

Estrella Substation Project Description and Functional Specifications for Competitive Solicitation

1. Description

In the 2013-2014 Transmission Planning Cycle, the ISO approved the construction of a reliability-driven *Estrella Substation Project* in the Los Padres Division of the PG&E service territory. The project will provide Paso Robles Substation with more reinforced 70 kV sources from Templeton and Estrella. A simplified single-line diagram of the area prior to the Estrella Substation project and after the project is in-service is shown in Figures 1 and 2.

Figure 1: Single-line diagram of area prior to the Estrella Substation Project

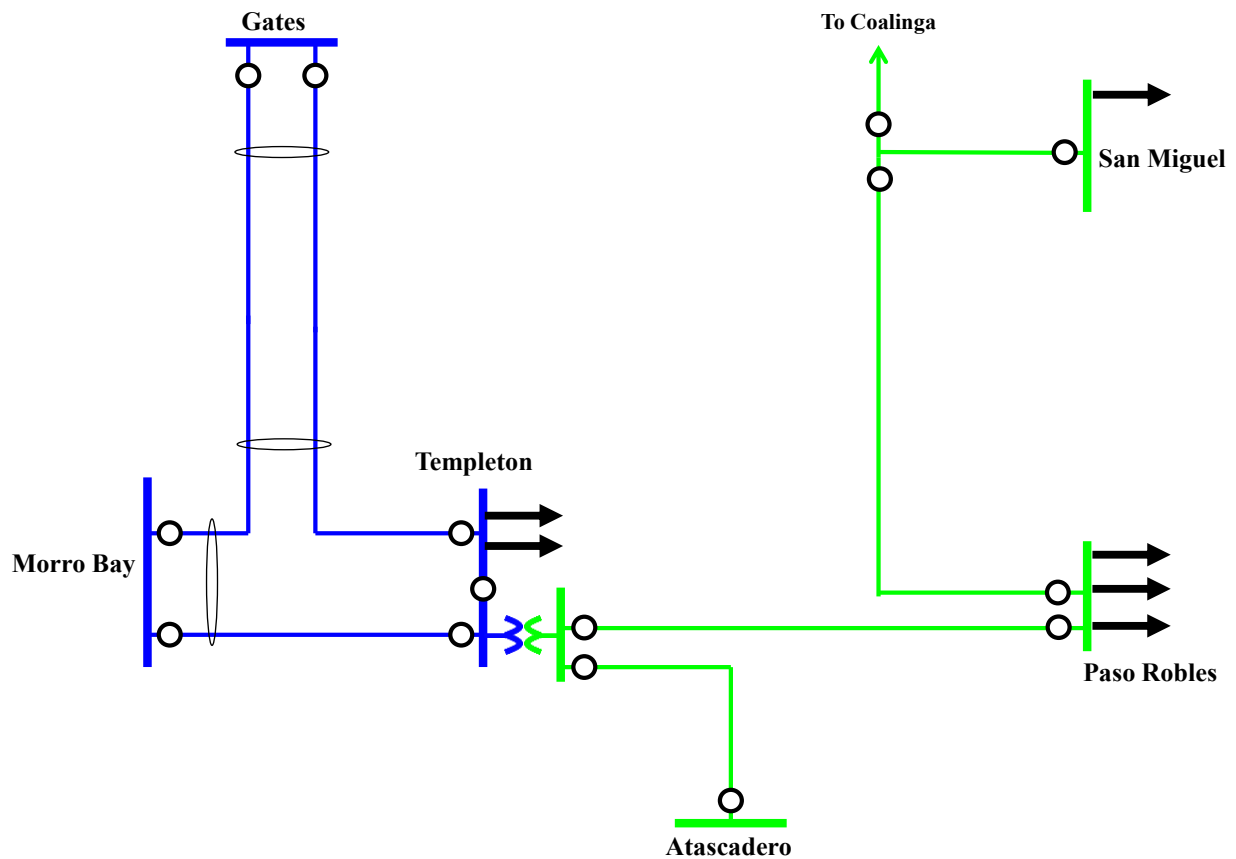
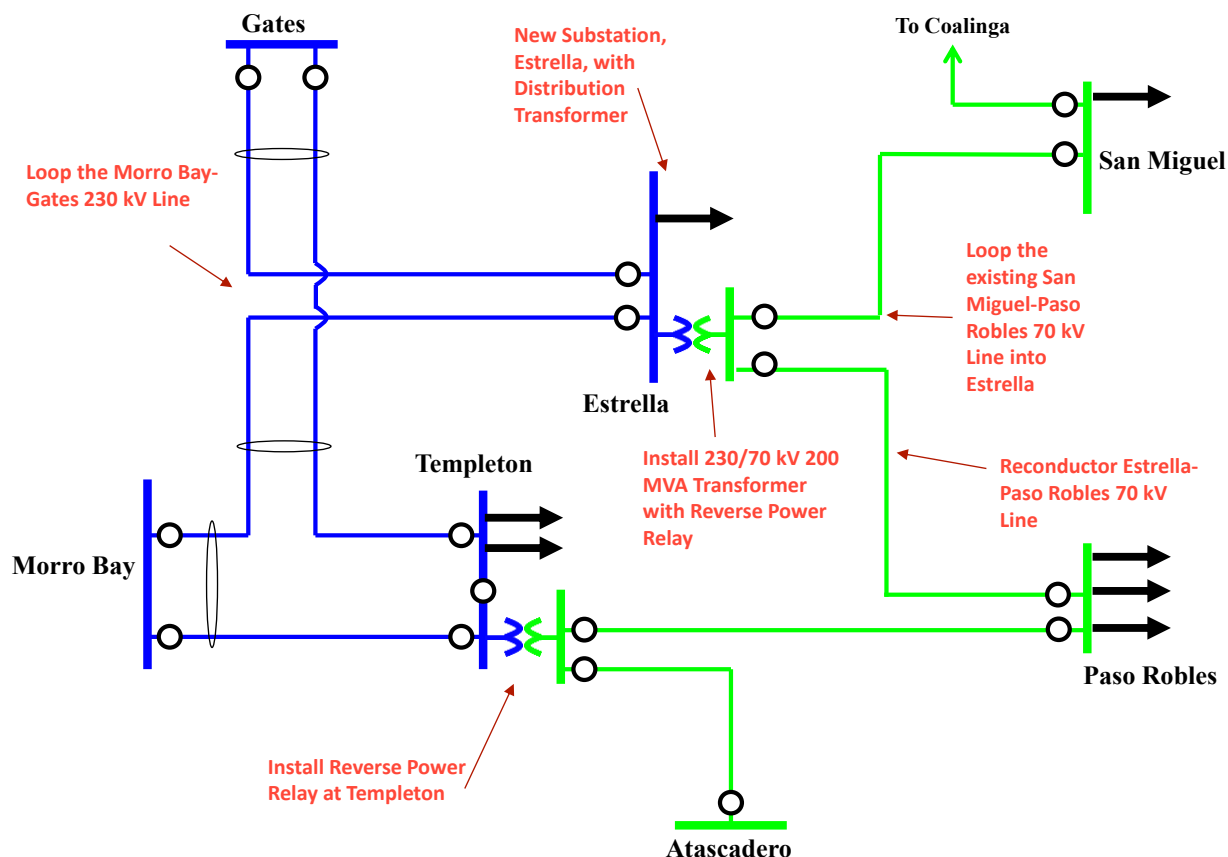


Figure 2: Proposed single-line diagram with the Estrella Substation Project



The scope of this project is to construct a new 230/70 kV substation, Estrella, approximately 5 miles east of the existing Paso Robles Substation. The Estrella substation will also be located relatively close to the Morro Bay-Gates and Templeton-Gates 230 kV transmission corridor. The Estrella 230 kV bus will be looped into the Morro Bay-Gates 230 kV line. A new 230/70 kV transformer will be installed at the Estrella substation. In addition, a 45 MVA 230/12 kV distribution transformer will be installed as a part of the project. The Estrella 70 kV bus will be looped into the existing San Miguel-Paso Robles 70 kV line. A reverse power relay will be installed on the Estrella 230/70 kV and the existing Templeton 230/70 kV #1 transformer banks to prevent the 70 kV system from feeding the 230 kV system. The Paso Robles-Estrella 70 kV line will be reconducted to prevent thermal overloads and it will operate at minimum summer normal and summer emergency ratings of 825 and 975 amps, respectively.

The project will mitigate the thermal overloads and voltage concerns identified in the Los Padres 70 kV system, specifically in the San Miguel, Paso Robles, Templeton, Atascadero, Cayucos and San Luis Obispo areas following a Category B contingency due to loss of either the Templeton 230/70 kV #1 Bank or the Paso Robles-Templeton 70 kV Line. These two Category B contingencies put approximately 60-70 MW of load at Paso Robles at risk by activating the existing Paso Robles UVLS during summer peak conditions to alleviate the thermal and low voltage concerns. Also, a Category C3 contingency condition involving loss of Morro Bay-Templeton and Templeton-Gates 230 kV lines results in thermal overloads and low voltages in

the underlying 70 kV system. With the additional source from the Gates 230 kV system, the *Estrella Substation Project* will provide robust system reinforcement to the Paso Robles and Templeton 70 kV system operations.

The ISO estimates that the proposed *Estrella Substation Project* in its entirety will cost \$35 million to \$45 million in 2014 dollars. The proposed in-service date of the project is May 2019.

The facilities in the Estrella substation project that are considered eligible for competitive solicitation are the 230 kV bus-work and termination equipment, and the 230/70 kV transformer bank. The 70 kV bus-work, termination equipment and modifications to existing facilities are not eligible for competitive solicitation. In addition the 230/12 kV distribution transformer, distribution bus-work and termination equipment and modifications to existing facilities are not eligible for competitive solicitation.

For the interconnection of the existing 230kV lines to the substation, the incumbent PTO (PG&E) will be responsible to bring the new transmission line extensions up to a point within 100 feet of the new substation fence. The new line extensions will terminate on a dead end structure(s), to be owned by PG&E. The approved project sponsor will be responsible (and will own and maintain) the facilities that go from this last dead end structure(s) into the high voltage rack. The approved project sponsor, who will be the owner of the 230 kV yard of the substation, will be responsible to own, operate and maintain the protection equipment located within the substation that is designated for the protection of the incoming transmission lines. The approved project sponsor will coordinate with PG&E for the specifications and the details of the associated line protection (e.g. current differential, directional comparison) etc. and will work with PG&E to develop relay logic and detailed relay settings.

While the 70 kV bus-work and termination equipment and the 230/12 kV distribution transformer are not a part of the scope of the facilities for competitive solicitation, the approved project sponsor will be required to coordinate with PG&E to determine the total amount of acreage required to build the entire facility. Further, the approved project sponsor will be responsible to acquire the station land and necessary environmental permits from the applicable siting agency for both the 230 kV yard and the 70 kV and distribution yard and will grant a permanent easement or transfer of ownership of a parcel of land to PG&E for PG&E's portion of the total station equipment. This will ensure that there is adequate property purchased and permitted to accommodate the initial and ultimate configurations of both yards. The approved project sponsor will coordinate with PG&E as to how to divide the two yards. The approved project sponsor will also be responsible for rough grading and drainage of the entire site and provide necessary safety measures (fencing) between the 230 kV and low voltage yards. The project sponsor shall coordinate and negotiate with PG&E how the low side of the 70 kV transformer bank will be interconnected to the 70 kV bus in the 70 kV and distribution yard. The project sponsor shall also coordinate and negotiate with PG&E how the high voltage side of the 230/12 kV distribution transformer will be interconnected to the 230 kV bus in the 230 kV yard. PG&E will specify the phase rotation for the termination to the 70 kV bus and distribution transformer in the low voltage yard.

With respect to protection and control buildings, the approved project sponsor and PG&E will install, own and maintain separate protection and control buildings for their respective substation yards.

2. Functional Specifications

Switching Station

Nominal Phase to Phase Voltage: 230 kV

Initial Bus Configuration (DBDB, BAAH, SBSB, etc.): Breaker and a half (BAAH)

Ultimate Bus Configuration (DBDB, BAAH, SBSB, etc.): BAAH

Initial Number of Lines: 2

Ultimate Number of Lines: 4 (To accommodate future looping of Templeton-Gates 230 kV Line)

Initial Number of 230 kV CBs: 6

Ultimate Number of 230 kV CBs: 12

Initial Minimum Bus Ampacity: 3000 Ultimate Bus Ampacity: 3000

Minimum CB Ampacity: 2000 Minimum CB Interrupting Capability: 40 kA

Transfer Bus Required (SBSB only): N/A

Station Minimum BIL: 900 kV

Initial Reactive Power Requirements: None

Ultimate Reactive Power Requirements: To be determined

Telemetry Requirements: Install necessary equipment, including RTUs to monitor the typical bulk power elements such as MW, MVA, and phase currents (Amps) at each line and also voltages (kV) at lines and buses and all circuit breaker (CB) status/control, protection relays statuses and alarms. The installed equipment must be capable of transmitting information to the appropriate Control Center.

Latest In Service Date: May 2019

Low Profile Required: Subject to local permitting requirements

Gas Insulation Required: No

Initial Number of Transformers: 1

Ultimate Number of Transformers: 2

Transformer Nominal Low Winding Phase to Phase Voltage: 70 kV

Tertiary Winding Required: Yes Nominal Voltage Rating: 13.2 kV

Primary Voltage Winding (wye, grounded wye, delta, etc): Grounded Wye

Secondary Voltage Winding: Grounded Wye Tertiary Voltage Winding: Corner Grounded Delta

Maximum Transformer % IZ: 7.5 Minimum Transformer % IZ: 6.5

Minimum Transformer OA Rating: 120 MVA

Maximum Transformer Load: 200 MVA LTC Required: Yes +/- 10%

No Load Taps Required: Yes – NLTs with two 2.5% taps above & below nominal 230 kV voltage