Proposed SCE Submittals into the 2021-2022 Transmission Planning Process

2021-2022 CAISO TPP
September 15, 2021

Energy for What's Ahead℠

SOUTHERN CALIFORNIA EDISON®

Summary of Proposed Projects

- New TPL 001-5 compliance assessment of "Known Outages" drove proposals for two reliability 230 kV switchrack reconfiguration projects. Two other reliability projects driven by overloads caused by P3, P6 and P7 contingencies.

#	Name of Project	Est. cost ($M)	In-Service Date
1	Devers 230 kV Reconfiguration Project	6	12/31/23
2	Victor 230 kV Reconfiguration Project	5	12/31/23
3	Laguna Bell-Mesa No. 1 230 kV Line Rating Increase Project	15	12/31/23
4	New Serrano 4AA 500/230 kV Transformer Bank	120	12/31/26

All costs are in 2021 dollars

Devers 230 kV Reconfiguration Project

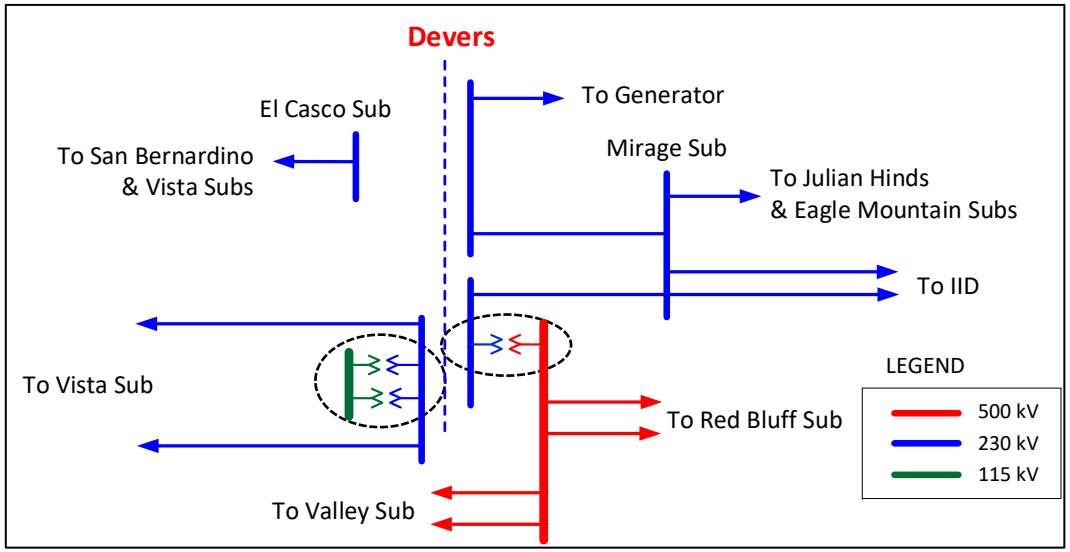
Area challenges

1. Devers 230 kV double bus outage:
   a. Isolates Mirage/IID/MWD from SCE System & causes a voltage collapse
   b. Requires the transfer of Devers load
   c. Requires curtailment of CPV Sentinel generation
   d. Is beyond existing NERC TPL reliability criteria

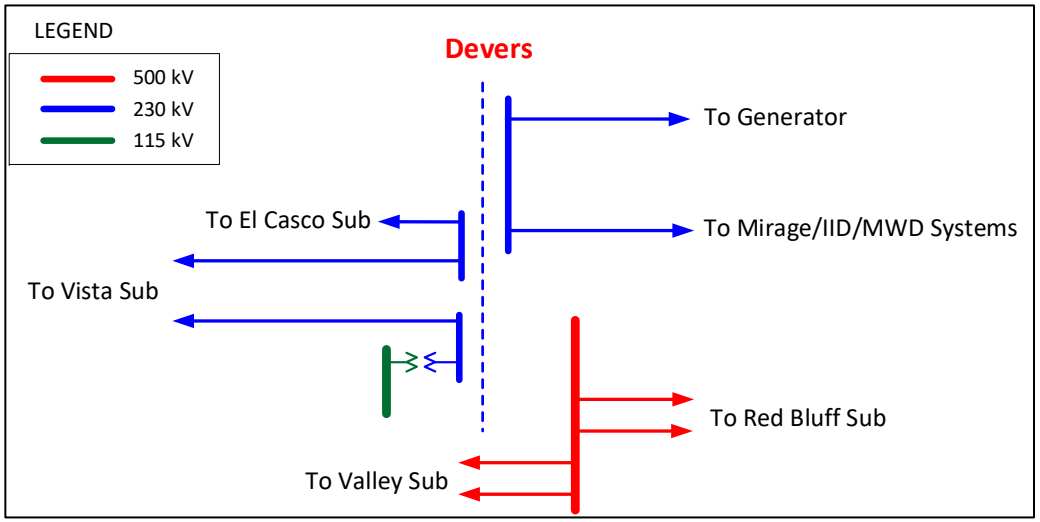
Proposed Scope

- Move Devers-Mirage No. 2 to Position 1XS
- Move Devers-Vista No. 2 to Position 7S
- Equip the 1XS and 7S 230 kV Bus Positions
- Cost: $6M

Post Project



Pre Project

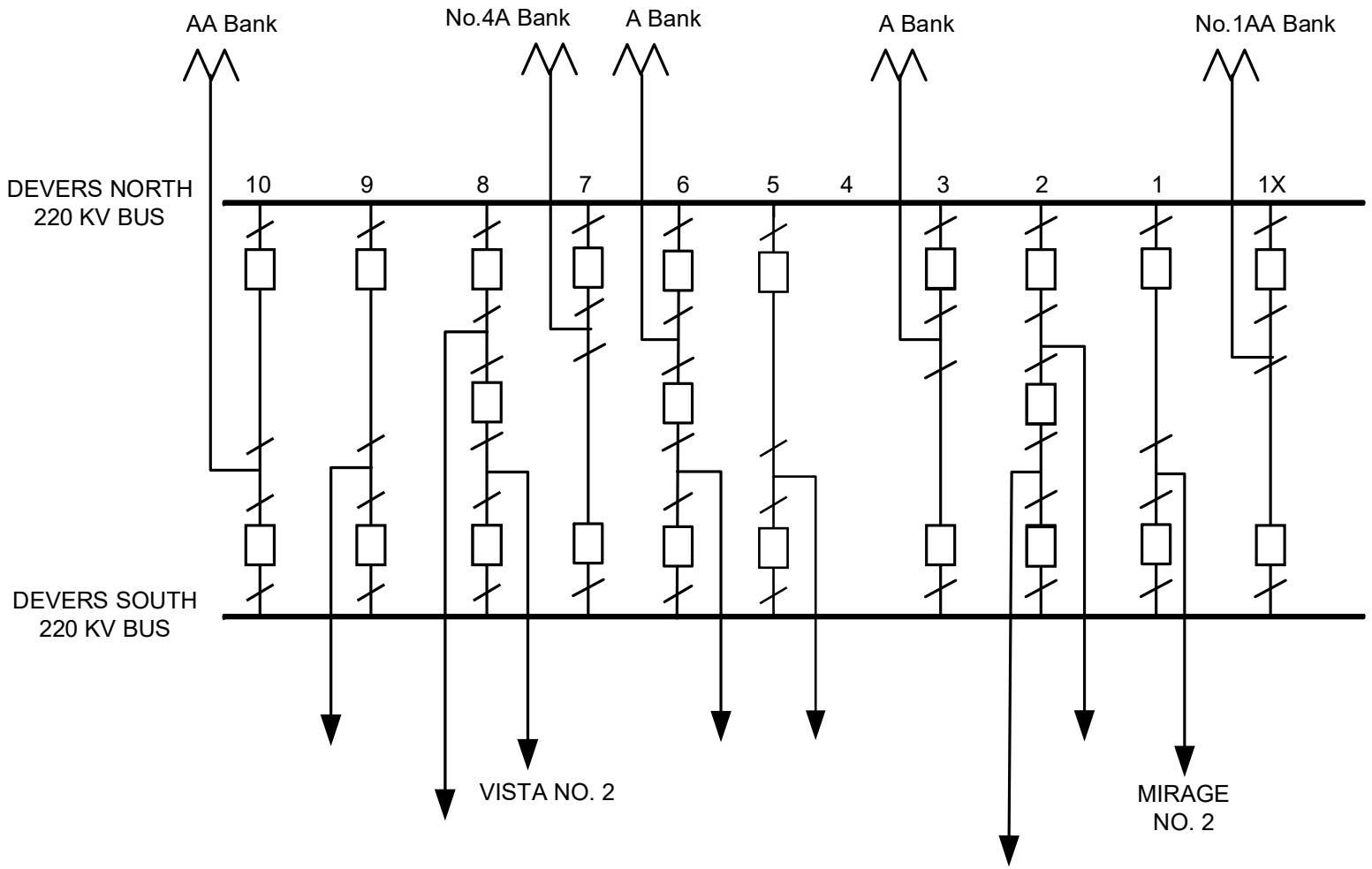


Impact of Proposed Project

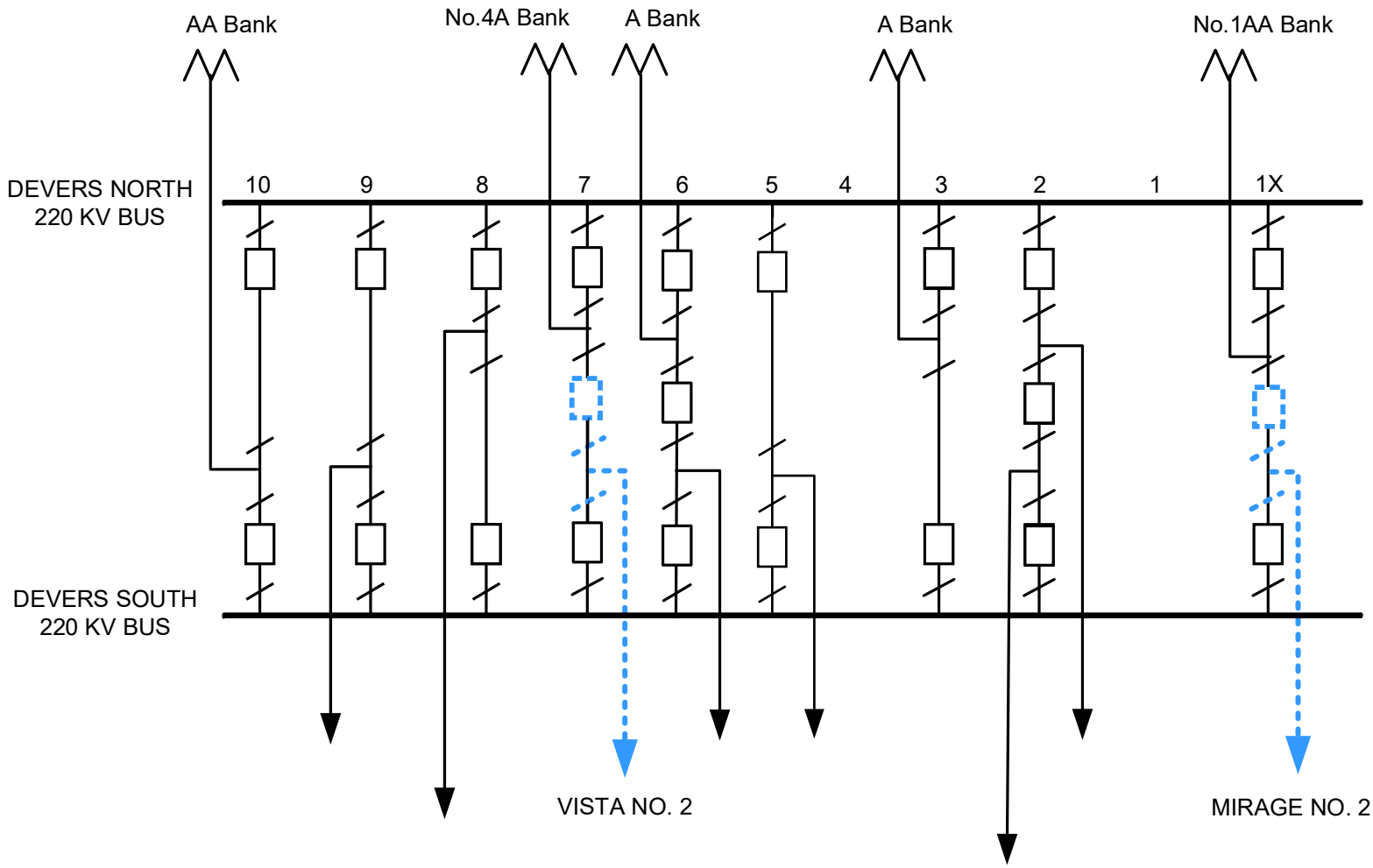
- Proposed project would increase Reliability and Operational flexibility
- Under the Devers 230 kV double bus outage, Mirage Sub would be connected by Devers 1AA Bank & (2) Devers A Banks would be served by Vista Sub

#	Eastern Area	Estimated Cost ($M)	Proposed In-Service Date
1	Devers 230 kV Configuration Upgrade	6	12/31/2023

Devers 230 kV Bus Existing Configuration



Devers 230 kV Reconfiguration Project



- Move Devers-Vista No. 2 230 kV T/L from Position 8S to 7S
- Move Devers-Mirage No. 2 230 kV T/L from Position 1S to 1XS

Devers 230 kV Reconfiguration Project

Item	Overloaded Facility	Existing Emergency Rating Amps/MVA	Contingency	Cat	Post Contingency Loading (%)	Post Contingency Loading with Proposed Upgrade (%)
2023						
1	Voltage Collapse	N/A	Devers 230 kV Double Bus Outage	Extreme	N/A	No Voltage Collapse
2026						
2	Voltage Collapse	N/A	Devers 230 kV Double Bus Outage	Extreme	N/A	No Voltage Collapse
2031						
3	Voltage Collapse	N/A	Devers 230 kV Double Bus Outage	Extreme	N/A	No Voltage Collapse

Victor 230 kV Switchrack Reconfiguration

Area Background

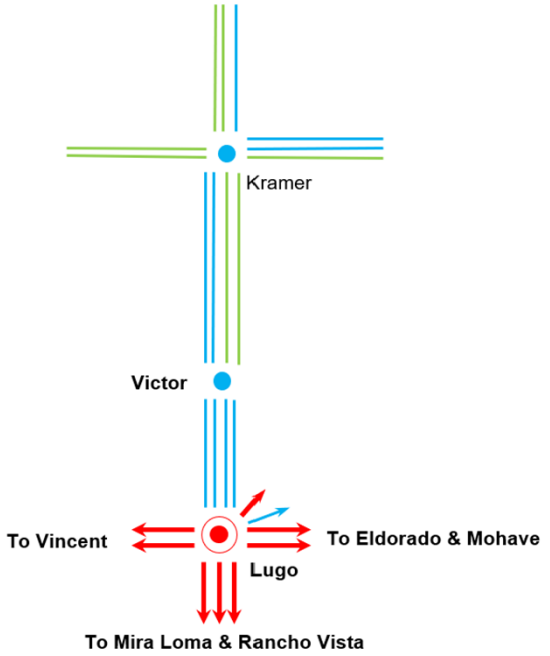
- Victor Substation is a major substation in the North of Lugo (NOL) Area. It is part of a major North to South path feeding into metropolitan areas.

Assessment

- Extreme Event
  - Risk of potential post contingency voltage collapse in the Victor/Kramer/Control areas during planned or forced Victor 230 kV bus outages
  - Loss of Victor Substation (all transformers and 230 kV portions) with the High Desert Power Plant (HDPP) RAS was evaluated for all study scenarios.
  - Critical contingency during an outage of one of the Victor 230kV buses was identified to be N-1 loss of the alternate Victor 230 kV bus

Proposed Scope

- The existing Victor 230 kV substation is physically built to breaker-and-a-half standard layout
- Convert Victor 230 kV bus from an existing double breaker double bus (DBDB) scheme to a breaker-and-a-half (BAAH) configuration
- Convert two positions to BAAH configuration by adding a tie circuit breaker (CB) and relocate 2 lines.



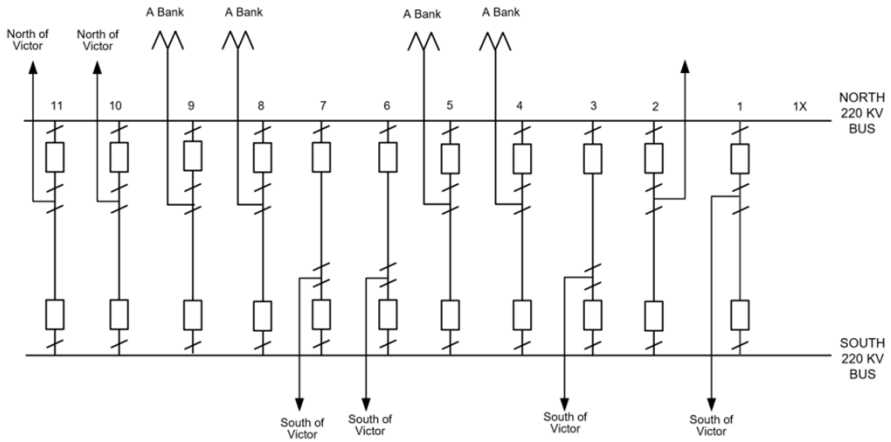
Impact of Proposed Project

- Mitigates voltage instability risk during planned/unplanned Victor 230 kV bus outages and associated constraints
- Provides operational flexibility and enhance reliability

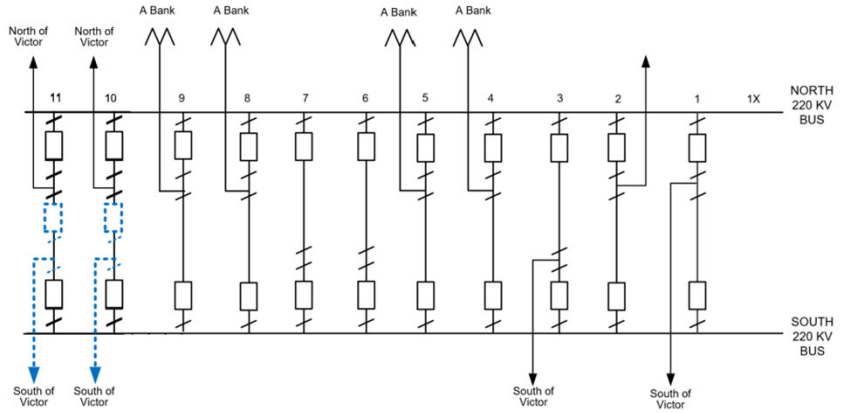
Estimated Cost ($M)	In-Service Date
5	12/31/23

Victor 230 kV Switchrack Reconfiguration

Existing Configuration



Proposed Configuration



- Move South of Victor T/L in Position 7 to South of Victor T/L Position 11
- Move South of Victor T/L in Position 8 to South of Victor T/L Position 10

Victor 230 kV Switchrack Reconfiguration Project

Item	Overloaded Facility	Existing Emergency Rating Amps/MVA (Voltage)	Contingency	Cat	Post Contingency Loading (%)	Post Contingency Loading with Proposed Upgrade (%)
2023						
1	Voltage Collapse	N/A	Victor 230 kV Double Bus Outage	Extreme	N/A	No Voltage Collapse
2026						
2	Voltage Collapse	N/A	Victor 230 kV Double Bus Outage	Extreme	N/A	No Voltage Collapse
2031						
3	Voltage Collapse	N/A	Victor 230 kV Double Bus Outage	Extreme	N/A	No Voltage Collapse

Laguna Bell-Mesa No. 1 230 kV Line Rating Increase Project

Area challenges

1. Bottleneck for flows into the Western LA Basin (Metro System)
2. New line would drive significant scope with associated cost, duration, and potential environmental disturbance

Proposed Scope

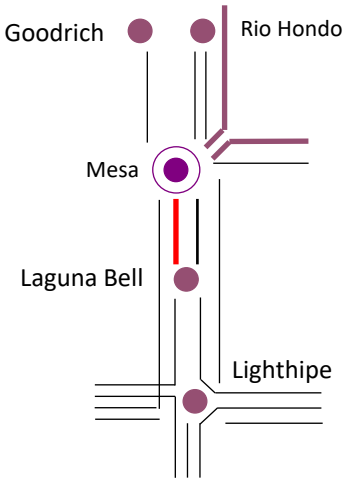
- Reconductor existing Laguna Bell-Mesa No. 1 230 kV Line with ACCC (Fort Worth) conductor.

*ACCC- Aluminum Conductor Composite Core – "High-Temperature Low-Sag"

- Requested in-service date of 12/31/2023

Impact of Proposed Project

- Mitigates P3 (Generator outage followed by the loss of another element) , P6 (loss of two non-simultaneous elements) and P7 (loss of two circuits on a common tower) contingencies
- Increases rating of line to 3250/4760 Amps SN/SE (by ~ 42%)
- Potential increase in deliverability into LA Basin and LCR benefits



Estimated Cost ($M)	In-Service Date
15	12/31/23

Laguna Bell-Mesa No. 1 230 kV Line Rating Increase Project (cont'd)

Item	Overloaded Facility	Existing Emergency Rating (Amps/MVA)	Contingency	Cat	Post Contingency Loading (%)	Proposed Emergency Rating (Amps/MVA)	Contingency Loading w Proposed Upgrade (%)
2023							
1	Laguna Bell-Mesa No.1 230 kV	3341 / 1331	Lighthipe-Mesa 230 kV and Laguna Bell-Mesa No. 2 230 kV	P7	103%	4760 / 1896	<100
2026							
2	Laguna Bell-Mesa No.1 230 kV	3341 / 1331	Lighthipe-Mesa and Laguna Bell-Mesa No.2 230 kV lines	P7	104%	4760 / 1896	<100
2031							
3	Laguna Bell-Mesa No.1 230 kV	3341 / 1331	Lighthipe-Mesa 230 kV Line and Huntington Beach Repower	P3	104%	4760 / 1896	<100
4	Laguna Bell-Mesa No.1 230 kV	3341 / 1331	Lighthipe-Mesa and Laguna Bell-Mesa No.2 230 kV lines	P7	112%	4760 / 1896	<100

New Serrano 4AA 500/230 kV Transformer Bank

Area challenges

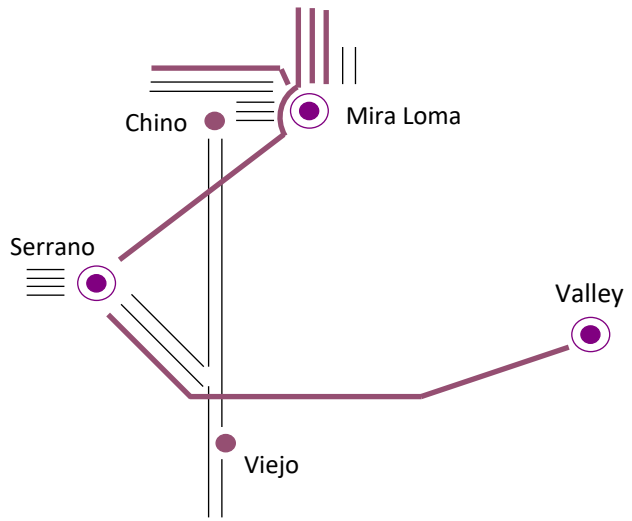
1. Main 500 kV hub for bringing power from renewable resources into Orange County.
2. Addition of 4th transformer bank would exceed short circuit duty ratings of existing 230 kV switchrack.

Proposed Scope

- Add 4th 500/230 kV AA Transformer Bank at Serrano Substationand and rebuild 230 kV switchrack to 80 kA capability.

Impact of Proposed Project

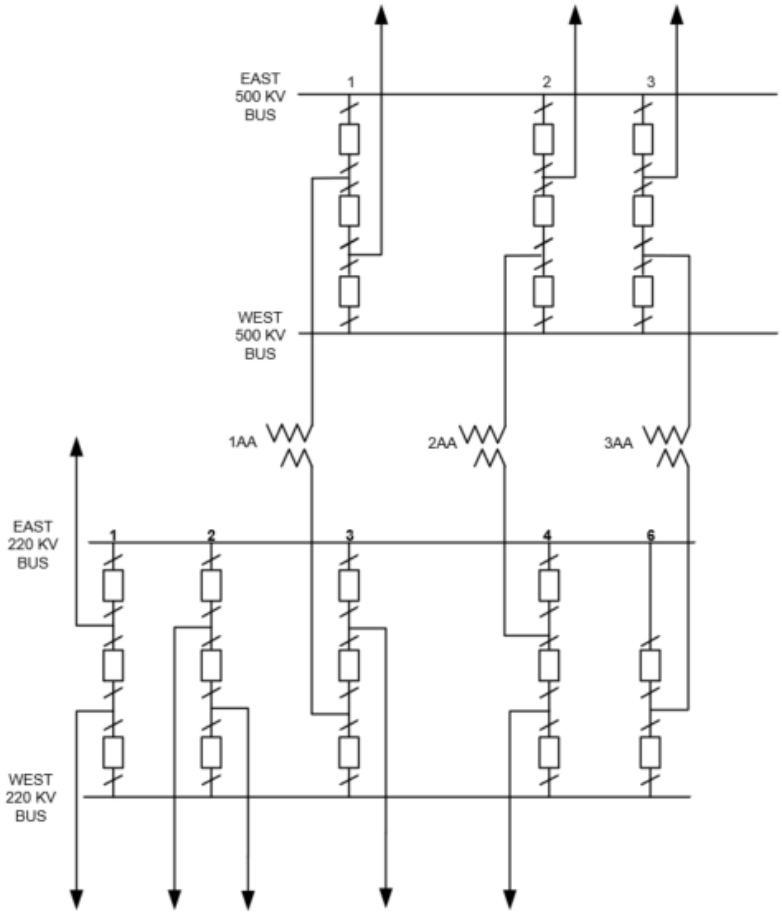
- Mitigate P6 contingencies (loss of two AA-banks).
- Retire existing Operating Procedure that opens 2-230 kV lines and splits Orange County.
- Provide potential increase in deliverability into LA Basin from renewables and LCR benefits.



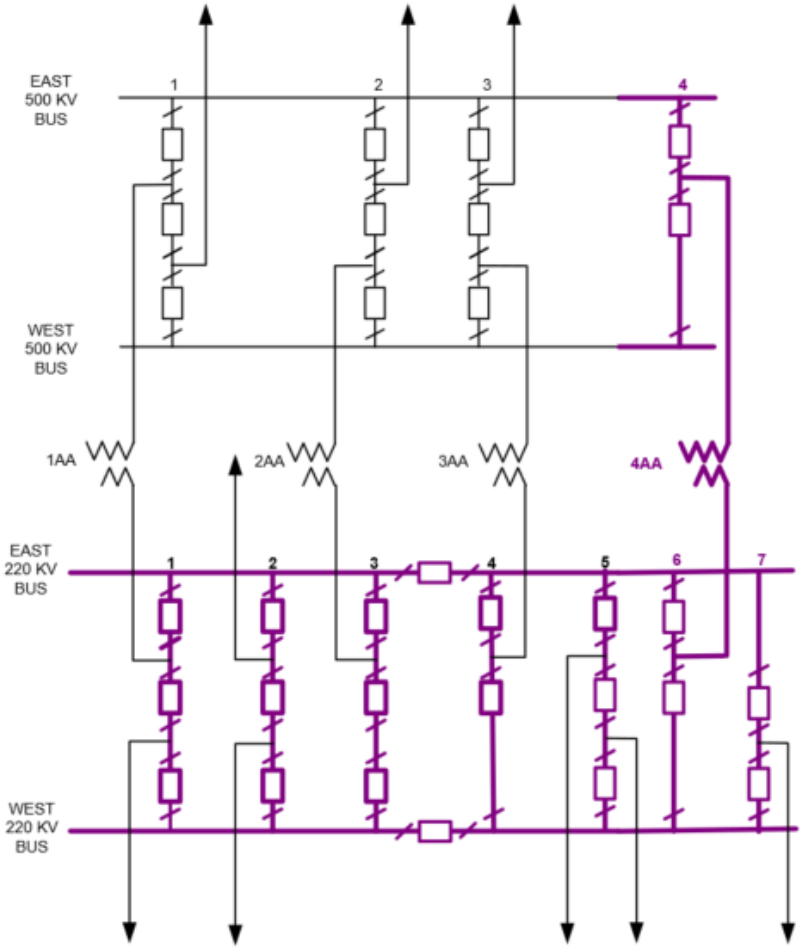
Estimated Cost ($M)	In-Service Date
120	12/31/26

Serrano 500/230 kV Substation

Existing Configuration



Proposed Configuration



New Serrano 4AA 500/230 kV Transformer Bank

Item	Overloaded Facility	Emergency Rating (Amps/MVA)	Contingency	Cat	Post Contingency Loading (%)	Post Contingency Loading w/ 4th Transformer Bank (%)
2023						
1	Serrano AA Bank	3374/1344	Loss of any two Serrano AA Banks	P6	107%	< 100%
2026						
2	Serrano AA Bank	3374/1344	Loss of any two Serrano AA Banks	P6	104%	< 100%
2031						
3	Serrano AA Bank	3374/1344	Loss of any two Serrano AA Banks	P6	108%	< 100%