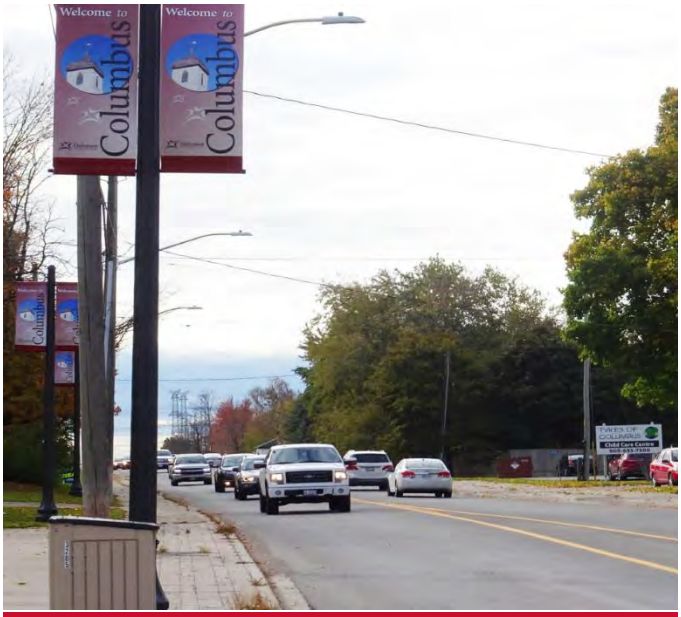
Item: ED-23-09
Attachment 10



Columbus Part II Plan Transportation Master Plan

Integrated Columbus Part II Planning Act and Municipal Class Environmental Assessment Act Study

Draft Final Report

City of Oshawa
November 24, 2022

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1 Introduction

The City of Oshawa has initiated an integrated Study that will satisfy the requirements of both the Planning Act and the Municipal Class Environmental Assessment Act, for the Columbus Community, focusing on the Columbus Part II Plan area as identified in Schedule "E" of the Oshawa Official Plan. The Study aims to achieve the City's objectives for future growth while considering the historical context, cultural heritage, as well as scale of development, transportation and servicing infrastructure, and the protection and enhancement of environmental and natural features in the area. The Study's objectives focus on advancing development which is consistent with the Provincial, Regional and City policy framework.

HDR has completed and documented preliminary findings throughout the course of this Study in the Phase 1 Transportation Report, May 2, 2019 ("Phase 1 Report", see **Appendix A**), Phase 2 Transportation Report dated November 13, 2019 ("Phase 2 Report", see **Appendix B**), and the Phase 2 Transportation Report Addendum dated June 9, 2020 ("Phase 2 Report Addendum", see **Appendix C**).

This Transportation Master Plan Final Report documents the overall findings of the transportation Study supporting the Part II Plan, following Phases I and II of the Municipal Class Environmental Assessment process. This report includes a summary of the Problem and Opportunity Statement, Alternative Solutions, transportation analysis of the Preferred Alternative Solution, public and stakeholder consultation at each stage, implementation requirements and next steps for further study.

1.1 Study Area

The Study Area is in the north part of the City of Oshawa, within the Regional Municipality of Durham. The Columbus Part II Plan Area is generally bounded by Howden Road to the north, the Oshawa-Whitby boundary to the west, Winchester Road to the south and the east branch of the Oshawa Creek to the east. The Study Area for the transportation Study extends beyond the Part II Plan Area to provide a broader assessment of transportation and infrastructure requirements. **Exhibit 1-1** illustrates the Study Area as well as the Columbus Part II Plan Area.

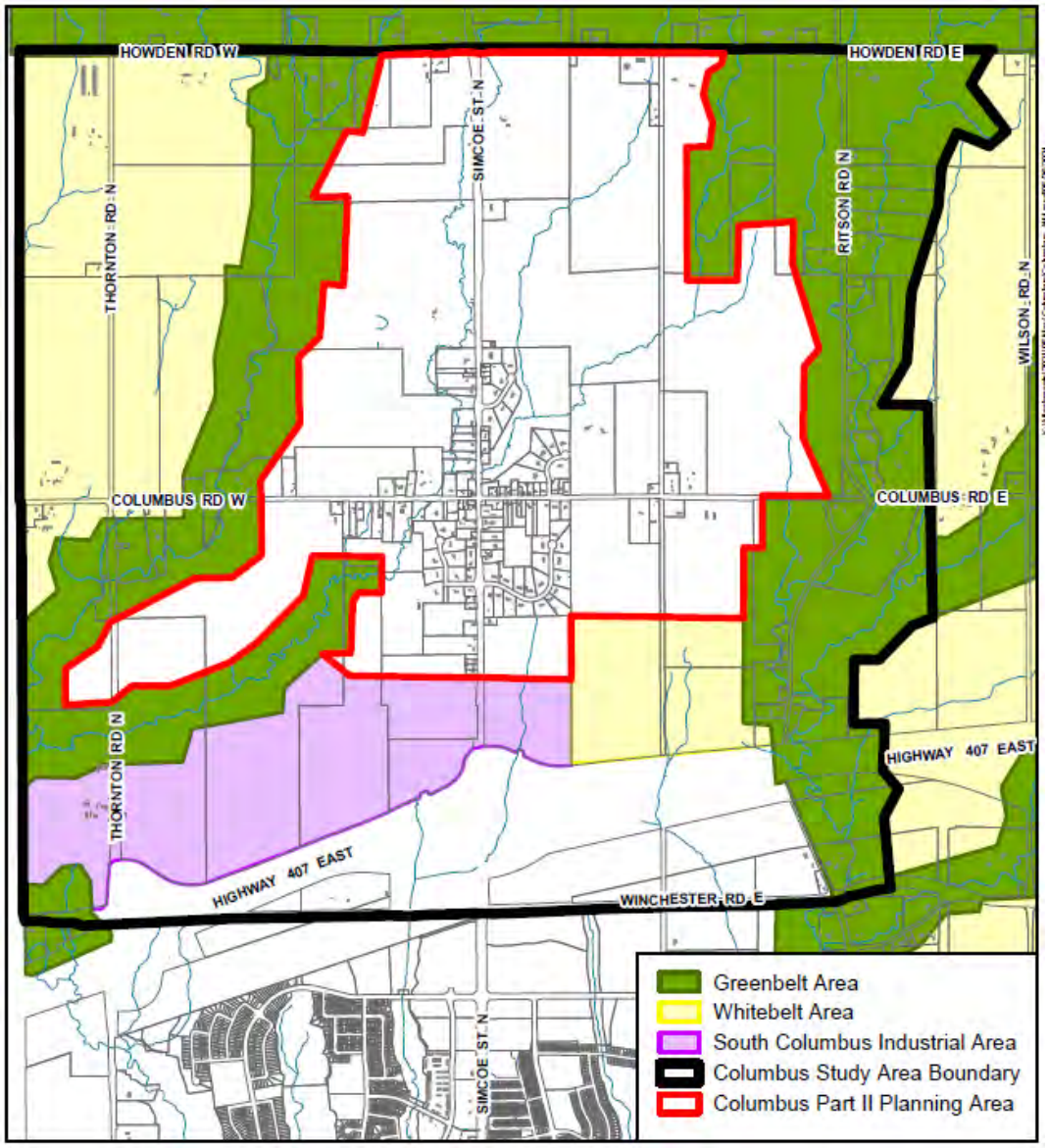


Exhibit 1-1: Study Area

1.2 Study Process

This integrated Study seeks to advance development in a manner that is consistent with both the Planning Act and Municipal Class Environmental Assessment (M.C.E.A.) Act requirements. The Study will follow the Master Planning process (Approach 4 – Integration with the Planning Act) as described in the Municipal Engineers Association Municipal Class Environmental Assessment (October 2000, as amended in 2007, 2011 and 2015).

The Master Plan examines transportation, water and wastewater infrastructure requirements for the Study Area. The Study (and specifically the Columbus Part II Plan Transportation Master Plan) addresses Phases I and II of the M.C.E.A. process, identifying the problem and opportunity and alternative solutions for transportation infrastructure projects only. While the Study satisfies M.C.E.A. requirements for Schedule A and A+ projects, Schedule B and Schedule C projects identified by this Study will require further Study through either subsequent phases of the M.C.E.A. process or through Planning Act approvals.

2 Public and Stakeholder Consultation

Throughout the Study, all stakeholders, including the public, agencies, and Indigenous Communities were contacted and consulted with to ensure that those who may be affected by the Study had sufficient opportunity to review materials and provide input.

An extensive public engagement process identified for this Study goes beyond M.C.E.A. requirements, including four (4) Public Information Centre (P.I.C.) meetings, Technical Advisory Committee meetings, Columbus Developers' Group meetings, and consultation with Indigenous Communities throughout the length of the Study.

Materials from consultation activities including notices, presentations, display boards, and relevant correspondence are provided in **Appendix D**.

2.1 Public Notices

To satisfy the requirements of the Transportation Master Plan Municipal Class Environmental Assessment process, public notices were issued to the public at key points throughout the Study, including a Notice of Study Commencement and Notice of Public Information Centres. Public notices were provided in both the Oshawa This Week and Oshawa Express newspapers, as well as on the City's website and social media accounts (e.g. Facebook and Twitter). Notices were also posted on the Study's webpage, located at https://www.oshawa.ca/en/city-hall/development-studies.aspx. The public notices for the Study and dates of issue are summarized in **Table 2-1**.

Table 2-1: Public Notices

Public Notice	Date of Issue
Notice of Study Commencement	November 14, 2018
Notice of Public Information Centre #1	November 14, 2018
Notice of Public Information Centre #2	May 29, 2019
Notice of Public Information Centre #3	October 23, 2019
Notice of Virtual Public Information Centre #4	October 7, 2021

2.2 Public Information Centres

2.2.1 Public Information Centre Number 1 – December 2018

The first Public Information Centre was held on December 5, 2018 at the Columbus Community Centre in the City of Oshawa, between 6:30pm to 8:30pm.

The P.I.C. featured a formal presentation as well as display materials that provided background information to interested parties. All stakeholders, including members of the public, were encouraged to participate in the workshop after the presentation to provide input on the Study, including the identification of top priorities and guiding principles for the future development of the community.

Electronic versions of the P.I.C. materials were posted online to the Study's webpage at https://www.oshawa.ca/en/city-hall/development-studies.aspx following the P.I.C., allowing members of the public not in attendance to access the information at their convenience.

Key Messages Heard

Many concerns were raised at the P.I.C. Number 1. A summary of the comments and key messages heard include:

- Concern about property impacts.
- Concern about density.
- Columbus' cultural heritage should be conserved and enhanced.
- Traffic on Simcoe Road is high. There is concern about the high speeds and traffic noise.
- A segment of Ritson Road North is closed. Concerns that connecting Ritson Road North will cause traffic infiltration. Speeding on Ritson Road North requires police enforcement.
- Traffic calming needed on Columbus Road.
- Columbus should be kept residential; preserve housing along Simcoe Street North.
- Desire for buffer to community from "City" to maintain / preserve community character.
- Gas station at Simcoe Street North and Columbus Road was designed so building face is setback from the road. This is desired for other development to maintain the rural feel of the community.

- Preference for town homes and mid-rise developments; do not desire high rises. Some indicated a preference for minimum one-acre lot sizes to maintain rural feel of the community.
- Land use planning should consider need for future schools, retail, general store, etc.
- The creeks, valleys and other related natural features that run through Columbus should be protected and maintained.
- Consider need for servicing (sewers, sanitary, water).
- Vehicles travel at high speeds along Simcoe Street North exiting Highway 407. Signage for speed reduction zone (approaching 60km/h) should be implemented.
- Suggestion of by-pass of Simcoe Street North to minimize cut-through traffic travelling to Highway 407 through Columbus community.
- Priorities for the Columbus area identified by attendees include:
  - Maintaining cultural heritage,
  - Improving municipal services,
  - Designating safety zones,
  - Balancing lot sizes (and also larger lot sizes), and
  - Maintaining the residential character of Columbus.

2.2.2 Public Information Centre Number 2 – June 2019

The second Public Information Centre was held on June 20, 2019 at the Columbus Community Centre in the City of Oshawa, between 6:30pm to 8:30pm.

The P.I.C. featured a formal presentation as well as display materials that provided background information to interested parties, including completed Study background reports. A presentation was provided to attendees which included the Problem and Opportunity Statement. Stakeholders and other members of the public were encouraged to provide comments on the Problem and Opportunity Statement after the presentation to provide input on the Study.

Electronic versions of the P.I.C. materials were posted online to the Study's webpage at https://www.oshawa.ca/en/city-hall/development-studies.aspx following the P.I.C., allowing members of the public not in attendance to access the information at their convenience.

Key Messages Heard

The second P.I.C. was well attended. Attendees voiced concerns on several topics including municipal servicing, farming, wi-fi, deferred lands, total population growth, house values and protecting the historic core and "small-town" feel. A few transportation related matters were also identified related to the transportation Problem and Opportunity Statement including:

- Status of the planned four-lane widening of Simcoe Street North
- Traffic calming measures along Simcoe Street North through Columbus
- Provision of bicycle paths in the Study Area

The Study team documented these questions and comments and noted that future transportation needs and the provision of bicycle paths will be considered in later phases of the Study.

2.2.3 Public Information Centre Number 3 – November 2019

The third Public Information Centre was held on November 20, 2019 at the Columbus Community Centre in the City of Oshawa, between 6:30pm to 8:30pm.

The P.I.C. featured a formal presentation as well as display materials that provided an overview of three alternative land use and road plans, and associated land budgets for the Study. A workshop session was held to engage and seek input on the three alternative land use and road plans.

Electronic versions of the P.I.C. materials were posted online to the Study's webpage at https://www.oshawa.ca/en/city-hall/development-studies.aspx following the P.I.C., allowing members of the public not in attendance to access the information at their convenience.

Key Messages Heard

Comments from attendees related to transportation focused on support for Alternative 2 which considered a Simcoe Street North "by-pass solution" directing traffic away from the Columbus Special Policy Area.

2.2.4 Public Information Centre Number 4 – October 2021

The fourth Public Information Centre was held virtually on October 28, 2021 between 6:30pm to 8:30pm.

The P.I.C. featured a formal presentation on the draft preferred land use and road plan and Part II Plan. A question and answer session allowed participants to ask questions about the presentation materials and the Study.

Electronic versions of the P.I.C. materials were posted online to the Study's webpage at https://www.oshawa.ca/en/city-hall/development-studies.aspx following the P.I.C., allowing members of the public not in attendance to access the information at their convenience.

Key Messages Heard

Comments from attendees related to the boundary of the Study Area, road design, and types of development.

2.3 Agency Consultation

A Technical Advisory Committee (T.A.C.) was formed comprising of representatives from Durham Region, City of Oshawa, and Central Lake Ontario Conservation Authority (C.L.O.C.A.).

The following meetings were held during Phase 1 of the Study:

- The first T.A.C. meeting was held on November 21, 2018 to provide background information on the Study.
- The second T.A.C. meeting was held on March 5, 2019 to provide a Study status update and overview of background studies including the Phase 1 Transportation Report. The T.A.C. advised the following regarding the transportation Study:
    - The T.A.C. highlighted the need to provide a robust transportation analysis considering environmental considerations and cost including the transportation related policies in the Provincial Greenbelt Plan.
    - Selection of the Preferred Alternative will require robust documentation and justifiable results.
- A visioning workshop which included members of the T.A.C. was held on April 25, 2019 to seek input on the land use and road alternatives. The following transportation related input was provided:
    - Alternatives should consider Regional road design criteria.
    - Region is open to streetscape improvements to Simcoe Street North.
    - Region currently does not support a "by-pass" but open to discuss.
    - City asked that multimodal considerations be explicitly identified in the vision statement.

  - Transit services noted as potentially challenging as an “edge community” separated from the core of the City and divided by Highway 407 East. These challenges should be noted in the Problem and Opportunity Statement.
  - Transit opportunities should consider “mobility-as-a-service.”
  - Durham Region Transit noted that density needed to operate, routes will be identified when there is demand.
  - A “complete” transportation system is required with connections both internally and externally.
  - Simcoe Street North noted as a critical spine for this community while also connecting communities to the north such as Port Perry. A balanced solution is required recognizing that this function remains.
  - Region asked for an evaluation of the east-west connection from Thornton-Ritson as shown in the Region’s Official Plan in alignment with the E.A. process.

- The third T.A.C. meeting was held on September 24, 2019 to provide a Study status update and overview of land use and road alternatives. The T.A.C. advised the following regarding the transportation Study:
  - A potential roundabout was identified on Simcoe Street North just north of Highway 407 and the Region asked if the intersection might function without one. The Study team noted that further Study will consider solutions without a roundabout.
  - The Region indicated that a potential Simcoe Street North by-pass should not be classified as a Type B Arterial Road.
  - There was an interest in understanding how active transportation network connectivity was considered in the alternatives.
  - Central Lake Ontario Conservation Authority advised that the alternatives must be feasible.
  - The Region indicated that transit options should be considered
  - City advised that the road network should identify collector roads south of the Special Policy Area.
  - City requested that the active transportation network be shown, Study team agreed to show in the preferred alternative.

  - The intersection of Ritson and Columbus be reviewed – a separate M.C.E.A. Study was recently completed recommending a roundabout at this location.
  - The road network for the employment lands south of the Part II Plan area should be considered under a separate process.
  - Ministry of Transportation Ontario should be consulted with regarding their lands within the Study Area.
  - Bridle Road overpass should be studied further in subsequent phases of the Study.

- On January 29, 2020, the Part II Plan team and City staff met with Durham Region to discuss analysis required to address the potential need for a Regional Road Simcoe Street North by-pass, resulting in the Phase 2 Transportation Report Addendum (**Appendix C**).
- On April 27, 2020, the Part II Plan team and City staff met with Durham Region to discuss the findings of the additional transportation Study regarding the need for a Regional Road Simcoe Street North by-pass. Overall, the Study found that a Regional Road Type-B by-pass is not required, resulting in a solution consisting of Type C arterial roads east and west of Simcoe Street North to provide routing options for new development. It was agreed that urban design solutions should be considered to encourage safe speeds through the Columbus Special Policy Area.
- The fourth T.A.C. meeting was held on May 12, 2021 to present and seek input on the Preferred Land Use and Road Plan, the draft recommendations of the Transportation Master Plan study, and Servicing and Stormwater Management status. The T.A.C. advised the following regarding the Transportation Master Plan Study:
  - Include a corridor protection area for a Carnwith Drive extension connecting to the Town of Whitby.
  - Include policy text related to roundabouts.
  - Improve Columbus Road with a multi-use path between the two trail systems.
  - Noted that City typically requires arterial roads with 30 metre right-of-way widths to accommodate utilities.
  - Class II Trail location in the Greenbelt should be adjusted to be closer to the Part II Plan area.

- The fifth T.A.C meeting was held on November 14, 2022 to present the final Preferred Land use and Road Plan, recommendations of the Transportation Master Plan Study, and status of the Servicing and Stormwater Management. No concerns about the T.M.P. recommendations were raised at the meeting.

It is noted that all correspondence with agencies are documented in **Appendix D**.

2.4 Columbus Developers' Group Consultation

The Columbus Developers' Group is comprised of representatives acting on behalf of various developers with an interest in developing land holdings in the Columbus community.

The following meetings were held during Phase 1 of the Study:

- A meeting was held with the Columbus Developers' Group on November 21, 2018 to gather input on the Study. Comments received regarding the transportation network are as follows:
  - Consider the implementation of public laneways and flexible public laneway engineering standards;
  - Confirm road rights-of-way (R.O.W.) for all roads and consider reducing road R.O.W.s (e.g. 16m or 17m); and,
  - Consideration of locating public trails in the Greenbelt.
- A second meeting was held on March 5, 2019 which was focused on updating the Columbus Developers' Group on Study status and the completed background studies. Transportation related discussion included:
  - High-level discussion on the need to align Transportation M.C.E.A. process with the parallel Subwatershed Study and requirements for mitigating impacts to the watercourses in the Part II Plan area.
- A third meeting was held on October 22, 2019 which provided an overview of three Alternative Land Use and Road plans. Transportation related discussion included:
  - Simcoe Street North by-pass – it was noted that the Region did not support a Regional Road or Type B Arterial classification for any alternative route to Simcoe Street North.
  - Bridle Road overpass of Highway 407 East – City staff indicated that City does not support it and this position was relayed to the Region at the previous T.A.C. meeting.

- A fourth meeting was held on February 28, 2020 to discuss preliminary findings of HDR's updated transportation analysis following the January 29, 2020 meeting with Durham Region. Overall, there was support for findings which indicated that a solution consisting of Type C arterial roads providing alternative routes to Simcoe Street North would be preferable versus a by-pass solution.
- A fifth meeting was held on September 22, 2020 focused on stormwater management systems in the Greenbelt, specifically looking at naturalized stormwater management systems.
- A sixth meeting was held on October 7, 2021. A Study update was provided in addition to details on the upcoming P.I.C 3.

2.5 Indigenous Communities Consultation

Indigenous Communities who may have an interest in the Study Area were identified through correspondence with the Ministry of Environment, Conservation and Parks, as well as through a search on the Aboriginal and Treaty Rights Information System (A.T.R.I.S.). These communities received the Notice of Study Commencement and P.I.C. Numbers 1 to 4 through regular mail and/or email. They were invited to participate in the Study by providing input and feedback and reviewing P.I.C. materials available on the Study website. The Indigenous Communities that were contacted are:

- Mississaugas of Alderville First Nation*
- Beausoleil First Nation*
- Curve Lake First Nation*
- Chippewas of Georgina Island First Nation*
- Chippewas of Rama-Mnjikaning First Nation*
- Coordinator Williams Treaty First Nations
- Hiawatha First Nation*
- Conseil de la Nation Huronne-Wendat
- Mississaugas of Scugog Island First Nation*
- Métis Nation of Ontario

It should be noted that all nations identified with an asterisk (*) indicate Williams Treaty member nations.

All Indigenous consultation activities completed (including comments) are provided in **Appendix D**.

3 Phase 1 Problem and Opportunity

Existing and baseline future transportation conditions were documented in detail in the Phase 1 Transportation Report (**Appendix A**). A summary of the Phase 1 Report is provided in this section.

3.1 Planning Context

The Part II Plan transportation study builds upon Provincial, Regional, and local municipal transportation policies and plans. Key documents which inform the Columbus Part II Plan are identified in the following list, while a more detailed summary of each is provided in **Appendix A**. It is noted that policies in **Appendix A** may reference past versions of policies and plans based on the time of documentation.

Provincial context:

- Provincial Policy Statement (2020)
- Growth Plan for the Greater Golden Horseshoe (2020)
- Greenbelt Plan (2017)
- Oak Ridges Moraine Conservation Plan (2017)

Durham Region planning context:

- Durham Region Official Plan (2017)
- Durham Transportation Master Plan (2017)
- Durham Region Cycling Plan (2021)

Local municipal context:

- City of Oshawa Consolidated Official Plan (2021)
- City of Oshawa Integrated Transportation Master Plan (2018)
- City of Oshawa Active Transportation Master Plan (2015)

3.2 Background Transportation Conditions

This section summarizes findings from an analysis of existing and future transportation conditions documented in further detail in **Appendix A**.

3.2.1 Existing and Future Planned Transportation System

The Columbus Part II Plan area is largely rural today with the community of Columbus centred on the intersection of Simcoe Street North and Columbus

Road. The following is a description of the roads servicing the Part II Plan area today:

- Thornton Road North is an undivided, two-lane, north-south Type B Arterial with a posted speed limit of 80km/h.
- Simcoe Street North (Regional Road 2) is an undivided, two-lane, north-south, Type B Arterial with a posted speed limit ranging from 50km/h (near the built-up area around Columbus Road) to 80km/h. Simcoe Street North becomes a divided, four-lane street between the Highway 407 on-ramps.
- Ritson Road North is an undivided, two-lane, north-south, Type B Arterial with a posted speed limit of 50km/h.
- Howden Road is an undivided, two-lane, east-west, Type A Arterial with a posted speed limit of 50 km/h.
- Columbus Road is an undivided, two-lane, east west Type B Arterial with a posted speed limit of 50km/h.
- Winchester Road (Regional Road 3) is an undivided, two-lane, east-west, Type B Arterial with a posted speed limit of 80 km/h.
- Highway 407 is a divided, six-lane, east-west freeway with an exit at Simcoe Street North and a posted speed limit of 100 km/h.

There is an existing truck restriction along Columbus Road east of Thornton Road North. However, this restriction does not apply to buses or heavy trucks performing local trips.

The existing road network is illustrated in the City of Oshawa Official Plan Schedule ‘B’ in **Exhibit 3-1**. Future planned roadways in the Part II Plan area are also included in the Official Plan map (dashed lines).

Within **Exhibit 3-1**, it is noted the north-south Type C Arterial road west of Simcoe Street, from the east-west Type C Arterial south of Columbus Road to Winchester Road, was deleted from the Regional Official Plan as part of Amendment #171 (the Region's T.M.P. Network amendment). However, resolving the portion of Deferral 5 (D5) and the deletion of the subject section of Type C Arterial road is not yet reflected in the Oshawa OP.

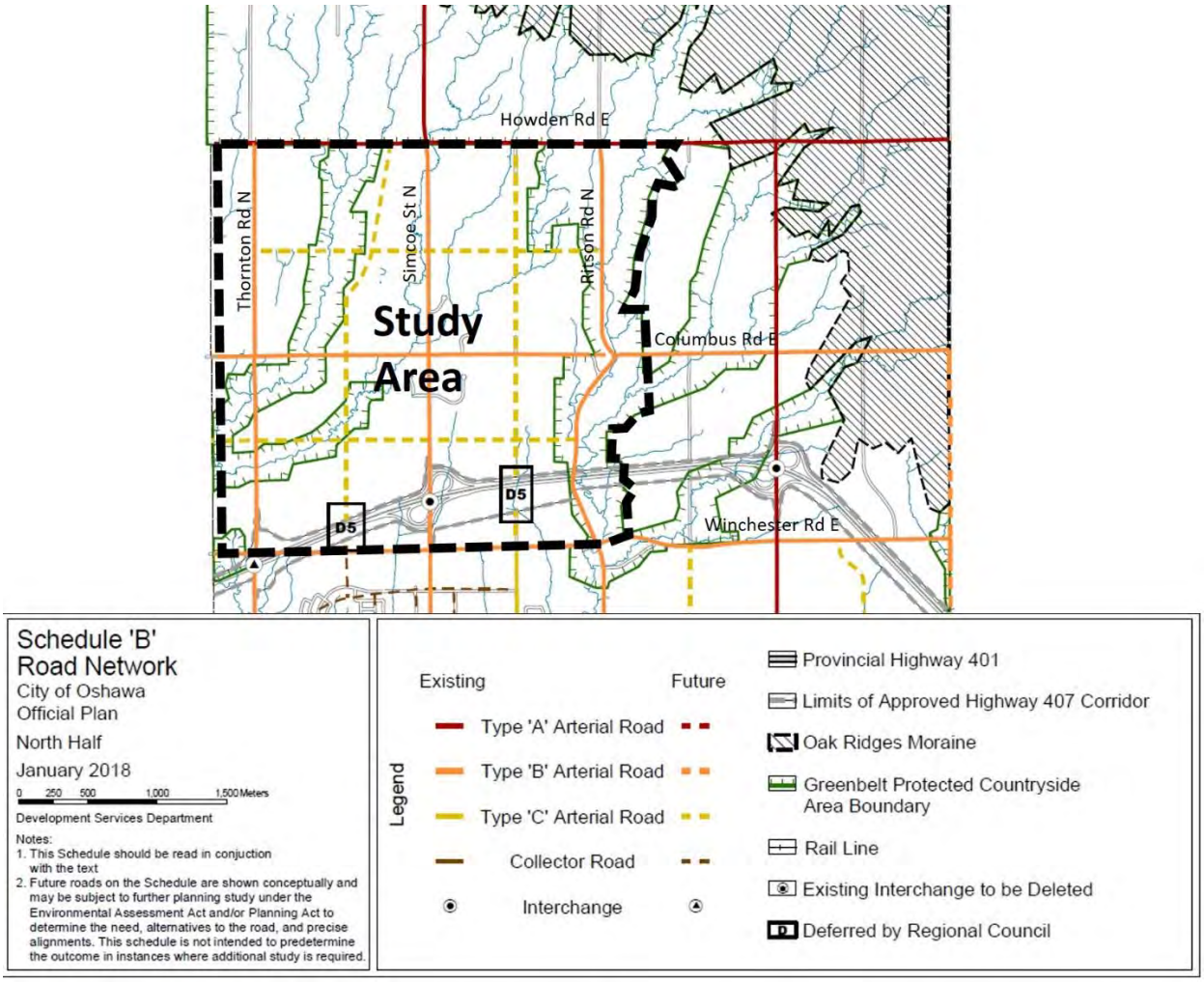


Exhibit 3-1: City of Oshawa Official Plan – Road Network

Within the Study Area, future planned Type C Arterial roads are recommended to provide east-west and north-south connections to existing Type “B” Arterials to serve future development. This Study will confirm the need for the planned transportation infrastructure.

3.2.2 Vehicular Traffic Conditions

Existing and future background intersection traffic capacity analysis is conducted at the intersections in the Study Area. Existing lane configurations (i.e., when the Study started in 2019) informing the analysis are shown are shown in **Exhibit 3-2**. Future intersection lane configuration for the purpose of background intersection analysis is shown in **Exhibit 3-3**. It accounts for the recent Fall 2020 reconstruction of Simcoe Street North and Winchester Road.

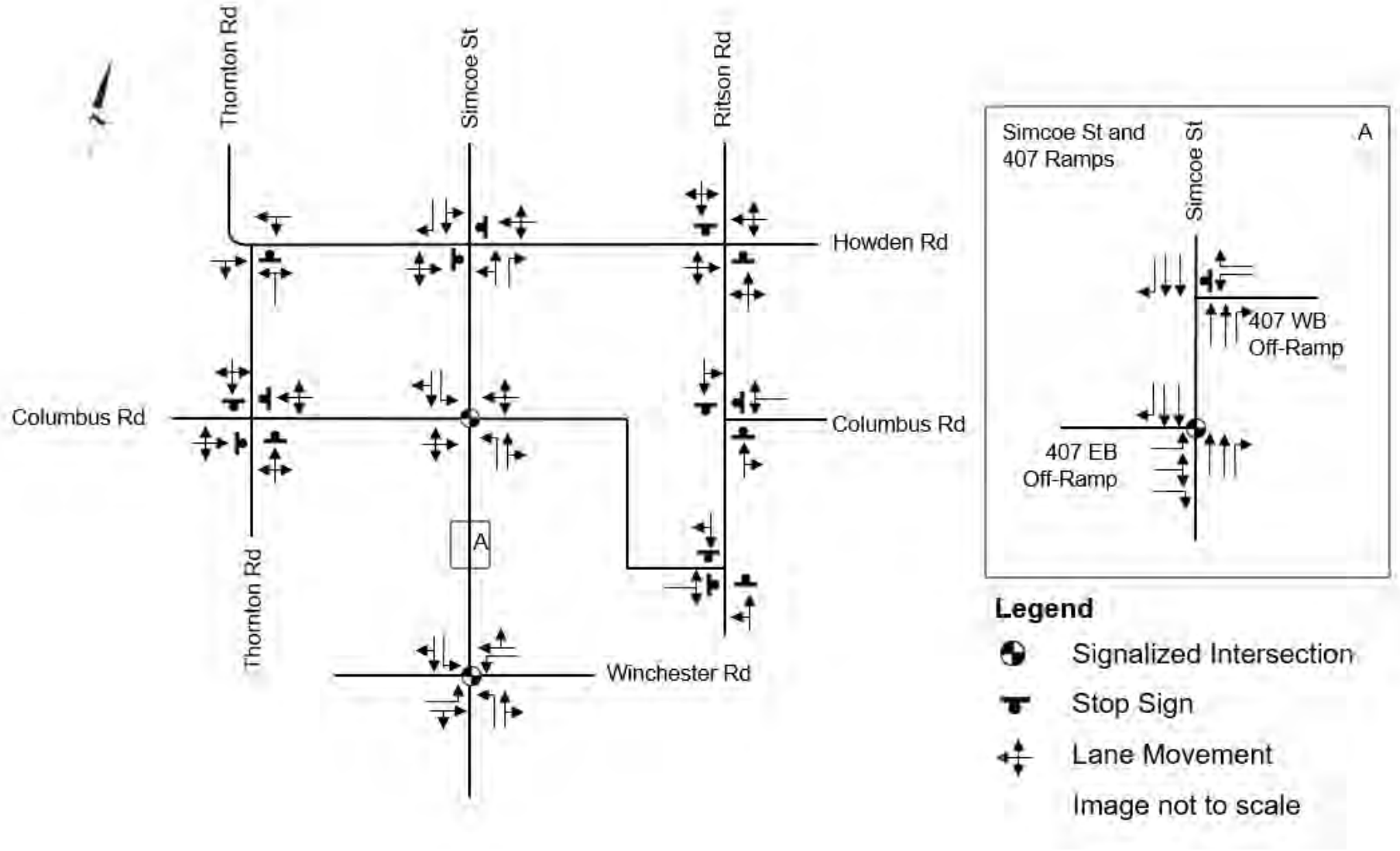


Exhibit 3-2. Lane Configuration of Existing Conditions (2019)

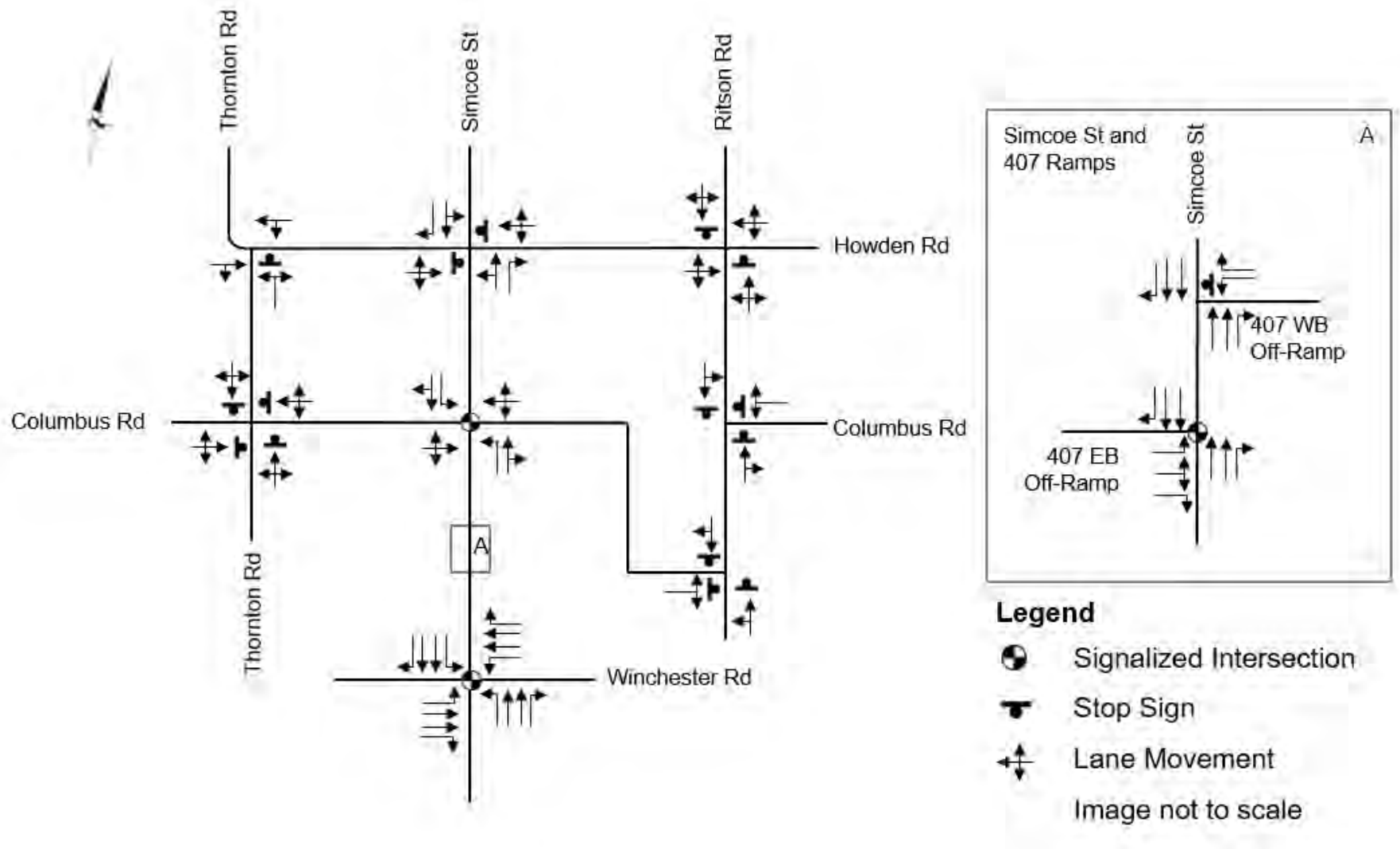


Exhibit 3-3. Lane Configuration of Future Background Conditions (2031)

Traffic Analysis Methodology

Intersection operations were assessed using Synchro 10 software. Synchro 10 can analyze both signalized and unsignalized intersections within a road corridor or network by taking the spacing, intersection, queues, and operations between intersections into account.

Two Measures of Effectiveness (M.O.E.s) are considered in the signalized intersection analysis:

- Volume to capacity (v/c) ratio; and
- Level of Service (L.O.S.) for all intersection movements.

Two M.O.E.s are considered in the two-way unsignalized intersection analysis:

- Volume to capacity (v/c) ratio; and
- The highest movement Level of Service.

As defined in the Highway Capacity Manual (H.C.M.), L.O.S. is based on the average control delay per vehicle for a given movement. Delay is an indicator of how long a vehicle must wait to complete a movement and is represented by a letter between 'A' and 'F', with 'F' being the longest delay as described in **Table 3-1**. The volume to capacity (v/c) ratio is a measure of the degree of capacity expected at an intersection.

Table 3-1. Highway Capacity Manual Level of Service Descriptions - Intersections

LOS	Average Control Delay Per Vehicle (seconds)		Operational Recommendation - Urban Area
	Signalized Intersections	Unsignalized Intersections	
A	≤10	≤ 10	Acceptable
B	>10 and ≤20	>10 and ≤15	Acceptable
C	>20 and ≤35	> 15 and ≤25	Acceptable
D	>35 and ≤55	> 25 and ≤35	Acceptable
E	>55 and ≤80	>35 and ≤50	Consider Improvements
F	>80	>50	Consider Improvements

Within Durham Region, acceptable operations in urban areas are generally considered to be L.O.S. 'D' or better and where volume to capacity ratios do not exceed 1.0. Within this report and the analysis supporting the Part II Plan

in general, individual turning movements with L.O.S. 'E' or 'F' or a v/c ratio equal to or exceeding 1.0 will be identified and considered for improvement.

Existing Intersection Operations

Under existing conditions, most intersections are performing acceptably, with movements at L.O.S. C or better and v/c ratio less than 0.85. A few critical movements are noted at intersections on Simcoe Street North as noted in **Table 3-2**. Full details of the analysis are found in **Appendix A**.

Table 3-2. Critical Movements under Existing Conditions (2019)

Movement		Period	Volume	V/C Ratio	LOS
Simcoe Street North and Winchester Road* Signalized intersection					
Westbound	Through-Right	A.M.	385	0.96	E
Northbound	Left	A.M.	255	0.95	E
Southbound	Left	P.M.	281	1.08	F
Simcoe Street North and Howden Road Two-way stop control (EB/WB)					
Eastbound	Left-Through-Right	A.M.	4	0.11	E
Eastbound	Left-Through-Right	P.M.	21	0.27	E
*analysis reflects conditions prior to 2020 intersection improvements					

Future Background Intersection Operations

The following discusses the future background conditions (2031), which provide an understanding of the growth surrounding the Study Area and the future 2031 context - without the growth in the Study Area itself and form a key input to the Problem and Opportunity Statement.

To assess future background conditions, policy forecasts from the Durham Region Emme model inform future growth in travel demand by 2031 outside of the Part II Plan area. This "background traffic" growth predicted by the model is then applied to 2018 observed traffic volumes to forecast 2031 traffic volumes.

Based on the future background Synchro model results, most of the intersections operate with some residual capacity, at L.O.S. D or better similar to the existing conditions. Only the Simcoe Street North at Howden Road

intersection operates over capacity. Critical movements (i.e. operating at L.O.S. 'E' or 'F' or v/c ratio > 1.0) at these intersections are summarized in **Table 3-3**.

Table 3-3: Critical Movements under Future Background Conditions

Movement		Period	Volume	V/C Ratio	LOS
Simcoe Street North and Howden Road Two-way stop control (EB/WB)					
Eastbound	Left-Through-Right	A.M.	6	0.24	F
Eastbound	Left-Through-Right	P.M.	26	0.52	F
Westbound	Left-Through-Right	A.M.	7	0.44	E
Westbound	Left-Through-Right	P.M.	13	0.47	F

Most intersections within the Study Area operate acceptably with L.O.S. 'D' or better in both 2018 existing conditions and 2031 future background conditions, apart from Simcoe Street North and Howden Road in 2031.

Based on discussions and consultations with stakeholders, any proposed road network changes and recommended improvements to mitigate capacity concerns in the Study Area will be analyzed in a separate scenario in Phase 2 of the M.C.E.A. process.

3.2.3 Transit

This section documents the transit route information from 2018. It is noted routes may have been changed due to regular updates and in response to the COVID-19 pandemic.

Durham Region Transit (D.R.T.) Route 950 is the only transit route that serves the Columbus Part II Plan area. This route operates Monday to Saturday from Uxbridge and Port Perry to Ontario Tech University (O.T.U.), formerly known as the University of Ontario Institute of Technology, and Durham College in Oshawa. The route offers twelve daily trips from O.T.U. Monday to Friday, with five trips running on Saturday. There is currently no Sunday service available. The closest terminal and station is O.T.U., located at Conlin Road West and Simcoe Street North. This location provides connections with D.R.T. Routes 310, 401, 417, 420, 422, 910, and 915 and GO Transit Routes 52 and 93.

There are currently six D.R.T. transit stops located along Simcoe Street North throughout the Columbus Study Area. Four stops are within the current hamlet of Columbus, with two transit stops located outside of the hamlet at Howden Road. GO Route 81 runs nearby along Baldwin Street within the Town of Whitby. Just north of the City of Oshawa, D.R.T. offers on-demand services.

In the future, Simcoe Street North is planned in the Durham Region Official Plan as an 'Other Transit Connection' which facilitates longer-distance trips, connecting to Transportation Hubs and Commuter Stations from smaller urban and rural areas. A future Transportation Hub is also planned for the Windfields area south of Highway 407 at Simcoe Street North and Winchester Road. Based on the Durham Region T.M.P. and illustrated in **Exhibit 3-4**, just south of the Highway 407, Higher-Order transit has been planned for Simcoe Street North as a connection from the planned Highway 407 / Simcoe Street North Multimodal Transit Node to the Central Oshawa GO Station.

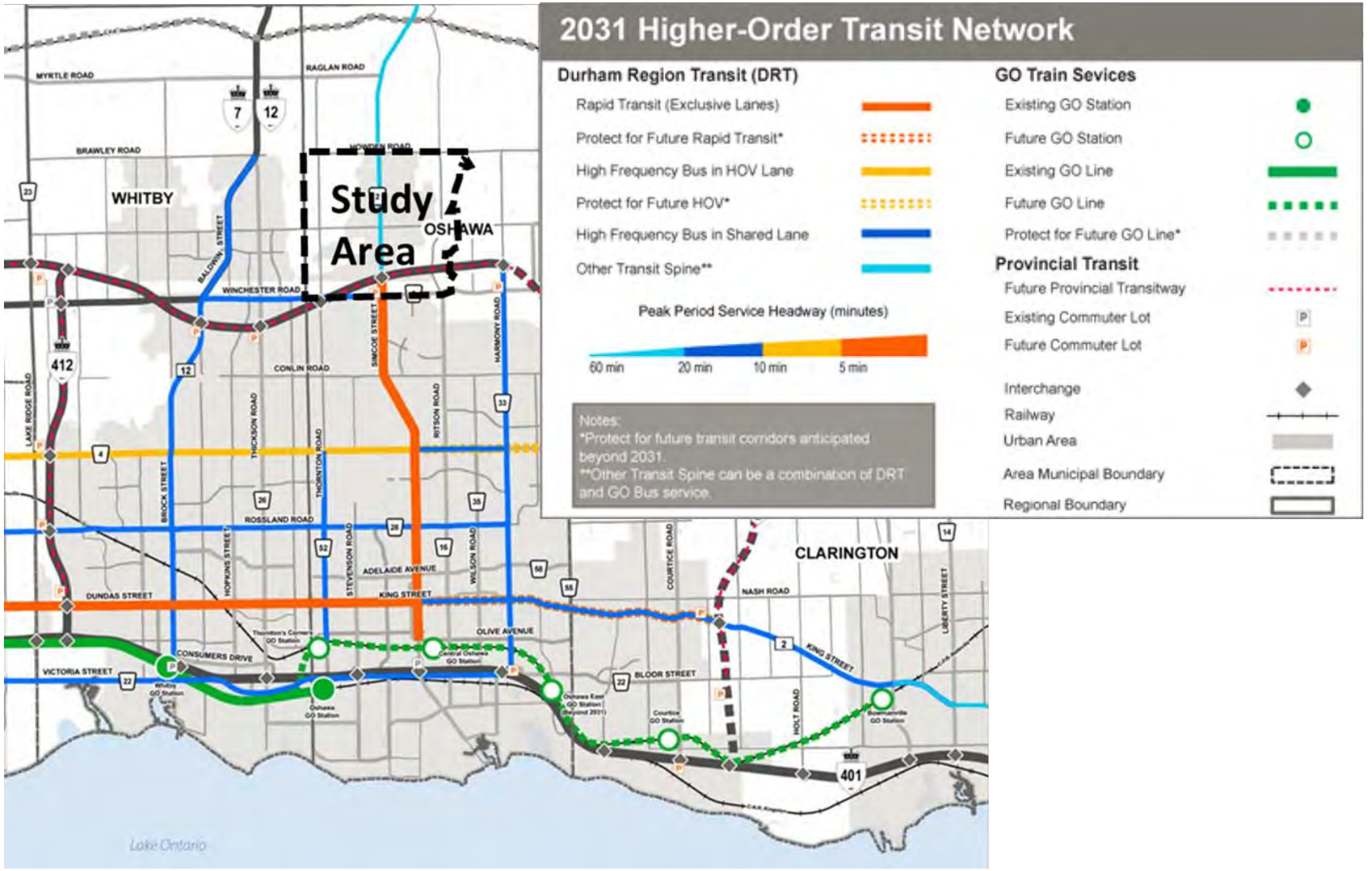


Exhibit 3-4: Durham Regional T.M.P. – 2031 Higher Order Transit Network

3.2.4 Active Transportation

The existing active transportation networks are limited within the Study Area boundaries. Sidewalks are limited and are only provided on Simcoe Street North from Ridge Top Court to Steepleview Court, and Columbus Road from approximately 80m west of Simcoe Street North to approximately 135m east on Simcoe Street North. There are no existing trails and there are no dedicated or signed cycling facilities within the Study Area boundaries.

The Durham Regional Cycling Plan (May 2021) also identifies specific cycling facilities building on the recommendations from the Durham T.M.P (2017), including a north-south connection to Port Perry through Simcoe Street North. New additions include different cycling facilities along Simcoe Street North (in-boulevard multi-use path, buffered paved cycling lane, and buffered paved shoulder) and Ritson Road (shared roadway). Other specifications include paved shoulders along Columbus Road and in-boulevard multi-use path along Winchester Road. The described network can be seen in **Exhibit 3-5**.

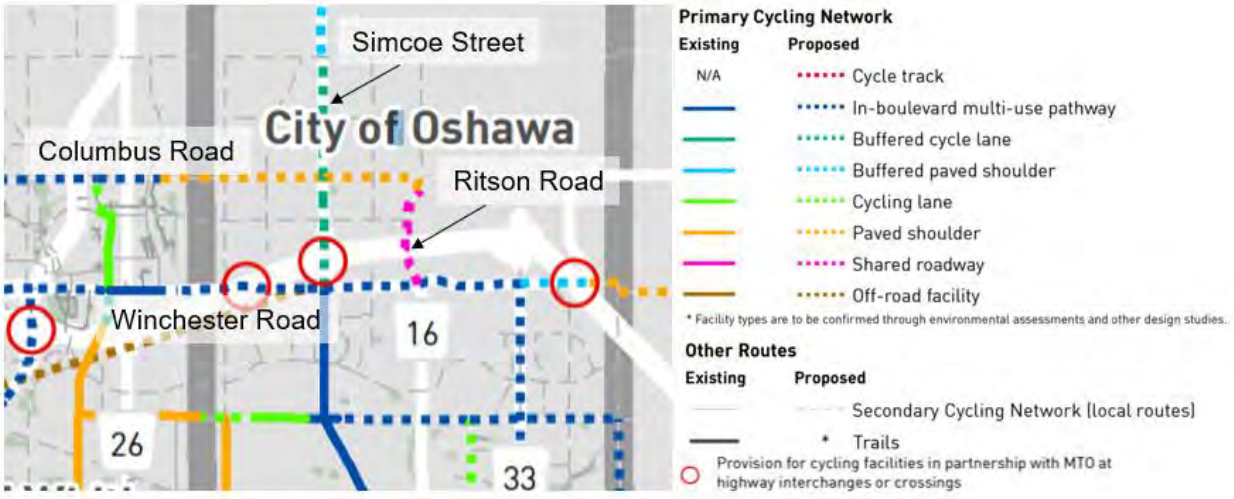


Exhibit 3-5. Durham Regional Cycling Plan (2021)

Further to the opportunity to refine the regional network, the City of Oshawa's 2015 Active Transportation Master Plan has identified a number of proposed on-road active transportation facilities along Howden Road, Columbus Road, Thornton Road North, and Ritson Road North. Two north-south off-road multi-use trails have also been identified, one extending north-east from Thornton Road North north of Columbus Road to beyond Howden Road and another adjacent to Ritson Road with a northern boundary at Columbus Road. These potential facilities are shown in **Exhibit 3-6**.

It is noted proposed cycling facilities differ between the plans mentioned. The Columbus Part II Plan will review the proposed facilities and recommend preferred cycling opportunities.

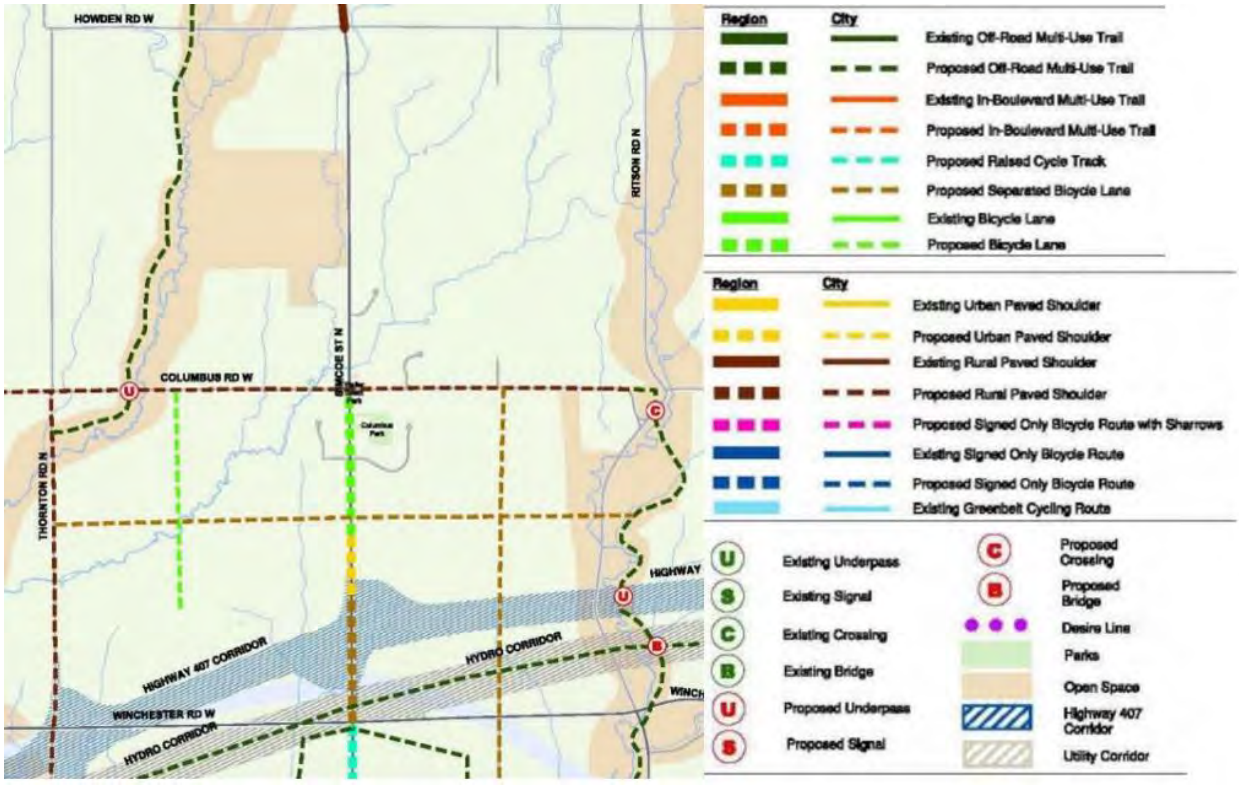


Exhibit 3-6. City of Oshawa Active Transportation Master Plan Cycling Opportunities (2015)

3.2.5 Collision Analysis

A desktop review of collision data within the Study Area was undertaken to understand any potential operational and safety issues which exist today, and which may be mitigated in the future through infrastructure improvements arising out of development. Details on the analysis are found in **Appendix A**.

The collision data was reviewed and summarized to calculate average Collision Rates at Study Area intersections and road segments. Based on this analysis, where the rates appear to be outliers, further considerations are made for Phase 2 of this Study.

It is noted collisions reported are per million vehicles entering the intersection or million vehicle-kilometres per segment.

Summary of Findings

Simcoe Street North and Winchester Road, which is the busiest Study Area intersection in terms of total traffic volumes, also has the highest intersection collision rate (0.99 collisions per million vehicles) within the Study Area. Based on our judgment, this result is expected, and no issues can be determined through this high-level analysis at the intersections.

The road segment which has the highest collision rate (1.30 collisions per million vehicles) was Ritson Road North between Columbus Road West and Columbus Road East, which is significantly higher than (more than double) the majority of collision rates observed at other road segments in the Study Area. While only two collisions occurred on this segment, the average collision rate calculation indicates a significantly high collision rate as it is a very short road segment. While this may be a statistical outlier due to the short segment length, based on a Google Streetview review of this segment, the curvature of the roadway, steep grades and non-standard intersections may all be contributing factors to collisions along this road segment. As such, Phase 2 of this Study will consider options to mitigate identified factors contributing to collisions experienced on the road segment.

Finally, the segment of Simcoe Street North between Ridge Top Court and Columbus Road also sees a relatively high average collision rate of 0.94 collisions per million vehicle-kilometres. This segment of Simcoe Street North includes multiple driveway accesses for residential homes located midway between Ridge Top Court and Columbus Road at a crest in the vertical alignment of the roadway. This vertical curvature, combined with speeds in excess of the posted speed limit, may be contributing factors to the high observed collision rate. It is recommended that Phase 2 of this Study will consider options to mitigate identified factors contributing to collisions experienced on the road segment.

Next Steps

Because much of the context and character of the roadways identified in this collision analysis will change in character through the development of the Study Area, Phase 2 of this Study should only consider solutions which may mitigate or steer traffic away from problematic locations which appear to have a higher than expected collision rate – i.e. Ritson Road North at Columbus Road and Simcoe Street North between Columbus Road and Ridge Top Court. As noted, for locations outside of the Part II Plan area, recommendations made herein for further investigations may be carried out by the City following the Part II Plan Study.

3.3 Inventory of the Environment

A thorough inventory of the environment has been conducted in parallel to this Transportation Master Plan (T.M.P.) study, including natural, social, cultural, and economic environments. The broader Part II Plan Study includes the following studies which informed the T.M.P.:

- Cultural Heritage Resource Assessment

- Stage 1 Archaeological Assessment
- Demographic, Housing and Economic Analysis
- Retail Background Report
- Subwatershed Study

In particular, key inputs from the subwatershed study were utilized to inform the assessment of alternative solutions to address the problem and opportunity. This included documentation of recommended minimum vegetation protection zones, meander belt, significant valleylands, significant woodlands, and wetland buffer widths. This information was used to identify preferred natural heritage system crossing locations to minimize environmental impacts at the T.M.P. stage of study, subject to further phases of the Municipal Class Environmental Assessment (E.A.) Process.

The inputs from the subwatershed study are documented within this report in **Appendix B, Phase 2 Transportation Report**. Subsequent assessment of Natural Heritage and Water Resource impacts of the preferred transportation network are documented in **Appendix C, Addendum to the Phase 2 Transportation Report.**

3.4 Problem and Opportunity

Through consultation with the public, agencies and stakeholders as well as a thorough review of existing transportation conditions and the planning context, a Problem and Opportunity Statement was identified which will form the basis of transportation infrastructure needs to be addressed further as part of Phase 2 of the Municipal Class E.A Process.

3.4.1 Summary of Key Issues

Problems and opportunities identified through the detailed analysis and consultation activities are detailed in **Table 3-4** and shall be addressed in Phase 2 of this Study.

Table 3-4: Key Issues and Potential Opportunities

Issue	Potential Opportunity
Existing and future traffic conditions experience critical movements at select intersections	Evaluate future traffic conditions and improve intersection operations to accommodate demand

Issue	Potential Opportunity
Safety and operational concerns at various intersections and in the Study Area	Evaluate intersection-related and segment-related countermeasures and treatments, such as speed and traffic calming measures which may include community safe zones, speed limits and neighbourhood traffic management programs. Consider alternative solutions which divert traffic away from locations with high average collision rates.
Expand the existing transportation network to accommodate proposed future development in the Study Area	Improve the transportation network to accommodate proposed future development while preserving the Columbus community character.
Transit service is not frequent and is not provided on Sundays	Evaluate transit ridership and potential to expand/improve service and provide connections to future multimodal node at Highway 407 & Simcoe Street North.
Lack of continuous active transportation facilities for all users	Provide continuous sidewalks on both sides of Simcoe Street North, Columbus Road, and other arterial roads. Consider cycling facilities along Simcoe Street North to connect to the Greenbelt Cycling Route along Raglan Road. Evaluate the proposed active transportation (A.T.) network and provide recommendations for other connections to Existing Greenbelt trails. Develop a well-connected active transportation network on proposed collector networks throughout the Part II Plan area.

3.4.2 Problem and Opportunity Statement

Columbus is a small, tight knit community in north Oshawa. Because of its distance to the core of the City, travel in the area is dominated by the personal automobile. As a result, there are existing concerns about high traffic volumes and speeding through the community.

The development of Columbus through the Study presents an opportunity to address these concerns while also improving the Study Area transportation network for all travel modes – including pedestrians, cyclists, transit, and vehicles. The Study will seek to address these opportunities by building upon the recommendations of the Durham Region T.M.P. and the City of Oshawa Integrated T.M.P. to identify a transportation network that supports anticipated growth and that is safe, accessible and comfortable for users of all ages and abilities.

In addition, the anticipated growth of the Part II Plan area will result in significant traffic congestion to the south and west of the Part II Plan Area. Alternative transportation solutions should consider new policies or infrastructure which address these needs building on the three themes set forth in the Oshawa Integrated Transportation Master Plan (I.T.M.P.): improving mobility, alleviating congestion, and encouraging sustainability.

4 Phase 2 Alternative Solutions

Preliminary transportation network alternatives were developed prior to the development of land use and road alternatives building upon the Phase 1 Problem and Opportunity Statement that identifies the existing transportation issues and recognizes the opportunity to improve the Study Area transportation network for all modes. These preliminary alternatives are documented in the Phase 2 Transportation Report, **Appendix B**. In this report, three alternative land use and road plans were then assessed to inform an emerging land use scenario which would then be used to analyze alternative transportation solutions. Functional design was also undertaken to verify the feasibility of potential road network.

Further to the Phase 2 Transportation Report and following consultation with Durham Region and other agencies and stakeholders, additional analysis was undertaken on alternative transportation solutions as part of the T.M.P. process. The Phase 2 Transportation Report Addendum (**Appendix C**), documents alternative solutions and analysis to assess infrastructure needs to support the emerging growth scenario and supersedes the analysis presented in **Appendix B**.

The following sections document the alternative solutions considered as part of the T.M.P. process following Phases 1 and 2 of the Municipal Class Environmental Assessment process.

It is noted that all maps presented in this section use previous versions of the draft road network and land uses. The intent of the maps is to illustrate the location of improvements identified in each scenario for network modelling purposes.

4.1 Base Case Scenarios

Two base case scenarios are considered for prior to identifying alternative road network scenarios, and to inform a revised Problem and Opportunity Statement in accordance with the Master Plan approach following Phases 1 and 2 of the Municipal Class Environmental Assessment process.

4.1.1 Columbus Development Base Case

The Base Case for further alternative scenario testing is based upon the previous Land Use and Road Alternative 1, documented in the Phase 2 Report (**Exhibit 4-1**). This includes the proposed development of the Part II Plan Area and the proposed Type C Arterial and collector road network. One exception is the potential connection to Ritson Road North, which is

considered in the new transportation alternatives documented later in this report. There is also a future intersection improvement at Columbus Road and Ritson Road North to realign the approaches.

The v/c ratios in the Base Case show significant congestion on Simcoe Street North south of Columbus Road, on Columbus Road west of Simcoe Street North, and on Thornton Road North at Winchester Road as shown in **Exhibit 4-2**.

The Base Case scenario avoids any major transportation network improvements which are outside of the Part II Plan Area, and thus represents a minimum transportation network which may be implemented through development.

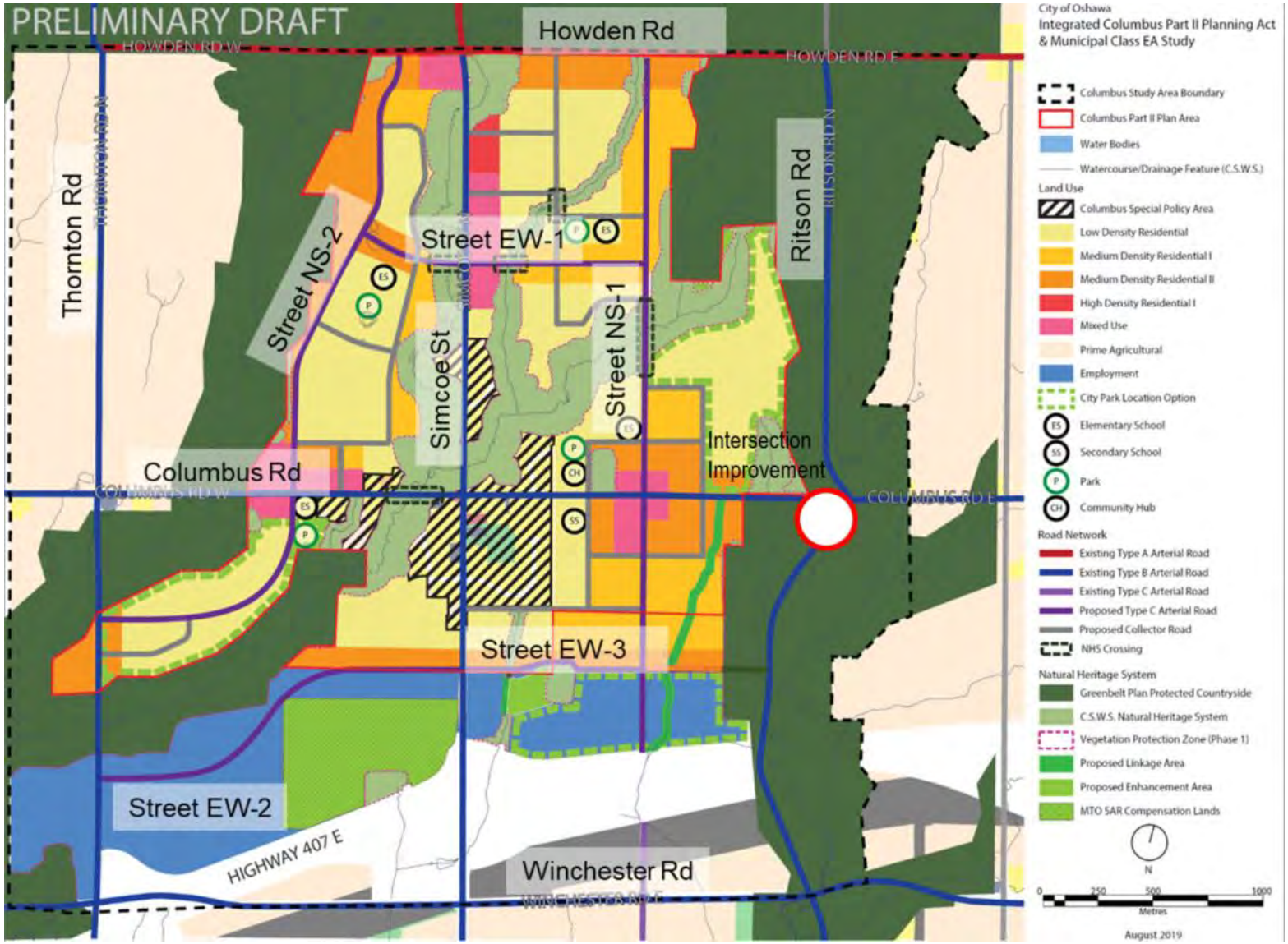


Exhibit 4-1: 2031 Base Case (Previous Land Use and Road Alternative 1)

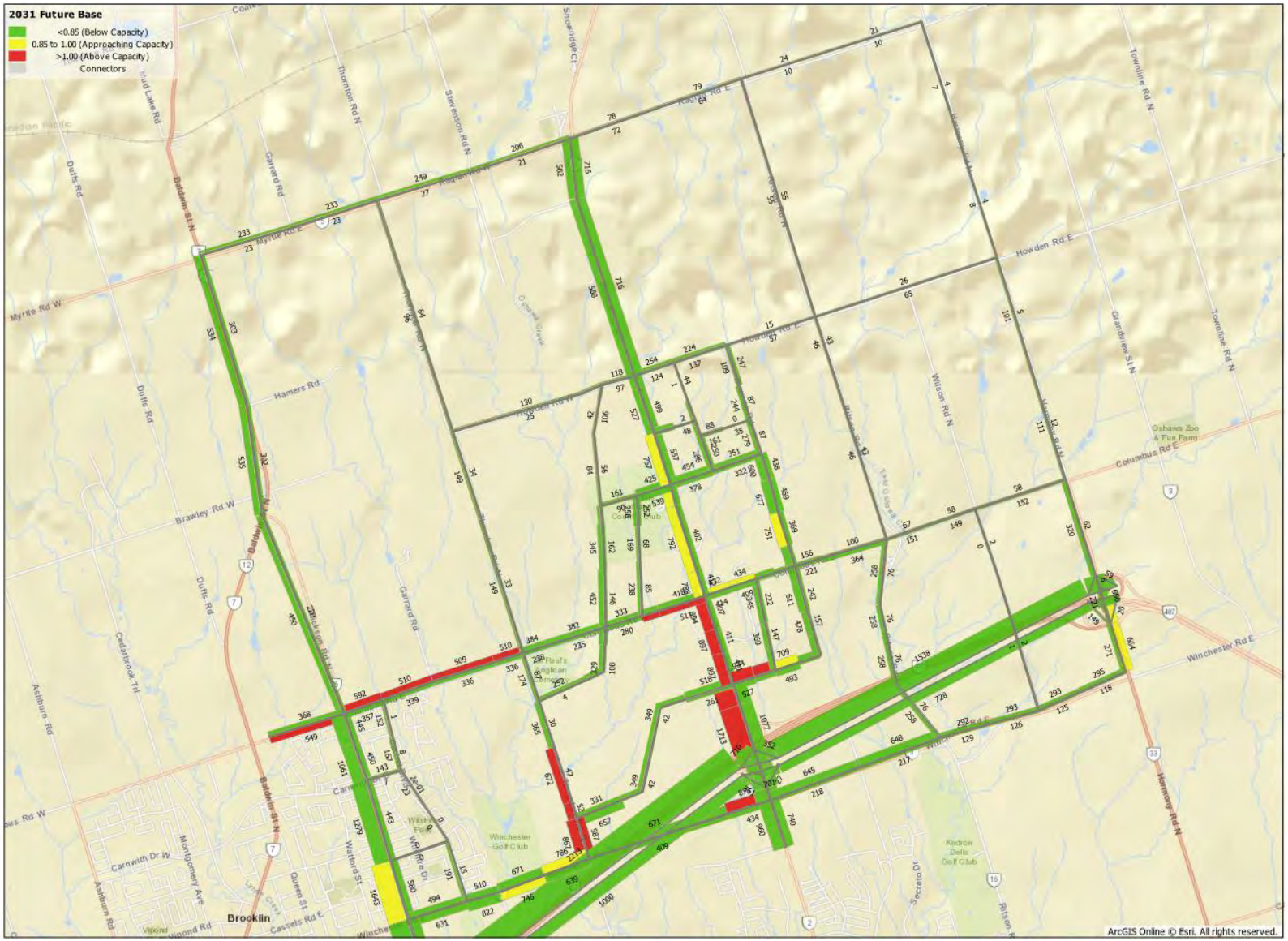


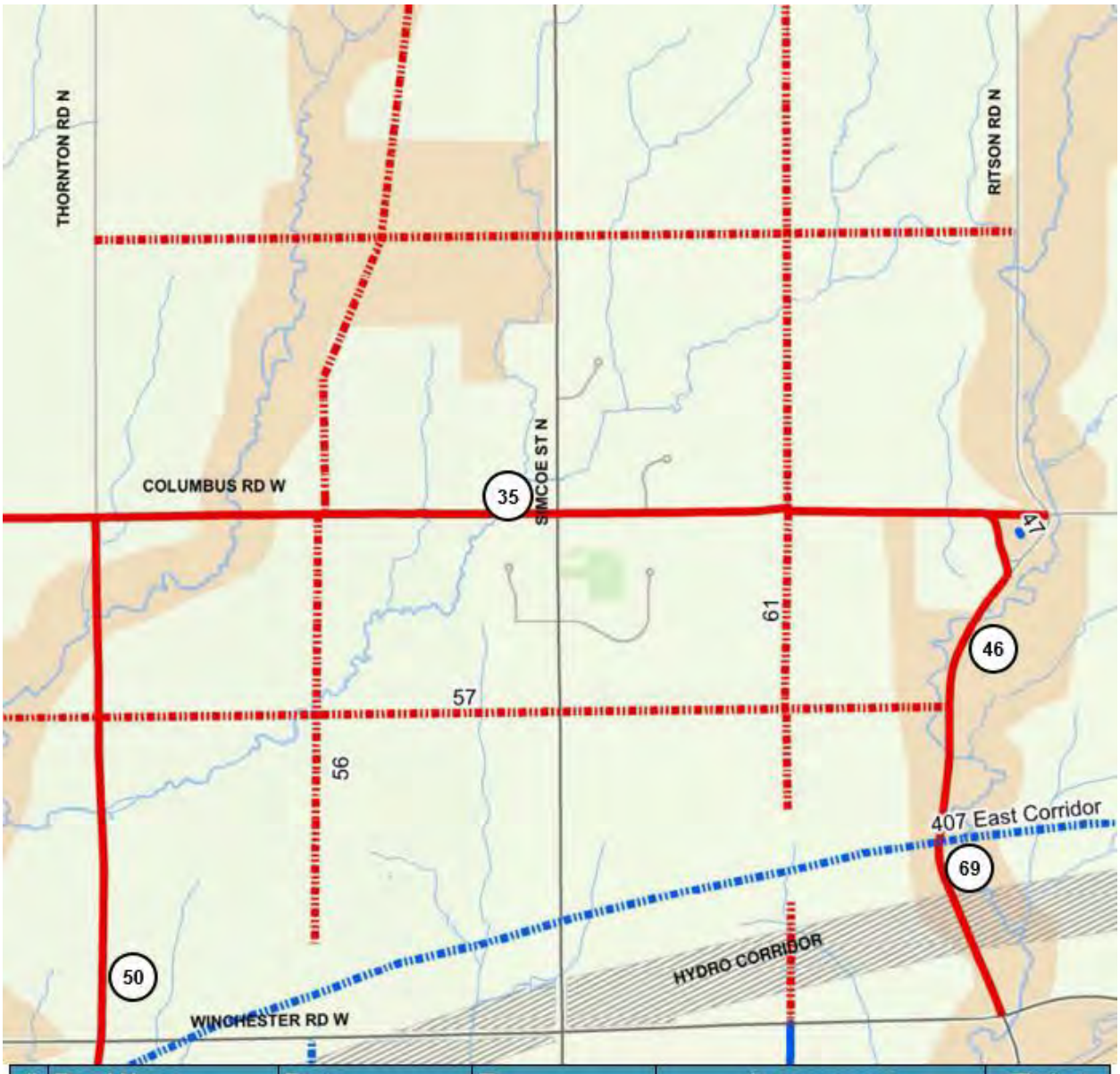
Exhibit 4-2: 2031 Base Case EMME V/C Ratios

4.1.2 I.T.M.P. Base Case

The I.T.M.P. base improvements scenario includes the three road improvement projects which improve existing roadways identified in Oshawa's I.T.M.P., plus the widening of Simcoe Street North from Street E.W.-2 / E.W.-3 southerly as shown in **Exhibit 4-3** and **Exhibit 4-4**, respectively. The road improvements include reconstruction of the following connections within the Study Area:

- Ritson Road North between Columbus Road and Winchester Road
- Thornton Road North between Columbus Road and Winchester Road
- Columbus Road between Ritson Road North and the western City limits

A volumes plot of this scenario is shown in **Exhibit 4-5**. Compared to the Base Case Scenario, the I.T.M.P. scenario relieves some congestion along Columbus Road and Simcoe Street North. However, capacity issues still exist, particularly on Simcoe Street North through the Study Area but particularly south of Columbus Road, on Thornton Road North south of Street N.S.-2, and on Street E.W.-3 approaching Simcoe Street North from the east.



#	Road Name	From	To	Improvement	Timing
35	Columbus Rd W + E	West City Limits	Ritson Rd N	Rural to 2 Lane Urban Arterial	2024-2028
46	Ritson Rd	ARTC5	Columbus Rd E	Rural to 2 Lane Urban Arterial	2024-2028
50	Thornton Rd N	Britannia Ave W	Columbus Rd W	Rural to 2 Lane Urban Arterial	2024-2028
69	Ritson Rd N	Winchester Rd E	ARTC5	Rural to 2 Lane Urban Arterial	2029-2031

Exhibit 4-3. Oshawa I.T.M.P. Roadway Improvements on Existing Roadways

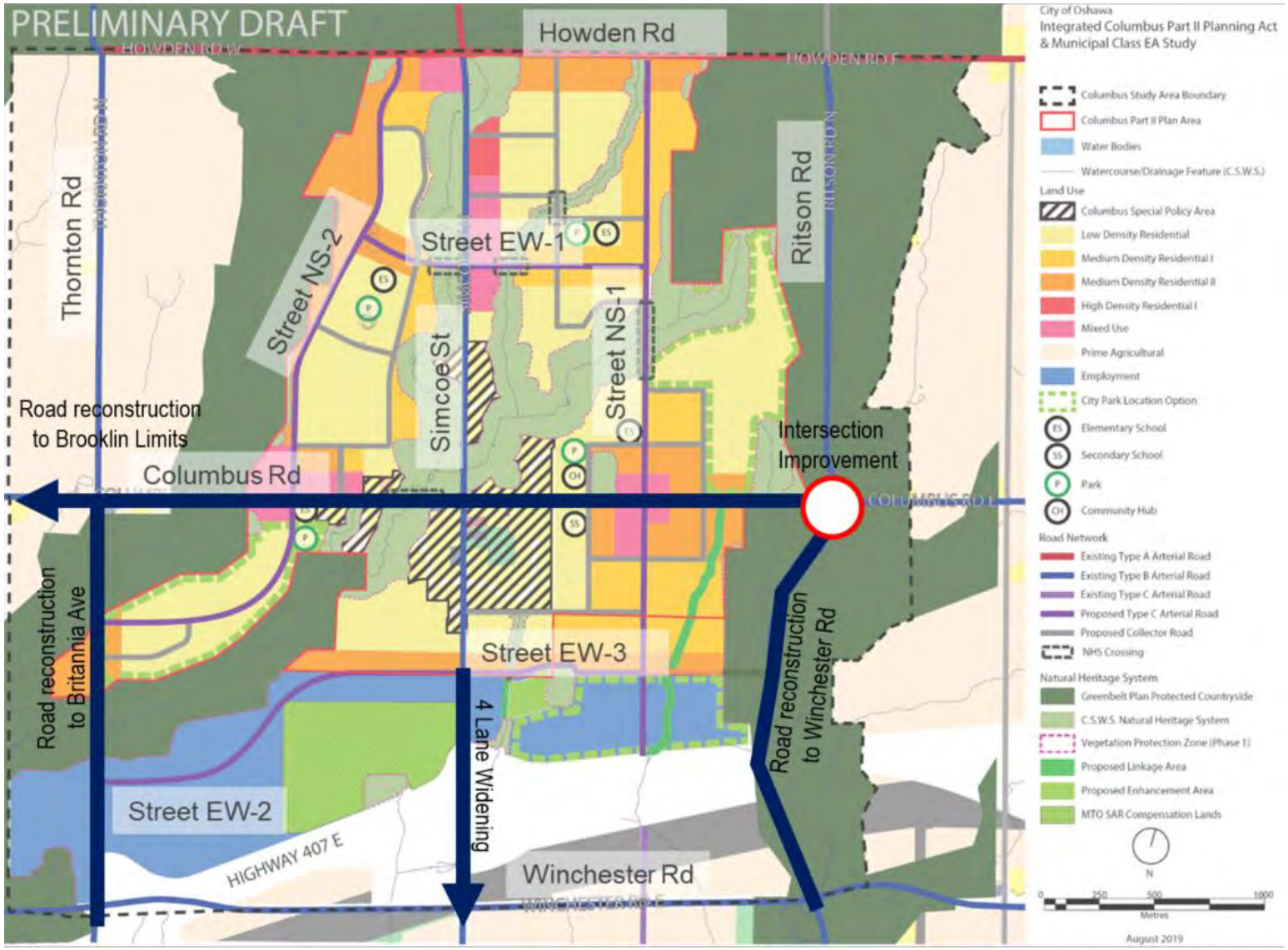


Exhibit 4-4. I.T.M.P. Scenario

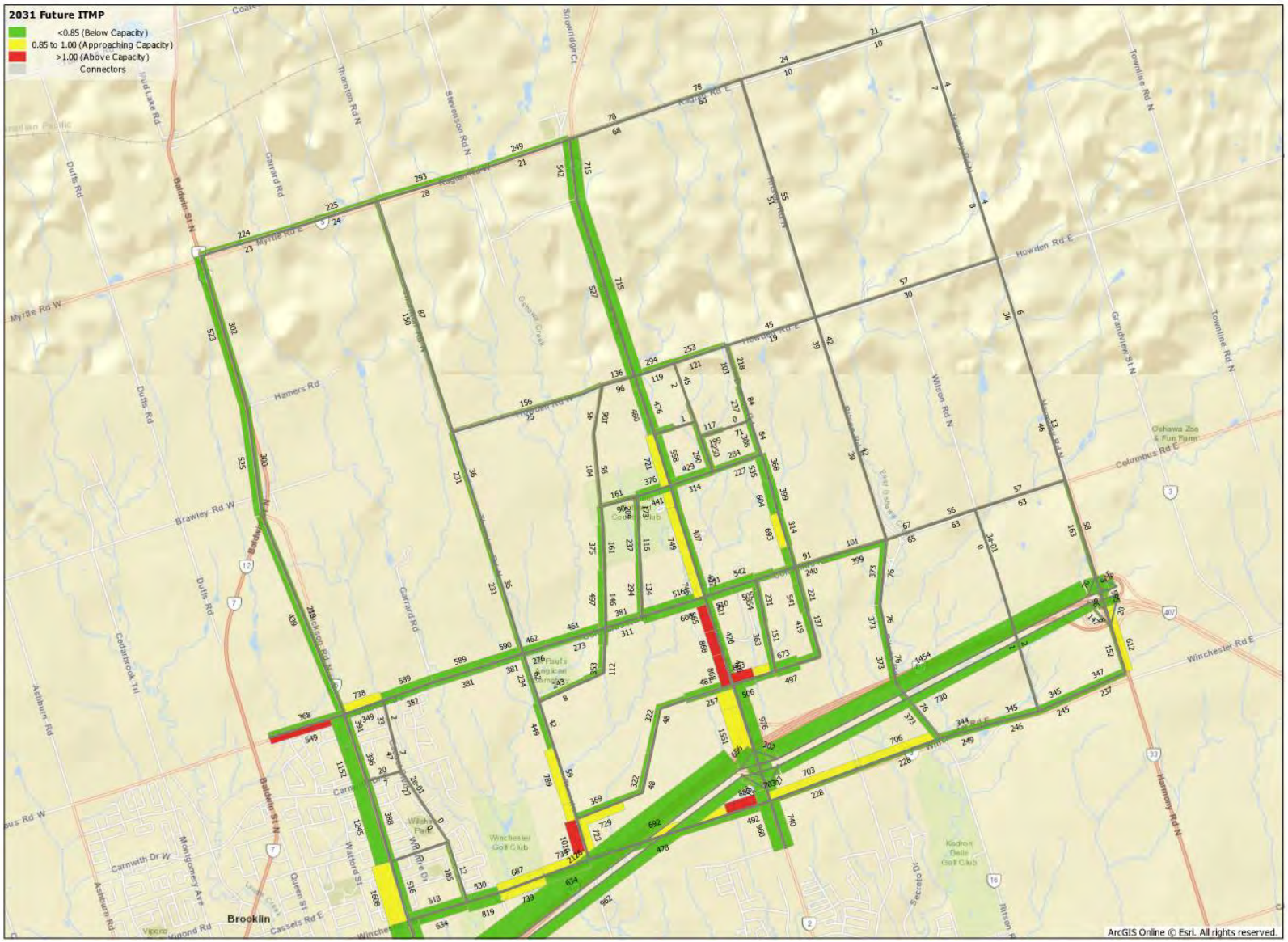


Exhibit 4-5. I.T.M.P. Scenario Emme V/C and Volumes Plot

4.2 Identification of Alternative Solutions

Alternative network scenarios are identified to address the Problem and Opportunity statement, considering any changes that may be recommended to the previously planned road system identified in the Region's Official Plan, and to assess the potential need for a continuous Simcoe Street North by-pass and thus a modification to the Regional Road network.

4.2.1 Alternative Groupings

A series of network alternatives were identified to support the planning for the Part II Plan area. The alternatives have been categorized into five network "families" as described below:

1. New Greenbelt crossings
2. South screenline improvements
3. West screenline improvements
4. Combined alternatives
5. Preliminary preferred combined alternative versus Simcoe By-pass options

The first three network families (**Alternative 1 to 3**) build upon the Columbus Development Base Case to address specific needs including Greenbelt crossings, improvements to the south screenline and the west screenline.

The fourth family (**Alternative 4**) investigates combinations of effective sub-options from the first three network families, identifying a preliminary preferred combined alternative.

The fifth family (**Alternative 5**) tests the preliminary preferred combined alternative against Simcoe Street North Bypass options, which consider the need for a continuous Regional Road realignment and "by-pass" of the Columbus Special Policy Area.

4.3 Alternative 1 to 3 Identification and Assessment

4.3.1 Alternative 1: New Greenbelt Crossings

The Alternative 1 family of improvements considers new crossings of the Greenbelt Plan area.

Alternative 1a: Type C Arterial west of Simcoe Street North

Alternative 1a includes a Type C connection crossing the Greenbelt area between Street N.S.-2 and Street E.W.-2 as shown in **Exhibit 4-6.** This is a

new crossing identified specifically to divert new development traffic away from the Columbus Special Policy Area. A volumes plot of this alternative is shown in **Exhibit 4-7**.

Compared to the Base Scenario, the connection relieves congestion eastbound on Columbus Road east of Simcoe Street North and westbound on Columbus Road west of Thornton Road North. **The connection provides an important alternative route to Simcoe Street North**.

Alternative 1b: Type C Arterial Connection to Thornton Road North

Alternative 1b includes the western extension of Type-C Street E.W.-1 to Thornton Road North north of Columbus Road as shown in **Exhibit 4-8**. This connection was previously identified in the Durham Region and City of Oshawa Official Plans and the Oshawa I.T.M.P. The volumes plot in **Exhibit 4-9** shows that **this new connection does not provide any significant improvements to congestion on the network**.

Alternative 1c: Type C Arterial Connection to Ritson Road North

Alternative 1c includes the eastern extension of Type-C Street E.W.-1 to Ritson Road North north of Columbus Road as shown in **Exhibit 4-10**. This connection was previously identified in the Durham Region and City of Oshawa Official Plans and the Oshawa I.T.M.P. The volumes plot in **Exhibit 4-11** shows that **this new connection does not provide any significant improvements to congestion on the network**.

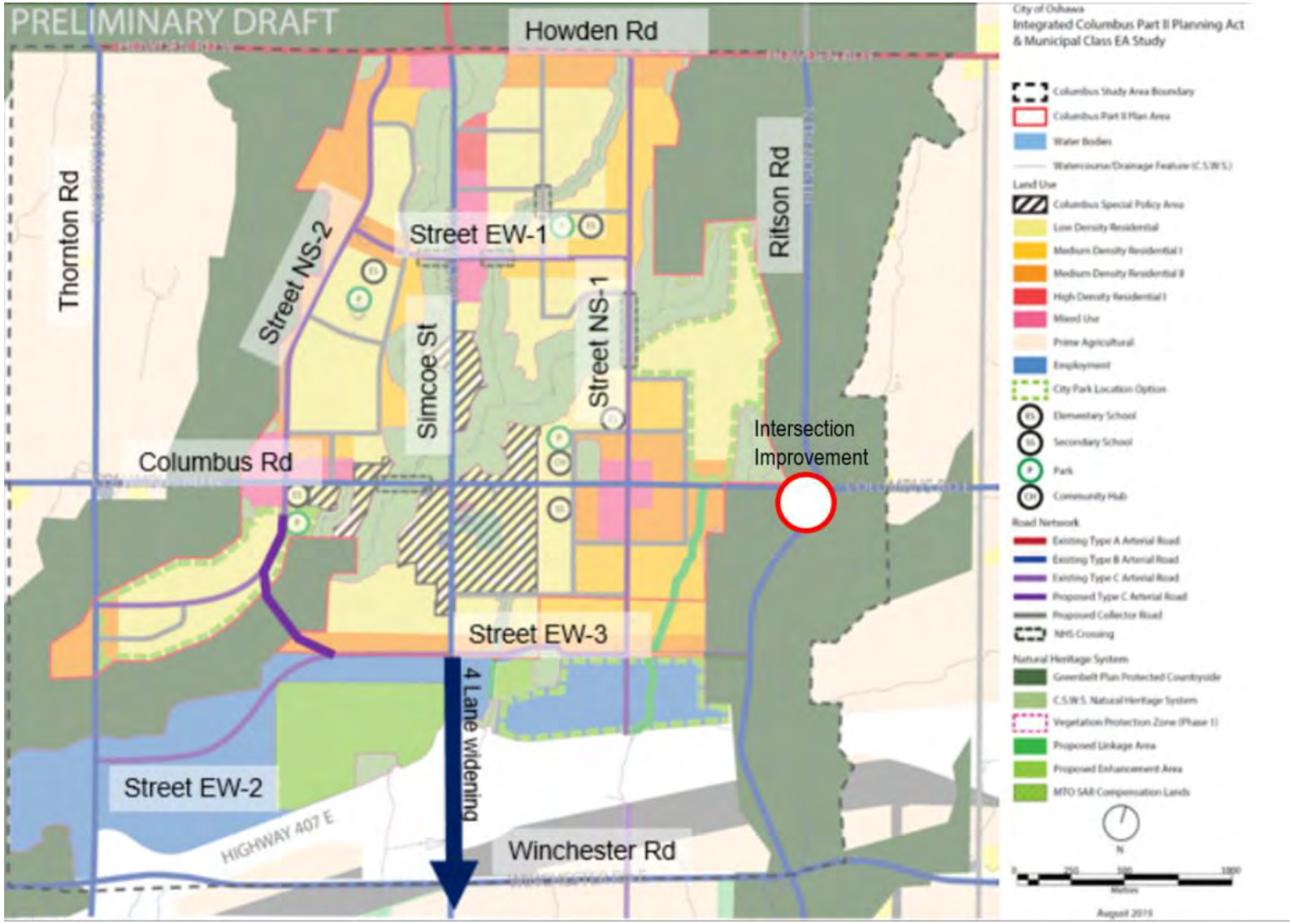


Exhibit 4-6. Alternative 1a

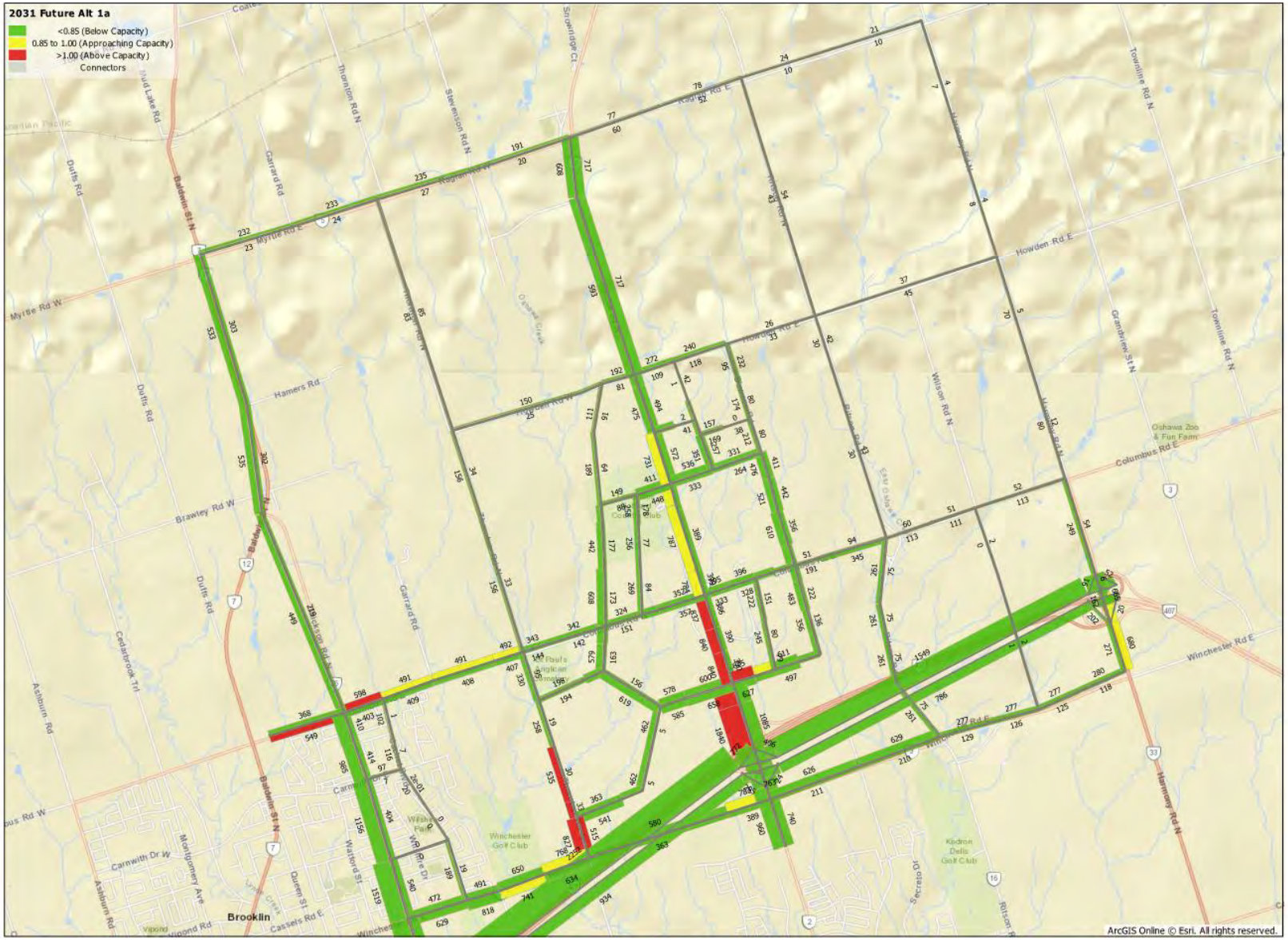


Exhibit 4-7. Alternative 1a EMME V/C and Volumes Plot

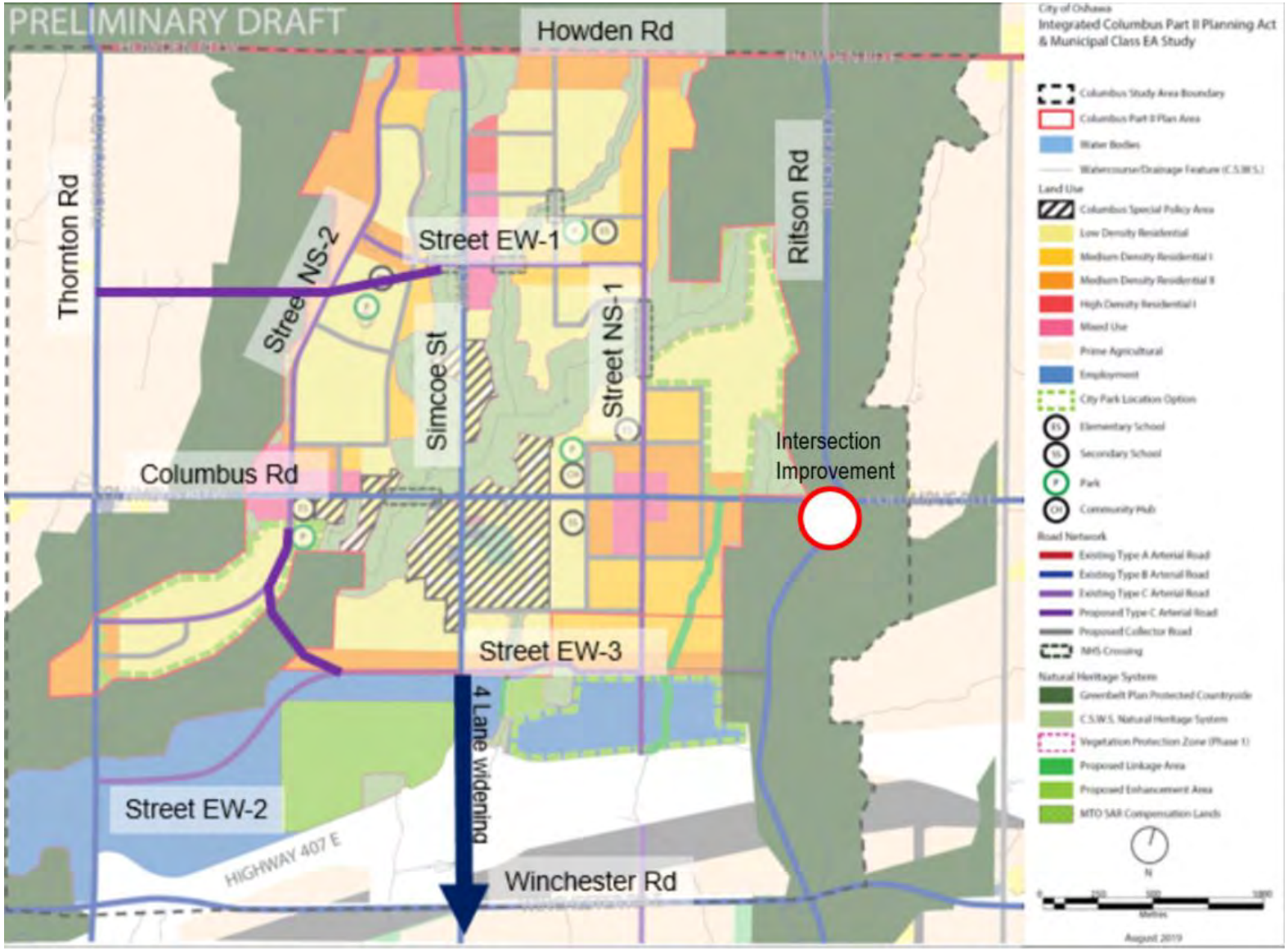


Exhibit 4-8. Alternative 1b

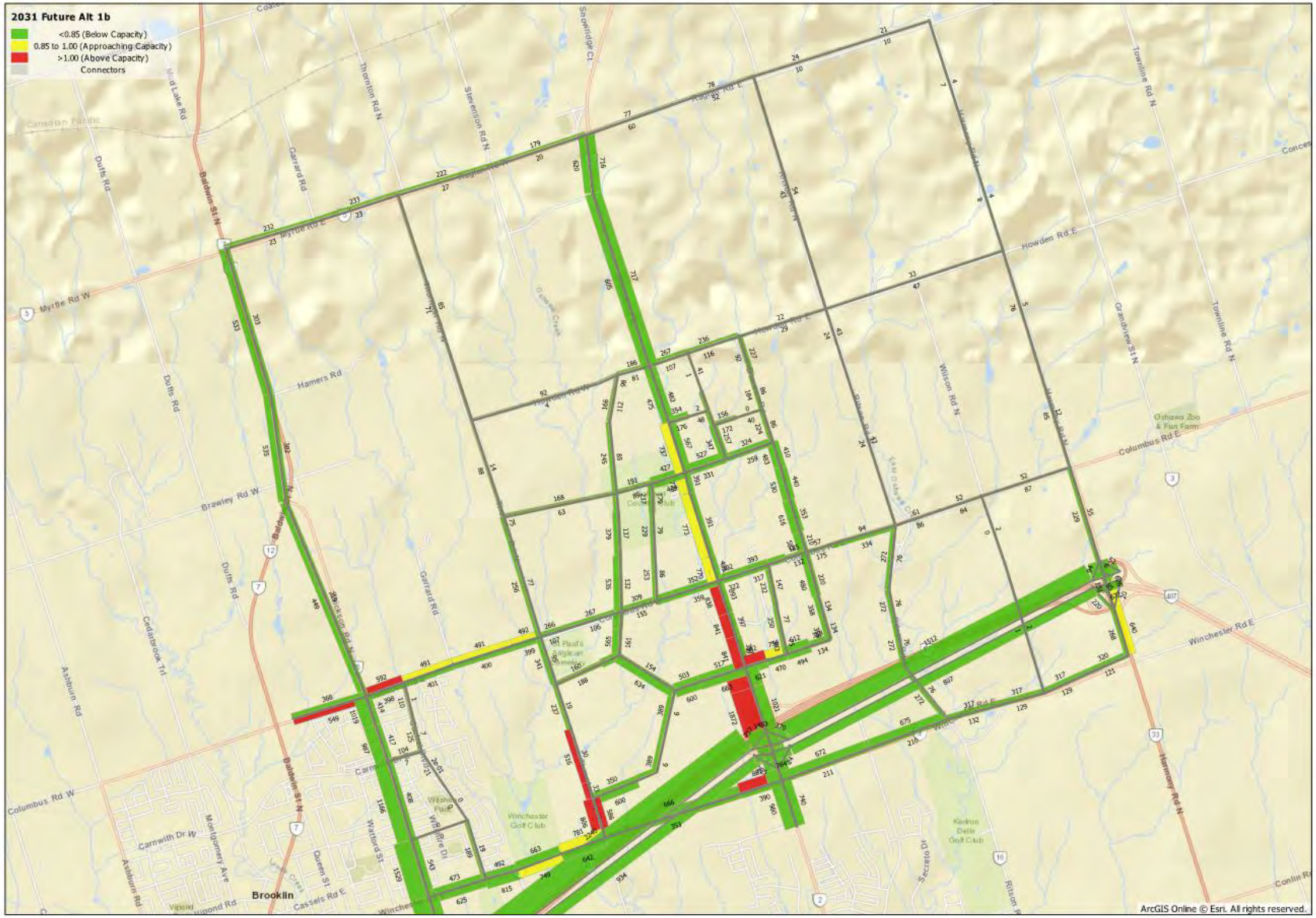


Exhibit 4-9. Alternative 1b EMME V/C and Volumes Plot

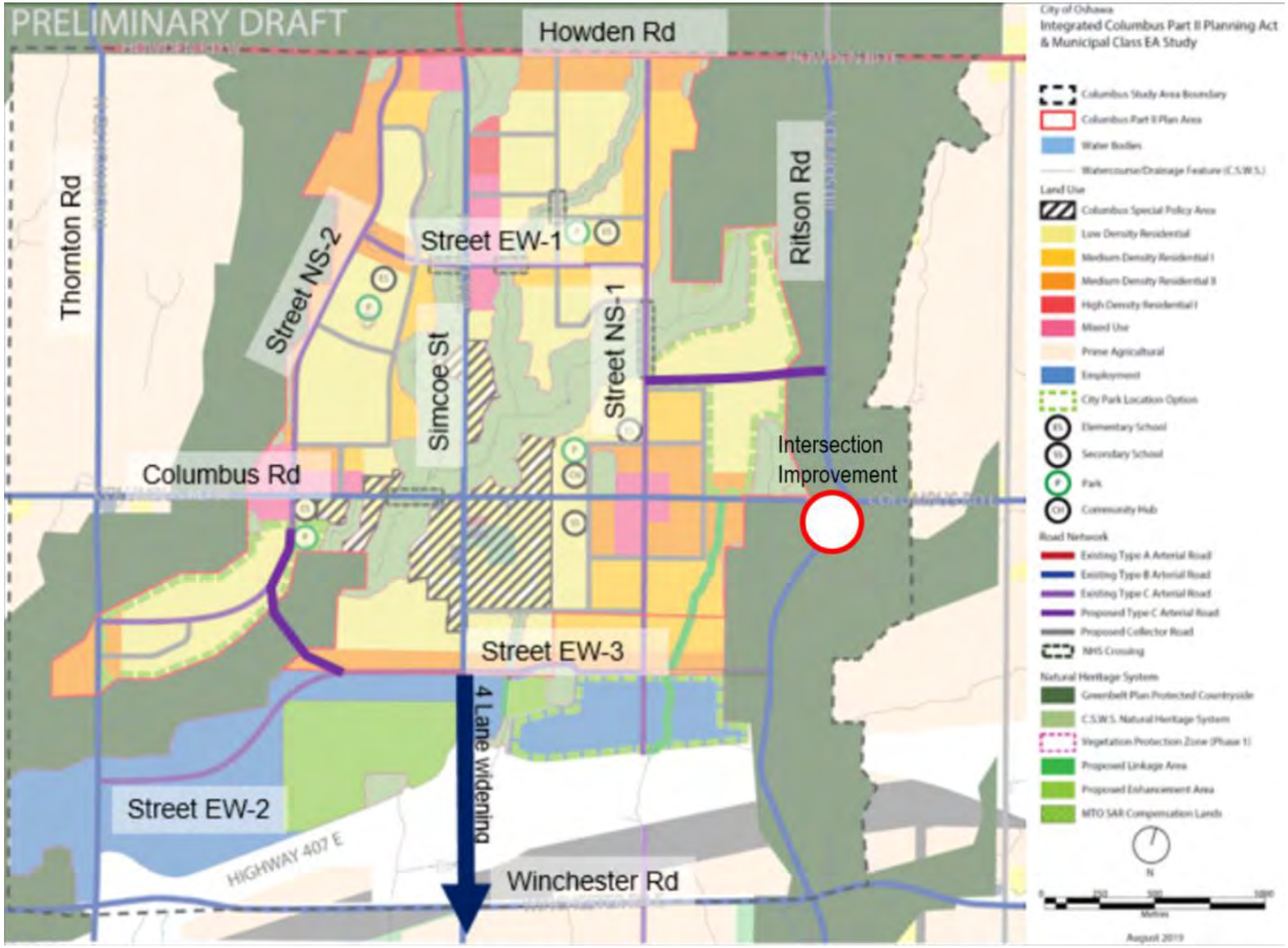


Exhibit 4-10. Alternative 1c

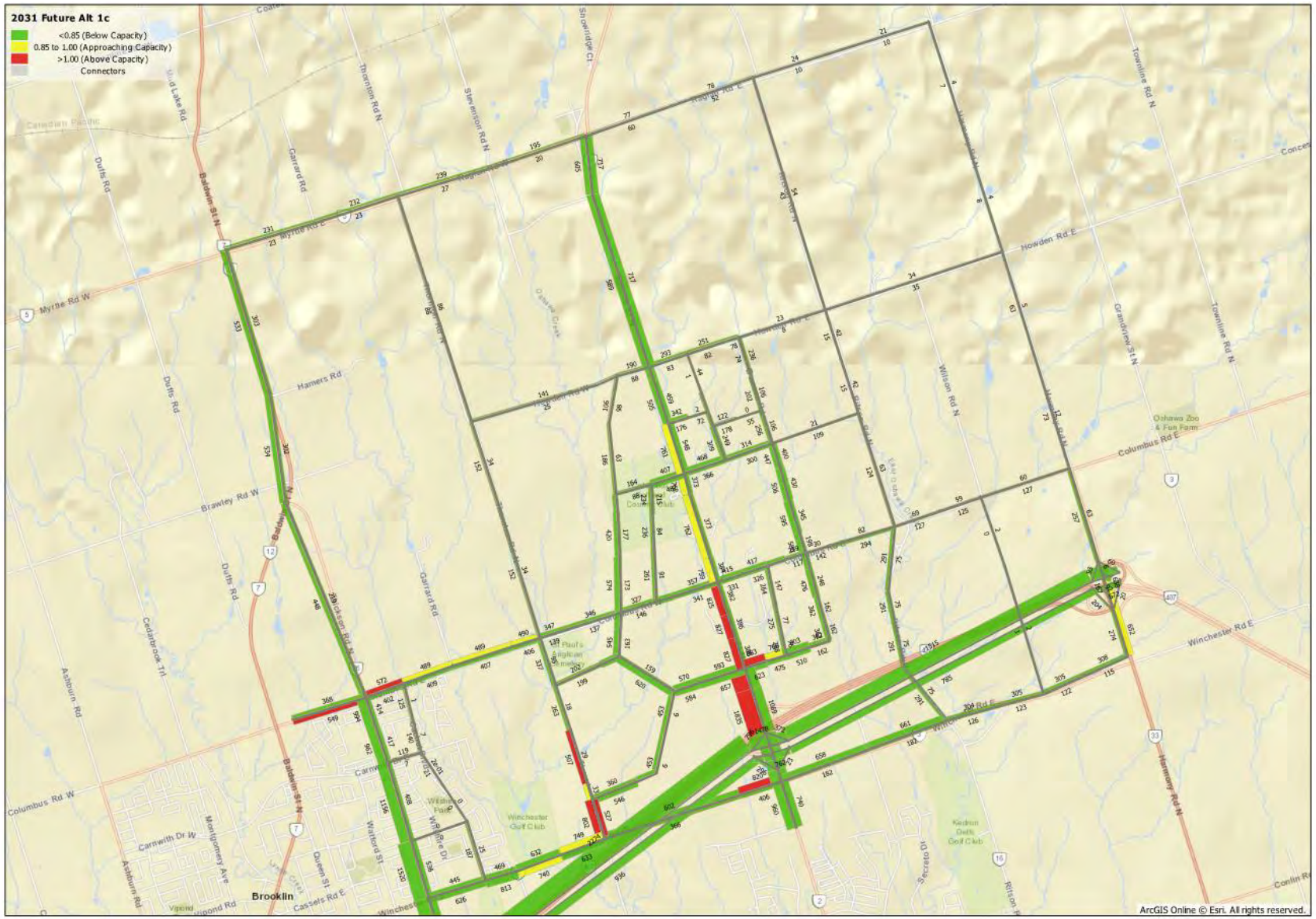


Exhibit 4-11. Alternative 1c EMME V/C and Volumes Plot

4.3.2 Alternative 2: South Screenline Improvements

Building on Alternative 1, additional improvements to the south screenline north of Highway 407 East are addressed. Three alternatives were considered:

- Alternative 2a: Extension of Street N.S.-1 Type C Arterial over Highway 407 East (consistent with deferral D.5 in the Oshawa Official Plan)
- Alternative 2b: Extension of Street E.W.-3 Type C Arterial to Ritson Road North
- Alternative 2c: Widening of Thornton Road North south of Street N.S.-2 from 2 to 4 lanes, extension of Street N.S.-1 southerly and easterly to Ritson Road North, and reconstruction of Ritson Road North to improve capacity

Based on this analysis, Alternative 2c appears to effectively address south screenline capacity needs without the need for a new Highway 407 East flyover.

Alternative 2a: New Highway 407 Crossing

Alternative 2a includes an extension of the Type-C Street N.S.-1, serving as a midblock crossing of Highway 407 East between Simcoe Street North and Ritson Road North as shown in **Exhibit 4-12**. A V/C ratio plot of this alternative is shown in **Exhibit 4-13**.

This alternative effectively relieves congestion on Simcoe Street North, but does not address capacity constraints on Thornton Road North.

Alternative 2b: New Connection to Ritson Road North

Alternative 2b includes an extension of Type-C Street E.W.-3 to Ritson Road North as shown in **Exhibit 4-14**. A volumes plot for this alternative is shown in **Exhibit 4-15**.

This alternative primarily diverts vehicles away from using Columbus Road to access Ritson Road North but **does not effectively address the congestion on Simcoe Street North**.

Alternative 2c: Thornton Widening and Revised Ritson Road North Connection

Alternative 2c includes a combination of improvements shown in **Exhibit 4-16** with predicted EMME v/c ratios in **Exhibit 4-17.** The Ritson Road North connection appears to be more effective when aligned with Street N.S.-1 plus

improvements to Thornton Road North and Ritson Road North. **This alternative effectively addresses the need for south screenline improvements**.

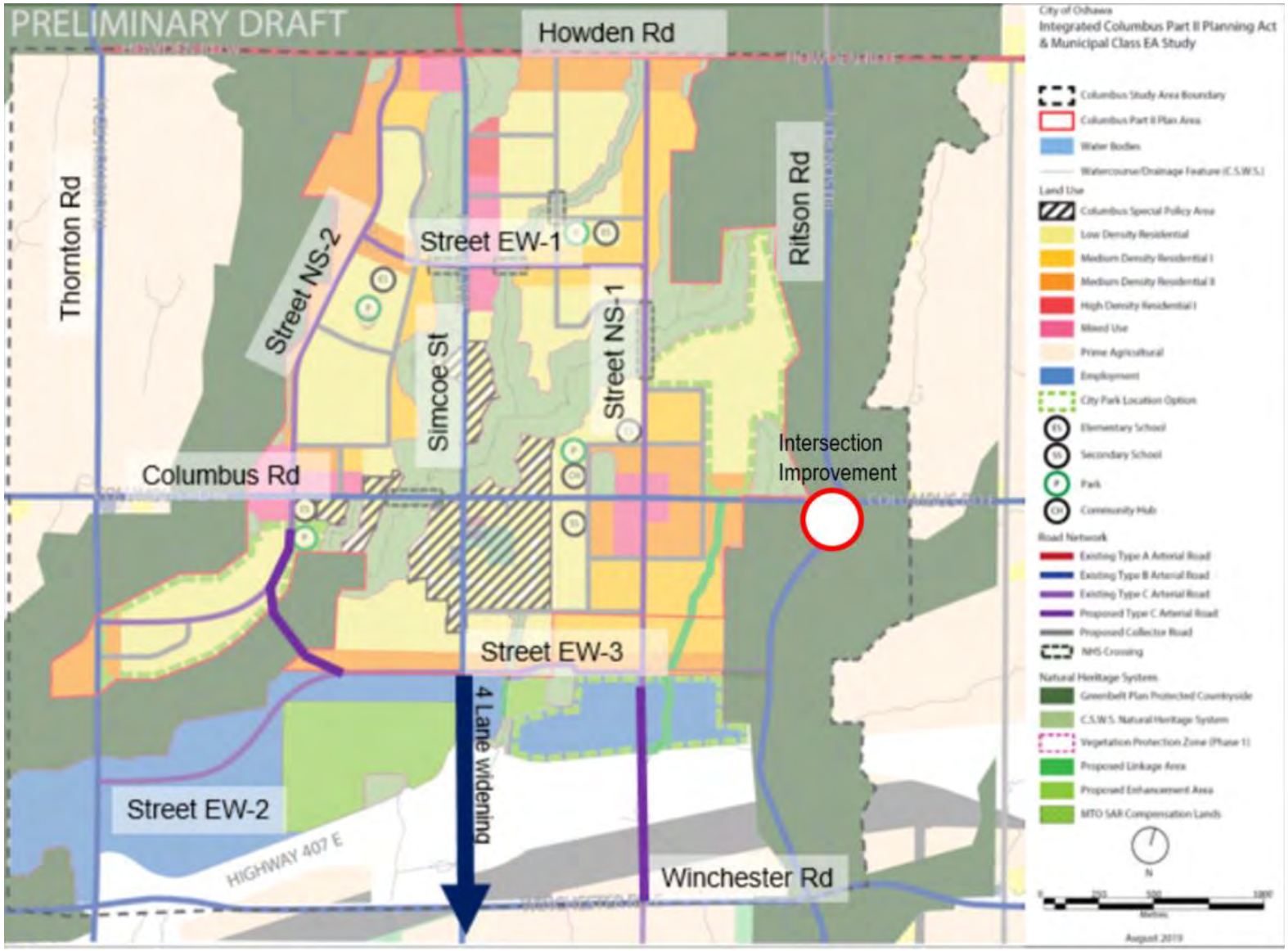


Exhibit 4-12. Alternative 2a

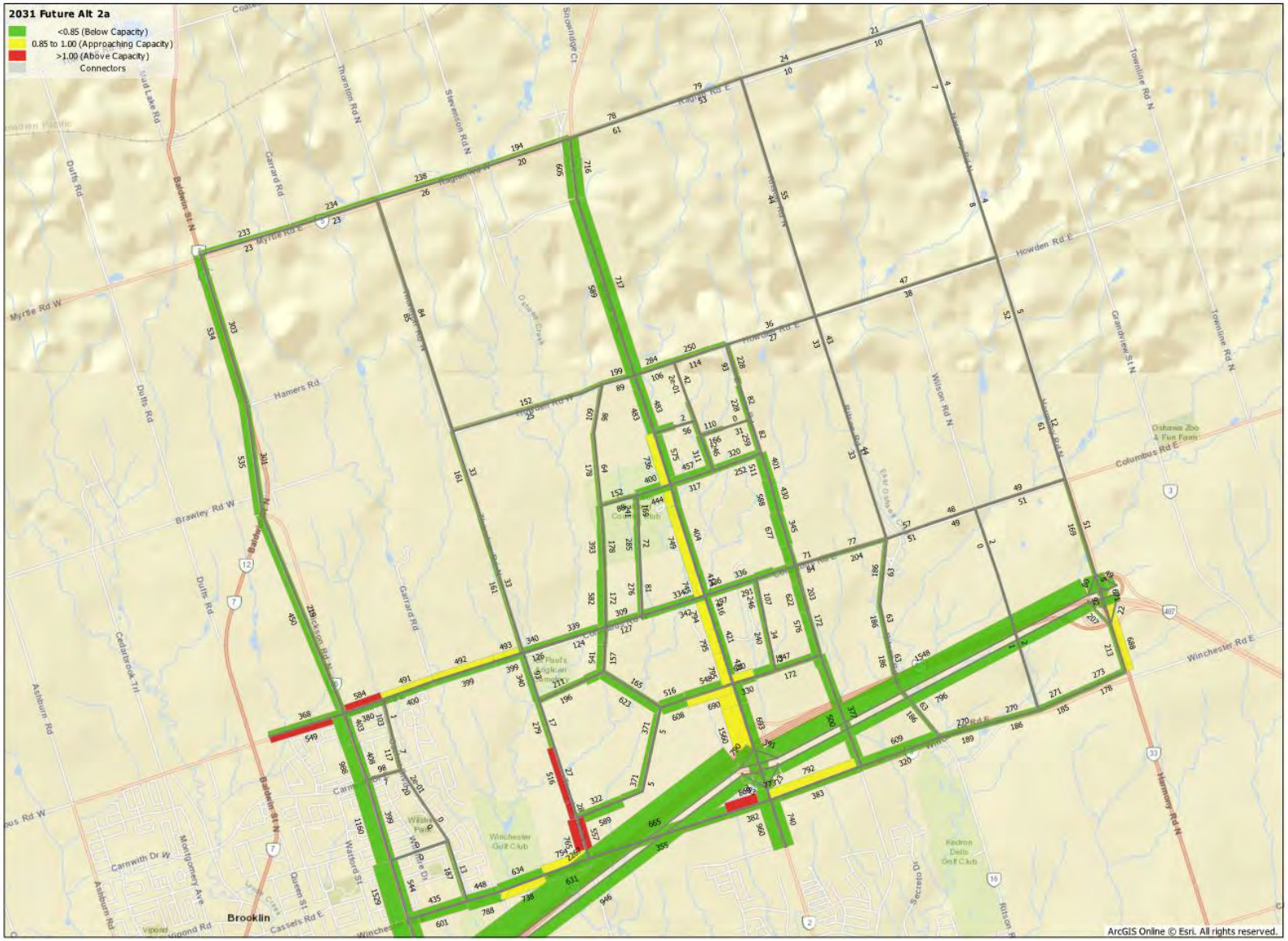


Exhibit 4-13. Alternative 2a EMME V/C and Volumes Plot

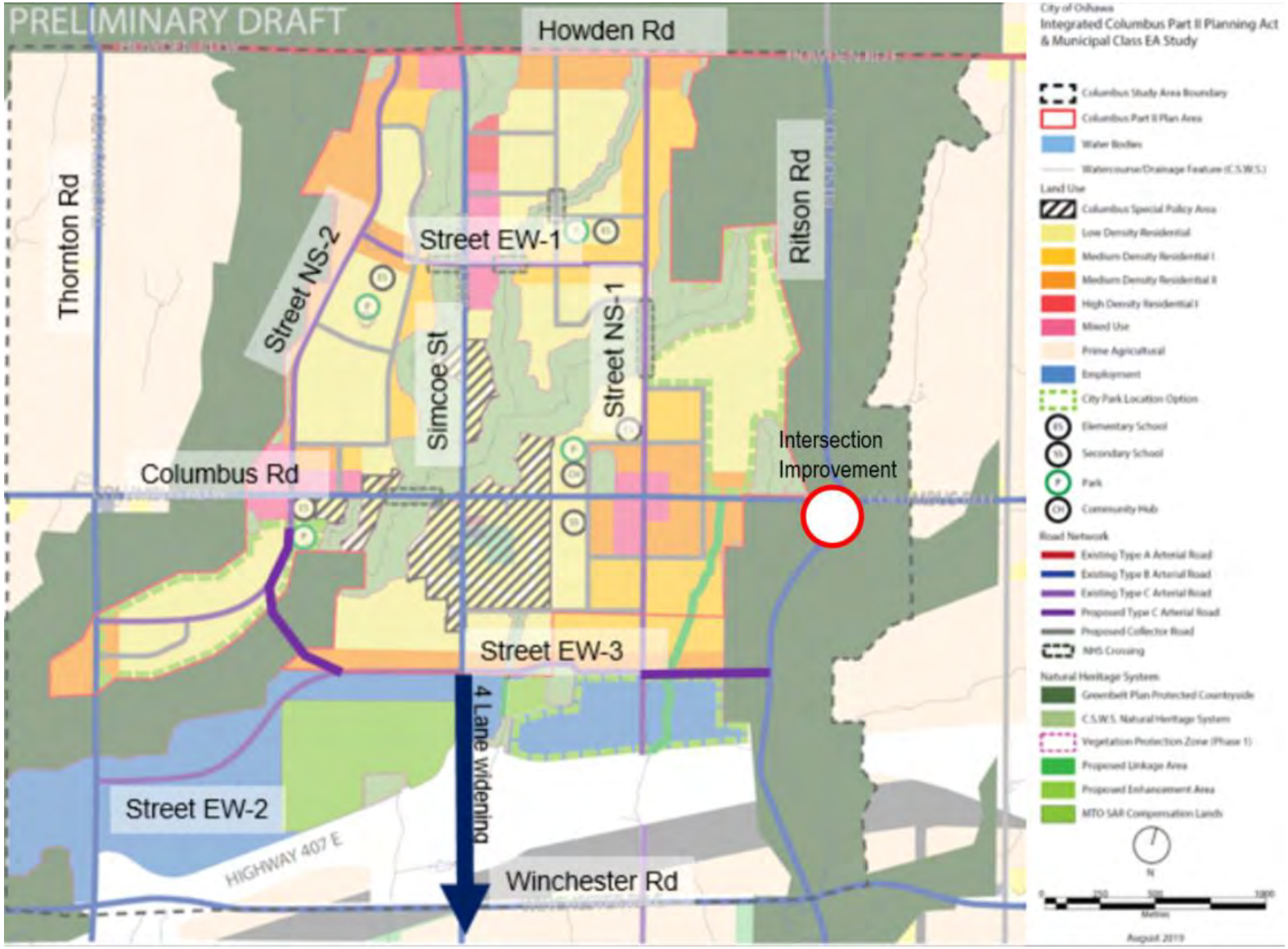


Exhibit 4-14. Alternative 2b

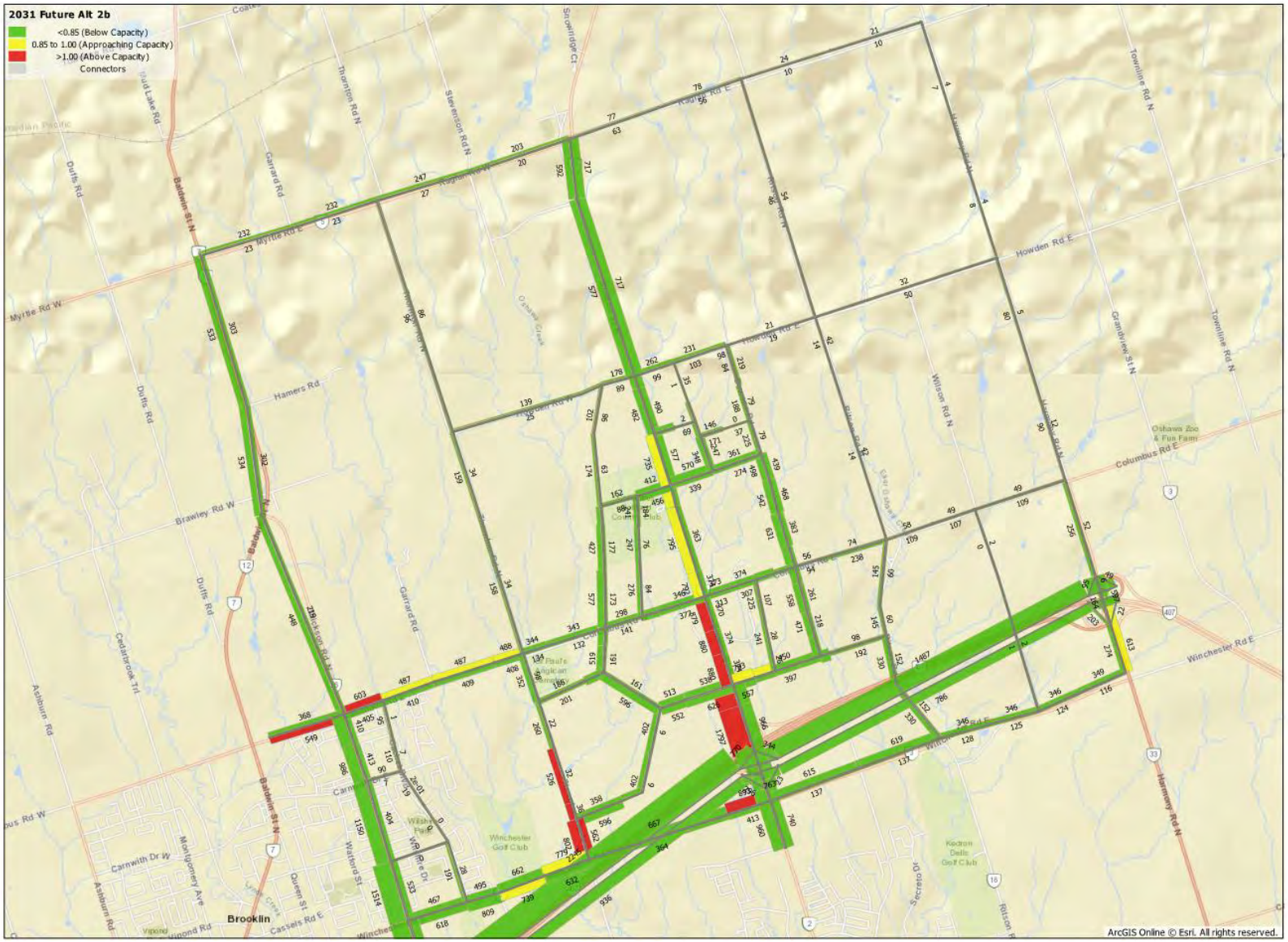


Exhibit 4-15. Alternative 2b EMME V/C and Volumes Plot

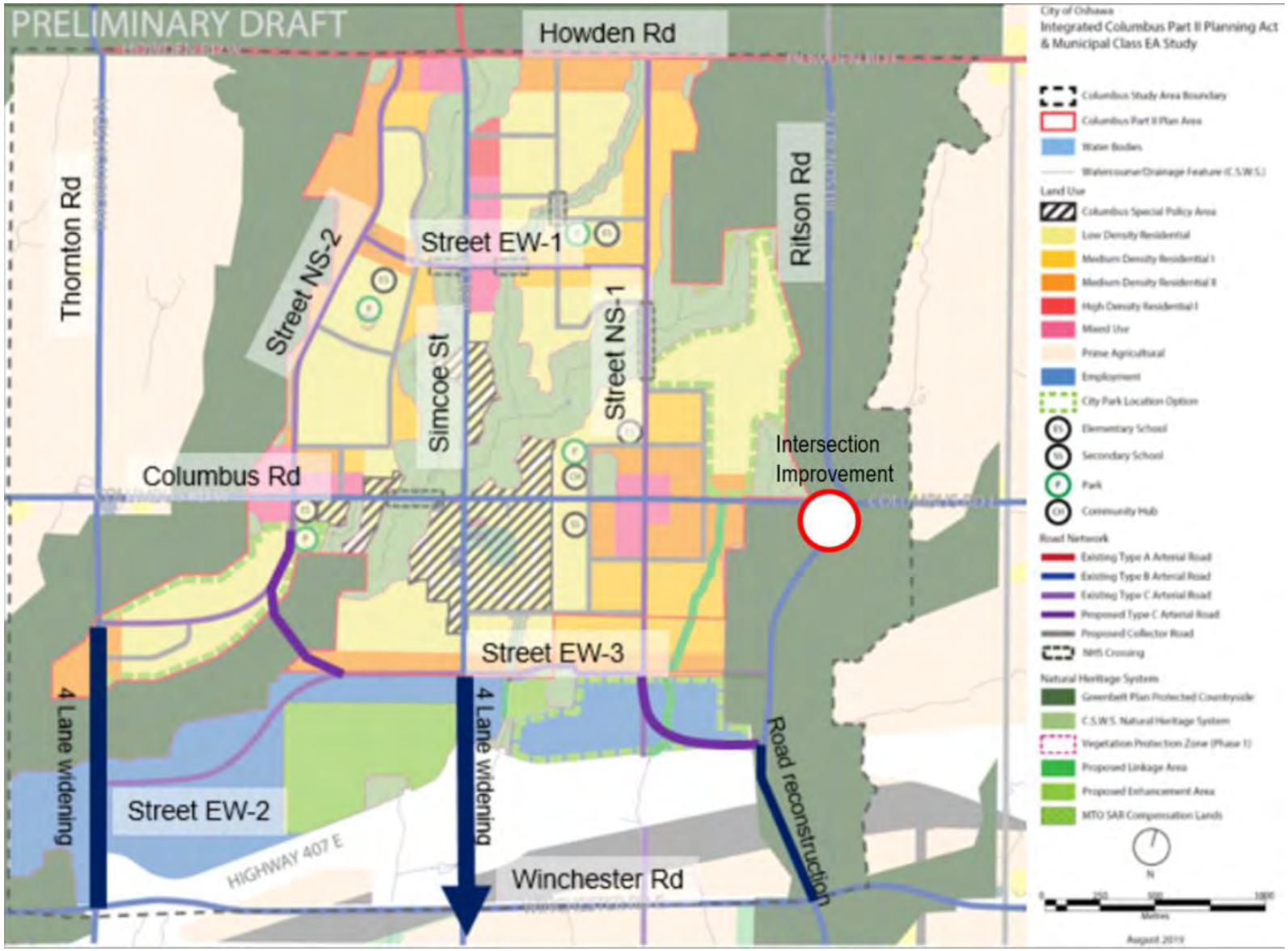


Exhibit 4-16. Alternative 2c

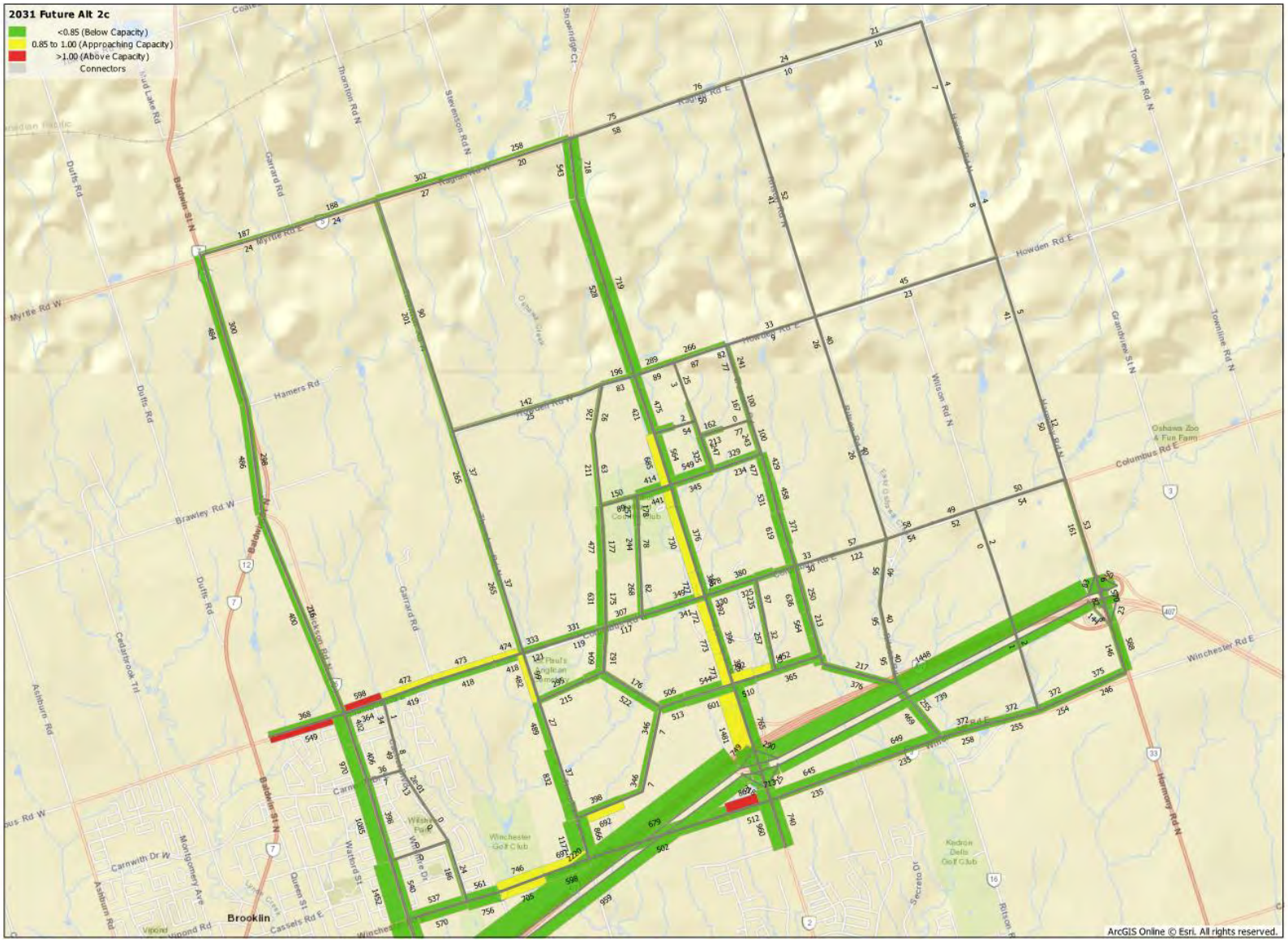


Exhibit 4-17. Alternative 2c EMME V/C and Volumes Plot

4.3.3 Alternative 3: West Screenline Improvements

Building on Alternatives 1 and 2, additional improvements to the west screenline beyond the Part II Plan Area are addressed. Two alternatives were considered:

- Alternative 3a: Extension of Street N.S.-2 Type C Arterial to Carnwith Drive in the Town of Whitby (as identified in the Durham Region and City of Oshawa Official Plans)
- Alternative 3b: Reconstruction of Columbus Road from east of Street N.S.-2 into the Town of Whitby

Based on the analysis presented below, both alternatives appear to address some capacity needs within the network and will be further assessed in combination with other alternatives.

Alternative 3a: Carnwith Drive Connection

Alternative 3a consists of the extension of Type-C Street N.S.-2 to Carnwith Drive as shown in **Exhibit 4-18**, avoiding the TransCanada Pipeline where possible and minimizing environmental impacts.

As shown in **Exhibit 4-19**, the **Carnwith Drive extension relieves congestion westbound along Columbus Road and southbound along Thornton Road North**. It is noted however that west of the Study Area within the Town of Whitby and community of Brooklin, Columbus Road is congested.

Alternative 3b: Columbus Road Reconstruction

Alternative 3b features a road reconstruction of Columbus Road from east of Street N.S.-2 to the Brooklin limits shown in **Exhibit 4-20**, consistent with the I.T.M.P. recommendation. Intersection improvements along with potential vertical or horizontal road profile alignment improvements can effectively increase capacity for this segment of road. A volumes plot is shown in **Exhibit 4-21** and it shows that **these minor capacity improvements can relieve projected congestion along Columbus Road**.

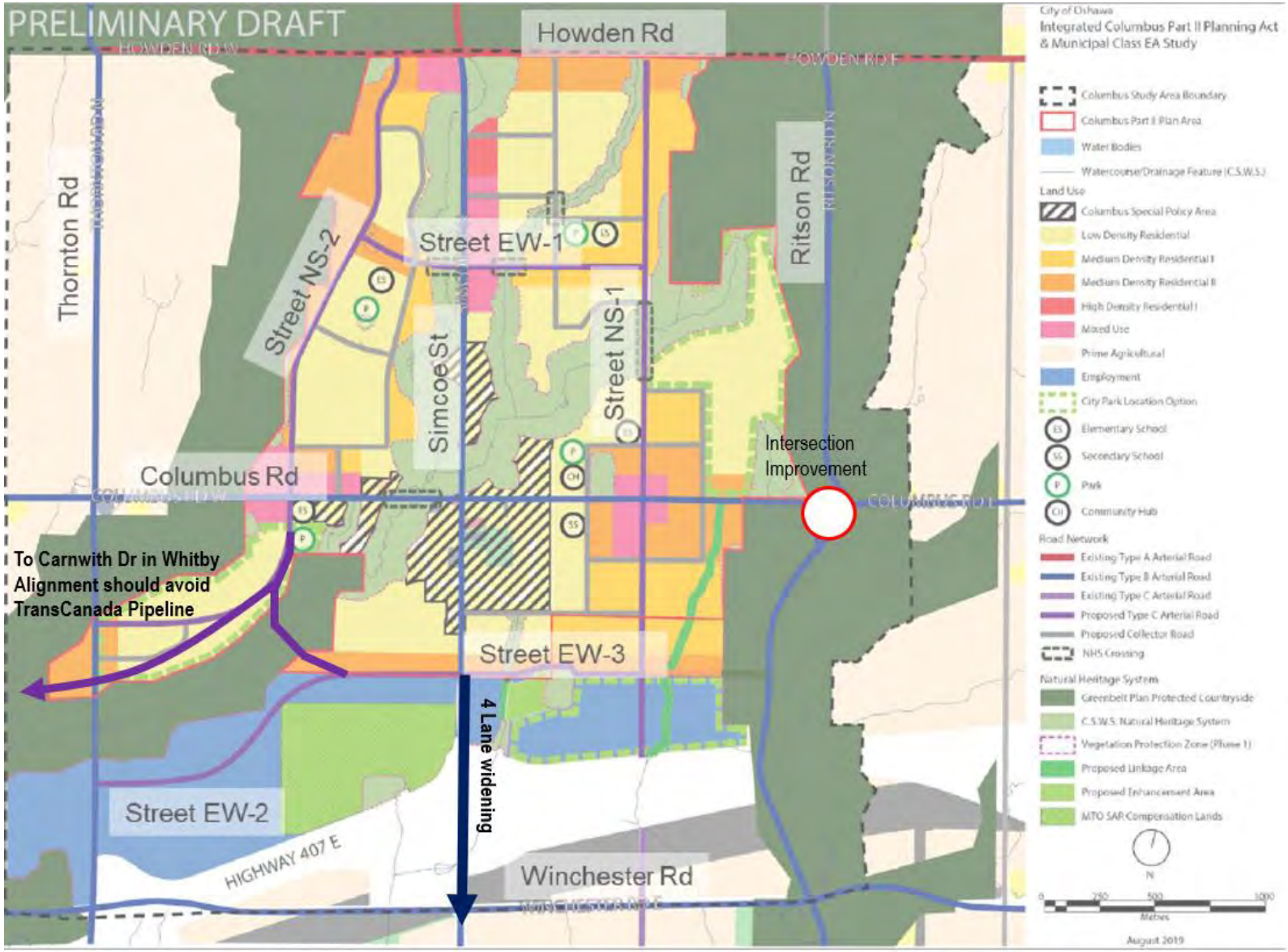


Exhibit 4-18. Alternative 3a

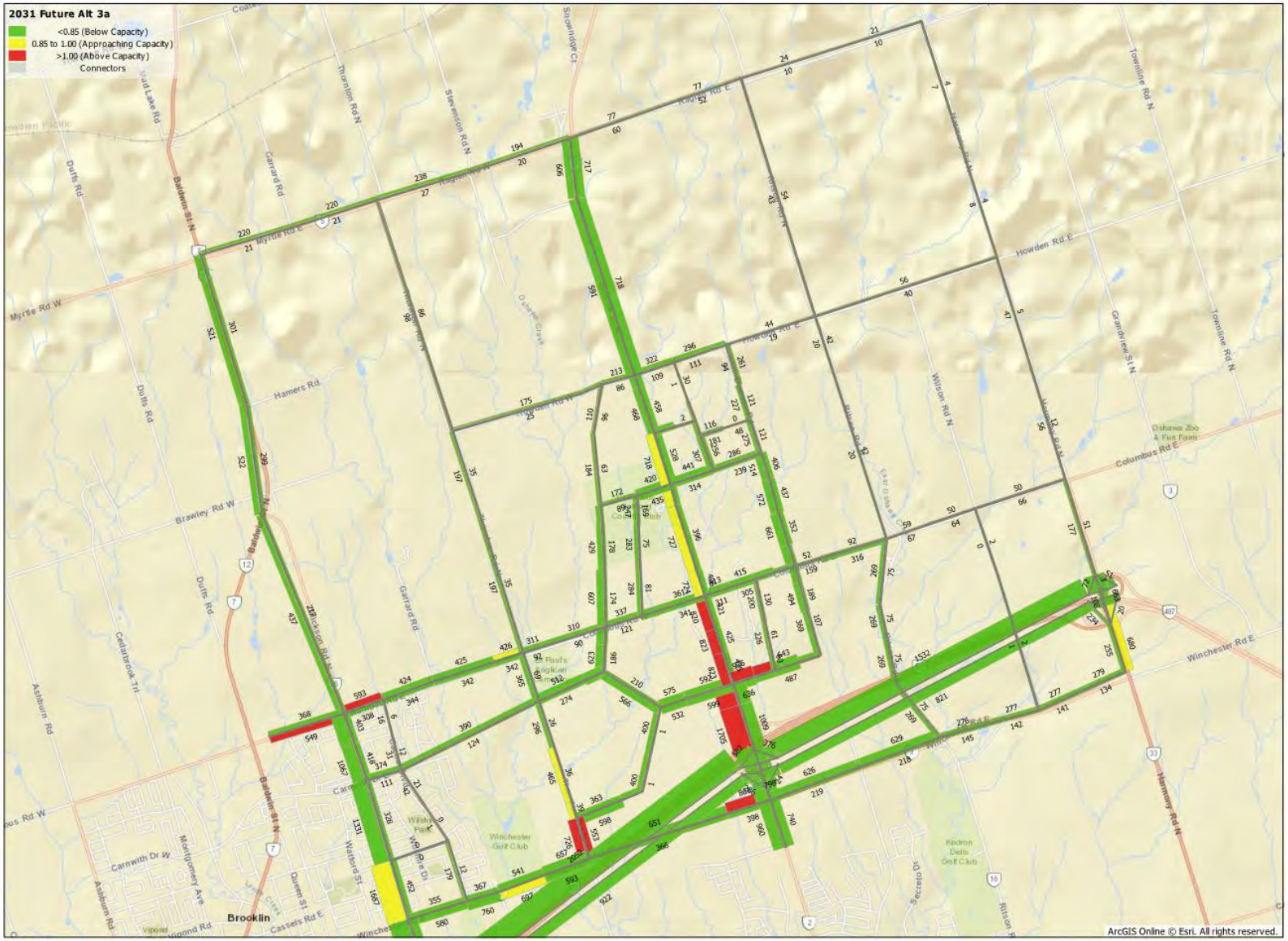


Exhibit 4-19. Alternative 3a EMME V/C and Volumes Plot

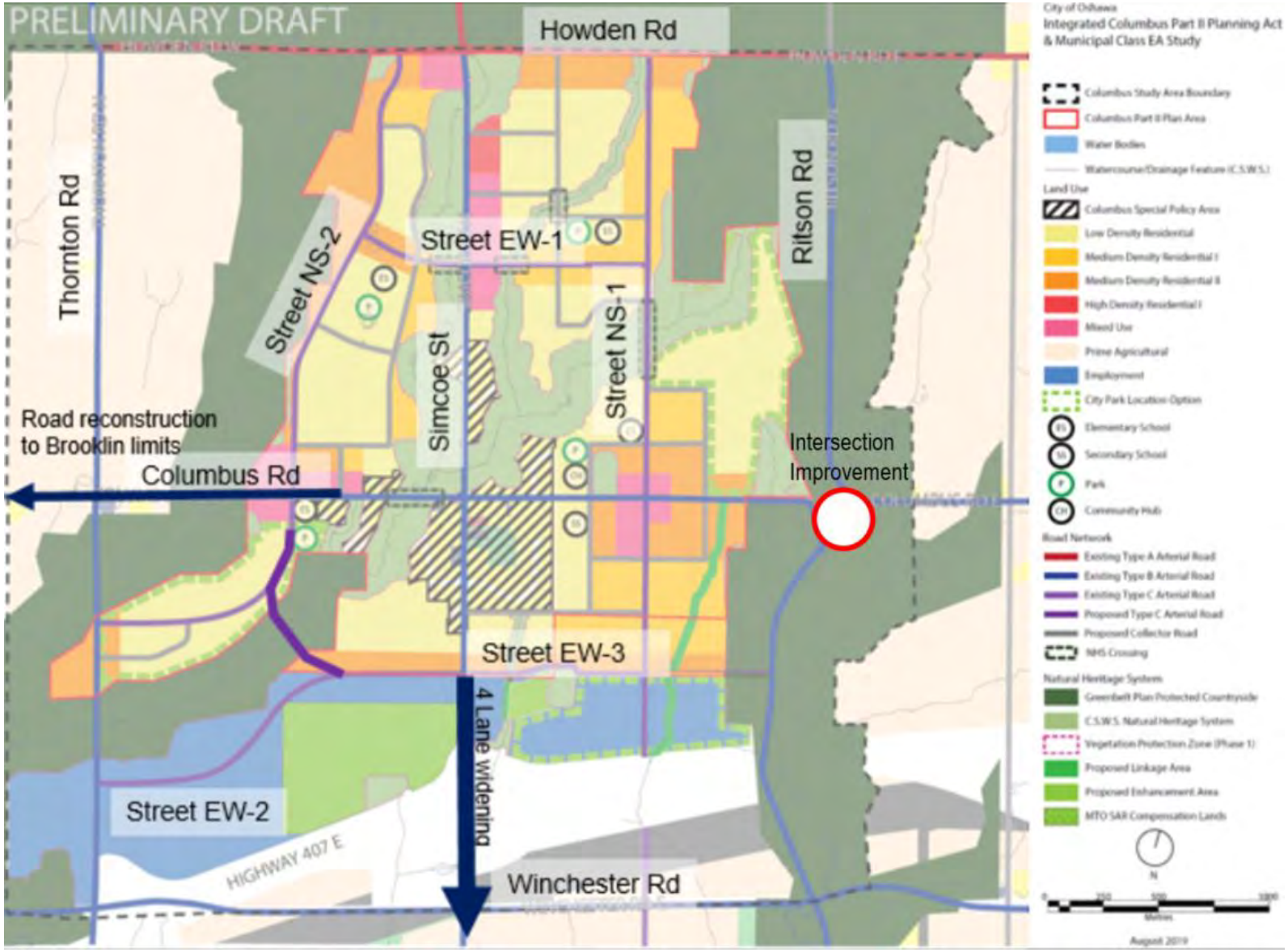


Exhibit 4-20. Alternative 3b

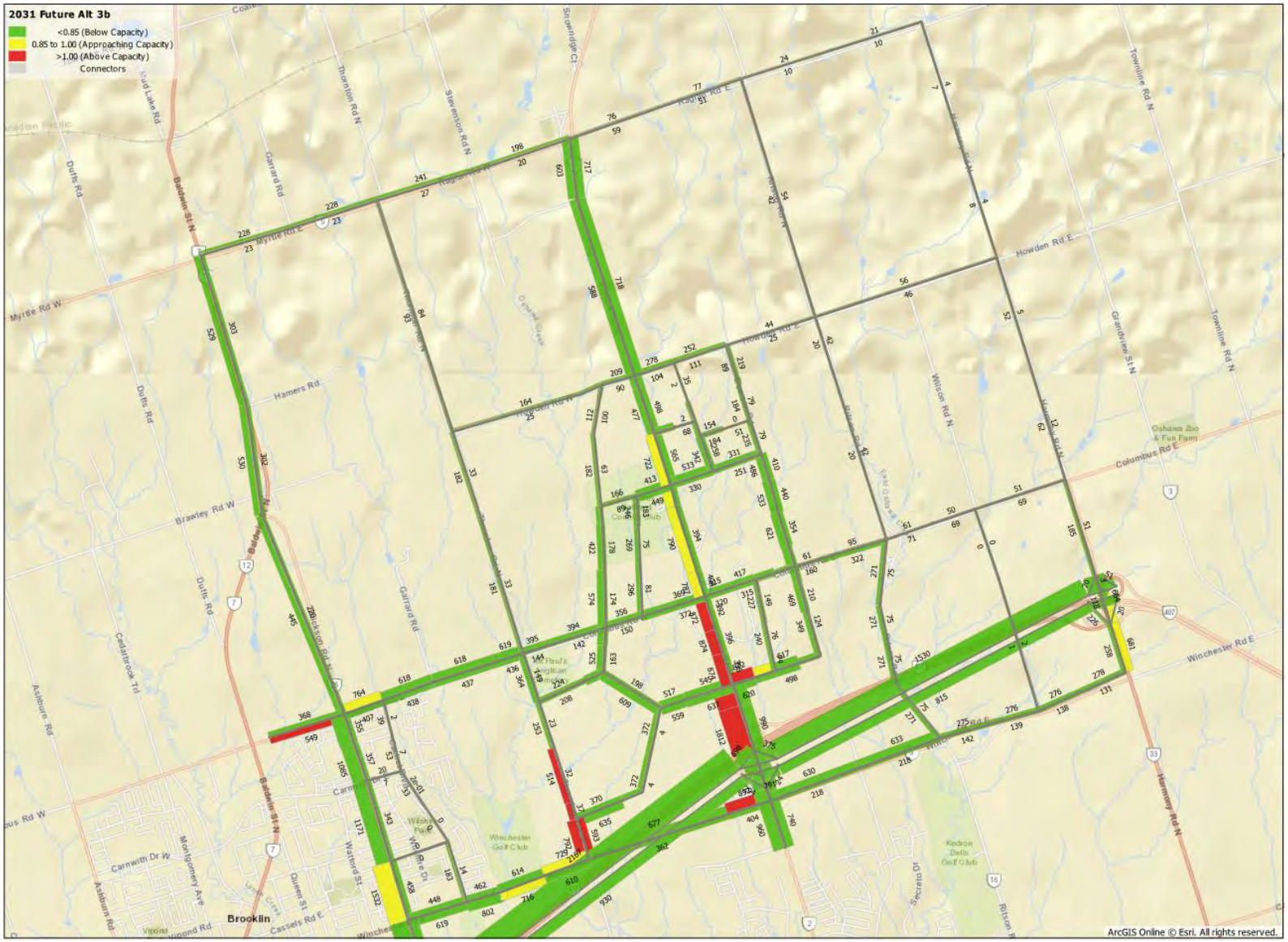


Exhibit 4-21. Alternative 3b EMME V/C and Volumes Plot

4.4 Alternatives 1 to 3 Evaluation

Analysis and evaluation of alternatives were completed for individual alternatives, then combinations of individual alternatives, and then Simcoe Street North by-pass options.

4.4.1 Evaluation Criteria

The preliminary transportation network alternatives were evaluated against the following major criteria:

- Transportation
- Natural Environment
- Socio-Economic Environment
- Cost

Performance indicators used in the evaluation are described in **Table 4-1**.

Table 4-1: Evaluation Criteria

Major Criteria	Performance Indicators
Transportation	• Provides network capacity to support growth - Minimizes peak direction traffic volume to capacity ratios (individual link and screenline totals) • Maximize connectivity for transit and active transportation • The network performs efficiently by minimizing total congested vehicle-km travelled • The network performs efficiently by minimizing total congested vehicle-hours travelled
Natural Environment	• Minimize impacts to the Greenbelt, particularly the Natural Heritage System (as identified in Exhibit 2-2 in Phase 2 Transportation Report **Appendix B**) • Minimize impacts to the Water Resource System • Minimize tailpipe emissions by minimizing total vehicle-km travelled and total congested vehicle-km travelled
Socio-Economic Environment	• Minimize traffic impact to lands designated as Special Policy Area (as identified in Table 3-5 in Phase 2 Transportation Report **Appendix B**) • Minimize impact to existing businesses, residential areas and agricultural land uses, air quality, aesthetics, and recreational uses • Supports new development areas
Implementation	• Minimizes capital construction costs • Minimizes technical challenges for implementation such as agency approval

4.4.2 Evaluation of Alternative 1: Greenbelt Crossings

Alternatives 1a, 1b and 1c are evaluated in detail as presented in **Appendix C**. Overall, there are limited transportation benefits to Alternative 1b and 1c relative to their environmental and cost impacts. The transportation benefits are seen primarily in Alternative 1a, including multimodal network connectivity, traffic congestion and the amount of new development traffic passing through the Columbus Special Policy Area.

Based on this analysis, ***Alternative 1a is recommended to be carried forward. Alternative 1b and 1c however appear to have limited benefits and can be screened out individually.*** Based on further discussion with City and Regional staff, one further test is considered in this report as part of Alternative 4c.

4.4.3 Evaluation of Alternative 2: South Screenline Improvements

Due to the significant congestion observed in the south screenline north of Highway 407, Alternative 2a considers a new Highway 407 crossing connecting Street N.S.-1 to Winchester Road. Alternative 2b considers a connection to Ritson Road North which already crosses Highway 407 via an existing underpass. The traffic benefits are clear with respect to the Highway 407 crossing, but they do not address congestion on Thornton Road North caused by development in the west part of the Part II Plan area. As such Alternative 2c considers a realignment of the Ritson Road North connection and adds a Thornton Road North widening, avoiding significant valleylands and minimizing potential logistical stormwater management challenges. Overall, while the 407 crossing performs well particularly improving mobility for the east part of the Part II Plan area, a Thornton Road North widening is still required.

The detailed evaluation is provided in **Appendix C.** Both Alternative 2a *and 2c perform well, but it is noted that Alternative 2a would still require improvements to Thornton Road North. Thus,* ***Alternative 2c is recommended to be carried forward****.*

Furthermore, based on discussion with Regional staff it is noted that a planned 407 transitway maintenance facility could potentially be located in the vicinity of the proposed flyover. Overall, the roadway is not required to support the Columbus Part II Plan area development, but ***the City and Region may continue to protect for the Highway 407 flyover for the longer-term future***.

4.4.4 Evaluation of Alternative 3: West Screenline Improvements

Alternatives 3a and 3b consider two options to provide sufficient transportation capacity to the west of the Part II Plan area. The two options are a Carnwith Drive extension from the existing roadway in the community of Brooklin in the Town of Whitby to the Part II Plan area (connecting with proposed Street N.S.-2), and a reconstruction of Columbus Road also connecting into Whitby. Both improvements have similar transportation benefits and environmental impacts. While the Carnwith Drive extension can improve multimodal network connectivity between Brooklin and Columbus, the requirements for implementing a new roadway through Greenbelt Plan Area lands are significant. As such ***Alternative 3b is recommended to be carried forward.***

Similar to Alternative 2a, Alternative 3a is not required to support the development of the Columbus Part II Plan Area but ***the City and Region***

may continue to protect for the Carnwith Drive Extension in the longer-term future.

The evaluation of these improvements is provided in detail in **Appendix C**.

4.4.5 Alternative 1 to 3 Evaluation Findings

Based on the analysis and evaluation presented, it is recommended that Alternative 1a, 2c, and 3b be carried forward for consideration in the Alternative 4 combined alternatives.

Alternative 2a (Highway 407 Flyover) and Alternative 3a (Carnwith Drive Extension) are not required to support the Columbus Part II Plan but may continue to be protected for.

Finally, one further test combining Alternatives 1b and 1c will be considered in Alternative 4.

Alternative 4 will further investigate combinations of carried forward alternatives from the first three network families to identify a preliminary preferred network alternative.

4.5 Alternative 4 Identification and Analysis

Three combined alternatives are identified to provide input to a preliminary preferred alternative:

- Alternative 4a: Combination of 1a, 2c, 3b
- Alternative 4b: Alternative 4a minus 1a, to test network performance without the Greenbelt crossing.
- Alternative 4c: Alternative 4a plus 1b and 1c, to test the benefit of increased network connectivity north of Columbus Road to both Thornton Road North and Ritson Road North.

4.5.1 Alternative 4a

Alternative 4a includes a combination of the following improvements from Alternatives 1a, 2c, and 3b, also shown in **Exhibit 4-22**:

1. Reconstruction and widening of Thornton Road North between Street N.S.-2 to Winchester Road from 2 lanes to 4 lanes;
2. A continuous extension of Type-C Street N.S.-1 to Ritson Road North;
3. Reconstruction of Ritson Road North from Street N.S.-1 to Winchester Road, providing increased capacity; and

4. Reconstruction of Columbus Road from a midblock collector between Street N.S.-2 and Simcoe Street North to the Brooklin limits, providing increased capacity.

The results from the volumes plot in **Exhibit 4-23** indicates that the combination of these improvements addresses the congestion westbound along Columbus Road, and southbound along both Thornton Road North and Simcoe Street North.

4.5.2 Alternative 4b

Alternative 4b tests the improvements of Alternative 4a without the Greenbelt Plan Area crossing connection between Street N.S.-2 and E.W.-2 from Alternative 1a, as shown in **Exhibit 4-24**.

The volumes plot shown in **Exhibit 4-25** show that compared to Alternative 4a, Alternative 4b has increased southbound congestion along Simcoe Street North between Columbus Road and Street E.W.-2, thus confirming the need for the Greenbelt Plan Area crossing in addition to other improvements identified.

4.5.3 Alternative 4c

Alternative 4c includes a combination of the following improvements from Alternatives 2c, 1b and 1c, also shown in **Exhibit 4-26**:

1. Reconstruction and widening of Thornton Road North between Street N.S.-2 to Winchester Road from 2 lanes to 4 lanes;
2. A continuous extension of Type-C Street N.S.-1 to Ritson Road North;
3. Reconstruction of Ritson Road North from Street N.S.-1 to Winchester Road, providing increased capacity;
4. The western extension of Type C Street EW..-1 to Thornton Road North north of Columbus Road; and
5. The eastern extension of Type-C Street E.W.-1 to Ritson Road North north of Columbus Road.

The volumes plot shown in **Exhibit 4-27** indicates the combination of these alternatives addresses some of the capacity westbound along Columbus Road and southbound along Simcoe Street North south of Street E.W.-3. The benefits are overall minor however, and the additional connection between Thornton Road North and Ritson Road North does not appear to be effective.

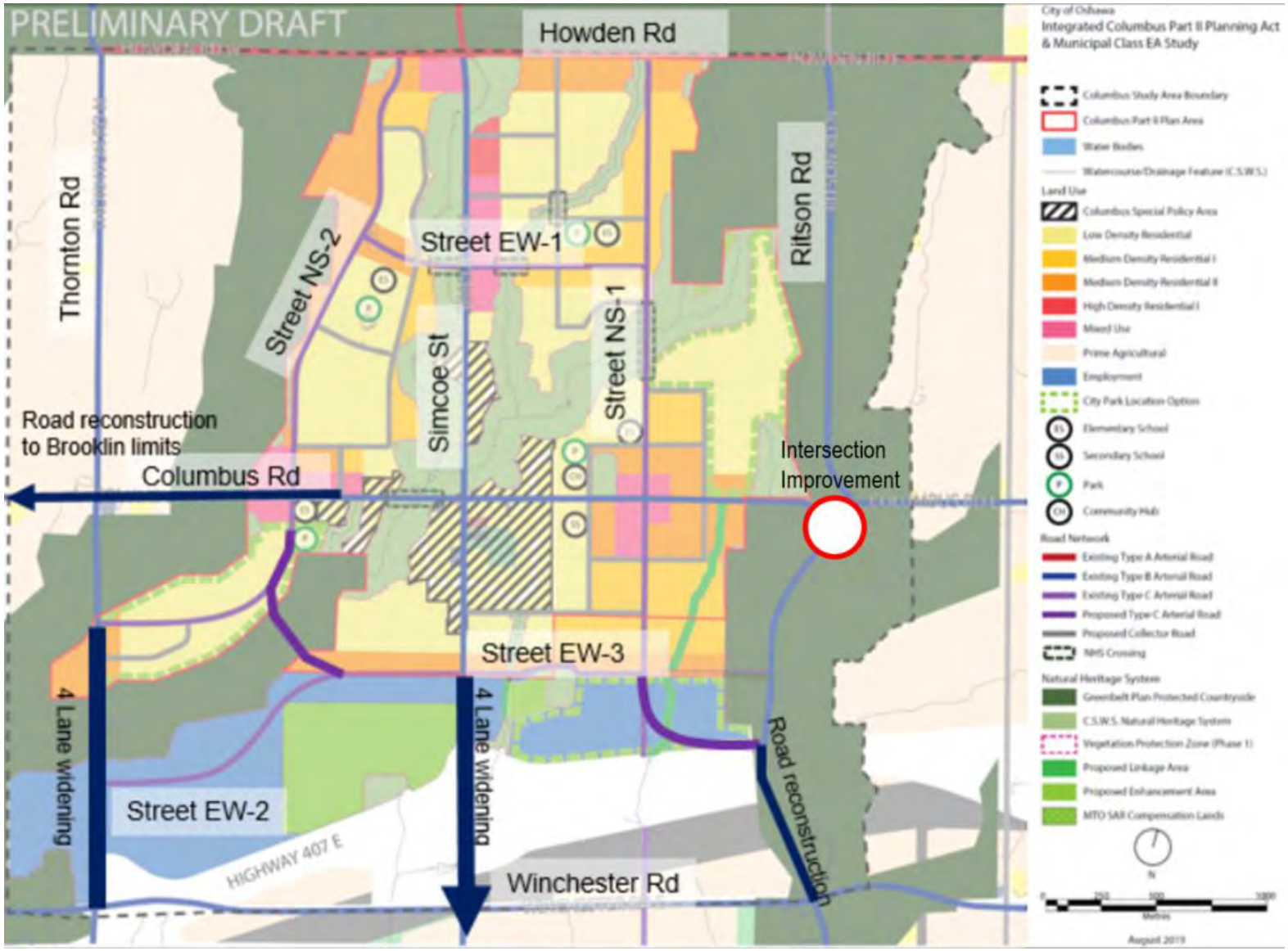


Exhibit 4-22. Alternative 4a

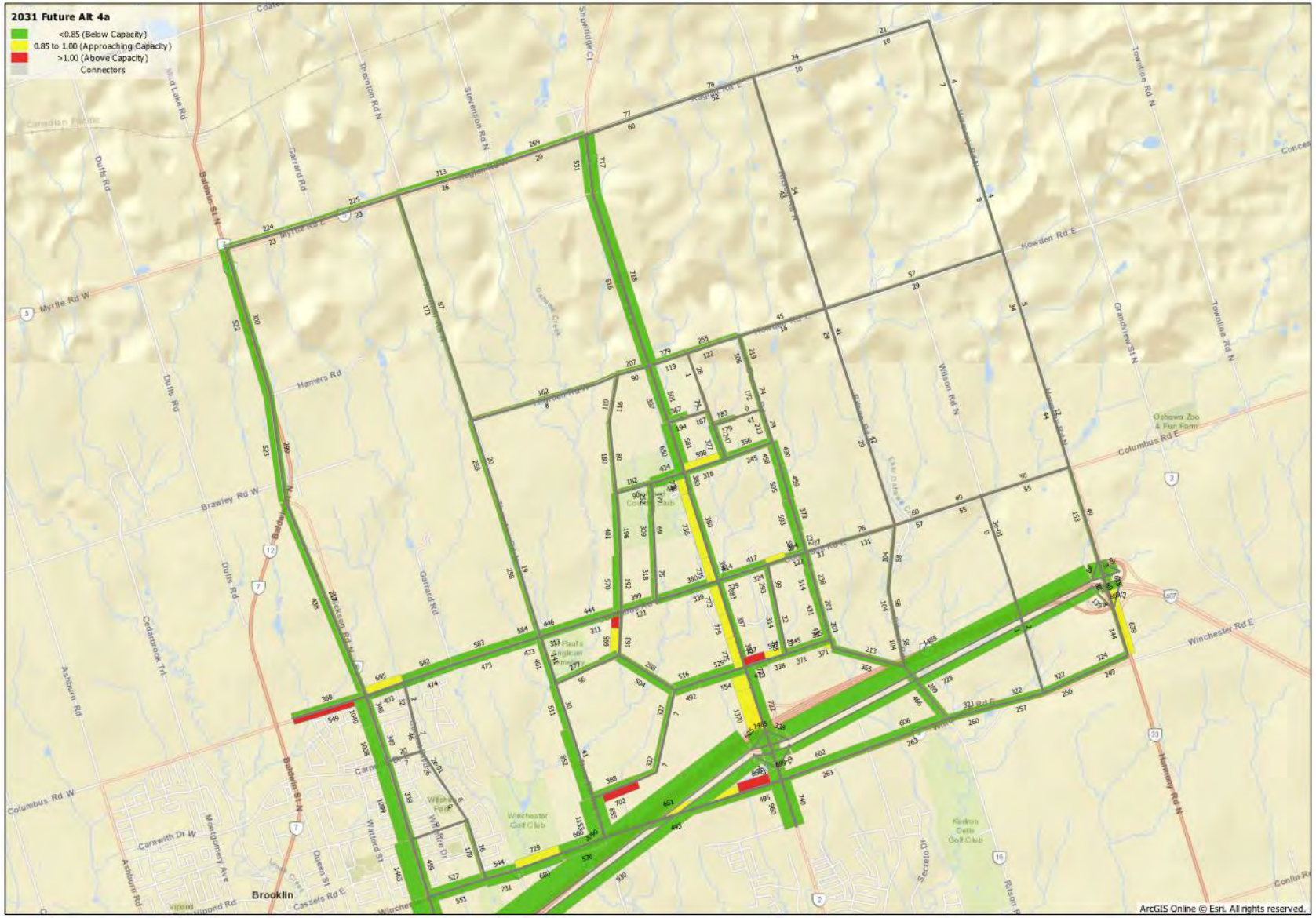


Exhibit 4-23. Alternative 4a EMME V/C and Volumes Plot

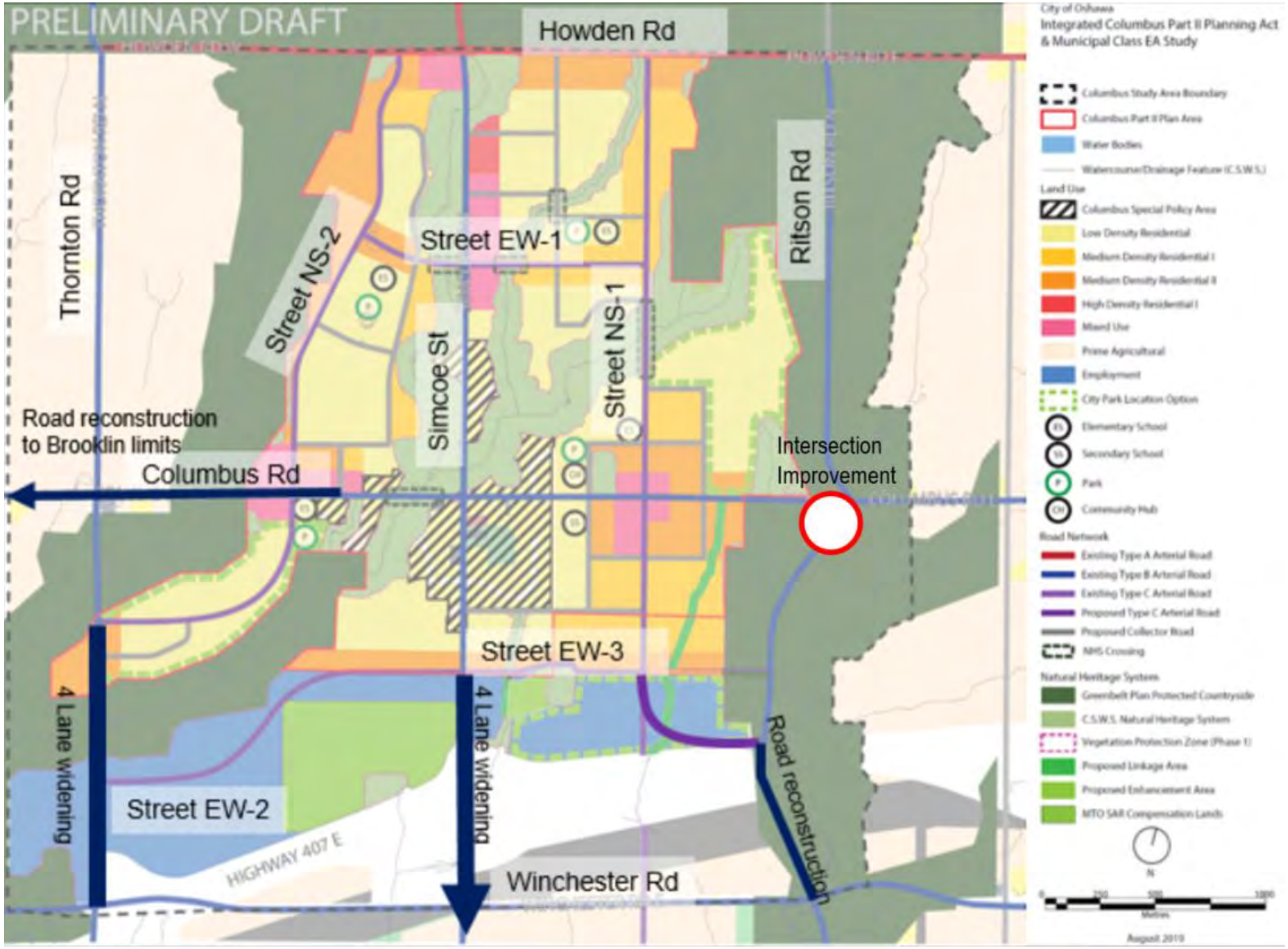


Exhibit 4-24. Alternative 4b

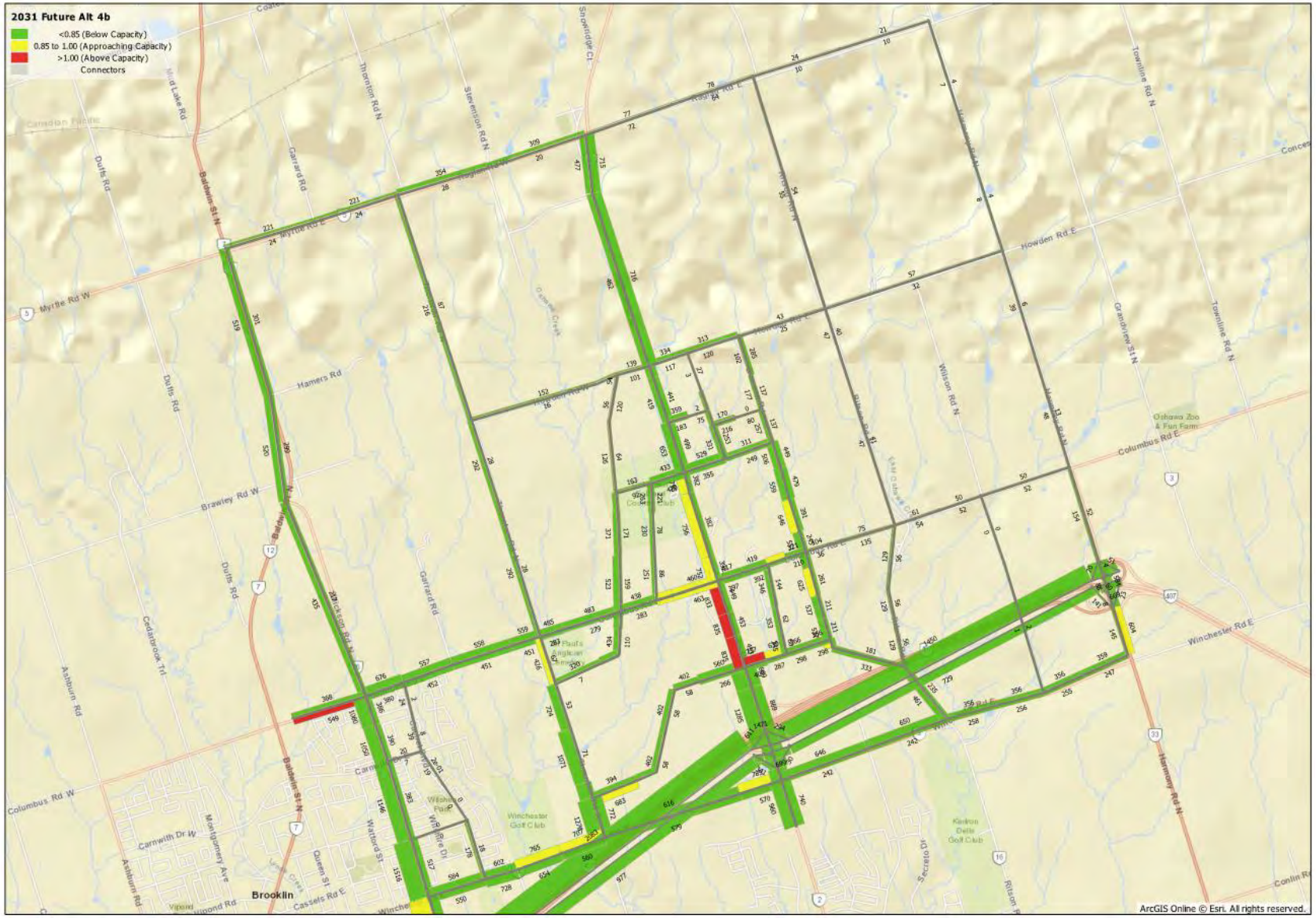


Exhibit 4-25. Alternative 4b EMME V/C and Volumes Plot

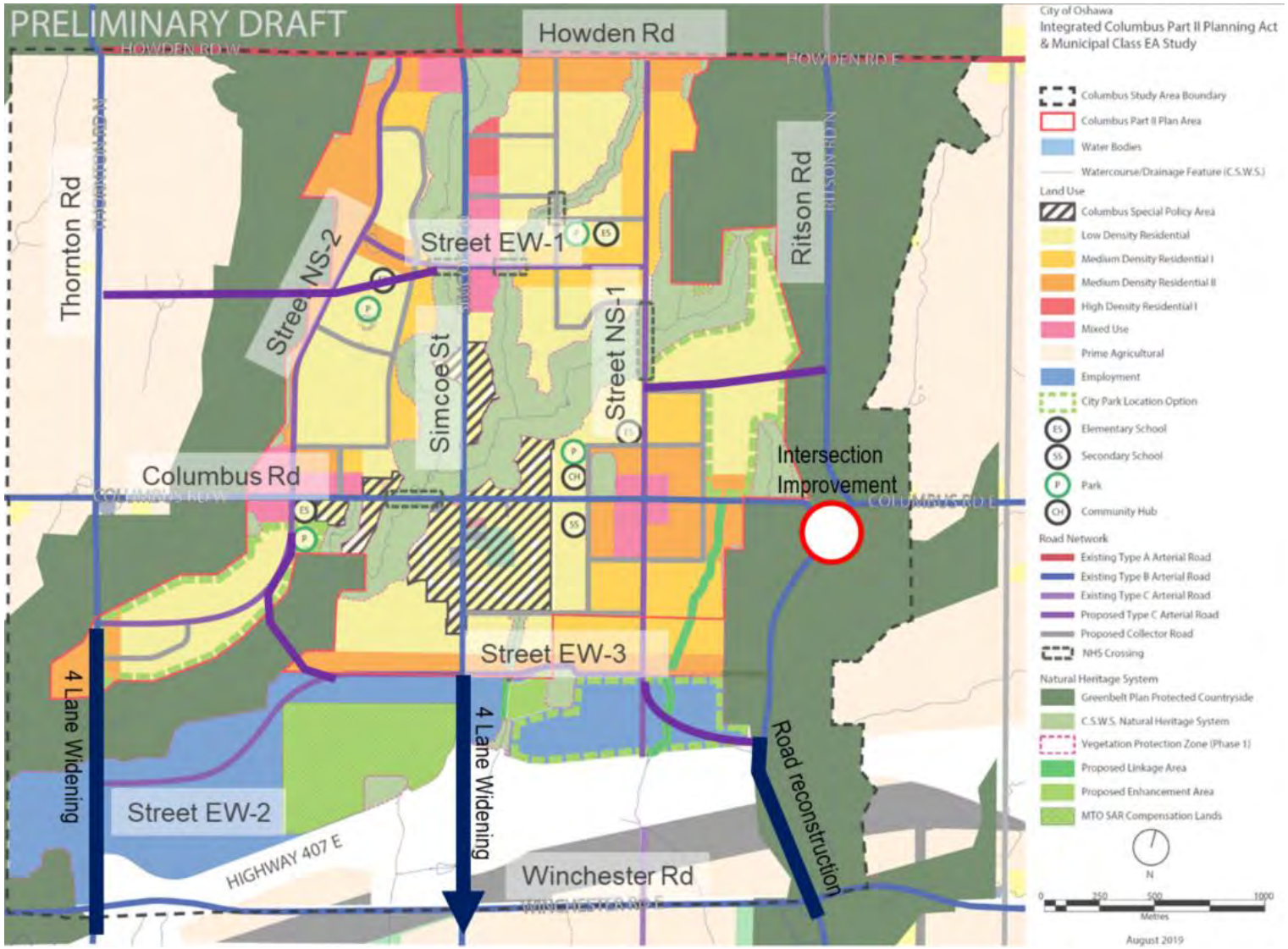


Exhibit 4-26. Alternative 4c

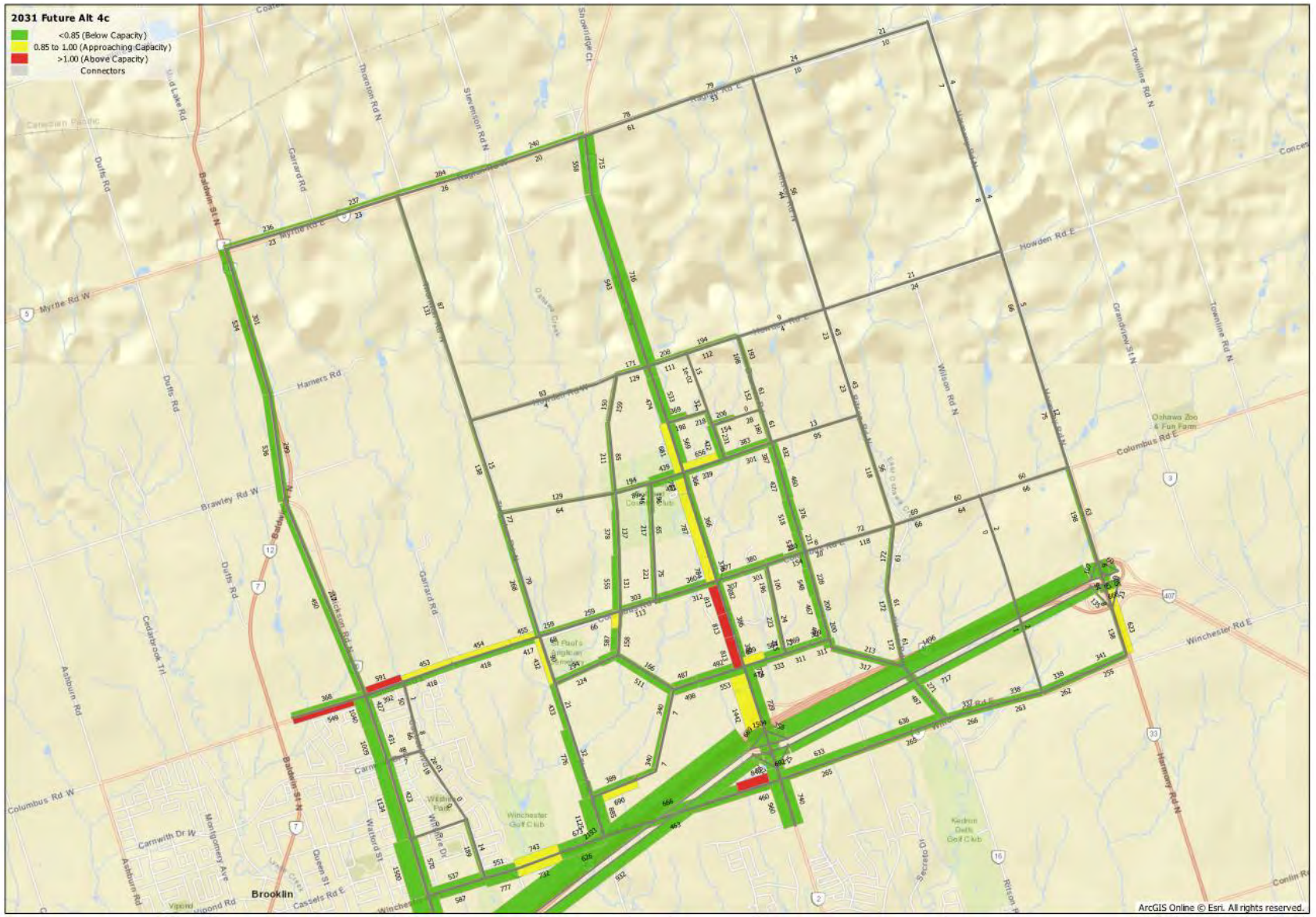


Exhibit 4-27. Alternative 4c EMME V/C and Volumes Plot

4.6 Alternative 4 Evaluation

Alternative 4a performs very well in providing good transportation service by providing good connectivity to new developable lands to the east and west sides of the Part II Plan area. It also mitigates impacts to the Special Policy Area and the Greenbelt lands at the same time. ***Alternative 4a is thus recommended to be carried forward***.

Alternative 4b does not perform well overall and does not provide the ability to divert new development traffic away from the Special Policy Area. This analysis supports the need for the Greenbelt crossing identified in Alternative 4a, and ***Alternative 4b is recommended to be screened out***.

The evaluation also confirms the full extension of Street E.W.-1 to both Ritson Road North and Thornton Road North from Alternatives 1b and 1c is not needed to support the Part II Plan. The lack of transportation benefits plus the anticipated significant impacts to the natural environment and costs result in a ***recommendation to screen out Alternative 4c***.

Until the lands north of Columbus Road west of the Greenbelt corridor open up for development, there would be little benefit to the Alternative 1b connection. Similarly, the lands north of Columbus Road and east of Ritson Road North would need to be developed to justify the Alternative 1c connection. ***It is recommended the City protects for these connections in anticipation these lands open up for development in the future*.**

4.6.1 Preliminary Preferred Network Alternative

Based on the analysis presented Alternative 4a performs well and is recommended as the preliminary preferred network alternative.

4.7 Alternative 5 Identification and Analysis

As noted previously, public engagement indicated a strong desire to minimize traffic impacts on the Simcoe Street North corridor, particularly in the area identified as the “Columbus Special Policy Area”. As such, the family of options in Alternative 5 considers two Simcoe Street North Bypass scenarios which provide a continuous Regional Road diversion of Simcoe Street North around the Special Policy Area, and a downgrade of existing Simcoe Street North to a collector road. These scenarios are tested using the preferred Alternative 4a as identified in the previous section.

It is noted the actual by-pass alignments will extend north of Howden Road to tie back into Simcoe Street North, rather than the simplistic t-intersections shown in Emme for analysis purposes. The full evaluation of these

alternatives considers the extension north of Howden Road, including costs and environmental impacts.

4.7.1 Alternative 5a: West Bypass

Alternative 5a builds upon Alternative 4a, but includes a westerly regional by-pass as shown in **Exhibit 4-28.** Changes to account for the regional by-pass compared to Alternative 4a include increased speeds to 60 km/h along the entire by-pass, reduced speeds to 50 km/h on Simcoe Street North between Howden Road and Street E.W.-1, and reduced speeds to 40 km/h on Simcoe Street North between Street E.W.-1 and Street E.W.-3. The volumes plot is provided in **Exhibit 4-29**.

Compared to Alternative 4a, there is less congestion southbound on Simcoe Street North between Street E.W.-1 and Highway 407. The southbound segment on Thornton Road North just south of Columbus Road now has more congestion.

4.7.2 Alternative 5b: East Bypass

Alternative 5b also builds from Alternative 4a but includes an easterly regional by-pass as shown in **Exhibit 4-30**. Changes to account for the regional by-pass compared to Alternative 3c include increased speeds to 60 km/h along the entire by-pass, reduced speeds to 50 km/h on Simcoe Street North between Howden Road and Street E.W.-1, and reduced speeds to 40 km/h on Simcoe Street North between Street E.W.-1 and Street E.W.-3. The volumes plot is provided in **Exhibit 4-31**.

Compared to Alternative 4a, there is less congestion southbound on Simcoe Street North between Street E.W.-1 and Highway 407. The southbound segment on Thornton Road North just south of Columbus Road now has more congestion.

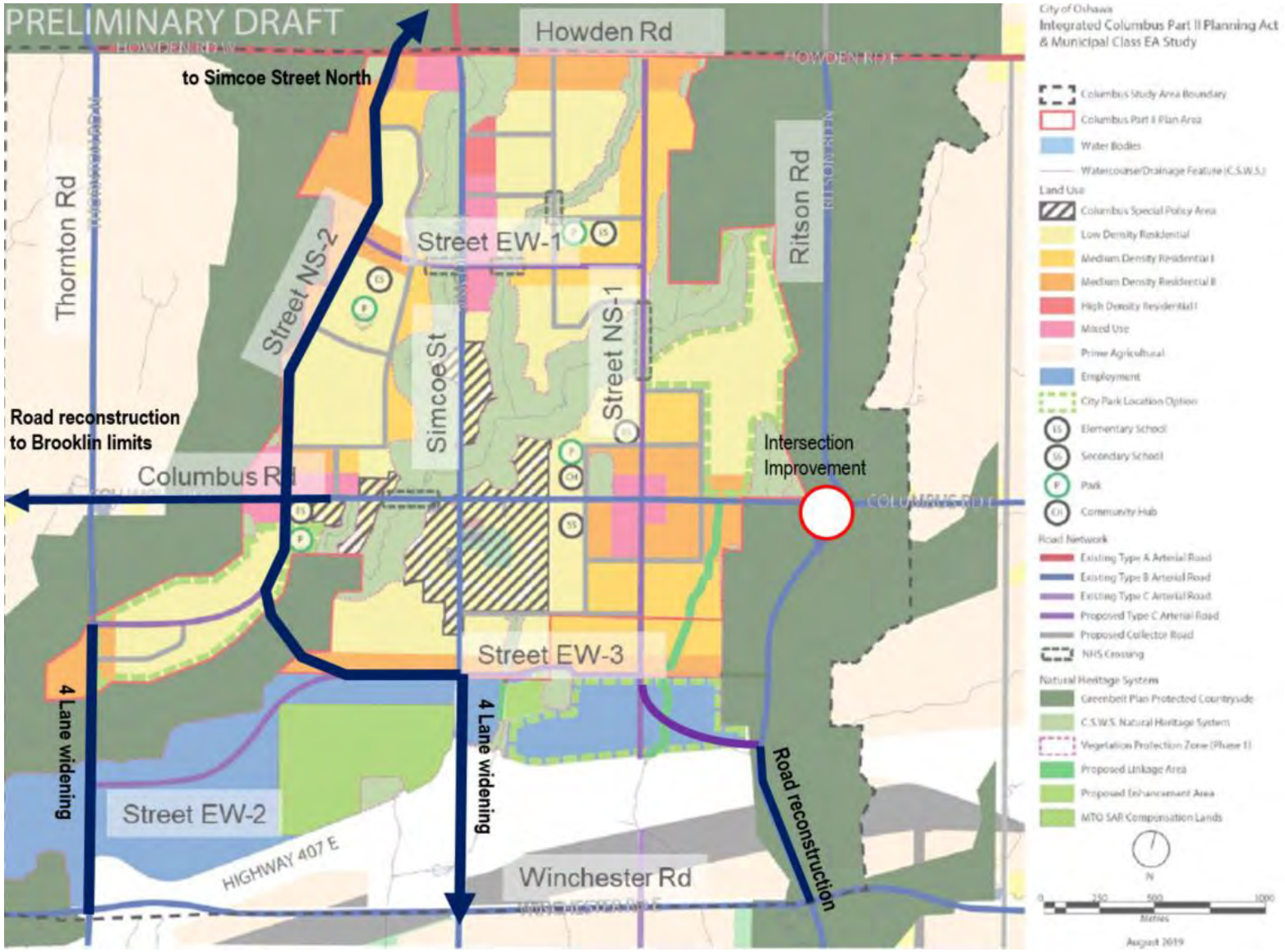


Exhibit 4-28. Alternative 5a

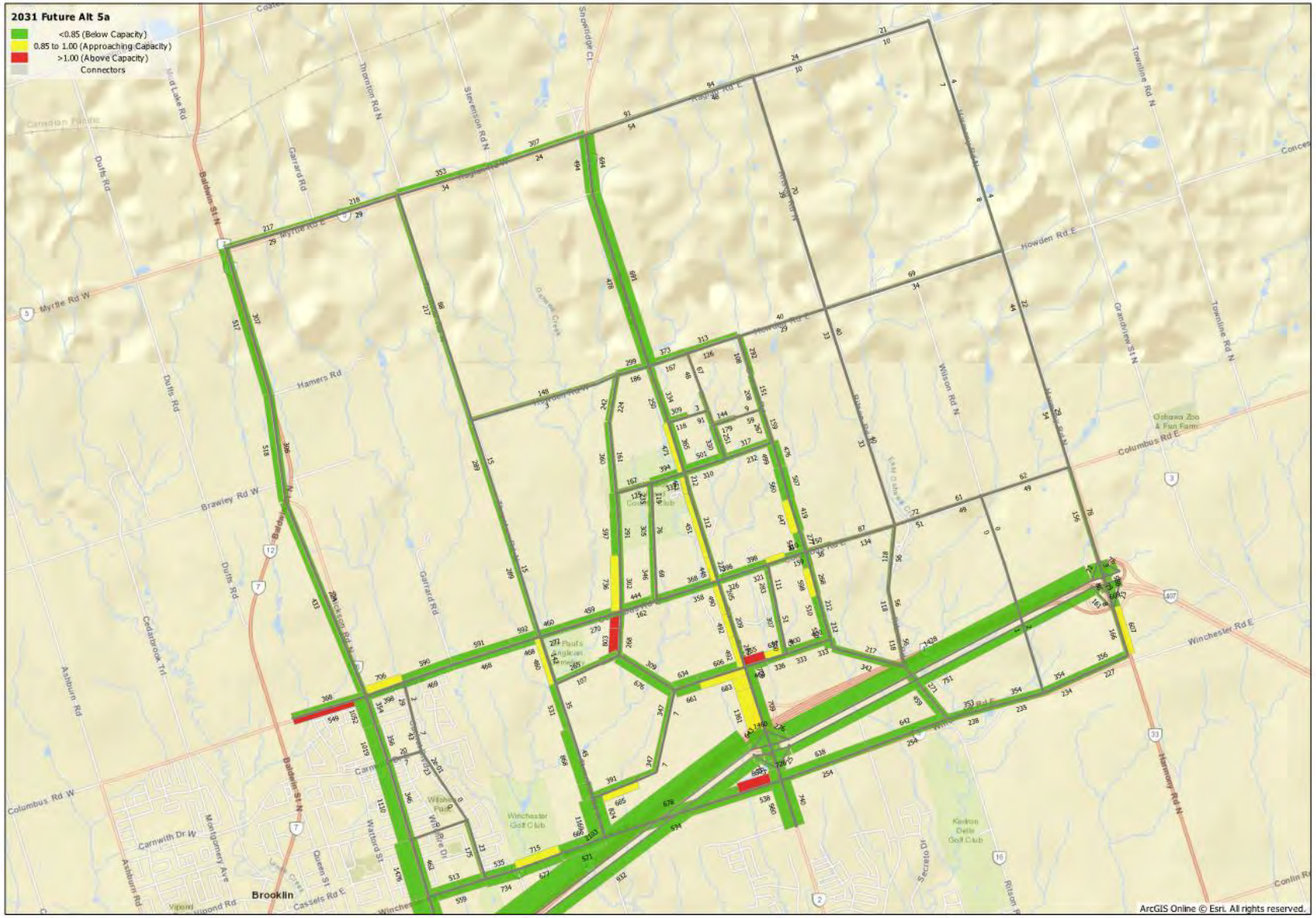


Exhibit 4-29. Alternative 5a EMME V/C and Volumes Plot

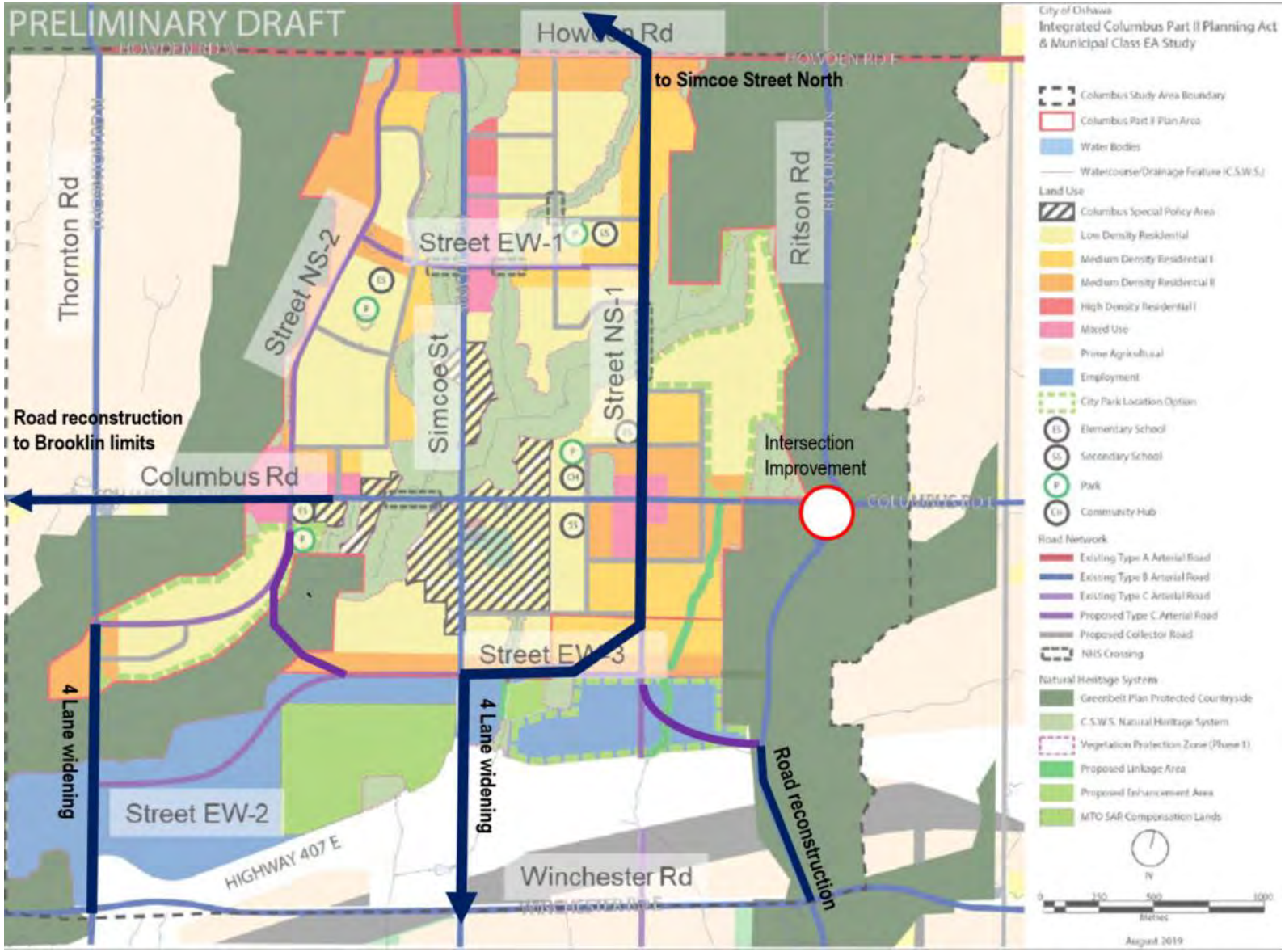


Exhibit 4-30. Alternative 5b

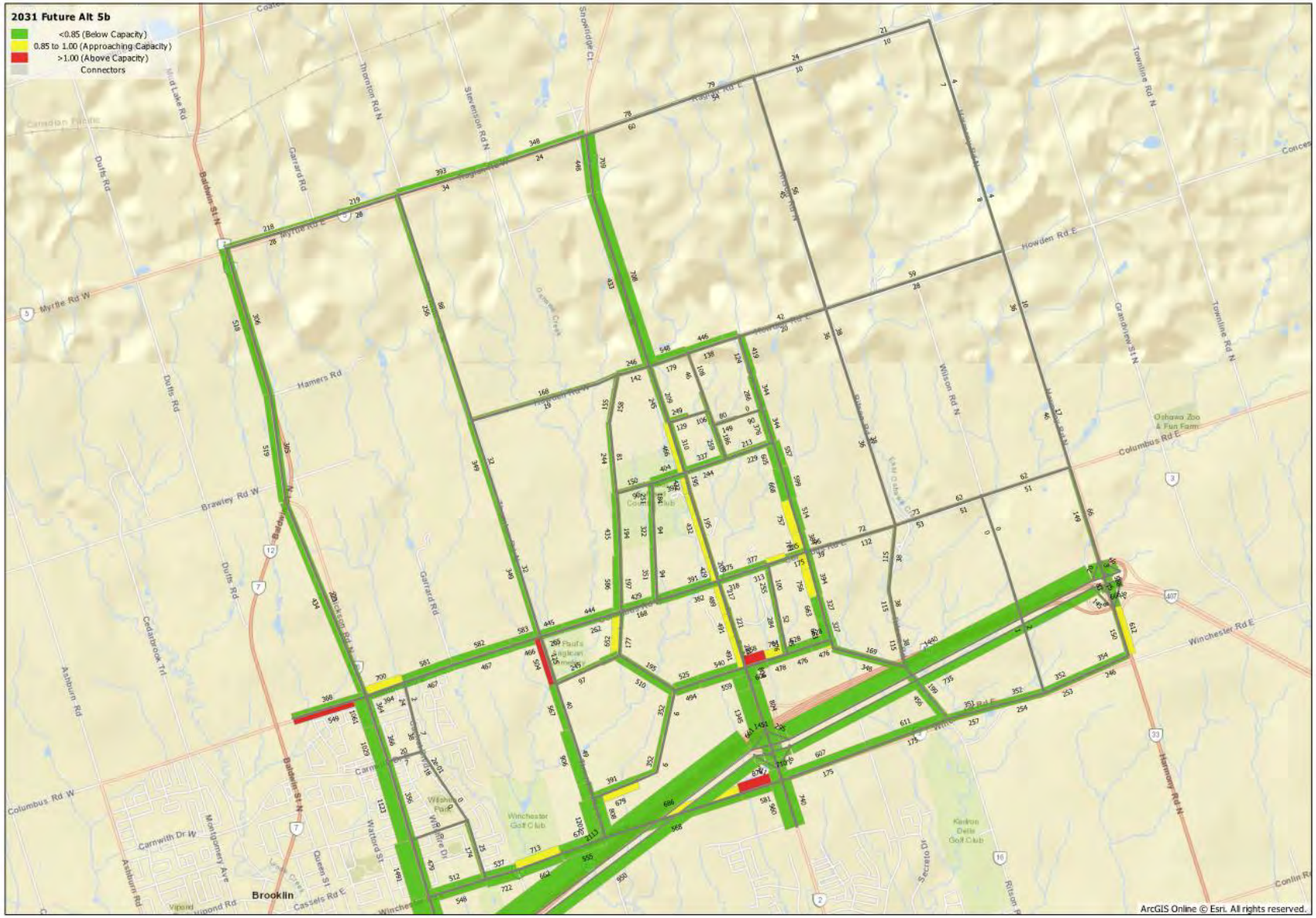


Exhibit 4-31. Alternative 5b EMME V/C and Volumes Plot

4.8 Alternative 5 Evaluation

As noted previously, a key consideration is the impact of the proposed Part II Plan area development on the Columbus Special Policy Area. As such two scenarios were considered further to Alternative 4a which involve a continuous Regional Road realignment or "by-pass" of Simcoe Street North around the Special Policy Area. Alternative 5a considers a by-pass to the west, generally along the Street N.S.-2 alignment while Alternative 5b considers a by-pass to the east, generally along the Street N.S.-1 alignment.

While these by-pass scenarios improve congestion metrics and minimize traffic passing through the Special Policy Area, it is noted that Alternative 4a adequately serves the proposed growth of Columbus without a continuous Regional Road realignment of Simcoe Street North, additional costs, or more environmental impacts. As such, ***it is recommended that the Part II Plan move forward with Alternative 4a*.**

The evaluation table for the by-pass scenarios is provided in detail in **Appendix C**.

4.9 Preliminary Preferred Alternative Solution

Based on the transportation analysis presented within this report, the preferred road network for Columbus is consistent with the previous Land Use and Road Alternative 1 (identified in this report as the Columbus Development Base Case in **Section 4.1.1**), with the following modifications (as illustrated in **Exhibit 4-32)**:

- Widening of Simcoe Street North to 4 lanes from E.W.-3 southerly to Highway 407.
- A new Type C Arterial crossing of the Greenbelt Plan Area west of Simcoe Street North.
- Reconstruction of Thornton Road North south of Columbus Road as identified in the I.T.M.P. and widening to 4 lanes south of Street E.W.-2 to Winchester Road.
- Extension of Street N.S.-1 southerly and easterly connecting to Ritson Road North just north of Highway 407.
- Reconstruction of Ritson Road North south of Columbus Road as identified in the I.T.M.P., to Winchester Road.
- Reconstruction of Columbus Road from west of Ritson Road North as identified in the I.T.M.P., to west of Thornton Road North to the Brooklin community limits in the Town of Whitby.

- Intersection improvements at the Columbus Road and Ritson Road North intersection as identified in the Ritson / Columbus Intersection Improvements Municipal Class Environmental Study Report.
- Consider downgrading Street E.W.-1 to a Collector Road to improve access.
- A roundabout should be considered as a potential intersection treatment at the intersection of Simcoe Street North and Street E.W.-2 to encourage traffic to use the new Type C arterial, lessen the demand on Simcoe Street North, and manage high turning movement volumes. A roundabout could also act as a potential gateway feature to differentiate the Special Policy Area and the widened Simcoe Street North segment to the south. The preferred control at the location should be the outcome of an intersection control Study, as with all new intersections

These preliminary preferred recommendations were presented to stakeholders, including the public, to seek input on a Preferred Land Use and Road Plan as part of Phase 2 of the Transportation Master Plan and Municipal Class Environmental Assessment process integrated with the Part II Plan.

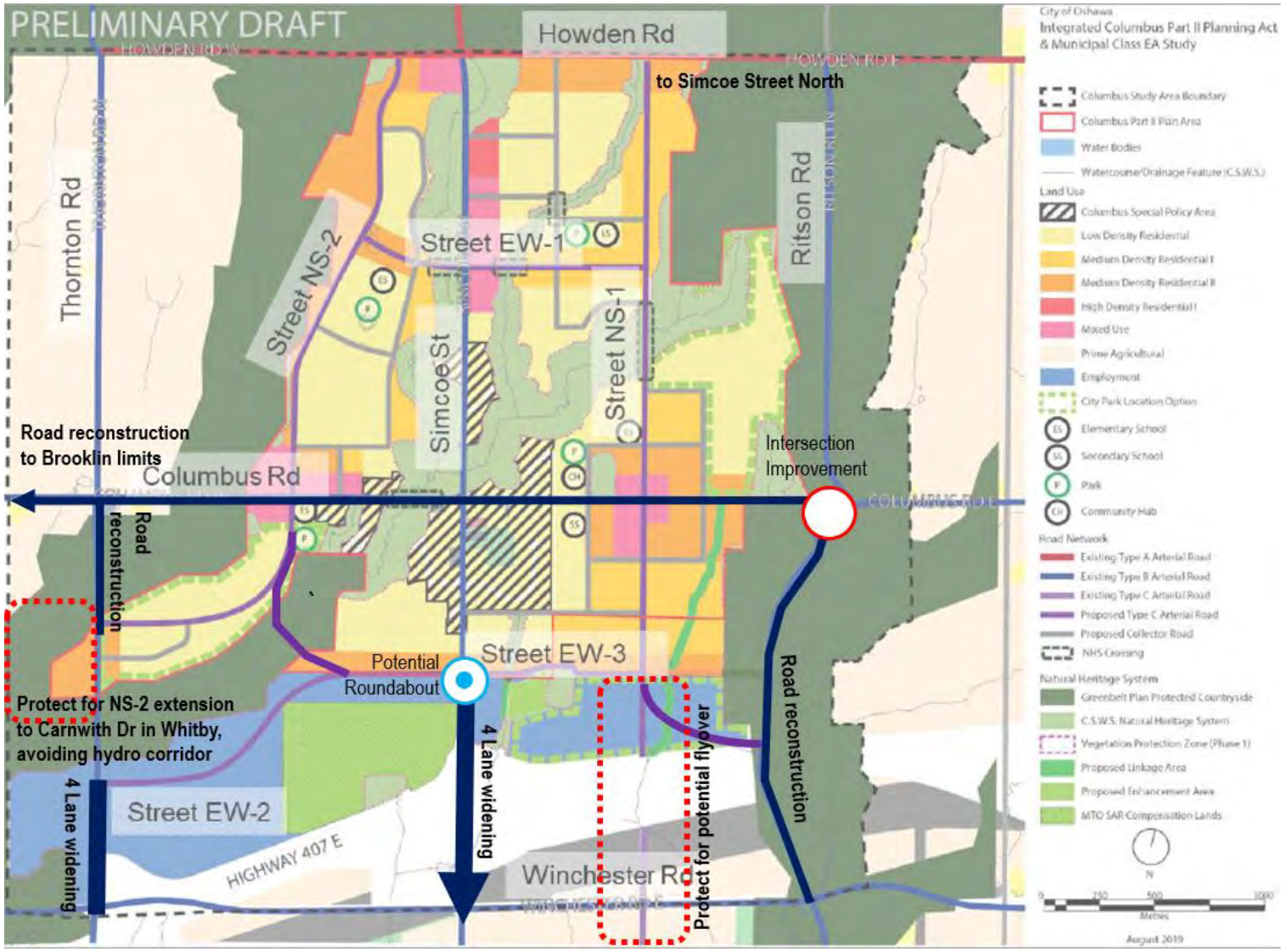


Exhibit 4-32. Preliminary Preferred Solution

5 Detailing the Preferred Solution

Following the analysis, evaluation, and public and stakeholder engagement on the alternative land use and road plans, a Preferred Solution was developed further considering specific roadway and intersection traffic control recommendations, transit services, active transportation and off-road trails, roadway right-of-way widths, functional design and a travel demand management strategy.

5.1 Draft Recommended Land Use and Road Plan

Following consultation with stakeholders and the general public, the Draft Recommended Land Use and Road Plan (the Draft Recommended Plan) was developed further as shown in **Exhibit 5-1**, building upon and refining the positive elements of three alternative scenarios presented previously.

The recommended road system is an important feature of the Columbus Part II Plan consisting of improvements to existing Type B arterials, a network of new Type C arterials and new collector roads. These streets should also incorporate dedicated space for active transportation, providing a well-connected grid network intended to maximize mobility choice. Because Simcoe Street North already handles high volumes of traffic today, the road system is designed to provide alternative routes that encourage access to and from the new community via Thornton Road North, Ritson Road North, and the Type C arterials. The intent is to mitigate growth in traffic on Simcoe Street North impacting the Columbus Special Policy Area.

Specific transportation elements of the Preferred Plan include:

- Improvements to existing roadways:
  - Widening of Simcoe Street North to 4 lanes from Street E.W.-2 and E.W.-3 southerly to Highway 407.
  - Reconstruction of Thornton Road North south of Columbus Road as identified in the I.T.M.P. and widening to 4 lanes south of Street E.W.-2 to Winchester Road.
  - Reconstruction of Ritson Road North south of Columbus Road as identified in the I.T.M.P., to Winchester Road.
  - Reconstruction of Columbus Road from west of Ritson Road North as identified in the I.T.M.P., to west of Thornton Road North to the Brooklin community limits in the Town of Whitby.
- New Type C Arterial Roadways

  - Street N.S.-1 southerly and easterly connecting to Ritson Road North just north of Highway 407.
  - Street N.S.-2 including a crossing of the Greenbelt Plan Area west of Simcoe Street North.
  - Street E.W.-1
  - Street E.W.-2
  - Street E.W.-3
- New Collector Roads, as shown in **Exhibit 5-1**
- Corridor protection, with preferred alignment to minimize environmental impacts where possible
  - Westerly Street E.W.-1 extension to Thornton Road North (future development of lands outside Columbus Part II Plan)
  - Eastern connection between Street N.S.-1 and Ritson Road North (future development of lands outside Columbus Part II Plan)
  - Carnwith Drive extension to either Street N.S.-2 or east-west connector between Thornton Road and Street N.S.-2 between Columbus Road and Street E.W.-2.
  - Street N.S.-1 extension to Winchester Road across Highway 407 (flyover)

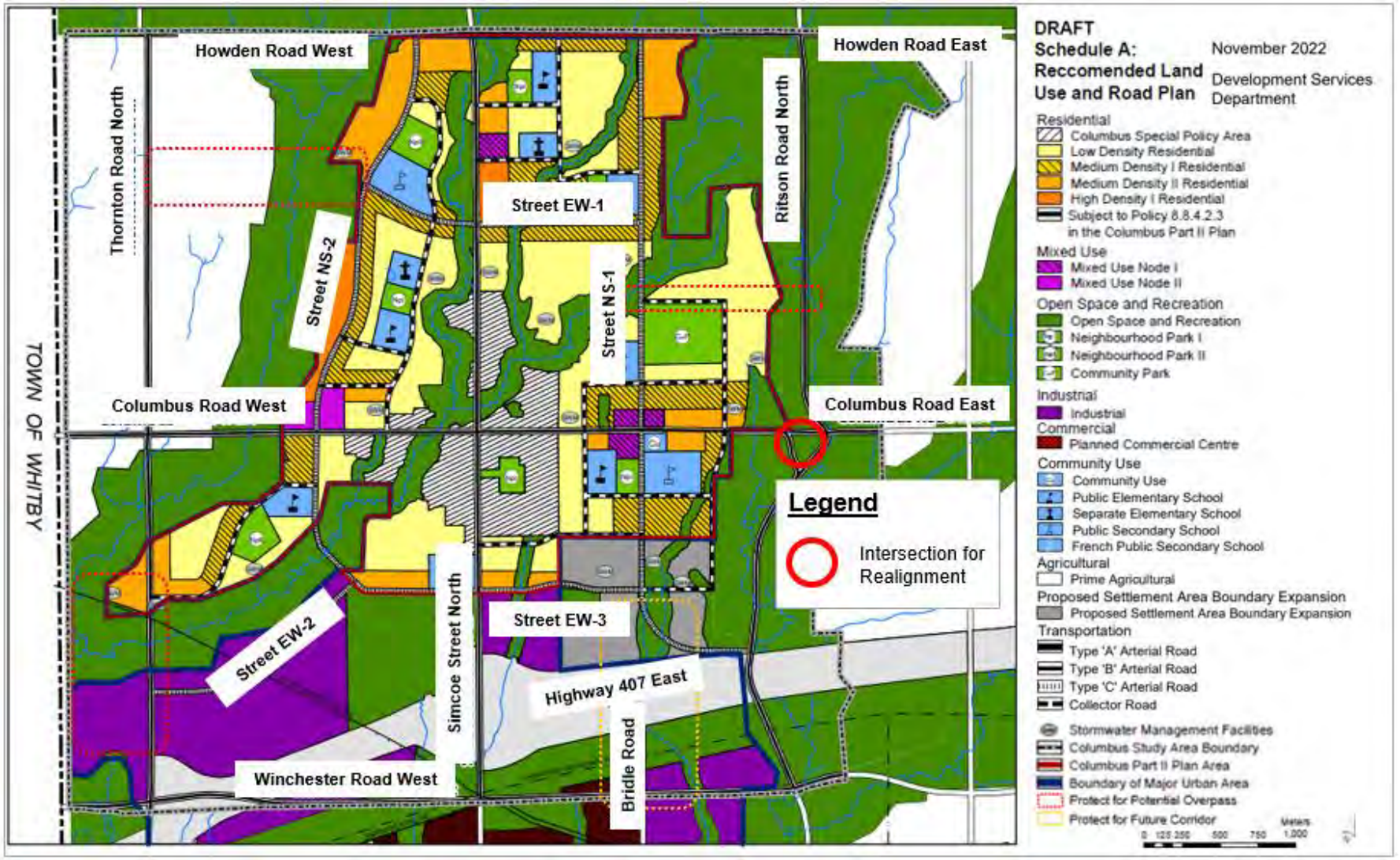


Exhibit 5-1. Draft Recommended Land Use and Road Plan

5.2 Traffic Analysis of the Preferred Solution

HDR built upon the traffic analysis that has been documented in the Phase 1, Phase 2, and Phase 2 Addendum Reports. This section will document the updated traffic analysis based on the draft recommended land use and road plan.

5.2.1 Trip Generation Update

Future trip generation is updated based upon the final population and employment growth projections in the draft recommended land use and road scenario. This represents an update to the Future Background Conditions which informed the Problem and Opportunity Statement documented in **Section 2**. The updated trips for the A.M. and P.M. peak hours are presented by traffic zone in **Table 5-1.**

Table 5-1. Updated Trip Generation for Draft Recommended Land Use by Durham Traffic Zone

Draft Recommended Land Use Trip Generation	A.M. Trips		P.M. Trips	
Durham Traffic Zones	IN	OUT	IN	OUT
7591	178	580	596	350
7592	619	1096	925	597
7601	645	1250	1064	665
7602	319	592	526	332
7604	366	751	687	426
7623	293	545	446	283
7630	53	159	179	105
7641	93	285	307	185
7642	308	188	207	208
7651	326	107	191	351
7652	813	268	479	878
7660	263	289	350	347
7671	37	118	126	75
7672	90	302	303	177
Total	**4,403**	**6,530**	**6,386**	**4,979**

5.2.2 Future Total Scenario Network Assumptions

The EMME Subarea model built upon the work conducted in the Phase 2 Addendum report and is based on the Durham Region A.M. Peak EMME

Model with a focus on the Columbus Study Area. The EMME Subarea is used to undertake the detailed traffic analysis.

The subarea model was based on a broader area to account for any new road connections outside the Study Area that may impact the Columbus development. As shown in **Exhibit 5-2,** the subarea is bound by Thickson Road, Winchester Road, Harmony Road, and Raglan Road. Details regarding model validation can be found in **Appendix C Phase 2 Report Addendum**. It is also noted that school trips for the draft recommended land use and road plan were also internally distributed within the network.

Results from the subarea model (**Exhibit 5-3**) were used to forecast 2031 future turning movement volumes as inputs in the intersection operations analysis in Synchro 10.

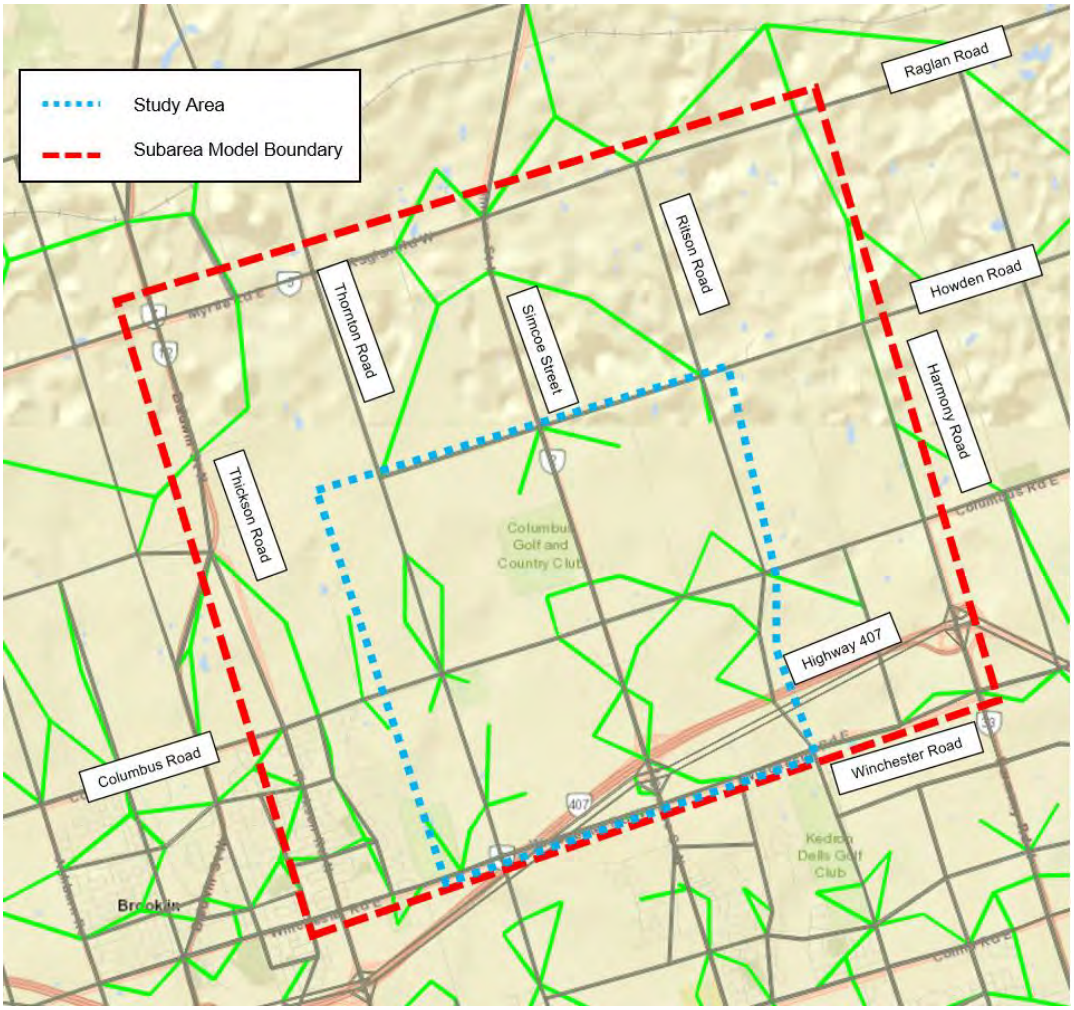


Exhibit 5-2. Subarea Model Boundary

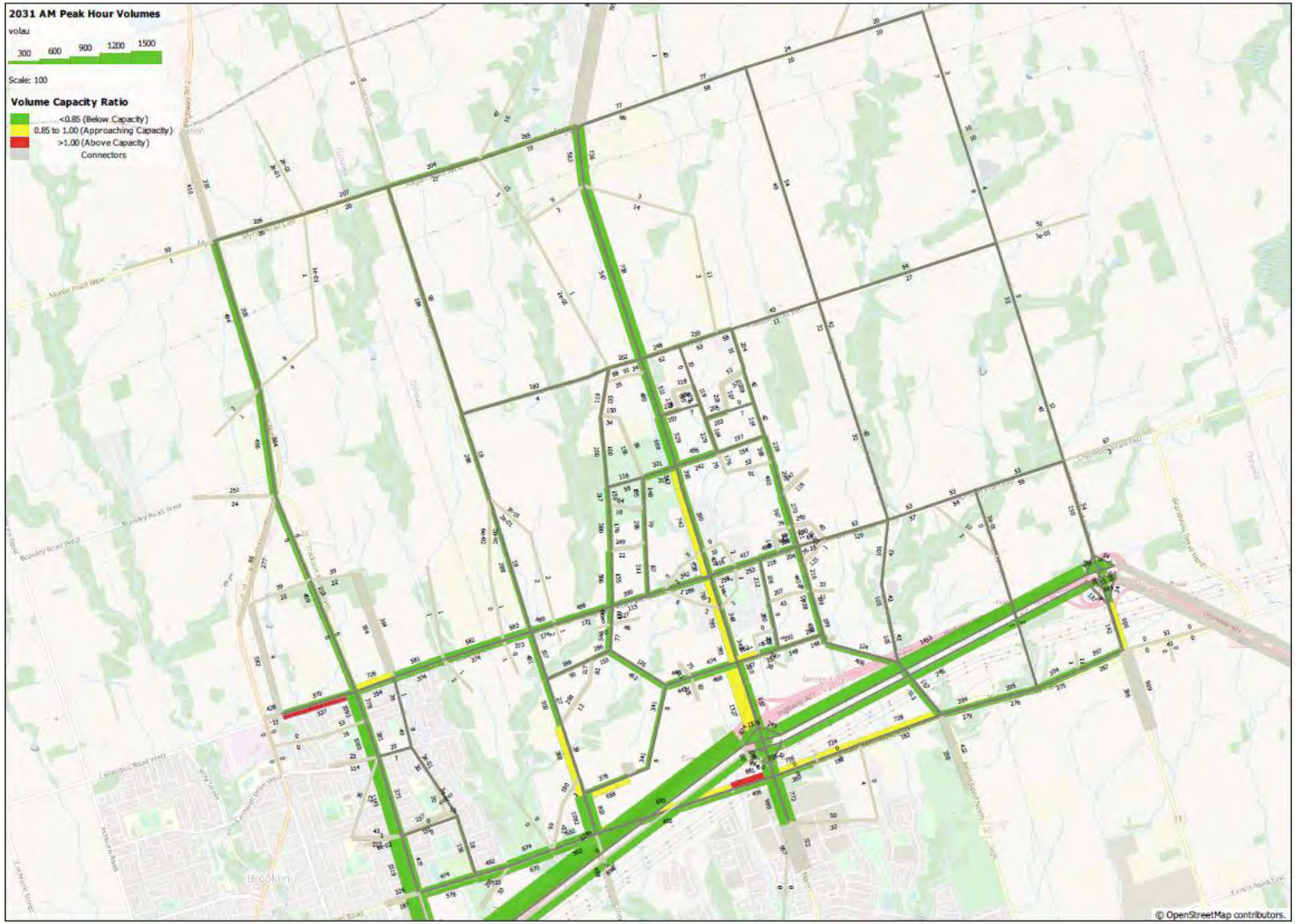


Exhibit 5-3. 2031 A.M. Future Total EMME V/C and Volumes Plot

5.2.3 Future Total Intersection Operations Analysis

Future Volumes Development

This section documents the methodology used to develop 2031 future turning movement counts at the intersection level. It is noted future volumes were developed and analyzed for only key intersections to the Study as identified in **Exhibit 5-4**. These intersections are generally those which intersect with existing Type B Arterials and proposed Type C Arterials to best inform the structuring arterial road network elements. Once the arterial network is confirmed, further detailed analysis should be conducted at the site plan application stage for collector road intersections.

It is noted the Ritson / Columbus Intersection Improvements Municipal Class Environmental Study Report identifies the preferred solution at the Ritson Road North and Columbus Road East intersection as a realignment of the two roads with a roundabout as the intersection control type. The intersection operations analysis conducted as part of the Columbus Part II Plan study will re-evaluate a realignment of this intersection with an appropriate intersection control type based on the Draft Recommended Plan.

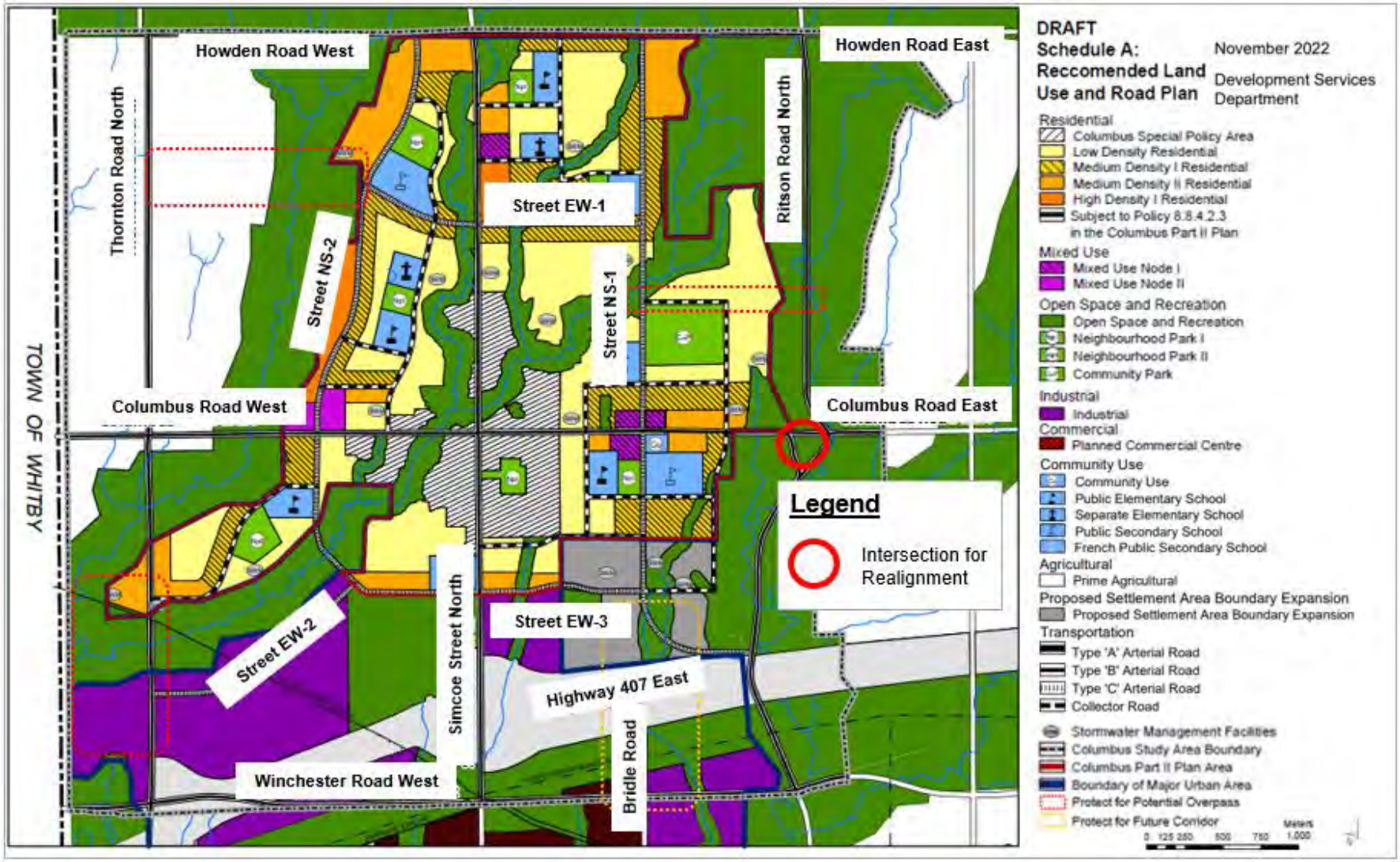


Exhibit 5-4. Intersections to be further analyzed

Future turning movements were developed based on EMME link and turning movement outputs for the 2031 draft qrecommended land use scenario. For intersections where existing turning movement counts (TMCs) existed, 2031 A.M. volumes were developed using the furnessing method, which accounts for existing traffic patterns (TMCs) and future target link volumes (from EMME). For intersections where either existing counts are unavailable or are new intersections from the development, EMME turning movement outputs were used. Adjustments were made to volumes to account at locations with unreasonably high turning volumes and re-routed within the network.

Similarly, the 2031 P.M. volumes were also developed based on whether existing counts are available. At locations where existing counts are available, the difference between future furnessed counts and existing counts was applied to the equal and opposite movements. For other intersections where existing data was unavailable, EMME turning movement outputs were used for the equal and opposite movements. Additional adjustments were made to P.M. volumes to ensure balancing between links in the network.

The future 2031 turning volumes are shown in **Exhibit 5-5**. It is noted that dummy values of 5 vehicles were included for turning movements that resulted in a value zero to allow for some Measure of Effectiveness (M.O.E.) extraction.

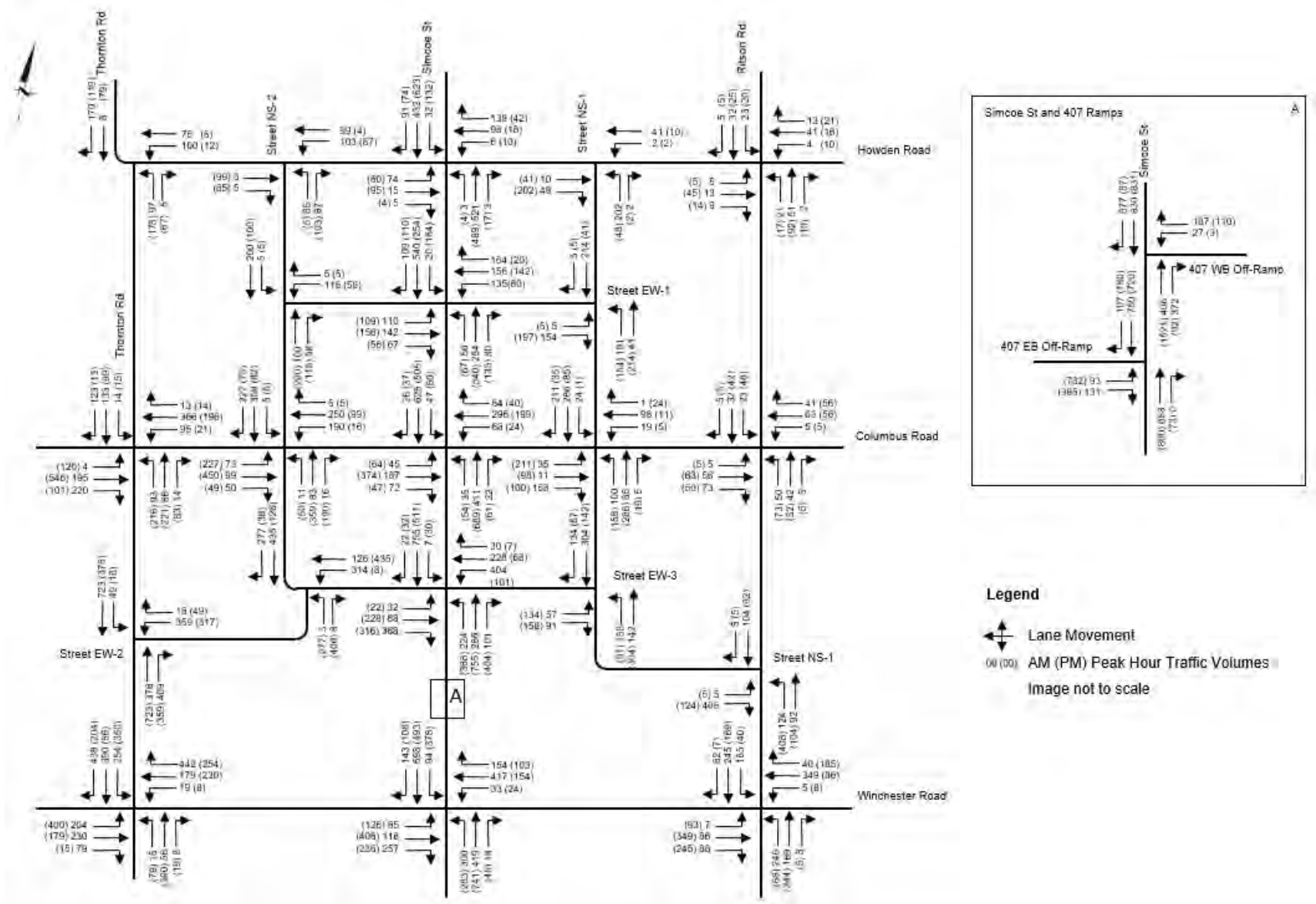


Exhibit 5-5. 2031 Future Total Volumes

2031 Future Total (Existing Locations, No Improvements)

Intersection operations analysis at existing intersections was conducted using the 2031 future total volumes to identify if deficiencies exist based on the existing lane configuration. Turning movements at the Columbus Road and Ritson Road intersection assumed the existing jogged alignment as part of the “No Improvements”, with volumes interpreted for the alignment based on **Exhibit 5-5** as shown in **Exhibit 5-6**.

Critical movements (i.e. operating at L.O.S. E or F or v/c ratio > 1.0) for signalized and unsignalized intersections are identified and shown in **Table 5-2** and **Table 5-3**, respectively. Improvements will be required at Winchester Road at Thornton Road North. Note the existing intersections of Winchester Road at Thornton Road North and Winchester Road at Ritson Road North were not analyzed similarly to the Phase 1 report as signal timings are unavailable.

Intersection operations for the A.M. and P.M. peak periods are shown in **Exhibit 5-7** and **Exhibit 5-8**. Full 2031 No Improvement results for existing locations are provided in **Appendix E**. Based on the results, several intersections within the Study Area are operating poorly and require improvements to support future developments.

The Ritson Road North and Columbus Road jogged intersections operate well under the No Improvements scenario; however, intersection re-alignment is recommended. As indicated in the Ritson Road North and Columbus Road East Intersection Improvements Municipal Class Environmental Study Report, the re-alignment will improve road safety and better accommodate future traffic volumes by improving sightline distances and road geometrics.

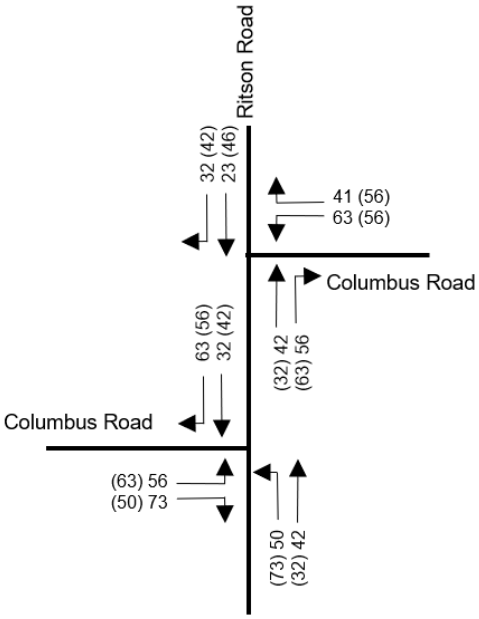


Exhibit 5-6. Columbus Road and Ritson Road Volumes for 2031 Future Total, No Improvements

Table 5-2. Critical Movements at Signalized Intersections under Future Total Conditions (no improvements)

Location	Movement	Period	Volume	V/C Ratio	L.O.S.
Thornton Road North at Winchester Road	E.B. Left-thru-right	A.M.	513	1.31	F
Thornton Road North at Winchester Road	E.B. Left-thru-right	P.M.	594	1.76	F
Thornton Road North at Winchester Road	S.B. Thru-right	A.M.	828	1.27	F

*E.B. = Eastbound, W.B. = Westbound, N.B. = Northbound, S.B. = Southbound

Table 5-3. Critical Movements at Unsignalized Intersections under Future Total Conditions (no improvements)

Location	Movement	Period	Volume	V/C Ratio	LOS
Columbus Road and Thornton Road North (A.W.S.C.)	E.B. Left-thru-right	A.M.	419	0.95	F
Columbus Road and Thornton Road North (A.W.S.C.)	N.B. Left-thru-right	A.M.	474	1.13	F
Simcoe Street North and Howden Road (T.W.S.C.)	E.B. Left-thru-right	A.M.	89	2.2	F
Simcoe Street North and Howden Road (T.W.S.C.)	W.B. Left-thru-right	A.M.	242	1.02	F
407 WB Off-ramp (T.W.S.C.)	W.B. Left	P.M.	3	0.08	F
Columbus Road and Thornton Road North	E.B. Left-thru-right	P.M.	526	1.08	F
Columbus Road and Thornton Road North	N.B. Left-thru-right	P.M.	504	0.99	F
Simcoe Street North and Howden Road	E.B. Left-thru-right	P.M.	179	2.08	F
Simcoe Street North and Howden Road	W.B. Left-thru-right	P.M.	70	0.87	F

*T.W.S.C. = Two-way Stop Control, A.W.S.C. = All-way Stop Control

*E.B. = Eastbound, W.B. = Westbound, N.B. = Northbound, S.B. = Southbound

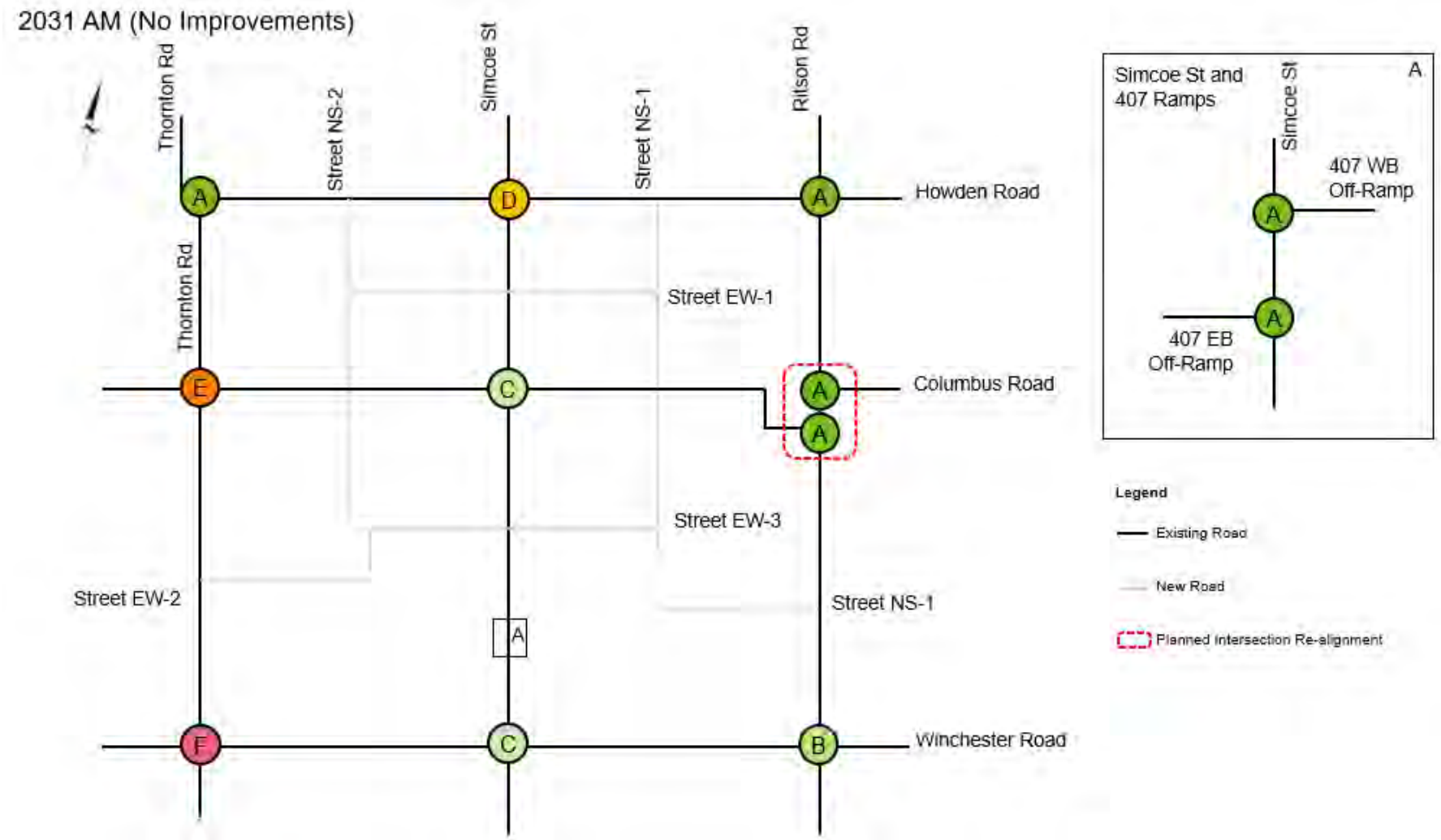


Exhibit 5-7. 2031 Future Total A.M. intersection operations at existing intersections with No Improvements

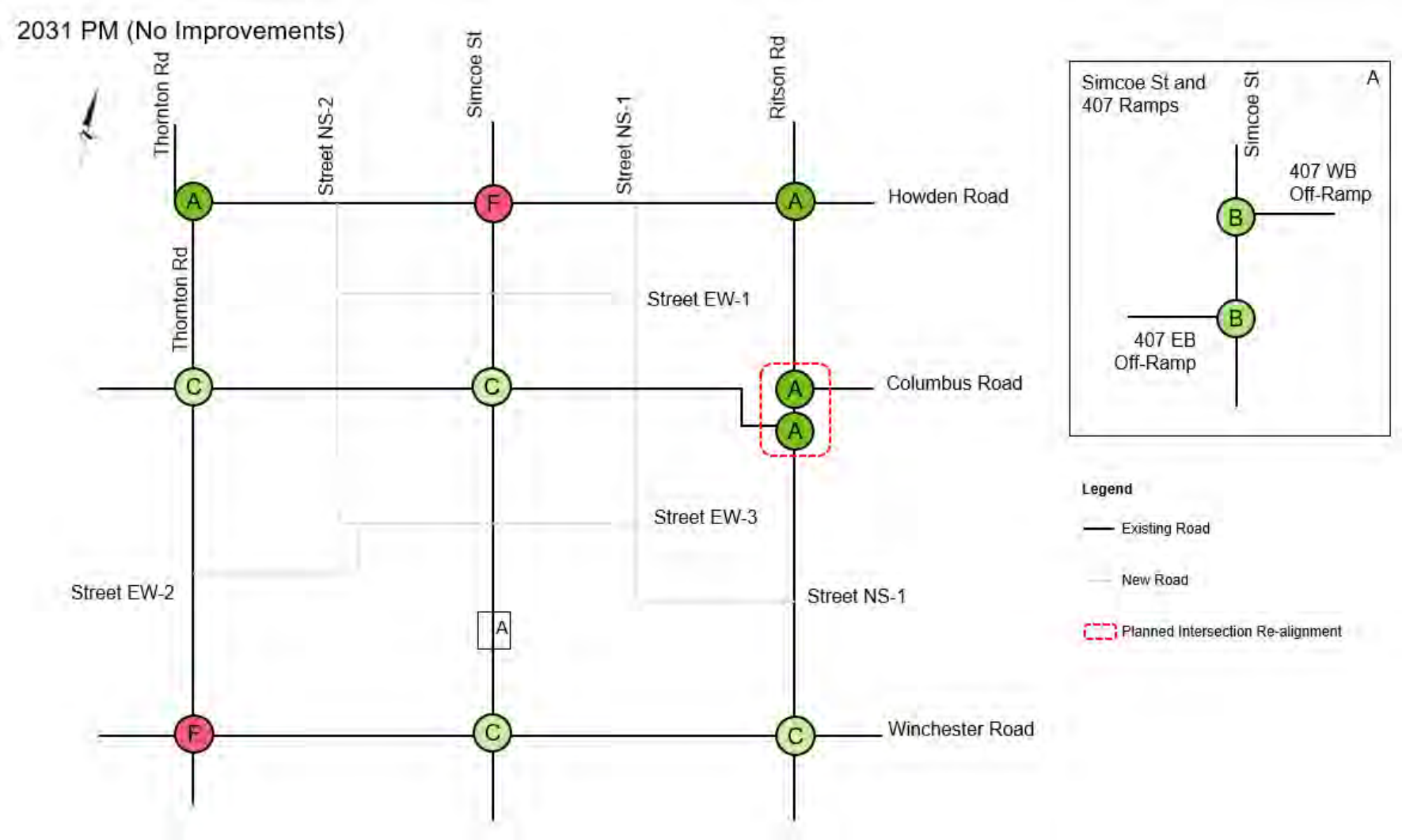


Exhibit 5-8. 2031 Future Total P.M. intersection operations at existing intersections with No Improvements

2031 Future Total Analysis (with Improvements)

The network lane configurations and intersection controls for all intersections were determined using the following methodology:

- Existing lane configurations and intersection controls were followed.
- Unsignalized operations were assumed for new intersections. Intersections were upgraded to signalized operations if critical movements existed.
- Shared left-through-right (L.T.R.) were assumed for all new approaches, with left turn lanes provided along major arterial approaches for all intersections analyzed.
- Additional dedicated left turn and right turn lanes were provided at intersections as determined by critical movements intersection operations analysis and engineering judgement, including deficiencies at existing locations noted in **Table 5-2** and **Table 5-3**.
- Further analysis will be required at the subdivision planning stage to confirm left and right turns.
- Common cycle lengths were determined based on the worse operating intersection and used throughout the Study Area to provide coordination opportunities.

The lane configuration and intersection control type evaluated based on the methodology is shown in **Exhibit 5-9**.

Based on the future total Synchro model results, most of the intersections operate with some residual capacity, at L.O.S. D or better. Some critical movements (i.e. operating at L.O.S. E or F) exist at signalized intersections and one unsignalized intersection as shown in **Table 5-4**. Intersection operations for A.M. and P.M. peak periods are shown in **Exhibit 5-10** and **Exhibit 5-11**, respectively. Full 2031 With Improvements results for all Study Area intersections are shown in **Appendix E**. Improved transit services, walking and cycling infrastructure, and other travel demand management measures (as described in **Section 5.3.1**, **Section 5.5**, and **Section 5.8**, respectively) should be considered to help relieve capacity deficiencies at intersections.

It is noted high delays exist for the westbound left turn movement at the Highway 407 Westbound off-ramp at Simcoe Street North; however, low volumes were modelled. This may be due to limitations of the macro model outputs for the development of future volumes. Traffic along Simcoe Street North is predicted to grow and would impact available gaps for left turning

volumes, increasing both delay and safety risks. As a result, it is recommended the Highway 407 Westbound off-ramp at Simcoe Street North be signalized to support the development.

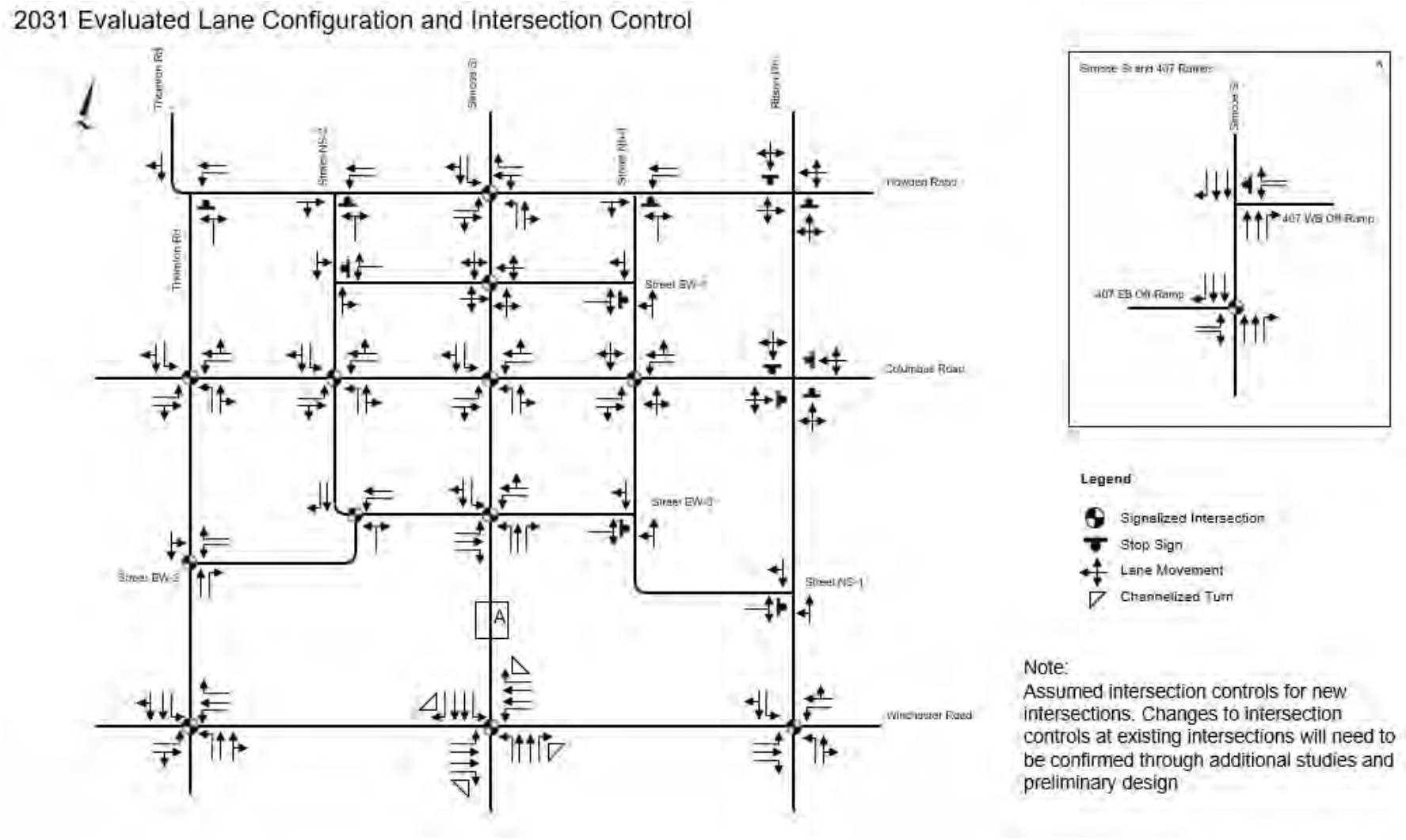


Exhibit 5-9. 2031 Evaluated Future Lane Configuration and Intersection Control under Future Total Conditions with Improvements

Table 5-4. Critical Movements at Intersections under Future Total Conditions with Improvements

Location (Signalized)	Movement	Period	Volume	V/C Ratio	L.O.S.
Simcoe Street North and Columbus Road	E.B. Thru-right	A.M.	259	0.87	D
Simcoe Street North and Winchester Road	E.B. Right-turn	A.M.	257	0.19	F
Simcoe Street North and Winchester Road	W.B. Thru	A.M.	417	0.77	E
Simcoe Street North and Winchester Road	W.B. Right-turn	A.M.	154	0.11	E
Simcoe Street North and Winchester Road	S.B. Left-turn	P.M.	378	0.87	D
Thornton Road North and Winchester Road	W.B. Right-turn	A.M.	442	0.31	F
Thornton Road North and Winchester Road	E.B. Left-turn	P.M.	400	0.98	E
Thornton Road North and Street E.W.-2	N.B. Right-turn	A.M.	409	0.29	E
Thornton Road North and Street E.W.-2	S.B. Left-thru	A.M.	772	0.96	D
Thornton Road North and Street E.W.-2	W.B. Left-turn	P.M.	517	0.95	D
Thornton Road North and Street E.W.-2	N.B. Thru	P.M.	723	0.85	C
Simcoe Street North and Street E.W.-3	E.B. Left-turn	A.M.	32	0.44	E
Simcoe Street North and Street E.W.-3	E.B. Thru	A.M.	68	0.55	E
Simcoe Street North and Street E.W.-3	E.B. Right-turn	A.M.	368	0.91	E
Simcoe Street North and Street E.W.-3	W.B. Left-turn	A.M.	404	1.04	F
Simcoe Street North and Street E.W.-3	S.B. Thru-right	A.M.	777	1.01	E
Simcoe Street North and Street E.W.-3	S.B. Thru-right	P.M.	543	0.95	E
Street N.S.-2 / Street E.W.-3 and Street E.W.-2	W.B. Left-turn	A.M.	314	0.98	E
Street N.S.-2 / Street E.W.-3 and Street E.W.-2	W.B. Thru	P.M.	435	0.88	D
Simcoe Street North and Highway 407 W.B. Off-ramp (Unsignalized)	W.B. Left-turn	P.M.	3	0.09	F

*E.B. = Eastbound, W.B. = Westbound, N.B. = Northbound, S.B. = Southbound

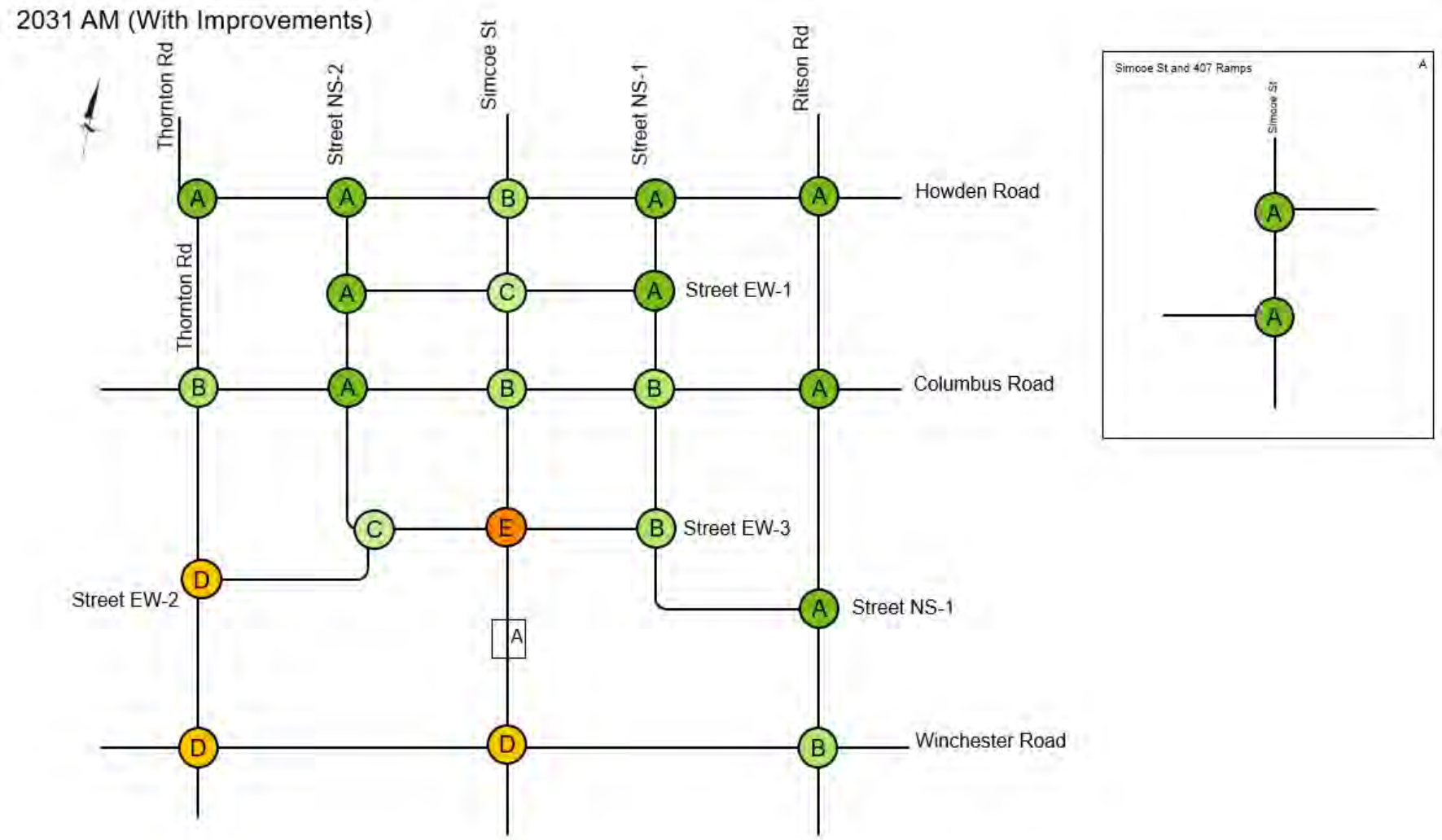


Exhibit 5-10. 2031 Future Total A.M. With Improvements (All Intersections)

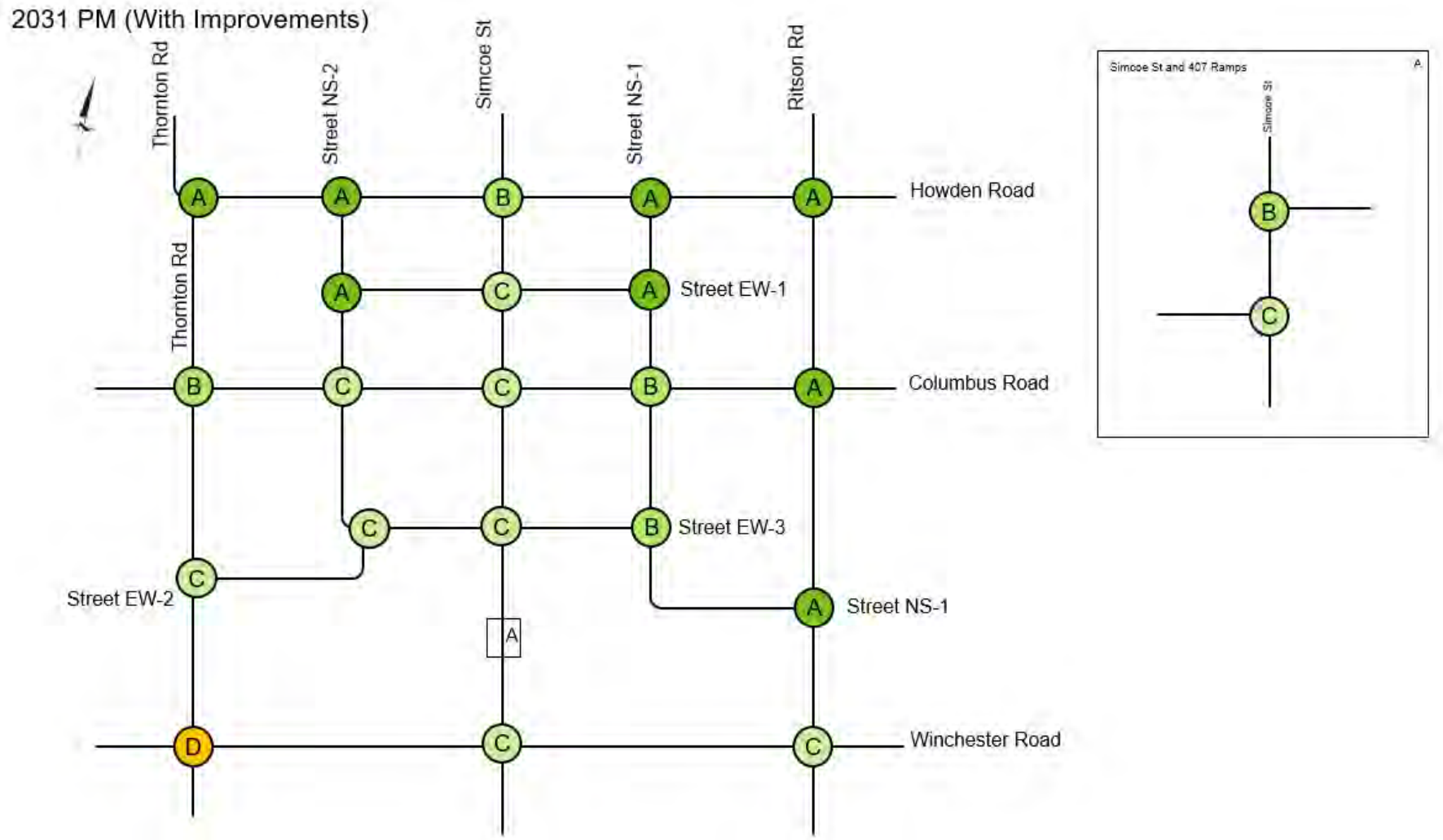


Exhibit 5-11. 2031 Future Total P.M. With Improvements (All Intersections)

5.3 Recommended Roads and Intersection Controls

Based on the results shown in **Section 5.2.3**, several of the existing intersections analyzed in existing conditions require improvements to serve the future developments in the Columbus Study Area.

A summary of recommended intersection control types and additional storage lanes at locations requiring improvements are shown in **Table 5-5** and **Table 5-6**, respectively.

Table 5-5. Intersection Control Type Recommendations

Intersection	Existing*	Recommended*
Howden Road and Thornton Road North	T.W.S.C.	T.W.S.C.
Howden Road and Street N.S.-2	n/a	T.W.S.C.
Howden Road and Simcoe Street North	T.W.S.C.	Signalized
Howden Road and Street N.S.-1	n/a	TWSC
Howden Road and Ritson Road	T.W.S.C.	T.W.S.C.
Columbus Road and Thornton Road North	A.W.S.C.	Signalized
Columbus Road and Street N.S.-2	n/a	Signalized
Columbus Road and Simcoe Street North	Signalized	Signalized
Columbus Road and Street N.S.-1	n/a	Signalized
Columbus Road and Ritson Road	A.W.S.C.	A.W.S.C.
Street EW-2 and Thornton Road North	n/a	Signalized
Street EW-3 and Street N.S.-2	n/a	Signalized
Street EW-3 and Simcoe Street North	n/a	Signalized
Street EW-3 and Street N.S.-1	n/a	T.W.S.C.
Highway 407 Westbound 407 Off-Ramp and Simcoe Street North	T.W.S.C.	Signalized
Highway 407 Eastbound Off-Ramp and Simcoe Street North	Signalized	Signalized
Street NS-1 and Ritson Road North	n/a	T.W.S.C.
Winchester Road and Thornton Road North	Signalized	Signalized
Winchester Road and Simcoe Street North	Signalized	Signalized
Winchester Road and Ritson Road North	Signalized	Signalized

*T.W.S.C. = Two-way Stop Control, A.W.S.C. = All-way Stop Control

Table 5-6. Additional Storage Lanes Recommended

Intersection	Left-turn Lanes	Right-turn Lanes
Winchester Road and Thornton Road North	E.B., W.B.	W.B.
Columbus Road and Thornton Road North	E.B., W.B., N.B., S.B.	
Columbus Road and Simcoe Street North	E.B., W.B.	
Howden Road and Simcoe Street North	W.B.	E.B.

*E.B. = Eastbound, W.B. = Westbound, N.B. = Northbound, S.B. = Southbound

Based on input from Durham Region, left turn lanes are required on all approaches at signalized intersections for safety and efficiency purposes. The final recommended lane configurations and intersection control types for all intersections analyzed in future conditions are shown in **Exhibit 5-12**. In general, most new intersections along existing arterial roads require signalization in the future. Roundabouts will be considered in the preliminary design where new traffic signals or A.W.S.C. are recommended at collector-collector or arterial-collector intersections.

It is noted traffic infiltration within the network onto the adjacent collector road network should also be monitored. Best practices from the draft Traffic Calming Guidelines should be considered where possible.

Recommended road improvements, corridor protection and intersection controls are illustrated in **Exhibit 5-13**. Each recommended improvement has been assigned an identification number which is referred to further in **Section 6 - Implementation Plan**.

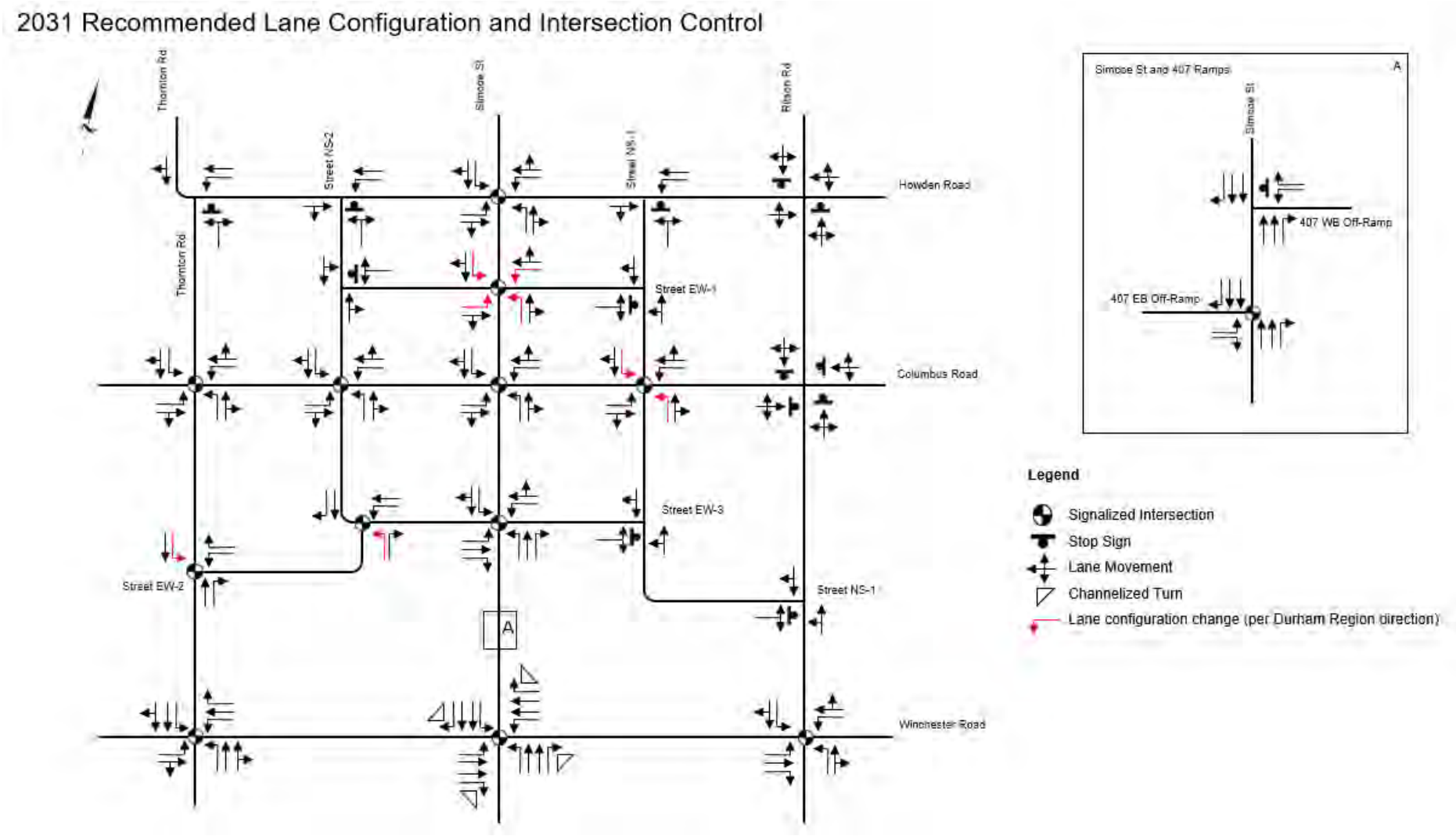


Exhibit 5-12. 2031 Recommended Future Lane Configuration and Intersection Operations

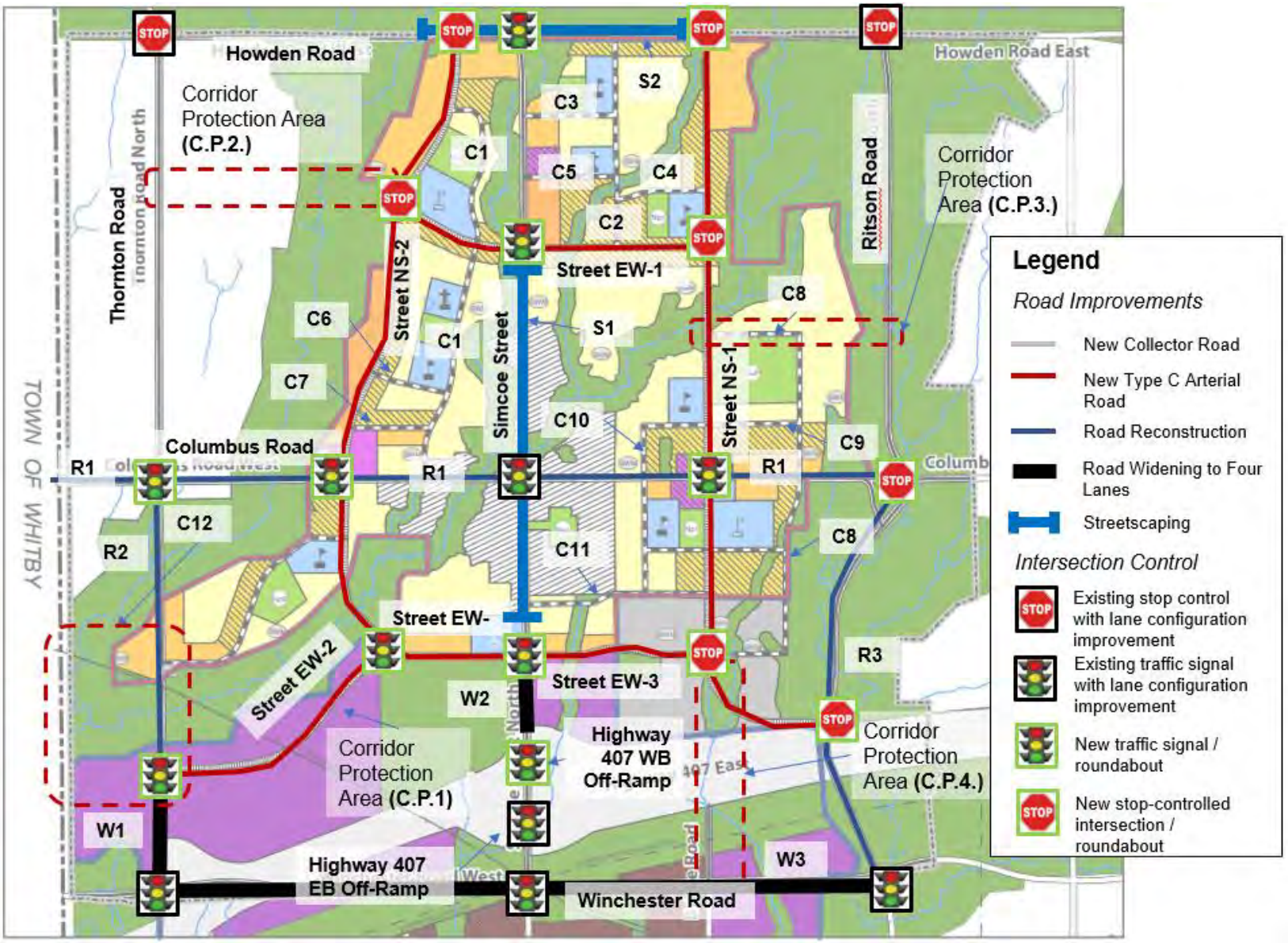


Exhibit 5-13: Recommended Road Network Improvements

5.3.1 Roundabouts

The City of Oshawa's Integrated Transportation Master Plan (T.M.P.) identifies a high-level, preliminary guideline for determining the feasibility of implementing a roundabout. The study also recommends that any locations being considered for a potential new traffic signal (as identified in **Exhibit 5-13**), including site access intersections for proposed developments, should consider a roundabout. Existing signalized and unsignalized intersections with current or projected operational problems should also consider a roundabout.

Further study such as subsequent Municipal Class E.A. phases for municipal intersections or site plan application for development access intersections should complete the preliminary guideline identified in the City's Integrated T.M.P. study to confirm whether a specific location should be designed as a roundabout for traffic signal.

5.4 Transit and Mobility Hubs

Building upon the recommendations of the Durham Region Transportation Master Plan (T.M.P.), transit and regional trail servicing are refined to accommodate the draft recommended land use and Road Plan. The proposed transit and Regional trail networks shown in **Exhibit 5-14** which also identifies potential "EcoMobility Hub" areas should integrate shared mobility services with transit stops.

5.4.1 Transit Network Recommendations

Transit servicing for the Part II Plan area builds upon Durham Region T.M.P. recommendations including rapid transit with exclusive lanes on Simcoe Street North up to Columbus Road, and an "other transit spine" which could be a combination of D.R.T. and GO Bus service on Simcoe Street North through Columbus and connecting to rural communities to the north.

A few refinements to the Regional T.M.P. recommendations include:

- Potential extension of the Simcoe Street North Rapid Transit service from the currently planned terminus at Highway 407 northward into Columbus, with a transit terminal or hub location at the intersection of Simcoe Street North and Street EW-3 (subject to further Study through Simcoe Street North Rapid Transit project).
    - It is noted that the bridge over Highway 407 represents a significant infrastructure constraint to provision of dedicated bus lanes. Based on the traffic analysis in this document, it is anticipated bus operation in mixed traffic should be sufficient to provide the connection to Columbus.

    - Alternatives solutions to connect to Columbus are recommended to be explored further through the Simcoe Street North Rapid Transit project.

- A local transit service which could circulate around the Study Area as a fixed route or demand-responsive flexible route, run by Durham Region Transit (D.R.T.)
- EcoMobility hubs identified at key locations to incorporate integration of shared mobility services, as appropriate to support transit connectivity

Local transit routing or on-demand service will be determined by Durham Region Transit as appropriate to support and encourage future transit demand, while mobility hub implementation, if requiring space beyond the public right-of-way could be facilitated through the development process.

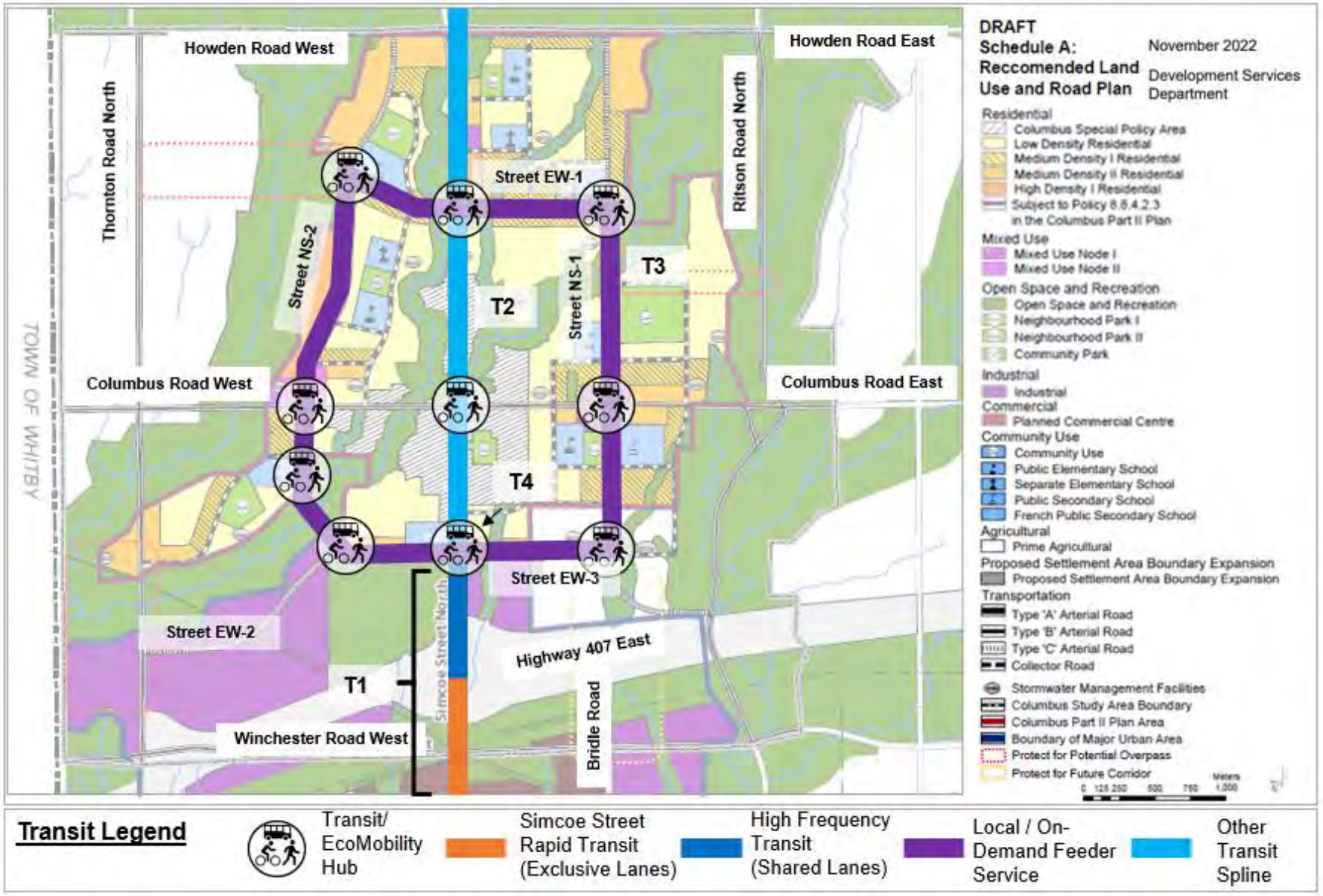


Exhibit 5-14: Recommended Transit Network

5.4.2 Mobility Hubs

The City of Oshawa's Integrated Transportation Master Plan (I.T.M.P.) Study recommends building upon Metrolinx's Mobility Hub Guidelines to review and update, as appropriate, City land use planning and zoning to maximize intensification of land uses and transit-oriented development around mobility hubs. The Highway 407 / Simcoe Street North area has been identified in the I.T.M.P. as a potential mobility hub. Due to close proximity to the Columbus Part II Plan area, it is recommended the future Highway 407 / Simcoe Street North Hub location be considered at Simcoe Street North and Street EW-3 to improve connectivity within the Columbus area.

EcoMobility Hubs[1] are multi-modal one-stop hubs to facilitate smart and easy access to mobility services such as car sharing, ride sharing and bicycle sharing. These hubs may vary in scale from major transit station areas (i.e. Simcoe Street North Bus Rapid Transit terminal) to smaller-scale community-based hubs. Depending on the scale, the hub may include bus stops, dedicated car share parking spaces with charging stations, parking lay-bys for ride sharing, bicycle share stations, comfortable and safe waiting areas with displays for real-time data for all modes, benches, open space, free Wi-Fi, wayfinding information, and retail support. The EcoMobility Hub concept is illustrated in **Exhibit 5-15**, while potential locations integrated with the proposed transit network are shown in **Exhibit 5-14**.

It is noted that rural on-demand services are currently offered within the Study Area. D.R.T. will continue to monitor the subject area growth and development to determine and consider future local routes if needed.

[1]1. Karim D. M., Innovative Mobility Master Plan: Connecting Multimodal Systems with Smart Technologies, Disrupting Mobility Conference, MIT Media Lab, Cambridge, USA, November 11~13, 2015.

2. Karim D. M., Creating an Innovative Mobility Ecosystem for Urban Planning Areas, Disrupting Mobility - Impacts of Sharing Economy and Innovative Transportation on Cities, Springer Book, Lectures in Mobility, ISBN: 978-3-319-51601-1, pages 21-47, 2017.

Exhibit 5-15: EcoMobility Hub Concept

Source: multi mobility, Sophia von Berg, 2014

5.5 Active Transportation Network

The draft recommended land use and road plan should be supported by a well-connected and safe system of dedicated active transportation facilities for people of all ages and abilities. This includes consideration of desirable separation based on vehicular traffic volumes and speeds and providing connections to existing and proposed park and planned Regional trails.

Cycling facilities within the street right-of-way were selected based on expected characteristics of the roads with consideration of the Oshawa Active Transportation Master Plan (A.T.M.P.) and Ontario Traffic Manual (O.T.M.) Book 18 (June 2021 edition) which offer guidelines for bicycle network design, facility selection, facility design, and network implementation (see **Exhibit 5-16** and **Exhibit 5-17** for urban/suburban or rural context, respectively). It is noted O.T.M. Book 18 indicates the urban/suburban nomograph may be used in rural town/hamlet/village contexts. Facilities range in separation from shared routes to dedicated on-road facilities, to separated in-boulevard and off-road facilities. Facility type is guided by criteria including vehicle speed and volume, traffic mix, space availability, existing and future demand, and cost. The diverse nature of the streets within the Study Area will merit a nuanced approach to bicycle network design using the tools presented in Book 18.

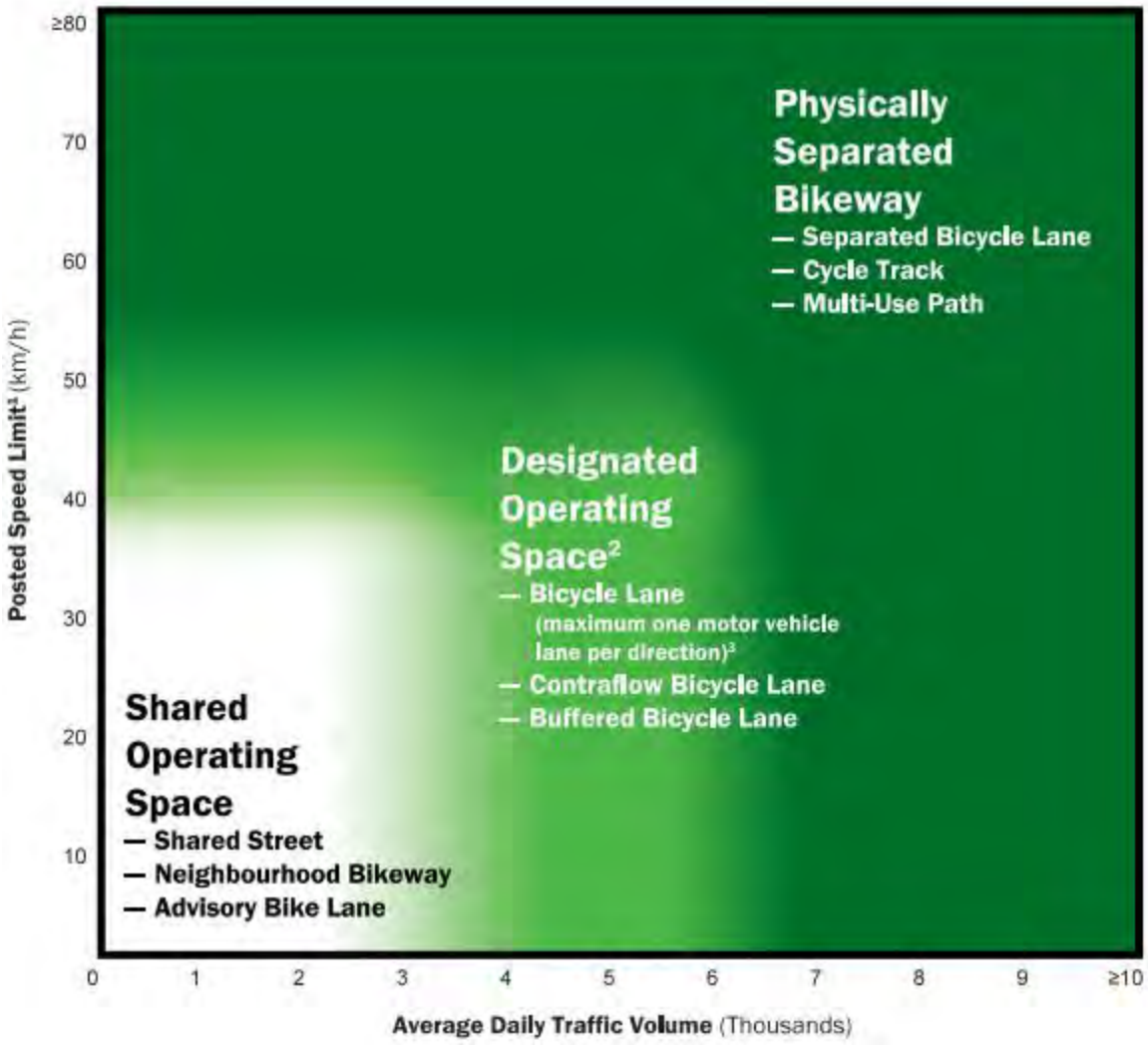


Exhibit 5-16. Desirable Cycling Facility Pre-Selection Nomograph (Urban / Suburban Context. June 2021)

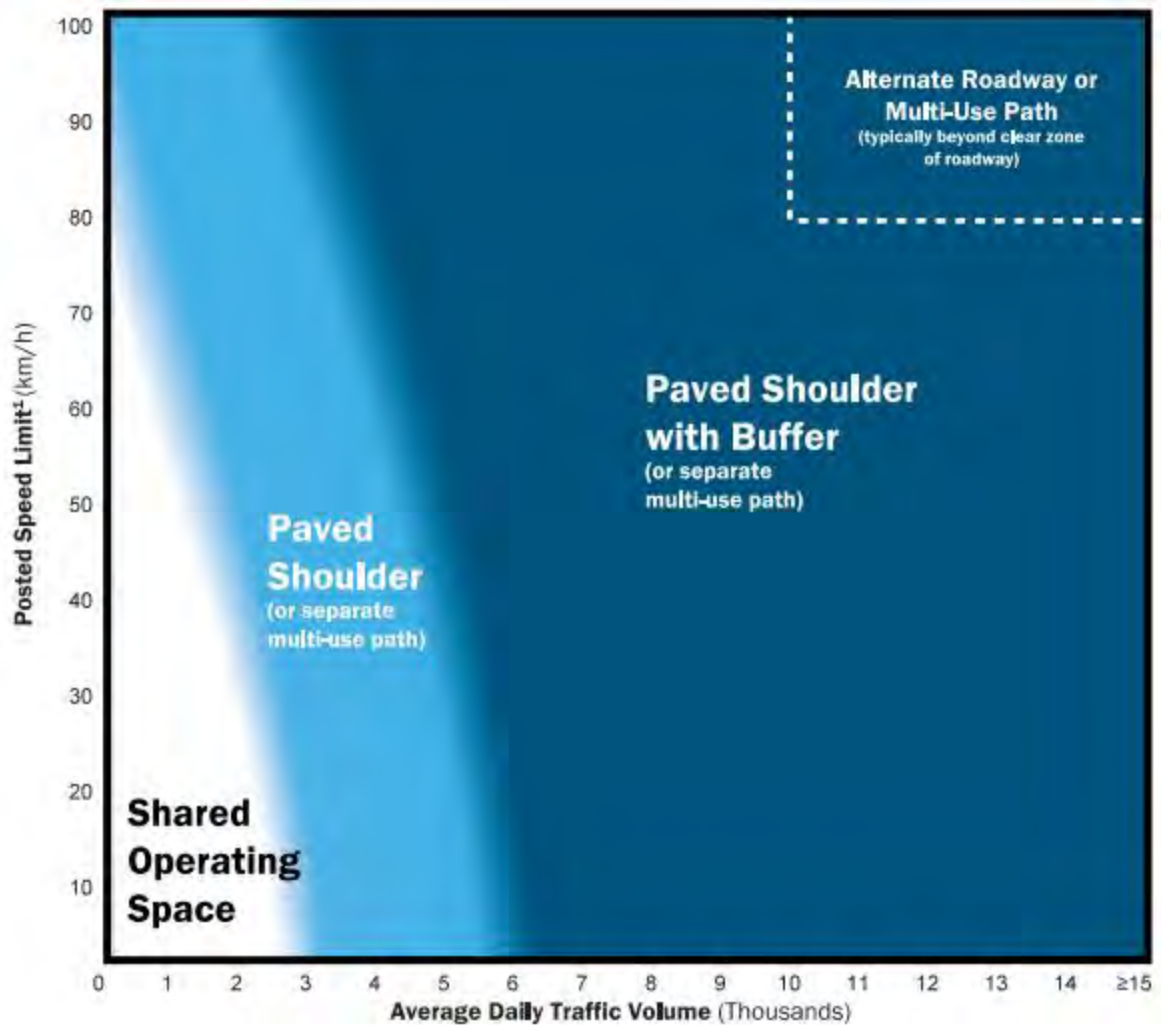


Exhibit 5-17. Desirable Cycling Facility Pre-Selection Nomograph (Rural Context, June 2021)

The preliminary screening considers several classes of active transportation facilities:

- **On-road cycling routes** are located within the pavement right-of-way and may include either of the following:
    - Lined and signed bicycle routes where on-street parking that occupies the area lined and signed for bicycles is permitted; or
    - Painted decals (“sharrows”) within widened travel lanes to indicate designed joint use of the travel lane by motorists and cyclists.

- **On-road cycling lanes** are located within the pavement right-of-way and may include either of the following:
    - Separate, dedicated bicycle lanes and/or paved shoulders marked/signed for cyclists where on-street parking that occupies any portion of the bicycle lane is prohibited; or
    - Separate, dedicated buffered bicycle lanes and/or paved shoulders marked/signed for cyclists where on-street parking that occupies any portion of the buffered bicycle lane is prohibited, and which include a curb to further separate cyclists from vehicular traffic.
- **Class I trails** are located within the boulevard of a road and can include two-way multi-use trails or one/two-way cycling facilities.
- **Class II trails** are located off-road and include shared multi-use pathways or trails. These were also considered in the draft recommended active transportation network to improve network connectivity with existing and planned Regional trails.

The draft recommended active transportation network is presented in **Exhibit 5-18**. *It is noted the highest order cycling facility is shown in instances of multiple active transportation facilities on a road segment.* The preliminary screening of cycling facilities within a street right-of-way in consideration of O.T.M. Book 18 is shown in **Table 5-7**. The preferred active transportation network considers and refines the recommendations found in the City of Oshawa's 2015 Active Transportation Master Plan and the Durham Region's 2021 Cycling Master Plan.

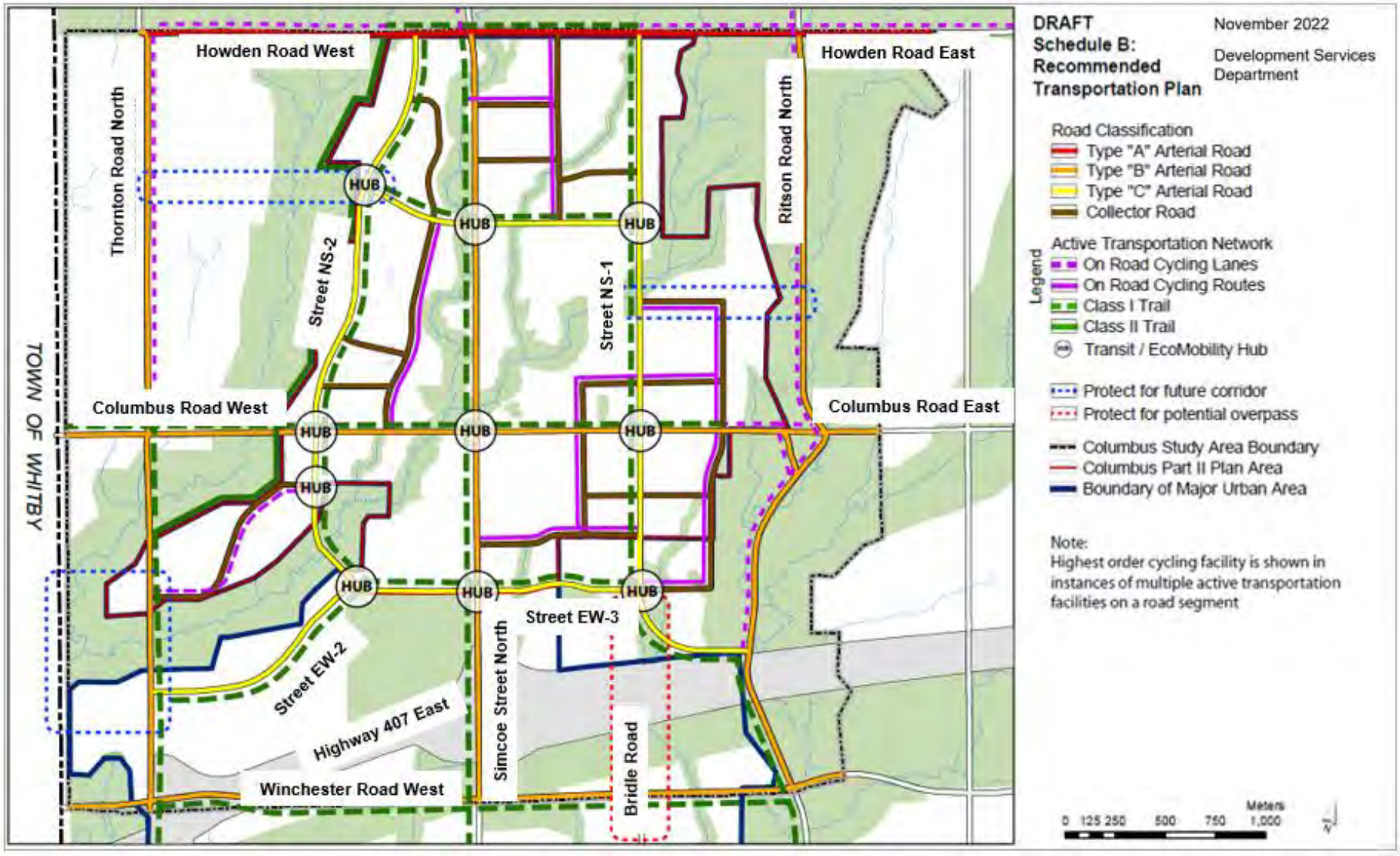


Exhibit 5-18: Draft Recommended Active Transportation Network

Table 5-7. Preliminary Screening of Cycling Facilities per O.T.M. Book 18

Corridor	2031 A.A.D.T.*	Context	Highest Operating Speed (km/h)	Desirable Cycling Facility (O.T.M. Book 18)	Minimum Recommended Cycling Facility
Howden Road (Street N.S.-1 to Street N.S.-2)	2,600	Urban	50	Designated Operating Space	Class I Trail
Howden Road (outside of Street N.S.-1 to Street N.S.-2, including east of Ritson Road)	1,500	Rural	50	Shared Operating Space	On Road Cycling Routes
Winchester Road	11,000	Rural	80	Alternative Roadway or Multi-Use Path	Class I Trail
Thornton Road North (Winchester Road to Street E.W.-2)	15,100	Urban	60	Physically Separated Bikeway	Class I Trail
Thornton Road (Street E.W.-2 to Columbus Road)	7,900	Urban	60	Physically Separated Bikeway	Class I Trail
Thornton Road (Columbus Road to Howden Road)	2,400	Rural	80	Paved Shoulder	On Road Cycling Routes
Ritson Road (Street N.S.-1 to southern boundary of Columbus Study Area)	5,400	Rural	60	Paved Shoulder with Buffer	On Road Cycling Routes
Ritson Road (North of Howden Road to Street N.S.-1)	1,200	Rural	50	Shared Operating Space	On Road Cycling Routes
Columbus Road (west of Thornton Road to eastern boundary of Columbus Study Area)	7,600	Urban	60	Physically Separated Bikeway	Class I Trail
Columbus Road (Eastern boundary of Columbus Study Area to Ritson Road)	1,500	Rural	60	Paved Shoulder	On Road Cycling Routes
Simcoe Street North (Street E.W.-3 to Winchester Road)	17,100	Urban	60	Physically Separated Bikeway	On Road Cycling Lanes

Corridor	2031 A.A.D.T.*	Context	Highest Operating Speed (km/h)	Desirable Cycling Facility (O.T.M. Book 18)	Minimum Recommended Cycling Facility
Simcoe Street North (North of Howden Road to Street E.W.-3)	9,600	Urban	60	Physically Separated Bikeway	On Road Cycling Lanes
Street N.S.-1	6,700	Urban	50	Physically Separated Bikeway	Class I Trail
Street N.S.-2	5,900	Urban	50	Designated Operating Space	Class I Trail
Street E.W.-1	5,600	Urban	50	Designated Operating Space	Class I Trail
Street E.W.-2	7,500	Urban	50	Physically Separated Bikeway	Class I Trail
Street E.W.-3	8,300	Urban	50	Physically Separated Bikeway	Class I Trail

*AADT based on 2031 A.M. Preferred Alternative EMME Model volumes

Designated operating space includes paved shoulders and exclusive cycling lanes (O.T.M. Book 18)

Separated facilities include in-boulevard active transportation facility, buffered paved shoulder, separated bicycle lanes (O.T.M. Book 18)

5.5.1 Sidewalks

Sidewalks are a key component of active transportation infrastructure in the City. As per the City's Engineering Design Criteria Manual (January 2020), concrete sidewalks shall be constructed on both sides of all arterial and collector roads. Local roads require sidewalks on at least one side. The appropriate side is to be determined based on predicted pedestrian movement, generally serving the majority of pedestrians. Where there is no appreciable difference in predicted pedestrian movement on either side, the north and east sides shall be used to maximize exposure to the sun during winter months.

All proposed sidewalks, whether they are retrofits or new construction, should be consistent with the Built Environment Standards required by the Accessibility for Ontarians with Disabilities Act (A.O.D.A.).

The standard width of sidewalk shall be 1.50 m to 1.80 m as noted on Standards 301 and 303; refer to City of Oshawa standards OS-200 series for typical location within the right-of-way. However, the City's Active Transportation Master Plan does allow for 2.0 m sidewalk width in higher demand areas.

At locations where sidewalks include bus stops and related infrastructure, the design for sidewalks should align with the dimensions noted in S-500.012 with additional consultation with D.R.T. through the subdivision/site planning process.

It is recommended that streets adjacent to high density and mixed-use areas of the Part II Plan area consider 2.0 m sidewalks. Desired widths of sidewalks per road type are detailed in **Section 5.6**.

5.5.2 Midblock Crossing Considerations

Midblock pedestrian crossings should be implemented within long blocks and at key destinations such as schools, transit stops, mixed use development and retail shopping plazas. Treatment types may include traffic signals, mid-block pedestrian signals, pedestrian crossovers (also known as PXOs) and pedestrian crossing or refuge islands, in accordance with Ontario Traffic Manual (O.T.M.) Book 15 guidelines.

Traffic control signals are already recommended at many arterial and collector road intersections. Additional midblock crossings treatments for Type C arterial roads should be considered during further study at key destinations and at locations where the distance from the closest protected crossing exceeds 200 m. This threshold is based on O.T.M. Book 15 where

pedestrian crossovers are warranted where 8-hour pedestrian crossing volumes exceed 100 persons and the cross-street traffic volumes exceed 750 vehicles. It is noted however the pedestrian and cyclist demand can become suppressed when appropriate safe infrastructure is not provided. As such, engineering judgement in the design of the community is encouraged through further study.

5.5.3 Cycling Interchanges

To facilitate safe cycling movements along identified cycling corridors, “cycling interchanges” should be considered at the intersection of two streets with dedicated cycling facilities identified in **Exhibit 5-18**. Considerations should be made for safe cycling intersection design such as protected intersections or bicycle-boxes which can help facilitate left-turn movements in accordance with O.T.M. Book 18 Cycling facility standards. Crossrides should be provided per standards noted in O.T.M. Book 18 Section 6.2.1.

5.6 Roadway Classification and Right-of-Way Widths

Considering the roadway, transit and active transportation requirements identified, typical cross-sections for various street types in the Part II Plan area are provided in this section.

Road improvement types are defined as follows:

- Road reconstruction: improvements to road surface due to existing poor pavement conditions that nears end of service life.
- Road urbanization: inclusion of additional urban road right-of-way elements including streetscaping, active transportation facilities, and more.
- Road widening: provision of additional lanes to increase road capacity.

5.6.1 Type A and Type B Arterial Roads

Several existing streets within the Study Area are classified as Type A and B Arterial Roads and are intended to carry moderate to large volumes of traffic. Urban areas generally feature a multi-use trail, 1.8 m width sidewalk (minimum), and on-road cycling facilities. Rural areas generally will feature on-road cycling facilities. The street names and recommended improvements are summarized in **Table 5-8**. It is noted that Low Impact Development (L.I.D.) measures and stormwater treatments should be accommodated within the road R.O.W.

Table 5-8: Recommendations for Type A and Type B Arterial Roads

Street Name	Classification / Jurisdiction / R.O.W.*	Road Improvement	Active Transportation
Howden Road	Type A, City of Oshawa, 36 m (2 lane)	Urbanization adjacent to new development with active transportation.	Class I trail on south side for urban section (NS-1 to NS-2); on-road cycling lanes for rural section (Thornton Road to Ritson Road outside of NS-1 to NS-2)
Columbus Road	Type B, City of Oshawa, 36 m (2 lane)	Reconstruction and urbanization – vertical alignment improvements (Oshawa-Whitby boundary to collector road east of Street N.S.-1). Reconstruction from collector road east of Street N.S.-1 to Ritson Road.	On-road cycling lanes and Class I trail for rural and urban section (Oshawa-Whitby boundary to collector road east of Street N.S.-1); On-road cycling lanes for rural section (east of Street N.S.-1 to Ritson Road)
Winchester Road	Type B, Durham Region, 36 m (4 lane)	None by 2031, maintain rural cross-section *[Post 2031: 2 to 4 lane widening between Garrard Road and Simcoe Street North]*	Class I trail on south side (west of Thornton Road North to Ritson Road)
Thornton Road North	Type B, City of Oshawa, 36 m (2 lane), 36 m (4 lane)	Reconstruction and urbanization – vertical alignment improvements (Columbus Road to Street E.W.-2); 2 to 4 lane widening (Street E.W.-2 to Winchester Road)	On-road cycling lanes for rural sections (Howden Road to Columbus Road); Class I trail (Columbus Road to Winchester Road)

Street Name	Classification / Jurisdiction / R.O.W.*	Road Improvement	Active Transportation
Simcoe Street North	Type B, Region of Durham, 30 m (2 lane), 36 m (4 lane)	2 to 4 lane widening (Street E.W.-3 to Highway 407), streetscaping (Street E.W.-2 / E.W.-3 to Street E.W.-1)	On-road cycling lanes and Class I trail (north of Howden Road to Winchester Road)
Ritson Road North	Type B, City of Oshawa, 30 m (2 lane)	Reconstruction – vertical alignment improvements (Columbus Road to Winchester Road)	On-road cycling lanes for rural sections (north of Howden Road to Street N.S.-1); Class I trail (Street N.S.-1 to Winchester Road)

*additional ROW may be required to accommodate auxiliary lanes and transit stops at intersections, grading, structures, etc. Detailed ROW requirements should be determined in future EA studies

Typical cross-section recommendations are identified for the Type A and B arterial road improvements which incorporate road widenings and multi-use trail or separated cycling facility improvements. This includes:

- 36 m R.O.W. with two traffic lanes, on-road cycling lanes, ditching and a Class I trail (Columbus Road – **Exhibit 5-19**)
- 36 m R.O.W. with two traffic lanes, ditching and a Class I trail (Ritson Road North – **Exhibit 5-20**)
- 36 m R.O.W. with two traffic lanes, on-road cycling lanes, and ditching (Howden Road, Thornton Road North, Ritson Road, Columbus Road - **Exhibit 5-21**
- 36 m R.O.W. with four traffic lanes, on-road cycling lanes, ditching and Class I trail (Winchester Road - **Exhibit 5-22**)
- 36 m R.O.W. with four traffic lanes, urban with sidewalks and Class I trail (Thornton Road North - **Exhibit 5-23**)
- 36 m R.O.W. with two traffic lanes, urban with sidewalks and Class I trail (Columbus Road, Howden Road, Simcoe Street North - **Exhibit 5-24)**
- 36 m R.O.W. with four traffic lanes, urban with on-road cycling lanes and Class I trail (Simcoe Street North – **Exhibit 5-25**).

Exhibit 5-19: Typical Midblock Cross Section, 36m Type B Arterial, Two-Lane Rural with Class I Trail (In-Boulevard Multi-use Trail) and On-road Cycling Lanes (Paved Shoulders)

Exhibit 5-20. Typical Midblock Cross Section, 36m Type B Arterial, Two-Lane Rural with Class I Trail (In-Boulevard Multi-use Trail)

Exhibit 5-21: Typical Midblock Cross Section, 36m Type B Arterial, Two-Lane Rural with On-Road Cycling Lanes (Paved Shoulders)

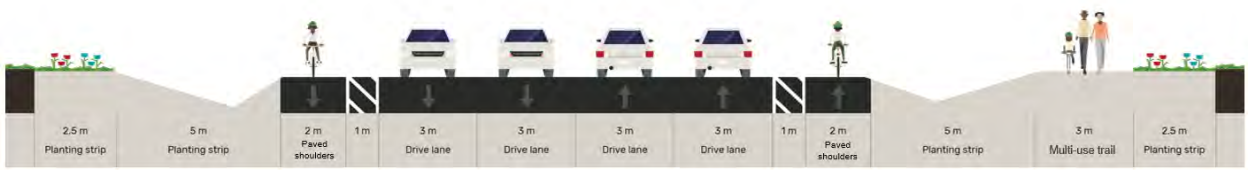


Exhibit 5-22: Typical Midblock Cross Section, 36m Type B Arterial, Four-Lane Rural with Class I trail (In-Boulevard Multi-use Trail) and On-Road Cycling Lanes (Paved Shoulders)

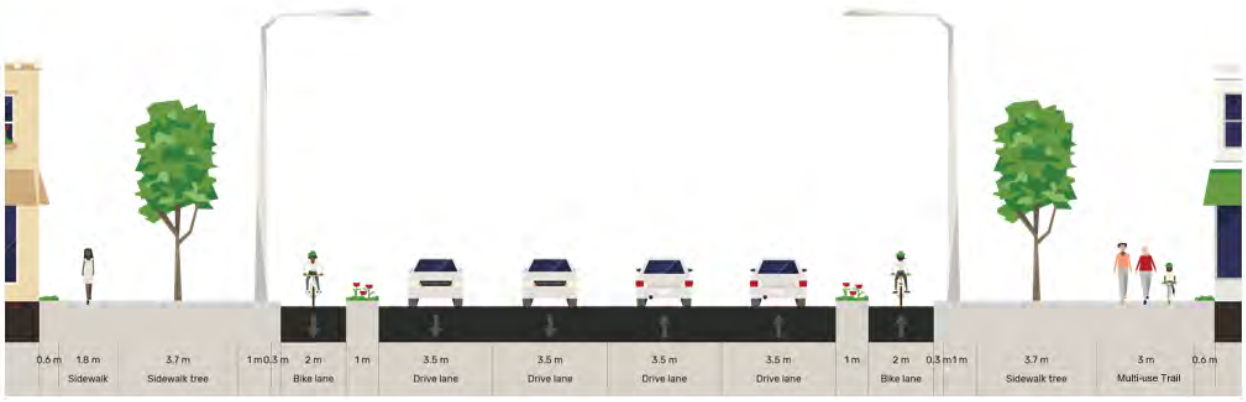


Exhibit 5-23: Typical Midblock Cross Section, 36m Type B Arterial, Four-Lane Urban with Class I trail (In-Boulevard Multi-use Trail) and On-Road Cycling Lanes (Bike Lanes)

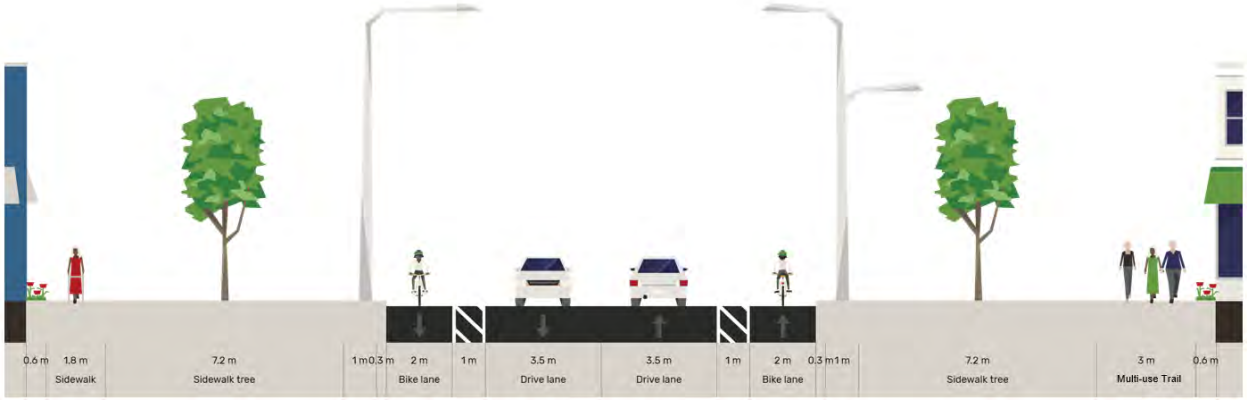


Exhibit 5-24. Typical Midblock Cross Section, 36m Type B Arterial, Two-Lane Urban with Class I trail (In-Boulevard Multi-use Trail) and On-Road Cycling Lanes (Bike Lanes)

Exhibit 5-25. Typical Midblock Cross Section, 36m Type B Arterial, Four-Lane Urban with Class I trail (In-Boulevard Multi-use Trail) and On-Road Cycling Lanes (Bike Lanes)

5.6.2 Type C Arterial Roads

Type C Arterial Roads move lower volumes of traffic and intersect with Type B Arterial, Type C Arterial, and collector roads. R.O.W. widths range from 26 to 30 m depending on vehicular travel lane and cycling needs. Based on the traffic analysis for this Study, one vehicular through-traffic lane is required on the Type C arterial roads identified in the draft recommended land use and road plan. Five Type C arterial roads (Street N.S.-1, Street N.S.-2, Street E.W.-1, Street E.W.-2, and Street E.W.-3) are identified with each requiring a 30 m R.O.W. and incorporate on-road bicycle lanes and an in-boulevard 3 m multi-use trail on one side as shown in **Exhibit 5-26**. Sidewalks will have a minimum width of 1.8 m.

There are opportunities to have centre islands in place of turning lanes in between intersections, which will be determined during the preliminary design.

Recommended improvements for Type C arterial roads are summarized in **Table 5-9**.

Table 5-9: Recommendations for Type C Arterial Roads

Street Name	Classification / Jurisdiction / R.O.W.	Road Improvement	Active Transportation
Street N.S.-1, Street N.S.-2, Street E.W.-1, Street E.W.-2 Street E.W.-3	Type C, City of Oshawa, 30 m (2 lane)	New construction, 16 m roadway with two through traffic lanes, turning lanes at intersections	On-road cycling lane. 1.8 m sidewalk on one side, 3.0 m Class I trail on one side

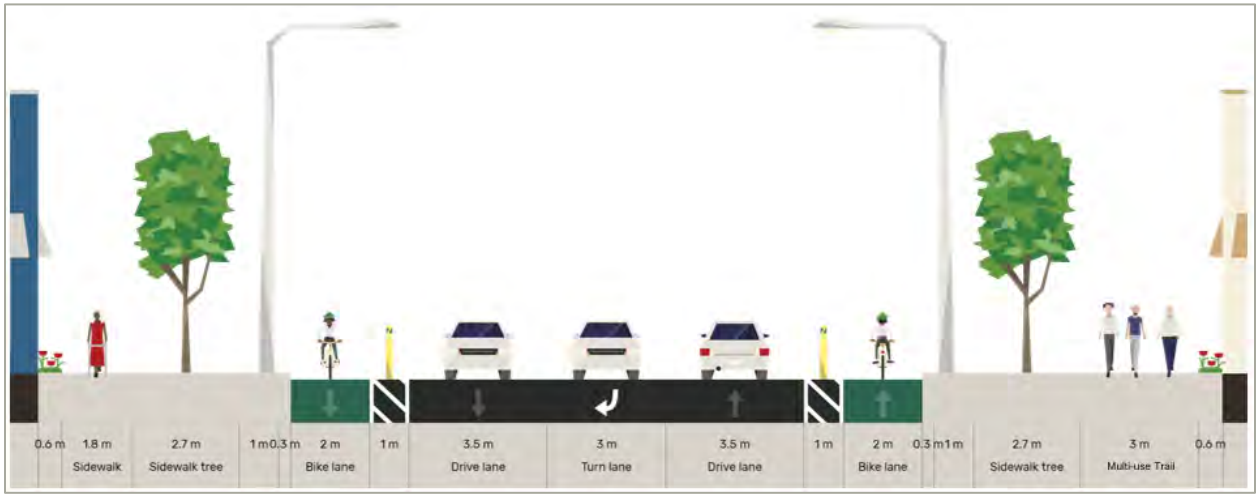


Exhibit 5-26. Typical Cross Section, 30m Type C Arterial with Class I trail (In-Boulevard Multi-use Trail) and On-Road Cycling Lanes (Bike Lanes)

Note: turning lane replaceable with median

5.6.3 Collector Roads

Collector Roads in the Part II Plan area serve moderate volumes of traffic connecting points of origin to arterial roads, providing access to local, collector and arterial roads. Several collector roads are identified in the draft recommended land use and road plan with R.O.W. widths which may range from 20 m to 26 m depending on vehicle travel lanes and cycling facilities.

Street E.W.-1 is an example of a collector road recommended for separated cycling facilities and a 26 m R.O.W. width.

Based on the traffic analysis supporting this Study, one through-vehicle lane per direction is required on all collector roads. Collector roads incorporate 10 m paved roadway consistent with Standard Drawing OS-204, thus allowing for a third lane which may be utilized for on-road bicycle lanes, parking, or a turning lane. Additional R.O.W. space is required to provide full width facilities such as both separated cycling facilities and on-road parking, requiring up to 26 m in width.

Based on the above two typical cross-section options are provided for illustrative purposes. A 20 m cross-section is illustrated in **Exhibit 5-27** and **Exhibit 5-28** with on-road bicycle lanes and on-road parking, respectively.

Recommended improvements for collector roads are summarized in **Table 5-10**.

Table 5-10: Recommendations for Collector Roads

Street Name	Classification / Jurisdiction / R.O.W.	Road Improvement	Active Transportation
Collector Roads with on-road bicycle lane	Collector Road, City of Oshawa, 20 m	New construction, 10 m roadway with two through traffic lanes, turning lanes at intersections if required (with localized R.O.W. widening)	1.5m on-road cycling lanes, 1.5 m sidewalks on both sides
Collector Roads with on-road parking	Collector Road, City of Oshawa, 20 m	New construction, 9 m roadway with two through traffic lanes, turning lanes at intersections if required, on-road parking midblock	No dedicated cycling facilities; however, opportunities for on-road cycling route. 1.5 m sidewalks on both sides

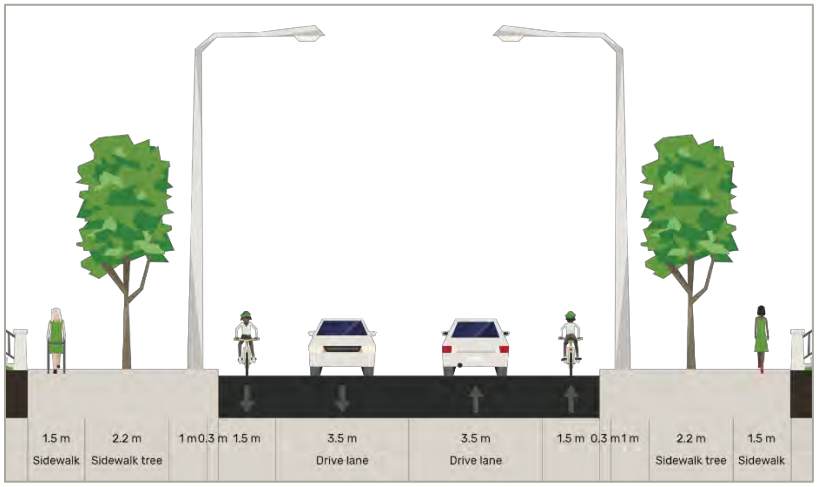


Exhibit 5-27: Typical Cross Section, 20m Collector Road, On-road Cycling Lanes

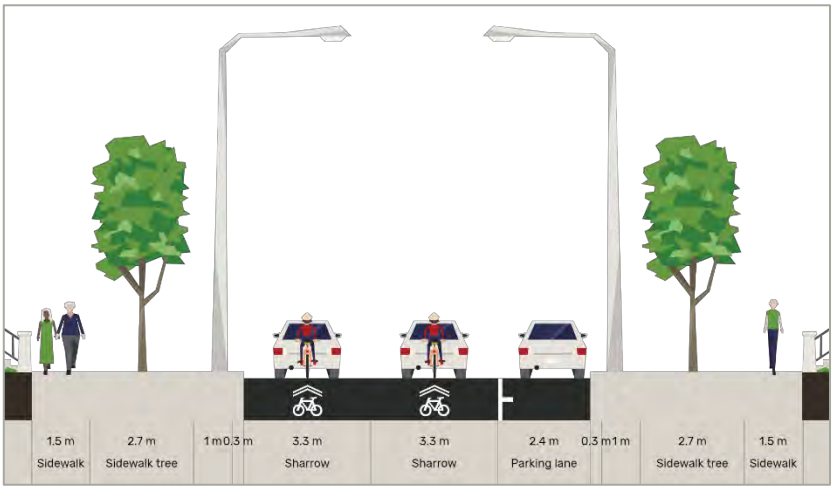


Exhibit 5-28: Typical Cross Section, 20m Collector Road, On-road Cycling Route (Sharrow)

Note: parking lane replaceable with median

5.6.4 Local Roads

The general function of local roads is to provide access from points of origin to collector roads and serve light volumes of traffic and are discouraged from accessing arterial roads. Local roads are not identified on the draft recommended land use and road plan and should be identified at the plan of subdivision stage. Typical cross-sections for local roads should follow City of Oshawa Standard Drawings OS-203 for 18 m or 20 m Right-of-Way (R.O.W.) width per City of Oshawa Policy and Procedure No. 2.3.1-012. An 18 m R.O.W. per OS-202 is allowable on cul-de-sacs, crescents, or any other local roads with less than 100 units, subject to the approval of the Oshawa

Commissioner of Public Works Services, and where underground wiring and services can be accommodated. These drawings incorporate an 8.5 m paved roadway, with remaining space allocated to boulevard including sidewalk on at least one side and trees on both sides.

5.7 Functional Design

A functional design exercise is carried out on the draft recommended land use and road plan to confirm the design feasibility of the road network. The analysis is carried out at a conceptual level to inform further work being undertaken by landowners through a Master Environmental Servicing Plan.

5.7.1 Scope

Only the proposed new arterial roads were designed. Because these streets are structuring elements of the Part II Plan area with connections to the existing arterial roads, the conceptual horizontal and vertical alignments will dictate the grading of adjacent land uses. More minor streets including collector and local roads should be designed in concert with subdivision design. Because the land will be developed affecting existing grades and drainage, the conceptual alignments identified should be considered conceptual and subject to further study.

The functional design includes four Type C arterial roads and one collector road. The City of Oshawa classifies Type C arterials as serving lower volumes of city-wide traffic[2] relative to higher order arterials with a right-of-way width 26 to 30m. Collector Roads accommodate moderate traffic volumes moving between points of origin and arterial roads and right-of-way widths range from 20 to 26m for urban cross-sections.

A description of the five roads follows (for numbering refer to **Exhibit 5-1**):

- Type C Arterial Roads
  - North-South-1 (N.S.-1): Located east of Simcoe Street North from Howden Road to Ritson Road North (via Grass Grove Lane north of Columbus, and Dowson Road south of Howden Road)
  - North-South-2 (N.S.-2): Located west of Simcoe Street North, from Howden Road to intersection of Street E.W.-2 and Street E.W.-3
  - East-West-2 (E.W.-2): Located south of Columbus Road from Thornton Road North easterly to the intersection of Street N.S.-2 and Street E.W.-3

[2] https://www.oshawa.ca/business-and-investment/resources/Engineering-Design-Criteria-Manual.pdf

- East-West-3 (E.W.-3): Located south of Columbus Road from intersection of Street N.S.-2 and Street E.W.-2 easterly to Street N.S.-1
- East-West-1 (E.W.-1): Located north of Columbus Road, from Street N.S.-2 easterly to Street N.S.-1

5.7.2 Design Criteria

The design criteria for the horizontal and vertical alignments for the Columbus Part II Plan was developed the City of Oshawa Engineering Design Criteria Manual (2020) and the Transportation Association of Canada Geometric Design Guidelines (2017). The functional design criteria applied to this functional design exercise is summarized in **Table 5-11**.

Table 5-11: Functional Design Criteria

Classification	Type C – Arterial		Collector Road	
	Design Standard	**Reference**	**Design Standard**	**Reference**
Jurisdiction	City		City	
Posted Speed (km/h)	50		50	
Design Speed (km/h)	70	E.D.C.M. 2020 Section 3.3	60	E.D.C.M. 2020 Section 3.3
Minimum Stopping Sight Distance (m)	110	E.D.C.M. 2020 Section 3.3	85	E.D.C.M. 2020 Section 3.3
Minimum Curve Radius (m)	260	E.D.C.M. 2020 Section 3.3	175	E.D.C.M. 2020 Section 3.3
Minimum Tangent Length Through Intersection (m)	120	E.D.C.M. 2020 Section 3.3	90 (arterial) 60 (other roads)	E.D.C.M. 2020 Section 3.3
Sag Vertical Curve K_{min} (non-illuminated)	23	T.A.C. 2017 Table 3.3.4	18	T.A.C. 2017 Table 3.3.4
Sag Vertical Curve K_{min} (COMFORT - illuminated)	12 / 10-12	E.D.C.M. 2020 Section 3.3 / T.A.C. 2017 Table 3.3.5	9 / 8-9	E.D.C.M. 2020 Section 3.3 / T.A.C. 2017 Table 3.3.5
Crest Vertical Curve K_{max}	16-23 / 17	E.D.C.M. 2020 Section 3.3 / T.A.C. 2017 Table 3.3.2	10-13 / 11	E.D.C.M. 2020 Section 3.3 / T.A.C. 2017 Table 3.3.2
Minimum grade (%)	0.50%	E.D.C.M. 2020 Section 3.3 / T.A.C. 2017 Section 3.3.2.5	0.50%	E.D.C.M. 2020 Section 3.3 / T.A.C. 2017 Section 3.3.2.5
Maximum grade (%)	5%	E.D.C.M. 2020 Section 3.3/ T.A.C. 2017 Table 3.3.1 Rolling topo U.A.U.	6%	E.D.C.M. 2020 Section 3.3/ T.A.C. 2017 Table 3.3.1 Rolling topo U.C.U.
Right-of-Way (R.O.W.) width (m)	30	E.D.C.M. 2020 Section 3.3	Urban 20 to 26 Rural 30	E.D.C.M. 2020 Section 3.3

Notes:
T.A.C. 2017 - Transportation Association of Canada Geometric Design Guide for Canadian Roads
E.D.C.M. 2020 - City of Oshawa - Engineering Design Criteria Manual
Generally, no superelevation as per E.D.C.M. 2020

5.7.3 Horizontal Alignments

The horizontal alignment for each road was created to satisfy the minimum curve radius requirement identified in the design criteria of 260m and 175m for Type C arterial and collector roads, respectively. A minimum tangent of 120m and 90m for Type C arterials and collector roads at arterial intersections between curves were also ensured, respectively. Proposed roads were designed to perpendicularly intersect all other proposed and existing roads where possible. A R.O.W. offset to the alignment was also used to avoid any lands designated as part of the Natural Heritage System (N.H.S.).

Three locations are identified where minimum tangent length at intersection does not meet the Design Criteria:

1. Street E.W.-1 at Street N.S.-2 (intersection on curve)
2. Street E.W.-2 at Street E.W.-3 / Street N.S.-2 (intersection on curve)
3. Street E.W.-3 at Street N.S.-1 (Street N.S.-1 curve starts 25m south of Street E.W.-3)

These locations are numbered accordingly in **Exhibit 5-29**. Further design work should seek to address or mitigate issues at these locations.

A plan drawing of all functional horizontal alignments developed for this exercise is provided in **Appendix F**. It is noted that the naming convention of the streets in **Appendix F** varies from those presented previously in this report. Equivalent names are identified in **Exhibit 5-29**.

5.7.4 Vertical Alignments

Surface profiles were created for the horizontal alignments based on 1 m topographic contour information provided by the City of Oshawa. The contour data was transformed into a Digital Terrain Model (D.T.M.); however, the level of accuracy is limited due to the lack of break-lines available. As a result, the vertical road profile alignments should be considered functional and subject to further engineering design.

It is important to consider safe smooth transitions between adjacent grades when designing vertical alignments. This is captured within a K factor, a coefficient that considers the horizontal length of the vertical curve with respect to the change in vertical grade experienced. It also considers safe stopping distances along vertical curves. K factors were considered where possible. Crest K factors used are outlined in the design criteria. A conservative sag K factor of 12 and 9 was used for Type C arterial and collector roads, respectively.

Profile drawings of all functional vertical alignments developed for this exercise are provided in **Appendix F**.

Exhibit 5-29: Minimum Tangent Length Issue Locations

Note: Base land use map in exhibit references preliminary work. See **Exhibit 5-1** for latest land use map

5.7.5 Limitations and Further Study Required

The intent of this analysis is to identify feasible horizontal and vertical roadway alignments to inform the Part II Plan. The road alignments should be investigated further during subsequent engineering design such as subsequent phases of the Municipal Class E.A. process or through the Planning Act and completion of a plan of subdivision, each of which requires a more detailed land survey. Intersection locations will also need to be confirmed to ensure compliance with the minimum intersection spacing

indicated in the Region of Durham's Official Plan. Finally, **Exhibit 5-29** identifies intersection locations where the minimum tangent length at intersections does not meet the design criteria and further design work should seek to address or mitigate issues at these locations.

5.8 Travel Demand Management

Travel Demand Management (T.D.M.) policy and strategies are a critical component of the Preferred T.M.P. Solution which can assist in influencing travel decisions. T.D.M. can be especially effective when aligned with higher density development and new transit and active transportation infrastructure to further encourage sustainable travel behaviour. T.D.M. strategies generally seek to affect travel behaviour through:

1. **Education, promotion and outreach.** This could include strategies such as special events, marketing campaigns, or skills training.
2. **Incentives and disincentives.** This could include rewards, convenience improvements, and/or increased costs.

The recommended land use for the Columbus Part II Plan area will innately incorporate measures to reduce auto travel demand by creating transit-supportive, dense mixed-use areas that will feature services and community destinations within walking distance. The measures and examples listed below include continuations of existing programs in the Study Area, implementation of strategies used elsewhere in Toronto, and new measures.

5.8.1 Improving Travel Options

Four (4) measures are identified to improve travel options. This includes:

- Integrate walking, transit, and cycling
  - Provide enhanced walking routes throughout the Part II Plan area, focused on connectivity to community hub / mixed use areas
  - Provide bicycle parking at transit stops and community hubs
- Support cycling
  - Make bicycle parking more visible, secure, and convenient
  - Provide guidelines and support for workplaces and other destinations on bicycle parking
  - Encourage better shower and change facilities at workplaces
- Make transit easier to use
  - Provide transit information kiosks with real-time information

  - Consider shuttle bus services or first-last mile solutions
  - Monitor existing on-demand service for opportunities of implementing new local routes
- Support carpooling and mobility on-demand services
  - Plan for public carpooling parking spots and make arrangements with property owners to permit carpool parking (i.e. preferential carpool parking spaces and discounted fees)
  - Provide coordination support for carpooling programs
  - Provide Passenger Pick-Up and Drop-Off (P.P.U.D.O.) spots and spaces for other on-demand mobility services such as shared e-bicycles or shared e-scooters near bus stops and other community hub destinations

5.8.2 Employer-Focused T.D.M. Programs

In alignment with Actions #70 and #71 of the Durham Region T.M.P. Study, continued support for T.D.M. marketing and services should be considered to support the development of the Columbus Part II Plan area.

As noted in the 2019 Envision Durham Transportation System Discussion Paper, current T.D.M. policies in the Durham R.O.P. are focused on employer-based programming to reduce peak period single-occupant vehicle travel and to promote alternatives. It encourages employers to promote or provide D.R.T. passes, ridesharing and vanpooling programs, carpool spaces, alternative work hours, telecommuting (such as working from home) and developing facilities that support cycling.

From 2007 to 2019, Smart Commute Durham in partnership with Metrolinx, was a Transportation Management Association (T.M.A.) serving the City of Oshawa providing and promoting alternative commuting solutions such as carpooling, transit use and active transportation throughout Oshawa. In May 2019, Metrolinx indicated that it will no longer be supporting the Smart Commute program or the 13 Transportation Management Associations (including Smart Commute Durham) that administer the program. Durham Region is currently investigating how it will maintain the program in-house.

It is recommended to integrate development in the Study Area with current employer-based initiatives and Smart Commute Durham to implement the right policies and programs for Columbus.

5.8.3 Parking Requirements

In alignment with Action #80 of the Durham Region T.M.P. Study, guidelines for parking management at strategic nodes and corridors should be considered.

City of Oshawa Zoning By-Law 60-94 governs the provision of parking by development, and the potential for an amendment to the Zoning By-Law as it affects the Study Area should be considered to support the Preferred T.M.P. Solution.

As the availability of parking has a direct impact on modal choice, further Study should consider revisions to minimum parking requirements especially in areas of the Part II Plan intended to be well-served by transit – particularly the area surrounding a potential future Simcoe B.R.T. transit hub.

5.8.4 T.D.M.-Supportive Development Strategies

In alignment with Action #79 of the Durham Region T.M.P. Study, a strategy for implementing T.D.M. programs should be integrated into the development approval process. It is noted subdivision and condominium development review processes should also be included with the site plan review.

The primary mechanism by which the City of Oshawa can influence the provision of T.D.M. measures and parking policies is through the site plan application process. Typically, a Transportation Impact Study (T.I.S.) is a requirement of site plan application which provides the city with information on the transportation impacts of a new development project. Mitigation can include transportation infrastructure investments and T.D.M. programs and strategies designed to reduce drive alone rates and encourage walking, cycling, transit use and other alternatives to reduce single auto occupancy. In the Columbus Part II Plan Area, T.I.S.'s for new developments must align with the policies of the Part II Plan in addition to demonstrate to the satisfaction of City staff that alternative modes of travel are strongly considered in the application.

5.8.5 Cycling Programs

Educational support, advocacy, and promotion of cycling in the City of Oshawa and Durham Region is provided through the City and Region websites.

- Create and disseminate knowledge about cycling network in the City of Oshawa, Study Area and surrounding neighbourhood;
- Promote cycling projects and infrastructure;

- Build capacity among local agencies and individuals to support cycling;
- Address barriers to cycling such as safety and transit integration; and
- Engage with residents and stakeholders about the benefits of improved cycling infrastructure.

Continued support for cycling is a critical component of encouraging sustainable alternatives to private vehicles. Education and outreach via City and Regional resources for cycling should be incorporated into the implementation of the Columbus development.

5.8.6 Other Stakeholders

To maximize success, a wide variety of stakeholders should be engaged in the development and implementation of T.D.M. measures.

Additional stakeholders that should be engaged include:

- Employers
- Schools
- Property managers and developers
- Social service agencies
- Durham Region Transit
- Metrolinx
- Lyft, Uber, and other on-demand transportation providers such as shared e-scooter or shared e-bicycle providers.

6 Implementation Plan

This chapter outlines the implementation plan of the preferred T.M.P. strategy, including:

- Policy recommendations;
- Recommendations for further study; and
- Funding tools and programs.

6.1 Policy Recommendations

To guide the development of the preferred T.M.P. strategy, several policy directions have been developed regarding the new road network and potential amendments to the Official Plan and the Zoning By-Law.

6.1.1 Official Plan Schedules

An update to the City's Official Plan Schedule 'B' Road Network should be made to reflect the recommended transportation networks of the Part II Plan including roads and corridor protection policies (**Exhibit 5-13**), transit (**Exhibit 5-14**), active transportation (**Exhibit 5-18**).

6.1.2 Zoning By-Law

As noted in **Section 4.9.3**, City of Oshawa Zoning By-Law 60-94 should consider revisions to minimum parking requirements in the area surrounding a potential future Simcoe B.R.T. transit hub, medium density, high-density, and mixed-use areas.

6.1.3 Integrate T.D.M. into Transportation Impact Studies

Requirements for the implementation of Transportation Demand Management (T.D.M.) programs and/or policies should be incorporated into the site plan review process. As part of site plan approval, provision of T.D.M. such as on-site bicycle parking, parking spaces for shared e-scooters or e-bicycles, provision of comfortable and safe designated waiting areas supporting the EcoMobility hub concept, information screens with real-time transit information, etc., can demonstrate to the satisfaction of City staff that a commitment to encouraging sustainable travel is being made in the application.

A separate study should be completed to confirm the City's preferred approach to integrating T.D.M. measures into the site plan approval process.

It is noted subdivision and condominium development review processes should also be included with the site plan review.

6.2 Recommendations for Further Study

The components of the Preferred Solution have been evaluated to determine the next steps for implementation for the recommended roadway, transit, and active transportation projects.

6.2.1 Municipal Class Environmental Assessment Schedule.

Recommended infrastructure projects are subject to Municipal Class Environmental Assessment requirements which are identified based on the following Schedules (M.C.E.A. Project Schedules, December 2015):

- **Schedule A** projects are limited in scale, have minimal adverse environmental effects, and include several municipal maintenance and operational activities. These projects are pre-approved and may proceed to implementation without following the full Class E.A. planning process. Examples include new active transportation facilities within existing R.O.W.,
- **Schedule A+** projects are also limited with minimal adverse environmental effects but may have impacts on the public and may be approved locally after public input. Examples include intersection modifications, signalization and reconfiguration, and in-boulevard treatments such as streetscaping and public amenities.
- **Schedule B** projects have the potential for some adverse environmental effects, and the municipality is required to undertake a screening process with the public and relevant review agencies to ensure that they are aware of the project and their concerns are addressed. Once outstanding concerns resolved, the project may proceed to the implementation stage. Examples include reconstruction or widening the road where the new facility will not be utilized for the same purpose, use, or capacity (i.e. conversion of vehicular lane to bicycle lane), new road construction less than one (1) km in length, and new active transportation facilities outside of existing R.O.W. with a construction cost under $2.6M (M.C.E.A. Clarification on Cost Thresholds, March 2019).
- **Schedule C** projects have the potential for significant adverse environmental effects and must proceed under the full planning and documentation procedures specified in the Class E.A. document (Phases 1 to 4), including an Environmental Study Report (E.S.R.) which must be made available for review by the public and regulatory review agencies.

Examples include new road construction exceeding the cost threshold of $2.6M and/or greater than one (1) km in length including major transit projects which fall under the six (6)-month Transit Project Assessment Process (T.P.A.P.).

6.2.2 Roadway Projects

The recommended new street network for the Study Area is broken down into unique segments, classified and assigned a recommended right-of-way width, and a roadway length is estimated. Implementation recommendations for roadway projects and other improvements are identified in **Table 6-1** and illustrated with Street I.D.s in **Exhibit 5-13**, if applicable. It is recommended additional studies identified for the roadway improvements should be undertaken prior to the approval of any draft plans within the Columbus Part II Planning Area.

Table 6-1: Schedule of Recommended Roadway Improvements

Street I.D.	Proposed Improvement*	Basic R.O.W. (m)	Approx. Length (m)	Location / Flexibility	Further Study / Approval**
E.W.-1	New Road Construction - Collector	26	1430	Fixed, subject to further Study	Phase 3 and 4 Municipal Class E.A. Study Schedule C
E.W.-2	New Road Construction - Type C Arterial	27	1240	Fixed, subject to further Study	Phase 3 and 4 Municipal Class E.A. Study Schedule C
E.W.-3	New Road Construction - Type C Arterial	27	1500	Fixed, subject to further Study	Phase 3 and 4 Municipal Class E.A. Study Schedule C
N.S.-1	New Road Construction - Type C Arterial	27	3500	Fixed, subject to further Study	Phase 3 and 4 Municipal Class E.A. Study Schedule C
N.S.-2	New Road Construction - Type C Arterial	27	2900	Fixed, subject to further Study	Phase 3 and 4 Municipal Class E.A. Study Schedule C
C.1. to C.12.	New Road Construction - Collector	20	varies	Flexible, subject to further Study	Planning Act (Landowner)
R.1.	Road Reconstruction Type B Arterial	30	3800	Fixed (Columbus Road)	Phase 3 and 4 Municipal Class E.A. Study Schedule B or C

Street I.D.	Proposed Improvement*	Basic R.O.W. (m)	Approx. Length (m)	Location / Flexibility	Further Study / Approval**
R.2.	Road Reconstruction Type B Arterial	30	1200	Fixed (Thornton Road North)	Phase 3 and 4 Municipal Class E.A. Study Schedule B or C
R.3.	Road Reconstruction Type B Arterial	30	2000	Fixed (Ritson Road North)	Phase 3 and 4 Municipal Class E.A. Study Schedule B or C
W.1.	Road Widening, Type B Arterial	30	600	Fixed (Thornton Road North)	Phase 3 and 4 Municipal Class E.A. Study Schedule C
W.2.	Road Widening, Type B Arterial	30	400	Fixed (Simcoe Street North)	Phase 3 and 4 Municipal Class E.A. Study Schedule C (Durham Region)
C.P.1.	Corridor protection	n/a	n/a	Carnwith Drive extension	Functional Design to inform corridor protection. Phase 1 to 4 Municipal Class E.A. Study Schedule C
C.P.2.	Corridor protection	n/a	n/a	Street EW-1 west extension	Functional Design to inform corridor protection. Phase 1 to 4 Municipal Class E.A. Study Schedule C
C.P.3.	Corridor protection	n/a	n/a	Street EW-1 east extension	Functional Design to inform corridor protection. Phase 1 to 4 Municipal Class E.A. Study Schedule C
C.P.4.	Corridor protection	n/a	n/a	Street NS-1 extension across Highway 407 (flyover)	Functional Design to inform corridor protection. Phase 1 to 4 Municipal Class E.A. Study Schedule C
S.1. (see also Project A.2.)	Streetscaping Improvements with On-Road Bicycle Lanes	36 m	2000	Fixed (Street EW-1 to Street EW-3)	Functional Design Feasibility Study / Streetscaping Study

Street I.D.	Proposed Improvement*	Basic R.O.W. (m)	Approx. Length (m)	Location / Flexibility	Further Study / Approval**
S.2. (see also Project A.4.)	Streetscaping Improvements with Class II Trail	36 m	1800	Fixed (Regional Trail west of Street N.S.-2 to Street N.S.-1)	Functional Design Feasibility Study / Streetscaping Study

*Roadway improvements to incorporate recommended cycling facilities identified in (**Exhibit 4-14**). Recommended intersection controls to be implemented through future E.A. Study of associated new streets.
**City of Oshawa responsibility unless noted otherwise

The identification, location, and design of local roads within the Part II Plan will be established through the Planning Act and plan of subdivision process.

6.2.3 Transit Projects

Implementation of the recommended transit projects (**Exhibit 5-14**) is subject to further study as identified in **Table 6-2.**

Table 6-2: Transit Project Implementation

Project ID	Project Name	Next Steps	Responsibility
T.1.	Simcoe Street North High Frequency Transit	Initial Business Case / Transit Project Assessment Process	Durham Region / Metrolinx
T.2.	Simcoe Street North Rural Transit Spine	Transit Service Planning	Durham Region / Metrolinx
T.3.	Local / on-demand feeder service	Transit Service Planning	Durham Region
T.4.	Simcoe Street North Rapid Transit Mobility Hub	Initial Business Case / Transit Project Assessment Process	Durham Region / Metrolinx
T.5.	EcoMobility Hubs	Identify partnerships with shared mobility service providers, develop implementation policies	City of Oshawa / Durham Region / Private Development

6.2.4 Active Transportation Projects

Implementation of active transportation projects identified in **Exhibit 5-18** which are not associated with a roadway project are identified **Table 6-3**.

Table 6-3: Active Transportation Project Implementation

Project ID	Project Name	Next Steps	Anticipated E.A. Schedule	Responsibility
A.1.	Simcoe Street North Separated Bicycle Lanes (Winchester Road to Highway 407 Ramps)	Integrate into E.A. Study for Simcoe Street North Widening (Project W-2)	C (potential to exceed cost threshold)	Durham Region
A.2. (see also Project S.1.)	Simcoe Street North Bicycle Lanes (Street E.W.-3 to Howden Road)	Functional Design Feasibility Study / Streetscaping Study	A+ (to be confirmed by feasibility Study), potential for B or C if significant environmental impacts	Durham Region
A.3.	Thornton Road North Paved Shoulders (Howden Road to Columbus Road)	Functional Design Feasibility Study	A+ (to be confirmed by feasibility Study), potential for B or C if significant environmental impacts	City of Oshawa
A.4. (see also Project S.2.)	Howden Road Paved shoulders (Thornton Road North to Street N.S.-2 and Street N.S.-1 to east of Ritson Road)	Functional Design Feasibility Study / Streetscaping Study	A+ (to be confirmed by feasibility Study), potential for B or C if significant environmental impacts	City of Oshawa
A.5.	Regional Trail from Howden Road to Thornton Road North	Functional Design Feasibility Study	C (to be confirmed by feasibility Study and pending upcoming changes to Municipal Class E.A. process)	City of Oshawa

6.2.5 Columbus Area Arterial Road Entrance Features

The Columbus Part II Plan Area will introduce a planned transit supportive and mixed-use development in a currently rural area within the City of Oshawa. It will be important to further investigate and include gateway features at arterial road entrances into the area to distinguish between the surrounding rural area and proposed urban realm as part of the Simcoe

Streetscaping Study identified in **Table 6-1**. These features should help provide visual indication to all road users to expect a change in the number of active transportation users and to encourage cautious driving behaviours.

6.2.6 Additional Studies and Future Commitments

Further to the completion of the TMP, additional studies are needed to address the requirements of subsequent phases of the Municipal Class E.A. process. In consultation with the M.E.C.P., the following studies were identified:

- Contaminated Sites – known areas of contamination should be identified. Appropriate tests should be conducted to determine contaminant levels from previous land uses or dumping.
- Historical Waste Disposal Sites – identify and confirm status of these sites to determine whether approval pursuant to Section 46 of the Environmental Protection Act may be required for these lands.
- Underground Storage Tank or Transmission Lines – infrastructure should be identified and owners should be consulted to avoid impact to infrastructure, including potential spills.
- Source Water Protection – Source water protection areas should be identified. Vulnerable sources of drinking water and proximity drinking water sources within the project area should be considered and assessed. If vulnerable areas are impacted, documentation should be provided to detail items such as drinking water threats and project adherence to policies for local source protection plan.
- Climate Change – this T.M.P. was developed in alignment with Provincial guidelines and policies, Conservation Authorities, and City and Regional Official Plan policies which encourage sustainable development and transportation planning. Consideration of climate change in the E.A. process, such as the project's expected production of greenhouse gas emissions, impact on carbon sinks, resilience/vulnerability to changing climactic conditions, etc., should be addressed through further study in alignment with addressing subsequent phases of the Municipal Class E.A. process.

In addition, and as outlined in Section A.2.9.4 of the M.C.E.A., Class E.A. future commitments that are also required including the following

(a) The Stage 1 Archaeological Assessment concluded that, unless entirely confined to areas that have already been assessed and cleared of any future archaeological concern, any future developments

in the Study Area must be preceded by a Stage 2 Archaeological Assessment and include consultation with Indigenous communities.

(b) As identified in M.E.C.P.'s letters, dated November 15, 2019 and December 19, 2018, given this project includes multiple new roads, an air quality impact assessment is required to address potential air quality impacts of the selected preferred alternative. Air quality impact assessment will be conducted for all new roads as part of the further study required for Schedule C projects completing Phases 3 and 4 of the M.C.E.A. process.

(c) Identified resources may be candidates for conservation/integration into future land uses and should be subject to cultural heritage impact assessments as part of subsequent planning applications.

6.3 Funding Tools and Programs

The funding opportunities outlined below should be considered to assist in the implementation of the improvements identified in this document and defray the cost to existing taxpayers.

6.3.1 Development Charges

The City already conducts development charges studies to collect funds for transportation service improvements under the Development Charges (D.C.) Act and should continue to update its development charges studies in the future. Durham Region also collects development charges to fund growth-related Regional road and transit expansion projects. D.C. studies typically identify all types of transportation infrastructure required to serve development growth, including roads, and active transportation infrastructure. A potential refinement to the D.C. By-Law may include the addition of EcoMobility hubs if not yet covered under the By-Law. All projects recommended under **Section 6.2** should be reviewed and further refined with updated scopes for proper costing to the Development Charges Background Study.

Benchmark costs used for project estimates are shown in **Table 6-4**, with capital costs for roadway and active transportation projects shown in **Table 6-5** and **Table 6-6** for projects previously shown in **Table 6-1** and **Table 6-3**, respectively. Roadway costs are prepared based on indexed values from HDR's estimates noted in **Appendix B**. Active transportation costs are indexed from values provided in the 2015 City of Oshawa Active Transportation Master Plan.

It is noted that transit service projects (**Table 6-2**) are under Regional jurisdiction and thus not costed.

Table 6-4. Benchmark Costs for Roadway and Active Transportation Projects

Item	
Roadway	**Cost**
New Construction Type B Arterial Roads (per km)	$ 5,970,000
Reconstruction Type B Arterial Roads (per km)	$ 7,200,000
Widening Type B Arterial Roads (per km)	$ 7,200,000
New Construction Type C Arterial Roads (per km)	$ 5,970,000
New Construction Collector Roads (per km)	$ 5,260,000
New Construction Type B Arterial NHS Crossings (each)	$28,900,000
New Construction Collector Road NHS Crossings (each)	$19,900,000
Streetscaping, no Active Transportation facility (per km)	$ 150,000
Active Transportation	**Cost**
Bicycle Lane – On Road Cycling Lanes (per km)	$ 10,700
Paved Shoulder – On Road Cycling Routes (per km)	$ 79,000
Off-road Multi-use Trail – Class II Trail (per km)	$ 357,000

Table 6-5. Roadway Projects Cost Estimate

Street I.D.	Proposed Improvement*	Approx. Length (m)	Total Road Cost	# of Structures	Total Structure Cost	Total Cost
E.W.-1	New Road Construction - Collector	1430	$7,521,800	2	$39,800,000	$47,321,800
E.W.-2	New Road Construction - Type C Arterial	1240	$7,402,800	0	$0	$7,402,800
E.W.-3	New Road Construction - Type C Arterial	1500	$8,955,000	0	$0	$8,955,000
N.S.-1	New Road Construction - Type C Arterial	3500	$20,895,000	2*	$39,896,000	$60,791,000
N.S.-2	New Road Construction - Type C Arterial	2900	$17,313,000	0	$0	$17,313,000
C.1. to C.12.	New Road Construction - Collector	11300	$59,438,000	1	$19,900,000	$79,338,000
R.1.	Road Reconstruction Type B Arterial	3800	$27,360,000	1	$28,900,000	$56,260,000
R.2.	Road Reconstruction Type B Arterial	1200	$8,640,000	0	$0	$8,640,000
R.3.	Road Reconstruction Type B Arterial	2000	$14,400,000	0	$0	$14,400,000
W.1.	Road Widening, Type B Arterial	600	$4,320,000	0	$0	$4,320,000
W.2.	Road Widening, Type B Arterial	400	$2,880,000	0	$0	$2,880,000
S.1. (see also Project A.2.)	Streetscaping Improvements with On-Road Bicycle Lanes	2000	$300,000	0	$0	$300,000
S.2. (see also Project A.4.)	Streetscaping Improvements with Class II Trail	1800	$270,000	0	$0	$270,000

*Note: Street N.S.-1 has a single long crossing and thus is costed as 2 structures

Table 6-6. Active Transportation Projects Cost Estimate

Project ID	Project Name	Approx. Length (m)	Total Cost
A.1.	Simcoe Street North Separated Bicycle Lanes (Winchester Road to Highway 407 Ramps)	300	$3,200
A.2. (see also Project S.1.)	Simcoe Street North Bicycle Lanes (Street E.W.-3 to Howden Road)	3000	$32,100
A.3.	Thornton Road North Paved Shoulders (Howden Road to Columbus Road)	2000	$158,000
A.4. (see also Project S.2.)	Howden Road Paved shoulders (Thornton Road North to Street N.S.-1)	1700	$134,300
A.5.	Regional Trail from Howden Road to Thornton Road North	3000	$1,071,000

6.3.2 Federal Gas Tax Fund

The Federal Gas Tax Fund, legislated in 2011 as a permanent source of infrastructure funding for municipalities, is a key source of funding for all municipalities in Canada. In Ontario, funding is generally allocated on a per capita basis and provided up front, twice a year, to the Province, the Association of Municipalities of Ontario, and the City of Toronto. Projects are chosen at the local Government level and are prioritized according to the infrastructure needs of each community.

On June 1, 2020, the government of Canada announced that $2.2 billion under the Federal Gas Tax Fund would be accelerated to help Canadian communities recover from the COVID-19 pandemic as quickly as possible. In Ontario, funding is administered through the Association of Municipalities of Ontario for transportation projects including public transit, local roads and bridges and highways.

6.3.3 Ontario Gasoline Tax

A similar program to the Federal Gas Tax Fund is offered by the province of Ontario. Two cents per litre of the collected Ontario Gasoline Tax is transferred to municipalities exclusively for public transit. The allocation is based upon each municipality's proportionate share of the Province's population and transit ridership. The funds can be used for either operating or capital costs. Funds could be available specifically for transit service improvements identified in this Plan.

In January 2021, the Ontario Government announced $375 million through the Gas Tax program focused on supporting public transit.

6.3.4 Additional Programs

Further to the above noted items, several other funds, grants, and programs are identified which could provide additional funds to support the transportation the improvements and programs identified in this T.M.P. Study:

- Federation of Canadian Municipalities Green Municipal Fund;
- Investing in Canada Infrastructure Program;
- Employment and Social Development Canada funding opportunities, including the Enabling Accessibility in Communities Fund;
- Corporate donations which may consist of money or services in-kind, and have been contributed by a number of large and small corporations over the years;

- Potential future funding that might emerge from the Province in rolling out the Ontario Trails Strategy; and
- Private Citizen Donations / bequests, that can also include a tax receipt for the donor where appropriate.

New or existing relationships with non-profit organizations could be leveraged to obtain funding not directly available to the City of Oshawa. This funding could be used to implement certain aspects of the program, such as educational programs proposed as part of the T.D.M. strategy or EcoMobility Hubs. These funding streams include:

- Environment and Climate Change Canada – EcoAction Community Funding Program;
- Ontario Trillium Foundation funding; and
- Corporate Environmental Funds such as those from Shell and Mountain Equipment Co-op that tend to fund small, labour-intensive projects where materials or logistical support is required.