

COMMITTEE OF THE WHOLE JUNE 17, 2002

COLLISIONS AT SIGNALIZED AND UNSIGNALIZED INTERSECTIONS

Recommendation

The Commissioner of Engineering and Public Works recommends:

1. That the following report be received for information purposes;
2. That York Region Police be requested to provide more frequent enforcement of the speed limit and compliance at the traffic signal/allway stop control at the following intersections:
 - Rivermede Road/Bowes Road;
 - New Westminster Drive/Mullen Drive/Joseph Aaron Boulevard;
 - New Westminster Drive/Conley Street; and
 - Hilda Avenue/Pinewood Drive.
3. That the Doughton Road/Maplecrete Road intersection be reviewed in more detail should the high collision rate continue in 2002.

Purpose

This collision summary, the third in an annual series, represents a comprehensive review of collision rates at the City's signalized and major unsignalized intersections.

Background - Analysis and Options

Collision Reporting

Collision data was collected or updated at the City's 46 signalized intersections, plus 18 unsignalized intersections selected by staff within the City. The number of unsignalized intersections reviewed is nine less than last year, due to their signalization within the past year. The data was based on and limited to the collision reports received from York Region Police, and does not include unreported collisions. A vehicle collision is reportable when any of the following conditions apply:

- Property damage is in excess of \$1,000.00;
- The collision resulted in a personal injury;
- Charges are laid as a result of the collision; or,
- A government vehicle is involved.

It must be recognized that generally collision reports are prepared to document incident, assign fault and identify driver error as opposed to documenting collision factors such as geometric design, traffic control operations, roadside environment or driver behaviour.

Collision Rate Determination

Collision rates are considered a better measure of collision risk than the absolute number of collisions at an intersection. This is primarily due to the fact that a collision rate takes into account the volume of traffic that travels through an intersection each day. For example, 5 collisions in a year at an intersection with 2,000 cars entering it each day is generally more notable than the same number of collisions occurring at an intersection with 15,000 cars entering it each day. Collision rates at intersections are measured in "collisions per million vehicles entering" (collisions/mve), or the average number of collisions for every one million vehicles that pass through the intersection.

$$\text{Collision rate} = \frac{\text{number of collisions/year} \times 1,000,000}{24 \text{ hour entering volume} \times 365 \text{ days}}$$

The 24 hour traffic volume entering an intersection was determined either by use of automatic traffic recorders (ATR's) or from eight hour turning movement counts conducted by staff. In the latter case the daily traffic volume was estimated by doubling the eight hour counts, since the 24 hour volume is typically twice the volume in the peak eight hours of the day.

An intersection is generally considered critical when the collision rate exceeds 1.5 collisions/mve, or where a fatal collision has occurred in the past year. Most jurisdictions therefore use these criteria as a "trigger" for further review.

Collisions at Signalized Intersections

Collisions were reviewed at the City's 46 signalized intersections, listed as follows and illustrated on Attachment No. 1:

Aberdeen Avenue/Chancellor Drive
Aberdeen Avenue/Embassy Drive
Ansley Grove Road/Chancellor Drive
Ansley Grove Road/Belview Avenue/Aberdeen Avenue
Ansley Grove Road/Embassy Drive/Blue Willow Drive
Ansley Grove Road/Windflower Gate/Pinedale Crescent
Atkinson Avenue/Campbell Avenue/Manor Gate
Atkinson Avenue/Rosedale Heights Drive (North)
Atkinson Avenue/Rosedale Heights/Edmund Seager Drive
Atkinson Avenue/Spring Gate Boulevard
Centre Street/Atkinson Avenue
Clark Avenue/Atkinson Avenue
Clark Avenue/Brownridge Drive/Joseph Aaron Boulevard
Clark Avenue/Charles Street
Clark Avenue/Condo Corporation (West of Yonge Street)
Clark Avenue/Coulters Mill Plaza (East)
Clark Avenue/Hilda Avenue
Clark Avenue/Judith Avenue/Stonemill Gate
Clark Avenue/New Westminster Drive
Clark Avenue/South Promenade
Clark Avenue/York Hill Boulevard (West)
Clark Avenue/York Hill Boulevard/Springfield Way
Creditstone Road/McCleary Court
Edgeley Boulevard/Applewood Crescent (South)
Hilda Avenue/Crestwood Road
Hilda Avenue/York Hill Boulevard
Kipling Avenue/Woodbridge Avenue
Martin Grove Road/Andrew Park/Auburn Road
Martin Grove Road/Roysun Road
Martin Grove Road/Woodbridge Avenue
Martin Grove Road/Woodstream Blvd/Regina Road
McNaughton Road/Cranston Park Drive
McNaughton Road/St. Joan of Arc Avenue
Millway Avenue/Pennsylvania Avenue
New Westminster Drive/Beverly Glen Boulevard
New Westminster Drive/Brownridge Drive/W. Promenade
New Westminster Drive/Conley Street
New Westminster Drive/Mullen Drive/Joseph Aaron Boulevard

Rivermede Road/Bowes Road
 Rivermede Road/North Rivermede Road
 Rowntree Dairy Road/Strada Drive
 Rowntree Dairy Road/Winges Road/Auto Park Circle
 Whitmore Road/Winges Road/Trowers Road
 Woodbridge Avenue/Clarence Street
 York Hill Boulevard/Chabad Gate
 Martin Grove Road/Langstaff Road

Attachment No. 2 includes a four-year summary of collisions at the City's 46 signalized intersections.

Provided below is a summary of collision rates at five of the City's signalized intersections between January 1 and December 31, 2001, in descending order of collision rate:

<u>Intersection</u>	<u>2001 Collision Rate</u>
Rivermede Road/Bowes Road	1.43
New Westminster Drive/Mullen Drive/Joseph Aaron Boulevard	1.17
Rivermede Road/North Rivermede Road	1.03
New Westminster Drive/Conley Street	0.99
Clark Avenue/Condo Corp. (West of Yonge Street)	0.39

The first four locations experienced the highest collisions rates among the City's signalized intersections during 2000, although none were in excess of 1.5 collisions/mve. Staff examined the collision reports to identify any trends in the type of collision, road condition, time of day, vehicle type, driver action and pedestrian/cyclist involvement.

The signalized Clark Avenue/Condo Corp. intersection, which was examined in detail last year, experienced a collision rate lower than in 2000. As the new rate is well below 1.5 collisions/mve, it is recommended that no further review is required at this time.

In November 2000 a fatal collision occurred on Clark Avenue west of this location, where there is a reverse curve in the road between York Hill Boulevard and Hilda Avenue. A single westbound motorist lost control and struck a tree on the north boulevard. In response, staff have increased the size of the existing curve warning signs from 75 cm, as is specified for this type of road, to 90 cm. A westbound curve ahead sign, also of 90 cm size, with a "Slow" tab, was also installed to provide further warning for motorists.

Rivermede Road/Bowes Road

The signalized Rivermede Road/Bowes Road intersection is located within an industrial area in Concord. There were 7 collisions reported in 2001, compared to 3 in 2000, for a collision rate of 1.43 collisions/mve. Four or five of these were angle collisions (there was disagreement between motorists whether one was an angle collision or a rear end collision). Staff have verified that the signals are appropriately located and sized for this type of intersection, and no complaints have been received about the signal timing. The other possible cause of the collisions is high speeds. Staff will request that York Region Police provide more frequent enforcement of the speed limit in the vicinity.

New Westminster Drive/Mullen Drive/Joseph Aaron Boulevard

The signalized New Westminster Drive/Mullen Drive/Joseph Aaron Boulevard intersection is located within a residential area in Thornhill. There were 9 collisions reported in 2001, compared to 8 in 2000, for a collision rate of 1.17 collisions/mve. Six were angle collisions. Staff have verified that the signals are appropriately located and sized for this type of intersection, and no

complaints have been received about the signal timing. Upon speaking with the school crossing guard at the intersection, it was confirmed that speeds are high along New Westminster Drive and are the probable cause of most collisions. Staff will request that York Region Police provide more frequent enforcement of the speed limit in the vicinity.

Rivermede Road/North Rivermede Road

The signalized Rivermede Road/North Rivermede Road intersection is located within an industrial area in Concord. There were 6 collisions reported in 2001, compared to 2 in 2000, for a collision rate of 1.03 collisions/mve. The collisions were of varying types, with no trends identified. Two occurred under icy conditions. It is recommended that no further review of the intersection is required at this time.

New Westminster Drive/Conley Street

The signalized New Westminster Drive/Conley Street intersection is located within a residential area in Thornhill. There were 4 collisions reported in 2001, compared to 6 in 2000, for a collision rate of 0.99 collisions/mve. The collisions were of varying types. No trends were identified, although high speeds along New Westminster Drive is a probable cause. Staff will request that York Region Police provide more frequent enforcement of the speed limit in the vicinity.

Collisions at Unsignalized Intersections

Collisions were also reviewed at the following 18 major unsignalized intersections, as illustrated on Attachment No. 3:

Beverly Glen Boulevard/Worth Boulevard
Creditstone Road/Doughton Road
Creditstone Road/MacIntosh Boulevard
Creditstone Road/Pippin Road
Doughton Road/Maplecrete Road
Edgeley Boulevard/Cidermill Avenue
Edgeley Boulevard/Pennsylvania Avenue
Hilda Avenue/Pinewood Drive
Islington Avenue/Nashville Road
Jevlan Drive/Carlauren Road
Jevlan Drive/Chrislea Road
Jevlan Drive/Roytec Road
Martin Grove Road/Forest Drive
Marycroft Avenue/Strada Drive
Melville Avenue/Cunningham Drive
Millway Avenue/Applewood Crescent (South)
Millway Avenue/Cidermill Avenue
Millway Avenue/Pennsylvania Avenue

Attachment No. 4 includes a four-year summary of collisions at 18 of the City's unsignalized intersections.

Provided below is a summary of selected collision rates at two of the City's major unsignalized intersections between January 1 and December 31, 2001, in descending order of collision rate:

<u>Intersection</u>	<u>2001 Collision Rate</u>
Doughton Road/Maplecrete Road	1.58
Hilda Avenue/Pinewood Drive	1.55

The Rowntree Dairy Road/Winges Road/Auto Park Circle intersection, which was reported last year as having a collision rate in 2000 well in excess of 1.5 collisions/mve, was signalized in May 2002. Staff will report on the collision experience at this intersection in next year's report.

Doughton Road/Maplecrete Road

The allway stop controlled Doughton Road/Maplecrete Road intersection is located within an industrial area in Concord. There were 3 collisions reported in 2001, compared to 0 in 2000, for a collision rate of 1.58 collisions/mve. Two of the collisions involved motorists colliding into vehicles parked at the side of the road, while the other was a rear-end collision. All three occurred at night. The street lighting in the area is adequate, and there are no other factors that should contribute to collisions. Because of this and the low volume of traffic at this location, which can make small increases in the number of collisions seem disproportionately large, it is recommended that this intersection be looked at in more detail should the high collision rate continue in 2002.

Hilda Avenue/Pinewood Drive

The allway stop controlled Hilda Avenue/Pinewood Drive intersection is located within a residential area in Thornhill. There were 9 collisions reported in 2001, compared to 2 in 2000, for a collision rate of 1.55 collisions/mve. The collisions were of varying types, with four occurring in inclement weather. No trends were identified in the 2001 data, although speeds are high along Hilda Avenue and many motorists exhibit poor compliance at the allway stop. Collision data from previous years indicates that speeding and stop sign compliance, particularly in the southbound direction, has contributed to several collisions. Staff will request that York Region Police provide more frequent enforcement of the posted speed limit along Hilda Avenue and compliance at the allway stop.

The Engineering Department is currently conducting a review of this intersection as part of the traffic calming plan proposal for the Pinewood/Crestwood/Hilda Traffic Committee. It is expected that the review will recommend the implementation of physical measures at the intersection to slow motorists and increase allway stop compliance.

Conclusion

Based on the collision review, none of the City's signalized intersections experienced a collision rate in 2000 higher than 1.5 collisions/mve, a rate that is utilized by a number of jurisdictions as a "trigger" for review. However, the following four signalized intersections experienced a collision rate higher than 0.99 collisions/mve:

- Rivermede Road/Bowes Road;
- New Westminster Drive/Mullen Drive/Joseph Aaron Boulevard;
- Rivermede Road/North Rivermede Road; and
- New Westminster Drive/Conley Street.

The following two unsignalized intersections experienced a collision rate in 2000 higher than 1.5 collisions/mve. They are:

- Doughton Road/Maplecrete Road; and
- Hilda Avenue/Pinewood Drive.

Staff will request that York Region Police provide more frequent enforcement of the speed limit in the vicinity of the Rivermede Road/Bowes Road, New Westminster Drive/Mullen Drive/Joseph Aaron Boulevard and New Westminster Drive/Conley Street intersections. Staff will request that York Region Police provide more frequent enforcement of the speed limit in the vicinity of the Hilda Avenue/Pinewood Drive intersection, and compliance at the allway stop.

Staff will examine the Doughton Road/Maplecrete Road intersection in more detail should the high collision rate continue in 2002.

Attachments

1. Location Map of Signalized Intersections
2. Summary of Collisions at Signalized Intersections
3. Location Map of Major Unsignalized Intersections
4. Summary of Collisions at Major Unsignalized Intersections

Report prepared by:

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Brendan Holly, Senior Manager Development/Transportation Engineering, ext 8250

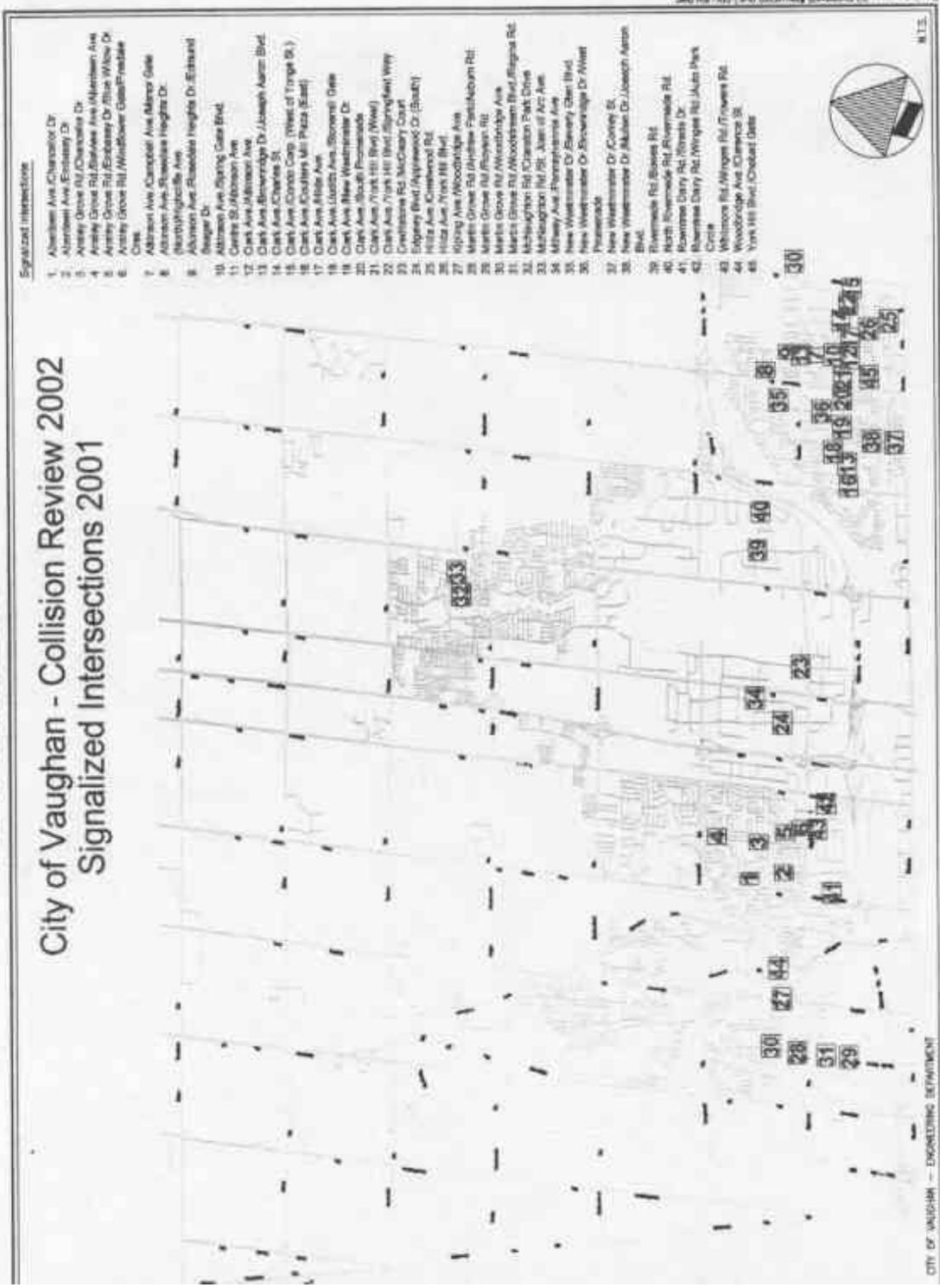
Respectfully submitted,

Bill Robinson, P. Eng
Commissioner of Engineering and Public Works

PW/mp

ATTACHMENT No. 1

City of Vaughan - Collision Review 2002 Signalized Intersections 2001



ATTACHMENT #2
City of Vaughan

Collision Review 2002 - Major Signalized Intersections

#	Intersection Location	Block	Activation Date	AADT	Collisions per Year					Collision Rate (collisions/mve)				
					1998	1999	2000	2001	1998	1999	2000	2001		
1	Aberdeen Avenue/Chancellor Drive	B37	02-Feb-02	11200	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c
2	Aberdeen Avenue/Embassy Drive	B37	02-Feb-02	8300	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c
3	Anslay Grove Road/Chancellor Drive	B37	25-Feb-93	17200	3	3	1	3	0.48	0.48	0.16	0.48	0.48	0.48
4	Anslay Grove Road/Beview Avenue/Aberdeen Avenue	B37	01-Feb-01	15600	n/c	n/c	n/c	3	n/c	n/c	n/c	n/c	n/c	0.53
5	Anslay Grove Road/Embassy Drive/Blue Willow Drive	B37	28-Aug-98	14200	2	2	6	3	0.39	0.39	1.16	0.58	0.39	0.58
6	Anslay Grove Road/Windflower Gate/Pinedale Crescent	B37	30-Mar-95	16300	1	0	0	1	0.17	0	0	0.17	0	0.17
7	Atkinson Avenue/Campbell Avenue/Manor Gate	B1	24-Jan-01	17300	n/c	n/c	n/c	4	n/c	n/c	n/c	n/c	n/c	0.63
8	Atkinson Avenue/Rosedale Heights Drive (North)	B2	16-Dec-98	14000	n/c	0	2	0	n/c	0	n/c	0	0.39	0
9	Atkinson Avenue/Rosedale Heights/Edmund Seager Drive	B2	24-Jan-01	14500	n/c	n/c	n/c	0	n/c	n/c	n/c	n/c	n/c	0
10	Atkinson Avenue/Spring Gate Boulevard	B1	17-Aug-94	16200	0	2	2	1	0	0.34	0.34	0.17	0	0.17
11	Centre Street/Atkinson Avenue	B1	07-Aug-85	29500	2	4	4	6	0.19	0.37	0.37	0.56	0.37	0.56
12	Clark Avenue/Atkinson Avenue	B1	06-Aug-86	34900	6	4	7	7	0.47	0.31	0.55	0.55	0.47	0.55
13	Clark Avenue/Brownridge Drive/Joseph Aaron Boulevard	B8	10-Dec-88	17400	1	3	3	1	0.16	0.47	0.47	0.16	0.16	0.47
14	Clark Avenue/Charles Street	B1	22-Feb-96	21600	1	4	2	5	0.13	0.51	0.25	0.63	0.13	0.63
15	Clark Avenue/Condo Corporation (West of Yonge Street)	B1	11-Aug-98	28400	n/c	11	11	4	n/c	1.06	1.06	0.39	1.06	0.39
16	Clark Avenue/Coulfers Mill Plaza (East)	B8	11-Mar-92	17400	1	2	1	2	0.16	0.31	0.16	0.31	0.16	0.31
17	Clark Avenue/Hilda Avenue	B1	06-Nov-87	32100	1	4	2	6	0.09	0.34	0.17	0.51	0.09	0.51
18	Clark Avenue/Judith Avenue/Stonemill Gate	B8	19-Apr-90	18300	3	2	1	1	0.45	0.3	0.15	0.15	0.45	0.15
19	Clark Avenue/New Westminster Drive	B8	20-Mar-90	31600	4	10	6	7	0.35	0.87	0.52	0.61	0.35	0.87
20	Clark Avenue/South Promenade	B8	06-Aug-86	22000	3	2	2	2	0.37	0.25	0.25	0.25	0.37	0.25
21	Clark Avenue/York Hill Boulevard (West)	B1	10-Dec-88	27200	4	7	7	6	0.4	0.71	0.71	0.6	0.4	0.71
22	Clark Avenue/York Hill Boulevard/Springfield Way	B1	21-Jan-88	20400	5	5	7	3	0.67	0.67	0.94	0.4	0.67	0.94
23	Creditstone Road/McCleary Court	B23	02-Feb-02	10700	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c
24	Edgely Boulevard/Applewood Crescent (South)	B30	01-Feb-01	12300	n/c	n/c	n/c	2	n/c	n/c	n/c	n/c	n/c	0.45
25	Hilda Avenue/Crestwood Road	B1	17-Jan-96	14300	2	1	0	2	0.38	0.19	0	0.38	0.19	0
26	Hilda Avenue/York Hill Boulevard	B1	05-Mar-90	16100	3	2	1	4	0.45	0.3	0.15	0.61	0.45	0.3
27	Kipling Avenue/Woodbridge Avenue	B51	07-Feb-83	23600	4	5	3	7	0.46	0.58	0.35	0.81	0.46	0.58
28	Martin Grove Road/Andrew Park/Auburn Road	B51	30-Oct-97	19600	0	2	1	2	0	0.28	0.14	0.28	0	0.28
29	Martin Grove Road/Langstaff Road	B51		14300	7	1	0	2	1.34	0.19	0	0.38	1.34	0.19

30	Martin Grove Road/Froyson Road	B51	19-Apr-91	16200	2	1	1	0	0.34	0.17	0.17	0
31	Martin Grove Road/Woodbridge Avenue	B51	20-Apr-93	12300	1	1	2	4	0.22	0.22	0.45	0.89
32	Martin Grove Road/Woodstream Blvd/Hegins Road	B50	07-Feb-02	19100	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c
33	McNaughton Road/Christian Park Drive	B26	08-Feb-99	9100	n/c	n/c	0	0	n/c	n/c	0	0
34	McNaughton Road/St. Joan of Arc Avenue	B26	30-Oct-97	10000	0	0	0	0	0	0	0	0
35	Millway Avenue/Pennsylvania Avenue	B30	02-Feb-02	6600	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c
36	New Westminster Drive/Beverly Glen Boulevard	B9	22-Feb-99	17600	n/c	n/c	6	3	n/c	n/c	0.93	0.47
37	New Westminster Drive/Brownridge Drive/W. Promenade	B8	23-Nov-93	25700	2	4	1	2	0.21	0.43	0.11	0.21
38	New Westminster Drive/Conley Street	B8	21-Jan-89	11100	5	2	6	4	1.23	0.49	1.48	0.99
39	New Westminster Drive/Mullen Drive/Joseph Aston Blvd	B8	20-Mar-90	21100	3	3	8	9	0.39	0.39	1.04	1.17
40	Rivermede Road/Bowles Road	B16	18-Nov-92	13400	4	7	3	7	0.82	1.43	0.51	1.43
41	Rivermede Road/North Rivermede Road	B16	14-Mar-94	16000	4	2	2	6	0.68	0.34	0.34	1.03
42	Rowntree Dairy Road/Strada Drive	B36	16-May-02	17800	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c
43	Rowntree Dairy Road/Winggs Road/Auto Park Circle	B36	16-May-02	18300	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c
44	Whitmore Road/Winggs Road/Trowers Road	B36	16-May-02	16700	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c
45	Woodbridge Avenue/Clarence Street	B44	24-Oct-96	18200	0	3	5	3	0	0.45	0.75	0.45
46	York Hill Boulevard/Chabad Gate	B1	02-Feb-02	12600	n/c	n/c	n/c	n/c	n/c	n/c	n/c	n/c

Notes:

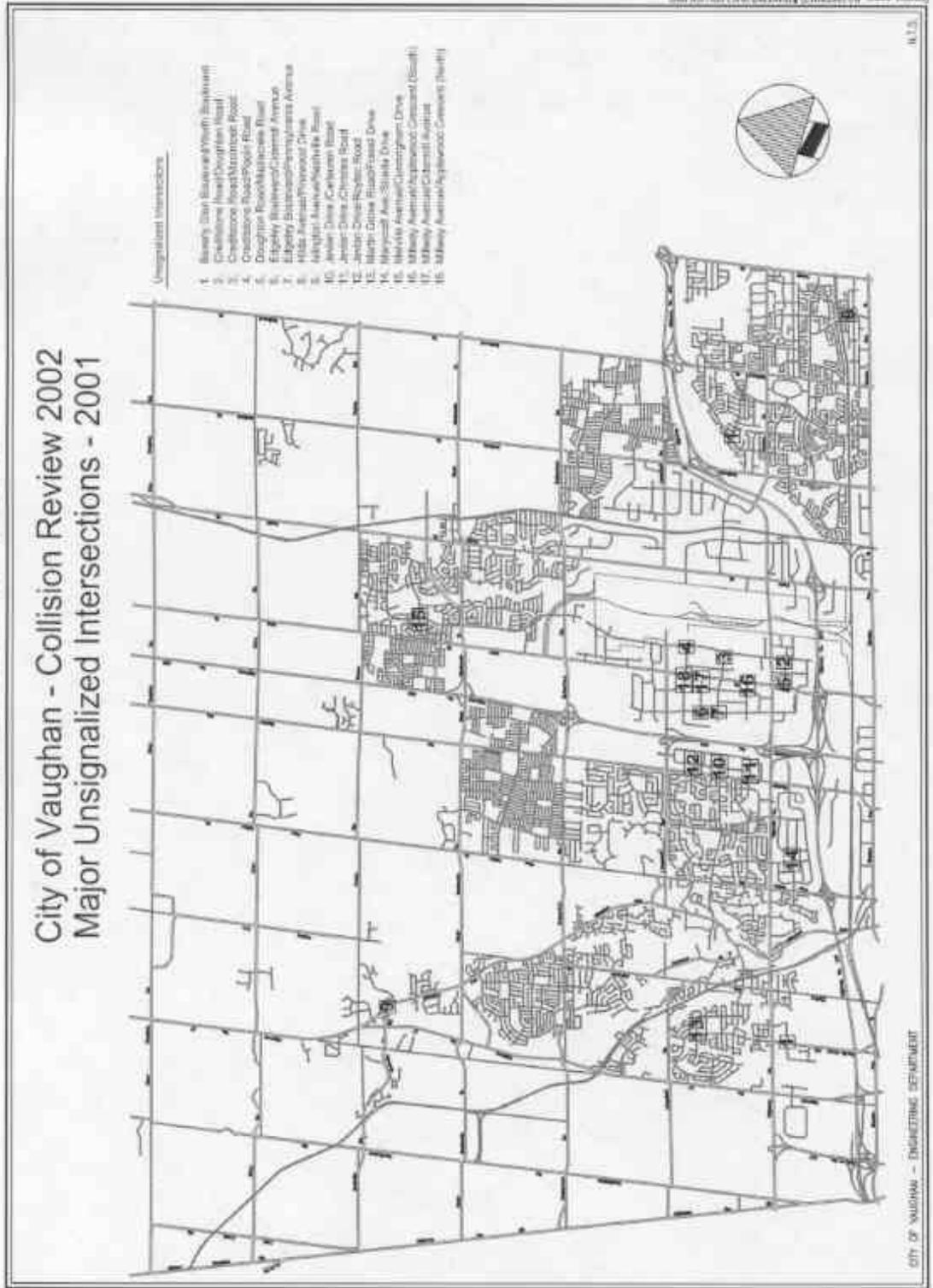
N/C - Not calculated, the collision rates are based upon the whole calendar years of signal operation after the signal activation date.

AAOT - Annual Average Daily Travel

n/c - million vehicles entering

ATTACHMENT No. 3

City of Vaughan - Collision Review 2002 Major Unsignalized Intersections - 2001



ATTACHMENT #4
City of Vaughan
Collision Review 2002 - Major Unsignalized Intersections

#	Intersection Location	Block	All-Way Stop	Surrounding Uses	AADT	Collisions per Year			Collision Rate (collisions/mva)				
						1998	1999	2000	2001	1998	1999	2000	2001
1	Beverly Glen Boulevard/Worth Boulevard	B9	No	Residential	7000	0	0	1	0	0.00	0.00	0.39	0.00
2	Creditstone Road/Doughton Road	B22	Yes	Industrial	8100	2	1	0	0	0.68	0.34	0.00	0.00
3	Creditstone Road/Macintosh Boulevard	B23	No	Industrial	10900	1	2	1	0	0.25	0.50	0.25	0.00
4	Creditstone Road/Pippin Road	B23	No	Industrial	8800	0	0	0	0	0.00	0.00	0.00	0.00
5	Doughton Road/Mapleorelle Road	B22	Yes	Industrial	5200	1	0	0	3	0.33	0.00	0.00	1.58
6	Edgely Boulevard/Cidermill Avenue	B30	No	Industrial	9000	0	0	0	0	0.00	0.00	0.00	0.00
7	Edgely Boulevard/Penny/Wanis Avenue	B30	Yes	Industrial	11700	0	1	2	1	0.00	0.23	0.47	0.23
8	Hilda Avenue/Pinewood Drive	B1	Yes	Residential	15900	2	3	2	9	0.34	0.52	0.34	1.55
9	Inlington Avenue/Nashville Road	B54	Yes	Kleinburg	10000	0	0	0	0	0.00	0.00	0.00	0.00
10	Jevlan Drive/Cariakura Road	B30	Yes	Industrial	8800	0	0	0	0	0.00	0.00	0.00	0.00
11	Jevlan Drive/Chislea Road	B30	Yes	Industrial	16700	4	4	2	4	0.66	0.66	0.33	0.66
12	Jevlan Drive/Roytec Road	B30	Yes	Industrial	12100	2	0	1	4	0.45	0.00	0.23	0.91
13	Martin Grove Road/Forest Drive	B51	Yes	Residential	11600	1	0	0	4	0.24	0.00	0.00	0.94
14	Marycroft Avenue/Strada Drive	B36	Yes	Industrial	12400	4	2	1	1	0.88	0.44	0.22	0.22
15	Moulvie Avenue/Cunningham Drive	B26	Yes	Residential	5700	0	0	1	0	0.00	0.00	0.46	0.00
16	Milway Avenue/Applewood Crescent (North)	B30	Yes	Industrial	7500	2	1	1	1	0.73	0.37	0.37	0.37
17	Milway Avenue/Applewood Crescent (South)	B30	Yes	Industrial	7400	5	1	1	2	1.85	0.37	0.37	0.74
18	Milway Avenue/Cidermill Avenue	B30	Yes	Industrial	5000	0	0	0	0	0.00	0.00	0.00	0.00

Notes:
 Kleinburg refers to Kleinburg Village
 AADT - Annual Average Daily Travel
 mva - million vehicles entering