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SECTION 2

Project Description

The Stanton Energy Reliability Center (SERC) will be a nominal 98-megawatt (MW) natural gas-fired EGT plant consisting of two General Electric (GE) LM6000 PC natural gas-fired combustion turbine generators (CTGs) and related facilities, with integrated batteries for hybrid operation and clutch gear for synchronous condenser operation. EGT refers to the LM6000 PC Hybrid EGT jointly developed by General Electric International, Inc. and Wellhead Power Solutions (Wellhead). The EGT combines a combustion gas turbine with an integrated battery storage component operated by a proprietary software system. Project elements include the generation equipment, battery array, and connections to natural gas, municipal water supply, and the electrical grid. The SERC location, ownership, and project benefits are described in detail in Section 1, Introduction.

2.1 Generating Facility Description, Design, and Operation

SERC will be a hybrid generating facility consisting of two power blocks. Each power block will contain a single EGT and its ancillary equipment. SERC will interconnect to the grid at the Southern California Edison (SCE) Barre Substation through a generator tie-line. SERC will be designed and constructed in accordance with the design criteria provided in Appendix 2A in accordance with applicable laws, ordinances, regulations, and standards (LORS).

2.1.1 General Site Arrangement and Layout

Figure 2.1-1 is the SERC's general arrangement, and Figure 2.1-2 presents elevation drawings showing the project profile. The main access to the SERC site will be to Parcel 1 via Dale Avenue in Stanton, California. Secondary access will be to Parcel 2 at the corner of Pacific Street and Fern Avenue. A portion of the site will be surfaced to provide internal access to all project facilities and onsite buildings. The areas around equipment will have gravel surfacing where not paved or concreted.

2.1.2 Process Description

The generating facility will consist of two GE LM6000 PC CTGs equipped with selective catalytic reduction (SCR) and oxidation catalyst emissions control equipment, SPRay INTercooled (SPRINT) technology, and associated support equipment for oxides of nitrogen (NO_x) and carbon monoxide (CO) control. The SERC will have a nominal generation rating of 98 MW.

Each CTG will generate approximately 49 MW at full load under average annual ambient conditions. SERC is expected to have an overall annual availability of 92 to 98 percent, including scheduled and forced outages. The facility will be able to deliver power on demand (Pmin = 0).[1] This technology is extremely well suited for resource adequacy and voltage support tasks required in operating the modern grid that is becoming increasingly dependent on intermittent renewable resources.

Combustion air entering each CTG will be cooled using a fogging system. Each CTG will also have power augmentation using GE's SPRINT technology. SPRINT provides a spray of demineralized water into the air stream at the inlet of the CTG's low pressure compressor. As the demineralized water flows through the low pressure compressor, the heat of compression vaporizes the water spray, absorbing heat as it cools and compresses (makes denser) the air flow, allowing for increased mass flow and subsequently more power production.

[1] Pmin refers to minimum stable generation or the lower limit (MW) of stable combustion turbine generation.

The SERC heat and mass balance diagram is shown on Figure 2.1-3. This balance is based on an ambient dry bulb temperature of 65 and 102.7 degrees Fahrenheit (°F) (annual average and mean extreme maximum, per American Society of Heating, Refrigerating, and Air-Conditioning Engineers, Inc. [ASHRAE]) and relative humidity (RH) of 72 and 17 percent, respectively (based on mean coincident wet bulb temperatures for the annual average and mean extreme maximum ASHRAE dry bulb temperatures). Actual net output of the system will vary in response to ambient air temperature conditions, generator power factor, firing conditions of the combustion turbine, and other operating factors. Operational modes will be driven by good operating practices, market conditions, and dispatch requirements.

The emissions of each CTG are stabilized at permitted levels within 15 minutes of startup. Hot flue gas exits the CTGs and enters the emissions control equipment. The proposed emissions limits will be met using (1) Best Available Control Technology (BACT), which includes the use of water injection and an SCR system that uses aqueous ammonia, to limit the emissions of NO_x, and (2) an oxidation catalyst that will control the emissions of CO and volatile organic compounds (VOCs). Emissions will be monitored by a continuous emissions monitoring system (CEMS) before exiting the stack. Emissions of particulate matter and sulfur dioxide will be controlled by the exclusive use of pipeline quality natural gas and inlet air filtration.

As a reliability plant, the SERC is expected to operate during periods of increased need on the grid such as times of high electrical load, during periods when intermittent renewable source generation fluctuates, when baseload plants are not operating or being brought online, or during emergency conditions and local reliability needs.

2.1.3 Integrated Energy Storage

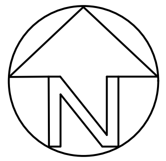
Two 10 MW/5 MWh lithium-ion battery energy storage system will be installed at the SERC site. The system can be operated in conjunction with the thermal power plant using the proprietary EGT Hybrid technology, jointly developed by Wellhead and GE. The storage system will consist of three main components: batteries, inverters, and Balance of Plant (BOP) (e.g., step-up transformers and site controller). Each set of batteries will be installed in a purpose built battery enclosure to meet fire protection requirements and provide secondary containment. SERC, LLC expects the energy storage system to enable the EGT to be used for greenhouse gas (GHG)-free operating reserve, regulation up and regulation down, frequency regulation, and voltage regulation.

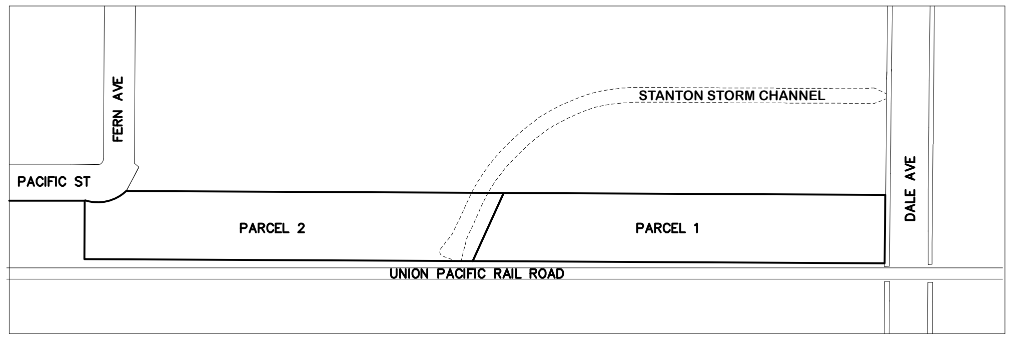
2.1.4 Generating Facility Cycle

In the CTGs, combustion air flows through the filters and associated air inlet ductwork, and then is compressed in the gas turbine compressor section, before flowing to the LM6000 PC single annular combustor. Natural gas is injected along with the compressed air into the combustor and is then ignited. The hot combustion gases expand through the power turbine section of the CTG, causing the shaft to rotate and drive the electric generator and CTG compressor.

2.1.5 Combustion Turbine Generators

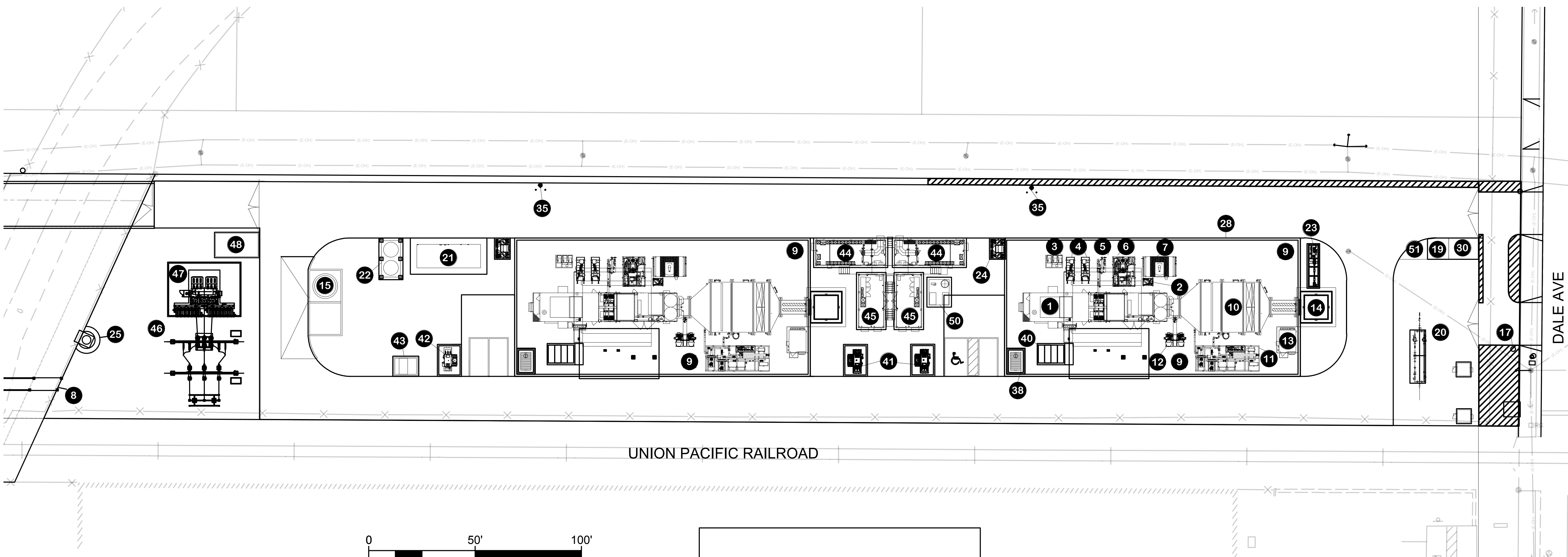
Thermal energy is produced in each CTG through the combustion of natural gas, which is converted into the mechanical energy required to drive the combustion turbine compressors and electric generators. The GE LM6000 PC CTG is a two-shaft/two-spool engine consisting of a low-pressure compressor, a high-pressure compressor, a high-pressure turbine, and a low-pressure turbine. The engine is shock-mounted and connected to a two-pole, air-cooled generator operating at 13.8 kilovolts (kV) and 60 hertz (Hz).





KEYNOTES:

1. GAS TURBINE/GENERATOR
2. SPRINT SKID
3. FOGGER SKID
4. WATER INJECTION PUMPS
5. CLUTCH LUBE OIL SKID
6. HYDRAULIC START SKID
7. FIN–FAN L.O. COOLER
8. UTILITY BRIDGE
9. PORTABLE HAZMAT STORAGE CART
10. SCR/CO UNIT
11. AMMONIA INJECTION SKID
12. PURGE AIR FANS
13. CEMS ENCLOSURE
14. EXHAUST STACK
15. AMMONIA STORAGE TANK & PUMPS
16. WAREHOUSE
17. STEEL POLE MOUNTED DISCONNECT
18. PORTABLE HAZARDOUS MATERIALS & STORAGE
19. TRASH ENCLOSURE
20. GAS MSA YARD (SCG)
21. FUEL GAS COMPRESSOR (FGC)
22. FGC L.O. FIN–FAN COOLER
23. GAS EMERGENCY SHUT–DOWN VALVE
24. FUEL GAS FILTER SKID
25. PARCEL 1 STORMWATER LIFT STATION
26. INVERTER (PCS)
27. ISOLATION TRANSFORMER
28. GT FACILITY ENCLOSURE
29. BATTERY ENERGY STORAGE SYSTEM
30. BACKFLOW PREVENTER
31. WATER FORWARDING SKID
32. DEMINERALIZED WATER SKID
33. REVERSE OSMOSIS SKID
34. DEMINERALIZED WATER TANK
35. FIRE HYDRANT
36. STORMWATER DETENTION TANK
37. FOGGING WATER DRAIN TANK
38. OILY WATER WASTE TANK
39. PARCEL 2 STORMWATER COLLECTION
40. SWITCHGEAR (15KV)
41. AUX TRANSFORMER (480V)
42. AUX TRANSFORMER (4160V)
43. SWITCHGEAR (4160V)
44. POWER DISTRIBUTION MODULE
45. CONTROL MODULE
46. SWITCHYARD
47. GSU TRANSFORMER
48. SWITCHYARD CONTROL
49. BESS SWITCH GEAR
50. AIR COMPRESSOR SKID
51. FIRE ALARM ANNUNCIATOR PANEL

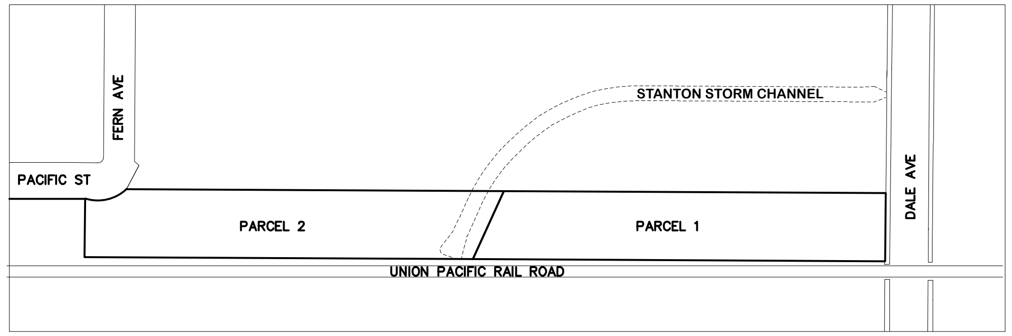


0 50' 100'

SCALE

PRELIMINARY

Figure 2.1-1a
General Arrangement - Parcel 1
Stanton Energy Reliability Center AFC
Stanton, California



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10. SCR/CO UNIT
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12. PURGE AIR FANS
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14. EXHAUST STACK
15. AMMONIA STORAGE TANK & PUMPS
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21. FUEL GAS COMPRESSOR (FGC)
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39. PARCEL 2 STORMWATER COLLECTION
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42. AUX TRANSFORMER (4160V)
43. SWITCHGEAR (4160V)
44. POWER DISTRIBUTION MODULE
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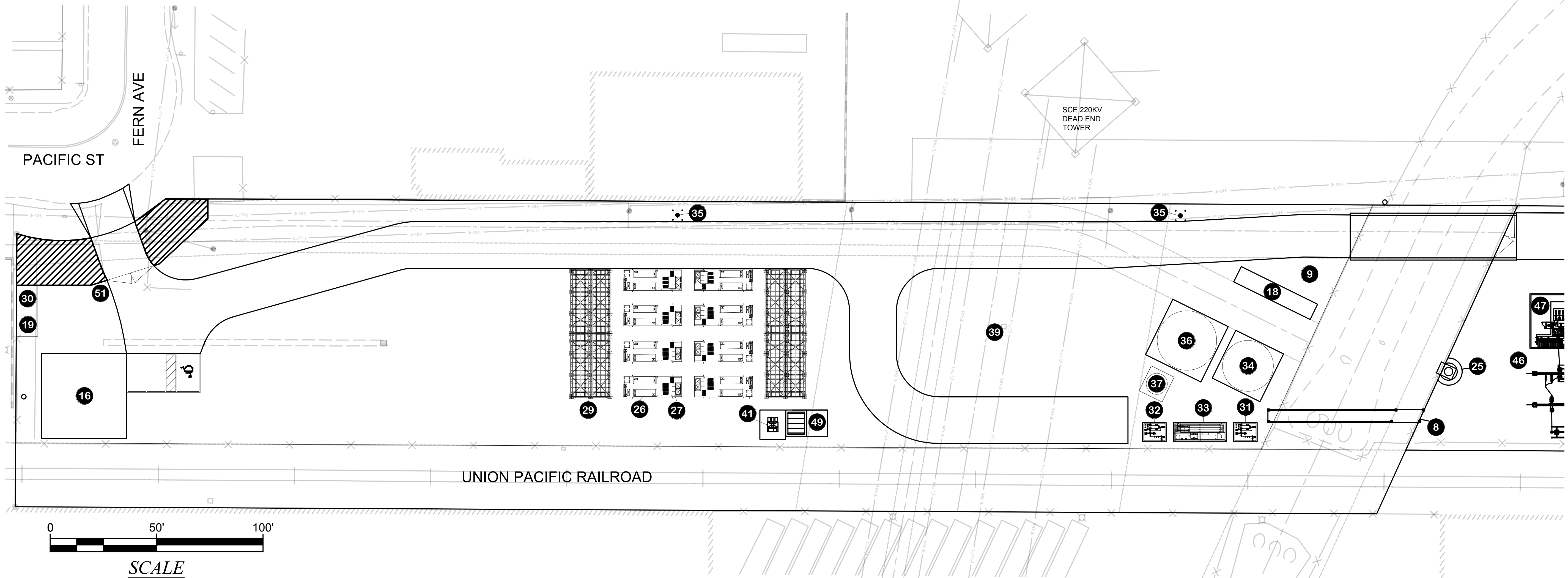
46. SWITCHYARD
47. GSU TRANSFORMER
48. SWITCHYARD CONTROL
49. BESS SWITCH GEAR
50. AIR COMPRESSOR SKID
51. FIRE ALARM ANNUNCIATOR PANEL



PRELIMINARY

Figure 2.1-1b
General Arrangement - Parcel 2
Stanton Energy Reliability Center AFC
Stanton, California

ch2m

KEYNOTES:

1 GAS TURBINE/GENERATOR
2 SPRINT SKID
3 FOGGER SKID
4 WATER INJECTION PUMPS
5 CLUTCH LUBE OIL SKID
6 HYDRAULIC START SKID
7 FIN-FAN L.O. COOLER
8 UTILITY BRIDGE
9 PORTABLE HAZMAT STORAGE CART
10 SCR/CO UNIT
11 AMMONIA INJECTION SKID
12 PURGE AIR FANS
13 CEMS ENCLOSURE
14 EXHAUST STACK
15 AMMONIA STORAGE TANK & PUMPS
16 WAREHOUSE
17 STEEL POLE MOUNTED DISCONNECT
18 PORTABLE HAZARDOUS MATERIALS & STORAGE
19 TRASH ENCLOSURE
20 GAS MSA YARD (SCG)
21 FUEL GAS COMPRESSOR (FGC)
22 FGC L.O. FIN-FAN COOLER
23 GAS EMERGENCY SHUT-DOWN VALVE
24 FUEL GAS FILTER SKID
25 PARCEL 1 STORMWATER LIFT STATION
26 INVERTER (PCS)
27 ISOLATION TRANSFORMER
28 GT FACILITY ENCLOSURE
29 BATTERY ENERGY STORAGE SYSTEM
30 BACKFLOW PREVENTER
31 WATER FORWARDING SKID
32 DEMINERALIZED WATER SKID
33 REVERSE OSMOSIS SKID
34 DEMINERALIZED WATER TANK
35 FIRE HYDRANT
36 STORMWATER DETENTION TANK
37 FOGGING WATER DRAIN TANK
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39 PARCEL 2 STORMWATER COLLECTION
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42 AUX TRANSFORMER (4160V)
43 SWITCHGEAR (4160V)
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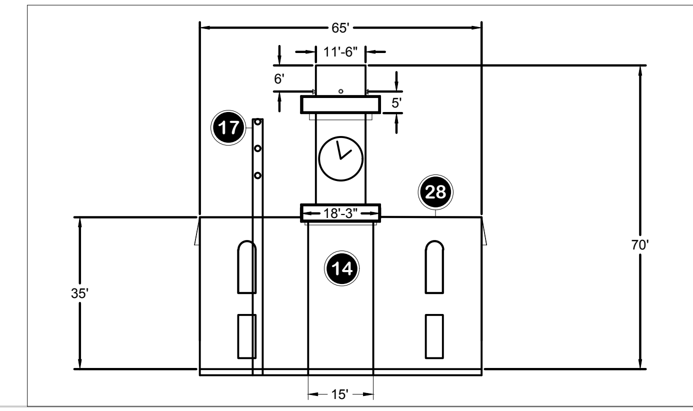
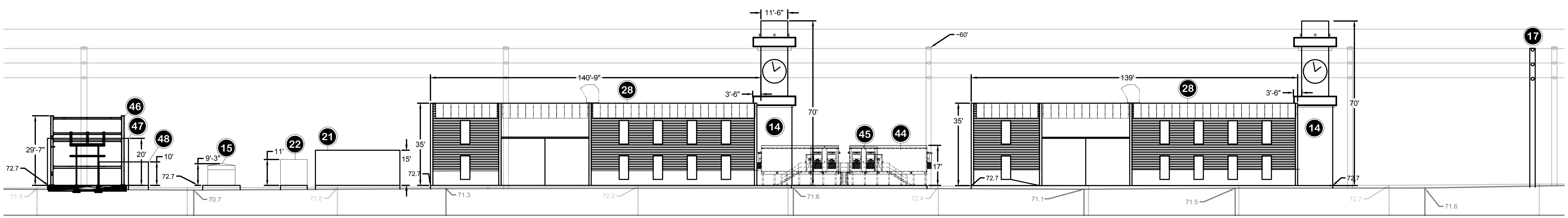
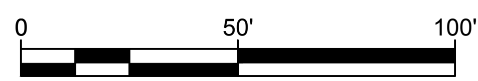
45 CONTROL MODULE
46 SWITCHYARD
47 GSU TRANSFORMER
48 SWITCHYARD CONTROL
49 BESS SWITCH GEAR
50 AIR COMPRESSOR SKID
51 FIRE ALARM ANNUNCIATOR PANEL

EAST END VIEW





SOUTH SIDE VIEW



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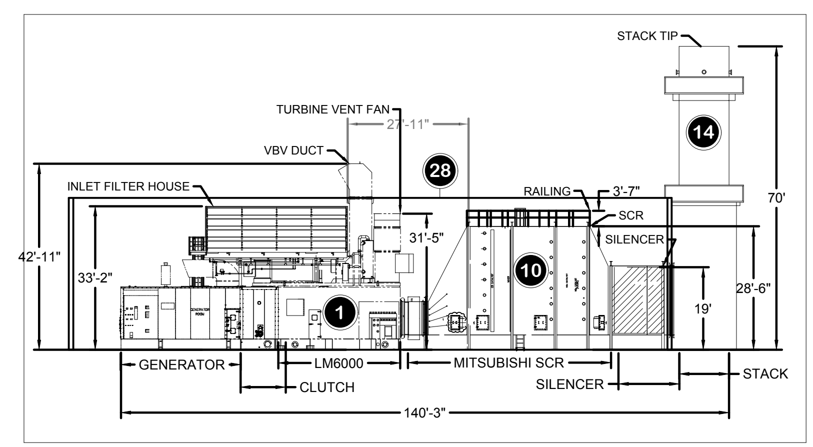

LM6000 EQUIPMENT VIEW

PRELIMINARY

Figure 2.1-2a
Elevations - Parcel 1
Stanton Energy Reliability Center AFC
Stanton, California

KEYNOTES:

1 GAS TURBINE/GENERATOR
2 SPRINT SKID
3 FOGGER SKID
4 WATER INJECTION PUMPS
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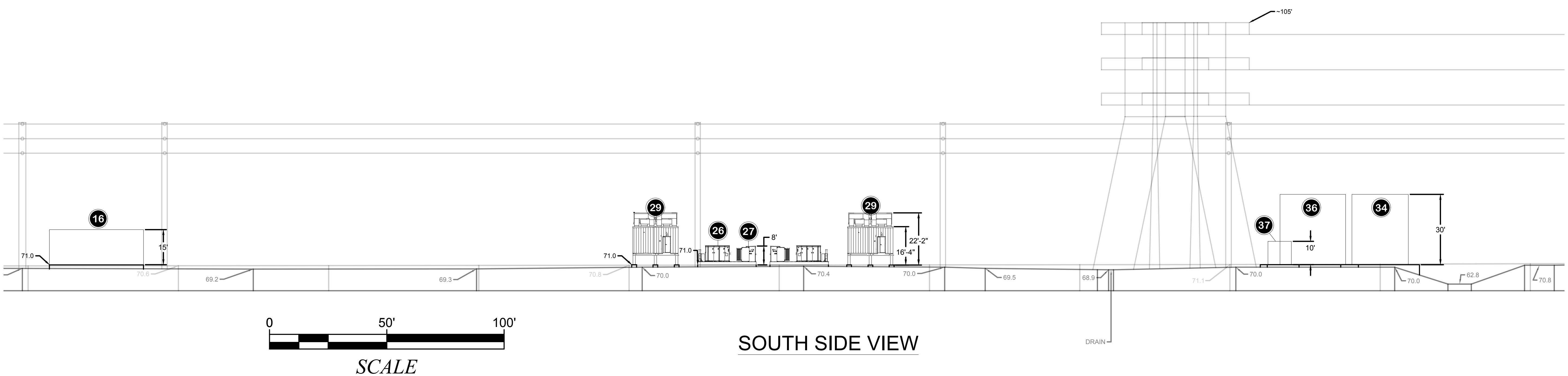

SOUTH SIDE VIEW

PRELIMINARY

Figure 2.1-2b
Elevations - Parcel 2
Stanton Energy Reliability Center AFC
Stanton, California

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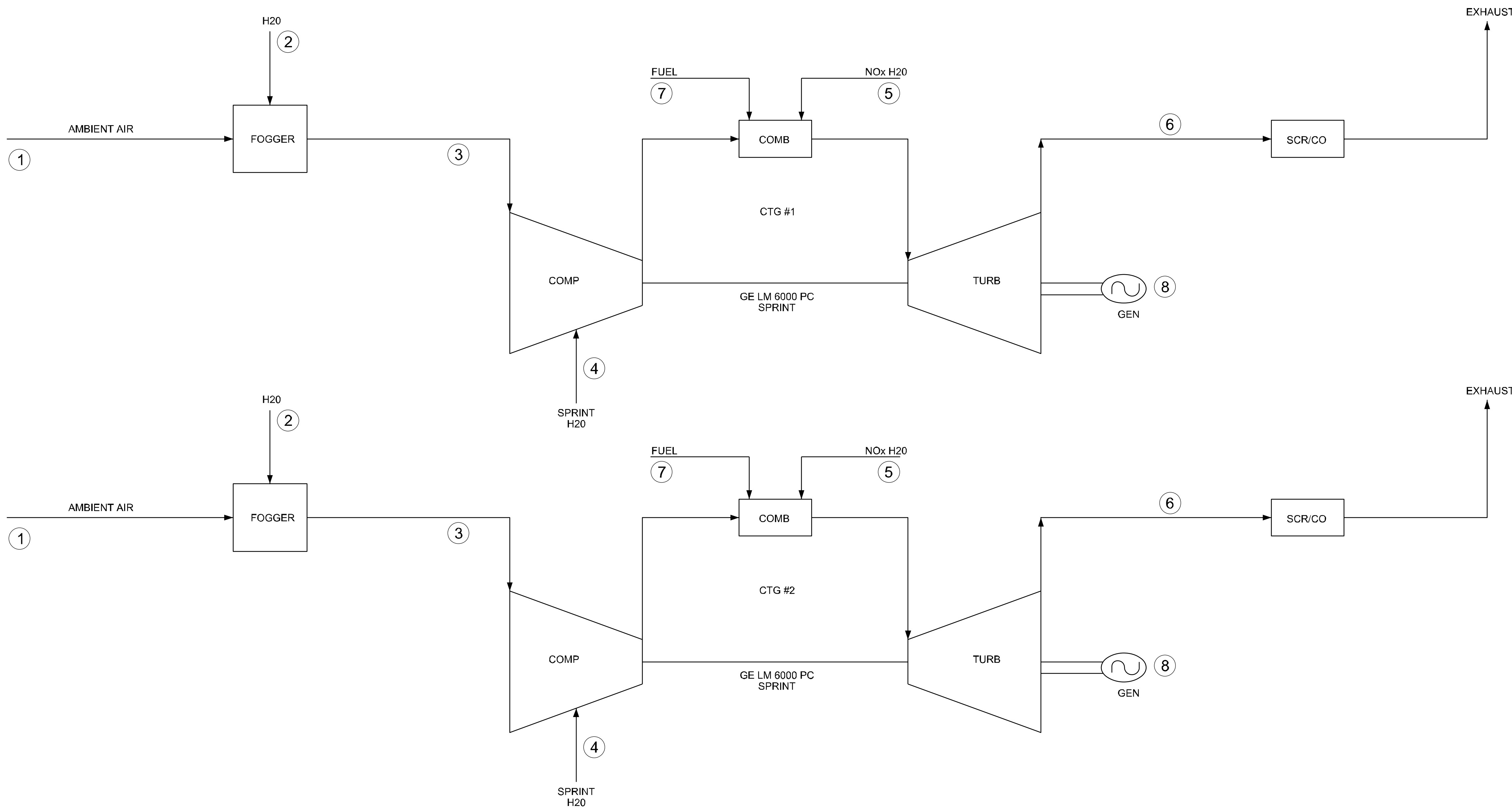


Stanton Energy Reliability Center					
Heat Balance Summary					
Stream No	Description	Units	Case 1 Summer High Amb	Case 2 Annual Avg Amb	Case 3 Winter Low Amb
1	Ambient Air	deg F / RH%	102.7 / 17	65 / 72	40 / 71.4
2	Fogging Water Supply	pph	7,560	1,365	0
3	Compressor Inlet	deg F / RH%	69.1 / 100	59.3 / 100	40 / 71.4
4	SPRINT Water Supply	pph	9,323	9,571	3,792
5	NOx Water Supply	pph	16,699	18,324	23,557
6	Turbine Exhaust	kpph / deg F	1,022.4 / 863.5	1,050.4 / 856.4	1,090.8 / 845.2
7	CTG Fuel Supply	Mbtuh (HHV)	453.8	469.2	485.0
8	CTG Gross Power Output	kW	47,252	49,058	51,049
	Summary:				
	Total Plant Fuel	Mbtuh (HHV)	907.5	938.4	969.9
	Total CTG Gross Output	kW	94,504	98,116	102,098
	Plant Aux Elect Load	kW	2,722	2,771	2,824
	Plant Net Power Output	**kW**	**91,782**	**95,345**	**99,274**
	Plant Net Heat Rate	**BTU/kWhr (HHV)**	**9,888**	**9,842**	**9,770**
	Plant Efficiency	**% (HHV)**	**34.5**	**34.7**	**34.9**

Figure 2.1-3
Heat and Mass Balance Diagram
Stanton Energy Reliability Center AFC
Stanton, California

Each CTG system consists of a stationary CTG, supporting systems, and associated auxiliary equipment. The CTGs will be equipped with the following required accessories to provide safe and reliable operation:

- Air inlet system complete with a modular filtration system
- Inlet air fogging system
- Weatherproof acoustic enclosures with explosion-proof lighting
- Fuel system, including an electronically controlled fuel metering valve
- Two lube oil systems: one synthetic for the gas turbine and one mineral for the generator/clutch assembly
- Stainless steel lube oil reservoirs, valve trim, and piping
- Lube oil cooling provided by an air-cooled fin-fan cooler
- Electro-hydraulic start system
- 24-volt direct current (DC) battery system
- Generator protective relays
- Water injection for NO_x control
- Compressor wash system
- Fire detection and protection system
- Turbine/generator base plate

2.1.6 Major Electrical Equipment and Systems

The electric power generated by the SERC will be transmitted to the electrical grid, with the exception of the power required for onsite auxiliaries such as pumps, fans, gas compressors, and other parasitic loads. Transmission and auxiliary uses are discussed in the following subsections.

2.1.6.1 Alternating Current Power—Transmission

Power will be generated by the two EGTs at 13.8 kV and then will be stepped up using a single 13.8/66-kV, oil-filled generator step-up transformer to support connection to the local 66-kV network at the Barre Substation. Surge arrestors protect the transformer from surges in the 66-kV system caused by lightning strikes or other system disturbances.

The transformer will be set on a concrete foundation that includes a secondary oil containment reservoir to contain the transformer oil in the event of a leak or spill. The high-voltage side of the generator step-up transformer will be connected to a single-circuit, three-phase, 66-kV line, which will be connected to the SCE 66-kV switchyard at the Barre Substation east of the SERC site via an approximately 0.35-mile underground generator tie-line.

A detailed discussion of the electric transmission system is provided in Section 3, Electric Transmission.

2.1.6.2 Alternating Current Power—Distribution to Auxiliaries

Auxiliary power for each EGT will be supplied through a 15-kV rated switchgear lineup at 13,800 volts, and then to a single 13.8/4.16-kV auxiliary transformer for gas compression that supports both EGTs and individual unit 13.8kV/480 V station service transformers for the supply of primary power to the 480-volt switchgear and the corresponding 480-volt motor control center (MCC). The 15-kV switchgear lineup will be on the low-voltage side of one of the single generator step-up transformers. This interface point allows the switchgear to be back-fed from the local grid when the CTGs are not running, or directly from the CTGs when they are in operation. Each CTG will have a 15-kV rated breaker between the generator and the generator step-up transformer for generator synchronization and isolation.

The 4,160-volt switchgear/MCC lineup supplies power for gas compression. Each 13.8 kV/480-volt station service transformer will be oil-filled and sized to supply 480-volt, three-phase power to the plant 480-volt MCCs. The MCCs will provide power to the 480-volt motor loads as well as to other low-voltage plant loads.

2.1.6.3 125-Volt DC Power Supply System

Each EGT will have its own 125-volt DC power supply system for control power and control computers on uninterruptible power sources, consisting of one 100-percent-capacity battery bank, two 100-percent static battery chargers, and a switchboard; and two or more distribution panels will be supplied for the BOP and essential CTG equipment.

Under normal operating conditions, the battery chargers supply DC power to the DC loads. The battery chargers are fed by 480-volt alternating current (VAC) and continuously charge the battery banks while supplying power to the DC loads.

Under abnormal or emergency conditions, when power from the alternating current (AC) power supply (480-volt) system is unavailable, the batteries supply DC power to the DC system loads. Recharging of a discharged battery occurs whenever 480-volt power becomes available from the AC power supply system. The rate of charge depends on the characteristics of the battery, battery charger, and the connected DC load during charging. The anticipated maximum recharge time will be 12 hours.

The 125-volt DC system will also be used to provide control power to the 13.8-kV switchgear, the 4,160-volt switchgear, the 480-volt load centers, critical control circuits, the plant control system, and the emergency DC motors.

2.1.6.4 Uninterruptible Power Supply System

The CTGs and power block will have an essential-service 120-VAC, single-phase, 60-Hz uninterruptible power supply (UPS) supplying power to essential instrumentation, critical equipment loads, and unit protection and safety systems that require uninterrupted AC power.

Redundant UPS inverters will supply 120-VAC, single-phase power to the UPS panel boards that supply critical AC loads. The UPS inverters will be fed from the SERC’s 125-volt DC power supply system. Each UPS system will consist of one full-capacity inverter, a static transfer switch, a manual bypass switch, an alternate source transformer, and two or more panelboards.

The normal source of power to the SERC system will be from the 125-volt DC power supply system through the inverter to the panelboard. A solid-state static transfer switch will continuously monitor both the inverter output and the alternate AC source. The transfer switch will automatically transfer essential AC loads without interruption from the inverter output to the alternate source upon loss of the inverter output.

A manual bypass switch will also be included to enable isolation of the inverter for testing and maintenance without interruption to the essential service AC loads.

The supervisory control system (SCS) operator stations will be supplied from the UPS. The CEMS equipment, SCS controllers, and input/output (I/O) modules will be fed using either UPS or 125-volt DC power directly.

2.1.7 Fuel System

The CTGs will be designed to burn only natural gas. The natural gas requirement during full load operation at annual average ambient temperature is approximately 938.4 million British thermal units per hour (MMBtu/hr) (higher heat value [HHV] basis, total for two CTG units).

Natural gas will be delivered to the SERC via one of the following: (1) a 2.75-mile-long pipeline extending north along Dale Avenue to La Palma Avenue, or (2) a 1.78-mile-long pipeline running south along Dale Avenue to Lampson Avenue. At SERC, the natural gas will flow through either a 12-inch- or 16-inch pipeline, turbine-meter set, gas scrubber/filtering equipment, a gas pressure control station, electric-driven booster compressors, and coalescing and final fuel filters prior to entering the combustion turbines.

A minimum floating delivery pressure of 300 pounds per square inch gauge, as measured downstream of a nonregulated meter set, is expected from Southern California Gas Company (SoCalGas). One 100-percent-capacity, electric-driven fuel gas compressor will be provided to boost the pressure to that required by the CTGs. The gas compressor will be located outdoors and will be housed in an acoustical enclosure to reduce the compressor noise level.

2.1.8 Inlet Air Fogging System

Combustion air for each CTG will be cooled via the use of a fogging-based system. Fogging systems are based upon the extremely high pressurization of demineralized water being forced through nozzles to create a fine mist or fog. The fogging system will cool the inlet air to the wet bulb temperature of the inlet air. The fogging system will be in service only when the CTGs are at or near full load, and will not be placed in service for ambient dry bulb conditions below 50°F.

2.1.9 Water Supply and Use

Figures 2.1-4a, 2.1-4b, and 2.1-4c are water balance diagrams showing three different operating conditions. These include average operation with two CTGs operating at 100 percent load under hot (102.7°F/17 percent RH), average (65°F/72 percent RH), and cold (40°F/71.4 percent RH) ambient conditions, respectively.

SERC will use water supplied by Golden State Water Company via water supply pipelines located in Dale Avenue and/or Pacific Street. This source will also provide water for fire protection and service water, potable outlets, and safety showers. Appendix 2B is a will-serve letter from Golden State Water Company.

A detailed description of the water supply system, treatment, and permits is provided below and in Section 5.15, Water Resources.

2.1.9.1 Water and Wastewater Requirements

The SERC will use demineralized potable water for inlet air cooling, NO_x control, and power augmentation for the gas turbines. Under the peak operating scenario of 1,076 hours per year at full load, the SERC will use approximately 34 acre-feet of water per year for all plant uses. Simple-cycle peakers in California larger than 50 MW generally average a 5 percent capacity factor, so the actual water use for SERC is anticipated to be less. A breakdown of the estimated average daily quantity of water required for operation of the SERC is presented in Table 2.1-1.

Table 2.1-1. Estimated Daily, Annual, and Peak Water Use and Wastewater Discharge for SERC Operations

Estimated Daily Water Use and Wastewater Discharge	Hot Ambient Conditions (102.7°F)	Average Ambient Conditions (65°F)	Cold Ambient Conditions (40°F)
Average Daily Potable Water Use, gpm	186.0	162.1	151.9
Average Daily Wastewater Discharge to Sewer, gpm	51.6	45.0	42.2
Annual Water Use and Wastewater Discharge	**Potable Water**		**Wastewater Discharge**
Maximum Annual [a]	34.0		3.1
Expected Annual [b]	13.4		1.2

Table 2.1-1. Estimated Daily, Annual, and Peak Water Use and Wastewater Discharge for SERC Operations

Peak Instantaneous Water Use and Wastewater Discharge	Potable Water	Wastewater Discharge
Peak Instantaneous, gpm	261 [c]	52

[a] Maximum annual operating scenario is based on a total of 1,076 operating hours (highest operating hours scenario used for air quality permitting) with a conservative assumption of all operating hours at 100% load with 50% of the hours at hot ambient conditions, 25% at average ambient conditions, and 25% at cold ambient conditions.

[b] Expected annual operating scenario is based on a total of 438 operating hours (5% capacity factor at 100% load) with the hours equally distributed between hot ambient, average ambient, and cold ambient conditions.

[c] Instantaneous maximum value which includes maximum use from water balances plus 30 gpm for landscape irrigation (representing the flow from a 1-inch irrigation valve), 25 gpm for service water (representing the flow from a 3/4-inch hose), and 20 gpm for potable water (representing the flow from a single safety shower).

Note:

gpm = gallon(s) per minute

The daily water requirements shown are estimated quantities based on the facility operating at full load. Water requirements shown in Table 2.1-1 are based on ambient conditions of 102.7°F/17 percent RH, 65°F/72 percent RH, and 40°F/71.4 percent RH representing hot, average, and cold ambient conditions, respectively.

2.1.9.2 Water Quality

Section 5.15, Water Resources, includes a projection of the water quality based on available testing data from Golden State Water Company.

2.1.9.3 Water Treatment

Water from the Golden State Water Company will be used for makeup to the plant demineralized water system, fire protection, potable demands, and general (nonpotable) needs such as landscaping and hose bibs (e.g., equipment and surface washdown).

Reverse osmosis (RO) equipment and rental demineralizer equipment, including trailers or portable demineralizer skids, will demineralize the raw water and supply it as demineralized water to the plant. The high-quality demineralized water will be used for the combustion turbine inlet air fogging, SPRINT power augmentation, water injection for NO_x reduction, and online water wash of the combustion turbine compressor section. Table 2.1-2 presents the purity requirements for the demineralized water.

Table 2.1-2. LM6000 PC Demineralized Water Purity Requirements

Parameter	Units of Measure	Value
Total Solids	ppm	5.0
TDS	ppm of TDS	3.0
Silica	mg/L as SiO_2	0.1
Conductivity at 25 degrees Celsius*	micromho/centimeter	0.1
pH*	Standard Unit	6.5 – 7.5
Chloride	mg/L as Chlorine	0.5
Sulfate	mg/L as SO_4^{2-}	0.5

* Measured in the absence of CO_2
CO2 = carbon dioxide
mg/L = milligram(s) per liter
ppm = part(s) per million
micromho/centimeter = microsiemen(s)/centimeter
SiO_2 = silicon dioxide
SO_4 = sulfate
TDS = total dissolved solids

Notes:
1. All flow rates are in gallons/minute unless otherwise noted.
2. Fire protection and potable water flow rates shown are for normal operation. Maximum instantaneous demands will be greater.
3. Landscape irrigation, service water, and CT washwater demands shown are averages. Maximum instantaneous demands will be greater.

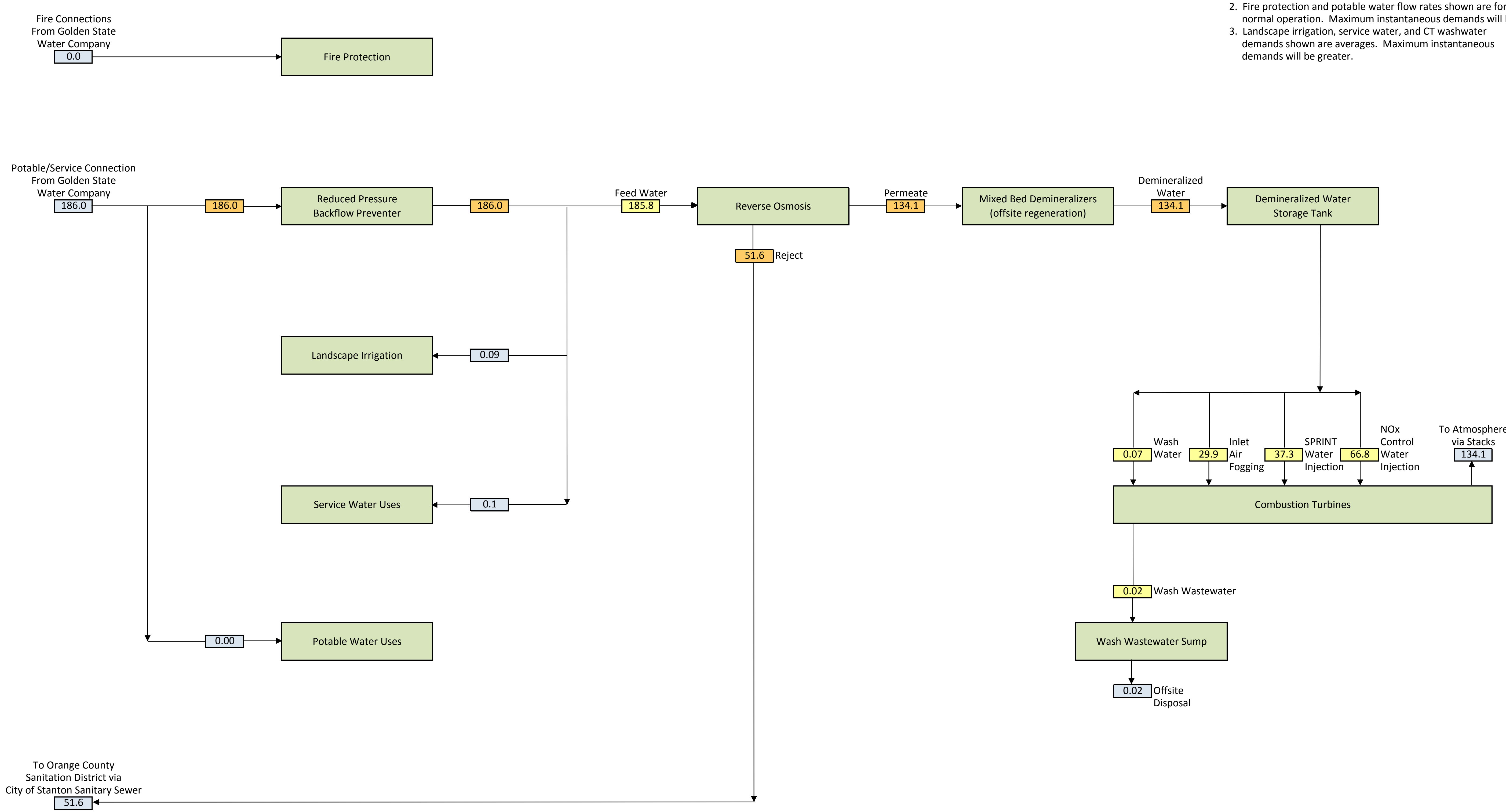


Figure 2.1-4a
Water Balance, High Ambient Temperature
Stanton Energy Reliability Center AFC
Stanton, California

Notes:
1. All flow rates are in gallons/minute unless otherwise noted.
2. Fire protection and potable water flow rates shown are for normal operation. Maximum instantaneous demands will be greater.
3. Landscape irrigation, service water, and CT washwater demands shown are averages. Maximum instantaneous demands will be greater.

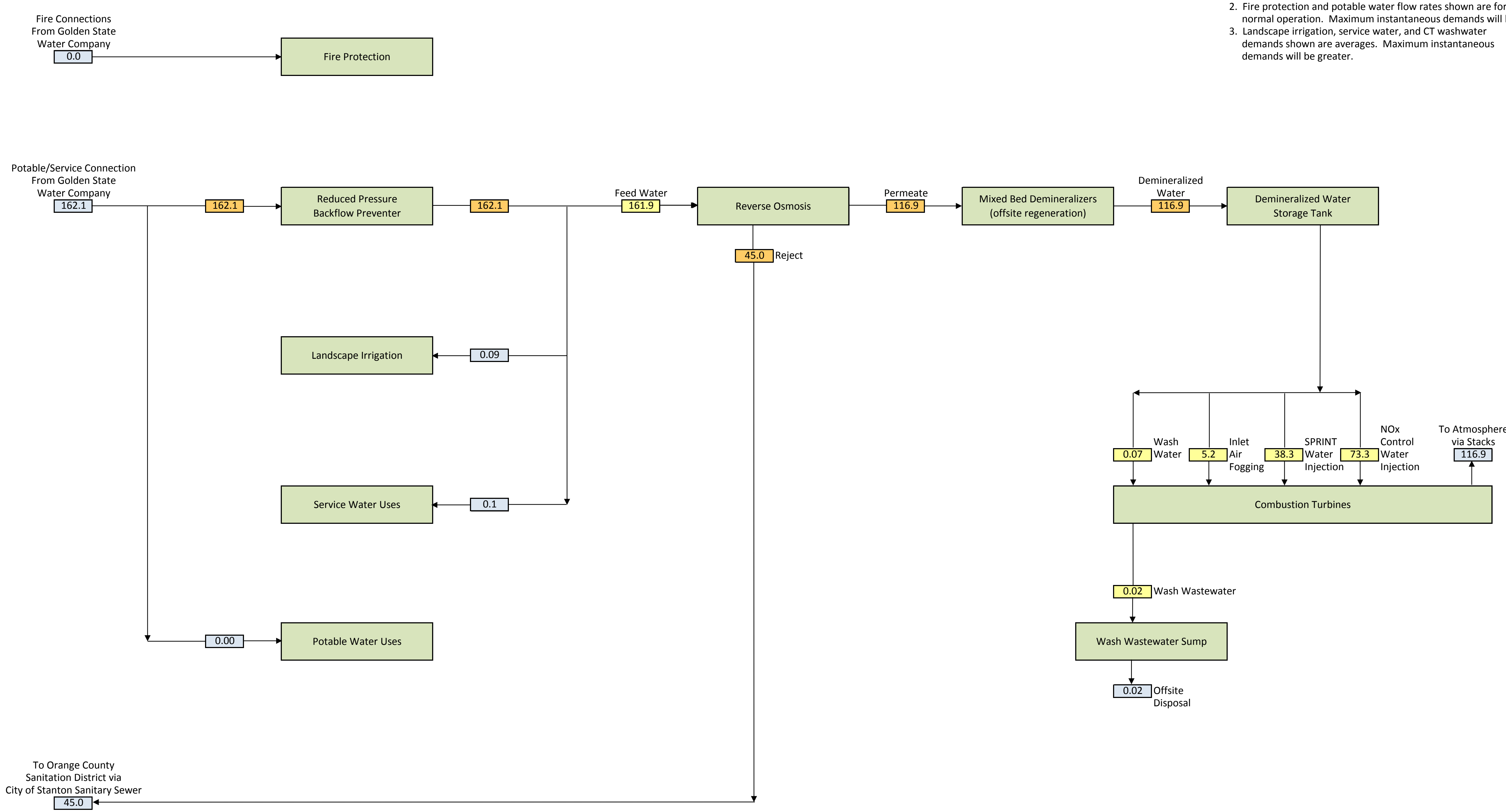


Figure 2.1-4b
Water Balance, Average Ambient Temperature
Stanton Energy Reliability Center AFC
Stanton, California

Notes: 1. All flow rates are in gallons/minute unless otherwise noted.
2. Fire protection and potable water flow rates shown are for normal operation. Maximum instantaneous demands will be greater.
3. Landscape irrigation, service water, and CT washwater demands shown are averages. Maximum instantaneous demands will be greater.

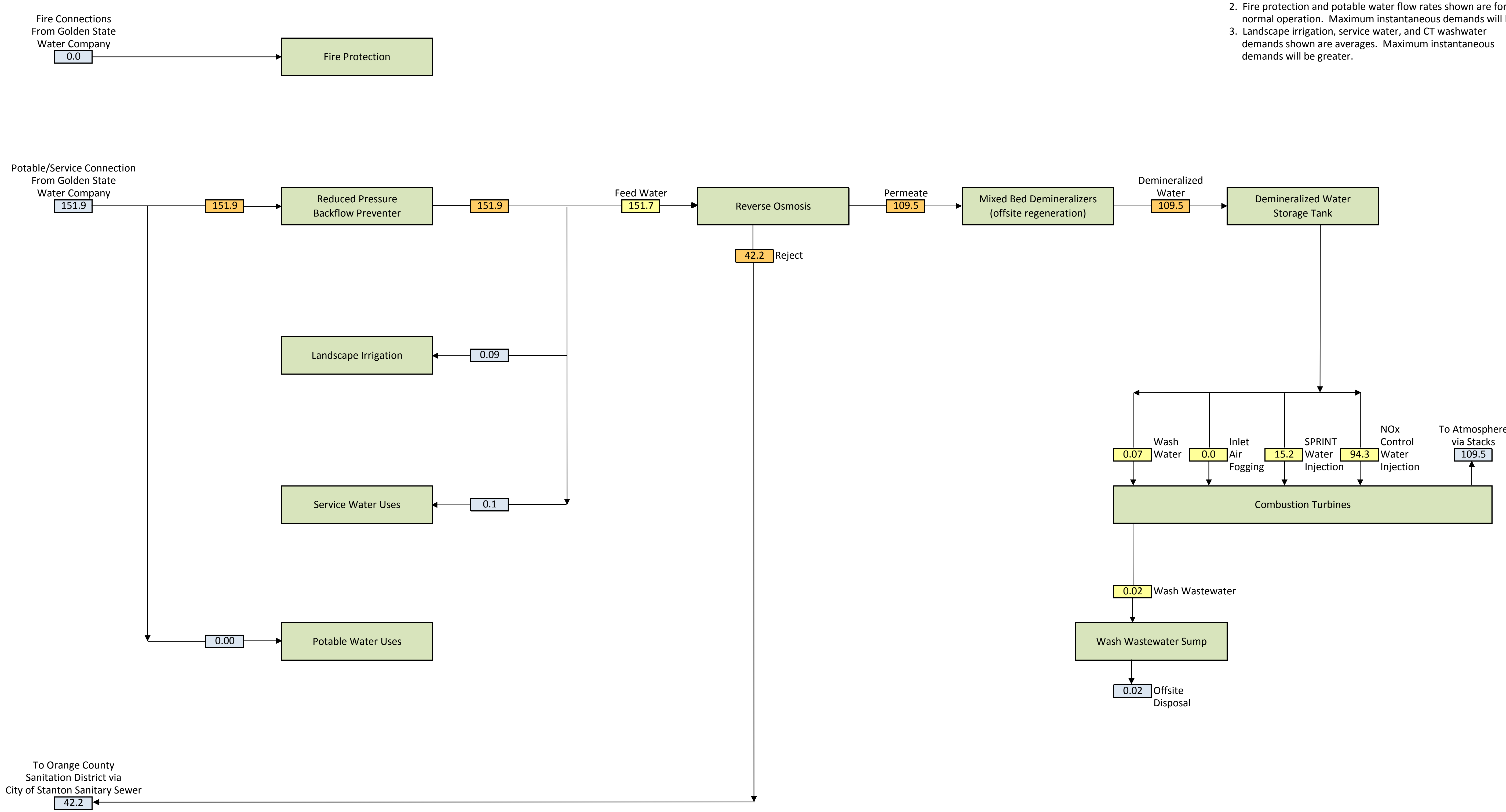


Figure 2.1-4c
Water Balance, Low Ambient Temperature
Stanton Energy Reliability Center AFC
Stanton, California

The product water from the demineralizer system will be stored in a 100,000-gallon demineralized water storage tank, which is nominally sufficient for 12 hours of plant use under peak demands. Potable water will be provided via a tie from the Golden State Water Company service connection for safety showers, landscaping, eye-wash stations, and drinking water.

2.1.10 Waste Management

Waste management is the process whereby all wastes produced at the SERC will be properly collected, treated if necessary, and disposed of. Wastes include process wastewater as well as nonhazardous waste and hazardous waste, both liquid and solid. Waste management is discussed below and in more detail in Section 5.14, Waste Management.

2.1.10.1 Wastewater Collection, Treatment, and Disposal

Through an agreement with the City of Stanton, project wastewater, principally RO system reject, will be discharged to an adjacent sanitary sewer line in either Pacific Street, to the northwest of Parcel 2, or in Dale Avenue, to the east of Parcel 1. Appendix 2C is a can-serve letter from City of Stanton. The water balance diagrams (Figures 2.1-4a through 2.1-4c) show the expected SERC wastewater streams and flow rates under three different operating scenarios. Although the City of Stanton owns and maintains the local wastewater conveyance system, the Orange County Sanitation District (OCSD) sets and enforces wastewater quality limits in the project area. The project would not require an industrial wastewater permit, however, because it will not introduce any external chemicals or metals into the waste stream, which will consist of RO reject only, and because the SERC's daily discharge is well below the 25,000-gallon-per-day level that would trigger a discharge permit requirement from OCSD (see Appendix 2D for correspondence with OCSD personnel on this topic).

Wastewater from infrequent combustion turbine water washes will be collected in holding tanks (one for each CTG) and will be hauled away by a licensed waste hauler. Each auxiliary skid for the gas turbine packages will be procured with weather-proof enclosures or will have rain shelters to prevent potential contamination of stormwaters. As such, no collection of contaminated stormwaters will be needed. Wastewater (or other wastes) from occasional small leaks on skids within the enclosures will be retained on the skid and will be tested for oily residue prior to release into surrounding permeable areas; if oil contamination is present, the wastewater (or other wastes) will be collected with rags and sorbents and disposed of accordingly for any contaminants observed.

SERC will not have a practice of washing down any equipment with oily residues. Equipment that has oily residues will be cleaned with rags and sorbents, and appropriate cleaning solutions will be applied to the rags and sorbents. After the cleaning, the oily rags and sorbents will be properly stored, manifested, and disposed of by licensed disposal companies in the regulatory-required time frames.

2.1.10.2 Solid Nonhazardous Wastes

SERC will produce construction, operation, and maintenance nonhazardous solid wastes typical of power generation operations. Construction wastes generally include soil, scrap wood, excess concrete, empty containers, scrap metal, and insulation. Generation plant wastes include oily rags, scrap metal and plastic, insulation material, defective or broken electrical materials, empty containers, and other solid wastes, including the typical refuse generated by workers. Solid wastes will be trucked offsite for recycling or disposal. Waste management is discussed further in Section 5.14, Waste Management.

2.1.10.3 Hazardous Wastes

Several methods will be used to properly manage and dispose of hazardous wastes generated by the SERC. Waste lubricating oil will be recovered and recycled by a waste oil recycling contractor. Spent lubrication oil filters will either be recycled or disposed of in a Class I landfill. Spent SCR and oxidation catalysts will be recycled by the supplier or disposed of in accordance with regulatory requirements. Workers will be trained to handle hazardous wastes generated at the site.

Chemical cleaning wastes will include turbine wash water effluent. These wastes will be temporarily stored onsite in portable tanks or sumps, and disposed of offsite by an appropriate contractor in accordance with applicable regulatory requirements. Hazardous materials management is further discussed in Section 5.5, Hazardous Materials Handling.

2.1.11 Management of Hazardous Materials

A variety of chemicals will be stored and used during the construction and operation of the SERC. The storage, handling, and use of all chemicals will be conducted in accordance with applicable LORS. Chemicals will be stored in appropriate chemical storage facilities. Bulk chemicals will be stored in storage tanks, and most other chemicals will be stored in returnable delivery containers. Chemical storage and chemical feed areas will be designed to contain leaks and spills. Concrete containment pits and drain piping design will allow a full-tank capacity spill without overflowing the containment area. For multiple tanks located within the same containment area, the capacity of the largest single tank will determine the volume of the containment area and drain piping. Drain piping for reactive chemicals will be trapped and isolated from other drains to eliminate noxious or toxic vapors.

The aqueous ammonia storage and delivery area will have spill containment and ammonia vapor detection equipment, as described in Section 5.5, Hazardous Materials Handling.

Safety showers and eyewashes will be provided adjacent to, or in the vicinity of, chemical use and storage areas. Plant personnel will use approved personal protective equipment during chemical spill containment and cleanup activities. Personnel will be properly trained in the handling of these chemicals and will be instructed in the procedures to follow in case of a chemical spill or accidental release. Adequate supplies of absorbent material will be stored onsite for spill cleanup.

A list of the chemicals anticipated to be used at the SERC and their storage locations is provided in Section 5.5, Hazardous Materials Handling. This list identifies each chemical by type, intended use, and estimated quantity to be stored onsite.

2.1.12 Emission Control and Monitoring

Air emissions from the combustion of natural gas in the CTGs will be controlled to the standards of BACT. To ensure that the systems perform correctly, continuous emissions monitoring for NO_x and CO will be performed. Section 5.1, Air Quality, includes additional information on emission control and monitoring.

2.1.12.1 NO_x Emission Control

The CTGs selected for the SERC will use demineralized water injection and SCR to control emissions of NO_x. One-hour NO_x emissions will be controlled at the stack to 2.5 parts per million by volume (ppmv), dry basis (ppmvd), corrected to 15 percent oxygen. The SCR process will use 19-percent aqueous ammonia. Ammonia slip, or the concentration of unreacted ammonia in the stack exhaust, will be limited to 5 ppmv. The SCR equipment will include a reactor chamber, catalyst modules, ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors. The project will use an ammonia delivery system, which consists of a 5,000-gallon ammonia tank, spill containment basin, and refilling station with a covered spill containment sump.

2.1.12.2 CO and VOC Emission Control

CO and VOC emissions will be controlled by means of CO oxidation catalysts. Oxidation catalysts will limit 1-hour stack CO emissions to 4 ppmvd. VOC emissions will also be limited to 1 ppmvd.

2.1.12.3 Particulate Emission Control

Particulate emissions will be controlled by the use of best combustion practices along with the exclusive use of pipeline quality natural gas, which is low in sulfur, and high-efficiency air inlet filtration.

2.1.12.4 Continuous Emission Monitoring

For each CTG, a separate CEMS will sample, analyze, and record NO_x and CO concentration levels and percentage of oxygen in the exhaust gas from the stacks, and fuel gas flow rates. The CEMS will transmit data to a data acquisition system (DAS) that will store the data and generate emission reports in accordance with permit requirements. The DAS will also include alarm features that will send signals to the plant SCS when the emissions approach or exceed pre-selected limits.

2.1.13 Fire Protection

The fire protection system will be designed to protect personnel and limit property loss and plant downtime in the event of a fire. The system will include a fire protection water system consisting of hydrants, CO_2 fire suppression systems for the CTGs, and portable fire extinguishers. A fire protection water main will be designed to protect the SERC and will be connected to the Golden State Water mains in Pacific Street and Dale Avenue. The system will be designed in accordance with the following:

- Federal, state, and local fire codes, and occupational health and safety regulations
- California Building Code (CBC)
- Applicable, mandatory National Fire Protection Association (NFPA) standards

Water supply from Golden State Water Company will provide firefighting water to yard hydrants. The system will be capable of supplying maximum water demand for any automatic sprinkler system, as well as water for fire hydrants. Hydraulic calculations will be performed to demonstrate that the fire protection main has sufficient capacity to provide all the required firefighting water for the power plant.

Separation criteria, as defined by NFPA and the CBC, shall be used to determine spacing of the transformers, ammonia storage, and other areas that pose a fire risk or health hazard, such as natural gas-fired equipment, lube oil and hydraulic oil piping and containment, and ammonia storage and unloading equipment.

The CO_2 fire-suppression system provided for each CTG will include an array of CO_2 storage cylinders, CO_2 piping and nozzles, fire detection sensors, and a control system. The control system will automatically shut down the affected CTG turbines, isolate natural gas fuel supply from the project, turn off ventilation, close ventilation openings, and release CO_2 upon detection of a fire. The CO_2 fire suppression systems will cover the turbine enclosure.

Portable CO_2 and dry chemical extinguishers will be located throughout the power plant site, including switchgear rooms, with size, rating, and spacing in accordance with NFPA 10.

SERC has met with Orange County Fire Authority (OCFA) to discuss fire protection design concepts. OCFA has indicated that the fire protection main as proposed by SERC along with annunciators at each entrance would be acceptable fire protection measures. SERC has incorporated annunciators into the design (see Figures 2.1-1a and 2.1-1b [Item #51]).

Section 5.5, Hazardous Materials Handling, includes additional information for fire and explosion risk; and Section 5.10, Socioeconomics, provides information on local fire protection capability.

2.1.14 Plant Auxiliaries

The following systems will support, protect, and control the SERC.

2.1.14.1 Lighting

The lighting system provides personnel with illumination for operation under normal conditions and for egress or manual equipment operations under emergency conditions. The system also provides 120-volt convenience receptacles.

The lighting system will be designed in accordance with the Illuminating Engineering Society of North America and calculated average illumination levels with a 0.8 maintenance factor. The lighting plan will include the following components:

- Photo cells to control outdoor lighting
- Frequently switched indoor lighting (such as office and maintenance areas) will be controlled by wall-mounted switches. Infrequently switched indoor lighting (such as in equipment buildings) will be controlled by panel board circuit breakers.
- Self-contained battery-backed emergency lighting and exit signs will be furnished to provide safe personnel egress from buildings during a total loss of plant power. Emergency lighting will be designed to maintain the necessary illumination for a minimum of 90 minutes.
- All 120-volt outdoor receptacles will be fed from ground fault circuit interrupter-type receptacles. Receptacles will be located so that equipment at grade can be reached with a 75-foot extension cord.
- Fixtures will be placed to provide lighting levels that are in compliance with the Occupational Safety and Health Administration safety standards.
- Fixtures will be designed to meet standards of light pollution control.

2.1.14.2 Grounding

The SERC electrical system is susceptible to ground faults, lightning, and switching surges that can constitute a hazard to site personnel and electrical equipment. The SERC grounding system provides a path to permit the dissipation of hazardous energy created by these events.

Site ground resistivity readings shall be used to determine quantity of grounding electrodes and grid spacing to ensure safe step and touch potentials under severe fault conditions.

Bare copper conductors will be installed below grade based on the calculated grid spacing. Each junction of the grid will be electrically bonded together.

All building steel and nonenergized metallic parts of electrical equipment shall be electrically bonded to the ground grid.

2.1.14.3 Supervisory Control System

The SCS provides modulating control, digital control, monitoring, and indicating functions for the plant power block systems.

The SCS will provide the following functions:

- Controlling the CTGs and other systems in a coordinated manner
- Controlling the BOP systems in response to plant demands
- Monitoring controlled plant equipment and process parameters and delivering this information to plant operators

- Providing control displays (e.g., printed logs and liquid crystal diode [LCD] video monitors) for signals generated within the system or received from I/O data
- Providing consolidated plant process status information through displays presented in a timely and meaningful manner
- Providing alarms for out-of-limit parameters or parameter trends, displaying on alarm video monitor(s), and recording on an alarm log printer
- Providing storage and retrieval of historical data

The SCS will be a redundant microprocessor-based system and will consist of the following major components:

- PC-based operator consoles with LCD video monitors
- Complete distributed control system equipment and architecture
- I/O cabinets
- Historical data unit
- Printers
- Data links to the combustion turbine and steam turbine control systems

The SCS will have a functionally distributed architecture allowing integration of BOP equipment that may be controlled locally via a programmable logic controller.

The SCS will interface with the control systems furnished by the CTG supplier to provide remote control capabilities, as well as data acquisition, annunciation, and historical storage of turbine and generator operating information.

The system will be designed with sufficient redundancy to preclude a single device failure from significantly affecting overall plant control and operation. The design will also ensure that critical control and safety systems have redundancy of control and uninterruptable power sources.

As part of the quality control program, daily operator logs will be available for review to determine the status of the operating equipment.

2.1.14.4 Cathodic Protection

The cathodic protection system will be designed to control the electrochemical corrosion of designated metal piping buried in the soil. Depending on the corrosion potential and the SERC site soils, either passive or impressed current cathodic protection will be provided.

2.1.14.5 Freeze Protection System

Freeze protection for above- and below-grade piping and instrumentation lines will be evaluated and installed, as necessary, based on the expected minimum ambient temperature at the plant. Given that the record minimum temperature near Stanton is 19.4°F, freeze protection is not expected to be required for large piping, but may be required for small piping and air tubing.

2.1.14.6 Service Air

The service air system will supply compressed air to hose connections for general plant use. Service air headers will be routed to hose connections located at various points throughout the facility.

2.1.14.7 Instrument Air

The instrument air system will provide dry, filtered air to pneumatic operators and devices. Air from the service air system is dried, filtered, and pressure-regulated before delivery to the instrument air piping network. An instrument air header will be routed to locations within the facility equipment areas and within the water treatment facility where pneumatic operators and devices will be located.

2.1.15 Interconnect to Electrical Grid

The two CTGs and battery arrays will connect to the regional electrical grid via a new approximately 0.35-mile, 66-kV underground gen-tie line that will run from the SERC to the SCE Barre Substation (see Section 3, Electric Transmission).

2.1.16 Project Construction

Assuming that a decision is made approving this Application for Certification (AFC) within 12 months of when the AFC is deemed data adequate, construction of the generating facility from site preparation and grading to commercial operation is expected to take place from November 2018 to December 2019 (approximately 14 months total). Major milestones are listed in Table 2.1-3.

Table 2.1-3. Major Project Milestones

Activity	Date
Begin Construction	November 1, 2018
Startup and Test	September 15, 2019
Commercial Operation	December 31, 2019

During construction, there will be an average and peak workforce of 30 and 60, respectively, of construction craft people and supervisory, support, and construction management personnel onsite (see Table 5.10-8).

Typically, construction will be scheduled to occur between 7 a.m. and 8 p.m. on weekdays and Saturdays. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities (e.g., pouring concrete at night during hot weather, and working around time-critical shutdowns and constraints). During some construction periods and during the startup phase of the project, some project activities will occur 24 hours per day, 7 days per week. However, in accordance with the City of Stanton Noise Ordinance, noisy construction work will not take place on Sundays or federal holidays, or between 8 p.m. and 7 a.m. Monday through Saturday.

The peak construction site workforce level is expected to last from month 6 through month 10 of the construction period, with the peak being months 8 and 9.

Table 2.1-4 provides an estimate of the average and peak construction traffic during the 13-month construction/commissioning period for the SERC.

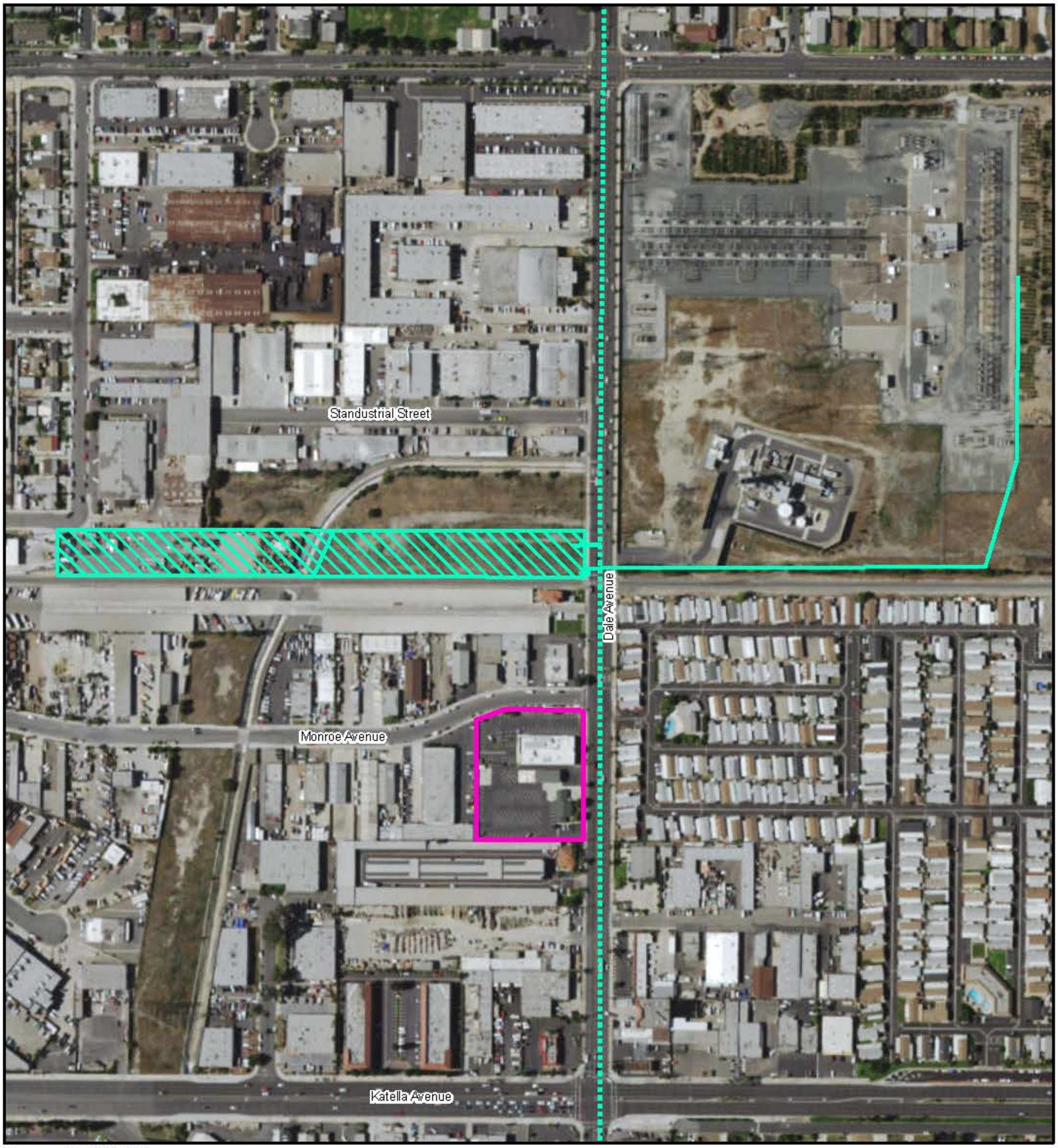
Table 2.1-4. Estimated Average and Peak Construction Traffic

Vehicle Type	ADT	Peak Daily Trips
Construction Workers	40	60
Deliveries	10	20
Total	**50**	**80**

Note:

ADT = average daily trip(s)

Figure 2.1-5 shows the SERC site in relation to the construction laydown and worker parking area.



Source: Esri World Imagery

LEGEND

Project Site

Generator Tie-Line

Proposed Natural Gas Pipeline Route Alternatives

Construction Worker Parking Area

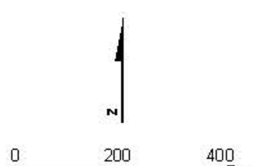


FIGURE 2.1-5
Construction Worker Parking Area
Stanton Energy Reliability Center AFC
Stanton, California

\\BROOKSIDE\GIS_SHARE\ENBG\00_PROJ\S\SERC\MAPFILES\REPORT\2016\FIG_2 1-5_CONSTRUCTIONWORKER_PARKING.MXD
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2.1.17 EGT Facility Operation

SERC will have an operations and maintenance manager, plant technicians, and an instrument technician working periodically at the SERC during the standard 5-day, 8-hour-per-day workweek for the performance of preventive and corrective work orders. Otherwise, the facility will be unmanned. Project operation will take place remotely from SERC, LLC's control room in Sacramento, California. Plant technicians will be dispatched to the SERC by remote operators for trouble and service calls when needed.

SERC is expected to have an annual plant availability of 92 to 98 percent, including scheduled outages for maintenance and forced outages. SERC, LLC expects to operate the SERC in a similar fashion to a peaker unit, with some amount of load following and cycling. The facility is expected to be operated during high demand times (typically afternoon hours) to supplement base-load and renewable generation capacity. The exact operational profile of the plant, however, cannot be defined in detail because operation of the facility depends on the variable demand in the SERC service area.

The facility may be operated in one or all of the following modes:

- **Regulation Service**. The facility, as an EGT, could be operated at loads that may vary between maximum continuous output (both of the CTGs operating at full load) and minimum load (one CTG operating as low as 50-percent load) to the needs of the California Independent System Operator (CAISO) for regulation up or regulation down.
- **Energy Cycling**. During high demand periods, the facility may be operated for the delivery of energy in a cycling mode, where the plant is operated at maximum continuous output during periods when the grid needs energy. This mode of operation may occur either with multiple daily startups and shutdowns or with weekend shutdowns depending on broader electrical system characteristics (i.e., electrical demand, hydroelectric power availability, and other matters). The facility may cycle more than once a day to accommodate the grid's needs.
- **Synchronous Condenser.** Either or both generators can be used in synchronous condenser mode when the turbines are not running. To operate in this mode, the turbines will spin the generator to operating speed, the control system will synchronize the generator, and then a clutch will disengage the turbine from the generator and the turbine can then be shut down. During this mode, the generator is held at synchronous speed by the grid, and the generator voltage and voltage-ampere reactives can be adjusted as the grid requires to the limit of the generator's capability.
- **GHG-Free Operating Reserve.** SERC can provide operating reserve to the CAISO without the requirement to burn gas. This mode of operation will allow SERC to satisfy the CAISO's needs for operating reserve and minimum online commitment.

2.2 Engineering

In accordance with California Energy Commission (CEC) regulations, this section together with the engineering appendix (Appendix 2A, Design Criteria) and Sections 3 and 4 present information concerning the design and engineering of the SERC. The LORS applicable to SERC's engineering are provided along with a list of agencies that have jurisdiction, the contacts within those agencies, and a list of the permits that will be required.

2.2.1 Facility Design

Summary descriptions of the design criteria for all of the major engineering disciplines are included in Appendix 2A, Design Criteria.

Design and engineering information and data for the following systems are found in the related subsections of this AFC:

- **Power Generation—**See Section 2.1.5, Combustion Turbine Generators. Also see Appendix 2A and Sections 2.1.6 through 2.1.14, which describe the various plant auxiliaries.
- **Inlet Air Fogging System—**See Section 2.1.8.
- **Water Supply System—**See Section 2.1.9, Water Supply and Use. Also see Appendix 2A.
- **Air Emission Control System—**See Section 2.1.12, Emission Control and Monitoring, and Section 5.1, Air Quality.
- **Waste Disposal System—**See Section 2.1.10 and Section 5.14, Waste Management.
- **Noise Abatement System—**See Section 5.7, Noise.
- **Switchyards/Transformer Systems—**See Section 2.1.6, Major Electrical Equipment and Systems; Section 2.1.14.2, Grounding; Section 2.1.6.1, AC Power—Transmission; Section 2.1.15, Interconnect to Electrical Grid; and Section 3, Electric Transmission. Also see Appendix 2A.

2.2.1.1 Facility Safety Design

The SERC will be designed to maximize safe operation. Potential hazards that could affect the facility include earthquake, flood, and fire. Facility operators will be trained in safe operation, maintenance, and emergency response procedures to minimize the risk of personal injury and damage to the plant.

2.2.2 Facility Reliability

This section discusses the expected facility availability, equipment redundancy, fuel availability, water availability, and project quality control measures.

2.2.2.1 Facility Availability

The SERC, as an EGT, will be designed to operate between 0 percent (Pmin equaling 0 MW of two turbines) and 100 percent of full load, or nominally 0 to 98 MW, to support dispatch service in response to CAISO's needs for reliability services and energy.

The SERC will be designed for an operating life of 35 years. Reliability and availability projections are based on this operating life. Operation and maintenance procedures will be consistent with industry standard practices to maintain the useful life of plant components.

The equivalent availability factor (EAF), which considers the projected percent of energy production capacity achievable, may be defined as a weighted average of the percent of full energy production capacity achievable. The projected EAF for SERC is estimated to be approximately 98 to 99 percent.

The EAF, which is a weighted average of the percent of energy production capacity achievable, differs from the "availability of a unit," which is the percent of time that a unit is available for operation, whether at full load, partial load, or standby. For purposes of calculating the EAF, EGT operations in GHG-Free Operating Reserve mode (when the EGT's output is 0 MW, but it is providing voltage support services to the grid) would not be considered "standby" and the unit would be in service.

2.2.2.2 Redundancy of Critical Components

The following subsections identify equipment redundancy as it applies to project availability. A summary of equipment redundancy is shown in Table 2.2-1. Final design could differ.

Table 2.2-1. Major Equipment Redundancy

Description	Number of Units
Simple-cycle CTGs	2 – each capable of independent operation
Batteries	2 battery banks, 8 inverters per battery bank, and 8 medium voltage transformers per battery bank
Fire Protection Main Connection	2 – 100 percent capacity
Demineralized water forwarding pumps	2 – 100 percent
Ammonia transfer pumps	2 – 100 percent
Air compressors	2 – 100 percent

2.2.2.3 Fuel Availability

Fuel will be delivered via a new 12- or 16-inch-diameter pipeline serving the SERC site. This pipeline will interconnect with an existing SoCalGas high-pressure natural gas pipeline in either Las Palmas Avenue (2.75 miles north of the SERC) or in Lampson Avenue (1.78 miles south of SERC).

2.2.2.4 Water Availability

Potable water for drinking and safety showers will be supplied by Golden Gate Water Company via pipe connections to the water main in Dale Avenue and Pacific Street. The availability of water to meet the SERC's needs is discussed in more detail in Section 5.15, Water Resources.

2.2.2.5 Project Quality Control

The quality control program that will be applied to the SERC is summarized in this subsection.
The objective of the Quality Control Program is to ensure that all systems and components have the appropriate quality measures applied, whether during design, procurement, fabrication, construction, or operation. The goal of the quality control program is to achieve the desired levels of safety, reliability, availability, operability, constructability, and maintainability for the generation of electricity.

The required quality assurance for a system is obtained by applying controls to various activities, according to the activity being performed. For example, the appropriate controls for design work are checking and review, and the appropriate controls for manufacturing and construction are inspection and testing. Appropriate controls will be applied to each of the various activities for the SERC.

2.2.2.5.1 Project Stages

For quality assurance planning purposes, the SERC activities have been divided into eight stages that apply to specific periods during the project. As the SERC progresses, the design, procurement, fabrication, erection, and checkout of each generating facility system will progress through the following eight stages:

- **Conceptual Design Criteria –** Activities such as definition of requirements and engineering analyses
- **Detail Design –** Activities such as the preparation of calculations, drawings, and lists needed to describe, illustrate, or define systems, structures, or components
- **Procurement Specification Preparation –** Activities necessary to compile and document the contractual, technical, and quality provisions for procurement specifications for plant systems, components, or services
- **Manufacturer's Control and Surveillance –** Activities necessary to ensure that the manufacturers conform to the provisions of the procurement specifications

- **Manufacturer Data Review –** Activities required to review manufacturers' drawings, data, instructions, procedures, plans, and other documents to ensure coordination of plant systems and components, as well as conformance to procurement specifications
- **Receipt Inspection –** Inspection and review of product at the time of delivery to the construction site
- **Construction/Installation –** Inspection and review of storage, installation, cleaning, and initial testing of systems or components at the facility
- **System/Component Testing –** Actual operation of generating facility components in a system in a controlled manner to ensure that the performance of systems and components conform to specified requirements

2.2.2.5.2 Quality Control Records

The following quality control records will be maintained for review and reference:

- Project instructions manual
- Design calculations
- Project design manual
- Quality assurance audit reports
- Conformance to construction records drawings
- Procurement specifications (contract issue and change orders)
- Purchase orders and change orders
- Project correspondence

During construction, field activities are accomplished during the last four stages of the project: receipt inspection, construction/installation, system/component testing, and plant operations. The construction contractor will be contractually responsible for performing the work in accordance with the quality requirements specified by contract.

The subcontractors' quality compliance will be surveyed through inspections, audits, and administration of independent testing contracts.

A plant operation and maintenance program, typical of a project this size, will be implemented by SERC to control operation and maintenance quality. A specific program for this project will be defined and implemented during initial plant startup.

2.2.3 Thermal Efficiency

Since SERC is using two EGTs, the basis for a discussion of thermal efficiency is very different from conventional simple-cycle or combined-cycle units. The vast majority of SERC's hours of operation are expected to be in the operating mode best described as "GHG-Free Operating Reserve." When providing GHG-Free Operating Reserve, SERC is actively providing reliability services without burning any gas. As a result, the discussion of thermal efficiency will be based upon two elements: (1) the worst-case thermal efficiency of the EGT, and (2) the benefits to the CAISO system of reducing system-wide heat rates.

2.2.3.1 Worst-case Full-Load Thermal Efficiency

The worst-case full-load thermal efficiency can be examined by looking at the underlying gas turbine technology. The net thermal efficiency (based upon power net of parasitic loads, delivered to the grid) that can be expected from a natural gas-fired simple-cycle plant using GE LM6000 PC combustion turbine units is approximately 39 percent on a lower heating value basis. This level of efficiency is achieved when the GE LM6000 PC is operating at full load over all ranges of ambient conditions. Other types of operations, particularly those at less than full gas turbine output, will result in lower efficiencies.

It is estimated that the range of fuel consumed by the power plant will be from a minimum of zero British thermal units (Btu) per hour (operating as GHG-free operating reserve) to a maximum of approximately 938 MMBtu per hour (HHV basis) at 100-percent load and average ambient conditions.

The net annual electrical production of SERC cannot be accurately forecasted at the present time because of future uncertainties in the CAISO system needs for energy from SERC. The maximum annual generation possible from the facility is estimated to be approximately 105 gigawatt hours per year, based on a combined total of 1,076 operating hours per CTG per year.

2.2.3.2 Benefits to the CAISO System of Reducing System-wide Heat Rates

SERC has performed modeling of the CAISO system demonstrating that the addition of EGT capability to the system allows more efficient system-wide energy dispatch on a net annual basis. The following general effects of the EGT's drive CAISO-realized efficiencies:

- Lower overall system dispatched heat rate
- Allow reduced commitment of higher-cost generators
- Provide capacity and allow for avoided gas burn from other units by meeting or maintaining the following:
  - Minimum online commitments
  - Voltage support
  - Operating reserves
  - Primary frequency protection
  - High-speed regulation during system load peaks
  - More efficient resources to provide energy

By procuring operating reserves from the EGTs, there is reduced need to procure operating reserve from other gas-burning units in the system, which results in the other units being more efficiently dispatched for energy or used for ancillary services at a lower overall cost to the system.

The anticipated improvement in system heat rate is expected to result in system-wide reduced fuel consumption 35,000 mmBtu/year per EGT, or 70,000 mmBtu/yr for SERC (SERC has two EGTs). This is equivalent to 75 full load operating hours per EGT per year.

When viewed as a credit to SERC's worst-case thermal efficiency and maximum operating hours scenario, SERC's thermal efficiency is elevated from 39 to 42 percent.

2.3 Facility Closure

SERC closure can be temporary or permanent. Temporary closure is defined as a shutdown for a period exceeding the time required for normal maintenance, with an intent to restart in the future. Causes for temporary closure include a disruption in the supply of natural gas or damage to the plant from earthquake, fire, storm, or other natural acts. Permanent closure is defined as a cessation in operations with no intent to restart operations. Section 2.3.1 discusses temporary facility closure, and Section 2.3.2 discusses permanent facility closure.

2.3.1 Temporary Closure

For a temporary closure where there is no release of hazardous materials, SERC, LLC will maintain security of the SERC facilities and will notify the CEC and other responsible agencies as required by law. Where the temporary closure includes damage to the SERC, and where there is a release or threatened release of regulated substances or other hazardous materials into the environment, procedures will be followed as set forth in a Risk Management Plan and a Hazardous Materials Business Plan to be developed as described in Section 5.5, Hazardous Materials Handling. Procedures will include methods to control releases, notification of applicable authorities and the public, emergency response, and training for plant personnel in responding to and controlling releases of hazardous materials. Once the immediate problem is solved and the regulated substance/hazardous material release is contained and cleaned up, temporary closure will proceed as described above for a closure where there is no release of hazardous materials.

2.3.2 Permanent Closure

If the facility is permanently closed, the closure procedure will follow a plan that will be developed as described below.

The conditions that would affect the decommissioning decision are largely unknown at this time; therefore, these conditions would be presented to the CEC when more information is available and the timing for decommissioning is more imminent.

To ensure that public health and safety and the environment are protected during decommissioning, a decommissioning plan will be submitted to the CEC for approval prior to decommissioning. The plan will discuss the following:

- Proposed decommissioning activities for the SERC and all appurtenant facilities constructed as part of the SERC
- Conformance of the proposed decommissioning activities to all applicable LORS and local/regional plans
- Activities necessary to restore the SERC if the plan requires removal of all equipment and appurtenant facilities
- Decommissioning alternatives other than complete restoration
- Associated costs of the proposed decommissioning and the source of funds to pay for the decommissioning

In general, the decommissioning plan for the SERC will attempt to maximize the recycling or reuse of all facility components. All nonhazardous wastes will be collected and disposed of in appropriate landfills or waste collection facilities. All hazardous wastes will be disposed of according to all applicable LORS.