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EFFECT OF RED LIGHT CAMERAS on INJURY CRASHES in the CITY OF VIRGINIA BEACH

INTRODUCTION AND SUMMARY

The National Highway Traffic Safety Administration and others have shown that crashes caused by Right-Turn-On-Red (RTOR) violations are extremely rare.^{1,2} The City of Virginia Beach is no exception. There is no documented history of a significant number of RTOR crashes having ever occurred anywhere in the City. Nevertheless, when the City reinstated its PhotoSafe red light camera system during 2009, it added 16 (now 17) crash-free right-turn lanes. The only effect that camera-enforcement can have on zero crash rates is to cause them to go up. At PhotoSafe intersections, the only question is by how much.

The accepted traffic engineering practice is to employ “right-turn overlap phasing” at busy intersections. GREEN RIGHT-ARROW or FLASHING YELLOW RIGHT-ARROW indications are displayed to right-turning traffic when it overlaps with left-turning traffic approaching the intersection on the crossing street from the right. This reduces the risk of rear-end crashes, improves intersection capacity, saves fuel, reduces air pollution, and reduces diversions to less desirable routes such as residential streets.

The state’s red light camera law (Code § 15.2-968.1) requires that violation surveys and engineering studies be conducted and reasonable improvements be made prior to camera-enforcement. The surveys and studies for the PhotoSafe system did not include right-turn lanes and no improvements, such as right-turn overlap phasing, were made to them. As a result, the 17 camera-enforced right-turn lanes (out of a total of 106 camera-enforced lanes) generate

¹ Compton, Richard 1995. *The Safety Impact of Right Turn On Red Report To Congress*, Traffic Tech, Technology Transfer Series, Number 86, February 1995, National Highway Traffic Safety Administration. Available at: <http://www.nhtsa.gov/people/outreach/traftech/1995/TT086.htm>

² Beeber, Jay 2011. *How Dangerous is a Rolling Right Turn?*, Safer Streets L.A. Available at: <http://saferstreetsla.org/wp-content/uploads/reports/HOW%20DANGEROUS%20IS%20A%20ROLLING%20RIGHT%20TURN.pdf>

83.5% of all PhotoSafe citations. Drivers are being cited for making perfectly safe rolling right turns at speeds of less than 5 mph on RED signal indications, indications that should be GREEN RIGHT-ARROW or FLASHING YELLOW RIGHT-ARROW.

Fatality and injury crashes are the best measure of the effectiveness of highway traffic safety projects. They are the crashes that really matter, and are the only types of crashes that are consistently reported. In its PhotoSafe Crash Analysis dated November 24, 2014, the City states that “*Injury crashes have slightly increased by 3%*” at PhotoSafe intersections. On July 2, 2015, the City indicated that this was based on a simple before-and-after calculation, meaning the increase was not compared to the change in a valid comparison group. Experts agree that this is an improper method of analysis. This paper corrects that defect.

This paper compares the change in injury crashes at PhotoSafe intersections to those at signalized intersections without cameras. This comparison reveals that the number of injury crashes at the City’s 13 camera-enforced intersections is 19.5 percent greater than would have been expected had cameras not been installed.

Insufficient data has been made available to the NMA for it to say with certainty that the increase in injury crashes at PhotoSafe intersections is directly associated with camera-enforcement of RTOR violations at intersections with outdated signals. However, it suspects that this is a major factor.

METHODOLOGY

Various methodologies used to determine the effect of red light cameras can be found in NCHRP Synthesis 310, *Impact of Red Light Camera Enforcement on Crash Experience*, at page 32 et seq.³ Among them are:

- The *Simple Before-and-After* methodology (which the City uses); and,
- The *Before-and-After with Comparison Group* methodology, which is the recommended methodology that was used for the conclusions reached in this paper.

NCHRP Synthesis 310 states categorically that:

“A simple before-and-after study should not be used to evaluate [red light] cameras. ... If an agency does use a simple before-and-after study, they should be cognizant that the ... effect of the cameras on the safety of the intersection will likely be overestimated.”

³ McGee, H. W. and Eccles, K. A. (2003). “*Impact of Red Light Camera Enforcement on Crash Experience.*” NCHRP Synthesis 310, National Cooperative Highway Research Program, Transportation Research Board, Washington, D.C., 2003. http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_syn_310.pdf

CRASH DATA

On July 2, 2015, the City provided the NMA with a copy of the PhotoSafe Crash Analysis dated November 24, 2014. It included injury crash data from 2006 through 2013 for all signalized intersections in the City and for PhotoSafe intersections. The City indicated that “adjustments” had been made to the data since the release of its 2013 program analysis, but did not explain the nature of them.

Table 1 presents the City’s adjusted injury crash data. The data for unenforced intersections was determined by subtracting the PhotoSafe Intersections from All Signalized Intersections.

Crash data from 2013 was not used because of the increase in the duration of yellow change intervals to the levels required by the state’s red light camera law that occurred at PhotoSafe intersections on January 10, 2013, which the NMA had been demanding since the inception of the system.

Table 1. Adjusted Injury Crash Data

| | All Signalized Intersections | PhotoSafe Intersections | Unenforced Intersections |
|---|---------------------------------|----------------------------|-----------------------------|
| 2006 | 931 | 90 | 841 |
| 2007 | 825 | 78 | 747 |
| 2008 | <u>776</u> | <u>83</u> | <u>693</u> |
| Totals <i>Before</i> installation: | 2532 | 251 | 2281 |
| 2009 | Cameras Installed | | |
| 2010 | 795 | 72 | 723 |
| 2011 | 741 | 98 | 643 |
| 2012 | <u>692</u> | <u>89</u> | <u>603</u> |
| Totals <i>After</i> Installation: | 2228 | 259 | 1969 |

CALCULATION OF THE EFFECT OF RED LIGHT CAMERAS ON INJURY CRASHES

The City calculates the effect of red light cameras using the *Simple Before-and-After* methodology:

Effect of cameras = PhotoSafe Intersections *After* / *Before*

Effect of cameras = 259 / 251 = 1.0319 = 3.19% increase in injury crashes.

The *Before-and-After with Comparison Group* methodology recommended by NCHRP Synthesis 310 produces a significantly different result. Using Unenforced Intersections as the comparison group, the *Expected* number of crashes at PhotoSafe Intersections had cameras not been installed is:

Expected = (Comparison Group *After* / *Before*) x (PhotoSafe Intersections *Before*)

Expected = (1969 / 2281) x 251 = 216.67 crashes

Comparing the actual number of injury crashes at PhotoSafe intersections in the *After* period to the *Expected*:

Effect of cameras = *After* / *Expected*

Effect of cameras = 259 / 216.67 = 1.1954 = 19.5% more injury crashes

CONCLUSIONS

Based on the adjusted data provided by the City and the guidance provided by NCHRP Synthesis 310, the number of injury crashes at the City's 13 camera-enforced intersections is 19.5 percent greater than would have been expected had cameras not been installed. The City's statement that "*Injury crashes have slightly increased by 3%*" is misleading, and understates the adverse effect the PhotoSafe system is having on injury crashes. Regardless of how the data is analyzed, the PhotoSafe system has not reduced injury crashes; it has increased them.

A likely major cause of the increase is camera-enforcement of outdated RED right-turn signal indications during the overlap phase. This enforcement is illegal, as well as an offense to fairness and common sense.

RECOMMENDATIONS

The City must comply with state law and the mandatory driver safeguards the General Assembly built into the red light camera statute. Since the required surveys and studies for the PhotoSafe system did not include right-turn lanes, camera-enforcement of right-turn movements must be suspended immediately.

Programs designed to improve safety, but which actually result in more injuries, must be ended. The City's current red light camera contract with Redflex Traffic Systems of Australia should be allowed to expire at the earliest opportunity.

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