



Hamilton-Finn
Road Safety
Consultants Ltd.

Suite 310
3016 – 5th Avenue N.E.
Calgary, Alberta
dawatt.dawatt.com
www.hamiltonfinn.ca

Tel. (403) 207-6000
Fax. (403) 273-3440

January 19, 2005

Mr. Don Szarko, MBA
Manager, Traffic Safety
Alberta Motor Association
Box 8190, Station South
Edmonton, AB T6H 5X9

Dear Mr. Szarko:

**RE: Traffic Conflict and Driver Violation Surveys
For the Capital Region Intersection Safety Study**

We are pleased to submit this letter report comparing and documenting the traffic conflict and driver violation survey results at three intersections in the Capital Region before and after a period where enforcement, education, and engineering initiatives were implemented to improve safety. A report for the pre-intervention survey was submitted on October 6, 2004 and an updated summary is shown in an ATTACHMENT at the end of this report.

1.0 Background and Purpose

In 2001, the Capital Region Intersection Safety Partnership (CRISP) brought together organizations with the common objective of reducing traffic collisions, particularly those causing injuries and deaths. The partnership comprises the City of Edmonton Transportation and Streets Department, the Edmonton Police Service, Capital Health, Strathcona County, the City of St. Albert, RCMP (Strathcona County and St. Albert detachments), and the Alberta Motor Association (AMA). Since 2001, CRISP has led safety initiatives such as the *Red Means Stop* and *Look out for Each Other* campaigns.

The partnership has selected three intersections where enforcement, education, and engineering initiatives are being implemented to improve safety:

- 137 Avenue and 97 Street in Edmonton;
- St. Albert Road and Hebert Road in St. Albert; and,
- Highway 21 and Wye Road in Strathcona County.

The purpose of this survey is to establish baseline conditions related to traffic conflicts and driver behaviour, and to compare any changes to these baseline conditions after the enforcement safety initiatives are implemented. While conducting the baseline surveys, obvious issues in the physical and traffic control characteristics of the intersections were identified.

2.0 Survey Methodology

Two surveyors trained for traffic conflict surveys from Hamilton-Finn (and the parent company Hamilton Associates) visited the three intersections, and each conducted a traffic conflict survey and a driver violation survey for a duration of three hours from 3 to 6pm, or 6 person-hours. At each intersection, both surveyors observed traffic simultaneously in opposite directions and rotated positions every 45 minutes in order to observe the four legs equally. The survey schedule is shown below:

Location	Date for Pre Intervention Survey	Date for Post Intervention Survey
137 Avenue and 97 Street in Edmonton	August 30, 2004	November 26, 2004
St. Albert Road and Hebert Road in St. Albert	August 31, 2004	November 16, 2004
Highway 21 and Wye Road in Strathcona County	September 1, 2004	November 17, 2004

A traffic conflict, or “near miss”, is defined as an event where two or more vehicles are likely to collide and at least one of the drivers makes an evasive action to avoid a collision. The surveyor records the severity, type, location, and cause of the conflicts. The driver violation survey records driver violations such as the following:

- Red-light and amber-light running;
- Crosswalk violations (failing to yield to pedestrians);
- Failing to indicate turns;
- Turns from or into the wrong lane;
- Sudden lane changes / excessive weaving; and
- Other site-specific violations that are apparent during our survey.

The post-intervention surveys primarily evaluated the effects of concentrated traffic enforcement that took place at each of the three intersections. All the enforcement activities started after the date of the pre-intervention survey dates, and ended before the post-intervention survey dates shown in the table above. The traffic enforcement was focussed on the Friday afternoon peak period for three Fridays at each location, and included strict and visible enforcement of safety-related traffic violations. In addition to the enforcement program, a few operational and geometric changes were implemented between the pre- and post-intervention surveys. At the 137 Avenue and 97 Street intersection, pedestrian countdown timers were installed. At the St. Albert Road and Hebert Road intersection, an eastbound to northbound left-turn lane was added, along with associated pavement marking and channelization improvements.

The afternoon peak period traffic volumes were observed to be generally similar during the pre- and post-intervention surveys. Although schools were in session in the post-intervention surveys (November), this did not significantly affect the levels of congestion or the order of magnitude of the afternoon peak hour traffic volumes. It is expected that a larger proportion of the drivers in November were commuters, compared to a larger proportion of tourists and recreational trips in late August. It is noted that each intersection has different traffic volume characteristics, and the survey results are not intended to provide a cross-sectional comparison among the three sites.

3.0 Survey Results

A. 137 Avenue and 97 Street in Edmonton

Traffic Conflict Results

CONFLICT TYPE	PRE- INTERVENTION INCIDENCES	POST- INTERVENTION INCIDENCES
Rear End	11	3
Left Turn Opposing	3	1
Weaving	0	2
Right Turn	0	1
Total	14	7

Notes:

- The number of rear end conflicts decreased substantially (a reduction of 73 percent).
- The overall number of traffic conflicts decreased by 50 percent.

Driver Violation Results

VIOLATION TYPE	PRE- INTERVENTION INCIDENCES	POST- INTERVENTION INCIDENCES
Amber Light Running	34	33
Red Light Running	14	7
Failing to Indicate Turn	33	317
Illegal Lane Change	9	60
Pedestrian	5	0
Other	3	0
TOTAL VIOLATION	98	417

Notes:

- The more serious violations, shown in yellow, decreased from a total of 48 to a total of 40, a 17 percent reduction.
- Red Light Running violations in particular decreased significantly (a reduction of 50 percent) in the post-intervention period.
- Pedestrian violations decreased as well. This may be attributed to the addition of the pedestrian countdown timer. With the onset of colder weather, it is also possible that the number of pedestrians may have decreased.
- The overall significant increase in less serious violations is due to the higher frequency of “Failing to Indicate Turn” and “Illegal Lane Change” violations, which are types of violations that are not likely to be affected by additional on-site police enforcement. These violations were typically due to vehicles not indicating turns on the channelized right turn lanes. Most drivers appeared to assume that they are in a dedicated lane for right turn vehicles and that it was unnecessary to put on the right turn indicators. Section 4.0 provides a possible explanation for this increase.

B. St. Albert Road and Hebert Road / Gervais Road in St. Albert

As noted during the pre-intervention survey, results observed from the westbound approach were excluded due to a vehicle malfunction. For consistency, results from the westbound approach were also excluded from the post-intervention results summarized below.

Traffic Conflict Results

CONFLICTS	PRE- INTERVENTION	POST- INTERVENTION
Rear End	8	4
Left Turn Opposing	1	2
Weaving	3	3
Right Turn	0	1
TOTAL	12	10

Notes:

- The number of rear-end conflicts decreased by 50 percent.
- The overall traffic conflict frequency decreased by 17 percent.

Driver Violation Results

VIOLATION CATEGORY	PRE- INTERVENTION (PERCENT OF TOTAL)	POST- INTERVENTION (PERCENT OF TOTAL)
Amber Light Running	23	24
Red Light Running	3	14
Pedestrian	7	5
Failing to Indicate Turn	125	218
Illegal Lane Change	3	35
Other	2	1
TOTAL VIOLATION	163	297

Notes:

- The number of serious violations (shown in yellow), increased by 46 percent. Red light running violations increased significantly. Further analysis indicated that all red light running violations were by left turning vehicles, unlike the pre-intervention survey results where there were an equal incidences involving left turning and through vehicles.
- The overall significant increase in violations is due to the higher frequency of “Failing to Indicate Turn” violations. Similar to the previous intersection, most of the driver violations occurred while the vehicles were entering the right turn channelized lane.
- Illegal lane change violations also increased in the post-intervention period.
- As mentioned earlier, the capacity of this intersection was improved with the addition of a left-turn lane between the pre- and post-intervention surveys. It is likely that the overall increase in the number of driver violations at this intersection is related to the improved intersection capacity allowing a higher throughput (greater exposure) of vehicles during the afternoon peak period.

C. Highway 21 and Wye Road in Strathcona County

Traffic Conflict Results

CONFLICTS	PRE- INTERVENTION	POST- INTERVENTION
Rear End	5	3
Left Turn Opposing	2	2
Weaving	0	0
Right Turn	1	0
TOTAL	8	5

Notes:

- The number of rear-end conflicts decreased by 40 percent.
- Overall, the conflict frequency decreased by 38 percent.
- The number of observed conflicts were relatively low, such that the changes in frequency are statistically less reliable.

Driver Violation Results

VIOLATION CATEGORY	PRE- INTERVENTION (PERCENT OF TOTAL)	POST- INTERVENTION (PERCENT OF TOTAL)
Amber Light Running	18	14
Red Light Running	0	0
Illegal Lane Change	4	10
Failing to Indicate Turn	40	84
Pedestrian	0	0
Other	0	0
TOTAL VIOLATION	62	108

Notes:

- The more serious violations (shown in yellow) decreased by 22 percent.
- The increase in overall violation frequency was again due to increased observations of “Failing to Indicate Turn” and “Illegal Lane Change” violations.

4.0 Conclusions

Overall, at the three intersections combined, the total number of conflicts decreased from 34 to 22, a reduction of 35 percent.

The most noticeable effect was a reduction in the number of rear-end conflicts, from 24 to 10 at all three intersections combined, a decrease of 58 percent.

At the three intersections combined, the number of serious violations, in particular Amber Light Running and Red Light Running, stayed constant at 92. The frequency of these serious violations was effectively unchanged at the Strathcona intersection, decreased at the Edmonton intersection, and increased at the St. Albert intersection.

The number of minor observed violations increased substantially. Although there is no clear explanation for this, it is hypothesized that the post-intervention surveys in November included a higher proportion of regular commuters during the afternoon peak period (compared to the late August pre-intervention surveys). Regular commuters who travel the same route everyday may tend to develop similar and less refined habits in terms of lane changing and signalling. As well, exposure (traffic volume) was increased at the St. Albert intersection.

As discussed in the pre-intervention letter report, many observed traffic safety issues were related to the intersection geometry and traffic operations. These issues are likely to be mitigated by engineering measures.

In conclusion, the targeted enforcement effort that was implemented at the three study locations may have contributed to a 35 percent decrease in the frequency of all traffic conflicts, and specifically a 58 percent reduction in rear-end conflicts. Serious violations related to red-light and amber-light running were effectively unchanged. This may indicate the need for more intensive and longer lasting enforcement to target this behaviour.

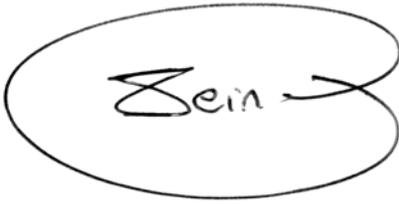
More minor violations primarily related to drivers signalling their intentions increased, and this may be a function of the driver population characteristics in November compared to August. These minor violations were not the primary focus of the enforcement effort.

It is noted that this study explored the observed changes in the short term, within weeks of the targeted enforcement effort being concluded. Long term effects may be different.

We trust that this letter report can help ascertain the impacts of the safety efforts sponsored by CRISP. If you have any questions regarding the letter report, or if you require any additional information, please don't hesitate to contact the undersigned. We look forward to hearing from you.

Yours truly,

HAMILTON-FINN ROAD SAFETY CONSULTANTS LTD.

A handwritten signature in black ink, enclosed within a hand-drawn oval. The signature appears to be "Sany R. Zein" with a stylized flourish at the end.

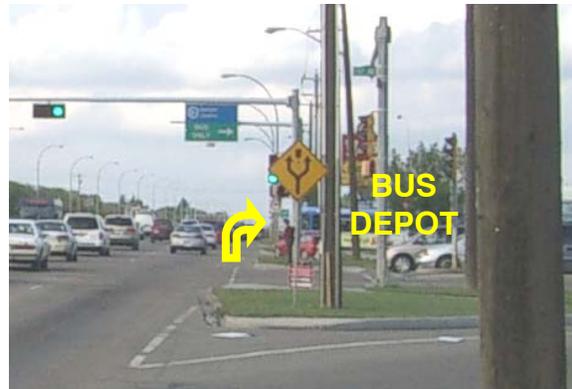
Sany R. Zein, M.Eng., P.Eng.
President

ATTACHMENT – PRE-INTERVENTION SURVEY SUMMARY

A. 137 Avenue and 97 Street in Edmonton

Traffic Conflict Results - 14 traffic conflicts were recorded; 11 rear end and 3 conflicts left turn opposing conflicts.

Seven rear end conflicts were recorded on the northbound approach and occurred at two different locations. The first location is on the northbound exit leg near the driveway to the bus depot. Transit vehicles slowed down to enter the bus depot and complete their turns of 97 Street. Northbound vehicles behind the bus may be following too closely and had to brake abruptly to avoid crashing into the leading transit vehicles.



View of northbound approach

The other location is at the northbound channelized right turn lane, where drivers were observed to yield to eastbound through vehicles, even though there is a dedicated right turn acceleration lane on the eastbound leg with a sign indicating the added lane. Thus, some following drivers assume the leading vehicles would clear the right turn lane without stopping could find themselves braking abruptly for slowed or stopped leading right turn vehicles.



View of northbound right turn lane

Driver Violation Results - 98 driver violations were recorded and their distributions are as follow:

VIOLATION CATEGORY	PERCENT OF TOTAL
Amber Light Running	35%
Failing to Indicate Turn	34%
Red Light Running	14%
Illegal Lane Change	9%
Pedestrian	5%
Other	3%

Amber Light Running and Red Light Running violations were mostly committed by left turn drivers in the double left turn lanes.

Other Safety Observations

- The northbound, westbound, and eastbound approaches featured double left turn lanes and they operate under a protected/permissive left turn phasing.
- At the double left turn lane approaches, drivers of vehicles in the inside lane may have their visibility blocked by vehicles in the outside turn lane.
- There is only one left turn signal per approach. The left turn driver's visibility of the traffic signal is often blocked off by heavy vehicle in front, especially in the eastbound and westbound direction as the left-turn signal heads are not located high off the ground. Consequently, left turn vehicles following a heavy vehicle were observed to complete their turn after their left-turn phase ended and as the opposing through traffic is entering the intersection.
- One primary signal head and one right-side secondary signal head are provided for all approaches.
- The southbound left turn lane often spilled back beyond the left turn storage lane due to the observed large southbound left turn demand. The queue sometimes blocked off the intersection leading to the bus depot.
- The street name signs denoting either 97 Street or 137 Avenue seemed small.



Eastbound left-turn vehicles: Note that a larger vehicle, such as the red minivan, may obstruct the visibility of the one left-turn signal from smaller vehicles behind it.

Suggested Improvements

- Provide a far side left turn signal head on all approaches;
- Provide an additional primary signal head on all approaches (given the large width of the intersection, additional signal heads would add to the conspicuity of the intersection);
- Provide larger street name signs on all approaches (important as this is a major intersection providing access to areas within and beyond Edmonton, and there are likely to be many motorists unfamiliar with the road network);
- Provide directional signage on all approaches; and
- Convert protected/permissive left turn phasing to protected only for double left turn lane.

B. St. Albert Road and Hebert Road / Gervais Road in St. Albert

Traffic Conflict Results - 12 traffic conflicts were recorded; 8 Rear End, 3 Weaving, 1 Left Turn Opposing

St. Albert Road in the vicinity of the intersection is oriented northwest/southeast. For this study, it is assumed that St. Albert Road is a north/south road. Hebert Road comprises the east leg, while Gervais Road comprises the west leg.

At the time of the survey, a mal-function vehicle was parked on the westbound curb lane from 4pm to 6pm. Vehicles behind the parked vehicle had to weave around, and created unnecessary weaving manoeuvres and conflicts. Thus, the traffic conflict results exclude any data collected for the westbound approach.

Rear end conflicts were recorded at the channelized right turn lane. Right turning vehicles were often observed to enter the channelized right turn lane at a very high speed. When a pedestrian is trying to cross onto the pedestrian island, right turn vehicles often had to brake abruptly to avoid hitting the pedestrian and created a chain reaction for the following vehicles to brake abruptly as well.

Weaving conflicts were observed on the eastbound exit leg between northbound right turn vehicles and southbound left turn vehicles. The eastbound added lane for northbound right turn traffic leads to a driveway for a commercial mall situated on the southeast corner. Thus, southbound left turn vehicles would complete the left turn movement and quickly change into the curb lane destined for the mall, not being aware of the northbound right turn vehicles that are entering the intersection thinking that they have the right of way.



View of northbound right turn added lane

Driver Violation Results – 163 driver violations were recorded and their distribution is as follow:

VIOLATION CATEGORY	PERCENT OF TOTAL
Failing to Indicate Turn	77%
Amber Light Running	14%
Pedestrian	4%
Red Light Running	2%
Illegal Lane Change	2%
Other	1%

Most of the driver violations were drivers failing to indicate turns when entering the right turn channelized lane. Most drivers assumed they are in a dedicated lane for right turn and that it was unnecessary to put on the right turn indicators. Red light running does not appear to be an issue at this intersection.

Other Safety Observations

- The westbound approach featured double left turn lanes and they operate under a protected/permissive left turn phasing.
- There is only one left turn signal per approach. The left turn driver's visibility of the traffic signal is often blocked off by heavy vehicle in front, especially in the eastbound and westbound direction as the left-turn signal heads are not located high off the ground. Consequently, left turn vehicles following a heavy vehicle were observed to complete their turn after their left-turn phase ended and as the opposing through traffic is entering the intersection.
- One primary signal head and one right-side secondary signal head are provided for all approaches.
- The eastbound left turn lane often spilled back beyond the left turn storage lane due to the observed large eastbound left turn demand.
- There is no sidewalk provided on either side of the southbound approach.
- The end of the median island on the eastbound approach separating the through and left turn vehicles extended more than half way into the west pedestrian crosswalk. Should there be a lot of pedestrians using the crosswalk at the same time, the median may force some pedestrians close to the travel path of southbound through vehicles.



View of the west crosswalk

Suggested Improvements

- Provide a far side left turn signal head on all approaches;
- Provide an additional primary signal head on all approaches;
- Provide additional advance pedestrian crosswalk warning signage on all four channelized right turn lanes;
- Provide larger street name signs on all approaches;
- Provide sidewalks on the southbound approach; and
- Remove a portion of the concrete median on the west pedestrian crosswalk.

C. Highway 21 and Wye Road in Strathcona County

Traffic Conflict Results – 8 traffic conflicts were recorded; 5 rear end, 2 left turn opposing, 1 right turn.

The traffic conflict results did not show any particular trends among all type of conflicts. The 5 rear ends conflicts merely involved some vehicles following too closely and did not reveal any safety issues at the intersection.

Driver Violation Results – 62 driver violations were recorded

VIOLATION CATEGORY	PERCENT OF TOTAL
Failing to Indicate Turn	65%
Amber Light Running	29%
Illegal Lane Change	6%
Pedestrian	0%
Red Light Running	0%
Other	0%

Other Safety Observations

- Curb letdowns were absent on the southbound right turn channelization island.
- There was no sidewalk provided on the west side of the southbound approach.
- The northbound and southbound left turn lane is off-set. Even though there is a dedicated left turn bay on both approaches, there is a merging lane on the northbound exit lane and this creates an off-set between the two left turn lanes. Left turn drivers' view of opposing through traffic may be reduced.



View of southbound left turn vehicles

Suggested Improvements

- Provide curb let-down on the southbound right turn pedestrian refuge island;
- Provide sidewalk on the west side of the southbound approach; and
- Remove the merging lane on the northbound exit leg and align the northbound and southbound left turn lanes.

It is noted that pedestrian volumes are currently low at this location. Pedestrian-related improvements may be phased in as new developments increase the likelihood of pedestrian activity. As well, this intersection will be affected by the future twinning of Highway 21. Intersection improvements should be coordinated with the twinning project to optimize resources and reduce “throw-away” effort.