All our energy.
All the time.

MARITIME ELECTRIC
A FORTIS COMPANY

3:00 PM

July 14, 2021

Island Regulatory and Appeals Commission
PO Box 577
Charlottetown PE C1A 7L1

Dear Commissioners:

Please find enclosed five copies of Maritime Electric's 2022 Capital Budget Application ("Capital Budget" or "Application").

The Capital Budget has been developed in accordance with the requirements of the Company's Capital Expenditure Justification Criteria and related Commission Order UE-17-03. In addition, as requested in the Commission's June 7, 2021 letter of direction concerning filing requirements for annual capital budget applications, the Application includes:

i. A breakdown of proposed capital expenditures by Investment Classification in Section 3.4 with supporting information in Appendix E;
ii. System reliability trends and benchmarking (to other Atlantic Canadian electric utilities) information in Section 3.5 a-c and Confidential Appendix S-1;
iii. Identification of the 10 worst performing feeders over the past 10 years based on SAIDI and SAIFI reliability data, and the rationale for the 2022 capital projects that will target four of these feeders (Section 3.5 d);
iv. A summary of historical and current electricity rates and a forecast of the impact that the proposed 2022 Capital Budget will have on electricity rates (Section 3.3); and
v. A summary of actual and forecast capital expenditures for the period 2013 to 2026, with breakdown to the major budget category level (i.e., Generation, Distribution, Transmission and Corporate), provided as Appendix A.

If you have questions or require additional information concerning any aspect of the 2022 Capital Budget Application, please do not hesitate to contact me at 902-629-3641.

Yours truly,

MARITIME ELECTRIC

Gloria Crockett

Gloria Crockett, CPA, CA
Manager, Regulatory and Financial Planning

GCC20
Enclosures

C. Mackenzie
Cassie Mackenzie

180 Kent Street • PO Box 1328 • Charlottetown, PE C1A 7N2
telephone 1-800-670-1012 • fax 902-629-3665 • maritimeelectric.com

C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY
AND APPEALS COMMISSION

IN THE MATTER of Section 17(1) of the Electric Power Act (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order of the Commission approving the 2022 Annual Capital Budget and for certain approvals incidental to such an order.

APPLICATION AND EVIDENCE
OF
MARITIME ELECTRIC COMPANY, LIMITED

July 14, 2021

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1.0 APPLICATION

C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY
AND APPEALS COMMISSION

IN THE MATTER of Section 17(1) of the Electric Power Act (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order of the Commission approving the 2022 Annual Capital Budget and for certain approvals incidental to such an order.

Introduction

1. Maritime Electric Company, Limited ("Maritime Electric" or the "Company") is a Corporation incorporated under the laws of Canada with its head or registered office at Charlottetown and carries on a business as a public utility subject to the Electric Power Act engaged in the production, purchase, transmission, distribution and sale of electricity within Prince Edward Island.

Application

2. Maritime Electric hereby applies for an order of the Island Regulatory and Appeals Commission ("IRAC" or the "Commission") approving the capital budget for the year 2022 as outlined in the attached evidence.

3. The proposals contained in this Application represent a just and reasonable balance of the interests of Maritime Electric and those of its customers and will, if approved, allow the Company to perform necessary capital additions and improvements at a cost that is, in all circumstances, reasonable.

Procedure

4. Filed hereto is the Affidavit of Jason C. Roberts, Angus S. Orford, Enrique A. Riveroll and T. Michelle Francis which contains the evidence in which Maritime Electric relies in this Application.

Dated at Charlottetown, Province of Prince Edward Island, this 14th day of July, 2021.

D. Spencer Campbell, Q. C.

STEWART MCKELVEY
65 Grafton Street, PO Box 2140
Charlottetown PE C1A 8B9
Telephone: (902) 629-4549
Facsimile: (902) 892-2485
Solicitors for Maritime Electric Company, Limited

2.0 AFFIDAVIT

C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY
AND APPEALS COMMISSION

IN THE MATTER of Section 17(1) of the Electric Power Act (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order of the Commission approving the 2022 Annual Capital Budget and for certain approvals incidental to such an order.

AFFIDAVIT

We, Jason Christopher Roberts of Suffolk, Angus Sumner Orford of Charlottetown, Enrique Alfonso Riveroll of New Dominion and T. Michelle Francis of Emyvale, in Queens County, Province of Prince Edward Island, MAKE OATH AND SAY AS FOLLOWS:

1. We are the President and Chief Executive Officer, Vice-President, Corporate Planning and Energy Supply, Vice-President, Customer Service and Vice-President, Finance and Chief Financial Officer of Maritime Electric respectively and, as such, have personal knowledge of the matters deposed to herein, except where noted, in which case we rely upon the information of others and in which case we verily believe such information to be true.

2. Maritime Electric is a public utility subject to the provisions of the Electric Power Act engaged in the production, purchase, transmission, distribution and sale of electricity within Prince Edward Island.

3. We prepared or supervised the preparation of the evidence and to the best of our knowledge and belief the evidence is true in substance and in fact. A copy of the evidence is attached to this, our Affidavit, and is collectively known as Exhibit "A", contained in Sections 3 through 9 inclusive and Appendices A through L inclusive.

4. Section 10 contains a proposed Order of the Commission based on the Company's Application.

SWORN TO SEVERALLY at
Charlottetown, Province of Prince Edward Island,
the 14th day of July, 2021.
Before me:

Jason C. Roberts

T. Michelle Francis

Angus S. Orford

Enrique A. Riveroll

A Commissioner for taking Affidavits
in the Supreme Court of Prince Edward Island.

3.0 INTRODUCTION

3.1 Corporate Profile

Maritime Electric owns and operates a fully integrated system providing for the purchase, generation, transmission, distribution and sale of electricity throughout Prince Edward Island ("PEI"). The Company's head office is located in Charlottetown with generating facilities in Charlottetown and Borden-Carleton.

Maritime Electric is the primary electric utility on PEI delivering approximately 90 per cent of the electricity supplied in the province. To meet customers' energy demand and supply requirements, the Company has contractual entitlement to capacity and energy from New Brunswick ("NB") Power's Point Lepreau Nuclear Generating Station ("Point Lepreau") and an agreement for the purchase of capacity and system energy from NB Power delivered via four submarine cables owned by the Province of PEI. Through various contracts with the PEI Energy Corporation, the Company purchases the capacity and energy from 92.5 megawatts ("MW") of wind generation on PEI.

Maritime Electric is a public utility subject to PEI's *Electric Power Act*. As a public utility, the Company is subject to regulatory oversight and approvals of the Island Regulatory and Appeals Commission ("IRAC" or the "Commission"). IRAC's jurisdiction to regulate public utilities is found in the *Electric Power Act* and the *Island Regulatory and Appeals Commission Act.*

3.2 Overview of Evidence

Under Section 17 (1) of the *Electric Power Act*, every public utility is required to submit to the Commission, for its approval, an annual capital budget of proposed improvements or additions to its property. This is the evidence in support of Maritime Electric's 2022 Capital Budget Application ("Application"). In preparing this evidence, the Company used the Capital Expenditure Justification Criteria ("CEJC") filed on April 10, 2018 and updated on November 22, 2019. Accordingly, for each proposed Capital Budget project, the evidence will indicate whether the project is considered mandatory, recurring, justifiable or work support services. However, Section 3.4 provides the 2022 Capital Budget according to the

Investment Classifications proposed by the Commission in a letter of direction dated June 7, 2021.

This Application has been developed to address a range of system and business requirements that support the Company's ability to fulfil its obligation as a public utility under Section 3a of the *Electric Power Act* which states:

> "Every public utility shall:
> (a) Furnish at all times such reasonably safe and adequate service and facilities for services as changing conditions require;"

Capital investment in the electricity supply system, and the facilities and equipment that support the operation of the system, is an annually recurring necessity for the Company to comply with this obligation. Through capital investment, the Company is able to serve existing and new customers, modify the system as necessary to meet customer demand, replace or upgrade aged, deteriorated or obsolete assets in a structured manner, improve system performance through design and technology enhancements, and ensure that the work support services to meet business and regulatory requirements are in place and adequate.

It is important that the Company strategically allocates the annual capital investment to meet the needs across the primary system categories of the Application (i.e., Generation, Distribution, Transmission and Corporate). This is accomplished using structured planning resources such as the Integrated System Plan and the Distribution Asset Management Program (as outlined in Section 3.5a), as well as information collected through operations (e.g., inspection programs), and projects designed to identify and assess equipment or system deficiencies (e.g., engineering studies, cybersecurity reviews, etc.).

The Company's capital investments are also dictated by some mandatory activities as a result of legislation or regulatory direction. These are often to address safety or environmental issues, but orders of the Commission can also result in mandatory capital investments.

Appendix A outlines the Company's actual and proposed capital expenditures from 2013 to 2026.

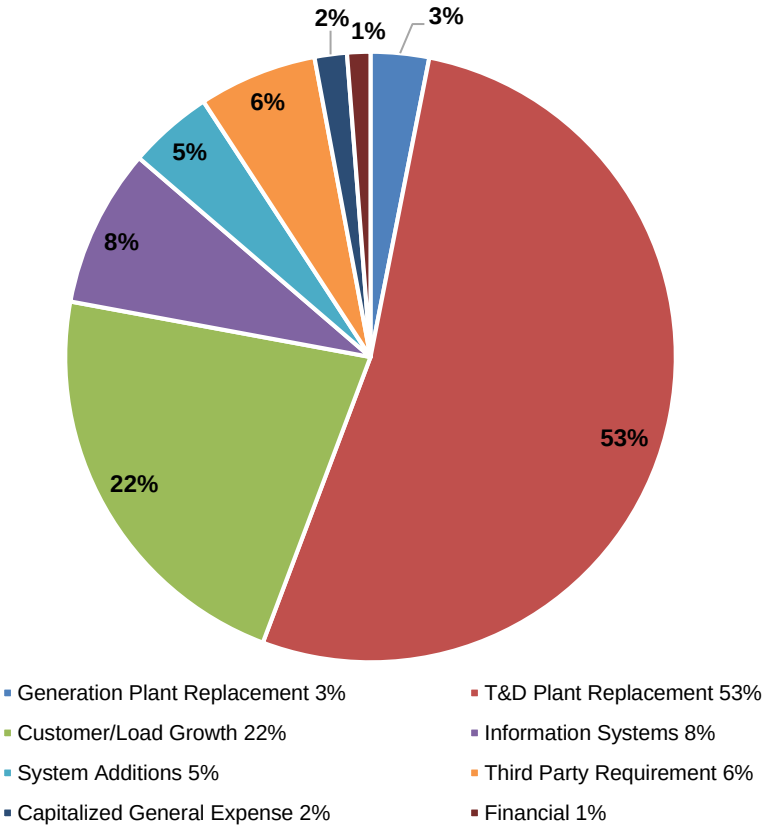
Table 1 outlines the proposed capital expenditures for 2022.

Table 1
Proposed 2022 Capital Expenditures

4.0	**Generation**		
	4.1	Charlottetown Generating Station – Buildings and Site Services	$ 30,000
	4.2	Charlottetown Generating Station – Turbine Generator	524,000
	4.3	Borden-Carleton Generating Station – Buildings and Site Services	283,000
	4.4	Borden-Carleton Generating Station – Turbine Generators	408,000
			1,245,000
5.0	**Distribution**		
	5.1	Replacements Due to Storms, Collisions, Fire and Road Alterations	1,631,000
	5.2	Distribution Transformers	5,337,000
	5.3	Services and Street Lighting	5,573,000
	5.4	Line Extensions	2,572,000
	5.5	Line Rebuilds	8,876,000
	5.6	System Meters	664,000
	5.7	Distribution Equipment	1,556,000
	5.8	Transportation Equipment	2,040,000
			28,249,000
6.0	**Transmission**		
	6.1	Substation Projects	6,122,000
	6.2	Transmission Projects	2,767,000
			8,889,000
7.0	**Corporate**		
	7.1	Corporate Services	656,000
	7.2	Information Technology	3,379,000
			4,035,000
Sub-total			$ 42,418,000
8.0	**Capitalized General Expense**		690,000
9.0	**Interest During Construction**		496,000
Less:	Customer Contributions		(3,538,000)
TOTAL			**$ 40,066,000**

Figure 1 shows the proposed 2022 capital expenditures by origin.

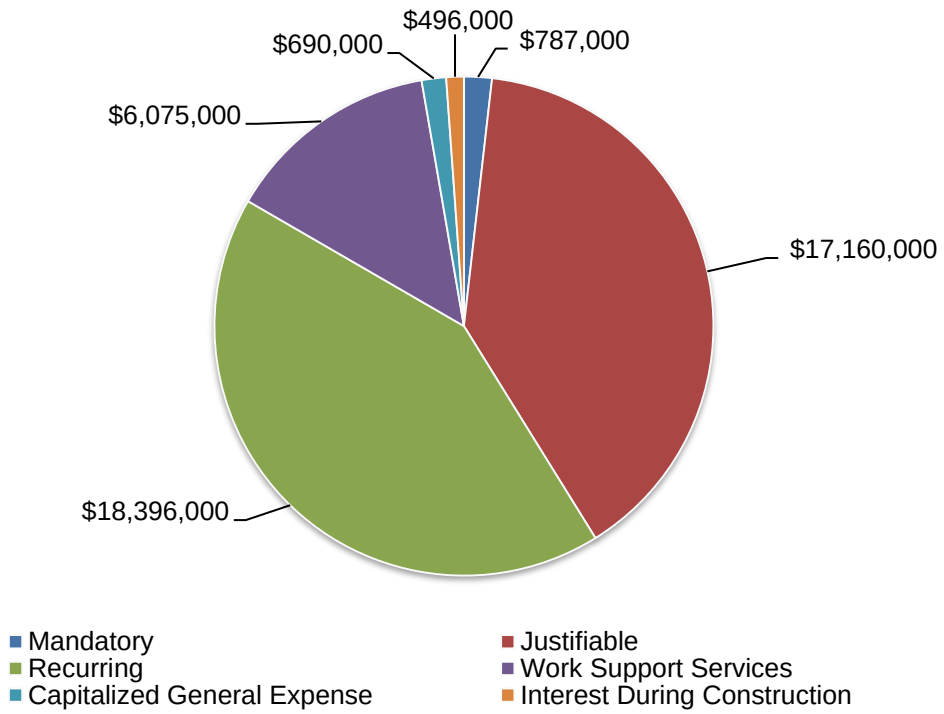
Figure 1
Proposed 2022 Capital Expenditures by Origin



Included in the above category labelled Third Party Requirement is the 2022 Capital Budget for the PEI Broadband Project. Net of contributions, this multi-year, customer driven project accounts for 72 per cent of the Third Party Requirement represented in Figure 1 above and 4.5 per cent of the total proposed 2022 Capital Budget.

Figure 2 shows the proposed 2022 capital expenditures, before customer contributions, by CEJC classification.

Figure 2
Proposed 2022 Capital Expenditures by Capital Expenditure Classification



An expanded breakdown of proposed 2022 capital expenditures by CEJC classification, is provided in Appendix B.

A map of the current electric grid, showing the major supply system components and the location of the proposed 2022 capital expenditures, is provided as Appendix C.

Whereas some components of the Capital Budget involved work throughout the province, they cannot be assigned to one location and are therefore not shown on the map. This includes components in Capital Budget Sections 5.1, 5.2, 5.3, 5.4a, 5.5b-d, 5.6, 5.7, 5.8, 6.1d, 6.1f-j, 6.2a-b, 7.1a and 7.2a-i.

3.3 Estimated Impact on Rate Base, Revenue Requirement and Customer Rates

In accordance with Section 4.0 of the CEJC, the information in this section provides an estimate of the impact of the proposed 2022 Capital Budget on rate base, revenue requirement and customer rates.

The proposed 2022 capital expenditures of $40.1 million in this Application is $1.3 million lower than the 2021 Capital Budget approved by Commission Order UE21-02. The following table provides an estimate of the impact of the proposed 2022 Capital Budget on the Company's forecast 2022 rate base.

Table 2
Estimated Impact of Proposed 2022 Capital Budget on 2021 Year End Rate Base

Estimated Impact on Rate Base (000s)	A	$38,035
Forecast 2022 Year End Rate Base (000s)	B	$455,873
% of 2022 Forecast Year End Rate Base	C = A/B	8.34%

The supporting calculations for the above table can be found on page 3 of Appendix D.

The proposed 2022 Capital Budget will increase the Company's revenue requirement by the incremental depreciation expense, cost of capital and income tax charges associated with the projects. The following table provides an estimate of the increase in revenue requirement from the proposed 2022 Capital Budget over the Company's forecast 2021 revenue requirement.

Table 3
Estimated Increase in Annual Revenue Proposed 2022 Capital Budget

Estimated Impact on Annual Revenue Requirement (000s)	A	$3,928
Forecast 2021 Revenue Requirement (000s)	B	$233,477
% Increase in 2022 Forecast Revenue Requirement over 2021	C = A/B	1.68%

The supporting calculations for the above table can be found on page 4 of Appendix D. It should be noted that the estimated revenue requirement does not consider potential higher revenues from customer growth projects or the long-term effect of a fully justified capital expenditure program on minimizing aggregate costs and consequently, revenue requirement.

If approved, the estimated increase in revenue requirement would be recovered from customers through the proposed rates, tolls and charges for electric service. The following table shows the estimated impact on revenue requirement expressed as a rate per kilowatt hour ("kWh").

Table 4 Estimated Revenue Requirement of Proposed 2022 Capital Budget Expressed as a Rate per kWh		
Estimated Impact on Revenue Requirement (000s)	A	$3,928
Forecast 2022 kWh Sales (000s)	B	1,375,497
Increase in Revenue Requirement Expressed as a Rate per kWh	C = A/B	$0.00286

The supporting calculations for the above table can be found on page 5 of Appendix D.

Using the rate per kWh calculated above, the following table provides an estimate of the increase in annual cost for electric service for the typical customer in each of Maritime Electric's rate classes that would result from the proposed 2022 Capital Budget.

Table 5 Estimated Cost Increase for Typical Customer of Proposed 2022 Capital Budget	
Annual Cost Increase for a Typical Residential Customer (650 kWh per month) before tax	$22.31
Annual Cost Increase for a Typical General Service Customer (10,000 kWh per month) before tax	$343.20
% Increase in Annual Cost for Typical Rural Residential Customer	1.50%
% Increase in Annual Cost for Typical Urban Residential Customer	1.53%
% Increase in Annual Cost for Typical General Service Customer	1.47%

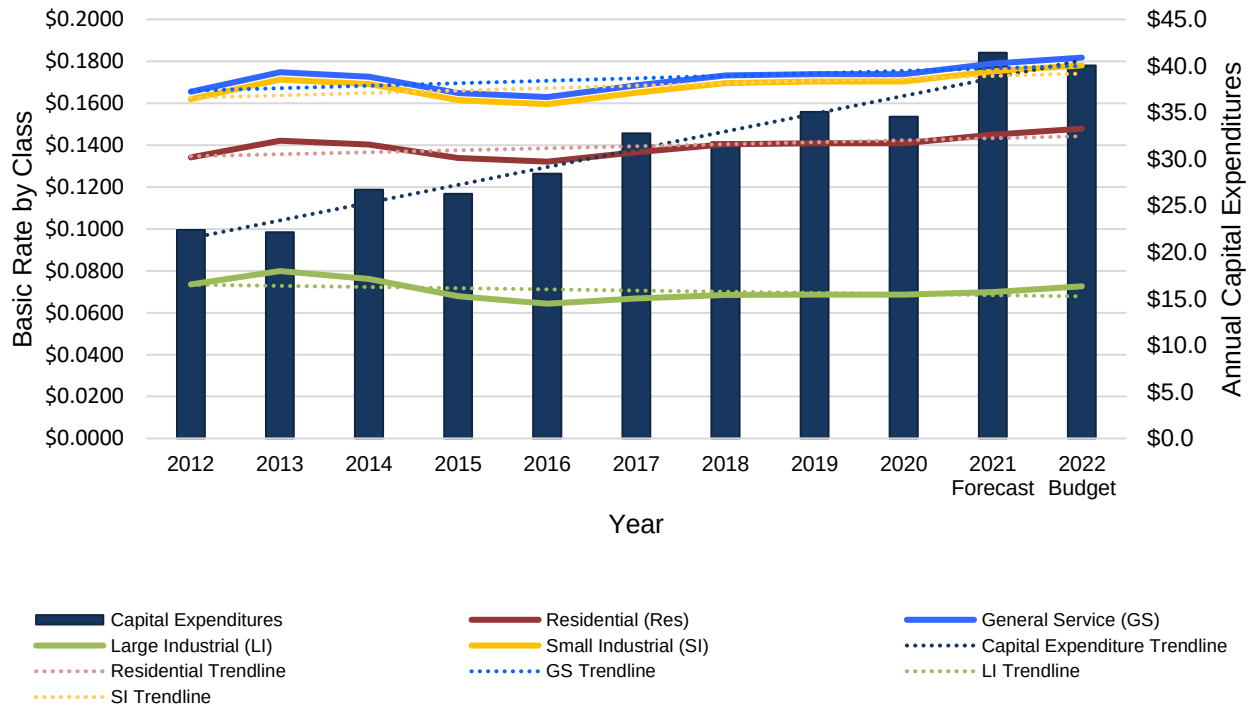
The supporting calculations for the above table can be found on page 5 of Appendix D.

Revenue requirement is amount of forecast revenue required by a utility in a year to cover the cost of serving its customers including operating costs, depreciation, financing costs, taxes and the allowed return for the shareholder. Approved customer basic rates are set to recover the Company's forecast revenue requirement based on the forecast energy and demand for customers.

Figure 3 shows the actual historical capital expenditures since 2012 as well as a forecast for 2021 based on the approved 2021 Capital Budget and the 2022 Capital Budget as

proposed in this Application. Figure 3 also shows the energy charge per kWh[1] over the same period for the four largest customer classes.

Figure 3
Historical and Forecast Capital Expenditures and Basic Rates by Class



As shown by the Capital Expenditure Trendline in Figure 3, the Company's capital investment has increased since 2012. However, many factors influence customer rates and the relationship between a utility's investment in capital and revenue requirement/customer rates is a complex one. The most direct impact of capital investment on revenue requirement and rates is annual depreciation expense. However, annual capital expenditures influence revenue requirement in other ways such as additional revenue from increased sales due to the ability to service customer growth and reduced maintenance costs. As a result, the slope of the trendlines for customer basic rates over the same period are significantly less than the capital expenditure trendline.

[1] For classes with multiple energy blocks, the first block rate is shown in Figure 3.

A fully justified capital investment program combined with efficient operations will minimize revenue requirement and provide the least cost electricity to ratepayers.

3.4 Capital Budget by Investment Classification

In a letter of direction to Maritime Electric on June 7, 2021, the Commission provided the Company with Investment Classifications to organize the projects and expenditures proposed in the 2022 Capital Budget Application. The Investment Classifications identified and described in the letter of direction are repeated in Table 6.

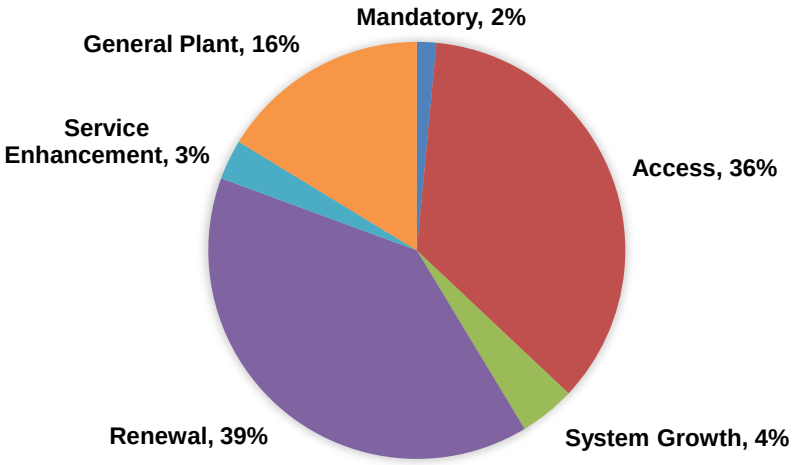
Table 6
Investment Classification Descriptions

Investment Classification	Description
Mandatory	Investments that are prescribed by a governing body, such as the Provincial Government or the Commission.
Access	Investments modifying (including asset relocations) the Company's electrical system that the Company is obligated to perform to provide a customer or group of customers with access to electric service.
System Growth	Investments that are modifications to the Company's system to meet forecast changes in customer electricity resource requirements.
Renewal	Investments replacing and/or refurbishing system assets on a like for like basis to extend their service life, and thereby maintain the ability to provide customers with their current electric services.
Service Enhancement	Investments that are modifications to the Company's system to meet system operations requirements in a more efficient and/or effective manner.
General Plant	Investments in the Company's assets that are not part of its generation, transmission and distribution system, including land and buildings, tools and equipment, and electronic devices and software used to support day to day business and operations activities.

Figure 4 shows the percentage breakdown of proposed 2022 capital expenditures by Investment Classification based on an itemized classification of capital projects, programs and activities provided in Appendix E. While the Investment Classification categories appear similar to the Capital Expenditures by Origin categories shown in Figure 1 of Section 3.2, direct comparison should not be made for some categories as the methodology used to assign a capital budget item to an Investment Classification or Expenditure by Origin category is materially different. For example, the Customer Load Growth category of Capital Expenditures by Origin includes a significant portion of new service connection costs (also including associated transformers and meter equipment),

whereas those same costs are included in the Access category of Investment Classifications (rather than the System Growth category).

Figure 4
2022 Capital Expenditures by Investment Classification



Proposed expenditures in each of the Investment Classifications are driven by capital projects, programs and activities in the underlying Generation, Distribution, Transmission and Corporate categories and are discussed as follows.

Mandatory

Planned expenditures in the Mandatory classification represent approximately 2 per cent of the 2022 Capital Budget. There is one Mandatory project in the Distribution category, which involves removing electrical equipment from service that contains polychlorinated biphenyl ("PCB") at a concentration above 50 parts per million ("ppm"), by December 31, 2025. This removal requirement is federally legislated and a budget allocation of $640,000 within Section 5.2 - Distribution Transformers is proposed. In the Transmission category, the Substation Oil Containment Program is classified as Mandatory, as its objective is to comply with the PEI *Environmental Protection Act* by preventing the discharge of a containment into the environment.

Access

Planned expenditures in the Access classification represent approximately 36 per cent of the 2022 Capital Budget and are primarily driven from the Distribution category. Access activities tend to be tied to:

i. Customer requested work (e.g., service connections requiring transformers and meters, street and area lighting and customer-driven line extensions); and
ii. Third party requirements (e.g., system modifications to accommodate road alterations and make-ready work for communication companies).

While the direction of the Commission is to organize/classify each capital project or expenditure into one of the Investment Classifications, an exception has been made for distribution transformers and system meters. For distribution transformers, a portion of the proposed budget is allocated to the Mandatory classification, as it will be used to remove and replace transformers containing polychlorinated biphenyl ("PCB") in accordance with Federal legislation. The remaining balance of the distribution transformers budget, as well as the system meters budget, is proportionally allocated to Access and Renewal in accordance with the forecast transformer and meter quantities planned for addition and replacement. This exception was made to more accurately reflect actual expenditures on transformers and meters, whereas the same multi-classification allocation cannot be done for other budget items without some subjective estimation. For distribution transformers, the budget allocation is 12 per cent Mandatory, 44 per cent Access and 44 per cent Renewal, and for system meters, 64 per cent of the budget is allocated to Access and 36 per cent is allocated to Renewal.

System Growth

Planned expenditures in the System Growth classification represent approximately 4 per cent of the 2022 Capital Budget, distributed across the Generation and Transmission categories. In Generation, system-wide load growth is driving the need for the generation capacity study and in Transmission, the East Royalty Substation and the Transmission Tap to East Royalty Substation projects are driven by localized load growth.

Renewal

Planned expenditures in the Renewal classification represent approximately 39 per cent of the 2022 Capital Budget, distributed across the Generation, Distribution, and Transmission categories. In Generation, Renewal projects are required to ensure that the Company's three combustion turbines are ready to operate when required. In Distribution, Renewal expenditures are associated with replacements due to storms, fires and collisions, polemount and padmount transformer replacements, distribution line rebuilds, distribution line/equipment refurbishment and replacement programs, and system meters. In Transmission, Renewal represents the majority of the project and program work proposed to rebuild, refurbish, and modernize substation facilities and transmission line assets to current operating and safety standards.

Service Enhancement

Planned expenditures in the Service Enhancement classification represent approximately 3 per cent of the 2022 Capital Budget, as they are limited to two reliability driven line extension projects within the Distribution category and the Cavendish Feeder Automation project within the Transmission category.

General Plant

Planned expenditures in the General Plant classification represent approximately 16 per cent of the 2022 Capital Budget, distributed across the Generation, Distribution, and Transmission and Corporate categories. In Generation, General Plant projects are required to upgrade and replace various building and facility components that are necessary to support generation at that station. In Distribution, General Plant expenditures are incurred to provide the tools and equipment required by operations personnel, as well as the transportation equipment required across all departments. There is only one General Plant project proposed under Transmission for 2022, which involves the installation of a solar panel and battery backup system at the Rattenbury Substation, while all projects in the Corporate category (i.e., all Corporate Services and Information Technology projects) fall within the General Plant classification.

3.5 System Reliability Performance and Improvement

a. System Average Interruption Duration Index

The only metric used by Maritime Electric for measuring its reliability performance is System Average Interruption Duration Index ("SAIDI")[2], which reflects the total outage time to the average customer over a period of one year. There are two SAIDI indices commonly used by utilities: (i) SAIDI (All In) measures reliability performance using outage data collected under all operating conditions; and (ii) SAIDI (MED Excluded) normalizes the outage data by removing significant outage events to reflect reliability performance under normal operating conditions (i.e., blue sky days). When a significant outage event that meets the criteria of a major event day ("MED") occurs, the customer outage time associated with that event is not included in the resulting SAIDI (MED Excluded). SAIDI (MED Excluded) was developed by the Institute of Electrical and Electronics Engineers ("IEEE") to address large outage data variances caused by major system disturbances that if otherwise included, would make it difficult to track changes to the reliability performance of the electricity supply system under normal operating conditions.

Historical SAIDI Performance

Figure 5 provides the SAIDI (All In) and SAIDI (MED Excluded) experienced by Maritime Electric customers over the ten-year period 2011 to 2020. The SAIDI (MED Excluded) data includes externally caused outages[3], which are typically infrequent, with only one such occurrence between 2011 and 2020[4]. (Given the scope of impact of an externally caused outage, it would be uncommon for it not to be recorded as a MED.)

---

2 Maritime Electric collects data for reporting on another reliability metric (i.e., System Average Interruption Frequency Index or "SAIFI"), but it does not use SAIFI for measuring reliability performance. This is further discussed in Section 3.5b.

3 An externally caused outage for Maritime Electric is an outage resulting from the loss of supply from NB Power.

4 A severe wind, snow and ice storm on November 29, 2018 resulted in a loss of supply from NB Power for a period of approximately 8.20 hours.

Figure 5

SAIDI Performance 2011 to 2020

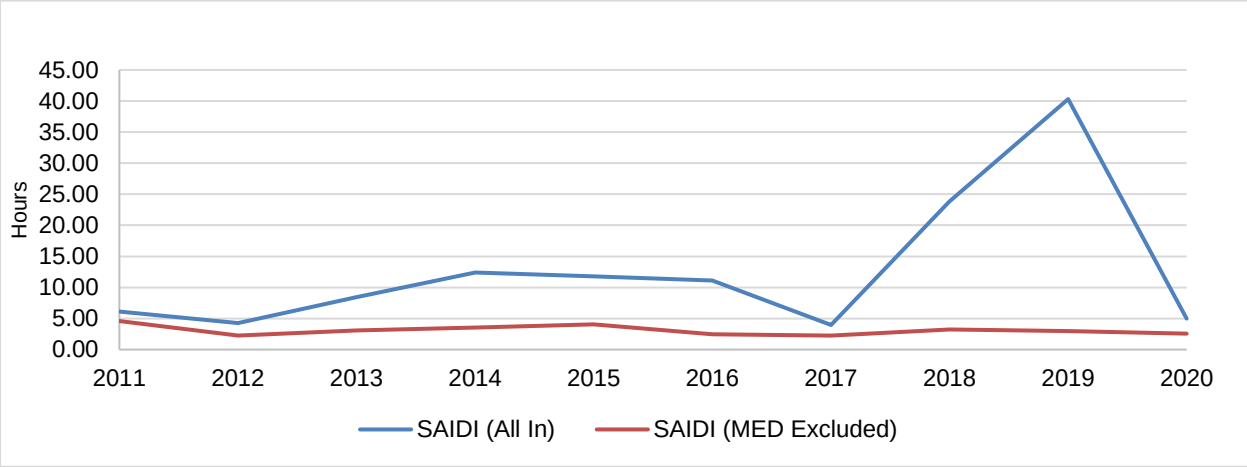


Figure 5 indicates that SAIDI (MED Excluded) reliability experienced by Maritime Electric customers has been reasonably consistent over the past ten years, with the duration of the average customer outage time ranging from 4.59 to 2.25 hours.

The reliability of Maritime Electric's electricity supply system under normal operating conditions, SAIDI (MED Excluded), is a reflection of the Company's diligence in monitoring performance metrics and responding with the appropriate balance of operating controls and capital investments. Operating controls are applied to improving reliability through outage avoidance (e.g., live line work methods) and outage response (i.e., prompt and strategic to isolate problems quickly). Capital investments help to ensure that aged, deteriorated or overloaded components are replaced in a timely manner and provide for other system improvements that benefit customers over the life cycle of these investments.

While the reliability of the electricity supply system under normal operating conditions is performing reasonably well most of the time, Figure 5 also indicates that an increased frequency and severity of major storm events, demonstrated by SAIDI (All In), has exposed system deficiencies and highlights the importance of systematically identifying and replacing aged and deteriorated system components, as well as ensuring the electricity supply system is able to withstand the impact of major storm events.

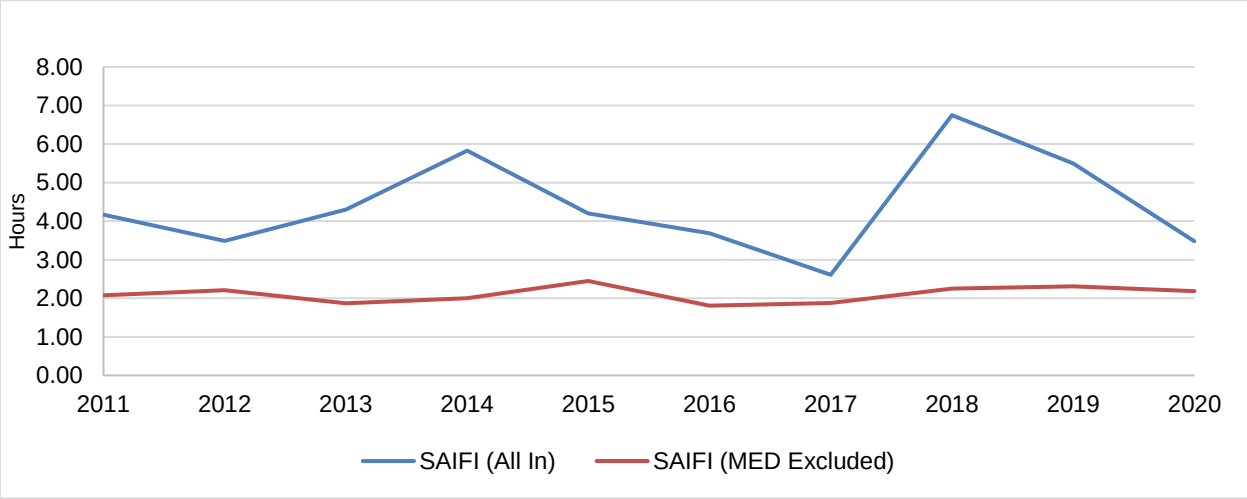
b. System Average Interruption Frequency Index

A second reliability performance metric that Maritime Electric collects data and reports on, but is not used by the Company to measure reliability performance, is System Average Interruption Frequency Index ("SAIFI"). SAIFI reflects the number of interruptions to the average customer over a one year period. Similar to SAIDI, SAIFI can be reported for all operating conditions or with MEDs excluded. While (as previously indicated) Maritime Electric only uses SAIDI for measuring reliability performance, it records data for reporting on SAIDI and SAIFI to the Canadian Electricity Association ("CEA") and the Commission.

Historical SAIFI Performance

Figure 6 provides the SAIFI (All In) and the SAIFI (MED Excluded) as experienced by Maritime Electric customers over the ten-year period 2011 to 2020. As with SAIDI, externally caused outages are included in the SAIFI (MED excluded) data.

Figure 6
SAIFI Performance 2011 to 2020



There are some deficiencies in Maritime Electric's historical SAIFI records due to limitations within the Company's outage management software. These deficiencies are more pronounced with the SAIFI (All In); however, it affects the SAIFI (MED Excluded) data as well. Future investment in the Company's outage

management software will be necessary to support the utilization of SAIFI as a reliability performance metric.

c. Benchmarking Against Similar Utilities

Maritime Electric's SAIDI and SAIFI performance compared to the average performance of other Atlantic Canadian electric utilities ("Atlantic Utilities"), for the period 2011 to 2020, is provided in Confidential Appendix S-1[5], Figures 1 to 4.

Maritime Electric monitors and measures reliability performance by comparing its reliability metrics with that of neighbouring Atlantic Utilities. The Company uses the moving average technique to get an overall idea of the trends in a reliability data set. Over the last five years, the moving average of Maritime Electric's SAIDI (MED Excluded) and SAIFI (MED Excluded), as provided in Confidential Appendix S-1, Figures 5 and 6, have shown a trend of relative stability. This indicates that the Company's reliability performance under normal operating conditions is reasonable and that programs, such as the Porcelain Cutout Replacement Program, Eastern Cedar Pole Replacement Program, Line Rebuild Program, Spill Prevention Program, and Transmission and Distribution Line Refurbishment Programs, have been effective in achieving stable SAIDI (MED Excluded) reliability performance.

While the Company's SAIDI (MED Excluded) reliability performance has been stable over the last five years, the moving average of SAIDI (All In) and SAIFI (All In), as shown in Confidential Appendix S-1, Figures 7 and 8, have for the most part been above the Atlantic Utilities average and are trending upwards. This indicates that major weather events, such as ice or wind storms and system outage events on large feeders with no back-up capabilities, are having a negative impact on reliability performance. In Maritime Electric's view, assessing the Company's reliability performance to be equal to, or better than, the Atlantic Utilities average is a reasonable indicator of service quality and is consistent with the Company's obligation under the *Electric Power Act* to at all times provide reasonably safe and

[5] Information on the reliability performance of other Atlantic Utilities was obtained through CEA and is confidential to CEA member utilities.

adequate service as changing conditions require. With this in mind, the Company has been focusing its efforts on improving SAIDI (All In) reliability performance.

Looking forward, the Canadian Standards Association ("CSA") has identified that "ice, snow and wind loads are perceived as the highest, most prevalent climate risk to the electrical sector across Canada[6]." Maritime Electric along with other key stakeholders are engaged with CSA as it undertakes extensive research and consultation concerning climate-related risks, impacts and best practices relevant to the Canadian electricity sector. This, along with a Climate Change Vulnerability Assessment to be completed by the Company in 2022, will be used to assess the Company's climate change risks and thereby guide the Company's efforts to proactively mitigate any threats to the reliability performance of the electricity supply system.

d. <u>Feeder Reliability Performance</u>

Maritime Electric regularly compares feeder reliability performance to help identify where distribution system improvements are needed. This is done by gathering distribution outage data for a given period, subtotaling the data by feeder, and sorting the feeders based on average annual SAIDI contribution. Results change regularly depending upon the period analyzed, as new data is being generated with every outage. Using this approach, the SAIDI and SAIFI for Maritime Electric's ten feeders with the highest outage hours over the period 2011 to 2020 were calculated and are listed in Tables 7 and 8. The feeders identified in the tables can be compared with Maritime Electric's average feeder reliability performance (also shown in the tables).

Outage hours resulting from transmission and substation outages are upstream of feeders, and as such, are not relevant when identifying where feeder improvements are needed. For this reason, outage hours resulting from transmission and substation outages are excluded from the feeder data in both tables.

6 CSA Cross Country Stakeholder Workshop Phase II Final Report.

Outage records for feeders that were subdivided over the ten-year review period have been adjusted, such that only the outages hours associated with the current feeder configuration are included. This adjustment enables Maritime Electric to better identify and target areas where distribution system improvements are required.

The feeders with the highest outage hours under all operating conditions for the period 2011 to 2020 are shown in Table 7.

Table 7
Feeders with Highest Outage Hours 2011 to 2020 Under all Operating Conditions

Circuit	Feeder	Average Yearly SAIDI Contribution	Average Yearly SAIFI Contribution	Feeder Length (km)	Customer Count
Maritime Electric Average Feeder		**0.089**	**0.024**	**70**	**1160**
1. Tignish West	AL00295	0.322	0.067	250	2750
2. Irishtown	KN80400	0.259	0.054	176	2223
3. Eldon-Belfast	VC01440	0.203	0.039	209	1472
4. Wellington East	WL02088	0.196	0.036	121	1488
5. Crapaud	AB33125	0.178	0.047	101	1210
6. Bedeque	AB33127	0.177	0.054	170	1925
7. Wellington West	WL02002	0.146	0.027	219	1770
8. Pooles Corner	GT00670	0.139	0.035	172	1302
9. Queens Arms	QA02700	0.133	0.036	27	3342
10. Cavendish	BG56300	0.120	0.012	57	1336

The feeders with the highest outage hours excluding MEDs and externally caused outages, for the period 2011 to 2020, are shown in Table 8.

Table 8 Feeders with Highest Outage Hours 2011 to 2020 Excluding MEDs and Externally Caused Outages					
Circuit	**Feeder**	**Average Yearly SAIDI Contribution**	**Average Yearly SAIFI Contribution**	**Feeder Length (km)**	**Customer Count**
Maritime Electric Average Feeder		**0.027**	**0.016**	**70**	**1160**
1. Tignish West	AL00295	0.122	0.052	250	2750
2. Crapaud	AB33125	0.085	0.032	101	1210
3. Bedeque	AB33127	0.077	0.042	170	1925
4. Eldon-Belfast	VC01440	0.049	0.026	209	1472
5. Wood Islands	DV19005	0.040	0.019	135	1292
6. Wellington East	WL02088	0.035	0.024	121	1488
7. Inkerman	IK03400	0.034	0.025	25	2007
8. Stratford	CR04447	0.033	0.017	20	1406
9. Riverside Drive	RD04100	0.032	0.019	12	732
10. Irishtown	KN80400	0.032	0.019	176	2223

e. <u>Feeder Reliability Improvements Proposed for 2022</u>

In order to improve reliability on the Tignish West, Bedeque and Irishtown circuits, Maritime Electric is planning recloser additions or upgrades to these high outage feeders as described in Section 6.1e (iv) - Substation and Distribution System Automation. All three of these feeders are problematic due to being well above Maritime Electric's average feeder length and serving a large number of customers (e.g., Tignish West has more than double the customer count of Maritime Electric's average feeder). Recloser additions or upgrades will improve the Company's ability to sectionalize the lines so that when an outage occurs, the number of customers impacted can be minimized.

In order to improve reliability on the Cavendish feeder, Maritime Electric is planning the Cavendish Feeder Automation project as described in Section 6.1h of this Application. Many of the customers on this feeder are located near its end point. The automation project will allow the Company to remotely restore power during some outages by enabling the Energy Control Centre ("ECC") to communicate with various downstream devices.

3.6 Planning Capital Investments

Maritime Electric makes capital investments in the electricity supply system to ensure that, as required by Section 3(a) of the *Electric Power Act*, it is sustained in a condition that provides reliable service to customers and that has sufficient capacity to meet customer requirements as individual and overall system loads increase. When planning these investments, the Company must balance the need to replace system components, based on average service life expectations, and expand the system as new customers are added. Failure to achieve a proper balance can result in future system deficiencies that affect safety, reliability and cost. Considering the Company's size, Maritime Electric has an appropriate process for planning capital projects as described in this section of the Application.

All capital projects proposed for 2022 are necessary to provide safe and reliable electric service. Those capital projects not considered necessary in 2022 have been deferred to a future year as identified in the list of Future Capital Projects provided as Appendix F.

a. Capital Planning Process

The Company's annual capital budget application outlines the projects, programs and activities necessary to continue to provide safe and reliable service to customers. The items budgeted are required to: (i) connect new customers to the electrical system; (ii) replace equipment that has been damaged or failed as a result of storm damage or other causes; (iii) meet health, safety and environmental regulatory requirements; (iv) improve reliability; (v) provide security of supply; (vi) ensure system cybersecurity; and (vii) strategically replace assets that have reached the end of their useful life.

The 2022 Capital Budget Application was based on the most recent information and analyses with respect to energy and load growth forecasts, asset inspection and monitoring data, supply system reliability performance, operations and business technology requirements, and other factors that may impact the timing of capital projects over the near term. In addition, the Company's Integrated System Plan ("ISP") and Distribution Asset Management Program ("DAMP") both guide the

planning of current period projects to meet anticipated longer term system and customer requirements.

The ISP identifies medium- and long-term system requirements based on a combination of historical system performance, load forecasting and engineering analysis along with technological trends. For example, the ISP identifies major assets that need to be constructed or upgraded due to system load growth and/or age. The newly constructed Clyde River Substation is an example of the former and the recently upgraded Lorne Valley Switching Station is an example of the latter.

Similarly and complementary to the ISP, the DAMP ensures that distribution assets are prudently and effectively managed to balance system reliability, cost and risk of failure. It provides guidance that sufficient overall investment is being made to:

i. Provide for the growth needs of customers;
ii. Provide safe, reliable and high quality service; and
iii. Satisfy the first two principles in a way that minimizes the long-term costs to Maritime Electric customers.

Inherent in the DAMP is the determination of optimal asset management practices. Such practices can include the differentiation between a high volume of individually low cost assets and a low volume of individually high cost assets. For example, Maritime Electric has a high volume of poles and polemount transformers that are, individually, relatively low cost with a reasonably maintenance free service life (400,000 hours for poles and 300,000 hours for transformers). In addition, because pole and transformer failures often impact only a few customers, a replacement program that is based on an average annual replacement rate is acceptable[7].

[7] The DAMP recommends an average replacement rate of 850 transformers per year, based on approximately 34,000 transformers in service having an expected life of 40 years and 2,600 wood poles per year, based on approximately 132,000 wood poles in service having an expected life of 50 years.

In contrast, Maritime Electric has a low volume of high cost substation equipment that upon failure large numbers of customers can be affected (e.g., substation transformers, breakers and switches). Therefore, a capital maintenance program that includes the monitoring of individually high cost assets to detect problems and proactively address issues to avoid failure is required.

The DAMP outlines the Company's general approach to identifying system needs for capital budget decision making; however, it is also important to note that dynamics outside of the Company's control can change project timing (in some cases with little or no advance notice). Examples of this include the addition of new commercial and large industrial customers and the electrification of space heating, which increased system load over the past several years. While the DAMP is specific to the distribution system, generation and transmission assets are managed in a similar fashion and are also subject to the influence of external factors.

The development of a capital budget includes an assessment of the effectiveness and progress of existing activities, and the identification of new cost effective activities that achieve reliability, provision of service and safety objectives, while responding to customer demands, load growth requirements and other system dynamics. A balanced capital budget will pursue these objectives while considering the long-term costs to be borne by customers. Maritime Electric has developed the proposed 2022 Capital Budget Application to achieve a just and reasonable balance of system needs and the interests of customers.

In addition to the Company's process for planning and forecasting capital projects as already discussed, there is also a need to invest in work support services to meet health, safety and environmental regulatory requirements, communicate effectively with customers, provide functional and safe work facilities for employees, ensure a safe and reliable transportation fleet and provide cyber secure information and operational technology solutions. The evidence provided in this Application explains how the need for capital projects is determined, and why the capital projects planned for 2022 are necessary.

b. Deferral in the Planning Process

The process of determining the projects required for 2022 also considered whether projects could be deferred to a later date. Projects that are required to (i) connect new customers to the electrical system, (ii) replace equipment that failed as a result of storm damage or other causes, or (iii) meet health, safety, and environmental ("HSE") and regulatory requirements, typically, cannot be deferred. Projects to strategically replace assets that have reached the end of their useful life may, in theory, be deferred in the short term (i.e., one to two years).

The need to achieve an appropriate level of investment must be balanced against the overall risks associated with such deferrals. As such, annual capital expenditures are planned to avoid a long-term build up or backlog of such capital projects; otherwise, the result would be an asset management program that is not achieving its sustainable objective.

As indicated, capital projects to strategically replace assets that have reached the end of their useful life may, in theory, be deferred in the short term. An example would be the replacement of a distribution line that is aged and deteriorated. Such a project should only be deferred in the short term as a longer term deferral runs the risk of multiple failures of that asset prior to replacement, resulting in unnecessary customer outages or an unsafe situation. Also, the replacement of failed assets is typically more expensive (e.g., when overtime is required) than a planned replacement. Always deferring to failure would be in direct contradiction to the Company's objective to provide reliable service at the least cost. Examples of capital projects that were identified in previous years but deferred until 2022 are provided in Table 9, and examples of capital projects originally planned for 2022 that have been deferred to subsequent years are provided in Table 10.

Table 9 2022 Capital Project Deferred from Previous Years	
Project	**Description**
Mount Herbert Three Phase Conversion	This project was originally approved for 2018 as the Trans-Canada Highway to Mount Herbert line extension project but was deferred due to over budget variances on other projects in the Distribution category. At the time of deferral, it was expected that the conversion could be delayed for the near term; however, to facilitate being able to rebuild the Crossroads Substation as described in Section 6.1b, the project is now necessary to transfer load to the Mount Albion Substation (see Mount Herbert Three Phase Conversion project description provided in Appendix H). In addition, the project will better enable the Crossroads Substation to accommodate future load growth in the Stratford area and improve reliability for some customers on the Bunbury circuit, by providing new backup opportunities.
180 Kent Street Office Building Roof Replacement	An inspection of the building roof at 180 Kent Street was completed in July 2019 and the inspection report recommended that the roof be replaced within three years. The report indicated that with some preventative maintenance, the replacement could be deferred to the latest year (i.e., 2022). The preventative maintenance was completed in 2020 and roof replacement is now proposed for 2022 as described in Section 7.1b.

Table 10 Capital Projects Deferred from 2022 to Subsequent Years	
Project	**Description**
Supervisory Control and Data Acquisition ("SCADA") Video Wall Display	The SCADA video wall was installed at the ECC in 2011 to replace the old mimic board. The SCADA video wall was initially nine screens and was expanded in 2013 to include three additional screens for twelve in total. The screens are now eight and ten years old and have exceeded the manufacturer's rated usage hours for a screen. A project to replace the screens was planned for 2022, but based on an assessment of video quality and recent discussions with the supplier, it was determined that replacement could be deferred until such time as one of the twelve screens fail. As a contingency, the Company has a spare LCD screen in storage in the event that a screen fails prior to replacement of the entire video wall.
Lady Slipper Drive North Three Phase Conversion	The Company is constantly monitoring load on single phase lines. The single phase line on Lady Slipper Drive North, in St. Eleanors, was a candidate for conversion to three phase in 2022; however, recent field checks identified that it was not yet loaded to a point where immediate action is required. For this reason, the project was deferred to 2024 with field checks planned to reoccur during subsequent peak conditions.

Capital projects are scheduled to address known or anticipated issues related to age, condition, safety, capacity and reliability. While the Company endeavors to provide the most accurate forecast of future capital projects, unforeseen issues can arise causing the timing of projects to change, new projects to be added, and in some cases, significant change to the scope of projects. As such, the List of

Future Capital Projects (Appendix F) is based on current information. Changing information may result in a project being advanced to an earlier year, being deferred to a later year, or removed entirely. Examples of new information that could result in the deferral or removal of a project include:

i. Updated customer, energy and demand forecast. A reduced forecast could result in the deferral of a planned substation or distribution upgrade.
ii. Updated condition assessments of equipment. A piece of equipment that is aged but inspected and found to be in adequate condition could result in the deferral of a refurbishment or replacement project.
iii. Updated assessments of potential customer benefits. Changes in system costs or technologies may result in a project no longer being economic for customers, allowing the project to be deferred or eliminated.

The Company considers all available information in evaluating alternatives for meeting a particular system requirement. This can include solutions that do not require capital investments, such as transferring customer load to an adjacent substation when overload conditions arise. It can also include small capital investments to delay the full replacement of the asset, such as the replacement of component parts (e.g., switches) when reasonably practical. Each of these factors can result in the deferral of a project.

While the deferral of capital projects can and do occur, it must be recognized that the prolonged deferral of a project required to sustain the system can result in assets being unsafe for the public and Company employees, lead to more frequent outage events (especially during storm situations) and increase costs because it is often more time consuming to safely work on (or around) deteriorated assets. Similarly, the prolonged deferral of capital projects that are driven by load growth can lead to outages at times of high demand, low voltage situations that can damage customer assets (resulting in damage claims) and be harmful to critical system components. Good utility practice requires consideration of all of these factors to develop and implement sustainable levels of annual capital investment.

c. Capital Cost Accounting

Maritime Electric follows Canadian Private Entity Generally Accepted Accounting Principles ("GAAP"), which allows reference to other guidance including accounting principles established in the United States. In the United States, the Federal Energy Regulatory Commission ("FERC"), which regulates the transmission and wholesale sale of electricity, developed a Uniform System of Accounts ("USofA") for the financial accounting of regulated utilities. Following the FERC USofA is considered good utility practice in Canada. According to FERC, to capitalize project costs, the costs must meet the following two qualifications:

1. Extend the life, increase the capacity or improve the safety or efficiency of an existing asset owned by a company; and

2. Improve the condition of that asset after the costs are incurred as compared with the condition of that asset when originally constructed or acquired.

The overall management of the electrical system also includes the identification of critical components that upon failure would affect a large number of customers. If these components are difficult to source or have a significant delivery time, it is considered prudent to secure critical spares.

Under the "used and useful" concept, only system equipment (or "plant") that is currently providing or capable of providing utility service to customers is to be included in rate base. However, maintaining critical spares is an essential component of the requirement to provide least cost, reliable service. To address this need, FERC and most regulators allow "plant held for future use" to also be included in rate base provided there is a definite plan for its use (i.e., it is intended for a very specific and essential purpose). This approach is consistent with recognized accounting standards as indicated below.

According to CPA Handbook, Part II Accounting Standards for Private Enterprises, Section 3061.03:

> *"Spare parts and servicing equipment are usually carried as inventory and recognized in net income as consumed. However, major spare parts and standby equipment qualify as property, plant and equipment when an entity expects to use them during more than one period. Similarly, if the spare parts and servicing equipment can only be used in connection with an item of property, plant and equipment, they are accounted for as property, plant and equipment."*

International Accounting Standard, IAS16, paragraph 8 includes the following discussion:

> *"Spare parts and servicing equipment are usually carried as inventory and recognized in profit or loss as consumed. However, major spare parts and stand-by equipment qualify as property, plant and equipment when an entity expects to use them during more than one period. Similarly, if the spare parts and servicing equipment can be used only in connection with an item of property, plant and equipment, they are accounted for as property, plant and equipment.*
>
> *For rate-making and reporting purposes, in most cases major spare parts and stand-by equipment (e.g. transformers and meters) should be accounted for as property, plant and equipment capital assets, as it is expected that:*
>
> *a. these items are not held for sale in the ordinary course of business or to be consumed in the production process or rendering of services;*
> *b. they have a longer period of future economic benefit as compared to inventory items;*

c. they form an integral part of the original distribution plant by enhancing the system reliability of the original distribution plant; and

d. they embody future economic benefits because they are expected to be placed in service."

Based on the above, Maritime Electric considers investment in critical spares as part of the capital planning process and that these capital assets are properly included in rate base.

3.7 Budget Components and Process

The type and scope of each capital project or program proposed in this application determines the relative balance of internal labour, external labour, materials, equipment and other resources that are budgeted to complete the proposed work[8]. An overview of each of these budgetary components and how they are incorporated into the estimating process is provided as follows.

a. Internal Labour and Transportation

Maritime Electric generally constructs, monitors and services its own assets and, as such, most capital project and program cost estimates include an internal labour component. Furthermore, because the nature of the work and the disbursement of assets across the Island requires access to a fleet of vehicles to perform this work, the internal labour includes associated transportation costs.

Internal Labour

The Company's investment in its electrical system is based on the least cost approach with internal labour mainly provided by a unionized workforce under a Collective Agreement with Local 1928 of the International Brotherhood of Electrical Workers. Internal labour also includes non-union positions typically for planning, engineering support, project management, field supervision and administration.

[8] A capital project is typically associated with a specific undertaking with activities in a defined location and a completion timeframe of less than a year (although some larger projects can be multi-year). A capital program is typically designed to address a specific issue at multiple locations over a period of several years.

The Collective Agreement establishes the negotiated hourly rates of the unionized workforce for regular, overtime and double-time work. Salaries for non-union positions are determined using a structured Korn-Ferry process that reflects job functions and comparable employment in the region. Therefore, internal labour costs are supported by either a negotiated Collective Agreement or comparison to regional benchmarks.

Transportation

The Company operates five classes of vehicles in its fleet: (i) passenger vehicles; (ii) pickup trucks; (iii) vans; (iv) 1 to 3 ton trucks; and (v) trucks over 3 tons. The cost to operate these vehicles includes fuel, insurance, registration, maintenance, parking, washing and lease costs (when applicable). For budgeting, an hourly rate for each class of vehicle is calculated based on the total operating costs for the previous year. Vehicles are assigned to employees by the type required and the hourly vehicle rate is combined with the employee hourly rate resulting in an internal labour and transportation rate for that employee position.

Standard Distribution of Costs

For each capital project or program proposed in this application, a total cost of internal labour and transportation is provided. Internal labour and transportation costs are allocated to operating and capital accounts using a standard distribution approach that is based on the scope of activities and responsibilities for each employee, both union and non-union. For example, it is estimated that a power line technician (“PLT”) will spend approximately 67 per cent of their time working on capital activities, approximately 18 per cent on operating activities and approximately 15 per cent on asset removal and retirement. The capital component of standard distribution related to labour and transportation for the PLT position is further broken down in Table 11.

Table 11 Capital Accounts Standard Distribution of Powerline Technician, Labour and Transportation	
Capital Budget Category	**Per cent Allocation**
5.1 Storms and Road Alterations	7%
5.2 Distribution Transformers	9.5%
5.3 Services and Street Lighting	37.5%
5.4 Line Extensions	3%
5.5 Line Rebuilds	3%
6.2 Transmission Lines	7%

The standard distribution of labour and transportation costs is reviewed and updated annually to ensure that it accurately allocates costs to the appropriate accounts based on the planned capital and operating activities for that year. If actual activities differ significantly from what was planned, the standard distribution allocations are updated accordingly. The use of standard distribution is a cost effective approach that results in an appropriate allocation of labour and transportation to operating and capital activities.

b. External Labour

Maritime Electric engages external consultants and contractors to perform work that the Company does not have sufficient internal labour resources to perform or, in some instances, the necessary experience, expertise or equipment to do the work safely. The specifics of each capital project or program in this application dictates whether or not external labour is required.

Contractor labour is typically sourced locally through fixed-term agreements (one-year or multi-year contracts) or a competitive bidding process. Fixed-term agreements are more applicable to distribution and transmission line projects involving line crews, vegetation management crews and traffic control crews. Such agreements establish hourly contractor rates that apply to planned work as well as unplanned system events that require external resources (e.g., storm response). Similar to internal labour, hourly rates for contractor labour typically include a

transportation cost component. An example of a fixed-term agreement for line work and tree trimming crews is provided in Confidential Appendix S-2.

A competitive bidding process is used where fixed-term agreements are not in place. A competitive bidding process is sometimes used even where a fixed-term agreement is in place in order to check that the rates specified in the fixed-term agreement are reasonably competitive. An example of a past call for tender and associated bid submissions is provided in Confidential Appendix S-3.

c. Materials and Equipment

Maritime Electric typically procures materials and equipment for capital projects and programs through competitively sourced standing offer material supply contracts or job-specific material and equipment tenders. The Company has also benefitted from its affiliation with other Fortis companies. For example, in the past, the group purchasing of poles with Newfoundland Power resulted in a lower price than the Company could have secured on its own. The Company also participates in Fortis group tendering for transformers but purchases directly from the chosen supplier at the tendered prices.

Materials for capital projects and programs are incorporated into proposed budget amounts using the unit cost of each specific item that has been entered into the Company's financial inventory system which is based on competitively sourced or standing offer pricing.

d. Estimating Capital Expenditures

Capital projects differ from capital programs on the basis that projects tend to be localized to a community level with durations measured in months (e.g., rebuilds and line extensions) while programs typically address the upgrading or replacement of equipment, parts and tools on an as required provisional basis or specific system issues that require a longer term and Island-wide approach to effectively monitor, maintain and/or replace capital assets (e.g., substation modernization and distribution line refurbishment, porcelain cutout replacement and eastern cedar pole replacement programs).

Maritime Electric incorporates a variety of methods to estimate proposed capital expenditures. An overview of how the Company typically estimates capital project and program budgets for line construction and asset replacement activities is provided below.

For capital programs, recent historical data is often adequate to estimate unit costs that can then be extrapolated to quantify the program scope (e.g., the number of eastern cedar poles or porcelain cutouts replaced within budget allocations of previous years). Use of historical cost data is more applicable to capital programs that span several years as described above, than it is to customer or event-driven provisional allocations (e.g., storm response, system modifications due to highway work, new service connections, etc.).

Capital projects tend to require a more detailed consideration of costs that cannot be reasonably estimated using broad assumptions. For example, a kilometre of three phase line construction can vary considerably by location due to variations in work methods and/or the extent of requirements for traffic control, vegetation clearing, travel time, etc. This being the case, the Company estimates project costs based upon the labour, material, equipment and other resource requirements and consideration of job specific factors. The job specific factors for each line construction project proposed in this application are outlined in the project descriptions provided in Appendices H, I and O.

As outlined above, distribution and transmission line construction projects are estimated on a job-by-job basis to ensure that the proposed budget allocation is as accurate as possible. Material estimates are prepared using the Company's survey system which has an integrated material database that is updated regularly[9]. The estimating process involves but is not limited to the following steps and considerations:

[9] The survey system is an in-house developed software application that is used to assign survey work, track its status, specify material and labour requirements, estimate costs, and prepare jobs for assignment to line crews and technicians.

Project Definition

- Project scoping with input from Maritime Electric engineering staff and the district superintendent where the project will be located;
- Determination if the line extension or rebuild will be constructed on the same side or opposite side of the road relative to the existing line;
- Identification of any environmental restrictions or special considerations that will affect the project;
- Selection of conductor type based on current and future load requirements;
- Determination of joint-use status and scope conversion requirements, if applicable; and
- Determination of pole span requirements based on the selected conductor and the joint-use requirements.

Construction Cost Factors

- Pole height and hardware requirements are based on line type, right-of-way topography, roadway clearances and space for joint-use attachments, if applicable;
- Quantity and height of tangent pole, single pin turn, double pin turn, running angle turn and double dead-end corner structures;
- Amount of conductor and neutral wire required, allowing for sag;
- Number of primary service take-offs to customer premises and related quantity of primary wire and cutouts;
- Number of transformers to be removed/installed and associated requirements for secondary wire;
- Number of streetlights that need to be removed/installed; and
- Requirements for traffic control, vegetation clearing, special pole supports (culvert and gravel), portable washrooms, job trailers, snow removal from ditches, equipment rental, lodging crews, etc.

An estimate template is used in conjunction with the survey system, which allows the incorporation of job and site specific factors that can impact the overall project cost. This may involve applying contingency amounts to the labour components of the job. Also, as already noted, heavy vegetation, high speed or high volume traffic,

and requirements for hot-line work are examples of job and site specific factors that can cause similar sized jobs in different locations to vary considerably in cost.

Contingencies

Contingency amounts are included in cost estimates to allow for unforeseen costs associated with project uncertainties. Cost uncertainties are common in unique or complex projects as well as when the timeframe between estimating and incurring costs is protracted.

Contingency amounts (typically between 5 and 30 per cent) are determined based on the estimator's judgement/experience, the level of project definition (i.e., percentage of detailed engineering completed) at the time the cost estimate was prepared, the number of potential bidders for a project (i.e., sole source projects often require higher contingencies), and the complexity of the project. When setting contingency amounts, Maritime Electric compares historical project costs to budgeted project costs and adjusts contingency amounts accordingly.

Maritime Electric cost estimates often include contingencies similar to those published in the American Association of Cost Estimating ("AACE") International's Recommended Practice 18R-97, as shown in Table 12. With this cost estimating methodology, contingencies vary based on the class of cost estimate prepared.

Generation projects tend to include contingency amounts because they are often unique "one-of" projects compared to distribution, transmission and corporate projects. Contingency allocations are often not budgeted for distribution, transmission and corporate projects as they tend to be similar from year to year and the estimator has actual expenditures from the previous years to base the estimate upon. However, there are sometimes exceptions required when the projects are complex (e.g., energized rebuild work or the development of a customized software application) and when civil works are involved (e.g., the construction of a substation on a green field site). In such cases, these projects are also typically estimated to an AACE Class 2 or Class 3 level.

Table 12
AACE International's Recommended Practice for Cost Estimating

	Primary Characteristic	*Secondary Characteristic*			
ESTIMATE CLASS	**LEVEL OF PROJECT DEFINITION** Expressed as % of complete definition	**END USAGE** Typical purpose of estimate	**METHODOLOGY** Typical estimating method	**EXPECTED ACCURACY RANGE** Typical variation in low and high ranges [a]	**PREPARATION EFFORT** Typical degree of effort relative to least cost index of 1 [b]
Class 5	0% to 2%	Concept Screening	Capacity Factored, Parametric Models, Judgment, or Analogy	L: -20% to -50% H: +30% to +100%	1
Class 4	1% to 15%	Study or Feasibility	Equipment Factored or Parametric Models	L: -15% to -30% H: +20% to +50%	2 to 4
Class 3	10% to 40%	Budget, Authorization, or Control	Semi-Detailed Unit Costs with Assembly Level Line Items	L: -10% to -20% H: +10% to +30%	3 to 10
Class 2	30% to 70%	Control or Bid/ Tender	Detailed Unit Cost with Forced Detailed Take-Off	L: -5% to -15% H: +5% to +20%	4 to 20
Class 1	50% to 100%	Check Estimate or Bid/Tender	Detailed Unit Cost with Detailed Take-Off	L: -3% to -10% H: +3% to +15%	5 to 100

Notes: [a] The state of process technology and availability of applicable reference cost data affect the range markedly. The +/- value represents typical percentage variation of actual costs from the cost estimate after application of contingency (typically at a 50% level of confidence) for given scope.

[b] If the range index value of "1" represents 0.005% of project costs, then an index value of 100 represents 0.5%. Estimate preparation effort is highly dependent upon the size of the project and the quality of estimating data and tools.

4.0 GENERATION $1,245,000

Maritime Electric's Charlottetown Thermal Generating Station ("CTGS" or "Steam Plant") has reached the end of its useful life and is scheduled to be retired on December 31, 2021. As such, the Generation category has been restructured so that Sections 4.1 and 4.2 now reference the Charlottetown Generation Station ("CGS"), and Section 4.3, which used to encompass all facilities and equipment at the Borden Generating Station ("BGS") has been separated into two Sections, 4.3 Borden Generating Station – Buildings and Site Services, and 4.4 Borden Generating Station – Turbine Generators. The new breakdown is better structured for comparing planned and historical spending in this and future capital budget applications.

The two remaining on-Island generating stations, which are primarily backup supply sources, are equipped as follows:

Borden Generating Station	2 Generators	40 MW (total)
Charlottetown Generating Station	1 Generator	50 MW

The BGS is the site where Combustion Turbine 1 ("CT1") and Combustion Turbine 2 ("CT2") are located. The CGS is the site where Combustion Turbine 3 ("CT3") is located. The primary role of Maritime Electric's on-Island generation is to supply energy in times of curtailment from off-Island energy suppliers or during transmission line outages or curtailments, on either PEI or the mainland. Other benefits of having on-Island generation include reduced purchased capacity costs and the ability to provide backup for the four submarine cables connecting PEI to the mainland[10].

The Generation component of the Capital Budget is comprised of projects required to maintain the generating stations in a state that enables the Company to meet reliability and safety requirements. These requirements are specified in the Company's Energy Purchase Agreement with NB Power, health and safety regulations, provincial pressure vessel inspector recommendations, insurance requirements and contingency plans.

[10] Having dispatchable on-Island generation enables Maritime Electric to purchase interruptible energy which is less costly than non-interruptible (or "firm") energy. Also, it puts an upper limit on the cost of purchased energy (i.e., when the price is too high, the energy can be produced by running the on-Island generation).

4.1 Charlottetown Generating Station - Buildings and Site Services ***$ 30,000***

This category includes CGS expenditures required for buildings and site services projects, which includes necessary refurbishments, replacements and upgrades to the Energy Control Centre ("ECC"), Backup Control Centre ("BCC") and to infrastructure within the CGS compound.

The ECC provides continuous 24-hour monitoring and operation of Maritime Electric's electrical system by performing functions such as energy purchases, load and wind forecasting, generation dispatch and line crew dispatch. The ECC building, located on Cumberland Street in Charlottetown, was constructed in 1976. The BCC, located at the West Royalty Service Centre, is equipped to serve as the control centre for Company operations in the event that the ECC is not available for any reason. The BCC has also been used concurrently with the ECC to segregate operators into cohorts in accordance with the Company's pandemic response operational plan.

The CGS compound encompasses the following infrastructure inside the fence line at the Cumberland Street site: ECC building; 69 kV Charlottetown Plant Substation; Substation Control Building; 69 kV capacitor bank; 50 MW CT3; X4 step-up transformer and auxiliaries; fuel storage, containment and offloading facility; machine shop; and storage building.

The proposed budget allocation is below historical spending as shown in Table 13, which reflects reduced spending on CGS buildings and site services projects with the retirement of the Steam Plant at the end of 2021.

Table 13 Historical and Proposed Expenditures CGS Buildings and Site Services[a]						
Description	**2017**	**2018**	**2019**	**2020[b]**	**2021 Budget**	**2022 Budget**
Material	$ 8,082	$ 87,126	$ 44,298	$ 234,882	$ 60,000	$ 26,000
External Labour	-	-	17,937	54,658	15,000	-
Internal Labour and Transportation	741	11,100	35,750	6,639	32,500	4,000
Other	-	11,805	-	11,738	17,500	-
TOTAL	**$ 8,823**	**$ 110,031**	**$ 97,985**	**$ 307,917**	**$ 125,000**	**$ 30,000**

a Prior to 2022, the equivalent Generation subcategory was identified as Charlottetown Plant Buildings and Services Projects.
b. Includes $38,000 budgeted for carryover costs to complete 2020 projects in 2021.

a. ECC Building Sidewalk Replacement (Justifiable) $ 21,000

The back entrance of the ECC building includes a concrete sidewalk situated over the top of a pre-cast concrete cable trench. The cable trench, which contains communication lines from the nearby Steam Plant, will no longer be required as of January 1, 2022. This back entrance is adjacent to the facility's parking lot and serves as the main entrance for Maritime Electric personnel and visitors to the ECC building. This project includes the removal of the existing concrete cable trench and the construction of a new concrete sidewalk. Over the years, the concrete sidewalk blocks that served as trench covers have heaved and cracked. Removing the cable trench and replacing it with a proper sidewalk will address the health and safety concerns associated with the existing deteriorated and uneven walkway.

Justification

The project is justified on the obligation to ensure continued safe operation and use of CGS buildings and site services. For this reason, it cannot be deferred.

Costing Methodology

The proposed budget allocation is based on a combination of engineering estimates for internal labour and a vendor quotation.

A breakdown of the proposed budget for sidewalk replacement at the ECC building is shown in Table 14. A contingency has been budgeted as this is a one-of project[11], the vendor quotation may need to be refreshed, some project component costs were estimated, and minor adjustments in scope of work are commonly required with this type of project.

Table 14
Breakdown of Proposed Budget Allocation
ECC Building Sidewalk Replacement

Description	**Budget**
Materials and External Labour	$ 14,000
Internal Labour and Transportation	4,000
Contingency (17 per cent)	3,000
TOTAL	**$ 21,000**

Supporting information for the cost estimates included in Table 14 is provided in Confidential Appendix S-4.

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all materials and external labour will be obtained through competitive procurement processes.

The expected start date for this project is July 2022 and the expected in-service date is August 2022.

Alternatives

An alternative to replacing the ECC building sidewalk is to remove the cable trench and reset the existing concrete blocks; however, this is not recommended as the

[11] See Contingencies in Section 3.6d - Estimating Capital Costs.

blocks are old and some are cracked, and they would be difficult to match with replacements.

Future Commitments

This is not a multi-year capital budget commitment.

b. <u>CGS Miscellaneous Building and Site Upgrades</u> (Recurring) $ 9,000

As CGS buildings and site services age, upgrades are required each year to address deteriorated components. Experience indicates that unplanned and emergency events will also occur that require capital replacements, refurbishments and upgrades. Performing necessary replacement, refurbishment and upgrade work in a timely manner when the need arises, helps to ensure that CGS facilities remain in adequate condition for the safety of employees and to avoid costly emergency repairs or replacements.

As the projects under this budget category are unplanned and identified on an as required basis, cost projections at the item level cannot be determined in advance and therefore, the proposed budget allocation is provisional.

Justification

The proposed provisional budget allocation is justified on the obligation to ensure the efficient and safe operation and use of CGS facilities. For this reason, when projects arise throughout the year, they cannot be deferred.

Costing Methodology

A breakdown of the historical, 2021 budget and the proposed 2022 budget allocation for CGS miscellaneous building and site upgrades is shown in Table 15. Reduced budget allocations in 2021 and 2022 reflect the retirement of the Steam Plant at the end of 2021.

Table 15 Historical and Proposed Expenditures CGS Miscellaneous Building and Site Upgrades				
Description	**2019[a]**	**2020[a]**	**2021 Budget[b]**	**2022 Budget**
Material	$ -	$ 42,154	$ 9,000	$ 9,000
External Labour	14,837	41,500	-	-
Internal Labour and Transportation	6,000	10,783	-	-
Other	-	2,238	-	-
TOTAL	**$ 20,837**	**$ 96,675**	**$ 9,000**	**$ 9,000**

a. In the 2019 and 2020 Capital Budgets, the equivalent item was under 4.1c Charlottetown Plant Miscellaneous Buildings and Services and prior to 2019, there was no equivalent item (i.e., it was consolidated with all Charlottetown Plant Buildings and Services Projects).
b. In the 2021 Capital Budget, the equivalent budget allocation is listed as item iii in Table 9 of Section 4.1a.

To ensure projects are completed at the lowest possible costs, all material and external labour contracts will be obtained through a competitive procurement process. In situations where there are no competitive contractors in the service area, the Company will negotiate the best possible pricing.

Alternatives

Alternatives will be considered at the time when CGS miscellaneous building and site upgrades are identified as required.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring provisional capital requirement that is budgeted annually.

4.2 Charlottetown Generating Station – Turbine Generator *$ 524,000*

This category includes expenditures associated with the generation equipment located at the CGS, which includes CT3 and ancillary systems.

The CT3 ancillary systems include the following: ventilation and combustion air system; lube oil system; instrument air system; liquid fuel system; fire protection system; generator excitation system; vibration monitoring system; and balance of plant equipment. The capital projects proposed in this category are critical to ensuring CT3 is in a state that it is ready to operate on demand.

A breakdown of the historical, 2021 budget and the proposed 2022 budget allocation for CGS turbine generator projects is shown in Table 16.

Table 16
Historical and Proposed Expenditures
Charlottetown Generating Station - Turbine Generator[a]

Description	2017	2018	2019[b]	2020[c]	2021 Budget	2022 Budget
Material	$ 435,330	$ 550,742	$ 864,105	$ 154,028	$ 507,100	$ 198,000
External Labour	12,343	12,280	46,927	16,841	221,300	300,000
Internal Labour and Transportation	143,258	131,403	104,759	4,578	102,500	26,000
Other	493	6,483	3,231	2,658	69,100	-
TOTAL	**$ 591,424**	**$ 700,908**	**$1,019,022**	**$ 178,105**	**$ 900,000**	**$ 524,000**

a. Prior to 2022 the equivalent Generation category was identified as Charlottetown Plant Turbine-Generator Projects.
b. Includes $695,977 in carryover costs for 2019 projects completed in 2020.
c. Includes $10,000 budgeted for carryover costs to complete 2020 projects in 2021.

a. On-Island Generating Capacity Study (Justifiable) $ 320,000

The Company's current projections indicate that additional on-Island backup generating capacity is required for security of supply. To address this concern, the Company will engage an independent consultant to undertake an unbiased and in-depth analysis of the regional capacity market and future capacity prospects, as well as determine the optimal location for additional generation capacity in the province. The study will supplement and most likely confirm the Company's internal analysis regarding the need for additional on-Island dispatchable generation.

The Company is also planning on studying the capability of existing diesel and wind generating facilities to supply customers when there is a loss of supply from off-Island as most recently occurred in November 2018. The results of the study will be provided to the consultant to be included in its analysis.

Justification

The obligation of a public utility under the *Electric Power Act* to provide reasonably safe and adequate service requires the Company to manage security of supply, which includes the ability to avoid or mitigate the impact of an extended off-Island supply disruption.

Costing Methodology

The proposed budget allocation is an estimate of the cost to engage a consultant to carry out the study. A breakdown of the budget is shown in Table 17.

Table 17
Breakdown of Proposed Budget Allocation
On-Island Generation Capacity Upgrade Study

Description	**Budget**
Consultant	$ 300,000
Internal Labour and Transportation	20,000
TOTAL	**$ 320,000**

To ensure this project is completed at the lowest possible cost, the consultant will be selected through a competitive request for proposals ("RFP") process. All RFP submissions will be evaluated on a combination of technical merit and price.

The expected start date for the project is January 2022 with final report completion by April 2022.

Alternatives

Consideration was given to conducting the generation capacity upgrade study with in-house engineering resources. However, due to in-house resource availability limitations, as well as the potential for perceived bias should the study report be

required to support a capital budget request, it is deemed prudent to engage an independent third party to complete the project.

Future Commitments

This is not a multi-year budget commitment; however, the proposed study may be used to justify a future multi-year generation capacity upgrade project.

b. <u>Electronic Level Gauges for CT3 Fuel Tanks</u> (Justifiable) $ 40,000

This project consists of equipping the two combustion turbine diesel fuel tanks at the CGS with electronic level gauges[12]. Currently, the quantity of fuel in the tanks is measured manually at least monthly.

The process for measuring the quantity of fuel in the tanks involves climbing to the top of the tank (either ladder or staircase) and then walking across the top of the tank to dip it with a long tape. This process unnecessarily exposes employees to a safety hazard that was assessed as moderate in the Generation department's most recent annual review of health and safety issues.

Temperature readings are also recorded and are important in calculating the temperature-corrected quantity of fuel, as the volume of the fuel increases and decreases with temperature.

The electronic fuel tank gauges will enable the Company to record more accurate and precise temperature-corrected fuel quantity information for billing and accounting purposes. Inaccurate fuel depth and temperature measurements can cause fuel quantity calculation errors of thousands of litres.

Justification

This project is justified on the basis that it eliminates a safety hazard for employees and provides more accurate costing information on fuel inventory and consumption.

[12] One tank has a two million litre capacity and the other has a capacity of 115,000 litres.

Costing Methodology

A breakdown of the proposed project budget allocation for the CGS fuel tank electronic gauges is shown in Table 18. A contingency has been budgeted as this is a one-of project[13], the vendor quotation may need to be refreshed and to allow for minor adjustments in the scope of work that may be necessary to complete the project.

Table 18
Breakdown of Proposed Budget Allocation
Electronic Level Gauges for CT3 Fuel Tanks

Description	**Budget**
Materials and External Labour	$ 28,200
Internal Labour and Transportation	6,000
Contingency (17 per cent)	5,800
TOTAL	**$ 40,000**

Supporting information for the cost estimates included in Table 17 is provided in Confidential Appendix S-4.

The expected start date for this project is May 2022 and the expected in-service date is July 2022.

Alternatives

There is no alternative to this project. The project will significantly improve safety for Maritime Electric employees and provide better information for managing the fuel inventory in the tanks.

Future Commitments

This is not a multi-year capital budget commitment.

[13] See Contingencies in Section 3.6d - Estimating Capital Costs.

c. CGS Combustion Turbine Improvements, Parts and Tools

(Recurring) $ 164,000

The proposed capital budget allocation is a provisional amount for the supply and installation of replacement equipment, critical parts and tools as required for the continued safe and reliable operation of the CT3 unit. The scope of the allocation also provides for the acquisition of tools and critical parts that are depleted from stock or required as a result of failure or obsolescence issues.

As the projects under this budget category are unplanned and identified on an as required basis, cost projections at the item level cannot be determined in advance and therefore, the proposed budget allocation is provisional.

Justification

The obligation of a public utility under the *Electric Power Act* to provide reasonably safe and adequate service requires the Company to manage security of supply, which includes the ability to avoid or mitigate the impact of an extended off-Island supply disruption.

Costing Methodology

The proposed provisional budget allocation was estimated based on historical expenditures for equipment replacements due to in-service failures as shown in Table 19.

Table 19 Historical and Proposed Capital Expenditures CGS Combustion Turbine Improvements, Parts and Tools						
Description	**2017**	**2018**	**2019**	**2020[a]**	**2021 Budget**	**2022 Budget**
Material	$ 100,035	$ 73,821	$ 134,896	$ 53,425	$ 207,000	$ 164,000
External Labour	15,463	4,600	40,427	16,842	-	-
Internal Labour and Transportation	46,105	8,320	-	4,578	25,000	-
Other	391	-	6,500	2,658	-	-
TOTAL	**$ 161,994**	**$ 86,741**	**$ 181,823**	**$ 77,503**	**$ 232,000**	**$ 164,000**

a. The 2020 budget was reduced from historical levels due to the proposed CT3 Equipment Building Project, which was denied under Order UE19-08.

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all material will be obtained through a combination of competitive procurement processes and sole source purchases (where materials and services are best supplied by the original equipment manufacturer).

Alternatives

There is no alternative to this project. CT3 provides critical on-Island backup generation capability and the consequence of not having funds to cover the acquisition of critical parts or replacements due to unforeseen in-service failures could result in the equipment not being available for operation when required.

Future Commitments

This is not a multi-year capital budget commitment but it is a recurring provisional capital requirement that is budgeted annually.

4.3 Borden Generating Station - Buildings and Site Services *$ 283,000*

This category includes BGS expenditures required for building and site services projects, which includes necessary refurbishments, replacements and upgrades to the buildings and infrastructure within the BGS compound.

The BGS compound encompasses the following infrastructure inside the fence line at the Carleton Street site in Borden-Carleton: BGS maintenance building; two control room buildings; 69 kV Borden Substation with two step-up transformers X1 and X2; three diesel fuel storage tanks; a fuel tanker truck offloading facility; a lube oil storage building; two storage buildings for spare lengths of submarine cable; and the adjacent 138 kV Borden Riser Station for submarine cables 3 and 4.

a. <u>Commercial Storage Containers</u> (Justifiable) $ 90,000

This project includes the purchase and installation of two commercial storage/shipping containers for the BGS site. These storage containers resemble those that are used to transport goods by train or ocean vessel.

Justification

The purpose of this project is to provide more storage space for combustion turbine tools and spare parts at the BGS site. Given the age of the combustion turbines at the BGS, spare parts storage is increasingly important. It is prudent for combustion turbine spare parts to be stored in a building that is separate from the combustion turbine housings in case a catastrophic failure were to occur within a combustion turbine housing. Currently, some parts are stored at the Company's West Royalty Service Centre facility; however, space at this facility is becoming limited. The benefit of purchasing storage containers compared to building a permanent storage building is that the containers can be relocated to other locations when the combustion turbines are retired.

Costing Methodology

The proposed budget allocation shown in Table 20 is based on a combination of engineering estimates for internal labour and vendor quotations. A contingency has been budgeted as this is a one-of project[14], the vendor quotations may need to be refreshed, some project component costs were estimated, and to allow for minor adjustments in the scope of work that may be necessary to complete the project.

[14] See Contingencies in Section 3.6d - Estimating Capital Costs.

Table 20 Breakdown of Proposed Budget Allocation Commercial Storage Containers	
Description	**Budget**
Materials and External Labour	$ 59,000
Internal Labour and Transportation	18,000
Contingency (17 per cent)	13,000
TOTAL	**$ 90,000**

Additional support for the project cost estimates included in Table 20 is provided in Confidential Appendix S-4.

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all material will be obtained through competitive tendering.

The expected start date for this project is May 2022 and the expected in-service date is October 2022.

Alternatives

Used storage containers will be considered, depending on availability and quality at the time of purchase. The construction of a permanent storage building was considered, but the advantage of being able to move the containers to another location in the future (e.g., when the combustion turbines in Borden are retired) made them the preferred solution.

Future Commitments

This is not a multi-year capital budget commitment.

b. <u>BGS Miscellaneous Building and Site Upgrades</u> (Recurring) $ 193,000

The proposed budget allocation is for upgrades to the BGS maintenance building facilities electrical upgrades, and the installation of heat pumps for various BGS buildings.

Upgrades to the maintenance building include window replacements, door replacements, siding recoating, roof recoating and storm water drainage

improvements. These upgrades are required to prevent the 1972 building from further deteriorating; very few capital upgrades were completed on the building since it was originally constructed[15].

Electrical upgrades to the BGS facilities include the replacement of light fixtures, the installation of a dedicated electrical service for the storage building and the installation of heat pumps. The old fluorescent light fixtures in the maintenance building will be replaced with new energy efficient LED fixtures. Many of the fluorescent bulbs in the building are burnt out and replacing these bulbs is increasingly more expensive. The new LED light fixtures are also expected to reduce energy costs. The electrical service proposed for the storage building will make the storage building more functional and allow for the installation of proper heating and cooling in the building.

The heat pumps proposed will provide heating and cooling to the maintenance building, storage building and control rooms. This will provide more comfort for station operators and will be 2 to 3 times more energy efficient than the existing heating and cooling systems (electric resistive type) where they currently exist.

Justification

The proposed BGS building and site upgrades are justified on the need to ensure that the BGS facilities, which are required to operate the station and generation equipment at the site, provide a functional and safe working environment for employees.

Costing Methodology

The proposed budget allocation is based on a combination of engineering estimates for internal labour and vendor quotations. A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for miscellaneous BGS building and site upgrade projects is shown in Table 21.

[15] Although Maritime Electric expects CT1 and CT2 to be in service until at least 2030, the Company also expects that the majority of the BGS facilities proposed for upgrades will remain on site beyond 2030.

Table 21 Historical and Proposed Capital Expenditures BGS Miscellaneous Building and Site Upgrades						
Description	**2017**	**2018**	**2019**	**2020**	**2021 Budget[a]**	**2022 Budget**
Material	$ -	$ 9,426	$ 979	$ -	$ 9,000	$ 74,000
Internal Labour and Transportation	-	1,230	2,000	-	2,000	100,000
Other	-	-	-	-	-	19,000[b]
TOTAL	**$ -**	**$ 10,656**	**$ 2,979**	**$ -**	**$ 11,000**	**$ 193,000**

a. In the 2021 Capital Budget, BGS – Buildings and Site Services and BGS – Turbine Generators were consolidated in Section 4.3 - Borden Plant Projects, with a budget of $113,000. To accommodate the new structure in this Application (i.e., separating building and site services projects from turbine generator projects), it was estimated that approximately 10 per cent of the budget for "Borden Plant Projects" will be required for BGS Buildings and Site Services, and approximately 90 per cent will be required for BGS Turbine Generators. (However, as the $113,000 that is budgeted for 2021 is a provisional amount, the actual amount and allocation of expenditures could vary considerably from the budget, depending upon the needs that arise throughout the year).

b. A contingency of 11 per cent has been budgeted as the vendor quotations may need to be refreshed, some project component costs were estimated, and to allow for minor adjustments to the scope of work of one or more of the proposed upgrade projects. For additional information on budgeting contingency amounts, see Contingencies in Section 3.6d - Estimating Capital Costs.

Additional support for the 2022 budget shown in Table 20 is provided in Confidential Appendix S-4.

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all material will be obtained through competitive tendering.

The expected start date for this project is May 2022 and the expected in-service date is August 2022.

Alternatives

There is no alternative to this project due to the existing condition of the facilities.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring capital requirement that is budgeted annually.

4.4 Borden Generating Station – Turbine Generators *$ 408,000*

This category includes expenditures associated with the generation equipment located at the BGS, which includes CT1, CT2 and ancillary systems.

a. CT1 and CT2 Life Extension Engineering Assessment

(Justifiable) $ 48,000

This project involves the engagement of a consultant to perform an engineering assessment of CT1 and CT2[16], and provide an expert opinion on the condition and expected lifetime of the two generators. The assessment report will also identify future projects for CT1 and CT2 that support the consultant's life extension recommendations. The consultant will determine the risks associated with maintaining these units until they need to be decommissioned (i.e., when life extension is no longer feasible or possible). The consultant will also be expected to identify any critical spare part purchases, capital projects and maintenance projects that are prudent to undertake in future years to extend the life of the two combustion turbines.

Justification

The obligation of a public utility under the *Electric Power Act* to provide reasonably safe and adequate service requires the Company to manage security of supply, which includes the ability to avoid or mitigate the impact of an extended off-Island supply disruption.

Costing Methodology

The proposed budget allocation provided in Table 22 is an estimate based on the cost of a similar study that was completed for the Steam Plant in 2009. A contingency has been budgeted as a consultant has not yet been selected, and therefore, the exact cost to complete the study is not yet known.

[16] CT1 was commissioned in 1971 and is now 50 years old. CT2 was commissioned in 1973 and is now 48 years old.

Table 22 Breakdown of Proposed Budget Allocation CT1 and CT2 Life Extension Engineering Assessment	
Description	**Budget**
External Labour	$ 25,000
Internal Labour and Transportation	17,000
Contingency (14 per cent)	6,000
TOTAL	**$ 48,000**

The engineering assessment is expected to take place during the annual CT1 and CT2 outages in 2022, which typically occur during the months of April through June.

Alternatives

There is no alternative to this project. A thorough condition assessment of CT1 and CT2 is necessary due to the increased reliance on the units with the retirement of the Steam Plant.

Future Commitments

This is not a multi-year capital budget commitment.

b. CT2 Detroit Diesel Starter Overhaul (Justifiable) $ 63,000

This project involves dismantling the CT2 Detroit Diesel starter to perform a thorough inspection and overhaul. The starter's main function is to black start CT2 (i.e., starting CT2 without using any energy from the grid in the case of a blackout).

Annual oil samples of the starter oil have recently shown signs of fuel contamination and poor viscosity. This contamination compromises the quality of the oil and the operation of the starter. An oil analysis report received in 2021 recommends evaluating and identifying the source of the fuel in the oil, which is why the overhaul is required. A copy of the oil analysis report is provided in Appendix G.

Justification

The obligation of a public utility under the *Electric Power Act* to provide reasonably safe and adequate service requires the Company to manage security of supply, which includes the ability to avoid or mitigate the impact of an extended off-Island supply disruption.

Costing Methodology

The proposed budget allocation shown in Table 23 is based on a combination of engineering estimates for internal labour and a vendor quotation. A contingency has been budgeted as this is a one-of project[17], the vendor estimate may need to be refreshed, and to allow for additional materials or labour costs that may be necessary to complete the project.

Table 23
Breakdown of Proposed Budget Allocation
CT2 Detroit Diesel Starter Overhaul

Description	**Budget**
Materials and External Labour	$ 35,000
Internal Labour and Transportation	21,000
Contingency (12.5 per cent)	7,000
TOTAL	**$ 63,000**

Additional support for the cost estimates included in Table 22 is provided in Confidential Appendix S-4.

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all material and external labour will be obtained through competitive tendering.

The starter overhaul is expected to take place during the annual CT2 outage in 2022, which typically occurs during the months of April through June.

[17] See Contingencies in Section 3.6d - Estimating Capital Costs.

Alternatives

There is no alternative to this project. Failure to address the fuel contamination of the starter oil could eventually lead to the failure of the starter and the combustion turbine will not start when required.

Future Commitments

This is not a multi-year capital budget commitment.

c. <u>CT1 and CT2 Component Upgrades</u> (Justifiable) $ 131,000

This project includes accessibility improvements to the CT1 stack, replacing CT2 batteries and battery charger and recoating the CT2 stack.

Combustion turbine operators are required to access the top of the CT1 stack a minimum of three times per year. Currently, accessibility to the CT1 stack is poor and presents employee safety risks. Improving its accessibility with a fixed ladder and platform system will provide safer access to the stack and significantly reduce the time required to access the top of the stack.

The CT2 batteries and battery charger requires replacement because they are critical components used for black start of the combustion turbine. The existing battery charger is original equipment that was installed with the combustion turbine in 1972 and has reached end of life.

The exterior surface of the CT2 stack has deteriorated, especially on the side facing the Northumberland Strait. This project involves cleaning the stack and applying an industrial thermal coating to prevent further deterioration and protect it in the future.

Justification

These upgrades are justified on the obligation to provide security of supply and cannot be deferred due to the safety concerns associated with accessing the CT2 stack, the importance of the CT2 battery system to the unit's black start capability, and to prevent further deterioration of the CT2 stack.

Costing Methodology

The proposed budget allocation shown in Table 24 is based on a combination of engineering estimates for internal labour and vendor quotations. A contingency has been budgeted as the vendor quotations may need to be refreshed, some project components were estimated, and to allow for minor adjustments to the scope of work that are commonly required with these types of projects.

Table 24
Breakdown of Proposed Budget Allocation
CT1 and CT2 Component Upgrades

Description	**Budget**
Materials and External Labour	$ 44,100
Internal Labour and Transportation	73,000
Contingency (12 per cent)	13,900
TOTAL	**$ 131,000**

Additional support for the cost estimates included in Table 24 is provided in Confidential Appendix S-4.

The expected start date for this project is January 2022 with in-service dates throughout the year.

Alternatives

There is no alternative to this project. Failure to address the CT1 stack access presents a safety risk and the batteries, battery charger and stack condition are all critical to the continued reliability of CT2.

Future Commitments

This is not a multi-year capital budget commitment.

d. <u>Electronic Level Gauges for BGS Fuel Tanks</u> (Justifiable) $ 58,000

This project consists of equipping the three combustion turbine fuel tanks at the BGS with electronical level gauges[18]. Currently, the quantity of fuel in the tanks is measured manually at least monthly.

The process for measuring the quantity of fuel in the tanks involves climbing to the top of the tank (either ladder or staircase) and then walking across the top of the tank to dip it with a long tape. This process unnecessarily exposes employees to a safety hazard that was assessed as moderate in the Generation department's most recent annual review of health and safety issues.

Temperature readings are also recorded and are important in calculating the temperature-corrected quantity of fuel, as the volume of the fuel increases and decreases with temperature.

The electronic fuel tank gauges will enable the Company to record more accurate and precise temperature-corrected fuel quantity information for billing and accounting purposes. Inaccurate fuel depth and temperature measurements can cause fuel quantity calculation errors of thousands of litres.

Justification

This project is justified on the basis that it eliminates a safety hazard for employees and provides more accurate costing information fuel inventory and consumption.

Costing Methodology

A breakdown of the proposed budget allocation for the BGS fuel tank electronic level gauges is shown in Table 25. A contingency has been budgeted as this is a one-of project[19], the vendor quotation may need to be refreshed, and to allow for minor adjustments in the scope of work that may be necessary to complete the project.

[18] BGS has three 750,000 litre fuel tanks.
[19] See Contingencies in Section 3.6d - Estimating Capital Costs.

Table 25 Breakdown of Proposed Budget Allocation Electronic Level Gauges for BGS Fuel Tanks	
Description	**Budget**
Materials and External Labour	$ 42,300
Internal Labour and Transportation	9,000
Contingency (13 per cent)	6,700
TOTAL	**$ 58,000**

Supporting information for the cost estimates included in Table 25 is provided in Confidential Appendix S-4.

The expected start date for this project is May 2022 and the expected in-service date is October 2022.

Alternatives

There is no alternative to this project. The project will significantly improve safety for Maritime Electric employees and provide better information for managing the fuel inventory in the tanks.

Future Commitments

This is not a multi-year capital budget commitment.

e. BGS Combustion Turbine Improvements, Parts and Tools

(Recurring) $ 108,000

The proposed budget allocation is for the replacement and installation of equipment, critical parts and tools as required for the continued safe and reliable operation of the BGS.

As the projects under this budget category are unplanned and identified on an as required basis, cost projections at the item level cannot be determined in advance and therefore, the proposed budget allocation is provisional.

Justification

The obligation of a public utility under the *Electric Power Act* to provide reasonably safe and adequate service requires the Company to manage security of supply, which includes the ability to avoid or mitigate the impact of an extended off-Island supply disruption.

Costing Methodology

The proposed provisional budget was estimated based on average historical expenditures for equipment replacements due to in-service failures. A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for BGS combustion turbine improvements, parts and tools is shown in Table 26.

Table 26
Historical and Proposed Capital Expenditures
BGS Combustion Turbine Improvements, Parts and Tools

Description	2017	2018	2019	2020	2021 Budget[a]	2022 Budget
Material	$ 69,213	$ 45,068	$ 43,949	$ 139,571	$ 84,000	$ 108,000
External Labour	-	55,700	4,298	77,845	-	-
Internal Labour and Transportation	11,849	16,457	8,000	-	18,000	-
TOTAL	**$ 81,062**	**$ 117,225**	**$ 56,247**	**$ 217,416**	**$ 102,000**	**$ 108,000**

a. In the 2021 Capital Budget, BGS – Buildings and Site Services and BGS – Turbine Generators were consolidated in Section 4.3 - Borden Plant Projects, with a budget of $113,000. To accommodate the new structure in this Application (i.e., separating building and site services projects from BGS turbine generator projects), it was estimated that approximately 10 per cent of the budget for "Borden Plant Projects" will be required for BGS Buildings and Site Services, and approximately 90 per cent will be required for BGS Turbine Generators. (However, as the $113,000 that is budgeted for 2021 is a provisional amount, the actual amount and allocation of expenditures could vary considerably from the budget, depending upon the needs that arise throughout the year.)

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all material will be obtained through a combination of competitive tendering and sole source purchases for materials and services that are better supplied by the original equipment manufacturer.

The expected start date for this project is January 2022 with in-service dates throughout the year, as required.

Alternatives

There is no alternative to this project. The BGS combustion turbines provide critical backup generation capability and the consequence of not having funds to cover the acquisition of critical parts or replacements due to unforeseen in-service failures could result in the equipment not being available for operation when required.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring provisional capital requirement that is budget annually.

5.0 DISTRIBUTION *$ 28,249,000*

Maritime Electric's proposed 2022 capital expenditures for distribution were developed using the Company's ISP and DAMP, and is focused on the replacement of aged infrastructure to maintain system reliability, improve energy efficiency and ensure continued compliance with all safety and environmental requirements. In addition, distribution assets will be installed to serve new customers, modify existing service connections, address system load growth impacts and facilitate joint use of utility poles with communication providers. The Company's asset database, field inspection results, and reliability data continues to be used to identify facilities and equipment for priority replacement.

5.1 Replacements Due to Storms, Collisions, Fire and Road Alterations *$ 1,631,000*

This provisional budget allocation is required for capital replacements due to storms, fire, motor vehicle accidents, other emergency incidents and road alterations. The amount for 2022 as shown in Table 27 is lower than the historical five-year average because severe storms in 2018 and 2019 resulted in higher than normal annual expenditures. The proposed budget for 2022 is increased over 2021 by more than inflation, to raise the allocation for road alterations, which has seen increased activity (resulting in over budget variances) in recent years.

Table 27
Historical and Proposed Capital Expenditures
Replacements Due to Storms, Collisions, Fire and Road Alterations

Description	2017	2018[a]	2019[a]	2020	2021 Budget	2022 Budget
Material	$ 318,977	$ 476,673	$ 406,239	$ 411,621	$ 274,000	$ 282,000
Contractor Labour	145,661	1,105,758	703,015	517,043	393,000	401,000
Internal Labour and Transportation	793,850	1,154,987	947,426	873,796	779,000	948,000
Other	18,064	44,803	63,048	13,624	-	-
TOTAL	**$1,276,552**	**$2,782,221**	**$2,119,728**	**$1,816,084**	**$1,446,000**	**$1,631,000**

a. Includes expenditures due to above average storm activity that caused system damage requiring replacement of capital assets.

a. **<u>Replacements Due to Storms, Fire and Collisions</u> (Recurring) $ 990,000**

Maritime Electric operates approximately 5,300 kilometres of distribution lines to serve customers within its service territory. When system damage occurs to distribution structures and equipment, the Company is obligated to respond in a timely manner and restore the system to a safe and reliable operating condition. The scope and severity of damage caused by storms and other adverse events can be highly variable from year to year. For this reason, the budgeted amount is a provisional cost estimate for labour and material that will be required in 2022 to replace distribution equipment (predominantly poles, transformers and wire) damaged as a result of unforeseen events that are beyond the control of the Company.

This budget allocation differs from the budget allocation in Section 5.5 - Line Rebuilds, as the work is unplanned and is necessary to address operational events, including power interruptions and customer trouble calls.

Justification

The provisional budget allocation for distribution system replacements due to storms, fire and collisions is justified on the obligation to provide safe and reliable service to customers and cannot be deferred.

Costing Methodology

A breakdown of the historical, 2021 budget and the proposed 2022 budget allocation for the storm response and other outage restoration activity that the Company is obligated to provide is shown in Table 28.

Table 28 Historical and Proposed Expenditures Replacements Due to Storms, Fires and Collisions						
Description	**2017**	**2018[a]**	**2019[a]**	**2020**	**2021 Budget**	**2022 Budget**
Material	$ 211,329	$ 281,194	$ 199,489	$ 196,970	$ 170,000	$ 175,000
Contractor Labour	106,332	884,193	282,229	120,973	250,000	255,000
Internal Labour and Transportation	450,247	818,537	575,937	667,791	550,000	560,000
Other	11,070	37,674	50,849	8,162	-	-
TOTAL	**$ 778,978**	**$2,021,598**	**$1,108,504**	**$ 993,896**	**$ 970,000**	**$ 990,000**
Less: Significant Storm Events*	-	(861,296)	(388,110)	-	-	-
TOTAL Excluding Significant Storm Events	**$ 778,978**	**$1,160,302**	**$ 720,394**	**$ 993,896**	**$ 970,000**	**$ 990,000**

a. Significant Storm Events:
2018 – November 29, 2018 - snow, ice and wind storm
2019 – September 7, 2019 - Tropical Storm Dorian

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring provisional capital requirement that is budgeted annually.

b. Replacements Due to Road Alterations (Recurring) $ 641,000

Each year, the Company relocates or replaces distribution and transmission assets to accommodate third parties including government agencies, communication providers, customers and other entities utilizing public rights of way. The most common activities requiring the relocation or replacement of distribution and transmission assets are related to provincial and municipal government infrastructure projects such as sidewalk installations, sewer and water line extensions, road widening, road construction and bridge replacements. At the time that the 2022 Capital Budget was developed, government plans for infrastructure

work in 2022 were not yet confirmed and, therefore, a provisional amount has been budgeted.

Third party requests to relocate or replace distribution facilities are governed by the provisions of agreements and understandings in place with the requesting parties. The relocation or replacement of facilities for customers is governed by the General Rules and Regulations of the Company.

Justification

The provisional budget allocation for distribution system replacements due to road alterations is justified on the obligation to ensure the protection and maintenance of safe and adequate distribution and transmission facilities and cannot be deferred.

Costing Methodology

A breakdown of the historical, 2021 budget and the proposed 2022 budget allocation for the road and other third party driven system alterations activity that the Company is obligated to provide is shown in Table 29.

In recent years, the PEI Department of Transportation and Infrastructure has significantly increased its annual investments in improvements to intersections, roads and bridges across the province, which has increased the requirement for modifications to the electricity supply system. To better reflect this increased requirement, the provisional budget for system modifications due to road alterations has been increased by approximately 35 per cent (over 2021). Depending upon the end of year variance for this budget item, additional adjustments may be warranted in the future.

Table 29 Historical and Proposed Capital Expenditures Replacements Due to Road Alterations						
Description	**2017**	**2018**	**2019**	**2020**	**2021 Budget**	**2022 Budget**
Material	$ 107,648	$ 195,479	$ 206,750	$ 214,651	$ 104,000	$ 107,000
Contractor Labour	39,329	221,566	420,785	396,070	143,000	146,000
Internal Labour and Transportation	343,603	336,449	371,490	206,005	229,000	388,000
Other	6,994	7,129	12,199	5,462	-	-
TOTAL	**$ 497,574**	**$ 760,623**	**$1,011,224**	**$ 822,188**	**$ 476,000**	**$ 641,000**

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring provisional capital requirement that is budgeted annually.

5.2 Distribution Transformers (Recurring/Mandatory[20]) *$ 5,337,000*

The purchase and installation of new distribution transformers and other related equipment is an annual recurring capital budget expenditure that is required to serve new customers, accommodate changes for existing customers and replace deteriorated or damaged units. This requirement has steadily grown in recent years due to the increase in the number of new services related to housing starts.

Canada Mortgage and Housing Corporation ("CMHC") forecasts 2022 housing starts will be down slightly from 2021. Despite this change, the Company estimates that the polemount and padmount transformer requirements will be similar to those of 2021, as work to replace polychlorinated biphenyl ("PCB") containing electrical equipment is

[20] Mandatory replacement of transformer equipment containing polychlorinated biphenyl ("PCB") is budgeted at $640,000, which is included in the proposed budget ($5,337,000) for distribution transformers.

increasing to ensure compliance with the December 31, 2025 federally regulated replacement deadline[21].

The Transclosure Removal Program will continue in 2022 with the removal of units in Slemon Park and Charlottetown.

Justification

This Project is justified based on the need to maintain safe, reliable electrical service at least cost and the obligation to provide equitable access to an adequate supply of power to new and existing customers. For the reasons provided, it cannot be deferred.

Projected Expenditures

The proposed budget allocation for transformers is based on the previous year's usage, upcoming line rebuilds, new housing start forecasts, transformer inspections and recent annual expenditures as shown in Table 30. Supporting information for the 2022 transformer budget is provided in Confidential Appendix S-5.

Table 30
Historical and Proposed Capital Expenditures
Distribution Transformers

Description	2017	2018	2019	2020[a]	2021 Budget	2022 Budget
Material	$2,706,219	$2,714,234	$3,328,997	$3,243,378	$4,211,000	$4,335,000
Contractor Labour	112,448	154,102	10,963	36,652	56,000	77,000
Internal Labour and Transportation	517,049	395,282	582,219	600,717	872,000	925,000
Other	19,039	3,829	2,006	39,845	53,000	-
TOTAL	**$3,354,755**	**$3,267,447**	**$3,924,185**	**$3,920,592**	**$5,192,000**	**$5,337,000**

a. Includes $111,000 in carryover costs for 2020 transformers delivered in 2021.

[21] Federal regulations state that polemount electrical transformers and their polemount auxiliary electrical equipment as well as current transformers, potential transformers, circuit breakers, reclosers and bushings that are located at an electrical generation, transmission or distribution facility, which contain PCBs in a concentration of 500mg/kg or more, have an end of use deadline of December 31, 2025.

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all material will be obtained through competitive procurement processes.

The expected start date for this project is January 2022 and will continue to end of the year with in-service dates throughout.

Future Commitments

This is not a multi-year capital budget commitment; however, it is recurring capital requirement that is budgeted annually.

5.3 Services and Street Lighting *$ 5,573,000*

The proposed budget includes the construction of service lines to connect new customers, refurbishment of aged service lines, and installation of new street lights and replacement of existing street lights with energy efficient light-emitting diode ("LED") fixtures. The service line expenditures are expected to be partially offset by customer contributions for construction charges as set by the General Rules and Regulations of the Company.

The proposed provisional budget is based upon historical spending as shown in Table 31 and reflects a sustained level of activity since 2017.

Table 31
Historical and Proposed Capital Expenditures
Services and Street Lighting

Description	2017	2018	2019	2020	2021 Budget	2022 Budget
Material	$1,169,218	$1,416,821	$1,121,510	$1,271,480	$1,218,000	$1,252,000
Contractor Labour	789,687	768,782	787,209	422,633	90,000	248,000
Internal Labour and Transportation	2,901,765	2,910,330	2,960,358	3,463,387	3,993,000	4,073,000
Other	21,606	16,265	47,979	75,671	-	-
TOTAL	**$4,882,276**	**$5,112,198**	**$4,917,056**	**$5,233,171**	**$5,301,000**	**$5,573,000**

a. <u>Overhead and Underground Services</u> (Recurring) $ 4,738,000

Service work involves the installation and replacement of distribution wires that connect a customer's electrical service equipment to the Company's transformers and the transformers to the main line. The volume of overhead and underground new and replacement services work fluctuates from year to year. As such, the budgeted amount for labour and material to install or replace overhead and underground services is a provisional estimate based on historical customer requests. Replacement of existing service wires is typically due to deterioration, failure, damage or to accommodate an increased customer load.

Justification

The provisional budget allocation for overhead and underground service work is justified on the obligation to provide equitable access to an adequate supply of power to new and existing customers and cannot be deferred.

Costing Methodology

A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for customer service work that the Company is obligated to provide is shown in Table 32.

Table 32
Historical and Proposed Capital Expenditures
Overhead and Underground Services

Description	2017	2018	2019	2020	2021 Budget	2022 Budget
Material	$ 766,123	$ 896,891	$ 722,368	$ 906,081	$ 894,000	$ 920,000
Contractor Labour	789,687	767,192	787,209	422,633	60,000	217,000
Internal Labour and Transportation	2,806,963	2,596,372	2,579,271	3,034,889	3,532,000	3,601,000
Other	21,504	16,231	47,979	75,671	-	-
TOTAL	**$4,384,277**	**$4,276,686**	**$4,136,827**	**$4,439,274**	**$4,486,000**	**$4,738,000**

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring provisional capital requirement that is budgeted annually.

b. <u>Street and Area Lighting</u> (Recurring) $ 835,000

Street and area lighting is an established service offering of Maritime Electric. Changes in lighting technology over the past several years has resulted in existing high-pressure sodium ("HPS") and mercury vapour ("MV") light fixtures being replaced with energy efficient LED fixtures under a Commission approved Conversion Program which began in 2015. In 2022, the Conversion Program will be in the eighth year of a planned ten-year duration.

The 2022 budget amount allows for the replacement of approximately 750 LED street lights through the Conversion Program. The budget amount also includes the installation of approximately 150 LED street and yard lights based on the historical level of customer requests and light replacements due to fixtures reaching the end of their useful life.

Justification

The budget allocation for street and area lighting work is justified on the obligation to serve new and existing customers and cannot be deferred.

Costing Methodology

A breakdown of the historical, 2021 budget and the proposed 2022 budget allocation for street and area lighting service that the Company is obligated to provide is shown in Table 33.

Table 33 Historical and Proposed Capital Expenditures Street and Area Lighting						
Description	**2017**	**2018**	**2019**	**2020**	**2021 Budget**	**2022 Budget**
Material	$ 403,095	$ 519,930	$ 399,142	$ 365,399	$ 324,500	$ 332,000
Contractor Labour	-	1,590	-	-	30,000	31,000
Internal Labour and Transportation	94,802	313,958	381,087	428,498	460,500	472,000
Other	102	34	-	-	-	-
TOTAL	**$ 497,999**	**$ 835,512**	**$ 780,229**	**$ 793,897**	**$ 815,000**	**$ 835,000**

Future Commitments

The Conversion Program is being carried out over ten years pending approval annually through the Company's capital budget application.

5.4 Line Extensions *$ 2,572,000*

Line extension projects involve the construction of both primary and secondary distribution lines to connect new customers to the electrical system or to upgrade the capacity of existing lines to accommodate increased customer loads. Line extensions can also be initiated by the Company as a means to cost effectively redistribute system loads by reconfiguring circuits or establishing new circuits for overall improvements in system reliability and operability.

Line extension work to connect new customers or accommodate increased customer loads is categorized as Customer Driven Line Extensions and the proposed budget allocation is provisional. Line extension projects initiated by the Company to redistribute system loads are categorized as Reliability Driven Line Extensions and the proposed budget allocation is based on estimated material and labour requirements.

The proposed budget allocation for line extensions is provided in Table 34 and is expected to be partially offset by customer contributions.

Table 34 Historical and Proposed Capital Expenditures Line Extensions						
Description	**2017**	**2018[a]**	**2019[b]**	**2020[c]**	**2021 Budget**	**2022 Budget**
Material	$ 517,872	$ 847,432	$ 1,625,226	$ 1,083,320	$ 476,000	$ 470,000
Contractor Labour	267,034	839,120	739,610	1,272,792	601,000	908,000
Internal Labour and Transportation	1,342,812	1,541,163	1,392,226	1,287,603	1,155,000	1,194,000
Other	5,632	36,018	12,800	5,978	-	-
TOTAL	**$ 2,133,350**	**$ 3,263,733**	**$ 3,769,862**	**$ 3,649,693**	**$ 2,232,000**	**$ 2,572,000**

a. Includes $640,939 in carryover costs for 2018 projects completed in 2019.
b. Includes $840,349 in actual and budgeted carryover to complete a 2019 project in 2021.
c. Includes $272,000 budgeted for carryover costs to complete a 2020 project in 2021.

a. Customer Driven Line Extensions (Recurring) $ 1,447,000

Line extension work will involve both upgrades to existing infrastructure and new construction of single phase and three phase distribution lines to serve all types of customers and customer driven supply requirements.

Justification

The provisional allocation within this budget category is justified on the obligation to provide equitable access to an adequate supply of power to new and existing customers and cannot be deferred.

Costing Methodology

A breakdown of the historical, 2021 budget and the proposed 2022 budget allocation for customer driven line extension work that the Company is obligated to provide is shown in Table 35.

Table 35 Historical and Proposed Capital Expenditures Customer Driven Line Extensions[a]				
Description	**2019**	**2020**	**2021 Budget**	**2022 Budget**
Material	$ 604,506	$ 638,240	$ 282,000	$ 290,000
Contractor Labour	329,851	114,369	258,000	263,000
Internal Labour and Transportation	1,388,688	1,012,452	877,000	894,000
Other	9,915	1,691	-	-
TOTAL	**$ 2,332,960**	**$ 1,766,752**	**$ 1,417,000**	**$ 1,447,000**

a. Prior to 2019, customer driven line extensions and reliability driven line extensions were not broken out as separate items.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring provisional capital requirement that is budgeted annually.

b. Reliability Driven Line Extensions (Justifiable) $ 1,125,000

The budget provides for the extension of single phase and three phase distribution lines including joint use lines. Projects are prioritized based on the need to re-distribute feeder load, balance load on three phase lines and address reliability issues associated with projected load growth.

The following line extension projects are planned for 2022:

i. Glenn Drive Three Phase Conversion
ii. Mount Herbert Three Phase Conversion

The Mount Herbert Three Phase Conversion project is interdependent with two other capital projects proposed for 2022. It is necessary to enable the Crossroads Substation Rebuild project to be done in its existing location[22], in phases, over a

[22] See Section 6.1b for a description of the Crossroads Substation Rebuild project.

two year period. It is also interdependent with the Crossroads Substation Transmission Modifications project[23], which is also necessary for the rebuild to proceed.

Additional details on the proposed reliability driven line extension projects are provided in Appendix H.

Justification

The proposed reliability driven line extension projects are justified based on the obligation to provide safe and reliable service to customers.

Costing Methodology

A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for reliability driven line extensions is provided in Table 36.

Table 36
Historical and Proposed Capital Expenditures
Reliability Driven Line Extensions[a]

Description	2019[b]	2020[c]	2021 Budget	2022 Budget
Material	$ 1,020,720	$ 445,080	$ 194,000	$ 180,000
Contractor Labour	409,759	1,158,423	343,000	645,000
Internal Labour and Transportation	3,538	275,151	278,000	300,000
Other	2,885	4,287	-	-
TOTAL	**$ 1,436,902**	**$ 1,882,941**	**$ 815,000**	**$ 1,125,000**

a. Prior to 2019, reliability driven line extensions and customer driven line extensions were not broken out as separate items.
b. Includes $840,349 in actual and budgeted carryover costs to complete a 2019 project in 2021.
c. Includes $272,000 budgeted for carryover costs to complete a 2020 project in 2021.

[23] See Appendix O for a description of the Crossroads Substation Transmission Modifications project.

5.5 Line Rebuilds *$ 8,876,000*

The projects and programs proposed in the Line Rebuilds budget category enable the Company to address the timely replacement of aged infrastructure, improve reliability and voltage levels, reduce electrical losses and improve safety for workers by upgrading the system to meet current construction standards. The Company's asset database, field inspection results and reliability data serve as the primary tools for planning single and three phase rebuilds, pole and component replacements and other reliability improvement activities. Projects initiated by third party telecommunication companies requesting joint use line conversions to accommodate communication equipment are also included in this section. Communications make-ready work requests are customer driven and are often received without advance notice; however, the Company is still obligated to complete such work in a timely manner. Customer driven capital expenditures can be partially offset by a contribution, depending upon the specifics of the project.

A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for line rebuilds is shown in Table 37.

Table 37
Historical and Proposed Capital Expenditures
Line Rebuilds

Description	2017	2018	2019[a]	2020	2021 Budget	2022 Budget
Material	$ 1,258,067	$ 994,150	$ 1,052,116	$ 798,628	$ 761,000	$ 757,000
External Labour	2,403,903	2,340,138	2,779,812	1,960,459	2,851,000	2,277,000
Internal Labour and Transportation	480,289	1,424,613	1,096,644	1,128,543	1,322,000	1,278,000
Other	67,623	30,101	134,706	29,823	-	-
PEI Broadband	-	-	-	8,279,705[b]	4,431,000	4,564,000
Less: Joint Use Charged to/ Owned by Third Party	(137,640)	(506,976)	(688,471)	(2,703,887)[c]	-	-
TOTAL	**$ 4,072,242**	**$ 4,282,026**	**$ 4,374,807**	**$ 9,493,271**	**$ 9,365,000**	**$ 8,876,000**

a. Includes $90,295 in carryover costs for a 2019 project that was completed in 2020.
b. Includes a $4,942,000 in carryover costs for 2020 PEI Broadband Project work that is expected to be completed in 2021.
c. In 2020, $2,569,773 of Joint Use charges relates to PEI Broadband Project.

a. <u>Single Phase and Three Phase Line Rebuilds</u> (Justifiable) $ 2,205,000

The budget provides for the rebuilding of single phase and three phase distribution lines including joint use lines. Projects are identified for rebuild based on the condition of poles and wire, length of spans, historical reliability issues associated with the line and historical and projected load growth in this area.

The proposed rebuilds will improve both reliability and voltage stability, allow for future load growth and reduce losses. The rebuilds will also improve safety for Company employees by upgrading to modern construction standards with increased line clearances and updated system equipment. The majority of the rebuilds planned for 2022 are on lines with numerous eastern cedar poles, which are more than 40 years old, and that have damaged or deteriorated conductor. Two of the projects include a voltage conversion from 7,200 to 14,400 volts required to off-load equipment and to improve the power quality and reliability for customers.

The following single phase and three phase line rebuilds are planned for 2022:

i. Northside Road (Route 16) line rebuild;
ii. Rustico Road (Route 7) line rebuild and voltage conversion;
iii. Kingston Road (Route 235) line rebuild; and
iv. North York River Road (Route 248) line rebuild and voltage conversion.

Additional project details and justifications are provided in Appendix I.

Justification

The timely refurbishment of deteriorated distribution structures and equipment is justified on the obligation to maintain a safe and reliable electricity supply system and cannot be deferred.

Costing Methodology

A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for single and three phase line rebuild projects is shown in Table 38. Budget

amounts for each project are a function of the distance covered by the rebuild, the customer density along the line and the construction standard used in the design.

Table 38 Historical and Proposed Capital Expenditures Single Phase and Three Phase Line Rebuilds						
Description	**2017**	**2018**	**2019[a]**	**2020**	**2021 Budget**	**2022 Budget**
Material	$ 794,509	$ 843,153	$ 500,591	$ 502,601	$ 401,000	$ 388,000
Contractor Labour	1,861,812	1,977,286	1,591,122	1,379,381	1,849,000	1,143,000
Internal Labour and Transportation	312,612	1,072,506	422,300	307,485	629,000	674,000
Other	62,043	27,998	44,241	28,212	-	-
Less: Joint Use Charged to/Owned by Third Party	(126,491)	(506,976)	(428,747)	(134,115)	-	-
TOTAL	**$ 2,904,485**	**$ 3,413,967**	**$ 2,129,507**	**$2,083,564**	**$ 2,879,000**	**$ 2,205,000**

a. Includes $90,295 in carryover costs for a 2019 project that was completed in 2020.

Future Commitments

None of the proposed line rebuild projects are multi-year capital budget commitments.

b. PEI Broadband Project (Justifiable) $ 4,564,000

The PEI Broadband Project is a four year customer driven initiative that involves the installation of approximately 1,150 kilometres of communication fibre on new and existing utility poles across the Island[24].

As required by Order UE20-02, the Company has provided regular updates to the Commission on the timelines for each of the respective customers involved with this project based on new information as it becomes available.

[24] In December 2019, Maritime Electric filed a Supplemental Capital Budget Request and subsequently received Commission approval under Order UE20-02 to proceed with work on the PEI Broadband Project in 2020. 2022 is year three of the four-year project.

With the majority of the Bell fibre installation make-ready work now completed, the Company projects that the 2021 carryover amount of $4.942 million will be adequate to complete the Bell component of the project work (including the Maritime Electric plant specific work); however, the work may not be finished in 2021 and a portion of the work may require a carryover into 2022[25].

The Xplornet component of the PEI Broadband Project started later than expected in 2021 and as a result it is expected that a portion of the $4.431 million capital budget for 2021 will need to be carried over into 2022. Xplornet has an aggressive timeline with the majority of the work being performed in 2022 and then finished in early 2023.

The Company will continue to file a written report with the Commission every three months as required under Order UE20-02. These reports provide an update on costs including any forecast variances and a summary of work performed since the project commenced in May 2020.

Additional information concerning the PEI Broadband Project is provided in Appendix J.

c. <u>Distribution Line Refurbishment</u> (Recurring) $ 794,000

In 2017, the Company initiated a Distribution Inspection Program as a proactive way to improve reliability through identifying components of the distribution system that are unsafe or at risk of failure. The Program was designed to ensure that all overhead primary distribution lines are subject to a detailed ground inspection every six years.

The structured inspection and refurbishment of distribution lines plays a critical role in extending and/or maintaining their lifespan, enhancing employee and public safety, and improving system reliability by reducing the probability of component

[25] Some of Maritime Electric's plant specific work has been delayed because vegetation clearing along the new lines has not yet been completed by Bell.

failure. Photographs of deficiencies identified through the Program are shown in Appendix K.

Justification

The timely refurbishment of deteriorated distribution structures and equipment is justified on the obligation to maintain a safe and reliable electrical system and cannot be deferred.

Costing Methodology

The proposed budget allocation for distribution line refurbishment is based upon historical and budgeted spending over the first four years of the program, 2018 to 2021. A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for distribution line refurbishment is shown in Table 39.

Table 39
Historical and Proposed Capital Expenditures
Distribution Line Refurbishments

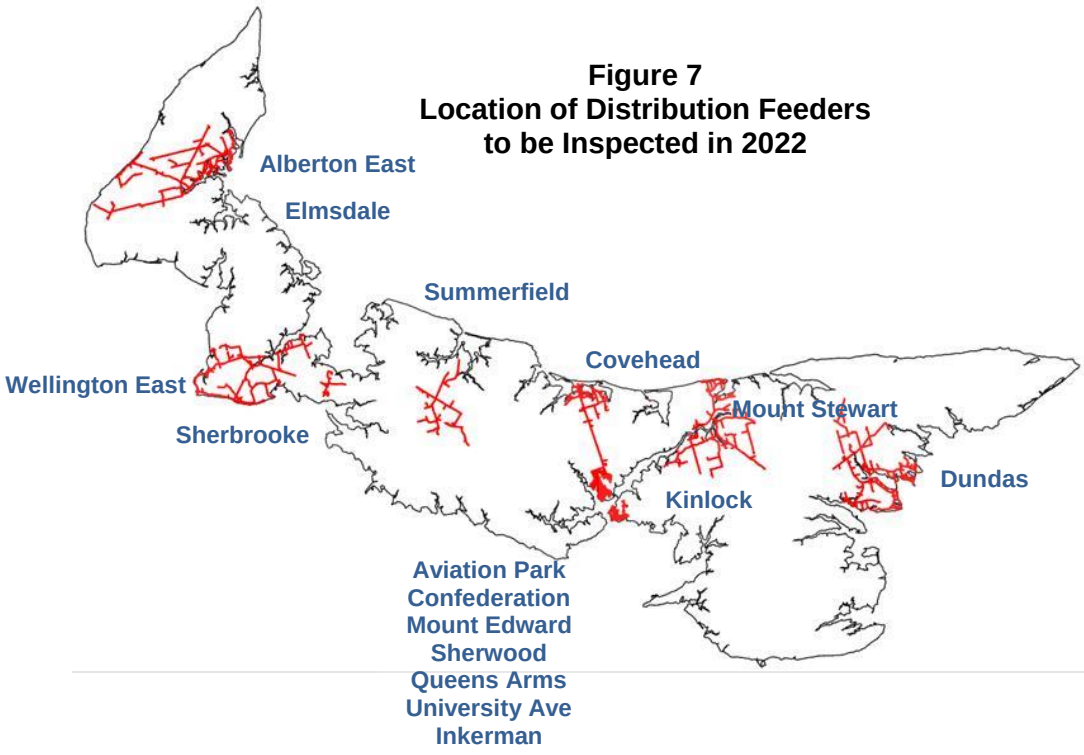
Description	2017[a]	2018	2019	2020	2021 Budget	2022 Budget
Material	$ 125,085	$ 70,620	$ 262,615	$ 115,947	$ 125,000	$ 128,000
Contractor Labour	130,999	226,230	240,802	127,162	42,000	167,000
Internal Labour and Transportation	167,677	300,525	435,511	499,475	608,000	499,000
Other	1,588	1,613	1,348	168	-	-
Less: Joint Use Charged to/ Owned by Third Party	(11,149)	-	(100,159)	-	-	-
TOTAL	**$ 414,200**	**$ 598,988**	**$ 840,117**	**$ 742,752**	**$ 775,000**	**$ 794,000**

a. Expenditures in 2017 were under a Pole for Pole Replacement Program that was in place prior to the Distribution Line Refurbishment Program, which was introduced in 2018.

The proposed budget allocation will allow for inspection of feeders identified in Table 40 and the prioritized replacement of deteriorated assets such as poles, crossarms, conductor and hardware. The locations of the feeders are provided in Figure 7.

Table 40 Distribution Feeders to be Inspected in 2022		
Feeders	**Kilometres**	**Number of Customers**
Aviation Park [AP52100]	-	3
Covehead [AP52200]	64	964
Confederation [CO07100]	14	2,059
Kinlock [CR44428]	39	2,155
Inkerman [IK03400]	25	2,007
Mount Edward [ME02622]	8	336
Queens Arms [QA02700]	27	3,342
Sherwood [SH03100]	11	947
University Ave. [UA03200]	6	336
Dundas [DM00550]	147	765
Mount Stewart [SF01190]	136	1,197
Alberton East [AL00200]	70	1,332
Elmsdale [OL03194]	85	746
Summerfield [RT01000]	57	441
Sherbrooke [SE23100]	17	634
Wellington East [WL02088]	122	1,448
TOTAL	**828**	**18,712**

Figure 7
Location of Distribution Feeders
to be Inspected in 2022



Future Commitments

Distribution inspection and refurbishment is structured on a six-year cycle pending approval annually through the Company's capital budget application. As such, this is not a multi-year capital budget commitment; however, it is a recurring capital program that is budgeted annually.

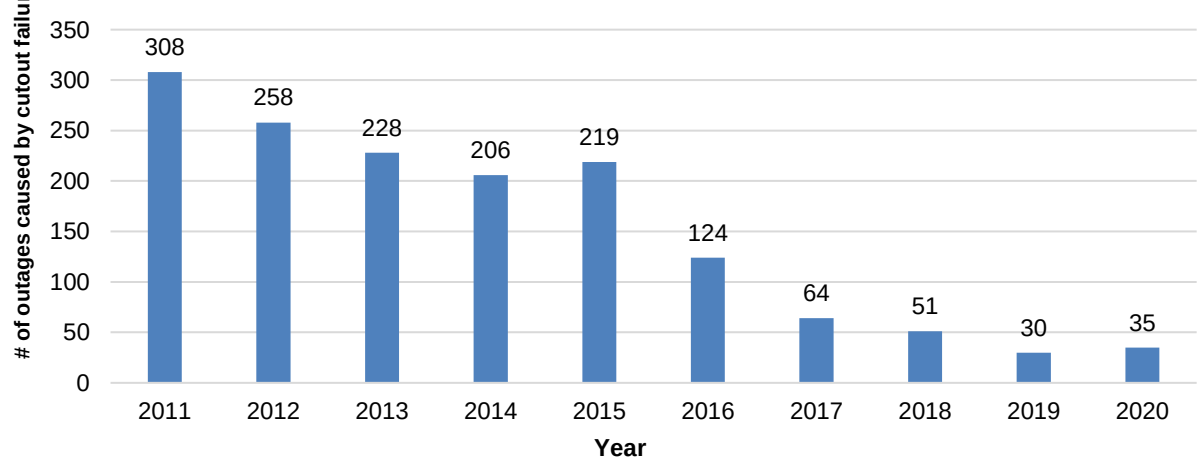
d. **<u>Accelerated Distribution Component Replacement</u> (Justifiable)$ 1,313,000**

This proposed budget allocation provides for the accelerated replacement of porcelain cutouts and eastern cedar poles. Rationale and justification for the program is provided below.

i. ***<u>Porcelain Cutout Replacement Program</u>*** ***$ 102,000***

The Porcelain Cutout Replacement Program began in 2008. Before the Program was implemented, the frequent failure of porcelain cutouts was negatively impacting system reliability and was a concern for employee safety. As a result of the Program, there has not been a safety incident reported due to a cutout failure in recent years. As well, there has been a significant reduction in outages attributed to cutout failures as a result of the Program as shown in Figure 8.

Figure 8
Annual Number of Outages
Caused by Cutout Failure



The reduction in the number of outages and safety incidents caused by cutout failures reflects the effectiveness of these types of replacement programs. In 2019, the Porcelain Cutout Replacement Program was scaled back from historical levels of approximately 2,500 porcelain cutout replacements per year to approximately 500 replacements per year, then to approximately 300 in 2020 and 150 in 2021. The replacement of approximately 150 cutouts in 2022 is proposed.

Justification

The Porcelain Cutout Replacement Program is justified on the obligation to maintain a safe and reliable electrical system and cannot be deferred.

Costing Methodology

A breakdown of the historical, 2021 budget and the proposed 2022 budget allocation for porcelain cutout replacement is shown in Table 41.

Table 41
Historical and Proposed Capital Expenditures
Porcelain Cutout Replacement Program

Description	2017	2018	2019	2020	2021 Budget	2022 Budget
Material	$ 338,473	$ 80,377	$ 94,646	$ 61,956	$ 30,000	$ 31,000
Contractor Labour	411,092	136,621	73,986	57,558	55,000	43,000
Internal Labour and Transportation	-	51,581	171,168	71,486	15,000	28,000
Other	3,992	491	227	-	-	-
Less: Joint Use Charged to/ Owned by Third Party	-	-	(54,052)	-	-	-
TOTAL	**$ 753,557**	**$ 269,070**	**$ 285,975**	**$ 191,000**	**$ 100,000**	**$ 102,000**

Future Commitments

This is not a multi-year capital budget commitment.

ii. Eastern Cedar Pole Replacement Program $ 1,211,000

The vast majority of eastern cedar poles in the Company's distribution system are a minimum of 40 years of age. In the past, these poles were being replaced through a combination of rebuild projects and storms at a combined rate of approximately 900 per year. At this rate of replacement, it was estimated in 2018 that it would take up to 20 years to replace the 16,000 eastern cedar poles remaining in the system.

With the addition of the Eastern Cedar Pole Replacement Program in 2019, the target replacement rate was increased to approximately 1,500 poles per year. This improved the timeframe for substantial removal of all eastern cedar distribution poles to approximately ten years.

Justification

The Eastern Cedar Pole Replacement Program is justified on the obligation to maintain a safe and reliable electrical system and cannot be deferred.

Costing Methodology

A breakdown of the historical, 2021 budget and the proposed 2022 budget allocation for eastern cedar pole replacement is shown in Table 42.

Table 42
Historical and Proposed Capital Expenditures
Eastern Cedar Pole Replacement Program[a]

Description	2019	2020[b]	2021 Budget	2022 Budget
Materials	$ 194,264	$ 118,123	$ 205,000	$ 210,000
Contractor Labour	873,902	396,359	905,000	924,000
Internal Labour and Transportation	67,665	250,096	70,000	77,000
Other	88,890	1,444	-	-
Less: Joint Use Charged to/Owned by Third Party	(105,513)	-	-	-
TOTAL	**$ 1,119,208**	**$ 766,022**	**$ 1,180,000**	**$ 1,211,000**

a. 2019 was the first year of the Eastern Cedar Pole Replacement Program; therefore, there is no historical data prior to 2019.
b. In 2020, the program budget was decreased to reflect an expectation that the PEI Broadband Project would result in a significant number of eastern cedar pole replacements. This did not occur and targeted replacements under the program has returned to 2019 levels, for 2021 (and 2022).

Future Commitments

This is not a multi-year capital budget commitment.

5.6 System Meters — *$ 664,000*

This proposed budget allocation provides for the purchase and installation of revenue metering and associated equipment. The proposed expenditure is based on recent historical spending as outlined in Table 43.

Table 43
Historical and Proposed Capital Expenditures
System Meters

Description	2017[a]	2018[b]	2019	2020[c]	2021 Budget	2022 Budget
Material	$ 211,981	$ 256,493	$ 296,327	$ 323,690	$ 268,000	$ 304,000
External Labour	-	-	-	172,270	-	-
Internal Labour and Transportation	315,645	297,264	344,822	372,174	347,000	360,000
Other	258	340	4,218	20,060	5,000	-
TOTAL	**$ 527,884**	**$ 554,097**	**$ 645,367**	**$ 888,194**	**$ 620,000**	**$ 664,000**

a. Includes $86,000 in carryover costs for 2017 system meters work completed in 2018.
b. Includes $22,050 in carryover costs for 2018 system meters work completed in 2019.
c. The 2020 approved capital budget included $300,000 for an Advanced Metering Infrastructure ("AMI") project.

Justification

The proposed budget allocation for system meters is justified on the obligation to serve new and existing customers and cannot be deferred.

Costing Methodology

A breakdown of the proposed budget allocation for system meters is shown in Table 44.

Table 44 Breakdown of Proposed Budget Allocation System Meters			
Description	**Materials**	**Internal Labour and Transportation**	**Budget**
Watt Hour Meters	$ 162,770	$ 223,230	$ 386,000
Combination Meters	48,260	65,740	114,000
Outdoor Metering Tanks	55,970	71,030	127,000
Miscellaneous Metering Equipment	37,000	-	37,000
TOTAL	**$ 304,000**	**$ $360,000**	**$ 664,000**

Supporting information for the cost estimates is provided in Confidential Appendix S-6. To ensure this project is completed at the lowest possible cost, all materials will be obtained through competitive procurement processes.

The expected start date of this project is January 2022 with in-service dates throughout the year.

Alternatives

While a transition to advanced metering infrastructure ("AMI") technology is being considered, until AMI is approved and deployed the existing metering system and components must continue to be supported, to serve new and existing customers.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring capital requirement that is budgeted annually.

a. Watt-Hour Meters (Recurring) $ 386,000

The 2022 budget for radio frequency ("RF") remote interrogation watt-hour meters includes a provision for new service installations, an allowance for the replacement of damaged or failed units, and the replacement of RF watt-hour meters to permit annual sample testing of approximately 975 meters (which is required to ensure compliance with Industry Canada/Measurement Canada Standards).

Table 45 provides a forecast of watt-hour meter installs in 2022 based on the anticipated rate of customer growth, historical equipment damage and failure rates, and the requirement to conduct annual compliance testing.

The proposed budget allocation for watt-hour meters reflects an increase in meter purchases and internal labour and transportation costs over 2021. The increased need for single phase meters and associated installation labour is tied to an increased demand for net metering installations. There is also a high demand for five jaw meters in the watt-hour category. In larger apartment buildings, these meters are required to step down from three phase to single phase power. These meters carry a 100 per cent premium over regular watt-hour meters and are required in 50 per cent of the Company's installations.

Table 45
Forecast of Watt-Hour Meter Installs in 2022

Description	**Installs**
Single phase – customer growth, replacements and annual testing	1,700
Network and three phase meters	525
Total Watt-Hour Meters	**2,225**

The budget for watt-hour meters is based on vendor invoice information from previous years, provided in Confidential Appendix S-6.

b. Combination Meters (Recurring) $ 114,000

This proposed budget allocation provides for the purchase and installation of new combination meters that measure both demand and energy consumption. New combination meters are required to meet forecast customer growth levels and to replace existing meters due to damage, failure and customer service size upgrades.

In addition, the proposed budget allocation provides for in-situ meter installation tests (potential transformers and current transformers) to confirm accuracy. Measurement Canada recommends the testing of meter installations on an eight-year cycle.

The proposed budget allocation for combination meters reflects a decrease in internal labour and transportation costs as compared to 2021. This is a reallocation that is associated with more work in the watt-hour category.

Table 46 provides a forecast of new and replacement combination meters required in 2022.

Table 46
Forecast of New and Replacement Combination Meters Installs in 2022

Description	**Installs**
Customer growth	55
Replacements due to upgrades, damage and failure	40
Total Combination Meters	**95**

The proposed budget allocation for combination meters is based on vendor invoice information from previous years, provided in Confidential Appendix S-6.

c. Outdoor Metering Tanks (Recurring) $ 127,000

Outdoor metering tanks are used in the Company's substations and in specific customer applications where customers are metered at either transmission or primary voltage levels. The proposed budget allocation provides for the purchase of three outdoor metering tanks and is based on vendor invoice information from previous years, provided in Confidential Appendix S-6.

d. Miscellaneous Metering Equipment (Recurring) $ 37,000

This proposed budget allocation provides for the purchase of miscellaneous metering equipment such as potential transformers, current transformers, cabinets, security bands, sealing rings, locks, meter covers, load limiters, cable connectors, meter adapters, test blocks, phase indicators, neutral isolators, communication cables and media converters for interval meters, DC breakers and disconnect sleeves.

5.7 Distribution Equipment *$ 1,556,000*

The proposed budget allocation is necessary to replace distribution system equipment that has failed or is deemed unsafe due to storm damage, lightning strikes, vandalism, electrical or mechanical damage, corrosion damage, technical obsolescence or performance testing.

The budget also provides for the replacement of aged system equipment that is used to provide voltage support, communications, protection and control of the Company's assets, and the replacement of line tools and equipment as identified in Table 47.

System equipment that fails in-service requires immediate attention as it is essential to the integrity and reliability of the electricity supply system. Therefore, a recurring investment in distribution system equipment is essential to provide ongoing reliable service to customers.

Costing Methodology

In some cases, distribution equipment assets will only require refurbishment to extend their life while others will require a complete replacement. The proposed budget is estimated based on past experience, professional engineering judgement and historical expenditures. The Distribution Equipment budget for internal labour and transportation is lower for 2022 as compared to 2021, due to a reallocation of resources within the Engineering department.

Materials will be obtained through competitive procurement processes to ensure the best possible pricing is achieved. Supporting information for the proposed project costs is provided in Confidential Appendix S-7.

The expected start date for the project is January 2022 with in-service dates throughout the year.

Justification

The proposed budget allocation for distribution equipment is justified based on the need to maintain safe, reliable electrical service at the least cost and ensure that the electrical

system equipment operates as designed, to prevent catastrophic damage or injury to employees or the public. For the reasons provided, it cannot be deferred.

Future Commitment

This is not a multi-year capital budget commitment; however, it is a recurring capital requirement that is budgeted annually.

Table 47 Proposed Distribution Equipment Replacements 2022			
Distribution Equipment 2022	**Materials**	**Internal Labour and Transportation**	**Budget**
a. Substation, Line and Communication Equipment	**$ 858,000**	**$ 174,000**	**$ 1,032,000**
Electronic Reclosers[a]	150,000		
Recloser Controllers to replace obsolete FXB Controllers	20,000		
Voltage Regulator Controls Replacement	22,000		
Voltage Regulators[a]	180,000		
Capacitor Bank Controllers	11,000		
Capacitor Banks and Parts	25,000		
Voltage Regulator and Recloser Parts - Preventative Upgrades	11,000		
Power Transformer Parts (Pressure Relief Devices/Fall Arrest Mounts)	5,000		
Transformer Oil	30,000		
Transformer Oil Reconditioning	20,000		
69 kV and 138 kV Breaker Contacts - Preventative Upgrades	30,000		
Annual Dissolved Gas Analysis	25,000		
Tap Changer Contacts - Autotransformer Preventative Maintenance	30,000		
SCADA RTU Retro-fit Parts	15,000		
SCADA RTU Scout and Willowglen Replacement Program (2 year)[a]	135,000		
Fault Indicators	22,000		
Vehicle Antenna (Radio and RF Meters)	2,000		
Doble Power Factor Test Equipment	43,000		
Aging Battery Bank Replacement	22,000		
Substation Radio Equipment Replacement	30,000		
Communication Tower Equipment Replacement	30,000		
b. Relay Replacement	**$ 130,000**	**$ 28,000**	**$ 158,000**
Teleprotection/Relay Replacement Equipment[a]	130,000		
c. Distribution Switches	**$ 92,000**	**$ 21,000**	**$ 113,000**
Recloser By-Pass Switch[a]	21,000		
Distribution Switches[a]	55,000		
Voltage Regulator By-Pass Switch[a]	16,000		
d. Line Tools and Equipment	**$ 222,000**	**$ -**	**$ 222,000**
e. Meter Shop Equipment	**$ 31,000**	**$ -**	**$ 31,000**
TOTAL	**$ 1,333,000**	**$ 223,000**	**$ 1,556,000**

a. Supporting information is provided in Confidential Appendix S-7.

a. <u>Substation, Line and Communication Equipment</u> (Recurring) $ 1,032,000

The Company operates 31 substations and approximately 5,300 kilometres of main line distribution infrastructure with equipment such as reclosers, voltage regulators, capacitor banks, power transformers and circuit breakers. The need to replace equipment is determined on the basis of equipment condition, age, test results and operational history.

The proposed budget allocation is based on past experience, professional engineering judgement and historical expenditure. Materials will be obtained through competitive procurement processes to ensure the best possible pricing is achieved.

A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for substation, line and communication equipment is shown in Table 48.

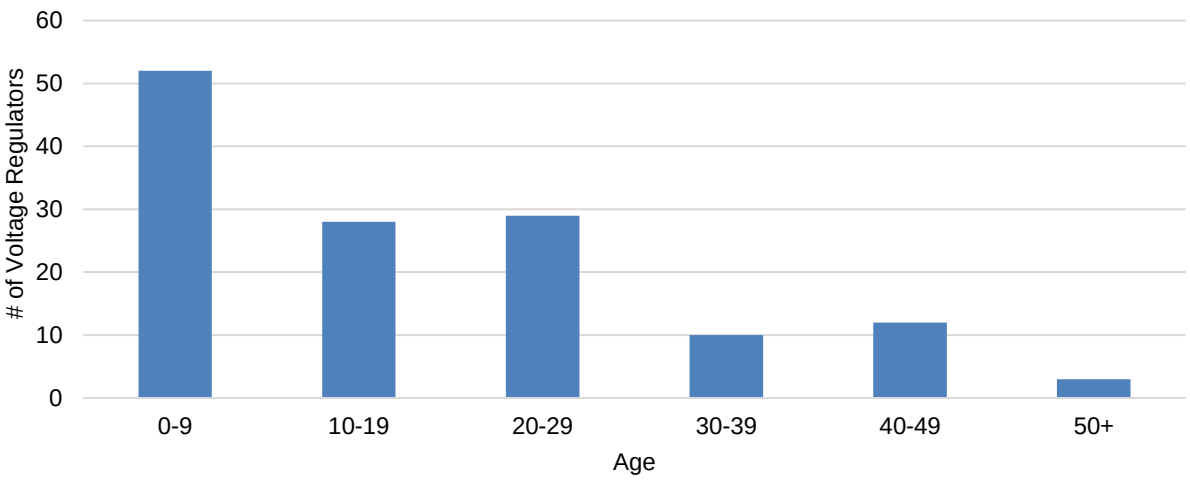
Table 48
Historical and Proposed Capital Expenditures
Substation, Line and Communication Equipment

	2017[a]	2018	2019[b]	2020[c]	2021 Budget	2022 Budget
Material	$ 726,254	$ 769,434	$1,057,740	$ 657,814	$ 809,000	$ 858,000
External Labour	13,270	22,244	418	21,472	-	-
Internal Labour and Transportation	276,558	372,718	351,886	244,864	386,000	174,000
Other	70,473	7,815	9,192	15,998	-	-
TOTAL	**$1,086,555**	**$1,172,211**	**$1,419,236**	**$ 940,148**	**$1,195,000**	**$1,032,000**

a. Includes $184,418 in carryover costs for 2017 distribution equipment delivered in 2018.
b. Includes $175,854 in carryover costs for 2019 distribution equipment delivered in 2020.
c. Includes $28,000 budgeted in carryover costs for 2020 distribution equipment to be delivered in 2021.

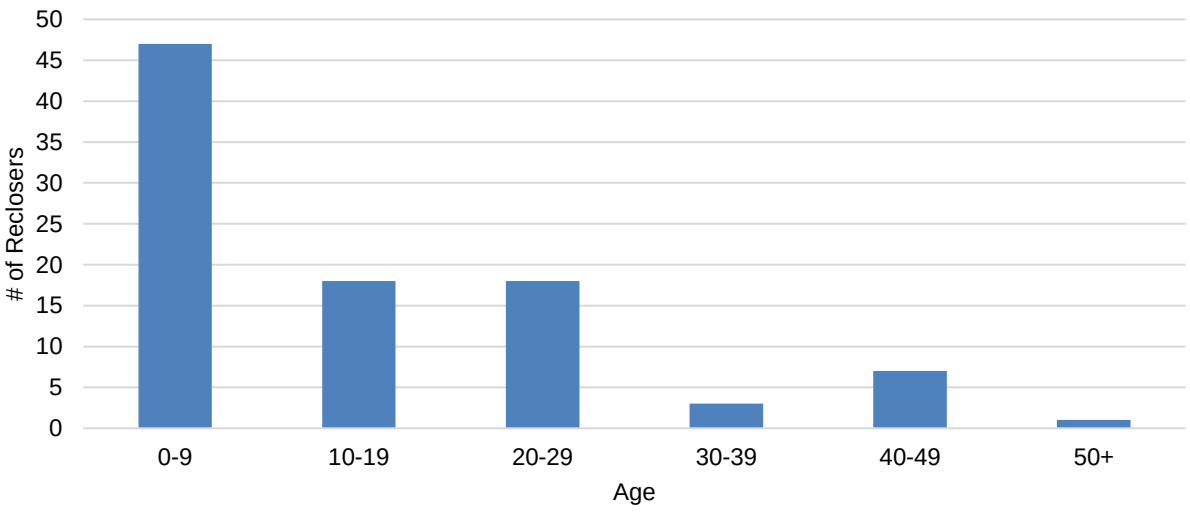
The average age of the voltage regulators in the system is approximately 18 years and approximately 11 per cent are over 40 years old and at the end of their useful life, as shown in Figure 9.

Figure 9
Voltage Regulators Installed in the System



The average age of the reclosers in the system is approximately 15 years and approximately 7 per cent are over 40 years old and at the end of their useful life, is shown in Figure 10.

Figure 10
Reclosers Installed in the System



The Company has 43 communication sites comprised of a 7 GHz microwave and fibre backbone system. The need to replace communication equipment is determined on the basis of equipment condition, age, test results and operational history.

b. Relay Replacement (Recurring) $ 158,000

New generation microprocessor-based relays offer a host of advantages compared to electromechanical relays because of enhanced capabilities and programming versatility. One microprocessor-based relay replaces several electromechanical relays resulting in cost and efficiency advantages. This proposed budget allocation is for the continued replacement and upgrade of relays in the West Royalty and Sherbrooke substations.

A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for relay equipment is shown in Table 49.

Table 49
Historical and Proposed Capital Expenditures
Relay Replacement

	2017	2018	2019	2020	2021 Budget	2022 Budget
Material	$ 146,144	$ 163,997	$ 185,014	$ 109,484	$ 130,000	$ 130,000
Internal Labour and Transportation	34,168	8,184	-	68,295	62,000	28,000
Other	71	167	-	-	-	-
TOTAL	**$ 180,383**	**$ 172,348**	**$ 185,014**	**$ 177,779**	**$ 192,000**	**$ 158,000**

c. Distribution Switches (Recurring) $ 113,000

The requirement to replace distribution switches is based on findings of an ongoing switch inspection program. The budget also includes a provision for replacing switches that are used for bypassing recloser and voltage regulators when performing equipment upgrades. The need to replace switch equipment is determined on the basis of equipment condition, age, and operational history. The proposed budget allocation is based on past experience, professional engineering judgement and historical expenditures.

A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for distribution switches is shown in Table 50.

Table 50
Historical and Proposed Capital Expenditures
Distribution Switches

	2017	2018	2019	2020	2021 Budget	2022 Budget
Material	$ 67,542	$ 60,882	$ 110,986	$ 145,867	$ 153,000	$ 92,000
External Labour	-	82,065	25,000	-	-	-
Internal Labour and Transportation	33,652	28,235	-	81,162	73,000	21,000
Other	67	8	-	-	-	-
TOTAL	**$ 101,261**	**$ 171,190**	**$ 135,986**	**$ 227,029**	**$ 226,000**	**$ 113,000**

d. Line Tools and Equipment (Recurring) $ 222,000

This proposed budget allocation is for the replacement of line equipment such as hotline sticks, phasing sticks, potential indicators, ground mats, hard and rubber cover-up, fall arrest equipment, survey equipment and material handling equipment such as presses and dies, running blocks and chain hoists.

A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for line tools and equipment is shown in Table 51.

Table 51
Historical and Proposed Capital Expenditures
Line Tools and Equipment

	2017	2018	2019	2020[a]	2021 Budget[b]	2022 Budget
Material	$ 66,933	$ 137,237	$ 136,528	$ 118,953	$ 391,000	$ 222,000
Other	93,536	34,305	125,489	55,521	-	-
TOTAL	**$ 160,469**	**$ 171,542**	**$ 262,017**	**$ 174,474**	**$ 391,000**	**$ 222,000**

a. Includes $33,000 budgeted in carryover costs for 2020 line tools and equipment to be delivered in 2021.
b. The 2021 budget for line tools and equipment included $180,000 (above the normal recurring budget allocation) for equipment to wash insulators impacted by salt contamination.

e. Meter Shop Equipment (Recurring) $ 31,000

This proposed budget allocation provides for the purchase of power quality test equipment, voltmeters and meter test equipment

A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for meter shop equipment is shown in Table 52.

Table 52
Historical and Proposed Capital Expenditures
Meter Shop Equipment

	2017	2018	2019	2020	2021 Budget	2022 Budget
Material	$ 23,043	$ 13,539	$ 29,660	$ 22,382	$ 31,000	$ 31,000
External Labour	-	6,494	-	-	-	-
TOTAL	**$ 23,043**	**$ 20,033**	**$ 29,660**	**$ 22,382**	**$ 31,000**	**$ 31,000**

5.8 Transportation Equipment (Work Support Services) *$ 2,040,000*

The Company's transportation fleet consists of large line vehicles with aerial and/or digger attachments, cars, small trucks, vans, pole and wire trailers and other related equipment. Large line vehicle replacements are planned based on the age and condition of the unit. The life span of these vehicles average from ten to twelve years with the aerial units lasting longer than the digger units. Small vehicle replacements depend on age, mileage and type of service; however, the life span is typically five to ten years. The 2022 Transportation Equipment justification report is included in Appendix L.

Maritime Electric upgraded its small vehicle fleet with a Chevrolet Bolt battery electric vehicle in 2020 and a Toyota RAV4 plug-in hybrid electric vehicle in 2021. The Company will continue transitioning to electric vehicles with individual vehicle decisions based on job functions, vehicle specifications, availability and price. The proposed replacement of an SUV in the Metering department (item 6 in Table 54) in 2022 will consider electric vehicle options. Also, with electric vehicles now in the Company fleet, charging stations are proposed (item 12 in Table 54) for key operations facilities in West Royalty, Borden-Carleton, Sherbrooke and Roseneath.

Justification

The timely replacement of aged and deteriorated transportation equipment is justified to protect the safety of employees and the general public as well as the obligation to provide reliable service to customers at least cost.

Costing Methodology

A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for transportation equipment is shown in Table 53. Long delivery times for larger vehicles[26], such as line trucks, is responsible for carryovers being required each year. This requirement is expected to continue in 2022.

Table 53
Historical and Proposed Capital Expenditures
Transportation Equipment

	2017[a]	2018[b]	2019[c]	2020[d]	2021 Budget	2022 Budget
Material	$ 969,221	$ 1,311,175	$ 1,537,603	$ 1,737,880	$ 1,783,000	$ 1,958,000
Internal Labour and Transportation	35,744	32,343	69,839	36,586	81,000	82,000
Other	3,586	4,257	1,887	6,041	-	-
TOTAL	**$ 1,008,551**	**$ 1,347,775**	**$ 1,609,329**	**$ 1,780,507**	**$ 1,864,000**	**$ 2,040,000**

a. Includes $129,305 in carryover costs for 2017 vehicles delivered in 2018.
b. Includes $608,068 in carryover costs for 2018 vehicles delivered in 2019.
c. Includes $566,257 in carryover costs for 2019 vehicles delivered in 2020.
d. Includes $1,000,000 budgeted in carryover costs for 2020 vehicles to be delivered in 2021.

The budget is based on a combination of engineering estimates and vendor invoice information from prior years for similar items. A breakdown of the proposed transportation equipment replacements and additions for 2022 is shown in Table 54.

[26] The delivery time for a line truck is typically 18 months, but this was increased to 24 months for some vehicles due to COVID-19 related production limitations.

Table 54 Proposed Transportation Equipment Replacements and Additions for 2022						
	Description	**Location**	**Age (Yrs)[a]**	**Current Mileage (km)**	**2018-2020 Annual Maintenance Cost (3 Year Average)**	**Budget**
1.	Aerial Bucket with Elevator	Central Line Dept.	10	185,950	$ 31,833	$ 685,000
2.	Digger/Derrick	Eastern Line Dept.	9	247,800	33,233	540,000
3.	CSUP	Central Line Dept.	5	256,500	36,171	275,000
4.	GMC Van	Tech Services	10	164,634	957	94,000
5.	Dodge 1500	T&D Operations	7	301,123	4,585	55,000
6.	Ford Escape	Meter Dept.	5	140,067	1,408	50,000
7.	1/2 ton Truck	Survey	8	154,770	7,837	55,000
8.	1/2 ton Truck	Western Line Dept.	8	245,743	5,117	55,000
9.	1/2 ton Truck[b]	CT Techs	N/A	N/A	N/A	55,000
10.	1/2 ton Truck	Engineering	8	170,122	4,267	55,000
11.	1-Pole Trailer	Line Dept.	N/A	N/A	N/A	31,000
12.	Four Level 2 EV Charging Stations	Company	N/A	N/A	N/A	15,000
13.	Allowance for unforeseen capital expenditures					75,000
TOTAL						**$ 2,040,000**

a. Age at time of replacement.
b. This is a new addition to the fleet (i.e., not a replacement).

Supporting information for transportation equipment cost estimates is provided in Confidential Appendix S-8.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring capital requirement that is budgeted annually.

6.0 TRANSMISSION *$ 8,889,000*

The Transmission category reflects the Company's proposed activities for the expansion and replacement of the 69 kV and 138 kV transmission system using the Company's ISP as a guideline. This includes transmission lines, substations, power transformers and protection devices such as circuit breakers.

6.1 Substation Projects *$ 6,122,000*

The proposed budget allocation for substation projects is shown in Table 55.

Table 55
Breakdown of Proposed Budget Allocation
Substation Projects

Description	Budget
a. East Royalty Substation	$ 1,226,000
b. Crossroads Substation Rebuild	2,620,000
c. West Royalty X5 Autotransformer Upgrade	363,000
d. Substation Oil Containment Program	147,000
e. Substation Modernization Program	588,000
f. 138 kV Breaker Replacement Program	146,000
g. Mobile Communications System Upgrade	467,000
h. Cavendish Feeder Automation	233,000
i. Rattenbury Small Scale Solar and Battery Storage Pilot	165,000
j. SCADA Master System Refresh	129,000
k. Fibre Modifications Due to Road Alterations	38,000
TOTAL	**$ 6,122,000**

a. East Royalty Substation (Justifiable) $ 1,226,000

This will be the second year of construction for the East Royalty Substation that was proposed and approved as a multi-year project in the 2021 Capital Budget Application.

The project work plan for 2021 includes purchasing the land, ordering the transformer, completing the design and site preparation work, erecting the structural steel components and constructing and winterizing the control building envelope.

The 2022 work plan includes completion of the control building interior, assembly of the control panels and substation commissioning.

An increase of $100,000 to the 2022 project budget is proposed to address an arc-flash hazard safety issue that was recently identified with 138 kV switches under certain operating scenarios. The concern is related to the safe operation of the switches that will be located on Y-104 where the line gets tapped to connect to the new substation. The original design has a circuit breaker on one side of the tap but not the other, leaving one side of the tap susceptible to an arc-flash hazard when the switch is opened. The solution is to have a circuit breaker on both sides of the tap and for this reason, an additional circuit breaker is required for the project. The cost of the additional circuit breaker is $100,000.

Justification

This project is justified based on the need to provide reliable service to the East Royalty/Suffolk/York/Bedford/Scotchfort areas and cannot be deferred. Also, as a multi-year project that was approved by the Commission as part of a previous Capital Budget, the work proposed for 2022 is required to complete the substation.

Costing Methodology

The estimated construction costs shown in Table 56 are based on construction costs for the Mount Albion Substation built in 2018 and Lorne Valley Substation built in 2019. A contingency has been budgeted as the project location is a green field site[27], some project component costs were estimated, and to allow for minor adjustments to the project scope of work.

[27] See Contingencies in Section 3.6d - Estimating Capital Costs.

Table 56 Breakdown of Multi-Year Budget East Royalty Substation			
Description	**2021**	**2022**	**Budget**
Civil Works	$ 361,000	$ -	$ 361,000
Foundations	218,000	-	218,000
Ground Grid and Fencing	105,000	-	105,000
Substation Equipment	777,000	100,000[a]	877,000
Control Building and Station Service Equipment	204,000	76,000	280,000
Transformer	223,000	777,000	1,000,000
Land Purchase and Survey	110,000	-	110,000
Protection and Control	60,000	69,000	129,000
Steel/Bus Works	455,000	-	455,000
Design	108,000	-	108,000
Internal Labour and Transportation	241,000	112,000	353,000
Contingency (3 per cent)	28,000	92,000	120,000
TOTAL	**$ 2,890,000**	**$ 1,226,000**	**$ 4,116,000**

a. This is a new project cost for 2022, to purchase an additional circuit breaker for the Y-104 tap point.

Supporting information for project cost estimates is provided in Confidential Appendix S-9.

The East Royalty Substation is interdependent on the Transmission Tap to East Royalty Substation project[28], also planned for 2022. The transmission tap project will connect the new substation to transmission line Y-104. The combined budget of these two interdependent projects is shown in Table 57.

Table 57 Combined Budget of Interdependent Projects			
Project	**2021**	**2022**	**Budget**
East Royalty Substation	$ 2,890,000	$ 1,226,000	$ 4,116,000
Transmission Tap to East Royalty Substation	-	287,000	287,000
TOTAL	**$ 2,890,000**	**$ 1,513,000**	**$ 4,403,000**

[28] See Appendix O for a description of the Transmission Tap to East Royalty Substation project.

Alternatives

Alternatives to the East Royalty Substation were provided in Appendix O of in the 2021 Capital Budget Application.

Future Commitments

This Project began in 2021 and will be completed in 2022.

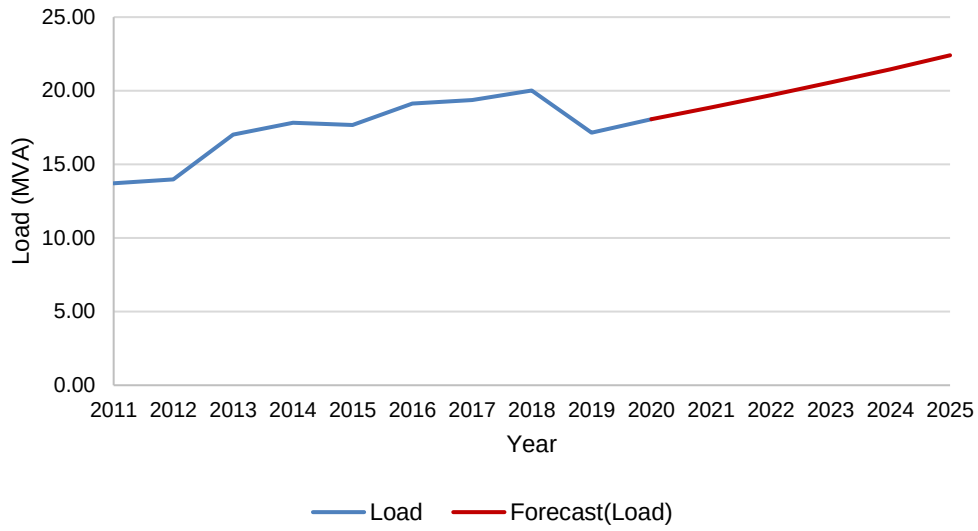
b. <u>Crossroads Substation Rebuild</u> (Justifiable) $ $2,620,000

The Crossroads Substation was built in 1978 at 110 Mason Road, Stratford and is approaching end of life. It is fed from 69 kV transmission line T-2 out of the Charlottetown Substation and the Lorne Valley Switching Station. The substation serves 5,916 customers (as of March 2021) in the Town of Stratford and nine neighbouring communities.

The substation has two 7.5/10 MVA substation transformers and four circuits feeding the Kinlock, Bunbury, Tea Hill/Pownal and Southport areas. The recent summer and winter peak load of 11.7 MVA and 18.1 MVA, respectively, is approaching susbstation capacity. The winter peak load in Stratford and surrounding area has grown by 14.4 per cent from 2016 to 2020[29]. The peak load on the Crossroads Substation for the period 2011 to 2020, and the peak load forecast for 2021 to 2025 is shown in Figure 11.

[29] The Town of Stratford is the third largest community on PEI, and has one of the fastest growing populations in the Maritimes. For this reason, load growth is expected to continue at a strong rate in the area currently served by the Crossroads Substation.

Figure 11
Crossroads Substation Peak Load



The preliminary design of the proposed Crossroads Substation Rebuild is based on feeding Crossroads Substation customers with one power transformer during construction. Because this is only possible during off-peak seasons, the rebuild will occur over two years to avoid winter load constraints. With construction scheduled over two years, one half of the substation can be de-energized and rebuilt in the first year, and the other half can be rebuilt de-energized in the second year. There is adequate land available to separate the construction activity from the energized side of the substation allowing for the work to be completed safety and efficiently. The first phase of construction is scheduled to begin in May 2022 and be completed in October 2022. The second phase of construction is scheduled to begin in early 2023 and be completed in the fourth quarter of 2023.

The rebuilt Crossroads Substation will consist of a standard 69 kilovolt ("kV") air insulated steel bus structure, 69 kV switches, two new 15/20 megavolt amp ("MVA") - 69 kV/12.47 kV substation power transformers (with on-load-tap-changer), two 12.47 kV transformer reclosers, a 12.47 kV air-insulated steel bus structure, 12.47 kV switches and four 12.47 kV feeder reclosers. The two new transformers in the Crossroads Substation will have capacity for future load growth. The plan for the two existing power transformers (#64 is 10 years old and

#66 is 14 years old) is to re-use them to replace older power transformers in the Souris and Kensington substations[30].

Justification

The project is justifed based on the need to rebuild the Crossroads Substation due to deteriorated infrastucture as detailed in Appendix M. In addition, the substation will be rebuilt with the capacity to serve the growing load in the Stratford area well into the future. For the reasons provided, the project cannot be deferred.

Costing Methodology

The estimated construction costs shown in Table 58 are based on previous substation projects including the Clyde River and East Royalty substations. A contingency has been budgeted as the rebuild will occur within an energized substation[31], some project cost components were estimated and to allow for minor adjustments to the project scope of work.

Table 58
Breakdown of Proposed Multi-Year Budget
Crossroads Substation Rebuild

Description	**2022**	**2023**	**Budget**
i. Civil Works, Foundations, Grounding and Fencing	$ 423,000	$ 435,000	$ 858,000
ii. Substation Equipment	220,000	227,000	447,000
iii. Protection and Control	90,000	91,500	181,500
iv. OT Cybersecurity	44,500	46,000	90,500
v. Structural Steel	147,000	151,000	298,000
vi. Bus Works	193,000	198,000	391,000
vii. Transformers	1,075,000	1,107,000	2,182,000
viii. Design	120,000	-	120,000
ix. Internal Labour and Transportation	152,000	153,000	305,000
x. Contingency (6 per cent)	155,500	117,500	273,000
TOTAL	**$ 2,620,000**	**$ 2,526,000**	**$ 5,146,000**

[30] One of the power transformers removed from the Crossroads Substation will replace two transformers in the Souris Substation (#23 which is 54 years old and #28 which is 50 years old). The other will replace one transformer in the Kensington Substation (#39 which is 44 years old).

[31] See Contingencies in Section 3.6d - Estimating Capital Costs.

Detailed support for project cost estimates is provided in Confidential Appendix S-10.

The Crossroads Substation Rebuild is interdependent on two other capital projects proposed for 2022. One is the Mount Herbert Three Phase Conversion project[32], and the other is the T-2 Modifications at Crossroads Substaton project[33]. The combined budget of these three interdependent projects is shown in Table 59.

Table 59
Combined Budget of Interdependent Projects

Project	2022	2022	Budget
Crossroads Substation Rebuild	$ 2,620,000	$ 2,526,000	$ 5,146,000
T-2 Modifications at Crossroads Substation	81,000	-	81,000
Mount Herbert Three Phase Conversion	615,000	-	615,000
TOTAL	**$ 3,316,000**	**$ 2,526,000**	**$ 5,842,000**

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all materials and contracted services will be obtained through a competitive tendering process.

The expected start date for the project is May 2022 with a completion date in the fourth quarter of 2023.

Alternatives

Two alternatives to rebuilding the substation in place were considered in the project planning stage. The first was to rebuild on a greenfield site nearby. This would allow the existing substation to remain fully operational through construction of the new substation. This option was not selected because the land around the existing substation is limited in availability and therefore very expensive. The second alternative was to rebuild on a green field site further away from the existing substation where land is more readily available and affordable. This option was not

[32] See Appendix H for a description of the Mount Herbert Three Phase Conversion project.
[33] See Appendix O for a description of the T-2 Modifications at Crossroads Substation project.

selected because significant transmission and distribution expansion would be required, making it a more expensive than the proposed rebuild-in-place option.

Future Commitments

This is a multi-year project that is proposed to be completed over two years in 2022 and 2023. If there are any changes to the evidence provided herein including changes in scope, budget and/or timelines over the course of year one, further evidence will be provided in the 2023 Capital Budget Application.

c. <u>West Royalty X5 Autotransformer Upgrade</u> (Justifiable) $ 363,000

Maritime Electric currently has six 50 MVA transformers in service with the capability to backup any of the six if required[34]. This backup is provided either through the operation of CT3 (for West Royalty transformer contingency) or converting Y-113 transmission line from 138 kV to 69 kV operation (for Borden and Sherbrooke transformer contingencies). The extent of backup capability will diminish over time as the system load continues to grow. In addition, it is cost prohibitive to operate CT3 for extended periods of time, to mitigate the loss of one of the three autotransformers in West Royalty. The 2020 ISP identified the need to replace the 50 MVA West Royalty X5 autotransformer with a 75 MVA 138/69 kV autotransformer in 2023, due to transformer condition and increasing load.

West Royalty X5 autotransformer has an on-load-tap-changer located within the main transformer tank. Tap changers located within the main transformer tank are difficult to maintain. A failure of this type of tap changer could leak into the main transformer tank, possibly impacting the transformer core and coils, and requiring repairs that could take 6 to 12 months. In addition, spare parts for these types of tap changers are increasingly difficult to source, as they are becoming obsolete.

The new autotransformer will need to be installed and commissioned before the existing 50 MVA X5 can be decommissioned. The autotransformer will be ordered

[34] Three 50 MVA transformers are located at West Royalty Substation, two are located at Sherbrooke Switching Station and one is located at the Borden Substation.

in 2022 and installed in 2023[35]. The new autotransformer will require a new concrete pad and a new connection to the West Royalty 69 kV bus. As part of the upgrade new 69 kV conductors and terminations and new protection and control equipment will also be required.

Justification

The project is justified based on the need to replace a critical aged asset that has reached end of life and cannot be operated to failure. For these reasons, it cannot be deferred.

Costing Methodology

The budget for this project is provided in Table 60. A contingency has been budgeted as some major cost components were estimated, and to allow for minor adjustments to the project scope of work.

Table 60
Breakdown of Proposed Multi-Year Budget
West Royalty X5 Autotransformer Upgrade

Description	2022	2023	Budget
i. Civil Works, Foundations, Grounding and Fencing	$ -	$ 170,000	$ 170,000
ii. Substation Equipment	-	423,000	423,000
iii. Protection and Control	-	80,000	80,000
iv. Structural Steel	-	128,000	128,000
v. Bus Works	-	50,000	50,000
vi. 69 kV Underground Cable and Trenching	-	200,000	200,000
vii. X5 Autotransformer	322,000	1,237,000	1,559,000
viii. Design	30,000	40,000	70,000
ix. Internal Labour and Transportation	11,000	166,000	177,000
x. Contingency (9 per cent)	-	248,000	248,000
TOTAL	**$ 363,000**	**$ 2,742,000**	**$ 3,105,000**

[35] Delivery time for the new autotransformer is estimated as approximately 12 to 15 months from date of order.

With the exception of the cable trenching[36], supporting information for the project cost estimates are provided in Confidential Appendix S-11.

The West Royalty X5 Transformer Upgrade is interdependent on the West Royalty Substation Transmission Modifications project[37], also planned for 2022. The transmission modifications project will allow the substation's 138 kV bus to be split in the future, which, with the new X5 autotransformer installed, will improve reliability. The combined budget of the two interdependent projects is shown in Table 61.

Table 61
Combined Budget of Interdependent Projects

Project	2022	2023	Budget
West Royalty X5 Autotransformer Upgrade	$ 363,000	$ 2,742,000	$ 3,105,000
West Royalty Substation Transmission Modifications	48,000	-	48,000
TOTAL	**$ 411,000**	**$ 2,742,000**	**$ 3,153,000**

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all material and contractor services will be obtained through a combination of competitive procurement processes and sole source purchases (e.g., where materials and services are best supplied by the original equipment manufacturer).

Alternatives

There are no alternative to replacing West Royalty X5 Autotransformer.

Future Commitments

This is a multi-year project that is proposed to be completed over two years in 2022 and 2023. If there are changes to the evidence provided herein including changes

[36] The proposed budget allocation of $200,000 for 69 kV underground cables and trenching is an estimate developed through discussions with a trenching system manufacturer. In 2022, once detailed design of the site modifications is completed, Maritime Electric will obtain a detailed quote for the cable trenching system, to be included in the 2023 Capital Budget Application.

[37] See Appendix O for a description of the West Royalty Substation Transmission Modifications project.

in scope, budget and timelines, over the course of year one, further evidence will be provided in the 2023 Capital Budget Application.

d. <u>Substation Oil Containment Program</u> (Justifiable) $ 147,000

Oil containment systems are now standard components of all new substations but this was not the case when the Company's older substations were built.

The risk of oil being released into the environment is reduced considerably with an oil containment system in place for each transformer in a substation. This program involves the installation of oil containment systems in older substations.

There are currently 37 transformers which require oil containment systems. Depending on location, in some circumstances, one system can serve multiple transformers. For that reason, there are 23 systems required. The program, which started in 2021, is anticipated to take approximately 15 years to complete. As systems are site specific, annual budgets may vary.

The proposed budget allocation is for the addition of oil containment systems for two transformers in the O'Leary Substation in 2022. The same oil containment system that has been installed in other substations over the past six years will be installed in O'Leary, as it is the most cost effective system in regards to installation and maintenance.

Justification

The proposed substation oil containment system project is justified based on the need to protect against transformer oil spills in substations, which can result in environmental damage, costly cleanups and long-term contamination liabilities. For these reasons, the project cannot be deferred.

Costing Methodology

The breakdown of estimated costs for the proposed substation oil containment project is shown in Table 62 and detailed support for the estimate is provided in Confidential Appendix S-12. A contingency has been budgeted as the vendor

quotation may need to be refreshed and to allow for minor adjustments in the scope of work that may be necessary to complete the project.

Table 62 Breakdown of Proposed Budget Allocation Substation Oil Containment Program	
Description	**Budget**
Material	$ 127,000
Internal Labour and Transportation	10,000
Contingency (7 per cent)	10,000
TOTAL	**$ 147,000**

To ensure that this project is completed at the lowest possible cost consistent with safe and reliable service, all materials and contracted services will be obtained through competitive procurement processes.

The expected start date for the project is January 2022 with a planned commissioning date in the fourth quarter of 2022.

Alternatives

There is no alternative for substation oil containment.

Future Commitments

This is not a multi-year capital budget commitment; however, it will be a recurring capital requirement that is budgeted annually until all substations have oil containment systems in place.

e. Substation Modernization Program (Justifiable) $ 588,000

This program, which started in 2019, is necessary for the planned replacement and modernization of deteriorated and substandard substation infrastructure, and the installation of security cameras, protective relaying, additional grounding, backup generators and fencing upgrades. Infrastructure replacement requirements are identified through inspections, engineering assessments and operating experience.

Justification

The proposed substation modernization work is justified based on the obligation to ensure employee and public safety, reliability and outage response times for existing substations. For these reasons, the proposed work cannot be deferred.

Costing Methodology

The breakdown of estimated costs for the proposed Substation Modernization Program is provided in Table 63.

Table 63
Breakdown of Proposed Budget Allocation
Substation Modernization Program

Description	Materials	Internal Labour and Transportation	Budget
i. Ground Grid Modernization	$ 60,000	$ 5,000	$ 65,000
ii. Substation Security Camera Installation	55,000	4,000	59,000
iii. Fence Upgrades	26,000	2,000	28,000
iv. Substation and Distribution Automation	163,000	12,000	175,000
v. Substation Backup Generator Program	76,000	6,000	82,000
vi. Mobile Transformer Accommodation	99,000	8,000	107,000
vii. Transformer Reclosers	67,000	5,000	72,000
TOTAL	**$ 546,000**	**$ 42,000**	**$ 588,000**

To ensure this program is completed at the lowest possible cost consistent with safe and reliable service, all materials and contracted services will be obtained through a competitive tendering process.

A description of each of the items in Table 63 is provided below and a detailed breakdown of the budget allocation proposed for each item (with the exception of item iii, which has a provisional budget allocation) is provided in Confidential Appendix S-12.

i. Ground Grid Modernization

To deter copper theft, the Company is proposing to replace all exposed copper grounding leads in existing substations with theft-deterrent Erico

cable. Erico cable consists of outer galvanized steel strands, with inner tinned copper strands. The cable provides the functionality of copper conductor, but appears to be a non-copper conductor and is difficult to cut with hand tools. This program requires a study and design plan for each substation by a consultant, which is then followed up by the actual replacement or repairs of the grounding system for each station. The 2022 budget includes the replacement of the copper grounding with Erico cable in the Bedeque Substation and the Sherbrooke Switching Station (the study and design plans for those stations were budgeted for 2021). A breakdown of the budget is provided in Confidential Appendix S-12.

ii. Substation Security Camera Installation

Security cameras are now standard components of all new substations. The addition of security cameras to existing substations is an additional measure to secure older substations and deter copper theft. The addition of security cameras to the O'Leary Substation is proposed for 2022. A breakdown of the budget is provided in Confidential Appendix S-12.

iii. Fence Upgrades

Substation fence upgrades are regularly required to improve the safety and security of existing substations. The proposed budget allocation is provisional based on past experience, professional engineering judgement and historical expenditure.

iv. Substation and Distribution System Automation

This program involves installing new reclosers with associated communication in areas identified with poor reliability to allow for automated switching during outages. These areas were identified in Section 3.5 - System Reliability Performance and Improvement. For 2022, recloser upgrades are proposed for the Tignish, Bedeque and Irishtown areas. A breakdown of the budget is provided in Confidential Appendix S-12. Each of these areas has a feeder with outage hours higher than the

Company average, as listed and discussed in Sections 3.5d and 3.5e of this Application.

v. Substation Backup Generator Program

A Substation Backup Generator Program was started in 2020 to install new (or replace aging) backup generators at critical substations. These generators are important to a substation's reliability as they supply the required power to charge the station batteries and keep systems online in the event of a power outage. The proposed budget allocation will enable the Company to install a backup generator at the O'Leary Substation in 2022. Additional costs for transfer switches, disconnects and civil work are also included in the project cost estimate. A breakdown of the budget is provided in Confidential Appendix S-12.

vi. Mobile Transformer Accommodation

The Company has two 10 MVA mobile transformers, one with a high voltage rating of 69 kV and the other with a dual 138/69 kV high voltage rating. The mobile bays in older substations require expansion to be able to accommodate the larger dual voltage mobile transformer. The proposed budget allocation will allow the Company to upgrade the mobile transformer bay at the O'Leary Substation in 2022. The project will be completed in conjunction with the proposed oil containment system installation (see Section 6.1d). Substation changes to accommodate the larger mobile transformer include modifications to the high voltage bus structures, the addition of a 69 kV switch, civil works and fence upgrades. A breakdown of the budget is provided in Confidential Appendix S-12.

vii. Transformer Recloser

Distribution substations typically have one or two power transformers and the current design for new substations is to have a recloser on the secondary side of each transformer. This provides for a better protection scheme and also allows for ease of isolation when performing maintenance. The proposed 2022 budget allocation will allow the Company

to install two new reclosers in the O'Leary Substation. A breakdown of the budget is provided in Confidential Appendix S-12.

The expected start date for the Substation Modernization Program is January 2022 with in-service dates throughout the year.

Future Commitments

This is not a multi-year capital budget commitment; however, it will be a recurring capital requirement that is budgeted annually until all substations meet the current standards.

f. <u>138 kV Breaker Replacement Program</u> (Justifiable) $ 146,000

There are seven breakers in the Bedeque Substation, three of which are over 40 years old. The proposed budget allocation is for the replacement of the 138 kV breaker at the Bedeque Substation that serves Y-111 which was installed in 1977. The requirement for this breaker replacement is based on test results, age and the severity of the resulting system impact in the event of failure. The Company continuously monitors the condition of breakers to assess the need for life extension or replacement. Due to age, condition, availability of parts and vendor support availability for the breaker, replacement of the breaker is necessary.

Justification

The proposed 138 kV breaker replacement project is justified based on the need to replace aged equipment at the end of its useful life and cannot be deferred.

Costing Methodology

The breakdown of estimated costs for the proposed 138 kV breaker replacement project is shown in Table 64 and detailed support for the estimate is provided in Confidential Appendix S-12.

Table 64 Breakdown of Proposed Budget Allocation 138 kV Breaker Replacement Program	
Description	**Budget**
138 kV Breaker	$ 102,000
Steel Base	4,000
Relay Panel Replacement	10,000
Control Wire and Supplies	20,000
Internal Labour and Transportation	10,000
TOTAL	**$ 146,000**

Future Commitments

This is not a multi-year capital budget commitment; however, it is a regularly occurring capital requirement that is budgeted annually, as required.

g. Mobile Communications System Upgrade (Justifiable) $ 467,000

This will be the second year of the mobile communications upgrade project that was proposed and approved as a multi-year project in the 2021 Capital Budget Application.

The project work plan for 2022 includes completing the purchase and installation of system components.

Justification

The mobile communications system upgrade project is justified based on the need to provide a safe and reliable electrical service for customers, and a safe and functional workplace for employees by ensuring the necessary communications between dispatchers and field personnel is maintained. Also, as a multi-year project that was approved by the Commission as part of a previous Capital Budget, the work proposed for 2022 is required to complete the upgrade. For the reasons provided, the project is necessary and cannot be deferred.

Costing Methodology

A breakdown of the annual and total estimated project cost is provided in Table 65. The estimate is based on a price quotation from a local communications service provider. A contingency has been budgeted to allow for changes in supplier pricing over the project, the possibility of tower modifications being required and to accommodate minor adjustments to the project scope of work.

Table 65
Breakdown of Multi-Year Budget
Mobile Communications System Upgrade

Description	2021	2022	Budget
Mobile Radio Network – Repeater Sites	$ 260,000	$ 325,000	$ 585,000
Subscribers – Mobile Radios	25,000	55,000	80,000
Subscribers – Portable Radios	10,000	26,000	36,000
Console System	90,000	-	90,000
Internal Labour and Transportation[a]	37,000	33,000	70,000
Contingency/Other Materials	23,000	28,000[b]	51,000
TOTAL	**$ 445,000**	**$ 467,000**	**$ 912,000**

a. Internal Labour and Transportation was included in Contingency/Other Materials in the 2021 Capital Budget.
b. The project contingency is approximately 6 per cent.

Supporting information for project cost estimates is provided in Confidential Appendix S-13.

The capital project started in March 2021 and completion is expected in 2022.

Future Commitments

There are no future capital cost commitments associated with this project upon its completion in 2022.

h. Cavendish Feeder Automation (Justifiable) $ 233,000

Cavendish is also an area with a feeder that has outage hours higher than the Company average, as listed and discussed in Sections 3.5d and 3.5e of this Application. The Cavendish area includes customers in the Stanley Bridge, Bayview, Cavendish and North Rustico areas. During the peak summer season, from late June to early September, the electrical peak in the Cavendish area is

approximately 3.8 MVA. Some of the larger customers in the area include campgrounds[38], amusement parks, and the Cavendish Beach Music Festival concert site.

In order to address the unique challenges in serving the area due to a large load influx in the summer months, the proposed project will install a feeder automation system in this area. The automation system will include the integration of reclosers, voltage regulators and capacitor banks. These devices will be remotely controlled by the ECC through a communication system[39]. During certain outage events, the automation system will improve the reliability by allowing the ECC to remotely isolate the faulted area and restore power to some customers in a matter of minutes. Otherwise, if a line crew was required to isolate the faulted area, it could be an hour or more to restore power to those same customers.

Local communities in the area have raised concerns of power quality issues affecting critical infrastructure. The automation system will help Maritime Electric better monitor power quality in the area by enabling the ECC to monitor the voltage supply and neutral current in real time. The availability of real time data will also reduce troubleshooting time for the Company if future power quality issues arise.

Justification

This project is justified on the obligation to provide safe and reliable service to customers in the Cavendish area throughout the year. It will also provide the Company with the opportunity to explore the effectiveness of point to multipoint radio communication versus cellular communication for feeder automation.

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38 A campground is counted as a single customer; however, it could have hundreds of camp sites serviced with electricity.

39 The Company believes the radio system or equivalent for the project is more cost-effective than the fibre system due to the unique nature of loads; however, the engineering design will also explore the possible use of cellular based communications.

Costing Methodology

The breakdown estimated costs for the proposed Cavendish feeder automation project is shown in Table 66 and detailed support for the estimate is provided in Confidential Appendix S-12.

Table 66
Breakdown of Proposed Budget Allocation
Cavendish Feeder Automation

Description	Budget
Reclosers	$ 81,000
900 MHz Radios	59,000
Radio Antennas and Related Supplies	20,000
Controllers	55,000
Other Miscellaneous Material	2,000
Internal Labour and Transportation	16,000
TOTAL	**$ 233,000**

To ensure that the project is completed at the lowest possible cost, consistent with safe and reliable service, all materials will be obtained through competitive procurement processes.

Future Commitments

This is not a multi-year capital budget commitment.

i. Rattenbury Small Scale Solar and Battery Storage Pilot

(Justifiable) $ 165,000

A pilot project is proposed to install small scale solar panels with a battery storage system at the Rattenbury Substation. The purpose of this project is to evaluate the benefits of integrating solar panels with battery storage, providing insights on their use for energy management and backup during power outages.

Maritime Electric is experiencing a significant increase in customers installing residential solar power as a result of government incentives. It is important for Maritime Electric to gain practical hands on experience with small scale solar and battery storage. These small solar systems are now the primary choice of

customers for net metering installations. Given that solar power is an intermittent source of energy, the proposed installation will also provide Maritime Electric with insight into the benefits and limitations (specific to PEI) of solar panels coupled with battery storage during power outages.

Rattenbury Substation was constructed based on previous standards and currently operates without a backup generator or battery storage. This pilot will provide an upgrade to the existing service reliability, enabling the ECC to control station equipment during transmission outages.

Justification

The project is justified on the basis of gaining insights into small scale solar, integrated with battery storage. The project will also provide backup station service to the Rattenbury Substation and depending upon how it performs, solar/battery hybrid systems could be an effective and sustainable alternative the Company's current standard practice of installing propane-fired backup generation at remote facilities.

Costing Methodology

The proposed budget allocation shown in Table 67 is based on a combination of engineering estimates for internal labour and a vendor quotation. A contingency has been budgeted as this is a one-of project[40], the vendor quotation may need to be refreshed, some project component costs were estimated, and to allow for minor adjustments in the scope of work that may be necessary to complete the project.

[40] See Contingencies in Section 3.6d - Estimating Capital Costs.

Table 67 Breakdown of Proposed Budget Allocation Rattenbury Small Scale Solar and Battery Storage Pilot	
Description	**Budget**
Materials and External Labour	$ 128,000
Internal Labour and Transportation	16,000
Contingency (13 per cent)	21,000
TOTAL	**$ 165,000**

Additional support for the cost estimates included in Table 67 is provided in Confidential Appendix S-12.

To ensure this project is completed at the lowest possible cost consistent with safe and reliable service, all material and external labour will be obtained through competitive tendering.

The expected start date for this project is May 2022 and the expected in-service date is October 2022.

Alternatives

The alternative is to install a propane-fired backup generator at this site. This is not recommended as the pilot solar/battery installation will provide an opportunity to develop a practical understanding of how the equipment interacts with the Company's supply system and may provide a more sustainable solution for backup power at other substation locations.

Future Commitments

This is not a multi-year capital budget commitment.

j. SCADA Master System Refresh (Justifiable) $ 129,000

Maritime Electric's Supervisory Control and Data Acquisition ("SCADA") master system is used to monitor and control the Company's electrical grid, including transmission, distribution, and generation systems.

Maritime Electric's existing SCADA master system was purchased in 2016 and commissioned in 2017. The system's hardware support contract expired in 2019 and the system's operating system end of support is set for 2023, which will present a significant cybersecurity risk if the system is not upgraded prior to the expiry of support for the operating system.

Justification

This project is required to provide safe, reliable power and cannot be deferred.

Costing Methodology

The breakdown of estimated costs for the proposed SCADA Master System Refresh project is shown in Table 68 and detailed support for the project estimate is provided in Confidential Appendix S-12.

Table 68
Breakdown of Proposed Budget Allocation
SCADA Master System Refresh

Description	Budget
SCADA Master	$ 120,000
Internal Labour and Transportation	9,000
TOTAL	**$ 129,000**

To ensure that the project is completed at the lowest possible cost consistent with safe and reliable service, all materials and vendor services will be obtained through competitive procurement processes.

Future Commitments

This is not a multi-year capital budget commitment.

k. <u>Fibre Modifications Due to Road Alterations</u> (Recurring) $ 38,000

Each year the Company relocates or replaces electricity supply system components to accommodate provincial and municipal government infrastructure projects, such as sidewalk installations, sewer and water line extensions, road widening, road construction and bridge replacements. The proposed budget allocation is a provisional amount reflecting a slight increase over the 2021 budget

allocation and will be adjusted annually, based on experience, in future capital budget applications.

Justification

As communication fibre is increasingly utilized within the electricity supply system, the need to modify its location and configuration will also increase in frequency. The proposed provisional budget allocation for fibre modifications due to road alterations is justified based on the obligation to provide safe and reliable service to customers and cannot be deferred.

Costing Methodology

A breakdown of the proposed provisional budget allocation for fibre modifications due to road alterations work is shown in Table 69.

Table 69
Breakdown of Proposed Budget Allocation
Fibre Modifications Due to Road Alterations

Description	Budget
Material	$ 35,000
Internal Labour and Transportation	3,000
TOTAL	**$ 38,000**

To ensure that all fibre modifications due to road alteration work is completed at the lowest possible costs. All materials will be obtained through competitive procurement processes.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring provisional capital requirement that is budgeted annually.

6.2 Transmission Projects — *$ 2,767,000*

The capital work proposed in the Transmission Projects category addresses the timely replacement of aged infrastructure, improves reliability and voltage levels, reduces electrical losses and improves safety for workers by upgrading the system to meet current construction standards. The Company's asset database, field inspection results and

reliability data serve as the primary tools for identifying necessary transmission system upgrade activities.

The proposed budget allocation for Transmission Projects provided in Table 70 was established based on historical expenditures and project cost estimates.

Table 70
Historical and Proposed Capital Expenditures
Transmission Projects

Description	2017	2018[a]	2019	2020[b]	2021 Budget	2022 Budget
Material	$ 956,473	$ 1,356,116	$ 479,651	$ 1,017,303	$ 2,100,000	$ 620,000
Contractor Labour	1,346,672	1,351,636	691,280	990,064	1,710,000	815,000
Internal Labour and Transportation	1,214,928	695,613	1,032,254	1,205,653	1,675,000	1,332,000
Other	96,974	75,833	85,441	41,770	-	-
TOTAL	**$ 3,615,047**	**$ 3,479,198**	**$ 2,288,626**	**$ 3,254,790**	**$ 5,485,000**	**$ 2,767,000**

a. Includes $185,744 in carryover costs for a 2018 project that was completed in 2019.
b. Includes $460,000 budgeted for carryover costs to complete 2020 projects in 2021.

a. 69 kV and 138 kV Switch Program (Justifiable) $ 590,000

This is a program to upgrade and extend the life of selected 69 kV and 138 kV line switches to improve the reliability and safe operation of this equipment. The Company has an Air Switch Inspection Program and a Transmission Line Refurbishment Program that provides for annual inspection of switches and transmission lines. Based on previous inspections, the Company identified a requirement to replace four existing 69 kV switches:

- SW386 at Kensington Substation (Transmission line T-1);
- SW206 on Transmission line T-2;
- SW212 at Charlottetown Plant Substation; and
- SW213 at Charlottetown Plant Substation.

The Company also intends to purchase two 69 kV and two 138 kV spare motorized transmission air switches and accessories to have available for emergency backup replacements. Transmission air switches have long delivery lead times so having replacements available allows for faster restoration time whenever these switches fail.

Justification

The 69 kV and 138 kV Switch Program is justified on the obligation to maintain a safe and reliable electrical system and it cannot be deferred.

Costing Methodology

The proposed budget allocation for the 69 kV and 138 kV Switch Program is based on recent historical spending as shown in Table 71 and project cost estimates.

Table 71
Historical and Proposed Capital Expenditures
69kV and 138 kV Switch Program

Description	2017	2018	2019	2020	2021 Budget	2022 Budget
Material	$ 117,700	$ 191,063	$ 20,640	$ 288,649	$ 150,000	$ 156,000
Contractor Labour	61,259	23,000	6,500	18,794	-	-
Internal Labour and Transportation	272,134	208,032	378,746	259,036	425,000	434,000
Other	700	-	35,781	-	-	-
TOTAL	**$ 451,793**	**$ 422,095**	**$ 441,667**	**$ 566,479**	**$ 575,000**	**$ 590,000**

To ensure that the program is completed at the lowest possible costs, all materials will be obtained through competitive procurement processes.

The expected start date for work under the program is January 2022 and work will progress throughout the year.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring capital requirement that is budgeted annually.

b. <u>Transmission Line Refurbishment</u> (Justifiable) $ 932,000

The 69 kV and 138 kV transmission lines are critical elements of Maritime Electric's electricity supply system.

The proposed budget amount provides for the inspection and life extension activities of the transmission system, which will also support system reliability. Completion of ground inspection and emergency and priority deficiencies on the following 69 kV (T-line) and 138 kV (Y-line) transmission lines are planned for 2022:

- T-3 between Borden and Albany substations;
- T-5 between Sherbrooke and Wellington substations;
- T-8 between Lorne Valley and Dingwells Mills substations;
- T-21 between Alberton and O'Leary substations;
- Y-105 between Bedeque and Sherbrooke substations;
- Y-107 and Y-113 between Bedeque and Borden substations; and
- Y-109 and Y-111 between Bedeque and West Royalty substations.

Photographs of deficiencies recently identified through the program are shown in Appendix N.

Justification

The timely refurbishment of deteriorated transmission structures and equipment is justified on the obligation to maintain a safe and reliable electrical system and cannot be deferred.

Costing Methodology

The proposed budget allocation is based on recent historical spending as shown in Table 72 and project cost estimates.

Table 72 Historical and Proposed Capital Expenditures Transmission Line Refurbishment						
Description	**2017**	**2018**	**2019**	**2020**	**2021 Budget**	**2022 Budget**
Material	$ 95,769	$ 176,348	$ 115,667	$ 136,263	$ 150,000	$ 155,000
Contractor Labour	101,600	393,244	306,760	224,425	110,000	113,000
Internal Labour and Transportation	764,996	153,197	370,625	601,101	650,000	664,000
Other	24,865	6,062	7,492	8,272	-	-
TOTAL	**$ 987,230**	**$ 728,851**	**$ 800,544**	**$ 970,061**	**$ 910,000**	**$ 932,000**

To ensure that the program is completed at the lowest possible cost, all materials and contracted services will be obtained through competitive procurement processes or negotiated agreements.

The expected start date for the program is January 2022 and work will progress throughout the year.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring capital requirement that is budgeted annually.

c. Transmission Lines (Justifiable) $ 1,245,000

The projects proposed in the Transmission Lines category enable the Company to address the timely replacement of aged infrastructure, connect to new or upgraded substations and equipment, improve reliability, reduce electrical losses and improve safety for workers by upgrading the system to meet current standards.

The following transmission line projects are planned for 2022:

i. T-11 Rebuild[41];
ii. Transmission Tap to East Royalty Substation;
iii. Crossroads Substation Transmission Modifications; and
iv. West Royalty Substation Transmission Modifications.

Three of the transmission line projects are interdependent on other capital projects proposed for 2022. The Transmission Tap to East Royalty Substation will connect transmission line Y-104 to the new substation in East Royalty[42], the Crossroads Substation Transmission Modifications project will accommodate the rebuild of the Crossroads Substation[43], allowing it to be rebuilt in its existing location, and the West Royalty Substation Transmission Modifications project will allow the substation's 138 kV bus to be split in the future. With the new X5 autotransformer installed[44], splitting the bus will improve reliability.

Additional details and justifications for all four proposed transmission line projects are provided in Appendix O.

Costing Methodology

A breakdown of the historical, 2021 budget and the proposed 2022 budget allocation for rebuilding and modifying transmission lines is shown in Table 73.

41 The rebuild of T-11 was originally planned for 2024 but upon a recent inspection, the crossarms were found to be severely deteriorated, requiring the rebuild to be carried out as soon as possible.
42 See Section 6.1a for a description of the East Royalty Substation project.
43 See Section 6.1b for a description of the Crossroads Substation Rebuild project.
44 See Section 6.1c for a description of the West Royalty X5 Autotransformer Upgrade project.

Table 73 Historical and Proposed Capital Expenditures Transmission Lines						
Description	**2017**	**2018[a]**	**2019**	**2020[b]**	**2021 Budget**	**2022 Budget**
Material	$ 743,004	$ 988,705	$ 343,344	$ 592,391	$ 1,800,000	$ 309,000
Contractor Labour	1,183,813	935,392	378,020	746,844	1,600,000	702,000
Internal Labour and Transportation	177,798	334,384	282,883	345,516	600,000	234,000
Other	71,409	69,771	42,168	33,498	-	-
TOTAL	**$ 2,176,024**	**$ 2,328,252**	**$ 1,046,415**	**$ 1,718,249**	**$ 4,000,000**	**$ 1,245,000**

a. Includes $185,744 in carryover costs for a 2018 project that was completed in 2019.
b. Includes $460,000 budgeted for carryover costs to complete 2020 projects in 2021.

To ensure that the projects are completed at the lowest possible cost, all materials and contracted services will be obtained through competitive procurement processes or negotiated agreements.

Future Commitments

None of the proposed transmission line projects are multi-year capital budget commitments.

7.0 CORPORATE $ 4,035,000

7.1 Corporate Services $ 656,000

a. Recurring Annual Capital Requirements

(Work Support Services) $ 441,000

As facilities age and deteriorate, annual upgrades and replacements will be required for various components of Company facilities. Experience indicates that unplanned and emergency events will occur that require capital replacements and refurbishments. Performing upgrades and refurbishments to ensure properties remain in adequate condition prior to complete failure is required to ensure the safety of employees, customers, contractors and to avoid costly emergency repairs or replacements.

Capital expenditures on facilities historically have been made as required to cover items including:

- Window and door replacements;
- Garage doors;
- Roofing and siding;
- Paving for facility entrances and parking lots;
- Office furniture and equipment; and
- Unforeseen capital expenditures.

As the projects under this budget category are unplanned and identified on an as required basis, cost projections at the item level cannot be determined in advance and therefore, the proposed budget allocation is provisional.

Justification

This proposed provisional budget allocation is justified on the obligation to provide safe and functional facilities for employees, contractors and the general public. For this reason, when projects arise throughout the year, they cannot be deferred.

Costing Methodology

A breakdown of the historical, 2021 budget and the proposed 2022 budget allocation for corporate services projects is shown in Table 74.

Table 74
Historical and Proposed Capital Expenditures
Corporate Services

	2017	2018	2019	2020	2021 Budget	2022 Budget
Material	11,920	6,818	24,840	190,698	51,000	71,000
External Labour	699	99,619	103,897	13,963	345,000	355,000
Internal Labour and Transportation	13,730	13,978	14,090	34,596	15,000	15,000
Other	7,151	17,473	9,673	76,158	-	-
TOTAL	**$ 33,500**	**$ 137,888**	**$ 152,500**	**$ 315,415**	**$ 411,000**	**$ 441,000**

The Company believes that it is prudent to set the budget amount at the higher end of the historical expenditure range to ensure that sufficient funds are available, if needed. To ensure projects are completed at the lowest possible costs, all supply and install contracts will be obtained through a competitive procurement process. In certain situations, where there are no competitive contractors in the service area, the Company will negotiate the best possible pricing.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring provisional capital requirement that is budgeted annually.

b. 180 Kent Street Office Building Roof Replacement

(Work Support Services) $ 215,000

The roof at 180 Kent Street Office location was last replaced in 1995. An inspection of the roof was completed by Tremco in July 2019 and the inspection report is attached as Appendix P.

The report describes the composition of the roof, the visible defects and recommended replacement within one to three years. To ensure the structural integrity of the building and maintain health and safety standards, this project is

being proposed for completion in 2022, the latest year recommended in the inspection report.

Justification

This project is justified on the obligation to provide safe and functional facilities and cannot be deferred.

Costing Methodology

The proposed budget allocation of $215,000 is based on the estimated cost in the 2019 Tremco report Financial Summary section (last page of the report). Since the 2019 report estimated the roof replacement cost to be $195,000, a ten per cent adjustment to the estimated cost has been added to the budget to allow for inflation.

Alternatives

The 2019 Tremco report identified some preventative maintenance items that could extend the service life of the roof until a budget for replacement was secured. The report also stated that the long-term solution is the replacement of the roof within three years. The preventative maintenance was completed in 2020 and the three year timeframe to replacement will be reached in 2022.

Future Commitments

This is not a multi-year capital budget commitment.

7.2 Information Technology — *$ 3,379,000*

a. Hardware Acquisitions (Work Support Services) — $ 996,000

The budget amount includes the purchase and implementation of additional units and life-cycle replacement or upgrade of computer hardware, servers and communication equipment (switches, routers, etc.) in the data centre. This equipment is critical to ensuring the efficient operation of the Company's business network and provision of service to customers. The replacement or upgrade of servers and communications equipment is determined based on the existing performance of the equipment, the ability to expand the equipment for future growth, the criticality of the equipment based on the business or customer impact should the equipment fail, and the cost of replacing or upgrading as compared to the operating costs of the existing equipment. Industry practice is to replace servers and communication equipment every five years.

The budget amount also includes the purchase and implementation of additional units and life-cycle replacement of personal computers (desktops, laptops and tablets) and printers. The Company has approximately 320 of these devices which are replaced every five to seven years.

Included in the proposed budget allocation is $645,000 for the replacement of the company's storage area network and server farm. The current hardware was purchased in 2016 with a life expectancy of three to five years.

Relative to 2021, and excluding the $645,000 budgeted for the storage area network and server farm, the recurring base budget for hardware acquisitions has increased by approximately 19 per cent due to increased costs for engineering laptops and global positioning system ("GPS") devices, and life cycle replacement of several large printers and desktop computers.

Justification

Hardware acquisitions are justified based on the need to replace and upgrade Information Technology ("IT") hardware to maintain a reliable IT network which is critical to the overall service the Company provides to customers.

Costing Methodology

A breakdown of the historical, 2021 budget and proposed 2022 budget allocation for hardware acquisitions is shown in Table 75.

Table 75
Historical and Proposed Capital Expenditures
Hardware Acquisitions

	2017	2018	2019	2020	2021 Budget	2022 Budget
Material	$ 145,509	$ 217,348	$ 264,257	$ 227,580	$ 242,000	$ 938,000
Internal Labour and Transportation	47,944	14,726	12,417	7,114	53,000	58,000
TOTAL	**$ 193,453**	**$ 232,074**	**$ 276,674**	**$ 234,694**	**$ 295,000**	**$ 996,000**

The proposed 2022 budget for hardware acquisitions by equipment type is shown in Table 76. The budget is based on the most recent purchases and vendor quotes for similar equipment and the estimated cost of internal labour required to deploy the equipment.

Table 76
Hardware Acquisitions

Description	Budget
Servers and Communication Equipment	$ 120,500
Personal Computing Devices and Printers	194,500
Storage Area Network/Server Farm	681,000
TOTAL	**$ 996,000**

Supporting information for the budget is provided in Confidential Appendix S-14.

To ensure this project is completed at the lowest possible cost, all hardware acquisitions will be obtained through competitive procurement processes.

The expected start date of this project is January 2022 with in-service dates throughout the year.

Alternatives

The only alternative is to defer hardware acquisition projects. This is not recommended as computer hardware, servers and communication equipment are critical to conducting Company business and providing service to customers.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring capital requirement that is budgeted annually.

b. <u>Purchased Software and Upgrades</u> (Work Support Services) $ 546,000

Maritime Electric relies on a wide variety of software to deliver service to customers. Vendors that supply and support this software charge for the ongoing development of new features, the creation of security patches and the support of system customizations. These enhancements improve the functionality, security and service life of the software. The proposed budget allocation includes an internal labour component required for installation, patching, upgrading and testing.

Microsoft supplies end user business software such as word processing, spreadsheets and email as well as key data centre software including the corporate database management system and the financial management suite. Microsoft also supplies most core operating systems both on servers and computers. The budget amount provides for access to the latest versions of each software product.

ESRI is the Company's provider of enterprise Geographic Information System ("GIS") solutions. ESRI maps are embedded in most Maritime Electric applications including the Customer Information System, Vegetation Management System and the outage restoration map on the corporate website. The budget amount also

provides for the continued support by the vendor, contributing to the effective operation of the GIS.

Cybersecurity software is sourced from specialized vendors and provides essential services to Maritime Electric in order to maintain a safe network. These solutions include the management of mobile devices, second factor authentication and intrusion detection.

The Company also uses a wide variety of smaller applications that include software development tools, engineering design software and billing support applications.

Justification

Purchased software and upgrades are justified based on the need for the continued support of the software products being utilized to ensure there is no negative impact to the security and operation of the IT network which is critical to the overall service the Company provides to customers.

Costing Methodology

A breakdown of the historical, 2021 budget, and proposed 2022 budget allocation for purchased software and upgrades is shown in Table 77.

Table 77
Historical and Proposed Capital Expenditures
Purchased Software and Upgrades

	2017	2018	2019	2020	2021 Budget	2022 Budget
Material	$ 212,428	$ 299,701	$ 316,963	$ 383,780	$ 390,000	$ 433,000
Internal Labour and Transportation	44,864	49,952	50,316	60,365	95,000	113,000
TOTAL	**$ 257,292**	**$ 349,653**	**$ 367,279**	**$ 444,145**	**$ 485,000**	**$ 546,000**

The proposed 2022 budget for purchased software and upgrades by software type is shown in Table 78. The budget is based on the most recent purchases and vendor quotes for software purchases as well as the estimated cost of internal labour required to install the software.

Table 78 Breakdown of Proposed Budget Allocation by Software Type Purchased Software and Upgrades	
Description	**Budget**
Microsoft Suite	$ 130,057
Great Plains Financials	21,455
ESRI Mapping	69,155
Software Development Tools	23,669
Cybersecurity Software	71,516
Miscellaneous Software Upgrades	98,521
Internal Labour and Transportation	113,000
New Purchases	18,627
TOTAL	**$ 546,000**

Supporting information for the budget is provided in Confidential Appendix S-14.

To ensure this project is completed at the lowest possible cost, all purchased software and upgrades will be obtained through competitive procurement processes.

The expected start date of this project is January 2022 with in-service dates throughout the year.

Alternatives

The only alternative is to defer purchased software and upgrades projects. This is not recommended as software functionality and security is critical to conducting Company business and providing service to customers.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring capital requirement that is budgeted annually.

c. <u>Cybersecurity Enhancements</u> (Work Support Services) $ 547,000

Cybersecurity continues to be a core strategic focus for Maritime Electric. Cyber threats are increasingly more complex, frequently utilizing highly sophisticated forms of malware to mount persistent and targeted attacks. The consequences of dealing with security breaches are significant and can include privacy violations, data corruption, loss of asset and system control, loss of customer confidence, financial penalties, legal exposure and negative press. This issue is even more concerning for companies with critical infrastructure assets such as Maritime Electric. For these reasons, the Company continues to invest in cybersecurity initiatives. Areas of investment are driven by the Cyber Risk Management Program ("CRMP"). The program evaluates core cyber risks against existing controls and identifies projects that can eliminate or mitigate risk. These projects drive a rolling five year cybersecurity roadmap that guides investment. This proposed budget amount will progress the roadmap in several areas.

Work in the Cybersecurity Enhancements category will involve a review and analysis of the business network by an external security specialist. The review evaluates the many facets of security against the latest trends in criminal cyber activity. The process consists of an independent audit, recommendations assessment, and the development and implementation of a work plan. The funds required to carry out the workplan are also included in the proposed budget amount.

Also, within Cybersecurity Enhancements, several operations technology ("OT") network projects are planned, including the hardening of the SCADA servers and workstations. This will involve adding log aggregation, secure active directory and anti-virus software, and will coincide with a proposed SCADA upgrade project (see Section 6.1j). Other areas of OT improvement will include network monitoring and network protection tools.

Justification

The project is justified on the basis that cyber threats are constantly evolving and the protection of IT and OT networks is critical to the security of the Company's asset and customer data.

Costing Methodology

A breakdown of the historical, 2021 budget and the proposed 2022 budget allocation for cybersecurity enhancements is shown in Table 79.

Table 79
Historical and Proposed Capital Expenditures[a]
Cybersecurity Enhancements

	2017[b]	2018[c]	2019[d]	2020[e]	2021 Budget[f]	2022 Budget
Material	$ 33,850	$ 69,707	$ 24,274	$ 61,965	$ 449,000	$ 417,000
External Labour	-	27,797	6,862	50,785	115,000	-
Internal Labour and Transportation	25,054	48,461	90,989	129,747	98,000	130,000
TOTAL	**$ 58,904**	**$ 145,965**	**$ 122,125**	**$ 242,497**	**$ 662,000**	**$ 547,000**

a. All cybersecurity initiatives proposed for 2022 have been consolidated under 7.2c Cybersecurity Enhancements. Historical and forecast data represents the total amount for the equivalent cybersecurity initiatives in that year.
b. In 2017, the equivalent cybersecurity initiative was Capital Budget item 7.2c Network Security Review.
c. In 2018, the equivalent cybersecurity initiatives were Capital Budget items 7.2c Business Network Security Review and 7.2g Security Enhancements.
d. In 2019, the equivalent cybersecurity initiatives were Capital Budget items 7.2c Network Access Control and 7.2e Security Enhancements SCADA Network.
e. In 2020, the equivalent cybersecurity initiatives were Capital Budget items 7.2d Business Network Security Review and 7.2e Cybersecurity Enhancements.
f. In 2021, the equivalent cybersecurity initiatives were Capital Budget items 7.2d Business Network Security Review, 7.2e Cybersecurity Enhancements and 7.2f Operations Network Data Centre Infrastructure.

The proposed 2022 budget allocation for cybersecurity enhancements is shown in Table 80. The budget is based on the most recent purchases and vendor quotes as well as the estimated cost of internal labour required to complete the projects.

Table 80
Breakdown of Proposed Budget Allocation
Cybersecurity Enhancements

Description	Budget
Business Network	$ 98,000
Operations Network	449,000
TOTAL	**$ 547,000**

Supporting information for the cybersecurity enhancements budget is provided in Confidential Appendix S-14.

To ensure this project is completed at the lowest possible cost, materials and services will be obtained through competitive procurement processes. Where alternative suppliers do not exist to provide competitive bids, materials and services will be negotiated to ensure they are least cost.

The project will start in January 2022 with in-service dates throughout the year.

Alternatives

The only alternative is to defer the proposed cybersecurity enhancement projects. This is not recommended as the protection of the Company's IT and OT networks is increasingly important as cyber attacks are occurring more frequently and becoming more sophisticated.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring capital requirement that is budgeted annually.

d. <u>Customer Services and Communication Enhancements</u>

(Work Support Services) $ 134,000

The Company continues to improve the customer experience by enhancing technology and options for customer communication. Customers expect seamless and efficient service via their method of choice and the Company is continuing to advance its service level offerings to evolve with customer expectations. New tools and better information for customers will enhance the customer experience as well as internal efficiencies through technology, information and automation.

The Company is proposing to invest in new interactive voice response ("IVR") self-service automation options for customers. Working with the existing Virtual Contact Centre vendor, the Company is proposing to expand services to automate

customer interactions for balance inquiries, last payment received and reporting outages.

The Company is also proposing to investigate options for web bot and artificial intelligence services in 2022. This automation will provide benefits to customers by offering more self-serve options for frequently asked questions linked directly to the Company's internal systems. If the customer requires any additional information, the option to speak directly with a representative in the Contact Centre will remain.

The development and enhancement of online and mobile services and tools for customers will also continue in 2022 with the proposed budget allocation.

Justification

The project is justified based on the obligation to serve existing and new customers in a timely and informative manner.

Costing Methodology

A breakdown of the historical, 2021 budget and the proposed 2022 budget allocation for customer service and communication enhancements is shown in Table 81.

Table 81
Historical and Proposed Capital Expenditures[a]
Customer Service and Communication Enhancements

	2017	2018	2019	2020	2021 Budget	2022 Budget
Material	$ -	$ -	$ -	$ -	$ 31,000	$ 35,000
External Labour	-	29,215	102,262	46,000	85,000	69,000
Internal Labour and Transportation	-	35,827	32,617	85,421	20,000	30,000
Other	-	40,785	60,425	26,349	-	-
TOTAL	**$ -**	**$ 105,827**	**$ 195,304**	**$ 157,770**	**$ 136,000**	**$ 134,000**

a. In 2020 and 2021, the equivalent Capital Budget item was On-Line Services and in 2018 and 2019, it was Customer Self Service. There was no equivalent Capital Budget item in 2017.

Supporting information for the project budget is provided in Confidential Appendix S-14.

To ensure this project is completed at the lowest possible cost, materials and services will be obtained through competitive procurement processes. Where alternative suppliers do not exist to provide competitive bids, materials and services will be negotiated to ensure they are least cost.

The project will start in January, 2022 with in-service dates throughout the year.

Alternatives

The only alternative is to defer the proposed customer service and communication enhancement projects. This is not recommended as customers increasingly expect to be able to communicate with the Company using a variety of platforms including their mobile devices.

Future Commitments

This is not a multi-year capital budget commitment; however, it is a recurring capital requirement that is budgeted annually.

e. <u>Load Flow Software</u> (Work Support Services) $ 134,000

The Company uses a load flow software as a critical planning tool to model its distribution network. The load flow software currently being used is several years old and its data import capability needs a significant upgrade.

The load flow software is particularly useful for minimizing customer impact when system changes are required, such as during a storm or to accommodate a line construction or rebuild project. The software's modeling capability is also used in planning capital projects to ensure that maximum system benefits are achieved and to accurately determine the maximum capacity of the distribution network to host net metered generation. This feature is becoming increasingly important as the addition of net metered generation to the electricity supply system continues to be popular with customers.

Modeling the distribution network drives many functions within the organization including:

- Distribution system expansion planning;
- Contingency planning;
- Optimizing equipment fuse protection and coordination;
- Understanding the impact of the evolving role that renewable energy installations have on the network; and
- Understanding the impact of additional heat pump and electric vehicle load growth on the system.

The budget amount includes the purchase of the software as well as the support services required to integrate to the company's existing geographic information system ("GIS"), asset management database and historical customer consumption database.

Justification

This project is justified based on the need to provide reliable and cost effect service to the Company's customers and cannot be deferred.

Costing Methodology

A breakdown of the proposed budget allocation for the load flow software is shown in Table 82. A contingency has been budgeted to allow for some uncertainty around the work involved to integrate the new software with existing software applications.

Table 82
Breakdown of Proposed Budget Allocation
Load Flow Software

Description	**Budget**
Software and Vendor Labour	$ 114,000
Internal Labour and Transportation	10,000
Contingency (8 per cent)	10,000
TOTAL	**$ 134,000**

Supporting information for the project budget is provided in Confidential Appendix S-14.

Future Commitments

This is not a multi-year capital budget commitment.

f. <u>Website Hosting</u> (Work Support Services) $ 98,000

For the past fifteen years, Maritime Electric has hosted its website in its own data center. The Company continues to provide more services to its customers via the website, which can be accessed using both desktop and mobile devices. The most popular of the website services is the customer outage map that displays real-time outage information. During large outages, the popularity of the map has grown to a point where it has caused website performance issues and impacted other Maritime Electric web services.

The proposed budget allocation will be used to move the website to a cloud-based hosted environment. The primary benefit will be that instead of the website being deployed on a single server, cloud hosting utilizes a network of connected servers, ensuring greater flexibility, redundancy and scalability.

By moving to a hosted, scalable environment, website performance issues will be eliminated and the potential for such performance issues to impact other Maritime Electric website services will also be eliminated. In addition, the vendor will assume the responsibility for updating the software and deploying new content and features. This will allow internal IT resources to focus on other areas. The investment will also provide a flexible, redundant and scalable platform for future customer service initiatives.

Justification

The project is justified based on the obligation to serve existing and new customers in a timely and informative manner.

Costing Methodology

A breakdown of the proposed budget allocation for the website hosting project in shown in Table 83.

Table 83 Breakdown of Proposed Budget Allocation Website Hosting	
Description	**Budget**
Software and Vendor Labour	$ 72,000
Internal Labour and Transportation	26,000
TOTAL	**$ 98,000**

Supporting information for the project budget is provided in Confidential Appendix S-14.

To ensure this project is completed at the lowest possible cost, materials and vendor services will be obtained through competitive procurement processes. Where alternative suppliers do not exist to provide competitive bids, materials and services will be negotiated to ensure they are least cost.

Alternatives

The only alternative is to defer the project; however, this is not recommended as customers are increasingly using the customer outage map for real-time outage information.

Future Commitments

This is not a multi-year capital budget commitment.

g. Survey Diagram Software (Work Support Services) $ 98,000

The proposed project is for the purchase and integration of a survey online drawing tool for use in conjunction with the Company's in-house survey system. The integration of drawing software with the survey system will improve the efficiency in the completion of service orders. Currently, the drawings for surveyed projects are completed by hand in the field and redrawn by hand as required for final attachment to a service order. The proposed survey tool allows for real time

drawing, design, measurement, coordinate and structure placement using the survey system inputs and existing survey GIS data. The drawing software's ability to produce service order drawings from within the survey system will streamline the workflow, and improve overall project accuracy by using quality online data.

Justification

The project is justified based on the obligation to serve new and existing customers in a timely and efficient manner.

Costing Methodology

A breakdown of the proposed budget allocation for the purchase and integration of survey design software is shown in Table 84. A relatively high contingency has been budgeted due to uncertainty around the work involved to integrate the software with existing in-house applications. This is reflected in the vendor proposal to complete the project, as it was qualified as a "rough order of magnitude" estimate.

Table 84
Survey Diagram Software
Breakdown of Proposed Budget Allocation

Description	Budget
Software and Vendor Labour	$ 57,500
Internal Labour and Transportation	16,000
Contingency (33 per cent)	24,500
TOTAL	**$ 98,000**

Supporting information for the project budget is provided in Confidential Appendix S-14.

To ensure this project is completed at the lowest possible cost, materials and vendor services will be obtained through competitive procurement processes. Where alternative suppliers do not exist to provide competitive bids, materials and services will be negotiated to ensure they are least cost.

Future Commitments

This is not a multi-year capital budget commitment.

h. Health, Safety and Environment Information Application

(Work Support Services) $ 58,000

Currently, the Health, Safety and Environment ("HSE") department relies on an in-house built system developed in 2012 to record, track and manage HSE data. While the system has served its purpose, the Company has outgrown its basic features and requires a more robust system that can store, analyze, predict and manage this data. This enhanced ability is especially critical given the importance of tracking safety metrics and trends, and the obligation to ensure the safety of employees and the public. The budget amount will be used to purchase and implement a packaged software solution which includes several modules including incident tracking, audits, corrective actions and checklists.

Due to the limited capabilities of the existing system, the HSE department is currently reliant on a spreadsheet based process to track incidents and perform data analysis (e.g., graphs, charts, annual comparisons, trending information, etc.). The limitations of the current process increase the probability of error and create inefficiency. An added benefit of the new software will be its ability to facilitate online training activities, and support asset and contractor management.

Justification

The project is justified based on the obligation to provide a safe working environment for employees and to ensure compliance with all HSE programs, policies and procedures.

Costing Methodology

A breakdown of the proposed budget allocation for the purchase and implementation of a new HSE management software application is shown in Table 85. A contingency has been budgeted to allow for cybersecurity tooling, if required, and any minor configuration adjustments that were not included in the vendor estimate.

Table 85
Breakdown of Proposed Budget Allocation
HSE Application Software

Description	**Budget**
Software and Vendor Labour	$ 30,000
Internal Labour and Transportation	18,000
Potential Cybersecurity Tooling/ Contingency (21 per cent)	10,000
TOTAL	**$ 58,000**

Supporting information for the project budget is provided in Confidential Appendix S-14.

To ensure this project is completed at the lowest possible cost, materials and vendor services will be obtained through competitive procurement processes. Where alternative suppliers do not exist to provide competitive bids, materials and services will be negotiated to ensure they are least cost.

Future Commitments

This is not a multi-year capital budget commitment.

i. Substation Communications System Upgrade

(Work Support Services) $ 768,000

This project is a continuation of a two-year project originally approved under Section 6.1b of the 2020 Capital Budget Application. The project was scheduled to be completed at the end of 2021; however, it is necessary to extend the end date into 2022. The extension will accommodate a change in project scope that includes the addition of two new substations (Clyde River and East Royalty) that

were not included in the original project budget. The project team also encountered several facilities that required more elaborate hardware configurations than were originally anticipated. These included West St. Peters, Sherbrooke, West Royalty, Charlottetown Plant and Church Road substations, and the ECC.

The project involves upgrading the existing OT infrastructure to achieve the following objectives:

- Maintain safe and reliable communications for current operational tasks;
- Provide the ability to accommodate future growth;
- Enhance security of the overall network and system; and
- Reduce the resources required to support the OT network infrastructure.

Table 86 contains the proposed project schedule that will see all in-scope sites completed by the end of 2022.

Table 86 Substation Communications System Upgrade Project Schedule		
Site Description	**Status**	**Schedule**
ECC	Complete	2020
UPEI Substation	Complete	2020
Lorne Valley Substation	Complete	2020
Airport Substation	Complete	2020
Bagnall Road Substation	Complete	2020
West St. Peters Substation	Complete	2020
Mount Albion Substation	Complete	2020
West Cape Wind Farm	Complete	2020
O'Leary Substation	Complete	2020
Sherbrooke Substation	Not Started	2021
Bedeque Substation	In Progress	2021
Murray Corner Riser Station	In Progress	2021
Norway – Suez	Complete	2021
Norway – WEICAN	Complete	2021
Hermainville	Complete	2021
East Point Wind Farm	Complete	2021
Clyde River Substation	In Progress	2021
Port Hill Radio Site	Not Started	2021
Church Road Substation	Not Started	2021
Rollo Bay Radio Site	Not Started	2021
Summerville Radio Site	Not Started	2021
Green Road Radio Site	Not Started	2021
ECC – SCADA	Not Started	2022
Crossroads Radio	Not Started	2022
West Royalty Substation	Not Started	2022
West Royalty Service Centre	Not Started	2022
Alberton Substation	Not Started	2022
Wellington Substation	Not Started	2022
Sherbrooke Office	Not Started	2022
Borden Generating Station	Not Started	2022
Cape Tormentine	Not Started	2022
Plant Control Building	Not Started	2022
GT3/BOP/Siemens SW Gear	Not Started	2022
Roseneath Office	Not Started	2022

To achieve these objectives, hardware that provides operational services for substation communication will be updated with next generation utility grade hardware at the remaining sites (i.e., Lorne Valley, Crossroads, Clyde River and East Royalty).

Justification

The substation communications system upgrade work proposed is to complete a previously approved multi-year project. It is justified based on the need to maintain safe, reliable electrical service, accommodate future growth of the electrical system, enhance security and reduce resources required to support the OT Network. For the reasons provided, it cannot be deferred.

Costing Methodology

A breakdown of the total project cost is provided in Table 87. The proposed budget is based on supplier quotes for materials and equipment as well as estimated internal and external resources required to complete the project.

Table 87
Breakdown of Multi-Year Budget
Substation Communications System Upgrade

Description	2020	2021	2022	Budget
Material/Equipment	$ 805,162	$ 285,600	$ 710,000	$ 1,800,762
External Professional Services	35,035	48,400	-	83,435
Internal Labour and Transportation	72,492	-	58,000	130,492
TOTAL	**$ 912,689**	**$ 334,000**	**$ 768,000**	**$ 2,014,689**

Supporting information for the 2022 project cost estimates is provided in Confidential Appendix S-14.

To ensure this project is completed at the lowest possible cost, materials and services will be obtained through competitive procurement processes. Where alternative suppliers do not exist to provide competitive bids, materials and services will be negotiated to ensure they are least cost.

Future Commitments

This is a multi-year capital project that was started in 2020 and will be completed in 2022.

8.0 CAPITALIZED GENERAL EXPENSE $ 690,000

This budget amount includes a portion of administrative costs (predominately labour) that are properly recognized as part of the Company's overall capital expenditure program. These recurring expenditures represent an allocation of administrative costs, not specific to any one capital project, but rather as part of the overall development, implementation and management of the Company's capital budget program. The costs are labour and transportation related and derived from departments that support the overall capital program of the Company, primarily the Finance and Purchasing departments and Stores operations.

The proposed budget reflects historical spending over the past five years as shown in Table 88.

Table 88
Capitalized General Expenses

	2017	2018	2019	2020	2021 Budget	2022 Proposed
Stores	$ 438,405	$ 407,724	$ 494,872	$ 412,884	$ 440,000	$ 442,000
Finance and Purchasing	64,045	67,644	72,633	76,861	78,000	79,000
Corporate Planning[45]	-	-	-	-	-	169,000
TOTAL	**$ 502,450**	**$ 475,368**	**$ 567,505**	**$ 489,745**	**$ 518,000**	**$ 690,000**

[45] Additional resource for managing regulatory capital planning and reporting.

9.0 INTEREST DURING CONSTRUCTION $ 496,000

This budget amount represents an allowance for the cost of funds used during the construction of certain assets. It is reflected in the accounts as an offset to financing costs and is based on the Company's cost of borrowing. This amount is allocated to fixed assets and recovered through amortization over the life of the assets. Appendix Q to this Application provides the calculation of the budget provision for Interest During Construction for 2022.

10.0 PROPOSED ORDER

C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY
AND APPEALS COMMISSION

IN THE MATTER of 3.6 17(1) of the Electric Power Act (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order of the Commission approving the 2022 Annual Capital Budget and for certain approvals incidental to such an order.

UPON receiving an Application by Maritime Electric Company, Limited (the "Company") for approval of the Company's capital budget for year 2022;

AND UPON considering the Application and Evidence filed in support thereof;

NOW THEREFORE, for the reasons given in the annexed Reasons for Order and pursuant to the Electric Power Act;

IT IS ORDERED THAT

The 2022 Capital Budget Application of the Company, filed herein on _____, 2022 and summarized below is approved:

2022 Capital Budget Summary	
Generation	$ 1,245,000
Distribution	28,249,000
Transmission	8,889,000
Corporate	4,035,000
General Expense Capitalized	690,000
Interest During Construction	496,000
TOTAL	$ 43,604,000
Less: Contributions	(3,538,000)
TOTAL (Net)	**$ 40,066,000**

DATED at Charlottetown, Prince Edward Island, this ___ day of _____, 2022.

BY THE COMMISSION:

_____

Chair

_____

Commissioner

_____

Commissioner

APPENDIX A

Summary of Actual and Proposed Capital Expenditures

(2013 to 2026)

Maritime Electric Company, Limited
Summary of Actual and Proposed Capital Expenditures (2013 to 2026)

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Actual	Budget	Budget	Budget	Budget	Budget	Budget
Generation														
Charlottetown Plant and CT3	$ 669,275	$ 592,872	$ 451,154	$ 500,777	$ 983,658	$ 814,902	$ 426,114	$ 1,133,998	$ 1,025,000	$ 554,000	$ 1,318,000	$ 1,259,000	$ 2,874,000	$ 570,000
Combustion Turbine #4													45,020,000	46,371,000
Borden Plant	881,322	1,468,960	234,642	740,335	81,062	185,765	59,226	291,417	305,000	691,000	638,000	578,000	132,000	685,000
Subtotal	1,550,597	2,061,832	685,796	1,241,112	1,064,720	1,000,667	485,340	1,425,415	1,330,000	1,245,000	1,956,000	1,837,000	48,026,000	47,626,000
Distribution and Transmission														
Distribution	15,707,728	16,974,255	16,132,068	18,246,306	19,834,463	21,445,487	23,777,736	23,530,799	28,055,000	28,249,000	46,145,000	40,317,000	30,884,000	31,352,000
Transmission	4,106,795	6,462,871	8,092,839	8,283,251	10,832,373	6,989,530	8,674,018	7,854,808	11,528,000	8,889,000	8,806,000	8,923,000	10,382,000	13,886,000
Subtotal	19,814,523	23,437,126	24,224,907	26,529,557	30,666,836	28,435,017	32,451,754	31,385,607	39,583,000	37,138,000	54,951,000	49,240,000	41,266,000	45,238,000
Corporate	757,930	979,141	897,585	1,039,510	841,786	2,143,044	1,850,589	1,894,378	2,527,000	4,035,000	15,394,000	3,761,000	2,487,000	2,538,000
Subtotal	22,123,050	26,478,099	25,808,288	28,810,179	32,573,342	31,578,728	34,787,683	34,705,400	43,440,000	42,418,000	72,301,000	54,838,000	91,779,000	95,402,000
Capitalized General Expense	350,331	388,730	458,433	477,714	502,450	475,368	567,505	489,745	518,000	690,000	705,000	720,000	734,000	750,000
Interest During Construction	298,913	368,486	376,452	405,915	449,760	432,111	474,433	444,170	565,000	496,000	655,000	702,000	1,308,000	1,330,0000
Subtotal	22,772,294	27,235,315	26,643,173	29,693,808	33,525,552	32,486,207	35,829,621	35,639,315	44,523,000	43,604,000	73,661,000	56,260,000	93,821,000	97,482,000
Less: Customer Contributions	(643,920)	(525,236)	(382,693)	(1,262,517)	(746,454)	(677,905)	(758,922)	(1,094,598)	(3,107,000)	(3,538,000)	(13,621,000)	(750,000)	(750,000)	(750,000)
Net Capital Expenditures	**$ 22,128,374**	**$ 26,710,079**	**$26,260,480**	**$ 28,431,291**	**$32,779,098**	**$ 31,808,302**	**$ 35,070,699**	**$ 34,544,717**	**$ 41,416,000**	**$ 40,066,000**	**$60,040,000**	**$55,510,000**	**$93,071,000**	**$96,732,000**

APPENDIX B

Expanded Table Figure 2 Expenditures by CEJC Classification

Table 1
Proposed 2022 Capital Expenditures

	Mandatory	Justifiable	Recurring	Work Support Services	Capitalized General Expense	Interest During Construction	TOTAL	% of Total Category Proposed
4.0 Generation								
4.1 Charlottetown Generating Station - Buildings and Site Services								
a. ECC Building Sidewalk Replacement		$ 21,000						
b. CGS Miscellaneous Building and Site Upgrades			9,000					
	-	21,000	9,000	-	-	-	$ 30,000	2.4%
4.2 Charlottetown Generating Station - Turbine Generator								
a. On-Island Generating Capacity Study		320,000						
b. Electronic Level Gauges for CT3 Fuel Tanks		40,000						
c. CGS Combustion Turbine Improvements, Parts and Tools			164,000					
	-	360,000	164,000	-	-	-	524,000	42.1%
4.3 Borden Generating Station - Buildings and Site Services								
a. Commercial Storage Containers		90,000						
b. BGS Miscellaneous Building and Site Upgrades			193,000					
	-	90,000	193,000	-	-	-	283,000	22.7%
4.4 Borden Generating Station - Turbine Generators								
a. CT1 and CT2 Life Extension Engineering Assessment		48,000						
b. CT2 Detroit Diesel Starter Overhaul		63,000						
c. CT1 and CT2 Component Upgrades		131,000						
d. Electronic Level Gauges for BGS Fuel Tanks		58,000						
e. BGS Combustion Turbine Improvements, Parts and Tools			108,000					
	-	300,000	108,000	-	-	-	408,000	32.8%
	-	**771,000**	**474,000**	**-**	**-**	**-**	**1,245,000**	**100.0%**
% of Total Category Proposed	**0.0%**	**61.9%**	**38.1%**	**0.0%**	**0.0%**	**0.0%**		**100.0%**

Proposed 2022 Capital Expenditures

	Mandatory	Justifiable	Recurring	Work Support Services	Capitalized General Expense	Interest During Construction	TOTAL	% of Total Category Proposed
5.0 Distribution								
5.1 Replacements due to Storms, Collisions, Fire and Road Alterations								
a. Replacements due to Storms, Fire and Collisions			990,000					
b. Replacements due to Road Alterations			641,000					
	-	-	1,631,000	-	-	-	1,631,000	5.8%
5.2 Distribution Transformers								
a. Polemount and Padmount Transformers			4,697,000					
b. Spill Prevention Program	640,000							
	640,000	-	4,697,000	-	-	-	5,337,000	18.9%
5.3 Services and Street Lighting								
a. Overhead and Underground Services			4,738,000					
b. Street and Area Lighting			835,000					
	-	-	5,573,000	-	-	-	5,573,000	19.7%
5.4 Line Extensions								
a. Customer Driven Line Extensions			1,447,000					
b. Reliability Driven Line Extensions		1,125,000						
	-	1,125,000	1,447,000	-	-	-	2,572,000	9.1%
5.5 Line Rebuilds								
a. Single Phase and Three Phase Rebuilds		2,205,000						
b. PEI Broadband Project		4,564,000						
c. Distribution Line Refurbishment			794,000					
d. Accelerated Distribution Component Replacement								
i. Porcelain Cutout Replacement Program		102,000						
ii. Eastern Cedar Pole Replacement Program		1,211,000						
	-	8,082,000	794,000	-	-	-	8,876,000	31.4%
5.6 System Meters								
a. Watt-Hour Meters			386,000					
b. Combination Meters			114,000					
c. Outdoor Metering Tanks			127,000					
d. Miscellaneous Metering Equipment			37,000					
	-	-	664,000	-	-	-	664,000	2.4%
5.7 Distribution Equipment	-	-	1,556,000	-	-	-	1,556,000	5.5%
5.8 Transportation Equipment	-	-	-	2,040,000	-	-	2,040,000	7.2%
	640,000	**9,207,000**	**16,362,000**	**2,040,000**	**-**	**-**	**28,249,000**	**100.0%**
% of Total Category Proposed	**2.3%**	**32.6%**	**57.9%**	**7.2%**	**0.0%**	**0.0%**		**100.0%**

Proposed 2022 Capital Expenditures

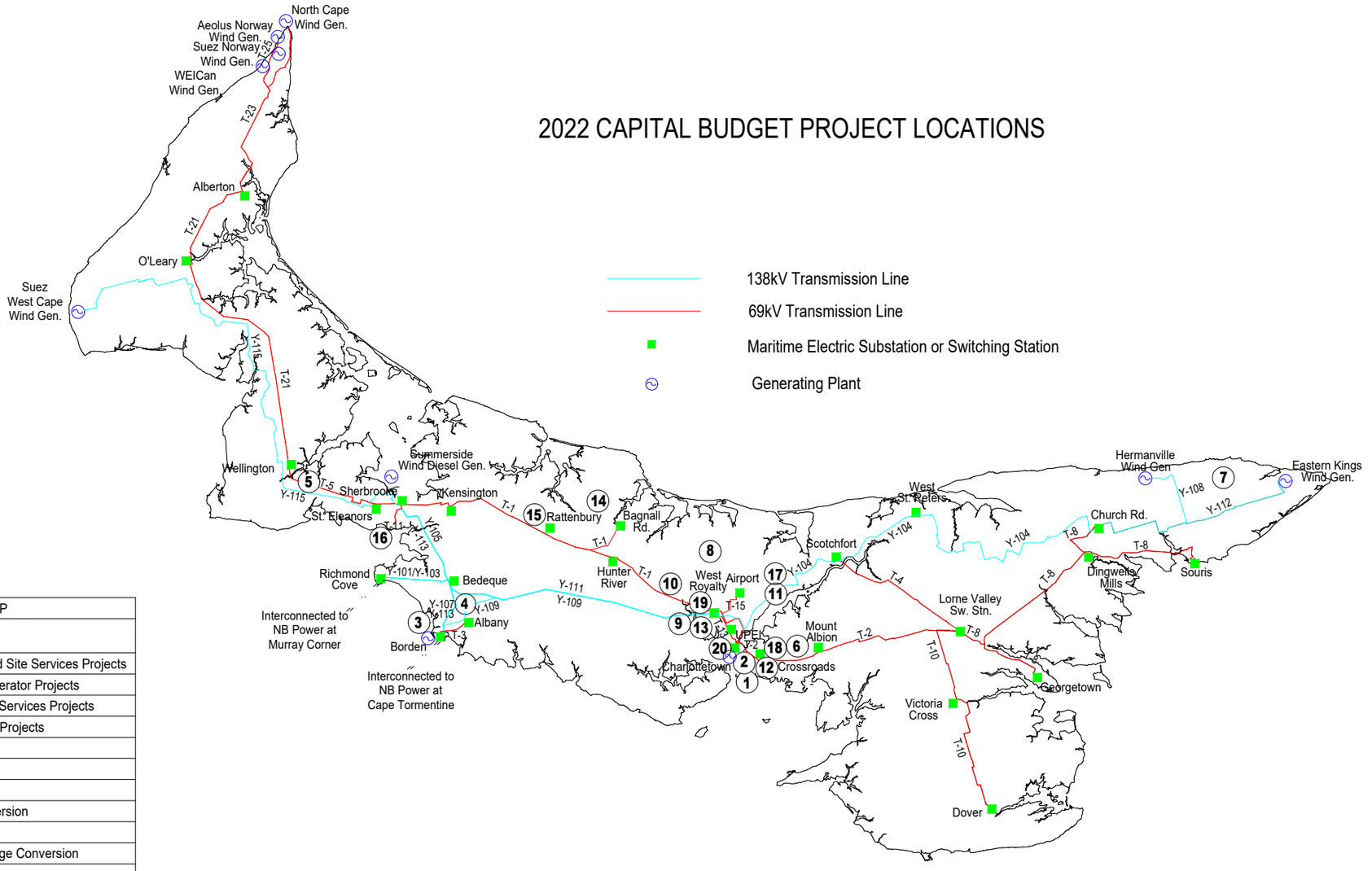
	Mandatory	Justifiable	Recurring	Work Support Services	Capitalized General Expense	Interest During Construction	TOTAL	% of Total Category Proposed
6.0 Transmission								
6.1 Substation Projects								
a. East Royalty Substation		1,226,000						
b. Crossroads Substation Rebuild		2,620,000						
c. West Royalty X5 Autotransformer Upgrade		363,000						
d. Substation Oil Containment Program	147,000							
e. Substation Modernization Program		588,000						
f. 138 kV Breaker Replacement Program		146,000						
g. Mobile Communications System Upgrade		467,000						
h.Cavendish Feeder Automation		233,000						
i. Rattenbury Small Scale Solar and Battery Storage Pilot		165,000						
j. SCADA Master System Refresh		129,000						
k. Fibre Modifications due to Road Alterations			38,000					
	147,000	5,937,000	38,000	-	-	-	6,122,000	68.9%
6.2 Transmission Projects								
a. 69 kV and 138 kV Switch Program			590,000					
b. Transmission Line Refurbishment			932,000					
c. Transmission Lines		1,245,000						
	-	1,245,000	1,522,000	-	-	-	2,767,000	31.1%
	147,000	**7,182,000**	**1,560,000**	**-**	**-**	**-**	**8,889,000**	**100.0%**
% of Total Category Proposed	**1.7%**	**80.8%**	**17.5%**	**0.0%**	**0.0%**	**0.0%**		**100.0%**
7.0 Corporate								
7.1 Corporate Services								
a. Recurring Annual Capital Requirements				441,000				
b. 180 Kent Street Office Building Roof Replacement				215,000				
	-	-	-	656,000	-	-	656,000	16.3%
7.2 Information Technology								
a. Hardware Acquisitions				996,000				
b. Purchased Software and Upgrades				546,000				
c. Cybersecurity Enhancements				547,000				
d. Customer Services and Communication Enhancements				134,000				
e. Load Flow Software				134,000				
f. Website Hosting				98,000				
g. Survey Diagram Software				98,000				
h. Health, Safety and Environment Information Application				58,000				
i. Substation Communications System Upgrade				768,000				
	-	-	-	3,379,000	-	-	3,379,000	83.7%
	-	**-**	**-**	**4,035,000**	**-**	**-**	**4,035,000**	**100.0%**
% of Total Category Proposed	**0.0%**	**0.0%**	**0.0%**	**100.0%**	**0.0%**	**0.0%**		**100.0%**

Sub-total	**787,000**	**17,160,000**	**18,396,000**	**6,075,000**	**-**	**-**	**42,418,000**	
% of Total Proposed	**1.9%**	**40.5%**	**43.4%**	**14.3%**	**0.0%**	**0.0%**		**100.0%**
8.0 Capitalized General Expense					690,000		690,000	
9.0 Interest During Construction						653,000	496,000	
Less: Customer Contributions							(3,538,000)	
TOTAL							**$ 40,066,000**	

APPENDIX C

Map of 2022 Capital Budget Project Locations

2022 CAPITAL BUDGET PROJECT LOCATIONS



LEGEND OF PROJECT LOCATIONS ON MAP		
Map Location	Budget Category	Project Description
1	4.1	Charlottetown Generating Station Buildings and Site Services Projects
2	4.2	Charlottetown Generating Station Turbine Generator Projects
3	4.3	Borden Generating Station Buildings and Site Services Projects
4	4.4	Borden Generating Station Turbine Generator Projects
5	5.4b(i)	Glenn Drive Three Phase Conversion
6	5.4b(ii)	Mount Herbert Three Phase Conversion
7	5.5a(i)	Northside Road Line Rebuild
8	5.5a(ii)	Rustico Road Line Rebuild and Voltage Conversion
9	5.5a(iii)	Kingston Road Line Rebuild
10	5.5a(iv)	North York River Road Line Rebuild and Voltage Conversion
11	6.1a	East Royalty Substation
12	6.1b	Crossroads Substation Rebuild
13	6.1c	West Royalty X5 Autotransformer Upgrade
14	6.1h	Cavendish Feeder Automation
15	6.1i	Rattenbury Small Scale Solar and Battery Storage Pilot
16	6.2c(i)	T-11 Rebuild
17	6.2c(ii)	Transmission Tap to East Royalty Substation
18	6.2c(iii)	Crossroads Substation Transmission Modifications
19	6.2c(iv)	West Royalty Substation Transmission Modifications
20	7.1b	180 Kent Street Office Building Roof Replacement

MARITIME ELECTRIC
ENERGY SUPPLY SYSTEM
PRINCE EDWARD ISLAND

APPENDIX D

Impact Rate Base, Revenue Requirement and Customer Rates

Depreciation (000s)	**Reference**	**Annual**
Depreciation Expense		
Capital Investment per Table 1, Proposed 2022 Capital Expenditures	A = $40,066 + $3,538	43,604
Retirements (Note 1)	B = (A X 20%)	(8,721)
Plant Investment for Depreciation	C = A + B	$ 34,883
Depreciation Rate (Note 2)	D	3.49%
Depreciation Expense	E = C X D	$ 1,217
Capital Investment		
Capital Investment	A	43,604
Less: Customer Contributions per Table 1, Proposed 2022 Capital Expenditures	F	(3,538)
Total Capital Investment	G = A + F	$ 40,066
Accumulated Depreciation		
Costs of Removal (Note 3)	H = A / (1-17%) X 17%	(8,931)
Depreciation & Amortization	E	1,217
Total Change in Accumulated Depreciation	I = H + E	$ (7,714)
Net Book Value (NBV) - Plant Investment	**J = C - I**	**$ 42,597**
Customer Contributions		
Customer Contributions per Table 1, Proposed 2022 Capital Expenditures	F	**$ (3,538)**
Depreciation Expense - Contributions		
Annual Contributions	F	$ (3,538)
Depreciation Rate (Note 4)	K	3.64%
Amortization of Customer Contributions	L = F X K	$ (129)
Net Book Value (NBV) - Customer Contributions	**M = F - L**	**$ (3,409)**
Total Depreciation Expense (Net of Contributions)	**N = E + L**	**$ 1,089**

Note 1: Asset retirements estimated at 20% of capital expenditures based on average for 2018-2020.

Note 2: Composite depreciation rate per 2017 Depreciation Study.

Note 3: Costs of Removal are estimated to be 17% of total capital investment and costs of removal based on average for 2018-2020.

Note 4: Distribution Contributions are depreciated using the rate per 2017 Depreciation Study for Distribution Service Lines.

Income Taxes (000s)	**Reference**	**Annual**
Capital Cost Allowance		
Capital Investment per Table 1, Proposed 2022 Capital Expenditures	A = $43,604 - $3,538	40,066
UCC for Calculation (Accelerated Investment Incentive)	A	40,066
Capital Cost Allowance ("CCA") Rate (assumes class 47)	B	8.00%
CCA (Accelerated Investment Incentive @ 150%)	C = A X B X 150%	4,808
Ending UCC	D = A - C	$ 35,258
Future Income Taxes		
CCA	C	$ 4,808
Depreciation	E = N from Page 1	1,089
Difference CCA/Depreciation	F = C - E	3,719
Future Tax Rate	G	31.00%
Future Income Taxes	H = F X G	1,153
Income Tax Effects of Increased Return		
Return on Rate Base	I = H from Page 3	$ 2,564
Equity Return (grossed up)	J = G from Page 3 / (1-G)	2,042
Debt Return	K = F from Page 3	(1,156)
	L = J + K	$ 886
Income Tax Calculation		
Return on Rate Base	L	$ 886
Add: Depreciation	E	1,089
Less: CCA	C	(4,808)
	M = L + E + C	(2,833)
Corporate Tax Rate	G	31.00%
Current Income Taxes	N = M X G	(878)
Future Income Taxes	H	1,153
Total Income Tax Expense	**O = N + H**	**$ 275**

Rate Base & Cost of Capital (000s)	**Reference**		**Annual**
Net Book Value, Capital Investment	A = J from Page 1	$	42,597
Net Book Value, Contributions	B = M from Page 1		(3,409)
Future Income Taxes	C = H from Page 2		(1,153)
Projected Rate Base	**D = A + B + C**	**$**	**38,035**
% of 2022 Forecast Year End Rate Base	**E = D / R**		**8.34%**
Return on Debt	F = D X O	$	1,156
Return on Common Equity	G = D X P		1,409
Total Return On Rate Base	H = F + G	$	2,564
Weighted Average Cost of Capital ("WACC")			
Debt	I		60.20%
Common Equity	J		39.80%
Cost of Debt	K		5.07%
Cost of Common Equity	L		9.35%
Forecast 2022 Average Capitalization (Total Debt plus Common Equity)	M		441,067,000
Forecast 2022 Average Rate Base	N		443,101,100
WA Cost of Debt	O = I X K X M/ N		3.04%
WA Cost of Common Equity	P = J X L X M/ N		3.70%
Forecast 2022 WACC	Q = O + P		6.74%
2022 Forecast Year End Rate Base	**R**	**$**	**455,873**

Annual Project Revenue Requirement (000s)	**Reference**		**Annual**
Depreciation	A = N from Page 1	$	1,089
Return on Debt	B = F from Page 3		1,156
Return on Equity	C = G from Page 3		1,409
Income Taxes	D = O from Page 2		275
Estimated Annual Project Revenue Requirement	**E = A + B + C + D**	**$**	**3,928**
% Increase in Revenue Requirement over 2021	**F = E / G**		**1.68%**
Proposed 2021 Revenue Requirement*	**G**	**$**	**233,477**

* Page 1 of Attachment 1 of the Final Submission to Commission Staff Docket UE20944 filed on December 18, 2020.

Project Rate Impact	**Reference**	**Annual**
Total Project Revenue Requirement	A = E from Page 4 X 1000	$ 3,928,118
Forecast 2022 kWh Sales *	B	1,375,497,353
Forecast Increase Per kWh Project Rate Impact	**C = A / B**	**$ 0.00286**
Forecast Increase Annual Cost Average Residential Customer (650 kWh per month) before tax	**D = 650 kWh X C X 12 months**	**$ 22.31**
% of 2021 Forecast Annual Cost for Rural Residential Customer	E = D / I	1.50%
% of 2021 Forecast Annual Cost for Urban Residential Customer	F = D / J	1.53%
Forecast Increase Annual Cost Average General Service Customer (10,000 kWh per month) before tax	**G = 10,000 kWh X C X 12 months**	**$ 343.20**
% of 2021 Forecast Annual Cost for General Service Customer	H = G / K	1.47%
2021 Forecast Annual Cost Average Rural Residential Customer (650 kWh per month) excluding tax per page 2 of Attachment 1 of the Final Submission to Commission Staff Docket UE20944 filed on December 18, 2020.	I	$ 1,486.83
2021 Forecast Annual Cost Average Urban Residential Customer (650 kWh per month) excluding tax per per page 2 of Attachment 1 of the Final Submission to Commission Staff Docket UE20944 filed on December 18, 2020.	J	$ 1,458.62
2021 Forecast Annual Cost Average General Service Customer (10,000 kWh per month) excluding tax per page 2 of Attachment 1 of the Final Submission to Commission Staff Docket UE20944 filed on December 18, 2020.	K	$ 23,321.95

* Forecast 2022 kWh sales based on current load forecast at the time of filing this application.

APPENDIX E

Proposed 2022 Capital Projects by Investment Classification

Proposed 2022 Capital Projects by Investment Classification

	Mandatory	Access	System Growth	Renewal	Service Enhancement	General Plant	TOTAL
4.0 Generation							
4.1 Charlottetown Generating Station - Buildings and Site Services							
a. ECC Building Sidewalk Replacement						21,000	
b. CGS Miscellaneous Building and Site Upgrades						9,000	
Subtotal	-	-	-	-	-	30,000	$ 30,000
4.2 Charlottetown Generating Station - Turbine-Generator							
a. On-Island Generating Capacity Study			320,000				
b. Electronic Level Gauges for CT3 Fuel Tanks						40,000	
c. CGS Combustion Turbine Improvements, Parts and Tools				164,000			
Subtotal	-	-	320,000	164,000	-	40,000	$ 524,000
4.3 Borden Generating Station - Buildings and Site Services							
a. Commercial Storage Containers						90,000	
b. BGS Miscellaneous Building and Site Upgrades						193,000	
Subtotal	-	-	-	-	-	283,000	$ 283,000
4.4 Borden Generating Station - Turbine Generators							
a. CT1 and CT2 Life Extension Engineering Assessment				48,000			
b. CT2 Detroit Diesel Starter Overhaul				63,000			
c. CT1 and CT2 Component Upgrades				131,000			
d. Electronic Level Gauges for BGS Fuel Tanks						58,000	
e. BGS Combustion Turbine Improvements, Parts and Tools				108,000			
Subtotal	-	-	-	350,000	-	58,000	$ 408,000
Generation Total	**-**	**-**	**320,000**	**514,000**	**-**	**411,000**	**1,245,000**
% of Generation Total by Investment Classification	**0.0%**	**0.0%**	**25.7%**	**41.3%**	**0.0%**	**33.0%**	**100.0%**
5.0 Distribution							
5.1 Replacements Due to Storms, Collisions, Fire and Road Alterations							
a. Replacements Due to Storms, Fire and Collisions				990,000			
b. Replacements Due to Road Alterations		641,000					
Subtotal	-	641,000	-	990,000	-	-	$ 1,631,000
5.2 Distribution Transformers							
a. Polemount and Padmount Transformers		2,348,500		2,348,500			
b. PCB Equipment Replacements	640,000						
Subtotal	640,000	2,348,500	-	2,348,500	-	-	$ 5,337,000
5.3 Services and Street Lighting							
a. Overhead and Underground Services		4,738,000					
b. Street and Area Lighting		835,000					
Subtotal	-	5,573,000	-	-	-	-	$ 5,573,000
5.4 Line Extensions							
a. Customer Driven Line Extensions		1,447,000					
b. Reliability Driven Line Extensions					1,125,000		
Subtotal	-	1,447,000	-	-	1,125,000	-	$ 2,572,000
5.5 Line Rebuilds							
a. Single Phase and Three Phase Rebuilds				2,205,000			
b. PEI Broadband Project		4,564,000					
c. Distribution Line Refurbishment				794,000			
d. Accelerated Distribution Component Replacement							
i. Porcelain Cutout Replacement Program				102,000			
ii. Eastern Cedar Pole Replacement Program				1,211,000			
Subtotal	-	4,564,000	-	4,312,000	-	-	$ 8,876,000
5.6 System Meters							
a. Watt-Hour Meters		247,000		139,000			
b. Combination Meters		73,000		41,000			
c. Outdoor Metering Tanks		81,000		46,000			
d. Miscellaneous Metering Equipment		24,000		13,000			
Subtotal	-	425,000	-	239,000	-	-	$ 664,000
5.7 Distribution Equipment							
a-c. Substations, Line, Communications (incl. relays and switches)				1,303,000			
d. Line Tools and Equipment						222,000	
c. Meter Shop Equipment						31,000	
Subtotal	-	-	-	1,303,000	-	253,000	$ 1,556,000
5.8 Transportation Equipment	-	-	-	-	-	2,040,000	$ 2,040,000
Subtotal	-	-	-	-	-	2,040,000	2,040,000
Distribution Total	**640,000**	**14,998,500**	**-**	**9,192,500**	**1,125,000**	**2,293,000**	**28,249,000**
% of Distribution Total by Investment Classification	**2.3%**	**53.1%**	**0.0%**	**32.5%**	**4.0%**	**8.1%**	**100%**
6.0 Transmission							
6.1 Substation Projects							
a. East Royalty Substation			1,226,000				
b. Crossroads Substation Rebuild				2,620,000			
c. West Royalty X5 Autotransformer Upgrade				363,000			
d. Substation Oil Containment Program	147,000						
e. Substation Modernization Program				588,000			
f. 138 kV Breaker Replacement Program				146,000			
g. Mobile Communications System Upgrade				467,000			
h. Cavendish Feeder Automation					233,000		
i. Rattenbury Small Scale Solar and Battery Storage Pilot						165,000	
j. SCADA Master System Refresh				129,000			
k. Fibre Modifications Due to Road Alterations		38,000					
Subtotal	147,000	38,000	1,226,000	4,313,000	233,000	165,000	$ 6,122,000
6.2 Transmission Projects							
a. 69 kV and 138 kV Switch Program				590,000			
b. Transmission Line Refurbishment				932,000			
c. Transmission Lines							
i. T-11 Rebuild				829,000			
ii. Transmission Tap to East Royalty Substation			287,000				
iii. Crossroads Substation Transmission Modifications				81,000			
iv. West Royalty Substation Transmission Modifications				48,000			
Subtotal	-	-	287,000	2,480,000	-	-	$ 2,767,000
Transmission Total	**147,000**	**38,000**	**1,513,000**	**6,793,000**	**233,000**	**165,000**	**8,889,000**
% of Transmission Total by Investment Classification	**1.7%**	**0.4%**	**17.0%**	**76.4%**	**2.6%**	**1.9%**	**100%**
7.0 Corporate							
7.1 Corporate Services							
a. Recurring Annual Capital Requirements						441,000	
b. 180 Kent Street Office Building Roof Replacement						215,000	
Subtotal	-			-	-	656,000	$ 656,000
7.2 Information Technology							
a. Hardware Acquisitions						996,000	
b. Purchased Software and Upgrades						546,000	
c. Cybersecurity Enhancements						547,000	
d. Customer Services and Communication Enhancements						134,000	
e. Load Flow Software						134,000	
f. Website Hosting						98,000	
g. Survey Diagram Software						98,000	
h. Health, Safety and Environment Information Application						58,000	
i. Substation Communications System Upgrade						768,000	
Subtotal	-			-	-	3,379,000	$ 3,379,000
Corporate Total	**-**	**-**	**-**	**-**	**-**	**4,035,000**	**4,035,000**
% of Corporate Total by Investment Classification	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**100.0%**	
TOTAL	**787,000**	**15,036,500**	**1,833,000**	**16,499,500**	**1,358,000**	**6,904,000**	**42,418,000**
% of TOTAL	**1.9%**	**35.5%**	**4.3%**	**38.9%**	**3.1%**	**16.3%**	**100.0%**

APPENDIX F

List of Future Capital Projects

Legend of Abbreviations – Future Capital Projects List	
Abbreviation	**Description**
A/C	Air Conditioning
AMI	Advanced Metering Infrastructure
ATV	All-Terrain Vehicle
BCC	Backup Control Centre
BGS	Borden Generating Station
CIS	Customer Information System
CGS	Charlottetown Generating Station
CSUP	Customer Service Utility Person
CT1	Combustion Turbine #1
CT2	Combustion Turbine #2
CT3	Combustion Turbine #3
ECC	Energy Control Centre
EIA	Environmental Impact Assessment
GIS	Geographic Information System
HMI	Human-Machine Interface
HVAC	Heating, Ventilation and Air Conditioning
IT	Information Technology
MDM/R	Meter Data Management and Repository
OT	Operations Technology
RO-EDI	Reverse Osmosis-Electrodeionization
SCADA	Supervisory Control and Data Acquisition
WRSC	West Royalty Service Centre
TCH	Trans Canada Highway
XFMR	Transformer

List of Future Capital Projects						
	2022	**2023**	**2024**	**2025**	**2026**	**Future**
4.0 - GENERATION	**4.1 - CGS - Buildings and Site Services**	**4.1 - CGS - Buildings and Site Services**	**4.1 - CGS - Buildings and Site Services**	**4.1 - CGS - Buildings and Site Services**	**4.1 - CGS - Buildings and Site Services**	**4.1 - CGS - Buildings and Site Services**
	CGS Miscellaneous Building and Site Upgrades	CGS Miscellaneous Building and Site Upgrades	CGS Miscellaneous Building and Site Upgrades	CGS Miscellaneous Building and Site Upgrades	CGS Miscellaneous Building and Site Upgrades	CGS Miscellaneous Building and Site Upgrades
	ECC Building Sidewalk Replacement	ECC - Replace Rooftop A/C with Heat Pump	ECC - Window Replacement	ECC - Add GIS Capabilities to SCADA	ECC - Building Electrical Service Entrance Upgrade	ECC - SCADA Simulator
		ECC - Control Room Phone System with Wireless Headsets	ECC - SCADA Video Wall Display			CGS - Construction of New Entrance from Water Street Parkway
		CGS - Post Demolition Water Control (consultant)	ECC - Solar Panel and Powerwall Installation			CGS - Implementation of Heating System in Grey Shed
		CGS - Site Improvements and Landscaping	ECC - New ECC Operator Locker Room			CGS - Install Lunchroom and Washroom Facilities in Machine Shop
			CGS - Grey Storage Shed Renovations			CGS - Welding Area in the Grey Shed or Machine Shop
			CGS - Machine Shop Building Upgrades			CGS - Richmond Street Paving Upgrades
			CGS - Paving for Fuel Offloading and Steam Plant Lot			
	4.2 - CGS - Turbine Generator	**4.2 - CGS - Turbine Generator**	**4.2 - CGS - Turbine Generator**	**4.2 - CGS - Turbine Generator**	**4.2 - CGS - Turbine Generator**	**4.2 - CGS - Turbine Generator**
	CGS Combustion Turbine Improvements, Parts and Tools	CGS Combustion Turbine Improvements, Parts and Tools	CGS Combustion Turbine Improvements, Parts and Tools	CGS Combustion Turbine Improvements, Parts and Tools	CGS Combustion Turbine Improvements, Parts and Tools	CGS Combustion Turbine Improvements, Parts and Tools
	On-Island Generating Capacity Study	Flammables Storage Container for Lube Oil Storage	Additional 2,000,000 L Fuel Tank for CT3 Phase 1	Additional 2,000,000 L Fuel Tank for CT3 Phase 2	Install Salvaged Vibration Equipment on CT3 Auxillary Equipmen	Portable HMIs
	Electronic Level Gauges for CT3 Fuel Tanks	Install Ion Meters for Monthly Readings of Siemens Switchgear	Fire Detection Installation in CT3 Fuel Building	CT4 Combustion Turbine Phase 1	CT4 Combustion Turbine Phase 2	New Parts Storage Facility
		Modify RO-EDI for Recirculation Flushing		Coating of CT3 Fuel Tank and Three Borden Fuel Tanks		Installation of Wet Supression System for CT3
		RO-EDI Equipment Upgrades				Installation of Bird Deterrent Equipment
						Electronic Data Consolidation Equipment
						Replace Dorman Diesel
						CT3 Hybrid Battery System Retrofit
						New Diesel Pipeline Interconnection
	4.3 - BGS - Buildings and Site Services	**4.3 - BGS - Buildings and Site Services**	**4.3 - BGS - Buildings and Site Services**	**4.3 - BGS - Buildings and Site Services**	**4.3 - BGS - Buildings and Site Services**	**4.3 - BGS - Buildings and Site Services**
	BGS Miscellaneous Building and Site Upgrades	BGS Miscellaneous Building and Site Upgrades	BGS Miscellaneous Building and Site Upgrades	BGS Miscellaneous Building and Site Upgrades	BGS Miscellaneous Building and Site Upgrades	BGS Miscellaneous Building and Site Upgrades
	Commercial Storage Containers	Installation of Wireless Internet and Intranet Access				City Water Hookup and Fire Hydrant/Monitor Installation
						Outbuildings Upgrades and/or Replacement
	4.4 - BGS - Turbine Generators	**4.4 - BGS - Turbine Generators**	**4.4 - BGS - Turbine Generators**	**4.4 - BGS - Turbine Generators**	**4.4 - BGS - Turbine Generators**	**4.4 - BGS - Turbine Generators**
	BGS Combustion Turbine Improvements, Parts and Tools	BGS Combustion Turbine Improvements, Parts and Tools	BGS Combustion Turbine Improvements, Parts and Tools	BGS Combustion Turbine Improvements, Parts and Tools	BGS Combustion Turbine Improvements, Parts and Tools	BGS Combustion Turbine Improvements, Parts and Tools
	CT1 and CT2 Life Extension Engineering Assessment	CT1 Generator Inspection/Overhaul	CT2 Generator Inspection/Overhaul		CT1 Main Unit Gearbox Inspection and Refurbishment	CT2 Motor Control Centre Upgrades
	CT2 Detroit Diesel Starter Overhaul				CT2 Sodium Filter Replacement	Exhaust Volute on CT1
	CT1 and CT2 Component Upgrades					Renovate Air Filter House on CT2
	Electronic Level Gauges for BGS Fuel Tanks					
5.0 - DISTRIBUTION	**5.1 - Replacements Due to Storms and Road Alterations**	**5.1 - Replacements Due to Storms and Road Alterations**	**5.1 - Replacements Due to Storms and Road Alterations**	**5.1 - Replacements Due to Storms and Road Alterations**	**5.1 - Replacements Due to Storms and Road Alterations**	**5.1 - Replacements Due to Storms and Road Alterations**
	Replacements Due to Storms, Fires and Collisions	Replacements Due to Storms, Fires and Collisions	Replacements Due to Storms, Fires and Collisions	Replacements Due to Storms, Fires and Collisions	Replacements Due to Storms, Fires and Collisions	Replacements Due to Storms, Fires and Collisions
	Replacements Due to Road Alterations	Replacements Due to Road Alterations	Replacements Due to Road Alterations	Replacements Due to Road Alterations	Replacements Due to Road Alterations	Replacements Due to Road Alterations
	5.2 - Distribution Transformers	**5.2 - Distribution Transformers**	**5.2 - Distribution Transformers**	**5.2 - Distribution Transformers**	**5.2 - Distribution Transformers**	**5.2 - Distribution Transformers**
	Polemount and Padmount Transformers	Polemount and Padmount Transformers	Polemount and Padmount Transformers	Polemount and Padmount Transformers	Polemount and Padmount Transformers	Polemount and Padmount Transformers
	PCB Equipment Replacements	PCB Equipment Replacements	PCB Equipment Replacements	PCB Equipment Replacements		
	5.3 - Services and Street Lighting	**5.3 - Services and Street Lighting**	**5.3 - Services and Street Lighting**	**5.3 - Services and Street Lighting**	**5.3 - Services and Street Lighting**	**5.3 - Services and Street Lighting**
	Overhead and Underground Services	Overhead and Underground Services	Overhead and Underground Services	Overhead and Underground Services	Overhead and Underground Services	Overhead and Underground Services
	Street and Area Lighting	Street and Area Lighting	Street and Area Lighting	Street and Area Lighting	Street and Area Lighting	Street and Area Lighting
	5.4 - Line Extensions	**5.4 - Line Extensions**	**5.4 - Line Extensions**	**5.4 - Line Extensions**	**5.4 - Line Extensions**	**5.4 - Line Extensions**
	Customer Driven Line Extensions	Customer Driven Line Extensions	Customer Driven Line Extensions	Customer Driven Line Extensions	Customer Driven Line Extensions	Customer Driven Line Extensions
	Glenn Drive Three Phase Conversion	Two Feeders from East Royalty Substation (tap existing)	Blue Shank Road to Rte 1A (3-phase conversion)	Cameron Road (white phase WR02560) 27-XFMR	Victoria Cross Voltage Conversion (VC01482)	Tie Souris & Dingwells Mills (across the bridge)
	Mount Herbert Three Phase Conversion	3rd Feeder from East Royalty Substation (double circuit)	Blue Shank Road KN80084 (3-phase conversion)	New Albany Feeder	New Dover Feeder	Wellington Feeder
			Riverdale Road (3-phase conversion/step downs/85-XFMR)	Canoe Cove Voltage Conversion (blue phase WR15100) 143-XFMR		Souris Backup from Dingwells Mills (c/w automated switch)
			Robertson Road (3 phase conversion)			New Kensington Feeder
			Lady Slipper Drive North SE23313 (3-phase conversion)			Eldon-Belfast Voltage Conversion
	5.5 - Line Rebuilds	**5.5 - Line Rebuilds**	**5.5 - Line Rebuilds**	**5.5 - Line Rebuilds**	**5.5 - Line Rebuilds**	**5.5 - Line Rebuilds**
	Distribution Line Refurbishment Program	Distribution Line Refurbishment Program	Distribution Line Refurbishment Program	Distribution Line Refurbishment Program	Distribution Line Refurbishment Program	Distribution Line Refurbishment Program
	Porcelain Cutout Replacement Program	Porcelain Cutout Replacement Program	Porcelain Cutout Replacement Program	Porcelain Cutout Replacement Program	Porcelain Cutout Replacement Program	Porcelain Cutout Replacement Program
	Eastern Cedar Pole Replacement Program	Eastern Cedar Pole Replacement Program	Eastern Cedar Pole Replacement Program	Eastern Cedar Pole Replacement Program	Eastern Cedar Pole Replacement Program	Eastern Cedar Pole Replacement Program
		Copper Wire Replacement Program	Copper Wire Replacement Program	Copper Wire Replacement Program	Copper Wire Replacement Program	Copper Wire Replacement Program
		Backlot Feed Relocation Program	Backlot Feed Relocation Program	Backlot Feed Relocation Program	Backlot Feed Relocation Program	Backlot Feed Relocation Program
	PEI Broadband Project - Year 3	PEI Broadband Project Year 4	Miscellaneous Communication Make-Ready Projects	Miscellaneous Communication Make-Ready Projects	Miscellaneous Communication Make-Ready Projects	Miscellaneous Communication Make-Ready Projects
	Northside Road Line Rebuild	West Royalty Industrial Park Backlot Feed Upgrade	Village Green Road	Northside Road	Rte 20 Malpeque	Kinross to Vernon River
	Rustico Road Line Rebuild and Voltage Conversion	Rte 2 Elmsdale to Bloomfield	Grahams Road (RT01072)	Keppoch Road	Baltic Road	Mount Edward Road
	Kingston Road Line Rebuild	Crossroad Substation Distribution Work	Alberton to Elmsdale	Egmont Bay Rte #11 Maximeville (WL02028)	Egmont Bay	TCH Desable to Victoria
	North York River Road Line Rebuild and Voltage Conversion			North York Rebuild	New Zealand Road-West	Kingston Voltage Conversion
					TCH Mt Mellick to Rte 3	Backup Rattenbury with Kensington
					Fernwood	Locke Road
						St. Peters Road
						Greenmount Road
						Montrose to Tignish
						West Cape to Howards Cove
						Lower Bedeque
						Baltic Road-East
						Green Road Bonshaw (rebuild/voltage upgrade)
						Spring Park Road/Douglas Street
						Nodd Road

	List of Future Capital Projects					
	2022	**2023**	**2024**	**2025**	**2026**	**Future**
5.0 - DISTRIBUTION	**5.6 - System Meters**	**5.6 - System Meters**	**5.6 - System Meters**	**5.6 - System Meters**	**5.6 - System Meters**	**5.6 - System Meters**
	Watt-Hour Meters	Watt-Hour Meters	Watt-Hour Meters	Watt-Hour Meters	Watt-Hour Meters	Watt-Hour Meters
	Combination Meters	Combination Meters	Combination Meters	Combination Meters	Combination Meters	Combination Meters
	Outdoor Metering Tanks	Outdoor Metering Tanks	Outdoor Metering Tanks	Outdoor Metering Tanks	Outdoor Metering Tanks	Outdoor Metering Tanks
	Miscellaneous Metering Equipment	Miscellaneous Metering Equipment	Miscellaneous Metering Equipment	Miscellaneous Metering Equipment	Miscellaneous Metering Equipment	Miscellaneous Metering Equipment
		Smart Meters (AMI)	Smart Meters (AMI)	Smart Meters (AMI)	Smart Meters (AMI)	Smart Meters (AMI)
	5.7 - Distribution Equipment	**5.7 - Distribution Equipment**	**5.7 - Distribution Equipment**	**5.7 - Distribution Equipment**	**5.7 - Distribution Equipment**	**5.7 - Distribution Equipment**
	Substation, Line and Communication Equipment	Substation, Line and Communication Equipment	Substation, Line and Communication Equipment	Substation, Line and Communication Equipment	Substation, Line and Communication Equipment	Substation, Line and Communication Equipment
	Relay Replacement	Relay Replacement	Relay Replacement	Relay Replacement	Relay Replacement	Relay Replacement
	Distribution Switches	Distribution Switches	Distribution Switches	Distribution Switches	Distribution Switches	Distribution Switches
	Line Tools and Equipment	Line Tools and Equipment	Line Tools and Equipment	Line Tools and Equipment	Line Tools and Equipment	Line Tools and Equipment
	Meter Shop Equipment	Meter Shop Equipment	Meter Shop Equipment	Meter Shop Equipment	Meter Shop Equipment	Meter Shop Equipment
	5.8 - Transportation Equipment	**5.8 - Transportation Equipment**	**5.8 - Transportation Equipment**	**5.8 - Transportation Equipment**	**5.8 - Transportation Equipment**	**5.8 - Transportation Equipment**
	Passenger Vehicles and Trailers	Passenger Vehicles and Trailers	Passenger Vehicles and Trailers	Passenger Vehicles and Trailers	Passenger Vehicles and Trailers	Passenger Vehicles and Trailers
	Aerial Bucket with Elevator (Central)	Digger Derrick (Central)	Aerial Bucket (Central)	CSUP Truck	Aerial Bucket (East)	Line Trucks and Other Large Vehicles
	Digger/Derrick (East)	Digger Derrick (Central)	Tracked Bucket	Tracked Digger	Digger Derrick (Central)	Offroad Vehicles
	CSUP Truck (Central)	CSUP Truck (West)	Large pulling Trailer	Telehandler (Stores)	CSUP Truck	
	Four Level 2 EV Charging Stations	Vehicle for Towing Mobile Transformer and Nodwells	Large Tensioning Trailer	Side by Side ATV with Trailer		
6.0 - TRANSMISSION	**6.1.- Substation Projects**	**6.1.- Substation Projects**	**6.1.- Substation Projects**	**6.1.- Substation Projects**	**6.1.- Substation Projects**	**6.1.- Substation Projects**
	Substation Oil Containment Program	Substation Oil Containment Program	Substation Oil Containment Program	Substation Oil Containment Program	Substation Oil Containment Program	Substation Oil Containment Program
	Substation Modernization Program	Substation Modernization Program	Substation Modernization Program	Substation Modernization Program	Substation Modernization Program	Substation Modernization Program
	138 kV Breaker Replacement Program	138 kV Breaker Replacement Program	138 kV Breaker Replacement Program	138 kV Breaker Replacement Program	138 kV Breaker Replacement Program	138 kV Breaker Replacement Program
	Fibre Modifications Due to Road Alterations	Fibre Modifications Due to Road Alterations	Fibre Modifications Due to Road Alterations	Fibre Modifications Due to Road Alterations	Fibre Modifications Due to Road Alterations	Fibre Modifications Due to Road Alterations
	East Royalty Substation	Alberton Substation Low Voltage Bus and Control Building Phase 1	Alberton Substation - New Low Voltage Bus and Control Building Phase 2	69 kV Alberton Breaker Replacement	Tignish Substation Land Purchase, EIA and Engineering	Tignish Substation Construction
	Crossroads Substation Rebuild	Crossroads Substation Rebuild	X4 West Royalty 20 MVA Power Transformer	X1 West Royalty 20 MVA Power Transformer	Tignish Power Transformer Specification	Tignish Power Transformer
	West Royalty X5 Autotransformer Upgrade	West Royalty X5 Autotransformer Upgrade	West Royalty Autotransformer (tie-breaker)	West Royalty Autotransformer Phase 4 (order X6/install X6 cable)	West Royalty Autotransformer Phase 5 (install X6)	Charlottetown Area Substation
	Mobile Communication System Upgrade	Communication Fibre Lorne Valley to Georgetown	Communication Fibre Lorne Valley to Dingwells Mills	Communication Fibre Victoria Cross to Dover	Communication Fibre from Sherbrooke to O'Leary	Borden X3
	Cavendish Feeder Automation	Communication Fibre Lorne Valley to Victoria Cross	Communication Fibre Borden to Albany	Communication Fibre Bedeque to Richmond Cove	Communication Fibre Expansion	Communication Fibre Expansion
	Rattenbury Small Scale Solar and Battery Storage Pilot		Reactor 1 Bedeque	Reactor 2 Bedeque	69 kV Mobile Transformer #47 Replacement	69 kV Mobile Replace #47
	SCADA Master System Refresh		St. Eleanor's 10 MVA Power Transformer	O'Leary Switching Station Engineering Design	O'Leary Switching Station Phase 1 Construction	O'Leary Switching Station Phase 2
				O'Leary Switching Station Phase 1 Construction	O'Leary Autotransformer Specification	Auto transformer O'Leary
				69 kV Spare Breaker	138 kV Spare Breaker	Cavendish Substation
				Communication System Upgrade	Communication System Upgrade	Bedeque Substation
				Sherbrooke Switching Station Upgrade Engineering	X1 Sherbrooke Replacement	Scotchfort Substation
				Sherbrooke Switching Station Tie Breaker		Mt. Pleasant Substation
	6.2 - Transmission Lines	**6.2 - Transmission Lines**	**6.2 - Transmission Lines**	**6.2 - Transmission Lines**	**6.2 - Transmission Lines**	**6.2 - Transmission Lines**
	69 kV and 138 kV Switch Program	69 kV and 138 kV Switch Program	69 kV and 138 kV Switch Program	69 kV and 138 kV Switch Program	69 kV and 138 kV Switch Program	69 kV and 138 kV Switch Program
	Transmission Line Refurbishment Program	Transmission Line Refurbishment Program	Transmission Line Refurbishment Program	Transmission Line Refurbishment Program	Transmission Line Refurbishment Program	Transmission Line Refurbishment Program
	T-11 Rebuild	Transmission Lines Aerial Inspection		Transmission Lines Aerial Inspection	Y-101 Rebuild Part 1	Y-101 Rebuild Part 2
	Transmission Tap to East Royalty Substation			Looped Transmission Feed to O'Leary (69 kV)	Reroute T-1 out of Thorndale Drive Area	T-15 Rebuild
	Crossroads Substation Transmission Modifications				O'Leary Switching Station 138 kV Transmission Work	Y-103 Rebuild
	West Royalty Substation Transmission Modifications					Y-105 Rebuild
						Y-107 Rebuild
						T-1 Re-route Hunter River to St. Patrick's Road
						T-1 Re-route Rattenbury to Kensington
						Rebuild (in place) Y-109 from the Connolly Woods Road to Bedeque
						Rebuild Y-109 from Connelly Woods Road to the Bannockburn Road
						Mount Pleasant Transmission
						Rebuild Y-111 from Towers to Bedeque
						Looped Transmission Feed to Victoria Cross (T-10)
						Looped Transmission Feed to Georgetown Substation
						Rebuild Georgetown Substation
						Y-110 from Scotchfort to Lorne Valley
						Lorne Valley Expansion
						Y-119 from Bannockburn Road to Scotchfort
7.0 - CORPORATE	**7.1 Corporate Services**	**7.1 Corporate Services**	**7.1 Corporate Services**	**7.1 Corporate Services**	**7.1 Corporate Services**	**7.1 Corporate Services**
	Recurring Annual Capital Requirements	Recurring Annual Capital Requirements	Recurring Annual Capital Requirements	Recurring Annual Capital Requirements	Recurring Annual Capital Requirements	Recurring Facilities Upgrade Projects
	180 Kent Street Office Building Roof Replacement	180 Kent HVAC, Insulation, Electrical	WRSC Improvement Plan Phase 3			
	7.2 Information Technology	**7.2 Information Technology**	**7.2 Information Technology**	**7.2 Information Technology**	**7.2 Information Technology**	**7.2 Information Technology**
	Hardware Acquisitions	Hardware Acquisitions	Hardware Acquisitions	Hardware Acquisitions	Hardware Acquisitions	Hardware Acquisitions
	Purchased Software Upgrades	Purchased Software Upgrades	Purchased Software Upgrades	Purchased Software Upgrades	Purchased Software Upgrades	Purchased Software Upgrades
	Cybersecurity Enhancements	Cybersecurity Enhancements	Cybersecurity Enhancements	Cybersecurity Enhancements	Cybersecurity Enhancements	Cybersecurity Enhancements
	Customer Services and Communication Enhancements	Customer Services and Communication Enhancements	Customer Services and Communication Enhancements	Customer Services and Communication Enhancements	Customer Services and Communication Enhancements	Customer Services and Communication Enhancements
	Load Flow Software	Other IT Projects	Other IT Projects	Other IT Projects	Other IT Projects	Other IT Projects
	Website Hosting	MDM/R-CIS-Billing Year 1	MDM/R-CIS-Billing Year 2	MDM/R-CIS-Billing Year 3		
	Health, Safety and Environment Information Application	Engineering Fixed Assets	Load Modeling Software			
	Substation Communications System Upgrade					
	Survey Diagram Software					

APPENDIX G

CT2 Starter Oil Analysis Report

Client: 3532311

MARITIME ELECTRIC COMPANY
50 CUMBERLAND ST. / P.O. BOX 1328
CHARLOTTETOWN, PEI C1A7N2

ATTN: JOE STEELE/SHAWN CONNOLLY

Unit #: GT2
Unit Location: Borden
Component: STARTER
Location:
Serial #: 205155
Make: DETROIT DIESEL
Model:
OAS #:

AGAT Laboratories
Equipment Reliability and Lubricants Testing Services
3650 21st Street N.E., Calgary, AB, T2E6V6
Phone:(403)299-2000 Fax:(403)299-2105

Date analyzed: 01/13/21
Work order: 21C163850
Oil brand & grade: SHELL ROTELLA T 30
Client Ref #:

LEGEND - LC -Lower Critical | LR -Lower Reportable | UR -Upper Reportable | UC -Upper Critical | * *Ital* -Custom Limit

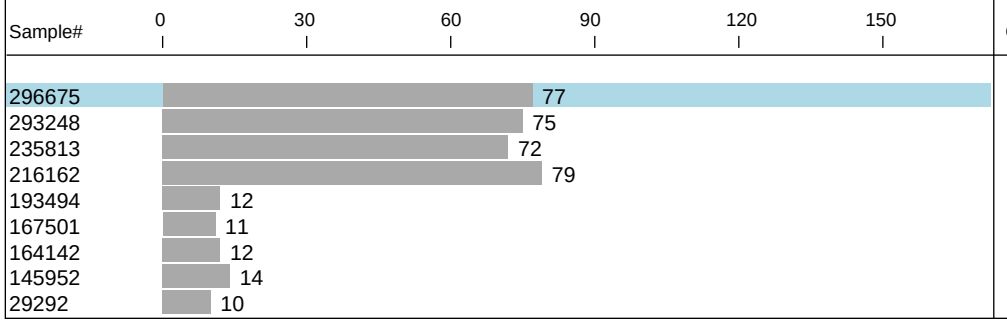
UNIT DATA / SPECTROGRAPHIC ANALYSIS (PPM)

Sample#	Date Sampled	Component Service	Oil Service	Oil Changed	Al Aluminum	Cr Chromium	Cu Copper	Fe Iron	Sn Tin	Pb Lead	Si Silicon	Mo Molybdenum	Ni Nickel	Ag Silver	K Potassium	Na Sodium	B Boron	Ba Barium	Ca Calcium	Mg Magnesium	Mn Manganese	P Phosphorus	Zn Zinc
New Oil					0	0	0	0	0	0	0	0	0	0	0	0	150	0	1700	0	0	640	720
296675	12/15/20			N	0	0	2	4	1	1	3	69	0	0	0	5	14	0	2170	169	0	703	886
293248	11/26/19			N	0	0	2	3	0	1	3	69	0	0	0	5	15	0	2120	169	0	785	809
235813	11/27/18			N	0	0	1	3	0	1	3	67	0	0	0	1	18	0	2220	147	0	805	918
216162	11/14/17			N	0	0	1	3	0	0	3	75	0	0	0	2	19	0	2400 UR	164	0	893	949
193494	12/14/16			N	1	1	1	6	1	1	2	1	0	0	0	2	86	0	1970	17	0	599	676
167501	12/01/15				1	1	1	6	1	1	2	0	0	0	1	2	75	1	2040	17	0	639	793
164142	01/23/15			N	1	0	1	6	1	2	2	1	0	0	1	2	115	0	1880	16	0	613	683
145952	05/02/14			N	2	1	1	6	1	2	2	1	0	0	2	2	127	1	1760	16	0	629	737
29292	01/29/13			N	0	1	1	5	1	2	2	0	0	0	1	0	145	0	1870	15	0	671	786

PHYSICAL PROPERTIES / ISO CLEANLINESS / OIL DEGRADATION

Sample#	Glycol	H2O	% Fuel	Viscosity 40°C	Viscosity 100°C	% Solids	KF	°C Flash Point	Micron size 4	Micron size 6	Micron size 14	ISO Code	% SOOT	abs/cm-1 OXD	abs/cm-1 NOX	abs/cm-1 COX	abs/cm-1 SO4	abs/cm-1 ZDDP	TAN	TBN	Min. RPVOT
New Oil				100.0	11.6														2.75	6.0	
296675	N	N	5.3	81.4 LC															2.01		
293248	N	N		89.7 LR					24009	3022	84	22/19/14							2.20		
235813	N	N		90.5					7651	1031	14	20/17/11							2.34		
216162	N	N		93.2					66737	15127	510	23/21/16							1.85		
193494	N	N	6.7	76.0 LC					20203	4146	130	22/19/14							1.75		
167501	N	N	6.0	77.0 LC															1.21		
164142	N	N	5.6	78.1 LC	10.1 LR														1.61		
145952	N	P		79.4 LR			0.14%												1.13		
29292	N	P		82.2 LR			0.16%												2.20		

WEAR CONTROL CHART



COMMENTS

Comments:

REFER TO REVERSE FOR QUALITY CONTROL REPORT, EXPLANATION OF VARIANCE AND POSSIBLE CAUSES.

Should you wish to provide feedback to AGAT Laboratories, please access our Customer review form at www.agatlabs.com/review.htm. This input is extremely important to us because your well being and satisfaction is our number one priority.

* COMPONENT SERIAL NUMBER MUST BE GIVEN TO GENERATE HISTORY. Bold faced elements are included in Wear Control Chart.

Client: 3532311

MARITIME ELECTRIC COMPANY
50 CUMBERLAND ST. / P.O. BOX 1328
CHARLOTTETOWN, PEI
C1A7N2
ATTN: JOE STEELE/SHAWN CONNOLLY

Date analyzed: 01/13/21
Work order: 21C163850
Oil brand & grade: SHELL ROTELLA T 30
Client Ref #:

Unit No.: GT2
Unit Location: Borden
Component: STARTER
Location:
Serial No.: 205155
Make: DETROIT DIESEL
Model:
OAS No.:

AGAT Laboratories

Quality Control Report

Flagged Result	Possible Causes	Significance of Result / Recommended Action
Fuel - Fuel Dilution	Fuel dilution may be due to excessive blow-by, excessive idling, cold weather starting, faulty injector, leaking fuel transfer pump seals or stop and go driving. Fuel dilution may be correlated with decreased oil viscosity.	Fuel dilution indicates contamination of the sample with fuel. Identify and evaluate the source. Consider changing the oil.
VISC40 - Viscosity at 40 C	Lower than expected viscosity may be due to contamination with lower grade oil, fuel or degradation due to shearing or extended drain intervals.	Lower than expected viscosity may indicate contamination or degradation of the oil. Verify the identity and grade of the oil in use. Identify and evaluate the cause. Consider changing the oil.

Client: 3532311

MARITIME ELECTRIC COMPANY
50 CUMBERLAND ST. / P.O. BOX 1328

CHARLOTTETOWN, PEI C1A7N2

ATTN: JOE STEELE/SHAWN CONNOLLY

Unit #: GT2
Unit Location: Borden
Component: STARTER
Location:
Serial #: 205155
Make: DETROIT DIESEL
Model:

Oil brand & grade: SHELL ROTELLA T 30
Sample #: C-910261
Date Sampled: 01/13/21
Date Analyzed: 01/13/21
Work order: 21C163850
Client Ref #:

AGAT Laboratories

Sample Status and Trending

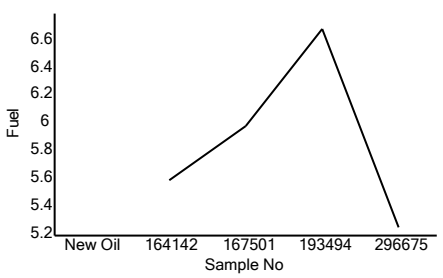
Sample Score:

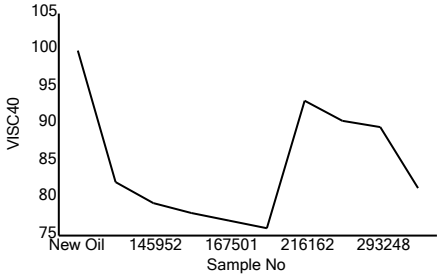
Your Sample Score: 6

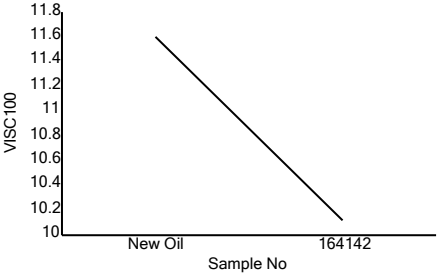
Rankings: 0-3 Normal, 4-6 Reportable, 7-10 Critical

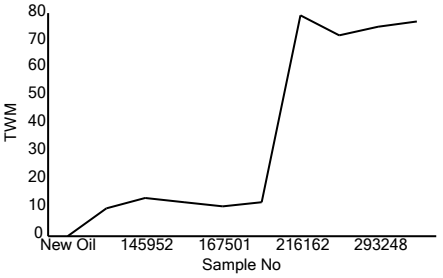
Normal Reportable Critical

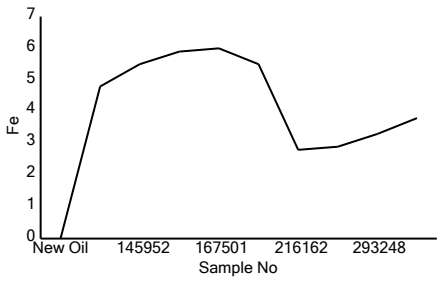
Trend Graphs

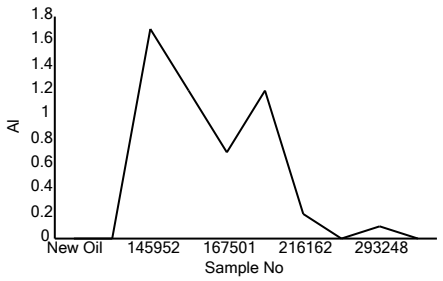


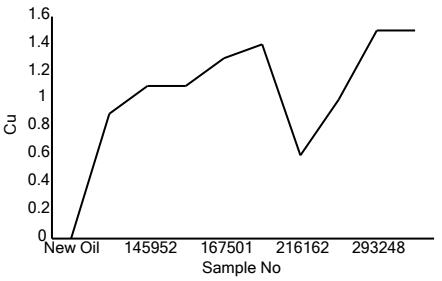


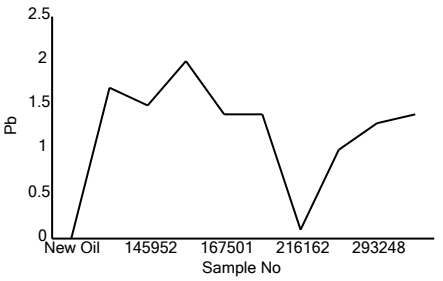












APPENDIX H

Reliability Driven Line Extensions Description and Justification

Title:	**Glenn Drive Three Phase Conversion**
Location:	**Linkletter**
Line Type:	**Distribution – Single Phase**
Distance:	**2.8 kilometres**
Amount:	**$510,000**

Project Description

This project involves converting lines SE23110, SE23126, SE23116 and SE23120 from single to three phase. The line conversion starts at the dead end of Marion Drive and then follows Jason Drive, Tanton Drive, Glenn Drive, Fairway Avenue and Route 11 to Spruce Drive. The circuit operates at 7,200 volts.

Justification

The primary objective of the project is to reduce load imbalance on two St. Eleanors Substation circuits (Sherbrooke and Miscouche) by converting a 2.8 km section of single phase line, between St. Eleanors and Linkletter, to three phase. The conversion will involve upgrading the conductor from #2 to 477 Cosmos, which will increase the load capacity of the line by 250 per cent (from 180 amps to 584 amps and reduce losses[1]). Once the new three phase line is in place, it will allow for the existing heavily loaded single phase lines on the Sherbrooke and Miscouche circuits to be separated and balanced. This will be accomplished by connecting the various remaining single phase lines to separate phases (i.e., phase A, B or C) of the new three phase line.

In December 2020, the neutral current on the Sherbrooke and Miscouche circuits exceeded 85 amps and 70 amps, respectively. This indicated a significant load imbalance as the neutral wire is the return path for imbalanced current, and the presence of large neutral currents indicates an imbalance that can cause voltage control problems. In addition, neutral currents of this magnitude are a safety hazard for communication companies working in proximity to the neutral.

Currently, the single phase lines along Glenn Drive (Sherbrooke circuit) and Lady Slipper Drive South (Miscouche circuit) are heavily loaded, both peaking above 100 amps (the rating of the fuse protection devices on those lines). Single phase lines operating above 100 amps typically

[1] Energy loss savings of approximately $640,000 (present value) are expected over the service life of the new three phase line.

have power quality problems and it is difficult to coordinate fuse protection. By converting the single phase line from Marion Drive to Spruce Drive as shown in Figure 1, load balancing can occur on the Sherbrooke circuit. Some of the Miscouche circuit load at the far end of Lady Slipper Drive will be moved onto the Sherbrooke circuit, providing backup opportunities to improve reliability in the area.

The section of SE23116 that is on Glenn Drive currently has an additional safety concern, as two utilities (i.e., Maritime Electric and City of Summerside Electric Utility) are sharing the same poles, crossarms and neutral wire. This project will allow Maritime Electric to move most of this section of line to the opposite side of the road and separate the two systems.

This project is justified based on the obligation to provide customers with equitable access to a safe, reliable and adequate supply of power and cannot be deferred.

Costing Methodology

A breakdown of the proposed budget allocation for the Glenn Drive Three Phase Conversion project is shown in Table 1.

Table 1
Breakdown of Proposed Budget Allocation
Glenn Drive Three Phase Conversion

Description	**Budget**
Material	$ 77,000
Contractor Labour	298,000
Internal Labour and Transportation	135,000
TOTAL	**$ 510,000**

Construction

The existing line along Glenn Drive with #2 conductor (rated for 180 amps) is old and in poor condition. The new 477 Cosmos conductor (rated for 584 amps) will be installed throughout the conversion. It is intended that the new line will be built on the same side of the road as the existing line except along Glenn Drive where the new line will be built on the opposite side of the road. Approximately 15 cedar poles will be removed as part of this project.

A permit from the Department of Transportation and Infrastructure will be required for the project. Traffic control personnel will be necessary as it is located within a busy neighbourhood setting.

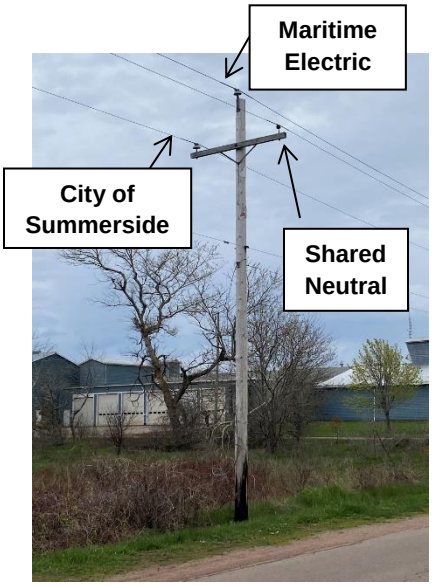
Construction is scheduled to begin in early 2022, and four crews working seven weeks will be required to complete the project.

Alternatives

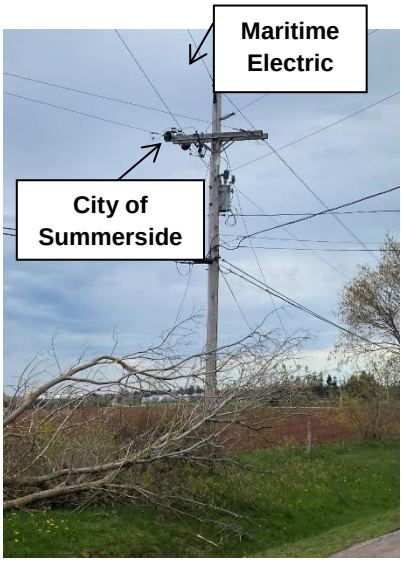
An alternative to the project, as proposed, was evaluated. It involved installing three-phase Hendrix bundled conductor along a portion of the Confederation Trail to provide a similar load balancing benefit. This option was determined to be more costly to construct and more difficult to access for maintenance, compared to the proposed project. Also, the alternative was based on a construction method that is not standard to Maritime Electric.

Future Commitments

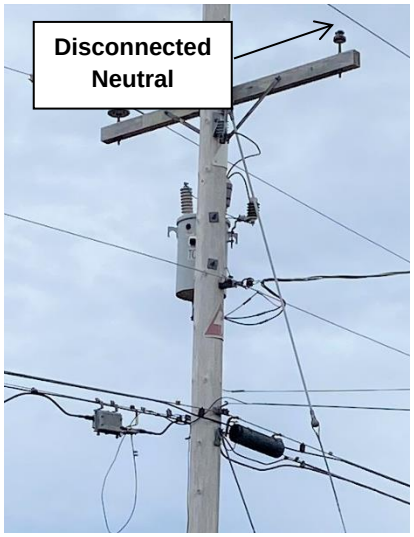
This is not a multi-year project.



Two utilities sharing a common neutral



Two utilities sharing a utility pole



Neutral is disconnected from the crossarm

Figure 1:
Scope of 2.8 kilometre Glenn Drive Three Phase Conversion, Linkletter, PE

Title:	**Mount Herbert Three Phase Conversion**
Location:	**Mount Herbert**
Line Type:	**Distribution – Single Phase**
Distance:	**2.7 kilometres**
Amount:	**$615,000**

Project Description

This project involves converting line CR00424 from single to three phase. The line conversion will start at 2793 Route 215 in Mount Herbert, head southeast towards the Mount Herbert Road, and then follow the Mount Herbert Road to the Trans Canada Highway. The circuit operates at 7,200 volts.

Justification

The primary objective of this project is to reduce load on the Crossroads Substation which is continuing to experience load growth with ongoing development in the Stratford area. In addition, new line will:

i. Improve reliability by providing a backup feed for approximately 900 customers on the Bunbury circuit (CR00484);
ii. Support the Crossroads Substation Rebuild project[2], by permanently transferring load in the Mount Herbert area from the Crossroads Substation to the Mount Albion Substation. As such, the Mount Herbert Three Phase Conversion project is interdependent with the Crossroads Substation Rebuild project, as well as the Crossroads Substation Transmission Modifications project[3];
iii. Move the supply source for the rural area around Stratford to the Mount Albion Substation, thereby enabling the Crossroads Substation to accommodate the expected load growth in the Town of Stratford.

This project is justified based on the obligation to provide customers with access to a safe, reliable and adequate supply of power and cannot be deferred.

[2] See Section 6.1b for a description of the Crossroads Substation Rebuild project.
[3] See Appendix O for a description of the Crossroads Substation Transmission Modifications project.

Costing Methodology

A breakdown of the proposed budget allocation for the Mount Herbert Three Phase Conversion project is shown in Table 2.

Table 2
Breakdown of Proposed Budget Allocation
Mount Herbert Three Phase Conversion

Description	Budget
Material	$ 103,000
Contractor Labour	347,000
Internal Labour and Transportation	165,000
TOTAL	**$ 615,000**

Construction

The existing line along the Mount Herbert Road is #2 conductor (rated for 164 amps) that is old and in fair condition. This project will require the installation of new 477 Cosmos conductor (rated for 584 amps) throughout. It is planned for the new line to be built on the same side of the road by leaning the existing line out of the way and building the new line with the existing line still energized to minimize customer outage impacts. There are 7 cedar poles to be removed in this project out of a total of 59 poles (12 per cent).

A permit from the Department of Transportation and Infrastructure will be required for the project. Traffic control personnel will be necessary as traffic volume is low but speed is high along the project route.

Construction is scheduled to begin in the summer of 2022 and four crews working for nine weeks will be required to complete the project.

Alternatives

There is no alternative to this project. The proposed route is the shortest, least cost option.

Future Commitments

This is not a multi-year project.

Rusted Transformers

Leaning Eastern Cedar Poles

Long Spans

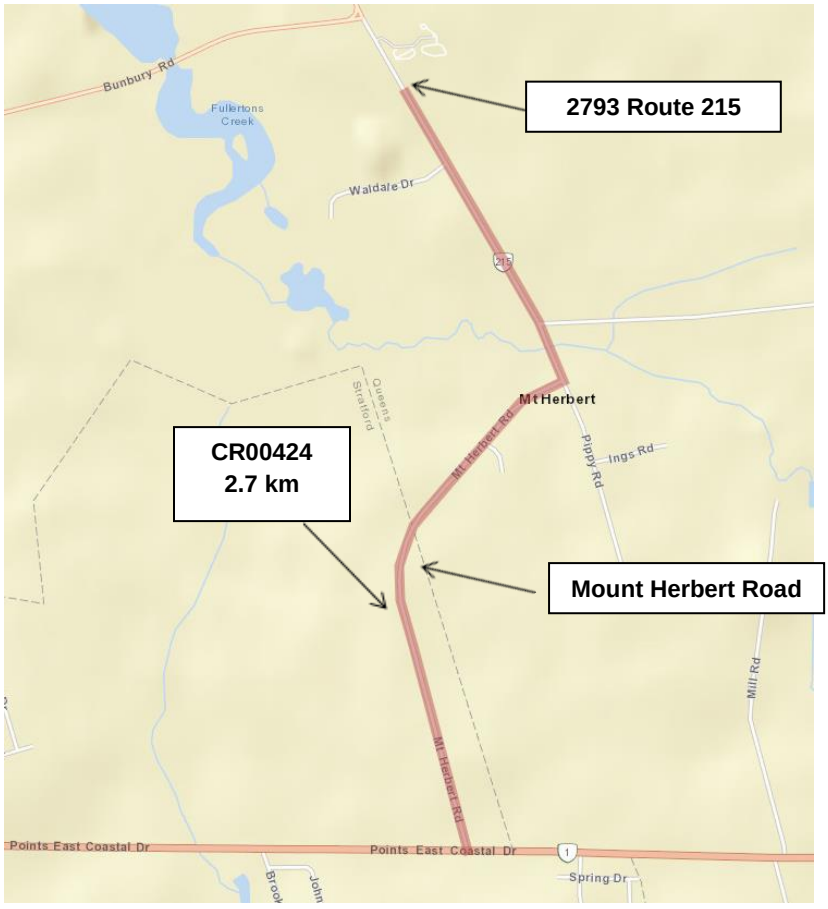


Figure 2:
Scope of 2.7 kilometre Mount Herbert Three Phase Conversion, Mount Herbert, PE

APPENDIX I

Single and Three Phase Line Rebuilds Description and Justification

Title: **Northside Road (Route 16) Line Rebuild**
Location: **Hermanville**
Line Type: **Distribution – Single Phase**
Distance: **3.7 kilometres**
Amount: **$470,000**

Project Description

This project is a single phase rebuild to replace a 3.7 kilometre section of line SO13143 from civic address 8180 Route 16 (the intersection of Baltic Road) to 7447 Route 16 (as shown in Figure 1). The line is operated at 7,200 volts and is connected to the Souris Substation. There are 32 customers fed from this line.

Justification

The primary justification for the project is that SO13143 is aged and deteriorated. There are approximately 43 poles along the route with 20 of them (46 percent) being aged eastern cedar poles in poor condition. In addition, there are multiple splice repairs on this section of line, the spans are very long and parts of the line have old neutral spacing. Customers fed from SO13143 have experienced 153.6 customer outage hours in the last 5 years.

The project is justified based on the obligation to provide safe and adequate service to customers. For the reasons provided, the project cannot be deferred.

Costing Methodology

A breakdown of the proposed budget allocation for the Northside Road Line Rebuild project is shown in Table 1.

Table 1
Breakdown of Proposed Budget Allocation
Northside Road Line Rebuild

Description	**Budget**
Material	$ 79,000
Contractor Labour	248,000
Internal Labour and Transportation	143,000
TOTAL	**$ 470,000**

Construction

The existing conductor is #4 Swan (rated for 140 amps) and will be replaced with 2/0 Quail (rated for 270 amps) to bring the line to current standards. The line will be rebuilt on the same side of the road to utilize existing main line and service poles that are in good condition and do not have to be replaced.

A permit from the Department of Transportation and Infrastructure will be required for this project and traffic control will be necessary as vehicle speed is high on this road.

Construction is scheduled to begin in early 2022 and four crews working for six weeks will be required to complete the project.

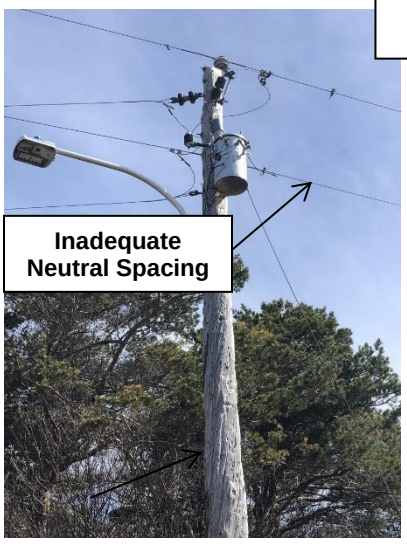
Alternatives

There are no alternatives to this project. The section of line proposed for rebuild requires replacement.

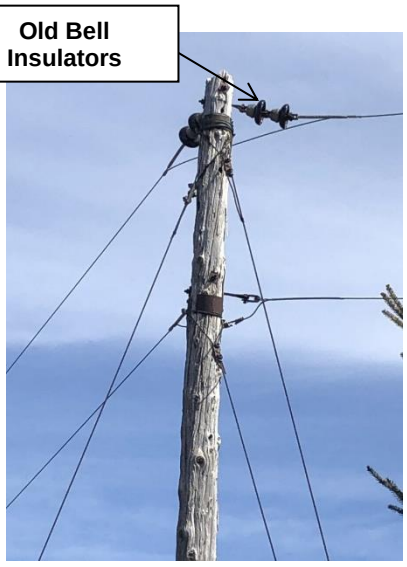
Future Commitments

This is not a multiyear project.

Eastern cedar pole with long spans



Eastern cedar pole with inadequate neutral spacing and old bell insulators



Eastern cedar pole with old bell insulators

Figure 1:
Scope of the 3.7 kilometre Northside Road Line Rebuild, Hermanville, PE

Title:	**Rustico Road (Route 7) Line Rebuild and Voltage Conversion**
Location:	**North Milton**
Line Type:	**Distribution – Single Phase**
Distance:	**3.8 km Rebuild; 10 km Voltage Conversion**
Amount:	**$1,233,000**

Project Description

The project includes a single phase rebuild to replace 3.8 kilometres of line WR01692 on Route 7 in two sections, from civic address 868 to 1298 (at the intersection of Rustico Road and Parker Cross Road) and from civic address 1641 to 1956 (near the Esso station parking lot) as shown in Figure 2. The project also includes 10 kilometres of voltage conversion of line WR01692 on the Rustico Road starting near Miltonvale Park and ending in Oyster Bed Bridge. A 2.2 kilometre section of the voltage conversion is three phase construction. The line is currently operated at 7,200 volts and is connected to the West Royalty Substation. There are approximately 161 customers fed from this section of line and a total of 87 transformers will be converted to 14,400 volts.

Justification

The primary objective of the project is to improve the power quality and reliability for customers in the North Milton, Oyster Bed Bridge and surrounding areas. In addition:

i. WR01692 is a 7,200 volt line that is connected to a 14,400 volt feeder from West Royalty through a step-down transformer that is rated for 1 MVA. The load on the step-down transformer is now at 989 kVA, with load growth projections that it will be overloaded in the near future; and
ii. Customers fed from WR01692 experienced 915 outage hours in the last five years.

The project is justified based on the obligation to provide safe and adequate service to customers. For the reasons provided, the project cannot be deferred.

Costing Methodology

A breakdown of the proposed budget allocation for the Rustico Road line rebuild and voltage conversion project is shown in Table 2.

Table 2 Breakdown of Proposed Budget Allocation Rustico Road Line Rebuild and Voltage Conversion	
Description	**Budget**
Material	$ 212,000
Contractor Labour	643,000
Internal Labour and Transportation	378,000
TOTAL	**$ 1,233,000**

Construction

The existing conductor is #4 Swan (rated for 140 amps) and will be replaced with 2/0 Quail (rated for 270 amps) for the single phase rebuild to meet load requirements. The line will be rebuilt on the opposite side of the road as this is the least-cost option, due to the productivity and safety benefits of not having to work alongside energized conductor that is in poor condition and at risk of failure during handling.

A permit from the Department of Transportation and Infrastructure will be required for this project and traffic control will be necessary as vehicle speed is high on this road. Construction is scheduled to begin in the summer of 2022 and five crews working for 14 weeks will be required to complete the project.

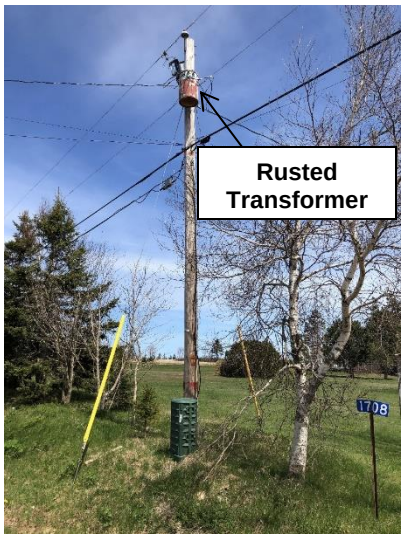
Alternatives

There are no alternatives to this project. This section of line requires voltage conversion and where the line is in poor condition, it needs to be rebuilt.

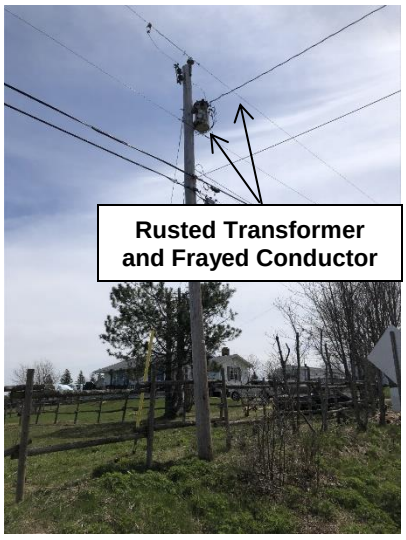
Future Commitments

This is not a multiyear project.

Eastern cedar pole with old bell insulators



Rusted transformers



Rusted transformers and frayed conductor

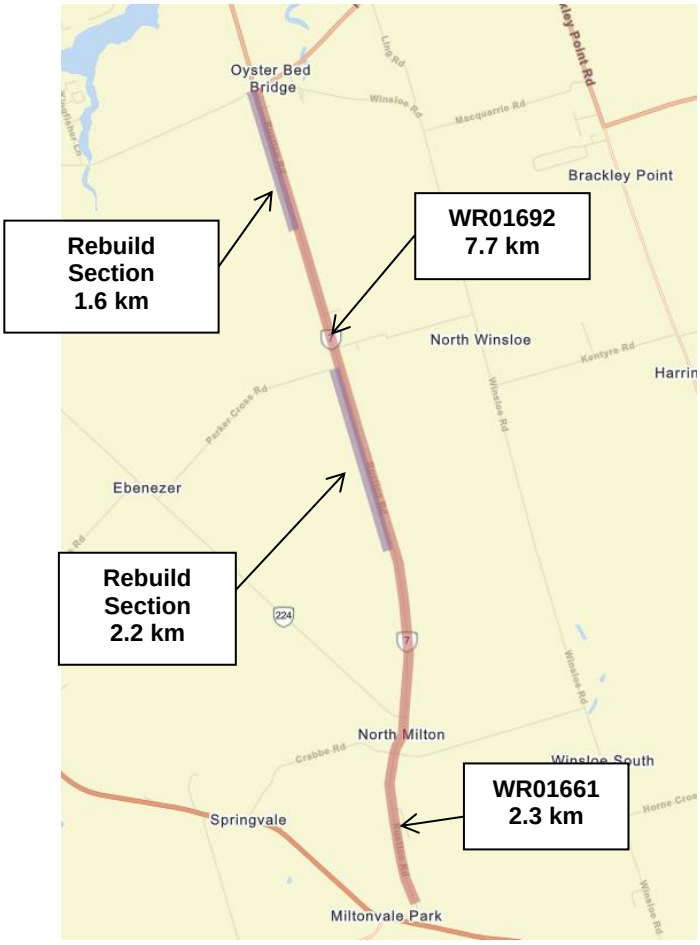


Figure 2:
Scope of the Rustico Road 3.8 kilometre line rebuild (purple) and 10 kilometre voltage conversion (red), North Milton, PE

Title:	**Kingston Road (Route 235) Line Rebuild**
Location:	**East Wiltshire**
Line Type:	**Distribution – Three Phase**
Distance:	**0.9 kilometres**
Amount:	**$200,000**

Project Description

The project is a three phase rebuild to replace a section of line WR02252 from civic address 32 Route 248 (intersection of North York River Road and Lakeview Drive) to civic address 99 Route 235 (in front of East Wiltshire School) as shown in Figure 3. The line is operated at 14,400 volts and is connected to the West Royalty Substation. There are approximately 271 customers fed from this section of line.

Justification

The primary objective of the project is to replace the existing #4 Swan conductor which is aged and deteriorated, and does not meet current standards. The conductor is undersized for the load and is not safe to work on while energized, as it is now brittle and breaks easily. The condition of the conductor also puts it at high risk of failure in storm conditions, and should failure occur, repairs will be difficult due to its deteriorated state. In addition, 7 out of the 17 poles (41 per cent) along the line are aged and deteriorated.

The project is justified based on the obligation to provide safe and adequate service to customers. For the reasons provided, the project cannot be deferred.

Costing Methodology

A breakdown of the proposed budget allocation for the Kingston Road Line Rebuild project is shown in Table 3.

Table 3 Kingston Road Line Rebuild Breakdown of Proposed Budget Allocation	
Description	**Budget**
Material	$ 33,000
Contractor Labour	106,000
Internal Labour and Transportation	61,000
TOTAL	**$ 200,000**

Construction

The existing conductor is #4 Swan (rated for 140 amps) and will be replaced with 477 Cosmos (rated for 584 amps) to bring the line to current standards and accommodate future load growth. The line will be rebuilt on the same side of the road to utilize existing main line and service poles that are in good condition.

A permit from the Department of Transportation and Infrastructure will be required for this project and traffic control will be necessary as vehicle speed is high on this road. Construction is scheduled to begin in the summer of 2022 and four crews working for three weeks will be required to complete the project.

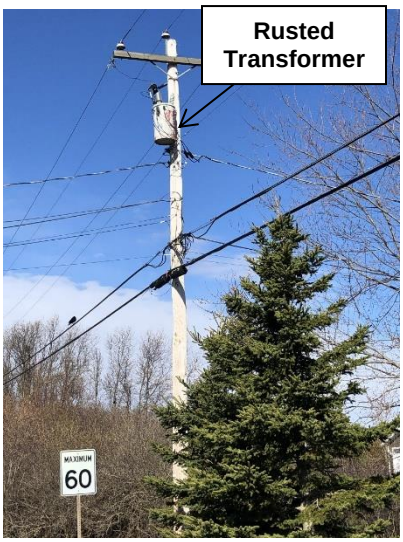
Alternatives

There are no alternatives to this project. The conductor on this section of line requires replacement.

Future Commitments

This is not a multi-year project.

Rotten Crossarm



Rusted Transformer

Splitting Pole

Figure 3:
Scope of the 0.9 km Kingston Road Line Rebuild, East Wiltshire, PE

Title:	**North York River Road (Route 248) Line Rebuild and Voltage Conversion**
Location:	**Warren Grove**
Line Type:	**Distribution – Single Phase**
Distance:	**5.8 kilometres**
Amount:	**$302,000**

Project Description

The project is a single phase voltage conversion of lines WR02203, WR02213 and WR02223 from civic address 1624 North York River Road to 2300 North York River Road, with approximately 3.4 kilometres along the main road and 2.4 kilometres alongside roads as shown in Figure 4. The lines are operated at 7,200 volts and are connected to the West Royalty Substation. There are approximately 115 customers fed from these lines. A total of 41 existing transformers will be replaced with transformers rated for 14,400 volts.

Justification

The primary objective for the project is to improve the power quality and reliability for customers in the Warren Grove area. Additional supporting information is as follows:

i. WR02203, WR02213 and WR02223 are 7,200 volt lines connected to a 14,400 volt feeder from West Royalty Substation through a step-down transformer that was manufactured in 1982 and has reached the end of its life. The removal of the aged step-down transformer will also align with the regulations that require the retirement of electrical equipment containing polychlorinated biphenyls (“PCBs”) by December 31, 2025;
ii. The existing step-down transformer is rated for 333 kVA but experienced a peak load of 393 kVA in 2020 (18 per cent above its rated operating limit); and
iii. By converting a portion of the line to 14,400 volts and feeding customers directly from the 14,400 volt distribution system, 115 customers in the area will experience improved reliability and power quality, as the voltage drop on the converted line will be reduced by 75 per cent (due to a 50 per cent increase in the primary voltage).

The project is justified based on the obligation to provide safe and adequate service to customers. For the reasons provided, the project cannot be deferred.

Costing Methodology

A breakdown of the proposed expenditures for the North York River Road line rebuild and voltage conversion project is shown in Table 4.

Table 4 **Breakdown of Proposed Budget Allocation** **North York River Road Line Rebuild and Voltage Conversion**	
Description	**Budget**
Material	$ 64,000
Contractor Labour	146,000
Internal Labour and Transportation	92,000
TOTAL	**$ 302,000**

Construction

The lines will be rebuilt on the same side of the road to take advantage of efficiencies with the existing line locations and to utilize the poles that are in good condition. The existing 2/0 Quail (rated for 270 amps) conductor, is in good condition and will not be replaced.

A permit from the Department of Transportation and Infrastructure will be required for this project and traffic control will be necessary as vehicle speed is high on this road.

Construction is scheduled to begin in early 2022 and four crews working for five weeks will be required to complete the project.

Alternative

There are no alternatives to this project. The step-down transformer must be removed from service.

Future Commitments

This is not a multi-year project.

Aged Step-Down Transformer (1982 vintage)

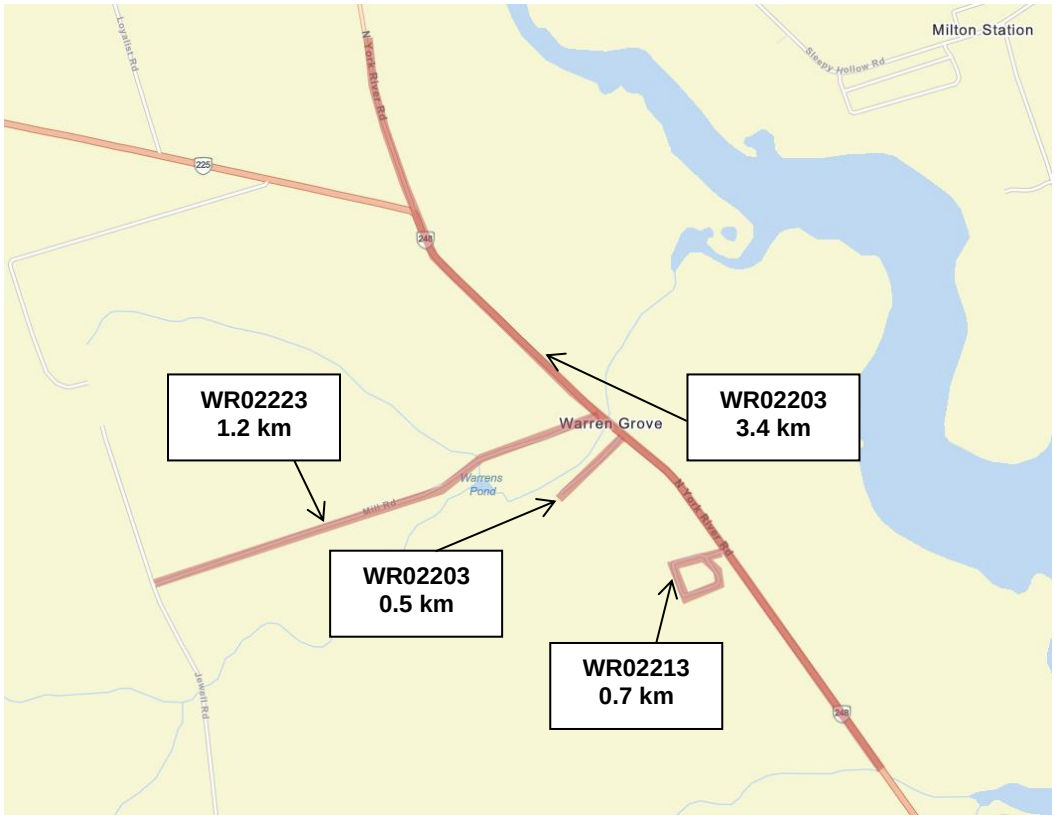


Figure 4:
Scope of the 5.8 km North York River Road Line Rebuild and Voltage Conversion, Warren Grove, PE

APPENDIX J

PEI Broadband Project Description and Justification

Title: **PEI Broadband Project**
Location: **Island Wide**
Amount: **$4,564,000**

Project Description

The PEI Broadband Project ("Project") is a four-year customer driven line rebuild project that includes the installation of approximately 1,150 kilometres of fibre optic cable as well as fixed wireless technologies on new and existing utility poles across the Island. The Project is an initiative of Bell Canada ("Bell") and Xplornet Communications ("Xplornet") under contract with the Government of Prince Edward Island.

In accordance with the Capital Expenditure Justification Criteria for multi-year capital projects, the Company filed a Supplemental Budget Request ("SBR") with the Island Regulatory and Appeals Commission ("Commission") on December 5, 2019. On May 5, 2020, the Commission issued Order UE20-02 approving the 2020 capital budget for the Project. The 2021 budget allocation for the Project was approved as part of the Company's 2021 Capital Budget.

On July 28, 2020, Maritime Electric filed a Project timeline update with the Commission after Bell and Xplornet had provided more detail on their Project completion requirements.

Bell Canada

The Bell portion of the Project is expected to be completed in 2021; however, material shortages due to the on-going pandemic could affect Maritime Electric's ability to complete the utility component of the work on the Bell pole lines. The availability of 2/0 Quail conductor is limited and priority for using what is available will be given to new service work, line extensions, critical rebuilds, and storm repairs. Also, Bell has not completed vegetation management activities on some of the pole lines it installed, which has delayed Maritime Electric's ability to work on these lines. For the reasons provided, the Company may have to carryover a portion of the 2021 budget allocated for Bell work, into 2022.

Xplornet Communications

Xplornet has submitted make-ready requests to Maritime Electric and Bell. The majority of the make-ready requests involve Maritime Electric exclusively (i.e., where communication attachments are to be added to Maritime Electric owned poles); however, a small number of the attachment requests include existing joint use poles with varied ownership between Maritime Electric and Bell. The approval process for adding communication attachments to the joint use poles with varied ownership, also involves Bell.

Xplornet plans for 2022 involve the installation of fibre in central and eastern PEI. The following areas have been identified in Xplornet's 2022 work plan: Kensington to Charlottetown along Route #2, Rennies Road, Wood Islands, Flat River, Pinette, Charlottetown to St. Peters along Route #2, Northside Road to Souris, Cardigan, and Georgetown.

Justification

The project is justified on the obligation to permit the use Company facilities to communication providers, where public convenience and necessity is served.

Construction

A permit from the Department of Transportation and Infrastructure will be required when an entire line is being rebuilt. It is expected that most of the work will be carried out replacing and adding poles on the same side of the road as existing Maritime Electric poles while energized. Traffic control personnel will be necessary for parts of this project as required. Traffic speed, volume, and weather conditions are factors that determine the need for traffic control services.

Capital Budget Requirements

A breakdown of Project spending over the four-year term based on the revised timelines provided to the Commission on July 28, 2020, is provided in Table 1.

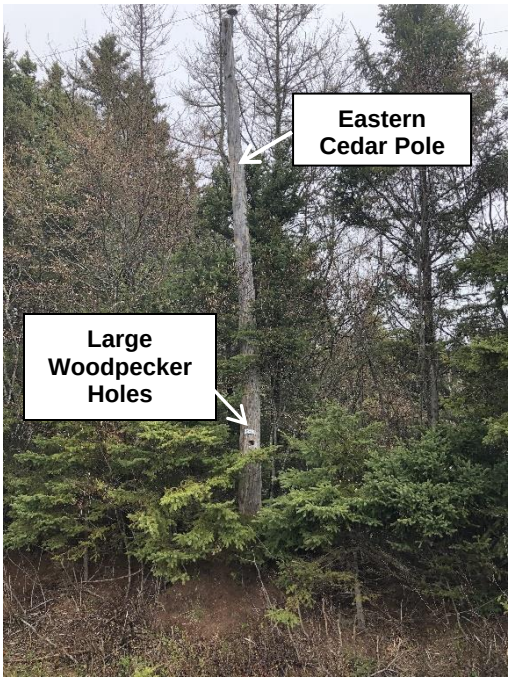
Table 1 2020 - 2023 Annual & Multi-year Totals for PEI Broadband Project						
	SBR Table 4[1]		**Revised[2]**		**Change**	
	Line Rebuilds	**Contributions**	**Line Rebuilds**	**Contributions**	**Line Rebuilds**	**Contributions**
2020						
Bell	$ 2,436,000	-	$ 5,710,000	$ -	$ 3,274,000	$ -
Xplornet	3,274,000	2,000,000	-	-	(3,274,000)	(2,000,000)
Subtotal	$ 5,710,000	$ 2,000,000	$ 5,710,000	$ -	$ -	$ (2,000,000)
2021						
Bell	$ 2,508,000	$ -	$ 4,481,000	$ -	$ 1,973,000	$ -
Xplornet	3,373,000	2,060,000	4,431,000	2,707,000	1,058,000	647,000
Subtotal	$ 5,881,000	$ 2,060,000	$ 8,912,000	$ 2,707,000	$ 3,031,000	$ 647,000
2022						
Bell	$ 2,585,000	$ -	$ -	$ -	$ (2,585,000)	$ -
Xplornet	3,472,000	2,121,000	4,564,000	2,788,000	1,092,000	667,000
Subtotal	$ 6,057,000	$ 2,121,000	$ 4,564,000	$ 2,788,000	$ (1,493,000)	$ 667,000
2023						
Bell	$ 2,662,000	$ -	$ -	$ -	$ (2,662,000)	$ -
Xplornet	3,577,000	2,185,000	4,701,000	2,871,000	1,124,000	686,000
Subtotal	$ 6,239,000	$ 2,185,000	$ 4,701,000	$ 2,871,000	$ (1,538,000)	$ 686,000
TOTAL	**$23,887,000**	**$ 8,366,000**	**$23,887,000**	**$ 8,366,000**	**$ -**	**$ -**
Bell	$10,191,000	$ -	$10,191,000	$ -	$ -	$ -
Xplornet	13,696,000	8,366,000	13,696,000	8,366,000	-	-
TOTAL	**$23,887,000**	**$ 8,366,000**	**$23,887,000**	**$ 8,366,000**	**$ -**	**$ -**

[1] See also the Company's Response to IR-13 on the PEI Broadband Project submitted on March 17, 2020.

[2] Revised amounts for 2021-2023 are subject to annual approval by IRAC in accordance with the Capital Expenditures Justification Criteria.

APPENDIX K

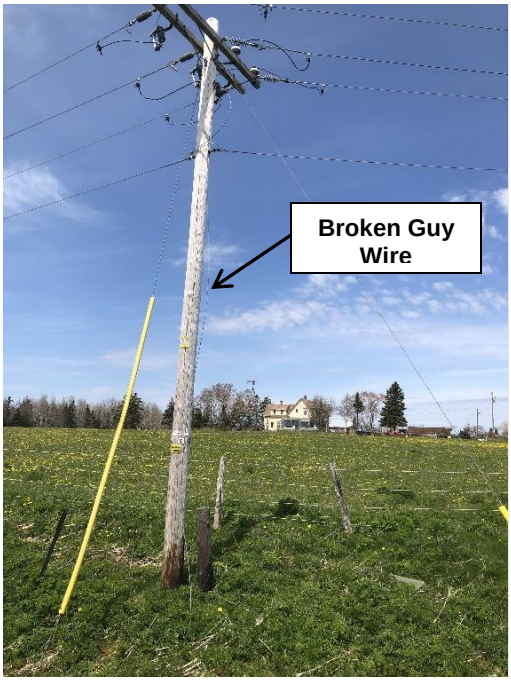
Distribution Inspection Deficiencies



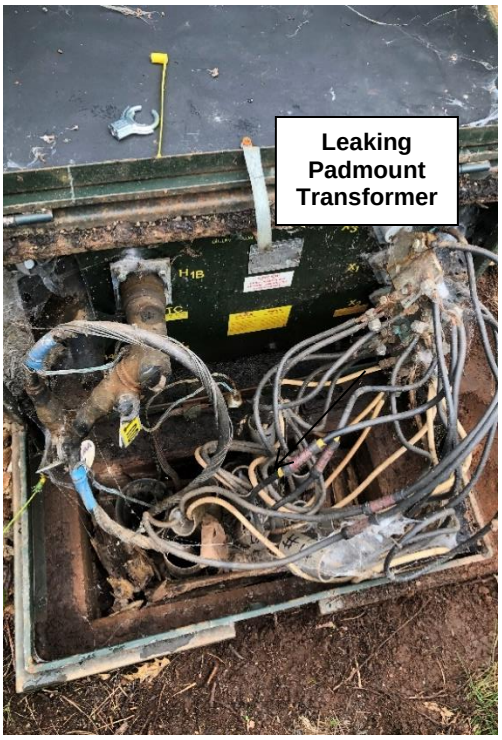
Damaged Pole
(reduced pole strength)

Aged and Deteriorated Pole

Deteriorated Equipment
(oil spill risk)



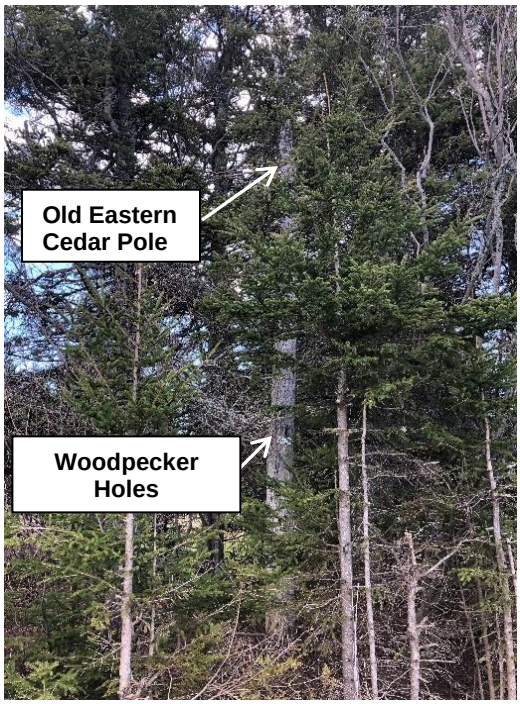
Damaged Pole Support
(safety hazard)



Deteriorated Equipment
(environmental risk)

Damaged Pole
(safety hazard)

Aged and Deteriorated Pole
(safety hazard)



Damaged Pole
(reduced pole strength)

APPENDIX L

Transportation Equipment 2022

2022 TRANSPORTATION EQUIPMENT

Prepared by: Kevin Burns
Reviewed by: Adam MacKenzie
Date: April 12, 2021

All our energy.
All the time.

MARITIME ELECTRIC
A FORTIS COMPANY

Table of Contents

1.0 Introduction

This 2022 transportation equipment budget proposal includes the necessary replacement of heavy fleet vehicles, trailers and passenger vehicles as well as the purchase of one additional passenger vehicle. Detailed evaluation of the units to be replaced indicates they have reached the end of their useful service lives.

The Company is also looking to expand access to electric vehicle ("EV") charging infrastructure with the addition of four Level 2 EV charging stations at Company facilities across PEI.

2.0 Vehicles Requirement in 2022

The Transportation Equipment purchases by category proposed for 2022 are shown in Table 1.

Table 1
2022 Proposed Vehicle Procurement

Category	No. of Units
Heavy Fleet Vehicles	2
Medium Fleet Vehicles	1
Passenger Vehicles	7
Trailers	1
TOTAL	**11**

With the exception of one additional passenger vehicle that is required for a new position within the Company, all proposed vehicle replacements meet the Company's replacement criteria for vehicles as per Table 2.

3.0 Vehicle Replacement Criteria

Maritime Electric's vehicle replacement criteria is shown in Table 2.

Table 2 Maritime Electric Replacement Criteria for Vehicles	
Tracked Heavy Vehicles	15 years
Heavy/Medium Flat Bed Trucks	10 years or 250,000 km
Heavy Vehicles	10 years or 250,000 km
Service Trucks (CSUP – run double shift) Medium Vehicles	5 years or 250,000 km
Passenger Vehicles	7 years or 200,000 km

To determine if a vehicle has reached the end of useful service life, the age of the vehicle is a guiding factor along with a number of additional criteria such as annual maintenance costs, power take-off ("PTO") hours (if applicable) and vehicle condition (e.g., rust, electrical issues, etc.). Based on all criteria considerations, it has been determined that each unit proposed for replacement will reach the end of its useful service life and will require replacement in 2022.

Table 3 provides further information pertaining to the Heavy and Medium fleet vehicles proposed for replacement in 2022, as these three vehicles alone make up approximately 74 per cent of the overall 2022 Transportation Equipment proposed budget allocation.

Table 3 Details of Vehicles >$250,000 Proposed for Replacement in 2022			
Item	**Digger/Derrick for Eastern District**	**Aerial Bucket for Central District**	**CSUP Truck for Eastern District**
Vehicle #	13-12-56	12-12-58	17-10-13
Chassis Make/Model	Freightliner	Freightliner	Dodge 5500
Boom Make/Model	Altec 2050BC	Posi-Plus 500-55-Au/E68	Versalift SST37EIH
Description	Chassis and boom are 2012. Unit is a 50 ft. digger/derrick	Chassis is 2012 with a 2001 aerial device. Unit is a 68 ft. aerial bucket truck, which includes a 13ft elevator	Chassis is a 2017 and the boom was put into service in 2010. Unit is a 37 ft. single man aerial bucket truck
Mileage as of April 5, 2021	247,800 km	185,950 km	256,500 km
PTO or Engine Hours	11,274 engine hours	12,664 PTO hours	5,200 engine hours
2018-2020 Annual Maintenance Costs (3-Year Average)	$33,233	$31,833	$36,171
Summary	Boom and chassis will be 10 years old at time of replacement. The. chassis and body have been well looked after but are starting to show signs of their age. The boom is electric-over-hydraulic and these types of units tend to have higher maintenance costs and more downtime, especially as they get older.	The chassis will be 11 years old at time of replacement and the aerial device will be 22 years old (this boom was re-chassied in 2012). Both are starting to show signs of their age with increased maintenance costs and down time.	This unit operates on a double shift operating 16 hours per day, which is reflected in both the high mileage and engine hours. This unit is first to respond to most no-power calls and is the only truck of this type in its district so when the unit is down for maintenance it impacts on the Company's response time.

4.0 New Vehicle Addition

There is one additional unit required in 2022.

The addition of a third combustion turbine operator/maintenance person in the Generation department has resulted in the requirement to add one new ½ ton truck. The individual occupying this position is required to travel frequently between Charlottetown and Borden-Carleton.

5.0 Electric Vehicle Chargers

With the purchase of one fully EV in 2020, one plug-in hybrid EV in 2021 and plans to continue to increase the number of both types of vehicles in the fleet, the 2022 Capital Budget also proposes the installation of EV charging infrastructure at Company facilities across PEI.

Presently, the Company has two EV charging stations, both of which are located in the Charlottetown area (one at the Energy Control Centre and the other at 180 Kent Street. The new charging stations are proposed for the Roseneath Service Centre, West Royalty Service Centre, Sherbrooke Service Centre and Borden Generating Station. The charging stations will be located within secure fenced areas at each facility and will not be accessible to the general public. The proposed charging stations are Level 2 chargers (240 volt) and capable of tracking usage data.

Level 2 charging is typically 6 to 8 kilowatts and will provide approximately 40 km of range per hour of charge. Level 2 chargers are typically used at destination locations where vehicles will spend a couple of hours; for example hotels, restaurants, shopping centres, curbside parking, and public facilities (arenas, libraries).

Level 3 charging (also known as DC Fast Charging) is higher power and faster charging but they are also more expensive than Level 2 chargers. A Level 3 charging stations costs between $100,000 to $150,000 to install compared to $4,000 for a Level 2 charging station. A Level 3 charger is typically 50 kilowatts and can provide more than 200 km of range per hour of charge. Level 3 chargers are often used along transportation corridors where drivers require a quick charge before carrying on to their destination.

Level 2 charging is sufficient to meet Maritime Electric’s current need.

6.0 Photographs

CSUP Truck for Central District
17-10-13

Truck 17-10-13 – Passenger side view from back

Truck 17-10-13 – Passenger side view from front
Aerial Bucket with Elevator for Central District
12-12-58

Truck 12-12-58 – Driver side view from side

Truck 12-12-58
Odometer reading

Truck 12-12-58
PTO hours reading

Truck 12-12-58
Corrosion / holes at tailgate

Truck 12-12-58
Corrosion at back of truck

Truck 12-12-58
Corrosion around tool compartments

Truck 12-12-58
Condition of elevator drive chain & hoses

Truck 12-12-58
Main turret and elevator

Truck 12-12-58
Weld repairs at main turret

Truck 12-12-58
Weld repairs at main turret

Truck 12-12-58
Corrosion holes through bed liner

Truck 12-12-58
Corrosion of truck bed liner

Truck 12-12-58
Passenger side, rear outrigger

Truck 12-12-58
Corrosion/metal scaling in truck bed liner

Digger/Derrick for Eastern District
13-12-56

Truck 13-12-56
Driver side, view from front

Truck 13-12-56
Front view of truck

Truck 13-12-56
Turret for digger/derrick
and control station

Truck 13-12-56
Corrosion of bed liner and false floor

APPENDIX M

Crossroads Substation Deficiencies

Crossroads Substation Deficiencies

As the Crossroads Substation approaches its end of life, the reliability of power supply to customers in the Stratford area is an issue of concern. To address aging infrastructure, the Crossroad Substation needs to be rebuilt. A recent detailed inspection of the substation's structures and equipment identified the issues presented herein.

The wood structures show significant deterioration and are now approaching end of life.

Poles are split with depths of 1 inch (left) and 3 inches (right).

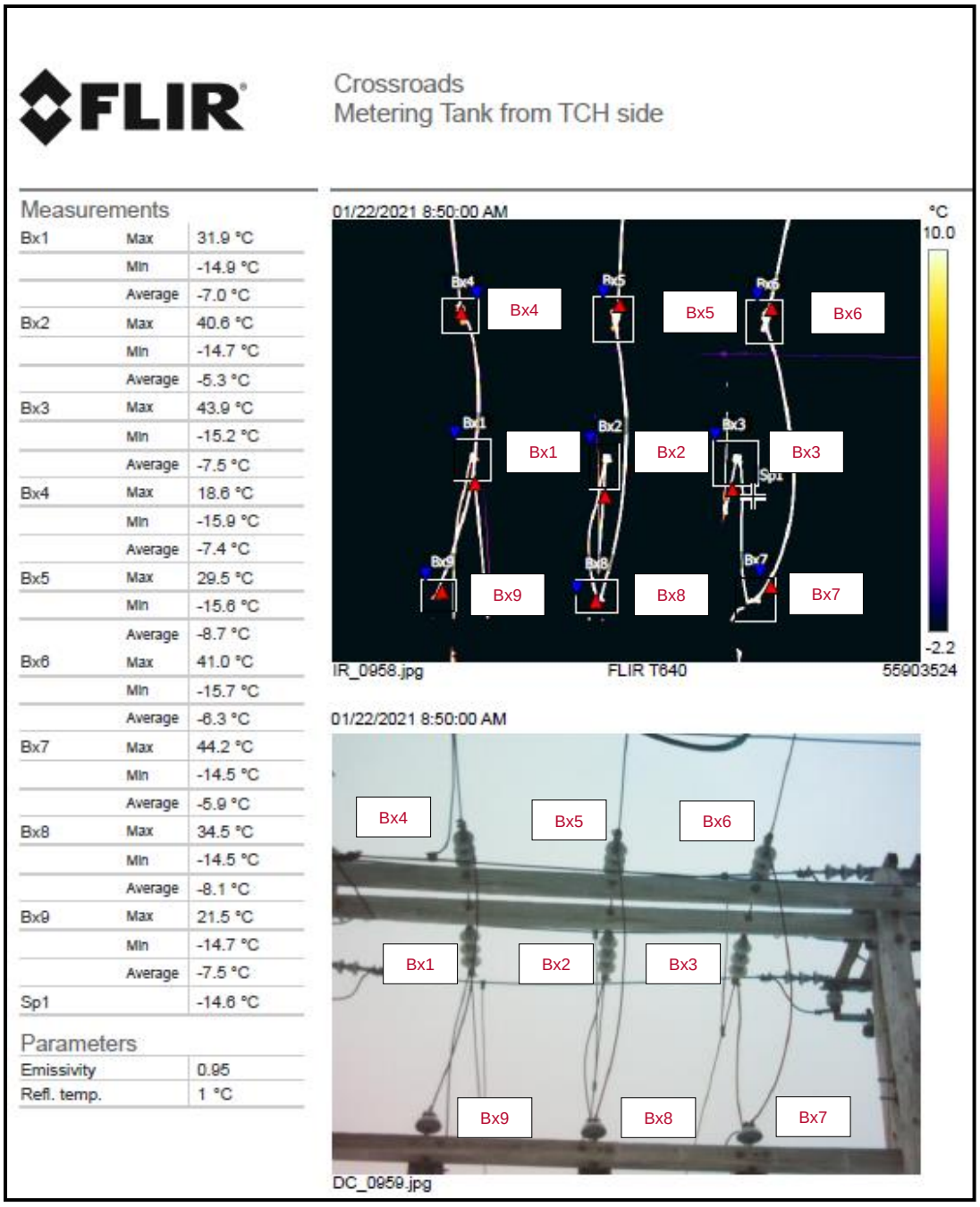
This pole split has a depth of 0.75 inches (left) and a length of over 1 foot (right).

This pole split has a width of 0.50 inches (left) and a length of over 1 foot (right).

Structures are congested, which present additional maintenance and repair challenges.

Safety clearances within the station do not meeting current standards.

The bus structure (left) is measured to be approximately 12 feet above ground level (right).
The new bus structure will be 25 feet above ground level.



FLIR

Crossroads
Metering Tank from TCH side

Measurements

Bx1	Max	31.9 °C
	Min	-14.9 °C
	Average	-7.0 °C
Bx2	Max	40.6 °C
	Min	-14.7 °C
	Average	-5.3 °C
Bx3	Max	43.9 °C
	Min	-15.2 °C
	Average	-7.5 °C
Bx4	Max	18.6 °C
	Min	-15.9 °C
	Average	-7.4 °C
Bx5	Max	29.5 °C
	Min	-15.6 °C
	Average	-8.7 °C
Bx6	Max	41.0 °C
	Min	-15.7 °C
	Average	-6.3 °C
Bx7	Max	44.2 °C
	Min	-14.5 °C
	Average	-5.9 °C
Bx8	Max	34.5 °C
	Min	-14.5 °C
	Average	-8.1 °C
Bx9	Max	21.5 °C
	Min	-14.7 °C
	Average	-7.5 °C
Sp1		-14.6 °C

Parameters

Emissivity	0.95
Refl. temp.	1 °C

01/22/2021 8:50:00 AM

°C
10.0
-2.2

Bx4 Bx5 Bx6 Bx1 Bx2 Bx3 Sp1 Bx9 Bx8 Bx7

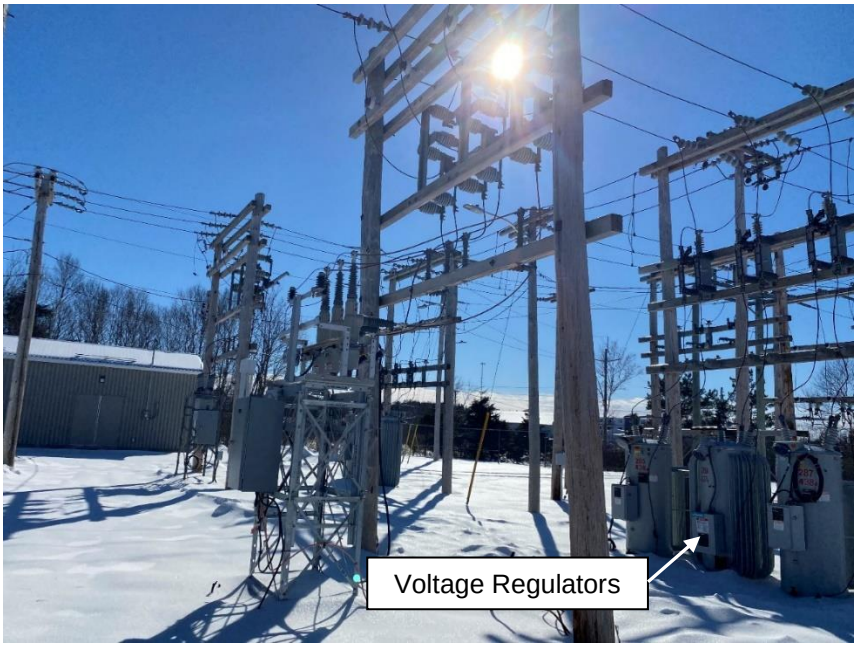
IR_0958.jpg FLIR T640 55903524

01/22/2021 8:50:00 AM

Bx4 Bx5 Bx6 Bx1 Bx2 Bx3 Bx9 Bx8 Bx7

DC_0959.jpg

The 12.5 kV buses are aged and do not provide adequate ampacity to meet the increased load conditions. The thermal scan image (top) and actual image (bottom) was captured in January 2021. The thermal image indicates hotspots, demonstrating early signs of failure.



Each 12.5 kV feeder has its own set of voltage regulators which do not meet current standards for energized conductor above ground level. New transformers are now supplied with built-in on-load-tap-changers and do not require external voltage regulators.

The 69 kV bus structures do not meet current limit of approach standards for energized conductor above ground level.

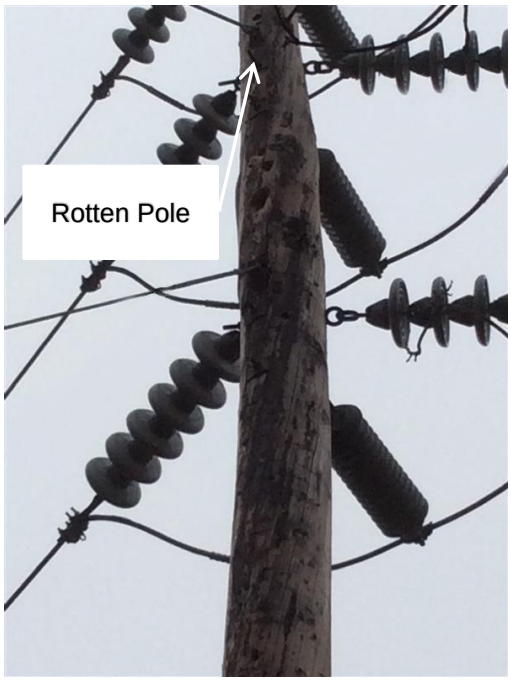
The mobile bay is aged and is not compatible with Maritime Electric's newest mobile transformer (due to the bushing locations on the mobile transformer).

The transformers in service at Crossroads do not currently have oil containment systems. Oil containment systems will be installed for the new transformers as part of the Crossroads Substation rebuild.

APPENDIX N

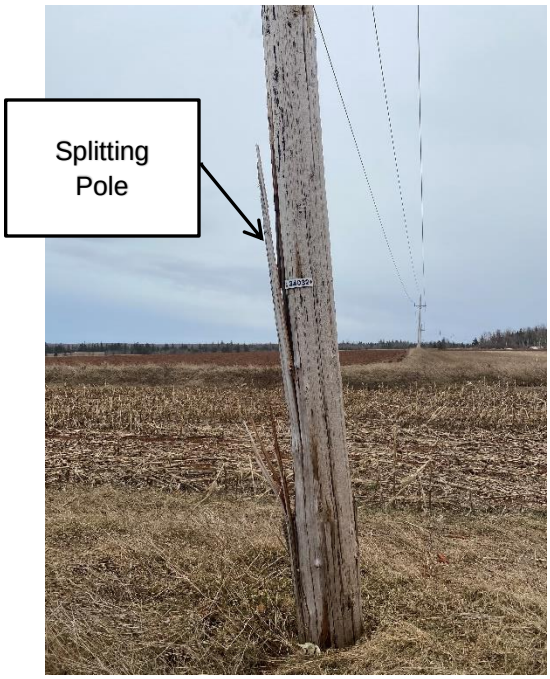
Transmission Inspection Deficiencies

Damaged Pole
(reduced pole strength)



Deteriorated Pole
(reduced pole strength)

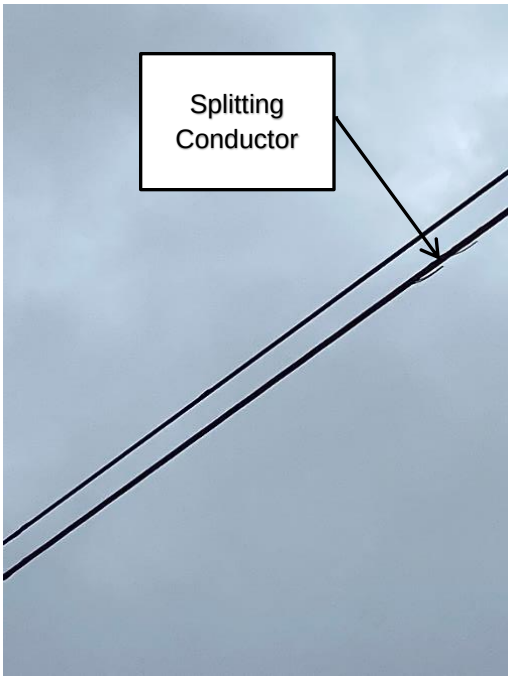
Deteriorated Crossarm
(safety hazard)



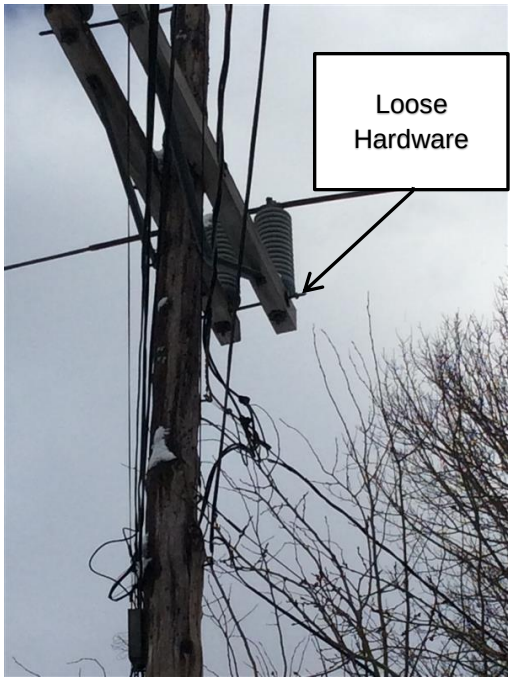
Deteriorated Pole
(safety hazard)

Damaged Pole
(reduced pole strength)

Damaged Pole Support
(safety hazard)



Deteriorated Conductor
(safety hazard)



Structural Deficiency
(reduced crossarm strength)

APPENDIX O

Transmission Lines Description and Justification

Title:	**T-11 Rebuild**
Location:	**Summerside**
Line Type:	**Transmission – 69 kV**
Distance:	**3.6 kilometres**
Amount:	**$829,000**

Project Description

T-11 currently serves as the transmission backbone supplying energy to the City of Summerside Electric Utility ("Summerside Electric"). T-11 is a 69 kV transmission line that starts at the Sherbrooke Substation (501 Veteran's Memorial Hwy - Route 2) and ends at the Summerside Electric Substation (94 Ottawa Street). The original section of T-11 was built in 1963 (MacEwen Road to the Summerside Electric Substation) with a 1 kilometre section built in 1997 (Sherbrooke Substation to MacEwen Road). The proposed project is to rebuild the entire T-11 transmission line.

The condition of T-11 is such that a full rebuild is required, as the majority of the line is 58 years old and the entire line is deteriorated. The existing line does not meet current standards and it contains deteriorated poles, crossarms and porcelain insulators that are over 50 years old and at end of life. The existing conductor is 2/0 Quail (rated for 270 amps) and will be replaced with 4/0 Penguin (rated for 357 amps) to allow for future load growth.

The rebuild of T-11 was originally planned for 2024 but upon a recent inspection, it was determined that it requires replacement as soon as possible. Specifically, the crossarm materials on the structures are deteriorated to the point they are now considered unsafe.

Justification

This project is justified on the obligation to provide customers with equitable access to a safe, reliable and adequate power supply and cannot be deferred.

Costing Methodology

A breakdown of the proposed budget allocation for the T-11 transmission line rebuild is shown in Table 1.

Table 1 Breakdown of Proposed Budget Allocation T-11 Rebuild	
Description	**Budget**
Material	$ 206,000
Contractor Labour	468,000
Internal Labour and Transportation	155,000
TOTAL	**$ 829,000**

Construction

T-11 is primarily a roadside line but there are two sections that are off road with easements in place that allow for access. Existing structures will be replaced with new structures that meet current standards. Line design software will be used to confirm that the new construction meets current standards and design criteria. Light detection and ranging ("LIDAR") will be used to obtain the ground topography and confirm compliance with transmission line clearance and separation requirements when the line is subject to various weather and load conditions. Permits from the Department of Transportation and Infrastructure and the Department of Environment, Energy and Climate Action will be required for this project. In addition, a small amount of vegetation management will be required and traffic control will be necessary as vehicle speed and traffic volume can be high in the project area.

The rebuild will be completed in stages, coordinating any necessary power outages with Summerside Electric; however, the majority of the construction will be completed with the transmission line in operation. As each section is completed, an outage will be planned to allow for the connection of the new section and the retirement of the old section. Summerside Electric will need to provide generation at off-peak periods during the transmission outages. A significant number of crews will be mobilized to work on this project during the scheduled outages to minimize the amount of time the transmission line is out of service.

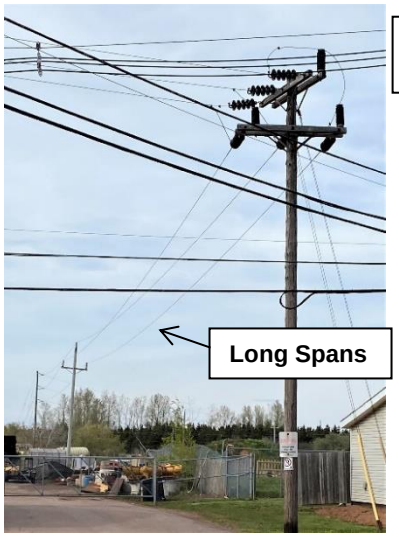
Construction will be scheduled in consultation with the Summerside Electric and four crews working for ten weeks will be required to complete the project.

Alternatives

There are no alternatives to this project. T-11 needs to be replaced and its existing location provides the most direct route from Sherbrooke to the Summerside Electric Substation.

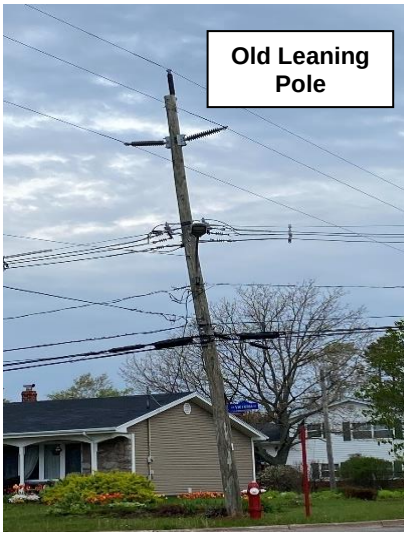
Future Commitments

This is not a multi-year project.

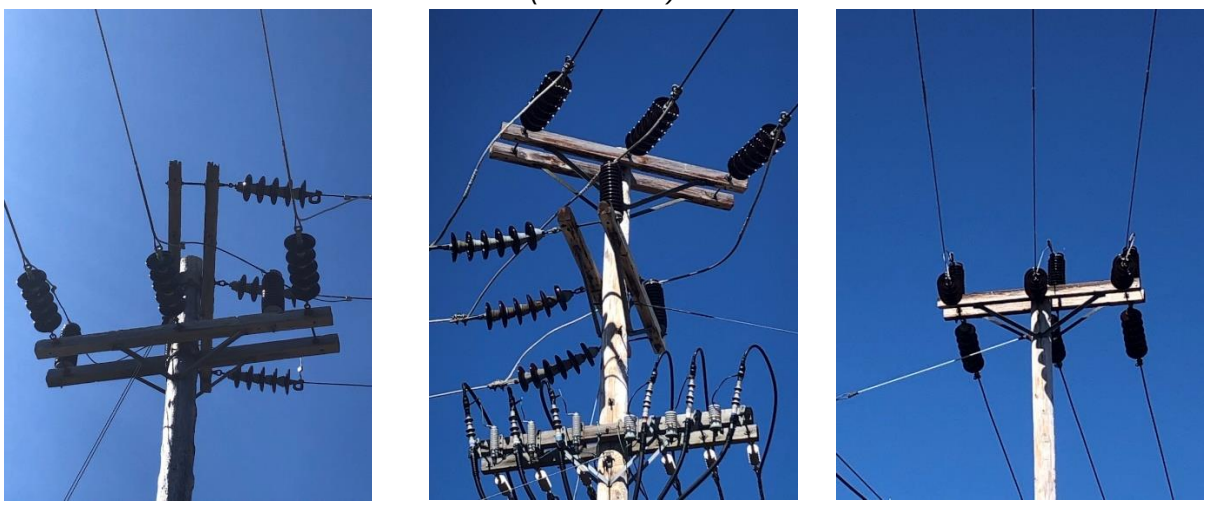


Old porcelain insulators and long spans

Old porcelain insulators and old construction standards (clearances)



Old leaning pole



Aged and deteriorated crossarm structures.

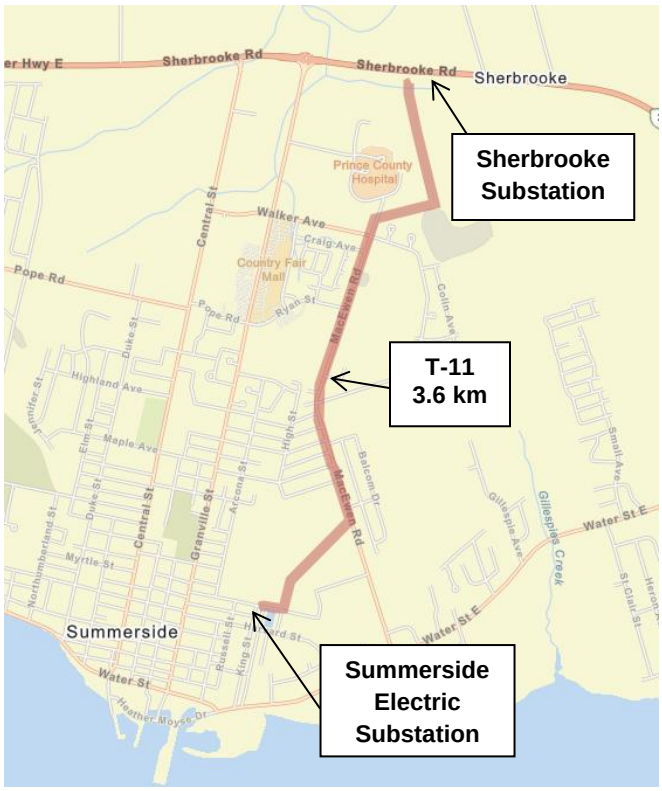


Figure 1
Scope of the 3.6 kilometre T-11 Rebuild, Summerside, PE

Title: **Transmission Tap to East Royalty Substation**
Location: **Marshfield**
Line Type: **Transmission – 138 kV**
Amount: **$287,000**

Project Description

This transmission tap project connects the new East Royalty Substation[1] to the existing Y-104 transmission line. As such, the Transmission Tap to East Royalty Substation is interdependent with the East Royalty Substation project.

To complete the tap, Y-104 will be re-routed to pass through the new substation and then continue to the West St. Peters Substation.

Justification

This project is justified based on the need to supply power to the new East Royalty Substation and cannot be deferred.

Costing Methodology

A breakdown of the proposed budget allocation for this transmission project is shown in Table 2.

Table 2
Breakdown of Proposed Budget Allocation
Transmission Tap to East Royalty Substation

Description	Expenditure
Material	$ 62,000
Contractor Labour	171,000
Internal Labour and Transportation	54,000
TOTAL	**$ 287,000**

Construction

The new construction will be off road alongside the new substation location. Line design software will be used to confirm that the new construction meets current standards and design criteria. LIDAR will be used to obtain the ground topography and confirm compliance with transmission line clearance and separation requirements when the line is subject to various weather and load

[1] See Section 6.1a for a description of the East Royalty Substation project.

conditions. Permits from the Department of Transportation and Infrastructure and the Department of Environment, Energy and Climate Action will be required for this project. A small amount of vegetation management will also be required.

Construction is scheduled to begin in the summer of 2022 and three crews working for four weeks will be required to complete the project.

Alternatives

There are no alternatives for this project. Y-104 is the only transmission line in proximity to the new East Royalty Substation location.

Future Commitments

This is not a multi-year project.

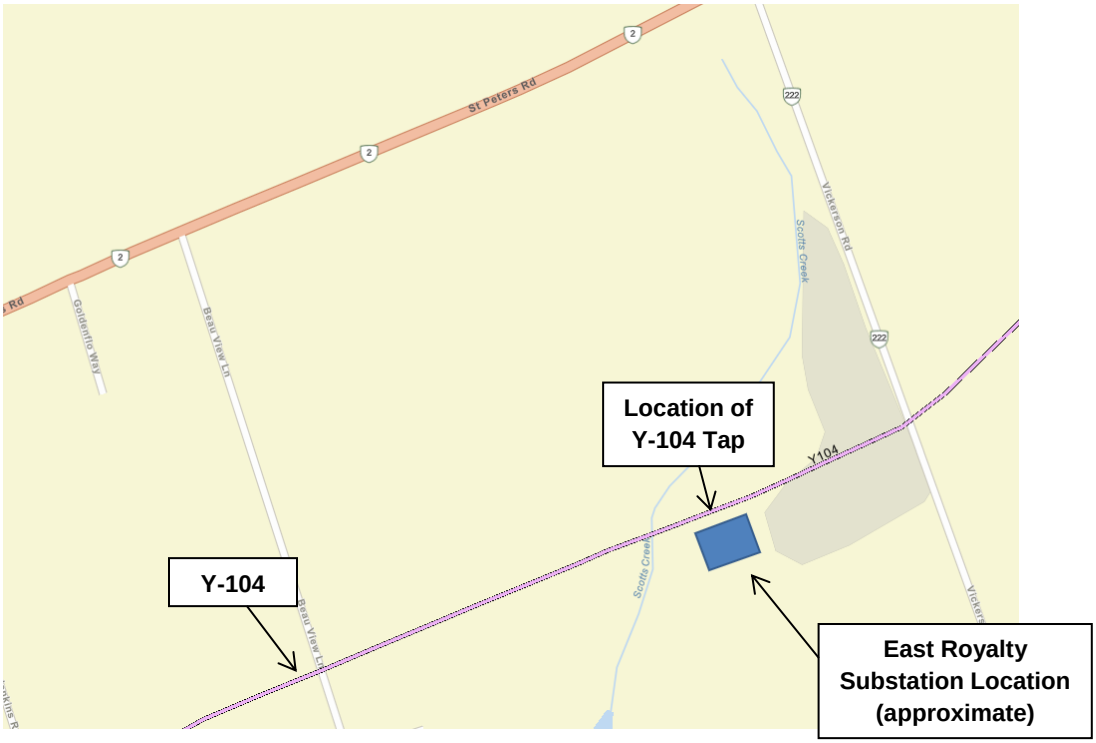


Figure 2:
Scope of Transmission Tap to East Royalty Substation, Marshfield, PE

Title: **Crossroads Substation Transmission Modifications**
Location: **Stratford**
Line Type: **Transmission – 69 kV**
Amount: **$81,000**

Project Description

This project involves modifications to transmission line T-2 for the Crossroads Substation Rebuild project[2]. As such, the Crossroads Substation Transmission Modifications project is interdependent with the Crossroads Substation Rebuild project.

The proposed modifications include moving 69 kV switch #431 within the substation and installing transmission poles to carry the 69 kV tap line to the new switch location. This relocation will be temporary for the duration of the Crossroads Substation Rebuild, and switch #431 will be returned to its original location upon completion of the rebuild.

Justification

The project is justified on the basis that it will allow Crossroads Substation to remain connected to transmission line T-2 which is necessary for one side of the substation to remain energized during the rebuild, while the other side is being worked on, while de-energized.

Costing Methodology

A breakdown of the proposed budget allocation for the T-2 work required at the Crossroads Substation is shown in Table 3.

Table 3
Breakdown of Proposed Budget Allocation
Crossroads Substation Transmission Modifications

Description	Budget
Material	$ 31,000
Contractor Labour	34,000
Internal Labour and Transportation	16,000
TOTAL	**$ 81,000**

[2] See Section 6.1b for a description of the Crossroads Substation Rebuild project.

Construction

All construction work will occur inside of the existing Crossroads Substation (see Figure 3). For this reason, there will be no vegetation management or traffic control required for the project. Line design software will be used to confirm that the new construction meets current standards and design criteria. LIDAR will be used to obtain the ground topography and confirm compliance with transmission line clearance and separation requirements when the line is subject to various weather and load conditions.

Construction is scheduled to begin in May of 2022 and two crews working for three weeks will be required to complete the project.

Alternatives

There are no alternatives for this project. The line modifications are necessary to maintain transmission service during the Crossroads Substation Rebuild project.

Future Commitments

This is not a multi-year project.

Figure 3:
Crossroads Substation, Stratford, PE

Title: **West Royalty Substation Transmission Modifications**
Location: **West Royalty**
Line Type: **Transmission – 138 kV**
Amount: **$48,000**

Project Description

This project involves modifications to transmission line Y-111 for the West Royalty X5 Autotransformer Upgrade project[3]. As such, the West Royalty Substation Transmission Modifications project is interdependent with the West Royalty X5 Autotransformer Upgrade project.

The proposed modifications include removing the connection of Y-111 to Breaker #906 (this breaker will be retired) and creating a connection from Y-111 (at the steel tower) to a new Breaker #906 in a bay on the other side of the substation (see Figure 4 for schematic diagram).

Justification

This project is justified on the basis that it will enable the substation's 138 kV bus to be split in the future which, with the new X5 autotransformer installed, will improve reliability.

Costing Methodology

A breakdown of the proposed budget allocation for the Y-111 work required at the West Royalty Substation is shown in Table 4.

Table 4
Breakdown of Proposed Budget Allocation
West Royalty Substation Transmission Modifications

Description	Budget
Material	$ 10,000
Contractor Labour	29,000
Internal Labour and Transportation	9,000
TOTAL	**$ 48,000**

[3] See Section 6.1c for a description of the West Royalty X5 Autotransformer Upgrade project.

Construction

All construction work will occur inside of the existing West Royalty Substation. For this reason, there will be no vegetation management or traffic control required for the project. West Royalty Substation will be energized from the Y-109, 138 kV transmission line during the Y-111 modifications. Line design software will be used to confirm that the line modifications meet current standards and design criteria. LIDAR will be used to obtain the ground topography and confirm compliance with the transmission line clearance and separation requirements when the line is subject to various weather and load conditions.

Construction is scheduled to begin in the fall of 2022 and two crews working for three weeks will be required to complete the project.

Alternatives

There is no alternative to this project. The modifications are necessary to improve the future reliability of the West Royalty Substation.

Future Commitments

This is not a multi-year project.

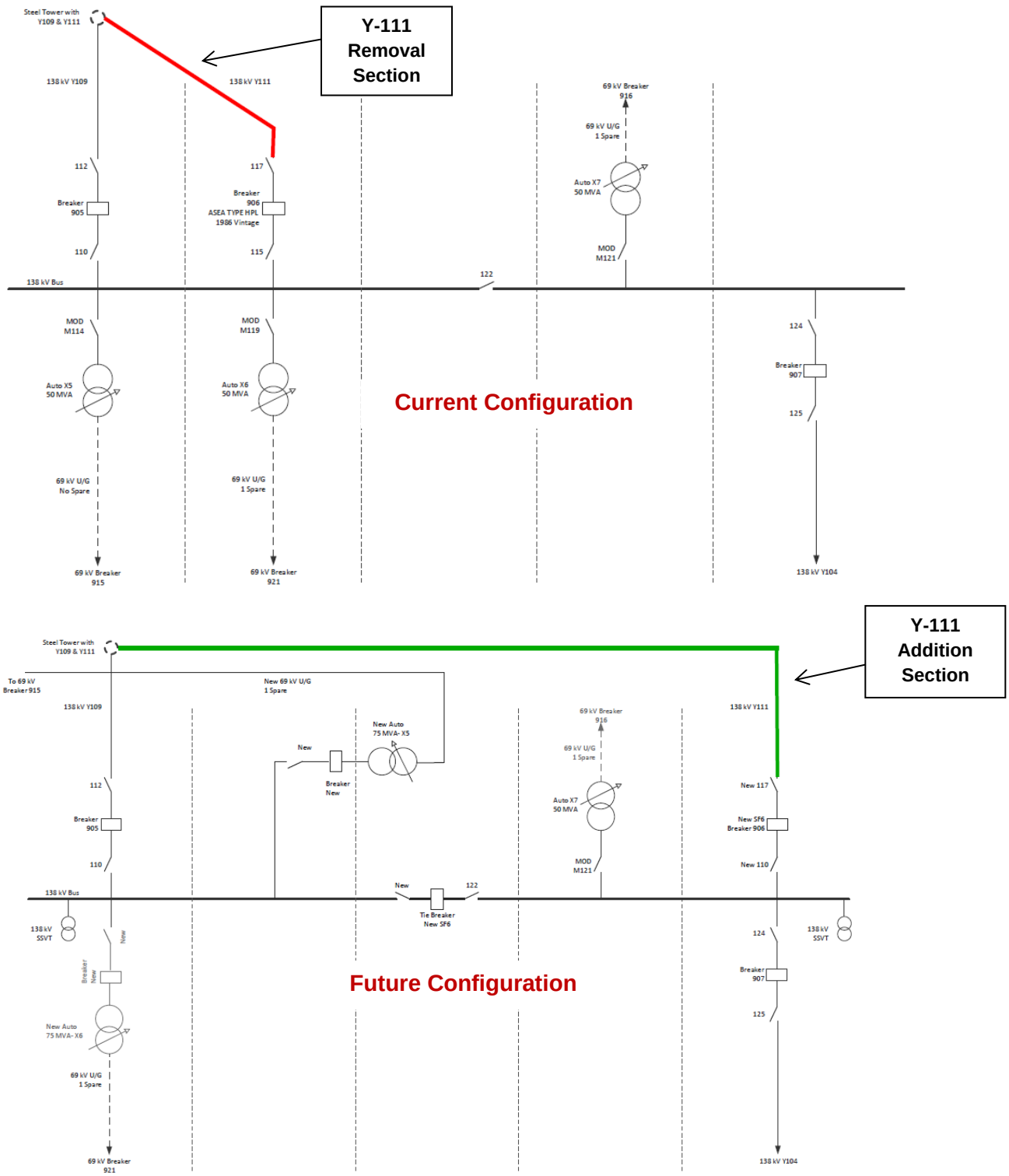


Figure 4:
Scope of West Royalty Substation Transmission Modifications, West Royalty, PE

APPENDIX P

2019 Tremco Report

O N L I N E I N F O R M A T I O N

Maritime Electric
180 Kent Street

180 Kent Street
Charlottetown, PE C1A 7N2

12 August 2019

TREMCO
ROOFING & BUILDING MAINTENANCE

Roofs Sorted by Condition

Number of Buildings	1
Number of Individual Roof Areas	3
Total Square Footage	5,891

Maritime Electric — 180 Kent Street

Fair

Region/Facility	Building	Roof	Sq. Ft.
Maritime Electric	180 Kent Street	A	438
		B	5,008
	Subtotal	2 Roof(s)	5,446 Sq. Ft.

Poor

Region/Facility	Building	Roof	Sq. Ft.
Maritime Electric	180 Kent Street	C	445
	Subtotal	1 Roof(s)	445 Sq. Ft.
	Grand Total	3 Roof(s)	5,891 Sq. Ft.

TREMCO ROOFING & BUILDING MAINTENANCE

BUILDING FACILITY SUMMARY

An inspection of the roofs located at the above facility were insected on July 25, 2019 by Tremco.

The upper roofs (sections A & B) are inverted roof assemblies. These roofs appear to be the original roofs on the facility. The membrane is a multi-ply asphalt based roof membrane. The age of the roof appears to be greater than 25+ years. It is now time to consider these roofs for replacement.

There are maintenance items on roof sections A & B that can be completed in 2019 to allow for more time for replacement. These maintenance items will at least provide waterproofing.

The lower front canopy roof (section C) is in poor condition. This roof requires replacement. Tapered insulation should be installed to get the flow of water to each end of the roof to the drains.

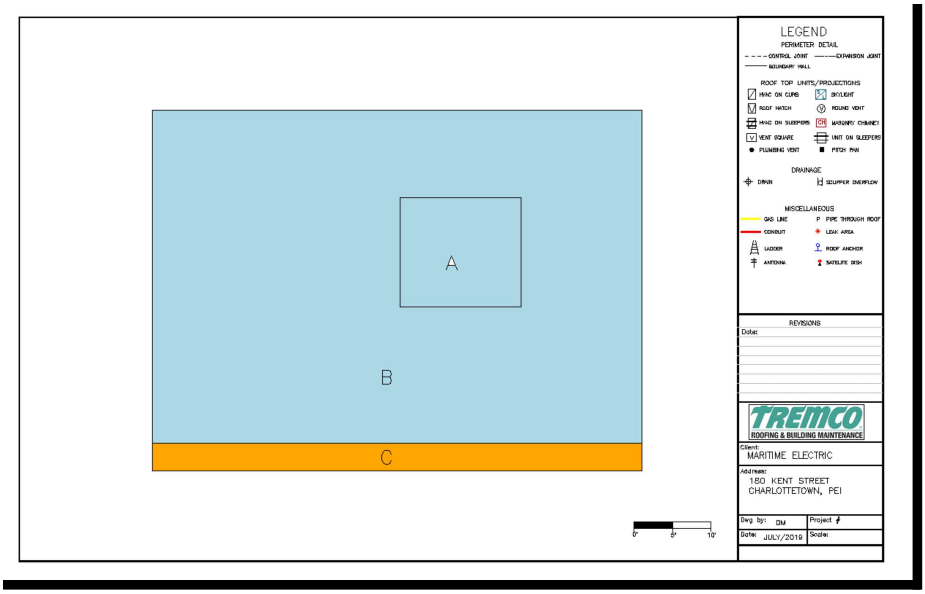
Budget estimates for all recommendations are provided within the Financial Summary portion of this report.

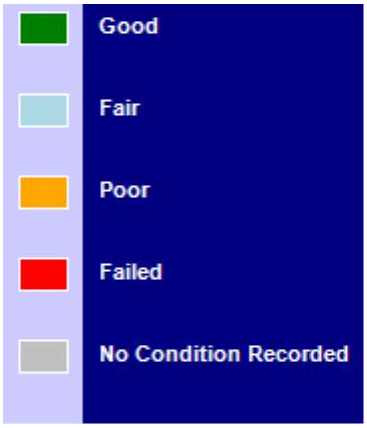
TREMCO®
ROOFING & BUILDING MAINTENANCE

Maritime Electric

180 Kent Street

180 Kent Street
Charlottetown, PE C1A 7N2

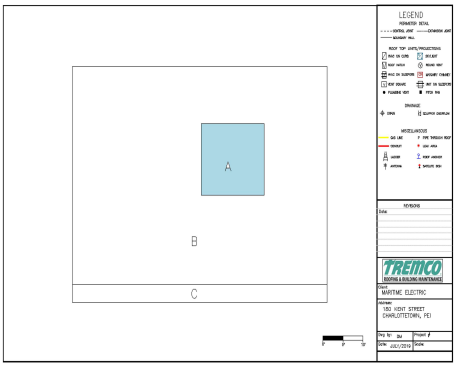




TREMCO
ROOFING & BUILDING MAINTENANCE

GENERAL INFORMATION

Roof Name	A
Service Activity Type	Inspection
Service Activity Date	25/07/19
Year of Installation	1990 (Estimate)
Roof Leaks	No
Roof Size	438 sq. ft.
	40.71 sq. meters
Roof Type	Inverted BUR
Restoration Cost	$6,000.00
Roof Rating	Fair
Year to Restore	2014



ROOF COMPOSITION

Inverted Built-up roof assembly with ballasted surfacing
4 Ply Build Up roof - Organic Felt and asphalt
Polyethylene Slip Sheet
4+2 inches Extruded Polystyrene insulation
Woven scrim

OVERALL CONDITION

Roof is in fair condition

VISIBLE ROOF DEFECTS

Ballast is getting down between the insulation and membrane. This can damage the roof membrane and cause leakage.
The perimeter metal counterflashing is bent upward. This has allowed ballast to get between the metal and insulation. Again, this can damage the roof membrane.
Vent cap fasteners appear not to be original. The fasteners within the cap of the mechanical unit are loose.

RECOMMENDATIONS

Inspect and Secure vent cap.
Schedule the roof for replacement in the near future.
Re-inspect annually

URGENCY ITEMS

Inspect and Secure vent cap.

WORK HISTORY

Inspection by Tremco September 2014
Inspection by Tremco July 25, 2019

Overview of the insulation at the cut test.

Overview of the insulation at the cut test.

Fabric has been displaced on roof. This allows ballast to get down between insulation and roof membrane. This can damage the membrane.

View of pavers in corner.

View of pavers in corner.

Ventilation unit in corner of roof.

Fasteners for securing the cap of the vent hood appear to be in poor condition.

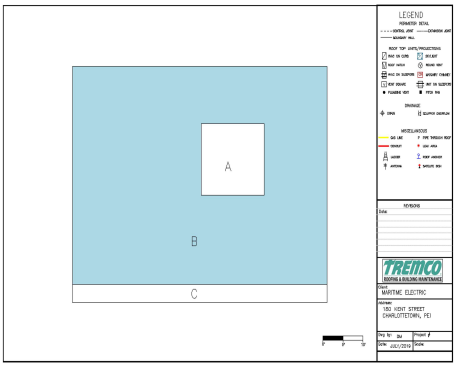
Ballast can get between the insulation and membrane. This can damage the roof membrane.

View of perimeter metal counterflashing. It appears loose with ballast underneath.

View of ladder to upper roof.

GENERAL INFORMATION

Roof Name	B
Service Activity Type	Inspection
Service Activity Date	25/07/19
Year of Installation	1995 (Estimate)
Roof Leaks	No
Roof Size	5,008 sq. ft.
	465.43 sq. meters
Roof Type	Inverted BUR
Replacement Cost	$195,001.00
Roof Rating	Fair
Year to Replace	2022



ROOF COMPOSITION

Inverted Built-up roof assembly with ballasted surfacing
4 Ply Build Up roof - Organic Felt and asphalt
Polyethylene Slip Sheet
4+2 inches Extruded Polystyrene insulation
Woven scrim

OVERALL CONDITION

Roof is in fair condition.
Replacement of roof is required within next 1 - 3 years.

VISIBLE ROOF DEFECTS

The exposed base flashing membrane along the outside parapet wall is showing some aging. The modified bitumen cap sheet used is showing an extensive amount of granule loss. The flashing membrane is also showing some vegetation growth in the corners of the roof.

The base flashing membrane along the perimeter parapet is loose in some areas. Although it does remain watertight, water can eventually enter in this area.

One (1) vent stack detail is located in the southeast corner of the roof. The base flashing membrane around the curb of this stack is in poor condition.

The ballast on the roof is has been displaced in areas. The woven scrim used to separate the ballast from the insulation is open/exposed in areas. If the ballast were to get between the insulation and membrane in areas (which it has), then the ballast can damage the roof membrane and cause leakage.

The roof surface is showing vegetation growth in areas. If these grow deep enough, they can root within the roof membrane and cause damage.

RECOMMENDATIONS

Short term maintenance items are required to possibly extend the service life until roof replacement is budgeted. These are:
1. Coat the base flashing membrane to prevent further delamination/deterioration
2. Repair base flashing membrane at small vent stack
3. Remove vegetation growth from roof.
4. Repair ballasted areas to ensure woven scrim keeps ballast from getting under insulation

Long term solution is the replacement of the roof within the next three (3) years.

URGENCY ITEMS

Repair base flashing membrane at small vent stack
Remove vegetation growth from roof.
Repair ballasted areas to ensure woven scrim keeps ballast from getting under insulation

WORK HISTORY

Inspection July 2019

SCAN HISTORY

Tremco inspected 2014.

Stairs from roof entrance.

Exposed base flashing membrane.

Severe granule loss on base flashing membrane.

Severe granule loss on base flashing membrane.

Severe granule loss on base flashing membrane.

View of roof.

New roof top unit on roof surface.

Severe granule loss on base flashing membrane.

View of roof top units on roof.

Damaged outside corner of metal cladding to penthouse.

View of vent stack on roof surface.

Base flashing membrane at base of stack in poor condition.

View of roof.

Severe granule loss on base flashing membrane.

Loose base flashing membrane at wall parapet.

Repairs made to base flashing sub-standard.

Repairs made to base flashing sub-standard.

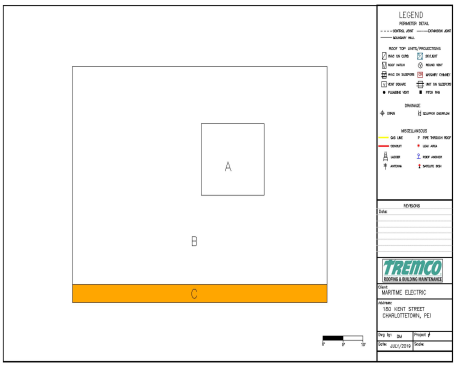
Ballast is displaced on roof surface. The scrim is exposed.

Vegetation growth on roof surface,

Vegetation growth on roof surface,

GENERAL INFORMATION

Roof Name	C
Service Activity Type	Inspection
Service Activity Date	25/07/19
Year of Installation	1990 (Estimate)
Roof Leaks	No
Roof Size	445 sq. ft.
	41.36 sq. meters
Roof Type	Modified Bitumen
Replacement Cost	$15,575.00
Roof Rating	Poor
Year to Replace	2019



ROOF COMPOSITION

Two ply modified bitumen roof membrane with granule surfacing

OVERALL CONDITION

Roof is in a poor condition.
Replacment is required.

VISIBLE ROOF DEFECTS

Ponding water visible throughout the entire roof area. The drains on each end of the roof are located on the high spot of the decking. The deck allows the roof to fill up with @ 2 inches of water. The drains do not allow for positive flow of water off the roof.

There are repairs to the outside perimeter where leakage has been reported in the past.

RECOMMENDATIONS

Remove/replace existing roof assembly.

URGENCY ITEMS

Address draining issue with additional drain installation or via tappered insulation when replacing roof.

WORK HISTORY

Inspection July 2019

SCAN HISTORY

Tremco inspected in 2014.

View of roof. Drain is located in high location of roof deckingon south side of building.

View of drain on south side of building.

Ponding water on roof surface.

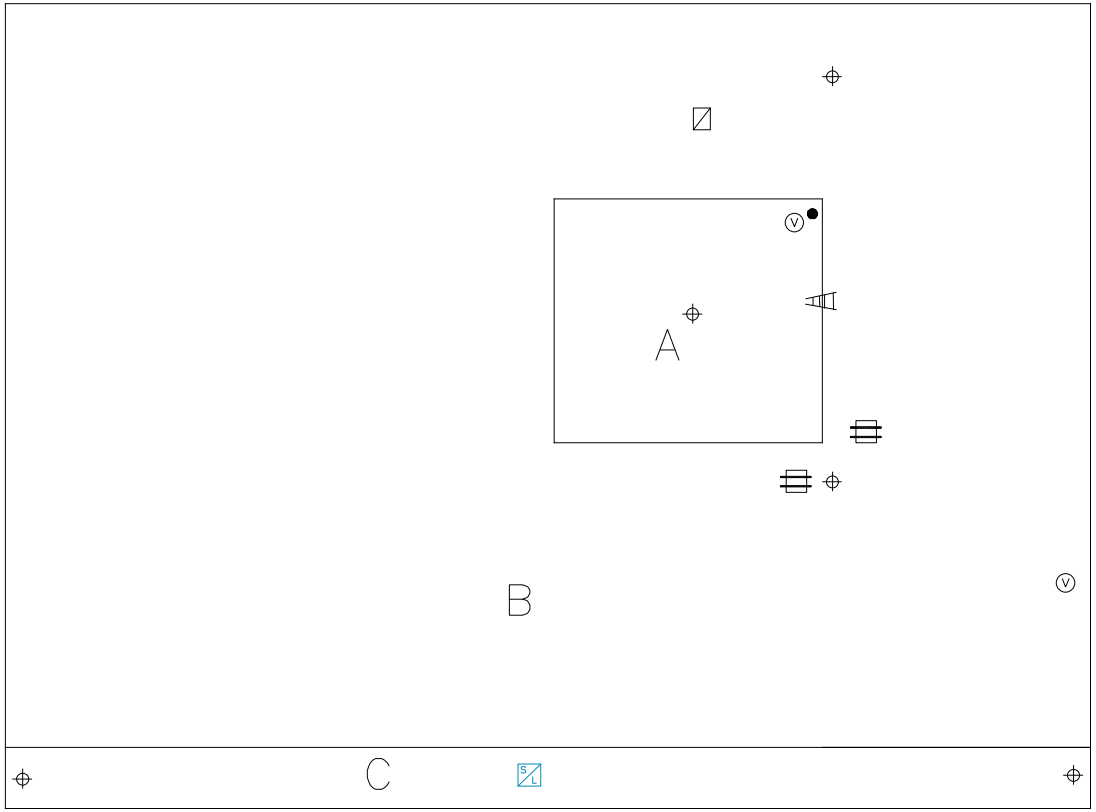
Ponding water on roof surface.

Excessive amount of water on roof surface.

Excessive amount of water on roof surface.

Area of deteriorated decking and insulation. Water setting inside.

View of wall base flashing.



0' 5' 10'

LEGEND

PERIMETER DETAIL

- - - - CONTROL JOINT
——— EXPANSION JOINT
——— BOUNDARY WALL

ROOF TOP UNITS/PROJECTIONS

- HVAC ON CURB
- SKYLIGHT
- ROOF HATCH
- ROUND VENT
- HVAC ON SLEEPERS
- MASONRY CHIMNEY
- VENT SQUARE
- UNIT ON SLEEPERS
- PLUMBING VENT
- PITCH PAN

DRAINAGE

- DRAIN
- SCUPPER OVERFLOW

MISCELLANEOUS

- GAS LINE
- P PIPE THROUGH ROOF
- CONDUIT
- LEAK AREA
- LADDER
- ROOF ANCHOR
- ANTENNA
- SATELITE DISH

REVISIONS

Date:

TREMCO
ROOFING & BUILDING MAINTENANCE

Client:
MARITIME ELECTRIC

Address:
180 KENT STREET
CHARLOTTETOWN, PEI

Dwg by: DM	Project #
Date: JULY/2019	Scale:

Financial Summary

Maritime Electric

Filters

Task Title: All

Start Year: 2019

Responsibility: All

Status: All

Costs: Total

Building	2019 Recom.	2020 Recom.	2021 Recom.	2022 Recom.	2023 Recom.										
180 Kent Street															
A															
Replace Roof		$18,000													
B															
Replace Roof				$195,000											
Preventative Maintenance	$9,500														
Coat the base flashing membrane to prevent further delamination/deterioration Repair base flashing membrane at small vent stack Remove vegetation growth from roof. Repair ballasted areas to ensure woven scrim keeps ballast from getting under insulation															
C															
Replace Roof	$22,000														
Building Total	$31,500	$18,000		$195,000											
Report Total	$31,500	$18,000		$195,000											

APPENDIX Q

Interest During Construction

Interest During Construction ("IDC"), as proposed in Maritime Electric's budget Section 9.0, is calculated on all capital additions except those classified as: (i) services and street lighting; (ii) distribution equipment; (iii) transportation equipment; and (iv) information technology. The interest rate used in calculating IDC is the annual return on rate base and it is assumed that all applicable project costs are financed over an average 90 day cycle. The following table shows the calculation of the 2022 IDC budget.

2022 Estimate of Interest During Construction	
Total Capital Budget[a]	$ 42,418,000
Less:	
5.3 Services and Street Lighting	(5,573,000)
5.7 Distribution Equipment	(1,556,000)
5.8 Transportation Equipment	(2,040,000)
7.2 Information Technology	(3,379,000)
Total Estimated Capital Subject to IDC	**$ 29,870,000**
Forecast Average Return on Rate Base/WACC[b]	6.74%
Average Number of Days to Finance	90
Proposed 2022 Budget for IDC (rounded)	**$ 496,000**

a. Before capitalized general expense and IDC.
b. See Appendix D, page 3 for calculation of 2022 forecast weighted average cost of capital ("WACC"). This is equivalent to the forecast average return on rate base.