
		7488	3744	3744							0		0	0	
														A	7488
														E	
														C	3744
													TAL(VA)		14976
													NNEC. A	MPS	41.6





DESIGNED BY:	ВТ
CHECKED BY:	ВТ
PROJECT NO:	23504
SCALE:	1/8" = 1'-0"
SHEET NO.	
E1.	.101

PANELBOARD	): SP	-1-4C	(NEW)	I									
VOLTAGE: 208Y/	/120-3PH	ASE-4W										С/В ТҮРЕ	Ξ
MAIN TYPE: MAIN	BREAK	ER										ENCLOSI	JRE:
BUS TYPE: TIN P	LATED	CU										MAX. CK	T. POLES:
BUS AMPS .:	100	AMPS.										MOUNTIN	IG:
OCPD AMPS:	100	AMPS.										CU NEUT	RAL BUS F
OCPD OPT.: -											NEUTRAL	BONDING	
INT.RATING:	22	KA										CU EQ. G	GND. BUS:
BUS OPT: -		-		-	-	-					-	INTEGRA	L TVSS
SERVES		A	В	с	C/B	POS				POS	C/B	A	В
CU-B1		3744			45	1	Α			2			
			3744		40	3		В		4	30		
CU-B2				3744	45	5			С	6			
		3744			43	7	Α			8	20		
SPACE					20	9		В		10	20		
SPACE					20	11			С	12	20		
SPACE					20	13	Α			14	20		
SPACE					20	15		В		16	20		
SPACE					20	17			С	18	20		
SPACE					20	19	А			20	20		
SPACE					20	21		В		22	20		
SPACE					20	23			С	24	20		
SPACE					20	25	Α			26	20		
SPACE					20	27		В		28	20		
SPACE					20	29			С	30	20		
		7488	3744	3744								0	0
													TOTAL(VA)



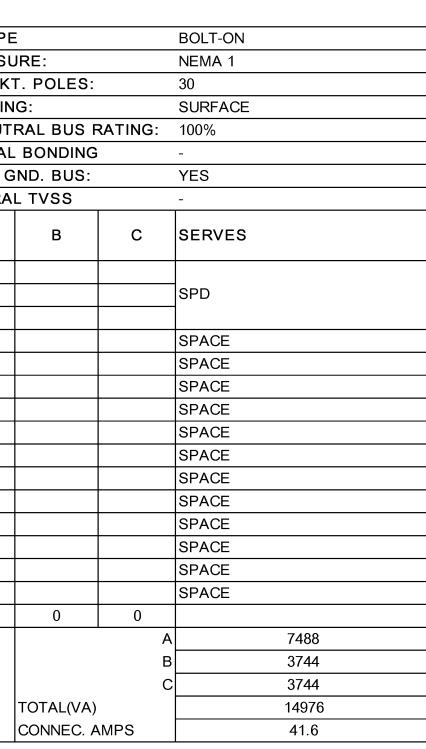
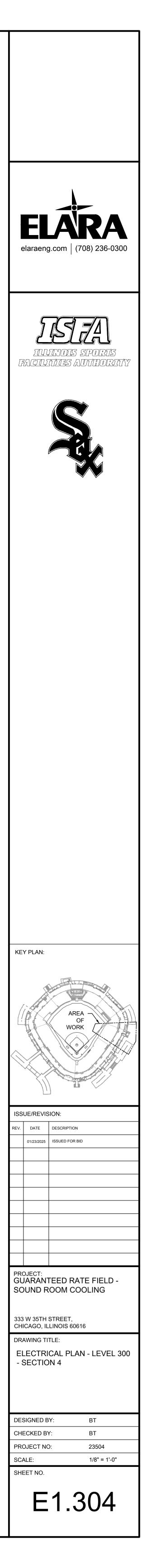


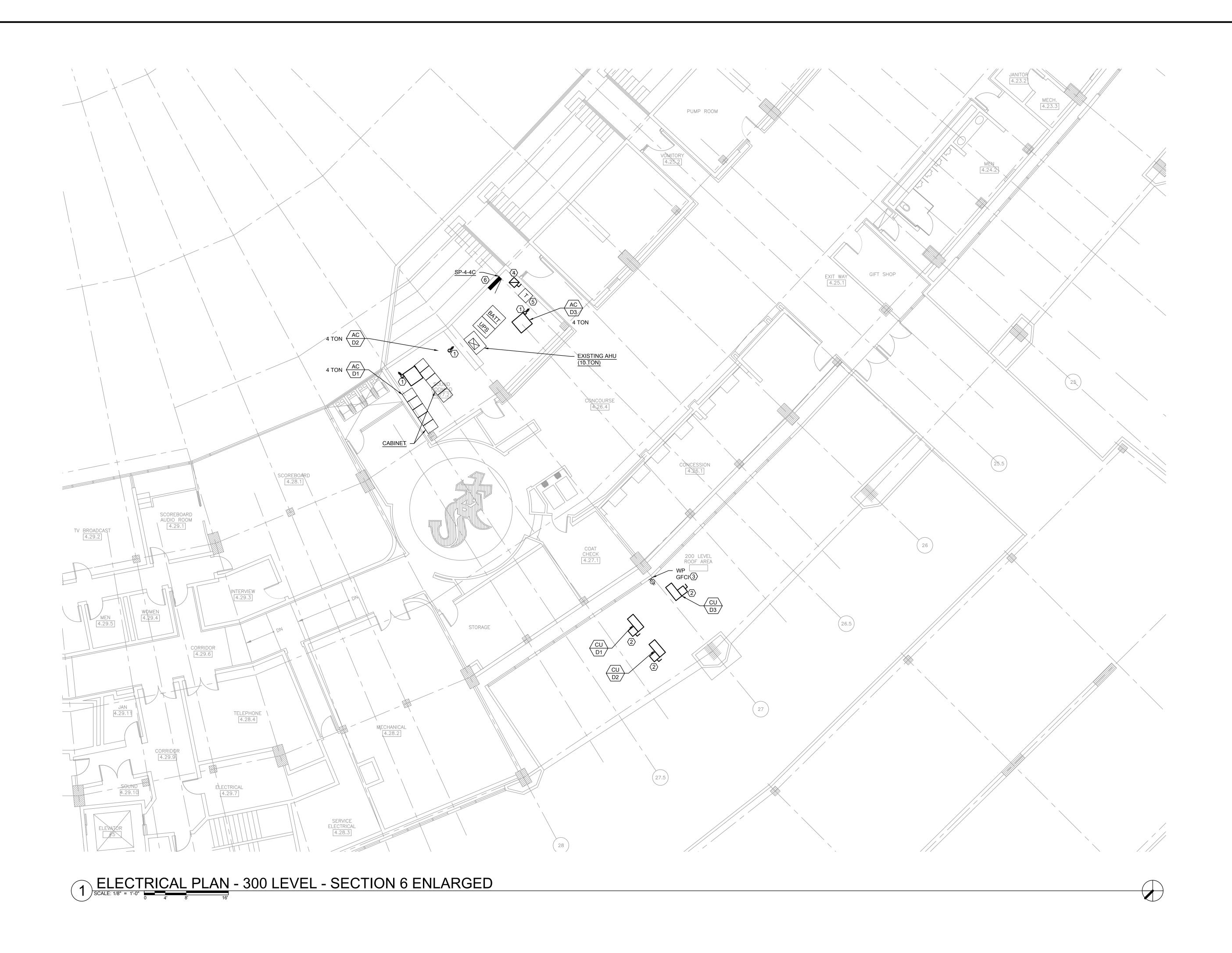
DIAGRAM.

4. FURNISH AND INSTALL NEW DISCONNECT SWITCH WITH CONDUIT AND WIRES. REFER TO SINGLE-LINE DIAGRAM. 5. FURNISH AND INSTALL NEW TRANSFORMER WITH CONDUIT AND WIRES. REFER TO SINGLE-LINE DIAGRAM. PROVIDE

WALL MOUNTED BRACKET. 6. FURNISH AND INSTALL NEW PANELBOARD AS SCHEDULE WITH CONDUIT AND WIRES. REFER TO SINGLE-LINE



VOLTAGE: 208Y/120-3	PHASE-4W										C/B TYP	F		BOLT-ON	
MAIN TYPE: MAIN BREA	-										ENCLOS			NEMA 1	
BUS TYPE: TIN PLATE												T. POLES:		30	
	00 AMPS.										MOUNTI			SURFACE	
	00 AMPS.											TRAL BUS F	RATING:	100%	
OCPD OPT.: -											NEUTRA	L BONDING		-	
INT.RATING:	22 KA										CU EQ.	GND. BUS:		YES	
BUS OPT: -											INTEGRA	AL TVSS		-	
SERVES	A	В	с	C/B	POS				POS	C/B	A	В	С	SERVES	
CU-D1	3744			45	1	А			2						
0-01		3744		] 43	3		В		4	30				SPD	
CU-D2			3744	45	5			С	6						
00-02	3744				7	А			8	20				SPACE	
CU-D3		3744		45	9		В		10	20				SPACE	
			3744		11			С	12	20				SPACE	
SPACE				20	13	A			14	20				SPACE	
SPACE				20	15		В		16	20				SPACE	
SPACE				20	17			С	18	20				SPACE	
SPACE				20		A	_		20	20				SPACE	
SPACE				20	21		В		22	20				SPACE	
SPACE				20	23			С	24	20				SPACE	
SPACE				20	25		_		26	20				SPACE	
SPACE				20	27		В		28	20				SPACE	
SPACE	7488	7488	7488	20	29			С	30	20	0	0	0	SPACE	
	/ 400	/ 400	/ 400	]										A	7488
														3	7488
															7488
												TOTAL(VA)			22464
												CONNEC. A			62.4



### KEYED ELECTRICAL NEW WORK SHEET NOTES ⟨#⟩ 1. FURNISH AND INSTALL NEW 15A/2P TOGGLE DISCONNECT SWITCH WITH NEW BRANCH CIRCUIT FROM OUTDOOR

- CONDENSING UNIT. 2. FURNISH AND INSTALL NEW 60A/2P, NEMA-3R LOCAL DISCONNECT SWITCH WITH NEW BRANCH CIRCUIT FROM THE NOTED PANELBOARD AND CIRCUIT.
- 3. FURNISH AND INSTALL NEW 20A RATED WEATHER PROOF DUPLEX RECEPTACLE. FURNISH AND INSTALL NEW BRANCH CIRCUIT FROM THE NEAREST EXISTING RECEPTACLE CIRCUIT.
- 4. FURNISH AND INSTALL NEW DISCONNECT SWITCH WITH CONDUIT AND WIRES. REFER TO SINGLE-LINE DIAGRAM.
- 5. FURNISH AND INSTALL NEW TRANSFORMER WITH CONDUIT AND WIRES. REFER TO SINGLE-LINE DIAGRAM. PROVIDE WALL MOUNTED BRACKET.
- FURNISH AND INSTALL NEW PANELBOARD AS SCHEDULE WITH CONDUIT AND WIRES. REFER TO SINGLE-LINE DIAGRAM.

ELARA elaraeng.com (708) 236-0300
ILLENOES SPORTS FACILITIES AUTIORITY
KEY PLAN:
KET FLAN.
ISSUE/REVISION: REV. DATE DESCRIPTION
01/23/2025         ISSUED FOR BID
GUARANTEED RATE FIELD - SOUND ROOM COOLING
333 W 35TH STREET, CHICAGO, ILLINOIS 60616 DRAWING TITLE:
ELECTRICAL PLAN - LEVEL 300 - SECTION 6
DESIGNED BY:         BT           CHECKED BY:         BT           PROJECT NO:         23504           SCALE:         1/8" = 1'-0"
SHEET NO. E1.306



# KEYED ELECTRICA

1. EXISTING PANELBOARD SHALL REMAIN. FURNISH SCHEDULE.

## PANELBOARD: CRP-4-3 (EXISTING) 208Y/120-3PHASE-4W

VOLTAGE: MAIN LUGS MAIN TYPE: BUS TYPE: TIN PLATED CU BUS AMPS .: 225 AMPS. OCPD AMPS: - AMPS. OCPD OPT.: 22 KA INT.RATING: BUS OPT: SERVES Α В 3744 CU-F1 (**) 3744 3744 CU-F2 (**) 3744 20 9 SPARE 
 20
 11

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 41
 SPARE SPARE ISPARE SPARE SPARE SPARE ISPARE ISPARE ISPARE SPARE SPARE ISPARE SPARE SPARE SPARE SPARE

(**) REPLACE THE EXISTING CIRCUIT NEW CIRCUIT AS NOTED. THE NEW CIRCU AND AIC RATING SHALL MATCH THE EXISTING.

7488 3744 3744

				ELARA elaraeng.com (708) 236-0300
				TULINOIS SPORTS FACILITIES AUTILORITY
L NEW WORK	SHEET NOT	ΓES	(#)	KEY PLAN:
E N N C	IT BREAKERS AS SHOU /B TYPE NCLOSURE: IAX. CKT. POLES: IOUNTING: U NEUTRAL BUS EUTRAL BONDING	RATING:	BOLT-ON NEMA 1 42 SURFACE 100%	ISSUE/REVISION:
с 	U EQ. GND. BUS: NTEGRAL TVSS		- YES -	REV.     DATE     DESCRIPTION       01/23/2025     ISSUED FOR BID
A 2	A B	С	SERVES	
B         4         30           C         6         4           A         8         20			SPD SPARE	
B         10         20           C         12         20           A         Image: Compared to the second to the secon			SPARE SPARE SPARE	
B         16         20           C         18         20           A         20         20			SPARE SPARE SPARE	
B         22         20           C         24         20           A         26         20			SPARE SPARE SPARE	 PROJECT: GUARANTEED RATE FIELD -
B         28         20           C         30         20			SPARE SPARE	SOUND ROOM COOLING
A         32         20           B         34         20           C         36         20			SPARE SPARE SPARE	 333 W 35TH STREET, CHICAGO, ILLINOIS 60616 DRAWING TITLE:
A         38         20           B         40         20           C         42         20			SPARE SPARE SPARE	ELECTRICAL PLAN - LEVEL 300 - SECTION 8
<u>   </u>   42   20   _	0 0	0 A	7488	
JIT BREAKER MAKE, MC	DEL, TOTAL(VA)	B C )		 DESIGNED BY: BT
	CONNEC.		41.6	 CHECKED BY:BTPROJECT NO:23504
				SCALE: 1/8" = 1'-0" SHEET NO.

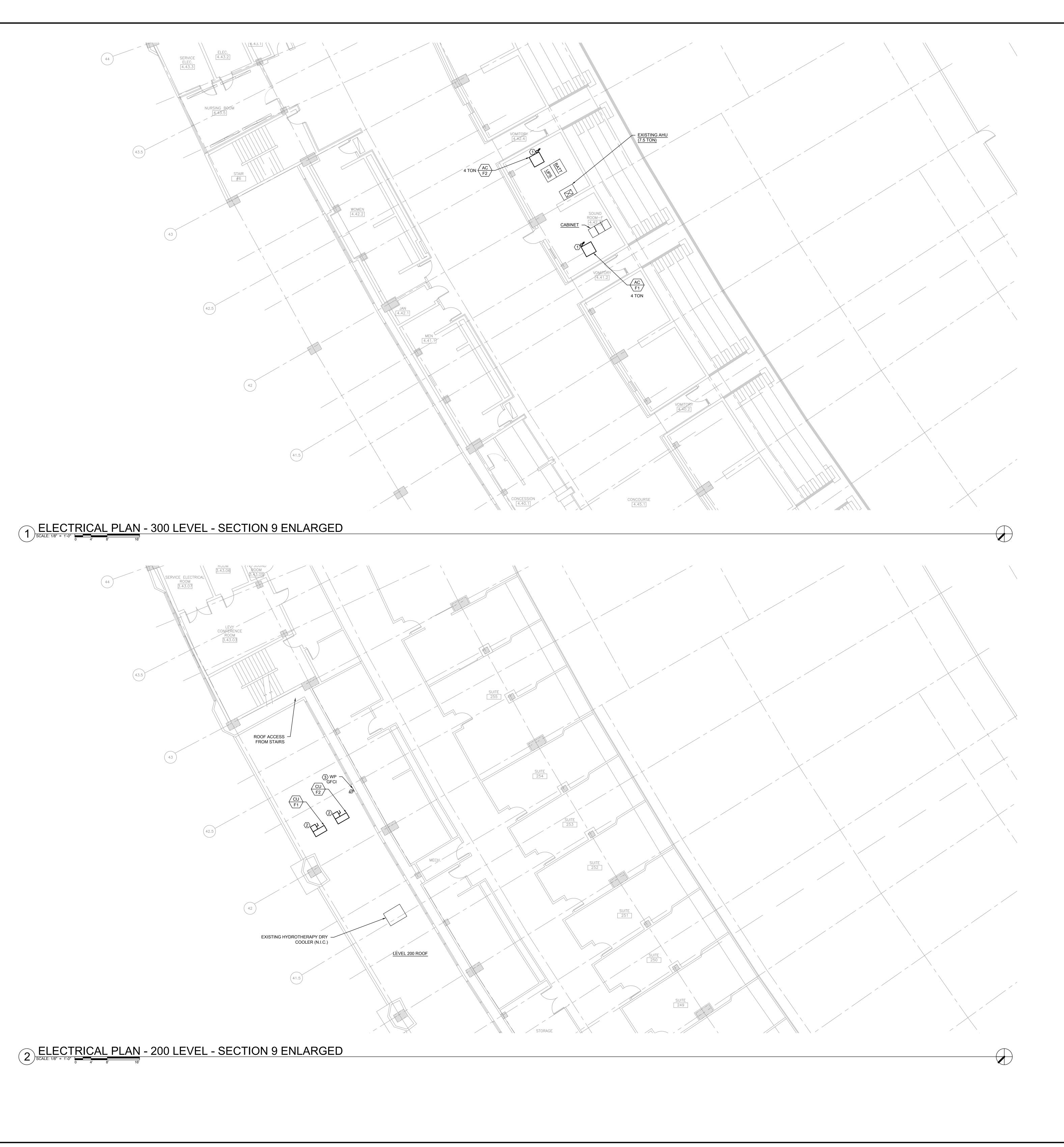
1	.3	NΣ
	.0	UC

# KEYED ELECTRICAL NEW WORK SHEET NOTES

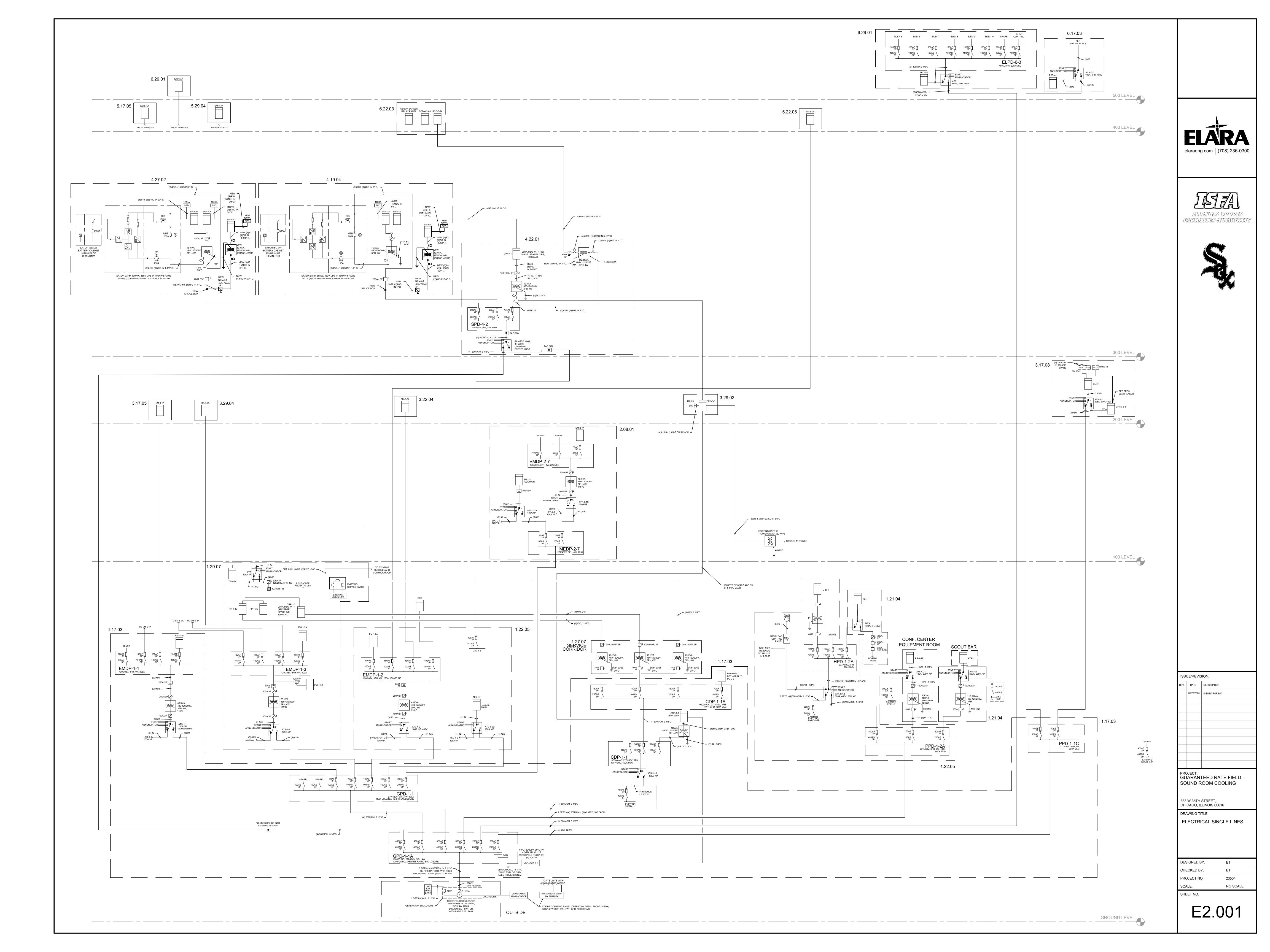
 $\langle \# \rangle$ 

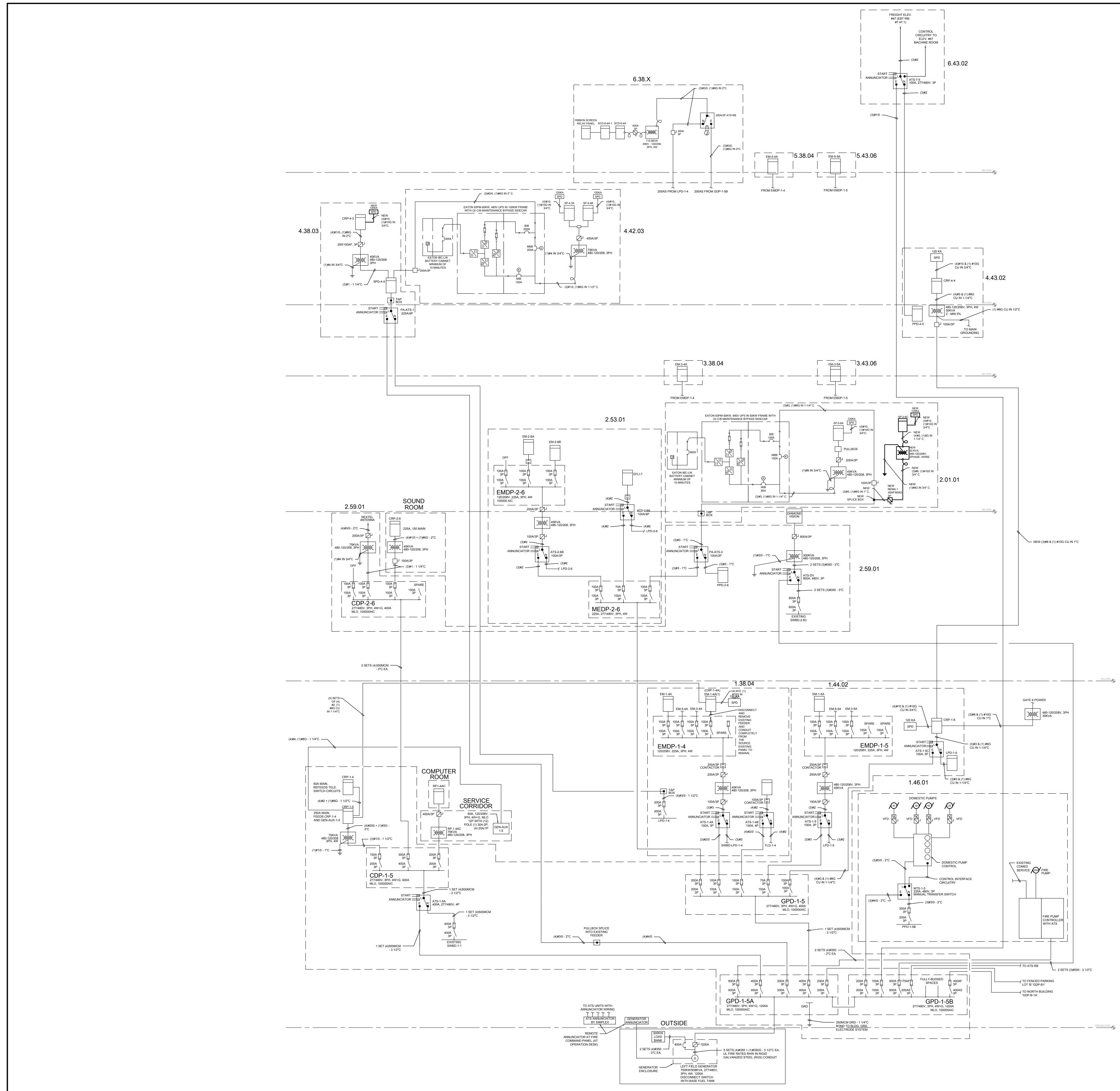
1. FURNISH AND INSTALL NEW 15A/2P TOGGLE DISCONNECT SWITCH WITH NEW BRANCH CIRCUIT FROM OUTDOOR CONDENSING UNIT. FURNISH AND INSTALL NEW 60A/2P, NEMA-3R LOCAL DISCONNECT SWITCH WITH NEW BRANCH CIRCUIT FROM THE NOTED PANELBOARD AND CIRCUIT.

- 3. 3. FURNISH AND INSTALL NEW 20A RATED WEATHER PROOF DUPLEX RECEPTACLE. FURNISH AND INSTALL NEW BRANCH CIRCUIT FROM THE NEAREST EXISTING RECEPTACLE CIRCUIT.



ELARAA elaraeng.com (708) 236-0300
ILLINOIS SPORTS FACILITIES AUTILORITY
KEY PLAN:
AREA OF WORK
ISSUE/REVISION:       REV.     DATE     DESCRIPTION       01/23/2025     ISSUED FOR BID
PROJECT: GUARANTEED RATE FIELD - SOUND ROOM COOLING 333 W 35TH STREET,
CHICAGO, ILLINOIS 60616 DRAWING TITLE: ELECTRICAL PLAN - LEVEL 300 - SECTION 9
DESIGNED BY: BT
CHECKED BY: BT PROJECT NO: 23504
SCALE: 1/8" = 1'-0" SHEET NO.
E1.309





ELARA	
elaraeng.com (708) 236-0300	
	_
LELLA ILLINOIS SPORTS	
EAGILITIES AUTHORITY	
ISSUE/REVISION: REV. DATE DESCRIPTION	
01/23/2025 ISSUED FOR BID	
	,
PROJECT: GUARANTEED RATE FIELD -	
SOUND ROOM COOLING	
333 W 35TH STREET, CHICAGO, ILLINOIS 60616	
DRAWING TITLE: ELECTRICAL SINGLE LINES	
DESIGNED BY: BT	
CHECKED BY: BT	
PROJECT NO:23504SCALE:NO SCALE	
SHEET NO.	
E2.002	

<ul> <li>I. GENERAL CONDITIONS AND REQUIREMENTS</li> <li>A. ALL ELECTRICAL WORK INCLUDING BUT NOT LIMITED TO INSTALLATION, GROUNDING, EQUIPMENT, AND DEVICES SHALL CONFORM TO THE REQUIREMENTS OF ALL AUTHORITIES HAVING</li> </ul>	<ul> <li>III. SHUT-DOWN OF SYSTEM</li> <li>A. COORDINATE AND SEQUENCE DEMOLITION SO AS NOT TO CAUSE SHUTDOWN OF OPERATION OF SURROUNDING AREAS.</li> </ul>
JURISDICTION AND APPLICABLE NATIONAL, STATE, CITY, AND MUNICIPAL BUILDING CODES. B. ALL ELECTRICAL WORK SHALL CONFORM TO NATIONAL AND LOCAL STANDARDS AND GUIDELINES INCLUDING BUT NOT LIMITED TO THE LATEST VERSIONS OF THE FOLLOWING:	<ul> <li>B. SHUT-DOWN PERIODS:</li> <li>1. ARRANGE TIMING OF SHUT-DOWN PERIODS OF SYSTEM, SERVICE WITH OWNER. DO NOT</li> </ul>
1. ANSI - AMERICAN NATIONAL STANDARDS INSTITUTE	SHUT DOWN ANY SERVICE, WITHOUT PRIOR WRITTEN APPROVAL. PROVIDE NOTICE MINIMUM 15 WORKING DAYS IN ADVANCE.
<ol> <li>ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA (IES)</li> <li>NATIONAL ELECTRICAL SAFETY CODE (NESC)</li> </ol>	<ol> <li>KEEP SHUT-DOWN PERIOD TO MINIMUM OR USE INTERMITTENT PERIOD AS DIRECTED BY THE OWNER.</li> <li>MAINTAIN LIFE-SAFETY SYSTEM IN FULL OPERATION IN OCCUPIED FACILITIES, OR PROVIDE</li> </ol>
<ol> <li>NFPA - NATIONAL FIRE PROTECTION ASSOCIATION: STANDARD FOR ELECTRICAL SAFETY IN THE WORKPLACE (NFPA 70E)</li> <li>UNDERWIDITERS &amp; ADORATORY (OR OTHER RECOONSTED INORECTING ACENO)</li> </ol>	<ol> <li>4. THE SYSTEM SHUT-DOWN SHALL BE DONE DURING OFF-BUSINESS HOURS.</li> </ol>
<ol> <li>UNDERWRITERS LABORATORY (OR OTHER RECOGNIZED INSPECTING AGENCY)</li> <li>THE APPLICABLE NATIONAL ELECTRICAL CODE (NEC).</li> </ol>	IV. VISIT TO SITE
<ol> <li>ENERGY CODE IECC.</li> <li>ALL MATERIALS SHALL BE LISTED BY AN APPROVED LABORATORY AND SHALL BE NEW AND THE BEST OF THEIR RESPECTIVE KINDS AND SHALL BE INSTALLED AND APPLIED AS INTENDED AND REQUIRED BY THE MANUFACTURER.</li> </ol>	A. THIS CONTRACTOR SHALL CAREFULLY EXAMINE THE ENTIRE SET OF CONTRACT DOCUMENTS, VISIT THE SITE, AND FULLY FAMILIARIZE HIMSELF/HERSELF AS TO ALL CONDITIONS AND MATTERS THAT CAN AFFECT THE WORK OR THE COST THEREOF. THIS CONTRACTOR IS RESPONSIBLE FOR NOTIFYING ENGINEER IN WRITING, AND PRIOR TO BID, OF DISCREPANCIES OR OMISSIONS FROM THE DRAWINGS, SPECIFICATIONS OR OTHER DOCUMENTS. OBTAIN CLARIFICATION PRIOR TO
<ul><li>D. ELECTRICAL WORK SHALL INCLUDE, BUT NOT BE LIMITED TO:</li><li>1. ALL MATERIALS</li></ul>	SUBMITTING ANY BID. LACK OF NOTIFICATION SHALL BE INTERPRETED TO INDICATE NO DISCREPANCIES OR CONFLICTS EXIST AND ADDITIONAL COMPENSATION WILL NOT BE GRANTED AFTER AWARD OF CONTRACT FOR ANY WORK REQUIRED TO COMPLY WITH THESE REQUIREMENTS OR INTENT.
<ol> <li>EQUIPMENT, TOOLS, AND LABOR REQUIRED FOR A COMPLETE AND CODE COMPLIANT SYSTEM.</li> <li>ANY OSHA REQUIREMENTS THAT MAY APPLY TO THE WORK UNDER THIS CONTRACT</li> </ol>	<ul> <li>B. SUBMISSION OF PROPOSALS SHALL BE CONSIDERED EVIDENCE THAT THE CONTRACTOR HAS VISITED AND EXAMINED THE SITE.</li> </ul>
INCLUDING BUT NOT LIMITED TO SAFETY MEETINGS, STRICT LOCK/OUT/TAG/OUT PROCEDURES, AND PROPER PROTECTIVE EQUIPMENT.	C. NO EXTRA PAYMENT WILL BE ALLOWED THE CONTRACTOR FOR EXTRA WORK CAUSED BY FAILURE TO VISIT, EXAMINE AND VERIFY.
<ol> <li>LABOR AND SPECIALTY MODELING SOFTWARE REQUIRED FOR INTERDISCIPLINARY COORDINATION AND FAMILIARIZATION WITH SITE CONDITIONS.</li> <li>TRAINING AND GATHERING OF DOCUMENTATION FOR CLOSEOUT PROCEDURES.</li> </ol>	D. THE ENGINEER WILL MAKE PERIODIC VISITS TO THE JOBSITE TO OBSERVE THE PROGRESS OF THE WORK AND TO OBSERVE ITS ACCORDANCE WITH THE CONTRACT DOCUMENTS. THE ENGINEER IS NOT A GUARANTOR OF THE CONTRACTOR'S WORK, RESPONSIBLE FOR JOBSITE SAFETY,
<ul> <li>E. THE DRAWINGS AND SPECIFICATIONS SHALL BE UNDERSTOOD TO COVER COMPLETE SYSTEMS ACCORDING TO THEIR INTENT AND MEANING AS DESCRIBED HEREIN. THIS SPECIFICATION IS INCLUSIVE FOR EACH ITEM, REQUIRING ALL LABOR, MATERIAL AND EQUIPMENT NECESSARY TO PROPERLY INSTALL, ALTER, ADJUST AND PUT IN OPERATION THE COMPLETE ELECTRICAL SYSTEM.</li> </ul>	RESPONSIBLE FOR SUPERINTENDING, OR IN CHARGE OF THE ERECTION AND/OR CONSTRUCTION OF THE WORK. THE ENGINEER IS NOT RESPONSIBLE FOR SAFETY OR ADEQUACY OF ANY SHIPMENT, BUILDING, SCAFFOLDING, FORMS OR OTHER WORK AIDS USED.
F. THIS CONTRACTOR IS RESPONSIBLE FOR FURNISHING AND INSTALLING ALL ELECTRICAL COMPONENTS AND SYSTEMS AS REQUIRED FOR A FULLY FUNCTIONAL SYSTEM AND AS DESCRIBED HEREIN. ALL EQUIPMENT AND DEVICES SPECIFIED AND ADDITIONALLY REQUIRED WILL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR. IT WILL BE THE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO PURCHASE ALL EQUIPMENT AND FURNISH LABOR AND EQUIPMENT FOR A COMPLETE CODE COMPLIANT OPERATING FURNISH LABOR AND	<ul> <li>V. LAWS, ORDINANCES, AND REGULATIONS</li> <li>A. ALL SYSTEMS SHALL CONFORM IN FULL AND/OR PART SHALL CONFORM TO ALL PERTINENT LAWS, ORDINANCES AND REGULATIONS OF ALL BODIES HAVING JURISDICTION AT ALL GOVERNING LEVELS, NOTWITHSTANDING ANYTHING IN THESE DRAWINGS OR SPECIFICATIONS TO THE CONTRARY. IN CASE OF CONFLICT BETWEEN GOVERNING LEVELS, THE MORE STRINGENT LAWS SHALL APPLY.</li> </ul>
EQUIPMENT FOR A COMPLETE CODE COMPLIANT OPERATING ELECTRICAL SYSTEM. G. THE CONTRACTOR IS RESPONSIBLE FOR THE PROPER LAYOUT AND CONSTRUCTION OF THE WORK INCLUDED IN THIS CONTRACT, INSTALLED ACCORDING TO THE APPLICABLE BUILDING CODES.	B. THE CONTRACTOR SHALL PAY ALL FEES AND OBTAIN AND PAY FOR ALL PERMITS AND INSPECTIONS REQUIRED BY ANY AUTHORITY HAVING JURISDICTION IN CONNECTION WITH HIS
H. SPECIFIC VOLTAGE AND CURRENT REQUIREMENTS ON THE ELECTRICAL DRAWINGS SHALL NOT RELIEVE THIS CONTRACTOR OF THE RESPONSIBILITY TO VERIFY THE VOLTAGE PRIOR TO PURCHASING OR ROUGH-IN WORK. THIS CONTRACTOR SHALL REVIEW ALL DEVICES AND	WORK. C. WHERE APPLICABLE, ALL NEW MATERIAL SHALL BEAR THE UNDERWRITER'S (UL) SEAL OF APPROVAL, AS WELL AS THOSE SEALS OF ALL MUNICIPALITIES HAVING JURISDICTION.
<ul> <li>EQUIPMENT FURNISHED BY HIS/HER CONTRACT AND THOSE FURNISHED BY OTHER CONTRACTORS ARE IN AGREEMENT WITH THE DATA SHOWN ON THE DRAWINGS. THE E.C. SHALL PROVIDE FEEDERS, CABLE AND DEVICES THAT ARE IN ACCORDANCE WITH CODE.</li> <li>I. ITEMS, ACCESSORIES, AND DEVICES REASONABLY INFERABLE AS NECESSARY FOR THE</li> </ul>	<ul> <li>CERTIFICATES TO THIS AFFECT TO BE FURNISHED TO ARCHITECT UPON REQUEST.</li> <li>D. THE ELECTRICAL CONTRACTOR SHALL SECURE AND PAY FOR ALL LICENSES REQUIRED BY THE GOVERNING BODIES TO OPERATE AS AN ELECTRICAL CONTRACTOR FOR THIS PROJECT.</li> </ul>
COMPLETE AND PROPER OPERATION OF ANY SYSTEM SHALL BE PROVIDED BY THE CONTRACTOR FOR SUCH SYSTEM(S), WHETHER THEY ARE SPECIFICALLY CALLED FOR BY THE DRAWINGS AND/OR SPECIFICATIONS OR NOT.	E. ALL LIGHT FIXTURES, RECEPTACLES, AND ELECTRICAL COMPONENTS SHALL BE DISPOSED IN CONFORMANCE WITH EPA REGULATION.
J. THE DRAWINGS MAY NOT SHOW COMPLETE OR ACCURATE DETAILS OF THE EXISTING FACILITY IN EVERY RESPECT. EXACT LOCATIONS AND RELATIONS ARE TO BE DETERMINED IN THE FIELD AND SHALL BE TO THE SATISFACTION OF THE OWNER. THIS CONTRACTOR SHALL VERIFY AND BE	<u>VI. WORKMANSHIP</u> A. ALL WORK TO BE PERFORMED SHALL BE DONE BY QUALIFIED MECHANICS. ALL MECHANICS IN
<ul> <li>RESPONSIBLE FOR ALL FIELD MEASUREMENTS AND EXACT EQUIPMENT LOCATIONS.</li> <li>K. DRAWINGS ARE GENERALLY DIAGRAMMATIC. ROUTING OF CONDUIT AND RACEWAYS ARE SHOWN FOR CONCEPT. BUT DO NOT INTEND TO SHOW EVERY RISE, DROP, OFFSET, FITTING, NOR EVERY</li> </ul>	THE EMPLOY OF THIS CONTRACTOR ON THIS PROJECT SHALL BE SKILLED IN THE PHASES OF THE WORK TO WHICH THEY ARE USED.
STRUCTURAL ELEMENT THAT MAY BE ENCOUNTERED DURING THE INSTALLATION OF THIS WORK. CONTRACTOR SHALL MAKE ANY REQUIRED CHANGES FROM THE GENERAL ROUTING SHOWN ON THESE DRAWINGS, SUCH AS OFFSETS, BENDS OR CHANGES IN ELEVATION DUE TO COORDINATION WITH THE WORK OF OTHER TRADES AND BUILDING CONSTRUCTION. ALL CHANGES SHALL BE MADE WITHOUT ADDITIONAL COST TO THE OWNER OR DELAY IN COMPLETION DATE OF THE	<ul> <li>B. ALL WORK MUST BE DONE IN WORKMANLIKE MANNER TO THE COMPLETE SATISFACTION OF THE ENGINEER. ALL MATERIAL SHALL BE NEW, OF THE QUALITY SPECIFIED, FREE FROM DEFECTS AND IN FIRST-CLASS CONDITION. ALL VERTICAL CONDUITS SHALL BE PLUMB.</li> <li>C. THE COMPLETE SYSTEM SHALL MEET THE REQUIREMENTS OF THE LOCAL ELECTRICAL CODE AND AS MAY BE MODIFIED BY LOCAL AMENDMENTS.</li> </ul>
<ul> <li>PROJECT.</li> <li>L. IT IS INTENDED THAT EQUIPMENT SHALL BE LOCATED SYMMETRICALLY WITH THE ARCHITECTURAL ELEMENTS OF THE BUILDING, NOTWITHSTANDING THE FACT THAT LOCATIONS INDICATED BY THESE DRAWINGS MAY BE DISTORTED FOR CLEARNESS OF PRESENTATION. ENGINEER HAS RIGHT TO MOVE ANY EQUIPMENT OR DEVICE BY 10 FEET WITHOUT ANY ADDITIONAL COST TO OWNER. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO SUBMIT SHOP DRAWINGS FOR APPROVAL PRIOR TO ROUGH-IN.</li> </ul>	D. THIS CONTRACTOR SHALL ESTABLISH SAFE WORKING PROCEDURES FOR THE PROTECTION OF THE WORKING CREW AND NON-WORKING OCCUPANTS IN ALL PHASES OF WORK, COMPLYING WITH THE APPLICABLE PROVISIONS OF ALL CITY, STATE AND FEDERAL SAFETY LAWS (OSHA). THIS SHALL INCLUDE "LOCK-OUT/TAG-OUT" AND REQUIRED GROUNDING. WORK UNDER THIS CONTRACT SHALL NOT BE DONE ON ENERGIZED CIRCUITS.
M. CONTRACTOR SHALL BE RESPONSIBLE AND PAY FOR ALL X-RAY IMAGING, CORING, CUTTING, PATCHING, REPAIRING AND REFINISHING OF BUILDING CONSTRUCTION REQUIRED TO ACCOMMODATE THE INSTALLATION OF THEIR WORK. ALL PATCHING, REPAIRING AND REFINISHING	VII. MATERIALS AND EQUIPMENT A. ALL MATERIALS AND EQUIPMENT SHALL BE NEW AND SHALL CONFORM TO THE GRADE, QUALITY
WORK SHALL BE PERFORMED BY THOSE REGULARLY INVOLVED IN THAT TRADE AND SHALL MATCH THE NEW CONSTRUCTION AS CLOSELY AS POSSIBLE. CARE SHALL BE TAKEN SO AS NOT TO DAMAGE ANY EXISTING BUILDING CONSTRUCTION OR ITEMS THAT ARE TO REMAIN. ANY EXISTING FINISHES THAT ARE DAMAGED DURING THE INSTALLATION OF NEW WORK SHALL BE REPAIRED,	AND STANDARD SPECIFIED HEREIN. ALL EQUIPMENT OFFERED UNDER THESE SPECIFICATIONS SHALL BE LIMITED TO PRODUCTS REGULARLY PRODUCED AND RECOMMENDED FOR SERVICE, IN ACCORDANCE WITH ENGINEERING DATA, RATINGS OR OTHER COMPREHENSIVE LITERATURE MADE AVAILABLE TO THE PUBLIC AND IN EFFECT AT THE TIME OF OPENING OF BIDS.
REPLACED AND PAID FOR BY THE INSTALLING CONTRACTOR, TO THE SATISFACTION OF THE ENGINEER AND OWNER. N. THIS CONTRACTOR IS RESPONSIBLE FOR SCHEDULING DELIVERY, RECEIVING, UNLOADING,	B. EQUIPMENT SHALL BE INSTALLED IN STRICT ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS FOR TYPE AND CAPACITY OF EACH PIECE OF EQUIPMENT USED, UNLESS INDICATED OTHERWISE, THE ENGINEER MAKES NO REPRESENTATION AS TO WHETHER OR NOT
UNCRATING, STORING, SETTING IN PLACE, AND PROTECTING FROM DAMAGE, VANDALISM, THEFT OR WEATHER ALL NEW EQUIPMENT FURNISHED BY THIS CONTRACTOR FOR THE ENTIRETY OF CONSTRUCTION. THIS REQUIREMENT ALSO APPLIES TO ITEMS FURNISHED BY THE OWNER TO THE ELECTRICAL CONTRACTOR. THIS CONTRACTOR SHALL COORDINATE THE DELIVERY TO MEET THE PROJECT COMPLETION DATES AS ESTABLISHED BY THE OWNER.	ANY HAZARDOUS OR CONTAMINATED MATERIALS (INCLUDING BUT NOT LIMITED TO ASBESTOS, PCB'S, CONTAMINATED SOILS, ETC.) ARE PRESENT WITHIN THE EXISTING BUILDING OR ON THE SITE. WORK SHOWN ON THE DRAWINGS AND/OR INDICATED IN THE SPECIFICATIONS SHALL NOT BE CONSTRUED TO CALL FOR CONTACT WITH ANY OF THESE MATERIALS. IF THESE MATERIALS ARE ENCOUNTERED OR SUSPECTED THE CONTRACTOR SHALL NOT DISTURB THEM AND SHALL CONTACT THE ENGINEER IMMEDIATELY.
O. REFER TO ARCHITECTURAL DRAWINGS FOR EXISTING BUILDING CONSTRUCTION THAT IS TO REMAIN AND, THEREFORE, SUBJECT TO PATCHING, REPAIRING, AND REFINISHING.	C. ALL INSTRUMENTS, APPARATUS AND EQUIPMENT SHALL BE TESTED AND PROVED TO BE ELECTRICALLY AND MECHANICALLY WITHOUT DEFECTS. THE ELECTRICAL SYSTEM SHALL BE
<ul> <li>P. ANY ITEMS AND EQUIPMENT SCHEDULED TO BE REMOVED THAT THE OWNER WANTS TO RETAIN SHALL BE REMOVED CAREFULLY (SO AS NOT TO DAMAGE THEM) AND TURNED OVER TO THE OWNER. ALL OTHER ITEMS TO BE REMOVED SHALL BECOME THE PROPERTY OF THE CONTRACTOR AND REMOVED FROM THE SITE.</li> <li>Q. CONTRACTOR SHALL BE RESPONSIBLE FOR THEIR OWN CLEANUP DURING CONSTRUCTION. IF</li> </ul>	TESTED FOR GROUNDS OR SHORTS. IF THE TROUBLE IS WITHIN THE CIRCUIT WIRING, ALL SHORTED OR GROUNDED WIRES SHALL BE REPLACED AND THEN RE-TESTED. ALL METERS, CABLES, EQUIPMENT OR APPARATUS NECESSARY FOR MAKING ALL TESTS SHALL BE FURNISHED AND PROVIDED BY THIS CONTRACTOR. ANY TESTING OR EQUIPMENT MUST CONFORM TO OSHA REQUIREMENTS.
CONTRACTOR FAILS TO PROVIDE SUCH CLEANUP, THE ENGINEER WILL DIRECT ANOTHER CONTRACTOR TO PERFORM THE CLEAN-UP AND THE NEGLIGENT CONTRACTOR SHALL PAY THE ASSOCIATED BACK-CHARGES AS DEEMED APPROPRIATE BY THE ENGINEER.	VIII. COORDINATION WITH OTHER TRADES
R. ACCESS TO WORK AREAS, INCLUDING WORK SCHEDULED THEREIN, MUST HAVE PRIOR APPROVAL OF THE OWNER. ALL WORK AREAS WILL BE KEPT CLEAN BY THIS CONTRACTOR WITH THOROUGH CLEAN UP AT END OF EACH DAY'S WORK. ALL EXISTING ELECTRIC SERVICE	A. THE SEQUENCE FOR THE INSTALLATION OF ALL WORK SHALL BE COORDINATED BETWEEN ALL CONTRACTORS ON THE PROJECT AND IN STRICT ACCORDANCE WITH ENGINEER AND OWNERS STIPULATION AS CALLED FOR IN THE SPECIFICATION AND/OR AS DIRECTED.
EQUIPMENT IS TO REMAIN OPERATIONAL DURING THE CONSTRUCTION PERIOD. ANY TEMPORARY WIRING OR REROUTING OF CIRCUITRY TO ACHIEVE THIS IS BY THE ELECTRICAL CONTRACTOR. S. CONTRACTOR SHALL FURNISH MATERIALS AND USE INSTALLATION METHODS SUITABLE FOR THE	B. THE CONTRACTOR IS RESPONSIBLE FOR PROVIDING THE LABOR AND SOFT MATERIALS REQUIRED FOR COORDINATING CONSTRUCTION INSTALLATION ELECTRONICALLY WITH OTHER TRADES USING CURRENT SOFTWARE AND MODELING SYSTEMS. THE CONTRACTOR SHALL CONFIRM
ENVIRONMENTAL CONDITIONS OF THE AREA IN WHICH EQUIPMENT, FIXTURES AND DEVICES ARE INSTALLED.	MODELING REQUIREMENTS PRIOR TO BID. C. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATING HIS WORK WITH THAT WORK OF THE OTHER TRADES. CONTRACTOR IS COMPLETELY RESPONSIBLE IF FAILURE ON HIS PART TO
T. CONTRACTOR SHALL PROVIDE SLEEVES IN BEAMS, FLOORS, COLUMNS AND WALLS, AS REQUIRED BY JOB SITE CONDITIONS, AND/OR AS SPECIFIED, WHEN INSTALLING THEIR WORK. ALL BEAMS AND COLUMNS WHICH ARE REQUIRED TO BE SLEEVED SHALL BE CUT AND REINFORCED AS REQUIRED BY FIELD CONDITIONS AND LOCATIONS AND SIZES SHALL BE CHECKED AND APPROVED BY ENGINEER BEFORE CONTRACTOR CUTS ANY BUILDING STRUCTURAL MEMBER.	<ul> <li>COORDINATE EFFORTS RESULTS IN EXTRA WORK HAVING TO BE DONE TO COMPLETE A TASK. AS SUCH, HIS FAILURE SHALL NOT BE THE BASIS FOR ANY EXTRA CHARGE AGAINST THE OWNER.</li> <li>D. CONTRACTOR SHALL CHECK DRAWINGS OF OTHER TRADES TO VERIFY THAT SPACES IN WHICH THEIR WORK WILL BE INSTALLED IS CLEAR OF OBSTRUCTIONS. WORK SHALL BE INSTALLED TO</li> </ul>
U. CONTRACTOR SHALL REFER TO THE ARCHITECTURAL AND STRUCTURAL CONTRACT DRAWINGS (BEFORE SUBMITTING THEIR BIDS) TO FAMILIARIZE THEMSELVES WITH THE EXTENT OF THE GENERAL CONTRACTORS WORK, CEILING HEIGHTS AND CLEARANCE FOR INSTALLING THEIR	MAINTAIN MAXIMUM HEADROOM AND SPACE CONDITION AT ALL POINTS IN THE BUILDING. WHERE HEADROOM OR SPACE CONDITIONS APPEAR INADEQUATE, CONTRACTOR SHALL NOTIFY ENGINEER BEFORE PROCEEDING WITH THE INSTALLATION OF THEIR WORK. CONTRACTOR SHALL FURNISH OTHER TRADES ADVANCE INFORMATION AND/OR SHOP DRAWINGS ON LOCATIONS AND
<ul> <li>WORK.</li> <li>V. CONTRACTOR SHALL STORE ALL MATERIALS AND EQUIPMENT SHIPPED TO THE SITE IN A PROTECTED AREA. IF MATERIAL IS STORED OUTSIDE OF THE BUILDING, IT MUST BE STORED OFF</li> </ul>	SIZES OF CONDUITS, RACEWAYS, EQUIPMENT, FRAMES, BOXES, SLEEVES AND OPENINGS, ETC. NEEDED FOR THEIR WORK TO PERMIT OTHER TRADES AFFECTED TO INSTALL THEIR WORK PROPERLY AND WITHOUT DELAY.
THE GROUND A MINIMUM OF SIX INCHES (6") ON 6' x 6' PLANKS AND/OR WOOD PALLETS. ALL PIPING AND DUCTWORK WILL HAVE THE ENDS CLOSED TO KEEP OUT DIRT AND OTHER DEBRIS. NO EQUIPMENT SHALL BE STORED ON THE SITE UNLESS IT IS SITTING ON WOOD PLANKS AND	E. WHERE THERE IS EVIDENCE THAT WORK OF ONE TRADE WILL INTERFERE WITH WORK OF OTHER TRADES, ALL TRADES SHALL MEET ON JOB SITE TO WORK OUT SPACE CONDITIONS, AND MAKE SATISFACTORY ADJUSTMENTS TO INSTALLATION OF THE NEW WORK. CONTRACTOR SHALL
COMPLETELY PROTECTED WITH WEATHERPROOF COVERS. ALL MATERIALS AND EQUIPMENT MUST BE COMPLETELY COVERED WITH WATERPROOF TARPS OR VISQUIN. W. ELECTRICAL CONTRACTOR SHALL COORDINATE ALL NON-ACCESSIBLE SYSTEM DEVICES, PULL	VERIFY EXACT LOCATIONS OF ALL ELECTRICAL DEVICES AND EQUIPMENT PRIOR TO ROUGH-IN WITH FIELD CONDITIONS, SHOP DRAWINGS AND WORK OF OTHER TRADES. EACH CONTRACTOR SHALL BE RESPONSIBLE, AT THEIR OWN EXPENSE, FOR THE REMOVAL AND REINSTALLATION OF
BOXES AND EQUIPMENT, ETC. TO ACCESSIBLE CEILING AREAS. E.C. SHALL INCLUDE ALL COMPLETE COSTS FOR RELOCATION AND VERIFY SUCH CONDITIONS WITH ARCHITECTURAL CEILING PLANS PRIOR TO FINAL BID.	ANY PART OF THEIR WORK IF SAME WAS INSTALLED WITHOUT CONSULTING WITH OTHER TRADES BEFORE INSTALLING THEIR WORK. F. REFER TO THE ARCHITECTURAL, MECHANICAL AND PLUMBING SHEETS AND SPECIFICATIONS FOR
X. ELECTRICAL CONTRACTOR SHALL FOLLOW NEMA NO. PB-1.1 1979 PUBLICATION, PART V PROCEDURES PRIOR TO ENERGIZATION OF ANY SWITCHGEAR. THE ELECTRICAL CONTRACTOR SHALL USE ONLY TRAINED AND AUTHORIZED PROFESSIONAL ELECTRICAL CRAFT PERSONS. THE	EQUIPMENT LOCATIONS, LOADS, AND ADDITIONAL REQUIREMENTS. G. ELECTRICAL CONTRACTOR SHALL COORDINATE WITH MECHANICAL CONTRACTOR FOR EXACT
E.C. SHALL FURNISH ANY PERSONNEL SAFETY EQUIPMENT, LADDERS, MAN-LIFTS, AND POWERED HAND TOOLS THAT MAY BE REQUIRED. ALL POWERED TOOLS SHALL BE IN GOOD CONDITION WITH ALL GROUND CONDUCTOR IN PROPER OPERATION.	LOCATION OF HVAC EQUIPMENT TO BE WIRED PRIOR TO ROUGH-IN. H. THE EC SHALL REVIEW AND BE FAMILIAR WITH THE MECHANICAL DRAWINGS AND SCHEDULES FOR FINAL EQUIPMENT SELECTION. THE EC SHALL VERIFY HORSEPOWER, VOLTAGE, PHASES,
Y. VERIFY CODE CLEARANCES FOR ALL NEW ELECTRICAL WORK BEFORE PROCEEDING WITH CONSTRUCTION. PROVIDE ADEQUATE WORKING CLEARANCES, DEDICATED EQUIPMENT SPACE, AND LEAK PROTECTION SYSTEMS AS REQUIRED BY APPLICABLE ELECTRICAL CODES.	AMPACITY, AND SPECIAL MOUNTING BEFORE SUBMITTING HIS BID. ANY SPECIAL CONDITIONS OR CONFLICTS MUST BE INDICATED IN WRITING TO THE ENGINEER PRIOR TO OR AT THE TIME OF BID.
COORDINATE USAGE OF AVAILABLE SPACE WITH ALL TRADES. IN THE EVENT OF CONFLICTS, NOTIFY THE ENGINEER BEFORE PROCEEDING WITH THE WORK.	I. BEFORE STARTING ANY DEMOLITION ON HVAC EQUIPMENT WHICH HAS AN ELECTRICAL CONNECTION.THE MECHANICAL CONTRACTOR SHALL MEET WITH THE ELECTRICAL CONTRACTOR TO IDENTIFY ALL SUCH EQUIPMENT. THE ELECTRICAL CONTRACTOR WILL DISCONNECT THE POWER TO EACH UNIT, REMOVE CONDUIT, WIRING, DISCONNECT SWITCHES, AND STARTERS
<ul><li>Z. EXISTING, DEMOLITION, AND SALVAGE NOTATIONS:</li><li>1. EX - EXISTING TO REMAIN.</li></ul>	UNDER HIS CONTRACT. MECHANICAL CONTRACTOR WILL REMOVE ALL EQUIPMENT, ELECTRICAL TEMPERATURE CONTROL AND WIRING UNDER HIS CONTRACT. MECHANICAL CONTRACTOR SHALL NOT START DEMOLITION UNTIL ALL ELECTRICAL POWER HAS BEEN SAFELY DISCONNECTED FROM
2. X - DISCONNECT AND REMOVE THE EXISTING DEVICE MARKED WITH THE TAG "X" COMPLETELY. REMOVE EXISTING CONDUIT AND WIRES/CABLES COMPLETELY FROM THE SOURCE.	EQUIPMENT TO BE DEMOLISHED.
<ol> <li>ER# - DISCONNECT, REMOVE, AND SALVAGE THE EXISTING DEVICE MARKED WITH THE TAG "ER" FOR RELOCATION. EXISTING CONDUIT AND WIRE/CABLE SHALL REMAIN. EXTEND EXISTING WIRE/CABLE AND CONDUIT AS REQUIRED TO RELOCATED DEVICE LOCATION.</li> </ol>	A. THE CONTRACTOR SHALL PROVIDE COMPLETE SHOP DRAWINGS INDICATING EQUIPMENT, DEVICE, AND RACEWAY LOCATIONS, INVERTS FOR OUTDOOR DEVICES, AND COMPLETE INSTALLATION
<ul> <li>R - DISCONNECT AND REMOVE THE EXISTING DEVICE MARKED WITH THE TAG "R" COMPLETELY. EXISTING CONDUIT AND WIRE/CABLE SHALL REMAIN.</li> <li>XS. DISCONNECT, REMOVE, AND SALVACE THE EXISTING DEVICE MARKED WITH THE TAC "XS".</li> </ul>	DRAWINGS. THE DRAWINGS SHALL BE MAINTAINED AT THE JOB SITE AND SHALL BE UPDATED AND MAINTAINED IN AS NEAR AS POSSIBLE TO THE "AS INSTALLED" STATUS OF THE PROJECT AND SHALL BE KNOWN AS "CONTRACT RECORD DOCUMENTS". THE DRAWINGS SHALL BE REVISED IN AN AUTOCAD FORMAT AND SUBMITTED TO THE ENGINEER FOR REVIEW. THE FINAL ELECTRICAL
5. XS - DISCONNECT, REMOVE, AND SALVAGE THE EXISTING DEVICE MARKED WITH THE TAG "XS". REMOVE EXISTING CONDUIT AND WIRE/CABLE COMPLETELY FROM THE SOURCE.	PAYOUT SHALL NOT BE MADE TO THE EC UNTIL THE CONTRACT RECORD DOCUMENTS HAVE BEEN RECEIVED AND REVIEWED BY THE ENGINEER. THE ENGINEER WILL PROVIDE WRITTEN CONFIRMATION TO THE OWNER AND GENERAL CONTRACTOR FOR FINAL PAYOUT BASED ON THE REVIEW OF THE CONTRACT RECORD DOCUMENTS.
II. CONFLICT IN DOCUMENTS A. GENERALLY, THE DRAWINGS ESTABLISH THE LOCATION, QUANTITY AND RELATIONSHIP OF THE	B. PROVIDE PRODUCT DATA FOR ALL EQUIPMENT AND DEVICES SUCH AS PANELBOARDS, DISCONNECT SWITCHES, CONDUIT & JUNCTION BOXES, WIRING, GROUNDING MATERIALS, WIRING DEVICES, EMERGENCY GENERATOR, PIPING MATERIALS, VALVES, ETC.
PARTS OF THE WORK, AND THE SPECIFICATIONS DEFINE THE TYPE AND QUALITY OF MATERIALS AND WORKMANSHIP. WORK SHOWN IN THE DRAWINGS AND NOT MENTIONED IN THE SPECIFICATIONS, OR REQUIRED BY THE SPECIFICATIONS AND NOT SHOWN ON THE DRAWINGS,	C. PROVIDE DIMENSIONAL DRAWINGS, MANUFACTURERS' TECHNICAL DATA, PERFORMANCE, ELECTRICAL CHARACTERISTICS, RATINGS, AND FINISHES. INCLUDE WIRING DIAGRAMS FOR POWER, SIGNAL, AND CONTROL WIRING.
SHALL BE PROVIDED AS IF FULLY PROVIDED FOR IN BOTH. IN THE CASE OF CONFLICTS BETWEEN THE DRAWINGS AND SPECIFICATIONS, OR WITHIN EITHER DOCUMENT, THE ENGINEER SHALL DETERMINE THE INTENT. IN SUCH CASES, IN GENERAL, THE MORE STRINGENT REQUIREMENT	D. PROVIDE OPERATION AND MAINTENANCE DATA FOR ALL EQUIPMENT AND DEVICES INCLUDING MANUFACTURER'S WRITTEN INSTRUCTIONS FOR TESTING AND ADJUSTING EQUIPMENT AND DEVICES.
CONCERNING GREATER QUANTITY, QUALITY AND/OR RESULTING IN A HIGHER COST SHALL GOVERN WITHOUT FURTHER COST TO THE OWNER.	E. PROVIDE SHOP DRAWINGS FOR CONDUITS LARGER THAN 1" AND ALL EXPOSED RACEWAYS.

I. GENERAL CONDITIONS AND REQUIREMENTS

## ) SEQUENCE DEMOLITION SO AS NOT TO CAUSE SHUTDOWN OF OPERATION OF

X. IDENTIFICATION

- A. IN ADDITION TO THE REQUIREMENTS OF THE ELECTRICAL CODE AND OSHA, INSTALL AN IDENTIFICATION SIGN WHICH CLEARLY INDICATES INFORMATION REQUIRED FOR USE AND MAINTENANCE OF ITEMS SUCH AS PANELBOARDS, MOTOR CONTROLLERS (VFD, STARTERS, ETC.), SAFETY SWITCHES, CONTROL DEVICES AND OTHER SIGNIFICANT EQUIPMENT. NAMEPLATES SHALL BE LAMINATED BLACK PHENOLIC RESIN WITH A WHITE CORE WITH ENGRAVED LETTERING, A MINIMUM OF 6 MM (1/4_INCH) HIGH.
- B. PROVIDE PANELBOARD AND CIRCUIT NUMBER TAG ON EACH RECEPTACLE.
- XI. FIRESTOPPING
- A. APPLY UL LISTED FIRE STOPPING TO PENETRATIONS OF FIRE-RATED FLOOR AND WALL ASSEMBLIES FOR ELECTRICAL INSTALLATIONS TO RESTORE ORIGINAL FIRE-RESISTANCE RATING OF ASSEMBLY.
- B. PROVIDE FIRE PUTTY TO MEET FIRE RATED ENCLOSURE UL LISTING REQUIREMENTS ON ALL ELECTRICAL BOXES INSTALLED ON THE FIRE RATED WALLS AND CEILINGS.

XII. CLOSEOUT PROCEDURES

- A. TESTING 1. PERFORM TESTS RECOMMENDED BY MANUFACTURER INCLUDING VISUAL, MECHANICAL, AND ELECTRICAL INSPECTIONS.
- 2. PERFORM INSULATION-RESISTANCE TESTS IN ACCORDANCE WITH IEEE 43.
- 3. FUNCTIONALLY TEST EQUIPMENT TO ENSURE IT IS INSTALLED PER DESIGN. 4. PROVIDE OPERATIONAL TEST AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, CONFIRM
- PROPER OPERATION. 5. PROVIDE WRITTEN REPORT OF THE RESULTS OF TESTS AND INSPECTIONS.
- 6. PERFORM EMERGENCY SYSTEM (GENERATOR, TRANSFER SWITCH, EMERGENCY LIGHTING, BATTERIES, ETC.) TESTS RECOMMENDED BY MANUFACTURER INCLUDING VISUAL AND MECHANICAL AND ELECTRICAL INSPECTIONS. FUNCTIONALLY TEST EQUIPMENT TO ENSURE IT IS INSTALLED PER DESIGN INCLUDING EMERGENCY LIGHTING BLACKOUT TEST. PROVIDE OPERATIONAL TEST AFTER ELECTRICAL CIRCUITRY HAS BEEN ENERGIZED, CONFIRM PROPER OPERATION. PROVIDE WRITTEN REPORT OF THE RESULTS OF TESTS AND INSPECTIONS. B. GUARANTEE
- 1. THIS CONTRACTOR SHALL UNCONDITIONALLY GUARANTEE IN WRITING ALL MATERIAL, EQUIPMENT AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FROM DATE OF ACCEPTANCE BY OWNER. THE CONTRACTOR SHALL PROVIDE FREE SERVICE FOR ALL EQUIPMENT INVOLVED IN HIS CONTRACT DURING THIS GUARANTEE PERIOD.
- 2. THE GUARANTEE SHALL INCLUDE RESTORATION TO ITS ORIGINAL CONDITION OF ALL ADJACENT WORK THAT MUST BE DISTURBED IN FULFILLING THIS GUARANTEE.
- 3. ALL SUCH REPAIRS AND/OR REPLACEMENTS SHALL BE MADE WITHOUT DELAY AND AT THE CONVENIENCE OF THE DEVELOPER AND TENANT. C. WARRANTY
- 1. INSTALLER AND MANUFACTURERS AGREE TO REPAIR OR REPLACE MATERIALS OR WORKMANSHIP THAT FAIL WITHIN SPECIFIED WARRANTY PERIOD. WARRANTY PERIOD SHALL BE ONE YEAR FROM DATE OF SUBSTANTIAL COMPLETION. D. INSPECTION
- 1. ALL ELECTRICAL WORK IS TO BE INSPECTED AND APPROVED BY THE AUTHORIZED REPRESENTATIVE BEFORE THE SYSTEM IS ENERGIZED. DUPLICATE CERTIFICATES OF THIS APPROVAL SHALL BE DELIVERED TO THE ENGINEER.
- 2. ALL FEES FOR THIS INSPECTION AND APPROVAL SHALL BE BORNE BY THE CONTRACTOR AND ARE TO BE INCLUDED IN HIS/HER BID. NO EXTRA COMPENSATION SHALL BE ALLOWED FOR THIS SERVICE E. CLOSEOUT DOCUMENT AND EQUIPMENT TURNOVER
- 1. PROVIDE FINAL AS-BUILT DRAWINGS IN ELECTRONIC PDF FORMAT TO OWNER AND ENGINEER SHOWING FINAL INSTALLED CONDITIONS AND BEFORE FINAL PAYMENT WILL BE ISSUED. 2. THE AS-BUILT DRAWINGS SHALL DIAGRAMMATICALLY INDICATE THE INSTALLED CONDITION, CIRCUIT NUMBERS, AND LOCATION OF THE DEVICES FOR ALL WORK. THESE DRAWINGS SHALL BE CONSIDERED CONTRACT RECORD DOCUMENTS AND SHALL ACCURATELY REFLECT THE
- ACTUAL INSTALLATION OF THE ELECTRICAL COMPONENTS AND CONDUITS. 3. PROVIDE ALL EQUIPMENT INSTALLATION, MAINTENANCE, AND INSTRUCTION MANUALS.
- 4. TURN OVER ALL KEYS, SPARE MATERIALS, STOCK ITEMS, AND OTHER EQUIPMENT PURCHASED AS PART OF THE CONTRACT AND BELONGING TO THE OWNER.

XIII. HANGERS AND SUPPORT SYSTEMS

- A. CONTRACTOR SHALL INSTALL ALL AUXILIARY SUPPORTING STEEL AS REQUIRED FOR THE SUPPORTING OF THEIR CONDUIT, FIXTURES, DEVICES, EQUIPMENT, ETC. ALL SUPPORTING STEEL FOR ITEMS ABOVE A SUSPENDED CEILING SHALL BE FROM BUILDING STRUCTURAL MEMBERS ONLY.
- B. THIS CONTRACTOR SHALL VERIFY ALL EQUIPMENT AND DEVICE MOUNTING ARRANGEMENTS, HEIGHTS, AND LOCATIONS PRIOR TO ROUGH-IN. ANY MENTION OF A SPECIFIC MOUNTING ARRANGEMENT, HEIGHT, OR LOCATION SHALL NOT RELIEVE THIS CONTRACTOR OF THE RESPONSIBILITY TO COORDINATE LOCATIONS AND SPECIFIC REQUIREMENTS WITH THE EQUIPMENT FURNISHED BY OTHER TRADES IN THE SAME AREA. NO ADDITION TO THE CONTRACT SUM WILL BE PERMITTED FOR WRONG OR CONFLICTING LOCATIONS. THE OWNER RESERVES THE RIGHT TO RELOCATE ANY DEVICE 10' - 0" PRIOR TO ROUGH-IN WITHOUT ANY ADDITIONAL CHARGE BY THIS CONTRACTOR. THIS CONTRACTOR SHALL FULLY COORDINATE ELECTRICAL WORK WITH THE INSTALLATION OF WORK BY ALL OTHER TRADES AND MAKE NECESSARY FIELD ADJUSTMENTS AS REQUIRED TO ACCOMMODATE THE ELECTRICAL INSTALLATION. ALL OF THE ABOVE SHALL BE INCLUDED IN THE SCOPE OF WORK AT NO ADDITIONAL COST TO THE OWNER.
- C. ALL CONDUITS SHALL BE RIGIDLY SUPPORTED BY MEANS OF APPROVED CONDUIT HANGERS OR CLAMPS FIRMLY ANCHORED IN PLACE AND SPACED AT INTERVALS NOT TO EXCEED 7'-0". ALL EXPOSED CONDUIT SHALL BE RACKED AND PARALLEL OR PERPENDICULAR TO WALLS AND STRUCTURAL MEMBERS, WITH 90° BENDS WHERE REQUIRED. PULL AND JUNCTION BOXES SHALL BE HELD TO A MINIMUM. THIS CONTRACTOR SHALL BE RESPONSIBLE FOR PROVIDING ALL RODS, ANGLES, RAILS, STRUTS, BRACE PLATES, PLATFORMS, ETC.. REQUIRED FOR SUSPENSION OR SUPPORT OF CONDUIT AND EQUIPMENT AND ALL STRAPS, CLAMPS, THREADED RODS, TURNBUCKLES, ANCHORS, FASTENERS, AND MISCELLANEOUS SPECIALTIES FOR THE ATTACHMENT OF HANGERS AND SUPPORTS TO THE STRUCTURE. ALL CONDUIT FASTENERS, STRAPS, SUPPORTS AND ETC., MUST BE "BOLT-ON" GALVANIZED STEEL ON EXPOSED CONSTRUCTION. SINGLE CONDUIT SUPPORTS SHALL BE MINNERALIC OR EQUAL.
- D. IN SUSPENDED CEILINGS, SUPPORT CONDUIT AND JUNCTION BOXES DIRECT FROM THE STRUCTURAL SLAB, DECK, OR FRAMING PROVIDED FOR THAT PURPOSE. THE CONDUITS SHALL NOT BE CLIPPED TO THE CEILING SUPPORT WIRES OR SPLICE UNLESS THE CEILING SYSTEM HAS BEEN SPECIFICALLY DESIGNED FOR THAT PURPOSE AND APPROVAL GRANTED BY ENGINEER.
- XIV. RACEWAY, JUNCTION BOX, AND PULL BOX SYSTEMS A. THIS CONTRACTOR SHALL INSTALL SIZE OF CONDUIT CALLED FOR ON DRAWINGS AND SHALL NOT REDUCE SIZE OF CONDUITS TO SUIT WIRE FILL CAPACITY, MINIMUM SIZE OF CONDUIT SHALL BE 3/4" UNLESS OTHERWISE NOTED. THIS CONTRACTOR SHALL LEAVE A WIRE PULLING LINE IN ALL CONDUITS WHICH ARE NOT FILLED TO CAPACITY. THE E.C. SHALL VERIFY ALL CONDUIT SIZE PRIOR
- TO INSTALLATION. NOTIFY THE ENGINEER IMMEDIATELY OF ANY CONFLICT. B. THE RACEWAY SYSTEM SHALL BE METALLIC, ELECTRICAL METALLIC TUBING "EMT" IN TRADE SIZED CONCEALED WHEREVER POSSIBLE. ALL FITTINGS SHALL BE COMPRESSION TYPE ONLY EXCEPT WHERE PVC IS ALLOWED BY CONTRACT DOCUMENTS.
- C. CONDUIT USED OUTDOORS AND NOT BELOW GRADE OR EXPOSED TO WEATHER SHALL BE TYPE INTERMEDIATE METALLIC CONDUIT "IMC" OR RIGID GALVANIZED METAL CONDUIT "RMC" WITH THREADED COUPLINGS. PROVIDE MEYERS HUBS AT NON/CAST TYPE JUNCTION/PULL BOXES AND SWITCH/RECEPTACLE OUTLETS.
- D. ALL CONDUITS SHALL BE RUN PARALLEL AND/OR PERPENDICULAR TO CONSTRUCTION LINES OF THE BUILDING AND IN THE CASE OF CEILING AND FLOOR RUNS, CONDUITS SHALL BE GROUPED AND SUPPORTED WITH TRAPEZE/TYPE RACKS OR STANDOFFS WITH INDIVIDUAL CONDUITS SEPARATELY ACCESSIBLE FOR REPLACEMENT AND MAINTENANCE. E. ALL WIRING INCLUDING ALL LOW VOLTAGE CABLING BEHIND THE WALL AND ABOVE THE
- NON-ACCESSIBLE CEILING SHALL BE INSTALLED IN CONDUIT. F. JUNCTION BOXES, PULL BOXES AND TERMINAL BOXES SHALL BE INSTALLED WHERE SHOWN ON THE DRAWINGS AND AT OTHER LOCATIONS AS REQUIRED TO FACILITATE THE PULLING OF
- CABLES. G. PULL BOXES SHALL BE CODE SIZED AND SHALL BE CONSTRUCTED OF CODE GAUGE GALVANIZED SHEET STEEL. EACH BOX SHALL BE PROVIDED WITH A SCREW-ON REMOVABLE COVER. PROVIDE FLANGED COVERS ON FLUSH BOXES. BOXES SHALL BE SMOOTH, SQUARE AND SET PARALLEL WITH WALLS AND CEILING.
- H. ALL BOXES SHALL BE PROVIDED IN LOCATIONS WHERE REASONABLE ACCESS CAN BE OBTAINED IN THE FUTURE WITHOUT REQUIRING REMOVAL OF BUILDING ELEMENTS OR FINISHES. IT SHALL BE THE SOLE RESPONSIBILITY OF THE ELECTRICAL CONTRACTOR TO RELOCATE BOXES TO ACCESSIBLE AREAS WHERE INACCESSIBILITY IS DETERMINED BY THE INSPECTOR OR ENGINEER. I. REMOVE ALL UNUSED AND ABANDONED CONDUIT AND RACEWAY COMPLETELY.
- J. ANY SURFACE RACEWAY USED ON A FINISHED SURFACE MUST BE METALLIC RACEWAY, WIREMOLD OR EQUAL. IF RACEWAY USED FOR POWER AND DATA, THEN MUST BE DUAL CHANNEL WITH PARTITION. SUBMIT FOR APPROVAL BY ENGINEER PRIOR TO INSTALLATION.
- K. FINAL CONNECTIONS TO MOVABLE DEVICES, OR DEVICES THAT MAY TRANSMIT VIBRATION SHALL BE MADE THROUGH FLEXIBLE METALLIC CONDUIT OR LIQUID-TIGHT FLEXIBLE CONDUIT. (MOTORS, TRANSFORMERS, DUCT MOUNTED DEVICES, ETC.)
- . ENDS OF ALL METALLIC CONDUITS SHALL BE EQUIPPED WITH INSULATED GROUNDING BUSHINGS FOR DEDICATED CONDUITS SERVING GROUNDING CONDUCTORS. ALL METALLIC CONDUIT SERVING FEEDERS AND BRANCH CIRCUITS SHALL BE EQUIPPED WITH INSULATED ANTI-SHORT FITTINGS AT ENDS. ENDS OF ALL CONDUITS SHALL BE TEMPORARILY CAPPED PRIOR TO INSTALLATION AND DURING CONSTRUCTION TO EXCLUDE FOREIGN MATERIAL. UPON THE COMPLETION OF CONSTRUCTION THE OPEN END OF CONDUITS OR SLEEVES SHALL BE SEALED WATERTIGHT.
- M. EACH LIGHT, RECEPTACLE OR OTHER MISCELLANEOUS DEVICE SHALL BE PROVIDED WITH A GALVANIZED OR SHERARDIZED PRESSED STEEL OUTLET BOX OF THE KNOCKOUT TYPE, OR NOT LESS THAN NO. 14 U.S. GAUGE STEEL. CONDUITS SHALL BE FASTENED WITH LOCK NUTS AND BUSHINGS. ALL UNUSED BOX KNOCKOUTS MUST BE LEFT SEALED. THERE MUST BE SUFFICIENT ROOM FOR WIRES AND BUSHINGS, AND DEEP BOXES SHALL BE INSTALLED WHERE REQUIRED. BOXES SHALL BE SECURELY AND ADEQUATELY SUPPORTED.
- N. WHERE FLOOR FITTINGS REQUIRE PENETRATION OF THE FLOOR SLAB, THERE SHALL BE A STANDARD DEVICE LISTED BY UL FOR THE PURPOSE AND HAVE A UL FIRE RATING EQUAL TO THE FLOOR RATING. ALL CORE SIZES AND LOCATIONS SHALL BE SUBMITTED TO ENGINEER FOR APPROVAL AND SUBMISSION TO STRUCTURAL ENGINEER PRIOR TO CORING. THE ELECTRICAL CONTRACTOR MUST PROVIDE FLOOR X-RAY SERVICES TO DETECT AND AVOID EXISTING EMBEDDED SYSTEMS PRIOR TO CORING.
- O. ALL CONDUIT RUNS SHALL BE INSTALLED ABOVE AND OVER TOP OF ALL NEW DUCTWORK, PIPING, CONDUITS, PULL BOXES, ETC. WITH PROVISION FOR ALL NECESSARY ACCESSIBLE PULL BOXES. CONDUIT MAY NOT EXCEED CODE ALLOWED NUMBER OF BENDS.
- P. CONDUIT RUNS OR PULL BOXES SHALL NOT BLOCK OR PREVENT FULL ACCESS OR OPERATION OF HVAC EQUIPMENT, ACCESS DOORS, PIPING VALVES, JUNCTION BOXES, MAIN RETURN AIR DUCTS, PULL BOXES, CLEAN OUTS, ETC.
- Q. FLEXIBLE METAL CONDUIT SHALL NOT BE LONGER THAN 6' 0" LONG.

## XV. WIRE AND WIRING METHOD

A. ALL CONDUCTORS SHALL BE COPPER IN SIZES AS SHOWN OR REQUIRED BY LOADS SERVED. ALL CABLE SHALL BE 600/VOLT INSULATION RATED AT 75 DEGREES C, WITH TERMINATIONS AND LOADS SERVED RATED AT 75 DEGREES C. INDOOR DRY LOCATIONS SHALL BE TYPE "THHN" AND WET LOCATIONS (EXPOSED, BELOW THE SLAB, AND BELOW GRADE) SHALL BE TYPE "XHHW".

B. A SEPARATE NEUTRAL CONDUCTOR AND GREEN GROUND WIRE SHALL BE INSTALLED FOR EACH FEEDER AND BRANCH CIRCUIT.

C. EACH BRANCH CIRCUIT SHALL HAVE A DEDICATED NEUTRAL WIRE. A SHARED NEUTRAL IS NOT ALLOWED.

MINIMUM SIZE CONDUCTOR SHALL BE #12 EXCEPT FOR CONTROL, FIRE ALARM AND SIGNAL CABLES. CONDUCTORS AND ASSOCIATED RACEWAYS SHALL BE INCREASED FOR VOLTAGE DROP COMPENSATION AS CALCULATED ACCORDING TO ELECTRICAL CODE REQUIREMENTS.

THE E.C. SHALL FURNISH AND INSTALL LUG KITS TO MATCH THE CABLE SIZES AS SHOWN ON THE DRAWINGS. TYPICAL FOR ALL ELECTRICAL AND MECHANICAL EQUIPMENT. ANY AND ALL REQUIRED LUG KITS SHALL BE INCLUDED IN THE BASE BID. CABLE SIZE REDUCING PINS SHALL NOT BE AN

ACCEPTABLE ALTERNATIVE TO LUG KITS. REMOVE ALL UNUSED AND ABANDONED WIRING, INCLUDING LOW VOLTAGE, COMPLETELY BACK TO SOURCE.

G. ALL COMMUNICATION CABLING INSTALLED IN PLENUM AIR SPACES SHALL BE IN CONDUIT,

WITHOUT ANY EXCEPTIONS.

H. ALL PLENUM AIR SPACES AREA SHALL BE IN CONDUIT WITH PLENUM RATED BOX.

I. E.C SHALL PROVIDE ALL FEEDER & BRANCH CIRCUITS SIZED BASED ON VOLTAGE DROP REQUIRED

PER LOCAL CODE. J. CONDUCTOR SPLICING

1. SPLICING WIRES SHALL BE DONE ONLY IN ACCESSIBLE OUTLET JUNCTION OR PULL BOXES. 2. SPLICES SHALL BE MADE STRICTLY IN ACCORDANCE WITH THE INSTRUCTIONS OF THE CABLE

MANUFACTURER USING THE METHODS AND MATERIALS RECOMMENDED BY HIM. 3. FOR #10 AND #12 WIRE SPLICES SHALL BE MADE WITH SCOTCH-LOK CONNECTORS.

4. WIRE #6 AND LARGER SHALL BE CONNECTED WITH BURNDY OR EQUAL SOLDERLESS MECHANICAL LUG AND PAINTED WITH INSULATING VARNISH.

5. ALL CONNECTIONS SHALL BE PROPERLY TAPED WITH SCOTCH ELECTRICAL TAPE #22, #33 OR APPROVED EQUAL.

6. ALL GROUND SPLICES AND GROUND CONNECTIONS TO DEVICES WITHIN METALLIC BOXES SHALL BE BONDED TO BOX USING APPROPRIATELY SIZED PIGTAIL CONNECTIONS OR OTHER UL APPROVED BONDING METHOD.

## XVI. GROUNDING AND BONDING

A. EQUIPMENT GROUNDING CONDUCTORS SHALL BE UL 83 INSULATED STRANDED COPPER, UNLESS OTHERWISE INDICATED ON THE DRAWINGS. INSULATION COLOR SHALL BE CONTINUOUS GREEN FOR ALL EQUIPMENT GROUNDING CONDUCTORS. BONDING CONDUCTORS SHALL BE ASTM B8 BARE STRANDED COPPER, EXCEPT THAT SIZES NO. 10 AWG AND SMALLER SHALL BE ASTM B1 SOLID BARE COPPER WIRE. CONDUCTOR SIZES SHALL NOT BE LESS THAN WHAT IS SHOWN ON THE DRAWINGS AND NOT LESS THAN REQUIRED BY THE NEC, WHICHEVER IS GREATER. A GROUND CONDUCTOR SHALL BE INSTALLED IN EVERY RACEWAY AND BONDED TO ALL BOXES AND ENCLOSURES EXCEPT FOR THE SERVICE LATERALS. THE GROUND CONDUCTOR SHALL BE BONDED IN EVERY ENCLOSURE.

B. FURNISH AND INSTALL PIGTAILED AND BOND THE JUNCTION BOX, WHEREVER CIRCUIT CONDUCTORS ARE SPLICED IN A JUNCTION BOX.

FURNISH AND INSTALL THE BONDING OF THE WATER PIPE SYSTEM AT THE WATER HEATER. THE WATER HEATER SHALL BE JUMPERED BETWEEN THE COLD AND HOT WATER PIPES WITH A JUMPER SIZED ACCORDING TO NEC TABLE 250.66, PER NEC 250.104(A)(1); PER NEC 250.104(B). SEE ALSO NEC 250.53(D)(1).

## XVII. DISCONNECT SWITCHES

A. ALL FUSED (FD) AND NON-FUSED (NF) DISCONNECTS SHALL BE SQUARE D COMPANY OR APPROVED EQUAL, 3-POLE HEAVY DUTY TYPE ONLY. ALL UNITS INSTALLED OUTDOORS SHALL BE RATED WEATHERPROOF NEMA 3R. MANUFACTURERS: SCHNEIDER SQUARE D, EATON, GENERAL ELECTRIC, SIEMENS, OR APPROVED EQUAL.

## XVIII. PANELBOARDS

A. PROVIDE PANELBOARDS WITH ELECTRICAL COMPONENTS, DEVICES, AND ACCESSORIES: LISTED AND LABELED AS DEFINED IN NFPA 70, BY A QUALIFIED TESTING AGENCY, MARKED FOR INTENDED LOCATION AND APPLICATION AND THAT COMPLY WITH NEMA PB 1.

B. SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE PANELBOARDS BY:

PLUG-IN CIRCUIT BREAKERS ARE NOT APPROVED.

1. SQUARE D 2. SIEMENS

3. GENERAL ELECTRIC

4. EATON

### 5. APPROVED EQUAL

SURFACE MOUNTED (AS SHOWN IN PLAN), DEAD-FRONT CABINETS RATED FOR ENVIRONMENTAL CONDITIONS AT INSTALLED LOCATION.

D. PANELBOARD TRIM AND FRONT COVER SHALL BE HINGED DOOR-IN-DOOR SYLE.

E, INDOOR DRY AND CLEAN LOCATIONS: NEMA 250, TYPE 1), PROVIDE GALVANIZED STEEL CABINETS TO HOUSE PANELBOARDS FLUSH AND SURFACE-MOUNTED, DEAD-FRONT CABINETS.

F. FACTORY FINISHED WITH MANUFACTURER'S STANDARD TWO-COAT, BAKED-ON FINISH. G. PROVIDE DIRECTORY CARD WITH TRANSPARENT COVER PERMANENTLY MOUNT ON INSIDE OF DOORS.

H. PHASE, NEUTRAL, AND GROUND BUSES AND BARS SHALL BE TINNED COPPER MATERIAL AND BUS SHALL BE FULLY RATED THE ENTIRE LENGTH OF ENCLOSURE. PROVIDE FULL-SIZED NEUTRAL WITH FULL-CAPACITY BONDING STRAP FOR SERVICE ENTRANCE APPLICATIONS. MAIN AND NEUTRAL LUGS SHALL BE MECHANICAL TYPE, WITH A LUG ON THE NEUTRAL BAR FOR EACH POLE IN THE PANELBOARD AND WITH A LUG ON THE GROUND BAR FOR EACH POLE IN THE PANELBOARD.

PANELBOARDS SHALL BE STANDARD MANUFACTURED PRODUCTS. ALL COMPONENTS WITHIN ONE ASSEMBLY SHALL BE OF THE SAME MANUFACTURER. ALL PANELBOARDS SHALL BE DEAD FRONT TYPE. ALL PANELBOARDS SHALL BE COMPLETELY FACTORY ASSEMBLED WITH MOLDED CASE CIRCUIT BREAKERS AND ARRANGED SO THAT IT WILL BE POSSIBLE TO SUBSTITUTE A 2 POLE BREAKER FOR TWO SINGLE POLE BREAKERS, AND A 3 POLE BREAKER FOR THREE SINGLE POLE BREAKERS, WHEN TRIP IS 30 AMPS OR LESS AND FRAME SIZE IS 100 AMPERES OR LESS, WITHOUT HAVING TO DRILL AND TAP THE MAIN BUS BARS AT BUS STRAPS.CIRCUIT BREAKERS SHALL BE BOLT-ON CONNECTED TO THE PANELBOARD, MINIMUM INTERRUPTING CAPACITY SHALL BE 14,000 AIC FOR 277/480 VOLT CIRCUIT BREAKERS AND 10,000 AIC FOR 120/208 VOLT CIRCUIT BREAKERS.

J. ALL SHORT CIRCUIT WITHSTAND RATINGS SHOWN ON DRAWINGS ARE MINIMUM REQUIREMENTS. K. PANELBOARD FAULT WITHSTAND RATING SHALL BE INCREASED BY THE ELECTRICAL CONTRACTOR AS A RESULT OF SHORT-CIRCUIT STUDY RESULTS AT NO ADDITIONAL COST TO

ALL NEW CIRCUIT BREAKERS FOR THE EXISTING PANELBOARDS SHALL BE COMPATIBLE WITH THE EXISTING EQUIPMENT. AIC RATINGS SHALL MATCH THE ORIGINAL EQUIPMENT AIC RATINGS. M. CIRCUIT BREAKERS SERVING HAND DRYERS AND WATER COOLERS SHALL BE GFCI TYPE, WHERE

N. PROVIDE A TYPEWRITTEN DIRECTORY OF ALL CIRCUITS IN THE PANELBOARD.

## XIX. TRANSFORMERS

PROJECT

APPLICABLE.

A. PROVIDE FACTORY-ASSEMBLED AND -TESTED, AIR-COOLED UNITS FOR 60-HZ SERVICE. FOR TRANSFORMERS RATED 15 KVA AND LARGER COMPLY WITH NEMA TP 1 ENERGY-EFFICIENCY LEVELS AS VERIFIED BY TESTING ACCORDING TO NEMA TP 2. TRANSFORMER CORES ARE TO BE ELECTRICAL GRADE, NON-AGING SILICON STEEL WITH HIGH PERMEABILITY AND LOW HYSTERESIS LOSSES; COILS ARE TO BE CONTINUOUS COPPER WINDINGS WITHOUT SPLICES EXCEPT FOR TAPS WITH BRAZED OR PRESSURE TYPE INTERNAL CONNECTIONS. CORES ARE TO HAVE ONE LEG PER PHASE. FOR TRANSFORMERS SMALLER THAN 30 KVA SHALL HAVE CORE AND COILS COMPLETELY RESIN ENCAPSULATED. TRANSFORMER IMPEDANCE SHALL BE MINIMUM 5%. CORE ASSEMBLIES SHALL BE GROUNDED TO THEIR ENCLOSURES BY ADEQUATE FLEXIBLE GROUND STRAPS.

SUBJECT TO COMPLIANCE WITH REQUIREMENTS, PROVIDE TRANSFORMERS BY:

## 1. SQUARE D

2. SIEMENS 3. GENERAL ELECTRIC

4. EATON

## 5. APPROVED EQUAL

DISTRIBUTION TRANSFORMERS SHALL COMPLY WITH UL 156 AND THEIR KVA RATING (SHOWN ON THE DRAWINGS AND NAMEPLATE) SHALL BE SELF-COOLED BY NATURAL CONVECTION CONTINUOUS-DUTY WITHOUT THE USE OF COOLING FANS. FOR TRANSFORMERS SMALLER THAN

30 KVA PROVIDE INSULATION CLASS: 185 DEG C, UL-COMPONENT-RECOGNIZED INSULATION SYSTEM WITH A MAXIMUM OF 115-DEG C RISE ABOVE 40-DEG C AMBIENT TEMPERATURE: FOR TRANSFORMERS 30 KVA AND LARGER PROVIDE INSULATION CLASS: 220 DEG C. UL-COMPONENT-RECOGNIZED INSULATION SYSTEM WITH A MAXIMUM OF 115-DEG C RISE ABOVE 40-DEG C AMBIENT TEMPERATURE.

TRANSFORMERS 25 KVA AND LARGER SHALL HAVE TWO 2.5 PERCENT TAPS ABOVE AND TWO 2.5 PERCENT TAPS BELOW NORMAL FULL CAPACITY.

## E. SOUND-LEVELS

1. PROVIDE LOW-SOUND-LEVEL TRANSFORMERS WITH MAXIMUM SOUND LEVELS WHEN FACTORY TESTED ACCORDING TO IEEE C57.12.91, AS FOLLOWS:

a. 30 TO 50 KVA: 45 DB.

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