WATER | ENERGY | LIFE

RIVERSIDE PUBLIC UTILITIES

Board Memorandum

BOARD OF PUBLIC UTILITIES **DATE: APRIL 10, 2023**

SUBJECT: PLAZA SUBSTATION SWITCHGEAR NO. 4 REMOVAL AND 66KV BUS DIFFERENTIAL UPGRADE PROJECT; WORK ORDER 2312723 IN THE AMOUNT OF $275,000

ISSUE:

Approve the capital expenditure for Work Order No. 2312723 in the amount of $275,000 for the Plaza Substation Switchgear No. 4 Removal and 66kV Bus Differential Upgrade Project.

RECOMMENDATION:

That the Board of Public Utilities approve the capital expenditure for Work Order No. 2312723 in the amount of $275,000 which includes all design, construction, procurement, testing, commissioning, and construction support for upgrading the 66kV bus differential protection system and removing Transformer T4 and Switchgear No. 4 at Plaza Substation.

BACKGROUND:

Historically, the Riverside Public Utilities (RPU) primary distribution system was designed to operate at 4 kilovolt (kV) and the sub-transmission system voltage was designed to operate at 33kV. Over the years, this standard was revised to a higher voltage of 12kV for distribution and 66kV for sub-transmission. These higher voltages improve the stability and efficiency of the system, allowing RPU to serve a greater number of customers with safe and reliable power.

RPU has gradually migrated to new voltage standards of 12kV and 66kV through designated projects. The 2010 Electric System Master Plan recommends voltage conversion projects to improve circuit reliability and outage restoration time for area customers. In 2022, electric utility crews completed the conversion of five 4kV feeders to 12kV infrastructure for the Magnolia Center and Wood Streets areas. Presently, those 4kV facilities are de-energized and physically abandoned in place at Plaza Substation.

The equipment associated with those 4kV feeders is housed in a metal-clad switchgear which was used to control, protect, and isolate electrical equipment at Plaza Substation. That metal-clad switchgear also includes differential electromechanical relays and ancillary devices that are part of the 66kV bus protection equipment and not associated with the 4kV switchgear protection. These relays must be replaced and installed in a different location so that the switchgear can be demolished without compromising the protection system at the station.

In addition to the problematic location of the existing 66kV bus differential protective relays, they are 50-years old and have reached the end of their operational life. The relays are prone to electrical and mechanical failures, require frequent maintenance, and have setting limitations compared to new advanced microprocessor based digital relays.

Protective relays are critical components of electrical transmission and distribution systems. They detect faults and operate substation equipment in order to isolate equipment failures and minimize damage to our equipment. Therefore, RPU staff identified those electromechanical relays at Plaza Substation Switchgear No. 4 to be a high priority for upgrade.

DISCUSSION:

Project Description

The scope of work includes demolishing and disposing of outdated 4kV rated Transformer T4 and Switchgear No. 4 at the Plaza Substation, which have been de-energized and physically abandoned in place. All associated equipment, circuits, structures, and conduits will be removed. In addition, the 66kV bus protection electromechanical relays housed in Switchgear No. 4 will be removed. A new microprocessor relay panel will be installed in the control building to replace the removed equipment.

The engineering design contemplated for this project will be performed by RPU staff. The construction work, testing, and commissioning will be performed by RPU field forces. No contract work is anticipated for any of this scope of work.

Switchgear No. 4 and Transformer T4 to be removed at Plaza Substation

Typical Electromechanical Relays

Typical New Digital Relays

Total Project Cost

The project and fiscal breakdown is proposed as follows:

Project and Fiscal Breakdown		
Work Type	Performed By:	Amount ($)
Project Management and Engineering	RPU Engineering Staff	$70,000
Construction	RPU Substation Electricians	$110,000
Testing and Commissioning	RPU Test and SCADA	$30,000
Equipment and Material		$40,00
Project Contingency (10%)		$25,000
Work Order Total:		**$275,000**
Anticipated Start Date:		**April 2023**
Anticipated Duration:		**18 weeks**

STRATEGIC PLAN ALIGNMENT:

This item contributes to **Strategic Priority 6 - Infrastructure, Mobility and Connectivity** and **Goal 6.2** – Maintain, protect, and improve assets and infrastructure within the City's built environment to ensure and enhance reliability, resiliency, sustainability, and facilitate connectivity.

This item aligns with each of the five Cross-Cutting Threads as follows:

1. **Community Trust** – Planned replacement of deteriorating electrical protection infrastructure with equipment that complies with current standards will improve safety and reliability of the electric system is a prudent and responsible action that helps build community trust and results in the greater public good.

2. **Equity** – The replacement of the protection system relays has been established based on engineering planning and operational criteria, with equitable distribution of services to ensure every member of the community has equal access to share the benefits of system improvements and reliability.

3. **Fiscal Responsibility** – This item represents fiscal responsibility by identifying and replacing aging infrastructure, providing optimal electrical system reliability, safety, and efficiency, and reducing potential equipment and system failures and overall operational costs. Stock material and equipment will be used for the new installations, thus, minimizing outside purchases.

4. **Innovation** – RPU is committed to identifying creative solutions to meet the needs of our community members, effectively and efficiently by providing innovative infrastructure improvements. A collaborative and efficient approach has been used to replace the aging electric infrastructure to minimize potential disruptions to our customers in the future.

5. **Sustainability & Resiliency** – This project ensures that new protection system relays and related component upgrades provide grid modernization and reliability that is expected to last well into the future.

FISCAL IMPACT:

The total fiscal impact is $275,000. Sufficient funds are available in Public Utilities Substation Bus Upgrade Account No. 6130100-470616.

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Attachments:
1. Project Site Map
2. Presentation