CHAPTER 8

ELECTRIC POWER

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ACRONYMS AND ABBREVIATIONS

ac	alternating current
ASME	American Society of Mechanical Engineers
CCVT	coupling capacitor voltage transformer
CFR	Code of Federal Regulations
COL	Combined License
CPNPP	Comanche Peak Nuclear Power Plant
dc	direct current
DCD	Design Control Document
DFR	digital fault recorder
ERCOT	Electric Reliability Council of Texas
ETAP	Electrical Transient Analyzer Program
FMEA	failure modes and effects analysis
GIB	gas-insulated bus
GIS	gas-insulated switchgear
GLBS	generator load break switch
HV	high voltage
HVAC	heating, ventilation, and air conditioning
IEEE	Institute of Electrical and Electronics Engineers
IPB	isolated phase busduct
LOOP	loss of offsite power
LV	low voltage
MT	main transformer
OLTC	on-load tap changer
Oncor	Oncor Electric Delivery Company LLC
PPS	preferred power supply
PUCT	Public Utility Commission of Texas
RAT	reserve auxiliary transformer
SCADA	supervisory control and data acquisition
T/B	turbine building
TSP	transmission service provider
UAT	unit auxiliary transformer

8.0 ELECTRIC POWER

8.1 INTRODUCTION

This section of the referenced Design Control Document (DCD) is incorporated by reference with the following departures and/or supplements.

8.1.1 General

CP COL 8.2(3) Replace the fourth paragraph in DCD Subsection 8.1.1 with the following.

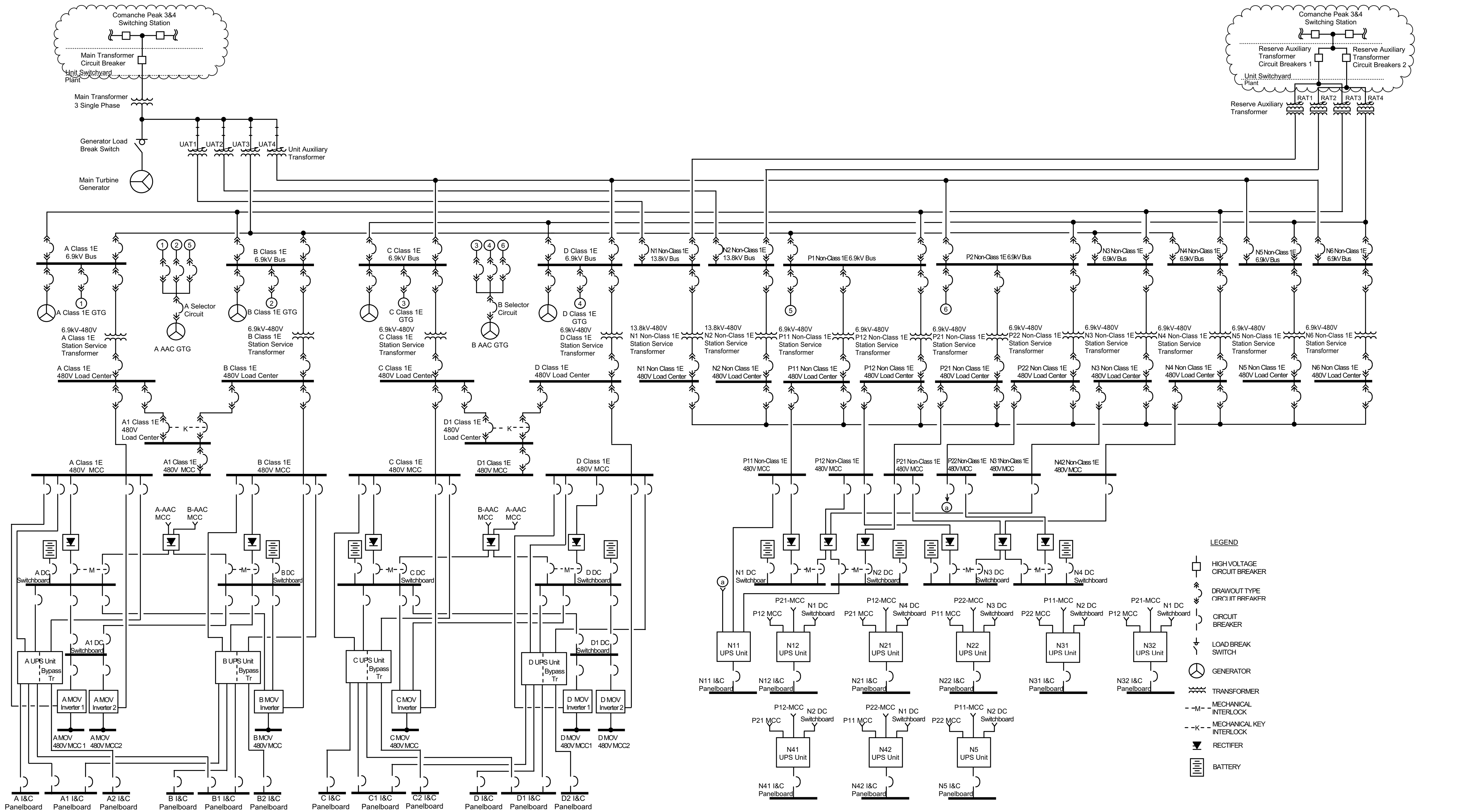
Figure 8.1-1R is a simplified electrical one line diagram depicting the alternating current (ac) and direct current (dc) onsite and offsite electric power system including the site-specific switchyard.

8.1.2.1 Utility Power Grid Description

CP COL 8.2(1) Replace the paragraph in DCD Subsection 8.1.2.1 with the following.

Oncor Electric Delivery Company LLC (Oncor) is the transmission service provider (TSP) for the Comanche Peak Nuclear Power Plant (CPNPP). Oncor operates the largest distribution and transmission system in Texas, providing power to three million electric delivery points over more than 101,000 miles of distribution and 14,000 miles of transmission lines. Oncor operates in a service area of east, west, and north central Texas and serves cities that include the Dallas-Fort Worth area and surrounding cities. The Oncor grid is connected to fossil-fueled plants, combustion turbine plants and nuclear plants supplying electric energy over a transmission system consisting of various voltages up to 345 kV. Oncor is a member of Electric Reliability Council of Texas (ERCOT). ERCOT is comprised of members engaged in generation, transmission, distribution and marketing of electric energy in the state of Texas. ERCOT is the independent system operator that oversees all generation and transmission functions.

A new 345 kV switching station for CPNPP Units 3 and 4 (plant switching station) is constructed prior to fuel loading. The plant switching station is a part of the ERCOT grid and has four outgoing transmission circuits to remote substations as described in Section 8.2. In addition, the plant switching station has four independent overhead transmission tie lines, two for CPNPP Unit 3 and the other two for CPNPP Unit 4. The plant switching station has two main buses configured in a breaker and a half scheme.



CP COL 8.2(3)

Figure 8.1-1R Simplified One Line Diagram Electric Power System

8.2 OFFSITE POWER SYSTEM

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

8.2.1.1 Transmission System

CP COL 8.2(1) Replace the paragraph in DCD Subsection 8.2.1.1 with the following.

Oncor is the TSP for CPNPP. Oncor operates the largest distribution and transmission system in Texas, providing power to three million electric delivery points over more than 101,000 miles of distribution and 14,000 miles of transmission lines. Oncor operates in a service area of east, west, and north central Texas and serves cities that include the Dallas-Fort Worth area and surrounding cities. The Oncor grid is connected to fossil-fueled plants, combustion turbine plants and nuclear plants supplying electric energy over a transmission system consisting of various voltages up to 345 kV. Oncor is a member of ERCOT. ERCOT is comprised of members engaged in generation, transmission, distribution and marketing of electric energy in the state of Texas. ERCOT is the independent system operator that oversees all generation and transmission functions. The relevant portions of the Oncor transmission system network configuration is shown in Figure 8.2-201.

A new Oncor 345 kV switching station for CPNPP Units 3 and 4 (plant switching station) is constructed prior to fuel loading. The plant switching station has four outgoing transmission lines to remote switching stations as indicated in Table 8.2-201.

The rights-of-way for the transmission lines listed in Table 8.2-201 is established and all four lines are constructed prior to fuel loading. These rights-of-way commence at the CPNPP property and continue towards the switching stations, listed in Table 8.2-201. The width of the rights-of-way is adequate for the planned transmission lines. The TSPs in the ERCOT region are subject to regulations of the Public Utility Commission of Texas (PUCT) that controls new transmission facilities and needed interconnections to transmit power to and from the transmission grid. Any existing rights-of-way are utilized without compromising design basis criteria.

In addition, the plant switching station has four independent overhead transmission tie lines, two for CPNPP Unit 3 and two for CPNPP Unit 4, as indicated in Table 8.2-202.

8.2.1.2 Offsite Power System

CP COL 8.2(4)
CP COL 8.2(5) Replace the first paragraph in DCD Subsection 8.2.1.2 with the following.

The offsite power system is a nonsafety-related, non-class 1E system, beginning at the transmission grid and ending at the line-side terminals of the main power supply circuit breakers feeding the 13.8 kV and 6.9 kV buses, and at the terminals on the main transformer (MT) side of the generator load break switch (GLBS). The plant switching station is connected to the transmission grid by four outgoing transmission lines. The one line diagram of the offsite power system is shown in Figure 8.2-202. The plant switching station has two independent control houses (#1 and #2) that contain the control and protection equipment for the four outgoing transmission lines. The control and protection equipment for the DeCordova and Johnson lines are in control house #1, and those for the Parker and the Whitney lines are in control house #2. The transmission lines that are associated with different control houses are designed such that, availability of the two lines associated with one control house is not lost by any single failure that may cause failure of lines associated with the other control house.

For each unit, there are two 345 kV gas-insulated switchgear, one is for the normal preferred power supply (PPS) and the other is for alternate PPS, hereinafter called unit switchyard. The normal PPS unit switchyard is located on the southwest side of the turbine building (T/B), and the alternate PPS unit switchyard is located on the southeast side of the T/B. The one-line diagrams for the normal PPS and alternate PPS unit switchyards are shown in Figures 8.2-203 and 8.2-204, respectively.

There are two indoor gas-insulated 345 kV circuit breakers in the normal PPS unit switchyard. One breaker is on the high-voltage side of reserve auxiliary transformer (RAT) 1 and RAT3, and the other is on the high voltage side of RAT2 and RAT4. The other sides of these two circuit breakers are connected to the overhead 345 kV transmission tie line going to the plant switching station. The 345 kV interconnections between the RATs, gas-insulated switchgear (GIS), and overhead transmission tie line are provided by gas-insulated bus (GIB).

There is one indoor gas-insulated 345 kV circuit breaker in the alternate PPS unit switchyard connecting the high-voltage side of the MT and the overhead 345 kV transmission tie line going to the plant switching station. The 345 kV interconnections between the MT, GIS, and overhead transmission tie line are provided by GIB.

The unit interface with the Oncor transmission system is at the connection to Oncor's 345 kV overhead transmission tie line in the unit switchyards. The four unit switchyards and the four transmission tie lines between the unit switchyards and the plant switching station are physically separated.

CP COL 8.2(4)
CP COL 8.2(5)

Replace the first four sentences of the second paragraph in DCD Subsection 8.2.1.2 with the following.

For each unit, offsite electric power is provided to the onsite power system from the grid and other generating stations by two physically independent transmission lines. During unit startup, shutdown, maintenance, and during all

postulated accident conditions, offsite electric power can be supplied to each unit site from the plant switching station through two physically independent transmission tie lines. One of these two transmission tie lines connects to the high-voltage side of the MT via a 345 kV circuit breaker. The other transmission tie line connects to two 345 kV circuit breakers at the unit switchyard, one circuit breaker is for RAT1 and RAT3, and the other circuit breaker is for RAT2 and RAT4. Both of any two outgoing transmission lines between the plant switching station and the remote offsite switching stations adequately maintain the voltage within ±5 percent of 345 kV at the high voltage side terminals of the MTs and RATs, while supplying full auxiliary loads of both units for all normal, abnormal and postulated accident conditions.

CP COL 8.2(4)
CP COL 8.2(5)

Add the following information after the last sentence of the second paragraph in DCD Subsection 8.2.1.2.

Neither the grid stability analysis in Subsection 8.2.2.2 nor the failure modes and effects analysis (FMEA) in Subsection 8.2.1.2.1.1 identified the non-safety related offsite power system as risk-significant during all modes of plant operation.

Add the following information after the last sentence of the eleventh paragraph in DCD Subsection 8.2.1.2.

The force-cooled continuous-current rating of the iso-phase bus duct section between the main generator and the main transformer is 44.4 kA, which provides 5% margin with respect to the 42.2 kA continuous current rating of the main generator.

STD COL 8.2(10)

Replace the last sentence of the fifteenth paragraph in DCD Subsection 8.2.1.2 with the following.

In case of a sudden pressure relay operation, the transformer is isolated.

CP COL 8.2(4)
CP COL 8.2(5)

Replace the second sentence of the eighteenth paragraph in DCD Subsection 8.2.1.2 with the following.

Minimum one-hour rated fire barriers are provided between all transformers. Figures 8.2-207 and 8.2-208 show physical layout of equipment in the Unit 3 and Unit 4 unit switchyards/transformer yards, respectively. Cables associated with the normal and alternate PPS between unit switchyard and the electrical room in the T/B are routed in separate underground duct bank. Normal and alternate PPS

cables are physically separated which minimizes the chance of simultaneous failure. The underground duct bank for these circuits is sealed to prevent degradation in wetted or submerged condition.

8.2.1.2.1 Switchyard

CP COL 8.2(3) Replace the content of DCD Subsection 8.2.1.2.1 with the following.

8.2.1.2.1.1 Plant Switching Station

The plant switching station is located approximately half a mile south-west from the plant-site, within the CPNPP property. From the plant switching station, there are four outgoing transmission lines going to remote switching stations, and four transmission tie lines going to the four unit switchyards. There are two control houses in the plant switching station. The control and protection equipment associated with the DeCordova and Johnson transmission lines and the two normal PPS transmission tie lines are located in control house #1. The control and protection equipment associated with the Parker and Whitney transmission lines and the two alternate PPS transmission tie lines are located in control house #2. The control and protection circuit cables that are routed in the yard and associates with two different control houses are physically separated to avoid a common cause failure of the two control houses and the availability of the associated offsite power circuits. The four outgoing transmission lines to remote switching stations and the four transmission tie lines to the unit switchyards are installed on separate sets of transmission towers and do not cross each other. Any credible failure of one PPS circuit, including catastrophic failure of transmission towers, is not cause the failed circuit or tower to fall into PPS circuit for the same unit. The plant switching station, including the transmission lines, towers, protection relay systems, control houses, etc. are not specifically designed for earthquake, tornado, hurricane or flooding; however, they are designed to the applicable industry standards and regulations to assure a safe and highly reliable offsite power system. Each power circuit of the normal and alternate PPS, originating from the ERCOT transmission grid and terminating at the line-side of the medium-voltage bus incoming circuit breakers, is designed to withstand the effects of natural phenomena (excluding earthquake, tornado, hurricane or flooding) and protected from dynamic effects, and has sufficient capacity and capability to assure satisfactory operation of all safety loads and non safety loads, under normal, abnormal and postulated accident conditions. Lightning protection system is also provided as discussed in Subsection 8.3.1.1.11.

The breakers in the plant switching station are arranged in a breaker-and-a-half scheme having six bays. Of the six bays, two bays are provided with three circuit breakers and the remaining four bays are provided with two circuit breakers. Provision is made for adding the third circuit breaker in the two-circuit breaker bays to accommodate future growth. All 345 kV circuit breakers have dual trip coils. The switching station main buses are constructed of six-inch aluminum

tubes with standard 345 kV spacing. All of the circuit breakers have a disconnect switch on each side to allow isolation or removal of a circuit breaker without affecting availability of each transmission line. The one line diagram and the physical layout drawing of the plant switching station are shown in Figures 8.2-205 and 8.2-206, respectively.

In order to avoid crossings of the 345 kV lines out of the plant switching station, a section of the two main buses is lengthened to allow several of the existing circuits to pass through (fly-over) the plant switching station. The section of bus is approximately 300 ft. long to allow space for the fly-over circuits. The fly-over circuits are double dead-ended between the two main buses to avoid a scenario that would allow a single failure of one of the lines to trip both of the main buses. Standard 345 kV substation dead ends are utilized for these terminations. The lines that pass through the station are the 345 kV CPNPP Units 1 and 2 – Parker 345 kV switching station line, the 345 kV CPNPP Units 1 and 2 – Comanche Switch line and the 138 kV CPNPP Units 1 and 2 – Stephenville line.

CP COL 8.2(3)
CP COL 8.2(8)

The plant switching station has two 25 ft. X 65 ft. control buildings. These buildings house the primary and backup line relaying panels, voltage transformer and current transformer indoor junction boxes, supervisory control and data acquisition (SCADA) unit, digital fault recorder (DFR) unit, batteries and battery chargers and all ac and dc panels. Each building houses a single set of batteries and battery charger in its own battery room separate from the relay panel room. One building houses dc source #1 and the other houses dc source #2. To reduce the cable lengths of the dc supplies in one control building to panels in the other control building, a set of fused cables are brought from the dc source in each control building to the dc box in the relay panel room of the other control building. This allows for short cable runs to the relay panels in the other control building, while keeping the batteries in different buildings. A SCADA unit is installed in each control building, with the data circuit bridged between the two units. This prevents bringing all of the SCADA cable to one building. A similar design is used on the DFR, but the station switcher is used to connect both DFRs to one phone line. Each building has its own heating, ventilation, and air conditioning (HVAC) system, portable fire extinguishers, and eyewash stations.

CP COL 8.2(7)

A fiber optic shield wire is installed on each of the four 345 kV tie lines between the plant switching station and the unit switchyards. These fibers are used for relay protection and for sending generator information to Oncor. Oncor has no direct control of any of the 345 kV circuit breakers located at the unit switchyards.

Each transmission line and the plant switching station buses are provided with primary and backup relay protection schemes. Each transmission line is protected by pilot protection using a directional comparison blocking scheme.
Phase step-distance and ground directional-overcurrent protection are also provided as backup protection. Each plant switching station bus has dual independent differential protection schemes. Each transmission tie line has differential protection and phase step-distance and ground directional-overcurrent protection. The relay protection schemes for independent transmission lines are

designed so that any single failure or incident, such as control house fire or cable dig-in, will not cause loss of both circuits in any combination of two independent transmission lines. The relay panels for independent transmission lines are physically located in separate control house and the control cables are physically separated. The design for every protection zone has fully redundant and electrically independent protection systems. This fully redundant concept is also applied to the breaker-failure schemes.

CP COL 8.2(9) The primary ac power supply for the plant switching station is provided from existing local electric distribution system. The backup ac power is supplied by a separate power source from the primary ac power.

CP COL 8.2(11) Any combination of two of the four outgoing transmission lines (DeCordova, Parker, Johnson, and Whitney), except for the combinations of DeCordova and Johnson and Parker and Whitney, are two independent offsite power circuits from the ERCOT transmission network to the plant switching station. Any credible single incident or single failure of a transmission line or a plant switching station component does not result in simultaneous failure of both circuits in any combination of two independent offsite power circuits. The FMEA presented in Table 8.2-203 indicates that at least one of the two independent offsite power circuits would remain available to perform its design basis functions under a postulated single incident or a single failure. The FMEA examines the various ways in which a failure may occur and the effects of this failure on the ability of the equipment to continue to perform its intended function. Each piece of critical equipment was reviewed to determine how it might fail. Physical as well as electrical failures were examined. Failures caused by external influences as well as failures due to overloading or over stressing of equipment were examined.

Each type of failure was evaluated to determine if it would affect any other equipment. For instance, if the trip out of a transmission line might cause other lines to be overloaded or interrupt an offsite power circuit.

The effects were analyzed to determine if critical functions of the plant switching station would be affected. There should be no single failure that results in un-availability of at least two power circuits and compromise the ability of the plant to maintain containment integrity and other vital functions. Failure modes and effects of the following equipment of the plant switching station were analyzed.

- Transmission line towers.
- Transmission lines.
- Plant switching station main buses.
- 345 kV circuit breakers.
- 345 kV disconnect switches.

- Transmission line and bus relay systems within the plant switching station.

8.2.1.2.1.2 Unit Switchyards/Transformer Yards

CP COL 8.2(3) The MTs, UATs, RATs, and the main generator excitation transformer are located outdoors in the transformer yard. There are two indoor GIS, the normal PPS GIS is located on the west side of the RATs, and the alternate PPS GIS located on the east side of the MTs. The two GIS buildings and the transformer yard are enclosed within a security fence that has controlled access. Three-hour rated fire barriers are provided between the transformers that are associated with the normal and alternate PPSs. There is a minimum one-hour rated fire barrier in between all transformers. The physical layouts of the Unit 3 and Unit 4 unit switchyards/transformer yards are shown in Figures 8.2-207 and 8.2-208, respectively.

CP COL 8.2(3)
CP COL 8.2(7) The isolated phase busducts (IPBs) from the GLBS are connected to the low voltage (LV) side of the MTs and to high voltage (HV) side of the UATs. The MT circuit breaker in the GIS is connected to the HV side of the MTs by GIB. The alternate PPS GIS has one gas-insulated circuit breaker, designated as MT- CB, which connects the HV side of the MT to the Oncor alternate PPS transmission tie line. The normal PPS GIS has two gas-insulated circuit breakers, one designated as RAT-CB1 for RAT1 and RAT3, and the other designated as RAT-CB2 for RAT2 and RAT4. The RAT-CB1 connects the HV sides of RAT1 and RAT3 to the Oncor normal PPS transmission tie line. The RAT-CB2 connects the HV sides of RAT2 and RAT4 to the Oncor normal PPS transmission tie line. The breaker open/close logic diagrams for the unit switchyard circuit breakers are shown in Figures 8.2-209 and 8.2-210. The RAT-CB1 and RAT-CB2 has a continuous rating of 2000 amp and 63 kA short circuit rating. The MT-CB has a continuous rating of 4000 amp and 63 kA short circuit rating. Two trip coils are provided for each circuit breaker, actuated by the primary and back up relay protection schemes. The one line diagrams for the normal and alternate PPS GIS are shown in Figures 8.2-203 and 8.2-204, respectively. Each circuit breaker is provided with two motor-operated grounding type disconnect switches. Additional motor-operated grounding type disconnect switches are provided, as shown in the one line diagrams in order to isolate any section of the power circuit. Surge arresters are provided both at the transformer side and at the transmission tie line side to protect the equipment from damage due to lightning and switching surges.

CP COL 8.2(8)
CP COL 8.2(9) Each unit switchyard has two sets of 125V dc batteries and two separate dc power distribution systems. Each battery system has its own 480V ac -125V dc battery charger. In addition, there is a spare battery charger that can be placed in service to replace any of the dedicated battery chargers. The batteries are sized conservatively to perform its design basis functions upon loss of the battery charger. The battery chargers are sized to charge a design basis discharged battery to 95 percent of its capacity within twenty-four hours. A primary and a backup relay protection scheme is provided for each of the transmission tie lines to the plant switching station. The dc control power for the primary and the backup protection scheme is provided from separate dc systems in each unit switchyard.

Four separate 480V ac power supply systems fed from four different non-Class 1E 480V load centers of each unit, are provided for the unit switchyards of each unit. Two systems are for the normal PPS unit switchyard and the other two for the alternate PPS unit switchyard. Within each unit switchyard, two separate low voltage ac power distribution systems provide power to two separate groups of electrical loads.

The normal PPS and the alternate PPS unit switchyards, the normal PPS and the alternate PPS transmission tie lines to the plant switching station, the low-voltage dc and ac power systems in the unit switchyards, are physically separated and do not share any common equipment. Hence, no FMEA is warranted for the equipment and circuits associated with the unit switchyards.

8.2.1.2.2 Plant Switching Station and Transmission Lines Testing and Inspection

CP COL 8.2(3) An agreement between Luminant and Oncor for inspection, maintenance, calibration, and testing of transmission lines, and plant switching station, provides the procedure, policy and organization to carry out inspection, maintenance, calibration, and testing of transmission lines and plant switching station.

This agreement defines the interfaces and working relationship between Luminant and Oncor. As a service to Luminant, Oncor performs inspection, maintenance, calibration, and testing of Luminant transformer and circuit breaker assets at CPNPP. Luminant and Oncor are responsible for control of plant/grid interface activities. For reliability, Luminant and Oncor coordinate maintenance and testing of offsite power systems. Oncor establishes communication and coordination protocols for restoration of external power supply to the nuclear plant on a priority basis.

For performance of maintenance, testing, calibration and inspection, Oncor follows its own field test manuals, vendor manuals and drawings, industry's maintenance practice and observes Federal Energy Regulatory Commission requirements and North American Electric Reliability Corporation reliability standard.

Oncor verifies that these test results demonstrate compliance with design requirements and takes corrective actions as necessary. Oncor plans and schedules maintenance activities, notifying the plant and transmission system operations group in advance. Oncor also procures necessary parts prior to the commencement of maintenance activities.

Transmission lines in the Oncor Electric Delivery transmission system are inspected through an aerial inspection twice per year. The inspection has a specific focus on vegetation management, inspection of structures and conductors, right-of-way encroachments, and any conditions that pose a danger to the public. Herbicide is used to control vegetation within the boundaries of the transmission line rights-of-way. Where herbicides cannot be applied, vegetation is

cut and removed. This cutting and removal effort is extended beyond the formal right-of-way limit to address the presence of any danger trees which may adversely affect the operation of the transmission line.

The interconnecting plant switching station, as well as other substation facilities, has multiple levels of inspection and maintenance, including the following:

- Walk throughs and visual inspections of the entire substation facility.
- Relay functional tests.
- Oil sampling of power transformers. Oil samples are evaluated through the use of gas chromatography and dielectric breakdown analysis.
- Power circuit breaker maintenance is based on operating conditions and time and consists of visual inspection, diagnostic tests and internal inspections to determine the breakers operating conditions.
- A power test (Doble Test) is typically performed on oil filled equipment, along with other diagnostic tests to determine the transformers operating conditions.
- Thermography is used to identify potential thermal heating issues on buses, conductors, connectors, switches, transformers, and other equipment located within a plant switching station.

8.2.1.2.3 Communication with ERCOT/Oncor

CP COL 8.2(1) The interfaces between CPNPP and Oncor are managed via a formal communication agreement. A reliability of the offsite power is managed by ERCOT, Oncor and CPNPP personnel through communications and actions governed and coordinated by the formal Interface Agreement.

The communication agreement specifies the responsibilities and communication methods among ERCOT, Oncor and CPNPP which have the responsibilities for the operation, maintenance, and engineering of transmission system. Planned activities and changes in plant structures, systems, and components (SSC) status which may affect grid stability/reliability are clearly identified and included in the communications. The main control room operators notify Oncor of any plant activity that may impact generation capability. The Oncor monitors transmission system conditions to ensure adequate voltage is maintained to support CPNPP, and notifies the main control room operators of conditions which will result in inadequate voltage support.

The instrumentation for monitoring and indicating the status such as breaker positions, bus and line voltages, frequency, watts and vars, etc., of the preferred power system ensure that any change in the preferred power system that would

prevent it from performing its intended function is immediately identified by the main control room operator.

Methods and procedures for confirming the operational readiness of offsite power systems are provided to verify that main control room operators are aware of the capability of the offsite power system to supply power during operation and situation that can result in a loss of offsite power (LOOP) following a trip of the plant.

Adequate procedures, administrative controls, and protocols are implemented to ensure that no modifications of the offsite power system circuits credited for satisfying GDC 17 without the performance of a proper safety evaluation.

Grid reliability evaluations are performed for maintenance or modifications to the offsite power system, as part of the maintenance risk assessment required by 10 Code of Federal Regulations (CFR) 50.65 before performing "grid-risk-sensitive" maintenance activities. The results of the grid reliability evaluations are evaluated by the maintenance rule program which is described in Subsection 17.6.2.

Communication links exist between the main control room operators and ERCOT/Oncor as a means to obtain timely information on power grid operating conditions and status to verify the operability of the offsite power grid in accordance with the requirements of the technical specifications. Communications with ERCOT/Oncor exist for restoration of offsite power in the event of a LOOP or station blackout.

Real time analysis tools are provided to evaluate the impact of the loss or unavailability of various transmission system elements. The evaluation results of these analysis tools notify the main control room operators to provide compensatory actions for the event.

Add the following subsection after DCD Subsection 8.2.2.1.

CP COL 8.2(1)

8.2.2.1.1 Switching Station Criteria

The following bullets address the application of GDCs 2, 4 and 5 to the CPNPP plant switching station:

- GDC 2, "Design Bases for Protection Against Natural Phenomena"

  GDC 2 does not apply to the switching station.

- GDC 4, "Environmental and Dynamic Effects Design Bases"

  GDC 4 does not apply to the switching station.

- GDC 5, “Sharing of Structures, Systems and Components”

  GDC 5 applies to the CPNPP Units 3 and 4 plant switching station. The switching station is the common point of interconnection where offsite power is fed to the plant and the offsite power system is the normal preferred power source for the plant safety-related loads. The offsite power system also provides power during all modes of plant operation (including normal, emergency shutdown and postulated accident conditions) to all safety-related unit auxiliary and safety-related plant service loads that are required to be operational for orderly shutdown and cooldown.

  - The offsite power system has adequate capacity to support the auxiliary loads of one unit connected to the switching station during an accident while providing for an orderly shutdown and cool down of the remaining unit.

  - The switching station equipments shared between Units 3 and 4, including the circuit breakers, have the capacity and are configured such that sharing will not significantly impair the ability to provide offsite power in response to an accident in one unit and an orderly shutdown and cool down of the remaining unit.

CP COL 8.2(11)

8.2.2.2 Grid Reliability and Stability Analysis

Oncor has performed a transient stability study for the proposed addition of CPNPP Units 3 and 4 generation facility to the ERCOT transmission network in accordance with BTP 8-3. The CPNPP Units 3 and 4 connect to the ERCOT network via four 345 kV transmission tie lines to the plant switching station and four 345 kV outgoing transmission lines, as discussed in Subsection 8.2.1.1. The purpose of this study is to determine if the expansion of this facility causes the proposed or existing nearby generators to experience transient instability for selected planning criteria contingencies. This study indicates that neither the proposed nor existing nearby generators experience transient instability for the selected planning criteria contingencies that have been considered.

This study, and its conclusions, is based on preliminary data and is subject to review using final data to be provided prior to the interconnection of the proposed generating facility expansion with the Oncor transmission system.

The pertinent details of the Oncor transient stability study are summarized below:

The study was conducted in accordance with the ERCOT Generation Interconnection or Change Request Procedure using a 2015 summer peak case projected from the 2012 ERCOT summer peak base case. The ERCOT dynamics database associated with the 2010 summer peak base case was modified for compatibility with the 2015 base case.

A series of contingencies consistent with the ERCOT planning criteria were applied to selected locations in the vicinity of CPNPP. The contingencies studied include the loss, as a result of a single event, of the largest generation capacity being supplied to the grid, removal of the largest load from the grid or loss of the most critical transmission line. The assumptions of this study are the following:

- All system elements were assumed to be in service prior to the contingency being simulated.
- Disturbances were modeled as close-in, normally-cleared faults by primary relaying and faults with stuck or hung breaker, cleared by back up protection.
- Normal clearing time for the primary relaying was assumed to be 4 cycles with one re-close attempt at 60 cycles.
- Selected machine rotor angles were monitored for indications of instability.

The expected contingencies are the following:

- Simultaneous trip of CPNPP Units 3 and 4 as the largest generator in the grid.
- Loss of the largest load in the grid.

The addition of the proposed CPNPP Units 3 and 4 at the Comanche Peak facility does not adversely impact the stability of the existing units and the new units in the area. The Comanche Peak generation remains stable for reasonably expected contingencies. These study cases include loss of the most heavily loaded transmission circuit connected to the plant switching station, loss of the largest capacity transmission circuit connected to the plant switching station and removal of the largest load from the system. In addition, in case of loss of the largest supply, i.e. CPNPP Units 3 and 4, the transmission system remains stable with slight voltage and frequency variation. The voltage low point is about 0.976 pu and frequency deviation from 60 Hz is only 0.24 Hz at the lowest point. In addition, the maximum frequency decay rate does not exceed 5 Hz/second that is assumed in the reactor coolant system flow analysis in Chapter 15. The grid stability analysis justifies the assumption used in Chapter 15 to power RCPs through the UATs for at least three seconds after a turbine generator trip.

Grid stability is evaluated on an ongoing basis based on load growth, addition of new transmission lines, addition of new generation capacities and for planned system changes.

The plant switching station and associated outgoing transmission lines and tie lines are newly constructed in CPNPP site and the transmission lines are connected to the four independent and separate local switching station. The transmission system reliability is evaluated in a similar manner as the CPNPP

Units 1 and 2. CPNPP Units 1 and 2 have not experienced any LOOP event caused by both the transmission system accepting the unit's output and the transmission system providing the preferred power for the unit's loads, from 1986 to 2007. According to this experience data, the transmission system is expected to be highly reliable.

8.2.3 Design Bases Requirements

CP COL 8.2(11) Replace the first sentence of the second paragraph in DCD Subsection 8.2.3 with the following.

A failure modes and effects analysis is provided in Subsection 8.2.1.2.1.1 and the offsite power system conforms to the following requirements.

STD COL 8.2(11) Replace the last sentence of the fifth paragraph in DCD Subsection 8.2.3 with the following.

A summary of a grid stability analysis is provided in Subsection 8.2.2.2 and the grid stability conforms to this requirement.

STD COL 8.2(11) Replace the last sentence of the eighth paragraph in DCD Subsection 8.2.3 with the following.

A transmission system reliability analysis is provided in Subsection 8.2.2.2.

CP COL 8.3(12) Condition monitoring of underground or inaccessible cables within the scope of the maintenance rule (10 CFR50.65) is incorporated into the maintenance rule program. The cable condition monitoring program incorporates lessons learned from industry operating experience, address regulatory guidance, and utilizes information from detailed design and procurement documents to determine the appropriate inspections, tests, and cable monitoring criteria within the scope of the maintenance rule described in Subsection 17.6.2. The program takes into consideration Generic Letter 2007-01.

8.2.4 Combined License Information

Replace the content of DCD Subsection 8.2.4 with the following.

CP COL 8.2(1) ***8.2(1)*** *Utility power grid and transmission line*

This Combined License (COL) Item is addressed in Subsections 8.1.2.1, 8.2.1.1, 8.2.1.2.3, 8.2.2.1.1, Table 8.2-201, Table 8.2-202, and Figure 8.2-201.

8.2(2) *Deleted from the DCD.*

CP COL 8.2(3) ***8.2(3)*** *Switchyard description*

This COL Item is addressed in Subsections 8.1.1, 8.2.1.2.1, 8.2.1.2.1.1, 8.2.1.2.1.2, 8.2.1.2.2, Figure 8.1-1R, Figure 8.2-202, Figure 8.2-203, Figure 8.2-204, Figure 8.2-205, Figure 8.2-206, Figure 8.2-207, Figure 8.2-208, Figure 8.3.1-1R and *Figure 8.3.1-2R.*

CP COL 8.2(4) ***8.2(4)*** *Normal preferred power*

This COL Item is addressed in Subsection 8.2.1.2, Figure 8.2-202, Figure 8.2-203, Figure 8.2-207 and *Figure 8.2-208.*

CP COL 8.2(5) ***8.2(5)*** *Alternate preferred power*

This COL Item is addressed in Subsection 8.2.1.2, Figure 8.2-202, Figure 8.2-204, Figure 8.2-207 and *Figure 8.2-208.*

8.2(6) *Deleted from the DCD.*

CP COL 8.2(7) ***8.2(7)*** *Protective relaying*

This COL Item is addressed in Subsections 8.2.1.2.1.1, 8.2.1.2.1.2, Figure 8.2-203, Figure 8.2-204, Figure 8.2-209 and *Figure 8.2-210.*

CP COL 8.2(8) ***8.2(8)*** *Switchyard dc power*

This COL Item is addressed in Subsections 8.2.1.2.1.1 and *8.2.1.2.1.2.*

CP COL 8.2(9) ***8.2(9)*** *Switchyard ac power*

This COL Item is addressed in Subsections 8.2.1.2.1.1 and *8.2.1.2.1.2.*

STD COL 8.2(10) ***8.2(10)*** *Transformer protection*

This COL Item is addressed in Subsection 8.2.1.2.

CP COL 8.2(11)
STD COL 8.2(11) ***8.2(11)*** *Stability and Reliability of the Offsite Transmission Power Systems*

This COL Item is addressed in Subsections 8.2.1.2.1.1, 8.2.1.2.3, 8.2.3 and *Table 8.2-203.*

8.2(12) *Deleted from the DCD.*

CP COL 8.2(1)

Table 8.2-201

345 kV Transmission Lines

345 kV Transmission Line	Transmission Line Designation	Termination Point	Approx. Length (Miles)	Thermal Rating (MVA)
Whitney	W	Whitney Switching Station	45	1631
Johnson	J	Johnson Switching Station	22	1631
DeCordova	D	DeCordova switching Station	17	1969
Parker	P	Parker Switching Station	42	1631

CP COL 8.2(1)

Table 8.2-202

Transmission Tie Lines

Transmission Tie Line Designation	Termination Point	Approx. Length (Miles)	Thermal Rating (MVA)
Unit 3 Normal PPS	Take-off Tower at Unit 3 Normal PPS unit Switchyard	0.55	1072
Unit 3 Alternate PPS	Take-off Tower at Unit 3 Alternate PPS unit Switchyard	0.66	2986
Unit 4 Normal PPS	Take-off Tower at Unit 4 Normal PPS unit Switchyard	0.30	1072
Unit 4 Alternate PPS	Take-off Tower at Unit 4 Alternate PPS unit Switchyard	0.42	2986

CP COL 8.2(11)

Table 8.2-203 (Sheet 1 of 6)

Failure Modes & Effects Analysis for Offsite Power Sources

Component	Function	Failure Mode	Effect on Safety Related Function
Transmission line towers	Provide the source of power to maintain containment integrity and other vital functions	Structural failure of a tower causing it to fall.	The 345 kV normal and alternate preferred power supply circuits between plant switching station and the unit switchyards for CPNPP Units 3 and 4 are on separate transmission structures. One or more of these circuits may share transmission structures with other circuits. Under normal conditions, the physical failure of any one of these transmission structures will only affect the circuits attached to the failed structure. The lateral separation between the normal and alternate preferred power supply circuits will be great enough such that the physical failure of any transmission structure to which these circuits are attached will not cause the failed structure, or the circuit(s) attached to the failed structure, to fall into the other normal or alternate preferred power supply circuit supplying the same generating unit. The lateral separation between all transmission circuits connected to the plant switching station and the transmission circuits connected to Oncor's existing on-site switchyard associated with CPNPP Units 1 and 2 are such that the physical failure of any structure in any circuit associated with CPNPP Units 1 and 2 will not cause both the normal and alternate preferred power supply circuits to be lost to either Unit 3 or 4. The lateral separation between the four 345 kV circuits associated with CPNPP Units 3 and 4 constructed from the plant switching station to four 345 kV off-site transmission network switching stations are such that, under normal conditions, in the event of a physical failure of any structure in any of these four circuits, the remaining circuits will have sufficient capacity to supply CPNPP Units 3 and 4 with the required power to maintain containment integrity and other vital functions at the required voltage. The actual routing of some or all of these four circuits will be subject to the approval of the PUCT. Final design of circuits subject to PUCT approval will take place after such the PUCT approval is received.

Table 8.2-203 (Sheet 2 of 6)

Failure Modes & Effects Analysis for Offsite Power Sources

Component	Function	Failure Mode	Effect on Safety Related Function
Transmission lines	Provide the source of power to maintain containment integrity and other vital functions	Loss of a transmission line for any reason, such as faults, splice failure, etc.	CPNPP Units 3 and 4 are each supplied from the plant switching station via a 345 kV normal preferred power supply circuit and a 345 kV alternate preferred power supply circuit. Under normal conditions, a fault on one of these circuits will be cleared by opening two breakers in the plant switching station and one breaker in the unit switchyard with no material affect on any other normal or alternate preferred power supply circuit. Under normal conditions, in the event of the failure of a normal or alternate preferred power supply circuit to a unit, the remaining preferred power supply circuit to that unit will have sufficient capacity to supply the required power to maintain containment integrity and other vital functions at the required voltage. The plant switching station is connected to four separate off-site 345 kV transmission network switching stations via four 345 kV transmission circuits. Under normal conditions, a fault on any one of these circuits is cleared by opening one or more breakers in the plant switching station and one or more breakers in the offsite switching stations with no material affect on the remaining three transmission lines. Under normal conditions, in the event of failure of any one of these four circuits, the remaining three circuits will have sufficient capacity to supply the required power to CPNPP Units 3 and 4 to maintain containment integrity and other vital functions at the required voltage.
Plant switching station bus	Provide the source of power to maintain containment integrity and other vital functions	Loss of a bus section for any reason, such as faults, maintenance outage, etc.	The plant switching station is constructed using a “breaker and a half” scheme, such that, under normal conditions, in the event of the outage of any circuit connected to the plant switching station, the plant switching station will have sufficient capacity to supply the required power to CPNPP Units 3 and 4 to maintain containment integrity and other vital functions at the required voltage. Under normal conditions, a fault on a circuit connected to the plant switching station is cleared by the opening of two breakers with no material affect on any other circuit connected to the plant switching station. Under normal conditions, either bus in the plant switching station is capable of being isolated without materially affecting the other bus or the operation of the plant switching station.

Table 8.2-203 (Sheet 3 of 6)

Failure Modes & Effects Analysis for Offsite Power Sources

Component	Function	Failure Mode	Effect on Safety Related Function
			The plant switching station is equipped with two independent battery systems. Each battery system is connected to a separate battery charger. The rating of each bus in the plant switching station meets or exceeds the maximum calculated current during all expected operating conditions. The momentary rating of each bus in the plant switching station meets or exceeds the maximum calculated fault current under all expected operating conditions. The voltage ratings of each bus and all insulators in the plant switching station meets or exceeds the maximum expected operating voltage of the plant switching station. Under normal conditions, due to the use of a “breaker and a half scheme”, in the event of failure of either plant switching station bus, the plant switching station will have sufficient capacity to supply the required power to CPNPP Units 3 and 4 to maintain containment integrity and other vital functions at the required voltage.
345 kV circuit breakers in the plant switching station	Fault clearing and switching of equipment	Failure of the breaker due to overload, excessive fault current, internal, or external electrical failure.	All 345 kV breakers in the plant switching station are equipped with dual trip coils. The continuous current rating of the breakers in the plant switching station meets or exceeds the maximum calculated current during any single contingency operating condition. The interrupting rating of the breakers in the plant switching station meets or exceeds the maximum calculated fault current under all expected operating conditions. The voltage rating of the breakers in the plant switching station meets or exceeds the maximum calculated operating voltage of the plant switching station.

Table 8.2-203 (Sheet 4 of 6)

Failure Modes & Effects Analysis for Offsite Power Sources

Component	Function	Failure Mode	Effect on Safety Related Function
			The relaying for each circuit connected to the plant switching station is equipped with breaker failure protection. The operation of breaker failure protection trips all breakers adjacent to the failed breaker necessary to isolate the failed breaker and other faulted equipment. Under normal conditions, in the event of the operation of breaker failure protection, the plant switching station will have sufficient capacity to supply the required power to CPNPP Units 3 and 4 to maintain containment integrity and other vital functions at the required voltage. The plant switching station is designed such that a stuck breaker, slow breaker, or relay failure will not adversely affect more than two transmission circuits. Because the plant switching station is designed such that the normal and alternate preferred power supply circuits associated with the same generating unit will not be connected in the same bay in the plant switching station, under normal conditions, in the event of the loss of two transmission circuits connected in the same bay, the plant switching station has sufficient capacity to supply the required power to CPNPP Units 3 and 4 to maintain containment integrity and other vital functions at the required voltage. Each breaker in the plant switching station is equipped with a disconnect switch on each side of the breaker to allow the breaker to be isolated from the rest of the plant switching station equipment. Under normal conditions, due to the use of a “breaker and a half” scheme and the provision of a normal and alternate preferred power supply circuit to CPNPP Units 3 and 4, in the event of failure of any one breaker in the plant switching station, the plant switching station has sufficient capacity to supply the required power to CPNPP Units 3 and 4 to maintain containment integrity and other vital functions at the required voltage.

Table 8.2-203 (Sheet 5 of 6)

Failure Modes & Effects Analysis for Offsite Power Sources

Component	Function	Failure Mode	Effect on Safety Related Function
345 kV disconnect switches in the plant switching station	Isolation of equipment	Failure of the disconnect due to overloading, faults, over stress, etc.	The rating of the 345 kV disconnect switches in the plant switching station meets or exceeds the maximum calculated current during all expected operating conditions. The momentary rating of the 345 kV disconnect switches in the plant switching station meets or exceeds the maximum calculated fault current under all expected operating conditions. The voltage rating of the 345 kV disconnect switches in the plant switching station meets or exceeds the maximum calculated operating voltage of the plant switching station. Under normal conditions, due to the use of a “breaker and a half” scheme and the provision of a normal and alternate preferred power supply circuit to CPNPP Units 3 and 4, in the event of failure of any one 345 kV disconnect switch in the plant switching station, the plant switching station will have sufficient capacity to supply the required power to CPNPP Units 3 and 4 to maintain containment integrity and other vital functions at the required voltage.
Relay systems in the plant switching station	Detect faults and operate the appropriate breakers to clear those faults.	Failure to operate during a fault condition.	Each 345 kV transmission line connected to the plant switching station, as well as each 345 kV bus section in the plant switching station, are equipped with primary and backup protective relay schemes. The primary and backup protective relays at the plant switching station are from different manufacturers or, if from the same manufacturer, are of different design, such that, under normal conditions, a “common mode failure” will not cause these protective systems to experience simultaneous outages. The primary and backup relays at the plant switching station are supplied by current from different sources, i.e., separate current transformers. The primary and backup relays at the plant switching station measure power system voltage using different sources, i.e. separate coupling capacitor voltage transformers (CCVTs), or CCVTs with separate secondary windings, etc.

Table 8.2-203 (Sheet 6 of 6)

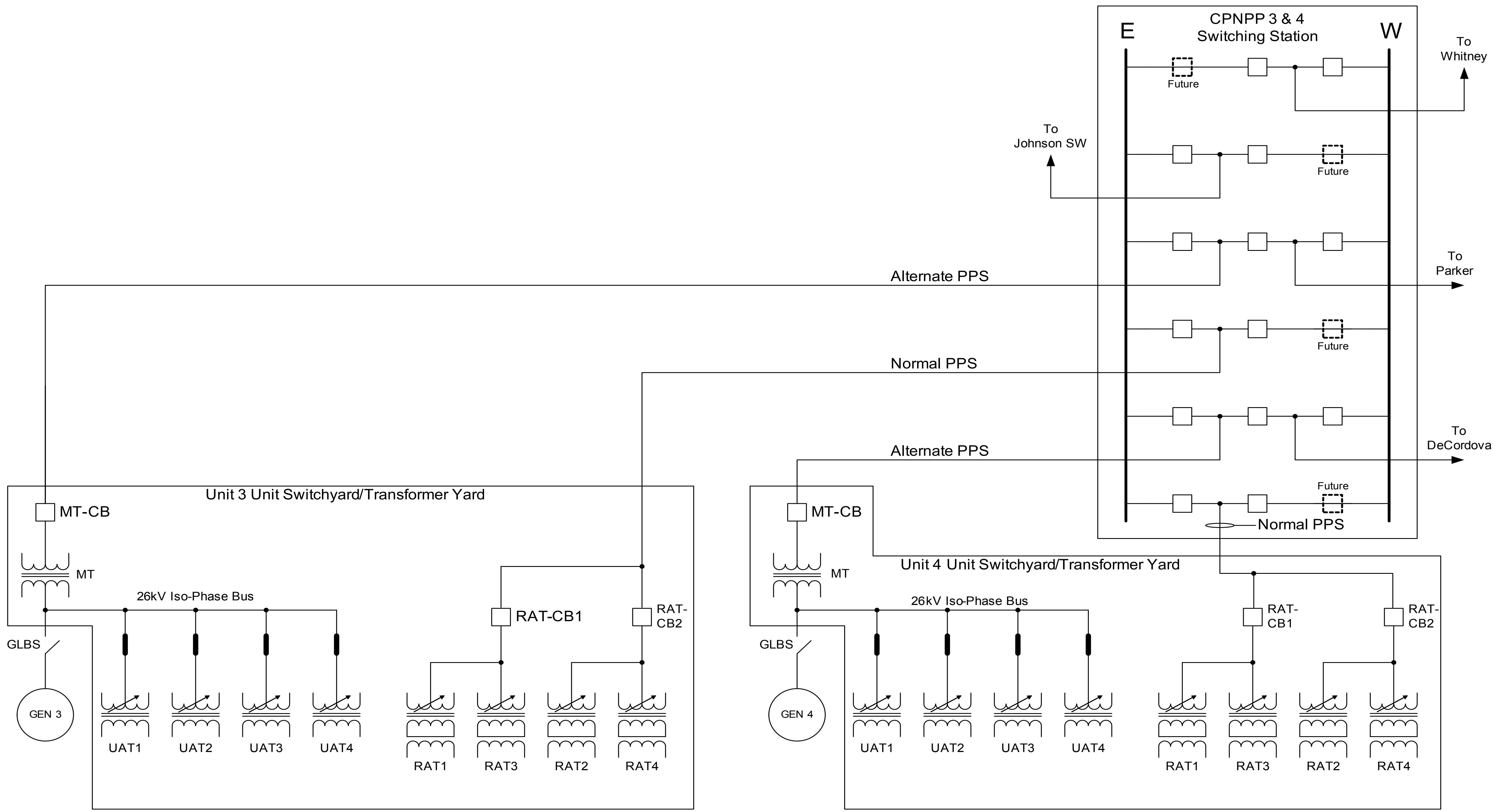
Failure Modes & Effects Analysis for Offsite Power Sources

Component	Function	Failure Mode	Effect on Safety Related Function
			The primary and backup relays at the plant switching station are supplied dc power from different battery systems. These dc systems are completely independent from each other, except that the battery chargers are supplied from the same ac source with a transfer scheme to an alternate ac supply if the normal supply is interrupted. Under normal conditions, the failure of one dc system at the plant switching station will not affect the other. The primary and backup relaying schemes will be independently powered from separate dc systems and operate separately fused and independent trip coil circuits. Two independent breaker failure schemes will provide each isolated contacts that will re-trip each separate fused and independent trip coil of the associated circuit breaker. Failure of a circuit breaker trip circuit will not affect the operation of either breaker failure scheme or the operation of the other trip circuit. The intent of the design of the primary and back up systems at the plant switching station is to maintain the availability of at least one protective relay system. Under normal conditions, in the event of failure of either a primary or backup relay system in the plant switching station, the plant switching station will have sufficient capacity to supply the required power to CPNPP Units 3 and 4 to maintain containment integrity and other vital functions at the required voltage.

(SRI)

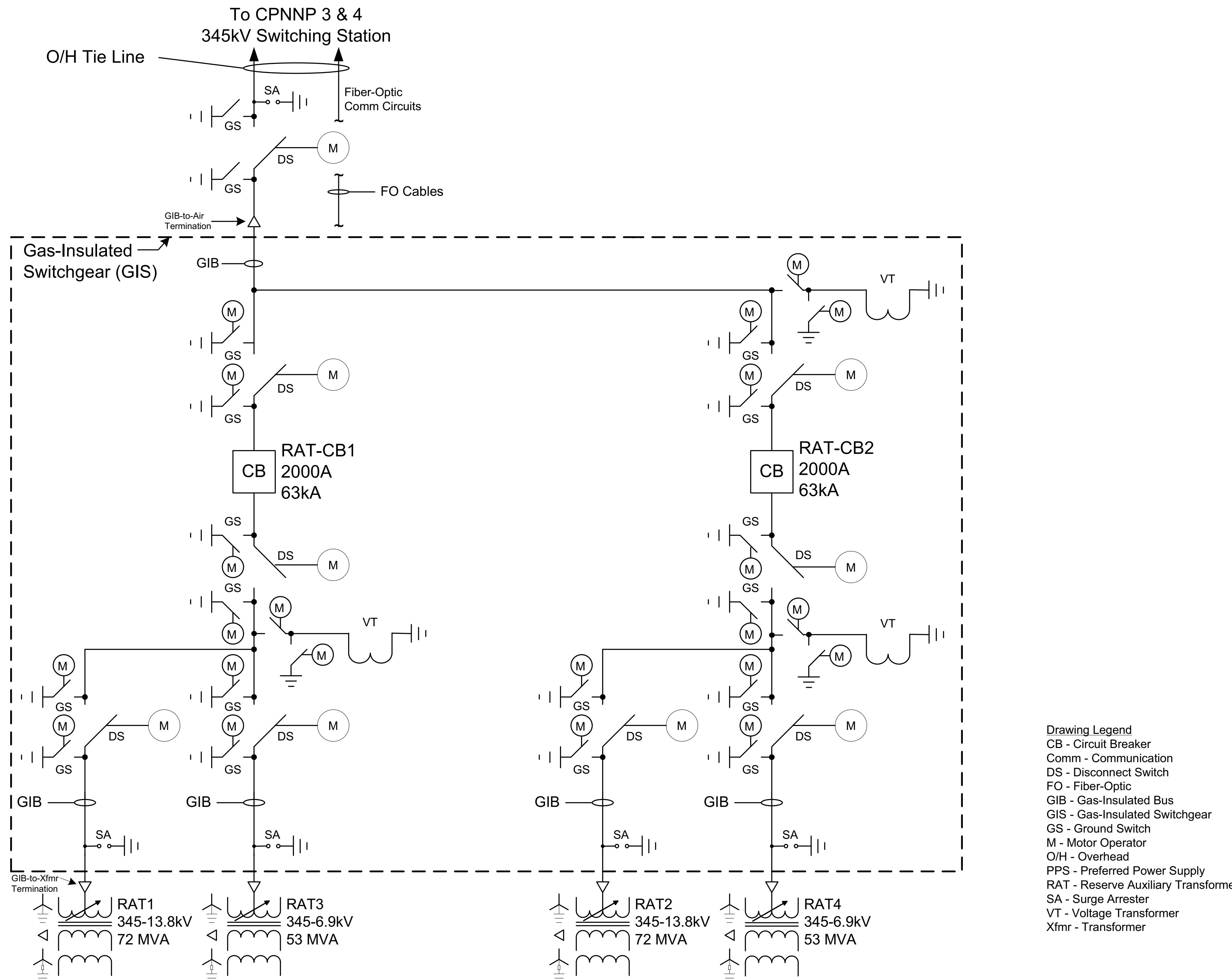
CP COL 8.2(1)

Figure 8.2-201 Relevant Portions of Oncor Transmission System Configuration



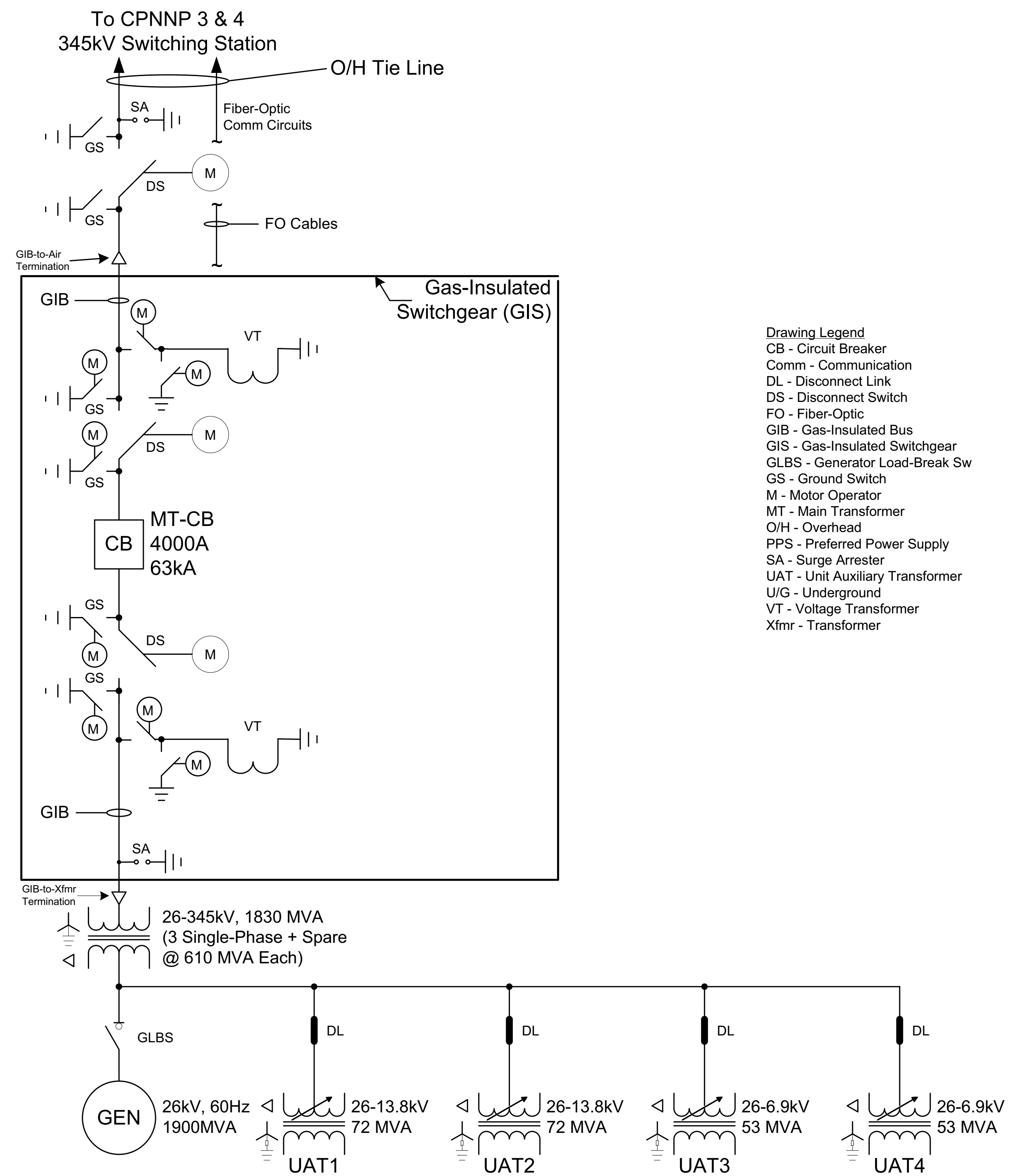
CP COL 8.2(3)
CP COL 8.2(4)
CP COL 8.2(5)

Figure 8.2-202 CPNPP Units 3 & 4 Offsite Power System Key One Line Diagram



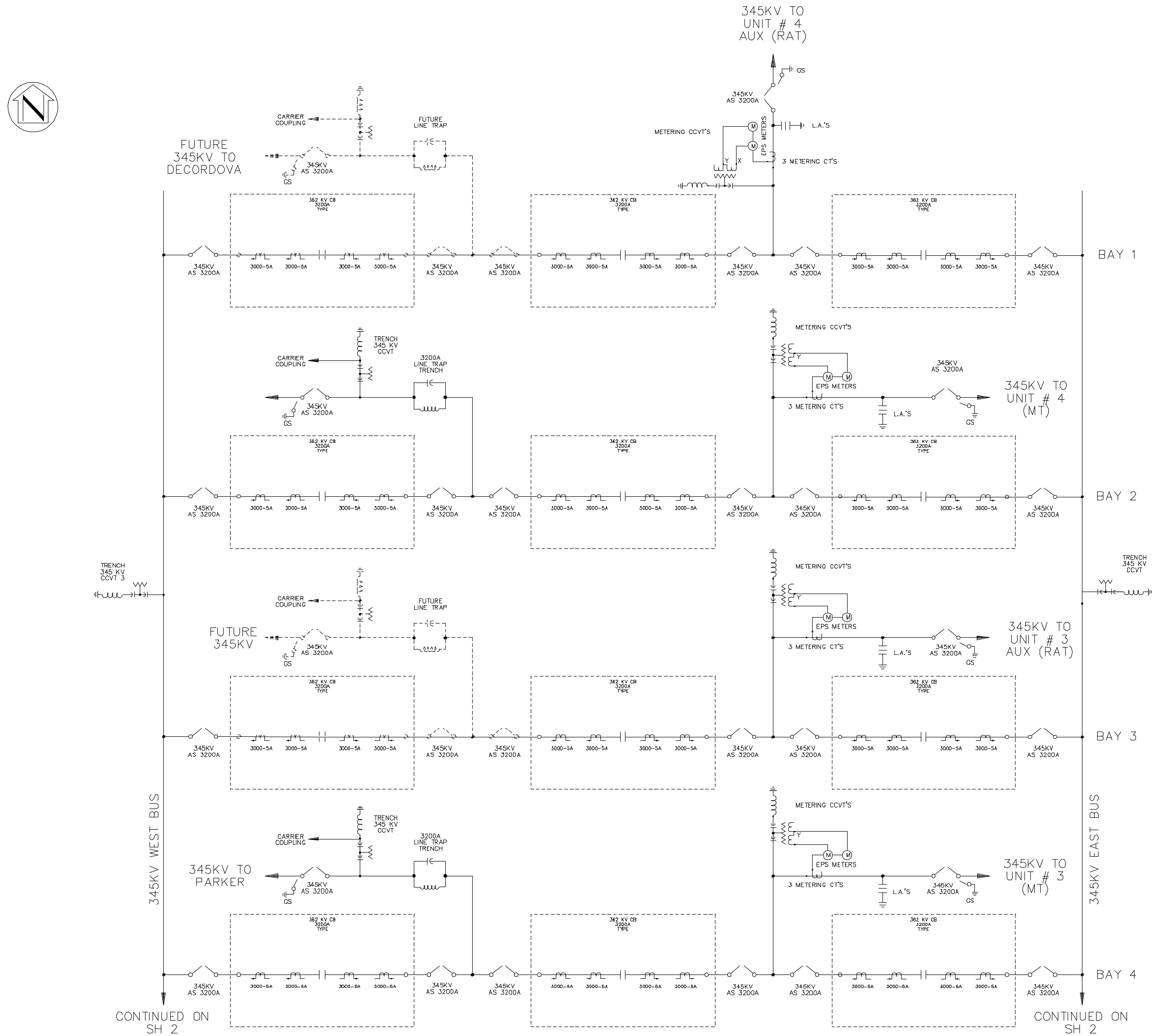
CP COL 8.2(3)
CP COL 8.2(4)
CP COL 8.2(7)

Figure 8.2-203 Normal PPS Unit Switchyard One Line Diagram



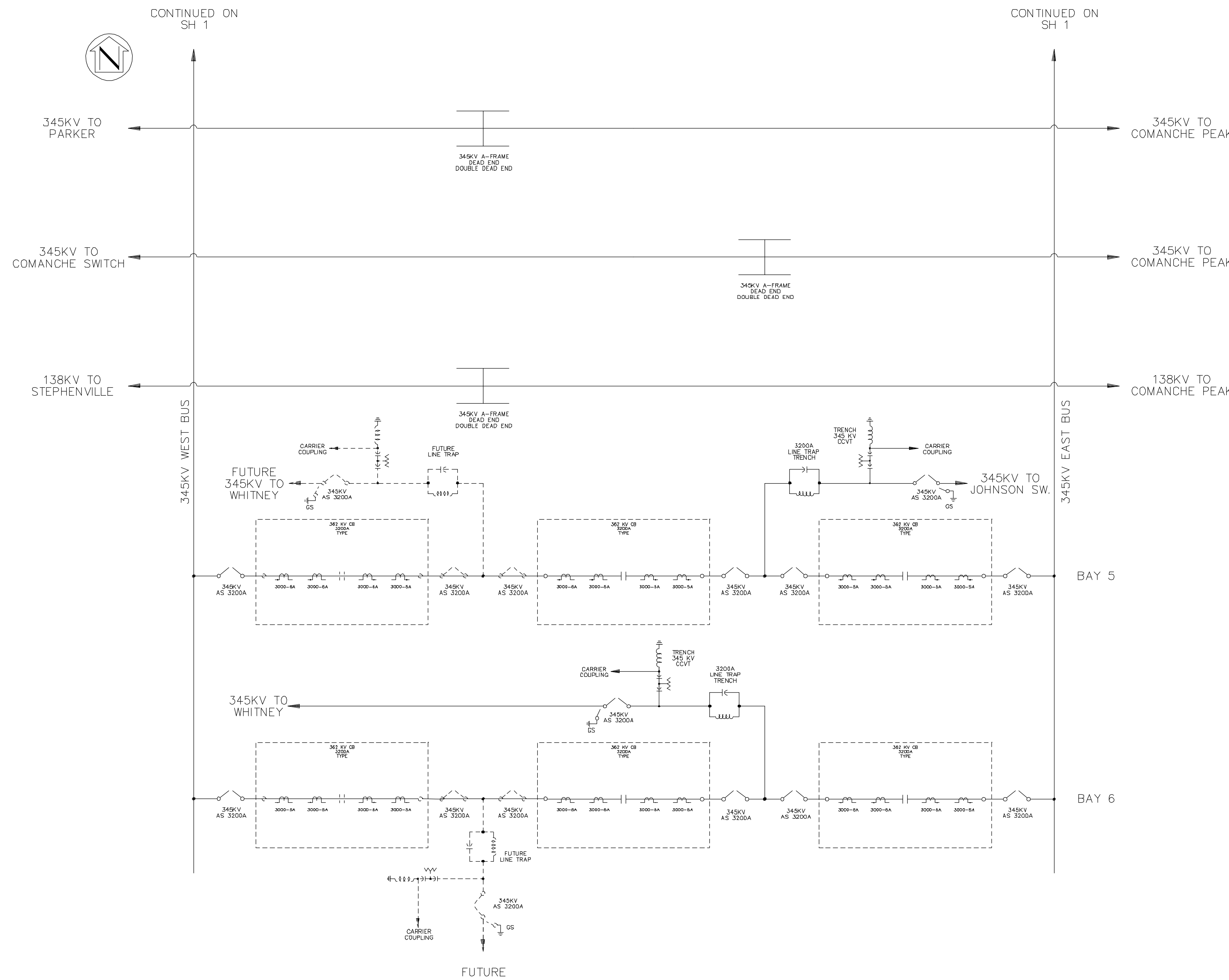
CP COL 8.2(3)
CP COL 8.2(5)
CP COL 8.2(7)

Figure 8.2-204 Alternate PPS Unit Switchyard One Line Diagram



CP COL 8.2(3)

Figure 8.2-205 Plant Switching Station One Line Diagram (Sheet 1 of 2)



CP COL 8.2(3)

Figure 8.2-205 Plant Switching Station One Line Diagram (Sheet 2 of 2)

(SRI)

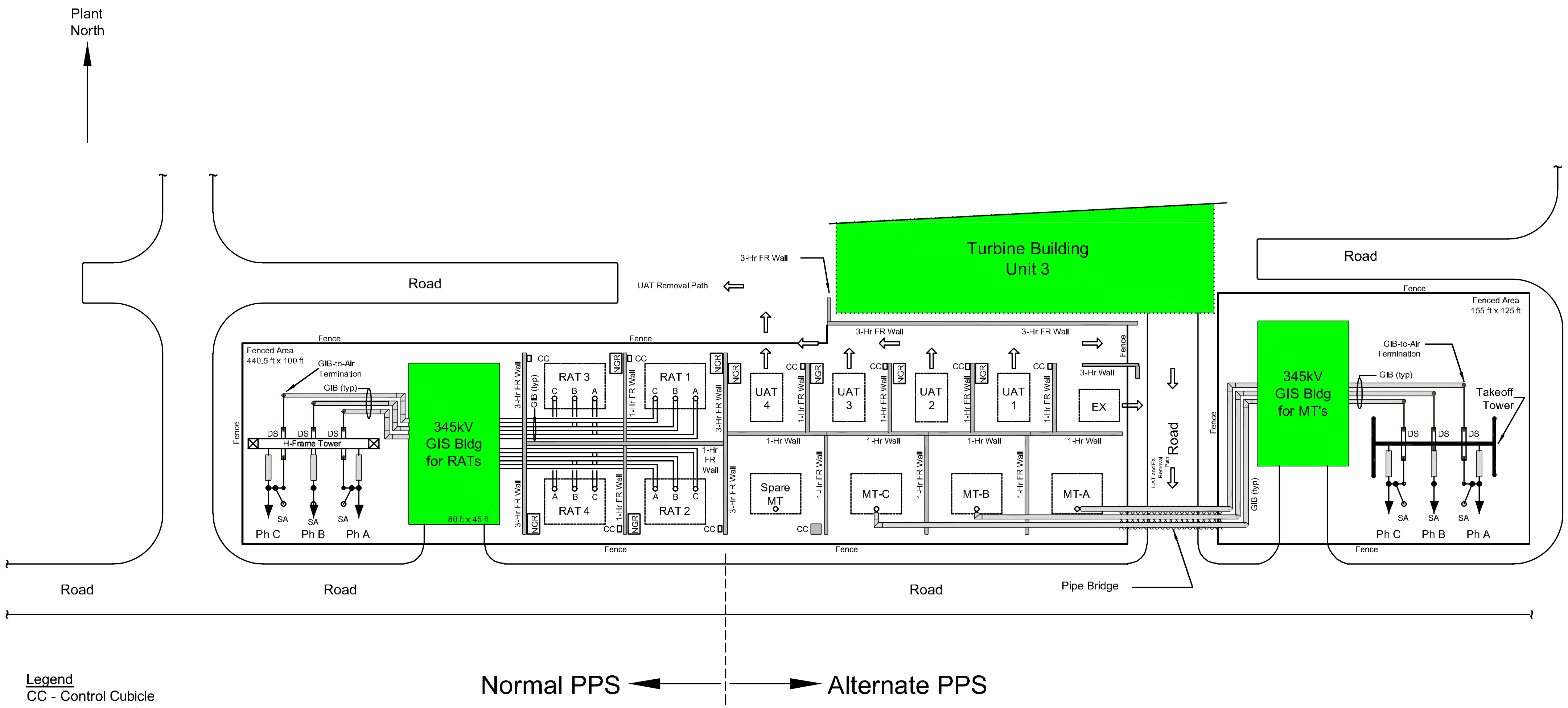
CP COL 8.2(3)

Figure 8.2-206 Plant Switching Station Layout (Sheet 1 of 2)

(SRI)

CP COL 8.2(3)

Figure 8.2-206 Plant Switching Station Layout (Sheet 2 of 2)

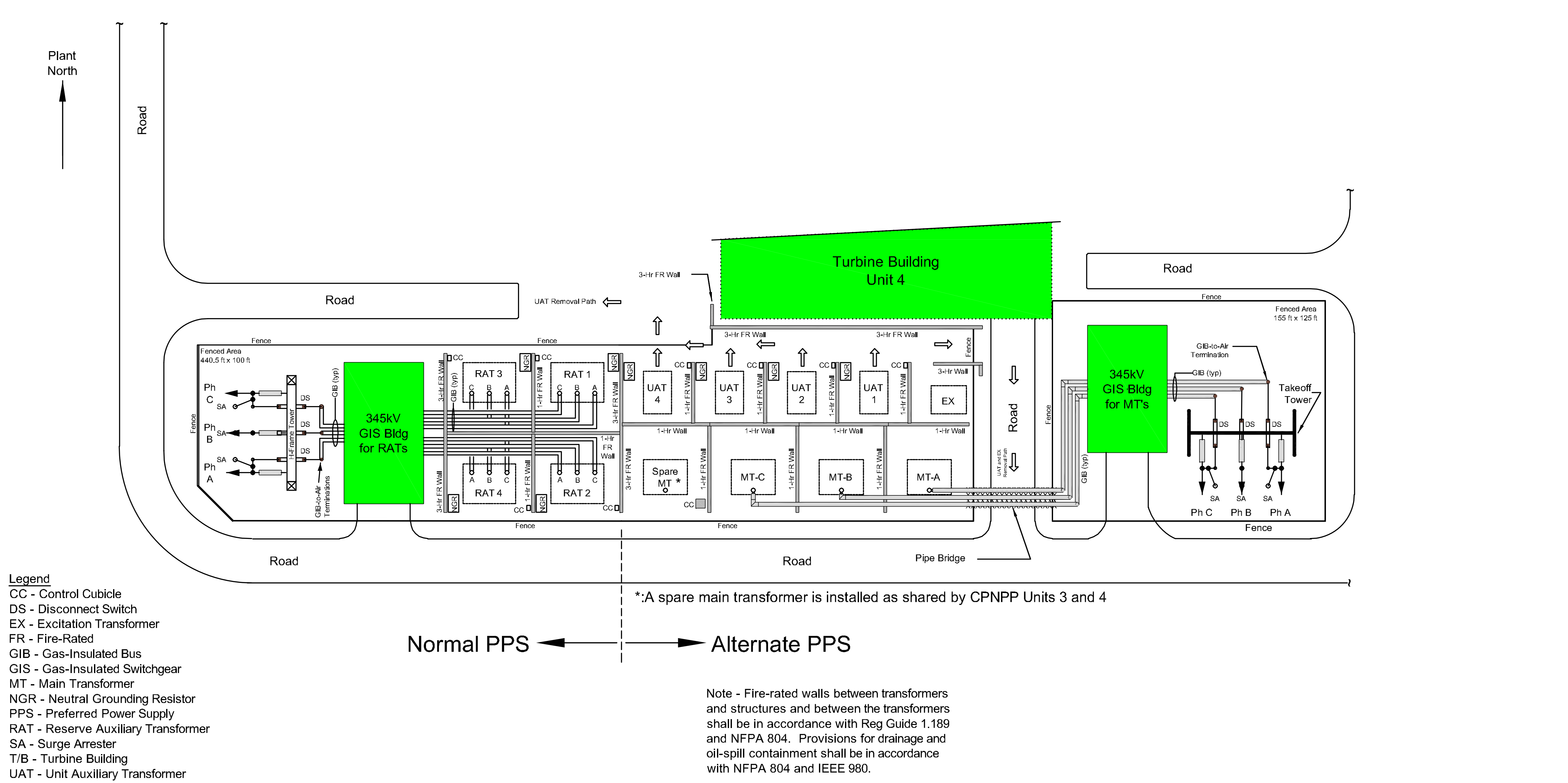


Legend
CC - Control Cubicle
DS - Disconnect Switch
EX - Excitation Transformer
FR - Fire-Rated
GIB - Gas-Insulated Bus
GIS - Gas-Insulated Switchgear
MT - Main Transformer
NGR - Neutral Grounding Resistor
PPS - Preferred Power Supply
RAT - Reserve Auxiliary Transformer
SA - Surge Arrester
T/B - Turbine Building
UAT - Unit Auxiliary Transformer

Note - Fire-rated walls between transformers and structures and between the transformers are in accordance with Reg Guide 1.189 and NFPA 804. Provisions for drainage and oil-spill containment are in accordance with NFPA 804 and IEEE 980.

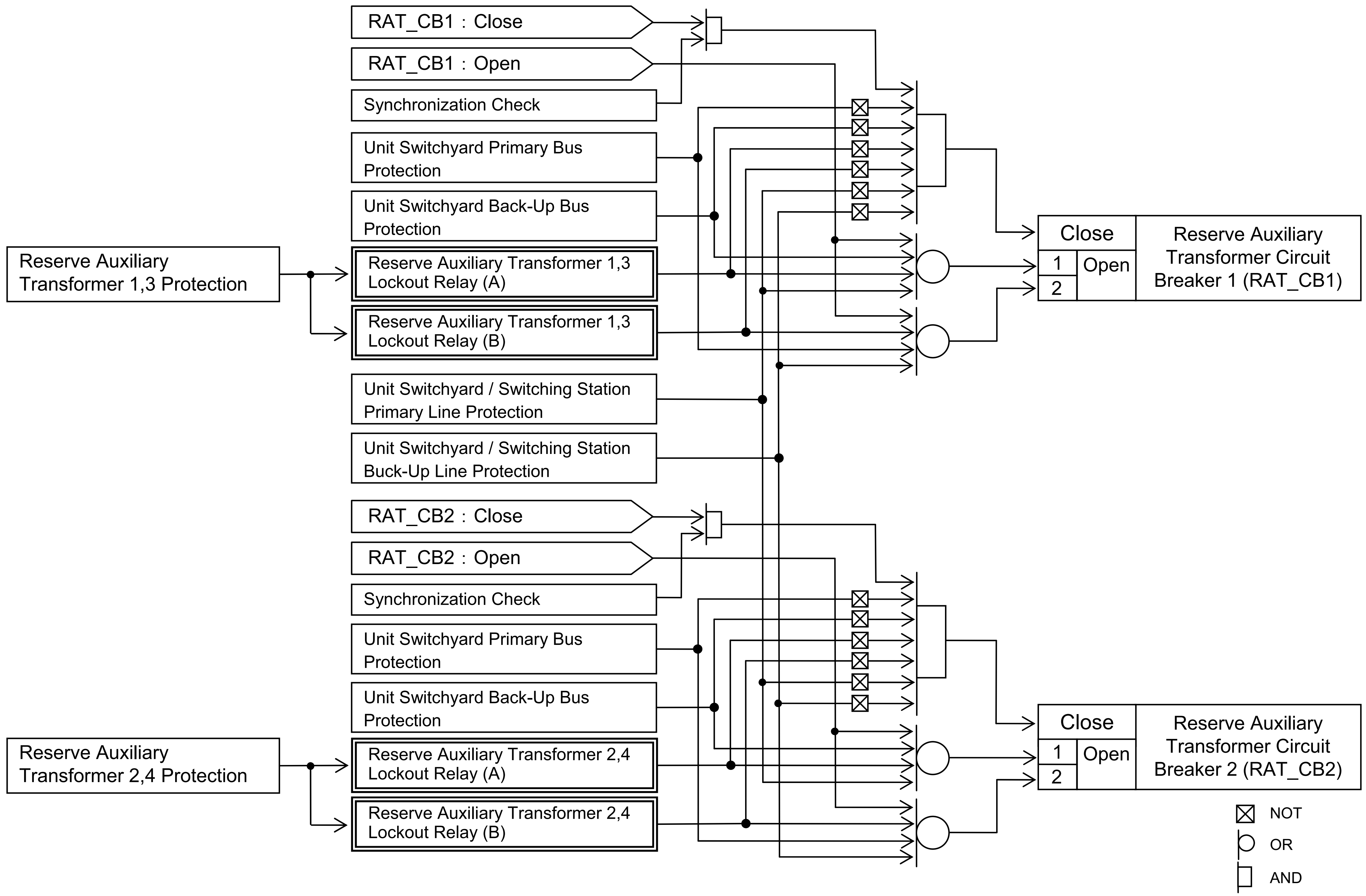
CP COL 8.2(3)
CP COL 8.2(4)
CP COL 8.2(5)

Figure 8.2-207 Unit 3 Unit Switchyard Layout



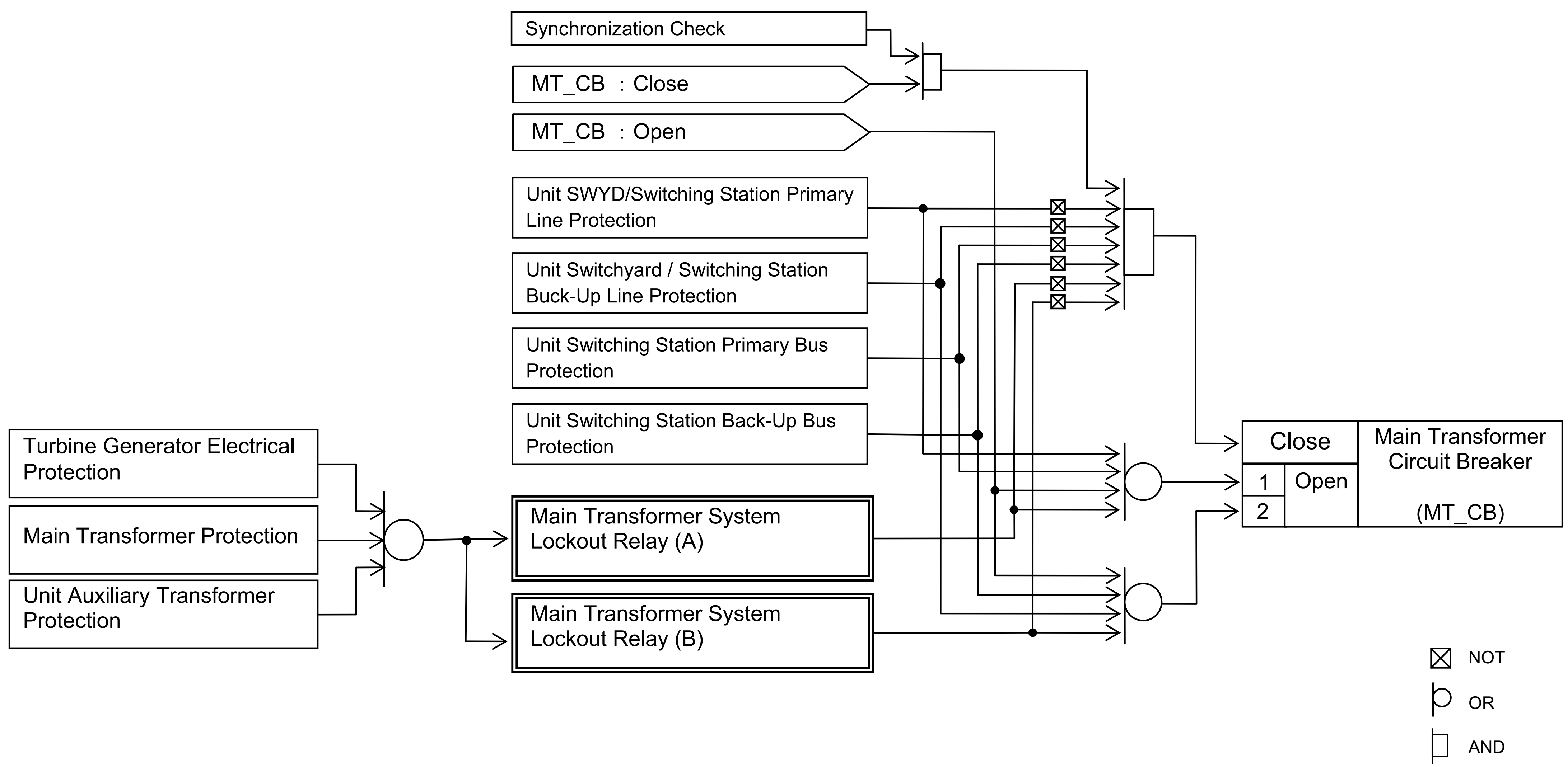
CP COL 8.2(3)
CP COL 8.2(4)
CP COL 8.2(5)

Figure 8.2-208 Unit 4 Unit Switchyard Layout



CP COL 8.2(7)

Figure 8.2-209 Logic Diagram – 345 kV Reserve Auxiliary Transformer Circuit Breakers



CP COL 8.2(7)

Figure 8.2-210 Logic Diagram – 345 kV Main Transformer Circuit Breaker

8.3 ONSITE POWER SYSTEMS

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

8.3.1.1 Description

CP COL 8.3(1) Replace the first sentence of the second paragraph in DCD Subsection 8.3.1.1 with the following.

The onsite ac power system is supplied offsite power from the 345 kV transmission system by two independent connections to the transmission system.

CP COL 8.3(1) Replace the seventh sentence of the second paragraph in DCD Subsection 8.3.1.1 with the following.

The rated voltage of the high-voltage winding of the RAT is 345 kV.

8.3.1.1.9 Design Criteria for Class 1E Equipment

STD COL 8.3(3) Replace the last sentence of the ninth paragraph in DCD Subsection 8.3.1.1.9 with the following.

Short circuit analysis for ac power system is addressed in Subsection 8.3.1.3.2.

8.3.1.1.11 Grounding and Lightning Protection System

CP COL 8.3(2) Replace the last paragraph in DCD Subsection 8.3.1.1.11 with the following.

The ground grid is designed in the shape of uniform square or rectangular meshes as shown in Figure 8.3.1-201. The layout of the air terminals is shown in Figure 8.3.1-201.

8.3.1.3.2 Short Circuit Studies

STD COL 8.3(3) Replace the last two sentences of the first paragraph in DCD Subsection 8.3.1.3.2 with the following.

As a result of the studies, maximum short circuit current has been confirmed to satisfy short circuit interrupt rating of circuit breakers indicated in Table 8.3.1-1R.

8.3.1.3.4 Equipment Protection and Coordination Studies

STD COL 8.3(10) Replace the last sentence of the first paragraph in DCD Subsection 8.3.1.3.4 with the following.

Coordination of protective devices is confirmed as part of equipment procurement.

8.3.1.3.5 Insulation Coordination (Surge and Lightning Protection)

CP COL 8.3(11) Replace the last sentence of the first paragraph in DCD Subsection 8.3.1.3.5 with the following.

Surge arresters are selected to be compatible with lightning impulse insulation level of the 345 kV offsite power circuit so that the insulation of onsite power system is assured from lightning surge.

8.3.2.1.1 Class 1E DC Power System

STD COL 8.3(8) Replace the last sentence of the fifth paragraph in DCD Subsection 8.3.2.1.1 with the following.

Short circuit analysis for dc power system is addressed in Subsection 8.3.2.3.2.

8.3.2.1.2 Non-Class 1E DC Power System

STD COL 8.3(8) Replace the last sentence of the fourth paragraph in DCD Subsection 8.3.2.1.2 with the following.

Short circuit analysis for dc power system is addressed in Subsection 8.3.2.3.2.

8.3.2.3.2 Short Circuit Studies

STD COL 8.3(8) Replace the last two sentences of the first paragraph in DCD Subsection 8.3.2.3.2 with the following.

As a result of the studies, maximum short circuit current has been confirmed to satisfy short circuit interrupt rating of circuit breakers indicated in Table 8.3.2-3.

8.3.4 Combined License Information

Replace the content of DCD Subsection 8.3.4 with the following.

CP COL 8.3(1) ***8.3(1)*** *Transmission voltages*

This COL Item is addressed in Subsection 8.3.1.1 and in Table 8.3.1-1R.

CP COL 8.3(2) ***8.3(2)*** *Ground grid and lightning Protection*

This COL Item is addressed in Subsection 8.3.1.1.11 and in Figure 8.3.1-201.

STD COL 8.3(3) ***8.3(3)*** *Short Circuit analysis for ac power system*

This COL Item is addressed in Subsections 8.3.1.1.9 and 8.3.1.3.2.

8.3(4) *Deleted from the DCD.*

8.3(5) *Deleted from the DCD.*

8.3(6) *Deleted from the DCD.*

8.3(7) *Deleted from the DCD.*

STD COL 8.3(8) ***8.3(8)*** *Short circuit analysis for dc power system*

This COL Item is addressed in Subsections 8.3.2.1.1, 8.3.2.1.2 and 8.3.2.3.2.

8.3(9) *Deleted from the DCD.*

STD COL 8.3(10) ***8.3(10)*** *Equipment Protection and Coordination Studies*

This COL Item is addressed in Subsection 8.3.1.3.4.

CP COL 8.3(11) ***8.3(11)*** *Insulation Coordination (Surge and Lightning Protection)*

This COL Item is addressed in Subsection 8.3.1.3.5.

CP COL 8.3(12) ***8.3(12)*** *Cable monitoring program*

This COL item is addressed in Subsection 8.2.3.

Table 8.3.1-1R

Electrical Equipment Ratings - Component Data Main AC Power System (Nominal Values)

	1.	Main Transformer (MT)		
CP SUP 8.3(1)		Quantity	Three single phase units (Besides one spare for the site)	
		MVA rating	1 phase 610MVA (3 phase 1830MVA)	
		Low voltage winding	26kV	
CP COL 8.3(1)		High voltage winding	345kV	
	2.	Unit Auxiliary Transformers (UATs)	UAT1, 2	UAT3, 4
		Quantity	Two 3 phase, 2 winding units	Two 3 phase, 2 winding units
		MVA rating	72MVA	53MVA
		Low voltage winding	13.8kV	6.9kV
		High voltage winding	26kV	26kV
		On-Load Tap Changer (OLTC)	Provided on high voltage side	Provided on high voltage side
	3.	Reserve Auxiliary Transformers (RATs)	RAT1, 2	RAT3, 4
		Quantity	Two 3 phase, 3 winding units (including delta tertiary winding)	Two 3 phase, 3 winding units (including delta tertiary winding)
		MVA rating	72MVA	53MVA
		Low voltage winding	13.8kV	6.9kV
CP COL 8.3(1)		High voltage winding	345kV	345kV
		On-Load Tap Changer (OLTC)	Provided on high voltage side	Provided on high voltage side
	4.	Generator Load Break Switch (GLBS)		
		Rated Voltage	Over 28kV	
		Rated Current	Over 44.4kA	
		Rated Frequency	60Hz	

Table 8.3.1-4R (Sheet 1 of 4)

Electrical Load Distribution - Class 1E GTG Loading

A Class 1E GTG

	Load	Quantity Installed	Rated Output [kW]	Load Input [kW]	Efficiency [%]	Power Factor [%]	Load Factor [%]	LOCA Concurrent with a LOOP				LOOP							
												Hot Shutdown				Cold Shutdown			
								Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]
	A Safety Injection Pump	1	900	900	95	85	95	1	900	558	1059	0	-	-	-	0	-	-	-
	A Component Cooling Water Pump	1	610	610	95	85	95	1	610	378	718	1	610	378	718	1	610	378	718
STD COL 9.2(6)	A Essential Service Water Pump	1	650	650	95	85	95	1	650	403	765	1	650	403	765	1	650	403	765
	A Containment Spray/Residual Heat Removal Pump	1	400	400	95	85	95	1	400	248	471	0	-	-	-	1	400	248	471
	A Charging Pump	1	820	820	95	85	95	0	-	-	-	1	820	508	965	1	820	508	965
	A Essential Chiller Unit	1	260	260	95	85	95	1	260	161	306	1	260	161	306	1	260	161	306
	A Spent Fuel Pit Pump	1	230	243	90	80	95	0	-	-	-	1	(243)	(182)	(303)	1	(243)	(182)	(303)
	A Pressurizer Heater (Back-up)	1	562	562	100	100	100	0	-	-	-	1	562	0	562	0	-	-	-
STD COL 9.2(20)	A Essential Service Water Pump Cooling Tower Fan	2	150	158	90	80	95	2	317	238	396	2	317	238	396	2	317	238	396
STD COL 9.2(20)	Motor Control Centers (A&A1)	2						2	650	164	670	2	620	134	634	2	620	134	634
	Total								3787	2150	4355		3839	1822	4249		3677	2070	4220

( ):This load is started by manually if GTG has necessary margin after completing automatic load sequence.

Table 8.3.1-4R (Sheet 2 of 4)

Electrical Load Distribution - Class 1E GTG Loading

B Class 1E GTG

	Load	Quantity Installed	Rated Output [kW]	Load Input [kW]	Efficiency [%]	Power Factor [%]	Load Factor [%]	LOCA Concurrent with a LOOP				LOOP							
												Hot Shutdown				Cold Shutdown			
								Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]
	B Safety Injection Pump	1	900	900	95	85	95	1	900	558	1059	0	-	-	-	0	-	-	-
	B Component Cooling Water Pump	1	610	610	95	85	95	1	610	378	718	1	610	378	718	1	610	378	718
STD COL 9.2(6)	B Essential Service Water Pump	1	650	650	95	85	95	1	650	403	765	1	650	403	765	1	650	403	765
	B Containment Spray/Residual Heat Removal Pump	1	400	400	95	85	95	1	400	248	471	0	-	-	-	1	400	248	471
	B Emergency Feed Water Pump	1	590	453	95	85	73	1	453	281	533	1	453	281	533	0	-	-	-
	B Essential Chiller Unit	1	260	260	95	85	95	1	260	161	306	1	260	161	306	1	260	161	306
	A Spent Fuel Pit Pump	1	230	243	90	80	95	0	-	-	-	1	(243)	(182)	(303)	1	(243)	(182)	(303)
	B Pressurizer Heater (Back-up)	1	562	562	100	100	100	0	-	-	-	1	562	0	562	0	-	-	-
STD COL 9.2(20)	B Essential Service Water Pump Cooling Tower Fan	2	150	158	90	80	95	2	317	238	396	2	317	238	396	2	317	238	396
STD COL 9.2(20)	Motor Control Centers (B&A1)	2						2	640	159	660	2	610	129	624	2	610	129	624
	Total								4230	2426	4876		3462	1590	3810		2847	1557	3245

( ): This load is started by manually if GTG has necessary margin after completing automatic load sequence.

Table 8.3.1-4R (Sheet 3 of 4)

Electrical Load Distribution - Class 1E GTG Loading

C Class 1E GTG

	Load	Quantity Installed	Rated Output [kW]	Load Input [kW]	Efficiency [%]	Power Factor [%]	Load Factor [%]	LOCA Concurrent with a LOOP				LOOP: Hot Shutdown				LOOP: Cold Shutdown			
								Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]
	C Safety Injection Pump	1	900	900	95	85	95	1	900	558	1059	0	-	-	-	0	-	-	-
	C Component Cooling Water Pump	1	610	610	95	85	95	1	610	378	718	1	610	378	718	1	610	378	718
STD COL 9.2(6)	C Essential Service Water Pump	1	650	650	95	85	95	1	650	403	765	1	650	403	765	1	650	403	765
	C Containment Spray/Residual Heat Removal Pump	1	400	400	95	85	95	1	400	248	471	0	-	-	-	1	400	248	471
	C Emergency Feed Water Pump	1	590	453	95	85	73	1	453	281	533	1	453	281	533	0	-	-	-
	C Class 1E Electrical Room Air Handling Unit Fan	1	110	116	90	80	95	1	116	87	145	1	116	87	145	1	116	87	145
	C Essential Chiller Unit	1	260	260	95	85	95	1	260	161	306	1	260	161	306	1	260	161	306
	B Spent Fuel Pit Pump	1	230	243	90	80	95	0	-	-	-	1	(243)	(182)	(303)	1	(243)	(182	(303)
	C Pressurizer Heater (Back-up)	1	562	562	100	100	100	0	-	-	-	1	562	0	562	0	-	-	-
STD COL 9.2(20)	C Essential Service Water Pump Cooling Tower Fan	2	150	158	90	80	95	2	317	238	396	2	317	238	396	2	317	238	396
STD COL 9.2(20)	Motor Control Centers (C&D1)	2						2	560	87	567	2	520	106	531	2	520	106	531
	Total								4266	2441	4915		3488	1654	3860		2873	1621	3299

( ):This load is started by manually if GTG has necessary margin after completing automatic load sequence.

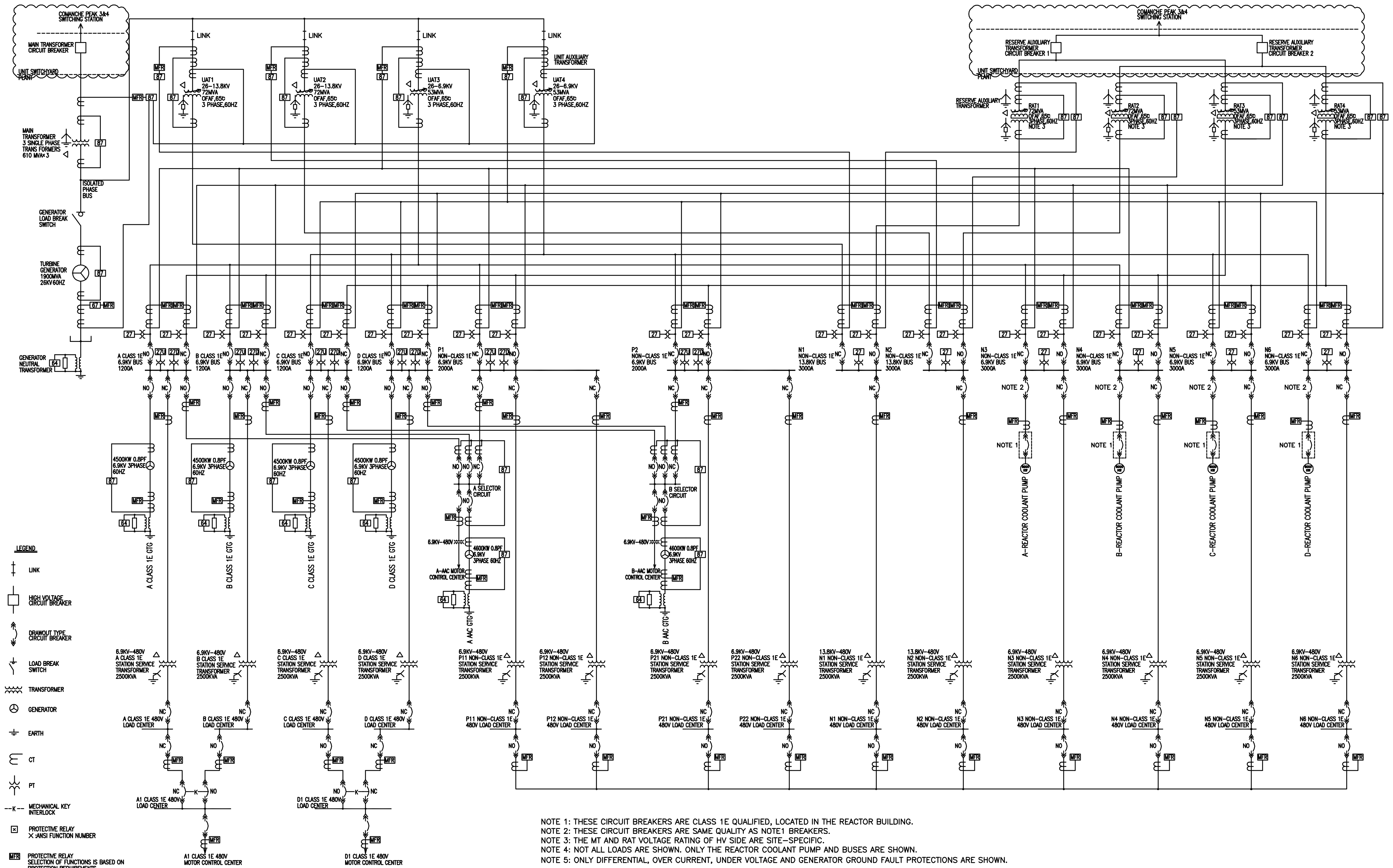
Table 8.3.1-4R (Sheet 4 of 4)

Electrical Load Distribution - Class 1E GTG Loading

D Class 1E GTG

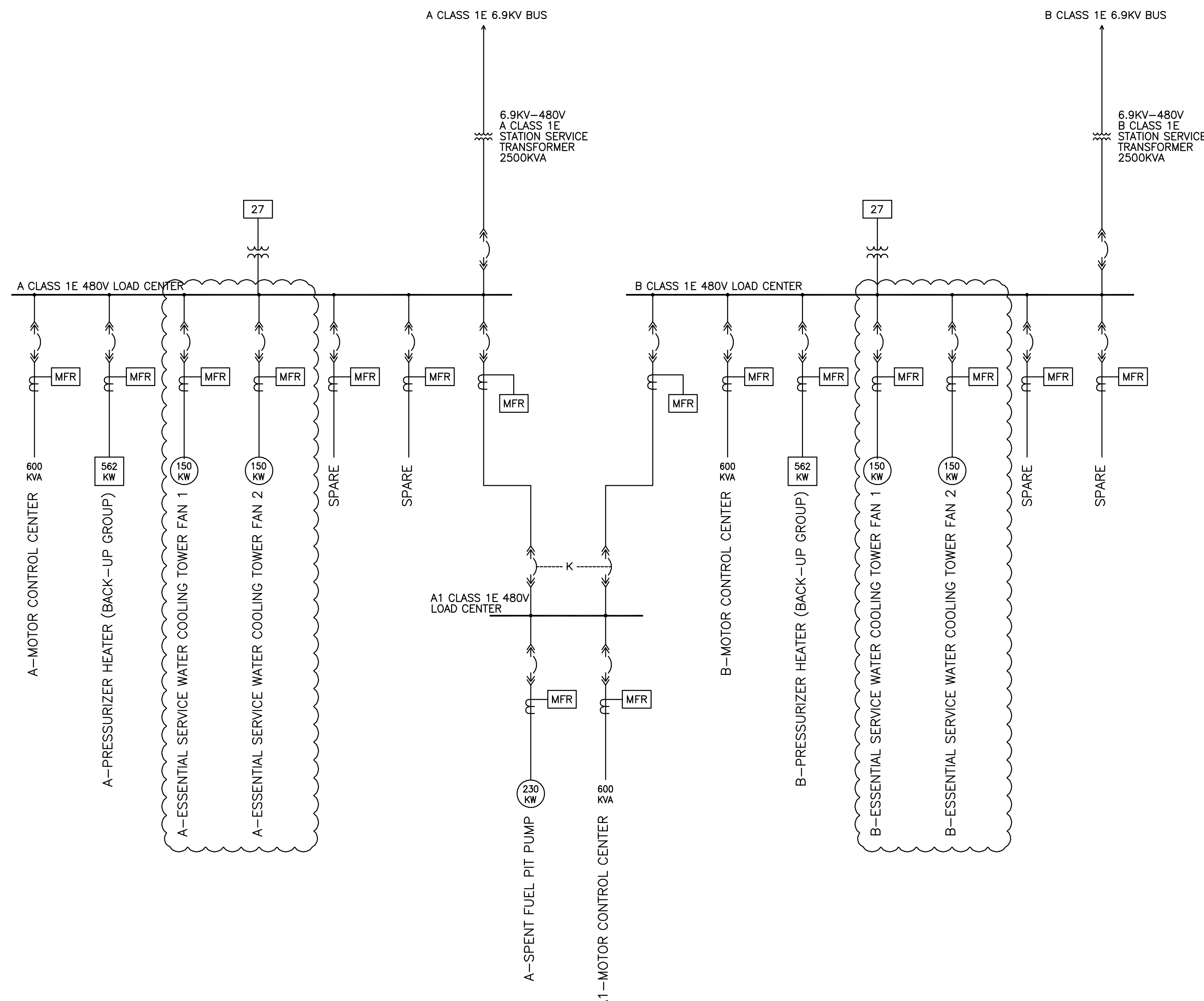
	Load	Quantity Installed	Rated Output [kW]	Load Input [kW]	Efficiency [%]	Power Factor [%]	Load Factor [%]	LOCA Concurrent with a LOOP				LOOP							
												Hot Shutdown				Cold Shutdown			
								Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]	Quantity	[kW]	[kVAR]	[kVA]
	D Safety Injection Pump	1	900	900	95	85	95	1	900	558	1059	0	-	-	-	0	-	-	-
	D Component Cooling Water Pump	1	610	610	95	85	95	1	610	378	718	1	610	378	718	1	610	378	718
STD COL 9.2(6)	D Essential Service Water Pump	1	650	650	95	85	95	1	650	403	765	1	650	403	765	1	650	403	765
	D Containment Spray/Residual Heat Removal Pump	1	400	400	95	85	95	1	400	248	471	0	-	-	-	1	400	248	471
	B Charging Pump	1	820	820	95	85	95	0	-	-	-	1	820	508	965	1	820	508	965
	D Class 1E Electrical Room Air Handling Unit Fan	1	110	116	90	80	95	1	116	87	145	1	116	87	145	1	116	87	145
	D Essential Chiller Unit	1	260	260	95	85	95	1	260	161	306	1	260	161	306	1	260	161	306
	B Spent Fuel Pit Pump	1	230	243	90	80	95	0	-	-	-	1	(243)	(182)	(303)	1	(243)	(182)	(303)
	D Pressurizer Heater (Back-up)	1	562	562	100	100	100	0	-	-	-	1	562	0	562	0	-	-	-
STD COL 9.2(20)	D Essential Service Water Pump Cooling Tower Fan	2	150	158	90	80	95	2	317	238	396	2	317	238	396	2	317	238	396
STD COL 9.2(20)	Motor Control Centers (D&D1)	2						2	570	95	578	2	540	45	542	2	540	45	542
	Total								3823	2168	4395		3875	1820	4281		3713	2068	4250

( ): This load is started by manually if GTG has necessary margin after completing automatic load sequence.



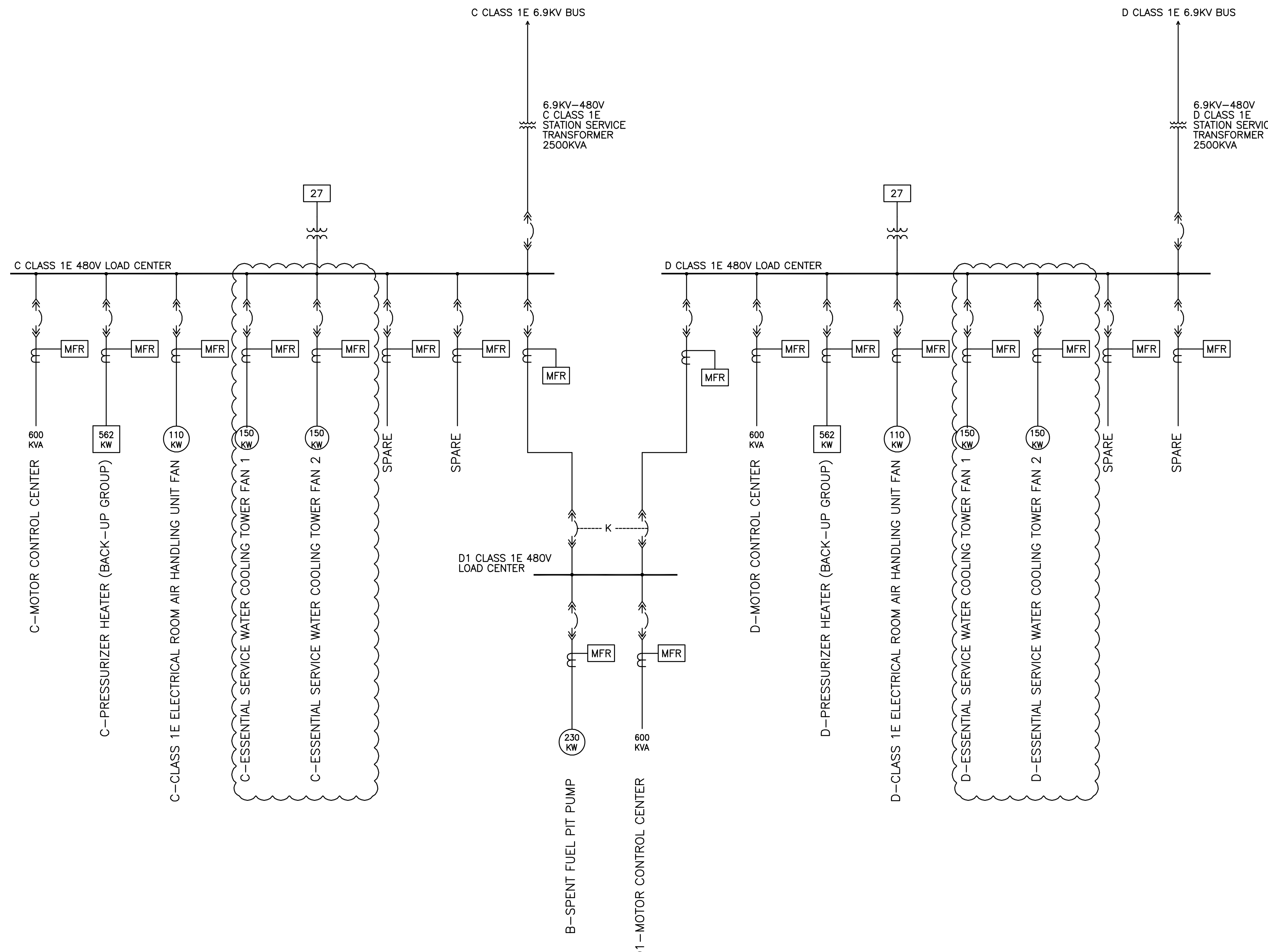
CP COL 8.2(3)

Figure 8.3.1-1R Onsite AC Electrical Distribution System (Sheet 1 of 8)
Main One Line Diagram



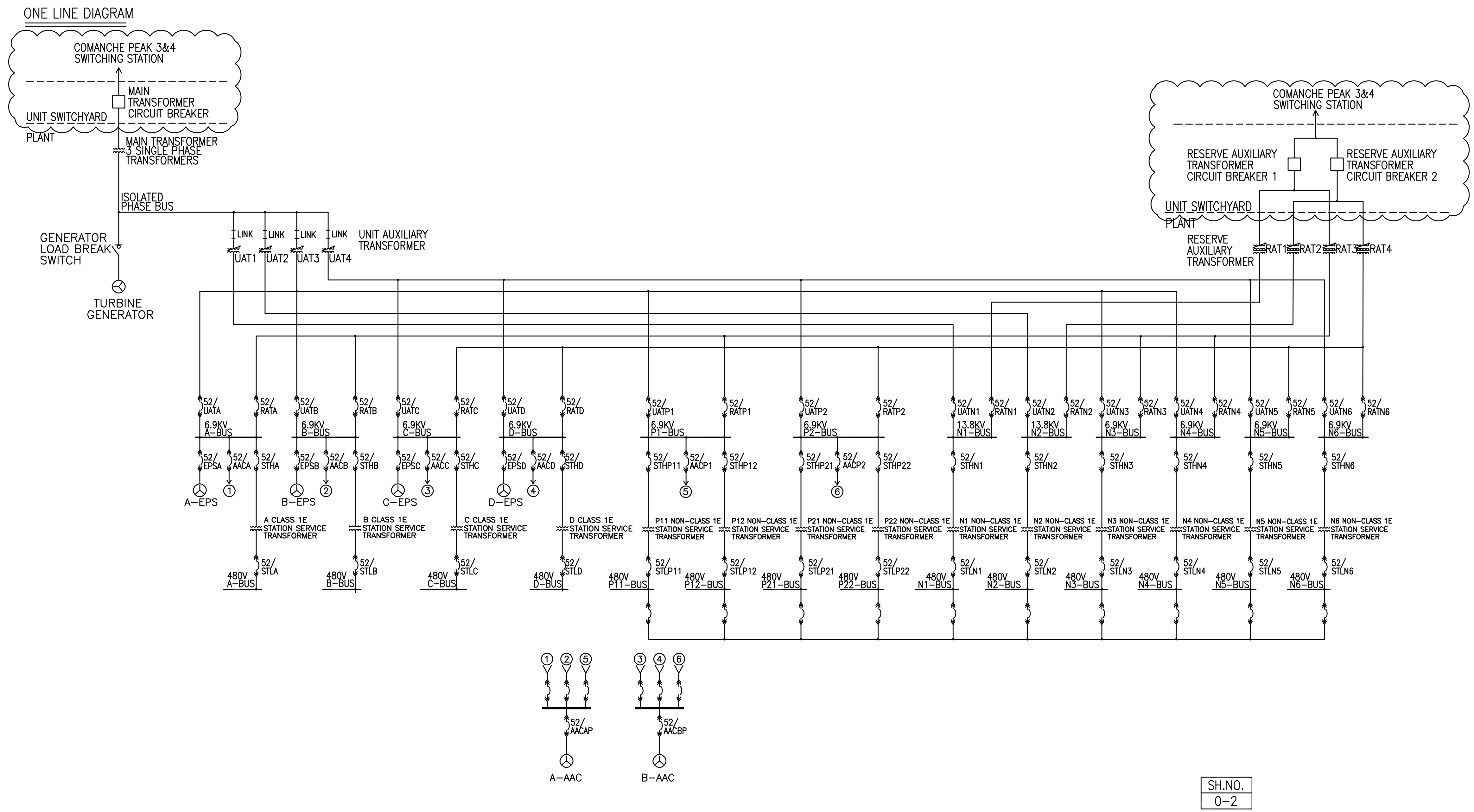
STD COL 9.2(20)

**Figure 8.3.1-1R Onsite AC Electrical Distribution System (Sheet 5 of 8)
Class 1E 480V Buses A and B One Line Diagram**



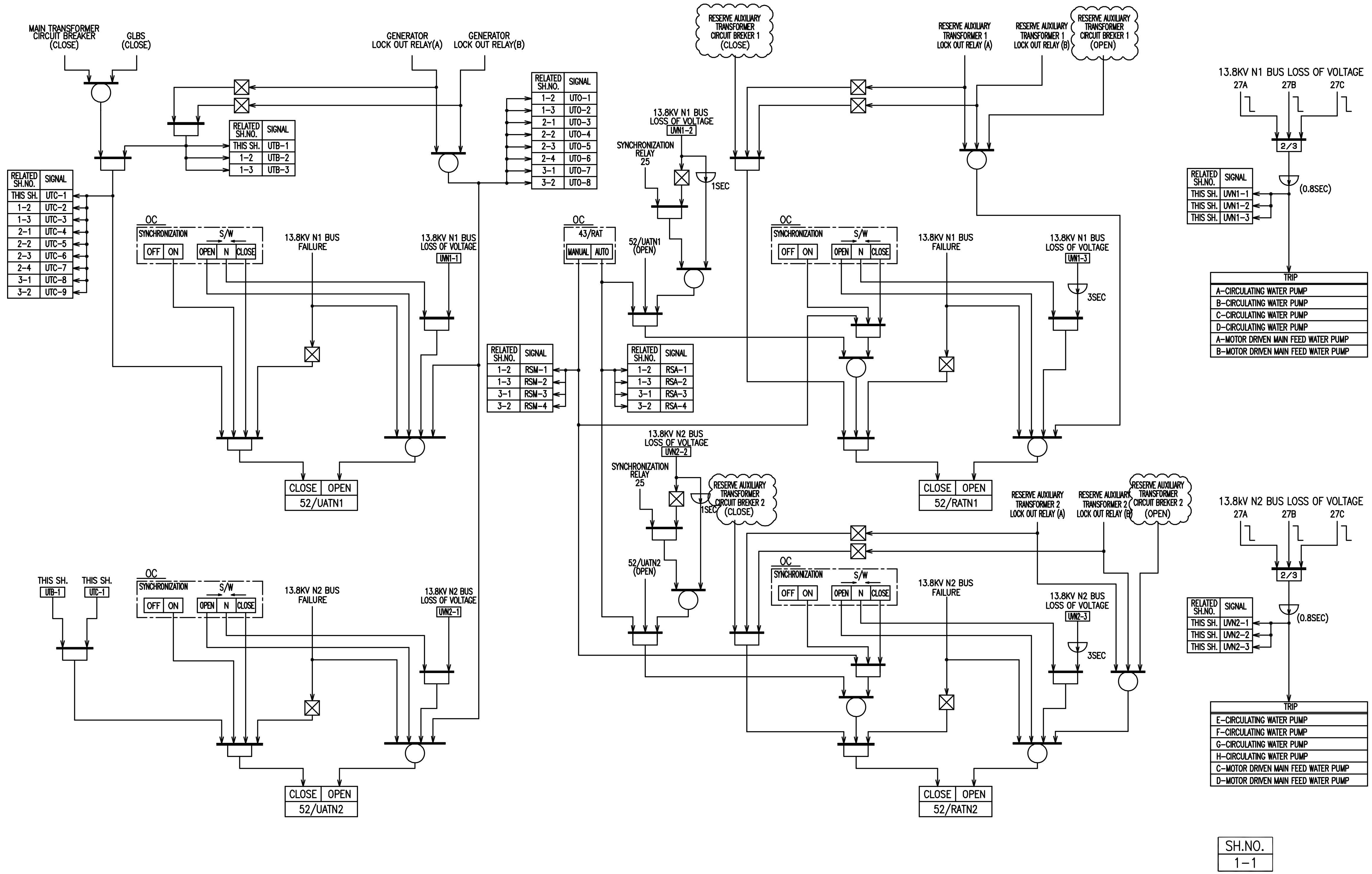
STD COL 9.2(20)

Figure 8.3.1-1R Onsite AC Electrical Distribution System (Sheet 6 of 8)
Class 1E 480V Buses C and D One Line Diagram



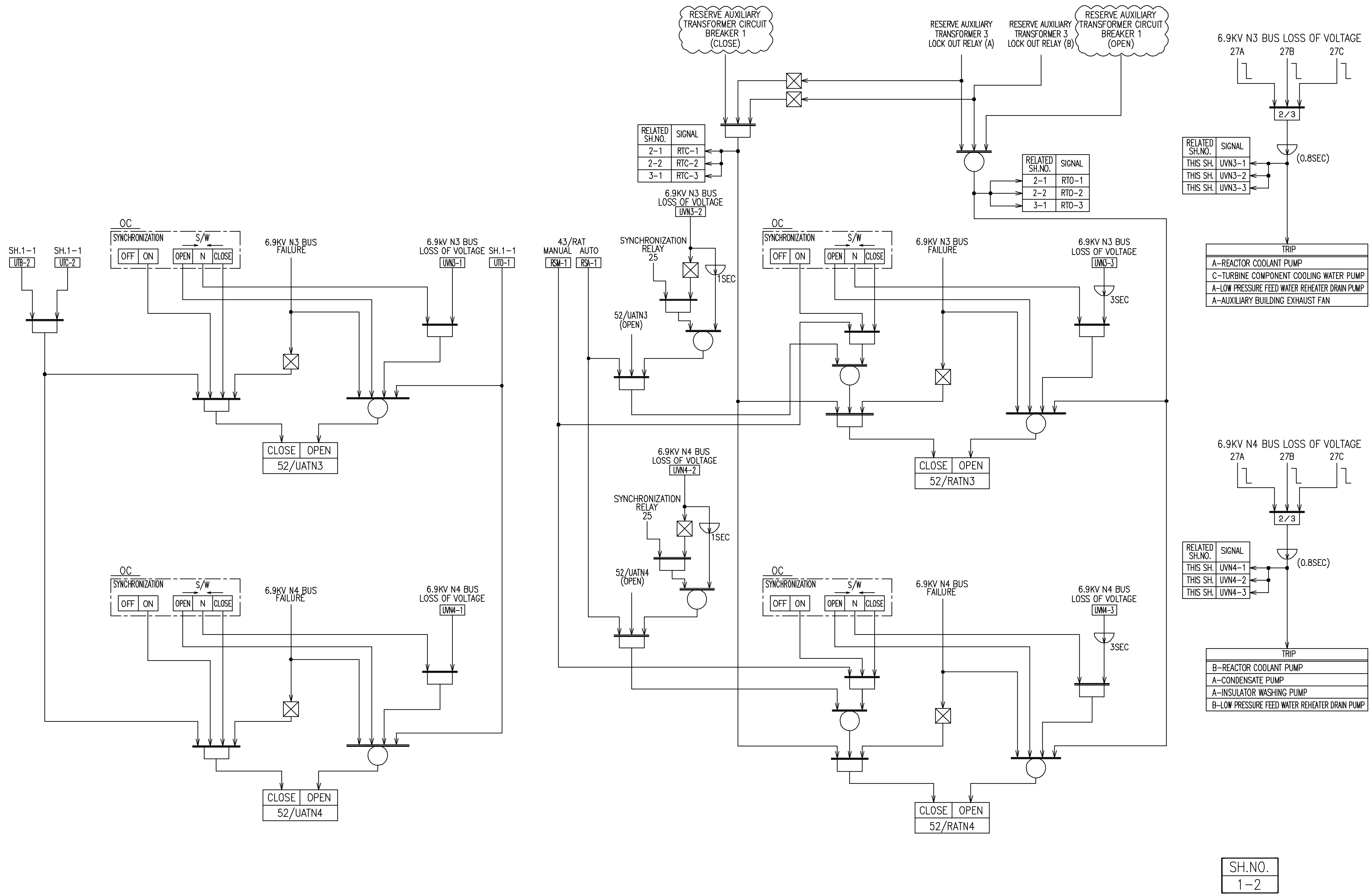
CP COL 8.2(3)

Figure 8.3.1-2R Logic Diagrams (Sheet 2 of 24)
One Line Diagram



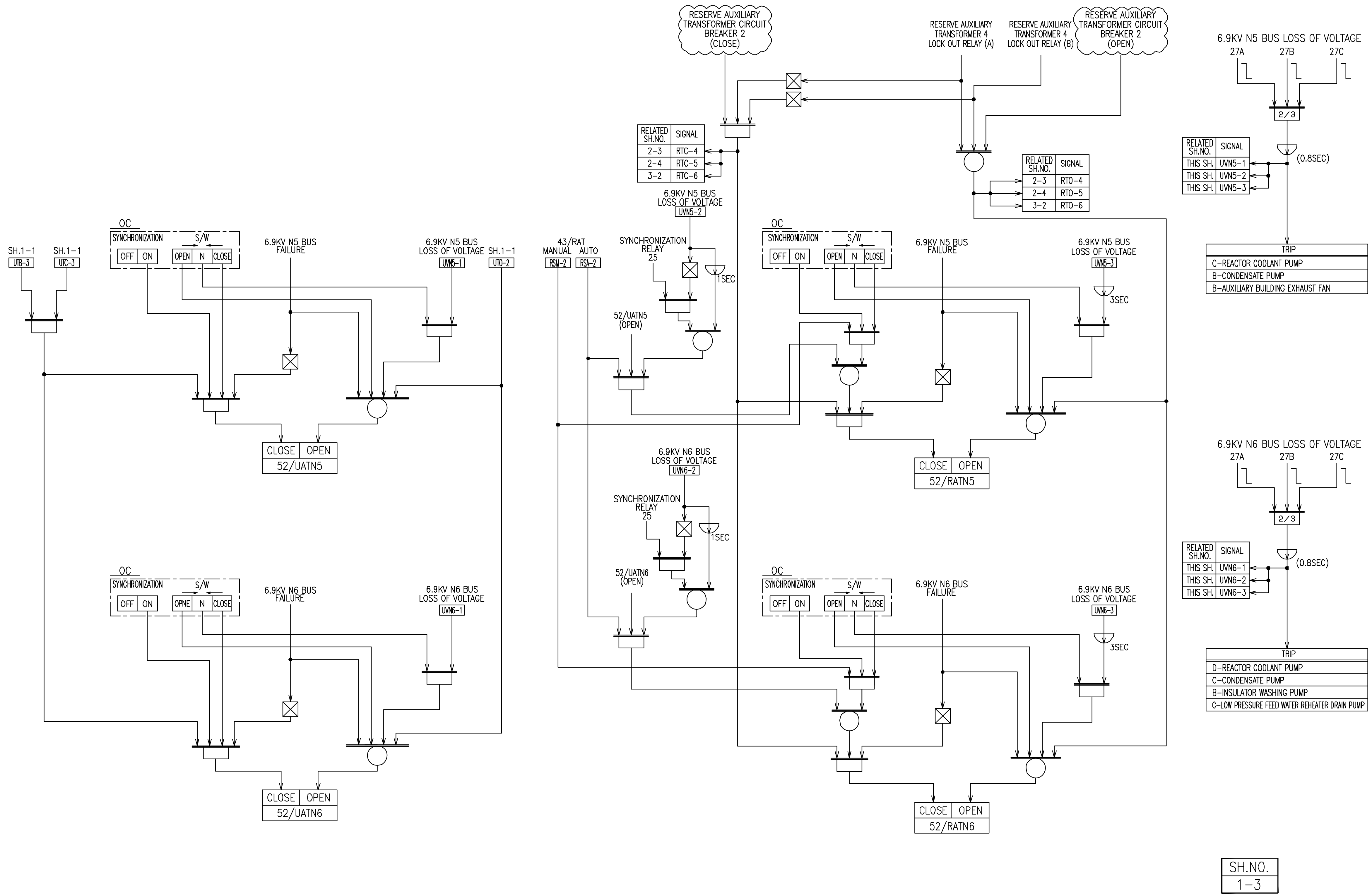
CP COL 8.2(3)

Figure 8.3.1-2R Logic Diagrams (Sheet 3 of 24)
Non-Class 1E 13.8kV Incoming Circuit Breaker Tripping and Closing



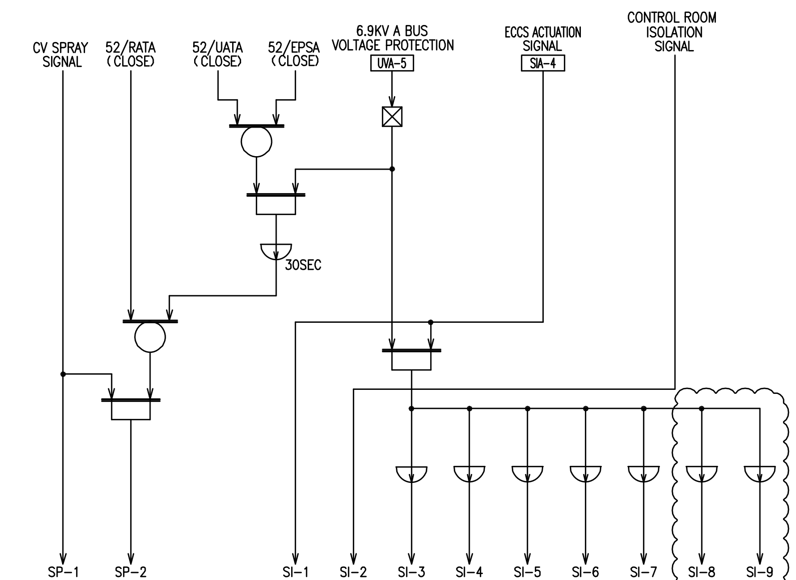
CP COL 8.2(3)

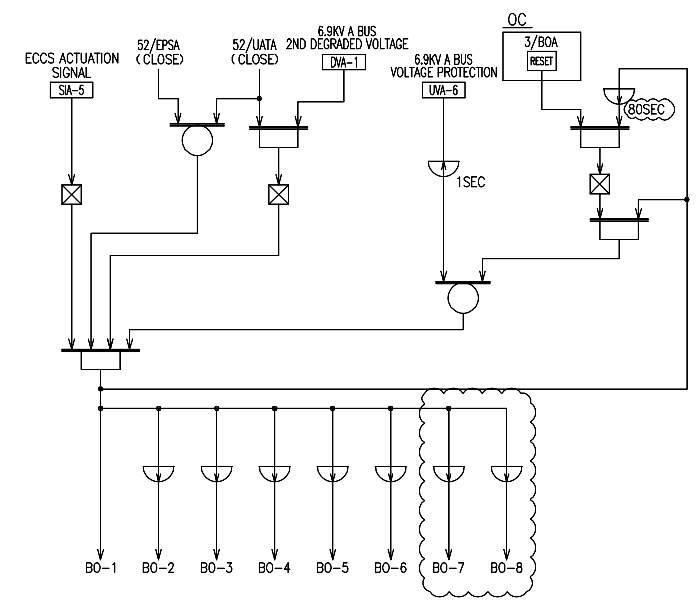
Figure 8.3.1-2R Logic Diagrams (Sheet 4 of 24)
Non-Class 1E 6.9kV Incoming Circuit Breaker (N3 & N4 buses) Tripping and Closing



CP COL 8.2(3)

Figure 8.3.1-2R Logic Diagrams (Sheet 5 of 24)
Non-Class 1E 6.9kV Incoming Circuit Breaker (N5 & N6 buses) Tripping and Closing





STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS	STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
SP-1	MOV OPERATED BY SP SIGNAL	MCC(A TRAIN)	—		SI-6	A-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V A-BUS	40SEC	(NOTE2)
SP-2	A-CONTAINMENT SPRAY / RESIDUAL HEAT REMOVAL PUMP	6.9KV A-BUS	30SEC		SI-7	A-ESSENTIAL CHILLER UNIT	6.9KV A-BUS	50SEC	
SI-1	MOV OPERATED BY SI SIGNAL MOTOR CONTROL CENTER EQUIPMENT	MCC(A TRAIN) MCC-A,A1	—	※1	SI-8	A-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V A-BUS	60SEC	
SI-2	MOTOR CONTROL CENTER EQUIPMENT	MCC-A,A1	—	※2	SI-9	A-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V A-BUS	70SEC	
SI-3	A-SAFETY INJECTION PUMP	6.9KV A-BUS	5SEC						
SI-4	A-COMPONENT COOLING WATER PUMP A-ESSENTIAL CHILLED WATER PUMP	6.9KV A-BUS MCC-A	10SEC						
SI-5	A-ESSENTIAL SERVICE WATER PUMP	6.9KV A-BUS	15SEC						

STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
BO-1	MOTOR CONTROL CENTER EQUIPMENT	MCC-A	—	※3
BO-2	A-CHARGING PUMP	6.9KV A-BUS	5SEC	
BO-3	A-COMPONENT COOLING WATER PUMP	6.9KV A-BUS	10SEC	
BO-4	A-ESSENTIAL SERVICE WATER PUMP A-ESSENTIAL CHILLED WATER PUMP	6.9KV A-BUS MCC-A	15SEC	
BO-5	A-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V A-BUS	30SEC	(NOTE2)
BO-6	A-ESSENTIAL CHILLER UNIT	6.9KV A-BUS	40SEC	
BO-7	A-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V A-BUS	50SEC	
BO-8	A-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V A-BUS	60SEC	

※ 1	REMARKS
A-ANNULUS EMERGENCY EXHAUST FILTRATION UNIT FAN	
A-ANNULUS EMERGENCY EXHAUST FILTRATION UNIT	
A-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
A-CLASS 1E BATTERY ROOM EXHAUST FAN	
A-EMERGENCY FEED WATER PUMP(T/D) AREA AIR HANDLING UNIT	(NOTE2)

※ 2	REMARKS
A-MAIN CONTROL ROOM AIR HANDLING UNIT	
A-MAIN CONTROL ROOM EMERGENCY FILTRATION UNIT	
A-MAIN CONTROL ROOM EMERGENCY FILTRATION UNIT FAN	

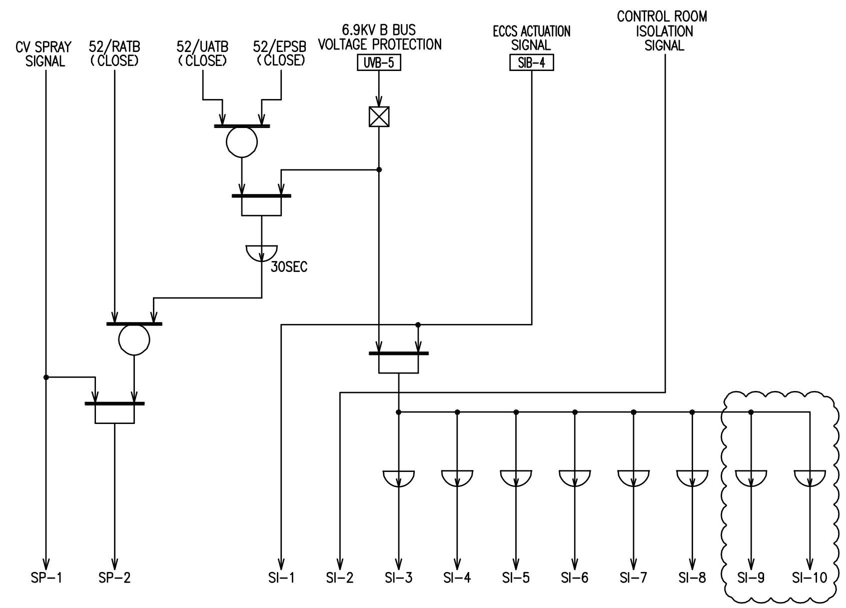
※ 3	REMARKS
A-MAIN CONTROL ROOM AIR HANDLING UNIT	(NOTE2)
A-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
A-CLASS 1E BATTERY ROOM EXHAUST FAN	
A-EMERGENCY FEED WATER PUMP(T/D) AREA AIR HANDLING UNIT	(NOTE2)

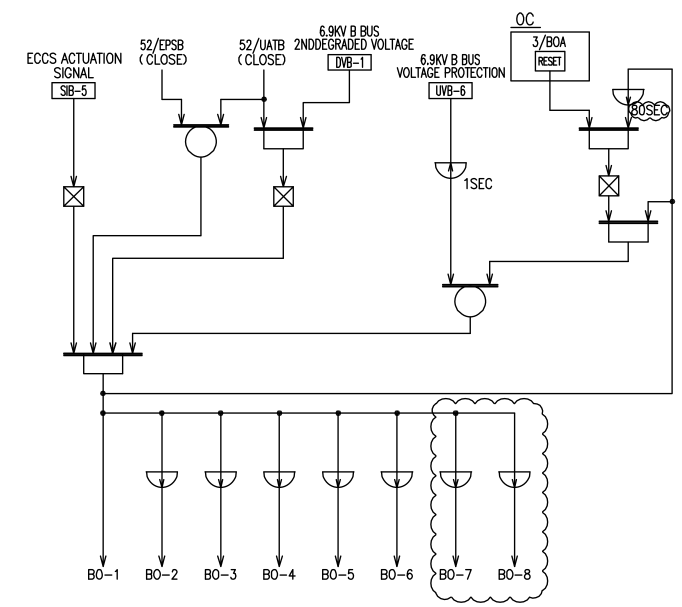
(NOTE1) TRAIN A
(NOTE2) HANDLING UNITS HAVE A FAN AND A REHEATING COIL. AFTER STARTING SIGNAL RECEIVING A FAN STARTS AND A REHEATING UNITS STARTS IF AREA TEMPERATURE MAKES SET VALUE.

SH.NO.
6-1

STDCOL 9.2(20)

Figure 8.3.1-2R Logic Diagrams (Sheet 18 of 24)
Class 1E Train A LOOP and LOCA Load Sequencing





STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
SP-1	MOV OPERATED BY SP SIGNAL	MCC(B TRAIN)	——	
SP-2	B-CONTAINMENT SPRAY / RESIDUAL HEAT REMOVAL PUMP	6.9KV B-BUS	30SEC	
SI-1	MOV OPERATED BY SI SIGNAL MOTOR CONTROL CENTER EQUIPMENT	MCC(B TRAIN) MCC-B,A1	——	※1
SI-2	MOTOR CONTROL CENTER EQUIPMENT	MCC-B,A1	——	※2
SI-3	B-SAFETY INJECTION PUMP	6.9KV B-BUS	5SEC	
SI-4	B-COMPONENT COOLING WATER PUMP B-ESSENTIAL CHILLED WATER PUMP	6.9KV B-BUS MCC-B	10SEC	
SI-5	B-ESSENTIAL SERVICE WATER PUMP	6.9KV B-BUS	15SEC	
SI-6	B-EMERGENCY FEED WATER PUMP	6.9KV B-BUS	20SEC	
SI-7	B-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V B-BUS	40SEC	(NOTE2)
SI-8	B-ESSENTIAL CHILLER UNIT	6.9KV B-BUS	50SEC	
SI-9	B-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V B-BUS	60SEC	
SI-10	B-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V B-BUS	70SEC	

STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
BO-1	MOTOR CONTROL CENTER EQUIPMENT	MCC-B	——	※3
BO-2	B-COMPONENT COOLING WATER PUMP	6.9KV B-BUS	10SEC	
BO-3	B-ESSENTIAL SERVICE WATER PUMP B-ESSENTIAL CHILLED WATER PUMP	6.9KV B-BUS MCC-B	15SEC	
BO-4	B-EMERGENCY FEED WATER PUMP	6.9KV B-BUS	20SEC	
BO-5	B-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V B-BUS	30SEC	(NOTE2)
BO-6	B-ESSENTIAL CHILLER UNIT	6.9KV B-BUS	40SEC	
BO-7	B-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V B-BUS	50SEC	
BO-8	B-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V B-BUS	60SEC	

※ 1	REMARKS
B-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
B-CLASS 1E BATTERY ROOM EXHAUST FAN	
B-EMERGENCY FEED WATER PUMP(M/D) AREA AIR HANDLING UNIT	(NOTE2)

※ 2	REMARKS
B-MAIN CONTROL ROOM AIR HANDLING UNIT	

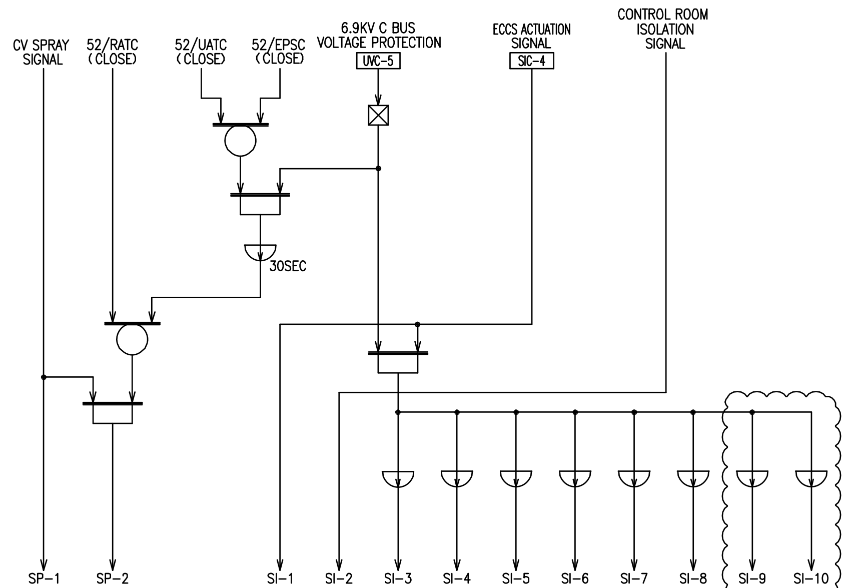
※ 3	REMARKS
B-MAIN CONTROL ROOM AIR HANDLING UNIT	(NOTE2)
B-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
B-CLASS 1E BATTERY ROOM EXHAUST FAN	
B-EMERGENCY FEED WATER PUMP(M/D) AREA AIR HANDLING UNIT	(NOTE2)

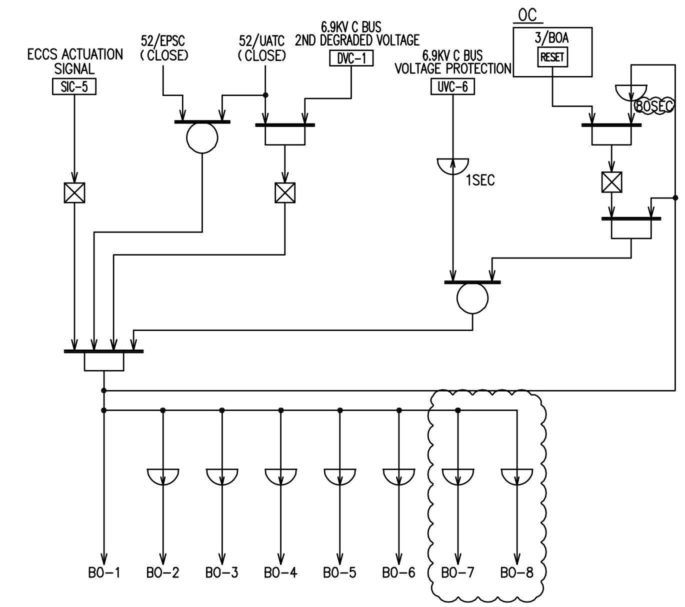
(NOTE1) TRAIN B
(NOTE2) HANDLING UNITS HAVE A FAN AND A REHEATING COIL. AFTER STARTING SIGNAL RECEIVING A FAN STARTS AND A REHEATING UNITS STARTS IF AREA TEMPERATURE MAKES SET VALUE.

SH.NO.
6-2

STD COL 9.2(20)

Figure 8.3.1-2R Logic Diagrams (Sheet 19 of 24)
Class 1E Train B LOOP and LOCA Load Sequencing





STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
SP-1	MOV OPERATED BY SP SIGNAL	MCC(C TRAIN)	—	
SP-2	C-CONTAINMENT SPRAY / RESIDUAL HEAT REMOVAL PUMP	6.9KV C-BUS	30SEC	
SI-1	MOV OPERATED BY SI SIGNAL MOTOR CONTROL CENTER EQUIPMENT	MCC(C TRAIN) MCC-C,D1	—	※1
SI-2	MOTOR CONTROL CENTER EQUIPMENT	MCC-C,D1	—	※2
SI-3	C-SAFETY INJECTION PUMP	6.9KV C-BUS	5SEC	
SI-4	C-COMPONENT COOLING WATER PUMP C-ESSENTIAL CHILLED WATER PUMP	6.9KV C-BUS MCC-C	10SEC	
SI-5	C-ESSENTIAL SERVICE WATER PUMP	6.9KV C-BUS	15SEC	

STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
SI-6	C-EMERGENCY FEED WATER PUMP	6.9KV C-BUS	20SEC	
SI-7	C-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V C-BUS	40SEC	(NOTE2)
SI-8	C-ESSENTIAL CHILLER UNIT	6.9KV C-BUS	50SEC	
SI-9	C-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V C-BUS	60SEC	
SI-10	C-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V C-BUS	70SEC	

STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
BO-1	MOTOR CONTROL CENTER EQUIPMENT	MCC-C	—	※3
BO-2	C-COMPONENT COOLING WATER PUMP	6.9KV C-BUS	10SEC	
BO-3	C-ESSENTIAL SERVICE WATER PUMP C-ESSENTIAL CHILLED WATER PUMP	6.9KV C-BUS MCC-C	15SEC	
BO-4	C-EMERGENCY FEED WATER PUMP	6.9KV C-BUS	20SEC	
BO-5	C-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V C-BUS	30SEC	(NOTE2)
BO-6	C-ESSENTIAL CHILLER UNIT	6.9KV C-BUS	40SEC	
BO-7	C-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V C-BUS	50SEC	
BO-8	C-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V C-BUS	60SEC	

※ 1	REMARKS
C-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
C-CLASS 1E BATTERY ROOM EXHAUST FAN	
C-EMERGENCY FEED WATER PUMP(M/D) AREA AIR HANDLING UNIT	(NOTE2)

※ 2	REMARKS
C-MAIN CONTROL ROOM AIR HANDLING UNIT	

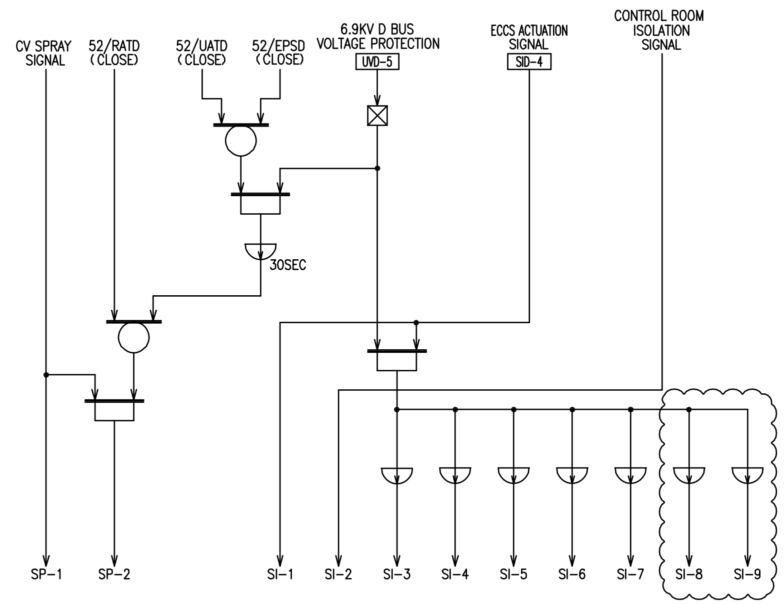
※ 3	REMARKS
C-MAIN CONTROL ROOM AIR HANDLING UNIT	(NOTE2)
C-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
C-CLASS 1E BATTERY ROOM EXHAUST FAN	
C-EMERGENCY FEED WATER PUMP(M/D) AREA AIR HANDLING UNIT	(NOTE2)

(NOTE1) TRAIN C
(NOTE2) HANDLING UNITS HAVE A FAN AND A REHEATING COIL. AFTER STARTING SIGNAL RECEIVING A FAN STARTS AND A REHEATING UNITS STARTS IF AREA TEMPERATURE MAKES SET VALUE.

SH.NO. 6-3

STD COL 9.2(20)

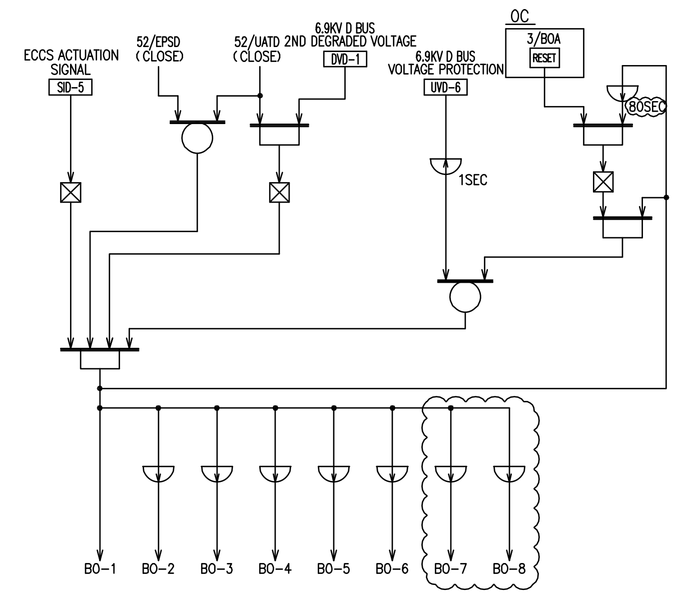
Figure 8.3.1-2R Logic Diagrams (Sheet 20 of 24)
Class 1E Train C LOOP and LOCA Load Sequencing



STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
SP-1	MOV OPERATED BY SP SIGNAL	MCC(D TRAIN)	—	
SP-2	D-CONTAINMENT SPRAY / RESIDUAL HEAT REMOVAL PUMP	6.9KV D-BUS	30SEC	
SI-1	MOV OPERATED BY SI SIGNAL MOTOR CONTROL CENTER EQUIPMENT	MCC(D TRAIN) MCC-D,D1	—	※1
SI-2	MOTOR CONTROL CENTER EQUIPMENT	MCC-D,D1	—	※2
SI-3	D-SAFETY INJECTION PUMP	6.9KV D-BUS	5SEC	
SI-4	D-COMPONENT COOLING WATER PUMP D-ESSENTIAL CHILLED WATER PUMP	6.9KV D-BUS MCC-D	10SEC	
SI-5	D-ESSENTIAL SERVICE WATER PUMP	6.9KV D-BUS	15SEC	
SI-6	D-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V D-BUS	40SEC	(NOTE2)
SI-7	D-ESSENTIAL CHILLER UNIT	6.9KV D-BUS	50SEC	
SI-8	D-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V D-BUS	60SEC	
SI-9	D-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V D-BUS	70SEC	

※ 1	REMARKS
B-ANNULUS EMERGENCY EXHAUST FILTRATION UNIT FAN	
B-ANNULUS EMERGENCY EXHAUST FILTRATION UNIT	
D-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
D-CLASS 1E BATTERY ROOM EXHAUST FAN	
D-EMERGENCY FEED WATER PUMP(T/D) AREA AIR HANDLING UNIT	(NOTE2)

※ 2	REMARKS
D-MAIN CONTROL ROOM AIR HANDLING UNIT	
D-MAIN CONTROL ROOM EMERGENCY FILTRATION UNIT	
D-MAIN CONTROL ROOM EMERGENCY FILTRATION UNIT FAN	



STEP NO.	NAME	CONNECTED BUS	TIMER SET VALUE	REMARKS
BO-1	MOTOR CONTROL CENTER EQUIPMENT	MCC-D	—	※3
BO-2	B-CHARGING PUMP	6.9KV D-BUS	5SEC	
BO-3	D-COMPONENT COOLING WATER PUMP	6.9KV D-BUS	10SEC	
BO-4	D-ESSENTIAL SERVICE WATER PUMP D-ESSENTIAL CHILLED WATER PUMP	6.9KV D-BUS MCC-D	15SEC	
BO-5	D-CLASS 1E ELECTRICAL ROOM AIR HANDLING UNIT	480V D-BUS	30SEC	(NOTE2)
BO-6	D-ESSENTIAL CHILLER UNIT	6.9KV D-BUS	40SEC	
BO-7	D-ESSENTIAL SERVICE WATER COOLING TOWER FAN 1	480V D-BUS	50SEC	
BO-8	D-ESSENTIAL SERVICE WATER COOLING TOWER FAN 2	480V D-BUS	60SEC	

※ 3	REMARKS
D-MAIN CONTROL ROOM AIR HANDLING UNIT	(NOTE2)
D-SAFEGUARD COMPONENT AREA AIR HANDLING UNIT	(NOTE2)
D-CLASS 1E BATTERY ROOM EXHAUST FAN	
D-EMERGENCY FEED WATER PUMP(T/D) AREA AIR HANDLING UNIT	(NOTE2)

(NOTE1) TRAIN D
(NOTE2) HANDLING UNITS HAVE A FAN AND A REHEATING COIL. AFTER STARTING SIGNAL RECEIVING A FAN STARTS AND A REHEATING UNITS STARTS IF AREA TEMPERATURE MAKES SET VALUE.

SH.NO.
6-4

STD COL 9.2(20

Figure 8.3.1-2R Logic Diagrams (Sheet 21 of 24)
Class 1E Train D LOOP and LOCA Load Sequencing

(SRI)

CP COL 8.3(2)

Figure 8.3.1-201 Ground Grid and Lightning Protection System

8.4 STATION BLACKOUT

This section of the referenced DCD is incorporated by reference with the following departures and/or supplements.

CP SUP 8.4(1) Add the following text after the tenth paragraph of DCD Subsection 8.4.2.2.

The procedures to cope with SBO are addressed in Section 13.5 and the training is addressed in Section 13.2. In particular, although not specifically referenced, SBO procedures are discussed in FSAR Subsection 13.5.2.1. This subsection addresses Operating and Emergency Operating Procedures as well as the Procedure Generation Package. The Station Blackout Response Guideline, the AC Power Restoration Guideline, and a Severe Weather Guideline are covered by the discussions in FSAR 13.5.2.1.