

**King Edward Avenue
Environmental Assessment Study
Existing Conditions**

REPORT No: DFA00-067-1

Prepared For:

Delcan Corporation
1223 Michael Street, Suite 100
Ottawa, Ontario
K1J 7T2

Prepared By:

Leanne Elsliger, B.Eng, EIT
Vincent Ferraro, M.Eng., P.Eng.

August 20, 2001

EXECUTIVE SUMMARY

This document establishes the existing environmental conditions for noise, air quality and ground vibrations produced by vehicle traffic along the King Edward Avenue corridor. The roadways covered in this study include the segment of King Edward Avenue spanning from Laurier Avenue to the MacDonald-Cartier Bridge, as well as the ramps connecting King Edward Avenue with Sussex Drive. This report addresses the effects of existing vehicle traffic and road configuration on noise, air quality, and ground-borne vibrations in the vicinity of neighboring buildings. Noise and air quality results are compared to established guidelines from the former Region of Ottawa-Carleton (ROC) and the Ministry of the Environment of Ontario (MOE). The effects of vibrations are evaluated against criteria for human perception and structural damage.

Our assessments indicate the following information about existing environmental effects created by vehicle traffic along King Edward Avenue:

- A) Overall the noise levels range between 57 dBA and 72 dBA over the area represented by 24 receptors used in the study. The largest noise levels occur near the Rideau Street intersection as well as along the segment of King Edward Avenue from Murray Street to Bolton Street. High traffic volumes and proximity of residences to the roadway are responsible for the high levels. The quietest areas are found among the open spaces at the north end of the corridor, followed by the southern end of the corridor near Laurier Avenue.

- B) The variability of wind speed and direction mitigate the maximum pollutant concentrations calculated to occur along the King Edward Avenue corridor. The pollutant levels that are predicted to exist most of the time fall below the MOE recommended standards. However, NO_x and PM (particulate matter) levels are predicted to approach, and occasionally exceed, the one-hour Ambient Air Quality Criteria (AAQC) stipulated by the MOE for infrequent

periods during rush hour at two intersections including King Edward Avenue and Rideau Street, as well as King Edward Avenue and Murray Street. This outcome is due to the large proportion of truck traffic along King Edward Avenue and the relatively high levels of NO_x and particulate matter in diesel exhaust.

- C) Field measurements of ground vibration due to vehicle traffic along the King Edward Avenue corridor at each of three locations indicate low levels of ground vibration, often less than the limits of perception for most individuals. The soil conditions along the King Edward Avenue corridor prevent excess vibration and attenuate its transmission to distant points. Although vibrations at residences adjacent to King Edward Avenue may occasionally be perceptible during traffic periods, the levels typically would not be annoying and have no long term impact regarding cosmetic or structural damage to buildings.

TABLE OF CONTENTS

	PAGE
EXECUTIVE SUMMARY	2
TABLE OF CONTENTS	4
1. INTRODUCTION	5
2. TERMS OF REFERENCE	5
3. OBJECTIVES	5
4. METHODOLOGY	6
4.1 Roadway Noise Assessment Procedure	6
4.2 Air Quality Procedure	10
4.3 Ground Vibrations Procedure	10
5. RESULTS	11
5.1 Roadway Noise	11
5.2 Air Quality	12
5.3 Ground Vibrations	16
6. CONCLUSIONS	18
FIGURES	
PHOTOGRAPHS	

1. INTRODUCTION

DFA has been retained by Delcan Corporation to provide technical support for the King Edward Avenue Renewal project on the subjects of noise, air quality and ground vibrations. This report establishes the existing conditions for the noted issues that will later be used, along with other criteria, for evaluation of the various renewal alternatives.

2. TERMS OF REFERENCE

The King Edward Renewal project has been included in the former Region of Ottawa-Carleton's Urban Rehabilitation Plan to address the problems and issues affecting the King Edward Avenue corridor. The first phase of work will be to undertake an environmental assessment study that will define existing conditions and evaluate future renewal options. The subsequent design phase will consider implementing the selected renewal scheme. The purpose of this report is to evaluate existing conditions along the King Edward Avenue corridor.

3. OBJECTIVES

One of the principal goals of this urban renewal project is to improve the environmental conditions along the King Edward Avenue corridor for both residents and users of the space. The specific goals of this report involve the definition of the existing environmental conditions relating to traffic-induced noise, air quality and ground vibrations that can be used as a baseline for comparison and selection of renewal alternatives. With this in mind, we have selected twenty-four receptors along King Edward Avenue for assessment of noise and air quality as well as three locations for measurement of ground vibrations, between Laurier Avenue on the south and Sussex Drive on the north.

4. METHODOLOGY

4.1 Roadway Noise Assessment Procedure

Based on traffic information received from the City of Ottawa (former ROC) through Delcan Corporation, we have determined noise levels at twenty-four receptors along King Edward Avenue including the area affected by ramps connecting King Edward Avenue with Sussex Drive and the Macdonald-Cartier Bridge (Figures 1 and 2, Photographs 1 to 20).

The major source of noise is assumed to be roadway traffic. No other sources of noise (including aircraft, train or industrial sources) have been considered in this study.

Noise calculations have been performed with the assistance of the MOE road noise analysis program, STAMSON 5.0 and the Annual Average Daily Traffic (AADT) volumes. A daytime/nighttime split of 75/25 was used along the full corridor. In addition, percentages of heavy and medium vehicles along the King Edward Avenue corridor of 2% and 10% respectively from Laurier Street to Rideau Street, 9% and 3% respectively from Rideau Street to Murray Street, and 6% each for the remainder of the corridor were used. This information covers all major intersections along King Edward Avenue between Laurier Avenue and Sussex Drive. Traffic information is summarized in Table 1 and depicted in Figures 1 and 2 for the various road segments. Receptor coordinates and offset distances are described in Table 2 and depicted in Figures 3 and 4. Procedures and calculations in this report satisfy appropriate MOE guidelines¹ and municipal requirements².

¹ Noise Assessment Criteria in Land Use Planning, Publication LU131, Ministry of The Environment, Oct. 1997.

² Noise Control Guidelines for New Developments Adjacent To Existing and Proposed Regional Roads and Transitways, Region of Ottawa-Carleton Background Report, Approved By Council January 1993.



TABLE 1: EXISTING TRAFFIC VOLUMES

SEGMENT OF KING EDWARD AVENUE	ROAD VOLUME (AADT)	
	NORTHBOUND	SOUTHBOUND
Boteler St. to Bolton St.	33462	21807
Bolton St. to Cathcart St.	24412	21807
Cathcart St. to Bruyere St.	25110	24738
Bruyere St. to St. Andrew St.	25809	24395
St. Andrew St. to Guigues St.	23426	24051
Guigues St. to St. Patrick St.	16091	24168
St. Patrick St. to Murray St.	12258	22123
Murray St. to Clarence St.	11702	20078
Clarence St. to York St.	13872	16293
York St. to George St.	12817	14930
George St. to Rideau St.	10424	16229
Rideau St. to Besserer St.	7708	14716
Besserer St. to Daly Ave.	6163	10765
Daly Ave. to Stewart St.	5814	10488
Stewart St. to Wilbrod St.	7001	7523
Wilbrod St. to Laurier Ave	8080	10632

SELECTED CROSS STREET	ROAD VOLUME (AADT)
St. Patrick St.	15711
Murray St.	7728
York St.	1795
Rideau St.	13898
Wilbrod St.	1210
Laurier Ave.	11183



TABLE 2: RECEPTOR COORDINATES & OFFSET DISTANCES

RECEPTOR	LOCATION	COORDINATES		DISTANCE TO KING EDWARD AVE CENTERLINE (m)	
		X (m)	Y (m)	NB	SB
1	189 Laurier Avenue, East side of King Edward Avenue	24	-20.5	17.5	25
2	Townhouses between 503 and 509 King Edward Avenue	99	-20	15	24
3	Church at 210 Wilbrod Street, West side of King Edward Avenue	98	10	15	6.5
4	460 King Edward Avenue, Les Freres des Ecoles Chretiennes	248.5	11.5	15	6.5
5	149 Daly Avenue, East side of King Edward Avenue	307	-10	9	16
6	290 Rideau Street, West side of King Edward Avenue	411.5	8	18	4.5
7	North face of 290 Rideau Street, West side of King Edward Avenue	430	27.5	39	26
8	Liquor store at 275 Rideau Street, West side of King Edward Avenue	459	16.5	31	15
9	303 Rideau Street, East side of King Edward Avenue	459	-23	8	24.5
10	Residential property at 375 King Edward Avenue	531.5	-30	14	32
11	195 George Street, West side of King Edward Avenue	554.5	15.5	32	14
12	Non-profit housing at 303 King Edward Avenue	698	-25	9	28
13	Church at 284 King Edward Avenue	743.5	10	27	7
14	In between houses at 235/237 King Edward Avenue	871	-27.5	10	26
15	Co-operative housing at East side of King Edward and St. Patrick Street	946.5	-33	14	31
16	Duplex at 174/176 King Edward Avenue	974	8	27	9
17	Residential property at 161 King Edward Avenue	1030	-30	10	30
18	Residential property at 124 King Edward Avenue	1110.5	10	30	10

TABLE 2 (CONTINUED): RECEPTOR COORDINATES & OFFSET DISTANCES

RECEPTOR	LOCATION	COORDINATES		DISTANCE TO KING EDWARD AVE CENTERLINE (m)	
		X (m)	Y (m)	NB	SB
19	Residential property at 100 King Edward Avenue	1229.5	7	32	12
20	Parking lot for residences at corner of Boteler St and King Edward Ave	1304	14.5	46.5	12
21	198 Boteler Street, facing North	1316	62.5	N/A	N/A
22	Triangular field defined by King Edward on/off ramps	1423	87	N/A	N/A
23	External Affairs building on Sussex, South facing side	1552	118	N/A	N/A
24	East side of King Edward Avenue, near river across from Boteler Street	1465	-66.5	N/A	N/A

The calculation output is the equivalent sound level of noise, L_{EQ} , for daytime and nighttime periods. The L_{EQ} provides a weighted measure of the time varying noise levels produced by vehicle traffic. It is defined as the continuous sound level that has the same energy as a time varying noise level over a selectable period of time. For roadways, the L_{EQ} is commonly calculated on the basis of a 16 hour daytime / 8 hour nighttime split.

Because sound (noise) levels can have an enormous range, they are represented in decibel units, dBA, which is a logarithmic ratio referenced to a standard noise level. The 'A' suffix refers to a weighting scale that represents the noise as perceived by the human ear. Accordingly, a doubling of traffic volumes results in a 3 dBA increase in measured noise levels and is just perceivable to most individuals. An increase of 10 dBA is perceived by most to be twice as loud. Most authorities consider daytime L_{EQ} of 55 dBA to be acceptable for outdoor living areas (OLA's) for residences in urban areas, with mitigating measures being required as the noise levels approach 70 dBA.

4.2 Air Quality Procedure

Using peak hour traffic volumes corresponding to the AADT values, an assessment of air quality along the King Edward Avenue corridor was performed for common vehicle pollutants, including carbon monoxide (CO), oxides of nitrogen (NO_x), total hydrocarbons (HC) and suspended particulates (PM). This information was used with a computer model of the King Edward Avenue corridor including selected crossroads with significant vehicle traffic. Twenty-four receptors were selected, all in common with noise measurement locations, to determine the worst-case one-hour concentrations during peak traffic hours of the morning and afternoon periods. Wind probabilities for the Ottawa area were combined with the pollution data to determine statistical levels of pollutants occurring along the corridor. The computer model used for the evaluation, CAL3QHC, incorporates vehicle counts, traffic speeds, characteristics of signalized intersections, and relevant atmospheric elements among other real life parameters.

4.3 Ground Vibrations Procedure

Existing levels of ground vibrations due to vehicle traffic were determined by field measurements using an Instantel model DS577 seismograph capable of recording three components (one vertical and two horizontal) of ground velocity. Measurements were performed as part of a separate study for the former ROC that focused on the impact of truck and heavy vehicles on noise and ground vibrations. The measurements were performed at three locations including: (i) the southwest corner of King Edward Avenue and George Street, (ii) the southeast corner of King Edward Avenue and Murray Street, and (iii) the east end of Boteler Street just north of the southbound ramp. With the instrument located near the inside edge of the sidewalk, each measurement was triggered when a heavy vehicle passed by the instrumentation creating vibrations that exceeded a pre-set threshold level of peak particle velocity. The trigger level was set to ensure that insignificant vibration levels would not be recorded.

5. RESULTS

5.1 Roadway Noise

The results of existing noise calculations in the form of equivalent sound pressure level, L_{EQ} , are illustrated in Table 3 for the daytime (16 hour L_{EQ}) and nighttime (8 hour L_{EQ}) periods.

TABLE 3: NOISE LEVELS ALONG KING EDWARD AVENUE DUE TO ROADWAY TRAFFIC - EXISTING CONDITIONS

RECEPTOR	NOISE LEVEL (dBA)		RECEPTOR	NOISE LEVEL (dBA)	
	DAY	NIGHT		DAY	NIGHT
1	67.4	65.0	13	69.5	67.7
2	66.2	64.4	14	70.6	68.7
3	66.2	65.4	15	72.1	69.7
4	64.1	62.3	16	71.9	70.2
5	67.2	65.4	17	72.0	70.3
6	68.3	66.5	18	71.9	70.2
7	66.9	65.2	19	71.4	69.7
8	71.2	69.4	20	68.9	67.2
9	70.5	68.7	21	71.1	71.0
10	69.0	67.2	22	65.3	63.9
11	68.7	66.9	23	59.7	58.4
12	70.5	68.5	24	57.1	55.8

Results for the existing King Edward Avenue corridor indicate that noise levels at the 24 receptors considered in this study range between 57 to 72 dBA for daytime periods and between 56 dBA to 71 dBA for nighttime periods. The levels vary for a number of reasons, including proximity to the roadway, number of vehicles and posted speed limits. The highest levels are observed between Murray Street and Bolton Street due to close proximity of residences to the roadway and high traffic volumes. The noise levels are lowest at selected receptors within the area among the ramps at the

north end of King Edward Avenue. Most locations along King Edward Avenue are adjacent to the roadway and experience noise levels in the range of 67 dBA to 72 dBA.

5.2 Air Quality

Results of calculations of maximum concentrations of pollutants for existing conditions along King Edward Avenue are summarized in Table 4. Predicted pollution levels incorporating the moderating effects of wind variability (wind statistics) are provided in Table 5. Figures 3 and 4 illustrate the receptor locations which were used for both noise and air quality calculations. These levels are considered separately as constant values that are added to the predicted results of each receptor. Tabulated results do not include background levels that may already exist in the environment.

TABLE 4: MAXIMUM EXISTING POLLUTANT CONCENTRATIONS ALONG KING EDWARD AVENUE FROM LAURIER AVE. TO SUSSEX DRIVE

RECEPTOR	CONCENTRATION (mg/m ³)			
	CO	HC	NO _x	PM
1	1.61	0.17	0.16	0.05
2	1.79	0.19	0.18	0.06
3	2.49	0.26	0.25	0.08
4	2.83	0.29	0.28	0.09
5	3.38	0.35	0.34	0.11
6	5.04	0.52	0.50	0.16
7	7.25	0.75	0.72	0.22
8	4.81	0.50	0.48	0.15
9	3.95	0.41	0.39	0.12
10	3.33	0.35	0.33	0.10
11	2.87	0.30	0.29	0.09
12	2.63	0.27	0.26	0.08
13	4.24	0.44	0.42	0.13
14	6.35	0.66	0.63	0.20
15	4.98	0.52	0.50	0.15
16	5.79	0.60	0.57	0.18
17	4.19	0.44	0.42	0.13
18	4.64	0.48	0.46	0.15
19	5.03	0.52	0.50	0.16
20	3.38	0.35	0.34	0.11
21	1.73	0.18	0.17	0.05
22	1.93	0.20	0.19	0.06
23	1.92	0.20	0.19	0.06
24	2.74	0.29	0.27	0.09



TABLE 5: POLLUTANT CONCENTRATIONS ALONG KING EDWARD AVENUE WITH WIND PROBABILITIES CONSIDERED

RECEPTOR	CONCENTRATION (mg/m ³)			
	CO	HC	NO _x	PM
1	0.48	0.05	0.05	0.02
2	0.44	0.05	0.04	0.02
3	0.48	0.05	0.05	0.02
4	0.47	0.05	0.05	0.02
5	0.54	0.06	0.05	0.02
6	1.15	0.12	0.11	0.05
7	1.97	0.20	0.20	0.09
8	1.24	0.13	0.12	0.05
9	1.59	0.16	0.16	0.07
10	0.81	0.08	0.08	0.03
11	0.52	0.05	0.05	0.02
12	0.45	0.05	0.05	0.02
13	0.66	0.07	0.07	0.03
14	1.90	0.20	0.19	0.08
15	1.39	0.14	0.14	0.06
16	1.11	0.12	0.11	0.05
17	1.18	0.12	0.12	0.05
18	0.90	0.09	0.09	0.04
19	1.00	0.10	0.10	0.04
20	0.88	0.09	0.09	0.04
21	0.59	0.06	0.06	0.03
22	0.69	0.07	0.07	0.03
23	0.26	0.03	0.03	0.01
24	0.55	0.06	0.05	0.02

According to the MOE's Ambient Air Quality Criteria (AAQC), the recommended allowable levels for these pollutants are indicated as follows:

		AAQC (mg/m³)	Background (mg/m³)
Carbon Monoxide, CO	36.2 (1 Hr)	15.7 (24 Hr)	0.46
Total Hydrocarbons As Hexane	35.0 (½ Hr)	12.0 (24 Hr)	0.003
Nitrous Oxides, NO _x	0.40 (1Hr)	0.20 (24 Hr)	0.026
Suspended Particulates	0.10 (½ Hr)	0.12 (24 Hr)	0.009

Results indicate that the area around Rideau Street, represented by receptors 6 through 8, as well as the segment from Murray Street to Bolton Street, represented by receptors 14-19, experience the worst pollution levels. The largest one-hour concentration of pollutants is found to occur at receptor 7, located on the east side of King Edward Avenue between Murray Street and St. Patrick Street. At this site the peak one-hour concentrations of CO, HC, NO_x and PM are 7.25 mg/m³, 0.75 mg/m³, 0.72 mg/m³ and 0.22 mg/m³ respectively. While the peak values for CO and HC are below the AAQC criteria, the peak values for NO_x and PM are 150% and 200% of the acceptable levels. Maximum concentrations are highest at signalized intersections including King Edward Avenue and Rideau Street (receptors 6, 7 and 8) as well as King Edward Avenue and Murray Street (receptor 14) due in large part to the idling emissions and queue lengths of traffic. The worst conditions will occur during rush hour periods when vehicle emissions are trapped by adverse temperature and buoyancy inversion in the atmosphere.

Combining these maximum pollutions levels with the Ottawa wind statistics generates the predicted pollution levels summarized in Table 5 that are expected to exist much of the time. These results are significantly below the allowable limits for CO, HC and NO_x, even after adding in the average background levels. For instance, the maximum statistical one-hour level of pollutants are predicted to be CO = 2.43 mg/m³ (1.97 + 0.46), HC = 0.17 mg/m³ (0.17 + 0.003), and NO_x = 0.23 mg/m³ (0.20+ 0.026), which fall below their representative criteria. However, the PM concentrations are predicted to reach the MOE criterion of 0.1 mg/m³ at receptor 7 when the background levels are

included (0.09 + 0.009). All other receptors experience results below the stated criterion. The relatively high levels of PM are due to the large proportion of truck traffic along King Edward Avenue and the large particulate content in diesel exhaust.

5.3 Ground Vibrations

Selected results of ground vibration measurements are illustrated in Table 6 in terms of the largest ten vibration readings at each of three locations along King Edward Avenue.

TABLE 6: HIGHEST TEN VIBRATION READINGS AT THREE LOCATIONS ALONG KING EDWARD AVENUE

RECORD NUMBER	PEAK VELOCITY (mm/s)		
	GEORGE ST. AND KING EDWARD AVE.	MURRAY ST. AND KING EDWARD AVE.	BOTELER ST. AND KING EDWARD AVE.
1	0.814	0.598	0.873
2	0.541	0.497	0.854
3	0.463	0.454	0.483
4	0.457	0.432	0.432
5	0.362	0.414	0.341
6	0.335	0.374	0.253
7	0.327	0.358	0.247
8	0.324	0.321	0.243
9	0.317	0.319	0.241
10	0.313	0.309	0.239

Peak ground vibrations along King Edward Avenue were measured to fall below 0.9 mm/s peak particle velocity at all locations. The highest readings occurred at George and Boteler Streets. In all cases, unlike for noise, trucks or buses were responsible for the vibrations as large mass and velocity are the important factors to cause vibrations.

The measured vibration levels are low and of no consequence to the residents of the area or the buildings along the corridor. Experience and published literature indicates that intermittent peak vibrations transmitted to people are tolerable up to 1 mm/s or more and that old buildings on poor soil can withstand vibrations of 30 mm/s or more without triggering new damage.³

6. CONCLUSIONS

The work summarized in this report establishes the existing environmental conditions for noise, air quality and ground vibrations along the King Edward Avenue corridor between Laurier Street and Sussex Drive.

Results of noise calculations indicate that the present daytime noise levels along King Edward Avenue, based on the 16 hour L_{EQ} , range between 57 dBA and 72 dBA, while the range for nighttime levels, referenced to the 8 hour L_{EQ} , is 56 dBA to 71 dBA. Values near the upper end of these ranges are due to the proximity of receptors and buildings to the existing streets as well as the high traffic volumes. The highest levels occur for the majority of locations between Rideau and Boteler Streets (Receptors 8, 9, 12 and 14 to 19), whereas the quietest areas are found at the north end of the corridor over the open spaces among the ramps (Receptors 22, 23 and 24). Noise levels at the south end of the corridor near Laurier Avenue are intermediate.

Regarding the influence of noise on the inhabitants of the area, the primary concern would be with the indoor noise levels within dwellings produced by the relatively high outdoor noise results. Although the intent is to improve overall noise condition, the outdoor noise levels are not specifically an issue since, with few exceptions, the outdoor living area of all dwellings along King Edward Avenue are located at the rear of the buildings with the main façades overlooking the corridor. Clearly the indoor noise environment will be improved with a reduction of the outdoor noise levels. These issues will form part of the evaluation of renewal alternatives.

An air quality assessment, considering vehicle traffic along King Edward Avenue as well as all relevant intersections, indicates that the levels of nitrous oxides (NO_x) and particulates (PM).

Will approach, and occasionally exceed, the Ambient Air Quality Criteria (AAQC). Such incidences however will be rare, occurring when low wind speeds (<1 m/s) coincide with certain wind directions and peak traffic volumes. The pollutant levels that are expected to exist most of the time will be less than the one-hour AAQC standards. The twenty-four hour criteria would not be exceeded within the King Edward Avenue corridor under any foreseeable conditions. Predicted levels of carbon monoxide (CO) and hydrocarbons (HC) are well below the AAQC criteria over both the one-hour and 24-hour averaging periods. High levels of PM and NO_x are due to the large proportion of truck traffic along King Edward Avenue and the large content of these pollutants in diesel fuel.

Based on site measurements at three locations, ground vibration levels due to roadway traffic along King Edward Avenue are low. As a result, although ground-borne vibrations are expected to be perceptible they will generally be acceptable for residents. In addition, these levels will be too low to cause any problems for buildings, structural or cosmetic.

This concludes our assessment of existing conditions. If you have any questions or wish to discuss our findings please advise us. In the meantime, we thank you for the opportunity to be of service.

Yours truly,

Daley Ferraro Associates

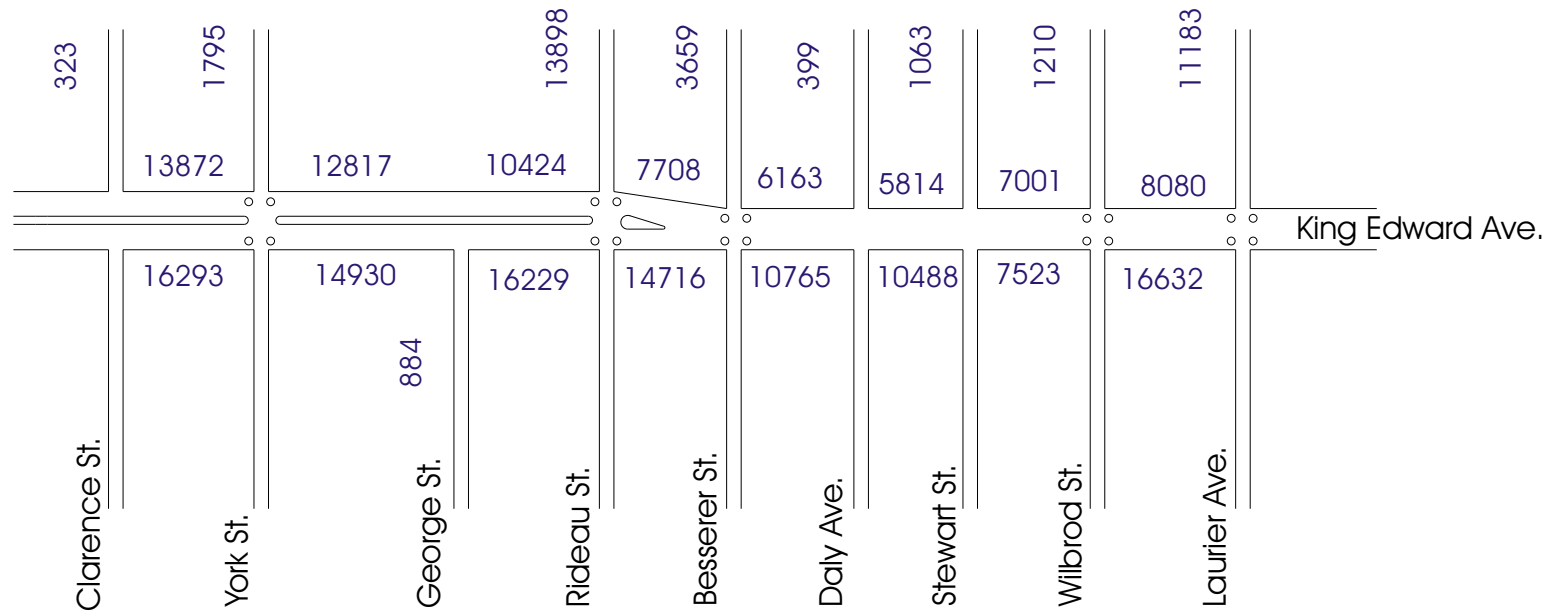
Vincent Ferraro, M.Eng., P.Eng.

Leanne Elsliger, B.Eng, EIT


C/DFA/PROJECTS/DELCAN/DFA00-067

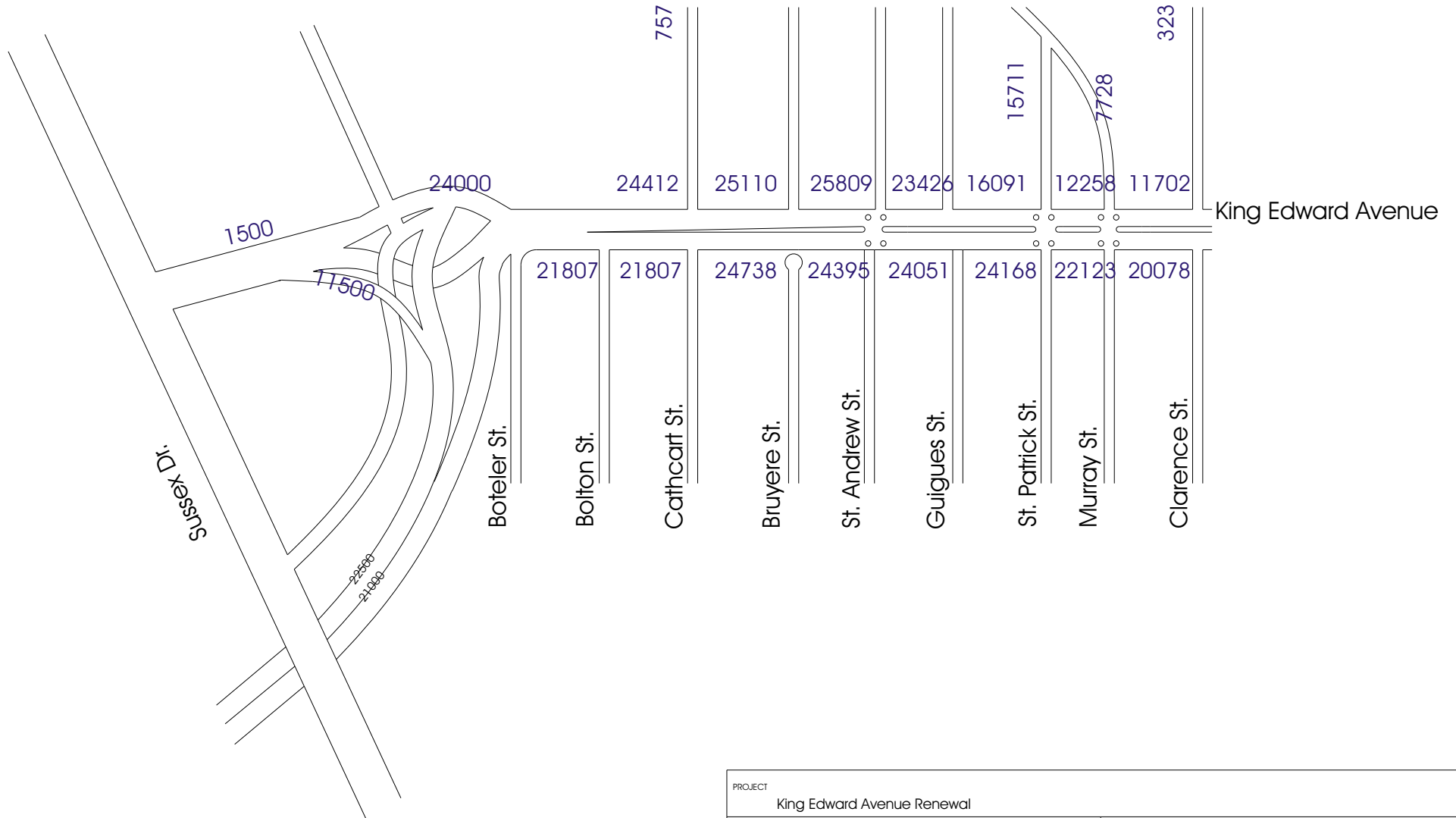
DISTRIBUTION: 2 COPIES DELCAN
1 COPY DFA

³ C.H. Dowding, Blast Vibration Monitoring & Control, Prentice Hall, 1985.




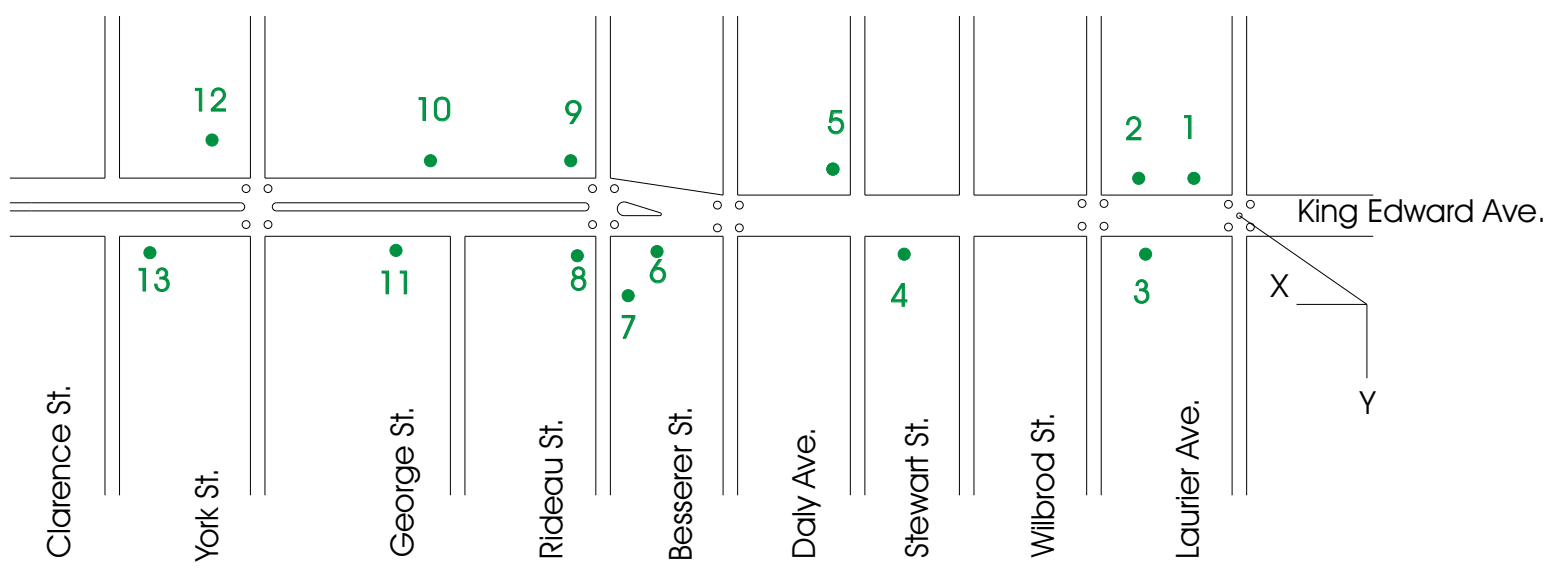
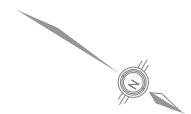
⊙ ⊙ Signalized Intersection

PROJECT King Edward Avenue Renewal			
 Daley Ferraro Associates Engineering Services		2720 Queensview Dr. Ottawa, Ontario K2B 1A5 (613) 726-2939	
DESCRIPTION		Figure 1. AADT's Along King Edward Avenue From Laurier Avenue to Clarence Street	
SCALE N.T.S.	DATE August 2, 2001	DRAWN BY L. Elstiger	DRAWING NO. DFA00-067-1




⊙⊙ Signalized Intersection

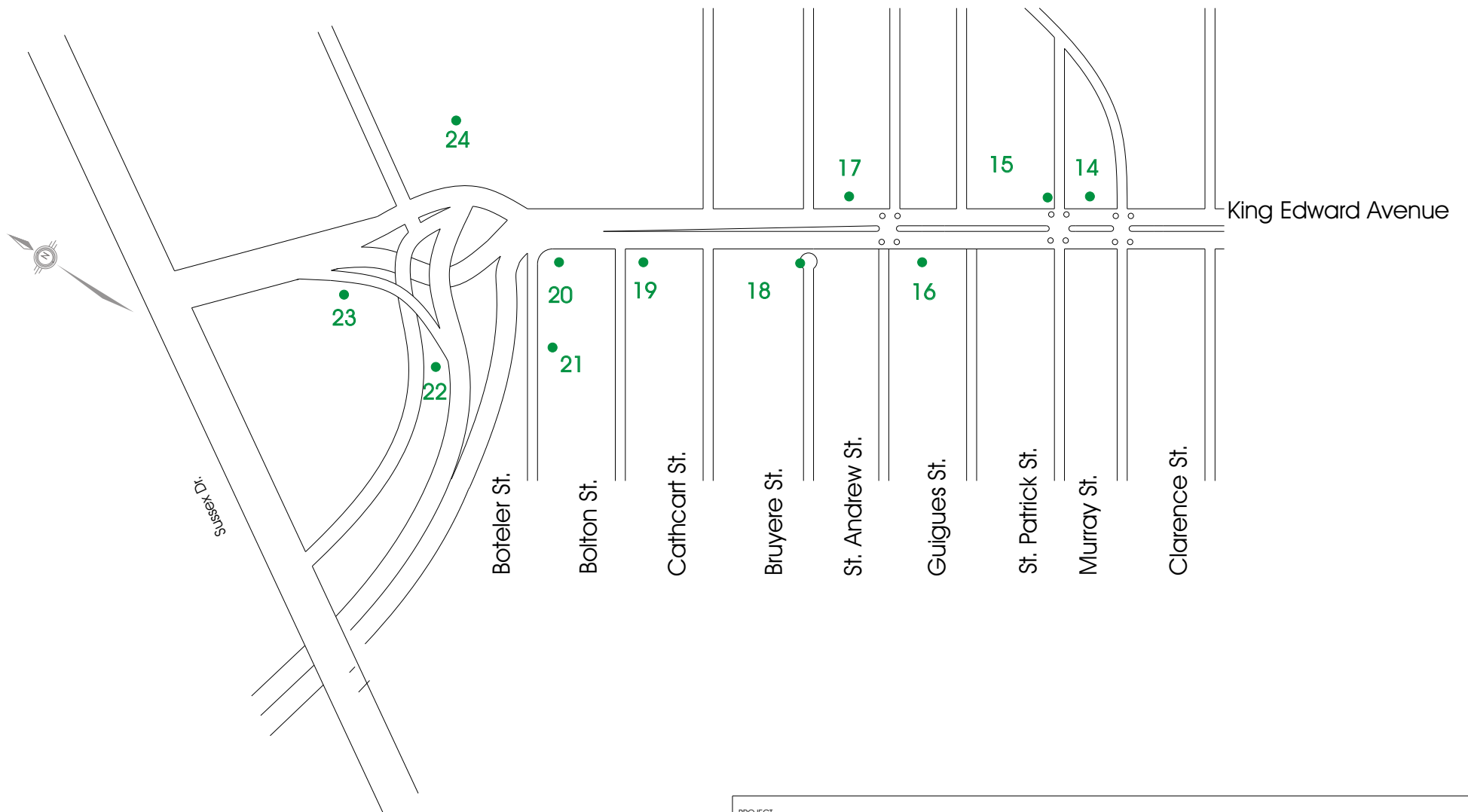
PROJECT King Edward Avenue Renewal			
 Daley Ferraro Associates Engineering Services		2720 Queensview Dr. Ottawa, Ontario K2B 1A5 (613) 726-2939	
DESCRIPTION Figure 2. AADT's Along King Edward Avenue From Clarence Street To Sussex Drive		DRAWN BY L. Elstiger	
SCALE N.T.S.	DATE August 2, 2001	DRAWING NO. DFA00-067-2	



Receptor Location


⊙ ⊙ Signaled Intersection

PROJECT King Edward Avenue Renewal			
 Daley Ferraro Associates Engineering Services		2720 Queensview Dr. Ottawa, Ontario K2B 1A5 (613) 726-2939	
DESCRIPTION		Figure 3. Location of Receptors 1-13 Along King Edward Avenue Corridor	
SCALE N.T.S.	DATE August 2, 2001	DRAWN BY L. Elsliger	DRAWING NO. FUTURE CONDITION



Receptor Location

⊙ ⊙ Signalized Intersection

PROJECT King Edward Avenue Renewal			
 Daley Ferraro Associates Engineering Services		2720 Queensview Dr. Ottawa, Ontario K2B 1A5 (613) 726-2939	
DESCRIPTION		Figure 4. Location of Receptors P14-24 Along King Edward Avenue Corridor	
SCALE N.T.S.	DATE August 2, 2001	DRAWN BY L. Elsliger	DRAWING NO. DFA00-067-4



PHOTOGRAPH 1: RECEPTOR 1, 189 LAURIER AVE, LOOKING NORTHWARD



PHOTOGRAPH 2: RECEPTOR 2, BETWEEN 503 AND 509 KING EDWARD AVE, LOOKING NORTHWARD



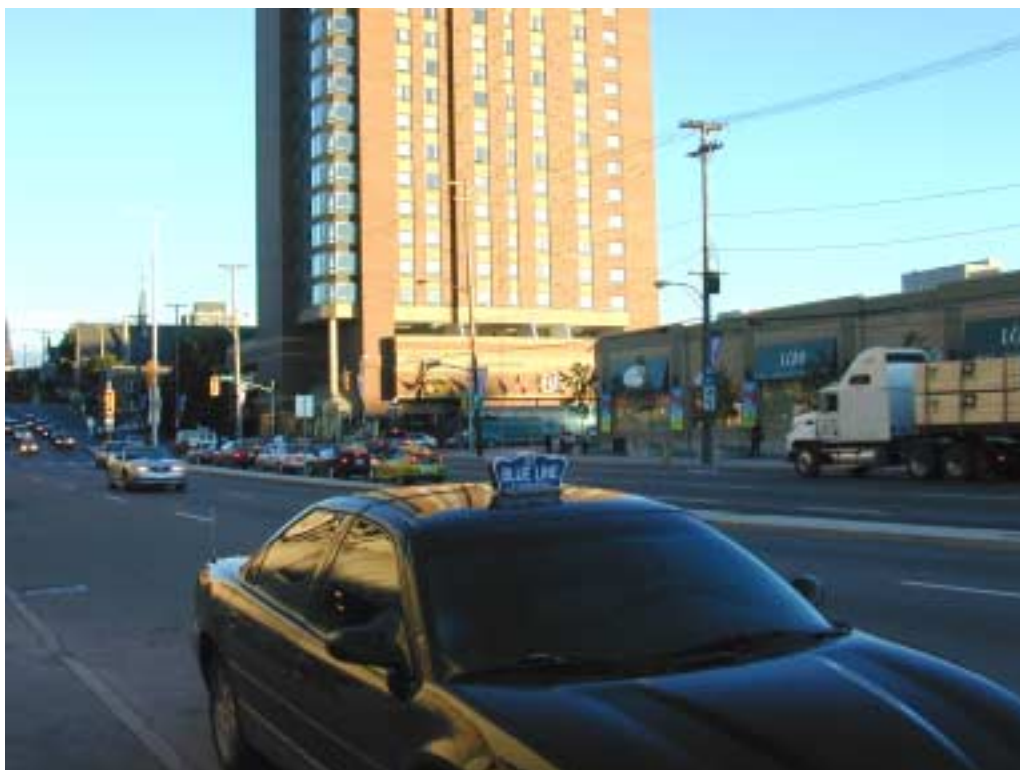
PHOTOGRAPH 3: RECEPTOR 3, ST. PAUL'S CHURCH AT 210 WILBROD ST, LOOKING NORTHWARD



PHOTOGRAPH 4: RECEPTOR 4, 460 KING EDWARD AVE, LOOKING NORTHWARD



PHOTOGRAPH 5: RECEPTOR 5, 149 DALY ST, LOOKING NORTHWARD



PHOTOGRAPH 6: RECEPTORS 6, 7 AND 8, CORNER OF RIDEAU ST AND KING EDWARD AVE, LOOKING SOUTHWARD



PHOTOGRAPH 7: RECEPTOR 9, QUEEN'S BUILDING AT CORNER OF RIDEAU ST AND KING EDWARD AVE, LOOKING NORTHWARD



PHOTOGRAPH 8: RECEPTOR 10, 375 KING EDWARD AVE, LOOKING NORTHWARD



PHOTOGRAPH 9: RECEPTOR 11, DAYCARE AT 195 GEORGE ST, LOOKING NORTHWARD



PHOTOGRAPH 10: RECEPTOR 12, NON-PROFIT HOUSING AT 303 KING EDWARD AVE, LOOKING NORTHWARD



PHOTOGRAPH 11: RECEPTOR 13, CHURCH AT 284 KING EDWARD AVE, LOOKING NORTHWARD



PHOTOGRAPH 12: RECEPTOR 14, FRONT LAWN OF 235/237 KING EDWARD AVE, LOOKING NORTHWARD



PHOTOGRAPH 13: RECEPTOR 15, CO-OPERATIVE HOUSING AT CORNER OF ST. PATRICK ST AND KING EDWARD AVE, LOOKING EASTWARD



PHOTOGRAPH 14: RECEPTOR 16, 174/176 KING EDWARD AVE, LOOKING NORTHWARD



PHOTOGRAPH 15: RECEPTOR 17, 161 KING EDWARD AVE, LOOKING NORTHWARD



PHOTOGRAPH 16: RECEPTORS 18 AND 19, 124 AND 100 KING EDWARD AVE RESPECTIVELY,
LOOKING NORTHWARD



PHOTOGRAPH 17: RECEPTOR 20, PARKING LOT AT CORNER OF KING EDWARD AVE AND BOTELER ST, LOOKING NORTHWARD



PHOTOGRAPH 18: RECEPTOR 21, 198 BOTELER ST., LOOKING WESTWARD FROM THE CORNER OF BOTELER ST AND KING EDWARD AVE



PHOTOGRAPH 19: RECEPTORS 22 AND 23, TRIANGULAR FIELD DEFINED BY KING EDWARD RAMPS AND EXTERNAL AFFAIRS BUILDING, RESPECTIVELY, LOOKING WESTWARD



PHOTOGRAPH 20: RECEPTOR 24, EAST SIDE OF ROADWAY NEAR RIVER AT KING EDWARD AVE AND BOTELER ST