

# **Wheeler Ridge Junction 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 *Wheeler Ridge Junction Substation Project* in the Kern Division of the PG&E service territory. The project will provide Wheeler Ridge Substation, as well as CDWR pumps, with a more reinforced 230 kV source from Kern PP. A simplified single-line diagram of the existing and proposed project is shown below in Figures 1 and 2.

Figure 1: Existing single-line diagram of Wheeler Ridge Junction Substation Project

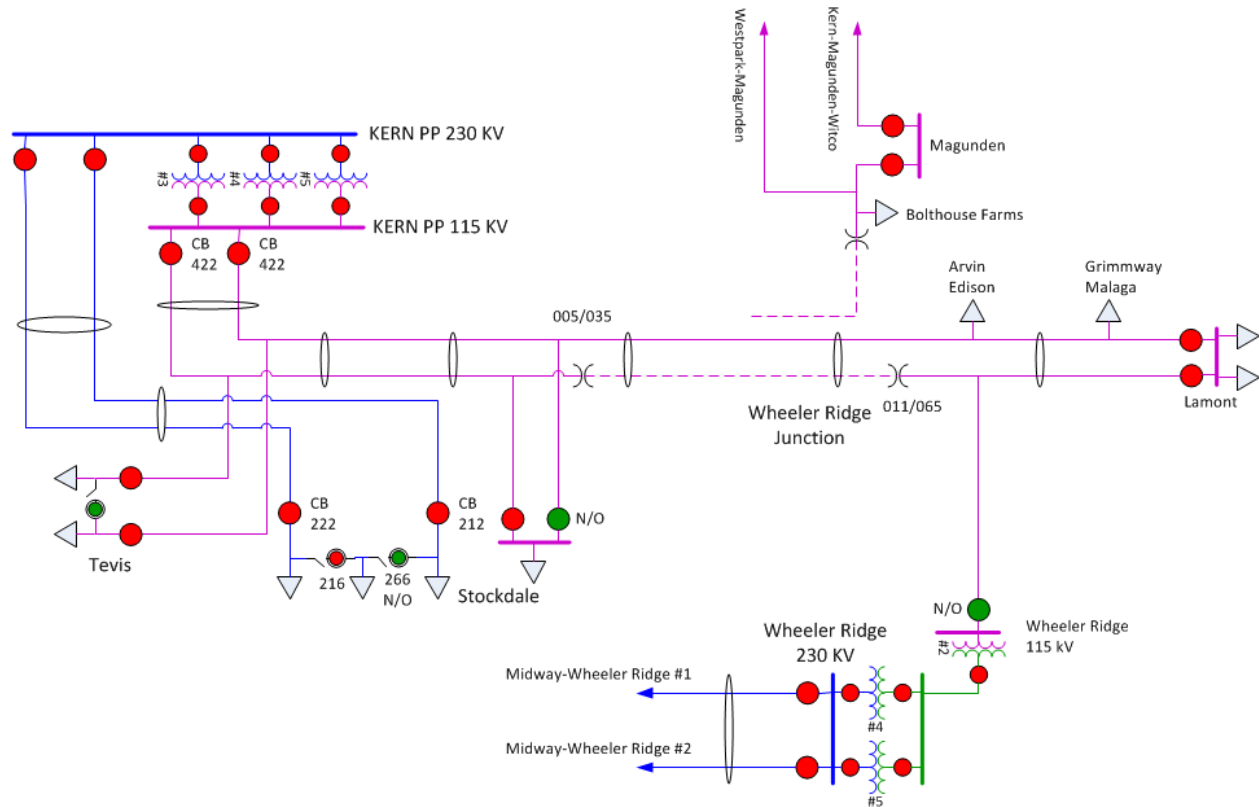
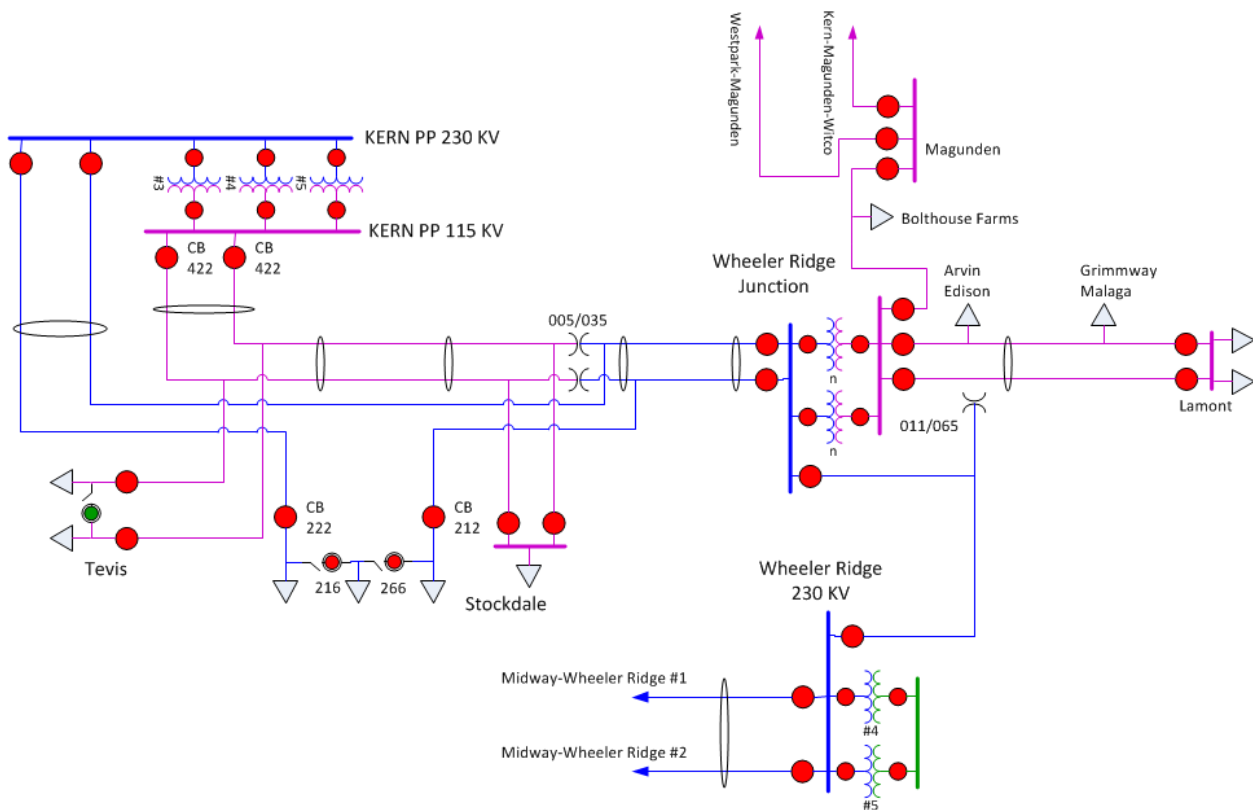


Figure 2: Proposed single-line diagram of the Wheeler Ridge Junction Substation Project



The scope of this project includes:

- Build a new 230/115 kV transmission substation at Wheeler Ridge Junction (WRJ)
  - 3 – 230 kV line terminations (ultimate 6)
  - 3 – 115 kV line terminations (ultimate 8)
  - 2 – 230/115 kV 420 MVA transformers
- Convert 15.5 miles of the Wheeler Ridge-Lamont 115 kV line from Wheeler Ridge to tower 011/065 to operate at 230 kV. Terminate at Wheeler Ridge and WRJ stations.
- Open end Kern-Tevis-Stockdale-Lamont 115 kV line at tower 005/035 and loop Stockdale 115 kV substation.
- Convert and re-conductor 5 miles of the Kern-Tevis-Stockdale-Lamont 115 kV Line section from Towers 005/035 to 011/065 to 230 kV operation on both sides of double circuit tower line (other side is idle circuit). Terminate both circuits at the WRJ station. Terminate both remaining 115 kV lines to Lamont at WRJ station.
- Remove Stockdale #2 230 kV Tap from Stockdale substation, and terminate the first newly converted 230 kV circuit. Bypassing Stockdale substation.

- Terminate second newly converted 230 kV circuit at Stockdale substation, for a loop arrangement.
- Re-conductor and upgrade 6 miles of the idle line from Wheeler Ridge Junction towards Magunden substation. Upgrade for 115 kV operation, and terminate at Magunden and WRJ stations.

The project will mitigate the thermal overloads and voltage concerns identified in the Wheeler Ridge 230 kV system, specifically in the area of the CDWR pumps, following a Category C1 or C2 contingency due to loss of either the Midway 230kV Bus 1D or Midway 230kV CB642 fault. This project will also mitigate several 115kV concerns in the Kern PP 115kV area.

This project is dependent on the Midway #2 230kV Line project that was submitted through the 2013 Request Window and approved during the 2013-2014 CAISO TPP.

The ISO estimates that the proposed *Wheeler Ridge Junction Project* in its entirety will cost between \$90 million and \$140 million in 2014 dollars. The proposed in-service date of the project is May 2020.

The facilities in the Wheeler Ridge Junction substation project that are eligible for competitive solicitation are the 230 kV bus-work and termination equipment, and the 230/115 kV transformers. The 115 kV 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 Wheeler Ridge Junction 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) for the transmission facilities from this last dead end structure(s) extending into and terminating on 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 low voltage facilities, 115 kV bus-work and termination equipment 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 and 115 kV yards, but will need to 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 made available 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 shall coordinate and negotiate with PG&E on how the low side of each transformer is to be interconnected to the bus in the low

voltage 115 kV yard. PG&E will specify the phase rotation for the termination to the 115 kV bus in the low voltage yard.

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

## 2. Functional Specifications

### Substation

Nominal Phase to Phase Voltage: 230/115kV

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

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

Initial Number of 230 kV Lines: 3

Ultimate Number of 230 kV Lines: 6

Initial Number of 230 kV CBs: 8

Ultimate Number of 230 kV CBs: 12

Initial Minimum Bus Ampacity: 3000A Ultimate Bus Ampacity: 3000A

Minimum CB Ampacity: 2000A 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, MVAR, 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 2020

Low Profile Required: Subject to local permitting requirements

Gas Insulation Required: No

Initial Number of Transformers: 2

Ultimate Number of Transformers: 2

Transformer Nominal Low Winding Phase to Phase Voltage: 115 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: 6.5 % Minimum Transformer % IZ: 5.5%  
(Impedance of the two are required to match as close as possible for parallel operation)

Minimum Transformer OA Rating: 252 MVA

Maximum Transformer Load: 420 MVA LTC Required: Yes +/- 10%

No Load Taps Required: 5 NLTs with two 2.5% taps above & below nominal voltage of 230 kV