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Energy Analysis for TGS Tier 1 Compliance

Bloor & Dundas

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July 1, 2022



Revision	Description	Issued By	Date
00	Simple Box Energy Analysis	NL/JH/MW/MS	June 10, 2022
01	Simple Box Energy Analysis	NL/JH/MW/MS	June 17, 2022
02	Simple Box Energy Analysis	NL/JH/MW/MS	July 1, 2022



TABLE OF CONTENTS

Executive Summary.....	4
Analysis Overview	5
Table A: Energy Modeling Inputs.....	5
Building Details	6
Multifamily Building Assumptions & Schedules.....	8
Heating, Ventilation, & Air Conditioning Systems	9
HVAC Description	9
Building Envelope	10
Lighting Systems & Misc Plug Load	10



EXECUTIVE SUMMARY

Bloor & Dundas is a proposed, seven building, mixed-use multifamily development located in Toronto, Ontario. The proposed development contains over 160,000 square meters of gross floor area with nearly 2,000 residential units. Buildings range from 7 to 38 stories above grade and include offices, amenity space, garage, and retail in addition to residential units.

Steven Winter Associates, Inc. (SWA) has prepared a simple box energy analysis based on early design details for each of the seven buildings included in the proposed development. The simple box analyses were performed with eQuest v3.65 energy simulation software. The primary purpose of the evaluation is to demonstrate compliance with energy performance targets of the Toronto Green Standard version 4 (TGSv4), Tier 1.

The results of this early energy analysis show that all seven buildings in the development are projected to comply with Tier 1 TEDI, EUI, and GHG targets outlined in TGSv4.

The buildings are anticipated to achieve EUIs of **102.0– 128.6 kwh/m²**, exceeding the TGSv4 Tier 1 requirement of 135 kwh/m².

The buildings are anticipated to achieve TEDIs of **31.3 – 40.7 kwh/m²**, exceeding the TGSv4 Tier 1 requirement of 50 kwh/m².

The buildings are anticipated to achieve GHG emissions of **9.6 – 13.1 kgCO²e/m²**, exceeding the TGSv4 Tier 1 requirement of 15 kgCO²e/m².

A summary of early energy inputs included in the energy models is outlined in **Table A** on the next page. Individual building details can be found in subsequent sections of this report.



ANALYSIS OVERVIEW

TABLE A: ENERGY MODELING INPUTS

The following table outlines building design components found across all seven energy models.

Component	Energy Modeling Input
Heating & Cooling	Water Source Heat Pumps Cooling Efficiency: 12.5 EER Heating Efficiency: 4.0 COP Supply Fan power: 0.42 W/CFM Plant Equipment: Condensing Boiler, 95% Et Cooling Tower with Two Speed Fan
Ventilation	Individual ERVs integrated into WSHP Systems 60% efficiency OA Flow rates modeled per ASHRAE 62.1
Envelope: Roof	R-30 c.i.
Envelope: Opaque Wall	Steel-Frame with Continuous Exterior & Cavity Insulation Average: U-0.50 Average derated for effect of 30% balconies: U-0.052-0.057
Envelope: Fenestration	40% Window-to-Wall Ratio Punched Windows Metal Framing, Double Pane: U-0.30 / SHGC-0.30 No external shading devices
Envelope: Balconies	30% units with balconies 10 LF / Balcony Typical
Low Flow Plumbing Fixtures	Bathroom: 1.0 gpm Kitchen: 1.5 gpm Showerhead: 2.0 gpm
DHW System	Central Gas Storage, 80% Et
Appliances	ENERGY STAR refrigerators, dishwashers, and in-unit laundry Electric Stoves and Dryers
Interior Lighting	Residential: 4.95 W/SM (0.46 W/SF) Offices: 10.6 W/SM (0.98 W/SF) Retail: 15.5 W/SM (1.44 W/SF) Garage: 2.1 W/SM (0.20 W/SF)
Garage Exhaust	Demand controlled



BUILDING DETAILS

Building 1

Building Type: Multifamily, Amenity, Retail

Modeled Floor Area: 47,661m²

Project Performance

EUI, kwh/m²: 102.0

TEDI, kwh/m²: 32.9

GHG, kgCO₂e/m²: 9.1

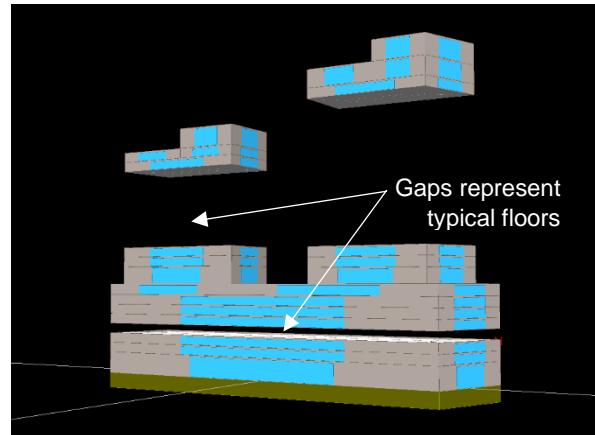


Figure A: Energy Model Rendering, Building 1

Building 2

Building Type: Multifamily, Amenity, Townhouses

Modeled Floor Area: 35,572 m²

Project Performance

EUI, kwh/m²: 124.2

TEDI, kwh/m²: 31.3

GHG, kgCO₂e/m²: 12.6

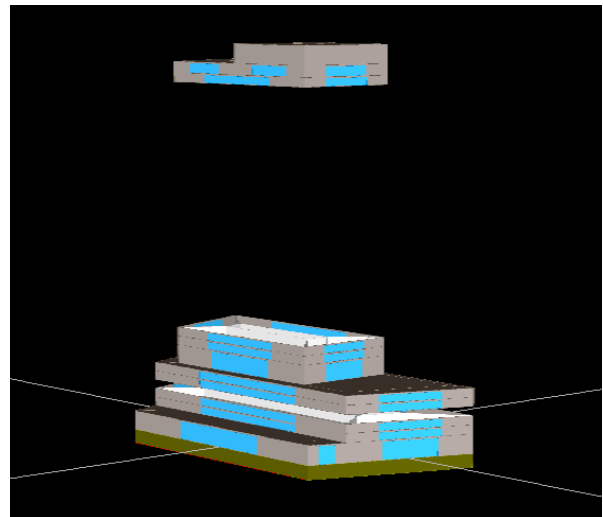


Figure B: Energy Model Rendering, Building 2

Building 3

Building Type: Multifamily, Amenity, Retail, Office

Modeled Floor Area: 41,029 m²

Project Performance

EUI, kwh/m²: 126.5

TEDI, kwh/m²: 35.1

GHG, kgCO₂e/m²: 10.4

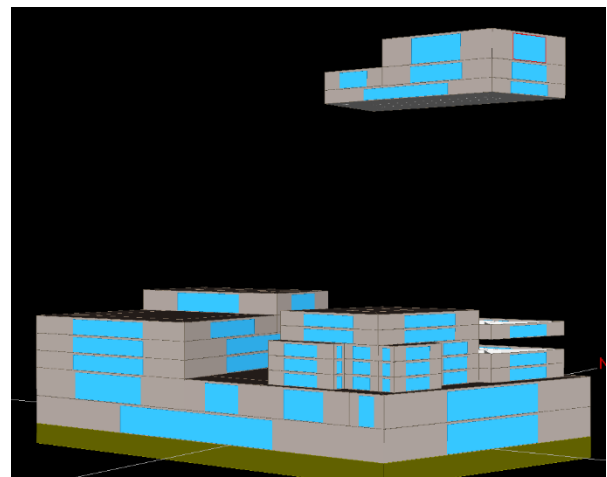


Figure C: Energy Model Rendering, Building 3



Building 4

Building Type: Multifamily, Amenity, Townhouses

Modeled Floor Area: 23,300 m²

Project Performance

EUI, kwh/m²: 128.6

TEDI, kwh/m²: 34.0

GHG, kgCO₂e/m²: 13.1

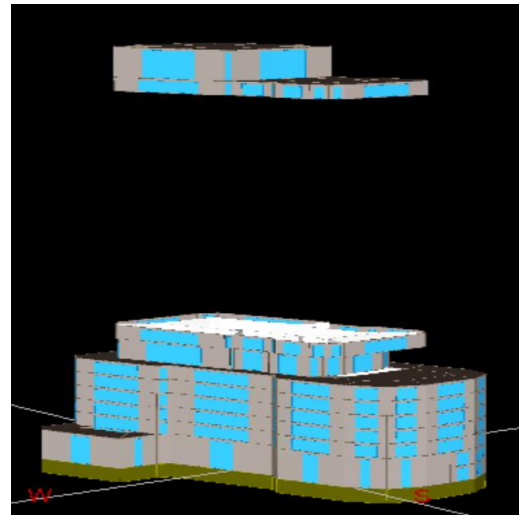


Figure D: Energy Model Rendering, Building 4

Building 5

Building Type: Multifamily, Amenity

Modeled Floor Area: 15,500 m²

Project Performance

EUI, kwh/m²: 121.4

TEDI, kwh/m²: 33.4

GHG, kgCO₂e/m²: 11.8

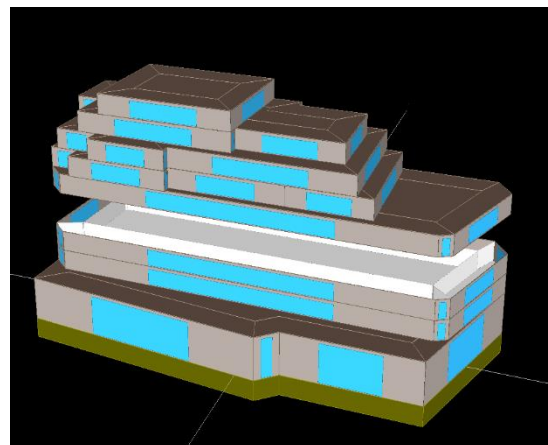


Figure E: Energy Model Rendering, Building 5

Building 6

Building Type: Multifamily, Amenity, Townhouses

Modeled Floor Area: 6,773 m²

Project Performance

EUI, kwh/m²: 124.2

TEDI, kwh/m²: 40.7

GHG, kgCO₂e/m²: 11.7

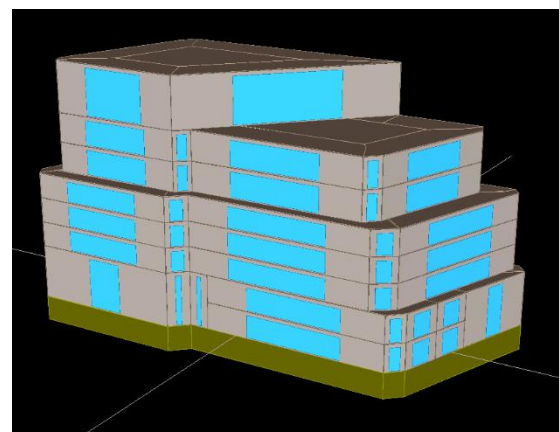


Figure F: Energy Model Rendering, Building 6



Building 7

Building Type: Multifamily, Amenity, Townhouses

Modeled Floor Area: 13,599 m²

Project Performance

EUI, kwh/m²: 123.7

TEDI, kwh/m²: 35.6

GHG, kgCO₂e/m²: 11.9

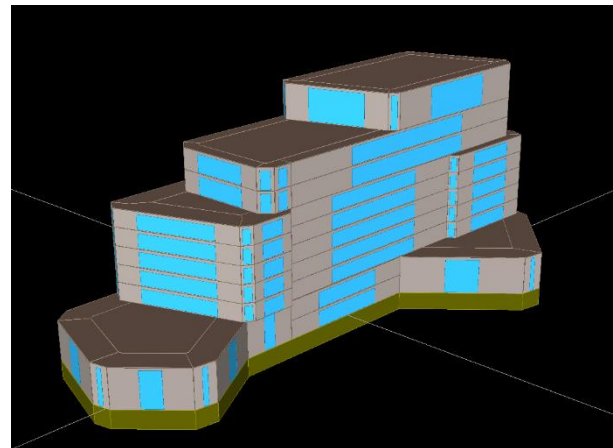


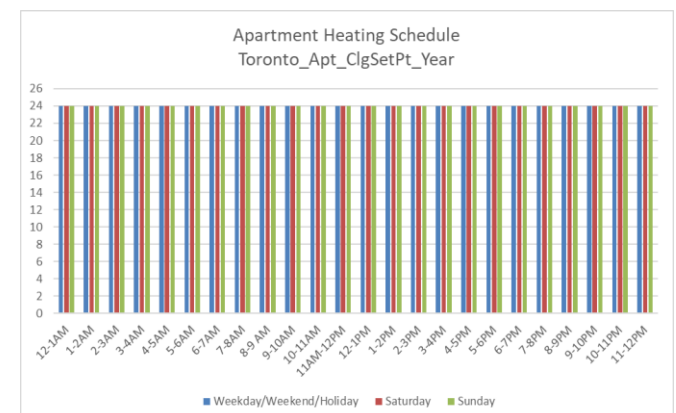
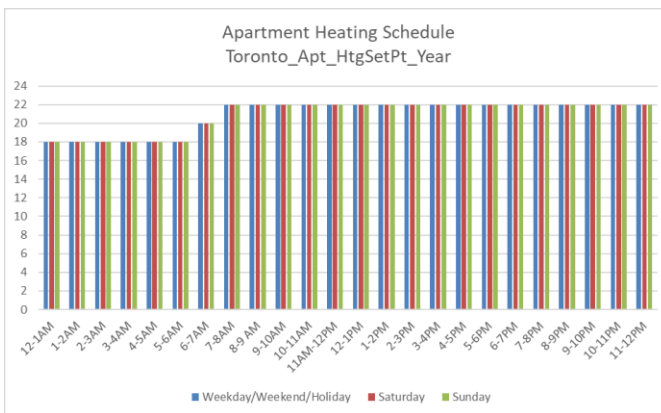
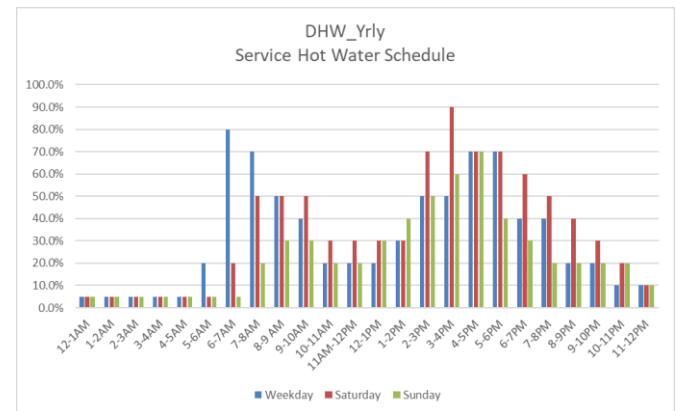
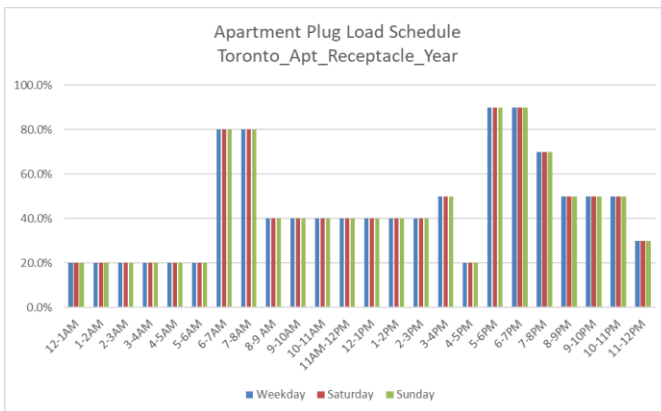
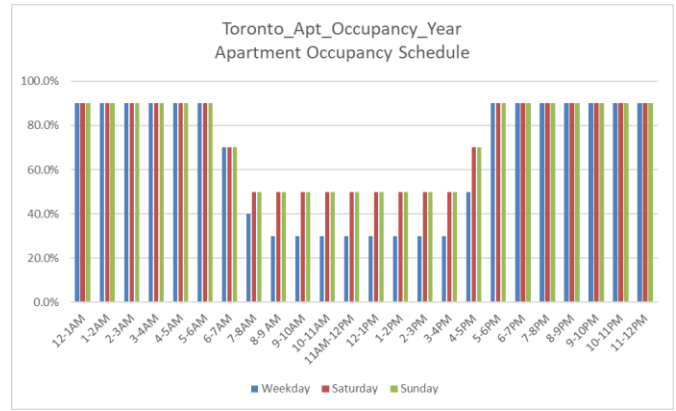
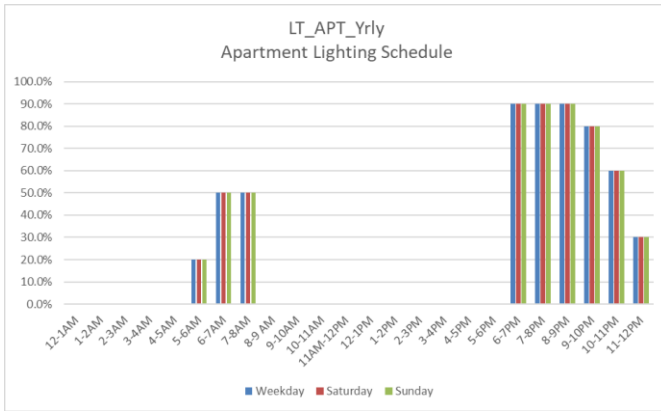
Figure G: Energy Model Rendering, Building 7

MULTIFAMILY BUILDING ASSUMPTIONS & SCHEDULES

The following assumptions are included in all seven energy models.

Building Property	Assumptions
Weather File	TMY3/CAN_ON_Toronto.Pearson.Intl.AP.716240_CWEC2016.BIN
Fenestration	No External Shading Devices
Plug Loads	0.46W/SF (5.0 W/SM) – Misc. Plug Units 1.5 W/SF (16.1 W/SM) – Office 0.5 W/SF (5.38 W/SM) – Retail
Infiltration	0.0448 CFM/SF @ 75 PA
Setpoints	Heating: 22°C / 18°C Setback Cooling: 24°C
Schedules	Per TGS, Indicated in Charts Below

The following charts indicate schedules used in the energy models for occupancy, plug loads, lighting, heating and cooling.



HEATING, VENTILATION, & AIR CONDITIONING SYSTEMS

HVAC Description

Primary HVAC & Hot Water Systems

The proposed primary space conditioning system in the building is distributed Water Source Heat Pumps with condensing boilers and cooling towers. WSHP systems have integral Energy Recovery Ventilation (ERV) in each unit. ERVs will have 60% efficiency.

Exhaust & Ventilation



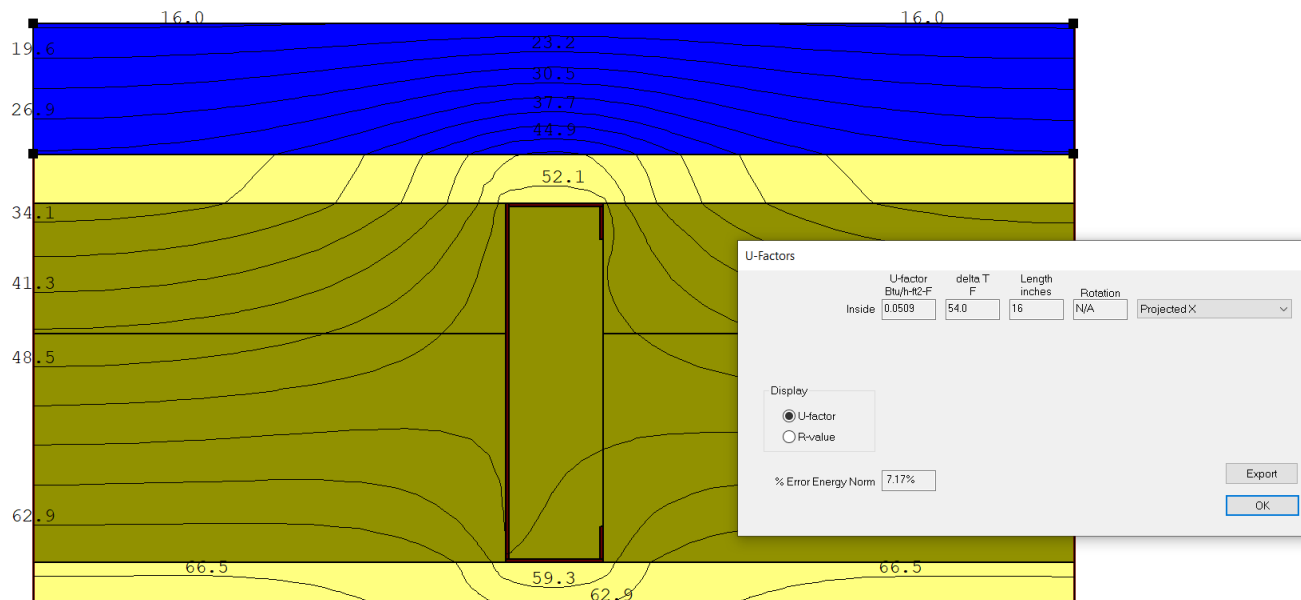
The ventilation rates for the buildings will be provided in accordance with ASHRAE 62.1. Each unit is ventilated individually with ERVs integrated into the WSHP systems.

BUILDING ENVELOPE

While the building envelope has not yet been fully designed, a typical opaque wall assembly, outlined in the table below, has been established as a baseline for the development.

R-Value	Thickness, in.	Description
0.74	-	Interior Surface Film Coefficient
0.56	0.625	Interior Gypsum Wall Board, R 0.9/inch
24.09	5.5 4.3/inch	Steel Stud Cavity Wall with 16 Gauge Steel Stud 16" OC, Packed with Mineral Wool R
0.68	0.75	Exterior Gypsum Sheathing, R 0.9/inch
7.50	2	Exterior XPS Insulation, R 3.75/inch (Note: XPS has de-rated to 75% of thermal efficiency to account for thermal bridging via clip system OR brick ties as per SWA high performance wall guide)
0.74	-	Exterior Surface Film Coefficient for Rainscreen Assembly

THERM modeling results of the assembly, displayed below, show a U-value of 0.50 Btu/hr.ft².°F.



LIGHTING SYSTEMS & MISC PLUG LOAD

High efficacy LED lights will be specified throughout the development. Lighting power densities (LPDs) will be designed to meet requirements of the TGSv4.

The energy model assumes various miscellaneous equipment loads in the building. Units are modeled with 5 W/SM (0.46 W/SF) of miscellaneous receptacle load. In addition, in-unit appliances will be Energy Star rated where available. Unit cooking ranges and dryers will be electric.