



RIVERSIDE PUBLIC UTILITIES

Board Memorandum

BOARD OF PUBLIC UTILITIES

DATE: JANUARY 23, 2023

SUBJECT: HARVEY LYNN SUBSTATION SWITCHGEAR NO. 5 PROTECTION SYSTEM UPGRADE PROJECT; WORK ORDER 2302559 IN THE AMOUNT OF \$383,000

ISSUE:

Consider approval of the capital expenditure for Work Order No. 2302559 in the amount of \$383,000 for the Harvey Lynn Substation Switchgear No. 5 Protection System Upgrade Project.

RECOMMENDATION:

That the Board of Public Utilities approve the capital expenditure for Work Order No. 2302559 in the amount of \$383,000 which includes all design, construction, procurement, testing and commissioning, and construction support for upgrading the protection and automation systems at Harvey Lynn Substation Switchgear No. 5.

BACKGROUND:

Protective relays are critical components of electrical transmission and distribution systems. The function of a protective relay is to detect and locate an electrical fault and issue a command to the associated circuit breaker to isolate the faulty section of the system. This is how protective relays play a key role in ensuring the safe and reliable operation of the electric grid.

Electromechanical relays and control systems were the standard in the electrical industry until the 1990s. Since then, there has been a migration towards digital relays and controls. RPU standardized the use of digital relays for all new installations and upgrades in the late 1990s. Now these first-generation digital relays that were installed in the late 1990s have reached the end of their design life of 20 years and are experiencing failure in service due to the effects of aging on electronic components of the digital relays.

Replacement of first-generation digital relays with new digital relays is essential to increase safety and system dependability and support smart grid infrastructure. New digital relays have high-speed, secure, dependable fault detection, robust event reporting, and comprehensive automation and control functions. The innovative features in new protective relays provide significant advantages over the first-generation digital relays and electromechanical relays.

RPU has an ongoing relay replacement program that identifies and proactively replaces substation protective relays, automation, and control equipment. The program is driven by a

number of factors including the age of relay, relay obsolescence, level of effort to maintain a complex and unique relay model, and system criticality.

The relays at Harvey Lynn Switchgear 5 were installed in 1995, making them 27 years old and far beyond their design life. Similar vintage relays have experienced failures at other substations for various reasons, such as power supply and sensing module failures. RPU has been systematically targeting the vintage relays for replacement to reduce the risk of failure in service and compromising the reliability of services to the customers. Therefore, RPU Substation Engineering and Test Group identified the relays at Harvey Lynn Substation as a good candidate for replacement.



Typical 1st Generation Digital Relays



Typical New Digital Relays

DISCUSSION:

Project Description

The scope of work includes replacing seven 15kV distribution first-generation digital relays with seven new digital relays at the Harvey Lynn Substation Switchgear No. 5 which will improve the reliability and simplify the protection and control systems. In addition, the scope of work will include installing a digital substation automation system for communication with the new relays. The project will include installing a new auto-transfer schemes for potential transformers and control power transformers.

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.

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	\$60,000
Construction	RPU Substation Electricians	\$105,000
Testing and Commissioning	RPU Test and SCADA	\$68,000
Equipment and Material		\$115,000
Project Contingency (10%)		\$35,000
Work Order Total:		\$383,000
Anticipated Start Date:		February 2023
Anticipated Duration:		16 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. The lowest price for the protection system relay replacement units and thereby the best value for RPU' s customers was ensured through a competitive bidding process.
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 ancillary devices provide grid modernization and reliability that is expected to last well into the future.

FISCAL IMPACT:

The total fiscal impact is \$383,000. Sufficient funds are available in Public Utilities Substation Bus Upgrade Account No. 6130100-470608.

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Attachments:
1. Project Site Map
2. Presentation