Site Plan Application Stage

Energy Efficiency Report Submission Checklist

Check each box to confirm the required documentation is submitted

☐ Appendix-A1, Better Buildings Partnership-Toronto Green Standard Energy Efficiency Report.
(Absolute Performance Targets Pathway)
The report to be completed and signed by the Energy Modeller and licensed Architect, C.E.T., B.E.M.P., or Professional Engineer

☑ Appendix-A2,Better Buildings Partnership-Toronto Green Standard Energy Efficiency Report.
(Relative Performance Targets Pathway)
if choose to comply with TGS % performance track applicable only for the projects pursuing Tier-1.
The report to be completed and signed by the Energy Modeller and licensed Architect, C.E.T., B.E.M.P., or Professional Engineer

☐ Appendix-B1, Better Buildings Partnership-Toronto Green Standard Energy Modelling Simulation Summary Report. (Absolute Performance Targets Pathway)

☑ Appendix-B2, Better Buildings Partnership-Toronto Green Standard Energy Modelling Simulation Summary Report. (Relative Performance Targets Pathway)
Only applicable if choosing to comply with TGS % performance track, only available for the projects pursuing Tier-1, or outside of the available archetypes.

☑ Energy Modelling Report.

☑ Working Energy Models (base case if applicable and energy efficienct case).

☑ Mechanical and Electrical Design Brief.

☑ Related supporting drawings and calculations.

Note: Additional documentation may be required upon request by City.

APPENDIX-A2 (Relative Performance Targets Pathway)
Better Buildings Partnership
TORONTO GREEN STANDARD
Energy Efficiency Report

PROJECT INFORMATION:

Project Address: **Grosvenor and Grenville - South**
SPA Number:
Date(dd-mm-yyyy): **23-01-2019**
Building Type: **Residential**
Total Modeled GFA (m^2): **41,696.00**
Energy Simulation Software Used: **eQuest v3.65**

Energy Modeller Information:

Company Name: **EQ Building Performance**
Contact Person: **Kevin Watt**
email: kw@eqbuilding.com
Telephone # **905-418-0203**

Architect Information:

Company Name:
Contact Person:
email:
Telephone #

Select Reference Code Compliance Path: **OBC SB-10 (2017) Division 3 Chapter 3 - NECB 2015**

	Reference Building						Proposed Building						Energy Savings			
Energy End Use	**Electrical Annual Consumption (kWh)**	**Natural Gas Annual Consumption (kWh)**	**EUI kWh/m^2**	**GHGI[a] kgCO^2e/m^2**	**Peak Demand Summer kW**	**Peak Demand Winter kW**	**Electrical Annual Consumption (kWh)**	**Natural Gas Annual Consumption (kWh)**	**Energy Use Intensity (kWh/m^2)**	**GHGI[a] kgCO^2e/m^2**	**Peak Demand Summer kW**	**Peak Demand Winter kW**	**Peak Demand Summer kW**	**Peak Demand Winter kW**	**Total Annual Consumption (kWh)**	**Energy Efficiency above Base Case %**
Lights	812,285	0.00	19.48				812,285.48	0.00	19.48						0.00	
Misc.Equipment	767,341	0.00	18.40				767,340.81	0.00	18.40						0.00	
Space Heating	9,844	3,228,749.80	77.67				5,215.22	1,851,989.79	44.54						1,381,389.25	
Space Cooling	500,163	0.00	12.00				421,026.63	0.00	10.10						79,136.60	
Heat Reject	0.00	0.00	0.00				0.00	0.00	0.00						0.00	
Pumps	301,193.72	0.00	7.22				187,777.29	0.00	4.50						113,416.43	
Fans	969,210.92	0.00	23.24				912,956.84	0.00	21.90						56,254.08	
Service Hot Water	0.00	2,052,394.95	49.22				0.00	1,943,988.65	46.62						108,406.30	
Others	0.00	0.00	0.00				0.00	0.00	0.00						0.00	
Totals	**3,360,038.62**	**5,281,144.75**	**207.24**	**26.94**			**3,106,602.27**	**3,795,978.44**	**165.55**	**20.19**			**0.0**	**0.0**	**1,738,602.66**	**20.1%**

a. GHGI is automatically calculated using the emission factor extracted from SB10 (0.05kg of CO^2 /kWh Electric & 1.899kg of CO^2 /m^3 Nat. gas). (1m^3 = 10.5ekWh)
b. TEDI value require input. See Energy Terms of Reference and Energy Modeling Guideline V3 for TEDI definition. Supporting calculation required to review TEDI value.

Total Annual Heat Demand for TEDI (kWh) 1,364,216.00

TEDI[b] (kWh/m^2) **32.7**

Please see Appendix-C for the calculation

I herby certify that the energy demand and consumption are properly representative of the Energy Modelling Report submitted for the above project.

Energy Modeller Name: **Kevin Watt**
Architect Name:

Signature:
Signature:

APPENDIX-B2
Better Buildings Partnership - Toronto Green Standard
Energy Modelling Simulation Summary Report - Relative Performance Targets Pathway

Date(dd-mm-yyyy):	23-01-2019

Project Description:

Grosvenor and Grenville is a multi-unit residential development that will be located in Toronto, Ontario. The project consists of two high-rise towers, north and south, with a shared podium, unc

Project's key energy efficiency measures proposed:

High performance glazing: low-e coating, thermally broken Al frames, Argon fill, warm edge spacers
Window-wall-ratio of approximately 49% (vision glass only)
Lighting levels as per NECB 2015 as modified by SB-10
In-suite energy recovery ventilators, amenity and retail heat recovery ventilators
Hot water, chilled water fan coils serving suites, lobbies and amenity areas

Provide a complete summary of energy simulation inputs and assumptions, referencing the relevant plans, drawings or reports.

Location:	Toronto, Ontario
Building Sector:	Residential
Space Use Classification:	Residential
Simulation Software Used:	eQuest v3.65
Modeled Gross Floor Area (square meter):	41,696.0
No. of Floors:	39
Gross Exterior Wall Area (Sq.meter):	33,379.0
Gross Exterior Window Area (Sq.meter):	17,275.0
Gross Roof Area (Sq.meter):	3,101.0

Passive Design Measure Description:

Building Envelope

Exterior Wall	Reference	Proposed	Notes/Reference
Wall Type	NECB Zone 5	Spandrel Glass Panel	
Add additional as necessary		Precast Brick Panel	
Add additional as necessary			
Nominal R-Value (F-sqft-hr/BTU)	20.4	13.11 / 18.31	
Overall R-Value(F-sqft-hr/BTU)	20.4	7.97 / 14.84	

Roof

Roof Type/Description	NECB Zone 5	4" continuous rigid insulation	
Nominal R-Value (F-sqft-hr/BTU)	36.4	20	
Overall R-Value(F-sqft-hr/BTU)	36.4	20	

Floor

Floor Type/Description	NECB Zone 5	NECB Zone 5	
Nominal R-Value (F-sqft-hr/BTU)	31	31	
Overall R-Value(F-sqft-hr/BTU)	31	31	

Windows

Fixed Glazing U-Value (BTU/sqft-F-hr)	0.335, SHGC 0.40	0.35, SHGC 0.30	
Operable Glazing U-Value (BTU/sqft-F-hr)	0.335, SHGC 0.40	0.35, SHGC 0.30	
Window-Wall Ratio:	40.0	49.0	
Skylight Assembly (If applicable)	NA	NA	
Skylight-Roof Ratio (If applicable):	NA	NA	

Lighting	**Reference**	**Proposed**	**Notes/Reference**
Fixture Types:	Per NECB 2015 + SB-10	Per NECB 2015 + SB-10	
Lighting Power Density (W/sq.ft):	0.475	0.475	
Light schedule:	Per space type	Per space type	
Lighting Controls:			

Other Equipment Load	**Reference**	**Proposed**	**Notes/Reference**
Equipment Description:	Per NECB 2015 + SB-10	Per NECB 2015 + SB-10	
Equipment Schedule:	Per space type	Per space type	
Peak Load Density (W/sq.m):	3.273	3.273	

HVAC

Plant	**Reference**	**Proposed**	**Notes/Reference**
Central Cooling Type:	Centrifugal Chiller	Centrifugal Chiller, VFD	
Capacity (Tons):	230	230	
Efficiency (COP):	5.547	6.1	
Primary Cooling Pumps (Head, Power, GPM):	pump power equal to proposed as per NECB	75 ft head, 65% efficiency, gpm autosized	
Cooling Tower:	0.013 kW/kW	0.013 kW/kW	
Central Heating Type:	Hydronic gas fired boiler	Hydronic gas fired boiler	
Capacity (MBH):	5272.9	5130.5	
Thermal Efficiency:	90	95	
Primary Heating Pumps (Head, Power, GPM):	pump power equal to proposed as per NECB	59 ft head, 60% efficiency, gpm autosized	

Domestic Hot Water	**Reference**	**Proposed**	**Notes/Reference**
Heating Type:	Gas	Gas	
Capacity (MBH):	Auto-sized	Auto-sized	
Thermal Efficiency:	90	95	

Systems

	Reference	**Proposed**	**Notes/Reference**
Suites	Fan Coil	Fan Coil	
Heating Source	Hydronic served by HW loop	Hydronic served by HW loop	
Heating Efficiency (if applicable)	N/A	N/A	
Cooling Source	Hydronic served by CHW loop	Hydronic served by CHW loop	
Cooling Efficiency (if applicable)	N/A	N/A	
Outdoor Air	Per ASHRAE 62.1	Per ASHRAE 62.1	
Airflow			
Fan Power	0.25 W/cfm	0.25 W/cfm	
Heat Recovery	No	Yes, 65% efficiency	
Other			
Residential Corridors	Per NECB Table 8.4.4.7-B - Variable Air Volume, System 6	Packaged Single Zone	
Heating Source	Hydronic served by HW loop	Gas Fired	
Heating Efficiency (if applicable)	N/A	90	
Cooling Source	Hydronic served by CHW loop	DX	

Cooling Efficiency (if applicable)	N/A	11 EER	
Outdoor Air	100%	100%	
Airflow	2983 CFM	2983 CFM	
Fan Power	1.0 W/cfm	1.0 W/cfm	
Heat Recovery	No	No	
Other			
Offices and Residential Lobby	Per NECB Table 8.4.4.7-B System 3	Fan Coil	
Heating Source	Furnace	Hydronic served by HW loop	
Heating Efficiency (if applicable)	80%	N/A	
Cooling Source	DX	Hydronic served by CHW loop	
Cooling Efficiency (if applicable)	COP 3.45 (14 SEER)	N/A	
Outdoor Air	Per ASHRAE 62.1	Per ASHRAE 62.1	
Airflow			
Fan Power	0.25 W/cfm	0.25 W/cfm	
Heat Recovery	Yes, on lobby, 55%	No	
Other			
Amenities and Retail	Per NECB Table 8.4.4.7-B System 3	Fan Coil	
Heating Source	Furnace	Hydronic served by HW loop	
Heating Efficiency (if applicable)	80%	N/A	
Cooling Source	DX	Hydronic served by CHW loop	
Cooling Efficiency (if applicable)	COP 3.45 (14 SEER)	N/A	
Outdoor Air	Per ASHRAE 62.1	Per ASHRAE 62.1	
Airflow			
Fan Power	0.25 W/cfm	0.25 W/cfm	
Heat Recovery	No	Yes, 65%	

Others

APPENDIX-C
Better Buildings Partnership - Toronto Green Standard
Thermal Energy Demand Intensity (TEDI) Documentation

Date(dd-mm-yyyy):	23-01-2019
Project Name and Address:	Grosvenor and Grenville - 26 Grenville & 27 Grosvenor

Peak Heating Load
The peak heating load of the building considers energy gained or lost due to envelope conduction, internal gains, and air infiltration. Outside air ventilation loads are excluded.
eQUEST: The peak heating load of the building can be found in the LS-C report under Total Load, Heating Load
IES: Using VistaPro to look at the Room Heating Loads (.htg file), sum the "Space conditioning sensible" variable for all rooms in the model.
EnergyPlus: In 'Output Reporting - Output:Table:Summary Reports' field in the idf file of the EnergyPlus model, add the report 'Facility Component Load Summary', and find the report after simulation. Use the 'Grand Total' in the column of 'Total [W]' of the table 'Estimated Heating Peak Load Components'.

Total Peak Heating Load (kW):	**1,698.91**	**This is for both buildings, north and south**

Provide a complete summary of the annual space heating energy delivered to the building spaces.

Hydronic Space Heating
The space heating energy provided by all hydronic loops in the model is summed to determine a total hydronic heating load.
eQUEST: The space heating load for each loop can be found in Report PS-D under Coil Load, Sum
IES: Using VistaPro to look at the HVAC network, select the "HWL space heating load" variable for each loop under Waterside: Hot water loops
EnergyPlus: in the 'Energy Meters - Annual and Peak Values - Other' report, use the 'Plant Loop Heating Demand: Facility' maximum value [W].

Modelled Hydronic Loop Name	Space Heating Load (GJ)	Notes / Source
HW Loop South	5,646.68	From PS-D report
Total Hydronic Heating Load (GJ)	**5,646.68**	

Direct Space Heating (e.g. Furnace, Direct Fire, Electric Resistance, Unit Heater, Force Flow)
The space heating energy provided by all direct heat sources in the model is summed to determine a total direct space heating load.
eQUEST: The space heating load for each heat source can be found by running an hourly report for each applicable system under Variable Type: HVAC Systems, 'Total Central/Zone Heat Coil Output' or by reviewing the SV-A report as applicable.
IES: Using VistaPro to look at the HVAC network, select the "GHS space heating load" variable for each heat source under Plant equipment: Generic Heat Sources
EnergyPlus: in the 'HVAC Sizing Summary - Zone Sensible Heating' report, use 'Calculated Design Load'.

Modelled Heat Source Name	Space Heating Load (GJ)	Notes / Source
North Corridor	469.28	Corridor MUA from hourly loads
Total Direct Space Heating Load (GJ)	**469.28**	

Heat Pump Heating
The space heating energy provided by all heat pumps in the model is summed to determine a total heat pump heating load.
eQUEST: The space heating load for each heat pump can be found by running an hourly report for each applicable system under Variable Type: HVAC Systems, 'Total Central/Zone Heat Coil Output' or by reviewing the SV-A report as applicable.
IES: Using VistaPro to look at the HVAC network, select the "HTL heating load" variable for each loop under Waterside: Heat transfer loops
EnergyPlus: in the 'HVAC Sizing Summary - Zone Sensible Heating' report, use 'Calculated Design Load'.

Modelled Heat Pump Name	Space Heating Load (GJ)	Notes / Source
Total Heat Pump Heating Load (GJ)	**0.00**	

Gross Floor Area (m2)	41,696.00
Total Heating Load (GJ)	6,115.96
TEDI (kWh/m2)	**40.74**

Appendix D: Performance Targets – All Buildings

Building Archetype	Scenario	Annual Targets		
		EUI (kWh/m^2)	TEDI (kWh/m^2)	GHG (kg/m^2)
High Rise MURB 30 Storeys,243,890 ft^2, 4 pipe H/C system with central plant, MUA ventilation for corridors, HRV/ERV for suites	**SB-10 2017**	225	80	28
	TGS v2 T1	190	77	26
	TGS v2 T2	170	70	20
	TGS v3 T1	170	70	20
	TGS v3 T2	135	50	15
	TGS v3 T3	100	30	10
	TGS v3 T4	75	15	5
4-6 Storey Wood Frame MURB 50,000 ft^2, 4 Stories,4 pipe H/C system with central plant, MUA ventilation for corridors, HRV/ERV for suites	**SB-10 2017**	235	87	32
	TGS v2 T1	**198**	**97**	**28**
	TGS v2 T2	**165**	**65**	**20**
	TGS v3 T1	165	65	20
	TGS v3 T2	130	40	15
	TGS v3 T3	100	25	10
	TGS v3 T4	70	15	5
Office Building 10 Stories, 200,000 sq. ft., HVAC system is typical VAV with reheat or 100% DOAS with Terminal h/c	**SB-10 2017**	233	84	27
	TGS v2 T1	200	82	23
	TGS v2 T2	175	70	20
	TGS v3 T1	175	70	20
	TGS v3 T2	130	30	15
	TGS v3 T3	100	22	8
	TGS v3 T4	65	15	4
Retail Building Single story, 50,000 sq. ft. (big box example), HVAC is Rooftop units or HRV/ERV with terminal h/c	**SB-10 2017**	227	100	31
	TGS v2 T1	190	75	24
	TGS v2 T2	170	60	20
	TGS v3 T1	170	60	20
	TGS v3 T2	120	40	10
	TGS v3 T3	90	25	5
	TGS v3 T4	70	15	3
Mixed Use: 90% Residential, 5% Retail, 5% Commercial	**SB-10 2017**	#DIV/0!	#DIV/0!	#DIV/0!
	TGS v2 T1	#DIV/0!	#DIV/0!	#DIV/0!
	TGS v2 T2	#DIV/0!	#DIV/0!	#DIV/0!
	TGS v3 T1	#DIV/0!	#DIV/0!	#DIV/0!
	TGS v3 T2	#DIV/0!	#DIV/0!	#DIV/0!
	TGS v3 T3	#DIV/0!	#DIV/0!	#DIV/0!
	TGS v3 T4	#DIV/0!	#DIV/0!	#DIV/0!

SB-10 (2017) was used as the baseline for all targets. GHGI targets were calculated using C02e emissions factors from SB-10 (Table 1.1.2.2). While modeled characteristics associated with each target are based in one sample set of criteria, there are several design options that can be used. Small variations in R-values and U-values are expected. The overall intent of results is to set achievable targets, not specify design solutions. Proposed targets are not always direct outputs of models; some have been increased slightly above modeled outputs to provide a more general progression towards near net zero.