The Village of Shorewood

Streetlight Replacement

Implementation Plan

6/03/2024

Agenda

Existing Streetlighting Systems

1. Commercial Corridors vs Residential Areas
2. Concurrent Construction

Alternative Systems Evaluation

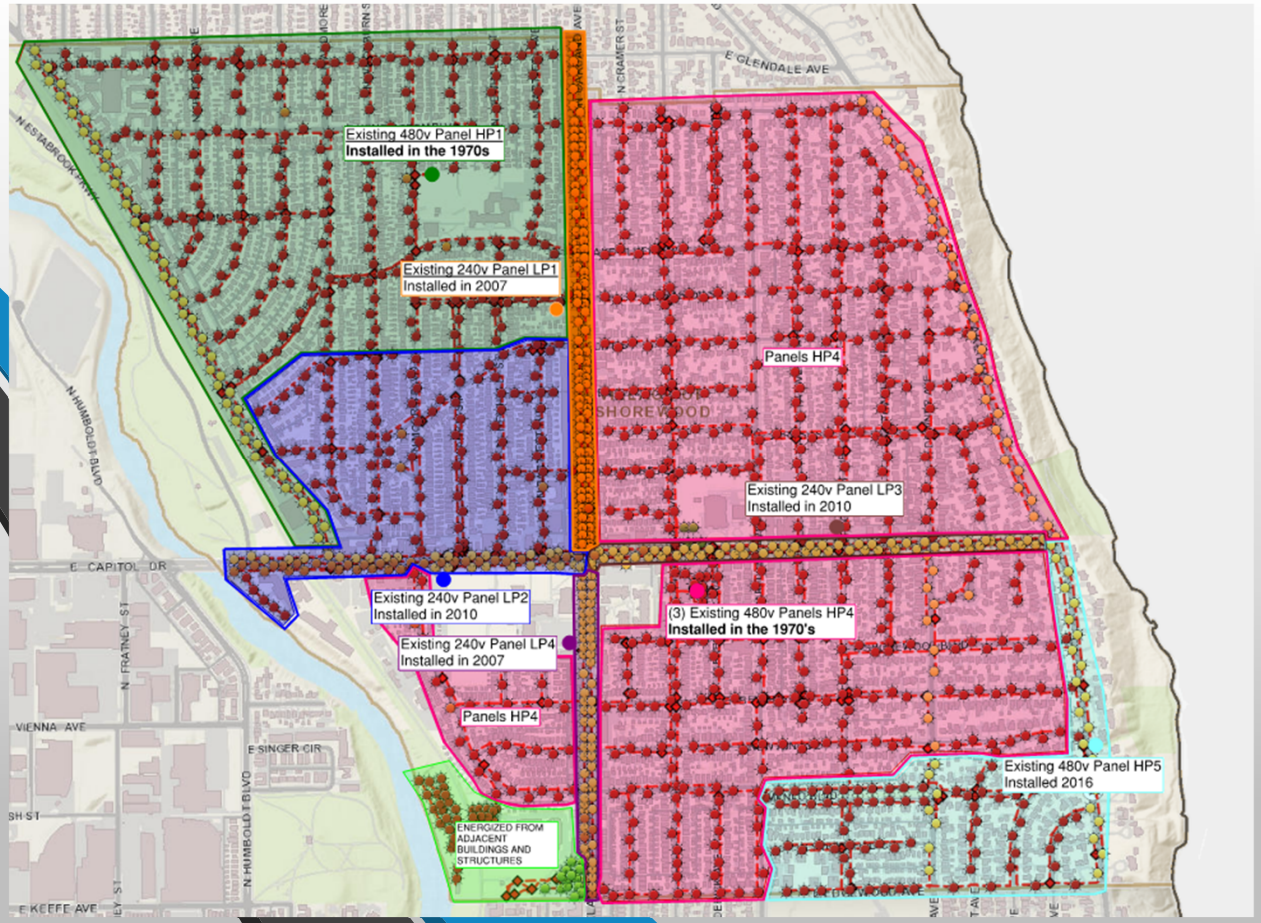
1. 480V vs. 240V vs. 277V
2. Recommendation

Construction Implementation

1. Years 1 – 5 (2025 – 2029)
2. Conclusion

Existing Streetlighting Systems

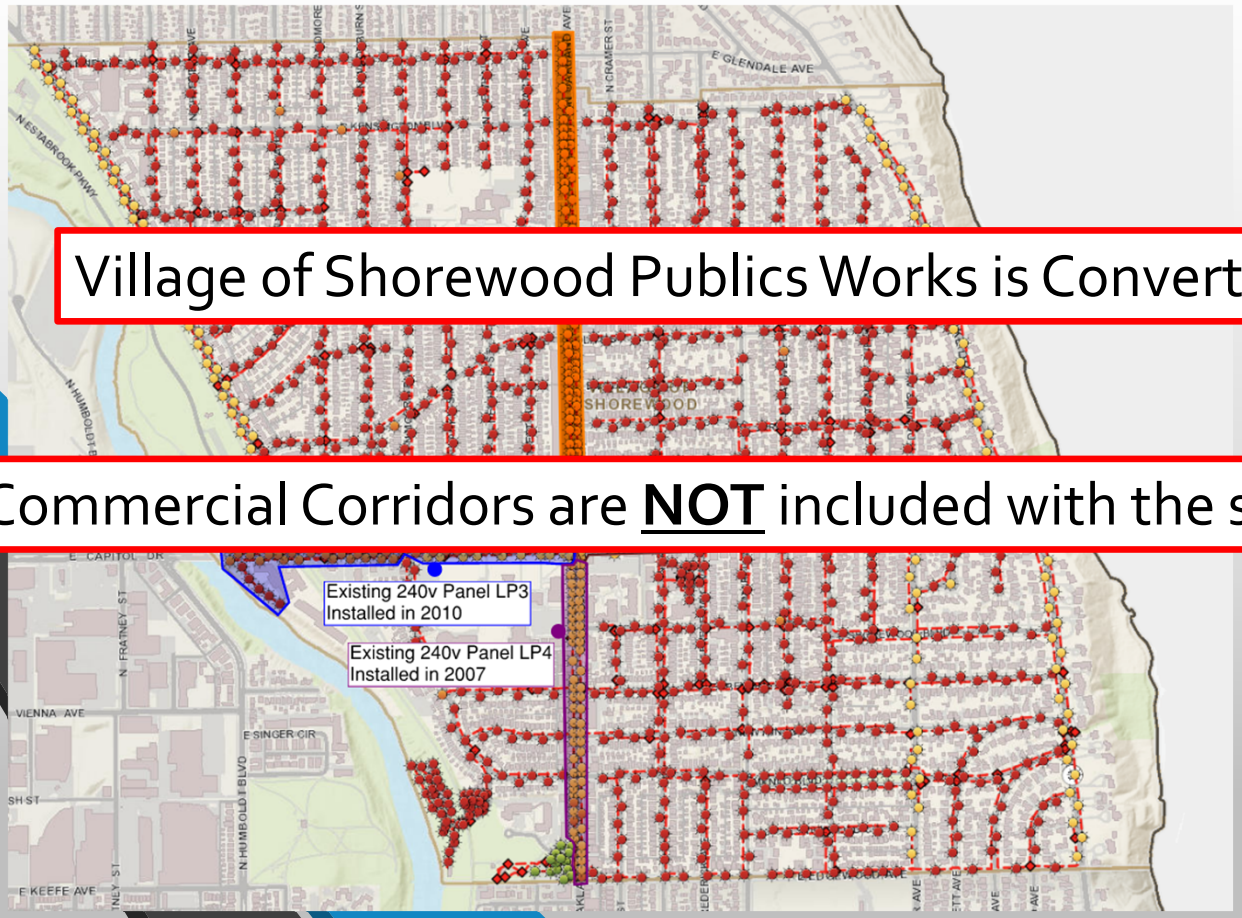
Overview



- Installed in the 1970's (typical life expectancy 30-40 years)
- Combination of 120/240V (Commercial Corridors) & 240V/480V (Residential Areas) systems
- 35-40 different circuits throughout the village, primarily using direct bury conductors
- Approximately 1,200 street lighting units

Existing Streetlighting Systems

Commercial Corridors

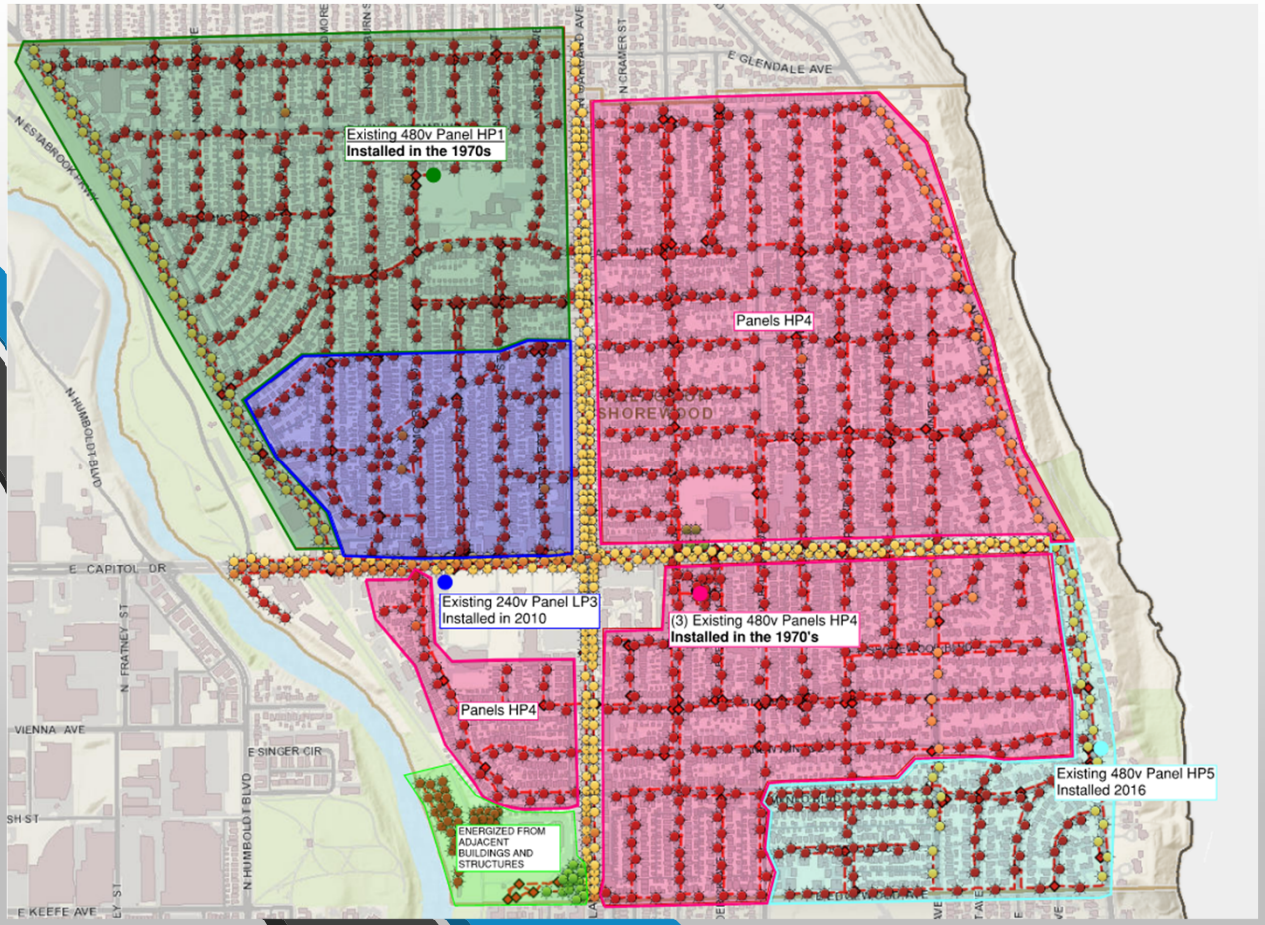


Village of Shorewood Publics Works is Converting these to LED

Commercial Corridors are **NOT** included with the scope of this project

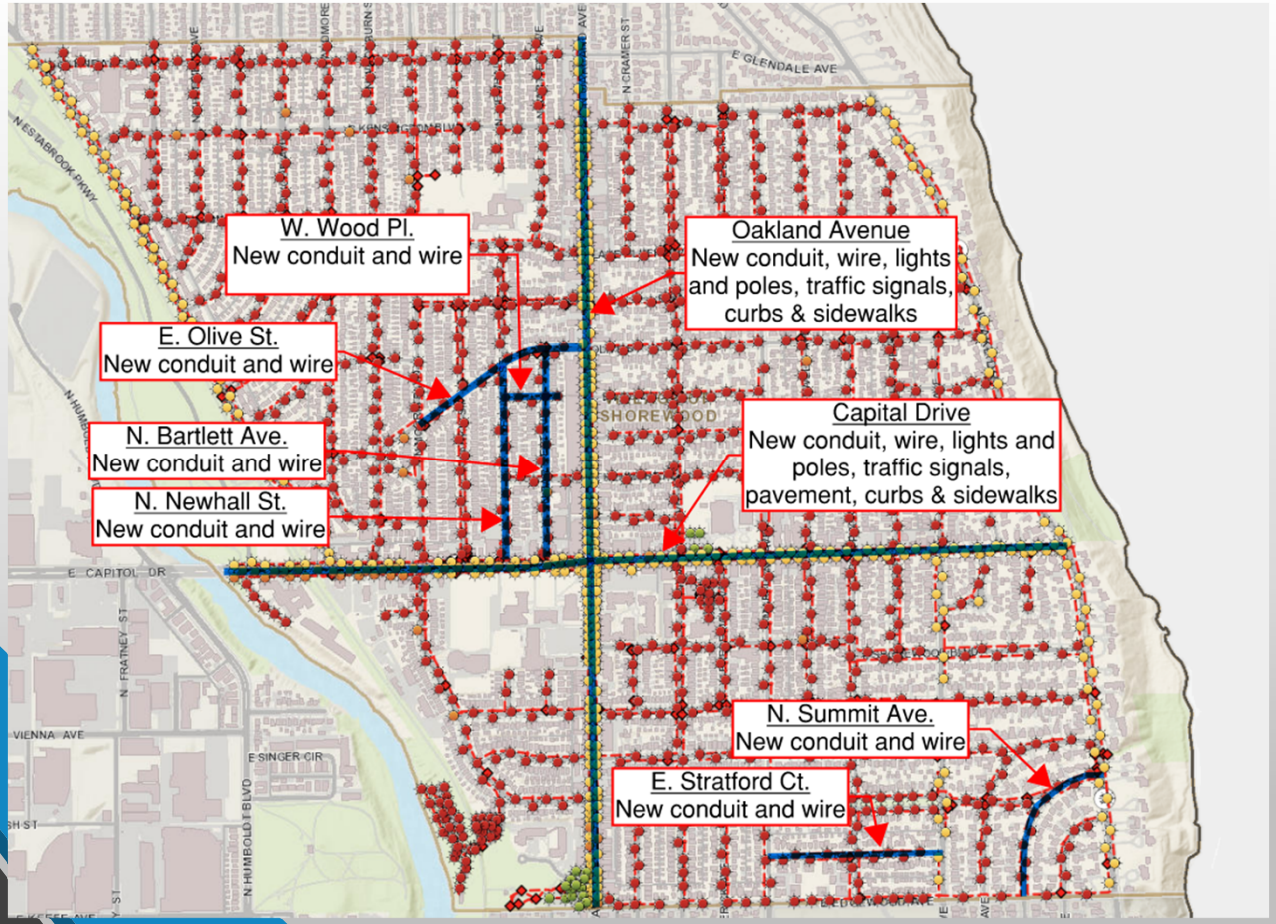
Existing Streetlighting Systems

Residential Areas



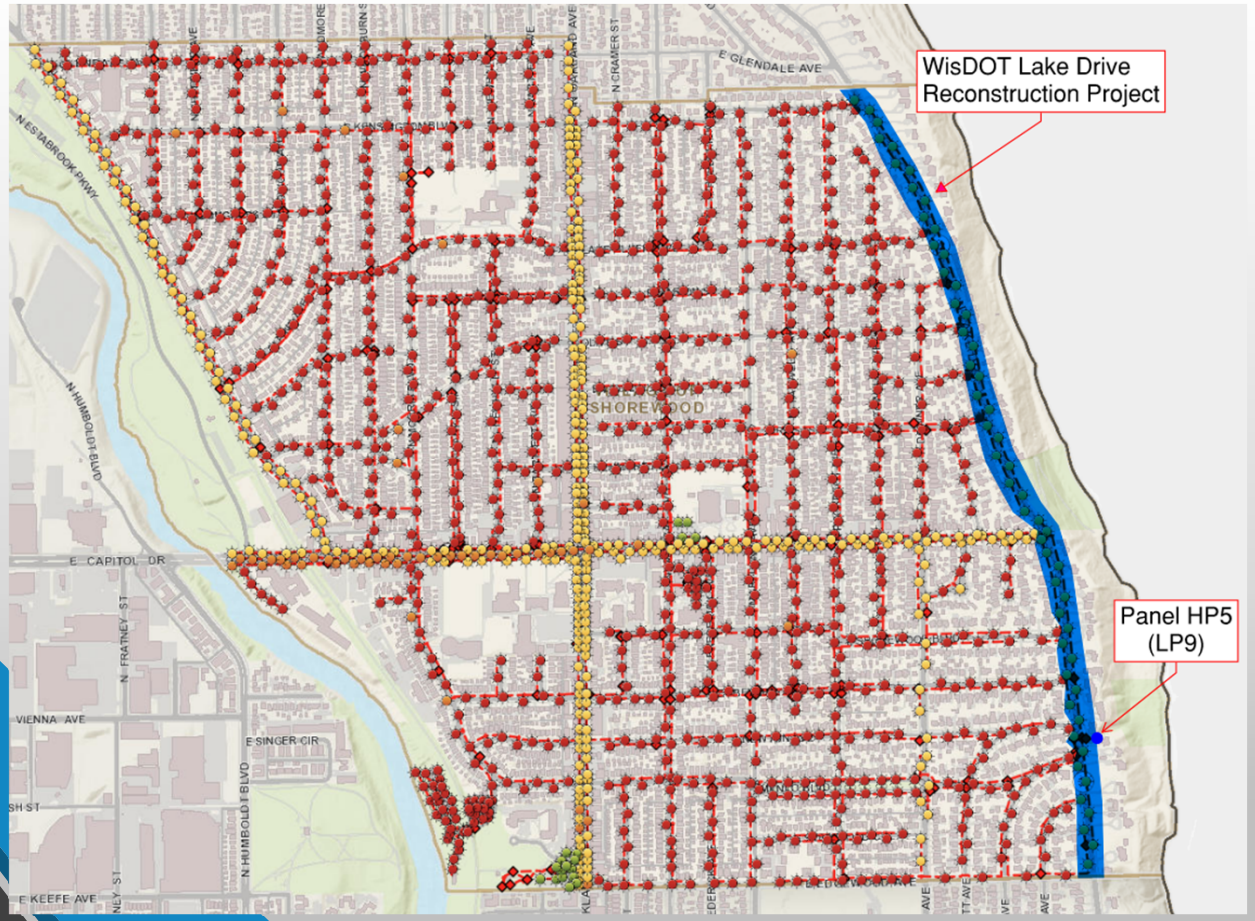
Existing Streetlighting Systems

Recent Infrastructure Upgrades



Existing Streetlighting Systems

Lake Drive Reconstruction Project



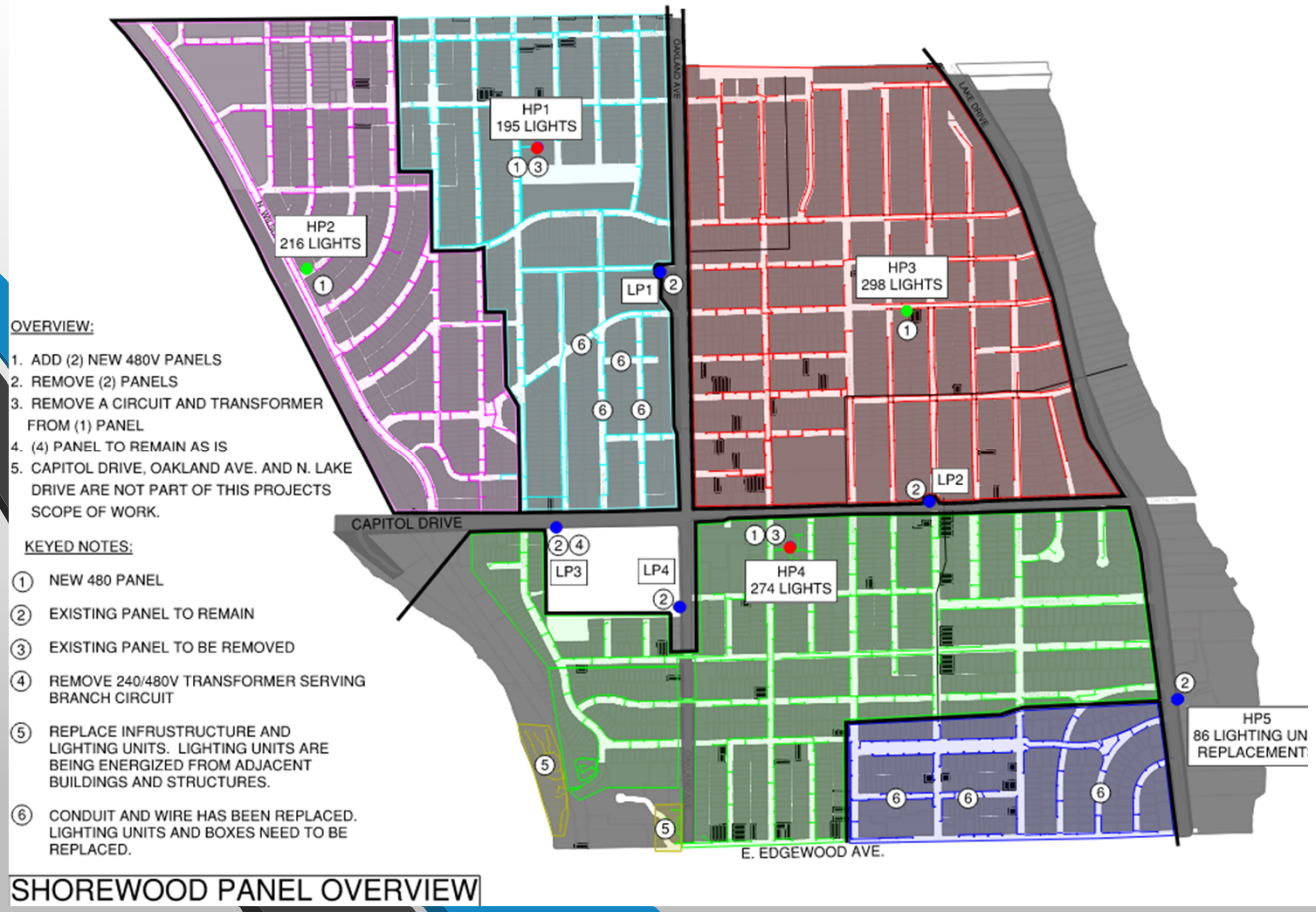
Alternative Systems Evaluation

Overview

- Evaluation focused on residential areas only
- Includes 480V single phase, 240V single phase, and 277V three phase systems

Alternative Systems Evaluation

480V Single Phase Panel Overview

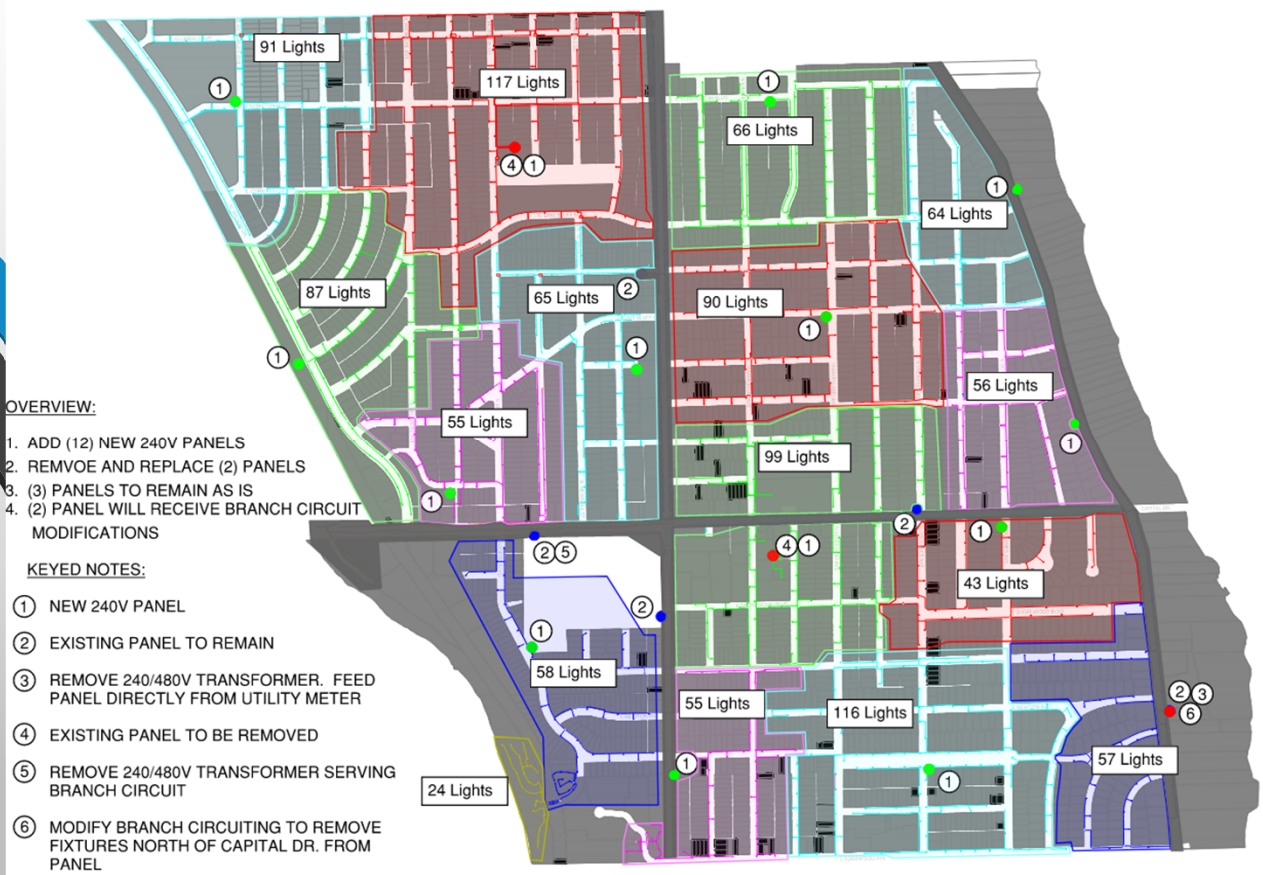


SHOREWOOD PANEL OVERVIEW

- Power distribution over greater distances means fewer panels (5 total)
  - (2) new panel locations will be required (HP2 & HP3)
  - Fewer meter fees
  - Smaller wire size
- Consistent with existing operations
  - Minimal impacts to maintenance operations
- Incompatible with 120/240V amenities i.e. outlet receptacles
- Approximate cost of $13,750 per lighting unit
  - Includes all necessary infrastructure

Alternative Systems Evaluation

240V Single Phase Panel Overview



- Power distribution distance is limited (17 panels total)
  - Greater impact to residents
  - More meter fees
  - Larger wire size
- Consistent with commercial corridor operations
  - Minimal impacts to maintenance operations
  - Simplifies material stocking
- Approximate cost of $14,700 per lighting unit
  - Includes all necessary infrastructure

Alternative Systems Evaluation

277V Three Phase Overview

- 277V three phase system alternative was eliminated early in the evaluation
- Three phase system provides for greater capacity of the panels, but 277V means circuits cannot extend much further than the 240V single phase alternative
  - Will require approximately (17) electric panels for entire system
- Converting to a 277V three phase system for the residential areas would require a complete overhaul of the electrical service infrastructure from the utility, as well as the street lighting infrastructure
  - Existing service laterals from the electric utility would not be compatible
  - The work associated with the utility company would drive the cost well beyond the previous alternatives
- Provides little to no operational benefit

Alternative Systems Evaluation

Cost Analysis

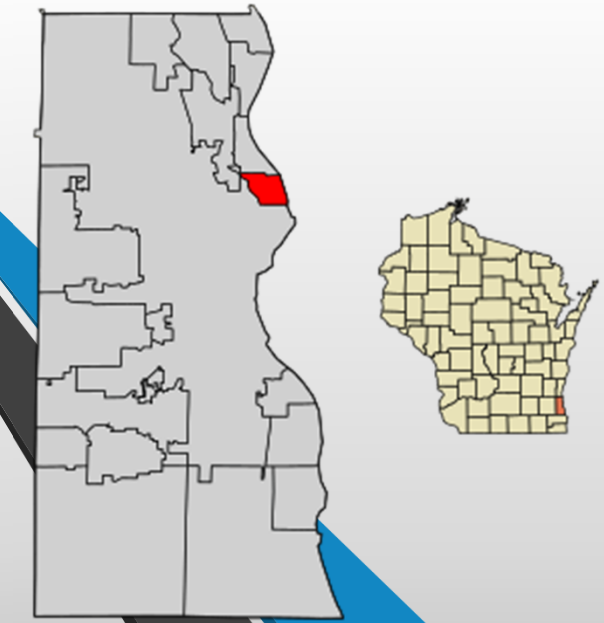
Alternatives Cost Analysis			
Alternative	**480V**	**240V**	**277V**
Construction Cost per Fixture (Average over 5 years)	$13,754	$15,032	--
Total Project Cost	$14,699,696	$15,905,874	--
Panel Quantity	5	17	17

Recommendation:
480V Single Phase Systems for Residential Areas

- Lower Cost
- Minimal Impacts to Maintenance
- Minimal Impacts to Residential Properties

Construction Implementation

Phasing Considerations



Concurrent Projects

- Our Phase Planning took other infrastructure projects into consideration that the Village of Shorewood has scheduled
- The location will not impede with the other infrastructure projects that are scheduled for each phase of lighting replacement

Methodology

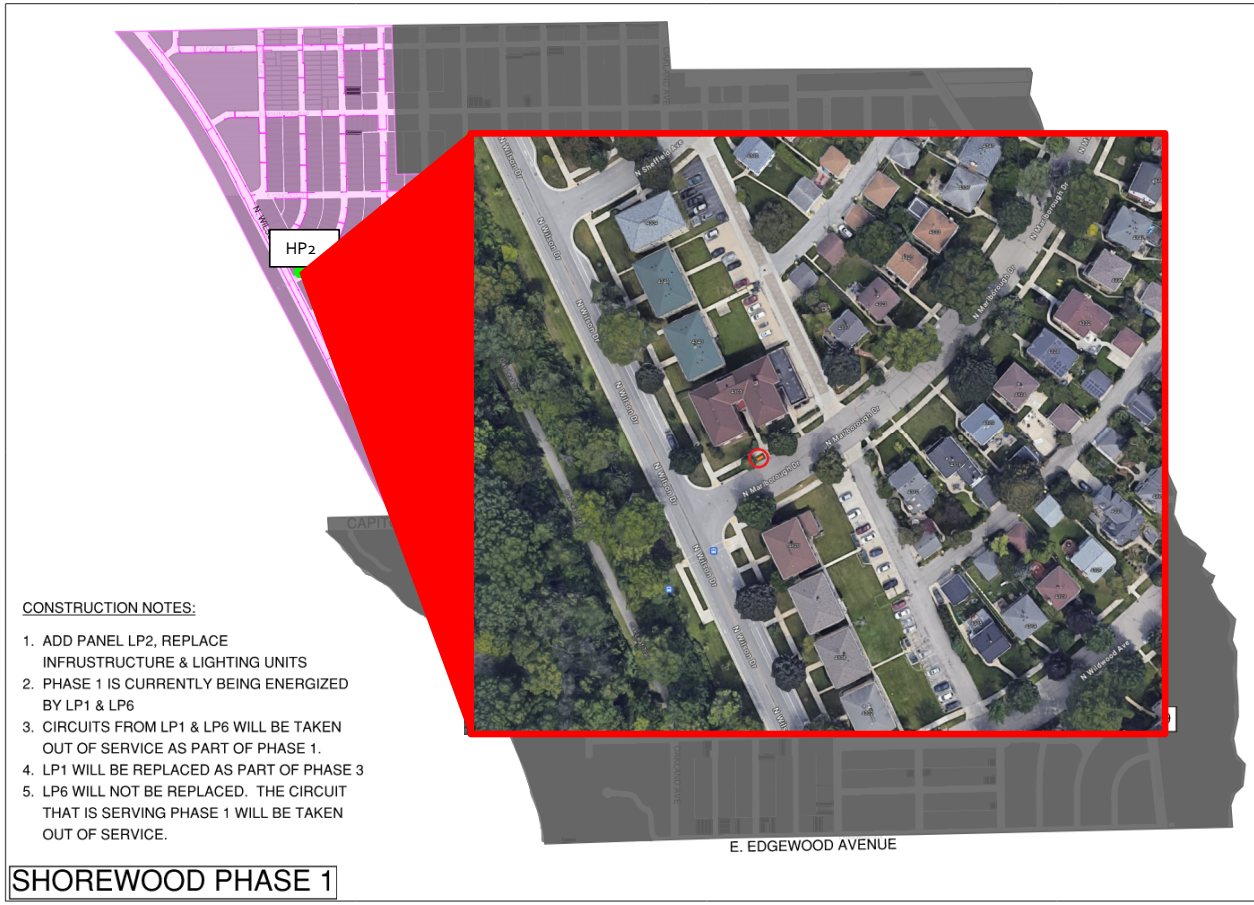
- Avoid long lighting shutdowns by replacing fixtures and infrastructure at the limits of existing panels and work backwards towards the panels currently in service
- Slowly remove load from existing panels and reallocate to new panels

Scope and Costs Evenly Spread Across Phases

- (22) fixture difference from the phase with the most lighting replacements to the phase with the fewest amount of lighting replacements
- $332,438 delta between the costliest and least costly phase

Construction Implementation

Phase 1 - 2025



Install Panel HP2

- Proposed to be installed at N. Wilson Drive and N. Marlborough Drive
- Remove circuits from existing panels by starting at the circuit limits and working back toward Panel LP1 and LP6.

Infrastructure

- Remove and replace fixtures (typ.)
- Install underground conduit, wire, and pull boxes (typ.)

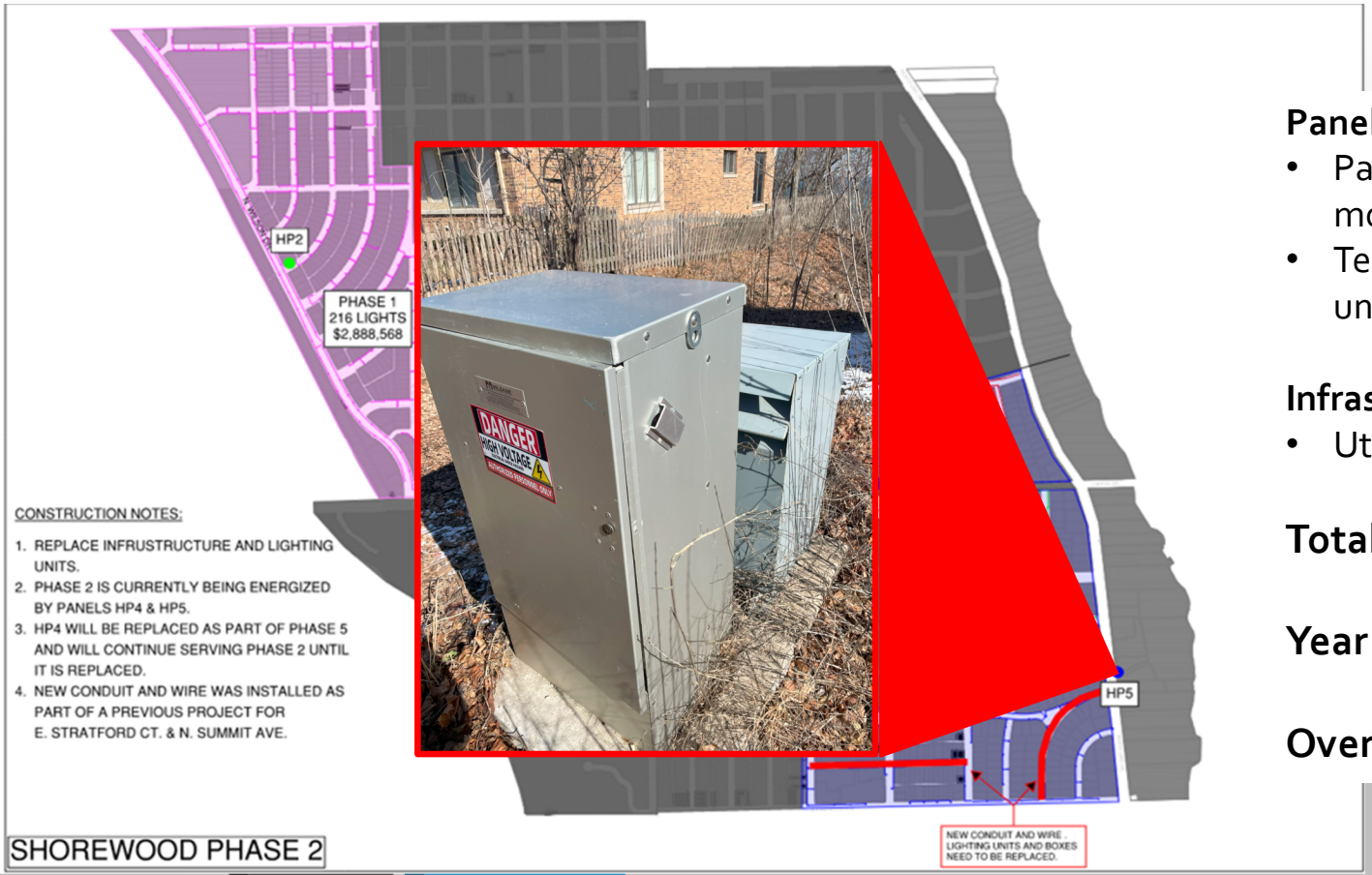
Total Luminaire Replacement – 216

Year 1 (2025) Cost - $2,888,568

Overall Cost per Luminaire - $13,373

Construction Implementation

Phase 2 - 2026



Panel HP5

- Panel HP5 is existing to remain without modifications
- Temporarily feed residential lighting until later construction phases

Infrastructure

- Utilize some existing infrastructure

Total Luminaires - 202

Year 2 (2026) Cost - $2,630,035

Overall Cost per Luminaire - $13,020

Construction Implementation

Phase 3 - 2027

Panel HP1

- Remove and replace Panel HP1
- HP1 will absorb the remaining fixtures being energized by LP3

Infrastructure

- Utilize some previously updated underground infrastructure

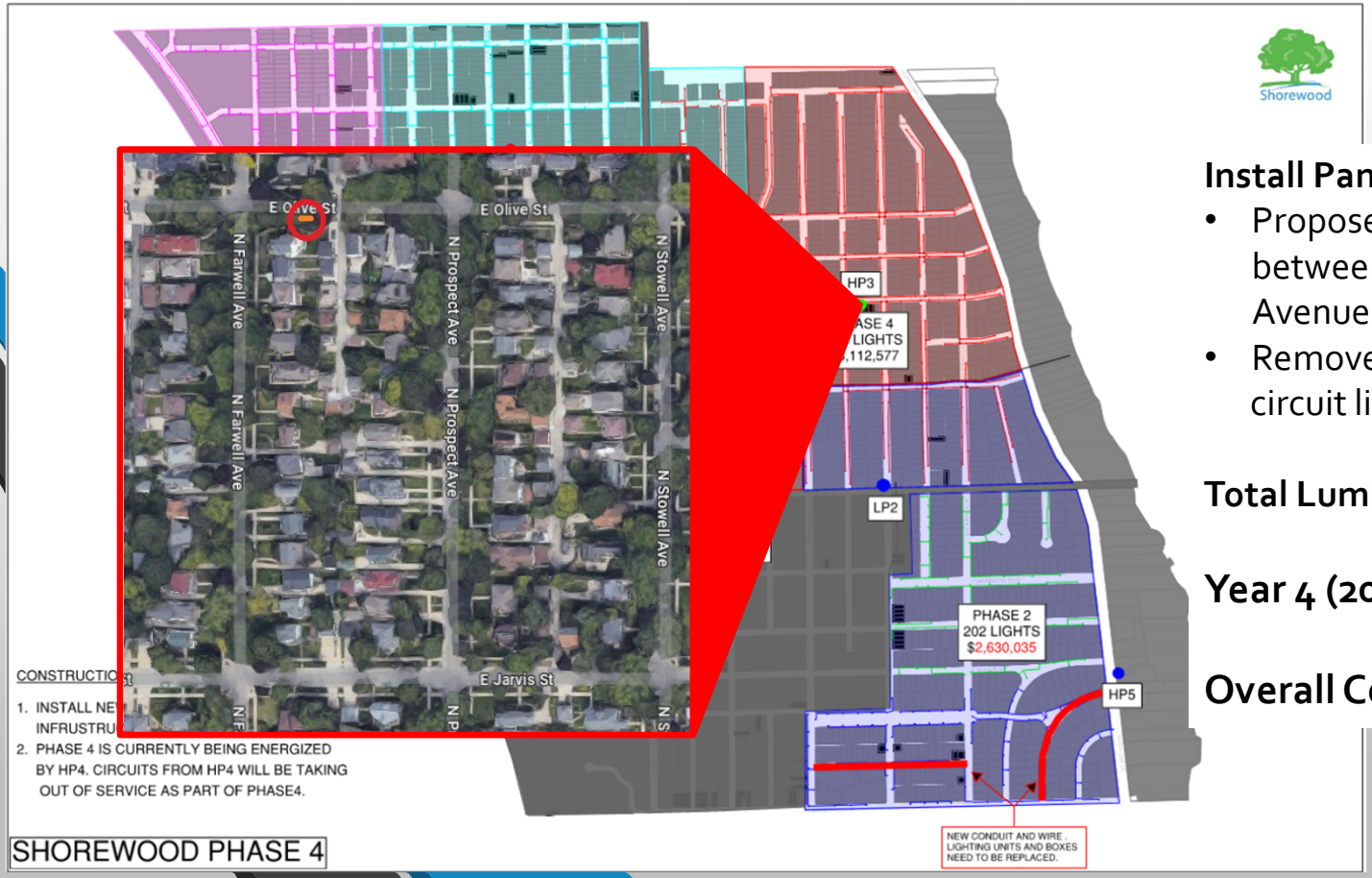
Total Luminaires - 224

Year 3 (2027) Cost - $2,847,510

Overall Cost per Luminaire - $12,712

Construction Implementation

Phase 4 - 2028



Install Panel HP3

- Proposed to be installed on E. Olive Street between N. Farwell Avenue and N. Prospect Avenue
- Remove circuits from HP4 by starting at the circuit limits and working towards HP4

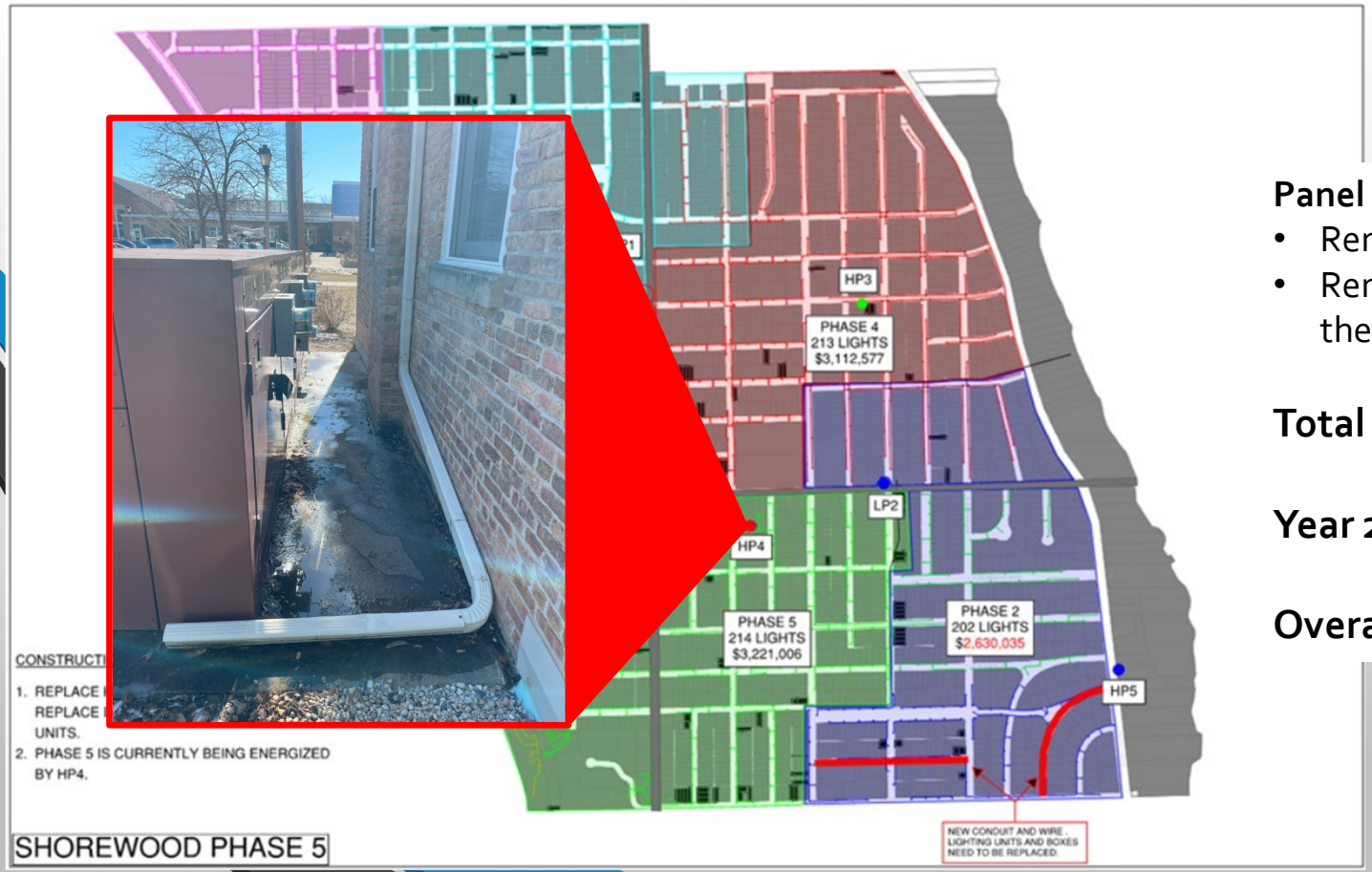
Total Luminaire replacement – 213

Year 4 (2028) Cost - $3,112,577

Overall Cost per Luminaire - $14,613

Construction Implementation

Phase 5 - 2029



Panel HP4

- Remove and replace Panel HP4
- Removal of HP4 must be completed in the final phase

Total Luminaires - 214

Year 2 (2029) Cost - $3,221,006

Overall Cost per Luminaire - $15,051

Construction Implementation

Conclusion

480V System Cost Per Phase			
Phase	**Lighting Units**	**Lighting Unit Cost**	**Cost Per Phase**
1	216	$ 13,373.00	$ 2,888,568.00
2	202	$ 13,019.98	$ 2,630,035.96
3	224	$ 12,712.10	$ 2,847,510.40
4	213	$ 14,613.04	$ 3,112,577.52
5	214	$ 15,051.43	$ 3,221,006.02
Total	1069		$ 14,699,697.90

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Questions and Discussion