

Observed Average Speeds On Highway 401 – One Ingredient of a Deadly Recipe

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Figure 1: Highway 401 is a major expressway in Canada that travels from Windsor, Ontario to the border of the Province of Quebec. Multiple lanes make it difficult for police to control traffic through traffic stops. A high volume of heavy truck traffic is governed to a maximum speed of just over 100 km/h. Some interchanges still contain old, short exit/entrance ramps with poor visibility. Construction projects also result in sudden speed reductions. This combination of factors results in speed differences between vehicles that have been historically deadly.

Gorski Consulting has been involved in a variety of short- range, naturalistic studies of traffic volumes, patterns and speeds on roads and highways throughout southern Ontario.

The highway carrying the greatest volume of traffic in Ontario is the Highway 401 expressway. Traffic volumes are low at the east and west (Quebec border and Windsor)

ends of the highway dropping to as low as 20,000 AADT. A vastly higher volume is found in the Toronto corridor where volumes might reach above 400,000 AADT. The site where our test results will be reported (near Eglin Road in Middlesex County) has a traffic volume of over 60,000 AADT.

Observations of traffic conditions on Highway 401 have been previously reported in a Gorski Consulting article of December 7, 2016 entitled “Heavy Truck Conflicts at Expressway On-Ramps” and this publication can be found on the Articles page of the Gorski Consulting website. The results reported in the current article are from the analysis of the same multiple-video camera set-up of November 15, 2016, that was discussed in detail in the previous article. Figure 2 provides an overview of the location of the nine video cameras used in this study. Further details can be obtained from examining the previously mentioned article.

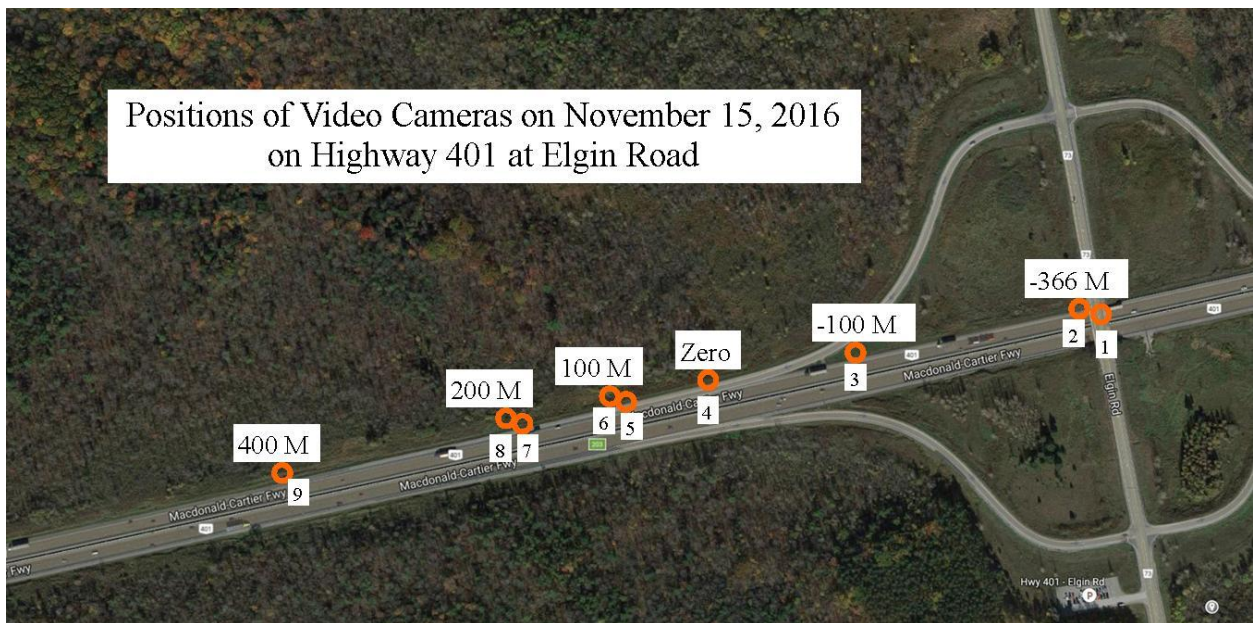


Figure 2: Positions of 9 video cameras used in this observational study.

Methodology

For the current study, the average speed of westbound vehicles travelling in the median lane of the highway was documented. The median lane is that which is closest to the centre median of the highway. This is commonly referred to as the “fast lane” as most drivers would use this lane to pass slower traffic. Average speeds were obtained from observing when each vehicle passed by Camera #2 at the -366 metre location and then observing the same vehicle as it passed by Camera #9 at the +400 metre location. Thus the average speed was obtained over a total distance of 766 metres.

Results

In this preliminary assessment 50 observations were made from examining just over six minutes of videotape. These observations were made between 1617 and 1623 hours on a Tuesday. The observations included 45% passenger cars, 36% SUVs, 16% Pick-up trucks and 2% passenger vans. No motorcycles, medium or large trucks, or transit buses were observed in this median lane.

It was found that the average speed of these 50 observed vehicles travelling in the westbound median lane was 118.5 km/h. The slowest observed speed was 108.9 km/h while the highest was 129.7 km/h.

Not unexpectedly, the maximum speed of vehicles was limited by the traffic volume as many vehicles were observed travelling close behind a vehicle ahead. As an example the gap between two vehicles was calculated by noting the time delay between the front of each vehicle passing Camera #1. In 26% of the observed instances the time gap between the front ends of two vehicles was found to be below 2 seconds. The actual distance between the front end of the following vehicle and the rear end of the leading vehicle would actually be less. This finding indicates how 1 in every 4 drivers may not have sufficient time to react if an emergency situation required the driver of the lead vehicle to apply maximum braking or other emergency scenarios. It will be interesting to note how automatic braking systems make changes to these findings as more vehicles become equipped with these systems.

The actual speed at which vehicles travel on an expressway may not indicate the degree to which there is a danger of collision. Thus if all vehicles could be guaranteed to travel at 120 km/h then the chance of a collision would be minimal. In reality differences in speed exist and when drivers do not have sufficient warning of this difference in speed collisions are more likely to occur. Differences in speed were noted at the testing site. In the previously mentioned article ("Heavy Truck Conflicts at Expressway On-Ramps") the speeds of trucks were calculated in the right lane next to the westbound on-ramp and also in the on-ramp. The following findings were noted for speeds in the curb lane:

-366 to Zero Metres = 100.35 km/h

Zero to 100 Metres = 98.59 km/h

100 Metres to 200 Metres = 98.46 km/h

200 Metres to 400 Metres = 99.07 km/h

Along the westbound on-ramp the average speeds were as follows:

Zero to 100 Metres = 65.50 km/h

100 Metres to 200 Metres = 69.65 km/h

200 Metres to 400 Metres = 76.08 km/h

It can be seen that the average speed of trucks travelling in the right lane can be substantially lower than the 118.5 km/h average speed of light vehicles travelling in the median lane. This can be a problem in instances where the driver of a fast-moving vehicle travelling in the median lanes decides to change lanes into either of the slower lanes where trucks may be present. For trucks entering the highway from an on-ramp their average speed could be below 80 km/h whereas the vehicle crossing from the median lane could easily be travelling 40 or 50 km/h faster. The closing speed of that fast-moving vehicle would be at 11 to 13 metres every second. If the truck driver needed to apply his brakes that closing speed could suddenly become much greater.

While the official, posted, speed limit for Highway 401 is 100 km/h our data clearly shows that the average speed of many light vehicles is much greater. Attempts to control that speeding by way of police traffic stops on this high volume road would be ill-advised as such stoppages would create more problems than it would solve. This is why, for the most part, the Ontario Provincial Police have placed an unadvertised "+20 km/h" rule to speed enforcement and they will generally not pull over a vehicle that is travelling up to 120 km/h. Obviously this has to change when factors such as slippery road conditions, poor visibility or construction related traffic stoppages cause the general flow of traffic to be much less than average. In those instances it would be dangerous to allow a driver to travel 20 km/h above the posted speed. And in many instances even a speed of 100 km/h may be dangerous depending on the particular circumstances.

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