



**CENTRAL MAINE
POWER**



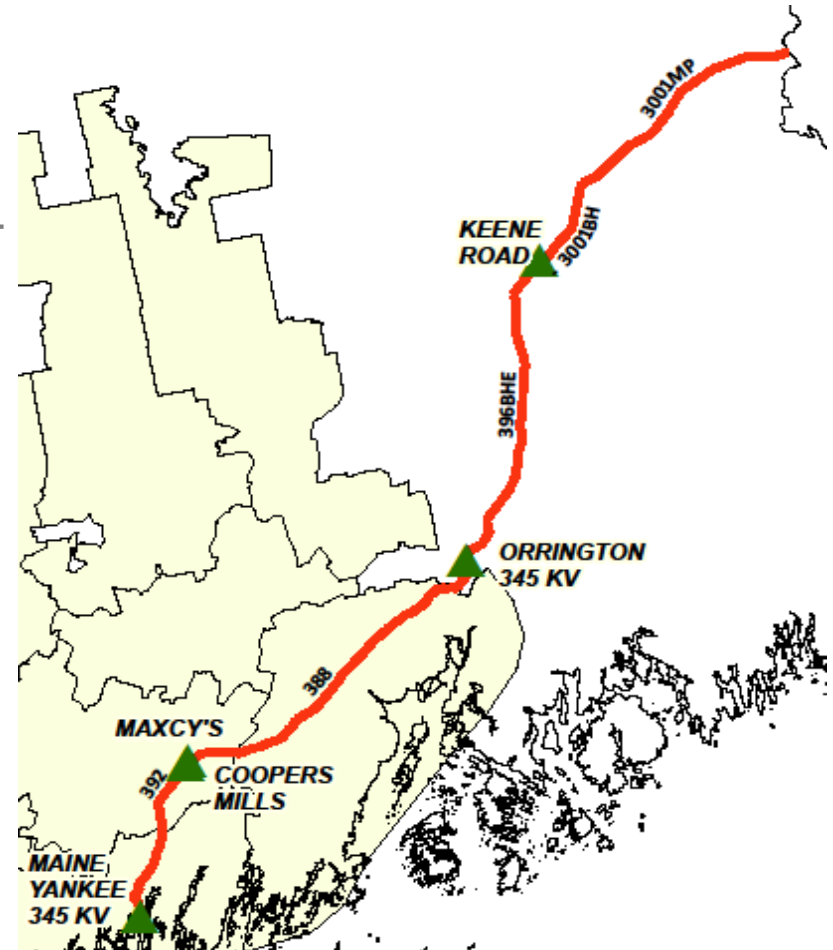
**Planning Advisory Committee
Meeting**

October 20th, 2016

MEPCO 345 kV Structure Replacements

The Maine Electric Power Company, Inc. (MEPCO)

- **Ownership**
 - Corporation jointly owned by Central Maine Power Company (CMP) and Emera Maine (formerly Bangor Hydro-Electric Company)
 - CMP - 78.3%
 - Emera Maine - 21.7%
- **MEPCO 345kV Lines**
 - Starts: Border with Canada
 - Ends: Maine Yankee
- **MEPCO Owns Sub Assets at:**
 - Orrington
 - Maine Yankee

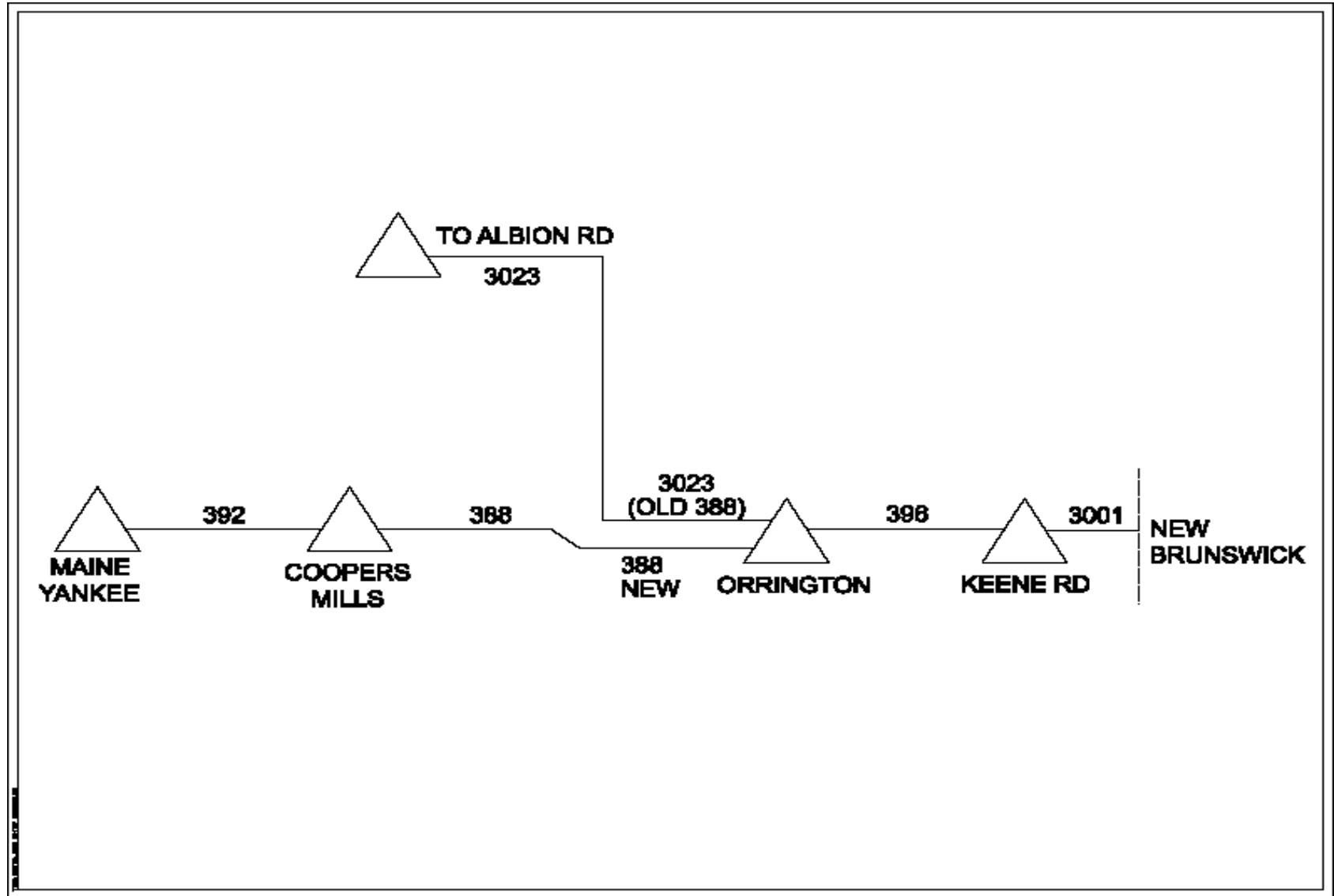


MEPCO Structure Replacements

Overview

- MEPCO 345 kV lines were constructed in the late 1960's
 - Wood H-frame construction with bundled 850.8 kcmil ACSR conductor
- Section 388
 - 54 mile line from Coopers Mills Road Substation to Orrington Substation
 - MEPCO owns 38.3 miles of S388 from Coopers Mills Road Substation to Frankfort
 - CMP and Emera Maine own the remainder from Frankfort to Orrington Substation
 - 30.5 mile segment of S388 that does not contain any dead-ends or storm structures
 - Current MEPCO criteria is to install a dead-end structure every 4-6 miles
- Section 3023
 - 59 mile line from Albion Road Substation to Orrington Substation
 - MEPCO owns 13 miles from Frankfort to Orrington Substation
 - CMP owns remainder from Albion Road Substation to Frankfort
- Section 396
 - 50 mile line from Orrington Substation to Keene Road Substation
 - 100% MEPCO Ownership
- Section 3001
 - 51 mile line from Keene Road Substation to the US/Canadian Border
 - 100% MEPCO Ownership

MEPCO Structure Replacements



MEPCO Inspection Process

Rejected Poles and Crossarms are identified through four types of inspections

- **Foot Patrol**
 - Inspect entire line annually from the ground
 - Visual inspection of structure hardware and overall condition
- **Ground line Pole Inspection**
 - Conducted every 10 years
 - Inspection includes sounding and boring for internal condition sampling
 - Treatment as needed for ants and decay
 - Mid-cycle re-treat of treated poles and inspection of poles rated as “fair”
- **Cross arm Inspection**
 - Conducted every 10 years
 - Conducted at arm level through climbing
 - Visual inspection plus sounding and probing for internal decay
 - Mid-cycle inspection of arms rated as “fair”
- **Helicopter Patrol**
 - Conducted annually

MEPCO Structure Replacements

2015 Inspection Summary

| Section | 388 Original Line | 388 Remaining Original Structures | 3023 Old 388 Structures | 388 New Plant | 396 | 3001 |
|---|-------------------------|--|-------------------------------|------------------|------|------|
| Miles | 54 | 38 | 13 | 17 | 50 | 51 |
| Structures | 491 | 351 | 140 | 152 | 432 | 428 |
| Age/Years | 40+ | 40+ | 40+ | 2 | 40+ | 40+ |
| Inspected Year | 2005 | 2014 | 2014 | 2014 | 2013 | 2013 |
| Inspected Structures | 491 | 351 | 140 | 152 | 432 | 428 |
| Condemned Structures | 0 | 6 | 0 | 0 | 0 | 0 |
| Danger Structures | 0 | 2 | 0 | 0 | 0 | 0 |
| Inspected Arms | 982 | 702 | 280 | 304 | 864 | 856 |
| Condemned Arms | 0 | 384 | 46 | 0 | 76 | 56 |
| Danger Arms | 0 | 3 | 0 | 0 | 0 | 4 |
| Total Structures with Condemned Components | 0 | 202 | 23 | 0 | 38 | 28 |

Definition of Danger/Condemn

| | Poles | Arms 115 kV | Arms 345 kV |
|----------------------|---|--------------------------|--------------------------|
| Danger | 1" or less shell* | More than 4" of decay | More than 4" of decay |
| Condemned/ Reject | Less than 4" shell | 1-4" of decay | 1-4" decay |
| Fair | 4" shell or more & more than 3" void | Less than 1" of decay | Less than 1" of decay |
| Good | 4" shell or more & less than 3" void | No decay | No decay |

*Shell refers to the hardened outer pole area

Laminated Cross arm Inspection

- The cross arms are beginning to bow which is causing the arms to delaminate and rot



MEPCO Structure Replacements

Sections 396 and 3001 Recommendation

- Targeted Structure Replacement – 69 structures
 - Replace complete structures for any one “reject” component (arm or pole)
 - Contractor consultation indicates equal or greater cost for arm or pole replacement compared to complete structure replacement
 - 66 structures have “Danger” or “Condemned/Reject” components
 - 3 structures have “Fair” condition components and are located adjacent to a replacement structure in areas of poor access
 - No change in conductor or static wire
 - **Total Cost of \$16.9M**
- Alternative Evaluated
 - Replacement of “reject” components only
 - This alternative was determined to be more costly than the targeted structure replacement

MEPCO Structure Replacements

Sections 388/3023 Alternatives Evaluated

- Option 1 – Complete Rebuild of Original Line
 - Rebuild the original line with bundled 1590 kcmil ACSR conductor
 - Significant long-term outages required to complete the rebuild
 - Total cost of \$125.3M
- Option 2 – Replace All Original Structures (**Recommended Solution**)
 - Tangent structure replacement will be completed under energized conditions with short duration outages to replace angle and dead-end structures
 - Detailed outage plan will be developed in early 2017. The current plan is to have multiple outages of approximately one week in duration during the spring and fall. Multiple structures will be replaced during one outage
 - Dead-ends will be installed every 4-6 miles
 - **Total cost of \$101.6M**
- Option 3 – Replace Condemned Structures as Needed
 - Replace structures under energized conditions
 - Initial replacement of 225 structures during first mobilizations
 - Assumes structures replaced over a ten year period with three construction mobilizations
 - Total cost of \$108.4M

MEPCO Structure Replacements

Timeline and Costs

- Section 396 and 3001
 - Construction start in January 2017
 - Completion in November 2017
 - Structures will be replaced under energized conditions
 - Structures will be roundwood structures with steel crossarms
 - Total Cost of \$16.9M
- Sections 388/3023
 - Construction start in October 2017
 - Completion in January 2019
 - Tangent structures will be roundwood with steel crossarms, angle structures will be laminated wood with steel crossarms and dead-ends will be direct-embedded steel
 - Dead-ends will be installed every 4-6 miles in accordance with current standards
 - Total Cost of \$101.6M
- **Total Cost of MEPCO Structure Replacements - \$118.5M**