

Date: 11-15-2022

Melanie Bachman, Executive Director Connecticut Siting Council Ten Franklin Square New Britain, CT 06051

RE: VFS, LLC. Notice of Exempt Modification Pursuant to RCSA 16-50j-57(a) to Existing Energy Facility Site at The City of New Haven, 200 Orange Street, New Haven, CT 06510 ("Notice of Exempt Modification")

Dear Ms. Bachman,

VFS, LLC. hereby gives notice to the Connecticut Siting Council of its intent to undertake an exempt modification in accordance with Section 16-50j-57(a) of the Regulations of Connecticut State Agencies ("RCSA") for the modification to VFS's fuel cell installation at The City of New Haven, 200 Orange Street, New Haven, CT 06510.

Proposed Modification

The proposed modification would take place within the existing fenced area at The City of New Haven, 200 Orange Street, New Haven, CT. The existing facility consists of a combined heat and power installation utilizing one Doosan 400 kW Fuel cell.

VFS, LLC. proposes the following modification to the facility:

- Removal of the existing fuel cell and associated cooling module.
- Installation of one (1) current generation Doosan Model 400 fuel Cells (direct replacement with the same GEN I nameplate)
- Installation of new cooling module.

The proposed modification would not have a substantial adverse environmental effect or cause a significant adverse change or alteration in the physical or environmental characteristics of the facility because:

- The modification would be made within the facilities existing fenced area and would not impair the structural integrity of the facility.
- The new equipment would be a direct replacement for the existing equipment and is dimensionally the same as the existing equipment and would not cause any significant adverse change in the physical or environmental characteristics of the facility.

The existing facility layout with proposed modification is shown on Attachment 1.

The proposed modification would not have a substantial adverse environmental effect or cause a significant adverse change or alteration in the physical or environmental characteristics of the facility because:

- The modification would be made within the facilities existing fenced area and would not impair the structural integrity of the facility.
- The new equipment would be a direct replacement for the existing equipment and is dimensionally the same as the existing equipment and would not cause any significant adverse change in the physical or environmental characteristics of the facility.
- The modifications would not affect waterways or wetlands and the facility is not in a flood zone.
- There are no endangered, threatened or special concern species in the vicinity of the facility as listed in the NDDB.
- Sound pressure levels will not increase because of the modifications.
- There would be no television or radio interference because of the modifications.
- Electric and magnetic field levels will not be affected by the modification due to low or no export of power from the site and the low voltage produced by the fuel cells.

VFS, LLC. proposes to commence work on the modification in January 2023 and scheduled to be complete by February 2023.

Pursuant to CSC rules VFS, LLC, will provide one copy of this filing and fifteen delivered copies of the filing along with a check for \$625.00 made payable to CT Siting Council.

A notice of this filing has been provided to the Mayor of New Haven and the property owners representative Giovanni Zinn via certified mail.

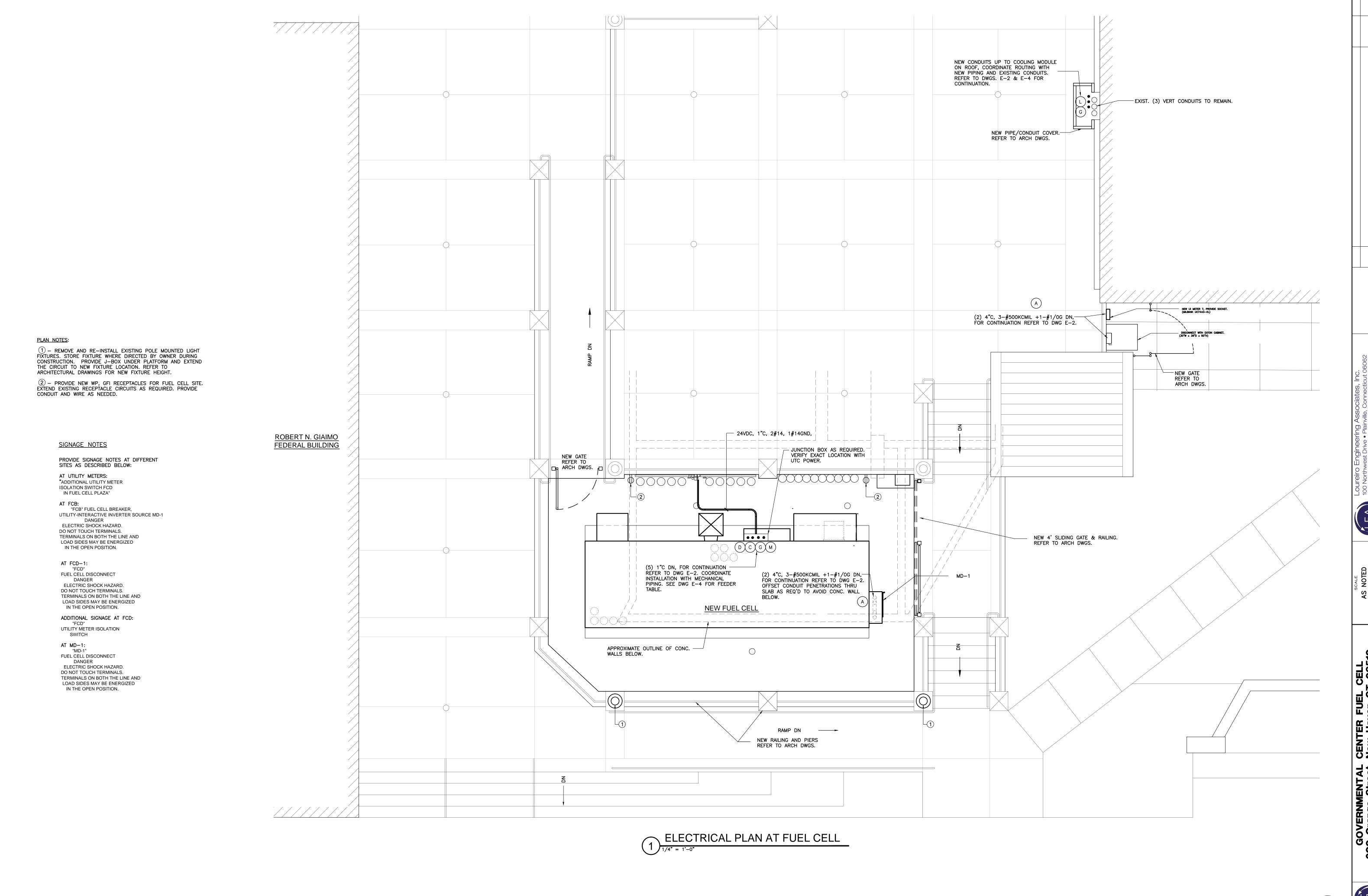
Please direct all communications regarding this filing to Steve Pearson at 248.417.0674 or via email spearson@vfsmi.com

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Steve Pearson

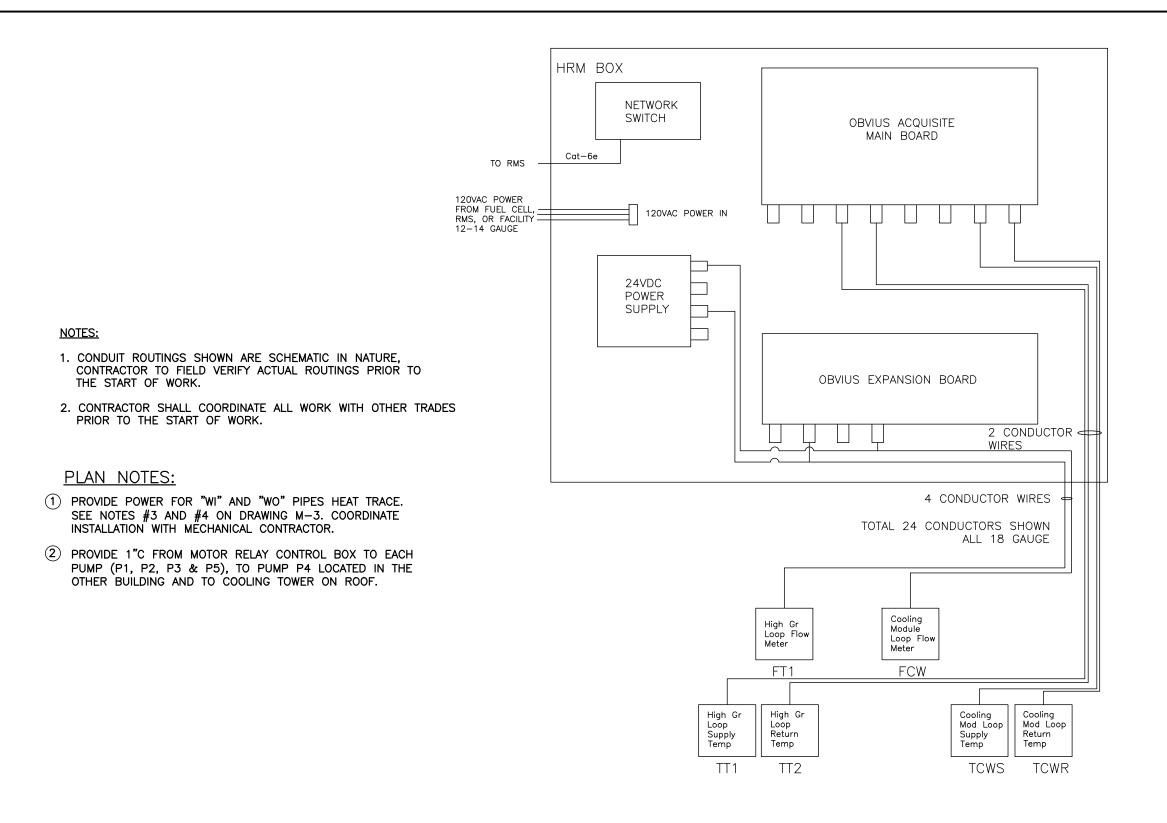
Installation Project Manager

VFS, LLC.



NORTH

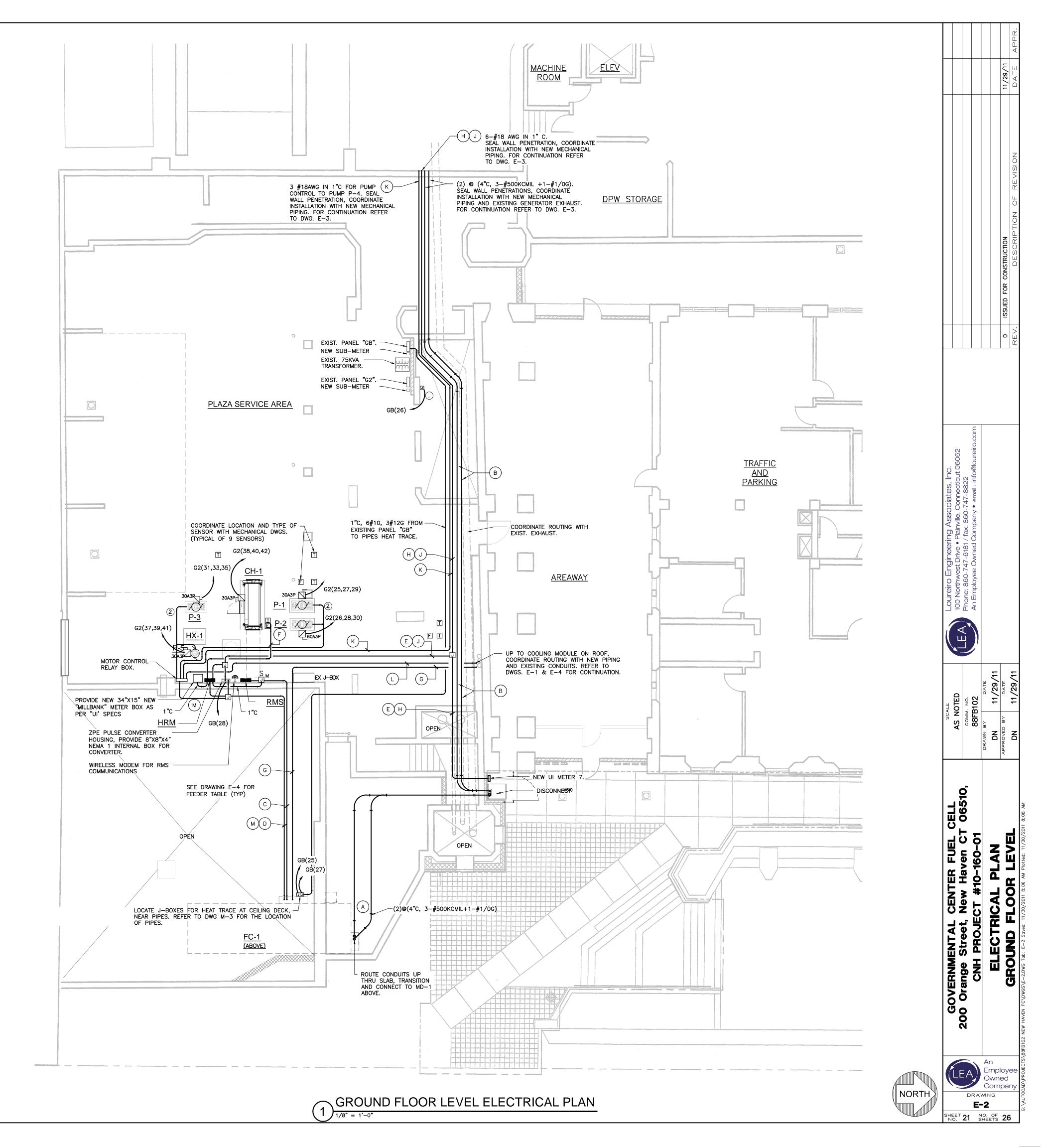
Company SHEET 20 NO. OF 26

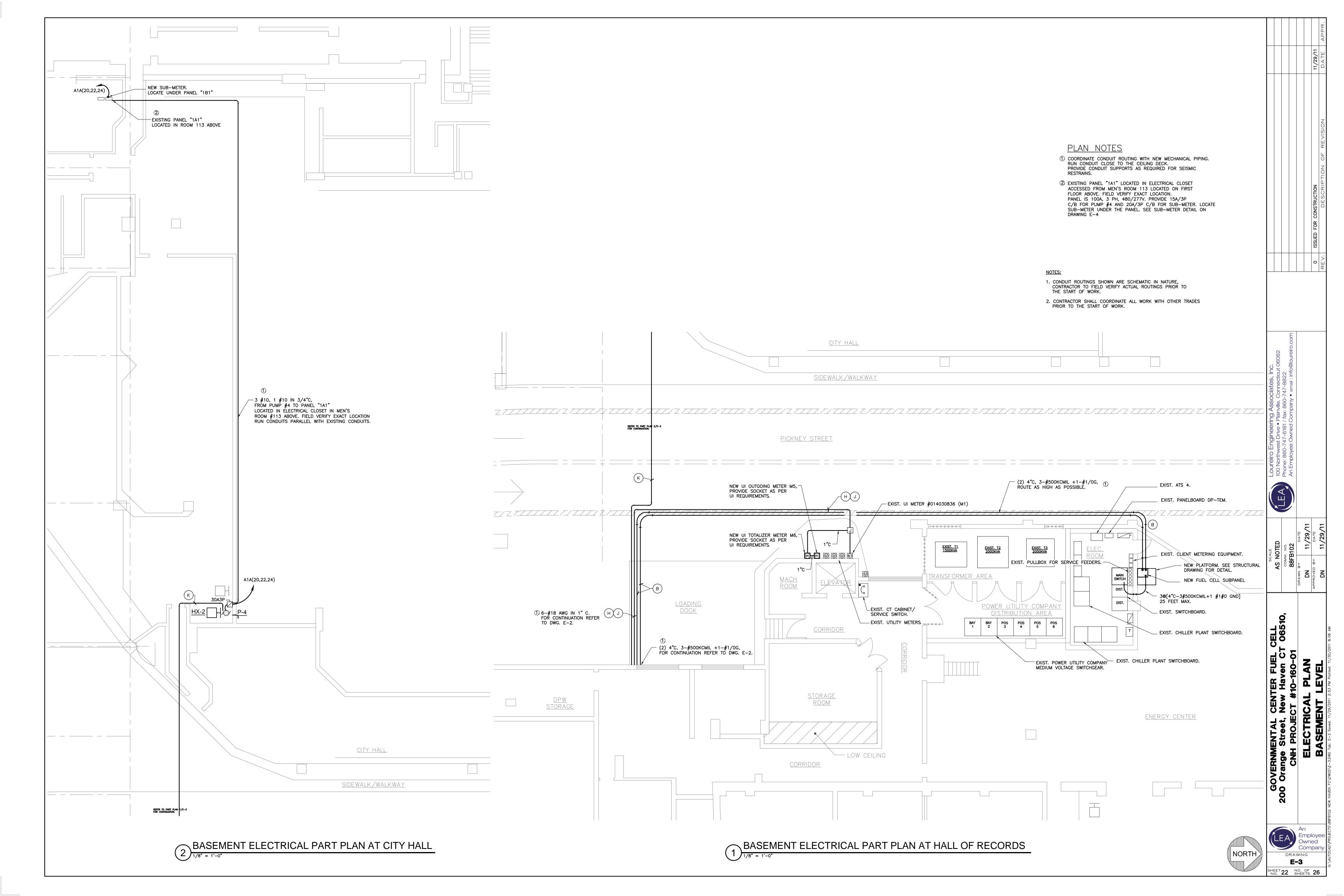


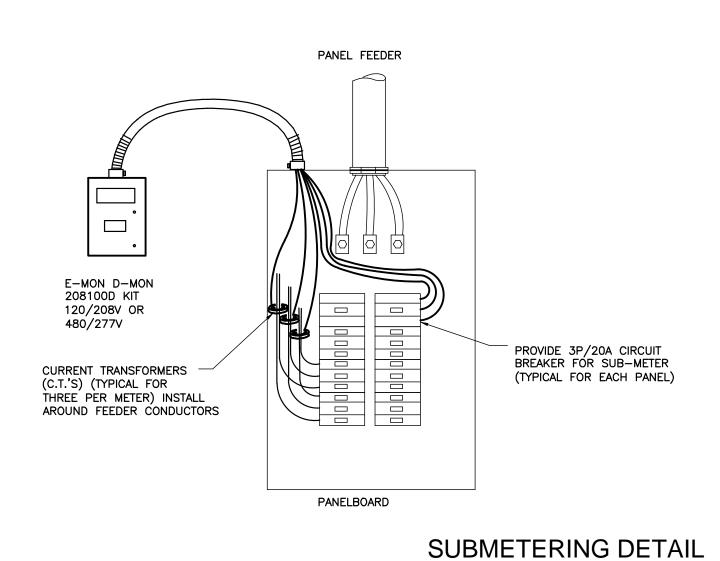
HRM FIELD WIRING DIAGRAM

MAI	N CB SIZE:	AMPS MO	CB 🗖] MI	LO 🛛			LOCA	ΓΙΟΝ: Ι	PLAZ	A SEF	RVICE	E ARE	Α	PHASE:	3
PAN	IEL SIZE: 200 A	MPS V	N TS	· 480	/277V	,		MTG:	SURFA	ACE		TY	PE: B	OLT- ON	WIRE: 4	
	LE OIZE. 200 / (IVII O VO					CC	ONN. LO	AD							
CKT. NO.	DESCRIPTION		WIRE SIZE	AMP	POLE	VA	A	VA B	С	VA	POLE	TRIP AMP	WIRE SIZE	DESCRIPTION		NO NO
1	EXSITING LOAD						XXX							EXSITING LOAD		2
3	EXSITING LOAD							XXX						EXSITING LOAD		4
5	SPACE								XXX					SPACE		6
7	SPACE						XXXX							SPACE		8
9	SPACE							XXX						SPACE		10
11	SPACE								XXXXX					SPACE		12
13	SPACE						XXXX							SPACE		14
15	SPACE							XXXX						SPACE		16
17	SPACE								XXXX					SPACE		18
19			- " 4 0 .			200	XXXXX							SPARE		20
21	SUBMETER	3	#12+ #12G	20	3	200		XXXX						SPARE		22
23			#126			200			XXXX					SPARE		24
25						2900	XXXXX			9000		50 1#100	3#8+	G P-2 (25HP)		26
27	P-1 (7.5HP)	1	#12+ #12G	20	3	2900		XXXX		9000	3					28
29			#126			2900			XXXX	9000			1"C			30
31						2900	XXXXX									32
33	P-3 (7.5HP)	3	8#12+ #12G	20	3	2900		XXXX			3	20		SPARE		34
35			#126			2900			XXXX							36
37						2000	XXX			1600			_ ,, _			38
39	P-5 (5HP)		#12+ #120	20	3	2000		XXX		1600	3	20	3#12+	CH (5.9A)		40
41			#12G			2000			XXX	1600			1#126			42
		(CONN.	VA/PI	HASE											
		7	TOTAL	CONN.	VA				•	1						

MAII	N CB SIZE: 225 AMPS M	ICB 🛚] M	LO 🗖		LOCATION:	PLAZ	A SEF	RVICE	E ARE	A I	PHASE:	1
PAN	IEL SIZE: 225 AMPS V	OLTS	: 120	/240V		MTG: SURFA	CE		TY	PE: B	OLT- ON	WIRE: 3	
CKT. NO.	DESCRIPTION	WIRE SIZE	TRIP AMP	POLE	VA	CONN. LOAD VA A B	VA	POLE	TRIP AMP	WIRE SIZE	DESCRIPTION		Ck
1	EXSITING LOAD					XXX					EXSITING LOAD		2
3	EXSITING LOAD					XXX					EXSITING LOAD		4
5	EXSITING LOAD										EXSITING LOAD		6
7	EXSITING LOAD					XXXX					EXSITING LOAD		8
9	EXSITING LOAD					XXX					EXSITING LOAD		10
11	EXSITING LOAD										EXSITING LOAD		12
13	EXSITING LOAD					XXXX					EXSITING LOAD		14
15	EXSITING LOAD					XXXX					EXSITING LOAD		16
17	EXSITING LOAD					XXXX					EXSITING LOAD		18
19	EXSITING LOAD					XXXXX					SPARE		20
21	EXSITING LOAD					XXXX					SPARE		22
23	EXSITING LOAD					XXXX					SPARE		24
25	HEAT TRACE (CHILLED WTR PIPE)	2#10	20	1	600	XXXXX	800	1	20	2#12	HEAT TRACE (WO PIPIN	G)	26
27	HEAT TRACE (CONDENS. DRAIN)	2#10	20	1	600	XXXX	200	1	20	2#12	ZPE CONVERTER		28
29		_ ,, _			200	XXXX		1	20		SPARE		30
31	SUBMETER	3#12+ 1#12G	20	3	200	XXXXX		1	20		SPARE		32
33		1#126			200	XXXX		1	20		SPARE		34
35	SPARE		20	1		XXXX		1	20		SPARE		36
37						XXX							38
39						XXX							40
41						XXX							42
		CONN. TOTAL	•										





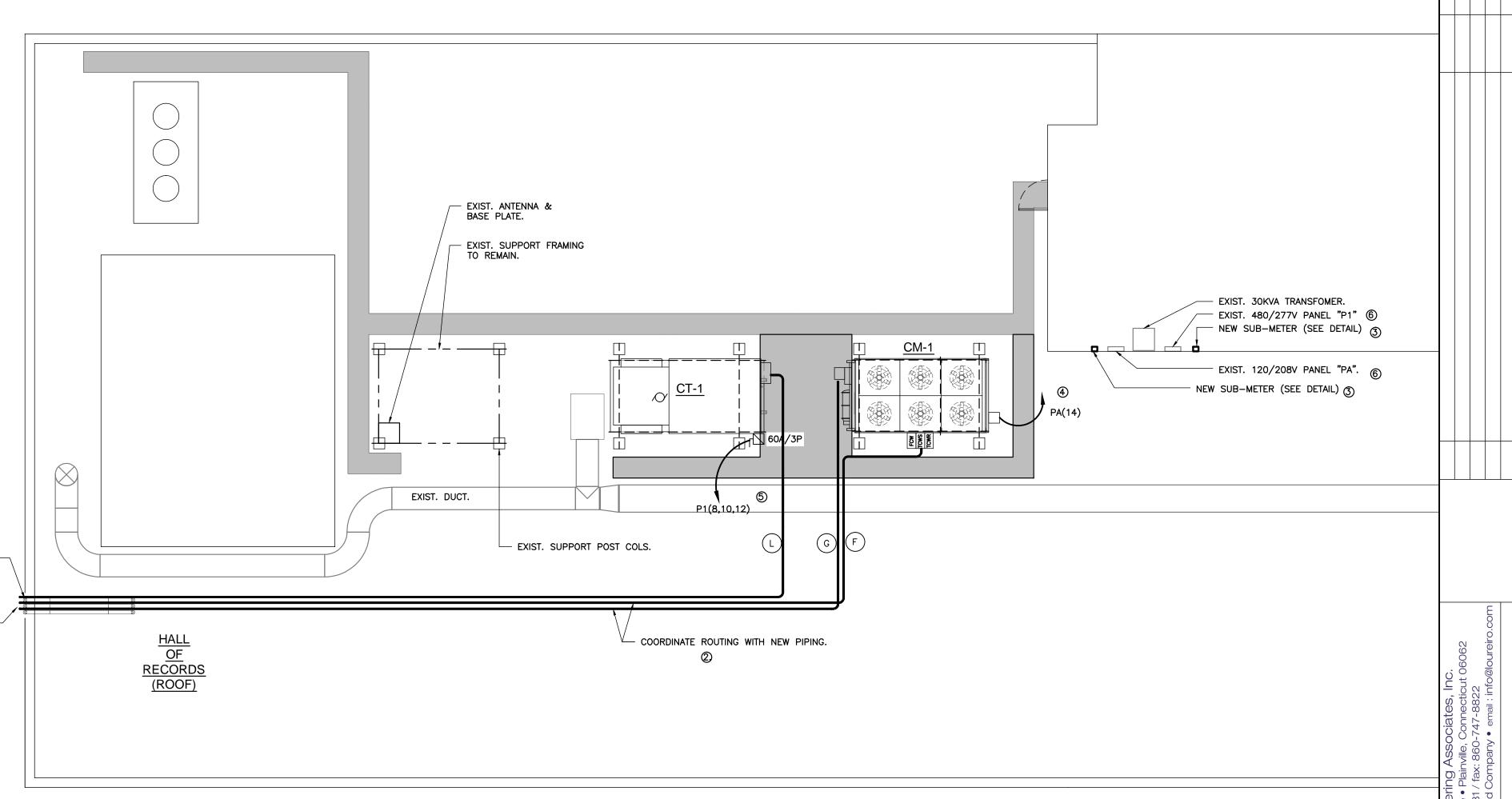


PLAN NOTES

- ① VERTICAL CONDUIT TO BE INSTALLED ON THE SIDE OF THE BUILDING DOWN TO PLAZA SERVICE AREA. COORDINATE ROUTING WITH NEW PIPING AND EXISTING CONDUITS. REFER TO DRAWINGS E-1 & E-2 FOR CONTINUATION. THIS IS A FIVE STORIES BUILDING WITH AN ESTIMATED HEIGHT OF ABOUT 70 FEET. FIELD VERIFY THE VERTICAL RUN. PROVIDE APPROPRIATE SUPPORTS FOR THE CONDUITS.
- 2 RUN CONDUITS ALONG THE PIPING. PROVIDE SUPPORTS FOR THE ROOF. COORDINATE WITH MECHANICAL CONTRACTOR AND WITH OWNER REPRESENTATIVE FOR THE TYPE OF SUPPORTS NEEDED TO PROTECT THE ROOF MEMBRANE.
- ③ PROVIDE SUB-METERS, ONE FOR EACH PANEL "P1" AND "PA". PROVIDE 20A3P CIRCUIT BREAKERS AND 3 #12, 1 #12G IN 3/4"C FOR METERS.
- (4) PROVIDE POWER FOR HEAT TRACE FOR FUEL CELL AND COOLING TOWER COLD WATER MAKE-UP PIPING: 2#12, 1#12G IN 3/4"C AND 20A1P C/B IN PANEL "PA"
- ⑤ PROVIDE POWER FOR COOLING TOWER "CT-1": 3#6, 1#6G IN 1"C AND 90A3P C/B IN PANEL "P1".
- PROVIDE ALL NEW CIRCUIT BREAKERS FOR THE NEW EQUIPMENT. DO NOT USE THE EXISTING SPARES

EXIST. (3) VERT CONDUITS.-

DOWN TO PLAZA SERVICE AREA, COORDINATE — ROUTING WITH NEW PIPING AND EXISTING CONDUITS. REFER TO DWGS. E-1 & E-2 FOR CONTINUATION.



		F	EEDERS AND CONDU	JIT TABLE	
UG PWR FEED	SIZE	FROM:	то:	WIRE SIZE:	REMARKS:
Α	2-4"C	MD1 AT THE FC	SWGR (UI METER SEC.)	(2) @ 4"C-3#500KCMIL & 1 #1/0G	
В		SWGR (UI METER SEC.)	HS NORMAL PWR. SWBD.	(2) @ 4"C-3#500KCMIL & 1 #1/0G	
С	1-1"C	HRM INSIDE BLDG.	FUEL CELL UPS	2 #12 AWG & 1 #12G IN 1"C	120V
D	1-1"C	RMS & ZPE	FUEL CELL - CC BOX	CAT 5E OR BETTER & AS REQUIRED	ETHERNET & ZPE INPUT
Ε	1-1"C	HRM	M7(DG)	(3) SETS OF 3 #18AWG SHIELDED,1"C	
F	1-1"C	HRM	COOLING MOD. PIPE IN BSMT.	10-#18 AWG IN 1" C	
G	1-1"C	FC INTERNAL LOADS	COOLING MOD. ON ROOF	3-#6 AWG, 1 #10G IN 1-1/4" C	
Н	1-1"C	M7 (DG)	M6 (TOTALIZER)	6-#18 AWG IN 1" C	KYZ SIGNALS see note 2
J	1-1"C	ZPE	M1	3-#18 AWG IN 1" C	
K	1-1"C	MOT.CNTRL. RELAY BOX	PUMP P-4	3-#18 AWG IN 1" C	PUMP #4 CONTROLS
L	1-1"C	MOT.CNTRL. RELAY BOX	COOLING TOWER ON ROOF	3-#18 AWG IN 1" C	COOLING TOWER CONTROLS
М	1-1"C	MOT.CNTRL. RELAY BOX	FUEL CELL CC	2-#16 AWG IN 1" C	24V DC

NOTES: 1.-RUN THE INSIDE PART OF THE CONDUITS CONCEALED OR CLOSE TO CEILING AND WALLS, PARALLEL WITH EACH OTHER. 2.-SHIELD THE KYZ SIGNALS (IN "H" CONDUITS) WITH SHIELD TERMINATED TO GROUND AT SIGNAL SOURCE END ONLY.

3.—SEE DRAWING E—6 FOR CONDUIT PLAN DIAGRAM

4.-NOT ALL CONDUITS ON THE DRAWINGS ARE LABELED WITH LETTERS. 5.—FEEDERS E, H AND J CAN SHARE THE SAME 1" CONDUIT WHEN RUNNING IN PARALLEL, PROVIDE J—BOXES AS REQ'D.

	ELECTRICAL ROOF PLAN 1/8" = 1'-0"
\cup	1/8" = 1'-0"
NOTES:	

1. CONDUIT ROUTINGS SHOWN ARE SCHEMATIC IN NATURE, CONTRACTOR TO FIELD VERIFY ACTUAL ROUTINGS PRIOR TO THE START OF WORK.

2. CONTRACTOR SHALL COORDINATE ALL WORK WITH OTHER TRADES PRIOR TO THE START OF WORK.

	MECHANICAL EQUIPMENT SCHEDULE												
No.	EQUIP.	LOCATION	VOLT	PH	AMPS	KW	MOTOR HP	FEEDER SIZE	GND	CONDUIT	CIRCUIT BREAKER	DISC SIZE	REMARKS
1	СН	UNDER PLAZA	480	3	5.9			3 #12	1 #12	3/4"	20A/3P	30A/3P	
2	ст	ROOF	480	3	46.8	38.9		3 #6	1 #8	1"	90A/3P	60A/3P	
3	P-1	UNDER PLAZA	480	3		8.8	7.5	3 #12	1 #12	3/4"	20A/3P	30A/3P	NOTE 1
4	P-2	UNDER PLAZA	480	3		27.1	25	3 #8	1 #10	1"	50A/3P	60A/3P	NOTE 1
5	P-3	UNDER PLAZA	480	3		8.8	7.5	3 #12	1 #12	3/4"	20A/3P	30A/3P	NOTE 3
6	P-4	BSMT. CITY HALL	480	3		3.8	3	3 #10	1 #10	3/4"	15A/3P	30A/3P	NOTE 2
7	P-5	UNDER PLAZA	480	3		6.1	5	3 #12	1 #12	3/4"	20A/3P	30A/3P	NOTE 2

- 1.-PUMPS P-1 AND P-2 RUN IN THE SUMMER WITH THE CHILLER AND IT IS MANUALLY TURNED OFF IN THE WINTER TIME. PROVIDE SUMMER/WINTER SWITCH.
- 2.-PUMPS P-4 AND P-5 RUN IN THE WINTER WITH PUMP P-3 AND IT IS MANUALLY TURNED OFF IN THE SUMMER TIME. PROVIDE SUMMER/WINTER SWITCH.
- 3.-PROVIDE SUMMER/WINTER SWITCH FOR PUMP P-3. P-3 IS STARTED BY FUEL CELL, IT WILL RUN CONTINUOUSLY AND IT IS CONTROLLED BY THE CHILLER DURING THE SUMMER. PROVIDE CONTROLLING MEANS.

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E	QUIPMENT ABBREVIATIONS	
СН	CHILLER	Α
СМ	COOLING MODULE	AIC
CT	COOLING TOWER	ATS
DI	DEIONIZED WATER	С
EMS	ENERGY MONITORING SYSTEM	GC
ET	EXPANSION TANK	GI
HEX	HEAT EXCHANGER	G OR GND
N2	NITROGEN	HZ
Р	PUMP	kcmil
РМ	POWER MODULE	KVA
RMS	REMOTE MONITORING SYSTEM	KW
		MA
· ·		,

EQUIPMENT SYMBOLS

☐ | FUSED DISCONNECT

JUNCTION BOX

(x#) | CONDUIT DESIGNATOR

S_M MOTOR SWITCH

MOTOR

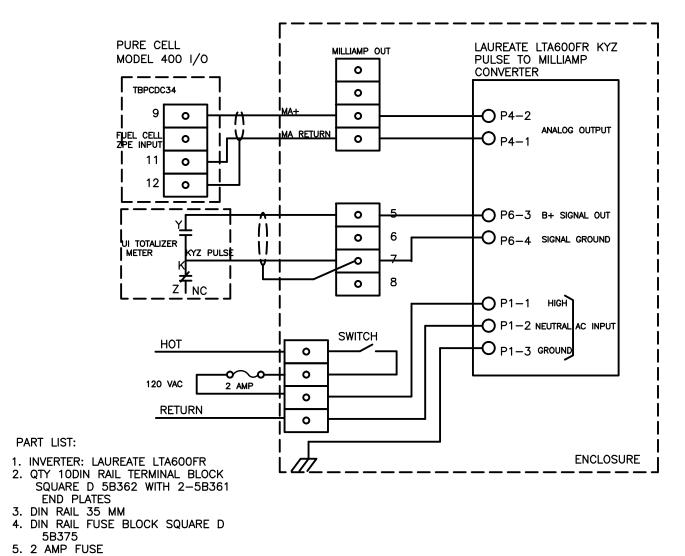
DISCONNECT

M (x#) METER

AIC	AMPERES OF INTERRUPTING CAPACITY
ATS	AUTOMATIC TRANSFER SWITCH
С	CONDUIT
GC	GRID CONNECT
GI	GRID INDEPENDENT
G OR GND	GROUND
HZ	HERTZ
kcmil	THOUSAND CIRCULAR MILL
KVA	VOLT-AMPERE
KW	KILOWATT
MA	MILLIAMPERE
RMS/EMS	REMOTE MONITORING SYSTEMS AND ENERGY MONITORING SYSTEMS
V	VOLTAGE
NE	NEW EQUIPMENT
E	EXISTING
	-

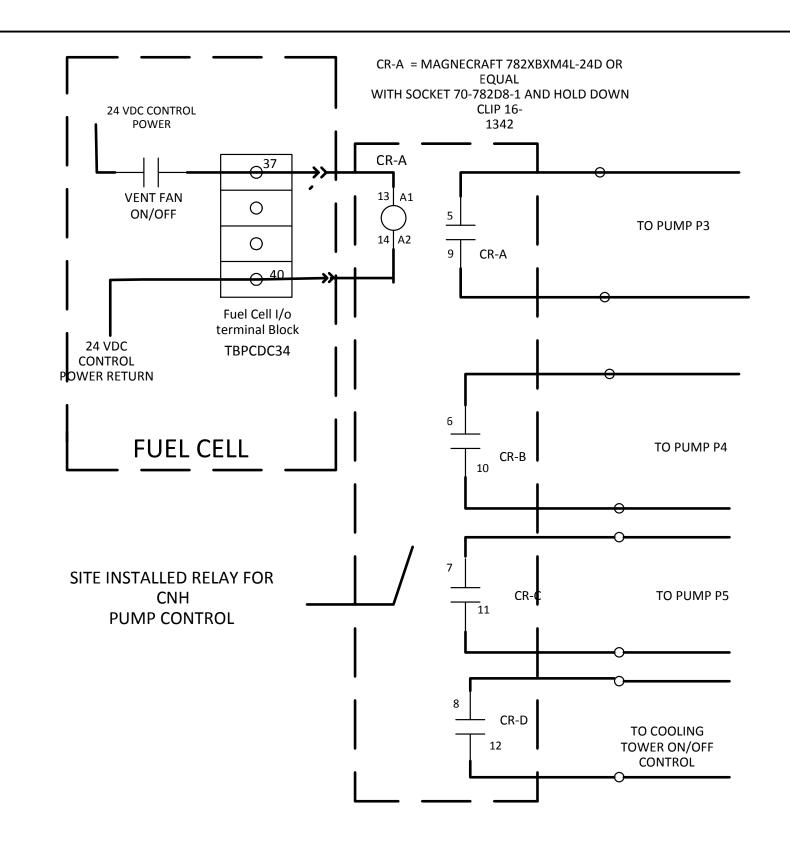
ELECTRICAL ABBREVIATIONS

AMPERE



6. TOGGLE SWITCH (DOOR MOUNT)





ON/OFF CONTROL FOR HEAT RECOVERY PUMPS DIAGRAM

FUEL CELL EXTERNAL

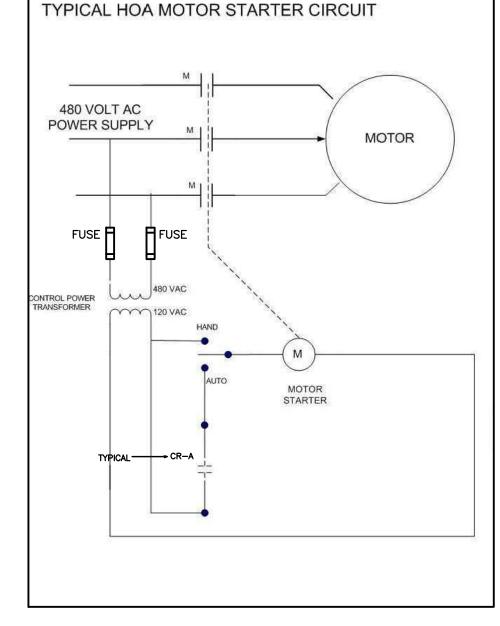
LOOP ISOLATOR

INTERNAL 24 VOLT DC -

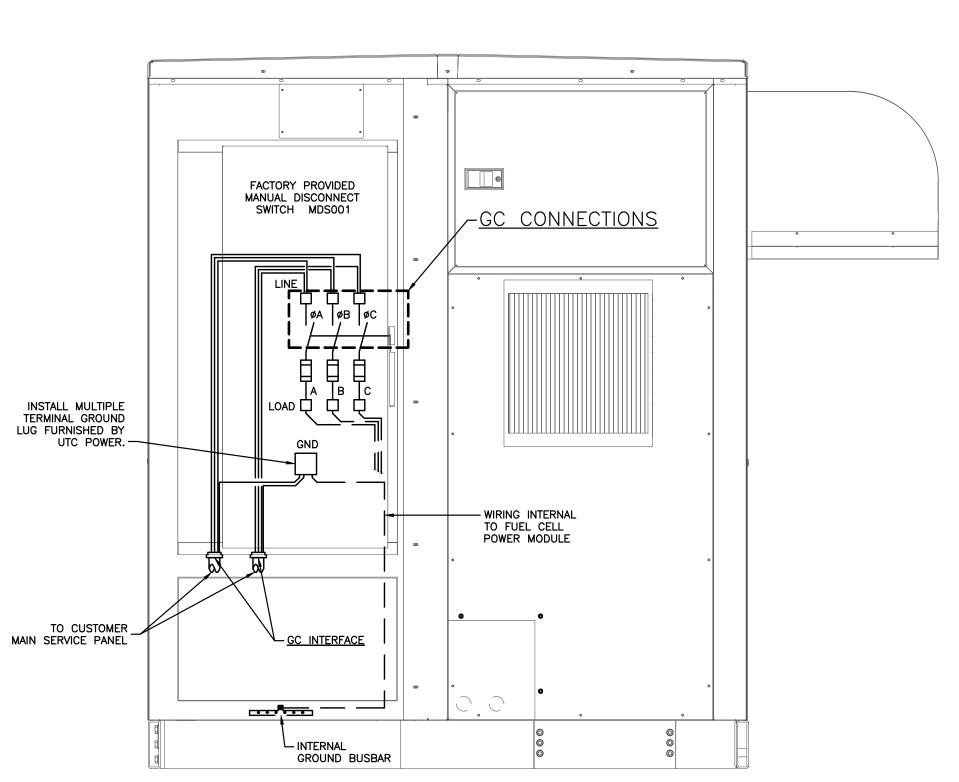
HIGH GRADE HEAT ANALOG

-3#16 FROM TRANSDUCER

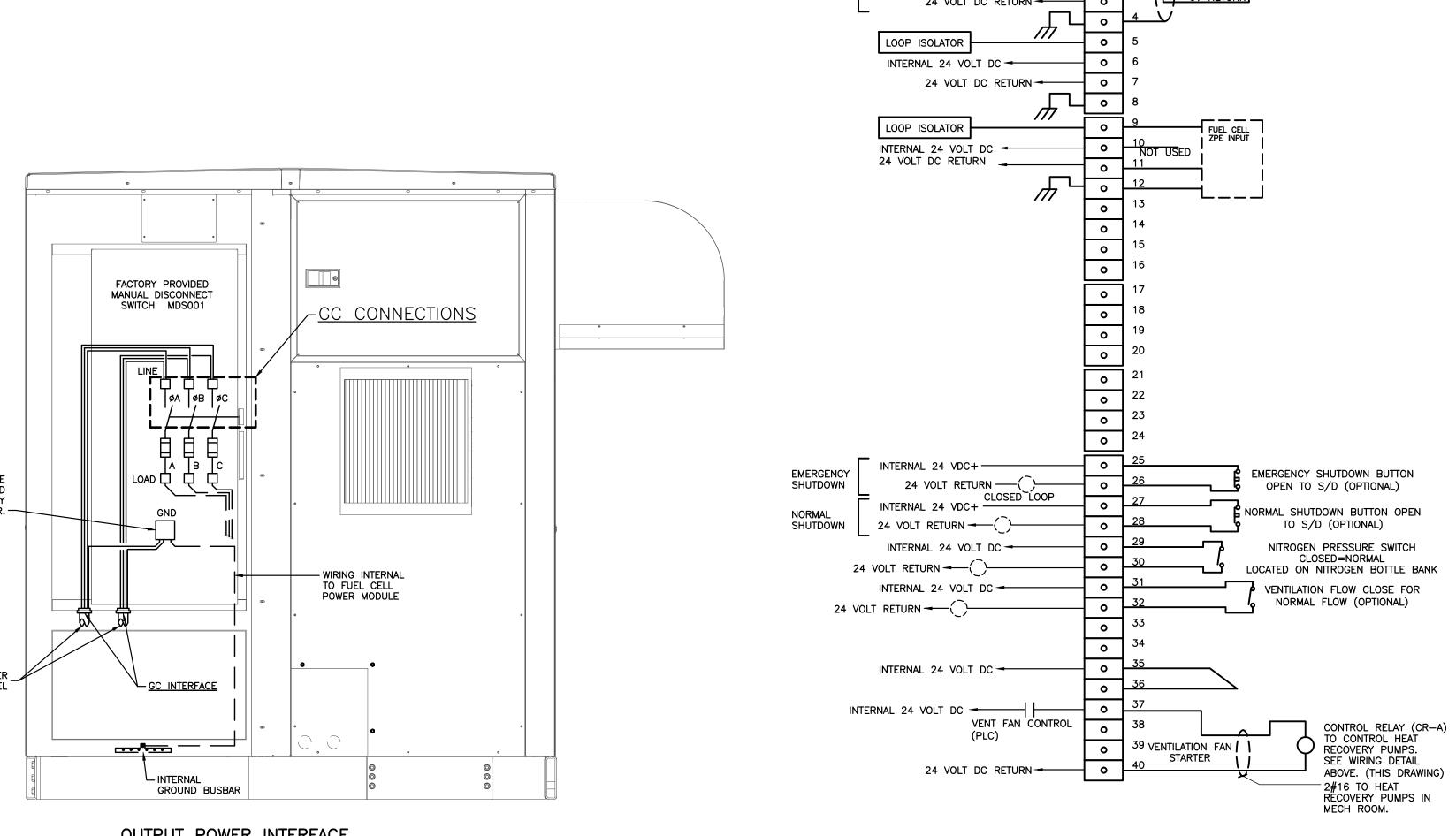
TRANSDUCER



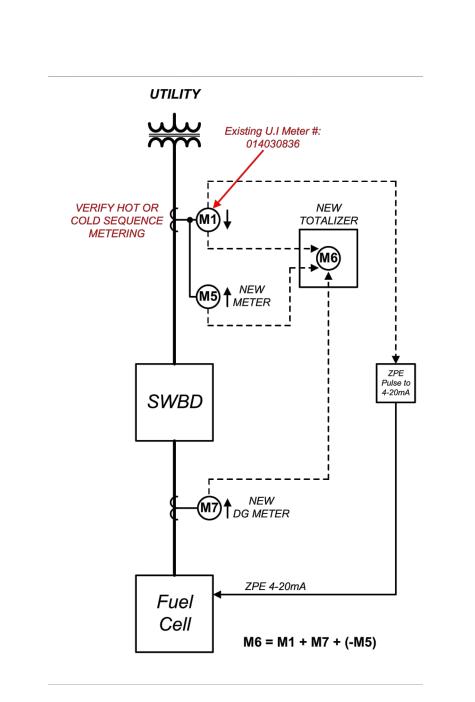
TYPICAL MOTOR STARTER CIRCUIT DIAGRAM



OUTPUT POWER INTERFACE



PURE CELL 400 I/O TERMINAL TBPCDC34 CONNECTIONS (FUEL CELL 1, FC-1)



PROPOSED METERING CONFIGURATION 1-LINE SIGNAL SCHEMATIC



ELECTRICAL

NOTES:

- 1. THE AIC RATING OF THE SITE ELECTRICAL INTERFACE MUST BE COMPARED WITH THE AIC RATING OF THE POWER PLANT CIRCUIT BREAKER (65,000 AIC).
- 2. CIRCUIT BREAKER (CB) MUST HAVE GFI PROTECTION AND BE SUITABLE FOR BACKFEEDING. THE C/B IS IN SEPARATE ENCLOSURE ON SIDE OF ELECTRICAL ROOM ON A NEW PLATFORM.
- 3. FUEL CELL POWER FACTOR IS ADJUSTABLE BETWEEN 0.85 LEADING AND LAGGING (DEFAULT PF=1.0). CUSTOMER SHOULD EVALUATE THE BUILDING LOADS TO DETERMINE APPROPRIATE FUEL CELL PF SETTING.
- 4. ALL SITE ELECTRICAL INSTALLATION DESIGNS INCLUDING SWITCHGEAR, WIRING, CONDUIT, ETC. MUST COMPLY WITH LOCAL AND NATIONAL ELECTRICAL CODES.

GROUNDING NOTES:

- 1. THE FUEL CELL GROUND LUG INSIDE DISCONNECT SWITCH MDS001 SHALL BE CONNECTED TO AN EXTERNAL #1/0 EQUIPMENT GROUNDING CONDUCTOR FROM THE CUSTOMER MAIN SERVICE PANEL'S "GROUNDED CONDUCTOR" PER NEC ART 692.44, IN ORDER TO PROVIDE THE REQUIRED SINGLE POINT GROUND PER NEC ART 250.24.A & D.
- 2. NOTE THAT THE FUEL CELL GROUND LUG INSIDE MDS001 IS BONDED TO ALL METALLIC NON-CURRENT CARRYING METAL PARTS BOTH INSIDE THE FUEL CELL AND ALSO AT EXTERNAL FUEL CELL SUBASSEMBLIES SUCH AS THE COOLING MODULE, SO ALL FUEL CELL PARTS ARE CONNECTED TO THE EQUIPMENT GROUNDING CONDUCTOR AS REQUIRED BY ART 250.110.
- 3. NOTE ALSO THAT THERE IS TO BE NO OTHER GROUNDING ELECTRODE AT THE FUEL CELL OR ANY OF ITS EXTERNAL SUBASSEMBLIES SUCH AS THE COOLING MODULE. ALL OF THESE SUBASSEMBLIES ARE TO BE CONNECTED TO THE EQUIPMENT GROUNDING CONDUCTOR INCLUDED WITH THE CIRCUIT CONDUCTORS FROM THE FUEL CELL PER ART 250.134.B, WHERE THE FUEL CELL GROUND LUG IN MDS001 CARRIES THESE GROUND WIRES BACK TO THE GROUNDED SERVICE CONDUCTOR AT THE CUSTOMER MAIN SERVICE PANEL.
- 4. ANY SUBASSEMBLY ELECTRICAL PANELS CONNECTED TO THE FUEL CELL SHALL BE GROUNDED TO THE EQUIPMENT GROUNDING CONDUCTOR FROM THE FUEL CELL PER ART 250.148 AND SHALL NOT HAVE THEIR OWN GROUND ELECTRODE.

NOT TO SCALE

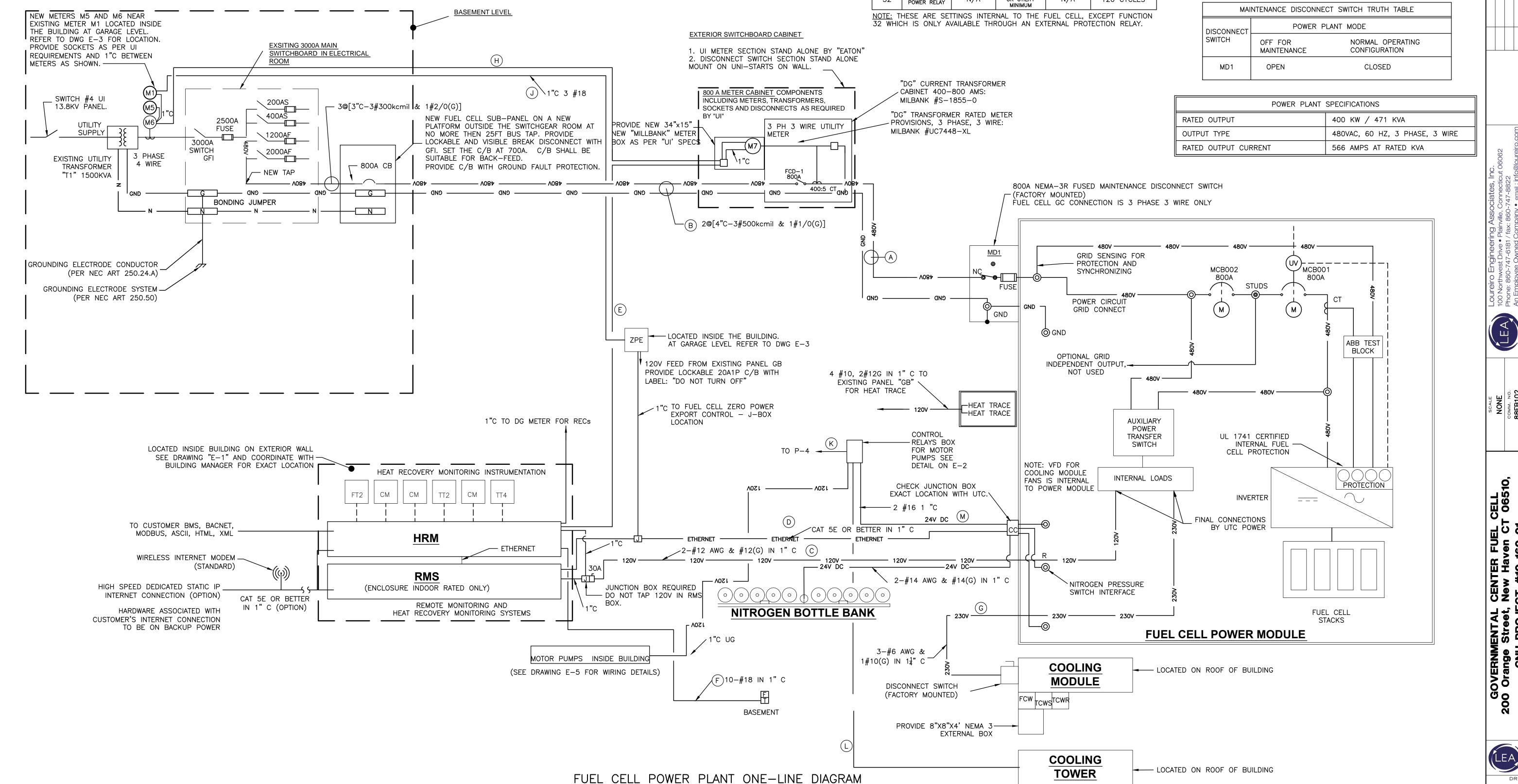
TAE	BLE A	PROTECTIV	E SETTINGS A	S PER IEEE	1547/UL 1741
ANSI C37 DEVICE NUMBER	PROTECTION FUNCTION	MAGNITUDE PARAMETER NUMBER	MAGNITUDE SETTING (RANGE)	TIME PARAMETER NUMBER	TIME SETTING (RANGE)
27	UNDER VOLTAGE	41.26	88% (88–98)	41.27	120 CYCLES (30-120)
27	FAST UNDER VOLTAGE	41.19	50% (50-98)	41.20	10 CYCLES (6-10)
59	OVER VOLTAGE	41.24	110% (102-110)	41.25	60 CYCLES (30-60)
59	FAST OVER VOLTAGE	41.17	120% (102-120)	41.18	10 CYCLES (6-10)
81	SLOW UNDER FREQUENCY	41.15	58.8 HZ (59.8-57)	41.16	300 SECONDS (0.16-300)
81	UNDER FREQUENCY	41.11	57 HZ (59.5-57)	41.23	10 CYCLES (6-10)
81	OVER FREQUENCY	41.10	60.5 HZ (59.8-60.5)	41.22	10 CYCLES (6-10)
79	RECLOSING TIME DELAY RELAY		OPEN TO TRIP	36.14	300 SECONDS (1-1000)
32	DIRECTIONAL POWER RELAY	N/A	0.1 PER UNIT OR UTILITY MINIMUM	N/A	120 CYCLES

CERTIFICATION:

POWER PLANT IS CERTIFIED TO: ANSI/CSA AMERICA FC 1 - 2004 (FORMALLY ANSI Z21.L83) "AMERICAN NATIONAL STANDARD FOR STATIONARY FUEL CELL POWER SYSTEM" INCLUDING,

- A. UL1741 "INVERTERS, CONVERTERS AND CONTROLLERS FOR USE IN INDEPENDENT POWER SYSTEMS - GRID CONNECTION"
- B. IEEE 1547 "STANDARD FOR INTERCONNECTING DISTRIBUTED RESOURCES WITH ELECTRIC POWER SYSTEMS."
- C. NFPA 70 NATIONAL ELECTRIC CODE (FOR INTERFACES TO CUSTOMER WIRING AND WIRING BETWEEN MODULES).

FUEL CELL OUTPUT CIRCUIT BREAKER TRUTH TABLE						
CIRCUIT	POWER PLANT MODE					
BREAKER	OFF/IDLE	GRID CONNECT (GC)				
MCB001	OPEN	CLOSED				
MCB002	CLOSED	CLOSED				



Compan

E-6

NO. 25 NO. OF 26

GENERAL NOTES:

REGULATIONS, AND LAWS.

- 1. THE STRUCTURAL PLANS AND SPECIFICATIONS, TO THE BEST OF OUR KNOWLEDGE, COMPLY WITH THE APPLICABLE REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE, 2003 EDITION AS SUPPLEMENTED, AMENDED, AND ADOPTED
- BY THE STATE OF CONNECTICUT. 2. THE CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF THE INTERNATIONAL BUILDING CODE. 2003 EDITION AND
- 3. ALL REFERENCED STANDARDS REFER TO THE EDITION IN FORCE AT THE TIME THESE PLANS AND SPECIFICATIONS ARE

ALL APPLICABLE FEDERAL AND STATE CODES, STANDARDS,

- 4. WORK NOT INDICATED ON A PART OF THE DRAWINGS BUT REASONABLY IMPLIED TO BE SIMILAR TO THAT SHOWN AT CORRESPONDING PLACES SHALL BE REPEATED.
- 5. IN ANY CASE OF CONFLICT BETWEEN THE NOTES, DETAILS AND SPECIFICATIONS, THE MOST RIGID REQUIREMENTS SHALL GOVERN, CONTRACTOR SHALL MAKE NO DEVIATION FROM DESIGN DRAWINGS WITHOUT WRITTEN APPROVAL OF THE
- 6. THE CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS AND COORDINATE WITH ARCHITECTURAL DRAWINGS, DRAWINGS FROM OTHER CONSULTANTS, PROJECT SHOP DRAWINGS AND FIELD CONDITIONS.
- 7. THE CONTRACTOR SHALL PROTECT EXISTING FACILITIES, STRUCTURES, AND UTILITY LINES FROM ALL DAMAGE.
- 8. JOB SAFETY AND CONSTRUCTION PROCEDURES ARE THE RESPONSIBILITY OF THE CONTRACTOR.

<u>DIVISION 3000 - REINFORCED CONCRETE NOTES:</u>

- 1. STRUCTURAL CONCRETE AND CONCRETING PRACTICES SHALL CONFORM WITH ACI-318- 02. "AMERICAN CONCRETE INSTITUTE. BUILDING CODE FOR REINFORCED CONCRETE. DETAILS SHALL BE IN ACCORDANCE WITH ACI-135, "MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES" UNLESS OTHERWISE NOTED ON THE
- 2. ALL STRUCTURAL CONCRETE SHALL BE NORMAL WEIGHT STONE CONCRETE. CONCRETE FOR SLABS SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI AT 28 DAYS UNLESS OTHERWISE NOTED ON THE DRAWINGS.
- 3. ALL EXPOSED CONCRETE SHALL HAVE AN AIR ENTRAINING
- 4. ALL REINFORCING BARS SHALL CONFORM TO ASTM A615,
- 5. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185. CHAIR OR LIFT WIRE FABRIC DURING CONCRETE PLACEMENT TO INSURE PROPER POSITION IN SLAB.
- 6. ALL REINFORCEMENT SHALL BE SECURELY HELD IN PLACE WHILE PLACING CONCRETE. IF REQUIRED ADDITIONAL BARS OR STIRRUPS SHALL BE PROVIDED BY THE CONTRACTOR TO FURNISH SUPPORT
- 7. MINIMUM CONCRETE COVER SHALL BE 3/4 INCH FOR SLABS, 1 INCH FOR WALLS AND 1-1/2 INCHES FOR COLUMNS. MINIMUM CONCRETE COVER FOR REINFORCING STEEL SHALL BE 1 INCH FOR SLABS ON GRADE AND WALLS. ALL CONCRETE EXPOSED TO WEATHER OR EARTH SHALL HAVE MINIMUM CONCRETE COVER OF 2 INCHES FOR BARS LARGER THAN #5, 1-1/2 INCHES FOR #5 BARS OR SMALLER. FOR ALL CONCRETE CAST AGAINST EARTH PROVIDE 3 INCHES COVER. ALL CONCRETE PLACED AGAINST PERMANENT SHEETING SHALL HAVE 4 INCHES COVER.
- 8. NO CONCRETE TEST WILL BE ACCEPTED IF CONCRETE IS TAMPERED WITH IN ANY WAY AFTER SAID TEST IS PERFORMED. REPEAT TEST IF WATER IS ADDED AFTER INITIAL SAMPLING.
- 9. THE GENERAL CONTRACTOR SHALL PROVIDE REINFORCING STEEL ERECTOR WITH A SET OF STRUCTURAL PLANS FOR FIELD USE.
- 10. ALL ADJOINING SURFACES NOT CAST MONOLITHICALLY SHALL BE ROUGHENED TO 1/4 INCH AMPLITUDE FOR THE ENTIRE INTERSECTING SURFACE ACCORDING TO ACT RECOMMENDATIONS
- 11. CONTRACTOR SHALL VERIFY DIMENSIONS AND LOCATIONS OF ALL OPENINGS, PIPE SLEEVES, CURBS ETC. AS REQUIRED BY OTHER TRADES BEFORE CONCRETE IS PLACED.
- 12. FOR LOCATION OF FLOOR DRAINS, CONCRETE PADS AND FLOOR DEPRESSIONS SEE ARCHITECTURAL AND MECHANICAL
- 13. CONTRACTOR SHALL USE RIGID TEMPLATES TO INSTALL ANCHOR 14. PIPES OR CONDUITS ARE NOT PERMITTED TO BE PLACED IN
- 15. TYPICAL PEDESTRIAN SLAB REINFORCING SHALL BE AS FOLLOWS:

TEMPERATURE REINFORCING 6 X 6 - W2.9 X W2.9 WELDED WIRE

DIVISION 1000 - STRUCTURAL STEEL NOTES:

- 1. FABRICATION AND ERECTION OF STRUCTURAL STEEL SHALL CONFORM WITH THE AMERICAN INSTITUTE OF STEEL CONSTRUCTION, "MANUAL OF STEEL CONSTRUCTION" (LATEST EDITION) OR THE "MANUAL FOR STEEL CONSTRUCTION, LOAD AND RESISTANCE FACTOR DESIGN" (LATEST EDITION).
- 2. ALL STEEL DETAILS AND CONNECTIONS SHALL BE IN ACCORDANCE WITH THE REQUIREMENTS OF THE AISC "SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS, ALLOWABLE STRESS DESIGN AND PLASTIC DESIGN". (LATEST EDITION) OR THE "MANUAL FOR STEE CONSTRUCTION, LOAD AND RESISTANCE FACTOR DESIGN", (LATEST EDITION). BRACED FRAME CONNECTIONS SHALL BE DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF THE AISC "SEISMIC PROVISIONS FOR STRUCTURAL BUILDINGS" 2002 EDITION.
- 3. ALL ROLLED SHAPES SHALL CONFORM TO ASTM STANDARD A572, GRADE 50 UNLESS SPECIFICALLY INDICATED ELSEWHERE ON OTHER
- 4. ALL CONNECTION MATERIAL, BASE PLATES, ANGLES AND MISCELLANEOUS FRAMING SHALL CONFORM TO ASTM STANDARD A-36 UNLESS OTHERWISE NOTED.
- 5. SHOP AND FIELD CONNECTIONS NOT SPECIFICALLY DETAILED ON THE DRAWINGS MAY BE BOLTED OR WELDED.
- 6. WHEN NOT SPECIFICALLY DETAILED ELSEWHERE ON THE DRAWINGS, ALL BEAM TO BEAM AND BEAM TO COLUMN CONNECTIONS SHALL BE TWO SIDED WEB ANGLE CONNECTIONS.
- 7. ALTERNATE CONNECTIONS WILL BE ACCEPTED ONLY WITH THE 8 WRITTEN APPROVAL OF THE ENGINEER. HOWEVER, THE ENGINEER SHALL BE THE SOLE JUDGE OF ACCEPTABILITY AND THE CONTRACTOR'S BID SHALL ANTICIPATE THE USE OF THOSE SPECIFIC DETAILS SHOWN ON THE DRAWINGS. IN ANY EVENT, THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE DESIGN OF SUCH ALTERNATE DETAILS WHICH HE PROPOSES.
- 8. WHEN INDICATED AS BOLTED ON THE DRAWINGS, ALL SHOP OR FIELD BOLTED BEAM TO BEAM CONNECTIONS SHALL BE BOLTED CONNECTIONS USING 3/4 INCH DIAMETER A325 BEARING BOLTS IN STANDARD HOLES UNLESS SPECIFICALLY NOTED OTHERWISE.
- 9. ALL BEAMS AND GIRDERS SHALL BE CONNECTED FOR 115% OF REACTION DENOTED BY THE SYMBOL V ON PLAN.
- 10. ALL BEAM AND GIRDER CONNECTIONS SHALL BE A LEAST CAPABLE OF DEVELOPING THE UNIFORMLY DISTRIBUTED LOAD CAPACITY OF THE MEMBER USING THE REACTION FROM THE ALLOWABLE LOAD OF BEAM AS TABULATED IN THE MANUAL OF STEEL CONSTRUCTION PART 2, (LATEST EDITION) UNLESS NOTED
- 11. OVERSIZED OR SLOTTED HOLES SHALL NOT BE USED FOR ANY CONNECTIONS UNLESS SPECIFICALLY INDICATED ON THE DRAWINGS OR APPROVED IN WRITING BY THE ENGINEER.
- 12. ALL WELDS INDICATED SHALL MEET THE MINIMUM WELD SIZE SPECIFIED BY THE CURRENT AISC MANUAL OF STEEL DESIGN.
- 13. ALL WELDING SHALL BE PERFORMED BY QUALIFIED WELDERS IN ACCORDANCE WITH A.W.S. SPECIFICATIONS, (LATEST EDITIONS). ALL WELDING ELECTRODES SHALL CONFORM TO A.W.S. A5.1 GRADE E-70. BARE ELECTRODES AND GRANULAR FLUX SHALL CONFORM TO A.W.S. A5.17, F70 A.W.S. FLUX CLASSIFICATION.
- 14. PROVIDE WELDED STIFFENER PLATES ON BOTH SIDES OF THE WEB OF BEAMS AT POINTS OF CONCENTRATED LOAD.
- 15. THE FILLER BEAMS SHOULD BE SPACED EQUALLY BETWEEN THE SUPPORTS IF NOT OTHERWISE NOTED ON THE DRAWINGS.
- 16. CUTS, HOLES, COPING, ETC. REQUIRED FOR WORK OF OTHER TRADES SHALL BE SHOWN ON THE SHOP DRAWINGS AND MADE IN THE SHOP. CUTS OR BURNING OF HOLES IN STRUCTURAL STEEL MEMBERS IN THE FIELD WILL NOT BE PERMITTED.
- 17. STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH ARCHITECTURAL AND MECHANICAL DRAWINGS AND DRAWINGS RELATED TO OTHER TRADES. THE GENERAL CONTRACTOR IS RESPONSIBLE TO CHECK AND COORDINATE DIMENSIONS, CLEARANCES, ETC., WITH THE WORK OF OTHER TRADES.
- 18. THE CONTRACTOR SHALL PROVIDE THE ENGINEER WITH SHOP DRAWINGS TO BE APPROVED PRIOR TO FABRICATING STEEL.

<u>DIVISION 15000 - MECHANICAL</u>

PART 1 — GENERAL

- 1.1 PIPE HANGERS AND SUPPORTS SHALL MEET THE REQUIREMENTS OF MSS SP-69 AND SP-89 DEVELOPED BY THE MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVES AND FITTINGS INDUSTRY INC.
- 1.2 SEISMIC SUPPORTS AND RESTRAINTS FOR EQUIPMENT, DUCTWORK AND PIPING SHALL MEET STATE BUILDING CODE REQUIREMENTS AND SMACNA SEISMIC RESTRAINT MANUAL GUIDELINES.
- 1.3 SOUTHERN CONNECTICUT GAS SHALL BE NOTIFIED BEFORE INSTALLING ANY GAS PIPING AND SHALL BE PRESENT WHILE EXCAVATING WITHIN 10 FEET OF THE BURIED HIGH PRESSURE GAS MAIN.
- 1.4 GENERAL PIPING REQUIREMENTS:
- A. ALL PIPING SHALL BE RUN PARALLEL TO THE LINE OF THE BUILDING.
- B. PITCH OF LINES SHALL BE UNIFORM AND TRUE WITH NO SAGS, POCKETS OR TRAPS. ECCENTRIC FITTINGS SHALL BE USED WHERE NECESSARY TO PROVIDE COMPLETE DRAINAGE.
- C. PROVIDE ISOLATION VALVES AT ALL CONNECTIONS TO FIXTURES AND ALL BRANCH TAKE-OFFS.
- D. PROVIDE MANUAL VENT VALVES AT ALL HIGH POINTS AND DRAIN VALVES AT ALL LOW POINTS. PROVIDE VENT VALVES WITH ISOLATION VALVES.
- E. SCREWED PIPE JOINTS SHALL BE MADE WITH TEFLON PIPE THREAD TAPE OR APPROVED PIPE JOINT COMPOUND.
- F. SEAL ALL FLOOR, WALL AND CEILING PENETRATIONS WITH 3HR RATED FIRE STOPPING MATERIAL.
- A. ALL PIPING SYSTEMS INSTALLED UNDER THIS CONTRACT SHALL BE PRESSURE TESTED WITH CLEAN WATER, UNLESS NOTED OTHERWISE, TO INSURE TIGHTNESS. . HEAT REJECTION. HEAT RECOVERY, AND MAKEUP WATER PIPING SHALL BE TESTED TO 100 PSIG. CONTRACTOR SHALL FOLLOW UTC POWER
- INSTALLATION MANUAL GUIDELINES AND SAFETY PROCEDURES. 2. DRAINAGE AND VENT PIPING SHALL BE TESTED TO 10 FOOT HEAD OF 3. GAS PIPING SHALL BE TESTED IN ACCORDANCE WITH NFPA 54. TEST
- PRESSURE SHALL BE 1-1/2 TIMES THE SYSTEM WORKING PRESSURE OR A MINIMUM OF 3 PSIG. TEST MEDIUM SHALL BE AIR, NITROGEN OR CARBON
- B. CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL PLUGS, PIPING. VALVES, HOSES, AND PUMPS NECESSARY FOR THE REQUIRED TESTS AND FOR PROPER DISPOSAL OF THE TEST MEDIUM UPON COMPLETION OF THE TESTS.
- 1.6 CLEANING OF THE PIPING SYSTEMS:
- A. UPON COMPLETION OF ALL WORK AND SATISFACTORY TESTING, ALL PIPING SYSTEMS, EXCEPT GAS PIPING, SHALL BE FLUSHED WITH WATER TO REMOVE DIRT, GRIT, CHIPS AND FOREIGN MATTER. REFER TO THE FUEL CELL INSTALLATION MANUAL. GAS PIPING SHALL BE PURGED OF AIR IN ACCORDANCE
- B. WATER FOR FLUSHING SHALL BE USED IN SUFFICIENT QUANTITY TO PRODUCE A VELOCITY OF AT LEAST 2.5 FEET PER SECOND. FLUSHING SHALL CONTINUE UNTIL DISCHARGE WATER SHOWS NO DISCOLORATION OR EVIDENCE OF FOREIGN
- C. DURING FLUSHING OPERATION, ALL VALVES SHALL BE OPERATED SEVERAL TIMES, BYPASSES OPENED AND EQUIPMENT FLUSHED.
- D. UPON COMPLETION OF FLUSHING OPERATIONS, ALL STRAINERS, FILTERS AND BLOWDOWNS SHALL BE REMOVED AND CLEANED OF ACCUMULATED WASTE.
- E. CARE SHOULD BE TAKEN TO INSURE THE COMPLETE REMOVAL OF ALL WATER FROM THE LINE OR SYSTEM AFTER TESTING. IF THERE IS ANY DANGER OF CONTAMINATION OR FREEZING, BLOW OUT THE FLUID WITH DRY, OIL-FREE AIR.
- A. ALL ITEMS REQUIRING LUBRICATION OF ANY KIND SHALL BE FULLY LUBRICATED AT THE TIME THE JOB IS TURNED OVER TO THE OWNER. THE CONTRACTOR SHALL SEE THAT NO EQUIPMENT IS TURNED ON OR RUN FOR TESTING PURPOSES WITHOUT PROPER LUBRICATION.
- B. FURNISH TO THE OWNER COMPLETE PRINTED LUBRICATION INSTRUCTIONS FOR EACH PIECE OF EQUIPMENT AND POINTS TO BE LUBRICATED.
- 1.8 FREEZE PROTECTION:
- A. AFTER COMPLETION OF TESTING AND BEFORE BALANCING THE COOLING MODULE HIGH GRADE PIPING SYSTEMS SHALL BE FILLED WITH A 35% SOLUTION OF DOW DOWFROST PROPYLENE GLYCOL.
- 1.9 WATER SYSTEM BALANCING:
- A. EACH SYSTEM SHALL BE COMPLETED AND FUNCTIONALLY CHECKED PRIOR TO BALANCING.
- B. FINAL ADJUSTMENTS AND BALANCING SHALL BE PERFORMED BY AN INDEPENDENT ADJUSTING AND BALANCING CONTRACTOR SPECIALLY TRAINED IN
- C. IMMEDIATELY FOLLOWING THE COMPLETION OF THE ADJUSTING AND BALANCING OF EACH SYSTEM, FINAL READINGS SHALL BE TAKEN AND RECORDED OF ALL ELECTRICAL LOADS FOR MOTORS, EQUIPMENT SPEEDS, OPERATING PRESSURES AT VARIOUS POINTS IN THE SYSTEM AND FINAL FLOWS AND PRESSURES FOR THE TOTAL SYSTEM AND EACH TERMINAL POINT OF THE SYSTEM. PROVIDE AN AS BUILT DRAWING SHOWING ALL TEST LOCATIONS. A FINAL REPORT SHALL BE SUBMITTED TO THE OWNER FOR APPROVAL.
- 1.10 ABOVE GROUND PIPE INSULATION SHALL BE RIGID, HEAVY DENSITY, PREFORMED GLASS FIBER, WITH ALL SERVICE JACKET. JACKET SHALL HAVE PRESSURE SENSITIVE TAPE CLOSURE. BUTT JOINTS SHALL HAVE 3" WIDE TAPE OF SAME MATERIAL. VALVES AND FITTINGS SHALL BE INSULATED WITH ZESTON, OR APPROVED EQUAL. INSULATED PVC, ONE PIECE, SNAP-TYPE COVERS AND ZESTON 1 1/2" Z-TAPE, 10 MIL. EXTERIOR PIPE SHALL BE PROVIDED WITH AN 0.016" ALUMINUM JACKET. INSULATION THICKNESS AS FOLLOWS:

INSULATION THICKNESS SYSTEM

- A. HOT WATER 2" AND LESS
- B. HOT WATER 2 1/2" AND GREATER
- C. CONDENSER WATER, COLD WATER 3/4"
- D. CHILLED WATER PIPING
- 1.11 PIPE IDENTIFICATION:
- A. ALL PIPING SHALL BE IDENTIFIED WITH NAME AND FLOW DIRECTION ARROWS. MARKERS SHALL BE PLACED EVERY 40 LINEAL FEET ON STRAIGHT RUNS, AT CHANGES IN DIRECTION, AND AT WALL PENETRATIONS (BOTH SIDES).

1 1/2"

- B. PIPE MARKERS SHALL BE EQUAL TO SETMARK, AS MANUFACTURED BY SETON NAMEPLATE CO. 1. TEXT AND BACKGROUND COLORS SHALL FOLLOW ANSI A13.1.
- C. PROVIDE AND INSTALL VALVE TAGS AND PERMANENT VALVE CHART.

PART 2 - PLUMBING

- 2.1 WATER PIPING: SHALL BE TYPE K HARD DRAWN COPPER TUBING CONFORMING TO ASTM B88, WITH ASME B16.22 WROUGHT COPPER FITTINGS, ASTM B32 SOLDER GRADE 95TA JOINTS.
- 2.2 NATURAL GAS PIPING: NATURAL GAS PIPING SHALL BE SCHEDULE 40 BLACK STEEL CONFORMING TO ASTM A53. FITTINGS SHALL BE 150 LB MALLEABLE IRON SCREWED CONFORMING TO ASTM B16.3. JOINTS SHALL BE THREADED OR WELDED IN ACCORDANCE WITH ANSI B31.2 AND NFPA 54 AND AS NOTED ON
- 2.3 DRAIN PIPING: SHALL BE SCHEDULE 40 PVC WITH SOLVENT WELD FITTINGS
- 2.4 NITROGEN PIPING: SHALL BE TYPE K HARD DRAWN COPPER TUBING CONFORMING TO ASTM B88, WITH ASME B16.22 WROUGHT COPPER FITTINGS, ASTM B32 SOLDER GRADE 95TA JOINTS.
- 2.5 VALVES SHALL BE AS FOLLOWS: B. GATE VALVES: WATTS GV SERIES. C. GLOBE VALVES: WATTS GLV SERIES
- D. CHECK VALVES: WATTS CV SERIES . BALL VALVES: JAMESBURY CLINCHER SERIES 2000.
- BACKFLOW PREVENTER WATTS 909 RPD G. NATURAL GAS BALL VALVES: APOLLO 80-100 UL LISTED FOR NATURAL GAS
- SERVICE, WITH LOCKABLE HANDLE. H. PRESSURE REDUCING REGULATOR VALVES: 2" - FISHER MODEL 133L, 2PSI INLET, 14" WG OUTLET, SPRING RANGE 8"-18"WG, 4,500 CFH CAPACITY.

2.6 ELECTRIC HEAT TRACING {SELF LIMITING}

A. MANUFACTURERS

B. CHARACTERISTICS:

(1)NELSON TYPE LT OTHER ACCEPTABLE MANUFACTURERS OFFERING EQUIVALENT PRODUCTS

- (A) RAYCHEM. (B) BRISK - HEAT.
- (1)SELF LIMITING, PARALLEL CIRCUIT TYPE WHICH AUTOMATICALLY SELF REGULATES HEAT OUTPUT. PRODUCT SHALL BE FACTORY MUTUAL APPROVED OR UL LISTED. CONSTRUCTION: 16 GAUGE NICKEL PLATED COPPER CONDUCTOR, SELF
- REGULÁTING CONDUCTIVE CORE, THERMOPLASTIC ELASTOMER INNER JACKET, METALLIC OVER-BRAID AND THERMOPLASTIC OUTER JACKET. (3) CAPACITY: 3 WATTS PER FOOT FOR THE 1" PIPING AND SMALLER PIPING AND 5 WATTS PER FOOT FOR LARGER PIPING WITH 120 VOLT ELECTRICAL POWER.
- C. TEMPERATURE CONTROLLERS: NELSON MODEL TF4X40 CONTROLLER WITH BULB TYPE SENSOR AND 3'0" LONG CAPILLARY, NEMA 3R ENCLOSURE, 22 AMP SPDT SWITCH WITH FIXED SETPOINT OF 40 DEGREES F.
- D. PROVIDE WITH SPLICE KITS, END KITS, TAPE, TAPE MARKERS, AND END OF CIRCUIT INDICATING LIGHTS AS REQUIRED FOR COMPLETE INSTALLATION.
- E. HEAT TRACE ALL EXTERIOR/UNHEATED SPACE COLD WATER SUPPLY PIPING, ALL EXTERIOR/UNHEATED SPACE CONDENSATE DRAIN PIPING AND FUEL CELL WO PIPING AND ALL CHILLED WATER PIPING THAT RUNS IN UNHEATED SPACES.

PART 3 - HVAC

- 3.1 HEAT RECOVERY PUMPS AND HEAT EXCHANGERS:
- A. PUMPS P-1,2,3,4,5 REFER TO PUMP SCHEDULE B. HX-1, HX-2 REFER TO HEAT EXCHANGER SCHEDULE.

- D. HIGH GRADE HEAT RECOVERY AND COOLING MODULE PIPING SHALL BE WELDED OR SEAMLESS CARBON STEEL PIPE, SCHEDULE 40. PROVIDE PIPING WITH THREADED ENDS UP TO 2", BEVELED ENDS 2 1/2" AND OVER, AND CONFORMING TO ASTM A53. INSTALLATION TO BE IN CONFORMANCE WITH ANSI B31.1 AND B31.9 STANDARDS. 1. FITTINGS 2" AND UNDER SHALL BE 150 LB. MALLEABLE IRON, SCREWED.
- 2. FITTINGS 2 1/2" AND OVER SHALL BE STANDARD WEIGHT, BUTT WELD, CARBON STEEL AS MANUFACTURED BY TUBE TURNS OR EQUAL. ELBOWS SHALL BE LONG RADIUS TYPE. TEES AND FITTINGS SHALL BE PREFABRICATED EXCEPT WELDOLET TYPE FITTINGS MAY BE USED WHERE BRANCH IS LESS THAN 1/2 THE SIZE OF THE MAIN.
- REDUCERS SHALL BE ECCENTRIC. 3. FLANGES SHALL BE CLASS 150 SOCKET OR WELDING NECK TYPE WITH RAISED FACE, AND SPIRAL SERRATED
- FINISH. BOLTS SHALL BE UNFINISHED, SQUARE HEAD, MACHINE BOLTS CONFORMING TO ASTM A307, GRADE B. 4. FITTINGS MAY BE VICTAULIC SUITABLE FOR 250'F PROPYLENE GLYCOL
- B. CONDENSER WATER PIPING SHALL BE WELDED OR SEAMLESS CARBON STEEL PIPE, SCHEDULE 40. PROVIDE PIPING WITH THREADED ENDS UP TO 2", BEVELED ENDS 2 1/2" AND OVER, AND CONFORMING TO ASTM A53. INSTALLATION TO BE IN CONFORMANCE WITH ANSI B31.1 AND B31.9 STANDARDS.
- 1. FITTINGS 2" AND UNDER SHALL BE 150 LB. ANSI 16.3 STAINLESS STEEL
- 2. FITTINGS 2 1/2" AND OVER SHALL BE STANDARD WEIGHT, BUTT WELD, STAINLESS STEEL AS MANUFACTURED BY
- TUBE TURNS OR EQUAL 3. FLANGES SHALL BE CLASS 150 SOCKET OR WELDING NECK TYPE WITH RAISED FACE, AND SPIRAL SERRATED FINISH. BOLTS SHALL BE UNFINISHED, SQUARE HEAD, MACHINE BOLTS CONFORMING
- 4. FITTINGS MAY BE VICTAULIC SUITABLE FOR 250°F PROPYLENE GLYCOL 3.3 VALVES SHALL BE AS FOLLOWS: (PROVIDE ALL VALVES WITH HANDLE EXTENSIONS FOR INSULATED PIPING)
- A. CHECK VALVES: CRANE CAST STEEL FIG. 147.
- B. BALL VALVES: JAMESBURY SERIES 6F, CARBON STEEL.
- C. BALANCING VALVES: B&G CIRCUIT SETTER MODEL CB, BRONZE BODY, NPT END
- D. BUTTERFLY VALVES: KEYSTONE TYPE AR WITH ALUMINUM-BRONZE DISC.
- 3.4 HYDRONIC SPECIALTIES:
- A. MANUAL VENTS: TACO MODEL 409.

TO ASTM A307, GRADE B.

- B. AIR SEPERATOR: TACO MODEL 4900AD, AIR AND DIRT ELIMINATOR.
- C. STRAINERS: SARCO TYPE IT. PROVIDE TEMPORARY STARTUP CONE STRAINERS. TS
- STRAINERS AND FILTERS, TO BE REMOVED AFTER FLUSHING SYSTEMS. D. PRESSURE GAUGES: ASHCROFT 1009 SERIES, 21/2" DIAL, STAINLESS STEEL CASE, RANGE 0-30" WG FOR GAS SYSTEMS, 0-200 PSIG FOR NITROGEN SYSTEMS, 0-100 PSIG FOR LIQUID SYSTEMS, UNLESS NOTED OTHERWISE.
- E. TEMPERATURE GAUGES: ASHCROFT E1 SERIES, 5" DIAL, STAINLESS STEEL CASE,
- EVERY-ANGLE CONNECTION, 0-200F RANGE. PROVIDE WITH THERMOWELL F. EXPANSION TANKS: TACO MODEL CA-140 WITH PRECHARGE AS NOTED ON THE DRAWINGS, 240F MAX OPERATING TEMPERATURE, 150 PSIG MAXIMUM WORKING
- G. CONTROL VALVES: SARCO TYPE TW WITH SA 1219 CONTROLLER, BRONZE WELL, CAPILLARY LENGTH TO BE DETERMINED IN FIELD.
- H. HOLDING TANK: RELIEF VALVE DISCHARGE TANK TO BE 55 GALLON TANK
- 3.5 SEQUENCE OF OPERATION:
- A. REFER TO DRAWING M-8.
- 3.6 HEAT COMMISSIONING: A. THE FACTORY START-UP OF ALL EQUIPMENT MUST HAVE BEEN CARRIED OUT AS WELL AS CONTROL SYSTEM COMPLETION AND SYSTEM CHECKOUT. AIR AND WATER BALANCING REPORTS MUST HAVE BEEN SUBMITTED AND APPROVED BY THE DESIGN
- B. OPERATION AND MAINTENANCE MANUALS. AS-BUILTS. TAB REPORTS AND ANY OTHER ITEMS AS MAY BE SPECIFIED SHALL BE SUBMITTED FOR REVIEW AND COMMENT.
- C. BEFORE ANY SYSTEM START-UPS BEGIN, THE CONTRACTOR(S) SHALL CONDUCT A FINAL INSTALLATION VERIFICATION AUDIT FOR THEIR WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLETION OF ALL WORK INCLUDING CHANGE ORDERS AND PUNCH LIST ITEMS TO THE OWNER'S SATISFACTION. THIS VISUAL CHECK OF THE VARIOUS SYSTEMS TO BE COMMISSIONED SHALL VERIFY THAT ALL COMPONENTS ARE PROPERLY INSTALLED.
- BEEN GIVEN TO THE START-UP PLAN AND AFTER THE PRESTART-UP INSPECTION HAS BEEN COMPLETED. E. FUNCTIONAL PERFORMANCE TESTING WILL COMMENCE AS SYSTEMS ARE BROUGHT TO SUBSTANTIAL COMPLETION AND WILL BE DONE ON A SYSTEM BY SYSTEM BASIS. THE

D. THE CONTRACTOR SHALL COMMENCE WITH SYSTEM START-UP AFTER APPROVAL HAS

OWNER/ENGINEER FOR A FINAL SYSTEM ACCEPTANCE. F. THE OWNER, CONTRACTOR, ENGINEER, OWNER'S CONSULTANT, AND UTC POWER

PERSONNEL SHALL ATTEND THE FINAL COMMISSIONING

RESULTS OF THESE TESTS WILL BE DOCUMENTED AND SUBMITTED TO THE

- G. FLOW RATES AND INLET/OUTLET TEMPERATURES AT EACH PIECE OF EQUIPMENT SHALL BE DOCUMENTED BY THE COMMISSIONING AGENT AND PROVIDED TO THE TEAM (ITEM F) FOR REVIEW.
- 3.7 COORDINATION AND SHOP DRAWINGS:
- A. THE CONTRACTOR SHALL PROVIDE EQUIPMENT AND PIPING COORDINATION DRAWINGS FOR THE OWNER'S REVIEW PRIOR TO FABRICATION. SHOP DRAWINGS FOR ALL EQUIPMENT NOT PROVIDED BY UTC POWER SHALL BE PROVIDED FOR THE OWNER'S
- 3.8 AS-BUILT DRAWINGS:
- A. THE CONTRACTOR SHALL PROVIDE AS-BUILT DRAWINGS OF ALL WATER SYSTEMS AND CONTROL SYSTEMS FOR THIS PROJECT. END OF SECTION

DIVISION 16000 - ELECTRICAL

- 1.1 DESCRIPTION A.NEW POWER DISTRIBUTION SYSTEM
- B.POWER AND CONTROL WIRING
- C.NEW LIGHTING SYSTEM 1.2 CONFORM TO THE REQUIREMENTS OF THE CONNECTICUT STATE BUILDING AND
- FIRE SAFETY CODES, INCLUDING BUT NOT LIMITED TO, THE FOLLOWING:
- A.NFPA 70 NATIONAL ELECTRICAL CODE (NEC). B.NFPA 70E - STANDARD FOR ELECTRICAL SAFETY IN THE WORKPLACE.
- C.NFPA 101 LIFE SAFETY CODE.
- 1.3 ALL ELECTRICAL EQUIPMENT FURNISHED BY THE CONTRACTOR SHALL BE LISTED AS SUITABLE FOR THE PURPOSE BY UNDERWRITERS' LABORATORIES OR
- 1.4 POWER AT 480/277V, 3 PHASE, 4 WIRE AND 208/120V, 3 PHASE, 4 WIRE IS AVAILABLE FROM EXISTING PANELS AS SHOWN ON THE DRAWINGS.

PART 2 PRODUCTS

2.1 WIRE AND CABLE

A. 600 VOLT WIRE SHALL HAVE STRANDED (CLASS B) SOFT, ANNEALED COPPER INSULATION SHALL BE 600V, THHN/THWN, 75°C FOR NO. 6 AND SMALLER; XHHW, 75°C, FOR NO. 4 AND LARGER.

- A. RIGID METAL CONDUIT (RMC) SHALL BE ZINC COATED STEEL OR RIGID ALUMINUM.
- B. INTERMEDIATE METAL CONDUIT (IMC) SHALL BE ZINC COATED STEEL.
- C. ELECTRIC METALLIC TUBING (EMT) SHALL BE ZINC COATED STEEL.
- D. RIGID NON-METALLIC CONDUIT (RNC) SHALL BE PVC SCHEDULE 40. E. FLEXIBLE METAL CONDUIT (FMC) SHALL BE METALLIC WITH OR WITHOUT A WATERPROOF PVC JACKET AS REQUIRED
- F. USE THREADED COUPLINGS FOR RIGID AND INTERMEDIATE STEEL CONDUIT. USE COMPRESSION TYPE COUPLINGS FOR EMT.

G. MINIMUM SIZE CONDUIT SHALL BE 3/4":

A. OUTLET BOXES FOR SURFACE MOUNTED SWITCHES AND RECEPTACLES SHALL BE TYPE FD, CAST FERROALLOY WITH THREADED HUBS. PROVIDE GASKETED

COVER AS REQUIRED. 2.4 RECEPTACLES

A. DESCRIPTION: SPECIFICATION GRADE, 120VAC, NEMA 5-20R. COLOR SHALL

- BE IVORY. B. MANUFACTURERS, DUPLEX GFI, WATERPROOF
- 2)LEVITON

3)PASS & SEYMOUR

- 2.5 SWITCHBOARDS
- A. SWITCHBOARDS: SQUARE D OR GE CIRCUIT BREAKER SWITCHBOARD, 480 VOLT, 3 PHASE, 3 WIRE, SOLIDLY GROUNDED.
- B. SWITCHBOARD BUS: SILVER PLATED COPPER, RATINGS AS INDICATED. PROVIDE COPPER GROUND BUS IN EACH SECTION.
- C. MINIMUM SHORT CIRCUIT RATING: 65,000 AMPERES RMS SYMMETRICAL FOR 480 VOLT SWITCHBOARDS.
- D. MOLDED CASE CIRCUIT BREAKERS: SQUARE D OR GE, SOLID STATE, E. ENCLOSURE TYPE: NEMA 3R FREE STANDING, STRIP HEATER WITH
- F. PROVIDE CT'S AND PT'S AS REQUIRED FOR METERING. SEE DRAWINGS FOR
- METERING DETAILS. G. PROVIDE GFI ON MAIN CIRCUIT BREAKER.

THERMOSTAT, PAD LOCKING

H. SEE DRAWINGS FOR RATINGS OF SWITCHBOARDS

ATTACHMENTS.

2.6 MOTOR STARTERS A. MAGNETIC STARTER SHALL BE COMBINATION FUSIBLE SWITCH/ MAGNETIC STARTERS. STARTERS SHALL HAVE THERMAL OVERLOAD PROTECTION IN ALL THREE PHASES; 120V CONTROL POWER FROM FUSED CONTROL TRANSFORMER; "GREEN RUNNING LIGHTS" AUXILIARY CONTACTS AND CONTROL MODIFICATIONS

AS REQUIRED BY DRAWINGS. FUSIBLE SWITCH SHALL ACCEPT ONLY UL CLASS

B. ALL STARTERS SHALL HAVE FACTORY INSTALLED HEATERS SIZED FOR HORSEPOWER SHOWN ON DRAWINGS. CONTRACTOR SHALL CHECK ACTUAL INSTALLED MOTOR NAMEPLATE AMPERE RATING AND CHANGE HEATERS AS REQUIRED IN THE FIELD TO AGREE WITH STARTER MANUFACTURER'S RECOMMENDED SIZING.

R FUSES. FUSES SHALL BE UL CLASS RK-1, TIME-DELAY.

2.7 PHOTOELECTRIC CONTROLS

- A. DESCRIPTION: CADMIUM SULFIDE CELL, 1 INCH DIAMETER IN A DIE-CAST ZINC ENCLOSURE WITH
- CONTROL CONTACTS IN A WEATHER-PROOF ENCLOSURE.
- B. OPERATING TEMPERATURE RANGE: -40°F TO +120°F. C. CONTACTS: SPST, 1800VA BALLAST LOAD AT 120 VOLTS.
- THE ON POSITION) D. TURN ON AT 1.5 TO 5 FOOTCANDLES; TURN OFF AT
- APPROXIMATELY 3 TIMES TURN ON.

NORMALLY CLOSED CONTACT (FAILS IN

E. EQUAL TO TORK MODEL NO. 2101.

2.8 FUSES

A. FUSES 600 VOLTS SHALL BE DUAL ELEMENT, TIME DELAY, CURRENT LIMITING, UL TYPE RK 1, 200,000 AMPS RMS SYMMETRICAL SHORT

CIRCUIT RATING. FUSES SHALL BE EQUAL TO BUSSMANN LPS-RK. 2.9 ACCEPTABLE MANUFACTURER'S LIST

ROBE, TRIANGLE

2.10 GENERAL WIRING REQUIREMENTS

OF CONDUIT SHALL BE AS

CONTINUITY FITTINGS.

- A. ELECTRICAL EQUIPMENT SCHEDULE WITH SIZES, PERFORMANCE, ETC., IS SHOWN ON DRAWINGS. ALL EQUIPMENT SHALL BE EQUAL IN GRADE, STYLE AND QUALITY TO THAT INDICATED, SPECIFIED OR SCHEDULED, AND SHALL BE LIMITED TO MANUFACTURERS LISTED
- 1)TRANSFORMERS: GENERAL ELECTRIC, SIEMENS, SQUARE D,
- SORGEL. WESTINGHOUSE. 2)SWITCHBOARDS: SQUARE D, CUTLER-HAMMER, GENERAL
- ELECTRIC, SIEMENS. 3)600V WIRES AND CABLES: ANACONDA, ESSEX WIRE AND
- CABLE, GENERAL CABLE, NATIONAL. 4)METAL CONDUIT: KAISER, NATIONAL, PITTSBURGH, REPUBLIC,
- 5)FITTINGS: APPLETON, CROUSE-HINDS, NATIONAL, O/Z GEDNEY, STEEL CITY, THOMAS & BETTS.

7)OUTLET BOXES: APPLETON, BELL, NATIONAL, RUSSELLSTOLL,

9)CHANNELS, SUPPORTS AND RACEWAY: B-LINE, GRINNELL,

- 6)CONNECTORS (WIRE & CABLE): BUCHANAN, BURNDY, SKOTCHLOK, T & B, TREGO.
- 8)PULL AND JUNCTION BOXES: COLUMBIA, FULLMAN, HOPE, KEYSTONE, LEE, SUN.

SUPERSTRUT, UNISTRUT. 10) CONDUIT SEALS: APPLETON, KILLARK, O/Z GEDNEY.

- A. ALL WIRING SHALL BE INSTALLED IN ACCORDANCE WITH NEC. B. JOINTS OR TERMINATIONS SHALL BE MADE WITH SOLDERLESS POSITIVE PRESSURE CONNECTIONS. JOINTS AND FREE ENDS, UNLESS
- TAPE IN A MANNER THAT MAKES THEIR INSULATION EQUAL TO THE ORIGINAL INSULATION OF THE CONDUCTOR. C. MINIMUM SIZED CONDUIT, UNLESS NOTED, SHALL BE 3/4". TYPE

PROPERLY INSULATED BY CONNECTORS, SHALL BE WRAPPED WITH

- FOLLOWS: 1)FEEDER, BRANCH AND CONTROL CIRCUITS: RIGID ZINC COATED
- STEEL OR INTERMEDIATE METAL CONDUIT. 2) CONNECTORS TO VIBRATING LIQUID TIGHT FLEXIBLE EQUIPMENT, MOTORS, ETC. IN NON-HAZARDOUS AREAS: LIQUID TIGHT FLEXIBLE METAL CONDUIT (SEALTITE) WITH APPROVED GROUND
- E. PULL AND JUNCTION BOXES SHALL BE INSTALLED AS REQUIRED BY ODE AND CONTRACTOR'S CONVENIENCE AS NECESSARY TO PULL IN

WIRES, WHETHER SHOWN ON DRAWINGS OR NOT.

D. ALL RIGID AND INTERMEDIATE CONDUIT JOINTS SHALL BE WRENCH

WIRING IN PANELS, WIREWAYS, STARTERS, ETC. SHALL BE NEATLY

TRAINED AND SECURED WITH PLASTIC CABLE TIES. CONNECTIONS TO TERMINALS SHALL BE WITH SQUARE BEND AND SERVICE

2.12 TESTING

- 2.11 IDENTIFICATION A. PROVIDE AND INSTALL MARKERS FOR ALL CONDUITS. MARKERS SHALL BE "BRADY" TYPE ADHESIVE-BACKED, PLASTIC-FACED OF SUITABLE COLOR. MARKER SHALL IDENTIFY SYSTEM AND FLECTRICAL CHARACTERISTICS INSTALL MARKERS AT POINT OF
- ORIGIN, TERMINATION, ADJACENT TO EACH INTERMEDIATE SPLICE, AND ALL BOXES IN RUN. B. IDENTIFY ALL CONDUCTORS AT ORIGIN, TERMINATION AND AT INTERMEDIATE BOXES BY MEANS OF "BRADY" TYPE, PRESSURE SENSITIVE, PLASTIC COATED FACE, STICK-ON LABELS EXCEPT

FEEDERS SHALL HAVE PHENOLIC TAGS ENGRAVED WITH CIRCUIT

A. UPON COMPLETION OF HIS WORK, CONTRACTOR SHALL CONDUCT

(WITH OTHER RELATED CONTRACTORS) OPERATING TESTS OF ALL

AND SPECIFICATIONS. TESTS SHALL BE PERFORMED IN THE

DESIGNATIONS AND ATTACHED WITH PLASTIC TIE-WRAPS.

ELECTRICALLY OPERATED OR CONTROLLED EQUIPMENT FOR APPROVAL AT SUCH TIME AS THE OWNER MAY DIRECT. EQUIPMENT SHALL OPERATE IN ACCORDANCE WITH THE REQUIREMENTS OF DRAWINGS

OF TESTS. DEFECTIVE MATERIALS AND WORKMANSHIP DISCLOSED BY TEST SHALL BE CORRECTED AT CONTRACTOR'S EXPENSE. 2.13 PROTECTIVE PAINTING

A. TOUCH-UP FACTORY PAINTED EQUIPMENT THAT HAS BEEN DAMAGED

DURING HANDLING OR INSTALLATION. FEATHER DAMAGED AREA AND

PRESENCE OF OWNER. THE CONTRACTOR SHALL PROVIDE LABOR,

MATERIALS, AND INSTRUMENTS REQUIRED FOR ELECTRICAL PORTION

GPM @ 80 FT.

EXISTING FINISH.

DIVISION 1000 - ALTERNATES ALTERNATE PRICING SCHEDULE

1.1 ALTERNATE 1 - MECHANICAL AND ELECTRICAL A.CHANGE CHILLED WATER PIPING FROM 3" TO 4". CHANGE PUMP

P-1 FROM 7.5 HP TO 5HP, 120 GPM ◎ 60 FT.

APPLY PRIMER PLUS TWO FRESH COATS TO MATCH

PUMP P-2 FROM 25 HP TO 15 HP. CHANGE PUMP MODEL TO FI 2513. 301 GPM @ 120 FT.

C.CHANGE HIGH GRADE PIPING FROM 2 1 TO 3". CHANGE PUMP P-3

FROM 7.5 HP TO 5 HP. CHANGE PUMP MODEL TO FI 1509, 76

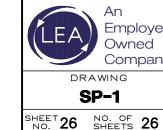
B.CHANGE 4" CONDENSER WATER PIPING FROM 4" TO 6". CHANGE

D.CHANGE RECIRC. PIPING FROM 2 $\frac{1}{2}$ " TO 3", CITY HALL, P-4 UNCHANGED.

CHANGE PUMP P-5 FROM 5 HP TO 3 HP. CHANGE P-5 MODEL

TO KV 1509, 76 GPM @ 60 FT F. CHANGE EXPANSION TANK MODEL TO CA 300.

E.CHANGE RECIRC. PIPING, HALL OF RECORDS, FROM 2 3"



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