24 May 2017 OUR REF: 476152 - 01000

The Salvation Army
2 Overlea Blvd.
Toronto, ON   M4H 1P4

**Attention:  Michaela Jones**

Dear Michaela:

**Re:     333 Montreal Road - Salvation Army
          Transportation Overview**

# 1. INTRODUCTION

Based on the information provided, the Salvation Army is proposing to develop a new design-build facility which will incorporate the uses presently existing in the Ottawa Booth Centre (currently located at 171 George Street).  The site, which is municipally known as 333 Montreal Road, is located adjacent to the existing Salvation Army Thrift Store with vehicle access proposed via driveway connections to Montreal Road and Montfort Street.  Truck loading is proposed to/from Ste. Anne Avenue via the 273 Ste. Anne Avenue lot.  The existing 333 Montreal Road site is currently a motel with a large parking lot (approximately 100 parking spaces) with vehicle access to Montreal Road only.

The proposed new facility buildings are 1 to 6 storeys high with amenities designed for both short and long-term stay. Minimal to no traffic is expected from the residents at this site given the buildings' clients/function.  Employee traffic volumes travelling to/from the site are expected to be less than the 75 veh/h during peak hours that is the threshold for providing any Transportation Impact Assessment (TIA) according to the City's 2006 TIA guidelines.  However, after discussions with City Staff (Wally Dubyk) and to assist in the approval process, a Transportation Overview is provided herein which focuses on the following issues:

- Existing signalized intersection performance within the vicinity of the site;
- Vehicle access to the public roadways;
- Truck loading access to the proposed development; and
- Parking and on-site circulation.

The local context of the site is provided as Figure 1 and the proposed Site Plan is provided as Figure 2.

Figure 1:  Site Context

**Figure 2: Proposed Site Plan**

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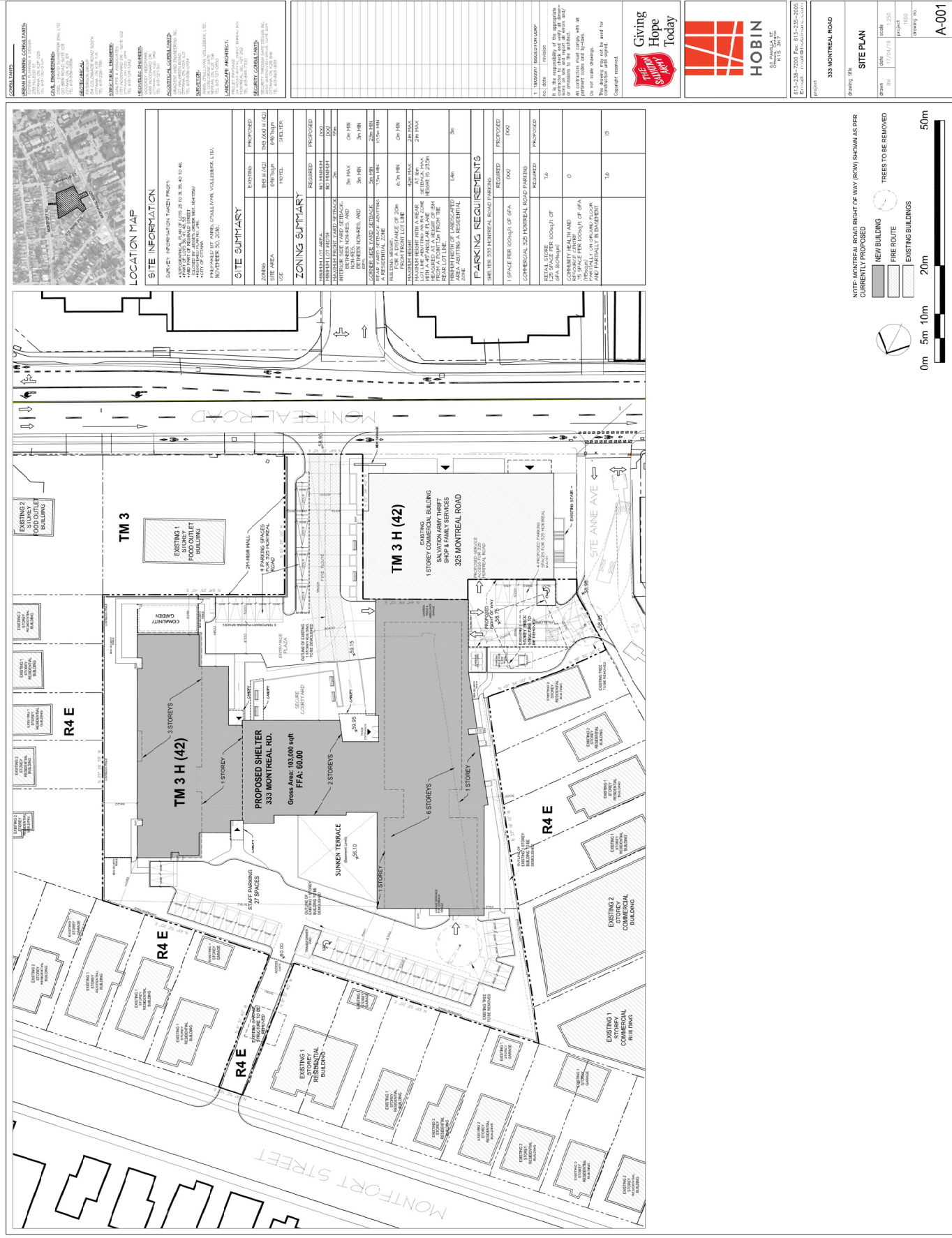
# 2. EXISTING CONDITIONS

## 2.1. TRAFFIC VOLUMES AND INTERSECTION OPERATIONS

The most recent traffic count data was obtained from the City of Ottawa at the Montreal/Granville and Montreal/Lacasse intersections. These volumes are illustrated in Figure 3 and included as Appendix A.

Figure 3: Existing Intersection Traffic Volumes
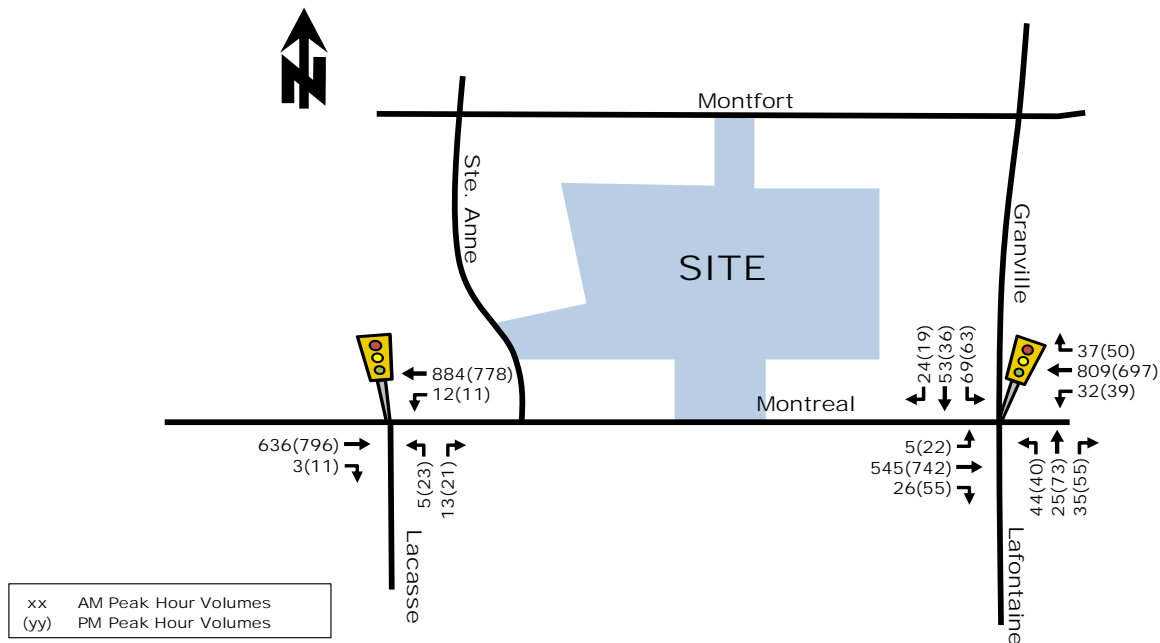


The following Table 1 provides a summary of existing traffic operations at study area intersections based on the SYNCHRO (V9) traffic analysis software. The subject intersections were assessed in terms of the volume-to-capacity (v/c) ratio and the corresponding Level of Service (LoS) for the critical movement(s). The subject intersections 'as a whole' were assessed based on a weighted v/c ratio. The SYNCHRO model output of existing conditions is provided within Appendix B.

Table 1: Existing Intersection Performance

| Intersection | Weekday AM Peak (PM Peak) | | | | | |
| | Critical Movement | | | Intersection 'as a whole' | | |
| | LoS | max. v/c | Movement | Delay (s) | LoS | v/c |
|---|---|---|---|---|---|---|
| Lafontaine & Granville/Montreal | B(B) | 0.69(0.66) | WBT(EBT) | 12.5(15.0) | B(B) | 0.65(0.63) |
| Lacasse/Montreal | A(A) | 0.60(0.57) | WBT(EBT) | 3.6(8.9) | A(A) | 0.59(0.56) |
| Note: Analysis of signalized intersections assumes a PHF of 0.95 and a saturation flow rate of 1800 veh/h/lane. | | | | | | |

As shown in Table 1, the intersections adjacent to the proposed development are operating at acceptable levels of service during the weekday morning and afternoon peak hours. The cross-section of Montreal Road is four-lanes, however, the curb lane operates as a transit/taxi lane during peak hours in the peak direction and during non-peak hours, on-street parking is permitted in the curb lane at various locations along the corridor. As such, the SYNCHRO analysis shows a 2-lane cross-section for general vehicle traffic.

**PARSONS**

# 3. DEMAND FORECASTING

## 3.1. TRIP GENERATION

Given the land use type, minimal residential vehicle trips are expected and no residential vehicle parking is provided. Short and long-term residency will be provided at the proposed development and it is assumed that residents are expected to stay on-site the majority of the time. Staff parking is provided and we are advised that approximately 30 veh/h (or less) are projected to access/egress the site during the weekday peak hours. During all other times of the day/week, the total number of trips is expected to be less. The trip break down as described by the proponent is summarized below. These details were provided by the Salvation Army based on their current experience with the Booth Centre located at 171 George Street.

- Staff – Directors, managers, front line and program staff:
  - Approximately 25 veh/h entering the site during the morning peak hour (7:30 – 9:00);
  - Approximately 25 veh/h exiting the site during the afternoon peak hour (15:30 – 17:30);
- Outreach and housing response – Varies based on demand:
  - Approximately 11 trips during the day;
  - Approximately 1 to 2 trips during the afternoon peak hour;
- Emergency Disaster Service and Canteen Service – Varies based on demand;
  - On average 2 trips per day – occasionally during peak hours;
- Deliveries;
  - Approximately 3 veh/h during the morning peak hour; and
  - No deliveries during the afternoon peak hour or weekends.

As shown, the total trips expected to access/egress the subject development during peak hours is approximately 30 veh/h (or less). As the City's 2006 TIA Guidelines indicate no traffic analysis is required for developments projected to generate less than 75 veh/h, no further analysis is provided. However, to assist in the approval process, a review of the Site Plan and site operations is provided as follows.

# 4. SITE PLAN REVIEW

This section provides an overview of site access, parking requirements, pedestrian circulation and transit accessibility. The proposed Site Plan was previously illustrated as Figure 2.

*Parking*
A total of 27 vehicle parking spaces are proposed in the northern parking lot, with access to Montfort Street, noted as 'Staff Parking'. A garage is proposed for an 'outreach' vehicle as well as a 'canteen truck' and an 'ambulance' as shown on the Site Plan. We are advised that the 27 parking spaces proposed for staff of the 333 Montreal Road site will be sufficient for the expected number of employees.

A total of 13 parking spaces are proposed to serve the Salvation Army Thrift Store (325 Montreal Road) located in the southern parking lot with access to Montreal Road (9 spaces) and in the truck loading area with access to Ste. Anne Avenue (4 spaces). Based on the information provided by the proponent regarding parking at the Salvation Army Thrift Store, during certain times some patrons to the store will likely use on-street parking as only 13 spaces are proposed to accommodate the store. In addition, based on the proposed geometry of the loading bay, vehicles will not be able to access the adjacent 4 parking spaces while a delivery truck is in the loading area. This is shown in Figure 4.

Figure 4: Loading Bay Vehicle Parking Spaces
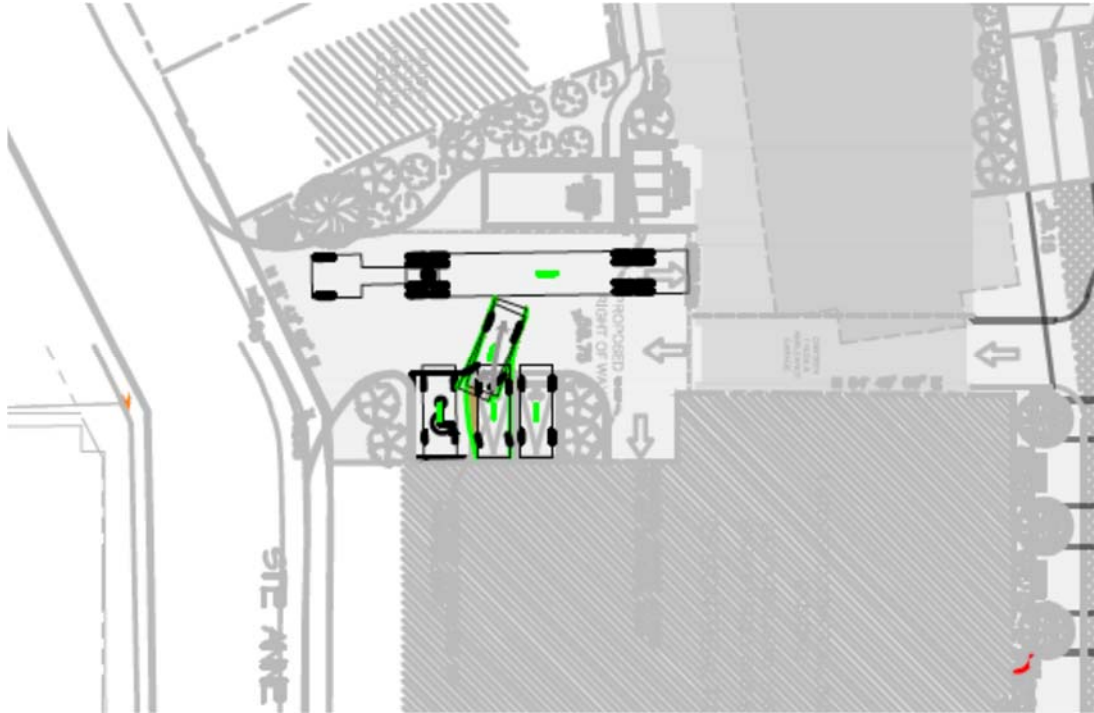


The proposed parking space dimensions are noted as 5.2 m in length and 2.6 m in width for 90 degree parking spaces and parallel parking spaces are noted as 6.7 m in length and 2.6 m in width. These dimensions meet the City's By-Law requirements.

*Site Circulation*

With regard to on-site circulation, the proposed site and parking lots are laid out effectively, such that two-way traffic can be efficiently accommodated. The proposed drive aisles are noted as 6.7 m wide, with the exception of the drive aisle access from Montfort Street, which is noted to be 5.0 m and the 6.0 m drive aisle adjacent to the parallel parking spaces. These drive aisles meet the City's requirement, except the 5.0 m driveway width at the north end of the site. However, as shown, there is limited property to provide a wide driveway at this location and given the low traffic volumes projected to use this driveway, the proposed drive aisle width is considered acceptable.

*Access Requirements*

Three unsignalized full-movement driveways are proposed to serve the subject development and the adjacent 325 Montreal Road site (Thrift Store); one to Montfort Street, one to Montreal Road and one to Ste. Anne Avenue. Based on the projected volumes, further traffic control and auxiliary turn lanes are not warranted or required at these driveways. The throat length at the northern site driveway connection to Montfort Street is approximately 30 m. The throat length to Montreal Road is approximately 6 m long because of the proposed parallel parking along this drive aisle. Removing one or more of the parallel parking spaces along this drive aisle will increase the throat length, however, this will also reduce the overall amount of parking provided for the Thrift Store. Considering the very low volume of vehicles using this access/egress, the proposed configuration is considered acceptable.

The truck loading bay is proposed to Ste. Anne Avenue. Truck turning templates (WB-20) were applied to the adjacent road network and trucks will have to access the loading bay by turning onto Granville Street from Montreal Road, then 'loop around' the site via Montfort Street and Ste. Anne Avenue to access the loading bay from the north. This is shown in the truck turning templates included as Appendix C and illustrated below as Figure 5. Some road modifications (widening) will be required for trucks to perform these turning movements. Turn templates were performed showing a truck turning onto Ste. Anne Avenue from Montreal Road and the truck cannot successfully enter the loading bay from this direction.

Figure 5: Delivery Vehicle Route
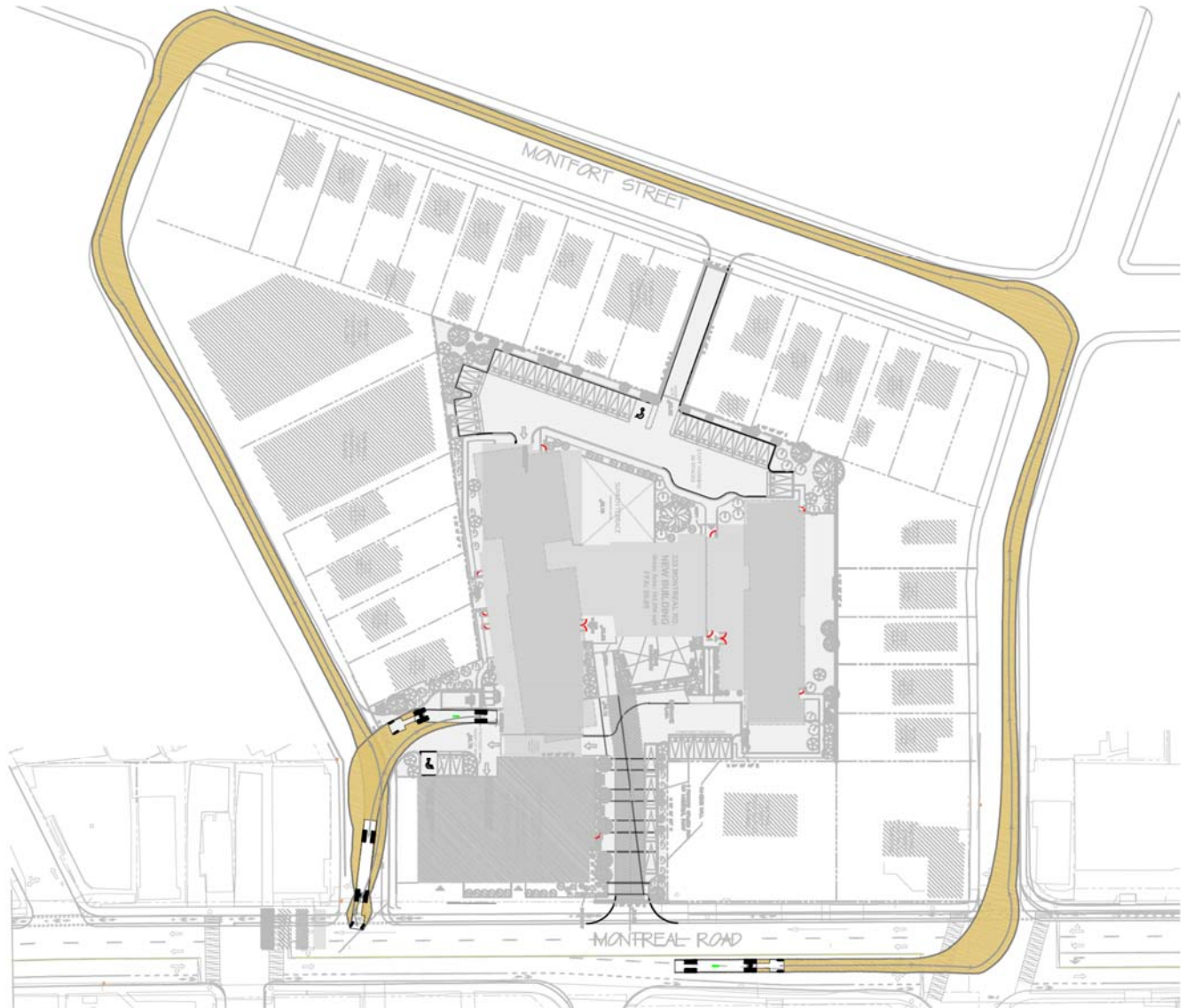


*Pedestrians/Transit*

To connect pedestrians to transit service and other nearby employment, shopping and recreation opportunities, sidewalks are provided along both sides of Montreal Road, Granville Street, Montfort Street and along the east side of Ste. Anne Avenue.

OC Transpo bus stops for Local Routes #12 and 19 are located along Montreal Road adjacent to the development, which provide frequent all-day service, 7 days a week. As part of the City's transportation planning and functional design study for Montreal Road, 'transit only' lanes are planned in the westbound direction along Montreal Road within the vicinity of the site.

*Bicycles*

Bicycle parking is not identified on the proposed Site Plan, however, staff and retail bike parking should be provided to encourage active modes.

The City of Ottawa is currently working on the transportation planning and functional design study for Montreal Road in conjunction with the Montreal Road Infrastructure Renewal Project. The current plan shows bicycle lanes along both sides

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of Montreal Road between North River Road and St. Laurent Boulevard. As shown in Figure 4 below, vehicle lane reductions are planned in the eastbound direction within the vicinity of the site. This proposed roadway geometry is included on the 333 Montreal Road Site Plan.

Figure 6: City of Ottawa Conceptual Design Plan – Montreal Road
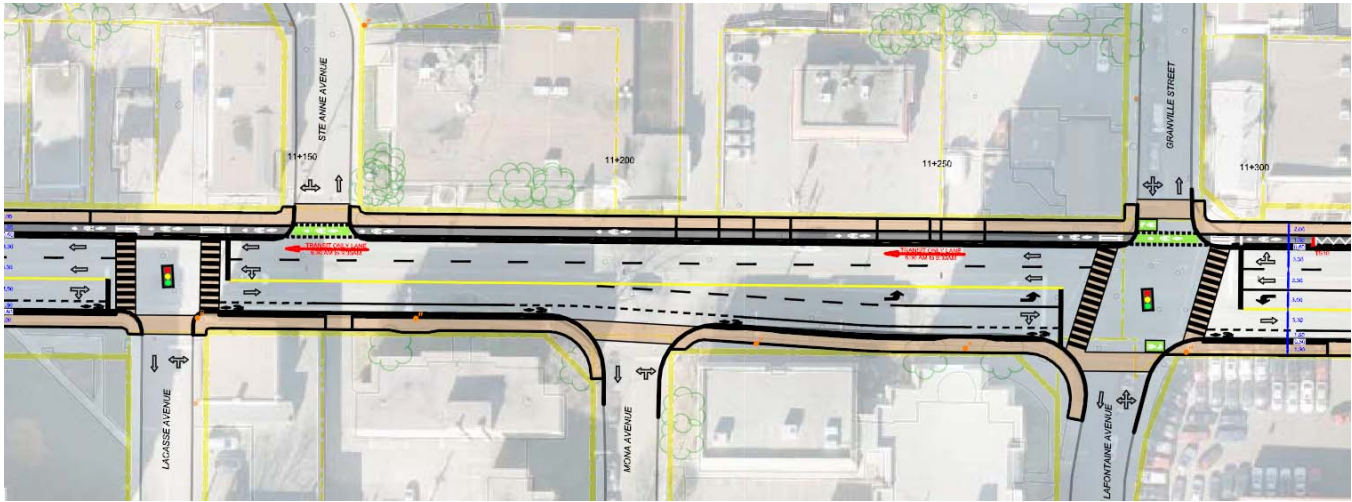


## 5. CONCLUSION

Based on the foregoing, the transportation related conclusions are as follows:

- The existing signalized intersections within the vicinity of the proposed development are currently operating at acceptable levels of service during the weekday peak hours;

- Based on the proposed land use for the 333 Montreal Road development, site-generated vehicle traffic volumes are expected to be low, approximately 30 veh/h or less during peak hours;

- Three unsignalized driveway connections are proposed to serve the subject development and the adjacent 325 Montreal Road site (Thrift Store);

- The proposed amount of parking for the subject 333 Montreal Road development is considered sufficient based on the planned number of employees;

- Some patrons to the Thrift Store may park on-street given the proposed number of parking spaces (13 spaces);

- The throat length for the site driveway connection to Montfort Street is 30 m, however, the drive aisle width is narrow at 5.0m. Given the low projected amount of vehicle volume expected to access/egress the site at this location, this drive aisle width will operate acceptably; and

- Trucks will access the loading bay via Granville Street, Montfort Street and Ste. Anne Avenue based on the existing geometry and truck turning templates. Through the site design process, an RMA detailing any required modifications to the impacted intersection should be completed.

Based on the foregoing, the proposed 333 Montreal Road development is recommended from a transportation perspective.

Prepared By:                                                    Reviewed By:

André Sponder, B.A.Sc.                                  Christopher Gordon, P.Eng.
Engineering Associate, Transportation          Senior Project Manager

# Appendix A
Existing Traffic Count Data

# Transportation Services - Traffic Services

## Turning Movement Count - Full Study Peak Hour Diagram
## LACASSE AVE @ MONTREAL RD

**Survey Date:** Thursday, February 04, 2016

**Start Time:** 07:00

**WO No:** 35701

**Device:** Miovision

LACASSE AVE

N
W · E
S

25

0

0

1

1

| Total | | | | | |
|---|---|---|---|---|---|
| | 0 | 0 | 0 | 0 | |
| Heavy Vehicles | 0 | 0 | 0 | 0 | 0 |
| Cars | 0 | 0 | 0 | 0 | 1 |

0    1    9

MONTREAL RD

889

38    851

0    0    0    0

1    0    1

636    28    608

640    3    0    3

**AM Period**
**Peak Hour:**
**07:45    08:45**

1529

0    0

848    36    884    897

12    0    12

1    0    1

622    28

1547

650

| 15 | 0 | 3 | 0 | 13 |
|---|---|---|---|---|
| 0 | 0 | 2 | 0 | 0 |
| | 0 | 5 | 0 | 13 |

**Cars**
**Heavy**
**Vehicles**

**Total**

18    0    0

16

15    18

33

**Comments**

# Transportation Services - Traffic Services

## Turning Movement Count - Full Study Peak Hour Diagram
## LACASSE AVE @ MONTREAL RD

**Survey Date:** Thursday, February 04, 2016

**Start Time:** 07:00

**WO No:** 35701

**Device:** Miovision

LACASSE AVE

N
W · E
S

70

0    1    21

**Total**

**Heavy Vehicles**

**Cars**

| 1 | 0 | 0 | 0 |
| 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 0 | 0 | 1 |

MONTREAL RD

802

1610

808

| 26 | 776 |
| 0 | 0 | 0 |
| 1 | 0 | 1 |
| 796 | 21 | 775 |
| 11 | 0 | 11 |

**PM Period**
**Peak Hour:**
**15:15    16:15**

| 0 | 0 | | 0 |
| 753 | 25 | | 778 | 789 |
| 10 | 1 | | 11 |
| 0 | 0 | | 0 |
| 796 | 21 | | |

1606

817

36    1    0

53

| 21 | 0 | 22 | 0 | 21 |
| 1 | 0 | 1 | 0 | 0 |
| | 0 | 23 | 0 | 21 |
| 22 | | 44 | |
| | 66 | | |

**Cars**

**Heavy Vehicles**

**Total**

**Comments**

# Transportation Services - Traffic Services

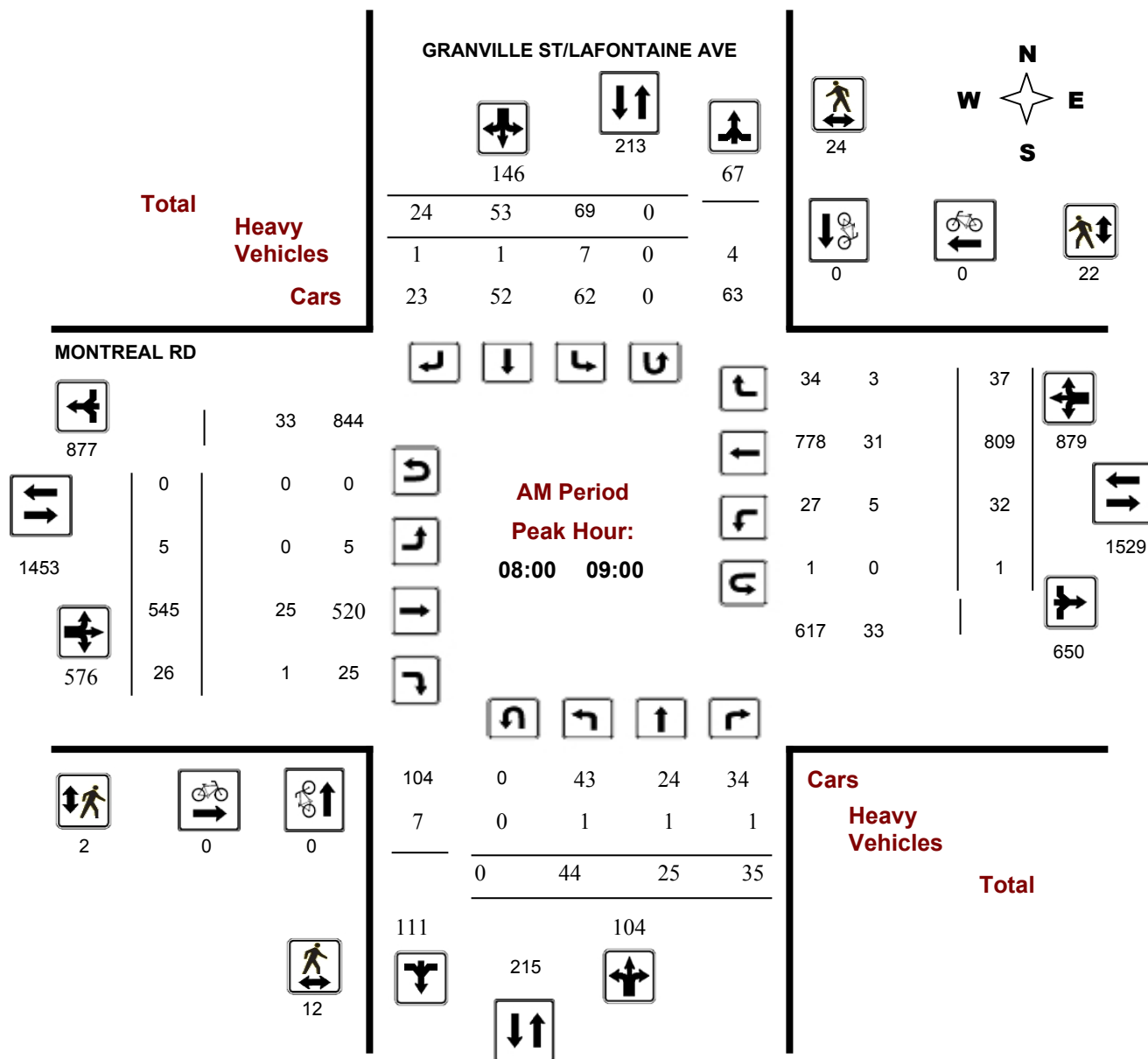## Turning Movement Count - Full Study Peak Hour Diagram
## MONTREAL RD @ GRANVILLE ST/LAFONTAINE AVE

**Survey Date:** Thursday, January 28, 2016
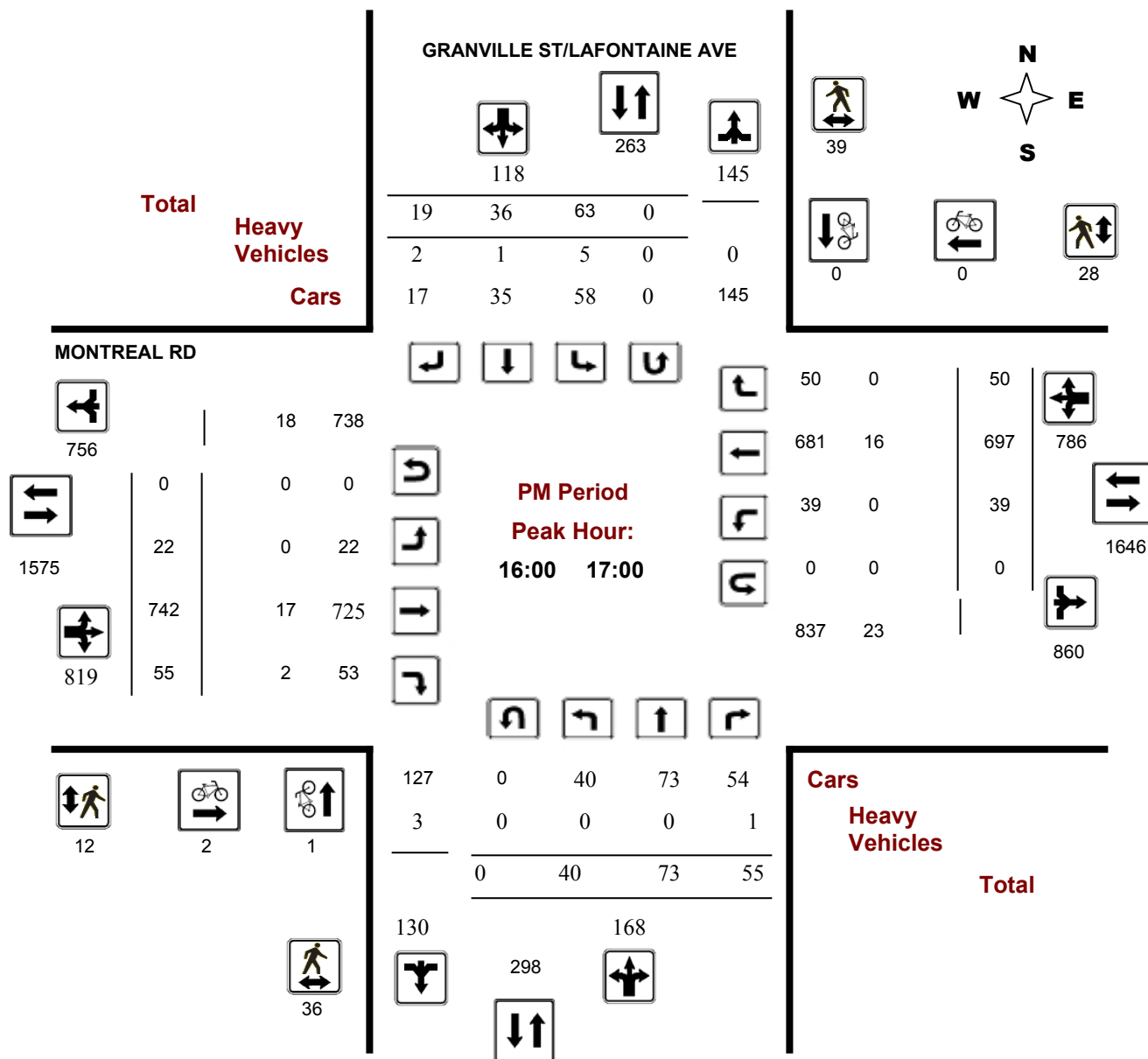
**Start Time:** 07:00

**WO No:** 35678

**Device:** Miovision

**GRANVILLE ST/LAFONTAINE AVE**

213

146

67

| Total | Heavy Vehicles | 24 | 53 | 69 | 0 | |
|---|---|---|---|---|---|---|
| | | 1 | 1 | 7 | 0 | 4 |
| | Cars | 23 | 52 | 62 | 0 | 63 |

24

0    0    22

**MONTREAL RD**

877

|  | | 33 | 844 |
|---|---|---|---|
| 0 | | 0 | 0 |
| 5 | | 0 | 5 |
| 545 | | 25 | 520 |
| 26 | | 1 | 25 |

1453

576

**AM Period**

**Peak Hour:**

**08:00    09:00**

| 34 | 3 | | 37 |
|---|---|---|---|
| 778 | 31 | | 809 |
| 27 | 5 | | 32 |
| 1 | 0 | | 1 |
| 617 | 33 | | |

879

1529

650

| 104 | 0 | 43 | 24 | 34 |
|---|---|---|---|---|
| 7 | 0 | 1 | 1 | 1 |
| | 0 | 44 | 25 | 35 |

**Cars**

**Heavy Vehicles**

**Total**

2    0    0

111    104

215

12

**Comments**

## Turning Movement Count - Full Study Peak Hour Diagram
## MONTREAL RD @ GRANVILLE ST/LAFONTAINE AVE

**Survey Date:** Thursday, January 28, 2016

**Start Time:** 07:00

**WO No:** 35678

**Device:** Miovision

**GRANVILLE ST/LAFONTAINE AVE**

|  | 118 | 263 | 145 | N W E S 39 |
|---|---|---|---|---|
| **Total** | | | | |
| **Heavy Vehicles** | 19 | 36 | 63 | 0 | 145 |
| | 2 | 1 | 5 | 0 | 0 |
| **Cars** | 17 | 35 | 58 | 0 | 145 |

0    0    28

**MONTREAL RD**

756

|  | 18 | 738 |
|---|---|---|
| 0 | 0 | 0 |
| 22 | 0 | 22 |
| 742 | 17 | 725 |
| 55 | 2 | 53 |

1575

819

**PM Period**
**Peak Hour:**
**16:00    17:00**

| 50 | 0 | 50 | 786 |
|---|---|---|---|
| 681 | 16 | 697 | |
| 39 | 0 | 39 | 1646 |
| 0 | 0 | 0 | |
| 837 | 23 | | 860 |

| 127 | 0 | 40 | 73 | 54 |
|---|---|---|---|---|
| 3 | 0 | 0 | 0 | 1 |
| | 0 | 40 | 73 | 55 |

12    2    1

130    298    168

**Cars**
**Heavy Vehicles**
**Total**

36
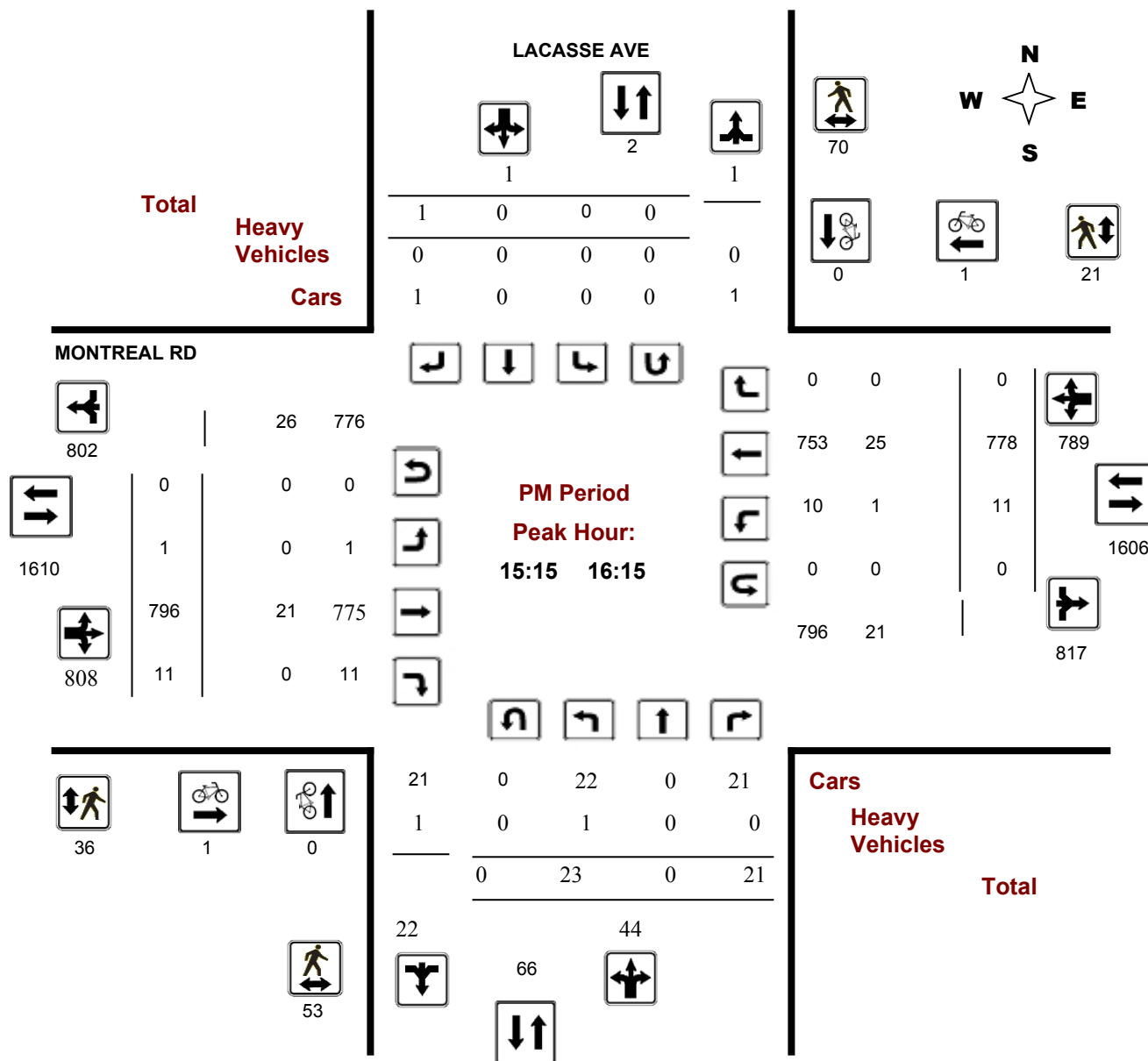
**Comments**

# Appendix B

SYNCHRO Capacity Analysis: Existing Conditions

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↱ | ↱ | ↱ | ↱ | | ↔ | | ↔ |
| Traffic Volume (vph) | 5 | 545 | 32 | 809 | 44 | 25 | 69 | 53 |
| Future Volume (vph) | 5 | 545 | 32 | 809 | 44 | 25 | 69 | 53 |
| Lane Group Flow (vph) | 5 | 601 | 34 | 891 | 0 | 109 | 0 | 154 |
| Turn Type | Perm | NA | Perm | NA | Perm | NA | Perm | NA |
| Protected Phases | | 2 | | 6 | | 8 | | 4 |
| Permitted Phases | 2 | | 6 | | 8 | | 4 | |
| Detector Phase | 2 | 2 | 6 | 6 | 8 | 8 | 4 | 4 |
| Switch Phase | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 23.5 | 23.5 | 23.5 | 23.5 | 23.5 | 23.5 | 23.5 | 23.5 |
| Total Split (s) | 60.0 | 60.0 | 60.0 | 60.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| Total Split (%) | 66.7% | 66.7% | 66.7% | 66.7% | 33.3% | 33.3% | 33.3% | 33.3% |
| Yellow Time (s) | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 |
| All-Red Time (s) | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| Lost Time Adjust (s) | -1.5 | -1.5 | -1.5 | -1.5 | | -1.5 | | -1.5 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | | 4.0 |
| Lead/Lag | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | None | None | None | None |
| Act Effct Green (s) | 65.6 | 65.6 | 65.6 | 65.6 | | 16.4 | | 16.4 |
| Actuated g/C Ratio | 0.73 | 0.73 | 0.73 | 0.73 | | 0.18 | | 0.18 |
| v/c Ratio | 0.02 | 0.47 | 0.07 | 0.69 | | 0.41 | | 0.61 |
| Control Delay | 3.4 | 4.8 | 4.9 | 11.2 | | 27.5 | | 41.1 |
| Queue Delay | 0.0 | 0.2 | 0.0 | 0.0 | | 0.0 | | 0.0 |
| Total Delay | 3.4 | 4.9 | 4.9 | 11.2 | | 27.5 | | 41.1 |
| LOS | A | A | A | B | | C | | D |
| Approach Delay | | 4.9 | | 11.0 | | 27.5 | | 41.1 |
| Approach LOS | | A | | B | | C | | D |
| Queue Length 50th (m) | 0.2 | 34.8 | 1.4 | 68.1 | | 12.2 | | 23.0 |
| Queue Length 95th (m) | m0.3 | 20.6 | 5.1 | 142.8 | | 25.1 | | 39.1 |
| Internal Link Dist (m) | | 136.6 | | 186.8 | | 52.9 | | 63.1 |
| Turn Bay Length (m) | 40.0 | | 38.0 | | | | | |
| Base Capacity (vph) | 283 | 1290 | 493 | 1289 | | 406 | | 396 |
| Starvation Cap Reductn | 0 | 152 | 0 | 0 | | 0 | | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 0 | | 0 | | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | | 0 | | 0 |
| Reduced v/c Ratio | 0.02 | 0.53 | 0.07 | 0.69 | | 0.27 | | 0.39 |

### Intersection Summary

Cycle Length: 90
Actuated Cycle Length: 90
Offset: 44 (49%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green
Natural Cycle: 65
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69

| | |
|---|---|
| Intersection Signal Delay: 12.5 | Intersection LOS: B |
| Intersection Capacity Utilization 65.9% | ICU Level of Service C |
| Analysis Period (min) 15 | |

m    Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases:    1: Lafontaine/Granville & Montreal

| →Ø2 (R) | ↓ Ø4 |
|---|---|
| 60 s | 30 s |
| ← Ø6 (R) | ↑ Ø8 |
| 60 s | 30 s |

| Lane Group | EBT | WBL | WBT | NBL |
|---|---|---|---|---|
| Lane Configurations | ↱ | | ↰ | ⅄ |
| Traffic Volume (vph) | 636 | 12 | 884 | 5 |
| Future Volume (vph) | 636 | 12 | 884 | 5 |
| Lane Group Flow (vph) | 672 | 0 | 944 | 19 |
| Turn Type | NA | Perm | NA | Prot |
| Protected Phases | 2 | | 6 | 8 |
| Permitted Phases | | 6 | | |
| Detector Phase | 2 | 6 | 6 | 8 |
| Switch Phase | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 23.5 | 23.5 | 23.5 | 23.5 |
| Total Split (s) | 60.0 | 60.0 | 60.0 | 30.0 |
| Total Split (%) | 66.7% | 66.7% | 66.7% | 33.3% |
| Yellow Time (s) | 3.3 | 3.3 | 3.3 | 3.3 |
| All-Red Time (s) | 2.2 | 2.2 | 2.2 | 2.2 |
| Lost Time Adjust (s) | -1.5 | | -1.5 | -1.5 |
| Total Lost Time (s) | 4.0 | | 4.0 | 4.0 |
| Lead/Lag | | | | |
| Lead-Lag Optimize? | | | | |
| Recall Mode | C-Max | C-Max | C-Max | None |
| Act Effct Green (s) | 80.6 | | 80.6 | 13.1 |
| Actuated g/C Ratio | 0.90 | | 0.90 | 0.15 |
| v/c Ratio | 0.42 | | 0.60 | 0.08 |
| Control Delay | 3.8 | | 3.2 | 18.4 |
| Queue Delay | 0.0 | | 0.0 | 0.0 |
| Total Delay | 3.8 | | 3.2 | 18.4 |
| LOS | A | | A | B |
| Approach Delay | 3.8 | | 3.2 | 18.4 |
| Approach LOS | A | | A | B |
| Queue Length 50th (m) | 0.0 | | 0.0 | 0.8 |
| Queue Length 95th (m) | 73.5 | | 48.9 | 6.2 |
| Internal Link Dist (m) | 88.2 | | 136.6 | 57.8 |
| Turn Bay Length (m) | | | | |
| Base Capacity (vph) | 1596 | | 1581 | 454 |
| Starvation Cap Reductn | 0 | | 5 | 0 |
| Spillback Cap Reductn | 0 | | 0 | 0 |
| Storage Cap Reductn | 0 | | 0 | 0 |
| Reduced v/c Ratio | 0.42 | | 0.60 | 0.04 |

**Intersection Summary**

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 44 (49%), Referenced to phase 2:EBT and 6:WBTL, Start of Green

Natural Cycle: 70

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.60

| | |
|---|---|
| Intersection Signal Delay: 3.6 | Intersection LOS: A |
| Intersection Capacity Utilization 76.0% | ICU Level of Service D |
| Analysis Period (min) 15 | |

Splits and Phases:  2: Lacasse & Montreal

| Lane Group | EBL | EBT | WBL | WBT | NBL | NBT | SBL | SBT |
|---|---|---|---|---|---|---|---|---|
| Lane Configurations | ↰ | ↱ | ↰ | ↱ | | ↔ | | ↔ |
| Traffic Volume (vph) | 22 | 742 | 39 | 697 | 40 | 73 | 63 | 36 |
| Future Volume (vph) | 22 | 742 | 39 | 697 | 40 | 73 | 63 | 36 |
| Lane Group Flow (vph) | 23 | 839 | 41 | 787 | 0 | 177 | 0 | 124 |
| Turn Type | Perm | NA | Perm | NA | Perm | NA | Perm | NA |
| Protected Phases | | 2 | | 6 | | 8 | | 4 |
| Permitted Phases | 2 | | 6 | | 8 | | 4 | |
| Detector Phase | 2 | 2 | 6 | 6 | 8 | 8 | 4 | 4 |
| Switch Phase | | | | | | | | |
| Minimum Initial (s) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | 23.5 | 23.5 | 23.5 | 23.5 | 23.5 | 23.5 | 23.5 | 23.5 |
| Total Split (s) | 60.0 | 60.0 | 60.0 | 60.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| Total Split (%) | 66.7% | 66.7% | 66.7% | 66.7% | 33.3% | 33.3% | 33.3% | 33.3% |
| Yellow Time (s) | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 | 3.3 |
| All-Red Time (s) | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| Lost Time Adjust (s) | -1.5 | -1.5 | -1.5 | -1.5 | | -1.5 | | -1.5 |
| Total Lost Time (s) | 4.0 | 4.0 | 4.0 | 4.0 | | 4.0 | | 4.0 |
| Lead/Lag | | | | | | | | |
| Lead-Lag Optimize? | | | | | | | | |
| Recall Mode | C-Max | C-Max | C-Max | C-Max | None | None | None | None |
| Act Effct Green (s) | 65.6 | 65.6 | 65.6 | 65.6 | | 16.4 | | 16.4 |
| Actuated g/C Ratio | 0.73 | 0.73 | 0.73 | 0.73 | | 0.18 | | 0.18 |
| v/c Ratio | 0.07 | 0.66 | 0.12 | 0.61 | | 0.61 | | 0.60 |
| Control Delay | 7.7 | 11.8 | 5.7 | 9.4 | | 36.8 | | 42.3 |
| Queue Delay | 0.0 | 0.2 | 0.0 | 0.2 | | 0.0 | | 0.0 |
| Total Delay | 7.7 | 12.0 | 5.7 | 9.6 | | 36.8 | | 42.3 |
| LOS | A | B | A | A | | D | | D |
| Approach Delay | | 11.9 | | 9.4 | | 36.8 | | 42.3 |
| Approach LOS | | B | | A | | D | | D |
| Queue Length 50th (m) | 0.9 | 58.0 | 1.7 | 52.9 | | 24.2 | | 18.2 |
| Queue Length 95th (m) | m3.5 | 121.4 | 6.2 | 109.3 | | 41.2 | | 33.3 |
| Internal Link Dist (m) | | 136.6 | | 186.8 | | 52.9 | | 63.1 |
| Turn Bay Length (m) | 40.0 | | 38.0 | | | | | |
| Base Capacity (vph) | 333 | 1280 | 335 | 1280 | | 449 | | 321 |
| Starvation Cap Reductn | 0 | 71 | 0 | 0 | | 0 | | 0 |
| Spillback Cap Reductn | 0 | 0 | 0 | 97 | | 1 | | 0 |
| Storage Cap Reductn | 0 | 0 | 0 | 0 | | 0 | | 0 |
| Reduced v/c Ratio | 0.07 | 0.69 | 0.12 | 0.67 | | 0.40 | | 0.39 |

## Intersection Summary

Cycle Length: 90

Actuated Cycle Length: 90

Offset: 60 (67%), Referenced to phase 2:EBTL and 6:WBTL, Start of Green

Natural Cycle: 60

Control Type: Actuated-Coordinated

Maximum v/c Ratio: 0.66

| | |
|---|---|
| Intersection Signal Delay: 15.0 | Intersection LOS: B |
| Intersection Capacity Utilization 66.0% | ICU Level of Service C |

Analysis Period (min) 15

m    Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases:    1: Lafontaine/Granville & Montreal

| →Ø2 (R) | | ↓Ø4 |
|---|---|---|
| 60 s | | 30 s |

| ←Ø6 (R) | | ↑Ø8 |
|---|---|---|
| 60 s | | 30 s |

|  |  | → | ↙ | ← | ↖ |
|---|---|---|---|---|---|
| Lane Group | | EBT | WBL | WBT | NBL |
| Lane Configurations | | ↱ | | ↰ | ⅄ |
| Traffic Volume (vph) | | 796 | 11 | 778 | 23 |
| Future Volume (vph) | | 796 | 11 | 778 | 23 |
| Lane Group Flow (vph) | | 850 | 0 | 831 | 46 |
| Turn Type | | NA | Perm | NA | Prot |
| Protected Phases | | 2 | | 6 | 8 |
| Permitted Phases | | | 6 | | |
| Detector Phase | | 2 | 6 | 6 | 8 |
| Switch Phase | | | | | |
| Minimum Initial (s) | | 10.0 | 10.0 | 10.0 | 10.0 |
| Minimum Split (s) | | 23.5 | 23.5 | 23.5 | 23.5 |
| Total Split (s) | | 60.0 | 60.0 | 60.0 | 30.0 |
| Total Split (%) | | 66.7% | 66.7% | 66.7% | 33.3% |
| Yellow Time (s) | | 3.3 | 3.3 | 3.3 | 3.3 |
| All-Red Time (s) | | 2.2 | 2.2 | 2.2 | 2.2 |
| Lost Time Adjust (s) | | -1.5 | | -1.5 | -1.5 |
| Total Lost Time (s) | | 4.0 | | 4.0 | 4.0 |
| Lead/Lag | | | | | |
| Lead-Lag Optimize? | | | | | |
| Recall Mode | | C-Max | C-Max | C-Max | None |
| Act Effct Green (s) | | 75.1 | | 75.1 | 14.7 |
| Actuated g/C Ratio | | 0.83 | | 0.83 | 0.16 |
| v/c Ratio | | 0.57 | | 0.57 | 0.17 |
| Control Delay | | 7.2 | | 9.4 | 20.2 |
| Queue Delay | | 0.0 | | 0.6 | 0.0 |
| Total Delay | | 7.2 | | 10.0 | 20.2 |
| LOS | | A | | A | C |
| Approach Delay | | 7.2 | | 10.0 | 20.2 |
| Approach LOS | | A | | A | C |
| Queue Length 50th (m) | | 46.5 | | 90.7 | 3.7 |
| Queue Length 95th (m) | | 113.3 | | 171.9 | 11.9 |
| Internal Link Dist (m) | | 88.2 | | 136.6 | 57.8 |
| Turn Bay Length (m) | | | | | |
| Base Capacity (vph) | | 1483 | | 1469 | 469 |
| Starvation Cap Reductn | | 0 | | 287 | 0 |
| Spillback Cap Reductn | | 0 | | 0 | 0 |
| Storage Cap Reductn | | 0 | | 0 | 0 |
| Reduced v/c Ratio | | 0.57 | | 0.70 | 0.10 |

| Intersection Summary |
|---|
| Cycle Length: 90 |
| Actuated Cycle Length: 90 |
| Offset: 0 (0%), Referenced to phase 2:EBT and 6:WBTL, Start of Green |
| Natural Cycle: 60 |
| Control Type: Actuated-Coordinated |
| Maximum v/c Ratio: 0.57 |

| | |
|---|---|
| Intersection Signal Delay: 8.9 | Intersection LOS: A |
| Intersection Capacity Utilization 70.9% | ICU Level of Service C |
| Analysis Period (min) 15 | |

Splits and Phases:   2: Lacasse & Montreal

| → Ø2 (R) | |
|---|---|
| 60 s | |
| ← ▽ Ø6 (R) | ↖ Ø8 |
| 60 s | 30 s |

# Appendix C

Truck Turn Templates
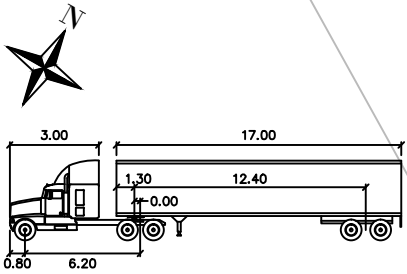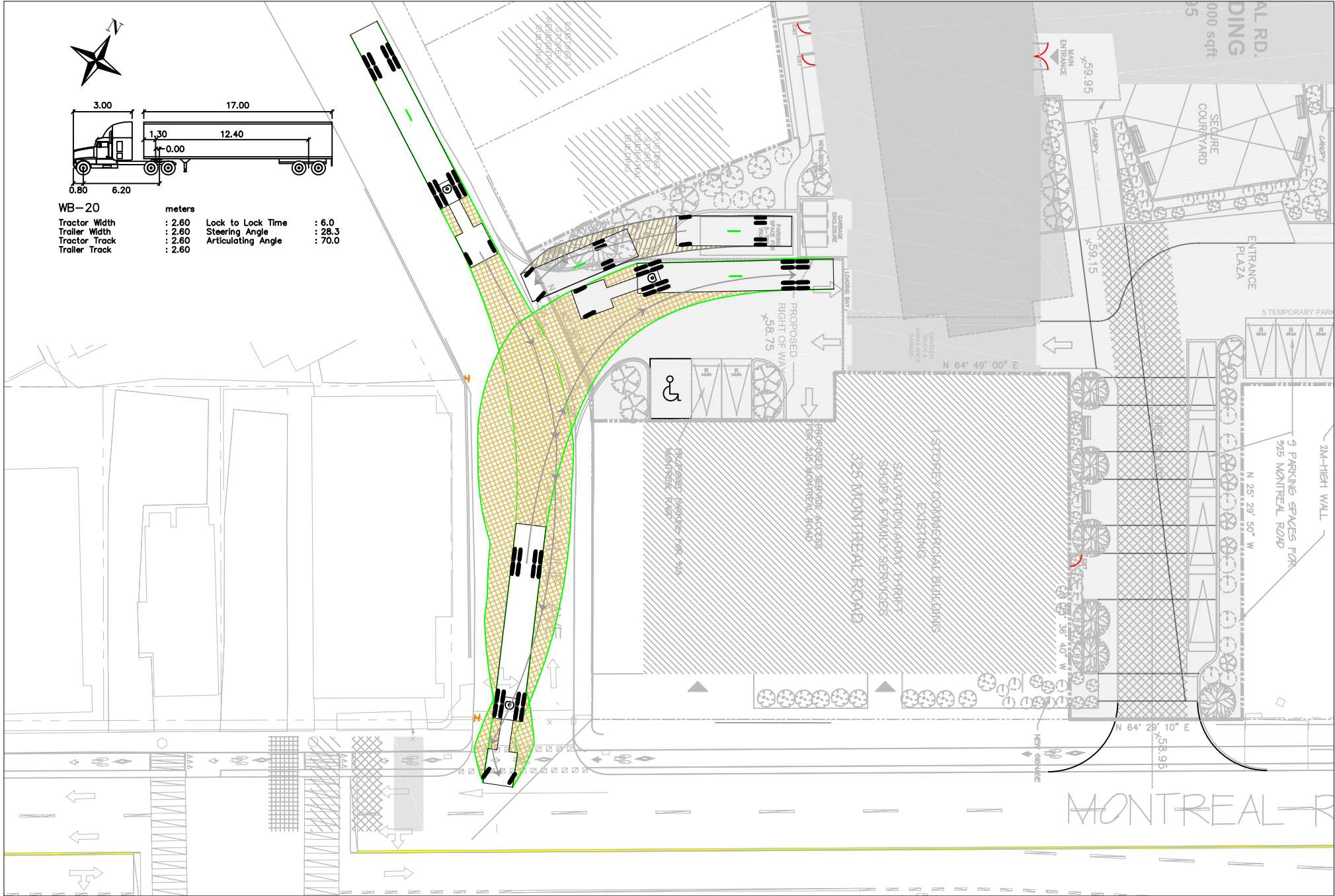
WB—20     meters

| | | | |
|---|---|---|---|
| Tractor Width | : 2.60 | Lock to Lock Time | : 6.0 |
| Trailer Width | : 2.60 | Steering Angle | : 28.3 |
| Tractor Track | : 2.60 | Articulating Angle | : 70.0 |
| Trailer Track | : 2.60 | | |

3.00

17.00

1.30    12.40

0.00

0.80    6.20

MONTREAL R

N 64° 49' 00" E

N 64° 29' 10" E

N 25° 29' 50" W

N

MONTFORT STREET

MONTREAL ROAD

333 MONTREAL RD.,
NEW BUILDING
Gross Area: 103,300 sq/ft
FFA: 59.95