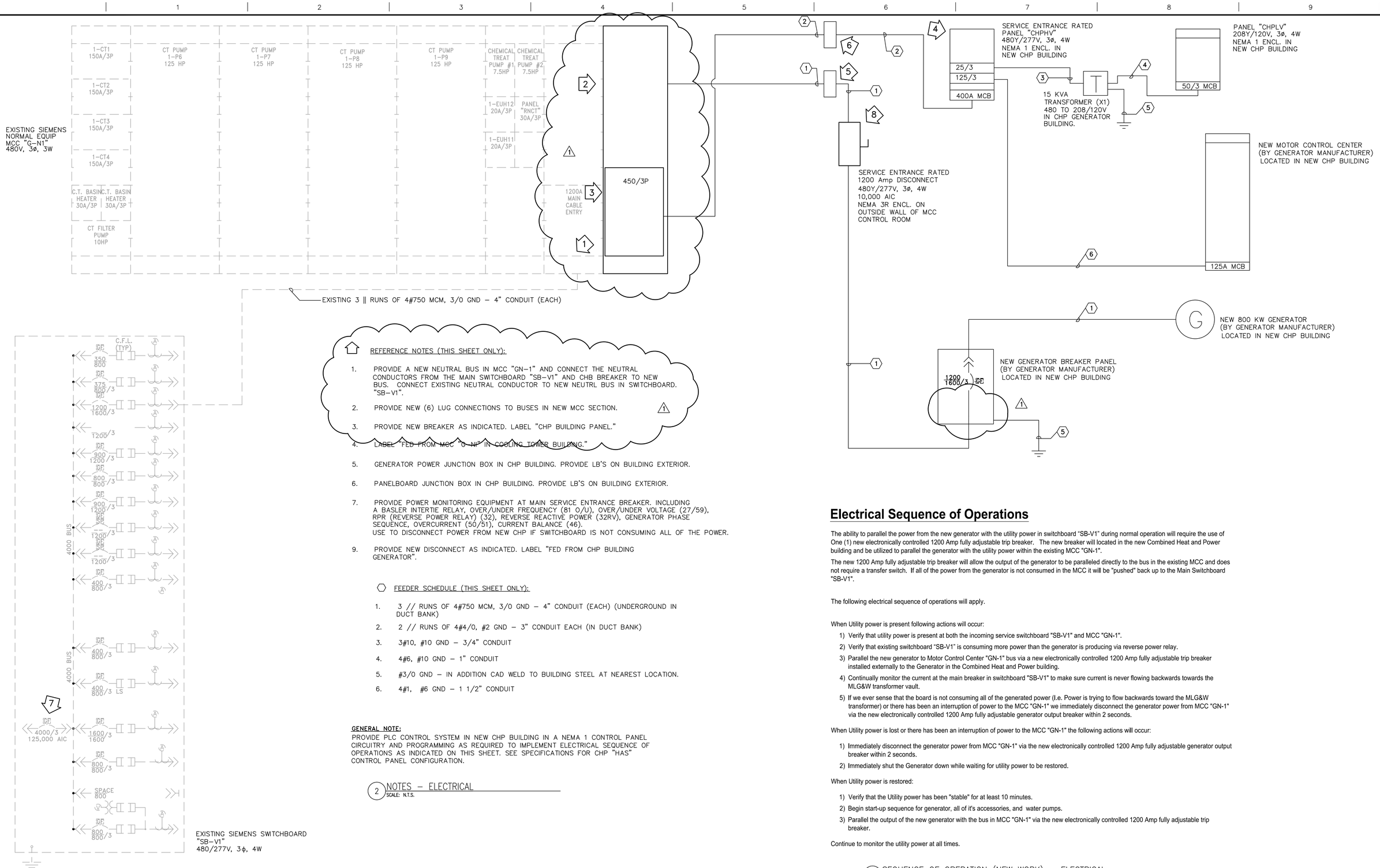

1 SINGLE-LINE DIAGRAM (NEW WORK) – ELECTRICAL
SCALE: N.T.S.

REFERENCE NOTES (THIS SHEET ONLY):

1. PROVIDE A NEW NEUTRAL BUS IN MCC "GN-1" AND CONNECT THE NEUTRAL CONDUCTORS FROM THE MAIN SWITCHBOARD "SB-V1" AND CHB BREAKER TO NEW BUS. CONNECT EXISTING NEUTRAL CONDUCTOR TO NEW NEUTRL BUS IN SWITCHBOARD. "SB-V1".
2. PROVIDE NEW (6) LUG CONNECTIONS TO BUSES IN NEW MCC SECTION.
3. PROVIDE NEW BREAKER AS INDICATED. LABEL "CHP BUILDING PANEL."
4. LABEL "FED FROM MCC "G-N1" IN COOLING TOWER BUILDING."
5. GENERATOR POWER JUNCTION BOX IN CHP BUILDING. PROVIDE LB'S ON BUILDING EXTERIOR.
6. PANELBOARD JUNCTION BOX IN CHP BUILDING. PROVIDE LB'S ON BUILDING EXTERIOR.
7. PROVIDE POWER MONITORING EQUIPMENT AT MAIN SERVICE ENTRANCE BREAKER. INCLUDING A BASLER INTERTIE RELAY, OVER/UNDER FREQUENCY (81 O/U), OVER/UNDER VOLTAGE (27/59), RPR (REVERSE POWER RELAY) (32), REVERSE REACTIVE POWER (32RV), GENERATOR PHASE SEQUENCE, OVERCURRENT (50/51), CURRENT BALANCE (46). USE TO DISCONNECT POWER FROM NEW CHP IF SWITCHBOARD IS NOT CONSUMING ALL OF THE POWER.
9. PROVIDE NEW DISCONNECT AS INDICATED. LABEL "FED FROM CHP BUILDING GENERATOR".

FEEDER SCHEDULE (THIS SHEET ONLY):

1. 3 // RUNS OF 4#750 MCM, 3/0 GND – 4" CONDUIT (EACH) (UNDERGROUND IN DUCT BANK)
2. 2 // RUNS OF 4#4/0, #2 GND – 3" CONDUIT EACH (IN DUCT BANK)
3. 3#10, #10 GND – 3/4" CONDUIT
4. 4#6, #10 GND – 1" CONDUIT
5. #3/0 GND – IN ADDITION CAD WELD TO BUILDING STEEL AT NEAREST LOCATION.
6. 4#1, #6 GND – 1 1/2" CONDUIT

GENERAL NOTE:
PROVIDE PLC CONTROL SYSTEM IN NEW CHP BUILDING IN A NEMA 1 CONTROL PANEL CIRCUITRY AND PROGRAMMING AS REQUIRED TO IMPLEMENT ELECTRICAL SEQUENCE OF OPERATIONS AS INDICATED ON THIS SHEET. SEE SPECIFICATIONS FOR CHP "HAS" CONTROL PANEL CONFIGURATION.

2 NOTES – ELECTRICAL
SCALE: N.T.S.

Electrical Sequence of Operations

The ability to parallel the power from the new generator with the utility power in switchboard "SB-V1" during normal operation will require the use of One (1) new electronically controlled 1200 Amp fully adjustable trip breaker. The new breaker will located in the new Combined Heat and Power building and be utilized to parallel the generator with the utility power within the existing MCC "GN-1".

The new 1200 Amp fully adjustable trip breaker will allow the output of the generator to be paralleled directly to the bus in the existing MCC and does not require a transfer switch. If all of the power from the generator is not consumed in the MCC it will be "pushed" back up to the Main Switchboard "SB-V1".

The following electrical sequence of operations will apply.

When Utility power is present following actions will occur:

1) Verify that utility power is present at both the incoming service switchboard "SB-V1" and MCC "GN-1".
2) Verify that existing switchboard "SB-V1" is consuming more power than the generator is producing via reverse power relay.
3) Parallel the new generator to Motor Control Center "GN-1" bus via a new electronically controlled 1200 Amp fully adjustable trip breaker installed externally to the Generator in the Combined Heat and Power building.
4) Continually monitor the current at the main breaker in switchboard "SB-V1" to make sure current is never flowing backwards towards the MLG&W transformer vault.
5) If we ever sense that the board is not consuming all of the generated power (I.e. Power is trying to flow backwards toward the MLG&W transformer) or there has been an interruption of power to the MCC "GN-1" we immediately disconnect the generator power from MCC "GN-1" via the new electronically controlled 1200 Amp fully adjustable generator output breaker within 2 seconds.

When Utility power is lost or there has been an interruption of power to the MCC "GN-1" the following actions will occur:

1) Immediately disconnect the generator power from MCC "GN-1" via the new electronically controlled 1200 Amp fully adjustable generator output breaker within 2 seconds.
2) Immediately shut the Generator down while waiting for utility power to be restored.

When Utility power is restored:

1) Verify that the Utility power has been "stable" for at least 10 minutes.
2) Begin start-up sequence for generator, all of it's accessories, and water pumps.
3) Parallel the output of the new generator with the bus in MCC "GN-1" via the new electronically controlled 1200 Amp fully adjustable trip breaker.

Continue to monitor the utility power at all times.

2 SEQUENCE OF OPERATION (NEW WORK) – ELECTRICAL
SCALE: N.T.S.

Revisions	Date
REVISION#1 - ADDED MCC SECTION	09.02.16

CONSULTANTS:
1. SEE SHEET 1-E1 FOR ELECTRICAL LEGEND.

MICHAEL S. COLLINS REGISTERED ENGINEER AGRICULTURE TENNESSEE No. 104181 STATE OF TENNESSEE

ARCHITECT/ENGINEERS:
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Allen & Hoshall
1661 International Drive Memphis, TN 38120
901 820 0820 fax 901 683 1001

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Approved Project Director: VAPAHCS PLANNING AND ENGINEERING
Project Title: MEMPHIS COMBINED HEAT AND POWER PLANT DESIGN
Location: VAMC MEMPHIS TN
Date: MARCH 10, 2016 | Checked: MSC | Drawn: MSC
Project Number: 614-16-114
Building Number:
Drawing Number: EP101
Dwg. 36 of 39

Office of Construction and Facilities Management
Department of Veterans Affairs

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