Highway 401 Median Barriers – Review Of Historical Data On A Re-Ignited Controversy

Posting Date: February 10, 2018

The official media and public groups have recently ignited a controversy over the lack of median barriers along a 118 kilometre length of Highway 401 between Tilbury and London, Ontario. Several recent, fatal, median, cross-over collisions have ignited local groups to file a petition for installation of concrete median barriers. Ontario's Ministry of Transportation recently announced it will start installing High Tension Cable Median Barriers (HTCMB) along half of that highway segment in 2018 with the remaining length being fitted in the few years that follow. Some local politicians and public groups have expressed concern that the cable barriers will not prevent heavy trucks from crossing the median.

The controversy is similar to what was taking place approximately 30 years ago when a number of fatal, median, cross-over collisions resulted in an inquest in 1989.

As an accident investigator working at the University of Western Ontario Multi-Disciplinary Accident Research Team Zygmunt Gorski was involved in the investigation of fatal, personal injury and property damage collisions in an approximate 50-mile radius of London, including Highway 401, between 1980 and 1990. In preparation for t he 1989 inquest a variety of analyses were conducted and presented to the inquest in a letter summarizing the results. Zygmunt Gorski provided testimony at the inquest.

Much of the current controversy surrounding the need for median barriers is difficult to evaluate because those who are concerned simply have very little objective information about the magnitude of the problem. Police who are the only ones allowed to document the collision evidence will not, and likely cannot, share the details with the public and the Ontario Ministry of Transportation also does not share the details of their studies. The resulting problem is that local residents and those directly involved end up drawing conclusions about what the problem is, and how to correct the problem, while operating in an information vacuum.

Due to this lack of information Gorski Consulting has decided to release some of the results of the analysis that was conducted in the 1980s in the hope that some members of the public will find this useful in their approach and understanding of the current issues. Below is a copy of the letter that was submitted to the inquest by Zygmunt Gorski in 1989 which summarizes the results of the Research Team's analysis in the 5 year period between 1984 and 1989.

accident research

The University of Western Ontario
Multi-Disciplinary Accident Research Team
Faculty of Engineering Science
London, Ontario, Canada N6A 5B9

Telephone: (519) 661-2127

July 6, 1989

Constable M. Doughty
Woodstock O.P.P. Detachment
Box 38
Woodstock, Ontario
N4S 7W5

Dear Constable Doughty:

In regard to the upcoming inquest involving a collision on Highway #401 on February 9th, 1989, near Sweaburg Road, in Oxford County, I am sending you this information identifying our research team's research activities related to these types of collisions. In particular I will concentrate on our research on passenger car collisions which we conduct as part of our contractual work for Transport Canada.

The Passenger Car Study (PCS) has been conducted by the University of Western Ontario Multi-Disciplinary Accident Research Team since April, 1984. The study gathers a sample of fatal and personal injury (PI) collisions in an approximate 50 mile radius of the City of London. The sampling rate for collisions on Highway 401 is:

1. Every fatal collision involving a passenger car

2. Every 45th personal injury collision involving a passenger car.

As of May 1, 1989, 67 collisions have been investigated on Highway 401 between the Waterloo-Oxford County border and the Elgin-Kent County border. This sample is representative of a total of 1343 personal injury (PI) and fatal collisions

MEDIAN-CROSSOVER COLLISIONS ON HIGHWAY 401

Of those 1343 collisions it is estimated that (See Table 1):

-291 or 21.7 % involved vehicles crossing the centre median

-321 or 23.9 % involved vehicles coming to rest in the median

-502 or 37.4 % involved vehicles coming to rest on the right roadside

-229 or 17.0 % involved other, collisions (i.e. rear end impacts where vehicles remain on the travel lane, etc.)

TABLE 1

	FATAL	PI	TOTAL
CROSS MEDIAN	21 55 %	270 20.7%	291
IN MEDIAN	6 15.8%	315 24 %	321
RIGHT ROADSIDE	7 18.4%	495 37.9%	502
OTHER	4 10.5%	225 17.2%	229
TOTAL	38 2.9%	1305 97.1%	1343 100%

Our data indicates 2.9% of all collisions on Highway 401 are fatal collisions whereas the percentage for our entire sampling area is 1.1%. More importantly over half of all the fatal collisions on Highway 401 involve median cross-over. This collision event has led to 25 fatalities and numerous injured persons.

Of the 21 fatal, median-cross-over collisions, 13 or 62% involved a vehicle being struck by traffic travelling from the opposite direction.

Rollovers

Of the estimated 1343 collisions represented by our sample, at least 965 or 71.8 % involved a vehicle rollover. For those vehicles which stopped in, or crossed the median the number of rollovers was 508 out of 612 or 83%. Of those 508, 13 or 2.6% were fatal collisions.

Departure Angles

Of all the collisions where a vehicle left the travel lanes the average departure angle was 13 degrees. The greatest departure angle was 34 degrees and the smallest was 3 degrees.

For collisions involving median cross-over, the average departure angle was 18 degrees. The greatest angle was 36 degrees and the shallowest angle was 9 degrees.

Distance Travelled Along Angle

Of all the collisions where a vehicle left the travel lanes the average distance travelled was 58 metres. The longest distance travelled was 104 metres and the shortest distance was 22 metres.

For collisions involving median cross-over, where the vehicle is not struck by opposing traffic, the average distance travelled along the angle was 46 metres. The longest distance was 80 metres and the shortest was 22 metres.

Distance Travelled Perpendicular To Own Asphalt Edge

Of all the collisions where a vehicle left the travel lanes the average distance travelled perpendicular to the asphalt edge (i.e. the final rest position of the vehicle) was 8 metres. The farthest distance from the asphalt edge was 36 metres and the shortest distance was 2 metres.

For collisions involving median cross-over, where the vehicle was not struck the average perpendicular distance travelled was 17 metres. The farthest distance was 28 metres and the shortest distance was 9 metres.

DISCUSSION

Gravel Shoulder Involvement

Of all the collisions on Highway 401 it is estimated that at least 25% originate with a driver loosing directional control of his/her vehicle on a gravel shoulder. Often evidence of shoulder involvement in loss-of-control collisions is over-looked therefore it is likely this percentage is significantly higher.

Even though a median barrier may reduce the frequency of major collisions on this highway consideration should be given to paving the shoulders, both on the right edge and in the median leading up to the barrier.

Deterioration Of The Road Surface

Many segments of Highway 401 contain narrow depressions which run parallel to the road length. It is believed extended use by heavy vehicles has caused the vehicles' wheels to press on narrow bands of the travel lanes. The resulting cross-section of the road is waved in appearance. The depressions are collection areas for water during heavy rain or the build-up of ice in colder temperatures. Consideration should be given to the elimination of these potentially dangerous conditions.

Seat-Belt Use

Given the very high number of rollover collisions on Highway 401 it is strongly recommended that the public continue to use their seat-belts. This is particularly so

if no action is taken to improve the roadway shoulders and characteristics of the median. Our research team has just completed a study of rollover collisions in our sampling region and we have found that 90% of the occupants fatally injured in these collisions were unbelted.

In conclusion, we would strongly recommend that a median barrier be built particularly in the area between the Highway 402 interchange and Highway #2 at Woodstock. We understand that plans are under way to complete such a project in ten years time. It is our strong opinion that such a delay will be too costly in terms of lives lost and injuries sustained by the public. We urge the jurors to recommend a median barrier be completed at a much earlier date.

Cordially yours

Zygmunt M. Gorski, B.A.
Accident Investigator
UWO Multi-Disciplinary
Accident Research Team

Further data exists with respect to several undesirable outcomes that were occurring on Highway 401, beyond the median crossover collisions. The table below provides some of the analysis that was not presented to the inquest. This table is interesting because it covers some of the collisions occurring in the current, non-median section of Highway. The table expresses the occurrence of undesirable outcomes taking into account the length of roadway segment and the traffic volume within that segment. This provides a more accurate indication of which road segments may be more susceptible to undesirable outcomes than others. Although the results are taken from a random sample of collisions and therefore they are more likely to represent the true population of outcomes, it is never-the-less based on just 67 personal injury (PI) and fatal collisions.

Recent comments from representatives of the Ontario Ministry of Transportation have been favourable toward the installation of High Tension Cable Median Barriers (HTCMB) referring to the successful usage of such systems in the State of Michigan. These favourable comments may be warranted but they should not be taken at face value. Based on past experience it is vitally important to conduct a close study of the collision details where such barriers have been involved. Past experience has shown that barrier systems that have been tested in a controlled environment to pass certain standards (NCHRP-350 or MASH) have not performed as adequately in the field. It becomes vitally important that data regarding the in-service performance of such systems be made publicly available so that persons independent to the process can make objective judgments on decisions that are vital to the safety of all the travelling public. Unfortunately, historically, this has not come to pass. When the details of the in-service performance of a system are held in secret safety problems do not become exposed until a system has thoroughly populated a highway system and it becomes difficult and expensive to change course to a safer one.

This is why it is extremely important for the public organizations and official news media who are interested in safety apply pressure to the holders of performance information to make that data publicly available so that intelligent conversations can be had.

As an example of the details that are sometimes missed, the inquest in 1989 was called with respect to a collision where a westbound Chevrolet Cavalier went out of control, crossed the median and collided with an eastbound Buick just east of the Sweaburg Road overpass, on the western outskirts of Woodstock, Ontario. All three occupants of the Cavalier perished. Evidence was brought forward indicating that, as the Cavalier was passing a tanker truck, the road was icy and there was a strong wind. While a median barrier may have changed the outcome there was little attention paid to the fact that the road surface was icy or what specific event caused the Cavalier to spin out of control. While it may be challenging to keep highway road surfaces from becoming too slippery there is essentially no information about what efforts were made on the day of the collision by roadway maintenance personnel to prevent the surface from icing up. This is the historical problem: the lack of information regarding an extremely important function that should not be kept secret. Whether maintenance was reasonable and correct is not the issue. Having publicly-available, objective information to confirm that everything was done properly has always been the key issue.

HIGHWAY: 401

LOCATION DESCRIPTION	DIST (KM)	PATT TYPE	1987 AADT	1987 SADT	1987 SAWDT	1987 WADT	1987 AR	Undesirable Outcomes			
								Fatal & P.I. Pass. Car Coll.	Median X-Over Rate	Rollover-Fatal & P.I. Rate	Fatal Collision Rate
Rates Per 10,000,000 vehicle kilometres driven through road segment ---------- →											
WATERLOO REG/OXFORD CTY BDY											
	13.5	IC	24200	27800	26900	21300	.5	2.35	.07	2.31	.08
DRUMBO RD IC 250 - OXFORD RD 29											
	3.5	IC	26350	31600	28500	22400	.5	.06	---	.06	.06
HORNER'S CK BR											
	8.6	IC	26350	30300	29200	23200	.5	1.14	---	.02	.05
HWY 2 IC 238 - EASTWOOD											
	1.1	IC	28100	32300	31200	24700	1.2	----	---	---	---
TOWERLINE RD IC 236-OXFORD RD 15											
	4.4	IC	29200	33600	32400	25700	.7	.13	.09	---	.13
HWY 59 IC 232 - WOODSTOCK											
	2.1	IC	30100	34600	33400	26500	.5	.17	.17	---	.17
SWEABURG RD IC 230-OXFORD RD 12											
	7.4	IC	31000	35700	34400	27300	.8	.88	1.10	2.20	.05
FOLDENS RD IC 222-OXFORD RD 6											
	3.7	IC	30600	35200	34000	26900	.5	.05	.05	----	.05
HWY 19 IC 218 - INGERSOLL											
	2.6	IC	30600	35200	34000	26900	.4	3.17	.07	3.10	.07
CULLODEN RD IC 216 - OXFORD RD 10											
	4.7	IC	31200	35900	34600	27500	.5	1.72	1.68	1.72	.04
OXFORD/MIDDLESEX CTY BDRY											
	2.8	IC	31200	35900	34600	27500	.5	-----	----	----	----
PUTNAM RD IC 208 - MDLSX RD 30											
	5.5	IC	31000	35700	34400	27300	.6	8.71	2.92	8.71	.03
HWY 73 IC 203											
	3.7	IC	31700	36500	35200	27900	.4	.05	----	.05	.05
DORCHESTER RD IC 199											
	3.8	IC	31600	36300	35100	27800	.7	2.05	----	2.05	----
HWY 74 - MILESTOWN RD IC 195											
	1.8	IC	32250	37100	35800	28400	.2	4.53	.28	4.34	.28
HWY 100 IC 194											
	4.5	IC	31400	36100	34900	27600	.5	3.50	----	----	----
HWY 126-HIGHBURY AVE IC 189 LONDON											
	3.3	IC	34700	39900	38500	30500	.8	10.93	4.31	6.57	.14
HWY 135 IC 186 - WELLINGTON RD											

HIGHWAY: 401

LOCATION DESCRIPTION	DIST (KM)	PATT TYPE	1987 AADT	1987 SADT	1987 SAWDT	1987 WADT	1987 AR	Fat. & P.I.	X-Over	Roll-Over	Fatal Coll. Rate
HWY 135 IC 186 - WELLINGTON RD											
	2.6	IC	30000	34500	33300	26400	.6	6.60	.14	3.30	.28
HWY 402 IC 183											
	6.6	IC	17500	20700	19800	15200	.4	4.27	2.13	2.13	----
HWY 4 IC 177											
	4.1	C	17900	20000	20000	15900	.7	----	----	----	----
MDLSX/ELGIN CTY BDRY											
	8.5	C	17900	20000	20000	15900	.3	.04	----	----	.04
UNION RD IC 164 - ELGIN RD 20											
	6.7	C	17000	19000	19000	15100	.5	4.33	----	2.16	----
IONA RD IC 157											
	8.9	C	15500	17400	17400	13800	.4	.04	----	.04	.04
CURRIE RD IC 149 - ELGIN RD 8											
	11.3	C	16600	18600	18600	14800	.3	.06	.03	.03	.06
HWY 76-GRAHAM RD IC 137-WEST LORNE											
	8.1	IT	14600	21000	19400	11200	.5	.09	.05	.09	.09
FURNIVAL RD IC 129-ELGIN RD 3											
	6.3	IT	14200	20400	18900	10900	.5	.06	----	.06	.06
ELGIN/KENT BDY-DISTRICTS 2/1 LINE											

Gorski Consulting
London, Ontario, Canada