



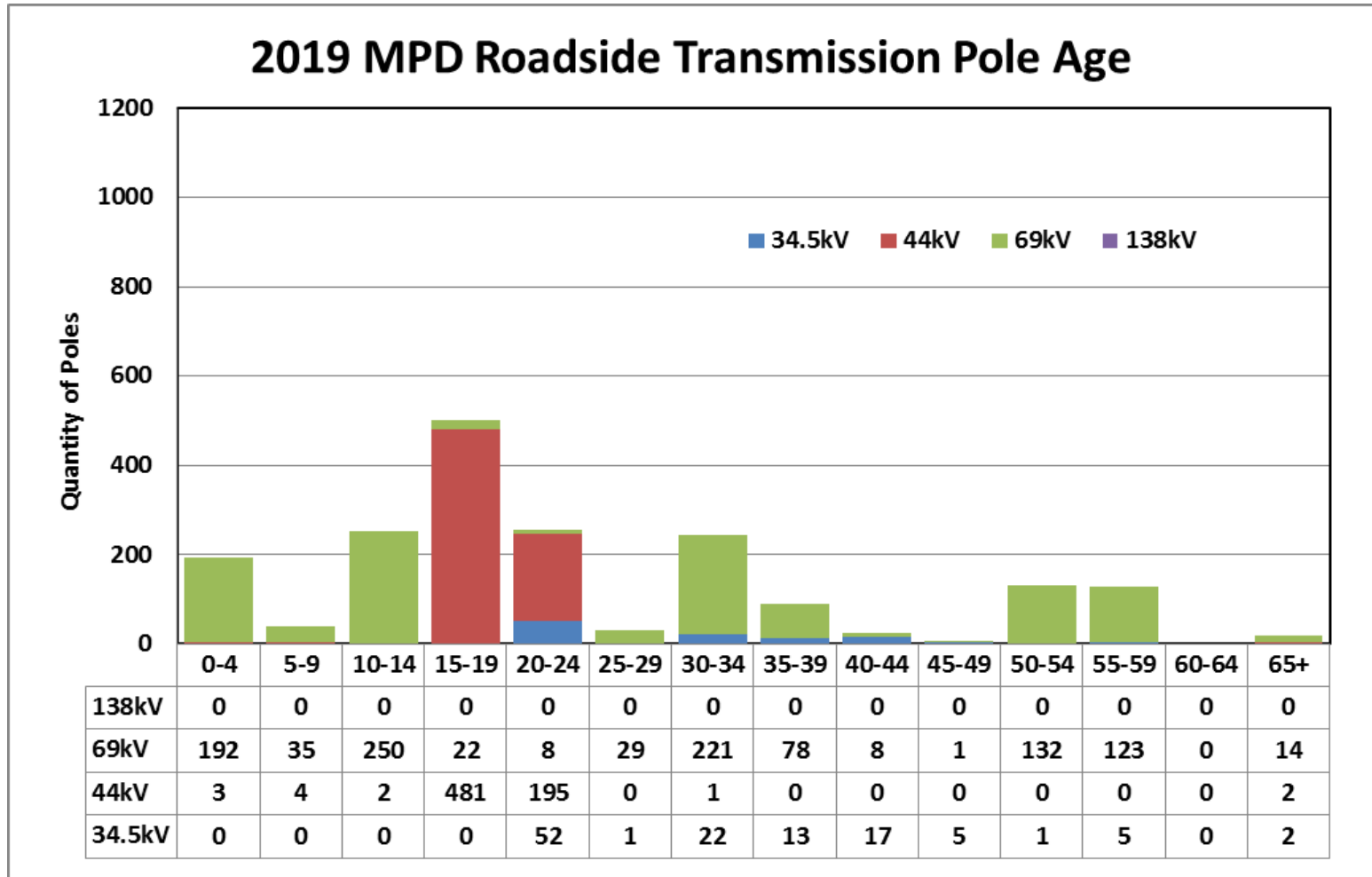
JUNE 20, 2019

**Northern Maine
Planning Advisory Group
Meeting**

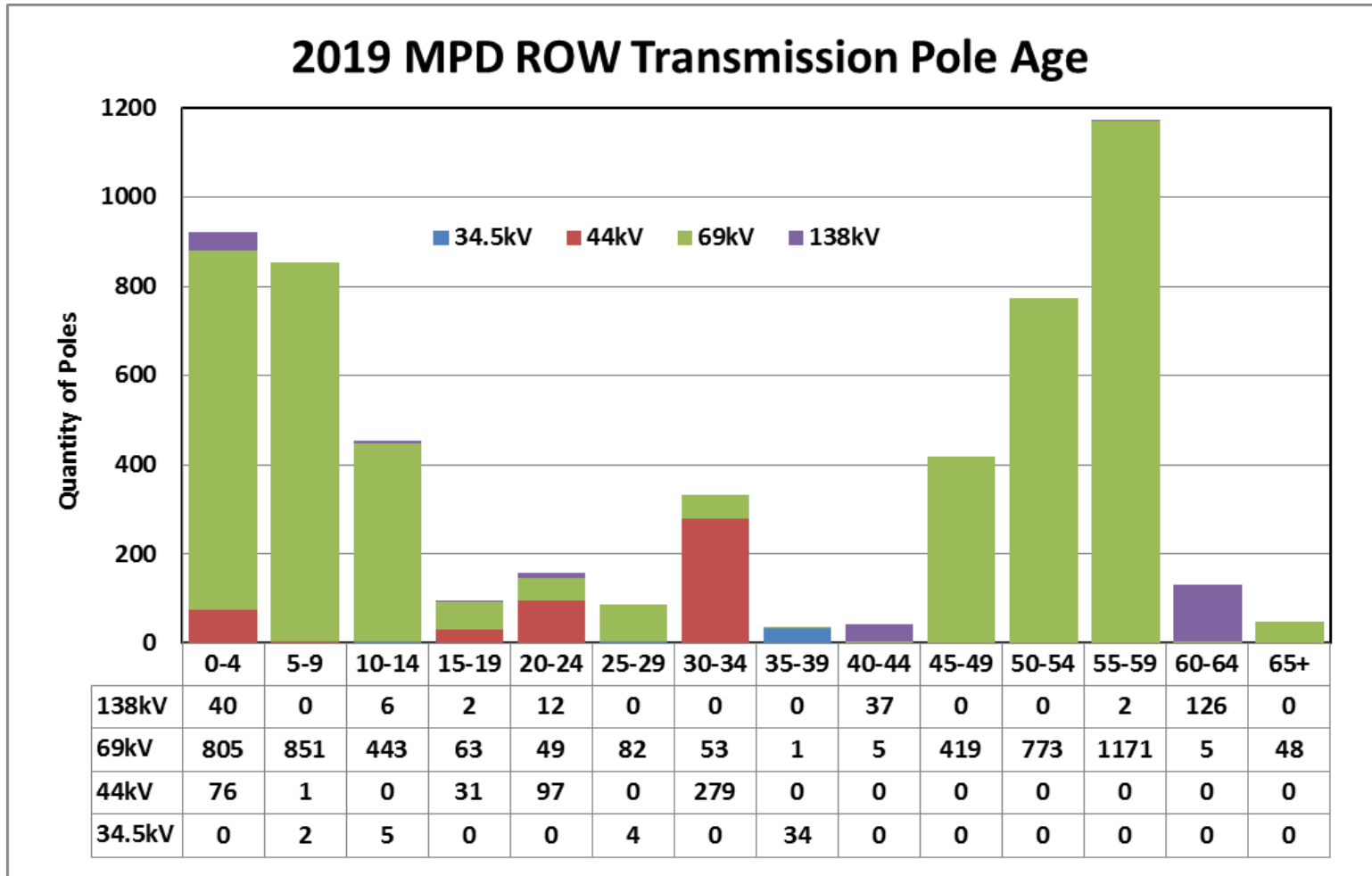
Meeting Agenda

- Welcome and Introductions
- Meeting Purpose and Agenda Review
- Northern System Overview
- System Reliability Report
- Five-Year Transmission Plan and MPUC Chapter 330 Filing
- Rebuild Program Progress and Plans
- Other Issues
- Regional Topics
- Meeting Close

MPD Roadside Transmission Line Pole Age



MPD ROW Transmission Line Pole Age



Measuring Outage Performance

System Average Interruption Frequency Index (SAIFI)

$$\text{SAIFI} = \frac{\text{Service Interruptions}}{\text{Customers served}}$$

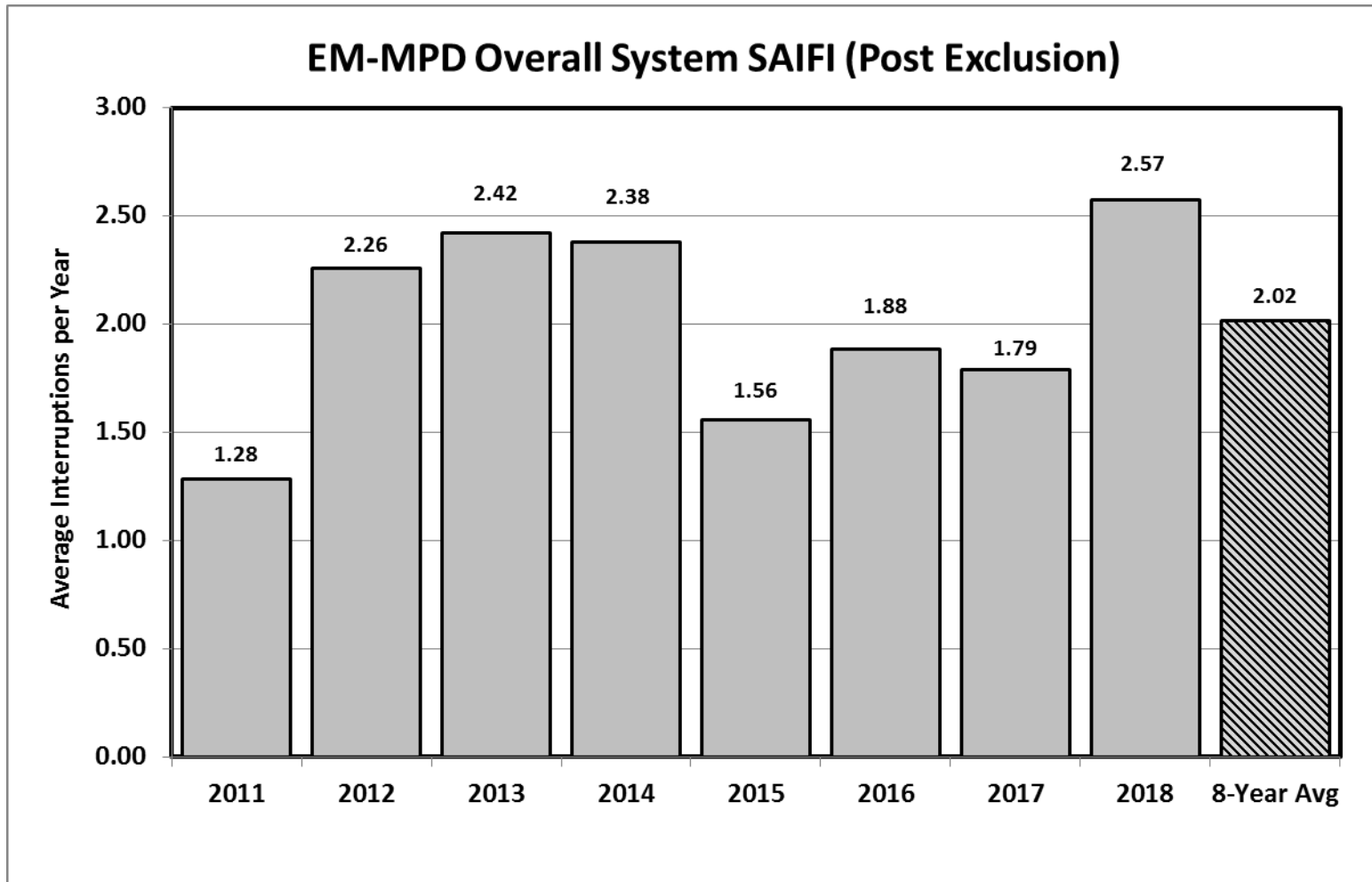
SAIFI Target = 1.75 events

Customer Average Interruption Duration Index (CAIDI)

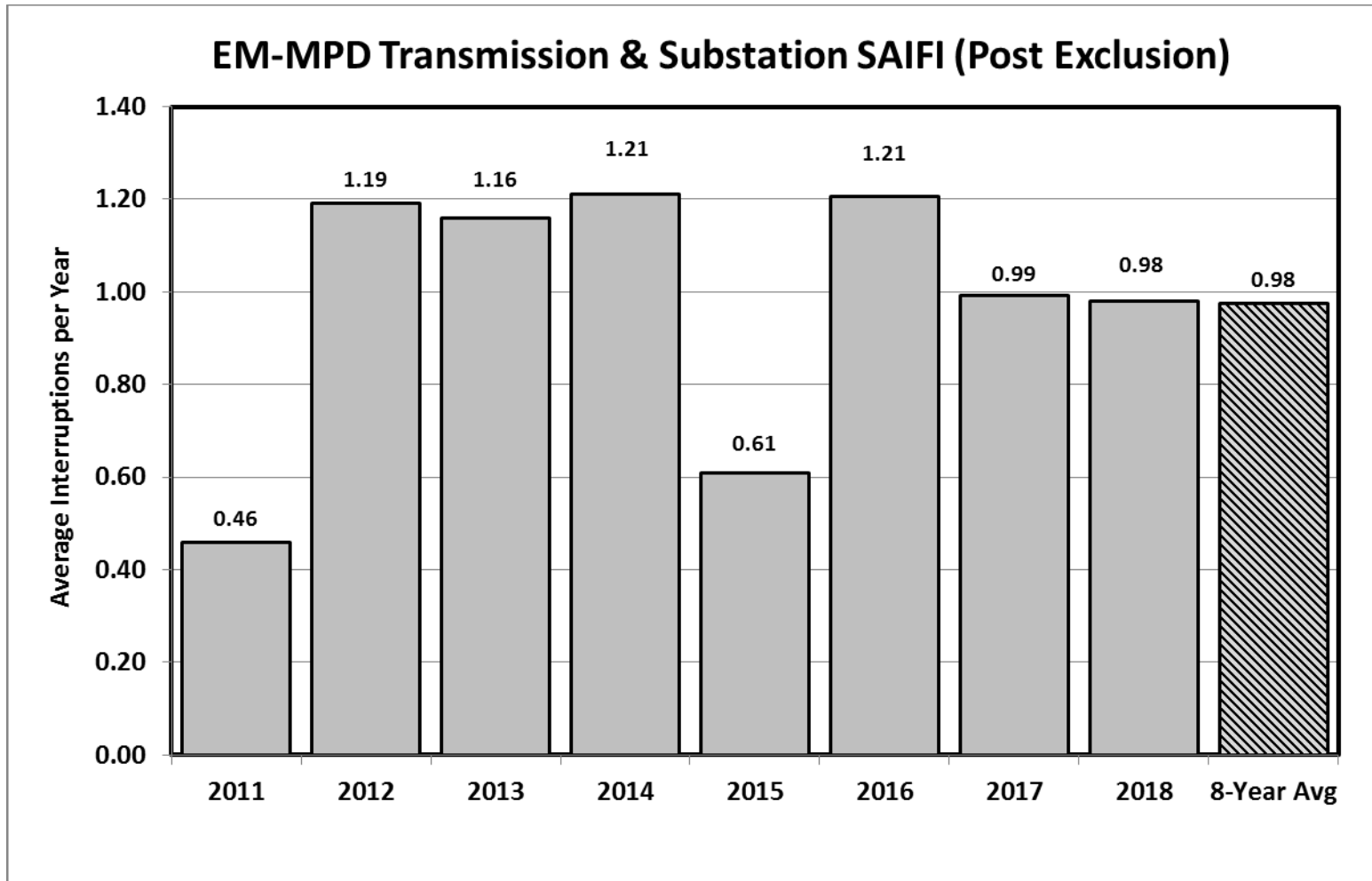
$$\text{CAIDI} = \frac{\text{Hours Service Interruption}}{\text{Service Interruptions}}$$

CAIDI Target = 1.85 hours per Service Interruption

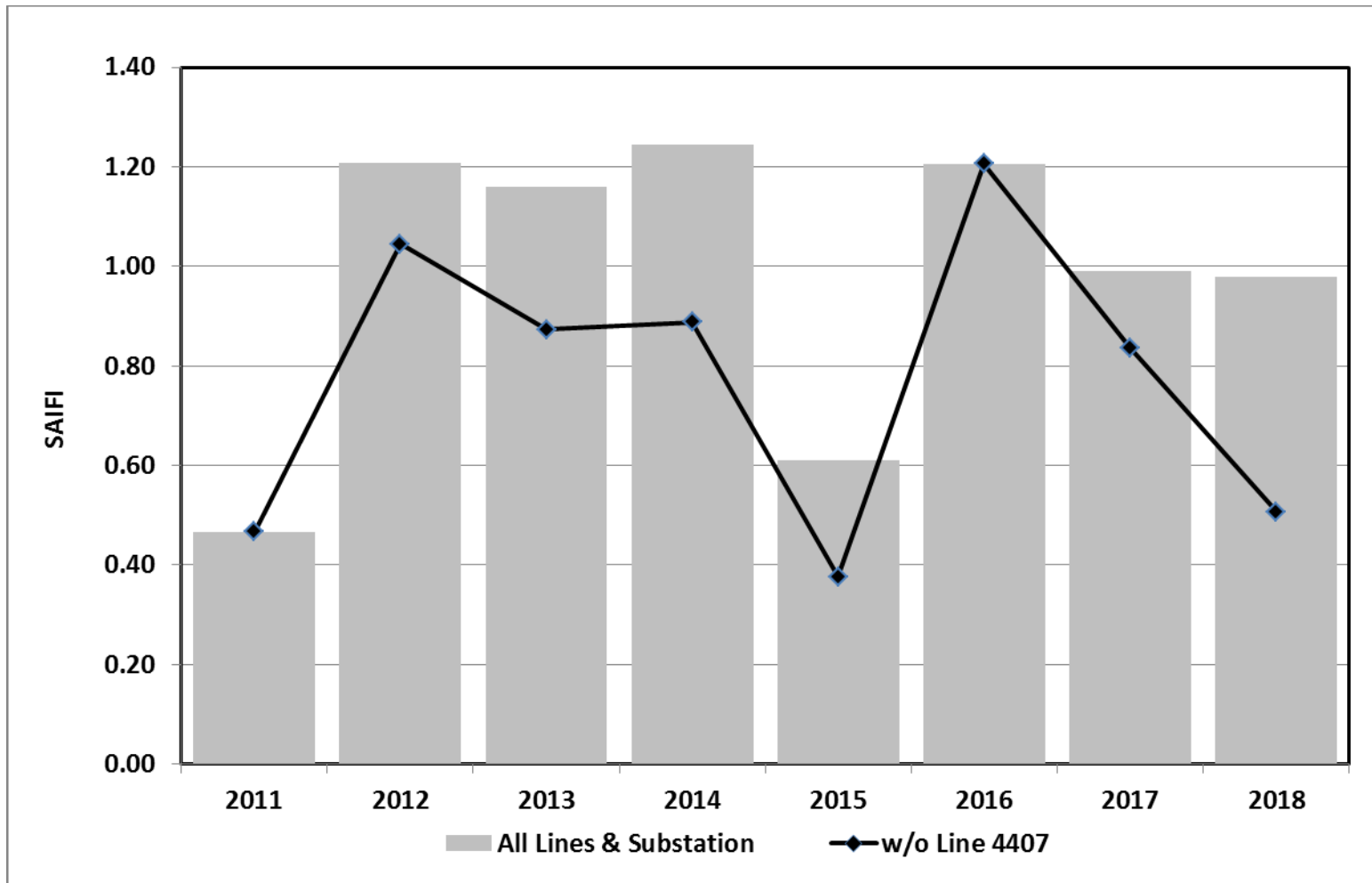
MPD Reliability – Overall Regional SAIFI



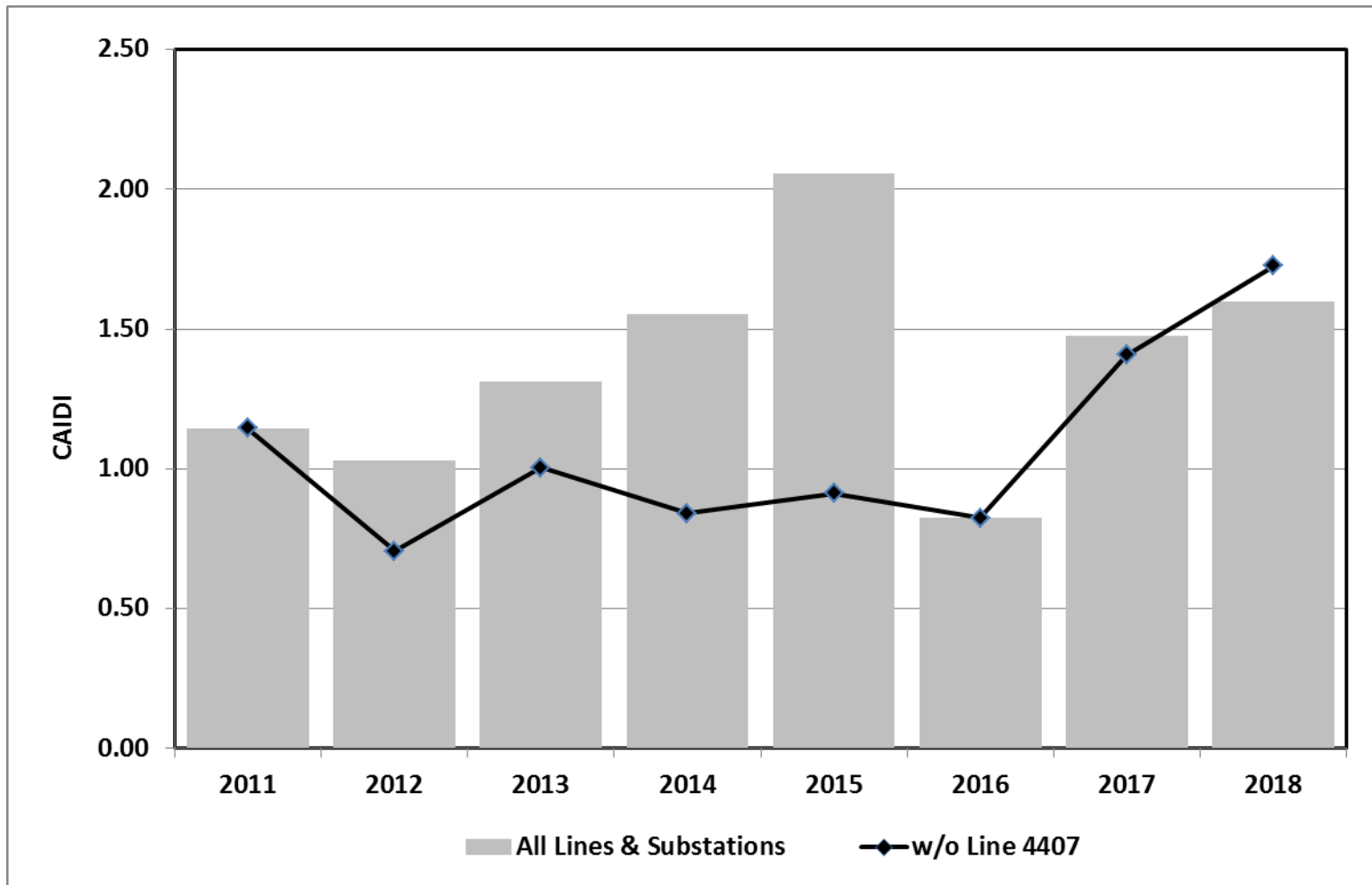
MPD Reliability – Transmission & Substation SAIFI



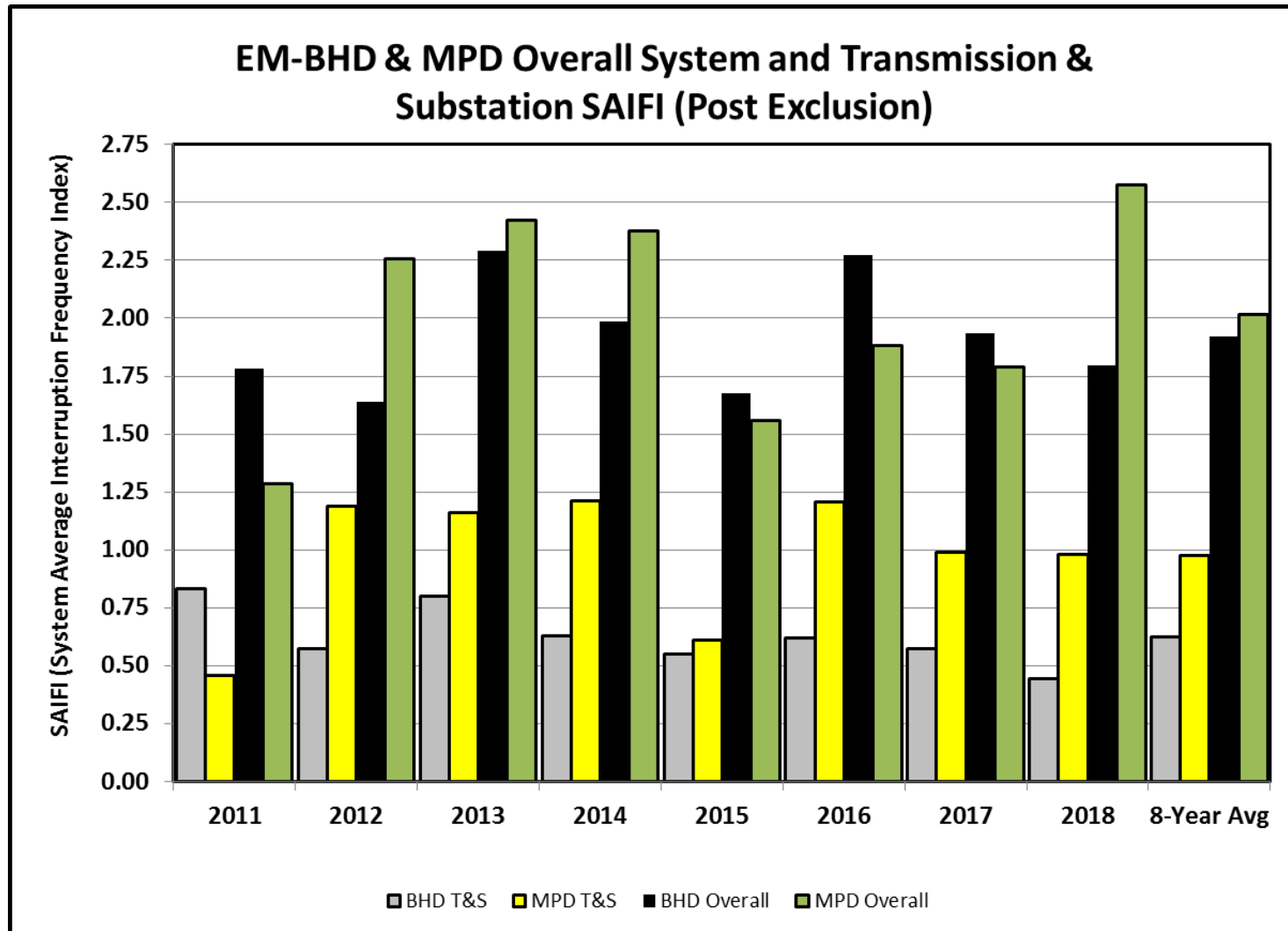
MPD Transmission/Substation SAIFI



MPD Transmission/Substation CAIDI



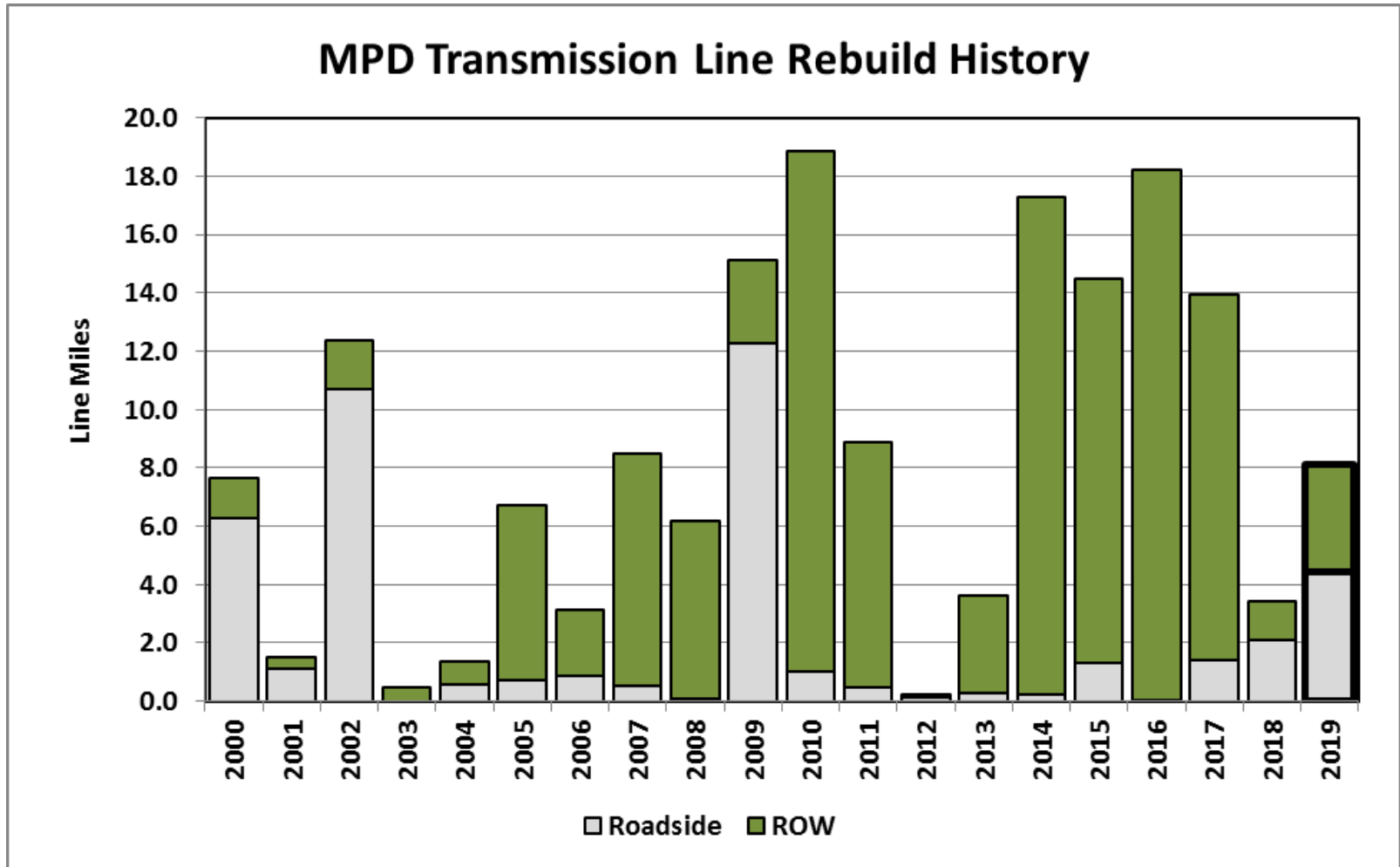
Regional Reliability Comparison



Transmission Planning Strategy

- Spread out remaining required MPD rebuild plan over 15-20 years (total rebuild program will span nearly 30 years)
- Final plan subject to enhanced inspection findings
- Pivoting to targeted line segments
- Targeted structure replacements where appropriate

20-Year Emera Maine MPD Transmission Rebuild History



Chapter 330 Plan Adjustments

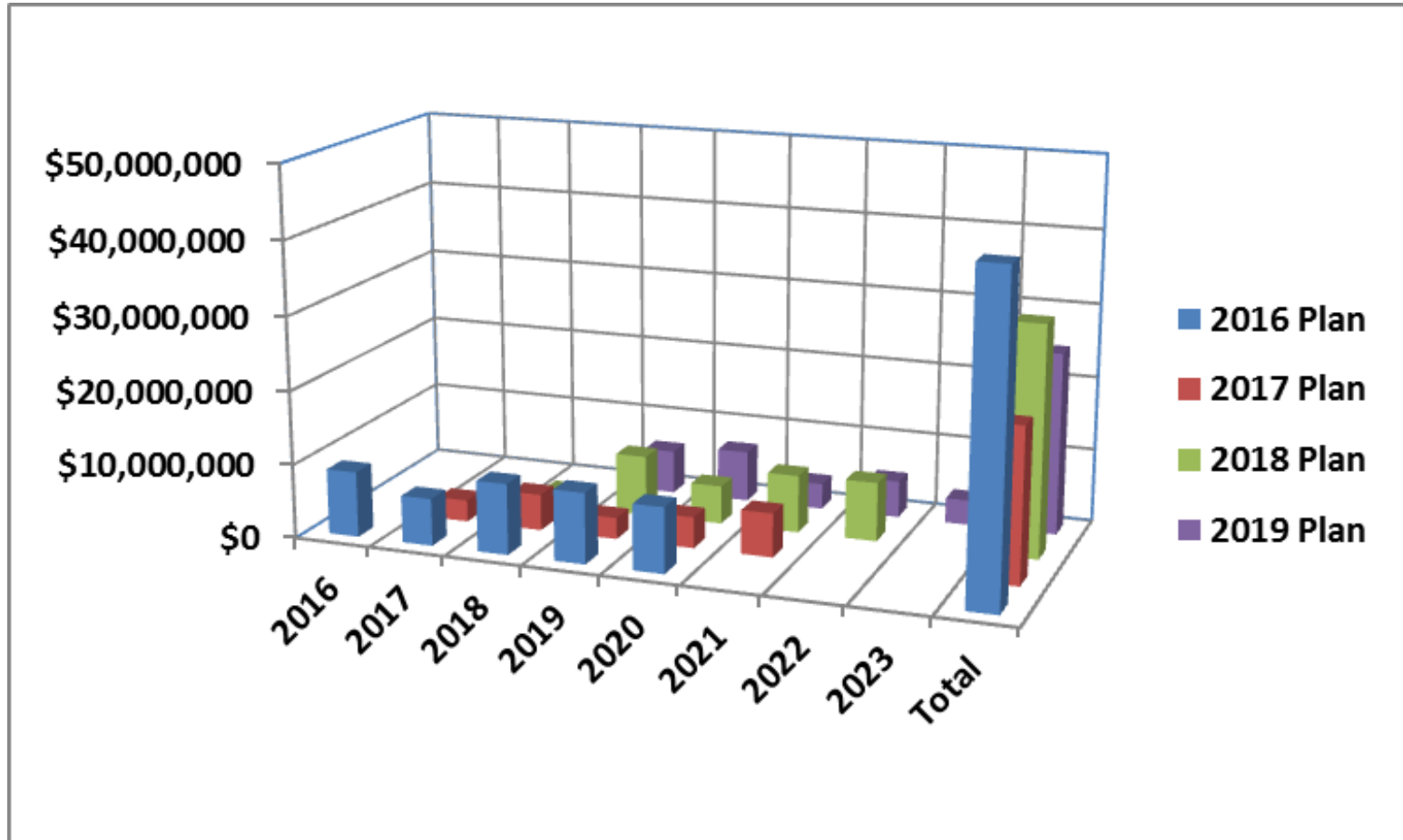
2019 Chapter 330 Plan			
Year	Miles	Cost Range (\$M)	Comments/Projects
2019	7.6	\$5.0 - 6.9	Smaller 6903 project, 1176 Ph. I
2020	9.4	\$6.1 - 7.5	1176 Ph. II, 6930
2021	4.8	\$3.1 - 3.8	1176 Ph. III
2022	6.4	\$4.5 - 5.5	Lines 6915 and 6950
2023	5.6	\$3.1 - 3.7	Lines 6903 and 6905
Total	33.8	\$22.0 - 27.4	
Avg	6.8	\$5.0	

2018 Chapter 330 Plan			
Year	Miles	Cost Range (\$M)	Comments/Projects
2018	3.8	\$1.6 - 2.4	Added 6913/New Sweden
2019	14.0	\$6.9 - 9.6	Moved 6903 '18 to '19
2020	8.4	\$4.5 - 6.0	Line 6930
2021	11.9	\$6.0 - 8.5	Line 3855/1176
2022	10.0	\$7.1 - 8.4	Lines 6930/6950
Total	48.1	\$26.0 - 35.0	
Avg	9.6	\$6.2	

Year-Over-Year Chapter 330 Filing

		2019	2020	2021	2022	2023	Total
2019 Chapter 330	Projects	6903	6930	1176	6915	6905	
		1176	1176		6950	6903	
		6913					
	Miles	7.6	9.4	4.8	6.4	5.6	33.8
	\$	\$5,900,000	\$6,900,000	\$3,500,000	\$5,000,000	\$3,400,000	\$24,700,000
2018 Chapter 330	Projects	6930	6930	1176	6930	6905	
		6903			6950	6903	
		6901 Tap					
	Miles	14	8.4	11.9	10	5.6	49.9
	\$	\$8,200,000	\$5,200,000	\$7,800,000	\$8,000,000	\$3,400,000	\$32,600,000

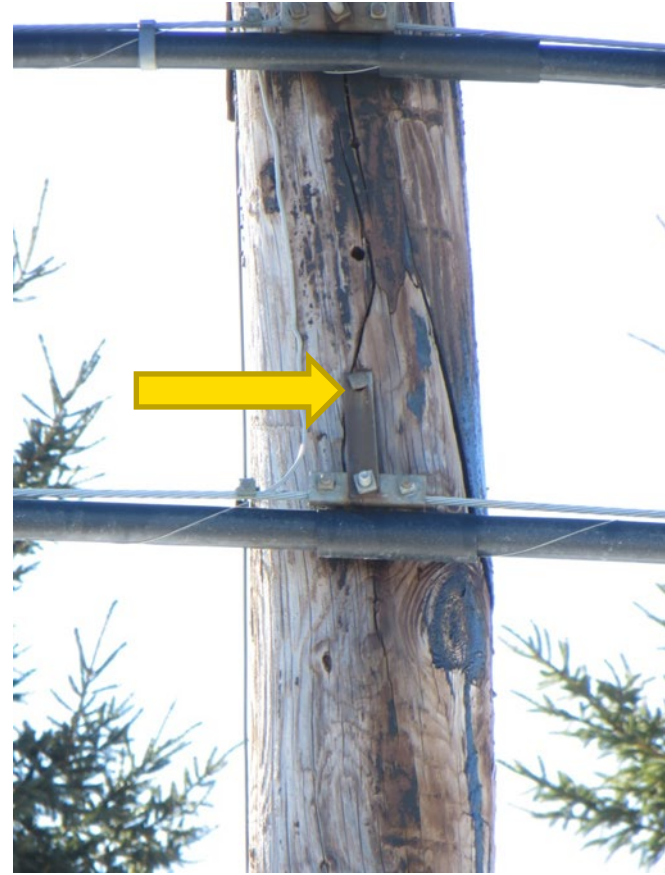
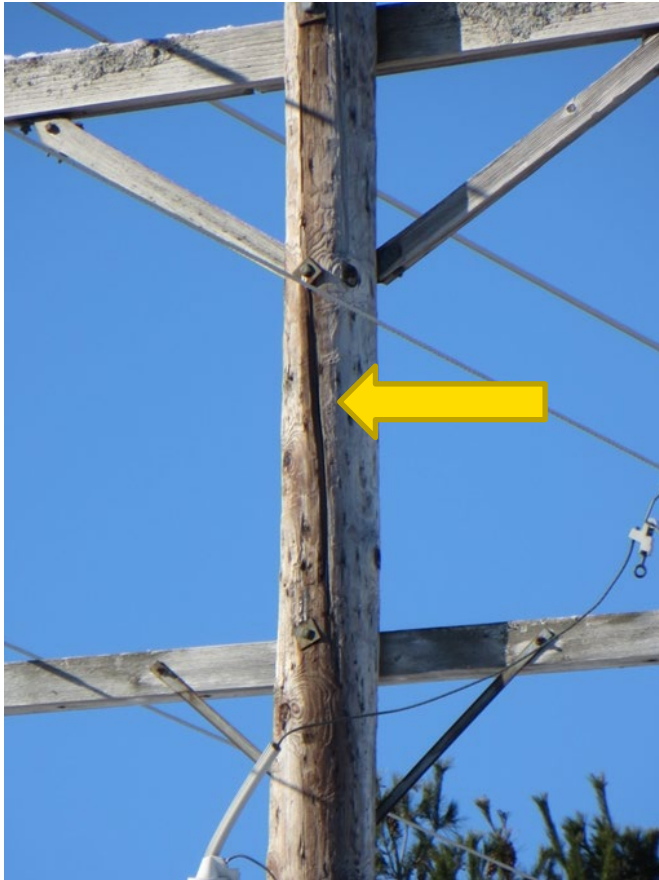
Maine Public District Major Capital Project Plan Comparisons (Years 2016 thru 2019)



2018 Completed Work

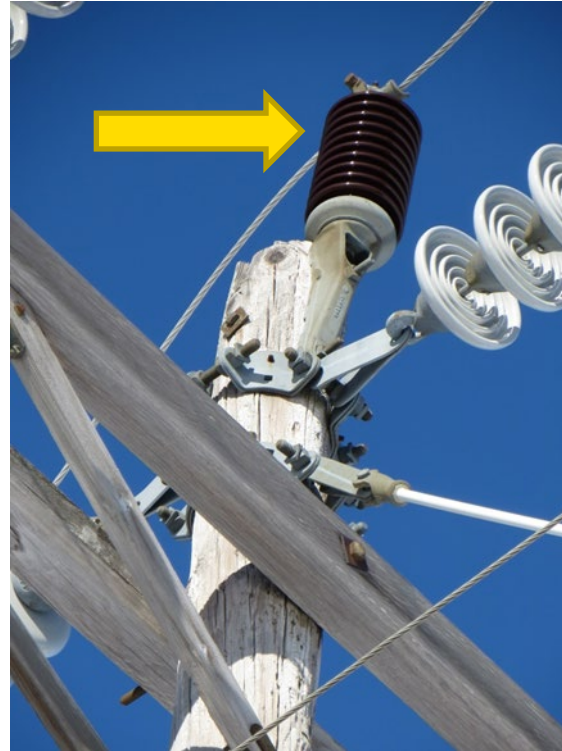
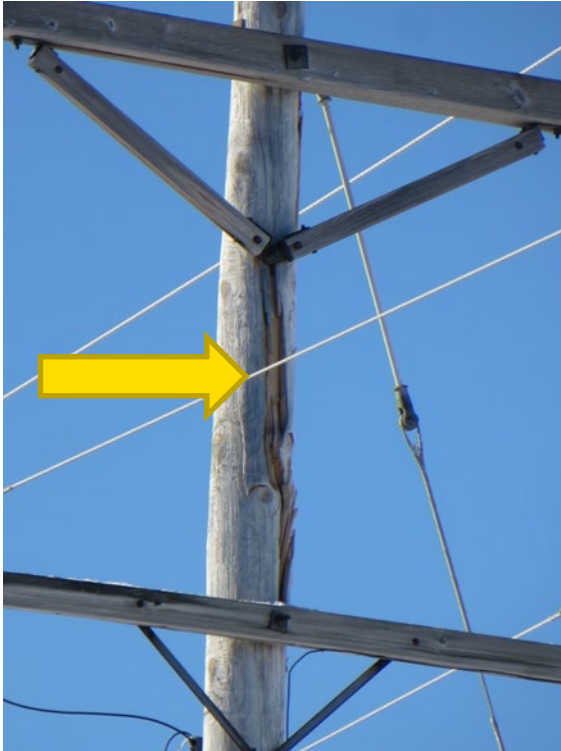
- **Line 6913 & 12-22 Rebuild (Mapleton)**
- **Line 6913 Targeted Pole Replacement (Pole 160 to Ashland)**
- **Line 6905 River Crossing (Madawaska)**
- **Line 1176 Emergency Pole & Crossarm Repairs (Easton)**
- **Line 4407 Targeted Structure Replacement (Island Falls, Crystal, Patten)**

Line 6913 Rebuild (Mapleton)



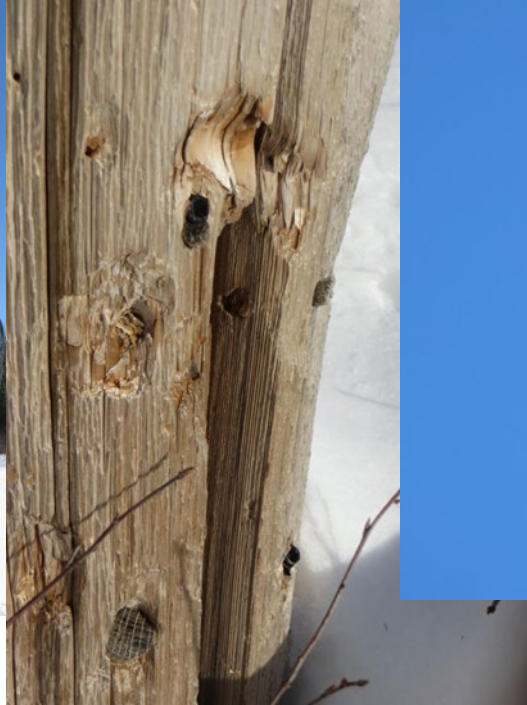
Cracked roadside transmission poles with distribution circuit 12-22 underneath

Line 6913 continued...



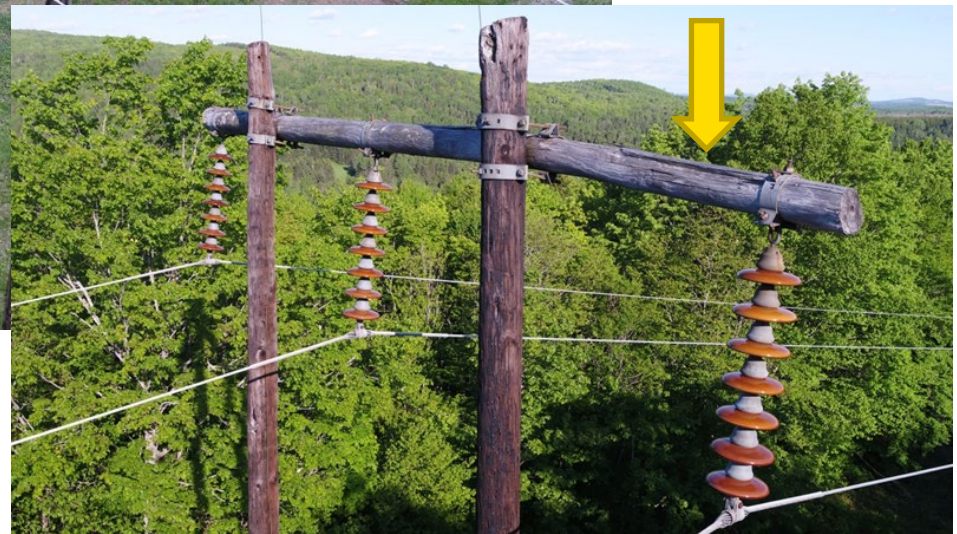
Lightning damaged pole, brown glass post type insulator and rejected wood pole due to internal rot

Line 6913 continued...



Rotting pole base resulting in a leaning pole, other poles with cracked base and woodpecker damage, small 3/0 ACSR conductor

Line 1176 Rebuild per Inspection



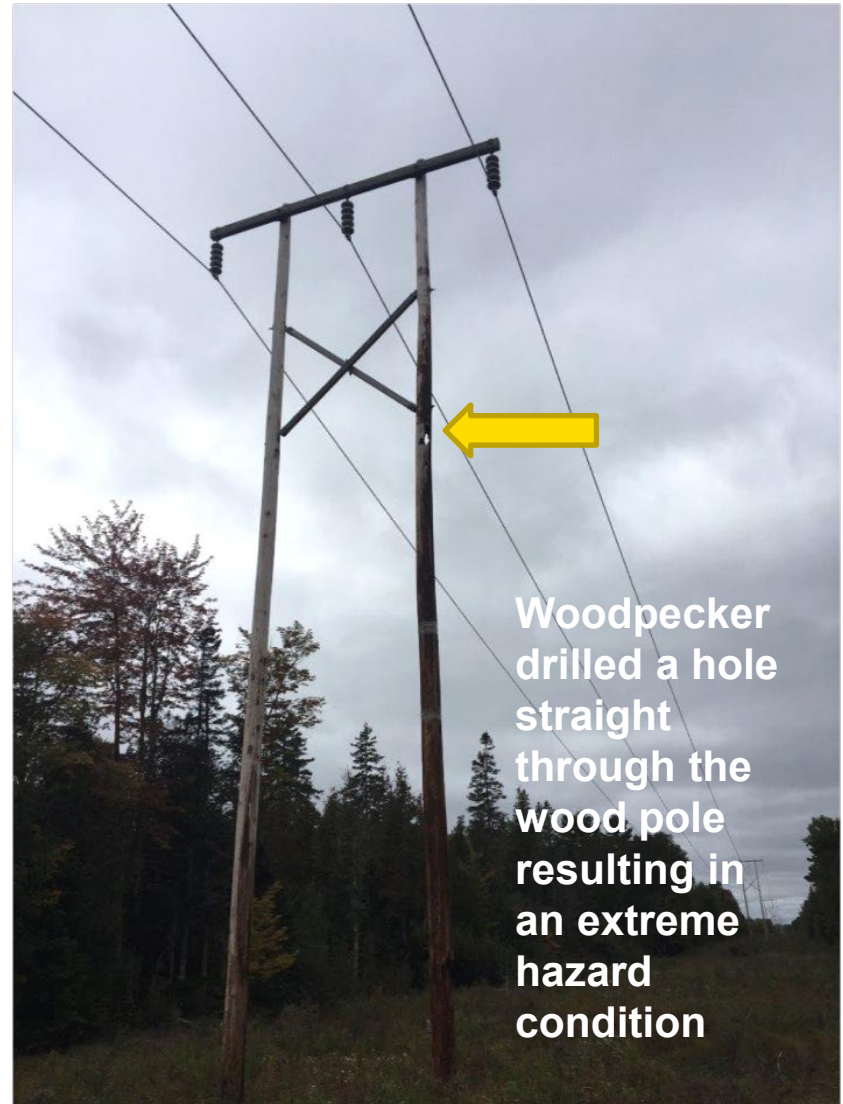
Hollow pole top and crossarm with extreme decay identified by drone inspection

Line 1176 Rebuild per Inspection continued...



**Extensive internal rot due to fungus and woodpecker damage,
conductor damaged by contact with tree fall-in from outside ROW**

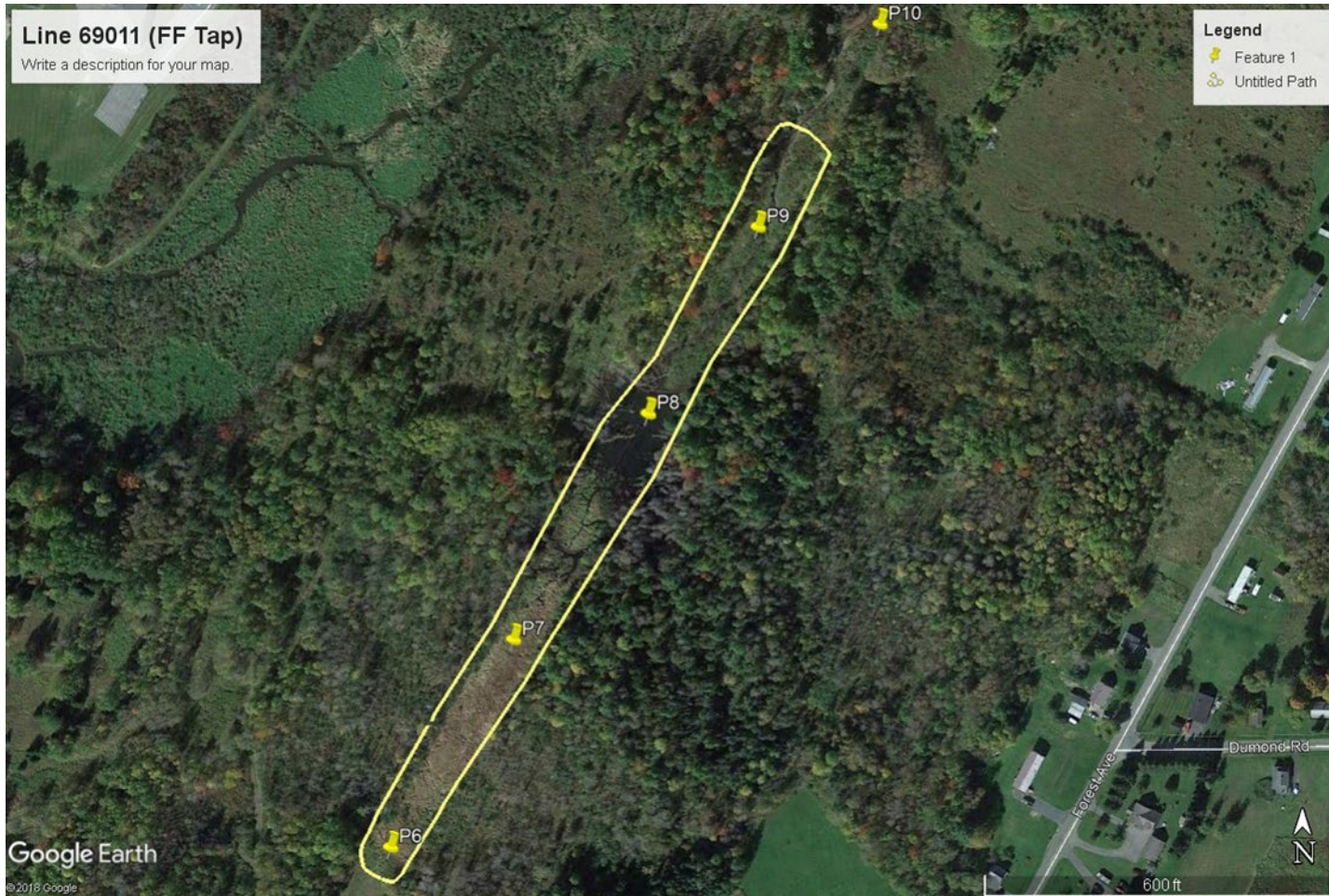
Line 4407 Targeted Structure Replacement



2019 Active and Planned Projects

- **Line 6901 Fort Fairfield Tap Rebuild**
- **Line 6903 Rebuild (Pole 57 to 126; Caribou, Limestone)**
- **Line 6913 Rebuild (Presque Isle SS to Pole 160)**
- **Line 1176 Rebuild Phase 1 (Pole 97 to Border)**
- **Line 4407 Interstate 95 Crossing (Island Falls)**
- **Line 4407 Targeted Pole/Structure Replacement (Phase 4)**
- **Caribou Switching Station**

Line 6901 FF Tap Rebuild



Wood poles #6 thru #9 in a beaver swamp replaced with composite poles and bog anchors and guys

Line 6901 FF Tap continued...

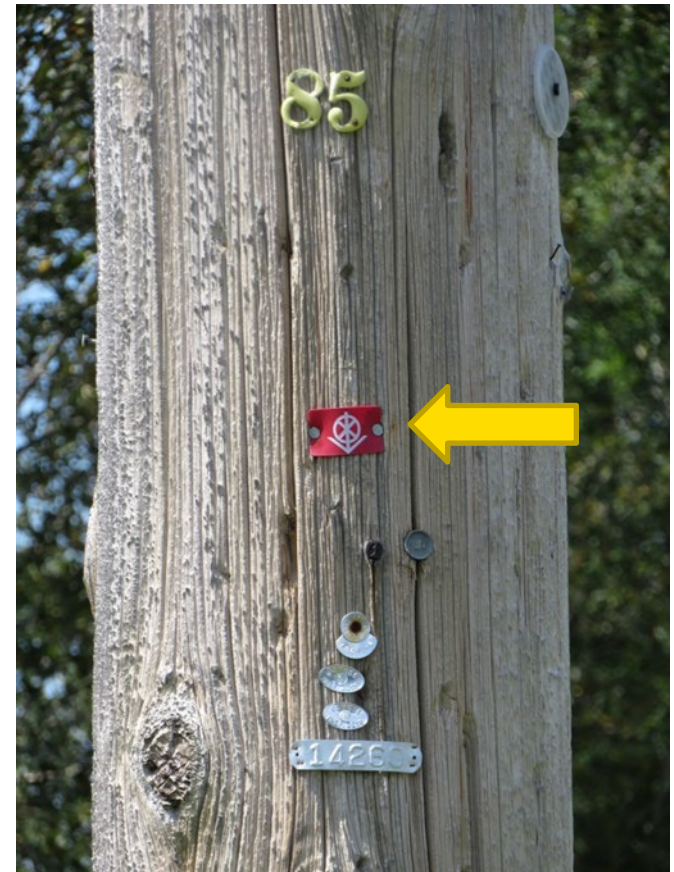
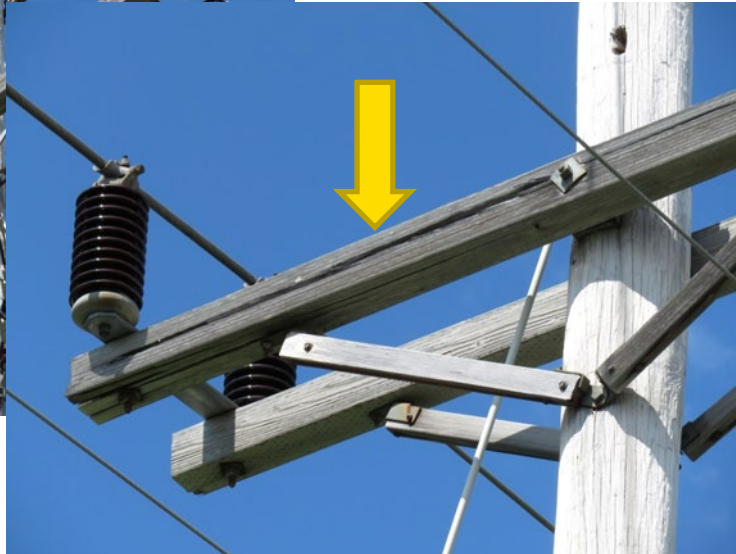


Extremely poor condition three pole deadend structure, left pole previously stubbed to provide support for weakened pole, right pole rejected due to excessive internal decay.

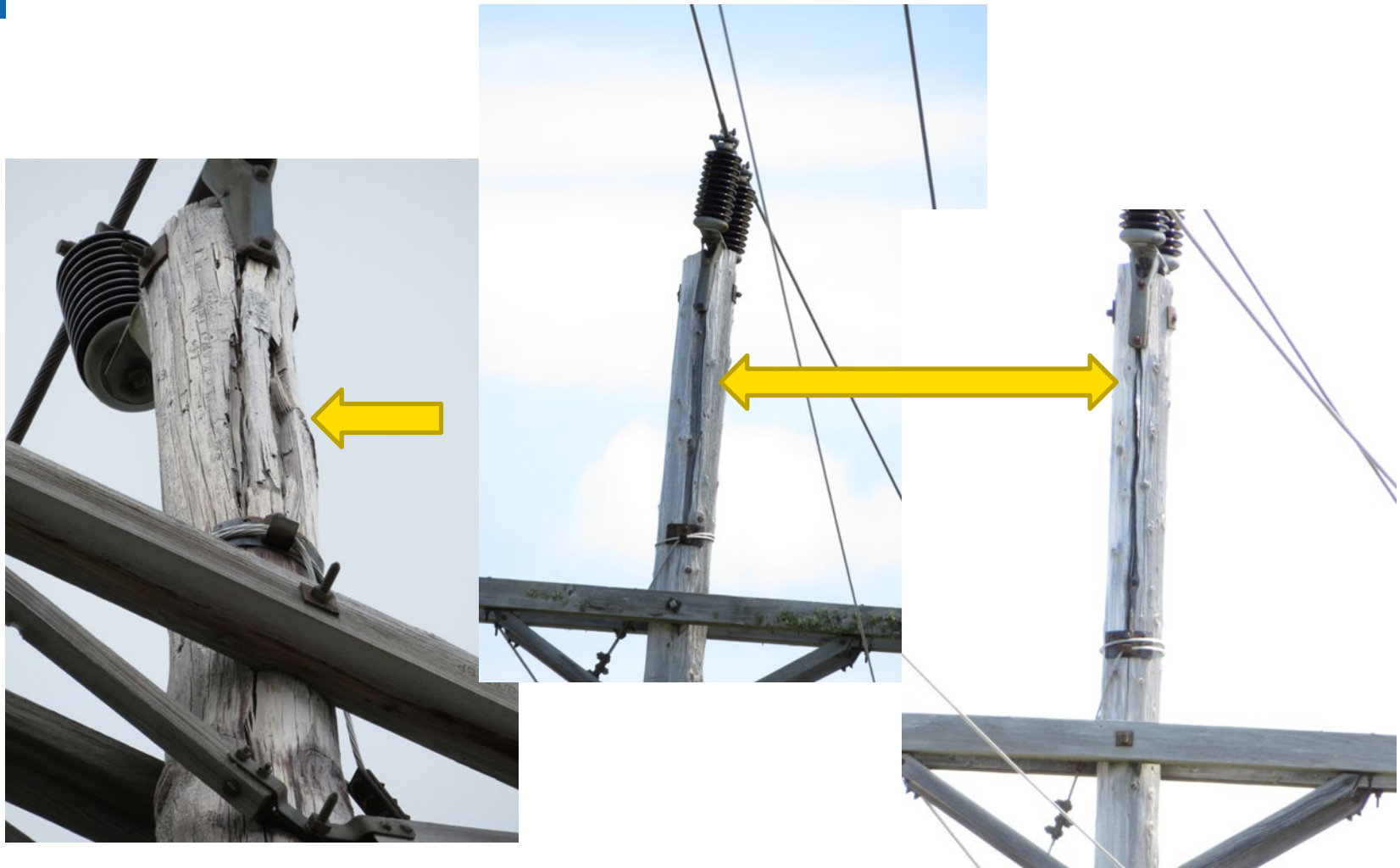
Line 6903 Rebuild (pole 57 to 127)



Brown glass post type insulators, cracked crossarms and rejected pole due to internal decay



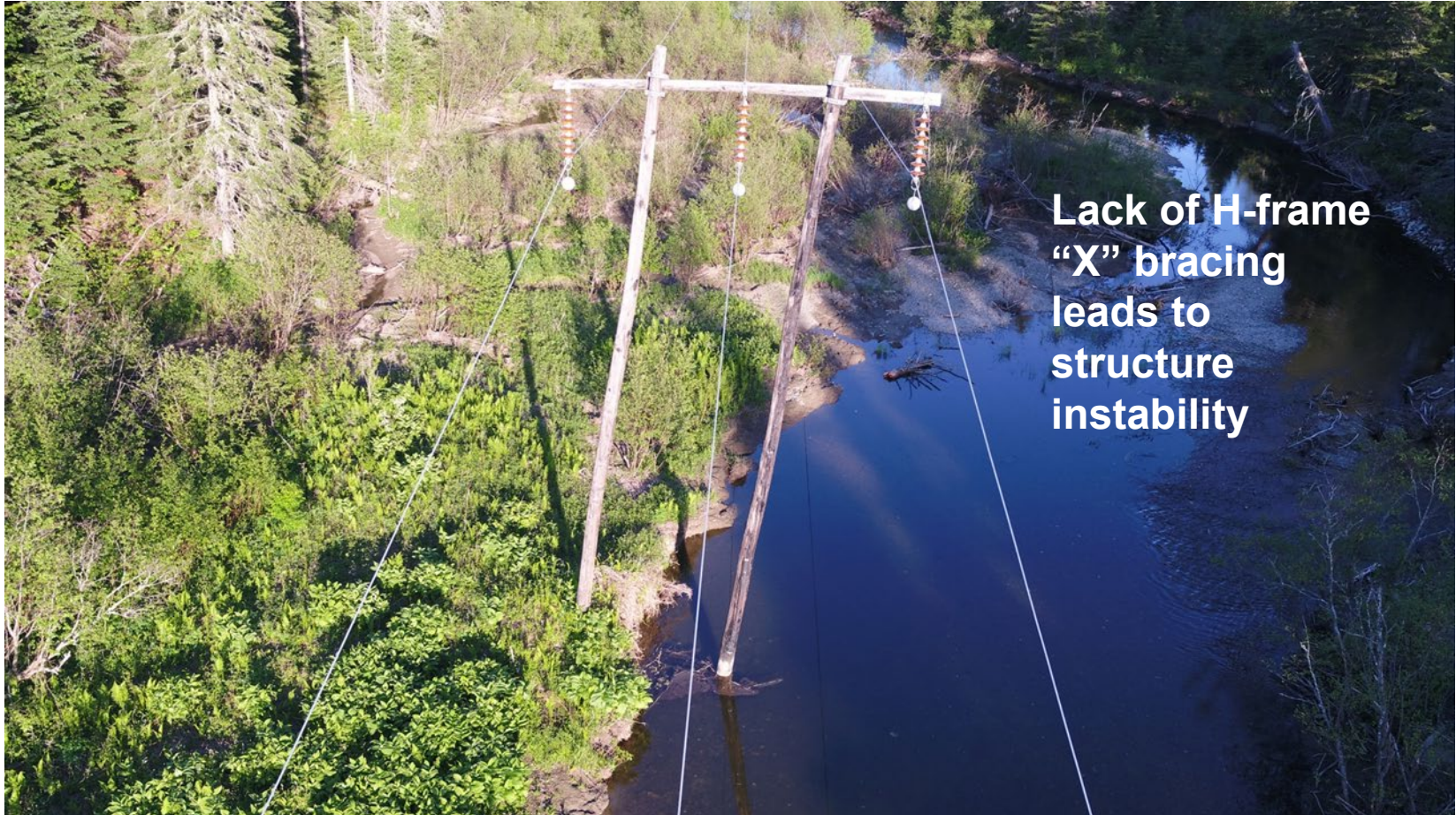
Line 6903 Rebuild continued...



Line 1176 Rebuild Phase 1



Line 1176 Rebuild continued...



Lack of H-frame
"X" bracing
leads to
structure
instability

Line 1176 Phase 1 continued...

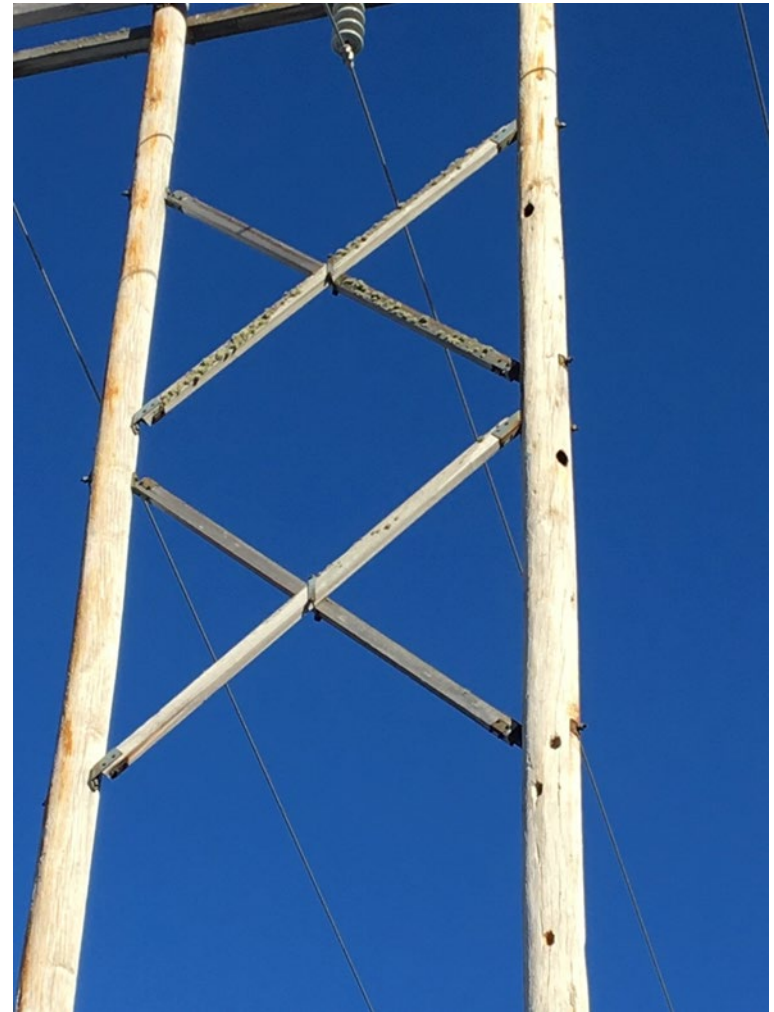
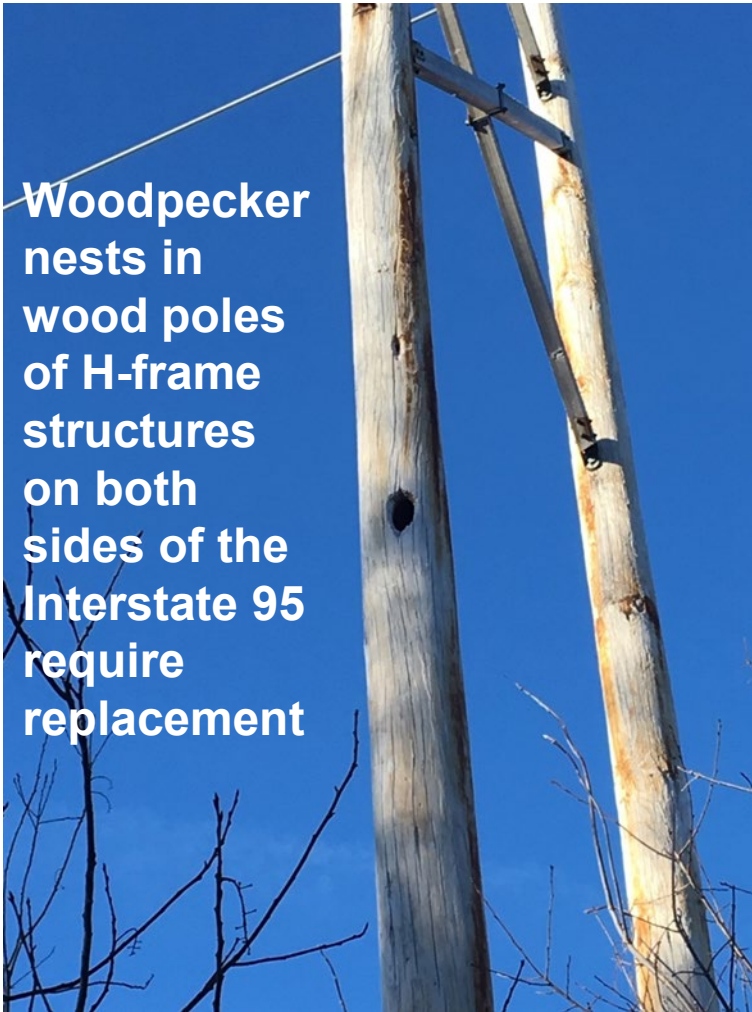


Rotted top

Also, note no
overhead static
wires

Line 4407 Interstate 95 Crossing

Woodpecker
nests in
wood poles
of H-frame
structures
on both
sides of the
Interstate 95
require
replacement



Caribou Switching Station



To protect its substation equipment from leaking water Emera Maine erected a tent as a temporary solution

Emerging Issues

- System Condition:
 - Line 1176 Rebuild
 - Line 6905 Targeted Rebuild
 - Line 6930 (Washburn Flooding/Ice Damage)

Line 6905



Rotted pole base, bear damage and leaning structure

Line 6930 Washburn Ice Damage



Power of ice and water during 2019 spring flood of Aroostook River cracked a pole and pushed the wood pole guy guard backwards located at Castle Hill Road Boat Landing



Line 6930 Washburn Ice Damage cont...



Wood pole H-frame structure excessive lean caused by spring flooding and contact with flowing ice that also broke guy wires on an additional structure. Access to this line segment is extremely difficult and at times impossible due to seasonal flooding, swampy wet ground and railroad tracks.

Line 6913 ROW



Winter construction required due to wet swampy ground. Horizontal "lower profile" configuration required by FAA due lines location at end of Presque Isle Airport runway

Line 6913 ROW continued...



Line 6913 ROW continued...



Horizontal “flat” construction changed to vertical outside of FAA flight path zone

Regional Topics

- Update on Houlton Water Company's plan to build a new line connection with New Brunswick, disconnect from the Northern Maine system and take network service from New Brunswick Power
- Other Regional Questions?

Meeting Close

- PAG member questions and comments to:
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david.norman@emeramaine.com
(207) 973-2568
(207) 973-2708
- Next PAG meeting – 2019