Transportation Services

595 9th Avenue East, Owen Sound, ON N4K 3E3
519-376-7337 / 1-800-567-GREY / Fax: 519-376-0967

April 24, 2024

Shawn Everitt, Chief Administration Officer
32 Mill Street, P.O. Box 3110
Thornbury, ON N0H 2P0

RE: Traffic Management Measures – Grey Road 40 at the intersections of Grey Road 13, and Grey Road 2.

Dear Mr. Everitt:

I am writing in response to your request for information regarding the traffic safety measures included in the intersection configuration at Grey Road 40 and Grey Road 2 as well as Grey Road 40 and Grey Road 13. Please see below for the comments specific to each intersection.

Both intersections are controlled with a stop sign for traffic travelling east west on GR 40. North south traffic travelling on GR 2 and 13 has the right of way. Considerations for traffic safety include safe intersection sight distance, sight triangles, and stop signs to name a few.

According to the American Association of State Highway and Transportation Officials (AASHTO) and Transportation Association of Canada (TAC), drivers perceive the space available to them to merge into traffic differently based on the speed travelled by through traffic at rural and semi-urban intersections. At higher speed roads, the sight distances are effectively reduced. Using this principle, AASHTO have developed time-based sight distances to be incorporated into the design process to ensure drivers have a safe opportunity to merge. TAC adopted these design standards, and they are what County staff utilize to ensure intersections provide enough sight distance to drivers.

Ontario Traffic Manual - Book 5 (Regulatory Signs) indicates that a Stop Sign (Ra-101) must be used at the junction of two major County or Regional roads where the posted speed limit is greater than 70 km/h. Appropriately spaced Stop Ahead Signs (Wb-1) are to be used in conjunction with each Stop Sign.

Rumble strips have proven to be ineffective in deterring drivers from failing to stop. Considering this, the County has stopped installing them as they are both a source of noise pollution and create a failure point in the asphalt where they are installed.

Grey Road 40 at Grey Road 2:

Sight distances for drivers were measured for each leg of the intersection. In each direction, the sight distances exceeded well over 600 m. The sight distances at the intersection are greater than that required by table 9.9.4 of Chapter 9 of TAC's Geometric Design Guideline for Canadian Roads.

Table 9.9.4: Design Intersection Sight Distance – Case B1, Left Turn From Stop

Design Speed (km/h)	Stopping Sight Distance (m)	Intersection Sight Distance for Passenger Cars	
		Calculated (m)	Design (m)
20	20	41.7	45
30	35	62.6	65
40	50	83.4	85
50	65	104.3	105
60	85	125.1	130
70	105	146.0	150
80	130	166.8	170
90	160	187.7	190
100	185	208.5	210
110	220	229.4	230
120	250	250.2	255
130	285	271.1	275

Regarding the Stop signs, for both the eastbound and westbound traffic, 120 cm (Ra-1101) signs have been installed complete with a supplementary red flashing beacon for each sign. It should be noted that the Ontario Traffic Manual – Book 5 (Regulatory Signs) indicates where the posted speed limit is greater than 70 km/h, the smaller 75 cm stop sign (Ra-101) should be used. Through the observation of collisions and requests for the public, the larger stop signs and flashers were installed to improve the safety at this intersection.

Eastbound traffic is presented with a Stop Ahead (Wb-101) and Cross Traffic Does Not Stop sign (Wa-19) with supplemental amber flashing beacon prior to approach of the Stop sign at Grey Road 2. For eastbound traffic, a 120 cm Stop Sign (Ra-1101) has been installed

complete with a supplementary red flashing beacon. This is the most robust configuration available under best practices.

Westbound traffic is presented with the same sign configuration as Eastbound traffic prior to approach of the Stop sign at Grey Road 2. For westbound traffic, a 120 cm Stop Sign (Ra-1101) has been installed c/w a supplementary red flashing beacon.

A century streetlight is also present on the southwest corner of this intersection.

Per the Town of The Blue Mountains report FAF.23.1146, the 85th-percentile vehicular speed on Grey Road 2 at Grey Road 40 is 90Km/h. This is well within the acceptable deviation from the posted limit of 80 km/h.

This report also provided information from the Blue Mountains OPP Detachment that 11 collisions at this intersection have taken place over the last 10 years. Of these collisions, the charges laid are due to driver error (Failure to Stop and Stop at Stop Sign and Proceeding and Failing to Yield to Through Traffic).

Crash Rate:

The number of accidents at an intersection per year (also known as Crash frequency) alone is often inadequate when comparing multiple intersections or prioritizing locations for improvement. Crash rates can be an effective tool to measure the relative safety at a particular intersection. The ratio of crash frequency (crashes per year) to vehicle exposure (number of vehicles entering the intersection) results in a crash rate. Crash rate analysis can be a useful tool to determine how a specific intersection compares to the average intersection on the roadway network.

Crash rates can be calculated using the following widely accepted equation. This equation can be used for any crash type or severity. The intersection crash rate based on vehicles entering the intersection is calculated as:

$$R = \frac{1{,}000{,}000\ x\ C}{365\ x\ N\ x\ V}$$

Where:

R = Crash rate for the intersection expressed as crashes per million entering vehicles

C = Total number of intersection-related crashes in the study period

N = Number of years of data

V = Traffic volumes entering the intersection daily (AADT for both roads)

For the Grey Road 2 and Grey Road 40 intersection, the following values were used as part of the calculation for crash rate:

C = 11 crashes at the intersection

N = 10 years of data

V = 4,650 AADT (2,200 AADT on Grey Road 2 and 2,450 AADT on Grey Road 40)

From these values, a crash rate is calculated as follows:

$$R = \frac{1{,}000{,}000\ x\ 11}{365\ x\ 10\ x\ 4{,}650}$$

R = 0.65 accidents per million vehicles

Although the County of Grey does not determine crash rates for all intersections on a standard basis, a crash rate of 0.65 accidents per million vehicles is considered low. In many other jurisdictions throughout the US where crash rate data is collected more frequently for two-way stop-controlled intersections, an average crash rate of 0.3 to 0.4 accidents per million vehicles is common. Most jurisdictions typically only list intersections where the crash rate is higher than 1.0 accident per million vehicles within their reporting of unsafe intersections. For further context, many of the worst intersection crash rates in these reports are between 2-3 accidents per million vehicles. Although the goal is a target of zero collisions, statistically this intersection is still considered to be of low to medium risk.

Future improvements:

Grey Road 40 at Grey Road 2 is identified in the County's Development Charges By-Law as being reconstructed as a roundabout in 2035. Generally, incidents of collision increase in the first year after a stop controlled or signalized intersection is replaced by a roundabout. However, these collisions are considered lower risk due to the reduced speeds and angle of impact, and over the long term, roundabouts provide a safer intersection with fewer collisions.

Grey Road 40 at Grey Road 13:

Sight distances for drivers were measured for each leg of the intersection. For traffic turning from Grey Road 40 on to Grey Road 13, the sight distances were 550 m and 600 m. Both distances exceed the TAC standards found in table 9.9.4 of Chapter 9 of TAC's Geometric Design Guideline for Canadian Roads.

Regarding the Stop signs, for both the eastbound and westbound traffic, 120 cm (Ra-1101) signs have been installed complete with a supplementary red flashing beacon for each sign. It should be noted that the Ontario Traffic Manual – Book 5 (Regulatory Signs) indicates where the posted speed limit is greater than 70 km/h, the smaller 75 cm stop sign (Ra-101) should be used. Through the observation of collisions and requests for the public, the larger signs and flashers were installed to improve the safety at this intersection.

Eastbound traffic is presented with a Stop Ahead (Wb-1) prior to approach of the Stop sign at Grey Road 2. For eastbound traffic, a 120 cm Stop Sign (Ra-101) has been installed complete with a supplementary red flashing beacon. Stop bar paint marking spaced at decreasing distance from one another has been installed in place of rumble strips. The effectiveness of these markings is unclear, especially as they are non-standard and may be confusing to non-local drivers.

Westbound traffic is presented with a Stop Ahead (Wb-1) prior to approach of the Stop sign at Grey Road 2. For westbound traffic, a 120 cm Stop Sign (Ra-101) has been installed complete with a supplementary red flashing beacon. This leg has the same Stop bar paint marking spaced at decreasing distance from one another as the eastbound direction in place of rumble strips. The effectiveness of these markings is unclear, especially as they are non-standard and may be confusing to non-local drivers.

A century streetlight is also present on the northeast corner of this intersection.

Town of The Blue Mountains report FAF.23.1146, did not indicate speed data for this intersection. As part of the County's traffic count program, the County does have speed data relating to this location. The 85th-percentile vehicular speed on Grey Road 13 at Grey Road 40 is 88 km/h. This is well within the acceptable deviation from the posted limit of 80 km/h.

This report provided information from the Blue Mountains OPP Detachment that 7 collisions at this intersection have taken place of the last 10 years. Of these collisions, the charges laid are due to driver error (Failure to Stop and Stop at Stop Sign and Proceeding and Failing to Yield to Through Traffic).

Crash Rate:

For the Grey Road 13 and Grey Road 40 intersection, the following values were used as part of the calculation for crash rate:

C = 7 crashes at the intersection

N = 10 years of data

V = 4,650 AADT (2,500 AADT on Grey Road 13 and 2,150 AADT on Grey Road 40)

From these values, a crash rate is calculated as follows:

$$R = \frac{1{,}000{,}000\ x\ 7}{365\ x\ 10\ x\ 4{,}650}$$

R = 0.41 accidents per million vehicles

As mentioned previously, an average crash rate of 0.3 to 0.4 accidents per million vehicles is common. Although the goal is a target of zero collisions, statistically this intersection is still considered to be of low risk.

Future improvements:

Currently there are no plans to improve the intersection of Grey Road 40 at Grey Road 13. There will be a small improvement to the southwest radius made to improve egress for right turning commercial vehicles during the reconstruction of Grey Road 40 in 2024.

As demonstrated throughout this report, the County takes road safety very seriously. Achieving the standards and best practices for road geometrics, markings, and signage is the benchmark that our road network is based. However, regardless of the standards applied, the goal is to balance factors such as level of service, risk for all users, environmental impact, and cost. Risk management in design entails two main strategies: reducing low likelihood but high impact risks and addressing high incidence but low impact risks.

Please feel to reach out if you have any questions about the content contained herein.

Thank you.

Sincerely,

Trevor Ireton
Engineering Manager, Transportation Services
www.grey.ca