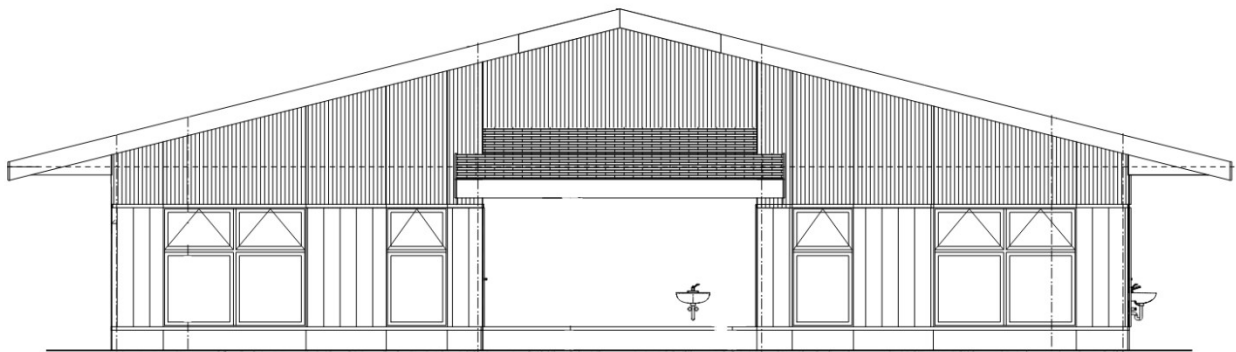


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# TRAIL UNICORN DAYCARE

Energy Modelling Report - NECB 2020 Compliance



Rendering by Boni Maddison Architects

July 10, 2026

RPE Project # 26025

Submitted To:

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**ROCKY POINT**  
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## 1 Executive Summary

The building is a single-storey child care centre located on Kootenay Avenue, Trail, BC. The purpose of this report is to show compliance with Part 10 of the 2024 BCBC and Part 8 of the 2020 NECB. The building must have a yearly total energy use (TEU) that is less than the reference building described in 8.4.4. of the NECB. The proposed building with the inputs outlined in this report meets this TEU target. The resultant TEU of the proposed building is 45,990 kWh/yr, which is 17.2% lower than the reference building TEU of 55,566 kWh/yr.

### Summary Table

| <i><b>Parameter</b></i>         | <i><b>Project Specific Information</b></i>      |
|---------------------------------|-------------------------------------------------|
| Modelled Floor Area             | 3,800.9 ft <sup>2</sup> (353.1 m <sup>2</sup> ) |
| Number of Levels                | 1                                               |
| Climate Zone                    | 5                                               |
| HDD 18°C                        | 3600                                            |
| Weather File Used               | CAN_BC_Nelson.AP.717760_CWEC2016                |
| Building Code Compliance        | BCBC Part 10 Requirements                       |
| Building Type                   | Daycare – Assembly Occupancy                    |
| Target                          | NECB 2020 Part 8                                |
| Reference Building TEU (kWh/yr) | 55,566                                          |
| Proposed Building TEU (kWh/yr)  | 45,990                                          |
| TEU % Improvement               | 17.2%                                           |
| Result                          | COMPLIES                                        |

## 2 Definitions

| Term                                   | Definition                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Thermal Energy Demand Intensity</i> | annual heating required by the building for space conditioning and for conditioning of ventilation air normalized per square metre of floor area of conditioned space and expressed in kWh/m <sup>2</sup> /yr, taking into account all of the following: thermal transmittance of above-ground walls and roof-ceiling assemblies; thermal transmittance of floors and walls in contact with the ground, or with space that is not conditioned space; thermal transmittance and solar heat gain of windows, doors and skylights; air leakage through the air barrier system; internal heat gains from occupants and equipment; and heat recovery from exhaust ventilation. |
| <i>Total Energy Use</i>                | energy used over a year by the building expressed in kWh/yr, including space heating, space cooling equipment, fans, service water heating equipment, pumps, and auxiliary, receptacle loads and miscellaneous equipment, appliances, elevators and escalators.                                                                                                                                                                                                                                                                                                                                                                                                           |
| <i>Thermal transmittance (U-value)</i> | the heat flow through an envelope per unit area and per a unit of time. The value includes the thermal transmittance of the assembly including the envelope construction and air films.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <i>Glazing</i>                         | refers to entire window assembly including the frame and the glass. Synonymous with fenestration and window.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| <i>Unmet hour</i>                      | an hour in which one or more zones is outside of the thermostat set point plus or minus one half of the temperature control throttling range. Any hour with one or more zones with an unmet cooling load or unmet heating load is defined as an unmet hour.                                                                                                                                                                                                                                                                                                                                                                                                               |

### 3 Abbreviations

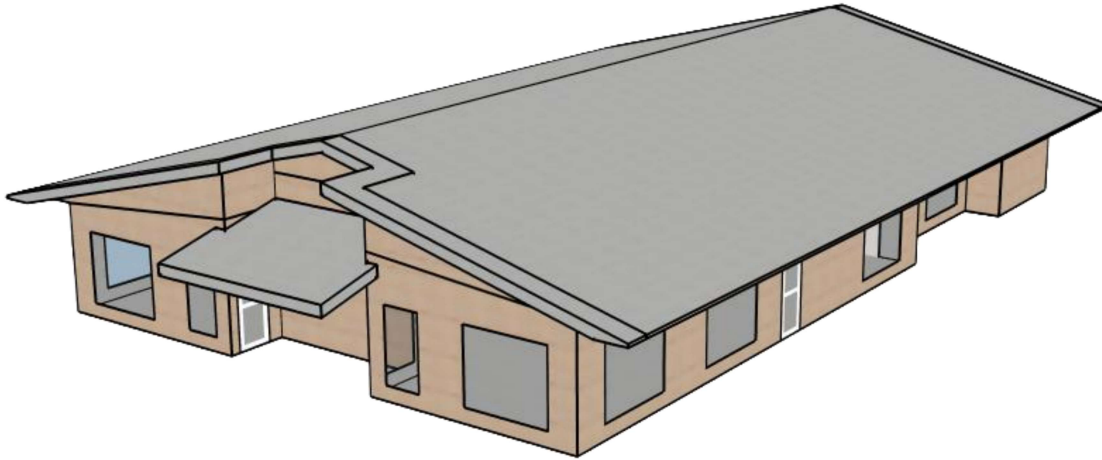
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|                |                                                                                                                 |
|----------------|-----------------------------------------------------------------------------------------------------------------|
| <i>BCBC</i>    | British Columbia Building Code 2024                                                                             |
| <i>BCESC</i>   | British Columbia Energy Step Code                                                                               |
| <i>BETBG</i>   | BC Hydro Building Envelope Thermal Bridging Guide v1.6                                                          |
| <i>CoV EMG</i> | City of Vancouver Energy Modelling Guidelines (Version 2.0)                                                     |
| <i>CWEC</i>    | Canadian Weather for Energy Calculation 2016                                                                    |
| <i>ECM</i>     | Energy Conservation Measure                                                                                     |
| <i>FDWR</i>    | Total vertical fenestration and door area to gross wall area ratio                                              |
| <i>LPD</i>     | Lighting power density                                                                                          |
| <i>NECB</i>    | National Energy Code of Canada for Buildings 2020                                                               |
| <i>SHGC</i>    | Solar heat gain coefficient (relevant glazing performance value). Values noted in this report are the minimums. |
| <i>TBD</i>     | To be determined                                                                                                |
| <i>TEU</i>     | Total Energy Use                                                                                                |
| <i>U-Value</i> | Thermal transmittance. Values noted in this report are the maximums.                                            |

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## 4 Introduction

Rocky Point Engineering Ltd. has been engaged by Boni Maddison Architects to complete an energy model and report to show energy performance of a new construction child care centre. The building is to meet the requirements of Part 10 of the BCBC by meeting Part 8 of the 2020 National Energy Code of Canada for Buildings (NECB). The building is situated on Kootenay Avenue, Trail, BC. which is climate zone 5.



*Figure 4.1 DesignBuilder Modelled Proposed Building*

## 5 Codes and Standards

This report was created using the following codes and standards for design requirements, scheduling, and best practices:

- British Columbia Building Code (BCBC) 2024
- National Energy Code of Canada for Buildings (NECB) 2020
- City of Vancouver Energy Modelling Guidelines (CoV EMG) v2.0
- BC Hydro Building Thermal Bridging Guide (BETBG) v1.6

## 6 Performance Requirements

Per BCBC and NECB guidelines, the building must have a total yearly energy use (TEU) that is lower than the reference building described in Section 8.4.4 of the NECB.

## 7 Climate

The Nelson Canadian Weather for Energy Calculation (CWEC) 2016 weather file was used as per the CoV EMG. The temperature profile shows a predominately heating climate as expected for the region.

| Weather File                     | Heating Degree Days<br>18°C | Minimum Temperature<br>(°C/°F) | Maximum Temperature<br>(°C/°F) |
|----------------------------------|-----------------------------|--------------------------------|--------------------------------|
| CAN_BC_Nelson.AP.717760_CWEC2016 | 3596                        | -9.6 / 14.72                   | 34.8 / 94.6                    |
| BCBC 2024 – Trail                | 3600                        | -17 / -1.4                     | 33 / 91.4                      |

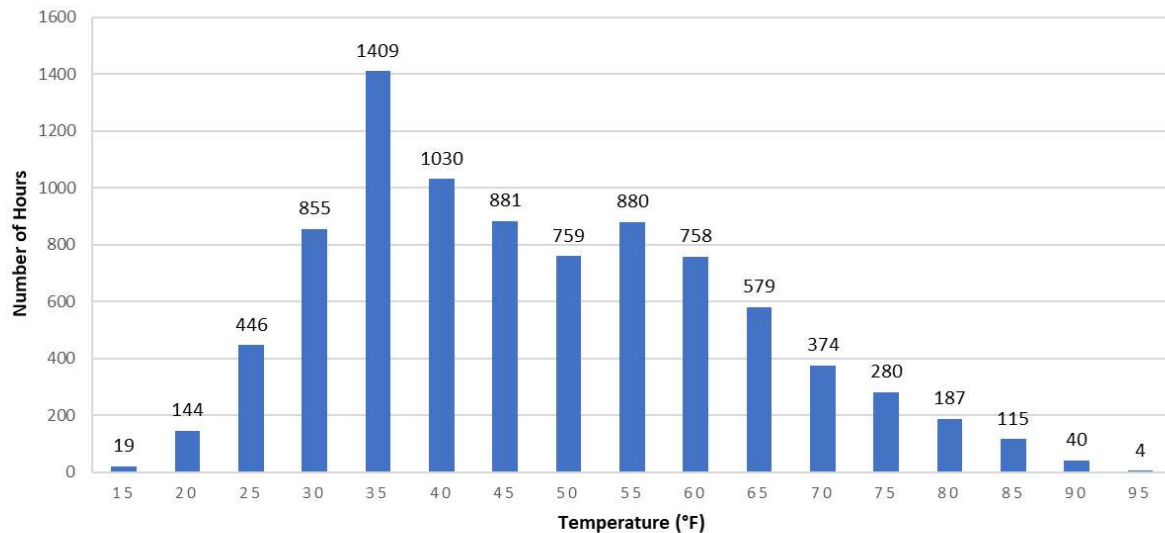


Figure 7.1: CWEC 2016 weather file temperature profile.

## 8 Proposed Building Performance

### 8.1 INPUTS

For this report, model inputs are determined from the design drawings and coordination with the consultant team. Note that the modelled wall values are placeholders until thermal bridging calculations are completed. The values are similar to the U-values calculated for comparable projects. Future reports will include wall U-Values calculated using the Thermal Bridging Guide (BETBG v1.6).

| Building Envelope                     | Proposed Building                                                                                                                         | NECB Reference Building                                                                                                        |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Above Grade Exterior Wall (effective) | U-0.100 BTU/°F·h-ft <sup>2</sup> *<br>Wood-framed wall, R-10 effective<br>*Overall wall transmittance including thermal bridging effects. | U-0.0467 BTU/h·°F·ft <sup>2</sup>                                                                                              |
| Slab-on-grade                         | F-0.51 BTU/h·°F·ft<br>Concrete slab with R-10 vertical insulation down to top of footings                                                 | F-0.65 BTU/h·°F·ft                                                                                                             |
| Roof                                  | U-0.020 BTU/°F·h-ft <sup>2</sup><br>Engineered roof truss structure with R-50 batt insulation                                             | U-0.0275 BTU/h·°F·ft <sup>2</sup>                                                                                              |
| Glazing                               | U-0.25 BTU/h·°F·ft <sup>2</sup><br>0.30 SHGC<br>Double-glazed windows                                                                     | U-0.335 BTU/h·°F·ft <sup>2</sup><br>0.30 SHGC                                                                                  |
| Entrance Doors                        | U-0.32 BTU/h·°F·ft <sup>2</sup><br>0.30 SHGC                                                                                              | U-0.335 BTU/h·°F·ft <sup>2</sup><br>0.30 SHGC                                                                                  |
| Doors – Solid                         | U-0.335 BTU/°F·h-ft <sup>2</sup>                                                                                                          | U-0.335 BTU/h·°F·ft <sup>2</sup>                                                                                               |
| FDWR                                  | 24.7%                                                                                                                                     | 40%                                                                                                                            |
| Exterior Infiltration                 | 0.5934 L/s/m <sup>2</sup> @ operating pressure<br>per gross exterior wall area<br>Equivalent to 1.5 L/s/m <sup>2</sup> @ 75 Pa            | 0.5934 L/s/m <sup>2</sup> @ operating pressure<br>per gross exterior wall area<br>Equivalent to 1.5 L/s/m <sup>2</sup> @ 75 Pa |

| <b>Mechanical Systems</b>  | <b>Proposed Building</b>                                                                                                                                                                                                               | <b>NECB Reference Building</b>                                                                                                                                        |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ventilation                | Distributed ERVs ducted to return of fan coil units, 68% sensible recovery at 32°F.<br>FC-1: 320 CFM<br>FC-2: 325 CFM<br>FC-3: 310 CFM<br>calculated per ASHRAE 62.1-2016<br>Ventilation scheduled per NECB 2020 Table A-8.4.3.2.(1)-D | No Energy Recovery<br>FC-1: 320 CFM<br>FC-2: 325 CFM<br>FC-3: 310 CFM<br>calculated per ASHRAE 62.1-2016<br>Ventilation scheduled per NECB 2020 Table A-8.4.3.2.(1)-D |
| Main Daycare Space Heating | Split Heat Pump fan coils with backup electric resistance heat<br>22°C / 71.6°F setpoint<br>18°C / 64.4°F night setback                                                                                                                | Heat Pump Rooftop Unit with backup electric resistance heat<br>22°C / 71.6°F setpoint<br>18°C / 64.4°F night setback                                                  |
| Main Daycare Space Cooling | Split Heat Pump<br>24°C / 75.2°F setpoint                                                                                                                                                                                              | Heat Pump Rooftop Unit<br>24°C / 75.2°F setpoint                                                                                                                      |
| Domestic Hot Water         | Central electric hot water plant<br>65 W/person per NECB.                                                                                                                                                                              | Same as proposed                                                                                                                                                      |
| Scheduling                 | School – NECB Table A-8.4.3.2.(1)-D                                                                                                                                                                                                    | Same as proposed                                                                                                                                                      |

| <b>Electrical Systems</b> | <b>Proposed Building</b>                                                                                                                                                               | <b>NECB Reference Building</b> |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------|
| Lighting Power Density    | Space-by-space method per NECB Energy Modeling guidelines.<br>Daycare: 7.6 W/m <sup>2</sup> (0.7061 W/ft <sup>2</sup> )<br>Mech/Elec: 4.6 W/m <sup>2</sup> (0.4274 W/ft <sup>2</sup> ) | Same as proposed               |
| Exterior Lighting         | 0.60 kW                                                                                                                                                                                | Same as proposed               |
| Plug Load Density         | Whole-Building method per NECB Energy Modeling guidelines.<br>Daycare: 5.0 W/m <sup>2</sup> (0.4645 W/ft <sup>2</sup> )<br>Mech/Elec: 1.0 W/m <sup>2</sup> (0.0929 W/ft <sup>2</sup> ) | Same as proposed               |

## 8.2 THERMAL BRIDGING

Thermal bridging calculations using the BETBG will be provided for future reports.

### 8.3 RESULTS

Using the inputs outlined above, the building's yearly energy use is 17.2% lower than the NECB reference building. The breakdown of energy use by category can be found in the table below and Figure 8.1.

|                    | Proposed Building<br>(kWh/yr) | NECB Reference Building<br>(kWh/yr) |
|--------------------|-------------------------------|-------------------------------------|
| Heating            | 14,672                        | 24,250                              |
| Cooling            | 1,516                         | 1,408                               |
| Interior Lighting  | 7,930                         | 7,930                               |
| Exterior Lighting  | 2,614                         | 2,614                               |
| Interior Equipment | 5,141                         | 5,141                               |
| Fans               | 5,343                         | 5,449                               |
| Domestic Water     | 8,773                         | 8,774                               |
| <b>Total</b>       | <b>45,990</b>                 | <b>55,566</b>                       |

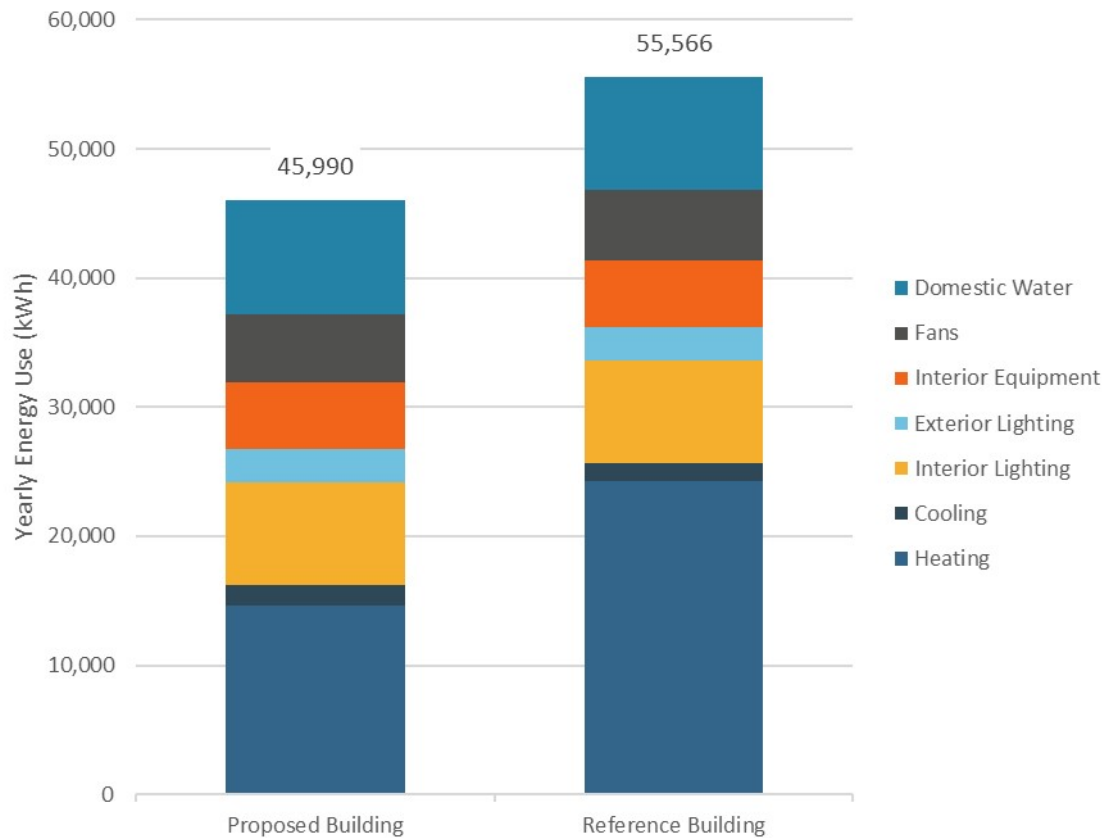


Figure 8.1: Total Yearly Energy Use of the Proposed and Reference Buildings

## 9 Conclusion

Using the assemblies and systems outlined in this report, the proposed building meets the requirements of Part 10 of the BCBC through Part 8 of the NECB. The building has a total yearly energy use of 45,990 kWh/year, 17.2% lower than the reference building total yearly energy use of 55,566 kWh/yr.

Yours very truly,

**ROCKY POINT ENGINEERING LTD.**

Reviewed By,



**Jordy Scott, EIT**  
Design Engineer



**Matthew Wallace, P.Eng.**  
Associate

## 10 Disclaimer

The energy models constructed for this report and the resultant energy consumption estimates have been performed using DesignBuilder v2025.1 simulation software that runs on the EnergyPlus simulation engine. DesignBuilder calculates hour-by-hour building energy consumption over an entire year (8760 hours) using hourly weather data for the location under consideration. Input to the program consists of a detailed description of the building being analyzed, including hourly scheduling of occupants, lighting, and equipment and thermostat settings. Many variables occur in the construction and operation of any building that energy modelling software and the software user cannot account for. These variables include, but are not limited to:

- 1) Seasonal variations in weather from the weather file used.
- 2) Locational differences from the weather file and the proposed building.
- 3) Variations in construction materials and construction quality.
- 4) Installed equipment usage that may differ from default values used in the software.
- 5) Variations in occupancy type as well as potential unoccupied tenant spaces.
- 6) Thermostat settings differing from those modelled.
- 7) Accuracy limitations inherent in the modelling software.
- 8) Design changes after energy model construction.
- 9) Maintenance of installed equipment, or lack thereof.
- 10) Impacts of neighbouring buildings, mountains, trees, etc. that are not accounted for in the energy model.

Due to the numerous variables inherent in predicting energy consumption through energy modelling, Rocky Point Engineering Ltd. shall not be held liable for any variations in actual energy consumption that may differ from the estimated predicted values contained in this report.

## 11 Appendix A – Detailed Inputs

| <i>Common Model Details</i> | <i>Note</i>                                          |
|-----------------------------|------------------------------------------------------|
| Modelled Floor Area         | 3,800.9 ft <sup>2</sup><br>(353.1 m <sup>2</sup> )   |
| Number of Levels            | 1                                                    |
| Climate Zone                | 5                                                    |
| HDD 18°C                    | 3600                                                 |
| Weather File Used           | CAN_BC_Nelson.AP.717760_CWEC2016                     |
| Target                      | NECB 2020 Part 8                                     |
| Gross Wall Area             | 2,728.09 ft <sup>2</sup><br>(253.45 m <sup>2</sup> ) |

| <i>Item</i>             | <i>Proposed Building</i> | <i>Reference Building</i> | <i>Note</i>   |
|-------------------------|--------------------------|---------------------------|---------------|
| <b>Results</b>          |                          |                           |               |
| Heating                 | 14,672                   | 24,250                    | kWh/yr        |
| Cooling                 | 1,516                    | 1,408                     | kWh/yr        |
| Interior Lighting       | 7,930                    | 7,930                     | kWh/yr        |
| Exterior Lighting       | 2,614                    | 2,614                     | kWh/yr        |
| Interior Equipment      | 5,141                    | 5,141                     | kWh/yr        |
| Fans                    | 5,343                    | 5,449                     | kWh/yr        |
| Domestic Water          | 8,773                    | 8,774                     |               |
| <b>Total Energy Use</b> | <b>45,990</b>            | <b>55,566</b>             | <b>kWh/yr</b> |
| <b>% Improvement</b>    | <b>17.2%</b>             | <b>-</b>                  | <b>TEU</b>    |

|                                       |                                              |                                               |  |
|---------------------------------------|----------------------------------------------|-----------------------------------------------|--|
| <b>Envelope Inputs</b>                |                                              |                                               |  |
| Above Grade Exterior Wall (effective) | U-0.100 BTU/°F·h·ft <sup>2</sup>             | U-0.0467 BTU/h·°F·ft <sup>2</sup>             |  |
| Slab-on-grade                         | F-0.51 BTU/h·°F·ft                           | F-0.65 BTU/h·°F·ft                            |  |
| Roof                                  | U-0.020 BTU/°F·h·ft <sup>2</sup>             | U-0.0275 BTU/h·°F·ft <sup>2</sup>             |  |
| Glazing                               | U-0.25 BTU/h·°F·ft <sup>2</sup><br>0.30 SHGC | U-0.335 BTU/h·°F·ft <sup>2</sup><br>0.30 SHGC |  |

| <i>Item</i>           | <i>Proposed Building</i>                                                     | <i>Reference Building</i>                                                    | <i>Note</i>                                  |
|-----------------------|------------------------------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------|
| Entrance Doors        | U-0.32 BTU/h·°F·ft <sup>2</sup><br>0.30 SHGC                                 | U-0.335 BTU/h·°F·ft <sup>2</sup><br>0.30 SHGC                                |                                              |
| Doors – Solid         | U-0.335 BTU/h·°F·ft <sup>2</sup>                                             | U-0.335 BTU/h·°F·ft <sup>2</sup>                                             |                                              |
| FDWR                  | 24.7%                                                                        | 40%                                                                          |                                              |
| Exterior Infiltration | 0.5934 L/s/m <sup>2</sup> @ operating pressure, per gross exterior wall area | 0.5934 L/s/m <sup>2</sup> @ operating pressure, per gross exterior wall area | Equivalent to 1.5 L/s/m <sup>2</sup> @ 75 Pa |

**Mechanical Inputs**

|                            |                                                                                                                                        |                                                                       |                                                           |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------|-----------------------------------------------------------|
| Ventilation                | Distributed ERVs ducted to return of fan coil units, 68% sensible recovery at 32°F.<br>FC-1: 320 CFM<br>FC-2: 325 CFM<br>FC-3: 310 CFM | No Energy Recovery<br>FC-1: 320 CFM<br>FC-2: 325 CFM<br>FC-3: 310 CFM | Ventilation scheduled per NECB 2020 Table A-8.4.3.2.(1)-D |
| Main Daycare Space Heating | Split Heat Pump fan coils with backup electric resistance heat                                                                         | Heat Pump Rooftop Unit with backup electric resistance heat           | 22°C / 71.6°F setpoint<br>18°C / 64.4°F night setback     |
| Main Daycare Space Cooling | Split Heat Pump                                                                                                                        | Heat Pump Rooftop Unit                                                | 24°C / 75.2°F setpoint                                    |
| Domestic Hot Water         | Central electric hot water plant 65 W/person per NECB.                                                                                 | Same as proposed                                                      |                                                           |
| Scheduling                 | School – NECB Table A-8.4.3.2.(1)-D                                                                                                    | Same as proposed                                                      |                                                           |

| <i>Item</i>              | <i>Proposed Building</i>                                                                                                                                                               | <i>Reference Building</i> | <i>Note</i>                    |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------------------------------|
| <b>Electrical Inputs</b> |                                                                                                                                                                                        |                           |                                |
| Lighting Power Density   | Space-by-space method per NECB Energy Modeling guidelines.<br>Daycare: 7.6 W/m <sup>2</sup> (0.7061 W/ft <sup>2</sup> )<br>Mech/Elec: 4.6 W/m <sup>2</sup> (0.4274 W/ft <sup>2</sup> ) |                           | Per NECB Table 4.2.1.5         |
| Exterior Lighting        | 0.60 kW                                                                                                                                                                                |                           |                                |
| Plug Load Density        | Space-by-space method per NECB Energy Modeling guidelines.<br>Daycare: 5.0 W/m <sup>2</sup> (0.4645 W/ft <sup>2</sup> )<br>Mech/Elec: 1.0 W/m <sup>2</sup> (0.0929 W/ft <sup>2</sup> ) |                           | Per NECB Table A-8.4.3.2.(2)-A |



|                  |                                                 |                  |
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