Shadow Study Report

Proposed Mixed-Use Residential Commercial Development

5438 Ferry Street
Niagara Falls
Ontario

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5438 Ferry Street

Shadow Study Report

Contents

Appendices

Appendix 1 –

Shade Study Reports

1.0 Introduction

Purpose of the Report:

The purpose of this report is to demonstrate the effect of the proposed development of a 30- storey mixed use residential and commercial building upon the current location and upon adjacent properties. This is done by using a computer generated Shadow Diagram, which generates the Shadow Pattern which is cast upon the ground by buildings upon adjacent properties. The study conforms to the Dates and Times set out typically for Shadow studies in Southwestern Ontario Municipalities. These can be found in Site Plan Standard "Design Reference Notes" or in "Standards for Shadow Studies."

Description of the Proposed Development:

The land parcel is approximately 3491 square meters (after road widening) of area coverage. 63.3m lot frontage onto Ferry Street, and 59.1m frontage onto Fallsview Blvd. There is one building on the subject lands: a one-storey building operating as a restaurant. The balance of the site is used as a paved surface parking lot. There are not existing trees on the site. As the site is entirely occupied by a surface parking lot, building, and attached patio, currently the site is approximately 0% "Landscaped Open Space" as defined by the Niagara Falls Zoning Bylaw.

The proposed mixed-use residential/commercial development will include a building of 2727 square meters in floor area. The balance of the site area, approximately 784 square meters (23%) of the land, will be converted to a "Landscaped Open Space" use. The Landscaped Open Space will comprise of sidewalks for pedestrian circulation, ground cover plantings as well as deciduous trees proposed on all sides of the development.

There is one existing buildings on the site occupying approximately 446 m2 of land coverage or approximately 13 percent of the land parcel area. A summary of existing building massing is provided in the following chart:

	Existing Building Name	Footprint Area		Maximum Bldg. Height		Average Height of Building Mass	
		sq. metres	sq. feet	metres	feet	metres	feet
1	Eighty Eight Wine Bar & Grill	446	4800	7.6	25	6.1	20

The existing building will be demolished and one new building is proposed which will have shadow impact and will include residential, commercial and below and above grade covered parking.

	New Building Name	Footprint Area		Maximum Bldg. Height		Average Height of Building Mass	
		sq. metres	sq. feet	metres	feet	metres	feet
1	New Residential Commercial Building	2707	29,138	120	393.7	120	393.7

Neighbouring Properties:

To the East:

Fallsview Blvd, across from the subject property are three commercially zoned properties. The first property closest to the intersection of Ferry Street and Fallsview Blvd (5374-5384 Ferry Street) has a 2 storey building operating as a souvenir shop, the second property (5912 Fallsview Blvd) and the third property (5920 Fallsview Blvd) are both undeveloped vacant lands.

Further to the east (not adjacent to the subject property nor Fallsview Blvd) is a surface parking lot and Caddilac model (5342 Ferry Street) – a one storey motel building with a two storey office.

To the West:

The property immediately adjacent (5444 Ferry Street) is commercially zone, and contains a 2 storey restaurant operating as ‘Potato Jackets’.

Further to the west (not adjacent to the subject property) is a gas station (5460 Ferry St) operated as ‘Circle-k’ and ‘shell’, followed by Stanley Ave, and across Stanley avenue is a one storey restaurant (5500 Ferry Street) operating as ‘Dairy Queen’ as well as a future multi-storey condominium development known as ‘The Standley Condos’ (pending addressing) which is noted on the shadow study diagrams.

Note that diagonally opposite Stanley Ave is a historic designation building operating as ‘Napoli Pizzeria’ (5485 Ferry Street). This historic building is approximately 72m from the corner of the new proposed building and is noted on the shadow study diagrams. Please also refer to the Heritage Impact Assessment.

To the North:

Ferry Street, across from the subject property are two commercially zoned properties. One of the properties (5449-5453 and 5435 Ferry Street) has a one storey building operating as 'Al Macs Buffet' and surface parking, and the other property (5427 Ferry Street) is solely a surface parking lot.

Further to the north (not adjacent) are additional commercially zoned and operated properties with a mix of 1 and 2 storey buildings and substantial surface parking. Beyond those are residential properties with singe family houses erect (on Buchanan Ave as well as Desson Ave) , the nearest residentially property to the North is approximately 120m from the proposed building.

To the South:

The immediately adjacent property (5927 Fallsview Blvd) is zoned commercial and contains a single-family residential house.

Beyond this property (not adjacent to the subject property) is a surface parking lot (at 5953 Fallsview Blvd), followed by 4 vacant lots (including 5965, 5981, and 5989 Fallsview Blvd), and an approximately 20 storey hotel operated as 'Double Tree Fallsview Resort & Spa'.

2.0 Methodology

The City of Niagara Falls has bylaws, which govern property development. One of the criteria being analysed under the broader application is the requirement that the proposed development address the bylaw requirements and that the development proponent make materials available to the Municipality for evaluating development applications.

Specifically this study is addressing the issue of new building height and effect of the shadows created upon neighbouring properties and the subject property itself as a result.

This shadow study also provides shadow diagrams for 4 periods of the day which is representative of different shadow patterns cast over the course of the day as the sun arcs through the sky.

Because the Sun changes its angle of arc, our study also analyses the typical shadow patterns, which reflect the solar solstice periods over the course of the year, and represent the highest, the mid points of the sun over the year.

The findings of a computer generated simulation provides data as to building height, shadow length, solar angle and solar rotation over the course of the typical day over the periods of study and presents this data in comparative chart form.

<u>Location Factors</u>

In Appendix “A” the shadow diagrams contained within that section illustrate the maximum shadows to be created at specific times and associated technical data. The analysis was conducted based upon a geodetic location of 43 degrees, 3 minutes and 36 seconds North and 79 degrees, 6 minutes and 24 seconds west, which is central to the subject property and specifically in the area of the land parcel where the proposed new buildings would be located.

Building Height Assumption

The analysis will base the shadow correlation of a building with a maximum height of 120 metres above the geodetic ground level set for the finished ground floor level, established at 189.90 metres above sea level for the purpose of the Study. The study takes into account the general terrain of the site and surrounding lands relative to the geodetic ground level as this will vary the shadow correlation.

The diagrams provided illustrate shadow patterns for 3-4 times at 2 specific dates of the year. The analysis of the shadow diagrams identify the typical shadows, which are cast in the summer and fall periods. On each shadow plan the report will discuss the surface pattern for each of the dates and times and will identify characteristics of those shadows and the anticipated impact upon the immediate site and neighbouring sites.

Criteria for determining an Impact

By way of priority, the report would weigh adverse impact of shadows as whether they firstly cast onto neighbouring private lands or public spaces. If there are new shadows created in the initial findings, secondary analysis will compare the change caused by the development against the background of existing shading conditions and by what extent or region of the neighbouring site being impacted. Specific concern would be identified for amenity spaces or predominantly pedestrian-utilized areas affected.

3.1 Shadow Study: Pre-Development

3.1.1 Summer Shadows: June 21st

Assumptions of shadows cast upon the site or from the site of the subject property are as follows:

- Shadows cast upon subject property: the 2 storey restaurant ‘Potato Jackets’ to the West casts partial shadows onto the subject property.
- Shadows cast from the site of the subject property: The existing restaurant on the subject property operating as ‘eighty-eight south’ casts full shadow North onto the pedestrian sidewalk on Ferry St and partial shadows onto the Ferry St vehicular roadway.

3.1.2 Fall Shadows: September 21st

Assumptions of shadows cast upon the site or from the site of the subject property are as follows:

- Shadows cast upon subject property: the 2 storey restaurant 'Potato Jackets' to the West casts partial shadows onto the subject property.
- Shadows cast from the site of the subject property: The existing restaurant on the subject property operating as 'eighty-eight south' casts full shadow North onto the pedestrian sidewalk on Ferry St and partial shadows onto the Ferry St vehicular roadway.

3.2 Shadow Study: Post-Development

POST DEVELOPMENT: (30-STOREY MODEL) ANALYSING THE IMPACT OF THE SHADOW OF NEW RESIDENTIAL/COMMERCIAL BUILDING" ON THE PROPERTIES SURROUNDING THE PROPOSED DEVELOPMENT.

3.2.1 Summer Shadows: June 21st

A summary of the summer shadow impact of the proposed development upon the subject property and surrounding area is as follows:

The morning sun rises at approximately 5:37 am

3.2.1A 10:00am (see Appendix 1, Page 1, drawing 1)
The shadow length is approximately 53.6 metres
Altitude 44.95 degrees, Azimuth 99.43 degrees

At this time, the adjacent commercial property on the neighbouring lands to the West (operating as 'Potato Jackets') will be fully shaded by the new development, and the gas station to the West, as well as the intersection of Stanley Ave and Ferry Street is partially shaded.

At this time there is no shadow impact on the historic designation building operating as 'Napoli Pizzeria' as the shadow arc does not reach the historic property at any time of day.

At this time, no shadows cast beyond the subject property to the South and East.

3.2.1B 12:00pm (see Appendix 1, Page 1, drawing 2)
The shadow length is approximately 33 metres
Altitude 64.57 degrees, Azimuth 134.32 degrees.

At this time, the adjacent commercial property on the neighbouring lands to the West (operating as 'Potato Jackets') will no-longer be shaded by the new development. The drive surface and the pedestrian sidewalk on both sides of Ferry Street will be partially shaded. The commercial parking lot across Ferry Street will be partially (minimally) shaded.

At this time, no shadows cast beyond the subject property to the South, East and West.

3.2.1C 2:00pm (see Appendix 1, page 1, drawings 3)
The shadow length is approximately 54.3 metres
Altitude 68.55 degrees, Azimuth 206.99 degrees.

At this time of day, the commercial parking lot across Ferry Street will no-longer be shaded. The pedestrian sidewalks and vehicular driveways on Ferry Street will still be partially shaded, and now also the intersection of Fallsview Blvd and Ferry Street will be fully shaded, and the pedestrian sidewalks and vehicular roadways on Fallsview Blvd will be partially shaded. The shadow will also be cast partially onto the commercial property across Fallsview Blvd to the East. As we move later beyond this time period into the evening and night, this commercial property will become fully shaded.

At this time, the shadow is nearest to the single-family residential houses on Buchanan Ave but the shadow still does not reach the houses.

At this time, no shadows cast beyond the subject property to the South and West.

3.2.1D 4:00pm (see Appendix 1, page 1, drawings 4)
The shadow length is approximately 125 metres
Altitude 51.44 degrees, Azimuth 252.58 degrees.

At this time of day the sun is descending below mid-way point in the sky. The pedestrian sidewalks and Vehicular roadways on Ferry Street are no-longer shaded. The intersection of Ferry Street and Fallsview Blvd is no-longer shaded.

At this time, the 4 commercial properties across Fallsview Blvd to the East become fully shaded up to and including the Cadillac Motel.

The sun sets at 9:00 pm

3.2.2 Fall Shadows: September 21st

A summary of the Fall shadow impact of the proposed development upon the subject property and surrounding area is as follows:

The sun rises at approximately 7:03am

3.2.2A 10:00am (see Appendix 1, page 1, drawings 5)
The shadow length is approximately 127.4 metres
Altitude 30.00 degrees, Azimuth 121.97 degrees.

At this time, the adjacent commercial property on the neighbouring lands to the West (operating as 'Potato Jackets') will be partially shaded by the new development, and the gas station to the West, as well as the intersection of Stanley Ave and Ferry Street is partially shaded.

At this time there is partial shadow impact on the historic designation building operating as 'Napoli Pizzeria'.

No shadows cast beyond the subject property to the South and East.

3.2.2B 12:00pm (see Appendix 1, page 1, drawings 6)
The shadow length is approximately 93 metres
Altitude 44.54 degrees, Azimuth 155.36 degrees.

At this time, the adjacent commercial property on the neighbouring lands to the West (operating as 'Potato Jackets') will no-longer be shaded by the new development. The drive surface and the pedestrian sidewalk on both sides of Ferry Street will be partially shaded. The commercial restaurant operating as 'Al Macs Buffet' will be partially shaded and the parking lot across Ferry Street will be fully shaded. Further to the north, the shadow will reach and partially shade the pedestrian sidewalk on the near side of Spring Street.

At this time, no shadows cast beyond the subject property to the South, East and West.

3.2.2C 2:00pm (see Appendix 1, page 1, drawings 7)
The shadow length is approximately 120 metres
Altitude 45.74 degrees, Azimuth 198.38 degrees.

At this time of day, the commercial parking lot across Ferry Street will no-longer be shaded. The pedestrian sidewalks and vehicular driveways on Ferry Street will still be partially shaded, and now also the intersection of Fallsview Blvd and Ferry Street will be fully shaded, and the pedestrian sidewalks and vehicular roadways on Fallsview Blvd will be partially shaded. The shadow will also be cast partially onto the commercial property across Fallsview Blvd to the East. As we move later beyond this time period into the evening and night, this commercial properties to the east will become increasingly shaded.

At this time, the shadow is nearest to the single-family residential houses on Buchanan Ave but the shadow still does not reach the houses.

At this time, no shadows cast beyond the subject property to the South and West.

3.2.2C 4:00pm (see Appendix 1, page 1, drawings 8)
The shadow length is approximately 250 metres
Altitude 32.69 degrees, Azimuth 233.70 degrees.

At this time of day the sun is descending below mid-way point in the sky. The pedestrian sidewalks and Vehicular roadways on Ferry Street are still partially shaded. As the angle of the shadow stretches along the length of Ferry Street – a higher area of Ferry Street is shaded than before. The intersection of Ferry Street and Fallsview Blvd is no-longer shaded as the shadow has moved further east.

At this time the shadow impact also reaches across Ferry Street onto the commercial properties located diagonally to the North-East of the subject site. A total of approximately 12 commercial properties located East and North-East of the proposed development will be partially shaded. Of these, 4 will be fully shaded. The 'LCBO liquor store' will be partially shaded, and the 'Cuban Cigar' store and a 'Pot Shop' cannabis dispensary will be fully shaded. Further away from the subject development, 'Club Seven' nightclub, a commercial parking lot, and 'Chucks Roadhouse' restaurant will also be fully shaded briefly as the sun sets.

The sun sets at 7:14pm

4.0 Shadow Impact

Summary of Impact by the proposed 30-storey development.

4.1 The shadows cast from this proposed development are larger in the Fall (September 21st) than in the Summer (June 21st):

- In the fall, the shadow is on average 120% larger than the average shadow in the summer. The shadow casts on average 147m in the fall, compared to an average of 66m in the summer, based on the 4 times of day measured in this study.
- The affect will be in the morning, afternoon, and evening.
- As the shadow sweeps across the neighbouring commercial properties, the properties immediately adjacent to the proposed development are most affected, and as the distance from the proposed development increases, the duration for which the neighbouring property is shaded decreases;
- The Shadows do not reach the residential single family houses on Buchanan Ave.
- The Shadows reaches the historic building operating as 'Napoli Pizzaria' in the Fall but not in the summer.

4.2 The shadows cast from this proposed development during the Summer:

- Shadows during the summer are much smaller and less impactful in the summer.
- Shadows during the summer do not have substantial impact on adjacent properties to the North of Ferry Street.

- The Shadows do not reach the historic building operating as ‘Napoli Pizzaria’ in the Summer at the time measured in this study.

4.3 General Comment Regarding Shadow Affect based upon the Shape of a Building:

- The shadow effect of a “thinner” or “stepped” building has less impact than a “wide” building. The shadow of a thinner building falls “upon” a property for a shorter period of time and effectively “passes over” a building and property more quickly than a wider building and therefore has less shadow impact.
- As this proposal is to create tapered building with a wider four storey plinth upon which a thinner tower, it is considered a “tapered” building with less shadow impact than a lower and wide building.

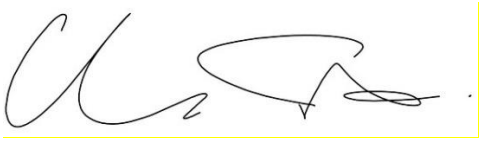
4.4 General Comment Regarding Buffers surrounding a Building:

- The commercial properties to the north are buffered by a row of proposed boulevard trees within the proposed development, as well as an existing roadway with sidewalks on both sides.
- The immediately adjacent property to the west is buffered by a row of proposed columnar trees within the proposed development. The 2 storey building on the property immediately to the west is constructed as close to the property line and thereby does not have many windows facing eastwards that would be affected by the proposed development.
- The properties to the south are buffered by a row of proposed columnar trees within the proposed development.
- The properties to the east are buffered by a row of proposed boulevard trees within the proposed development, as well as an existing roadway with sidewalks on both sides.

4.5 General Comments Regarding the nearby historic building operating as ‘Napoli Pizzaria’

- As the shadows only reach the historic building operating as ‘Napoli Pizzaria’ during certain times of year, during which the affect is limited to short periods around 1-2 hrs in duration, the impact is considered minimal.

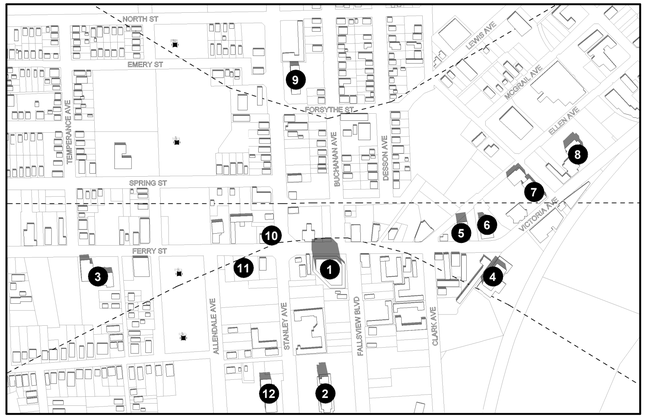
Should you have any questions regarding this report, please feel free to contact Quartek Group Inc.



Matthew Trendota, OAA

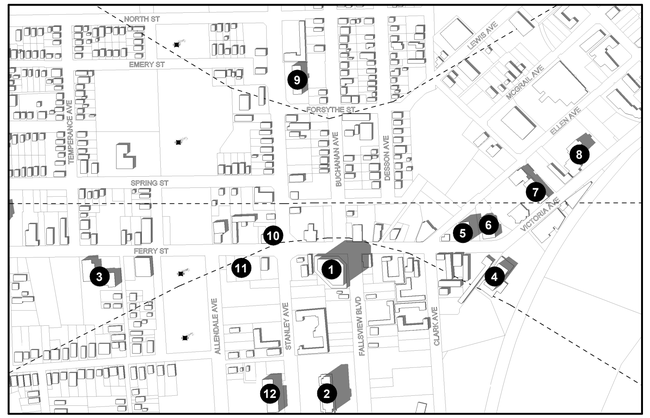
1 SUN-1 June 21 at 10am

Technical Data: Altitude 44.95 degrees, Azimuth 99.43 degrees



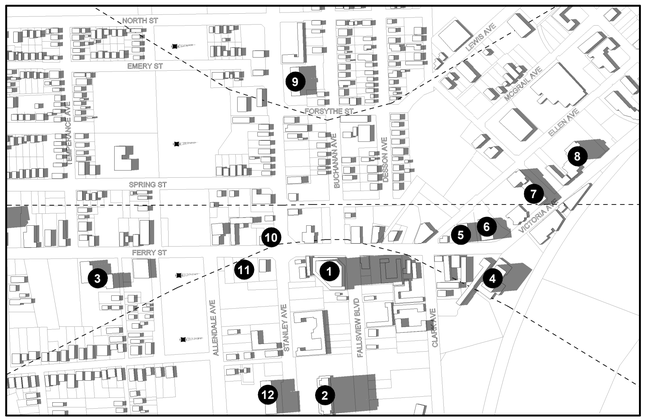
2 SUN-1 June 21 at 12pm

Technical Data: Altitude 64.57 degrees, Azimuth 134.32 degrees.



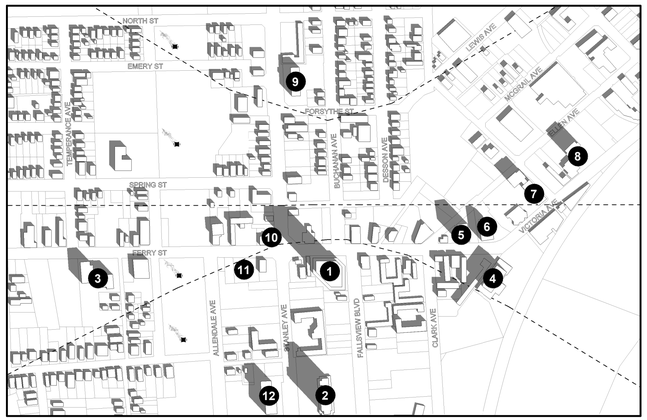
3 SUN-1 June 21 at 2pm

Technical Data: Altitude 68.55 degrees, Azimuth 206.99 degrees.



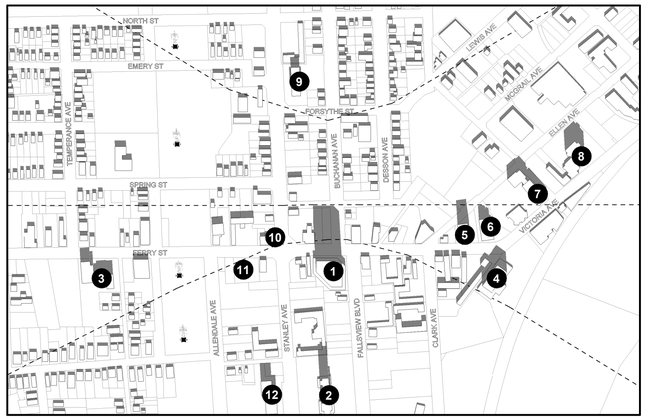
4 SUN-1 June 21 at 4pm

Technical Data: Altitude 51.44 degrees, Azimuth 252.58 degrees.



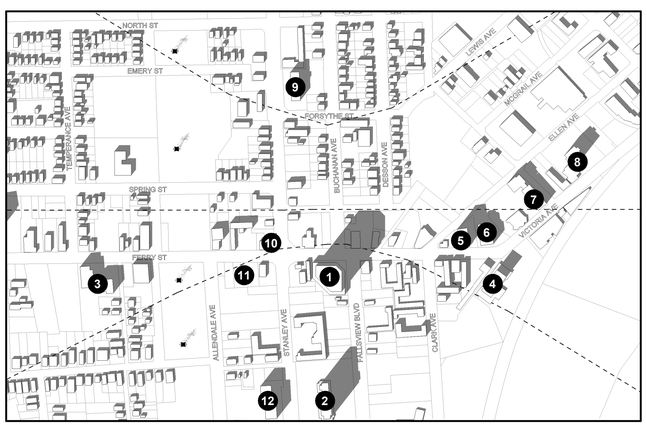
5 SUN-1 September 21 at 10am

Technical Data: Altitude 30.00 degrees, Azimuth 121.97 degrees.



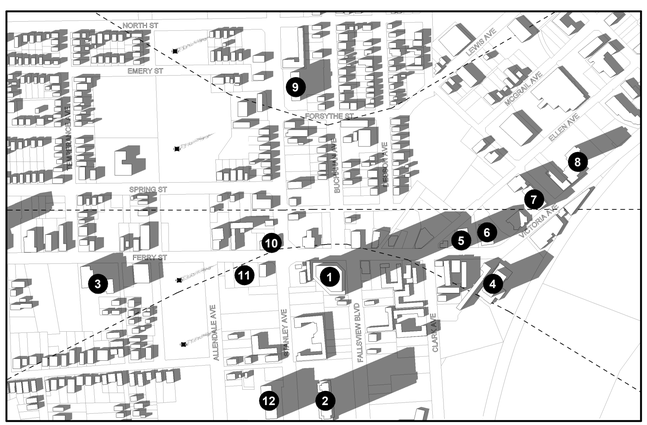
6 SUN-1 September 21 at 12pm

Technical Data: Altitude 44.54 degrees, Azimuth 155.36 degrees.



7 SUN-1 September 21 at 2pm

Technical Data: Altitude 45.74 degrees, Azimuth 198.38 degrees



8 SUN-1 September 21 at 4pm

Technical Data: Altitude 32.69 degrees, Azimuth 233.70 degrees.

SHADOW STUDY LEGEND

1. PROJECT SITE: 5438 FERRY ST.
2. DOUBLE TREE FALLS VIEW
3. RAMADA BY WINDHAM
4. COURTYARD BY MARRIOTT
5. FAIRFIELD BY MARRIIOTT
6. DAYS IN BY WYNDHAM
7. HOWARD JOHNSON PLAZA BY WYNDHAM
8. VICTORIA HOTEL & SUITES
9. SURESTAY PLUS HOTEL BY BEST WESTERN
10. HISTORIC DESIGNATION BUILDING
11. 'THE STANDLEY CONDOS' PROJECT. PHASE 1. (IN CONSTRUCTION AS OF 2023)
12. RAMADA BY WYNDHAM

TECHNICAL DATA

GEODETIC ELEVATION: 189.90M.

LOCATION: 5438 FERRY STREET, NIAGARA FALLS, ONTARIO, CANADA

LONGITUDE AND LATTITUDE: 43.0896 DEGREES NORTH, 79.0849 DEGREES WEST

N

Issue	Issued for	Date	Ind.
B	For ZBA R2	08NOV2023	MT
A	For ZBA R1	25AUG2023	MT

Seal

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Project Title

FERRY ST
RESIDENTIAL TOWER

5438 FERRY ST

Drawing Title

SHADOW STUDY

Drawn	Designed by
Author	Designer

Scale	Date Created
	03/28/11

Job Number	Issue
12345-678	B

Drawing Number

SUN-1

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