Electric Distribution System Long Range Plan Overview

City Council Meeting 9/20/2022

patterson & dewar ENGINEERS

P&D Overview

Proven Experience with Distribution Utilities

- Started in 1947
- Direct access to engineers and technical staff
- Collaborative Approach
- Custom Solutions

18
Employee Average
Years of Experience

95%
of our business is from
Repeat Customers

93%
Client Satisfaction Rating

P&D Overview

Project Team

Anthony Hanson, PE

- 34+ years of utility experience
- Business Unit Leader for Cooperatives/Municipal Utilities

JD Bush, PE

- 7 years of utility planning experience
- Manager of Distribution & Planning

LRP Objective

- Present a 20-year plan outlining all needed major construction projects to accommodate the current and future needs of the City.
  - Basis for the study was the year 2021
- Plan should be based on sound engineering judgement with aims to design a system that will:
  - Provide adequate voltage
  - Improve system capacity
  - Improve system reliability

Process

Data Review & Model Development

- System Loading Projections (FMPA)
- Milsoft© Utility Solutions WindMil© Model Updates
- Input from GCS

Analyze System and Develop Solutions

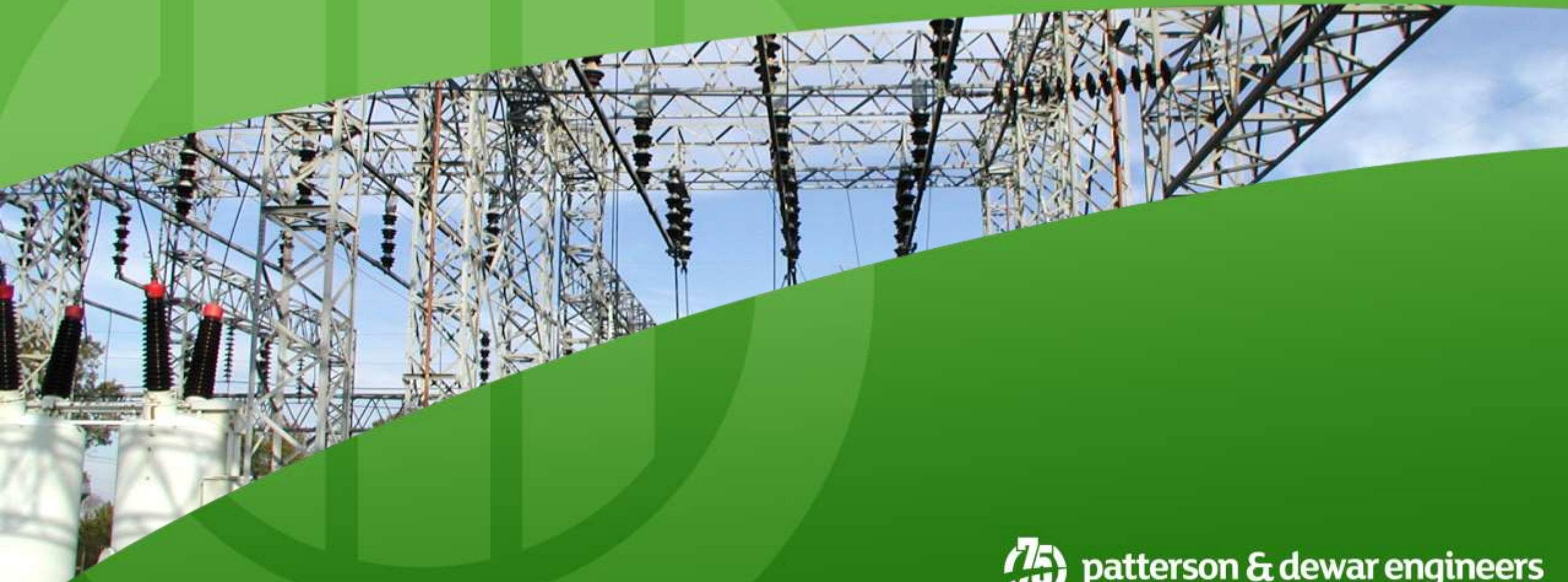
- Projected System Eng. Model
- Evaluate Potential Projects
- Cost Estimates
- Economic Analysis
- Develop Project Schedule

Create Final Report

- Finalize Plan with GCS Team
- Categorize Results
- Outline Plan and Present Full Results

Long Range Plan Overview

Summary of Findings and Recommendations



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Challenges

Aged Equipment

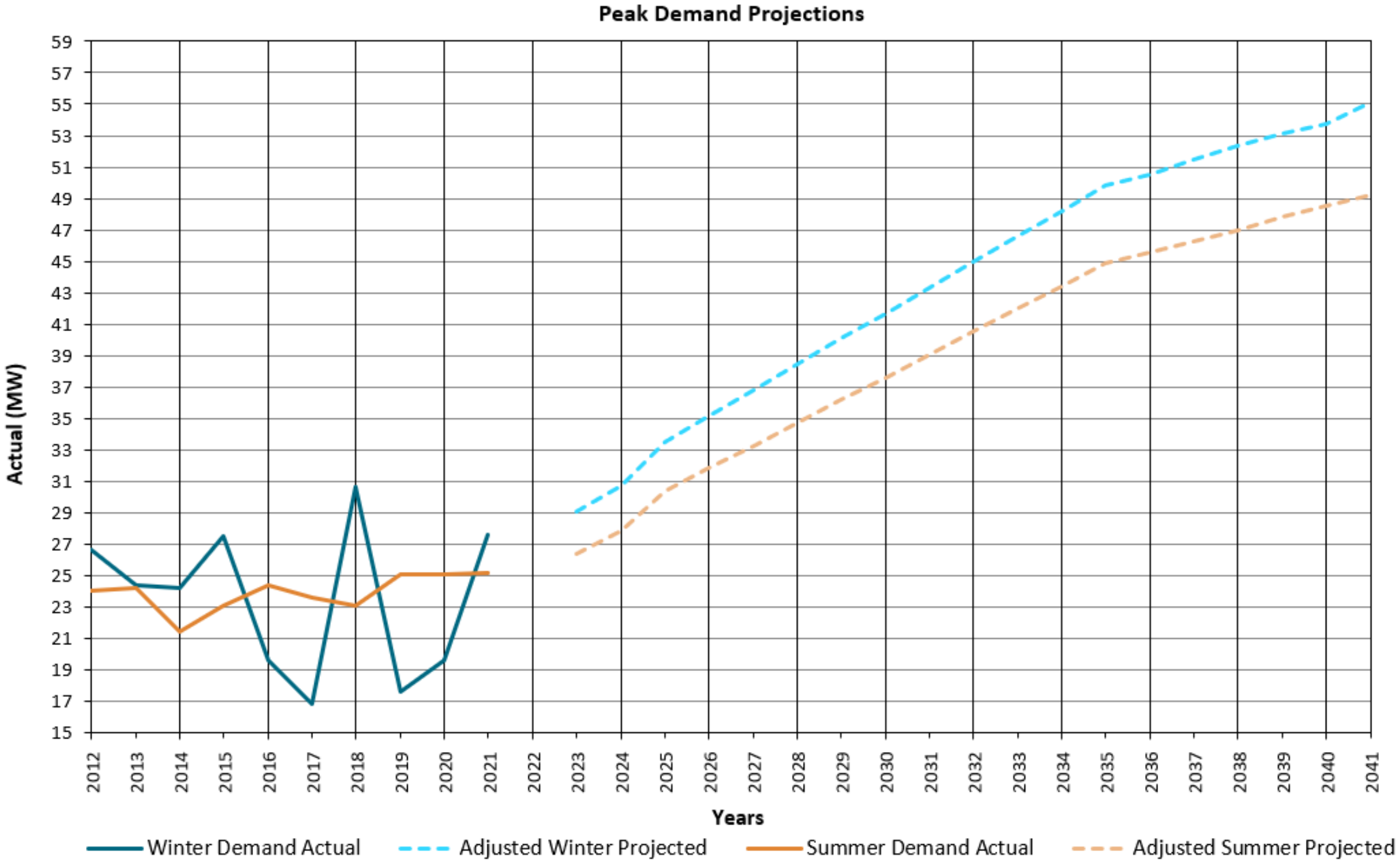
- City is served by Chapman Substation and three step-down stations.
  - 2 of 3 Chapman Transformers are excessively aged
  - North and South step-down stations are excessively aged
- Single primary delivery point limits reliability
  - Numerous single points of failure

Challenges

Expected Growth

- Historic Peak Load: 20-30 MW (Generally 25 MW)
  - 2021: 27.6 MW
- Projected 2041 Peak: 55.1 MW
  - Increase of ~100%
- Load growth will overload feeders out of Chapman Substation


Vac-Con, Inc
Reynolds Airpark
S Oakridge Ave
S Oakridge Ave
17
2,100 Homes To Be Developed
260 Apartment Units (tentative)


Peak Demand Projections
Actual (MW)
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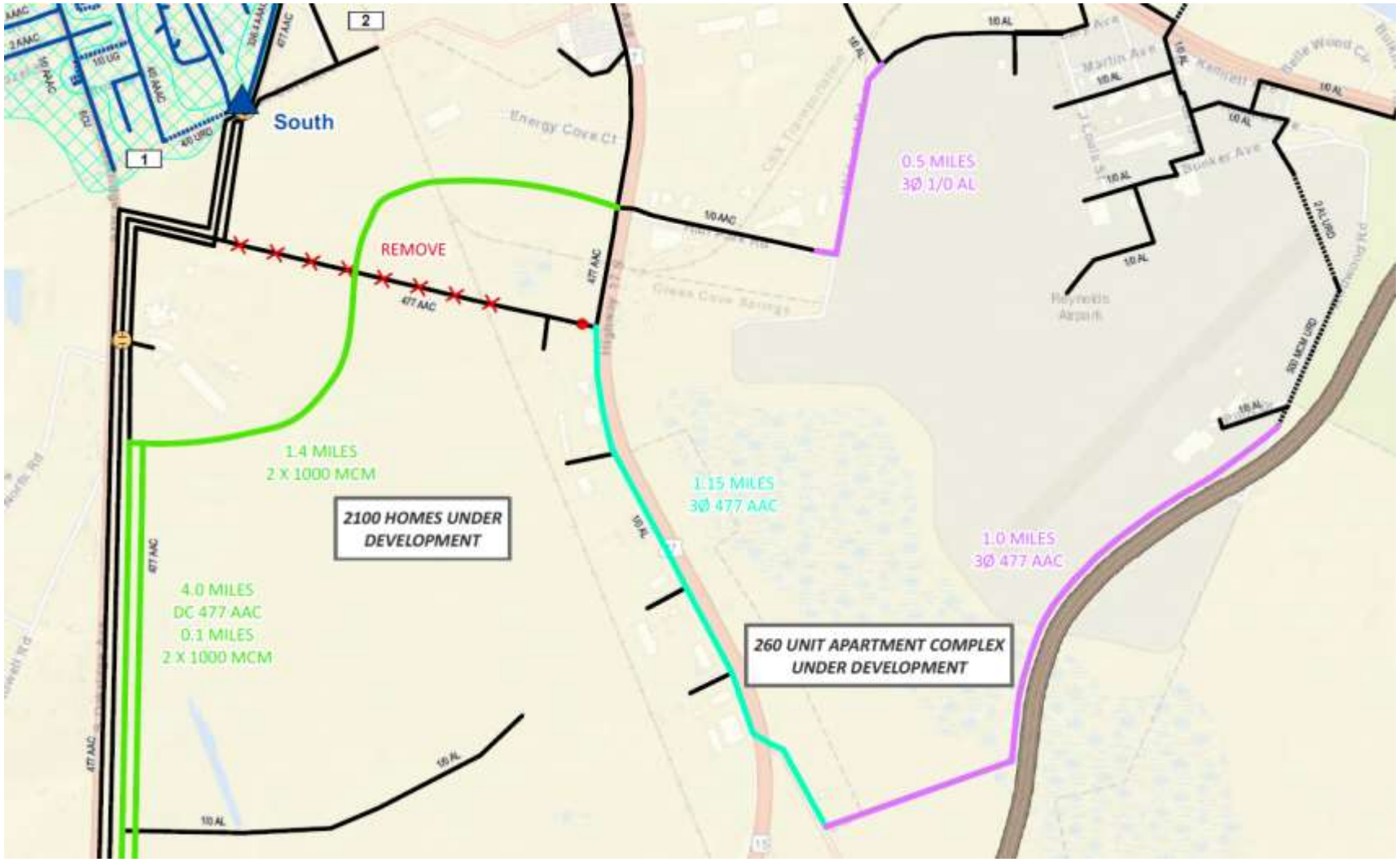
Years
Winter Demand Actual
Adjusted Winter Projected
Summer Demand Actual
Adjusted Summer Projected

Long Range Plan

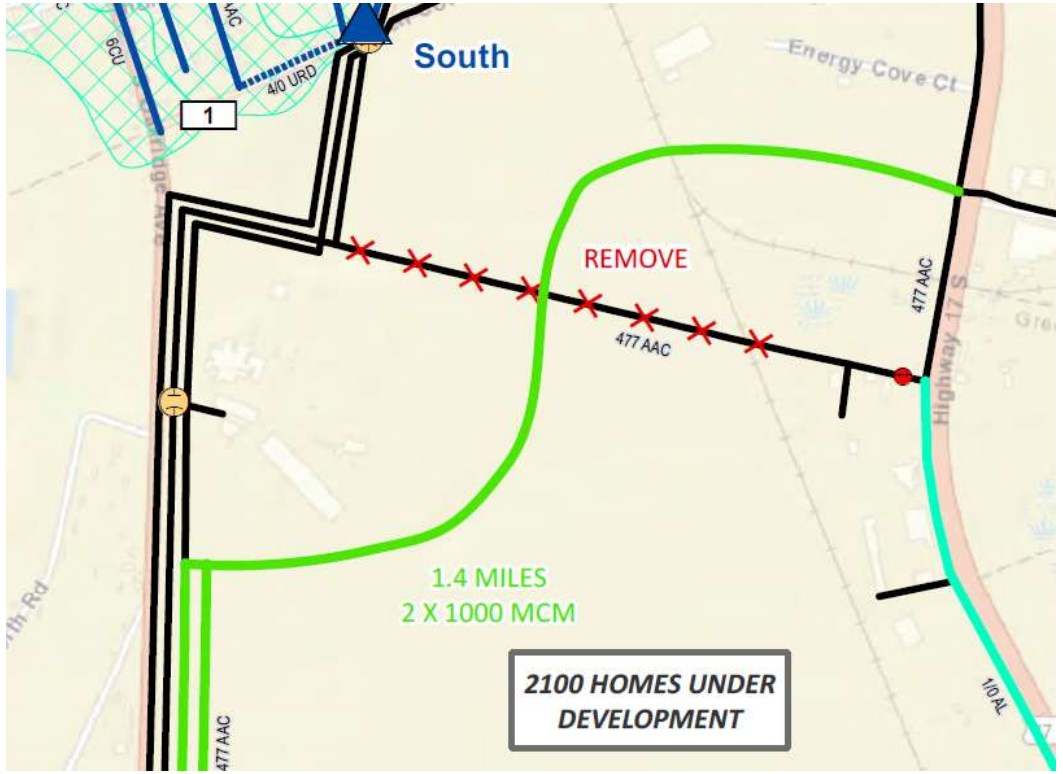
Power Line Projects



Long Range Plan

Power Line Projects

- Project 1: 2023
  - Underground main line through 2,100 home development
  - Improve long term feed to Reynolds Airpark
  - Estimated Cost: $2,800,000



Long Range Plan

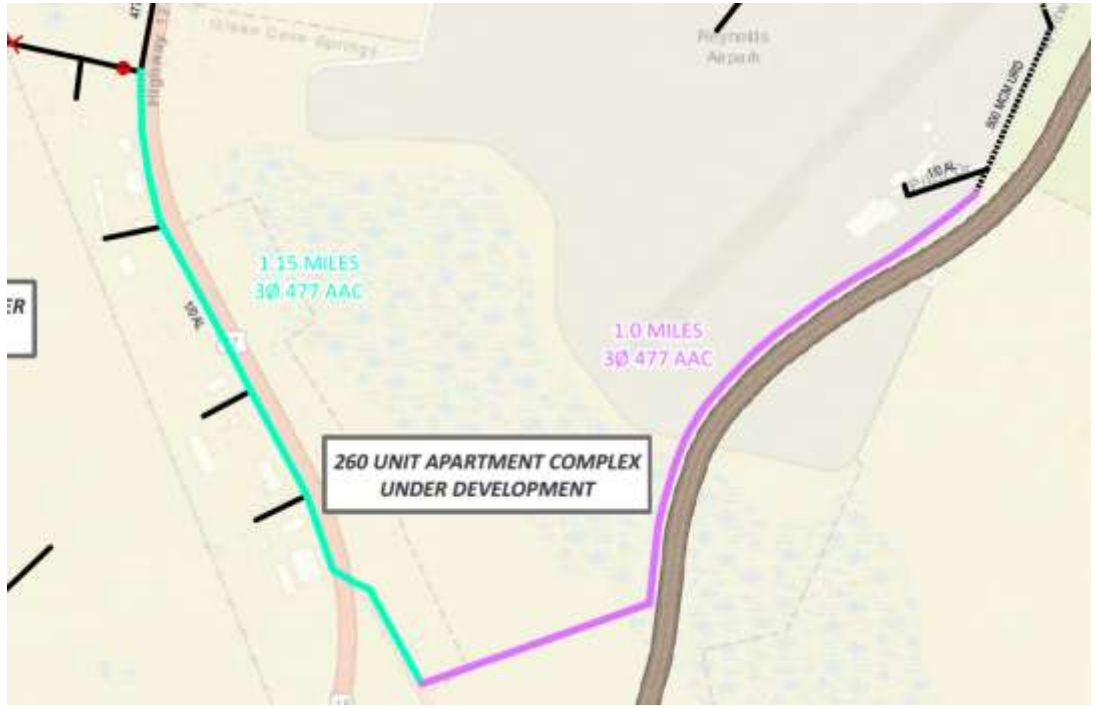
Power Line Projects

- Project 2: Likely by 2025
  - Replace one circuit on aged poles coming from Chapman with two circuits on one new set of poles
  - Solves capacity problems caused by new loads on existing feeders
  - Estimated Cost: $1,880,000

Long Range Plan

Power Line Projects

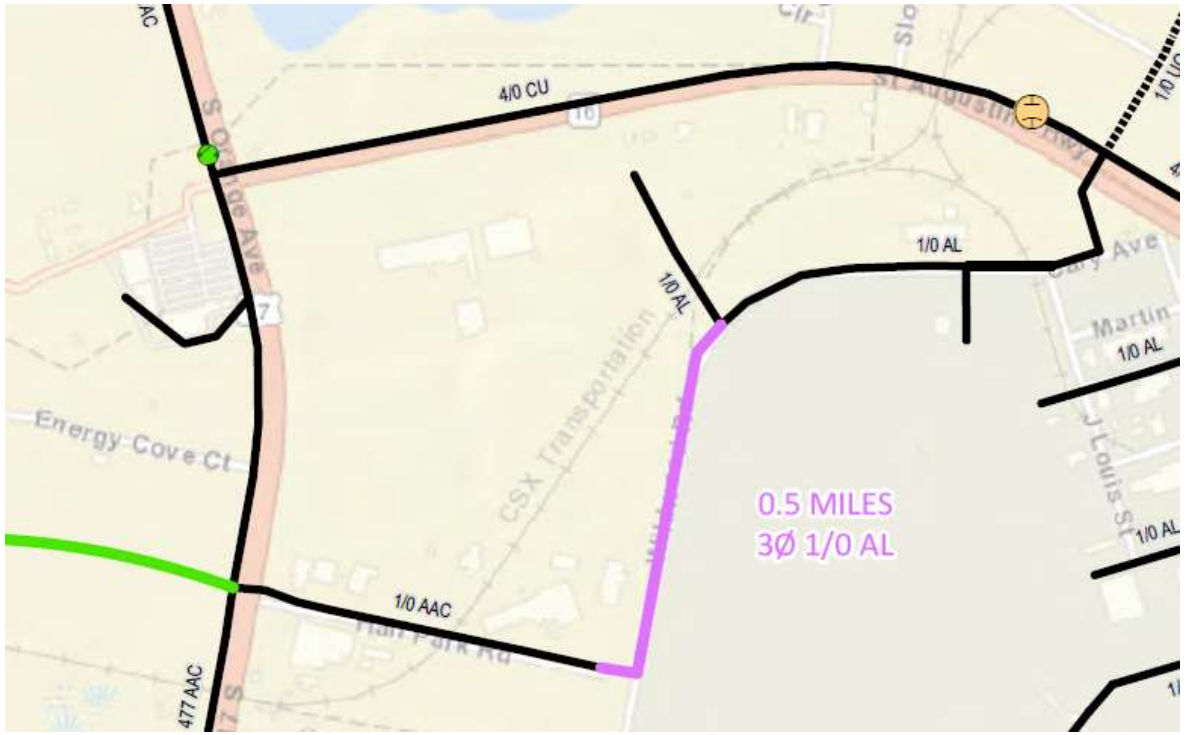
- Project 4: ~10 years out
  - Strengthen feed to possible apartments and other future load
  - 1st step towards tie around south end of Reynolds Airpark
  - Estimated Cost: $368,000
- Project 5: 10-12 years out
  - Complete tie around Reynolds Airpark
  - Estimated Cost: $320,000



Long Range Plan

Power Line Projects

- Project 6: 12-15 years out
  - Construct tie line on north end of Reynolds Airpark
  - Improved reliability options
  - Estimated Cost: $85,000



Long Range Plan

Voltage Conversion

- Voltage Conversion Benefits:
  - Unified System Voltage
  - Decreased System Losses
  - Increased System Capacity
  - No refurbishment work needed at aged step-down stations
  - Eliminates need to refurbish aged step-down stations

Long Range Plan

Voltage Conversion

- Harbor Road
  - 2025 – 2026
  - Estimated Cost: $1,387,000
  - Voltage Conversion eliminates need for refurbishment
- North
  - 2027 – 2028
  - Estimated Cost: $1,532,000
  - Voltage Conversion eliminates need for refurbishment
- South
  - 2029 – 2030
  - Estimated Cost: $1,593,000
  - Voltage Conversion eliminates need for refurbishment

Long Range Plan

Substation Projects

- Replace 1 Transformer at Chapman Substation
  - Recommended for 2023
  - Will provide Chapman with a second new transformer
  - “Firm Capacity”
  - No longer relying on aged units
  - Estimated Cost: $2,200,438

Long Range Plan

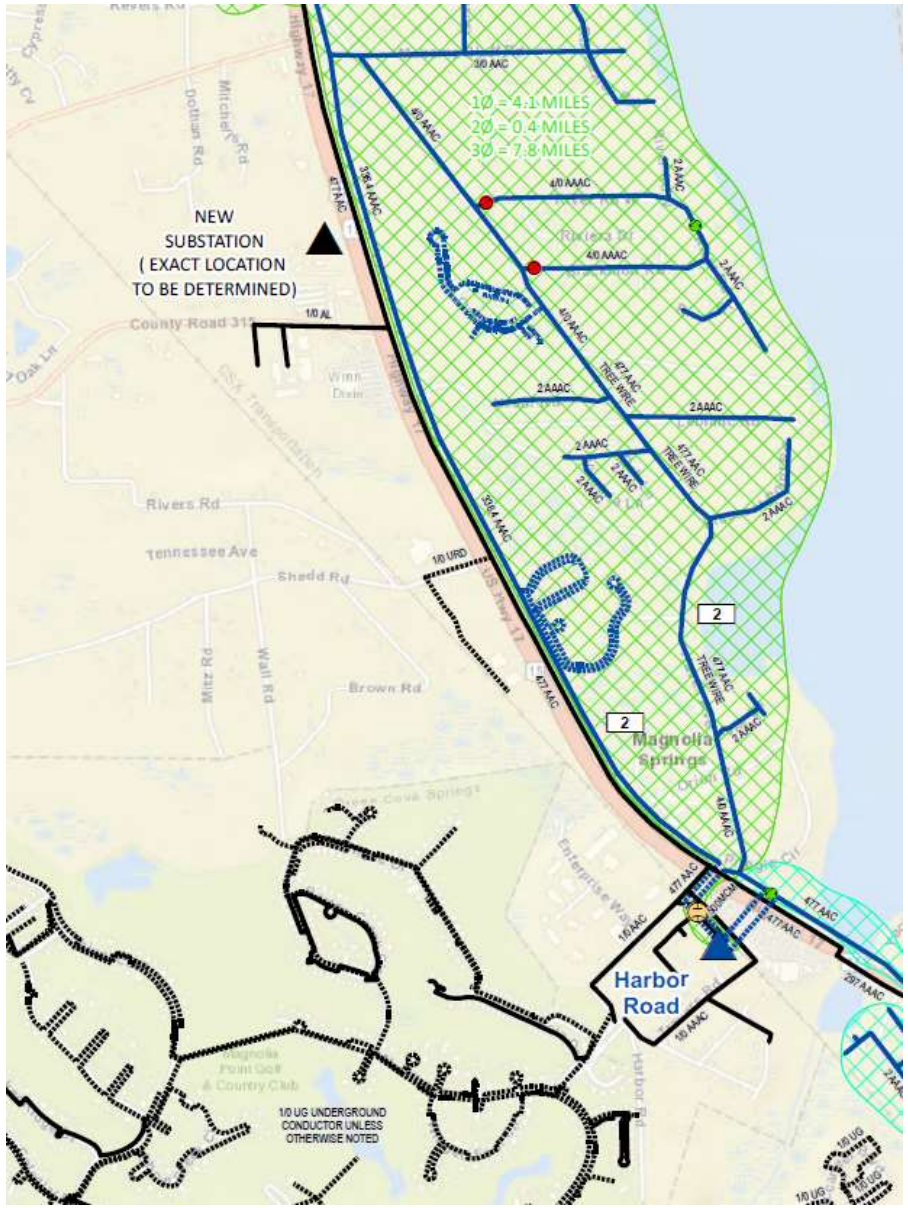
Substation Projects

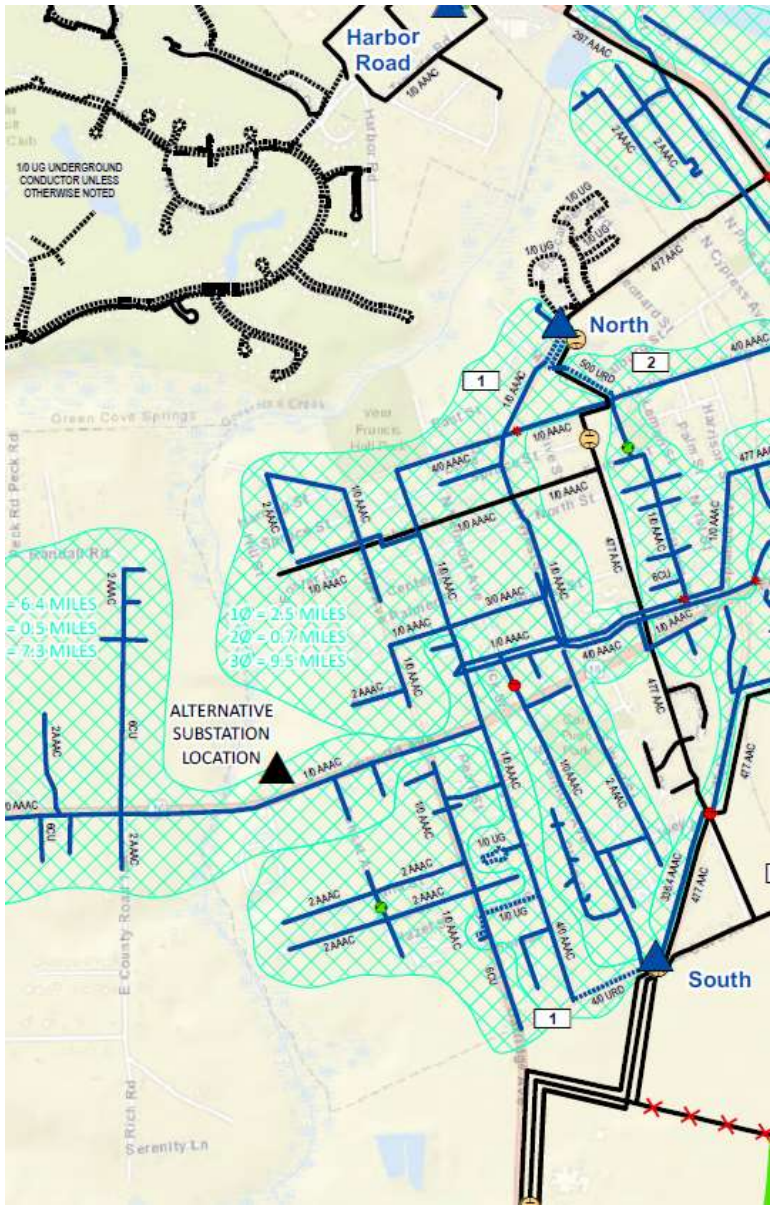
- New Substation
  - Recommended by 2030
  - Second source for the city
  - Replacing 3rd Transformer at Chapman no longer needed
  - Estimated Cost of Sub: $6,349,840
  - Estimated Cost for Feeder Exits: $250,000
    - Power Line Project 3
  - Plan is built around primary location (see next slide)

Long Range Plan

Substation Projects

- New Substation – Potential Locations





Long Range Plan

Substation Projects

- New Substation - Transmission
  - Coordination with FP&L and FMPA
  - Multi-year process
  - Specific plans to construct may result in LRP changes
  - Further study may be required

LRP – Cost Summary

Project Type	Estimated Cost (2022 Dollars)
Distribution Line Construction:	$10,215,000
Chapman Substation Upgrade:	$2,200,438
New Substation:	$6,349,840
TOTAL of Major Construction Items:	$18,765,278

Note: Transmission costs excluded as they will likely be incurred by FP&L

LRP – Schedule of Costs

Project Type	2022 - 2027	2028 - 2032	2033 - 2041	Total
Distribution Line Construction:	$6,833,000	$2,977,000	$405,000	$10,215,000
Substation Projects	$2,200,438	$6,349,840	$0	$8,550,278
TOTAL of Major Construction Items:	$9,033,438	$9,326,840	$405,000	$18,765,278

Note: All costs are 2022 Dollars

Long Range Plan

Results of Plan

- Ability to serve in progress development
- Added second delivery point
- Improved reliability
  - Multiple feeds around Reynolds Airpark
  - Unified system voltage