

April 17, 2018

Town of Richmond Hill
Planning and regulatory Services
225 East Beaver Creek
Richmond Hill, ON L4B 3P4

Attention: Ahsun Lee, P.Eng.
Transportation Engineer

**RE: Roundabout Operational Review
Tower Hill Road at Selwyn Road and Rollinghill Road
Town of Richmond Hill**

Dear Ahsun,

CIMA+ has undertaken an operational review of two roundabouts along Tower Hill Road in the Jefferson subdivision: at Selwyn Road and at Rollinghill Road. The review is in response to complaints received from residents about conditions at the roundabouts for pedestrians. The outcome of the review is a list of recommended remedial measures, and a discussion regarding a school crossing guard at the Selwyn Road roundabout.

Background and Site Context

Tower Hill Road is an east-west residential collector street, while Selwyn Road and Rollinghill Road are north-south local streets. All have a pavement width of 9.75 metres and a statutory speed limit of 50 km/h. Bathurst Street is located approximately 400 metres west of Selwyn Road. William Neal Community Park and Beynon Fields Public School are situated in the northwest corner of the Selwyn Road intersection. York Region Transit route 81 provides peak hour service through both roundabouts.

Each roundabout has an inscribed circle diameter (ICD) of 32 m, with a circulatory road width of 6 m and a truck apron width of 2.5 m. This leaves a central island diameter of 15 m. Entries and exits are about 6 m wide at the ICD perpendicular to the outer curbs. The splitter islands have rolled curb and so are fully-mountable. Pedestrian crosswalks are cut through the splitter islands and are set back 1.5 m at their closest point to the ICD. Typically crosswalks are set back one vehicle length, or about 6 m, so pedestrians can walk behind a queued vehicle. The roundabouts are shown in Figures 1 and 2.

Three similar roundabouts are located to the east and south, at Selwyn Road and Heathside Road/Alpaca Drive, Tower Hill Road and Wicker Drive/Mockingbird Drive, and Rollinghill Road and Glenis Gate.

A previous review was undertaken by Synectics entitled *Traffic Circles in Richmond Hill: Review of Existing Design and Development of Improvement Alternatives* (February 2005). At the time the five locations were traffic circles, with small central islands and little speed control. The review recommended that the circles be converted to roundabouts by making the central islands larger, extending centreline markings around the splitter islands, offsetting edge line markings from the outer curbs, and installing additional signage. It appears the changes were carried out, although the offset edge line markings are only in place at some entries.



Figure 1 – Looking East at the Selwyn Road Roundabout (Google)



Figure 2 – Looking West at the Rollinghill Road Roundabout (Google)

Current Conditions at the Roundabouts

Motor Vehicle Speeds

Pioneering research undertaken in the United Kingdom concluded that motor vehicle speed is a useful proxy for safety potential at a roundabout. If vehicle speeds are not sufficiently controlled then the likelihood of drivers yielding at an entry is reduced, which increases the potential for entry-circulating crashes and conflicts with pedestrians.

Speed control is measured by drawing fastest paths through a roundabout in accordance with industry procedures. A fastest path is the smoothest, flattest path possible for a passenger car in the absence of other traffic at a roundabout. An arc is overlaid over the portion of the path that has the most curvature (the controlling portion of the arc) and its radius measured. This radius is the entry path radius, and it can be converted to a fastest-path speed using a speed-radius equation.

Fastest-path speeds at the Selwyn Road and Rollinghill Road roundabouts were measured to be between 39 km/h and 49 km/h. See Figure 3.

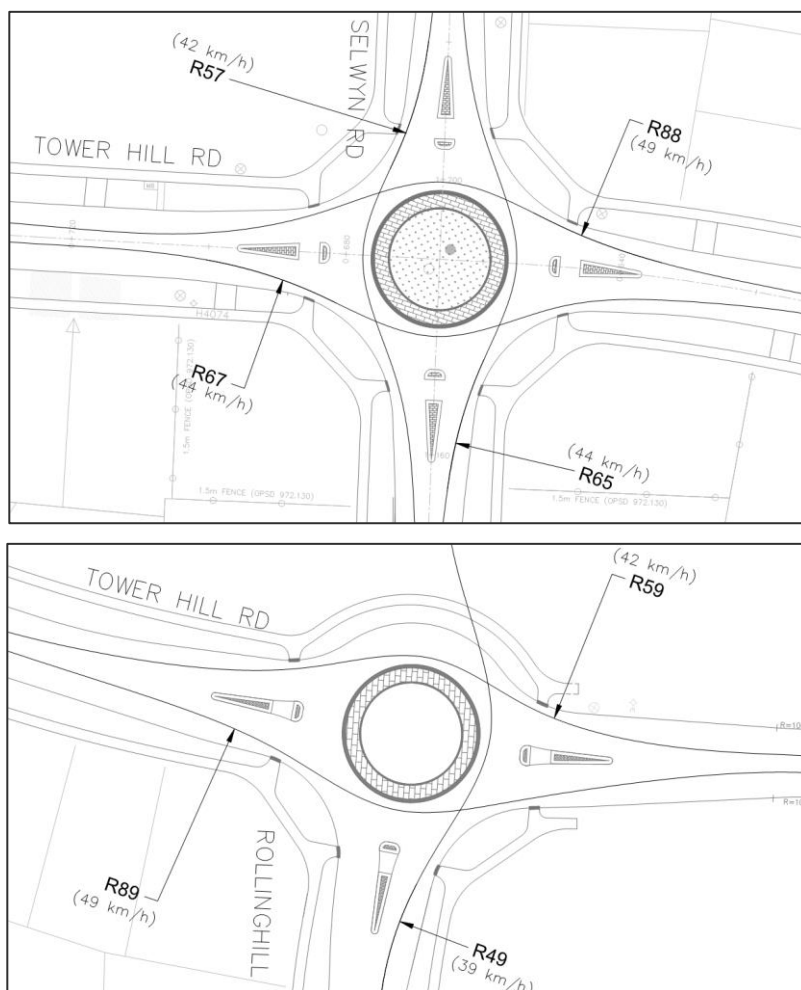


Figure 3 – Fastest-Path Determination at the Roundabouts

These are theoretical attainable speeds, not design or 85th percentile speeds. Most of them are somewhat high for roundabouts in a residential context. According to data from the Town average mid-block speeds on neighbouring streets are between 43 and 52 km/h, so speeds at the roundabouts are not always significantly lower. It probably appears to the public that, depending on direction of travel, some drivers tap their brakes to slow down a little at the roundabouts, but not much unless other traffic is present. So the roundabouts sometimes effect little, if any, change in motor vehicle speeds.

Field Observations

During a field visit on February 8, 2018, it was confirmed that many drivers did little to slow down as they navigated the roundabouts if it could be determined that no conflicting traffic would be present.

Design Vehicle Accommodation

The roundabouts can accommodate a WB-15 tractor semi-trailer for all movements with the rear wheels over-tracking the central island truck apron, and a B-12 transit bus without use of the truck apron. See Figure 4. A larger but more common WB-17 tractor semi-trailer cannot quite make left turns at the roundabouts.

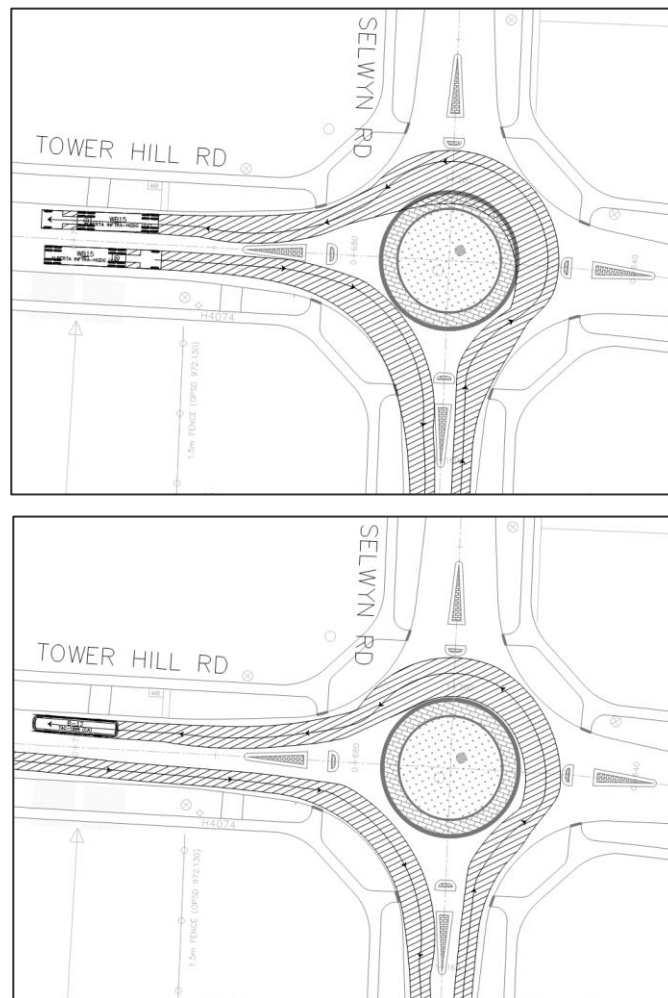


Figure 4 – Example Large Truck and Transit Bus Movements at Selwyn Road

If the roundabouts are to continue to accommodate a WB-15 design vehicle then this limits the range of possible geometric solutions available to lower motor vehicle speeds. In discussions with the Town it was agreed that accommodating a tractor semi-trailer should not be a priority at roundabouts in residential areas so that slower speeds for all users can be achieved.

Proposed Remedial Measures

Short Term-Measures

There are a number of measures that can be implemented at the two roundabouts almost immediately to slow motor vehicle speeds. They consist of signs and markings, and therefore may have a psychological effect on drivers. They include the following:

- Yield line markings at the entries. The markings should be comprised of a 0.6 m line and a 0.6 m gap, to be in conformance with guidance in the MUTCD for Canada 5th Edition, and have a width of about 45 cm.
- Yellow centreline markings with hatching. They should extend around the splitter islands to visually narrow the entries and exits. They are currently in place at some but not all legs of the two roundabouts.
- White offset edge line markings with hatching. Again, they are currently in place at some but not all legs of the two roundabouts.
- Crosswalk markings. They may consist of either parallel lines or zebra markings. Zebra markings in particular would add a transverse visual component to the roadway that may act to slow drivers, but would draw attention to the fact the crosswalks are set back only 1.5 m instead of 6 m.

Another possible measure is a curb extension or bump-out at each entry using flexible posts or delineators. They should physically narrow the entry to about 3.75 m, which is sufficient space for a transit bus or tandem snow plough. The posts would create more lateral deflection for drivers and therefore lower fastest-path speeds by about 2 to 7 km/h depending on roundabout and direction. One drawback to the posts is that they may not look very attractive. Another is that, depending on height, they may obstruct sightlines between drivers and pedestrians. An alternative is rubber parking stops, which come in various colours and styles. The parking stops would need to be accompanied by a Wa-33R object marker.

These measures are shown in Figures 5 and 6 for the west leg of the Selwyn Road roundabout. They may be implemented singly or in combination at each leg of both roundabouts.

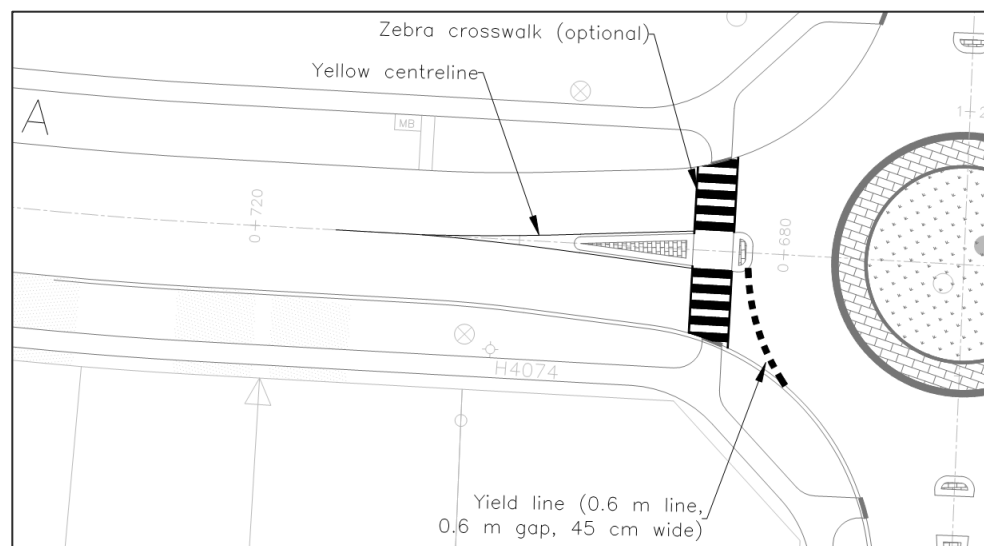


Figure 5 – Example Short-Term Measures

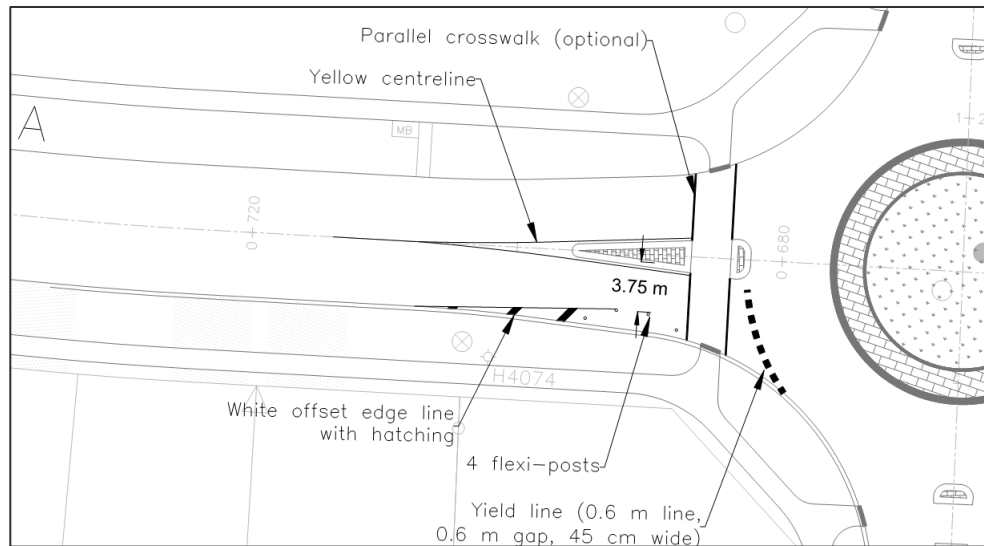


Figure 6 – Example Short-Term Measures

Medium-Term Measures

One medium-term measure was developed: a more permanent version of the curb extension or bump-out at each entry using concrete instead of flexible posts or parking stops. This measure is shown in Figure 4 for the west leg of the Selwyn Road roundabout, accompanied by a Wa-33R object marker and white edge line markings. Again, they should physically narrow the entry to about 3.75 m. The curb extensions would have to be constructed with consideration to avoiding catchbasins and bus stop pads (the latter shown in Figure 6). It is suggested that a gap be left between the curb extension and outer curb of the roundabout to facilitate drainage. Figure 7 shows such a curb extension at a similar roundabout in Vaughan.

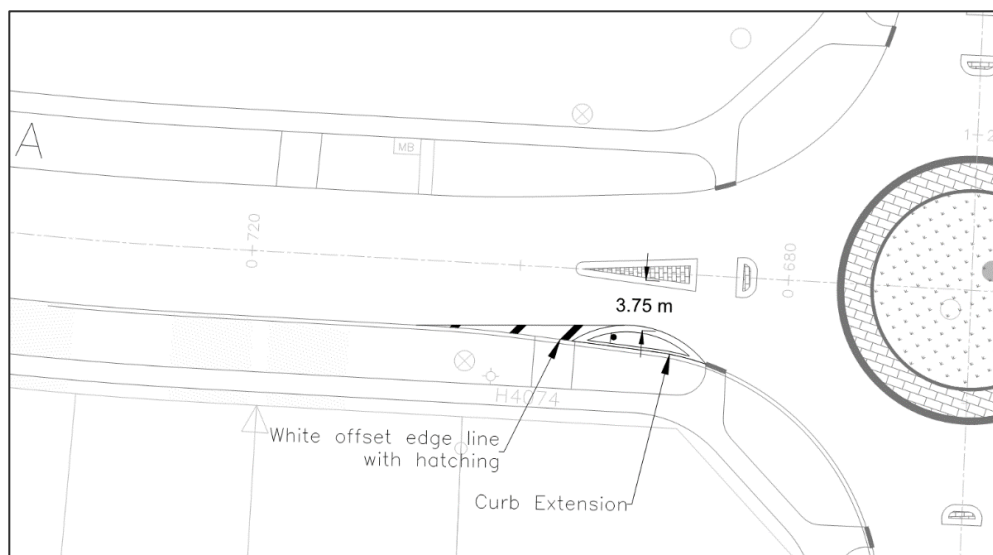


Figure 6 – Medium-Term Measures



Figure 7 – Example Curb Extension at a Roundabout in Vaughan (Google)

Longer-Term Measures

The main purpose of the short- and medium-term remedial measures is to slow motor vehicle speeds, either psychologically or physically. They should address the complaints received about conditions at the roundabouts for pedestrians. However if complaints persist, perhaps because the splitter islands are fully-mountable and crosswalks are set back only 1.5 m instead of 6 m, then the splitter islands could be reconstructed using barrier curb and the crosswalks relocated farther from the roundabout. Figure 8 shows how this could be achieved at the west leg of the Selwyn Road roundabout.

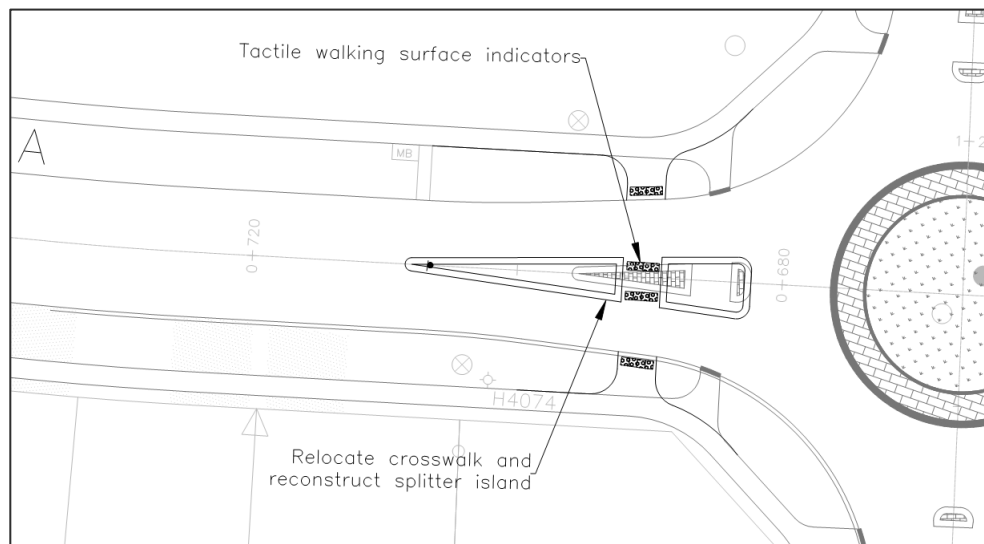


Figure 8 – Longer-Term Measures

Accompanying this reconstruction would be relocation of the boulevard crosswalk connection to the sidewalk, the installation of tactile warning surface indicators (TWSI's) at the end of each crosswalk section, and an Rb-25 Keep Right sign plus Wa-33L object marker at the splitter island bullnose. The curb extensions would have to be removed to maintain a physical narrowing of the entry of about 3.75 m. The result should be a lowering of fastest-path speeds by about 2 to 5 km/h compared to current conditions, depending on roundabout and direction, plus a more typical crosswalk location and pedestrian refuge area.

OTM Book 15 now allows for the introduction of Level 2 Pedestrian Crossovers (PXO's) at roundabouts. The Ra-5 Pedestrian Crosswalk sign conveys legal priority to a pedestrian at a crosswalk not otherwise controlled by a Stop sign or traffic signal. The various figures for roundabouts in Book 15 indicate that crosswalks are to be set back a minimum 12 m from the roundabout ICD. This distance is quite large in a residential setting and would create longer pedestrian travel distances. In the case of the Rollinghill Road roundabout it would also mean interference with driveways on the east and west legs. Therefore the decision whether to implement a Level 2 PXO's at these roundabouts should be made knowing that they would not exactly follow Book 15 guidelines.

School Crossing Guard Discussion

During the field visit it was observed that most pedestrians crossing at the roundabouts did so at the west leg of the Selwyn Road roundabout. This is consistent with pedestrian count information from the Town. So this would be the most logical location for a school crossing guard.

Assuming a Level 2 PXO is not implemented, the decision to introduce a school crossing guard should be made on the basis of the degree of speed control expected to be achieved by the remedial measures at what is considered an uncontrolled crossing location. Among the short, medium and longer-term measures this is likely to happen when a complete set of curb extensions (i.e. all four legs) is installed at the Selwyn Road roundabout, either using flexible posts, parking stops or concrete. Therefore this is the time that a school crossing guard could be introduced.

Recommendations

It is recommended that the following remedial measures be implemented at the Selwyn Road and Rollinghill Road roundabouts as soon as is practicable:

- Yield line markings at the entries.
- Yellow centreline markings with hatching extended around the splitter islands (refreshed where currently in place).
- White offset edge line markings with hatching (refreshed where currently in place).
- Crosswalk markings consisting of parallel lines. Zebra markings may be used instead at the discretion of the Town.

The next remedial measure that should be introduced is a curb extension at each entry. If feasible for the Town it is recommended the curb extensions be constructed out of concrete, similar to the example in Figure 7. If that is not possible within a reasonable period of time then they may be initially installed using flexible posts (provided the posts do not obstruct sightlines between drivers and pedestrians) or rubber parking stops. Curb extensions using parking stops or concrete would need to be accompanied by a Wa-33R object marker.

The cost of seven concrete curb extensions (four at the Selwyn Road roundabout and three at the Rollinghill Road roundabout) is estimated at about \$30,000. However because this would constitute a small project they could cost more if a contractor is not also mobilizing for other similar work with the Town.

If a school crossing guard is to be introduced at the west leg of the Selwyn Rad roundabout then it is recommended it occur at the same time as installation of the curb extensions (whether they be flexible posts, parking stops or concrete).

If after the curb extensions have been in place for some time (i.e. a year) a desire still remains for better conditions for pedestrians, then it is recommended the splitter islands at the two roundabouts be reconstructed. This would include relocating the pedestrian crosswalks one vehicle length from the roundabout ICD, the use of barrier curbs so the islands provide more of a pedestrian refuge, and the installation of an Rb-25 Keep Right signs plus Wa-33L object markers. The new splitter islands would necessitate relocating the boulevard crosswalk connections to the sidewalks, removing the curb extensions, and adding tactile walking surface indicators (TWSI's). It is estimated the new splitter islands would cost \$60,000 to \$120,000 in total for both roundabouts.

We hope the foregoing has been helpful. Please contact me should you have any questions or require further information.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Phil Weber', with a stylized flourish at the end.

Phil Weber, P.Eng.
Senior Project Manager
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/pw