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36 Years

1053, 1075 and 1145 March Road

Transportation Impact Assessment

1053, 1075 and 1145 March Road
Transportation Impact Assessment

Prepared for:

CU Developments Inc.

Prepared By:

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

October 2018

Ref No. R-2018-039
Novatech File: 116132

NOVATECH
Engineers, Planners & Landscape Architects

October 2nd, 2018

Planning, Infrastructure, and Economic Development Department
City of Ottawa
110 Laurier Ave. West, 4th Floor
Ottawa, Ontario
K1P 1J1

Attention: **Louise Sweet**

Reference: **1053, 1075 and 1145 March Road – CU Developments Inc.**
Transportation Impact Assessment
Novatech File No. 116132

Novatech is pleased to submit the following Transportation Impact Assessment (TIA) on behalf of CU Developments Inc. in support of Draft Plan of Subdivision and Zoning By-law Amendment applications for 1053, 1075 and 1145 March Road in Kanata North.

CU Developments Inc. intends to develop a residential subdivision with a total of 825 units including 295 single detached dwellings, 314 townhouse dwellings, and 216 multi-unit residential dwellings. The subdivision is located in the northwest quadrant of the Kanata North Community Design Plan and incorporates a portion of the north tributary of Shirley's Brook, as well as a number of institutional blocks, a neighbourhood park, and a stormwater management pond. The subdivision will develop in multiple phases.

Kanata North Community Design Plan was approved by Council on July 13, 2016. The Kanata North Urban Expansion Area Community Design Plan Transportation Master Plan (KNUEA CDP TMP) provided an in-depth review of the transportation impacts of the overall development on the area roadways. As discussed at the pre-consultation meeting, this TIA will follow the City's 2017 TIA guidelines. However, the KNUEA CDP TMP will serve as the parent document for the TIA, as many elements of the analysis were completed as part of the TMP and does not need to be duplicated.

Should you have any questions or comments, please do not hesitate to contact us.

Sincerely,

NOVATECH

B. Byvelds

Brad Byvelds, P. Eng.
Project Coordinator | Transportation/Traffic

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

TIA Plan Reports

On 14 June 2017, the Council of the City of Ottawa adopted new Transportation Impact Assessment (TIA) Guidelines. In adopting the guidelines, Council established a requirement for those preparing and delivering transportation impact assessments and reports to sign a letter of certification.

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 s/he meets the four criteria listed below.

CERTIFICATION

1. 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;
2. 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;
3. 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
4. I am either a licensed[1] or registered[2] professional in good standing, whose field of expertise [check √ appropriate field(s)] is either transportation engineering ☑ or transportation planning ☐.

[1,2] **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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Dated at Ottawa (City) this 2nd day of October, 2018.

Name: Brad Byvelds
(Please Print)

Professional Title: P. Eng. - Project Coordinator

B. Byvelds
Signature of Individual certifier that s/he meets the above four criteria

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EXECUTIVE SUMMARY

Novatech has been retained by CU Developments Inc. to prepare a Transportation Impact Assessment (TIA) in support of the application for a Draft Plan of Subdivision and Zoning By-Law Amendment (ZBLA) to allow for the development of lands known as 1053, 1075 and 1145 March Road in Kanata North (the "Subject Lands").

The Subject Lands – legally described as Part of Lot 13 and 14, Concession 3, Township of March – are owned by CU Developments Inc. and encompass approximately 48.05 hectares including several properties under the municipal addresses 1053, 1075 and 1145 March Road. They are located in the northwest quadrant of the Kanata North Urban Expansion Area (KNUEA) which is subject to the Kanata North Community Design Plan (CDP), approved by Council on July 13, 2016.

The Subject Lands are largely undeveloped and consist of open cultivated fields and recently fallow regenerating meadows. A tributary for Shirley's Brook runs through the Subject Lands in the northwest to southeast direction. Another tributary for Shirley's Brook also runs from the northwest to southeast just south of the Subject Lands.

The following describes the existing and planned land uses surrounding the Subject Lands:

North: Lands to the north are comprised of the Murphy's Court rural estate subdivision and rural lands. These lands fall outside the existing urban boundary.

East: Lands to the east contain existing institutional uses (Saint Isidore Roman Catholic Church and cemetery, and St. Isidore Catholic School), the Hillsview rural estate subdivision, and rural lands. March Road forms the eastern boundary of the site. The rural lands to the east of March Road and south of the Hillsview subdivision have been identified for residential development in the Kanata North Community Design Plan (CDP).

South: Lands to the south are comprised of existing rural lands identified for future development in the Kanata North CDP, and the Marchbrook Circle rural estate subdivision.

West: Lands to the west are comprised of the Panandrick Estates subdivision and rural lands.

The Kanata North Urban Expansion Area Community Design Plan Transportation Master Plan (KNUEA CDP TMP) provided an in-depth review of the transportation impacts of the overall development on the area roadways. The KNUEA CDP TMP provided a review of a number of alternative transportation solutions and alternative design concepts. The review included an analysis of alternative park and ride facility locations, alternative intersection controls along March Road, access alternatives to Old Carp Road, alternative access locations along March Road, and internal intersection control alternatives. As discussed at the pre-consultation meeting, this TIA will follow the City's 2017 TIA guidelines. However, the KNUEA CDP TMP will serve as the parent document for the TIA, as many elements of the analysis were completed as part of the TMP and does not need to be duplicated. As such, these sections of the TIA reference the previous analysis presented in the KNUEA CDP TMP. This TIA will provide a supplementary review of aspects of the subdivision to fulfil the requirements of the TIA.

The proposed development consists of 825 units including 295 single detached dwellings, 314 townhouse dwellings, and 216 multi-unit residential dwellings to be developed in multiple phases. This subdivision will be the first stage in building out the community envisioned in the Kanata North

CDP. The subdivision lands include blocks set aside for street-oriented single detached and townhouse dwellings, a stormwater management pond, a portion of a school block for the French Public School Board of Eastern Ontario (CEPEO), a future fire hall, and a future park and ride facility to be the terminus of the bus rapid transit planned for March Road. A linear neighbourhood park along the western boundary of the site will contain recreational facilities and continue the pathway network through the community.

The subject application satisfies all three triggers for completing a TIA report.

The study area for this report was discussed with City staff and will include March Road as well as the following intersections:

- March Road/Dunrobin Road
- March Road/Halton Terrace/Maxwell Bridge Road
- March Road/Street 1 (access intersection)

The selected time periods for the analysis are the weekday AM and PM peak hours, as they represent the 'worst case' combination of site generated traffic and adjacent street traffic. The proposed development is anticipated to be constructed with full occupancy in 2026.

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

- As development progresses within the KNUEA, and subject to the City and Development Charges Funding, March Road will be widened in two phases to accommodate the increase in vehicular traffic and ultimately extend the future Kanata North Transitway. Subject to the urban portion of the March Road widening project being brought into the affordable plan, and subject to reasonable terms being established including payback period, the Kanata North Land Owners Group (KNLOG) is prepared to enter into a front ending agreement with the City to construct the four lane widening of March Road to the limit of the urban area.

- The analysis presented in the KNUEA CDP TMP assumed approximately 30% of the overall residential development was located in the northwest quadrant, equating to approximately 330 single detached dwelling units and 655 residential condominium/townhouse units. The proposed development includes 295 single detached dwelling units and 530 residential condominium/townhouse units, which from a traffic perspective is less than the assumed development in the KNUEA CDP TMP.

- The proposed development is anticipated to generate approximately 100 to 135 person trips (or 60 to 80 vehicle trips) less than the assumed development for the northwest quadrant of the KNUEA lands in the KNUEA CDP TMP during the peak hours.

- A recreational pathway is proposed along the open space corridor between March Road and Street 4. The section of the recreational pathway adjacent to the stormwater management facility will also function as a service road for the pond. The recreational pathway will terminate at the March Road right-of-way (ROW) limit and can be extended to March Road when widened.

- A roundabout is proposed at the Street 1/Street 12/Park and Ride intersection, consistent with the findings of the KNUEA CDP TMP.

- As development progresses in the KNUEA, Street 4 and Street 10 will be extended to March Road. In the interest of limiting driver confusion upon full build-out of the KNUEA, side street stop control is recommended along Street 1 at the Street 4 intersection and all-way stop control is recommended at the Street 10/Street 12 intersection during the interim. Side street stop control is recommended for all other intersections within the Subject Lands.

- On-street parking will be permitted on one side of Street 12 and Street 1 between March Road and Street 4. On-street parking will also be provided on both sides of all local roadways.

- Intersection narrowing will be provided at the Street 10/Street 12 intersection to reduce the crossing distance for pedestrians at this intersection.

- A PXO D is recommended at the midblock location where the recreational pathway crosses Street 12.

- March Road is the only boundary street for the subject site. Complete streets principles were incorporated into the interim and ultimate cross-sections for March Road. The proposed signalized access location is consistent with the KNUEA CDP TMP and is not anticipated to impact the complete street design for March Road.

- The roadway modifications associated with the March Road/Street 1 intersection are currently included in the City of Ottawa's 2017 Development Charges By-law Background Study. The 2017 Development Charges By-law Background Study identifies funding of $950,000, with a recovery date of 2023 for the modifications at the March Road/Street 1 intersection.

- The roadway modifications associated with the future March Road/Street 10 intersection are eligible to be included in the 2019 update to the DC By-law Background Study.

- The proposed March Road/Street 1 intersection will meet the target BLOS and Auto LOS, however it will not meet the target PLOS and TkLOS. A reduction in the east-west pedestrian crossing distance is required to achieve the target PLOS on the south approach. Based on the projected northbound right turning traffic volumes (approximately 215 during the PM peak hour) and the posted speed limit of 80km/hr, a northbound right turn lane is recommended at this intersection. All other approaches meet the target PLOS for the General Urban Area. As a park and ride is planned along Street 1, a B-12 standard single unit bus was used as the design vehicle at the March Road/Street 1 intersection.

- Subject to the status of adjacent development within the KNUEA, and the timing for the construction of the park and ride, the proponent may potentially enter into an early transit service agreement with OC Transpo until regular transit services is warranted by occupancy levels. A review of the TDM Measures Checklist will be conducted for the multi-unit blocks within the subdivision during the Site Plan Control process, if required.

- The Subject Lands provide access exclusively on March Road. However, as development progresses in the KNUEA, the overall development will provide access via Old Carp Road, an east-west collector roadway between Halton Terrace and Old Second Line Road.

- The Subject Lands provide access exclusively on March Road. However, as development progresses in the KNUEA lands, the overall development will provide access via Old Carp Road, an east-west collector roadway between Halton Terrace and Old Second Line Road.

- Section 8.3 of the KNUEA CDP TMP reviewed four alternative alignments when developing a preferred configuration for the proposed Old Carp Road connection. The technically preferred configuration will re-align Old Carp Road and Halton Terrace to tie into the new collector roadway, which will be the operate under free flow conditions to March Road. Should problems arise, a variety of mitigation measures could be considered to address adverse impacts on Old Carp Road. Consultation with the City's Area Traffic Management group is recommended in the event of any unforeseen negative impacts.

- The proposed development is anticipated to generate approximately 121 transit trips (29 in, 92 out) during the AM peak hour and 147 transit trips (93 in, 54 out) during the PM peak hour. This equates to approximately 30% of the overall transit demand by the KNUEA lands.

- The screenline analysis in the KNUEA CDP TMP suggests the TAI screenline will operate below capacity, while the March Road screenline will operate above capacity during the 2026 build-out and 2031 horizon years. The report suggests other corridors in the greater Kanata North area apart from the KNUEA may need to be investigated by the City or through other long-term planning studies to provide additional capacity in the future.

- The March Road/Halton Terrace/Maxwell Bridge Road intersection meets the target TLOS and Auto LOS, however it does not meet the target PLOS, BLOS and TkLOS for the General Urban Area. A reduction in the east-west crossing distance for pedestrians would provide the greatest improvement to the PLOS at this intersection. However, based on the projected future traffic volumes, the existing cross section along March Road is appropriate. To achieve the target BLOS on the north and south approaches, the City could give consideration to providing a two-stage left-turn bike box to facilitate left-turn movements. A BLOS B can be achieved on the east approach with a reduced operating speed of 40km/hr.

- The north approach to March Road/Halton Terrace/Maxwell Bridge Road intersection does not meet the target TkLOS for the General Urban Area. As Halton Terrace is not designated as a truck route, the TkLOS E on the north approach is considered appropriate. Increasing the right turn radii on this approach would decrease the PETSI score for the PLOS evaluation and is not recommended.

- The March Road/Dunrobin Road intersection meets the target TkLOS and Auto LOS, however it does not meet the target BLOS for the General Rural Area. As this is a T-intersection with a high operating speed along March Road, the target BLOS D for the eastbound left turn movement is unachievable. It is noteworthy that the western lane on the north approach is a shared left/right-turn lane. Cyclists are not required to cross traffic lanes to perform the southbound left turn movement and are not conflicting with an opposing movement. As such, the BLOS criteria identified in the MMLOS Guidelines is not anticipated to be representative of the cyclist level of comfort on this approach.

- The intersection capacity analysis presented in the KNUEA CDP TMP suggests the study area intersections will operate with a LOS D or better during the weekday AM and PM peak hours through the 2031 horizon year.

- As the proposed development is to be constructed within the build-out time frame identified in the KNUEA CDP TMP, and it is anticipated that other developments within the KNUEA will proceed within the build-out timeframe and provide alternative connections to March Road, the screenline analysis and intersection capacity analysis presented in the KNUEA CDP TMP is representative of the conditions following build-out of the proposed development.

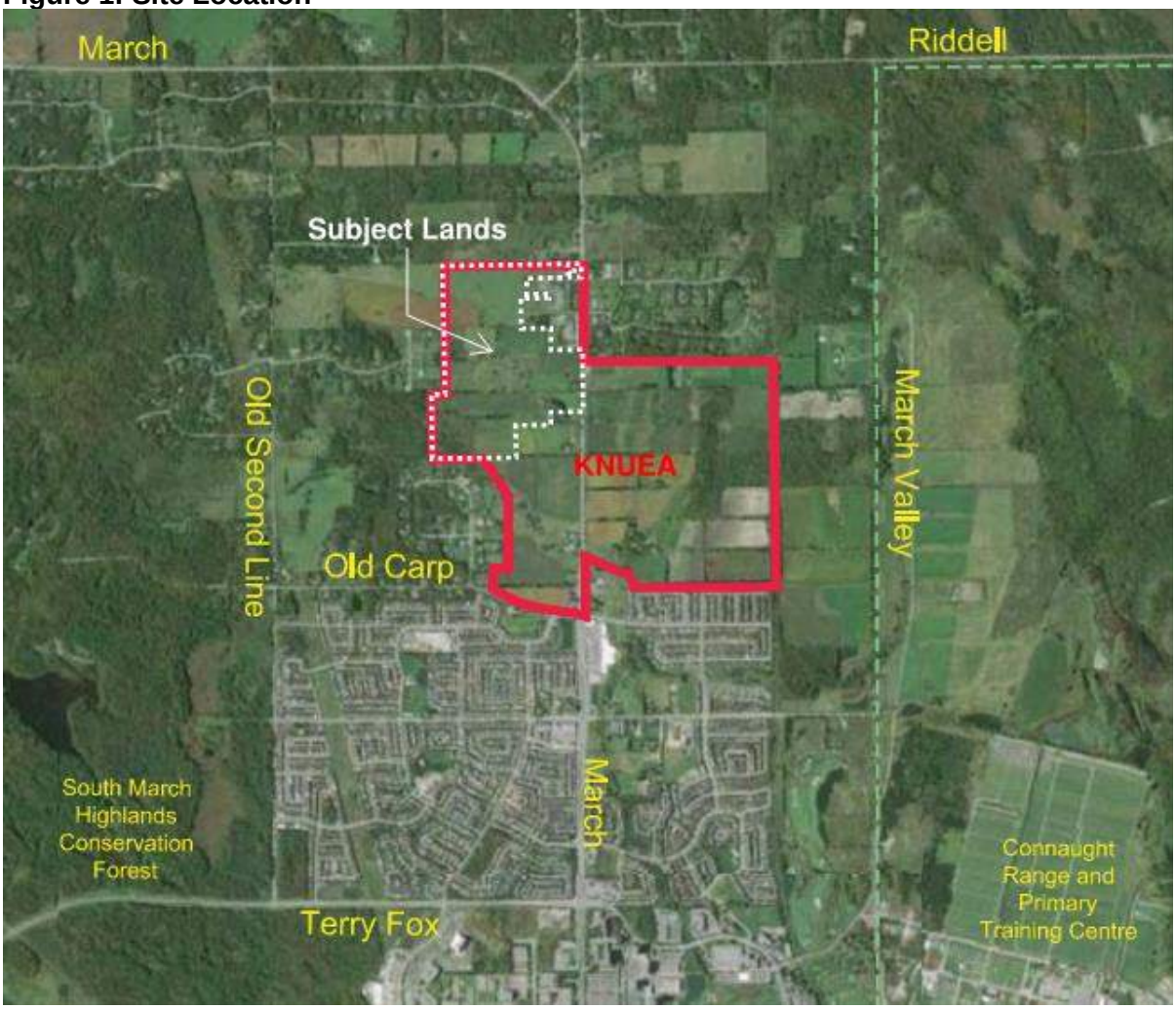
1.0 INTRODUCTION

Novatech has been retained by CU Developments Inc. to prepare a Transportation Impact Assessment (TIA) in support of the application for a Draft Plan of Subdivision and Zoning By-Law Amendment (ZBLA) to allow for the development of lands known as 1053, 1075 and 1145 March Road in Kanata North (the "Subject Lands").

1.1 Site Location and Context

The Subject Lands – legally described as Part of Lot 13 and 14, Concession 3, Township of March – are owned by CU Developments Inc. and encompass approximately 48.05 hectares including several properties under the municipal addresses 1053, 1075 and 1145 March Road. They are located in the northwest quadrant of the Kanata North Urban Expansion Area (KNUEA) (see Figure 1) which is subject to the Kanata North Community Design Plan (CDP), approved by Council on July 13, 2016.

Figure 1: Site Location



The Subject Lands are largely undeveloped and consist of open cultivated fields and recently fallow regenerating meadows. A tributary for Shirley's Brook runs through the Subject Lands in the northwest to southeast direction. Another tributary for Shirley's Brook also runs from the northwest to southeast just south of the Subject Lands.

The following describes the existing and planned land uses surrounding the Subject Lands:

North: Lands to the north are comprised of the Murphy's Court rural estate subdivision and rural lands. These lands fall outside the existing urban boundary.

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South: Lands to the south are comprised of existing rural lands identified for future development in the Kanata North CDP, and the Marchbrook Circle rural estate subdivision.

West: Lands to the west are comprised of the Panandrick Estates subdivision and rural lands.

1.2 KNUEA Background

As stated above, the Subject Lands make up the majority of the northwest quadrant of the KNUEA. The Kanata North CDP was completed in June of 2016 to establish a community-wide land-use framework for the KNUEA that reflects the principles, objectives and policies for community development as directed by the Official Plan.

The KNUEA is approximately 181 hectares in area. It was established as one of the City's Urban Expansion Areas during the 2009 Official Plan review through Official Plan Amendment 76 (OPA 76) to accommodate the projected population growth to 2031. The major landowners in the area, known collectively as the *Kanata North Land Owners Group* (KNLOG), then initiated a Community Design Plan process to fulfill the requirements of the Official Plan to permit the review of development applications in the KNUEA. The KNLOG represent approximately 87% of the land within the KNUEA.

The Sponsoring Landowners include:

- Metcalfe Realty Company Ltd.;
- Brigil (3223701 Canada Inc.);
- Valecraft (8409706 Canada Inc.)/JG Rivard Ltd.; and
- CU Developments Inc.
    - *Formerly Junic/Multivesco (7089121 Canada Inc.)*

Early in the process formal invitations were sent to other landowners to participate; however, none other than the group listed above chose to join the KNLOG. Non-participating landowners have been involved in the CDP process through consultation and opportunities to comment as the plan evolved. The CDP process was integrated with the OPA process and the Municipal Class Environmental Assessment (Class EA) processes for associate infrastructure processes. The objective of this

integrated process was to create a set of guiding documents that would help shape the development of Kanata North. The guiding documents include:

- *Kanata North Community Design Plan, Prepared by Novatech, Report No.: R-2016-020, dated June 28, 2016 (CDP);*
- *Kanata North Master Servicing Study, Prepared by Novatech, Report No.: R-2016-041, dated June 28, 2016 (MSS);*
- *Kanata North Environmental Management Plan, Prepared by Novatech, Report No.: R-2016-017, dated June 28, 2016 (EMP); and*
- *Kanata North Transportation Master Plan, Prepared by Novatech, Report No.: R-2015-161, dated June 28, 2016 (TMP).*

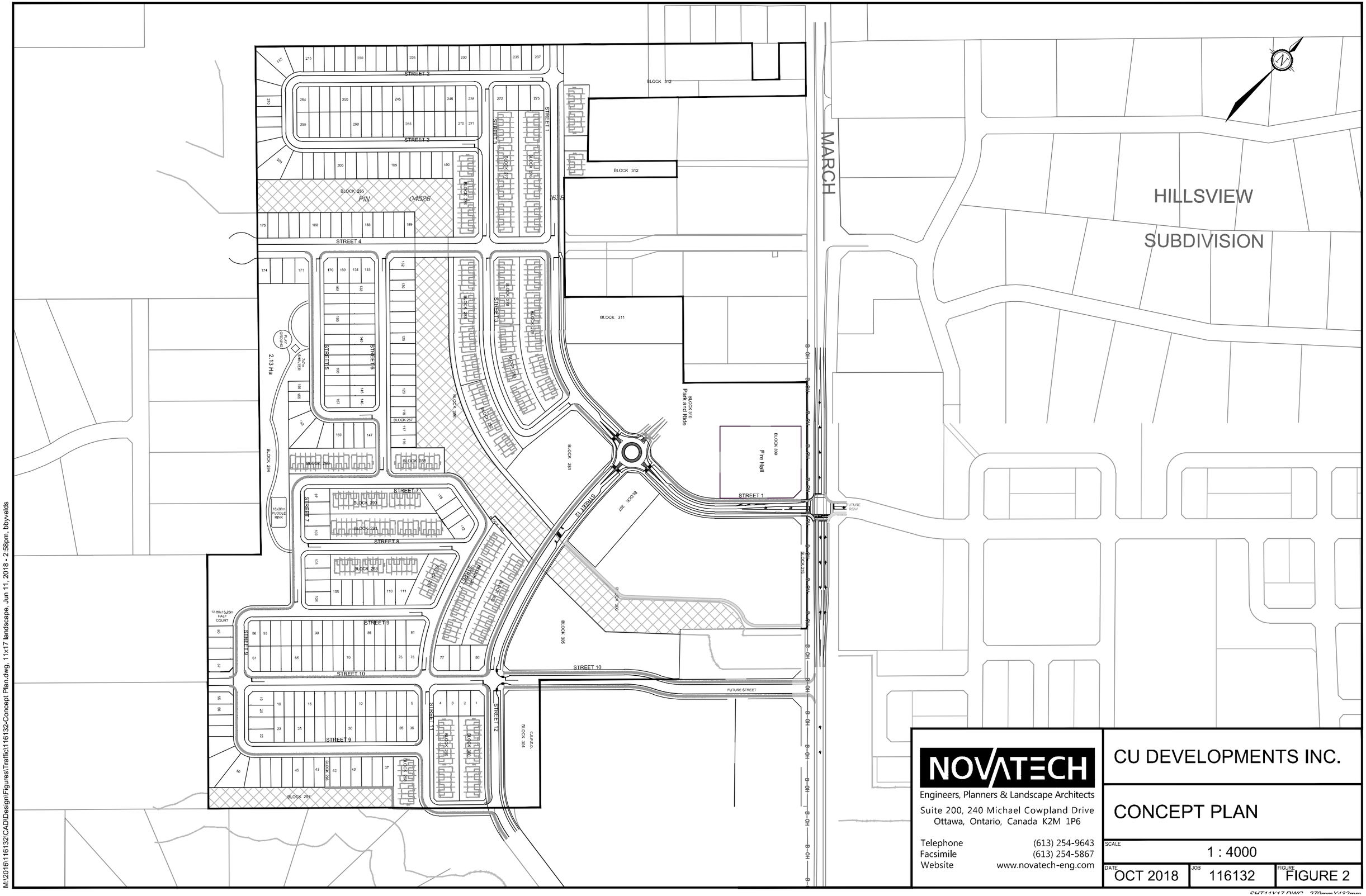
The proposed subdivision and its supporting studies (i.e. the Site Serviceability and Stormwater Management report, the Noise Feasibility Study, and the Transportation Impact Assessment) are consistent with the Kanata North CDP Demonstration Plan and the above-noted guiding documents. Based on the detailed analysis that was conducted for the development proposal, some recommendations from the guiding documents have been modified and updated. For example, minor modifications have been made to the street layout and to the shape of the stormwater management facility. Each supporting study contains details and rationale regarding the specific modifications. These modifications maintain the plan presented in the CDP while proving its conceptual feasibility for the development which has been identified for the KNUEA.

The KNUEA CDP TMP provided an in-depth review of the transportation impacts of the overall development on the area roadways. The KNUEA CDP TMP provided a review of a number of alternative transportation solutions and alternative design concepts. The review included an analysis of alternative park and ride facility locations, alternative intersection controls along March Road, access alternatives to Old Carp Road, alternative access locations along March Road, and internal intersection control alternatives. As discussed at the pre-consultation meeting, this TIA will follow the City's 2017 TIA guidelines. However, the KNUEA CDP TMP will serve as the parent document for the TIA, as many elements of the analysis were completed as part of the TMP and does not need to be duplicated. As such, these sections of the TIA reference the previous analysis presented in the KNUEA CDP TMP. This TIA will provide a supplementary review of aspects of the subdivision to fulfil the requirements of the TIA.

1.3 Proposed Development

The proposed development consists of 825 units including 295 single detached dwellings, 314 townhouse dwellings, and 216 multi-unit residential dwellings to be developed in multiple phases. This subdivision will be the first stage in building out the community envisioned in the Kanata North CDP. The subdivision lands include blocks set aside for street-oriented single detached and townhouse dwellings, a stormwater management pond, a portion of a school block for the French Public School Board of Eastern Ontario (CEPEO), a future fire hall, and a future park and ride facility to be the terminus of the bus rapid transit planned for March Road. A linear neighbourhood park along the western boundary of the site will contain recreational facilities and continue the pathway network through the community.

A concept plan for the Subject Lands is provided in **Figure 2**.



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CU DEVELOPMENTS INC.

CONCEPT PLAN

SCALE 1 : 4000

DATE OCT 2018 | JOB 116132 | FIGURE FIGURE 2

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2.0 SCREENING AND SCOPING

2.1 Screening Form

The City's 2017 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.

The subject application satisfies all three triggers for completing a TIA report. A copy of the TIA Screening form is included in **Appendix A**.

2.2 Existing Conditions

2.2.1 Roadways

All roadways within the study area, as described in Section 2.4, fall under the jurisdiction of the City of Ottawa.

March Road is an arterial roadway that travels between Eagleson Road/Highway 417 and Appleton Side Road. It generally runs on a north-south alignment and has a two-lane undivided rural cross section with a posted speed limit of 80km/hr north of Halton Terrace/Maxwell Bridge Road. School Zone signage with a flashing amber beacon are provided near St. Isidore Catholic School, reducing the posted speed to 60km/hr during school hours. March Road is classified as a truck route.

Dunrobin Road is an arterial roadway that generally runs on a north-south alignment between March Road and the Ottawa River. It has a two-lane undivided rural cross section and a posted speed limit of 60km/hr within the study area. Dunrobin Road is classified as a truck route.

Halton Terrace is a collector roadway that travels through the Morgan's Grant community between March Road and Flamborough Way. It has a two-lane undivided urban cross section with a posted speed limit of 40km/hr within the study area.

Maxwell Bridge Road is classified as a collector roadway between March Road and Marconi Avenue. East of Marconi Avenue, it is classified as a local roadway. It has a two-lane undivided urban cross section with a regulatory speed limit of 50km/hr under the *Ontario Highway Traffic Act*.

2.2.2 Intersections

March Road/Dunrobin Road

- Signalized intersection
- Eastbound: one through lane and one left turn lane
- Westbound: one through lane and one right turn lane
- Southbound: one left turn lane and one shared left/right turn lane
- Standard crosswalks are provided on the north and west legs of the intersection

March Road/Halton Terrace/Maxwell Bridge Road

- Signalized intersection
- Eastbound/Westbound: one left turn lane and one shared through/right turn lane
- Northbound/Southbound: two through lanes, one left turn lane and one right turn lane
- Standard crosswalks are provided on all legs of the intersection
- Pocket bike lanes are provided on the northbound and southbound approaches

2.2.3 Driveways

Three low volume driveways are provided to 1070 March Road and two low volume driveways are provided to 1090 March Road. These driveways are located on the east side of March Road, adjacent to the subject site.

2.2.4 Pedestrian and Cycling Facilities

Gravel shoulders are provided on both sides of March Road and Dunrobin Road within the study area. Concrete sidewalks are provided on both sides of Halton Terrace and Maxwell Bridge Road.

March Road and Dunrobin Road are classified as spine cycling routes, and Halton Terrace between March Road and Old Carp Road is classified as a local cycling route.

2.2.5 Transit

A copy of the OC Transpo system map for the study area is included in **Appendix B**. There is currently no transit service along March Road in the vicinity of the subject site.

2.2.6 Existing Traffic Volumes

Existing traffic volumes at the study area intersections are summarized in Figure 3 of the KNUEA Existing Conditions Report attached in Appendix A of Volume 2 of the KNUEA CDP TMP. Existing traffic volumes at the study area intersections are provided in **Appendix C**.

2.2.7 Collision Records

Historical collision data from the last five years was obtained from the City's Public Works and Service Department for the March Road/Dunrobin Road and March Road/Maxwell Bridge Road/Halton Terrace intersections. Copies of the collision summary reports are included in **Appendix D**.

A total of 17 collisions were reported at the March Road/Dunrobin Road intersection over the last five years. Six of the collisions were rear-end impacts, four were turning movement impacts, three were angle impacts, two were sideswipe impacts and two were single vehicle impacts. Of the six rear-end impacts, three occurred on the southbound approach, two occurred on the westbound approach, and one occurred on the eastbound approach. Eleven of the collisions occurred under wet, icy, or slushy surface conditions, suggesting environmental factors played a significant role in the collision history at this intersection. Personal injuries were incurred from two of the collisions. None of the collisions involved pedestrians or cyclists.

A total of 13 collisions were reported at the March Road/Maxwell Bridge Road/Halton Terrace intersection over the last five years. Five of the collisions were turning movement impacts, four were single vehicle impacts, two were sideswipe impacts, one was an angle impact and one was a rear-end impact. Six of the collisions occurred under wet, icy, or snowy surface conditions, suggesting environmental factors played a role in the collision history at this intersection. Personal injuries were incurred from four of the collisions. One of the single vehicle impacts involved a westbound vehicle turning left and two pedestrians.

Based on the foregoing, there were no relevant collision patterns observed at any of the study area intersections over the last five years.

2.3 Planned Conditions

The City of Ottawa's 2013 Transportation Master Plan (TMP) identifies a median bus rapid transit (BRT) system along March Road between Corkstown Road and Solandt Road in its 2031 Affordable Rapid Transit and Transit Priority Network. The 2013 TMP also identifies the future need to extend the median BRT system to Maxwell Bridge Road/Halton Terrace post 2031, with a conceptual future transit corridor extending further north towards Dunrobin Road.

As development progresses within the KNUEA, and subject to the City and Development Charges Funding, March Road will be widened in two phases to accommodate the increase in vehicular traffic and ultimately extend the future Kanata North Transitway. When the City of Ottawa extends the median BRT system further north through the KNUEA, the interim cross-section can be widened to

form the ultimate median BRT cross-section. The interim and ultimate cross sections along March Road adjacent to the site are shown in Figures 24 and 25 in the KNUEA CDP TMP, and are included in **Appendix E**.

Subject to the urban portion of the March Road widening project being brought into the affordable plan, and subject to reasonable terms being established including payback period, the KNLOG is prepared to enter into a front ending agreement with the City to construct the four lane widening of March Road to the limit of the urban area.

2.4 Study Area and Time Periods

The study area for this report was discussed with City staff and will include March Road as well as the following intersections:

- March Road/Dunrobin Road
- March Road/Halton Terrace/Maxwell Bridge Road
- March Road/Street 1 (access intersection)

The selected time periods for the analysis are the weekday AM and PM peak hours, as they represent the 'worst case' combination of site generated traffic and adjacent street traffic. The proposed development is anticipated to be constructed with full occupancy in 2026.

2.5 Exemptions Review

This module reviews possible exemptions from the final TIA, as outlined in the TIA Guidelines. The applicable exemptions for this site were reviewed with City staff and are shown in **Table 2**.

Table 1: TIA Exemptions

Module	Element	Exemption Criteria	Exemption Applies
Design Review Component			
4.1 Development Design	*4.1.2* Circulation and Access	• Only required for site plans	Yes
	4.1.3 New Street Networks	• Only required for plans of subdivision	No
4.2 Parking	*4.2.1* Parking Supply	• Only required for site plans	Yes
	4.2.2 Spillover Parking	• Only required for site plans where parking supply is 15% below unconstrained demand	Yes
Network Impact Component			
4.5 Transportation Demand Management	*All elements*	• Not required for site plans expected to have fewer than 60 employees and/or students on location at any given time	No
4.6	*4.6.1* Adjacent Neighbourhoods	• Only required when the development relies on local or collector streets for access and	No

Module	Element	Exemption Criteria	Exemption Applies
Neighbourhood Traffic Management		total volumes exceed ATM capacity thresholds	
4.8 Network Concept	*All elements*	• Only required when proposed development generates more than 200 person-trips during the peak hour in excess of the equivalent volume permitted by the established zoning	No

3.0 FORECASTING

3.1 Development-Generated Traffic

3.1.1 Trip Generation

The proposed development is located in the northwest quadrant of the KNUEA lands. The analysis presented in the KNUEA CDP TMP assumed approximately 30% of the overall residential development was located in the northwest quadrant, equating to approximately 330 single detached dwelling units and 655 residential condominium/townhouse units. The proposed development includes 295 single detached dwelling units and 530 residential condominium/townhouse units, which from a traffic perspective is less than the assumed development in the KNUEA CDP TMP.

The KNUEA CDP TMP used Land Use 210 – Single Detached Dwelling Units and Land Use 230 – Residential Condominium/Townhouse codes in the Institute of Transportation Engineers (ITE) Trip Generation Manual, 9th Edition. Land Use 230 – Residential Condominium/Townhouse reflects survey data for ownership units that have at least one other owned unit within the same building structure. The KNUEA CDP TMP applied a person trip adjustment factor of 1.42 to the ITE rates to determine the number of person trips generated the development.

In September 2017 ITE published the 10th Edition of the Trip Generation Manual. Previous editions of the ITE Trip Generation Manual contained separate land use codes for rental and ownership residential uses. The 10th edition reviewed previous data and found no clear difference between the rental and ownership sites within the ITE database. As such they combined the rental and ownership data, and separated the multifamily housing into three land use codes (low-rise, mid-rise, and high-rise). Land Use 220 – Multifamily Housing (Low-rise) in the 10th edition of the Trip Generation Manual reflects data from apartments, townhouses, and condominiums located within the same building with at least three other dwelling units and that have one or two levels (floors). This land use has 42 data points for the AM peak hour rates and 50 data points for the PM peak hour rates, which based on the ITE Trip Generation Manual is considered a sufficient data set.

Based on the foregoing, the rates for multifamily housing presented in the 10th edition of the ITE trip generation manual are more reflective of the multifamily residential units within the proposed development and have been used in the following analysis. The following table provides a comparison between the trips generated by the assumed development in the KNUEA CDP TMP (330 singles and 655 condominium/townhouses) using the KNUEA CDP TMP methodology and the trips generated by the proposed development (295 singles and 530 condominiums/townhouses) using the ITE Trip Generation Manual 10th Edition methodology.

Table 2: ITE Trip Generation

Land Use	ITE Code	Units	AM Peak			PM Peak		
			IN	OUT	TOT	IN	OUT	TOT
KNUEA CDP TMP								
Single Detached Dwellings	210	330	60	181	241	194	114	308
Residential Condominium/ Townhouse	230	655	39	193	232	188	93	281
		Total	**99**	**374**	**473**	**382**	**207**	**589**
Proposed Development								
Single Detached Dwellings	210	295	54	160	214	181	106	287
Multifamily (Low-Rise)	220	530	54	179	233	164	97	261
		Total	**108**	**339**	**447**	**345**	**203**	**548**
		Difference	**9**	**-35**	**-26**	**-37**	**-4**	**-41**

The KNUEA CDP TMP used a person trip adjustment factor of 1.42 to convert ITE trips to person trips. The City's 2017 TIA Guideline update provides a standardized person trip adjustment factor of 1.28 to convert ITE trips to person trips. The approved person trip adjustment factor of 1.28 was carried forward for the proposed development. A comparison of the person trips generated by the proposed development, compared to the assumed development in the KNUEA CDP TMP (using the 1.42 person trip adjustment factor assumed in the KNUEA CDP TMP) is provided in the following table.

Table 3: Projected Site-Generated Person Trips

Land Use	AM Peak			PM Peak		
	IN	OUT	TOTAL	IN	OUT	TOTAL
KNUEA CDP TMP						
Single Detached Dwellings	85	257	342	275	162	437
Residential Condominium/ Townhouse	55	274	329	267	132	399
Total	**140**	**531**	**671**	**542**	**294**	**836**
Proposed Development						
Single Detached Dwellings	**69**	**205**	**274**	**232**	**135**	**367**
Multifamily (Low-Rise)	**69**	**229**	**298**	**210**	**124**	**334**
Total	**138**	**434**	**572**	**442**	**259**	**701**
Difference	**-2**	**-97**	**-99**	**-100**	**-35**	**-135**

Based on the foregoing, the proposed development is anticipated to generate approximately 100 to 135 person trips less than the assumed development in the KNUEA CDP TMP.

The modal shares associated with the proposed development are anticipated to be consistent with the KNUEA CDP TMP. The transit modal share in the KNUEA CDP TMP was developed based on the 2031 target in the City's 2013 TMP for the Kanata/Stittsville area. The modal shares identified in the 2011 TRANS O-D Survey Report for the Kanata/Stittsville area were adjusted to reflect the increased transit modal share of 21%, with the auto driver share reduced accordingly. A comparison of the person trips by modal share between the proposed development and the assumed development in the KNUEA CDP TMP is provided in the following table.

Table 4: Site-Generated Trips by Modal Share

Travel Mode	Modal Share	AM Peak			PM Peak		
		IN	OUT	TOTAL	IN	OUT	TOTAL
KNUEA CDP TMP							
Total Person Trips		**140**	**531**	**671**	**542**	**294**	**836**
Auto Driver	59%	82	314	396	320	173	493
Auto Passenger	15%	21	79	100	81	44	125
Transit	21%	30	111	141	114	62	176
Non-Auto	5%	7	27	34	27	15	42
Proposed Development							
Total Person Trips		**138**	**434**	**572**	**442**	**259**	**701**
Auto Driver	59%	82	256	338	261	153	414
Auto Passenger	15%	21	65	86	66	39	105
Transit	21%	29	92	121	93	54	147
Non-Auto	5%	6	21	27	22	13	35
Auto Driver (Difference)		**0**	**-58**	**-58**	**-59**	**-20**	**-79**
Auto Passenger (Difference)		**0**	**-14**	**-14**	**-15**	**-5**	**-20**
Transit (Difference)		**-1**	**-19**	**-20**	**-21**	**-8**	**-29**
Non-Auto (Difference)		**-1**	**-6**	**-7**	**-5**	**-2**	**-7**

Based on the foregoing, the proposed development is anticipated to generate approximately 60 to 80 less vehicle trips compared to the assumed development in the KNUEA CDP TMP.

3.1.2 Trip Distribution

The distribution of traffic generated by the proposed development is anticipated be consistent with the distribution presented in the KNUEA CDP TMP, and is summarized as follows:

- 85% to/from the south
- 15% to/from the north

As the trips generated by the proposed development are anticipated to be less than the assumed development in the KNUEA CDP TMP, the site traffic projections in the TMP are considered a

conservative representation of the anticipated traffic following build-out of the development, and have not been updated.

3.2 Background Traffic

Background growth along the study area roadways is anticipated to be consistent with the projections in Section 6.5 of the KNUEA CDP TMP. Background traffic volumes for the 2026 build-out and 2031 horizon years were estimated in the KNUEA CDP TMP by increasing the existing transit modal shares to 21% and applying a 0.5% growth rate per annum to the traffic volumes

During the pre-consultation, City staff suggested the traffic analysis account for the following subdivisions:

- 457 & 467 Terry Fox Drive (Richardson Ridge)
- Area 2 of the Kanata Highlands

A review of the traffic impact assessments prepared in support of the above subdivisions suggests a small portion of traffic generated by the sites are anticipated to arrive/depart via March Road north of Terry Fox Drive. For the purposes of this assessment it is assumed that the background growth assumptions utilized in the KNUEA CDP TMP account for the additional traffic from the above subdivisions.

Background and total traffic volumes for the 2026 build-out and 2031 horizon years are anticipated to be consistent with the projections in the KNUEA CDP TMP, and are provided in **Appendix C**.

4.0 ANALYSIS

4.1 Development Design

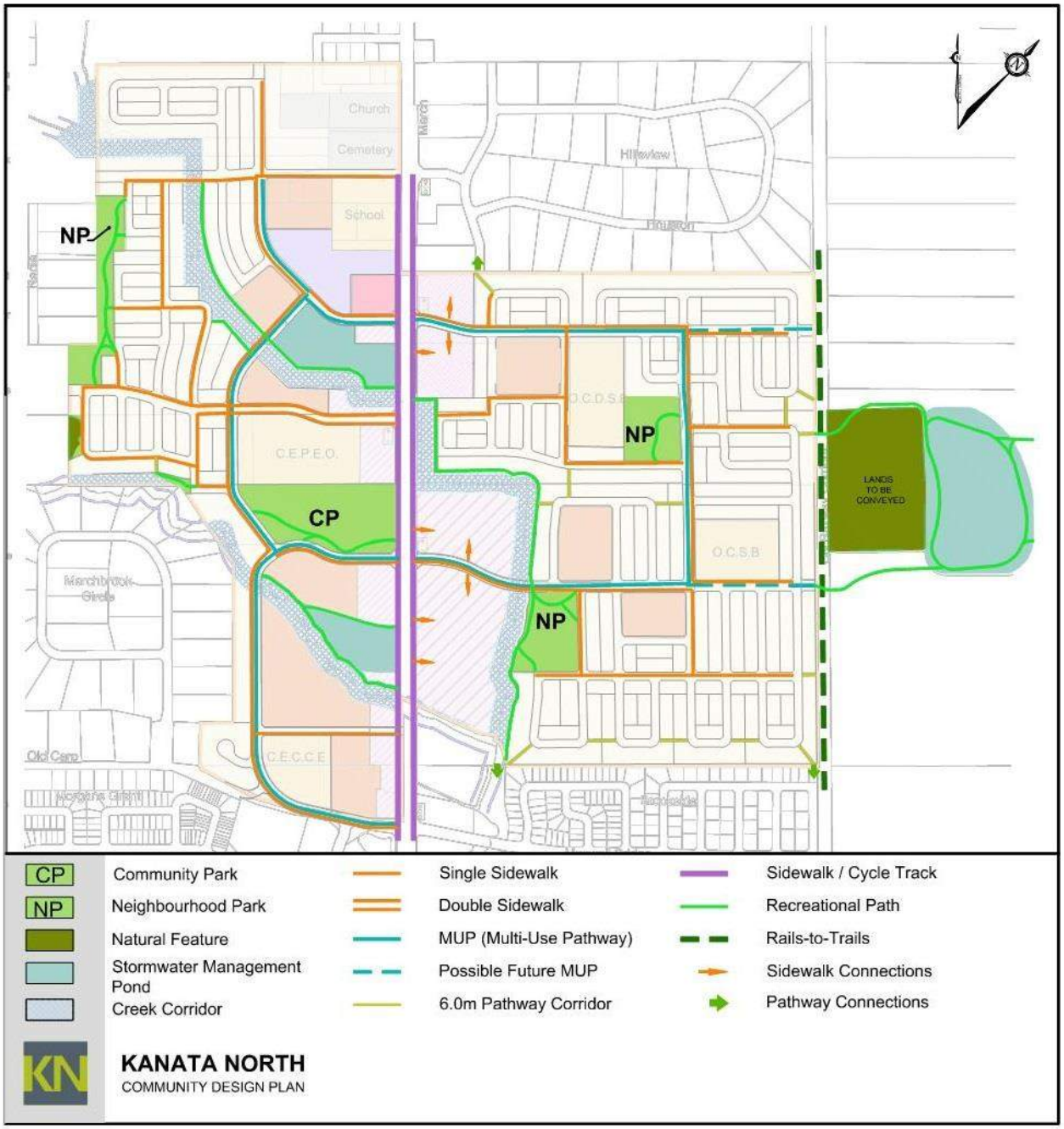
This section provides a review of the development design in terms of road network and intersections, roadway cross sections, as well as intersection narrowing and pedestrian crossing locations. A review of the City's Transportation Demand Management (TDM) – Supportive Development Design and Infrastructure Checklist is exempt from Draft Plan of Subdivision applications. A review of this TDM checklist will be conducted for the multi-unit blocks within the subdivision during the Site Plan Control process, if required.

4.1.1 Road Network and Intersections

The proposed collector road network and access intersections are consistent with the KNUEA CDP TMP. The collector roadway design will encourage the use of active transportation modes for utilitarian trips such as shopping, attending schools, and visiting neighbours. All collector roadways within the proposed development are classified as potential transit streets. The local roadway and sidewalk/pathway network is generally consistent with the Parks and Pathway Plan in the KNUEA CDP TMP, as shown in **Figure 3**.

A recreational pathway is proposed along the open space corridor between March Road and Street 4. The section of the recreational pathway adjacent to the stormwater management facility will also function as a service road for the pond. The recreational pathway will terminate at the March Road right-of-way (ROW) limit and can be extended to March Road when widened.

Figure 3: KNUEA CDP TMP – Parks and Pathway Plan



A review of the new street network with the initiatives identified in the City of Ottawa's Building Better and Smarter Suburbs (BBSS) report was completed. The proposed road network is consistent with the following BBSS initiatives:

- Design the street network as an integral part and extension of the municipal grid, taking into consideration its future adjustments and evolution.

- Design the street network in conjunction with the land use and open space system to ensure direct pedestrian and cycling connectivity to key destinations in the community (schools, shops, bus stops and stations, etc.).
- Ensure that a range of appropriate sized roadways complement the character and functional needs of each community area.
- Implement traffic calming measures at the outset of road design for local and collector streets.
- Use roundabouts that prioritize pedestrian and cyclist safety in appropriate functional locations.
- Avoid reverse frontage lots (rear yards abutting public streets) within a community.

A review of potential roundabout locations was conducted in Section 8.5 of the KNUEA CDP TMP, and suggests the collector/collector intersection in the northwest quadrant could be considered as a possible roundabout control at the time of application for Draft Plan of Subdivision. A roundabout is proposed at the Street 1/Street 12/Park and Ride intersection, consistent with the findings of the KNUEA CDP TMP. A review of internal intersection control at all other intersections within the Subject Lands was conducted as part of this application. Ontario Traffic Manual (OTM) Book 5 identifies criteria for the implementation of all-way stop control. Based on OTM Book 5, all-way stop control should be implemented if the total vehicle volumes on all approaches to an intersection exceed 350 vehicles during the peak hour and if the split is does not exceed 65%/35%.

As development progresses in the KNUEA, Street 4 and Street 10 will be extended to March Road. When Street 4 is extended to March Road, the east-west traffic flow at the Street 1/Street 4 intersection is anticipated to be the predominant flow and side street stop control is anticipated along Street 1. When Street 10 is extended to March Road, all-way stop control is anticipated to be warranted at the Street 10/Street 12 intersection. In the interest of limiting driver confusion upon full build-out of the KNUEA, side street stop control is recommended along Street 1 at the Street 4 intersection and all-way stop control is recommended at the Street 10/Street 12 intersection during the interim. Side street stop control along Street 1 at the Street 4 intersection will also provide east-west pedestrian connectivity across Street 1. Side street stop control is recommended for all other intersections within the Subject Lands, as shown on the concept plan in **Figure 2**.

4.1.2 Roadway Cross-Sections

Cross sections for March Road as well as all roadways within the proposed development were developed through the KNUEA CDP TMP. The cross sections incorporate the following compete streets principles.

- Pedestrians
    - Buffer between sidewalk and vehicular traffic on collector roadways and March Road
    - Sidewalks on both sides of collector roadways and March Road
- Cyclists
    - Multi-use pathways on one side of collector roadways
    - Raised cycle track on March Road
- Transit Users
    - Accessible transit stops
    - Transit shelters on inbound direction (towards downtown) of collector roadways
    - Future median BRT on March Road
- All Road Users
    - Street lighting on all roadways

- Landscaping in boulevards and medians on all roadways

Street 12 and Street 1 between March Road and Street 12 will be collector roadways with a 24m ROW containing a 7m road platform, a 2.5m parking lane, a multi-use pathway on one side, and a sidewalk on the other.

Street 1 between Street 12 and Street 4 is classified as a future collector and will have a 24m ROW. It will be constructed with a 7m road platform, a 2.5m parking lane, a multi-use pathway on one side, and a sidewalk on the other. This will provide a multi-use pathway connection to the residential multi-unit block in the southeast corner of the Street 1/Street 4 intersection, consistent with the KNUEA CDP TMP parks and pathway plan presented in **Figure 3**.

Street 4, Street 1 north of Street 4, and Street 10 west of Street 12 are identified as future collector roadways and will have a 24m ROW. These roadways will be constructed as a local roadway with an 8.5m road platform and sidewalk on one side of the roadway. The additional ROW will allow for a wider roadway platform and pedestrian facilities on both sides, if/when it is converted to a collector roadway to serve adjacent lands. All other local roadways within the proposed subdivision will have an 18m ROW containing an 8.5m road platform. Sidewalks will be provided on some local roadways, connecting residential areas and other land uses.

Cross-sections for all roadways within the Subject Lands are depicted in Figures 24 to 33 of the KNUEA CDP TMP, and are included in **Appendix E**.

On-street parking will be permitted on one side of Street 12 and Street 1 between March Road and Street 4. On-street parking will also be provided on both sides of all local roadways.

4.1.3 Intersection Narrowing and Pedestrian Crossovers

Intersection narrowing will be provided at the Street 10/Street 12 intersection to reduce the crossing distance for pedestrians at this intersection. A review of potential locations for pedestrian crossovers was conducted within the proposed development.

OTM Book 15 identifies the following criteria for the consideration of a pedestrian crossover (PXO):

- if the total 8-hour pedestrian volume crossing the main road is greater than 100 and the total 8-hour vehicular volume is greater than 750; or
- if the crossing location provides system connectivity or is on a desired pedestrian line.

The proposed recreational pathway along the open space corridor between March Road and Street 4 crosses Street 12 at a midblock location. The pedestrians crossing the roadway at this midblock location are not anticipated to meet the minimum 8-hour requirement of 100 people. As such, a PXO is not anticipated to be justified based on the pedestrian volume criteria identified above.

As this location is a desire line for pedestrians, although unwarranted based on the anticipated pedestrian volume, a PXO is recommended. Table 7 of OTM Book 5 identifies criteria for the level of PXO required based on the two-way vehicle volume conflicting with the pedestrian crossing location and the posted speed limit along the roadway. The two-way vehicle volumes along Street 12 are not anticipated to exceed 4,500 vehicles over eight hours, and the posted speed limit will be 40km/hr. Based on the OTM criteria, a PXO D is recommended at this midblock location.

The intersection narrowing and midblock PXO are shown on the concept plan in **Figure 2**.

4.2 Boundary Streets

March Road is the only boundary street for the subject site. As identified in Section 3.3 above, March Road will be widened in two phases. The timing of the March Road widening from two to four lanes will be determined by the City of Ottawa through future TMP updates when the urban portion of the project is brought into the affordable plan. Subject to the urban portion of the March Road widening project being brought into the affordable plan, and subject to reasonable terms being established including payback period, the Kanata North Land Owners Group (KNLOG) is prepared to enter into a front ending agreement with the City to construct the four lane widening of March Road to the limit of the urban area.

Complete streets principles, as identified in Section 5.1 above, were incorporated into the interim and ultimate cross-sections for March Road. The interim and ultimate cross sections for March Road are depicted in Figures 24 and 25 of the KNUEA CDP TMP, and are included in **Appendix E**. The proposed signalized access location is consistent with the KNUEA CDP TMP and is not anticipated to impact the complete street design for March Road.

4.3 Access Intersections Design

The Subject Lands will be served by one signalized all-movement access along March Road at Street 1. This intersection will also provide access to the future development in the northwest quadrant of the KNUEA. The location of the proposed signalized all-movement access is consistent with the KNUEA CDP TMP.

A functional design of the Street 1 access intersection along March Road is provided in **Appendix F**. As the future development in the northwest quadrant of the KNUEA is anticipated to proceed in line with the Subject Lands, the functional design of this intersection includes all four legs. Turn lane parallel and taper lengths at the proposed Street 1 intersection were developed using criteria in the Transportation Association of Canada (TAC) Geometric Design Guidelines. A design speed of 90km/hr was assumed for March Road, and 40km/hr was assumed for Street 1. The turning volumes at the intersection are based on the 2026 total traffic volumes presented in the KNUEA CDP TMP, also provided in **Appendix C**.

The KNUEA CDP TMP does not identify a requirement for a northbound right turn lane at this intersection once March Road is widened and the posted speed limit is reduced to 60km/hr. However, a northbound right turn lane is recommended based on volumes and safety concerns during the interim scenario when the speed limit along March Road is maintained at 80km/hr. A functional design of the proposed roadway modifications are included in **Appendix F**. Road Modification Approval (RMA) exhibits and a cost estimate are provided in under a separate letter.

The roadway modifications associated with the March Road/Street 1 intersection are currently included in the City of Ottawa's 2017 Development Charges By-law Background Study. The 2017 Development Charges By-law Background Study identifies funding of $950,000, with a recovery date of 2023 for the modifications at the March Road/Street 1 intersection. Relevant excerpts from the City's 2017 Development Charges By-law are included in **Appendix G**. It is noteworthy that the roadway modifications associated with the future March Road/Street 10 intersection are eligible to be included in the 2019 update to the DC By-law Background Study.

Intersection MMLOS has been conducted for the signalized access intersections. The MMLOS guidelines produced by IBI Group in October 2015 were used to evaluate the LOS of the signalized access intersections for each mode of transportation. Schedule B of the City of Ottawa's Official Plan indicates the access is located in the General Urban Area.

Target PLOS, BLOS, TLOS, TkLOS and Auto LOS for the March Road/Street 1 intersection are based on the targets for the General Urban Area, as identified in Exhibit 22 of the MMLOS guidelines. The following table summarizes the findings of the MMLOS analysis for the access intersections. Detailed MMLOS calculations are included in **Appendix H**.

Table 5: Access Intersection MMLOS Summary

Intersection	PLOS	BLOS	TLOS	TkLOS	Auto LOS
March Road/Street 1	D	A	-	E	D (or Better)
Target	**C**	**C**	**-**	**D**	**D**

Based on the foregoing, the proposed March Road/Street 1 intersection will meet the target BLOS and Auto LOS, however it will not meet the target PLOS and TkLOS.

A reduction in the east-west pedestrian crossing distance is required to achieve the target PLOS on the south approach. Based on the projected northbound right turning traffic volumes (approximately 215 during the PM peak hour) and the posted speed limit of 80km/hr, a northbound right turn lane is recommended at this intersection. All other approaches meet the target PLOS for the General Urban Area.

A review of turning movements was conducted at the access intersection. As a park and ride is planned along Street 1, a B-12 standard single unit bus was used as the design vehicle at the March Road/Street 1 intersection.

4.4 Transportation Demand Management

A review of the TDM Measures Checklist was conducted, and can be found in **Appendix I**. Subject to the status of adjacent development within the KNUEA, and the timing for the construction of the park and ride, the proponent may potentially enter into an early transit service agreement with OC Transpo until regular transit services is warranted by occupancy levels.

A review of the TDM Measures Checklist can also be conducted for the multi-unit blocks within the subdivision during the Site Plan Control process, if required.

4.5 Neighbourhood Traffic Management

The Subject Lands provide access exclusively on March Road. However, as development progresses in the KNUEA lands, the overall development will provide access via Old Carp Road, an east-west collector roadway between Halton Terrace and Old Second Line Road.

Section 8.3 of the KNUEA CDP TMP reviewed four alternative alignments when developing a preferred configuration for the proposed Old Carp Road connection. The technically preferred

configuration will re-align Old Carp Road and Halton Terrace to tie into the new collector roadway, which will operate under free flow conditions to March Road. Section 8.3 of the KNUEA CDP TMP also suggests that should problems arise, a variety of mitigation measures could be considered to address adverse impacts on Old Carp Road, including:

- Turn restrictions at Old Carp Road and the proposed north-south collector
- Speed cushions on Old Carp Road

Consultation with the City's Area Traffic Management group is recommended in the event of any unforeseen negative impacts.

4.6 Transit

The KNUEA CDP TMP suggests the overall residential development within the KNUEA lands will generate 414 transit trips (89 in, 325 out) during the AM peak hour and 497 transit trips (322 in, 175 out) during the PM peak hour. Based on the trip generation presented in Section 3.1 above, the proposed development is anticipated to generate approximately 121 transit trips (29 in, 92 out) during the AM peak hour and 147 transit trips (93 in, 54 out) during the PM peak hour. This equates to approximately 30% of the overall transit demand by the KNUEA lands.

As identified above, subject to the status of adjacent development within the KNUEA, and the timing for the construction of the park and ride, the proponent may potentially enter into an early transit service agreement with OC Transpo until regular transit services is warranted by occupancy levels.

4.7 Review of Network Concept

A screenline analysis has been completed in Section 10.3 of the KNUEA CDP TMP. This section of the report reviewed the operations at two screenlines, described as follows:

- Transportation Area of Interest (TAI) Screenline: Immediately south of Terry Fox Drive, bound by Innovation Drive to the west and Legget Drive to the east
- March Road Screenline: March Road immediately north the March Road/Maxwell Bridge Road/Halton Terrace intersection

The screenline analysis in the KNUEA CDP TMP suggests the TAI screenline will operate below capacity, while the March Road screenline will operate above capacity during the 2026 build-out and 2031 horizon years. The report suggests other corridors in the greater Kanata North area apart from the KNUEA may need to be investigated by the City or through other long-term planning studies to provide additional capacity in the future.

As the proposed development is to be constructed within the build-out time frame identified in the KNUEA CDP TMP, the screenline analysis is representative of the conditions following the proposed development. As such, an updated screenline analysis for the future traffic conditions has not been completed as part of this report.

4.8 Intersection Design

4.8.1 Existing Intersection MMLOS Analysis

This section provides a review of the study area intersections using complete streets principles. The MMLOS guidelines produced by IBI Group in October 2015 were used to evaluate the LOS of all study area intersections for each mode of transportation. Schedule B of the City of Ottawa's Official Plan indicates the March Road/Halton Terrace/Maxwell Bridge Road intersection is in the General Urban Area and the March Road/Dunrobin Road intersection is in the General Rural Area. Aerial photographs of the study area intersections are included in Section 2.2.2.

Target PLOS, BLOS, TLOS, TkLOS and Auto LOS for the study area intersections are based on the targets for the respective land use designation, as identified in Exhibit 22 of the MMLOS guidelines. The following table summarizes the findings of the MMLOS intersection analysis. Detailed intersection MMLOS calculations are included in **Appendix J**.

Table 6: Access Intersection MMLOS Summary

Intersection	PLOS	BLOS	TLOS	TkLOS	Auto LOS
March Road/Halton Terrace/ Maxwell Bridge Road	F	F	C	E	B
Target	**C**	**B**	**D**	**D**	**D**
March Road/ Dunrobin Road	-	F	-	C	D
Target	**-**	**D**	**-**	**C**	**D**

March Road/Halton Terrace/Maxwell Bridge Road
This intersection meets the target TLOS and Auto LOS, however it does not meet the target PLOS, BLOS and TkLOS for the General Urban Area.

A reduction in the east-west crossing distance for pedestrians would provide the greatest improvement to the PLOS at this intersection. However, based on the projected future traffic volumes, the existing cross section along March Road is appropriate. The City of Ottawa's criteria for implementing textured or ladder crosswalks is if the vehicle/pedestrian conflicts exceed 400,000 over an eight-hour period. Based on the City's criteria, textured or ladder crosswalks are not warranted on any legs of this intersection.

To achieve the target BLOS on the north and south approaches, the City could give consideration to providing a two-stage left-turn bike box to facilitate left-turn movements. A BLOS B can be achieved on the east approach with a reduced operating speed of 40km/hr.

The north approach to this intersection does not meet the target TkLOS for the General Urban Area. As Halton Terrace is not designated as a truck route, the TkLOS E on the north approach is considered appropriate. Increasing the right turn radii on this approach would decrease the PETSI score for the PLOS evaluation and is not recommended.

March Road/Dunrobin Road
This intersection meets the target TkLOS and Auto LOS, however it does not meet the target BLOS for the General Rural Area.

As this is a T-intersection with a high operating speed along March Road, the target BLOS D for the eastbound left turn movement is unachievable. It is noteworthy that the western lane on the north approach is a shared left/right-turn lane. Cyclists are not required to cross traffic lanes to perform the southbound left turn movement and are not conflicting with an opposing movement. As such, the BLOS criteria identified in the MMLOS Guidelines is not anticipated to be representative of the cyclist level of comfort on this approach.

4.8.2 Future Intersection Auto Analysis

Intersection capacity analysis has been completed in Section 10.4 of the KNUEA CDP TMP. The projected intersection operations within the study area, as identified in the KNUEA CDP TMP, are summarized in the following table.

Table 7: Intersection Capacity Analysis

Intersection	AM Peak			PM Peak		
	Max V/C Ratio	LOS	Mvmt	Max V/C Ratio	LOS	Mvmt
2026 Total Traffic						
March Road/ Dunrobin Road	0.68	B	SBL	0.64	B	WBT
March Road/ Maxwell Bridge Road/ Halton Terrace	0.77	C	SBT	0.81	D	EBL
March Road/ Street 1	0.84	D	WBL	0.73	C	EBT
2031 Total Traffic						
March Road/ Dunrobin Road	0.68	B	SBL	0.65	B	WBT
March Road/ Maxwell Bridge Road/ Halton Terrace	0.78	C	SBT	0.83	D	EBL
March Road/ Street 1	0.84	D	WBL	0.73	C	EBT/R

Based on the analysis presented in the KNUEA CDP TMP, the study area intersections are anticipated to operate with a LOS D or better during the weekday AM and PM peak hours through the 2031 horizon year. As the proposed development is to be constructed within the build-out time frame identified in the KNUEA CDP TMP, and it is anticipated that other developments within the KNUEA will proceed within the build-out timeframe and provide alternative connections to March Road, the intersection capacity analysis presented in the KNUEA CDP TMP is representative of the conditions following build-out of the proposed development. As such, intersection capacity analysis for the future traffic conditions has not been completed as part of this report.

5.0 CONCLUSIONS AND RECOMMENDATIONS

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

- As development progresses within the KNUEA, and subject to the City and Development Charges Funding, March Road will be widened in two phases to accommodate the increase in vehicular traffic and ultimately extend the future Kanata North Transitway. Subject to the urban portion of the March Road widening project being brought into the affordable plan, and subject to reasonable terms being established including payback period, the Kanata North Land Owners Group (KNLOG) is prepared to enter into a front ending agreement with the City to construct the four lane widening of March Road to the limit of the urban area.

- The analysis presented in the KNUEA CDP TMP assumed approximately 30% of the overall residential development was located in the northwest quadrant, equating to approximately 330 single detached dwelling units and 655 residential condominium/townhouse units. The proposed development includes 295 single detached dwelling units and 530 residential condominium/townhouse units, which from a traffic perspective is less than the assumed development in the KNUEA CDP TMP.

- The proposed development is anticipated to generate approximately 100 to 135 person trips (or 60 to 80 vehicle trips) less than the assumed development for the northwest quadrant of the KNUEA lands in the KNUEA CDP TMP during the peak hours.

- A recreational pathway is proposed along the open space corridor between March Road and Street 4. The section of the recreational pathway adjacent to the stormwater management facility will also function as a service road for the pond. The recreational pathway will terminate at the March Road right-of-way (ROW) limit and can be extended to March Road when widened.

- A roundabout is proposed at the Street 1/Street 12/Park and Ride intersection, consistent with the findings of the KNUEA CDP TMP.

- As development progresses in the KNUEA, Street 4 and Street 10 will be extended to March Road. In the interest of limiting driver confusion upon full build-out of the KNUEA, side street stop control is recommended along Street 1 at the Street 4 intersection and all-way stop control is recommended at the Street 10/Street 12 intersection during the interim. Side street stop control is recommended for all other intersections within the Subject Lands.

- On-street parking will be permitted on one side of Street 12 and Street 1 between March Road and Street 4. On-street parking will also be provided on both sides of all local roadways.

- Intersection narrowing will be provided at the Street 10/Street 12 intersection to reduce the crossing distance for pedestrians at this intersection.

- A PXO D is recommended at the midblock location where the recreational pathway crosses Street 12.

- March Road is the only boundary street for the subject site. Complete streets principles were incorporated into the interim and ultimate cross-sections for March Road. The proposed signalized access location is consistent with the KNUEA CDP TMP and is not anticipated to impact the complete street design for March Road.

- The roadway modifications associated with the March Road/Street 1 intersection are currently included in the City of Ottawa's 2017 Development Charges By-law Background Study. The 2017 Development Charges By-law Background Study identifies funding of $950,000, with a recovery date of 2023 for the modifications at the March Road/Street 1 intersection.

- The roadway modifications associated with the future March Road/Street 10 intersection are eligible to be included in the 2019 update to the DC By-law Background Study.

- The proposed March Road/Street 1 intersection will meet the target BLOS and Auto LOS, however it will not meet the target PLOS and TkLOS. A reduction in the east-west pedestrian crossing distance is required to achieve the target PLOS on the south approach. Based on the projected northbound right turning traffic volumes (approximately 215 during the PM peak hour) and the posted speed limit of 80km/hr, a northbound right turn lane is recommended at this intersection. All other approaches meet the target PLOS for the General Urban Area. As a park and ride is planned along Street 1, a B-12 standard single unit bus was used as the design vehicle at the March Road/Street 1 intersection.

- Subject to the status of adjacent development within the KNUEA, and the timing for the construction of the park and ride, the proponent may potentially enter into an early transit service agreement with OC Transpo until regular transit services is warranted by occupancy levels. A review of the TDM Measures Checklist will be conducted for the multi-unit blocks within the subdivision during the Site Plan Control process, if required.

- The Subject Lands provide access exclusively on March Road. However, as development progresses in the KNUEA, the overall development will provide access via Old Carp Road, an east-west collector roadway between Halton Terrace and Old Second Line Road.

- The Subject Lands provide access exclusively on March Road. However, as development progresses in the KNUEA lands, the overall development will provide access via Old Carp Road, an east-west collector roadway between Halton Terrace and Old Second Line Road.

- Section 8.3 of the KNUEA CDP TMP reviewed four alternative alignments when developing a preferred configuration for the proposed Old Carp Road connection. The technically preferred configuration will re-align Old Carp Road and Halton Terrace to tie into the new collector roadway, which will be the operate under free flow conditions to March Road. Should problems arise, a variety of mitigation measures could be considered to address adverse impacts on Old Carp Road. Consultation with the City's Area Traffic Management group is recommended in the event of any unforeseen negative impacts.

- The proposed development is anticipated to generate approximately 121 transit trips (29 in, 92 out) during the AM peak hour and 147 transit trips (93 in, 54 out) during the PM peak hour. This equates to approximately 30% of the overall transit demand by the KNUEA lands.

- The screenline analysis in the KNUEA CDP TMP suggests the TAI screenline will operate below capacity, while the March Road screenline will operate above capacity during the 2026 build-out and 2031 horizon years. The report suggests other corridors in the greater Kanata North area apart from the KNUEA may need to be investigated by the City or through other long-term planning studies to provide additional capacity in the future.

- The March Road/Halton Terrace/Maxwell Bridge Road intersection meets the target TLOS and Auto LOS, however it does not meet the target PLOS, BLOS and TkLOS for the General Urban Area. A reduction in the east-west crossing distance for pedestrians would provide the greatest improvement to the PLOS at this intersection. However, based on the projected future traffic volumes, the existing cross section along March Road is appropriate. To achieve the target BLOS on the north and south approaches, the City could give consideration to providing a two-stage left-turn bike box to facilitate left-turn movements. A BLOS B can be achieved on the east approach with a reduced operating speed of 40km/hr.

- The north approach to March Road/Halton Terrace/Maxwell Bridge Road intersection does not meet the target TkLOS for the General Urban Area. As Halton Terrace is not designated as a truck route, the TkLOS E on the north approach is considered appropriate. Increasing the right turn radii on this approach would decrease the PETSI score for the PLOS evaluation and is not recommended.

- The March Road/Dunrobin Road intersection meets the target TkLOS and Auto LOS, however it does not meet the target BLOS for the General Rural Area. As this is a T-intersection with a high operating speed along March Road, the target BLOS D for the eastbound left turn movement is unachievable. It is noteworthy that the western lane on the north approach is a shared left/right-turn lane. Cyclists are not required to cross traffic lanes to perform the southbound left turn movement and are not conflicting with an opposing movement. As such, the BLOS criteria identified in the MMLOS Guidelines is not anticipated to be representative of the cyclist level of comfort on this approach.

- The intersection capacity analysis presented in the KNUEA CDP TMP suggests the study area intersections will operate with a LOS D or better during the weekday AM and PM peak hours through the 2031 horizon year.

- As the proposed development is to be constructed within the build-out time frame identified in the KNUEA CDP TMP, and it is anticipated that other developments within the KNUEA will proceed within the build-out timeframe and provide alternative connections to March Road, the screenline analysis and intersection capacity analysis presented in the KNUEA CDP TMP is representative of the conditions following build-out of the proposed development.

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Prepared by:

Brad Byvelds, P. Eng.
Project Coordinator | Transportation/Traffic

APPENDIX A

TIA Screening Form

City of Ottawa 2017 TIA Guidelines Screening Form

1. Description of Proposed Development

Municipal Address	1075 March Rd
Description of Location	KNUEA - Junic / Multivesco Lands.
Land Use Classification	Residential Subdivision
Development Size (units)	835 units.
Development Size (m^2)	49 ha
Number of Accesses and Locations	2 - March/Maxwell & March/Street C
Phase of Development	
Buildout Year	2026

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.

Land Use Type	Minimum Development Size
Single-family homes	40 units
Townhomes or apartments	90 units
Office	3,500 m^2
Industrial	5,000 m^2
Fast-food restaurant or coffee shop	100 m^2
Destination retail	1,000 m^2
Gas station or convenience market	75 m^2

** If the development has a land use type other than what is presented in the table above, estimates of person-trip generation may be made based on average trip generation characteristics represented in the current edition of the Institute of Transportation Engineers (ITE) Trip Generation Manual.*

If the proposed development size is 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 City's Transit Priority, Rapid Transit or Spine Bicycle Networks?	✓	
Is the development in a Design Priority Area (DPA) or Transit-oriented Development (TOD) zone?*		✓

**DPA and TOD are identified in the City of Ottawa Official Plan (DPA in Section 2.5.1 and Schedules A and B; TOD in Annex 6). See Chapter 4 for a list of City of Ottawa Planning and Engineering documents that support the completion of TIA).*

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 km/hr 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 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?		✓
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.

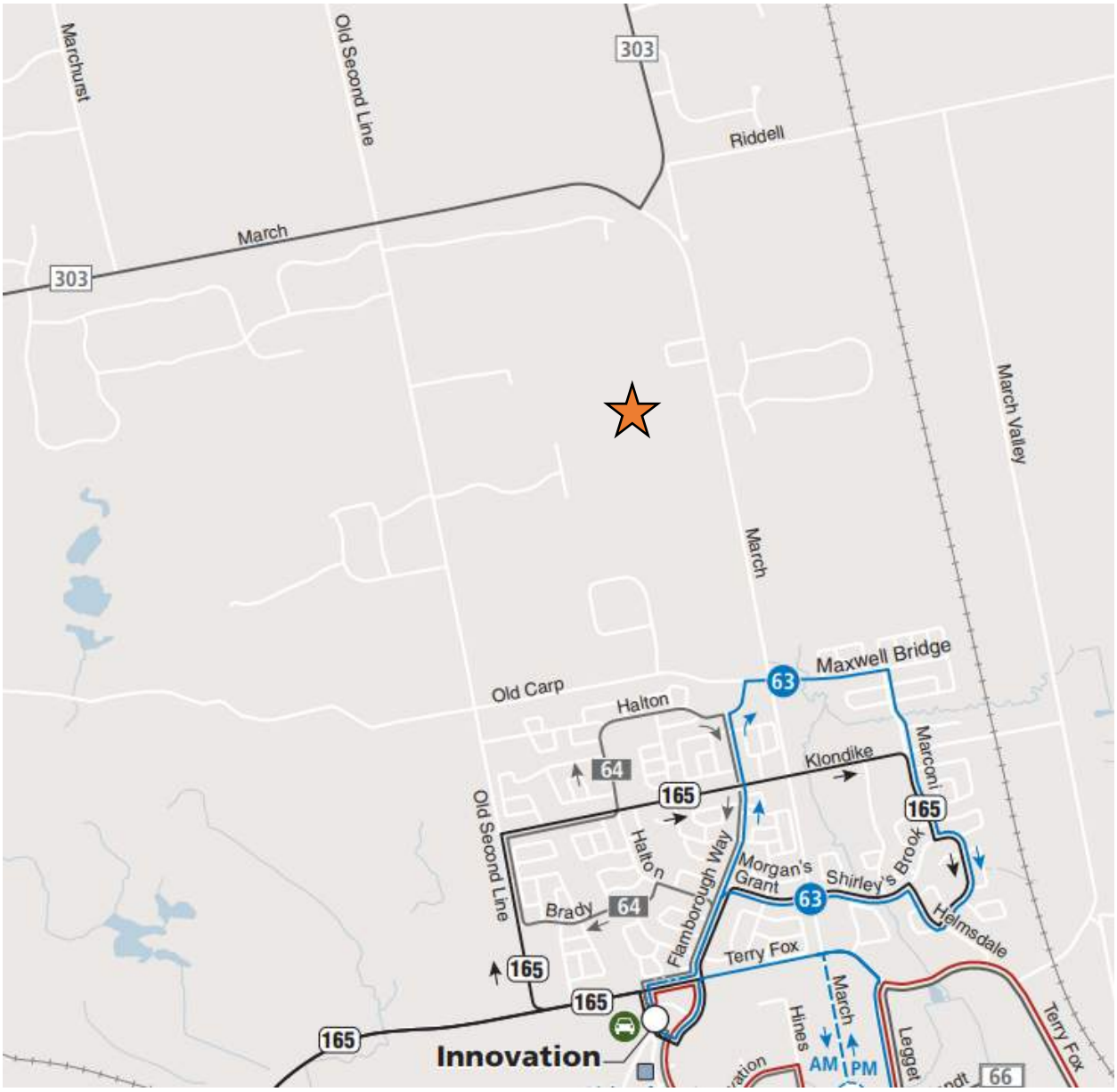
5. Summary

	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 B

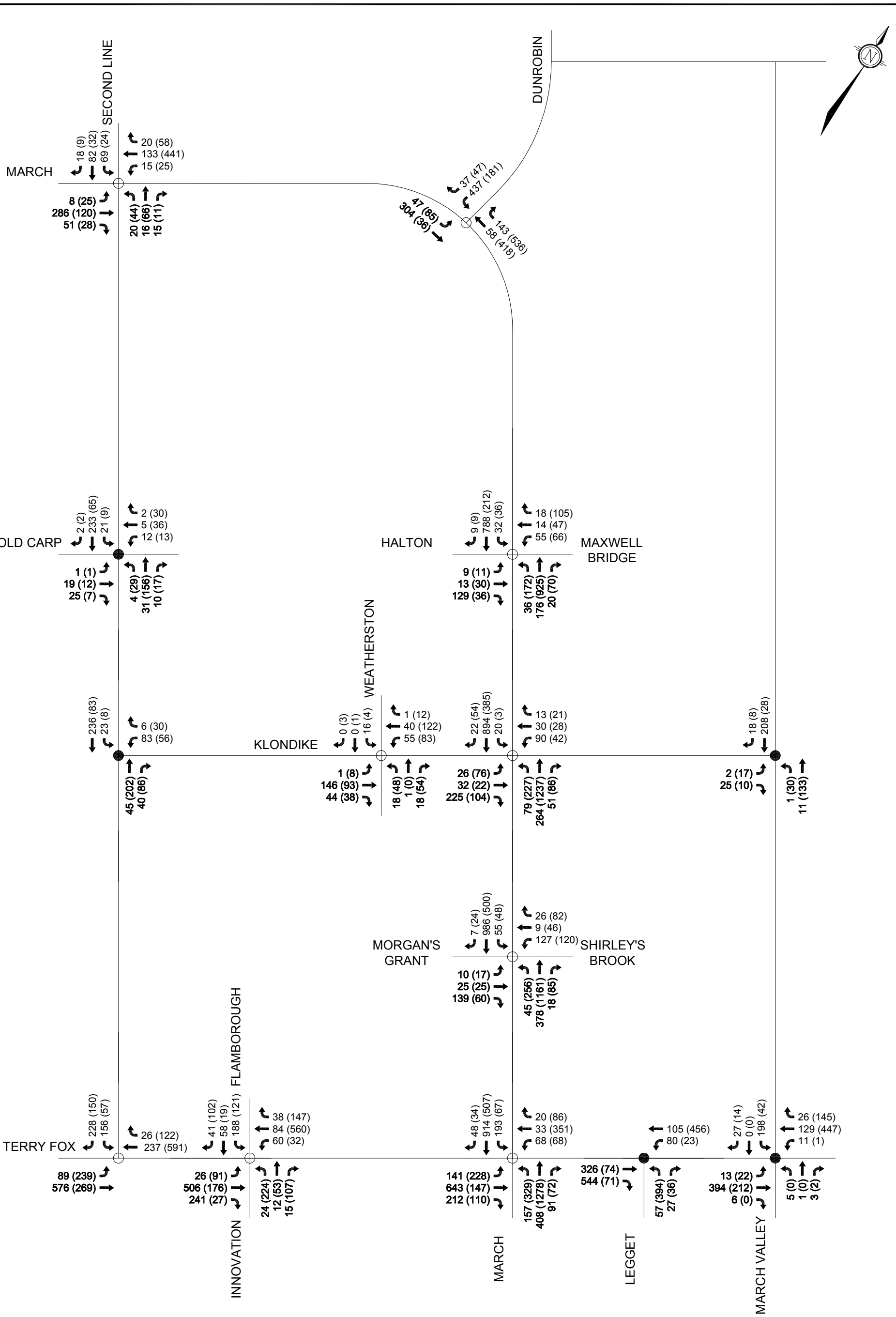
OC Transpo System Map



CU Development

APPENDIX C

KNUEA Traffic Projections



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Facsimile (613) 254-5867
Email: novainfo@novatech-eng.com

LEGEND

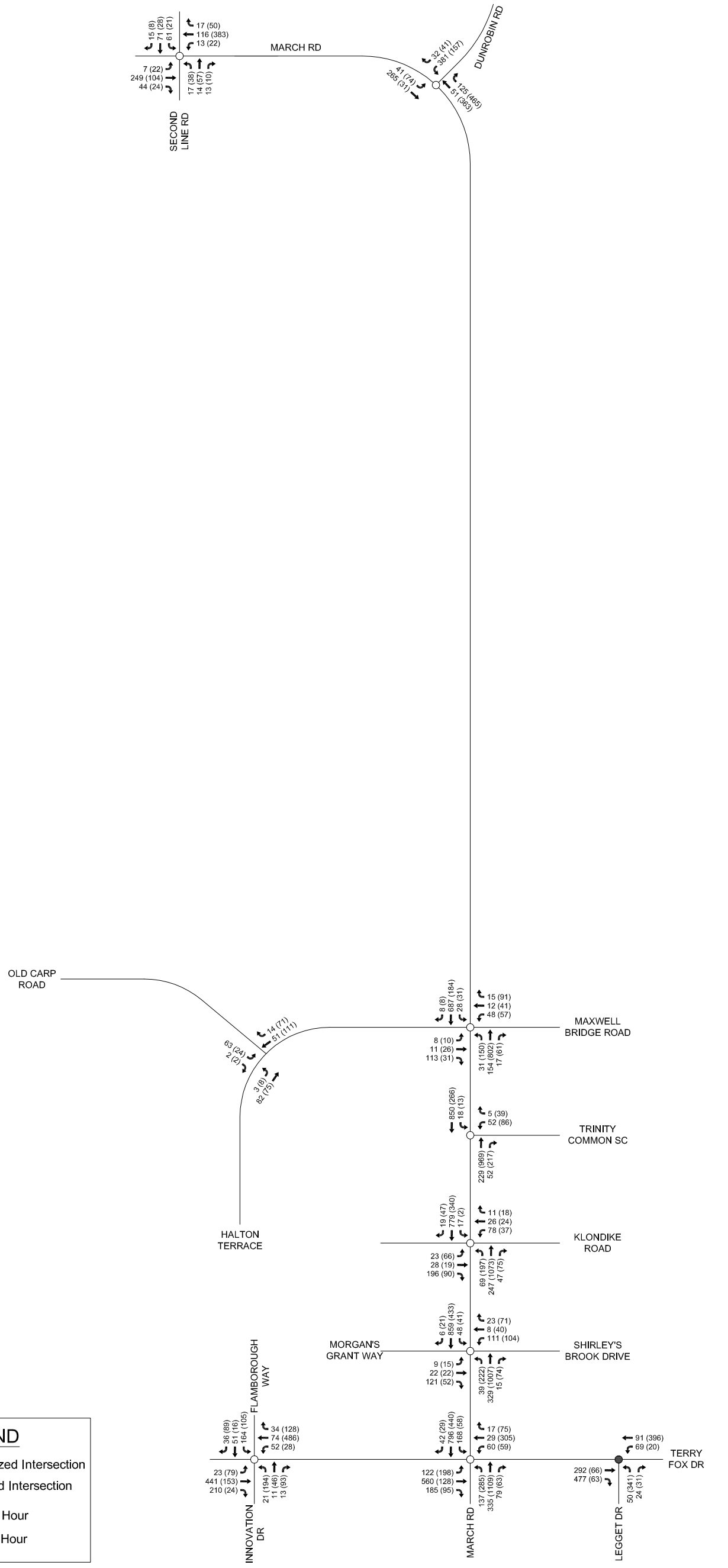
- Unsignalized Intersection
- Signalized Intersection
- xx VPH AM Peak Hour
- (xx) VPH PM Peak Hour

KANATA NORTH URBAN EXPANSION STUDY AREA

EXISTING TRAFFIC VOLUMES

MAR 2013 112117 FIGURE # 3

M:\2012\112117\CADDesign\Figures\Traffic\TrafficFigs.dwg, EXISTING TRAFFIC, Mar 04, 2013 - 2:12pm, bbyvelds



LEGEND

- Unsignalized Intersection
- Signalized Intersection

xx VPH AM Peak Hour

(xx) VPH PM Peak Hour

KANATA NORTH

COMMUNITY DESIGN PLAN

FIGURE NO. 11

2026 BACKGROUND TRAFFIC VOLUMES

DATE JUN 2016

JOB 112117

SCALE N.T.S.

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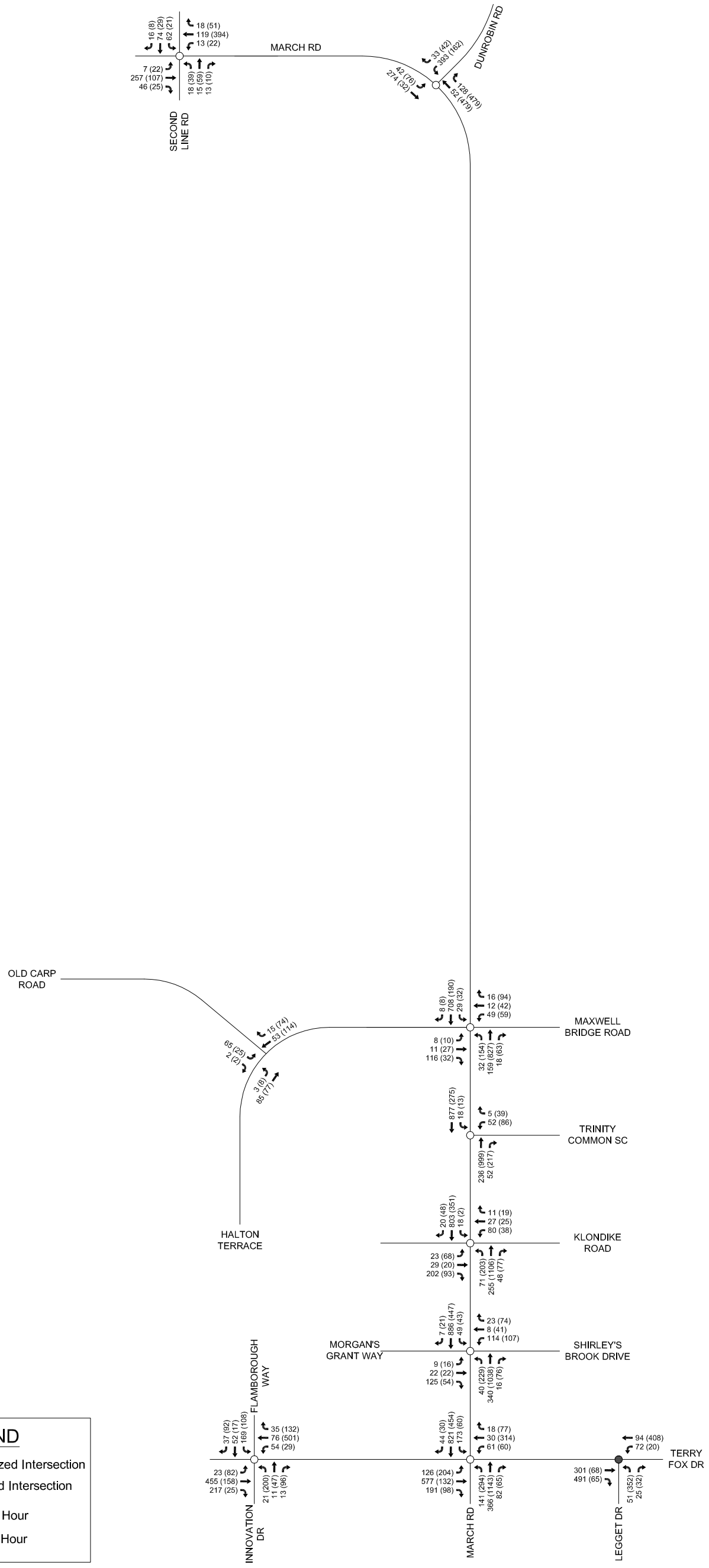

LEGEND

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

KANATA NORTH

COMMUNITY DESIGN PLAN

FIGURE NO. 12

2031 BACKGROUND TRAFFIC VOLUMES

DATE JUN 2016

JOB 112117

SCALE N.T.S.

NOVATECH
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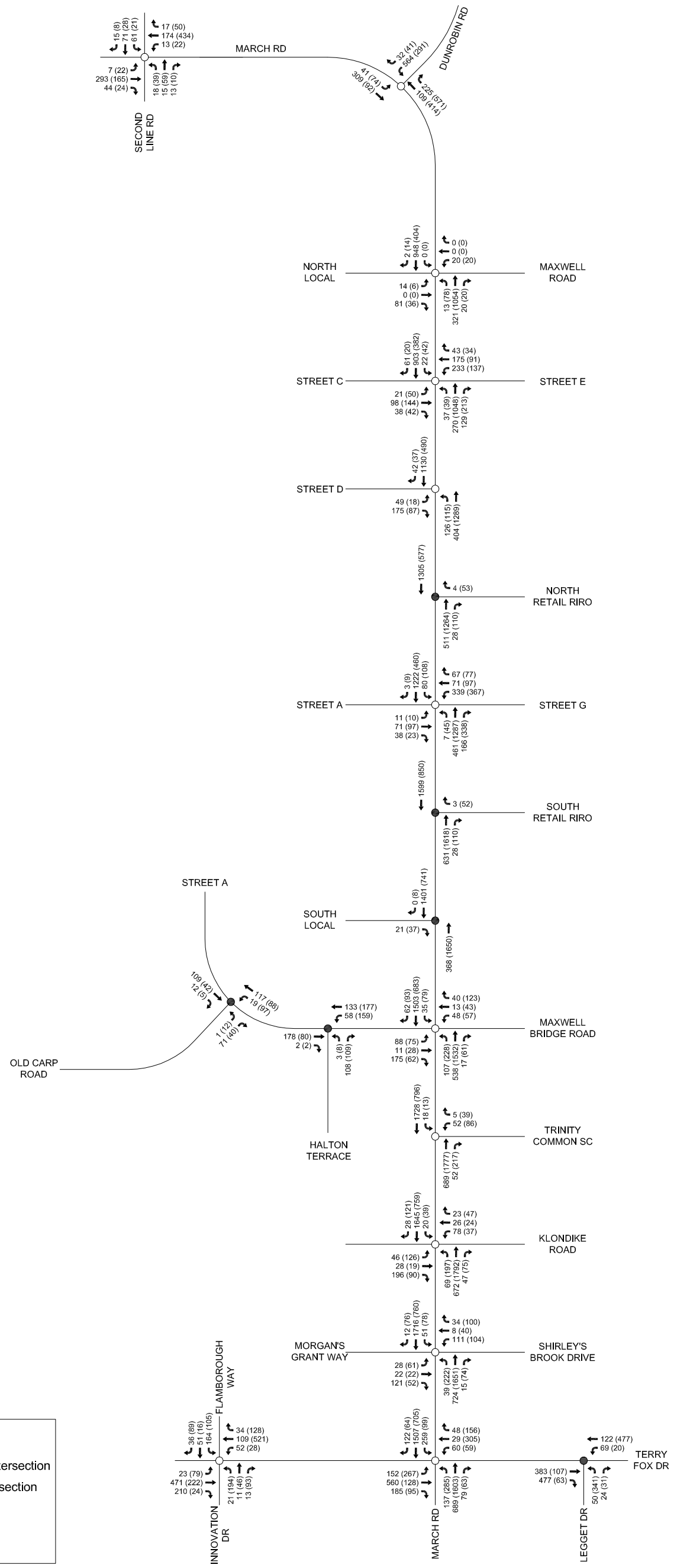

LEGEND

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

KANATA NORTH

COMMUNITY DESIGN PLAN

FIGURE NO. 36

2026 TOTAL TRAFFIC VOLUMES

DATE JUN 2016

JOB 112117

SCALE N.T.S.

NOVATECH

Engineers, Planners & Landscape Architects

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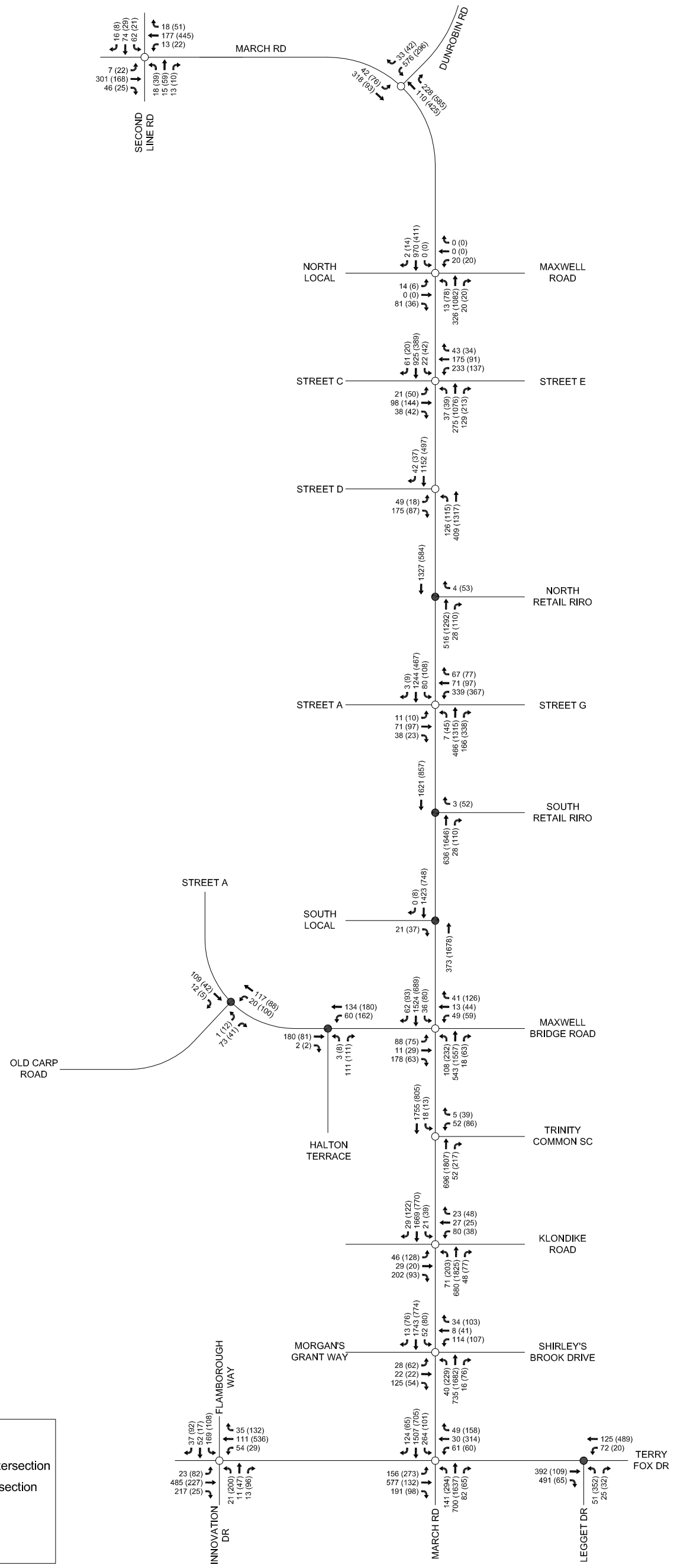
SHT11x17.DWG - 279mmx432mm



LEGEND

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

KANATA NORTH

COMMUNITY DESIGN PLAN

FIGURE NO.37

2031 TOTAL TRAFFIC VOLUMES

DATE JUN 2016 JOB 112117

SCALE N.T.S.

NOVATECH
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SHT11x17.DWG - 279mmx432mm

APPENDIX D

Collision Records

City Operations - Transportation Services

Collision Details Report - Public Version

From: January 1, 2012 **To:** December 31, 2016

Location: DUNROBIN 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
2014-Jan-12, Sun,13:30	Clear	Rear end	P.D. only	Wet	South	Going ahead	Truck-other	Other motor vehicle	
					South	Stopped	Passenger van	Other motor vehicle	
2014-Nov-09, Sun,23:53	Clear	SMV other	P.D. only	Wet	West	Going ahead	Passenger van	Ran off road	
2014-Feb-06, Thu,18:20	Clear	Turning movement	Non-fatal injury	Wet	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					East	Turning left	Automobile, station wagon	Other motor vehicle	
2014-Dec-17, Wed,17:30	Snow	Turning movement	Non-fatal injury	Wet	East	Turning left	Pick-up truck	Other motor vehicle	
					West	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Mar-29, Sun,18:00	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle	
					West	Going ahead	Passenger van	Other motor vehicle	
2015-Jul-07, Tue,16:20	Clear	Rear end	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle	
					South	Turning left	Passenger van	Other motor vehicle	

					South	Turning left	Automobile, station wagon	Other motor vehicle
2015-Nov-12, Thu,11:33	Rain	Angle	P.D. only	Wet	West	Turning right	Automobile, station wagon	Other motor vehicle
					South	Stopped	Pick-up truck	Other motor vehicle
2015-Nov-26, Thu,07:45	Clear	Sideswipe	P.D. only	Wet	South	Turning left	Automobile, station wagon	Other motor vehicle
					South	Turning left	School bus	Other motor vehicle
2015-Dec-20, Sun,02:41	Clear	SMV other	P.D. only	Ice	West	Going ahead	Automobile, station wagon	Ran off road
2016-May-05, Thu,19:29	Clear	Turning movement	P.D. only	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Mar-29, Tue,17:17	Clear	Rear end	P.D. only	Dry	West	Going ahead	Automobile, station wagon	Other motor vehicle
					West	Stopped	Pick-up truck	Other motor vehicle
2016-Jul-02, Sat,00:45	Rain	Sideswipe	P.D. only	Wet	South	Overtaking	Unknown	Other motor vehicle
					South	Going ahead	Automobile, station wagon	Other motor vehicle
2013-Jan-02, Wed,13:20	Clear	Angle	P.D. only	Ice	South	Turning left	Pick-up truck	Other motor vehicle
					West	Slowing or stopping	Automobile, station wagon	Other motor vehicle

2013-Oct-25, Fri,09:20	Clear	Angle	P.D. only	Dry	West	Slowing or stopping	Delivery van	Other motor vehicle	
					South	Turning left	Passenger van	Other motor vehicle	
2013-Dec-17, Tue,14:30	Snow	Rear end	P.D. only	Slush	East	Going ahead	Pick-up truck	Other motor vehicle	
					East	Stopped	Pick-up truck	Other motor vehicle	
2012-Aug-09, Thu,19:23	Clear	Turning movement	P.D. only	Dry	North	Turning left	Automobile, station wagon	Other motor vehicle	
					South	Going ahead	Automobile, station wagon	Other motor vehicle	
2012-Nov-26, Mon,07:56	Clear	Rear end	P.D. only	Slush	South	Stopped	Automobile, station wagon	Other motor vehicle	
					South	Slowing or stopping	Automobile, station wagon	Other motor vehicle	

Location: HALTON TERR/MAXWELL BRIDGE RD @ MARCH RD

Traffic Control: Traffic signal **Total Collisions:** 13

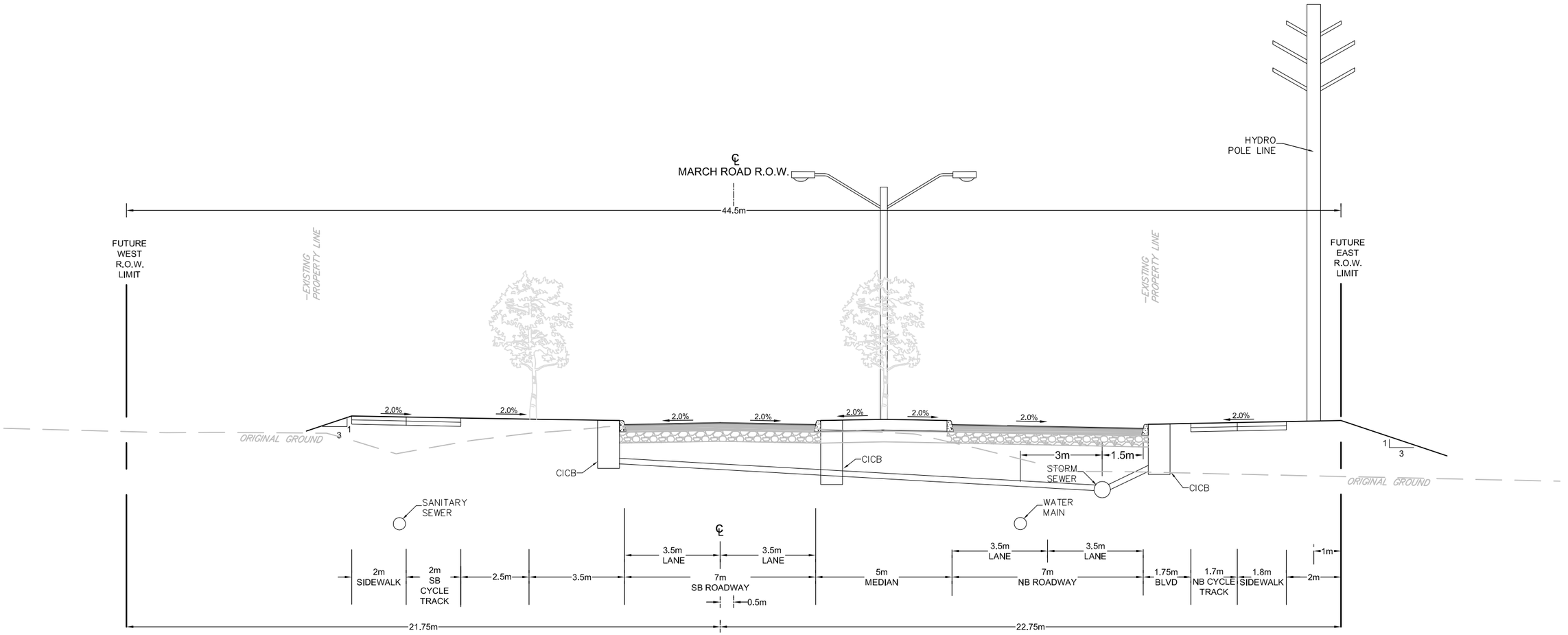
Date/Day/Time	Environment	Impact Type	Classification	Surface Cond'n	Veh. Dir	Vehicle Manoeuver	Vehicle type	First Event	No. Ped
2014-Jul-29, Tue,19:40	Clear	SMV other	P.D. only	Dry	South	Going ahead	Automobile, station wagon	Skidding/sliding	
2016-Feb-28, Sun,19:57	Freezing Rain	Turning movement	P.D. only	Ice	West	Turning left	Pick-up truck	Other motor vehicle	
					East	Going ahead	Automobile, station wagon	Other motor vehicle	
2015-Dec-13, Sun,17:23	Clear	Sideswipe	P.D. only	Dry	North	Changing lanes	Passenger van	Other motor vehicle	
					North	Going ahead	Passenger van	Other motor vehicle	

2016-Sep-30, Fri,19:32	Clear	Turning movement	Non-fatal injury	Dry	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Pick-up truck	Other motor vehicle
2016-Dec-23, Fri,10:59	Clear	Turning movement	P.D. only	Wet	South	Turning left	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Pick-up truck	Other motor vehicle
2016-Nov-24, Thu,06:47	Snow	Turning movement	Non-fatal injury	Ice	South	Turning left	Pick-up truck	Other motor vehicle
					North	Going ahead	Automobile, station wagon	Other motor vehicle
2016-Dec-05, Mon,08:23	Snow	Sideswipe	P.D. only	Loose snow	West	Changing lanes	Pick-up truck	Other motor vehicle
					West	Going ahead	Automobile, station wagon	Other motor vehicle
2013-Apr-10, Wed,15:45	Clear	Angle	P.D. only	Dry	East	Turning right	Automobile, station wagon	Other motor vehicle
					North	Going ahead	Pick-up truck	Other motor vehicle
2013-Aug-11, Sun,03:45	Clear	SMV other	P.D. only	Dry	North	Changing lanes	Unknown	Skidding/sliding
2013-Oct-01, Tue,07:47	Clear	Turning movement	Non-fatal injury	Dry	South	Going ahead	Automobile, station wagon	Other motor vehicle
					North	Turning left	Automobile, station wagon	Other motor vehicle
2012-Jan-15, Sun,06:30	Clear	SMV other	P.D. only	Ice	East	Turning right	Automobile, station wagon	Snowbank/drift

2012-May-29, Tue,16:07	Clear	Rear end	P.D. only	Wet	North	Slowing or stopping	Automobile, station wagon	Other motor vehicle	
					North	Going ahead	Automobile, station wagon	Other motor vehicle	
2012-Jul-24, Tue,15:30	Clear	SMV other	Non-fatal injury	Dry	West	Turning left	Pick-up truck	Pedestrian	2

APPENDIX E

KNUEA Cross Sections



KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 24

MARCH ROAD - INTERIM
CROSS SECTION

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

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SHT11x17.DWG - 279mmx432mm

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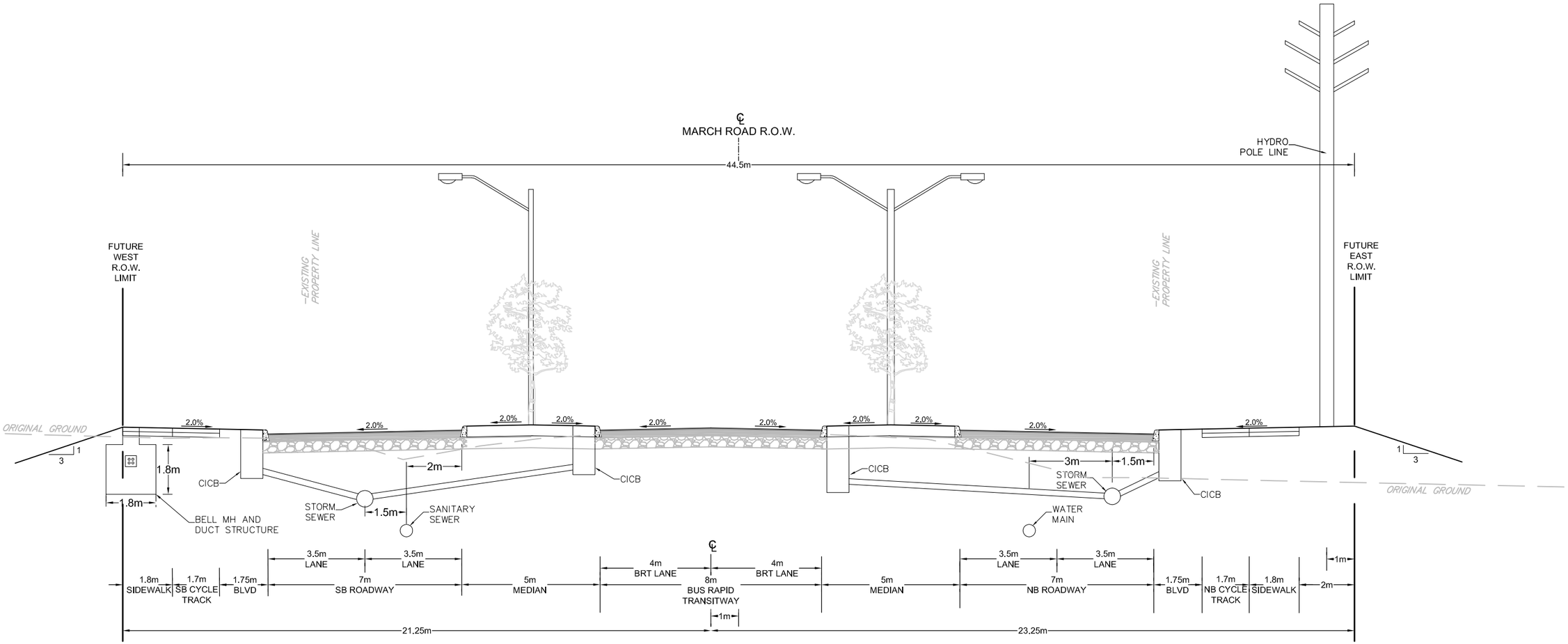

KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 25
MARCH ROAD - ULTIMATE
CROSS SECTION

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

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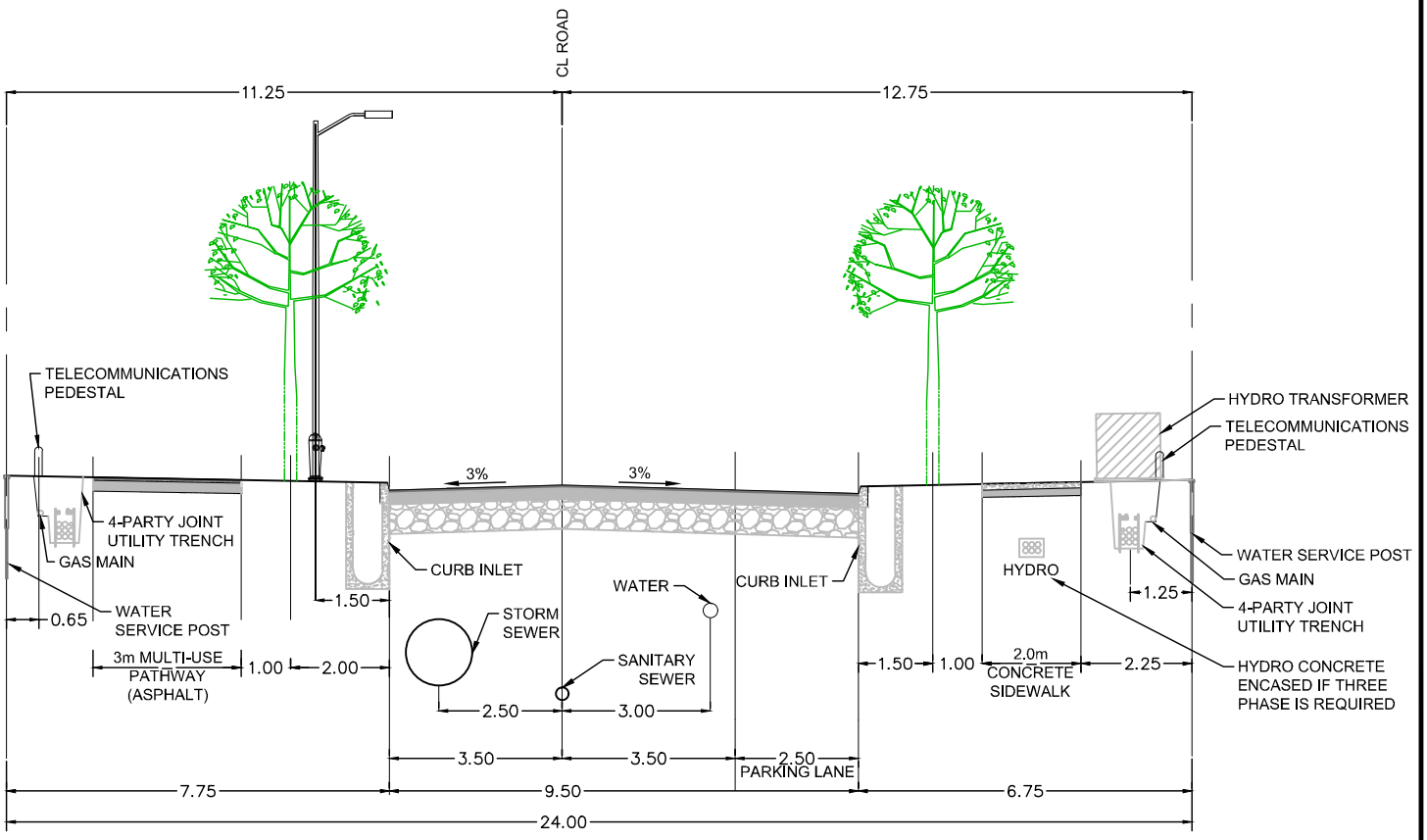
SHT11x17.DWG - 279mmx432mm



KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 26
COLLECTOR ROAD -
TYPICAL CROSS SECTION 1

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

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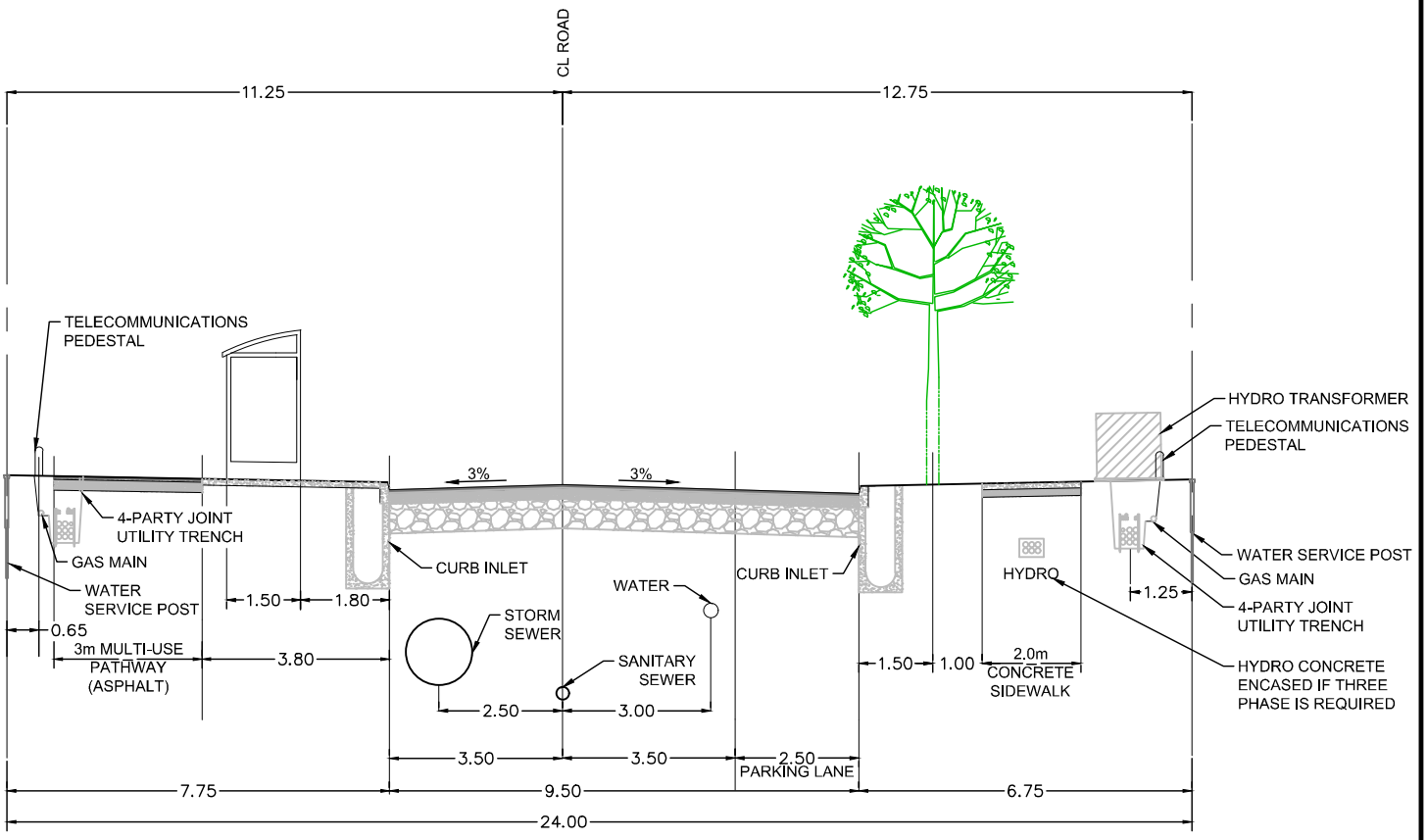

NOTES:

AT THE TIME OF PLAN OF SUBDIVISION OR SITE PLAN CONTROL WHEN BUS STOPS ARE IDENTIFIED, AT THESE LOCATIONS ON THE SIDEWALK SIDE OF THE STREET, THE SIDEWALK SHOULD BE RELOCATED TO BE ADJACENT TO THE CURB AND A BUS PAD (1.55m IN WIDTH), IF DETERMINED TO BE IMPLEMENTED, SHALL BE TO THE REAR OF THE SIDEWALK.

KANATA NORTH
COMMUNITY DESIGN PLAN

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

FIGURE NO. 27
COLLECTOR ROAD -
TYPICAL CROSS SECTION 1
(WITH BUS STOP)

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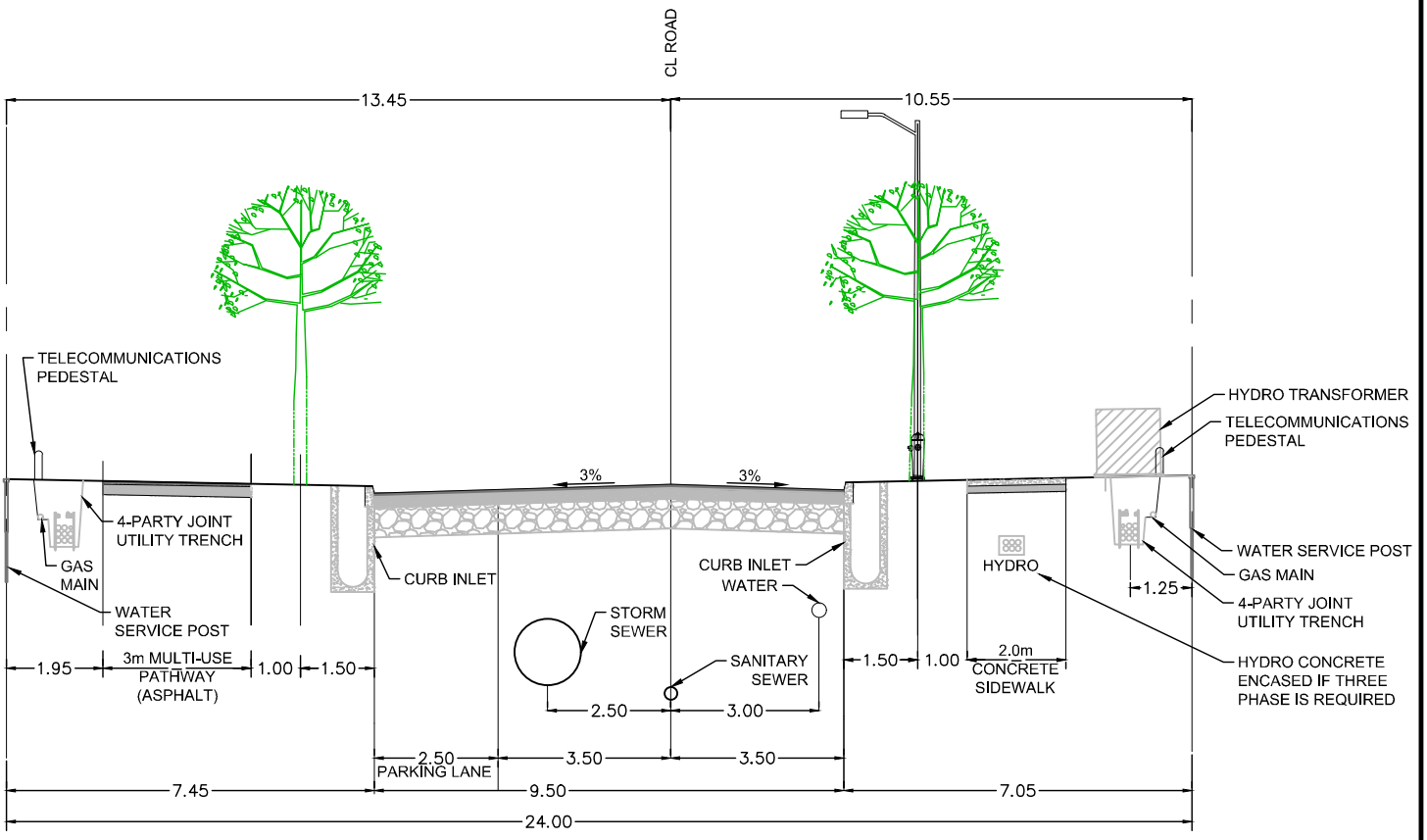

KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 28
COLLECTOR ROAD -
TYPICAL CROSS SECTION 2

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

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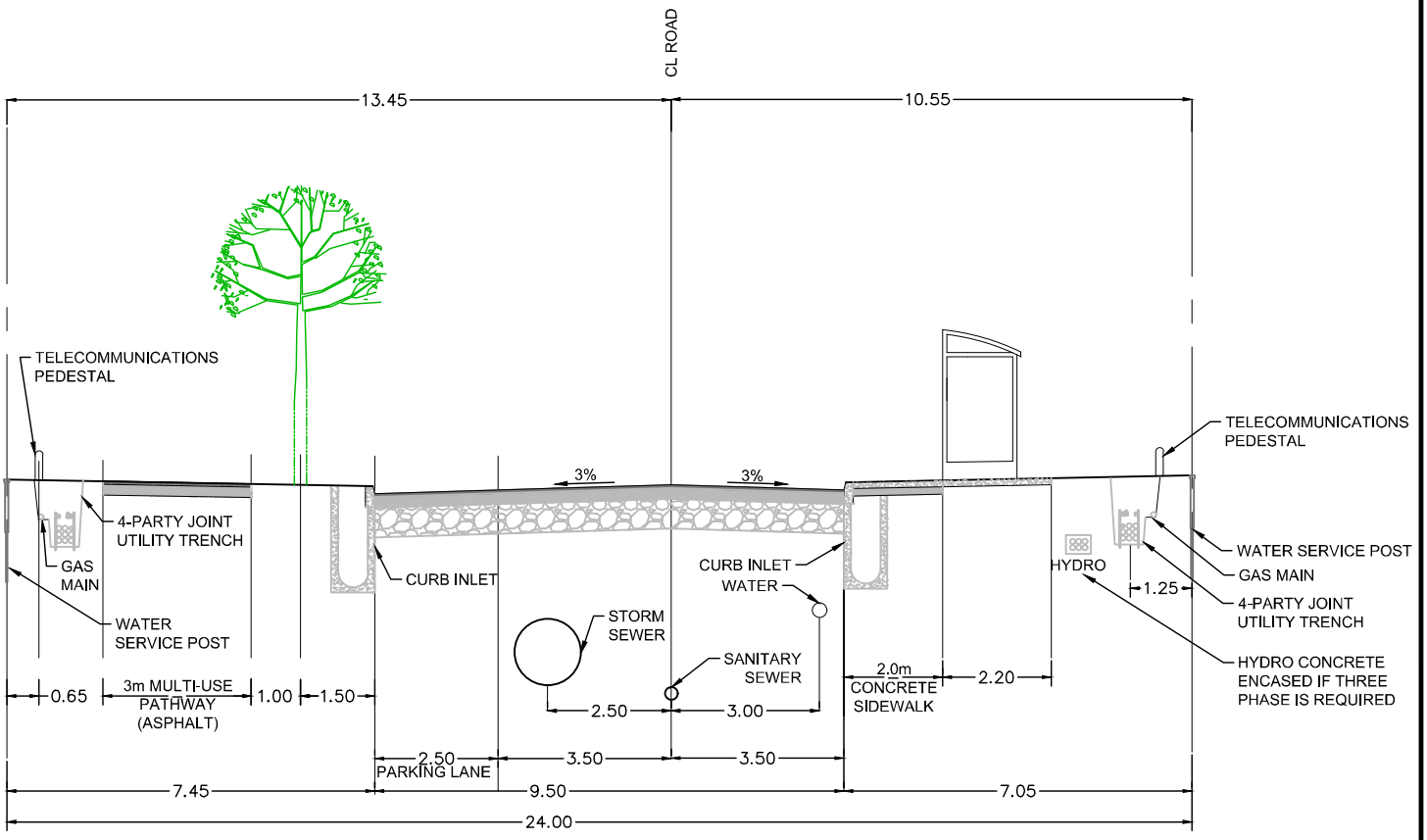

NOTES:

AT THE TIME OF PLAN OF SUBDIVISION OR SITE PLAN CONTROL WHEN BUS STOPS ARE IDENTIFIED, AT THESE LOCATIONS ON THE MULTI-USE PATHWAY SIDE OF THE STREET, BUS PLATFORMS (1.80m IN WIDTH) WILL BE PLANNED/IMPLEMENTED ADJACENT TO THE CURB.

KANATA NORTH
COMMUNITY DESIGN PLAN

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

FIGURE NO. 29
COLLECTOR ROAD -
TYPICAL CROSS SECTION 2
(WITH BUS STOP)

NOVATECH
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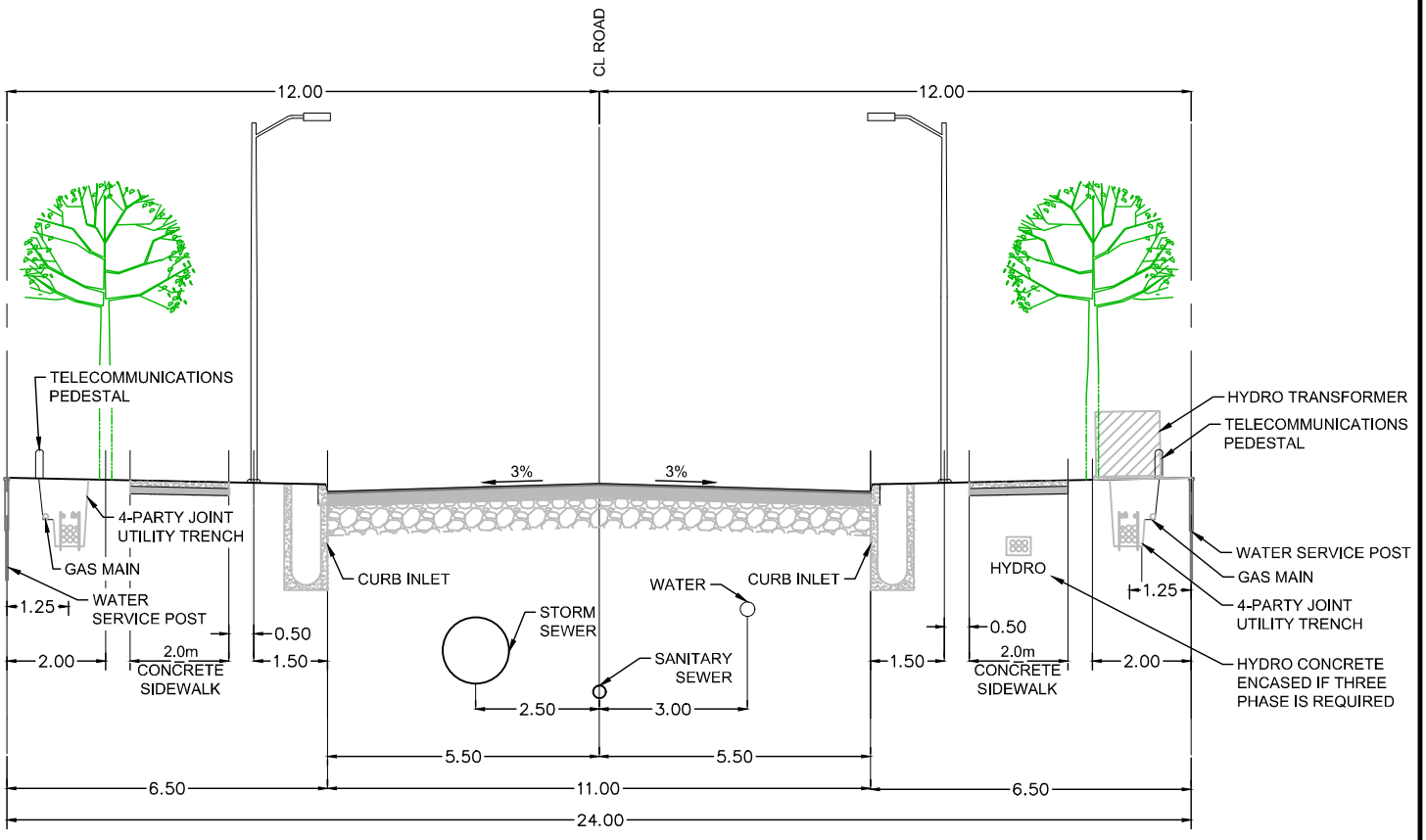


KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 30
MIDBLOCK COLLECTOR ROAD
- TYPICAL CROSS SECTION

DATE
JUN 2016

JOB
112117

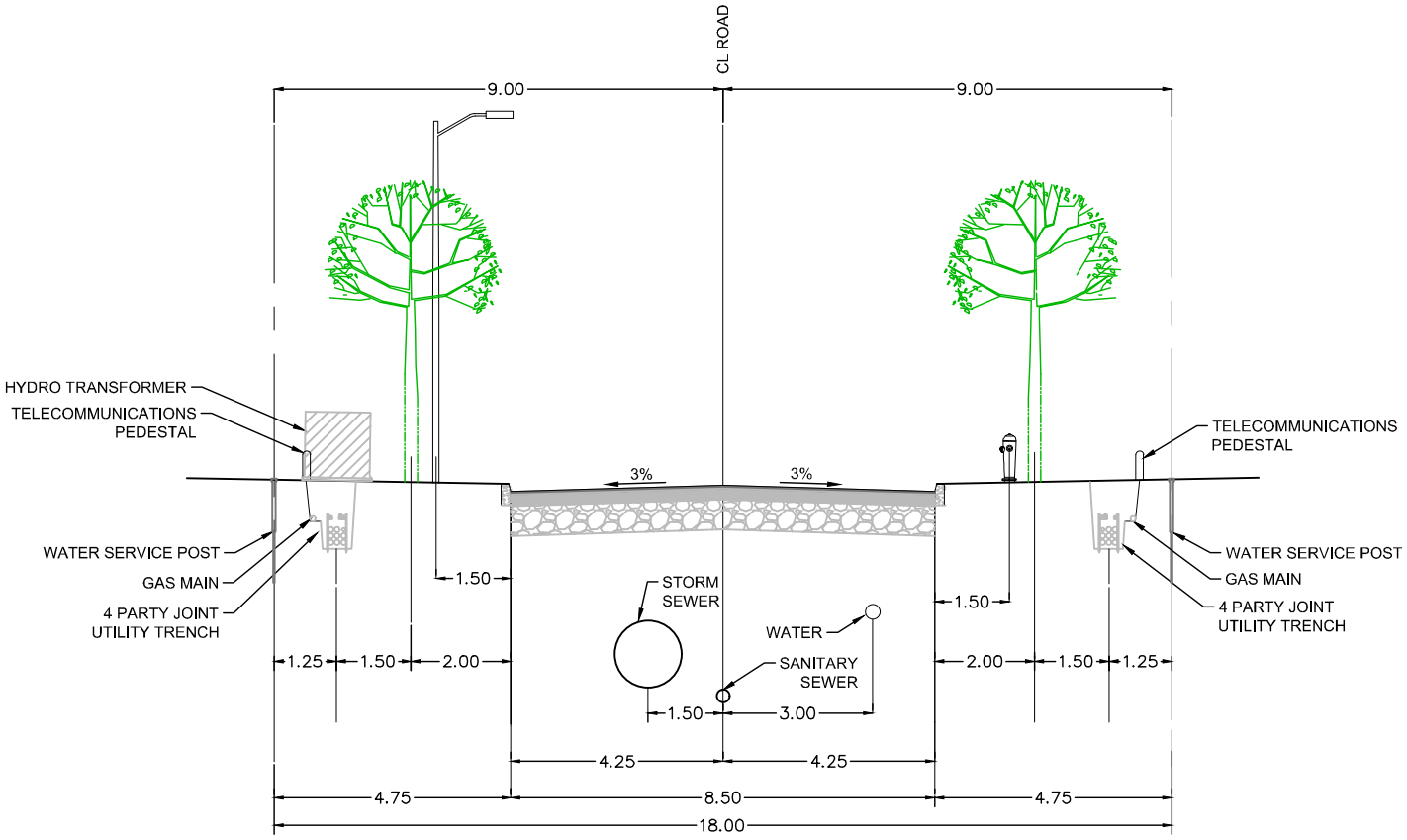
SCALE
1:150

0 1m 2m 4m

NOVATECH
Engineers, Planners & Landscape Architects

M:\2012\112117\CAD\Design\Figures\Traffic\TMP\FINAL\112117 - FIG-24mROW-MUP (1-150).dwg, MIDBLOCK COLLECTOR (TMP), Mar 28, 2016 - 1:29pm, tbrooks

SHT8x11.DWG - 216mmx279mm



KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 31
LOCAL ROAD
- TYPICAL 18m ROW
CROSS SECTION

DATE
JUN 2016

JOB
112117

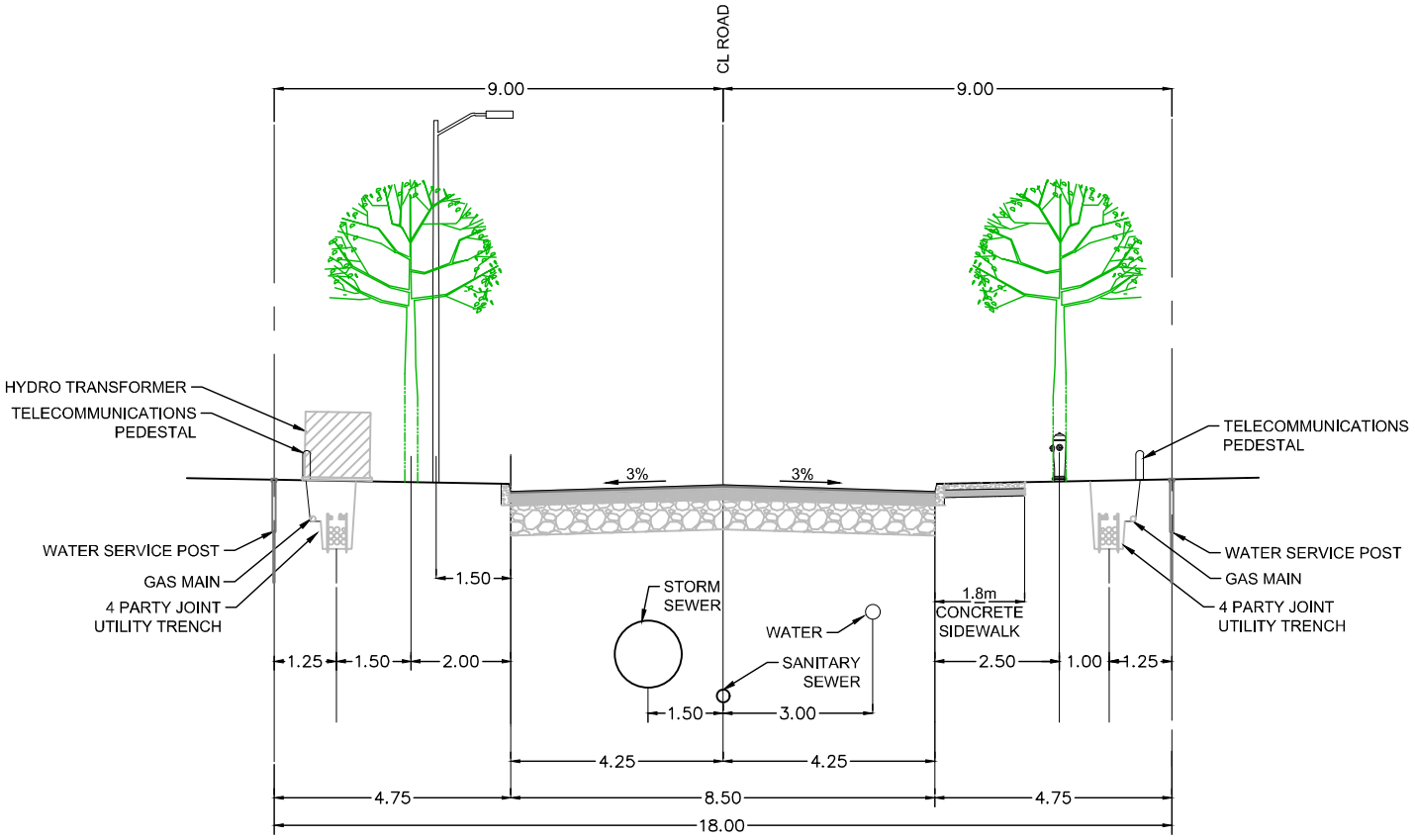
SCALE
1:150

0 1m 2m 4m

NOVATECH
Engineers, Planners & Landscape Architects

M:\2012\112117\CAD\Design\Figures\Traffic\TMP\FINAL\112117 - FIG-18m-LOCAL (1-150).dwg, LOCAL (TMP), Mar 28, 2016 - 12:11pm, tbrooks

SHT8x11.DWG - 216mmx279mm



KANATA NORTH
COMMUNITY DESIGN PLAN

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

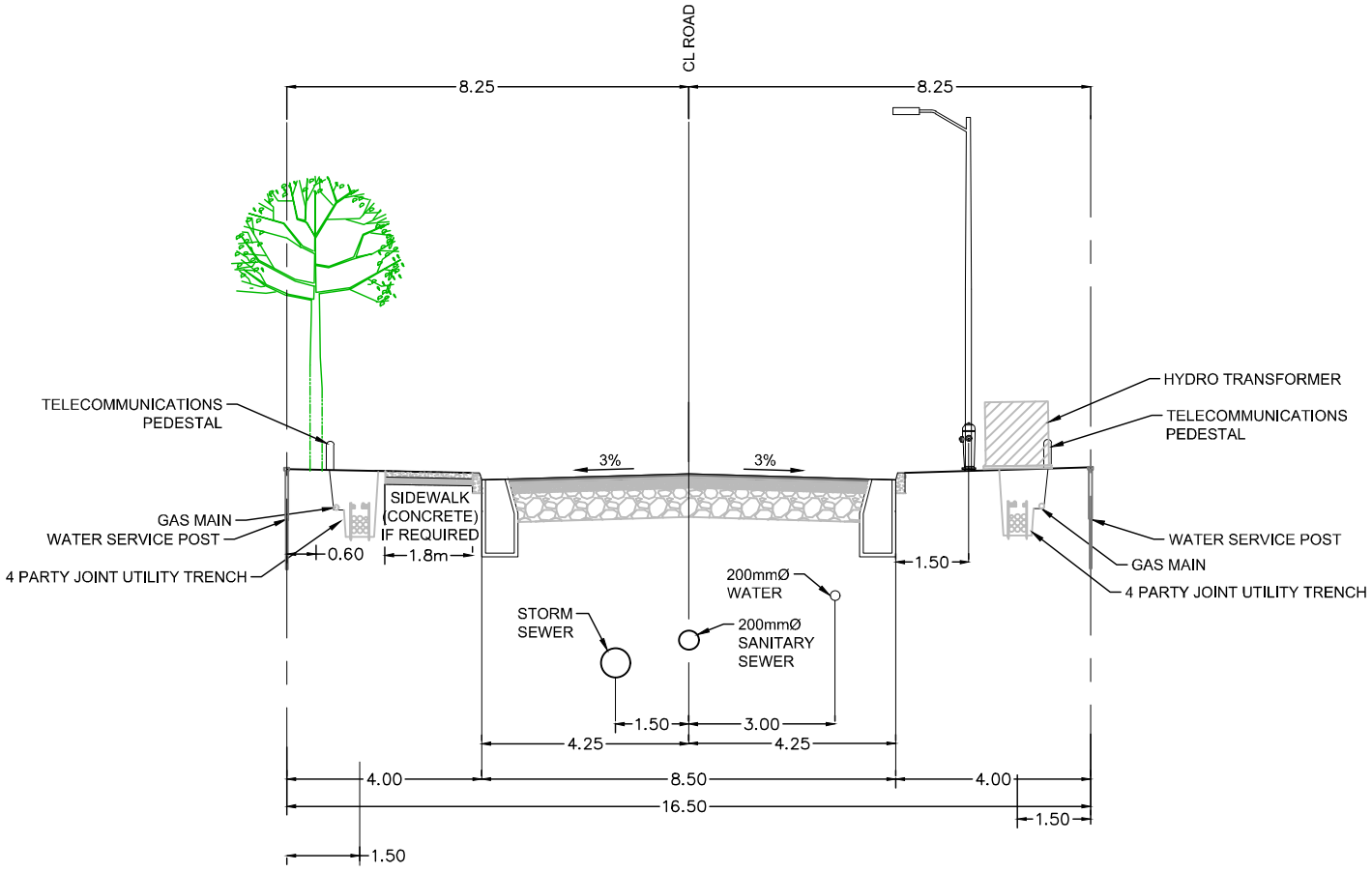
FIGURE NO. 32

LOCAL ROAD
- TYPICAL 18m ROW CROSS SECTION WITH SIDEWALK

NOVATECH
Engineers, Planners & Landscape Architects

M:\2012\112117\CAD\Design\Figures\Traffic\TMP\FINAL\112117 - FIG-18m-LOCAL (1-150).dwg, LOCAL SW (TMP), Mar 28, 2016 - 12:11pm, tbrooks

SHT8x11.DWG - 216mmx279mm



NOTES:

FOR SINGLE LOADED ROAD, BOULEVARD WITH NO HOUSING MAY BE REDUCED TO A MINIMUM OF 1.5m. HOUSING AND TREES TO BE LOCATED ON OPPOSITE SIDES OF THE STREET.

KANATA NORTH

COMMUNITY DESIGN PLAN

DATE
JUN 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

FIGURE NO. 33

LOCAL ROAD
- TYPICAL 16.5m ROW
CROSS SECTION

NOVATECH
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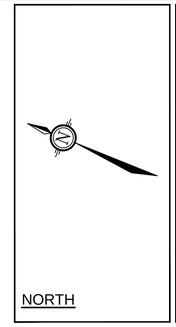
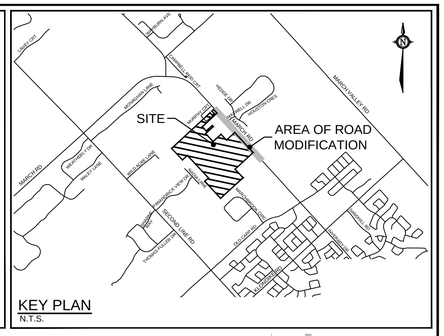
M:\2012\112117\CAD\Design\Figures\Traffic\TMP\FINAL\112117 - FIG-18m-LOCAL (1-150).dwg, WINDOW STRT (TMP), Mar 28, 2016 - 12:11pm, tbrooks

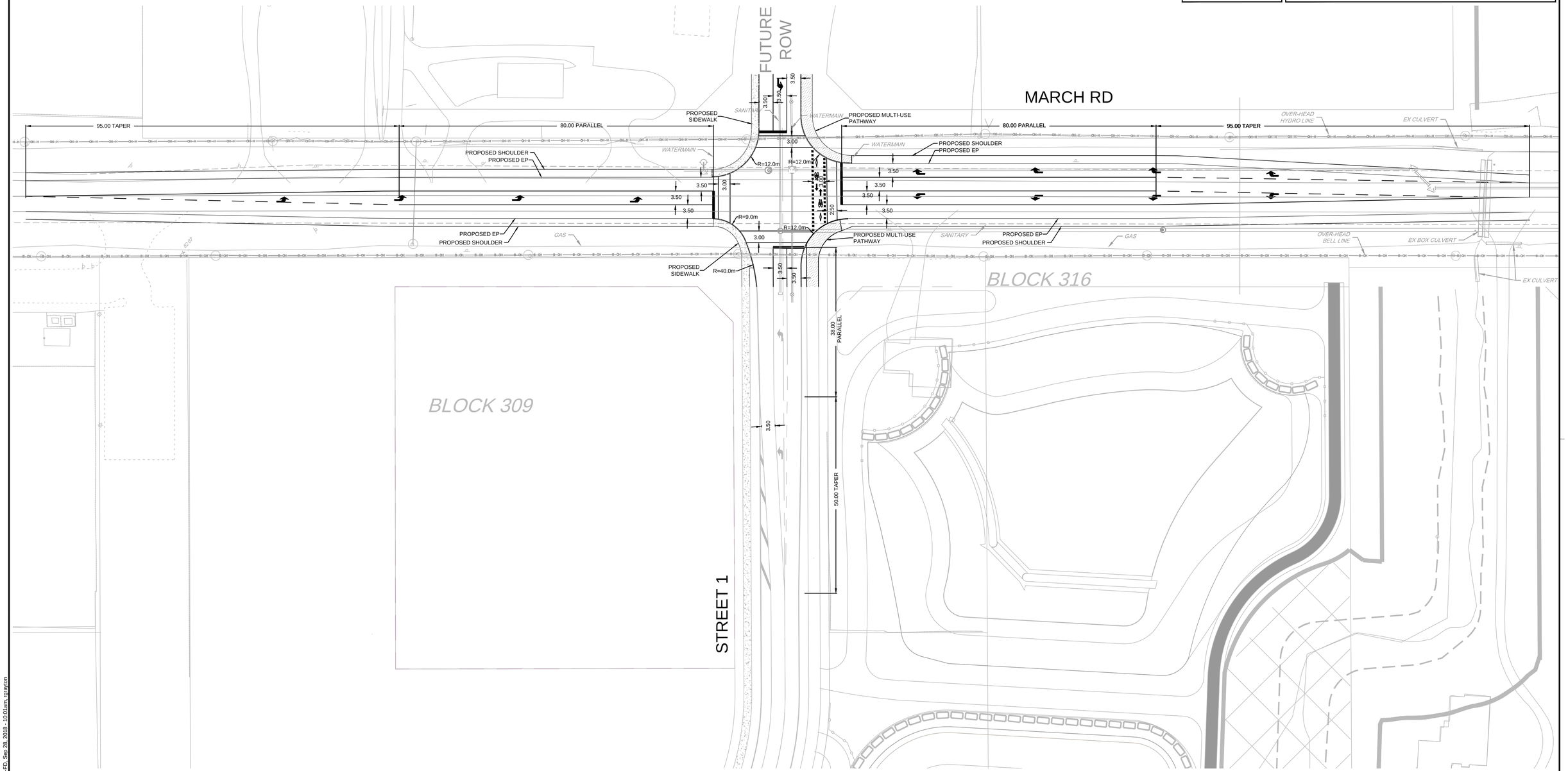
SHT8x11.DWG - 216mmx279mm

APPENDIX F

Functional Design







NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
1.	ISSUED FOR CITY OF OTTAWA REVIEW	SEPT 28/18	BJB

SCALE
1:500
1:500
0 5 10 15 20

DESIGN BJB
CHECKED JLL
DRAWN RCH
CHECKED BJB
APPROVED JLL

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

LOCATION
CITY of OTTAWA
MULTIVESCO LANDS - KANATA NORTH

DRAWING NAME
MARCH ROAD/STREET 1
MODIFICATIONS
FUNCTIONAL DESIGN

PROJECT No. 116132-00
REV REV # 1
DRAWING No. 116132-FD

M:\2016\116132\CAD\Design\116132-FD.dwg, 116132-RMA-FD, Sep 28, 2018 - 10:01am, rgraydon

APPENDIX G

Relevant Excerpts from the City of Ottawa DC By-law

TABLE 2

City of Ottawa

Amended Area-Specific Development Charge Projects

Service Component - Roads and Related Services

Item	Summary of Timing by Year(s) 2017-2031	Increased Service Needs Attributable to Anticipated Development - 2017-2031 Project Description	Adjusted Gross Capital Cost $000		Less			Growth Cost $000	61% Residential Share $000	39% Non-residentia Share $000	Allocation of Expenditures by Area		
				Benefit to Existing Development %	Benefit to Existing Development $000	Grants, Subsidies & Contributions $000	Post Period Capacity $000				0% Inside Greenbelt $000	98% Outside Greenbelt $000	2% Rural $000
1.XXX17	2020	Terry Fox Drive @ Cope Road	950	0%	-	-	-	950	693	257	0	931	19
1.XXX18	2021	Fernbank Road @ Street #1 (CRT draft plan)	950	0%	-	-	-	950	693	257	0	931	19
1.XXX04	2017	Shea Road @ Collector Road South of Fernbank Road	950	0%	-	-	-	950	693	257	0	931	19
1.XXXS6	2023	March Road @ Maxwell Road	950	0%	-	-	-	950	693	257	0	931	19
1.XXX20	2023	March Road and Kanata North Street No. 1	950	0%	-	-	-	950	693	257	0	931	19
1.XXXU6	2023	March Road and Kanata North Street No. 2	950	0%	-	-	-	950	693	257	0	931	19
1.XXXV6	2024	Terry Fox Drive @ Street No. 1	950	0%	-	-	-	950	693	257	0	931	19
		Multi-use Pathway Construction											
		West Urban Community											
1.OMB1	2017	Terry Fox Drive to Fernbank Road - Multi-Use Pathway	250	0%	-	-	-	250	183	68	0	245	5
1.OMB2	2017	Fernbank Road and Terry Fox Drive - Multi-use Pathway	2,500	0%	-	-	-	2,500	1,825	675	0	2,450	50
		South Area											
1.XXX21	2017	Earl Armstrong Road @ Collector D / Metro Site	950	0%	-	-	-	950	684	266	0	931	19
1.XXXB4	2023	Earl Armstrong Road @ Collector C	950	0%	-	-	-	950	684	266	0	931	19
1.XXXC4	2022	Earl Armstrong Road @ Collector E	950	0%	-	-	-	950	684	266	0	931	19
1.XXXD4	2017	Earl Armstrong Road @ Collector B	950	0%	-	-	-	950	684	266	0	931	19
1.XXX22	2020	Chapman Mills @ Strandherd	950	0%	-	-	-	950	684	266	0	931	19
1.XXX23	2017	Jockvale @ Golf Links South	950	0%	-	-	-	950	684	266	0	931	19
1.XXXG4	2023	Cambrian Road @ Tuscana Way	950	0%	-	-	-	950	684	266	0	931	19
1.XXX24	2019	Limebank @ Riverside Main Street	950	0%	-	-	-	950	684	266	0	931	19
1.XXX25	2017	River Road @ Summerhill (future collect. 1)	950	0%	-	-	-	950	684	266	0	931	19
1.XXX26	2021	River Road @ Borbridge (future collect. 2)	950	0%	-	-	-	950	684	266	0	931	19
1.XXXM4	2020	River Road @ Future Collector J	950	0%	-	-	-	950	684	266	0	931	19
1.XXX27	2018	Kelly Farm Drive @ Leitrim Road	950	0%	-	-	-	950	684	266	0	931	19
1.XXX28	2017	Street No. 12 (Blais Road) @ Bank Street (Remer draft plan)	950	0%	-	-	-	950	684	266	0	931	19
1.XXX29	2019	Street No. 2 (Remer Draft Plan) @ Bank Street	950	0%	-	-	-	950	684	266	0	931	19
1.XXX30	2017	Findlay Creek Drive @ Bank Street (Area 9A, OPA76) (upgrade to a 4-way intersection)	950	0%	-	-	-	950	684	266	0	931	19
1.XXX31	2017	Rotary Way @ Bank Street (upgrade to a 4-way intersction)	950	0%	-	-	-	950	684	266	0	931	19
1.XXXS4	2024	Jockvale Road @ Kilspindie Ridge	950	0%	-	-	-	950	684	266	0	931	19
		East Area											
1.XXX32	2020	Belcourt @ Eastboro	950	0%	-	-	-	950	598	352	0	931	19
1.XXX33	2018	Belcourt @ Renaud	950	0%	-	-	-	950	598	352	0	931	19
1.XXX34	2019	Belcourt @ Navan	950	0%	-	-	-	950	598	352	0	931	19
1.XXXD5	2020	Navan Road @ Street 1	950	0%	-	-	-	950	598	352	0	931	19
1.XXXE5	2019	Navan Road @ Street 2	950	0%	-	-	-	950	598	352	0	931	19
1.XXX35	2022	Belcourt @ Vanguard	950	0%	-	-	-	950	598	352	0	931	19
1.XXX36	2018	BHBP (Brian Coburn) @ Int. 1 (Gerry Lalonde)	2,000	0%	-	-	-	2,000	1,260	740	0	1,960	40
1.XXX37	2017	BHBP (Brian Coburn) @ Int. 2 (Strasbourg)	2,000	0%	-	-	-	2,000	1,260	740	0	1,960	40

APPENDIX H

Access Intersection MMLOS Analysis

Pedestrian Level of Service (PLOS)

Criteria	North Approach		South Approach		East Approach		West Approach	
March Road/Street 1								
PETSI SCORE								
CROSSING DISTANCE CONDITIONS								
Median > 2.4m in Width	No	105	No	88	No	105	No	105
Lanes Crossed (3.5m Lane Width)	3		4		3		3	
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	> 5m to 10m	-5	> 5m to 10m	-5	> 5m to 10m	-5	> 15m to 25m	-8
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		**71**		**54**		**71**		**68**
LOS		**C**		**D**		**C**		**C**
DELAY SCORE								
Cycle Length		90		90		90		90
Pedestrian Walk Time		24.4		20.4		31.4		28.4
DELAY SCORE		**23.9**		**26.9**		**19.1**		**21.1**
LOS		**C**		**C**		**B**		**C**
OVERALL		**C**		**D**		**C**		**C**

Note: Assumed cycle length of 90 seconds; pedestrian walk, don't walk, amber and red times were developed using criteria in OTM Book 12

Bicycle Level of Service (BLOS)

Approach	Bikeway Facility Type	Criteria	Travel Lanes and/or Speed[1]	BLOS
March Road/Street 1				
North Approach	Paved Shoulder	Right Turn Lane Characteristics	No Impact on LTS	A
		Left Turn Accommodation	No Left Turn	-
South Approach	Paved Shoulder	Right Turn Lane Characteristics	Right Turn Lane to the Left of Paved Shoulder	-
		Left Turn Accommodation	Two-Stage, Left Turn	A
East Approach	Multi-use Pathway	Right Turn Lane Characteristics	No Impact on LTS	-
		Left Turn Accommodation	Two-Stage, Left Turn	A
West Approach	Multi-use Pathway	Right Turn Lane Characteristics	No Impact on LTS	-
		Left Turn Accommodation	Two-Stage, Left Turn	A

1. Operating Speed based on Posted Speed Limit

Transit Level of Service (TLOS)

March Road, north of Halton Terrace/Maxwell Bridge Road is not currently identified as a Transit Priority Corridor, and does not have a target TLOS.

Truck Level of Service (TkLOS)

Approach	Effective Corner Radius (m)	Number of Receiving Lanes on Departure from Intersection	LOS
March Road/Street 1			
North Approach	> 15m	1	C
South Approach	< 10m	1	F
East Approach	< 10m	1	F
West Approach	< 10m	1	F

Auto LOS

Intersection capacity analysis for the interim condition prior to the widening of March Road was conducted in section 10.5 of the KNUEA CDP TMP. Based on the interim analysis, approximately 1,650 residential units can be constructed within the KNUEA without any adverse effect on the existing two-lane March Road.

MMLOS Summary Table

	Intersection	March Road/Street 1			
		North	South		West
Pedestrian	Median > 2.4m in Width	No	No	No	No
	Lanes	Three	Four	Three	Three
	Conflicting Left Turns	Permissive	Permissive	Permissive	Permissive
	Conflicting Right Turns	Permissive	Permissive	Permissive	Permissive
	Right Turn on Red	Allowed	Allowed	Allowed	Allowed
	Ped Leading Interval	No	No	No	No
	Parallel Radius	>5m to 10m	>5m to 10m	>5m to 10m	>10m to 25m
	Parallel Channel	No Channel	No Channel	No Channel	No Channel
	Perpendicular Radius	N/A	N/A	N/A	N/A
	Perpendicular Channel	N/A	N/A	N/A	N/A
	Crosswalk Type	Standard	Standard	Standard	Standard
	PETSI Score	71	54	71	68
	Delay Score	23.9	26.9	19.1	21.1
	Level of Service	C	D	C	C
		D			
	Target	C			
Cyclist	Type of Bikeway	Paved Shoulder	Paved Shoulder	Multi-Use Pathway	Multi-Use Pathway
	Turning Speed	≤25km/hr	≤25km/hr	≤25km/hr	≤25km/hr
	Right Turn Storage	N/A	80m	N/A	N/A
	Dual Right Turn Lanes	No	No	No	No
	Shared Through-Right Lane	Yes	No	Yes	Yes
	Bike Box/Two-Stage	Yes	Yes	Yes	Yes
	Lanes Crossed for Left Turns	None	None	None	None
	Dual Left Turn Lanes	No	No	No	No
	Approach Speed	80km/hr	80km/hr	40km/hr	40km/hr
	Level of Service	A	A	A	A
		A			
	Target	C			
Transit	Average Signal Delay	N/A	N/A	N/A	N/A
	Level of Service	-	-	-	-
		-			
	Target	-			
Truck	Turning Radius	>15m	< 10m	< 10m	< 10m
	Receiving Lanes	One	One	One	One
	Level of Service	C	F	F	F
		F			
	Target	D			
Auto	Level of Service	D (or Better)			
	Target	D			

APPENDIX I

Transportation Demand Management Checklist

TDM Measures Checklist:
Residential Developments (multi-family, condominium or subdivision)

Legend

BASIC — The measure is generally feasible and effective, and in most cases would benefit the development and its users

BETTER — The measure could maximize support for users of sustainable modes, and optimize development performance

★ — The measure is one of the most dependably effective tools to encourage the use of sustainable modes

		TDM measures: *Residential developments*	Check if proposed & add descriptions
	1.	**TDM PROGRAM MANAGEMENT**	
	1.1	**Program coordinator**	
BASIC ★	1.1.1	Designate an internal coordinator, or contract with an external coordinator	☒
	1.2	**Travel surveys**	
BETTER	1.2.1	Conduct periodic surveys to identify travel-related behaviours, attitudes, challenges and solutions, and to track progress	☒
	2.	**WALKING AND CYCLING**	
	2.1	**Information on walking/cycling routes & destinations**	
BASIC	2.1.1	Display local area maps with walking/cycling access routes and key destinations at major entrances *(multi-family, condominium)*	☒ N/A
	2.2	**Bicycle skills training**	
BETTER	2.2.1	Offer on-site cycling courses for residents, or subsidize off-site courses	☒

			TDM measures: *Residential developments*	Check if proposed & add descriptions
		3.	**TRANSIT**	
		3.1	**Transit information**	
BASIC		3.1.1	Display relevant transit schedules and route maps at entrances *(multi-family, condominium)*	☒ N/A
BETTER		3.1.2	Provide real-time arrival information display at entrances *(multi-family, condominium)*	☒ N/A
		3.2	**Transit fare incentives**	
BASIC	★	3.2.1	Offer PRESTO cards preloaded with one monthly transit pass on residence purchase/move-in, to encourage residents to use transit	☒
BETTER		3.2.2	Offer at least one year of free monthly transit passes on residence purchase/move-in	☒
		3.3	**Enhanced public transit service**	
BETTER	★	3.3.1	Contract with OC Transpo to provide early transit services until regular services are warranted by occupancy levels *(subdivision)*	☑
		3.4	**Private transit service**	
BETTER		3.4.1	Provide shuttle service for seniors homes or lifestyle communities (e.g. scheduled mall or supermarket runs)	☒ N/A
		4.	**CARSHARING & BIKESHARING**	
		4.1	**Bikeshare stations & memberships**	
BETTER		4.1.1	Contract with provider to install on-site bikeshare station (*multi-family)*	☒ N/A
BETTER		4.1.2	Provide residents with bikeshare memberships, either free or subsidized *(multi-family)*	☒ N/A
		4.2	**Carshare vehicles & memberships**	
BETTER		4.2.1	Contract with provider to install on-site carshare vehicles and promote their use by residents	☒
BETTER		4.2.2	Provide residents with carshare memberships, either free or subsidized	☒
		5.	**PARKING**	
		5.1	**Priced parking**	
BASIC	★	5.1.1	Unbundle parking cost from purchase price *(condominium)*	☒ N/A
BASIC	★	5.1.2	Unbundle parking cost from monthly rent *(multi-family)*	☒ N/A

TDM measures: *Residential developments*				Check if proposed & add descriptions
		6.	**TDM MARKETING & COMMUNICATIONS**	
		6.1	**Multimodal travel information**	
BASIC	★	6.1.1	Provide a multimodal travel option information package to new residents	☒
		6.2	**Personalized trip planning**	
BETTER	★	6.2.1	Offer personalized trip planning to new residents	☒

APPENDIX J

Study Area Intersection MMLOS Analysis

Pedestrian Level of Service (PLOS)

March Road/Halton Terrace/Maxwell Bridge Road

CRITERIA	North Approach		South Approach		East Approach		West Approach	
PETSI SCORE								
CROSSING DISTANCE CONDITIONS								
Median > 2.4m in Width	No	23	No	23	No	88	No	88
Lanes Crossed (3.5m Lane Width)	8		8		4		4	
SIGNAL PHASING AND TIMING								
Left Turn Conflict	Permissive	-8	Permissive	-8	Perm + Prot	-8	Perm + Prot	-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	> 15m to 25m	-8	> 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		**-12**		**-12**		**51**		**53**
LOS		**F**		**F**		**D**		**D**
DELAY SCORE								
Cycle Length		120		120		120		120
Pedestrian Walk Time		13.4		13.4		27.4		27.4
DELAY SCORE		**47.3**		**47.3**		**35.7**		**35.7**
LOS		**E**		**E**		**D**		**D**
OVERALL		**F**		**F**		**D**		**D**

March Road/Dunrobin Road

Located in the General Rural Area, No target PLOS.

Bicycle Level of Service (BLOS)

Approach	Bikeway Facility Type	Criteria	Travel Lanes and/or Speed[1]	BLOS
March Road/Halton Terrace/Maxwell Bridge Road				
North Approach	Pocket Bike Lanes	Right Turn Lane Characteristics	Right turn lane to he right of pocket bike lane ≤ 50m	B
		Left Turn Accommodation	Two lanes crossed; ≥ 50km/hr	F
South Approach	Pocket Bike Lanes	Right Turn Lane Characteristics	Right turn lane to the right of pocket bike lane ≤ 50m	B
		Left Turn Accommodation	Two lanes crossed; ≥ 50km/hr	F
East Approach	Mixed Traffic	Right Turn Lane Characteristics	Shared Through/Right Turn Lane	A
		Left Turn Accommodation	One lane crossed; 50km/hr	D
West Approach	Mixed Traffic	Right Turn Lane Characteristics	Shared Through/Right Turn Lane	A
		Left Turn Accommodation	One lane crossed; 40km/hr	B
March Road/Dunrobin Road				
North Approach	Paved Shoulder	Right Turn Lane Characteristics	No impact to LTS	A
		Left Turn Accommodation	Dual Left Turn Lanes	F
East Approach	Paved Shoulder	Right Turn Lane Characteristics	No impact to LTS	A
		Left Turn Accommodation	No left turn movement	-
West Approach	Paved Shoulder	Right Turn Lane Characteristics	No impact to LTS	A
		Left Turn Accommodation	One lane crossed; ≥ 60km/hr	E

1. Operating Speed based on Posted Speed Limit

Transit Level of Service (TLOS)

Based on the existing traffic analysis presented in the KNUEA CDP TMP, the delay on the northbound and southbound approaches is described as follows:

- Northbound: 9 seconds (AM Peak) and 10 seconds (PM Peak)
- Southbound: 11 seconds (AM Peak) and 11 seconds (PM Peak)

Based on the foregoing, Exhibit 16 in the MMLOS guidelines suggests this intersection is operating with a TLOS C.

Truck Level of Service (TkLOS)

Approach	Effective Corner Radius (m)	Number of Receiving Lanes on Departure from Intersection	LOS
March Road/Halton Terrace/Maxwell Bridge Road			
North Approach	10m to 15m	1	E
South Approach	> 15m	1	C
East Approach	10m to 15m	2	B
West Approach	10m to 15m	2	B
March Road/Dunrobin Road			
North Approach	> 15m	1	C
East Approach	> 15m	1	C
West Approach	N/A	N/A	N/A

Auto LOS

Intersection capacity analysis for the existing traffic condition was completed in the KNUEA CDP TMP. The existing operations at the study area intersections are depicted in Table 1 (Pages 4-5) of the existing conditions report, attached in Appendix A of Volume 2 of the KNUEA CDP TMP. For ease of read, the existing operations at the study area intersections are summarized in the following table.

Auto LOS Analysis – Existing

Intersection	AM Peak			PM Peak		
	Max V/C	LOS	Mvmt	Max V/C	LOS	Mvmt
March Road/Halton Terrace/ Maxwell Bridge Road	0.63	B	WBL	0.55	A	WBT/R
March Road/Dunrobin Road	0.61	B	SBL/R	0.64	B	WBR

MMLOS Summary Table

	Intersection	March Road/Halton Terrace/Maxwell Bridge Road				March Road/Dunrobin Road		
		North	South	East	West	North	South	West
Pedestrian	Median > 2.4m in Width	No	No	No		-	-	-
	Lanes (3.5m lane width)	Eight	Eight	Four	Four	-	-	-
	Conflicting Left Turns	Permissive	Permissive	Permitted and Protected	Permitted and Protected	-	-	-
	Conflicting Right Turns	Permissive	Permissive	Permissive	Permissive	-	-	-
	Right Turn on Red	Allowed	Allowed	Allowed	Allowed	-	-	-
	Ped Leading Interval	No	No	No	No	-	-	-
	Parallel Radius	>10m to 15m	>10m to 15m	>15m to 25m	>10m to 15m	-	-	-
	Parallel Channel	No Right Turn Channel	No Right Turn Channel	No Right Turn Channel	No Right Turn Channel	-	-	-
	Perpendicular Radius	N/A	N/A	N/A	N/A	-	-	-
	Perpendicular Channel	N/A	N/A	N/A	N/A	-	-	-
	Crosswalk Type	Standard	Standard	Standard	Standard	-	-	-
	PETSI Score	-12	-12	51	53	-	-	-
	Delay Score	47.3	47.3	35.7	35.7	-	-	-
	Level of Service	F	F	D	D	-	-	-
		F				-		
	Target	C				-		
Cyclist	Type of Bikeway	Pocket Bike Lanes	Pocket Bike Lanes	Mixed Traffic	Mixed Traffic	Paved Shoulder	Paved Shoulder	Mixed Traffic
	Turning Speed	≤25km/hr	≤25km/hr	≤25km/hr	≤25km/hr	≤25km/hr	≤25km/hr	≤25km/hr
	Right Turn Storage	<50m	<50m	N/A	N/A	N/A	<50m	N/A
	Dual Right Turn Lanes	No	No	No	No	No	No	No
	Shared Through-Right Lane	No	No	Yes	Yes	Yes	No	No
	Bike Box/Two-Stage	No	No	No	No	No	No	No
	Lanes Crossed for Left Turns	Two	Two	One	One	None	N/A	One
	Dual Left Turn Lanes	No	No	No	No	Yes	No	No
	Approach Speed	80km/hr	80km/hr	50km/hr	40km/hr	60km/hr	80km/hr	80km/hr
	Level of Service	F	F	D	B	F	A	E
		F				F		
	Target	B				D		
Transit	Average Signal Delay	11 Seconds	10 Seconds	N/A	N/A	N/A	N/A	N/A
	Level of Service	C	C	-	-	-	-	-
		C				-		
	Target	D				-		
Truck	Turning Radius	10m to 15m	>15m	10m to 15m	10m to 15m	>15m	>15m	N/A
	Receiving Lanes	One	One	Two	Two	One	One	N/A
	Level of Service	E	C	B	B	C	C	-
		E				C		
	Target	D				C		
Auto	Level of Service	B				B		
	Target	D				D		