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West Capital Airpark – Phase 2 Business Park
1500 Thomas Argue Road

Transportation Impact Assessment

West Capital Airpark – Phase 2 Business Park
1500 Thomas Argue Road

Transportation Impact Assessment

Prepared By:

NOVATECH
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

November 2025

Novatech File: 102085
Ref: R-2025-082

NOVATECH
Engineers, Planners & Landscape Architects

November 14, 2025

City of Ottawa
Planning, Development, and Building Services Department
110 Laurier Avenue West, 4th Floor
Ottawa, ON K1P 1J1

Attention: **Mr. Mike Giampa**
Senior Engineer, Infrastructure Approvals

Dear Mr. Giampa:

Reference: **West Capital Airpark – Phase 2 Business Park**
Transportation Impact Assessment
Novatech File No. 102085

We are pleased to submit the following Transportation Impact Assessment (TIA), as part of the Phase 2 Business Park detailed design recirculation at 1500 Thomas Argue Road, for your review and signoff. The structure and format of this report is in accordance with the City of Ottawa's *Revised Transportation Impact Assessment Guidelines* (June 2023).

If you have any questions or comments regarding this report, please feel free to contact Jennifer Luong, or the undersigned.

Yours truly,

NOVATECH

Joshua Audia, P.Eng.
Project Engineer | Transportation

Suite 200, 240 Michael Cowpland Drive, Ottawa ON K2M 1P6 Tel: 613.254.9643 Fax: 613.254.5867 www.novatech-eng.com

Certification Form for Transportation Impact Assessment (TIA) Study Program Manager

TIA Plan Reports

On April 14, 2022, the Province's Bill 109 received Royal Assent providing legislative direction to implement the More Homes for Everyone Act, 2022 aiming to increase the supply of a range of housing options to make housing more affordable. Revisions have been made to the TIA guidelines to comply with Bill 109 and streamline the process for applicants and staff.

Individuals submitting TIA reports will be responsible for all aspects of development-related transportation assessment and reporting, and undertaking such work, in accordance and compliance with the City of Ottawa's Official Plan, the Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines.

By submitting the attached TIA report (and any associated documents) and signing this document, the individual acknowledges that they meet the four criteria listed below.

Certification

- ☑ I have reviewed and have a sound understanding of the objectives, needs and requirements of the City of Ottawa's Official Plan, Transportation Master Plan and the Transportation Impact Assessment (2017) Guidelines (Update Effective July 2023);
- ☑ I have a sound knowledge of industry standard practice with respect to the preparation of transportation impact assessment reports, including multi modal level of service review;
- ☑ I have substantial experience (more than 5 years) in undertaking and delivering transportation impact studies (analysis, reporting and geometric design) with strong background knowledge in transportation planning, engineering or traffic operations; and

City of Ottawa
Transportation Engineering Services
Planning, Real Estate and Economic Development
110 Laurier Avenue West, 4th fl.
Ottawa, ON K1P 1J1
Tel. : 613-580-2424
Fax: 613-560-6006

☑ I am either a licensed or registered[1] professional in good standing, whose field of expertise [check ✓ appropriate field(s)]:

- ☑ is either transportation engineering
- ☐ or transportation planning.

Dated at Ottawa (City) this 14th day of November, 20 25.

Name: Jennifer Luong, P.Eng.

Professional Title: Senior Project Manager

Jennifer Luong

Signature of Individual certifier that they meet the above four criteria

Office Contact Information (Please Print)	
Address:	240 Michael Cowpland Drive, Suite 200
City / Postal Code:	Ottawa, ON K2M 1P6
Telephone / Extension:	613-254-9643 x 254
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Stamp

[1] License of registration body that oversees the profession is required to have a code of conduct and ethics guidelines that will ensure appropriate conduct and representation for transportation planning and/or transportation engineering works.

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EXECUTIVE SUMMARY

This Transportation Impact Assessment (TIA) has been prepared as part of the detailed design recirculation for the West Capital Airpark – Phase 2 Business Park (1500 Thomas Argue Road). The subject lands are located adjacent to the Carp Airport, are currently vacant, and are approximately 50 hectares in area. The subject site is surrounded by the following:

- Agricultural lands, followed by March Road to the north,
- The Carp Airport, industrial uses, or Russ Bradley Road to the south,
- Carp Road, followed by residential/agricultural lands to the east, and
- The Carp Airport or Thomas Argue Road to the west.

The proposed development is Phase 2 of the West Capital Airpark Business Park, consisting of 22 blocks that can accommodate future businesses and nine blocks that will be designated as roadway allowances, open spaces, servicing blocks, or stormwater management blocks. New public road connections to the existing roadway network are proposed at Thomas Argue Road, Carp Road, and Russ Bradley Road. For the purposes of this report, Phase 2 is assumed to be constructed in a single phase, with a buildout year of 2035.

The subject site is designated as 'Rural Countryside' on Schedule B9 of the City of Ottawa's *Official Plan*. The implemented zoning for the property is 'Air Transportation Facility Zone – Carp Airport Subzone' (T1B), and the site is within the *Carp Road Corridor* Community Design Plan (CDP) area.

A Transportation Impact Study (TIS) was prepared in December 2005 and revised in November 2011 by Novatech, in support of the greater West Capital Airpark. The 2011 TIS considered an ultimate development with 329 residential dwellings west of the existing Carp Airport, and 800,000 ft^2 gross floor area (GFA) of business park space, split between the areas north and east of the Carp Airport. The 2011 TIS includes analysis for a first phase that included 150 residential dwellings, a clubhouse area, communal hangars, a public park, and 200,000 ft^2 of business park space. The subject lands of this application do not include any of the Phase 1 business park lands, and therefore, a GFA of 600,000 ft^2 has been considered in this TIA.

The study area for this report includes the boundary roadways Thomas Argue Road, Carp Road, and Russ Bradley Road, as well as the intersections at March Road/Thomas Argue Road, March Road/Carp Road, and Carp Road/Russ Bradley Road.

The selected time periods for this report are the weekday AM and PM peak hours, as they represent the 'worst case' combination of site generated traffic and adjacent street traffic. The buildout year 2035 and horizon year 2040 have been considered.

The conclusions and recommendations of this TIA can be summarized as follows:

Site-Generated Traffic

- The ultimate proposed development is estimated to generate 204 vehicle trips during the peak hours.

Development Design

- Given the rural context of the proposed business park, 1.5m-wide gravel shoulders are proposed as part of the subject development.

- The average annual daily traffic (AADT) volumes of each proposed roadway is anticipated to be less than 1,000 vpd, consistent with local roadways. All roadways will be private but municipally operated. Each roadway has a proposed right-of-way (ROW) width of 20m and proposed roadway width of 6.0m, which is appropriate for local roadways. The curb radii at each proposed intersection measures approximately 9.0m to 10.0m. All proposed roadways meet the minimum fire route requirements.

- Street 17 is approximately 73m west of Carp Road at Russ Bradley Road, and approximately 80m west of Carp Road at Street 18. The intersection spacing on Carp Road is approximately 670m between March Road and Street 18, and approximately 770m between Street 18 and Russ Bradley Road. Therefore, all intersections meet the minimum intersection spacing requirements.

- Signalization will not be required at any of the proposed intersections. Side-street stop control is anticipated at each of the Phase 2 intersections.

- At March Road/Thomas Argue Road, a westbound left turn lane with 25m of storage length is warranted. At Carp Road/Russ Bradley Road, a northbound left turn lane with 30m of storage length is warranted. At Carp Road/Street 18, a northbound left turn lane with 15m of storage length is warranted. These storage lengths should be provided in addition to parallel lengths of 70m and taper lengths of 160m. The storage, parallel, and taper lengths for both auxiliary left turn lanes can be accommodated, given the spacing between intersections on March Road and Carp Road.

- Thomas Argue Road, Carp Road, and Russ Bradley Road are all generally level and straight roadways, and most vegetation along those roadways appear to be behind the ditches. Therefore, adequate sight distances are anticipated at the proposed locations where Street 15 intersects Thomas Argue Road, where Street 18 intersects Carp Road, and where Street 17 intersects Russ Bradley Road.

MMLOS Analysis

- Carp Road can only meet the target bicycle level of service (BLOS) D by providing a physically separated bikeway or reducing the operating speed to 70 km/h. Given the rural context, the existing paved shoulders are appropriate and no modifications are recommended.

- At March Road/Carp Road, the target BLOS can only be met if a protected intersection is implemented. However, given the rural context, a paved shoulder and traditional design is considered appropriate.

- At March Road/Carp Road, all approaches do not meet the target truck level of service (TkLOS) C. The paved shoulders at each corner provide additional pavement for trucks to complete right turns from any approach. It is anticipated that these shoulders can accommodate truck turning movements, and therefore, no modifications are recommended.

Existing, Background, and Total Traffic Operations

- In all scenarios, all movements operate at an acceptable level of service.

- The proposed Phase 2 Business Park in the West Capital Airpark subdivision is recommended from a transportation perspective.

1.0 SCREENING

1.1 Introduction

This Transportation Impact Assessment (TIA) has been prepared as part of the detailed design recirculation for the West Capital Airpark – Phase 2 Business Park (1500 Thomas Argue Road). The subject lands are located adjacent to the Carp Airport, are currently vacant, and are approximately 50 hectares in area.

The subject site is surrounded by the following:

- Agricultural lands, followed by March Road to the north,
- The Carp Airport, industrial uses, or Russ Bradley Road to the south,
- Carp Road, followed by residential/agricultural lands to the east, and
- The Carp Airport or Thomas Argue Road to the west.

An aerial of the vicinity around the subject site is provided in **Figure 1**.

Figure 1: View of the Subject Site

1.2 Proposed Development

The proposed development is Phase 2 of the West Capital Airpark Business Park, consisting of 22 blocks that can accommodate future businesses and nine blocks that will be designated as roadway allowances, open spaces, servicing blocks, or stormwater management blocks. New public road connections to the existing roadway network are proposed at Thomas Argue Road, Carp Road, and Russ Bradley Road. For the purposes of this report, Phase 2 is assumed to be constructed in a single phase, with a buildout year of 2035.

The subject site is designated as 'Rural Countryside' on Schedule B9 of the City of Ottawa's *Official Plan*. The implemented zoning for the property is 'Air Transportation Facility Zone – Carp Airport Subzone' (T1B), and the site is within the *Carp Road Corridor* Community Design Plan (CDP) area.

A copy of the concept plan is included in **Appendix A**.

A Transportation Impact Study (TIS) was prepared in December 2005 and revised in November 2011 by Novatech, in support of the greater West Capital Airpark. The 2011 TIS considered an ultimate development with 329 residential dwellings west of the existing Carp Airport, and 800,000 ft^2 gross floor area (GFA) of business park space, split between the areas north and east of the Carp Airport. The 2011 TIS includes analysis for a first phase that included 150 residential dwellings, a clubhouse area, communal hangars, a public park, and 200,000 ft^2 of business park space. The subject lands of this application do not include any of the Phase 1 business park lands, and therefore, a GFA of 600,000 ft^2 has been considered in this TIA.

A copy of the body of the revised 2011 TIS prepared in support of the West Capital Airpark is included in **Appendix B**.

1.3 Screening Form

The City's *Revised TIA Guidelines* identify three triggers for completing a TIA report, including trip generation, location, and safety. The criteria for each trigger are outlined in the City's TIA Screening Form, which is included in **Appendix C**. The trigger results are as follows:

- Trip Generation Trigger – The development is anticipated to generate over 60 peak hour person trips; further assessment is **required** based on this trigger.

- Location Triggers – The development does not propose a new connection to a designated Rapid Transit or Transit Priority (RTTP) corridor or a Crosstown Bikeway, and is not located within a Hub, Protected Major Transit Station Area (PMTSA), or Design Priority Area (DPA); further assessment is **not required** based on this trigger.

- Safety Triggers – A connection is proposed to Carp Road, which has a posted speed limit of 80 km/h; further assessment is **required** based on this trigger.

2.0 SCOPING

2.1 Existing Conditions

2.1.1 Roadways

All roadways within the study area fall under the jurisdiction of the City of Ottawa.

March Road is an arterial roadway that generally runs on an east-west alignment from Appleton Sideroad to Dunrobin Road, before transitioning to a north-south alignment from Highway 417 to Dunrobin Road. Within the study area, March Road has a two-lane undivided rural cross-section and a posted speed limit of 80 km/h. Paved shoulders are provided in the vicinity of the intersection with Carp Road. March Road is a designated truck route, allowing full loads.

Carp Road is an arterial roadway that generally runs on a north-south alignment between Galetta Side Road to Stittsville Main Street. Within the study area, Carp Road has a two-lane undivided rural cross-section with paved shoulders and a posted speed limit of 80 km/h. Carp Road is a designated truck route, allowing full loads. Along the subject site's frontage to Carp Road, the existing right-of-way (ROW) is approximately 26.5m to 30.0m, varying along the east side. The ROW on the west side of Carp Road is 15m from the centreline of paved surface. Schedule C16 of the City's *Official Plan* identifies a ROW protection of 30m for the section of Carp Road from March Road to Richardson Side Road, consistent with the *Carp Road Corridor* CDP. A widening is not required as part of this application.

Thomas Argue Road is a roadway that generally runs on a north-south alignment. It is classified as a collector roadway between Donald B. Munro Drive and March Road, and as a local roadway between March Road and Wingover Private. Thomas Argue Road has a two-lane undivided rural cross-section and a posted speed limit of 60 km/h. The roadway is paved south of March Road, and gravel north of March Road. Thomas Argue Road is not classified as a truck route. Along the subject site's frontage to Thomas Argue Road, the existing ROW is approximately 20.0m. Schedule C16 of the City's *Official Plan* identifies a ROW protection of 20m for local roadways in rural areas. Therefore, a widening is not required as part of this application.

Russ Bradley Road is a local roadway that generally runs on an east-west alignment between Huisson Road and Carp Road. Russ Bradley Road has a two-lane undivided rural cross-section and an unposted regulatory speed limit of 50 km/h. Russ Bradley Road is not classified as a truck route. Along the subject site's frontage to Russ Bradley Road, the existing ROW is approximately 30.5m. Schedule C16 of the City's *Official Plan* identifies a ROW protection of 20m for local roadways in rural areas. Therefore, a widening is not required as part of this application.

The roadway network of the greater area surrounding the subject site is illustrated in **Figure 2**.

Figure 2: Roadway Network

2.1.2 Intersections

March Road/Thomas Argue Road

- Unsignalized four-legged intersection
- Stop control on north and south approaches
- North Approach (Thomas Argue Road): one shared left turn/through/right turn lane
- South Approach (Thomas Argue Road): one shared left turn/through/right turn lane
- East Approach (March Road): one shared left turn/through/right turn lane
- West Approach (March Road): one shared left turn/through/right turn lane

March Road/Carp Road

- Signalized four-legged intersection
- North Approach (Carp Road): one left turn lane and one shared through/right turn lane
- South Approach (Carp Road): one left turn lane and one shared through/right turn lane
- East Approach (March Road): one left turn lane and one shared through/right turn lane
- West Approach (March Road): one left turn lane and one shared through/right turn lane
- Paved shoulders on all approaches

Carp Road/Russ Bradley Road

- Unsignalized three-legged intersection
- Stop control on west approach
- North Approach (Carp Road): one shared through/right turn lane
- South Approach (Carp Road): one shared left turn/through lane
- West Approach (Russ Bradley Road): one shared left turn/right turn lane
- Paved shoulders on north and south approaches

2.1.3 Driveways

In accordance with the *TIA Guidelines*, a review of the existing adjacent driveways along the boundary roads are provided as follows:

Thomas Argue Road, east side

- Two gravel driveways serving Carp Airport (1500 Thomas Argue Road);
- One driveway serving 29 Aerostar Private.

Thomas Argue Road, west side

- Three gravel driveways serving residences or agricultural uses at 1525 and 1549 Thomas Argue Road.

Carp Road, east side

- One paved and one gravel driveway serving commercial uses at 3358 Carp Road;
- Five paved driveways serving residences at 3358, 3382, 3390, 3398, & 3406 Carp Road;
- One gravel driveway serving a residence at 3436 Carp Road;
- Three field accesses serving 3486 Carp Road.

Carp Road, west side

- Three gravel field accesses serving subject site;
- One gravel driveway to a farm/residence at 3453 Carp Road.

Russ Bradley Road, north side

- Two field accesses serving 200 and 250 Russ Bradley Road.

Russ Bradley Road, south side

- Six gravel driveways serving vacant lots at 233 and 273 Russ Bradley Road.

2.1.4 Pedestrian and Cycling Facilities

There are no dedicated pedestrian facilities within the study area. Carp Road has continuous paved shoulders and March Road has paved shoulders in the immediate vicinity of the intersection with Carp Road.

No study area roadways are designated in the City's Crosstown Bikeway Network. In the City's Rural Active Transportation Network, March Road (east of Carp Road) and Carp Road (outside the village of Carp) are designated in the City's Proposed Paved Shoulder Network. East of the study area, the Renfrew Rail Corridor is designated as a Major Pathway.

2.1.5 Area Traffic Management

Within the study area, there are no Area Traffic Management (ATM) studies that are in progress, and no traffic calming measures on roads within the vicinity of the subject site.

2.1.6 Transit

The subject site is not within walking distance of any transit stops. The nearest stops to the subject site are located in the village of Carp, approximately 1.8km to the north. The stops are served by Route 303, which is a Wednesday-only route connecting transit users in Dunrobin and Carp to the shopping centres in Bayshore and Carlingwood.

2.1.7 Existing Traffic Volumes

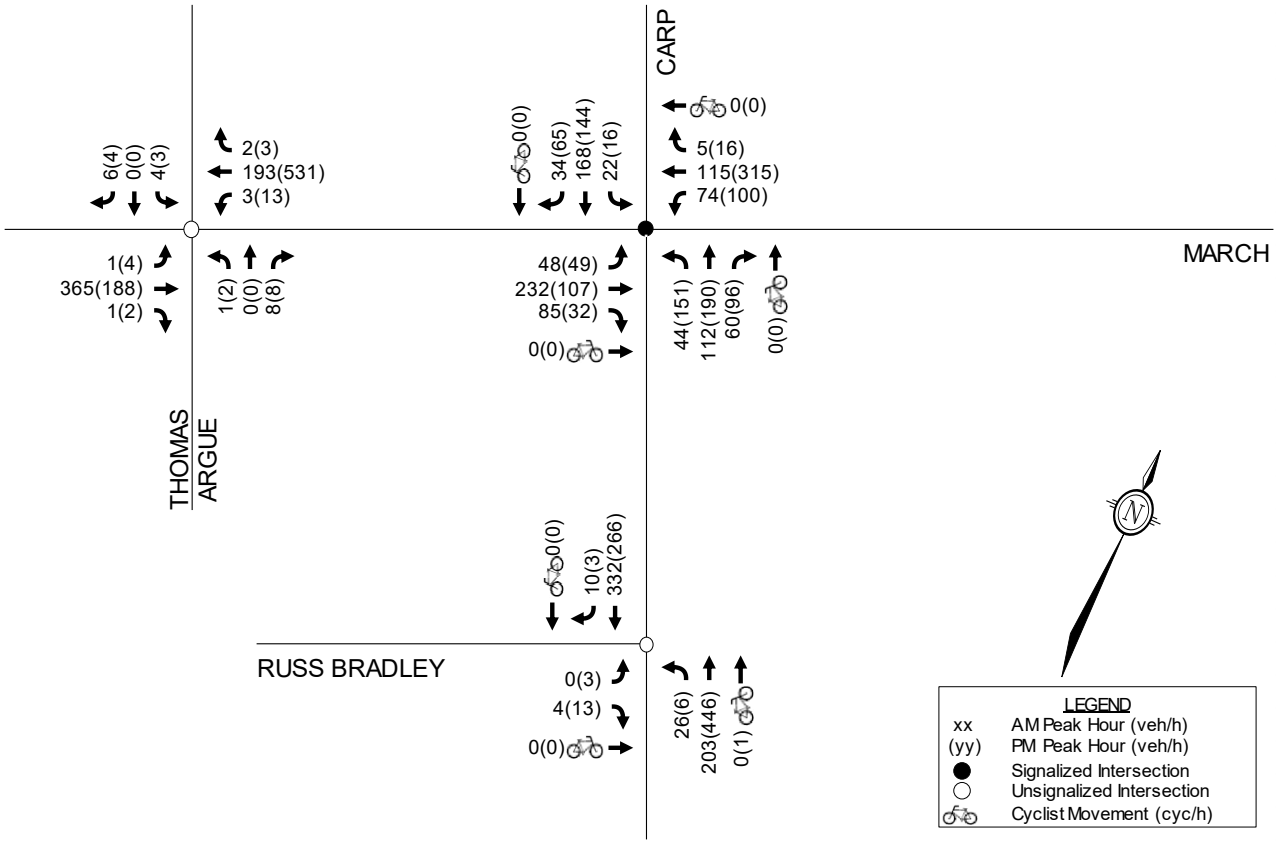
Weekday traffic counts completed by Novatech were used to determine the existing pedestrian, cyclist, and vehicular traffic volumes at March Road/Carp Road and Carp Road/Russ Bradley Road. These counts were completed on Wednesday, May 21, 2025.

Traffic volumes at March Road/Thomas Argue Road have been estimated based on an October 2011 traffic count and projected Phase 1 volumes that were included as part of the 2011 West Capital Airpark TIS. The 2011 count identified traffic volumes of ten vehicles or less on each approach of Thomas Argue Road. Since the count was conducted, the Phase 1 residential component west of the airport has been constructed, and some residential traffic may travel on Wingover Private to connect to Thomas Argue Road, with the remainder using Diamondview Road (west of the study area). For the purposes of this study, 50% of the projected Phase 1 residential traffic travelling to/from the east via March Road has been conservatively assumed to use Thomas Argue Road. Through volumes on March Road have been carried from the observed 2025 volumes at March Road/Carp Road.

Based on the traffic count data, the average annual daily traffic (AADT) of Carp Road is approximately 7,500 vehicles per day (vpd), and the AADT of Russ Bradley Road is approximately 210 vpd.

All traffic count data previously discussed are included in **Appendix D**. Traffic volumes within the study area are shown in **Figure 3**.

Figure 3: Existing Traffic Volumes



2.1.8 Collision Records

Historical collision data from the last five full years available was obtained from the City's Public Works and Service Department for the study area intersections and midblock segments. Copies of the collision summary reports are included in **Appendix E**.

The collision data has been evaluated to determine if there are any identifiable collision patterns, which are defined in the *Revised TIA Guidelines* as 'more than six collisions in five years' for any one movement. The number of collisions at each intersection from January 1, 2018 to December 31, 2022 is summarized in **Table 1**.

Table 1: Reported Collisions

Location	Impact Types						Total
	Approach	Angle	Rear End	Sideswipe	Turning Movement	SMV[1]/ Other	
March Road/ Thomas Argue Road	-	-	-	-	-	-	**0**
March Road/ Carp Road	-	9	2	-	3	3	**17**
Carp Road/ Russ Bradley Road	-	-	-	-	-	-	**0**
March Road btwn Thomas Argue Rd & Carp Rd	-	-	-	-	-	1	**1**
Carp Road btwn March Rd & Russ Bradley Rd	-	-	-	-	-	4	**4**

1. SMV = Single Motor Vehicle

March Road/Carp Road
A total of 17 collisions were reported at this intersection over the last five years, consisting of nine angle impacts, two rear-end impacts, three turning movement impacts, and three single vehicle/ other impacts. Three collisions resulted in injuries, but no collision caused fatalities. Nine of the 17 collisions (53%) occurred in poor driving conditions. No collisions involved pedestrians or cyclists.

Of the nine angle impacts, two involved a northbound vehicle and an eastbound vehicle, two involved a northbound vehicle and a westbound vehicle, three involved a southbound vehicle and an eastbound vehicle, and two involved a southbound vehicle and a westbound vehicle. No combination of movements meet the threshold of a collision pattern.

March Road between Thomas Argue Road and Carp Road
One single vehicle collision was reported along this segment over the last five years. The collision resulted in non-fatal injuries, occurred in poor driving conditions, and did not involve pedestrians or cyclists.

Carp Road between March Road and Russ Bradley Road
Four collisions were reported along this segment over the last five years, all of which were single vehicle/other impacts. One collision resulted in non-fatal injuries. Three of the four collisions (75%) occurred in poor driving conditions. No collisions involved pedestrians or cyclists.

2.2 Planned Conditions

2.2.1 Planned Transportation Projects

Within the study area, the City's *2025 Transportation Master Plan (TMP)* does not identify any transit projects in its Ultimate, 2046 Needs-Based, or 2046 Priority Transit Networks, and does not identify any roadway projects in its 2046 Needs-Based or 2046 Priority Road Networks. Additionally, the *2025 TMP* does not identify any pedestrian or cycling projects within the study area.

2.2.2 Other Area Developments

Based on a review of the City's Development Application Search Tool, there are multiple other area developments that are in proximity of the subject site and under construction, approved, or are in the approval process. These developments are summarized as follows.

West Capital Airpark
As described in Section 1.2, the 2011 TIS was prepared in support of a concept that considered 329 residential units and approximately 800,000 ft^2 gross floor area (GFA) of business park. Phase 1 was assumed to include 150 residential units and 200,000 ft^2 of business park GFA, with a buildout year of 2014. At the time of writing, the residential component of Phase 1 has been completed. The business park component of Phase 1 includes one completed building at with an estimated GFA of approximately 14,000 ft^2 (based on aerial photography) at 233 Russ Bradley Road, plus an industrial development at 6 Huisson Road.

273-275 Russ Bradley Road
This Site Plan Control application is for a block within the West Capital Airpark – Phase 1 Business Park. The proposed development includes 12 self-storage warehouse buildings with a total of 423 storage units. No TIA was required in support of this application.

2167 McGee Side Road
The proposed development includes a 18,945 ft^2 warehouse building. No TIA was required in support of this application.

2822 Carp Road
The proposed development includes two new multi-tenant commercial buildings with a combined GFA of 12,800 ft^2. The commercial uses are anticipated to be automotives sales, repair, retail, and general warehousing. A TIA was prepared by Dillon in August 2022, which estimated a buildout year of 2023. However, the development has not yet been constructed.

2885 Carp Road
The proposed development includes a 7,550 ft^2 warehouse building. No TIA was required in support of this application.

3119 Carp Road
The proposed development includes a commercial/industrial subdivision with a total GFA of 300,000 ft^2. A Transportation Brief was prepared by Delcan in January 2014, which estimated a buildout year of 2024. However, this development has not yet been constructed.

3711-3725 Carp Road

The proposed mixed-use development includes a subdivision with a total of 78 residential units and 17,286 ft^2 GFA of commercial space. A TIA was prepared by Novatech in May 2023, which estimated a buildout year of 2027.

A map indicating the approximate location of each development is included in **Figure 4**.

Figure 4: Other Area Developments

2.3 Study Area and Time Periods

The study area for this report includes the boundary roadways Thomas Argue Road, Carp Road, and Russ Bradley Road, as well as the intersections at March Road/Thomas Argue Road, March Road/Carp Road, and Carp Road/Russ Bradley Road.

The selected time periods for this report are the weekday AM and PM peak hours, as they represent the 'worst case' combination of site generated traffic and adjacent street traffic. The buildout year 2035 and horizon year 2040 have been considered.

2.4 Access Design

The design of any private approaches can be reviewed as part of future Site Plan Control applications. A review of the internal roadways (Street 15, Street 16, Street 17, and Street 18) and their connections to the existing roadway network is included in the TIA, as part of the Development Design section.

2.5 Development-Generated Travel Demand

2.5.1 Trip Generation

The trip generation surveys compiled in the *ITE Trip Generation Manual* record vehicle trips, and the sites surveyed are typically located in suburban areas where non-auto modes of transportation have a mode share of 10% or less. The *TRANS Trip Generation Manual* identifies the subject site as being located within the Rural West district. The manual identifies the observed AM peak period mode shares for rural employment generators of 85% auto driver, 5% auto passenger, 9% transit, 1% cyclist, and 1% pedestrian (not adding to 100% due to rounding). Given the context of the subject site's location and proximity to transit, the assumed mode shares for the proposed development can be summarized as 90% auto driver and 10% auto passenger.

The land use rates associated with the Industrial Park (land use code 130) in the *ITE Trip Generation Manual* have been considered. The estimated number of person trips generated by the proposed development during the AM and PM peak hours are shown in **Table 2**. A breakdown of these trips by mode share is shown in **Table 3**.

Table 2: Proposed Development – Peak Hour Trip Generation

Land Use	ITE Code	GFA	AM Peak Hour (pph[1])			PM Peak Hour (pph)		
			IN	OUT	TOT	IN	OUT	TOT
Industrial Park	130	600,000 ft^2	183	44	227	50	177	227

1. pph: Person Trips per Peak Hour, estimated by prorating to account for 10% passenger share

Table 3: Proposed Development – Peak Hour Trips by Mode Share

Travel Mode	Mode Share	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOT	IN	OUT	TOT
	Person Trips	**183**	**44**	***227***	**50**	**177**	***227***
Auto Driver	90%	165	39	*204*	45	159	*204*
Auto Passenger	10%	18	5	*23*	5	18	*23*
Transit	0%	-	-	*0*	-	-	*0*
Cyclist	0%	-	-	*0*	-	-	*0*
Pedestrian	0%	-	-	*0*	-	-	*0*

From the previous table, the proposed Phase 2 Business Park development is estimated to generate 204 vehicle trips during the peak hours.

2.5.2 Trip Distribution and Assignment

The assumed distribution of trips generated by the proposed Phase 2 Business Park follow the assumptions made in the 2011 TIS, which can be summarized as follows:

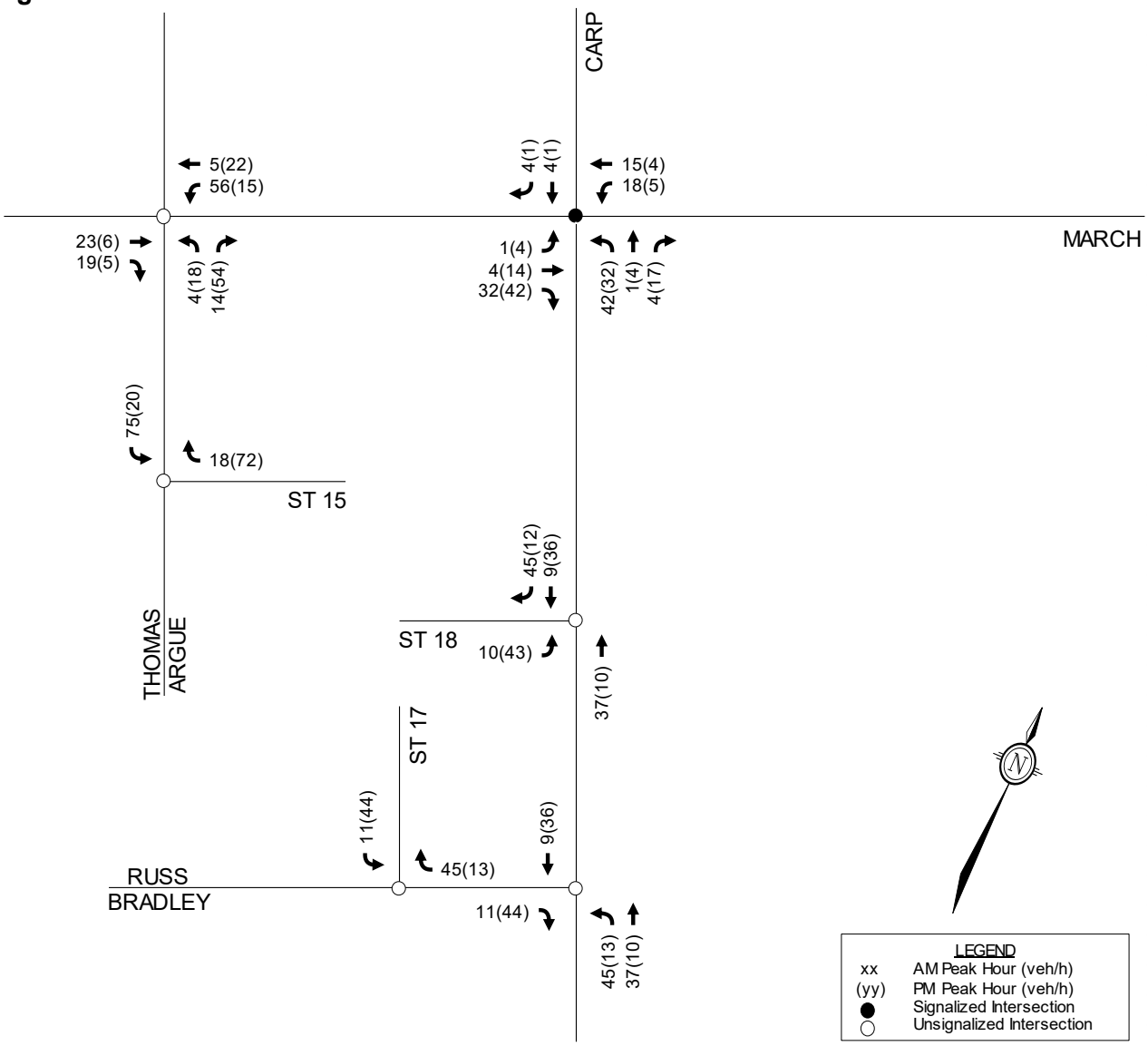
- 5% to/from the north via Carp Road;
- 50% to/from the south via Carp Road;
- 20% to/from the east via March Road;
- 25% to/from the west via March Road.

The assignment of trips to the new proposed access intersections is proportional to the developable area of the blocks closest to each intersection. The combined lot areas of Blocks 1-13 are approximately 45% of the total lot areas of Blocks 1-22, and therefore, 45% of trips are assigned to the Thomas Argue Road connection. For the remaining 55% of trips, they have been assigned to the Carp Road connection or Russ Bradley Road based on whichever is encountered first. The assumed trip assignment is therefore summarized as follows:

- 45% of trips to/from all directions assigned to the Thomas Argue Road connection;
- 55% of trips to/from the north, east, and west assigned to the Carp Road connection;
- 55% of trips to/from the south assigned to the Russ Bradley Road connection.

Based on the above, the distribution of site-generated traffic volumes to the study area intersections are shown in **Figure 5**.

Figure 5: Site-Generated Traffic Volumes



2.6 Exemptions Review

This module reviews possible exemptions from the final TIA, as outlined in the *Revised TIA Guidelines*. The applicable exemptions for this site are shown in **Table 4**.

Table 4: TIA Exemptions

Module	Element	Exemption Criteria	Status
4.1 Development Design	*4.1.2* Circulation and Access	• Required for site plan control and zoning by-law amendment applications	Exempt
	4.1.3 New Street Networks	• Required for draft plan of subdivision applications	Not Exempt

Module	Element	Exemption Criteria	Status
4.2 Parking	*All elements*	• Required for site plan control and zoning by-law amendment applications	Exempt
4.6 Neighbourhood Traffic Calming	*All elements*	• If all of the following criteria are met: 1. Access is provided to a collector or local roadway 2. Application is for zoning by-law amendment or draft plan of subdivision 3. Development generates more than 75 vehicle trips 4. Site trip infiltration is expected, and site-generated traffic will increase peak volumes by 50% or more along the route between the site and an arterial 5. The subject street segment is adjacent to two or more of the following significant sensitive land uses: ○ School (within 250m walking distance) ○ Park ○ Retirement/older adult facility ○ Licensed child care centre ○ Community centre ○ 50+% of adjacent properties along the route(s) are occupied by residential lands and at least ten dwellings are occupied	Exempt
4.7 Transit	*4.7.1* Transit Route Capacity	• Required when proposed development generates more than 75 transit trips	Exempt
	4.7.2 Transit Priority Requirements	• Required when proposed development generates more than 75 vehicle trips	Exempt
4.8 Network Concept	*All elements*	• Required when proposed development generates more than 200 peak hour person trips in excess of the equivalent volume permitted by the established zoning	Exempt
4.9 Intersection Design	*All elements*	• Required when proposed development generates more than 75 vehicle trips	Not Exempt

Based on the foregoing, the following modules will be included in the TIA report:

- Module 4.1: Development Design
- Module 4.3: Boundary Streets
- Module 4.5: Transportation Demand Management
- Module 4.9: Intersection Design

3.0 FORECASTING

3.1 Other Area Developments

Projected traffic generated by the developments listed in Section 2.2.2 have been added to the background traffic volumes. A summary of these developments is included below, and relevant excerpts of their respective traffic studies are included in **Appendix F**.

West Capital Airpark
The TIS prepared by Novatech in November 2011 considered 329 dwellings and 800,000 ft^2 GFA of business park space. Phase 1 was assumed to include 150 dwellings and 200,000 ft^2 of business park. At the time of the traffic counts conducted in May 2025, all of the Phase 1 residential and approximately 5% of the Phase 1 business park was constructed and occupied.

The number of peak hour trips generated by the remaining residential component and the Phase 1 business park has been estimated, for the purposes of adding these volumes to the 2035 and 2040 background traffic volumes. The complete process of estimating the trip generation is included in **Appendix F**. A summary of the trip generation estimates are included in **Table 5**.

Table 5: Remaining Residential and Phase 1 Business Park Trip Generation

Land Use	Units/GFA	AM Peak Hour (vph[1])			PM Peak Hour (vph)		
		IN	OUT	TOT	IN	OUT	TOT
Single-Family Detached Housing	179 units	43	100	*143*	98	60	*158*
Industrial Park	190,000 ft^2	55	13	*68*	15	53	*68*
Total		**98**	**113**	***211***	**113**	**113**	***226***

1. vph: Vehicle Trips per Peak Hour

2822 Carp Road
The TIA prepared by Dillon in August 2022 considered 12,800 ft^2 GFA of commercial space. The commercial uses are anticipated to be automotives sales, repair, retail, and general warehousing. A buildout year of 2023 was assumed, but the development has not been constructed. Therefore, traffic generated by this development has been added to the 2035 and 2040 background volumes.

3119 Carp Road
The Transportation Brief prepared by Delcan in January 2014 considered a subdivision with 300,000 ft^2 GFA of commercial/industrial spaces. A buildout year of 2024 was assumed, but the development has not been constructed. Therefore, traffic generated by this development has been added to the 2035 and 2040 background volumes.

3711-3725 Carp Road
The TIA prepared by Novatech in May 2023 considered a subdivision with 78 dwellings and 17,286 ft^2 GFA of commercial space. A buildout year of 2027 was assumed. Therefore, traffic generated by this development has been added to the 2035 and 2040 background volumes.

3.2 General Background Growth Rate

A review of the City's *Strategic Long-Range Model* has been conducted, comparing snapshots of 2022 and 2046 AM peak hour traffic volumes. These snapshots are included in **Appendix G**. The snapshots identify annual growth rates of approximately 2% on March Road, and approximately 0% to 1% on Carp Road. Therefore, an annual background growth rate of 2% has been assumed for March Road and 1% has been assumed for Carp Road. No annual growth rate has been applied to Thomas Argue Road or Russ Bradley Road.

3.3 Future Traffic Volume Figures

The figures below present the following traffic conditions:

- Other area development volumes in 2035/2040 are shown in **Figure 6**;
- Background volumes in 2035 and 2040 are shown in **Figure 7** and **Figure 8**, respectively;
- Total volumes in 2035 and 2040 are shown in **Figure 9** and **Figure 10**, respectively.

Figure 6: Other Area Development-Generated Traffic Volumes

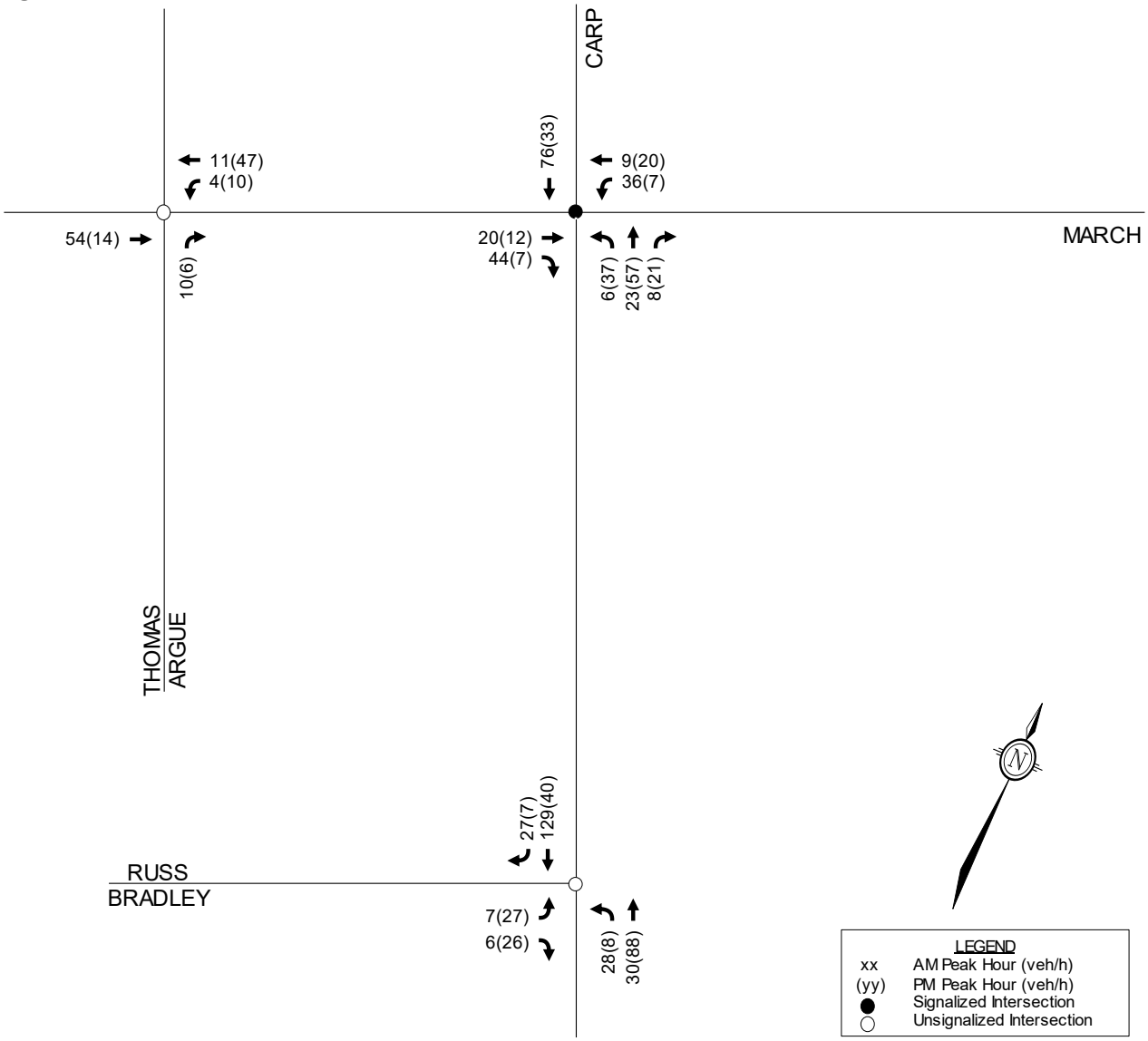


Figure 7: 2035 Background Traffic Volumes

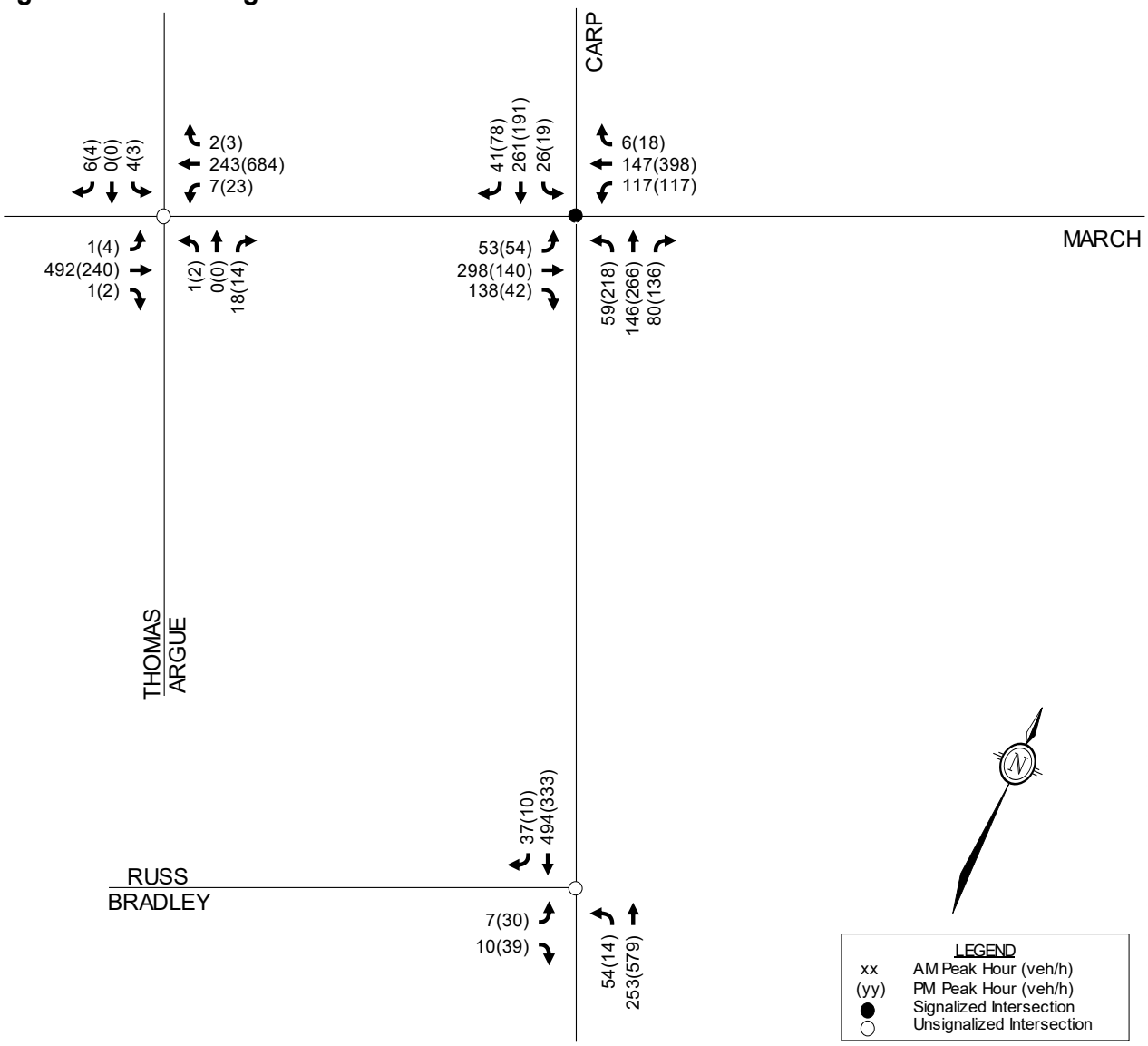


Figure 8: 2040 Background Traffic Volumes

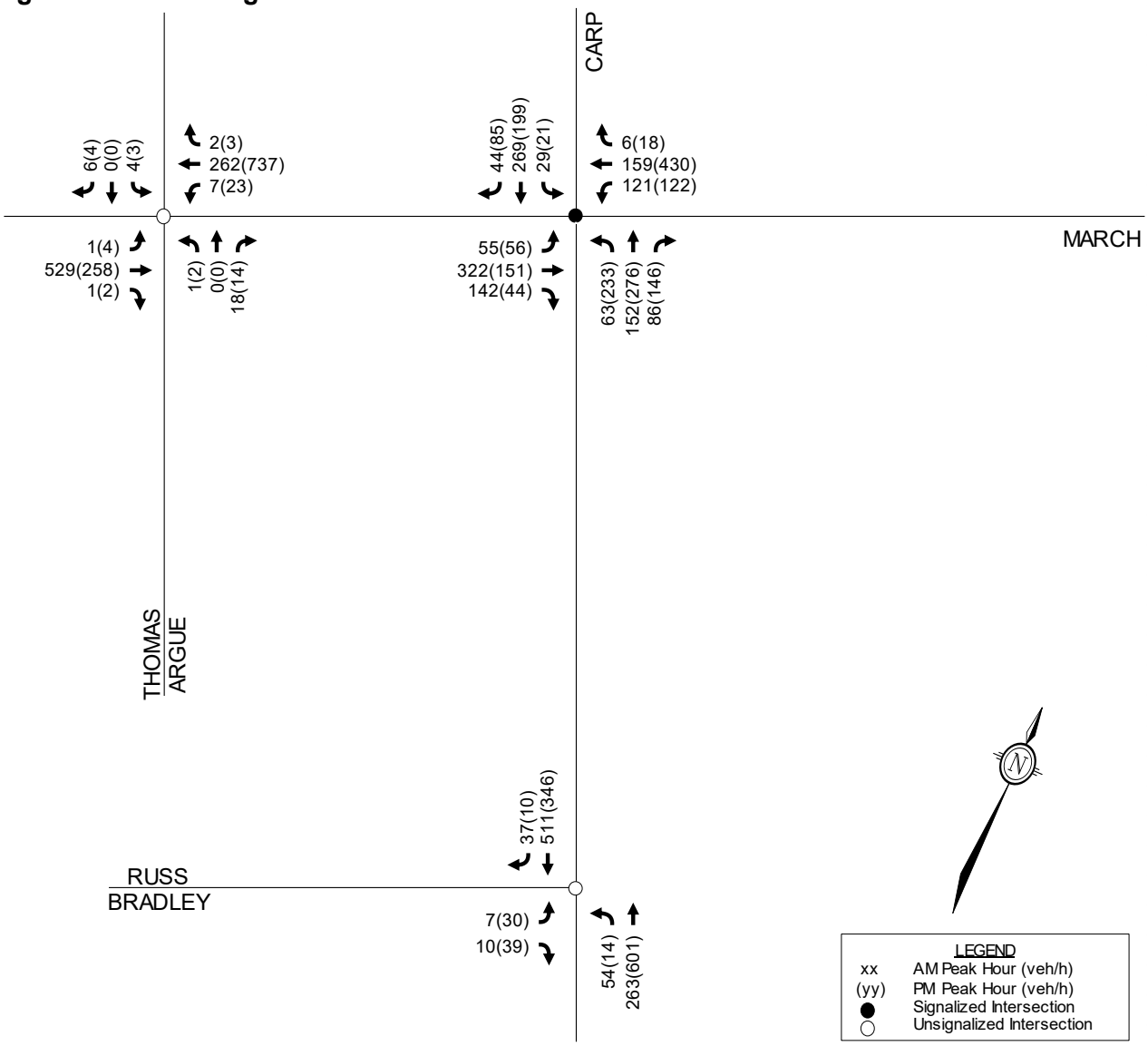


Figure 9: 2035 Total Traffic Volumes

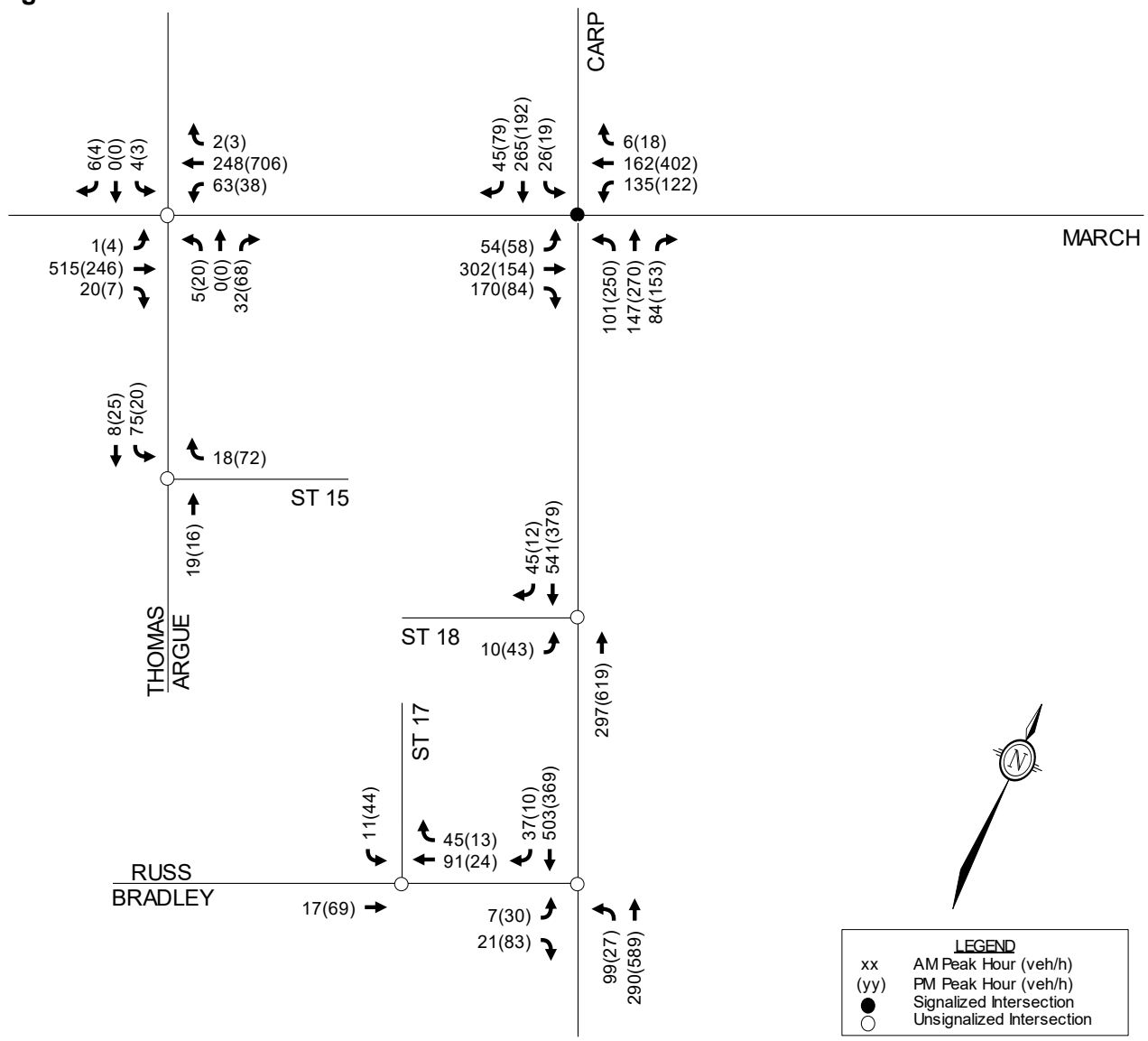
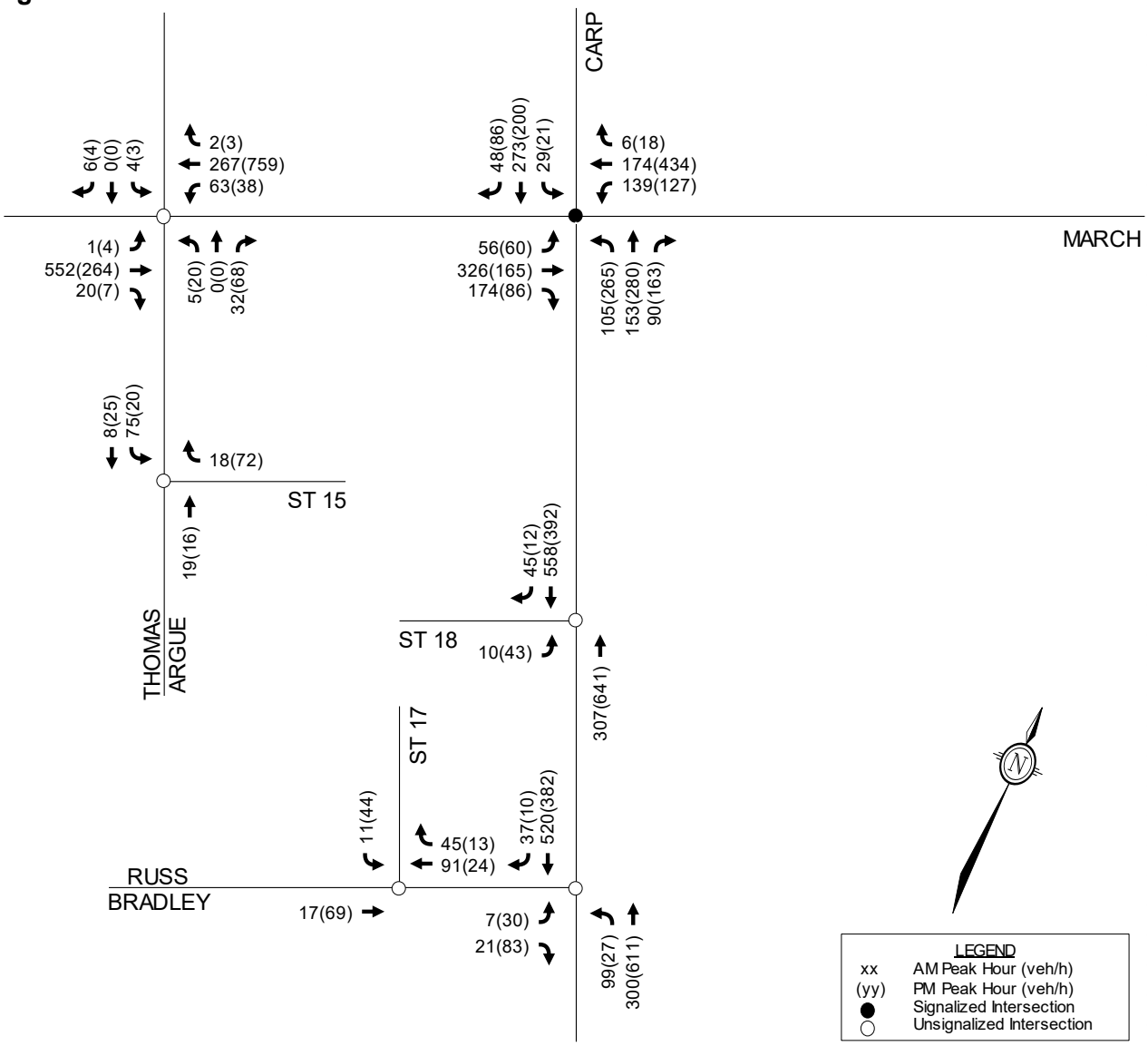


Figure 10: 2040 Total Traffic Volumes



3.4 Demand Rationalization

A review of the existing and background intersection operations has been conducted to determine if and where traffic volumes exceed capacity within the study area. The intersection parameters used in the analysis are consistent with the *Revised TIA Guidelines* (Saturated Flow Rate: 1,800 vphpl, Peak Hour Factor: 0.9 in existing conditions and 1.0 in future conditions). Per Exhibit 22 of the *Multi-Modal Level of Service (MMLOS) Guidelines*, all study area intersections are located in the General Rural Area. The target vehicular level of service (Auto LOS) for is an Auto LOS D, which includes a maximum vehicle-to-capacity (v/c) ratio of 0.90 at signalized intersections, and a maximum delay of 35 seconds at unsignalized intersections. The signal timing plan for March Road/ Carp Road has been obtained from the City, and is included in **Appendix H**.

3.4.1 Existing Traffic Conditions

Intersection capacity analysis has been conducted for the existing traffic conditions, using Synchro 11 software. The results of the analysis are summarized in **Table 6** for the weekday AM and PM peak hours. Detailed Synchro reports are included in **Appendix I**.

Table 6: Existing Intersection Analysis

Intersection	AM Peak Hour			PM Peak Hour		
	Max v/c or Delay	LOS	Mvmt	Max v/c or Delay	LOS	Mvmt
March Road/ Carp Road(1)	0.51	A	EBT/R	0.50	A	WBT/R
March Road/ Thomas Argue Road(2)	11 sec	B	SB	15 sec	B	SB
Carp Road/ Russ Bradley Road(2)	10 sec	A	EB	11 sec	B	EB

1. Signalized intersection
2. Unsignalized intersection

From the previous table, all movements operate at an acceptable level of service.

3.4.2 2035 Background Traffic Conditions

Intersection capacity analysis has been conducted for the 2035 background traffic conditions, using Synchro 11 software. The results of the analysis are summarized in **Table 7** for the weekday AM and PM peak hours. Detailed Synchro reports are included in **Appendix J**.

Table 7: 2035 Background Intersection Analysis

Intersection	AM Peak Hour			PM Peak Hour		
	Max v/c or Delay	LOS	Mvmt	Max v/c or Delay	LOS	Mvmt
March Road/ Carp Road(1)	0.63	B	EBT/R	0.56	A	WBT/R
March Road/ Thomas Argue Road(2)	13 sec	B	SB	17 sec	C	SB
Carp Road/ Russ Bradley Road(2)	14 sec	B	EB	15 sec	B	EB

1. Signalized intersection
2. Unsignalized intersection

From the previous table, all movements operate at an acceptable level of service.

3.4.3 2040 Background Traffic Conditions

Intersection capacity analysis has been conducted for the 2040 background traffic conditions, using Synchro 11 software. The results of the analysis are summarized in **Table 8** for the weekday AM and PM peak hours. Detailed Synchro reports are included in **Appendix J**.

Table 8: 2040 Background Intersection Analysis

Intersection	AM Peak Hour			PM Peak Hour		
	Max v/c or Delay	LOS	Mvmt	Max v/c or Delay	LOS	Mvmt
March Road/ Carp Road(1)	0.68	B	EBT/R	0.61	B	WBT/R
March Road/ Thomas Argue Road(2)	13 sec	B	SB	18 sec	C	SB
Carp Road/ Russ Bradley Road(2)	14 sec	B	EB	15 sec	B	EB

1. Signalized intersection
2. Unsignalized intersection

From the previous table, all movements operate at an acceptable level of service.

The Ministry of Transportation of Ontario (MTO) includes left turn lane warrants for unsignalized intersections, based on advancing/opposing volumes, the percentage of left turn lanes at a given approach, and design speed of a roadway. The 2035 background traffic volumes (shown in **Figure 8**) have been considered to determine if any auxiliary left turn lanes are warranted within the study area. The relevant left turn lane warrant graphs are included in **Appendix K**.

Based on the PM peak hour volumes at March Road/Thomas Argue Road, a westbound left turn lane with 25m of storage length is warranted. Based on the AM peak hour volumes at Carp Road/Russ Bradley Road, a northbound left turn lane with 25m of storage length is warranted. In both cases, the 25m of storage length should be provided in addition to a parallel length of 70m and a taper length of 160m.

4.0 ANALYSIS

4.1 Development Design

4.1.1 Design for Sustainable Modes

Given the rural context of the proposed business park, 1.5m-wide gravel shoulders are proposed as part of the subject development.

4.1.2 New Street Networks

Street 15 will run on an east-west alignment, starting at Thomas Argue Road, running east for a distance of approximately 1 km, and terminating as a cul-de-sac adjacent to Block 13. Measuring from the nearest edges of roadway, Street 15 will intersect Thomas Argue Road approximately 330m south of March Road, and approximately 290m north of Wingover Private. East of the cul-de-sac, a service road with a reduced width of 3.5m is proposed for approximately 125m. This service road will access a sanitary pump station and stormwater block, located between Block 13 and Block 22.

Street 16 will run on a north-south alignment, starting at Street 15, running south for a distance of approximately 230m, and terminating as a cul-de-sac adjacent to Block 7. Measuring from the nearest edges of roadway, Street 16 will intersect Street 15 approximately 550m east of Thomas Argue Road.

Street 17 will run generally on a north-south alignment, starting at Russ Bradley Road, running north for a distance of approximately 800m, and terminating at Street 18. Measuring from the nearest edges of roadway, Street 17 will intersect Russ Bradley Road approximately 68m from Carp Road and approximately 385m from Huisson Road. Street 17 will intersect Street 18 approximately 70m from Carp Road.

Street 18 will run on an east-west alignment, starting at Carp Road, running west for a distance of approximately 300m. Street 18 will intersect Carp Road approximately 770m north of Russ Bradley Road and 670m south of March Road.

The AADT of each proposed roadway is anticipated to be less than 1,000 vpd, consistent with local roadway volumes. All roadways will be private but municipally operated. Each roadway has a proposed right-of-way (ROW) width of 20m and proposed roadway width of 6.0m, which is appropriate for local roadways. The curb radii at each proposed intersection measures approximately 9.0m to 10.0m.

The Transportation Association of Canada (TAC)'s *Geometric Design Guide for Canadian Roads* identifies minimum intersection spacing requirements based on the roadway classifications and type of intersection (three-legged versus four-legged). Thomas Argue Road and Russ Bradley Road are local roadways and Carp Road is an arterial roadway. For local roadways, TAC identifies a minimum intersection spacing of 40m between adjacent three-legged intersections, measuring centre to centre. For arterial roadways, TAC identifies a minimum intersection spacing of 200m between adjacent intersections, measuring centre to centre.

Street 17 is approximately 73m west of Carp Road at Russ Bradley Road, and approximately 80m west of Carp Road at Street 18. The intersection spacing on Carp Road is approximately 670m between March Road and Street 18, and approximately 770m between Street 18 and Russ Bradley Road. Therefore, all intersections meet the minimum intersection spacing requirements.

4.1.3 Circulation and Access

It is anticipated that all proposed roadways will form part of the fire route of Phase 2. The *Ontario Building Code* identifies a required minimum roadway width of 6m, centreline radius of 12m, and turnaround facilities whenever a dead-end occurs beyond a distance of 90m. The proposed roadways meet the minimum roadway width and centreline radii requirements. Streets 15 and 16 include cul-de-sacs with 15m radii, and Streets 17 and 18 form a crescent loop. Therefore, all proposed roadways meet the minimum fire route requirements.

Signalization will not be required at any of the proposed intersections serving Phase 2 (i.e. Thomas Argue Road/Street 15, Street 15/Street 16, Russ Bradley Road/Street 17, Carp Road/Street 18, and Street 17/Street 18). Therefore, side-street stop control is anticipated at each of these intersections.

The 2035 total traffic volumes (shown in **Figure 8**) have been considered to determine if longer auxiliary left turn lanes are warranted within the study area, when compared to the 2035 background volumes. The relevant left turn lane warrant graphs are included in **Appendix K**.

Based on the PM peak hour volumes at March Road/Thomas Argue Road, a westbound left turn lane with 25m of storage length is warranted. Based on the AM peak hour volumes at Carp Road/Russ Bradley Road, a northbound left turn lane with 30m of storage length is warranted. While no northbound left turn volumes were assigned to Carp Road/Street 18, it is acknowledged that some trips may turn left onto Street 18 instead of Russ Bradley Road. Therefore, a northbound left turn lane with the minimum 15m of storage length is warranted. The above storage lengths should be provided in addition to parallel lengths of 70m and taper lengths of 160m. The storage, parallel, and taper lengths for both auxiliary left turn lanes can be accommodated, given the spacing between intersections on March Road and Carp Road.

A Roadway Modification Approval (RMA) package has been submitted under separate cover for the auxiliary left turn lanes at March Road/Thomas Argue Road, Carp Road/Russ Bradley Road, and Carp Road/Street 18. Functional designs for each proposed auxiliary left turn lane is included in **Appendix L**.

4.1.4 Sightline Review

TAC's *Geometric Design Guide* includes minimum required Stopping Sight Distances (SSDs) and desired Intersection Sight Distances (ISDs), based on the design speed of a roadway. The design speeds, minimum required SSDs, and desired ISDs for Thomas Argue Road, Carp Road, and Russ Bradley Road are included in **Table 9**.

Table 9: Minimum Sight Distances

Roadway	Design Speed	SSD	ISD, Left Turns	ISD, Right Turns
Thomas Argue Road (at Street 15)	70 km/h	105m	150m	130m
Carp Road (at Street 18)	100 km/h	185m	210m	185m
Russ Bradley Road (at Street 17)	60 km/h	85m	130m	110m

Thomas Argue Road, Carp Road, and Russ Bradley Road are all generally level and straight roadways, and most vegetation along those roadways appear to be behind the ditches. Therefore, adequate SSDs and ISDs are anticipated at the proposed locations where Street 15 intersects Thomas Argue Road, where Street 18 intersects Carp Road, and where Street 17 intersects Russ Bradley Road.

4.2 Boundary Streets

The *MMLOS Guidelines* have been used to evaluate the levels of service for each alternative mode of transportation, based on the targets for roadways within the General Rural Area.

Exhibit 22 of the *MMLOS Guidelines* identifies that there is no target pedestrian level of service (PLOS) for any class of roadway within the General Rural Area, and no target transit level of service (TLOS) for roadways without rapid/priority transit service. Additionally, Exhibit 22 of the *MMLOS Guidelines* identifies that there is no target bicycle level of service (BLOS) for General Rural Area roadways without a cycling route designation, and no target truck level of service (TkLOS) for General Rural Area collector and local roadways without a truck route designation. Therefore, Thomas Argue Road and Russ Bradley Road have not been evaluated in this review, as these roadways have no targets for any mode. Carp Road has been evaluated for BLOS and TkLOS.

The detailed MMLOS review of the boundary streets is included in **Appendix M**. A summary of the results are provided in **Table 10**.

Table 10: Segment MMLOS Summary

Boundary Street	BLOS		TkLOS	
	Actual	Target	Actual	Target
Carp Road	**E**	D	C	C

From the previous table, Carp Road meets the target TkLOS and does not meet the target BLOS. Based on Exhibit 11 of the *MMLOS Guidelines*, Carp Road can only meet the target BLOS D by providing a physically separated bikeway or reducing the operating speed to 70 km/h. Given the rural context, the existing paved shoulders are appropriate and no modifications are recommended.

4.3 Transportation Demand Management

4.3.1 Context for TDM

The proposed development is a subdivision, consisting of 22 blocks that can accommodate future businesses and nine blocks that will be designated as roadway allowances, open spaces, servicing blocks, or stormwater management blocks. Compared to other business parks, it is anticipated that a higher proportion of future businesses could be aviation-based.

4.3.2 Need and Opportunity

The subject site is designated as 'Rural Countryside' on Schedule B9 of the City of Ottawa's *Official Plan*. The implemented zoning for the property is 'Air Transportation Facility Zone – Carp Airport Subzone' (T1B), and the site is within the *Carp Road Corridor* Community Design Plan (CDP) area. As stated in Section 2.5.1, the ultimate proposed development is estimated to generate 204 vehicle trips during the peak hours.

4.3.3 TDM Program

The *TDM Measures Checklist* does not include measures that can be committed to or considered as part of this application. TDM measures and incentives for future staff and customers can be considered as part of future Site Plan Control applications within the business park.

4.4 Intersection Design

4.4.1 Intersection MMLOS

This section provides a review of the signalized intersection at March Road/Carp Road, using complete streets principles. March Road/Carp Road has been evaluated for PLOS, BLOS, and TkLOS. TLOS has not been evaluated as no rapid/priority transit service is provided during the peak hours of analysis. The MMLOS targets associated for intersections within the General Rural Area have been used in this review. The full intersection MMLOS analysis is included in **Appendix M**. A summary of the results is shown in **Table 11**.

Table 11: Intersection MMLOS Summary

Intersection	PLOS		BLOS		TkLOS	
	Actual	Target	Actual	Target	Actual	Target
March Road/Carp Road	E	-	**E**	D	**E**	C

From the previous table, March Road/Carp Road does not meet the target BLOS D or target TkLOS C. There is no target PLOS for rural intersections.

All approaches do not meet the target BLOS D, based on left turn characteristics. Exhibit 12 of the *MMLOS Guidelines* identifies that the target BLOS can only be met if a protected intersection is implemented. However, given the rural context, a paved shoulder and traditional design is considered appropriate.

All approaches do not meet the target TkLOS C. Exhibit 21 of the *MMLOS Guidelines* identify that the target TkLOS can be met if the effective corner radius exceeds 15m, or if an additional receiving lane is provided on each approach. The paved shoulders at each corner provide additional pavement for trucks to complete right turns from any approach. It is anticipated that these shoulders can accommodate truck turning movements, and therefore, no modifications are recommended.

4.4.2 2035 Total Traffic Conditions

Intersection capacity analysis has been conducted for the 2035 total traffic conditions, using Synchro 11 software. The auxiliary turn lanes described in Section 4.1.3 have been assumed in the total traffic analysis.

The results of the analysis are summarized in **Table 12** for the weekday AM and PM peak hours. Detailed Synchro reports are included in **Appendix N**.

Table 12: 2035 Total Intersection Analysis

Intersection	AM Peak Hour			PM Peak Hour		
	Max v/c or Delay	LOS	Mvmt	Max v/c or Delay	LOS	Mvmt
March Road/ Carp Road(1)	0.69	B	EBT/R	0.57	A	WBT/R
March Road/ Thomas Argue Road(2)	15 sec	B	SB	19 sec	C	SB
Carp Road/ Russ Bradley Road(2)	14 sec	B	EB	15 sec	C	EB
Thomas Argue Road/ Street 15(2)	9 sec	A	WB	9 sec	A	WB
Carp Road/ Street 18(2)	16 sec	C	EB	21 sec	C	EB
Russ Bradley Road/ Street 17(2)	9 sec	A	SB	9 sec	A	SB

1. Signalized intersection
2. Unsignalized intersection

From the previous table, all movements operate at an acceptable level of service.

4.4.3 2040 Total Traffic Conditions

Intersection capacity analysis has been conducted for the 2040 total traffic conditions, using Synchro 11 software. The results of the analysis are summarized in **Table 13** for the weekday AM and PM peak hours. Detailed Synchro reports are included in **Appendix N**.

Table 13: 2040 Total Intersection Analysis

Intersection	AM Peak Hour			PM Peak Hour		
	Max v/c or Delay	LOS	Mvmt	Max v/c or Delay	LOS	Mvmt
March Road/ Carp Road(1)	0.73	C	EBT/R	0.63	B	NBL
March Road/ Thomas Argue Road(2)	15 sec	B	SB	21 sec	C	SB
Carp Road/ Russ Bradley Road(2)	15 sec	B	EB	15 sec	C	EB
Thomas Argue Road/ Street 15(2)	9 sec	A	WB	9 sec	A	WB
Carp Road/ Street 18(2)	16 sec	C	EB	21 sec	C	EB
Russ Bradley Road/ Street 17(2)	9 sec	A	SB	9 sec	A	SB

1. Signalized intersection
2. Unsignalized intersection

From the previous table, all movements operate at an acceptable level of service.

5.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the foregoing, the conclusions and recommendations of this TIA can be summarized as follows:

Site-Generated Traffic

- The ultimate proposed development is estimated to generate 204 vehicle trips during the peak hours.

Development Design

- Given the rural context of the proposed business park, 1.5m-wide gravel shoulders are proposed as part of the subject development.

- The average annual daily traffic (AADT) volumes of each proposed roadway is anticipated to be less than 1,000 vpd, consistent with local roadways. All roadways will be private but municipally operated. Each roadway has a proposed right-of-way (ROW) width of 20m and proposed roadway width of 6.0m, which is appropriate for local roadways. The curb radii at each proposed intersection measures approximately 9.0m to 10.0m. All proposed roadways meet the minimum fire route requirements.

- Street 17 is approximately 73m west of Carp Road at Russ Bradley Road, and approximately 80m west of Carp Road at Street 18. The intersection spacing on Carp Road is approximately 670m between March Road and Street 18, and approximately 770m between Street 18 and Russ Bradley Road. Therefore, all intersections meet the minimum intersection spacing requirements.

- Signalization will not be required at any of the proposed intersections. Side-street stop control is anticipated at each of the Phase 2 intersections.

- At March Road/Thomas Argue Road, a westbound left turn lane with 25m of storage length is warranted. At Carp Road/Russ Bradley Road, a northbound left turn lane with 30m of storage length is warranted. At Carp Road/Street 18, a northbound left turn lane with 15m of storage length is warranted. These storage lengths should be provided in addition to parallel lengths of 70m and taper lengths of 160m. The storage, parallel, and taper lengths for both auxiliary left turn lanes can be accommodated, given the spacing between intersections on March Road and Carp Road.

- Thomas Argue Road, Carp Road, and Russ Bradley Road are all generally level and straight roadways, and most vegetation along those roadways appear to be behind the ditches. Therefore, adequate sight distances are anticipated at the proposed locations where Street 15 intersects Thomas Argue Road, where Street 18 intersects Carp Road, and where Street 17 intersects Russ Bradley Road.

MMLOS Analysis

- Carp Road can only meet the target bicycle level of service (BLOS) D by providing a physically separated bikeway or reducing the operating speed to 70 km/h. Given the rural context, the existing paved shoulders are appropriate and no modifications are recommended.

- At March Road/Carp Road, the target BLOS can only be met if a protected intersection is implemented. However, given the rural context, a paved shoulder and traditional design is considered appropriate.

- At March Road/Carp Road, all approaches do not meet the target truck level of service (TkLOS) C. The paved shoulders at each corner provide additional pavement for trucks to complete right turns from any approach. It is anticipated that these shoulders can accommodate truck turning movements, and therefore, no modifications are recommended.

Existing, Background, and Total Traffic Operations

- In all scenarios, all movements operate at an acceptable level of service.

Based on the foregoing, the proposed Phase 2 Business Park in the West Capital Airpark subdivision is recommended from a transportation perspective.

NOVATECH

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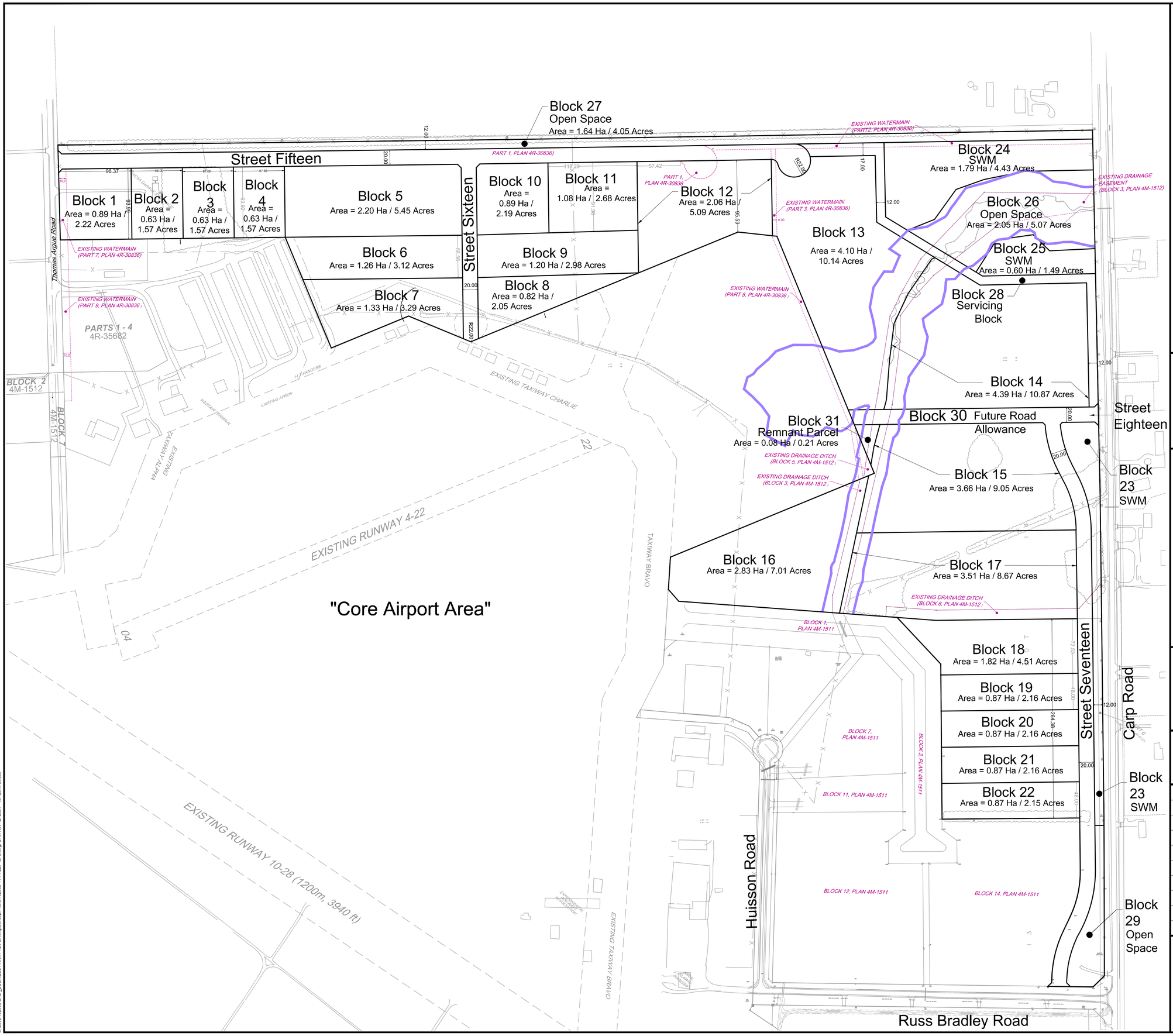
APPENDIX A

Concept Plan



KEY PLAN
NOT TO SCALE

WEST CAPITAL AIRPARK

PHASE 2 BUSINESS PARK CONCEPT PLAN 3

CONCEPTUAL LOTTING

WEST CAPITAL
Developments

SCALE
1 : 2000
0 40 80 120 160

No.	REVISION	DATE	BY
6.	UPDATED PER DETAILED DESIGN	NOV 11/24	MV
5.	REVISED PER COMMENTS	FEB 22/24	ARM
4.	REVISED PER COMMENTS	NOV 13/23	MV
3.	ISSUED TO CITY	NOV 08/22	EP
2.	UPDATED PER CLIENT COMMENTS	OCT 20/22	EP
1.	ISSUED FOR DISCUSSION	OCT 18/22	EP

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DATE
NOVEMBER, 2024

PROJECT No.
102085

DRAWING No.
102085-14-PH2BP-CP3

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APPENDIX B

West Capital Airpark 2011 TIS

1.0 INTRODUCTION

A Transportation Impact Study (TIS) was prepared in December 2005 for the proposed mixed-use aviation development at the Carp Airport in Ottawa. The site is located south of March Road, between Diamondview Road and Carp Road as shown in **Figure 1**.

At full build-out, the original development proposal consisted of the following components:

- Residential fly-in community with 329 dwelling units
- Aerospace Business Park with 800,000 ft^2 of floor area
- General Aviation Airport
- Parkland

The original study assessed the impacts of constructing 50 residential units and 50,000 ft^2 of business park space in 2007 and 300 residential units and 300,000 ft^2 of business park space in 2012.

This Revised TIS has been prepared to address the following:

- revisions to the proposed concept plan and phasing,
- expansion of the study area to include the Highway 417/March Road interchange, and
- compliance with the current Ministry of Transportation of Ontario (MTO) and City of Ottawa Traffic Impact Study (TIS)/Transportation Impact Assessment (TIA) Guidelines.

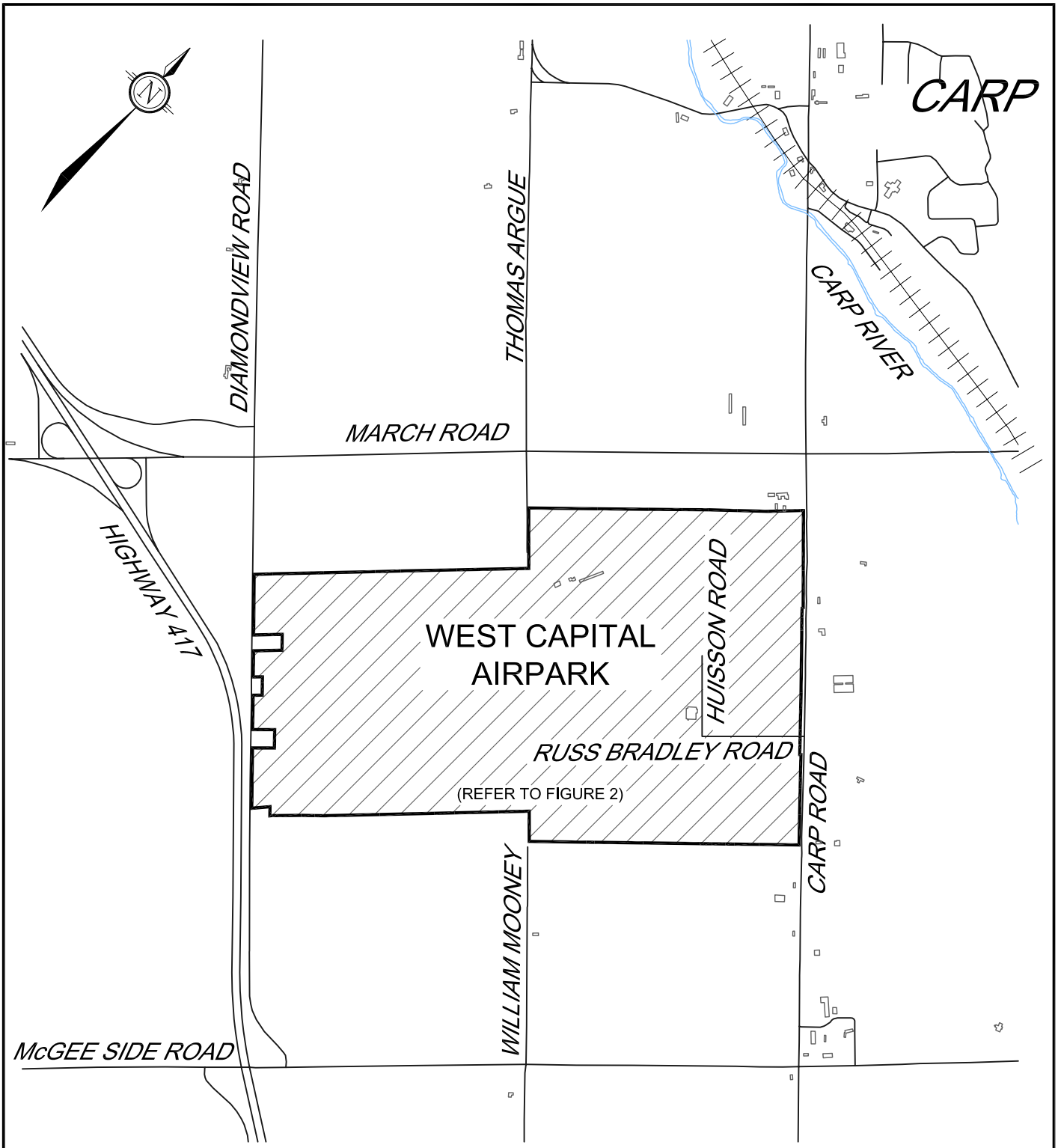
1.1 Revised Development

At full build-out the revised development is expected to include 329 residential units and 800,000 ft^2 of business park space. It is anticipated that half of the business park space will be developed north of the Carp Airport and half will be development east of the Carp Airport. The proposed land use plan is shown in **Figure 2**.

This report is written in support of an initial phase of development and in accordance with draft condition number 18 an additional study will be prepared prior to the construction of future phases of development.

Phase One development will consist of 150 residential units, a clubhouse area, communal hangars, a public park, and 200,000 ft^2 of business park space east of the Carp Airport. The residential development is divided into two communities, east and west of the Carp Creek. In Phase One the west community will consist of 76 single family lots and the east community will consist of 27 single family lots and 47 hangar estate lots. The public park will have two sports fields and on-site surface parking.

Phase One development will include the construction of six local roads. Streets Two and Eight will have an 18m road allowance and an urban cross section. Streets One, Six and Nine will have a 20m road allowance and an urban cross section. Street Eleven will have a 20m road allowance and a rural cross section. Residents of the east and west communities will gain auto access to the development at the proposed Street One connection to Diamondview Road, approximately 750m south of March Road. The access will be gated and no roadway connection will be provided between the residential and public park/business park components of Phase One development.



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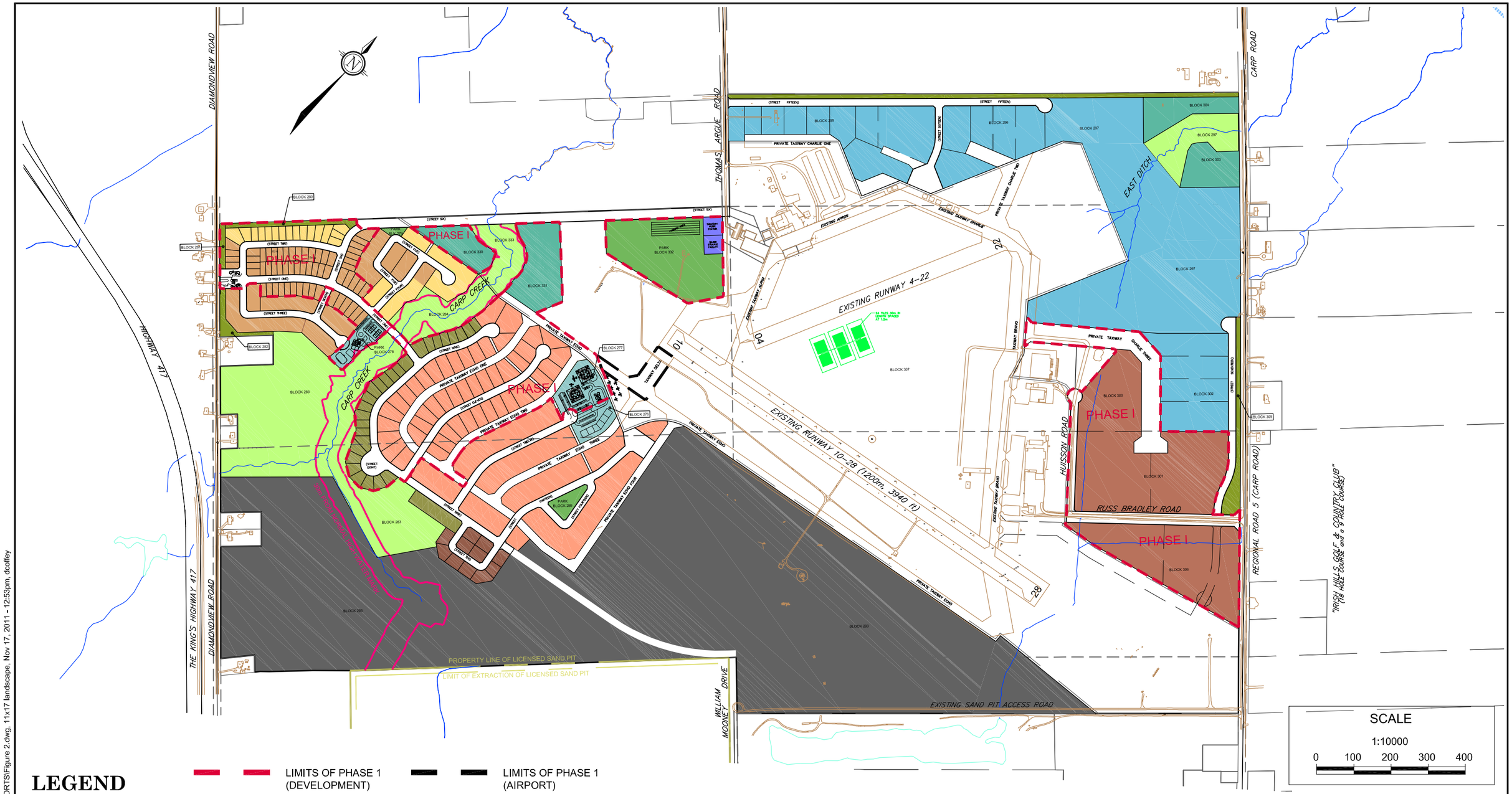
CITY OF OTTAWA

WEST CAPITAL AIRPARK

KEY PLAN

NOV 2011 102085 FIGURE 1



LEGEND

- LIMITS OF PHASE 1 (DEVELOPMENT)
- LIMITS OF PHASE 1 (AIRPORT)
- SINGLES 50' (15.2m) WIDE PHASE 1 LOTS: 60
- SINGLES 60' (18.3m) WIDE PHASE 1 LOTS: 16
- SINGLES 70' (21.3m) WIDE PHASE 1 LOTS: 27
- HANGAR ESTATE LOTS 30m PHASE 1 LOTS: 47
- TOWN HOMES (9.0m WIDTH) PHASE 1 UNITS: 0
- PHASE 1 LOTS / UNITS: 150
- TOTAL LOTS / UNITS: 329
- AEROSPACE BUSINESS PARK - PHASE 1
- AEROSPACE BUSINESS PARK - FUTURE PHASE
- COMMUNAL HANGARS / CLUBHOUSE
- SWM FACILITY AREA
- CORE AIRPORT AREA
- ADDITIONAL LANDS OWNED BY WEST CAPITAL DEVELOPMENTS
- OPEN SPACE (TO BE DEDICATED TO CITY)
- PARKLAND (TO BE DEDICATED TO CITY)
- LANDSCAPE BUFFER

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WEST CAPITAL AIRPARK

LAND USE PLAN

NOV 2011 102085 FIGURE 2

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Traffic generated by the public park will gain access from Thomas Argue Road. Auto traffic generated by the east business park will gain access from Russ Bradley Road.

Phase One will also include the construction of five taxiways. Taxiway Delta will have a right-of-way (ROW) width of 51.8m and connect with the existing Carp Airport Runway 10-28. Taxiway Echo will connect with Taxiway Delta; Taxiways Echo One and Two will connect with Taxiway Echo. Taxiways Echo, Echo One and Echo Two will have ROW widths of 21.3m wide. Residents of the east and west communities will gain aircraft access to the development using these taxiways. Taxiway Charlie 3 will have a ROW width of 51.8m and connect with the existing Carp Airport Taxiway Bravo. Aircraft traffic generated by the east business park will gain access using Taxiway Charlie 3.

The Carp Airport is currently used by recreational fliers and a number of airport related operations including Helicopter Transport Canada and an RCMP training facility. Helicopter Transport Canada and the RCMP properties are both accessed from Russ Bradley Road.

1.2 Analysis Methods

Intersection capacity analysis has been completed using the Synchro 8.0 software package. This software uses methodology from the 2000 and 2010 *Highway Capacity Manual* (HCM) published by the Transportation Research Board to evaluate signalized and unsignalized intersections.

Intersection operating conditions are commonly described in terms of a Level of Service (LOS). LOS is a quality measure of speed, freedom to manoeuvre, interruptions, comfort and convenience. Letters are assigned to six levels with LOS 'A' representing optimal operating conditions and LOS 'F' representing failing operating conditions.

The City of Ottawa has adopted criteria that directly relate the LOS of a signalized intersection to a volume to capacity (v/c) ratio. Vehicle capacity is defined as the maximum number of vehicles that can pass a given point during a specified period under prevailing traffic conditions. The City's criteria are as follows:

LOS	v/c ratio
A	0 to 0.60
B	0.61 to 0.70
C	0.71 to 0.80
D	0.81 to 0.90
E	0.91 to 1.00
F	>1.00

The LOS for an unsignalized intersection is based on average control delay and is defined for individual movements. Control delay includes initial deceleration, queue move-up time, stopped time and final acceleration. The HCM presents the following criteria relating the LOS for individual movements to average control delay:

LOS	Delay (sec/veh)
A	<10
B	10 to 15
C	15 to 25
D	25 to 35
E	35 to 50
F	>50

In this study, movements at signalized and unsignalized intersections have been evaluated in terms of the LOS as defined in the above tables. The City of Ottawa standards require mitigation measures in the form of additional lane capacity and/or signal timing adjustments where v/c ratios for signalized intersections exceed 0.90. For ramp terminals, the MTO standards require consideration of geometric improvements where v/c ratios for ramp approaches exceed 0.75.

Other types of analysis undertaken to assess the transportation impacts of the proposed development are as follows:

- assessment of provisions for non-auto travel modes, including access to local pedestrian, bicycle and transit systems,
- review of on-site design including vehicle access, parking and loading/unloading activities,
- evaluation of potential community concerns including neighbourhood infiltration, parking impacts, and conformance with Transportation Demand Management (TDM) principles.

1.3 Analysis Parameters

The study area for this report was confirmed with MTO and City staff and includes the following intersections:

- Highway 417/March Road interchange ramp terminals
- March Road/Diamondview Road
- Diamondview Road/Street One access
- March Road/Thomas Argue Road
- March Road/Carp Road
- Carp Road/Russ Bradley Road

The selected time periods for analysis remains the same as the original study and includes the weekday a.m. and p.m. peak hours.

Phase One is planned for build-out in 2014. Analysis has been completed for the Phase One development year and a five year horizon of 2019. Full build-out is assumed for the 2019 horizon year for the purpose of this report. As noted previously, an additional study will be completed prior to the construction of future development phases.

2.0 EXISTING CONDITIONS

2.1 Roadways

Highway 417 is the major east-west freeway serving the Ottawa area. At Ottawa's western urban boundary the highway curves to the north and follows a north-south alignment towards the Town of Arnprior. In the vicinity of the March Road interchange, Highway 417 has a four-lane rural divided cross section and a posted speed of 100 km/hr.

March Road is an east-west arterial extending between the town of Almonte in the west and the March Road/Eagleson Road/Highway 417 interchange in the east. It is a designated rural truck route. Within the study area March Road has a two-lane rural cross section with a posted speed of 80 km/hr and a ROW protection of 30 meters.

Carp Road is a north-south arterial extending between Fitzroy Harbour in the north to Stittsville in the south. It is a designated rural truck route. Within the study area Carp Road has a two-lane rural cross-section with a posted speed of 80 km/hr and a ROW protection of 30 meters. In the area of the development, the existing ROW width is 26m and a road widening will be required across the frontage of the site.

Diamondview Road and Thomas Argue Road are north-south collectors with two-lane rural cross-sections. Diamondview Road has an unposted speed of 80 km/hr and a ROW protection of 26 meters. The existing ROW width is 20m and a road widening will be required across the frontage of the site. Thomas Argue Road has a posted speed of 60 km/hr with an unpaved surface north of March Road. South of March Road, Thomas Argue Road is a local road with a paved surface and provides access to the Carp Airport. Thomas Argue Road has a ROW protection of 26m north of March Road and 20m south of March Road.

Russ Bradley Road provides access to the Carp Airport from Carp Road. It has a two-lane rural cross-section, a paved surface and a posted speed of 25 km/hr.

2.2 Intersections

Intersection control and auxiliary turning lanes are described as follows for each of the study area intersections:

- Highway 417 Eastbound and Westbound Off-ramps form tee intersections with March Road; stop control is provided on the ramp terminals with free flow on March Road; all approaches are single lane approaches.

- March Road and Diamondview Road form a four-leg intersection with stop control on Diamondview Road. A right-turn lane is provided on the east approach.

- March Road and Thomas Argue Road form a four-leg intersection with stop control on Thomas Argue Road. All approaches are single lane approaches.

- March Road and Carp Road form a four-leg intersection and operate under traffic signal control. Designated left-turn lanes are provided on all approaches.

- Russ Bradley Road and Carp Road form a tee intersection with stop control on Russ Bradley Road. All approaches are single lane approaches.

2.3 Pedestrian, Bicycle and Transit Facilities

Gravel shoulders are provided along both sides of all study area roads.

March Road and Carp Road are identified as on-road cycling routes in Ottawa's 2008 *Transportation Master Plan* (TMP). Bicycle lanes are provided along both sides of March Road and Carp Road for the extent of the left turn lanes on each approach at the signalized intersection.

The recommended cycling network outlined in the 2008 *Ottawa Cycling Plan* (OCP) designates March Road and Carp Road as Spine or City-wide cycling routes. Paved shoulders are proposed on both roadways as part of the long-term implementation plan (2018-2028).

The site is located beyond the limits of OC Transpo bus service. Transit facilities are available at Carp Road and Highway 417 approximately 7 km south of the subject site.

2.4 Existing Traffic Volumes

The original TIS was completed based on 2005 traffic count data. New traffic count data was obtained for the purpose of this revised report.

Eight-hour weekday traffic counts were completed by the City of Ottawa at the intersection of March Road and Carp Road in June 2011, June 2009 and May 2006. The 2011 count was completed on Thursday, June 30, one day before the Canada Day long weekend. Peak hour volumes observed during this count were approximately 40% lower than those observed in 2009. The 2009 count was completed on Tuesday, June 16 and peak hour volumes observed during this count were approximately 30% higher than those observed in 2006.

Due to the variation in the City's data, Novatech conducted a new eight-hour weekday count at the March Road/Carp Road intersection on Tuesday, October 4, 2011. Counts were also conducted by Novatech at the following study area intersections:

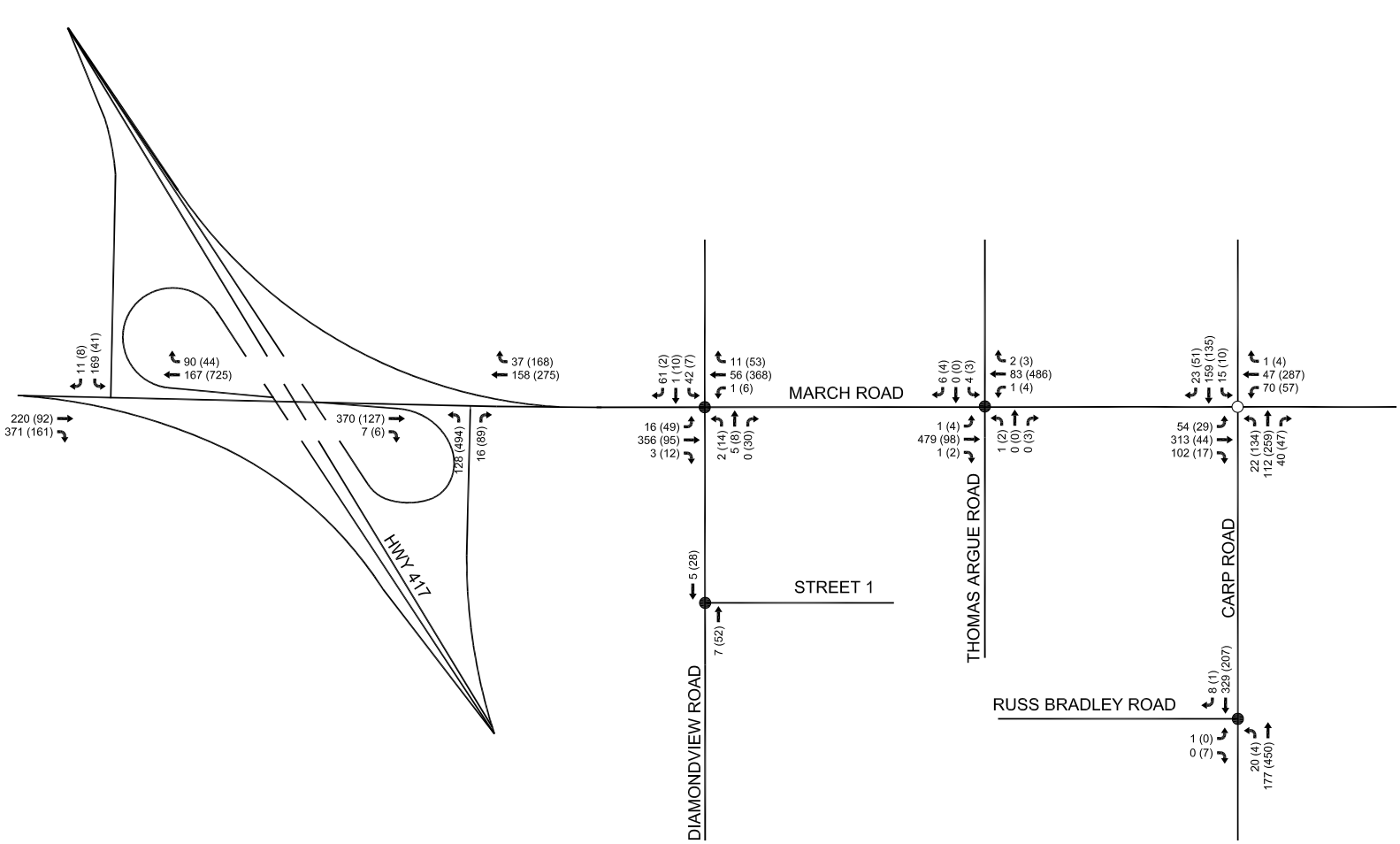
- March Road/Thomas Argue Road (October 2011)
- Carp Road/Russell Bradley Road (October 2011)
- March Road/Diamondview Road (July 2008)

Eight-hour weekday traffic counts were completed by the MTO at the Highway 417 Eastbound and Westbound Off-ramp intersections with March Road in August 2010 and June 2005.

Peak hour summary sheets for the above traffic counts are included in **Appendix A**. Existing traffic volumes are shown in **Figure 3** for the weekday a.m. and p.m. peak hours.

2.5 Collision Records

The 2008 MTO TIS Guidelines do not require a review or analysis of collision records. The MTO uses collision occurrence internally to determine any appropriate countermeasures.



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LEGEND

- Unsignalized Intersection
- Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour

WEST CAPITAL AIRPARK

EXISTING TRAFFIC VOLUMES

NOV 2011 102085 FIGURE 3

The 2006 City of Ottawa TIA Guidelines do require an evaluation of collision data to determine if there are any identifiable collision patterns. Historical collision data from the last three years was obtained from the City's Public Works and Service Department for study area intersections. Copies of the collision summary reports are included in **Appendix B**.

The Ottawa TIA Guidelines define a collision pattern as more than one collision involving similar directions and impact types. Further analysis may be warranted for intersections with a pattern of six or more collisions for any one movement or a total of 33 or more collisions over a three-year period.

The following table summarizes the number of collisions reported at each intersection from January 1, 2008 to December 31, 2010.

Table 1: Reported Collisions

Location	Number of Reported Collisions (Jan. 2006 to Jan. 2009)
Highway 417 WB Off-ramp & March Road	5
March Road & Diamondview Road	1
March Road & Thomas Argue	0
March Road & Carp Road	2

Two of the five collisions at the Westbound Off-ramp and March Road intersection were angled impacts involving northbound and eastbound movements.

None of the intersections meet the City's criteria for further analysis with respect to collision patterns or total collisions.

3.0 TRAVEL DEMAND FORECASTING

3.1 General Background Growth

The City traffic counts at the March Road/Carp Road intersection were reviewed to determine if a historical traffic growth rate could be established. Due to the variation of traffic volumes observed in 2011, 2009 and 2006, Planning and Growth Management Department staff was contacted and snapshots from the Long-Range Transportation Model were provided by the Transportation Strategic Planning Unit. The TRANS Model 2005 Existing and 2031 Simulated a.m. peak hour scenarios are included in **Appendix C**.

Based on the TRANS model output, a compound annual growth rate of 2% was confirmed with City and MTO staff for future background traffic projections at all study area intersections.

3.2 Other Study Area Developments

In the original TIS assumptions were made to account for anticipated future development within the Village of Carp. The same assumptions have been carried forward in this report and development levels have been updated as follows to reflect the 2014 and 2019 horizon years.

The Village of Carp Class Environmental Assessment (EA) for Water and Wastewater Infrastructure Upgrade/Expansion (December 2007) identified potential areas for new residential development within the village limits. At build-out, new developments are expected to result in an additional 750 residential units, with an estimated increase in population of approximately 2,000 people. Build-out of residential development within the Village of Carp is expected by 2031. Excerpts from the Village of Carp EA are included in **Appendix D**.

The estimated number of new residential units constructed within the Village of Carp was determined for each horizon year based on the construction of 750 residential units over 25 years.

It is assumed that 70% of traffic generated by future development within the Village of Carp may travel to and from the south along Carp Road in the a.m. and p.m. peak hours. This assumption is based on the existing study area traffic patterns.

Traffic generated by future development within the Village of Carp was determined using the Trip Generation Manual (Institute of Transportation Engineers 8th Edition) and is shown in the following table.

Table 2: Trip Generation – Village of Carp

Year	Total Units	AM Peak				PM Peak			
		Total Trips	Carp Rd Trips	In	Out	Total Trips	Carp Rd Trips	In	Out
2014	210	118	82	18	64	161	112	73	39
2019	360	195	136	30	106	262	183	119	64

Notes:
1. Total Trips have been estimated using the ITE rate for Residential Planned Unit Development (Land Use Code 270).
2. It is assumed that 70% of total trips will travel to and from the south along Carp Road.

Trips entering and leaving the Carp Road/March Road intersection were distributed based on recent traffic count data. The following distribution was assumed:

- 85% to/from the south on Carp Road
- 10% to/from the west on March Road towards Highway 417
- 5% to/from the east on March Road towards Kanata North

Background traffic projections for the 2014 and 2019 horizon years were calculated by applying the 2% background growth rate to the most recent traffic count data and adding the trips generated by the anticipated future development within the Village of Carp.

Background traffic volumes for the 2014 and 2019 horizon years are shown in **Figures 4 and 5** for the weekday a.m. and p.m. peak hours.

3.3 Trip Generation

Trips generated by the proposed development have been estimated using the ITE rates for single-family dwelling units (Land Use Code 210), residential condos/townhouses (Land Use Code 230), and industrial park (Land Use Code 130). The proposed clubhouse area is for the use of residents only and is not expected to generate external trips.

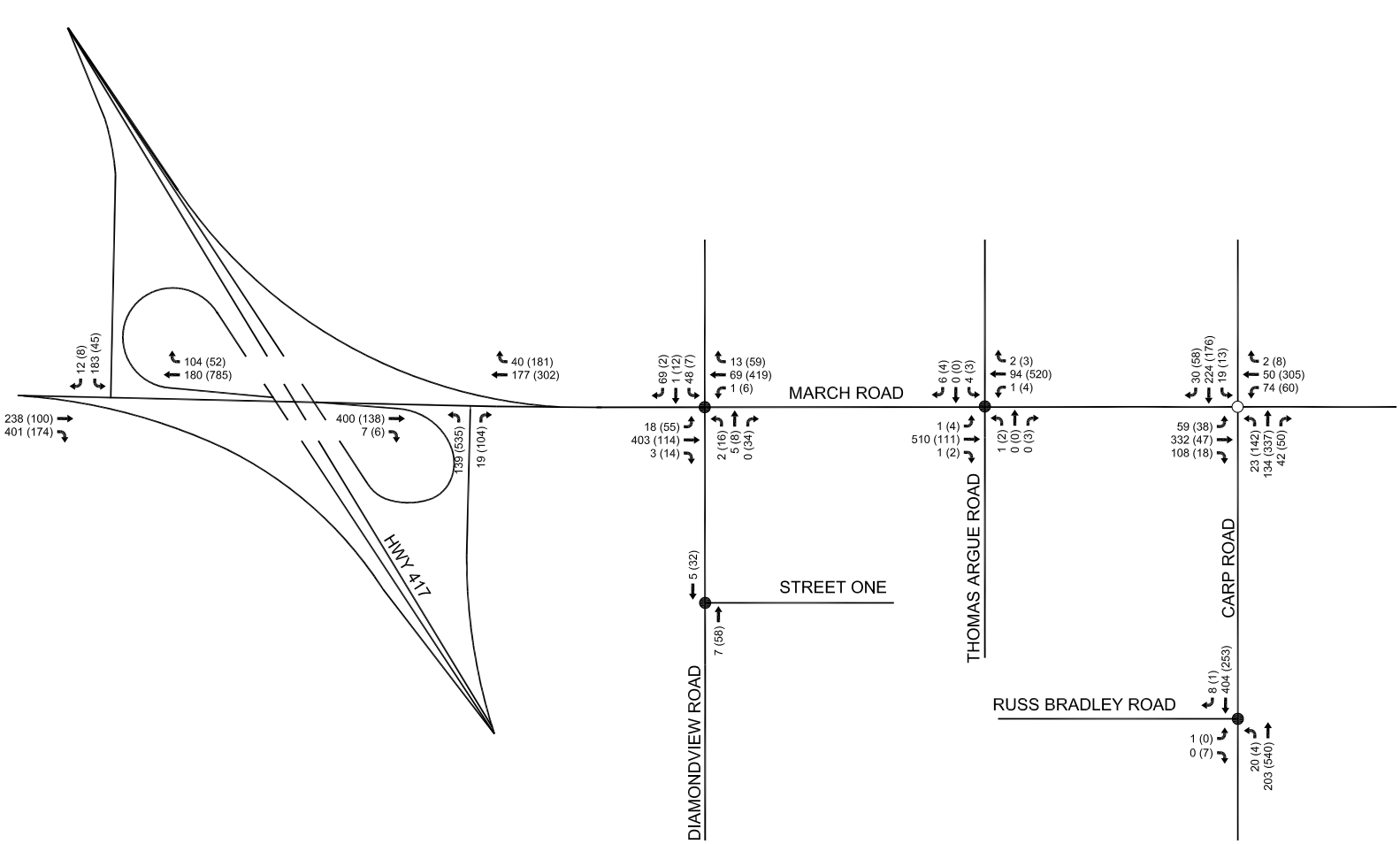
Peak site traffic at the public park is expected during evenings and weekends when the adjacent street traffic is lower. Trips generated in the weekday a.m. and p.m. peak hours are expected to be minimal and have not been estimated for the purpose of this analysis.

The trip generation surveys compiled in the *ITE Trip Generation Manual* record only vehicle trips and the sites surveyed are typically located in suburban areas in the United States where non-auto modes of transportation have a modal share of 10% or less. The non-auto modal share identified in the *2005 Trans O-D Survey Report* for the Ottawa Rural West district is similar to those observed in the ITE trip generation surveys. However, the proposed development is designed to attract frequent users of aviation services and is expected to generate a number of aircraft trips and potentially fewer auto trips than other traditional mixed-use developments. Due to the unique nature of the development, trip generation surveys from sites with similar operating and market characteristics are not readily available.

In the absence of local data, the ITE rates for residential development have been used directly and no adjustments have been made to reflect reduced auto trips.

The Helicopter Transport Canada and RCMP facilities currently located at the Carp Airport are considered to be representative of the types of businesses that may be attracted to the Aerospace Business Park. Based on the 2011 traffic count conducted at the Carp Road/Russ Bradley Road intersection, these sites are generating approximately 30 vph in the a.m. peak and 15 vph in the p.m. peak. The gross floor area of the two facilities is estimated at 100,000 ft^2. If the trips generated by the proposed business park are estimated by pro-rating the observed number of trips, then Phase One development could generate 60 vph in the a.m. peak and 30 vph in the p.m. peak. At full buildout, the proposed business park could generate 240 vph in the a.m. peak and 120 vph in the p.m. peak. These projections reflect the possibility that all businesses attracted to the Aerospace Business Park could be aviation-based and low generators of auto-traffic. In the interest of producing conservative results, the pro-rated trips have been adjusted by averaging them with the total number of trips that would be generated based on the ITE rate for a traditional industrial park.

The estimated number of vehicle trips generated by Phase One development and full build-out is shown in the following table.



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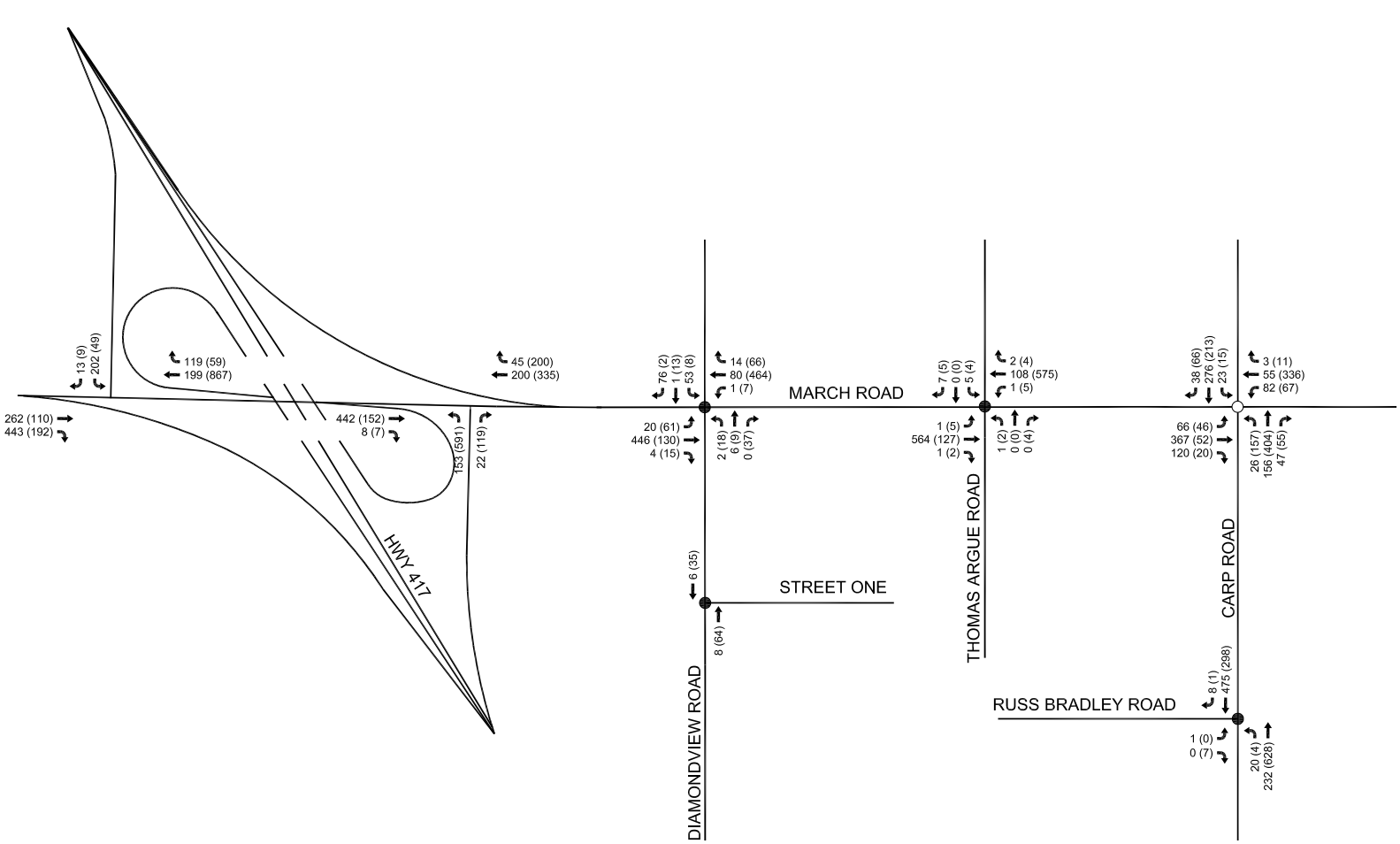
LEGEND

- Unsignalized Intersection
- Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour

WEST CAPITAL AIRPARK

2014 BACKGROUND TRAFFIC VOLUMES

NOV 2011 102085 FIGURE 4



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LEGEND

- Unsignalized Intersection
- Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour

WEST CAPITAL AIRPARK

2019 BACKGROUND TRAFFIC VOLUMES

NOV 2011 102085 FIGURE 5

Table 3: Trip Generation – West Capital Airpark

Land Use	Code	Units	AM Peak			PM Peak		
			In	Out	Total	In	Out	Total
Phase One								
Single Homes	210	150	27	81	108	89	53	142
Industrial Park	110 [2]	200,000 ft^2	93	21	114	21	80	101
Phase One			**120**	**102**	**222**	**110**	**133**	**243**
Full Build-out								
Single Homes	210	288	52	156	208	169	99	268
Condos/Towns	230	41	4	21	25	19	10	29
Industrial Park	110 [2]	800,000 ft^2	374	82	456	84	320	404
Full Build-out			**430**	**259**	**689**	**272**	**429**	**701**

Notes:
1. No adjustments have been made to account for an aircraft modal share of trips generated by the residential development.
2. Trips generated by the proposed business park have been estimated by taking an average of pro-rated observed trips and trips calculated using ITE Land Use Code 130 (Industrial Park).

At full build-out a roadway connection will be provided between the residential and north business park components. It is anticipated that business park owners and employees may take advantage of living in the same community as their place of work and the development may generate a number of internal trips. No adjustments have been made to reflect a reduced number of external trips on the adjacent roadway system and the findings of the analysis will be conservative in this respect.

3.4 Trip Distribution

The distribution of trips generated by the proposed residential development has been estimated based on existing peak hour travel patterns within the study area and is summarized as follows.

- 10% to/from the north via Highway 417
- 20% to/from the east via March Road
- 5% to/from the south via Diamondview Road
- 55% to/from the south via Highway 417
- 10% to/from the west via March Road

All Phase One residential trips are assigned to the proposed Diamondview Road/Street One access. At full build-out, half of the residential trips to and from the east via March Road are assigned to the proposed Thomas Argue Road/Street Six access.

The distribution of trips generated by the proposed Phase One business park has been estimated based on existing travel patterns to and from the Village of Carp and Statistics Canada census data for the surrounding communities of Arnprior, Mississippi Mills, Kanata, Kanata North, Stittsville and Richmond. Trip distribution assumptions are as follows:

- 10% to/from the north via Highway 417
- 5% to/from the north via Carp Road
- 20% to/from the east via March Road
- 50% to/from the south via Carp Road
- 15% to/from the west via March Road

At full-buildout it is assumed that 40% of trips generated by the north business park will travel to and from the south via Highway 417 and 10% will travel to/from the south via Carp Road.

Phase One peak hour site traffic is shown in **Figure 6**. Full build-out peak hour site traffic is shown in **Figure 7**.

Total traffic for 2014 and 2019 have been calculated by adding the peak hour site traffic with the projected background traffic. The 2014 and 2019 total traffic volumes are shown in **Figures 8 and 9**.

4.0 INTERSECTION ANALYSIS

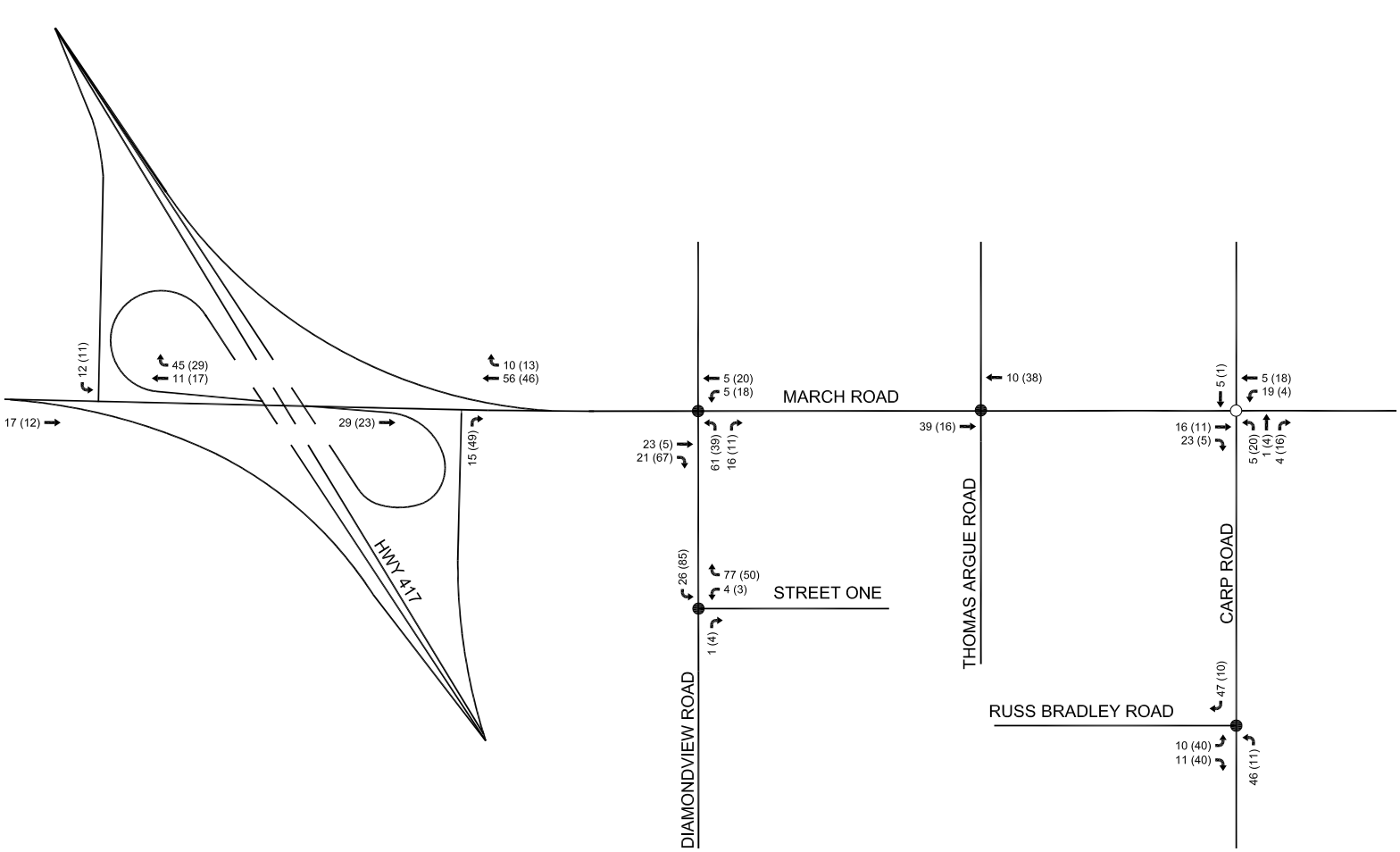
Intersection capacity analysis has been completed using the Synchro 8.0 software package. Operating conditions at signalized intersections have been evaluated in terms of the volume to capacity (v/c) ratio and the corresponding Level of Service (LOS) as outlined in the City of Ottawa TIA Guidelines. Operating conditions at unsignalized intersections have been evaluated in terms of delay and the corresponding LOS based on *Highway Capacity Manual 2000* (HCM) criteria. Mitigation measures in the form of additional lane capacity, intersection control modifications, and/or traffic signal adjustments have been identified for movements with a LOS E or F.

4.1 Existing Traffic

Intersection capacity analysis has been completed for the existing traffic condition.

The analysis is based on existing lane configurations and traffic signal timing plans obtained from the Public Works & Services Department.

The results of the analysis are summarized in the following table for the weekday a.m. and p.m. peak hours. Detailed reports are included in **Appendix E**.



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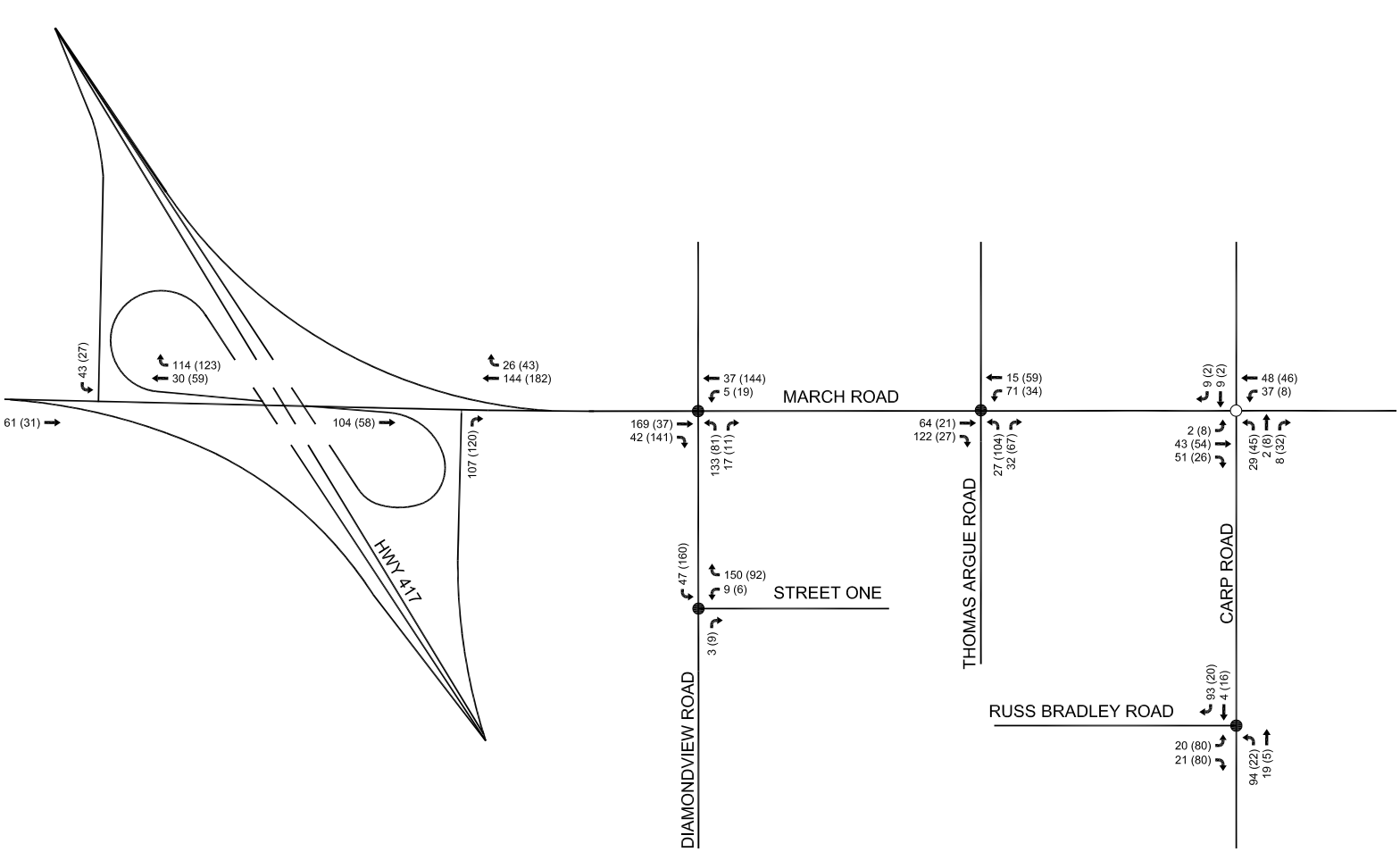
LEGEND

- Unsignalized Intersection
- Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour

WEST CAPITAL AIRPARK

PHASE 1 SITE TRIPS

NOV 2011 102085 FIGURE 6



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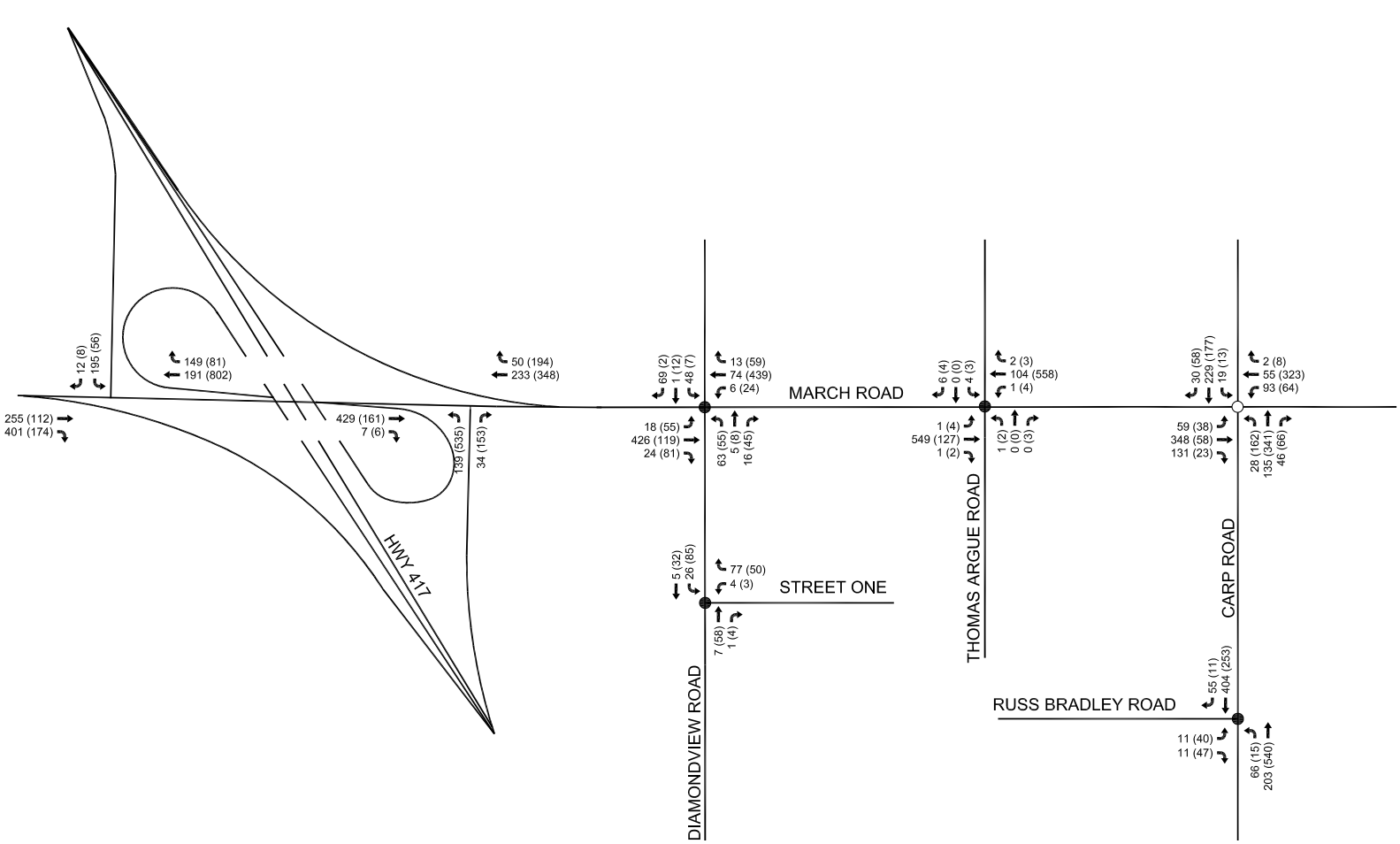
LEGEND

- Unsignalized Intersection
- Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour

WEST CAPITAL AIRPARK

BUILDOUT SITE TRIPS

NOV 2011 102085 FIGURE 7



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LEGEND

- Unsignalized Intersection
- Signalized Intersection

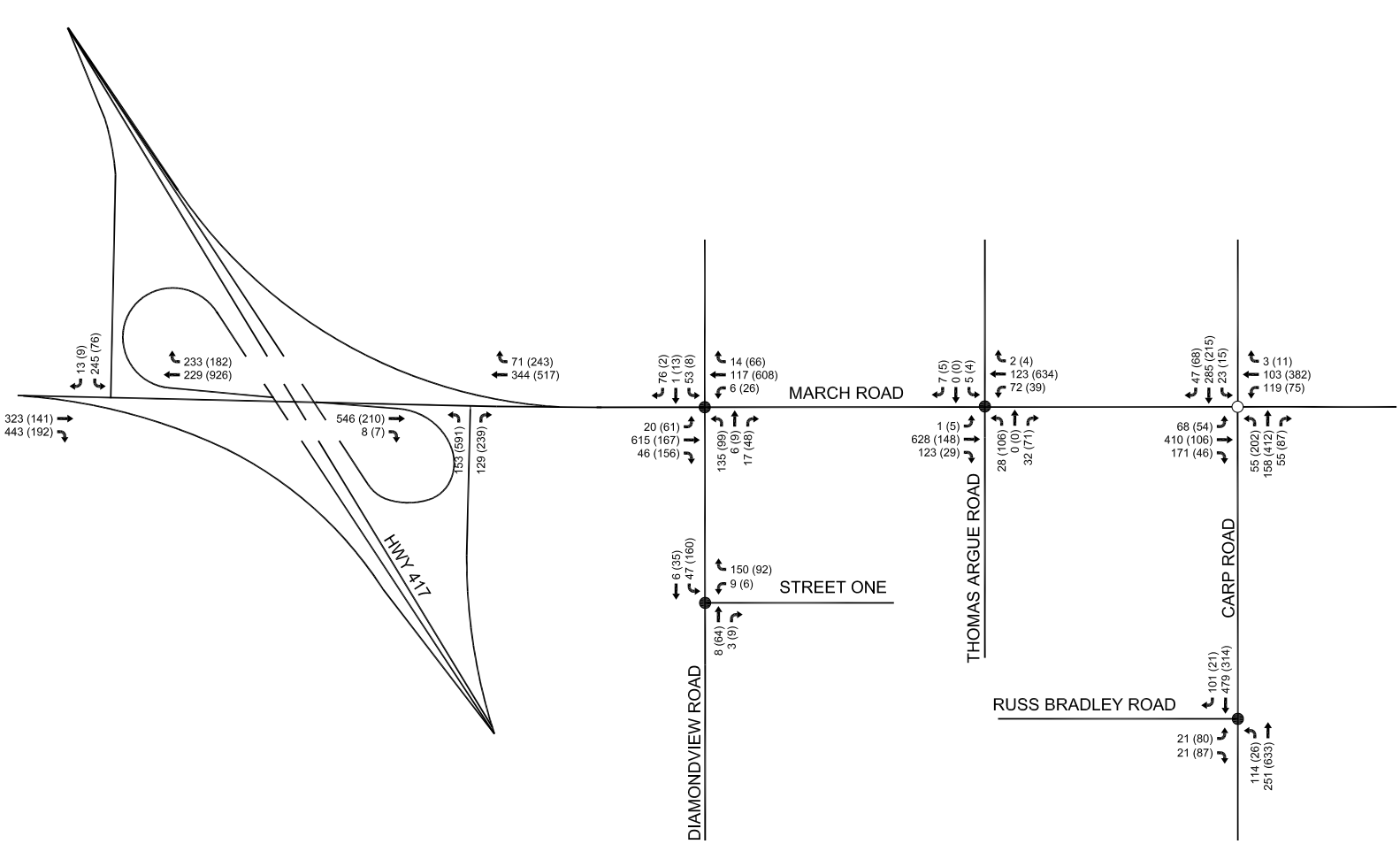
xx VPH AM Peak Hour

(xx) VPH PM Peak Hour

WEST CAPITAL AIRPARK

2014 TOTAL TRAFFIC

NOV 2011 102085 FIGURE 8



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LEGEND

- Unsignalized Intersection
- Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour

WEST CAPITAL AIRPARK

2019 TOTAL TRAFFIC

NOV 2011 102085 FIGURE 9

Table 4: Intersection Analysis – Existing Traffic

Intersection	AM Peak			PM Peak		
	max. v/c or delay	LOS	movement	max. v/c or delay	LOS	movement
Hwy 417 EB Off-Ramp / March	14 sec	B	SB	19 sec	C	SB
Hwy 417 WB Off-Ramp / March	16 sec	C	NB	**86 sec**	**F**	**NB**
Diamondview / March	13 sec	B	NB	16 sec	C	SB
Thomas Argue / March	14 sec	B	NB	13 sec	B	SB
Carp / March	0.65	B	EBT/R	0.56	A	NBT/R
Carp / Russ Bradley	13 sec	B	EB	10 sec	A	EB

Based on the above results, the northbound approach of the Highway 417 WB Off-ramp at the March Road intersection operates at a LOS F in the p.m. peak hour. The v/c ratio for the northbound approach is 1.08 in the p.m. peak with a queue length of 140 meters. A site visit was conducted on Wednesday, October 26, 2011 between 4:30 p.m. and 5:30 p.m. During the site visit the following operating conditions were observed:

- motorists making the northbound right-turn movement consistently bypass the left-turn queue and treat the approach as if there are two lanes;
- queues of 10 to 15 vehicles were observed for motorists making the left-turn movement; and,
- delays of up to 1 minute 20 seconds were observed for vehicles turning left.

The need for traffic signal control was reviewed using the procedure outlined in the *Ontario Traffic Manual Book 12*. Traffic signal justification calculations are provided in **Appendix F**. The calculations show that traffic signals are justified based on the 2010 traffic count volumes. The installation of traffic signal control should be considered to address the failing condition.

The p.m. peak northbound right-turn volume meets the channelization criteria (60 vph or more) outlined in Section E.8 of the MTO Geometric Design Standards. A right-turn lane with 90m of storage and a taper length of 90m is recommended. Proposed functional geometry is shown in **Figure 10**.

Additional analysis shows that all movements would operate at an acceptable level with the recommended modifications. Detailed reports are included in **Appendix E**.

Movements at all other study area intersections are operating at a LOS C or better, which reflects acceptable operating conditions according to MTO and City standards.

HIGHWAY 417 RAMP

MARCH ROAD

30m

R=0.6

30m

R=0.6

R=25m

5.75

145m TAPER

5.75

R=600m

90m

3.5

90m TAPER

HIGHWAY 417 RAMP

HIGHWAY 417 EB

HIGHWAY 417 WB

M:\2002\102085\CAD\Pre-Design\CAD\Traffic\102085-2011-FIG10.dwg, FIG-11x17 landscape, Nov 17, 2011 - 11:04am, rgrayton

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SCALE

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WEST CAPITAL AIRPARK

FUNCTIONAL GEOMETRY

HIGHWAY 417 WB OFF-RAMP/
MARCH ROAD

NOV 2011 102085 FIGURE 10

SHT11X17.DWG - 279mmX432mm

4.2 2014 Background Traffic

Intersection capacity analysis has been completed for the projected 2014 background traffic condition.

Traffic signal control and a channelized right-turn lane are assumed at the Highway 417 WB Off-ramp and March Road intersection.

The results of the analysis are summarized in the following table for the weekday a.m. and p.m. peak hours. Detailed reports are included in **Appendix E**.

Table 5: Intersection Analysis – 2014 Background Traffic

Intersection	AM Peak			PM Peak		
	max. v/c or delay	LOS	movement	max. v/c or delay	LOS	movement
Hwy 417 EB Off-Ramp / March	15 sec	B	SB	20 sec	C	SB
Hwy 417 WB Off-Ramp / March	0.42	A	NBL	**0.83**	**D**	**NBL**
Diamondview / March	14 sec	B	NB	17 sec	C	SB
Thomas Argue / March	15 sec	B	NB	14 sec	B	SB
Carp / March	0.67	B	EBT/R	0.67	B	NBT/R
Carp / Russ Bradley	14 sec	B	EB	10 sec	A	EB

Notes:
1. Traffic signal control and channelized right-turn lane assumed at Highway 417 WB Off-ramp/March Road.

A v/c ratio of 0.83 is expected for the northbound left-turn movement at the Highway 417 WB-Off-ramp and March Road intersection during the p.m. peak. A queue length of 90m is anticipated. According to MTO standards the operation of this movement is deemed critical and should be considered for geometric improvement. Monitoring is recommended to determine if actual background growth and growth within the Village of Carp meet or exceed the assumed rates.

The p.m. peak eastbound left-turn volume at the March Road/Diamondview Road intersection meets the MTO criteria for a dedicated left-turn storage lane. A copy of the left-turn storage lane graph is included in **Appendix F**. Based on a 90 km/hr design speed, a 15m storage length, 60m parallel length and 145m taper are recommended.

A westbound left turn lane is warranted at the March Road/Thomas Argue Road intersection based on the advancing and opposing p.m. peak volumes. A copy of the left-turn storage lane graph is included in **Appendix F**. In accordance with City comments dated April 13, 2006, an opposing eastbound left-turn lane should also be provided. Storage lengths of 15m, parallel lane lengths of 60m and 145m taper lengths are recommended.

4.3 2019 Background Traffic

Intersection capacity analysis has been completed for the projected 2019 background traffic condition.

In addition to the recommended modifications at the Highway 417 WB Off-ramp/March Road intersection, a dedicated eastbound left-turn lane is assumed at the March Road/Diamondview Road intersection.

The results of the analysis are summarized in the following table for the weekday a.m. and p.m. peak hours. Detailed reports are included in **Appendix E**.

Table 6: Intersection Analysis – 2019 Background Traffic

Intersection	AM Peak			PM Peak		
	max. v/c or delay	LOS	movement	max. v/c or delay	LOS	movement
Hwy 417 EB Off-Ramp / March	17 sec	C	SB	24 sec	C	SB
Hwy 417 WB Off-Ramp / March	0.45	C	NBL	**0.86**	**D**	**NBL**
Diamondview / March	15 sec	B	NB	19 sec	C	SB
Thomas Argue / March	16 sec	C	NB	15 sec	B	SB
Carp / March	0.71	C	EBT/R	0.71	C	NBT/R
Carp / Russ Bradley	16 sec	C	EB	10 sec	B	EB

Notes:
1. Traffic signal control and channelized right-turn lane assumed at Highway 417 WB Off-ramp/March Road.
2. EB left-turn lane assumed at March Road/Diamondview Road.

The v/c ratio for the northbound left-turn movement at the Highway 417 WB Off-ramp and March Road intersection is expected to increase from 0.83 to 0.86 during the p.m. peak. A queue length of 110m is anticipated.

4.4 2014 Total Traffic

Intersection capacity analysis has been completed for the projected 2014 total traffic condition.

Traffic signal control and a channelized right-turn lane are assumed at the Highway 417 WB Off-ramp and March Road intersection.

The results of the analysis are summarized in the following table for the weekday a.m. and p.m. peak hours. Detailed reports are included in **Appendix E**.

Table 7: Intersection Analysis – 2014 Total Traffic

Intersection	AM Peak			PM Peak		
	max. v/c or delay	LOS	movement	max. v/c or delay	LOS	movement
Hwy 417 EB Off-Ramp / March	16 sec	C	SB	22 sec	C	SB
Hwy 417 WB Off-Ramp / March	0.43	A	EB	0.83	D	NBL
Diamondview / March	18 sec	C	NB	20 sec	C	SB
Diamondview / Street One	9 sec	A	WB	9 sec	A	WB
Thomas Argue / March	16 sec	C	NB	14 sec	B	SB
Carp / March	0.71	C	EBT/R	0.69	B	NBT/R
Carp / Russ Bradley	14 sec	B	EB	15 sec	C	EB

Notes:
1. Traffic signal control and channelized right-turn lane assumed at Highway 417 WB Off-ramp/March Road.

Right-turn lanes are generally considered when the design volume is such that it creates a hazard and reduces capacity or when the volume approaches the channelization criteria (60 vph or more). Based on the existing rural cross section (gravel shoulders), the 90 km/hr design speed and an anticipated p.m. peak hour volume of 80 vph, an eastbound right-turn lane is recommended at the Diamondview Road/March Road intersection. A parallel lane length of 70m and a 75m taper should be provided.

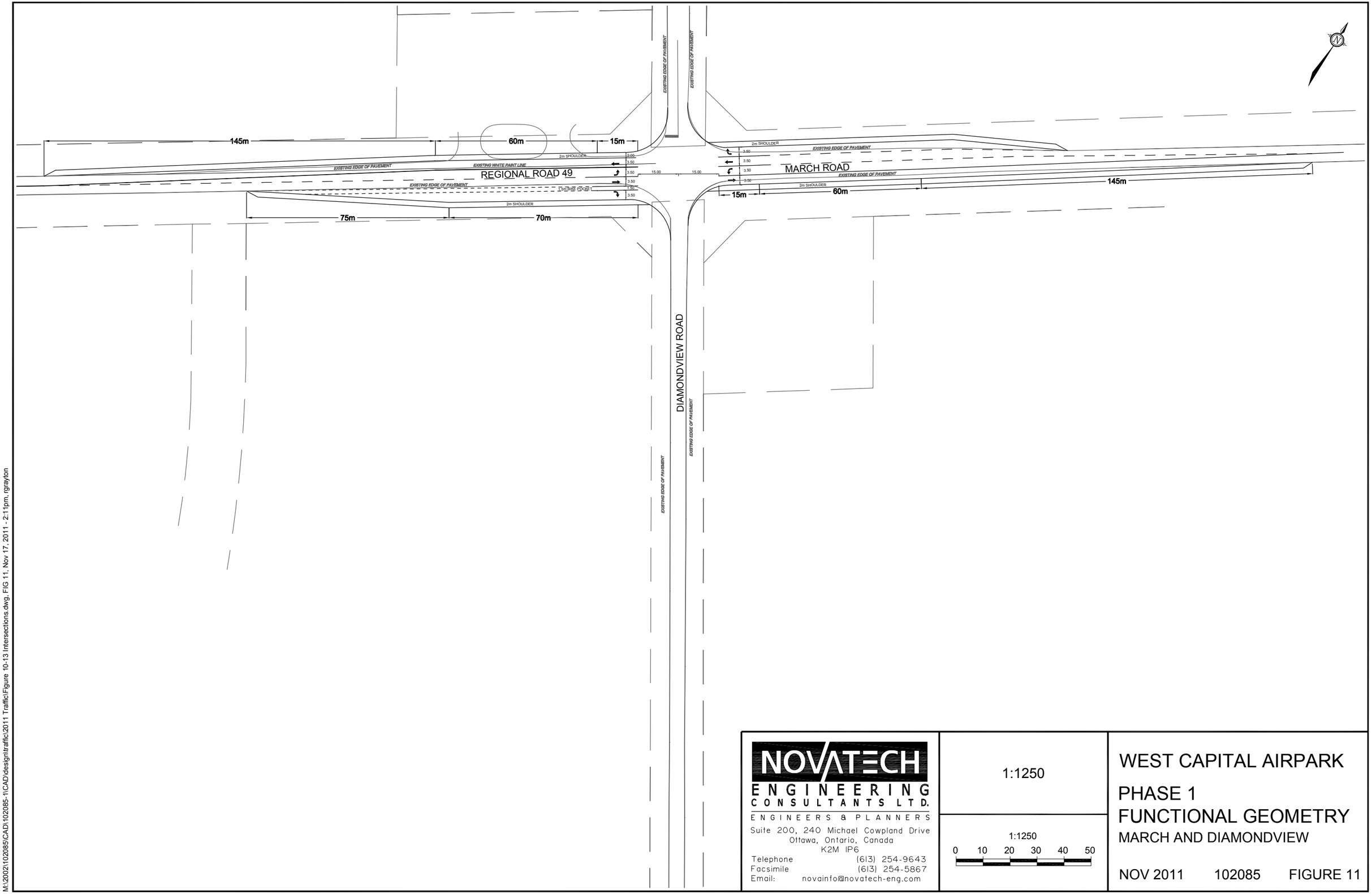
The p.m. peak westbound left-turn volume at the March Road/Diamondview Road intersection meets the MTO criteria for a dedicated left-turn storage lane. A copy of the left-turn storage lane graph is included in **Appendix F**. Based on a 90 km/hr design speed, a 15m storage length, 60m parallel length and 145m taper should be provided.

A southbound right-turn lane is recommended at the Carp Road/Russ Bradley Road intersection based on the same criteria as outlined above. A northbound left-turn lane is also warranted based on the anticipated a.m. peak hour volumes. A copy of the left-turn storage lane graph is included in **Appendix F**. Based on a 90 km/hr design speed, a 15m storage length, 60m parallel length and 145m taper should be provided.

Functional geometry for the recommended modifications at the March Road/Diamondview Road, March Road/Thomas Argue Road and Carp Road/Russ Bradley Road intersections is shown in **Figures 11, 12 and 13**. It should be noted that the modifications shown at the March Road/Thomas Argue Road intersection are based on the projected background traffic, without the addition of site generated traffic.

4.5 2019 Total Traffic

Intersection capacity analysis has been completed for the projected 2019 total traffic condition.



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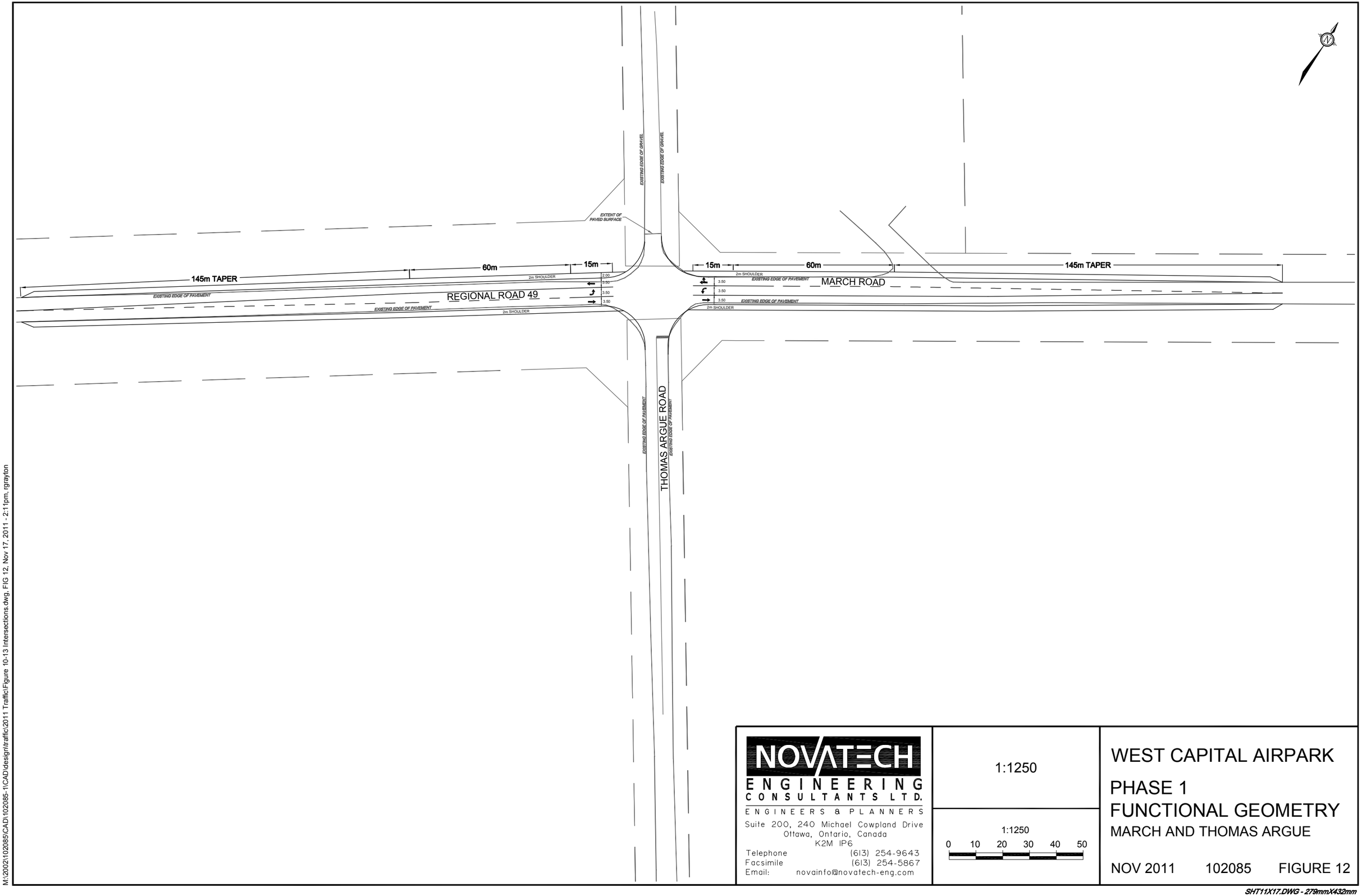
WEST CAPITAL AIRPARK

PHASE 1
FUNCTIONAL GEOMETRY
MARCH AND DIAMONDVIEW

NOV 2011 102085 FIGURE 11



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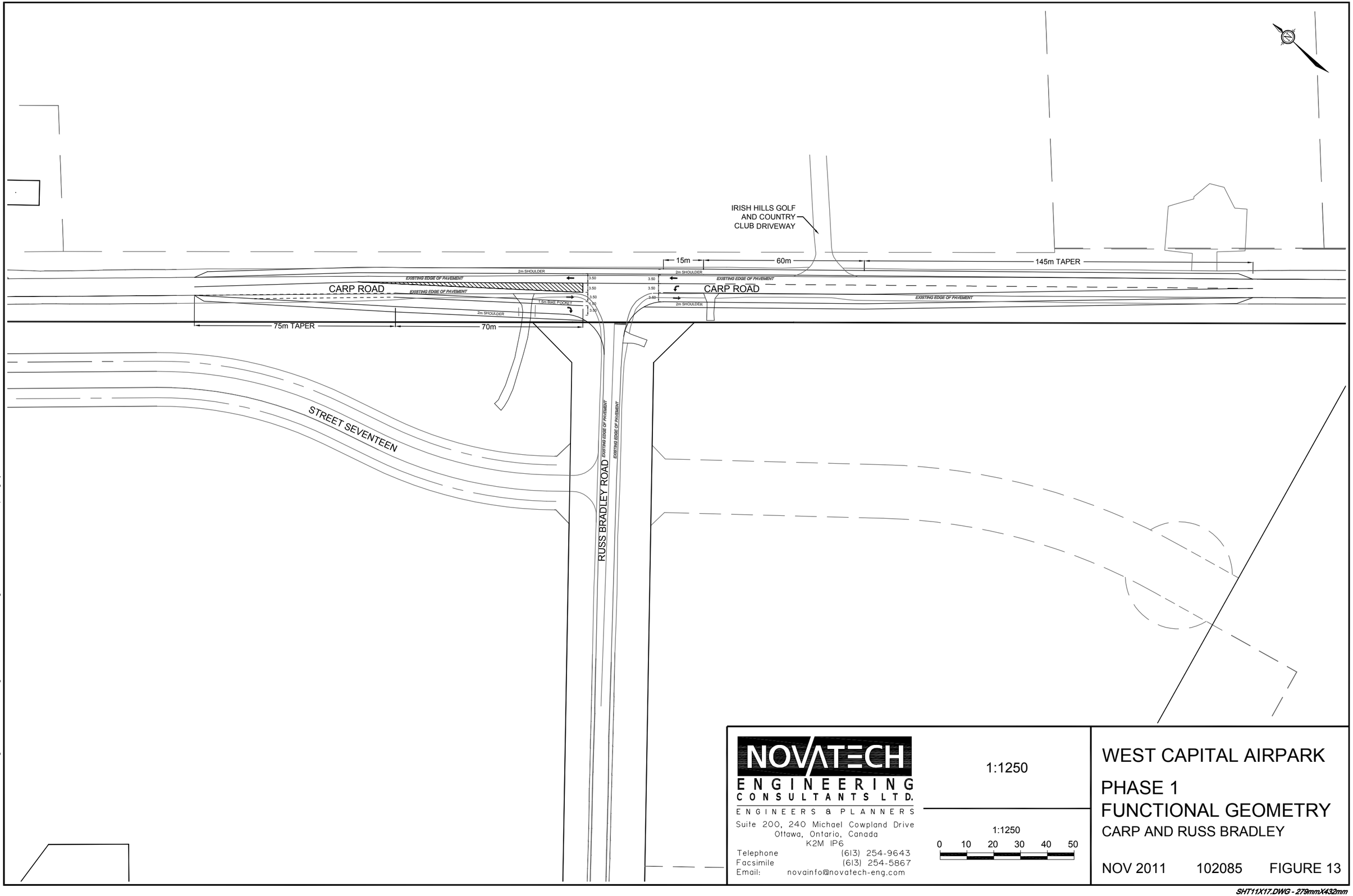
WEST CAPITAL AIRPARK

PHASE 1
FUNCTIONAL GEOMETRY
MARCH AND THOMAS ARGUE

NOV 2011 102085 FIGURE 12



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WEST CAPITAL AIRPARK

PHASE 1
FUNCTIONAL GEOMETRY
CARP AND RUSS BRADLEY

NOV 2011 102085 FIGURE 13

All recommended geometric modifications are assumed to be in place for the analysis of the 2019 total traffic condition.

The results of the analysis are summarized in the following table for the weekday a.m. and p.m. peak hours. Detailed reports are included in **Appendix E**.

Table 8: Intersection Analysis – 2019 Total Traffic

Intersection	AM Peak			PM Peak		
	max. v/c or delay	LOS	movement	max. v/c or delay	LOS	movement
Hwy 417 EB Off-Ramp / March	23 sec	C	SB	32 sec	D	SB
Hwy 417 WB Off-Ramp / March	0.57	A	EB	**0.93**	**F**	**WB**
Diamondview / March	**59 sec**	**F**	**NB**	**69 sec**	**F**	**NB**
Diamondview / Street One	9 sec	A	WB	9 sec	A	WB
Thomas Argue / March	23 sec	C	NB	32 sec	D	NB
Carp / March	0.79	C	EBT/R	0.72	C	WBT/R
Carp / Russ Bradley	18 sec	C	EB	25 sec	C	EB

Notes:
1. Traffic signal control and channelized right-turn lane assumed at Highway 417 WB Off-ramp/March Road.
2. Dedicated left-turn lanes assumed at March Road/Diamondview Road, March Road/Thomas Argue Road and Carp Road/Russ Bradley Road.
3. Eastbound right-turn lanes assumed at March Road/Diamondview Road and March Road/Thomas Argue Road. Southbound right-turn lane assumed at Carp Road/Russ Bradley Road.

A v/c ratio of 0.93 is expected for the westbound through movement at the Highway 417 WB Off-ramp and March Road intersection during the p.m. peak with a queue length of 160m. If five seconds of green time are reassigned from the off-ramp to March Road, the v/c for the westbound through movement is improved to 0.85 and the queue reduced to 140m. The v/c for northbound left-turn movement is expected to increase from 0.86 to 0.89, also with a queue of 140m. Detailed reports are included in **Appendix E**.

A number of conservative assumptions have been made for this assessment, including:

- a 2% background growth rate applied over an eight year period
- significant growth within the Village of Carp, and
- no adjustment factor to account for the effect of internal trips.

Continued monitoring of traffic volumes following the construction of the initial phase of development is recommended.

Failing operating conditions are expected for the northbound approach of the March Road/Diamondview Road intersection. A northbound left-turn lane is recommended. Based on a 90 km/hr design speed, a storage lane length of 30m, a parallel lane length of 60m and a 145m taper should be provided. With a dedicated turning lane, the v/c ratio is improved from 0.81 to 0.69 however a failing LOS based on delay is still anticipated. Monitoring of actual operating conditions is recommended.

Based on the projected volume of eastbound right-turn traffic at the March Road/Thomas Argue Road intersection, a right-turn lane with 70m of parallel lane length and a 75m taper should be provided.

Functional geometry for the recommended intersection modifications to accommodate full build-out of the development is shown in **Figures 14 and 15**. This report is written in support of Phase One development and an additional study will be prepared prior to the construction of future phases of development.

5.0 PROVISIONS FOR NON-AUTO MODES

Concrete sidewalks are proposed along both sides of Street One and along the south side of Street Nine. On-site pedestrian walkways should be provided at the main entrances to the future business park buildings, between adjacent buildings and connecting areas where employees may congregate. The location of on-site pedestrian walkways will be determined at the detailed design stage.

The site is located in Area D of Schedule 1 to the City of Ottawa's Zoning By-law. Bicycle parking must be provided for lands located in the villages of Ashton, Burritt's Rapids, Carlsbad Springs, Carp, Constance Bay, Cumberland, Dunrobin, Fallowfield, Fitzroy Harbour, Galetta, Greely, Kars, Kenmore, Kinburn, Manotick, Marionville, Metcalfe, Munster, Navan, North Gower, Notre Dame des Champs, Osgoode, Richmond, Sarsfield, Vars and Vernon located in Area D on Schedule 1. On-site bicycle parking is not required based on the location of the site.

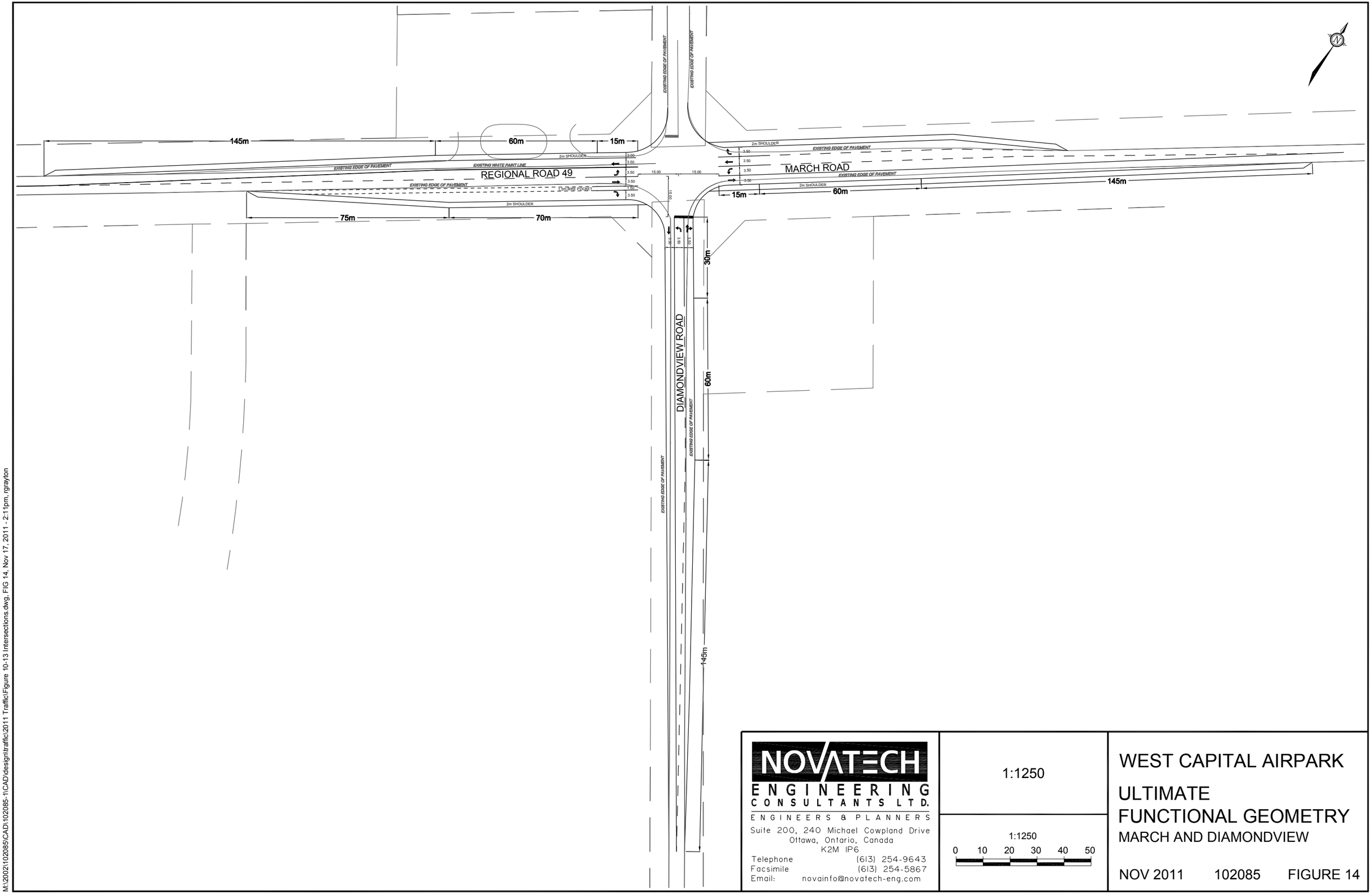
No on-site transit provisions are proposed since the site is located beyond the limits of OC Transpo bus service.

6.0 ON-SITE DESIGN

This section of the report provides a review of the on-site design in terms of vehicle access, on-site parking, and on-site loading activities.

6.1 Proposed Access

Auto access to the Phase One residential communities will be provided by Street One. Street One will intersect Diamondview Road at a 90 degree angle approximately 750m south of the March Road/Diamondview Road intersection. A single-family home driveway will form the west leg of the proposed Diamondview Road/Street One intersection. The alignment of the low-volume driveway and Street One is not expected to impact traffic operations. A guard hut is proposed at the Street One access to provide security for residents of the West Capital Airpark. The nearest intersection



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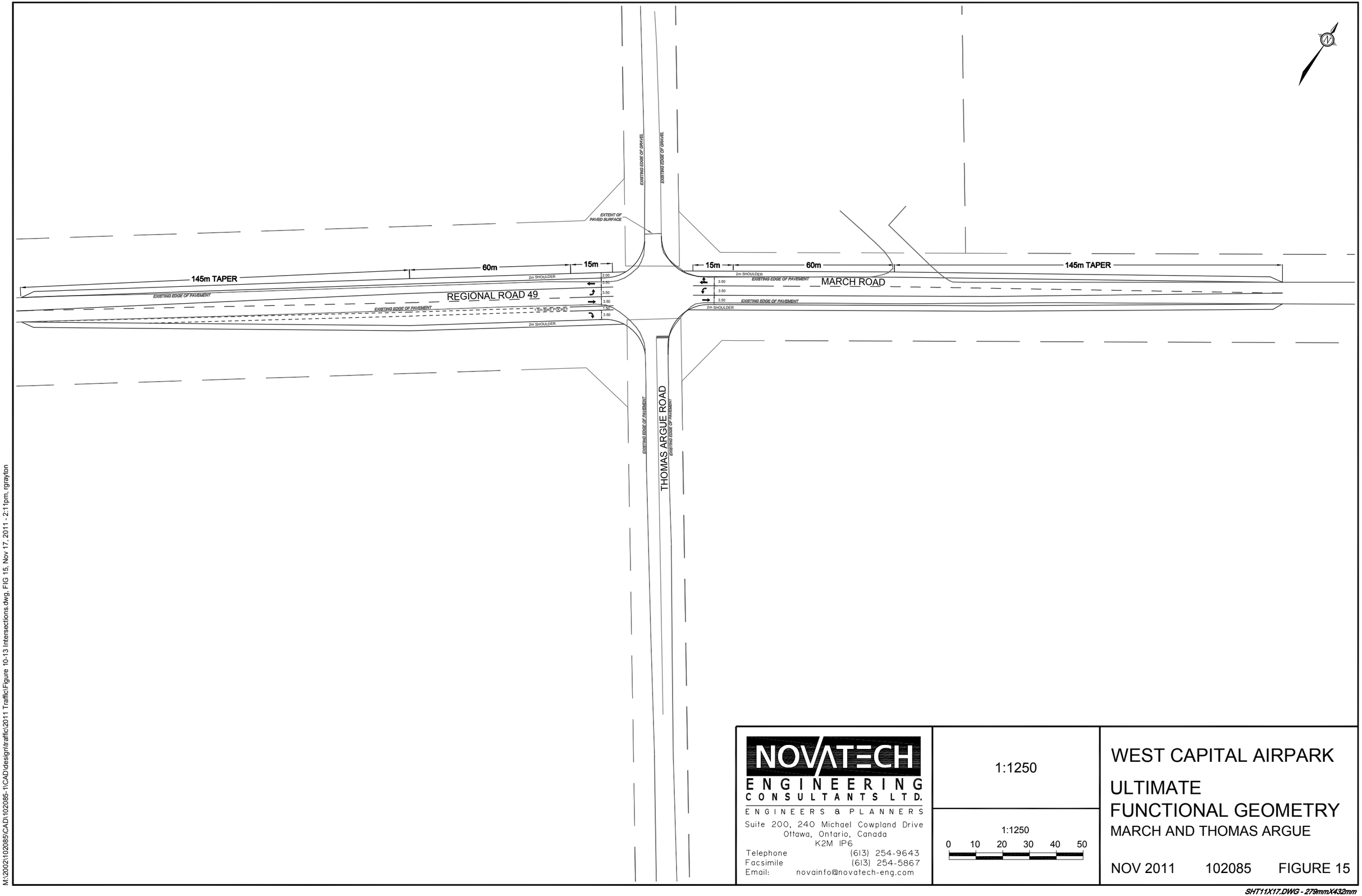
WEST CAPITAL AIRPARK

ULTIMATE FUNCTIONAL GEOMETRY

MARCH AND DIAMONDVIEW

NOV 2011 102085 FIGURE 14



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WEST CAPITAL AIRPARK

ULTIMATE FUNCTIONAL GEOMETRY

MARCH AND THOMAS ARGUE

NOV 2011 102085 FIGURE 15

to the south is Diamondview Road and McGee Side Road, over 2 km south of the Street One access. Internal Streets Two and Three intersect Street One approximately 70 meters east of Diamondview Road (measuring centerline to centerline).

In accordance with draft conditions, the proponent will upgrade Diamondview Road between the Street One access and March Road as part of Phase One development to the satisfaction of the City of Ottawa.

Russ Bradley Road will provide auto access to the Phase One business park. The proponent will upgrade Russ Bradley Road as part of Phase One development.

The driveway to the Irish Hill Golf and Country Club is approximately 80m south of Russ Bradley Road on the opposite side of Carp Road. Given the relative location of the offset accesses, additional consideration has been given to the left turn movements into the opposite sites.

The Irish Hills site consists of a 27-hole golf course with a club house and pro shop. Using the ITE land use rate 430, site generated traffic is estimated at 60 vph in the weekday a.m. and p.m. peak hours. If the trip distribution is consistent with the population of surrounding communities (Carp, Dunrobin, Kanata, Stittsville, Almonte) then 80% of trips travel to and from the south and 20% to and from the north. This amounts to a low volume of traffic (5 to 10 vph) making the southbound left turn movement into the golf club site during the weekday peak hours.

The projected volume of northbound left turn traffic into the West Capital Airpark site is highest in the a.m. peak, and is estimated at 65 vph in Phase One and 115 vph at full buildout. Based on the number of vehicles that are likely to accumulate in two minutes (S=NL/30), the anticipated queue lengths will be approximately 15m and 30m respectively. The deceleration length of the recommended northbound left turn lane will extend across the golf site access however the northbound left turn queue should not impact turning movements to and from the golf site.

6.2 On-site Parking

On-site vehicle parking will be provided for the proposed clubhouse area, communal hangars, public park, and business park lots. The on-site parking will meet the minimum requirements of the City of Ottawa Zoning By-law.

The number of on-site vehicle parking spaces will be determined at the detailed design stage when more information is available for these aspects of the development.

6.3 Loading Activities

The loading demands of individual sites within the Phase One business park are unknown at this time.

Loading facilities, design vehicles, and vehicle swept paths will be determined at the detailed design stage.

7.0 COMMUNITY IMPACTS

Vehicle access to Phase One development will be provided via the adjacent arterial and collector road network.

The increase in traffic on Diamondview Road between March Road and Street One will be significant compared to current peak hour volumes (an additional 135 vph in the p.m. vs. 90 vph existing). However total projected volumes are well within the range of typical AADT volumes of rural collector roads. If the projected p.m. peak hour volumes are assumed to be approximately 10% of AADT, then the AADT in 2014 will be in the order of 2,250 vpd and the AADT in 2019 will be in the order of 3,500 vpd. Rural collector roads may be expected to carry 200 vpd to 10,000 vpd, according to Table A5-4 of the MTO Geometric Design Guide.

As previously noted, on-site vehicle parking will be provided in accordance with the minimum requirements of Zoning By-law. Parking infiltration onto area roadways is not anticipated.

8.0 TRANSPORTATION DEMAND MANAGEMENT

The City of Ottawa is developing a comprehensive Transportation Demand Management (TDM) strategy as part of its efforts to reduce automobile dependency. TDM measures can reduce transportation infrastructure requirements by encouraging people to change their travel mode, timing or destination.

While the site has no connection to the City's transit service, the development has an inherent capacity to reduce auto dependence by promoting the use of travel by aircraft.

The development also has the potential to reduce the number of trips made during a.m. and p.m. peak hours as residents, business owners and employees will have the opportunity to live, work and participate in leisure activities within the same community.

9.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the results of the foregoing analysis, the following modifications are recommended to accommodate existing, projected background and site generated traffic volumes.

Existing Traffic

Highway 417 WB Off-ramp/ March Road	• Installation of traffic signals (100 % warranted) • Construction of a channelized right turn lane with 90m of storage and a 90m taper

2014 Background Traffic

March Road/Diamondview Road	• Construction of an EB left turn lane with 15m of storage, 60m of parallel length and a 145m taper

March Road/Thomas Argue	• Construction of opposing EB and WB left turn lanes with 15m of storage, 60m parallel lengths and 145m tapers

2014 Total Traffic – Phase 1 Development

March Road/Diamondview Road	• Construction of an EB right turn lane with 70m of parallel length and a 75m taper • Construction of a WB left turn lane with 15m of storage, 60m of parallel length and a 145m taper
Carp Road/Russ Bradley	• Construction of a NB left turn lane with 15m of storage, 60m of parallel length and a 145m taper • Construction of a SB right turn lane with 70m of parallel length and a 75m taper

2019 Total Traffic – Full Development

Highway 417 WB Off-ramp/ March Road	• Adjustment of signal timing
March Road/Diamondview Road	• Construction of a NB left turn lane with 30m of storage, 60m of parallel length and a 145m taper
March Road/Thomas Argue Road	• Construction of an EB right turn lane with 70m of parallel length and a 75m taper

The results of this assessment show that Phase One development can be safely and adequately accommodated in 2014 with the recommended roadway modifications. The proposed modifications to March Road, Diamondview Road and Carp Road should be eligible for funding under the City of Ottawa's Development Charges By-law and subject to a front-ending agreement between the developer and the City of Ottawa.

A number of conservative assumptions have been made for this assessment, including:

- a 2% background growth rate applied over an eight year period,
- significant growth within the Village of Carp, and
- no adjustment factor to account for the effect of internal trips.

Monitoring of actual traffic volumes following the construction of the initial phase of development is recommended.

In accordance with draft condition number 18 an additional study will be prepared prior to the construction of future phases of development.

APPENDIX C

TIA Screening Form

City of Ottawa 2017 TIA Guidelines TIA Screening

1. Description of Proposed Development

Municipal Address	1540 Thomas Argue Road (West Capital Airpark)
Description of Location	West side of Carp (south of March/north of Russ Bradley)
Land Use Classification	Commercial/Light Industrial
Development Size (units)	
Development Size square metre (m^2)	504,000 sq.m. (total combined area of lots)
Number of Accesses and Locations	3 (Thomas Argue, Carp, Russ Bradley)
Phase of Development	1
Buildout Year	20xx

If available, please attach a sketch of the development or site plan to this form.

2. Trip Generation Trigger

Considering the Development's Land Use type and Size (as filled out in the previous section), please refer to the Trip Generation Trigger checks below.

Table notes:

1. Table 2, Table 3 & Table 4 TRANS Trip Generation Manual
2. Institute of Transportation Engineers (ITE) Trip Generation Manual 11.1 Ed.

Land Use Type	Minimum Development Size
Single-family homes	**60 units**
Multi-Use Family (Low-Rise)[1]	**90 units**
Multi-Use Family (High-Rise)[1]	**150 units**
Office[2]	**1,400 m^2**
Industrial[2]	**7,000 m^2**
Fast-food restaurant or coffee shop[2]	**110 m^2**
Destination retail[2]	**1,800 m^2**
Gas station or convenience market[2]	**90 m^2**

If the proposed development size is equal to or greater than the sizes identified above, the Trip Generation Trigger is satisfied.

3. Location Triggers

	Yes	No
Does the development propose a new driveway to a boundary street that is designated as part of the Transit Priority Network, Rapid Transit network or Cross-Town Bikeways?	☐	☑
Is the development in a Hub, a Protected Major Transit Station Area (PMTSA), or a Design Priority Area (DPA)?[2]	☐	☑

If any of the above questions were answered with 'Yes,' the Location Trigger is satisfied.

4. Safety Triggers

	Yes	No
Are posted speed limits on a boundary street are 80 kilometers per hour (km/h) or greater?	☑	☐
Are there any horizontal/vertical curvatures on a boundary street limits sight lines at a proposed driveway?	☐	☑
Is the proposed driveway within the area of influence of an adjacent traffic signal or roundabout (i.e. within 300 metre [m] of intersection in rural conditions, or within 150 m of intersection in urban/ suburban conditions)?	☐	☑
Is the proposed driveway within auxiliary lanes of an intersection?	☐	☑
Does the proposed driveway make use of an existing median break that serves an existing site?	☐	☑

[2] Hubs are identified in Schedules B1 to B8 of the City of Ottawa Official Plan. PMTSAs are identified in Schedule C1 of the Official Plan. DPAs are identified in Schedule C7A and C7B of the Official. See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA.

	Yes	No
Is there is a documented history of traffic operations or safety concerns on the boundary streets within 500 m of the development?	☐	☑
Does the development include a drive-thru facility?	☐	☑

If any of the above questions were answered with 'Yes,' the Safety Trigger is satisfied.

5. Summary

Results of Screening	Yes	No
Does the development satisfy the Trip Generation Trigger?	☑	☐
Does the development satisfy the Location Trigger?	☐	☑
Does the development satisfy the Safety Trigger?	☑	☐

If none of the triggers are satisfied, the TIA Study is complete. If one or more of the triggers is satisfied, the TIA Study must continue into the next stage (Screening and Scoping).

APPENDIX D

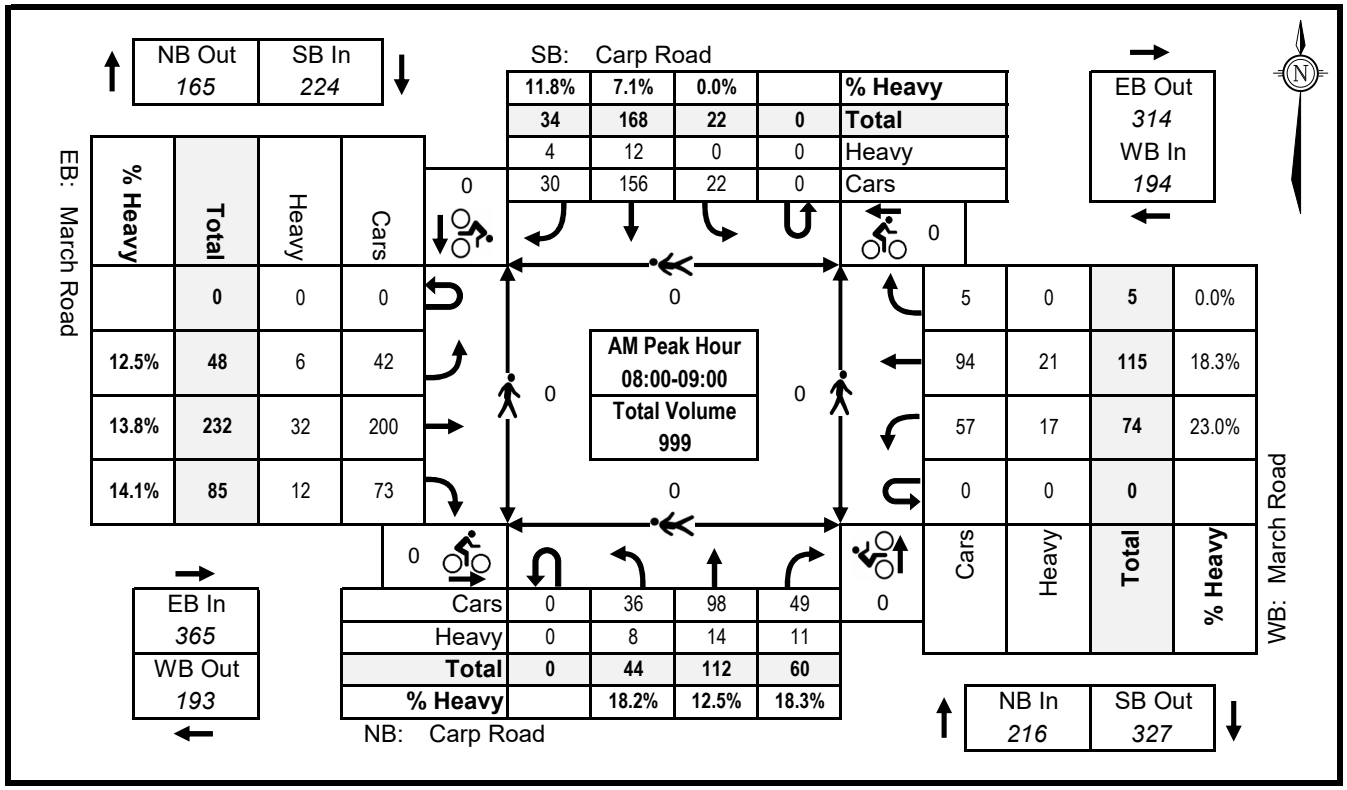
Traffic Count Data

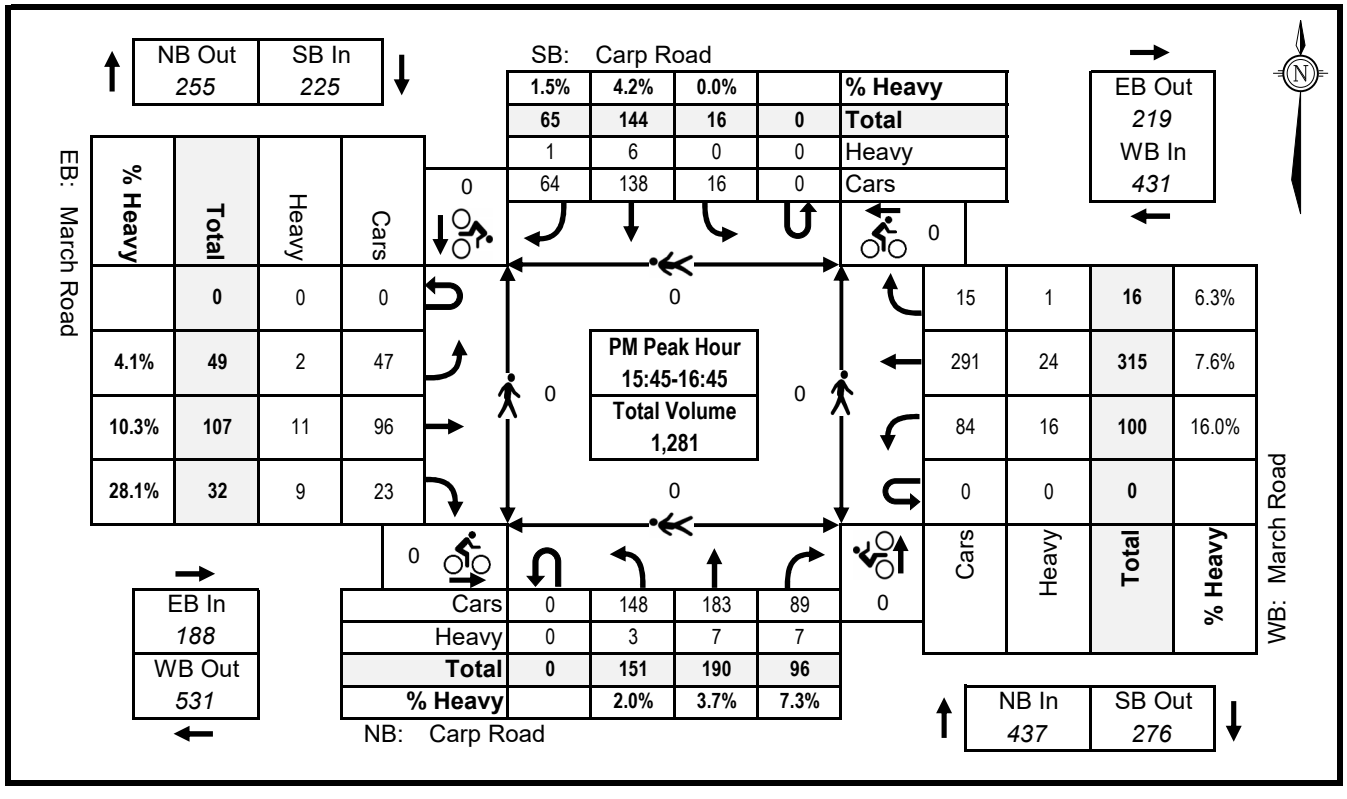
NOVATECH
Engineers, Planners & Landscape Architects

CARP ROAD @ MARCH ROAD

TURNING MOVEMENT COUNT
PEAK HOUR SUMMARIES

Date: Wednesday, May 21, 2025
Survey Hours: 07:00-10:00, 11:30-13:30, 15:00-18:00
Surveyor(s): J.Morris, B.Cameron





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CARP ROAD @ MARCH ROAD

TURNING MOVEMENT COUNT
8-HOUR SUMMARY

Date: Wednesday, May 21, 2025
Survey Hours: 07:00-10:00, 11:30-13:30, 15:00-18:00
Surveyor(s): J.Morris, B.Cameron

Period	Carp Road NORTHBOUND				Carp Road SOUTHBOUND				N/S Tot	March Road EASTBOUND				March Road WESTBOUND				E/W Tot	Grand Tot
	L	T	R	*Tot*	L	T	R	*Tot*		L	T	R	*Tot*	L	T	R	*Tot*		
07:00 - 08:00	20	86	62	*168*	6	139	9	*154*	**322**	57	203	108	*368*	66	91	3	*160*	**528**	**850**
08:00 - 09:00	44	112	60	*216*	22	168	34	*224*	**440**	48	232	85	*365*	74	115	5	*194*	**559**	**999**
09:00 - 10:00	44	127	56	*227*	10	135	35	*180*	**407**	36	143	51	*230*	53	99	11	*163*	**393**	**800**
11:30 - 12:30	60	145	69	*274*	12	165	36	*213*	**487**	39	96	45	*180*	53	113	16	*182*	**362**	**849**
12:30 - 13:30	63	167	49	*279*	22	117	36	*175*	**454**	37	85	45	*167*	51	96	12	*159*	**326**	**780**
15:00 - 16:00	100	178	86	*364*	11	149	56	*216*	**580**	32	123	52	*207*	77	225	12	*314*	**521**	**1,101**
16:00 - 17:00	157	195	92	*444*	16	137	59	*212*	**656**	45	106	37	*188*	101	313	18	*432*	**620**	**1,276**
17:00 - 18:00	145	189	70	*404*	16	114	45	*175*	**579**	59	87	32	*178*	66	258	11	*335*	**513**	**1,092**
Subtotal	633	1,199	544	*2,376*	115	1,124	310	*1,549*	**3,925**	353	1,075	455	*1,883*	541	1,310	88	*1,939*	**3,822**	**7,747**
U-Turns				*0*				*0*					*0*				*0*		
Total	633	1,199	544	*2,376*	115	1,124	310	*1,549*	**3,925**	353	1,075	455	*1,883*	541	1,310	88	*1,939*	**3,822**	**7,747**
Equivalent 12-hr	880	1,667	756	*3,303*	160	1,562	431	*2,153*	**5,456**	491	1,494	632	*2,617*	752	1,821	122	*2,695*	**5,312**	**10,768**
Expansion Factor: Calculated by multiplying the 8-hour totals by the 8- to 12-hour expansion factor of													**1.39**						
Average 12-hr	792	1,500	680	*2,973*	144	1,406	388	*1,938*	**4,911**	442	1,345	569	*2,355*	677	1,639	110	*2,426*	**4,781**	**9,692**
Expansion Factor: Calculated by multiplying the equivalent 12-hour totals by the month AADT factor of													**0.90**						
AADT 24-hr	1,038	1,965	891	*3,895*	189	1,842	508	*2,539*	**6,434**	579	1,762	745	*3,085*	887	2,147	144	*3,178*	**6,263**	**12,697**
Expansion Factor: Calculated by multiplying the avg 12-hour totals by the 12- to 24-hour expansion factor of													**1.31**						

Notes

1. Volumes include passenger vehicles and heavy vehicles (cyclists and pedestrians excluded)
2. Volumes have been rounded where factors are applied (i.e. for the rows displaying equivalent 12-hr, average 12-hr, and AADT 24-hr volumes)

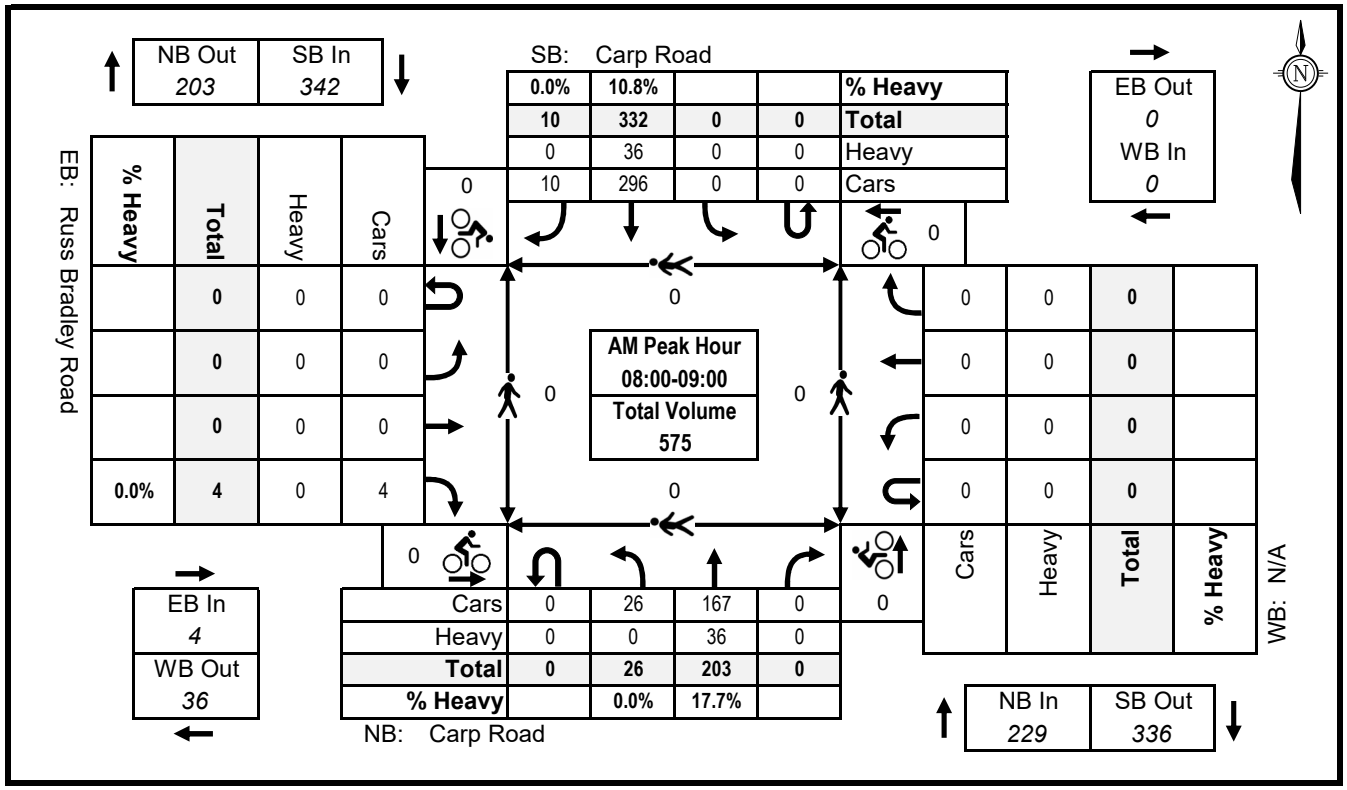
Project No.: 102085

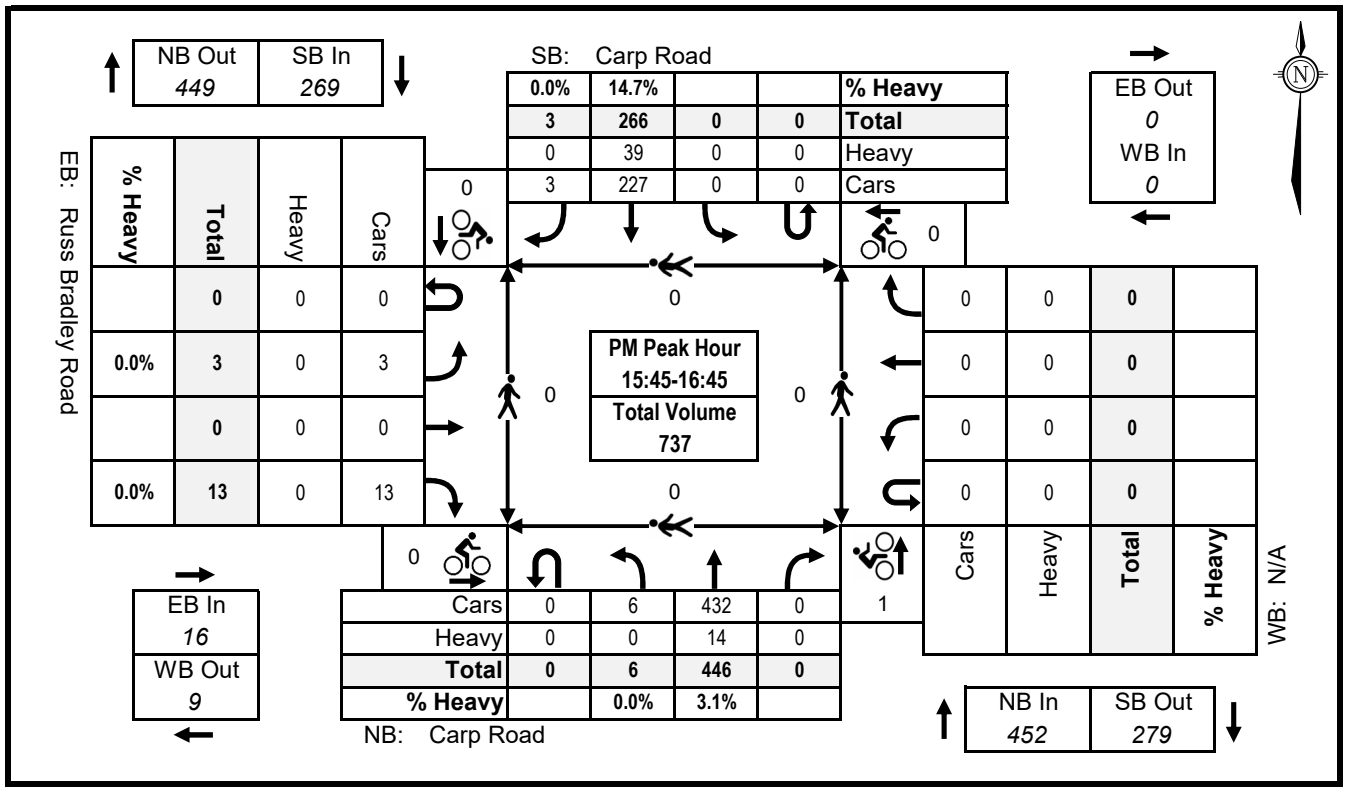
Engineers, Planners & Landscape Architects

CARP ROAD @ RUSS BRADLEY ROAD

TURNING MOVEMENT COUNT
PEAK HOUR SUMMARIES

Date: Wednesday, May 21, 2025
Survey Hours: 07:00-10:00, 11:30-13:30, 15:00-18:00
Surveyor(s): J.Morris, B.Cameron





NOVATECH
Engineers, Planners & Landscape Architects

CARP ROAD @ RUSS BRADLEY ROAD

TURNING MOVEMENT COUNT
8-HOUR SUMMARY

Date: Wednesday, May 21, 2025
Survey Hours: 07:00-10:00, 11:30-13:30, 15:00-18:00
Surveyor(s): J.Morris, B.Cameron

Period	Carp Road NORTHBOUND				Carp Road SOUTHBOUND				N/S Tot	Russ Bradley Road EASTBOUND				N/A WESTBOUND				E/W Tot	Grand Tot
	L	T	R	*Tot*	L	T	R	*Tot*		L	T	R	*Tot*	L	T	R	*Tot*		
07:00 - 08:00	26	171	0	*197*	0	303	12	*315*	**512**	1	0	2	*3*	0	0	0	*0*	**3**	**515**
08:00 - 09:00	18	215	0	*233*	0	320	7	*327*	**560**	0	0	3	*3*	0	0	0	*0*	**3**	**563**
09:00 - 10:00	8	221	0	*229*	0	245	3	*248*	**477**	2	0	9	*11*	0	0	0	*0*	**11**	**488**
11:30 - 12:30	9	269	0	*278*	0	261	6	*267*	**545**	10	0	14	*24*	0	0	0	*0*	**24**	**569**
12:30 - 13:30	13	283	0	*296*	0	207	5	*212*	**508**	6	0	8	*14*	0	0	0	*0*	**14**	**522**
15:00 - 16:00	5	368	0	*373*	0	274	0	*274*	**647**	3	0	9	*12*	0	0	0	*0*	**12**	**659**
16:00 - 17:00	6	446	0	*452*	0	266	3	*269*	**721**	3	0	13	*16*	0	0	0	*0*	**16**	**737**
17:00 - 18:00	4	393	0	*397*	0	208	1	*209*	**606**	10	0	32	*42*	0	0	0	*0*	**42**	**648**
Subtotal	89	2,366	0	*2,455*	0	2,084	37	*2,121*	**4,576**	35	0	90	*125*	0	0	0	*0*	**125**	**4,701**
U-Turns				*0*				*0*					*0*				*0*		
Total	89	2,366	0	*2,455*	0	2,084	37	*2,121*	**4,576**	35	0	90	*125*	0	0	0	*0*	**125**	**4,701**
Equivalent 12-hr	124	3,289	0	*3,413*	0	2,897	51	*2,948*	**6,361**	49	0	125	*174*	0	0	0	*0*	**174**	**6,535**
Expansion Factor: Calculated by multiplying the 8-hour totals by the 8- to 12-hour expansion factor of													**1.39**						
Average 12-hr	112	2,960	0	*3,072*	0	2,607	46	*2,653*	**5,725**	44	0	113	*157*	0	0	0	*0*	**157**	**5,882**
Expansion Factor: Calculated by multiplying the equivalent 12-hour totals by the month AADT factor of													**0.90**						
AADT 24-hr	147	3,878	0	*4,024*	0	3,415	60	*3,475*	**7,499**	58	0	148	*206*	0	0	0	*0*	**206**	**7,705**
Expansion Factor: Calculated by multiplying the avg 12-hour totals by the 12- to 24-hour expansion factor of													**1.31**						

Notes

1. Volumes include passenger vehicles and heavy vehicles (cyclists and pedestrians excluded)
2. Volumes have been rounded where factors are applied (i.e. for the rows displaying equivalent 12-hr, average 12-hr, and AADT 24-hr volumes)

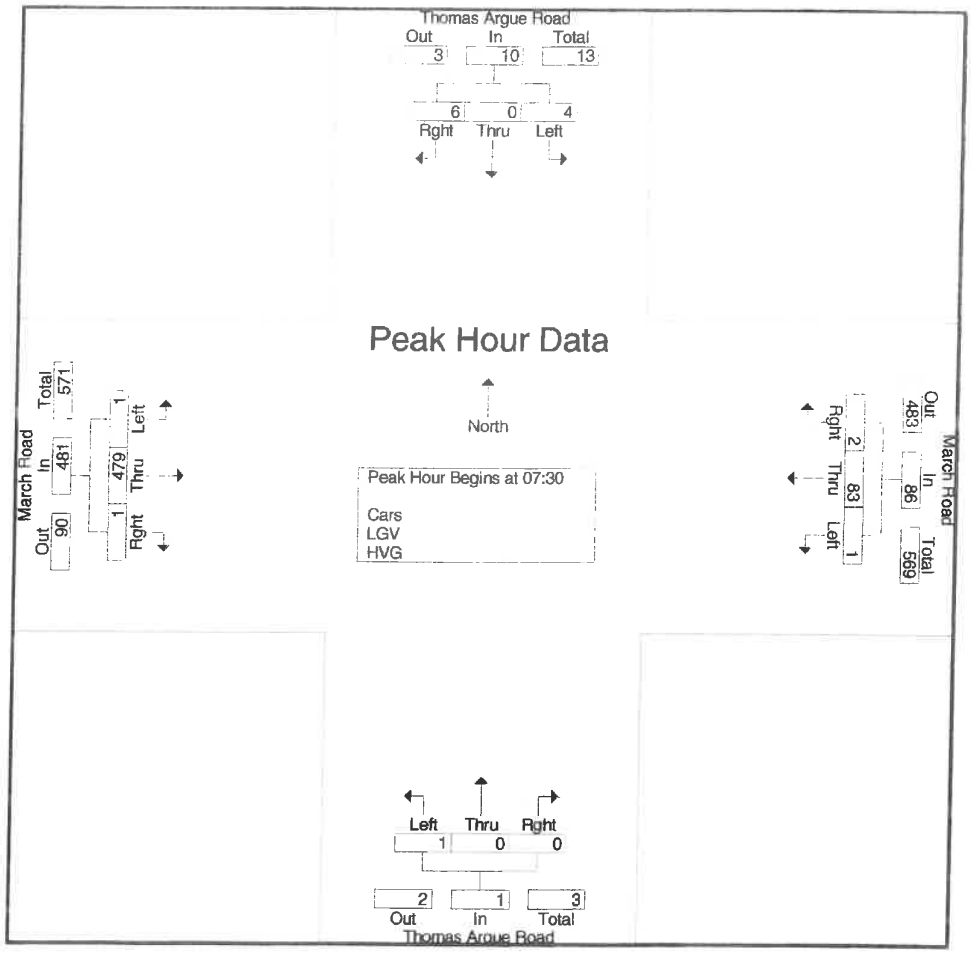
Project No.: 102085

NOVATECH ENGINEERING CONSULTANTS LTD
ENGINEERS & PLANNERS
Suite 200
240 Michael Cowpland Drive
Ottawa ON K2M 2Y7

Weather: 16C, rain
Serial Number: Manual
Collected by: B. Houle
Notes: Tuesday

File Name : thomasargue&march 4oct201
Site Code : 10208501
Start Date : 10/4/2011
Page No : 3

	March Road Westbound				Thomas Argue Road Southbound				March Road Eastbound				Thomas Argue Road Northbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 07:00 to 09:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:30																	
07:30	0	20	0	20	2	0	1	3	0	141	1	142	0	0	0	0	165
07:45	1	18	0	19	0	0	1	1	0	118	0	118	1	0	0	1	139
08:00	0	20	2	22	2	0	0	2	1	108	0	109	0	0	0	0	133
08:15	0	25	0	25	0	0	4	4	0	112	0	112	0	0	0	0	141
Total Volume	1	83	2	86	4	0	6	10	1	479	1	481	1	0	0	1	578
% App. Total	1.2	96.5	2.3		40	0	60		0.2	99.6	0.2		100	0	0		
PHF	.250	.830	.250	.860	.500	.000	.375	.625	.250	.849	.250	.847	.250	.000	.000	.250	.876



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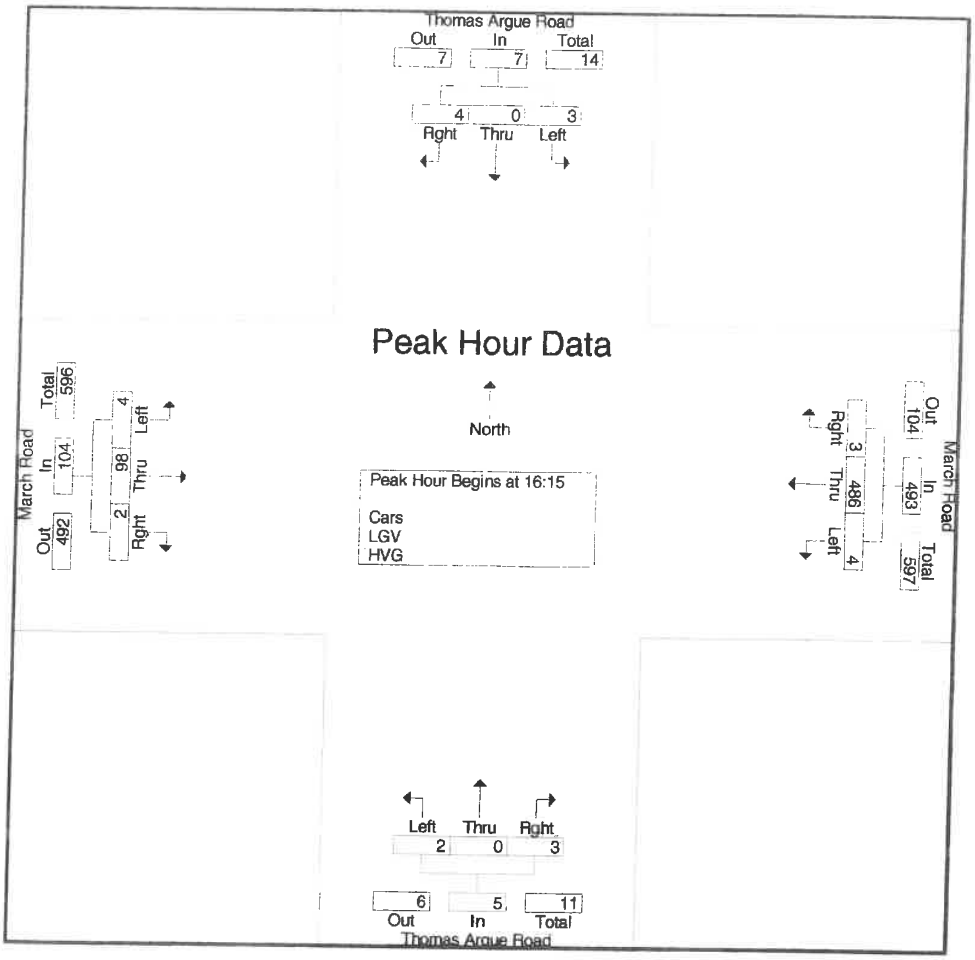
ENGINEERS & PLANNERS
Suite 200
240 Michael Cowpland Drive
Ottawa ON K2M 2Y7

Weather: 16C, rain
Serial Number: Manual
Collected by: B. Houle
Notes: Tuesday

File Name : thomasargue&march 4oct201
Site Code : 10208501
Start Date : 10/4/2011
Page No : 5

	March Road Westbound				Thomas Argue Road Southbound				March Road Eastbound				Thomas Argue Road Northbound				
Start Time	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Left	Thru	Rght	App. Total	Int. Total
Peak Hour Analysis From 14:00 to 17:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 16:15																	
16:15	2	122	0	124	2	0	2	4	1	27	2	30	0	0	2	2	160
16:30	0	107	1	108	0	0	0	0	1	24	0	25	1	0	1	2	135
16:45	2	124	0	126	1	0	2	3	2	24	0	26	1	0	0	1	156
17:00	0	133	2	135	0	0	0	0	0	23	0	23	0	0	0	0	158
Total Volume	4	486	3	493	3	0	4	7	4	98	2	104	2	0	3	5	609
% App. Total	0.8	98.6	0.6		42.9	0	57.1		3.8	94.2	1.9		40	0	60		
PHF	.500	.914	.375	.913	.375	.000	.500	.438	.500	.907	.250	.867	.500	.000	.375	.625	.952



APPENDIX E

Collision Records

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2018 **To:** December 31, 2022

Location: CARP RD @ MARCH RD

Traffic Control: Traffic signal **Total Collisions:** 17

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2018-Jan-29, Mon,09:07	Clear	Angle	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-May-16, Wed,17:00	Clear	Turning movement	P.D. only	Dry	South	Turning left	Pick-up truck	Other motor vehicle	0
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Aug-26, Sun,09:49	Clear	SMV other	P.D. only	Dry	North	Turning right	Pick-up truck	Pole (utility, power)	0
2018-Aug-30, Thu,14:42	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Turning left	Pick-up truck	Other motor vehicle	
2018-Oct-02, Tue,17:45	Rain	Turning movement	P.D. only	Wet	East	Turning left	Automobile, station wagon	Other motor vehicle	0
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2018-Dec-20, Thu,01:18	Clear	SMV other	P.D. only	Dry	South	Turning left	Automobile, station wagon	Pole (utility, power)	0
2019-Jan-31, Thu,10:14	Clear	Angle	P.D. only	Dry	East	Going ahead	Delivery van	Other motor vehicle	0
					North	Going ahead	Pick-up truck	Other motor vehicle	
					East	Stopped	Automobile, station wagon	Other motor vehicle	
2019-Feb-19, Tue,06:27	Clear	Angle	P.D. only	Dry	East	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Passenger van	Other motor vehicle	
2019-Sep-06, Fri,15:41	Rain	SMV other	P.D. only	Wet	North	Turning left	Pick-up truck	Skidding/sliding	0
2020-May-26, Tue,07:41	Clear	Rear end	P.D. only	Dry	North	Going ahead	Passenger van	Other motor vehicle	0
					North	Stopped	Automobile, station wagon	Other motor vehicle	
2020-May-29, Fri,10:52	Clear	Angle	Non-fatal injury	Dry	North	Going ahead	Truck and trailer	Other motor vehicle	0
					West	Turning right	Automobile, station wagon	Other motor vehicle	
2020-Dec-09, Wed,09:15	Snow	Rear end	P.D. only	Slush	North	Slowing or stopping	Pick-up truck	Other motor vehicle	0
					North	Stopped	Pick-up truck	Other motor vehicle	
2022-Feb-10, Thu,22:29	Freezing Rain	Angle	P.D. only	Ice	West	Turning right	Automobile, station wagon	Other motor vehicle	0
					South	Stopped	Pick-up truck	Other motor vehicle	

Transportation Services - Traffic Services

Collision Details Report - Public Version

From: January 1, 2018 **To:** December 31, 2022

Location: CARP RD @ MARCH RD

Traffic Control: Traffic signal **Total Collisions:** 17

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2022-Jul-14, Thu,08:04	Clear	Angle	Non-fatal injury	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2022-Nov-02, Wed,22:45	Clear	Turning movement	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	0
					West	Turning right	Automobile, station wagon	Other motor vehicle	
2022-Nov-09, Wed,16:30	Clear	Angle	Non-fatal injury	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle	0
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2022-Dec-20, Tue,22:15	Clear	Angle	P.D. only	Dry	West	Stopped	Automobile, station wagon	Other motor vehicle	0
					North	Turning left	Pick-up truck	Other motor vehicle	

Location: CARP RD btwn MARCH RD & RUSS BRADLEY RD

Traffic Control: No control **Total Collisions:** 4

Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2019-Mar-29, Fri,20:03	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Animal - wild	0
2019-Jul-22, Mon,20:47	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Ditch	0
2019-Aug-24, Sat,09:16	Clear	SMV other	P.D. only	Dry	North	Going ahead	Automobile, station wagon	Ran off road	0
2021-Mar-19, Fri,16:03	Clear	SMV other	Non-fatal injury	Dry	North	Going ahead	Pick-up truck	Pole (utility, power)	0

Date	Time	Location	Class	Initial Impact	Surface	Env Cond	Light	# Veh	# Ped	# Cyc	# Moto	Max Inj
8/23/2019	0:59	MARCH RD btwn THOMAS ARGUE RD & CARP RD	02 - Non-fatal inj.	07 - SMV other	01 - Dry	01 - Clear	07 - Dark	1				03 - Major

APPENDIX F

Other Area Developments

Remaining Residential

The number of peak hour person trips generated by the remaining residential has been estimated using the *TRANS Trip Generation Manual*, which present peak period trip generation rates and mode shares for different types of housing for the AM and PM peak periods. The data is divided into trip generation rates and mode shares for Single-Family Detached Housing, Low-Rise Multifamily Housing (one or two storeys), and High-Rise Multifamily Housing (three or more storeys). The process of converting the trip generation estimates from peak period to peak hour is shown below.

The *TRANS Trip Generation Manual* identifies the subject site as being located within a rural district, which has the following observed mode shares during the peak periods:

- Auto Driver: 60% in AM peak hour, 67% in PM peak hour;
- Auto Passenger: 14% in AM peak hour, 17% in PM peak hour;
- Transit: 24% in AM peak hour, 14% in PM peak hour;
- Cyclist: 2% in both peak hours;
- Pedestrian: 0% in both peak hours.

As there are no transit routes available within the West Capital Airpark development, the assumed residential mode shares have been adjusted from the observed rural mode shares above, and can be summarized as 85% auto driver and 15% auto passenger during the peak hours.

The process of converting the trip generation estimates from peak period to peak hour is shown in the following tables. The estimated number of person trips generated by the proposed development during the AM and PM peak periods are shown in **Table F.1**. A breakdown of these trips by mode share is shown in **Table F.2**.

Table F.1: Remaining Residential – Peak Period Trip Generation

Land Use	TRANS Rate	Units	AM Peak Period (ppp[1])			PM Peak Period (ppp)		
			IN	OUT	TOT	IN	OUT	TOT
Single-Family Detached Housing	AM: 2.05 PM: 2.48	179	105	246	*351*	263	161	*424*

1. ppp: Person Trips per Peak Period

Table F.2: Remaining Residential – Peak Period Trips by Mode Share

Travel Mode	Mode Share	AM Peak Period			PM Peak Period		
		IN	OUT	TOT	IN	OUT	TOT
Single-Family Person Trips		**105**	**246**	***351***	**263**	**161**	***424***
Auto Driver	85%	89	209	*298*	224	137	*361*
Auto Passenger	15%	16	37	*53*	39	24	*63*
Transit	0%	-	-	*0*	-	-	*0*
Cyclist	0%	-	-	*0*	-	-	*0*
Pedestrian	0%	-	-	*0*	-	-	*0*

Table 4 of the *TRANS Trip Generation Manual* includes adjustment factors to convert the estimated number of trips generated for each mode from peak period to peak hour. A breakdown of the peak hour trips by mode is shown in **Table F.3**.

Table F.3: Remaining Residential – Peak Hour Trips by Mode Share

Travel Mode	Adj. Factor		AM Peak Hour			PM Peak Hour		
	AM	PM	IN	OUT	TOT	IN	OUT	TOT
Auto Driver	0.48	0.44	43	100	*143*	98	60	*158*
Auto Passenger	0.48	0.44	8	18	*26*	17	11	*28*
Transit	0.55	0.47	-	-	*0*	-	-	*0*
Cyclist	0.58	0.48	-	-	*0*	-	-	*0*
Pedestrian	0.58	0.52	-	-	*0*	-	-	*0*
Single-Family Person Trips			**51**	**118**	***169***	**115**	**71**	***186***

The assumed trip distribution for the remaining residential matches the assumptions outlined in the 2011 TIS, which can be summarized as follows:

- 10% to/from the north via Highway 417;
- 20% to/from the east via March Road;
- 5% to/from the south via Diamondview Road;
- 55% to/from the south via Highway 417;
- 10% to/from the west via March Road.

Consistent with Section 2.1.7, 50% of the projected remaining residential traffic travelling to/from the east via March Road are assumed to turn on Thomas Argue Road to enter/exit the community.

Phase 1 Business Park

The number of peak hour trips generated by the Phase 1 business park has been estimated in the same manner as the Phase 2 business park, as described in Section 2.5.1. The estimated number of person trips generated by the proposed development during the AM and PM peak hours are shown in **Table F.4**. A breakdown of these trips by mode share is shown in **Table F.5**.

Table F.4: Phase 1 Business Park – Peak Hour Trip Generation

Land Use	ITE Code	GFA	AM Peak Hour (pph[1])			PM Peak Hour (pph)		
			IN	OUT	TOT	IN	OUT	TOT
Industrial Park	130	190,000 ft^2	61	14	*75*	17	59	*76*

1. pph: Person Trips per Peak Hour, estimated by prorating to account for 10% passenger share

Table F.5: Phase 1 Business Park – Peak Hour Trips by Mode Share

Travel Mode	Mode Share	AM Peak Hour			PM Peak Hour		
		IN	OUT	TOT	IN	OUT	TOT
Person Trips		**61**	**14**	***75***	**17**	**59**	***76***
Auto Driver	90%	55	13	*68*	15	53	*68*
Auto Passenger	10%	6	1	*7*	2	6	*8*
Transit	0%	-	-	*0*	-	-	*0*
Cyclist	0%	-	-	*0*	-	-	*0*
Pedestrian	0%	-	-	*0*	-	-	*0*

The assumed trip distribution for the Phase 1 business park matches the assumptions outlined in Section 2.5.2, which can be summarized as follows:

- 5% to/from the north via Carp Road;
- 50% to/from the south via Carp Road;
- 20% to/from the east via March Road;
- 25% to/from the west via March Road.

All Phase 1 business park trips have been assigned to the Carp Road/Russ Bradley Road intersection.

Volume Figure

Within the study area, the trips generated by the remaining residential component and Phase 1 business park are shown in **Figure F.1**.

Figure F.1: Remaining Residential and Phase 1 Business Park Volumes

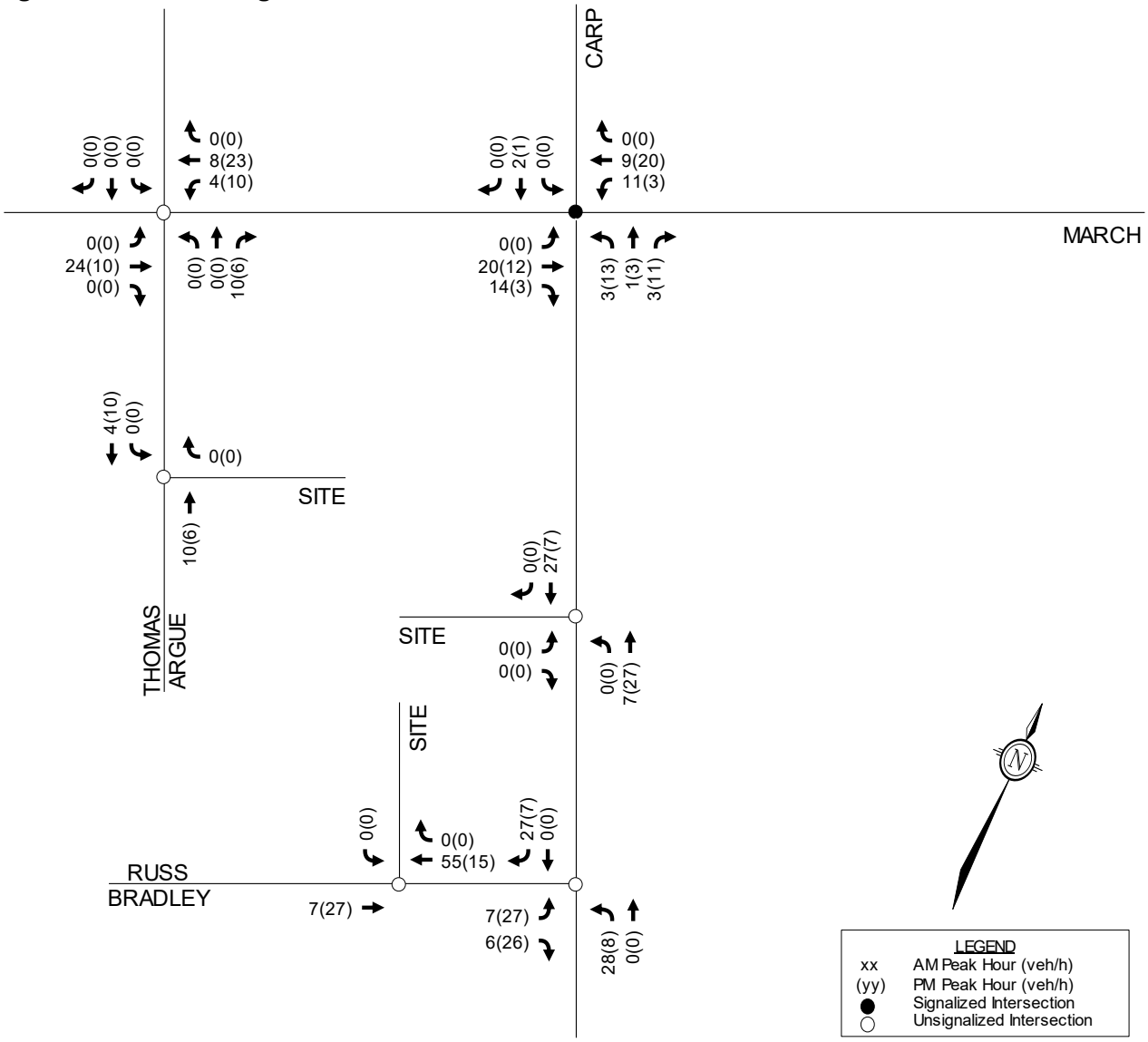
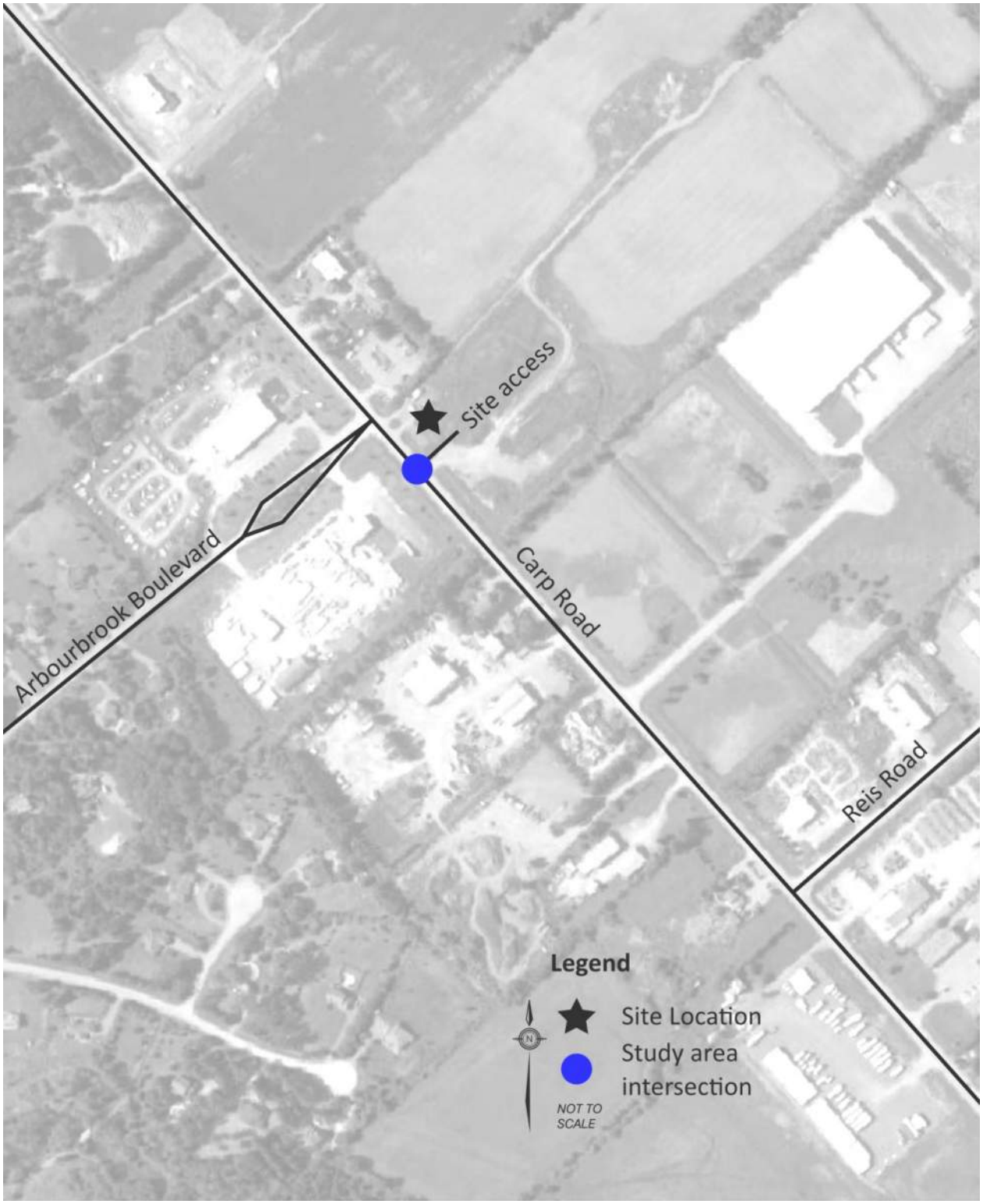


Figure 2: Study Area Intersection



Background map source: Google Maps, accessed October 2020

Table 4: Proposed Development Vehicle Trip Generation Traffic Volumes

Site Plan Land Use	ITE Land Use	AM Peak Hour		PM Peak Hour	
		In	Out	In	Out
Auto sales	841: auto sales, used	2	1	2	2
Auto body repair	943: auto parts and service centre	2	1	1	2
Retail	816: hardware/paint store	3	3	3	3
General warehouse	150: warehousing	20	11	6	17
Total		**27**	**16**	**12**	**24**

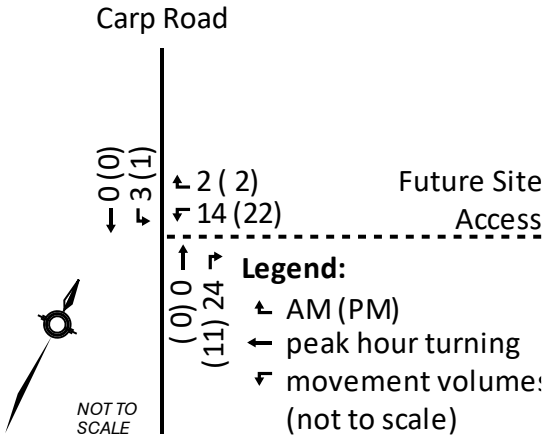
3.1.2 Trip Distribution

The trip distribution assumed within this analysis is 10% to/from the north and 90% to/from the south along Carp Road. This assumed that the majority of employees and customers would be from Ottawa which is south of the site.

3.1.3 Trip Assignment

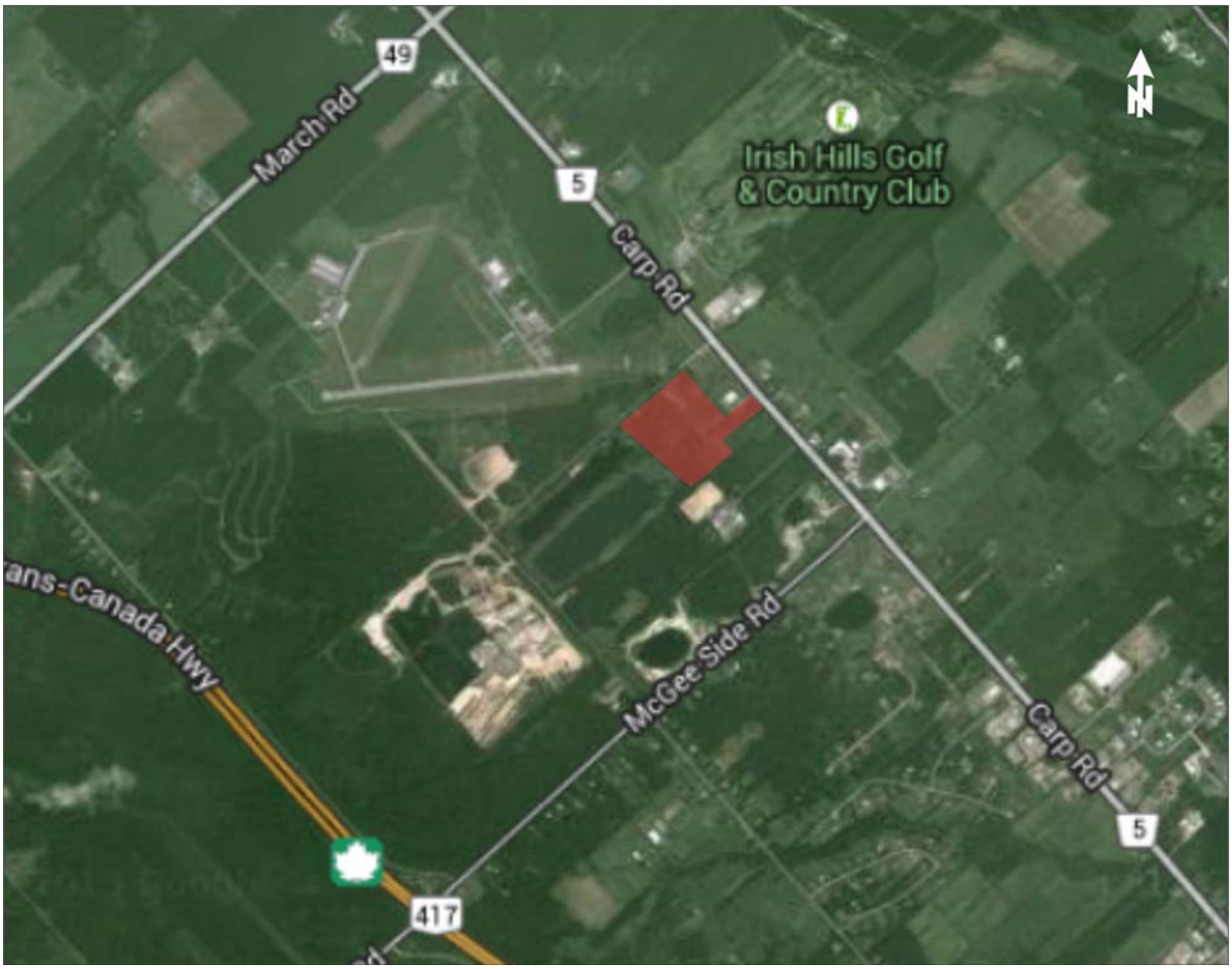
Figure 6 illustrates the traffic volumes generated by the development during the peak hour of adjacent road traffic. Overall these volumes are very low and are not anticipated to create operational issues. The southbound left turn into the site is only three (3) vehicles during the AM peak hour which would not warrant a left turn lane into the site.

Figure 6: Site Generated Traffic Volumes



Its intersection with McGee Side Road is STOP sign controlled on the east-west approaches only, and there are no turn lanes. Adjacent to the site, Carp Road is two lanes wide with gravel shoulders.

Figure 1: Site Context



3.2 Peak Hour Volumes and Intersection Operation

With regard to peak hour traffic volumes, these are depicted on Figure 3 and included as Appendix A. The Carp/March count was provided by the City of Ottawa and Delcan conducted the Carp/McGee intersection in December 2013. Peak direction volumes total approximately 400 with the two-directional total being approximately 550 vph during the morning peak hour and 650 vph during the afternoon peak hour. As shown in Table 1, the study area's two main intersections currently operate at a very good level of service (LoS 'A' to 'C'), with there being significant spare capacity.

Figure 5: Assignment of Projected Site-Generated Traffic

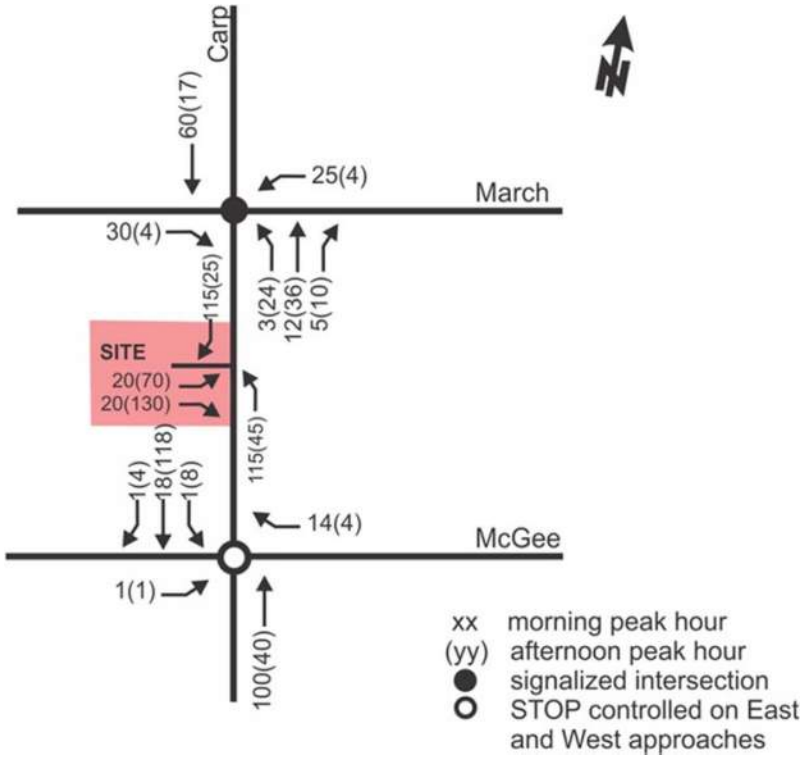
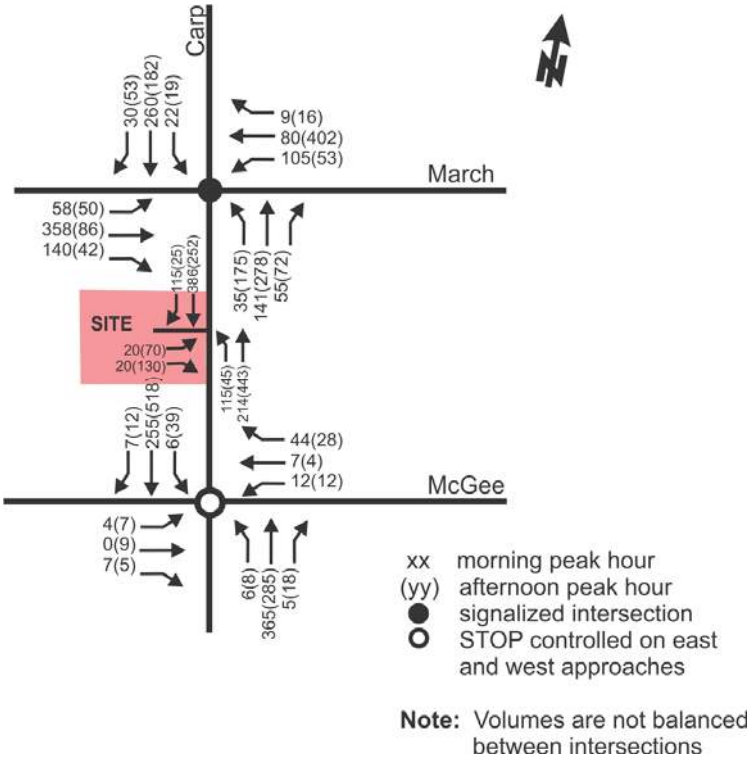
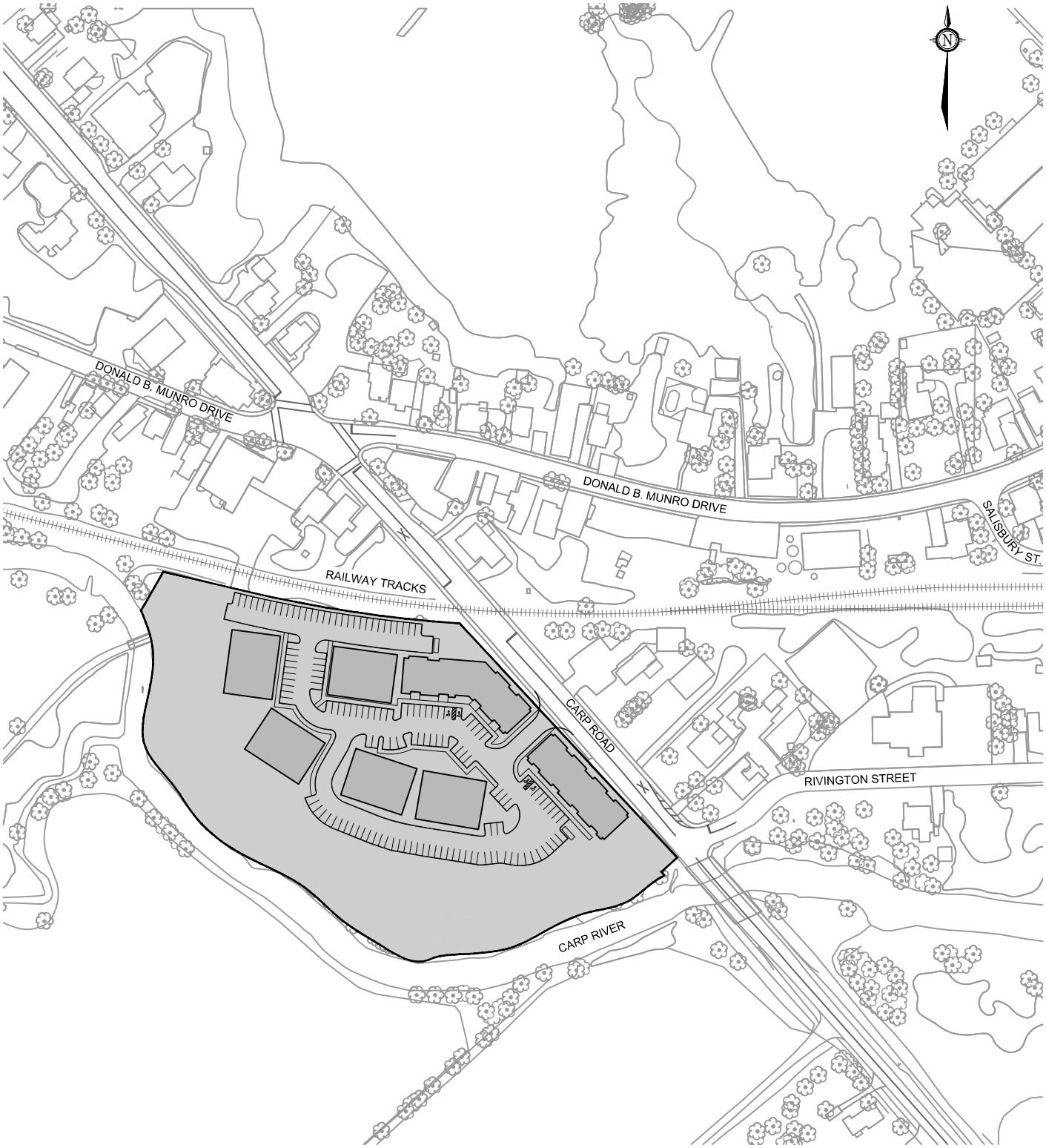


Figure 6: Total Projected Horizon Year Traffic Volumes





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3725 CARP ROAD

CONTEXT PLAN

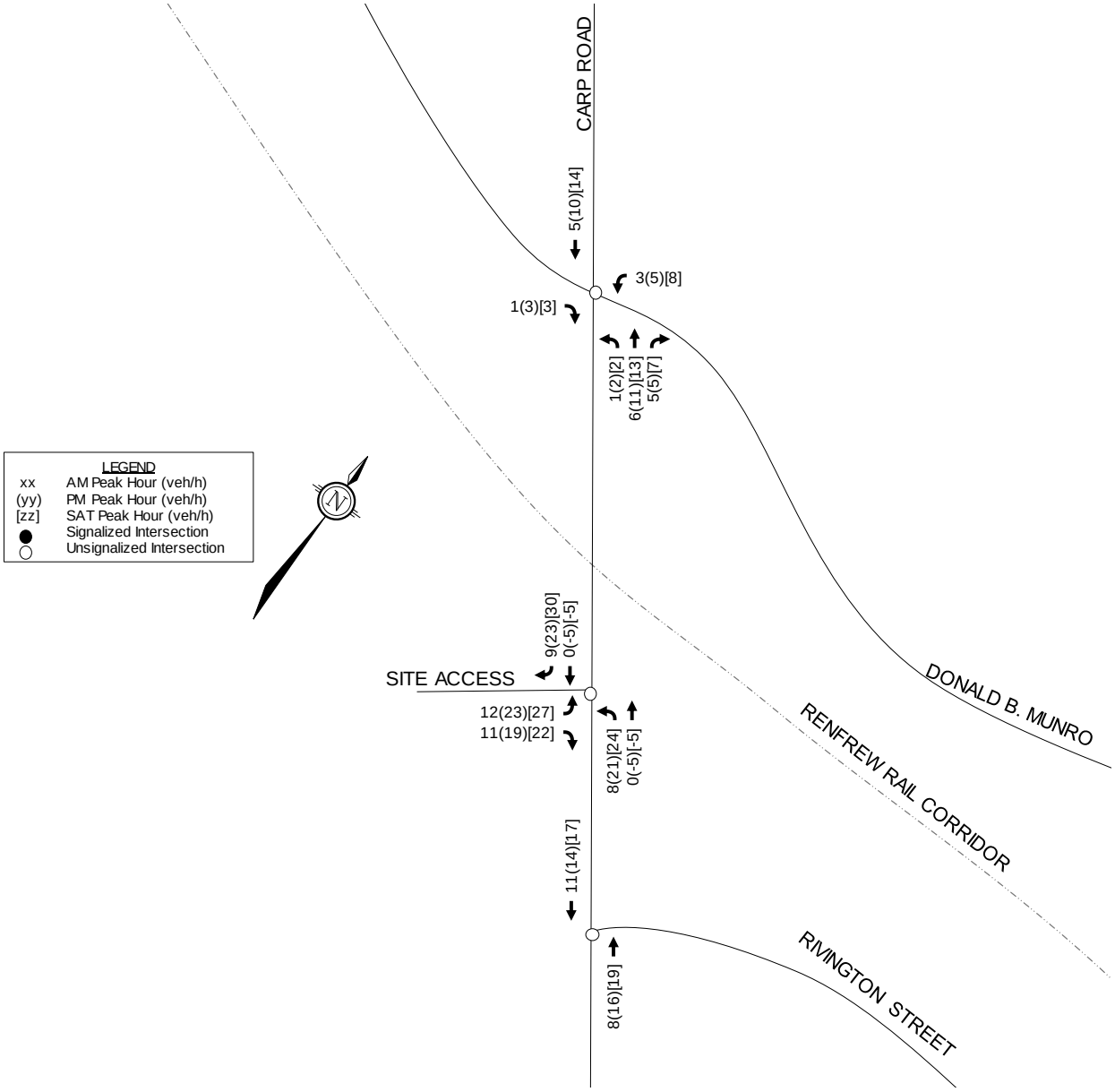
SCALE N.T.S.

DATE FEB 2023 | JOB 121173 | FIGURE FIGURE 2

SHT8X11.DWG - 216mmx279mm

C:\temp\AcPublish_13408\121173-Context.dwg, Context, Feb 23, 2023 - 10:39am, rhillier

Figure 9: Total Site-Generated Traffic Volumes



5.2 Background Traffic

5.2.1 Other Area Developments

A description of other study area development is included in Section 4.2.

Buildout of the residential subdivision at 147 Langstaff Road is anticipated for 2023. Traffic generated by this development has been added to the 2027 buildout and 2032 horizon years, using the distribution as outlined in the May 2022 TIA. Saturday traffic for this development has been estimated using the methodology described in Section 5.1.1 and added to the area roadways using the

APPENDIX G

Long-Range Model Snapshots

TRANS Regional Model

Version 1.01 - Assigned December, 2024

AM Peak Hour Total Traffic Volume

Carp Road

2022 Model - Basecase

N/A

User Initials: TIMW
Plot Prepared: April, 2025
EMME Scenario: 22002

Legend

AM Peak Hour Total Traffic Volume

1000 2000 3000 4000 5000

N

Distance (m)

100 1000

TRANS Regional Model

Version 1.01 - Assigned December, 2024

AM Peak Hour Total Traffic Volume

Carp Road

2046 Model - Basecase

N/A

User Initials: TIMW
Plot Prepared: April, 2025
EMME Scenario: 46001

Legend

AM Peak Hour Total Traffic Volume

1000 2000 3000 4000 5000

N

Distance (m)

100 1000

Carp Airport

Made with OpenPaths™ ©

The TRANS model is continuously refined & maintained, and all information is provided in good faith. However, model outputs are provided "as is", and no warranty or guarantee is provided as to the accuracy, reliability or reasonableness of the results. In using this data, you agree to accept any and all risks arising from any incorrect, incomplete, or misleading information.

Recipients are required to use caution and professional judgement in using and interpreting model outputs. In particular, caution should be used when focusing on a geographically limited area (such as a single road or intersection), as the model is primarily designed to simulate regional-scale phenomena and has been calibrated at a regional level.

As general good practice, it is recommended that the user confirm the network coding within the area of interest, and compare base year forecasts against traffic count data to assess the extent to which the model may be over- or under-estimating the travel demand.

APPENDIX H

Signal Timing Plans

Traffic Signal Timing

City of Ottawa, Public Works Department

Traffic Signal Operations Unit

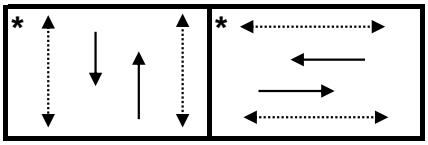
Intersection:	***Main:*** Carp	***Side:***	March
Controller:	**ATC 3**	**TSD:**	**6675**
Author:	Kymen Kwan	**Date:**	23-Apr-2025

Existing Timing Plans†

	Plan		**Ped Minimum Time**		
	Day	**Night**	***Walk***	***DW***	***A+R***
	11	12			
Cycle	90	90			
Offset	0	0			
NB Thru	45	45	7	14	4.6+1.8
SB Thru	45	45	7	14	4.6+1.8
EB Thru	45	45	7	14	4.6+2.1
WB Thru	45	45	7	14	4.6+2.1

Phasing Sequence‡

Plan: All



Notes: 1) For Plan 11 there is a maximum recall for all phases

2) For Plan 12, there is a minimum recall of 21s green time for the NS Thru movements

Schedule

Weekday

Time	Plan
0:05	11
23:55	12

Weekend

Time	Plan
0:05	11
23:55	12

Notes

†: Time for each direction includes amber and all red intervals

‡: Start of first phase should be used as reference point for offset

Asterisk (*) Indicates actuated phase

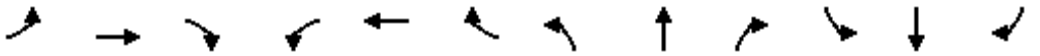
(fp): Fully Protected Left Turn

◄·····► Pedestrian signal

Cost is $62.38 ($55.20 + HST)

APPENDIX I

Existing Synchro Analysis

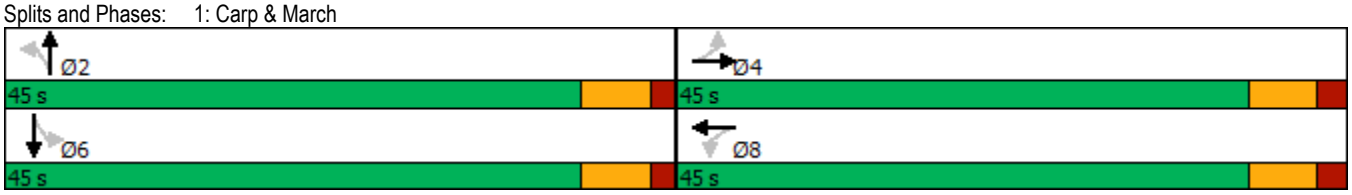


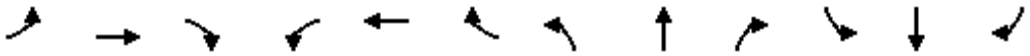
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	48	232	85	74	115	5	44	112	60	22	168	34
Future Volume (vph)	48	232	85	74	115	5	44	112	60	22	168	34
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	120.0		0.0	145.0		0.0	130.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	70.0			70.0			70.0			70.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.960			0.993			0.947			0.975	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1581	1583	0	1452	1592	0	1514	1551	0	1768	1700	0
Flt Permitted	0.671			0.466			0.603			0.637		
Satd. Flow (perm)	1116	1583	0	712	1592	0	961	1551	0	1186	1700	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		25			3			38			14	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		1395.3			662.5			720.5			545.3	
Travel Time (s)		62.8			29.8			32.4			24.5	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	13%	14%	14%	23%	18%	1%	18%	13%	18%	1%	7%	12%
Adj. Flow (vph)	53	258	94	82	128	6	49	124	67	24	187	38
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	352	0	82	134	0	49	191	0	24	225	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			4.0			4.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	27.7	27.7		27.7	27.7		27.4	27.4		27.4	27.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Yellow Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.1	2.1		2.1	2.1		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.7	6.7		6.7	6.7		6.4	6.4		6.4	6.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	1	1		1	1		1	1		1	1	
Act Effct Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.43	0.43		0.43	0.43	
v/c Ratio	0.11	0.51		0.27	0.20		0.12	0.28		0.05	0.31	
Control Delay	16.5	20.8		19.9	16.8		16.5	14.5		15.5	17.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	16.5	20.8		19.9	16.8		16.5	14.5		15.5	17.2	
LOS	B	C		B	B		B	B		B	B	
Approach Delay		20.2			18.0			14.9			17.0	
Approach LOS		C			B			B			B	
Queue Length 50th (m)	4.9	37.0		8.2	12.7		4.6	15.0		2.2	21.3	
Queue Length 95th (m)	11.5	59.8		18.1	23.4		11.0	28.4		6.4	36.2	
Internal Link Dist (m)		1371.3			638.5			696.5			521.3	
Turn Bay Length (m)	150.0			120.0			145.0			130.0		
Base Capacity (vph)	474	688		302	679		412	686		508	737	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.51		0.27	0.20		0.12	0.28		0.05	0.31	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.51			
Intersection Signal Delay: 17.9		Intersection LOS: B	
Intersection Capacity Utilization 90.1%		ICU Level of Service E	
Analysis Period (min) 15			

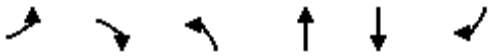
Splits and Phases: 1: Carp & March





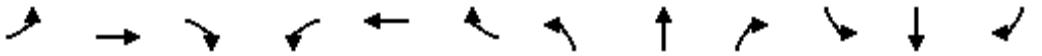
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	365	1	3	193	2	1	0	8	4	0	6
Future Volume (vph)	1	365	1	3	193	2	1	0	8	4	0	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.999			0.878			0.914	
Flt Protected					0.999			0.995			0.982	
Satd. Flow (prot)	0	1650	0	0	1595	0	0	1610	0	0	1654	0
Flt Permitted					0.999			0.995			0.982	
Satd. Flow (perm)	0	1650	0	0	1595	0	0	1610	0	0	1654	0
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		701.2			1395.3			331.3			446.0	
Travel Time (s)		31.6			62.8			19.9			26.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	14%	2%	2%	18%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1	406	1	3	214	2	1	0	9	4	0	7
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	408	0	0	219	0	0	10	0	0	11	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 30.9%		ICU Level of Service A	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	0	4	26	203	332	10
Future Volume (vph)	0	4	26	203	332	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.865				0.996	
Flt Protected				0.994		
Satd. Flow (prot)	1610	0	0	1622	1691	0
Flt Permitted				0.994		
Satd. Flow (perm)	1610	0	0	1622	1691	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	107.2			499.2	742.4	
Travel Time (s)	7.7			22.5	33.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	1%	1%	1%	17%	11%	1%
Adj. Flow (vph)	0	4	29	226	369	11
Shared Lane Traffic (%)						
Lane Group Flow (vph)	4	0	0	255	380	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	44.3%	ICU Level of Service	A
Analysis Period (min)	15		

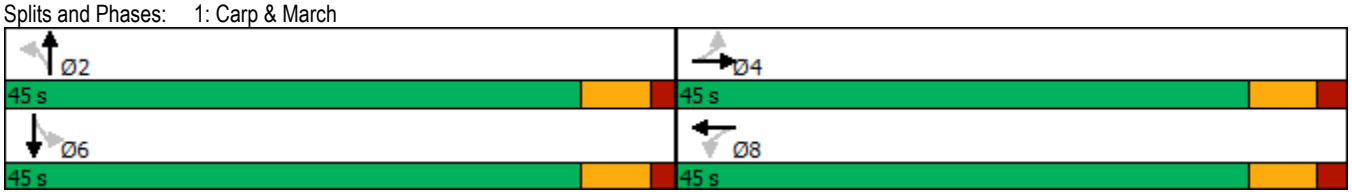


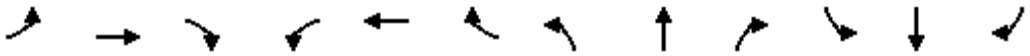
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	49	107	32	100	315	16	151	190	96	16	144	65
Future Volume (vph)	49	107	32	100	315	16	151	190	96	16	144	65
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	120.0		0.0	145.0		0.0	130.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	70.0			70.0			70.0			70.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.965			0.993			0.950			0.953	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1717	1589	0	1540	1730	0	1751	1701	0	1768	1733	0
Flt Permitted	0.449			0.659			0.595			0.500		
Satd. Flow (perm)	812	1589	0	1068	1730	0	1097	1701	0	931	1733	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			4			36			32	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		1395.3			662.5			720.5			545.3	
Travel Time (s)		62.8			29.8			32.4			24.5	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	4%	10%	28%	16%	8%	6%	2%	4%	7%	1%	4%	2%
Adj. Flow (vph)	54	119	36	111	350	18	168	211	107	18	160	72
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	155	0	111	368	0	168	318	0	18	232	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			4.0			4.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	27.7	27.7		27.7	27.7		27.4	27.4		27.4	27.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Yellow Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.1	2.1		2.1	2.1		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.7	6.7		6.7	6.7		6.4	6.4		6.4	6.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	1	1		1	1		1	1		1	1	
Act Effct Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.43	0.43		0.43	0.43	
v/c Ratio	0.16	0.23		0.24	0.50		0.36	0.42		0.05	0.30	
Control Delay	17.5	15.2		18.4	21.5		20.1	17.9		15.5	15.7	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	17.5	15.2		18.4	21.5		20.1	17.9		15.5	15.7	
LOS	B	B		B	C		C	B		B	B	
Approach Delay		15.8			20.8			18.7			15.7	
Approach LOS		B			C			B			B	
Queue Length 50th (m)	5.1	13.0		11.0	41.1		17.5	30.1		1.6	20.0	
Queue Length 95th (m)	12.2	24.8		21.7	63.9		32.1	49.9		5.3	34.9	
Internal Link Dist (m)		1371.3			638.5			696.5			521.3	
Turn Bay Length (m)	150.0			120.0			145.0			130.0		
Base Capacity (vph)	345	688		454	738		470	750		399	761	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.16	0.23		0.24	0.50		0.36	0.42		0.05	0.30	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.50			
Intersection Signal Delay: 18.4		Intersection LOS: B	
Intersection Capacity Utilization 90.4%		ICU Level of Service E	
Analysis Period (min) 15			

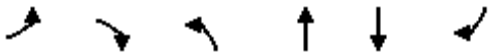
Splits and Phases: 1: Carp & March





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	188	2	13	531	3	2	0	8	3	0	4
Future Volume (vph)	4	188	2	13	531	3	2	0	8	3	0	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.999			0.890			0.923	
Flt Protected		0.999			0.999			0.991			0.979	
Satd. Flow (prot)	0	1709	0	0	1740	0	0	1626	0	0	1665	0
Flt Permitted		0.999			0.999			0.991			0.979	
Satd. Flow (perm)	0	1709	0	0	1740	0	0	1626	0	0	1665	0
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		701.2			1395.3			331.3			446.0	
Travel Time (s)		31.6			62.8			19.9			26.8	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	2%	10%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	4	209	2	14	590	3	2	0	9	3	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	215	0	0	607	0	0	11	0	0	7	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

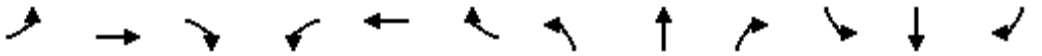


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	3	13	6	446	266	3
Future Volume (vph)	3	13	6	446	266	3
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.889				0.999	
Flt Protected	0.991			0.999		
Satd. Flow (prot)	1640	0	0	1824	1635	0
Flt Permitted	0.991			0.999		
Satd. Flow (perm)	1640	0	0	1824	1635	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	107.2			499.2	742.4	
Travel Time (s)	7.7			22.5	33.4	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90
Heavy Vehicles (%)	1%	1%	1%	3%	15%	1%
Adj. Flow (vph)	3	14	7	496	296	3
Shared Lane Traffic (%)						
Lane Group Flow (vph)	17	0	0	503	299	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 39.8%		ICU Level of Service A	
Analysis Period (min) 15			

APPENDIX J

Background Synchro Analysis

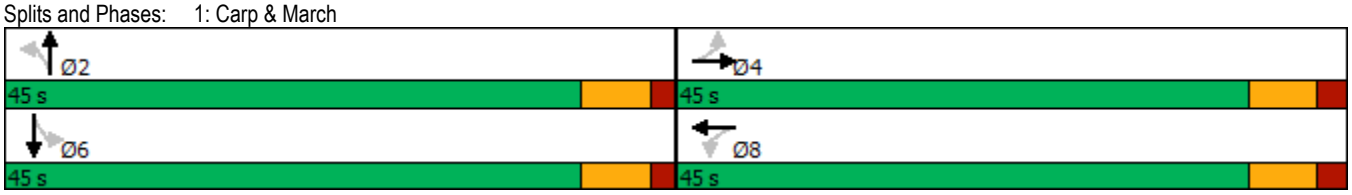


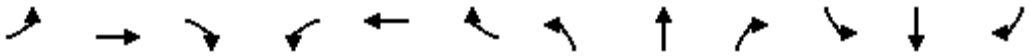
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	53	298	138	117	147	6	59	148	80	26	261	41
Future Volume (vph)	53	298	138	117	147	6	59	148	80	26	261	41
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	120.0		0.0	145.0		0.0	130.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	70.0			70.0			70.0			70.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.953			0.994			0.947			0.980	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1581	1572	0	1452	1593	0	1514	1551	0	1768	1711	0
Flt Permitted	0.660			0.379			0.517			0.599		
Satd. Flow (perm)	1098	1572	0	579	1593	0	824	1551	0	1115	1711	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		32			3			38			11	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		1395.3			662.5			720.5			545.3	
Travel Time (s)		62.8			29.8			32.4			24.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	14%	14%	23%	18%	1%	18%	13%	18%	1%	7%	12%
Adj. Flow (vph)	53	298	138	117	147	6	59	148	80	26	261	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	53	436	0	117	153	0	59	228	0	26	302	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			4.0			4.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	27.7	27.7		27.7	27.7		27.4	27.4		27.4	27.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Yellow Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.1	2.1		2.1	2.1		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.7	6.7		6.7	6.7		6.4	6.4		6.4	6.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	1	1		1	1		1	1		1	1	
Act Effct Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.43	0.43		0.43	0.43	
v/c Ratio	0.11	0.63		0.48	0.23		0.17	0.33		0.05	0.41	
Control Delay	16.5	23.8		26.7	17.2		17.5	15.7		15.6	19.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	16.5	23.8		26.7	17.2		17.5	15.7		15.6	19.2	
LOS	B	C		C	B		B	B		B	B	
Approach Delay		23.0			21.3			16.1			18.9	
Approach LOS		C			C			B			B	
Queue Length 50th (m)	5.0	49.1		13.0	14.7		5.6	19.2		2.4	31.1	
Queue Length 95th (m)	11.5	78.4		28.6	26.5		13.0	34.6		6.7	50.0	
Internal Link Dist (m)		1371.3			638.5			696.5			521.3	
Turn Bay Length (m)	150.0			120.0			145.0			130.0		
Base Capacity (vph)	467	687		246	679		353	686		478	740	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.11	0.63		0.48	0.23		0.17	0.33		0.05	0.41	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 20.3		Intersection LOS: C	
Intersection Capacity Utilization 97.7%		ICU Level of Service F	
Analysis Period (min) 15			

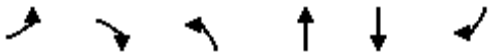
Splits and Phases: 1: Carp & March





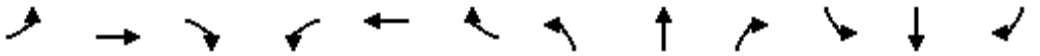
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	492	1	7	243	2	1	0	18	4	0	6
Future Volume (vph)	1	492	1	7	243	2	1	0	18	4	0	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.999			0.872			0.919	
Flt Protected					0.999			0.997			0.980	
Satd. Flow (prot)	0	1650	0	0	1598	0	0	1602	0	0	1660	0
Flt Permitted					0.999			0.997			0.980	
Satd. Flow (perm)	0	1650	0	0	1598	0	0	1602	0	0	1660	0
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		701.2			1395.3			331.3			446.0	
Travel Time (s)		31.6			62.8			19.9			26.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	14%	2%	2%	18%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1	492	1	7	243	2	1	0	18	4	0	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	494	0	0	252	0	0	19	0	0	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 37.9%		ICU Level of Service A	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	7	10	54	253	494	37
Future Volume (vph)	7	10	54	253	494	37
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.921				0.991	
Flt Protected	0.980			0.991		
Satd. Flow (prot)	1680	0	0	1632	1689	0
Flt Permitted	0.980			0.991		
Satd. Flow (perm)	1680	0	0	1632	1689	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	107.2			499.2	742.4	
Travel Time (s)	7.7			22.5	33.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	1%	1%	17%	11%	1%
Adj. Flow (vph)	7	10	54	253	494	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	17	0	0	307	531	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 60.4%		ICU Level of Service B	
Analysis Period (min) 15			

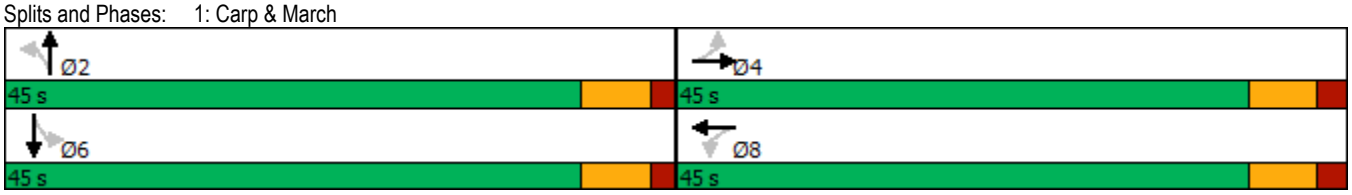


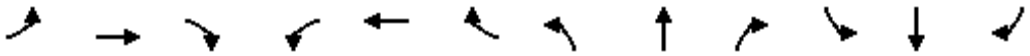
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	140	42	117	398	18	218	266	136	19	191	78
Future Volume (vph)	54	140	42	117	398	18	218	266	136	19	191	78
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	120.0		0.0	145.0		0.0	130.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	70.0			70.0			70.0			70.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.965			0.994			0.949			0.957	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1717	1589	0	1540	1732	0	1751	1699	0	1768	1740	0
Flt Permitted	0.399			0.643			0.553			0.411		
Satd. Flow (perm)	721	1589	0	1042	1732	0	1019	1699	0	765	1740	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		21			3			36			29	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		1395.3			662.5			720.5			545.3	
Travel Time (s)		62.8			29.8			32.4			24.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	10%	28%	16%	8%	6%	2%	4%	7%	1%	4%	2%
Adj. Flow (vph)	54	140	42	117	398	18	218	266	136	19	191	78
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	182	0	117	416	0	218	402	0	19	269	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			4.0			4.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	27.7	27.7		27.7	27.7		27.4	27.4		27.4	27.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Yellow Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.1	2.1		2.1	2.1		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.7	6.7		6.7	6.7		6.4	6.4		6.4	6.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	1	1		1	1		1	1		1	1	
Act Effct Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.43	0.43		0.43	0.43	
v/c Ratio	0.18	0.26		0.26	0.56		0.50	0.54		0.06	0.35	
Control Delay	18.1	16.0		18.8	23.1		23.6	20.4		15.8	16.9	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	18.1	16.0		18.8	23.1		23.6	20.4		15.8	16.9	
LOS	B	B		B	C		C	C		B	B	
Approach Delay		16.4			22.1			21.6			16.8	
Approach LOS		B			C			C			B	
Queue Length 50th (m)	5.2	15.9		11.7	48.3		24.5	41.8		1.7	24.7	
Queue Length 95th (m)	12.4	29.0		23.0	74.0		44.1	66.5		5.5	41.6	
Internal Link Dist (m)		1371.3			638.5			696.5			521.3	
Turn Bay Length (m)	150.0			120.0			145.0			130.0		
Base Capacity (vph)	306	688		443	738		437	749		328	762	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.18	0.26		0.26	0.56		0.50	0.54		0.06	0.35	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.56			
Intersection Signal Delay: 20.2		Intersection LOS: C	
Intersection Capacity Utilization 102.0%		ICU Level of Service G	
Analysis Period (min) 15			

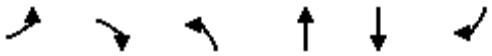
Splits and Phases: 1: Carp & March





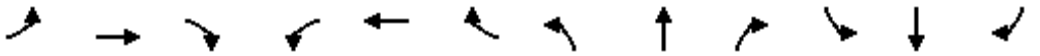
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	240	2	23	684	3	2	0	14	3	0	4
Future Volume (vph)	4	240	2	23	684	3	2	0	14	3	0	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.999			0.882			0.923	
Flt Protected		0.999			0.998			0.994			0.979	
Satd. Flow (prot)	0	1709	0	0	1739	0	0	1616	0	0	1665	0
Flt Permitted		0.999			0.998			0.994			0.979	
Satd. Flow (perm)	0	1709	0	0	1739	0	0	1616	0	0	1665	0
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		701.2			1395.3			331.3			446.0	
Travel Time (s)		31.6			62.8			19.9			26.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	10%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	4	240	2	23	684	3	2	0	14	3	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	246	0	0	710	0	0	16	0	0	7	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	61.5%	ICU Level of Service	B
Analysis Period (min)	15		



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	30	39	14	579	333	10
Future Volume (vph)	30	39	14	579	333	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.924				0.996	
Flt Protected	0.979			0.999		
Satd. Flow (prot)	1684	0	0	1824	1634	0
Flt Permitted	0.979			0.999		
Satd. Flow (perm)	1684	0	0	1824	1634	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	107.2			499.2	742.4	
Travel Time (s)	7.7			22.5	33.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	1%	1%	3%	15%	1%
Adj. Flow (vph)	30	39	14	579	333	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	69	0	0	593	343	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	55.0%	ICU Level of Service	A
Analysis Period (min)	15		

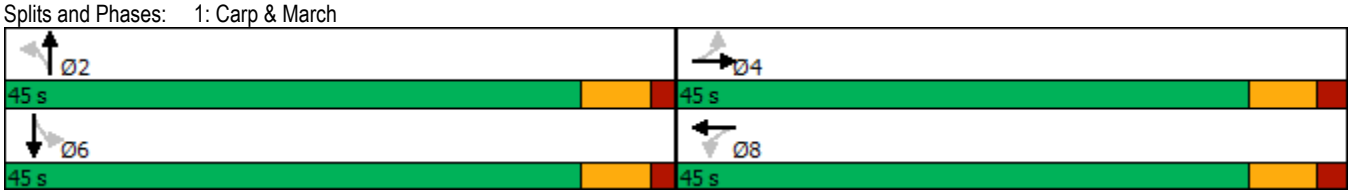


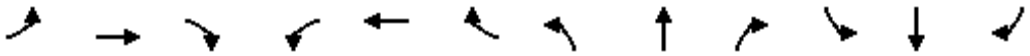
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	55	322	142	121	159	6	63	152	86	29	269	44
Future Volume (vph)	55	322	142	121	159	6	63	152	86	29	269	44
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	120.0		0.0	145.0		0.0	130.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	70.0			70.0			70.0			70.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.954			0.995			0.946			0.979	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1581	1573	0	1452	1594	0	1514	1549	0	1768	1709	0
Flt Permitted	0.653			0.350			0.505			0.588		
Satd. Flow (perm)	1086	1573	0	535	1594	0	805	1549	0	1094	1709	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		31			3			40			11	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		1395.3			662.5			720.5			545.3	
Travel Time (s)		62.8			29.8			32.4			24.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	14%	14%	23%	18%	1%	18%	13%	18%	1%	7%	12%
Adj. Flow (vph)	55	322	142	121	159	6	63	152	86	29	269	44
Shared Lane Traffic (%)												
Lane Group Flow (vph)	55	464	0	121	165	0	63	238	0	29	313	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			4.0			4.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	27.7	27.7		27.7	27.7		27.4	27.4		27.4	27.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Yellow Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.1	2.1		2.1	2.1		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.7	6.7		6.7	6.7		6.4	6.4		6.4	6.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	1	1		1	1		1	1		1	1	
Act Effct Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.43	0.43		0.43	0.43	
v/c Ratio	0.12	0.68		0.53	0.24		0.18	0.35		0.06	0.42	
Control Delay	16.6	25.3		29.8	17.5		17.8	15.9		15.7	19.5	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	16.6	25.3		29.8	17.5		17.8	15.9		15.7	19.5	
LOS	B	C		C	B		B	B		B	B	
Approach Delay		24.4			22.7			16.3			19.1	
Approach LOS		C			C			B			B	
Queue Length 50th (m)	5.2	54.0		13.9	16.0		6.0	20.1		2.6	32.5	
Queue Length 95th (m)	11.9	85.7		31.2	28.4		13.8	36.0		7.3	52.0	
Internal Link Dist (m)		1371.3			638.5			696.5			521.3	
Turn Bay Length (m)	150.0			120.0			145.0			130.0		
Base Capacity (vph)	462	687		227	680		345	687		469	739	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.12	0.68		0.53	0.24		0.18	0.35		0.06	0.42	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.68			
Intersection Signal Delay: 21.1		Intersection LOS: C	
Intersection Capacity Utilization 99.9%		ICU Level of Service F	
Analysis Period (min) 15			

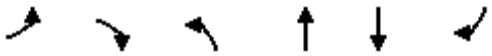
Splits and Phases: 1: Carp & March





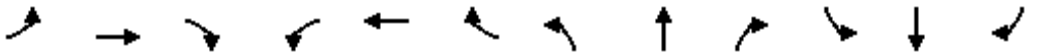
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	529	1	7	262	2	1	0	18	4	0	6
Future Volume (vph)	1	529	1	7	262	2	1	0	18	4	0	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.999			0.872			0.919	
Flt Protected					0.999			0.997			0.980	
Satd. Flow (prot)	0	1650	0	0	1597	0	0	1602	0	0	1660	0
Flt Permitted					0.999			0.997			0.980	
Satd. Flow (perm)	0	1650	0	0	1597	0	0	1602	0	0	1660	0
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		701.2			1395.3			331.3			446.0	
Travel Time (s)		31.6			62.8			19.9			26.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	14%	2%	2%	18%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1	529	1	7	262	2	1	0	18	4	0	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	531	0	0	271	0	0	19	0	0	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 39.9%		ICU Level of Service A	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	7	10	54	263	511	37
Future Volume (vph)	7	10	54	263	511	37
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.921				0.991	
Flt Protected	0.980			0.992		
Satd. Flow (prot)	1680	0	0	1632	1689	0
Flt Permitted	0.980			0.992		
Satd. Flow (perm)	1680	0	0	1632	1689	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	107.2			499.2	742.4	
Travel Time (s)	7.7			22.5	33.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	1%	1%	17%	11%	1%
Adj. Flow (vph)	7	10	54	263	511	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	17	0	0	317	548	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 61.9%		ICU Level of Service B	
Analysis Period (min) 15			

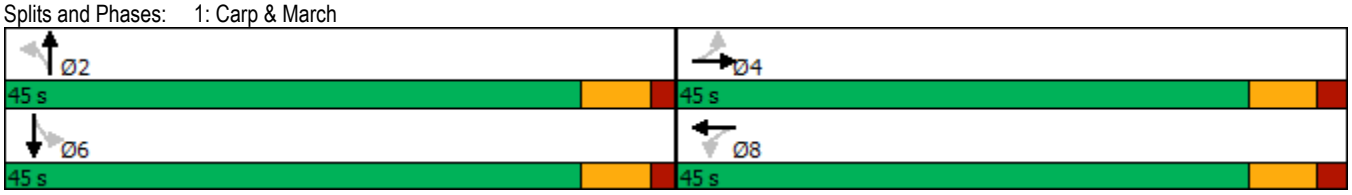


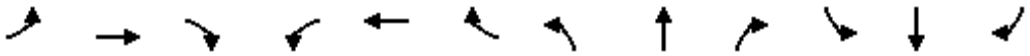
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	151	44	122	430	18	233	276	146	21	199	85
Future Volume (vph)	56	151	44	122	430	18	233	276	146	21	199	85
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	120.0		0.0	145.0		0.0	130.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	70.0			70.0			70.0			70.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.966			0.994			0.948			0.955	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1717	1592	0	1540	1732	0	1751	1697	0	1768	1736	0
Flt Permitted	0.367			0.635			0.537			0.391		
Satd. Flow (perm)	663	1592	0	1029	1732	0	990	1697	0	728	1736	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		20			3			37			30	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		1395.3			662.5			720.5			545.3	
Travel Time (s)		62.8			29.8			32.4			24.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	10%	28%	16%	8%	6%	2%	4%	7%	1%	4%	2%
Adj. Flow (vph)	56	151	44	122	430	18	233	276	146	21	199	85
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	195	0	122	448	0	233	422	0	21	284	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			4.0			4.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	27.7	27.7		27.7	27.7		27.4	27.4		27.4	27.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Yellow Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.1	2.1		2.1	2.1		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.7	6.7		6.7	6.7		6.4	6.4		6.4	6.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	1	1		1	1		1	1		1	1	
Act Effct Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.43	0.43		0.43	0.43	
v/c Ratio	0.20	0.28		0.28	0.61		0.55	0.56		0.07	0.37	
Control Delay	18.6	16.4		19.1	24.2		25.3	21.1		16.0	17.2	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	18.6	16.4		19.1	24.2		25.3	21.1		16.0	17.2	
LOS	B	B		B	C		C	C		B	B	
Approach Delay		16.9			23.1			22.6			17.2	
Approach LOS		B			C			C			B	
Queue Length 50th (m)	5.4	17.5		12.3	53.3		26.9	44.7		1.9	26.4	
Queue Length 95th (m)	13.2	31.2		23.9	81.5		48.4	70.7		6.0	43.9	
Internal Link Dist (m)		1371.3			638.5			696.5			521.3	
Turn Bay Length (m)	150.0			120.0			145.0			130.0		
Base Capacity (vph)	282	688		437	738		424	748		312	761	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.20	0.28		0.28	0.61		0.55	0.56		0.07	0.37	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 21.0		Intersection LOS: C	
Intersection Capacity Utilization 104.9%		ICU Level of Service G	
Analysis Period (min) 15			

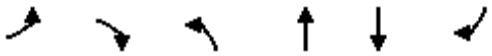
Splits and Phases: 1: Carp & March





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	258	2	23	737	3	2	0	14	3	0	4
Future Volume (vph)	4	258	2	23	737	3	2	0	14	3	0	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.999			0.999			0.882			0.923	
Flt Protected		0.999			0.998			0.994			0.979	
Satd. Flow (prot)	0	1708	0	0	1739	0	0	1616	0	0	1665	0
Flt Permitted		0.999			0.998			0.994			0.979	
Satd. Flow (perm)	0	1708	0	0	1739	0	0	1616	0	0	1665	0
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		701.2			1395.3			331.3			446.0	
Travel Time (s)		31.6			62.8			19.9			26.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	10%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	4	258	2	23	737	3	2	0	14	3	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	264	0	0	763	0	0	16	0	0	7	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 64.8%		ICU Level of Service C	
Analysis Period (min) 15			



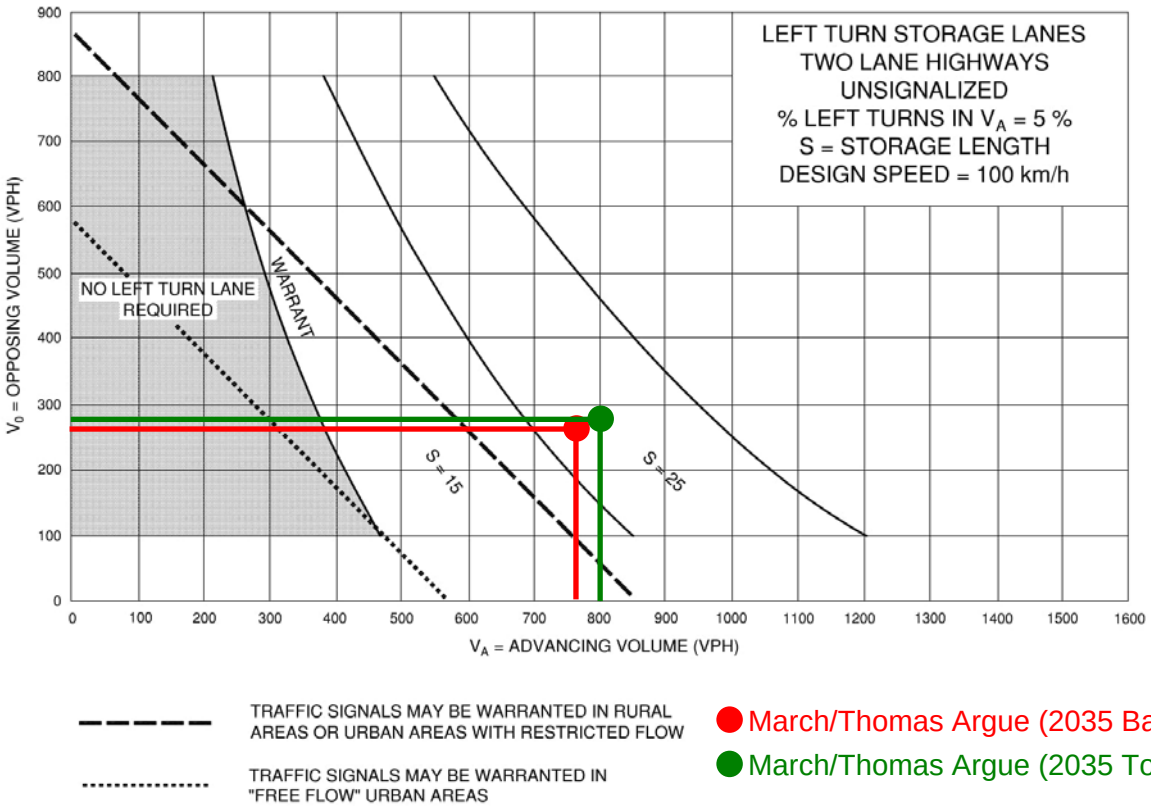
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	30	39	14	601	346	10
Future Volume (vph)	30	39	14	601	346	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.924				0.996	
Flt Protected	0.979			0.999		
Satd. Flow (prot)	1684	0	0	1824	1634	0
Flt Permitted	0.979			0.999		
Satd. Flow (perm)	1684	0	0	1824	1634	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	107.2			499.2	742.4	
Travel Time (s)	7.7			22.5	33.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	1%	1%	3%	15%	1%
Adj. Flow (vph)	30	39	14	601	346	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	69	0	0	615	356	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			0.0	0.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 56.2%		ICU Level of Service B	
Analysis Period (min) 15			

APPENDIX K

Left Turn Lane Warrant Graphs

Exhibit 9A-22



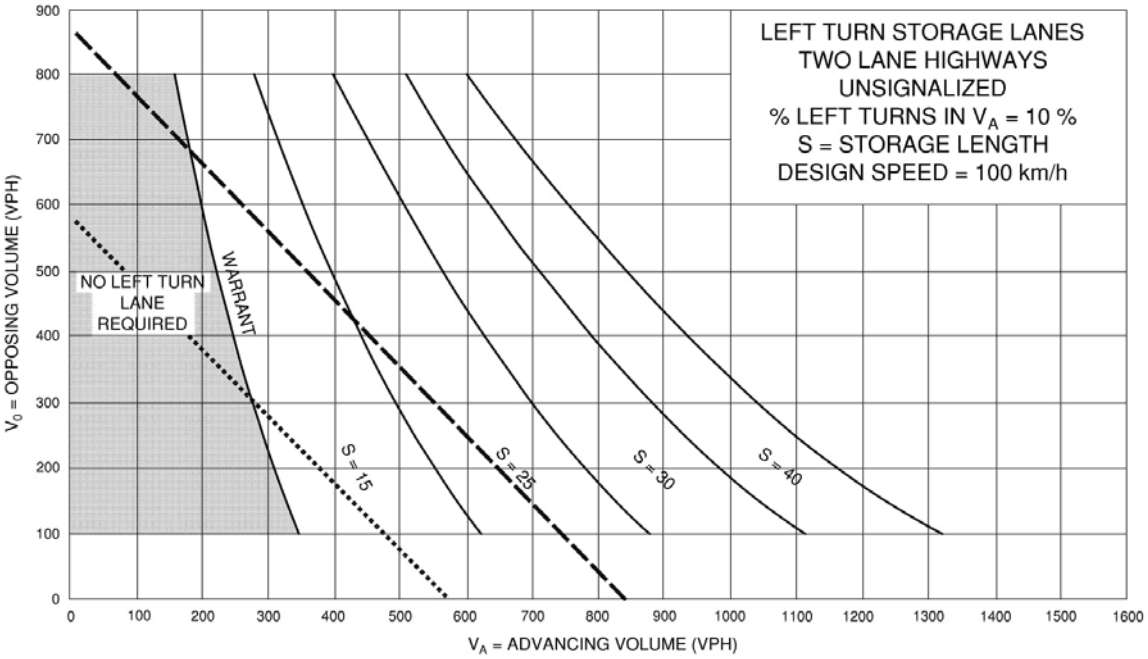
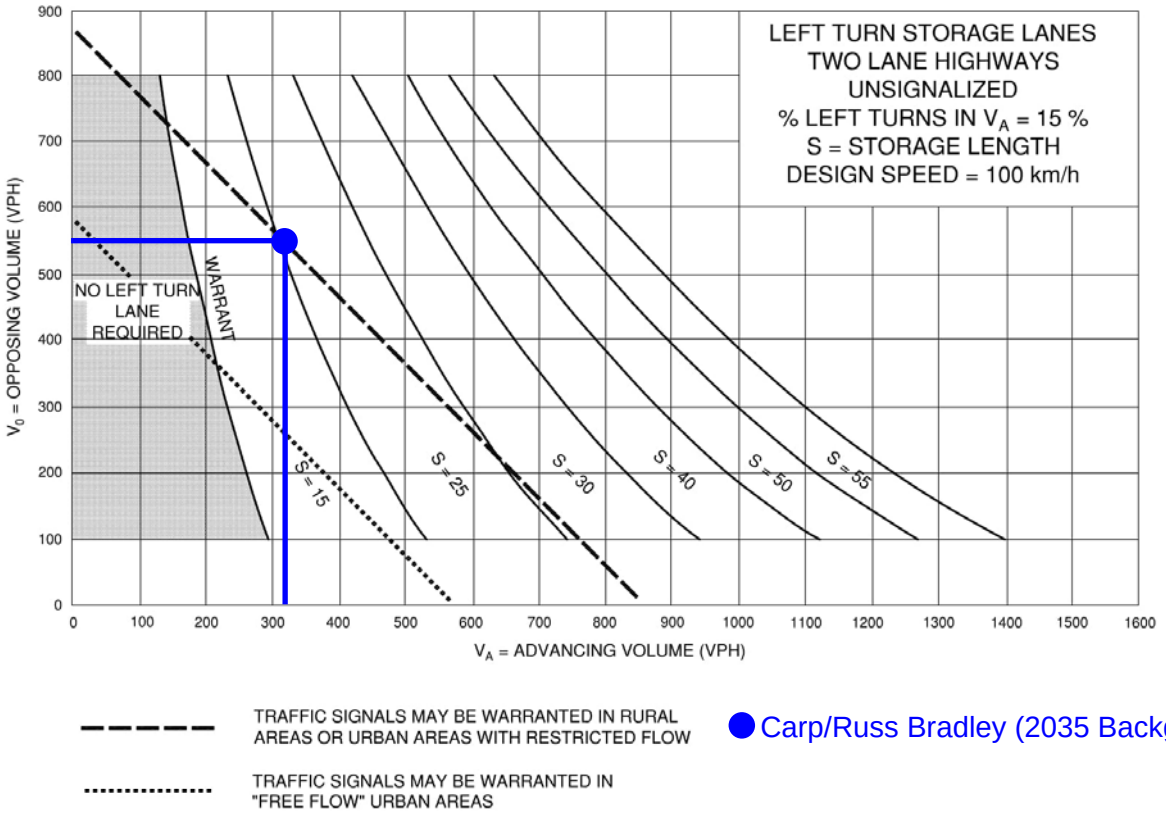
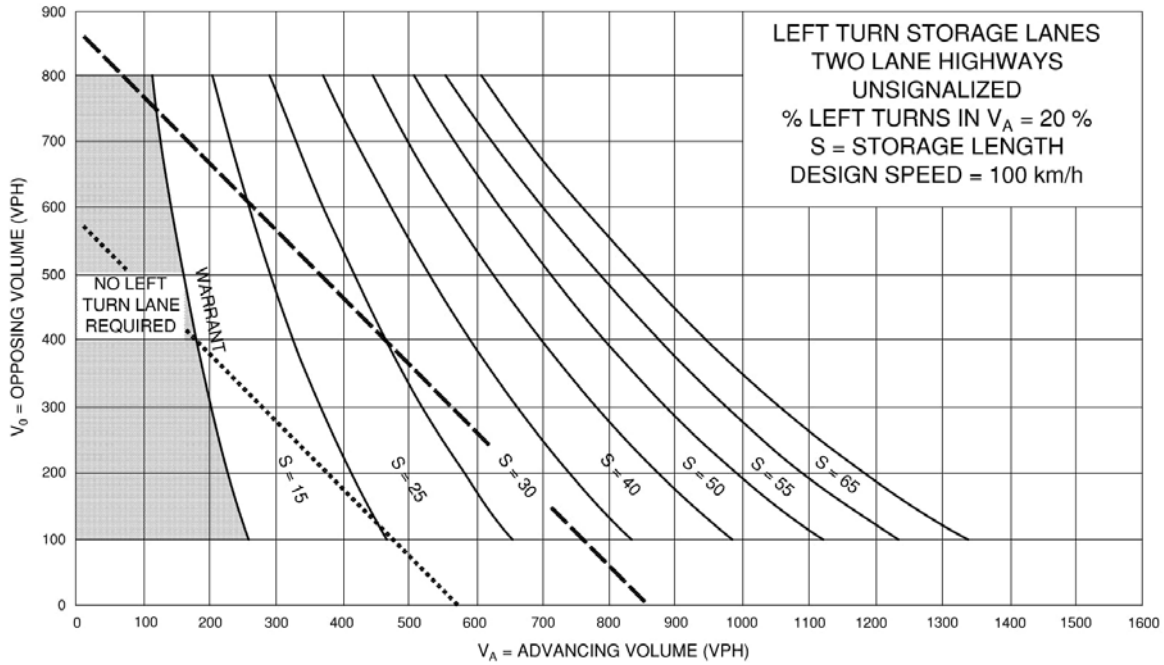


Exhibit 9A-23





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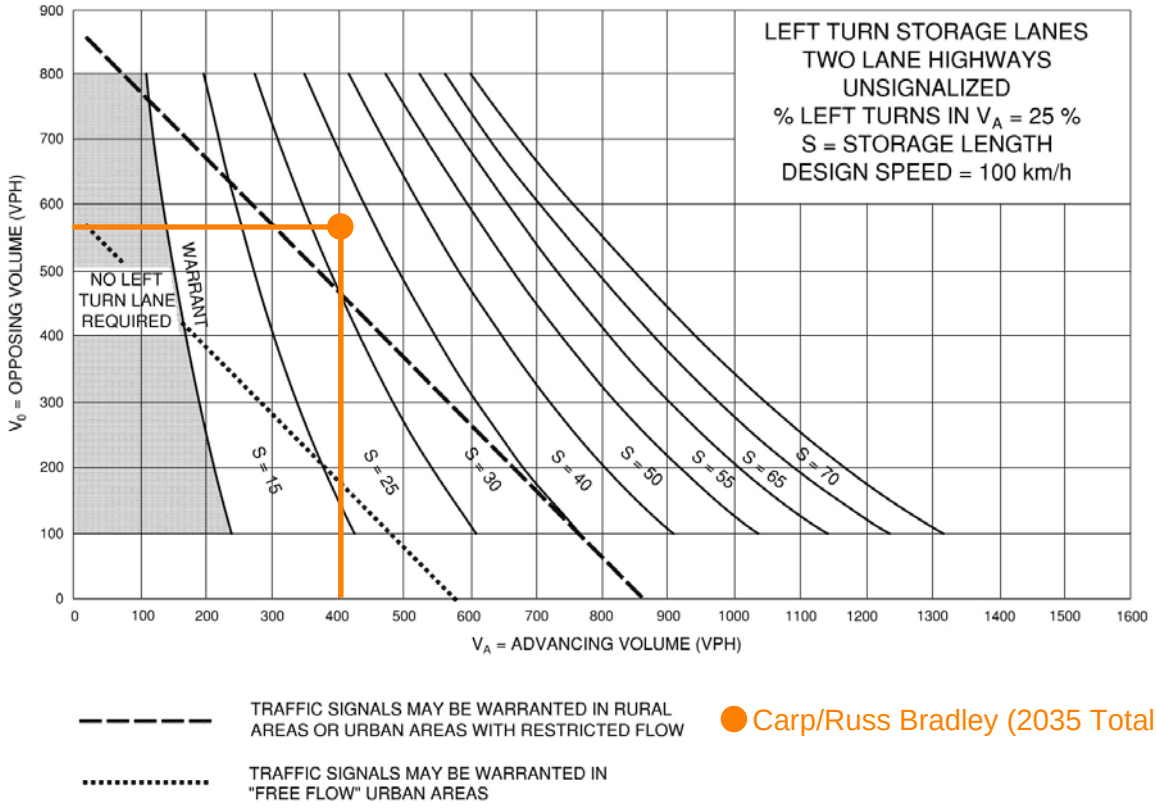
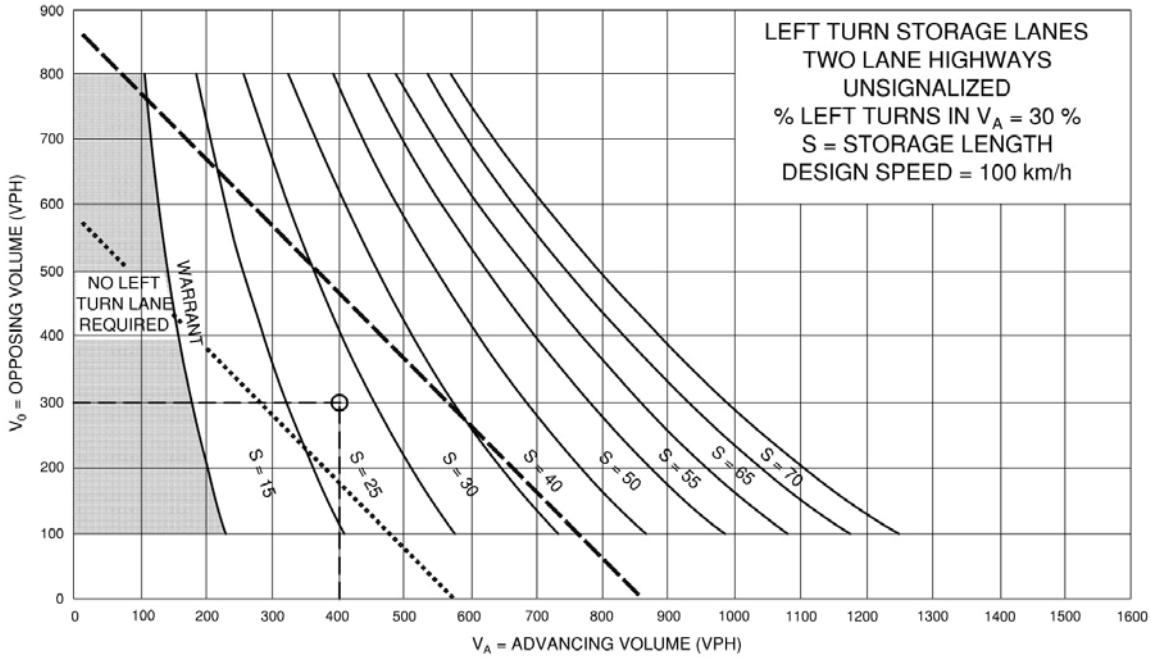
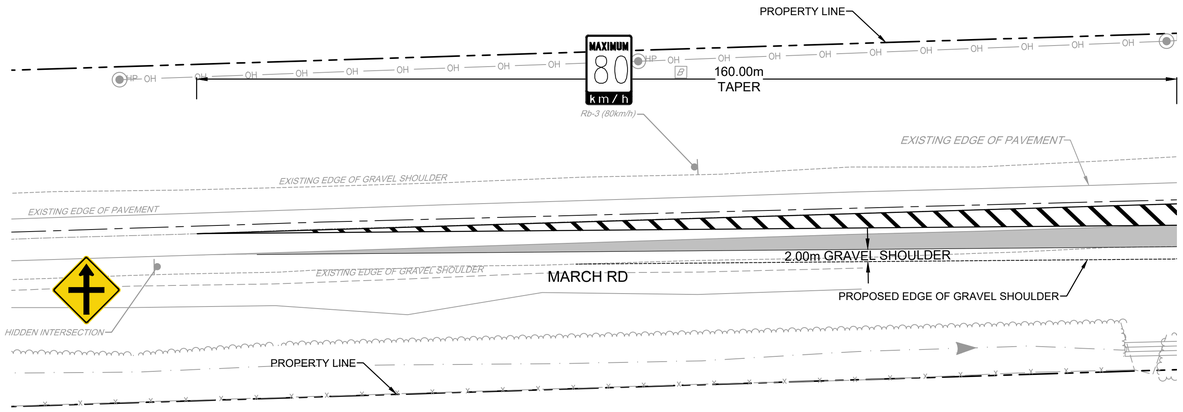
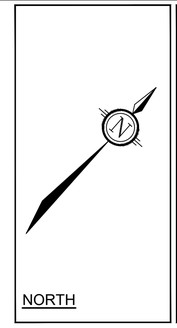


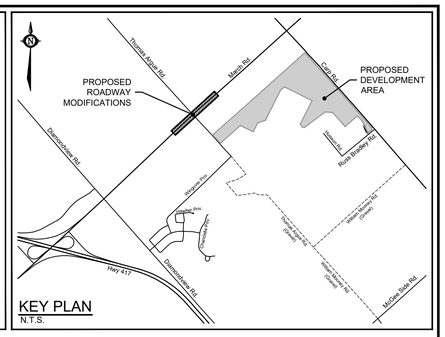


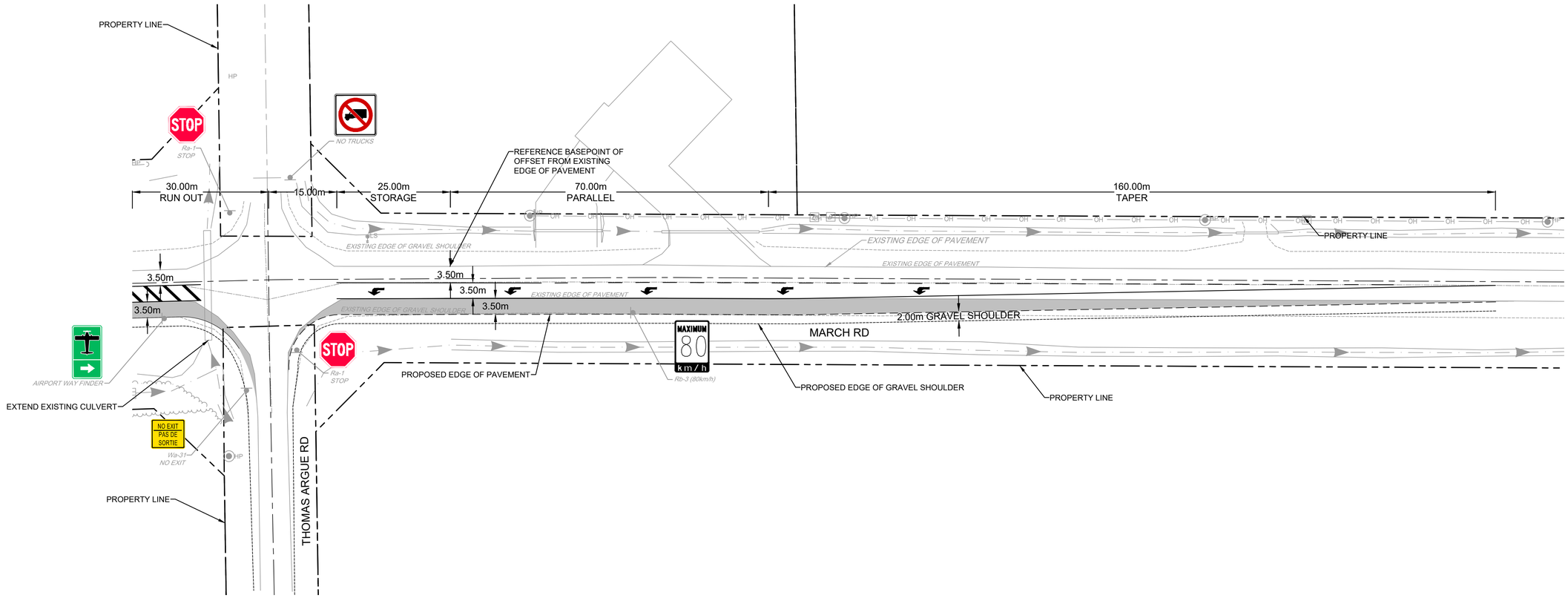
APPENDIX L

Auxiliary Left Turn Lane Functional Designs









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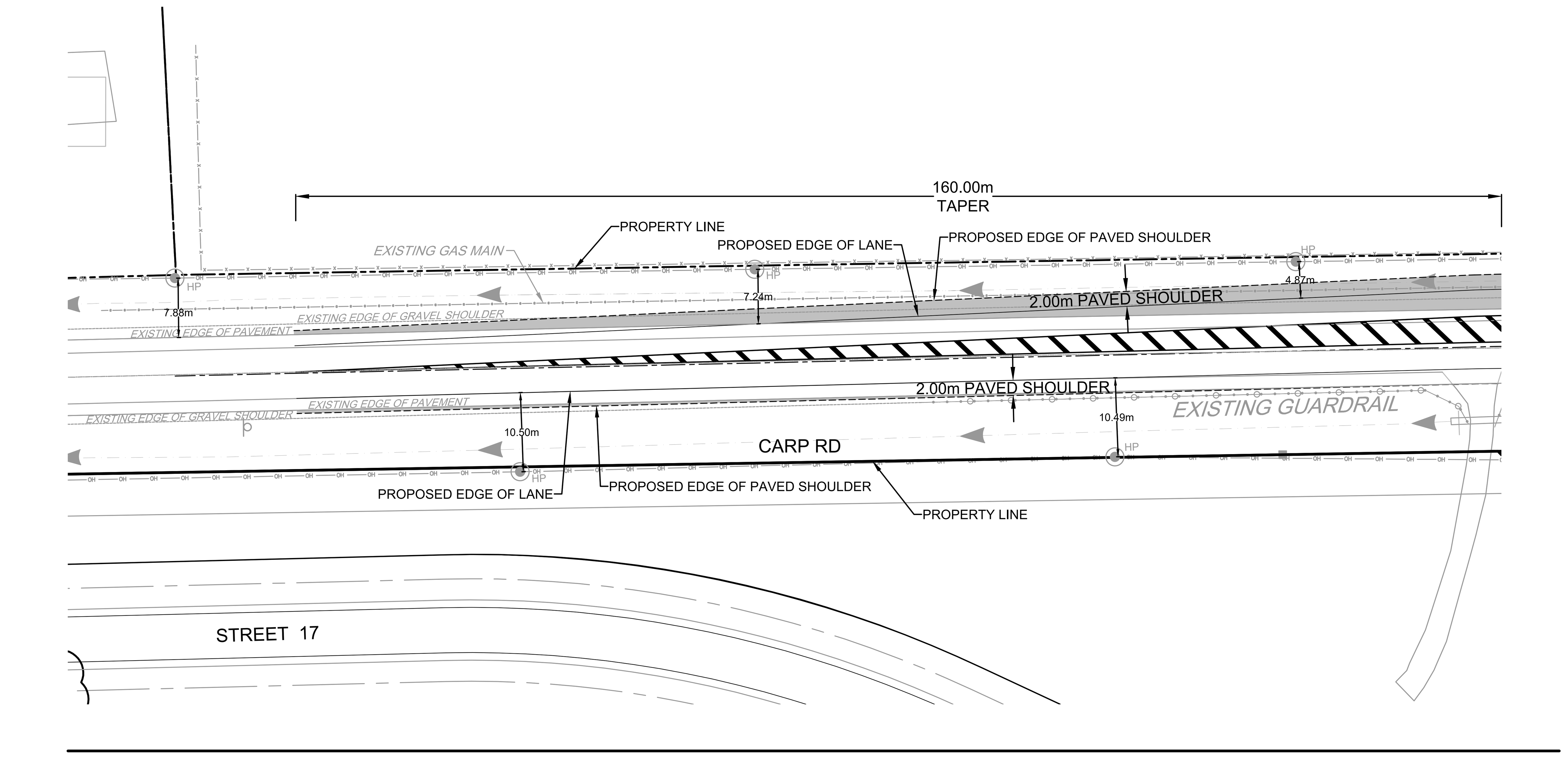
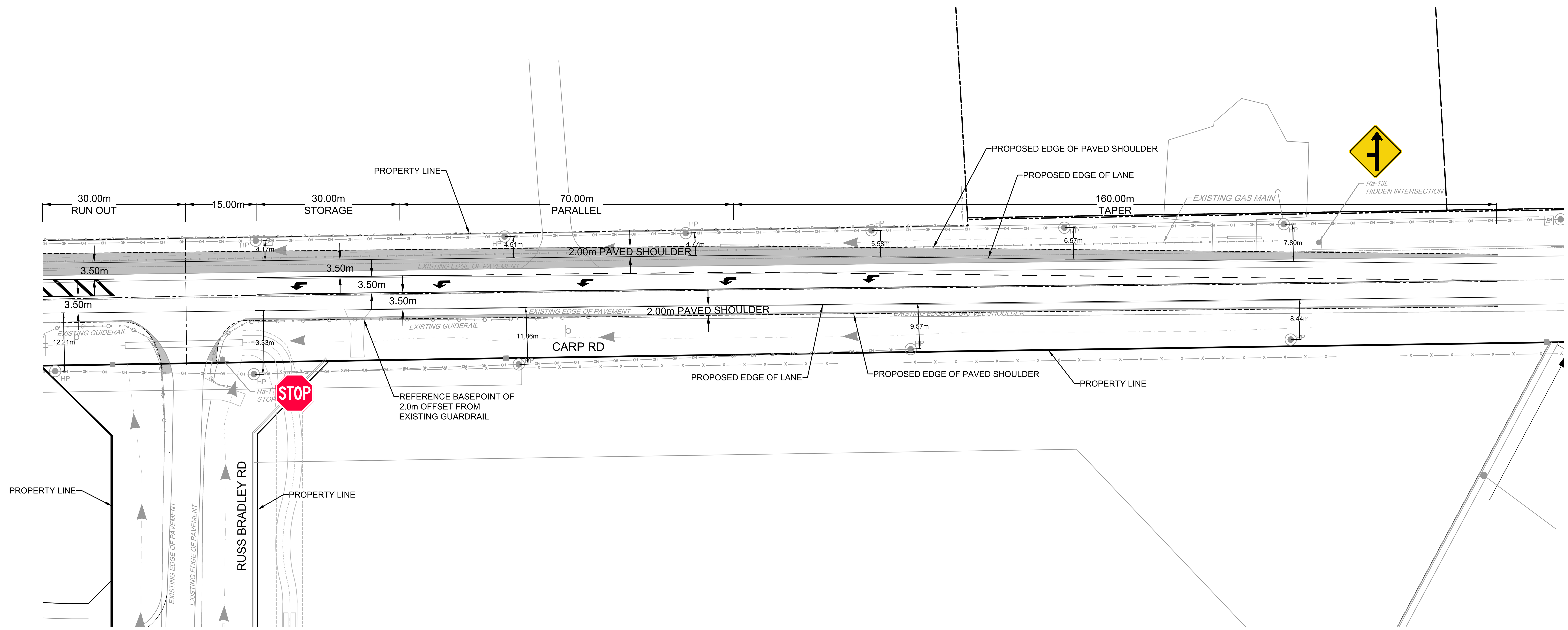
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

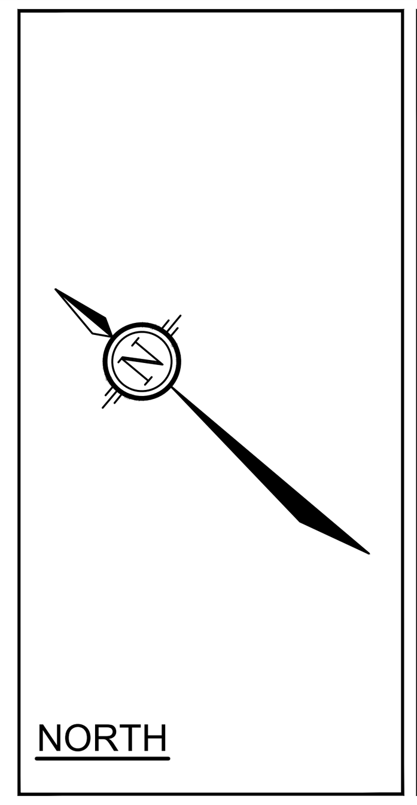
LOCATION
CITY of OTTAWA
CARP AIRPORT PH2 BUSINESS PARK

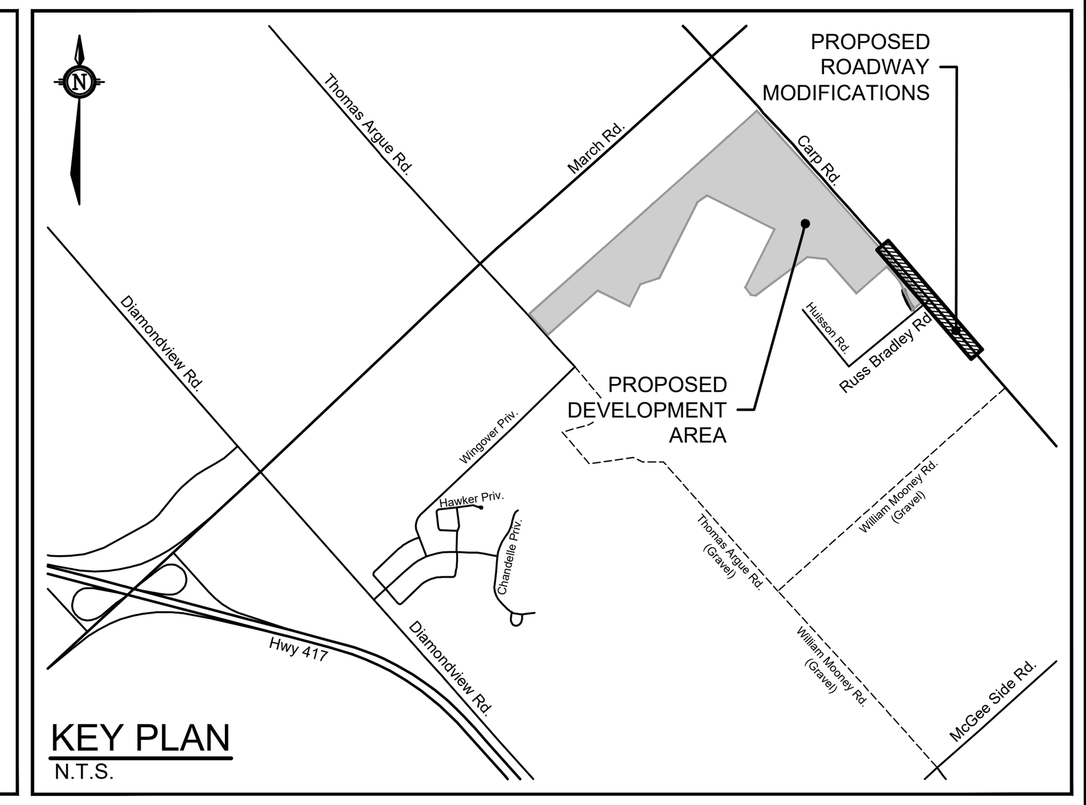
DRAWING NAME
FUNCTIONAL DESIGN
MARCH RD & THOMAS ARGUE RD

PROJECT No. 102085-14
REV REV # 1
DRAWING No. 102085-FD1









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LOCATION
CITY of OTTAWA
CARP AIRPORT PH2 BUSINESS PARK

DRAWING NAME
FUNCTIONAL DESIGN
CARP RD & RUSS BRADLEY RD

PROJECT No. 102085-14
REV: REV # 1
DRAWING No. 102085-FD2

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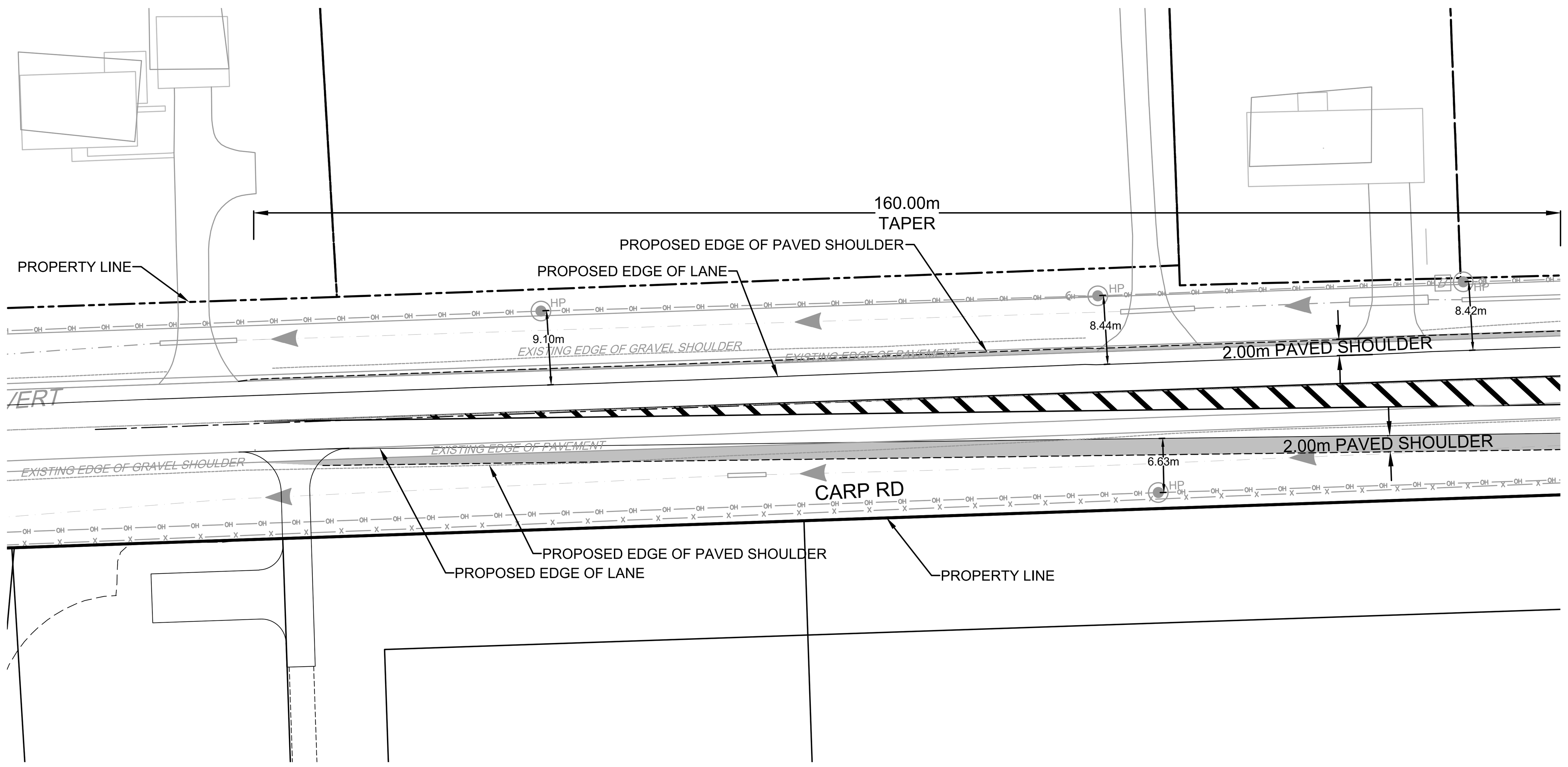

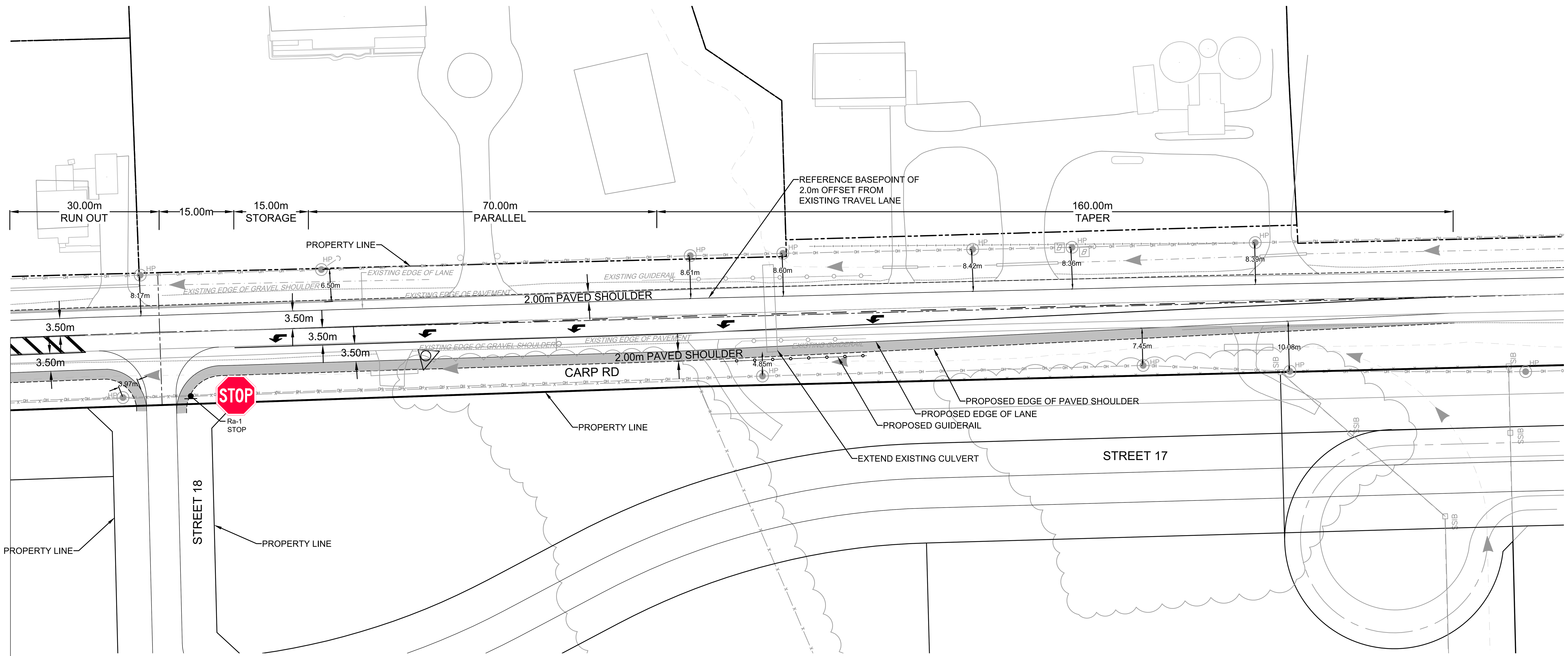

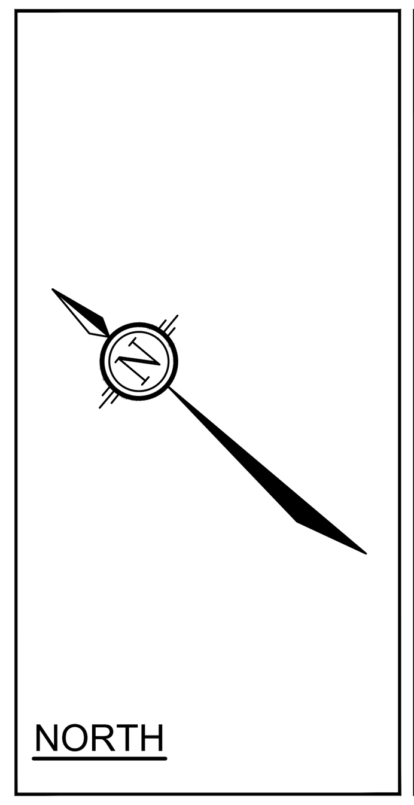

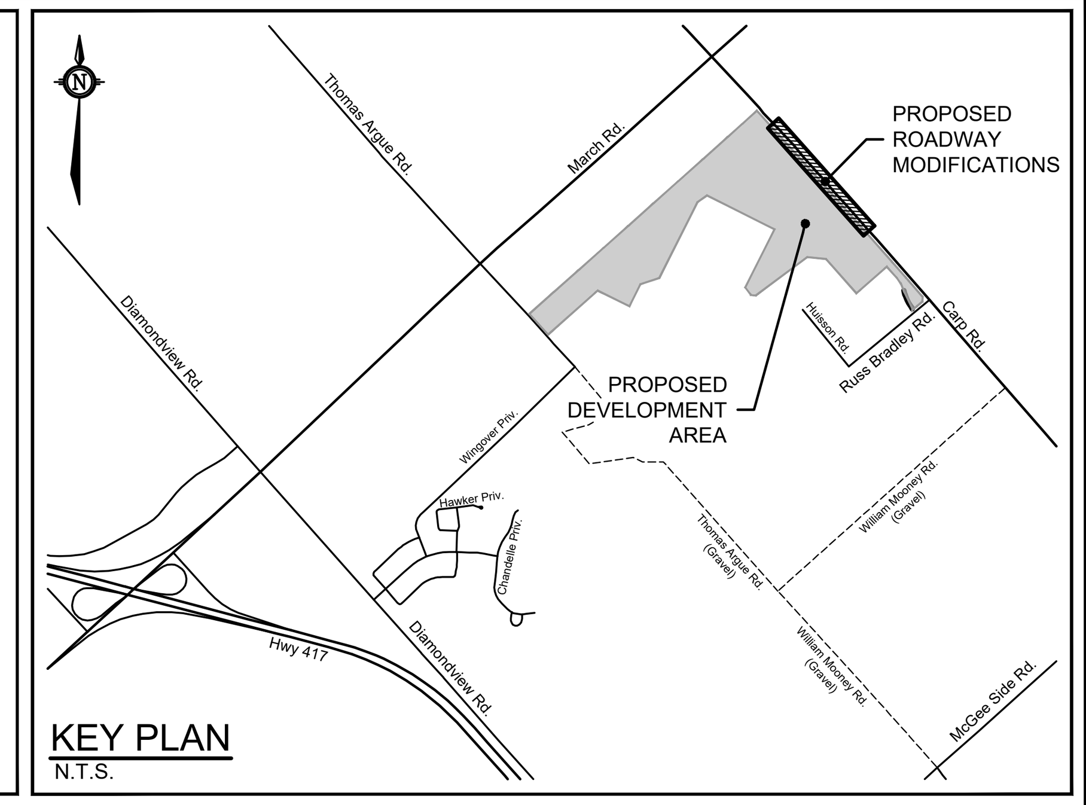

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Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY of OTTAWA
CARP AIRPORT PH2 BUSINESS PARK

DRAWING NAME
FUNCTIONAL DESIGN
CARP RD & STREET 18

PROJECT No. 102085-14
REV: REV # 1
DRAWING No. 102085-FD3

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APPENDIX M

MMLOS Analysis

Segment MMLOS Analysis

The *Multi-Modal Level of Service (MMLOS) Guidelines*, produced by IBI Group in October 2015, have been used to evaluate the levels of service for each alternative mode of transportation, based on the targets for roadways within the General Rural Area.

Exhibit 22 of the *MMLOS Guidelines* identifies no target pedestrian level of service (PLOS) for all classes of roadway in the General Rural Area. Therefore, the boundary streets have not been evaluated for PLOS.

Exhibit 11 of the *MMLOS Guidelines* has been used to evaluate the segment bicycle level of service (BLOS). Within the General Rural Area, Exhibit 22 of the *MMLOS Guidelines* identifies a target BLOS D for arterial spine routes (Carp Road), and no target for roadways without a cycling route designation (Thomas Argue Road, Russ Bradley Road). Therefore, only Carp Road has been evaluated for BLOS. The results of the segment BLOS analysis are summarized in **Table 1**.

Exhibit 22 of the *MMLOS Guidelines* identifies no target transit level of service (PLOS) for roadways that are not included in the RTTP network. The boundary streets do not service any existing transit routes during peak hours (Route 303 is a single bus in each direction on Wednesdays), and are not designated as rapid transit or transit priority routes. Therefore, the boundary streets have not been evaluated for TLOS.

Exhibit 20 of the *MMLOS Guidelines* has been used to evaluate the segment truck level of service (TkLOS). Within the General Rural Area, Exhibit 22 of the *MMLOS Guidelines* identifies a target TkLOS C for arterial truck routes (Carp Road), and no target for roadways without a truck route designation (Thomas Argue Road, Russ Bradley Road). Therefore, only Carp Road has been evaluated for TkLOS. The results of the segment TkLOS analysis are summarized in **Table 2**.

Table 1: BLOS Segment Analysis

Road Class	Route Type	Bikeway Type	Travel Lanes	Operating Speed	Bike Lane Width	Bike Lane Blockage	BLOS
Carp Road (March Road to Russ Bradley Road)							
Arterial	Spine Route	Paved Shoulder	2	90 km/h	1.2m-1.5m	Rare	**E**

Table 2: TkLOS Segment Analysis

Curb Lane Width	Number of Travel Lanes Per Direction	TkLOS
Carp Road (March Road to Russ Bradley Road)		
3.5m to 3.7m	1	C

Intersection MMLOS Analysis

The following is a review of the MMLOS of the signalized intersection March Road/Carp Road, using complete streets principles. The MMLOS targets associated for intersections within the General Rural Area have been used in this review.

Exhibit 5 of the *Addendum to the MMLOS Guidelines* has been used to evaluate the existing PLOS at March Road/Carp Road. Exhibit 22 of the *MMLOS Guidelines* identifies no target PLOS for intersections within the General Rural Area. However, the intersection has been evaluated as pedestrian call buttons have been installed and the signal timing plan includes pedestrian phases. Standard crosswalk treatments are assumed for the purposes of this review. The results of the intersection PLOS analysis are summarized in **Table 3**.

Exhibit 12 of the *MMLOS Guidelines* has been used to evaluate the existing BLOS at March Road/Carp Road. Exhibit 22 of the *MMLOS Guidelines* identifies a target BLOS D for spine route intersections within the General Rural Area. The results of the intersection BLOS analysis are summarized in **Table 4**.

The TLOS of March Road/Carp Road has not been evaluated, as no rapid/priority transit service is provided during the peak hours of analysis.

Exhibit 21 of the *MMLOS Guidelines* has been used to evaluate the existing TkLOS at March Road/Carp Road. Exhibit 22 of the *MMLOS Guidelines* identifies a target TkLOS C for arterial truck routes in the General Rural Area. The results of the intersection TkLOS analysis are summarized in **Table 5**.

Table 3: PLOS Intersection Analysis

CRITERIA	North Approach		South Approach		East Approach		West Approach	
PETSI SCORE								
CROSSING DISTANCE CONDITIONS								
Median > 2.4m in Width	No	72	No	72	No	72	No	72
Lanes Crossed (3.5m Lane Width)	5		5		5		5	
SIGNAL PHASING AND TIMING								
Left Turn Conflict	Permissive	-8	Permissive	-8	Permissive	-8	Permissive	-8
Right Turn Conflict	Permissive or Yield	-5	Permissive or Yield	-5	Permissive or Yield	-5	Permissive or Yield	-5
Right Turn on Red	RTOR Allowed	-3	RTOR Allowed	-3	RTOR Allowed	-3	RTOR Allowed	-3
Leading Pedestrian Interval	No	-2	No	-2	No	-2	No	-2
CORNER RADIUS								
Parallel Radius	> 10m to 15m	-6	> 10m to 15m	-6	> 10m to 15m	-6	> 10m to 15m	-6
Parallel Right Turn Channel	No Right Turn Channel	-4	No Right Turn Channel	-4	No Right Turn Channel	-4	No Right Turn Channel	-4
Perpendicular Radius	N/A	0	N/A	0	N/A	0	N/A	0
Perpendicular Right Turn Channel	N/A	0	N/A	0	N/A	0	N/A	0
CROSSING TREATMENT								
Treatment	Standard	-7	Standard	-7	Standard	-7	Standard	-7
PETSI SCORE		**37**		**37**		**37**		**37**
LOS		**E**		**E**		**E**		**E**
DELAY SCORE								
Cycle Length		90		90		90		90
Pedestrian Walk Time		24.3		24.3		24.6		24.6
DELAY SCORE		**24.0**		**24.0**		**23.8**		**23.8**
LOS		**C**		**C**		**C**		**C**
OVERALL		**E**		**E**		**E**		**E**

Table 4: BLOS Intersection Analysis

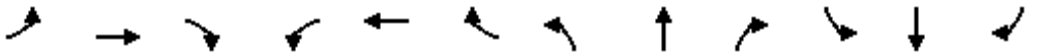
Approach	Facility Type	Criteria	Travel Lanes and/or Speed	BLOS
March Road/Carp Road				
North Approach	Paved Shoulder	Right Turn Lane Characteristics	Shared through/right turn lane	A
		Left Turn Accommodation	One lane crossed; ≥ 60 km/h	**E**
South Approach	Paved Shoulder	Right Turn Lane Characteristics	Shared through/right turn lane	A
		Left Turn Accommodation	One lane crossed; ≥ 60 km/h	**E**
East Approach	Paved Shoulder	Right Turn Lane Characteristics	Shared through/right turn lane	A
		Left Turn Accommodation	One lane crossed; ≥ 60 km/h	**E**
West Approach	Paved Shoulder	Right Turn Lane Characteristics	Shared through/right turn lane	A
		Left Turn Accommodation	One lane crossed; ≥ 60 km/h	**E**

Table 5: TkLOS Intersection Analysis

Approach	Effective Corner Radius	Number of Receiving Lanes Departing Intersection	TkLOS
March Road/Carp Road			
North Approach	10m to 15m	1	**E**
South Approach	10m to 15m	1	**E**
East Approach	10m to 15m	1	**E**
West Approach	10m to 15m	1	**E**

APPENDIX N

Total Synchro Analysis

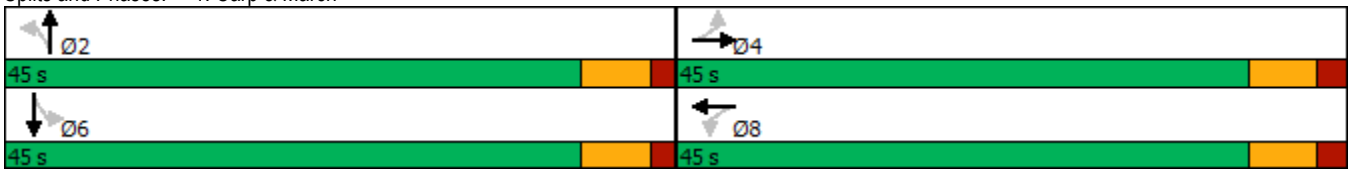


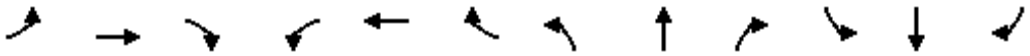
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	302	170	135	162	6	101	147	84	26	265	45
Future Volume (vph)	54	302	170	135	162	6	101	147	84	26	265	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	120.0		0.0	145.0		0.0	130.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	70.0			70.0			70.0			70.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.946			0.995			0.945			0.978	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1581	1560	0	1452	1593	0	1514	1547	0	1768	1707	0
Flt Permitted	0.651			0.343			0.508			0.596		
Satd. Flow (perm)	1083	1560	0	524	1593	0	809	1547	0	1109	1707	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		39			3			40			12	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		1395.3			662.5			720.5			545.3	
Travel Time (s)		62.8			29.8			32.4			24.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	14%	14%	23%	18%	1%	18%	13%	18%	1%	7%	12%
Adj. Flow (vph)	54	302	170	135	162	6	101	147	84	26	265	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	54	472	0	135	168	0	101	231	0	26	310	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			4.0			4.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	27.7	27.7		27.7	27.7		27.4	27.4		27.4	27.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Yellow Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.1	2.1		2.1	2.1		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.7	6.7		6.7	6.7		6.4	6.4		6.4	6.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	1	1		1	1		1	1		1	1	
Act Effct Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.43	0.43		0.43	0.43	
v/c Ratio	0.12	0.69		0.61	0.25		0.29	0.34		0.05	0.42	
Control Delay	16.6	25.4		34.2	17.5		19.7	15.7		15.6	19.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	16.6	25.4		34.2	17.5		19.7	15.7		15.6	19.3	
LOS	B	C		C	B		B	B		B	B	
Approach Delay		24.5			24.9			16.9			19.0	
Approach LOS		C			C			B			B	
Queue Length 50th (m)	5.1	54.5		16.2	16.4		10.2	19.3		2.4	32.0	
Queue Length 95th (m)	11.7	86.9		#39.7	28.9		21.2	34.8		6.7	51.3	
Internal Link Dist (m)		1371.3			638.5			696.5			521.3	
Turn Bay Length (m)	150.0			120.0			145.0			130.0		
Base Capacity (vph)	460	686		222	679		346	686		475	738	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.12	0.69		0.61	0.25		0.29	0.34		0.05	0.42	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 21.7		Intersection LOS: C	
Intersection Capacity Utilization 100.5%		ICU Level of Service G	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

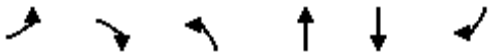
Splits and Phases: 1: Carp & March





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	515	20	63	248	2	5	0	32	4	0	6
Future Volume (vph)	1	515	20	63	248	2	5	0	32	4	0	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	95.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (m)	10.0			100.0			10.0			10.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995			0.999			0.883			0.919	
Flt Protected				0.950				0.993			0.980	
Satd. Flow (prot)	0	1648	0	1751	1593	0	0	1616	0	0	1660	0
Flt Permitted				0.950				0.993			0.980	
Satd. Flow (perm)	0	1648	0	1751	1593	0	0	1616	0	0	1660	0
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		701.2			1395.3			331.3			446.0	
Travel Time (s)		31.6			62.8			19.9			26.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	14%	2%	2%	18%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1	515	20	63	248	2	5	0	32	4	0	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	536	0	63	250	0	0	37	0	0	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 57.2%		ICU Level of Service B	
Analysis Period (min) 15			

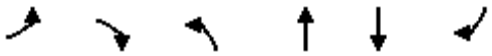


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	7	21	99	290	503	37
Future Volume (vph)	7	21	99	290	503	37
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0	0.0	100.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	10.0		100.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.899				0.991	
Flt Protected	0.988		0.950			
Satd. Flow (prot)	1653	0	1768	1607	1689	0
Flt Permitted	0.988		0.950			
Satd. Flow (perm)	1653	0	1768	1607	1689	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	107.2			499.2	742.4	
Travel Time (s)	7.7			22.5	33.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	1%	1%	17%	11%	1%
Adj. Flow (vph)	7	21	99	290	503	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	0	99	290	540	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			4.0	4.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.4%		ICU Level of Service A	
Analysis Period (min) 15			

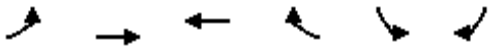
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	18	19	0	75	8
Future Volume (vph)	0	18	19	0	75	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				
Flt Protected						0.957
Satd. Flow (prot)	0	1594	1843	0	0	1764
Flt Permitted						0.957
Satd. Flow (perm)	0	1594	1843	0	0	1764
Link Speed (k/h)	50		60			60
Link Distance (m)	474.1		295.4			331.3
Travel Time (s)	34.1		17.7			19.9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	18	19	0	75	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	18	19	0	0	83
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	5.0		5.0			5.0
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24	14		14	24	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 14.8%		ICU Level of Service A	
Analysis Period (min) 15			



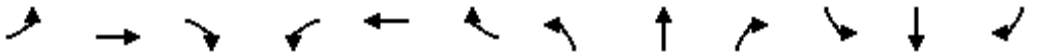
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	0	0	297	541	45
Future Volume (vph)	10	0	0	297	541	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.990	
Flt Protected	0.950					
Satd. Flow (prot)	1751	0	0	1843	1825	0
Flt Permitted	0.950					
Satd. Flow (perm)	1751	0	0	1843	1825	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	320.3			742.4	720.5	
Travel Time (s)	23.1			33.4	32.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	0	0	297	541	45
Shared Lane Traffic (%)						
Lane Group Flow (vph)	10	0	0	297	586	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			4.0	4.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	11	91	45	11	0
Future Volume (vph)	0	11	91	45	11	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.955			
Flt Protected					0.950	
Satd. Flow (prot)	0	1843	1760	0	1751	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1843	1760	0	1751	0
Link Speed (k/h)		50	50		80	
Link Distance (m)		347.0	107.2		307.1	
Travel Time (s)		25.0	7.7		13.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	11	91	45	11	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	11	136	0	11	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		4.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		5.0	5.0		5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	97			97	97	97
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.0%		ICU Level of Service A	
Analysis Period (min) 15			

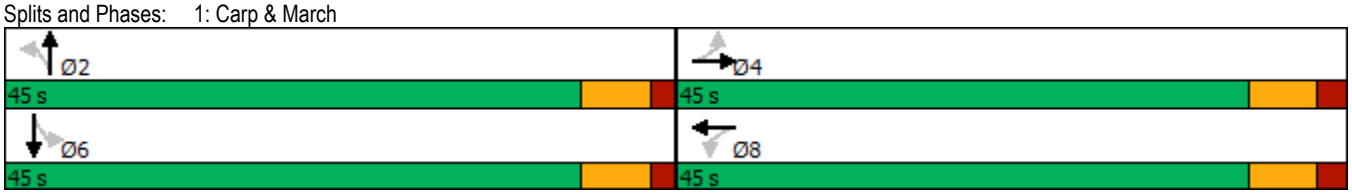


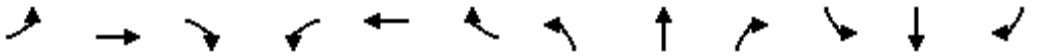
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	58	154	84	122	402	18	250	270	153	19	192	79
Future Volume (vph)	58	154	84	122	402	18	250	270	153	19	192	79
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	120.0		0.0	145.0		0.0	130.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	70.0			70.0			70.0			70.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.947			0.994			0.946			0.956	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1717	1530	0	1540	1732	0	1751	1692	0	1768	1738	0
Flt Permitted	0.395			0.592			0.551			0.390		
Satd. Flow (perm)	714	1530	0	959	1732	0	1016	1692	0	726	1738	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		38			3			40			29	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		1395.3			662.5			720.5			545.3	
Travel Time (s)		62.8			29.8			32.4			24.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	10%	28%	16%	8%	6%	2%	4%	7%	1%	4%	2%
Adj. Flow (vph)	58	154	84	122	402	18	250	270	153	19	192	79
Shared Lane Traffic (%)												
Lane Group Flow (vph)	58	238	0	122	420	0	250	423	0	19	271	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			4.0			4.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	27.7	27.7		27.7	27.7		27.4	27.4		27.4	27.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Yellow Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.1	2.1		2.1	2.1		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.7	6.7		6.7	6.7		6.4	6.4		6.4	6.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	1	1		1	1		1	1		1	1	
Act Effct Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.43	0.43		0.43	0.43	
v/c Ratio	0.19	0.35		0.30	0.57		0.57	0.57		0.06	0.36	
Control Delay	18.4	16.3		19.6	23.2		25.9	21.0		15.9	17.0	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	18.4	16.3		19.6	23.2		25.9	21.0		15.9	17.0	
LOS	B	B		B	C		C	C		B	B	
Approach Delay		16.7			22.4			22.8			16.9	
Approach LOS		B			C			C			B	
Queue Length 50th (m)	5.6	20.6		12.4	48.9		29.3	44.5		1.7	24.9	
Queue Length 95th (m)	13.2	36.7		24.4	75.1		52.1	70.5		5.6	41.9	
Internal Link Dist (m)		1371.3			638.5			696.5			521.3	
Turn Bay Length (m)	150.0			120.0			145.0			130.0		
Base Capacity (vph)	303	672		408	738		435	748		311	761	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.19	0.35		0.30	0.57		0.57	0.57		0.06	0.36	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 20.7		Intersection LOS: C	
Intersection Capacity Utilization 103.5%		ICU Level of Service G	
Analysis Period (min) 15			

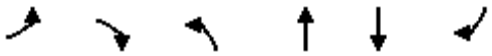
Splits and Phases: 1: Carp & March





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	246	7	38	706	3	20	0	68	3	0	4
Future Volume (vph)	4	246	7	38	706	3	20	0	68	3	0	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	95.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (m)	10.0			100.0			10.0			10.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.996			0.999			0.896			0.923	
Flt Protected		0.999		0.950				0.989			0.979	
Satd. Flow (prot)	0	1706	0	1751	1739	0	0	1633	0	0	1665	0
Flt Permitted		0.999		0.950				0.989			0.979	
Satd. Flow (perm)	0	1706	0	1751	1739	0	0	1633	0	0	1665	0
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		701.2			1395.3			331.3			446.0	
Travel Time (s)		31.6			62.8			19.9			26.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	10%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	4	246	7	38	706	3	20	0	68	3	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	257	0	38	709	0	0	88	0	0	7	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 52.2%		ICU Level of Service A	
Analysis Period (min) 15			

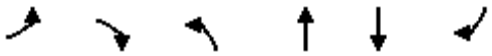


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	30	83	27	589	369	10
Future Volume (vph)	30	83	27	589	369	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0	0.0	100.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	10.0		100.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.901				0.996	
Flt Protected	0.987		0.950			
Satd. Flow (prot)	1655	0	1768	1825	1633	0
Flt Permitted	0.987		0.950			
Satd. Flow (perm)	1655	0	1768	1825	1633	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	107.2			499.2	742.4	
Travel Time (s)	7.7			22.5	33.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	1%	1%	3%	15%	1%
Adj. Flow (vph)	30	83	27	589	369	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	113	0	27	589	379	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			4.0	4.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 46.5%		ICU Level of Service A	
Analysis Period (min) 15			

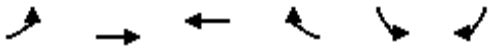
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	72	16	0	20	25
Future Volume (vph)	0	72	16	0	20	25
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				
Flt Protected						0.978
Satd. Flow (prot)	0	1594	1843	0	0	1803
Flt Permitted						0.978
Satd. Flow (perm)	0	1594	1843	0	0	1803
Link Speed (k/h)	80		60			60
Link Distance (m)	474.1		295.4			331.3
Travel Time (s)	21.3		17.7			19.9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	72	16	0	20	25
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	72	16	0	0	45
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	5.0		5.0			5.0
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	97	97		97	97	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 14.7%		ICU Level of Service A	
Analysis Period (min) 15			



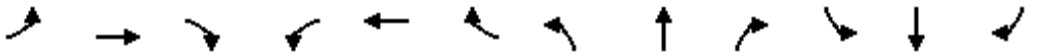
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	43	0	0	619	379	12
Future Volume (vph)	43	0	0	619	379	12
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.996	
Flt Protected	0.950					
Satd. Flow (prot)	1751	0	0	1843	1836	0
Flt Permitted	0.950					
Satd. Flow (perm)	1751	0	0	1843	1836	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	320.3			742.4	720.5	
Travel Time (s)	14.4			33.4	32.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	43	0	0	619	379	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	43	0	0	619	391	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			4.0	4.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	97	97	97			97
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	44.4%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	43	24	13	44	0
Future Volume (vph)	0	43	24	13	44	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.953			
Flt Protected					0.950	
Satd. Flow (prot)	0	1843	1757	0	1751	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1843	1757	0	1751	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		347.0	107.2		307.1	
Travel Time (s)		25.0	7.7		22.1	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	43	24	13	44	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	43	37	0	44	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		4.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		5.0	5.0		5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	97			97	97	97
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 13.3%		ICU Level of Service A	
Analysis Period (min) 15			

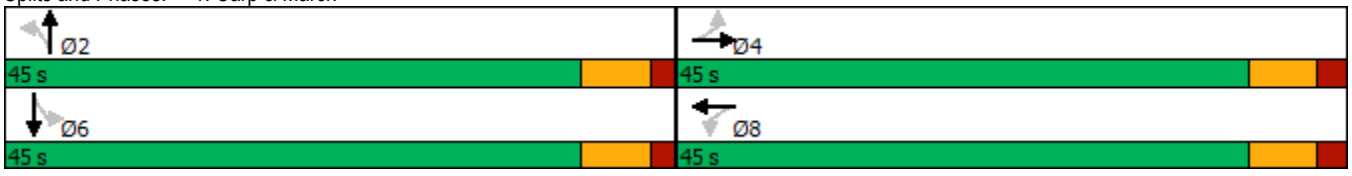


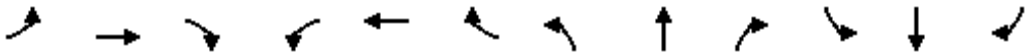
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	56	326	174	139	174	6	105	153	90	29	273	48
Future Volume (vph)	56	326	174	139	174	6	105	153	90	29	273	48
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	120.0		0.0	145.0		0.0	130.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	70.0			70.0			70.0			70.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.948			0.995			0.944			0.978	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1581	1563	0	1452	1593	0	1514	1545	0	1768	1706	0
Flt Permitted	0.644			0.315			0.496			0.582		
Satd. Flow (perm)	1071	1563	0	481	1593	0	790	1545	0	1083	1706	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		37			2			41			12	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		1395.3			662.5			720.5			545.3	
Travel Time (s)		62.8			29.8			32.4			24.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	13%	14%	14%	23%	18%	1%	18%	13%	18%	1%	7%	12%
Adj. Flow (vph)	56	326	174	139	174	6	105	153	90	29	273	48
Shared Lane Traffic (%)												
Lane Group Flow (vph)	56	500	0	139	180	0	105	243	0	29	321	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			4.0			4.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	27.7	27.7		27.7	27.7		27.4	27.4		27.4	27.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Yellow Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.1	2.1		2.1	2.1		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.7	6.7		6.7	6.7		6.4	6.4		6.4	6.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	1	1		1	1		1	1		1	1	
Act Effct Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.43	0.43		0.43	0.43	
v/c Ratio	0.12	0.73		0.68	0.27		0.31	0.35		0.06	0.43	
Control Delay	16.7	27.3		41.0	17.9		20.2	16.0		15.7	19.6	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	16.7	27.3		41.0	17.9		20.2	16.0		15.7	19.6	
LOS	B	C		D	B		C	B		B	B	
Approach Delay		26.2			28.0			17.2			19.3	
Approach LOS		C			C			B			B	
Queue Length 50th (m)	5.3	59.9		17.4	17.8		10.7	20.6		2.6	33.4	
Queue Length 95th (m)	12.1	95.2		#44.7	31.0		22.2	36.9		7.3	53.3	
Internal Link Dist (m)		1371.3			638.5			696.5			521.3	
Turn Bay Length (m)	150.0			120.0			145.0			130.0		
Base Capacity (vph)	455	686		204	679		338	686		464	738	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.12	0.73		0.68	0.27		0.31	0.35		0.06	0.43	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 23.1		Intersection LOS: C	
Intersection Capacity Utilization 102.7%		ICU Level of Service G	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

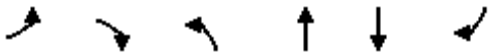
Splits and Phases: 1: Carp & March





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	1	552	20	63	267	2	5	0	32	4	0	6
Future Volume (vph)	1	552	20	63	267	2	5	0	32	4	0	6
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	95.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (m)	10.0			100.0			10.0			10.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.995			0.999			0.883			0.919	
Flt Protected				0.950				0.993			0.980	
Satd. Flow (prot)	0	1647	0	1751	1593	0	0	1616	0	0	1660	0
Flt Permitted				0.950				0.993			0.980	
Satd. Flow (perm)	0	1647	0	1751	1593	0	0	1616	0	0	1660	0
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		701.2			1395.3			331.3			446.0	
Travel Time (s)		31.6			62.8			19.9			26.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	14%	2%	2%	18%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	1	552	20	63	267	2	5	0	32	4	0	6
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	573	0	63	269	0	0	37	0	0	10	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 60.3%		ICU Level of Service B	
Analysis Period (min) 15			

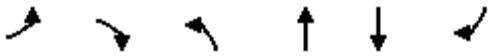


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	7	21	99	300	520	37
Future Volume (vph)	7	21	99	300	520	37
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0	0.0	100.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	10.0		100.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.899				0.991	
Flt Protected	0.988		0.950			
Satd. Flow (prot)	1653	0	1768	1607	1689	0
Flt Permitted	0.988		0.950			
Satd. Flow (perm)	1653	0	1768	1607	1689	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	107.2			499.2	742.4	
Travel Time (s)	7.7			22.5	33.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	1%	1%	17%	11%	1%
Adj. Flow (vph)	7	21	99	300	520	37
Shared Lane Traffic (%)						
Lane Group Flow (vph)	28	0	99	300	557	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			4.0	4.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 50.4%		ICU Level of Service A	
Analysis Period (min) 15			

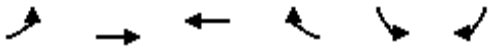
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	18	19	0	75	8
Future Volume (vph)	0	18	19	0	75	8
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				
Flt Protected						0.957
Satd. Flow (prot)	0	1594	1843	0	0	1764
Flt Permitted						0.957
Satd. Flow (perm)	0	1594	1843	0	0	1764
Link Speed (k/h)	80		60			60
Link Distance (m)	474.1		295.4			331.3
Travel Time (s)	21.3		17.7			19.9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	18	19	0	75	8
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	18	19	0	0	83
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	5.0		5.0			5.0
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	97	97		97	97	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 14.8%		ICU Level of Service A	
Analysis Period (min) 15			



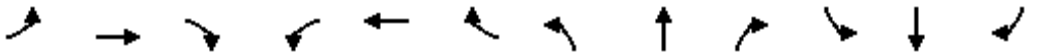
Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	10	0	0	297	541	45
Future Volume (vph)	10	0	0	297	541	45
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.990	
Flt Protected	0.950					
Satd. Flow (prot)	1751	0	0	1843	1825	0
Flt Permitted	0.950					
Satd. Flow (perm)	1751	0	0	1843	1825	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	320.3			742.4	720.5	
Travel Time (s)	14.4			33.4	32.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	10	0	0	297	541	45
Shared Lane Traffic (%)						
Lane Group Flow (vph)	10	0	0	297	586	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			4.0	4.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	97	97	97			97
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	42.9%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	11	91	45	11	0
Future Volume (vph)	0	11	91	45	11	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.955			
Flt Protected					0.950	
Satd. Flow (prot)	0	1843	1760	0	1751	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1843	1760	0	1751	0
Link Speed (k/h)		50	50		80	
Link Distance (m)		347.0	107.2		307.1	
Travel Time (s)		25.0	7.7		13.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	11	91	45	11	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	11	136	0	11	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		4.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		5.0	5.0		5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	97			97	97	97
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 18.0%		ICU Level of Service A	
Analysis Period (min) 15			

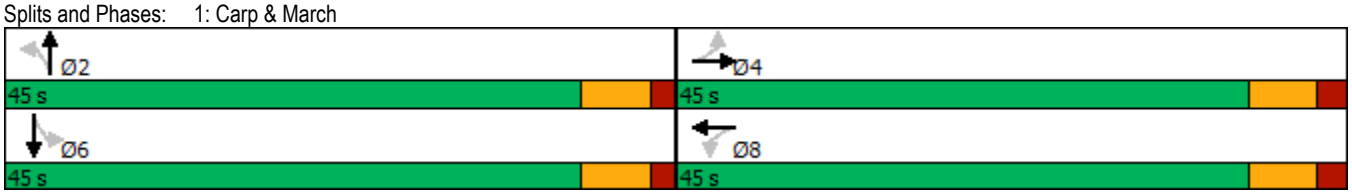


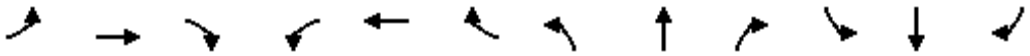
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	60	165	86	127	434	18	265	280	163	21	200	86
Future Volume (vph)	60	165	86	127	434	18	265	280	163	21	200	86
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	150.0		0.0	120.0		0.0	145.0		0.0	130.0		0.0
Storage Lanes	1		0	1		0	1		0	1		0
Taper Length (m)	70.0			70.0			70.0			70.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.949			0.994			0.945			0.955	
Flt Protected	0.950			0.950			0.950			0.950		
Satd. Flow (prot)	1717	1536	0	1540	1732	0	1751	1690	0	1768	1736	0
Flt Permitted	0.363			0.577			0.534			0.370		
Satd. Flow (perm)	656	1536	0	935	1732	0	984	1690	0	689	1736	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		36			3			41			30	
Link Speed (k/h)		80			80			80			80	
Link Distance (m)		1395.3			662.5			720.5			545.3	
Travel Time (s)		62.8			29.8			32.4			24.5	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	4%	10%	28%	16%	8%	6%	2%	4%	7%	1%	4%	2%
Adj. Flow (vph)	60	165	86	127	434	18	265	280	163	21	200	86
Shared Lane Traffic (%)												
Lane Group Flow (vph)	60	251	0	127	452	0	265	443	0	21	286	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			4.0			4.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Number of Detectors	1	2		1	2		1	2		1	2	
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	
Leading Detector (m)	2.0	10.0		2.0	10.0		2.0	10.0		2.0	10.0	
Trailing Detector (m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Position(m)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Size(m)	2.0	0.6		2.0	0.6		2.0	0.6		2.0	0.6	
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Detector 2 Position(m)		9.4			9.4			9.4			9.4	
Detector 2 Size(m)		0.6			0.6			0.6			0.6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		Perm	NA		Perm	NA	
Protected Phases		4			8			2			6	
Permitted Phases	4			8			2			6		
Detector Phase	4	4		8	8		2	2		6	6	
Switch Phase												
Minimum Initial (s)	20.0	20.0		20.0	20.0		20.0	20.0		20.0	20.0	
Minimum Split (s)	27.7	27.7		27.7	27.7		27.4	27.4		27.4	27.4	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Total Split (s)	45.0	45.0		45.0	45.0		45.0	45.0		45.0	45.0	
Total Split (%)	50.0%	50.0%		50.0%	50.0%		50.0%	50.0%		50.0%	50.0%	
Maximum Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Yellow Time (s)	4.6	4.6		4.6	4.6		4.6	4.6		4.6	4.6	
All-Red Time (s)	2.1	2.1		2.1	2.1		1.8	1.8		1.8	1.8	
Lost Time Adjust (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Lost Time (s)	6.7	6.7		6.7	6.7		6.4	6.4		6.4	6.4	
Lead/Lag												
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Recall Mode	Max	Max		Max	Max		Max	Max		Max	Max	
Walk Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Flash Dont Walk (s)	14.0	14.0		14.0	14.0		14.0	14.0		14.0	14.0	
Pedestrian Calls (#/hr)	1	1		1	1		1	1		1	1	
Act Effct Green (s)	38.3	38.3		38.3	38.3		38.6	38.6		38.6	38.6	
Actuated g/C Ratio	0.43	0.43		0.43	0.43		0.43	0.43		0.43	0.43	
v/c Ratio	0.22	0.37		0.32	0.61		0.63	0.59		0.07	0.38	
Control Delay	19.0	16.9		20.0	24.3		28.2	21.7		16.1	17.3	
Queue Delay	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	
Total Delay	19.0	16.9		20.0	24.3		28.2	21.7		16.1	17.3	
LOS	B	B		C	C		C	C		B	B	
Approach Delay		17.3			23.4			24.1			17.2	
Approach LOS		B			C			C			B	
Queue Length 50th (m)	5.9	22.4		13.1	54.0		32.0	47.5		1.9	26.6	
Queue Length 95th (m)	14.0	39.2		25.6	82.4		57.3	75.0		6.0	44.4	
Internal Link Dist (m)		1371.3			638.5			696.5			521.3	
Turn Bay Length (m)	150.0			120.0			145.0			130.0		
Base Capacity (vph)	279	674		397	738		422	748		295	761	
Starvation Cap Reductn	0	0		0	0		0	0		0	0	
Spillback Cap Reductn	0	0		0	0		0	0		0	0	
Storage Cap Reductn	0	0		0	0		0	0		0	0	
Reduced v/c Ratio	0.22	0.37		0.32	0.61		0.63	0.59		0.07	0.38	

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Natural Cycle: 60			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.63			
Intersection Signal Delay: 21.7		Intersection LOS: C	
Intersection Capacity Utilization 106.5%		ICU Level of Service G	
Analysis Period (min) 15			

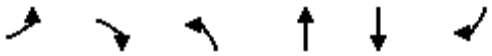
Splits and Phases: 1: Carp & March





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	264	7	38	759	3	20	0	68	3	0	4
Future Volume (vph)	4	264	7	38	759	3	20	0	68	3	0	4
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0		0.0	95.0		0.0	0.0		0.0	0.0		0.0
Storage Lanes	0		0	1		0	0		0	0		0
Taper Length (m)	10.0			100.0			10.0			10.0		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.997			0.999			0.896			0.923	
Flt Protected		0.999		0.950				0.989			0.979	
Satd. Flow (prot)	0	1707	0	1751	1739	0	0	1633	0	0	1665	0
Flt Permitted		0.999		0.950				0.989			0.979	
Satd. Flow (perm)	0	1707	0	1751	1739	0	0	1633	0	0	1665	0
Link Speed (k/h)		80			80			60			60	
Link Distance (m)		701.2			1395.3			331.3			446.0	
Travel Time (s)		31.6			62.8			19.9			26.8	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	2%	10%	2%	2%	8%	2%	2%	2%	2%	2%	2%	2%
Adj. Flow (vph)	4	264	7	38	759	3	20	0	68	3	0	4
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	275	0	38	762	0	0	88	0	0	7	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(m)		4.0			4.0			0.0			0.0	
Link Offset(m)		0.0			0.0			0.0			0.0	
Crosswalk Width(m)		5.0			5.0			5.0			5.0	
Two way Left Turn Lane												
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24		14	24		14	24		14	24		14
Sign Control		Free			Free			Stop			Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 55.2%		ICU Level of Service B	
Analysis Period (min) 15			

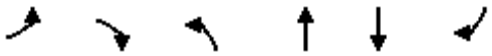


Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	30	83	27	611	382	10
Future Volume (vph)	30	83	27	611	382	10
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Storage Length (m)	0.0	0.0	100.0			0.0
Storage Lanes	1	0	1			0
Taper Length (m)	10.0		100.0			
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt	0.901				0.997	
Flt Protected	0.987		0.950			
Satd. Flow (prot)	1655	0	1768	1825	1635	0
Flt Permitted	0.987		0.950			
Satd. Flow (perm)	1655	0	1768	1825	1635	0
Link Speed (k/h)	50			80	80	
Link Distance (m)	107.2			499.2	742.4	
Travel Time (s)	7.7			22.5	33.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles (%)	1%	1%	1%	3%	15%	1%
Adj. Flow (vph)	30	83	27	611	382	10
Shared Lane Traffic (%)						
Lane Group Flow (vph)	113	0	27	611	392	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			4.0	4.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24	14	24			14
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	47.8%	ICU Level of Service	A
Analysis Period (min)	15		

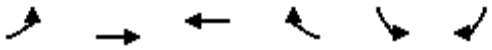
Lane Group	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	0	72	16	0	20	25
Future Volume (vph)	0	72	16	0	20	25
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt		0.865				
Flt Protected						0.978
Satd. Flow (prot)	0	1594	1843	0	0	1803
Flt Permitted						0.978
Satd. Flow (perm)	0	1594	1843	0	0	1803
Link Speed (k/h)	80		60			60
Link Distance (m)	474.1		295.4			331.3
Travel Time (s)	21.3		17.7			19.9
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	72	16	0	20	25
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	72	16	0	0	45
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Right	Left	Left
Median Width(m)	0.0		0.0			0.0
Link Offset(m)	0.0		0.0			0.0
Crosswalk Width(m)	5.0		5.0			5.0
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	97	97		97	97	
Sign Control	Stop		Free			Free

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 14.7%		ICU Level of Service A	
Analysis Period (min) 15			



Lane Group	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (vph)	43	0	0	619	379	12
Future Volume (vph)	43	0	0	619	379	12
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt					0.996	
Flt Protected	0.950					
Satd. Flow (prot)	1751	0	0	1843	1836	0
Flt Permitted	0.950					
Satd. Flow (perm)	1751	0	0	1843	1836	0
Link Speed (k/h)	80			80	80	
Link Distance (m)	320.3			742.4	720.5	
Travel Time (s)	14.4			33.4	32.4	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	43	0	0	619	379	12
Shared Lane Traffic (%)						
Lane Group Flow (vph)	43	0	0	619	391	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Right	Left	Left	Left	Right
Median Width(m)	4.0			4.0	4.0	
Link Offset(m)	0.0			0.0	0.0	
Crosswalk Width(m)	5.0			5.0	5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	97	97	97			97
Sign Control	Stop			Free	Free	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization	44.4%	ICU Level of Service	A
Analysis Period (min)	15		



Lane Group	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	43	24	13	44	0
Future Volume (vph)	0	43	24	13	44	0
Ideal Flow (vphpl)	1800	1800	1800	1800	1800	1800
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00
Frt			0.953			
Flt Protected					0.950	
Satd. Flow (prot)	0	1843	1757	0	1751	0
Flt Permitted					0.950	
Satd. Flow (perm)	0	1843	1757	0	1751	0
Link Speed (k/h)		50	50		50	
Link Distance (m)		347.0	107.2		307.1	
Travel Time (s)		25.0	7.7		22.1	
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00
Adj. Flow (vph)	0	43	24	13	44	0
Shared Lane Traffic (%)						
Lane Group Flow (vph)	0	43	37	0	44	0
Enter Blocked Intersection	No	No	No	No	No	No
Lane Alignment	Left	Left	Left	Right	Left	Right
Median Width(m)		0.0	0.0		4.0	
Link Offset(m)		0.0	0.0		0.0	
Crosswalk Width(m)		5.0	5.0		5.0	
Two way Left Turn Lane						
Headway Factor	1.01	1.01	1.01	1.01	1.01	1.01
Turning Speed (k/h)	24			14	24	14
Sign Control		Free	Free		Stop	

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 13.3%		ICU Level of Service A	
Analysis Period (min) 15			