

## Technical Memorandum

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To:	Tom Hanrahan – City of Barrie Jeff Sharp – City of Barrie	From:	John Northcote, P.Eng.
Date:	October 14 <sup>th</sup> , 2018	Project #:	1302
Project Name:	Barrie Lockhart Road LP		
Subject:	Transportation Design Manual – Conformity Review Scott Young – Sorbara Group of Companies		
Distribution:	Ray Duhamel – The Jones Consulting Group Ltd. John Priamo – SCS Consulting Group Ltd.		

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On behalf of our client (Barrie Lockhart Road LP), JD Northcote Engineering Inc. [JD Engineering] has completed a reviewed the attached Conformity Review Plan, as prepared by Jones Consulting Group Ltd. Our review identifies locations within the proposed design that do not conform to the City of Barrie Transportation Design Manual (2017) [City TM]. All non-conforming elements have been assessed to determine if they will result in operational or traffic safety issues. Recommendations for mitigation have been included where necessary.

### 1. Intersection Angle

#### 1.1. City TM Criteria

The Transportation Association of Canada *Geometric Design Guide for Canadian Roads* (2017) [TAC Guidelines] intersection angles less than 70° and greater than 110° are typically not desirable.

#### 1.2. Non-Conformance Location

None

### 2. Intersection Spacing

#### 2.1. City TM Criteria

According to the TAC Guidelines, the typical minimum spacing between adjacent intersections along a collector road is 60 metres. On a local road the minimum spacing between four-legged intersections is 60 metres. On a local road, where adjacent intersections are three-legged, a minimum spacing of 40 metres is acceptable.

#### 2.2. Non-Conformance Location

None

### 3. Driveway Spacing

#### 3.1. City TM Criteria

The TAC Guidelines recommend a 2.0 metre tangent spacing between a driveway and an adjacent intersection (Figure 8.9.2). According to the City Zoning By-law, the minimum driveway setback from the property line for a single detached unit is 0.3m. The following minimum driveway widths have been assumed for the purpose of our analysis:

Single driveway – 3.0 metre wide  
(townhouse, semi-detached, single detached units with less than 10.4 metre frontage)

Double driveway – 5.5 metre wide  
(single detached units with more than 10.4 metre frontage)

3.2. Non-Conformance Location  
None

**4. Road Centreline Radius**

4.1. City TM Criteria

Applying the methodology outlined in the TAC Guidelines, a vehicle can comfortably maintain travelling at the design speed (60km/h) on a road with a centerline radius of 177 metres (with a normal crown in low speed urban environment). Similarly, a vehicle can comfortably maintain travelling at the design speed (70km/h) on a road with a centerline radius of 297 metres (with a normal crown in an urban environment). The City TM identifies a design speed of 60km/h for local roads and 70km/h for collector roads.

Through our discussions with the City, as a general rule, a minimum centerline radius of 177 metres is required on collector roads and 'long' local roads unless there are extenuating circumstances.

4.2. Non-Conformance Location

4.2.1. Street A

Street A (collector road) has been designed with a minimum centerline radius of 184 metres. There are three locations with horizontal curves between the west property line and Street H and two very minor curves at Street M and east of Street M.

4.2.1.1. Analysis

Through our discussions with the City, as a general rule, a minimum centerline radius of 177 metres is required on collector roads and 'long' local roads unless there are extenuating circumstances. The proposed design exceeds this criterion. Furthermore, the sight distance along Street A is significantly greater than the minimum sight stopping distance for a 70km/h road (110 metres). No change in configuration is required.

4.2.2. Street B

Street B (local road) five locations (west of Street H, at Street H, east of Street J and two locations east of Street L) – 74 metre centerline radius.

4.2.2.1. Analysis

Street B is a low volume local road. Furthermore, with the exception of one critical area along Street B near Street H, the sight distance is greater than the minimum stopping sight distance for eastbound and westbound traffic for the design speed (85 metres at 60 km/h). Within the critical area, the sight distance for eastbound and westbound vehicles approaching Street H only meets the minimum stopping sight distance for a design speed of 50 km/h (65 metres). The sight distance for the egress movements from Street H (to the east) also only meets the minimum stopping sight distance for a design speed of 50 km/h (65 metres). Sight distance figure (Figure A) for the critical area is included in the Appendix. In order to control vehicle speed within this area, traffic calming is required. A village square is proposed on the north side of Street B, which requires consideration for pedestrian crossings.

The layout for the institutional property (Block 299), located south of Street B at the west side of the subject site, has not been confirmed at this time. However,

depending on the location of the future driveway, the sight distance may be obstructed by plantings within the northeast corner of the Village Square (Block 297).

The alignment of Street B is constrained to the north by the Environmental Protected lands; however, a road connection between the existing stub on Thicketwood Avenue and the elementary school block is required to provide connectivity. These are considered to be extenuating circumstances, specific to this site, which require some deviation in the City TM requirements. The centerline radius for Street B was reviewed in a meeting with the City's Supervisor of Traffic Services and the Supervisor of Traffic Operations & Community Safety. Consequently, as a result of the site specific constraints at this location, it was agreed that the 177 metre centerline radius was not feasible. Consequently, no change in configuration is required.

#### 4.2.2.2. Recommendation

A raised intersection is recommended at the intersection of Street H / Street B, per the detail provided in the Appendix from the Traffic Calming Policy staff report (dated January 10, 2011). Advance warning signage is recommended for westbound traffic on Street B at the lot line between lot 77 and 78. Advance warning signage is recommended for eastbound traffic on Street B at the lot line between lot 61 and 62. It is recommended that the driveway for lot 64 and 77 are aligned on the east side of the lot, in order to maximize the sight distance for approaching vehicles.

Plantings, berms, signage and structures within an area 5 metres south of the ROW and 25 metres west of the east edge of the block (as illustrated in Figure B in the Appendix), should be limited in height to maximize future sight lines.

#### 4.2.3. Street D

Street D (local road) west of Street F – 14 metre centerline radius around a 90o bend in the road.

##### 4.2.3.1. Analysis

This is a low volume local road. The centerline radius for Street D was reviewed in a meeting with the City's Supervisor of Traffic Services and the Supervisor of Traffic Operations & Community Safety. Consequently, as a result of the low volume of traffic at this location, it was agreed that the proposed 14 metre centerline radius was acceptable. Consequently, no change in configuration is required.

#### 4.2.4. Street H

Street H (local road) south of Street B – 45 metre centerline radius.

##### 4.2.4.1. Analysis

The end of the horizontal curve in Street H is located 20 metres south of the intersection of Street H / Street B. Vehicles approaching from the south will be preparing to stop at the intersection and vehicles approaching from the north will have just made a right or left turn movement from Street B; consequently, excessive travel speed is not anticipated to be an issue at this location. The sight distance for vehicle approaching from either direction is well in excess of the minimum sight stopping distance for the 60km/h design speed. The sight line for vehicles approaching from the south goes through the boulevard, which is expected to include boulevard trees. The centerline radius for Street H was reviewed in a meeting with the City's Supervisor of Traffic Services and the

Supervisor of Traffic Operations & Community Safety Consequently. It was agreed that a reduced centerline radius would be acceptable subject to the provision of acceptable sight distance. Consequently, no change in configuration is required.

4.2.4.2. Recommendation

Rather than eliminating the boulevard trees in this area, which have a number of benefits for active transportation (including, but not limited to traffic calming), it is recommended that a STOP AHEAD sign (Wb-1) is provided near the north lot line between Lot 194 and 195.

4.2.5. Street L

Street L (local road) south of Street B – 45 metre centerline radius.

4.2.5.1. Analysis

The end of the horizontal curve in Street L is located 20 metres south of the intersection of Street L / Street B. Vehicles approaching from the south will be preparing to stop at the intersection and vehicles approaching from the north will have just made a right or left turn movement from Street B; consequently, excessive travel speed is not anticipated to be an issue at this location. The sight distance for vehicle approaching from either direction is well in excess of the minimum sight stopping distance for the 60km/h design speed. The sight line for vehicles approaching from the north goes through the edge of the west boulevard, in an area beyond where boulevard trees would be planted. The centerline radius for Street L was reviewed in a meeting with the City's Supervisor of Traffic Services and the Supervisor of Traffic Operations & Community Safety Consequently. It was agreed that a reduced centerline radius would be acceptable subject to the provision of acceptable sight distance. Consequently, no change in configuration is required.

4.2.6. Street M

Street M (local road) southeast corner – 14 metre centerline radius around a 90° bend in the road.

4.2.6.1. Analysis

This is a low volume local road – no change in configuration is required.

Street M (local road) southwest corner – 14 metre centerline radius around a 90° bend in the road.

4.2.6.2. Analysis

This is a low volume local road – no change in configuration is required.

4.2.7. Street N

Street N (local road) east of Street L – 14 metre centerline radius around a 90° bend in the road.

4.2.7.1. Analysis

This is a low volume local road – no change in configuration is required.

**5. Intersection Sight Distance**

5.1. City TM Criteria

The minimum sight stopping distance according to the TAC Guidelines is 85 metres for a design speed of 60km/h and 105 metres for a design speed of 70km/h.

## 5.2. Non-Conformance Location

### 5.2.1. Intersection of Street H / Street B

Northbound vehicles on Street H have a sight distance of 72 metres to the west.

#### 5.2.1.1. Analysis

As outlined above, the sight distance for the egress movements from Street H (to the east) meets the minimum stopping sight distance for a design speed of 50 km/h (65 metres). Sight distance figure for the critical area is included in the Appendix.

#### 5.2.1.2. Recommendation

As outlined above, a raised intersection is recommended at the intersection of Street H / Street B, per the detail provided in the Appendix from the Traffic Calming Policy staff report (dated January 10, 2011). Advance warning signage is recommended for westbound traffic on Street B at the lot line between lot 77 and 78. Advance warning signage is recommended for eastbound traffic on Street B at the lot line between lot 61 and 62. It is recommended that the driveway for lot 64 and 77 are aligned on the east side of the lot, in order to maximize the sight distance for approaching vehicles.

### 5.2.2. Intersection of Street F / Street D

Northbound vehicles on Street F have a sight distance of 74 metres to the west.

#### 5.2.2.1. Analysis

Vehicles travelling around the bend on Street D will be travelling significantly slower than the design speed; consequently, no additional measures are required.

## 6. **Tangent Length Through Intersection**

### 6.1. City TM Criteria

The TAC Guidelines recommend that intersections are ideally located on tangent sections. The TAC Guidelines also suggest a 20 metre tangent length or more on a minor road at an intersection.

### 6.2. Non-Conformance Location

#### 6.2.1. Street F / Street D

Curve in road south of the intersection.

##### 6.2.1.1. Analysis

Sight distance is not limited by curve in the road, the curve meets the TAC Guidelines for the design speed (60km/h) and the roads are perpendicular at the intersection – no change in configuration required.

#### 6.2.2. Street H / Street B

Street H intersects Street B on a curve

##### 6.2.2.1. Analysis

Roads intersect at 90, which is preferable to skewed intersection. The sight distance from Street H does not meet the decision sight distance requirement for a design speed of 60km/h; however, a raised intersection is proposed to control vehicle speeds in the area. The tangent length at this intersection was reviewed in a meeting with the City's Supervisor of Traffic Services and the Supervisor of Traffic Operations & Community Safety. Consequently, it was agreed that a reduced tangent length would be acceptable subject to the provision of acceptable sight distance. Consequently, no change in configuration is required.

6.2.3. Street L / Street B

There is a short curve in Street B approximately 18 metres west of Street L

6.2.3.1. Analysis

Roads intersect at 90, which is preferable to skewed intersection. The sight distance from Street L exceeds the TAC decision sight distance requirements for a design speed of 60km/h. Since the minimum sight distance criteria are met for both roads – no change in configuration required.

## 7. Summary

Based the above-noted analysis the following mitigation measures are recommended:

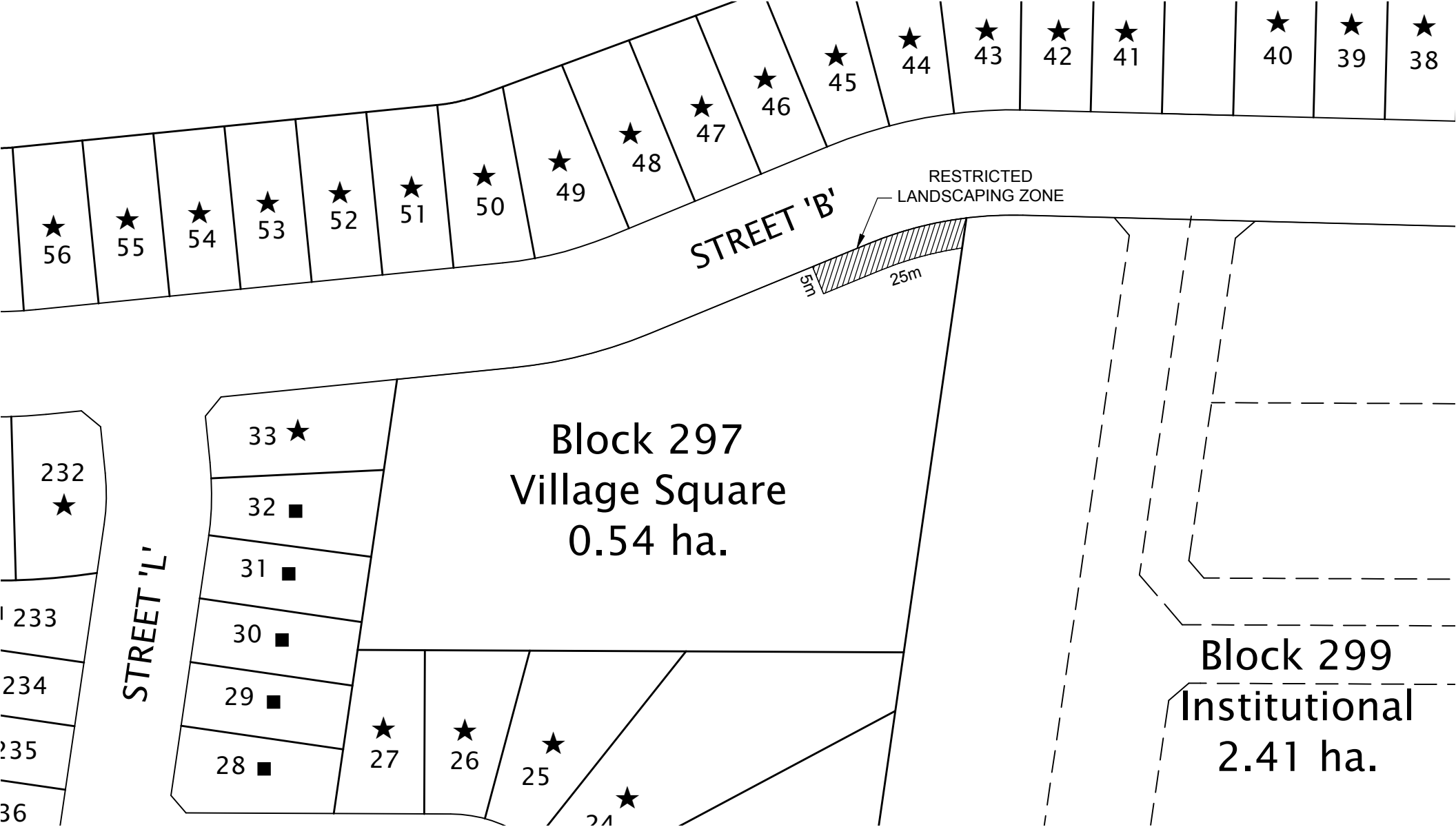
Street H / Street B

- Provide a raised intersection per the detail provided in the Appendix from the Traffic Calming Policy staff report (dated January 10, 2011). Install advance warning signage for westbound traffic on Street B at the lot line between lot 77 and 78. Install advance warning signage for eastbound traffic on Street B at the lot line between lot 61 and 62.
- The driveway for lot 64 and 77 are to be aligned on the east side of the lot, in order to maximize the sight distance for approaching vehicles.
- Limit the height (less than 0.3m) for the plantings, berms, signage and structures within an area 5 metres south of the ROW and 25 metres west of the east edge of the block (as illustrated in Figure A in the Appendix); and
- Install a *STOP AHEAD* sign (Wb-1) near the north lot line between Lot 194 and 195.

We trust you will find this submission acceptable. Should you have any questions or concerns or require any additional information in this regard, please contact our office.

## APPENDIX

FIGURE B





**APPENDIX "E"**

**RAISED INTERSECTION**

**FIGURE 4.2 RAISED INTERSECTION**

