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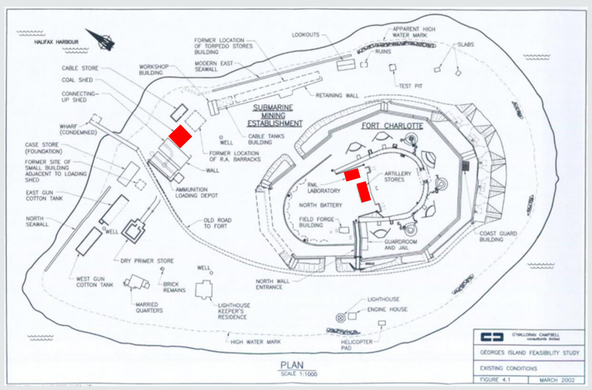
Electricity Source Options and Power Distribution on Georges Island

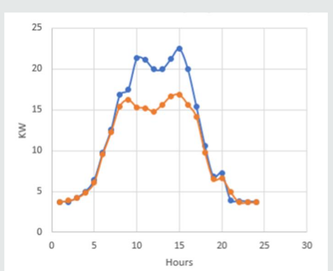
Introduction

Georges Island is a national historic site located in the middle of the Halifax Harbour. Parks Canada plans to turn the island into a tourist destination, which entails upgrades on the island's facility's such as the electrical and water systems. The team had been tasked with a set of objectives complete for this project which include:

- Design a distribution system for Georges Island which supplies power to various area. Three main areas of focus are the landing area, wharf, lighthouse side of the island, and parade square leading into the fortress tunnels.
- Assess multiple power supply options including tapping into existing power already supplied to the island, and alternatives such as renewable energy sources which would lower the islands operating costs and reduce the islands reliance on fossil fuels as a means of power generation.

Design Process

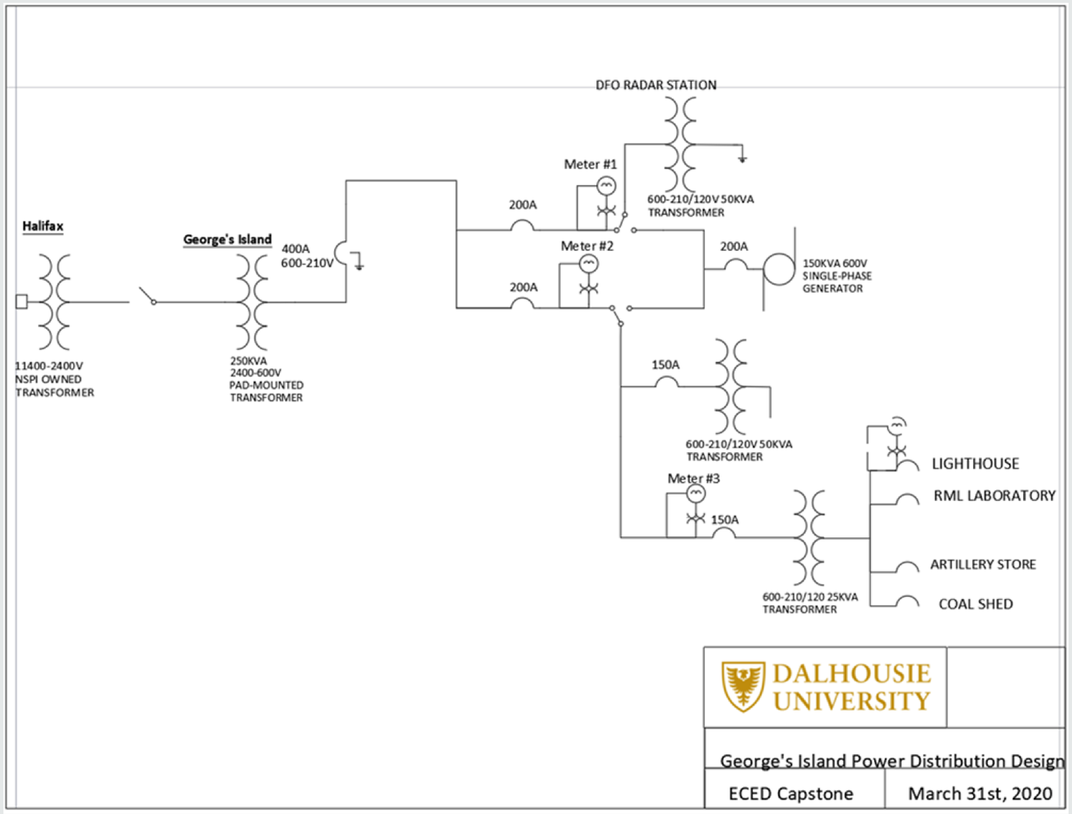




The pilot project for the island will be separated into two seasons. One will be open for public visitors during the summer months of July and August, and the other will see private bookings and special events for the months of September and October.

Details of Design

- The SLD was designed to address two major issues with the current design, the inlet transformer limiting power to the island as well as the combined lines of DFO and PCA services. Attempting to maintain and use existing lines on the island, while integrating the existing infrastructure components was a major part of our design.



- The different services are split up by meters 1 and 2. This allows for each respective agency to be responsible for their own power. The original inlet transformer is to have a windings reduction on the primary side make it a 25kVA 600-210/120V transformer. The inlet transformer is replaced by a 250kVA 2400-600V oil-filled pad mounted transformer. We included an extra branch for future developments as Parks Canada indicated that as a possibility in the future.

Size of System (KW)	Amount of Energy Produced (kWh)	Dollar Amount Produced/Year	Cost of System (Ave.)	Payback (Ave.)	Cost/Watt (CA Solar)	Cost of System (CA Solar)	Payback (CA Solar)
5	5450	861.3725	14150	16.42727159	$2.53/W	12650	14.68586471
10	10900	1722.745	28300	16.42727159	$2.65/W	26500	15.38242746
15	16350	2584.1175	42450	16.42727159	$2.76/W	41400	16.02094332
20	21800	3445.49	56600	16.42727159	$2.88/W	57600	16.71750607
25	27250	4306.8625	70750	16.42727159	$2.99/W	89700	20.82722632

- Above is an excerpt from our solar energy production research. We obtained quotes and capabilities of various size systems. We also showed the amount of money that can be saved, along with the respective payback period of the system. Average system costs are done using $2.83/W. CA Solar is a certified installer located in Antigonish, NS.

Conclusion

The single line diagram was created with assumptions including:

- Load capacity based on daily expected use by Parks Canada.
- Expected loads of future buildings are from former Feasibility study.
- Existing infrastructure can handle new expected loads.

The solar system design was based on the cost of a rooftop system without batteries. Due to the high cost of a system with a battery backup, it is suggested Parks Canada implement a system to be tied into the existing power grid. They can then sell power back to Nova Scotia Power through net metering.

Recommendations

- Existing infrastructure including the inlet transformer, and a backup generator should be upgraded.
- New underground wiring is to be laid and connected to new system for expected infrastructure.
- New meters to monitor each branch, and separate customers.
- Select size of renewables system to offset expected power usage bill.

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