

The report prepared by Lonergan Engineering dated November 8, 2023, presented 3 replacement Options from it's Feasibility review. For each of the 3 Options there is a summary provided for; Scope of Work, Class D Budget, Schedule, Advantages and Disadvantages. The Building and Property Summary of preferred Options from the Report is as follows:

Building and Property Preferred Option, B&P Option 1 – Replace Generator Set with Smaller Unit

- .1 This option involves replacing the existing 600kW generator with a 300kW generator.
- .2 If the generator is replaced it is also recommended that the automatic transfer switch be replaced with one containing an additional feature for manual by-pass to assist with maintenance procedures. Size to suit the new generator.
- .3 Provide an additional generator breaker, for annual load bank testing. This will ensure annual maintenance is being performed in compliance with CSA-282. In addition, in the event of a utility power outage occurs during an annual load bank testing, the system can immediately shunt the load bank and restore emergency back up power to the facility.
- .4 Disconnect and remove 28 Francis Street from the generator loads. Remove the existing transfer switch.
- .5 The anticipated Scope of Work is:
 - .1 Disconnect and remove all connections to 28 Francis Street
 - .2 Install a new 400A breaker in the main switchgear
 - .3 Install a new 400A automatic transfer switch in 26 Francis Street
 - .4 Install new cables from the electrical room to the generator location
 - .5 Install a new concrete pad adjacent to the existing generator
 - .6 Install a new generator and fuel tank
 - .7 Fill the new fuel tank
 - .8 Commission the new generator
 - .9 Empty the fuel tank of existing generator
- .6 Remove the existing generator set and fuel tank
- .7 Landscape area.

High Level Class D Budget: \$350,000 (add 50% for a natural gas solution with new piping)

The schedule to replace the generator package is 68-72 weeks.

Advantages:

- If the complete generator package is replaced, the facility will not have to worry about the functionality of the generator for another 25 years, only regular maintenance will be required. The generator package would be provided with new warranties.
- The existing building peak demand load is recorded by Hydro One at 106kW. The City of Kawartha Lakes indicated two new ERV units are installed but have not been running. According to the specification sheets that were provided by the City, these units consume 6.4kW. The existing peak demand load plus the new ERV units gives us a total demand load of 118.8kW for the building, leaving room and flexibility for some additional loads. This option is the most optimized generator size from a loading to efficiency perspective.
- A new automatic transfer switch with a maintenance by-pass would ease regular maintenance and a full building shut down would not be required.
- The acoustical performance of the generator package can be improved if a new one is provided, reducing the current noise from neighbouring properties.
- There are new design options for the enclosure to assist with the beautification of the landscape.

Disadvantages:

- This is more costly than the tank replacement solution.
- The schedule is quite long as the delivery leads on generators have not returned to normal since the pandemic.
- Reducing the size of the generator caps the amount of future loads that can be added to the emergency backup. This option may not be able to accommodate the facility needs if it had to meet Net Zero targets. However, a second generator can be added for unforeseeable loads and can be paralleled with this one in the future.

Building and Property Secondary Option, B&P Option 2 – Replace Generator Set like for like

- .1 This option involves replacing the existing 600kW generator with a new 600kW generator.
- .2 If the generator is replaced it is also recommended that the automatic transfer switch be replaced with one containing an additional feature for manual by-pass to assist with maintenance procedures. Size to remain the same.
- .3 Provide an additional generator breaker, for annual load bank testing. This will ensure annual maintenance is being performed in compliance with CSA-282. In addition, in the event of a utility power outage occurs during an annual load bank testing, the system can immediately shunt the load bank and restore emergency back up power to the facility.
- .4 Disconnect and remove 28 Francis Street from the generator loads. Remove the existing transfer switch.
- .5 The anticipated Scope of Work is:
 - .1 Disconnect and remove all connections and equipment within 28 Francis Street
 - .2 Install a new automatic transfer switch in 26 Francis Street
 - .3 Install new cables from electrical room to generator location
 - .4 Install a new concrete pad adjacent to existing generator
 - .5 Install a new generator and fuel tank
 - .6 Fill the new fuel tank
 - .7 Commission the new generator
 - .8 Empty the fuel tank of the existing generator
 - .9 Remove the existing generator set and fuel tank
 - .10 Landscape area

High Level Class D Budget: \$500,000 (add 50% for a natural gas solution with new piping)

The schedule to replace the complete generator package, like for like is 68-72 weeks.

Advantages:

- If the complete generator package is replaced, the facility will not have to worry about the functionality of the generator for another 25 years, only regular maintenance will be required. The generator package would be provided with new warranties.
- A new automatic transfer switch with a maintenance by-pass would ease regular maintenance and a full building shut down would not be required.
- Although there are no provisions for Net Zero targets, by leaving the generator at 600kW there will be ample space to add electric heating, and or electric vehicle charging loads if added in the future. Future upgrades will be backed up by the generator as the entire building is backed up.
- The acoustical performance of the generator package can be improved if a new one is provided, reducing the current noise from neighbouring properties.
- Although this will still be a large unit, there are new design options for the enclosure to assist with the beautification of the landscape.

Disadvantages:

- This is the most costly solution.
- The schedule is quite long as the delivery leads on generators have not returned to normal since the pandemic.
- The generator is oversized. In order for the generator to operate efficiently it needs to be loaded to a minimum of 30%. The existing building load is documented at 8% of the generator capacity, increasing losses and emissions. This also stresses the engine and reduces life expectancy.

Building and Property Least Preferred Option, B&P Option 3 – Replace Fuel Tank Only

- .1 This option involves only replacing the fuel tank to bring it up to current code. Modifications include but are not limited to:
 - .1 a dual lined tank with accessories and oil lines with new melting points of 538 °C,
 - .2 addition of new pressure relief valves,
 - .3 revised venting, etc.

- .2 The generator along with the existing breakers, and transfer switch would remain as is.
- .3 The anticipated Scope of Work is:
 - .1 Disconnect and remove all wiring and equipment at 28 Francis Street
 - .2 Empty fuel tank
 - .3 Disconnect and lift generator
 - .4 Replace tank
 - .5 Drop generator and reconnect
 - .6 Re-pipe as required
 - .7 Fill tank and commission

Budget: \$100,000

The schedule to replace the tank is 16-20 weeks.

Advantages:

- This is the most cost effective solution, and
- The schedule is the shortest.

Disadvantages:

- The generator is oversized, in order for the generator to operate efficiently it needs to be loaded to a minimum of 30%. The existing building load is documented at 8% of the generator capacity, increasing losses and emissions. This also stresses the engine and reduces life expectancy.
- The final life expectancy of this generator is not guaranteed, specifically after disconnection and reconnection. There is a risk, the generator may malfunction or fail after the tank replacement.
- If the generator package remains as is, there is no improvement to the acoustics during the operation of the generator, affecting neighbouring properties.
- The existing transfer switch would remain as is. A new switch with a manual by-pass would not be provided, as such regular maintenance would not be improved.

- It is not expected that the generator will last the full life cycle of the new tank. From a cost perspective, this does not seem like an appropriate allocation of funds.

Upon reviewing the conclusions and recommendations presented by Lonergan Engineering Building and Property agrees with the recommendation that **B&P Option 1** be pursued by They City based upon the following summary for each proposed Options:

B&P Option 1 Conclusions

Option 1 is the most optimized from a current needs perspective while considering current costs. The 300kW generator set can handle the peak demand of the building in its current state and will have flexibility to add some minor loads in the future. The smaller generator will be the most efficient from a fuel supply perspective, a losses perspective, an emissions perspective, and an overall performance perspective.

B&P Option 2 Conclusions

Option 2 provides the best flexibility to accommodate any future needs even though a 600kW generator will not be loaded to meet its preferred level of efficiency. This option is not the preferred option as it is not efficient, underloading puts unnecessary strain on the generator engine, reducing its life expectancy.

B&P Option 3 Conclusions

- Although the existing generator has not reached its maximum life expectancy, once the generator is disconnected there is no guarantee it will operate properly. Moving the generator may cause it to malfunction or fail.
- At best, if Option 3 were selected the City would need to look at a generator replacement within the next 10 years, or sooner. This would be the most costly solution in the long run. Retaining the older Generac unit and its proprietary components would also require higher maintenance costs to keep it running.