

H.3 – Traffic Signal Warrant Memorandum

Schedule “C” Class Environmental Assessment for Airport
Road from Braydon Boulevard / Stonecrest Drive to
Countryside Drive



Memorandum

Date: Monday, July 27, 2020

Project: Airport Road Class Environmental Assessment – Stonecrest Drive / Braydon Boulevard to Countryside Drive

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From: Dan Lu, Jenna Wu

Subject: Traffic Signal Warrants

1.0 Introduction

This memo provides a brief summary of traffic signal warrants analysis for Airport Road as part of the Class Environmental Assessment for 6-lane widening, between Stonecrest Drive / Braydon Boulevard and Countryside Drive. Three intersections were reviewed as part of this analysis:

- Airport Rd / Treeline Blvd
- Airport Rd / Camrose St
- Airport Rd / Eagle Plains Dr

2.0 Justifications

The Ontario Traffic Manual (OTM) Book 12 Signal Warrants justifications were used to review the signal warrants. The justifications reviewed include:

- Justification 1 – Minimum Vehicle Volume
- Justification 2 – Delay to Cross Traffic
- Justification 3 – Volume/Delay Combination
- Justification 5 – Collision Experience
- Justification 6 – Pedestrian Volumes and Delay
- Justification 7 – Projected Volumes

3.0 Findings

3.1 Justifications 1, 2, and 3 – Traffic Volumes

The existing traffic volumes along each of the studied intersections are illustrated in Table 1. The dates of when traffic counts were undertaken are as follows:

- Airport Road and Eagle Plains Drive – May 6, 2015
- Airport Road and Camrose Street – December 2, 2015
- Airport Road and Treeline Boulevard – April 18, 2013

Table 1: Existing 8-Hour Traffic Volumes

| Intersection Name | Movement | 7:00 AM | 8:00 AM | 11:00 AM | 12:00 PM | 1:00 PM | 3:00 PM | 4:00 PM | 5:00 PM |
|-----------------------------------|----------|---------|---------|----------|----------|---------|---------|---------|---------|
| Airport Road & Eagle Plains Drive | EBL | 11 | 39 | 16 | 19 | 15 | 36 | 24 | 30 |
| | EBR | 157 | 117 | 73 | 70 | 50 | 79 | 65 | 72 |
| | NBL | 54 | 41 | 40 | 58 | 53 | 128 | 140 | 151 |
| | NBT | 374 | 424 | 460 | 567 | 590 | 970 | 1104 | 1059 |
| | SBT | 1429 | 1147 | 610 | 573 | 597 | 640 | 612 | 671 |
| | SBR | 26 | 81 | 22 | 19 | 16 | 31 | 39 | 55 |
| Airport Road & Camrose Street | EBL | 7 | 5 | 3 | 1 | 8 | 5 | 11 | 4 |
| | EBR | 52 | 54 | 14 | 13 | 16 | 19 | 10 | 4 |
| | NBL | 15 | 23 | 10 | 15 | 11 | 32 | 36 | 29 |
| | NBT | 411 | 494 | 415 | 475 | 485 | 1054 | 1197 | 1224 |
| | SBT | 1353 | 1425 | 557 | 561 | 463 | 668 | 682 | 607 |
| | SBR | 4 | 5 | 6 | 1 | 6 | 13 | 13 | 15 |
| Airport Road & Treeline | WBL | 44 | 42 | 19 | 17 | 19 | 17 | 17 | 15 |
| | WBR | 62 | 69 | 22 | 23 | 33 | 40 | 42 | 40 |
| | NBT | 353 | 387 | 366 | 408 | 458 | 853 | 971 | 919 |
| | NBR | 8 | 19 | 11 | 11 | 18 | 43 | 22 | 36 |
| | SBL | 28 | 67 | 24 | 31 | 45 | 71 | 70 | 86 |
| | SBT | 1003 | 910 | 438 | 431 | 445 | 546 | 568 | 586 |

Based on the above, the 8-hour traffic volume Justification 1 and 2 results were compiled and illustrated in **Table 2**.

Table 2: Justification 1 and 2 Results

| Intersection Name | 1A Justification | 1B Justification | 2A Justification | 2B Justification |
|-----------------------------------|------------------|------------------|------------------|------------------|
| Airport Road & Eagle Plains Drive | 204% | 54% | 189% | 54% |
| Airport Road & Camrose Street | 165% | 7% | 161% | 7% |
| Airport Road & Treeline Boulevard | 147% | 33% | 140% | 33% |

Based on the above results, neither of the Justification 1 or 2 could be satisfied per the OTM standards. Since Justification 1B and 2B do not exceed 80%, Justification 3 is also not satisfied.

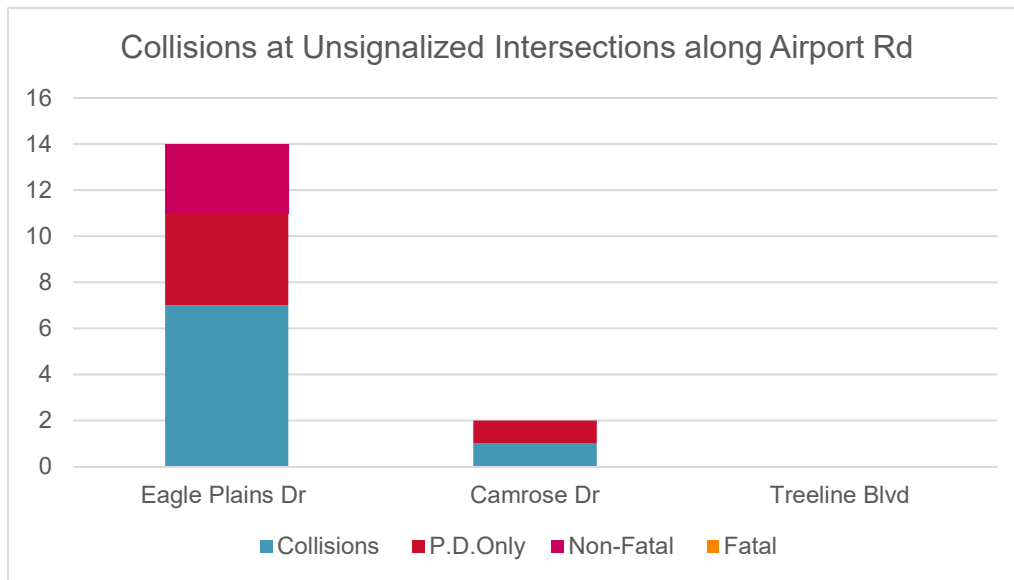
3.2 Justifications 5 – Collisions

Based on collision data provided by the Region, 5 years of collision statistics were analyzed as part of the Class EA, between 2012 and 2016. The detail breakdown of all collision analysis was documented in the Airport Rd Class EA Phase 1 Report. **Figure 1** illustrate the total number of collisions at each intersection between 2012 and 2016 for 5 years.

Based on the OTM Book 12 requirements, collision data from 36 consecutive months (3 years) exceeding 15 total collisions could be used to justify traffic signal installation.

Based on the results shown in Figure 1, none of the 3 unsignalized intersections observed collisions exceeding this threshold. As a result, justification 5 is not satisfied.

Figure 1: Total Collisions on Airport Rd between 2012 and 2016



3.3 Justification 6 – Pedestrian Volumes and Delays

In order to review the needs for signalization from a pedestrian crossings perspective, the following analysis was carried out.

- Identify existing crossing volumes at each of the unsignalized and adjacent signalized intersections and complete Justification 6
- Identify forecast crossing volumes at each of the unsignalized and adjacent signalized intersections based on existing and forecast transit volumes
- Conduct sensitivity analysis of potential justification at the unsignalized intersections if east-west pedestrian volumes are assumed to be based on projected transit ridership data provided by Brampton Transit

The reason for the above side-wise analysis is that there are no existing east-west crossings available at each of the Eagle Plains Drive, Camrose Street, and Treeline Boulevard intersections, and the analysis serves as a “what if” analysis to see if transit ridership projections at these currently unsignalized intersections could justify the need for a new controlled pedestrian crossing.

Based on OTM Book 12, Justification 6, the 8-hour vehicular volumes for Airport Road exceeds 7000. Therefore the following threshold was used.

$$\text{Justification Threshold (8 hour)} = 340 - (0.0094 V_8)$$

Table 3 summarizes the justification results based on existing conditions.

Table 3: Justification 6 Results – Existing Conditions

| Intersection | AADT | EW Pedestrians | Threshold | Justification 6 |
|--------------------------------------|-------|----------------|-----------|-----------------|
| Countryside Dr* | 18700 | 42 | - | - |
| Treeline Blvd | 10200 | 13 | 244 | Not justified |
| Brock/Yellow Avens* | 11800 | 136 | - | - |
| Camrose St | 12300 | 0 | 224 | Not justified |
| Eagle Plains Dr | 12800 | 0 | 220 | Not justified |
| Stonecrest Dr / Braydon Blvd* | 16000 | 310 | - | - |

*Intersection is already signalized and a warrant analysis is not required

Based on the above, none of the existing unsignalized intersections are justified for signalization.

The 2041 traffic forecasts (discussed in the subsequent section in more detail) for the auto mode were also leveraged to update the analysis as increased traffic volumes result in a lower pedestrian threshold for justification. **Table 4** summarizes these results.

Table 4: Justification 6 Results – 2041 Forecast

| Intersection | AADT | EW Pedestrians | Threshold | Justification 6 |
|--------------------------------------|-------|----------------|-----------|-----------------|
| Countryside Dr* | 34900 | 45 | - | - |
| Treeline Blvd | 19800 | 14 | 154 | Not justified |
| Brock/Yellow Avens* | 22500 | 147 | - | - |
| Camrose St | 22200 | 0 | 131 | Not justified |
| Eagle Plains Dr | 21900 | 0 | 134 | Not justified |
| Stonecrest Dr / Braydon Blvd* | 26400 | 335 | - | - |

*Intersection is already signalized and a warrant analysis is not required

Similarly, none of the existing unsignalized intersections are justified for signalization.

In order to conduct a sensitivity analysis to see if transit ridership projections could justify the need for a controlled pedestrian crossing, the following considerations were made.

- Transit ridership projections were provided by Brampton Transit up to the 2024 horizon year. Pedestrian crossing volumes were estimated using the provided transit ridership forecast.
- Auto traffic volumes were linearly interpolated between the 2017 existing conditions and 2041 horizon forecast, to obtain the 2024 auto volume projection.

Table 5 summarizes the results of the above sensitivity analysis.

Table 5: Justification 6 Results – 2024 Sensitivity Analysis

| Intersection | AADT | EW Pedestrians | Threshold | Justification 6 |
|--------------------------------------|-------|----------------|-----------|-----------------|
| Countryside Dr* | 22400 | 51 | - | - |
| Treeline Blvd | 12400 | 80 | 223 | Not Justified |
| Brock/Yellow Avens* | 14200 | 454 | - | - |
| Camrose St | 14600 | 43 | 203 | Not Justified |
| Eagle Plains Dr | 15000 | 132 | 199 | Not Justified |
| Stonecrest Dr / Braydon Blvd* | 18500 | 639 | - | - |

*Intersection is already signalized and a warrant analysis is not required

Based on the above results, none of the existing unsignalized intersections are justified for signalization. However, it is recommended that future transit ridership and pedestrian activity at these intersections be monitored, to assess whether a new controlled east-west pedestrian crossing might be warranted at a later time.

3.4 Justification 7 – Projected Volumes

Since traffic volume forecasts were produced for the 2041 horizon year, signal justifications based on projected traffic volumes were also reviewed for the 3 unsignalized intersections. Details of the forecasting methods can be found in the traffic analysis memo titled “Auxiliary Turn Lane Requirements as Part of 6-lane Widening on Airport Road”, available under separate cover. **Table 6** illustrates the existing and future turning movement volumes at each of the three unsignalized intersections.

Table 6: Horizon Year Traffic Volumes (2041)

| Intersection Name | Movement | 2016 AM | 2016 PM | 2041 AM | 2041 PM |
|-----------------------------------|----------|---------|---------|---------|---------|
| Airport Road & Eagle Plains Drive | EBL | 28 | 28 | 28 | 31 |
| | EBR | 130 | 76 | 137 | 97 |
| | NBL | 56 | 135 | 74 | 169 |
| | NBT | 437 | 1226 | 862 | 2192 |
| | SBT | 1380 | 665 | 2281 | 1463 |
| | SBR | 83 | 55 | 83 | 60 |
| Airport Road & Camrose Street | EBL | 7 | 3 | 61 | 3 |
| | EBR | 62 | 14 | 62 | 20 |
| | NBL | 18 | 34 | 18 | 48 |
| | NBT | 487 | 1193 | 948 | 2108 |
| | SBT | 1550 | 699 | 2840 | 1480 |
| | SBR | 4 | 10 | 21 | 11 |
| Airport Road & Treeline | WBL | 53 | 14 | 53 | 15 |
| | WBR | 79 | 40 | 110 | 52 |
| | NBT | 397 | 952 | 862 | 1934 |
| | NBR | 15 | 30 | 15 | 33 |
| | SBL | 45 | 91 | 52 | 125 |
| | SBT | 1069 | 606 | 2000 | 1421 |

Since horizon year traffic volumes were available for the AM and PM peaks only, the Average Hour Volumes were used (representing 50% of the average of AM and PM peak volumes) to calculate signal justification results. **Table 7** illustrates the horizon year justifications results. Since all road approaches

already exist, the thresholds to meet the Justification 1A through 2B must be met by 120% to satisfy Justification 7.

Table 7: Justification 7 Results

| Intersection Name | 1A Justification | 1B Justification | 2A Justification | 2B Justification |
|-----------------------------------|------------------|------------------|------------------|------------------|
| Airport Road & Eagle Plains Drive | 312% | 61% | 299% | 12% |
| Airport Road & Camrose Street | 318% | 30% | 311% | 13% |
| Airport Road & Treeline | 278% | 48% | 268% | 14% |

Based on the above results, Justification 1b and 2b results do not exceed the required 120% threshold. As a result, Justification 7 is not satisfied.

4.0 Conclusions

Based on the results identified for Justifications 1, 2, 3, 5, 6, and 7 using the OTM Book 12 methodology, none of the currently unsignalized intersections meet or exceed the justification requirements for traffic signal installation.

As a result, there are no new traffic signals or controlled pedestrian crossings recommended for the Airport Road/Treeline Boulevard, Airport Road/Camrose Street, or Airport Road/Eagle Plans Drive intersections. However, it is recommended that future transit ridership and pedestrian activity at these intersections be monitored, to assess whether a new controlled east-west pedestrian crossing might be warranted at a later time.