National Grid Distribution Reliability on 101L8

Nantucket, MA

ZIAD F. KARY, P.E.

ENVIRONMENTAL PARTNERS

Agenda:

- Project Background
- Peer Reviews
- Alternative Ductline Alignments Assessments
- Discussion and Limitations
- Conclusions and Recommendations
- Future Planning

Project Description and Need

- Scope
  - Install a new 13.2 kV feeder to Milestone Road (101L8)
- Purpose
  - Utilize the full benefit and capability of Bunker Road battery and generator
  - Increase capacity for east side of Nantucket Island, improve switching ability, reduce the potential for outages on the existing L2, L4, and L7, which serve critical facilities
- Alternatives Proposed by National Grid
  - 1 – Conventional Underground
  - 2 – Deep Underground
  - 3 – Overhead
  - 4 – Horizontal Directional Drilling

Environmental Partners Involvement

August 23, 2017
NGRID Submits Ductline Plan Set to the Town

October 23, 2018
NGRID Presents PowerPoint on Overhead Wire Option to the Town

November 2, 2018
EP Submits NGRID Ductline Installation Peer Review to the Town

January 25, 2019
EP Site Walkthrough

February 5, 2019
NGRID L8 Project Review Meeting

March 11, 2019
EP Submits NGRID Overhead Wire Peer Review to the Town

June 26, 2019
Public Info Session

July 16, 2019
Internal Town Meeting

July 24, 2019
EP and NGRID Present to Select Board

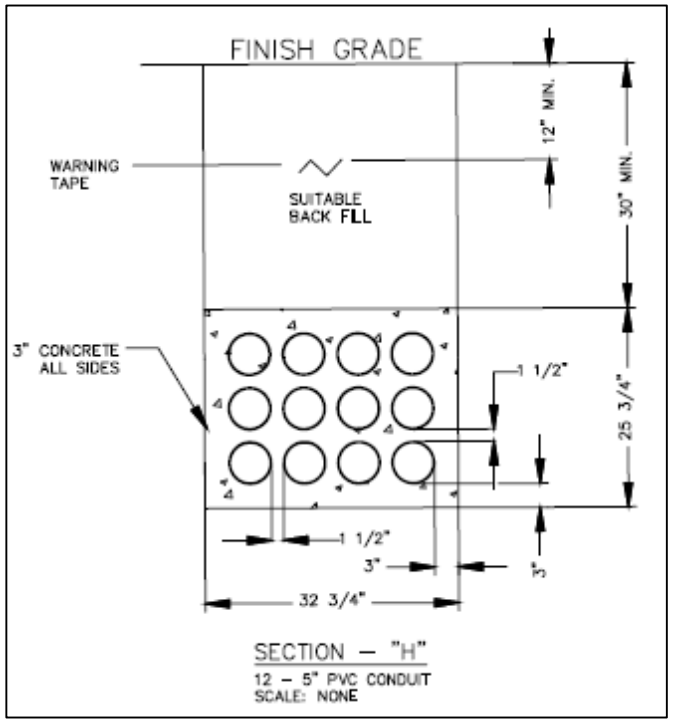
August 12, 2019
Issuance of Planning Board's Review Letter

December 9, 2019
EP Submits Planning Board Alignment Peer Review to the Town

Peer Reviews

Peer Review #1

- Focused on: National Grid's Proposed Ductline
  - Constructability
  - Potential impacts to Town utilities and infrastructure
  - Conceptual Cost Estimate
  - No access to Town GIS database during Peer Review



Peer Review #2

- Focused on: National Grid's Proposed Overhead Wire
  - Recommendations for individual utility pole locations
    - ADA compliance
    - License requirements
    - Air rights
  - Potential impacts to Town utilities and infrastructure
  - Conceptual Cost Estimate
  - No access to Town GIS database during Peer Review

Peer Review #3

- Focused on: Planning Board's Proposed Ductline
  - Advantages/Disadvantages of Alignment
  - Comparison to National Grid's Proposed Ductline Alignment
  - Potential impacts to Town utilities and infrastructure
  - Conceptual Cost Estimate

Alternative Ductline Alignments Assessment

Assessment Objectives

- Five Studied Alternative Ductline Alignments
  - 1 – National Grid Proposed Ductline Alignment
  - 2 – Planning Board Proposed Ductline Alignment
  - 3 – EP Proposed Ductline Alignment – Option 1
  - 4 – EP Proposed Ductline Alignment – Option 2
  - 5 – EP Proposed Ductline Alignment – Option 3

- For each Studied Alignment:
  - Alignment Route
  - Implementation Feasibility
  - Impacted Utilities and Infrastructure
  - Planning-Level Cost Estimate

Alternative Ductline Alignment Routes

Comparative Implementation Feasibility

Alignment	Length (ft)	Environmental Disruption (ft)	Utilization of Town Property (ft)	Vital Areas (#)	Flood Zones (ft)	Residential Areas (ft)	Narrow Roadways (ft)	Commercial Areas (ft)
NGRID	8,409	362	1,787	1	1,350	4,470	587	2,425
Planning Board	8,993	93	3,610	3	1,485	5,916	985	1,544
Option 1	9,476	93	3,428	2	1,350	6,418	587	1,544
Option 2	9,334	2,097	4,114	2	2,910	5,860	0	1,928
Option 3	8,496	362	1,787	1	1,485	4,249	985	2,425

Least Optimal Alternative **Most Optimal Alternative**

Impacted Utilities and Infrastructure – Example

General Information	
Ductline Alignment:	National Grid Proposed Ductline
Street Name:	Coffin Street
Length of Ductline on Street (ft):	39
Width of Ductline Trench on Street (ft):	5
Width of Street (ft):	25
Street Surveyed by NGRID?:	Yes
Optimal Location Recommendation	
Horizontal:	Keep as proposed by National Grid in 8/23/2017 Plan Set.
Vertical:	Recommend going underneath all existing utilities on Coffin Street to avoid conflict with drain, electric ducts, water main, and gravity sewer main.
Recommended Depth of Cover (ft):	6.5

Restoration of Town Infrastructure

Infrastructure	Size (in)	Material	Cover Depth (ft)	Surveyed? (Y/N)	Likelihood of Damage (%)	Unit	Replacement	Notes
Temp. Trench Pavement	2	Asphalt	N/A	Y	100	ton	2.5	39'L x 5'W x 2"D
Permanent Pavement	5.5	Asphalt	N/A	Y	100	ton	58	4-Way Intersection Restoration
Brick Sidewalk	N/A	Brick	N/A	Y	100	sf	50	
Granite Curb	N/A	Granite	N/A	Y	100	lf	20	
Road Marking	N/A	Paint	N/A	Y	100	lf	20	

Repairs/Replacement of Town Utilities

Utility Crossing	Size (in)	Material	Cover Depth (ft)	Surveyed? (Y/N)	Likelihood of Damage (%)	Unit	Replacement	Notes
Drain	10	CMP	2.5	Y	50	lf	10	Repair Above Ductline
Electric	UNK	UNK	2	Y	50	ea	1	Repair Above Ductline
Electric	UNK	UNK	2	Y	50	ea	1	Repair Above Ductline
Water Main	6	Transite	4.5	Y	50	lf	10	Repair Above Ductline
Electric	UNK	UNK	2	Y	50	ea	1	Repair Above Ductline
Gravity Sewer Main	8	Clay	5.75	Y	50	lf	10	Repair Above Ductline
Telecom	UNK	UNK	2	Y	50	ea	1	Repair Above Ductline
Water Main	UNK	UNK	4.5	Y	50	lf	10	Repair Above Ductline

Comparative Costs

	National Grid Proposed Ductline Alignment	Planning Board Proposed Ductline Alignment	EP Proposed Ductline Alignment Option 1	EP Proposed Ductline Alignment Option 2	EP Proposed Ductline Alignment Option 3
Total Cost	$22.4M	$23.1M	$24.2M	$23.3M	$22.3M
Restoration Cost/ lf of Ductline	$316.84	$256.78	$247.51	$226.33	$294.92
Utility Replacement Cost/lf of Ductline	$130.94	$111.67	$118.12	$76.39	$121.57
Total Cost/ lf of Ductline	$2,660.52	$2,567.94	$2,558.17	$2,494.05	$2,626.20

Least Optimal Alternative **Most Optimal Alternative**

Discussion of Limitations

Existing Electric Infrastructure

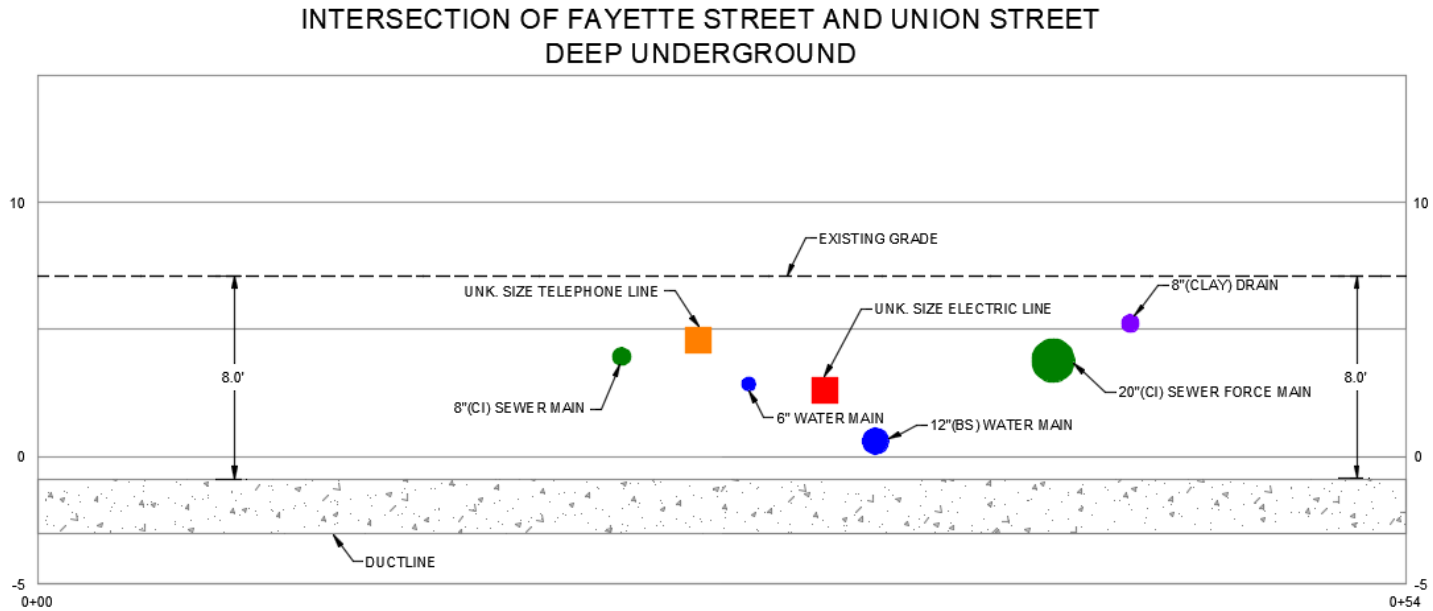
- New L8 “express” feeder will supplement, rather than replace existing infrastructure
- Replacing existing overhead wires with underground ductlines will involve:
  - 1 Ground-level transformer for every 5-10 houses 1
    - 13-26 transformers along NGRID ductline route. Others required for 3-phase and commercial properties
    - (5’x5’ in size, 10’x10’ easement)
    - Protection by bollards
    - Placed on concrete pad, elevation of 1 foot above flood level
  - Underground electric service/Handhole for each house/building
- Limited locations available for new ground-level infrastructure due to private property limitations
- Mature trees along certain routes

Ground-Level Transformers

Private Property Limitations

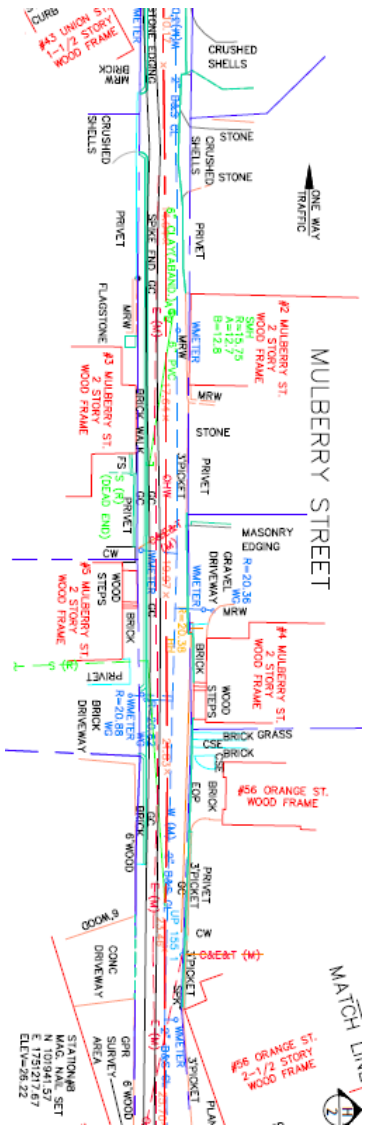
Implementation Time and Ductline Construction

- Implementation Time
  - 2020 Summer Months – Projected 108% Utilization
    - Unpredictable outages, service disruptions, emergency repairs
  - Ductline Estimated Construction Period: 180 days
  - Overhead Wire Estimated Construction Period: 90 days
- Ductline Construction
  - Greater depth = lower capacity rating



Ductline Construction Challenges

- Narrow Roadways and Right-of-Ways
- Groundwater/Dewatering
- Existing Utilities/Utility Stacking



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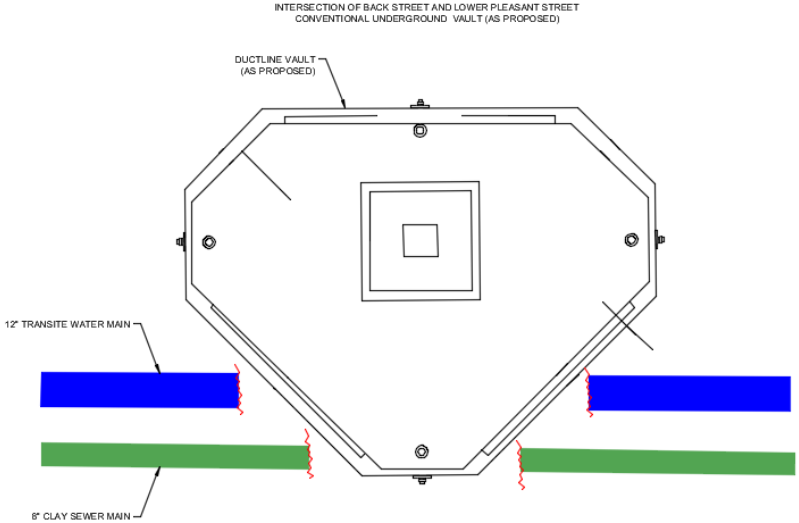

Climate Resiliency Planning

NOAA Scenario Dependent Sea-Level Rise for Nantucket Island

Year	Intermediate Low	Intermediate	Intermediate High	High	Extreme
2040	0.85	1.28	1.77	2.26	2.49
2060	1.31	2.17	3.05	4.13	4.82
2080	1.71	3.22	4.66	6.36	7.71
2100	2.03	4.33	6.56	9.25	11.42

Conclusions and Recommendations

Conclusions and Recommendations

- Timing
  - Overhead wiring: most expeditious option
- Suggested Conditions of Approval
  1. Overhead now, underground later following studies and proper planning
  2. Submission of a Final Plan Set including topographic survey
     - Determine optimal pole location for compliance with Massachusetts Architectural Access Board regulations (front of sidewalk vs. back of sidewalk)
  3. Retain and pay for Construction Administration and Oversight by a 3rd Party
  4. Obtain all permits and waivers required for construction
  5. Ongoing Coordination with Town and pole users (i.e. Verizon)
  6. Removal of all double-poles

Additional Recommendations

- Staking of property lines prior to construction
- Investigation of Subsurface Conditions (If required)
- Submission of Traffic Management Plan

Future Planning

Future Planning

- Island-Wide Study
  - Locate all 7 existing feeders and conduct alternative alignment assessments and feasibility studies for placing each feeder underground
  - Conduct study for placing part/all secondary overhead service wires on the island within underground ductlines
- Coordinate construction of underground ductlines with construction of Town utilities (i.e. water and sewer)

Thank You

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PARTNERS