Project Information

Title	Orrington T2 Bushing Replacement
Project #	853B
Blanket Account	No
Work Order Number	
Work Order Link	
Project Manager	AUXIER, SCOTT
Project Owner	BLACK, KEVIN
Project Category	Major Capital
Budget Status	Candidate
Region	SOR
County	Penobscot
Project Priority	1
Construction Class	Transmission
PTF	Yes
Project Owner AOR	T&D Engineering
Business Driver	Prospective Project
Circuit ID	Orrington Substation (OR)
Project Type_	Substation; Improve Reliability
Project Description	Replace 345kV Bushings and perform other recommended preventative maintenance.
Project Scope	Replace High Side 345kv Bushings, oil pumps, gauges, conservator bladders, oil to air re-gasket of cooling equipment and thermal wells, replace faulty oil pump, pre- and post-testing, inspect Preventative Auto Transformers (PAs).
Asset Additions	
Asset Replacements	
Project Justification	The transformer will be 41 years old in 2019. It has the original GE type U bushings on the high side. They are the same bushings as are in the T1 transformer. In 2017 we found an oil leak in the H2 bushing of T1 which helped to drive the bushing replacement project for that unit. This is a proactive approach to these bushings before a leak does develop. The GE Vacuum LTC transformers with integral PAs, have been identified by the electric industry as problematic (see attached Eversource Energy presentation). Shifting in core laminations and cracking core to frame insulation is inherent in the PA design and construction - risk increases after 40 years in service with frequent LTC operations. Visual inspection of the PAs will help us to better determine the condition and risks associated with the PAs. GE type U bushings have a well known industry reputation of multiple problems including top oil seals that can rupture and allow air and moisture to get into the expansion chamber eventually leading to failure. Catastrophic failure could easily lead to complete loss of the transformer or at the very least an extended transformer outage. Although impending PA failure is often indicated by dissolved gas analysis, visual inspection may indicate overheating or other insualtion problems even earlier. PA failure could easily lead to loss of the transformer. The system would be backed up by T1 but contingencies would be affected.
Project Risk Assessment	As with any BPS related job, there is a chance that the outage application may be denied at the last minute due to system contingencies. This would result in delay or postponement. Either of which would add considerable cost. Probability: Low Cost: Moderate to High
Screening Criteria for Consideration of NWA (Non-wires Alternative) Solution	5. This project addresses asset condition ONLY
Alternative Projects	None

Estimated Total Project Cost	1,090,572
Estimate Grade	C - Engineering Estimate (-10% to +10%)
Estimated Direct Cost	$690,291
Estimated Overhead Cost	$302,765
Estimated Labor Overhead	$64,469
Estimated Non-Labor Overhead	$272,553
Estimated AFUDC	$33,516
Estimated Nonunion Cost (ST)	$13,720
Estimated Union Cost (ST)	$25,852
Estimated Union Cost (OT)	$9,719
Estimated Outside Service Cost	$616,000
Estimated Direct Purchases	$25,000
Estimated Inventory Cost	$0
Estimated Lobby Stock	$0
Estimated Salvage	$0
Estimated Credits	$0
Estimated Reimbursement	$0
Estimated OM	$0
Estimated Contingency	$64,000
Planning Hours	0
Engineering Hours	160
Line Resources	-
Estimated Line Hours	0
Estimated PST Hours	880
Other Hours	0
Project Status	Closed
Project Start Date	5/1/2019
Construction Start Date	9/23/2019
In Service Date	1/31/2020
Approval Log	; Approval of Project Number (up to $10K Spend) (version 25.0) by NORMAN, DAVID on 3/13/2019 12:00:25 PM Approval Limit per LOSA $100K Total Project Cost $931,793.70; Approval of Project Justification Criteria (version 34.0) by RAVIN, KYLE on 4/13/2019 3:23:13 PM Approval Limit per LOSA $25K Total Project Cost $1,096,126.19; Approval of Project Estimate (version 36.0) by NORMAN, DAVID on 4/14/2019 9:27:43 PM Approval Limit per LOSA $100K Total Project Cost $1,096,126.19; Approval of Project Estimate (version 40.0) by MILLER, PAUL on 5/31/2019 8:34:52 AM Approval Limit per LOSA $500K Total Project Cost $1,075,016.72; Approval of Project Estimate (version 42.0) by HERRIN, MICHAEL on 5/31/2019 8:42:58 AM Approval Limit per LOSA $2M Total Project Cost $1,075,016.72; Approval of Project Closure(version 51.0) by AUXIER, SCOTT on 1/16/2020 1:12:06 PM Approval Limit per LOSA Total Project Cost $1,083,124.23
Approval Status	Completed Approval of Approval of Project Closure
Required Resources	PST SOR