

Group Sites > Capital Financial Pl...

## Project Information

Title	Graham 115 Control Upgrade
Project #	854B
Blanket Account	No
Work Order Number	NA
Work Order Link	<a href="http://intra.bhe.com/ewp/wo_detail.cfm?jmnu=NA">http://intra.bhe.com/ewp/wo_detail.cfm?jmnu=NA</a>
Project Manager	<input type="checkbox"/> AUXIER, SCOTT
Project Owner	<a href="#">BLACK, KEVIN</a>
Project Category	Major Capital
Budget Status	Candidate
Region	SOR
County	
Project Priority	1
Construction Class	Transmission
PTF	Yes
Project Owner AOR	T&D Engineering
Business Driver	Prospective Project
Circuit ID	
Project Type_	
Project Description	<p>The project will upgrade the local controls and SCADA system at Graham 115kV Substation, install a Phasor Measurement Unit (PMU) and upgrade the existing Digital Fault Recorder (DFR). At the same time, the control house will be expanded to accommodate both the control upgrade and potential future control upgrades required for NPCC Directory 4 Criteria compliance.</p> <p>Background:</p> <p>The existing Graham 115 kV Substation, located in Veazie, with ties to Orrington Substation, Maine Independence Station, Rebel Hill Switching Station, Passadumkeag Switching Station, and feeding Graham 46 kV Substation, is at the heart of the Bangor Hydro District's transmission system. Its existing control house is a 1990's vintage, compact design facility with primary function to control and monitor seventeen (17) 115kV breakers tied into two 115 kV buses at Graham Station.</p> <p>The existing control system is a hybrid; consisting of a 22 year old Tasnet "Intel 386" PC-based control system (the Intel 386 platform dating back to circa 1985) along with an Advanced Control Systems (ACS) 7050 Remote Terminal Unit (RTU). The Tasnet master program communicates with the various relays and meters via proprietary Network Interface Modules (NIM).</p>
Project Scope	<ul style="list-style-type: none"> <li>- Construct a 20 x 52 ft.(~1000 sq. ft.) metal addition to the existing control house.</li> <li>- Install control panels of standard Emera Maine design along with new battery bank for the seventeen existing 115kV circuit breakers under the control house's purview.</li> <li>- Replace the existing Tasnet control system and ACS 7050 RTU with a SEL RTAC/Axion control system (Emera Maine's current standard).</li> <li>- Install a Phasor Measurement Unit (PMU).</li> <li>- Upgrade the existing Digital Fault Recorder (DFR).</li> </ul>
Asset Additions	
Asset Replacements	
Project Justification	<p>The existing Tasnet control system and ACS 7050 RTU are obsolete with parts and technical support for this proprietary equipment (including associated NIMs) no longer readily available – certainly not available from OEM's or "primary" markets. This presents a risk to continuous operation in the event of failure of one of its components. If this occurs, until such time the Company determines a method of replacement or repair using whatever equipment is readily</p>

available, the risks include;

- Loss of control of the Graham Station 115kV breakers including MIS
- Loss of voltage and current sensing of our 115kV system (including real-time data required by ISO New England);
- There are system requirements where Emera must man the Graham 115kV Substation 24/7 until the system is again operational. For instance, Emera Maine is required to man the station in support of Central Maine Power's black start procedures upon failure of the control system - as well as during storm events, grid stress, and other significant transmission system events. During blue sky day SCADA failures, we would call in personnel as necessary to regulate voltage and effect required control changes.

A loss of functionality of this control system for an extended period would also present the risk of scrutiny from ISO New England and other bodies due to the significance of the transmission operations controlled and monitored with this system.

Furthermore, the existing control system is a first-generation attempt at substation integration, and due to this and the inability of technical support for further programming or changes, it offers very limited functionality compared to contemporary systems. One of the primary deficiencies due to this lack of functionality is that the Graham 115 local control and tagging procedures are currently required to be performed unlike those at any other Emera Maine substation. Requiring tagging procedures at Graham 115kV Substation that are not in alignment with those used throughout Emera Maine is potentially confusing and therefore poses a risk to reliability for some of our most critical assets and poses a risk to safety to our personnel. With the proposed control system, we will be able to utilize the same tagging procedures as we do elsewhere in the system.

The existing compact design of the control house requires us to expand in order to install a conventional control system. At the same time, the proposed expansion will also accommodate the possibility Graham 115 Substation will be designated as a Bulk Power System (BPS) asset by ISO New England, in which case the substation will have to comply with NPCC Directory 4 Criteria. The primary NPCC criteria require complete separation of the "A" and "B" protection packages for all components. This includes separation of all control cables and protection elements for these assets.

There is high likelihood of this reclassification occurring based on recent history. ISO New England performs system studies periodically to determine which facilities are to be classified as BPS. In May 2015, Emera Maine was notified that Graham 115 Substation was newly classified as BPS. At that time, Emera Maine developed a plan to bring the substation into compliance and began preliminary engineering. In December 2016, we were notified that Graham 115 Substation was reclassified as Non-BPS by a subsequent ISO New England study and the upgrade project was cancelled. Therefore, because of the likelihood Graham 115 assets will be reclassified as BPS in future study, along with the minimal costs to accommodate the protection system separation work if done now vs. costs as a new expansion project at a later date, this project includes accommodations for appropriate space, properly sized cable trays, etc. for that potential future work. (Note: none of the actual separation work is proposed here.)

The Phasor Measurement Unit (PMU) is required to be installed at this substation by 07/01/19 per agreement with ISO New England. This equipment will be used to send real time voltage and current phasor monitoring data to ISO New England as part of an initiative with several New England utilities to "improve the reliability of the transmission grid and to prevent the spread of local disturbances to neighboring regions through enhanced monitoring capabilities and increased situational awareness." This installation represents <\$100k of the total estimated project costs.

Also, the existing Graham 115kV Substation Digital Fault Recorder (DFR) is being upgraded because it does not meet the updated Dynamic Disturbance Recording (DDR) requirements of NERC PRC-002-2. Therefore it must be replaced or Emera Maine will be out of compliance. The DFR installation represents roughly \$250k of the total project

costs.

The PMU and DFR have been included as part of this project due to efficiencies of installation if done in concert with the rest of the control house upgrade.

Project Risk Assessment

Weather - Bad weather could delay the construction of the control house addition. Low Probability/Medium Impact

Outage coordination - Outage delays during the cutovers could delay the project. Medium Probability/High Impact.

Estimate includes 10% contingency for Direct Purchase and 10% contingency for Labor

Screening Criteria for Consideration of NWA (Non-wires Alternative) Solution

6. This project addresses control systems or performance ONLY, e.g. high speed protection, sectionalizing, etc.

Alternative Projects

**Do nothing: accept outage risk and/or 24/7 coverage with failure of these obsolete controls and RTU.**

Estimated Total Project Cost

3,647,132

Estimate Grade

C - Engineering Estimate (-10% to +10%)

Estimated Direct Cost

\$2,125,314

Estimated Overhead Cost

\$1,141,993

Estimated Labor Overhead

\$568,933

Estimated Non-Labor Overhead

\$708,298

Estimated AFUDC

\$379,824

Estimated Nonunion Cost (ST)

\$217,030

Estimated Union Cost (ST)

\$176,352

Estimated Union Cost (OT)

\$66,132

Estimated Outside Service Cost

\$866,000

Estimated Direct Purchases

\$799,800

Estimated Inventory Cost

\$0

Estimated Lobby Stock

\$0

Estimated Salvage

\$0

Estimated Credits

\$0

Estimated Reimbursement

\$0

Estimated OM

\$0

Estimated Contingency

\$0

Planning Hours

0

Engineering Hours

2,574

Line Resources

-

Estimated Line Hours

0

Estimated PST Hours

6,600

Other Hours

2,530

Project Status

Closed

Project Start Date

3/1/2018

Construction Start Date

1/15/2019

In Service Date

9/30/2020

Approval Log

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Approval of Project Justification Criteria (version 39.0)  
by CARON, PETER on 3/7/2018 7:17:25 AM  
Approval Limit per LOSA \$0  
Total Project Cost \$3,525,880.29;

Approval of Project Justification Criteria (version 42.0)  
by CARON, PETER on 3/7/2018 7:36:49 AM  
Approval Limit per LOSA \$0  
Total Project Cost \$3,525,880.29;

Approval of Project Estimate (version 44.0)  
by NORMAN, DAVID on 3/7/2018 8:01:55 AM

Approval Limit per LOSA \$100K  
Total Project Cost \$3,525,880.29;

Approval of Project Estimate (version 46.0)  
by BELLIVEAU, ROBERT on 3/7/2018 2:39:04 PM  
Approval Limit per LOSA \$500K  
Total Project Cost \$3,525,880.29;

Approval of Project Estimate (version 48.0)  
by HERRIN, MICHAEL on 3/7/2018 5:38:53 PM  
Approval Limit per LOSA \$2M  
Total Project Cost \$3,525,880.29;

Approval of Project Closure(version 5.0)  
by AUXIER, SCOTT on 6/15/2020 2:39:42 PM  
Approval Limit per LOSA  
Total Project Cost \$3,573,617.38

Approval Status	Completed Approval of Approval of Project Closure
Required Resources	PST SOR; Substation -Engineer
Team Members	<a href="#">AUXIER, SCOTT</a> ; <a href="#">HORN BROOK, JAMES</a>
Planning	Not Required
Planner	
Engineering	Required
Line Engineer	
Trim	Not Required
ROW	Not Required
Procurement	Not Required
Tel Pole Set	Not Required
Customer Rqmts	Not Required
Environ Permits	Not Required
Pole Permits	Not Required
Other Permits	Not Required
Dig Safe	Not Required
Final Inspection	Not Required

Released to Line

Line Status

Notes

Attachments

[Graham 115 Control Upgrade Estimate v2.xlsx](#)

Content Type: Project  
Version: 8.0  
Created at 7/31/2017 4:32 PM by  AUXIER, SCOTT  
Last modified at 10/5/2020 3:50 PM by  TATRO, SHANE

Close

### Board Updates

BOD Request Title	BOD Meeting Date	BOD Update Type	BOD Request Status
Graham 115kV Substation Controls Upgrade	2/15/2018	Funding Request	Approved

Change Orders - Required for projects exceeding the greater of 10% or \$10,000 of approved spend or for ALL scope changes

Proj#	Change Order Title	Change Order Date	Original Approved Estimate	New Total Cost Estimate
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There are no items to show in this view of the "Change Order Log" list. To add a new item, click "New".

### Chapter 330 Filing

Ch330 Project Title	Proj Status	Year Budgeted	Region	Cost Estimate
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There are no items to show in this view of the "Chapter 330" list.

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### Forecast Entry - 2021 (Monthly Amounts are Direct Costs Only)

## Capital Project Update/Request for the Board of Directors

BOD Request Title	Graham 115kV Substation Controls Upgrade
BOD Meeting Date	2/15/2018
BOD Update Type	Funding Request
BOD Requested Amount	\$3,530,000
BOD Request/Update	Replace the Graham 115kV substation local controls and SCADA systems.
Project Information	See attached board slides
Alternative Projects	
BOD Cost Summary	See attached board slides
Project Update	
Key Risks	
BOD Request Status	Approved
BOD Comments	
Signature	Per Rob Belliveau (See attached board slides)
Related Projects	<a href="#">854B</a>
Projects Lookup:Title (linked to item)	Graham 115 Control Upgrade
Related Projects:In Service Date	9/30/2020
Attachments	<a href="#">Line 10 - Graham 115 - New Sweden 02-15-18.pdf</a>

Content Type: BOD Request

Version: 2.0

Created at 2/22/2018 2:48 PM by  WRIGHT, AMY

Last modified at 2/22/2018 2:48 PM by  WRIGHT, AMY