

THE REGIONAL MUNICIPALITY OF YORK

Transportation and Works Committee
February 4, 2004
Report of the
Commissioner of Transportation and Works

ESTABLISHING SPEED LIMITS PROPOSED REGIONAL POLICY

1. RECOMMENDATIONS

It is recommended that:

1. The Speed Limit Policy attached to this report as *Attachment 1* be adopted by Regional Council as the policy for establishing speed limits on the Regional road network.
2. A copy of this report be forwarded by the Regional Clerk to the Clerks of each of the local municipalities.

2. PURPOSE

The Regional Municipality of York routinely undertakes reviews of speed limits. These reviews are generally initiated by requests from the public or elected representatives and the ongoing monitoring of the road network. Regardless of the reason for the investigation, there is a need for a credible, technically sound and consistent method of determining an appropriate speed limit.

This report discusses the results of an assignment undertaken by an independent consultant to review the current process for establishing speed limits and makes recommendations for changes to the process and establishes a warrant. The proposed new warrant will, if adopted, consider the 85th percentile speed of the roadway, vehicle-pedestrian collision risk, school areas and speed-related collision information.

3. BACKGROUND

The Region attempts to set speed limits that maximize safety, decrease delay, lower the burden of enforcement and meet public expectations. The task is complex as safety and delays are often competing objectives, and public opinion is polarized. Residents and vulnerable road users seek lower speed limits that promote quality of life for the community and increased security for pedestrians and cyclists. Motorists seek higher speeds that minimize travel time, and seemingly have no significant negative impacts on them.

Regional staff's existing practice in establishing posted speed limits was initiated in December of 1999. This practice involved relating the physical characteristics/attributes of the roadway to a speed limit. This method was developed to provide consistency and uniformity of posted speed limits on similar type roadway cross-sections. However, based upon the on-going discussions with the public and elected representatives, Regional staff determined that there was a need to review the process in establishing speed limits and make recommendations for changes to the process and establish a warrant. Of particular concern that needed to be addressed was the reduction of speed limits in school areas.

An independent consultant was retained to develop a procedure for setting speed limits on Regional roads. Regional facilities are typically arterial roadways in both urban and rural settings with various adjacent land use, traffic and physical features. The recommended procedure needed to be technically sound, consistent with the broader objectives of the transportation system, credible to the public and defensible in any forum of debate.

4. ANALYSIS AND OPTIONS

Maximum speed limits are laws, and as with most laws, speed limits are established for the protection of the public and the regulation of unreasonable behaviour on the part of individuals. Over the years, speed limits have been enacted for essentially three reasons:

- Safety
- Energy conservation
- Environmental protection

It is clear that energy conservation and environmental protection will only impact on speed limit setting in very extreme circumstances. By far, the prominent reason for speed limits is safety. Of late, urban speed limits have also been revised in response to public concerns about the impacts that fast-moving vehicles have on cycling and walking comfort and safety, school areas, and on the "sense of place" on shopping and residential streets. The last reason is an emerging social issue in York Region and elsewhere.

Many municipalities and agencies have started to look at the development of warrant criteria to more appropriately address today's issues around speed limits. The following summarizes the findings of the consultant's study.

4.1 Goals and Objectives

The goal of a surface transportation system is to provide safe, convenient, affordable, efficient and energy-conserving transportation while minimizing the impact on the environment. Setting speed limits is a strategy employed by municipalities in achieving this goal. Therefore, the setting of speed limits on Regional roads should be in conformance with this overarching goal.

The difficulty is that many of the desired features of the transportation system are essentially competing objectives. For example, efficiency might be promoted through high speed limits that permit motor vehicle travel times to be minimized. However, higher speeds negatively impact safety by increasing collision severity. The speed limit should be selected so as to balance the objectives.

The objectives of setting speed limits are as follows:

- Reduce the number of speed related collisions.
- Reduce collision severity.
- Minimize travel times for vehicular traffic.
- Provide roadways that protects vulnerable road users by minimizing the barrier effect of vehicular traffic.
- Reduce vehicular emissions.

While safety is always of primary importance on all roads, the emphasis placed on the objectives of mobility and emission has been determined when the road is classified and it is designed into the road.

Further objectives that promote the goals of safety and sustainability are:

- To give residents a realistic expectation of actual travel speeds by providing a speed limit that is an accurate reflection of travel speeds.
- To minimize the burden of enforcement on York Regional Police by providing speed limits which are respected by the majority of drivers.

4.2 Technical Information

Speed limits, like any element of the transportation system, are inextricably woven into the community fabric. Adjustments to the speed limit may have impacts and repercussions on many valued features of the community. The impacts of speed limits on travel speed and safety are provided below.

4.2.1 Travel Speed

Drivers receive up to 90% of their information visually. The visual clues conveyed by the road, and the roadside (including signs) are the primary determinants of travel speed. The strongest influence on a driver's selection of travel speed is the appearance of the road. Straight and flat alignments with wide lanes and few driveways and intersections are a visual invitation to travel at a high speed. As a driver turns onto a roadway, the information conveyed to the driver by the roadway design is subconsciously compared to similar roads that have been traversed, and a travel speed is selected based on the individual driver's past driving experience relating travel speed to safety and comfort.

Attempts have been made to counteract high travel speeds by posting speed limit signs that restrict legal travel to much lower speeds. These attempts are consistently unsuccessful because the visual clues provided by the roadway features (alignment, lane widths, etc.) are more powerful to the drivers' perceptions than a sign posted at the side of the road.

In the end, it can be concluded that the most important influence on travel speed are the design features of the road itself. The dimensions and these features, and in some instances, the presence of the features, are determined during design using the design speed concept. Essentially, this means that each element of the road is selected so that a certain speed can be safely attained and maintained.

Changes in the posted speed limit affect a change in the average travel speed of traffic, although the change in the travel speed is much smaller than the change in the posted speed limit. For instance, a 10 km/h reduction in the posted speed limit will usually result in a 2 to 3 km/h reduction in the average travel speed. The most successful speed limit reductions have been established in conjunction with large public information campaigns and/or intense enforcement efforts. In general, the posted speed limit has no significant effect on travel speed, and drivers will travel at a speed that they feel comfortable.

The ineffectiveness of speed limits to significantly change travel speeds has also been documented with local data. The data contained in Table 1 illustrates the effect that a speed limit change has on the 85th percentile speed of the traffic stream. The 85th percentile speed is the speed at which 85% of motorists drive at or below. When speed limits are altered by 10 km/h and 20 km/h, the corresponding maximum absolute change in 85th percentile speed is 2 km/h and 5 km/h, respectively. This data supports the perception that speed limit changes absent from any other significant changes to the road or level of enforcement, have limited impacts on actual travel speeds.

Table 1
Effects of Speed Limit Change on Travel Speeds

Location	Before		After		Change	
	Posted Speed (km/h)	85 th Percentile Speed (km/h)	Posted Speed (km/h)	85 th Percentile Speed (km/h)	Posted Speed (km/h)	85 th Percentile Speed (km/h)
Mulock Drive	70	80	60	80	-10	0
Victoria Road	60	78	50	80	-10	2
Langstaff Road	70	83	50	78	-20	-5
Leslie Street	80	80	60	78	-20	-2
Rutherford Road	70	86	60	87	-10	1

4.2.2 Safety

The link between collisions, travel speeds and speed limits has been extensively researched. Most of the research to date has examined the effects of modifying speed limits on safety, but has failed to establish a definitive causal chain. For a speed limit change to affect safety (i.e., collisions), it is necessary for the speed limit change to also cause a change in driver behaviour (typically a change in the travel speed).

The following is what we know about travel speeds, speed limits and safety:

- Collision occurrence is reduced when the motorist travels approximately at the 85th percentile speed.
- Collision severity is reduced by reducing travel speeds.

The link between absolute travel speed and collision occurrence is not well established. Intuitively, one might expect that faster travel would result in a greater number of collisions. While this may seem to be the case, a recent comprehensive review of numerous speed-safety studies report that “the evidence is not conclusive”.

4.3 Existing Methods for Setting Speed Limits

A considerable amount of effort has gone into developing a single method that can be used universally to set an “appropriate” speed limit. The transportation profession has developed many different methods and techniques ranging from the simple to the complex. The most well-known techniques are described briefly below.

4.3.1 85th Percentile Method

The research that concluded motorists traveling at the 85th percentile speed have the lowest involvement in collisions has resulted in a majority of North American road authorities adopting a policy of setting speed limits at the 85th percentile speed. The theory is that a speed limit set at the 85th percentile speed maximizes safety. This is the easiest and by far the most popular means of setting speed limits in North America.

4.3.2 The Institute of Transportation Engineers

The Institute of Transportation Engineers (ITE) published Speed Zone Guidelines, which outline a procedure for setting a speed limit other than the statutory speed limit. In brief, the recommended practice is that speed limits be established on the basis of an engineering study that should include an analysis of the current speed profile. The speed limit should be set at or near the 85th percentile speed, or the upper limit of the 16 km/h (10 mph) pace. The 16 km/h (10 mph) pace, is the 16 km/h (10 mph) range encompassing the greatest percentage of all the measured speeds in the speed study. The guidelines go on to indicate that the engineering study may also include consideration of roadway geometry, roadside development, surface condition, vulnerable road users, collision experience, and the speed limits of adjoining road sections.

4.3.3 Northwestern Speed Zoning Technique

A slight modification on the 85th percentile method is the Northwestern (NW) Speed Zoning Technique. The NW technique starts by using the measured/observed 85th percentile speed (gathered from speed studies conducted in accordance with ITE Guidelines) as a base speed limit, and then modifies it based on environmental, geometric, and traffic conditions. The conditions considered are driveway density and type, length of the proposed speed zone, lane and shoulder width, street classification, median presence and type, pedestrian and parking activity, horizontal and vertical alignment, and collision history.

There is little information available on its origin, and less documentation on its effectiveness. It is more complex than using the 85th percentile speed, but there is no evidence that it is any better than the latter method.

4.4 Current Ontario Practice

A survey was conducted of selected Ontario road authorities. The survey purpose was to ascertain the methods being used to set speed limits in other municipalities, and to assess their technical staffs' degree of satisfaction with their current method.

A total of twenty-six surveys were sent to municipalities in southern Ontario. Fourteen of the surveys were completed for a response rate of 54%. Eleven of the fourteen responding municipalities do not have a written method or process of setting speed limits in their jurisdiction. Of the municipalities that have written policies, most use the Northwestern Speed Zoning Technique or some modification of it. Only the Cities of Burlington and Kingston indicated that they have evaluated their speed limit setting method. The degree of satisfaction with the current Ontario methods (including case-by-case assessment) stands at 50% (seven of the fourteen responding municipalities).

The two most mentioned reasons for setting speed limits are safety and speed control. It is interesting to note that eleven of the fourteen respondents indicate that speed control is one of the purposes for setting speed limits. This, despite the overwhelming scientific evidence that indicates speed limits have a negligible effect on actual travel speeds. The factors that are most often considered by municipalities in selecting an appropriate speed limit are the prevailing speed of traffic, the design speed, roadway geometry, and the setting (i.e. urban, rural).

4.5 Proposed Policy Highlights

Regulations are in place for the extremes of society, not for the norms. Speed limits should not make reasonable people acting in a reasonable manner into law-breakers. Using this principle, it is equitable to set speed limits for those recurring conditions and situations that encourage faster, yet safe travel. This means that maximum speed limits should be set assuming daylight, dry roads with good pavement, clear visibility, and light traffic volumes.

In reviewing the various methods that are used to establish speed limits and the results of the survey of other municipalities it became evident that no one method was preferred and for the most part, warrants or policies were not in place. In addition, from the results of the study, not one of the well-known techniques described above had been acknowledged as the single best method to set an “appropriate” speed limit. Therefore, based upon the results of the review undertaken and the most recent available research information, the recommendation was to combine the more effective components of some of the existing techniques to establish the policy for setting speed limits on Regional Roads.

4.5.1 Regional Roads

The following conditions are the basic elements proposed to establish speed limits on Regional Roads.

- As a base condition, speed limits on York Region roads shall be between 50 km/h and 80 km/h and set at the 85th percentile speed of free-flow traffic.
- The minimum length of a speed zone to be as follows:
 - In rural areas, preferably two kilometres with a minimum of one kilometre.
 - In urban areas, preferably one kilometre with a minimum of 500 metres.
- Urban roadways with a driveway density of 13 driveways or more, on one side of the roadway, be considered for a speed limit lower than the 85th percentile speed.
- When the product of the eight-hour vehicular volume and the eight-hour pedestrian volume is greater than 1,000,000, then consideration be given to reducing the speed limit from the 85th percentile speed. The reduced speed limit to be within 20 km/h of the upstream speed limit to maximize the chance of compliance.

4.5.2 School Areas

The following conditions are the basic elements proposed to establish a reduced speed limit within a school area on a Regional Road.

- Requests for a change to a speed limit in a school area shall be made by the school Principal or the School Board.
- To be eligible, the road must be contiguous to a school and have a minimum of 200 students.
- If the collision record indicates that the safety performance of the road is worse than expected/predicted and alternative countermeasures have not been effective in improving the safety performance, a reduced school zone speed limit shall be considered.

- Qualifying schools shall be ranked/prioritized based upon potential conflicts and safety of pedestrians using peak hour pedestrian and volume information.
- If a school zone speed limit is warranted, it shall only be in effect during the times of the day that students are walking to and from school, as prescribed by municipal by-law.
- A school zone speed limit may be up to 20 km/h lower than the speed limit on the adjacent road sections.

5. FINANCIAL IMPLICATIONS

The costs associated with the manufacture and installation of signage for posted speed limits and school zones speed limits will be incurred within the proposed 2004 Business Plan and Budget for the Roads Transportation Branch.

6. LOCAL MUNICIPAL IMPACT

This report provides the Region with a proposed policy that addresses the establishment of speed limits along the Regional road network that is credible, technically sound and consistent.

7. CONCLUSION

The Region routinely undertakes investigations into the need for revised speed limits on the Regional road network. These investigations are generally initiated by requests from the public or elected representatives and the ongoing monitoring of the road network. Regardless of the reason for the investigation, there is a need for a credible, technically sound and consistent method of determining an appropriate speed limit.

This report presents the results of a review undertaken by an independent consultant, to review the process in establishing speed limits and make recommendations for any changes to the process and establish a warrant. Regional staff concurs with the findings and recommendations in the consultant's report and recommends that the attached policy (*see Attachment 1*) be adopted by Regional Council for establishing speed limits along the Regional road network.

The Senior Management Group has reviewed this report.

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Attachment (1)
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