SUN / SHADOW STUDY

Proposed Mixed-Use Development

535 Brant

535 – 551 Brant Street
City of Burlington

Prepared for:

Renimmob Properties Limited

Prepared by:

Ralph Bouwmeester, P. Eng.

March 2, 2021

R. BOUWMEESTER & ASSOCIATES
165 Browning Trail
Barrie, Ontario, Canada L4N 5E7
tel: (705) 726-3392 fax: (705) 726-3392

RBA File: S20006

1. This shadow study consists of this written report together with Drawings RH-1, SS-01 to SS-19, 4.3-1 to 4.3-6, 4.4-1 to 4.4-13, and 4.6-1 to 4.6-5 all dated March 2, 2021. It is based on the requirements of the City of Burlington's *Shadow Study Guidelines and Terms of Reference* dated June 2020.

2. Site latitude and longitude used in this study are as follows:

   Latitude: 43° 19' 43" N (43.3286º N)
   Longitude: 79° 48' 06" W (79.8017º W)

3. **Time Zone:** Eastern

4. Standard Time: UT – 5 hours - applies on December 21st
   Daylight Time: UT – 4 hours - applies on March 21st, June 21st and September 21st

5. Test times are hourly from 9:00 AM to 6:00 PM in Mar and Sep, 8:00 AM to 7:00 PM in Jun, and 11:00 AM to 3:00 PM in Dec all as per the Guidelines.

6. **Site Orientation:** East limit of Brant Street N 46° 38' 05" W.

   The "UTM grid" bearing of the east limit of Brant Street is shown as N 47° 27' 25" W on a plan of survey dated December 6, 2018, by A.T. McLaren Limited; the survey is referenced to the UTM Zone 17 NAD83 coordinate system. Based on this, we have determined True (Solar) North to be 0.8223° west (i.e. CCW) of Grid North in this location, that is, at grid azimuth 359° 10' 40".

   Accordingly, this shadow analysis is based on a 'true north' reference bearing of N 46° 38' 05" W for Brant Street. A True North arrow is shown on the drawings.

   The site boundaries were derived from the above survey.

7. Existing parks mapping and existing 3D building context mapping were obtained from the City's Open Data portal. Property line data maps were purchased from First Base Solutions.

   This study is based on plans and a 3D model provided by Turner Fleischer Architects Inc. Roof heights shown on Drawing RH-1 include parapets, balcony slabs, and roof-top features, where applicable. Roof heights are shown in metres above finished grade; they include an allowance of 0.20 m for the height of finished first floor above finished grade.

8. This shadow analysis is based on an assumed flat ground plane at elevation 0.00 m. Building heights relate to this datum.

9. **Shadow Criteria:**

Criteria 4.2 - Key Civic and Cultural Spaces - Mar 21 and Sep 21

No net new shadows are permitted on Key Civic and Cultural Spaces between 10:00 and 16:00 hours on Mar 21 and Sep 21.

Criteria 4.3 - Private Outdoor Amenity Spaces - Mar 21

Shadows from proposed developments should not exceed 2 hours in duration, between 09:00 and 18:00 on Mar 21.

Net new shadows resulting from proposed buildings should allow a minimum amount of sunlight to reach nearby private residential outdoor amenity areas, including common outdoor amenity areas, such that a Sun Access Factor of at least 0.22 is provided in such areas between the hours of 09:00 and 18:00 on Mar 21.

Criteria 4.4 - Parks and Open Spaces – Mar 21, Sep 21 and Dec 21

To ensure adequate access to sunlight at all times of the year, a Sun Access Factor of at least 0.50 is required on each of the three test dates.

Criteria 4.5 - Places Where Children Play – Mar 21, Sep 21 and Dec 21

Shadows cast by all existing buildings and proposed developments onto places where children play including but not limited to schoolyards, playgrounds, and park features such as wading pools or other outdoor shadow-sensitive activity areas must ensure a Sun Access Factor of at least 0.50 on each of the three test dates.

Criteria 4.6 - Public Realm and Sidewalks - Mar 21

Shadows cast by all existing buildings and proposed developments onto the full extent of the boulevard and sidewalk on the opposite side of the adjacent right-of-way must ensure a Sun Access Factor of at least 0.50 on Mar 21.

10. **Review of Shadow Drawings vs. Shadow Criteria:**

Criteria 4.2 – We have identified no key civic or cultural spaces within the shadow reach of the proposal.

Criteria 4.3 – Proposed shadows do not exceed 2 hours in duration on existing nearby private residential outdoor amenity areas, including common outdoor amenity areas. See Drawing 4.3-1.

In addition to adjacent and nearby private residential outdoor amenity areas, the City has indicated that Criteria 4.3 applies to on-site common outdoor amenity spaces. Our analysis of the proposed rooftop amenity spaces is included in Drawings 4.3-2 to 4.3-6

and summarized in Table 1. The overall Sun Access Factor for the rooftop amenity areas is 0.36 exceeding the minimum required 0.22. See Table 1.

Criteria 4.4 – Although there are no existing parks within the shadow reach of the proposal, we have evaluated the shadowing on a potential future park on the east side of John Street immediately east of the site. The boundary of the park (see Drawing 4.4-1) was derived from a block plan by Bousfields dated Apr 15/20 (see attached).

The Sun Access Factors exceed 0.50 as required on each of the three test dates. See attached Table 2 and Drawings 4.4-1 to 4.4-13.

We have also evaluated future conditions including the two future towers immediately to the north and south of the subject site as shown on the Bousfields block plan. With the additional shadowing from these two future towers, the Sun Access Factors still exceed 0.50 as required on each of the three test dates.

Criteria 4.5 – We have identified no places where children play (as defined in the Guidelines) within the shadow reach of the proposal.

Criteria 4.6 – Shadows reach the opposite sidewalk and boulevard of John Street in the afternoon. The area between the east curb and potential future park boundary (see Criteria 4.4 above) was derived from the McLaren survey (see Section 6) and includes the existing sidewalk. See Drawing 4.6-1 for curb, sidewalk and boulevard details.

The Sun Access Factor exceeds 0.50 on the east sidewalk and boulevard of John Street as required on Mar 21; the shadows do not reach the opposite side of Brant Street (as defined in the Guidelines). See attached Table 3 and Drawings 4.6-1 to 4.6-5.

11. **Description of Locations Not Meeting the Shadow Impact Criteria:**

Criteria 4.2 – None

Criteria 4.3 – None

Criteria 4.4 – None

Criteria 4.5 – None

Criteria 4.6 – None.

12. **In summary, this proposal meets the Shadow Impact Criteria of the City of Burlington as set out in their *Shadow Study Guidelines and Terms of Reference* dated June 2020.**

535-551 Brant Street
Burlington

TABLE 1

2-Mar-21
R. Bouwmeester & Associates

Sun Access Factor Analysis - Proposed Rooftop Amenity Space
Criteria 4.3 - Private Outdoor Amenity Spaces

Roof Amenity Space Areas (sm)

2nd Flr 198

Time of Day	Area in Sun (sm)	
21-Mar	Test Time Area (As) *	Interval Ave Area (Aa)
9:00	45	
10:00	27	36
11:00	8	18
12:00	0	4
13:00	0	0
14:00	0	0
15:00	44	22
16:00	84	64
17:00	68	76
18:00	87	78
	Total Area	297
	Average Area	33
	Amenity Area	198
Sun Access Factor (SAF) =		0.17

* Note: See Drawings 4.3-2 to 4.3-6

4th Flr 295

Time of Day	Area in Sun (sm)	
21-Mar	Test Time Area (As) *	Interval Ave Area (Aa)
9:00	0	
10:00	7	4
11:00	64	36
12:00	76	70
13:00	98	87
14:00	148	123
15:00	215	182
16:00	256	236
17:00	237	247
18:00	191	214
	Total Area	1,197
	Average Area	133
	Amenity Area	295
Sun Access Factor (SAF) =		0.45

* Note: See Drawings 4.3-2 to 4.3-6

26th Flr North 139

Time of Day	Area in Sun (sm)	
21-Mar	Test Time Area (As) *	Interval Ave Area (Aa)
9:00	4	
10:00	6	5
11:00	12	9
12:00	11	12
13:00	27	19
14:00	61	44
15:00	101	81
16:00	124	113
17:00	103	114
18:00	62	83
	Total Area	478
	Average Area	53
	Amenity Area	139
Sun Access Factor (SAF) =		0.38

* Note: See Drawings 4.3-2 to 4.3-6

26th Flr South 66

Time of Day	Area in Sun (sm)	
21-Mar	Test Time Area (As) *	Interval Ave Area (Aa)
9:00	4	
10:00	19	12
11:00	27	23
12:00	40	34
13:00	43	42
14:00	49	46
15:00	56	53
16:00	44	50
17:00	1	23
18:00	0	1
	Total Area	281
	Average Area	31
	Amenity Area	66
Sun Access Factor (SAF) =		0.47

* Note: See Drawings 4.3-2 to 4.3-6

Total Area Rooftop Amenity 698

Time of Day	Area in Sun (sm)	
21-Mar	Test Time Area (As) *	Interval Ave Area (Aa)
9:00	53	
10:00	59	56
11:00	111	85
12:00	127	119
13:00	168	148
14:00	258	213
15:00	416	337
16:00	508	462
17:00	409	459
18:00	340	375
	Total Area	2,253
	Average Area	250
	Amenity Area	698
OVERALL SAF =		**0.36**
> 0.22; therefore, meets criteria		

535-551 Brant Street
Burlington

TABLE 2

2-Mar-21
R. Bouwmeester & Associates

Sun Access Factor Analysis - Potential Future Park
Criteria 4.4 - Parks and Open Space

Area of Potential Park = 7,179 sm

Time of Day	Area in Sun (sm)	
21-Mar	Test Time Area (As) *	Interval Ave Area (Aa)
9:00	7,173	
10:00	6,576	6,875
11:00	7,096	6,836
12:00	7,179	7,138
13:00	7,116	7,148
14:00	6,512	6,814
15:00	5,215	5,864
16:00	5,038	5,127
17:00	5,011	5,025
18:00	4,541	4,776
	Total Area	55,600
	Average Area	6,178
	Park Area	7,179

Sun Access Factor (SAF) = 0.86
> 0.50; therefore, meets criteria

* Note: See Drawings 4.4-1 to 4.4-5

Time of Day	Area in Sun (sm)	
21-Sep	Test Time Area (As) *	Interval Ave Area (Aa)
9:00	7,124	
10:00	6,575	6,850
11:00	7,179	6,877
12:00	7,179	7,179
13:00	7,038	7,109
14:00	6,225	6,632
15:00	5,045	5,635
16:00	5,052	5,049
17:00	4,982	5,017
18:00	4,265	4,624
	Total Area	54,970
	Average Area	6,108
	Park Area	7,179

Sun Access Factor (SAF) = 0.85
> 0.50; therefore, meets criteria

* Note: See Drawings 4.4-6 to 4.4-10

Time of Day	Area in Sun (sm)	
21-Dec	Test Time Area (As) *	Interval Ave Area (Aa)
11:00	6,942	
12:00	6,567	6,755
13:00	5,861	6,214
14:00	4,610	5,236
15:00	3,174	3,892
	Total Area	22,096
	Average Area	5,524
	Park Area	7,179

Sun Access Factor (SAF) = 0.77
> 0.50; therefore, meets criteria

* Note: See Drawings 4.4-11 to 4.4-13

Sun Access Factor Analysis - John Street Sidewalk
Criteria 4.6 - Public Realm and Sidewalks

Area (sm) of Opposite
Boulevard and Sidewalk = 257

Time of Day	Area in Sun (sm)	
21-Mar	Test Time Area (As) *	Interval Ave Area (Aa)
9:00	257	
10:00	257	257
11:00	257	257
12:00	257	257
13:00	166	212
14:00	72	119
15:00	34	53
16:00	67	51
17:00	39	53
18:00	41	40
	Total Area	1,298

Overall Average Interval Area 144
Boulevard & Sidewalk Area 257

Sun Access Factor (SAF) = 0.56
> 0.50; therefore, meets criteria

* Note: See Drawings 4.6-1 to 4.6-5

LEGEND

- URBAN GROWTH CENTRE BOUNDARY
- BLOCK BOUNDARY
- SUBJECT SITE
- POTENTIAL TOWER WITH PODIUM BUILDING
- POTENTIAL MID-RISE BUILDING
- POTENTIAL PARK
- POTENTIAL OPEN SPACE
- EXISTING NATURAL AREAS
- POTENTIAL PEDESTRIAN CONNECTION
- EXISTING PEDESTRIAN CONNECTION

