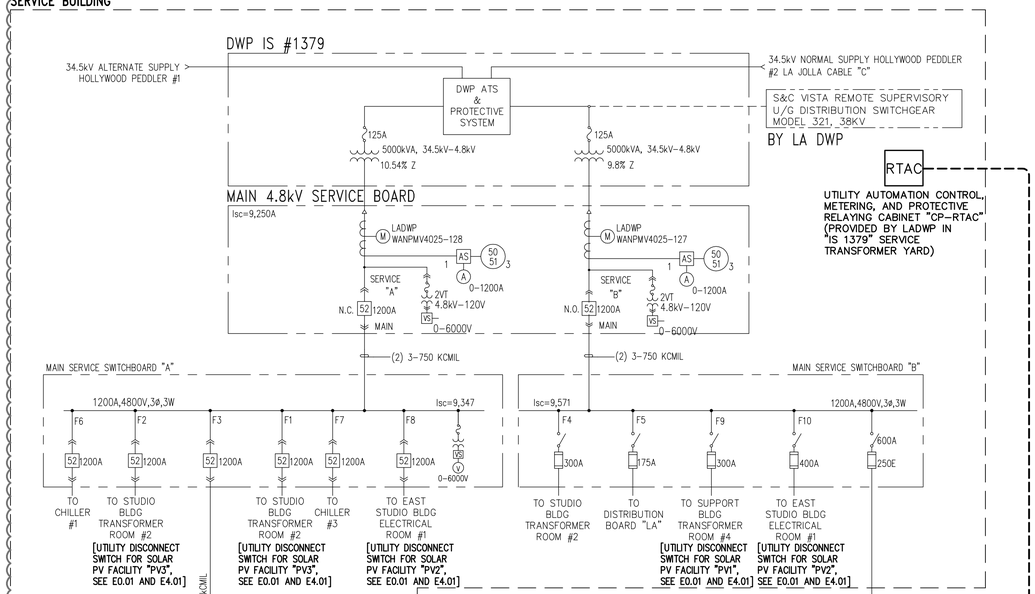

GENERAL NOTES

1. FOR ADDITIONAL SINGLE LINE DIAGRAM REQUIREMENTS, SEE PART 2 ON E0.12.
2. FOR CLARITY ONLY EXISTING FACILITIES SPECIFICALLY RELEVANT TO THE SCOPE OF WORK ARE SHOWN.
3. EXISTING ELECTRICAL FACILITIES SHALL REMAIN AND BE PROTECTED IN PLACE UNLESS SPECIFICALLY SHOWN OR SPECIFIED TO BE REMOVED OR MODIFIED.
4. CIRCUIT BREAKERS AND DISCONNECT SWITCHES ARE THREE POLE, UON.
5. TERMINATIONS AT FUEL CELL: POWER FEEDERS [MAIN AND GRID-INDEPENDENT] SHALL BE PROVIDED BY CONTRACTOR. ALL OTHER TERMINATIONS AT FUEL CELL WILL BE BY UTC.
6. THE SETTINGS FOR THE UL 1741-CERTIFIED ELECTRICAL SYSTEM INTERNAL TO THE FUEL CELLS ARE LISTED IN TABLE A "PROTECTIVE SETTINGS AS PER IEEE 1547/UL 1741" ON E0.12.
7. PROVIDE SIGNAGE ON EQUIPMENT PER REQUIREMENTS OF THE NATIONAL ELECTRICAL CODE (AND CALIFORNIA ELECTRICAL CODE) AND OWNER. IN ADDITION, PROVIDE SIGNAGE (1) ON EACH FUEL CELL OUTPUT SWITCHES "MD1-FCX" AND (2) ON THE MAIN SWITCH WITHIN FUEL CELL DISTRIBUTION BOARD "DB-FC" STATING THE FOLLOWING:

   DANGER
   ELECTRICAL SHOCK HAZARD
   DO NOT TOUCH TERMINALS
   TERMINALS ON BOTH THE LINE AND LOAD SIDES MAY BE ENERGIZED
   IN THE OPEN POSITION

8. ALSO PROVIDE SIGNAGE - SEPARATE FROM SIGNS PROVIDED UNDER GENERAL NOTE 7 ABOVE - ON EACH FUEL CELL OUTPUT SWITCH "MD1-FCX" STATING (1) OUTPUT VOLTAGE, (2) OUTPUT POWER RATING, AND (3) CONTINUOUS OUTPUT CURRENT RATING.

   -RATED OUTPUT: 400KW/471KVA
   -OUTPUT VOLTAGE: 480VAC, 60HZ, 3PH, 3W
   -RATED OUTPUT CURRENT: 560A AT RATED KVA

9. PROVIDE ARC FLASH WARNING SIGNS IN ACCORDANCE WITH NEC ART. 110-16 ON ELECTRICAL EQUIPMENT INSTALLED.
10. PER NEC ARTICLE 692.54, PROVIDE MARKING OF THE FUEL SHUT-OFF VALVE'S LOCATION AT EACH FUEL CELL OUTPUT SWITCH "MD1-FCX".
11. PER NEC ARTICLE 692.4.b, PROVIDE A PLAQUE AT SERVICE EQUIPMENT LOCATION WHICH IDENTIFIES ALL ELECTRIC POWER SOURCES.

KEY NOTES

1. UTC FUEL CELL AND ASSOCIATED EQUIPMENT, TYPICAL OF 3.
2. THE SETTINGS FOR THE UL 1741-CERTIFIED ELECTRICAL SYSTEM INTERNAL TO THE FUEL CELLS ARE LISTED IN TABLE A "PROTECTIVE SETTINGS AS PER IEEE 1547/UL 1741" ON E0.12. IN ADDITION, SEE THE CERTIFICATION NOTES AND INTERNAL CIRCUIT BREAKER TRUTH TABLE [LOCATED NEXT TO TABLE A] FOR EQUIPMENT SYSTEM QUALIFICATIONS AND FUNCTION.
3. UTC FACTORY-INSTALLED MAIN DISCONNECT SWITCH "MD1" MOUNTED ON FUEL CELL ENCLOSURE.
4. UTC FACTORY-MOUNTED DISCONNECT SWITCH ON SIDE OF AIR COOLING MODULE.
5. RMS/HRM ENCLOSURE - PROVIDE IN ACCORDANCE WITH UTC REQUIREMENTS.
6. THE RMS/HRM CABINET HOUSES THE UTC HEAT RECOVERY MODULES, REMOTE MONITORING SYSTEM, WIRELESS MODEM, AND THE ELECTRIC ENCLOSURE HEATER SHOWN.
7. POWER TRANSFORMER ON CONCRETE EQUIPMENT PAD, LIQUID-FILLED TYPE, LISTED NEMA TP1 ENERGY EFFICIENT TRANSFORMER SHALL BE RATED FOR BOTH STEPUP AND STEPDOWN SERVICE. PROVIDE GROUND ELECTRODE SYSTEM.
8. METERING IN ACCORDANCE WITH LADWP REQUIREMENTS. ALSO PROVIDE KYZ PULSE OUTPUT TO UTC HRM SYSTEM.
9. NOT USED.
10. METER, MAIN, AND DISTRIBUTION SWITCHBOARD SECTIONS - INCLUDING ADJACENT MCC SECTION - SHALL BE PROVIDED AS A COMPLETE UNITIZED SWITCHBOARD ASSEMBLY FROM ONE MANUFACTURER, COMPRISED OF EQUIPMENT HOUSED IN WEATHERPROOF NEMA 3R NON-WALK-IN SECTIONS WITH FULL-HEIGHT LOCKABLE DOORS. [DESIGN BASIS: SQUARE D TYPE QED SWITCHBOARD, MODEL 6 MOTOR CONTROL CENTER. FOR ADDITIONAL DATA, SEE E4.02].
11. 2" CONDUIT WITH CIRCUIT WIRING PER LADWP REQUIREMENTS FOR REMOTE METERING, CIRCUIT BREAKER CONTROL, AND PROTECTIVE RELAYING.
12. DISCONNECT SWITCH ON GRID-INDEPENDENT FEEDER IS PROVIDED TO FUNCTION AS THE MAIN DISCONNECTING MEANS FOR BUILDING [DURING GRID-INDEPENDENT OPERATION].
13. DISCONNECT SWITCH "MD2" PROVIDED ON THE GRID-INDEPENDENT OUTPUT FEEDER [TO ACCOMMODATE SERVICING OF THE FUEL CELL].
14. BUILDING-DEDICATED DISCONNECT SWITCH ALSO FUNCTIONS AS THE "MD2"-TYPE MAINTENANCE DISCONNECT FOR FUEL CELL "FC-1". [LINE-OF-SITE TO THE SWITCH FROM "FC-1" SHALL BE MAINTAINED FOR THIS PURPOSE, SEE E2.11.
15. MANUAL TRANSFER SWITCH "MTS-FC1/GI" SHALL BE PROVIDED TO ALLOW OWNER SELECTION OF EMERGENCY GENERATOR OR FUEL CELL GRID-INDEPENDENT OPERATION DURING A UTILITY SERVICE INTERRUPTION. "INTERCEPT" THE EXISTING GENERATOR OUTPUT FEEDER WITH 36" X 36" X 12" JUNCTION BOX SHOWN AS "JB-MDB" IN ORDER TO RE-ROUTE THAT FEEDER VIA THE MANUAL TRANSFER SWITCH.
16. MAINTAIN EXISTING KIRK-KEY INTERLOCK SHOWN BETWEEN MAIN BREAKER AND ALTERNATE SUPPLY BREAKER FOR THE "MDB" AND "EMDB" BUSSES.
17. DISTRIBUTION BOARD "DB-FC2/GI" SHALL BE PROVIDED AND LOCATED ADJACENT TO AND INTERCONNECTED WITH EXISTING DISTRIBUTION BOARD "PM". PROVIDE KIRK-KEY INTERLOCKING BETWEEN THE "DB-FC2/GI" FEEDER BREAKER AND THE "PM1" MAIN IN ORDER TO ENSURE SEPARATION OF NORMAL POWER AND FUEL CELL GRID-INDEPENDENT SOURCES.
18. UTILITY DISCONNECT SWITCH WITH VISIBLE-OPEN AND LOCKABLE CONTACTS. PROVIDE SIGNAGE ON UTILITY DISCONNECT SWITCH AS FOLLOWS:

    FUEL CELL
    AC DISCONNECT SWITCH
    [UTILITY-SIDE MAIN SWITCH]
    480V. THREE-PHASE, 2000A

19. PROVIDE SIGNAGE ON MAIN BREAKER AS FOLLOWS:

    UTILITY DISCONNECT SWITCHES
    (VISIBLE-OPEN AND LOCKABLE)
    ARE LOCATED
    ON EACH FUEL CELL

20. PROVIDE PER LADWP REQUIREMENTS:
    -FIELD WIRING TERMINAL BLOCKS
    -CT SHORING BLOCKS
    -PT FLEXITEST SWITCHES
    -BREAKER REMOTE TRIP
    -BREAKER REMOTE CLOSE
21. PROVIDE FEEDER BREAKER IN EXISTING BUSSED SPACE. MATCH EXISTING BREAKERS' MANUFACTURER/TYPE AND INTERRUPTING RATING. ALSO PROVIDE KIRK-KEY INTERLOCK WITH THE DISTRIBUTION BOARD "DB-FC2/GI" BREAKER AS SHOWN - COORDINATE LOCK/KEY REQUIREMENTS.
22. PROVIDE A GROUND ELECTRODE SYSTEM FOR THE COGEN/FUEL CELL YARD, INCLUDING TWO 3/4"DIA X 10'L COPPERCLAD STEEL GROUND RODS - SEPARATED BY A DISTANCE OF 10 FEET AND ALIGNED ONE FOOT IN FRONT OF THE DISTRIBUTION PANEL "DP-FC" SWITCHGEAR EQUIPMENT LINEUP - DRIVEN IN EARTH WITH TOP OF GROUND ROD HOUSED IN A CONCRETE TEST WELL. THE TWO GROUND RODS SHALL BE INTERCONNECTED WITH UNDERGROUND #4/0 B.C. GROUND CONDUCTOR CONNECTED WITH A LISTED BOLTED CONNECTOR TO THE TOP OF THE GROUND RODS, WITH AN ADDITIONAL #4/0 B.C. GROUND CONDUCTOR JUMPER FROM EACH OF THE GROUND RODS TO THE REINFORCING STEEL OF THE CONCRETE SLAB. FINALLY, FROM ONE OF THE GROUND RODS, PROVIDE A #4/0 B.C. GROUND CONDUCTOR JUMPER - WHICH SHALL BE DESIGNATED AS THE GROUNDING ELECTRODE CONDUCTOR - TO THE GROUND BUS/LUG CONNECTION WITHIN THE DISTRIBUTION PANEL "DP-FC" SWITCHGEAR EQUIPMENT LINEUP. INSTALL A 350KCMIL CU MAIN BONDING JUMPER BETWEEN NEUTRAL AND GROUND BUSSES IN "DP-FC".
23. PROVIDE A GROUND ELECTRODE SYSTEM FOR PAD-MOUNT TRANSFORMER "T-FC", INCLUDING TWO 3/4"DIA X 10'L COPPERCLAD STEEL GROUND RODS - SEPARATED BY A DISTANCE OF 10 FEET NEXT TO THE TRANSFORMER - DRIVEN IN EARTH WITH TOP OF GROUND ROD HOUSED IN A CONCRETE TEST WELL. THE TWO GROUND RODS SHALL BE INTERCONNECTED WITH UNDERGROUND #4/0 B.C. GROUND CONDUCTOR CONNECTED WITH A LISTED BOLTED CONNECTOR TO THE TOP OF THE GROUND RODS, WITH AN ADDITIONAL #4/0 B.C. GROUND CONDUCTOR JUMPER FROM EACH OF THE GROUND RODS TO THE REINFORCING STEEL OF THE CONCRETE SLAB. FINALLY, FROM ONE OF THE GROUND RODS, PROVIDE A #4/0 B.C. GROUND CONDUCTOR JUMPER - WHICH SHALL BE DESIGNATED AS THE GROUNDING ELECTRODE CONDUCTOR - TO THE GROUND LUG INSIDE THE TRANSFORMER.
24. PROVIDE A WP NEMA 4 PULLBOX MOUNTED TO THE SIDE WALL OF THE FUEL CELL IN ORDER TO ROUTE THE GRID-INDEPENDENT OUTPUT FEEDER CABLES FROM THE FUSE/TERMINAL LUGS [SHOWN IN THE FUEL CELL] INTO THE DUCTS SHOWN EXITING THE FUEL CELL. THE PULLBOX ASSEMBLY SHALL BE COMPRISED OF A HOFFMAN 24" X 24" X 12" PULLBOX TYPE CSD242412 WITH A HOFFMAN 8" X 8" X 6" FLANGED NIPPLE TYPE F88W, INCLUDING HARDWARE AND GASKETING AS REQUIRED FOR SECURE WEATHERTIGHT ATTACHMENT TO THE FUEL CELL.
25. 2" CONDUIT WITH CIRCUIT WIRING FOR FUEL CELL MCB001 BREAKER TRIP AND STATUS.
26. PROVIDE FEEDER BREAKER IN EXISTING BUSSED SPACE. MATCH EXISTING BREAKERS' MANUFACTURER/TYPE AND INTERRUPTING RATING.
27. THE FOLLOWING INFORMATION IS PROVIDED FOR REFERENCE ONLY, AND IS NOT IN CONTRACT [N.I.C.] AT THIS TIME: OWNER WILL BE PROVIDING ELECTRICAL FACILITY MODIFICATIONS [INCLUDING, BUT NOT LIMITED TO UPGRADE/REPLACEMENT OF SELECTED MOTOR CONTROLLERS AND ADDITIONS TO EMS AUTOMATED PROCESS CONTROL, IN ORDER TO MEET UTC-PRESCRIBED MAXIMUM-LOADING (350KVA MAXIMUM ALLOWED) AND STEP-LOADING GUIDELINES] AS REQUIRED TO ESTABLISH A COMPLETE AND OPERABLE FUEL CELL-SOURCED GRID-INDEPENDENT POWER DISTRIBUTION SYSTEM.
28. PROVIDE ARC FLASH LABELLING ON ALL OF THE FUEL CELLS' DISCONNECTING DEVICES, INCLUDING THE MAIN BREAKER IN "DB-FC", THE FUEL CELL FEEDER BREAKERS IN "DB-FC", THE FUEL CELL MAIN DISCONNECT SWITCHES "MD1-FCX", THE FUEL CELL FC1-ASSOCIATED GRID-INDEPENDENT DISCONNECT SWITCH "DS-FC1/GI", AND FUEL CELL FC2-ASSOCIATED GRID-INDEPENDENT DISCONNECT SWITCH "MD2-FC2/GI".
29. THE FUEL CELL GROUND LUG SHOWN INSIDE FUEL CELL MAIN DISCONNECT SWITCH "MD1-FCX" SHALL BE CONNECTED TO THE EQUIPMENT GROUNDING CONDUCTOR OF THE FEEDER SOURCED FROM [THE GROUNDED CIRCUIT CONDUCTOR OF] DISTRIBUTION BOARD "DB-FC" IN ACCORDANCE WITH NEC ART. 692.44 IN ORDER TO PROVIDE THE REQUIRED SINGLE-POINT GROUND PER NEC ART. 250-24.A & D.

    BONDED TO ALL METALLIC NON-CURRENT-CARRYING METAL PARTS INSIDE THE FUEL CELL. ALL EXTERNAL FUEL CELL SUBASSEMBLIES SUCH AS THE COOLING MODULE AND NITROGEN RACK SHALL BE CONNECTED TO THE EQUIPMENT GROUNDING CONDUCTOR AS REQUIRED BY NEC ART. 250.110.

    THERE SHALL BE NO OTHER GROUNDING ELECTRODE AT THE FUEL CELL OR ANY OF ITS EXTERNAL SUBASSEMBLIES. ALL OF THE SUBASSEMBLIES SHALL 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 "MD1-FCX" CARRIES THESE GROUND WIRES BACK TO THE GROUNDED SERVICE CONDUCTOR AT DISTRIBUTION BOARD "DB-FC".

    ANY SUBASSEMBLY ELECTRICAL PANELS CONNECTED TO THE FUEL CELL SHALL BE GROUNDED TO THE EQUIPMENT GROUNDING CONDUCTOR FROM THE FUEL CELL PER NEC ART. 250.148 AND SHALL NOT HAVE THEIR OWN GROUND ELECTRODE.
30. FROM THE LOCATION OF THE BTU METER SENSORS AND FLOW METER AT EACH FUEL CELL, PROVIDE UNDERGROUND 1-INCH DUCT [INCLUDING METER/SENSOR WIRING AS REQUIRED BY MANUFACTURER] TO THE HEAT RECOVERY MODULE IN CABINET "RMS/HRM". COORDINATE EXACT REQUIREMENTS WITH MECHANICAL.
31. FROM THE LOCATION OF THE SUPPLY AND RETURN TEMPERATURE SENSOR ON THE CHILLED WATER PIPING, PROVIDE UNDERGROUND 1-INCH DUCT [INCLUDING METER/SENSOR WIRING AS REQUIRED BY MANUFACTURER] TO THE HEAT RECOVERY MODULE IN CABINET "RMS/HRM". COORDINATE EXACT REQUIREMENTS WITH MECHANICAL.

1 E0.11 SINGLE LINE DIAGRAM [PART 1 OF 2, CONTINUED ON 0.12]
SCALE: NONE

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SINGLE LINE DIAGRAM [PART 1 OF 2]

ID	DATE	REMARKS
1	7/02/12	PRELIMINARY DESIGN REVIEW
2	8/20/12	PLAN CHECK
3	9/4/12	BID CLARIFICATIONS
4	9/19/12	UTC RECOMMENDED CORRECTIONS
5	10/18/12	UTC, REV., PLAN CHECK CORRECTIONS

ENGR:	
DRWN BY:	TEAM 1
CHK'D BY:	RLL
DATE:	9/19/12
JOB NO.:	12-010
SCALE:	AS NOTED

REGISTERED PROFESSIONAL ENGINEER ROY L. LOPEZ No. 13442 Exp. 09/30/14 ELECTRICAL STATE OF CALIFORNIA

SHEET
E0.11