12519-12715 HUMBER STATION

CGDS Energy Model Report

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PREPARED FOR:
PROLOGIS

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1 EXECUTIVE SUMMARY

An energy model was prepared for a proposed warehouse building in Caledon, Ontario to demonstrate energy efficiency compliance with Caledon's Green Development Standard. The new development has a total gross floor area of 143, 222m^2 and is located at 12519 – 12715 Humber Station Road, Caledon, Ontario.

The proposed development is an Industrial development under the CGDS. Therefore, the building performance is evaluated based on the absolute performance targets (Energy Use Intensity [EUI], Thermal Energy Demand Intensity [TEDI], and Greenhouse Gas Emissions Intensity [GHGI]) as defined in the Caledon Green Development Standard Guidebook. Ecovert developed an energy model based on the most up-to-date architectural drawings, and mechanical and electrical drawings dated October and September 2024. IES VE 2023.2.0.0 was the software used to develop the model.

The table below compares the proposed design performance with the absolute performance metrics of the CGDS showing that the project meets the requirements of CGDS.

Metric	12519-12715 Humber Station	CGDS
EUI (kWh/m^2/year)	69	130
TEDI (kWh/m^2/year)	49	60
GHGI (kgCO_2/m^2/year)	11	15

The following are key measures in meeting this targetted performance:

- 92% efficient Air Handling Unit providing heating to the warehouse space
- Roof Top Unit with a nominal capacity of 6.5 tons and an ARI EER of 12.5% providing heating and cooling to the open spaces.
- 100% efficient electric unit heaters provide heating in the north and south electrical rooms as well as the mechanical room.
- 100% efficient electric baseboard heaters providing additional heating to spaces within the office area (the open office and the lunchroom)
- Precast Concrete Insulated Wall Panel + Spandrel with an effective R-value of 14.5
- Single-Ply TPO Roof with an R-value of 30
- Pilkington 6mm Evergreen Tinted Tempered Glass with a U-Factor = 0.23 and a SHGC = 0.23

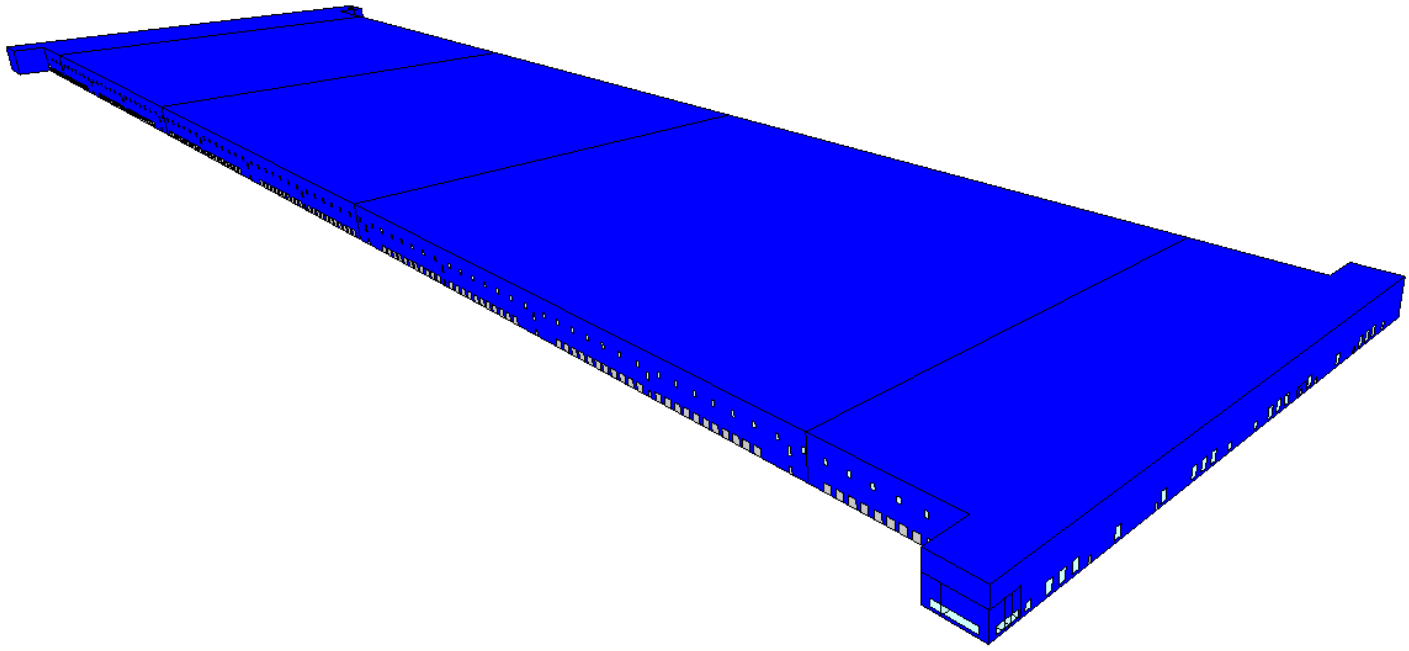
2 PROJECT DESCRIPTION

The project is an industrial building development located at 12519 – 12715 Humber Station Road, Caledon, Ontario. This 1-storey warehouse building has a total gross floor area of 143, 222m^2 consisting of a warehouse space, 2 electrical rooms, one mechanical room and an office space which includes a vestibule, open office, breakroom, janitor closet and washroom. The purpose of this report is to ensure that the proposed project will meet energy efficiency requirements in compliance with Caledon Green Development Standard.

Ecovert developed an energy model in compliance with Caledon Green Development Standard and ASHRAE 90.1 2010. The Proposed Model is based on the following drawings:

- Issued for Permit electrical drawings dated September 2024
- Issued for Review architectural drawings dated August 2024
- Issued for Coordination mechanical drawings dated August 2024

Where model inputs are unavailable, assumptions were made which are clearly outlined in this document. Key model inputs are shown in Section 4. Energy analysis is conducted using IES VE 2023 2.0.0 [2]. Figure 1 shows the energy model's geometry built in IES VE. Please note that colors used to show the geometry do not represent the actual color of the material designed by the architect.



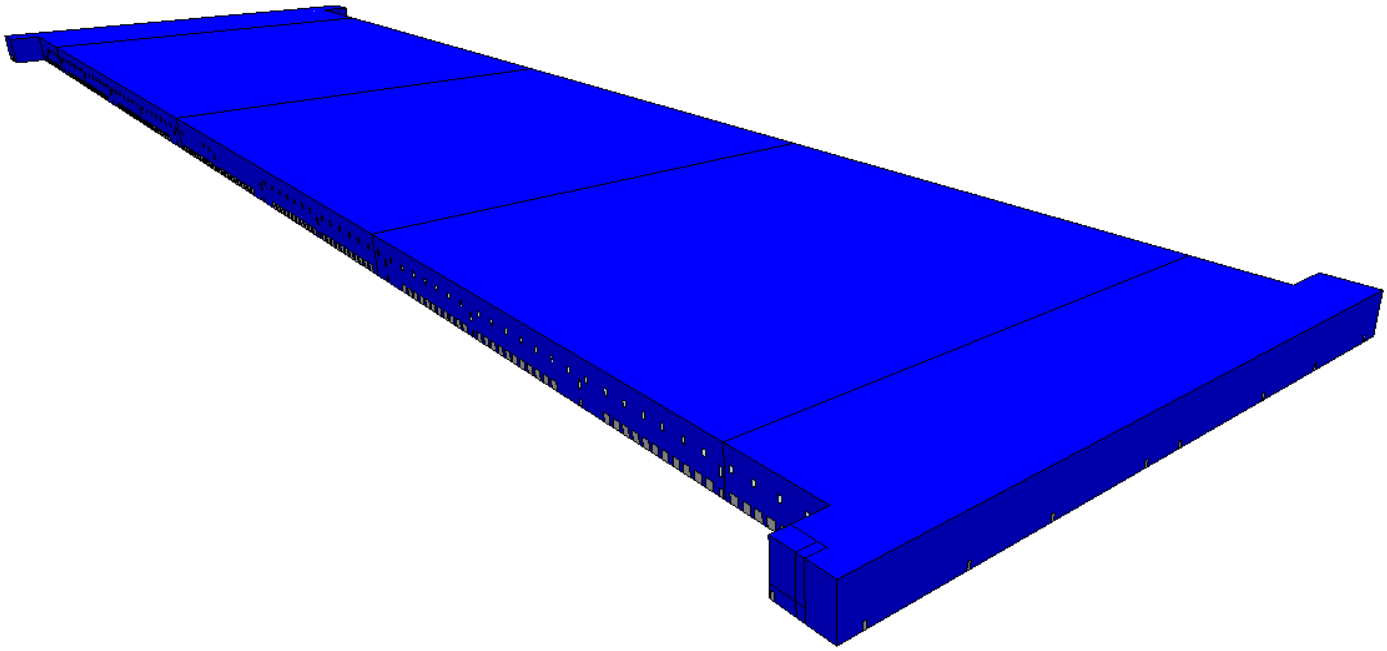


***Figure 1** – Geometry Built in IES VE (1. South & West View 2. North & East View)*

3 INCORPORATED ENERGY MEASURES

3.1 MECHANICAL EQUIPMENT

- Cambridge Air Solutions Blow-Through space Heater (Model: S1600) Air Handling Unit, Natural Gas Unit with a temperature rise of 160 F
    - Efficiency 92%
    - 6500 CFM
- Lennox LDT078H5E-J RTU with an economizer and heating and cooling capabilities
    - Nominal Capacity: 6.5 tons
    - ARI ERR: 12.5%
    - 2600 CFM (230 CFM O/A)
    - Total Cooling 82.6 MBH
    - Heating Output 104 MBH
- Ouellet Electric Heaters
    - Ouellet OFM 1502 Baseboard Heater with a heating capacity of 1.5 kW
    - Ouellet OAC04806-T Forced Flow Heater with a heating capacity of 4.8 kW
    - Ouellet OAC04008-T Forced Flow Heater with a heating capacity of 4.00 kW

3.2 ENVELOPE COMPONENTS

- Precast Insulated Wall Panel Effective R- 14.5
- Single – Ply TPO Roof, 80 mill reinforced TPO membrane, 13mm insulation overlay board, two layers of 76 mm rigid insulation, 13mm Sheathing, 38mm Metal Deck (R-30)
- Pilkington 6mm Evergreen Tinted Glass (U Factor = 0.23 and SHGCC = 0.23)

4 RESULTS

The simulation shows that the proposed design meets the absolute building performance requirements of Caledon Green Development Standards. CO_2 emission factors as per 2024 NIR [3] for Ontario, Canada is as follows: Natural Gas emissions is 0.1948 $kgCO_2e$ /kWh and Electricity emissions is 0.03 $kgCO_2e$/kWh.

	GFA (m2)	147,863.80		kg CO2 e/kWh
	Model	Proposed	Gas	0.1948
	Version	Preliminary	Electricity	0.03

		Energy (kWh)	EUI (kWh/m2/yr)	GHG (kg CO2e/yr)
	Heating	7,911,654	54	1,539,376
	Cooling	2,608	0.0	78
	Interior Lighting	986,627	7	29,599
	Exterior Lighting	85,723	1	2,572
	Fans	440,757	3	13,223
	Pumps	-	0	-
	SHW	2,628	0	79
	Receptacle	817,539	6	24,526
	Total	10,247,536	**69**	1,609,453

TEDI (kWh/m2/yr)	**49**
GHGI (kg CO2e/m2/yr)	**11**
Peak Electricity (kW)	**771**
Peak Electricity Intensity (w/m2)	**5**

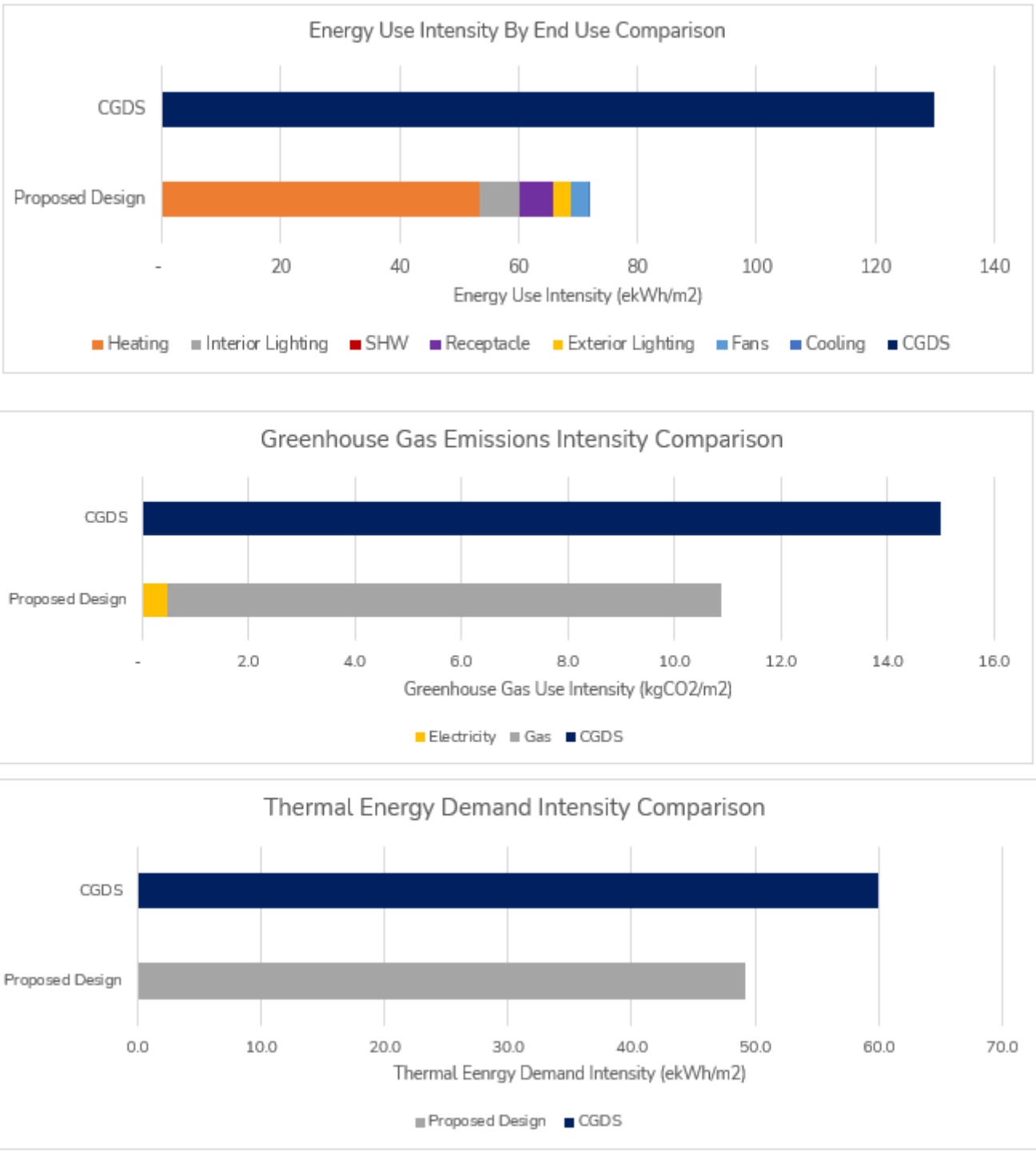


Figure 1: Summary of proposed design performance compared to CGDS (Caledon Green Development Standard) metrics.

5 SUMMARY OF KEY INPUT PARAMETERS

Location	Caledon, Ontario
Building Type	Industrial Building (Warehouse)
Weather File	CAN_ON_ELORA-RCS_6142286_CWEC.epw
Simulation Tool	IES VE 2023 Version 2.0.0
Climate Zone	ASHRAE CZ5 A
Occupancy (Calculated using ASHRAAE User Manual 2010 Occupancy (ft2/person))	114 occupants
Schedules	ASHRAE 90.1-2010 User Manual Schedule L (Warehouse): Monday to Friday 7AM to 5PM, Saturday 8AM to 4PM
	Proposed Design
	Envelope
Window Wall Ratio	2%
Wall RSI (R_{imp})	Spandrel + Precast Overall Wall: Effective 2.55 (14.5)
Window USI (U_{imp})	Overall, 1.306 (0.23)
Window SHGC	0.23
Roof RSI (R_{imp})	Effective 5.283 (30.0)
Infiltration	0.25 L/s.m^2 of façade @ 5 Pascal
	Internal Loads
Receptacle (Total Power Density) (W/m^2)	2.17
Elevators	N/A
Lighting	Interior Total Power Density(W/m^2) 2.62 Exterior Total Power Consumption (kW) 14.43
Service Hot Water (L/hour)	36

	Mechanical HVAC
HVAC System	**Warehouse:** 20 x Cambridge Air Solutions Blow-through Space Heater (Model S1600) with a temperature rise of 160 F, efficiency of 92% and a total heating output capacity of 25060 MBH (1253 MBH each) **Office Space (including washrooms, Janitor closet, office open space and lunchroom):** 1x Lennox LDT078H5E-J RTU serving the spaces through direct and transfer air distribution with a total cooling capacity of 82.6 MBH and a heating output of 104 MBH, the system has a capacity of 2600 CFM with 230 CFM of fresh air. 8 x Ouellet OFM 1502 electric baseboard heaters located in the open office and lunchroom with a capacity 1.5 kW each and 1 x 300 CFM exhaust fan in the washroom. **Vestibule:** 1 x Ouellet OAC04008T electric forced flow heater with a capacity of 4 kW **North Elec. Room:** 1 x Ouellet OAC04806 electric forced flow heater with a capacity of 4.8 kW and 1x Penn Barry SQX122-0541GP exhaust fan with a CFM of 500 and motor power of 0.2 kW **South Elec. Room:** 1 x Ouellet OAC04806 electric forced flow heater with a capacity of 4.8 kW and 1x Penn Barry SQX122-0541GP exhaust fan with a CFM of 500 and motor power of 0.2 kW **Mechanical Room:** 1 x Ouellet OAC04806 electric forced flow heater with a capacity of 4.8 kW
Heat Recovery	**N/A**
Ventilation	Warehouse: 130,000 CFM Total Air (100% Fresh Air) Open Spaces: 2,600 CFM Total Air (230 CFM Fresh Air)
Fans W/L/S (W/cfm)	AHU Fan: 1.21 (0.57) RTU Fan: 1.87 (0.882) Electric Heater Fan: 0.64 (0.3)
Service Hot Water	Electric Water Heater (30Gal, 3kW, 100% efficient)

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7 REFERENCES

[1] Caledon Green Development Standard – Guidebook
https://www.caledon.ca/en/town-services/green-development-standards.aspx

[2] Integrated Environmental Solutions Virtual Environment IES-VE 2022 Feature Pack 1 HotFix 1

[3] Environment and Climate Change Canada's National Inventory Report
https://www.canada.ca/en/environment-climate-change/services/climate-change/greenhouse-gas-emissions/inventory.html

8 APPENDIX A-THERMAL BRIDGING ANALYSIS

Thermal Bridging Calculator - R-16 Precast							
Thermal Object	Area/Length	Units	Transmittance	Units	Ref	Heat Flow	
Precast	28,222	*m2*	0.303	*W/m2K*	7.1.8 (w/ r-16)	8,551	71%
Spandrel	2,506	*m2*	0.563	*W/m2K*	calcs	1,412	12%
Parapet	2,051	*m*	0.65	*W/mK*	7.5.4	1,333	11%
Corners	128	*m*	0	*W/mK*	no loss	0	0%
Window Perimeters	1,207	*m*	0.059	*W/mK*	5.3.6	71	1%
Ground Floor Slab	2,051	*m*	0.325	*W/mK*	7.7.4	667	6%

Thermal Bridging Results		
	IP	SI
U	0.069	0.392
R	14.50	2.55

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