Video Technology Available To Support Transportation Committee's Advisory Functions

By Zygmunt M. Gorski, Gorski Consulting, October 8, 2019

This document has been prepared to review video camera hardware and procedures that are available to support London's Transportation Advisory Committee's (TAC) advisory functions to the City of London. These methods have been used by Gorski Consulting in situations where detailed data and analysis was required of roadways in support of criminal and civil litigation as well as to identify potential roadway safety problems. This article will provide a general description of the hardware and procedures as well as examples of how the process may be employed by the TAC in a specific example.

1.0 DATA AQUISITION

Multiple video cameras are synchronized and set up at a road segment or intersection, as shown below.

Figure 1: View of video cameras placed along the roadside to capture traffic motions.

Markers may sometimes be attached to the road surface so vehicle paths and locations can be viewed in the video footage.

Figure 2: Vehicles passing through a grid of markers placed on the road surface of an intersection.

2.0 CREATION OF VIDEO PROJECT IN ADOBE PREMIERE

Video footage taken from a site is inserted in a video editing program such as Adobe Premiere.

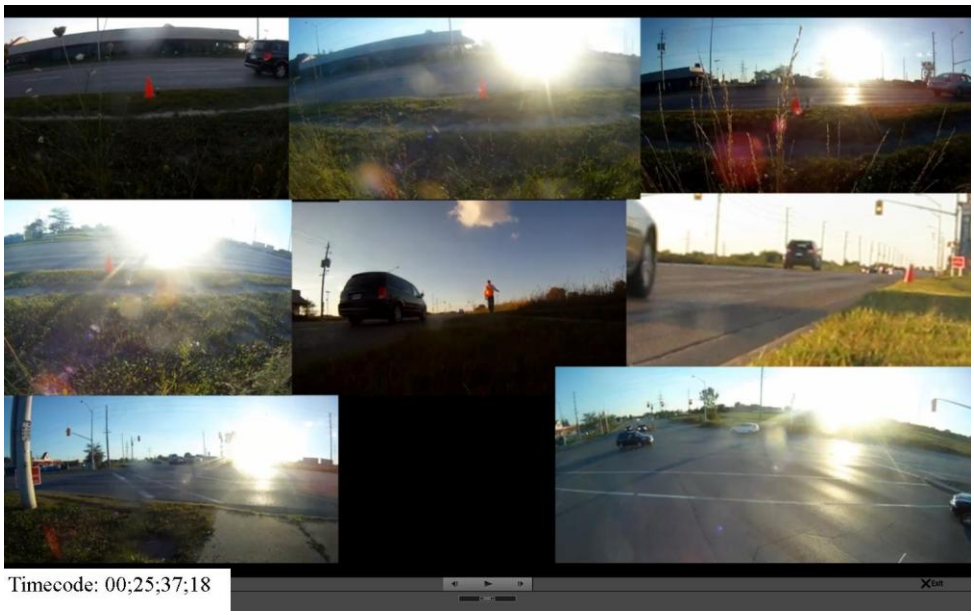

Figure 3: View in the Adobe Premiere video-editing program from 8 video cameras synchronized to show the same time.

Vehicle paths and positions are documented using the timecode in the video-editing project. Vehicles paths and positions may be plotted on diagrams or notated in spreadsheets.

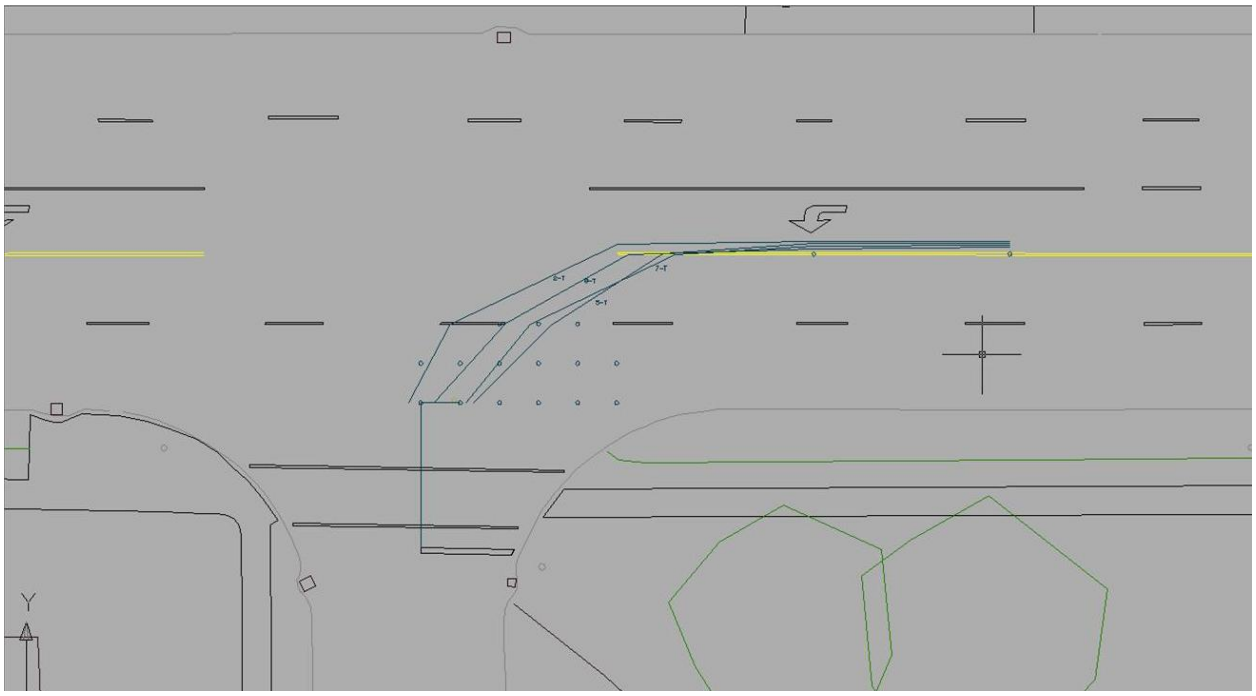

Figure 4: Example of the plot of the path of the right front tire of a vehicle during 4 left turns.

The effect of the roadway on a vehicle's motion may also be noted. In the example of a vehicle travelling around a curve the documentation of the rotation of the steering wheel can help to explain any deviations in the curve's surface.

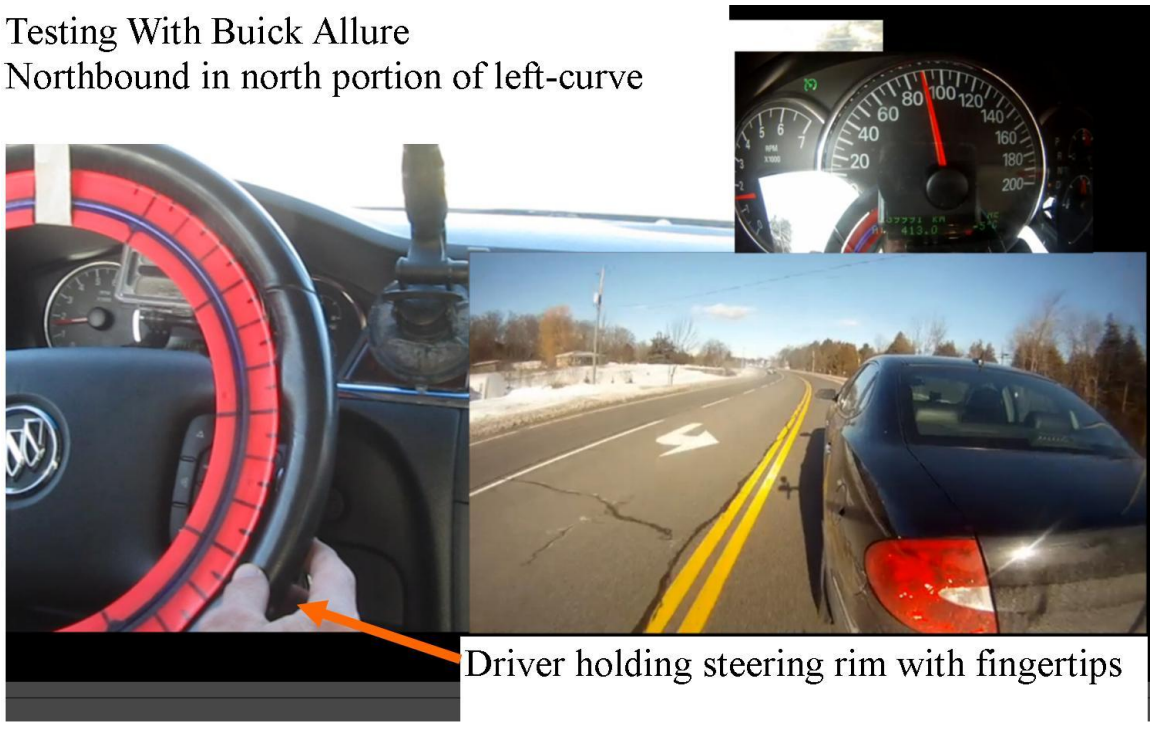

Figure 5: Example of testing around a roadway curve.

Steering wheel rotations can be plotted in graphic form to compare the effects of one curve versus another.

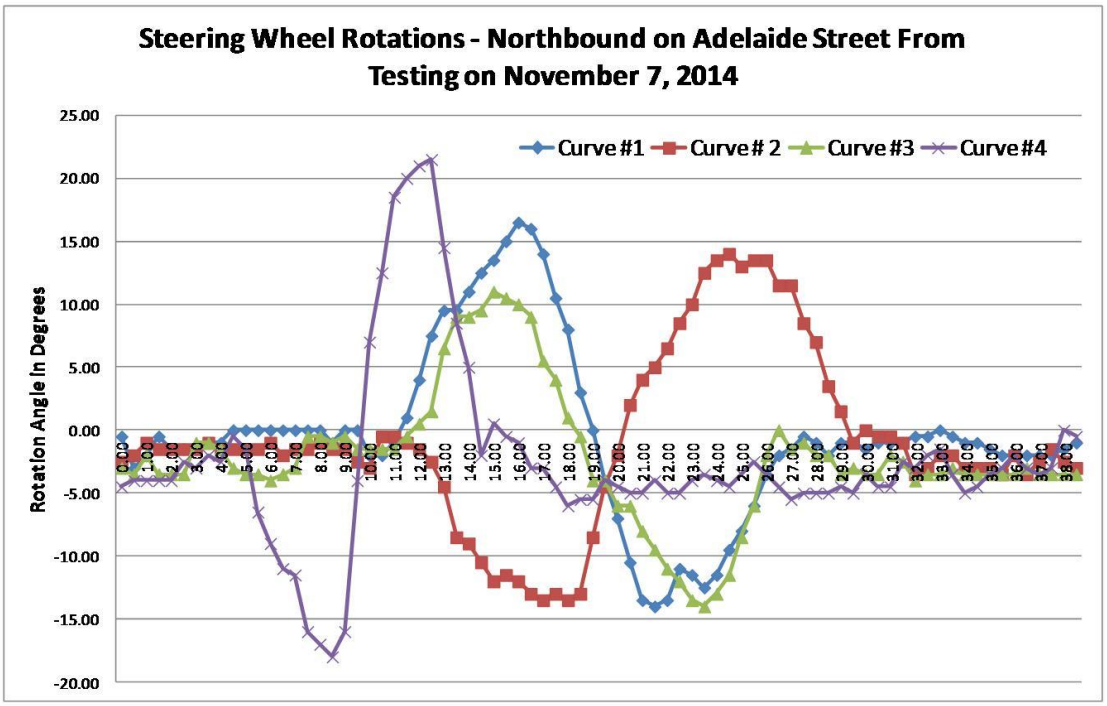

Figure 6: Steering wheel rotations that illustrate the effect of a curve on a vehicle's motion.

By installing a free app on an iPhone it is possible to document the motions of a test vehicle as it travels over road bumps, incomplete surface repairs, speed bumps, railway tracks, bridge junctions or any other features that might cause accelerations or rotations of the test vehicle. Video cameras which are synchronized with the output of data from the iPhone help to illustrate what portion, or its features, caused the noted data.

Longitudinal and Lateral Rotations of a test vehicle as it travels over a road surface can provide an objective measure of the quality of the road surface. Examples of data collected from the Lincoln Alexander Parkway in Hamilton Ontario are shown below. The iPhone data can be compared to the data previously obtained by Gorski Consulting from testing over many roadways in London and Southern Ontario. The “Road Data” for the tested roads may be accessed on the Road Data webpage of the Gorski Consulting website (www.gorskiconsulting .com).

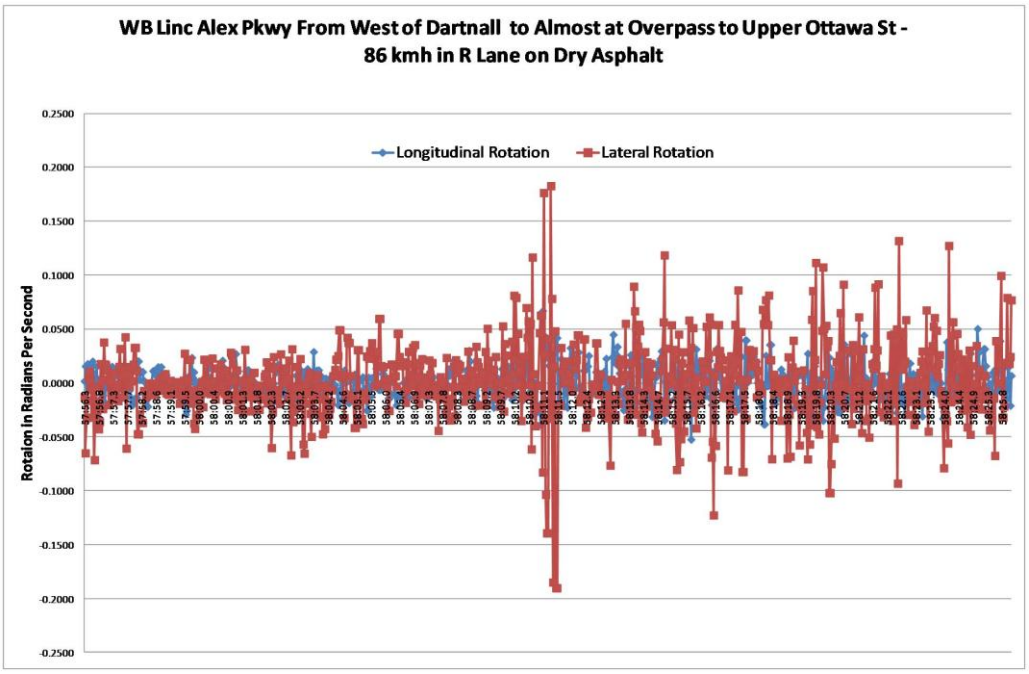

Figure 7: Example of the Longitudinal and Lateral Rotations caused during a test vehicle's travel over a portion of the Lincoln Alexander Parkway in Hamilton Ontario.

Road Segment	Test Date	Surface Condition	Test Speed (km/h)	Total Testing Time (In Seconds)	Sampling Rate of Date Collection	Travel Direction	Lateral Motion Standard Deviation	Longitudinal Motion Standard Deviation
Lincoln Alex Pkwy, From West of Dartnall Rd to Almost At Upper Ottawa St Overpass - Westbound	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0345	0.0144
Lincoln Alex Pkwy, Passing Upper Ottawa Overpass at 2.25 Seconds	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0339	0.0148
Lincoln Alex Pkwy, From 663 Metres West of Upper Ottawa St & Passing Upper Gage Ave Overpass at 7.0 Seconds	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0340	0.0163
Lincoln Alex Pkwy, Passing Upper Sherman Ave Overpass at 10.75 Seconds	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0467	0.0259
Lincoln Alex Pkwy, Passing Upper Wentworth St at 16.25 Seconds	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0357	0.0159
Lincoln Alex Pkwy, Passing Upper Wellington St at 23.0 Seconds	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0267	0.0132
Lincoln Alex Pkwy, Passing Upper James St at 29.5 Seconds	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0200	0.0161
Lincoln Alex Pkwy, Passing West 5th St Overpass at 16.5 Seconds	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0147	0.0089
Lincoln Alex Pkwy, Passing Fiona Crescent Pedestrian Walkway Overpass at 13.0 Seconds	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0150	0.0090
Lincoln Alex Pkwy, Passing Garth St Overpasss at 9.5 Seconds	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0261	0.0119
Lincoln Alex Pkwy, Passing Upper Paradise Rd Overpasss at 16.0 Seconds	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0243	0.0123
Lincoln Alex Pkwy, From 334 to 1051 Metres West of Upper Paradise Rd	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0212	0.0120
Lincoln Alex Pkwy, Passing Mohawk Rd (Golf Links Rd) Overpass at 30.0 Seconds	May 15-19	Bare & Dry	86	30.0	32 Hertz	Westbound	0.0206	0.0118
						Overall =	**0.0272**	**0.0140**

Figure 8: Table of the Longitudinal and Lateral Rotations of a test vehicle travelling over the Lincoln Alexander Parkway in Hamilton Ontario

3.0 SUMMARY

In general, objective data should be gathered to support advice given by the TAC to the City of London. In some cases the mentioned procedures may be implemented to augment data that has previously been collected by the City. In other cases outside contractors may have provided reports and conclusions to the City that could be independently reviewed by our TAC by conducting our own studies.

Some applications that come to mind are studies of the speed of vehicles in school zones and where speed limit signs and other controlling devices are being effective in providing a safe environment.

Another application might involve examining speeds and actions of drivers in the vicinity of red light cameras. As only a small number (2?) of installations may actually contain cameras it might be useful to explore driver actions at those intersections where housings exist but no cameras are in the housings.

If the members of the TAC find it useful, I would be happy to give a presentation on these methods or explain further applications for any projects that may be conducted by the TAC in the future.

Zygmunt M. Gorski

Gorski Consulting

London, Ontario