MULTI SUBSTATION PROTECTION AND AUTOMATION UPGRADE PROJECT

Riverside Public Utilities

Board of Public Utilities
September 25, 2023

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1

BACKGROUND

Protective Relaying Equipment:

- Critical components in the electrical system
- Safeguard the electrical grid from abnormal electrical events such as faults
- Provide fast isolation of affected sections
- Ensure optimum performance of system reliability, safety and stability

2

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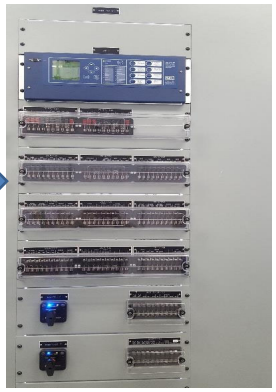
2

BACKGROUND

- Electromechanical relays were the industry standard for decades
- The late 1990s marked a shift from electromechanical to digital technologies in the electrical industry
- Advancements in electronics and computing have enabled this transition, providing speed, accuracy, and versatility
- Electromechanical relays, while historically effective, are now less precise, slower, and lack advanced functionality
- These systems are increasingly challenging to maintain and repair due to obsolete parts

BACKGROUND CONT.

Typical Electromechanical Relays



Modern Digital Relays

Modern Digital Relays Advantages

- Higher precision
- Application flexibility
- Less maintenance
- Self-diagnostic
- More reliable
- Improved monitoring and control functions

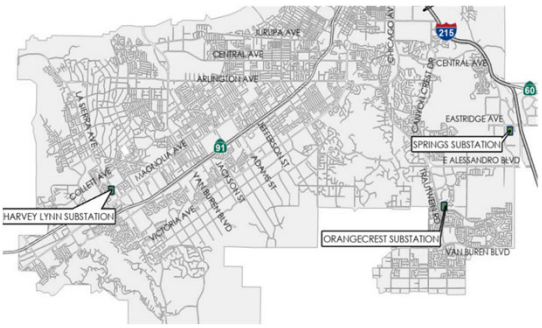
PROTECTION AND AUTOMATION REPLACEMENT PROGRAM

- RPU has established a protection relay and automation replacement program to transition from electromechanical relays and automation systems to digital systems
- The program prioritizes replacement based on several factors such as the relay's age, obsolescence, maintenance difficulty, and system criticality
- This program represents a strategic investment in our grid's future, ensuring continued delivery of reliable and secure power

DISCUSSION

As part of the relay program replacement, RPU is initiating these projects to upgrade the protective relays and automation systems at several substations:

- Springs Substation Bus Differential Relay Upgrade Project
- Harvey Lynn Substation Switchgear 5 Protection and Upgrade Project
- Orangecrest Substation Switchgear 1 and 2 Protection and Automation Upgrade Project



SPRINGS BUS DIFFERENTIAL RELAY UPGRADE PROJECT

- All electromechanical relays updated through various protection and automation projects except for two 66kV bus segment relays
- Scope of Work: Replacement of two 66kV electromechanical bus differential relays with digital ones, along with the installation of auxiliary devices to support the new relays

Project and Fiscal Breakdown (Springs Bus Differential Relay Upgrade Project)		
Work Type	Performed By:	Amount ($)
Project Management and Engineering	RPU Engineering Staff	$40,000
Construction	RPU Substation Electricians	$60,000
Testing and Commissioning	RPU Test and SCADA	$30,000
Equipment and Material		$45,000
Project Contingency (10%)		$18,000
Work Order Total:		$193,000
Anticipated Start Date:		October 2023
Anticipated Duration:		5 Months

HARVEY LYNN SWITCHGEAR 5 PROTECTION AND UPGRADE PROJECT

- Harvey Lynn Switchgear houses an outdated electromechanical protecting transformer T5 and older electromechanical control relays controlling auto-transfer schemes between switchgear 5 and others at the Harvey Lynn Substation
- Scope of Work: Includes replacing three transformer protection electromechanical relays with a single digital relay, and replacing electromechanical control relays with a new automation system. This system will manage auto-transfer schemes of the potential transformer, control power, and main bus tie breakers

Project and Fiscal Breakdown (Harvey Lynn Switchgear 5 Protection and Upgrade Project)		
Work Type	Performed By:	Amount ($)
Project Management and Engineering	RPU Engineering Staff	$50,000
Construction	RPU Substation Electricians	$96,000
Testing and Commissioning	RPU Test and SCADA	$40,000
Equipment and Material		$50,000
Project Contingency (10%)		$24,000
Work Order Total:		$260,000
Anticipated Start Date:		October 2023
Anticipated Duration:		6 Months

ORANGECREST SWITCHGEAR 1 AND 2 PROTECTION AND AUTOMATION UPGRADE PROJECT

- Orangecrest Switchgear 1 and 2 equipped with 32 protective relays installed between the late 1980s and early 1990s, comprising a mix of electromechanical and early-generation digital systems. The control and automation infrastructure of these units is notably outdated.

- Scope of Work: Involves replacing 32 existing electromechanical and first-generation digital relays with 17 modern digital relays. This includes upgrading the automation to integrate these new relays into the system.

Project and Fiscal Breakdown (Orangecrest Switchgear 1 & 2 Protection and Automation Upgrade Project)		
Work Type	Performed By:	Amount ($)
Project Management and Engineering	RPU Engineering Staff	$190,000
Construction	RPU Substation Electricians	$360,000
Testing and Commissioning	RPU Test and SCADA	$120,000
Equipment and Material		$220,000
Project Contingency (10%)		$89,000
Work Order Total:		$979,000
Anticipated Start Date:		October 2023
Anticipated Duration:		10 Months

STRATEGIC PLAN ALIGNMENT

Strategic Priority 6 – Infrastructure, Mobility and Connectivity

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.

Cross-Cutting Threads

- Community Trust
- Fiscal Responsibility
- Sustainability & Resiliency
- Equity
- Innovation

RECOMMENDATIONS

That the Board of Public Utilities:

1. Approve the capital expenditure for Work Order No. 2403007 in the amount of $193,000 for Springs Substation Bus Differential Relay Upgrade Project;
2. Approve the capital expenditure for Work Order No. 2323918 in the amount of $260,000 for Harvey Lynn Substation Switchgear 5 Protection and Upgrade Project; and
3. Approve the capital expenditure for Work Order No. 2402369 in the amount of $979,000 for Orangecrest Substation Switchgear 1 and 2 Protection and Automation Upgrade Project.