March 29, 2019

Mr. Yves Rousselle
1560 Laurier Street
Rockland, Ontario K4K 1P7

Dear Sir:

RE: ROADSIDE SAFETY REVIEW MEMORANDUM– BASELINE ROAD

Introduction

At the request of the City of Clarence-Rockland, HP Engineering has conducted a roadside safety review of Baseline Road between civic address 1063 Baseline Road and 1082 Baseline Road. The area in question is for the curve in the roadway resulting in eastbound traffic turning northbound (see attached photo 1for site map).
The City had reported that multiple vehicular accidents had occurred for vehicles travelling east bound on Baseline road travelling into the curve. The City and nearby residents have expressed concern of the repeated accidents. The purpose of the review is to assess the need for additional protective measures (e.g. traffic signage, guiderail, etc.). As part of the review, a site inspection was completed on December 4, 2018.

Existing Information:

- Roadway cross-section consists of two-3m wide lanes and two-2m wide gravel shoulders.
- The speed limit was noted to be 80km/hr on Baseline Road; it is reduced to 40km/hr approximately 160m west from the start of the curve.
- A total of 3 chevron alignment signs (Wa-9) were observed on the shoulders of the roadway within the curve; the signs are located approximately 2.5m to 4.5m away from the edge of the driving lane (painted white line)
- A winding road sign (Wa-6L) is located approximately 115m west from the start of the curve.
- A steep hill sign (Wa-21) is located approximately 95m west from the start of the curve.
- No traffic barrier is present in advance or along the curve.
- No existing drawings of the roadway geometry /drainage design were available; a roadway curve radius of approximately 60m was determined using satellite imagery of the roadway.

Photos identifying the existing site conditions are attached to this memo.

Recommendations:

Based on our site inspection and review of existing design guidelines, the following recommendations which are presented:

Speed limit reductions should only be decreased in maximum increments of 20km/hr; therefore, a speed zone of 60km/h should be implemented between the current 40km/h and 80km/h speed zones. In addition, a 'maximum speed ahead' signs (Rb-5) should be installed a minimum of 100m ahead of the start of the 60km/h and 40km/h speed zones.

In order to satisfy current design guidelines and based on a review of the surrounding area, it is recommended that the start of the 60km/h speed zone be implemented between the intersection of Baseline Road and St-Jean / Filion Road, and the current location of the 40km/h speed zone. Therefore, a 'maximum speed ahead' sign (Rb-5) for 60km/h should be installed 50m east of the intersection and a 'maximum speed begins' sign for 60km/h (Rb-3) should be installed 150m east of the intersection. A 'maximum speed ahead' sign for 40km/h (Rb-5) should also be installed 100m west of the existing 'maximum speed begins' sign for 40km/h speed zone.

It is recommended to install a minimum of 4 chevron alignment signs (Wa-9) spaced at maximum 15m within the curve. An additional chevron alignment sign (Wa-9) should also be installed 30m west from the beginning of the curve.

It is recommended that the winding road sign (Wa-6L) be replaced with a turn sign (WA-1L) with an advisory speed tab of 30km/h (Wa-7t). It is also recommended that the remainder of the curved roadway be examined for similar requirements (e.g. installing a series of turn signs [WA-1L or WA-1R] with advisory speed tabs to fully indicate each turn in the curve).

We have also examined the requirement / warrant for a traffic barrier at this location. Although there are no defined hazards that require protection (i.e. no hazards within clear zone width of 3m from edge of driving lane based on MTO *Roadside Design Manual)* and the adjacent roadway embankments do not warrant protection (i.e. embankment height less than 3m); the reported history of operational issues (i.e. accidents) may warrant the installation of a traffic barrier.

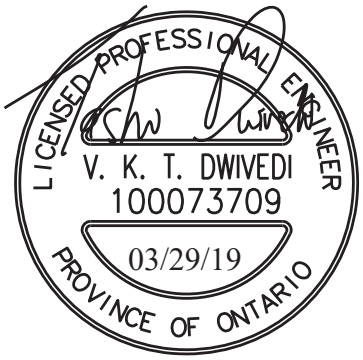
Further to the above, it is our understanding that the City intends to install a 3-cable guiderail at this location. It is our opinion that installing a barrier (along with the signage as recommended above) will increase the overall safety of this section of roadway therefore we have no objections. Alternatively to a 3-cable guiderail, a single steel beam guiderail on steel posts could be installed as well. Note that it appears that a private entrance is located along the curve on the east side of the roadway. The location of the entrance may interfere with the installation of a traffic barrier; therefore, this should be confirmed prior to the installation.

It should be noted that based on the estimated curve radius of 60m, a pavement superelevation should be implemented to the roadway in order to meet requirements specified in the MTO's *Geometric Design Standards for Ontario Highways*. Based on our visual observations on site, the roadway did not appear to be superelevated. It is recommended that this be confirmed by performing a topographical survey on the curve to confirm the curve radius and determine the transverse slope of the roadway (i.e. cross-fall or superelevation). Once this information is obtained, a further review of the adequacy of the roadway cross-falls can be completed.

Although the mandate of our assignment was limited to the section of the curve identified in the above report (see attached photo 1 for site map); it may be prudent for the City to perform a similar assessment on the remainder of the curve section to determine if any other additional protective measures are required / warranted.

Should you have any questions or require further information, do not hesitate to contact the undersigned.

Regards,



Julien Quirion, M.Eng. EIT
Structural Designer / Inspector

Tashi Dwivedi, P.Eng.
Principal

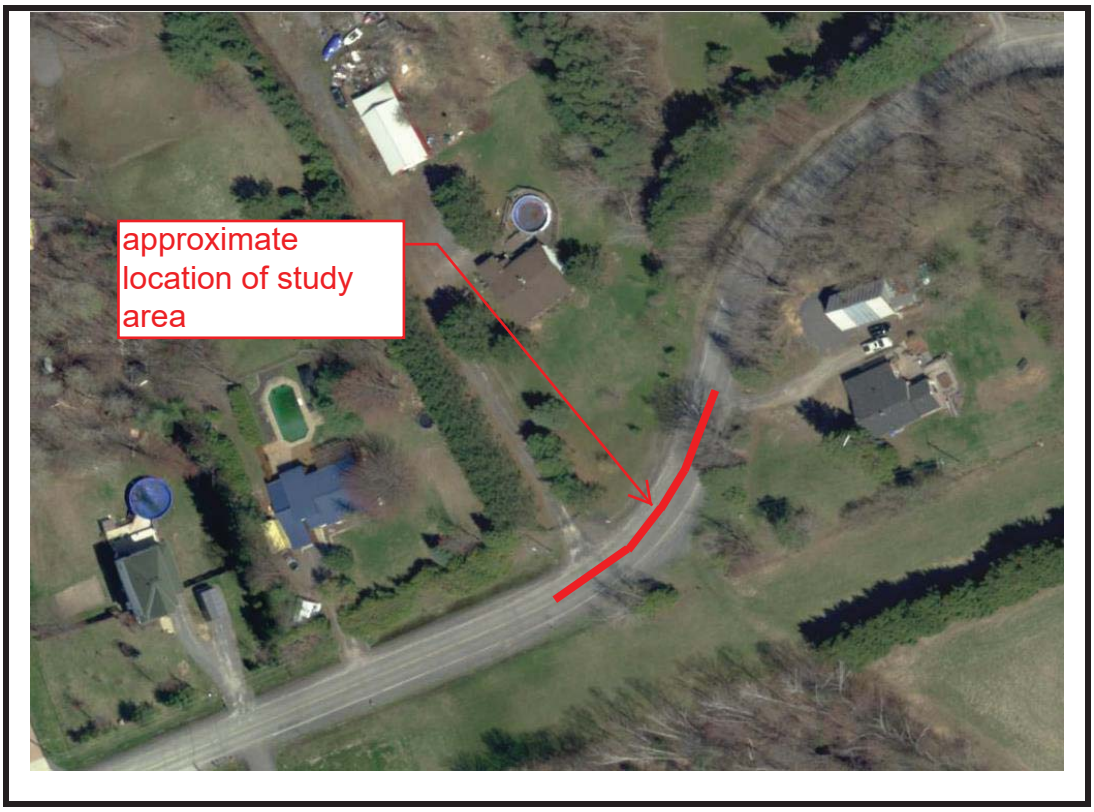


Photo 1 Plan View – Baseline Road

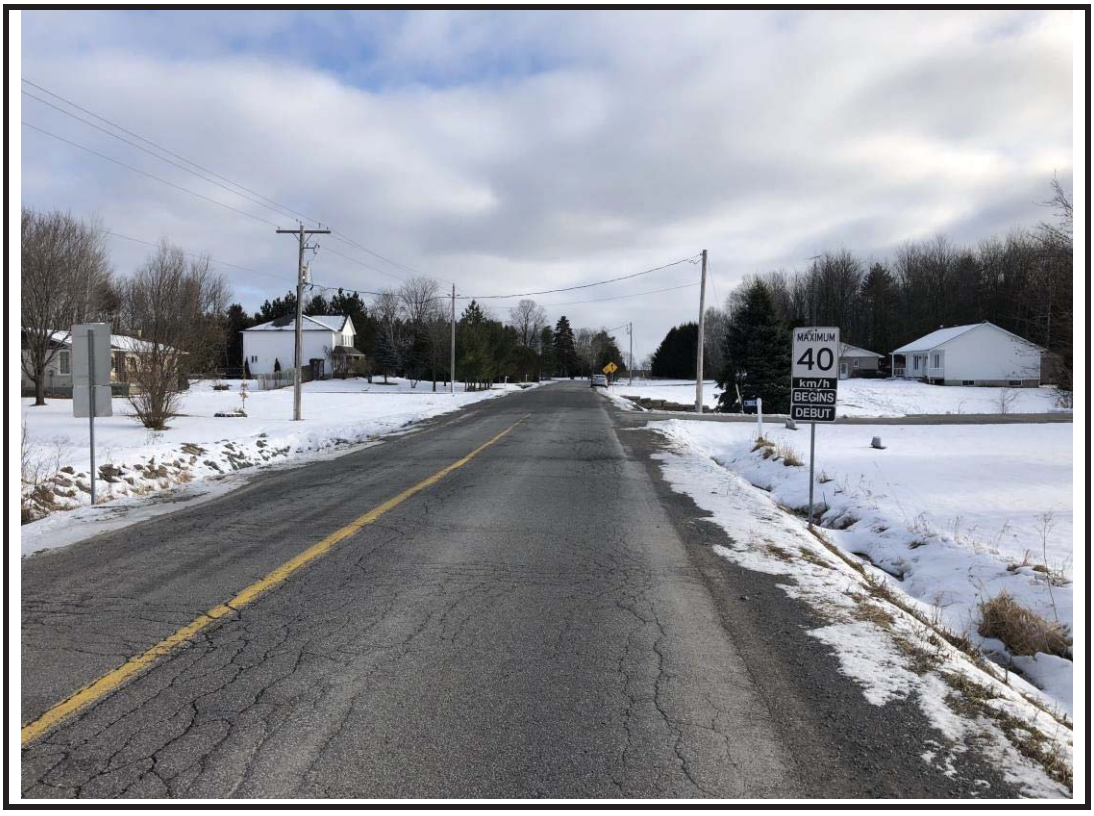


Photo 2 Baseline Road (looking east) – 40km/hr speed limit sign

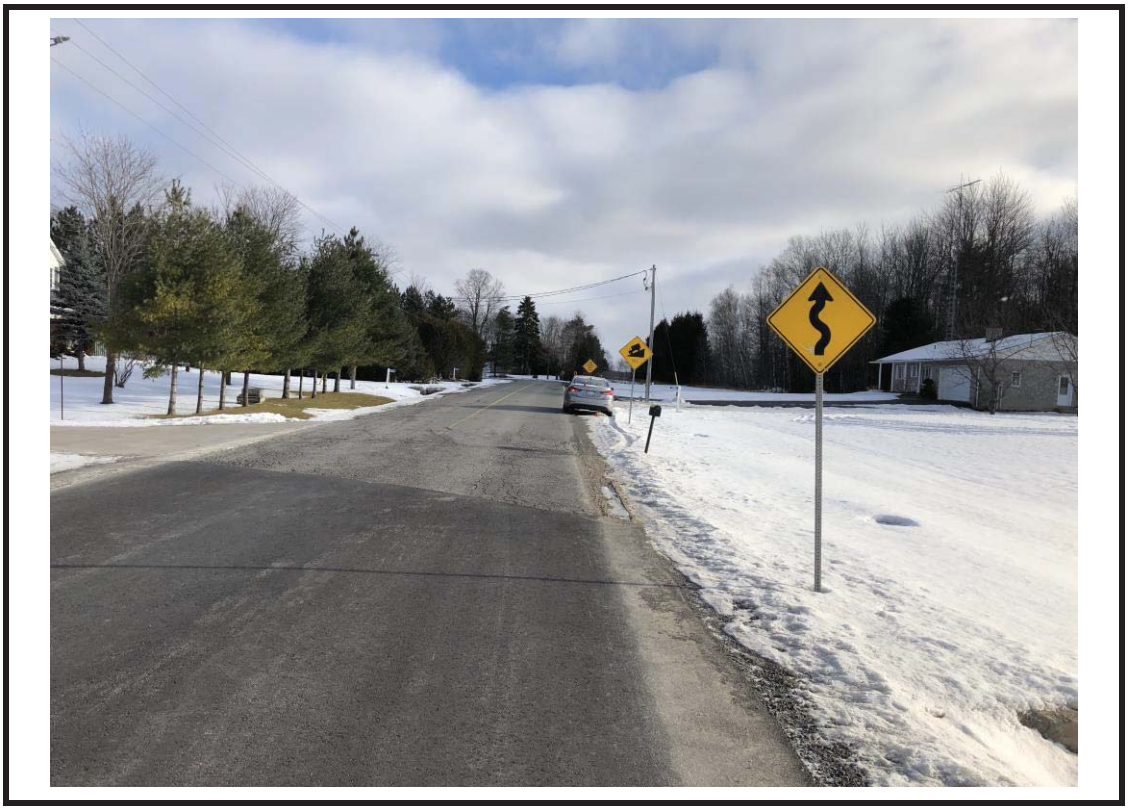


Photo 3 Baseline Road (looking east) – Winding Road Sign (Wa-6L)

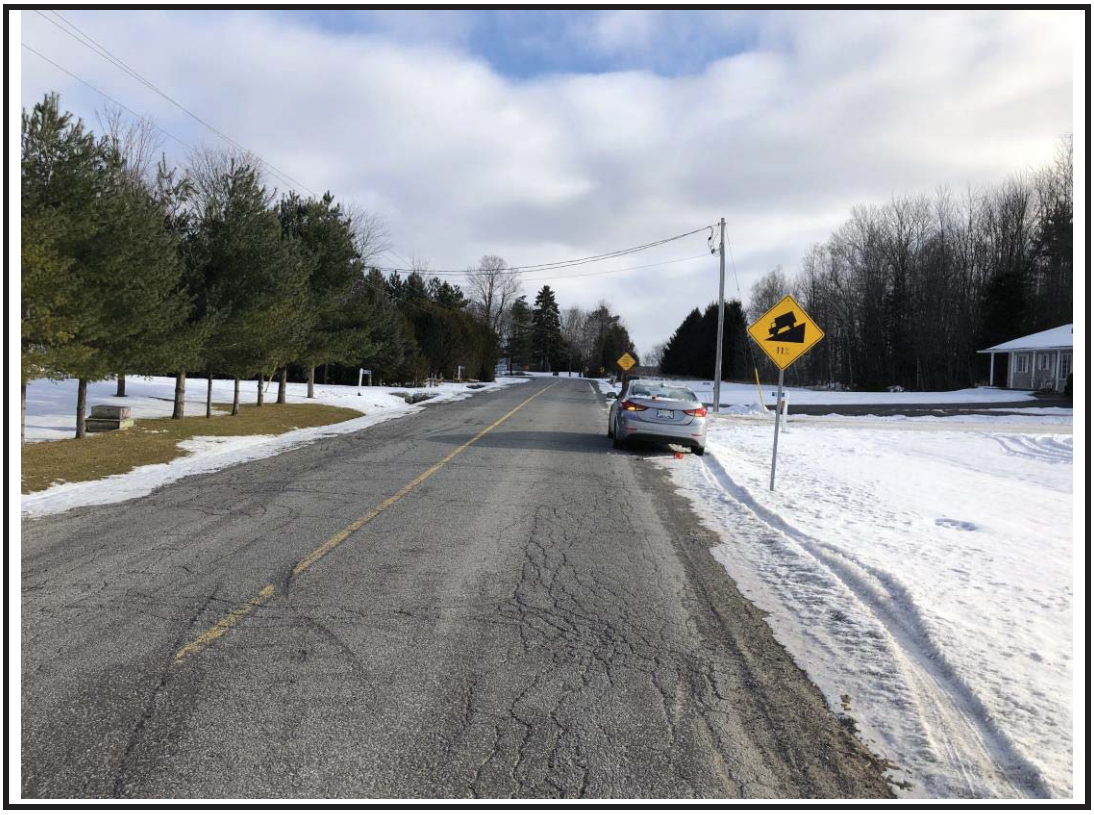


Photo 4 Baseline Road (looking east) Steep Hill Sign (Wa-21)

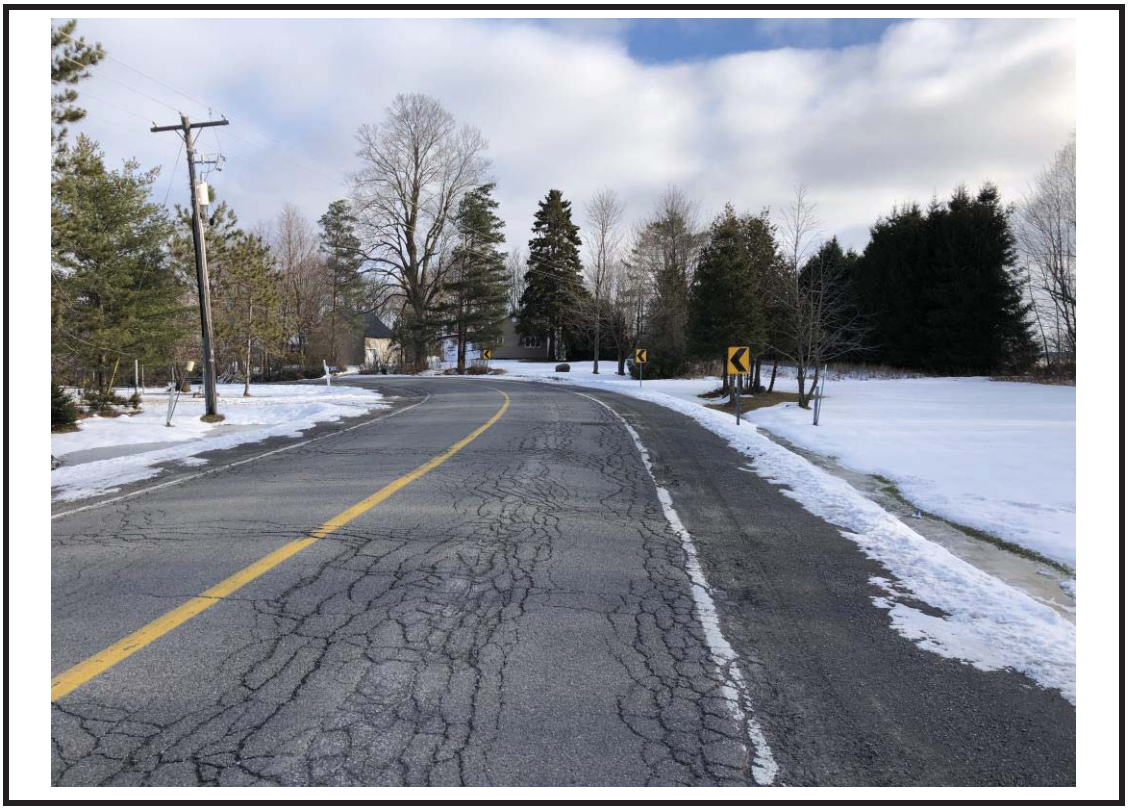


Photo 5 Baseline Road (looking east) – Chevron Alignment Sign (Wa-9)