TOR Energy Study Report

Hyatt Place

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ABBREVIATIONS

TEUI – Total annual energy use intensity (in kWh/m2)

TEDI – Thermal Energy Demand Intensity, (in kWh/m2)

GHGI - Greenhouse Gas Emissions Intensity, (in kg eCO2/m2)

ERV – Energy Recovery Unit (integrated with heat pumps)

MUA – Rooftop make-up air unit

WSHP – Water Source Heat Pump

ASHP – Air Source Heat Pump

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1.0 GENERAL BUILDING DESCRIPTION

1.1 Introduction

The proposed facility is a 9-storey hotel building, located in Waterloo, Ontario. The facility includes a common service area, a 7,000 square foot conference/banquet facility, and additional amenities consisting of a restaurant, fitness area, pool, etc.

The following is some key information of the energy modeling:

Building Type:	Hotel
Guest rooms:	216
Location	Waterloo
HDD18	4 000
Climate zone	6
Modeling software:	eQuest ver. 3.65

In this study, we compare two (2) HVAC design options, which the developer intends to use: air source heat pump (ASHP) system vs. water source heat pump (WSHP) system. The project is under design development; detailed design drawings are not available. So, the building envelope insulation details and configuration are based on a similar project, a Hyatt Hotel at Etobicoke, Ontario.

1.2 GHG Emission Factor

The GHG emission calculations shall be based on annual natural gas and electricity consumption, and based on the emission factors as OBC 2024:

- Electricity: 0.05 kgCO2e/kWh
- Natural Gas: 1.889 kgCO2e /m^3 or 0.1577 kgCO2e/kWh

1.3 Utility Rates

Electricity rate is as ENOVAPOWER for General Tariffs rate: (Large Business rate)

- Monthly charge: $125.96
- Peak Demand: $12.64/kW
- Energy:
    - $ 0.1 / kWh – first 750 kWh
    - $ 0.12/kWh - for all addition kWh

Natural Gas rate for Waterloo: Gas rate

- Monthly charge: $23.4
- Gas Rate: 30.66 Cents/m3 or 84.25 cents /Therm

1.4 Lighting

Building area lighting power density method is used in all models.

1.5 Operation schedules

Building Operation schedules are as NECB "F", for hotels.

1.6 Proposed Building Envelope

The exterior wall and roof assemblies are as following:

Typical Built-up Roof RT1

- 2-ply Modified Bituminous roof membrane
- 1/2" Protection board
- Tapered Polyiso insulation (R35) minimum
- Vapour barrier
- 8” (or 12”) concrete roof slab

Assembly U-value is 0.027 (IP).

Typical Exterior siding Wall WT2

- Metal siding
- 1 1/2” air Space
- 3" semi-rigid insulation R12.6
- Vapour barrier
- 1/2" sheathing
- 6" steel studs (@16 O.C.) filled with Polyurethane foam insulation R24 (effective R7.8)
- 1/2” gypsum board

Assembly overall U-value is 0.043 (IP).

Typical Exterior Brick Wall WT3

- 3 1/2" Brick (Stone) veneer
- 1” air Space

- 3" semi-rigid insulation R12.6
- Vapour barrier
- 1/2" sheathing
- 6" steel studs (@16 O.C.) filled with Polyurethane foam insulation R24 (effective R7.8)
- 1/2” gypsum board

Assembly overall U-value is 0.041 (IP).

Thermal Bridge and Exterior Wall U-value

Considering linear thermal bridges, the overall opaque wall U-value is 0.062 (IP). Refer to the thermal bridge calculations for details.

Glazing

Windows are double glazing, low E coated. The thermal performance data are as following:

- U Value 0.29 (IP)
- SHGC 0.4

The glazing area to gross wall area ratio is 20%.

1.7 Domestic Hot Water Heaters

Electric water heaters are considered for different design options.

2. HVAC SYSTEM OPTIONS

The different HVAC design options are described as following:

- Option 1: Water source heat pump system
- Option 2: Air source heat pump system

For both options the pool area will be the same, serviced by a dehumidification unit.

2.1 WSHP System

The WSHP system is composed of natural gas fired heating boilers and a fluid cooler.

For each common service space there is a horizontal heat pump; an ERV provides the required ventilation.

For each guest room there is a vertical heat pump; an ERV provides the required ventilation.

The HVAC equipment performance data are described as following:

Heat pumps

- Capacities: As required
- Cooling: EER 12
- Heating: COP 4.0
- ERV
    - 30 CFM for each guest room; common service area is as ASHRAE62.1.
    - 65% sensible effectiveness in winter

Water Loop pumps

- 120 feet head
- VRF controls

Gas Fired Heating Boilers

- Capacity: Auto sized as required
- Thermal Efficiency: 96%

Fluid Cooler

- Capacity: as required
- VFD controlled fan

MUA-1

- OA Airflow rate: 2 000 CFM
- Hydronic heating via a heat exchanger with glycol loop
- DX cooling: EER=11

2.2 ASHP System

For each guest room, there is a VTAC unit with an ERV, which is identical to the other design option.

The common service spaces, including lobby, amenity, etc., are serviced by an VRF system, which is composed of single or multiple outdoor units, linked with indoor units. ERVs provide ventilation to common service areas, which are identical to the other option.

VTAC and CTF systems are with DX cooling and heat pump heating. In extreme cold winter days, electric supplemental heating will be required.

The major equipment's performance data are as follows:

VTAC

- Capacity: As required.
- Cooling EER: 10
- Heating COP: 3.0
- Low ambient temperature: 10 ºF
- ERV
    - 30 CFM
    - 65% sensible effectiveness in wintertime

VRF

- Capacity: As required.
- Cooling EER: 11
- Heating COP: 3.2
- Low ambient temperature: -5 ºF
- ERVs
    - Capacity is as ASHRAE62.1
    - 65% sensible effectiveness in wintertime

MUA-1

- OA Airflow rate: 2 000 CFM
- DX cooling EER: 11
- DX heating COP: 3.0

- Low ambient temperature: 10 °F

2.3 Baselines

The proposed HVAC design options need to be compared with OBC 2024, and we consider the path of NECB 2015 + OBC 2024 as the baseline.

For each above two (2) described HVAC design options, the OBC baseline is different, which are summarized as following:

Table 1. Difference of OBC Baselines

	Clime zone for envelope U values	Primary heating Energy
WSHP	zone 6	Natural gas
ASHP	Zone 7B	Electricity

Refer to Table 2 and Table 3 for each baseline inputs.

3.0 ENERGY MODELING RESULTS

In this section we show the energy modeling results, and check each design option:

- OBC energy efficiency compliance, i.e. comparing each with its correspondent baseline
- ASHP vs. WSHP

3.1 WSHP System

Table 3-1 and 3-3 show the energy modeling results of WSHP system comparing with its baseline.

Table 3-1 Annual Energy Use Intensity TEUI

	Annual Energy Consumption MBTU			TEUI (kWh/m2)	Saving
	Electricity	Gas	Total		
WSHP	5,105.4	1,373.1	6,478.5	158.3	39.2%
Baseline	5,421.2	5,238.9	10,660.1	260.4	Base

Table 3-2 Annual GHG Emission Intensity GHGI

	Annual GHG kgCO2e			GHGI (kgCO2e/m2)	Saving
	Electricity	Gas	Total		
WSHP	74,794.1	63,445.6	138,239.7	11.5	57.0%
Baseline	79,420.6	242,069.1	321,489.7	26.8	Base

Table 3-3 Thermal Energy Demand Intensity TEDI

	Thermal Demand (MBTU)	TEDI (kgCO2e/m2)	Saving
WSHP	1,696.3	41.4	52.7%
Baseline	3,583.3	87.5	Base

From above results shown by Table 3-1 to Table 3-3, the proposed WSHP system option may achieve the following scenarios:

(1) OBC baseline

(2) High performance

	Proposed WSHP	City STD
TEUI	39.2%	30%
TEDI	52.7%	30%
GHGI	57.0%	50%

3.2 ASHP System

Table 3-4 to 3-6 show the energy modeling results of ASHP system.

Table 3-4 Annual Energy Use Intensity TEUI

	Annual Electricity Consumption	TEUI	Saving
	kWh	kWh/m2	
ASHP	1,664,408.0	138.8	35.0%
Baseline	2,560,947.0	213.5	Base

Table 3-5 Annual GHG Emission Intensity GHGI

	GHG	GHGI	Saving
	kgCO2e	kgCO2e/m2	
ASHP	83,220.4	6.9	35.0%
Baseline	128,047.4	10.7	Base

Table 3-6 Thermal Energy Demand Intensity TEDI

	Thermal Demand (MBTU)	TEDI (kgCO2e/m2)	Saving
ASHP	1,612.7	39.4	46.7%
Baseline	3,027.1	74.0	Base

From above results shown by Table 3-4 to Table 3-6, the proposed ASHP system option may achieve the following scenarios:

(1) OBC baseline

(2) High performance

	Proposed ASHP	City STD
TEUI	35.0%	30%
TEDI	46.7%	30%
GHGI	35.0%	50%

3.3 ASHP vs. WSHP System

Report 3.1 and 3.2 show each of proposed design options meets the city's scenarios of OBC baseline and High performance.

In the following we compare the two options and try to see which option is "better". The comparison is as following:

	WSHP	**ASHP**	**Difference**
Annual Energy Use, TEUI, kWh/m2	158.3	138.8	
GHG Emissions, GHGI, kgCO2e/m2	11.5	6.9	4.6
Thermal Energy Demand, TEDI, kWh/m2	41.4	39.4	
Annual Cost, $	$239,324	$264,373	$25,049

From above comparison we may see the following:

(1) ASHP system is better in TEUI number. The reason is primary energy source of heating is electricity for ASHP system, which is high than natural gas in quality.

(2) ASHP is much better in annual emission (GHGI).

(3) TEDI number is essentially the same because both options have identical building envelope insulation, and ventilation rates.

(3) ASHP is higher in annual operation cost, which is $25, 049 or approximately 10% more than WSHP.

APPENDIX

(1) Thermal bridge calculations

(2) Energy Modeling Results are in sequence of Proposed Building and Baseline for

- WSHP
- ASHP

and with the following reports:

- Annual energy use (BEPS)
- SS-D (Thermal energy demand)

(3) M/E design brief

Table 2. Baseline for WSHP Option

	Baseline (NECB 2015 + OBC2024)			Proposed Building
Envelope	U (SI)	U (IP)	Note	U (IP)
Wall	0.278	0.049	SB-2024 1.1.1.6.(1) Table SB 3.2.2.2 Climate Zone 6	Refer to Report 1.6.
Roof	0.156	0.028		
Floor	0.162	0.029		
Window (U/SHGC)	1.9 / 0.4	0.335 / 0.4		
Glazing Ratio	Identical		3.2.1.4	
HVAC System				
System	PTAC with hydronic heating		Tab 8.4.4.7.-A/B	Refer to Report 2.1.
Cooling efficiency	EER=11		Tab 5.2.12.1	
Heating Boilers	83% thermal efficiency		Tab 5.2.12.1	
Fan Power	2.57" W.G at efficiency 40%		Tab 8.4.4.18-3)	
Heat Recovery Winter Sen. Effectiveness	No		Table SB 5.2.10.1A 5.2.10.1 4)	
DHW Heaters				
Identical to proposed; electrical DHW heaters.			Tab 6.2.2.1	Refer to Report 1.7.
Lighting				
LPD	Building Area Method: 0.86 W/ft2		SB 4.2.1.5-2017	Refer to Report 1.4.

Table 3. Baseline for ASHP Option

	Baseline (NECB 2015 + OBC2024)			Proposed Building
Envelope	U (SI)	U (IP)	Note	U (IP)
Wall	0.21	0.037	SB-2024 1.1.1.6.(1) Table SB 3.2.2.2 Climate Zone 7B	Refer to Report 1.6.
Roof	0.138	0.024		
Floor	0.162	0.029		
Window (U/SHGC)	1.9 / 0.45	0.335 / 0.45		
Glazing Ratio	Identical		3.2.1.4	
HVAC System				
System	System 1 DX cooling with electric heating		Tab 8.4.4.7.-A/B	Refer to Report 2.2.
Cooling efficiency	COP 3.22 or EER=11		Tab 5.2.12.1	
Fan Power	2.57" W.G at efficiency 40%		Tab 8.4.4.18-3)	
Heat Recovery Winter Sen. Effectiveness	No		Table SB 5.2.10.1A 5.2.10.1 4)	
DHW Heaters				
Identical to proposed; electrical DHW heaters.			Tab 6.2.2.1	Refer to Report 1.7.
Lighting				
LPD	Building Area Method: 0.86 W/ft^2		SB 4.2.1.5-2017	Refer to Report 1.4.

Appendix (1)

Thermal Bridge Calculations
Hyatt Hotel
Waterloo

Overall Opaque Wall U and R-value

Proposed Building Entries						Totals	3,839.7	100%
Transmittance Type	**Description**	**Qty**	**Units**	**Transmittance Value**	**Units**	**Source**	**Heat Flow Btu/hr ^{o}F**	**% Total Heat Flow**
Clear Field	Typical Exterior Siding Wall WT2	26000.0	ft^2	0.043	Btu/hr ft^{2} ^{o}F	eQuest	1,118.0	29%
Clear Field	Typical Exterior Brick Wall WT3	35645.1	ft^2	0.041	Btu/hr ft^{2} ^{o}F	eQuest	1,461.4	38%
Linear Interface Detail	Slab	5002.0	ft	0.042	Btu/hr ft ^{o}F	Detail 5.2.39	210.1	5%
Linear Interface Detail	Parapets	764.0	ft	0.058	Btu/hr ft ^{o}F	Detail 5.5.9	44.3	1%
Linear Interface Detail	Corner	436.0	ft	0.088	Btu/hr ft ^{o}F	Detail 6.6.4	38.4	1%
Linear Interface Detail	Window Perimeter	6537.0	ft	0.148	Btu/hr ft ^{o}F	Detail 6.3.14	967.5	25%

Proposed Overall Opaque Wall Thermal Performance Values

Opaque U-Value (Btu/hr ft^{2} ^{o}F)	**Opaque Effective R-Value (hr ft^{2} ^{o}F/BTU)**
0.062	16.05

Appendix (2)

WSHP Proposed

Hyatt Place Waterloo WSHP Pro DOE-2.2-50a 4/14/2025 17:30:59 BDL RUN 1

REPORT- BEPS Building Energy Performance WEATHER FILE- Toronto ON CWEC

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY													
MBTU	982.8	0.0	274.8	259.3	427.6	1.2	404.9	877.0	0.0	0.0	1878.0	0.0	5105.4
FM1 NATURAL-GAS													
MBTU	0.0	0.0	0.0	1373.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1373.1
MBTU	982.8	0.0	274.8	1632.0	427.6	1.2	404.9	877.0	0.0	0.0	1878.0	0.0	6478.4

TOTAL SITE ENERGY 6478.44 MBTU 50.2 KBTU/SQFT-YR GROSS-AREA 50.2 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 16689.20 MBTU 129.3 KBTU/SQFT-YR GROSS-AREA 129.3 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.02
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 0
HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 2

NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.

Hyatt Place Waterloo WSHP Ref DOE-2.2-50a 4/14/2025 17:37:40 BDL RUN 1

REPORT- BEPS Building Energy Performance WEATHER FILE- Toronto ON CWEC

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY													
MBTU	982.8	0.0	274.8	0.0	671.8	0.0	130.3	1485.0	0.0	0.0	1876.0	0.0	5421.2
FM1 NATURAL-GAS													
MBTU	0.0	0.0	0.0	5239.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5238.9
MBTU	982.8	0.0	274.8	5239.0	671.8	0.0	130.3	1485.0	0.0	0.0	1876.0	0.0	10660.0

TOTAL SITE ENERGY 10660.10 MBTU 82.6 KBTU/SQFT-YR GROSS-AREA 82.6 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 21502.60 MBTU 166.6 KBTU/SQFT-YR GROSS-AREA 166.6 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.03
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 0
HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 3

NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.

REPORT- SS-D Building HVAC Load Summary WEATHER FILE- Toronto ON CWEC

	COOLING						HEATING						ELEC	
MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY	TIME OF MAX HR	DRY-BULB TEMP	WET-BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY	TIME OF MAX HR	DRY-BULB TEMP	WET-BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC-TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)
JAN	5.68636	22	15	41.F	36.F	181.151	-344.785	1	8	0.F	-1.F	-1344.915	68419.	167.030
FEB	5.74750	28	14	31.F	28.F	165.516	-300.519	23	8	4.F	3.F	-1253.394	61285.	165.876
MAR	13.23851	24	17	65.F	53.F	227.768	-228.946	11	8	8.F	8.F	-1159.238	64505.	159.930
APR	43.77114	17	16	80.F	63.F	520.079	-124.476	1	8	18.F	16.F	-858.454	61058.	176.721
MAY	122.89879	31	16	77.F	62.F	592.097	-60.662	1	8	31.F	28.F	-326.502	66805.	185.778
JUN	262.41574	17	20	78.F	74.F	983.799	-25.151	19	24	43.F	41.F	-138.068	74627.	212.427
JUL	373.30392	8	21	82.F	75.F	1218.743	-10.634	22	6	47.F	46.F	-87.989	84406.	235.967
AUG	350.40469	5	15	86.F	77.F	1142.457	-14.247	25	7	45.F	43.F	-108.470	82734.	222.006
SEP	204.76741	11	15	85.F	74.F	949.121	-39.370	26	8	34.F	33.F	-227.534	70712.	206.165
OCT	84.82536	10	15	75.F	60.F	542.405	-97.532	23	8	18.F	17.F	-705.721	65010.	182.590
NOV	19.81899	8	14	60.F	50.F	328.399	-164.007	18	8	22.F	21.F	-735.435	60918.	160.859
DEC	4.64703	15	14	13.F	11.F	127.712	-285.972	23	8	8.F	7.F	-1155.420	66447.	163.221
TOTAL	1491.528						-1696.297						826926.	
MAX						1218.743						-1344.915		235.967

MAXIMUM DAILY INTEGRATED COOLING LOAD (DES DAY) 0.000 (KBTU)
MAXIMUM DAILY INTEGRATED COOLING LOAD (WTH FILE) 0.000 (KBTU)

REPORT- SS-D Building HVAC Load Summary WEATHER FILE- Toronto ON CWEC

	COOLING						HEATING						ELEC	
MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY	TIME OF MAX HR	DRY-BULB TEMP	WET-BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY	TIME OF MAX HR	DRY-BULB TEMP	WET-BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC-TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)
JAN	16.37929	22	15	41.F	36.F	302.286	-641.301	1	8	0.F	-1.F	-1956.843	74070.	178.117
FEB	18.49786	28	14	31.F	28.F	292.197	-569.156	4	8	2.F	1.F	-1820.879	67279.	169.981
MAR	37.06218	24	17	65.F	53.F	344.983	-476.065	11	8	8.F	8.F	-1526.539	76124.	181.489
APR	84.15173	17	16	80.F	63.F	694.014	-303.992	4	8	15.F	13.F	-1185.445	78398.	202.359
MAY	168.57738	9	13	77.F	63.F	678.487	-175.494	1	8	31.F	28.F	-695.264	87120.	209.778
JUN	300.79016	17	17	83.F	76.F	1251.906	-76.088	19	24	43.F	41.F	-414.809	92827.	236.786
JUL	414.15091	8	20	85.F	75.F	1490.842	-34.813	22	7	50.F	48.F	-257.800	102236.	258.987
AUG	387.16434	5	15	86.F	77.F	1403.092	-45.483	25	7	45.F	43.F	-326.906	100452.	242.393
SEP	241.92168	11	15	85.F	74.F	1212.590	-117.317	26	8	34.F	33.F	-603.992	89182.	224.230
OCT	123.25677	10	15	75.F	60.F	655.909	-251.354	23	8	18.F	17.F	-1034.369	83676.	205.532
NOV	44.19115	8	14	60.F	50.F	460.970	-354.673	18	8	22.F	21.F	-977.368	75159.	189.301
DEC	16.92484	4	21	55.F	54.F	284.165	-537.585	16	8	9.F	8.F	-1601.617	74465.	188.301
TOTAL	1853.070						-3583.314						1000986.	
MAX						1490.842						-1956.843		258.987

MAXIMUM DAILY INTEGRATED COOLING LOAD (DES DAY) 0.000 (KBTU)
MAXIMUM DAILY INTEGRATED COOLING LOAD (WTH FILE) 0.000 (KBTU)

ASHP Proposed

25-118 Hyatt Place ASHP Pro DOE-2.2-50a 4/14/2025 17:13:18 BDL RUN 1

REPORT- BEPS Building Energy Performance WEATHER FILE- Toronto ON CWEC

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY													
MBTU	982.8	0.0	274.8	604.6	430.5	0.0	35.5	1089.0	0.0	385.3	1878.0	0.0	5680.6
FM1 NATURAL-GAS													
MBTU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MBTU	982.8	0.0	274.8	604.6	430.5	0.0	35.5	1089.0	0.0	385.3	1878.0	0.0	5680.6

TOTAL SITE ENERGY 5680.57 MBTU 44.0 KBTU/SQFT-YR GROSS-AREA 44.0 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 17041.70 MBTU 132.0 KBTU/SQFT-YR GROSS-AREA 132.0 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.03
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 0
HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 3

NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.

25-118 Hyatt Place ASHP Pro DOE-2.2-50a 4/14/2025 17:22:15 BDL RUN 1

REPORT- BEPS Building Energy Performance WEATHER FILE- Toronto ON CWEC

	LIGHTS	TASK LIGHTS	MISC EQUIP	SPACE HEATING	SPACE COOLING	HEAT REJECT	PUMPS & AUX	VENT FANS	REFRIG DISPLAY	HT PUMP SUPPLEM	DOMEST HOT WTR	EXT USAGE	TOTAL
EM1 ELECTRICITY													
MBTU	982.8	0.0	274.8	3027.0	640.8	0.0	34.6	1904.0	0.0	0.0	1877.0	0.0	8740.4
FM1 NATURAL-GAS													
MBTU	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
MBTU	982.8	0.0	274.8	3027.0	640.8	0.0	34.6	1904.0	0.0	0.0	1877.0	0.0	8740.4

TOTAL SITE ENERGY 8740.43 MBTU 67.7 KBTU/SQFT-YR GROSS-AREA 67.7 KBTU/SQFT-YR NET-AREA
TOTAL SOURCE ENERGY 26221.30 MBTU 203.1 KBTU/SQFT-YR GROSS-AREA 203.1 KBTU/SQFT-YR NET-AREA

PERCENT OF HOURS ANY SYSTEM ZONE OUTSIDE OF THROTTLING RANGE = 0.03
PERCENT OF HOURS ANY PLANT LOAD NOT SATISFIED = 0.00
HOURS ANY ZONE ABOVE COOLING THROTTLING RANGE = 0
HOURS ANY ZONE BELOW HEATING THROTTLING RANGE = 3

NOTE: ENERGY IS APPORTIONED HOURLY TO ALL END-USE CATEGORIES.

25-118 Hyatt Place ASHP Pro DOE-2.2-50a 4/14/2025 17:13:18 BDL RUN 1

REPORT- SS-D Building HVAC Load Summary WEATHER FILE- Toronto ON CWEC

	COOLING						HEATING						ELEC	
MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY	TIME OF MAX HR	DRY-BULB TEMP	WET-BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY	TIME OF MAX HR	DRY-BULB TEMP	WET-BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC-TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)
JAN	7.31401	22	15	41.F	36.F	208.153	-327.414	1	8	0.F	-1.F	-1322.784	131373.	476.648
FEB	7.15982	28	14	31.F	28.F	167.078	-284.668	23	8	4.F	3.F	-1230.598	116334.	461.629
MAR	17.96925	24	15	52.F	45.F	260.141	-214.022	11	8	8.F	8.F	-1130.504	97835.	432.663
APR	55.77001	17	16	80.F	63.F	529.240	-119.047	1	8	18.F	16.F	-833.466	78562.	269.231
MAY	135.26419	31	16	77.F	62.F	592.578	-59.976	1	8	31.F	28.F	-290.752	77203.	192.544
JUN	272.72336	17	20	78.F	74.F	1019.610	-25.151	19	24	43.F	41.F	-138.065	81201.	211.758
JUL	387.49191	8	21	82.F	75.F	1251.124	-10.634	22	6	47.F	46.F	-87.989	89550.	235.445
AUG	364.01981	5	15	86.F	77.F	1168.794	-14.247	25	7	45.F	43.F	-108.470	88018.	221.934
SEP	215.04016	11	15	85.F	74.F	981.640	-39.293	26	8	34.F	33.F	-199.986	78179.	206.017
OCT	97.00610	13	21	69.F	66.F	573.396	-94.306	23	8	18.F	17.F	-677.128	79824.	240.347
NOV	29.12951	8	14	60.F	50.F	340.044	-154.551	18	8	22.F	21.F	-694.630	83045.	227.275
DEC	7.63661	3	14	45.F	41.F	148.771	-269.420	23	8	8.F	7.F	-1130.507	111583.	432.663
TOTAL	1596.523						-1612.724						1112707.	
MAX						1251.124						-1322.784		476.648

MAXIMUM DAILY INTEGRATED COOLING LOAD (DES DAY) 0.000 (KBTU)
MAXIMUM DAILY INTEGRATED COOLING LOAD (WTH FILE) 0.000 (KBTU)

REPORT- SS-D Building HVAC Load Summary WEATHER FILE- Toronto ON CWEC

	COOLING						HEATING						ELEC	
MONTH	COOLING ENERGY (MBTU)	TIME OF MAX DY	TIME OF MAX HR	DRY-BULB TEMP	WET-BULB TEMP	MAXIMUM COOLING LOAD (KBTU/HR)	HEATING ENERGY (MBTU)	TIME OF MAX DY	TIME OF MAX HR	DRY-BULB TEMP	WET-BULB TEMP	MAXIMUM HEATING LOAD (KBTU/HR)	ELEC-TRICAL ENERGY (KWH)	MAXIMUM ELEC LOAD (KW)
JAN	35.72589	22	15	41.F	36.F	349.666	-543.773	1	8	0.F	-1.F	-1494.706	242718.	554.317
FEB	38.02165	28	14	31.F	28.F	349.914	-483.020	4	8	2.F	1.F	-1412.718	217225.	542.723
MAR	67.39204	24	17	65.F	53.F	430.450	-404.319	11	8	8.F	8.F	-1209.143	204041.	483.112
APR	127.26559	17	16	80.F	63.F	824.996	-257.270	4	8	15.F	13.F	-938.674	163021.	403.804
MAY	227.00894	31	16	77.F	62.F	780.444	-147.254	1	8	31.F	28.F	-559.811	140367.	329.707
JUN	380.25818	17	17	83.F	76.F	1296.391	-62.478	19	24	43.F	41.F	-352.519	122426.	284.279
JUL	510.18567	8	20	85.F	75.F	1494.170	-27.081	22	6	47.F	46.F	-214.066	122897.	278.597
AUG	481.60867	5	15	86.F	77.F	1451.114	-35.897	25	7	45.F	43.F	-262.528	123293.	266.878
SEP	320.03806	11	15	85.F	74.F	1270.227	-97.336	26	8	34.F	33.F	-496.116	128684.	303.643
OCT	180.35690	10	15	75.F	60.F	779.521	-212.342	23	8	18.F	17.F	-837.004	155948.	399.203
NOV	77.13359	2	15	62.F	58.F	545.776	-300.445	18	8	22.F	21.F	-769.633	171775.	380.052
DEC	38.09460	4	22	55.F	54.F	393.196	-455.904	16	8	9.F	8.F	-1232.651	217165.	490.010
TOTAL	2483.099						-3027.113						2009555.	
MAX						1494.170						-1494.706		554.317

MAXIMUM DAILY INTEGRATED COOLING LOAD (DES DAY) 0.000 (KBTU)
MAXIMUM DAILY INTEGRATED COOLING LOAD (WTH FILE) 0.000 (KBTU)

Appendix (3)

Hyatt Place / Hyatt House
Wes Graham Way & Hagey Blvd, Waterloo

Mechanical and Electrical

Design Brief

Date: April 14, 2025

Prepared by:
Jain Sustainability Consultants Inc.
7405 East Danbro Crescent
Mississauga, ON, L5N 6

PLUMBING AND FIRE PROTECTION SYSTEM

DESIGN CRITERIA

The building plumbing system will be based on climatic conditions per Ontario Building Code and current trend of utilization of natural resources in providing more economical and “greener” buildings and Hyatt brand Standards, latest edition for North America.

REGULATORY AGENCIES

The following Agencies may be contacted during the design process:

- Local Fire Department
- Local Building Department
- Insurance underwriter

It is necessary to contact these agencies to review the requirements for sprinkler systems including hydraulic design criteria, zoning, sprinkler head densities and provision of water supply for Fire Fighting purpose.

The Local Building and Plumbing department might reveal the existence of by-laws or local standards and clarification of OBC Standards.

SITE SERVICES

All mechanical site services such as water, storm, sanitary and fire protection (exterior hydrants) will be designed by Civil Engineer Consultant. All services from the building will be terminated at 1.5m from the face of the building except water service that will be terminated inside the building at 300mm above the finish floor by Civil contractor (OBC 7.6.1.3.)

PLUMBING

WATER SERVICE

Municipal water will be used for potable water systems. Watermeter with premise isolation must provided according with local standard. Domestic water booster pump and water softener shall be provided.

Water supply shall have 2 zones, one for residential area and another for public area on ground floor.

WATER HEATERS

The hot water system shall be continuous circulating for instant hot water on demand. Storage and recovery are to be sized to provide a minimum three hour back to back maximum operation. Water heater systems are to be designed so that each zone is provided with a minimum of two units. The hot water system shall be arranged to separate the laundry water and Prep Kitchen supply from the domestic system.

Cold water shall be distributed throughout the building to all fixtures, equipment connections and valved outlets. The distribution systems shall be designed to have a minimum 25 psi pressure at any outlet, a

maximum 75 psig pressure at any outlet and a maximum water velocity in piping of 1.856 m. sec. (6ft./sec.)

MATERIAL

Water system shall be installed of copper pipes, type L. Pex tubes are allowed within guestrooms' bathrooms and public restrooms for sizes up to 2".

Cold water risers shall be protected from condensation and hot water and recirculation shall be insulated per ASHRAE 90.1.

Insulation of piping for all below ambient temperature fluids shall be heavy density closed-cell elastomeric insulation.

PLUMBING FIXTURES

Plumbing fixtures will be CSA approved, first class and manufactured by nationally known manufacturers.

All trim shall have high quality chrome finish, polished. The mixing valve shall be anti-scald pressure balance type with adjustable temperature limit stops and integral stops.

Water closets:

a) Guestrooms – floor mounted, 4.8 lpf or less, elongated
b) Staff –wall mounted, open front seat with cover
c) Public: wall mounted, low flow flush valve, sensor operated, open front self-sustaining seat

Urinals: wall hung; sensor operated flush valve

Public Lavatories: undermount, vitreous china, with overflow, faucets 3.8 lpm, sensor operated, with mixing valve

Bathtub: cast iron porcelain enameled, trim

Shower base: Mincey marble, trim

Shower head: minimum flow of 2.0 gpm

Counter sinks: single compartment, undercounter, stainless steel

Janitor sinks: floor mounted mop sinks, terrazzo

Nonfreezing wall hydrants at building perimeter

Non-freezing wall hydrant at garbage enclose

SANITARY SERVICE

Sanitary drainage shall be collected under slab and discharge to sanitary pipe indicated on civil drawings.

Elevator sump pump shall be in secluded space and discharge to sanitary main.

Floor drains shall be provided in all accessible guestrooms' bathrooms with roll-in showers

MATERIAL

Underground sanitary and storm shall be D.W.V. PVC and cast iron at commercial washing machines discharge and dishwasher(s) for minimum of 5.0 m from washer/dishwasher.

Above ground piping will be cast iron soil pipe or DWV copper drainage with solder fittings.

PVC pipes are not acceptable due to sound.

STORM SERVICE

Storm water shall be designed per direction from Civil engineer. Appropriately sized rainwater leaders shall run to ground floor and discharge by gravity to storm connection at site.

All horizontal storm water piping under roof will be insulated c/w roof drain body.

Sump pump for weeping tiles around elevator pit footing shall be provided in secluded space. Discharge shall be connected to the storm system.

FIRE PROTECTION SYSTEM

Fire protection shall be provided for the entire Building.

A standard or fixed temperature system of automatic spray sprinklers and fire standpipe system throughout based upon requirements of the local Fire Department and Owner's Insurance Company in accordance with latest requirements of NFPA #13 and #14 on Ordinary Hazard in accordance with the Fire Department and Insurance Underwriter requirements. Portable fire extinguishers will be incorporated into the system according to Fire Code, latest Edition and brand standards.

Fire pump shall be provided in a sprinkler room designed per NFPA 20, latest edition and OBC.

The sprinkler shall be wet pipe in heated areas and dry pipe in un-heated areas such as buildings overhangs etc. Note that anti-freeze systems are not acceptable substitute to dry pipe systems with air compressor.

MATERIAL

Unburied mains and sprinkler piping for risers: standard black steel Schedule #40 (ASTM #A53) with black cast iron 1725 kPa WWP screwed or flanged fittings, U.L.C. approved. Victaulic or Couplox couplings and fittings with Butyl gaskets conforming to CSA #B242 may be used where approved by Insurance Underwriter and local authority.

IPEX Blazemaster CPVC pipes and fittings are acceptable for residential areas if approved by Insurance Underwriter and local authority.

All sprinkler heads shall be fast response type. All public areas, including Corridors on all floors, shall have recessed type sprinkler heads. Side wall sprinkler heads shall match adjacent heads. Sprinkler heads in Guestrooms shall be fully recessed. Areas without ceilings will have upright brass type wire guards. Pool and Laundry area shall have corrosion resistant sprinkler heads.

The standpipe system shall be hydraulically designed per NFPA 14. latest edition and OBC 2012.

HEATING, VENTILATION AND AIR-CONDITIONING

Heating, cooling and ventilation in the Guest Rooms will be provided by VTAC units with electric heating and integrated ERV's. Kitchenettes will have recirculating hoods with charcoal filters. 50 cfm from within 10 feet of the hood and 50 cfm from the washrooms will be exhausted through the ERV's. Common areas on the ground floor will be cooled and heated by fan coils with electrical coils with condensing units outside on grade or on low roof. Fresh air to fan coils will be provided by ERV's in ceiling spaces or on the low roof.

A gas-fired make-up air unit on the roof with DX cooling will pressurize the corridors.

There will be a make-up air unit and exhaust fan for the commercial kitchen.

A dehumidifier will be provided for the swimming pool room with condenser on the roof.

Conference Rooms will be heated, cooled and ventilated from roof-top air source heat pumps with ERV's to save energy.

ELECTRICAL

ELECTRICAL SERVICE

The estimated new service size is 1600A, 600/347V 3ph 4W.

POWER DISTRIBUTION SYSTEM

The main distribution switchboard equipped with all required circuit breakers, main breaker and surge protection device will be installed in the main Electrical Room on ground floor as required by local Hydro.

Panels location:

1. 600/347V equipment and site lighting (600/347V) for Hotel will be fed from main switchboard and dedicated panel.

2. Dedicated 120/208V panels for Ground floor mechanical equipment, Pool equipment, Fitness equipment, Admin office receptacles, laundry, and lighting loads.

3. Dry type Distribution transformers will be provided located in main electrical room on ground floor and in electrical rooms on typical floors.

EMERGENCY POWER & EMERGENCY LIGHTING

This building is a highrise building, emergency power supply will be provided via a life safety rated stand-by natural gas generator installed on roof with level 2 weatherproof enclosure (unless otherwise indicated by AHJ). Generator will serve life safety loads as per OBC building code including emergency lighting, elevators, fire alarm control panel, fire pump, and roof top unit.

The Generator will provide power supplies for via a non-life safety automatic transfer switch for building Telecommunication system receptacles, front desk outlets, BOH some outlets and Hotel Security and Access control management system.

Emergency lighting will be provided to comply with OBC requirements.
Exit lights will Lumacell signature collection glass blade model with LED source and will be 'Running Man' style to comply with the latest CSA standards and current OBC requirements and be fed from Generator power source.

LIGHTING AND LIGHTING CONTROLS

Lighting levels shall be in accordance with IESNA Standards and HYATT Studio specific requirements.

Site lighting, Exterior lighting at entrances will be LED type, full cut-off and controlled via photocell, relays and timer. Site lighting level shall meet Hyatt design criteria requirement.

Building uplighting and landscaping lighting will be in accordance with Architectural exterior elevation design and landscaping consultant design.

Interior lighting will be LED luminaires, surface and recessed LED lights. The luminaires specified will have specific Kelvin temperature per Hyatt Hotel brand standard requirement.

All Decorative lighting including ceiling or wall surface mounted Chandeliers, Wall sconces, decorative lights, Guestroom lights (recessed entry hall lights and shower lights excluded) will be specified by ID consultants, supplied by owner and installed by Electrical contractor.

Low voltage dimming control system by Leviton will be provided for Hotel Lobby,

Lobby, Lounge/Bar, Dining and meeting rooms lighting control per Hyatt standard and coordinate with Leviton Canada office to comply with. Common Corridor lights will be always on.

Some lights will be selected and fed from Generator as Emergency lighting to meet OBC emergency lighting level requirement.

Provide master light switch with signage to control all guestroom lights in guestroom except bathroom lights to meet OBC/ASHRAE 90.1requirement.

FIRE ALARM SYSTEM

A fully addressable, single stage non-coded fire alarm system will be provided throughout the building.

Provide one fire alarm annunciator panel near Front desk area.

Semi-flush mounted horn/strobe type signaling devices will be provided.

120V smoke alarm devices will be provided in all Guestroom, smoke and CO combination device will be installed in Guestroom that share floor assembly with a service room (i.e. kitchen, mech. room,) that contains fuel-burning appliance. provide a manually operated silencing switch in each suit to be incorporated within the circuitry of smoke alarm to meet OBC requirement.

Pull stations will be provided at all exits and Reception desk.

1. LED annunciator with passive colored graphics with zones identified shall be provided at the Firefighter's Entrance and Hotel Admin area.

2. Fire suppression system devices will be interconnected to fire alarm system.

TELECOMMUNICATIONS SYSTEM

The pathway rough-in infrastructure for a communications system will be provided for this facility based on Owner's requirements. Cables, jacks, racks, patch panel and switches will be under a separate scope/contract. The system will terminate in the ground floor SERVER Room.

Incoming telecommunication services will be provided to the building by Local Telecom utility.

SECURITY SYSTEM

Power supplies and rough-in conduits and back boxes for Access control card readers and electric door strikes will be provided at designated doors as per the architectural door schedule and as required by Owner's Security Consultant/Provider.

Door status monitoring shall be provided at all exterior doors and critical entry points.

CCTV system rough-in conduits and back boxes will be provided at locations per Owner's Security Consultant/Provider requirement.

WIRING METHODS

Rigid galvanized steel conduit shall comply with CSA Specification C22.2 No. 45.

Electrical metallic tubing (EMT) shall comply with CSA Specification C22.2 No. 83.
Connectors and couplings to be forged steel. Connectors to have factory-installed insulated throats.

Rigid PVC conduit shall comply with CSA Specification C22.2 No. 136.

Watertight flexible conduit: "Sealtite" PVC jacketed flexible steel with Hubbell-Kellum strain relief grips; shall comply with CSA Standard C22.2 No. 56.

OTHER SYSTEMS

1. Additional systems power supply and rough-ins will be provided as per coordination with the Architect and Owner:

    - Public annunciation / paging system
    - Interior lighting design and/or special decorative lighting design by interior design consultant
    - Audio/video system if any

END