Transportation Impact Study for the Proposed Development on the South Portion of Precinct J

Draft Report

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Table of Contents

EXECUTIVE SUMMARY 1

1.0 INTRODUCTION 4
1.1 PURPOSE 4
1.2 METHODOLOGY 5

2.0 PROPOSED DEVELOPMENT 6
2.1 LOCATION 6
2.2 LAND USE AND SITE LAYOUT 8
2.3 STUDY AREA 11
2.3.1 Surrounding Context 11
2.3.2 Transportation Context 11
2.4 FUTURE NEARBY DEVELOPMENTS 12
2.4.1 Land Use 12
2.4.2 Transportation System Modifications 14
2.5 ANALYSIS SCENARIOS 15

3.0 TRAFFIC VOLUMES 17
3.1 EXISTING BACKGROUND TRAFFIC 17
3.1.1 Balancing 18
3.2 BACKGROUND TRAFFIC PROJECTIONS 18
3.2.1 Growth Rates 18
3.2.2 Sage Creek 19
3.2.3 Final Background Traffic Volumes 19
3.3 SITE GENERATED TRAFFIC 20
3.3.1 Trip Generation 20
3.3.2 Development Interaction 23
3.3.3 Pass-By Trips 25
3.3.4 Directional Distribution 25
3.3.5 Trip Assignment 25
3.3.6 Mode Split 26
3.3.7 Southland Park 27
3.3.8 Site Generated Traffic Summary 27

4.0 ANALYSIS 28
4.1 TOTAL FUTURE TRANSPORTATION DEMAND 28
4.2 ANALYSIS OF PHASING 36
4.3 INTERNAL NETWORK 36
4.4 ACTIVE TRANSPORTATION 39
4.5 TRANSIT 41
4.6 TRAFFIC SIGNAL WARRANTS ANALYSIS 42

5.0 CONCLUSION 44

DRAFT

5.1 UNDERSTANDING OF PREVIOSULY IDENTIFED INFRASTRUCTURE IMPROVEMENTS 44
5.2 REGIONAL INFRASTRUCTURE 45
5.3 DEVELOPMENT DRIVEN RECOMMENDATIONS 45

LIST OF TABLES

Table 1: Study area street characteristics 12
Table 2: Background traffic at Fermor Avenue at Niakwa Road East 19
Table 3: Background traffic at Lagimodiere Boulevard at Abinojii Mikanah....19
Table 4: Trip generation for full buildout 21
Table 5: Unit count by trip generation zone 23
Table 6: Development interaction data from parallel TIS of Adjacent Development for full buildout....24
Table 7: General directional distribution exclusive of any interaction with Adjacent Development 25
Table 8: Directional distribution including interaction with Adjacent Development 25
Table 9: Estimated external trips by active modes 26
Table 10: Estimated external transit trips 26
Table 11: Estimated external personal vehicle trips 26
Table 12: Transportation demand at Fermor Ave and Niakwa Rd E/Dawson Rd S 29
Table 13: Transportation demand at Dawson Rd S and Collector B/Street B 30
Table 14: Transportation demand at Dawson Rd S and Collector C/Street C....31
Table 15: Transportation demand at Abinojii Mikanah and Blvd des Hivernants/Collector A....32
Table 16: Transportation demand at Abinojii Mikanah and Lagimodiere Blvd....33
Table 17: Internal roundabout intersection analysis 37
Table 18: Traffic Signal Warrant Analysis....43

LIST OF FIGURES

Figure 1: Regional context 6
Figure 2: Local context.... 7
Figure 3: Site plan.... 9
Figure 4: Local road network modifications 10
Figure 5: Proposed site plan for Adjacent Development....13
Figure 6: Current Transportation Master Plan regional network improvement map (2011)....15
Figure 7: Trip generation zones for traffic modeling 22
Figure 8: Proposed cross section for internal collectors in the Proposed Development....37
Figure 9: Collector ADT for full buildout of the Proposed Development and Adjacent Development 38
Figure 10: Roundabout with lane access....39
Figure 11: Sidewalks and active transportation paths....40
Figure 12: Potential transit routing and stops 42

DRAFT

LIST OF APPENDICES

APPENDIX A: TRANSPORTATION ENGINEERING BACKGROUND INFORMATION

APPENDIX B: TRAFFIC DATA AND CALCULATIONS

APPENDIX C: TRAFFIC SIGNAL WARRANT ANALYSIS

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EXECUTIVE SUMMARY

Stantec completed a Traffic Impact Study (TIS) for the Proposed Development on the south portion of Precinct J using a methodology that includes a) documenting the development site and study area characteristics, b) developing traffic volumes for analysis scenarios, c) conducting transportation analyses, and d) drawing conclusions from the study findings with the transportation analysis results. The TIS was consistent with the recommended methodologies set forth by the City of Winnipeg, with some modifications in analysis scenarios based on the uncertainty of Adjacent Development timelines.

In the regional context, the Proposed Development is to be located south of Fermor Avenue, west of Plessis Road, north of Abinojii Mikanah, and east of Lagimodiere Boulevard, in Winnipeg, Manitoba. In the local context, the Proposed Development is adjacent to Dawson Road South to the north, Plessis Road to the east, a Manitoba Hydro corridor to the south, and the Southland Park residential development/Glen Lawn Funeral Home and Cemetery/T&T Soils to the west.

The Proposed Development land use is residential. A total residential unit count of 1329 plus or minus 50 units was used as an input to the TIS, divided as follows: approximately 659 single family homes, approximately 60 duplex units, approximately 334 multifamily units in the form of townhouses, and approximately 276 multifamily units in the form of stacked townhouses or mid-rise multifamily.

The TIS assumes that the adjacent road network would be modified, such that Dawson Road South will be realigned to form the south leg at the intersection of Fermor Avenue and Niakwa Road East, approximately 800 m east of Lagimodiere Boulevard. The TIS also assumes that a new connection will be constructed between Abinojii Mikanah and the southmost access point to the Proposed Development, in the form of a north-south collector road.

Access for the Proposed Development was analyzed based on four access points, including two roundabouts along the northern frontage of Dawson Road South, one access point to the existing Southland Park development at the east leg of the Royal Mint Drive/Blue Mountain Road and Royal Park Crescent intersection, and one access point to the Abinojii Mikanah east extension at its intersection with the north extension of Boulevard des Hivernants.

The TIS analysis was based on a site plan dated November 12, 2022, which identified land uses by block as well as the configuration of collector and local roads within the development. Generally, development traffic is channeled to one collector road towards the south of the development and two collector roads towards the north of the development. The internal road network features two roundabouts where internal development traffic is expected to be highest, supported by stop control at the remaining internal intersections.

The four-step transportation demand modelling process was applied to the Proposed Development, including trip generation using unit counts and land use. Application of Institute of Transportation Engineer's *Trip Generation Manual* (11th Edition) methodology and survey data enabled the estimation of AM peak new site trip ends at 676 (165 entering, 511 exiting), PM peak new site trip ends at 889 (556

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entering, 333 exiting), and total daily new site trip ends at 9612 (4805 entering, 4807 exiting), which were further reduced based on mode split assumptions. A mode split reduction of 10% was applied to new site trip ends to account for both transit and active modes. No pass-by or diverted trip distributions were applied based on the residential-only land use.

There was one potential Adjacent Development identified as part of work on the TIS. The proposed Adjacent Development is generally bounded by the existing alignment of Dawson Road South to the south, vacant land/Royal Mint Drive to the west, Fermor Avenue to the north, and Plessis Road to the east. If is understood the Adjacent Development is proposed to share access with the Proposed Development to Dawson Road South at the two new roundabouts at Dawson Road South at Collector B and Dawson Road South at Collector C. Another new roundabout is also proposed along Dawson Road South (re-aligned) between Fermor Avenue and Collector B of the Proposed Development. Estimated net site trips for the Adjacent Development were obtained for incorporation of the proposed Adjacent Development in the TIS, however other details, including unit counts and other traffic-related assumptions were not made available.

The TIS assessed expected traffic performance for three existing external intersections, including Abinojii Mikanah at Lagimodiere Boulevard, Abinojii Mikanah at Boulevard des Hivernants, and Fermor Avenue at Niakwa Road East/Dawson Road South (realigned). Two new external intersections were analyzed, including Dawson Road South at Collector B (new) and Dawson Road South at Collector C (new). Analysis of expected traffic performance at internal intersections focused on three locations exhibiting the greatest total expected traffic, all located along the primary collector through the Proposed Development (Collector C). This included two roundabouts and one stop-control intersection.

Expected performance of forecasted traffic was simulated for the AM and PM peak hours of adjacent street traffic. Estimated average daily traffic was also used for comparisons with lane flow and capacity. Traffic estimates and simulation were based on the future time horizon of 2033, with additional analysis for phasing. Analysis was performed for these future time horizons for both the scenario of simultaneous buildout of the proposed Adjacent Development as well as no buildout of the proposed Adjacent Development within the overall 10-year time frame from 2023 to 2033. Traffic signal warrant analysis was performed for the unsignalized intersection on the external network; traffic signals were deemed warranted at the intersection of Abinojii Mikanah at Boulevard des Hivernants in the 2033 scenario with the Proposed Development and Adjacent Development at full buildout.

Phasing was proposed in up to three phases, beginning with development in the southwest portion of the proposed site (Phase 1 and 1B), followed by development in the east portion of the development (Phase 2), and concluding buildout with development in the north portion of the development (Phase 3). One major access is expected to be added per phase.

It is understood that transit service should be extended to Proposed Development. Collector C serves as the primary candidate for transit service, providing connectivity from Abinojii Mikanah to the south and Fermor Avenue to the north. Potential bus stop locations are proposed at four locations along Collector C and A in addition to two stops on the external network at the two new Collector C and Collector B roundabouts.

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The proposed accommodation of active transportation (AT) in and surrounding the Proposed Development was assessed based on draft plans for internal active transportation facilities as of May 5, 2023. This includes a multi-use path along west side of Collector B from Dawson Road South to the park space east of Collector C, a multi-use path along Collector C from Dawson Road South to Abinojii Mikanah, trails through park space, and other sidewalks in various locations across the Proposed Development. It is noted that sidewalk is not proposed for all local roads within the Proposed Development, such that active transportation users including cyclists and pedestrians would need to use the primary travel lanes to access nearby AT facilities. Safety was incorporated in the TIS through consideration of pedestrian accommodation, cyclist accommodation, and access configuration.

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1.0 INTRODUCTION

1.1 PURPOSE

The Winnipeg Transportation Master Plan (2011) sets out six key strategic goals that describe the vision for Winnipeg's transportation system. The six key strategic goals are:

- A transportation system that is dynamically integrated with land use.
- A transportation system that supports active, accessible, and healthy lifestyle options.
- A safe, efficient, and equitable transportation system for people, goods, and services.
- Transportation infrastructure that is well maintained.
- A transportation system that is financially sustainable.
- A transportation system that reduces its greenhouse gas emissions footprint and meets or surpasses climate change and emissions reduction goals set by the City and the Province.

Transportation Impact Studies (TISs) play an important role in the pursuit of these goals. TISs provide a quantitative basis for identifying deficiencies in the existing transportation system, impacts from new developments, and modifications required to facilitate development.

The purpose of this TIS is:

- To assess the impact of the Proposed Development on the surrounding multi-modal transportation system.
- To incorporate a revised residential road network that addresses concerns about cut through traffic destined for the commercial development along Dawson Road South while also accommodating transit service.
- To identify any transportation system modifications required to enable the surrounding multi-modal transportation system to provide safe and efficient service for all users under existing conditions and future conditions with and without the Proposed Development.
- To identify means of providing convenient alternatives to single occupant vehicle travel to the Proposed Development.

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1.2 METHODOLOGY

The TIS was completed using the following methodology:

- Document development site and study area characteristics including:
    - Development location,
    - Proposed land uses and site layout,
    - Study area boundaries,
    - Study area land use and transportation characteristics,
    - Nearby planned land use development and transportation system modifications, and
    - Anticipated horizon years and time periods for analysis.
- Develop traffic volumes for analysis scenarios including:
    - Existing (background) traffic based on traffic counts,
    - Projected future background traffic based on projected traffic growth,
    - Estimated traffic generated by the Proposed Development, and
    - Estimated traffic generated by adjacent developments.
- Conduct transportation analyses including:
    - Intersection vehicular traffic capacity and level of service analysis,
    - Traffic signal warrant analyses,
    - Consideration of average daily traffic (ADT) volumes,
    - Consideration of impacts to active transportation, and transit, and
    - Consideration of recommendations from other studies conducted on nearby developments.
- Draw conclusions from the study findings and recommend transportation system modifications consistent with the transportation analysis results.

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2.0 PROPOSED DEVELOPMENT

2.1 LOCATION

The Proposed Development is to be located south of Fermor Avenue, west of Plessis Road, north of Bishop Grandin Boulevard, and east of Lagimodiere Boulevard. **Figure 1** shows the development location in the regional context.



Figure 1: Regional context

More specifically, the Proposed Development is to be bounded by Dawson Road South to the north, Plessis Road to the east, a Manitoba Hydro Transmission Corridor to the south, and the Southland Park neighborhood to the west. **Figure 2** shows the Proposed Development in the local context.



Figure 2: Local context

2.2 LAND USE AND SITE LAYOUT

The Proposed Development is to be developed as a residential neighborhood with the following planned unit counts:

- Approximately 659 single family homes,
- Approximately 60 duplex units,
- Approximately 334 multifamily units in the form of townhouses, and
- Approximately 276 multifamily units in the form of stacked townhouses or mid-rise apartments.

The development as planned includes a total of approximately 1329 units, plus or minus 50 units.

The Proposed Development is to have the following connections to the adjacent street network:

- Two accesses to Dawson Road South,
- A connection to the Southland Park neighborhood at the east leg of the Royal Mint Drive/Blue Mountain Road and Royal Park Crescent intersection, and
- A connection to the Abinojii Mikanah east extension at the intersection with the north extension of Boulevard Des Hivernants.

The site plan and access points are shown on **Figure 3**.

Note that the site plan and access configuration assumes that Dawson Road South will be realigned to form the south leg at the intersection of Fermor Avenue and Niakwa Road East, approximately 800 m east of Lagimodiere Boulevard.

The site plan and access configuration also assumes that a new connection will be constructed between the Abinojii Mikanah eastern extension to the south access point to the Proposed Development, in the form of a collector road.

The westernmost section of Dawson Road South, which previously intersected Fermor Avenue approximately 275 m east of Lagimodiere Boulevard, was closed during the extension of Royal Mint Drive to Fermor Avenue. Royal Mint Drive now intersects Fermor Avenue approximately 415 m to the east of Lagimodiere Boulevard, with a right-in, right-out intersection.

The section of Dawson Road South between Royal Mint Drive and the new Dawson Road South alignment that connects to Niakwa Road East is expected to be realigned as part of the realignment of Dawson Road South to intersect with Fermor Avenue at the existing intersection of Fermor Avenue at Niakwa Road East.

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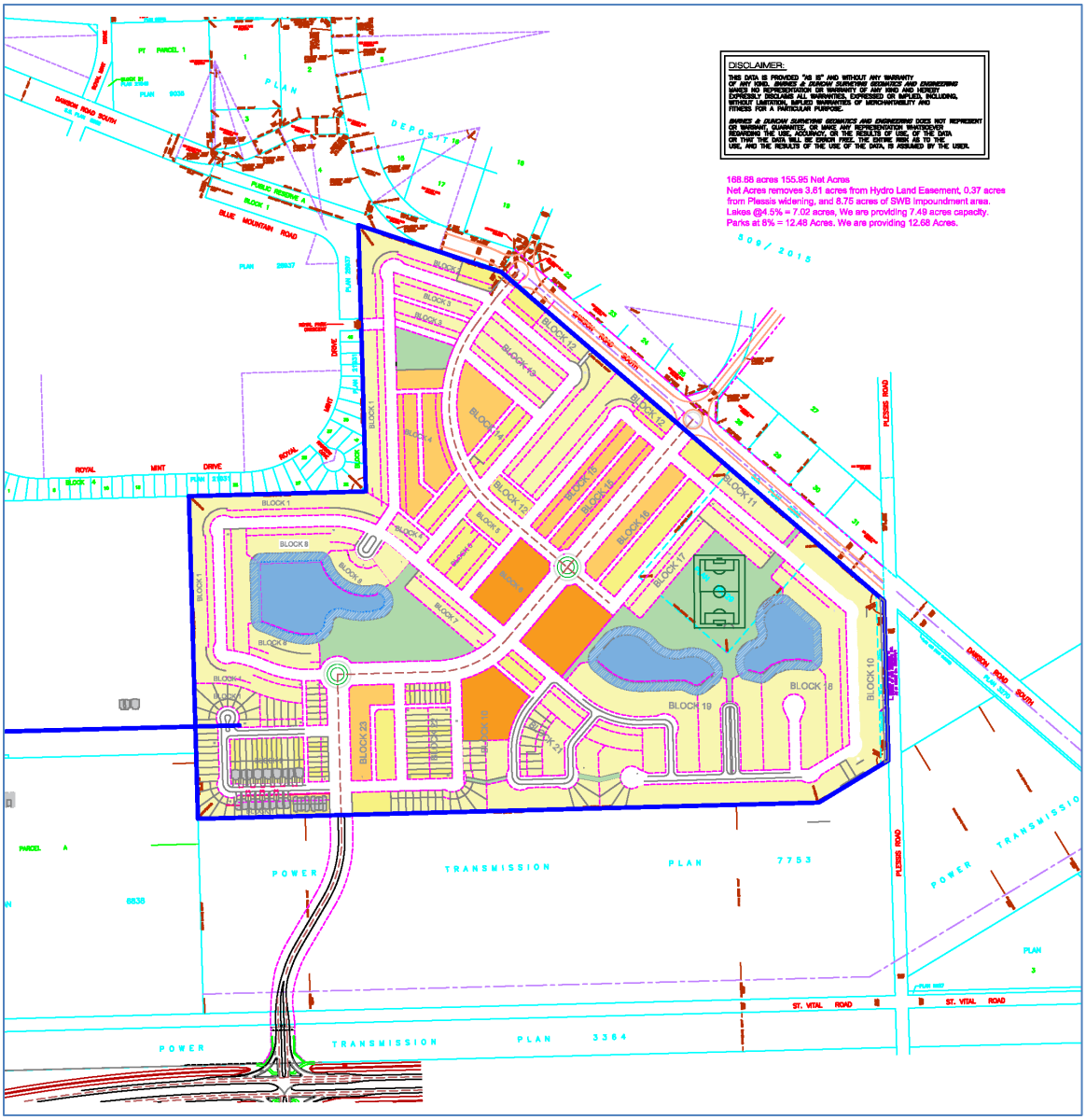


Figure 3: Site plan

Figure 4 shows the modifications to the local road network as a result of nearby proposed developments, including both road realignments and new roads (e.g., Bishop Grandin Boulevard east extension).



Figure 4: Local road network modifications

2.3 STUDY AREA

The study area is bounded by Fermor Avenue to the north, Plessis Road to the east, the Abinojii Mikanah east extension to the south, and Lagimodiere Boulevard to the west. There is a connection to the Sage Creek neighborhoods made by the northerly extension of Boulevard des Hivernants.

The external intersections expected to be most affected by the Proposed Development were selected as study intersections. These intersections are:

- Abinojii Mikanah at Lagimodiere Boulevard,
- Abinojii Mikanah at Boulevard des Hivernants, and
- Fermor Avenue and Niakwa Road (east intersection)/Dawson Road South (re-aligned).

Two other new intersections along the external road network were analyzed, including:

- Dawson Road South at Collector B (new), and
- Dawson Road South at Collector C (new).

Note that Dawson Road South is assumed to be realigned as part of the Adjacent Development and the development of the Proposed Development. As such, in any background scenarios the intersection of Fermor Avenue and Niakwa Road, 800 m east of Lagimodiere Boulevard, was considered as a “T” intersection, while in future scenarios with the Adjacent Development and/or the fully built Proposed Development the intersection was considered as a four-leg intersection.

Collector B (new) connects to a realigned Dawson Road South towards the west of the Proposed Development’s north frontage, whereas Collector C (new) connects to the realigned Dawson Road South towards the east of the development’s north frontage. Please refer to Appendix B for other road names assigned as part of this TIS, including reference to Collector B (new) and Collector C (new).

2.3.1 Surrounding Context

Lands to the north of Precinct J are occupied by the CN Symington Yards and other industrial development. Lands to the east are largely agricultural or have scattered residential development. To the west and south there are residential neighborhoods, as well as a Hydro Corridor along the south border. To the west along Lagimodiere Boulevard, there is the Royal Canadian Mint, an industrial/commercial building, a Church, a funeral home and memorial garden, and the Manitoba Hydro St Vital Station.

2.3.2 Transportation Context

Dedicated active transportation facilities in the study area include a multi-use path along the east side of Lagimodiere Boulevard from south of Abinojii Mikanah to Fermor Avenue, and a multi-use path along the north side of Fermor Avenue from west of Lagimodiere Boulevard to approximately 300 m east of Lagimodiere Boulevard; the multi-use path terminates where Niakwa Road East runs parallel to Fermor Avenue, functioning as a service road. There is another multi-use path connecting the southeast quadrant

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of the Fermor Avenue and Lagimodiere Boulevard intersection to near the existing intersection of Royal Mint Drive and Dawson Road South. There is a recently opened multi-use path on the south side of the Abinojii Mikanah east extension that connects Lagimodiere Boulevard to a multi-use path on the west side of Boulevard des Hivernants. Sidewalks and recreational paths are provided within the Southland Park neighborhood.

Transit service in the study area includes Routes 50 and 96, both of which run on Lagimodiere Boulevard and serve Southland Park. Route 50 extends south to serve Sage Creek and north through Windsor Park and St. Boniface into Downtown. Route 96 extends just north of Fermor Avenue on Lagimodiere Boulevard, and goes west to Southdale Centre and St Vital Centre.

Lagimodiere Boulevard currently operates as a four-lane divided facility with over 45,000 vehicles per day. Discussions with City of Winnipeg Public Works Department provided information that there were no plans on record to indicate future expansion to six-lanes and that a comprehensive study would need to be done to determine if there is sufficient room to expand the facility within the existing right of way. The Public Works Department also indicated that there were conceptual plans on record for a future interchange at Lagimodiere Boulevard and Fermor Avenue; this intersection is also identified for grade separation in the draft presentation of potential intersection upgrades through the TMP50 [in-progress].

Table 1 lists characteristics of key streets in the study area.

Table 1: Study area street characteristics

Street	Street Classification Through Study Area	Basic Cross-Section	Surface Type	Posted Speed Limit
Lagimodiere Boulevard	Regional Street	Four-Lane Divided	Pavement	80 km/h
Fermor Avenue	Regional Street	Four-Lane Divided	Pavement	80 km/h
Abinojii Mikanah	Regional Street	Four-Lane Divided	Pavement	80 km/h
Dawson Road South	Collector	Two-Lane Undivided	Pavement / Granular	50 km/h (unsigned)
Plessis Road	Collector	Two-Lane Undivided	Pavement / Granular	50 km/h (unsigned)

Lagimodiere Boulevard, Fermor Avenue, and Abinojii Mikanah all provide for high-speed travel through the study area. Major intersections are controlled by traffic signals, while direct property accesses operate under two-way stop control.

Dawson Road South and Plessis Road connect scattered rural development to the rest of the street network. These streets are primarily gravel construction, however some paved sections remain. Plessis Road previously connected to Fermor Avenue, however this connection has been recently closed. Access to Plessis Road is still possible via Dawson Road South.

2.4 FUTURE NEARBY DEVELOPMENTS

2.4.1 Land Use

The lands bounded by Fermor Avenue to the north, Plessis Road to the east, and Dawson Road South to the south and west are part of a proposed Adjacent Development. As there is only one future nearby

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development considered in this study, this area will be referred to as the Adjacent Development, as shown in **Figure 5**.



Figure 5: Proposed site plan for Adjacent Development

This development is being pursued by other parties but is considered in this TIS as it influences total traffic load at intersections with major routes in the study area. Based on available information, the Adjacent Development is to include the following uses:

- Commercial,
- Commercial mixed-use, and
- Residential multi-family units.

Some development information was supplied through a separate Traffic Impact Study for the Adjacent Development, primarily through trip counts. The detailed phasing of the Adjacent Development is unknown and therefore different phasing scenarios are included in this study; it was indicated that the Adjacent Development horizon years are 2025 for Phase 1 and 2030 for full buildout. Stantec was also supplied with the expected level of interaction between the Proposed Development and the Adjacent Development in the form of trips to and from each. This data applied to full buildout; no interaction was assumed for earlier phases in a parallel development scenario. Note that there were three primary

internal roads identified in the trip data, including Street A, B, C. Street B of the Adjacent Development is intended to connect to the Proposed Development's Collector B at a roundabout along Dawson Road South. Street B of the Adjacent Development is intended to connect to the Proposed Development's Collector C at a roundabout along Dawson Road South.

There is no official plan for developable lands east of Plessis Road and south of Fermor Avenue. These lands are within the R.M. of Springfield. There have been some discussions for the development of commercial and industrial land uses to the north of Fermor Avenue and east of Plessis Road, however discussion of this is tabled for results of the City of Winnipeg Transportation Master Plan 2050, such as discussion of the potential future replacement of the existing Fermor Avenue structure over the CN main line.

2.4.2 Transportation System Modifications

The following transportation system modifications are to be completed as part of the proposed and Adjacent Development:

- Dawson Road South is to be realigned from the existing connection to Royal Mint Drive to the Fermor Avenue and Niakwa Road intersection, approximately 800 m east of Lagimodiere Boulevard. This is to be completed as part of buildout of the Adjacent Development.
- The existing connection of Dawson Road South to Royal Mint Drive is to be closed or re-aligned to connect to a new intersection along the re-aligned Dawson Road South approximately 150 m south of Fermor Avenue. This is to be completed as part of the Adjacent Development.
- A new collector road is to be constructed, connecting to the intersection of Abinojii Mikanah and Boulevard des Hivernants to the south and providing access to the Proposed Development to the north. This is to be completed as part of the Proposed Development.

These modifications are shown in orange on **Figure 4**.

There have been recent discussions regarding the route of Abinojii Mikanah east of Plessis Road and how the alignment of Fermor Avenue and Abinojii Mikanah will be influenced with the replacement of the existing structure over the CN main line. The current *Transportation Master Plan (2011)* identifies the extension of Abinojii Mikanah (formerly named Bishop Grandin Boulevard) to the east to a new connection with Fermor Avenue approximately 2500 m northwest from PTH 100, as shown in **Figure 6**. Final decisions on the future nature and location of these routes are under discussion within the development of *Transportation Master Plan: 2050*. The completion of the traffic modeling as part of this study is predicated on the recent extension of Abinojii Mikanah to the east and no major development of Plessis Road as an alternate major regional connection to Fermor Avenue.

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Figure 6: Current Transportation Master Plan regional network improvement map (2011)

2.5 ANALYSIS SCENARIOS

Preliminary comment on phasing suggested the following time horizons for development of four phases, with the potential for buildout of the final phase to extend beyond a 10-year time frame:

- Phase 1: Year 0 (2023)
- Phase 1B: Year 2 or 3 (2025 or 2026)
- Phase 2: Year 5 (2028)
- Phase 3: Year 10+ (2033+)

Phasing of the Adjacent Development is unknown, however trip counts were provided for an initial phase (Phase 1) and full buildout. For the purpose of analysis in the case that both the Proposed Development and Adjacent Development are developed in parallel, it was assumed that Phase 1 of the Adjacent Development would occur based on a five-year time horizon (2028) and full buildout would occur based on a ten-year time horizon (2033).

In order to reconcile time frames for development of the Proposed Development and the Adjacent Development, the primary set of analysis scenarios were set along with assumptions of parallel development of the two sites, as follows:

- 2023 Background Traffic (existing conditions)
- 2033 Background Traffic

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- 2033 Background + Adjacent Development (where applicable)
- 2033 Background + Adjacent Development (Full Buildout) + Proposed Development (Full Buildout)

A secondary set of scenarios may be considered as it relates to development of the Proposed Development exclusive of any development of the Adjacent Development, as follows, however these are only discussed within the context of phasing:

- 2023 Background Traffic (existing conditions)
- 2023 Background + Proposed Development (Phase 1)
- 2028 Background Traffic
- 2028 Background + Proposed Development (Phases 1, 1B, and 2)
- 2033 Background Traffic
- 2033 Background + Proposed Development (Full Buildout)

The time periods for analysis in each scenario were the weekday AM and PM peak hours. These time periods are typically the critical traffic time periods for intersections on regional streets. Estimated average daily traffic was also used for comparisons with lane flow and capacity.

The Saturday Peak Hour impacts due to commercial development were reported in previous studies and are not impacted by the Proposed Development as any trips from the Proposed Development to the commercial land uses in the Adjacent Development would be internal to the Precinct.

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3.0 TRAFFIC VOLUMES

3.1 EXISTING BACKGROUND TRAFFIC

Background traffic volumes were taken and extrapolated from the traffic counts provided by the City of Winnipeg in 2017, when an earlier version of this study was initiated:

- **Lagimodiere Boulevard and Fermor Avenue**
  Wednesday, October 19th, 2011
  from 7:00 AM to 9:00 AM and from 12:00 PM to 6:00 PM

- **Lagimodiere Boulevard and Abinojii Mikanah**
  Wednesday, April 9th, 2014
  from 7:00 AM to 9:00 AM and from 12:00 PM to 6:00 PM

- **Lagimodiere Boulevard and Sage Creek Boulevard**
  Tuesday, November 24th, 2015
  from 7:00 AM to 6:00 PM

The age of these counts now extends beyond five years. Upon reinitiating this TIS in 2021, discussions were held with the City of Winnipeg to determine the acceptability of previous traffic counts. A determination was made to use the counts from the earlier version of the study, as new counts collected would be significantly impacted by COVID-19 traffic impacts and roadworks on major study roads. However, the overall duration of the Development application process allowed for collection of an updated count, as follows:

- **Lagimodiere Boulevard and Abinojii Mikanah**
  Thursday, June 22nd, 2023
  from 12:00 AM to 11:59 PM (24-hour count)

This count was used as a benchmark for the estimation of future background traffic completed in the earlier version of this study as well as the Precinct J Transportation Review. Note that both Lagimodiere Boulevard at Sage Creek Boulevard and Lagimodiere Boulevard at Fermor Avenue were not study intersections. These counts were used for comparison and volume balancing. This count was used to balance the volumes at Lagimodiere Boulevard and Abinojii Mikanah and at Lagimodiere Boulevard and Fermor Avenue, effectively bringing those intersection volumes to a 2015 level.

Traffic volumes on Fermor Avenue at Niakwa Road East (east intersection) were taken from estimates completed as part of the Precinct J Transportation Review.

The AM and PM peak hour for the TIS was based on the updated count of Lagimodiere Boulevard at Abinojii Mikanah Boulevard, as follows:

- AM: 7:15 AM – 8:15 AM

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- PM: 5:00 PM – 6:00 PM

The majority of counts did not cover full 24-hour periods, so weekday Average Daily Traffic (ADT) volumes were taken from the City of Winnipeg's 2019 Traffic Flow Map, with ADTs expressed as vehicles per day (vpd) as follows:

- Lagimodiere Boulevard, south of Fermor Avenue: 46,700 vpd
- Lagimodiere Boulevard, north of Fermor Avenue: 42,800 vpd
- Lagimodiere Boulevard, south of Abinojii Mikanah: 23,700 vpd
- Fermor Avenue, east of Lagimodiere Boulevard: 18,200 vpd
- Fermor Avenue, west of Lagimodiere Boulevard: 33,200 vpd
- Abinojii Mikanah, west of Lagimodiere Boulevard: 27,400 vpd

There was no ADT data available from the Traffic Flow Map for the Abinoji Mikanah extension east of Lagimodiere Boulevard due to its recent construction, however the daily traffic volume extracted from the 2023 count was 6,834 vpd.

Traffic growth projections described in Section 3.2 were used to bring the 2015 Background traffic volumes to 2023 levels.

3.1.1 Balancing

As there was only one study intersection along Lagimodiere Boulevard and one study intersection along Fermor Avenue, with multiple adjacent intersections and accesses, only a preliminary exercise to balance traffic to 2015 volumes was feasible. This exercise was performed using annual growth rates from the Precinct J Transportation Review, with growth rates of 1% on Fermor Avenue, 1% on Lagimodiere Boulevard north and south of Fermor Avenue, 1.5% on Lagimodiere Boulevard north and south of Abinojii Mikanah, and 1.5% on Abinojii Mikanah. These growth rates were not applied to any time horizons beyond 2015.

Further balancing was not required for new intersections as the trip generation, distribution, and assignment exercise assumes a continuous network and no additional access inside of external network gates.

3.2 BACKGROUND TRAFFIC PROJECTIONS

3.2.1 Growth Rates

The balancing process described in Section 3.1.1 adjusted the existing traffic volumes to represent conditions in 2015, the year of the most recent traffic count. Background traffic volumes were still required for the years 2023, 2028, and 2033. Background traffic was projected to these years using compound annual growth rates recommended by the City of Winnipeg, as follows:

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- **AM Peak Hour:** 0.0%
- **PM Peak Hour:** 0.2%
- **ADT:** 0.5%

3.2.2 Sage Creek

The Precinct J Transportation Review included an estimate of trips generated by increased development in the Sage Creek neighborhood, south of the Proposed Development. In that study Sage Creek was assumed to be fully built out by 2028, and new volumes were assigned to Boulevard des Hivernants and then to the Abinojii Mikanah east extension to Lagimodiere Boulevard. In the 2028 and 2033 scenarios that included the Proposed Development, the Sage Creek volumes were assigned to Boulevard des Hivernants, as in the Precinct J Transportation Review. These added volumes were distributed onto the surrounding transportation network at the intersection of Abinojii Mikanah and Lagimodiere Boulevard following the same distribution of traffic for the Proposed Development described in further detail on trip distribution.

3.2.3 Final Background Traffic Volumes

The following tables show the background traffic volumes for the 2023, 2028, and 2033 Background scenarios.

Table 2: Background traffic at Fermor Avenue at Niakwa Road East

Volume	West approach			East approach			South approach			North approach		
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
AM 2023	65	765	0	0	1345	25	0	0	0	5	0	10
AM 2028	65	765	0	0	1345	25	0	0	0	5	0	10
AM 2033	65	765	0	0	1345	25	0	0	0	5	0	10
PM 2023	10	1310	0	0	885	5	0	0	0	25	0	85
PM 2028	10	1325	0	0	895	5	0	0	0	25	0	85
PM 2033	10	1335	0	0	900	5	0	0	0	25	0	90

Table 3: Background traffic at Lagimodiere Boulevard at Abinojii Mikanah

Volume	West approach			East approach			South approach			North approach		
	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
AM 2023	765	55	205	5	165	265	365	1035	0	60	625	560
AM 2028	880	45	205	60	165	445	365	1485	15	125	625	560
AM 2033	880	45	205	60	165	445	365	1485	15	125	625	560
PM 2023	550	125	340	5	110	165	320	755	0	215	1070	865
PM 2028	845	140	345	35	110	245	325	765	55	390	1460	875
PM 2033	855	145	345	35	110	250	325	770	55	400	1475	880

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Background traffic in 2023 for the intersection of Lagimodiere Boulevard at Abinojii Mikanah is based on the updated count in 2023, however background traffic in 2028 and 2033 are based on the Precinct J Transportation Review forecasts benchmarked to the 2023 count. These forecasts therefore account for full buildout of Sage Creek. No background traffic is provided for the intersection of Boulevard des Hivernants and Abinojii Mikanah as this essentially an intersection with only through movements despite the right-angle geometry.

3.3 SITE GENERATED TRAFFIC

3.3.1 Trip Generation

Trip generation estimates were completed using data from the Institute of Transportation Engineers (ITE) *Trip Generation Manual (11th Edition)*. The *Trip Generation Manual* includes trip generation rates for a variety of land uses for different time periods, based on development size, occupancy, or other features.

Trip generation estimates were completed for the proposed uses in the Proposed Development. **Table 4** shows the land uses proposed for the Proposed Development and the corresponding ITE Land Use Categories and trip generation.

In total, the Proposed Development is estimated to generate 676 trip ends in the weekday AM peak hour, 889 trip ends in the weekday PM peak hour, and 9612 trip ends in the average weekday.

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Table 4: Trip generation for full buildout

Period	ITE Description	ITE code	Quantity [units]	Entering %	Exiting %	Fitted Curve Total Trip Ends	Fitted Curve Entering Trip Ends	Fitted Curve Exiting Trip Ends
Weekday	**Single-family detached housing**	**210**	**659**	**50%**	**50%**	**5719**	**2859**	**2860**
Weekday	Single-family attached housing	215	60	50%	50%	407	203	204
Weekday	Multifamily Housing (Low-Rise)	220	334	50%	50%	2216	1108	1108
Weekday	Multifamily Housing (Mid-Rise)	221	276	50%	50%	1270	635	635
Totals						*9612*	*4805*	*4807*
Period	**ITE Description**	**ITE code**	**Quantity**	**Entering %**	**Exiting %**	**Fitted Curve Total Trip Ends**	**Fitted Curve Entering Trip Ends**	**Fitted Curve Exiting Trip Ends**
Weekday AM	Single-family detached housing	210	659	25%	75%	414	104	310
Weekday AM	Single-family attached housing	215	60	25%	75%	26	6	20
Weekday AM	Multifamily Housing (Low-Rise)	220	334	24%	76%	126	30	96
Weekday AM	Multifamily Housing (Mid-Rise)	221	276	23%	77%	110	25	85
Totals						*676*	*165*	*511*
Period	**ITE Description**	**ITE code**	**Quantity**	**Entering %**	**Exiting %**	**Fitted Curve Total Trip Ends**	**Fitted Curve Entering Trip Ends**	**Fitted Curve Exiting Trip Ends**
Weekday PM	Single-family detached housing	210	659	63%	37%	585	368	217
Weekday PM	Single-family attached housing	215	60	59%	41%	32	19	13
Weekday PM	Multifamily Housing (Low-Rise)	220	334	63%	37%	164	103	61
Weekday PM	Multifamily Housing (Mid-Rise)	221	276	61%	39%	108	66	42
Totals						*889*	*556*	*333*

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For trip generation, the Proposed Development was first divided into 25 zones, denoted from Zone A to Zone Y and shown in **Figure 7**, to facilitate the development of internal intersection turning movements needed for detailed design as well as to facilitate analysis based on phasing of buildout. Zones were further simplified for PTV VISTRO analysis, numbered from 1 to 12.

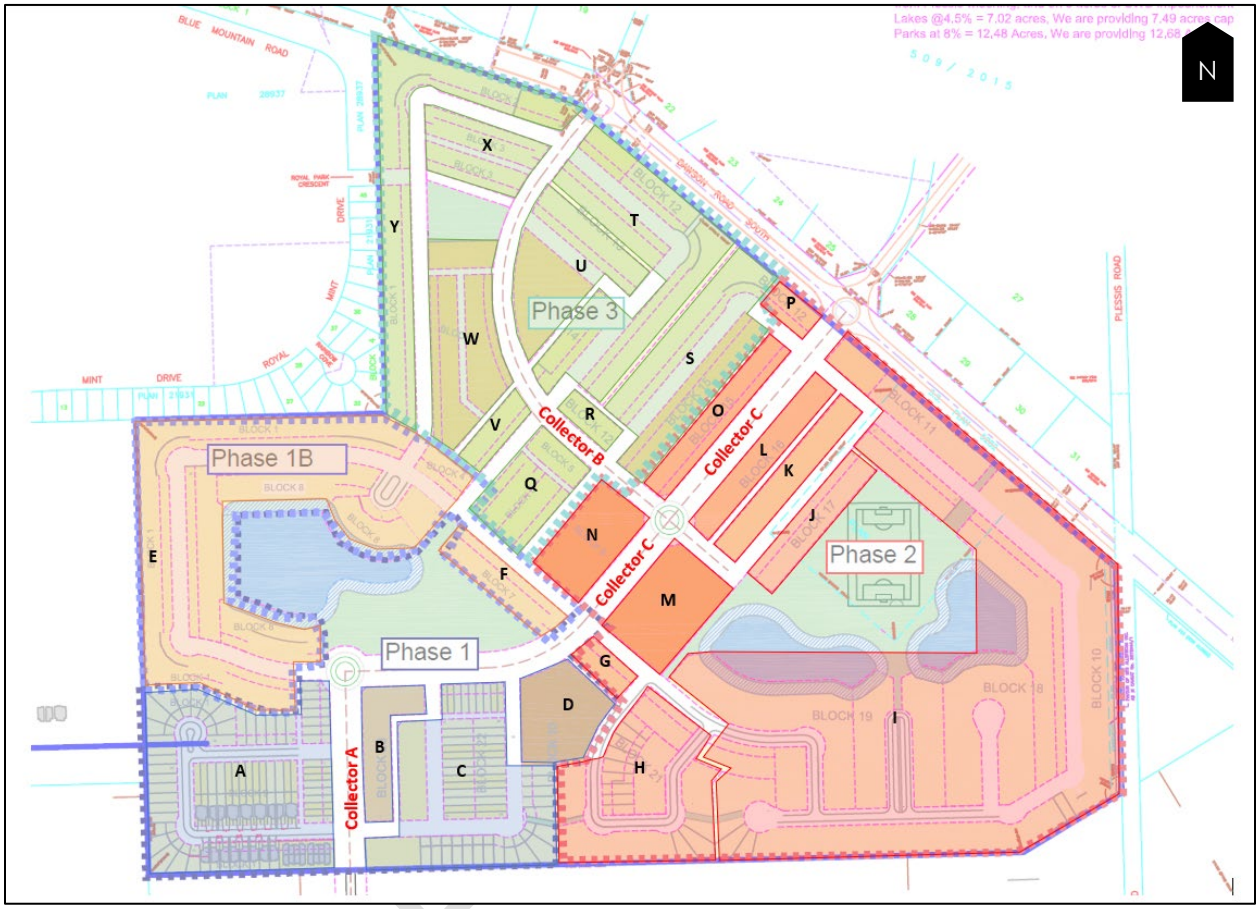


Figure 7: Trip generation zones for traffic modeling

To further define trip generation by zone, **Table 5** shows the number of units by land use for each zone.

Table 5: Unit count by trip generation zone

Zone [Phasing]	Zone [VISTRO]	Phase	Single Family	Duplex	Townhouse/Low-rise Multi-family	Mid-rise multi-family
Total			**659**	**60**	**334**	**276**
A	1	1	54	24	16	
B	2	1			32	
C	2	1	36	16	30	
D	2	1				86
E	3	1B	93			
F	3	1B	12			
G	4	2	8			
H	4	2	46			
I	4	2	188		16	
J	5	2	16			
K	5	2	17	12		
L	5	2			30	
M	6	2				110
N	7	2				80
O	8	2			30	
P	8	2			16	
Q	9	3	28			
R	10	3	8			
S	10	3	21		30	
T	11	3	45	8	16	
U	11	3	12		44	
V	12	3	11			
W	12	3			58	
X	12	3	25			
Y	12	3	39		16	

3.3.2 Development Interaction

Unit counts were not made available for the Adjacent Development. At a preliminary level, Stantec assessed trip generation based on maximum allowable development by zoning and compared this with the received data on new site trips associated with the Adjacent Development.

Interaction between the Proposed Development and the Adjacent Development was accounted for through analysis of supplied trips from the parallel TIS. This was achieved by calculating trip ends within the Proposed Development from the supplied net trip figures. By taking this approach, interaction between residential development in the Proposed Development and commercial land uses in the Adjacent Development was determined by the assumptions in the parallel TIS study. Net trips supplied from the parallel TIS were assumed to represent personal vehicle trips following reductions for mode split. Net trips were only supplied for full buildout and therefore no development interaction could be calculated for earlier phasing in the parallel development scenario.

Interaction between the two developments, in terms of trip attraction, is believed to be limited to interaction between residential units in the Proposed Development and commercial trip attractors in the Adjacent Development. The total number of trips attracted to commercial in the Adjacent Development were used to modify the trip distribution and assignment exercise for residential trips within the Proposed Development; trips between the two developments were subtracted from the supplied net trip figures then incorporated into the trip distribution of the Proposed Development at the equivalent generation level.

For the AM peak hour, it was identified that 28 trips enter Proposed Development from the Adjacent Development and 40 trips exit the Proposed Development to the Adjacent Development. This represents approximately 11% of AM peak hour personal vehicle trip generation for the Proposed Development. For the PM peak hour, it was identified that 70 trips enter the Proposed Development from the Adjacent Development and 64 trips exit the Proposed Development to the Adjacent Development. This represents approximately 17% of PM peak hour personal vehicle trip generation for the Proposed Development. For the average day, it was identified that 934 trips enter the Proposed Development from the Adjacent Development and 934 trips exit the Proposed Development to the Adjacent Development. This represents approximately 22% of average weekday personal vehicle trip generation for the Proposed Development. Development interaction is summarized in **Table 6**.

Table 6: Development interaction data from parallel TIS of Adjacent Development for full buildout

Trips to/from commercial land use in Adjacent Development			
	AM peak	**PM peak**	**ADT**
Entering the Proposed Development from commercial	28	70	934
Exiting Proposed Development to commercial	40	64	934
Subtotal interaction trips	68	134	1868
Total Proposed Development trip ends	676	889	9612
Total Proposed Development personal vehicle trips	609	800	8651
Percentage of Proposed Development personal vehicle trips interacting with Adjacent Development	11%	17%	22%
Percentage of Proposed Development personal vehicle trips interacting with Adjacent Development, west of Dawson Road South	5%	6%	5%
Percentage of Proposed Development personal vehicle trips interacting with Adjacent Development, east of Dawson Road South	7%	11%	9%

Documentation supplied by the consultant involved in the parallel TIS of the Adjacent Development including net site trips is included in **Appendix B**. It is noted that some interaction trips identified used Street C of the Adjacent Development and these were re-distributed to Street B of the Adjacent Development. These figures represent full buildout.

These assumptions were observed as a high degree of interaction between the Proposed Development and Adjacent Development. A comparison analysis was performed using the ITE *Trip Generation Handbook (11th Edition)* methodology along with the *OTISS Pro* software. Using the land use for the Proposed Development and an estimated 510,000 ft^2 of Shopping Centre land use, ITE code 820, that 11% of the Proposed Development personal vehicle trips would interact with the Adjacent Development in the PM peak hour. No interaction figures were available for the AM peak hour and the average weekday. In absence of greater detail on adjacent property land use, the interaction identified in **Table 6** was selected for analysis.

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No other development interactions were considered as part of this TIS given the solely residential land use proposed for the Proposed Development and the consideration of interaction with commercial land uses in the Adjacent Development through use of trips from the parallel study. No interaction was considered between residential land uses in the Proposed Development and the Adjacent Development.

3.3.3 Pass-By Trips

The Proposed Development is to include only residential development, which typically does not generate pass-by trips. No pass-by trip distribution was used, and thus all trips generated by the Proposed Development were assumed to be primary (new) trips.

3.3.4 Directional Distribution

External trips were distributed by direction according to the origin-destination data published through the development of the *Winnipeg Transit Master Plan*. The directional distribution applied to all residential land uses in the Proposed Development are shown in **Table 7**.

Table 7: General directional distribution exclusive of any interaction with Adjacent Development

External Destinations	Fermor Avenue West and Lagimodiere Boulevard North	Fermor Avenue East	Boulevard des Hivernants South	Abinojii Mikanah West	Lagimodiere Boulevard South	Dawson Road S/Plessis Road East
Proposed Development	62%	4%	3%	23%	8%	0%

Table 8 identifies a modified distribution to account for the interaction with the Adjacent Development, only to be used for scenarios with parallel development. It is noted that this is based on a reverse calculation from the net trips supplied through the parallel TIS. The ADT distribution developed through interpretation of Adjacent Development net site trips lost or gained in the Proposed Development through the supplied trip data in **Appendix B**.

Table 8: Directional distribution including interaction with Adjacent Development

External Destinations	Fermor Avenue West and Lagimodiere Blvd North	Fermor Avenue East	Boulevard des Hivernants South	Abinojii Mikanah West	Lagimodiere Boulevard South	Street A West	Street B East
Proposed Development AM	54%	4%	3%	7%	20%	5%	7%
Proposed Development PM	51%	3%	3%	7%	19%	6%	11%
Proposed Development ADT	49%	3%	2%	6%	18%	9%	13%

3.3.5 Trip Assignment

As some PTV VISTRO zones encapsulate multiple land uses, the proportion of trips assigned to various access points to the main collectors in the Proposed Development and the subsequent route choices for each zone may vary. Trip assignment was performed using PTV VISTRO software and considered path

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length, roadway type, connectivity, and access configuration. Paths between zones and gates are not detailed in the report or appendices, however may be made available in the form of the PTV VISTRO file.

3.3.6 Mode Split

External trips to all destinations were split by mode as follows:

- Active Modes (Walking, Cycling): 2%
- Winnipeg Transit: 8%
- Personal Vehicles: 90%

This mode split is consistent with the existing mode splits in suburban areas in Winnipeg. Active mode and transit splits may be higher in the future, with the development of Winnipeg's active transportation network and bus rapid transit network. When planning active transportation infrastructure and transit service for the Proposed Development, the volumes in **Table 9** and **Table 10** should be considered minimum demand. **Table 11** shows the estimated external personal vehicle trips.

Table 9: Estimated external trips by active modes

Development	Period	Active mode trip ends to external destinations						
		Fermor Avenue West	Lagimodiere Boulevard North	Fermor Avenue East	Boulevard des Hivernants South	Abinojii Mikanah West	Lagimodiere Boulevard South	Dawson Road S/Plessis Road East
Proposed Development	AM	6	2	1	0	3	1	0
	PM	8	3	1	1	4	1	0
	ADT	85	35	8	6	44	15	0

Table 10 shows the estimated external trips made via Winnipeg Transit service.

Table 10: Estimated external transit trips

Development	Period	Transit trip ends to external destinations						
		Fermor Avenue West	Lagimodiere Boulevard North	Fermor Avenue East	Boulevard des Hivernants South	Abinojii Mikanah West	Lagimodiere Boulevard South	Dawson Road S/Plessis Road East
Proposed Development	AM	24	10	2	2	12	4	0
	PM	31	13	3	2	16	6	0
	ADT	338	138	31	23	177	62	0

Table 11 shows the estimated personal vehicle trips.

Table 11: Estimated external personal vehicle trips

Development	Period	Personal vehicle trip ends to external destinations						
		Fermor Avenue West	Lagimodiere Boulevard North	Fermor Avenue East	Boulevard des Hivernants South	Abinojii Mikanah West	Lagimodiere Boulevard South	Dawson Road S/Plessis Road East
Proposed Development	AM	268	110	24	18	140	49	0
	PM	352	144	32	24	184	64	0
	ADT	3806	1557	346	260	1990	692	0

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3.3.7 Southland Park

The Proposed Development is to be provided with a residential street connection to the existing Southland Park neighborhood at Royal Park Crescent and Royal Mint Drive. For analysis, some traffic from Southland Park was assumed to travel through the Proposed Development to access the shopping center in the Adjacent Development, and some traffic from the Proposed Development was assumed to travel through Southland Park to access Lagimodiere Boulevard.

The following points describe how trips involving Southland Park were considered:

- Southland Park to/from Adjacent Shopping Center Development
    - Southland Park trips generated based on unit count (426 units)
    - Assumed 1% of AM/PM/ADT trips generated by Southland Park would be to/from commercial land uses in Adjacent Development via the Proposed Development internal streets
    - Resulting trips between Southland Park and commercial land uses in the Adjacent Development:
        - AM: 5 trips
        - PM: 19 trips
        - ADT: 40 trips
- Proposed Development to/from Lagimodiere Boulevard
    - Assumed Zone 12 (includes V, W, X, Y), the closest to Southland Park, would have 10% of trips traveling through Southland Park on the way to and from Lagimodiere Boulevard.

3.3.8 Site Generated Traffic Summary

Figures showing the estimated site generated traffic at the study intersections are included in Appendix B. These show personal vehicle trips, following the reduction of trip ends using mode split assumptions (total reduction of 10%).

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4.0 ANALYSIS

4.1 TOTAL FUTURE TRANSPORTATION DEMAND

Total transportation demand was required for the following primary set of analysis scenarios:

- 2023 Background
- 2033 Background
- 2033 Background + Adjacent Development (Full Buildout) (where applicable)
- 2033 Background + Adjacent Development (Full Buildout) + Proposed Development (Full Buildout)

Note that for the 2033 Background + Adjacent Development (Full Buildout) scenario, not all study intersections can be analyzed as

The following tables show the estimated total future transportation demand at the study intersections. Note that these represent personal automobile trips calculated after mode share reductions.

Table 12 shows transportation demand at the intersection of Fermor Avenue at Niakwa Road East/Dawson Road South.

Table 13 shows transportation demand at the intersection of Dawson Road South and Collector B/Street B. This represents a new external network intersection on a realigned Dawson Road South.

Table 14 shows transportation demand at the intersection of Dawson Road South and Collector C/Street C. This represents a new external network intersection on a realigned Dawson Road South.

Table 15 shows transportation demand at the intersection of Abinojii Mikanah and Boulevard des Hivernants/Collector A. This represents a new connection to an external network intersection, effectively changing a two-leg intersection into a three-leg T-intersection.

Table 16 shows transportation demand at the intersection of Abinojii Mikanah and Lagimodiere Boulevard.

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Table 12: Transportation demand at Fermor Ave and Niakwa Rd E/Dawson Rd S

			West approach			East approach			South approach			North approach		
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Year	Period	Type	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
2023	AM	Background	65	765	0	0	1345	25	0	0	0	5	0	10
2023	PM	Background	10	1310	0	0	885	5	0	0	0	25	0	85
2028	AM	Background	65	765	0	0	1345	25	0	0	0	5	0	10
2028	PM	Background	10	1325	0	0	895	5	0	0	0	25	0	85
2033	AM	Background	65	765	0	0	1345	25	0	0	0	5	0	10
2033	PM	Background	10	1335	0	0	900	5	0	0	0	25	0	90
2028	AM	Adjacent Development Phase 1	0	145	80	15	0	0	740	0	0	0	0	0
2028	PM	Adjacent Development Phase 1	0	440	235	45	0	0	410	0	0	0	0	0
2028	ADT	Adjacent Development Phase 1	0	4325	2280	425	0	0	6605	0	10	0	0	0
2033	AM	Adjacent Development Full Buildout	0	140	135	50	-25	0	805	0	15	0	0	0
2033	PM	Adjacent Development Full Buildout	0	420	340	150	-90	0	595	0	45	0	0	0
2033	ADT	Adjacent Development Full Buildout	0	4260	3565	1535	-915	0	8735	0	350	0	0	0
2033	AM	Proposed Development Full Buildout	0	0	80	5	0	0	250	0	15	0	0	0
2033	PM	Proposed Development Full Buildout	0	0	255	15	0	0	150	0	10	0	0	0
2033	ADT	Proposed Development Full Buildout	0	0	2095	130	0	0	2095	0	130	0	0	0
2033	AM	Future Background + Adjacent Development	65	905	135	50	1320	25	805	0	15	5	0	10
2033	PM	Future Background + Adjacent Development	10	1755	340	150	810	5	595	0	45	25	0	90
2033	AM	Future Background + Adjacent Development + Proposed Development	65	905	215	55	1320	25	1050	0	35	5	0	10
2033	PM	Future Background + Adjacent Development + Proposed Development	10	1755	595	165	810	5	745	0	55	25	0	90

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Table 13: Transportation demand at Dawson Rd S and Collector B/Street B

			West approach			East approach			South approach			North approach		
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Year	Period	Type	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
2028	AM	Adjacent Development Phase 1	0	65	0	0	110	15	0	0	0	55	0	0
2028	PM	Adjacent Development Phase 1	0	130	0	0	85	35	0	0	0	30	0	0
2028	ADT	Adjacent Development Phase 1	0	1365	0	0	1260	370	0	0	0	460	0	0
2033	AM	Adjacent Development Full Buildout	0	75	5	0	125	35	10	10	0	60	10	0
2033	PM	Adjacent Development Full Buildout	0	150	15	0	105	70	10	20	0	50	20	0
2033	ADT	Adjacent Development Full Buildout	0	1645	190	0	1575	825	190	280	0	715	280	0
2033	AM	Adjacent Development Full Buildout less interactions trips	0	70	0	0	115	30	0	0	0	55	0	0
2033	PM	Adjacent Development Full Buildout less interactions trips	0	135	0	0	90	60	0	0	0	40	0	0
2033	ADT	Adjacent Development Full Buildout less interactions trips	0	1460	0	0	1385	685	0	0	0	575	0	0
2033	AM	Proposed Development Full Buildout	0	40	55	0	125	15	165	20	0	5	5	0
2033	PM	Proposed Development Full Buildout	0	130	170	0	75	15	100	20	0	25	30	0
2033	ADT	Proposed Development Full Buildout	0	1110	1500	0	1110	230	1500	330	0	230	330	0
2033	AM	Future Combined with Adjacent Development + Proposed Development	0	105	55	0	240	45	165	20	0	60	5	0
2033	PM	Future Combined with Adjacent Development + Proposed Development	0	265	170	0	170	75	100	20	0	60	30	0
2033	ADT	Future Combined with Adjacent Development + Proposed Development	0	2570	1500	0	2495	920	1500	330	0	810	330	0

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Table 14: Transportation demand at Dawson Rd S and Collector C/Street C

			West approach			East approach			South approach			North approach		
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Year	Period	Type	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
2028	AM	Adjacent Development Phase 1	0	15	120	10	40	0	30	20	5	0	40	0
2028	PM	Adjacent Development Phase 1	0	45	65	5	25	0	85	55	10	0	20	0
2028	ADT	Adjacent Development Phase 1	0	420	1055	100	395	0	845	550	100	0	340	0
2033	AM	Adjacent Development Full Buildout	0	15	135	10	40	0	60	25	5	0	45	0
2033	PM	Adjacent Development Full Buildout	0	40	105	5	25	0	135	65	10	0	40	0
2033	ADT	Adjacent Development Full Buildout	0	405	1605	90	405	0	1555	630	90	0	585	0
2033	AM	Adjacent Development Full Buildout less interactions trips	0	15	125	10	40	0	45	15	5	0	40	0
2033	PM	Adjacent Development Full Buildout less interactions trips	0	40	80	5	25	0	110	55	10	0	30	0
2033	ADT	Adjacent Development Full Buildout less interactions trips	0	405	1275	90	405	0	1230	495	90	0	445	0
2033	AM	Proposed Development Full Buildout	0	0	40	0	0	0	135	0	0	0	0	0
2033	PM	Proposed Development Full Buildout	0	0	150	0	0	0	90	0	0	0	0	0
2033	ADT	Proposed Development Full Buildout	0	0	1345	0	0	0	1340	0	0	0	0	0
2033	AM	Future Combined with Adjacent Development + Proposed Development	0	15	165	10	40	0	180	15	5	0	40	0
2033	PM	Future Combined with Adjacent Development + Proposed Development	0	40	230	5	25	0	200	55	10	0	30	0
2033	ADT	Future Combined with Adjacent Development + Proposed Development	0	405	2620	90	405	0	2570	495	90	0	445	0

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Table 15: Transportation demand at Abinojii Mikanah and Blvd des Hivernants/Collector A

			West approach		South approach		North approach	
			EBL	EBR	NBL	NBT	SBT	SBR
Year	Period	Type	↗	↘	↖	↑	↓	↙
2023	AM	Background (Count)	0	115	430	0	0	0
2023	PM	Background (Count)	0	345	275	0	0	0
2023	ADT	Background (Count)	0	3490	3345	0	0	0
2028	AM	Background	0	190	665	0	0	0
2028	PM	Background	0	585	365	0	0	0
2033	AM	Background	0	190	665	0	0	0
2033	PM	Background	0	595	370	0	0	0
2028	AM	Adjacent Development Phase 1 (parallel development only)	35	0	0	15	45	120
2028	PM	Adjacent Development Phase 1 (parallel development only)	110	0	0	45	25	65
2028	ADT	Adjacent Development Phase 1 (parallel development only)	1065	0	0	425	425	1065
2033	AM	Adjacent Development Full Buildout (parallel development only)	35	0	0	35	60	115
2033	PM	Adjacent Development Full Buildout (parallel development only)	100	0	0	75	60	60
2033	ADT	Adjacent Development Full Buildout (parallel development only)	960	0	0	850	850	960
2033	AM	Proposed Development Full Buildout	40	0	0	5	15	125
2033	PM	Proposed Development Full Buildout	130	0	0	15	10	80
2033	ADT	Proposed Development Full Buildout	1045	0	0	85	85	1040
2033	AM	Future Background + Adjacent Development (parallel development only)	35	190	665	35	60	115
2033	PM	Future Background + Adjacent Development (parallel development only)	100	595	370	75	60	60
2033	AM	Future Background + Adjacent Development + Proposed Development	75	190	665	35	75	240
2033	PM	Future Background + Adjacent Development + Proposed Development	230	595	370	90	65	135

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Table 16: Transportation demand at Abinojii Mikanah and Lagimodiere Blvd

			West approach			East approach			South approach			North approach		
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Year	Period	Type	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
2023	AM	Background (Count)	765	55	205	5	165	265	365	1035	0	60	625	560
2023	PM	Background (Count)	550	125	340	5	110	165	320	755	0	215	1070	865
2023	ADT	Background (Count)	10065	1610	4435	60	1410	1870	4480	10080	40	1840	11045	10000
2028	AM	Background	880	55	205	60	165	445	365	1485	15	125	625	560
2028	PM	Background	845	140	340	35	110	245	325	760	55	390	1460	870
2033	AM	Background	880	55	205	60	165	445	365	1485	15	125	625	560
2033	PM	Background	855	145	345	35	110	250	330	770	55	400	1475	880
2028	AM	Adjacent Development Phase 1 (parallel development only)	0	35	0	0	120	0	0	0	0	0	0	0
2028	PM	Adjacent Development Phase 1 (parallel development only)	0	110	0	0	65	0	0	0	0	0	0	0
2028	ADT	Adjacent Development Phase 1 (parallel development only)	0	1065	0	0	1065	0	0	0	0	0	0	0
2033	AM	Adjacent Development Full Buildout (parallel development only)	0	35	0	0	115	0	0	0	0	0	0	0
2033	PM	Adjacent Development Full Buildout (parallel development only)	0	100	0	0	60	0	0	0	0	0	0	0
2033	ADT	Adjacent Development Full Buildout (parallel development only)	0	960	0	0	960	0	0	0	0	0	0	0
2033	AM	Proposed Development Full Buildout	0	30	0	30	90	0	0	0	10	0	0	0
2033	PM	Proposed Development Full Buildout	0	95	0	20	55	0	0	0	35	0	0	0
2033	ADT	Proposed Development Full Buildout	0	780	0	260	780	0	0	0	260	0	0	0
2033	AM	Future Background + Adjacent Development (parallel development only)	880	90	205	60	280	445	365	1485	15	125	625	560
2033	PM	Future Background + Adjacent Development (parallel development only)	855	245	345	35	170	250	330	770	55	400	1475	880
2033	AM	Future Background + Adjacent Development + Proposed Development	880	120	205	90	375	445	365	1485	25	125	625	560
2033	PM	Future Background + Adjacent Development + Proposed Development	855	335	345	55	225	250	330	770	90	400	1475	880

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Stantec then performed operational analysis on the specified analysis scenarios to determine capacity and identify any improvements to accommodate traffic. The following assumptions were used in the analysis:

- Critical intersection movements were defined as movements that met at least one of the following conditions:
    - Worse than Level of Service (LOS) D
    - v/c ratio of 0.85 or greater
- Saturated flow rates were set to the Synchro default 1,900 vehicles per hour per lane.
- Data on heavy vehicle volumes was not included in all of the existing traffic data, so heavy vehicle volumes were assumed where not available. Given that Fermor Avenue is a regional street and truck route, heavy vehicles were assumed to account for five percent of the through traffic on those streets, and two percent of traffic on all other movements.
- For all intersections in all future scenarios, PHFs were set to a typical value of 0.92 because of uncertainty in peaking within the peak hour in future scenarios.
- All traffic signals were set to operate with 4 second amber intervals and 2 second all red intervals.
- All left-turns off of Lagimodiere Boulevard, Fermor Avenue, and Abinojii Mikanah at signalized intersections were assumed to operate under protected phasing due to 80 km/h or higher speed limits on those roads.
- Traffic signal timings were set to allow pedestrian crossings on all approaches, based on a crossing speed of 1 m/s.
- All pedestrian crossings were assumed to have 10 pedestrian calls per hour.

From the analysis of future transportation demand, the following observations are made:

- At the intersection of Fermor Avenue and Niakwa Road East and Dawson Road South, the following intersection configuration is projected to be at capacity for the 2033 Background + Adjacent Development scenario:
    - Traffic signal control
    - Northbound approach: dual left-turn lanes plus a shared through and right-turn lane
    - Southbound approach: shared right-turn and through lane, share left-turn and through lane
    - Eastbound approach: an exclusive left-turn lane plus two through lanes plus an exclusive right-turn lane onto southbound Dawson Road South
    - Westbound approach: an exclusive left-turn lane plus two through lanes plus an exclusive right-turn lane

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- The configuration of a single lane four-leg roundabout at Dawson Road South and Collector B/Street B is expected to accommodate the traffic of the 2033 Background + Adjacent Development (Full Buildout) + Proposed Development (Full Buildout) acceptably, exhibiting:
    - LOS A and A for the AM and PM peak hours, respectively
    - Average delay of 6.6 seconds and 5.8 seconds for the AM and PM peak hours, respectively
    - v/c of 0.259 and 0.341 for the AM and PM peak hours, respectively
- The configuration of a single lane four-leg roundabout at Dawson Road South and Collector C/Street C is expected to accommodate the traffic of the 2033 Background + Adjacent Development (Full Buildout) + Proposed Development (Full Buildout) acceptably, exhibiting:
    - LOS A and A for the AM and PM peak hours, respectively
    - Average delay of 6.3 seconds and 6.0 seconds for the AM and PM peak hours, respectively
    - v/c of 0.141 and 0.198 for the AM and PM peak hours, respectively
- Improvements at the intersection of Abinojii Mikanah and Boulevard des Hivernants are warranted to accommodate development traffic and provide connectivity to the Proposed Development. These improvements are based on the assumption that no extension to the east of Boulevard des Hivernants occurs within the study horizons and the intersection is therefore a three-legged intersection. The intersection of Abinojii Mikanah and Boulevard des Hivernants is projected to provide acceptable traffic operations up to 2033 and full buildout conditions with the following configuration:
    - Traffic signal control
    - Northbound approach: an exclusive left-turn lane plus a through lane
    - Southbound approach: a channelized right turn under yield condition and a through lane
    - Eastbound approach: an exclusive left-turn lane and an auxiliary right-turn lane free flowing onto southbound Boulevard des Hivernants

    This configuration operates an acceptable level for both two-lane and four-lane cross sections along Abinojii Mikanah between Lagimodiere Boulevard and Boulevard des Hivernants, however this impacts whether the eastbound right-turn lane is an auxiliary lane upstream of the intersection as well as the whether the southbound right turn is free-flowing into its own westbound receiving lane or under yield control.
- It was determined that an alternative intersection configuration such as an interchange would be required at Lagimodiere Boulevard and Abinojii Mikanah based on 2033 Background traffic conditions and the constraint of maintaining four-lane cross sections for through traffic on Abinojii Mikanah and Lagimodiere Boulevard. In the interim, it is understood that there are no plans to increase the cross section of Lagimodiere Boulevard from four through lanes to six through lanes.

Additional detail on future transportation demand is supplied in Appendix B.

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4.2 ANALYSIS OF PHASING

For the scenario of parallel development of the Proposed Development and Adjacent Development, there is a reasonable analysis horizon of 2028, as follows:

- 2028 Background Traffic
- 2028 Background + Adjacent Development
- 2028 Background + Adjacent Development (Phase 1) + Proposed Development (Phases 1, 1B, and 2)

However, based on the uncertainty of phasing of the Adjacent Development, Stantec also reviewed phasing and operational requirements in the case that the Proposed Development is developed based on the proposed time horizons however the Adjacent Development is not. This results in the following scenarios, with some simplification and aggregation in the timing of Phases 1, 1B, and 2:

- 2023 Background Traffic + Proposed Development Phase 1
- 2028 Background Traffic + Proposed Development Phases 1, 1B, and 2
- 2033 Background Traffic + Proposed Development Full Buildout (Phases 1, 1B, 2, 3)

These phases are shown in **Figure 7** in **Section 3.3.1**, with further results and discussion provided in Appendix B.

4.3 INTERNAL NETWORK

Qualico provided a draft set of internal road cross sections for consideration as part of the TIS, including a modified collector roadway cross section. This cross section, shown in **Figure 8**, was applied to the three collectors in the Proposed Development and was included in this analysis. It consists of a two-lane undivided road with parking bays on either side along road segments. At intersections, the intention is for the cross section to be narrowed through curb extensions or bulb-outs, thereby terminating the four-lane cross section and only exhibiting two lanes (one approach, one departure) at intersections. These intersections include the roundabout at Collector B and Collector C (north internal roundabout), and at Collector C and Collector A (south internal roundabout).

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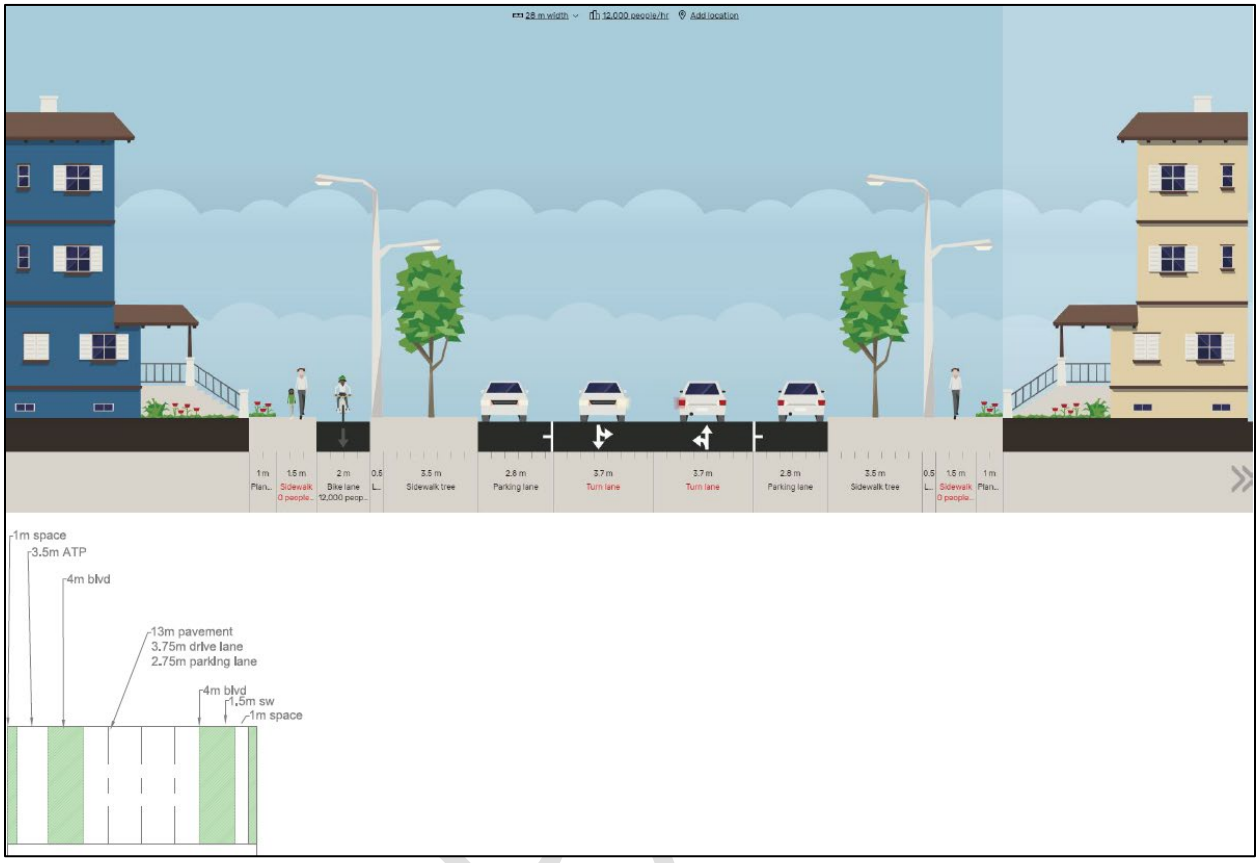


Figure 8: Proposed cross section for internal collectors in the Proposed Development

Traffic volumes were assessed for the AM peak hour, PM peak hour, and average weekday. Roundabout performance was analyzed using SIDRA Intersection 9 software. **Table 17** illustrates the expected performance of the two internal roundabouts for full buildout of both the Proposed Development and the Adjacent Development. Both intersections operated at an LOS of B or better.

Table 17: Internal roundabout intersection analysis

Intersection	Overall Intersection Performance Full buildout, 2033 (LOS / Delay / v/c) for AM (PM) peak hours	Critical Movements (Movement / LOS / Delay / v/c)
North internal roundabout (Collector B at Collector C)	A / 5.3 / 0.16 (A / 5.0 / 0.19)	None (None)
South internal roundabout (Collector A at Collector C)	A / 7.2 / 0.18 (A / 5.9 / 0.19)	None (None)

Estimated average daily traffic along the Proposed Development collectors for full buildout is shown in **Figure 9**.

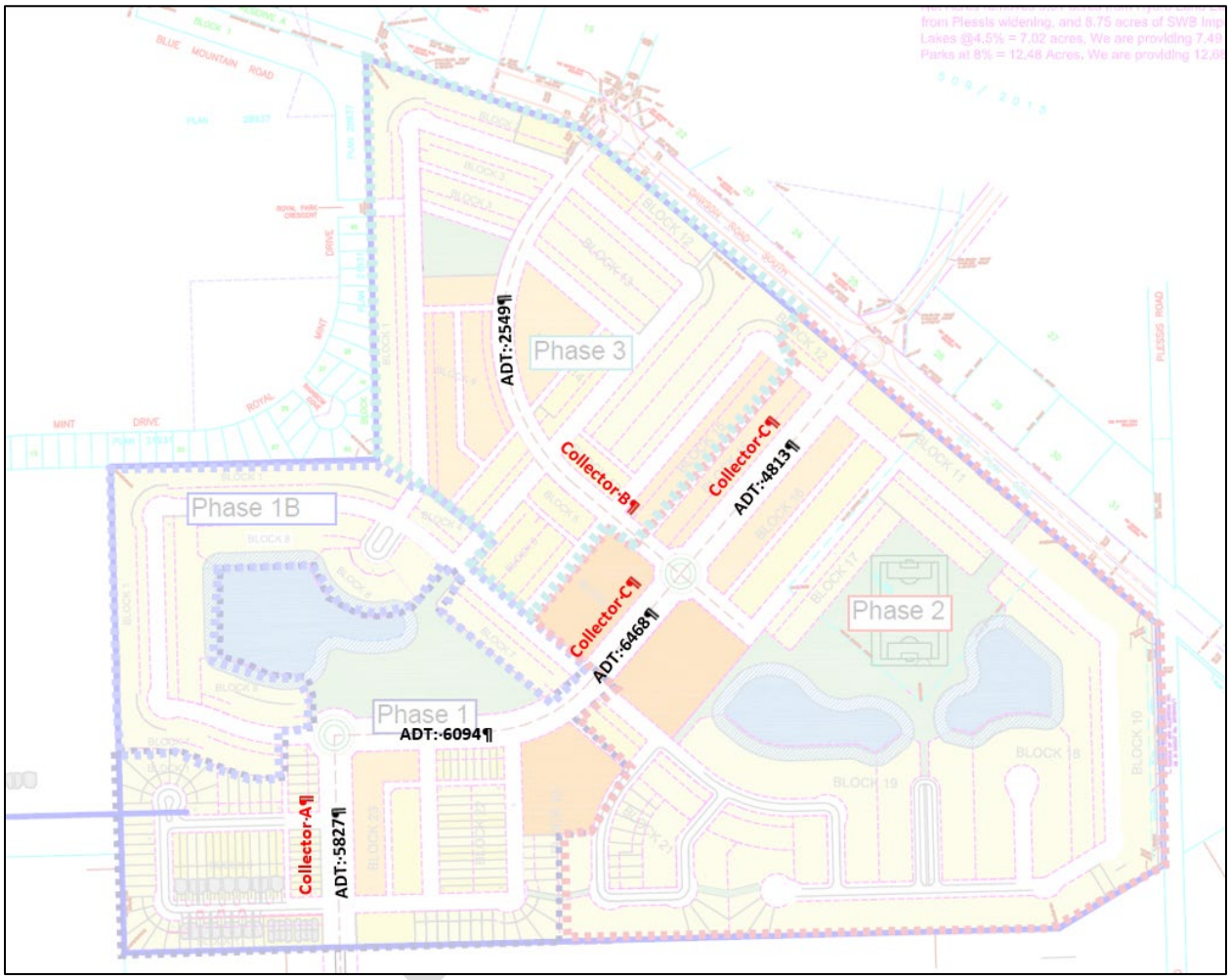


Figure 9: Collector ADT for full buildout of the Proposed Development and Adjacent Development

Note that several lanes shown in the site plan, **Figure 3**, intersect the collector streets near the roundabouts. Roundabout splitter islands can be designed to allow all-direction access to and from the lanes. These features can be observed on the splitter islands for the roundabouts at the intersection of Sage Creek Boulevard and Edward Turner Drive, as shown in **Figure 10**.

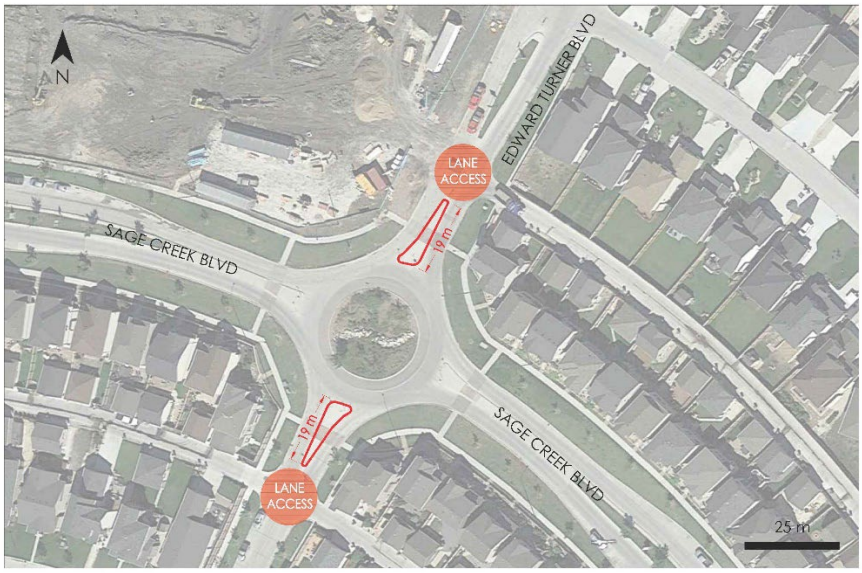


Figure 10: Roundabout with lane access

4.4 ACTIVE TRANSPORTATION

Table 9 from Section 3.3.5 showed estimated travel demand from the Proposed Development and the surrounding transportation network for active modes. This includes an estimated 13 trips in the AM peak hour, 18 trips in the PM peak hour, and 193 daily trips. The proposed accommodation of active transportation (AT) in and surrounding the Proposed Development was assessed based on draft plans for internal active transportation facilities as of May 5, 2023, shown in **Figure 11**. This includes a multi-use path along west side of Collector B from Dawson Road South to the park space east of Collector C, a multi-use path along Collector C from Dawson Road South to the roundabout intersection at Collector A, the multi-use path along Collector C from Collector C to Abinojii Mikanah, trails through park space, and other sidewalks in various locations across the Proposed Development. It is noted that sidewalk is not proposed for all local roads within the Proposed Development, such that active transportation users including cyclists and pedestrians would need to use the primary travel lanes to access nearby AT facilities.

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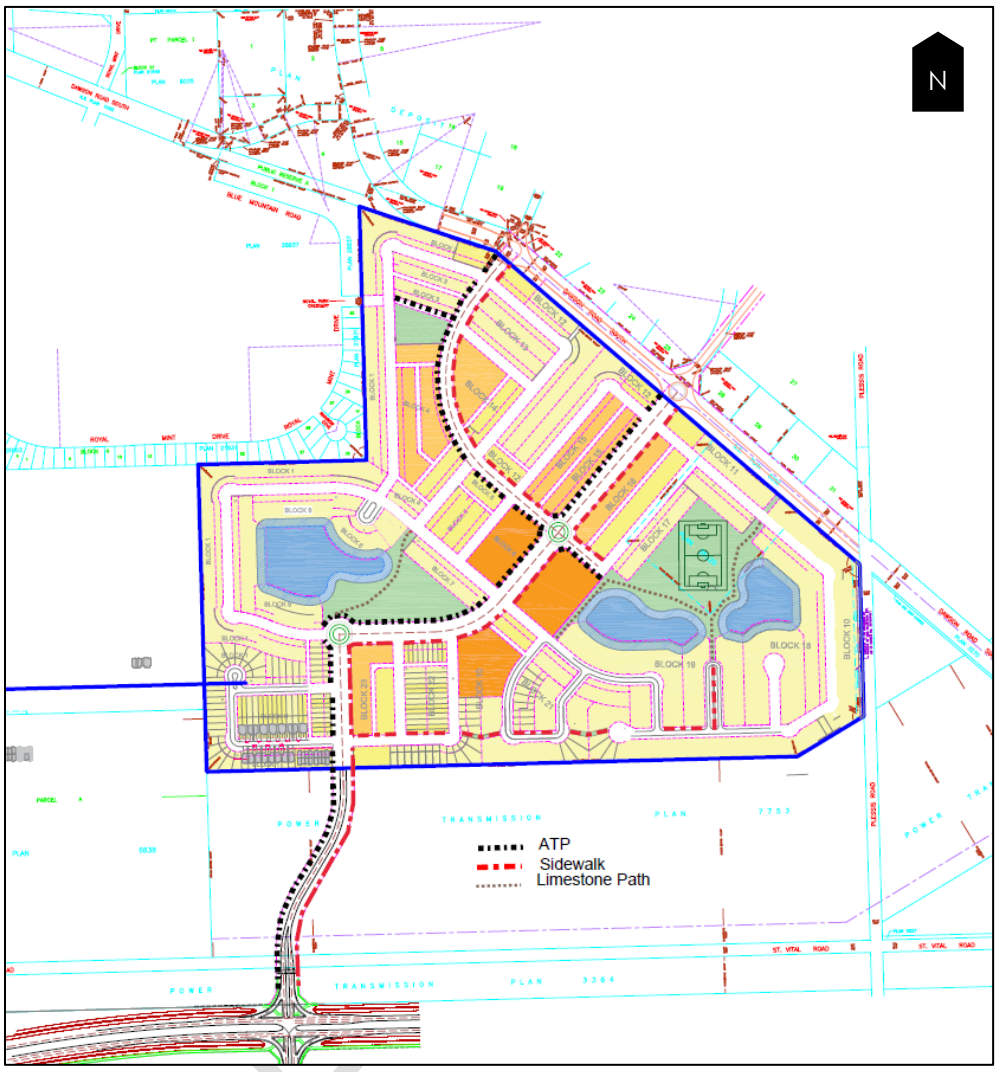


Figure 11: Sidewalks and active transportation paths

Regional active transportation paths, in the form of multi-use paths, are provided along Abinojii Mikanah, Lagimodiere Boulevard, and Fermor Avenue. Local active transportation paths are included in the Sage Creek neighborhood to the south of the Proposed Development.

Regional connections include a connection from the Proposed Development to the path east of Lagimodiere Boulevard, south of Fermor Avenue, and connections south along Boulevard des Hivernants to Sage Creek and the Abinojii Mikanah. The multi-use path along Collector A is expected to be the primary regional connection for trips connecting to the south. The multi-use path along Collectors B and C, along with adjacent infrastructure on Dawson Road South, is expected to be the primary regional connection for trips connecting to the north.

Active transportation facilities should be extended along the realigned Dawson Road South to Fermor Avenue from Collector B and Collector C. Active transportation facilities should be extended along Fermor

Avenue between Lagimodiere Boulevard and the realigned Dawson Road South; it is understood that this is a City requirement associated with the Adjacent Development. This may or may not incorporate the existing path the heads southeast from the intersection of Fermor Avenue at Lagimodiere. Active transportation facilities should also be extended south along Collector A to the Abinojii Mikanah extension, to connect to the existing multi-use path along the south side of Abinojii Mikanah at Boulevard des Hivernants.

4.5 TRANSIT

The existing Winnipeg Transit service in the area (Routes 50 and 96) may need to have increased frequency and/or route adjustments to serve the Proposed Development and the Adjacent Development. Alternatively, a new route could serve the area. Routing is expected to follow Collector A/Collector C through the Proposed Development, or alternatively Collector A/Collector B, either as an extension of an existing route or as a new route.

Potential routing and transit stop locations are identified in **Figure 12**. Routing could be further modified to include stops within the Adjacent Development. This would provide more convenience to people beginning or ending their trips at the Adjacent Development, but it would decrease directness and therefore convenience for people travelling on the route to some other destinations external to the Proposed Development.

Another modification to the route shown on **Figure 12** would be to extend service to the south into Sage Creek. This would increase Transit access to Sage Creek, but it would also provide less-direct routing for the Proposed Development trips to and from Abinojii Mikanah west of Lagimodiere Boulevard.

Consideration could also be given for a route connecting the Proposed Development and the Adjacent Development to Southdale Center, on Fermor Avenue near Lakewood Drive/Autumnwood Drive. This would provide connections to Routes 16, 57, 75, and 96. These routes provide access to the following destinations:

- Route 16: Downtown via Fermor Avenue and Osborne Street
- Route 57: Downtown via Archibald Street and Marion Street
- Route 75: Kildonan Place via Lagimodiere Boulevard, University of Manitoba via Abinojii Mikanah
- Route 96: St Vital Centre via Shorehill Boulevard, Southglen Boulevard, and Dakota Street

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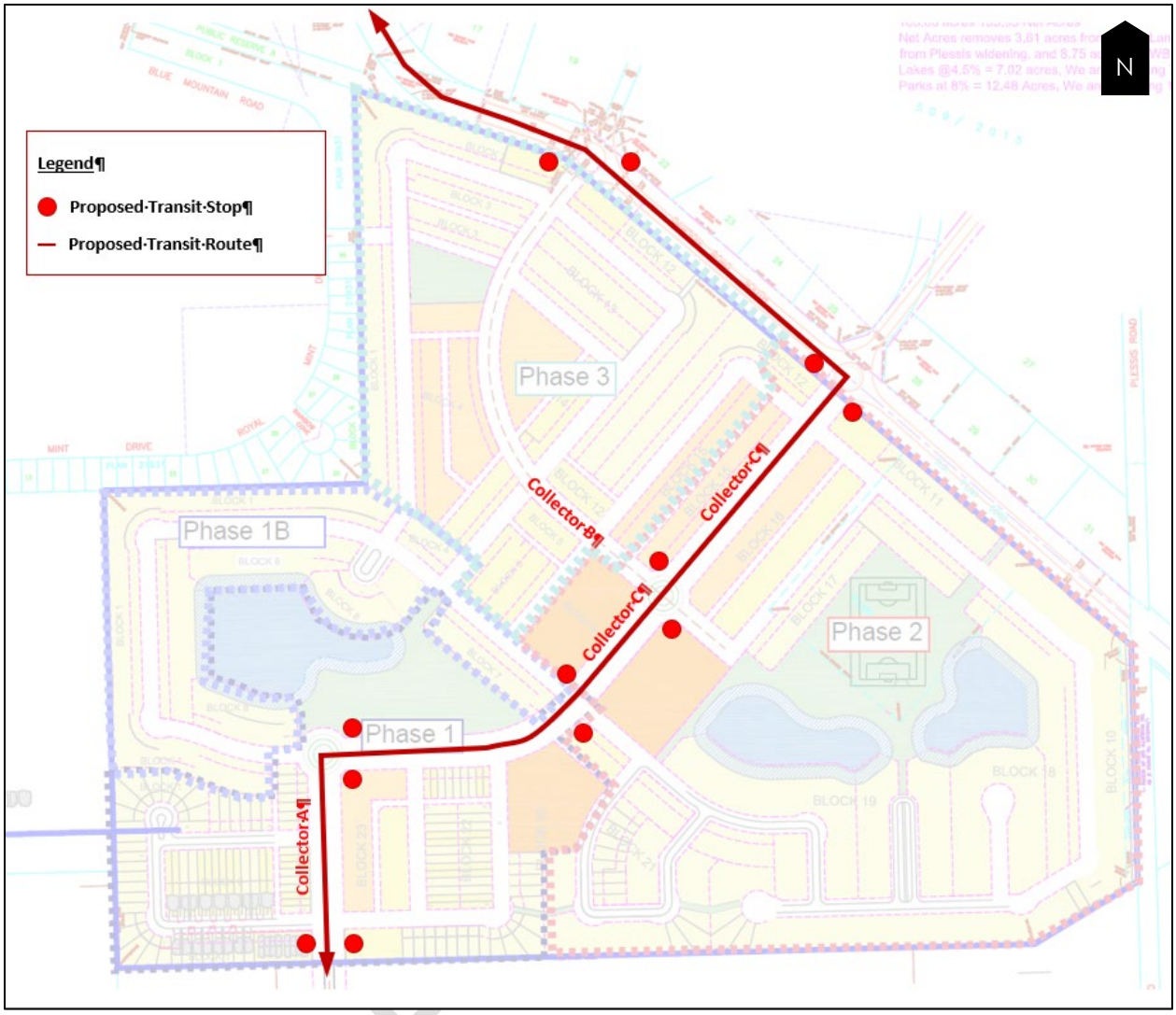


Figure 12: Potential transit routing and stops

4.6 TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrant analyses (TSWAs) consider the average vehicular and pedestrian traffic volumes at an intersection, and return a number of “warrant points” based on the number of conflicts occurring during the peak six hours of the day. The peak six hours are defined as two hours in the morning, two hours at mid-day, and two hours in the afternoon.

If the TSWA procedure returns 100 or more warrant points, a traffic signal can be considered warranted based on vehicular and pedestrian traffic volumes. However, if left-turn and through movement volumes on the minor street approaches average less than 75 vehicles per hour (vph) over the six hours, the minor street volumes are considered too low to warrant traffic signals at the intersection. Traffic signals can also be warranted for other reasons such as safety, geometry, or other site-specific requirements.

The study intersection of Lagimodiere Boulevard at Abinojii Mikanah is already signalized, so no TSWA was completed for that intersection. The intersection of Fermor Avenue and Niakwa Road East is understood to be signalized based on responsibilities of the Adjacent Developer, and therefore no TWSA was performed. The remaining external network intersection of Abinojii Mikanah and Boulevard des Hivernants is currently unsignalized and therefore TWSA was performed, shown in **Table 13**. In order to determine the peak six-hour volumes, the proportionality of traffic between hourly periods at the intersection of Abinojii Mikanah at Lagimodiere Boulevard was used from the 2023 count. The six hours exhibiting the highest levels of traffic at this intersection were from 7:15 AM to 9:15 AM, 12:00 PM to 2:00 PM, and 4:00 PM to 6:00 PM.

Table 18: Traffic Signal Warrant Analysis

Scenario	Bishop Grandin Blvd East Extension and Blvd des Hivernants Warrant Points
2023 Background	N/A
2028 Background	N/A
2033 Background	N/A
2033 Background + Adjacent Developer	N/A
2033 Background + Adjacent Developer + Proposed Development	126

The traffic signal warrant is not met for any of the background-only scenarios as the intersection is assumed to be in two-leg configuration. The 2033 scenario with background traffic and Adjacent Development does not modify the configuration. Only in the combined future 2033 scenario with the Proposed Development and Adjacent Development is that traffic signal warrant analysis possible, when the analysis yields 126 warrant points.

Traffic signal warrant analysis was not performed on new external network connections along Dawson Road South at Collector B or Collector C as these were proposed as roundabouts and operational performance was modelled separately using *SIDRA*.

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5.0 CONCLUSION

The following section identifies the findings from this TIS including recommendations and other requirements, and are separated by anticipated responsibility for implementation of infrastructure improvements.

5.1 UNDERSTANDING OF PREVIOSULY IDENTIFED INFRASTRUCTURE IMPROVEMENTS

Adjacent Developer

- At Fermor Avenue and Niakwa Road East and Dawson Road South, the following intersection configuration is projected to be at capacity for the 2033 Background + Adjacent Development scenario:
    - Traffic signal control
    - Northbound approach: dual left-turn lanes plus a shared through and right-turn lane
    - Southbound approach: shared right-turn and through lane, share left-turn and through lane
    - Eastbound approach: an exclusive left-turn lane plus two through lanes plus an exclusive right-turn lane free-flowing onto southbound Dawson Road South
    - Westbound approach: an exclusive left-turn lane plus two through lanes plus an exclusive right-turn lane

  It is understood that upgrades at the intersection of Fermor Avenue at Niakwa Road East and Dawson Road South are part of the Adjacent Development DASZ report.
- The intersection of Fermor Avenue and Lagimodiere Boulevard was not included as a study intersection for analysis, however it is understood that upgrades at this intersection are part of the Adjacent Development DASZ report.
- An active transportation path is shown along the south side of Dawson Road South as part of the Proposed Development between Collector C and Collector B. This active transportation facility should be extended along the realigned Dawson Road South to Fermor Avenue to provide connectivity to the surrounding network; it is understood that this is part of the Adjacent Development DASZ report.
- Active transportation facilities should be extended along Fermor Avenue between Lagimodiere Boulevard and the realigned Dawson Road South; it is understood that this is part of the Adjacent Development DASZ report. This may or may not incorporate the existing path that heads southeast from the intersection of Fermor Avenue at Lagimodiere Boulevard.

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5.2 REGIONAL INFRASTRUCTURE

City of Winnipeg Public Works

- It was determined that an alternative intersection configuration such as an interchange would be required at Lagimodiere Boulevard and Abinojii Mikanah based on 2033 Background traffic conditions and the constraint of maintaining four-lane cross sections for through traffic on Abinojii Mikanah and Lagimodiere Boulevard. In the interim, it is understood that there are no plans to increase the cross section of Lagimodiere Boulevard from four through lanes to six through lanes.
- The Abinojii Mikanah East Extension from Lagimodiere Boulevard to Boulevard des Hivernants already exhibits volumes typical of a four-lane divided cross section (i.e., > 6500 vpd). This segment is anticipated to be upgraded in the future to a four-lane cross section consistent with the connecting regional infrastructure along Abinojii Mikanah to the west. The proportional contribution of daily traffic added to this segment by the Proposed Development is low (e.g., ~2000 vpd at full buildout) and is similar to the contribution of traffic added to the segment by full buildout of the Adjacent Development (e.g., ~2000 vpd). The estimated future ADT of this segment in 2033 is approximately 11,000 vpd.

Winnipeg Transit

- The existing Winnipeg Transit service in the area (routes 50 and 96) may need to have increased frequency and/or route adjustments to serve the Proposed Development and the Adjacent Development. Alternatively, a new route could serve the area.
- If development of the Proposed Development occurs prior to the Adjacent Development, as is discussed in the concurrent development scenario presented in this report, this may impact the level of access for transit. In the case that Dawson Road South is not realigned and connected at its new location along Fermor Avenue, the existing right-in, right-out configuration of the Royal Mint Drive at Fermor Avenue likely does not provide suitable access for transit. Transit service may therefore need to be supplied as a loop stemming from the Abinojii Mikanah and Boulevard des Hivernants/Collector A.

5.3 DEVELOPMENT DRIVEN RECOMMENDATIONS

Developer Responsibilities

- The proposed collector cross section with two through lanes and two parking bay lanes, with curb extensions at intersections to terminate parking bays, was deemed to provide acceptable operational performance up to 2033 and full buildout conditions.
- Improvements at the intersection of Abinojii Mikanah and Boulevard des Hivernants are warranted to accommodate development traffic and provide connectivity to the Proposed Development. These improvements are based on the assumption that no extension to the east of Boulevard des Hivernants occurs within the study horizons and the intersection is therefore a three-legged intersection. North-south crossings by pedestrians should be accommodated on the

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east side of the intersection to improve signal timing performance. The intersection of Abinojii Mikanah and Boulevard des Hivernants is projected to provide acceptable traffic operations up to 2033 and full buildout conditions with the following configuration:

  - Traffic signal control
  - Northbound approach: an exclusive left-turn lane plus a through lane
  - Southbound approach: a channelized right turn under yield condition and a through lane
  - Eastbound approach: an exclusive left-turn lane and an auxiliary right-turn lane free flowing onto southbound Boulevard des Hivernants

- Active transportation facilities should be extended south along Collector A from the Proposed Development to Abinojii Mikanah.

- It is recommended to include the proposed connection between Royal Park Crescent in Southland Park and the internal road network of the Proposed Development. It is expected that volumes at this connection will be low, however the connection from the Proposed Development can accommodate various road users including those accessing active transportation facilities and greenspace within the developments.

Shared Developer Responsibility

- Development of the two roundabouts along Dawson Road South at Collector C and Collector B are anticipated to be shared in responsibility between the developer and adjacent developer, as are the section of road and active transportation facilities along the north frontage of the site Proposed Development.
- If the realignment of Dawson Road South and creation of an active transportation connection to Fermor Avenue at Dawson Road does not occur prior to the development of the Proposed Development, as identified as a responsibility of the Adjacent Developer, the existing Dawson Road South alignment may provide a temporary active transportation connection between the Proposed Development and Fermor Avenue. This would provide connectivity to the existing active transportation path that connects the intersection of the existing Dawson Road South at Royal Mint Drive to the intersection of Fermor Avenue at Lagimodiere Boulevard.

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APPENDIX A

TRANSPORTATION ENGINEERING BACKGROUND INFORMATION

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APPENDIX A: TRANSPORTATION ENGINEERING BACKGROUND INFORMATION

This appendix contains background information on transportation engineering concepts and performance measures.

A.1 PERFORMANCE MEASURES

A.1.1 Highway Capacity Manual

The intersection capacity and level of service analysis was based in part on methodology from the *Highway Capacity Manual* (HCM). Several performance measures from the HCM methodology are detailed below:

- **Level of Service (LOS)** – Based on the average vehicle delay during a 15-minute analysis period. Levels of Service range from A (minimal delay) to F (unacceptable delay) and may be measured on an intersection, approach, or movement basis.
- **Degree of Saturation** – The ratio of demand flow rate (v) to maximum capacity (c). Where the v/c ratio is 1.0 or greater, the intersection is operating at full capacity and experiencing major congestion.
- **Vehicle Delay** – The average time that vehicles are delayed on an intersection, approach, or movement basis. Measured in seconds of delay per vehicle or total hours of delay during the peak hour being analyzed.

For design and planning purposes, LOS D or better under peak hour conditions is considered acceptable. Table A.1 and Table A.2 describe the characteristics of each LOS for signalized and unsignalized stop-controlled intersections, respectively, as listed in the HCM.

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Table B.1: Signalized Intersections - HCM Level of Service Characteristics

HCM Level of Service	Average Signal Delay per Vehicle (sec/veh)	Characteristics
A	≤ 10	Free flow, low volumes and high speeds, most drivers can select own speed
B	> 10 and ≤ 20	Stable flow, speed restricted slightly by traffic
C	> 20 and ≤ 35	Stable flow, speed controlled by traffic
D	> 35 and ≤ 55	Approaching unstable flow, low speed
E	> 55 and ≤ 80	Unstable flow and speeds, volumes at/near capacity
F	> 80	Forced flow, low speed, volume above capacity

Table B.2: Stop Controlled Intersections - HCM Level of Service Characteristics

HCM Level of Service	Total Delay (sec/veh)
A	≤ 10
B	> 10 and ≤ 15
C	> 15 and ≤ 25
D	> 25 and ≤ 35
E	> 35 and ≤ 50
F	> 50

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A.1.2 Intersection Capacity Utilization

Intersection Capacity Utilization (ICU) is another measure used to evaluate intersection performance. It is expressed as a ratio or percentage of intersection capacity used by the demand volumes. ICU can be

expressed using Level of Service (ICU LOS), which is not equivalent to the HCM LOS described earlier, although the two may agree in some situations.

Table B.3: ICU Level of Service

Level of Service	Intersection Capacity Utilization (%)	Characteristics
A	≤ 60%	The intersection has no congestion. A cycle length of 80 sec. or less will move traffic efficiently. All traffic should be served on the first cycle. Traffic fluctuations, accidents, and lane closures can be handled with minimal congestion. This intersection can accommodate up to 40% more traffic on all movements.
B	> 60% and ≤ 70%	The intersection has very little congestion. Almost all traffic will be served on the first cycle. A cycle length of 90 sec. or less will move traffic efficiently. Traffic fluctuations, accidents, and lane closures can be handled with minimal congestion. This intersection can accommodate up to 30% more traffic on all movements
C	> 70% and ≤ 80%	The intersection has no major congestion. Most traffic should be served on the first cycle. A cycle length of 100 sec. or less will move traffic efficiently. Traffic fluctuations, accidents, and lane closures may cause some congestion. This intersection can accommodate up to 20% more traffic on all movements.
D	> 80% and ≤ 90%	The intersection normally has no congestion. The majority of traffic should be served on the first cycle. A cycle length of 110 sec. or less will move traffic efficiently. Traffic fluctuations, accidents, lane closures and sub-optimal timing can cause congestion. This intersection can accommodate up to 10% more traffic on all movements.
E	>90% and ≤ 100%	The intersection is on the verge of congested conditions. Many vehicles are not served on the first cycle. A cycle length of 120 sec. is required to move all traffic. Minor traffic fluctuations, accidents, lane closures and sub-optimal timing can cause significant congestion. This intersection has less than 10% reserve capacity available.

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F	> 100% and ≤ 110%	The intersection is over capacity and likely experiences congestion periods of 15 to 60 min. per day. Residual queues at the end of green are common. A cycle length over 120 sec. is required to move all traffic. Minor traffic fluctuations, accidents, and lane closures can cause increased congestion. Sub optimal signal timings can cause increased congestion.
G	> 110% and ≤ 120%	The intersection is 10% to 20% over capacity and likely experiences congestion periods of 60 to 120 min. per day. Long queues are common. A cycle length over 120 sec. is required to move all traffic. Motorists may be choosing alternate routes, if they exist, or making fewer trips during the peak hour. Signal timings can be used to "ration" capacity to the priority movements.
H	> 120%	The intersection is 20% over capacity and could experience congestion periods of over 120 min. per day. Long queues are common. A cycle length over 120 sec. is required to move all traffic. Motorists may be choosing alternate routes, if they exist, or make fewer trips during the peak hour. Signal timings can be used to "ration" capacity to the priority movements.

Highway Capacity Manual Level of Service (HCM LOS) and Intersection Capacity Utilization Level of Service (ICU LOS) are different performance measures and cannot be directly compared. HCM LOS is delay-based, while ICU LOS is capacity-based. At times the two measures will give very different evaluations of overall traffic operations. In these situations, the HCM LOS can be used to determine average delays experienced by traffic while the ICU LOS can be used to determine how much reserve capacity is available at each intersection and how frequently each intersection experiences congestion.

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APPENDIX B

TRAFFIC DATA AND CALCULATIONS

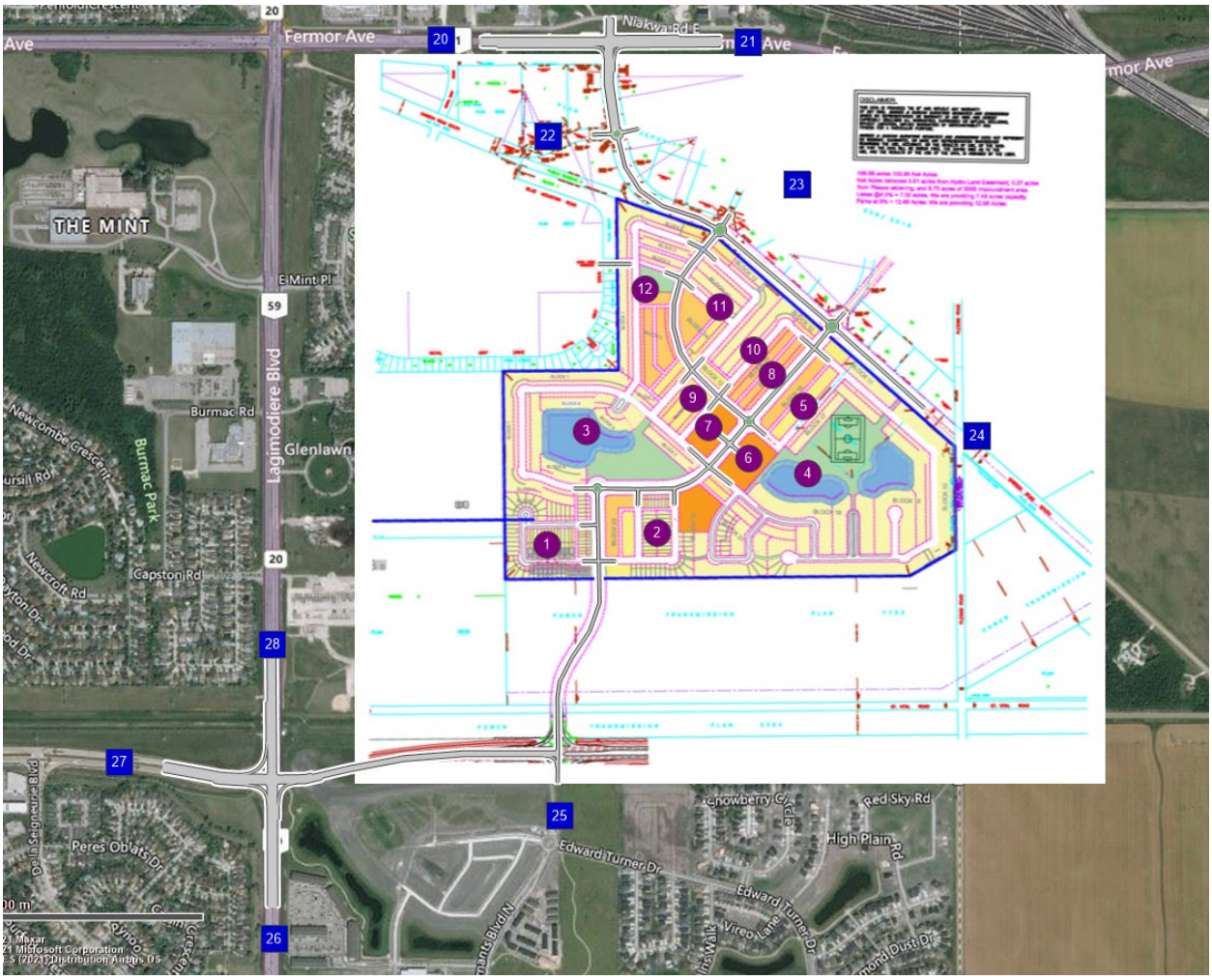
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APPENDIX B: TRAFFIC DATA AND CALCULATIONS

PTV VISTRO SETUP

Zone and Gate Setup in PTV VISTRO for Full Buildout

PTV VISTRO software was used to support the transportation demand management process, including the development of zones and gates, identification of trip generation by zone, trip distribution, and trip assignment. PTV VISTRO was also used to model differences in internal and external traffic volumes based on different phasing scenarios between the Proposed Development and Adjacent Development.



TRIP GENERATION

Trip Generation by Phase [total trip ends before mode reductions]

Zone	VISTRO	Phase	Single Family	Duplex	Townhouse/Low-rise Multi-family	Mid-rise multi-family
Total			659	60	334	276
A	1	1	54	24	16	
B	2	1			32	
C	2	1	36	16	30	
D	2	1				86
E	3	1B	93			
F	3	1B	12			
G	4	2	8			
H	4	2	46			
I	4	2	188		16	
J	5	2	16			
K	5	2	17	12		
L	5	2			30	
M	6	2				110
N	7	2				80
O	8	2			30	
P	8	2			16	
Q	9	3	28			
R	10	3	8			
S	10	3	21		30	
T	11	3	45	8	16	
U	11	3	12		44	
V	12	3	11			
W	12	3			58	
X	12	3	25			
Y	12	3	39		16	

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Trip Generation by Land Use Code

Single Family Only										
		Weekday			AM			PM		
Zone	VISTRO	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Total		5719	2859	2860	414	104	310	585	368	217
A	1	469	234	235	34	9	25	48	30	18
B	2	0	0	0	0	0	0	0	0	0
C	2	312	156	156	23	6	17	32	20	12
D	2	0	0	0	0	0	0	0	0	0
E	3	807	403	404	57	14	43	82	52	30
F	3	104	52	52	8	2	6	11	7	4
G	4	69	35	34	5	1	4	7	4	3
H	4	399	199	200	29	7	22	41	26	15
I	4	1633	816	817	117	29	88	166	105	61
J	5	139	70	69	10	3	7	14	9	5
K	5	148	74	74	11	3	8	15	9	6
L	5	0	0	0	0	0	0	0	0	0
M	6	0	0	0	0	0	0	0	0	0
N	7	0	0	0	0	0	0	0	0	0
O	8	0	0	0	0	0	0	0	0	0
P	8	0	0	0	0	0	0	0	0	0
Q	9	243	121	122	18	5	13	25	16	9
R	10	69	35	34	5	1	4	7	4	3
S	10	182	91	91	13	3	10	19	12	7
T	11	391	195	196	28	7	21	40	25	15
U	11	104	52	52	8	2	6	11	7	4
V	12	95	48	47	7	2	5	10	6	4
W	12	0	0	0	0	0	0	0	0	0
X	12	217	109	108	16	4	12	22	14	8
Y	12	338	169	169	25	6	19	35	22	13

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Trip Generation by Land Use Code

Duplex Only										
		Weekday			AM			PM		
Zone	VISTRO	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Total		407	203	204	26	6	20	32	19	13
A	1	163	81	82	11	2	9	13	8	5
B	2	0	0	0	0	0	0	0	0	0
C	2	109	54	55	7	2	5	9	5	4
D	2	0	0	0	0	0	0	0	0	0
E	3	0	0	0	0	0	0	0	0	0
F	3	0	0	0	0	0	0	0	0	0
G	4	0	0	0	0	0	0	0	0	0
H	4	0	0	0	0	0	0	0	0	0
I	4	0	0	0	0	0	0	0	0	0
J	5	0	0	0	0	0	0	0	0	0
K	5	81	41	40	5	1	4	6	4	2
L	5	0	0	0	0	0	0	0	0	0
M	6	0	0	0	0	0	0	0	0	0
N	7	0	0	0	0	0	0	0	0	0
O	8	0	0	0	0	0	0	0	0	0
P	8	0	0	0	0	0	0	0	0	0
Q	9	0	0	0	0	0	0	0	0	0
R	10	0	0	0	0	0	0	0	0	0
S	10	0	0	0	0	0	0	0	0	0
T	11	54	27	27	3	1	2	4	2	2
U	11	0	0	0	0	0	0	0	0	0
V	12	0	0	0	0	0	0	0	0	0
W	12	0	0	0	0	0	0	0	0	0
X	12	0	0	0	0	0	0	0	0	0
Y	12	0	0	0	0	0	0	0	0	0

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Trip Generation by Land Use Code

Low Rise Only										
		Weekday			AM			PM		
Zone	VISTRO	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Total		2216	1108	1108	126	30	96	164	103	61
A	1	106	53	53	6	1	5	8	5	3
B	2	212	106	106	12	3	9	16	10	6
C	2	199	100	99	11	3	8	15	9	6
D	2	0	0	0	0	0	0	0	0	0
E	3	0	0	0	0	0	0	0	0	0
F	3	0	0	0	0	0	0	0	0	0
G	4	0	0	0	0	0	0	0	0	0
H	4	0	0	0	0	0	0	0	0	0
I	4	106	53	53	6	1	5	8	5	3
J	5	0	0	0	0	0	0	0	0	0
K	5	0	0	0	0	0	0	0	0	0
L	5	199	100	99	11	3	8	15	9	6
M	6	0	0	0	0	0	0	0	0	0
N	7	0	0	0	0	0	0	0	0	0
O	8	199	99	100	11	3	8	15	9	6
P	8	106	53	53	6	1	5	8	5	3
Q	9	0	0	0	0	0	0	0	0	0
R	10	0	0	0	0	0	0	0	0	0
S	10	199	99	100	11	3	8	15	9	6
T	11	106	53	53	6	1	5	8	5	3
U	11	292	146	146	17	4	13	21	14	7
V	12	0	0	0	0	0	0	0	0	0
W	12	386	193	193	23	6	17	27	18	9
X	12	0	0	0	0	0	0	0	0	0
Y	12	106	53	53	6	1	5	8	5	3

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Trip Generation by Land Use Code

Mid Rise Only										
		Weekday			AM			PM		
Zone	VISTRO	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Total		1270	635	635	110	25	85	108	66	42
A	1	0	0	0	0	0	0	0	0	0
B	2	0	0	0	0	0	0	0	0	0
C	2	0	0	0	0	0	0	0	0	0
D	2	396	198	198	34	8	26	34	21	13
E	3	0	0	0	0	0	0	0	0	0
F	3	0	0	0	0	0	0	0	0	0
G	4	0	0	0	0	0	0	0	0	0
H	4	0	0	0	0	0	0	0	0	0
I	4	0	0	0	0	0	0	0	0	0
J	5	0	0	0	0	0	0	0	0	0
K	5	0	0	0	0	0	0	0	0	0
L	5	0	0	0	0	0	0	0	0	0
M	6	506	253	253	44	10	34	43	26	17
N	7	368	184	184	32	7	25	31	19	12
O	8	0	0	0	0	0	0	0	0	0
P	8	0	0	0	0	0	0	0	0	0
Q	9	0	0	0	0	0	0	0	0	0
R	10	0	0	0	0	0	0	0	0	0
S	10	0	0	0	0	0	0	0	0	0
T	11	0	0	0	0	0	0	0	0	0
U	11	0	0	0	0	0	0	0	0	0
V	12	0	0	0	0	0	0	0	0	0
W	12	0	0	0	0	0	0	0	0	0
X	12	0	0	0	0	0	0	0	0	0
Y	12	0	0	0	0	0	0	0	0	0

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Trip Generation Total for all Land Use Codes

Total, All Land Uses										
		Weekday			AM			PM		
Zone	VISTRO	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Total										
A	1	738	368	370	51	12	39	69	43	26
B	2	212	106	106	12	3	9	16	10	6
C	2	620	310	310	41	11	30	56	34	22
D	2	396	198	198	34	8	26	34	21	13
E	3	807	403	404	57	14	43	82	52	30
F	3	104	52	52	8	2	6	11	7	4
G	4	69	35	34	5	1	4	7	4	3
H	4	399	199	200	29	7	22	41	26	15
I	4	1739	869	870	123	30	93	174	110	64
J	5	139	70	69	10	3	7	14	9	5
K	5	229	115	114	16	4	12	21	13	8
L	5	199	100	99	11	3	8	15	9	6
M	6	506	253	253	44	10	34	43	26	17
N	7	368	184	184	32	7	25	31	19	12
O	8	199	99	100	11	3	8	15	9	6
P	8	106	53	53	6	1	5	8	5	3
Q	9	243	121	122	18	5	13	25	16	9
R	10	69	35	34	5	1	4	7	4	3
S	10	381	190	191	24	6	18	34	21	13
T	11	551	275	276	37	9	28	52	32	20
U	11	396	198	198	25	6	19	32	21	11
V	12	95	48	47	7	2	5	10	6	4
W	12	386	193	193	23	6	17	27	18	9
X	12	217	109	108	16	4	12	22	14	8
Y	12	444	222	222	31	7	24	43	27	16

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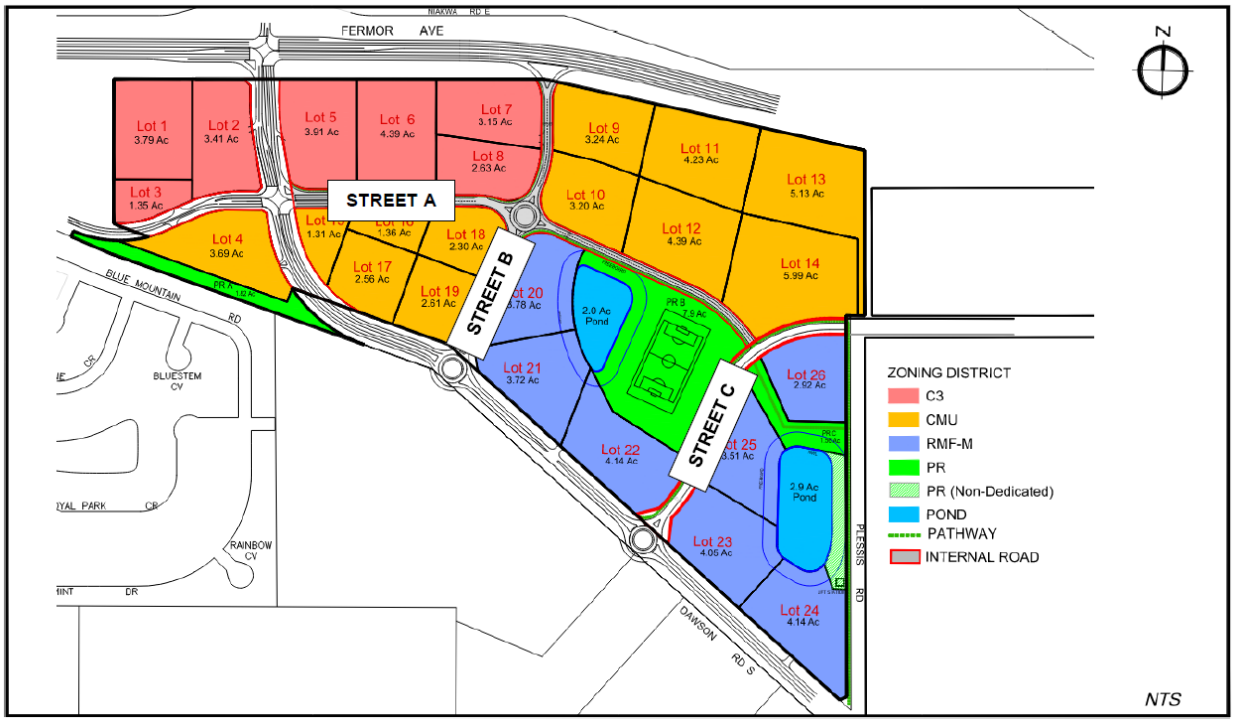
Trip Generation of Personal Vehicle Trips following Mode Split Reduction

		Total Trip Ends								
		Weekday			AM			PM		
VISTRO Zone	Phase	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
1	1	665	331	333	46	11	35	62	39	23
2	1	1105	553	553	79	20	59	95	59	37
3	1B	820	410	410	59	14	44	83	53	31
4	2	1986	993	994	141	34	107	199	126	74
5	2	510	257	254	33	9	24	45	28	17
6	2	455	228	228	40	9	31	39	23	15
7	2	331	166	166	29	6	23	28	17	11
8	2	275	137	138	15	4	12	21	13	8
9	3	219	109	110	16	5	12	23	14	8
10	3	405	203	203	26	6	20	37	23	14
11	3	852	426	427	56	14	42	76	48	28
12	3	1028	515	513	69	17	52	92	59	33
		8651	4328	4329	609	149	461	800	502	299

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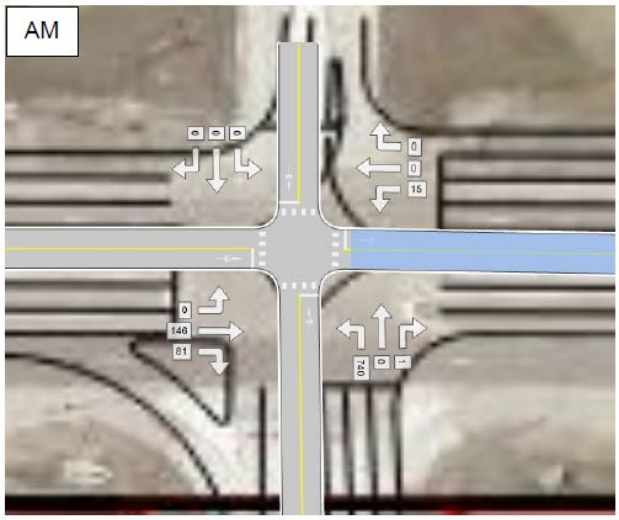
ADJACENT DEVELOPMENT TRIP ENDS

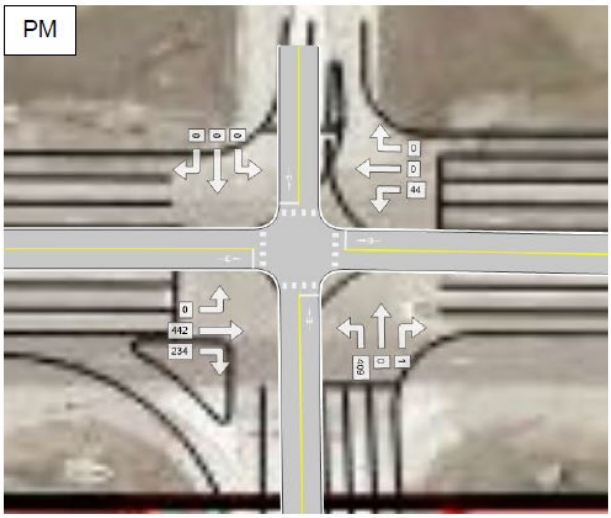
The following figure depicts the proposed site plan, supplied by the consultant for the parallel TIS in March 2023. Three internal roads are labeled in the site plan as Street A, Street B, and Street C. Street B is shown as sharing the roundabout intersection location on the realigned Dawson Road South with Collector B of the Proposed Development. Street C is shown as sharing the roundabout intersection location on the realigned Dawson Road South with Collector C of the Proposed Development.

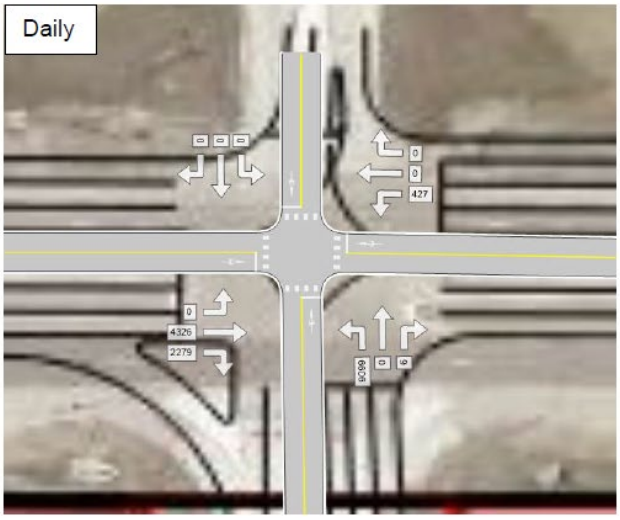


The following diagrams were also supplied by the consultant for the parallel TIS, relating to the Adjacent Development trip counts. These were interpreted as showing net site trip ends following mode share reductions and pass-by/diverted trip determinations for Phase 1 and full buildout of the Adjacent Development.

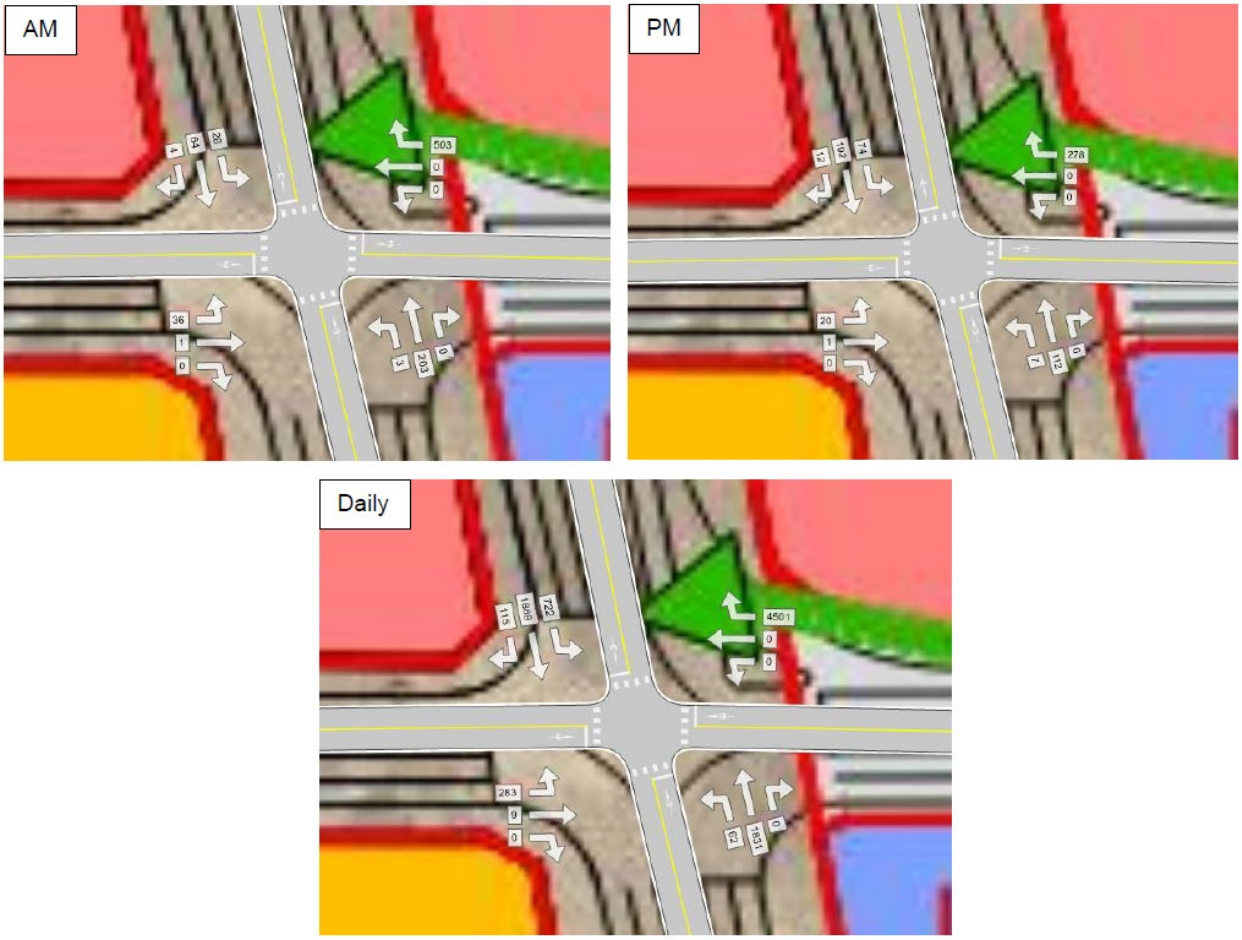
Phase 1: Net Site Trips at Fermor Avenue and Dawson Road



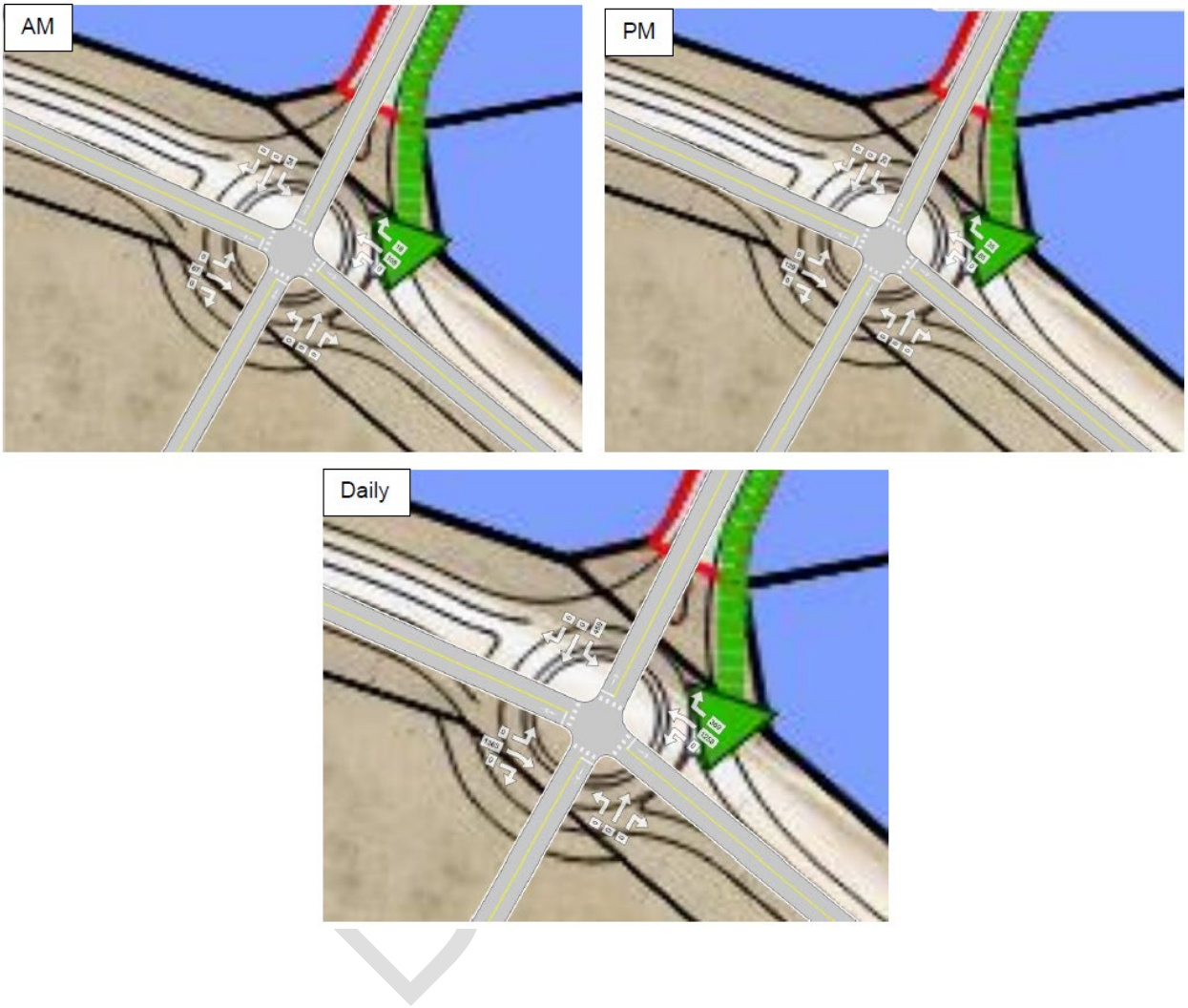




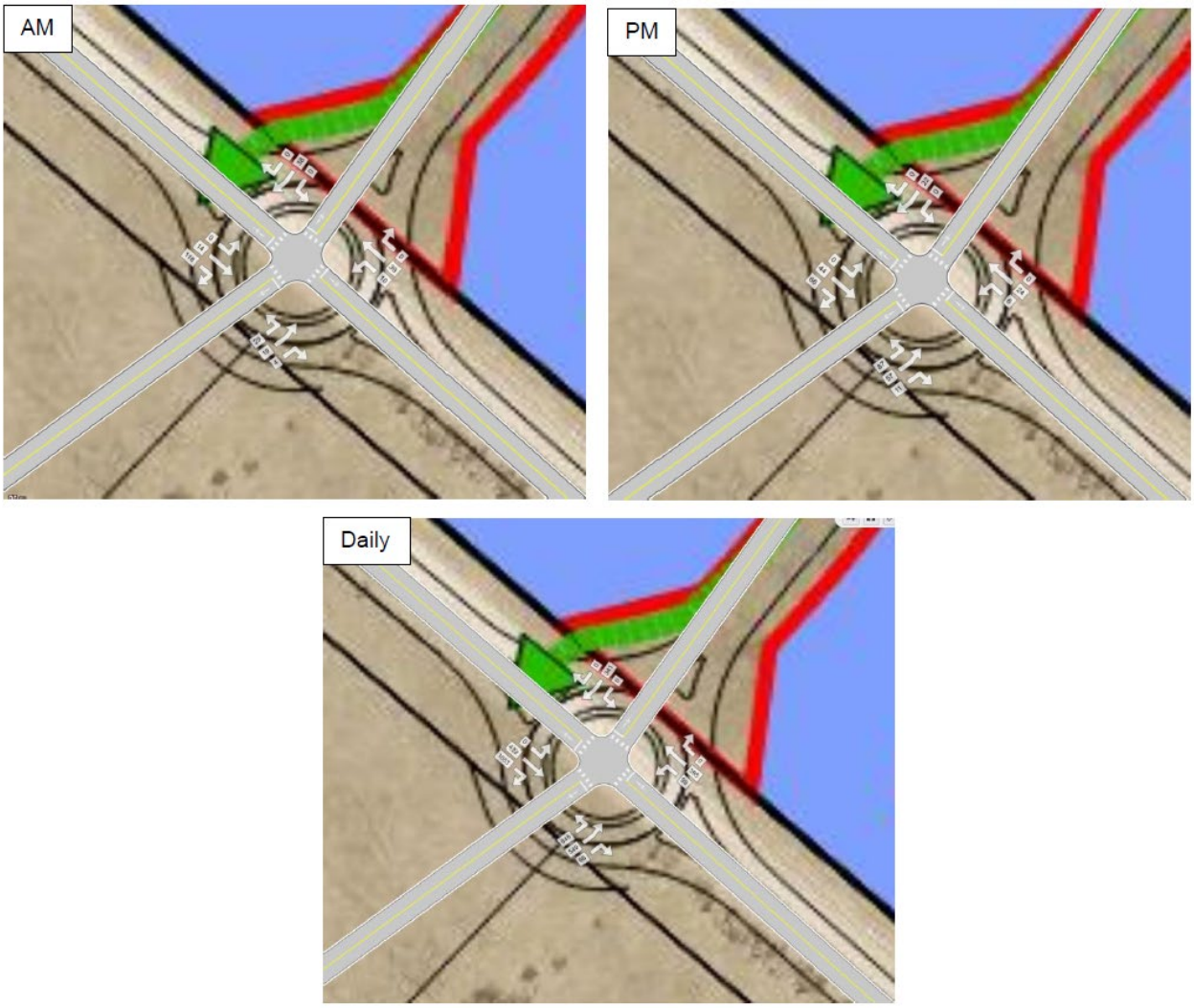
Phase 1: Net Site Trips at Dawson Road and Street A



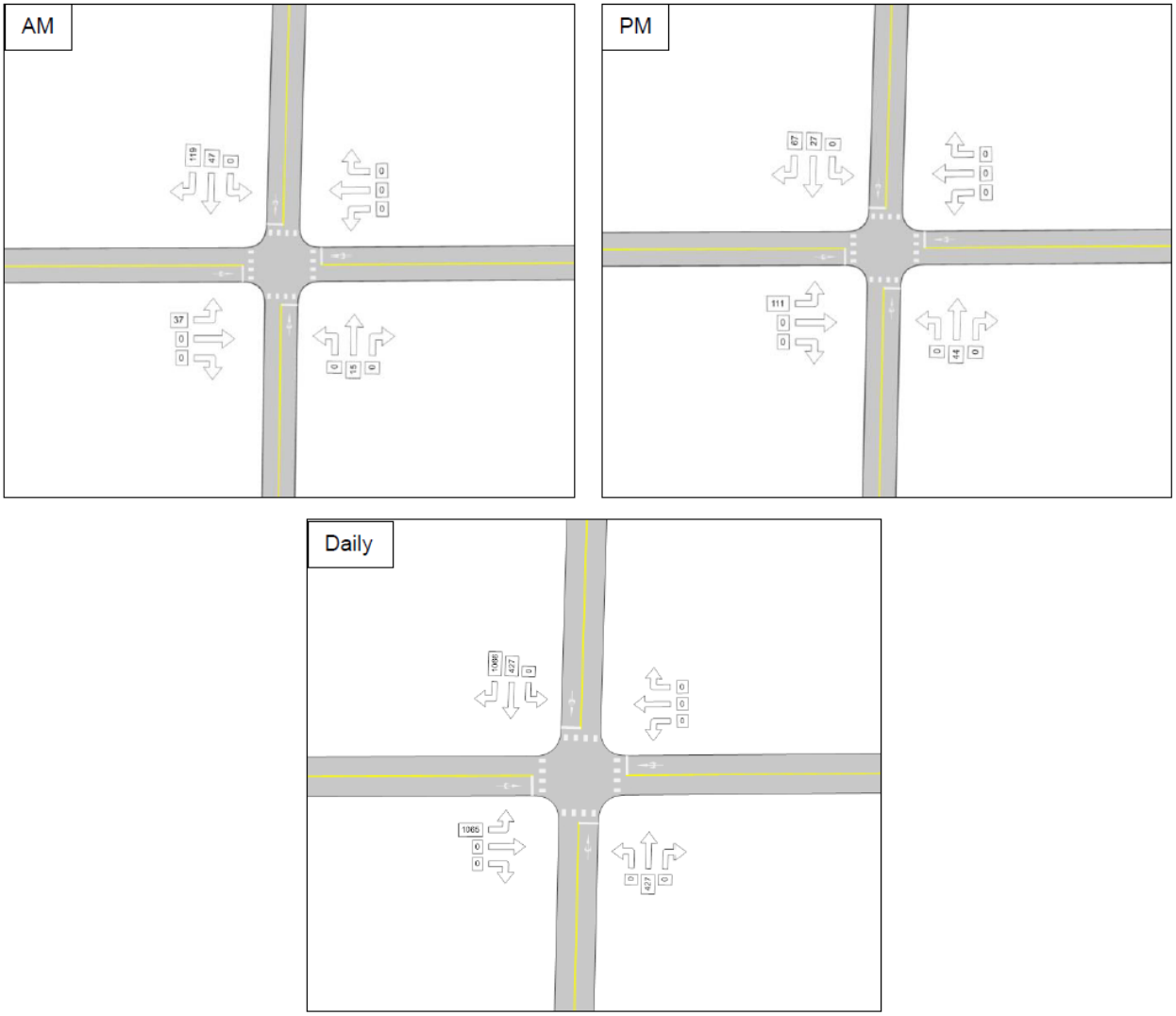
Phase 1: Net Site Trips at Dawson Road and Street B



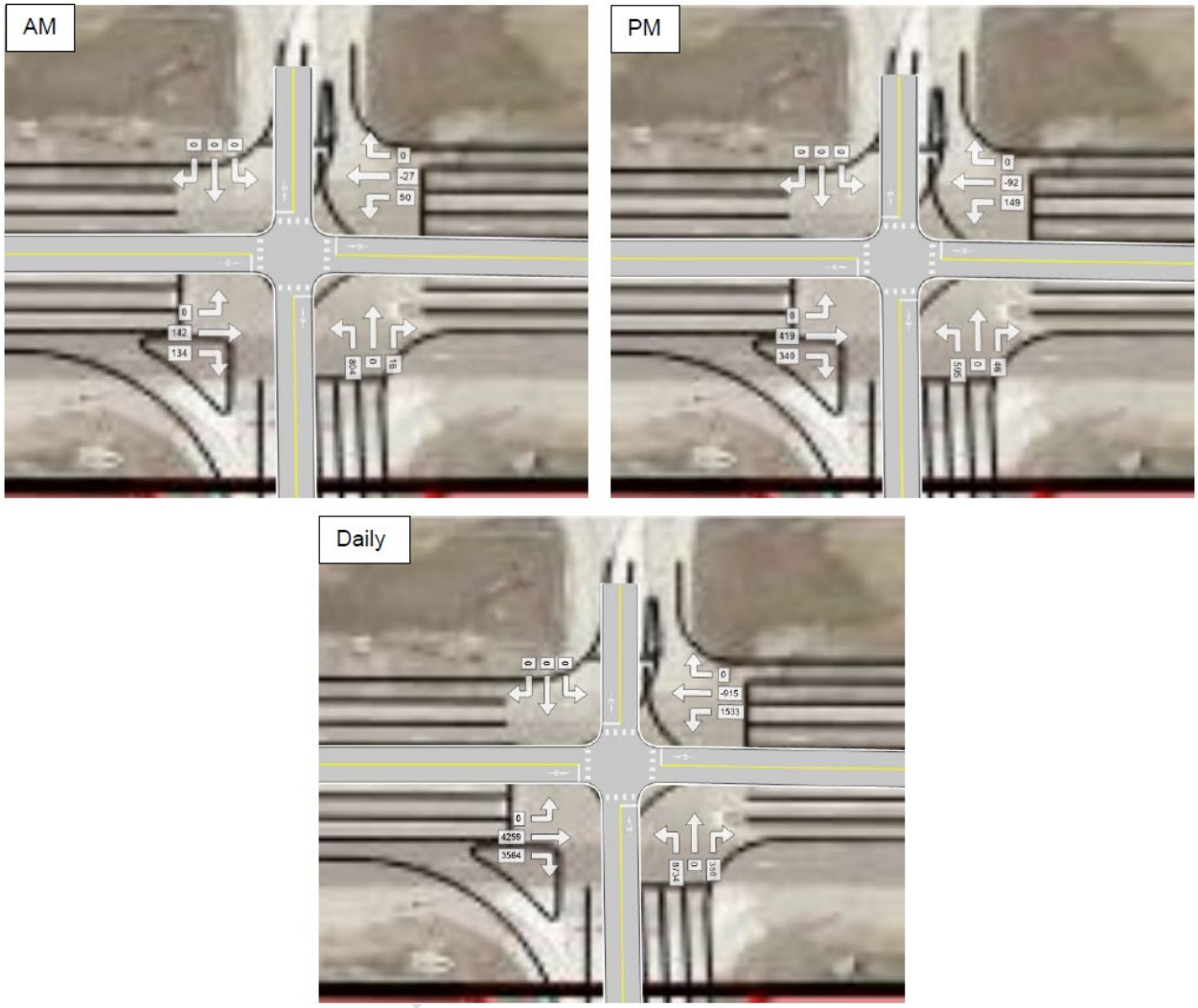
Phase 1: Net Site Trips at Dawson Road and Street C



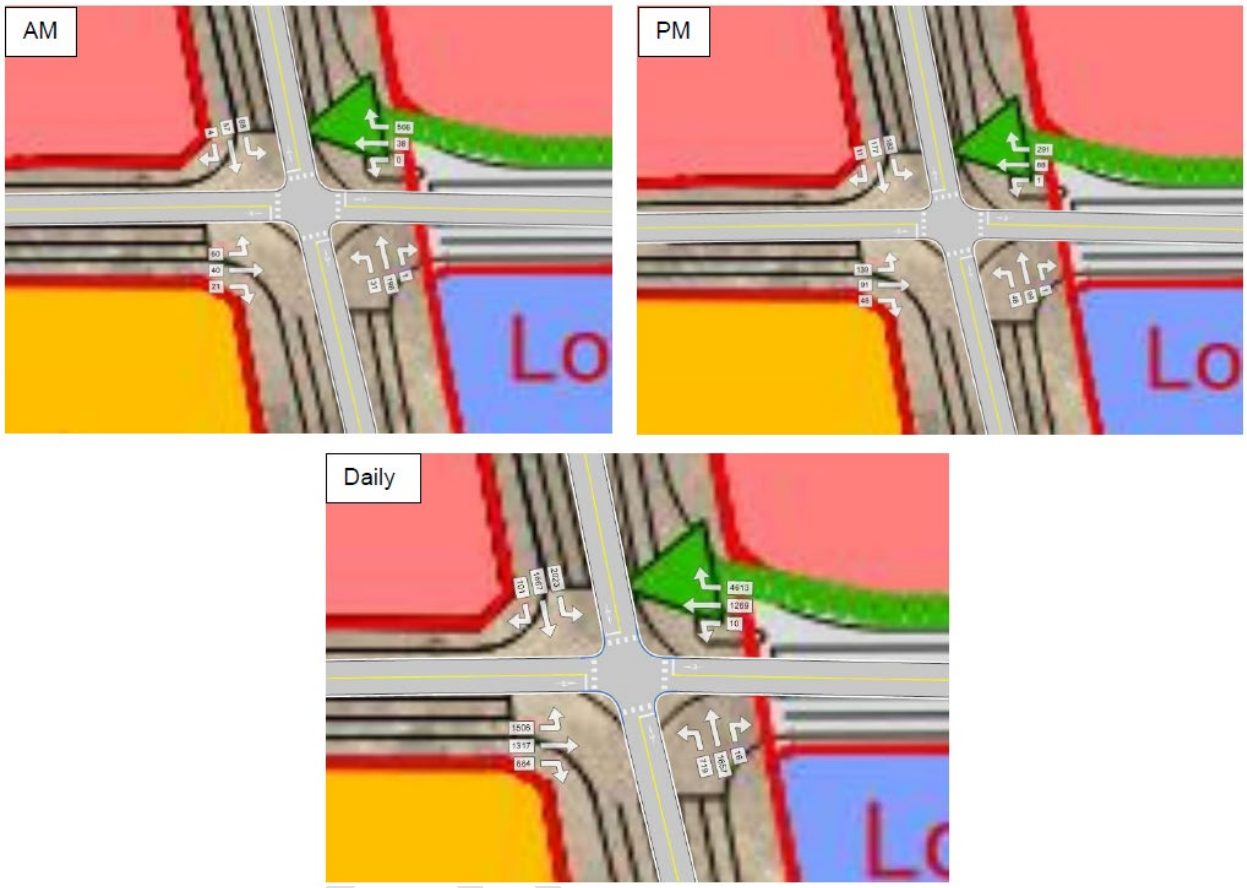
Phase 1: Net Site Trips at Abinojii Mikanah and Boulevard des Hivernants



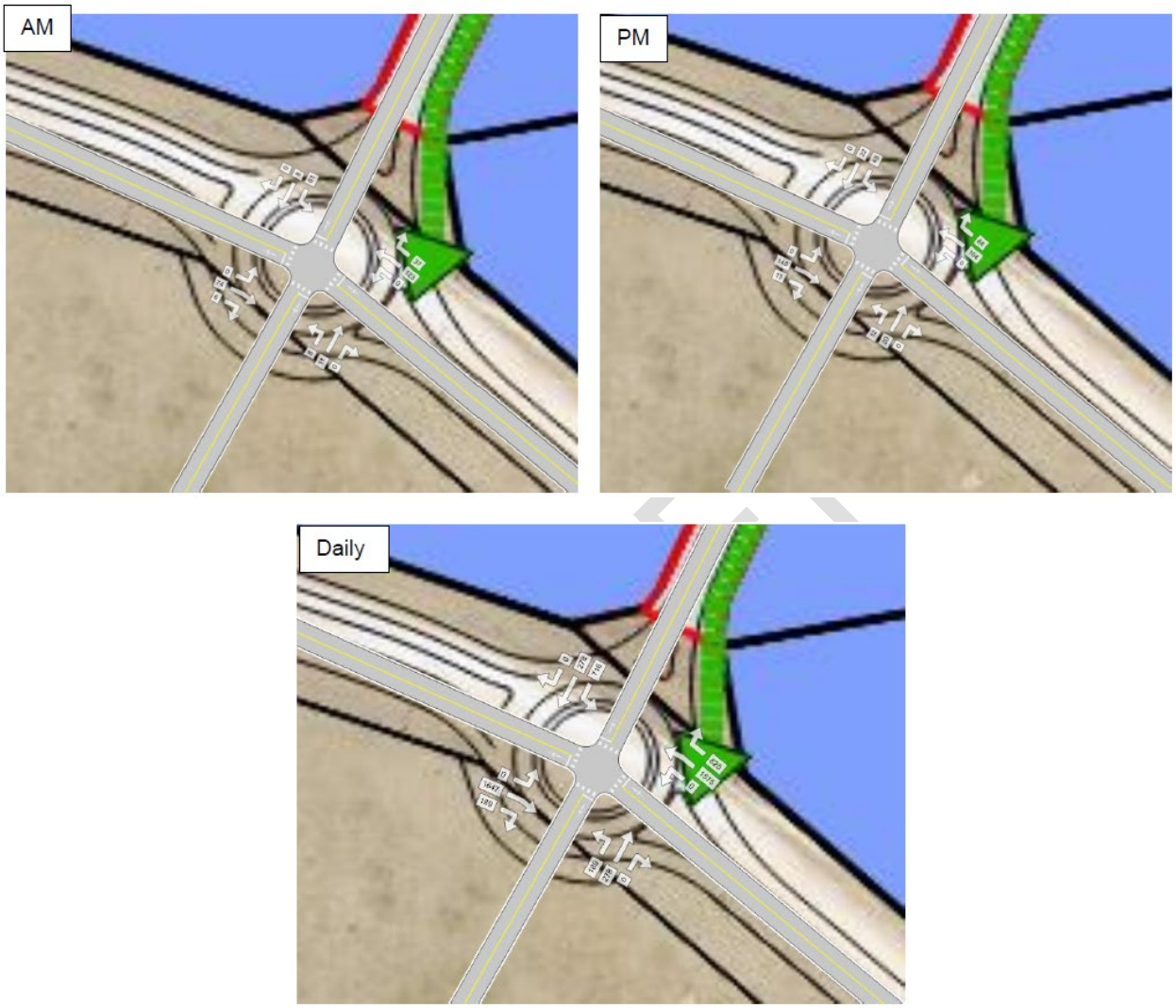
Full Buildout: Net Site Trips at Fermor Avenue and Dawson Road



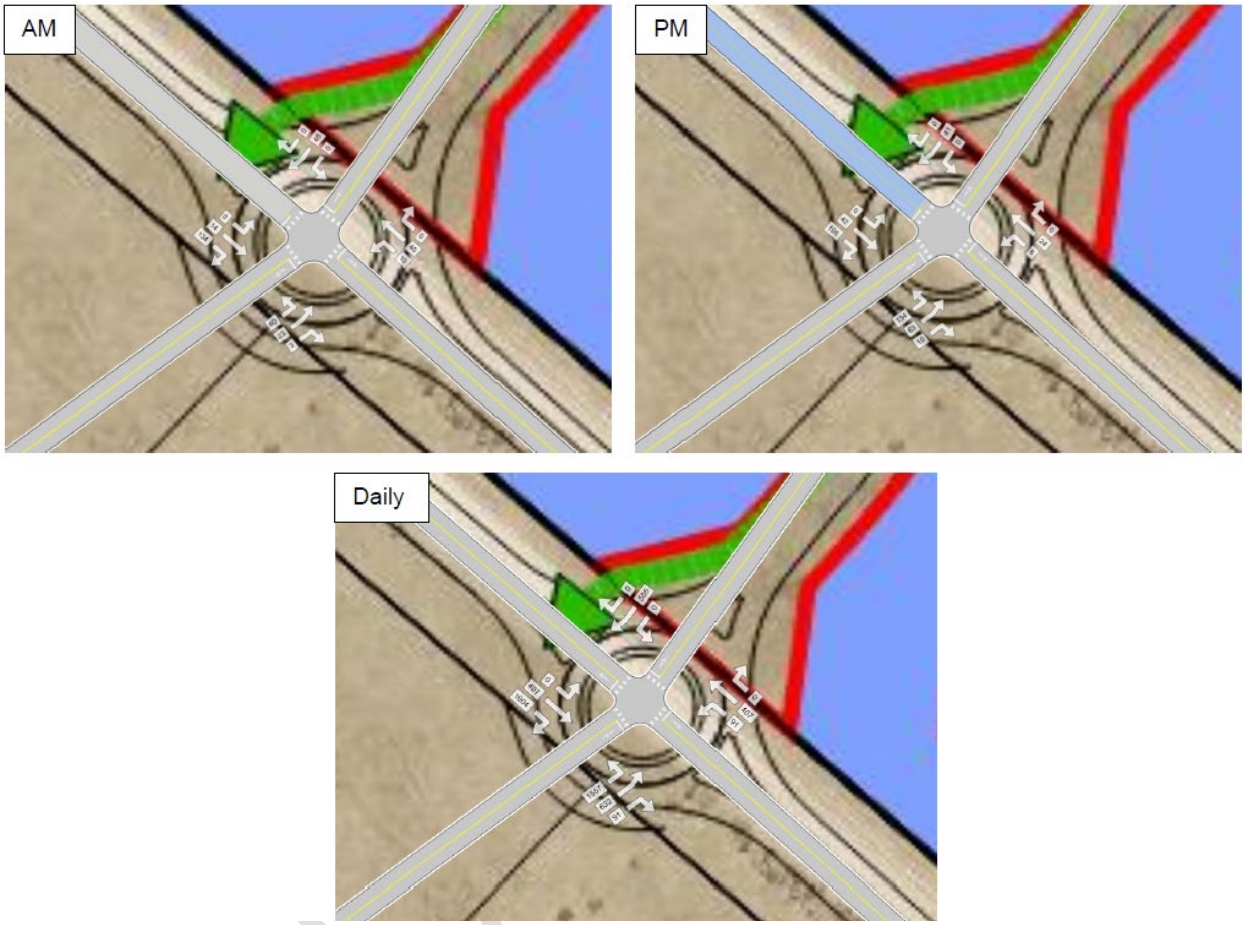
Full Buildout: Net Site Trips at Dawson Road and Street A



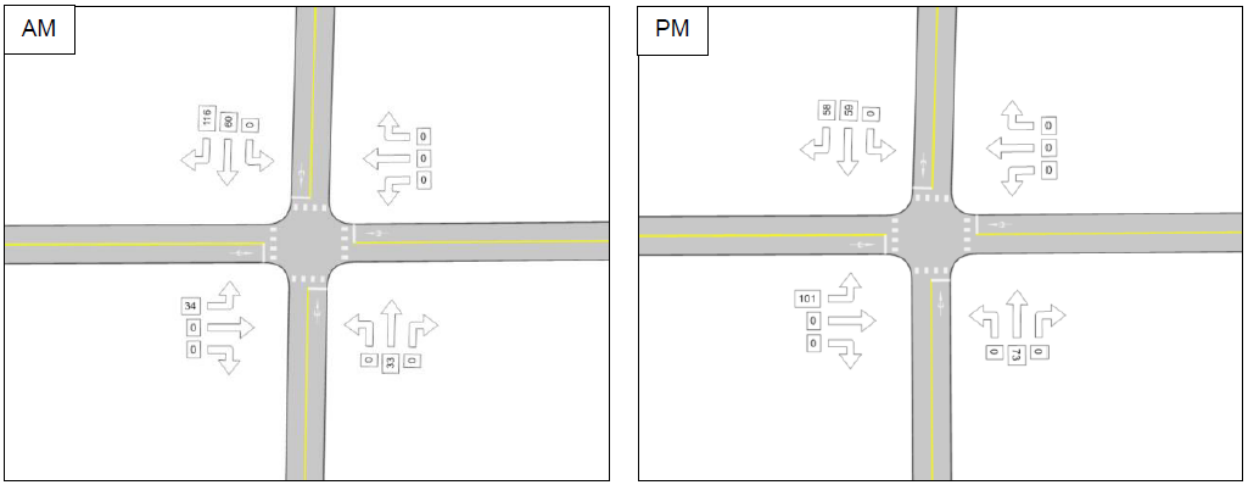
Full Buildout: Net Site Trips at Dawson Road and Street B



Full Buildout: Net Site Trips at Dawson Road and Street C

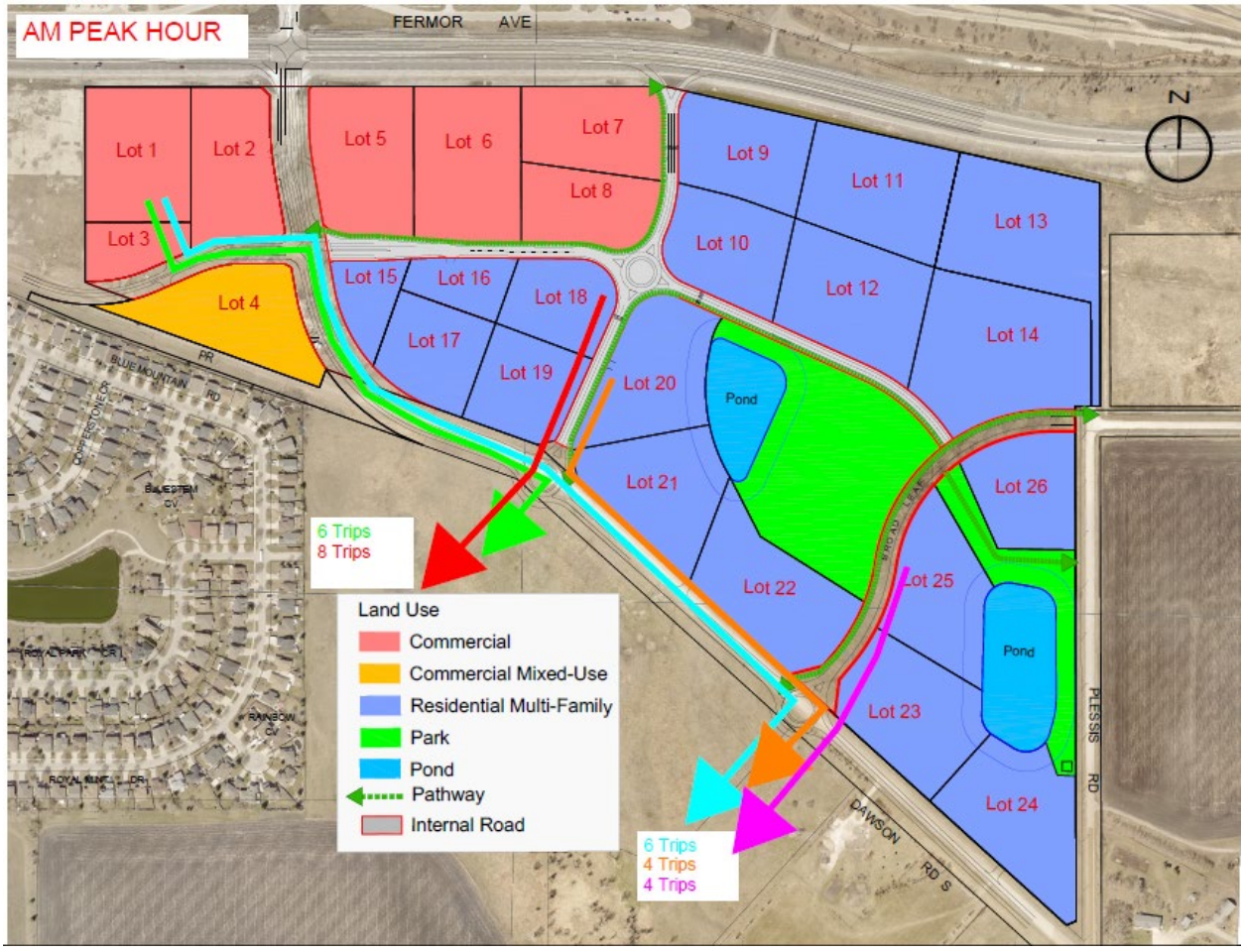


Full Buildout: Net Site Trips at Abinojii Mikanah and Boulevard des Hivernants

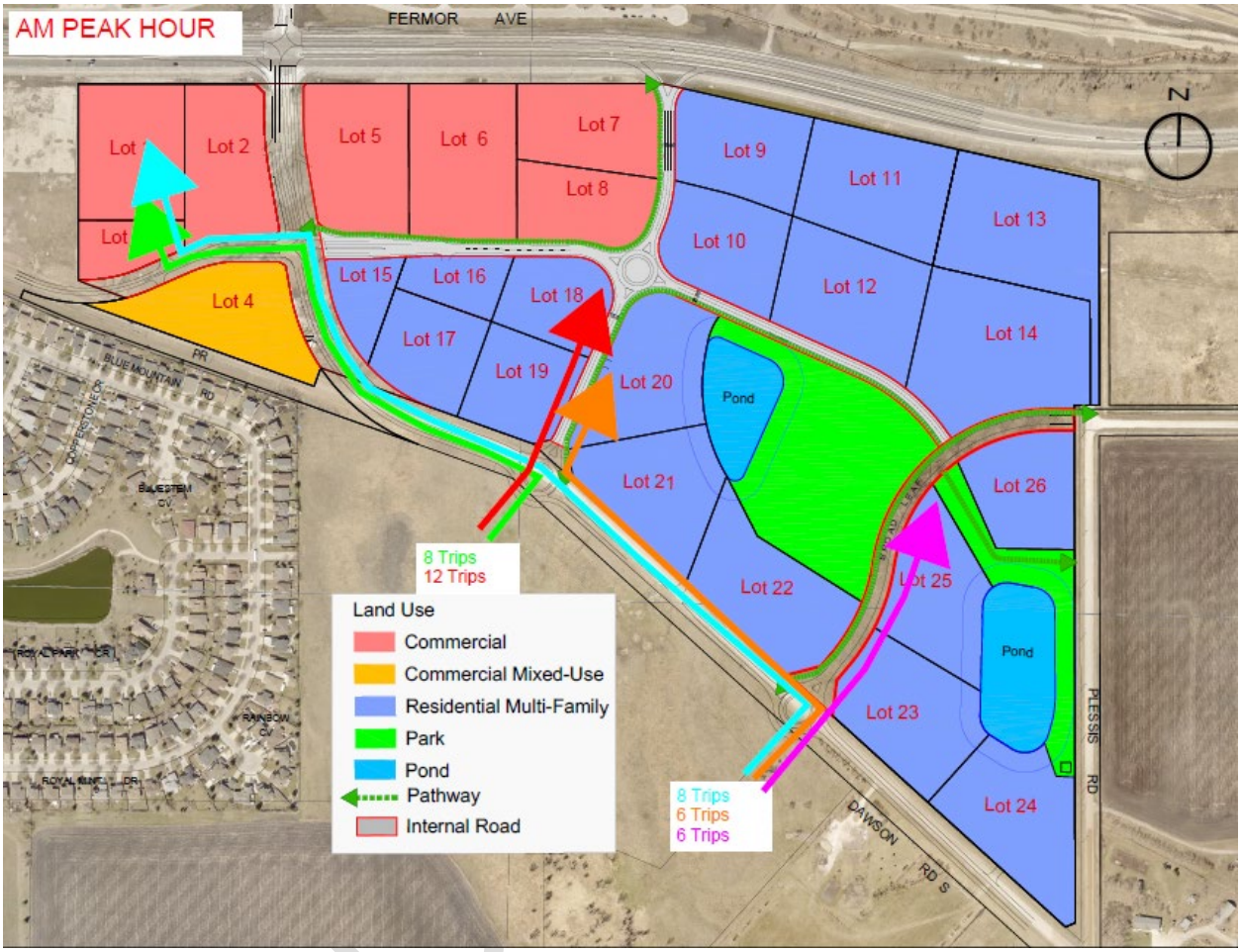


The following figures were also supplied by the consultant for the parallel TIS, relating to the anticipated interaction between the Adjacent Development and the Proposed Development. Minor differences between these diagrams and Stantec's analysis of the previously shown Net Site Trip diagrams were assumed to be a result of rounding. These trips were communicated as full buildout interaction.

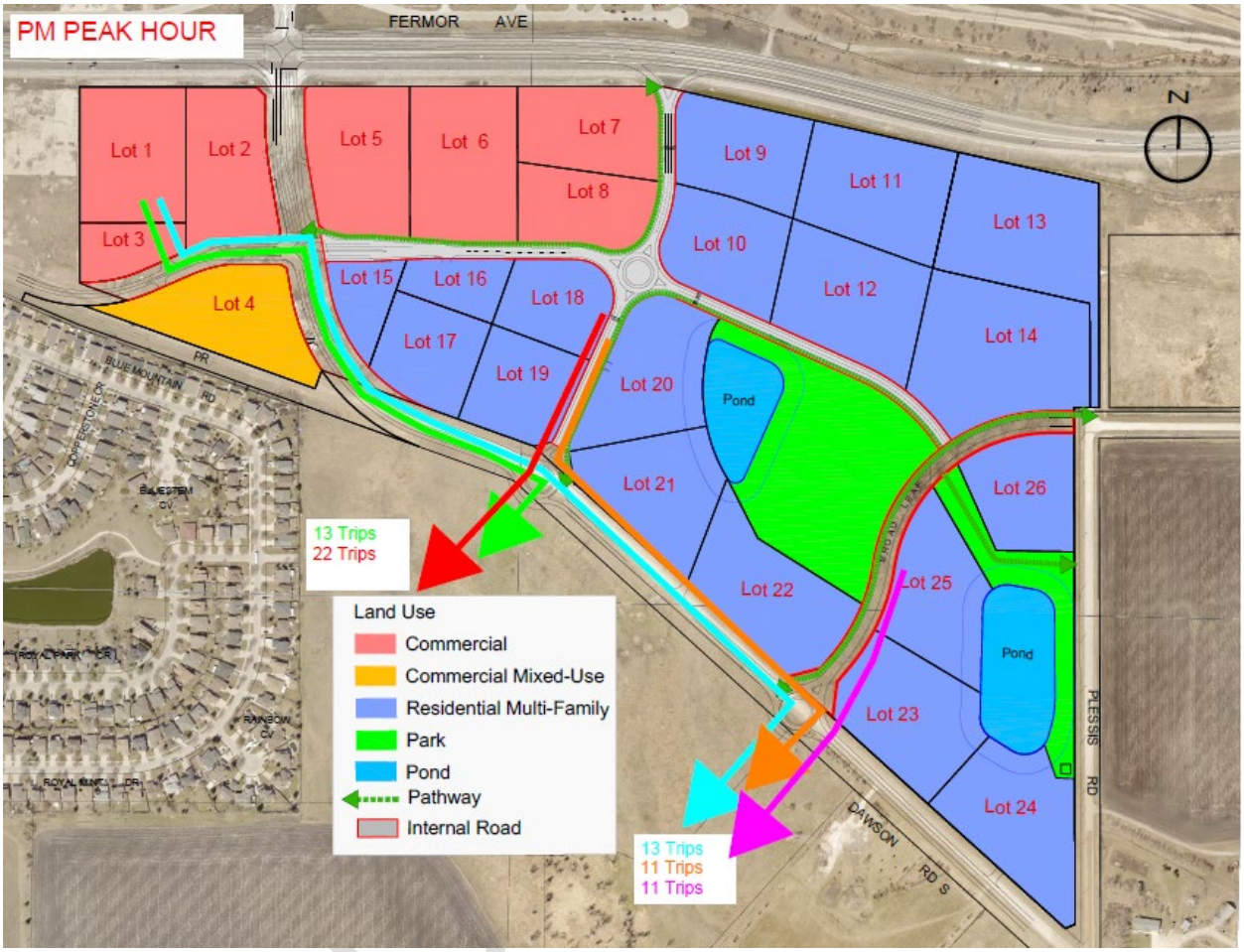
Development Interaction during AM Peak Hour: Adjacent Development to Proposed Development Trips



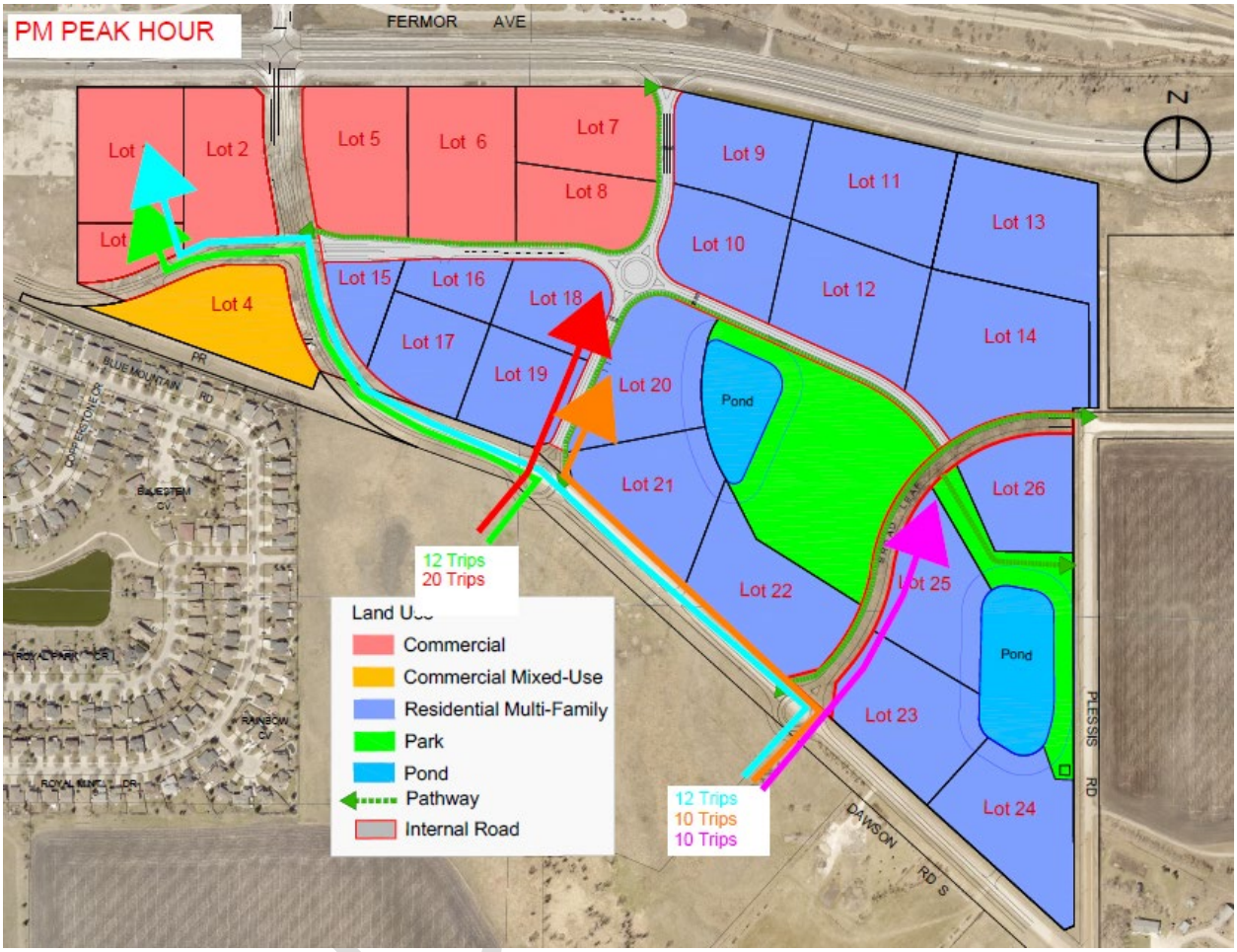
Development Interaction during AM Peak Hour: Proposed Development to Adjacent Development Trips



Development Interaction during PM Peak Hour: Adjacent Development to Proposed Development Trips



Development Interaction during PM Peak Hour: Proposed Development to Adjacent Development Trips



DEVELOPMENT INTERACTION

The following table shows the estimation of development interaction based on land use assumptions for the Adjacent Development and use of the internal trip capture methodology, only for the PM peak hour. This is extracted from the *OTISS Pro* software and uses the ITE internal trip capture methodology.

At Land Use	From/To Land Use	Internal Person Trips From/To Land Uses	Internal Person Trips From/To Land Uses	Internal Person Trips at Land Uses		Vehicle Occupancy		Internal Vehicle Trips at Land Use	
		Entry	Exit	Entry	Exit	Entry	Exit	Entry	Exit
210	215	0	0	42	22	1	1	38	20
	220	0	0						
	221	0	0						
	820	42	22						
215	210	0	0	2	1	1	1	2	1
	220	0	0						
	221	0	0						
	820	2	1						
220	210	0	0	12	6	1	1	11	5
	215	0	0						
	221	0	0						
	820	12	6						
221	210	0	0	8	4	1	1	7	4
	215	0	0						
	220	0	0						
	820	8	4						
820	210	22	42	33	64	1	1	30	58
	215	1	2						
	220	6	12						
	221	4	8						

Following this analysis and comparison between the two approaches, Stantec selected the trips supplied by the consultant of the parallel TIS as they represented the more conservative assumption (i.e., higher volumes). In order to incorporate these trips into the PTV VISTRO model, a new trip distribution for the Proposed Development was determined that matches the number, distribution, and assignment of trips generated by the Proposed Development that connect with gates 22 and 23 to the data supplied from the parallel TIS. These development interaction trips were then subtracted from the Adjacent Development net site trips so that the trip estimates provided from the parallel TIS could be incorporated as Adjacent Development trips for the parallel development scenario, preventing these trips from being double counted when estimating the future combined traffic for full buildout of both the Proposed Development and Adjacent Development.

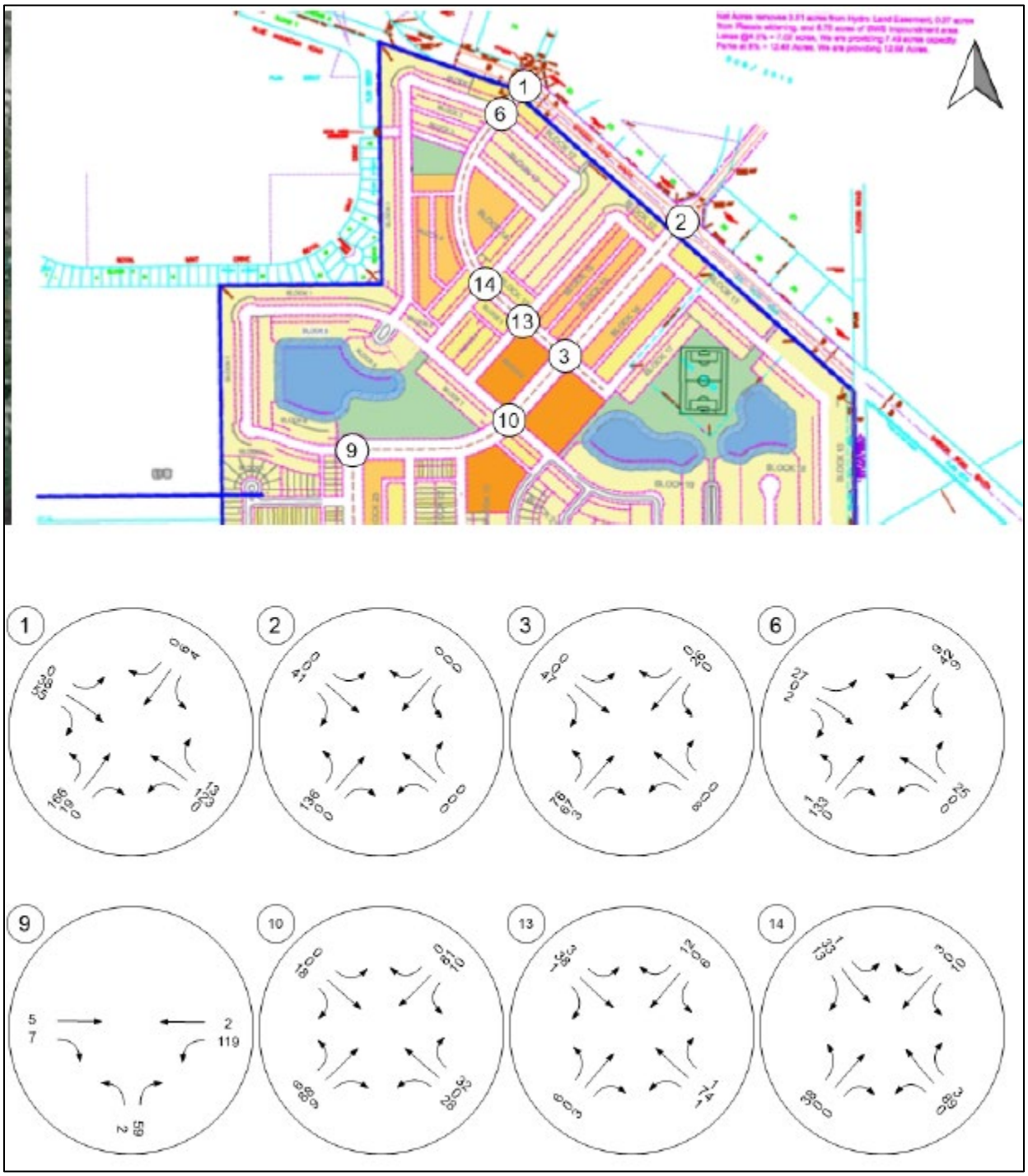
External Trip Distribution by Gate

Custom Distribution for All Zones based on Parallel TIS Development Interaction			
Gate	**AM**	**PM**	**ADT**
20 - Fermor Avenue West and Lagimodiere Boulevard North	54%	51%	49%
21 - Fermor Avenue East	4%	3%	3%
25 - Boulevard des Hivernants South	3%	3%	2%
26 - Lagimodiere Boulevard South	7%	7%	6%
27 - Abinojii Mikanah West	20%	19%	18%
22 - Adj Dev west of Dawson Road S	5%	6%	9%
23 – Adj Dev east of Dawson Road S	7%	11%	13%

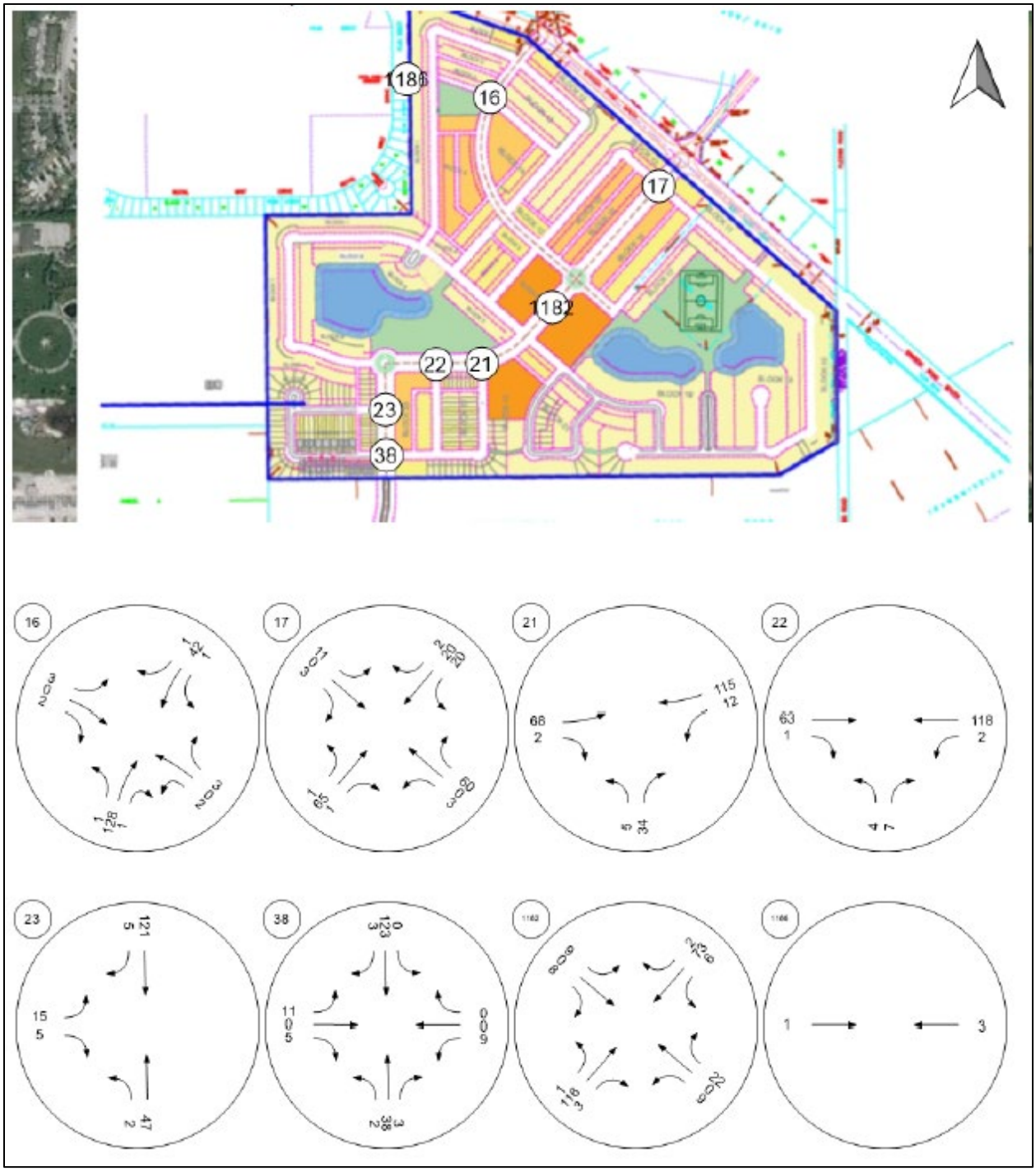
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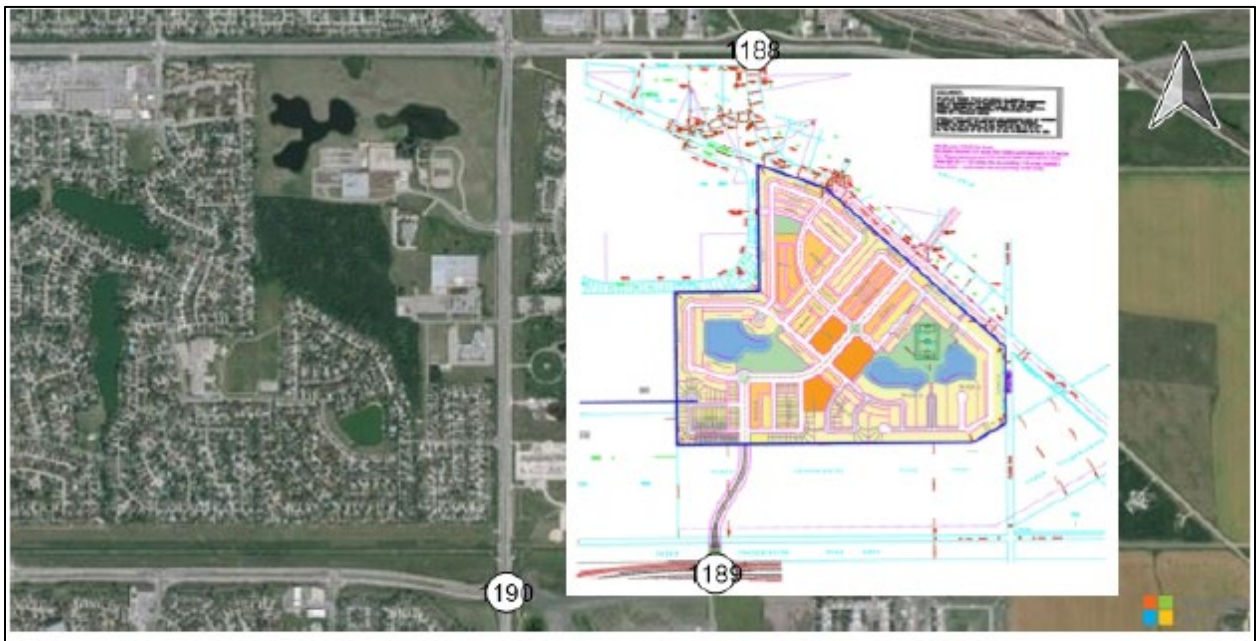
TRIP DISTRIBUTION AND ASSIGNMENT OF TRIP ENDS FOR PROPOSED DEVELOPMENT

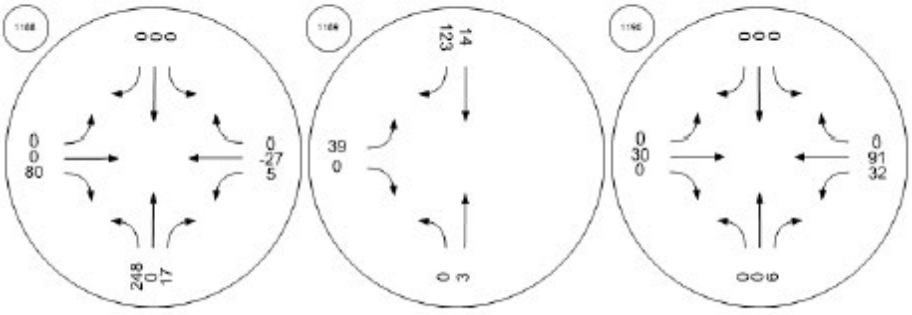
AM peak hour net new personal vehicle trips for the Proposed Development (full buildout)



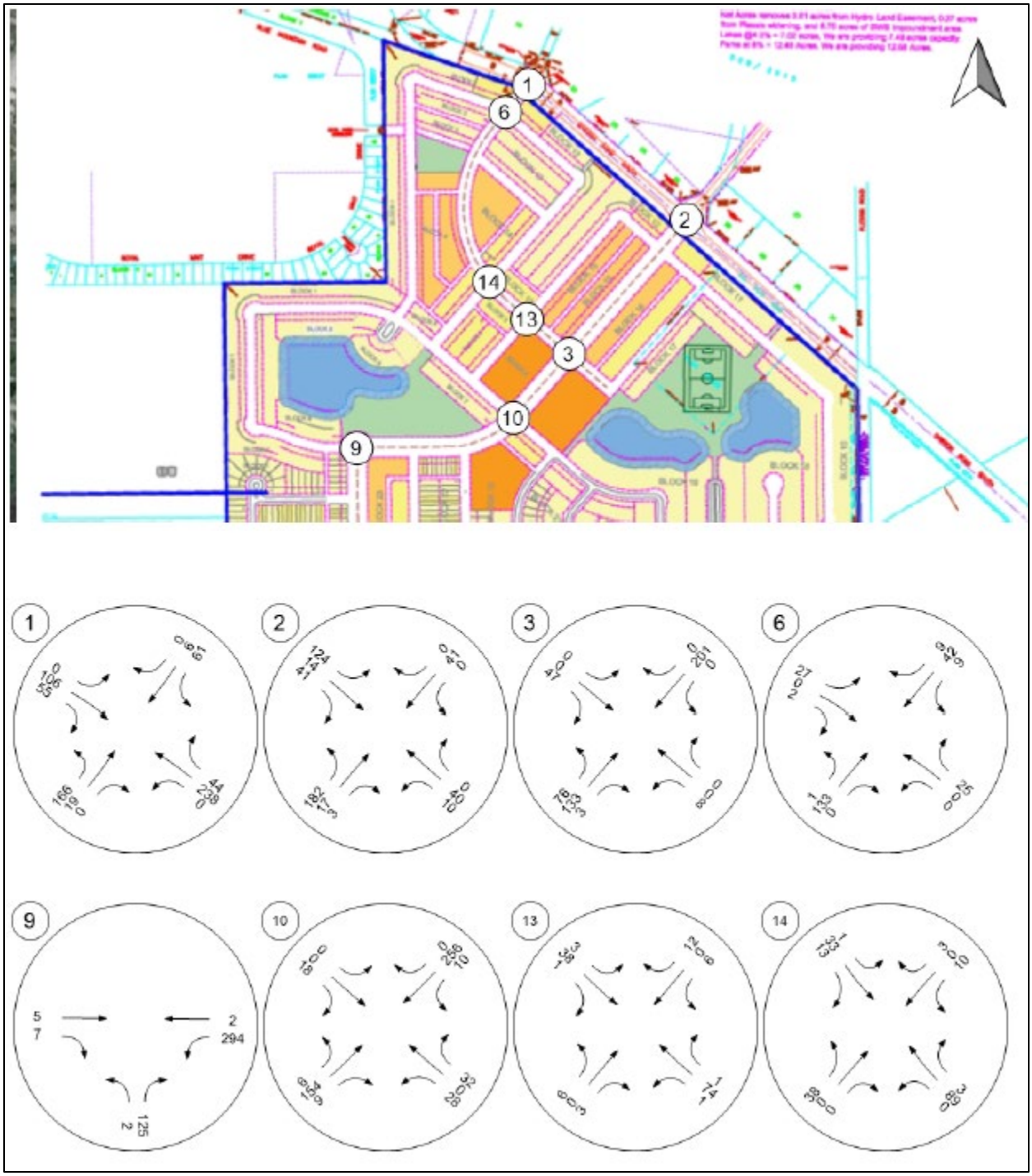
AM peak hour net new personal vehicle trips for the Proposed Development (Full Buildout)




188
189
190

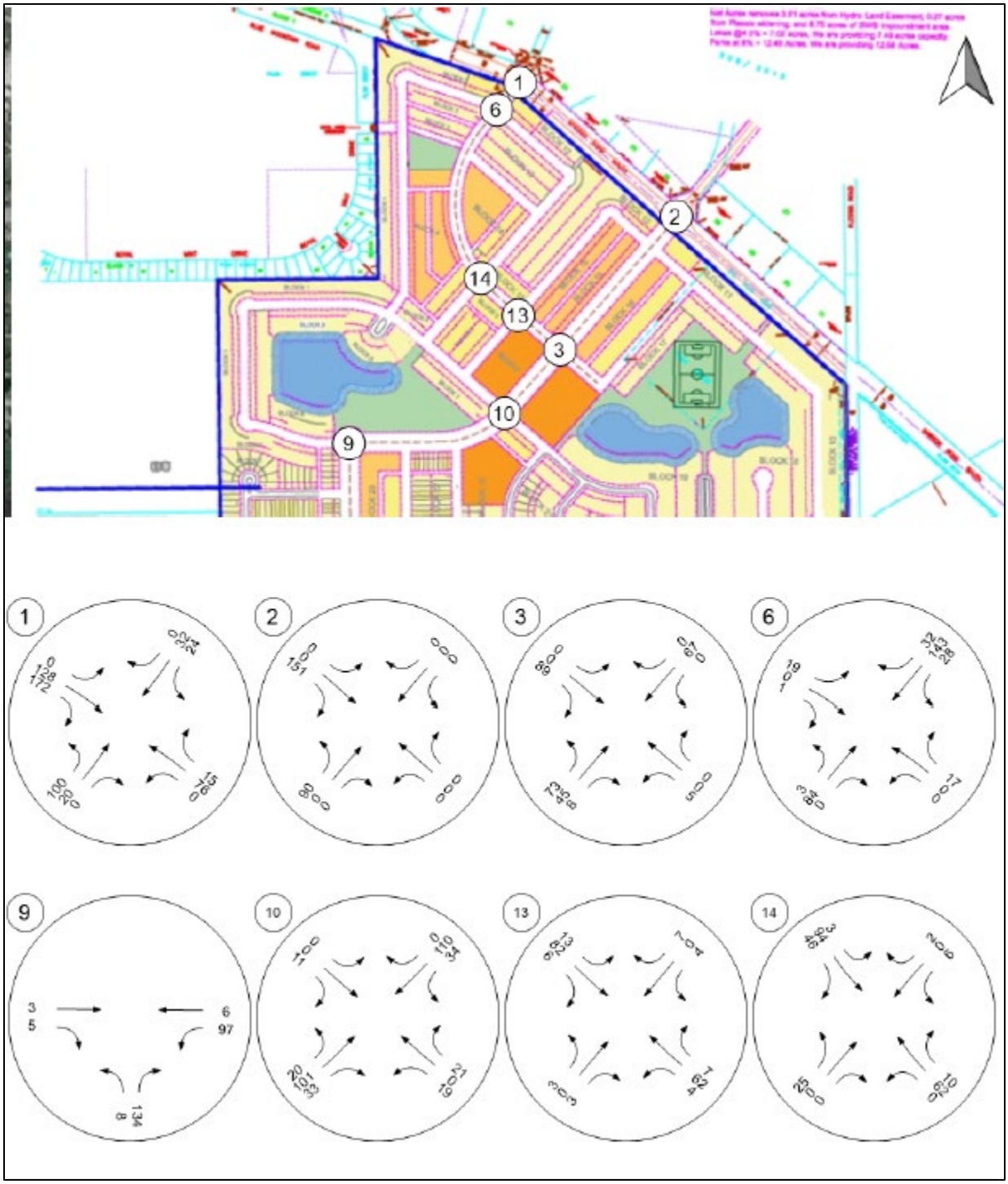

0
0
80
0
27
5
248
0
41
14
123
39
0
0
3
0
30
0
0
91
32

AM peak hour total future transportation demand for the Proposed Development



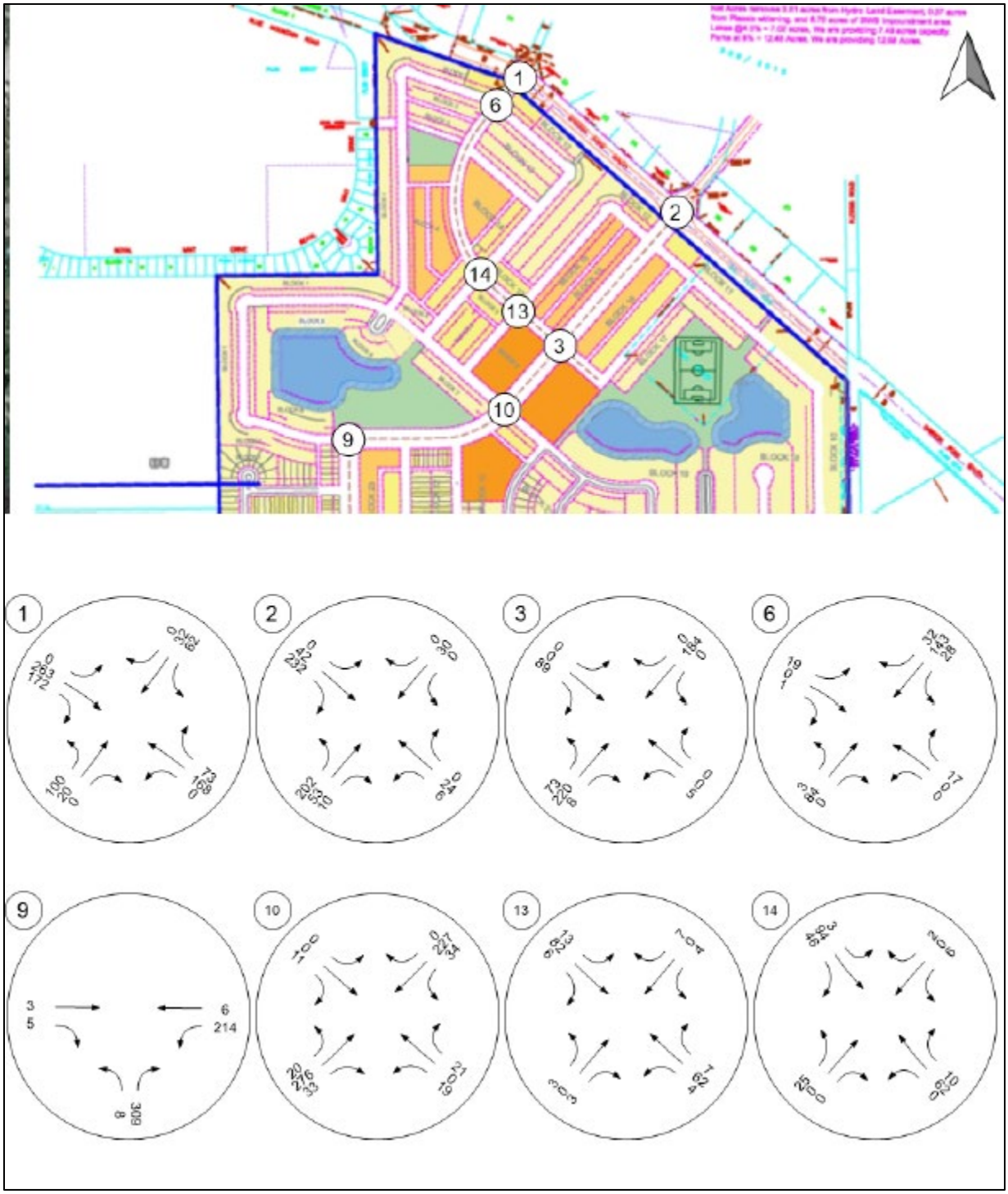

186
16
17
182
22
21
23
38
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17
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38

PM peak hour net new personal vehicle trips for the Proposed Development




186
16
17
182
22
21
23
38
16
17
21
22
23
38

PM peak hour total future transportation demand for the Proposed Development




1186
16
17
1182
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23
38

TRANSPORTATION DEMAND ANALYSIS

Fermor Avenue at Niakwa Road East/Dawson Road South Configuration Discussion

The existing configuration was analyzed for both 2023 background and 2033 background traffic volumes, with both cases excluding the realignment of Dawson Road South as the south leg. The future combined scenarios, with Adjacent Development traffic only followed by Adjacent Development + Proposed Development traffic, were based on an understanding of previously proposed geometry and previously constructed elements already present at this location. Potential modifications for the future combined scenarios may include an additional eastbound through lane to address this movement's heavy volume (1755 vehicles in the PM peak hour) and v/c ratio over 1. This may allow additional cycle length to be allocated to other critical movements like the westbound left or northbound left.

Existing configuration:

- West approach: free flowing, two through lanes, one auxiliary left lane with 75 m storage
- East approach: free flowing, two through lanes, one auxiliary through/right lane with 160 m
- South approach: not open
- North approach: stop control, one left-turn lane, one right-turn lane

Configuration for 2033 Background scenario:

- West approach: free flowing, two through lanes, one auxiliary left lane with 75 m storage
- East approach: free flowing, two through lanes, one auxiliary through/right lane with 160 m
- South approach: not open
- North approach: stop control, one left lane, one right lane

Modified Configuration 1 for 2033 Background + Adjacent Development and 2033 Background + Adjacent Development + Proposed Development scenarios:

- West approach: auxiliary left-turn lane, two through lanes, exclusive channelized right-turn lane under yield control
- East approach: auxiliary left-turn lane with 120 m of storage, two through lanes, shared through and right-turn lane with 160 m of storage
- South approach: shared left-turn and through lane, shared through and right-turn lane
- North approach: dual left-turn lanes, shared through and right-turn lane with a channelized right-turn configuration under yield control
- *Note:* Some elements of this configuration have already been constructed.

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Modified Configuration 2 for 2033 Background + Adjacent Development and 2033 Background + Adjacent Development + Proposed Development scenarios:

- West approach: auxiliary left-turn lane, three through lanes, exclusive channelized right-turn lane under yield control
- East approach: auxiliary left-turn lane, two through lanes, shared through and right-turn lane
- South approach: shared left-turn and through lane, shared through and right-turn lane
- North approach: triple left-turn lanes, shared through and right-turn lane with a channelized right-turn configuration under yield control

Operational Performance of the Fermor Avenue at Niakwa Road East/Dawson Road South Intersection across the Analysis Scenarios

Scenario	Configuration	Period	Intersection Performance [LOS, Delay (s), ICU]	Critical Movements [Direction, LOS, Delay (s), v/c]
2023 Background	Existing	AM	A, 1, 0.43	SBL, F, 103, 0.12
	Existing	PM	A, 1, 0.42	SBL, F, 69, 0.33
2033 Background	Existing	AM	A, 1, 0.43	SBL, F, 103, 0.12
	Existing	PM	A, 1, 0.43	SBL, F, 74, 0.35
2033 Background + Adjacent Development	Modification 1	AM	E, 60, 0.75	EBL, F, 89, 0.76 WBL, E, 65, 0.53 WBT, E, 56, 0.99 NBL, F, 83, 1.05
	Modification 1	PM	F, 87, 0.95	EBL, E, 75, 0.18 EBT, F, 112, 1.15 WBL, F, 205, 1.22 NBL, F, 154, 1.19
2033 Background + Adjacent Development + Proposed Development	Modification 1	AM	F, 80, 0.82	EBL, F, 111, 0.84 EBT, E, 64, 0.98 WBL, F, 83, 0.65 WBT, F, 93, 1.10 NBL, F, 96, 1.10
	Modification 1	PM	F, 105, 1.01	EBL, E, 75, 0.18 EBT, F, 151, 1.24 WBL, F, 202, 1.22 NBL, F, 172, 1.25
2033 Background + Adjacent Development + Proposed Development	Modification 2	AM	E, 63, 0.72	EBL, E, 71, 0.68 WBL, E, 58, 0.52 WBT, F, 98, 1.12 NBL, E, 58, 0.98
	Modification 2	PM	E, 60, 0.79	EBT, F, 94, 1.11 WBL, F, 188, 1.21

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Boulevard des Hivernants at Abinojii Mikanah Configuration Discussion

The existing configuration was not analyzed for any time horizon as it represents a two-leg intersection. The only future combined scenario that is relevant for analysis is the 2033 Background + Adjacent Development + Proposed Development scenario, at which point the Collector A connection is made and both Proposed Development and Adjacent Development traffic would be using this intersection. This configuration operates an acceptable level for both two-lane and four-lane cross sections along Abinojii Mikanah between Lagimodiere Boulevard and Boulevard des Hivernants, however this impacts whether the eastbound right-turn lane is an auxiliary lane upstream of the intersection as well as the whether the southbound right turn is free-flowing into its own westbound receiving lane or under yield control. Further discussion of this intersection for the case that the Adjacent Development does not proceed in parallel to the Proposed Development is provided in the following Phasing section.

Existing configuration:

- West approach: right-turn lane with cutoff (yield control)
- South approach: left-turn lane with stop control

Modified Configuration 1 for 2033 Background + Adjacent Development + Proposed Development scenario:

- Traffic signal control
- West approach: an exclusive left-turn lane and an exclusive right-turn lane free flowing onto southbound Boulevard des Hivernants
- South approach: an exclusive left-turn lane plus a through lane
- North approach: a channelized right turn under yield condition and a through lane

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Operational Performance of the Boulevard des Hivernants at Abinojii Mikanah Intersection across the Analysis Scenarios

Scenario	Configuration	Period	Intersection Performance [LOS, Delay (s), ICU]	Critical Movements [Direction, LOS, Delay (s), v/c]
2023 Background	Existing	AM	Unable to be modeled given two-leg configuration	
	Existing	PM		
2033 Background	Existing	AM		
	Existing	PM		
2033 Background + Adjacent Development	Existing	AM	Scenario does not apply given that the north leg is dependent on the Proposed Development	
	Existing	PM		
2033 Background + Adjacent Development + Proposed Development	Modification 1	AM	B, 11, 0.58	N/A
	Modification 1	PM	B, 10, 0.50	N/A

Lagimodiere Boulevard at Abinojii Mikanah Configuration Discussion

The existing configuration was analyzed for both 2023 background and 2033 background scenarios, with both cases including the recent east extension of Abinojii Mikanah to Boulevard des Hivernants. There are two receiving lanes on the east approach which reduce to one lane through a lane drop approximately 100 m east of Lagimodiere Boulevard. The intersection exhibits capacity concerns in across all of the future scenarios, however no 2033 Background + Adjacent Development scenario was analyzed given the lack of information on how trips would be distributed to this intersection if Collector A of the Proposed Development is not constructed and tied into the Boulevard des Hivernants at Abinojii Mikanah intersection. Potential modifications for the future combined scenarios may include additional through lanes on any of the approaches, therefore requiring widening (e.g., shifting Lagimodiere Boulevard to a six-lane cross section), or creation of dual left-turns for approaches that currently have one left-turn lane.

Existing configuration:

- West approach: two auxiliary left-turn lanes with 160 m of storage, two through lanes, one channelized auxiliary right-turn lane with 125 m of storage and a downstream acceleration lane (free-flowing)
- East approach: one auxiliary left-turn lane with 125 m of storage, one through lane, one channelized auxiliary right-turn lane under yield control with 70 m of storage
- South approach: two auxiliary left-turn lanes with 150 m of storage, two through lanes, one channelized auxiliary right-turn lane under yield control with no storage
- North approach: one auxiliary left-turn lane with 165 m of storage, two through lanes, and one channelized auxiliary right-turn lane under yield control with 120 m of storage

2033 Background scenario, 2033 Background + Adjacent Development scenario and 2033 Background + Adjacent Development + Proposed Development scenario

- West approach: two auxiliary left-turn lanes with 160 m of storage, two through lanes, one channelized auxiliary right-turn lane with 125 m of storage and a downstream acceleration lane (free-flowing)
- East approach: one auxiliary left-turn lane with 125 m of storage, one through lane, one channelized auxiliary right-turn lane under yield control with 70 m of storage
- South approach: two auxiliary left-turn lanes with 150 m of storage, two through lanes, one channelized auxiliary right-turn lane under yield control with no storage
- North approach: one auxiliary left-turn lane with 165 m of storage, two through lanes, and one channelized auxiliary right-turn lane under yield control with 120 m of storage

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Operational Performance of the Lagimodiere Boulevard at Abinojii Mikanah Intersection across the Analysis Scenarios

Scenario	Configuration	Period	Intersection Performance [LOS, Delay (s), ICU]	Critical Movements [Direction, LOS, Delay (s), v/c]
2023 Background	Existing	AM	D, 38, 0.83	WBT, E, 62, 0.69 NBL, E, 59, 0.76 SBL, E, 69, 0.51
	Existing	PM	D, 38, 0.76	WBL, E, 60, 0.07 WBT, E, 65, 0.58 NBL, E, 55, 0.61 SBL, E, 66, 0.74 SBT, E, 60, 0.96
2033 Background	Existing	AM	E, 67, 1.02	EBL, F, 92, 1.04 WBL, F, 84, 0.55 WBT, F, 87, 0.78 NBL, E, 73, 0.80 NBT, F, 106, 1.12 SBL, F, 159, 1.05
	Existing	PM	E, 74, 1.19	EBL, 85, 1.01 WBL, F, 83, 0.43 WBT, E, 78, 0.62 NBL, F, 86, 0.88 NBT, F, 84, 1.00 SBL, F, 86, 0.94 SBT, F, 132, 1.19
2033 Background + Adjacent Development	Existing	AM	Scenario does not apply given that no connection via Abinojii Mikanah at Boulevard des Hivernants (trip distribution, including the impact at this location, is unavailable from parallel TIS)	
	Existing	PM		
2033 Background + Adjacent Development + Proposed Development	Existing	AM	F, 95, 1.14	EBL, F, 92, 1.04 WBL, F, 83, 0.62 WBT, F, 151, 1.16 NBL, E, 75, 0.81 NBT, F, 174, 1.23 SBL, F, 233, 1.28
	Existing	PM	F, 83, 1.06	EBL, F, 85.1, 1.01 WBL, F, 82, 0.50 WBT, F, 113, 0.97 NBL, F, 172, 1.20 NBT, F, 93, 1.04 SBL, F, 123, 1.08 SBT, F, 132, 1.19

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Roundabout Analysis Scope

Stantec performed roundabout analysis using the SIDRA software for the intersections of Dawson Road South at Collector B and Dawson Road South at Collector A. The initial scenario modeled was for full buildout of both the Proposed Development and Adjacent Development in 2033. Operational performance of a single lane, simple roundabout configuration at each of these two locations showed no capacity concerns or critical movements, and was therefore accepted based on these traffic volumes being the highest of the analysis scenarios.

Roundabout Analysis for Dawson Road S at Collector B for Full Buildout (Parallel Development) – AM Peak

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Collector B														
1	L2	165	2.0	174	2.0	0.168	9.7	LOS A	0.9	6.4	0.37	0.62	0.37	52.5
2	T1	20	2.0	21	2.0	0.168	5.0	LOS A	0.9	6.4	0.37	0.62	0.37	52.5
3	R2	5	0.0	5	0.0	0.168	4.8	LOS A	0.9	6.4	0.37	0.62	0.37	51.4
Approach		190	1.9	200	1.9	0.168	9.1	LOS A	0.9	6.4	0.37	0.62	0.37	52.4
East: Dawson Road S														
4	L2	5	2.0	5	2.0	0.259	9.9	LOS A	1.6	11.2	0.43	0.52	0.43	54.7
5	T1	240	2.0	253	2.0	0.259	5.2	LOS A	1.6	11.2	0.43	0.52	0.43	54.8
6	R2	45	2.0	47	2.0	0.259	5.0	LOS A	1.6	11.2	0.43	0.52	0.43	53.5
Approach		290	2.0	305	2.0	0.259	5.3	LOS A	1.6	11.2	0.43	0.52	0.43	54.6
North: Street B														
7	L2	60	2.0	63	2.0	0.075	10.9	LOS B	0.4	2.9	0.53	0.68	0.53	52.0
8	T1	5	2.0	5	2.0	0.075	6.2	LOS A	0.4	2.9	0.53	0.68	0.53	52.1
9	R2	5	2.0	5	2.0	0.075	6.0	LOS A	0.4	2.9	0.53	0.68	0.53	50.9
Approach		70	2.0	74	2.0	0.075	10.2	LOS B	0.4	2.9	0.53	0.68	0.53	51.9
West: Dawson Road S														
10	L2	5	2.0	5	2.0	0.130	9.1	LOS A	0.7	5.3	0.24	0.44	0.24	55.7
11	T1	105	2.0	111	2.0	0.130	4.5	LOS A	0.7	5.3	0.24	0.44	0.24	55.7
12	R2	55	2.0	58	2.0	0.130	4.2	LOS A	0.7	5.3	0.24	0.44	0.24	54.4
Approach		165	2.0	174	2.0	0.130	4.5	LOS A	0.7	5.3	0.24	0.44	0.24	55.3
All Vehicles		715	2.0	753	2.0	0.259	6.6	LOS A	1.6	11.2	0.38	0.54	0.38	53.9

Roundabout Analysis for Dawson Road S at Collector B for Full Buildout (Parallel Development) – PM Peak

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Collector B														
1	L2	100	2.0	105	2.0	0.127	10.5	LOS B	0.7	4.9	0.50	0.67	0.50	52.3
2	T1	20	2.0	21	2.0	0.127	5.9	LOS A	0.7	4.9	0.50	0.67	0.50	52.3
3	R2	5	2.0	5	2.0	0.127	5.6	LOS A	0.7	4.9	0.50	0.67	0.50	51.2
Approach		125	2.0	132	2.0	0.127	9.6	LOS A	0.7	4.9	0.50	0.67	0.50	52.2
East: Dawson Road S														
4	L2	5	2.0	5	2.0	0.209	9.4	LOS A	1.3	9.0	0.34	0.47	0.34	55.2
5	T1	170	2.0	179	2.0	0.209	4.8	LOS A	1.3	9.0	0.34	0.47	0.34	55.3
6	R2	75	2.0	79	2.0	0.209	4.6	LOS A	1.3	9.0	0.34	0.47	0.34	54.0
Approach		250	2.0	263	2.0	0.209	4.8	LOS A	1.3	9.0	0.34	0.47	0.34	54.9
North: Street B														
7	L2	60	2.0	63	2.0	0.092	10.1	LOS B	0.5	3.4	0.44	0.62	0.44	53.0
8	T1	30	2.0	32	2.0	0.092	5.5	LOS A	0.5	3.4	0.44	0.62	0.44	53.1
9	R2	5	2.0	5	2.0	0.092	5.3	LOS A	0.5	3.4	0.44	0.62	0.44	51.8
Approach		95	2.0	100	2.0	0.092	8.4	LOS A	0.5	3.4	0.44	0.62	0.44	52.9
West: Dawson Road S														
10	L2	5	2.0	5	2.0	0.341	9.3	LOS A	2.4	16.8	0.33	0.46	0.33	55.3
11	T1	265	2.0	279	2.0	0.341	4.7	LOS A	2.4	16.8	0.33	0.46	0.33	55.4
12	R2	170	2.0	179	2.0	0.341	4.5	LOS A	2.4	16.8	0.33	0.46	0.33	54.1
Approach		440	2.0	463	2.0	0.341	4.7	LOS A	2.4	16.8	0.33	0.46	0.33	54.9
All Vehicles		910	2.0	958	2.0	0.341	5.8	LOS A	2.4	16.8	0.37	0.51	0.37	54.3

Roundabout Analysis for Dawson Road S at Collector C for Full Buildout (Parallel Development) – AM Peak

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Collector B														
1	L2	180	2.0	189	2.0	0.141	8.9	LOS A	0.7	5.2	0.12	0.61	0.12	53.1
2	T1	15	2.0	16	2.0	0.141	4.2	LOS A	0.7	5.2	0.12	0.61	0.12	53.2
3	R2	5	0.0	5	0.0	0.141	4.0	LOS A	0.7	5.2	0.12	0.61	0.12	52.0
Approach		200	2.0	211	2.0	0.141	8.4	LOS A	0.7	5.2	0.12	0.61	0.12	53.1
East: Dawson Road S														
4	L2	10	2.0	11	2.0	0.050	9.7	LOS A	0.2	1.7	0.36	0.50	0.36	54.6
5	T1	40	2.0	42	2.0	0.050	5.1	LOS A	0.2	1.7	0.36	0.50	0.36	54.7
6	R2	5	2.0	5	2.0	0.050	4.8	LOS A	0.2	1.7	0.36	0.50	0.36	53.4
Approach		55	2.0	58	2.0	0.050	5.9	LOS A	0.2	1.7	0.36	0.50	0.36	54.5
North: Street B														
7	L2	5	2.0	5	2.0	0.046	9.8	LOS A	0.2	1.6	0.38	0.50	0.38	54.7
8	T1	40	2.0	42	2.0	0.046	5.2	LOS A	0.2	1.6	0.38	0.50	0.38	54.8
9	R2	5	2.0	5	2.0	0.046	5.0	LOS A	0.2	1.6	0.38	0.50	0.38	53.5
Approach		50	2.0	53	2.0	0.046	5.6	LOS A	0.2	1.6	0.38	0.50	0.38	54.6
West: Dawson Road S														
10	L2	5	2.0	5	2.0	0.140	9.0	LOS A	0.8	5.5	0.20	0.46	0.20	56.1
11	T1	15	2.0	16	2.0	0.140	4.4	LOS A	0.8	5.5	0.20	0.46	0.20	56.2
12	R2	165	2.0	174	2.0	0.140	4.2	LOS A	0.8	5.5	0.20	0.46	0.20	54.8
Approach		185	2.0	195	2.0	0.140	4.3	LOS A	0.8	5.5	0.20	0.46	0.20	54.9
All Vehicles		490	2.0	516	2.0	0.141	6.3	LOS A	0.8	5.5	0.20	0.53	0.20	54.1

Roundabout Analysis for Dawson Road S at Collector C for Full Buildout (Parallel Development) – PM Peak

Vehicle Movement Performance

Mov ID	Turn	INPUT VOLUMES [Total veh/h	HV] %	DEMAND FLOWS [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% BACK OF QUEUE [Veh. veh	Dist] m	Prop. Que	Effective Stop Rate	Aver. No. Cycles	Aver. Speed km/h
South: Collector B														
1	L2	200	2.0	211	2.0	0.195	9.0	LOS A	1.1	7.7	0.19	0.58	0.19	53.4
2	T1	55	2.0	58	2.0	0.195	4.4	LOS A	1.1	7.7	0.19	0.58	0.19	53.5
3	R2	10	2.0	11	2.0	0.195	4.1	LOS A	1.1	7.7	0.19	0.58	0.19	52.2
Approach		265	2.0	279	2.0	0.195	7.8	LOS A	1.1	7.7	0.19	0.58	0.19	53.4
East: Dawson Road S														
4	L2	5	2.0	5	2.0	0.033	10.0	LOS A	0.2	1.2	0.41	0.51	0.41	54.5
5	T1	25	2.0	26	2.0	0.033	5.3	LOS A	0.2	1.2	0.41	0.51	0.41	54.6
6	R2	5	2.0	5	2.0	0.033	5.1	LOS A	0.2	1.2	0.41	0.51	0.41	53.3
Approach		35	2.0	37	2.0	0.033	6.0	LOS A	0.2	1.2	0.41	0.51	0.41	54.4
North: Street B														
7	L2	5	2.0	5	2.0	0.037	9.8	LOS A	0.2	1.3	0.38	0.50	0.38	54.7
8	T1	30	2.0	32	2.0	0.037	5.2	LOS A	0.2	1.3	0.38	0.50	0.38	54.7
9	R2	5	2.0	5	2.0	0.037	5.0	LOS A	0.2	1.3	0.38	0.50	0.38	53.4
Approach		40	2.0	42	2.0	0.037	5.7	LOS A	0.2	1.3	0.38	0.50	0.38	54.5
West: Dawson Road S														
10	L2	5	2.0	5	2.0	0.198	8.9	LOS A	1.2	8.3	0.17	0.45	0.17	56.2
11	T1	40	2.0	42	2.0	0.198	4.3	LOS A	1.2	8.3	0.17	0.45	0.17	56.3
12	R2	230	2.0	242	2.0	0.198	4.1	LOS A	1.2	8.3	0.17	0.45	0.17	54.9
Approach		275	2.0	289	2.0	0.198	4.2	LOS A	1.2	8.3	0.17	0.45	0.17	55.1
All Vehicles		615	2.0	647	2.0	0.198	6.0	LOS A	1.2	8.3	0.21	0.51	0.21	54.3

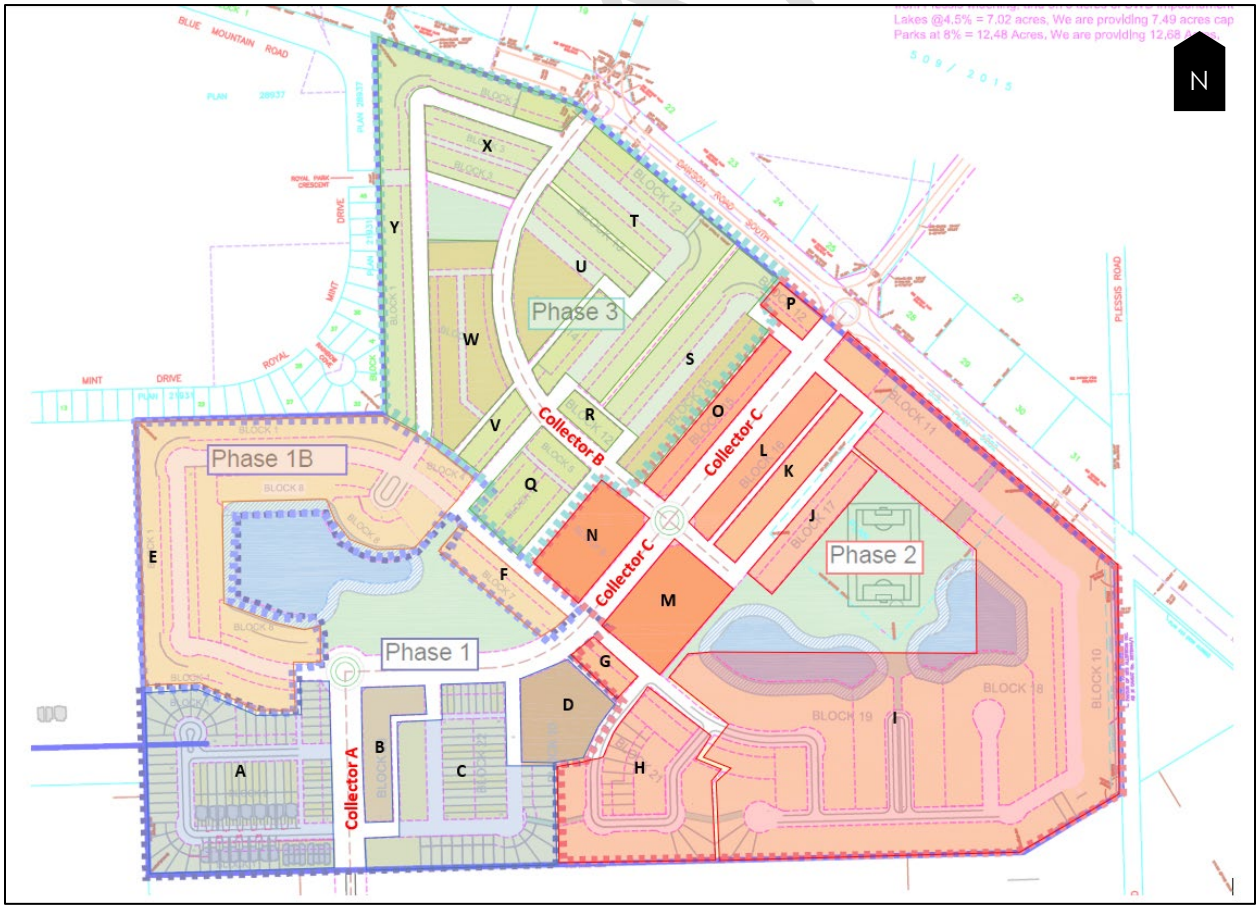
PHASING

Generally, phasing of the Proposed development can be simplified and aligned to the previously discussed horizon years as follows:

- 2023 Background Traffic + Proposed Development Phase 1
- 2028 Background Traffic + Proposed Development Phases 1, 1B, and 2
- 2033 Background Traffic + Proposed Development Full Buildout (Phases 1, 1B, 2, 3)

Stantec analyzed phase 1 alongside the scenario where the Adjacent Development does not proceed in parallel with the Proposed Development. This is based on the similar constraint where effectively all new site trips connect to the external network via Collector A and there are no connections to Fermor Avenue via a realigned Dawson Road South. Secondary access to the Proposed Development for emergency response was assumed to facilitated through either a connection to Southland Park at Royal Park Crescent or a temporary connection to the existing alignment of Dawson Road South, however no trips were assigned to these connections.

Proposed Development Phases



Proposed Development Only, No Adjacent Development

Based on the uncertainty of phasing of the Adjacent Development, Stantec reviewed phasing and operational requirements in the case that the Proposed Development is developed based on the proposed time horizons however the Adjacent Development is not. The modified trip distribution based on these scenarios is shown below.

Distribution for phasing scenario with no connection to Fermor Avenue via a realigned Dawson Road South

Gate (from PTV VISTRO)	Destination	Trip Distribution, Percentage
25	South (Sage Creek), via Boulevard des Hivernants	3%
26	South on Lagimodiere Boulevard, via Lagimodiere Boulevard at Abinojii Mikanah	8%
27	West on Abinojii Mikanah, via Lagimodiere Boulevard at Abinojii Mikanah	23%
28	North on Lagimodiere Boulevard, via Lagimodiere Boulevard at Abinojii Mikanah	66%

First, Phase 1 was analyzed alongside 2023 background traffic and a connection of Collector A to the intersection of Abinojii Mikanah at Boulevard des Hivernants.

2023 Background Traffic + Phase 1 at Abinojii Mikanah and Blvd des Hivernants/Collector A

			West approach		South approach		North approach	
			EBL	EBR	NBL	NBT	SBT	SBR
Year	Period	Type	↗	↘	↖	↑	↓	↙
2023	AM	Background + Phase 1	30	115	430	0	5	90
2023	PM	Background + Phase 1	95	345	275	5	0	60

Scenario	Configuration	Period	Intersection Performance [LOS, Delay (s), ICU]	Critical Movements [Direction, LOS, Delay (s), v/c]
2023 Background + Phase 1	Simple three-way stop	AM	B, 12, 0.56	None
	Simple three-way stop	PM	A, 10, 0.58	None
2023 Background + Phase 1	Phase 1 Mod 1	AM	B, 10, 0.51	None
	Phase 1 Mod 1	PM	A, 9, 0.52	None

Phase 1 can be accommodated by construction of only the southern connections (no connection to Fermor Avenue). While a three-leg simple T-intersection with single lane approaches and all-way stop control does not present capacity concerns for the intersection of Abinojii Mikanah and Boulevard des Hivernants, the following configuration (Phase 1, Modification 1) is recommended for the AM and PM peak periods in order to accommodate growth in between phases and for Phase 1B:

- Northbound approach: stop controlled, auxiliary left-turn lane (30 m storage) and through lane
- Southbound approach: stop controlled, shared right-turn (cut-off) and through lane

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- Eastbound approach: free flowing left-turn lane, auxiliary right-turn lane with channelization (length to be determined by geometric guidance) under yield control

2023 Background Traffic + Phase 1 at Abinojii Mikanah and Lagimodiere Boulevard

			West approach			East approach			South approach			North approach		
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Year	Period	Type	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
2023	AM	Background + Phase 1	765	65	205	10	190	325	365	1035	5	80	625	560
2023	PM	Background + Phase 1	550	150	340	10	125	200	320	755	10	280	1070	865

Scenario	Configuration	Period	Intersection Performance [LOS, Delay (s), ICU]	Critical Movements [Direction, LOS, Delay (s), v/c]
2023 Background + Phase 1	Existing	AM	D, 43.5, 0.85	EBL, E, 71, 0.93 WBL, E, 70, 0.13 WBT, E, 78, 0.75 NBL, E, 73, 0.79 SBL, F, 87, 0.63
	Existing	PM	D, 40, 0.81	WBL, E, 63, 0.14 WBT, E, 66, 0.62 NBL, E, 55, 0.61 SBL, E, 60, 0.74 SBL, E, 64, 0.98

For the intersection of Abinojii Mikanah, the existing configuration is close to meeting capacity constraints in the 2023 background scenario and the additional traffic from Phase 1 does not result in a significant marginal impact to traffic operations.

Next, Phases 1, 1B, and 2 were analyzed alongside 2028 background traffic and a connection of Collector A to the intersection of Abinojii Mikanah at Boulevard des Hivernants. There was no connection to Dawson Road South in this scenario.

2028 Background Traffic + Phase 1, 1B, and 2 at Abinojii Mikanah and Blvd des Hivernants/Collector A

			West approach		South approach		North approach	
			EBL	EBR	NBL	NBT	SBT	SBR
Year	Period	Type	↗	↘	↖	↑	↓	↙
2028	AM	Background + Phase 1, 1B, 2	105	190	665	0	10	325
2028	PM	Background + Phase 1, 1B, 2	345	585	365	10	5	210

Scenario	Configuration	Period	Intersection Performance [LOS, Delay (s), ICU]	Critical Movements [Direction, LOS, Delay (s), v/c]
2028 Background + Phase 1, 1B, 2	Phase 1 Mod 1	AM	F, 105, 0.64	NBL, F, 200, 1.36
	Phase 1 Mod 1	PM	F, 74, 0.53	NBL, 297, 1.53
2028 Background + Phase 1, 1B, 2	Phase 2 Mod 1	AM	D, 32, 0.64	NBL, F, 55, 1.00
	Phase 2 Mod 1	PM	B, 12, 0.53	NA

Phases 1, 1B, and 2 can be accommodated by construction of only the southern connections (no connection to Fermor Avenue). For the intersection of Abinojii Mikanah and Boulevard des Hivernants, a similar configuration to Phase 1 Modification 1 works, although the west leg needs to be stop controlled as well to allow for sufficient gaps for the northbound left turn. The northbound left turn just meets

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capacity for this configuration. This Phase 2 Modification 1 configuration could also be considered for Phase 1:

- Stop control
- Northbound approach: stop controlled, auxiliary left-turn lane and through lane
- Southbound approach: stop controlled, auxiliary right-turn lane with channelization and yield control, and through lane
- Eastbound approach: stop controlled, left-turn lane, auxiliary right-turn lane with channelization and yield control

2028 Background Traffic + Phase 1, 1B, and 2 at Abinojii Mikanah and Lagimodiere Boulevard

			West approach			East approach			South approach			North approach		
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Year	Period	Type	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
2028	AM	Background + Phase 1, 1B, 2	880	80	205	90	245	665	365	1485	25	195	625	560
2028	PM	Background + Phase 1, 1B, 2	845	225	340	50	160	390	325	760	80	630	1460	870

Scenario	Configuration	Period	Intersection Performance [LOS, Delay (s), ICU]	Critical Movements [Direction, LOS, Delay (s), v/c]
2028 Background + Phase 1, 1B, 2	Existing	AM	F, 83, 1.11	EBL, F, 92, 1.04 WBL, F, 84, 0.63 WBT, F, 133, 1.05 NBL, E, 73, 0.80 NBT, F, 154, 1.24 SBL, F, 195, 1.22
	Existing	PM	F, 95, 1.11	EBL, F, 82, 0.99 WBL, F, 83, 0.5 WBT, F, 86, 0.77 NBL, F, 139, 1.10 NBT, F, 158, 1.22 SBL, F, 211, 1.35 SBT, F, 119, 1.15

For the intersection of Abinojii Mikanah, the existing configuration exceeds capacity constraints in the 2028 background scenario and the additional traffic from Phases 1B and 2 does not result in a significant marginal impact. General improvements for these constraints are similar to the 2033 Background + Adjacent Development + Proposed Development scenario, including additional through lanes for northbound and southbound Lagimodiere Boulevard, and implementing dual left-turn lanes across the full intersection. Addition of the left turn lanes only is not expected to bring the intersection to acceptable performance, given the high through volumes and their impact on capacity.

Dawson Road South at Collector B, Dawson Road South at Collector C

No specific roundabout analysis for the two proposed roundabouts along Dawson Road South and the north frontage of the Proposed Development was performed. This would apply in the case that the Proposed Development advances and the Adjacent Development does not, however alternate intersection configurations could be modeled and evaluated for this scenario, such as stop-control.

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Parallel Development

For the scenario of parallel development of the Proposed Development and Adjacent Development, there is a reasonable analysis horizon of 2028, as follows:

- 2028 Background Traffic
- 2028 Background + Adjacent Development
- 2028 Background + Adjacent Development (Phase 1) + Proposed Development (Phases 1, 1B, and 2)

Dawson Road South at Niakwa Road East

No emphasis was placed on modelling this intersection for the parallel development scenario for 2028 phasing (i.e., Phases 1, 1B, and 2 of the Proposed Development and Phase 1 of the Adjacent Development).

Dawson Road South at Collector B

Based on the operational performance exhibited for the Dawson Road South at Collector B single-lane roundabout for the 2033 Background + Adjacent Development (Full Buildout) + Proposed Development (Full Buildout) scenario, it is anticipated that this configuration will acceptably accommodate the interim phases of development during parallel development of the Proposed and Adjacent Developments.

Dawson Road South at Collector C

Based on the operational performance exhibited for the Dawson Road South at Collector C single-lane roundabout for the 2033 Background + Adjacent Development (Full Buildout) + Proposed Development (Full Buildout) scenario, it is anticipated that this configuration will acceptably accommodate the interim phases of development during parallel development of the Proposed and Adjacent Developments.

Boulevard des Hivernants at Abinojii Mikanah

			West approach		South approach		North approach	
			EBL	EBR	NBL	NBT	SBT	SBR
Year	Period	Type	↗	↘	↖	↑	↓	↙
2028	AM	Background + Phase 1, 1B, 2 + Adjacent Development Phase 1	70	190	665	15	55	225
2028	PM	Background + Phase 1, 1B, 2 + Adjacent Development Phase 1	220	585	365	55	35	135

This intersection is expected to perform acceptable based on the Phase 2 Modification 1 configuration proposed for Phase 1, 1B, and 2 of the Proposed Development Only scenario, shown below. When comparing these two scenarios from 2028 (parallel development versus no development), the additional

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traffic from Phase 1 of the Adjacent Development is offset by the Proposed Development traffic that can now access Fermor Avenue via a realigned Dawson Road South.

Scenario	Configuration	Period	Intersection Performance [LOS, Delay (s), ICU]	Critical Movements [Direction, LOS, Delay (s), v/c]
2028 Background + Phase 1, 1B, 2 + Adjacent Development Phase 1	Phase 2 Mod 1	AM	D, 32, 0.57	NBL, F, 52, 0.98
	Phase 2 Mod 1	PM	B, 11, 0.58	NA

Lagimodiere Boulevard at Abinojii Mikanah

			West approach			East approach			South approach			North approach		
			EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Year	Period	Type	↗	→	↘	↙	←	↖	↖	↑	↗	↘	↓	↙
2028	AM	Background + Phase 1, 1B, 2 + Adjacent Development Phase 1	880	120	205	90	365	445	365	1485	25	125	625	560
2028	PM	Background + Phase 1, 1B, 2 + Adjacent Development Phase 1	845	335	340	50	225	245	325	760	80	390	1460	870

This intersection is expected to perform similarly to the analysis for the Phase 1, 1B, and 2 phasing of the Proposed Development Only scenario, with general improvements such as additional through lanes for northbound and southbound Lagimodiere Boulevard, and implementing dual left-turn lanes across the full intersection.

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APPENDIX C

TRAFFIC SIGNAL WARRANT ANALYSIS

APPENDIX C: TRAFFIC SIGNAL WARRANT ANALYSIS

Traffic signal warrant analyses (TSWAs) consider the average vehicular and pedestrian traffic volumes at an intersection, and return a number of "warrant points" based on the number of conflicts occurring during the peak six hours of the day. The peak six hours are defined as two hours in the morning, two hours at mid-day, and two hours in the afternoon.

If the TSWA procedure returns 100 or more warrant points, a traffic signal can be considered warranted based on vehicular and pedestrian traffic volumes. However, if left-turn and through movement volumes on the minor street approaches average less than 75 vehicles per hour (vph) over the six hours, the minor street volumes are considered too low to warrant traffic signals at the intersection. Traffic signals can also be warranted for other reasons such as safety, geometry, or other site-specific requirements.

The study intersection of Lagimodiere Boulevard at Abinojii Mikanah is already signalized, so no TSWA was completed for that intersection. The intersection of Fermor Avenue and Niakwa Road East is understood to be signalized based on responsibilities of the Adjacent Developer, and therefore no TWSA was performed. The remaining external network intersection of Abinojii Mikanah and Boulevard des Hivernants is currently unsignalized and therefore TWSA was performed. In order to determine the peak six-hour volumes, the proportionality of traffic between peak hours along the east leg of Abinojii Mikanah at Lagimodiere Boulevard was used from the 2023 count. The six hours exhibiting the highest levels of traffic at this intersection were from 7:15 AM to 9:15 AM, 12:00 PM to 2:00 PM, and 4:00 PM to 6:00 PM.

Scenario	**Bishop Grandin Blvd East Extension and Blvd des Hivernants Warrant Points**
2023 Background	N/A
2028 Background	N/A
2033 Background	N/A
2033 Background + Adjacent Developer	N/A
2033 Background + Adjacent Developer + Proposed Development	126

The traffic signal warrant is not met for any of the background-only scenarios as the intersection is assumed to be in two-leg configuration. The 2033 scenario with background traffic and Adjacent Development does not modify the configuration. Only in the combined future 2033 scenario with the Proposed Development and Adjacent Development is that traffic signal warrant analysis possible, when the analysis yields 126 warrant points.

Traffic signal warrant analysis was not performed on new external network connections along Dawson Road South at Collector B or Collector C as these were proposed as roundabouts and operational performance was modelled separately using *SIDRA*.

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TRANSPORTATION IMPACT STUDY FOR THE PROPOSED DEVELOPMENT ON THE SOUTH PORTION OF PRECINCT J

Appendix C: Traffic Signal Warrant Analysis

Proportionality of Peak Hours from 2023 Count at Abinojii Mikanah and Lagimodiere Boulevard

Peak period	Time	Factor	Factors Applies to?
AM peak	7:15 AM to 8:15 AM	1	N/A
Second AM peak	8:15 AM to 9:15 AM	0.83	AM Peak Hour
Midday peak	12:00 PM to 1:00 PM	0.76	AM Peak Hour
Second Midday peak	1:00 PM to 2:00 PM	0.67	PM Peak Hour
Second PM peak	4:00 PM to 5:00 PM	0.94	PM Peak Hour
PM peak	5:00 PM to 6:00 PM	1	N/A

Proportionality of Peak Hours from 2023 Count at East Leg of Abinojii Mikanah and Lagimodiere Boulevard

Peak period	Time	Factor	Factors Applies to?
AM peak	7:15 AM to 8:15 AM	1	N/A
Second AM peak	8:15 AM to 9:15 AM	0.75	AM Peak Hour
Midday peak	12:00 PM to 1:00 PM	0.33	AM Peak Hour
Second Midday peak	1:00 PM to 2:00 PM	0.51	PM Peak Hour
Second PM peak	4:00 PM to 5:00 PM	0.72	PM Peak Hour
PM peak	5:00 PM to 6:00 PM	1	N/A

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Appendix C: Traffic Signal Warrant Analysis

City of Winnipeg Canadian Matrix Traffic Signal Warrant Analysis

Main Street (name)	Abinojii Mikanah	Direction (EW or NS)	EW
Side Street (name)	Boulevard des Hivernants	Direction (EW or NS)	NS
Quadrant / Int #		Comments	Enter Comments about the analysis here.
for Warrant Calculation Results, please hit 'Page Down'	CHECK SHEET		

Road Authority:	City of Winnipeg
City:	Winnipeg
Analysis Date:	2023 Jul 01, Sat
Count Date:	2023 Jun 22, Thu
Date Entry Format:	(yyyy-mm-dd)

Lane Configuration		Excl LT	Th & LT	Through	Th+RT+LT	Th & RT	Excl RT	UpStream Signal (m)	# of Thru Lanes
Abinojii Mikanah	WB							10,000	0
Abinojii Mikanah	EB	1					1	640	0
Boulevard des Hivernants	NB	1		1					
Boulevard des Hivernants	SB			1			1		

Demographics		
Elem. School/Mobility Impaired	(y/n)	y
Senior's Complex	(y/n)	n
Pathway to School	(y/n)	n
Metro Area Population	(#)	850,000
Central Business District	(y/n)	n

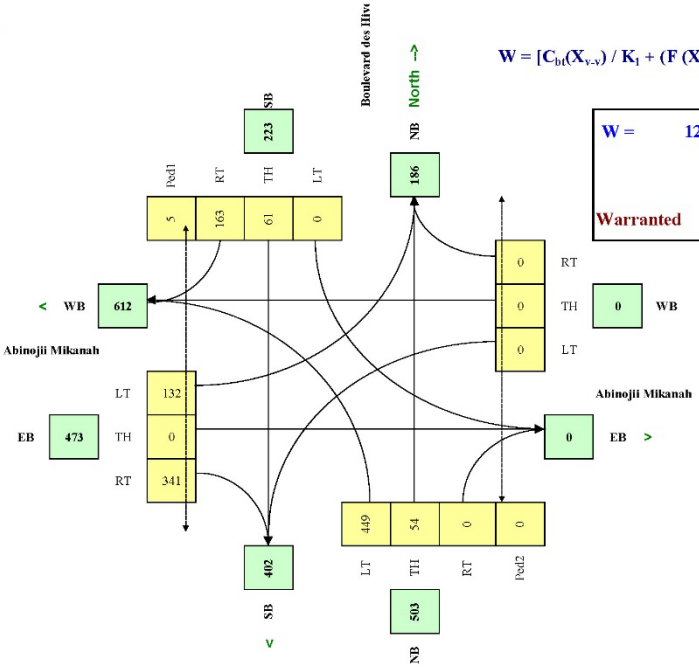
Other Input		Speed (Km/h)	Truck %	Bus Rt (y/n)	Median (m)
Abinojii Mikanah	EW	80	1.0%	n	12.5
Boulevard des Hivernants	NS		1.0%	n	

Set Peak Hours

Traffic Input	NB			SB			WB			EB			Ped1 NS	Ped2 NS	Ped3 EW	Ped4 EW
	LT	Th	RT	LT	Th	RT	LT	Th	RT	LT	Th	RT	W Side	E Side	N Side	S Side
press 'Set Peak Hours' Button to set the peak hour periods	665	35	0	0	75	240	0	0	0	75	0	190	5	0	0	5
	555	30	0	0	60	200	0	0	0	60	0	155	5	0	0	5
	505	25	0	0	55	180	0	0	0	55	0	145	5	0	0	5
	250	60	0	0	45	90	0	0	0	155	0	400	5	0	0	5
	350	85	0	0	65	130	0	0	0	215	0	560	5	0	0	5
	370	90	0	0	65	135	0	0	0	230	0	595	5	0	0	5
Total (6 hour peak)	2,695	325	0	0	365	975	0	0	0	790	0	2,045	30	0	0	30
Average (6-hour peak)	449	54	0	0	61	163	0	0	0	132	0	341	5	0	0	5

Average 6-hour Peak Turning Movements

$$W = [C_{bt}(X_{v-v}) / K_1 + (F (X_{v-p}) L) / K_2] \times C_i$$



W =	126	118	8
		Veh	*Ped*

Warranted

RESET SHEET