

**Agenda – Standing Policy Committee on Infrastructure Renewal and Public Works –
March 8 adjourned to March 15, 2011**

REPORTS

**Item No. 3 Review of the Adequacy of Amber Time Duration at
Signalized Intersections**

WINNIPEG PUBLIC SERVICE RECOMMENDATION:

- That, similar to the requirements in the State of Georgia, a traffic engineering study should be completed for future intersections that may be candidates for photo enforcement to ensure that all engineering tools have been utilized at reducing collisions that result from red light running and that photo enforcement is a suitable tool to reduce the frequency and severity of collisions normally associated with red light running;
- That amber time duration of 4 seconds not be changed because it is suitable at signalized intersections in Winnipeg, as evidenced by the low rate of “red light running” violations, and such value is within acceptable engineering practices;
- That the process of estimating clearance times be revised to include the Institute of Transportation Engineers’ (ITE) equation to estimate the duration of all-red interval to account for location-specific characteristics.

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DECISION MAKING HISTORY:

STANDING COMMITTEE RECOMMENDATION:

On November 23, 2010, the Standing Policy Committee on Infrastructure Renewal and Public Works granted the Winnipeg Public Services an extension of time of up to 90 days to report back as directed by the Executive Policy Committee on September 15, 2010.

EXECUTIVE POLICY COMMITTEE RECOMMENDATION:

On September 15, 2010, the Executive Policy Committee passed the following motion:

WHEREAS the City of Winnipeg currently uses photo enforcement cameras to monitor high traffic intersections for speeding vehicles and vehicles that run red lights;

AND WHEREAS the primary purpose of the photo enforcement program is to promote intersection safety for motorists, cyclists and pedestrians;

AND WHEREAS recent media reports cite a 2008 State of Georgia law which required yellow lights at signalized intersections to be timed to United States federal engineering standards, plus one additional second;

AND WHEREAS the City of Winnipeg is committed to exploring all options to further increase the safety of motorists, cyclists and pedestrians;

THEREFORE BE IT RESOLVED that the Executive Policy Committee request the City of Winnipeg Public Service to review the above-referenced State of Georgia legislation, as well as any other relevant studies or legislation regarding the effect of longer yellow lights on intersection safety, and report back to the appropriate committee of Council in 30 days with their analysis and recommendations.

ADMINISTRATIVE REPORT

Title: REVIEW THE ADEQUACY OF AMBER TIME DURATION AT SIGNALIZED INTERSECTIONS

Critical Path: Standing Policy Committee on Infrastructure Renewal and Public Works – Executive Policy Committee

AUTHORIZATION

Author	Department Head	CFO	CAO
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RECOMMENDATIONS

- That, similar to the requirements in the State of Georgia, a traffic engineering study should be completed for future intersections that may be candidates for photo enforcement to ensure that all engineering tools have been utilized at reducing collisions that result from red light running and that photo enforcement is a suitable tool to reduce the frequency and severity of collisions normally associated with red light running;
- That amber time duration of 4 seconds not be changed because it is suitable at signalized intersections in Winnipeg, as evidenced by the low rate of “red light running” violations, and such value is within acceptable engineering practices;
- That the process of estimating clearance times be revised to include the Institute of Transportation Engineers’ (ITE) equation to estimate the duration of all-red interval to account for location-specific characteristics.

REASON FOR THE REPORT

At their September 15, 2010 meeting, the Executive Policy Committee directed the Public Service to “review the State of Georgia legislation, which requires yellow lights at signalized intersections to be timed to United States federal engineering standards, plus one additional second; as well as any other relevant studies or legislation regarding the effect of longer yellow lights on intersection safety, and report back to the appropriate committee of Council in 30 days with their analysis and recommendations.”

IMPLICATIONS OF THE RECOMMENDATIONS

- Recommendations may affect signal timing practices.
- Recommendations may affect long term plans for deployment of the photo-enforcement program at signalized intersections.
- The consistent duration of amber intervals simplifies the driving task for motorists by providing an expected and predictable amber interval duration.

HISTORY

STATE OF GEORGIA – PHOTO ENFORCEMENT

House Bill 77, passed in May 2008, requires photo enforcement deployment to be approved and permitted by the Georgia Department of Transportation (GDOT) and there are key components associated with the permit application for photo enforcement at signalized intersections.

In particular, as part of the application process, the applicant is required to submit a proposed duration for the *clearance interval* calculations. The clearance interval is the total time of amber interval plus all-red interval that is placed between the green intervals of two conflicting movements. The amber portion of the clearance interval is required to be no less than the minimum recognized U.S. national standards/practices plus one additional second.

In addition to new proposed clearance intervals, the permit process also requires the applicant to submit data that justifies the need for photo enforcement (i.e., red light running frequency, collision information) as well as a traffic engineering study that details engineering measures that can be used in conjunction with or as an alternate to photo enforcement. In Winnipeg, the traffic engineering studies could be expected to cost approximately \$10,000 per location.

NATIONAL STANDARDS/PRACTICES FOR AMBER TIME DURATION

The U.S. Manual of Uniform Traffic Control Devices (MUTCD) regulates the requirements of traffic control devices, including traffic signals in the U.S. This manual refers the engineer to the use of engineering practices when calculating the clearance and amber intervals. The manual mentions the “Traffic Control Devices Handbook” and the “Manual of Traffic Signals Design” as support documents. Both are published by the Institute of Transportation Engineers (ITE).

In Manitoba, the operation of traffic signals is regulated by the Manual of Uniform Traffic Control Devices for Canada (MUTCDC), which is similar to, but has a different mandate than, the U.S. document. The MUTCDC refers the engineer to the Canadian Capacity Guide in addition to ITE documents as support material for estimating the duration of amber intervals.

RED LIGHT RUNNING

The duration of the amber interval can be considered less than adequate if too many motorists run the red light at a signalized intersection. In many jurisdictions, including Winnipeg, a red light running violation occurs when someone crosses the “stop line” at an intersection when the red interval is already on (violation on entrance). In other jurisdictions a red light running violation occurs when someone is still within an intersection when the red interval comes on (violation on exit). Of these scenarios, the latter (violation on exit) requires amber intervals to include additional time for a driver to traverse the intersection before the red display is activated. Many agencies consider a violation rate of 1-3% of vehicles traversing the intersection as an indication of having an inadequate amber interval duration. In Winnipeg, the photo enforced intersection that experienced the most red light running violations in 2010 (Sargent Ave. at Clifton St.) had a rate of 0.049%.

Violation on exit was utilized when estimating the suitability of amber intervals in a study conducted by ITE in 1980 entitled “The Influence of the Time Duration of Yellow Traffic Signals on Driver Response”. This study concluded that amber intervals needed to be longer to allow a motorist to fully cross the complete intersection (violation on exit) before the red interval comes on. Similarly, a study entitled “Red Light Running and Sensible Countermeasures” states that

implementing clearance intervals closer to what the ITE recommended equation indicates, will result in fewer red light running violations (i.e., fewer violations on exit).

Since photo enforcement and traffic signals timing practices in Winnipeg are based on the concept of violation on entrance rather than violation on exit, it can be concluded that the results of these studies, while informative, do not provide any useful information related to whether or not there is a need to modify the current duration of amber intervals in Winnipeg.

SAFETY

The duration of amber intervals alone is not always adequate to help reduce collisions. In Winnipeg, additional time is already provided based on engineering judgment to improve the safe operation of a signalized intersection. This is done through the use of an “all-red” interval. This interval always follows the amber interval. The purpose of this is to prevent a motorist on the side street from entering an intersection when a motorist on the main road may still be inside the intersection. This all-red interval varies between 0 and 3 seconds and is based on the characteristics of each intersection. When adding both the amber and all-red intervals together, we end up with clearance intervals between 4 seconds (when no all-red is used) to up to 7 seconds (when we include 3 seconds of all-red).

AMBER INTERVAL CALCULATION PRACTICES

There are two generally accepted engineering practices to determine amber interval durations. The first is by using a generally accepted equation. ITE provides engineers with one such equation. The second engineering practice for determining the amber time duration is by adopting a generally accepted value, which allows for predictability by motorists. This is the practice adopted in Manitoba.

The practice of using a single generally accepted value provides an easily understood process for drivers which gives them predictability in the duration of amber intervals (i.e., motorists know that in Manitoba, amber intervals last 4 seconds). Care must be taken when choosing such a value and engineering judgment plays a role in ensuring the suitability of such a value because while this single value provides for more than adequate time for roads with low speeds (usually less than 70 km/h) it becomes less adequate as speeds increase. For Winnipeg, research indicates that a value of approximately 4 seconds for amber intervals is adequate (ITE, “Vehicle Signals Change and Clearance Intervals”, August 1994).

All-Red Calculation PRACTICES

The U.S. MUTCD and ITE suggest that amber times and all-red intervals be calculated. The U.S. methodology for amber intervals, if applied to Winnipeg, may result in times of less than the 4 seconds for roads with lower speed limits. However, the process for estimating the all-red interval can be formalized by adopting the recommended equation by ITE (see below).

$$R = \frac{w + L}{v}$$

R = all-red interval
w = width of the intersection
L = length of vehicle
v = speed

The safe operation of Winnipeg’s signalized intersections, including photo enforced locations, can be maintained by continuing the practice of using 4 seconds for amber intervals, and formally adopting the calculation of all-red intervals as per ITE’s equation.

CONCLUSIONS

It can be concluded that:

- Similar to the requirements of the State of Georgia, a traffic engineering study would be beneficial as part of the process of assessing new locations that may be candidate intersections for photo enforcement to ensure that all engineering tools have been utilized at reducing collisions that result from red light running and that photo enforcement is a suitable tool to reduce the frequency and severity of collisions normally associated with red light running.
- Amber interval durations of 4 seconds are suitable for Winnipeg for roads with speeds up to and including 80 km/h based on enforcement data and such value is within acceptable engineering practices. This application of consistent amber intervals simplifies the driving task for motorists by providing an expected and predictable amber duration; and
- Finally, the process of estimating the clearance interval (i.e., amber plus all-red) should include the use of ITE's equation to estimate the duration of all-red intervals when the speed limit of the street in question is 70 km/h or higher, or based on the local characteristics of each intersection.

FINANCIAL IMPACT

Financial Impact Statement Date: [January 13, 2011](#)

Project Name:

REVIEW THE ADEQUACY OF AMBER TIME DURATION AT SIGNALIZED INTERSECTIONS

COMMENTS:

There is no financial impact associated with the recommendations of this report at this time. However, it is estimated that an engineering study for each intersection that would be considered a candidate for photo enforcement would cost approximately \$10,000.

"Original Signed by D. Stewart, CA"
Manager of Finance & Administration

CONSULTATION

In preparing this report there was consultation with: Winnipeg Police Service

SUBMITTED BY

Department: Public Works
Division: Transportation
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