4 Existing Conditions

This section outlines the existing conditions analysis for the Yorkdale TMP. It details the local area characteristics, land use and demographics, travel trends, street network, transit network, cycling network, and pedestrian network for the study area.

4.1 Local Area Characteristics

4.1.1 Natural Heritage

Designated natural areas include areas that have been identified for protection by the Ontario Ministry of Natural Resources and Forestry, Toronto and Region Conservation Authority, and the City of Toronto.

The results of the Natural Heritage Assessment indicates that there are no Provincially Significant Wetlands (PSWs), Areas of Natural and Scientific Interest (ANSIs), or Environmentally Significant Areas (ESAs) located within the larger study area.

However, the MNRF identified lands within the south-west quadrant of the larger study area within the Natural Heritage System and Wooded Areas. The wooded areas meander along Maple Leaf Creek within North Park. North Park is approximately 10.8 hectares in size and is located north of Lawrence Avenue West, west of Caledonia Road, and east of Keele Street. The Natural Heritage System and Woodlands are also located within Caledonia Park. Caledonia Park is approximately 11.5 hectares, of which 1.072 hectares are wooded areas. Caledonia Park is situated within the north-east intersection of Caledonia Road and Lawrence Avenue West.

Detailed assessment of the natural heritage is provided in **Appendix B.**

4.1.2 Cultural and Archaeological Heritage

The results of background historical research and a review of secondary source material, including historic mapping, revealed a densely developed residential and industrial study area with a rural land use history dating back to the early-nineteenth century. A review of federal registers and municipal and provincial inventories revealed that there are four previously identified features of cultural heritage value within the Yorkdale Transportation Master Plan study area.

Infrastructure and transportation improvements may have a variety of impacts upon cultural heritage resources. Based on the results of background data collection, there is the potential for additional cultural heritage resources to be identified within the Yorkdale Transportation Master Plan study area. As such, the proposed improvements should be planned to avoid impacts to any cultural heritage resources.

The Project Focus Area does not retain archaeological potential according to the Master Plan of Archaeological Resources for the City of Toronto and previous Stage 1 background research reports.

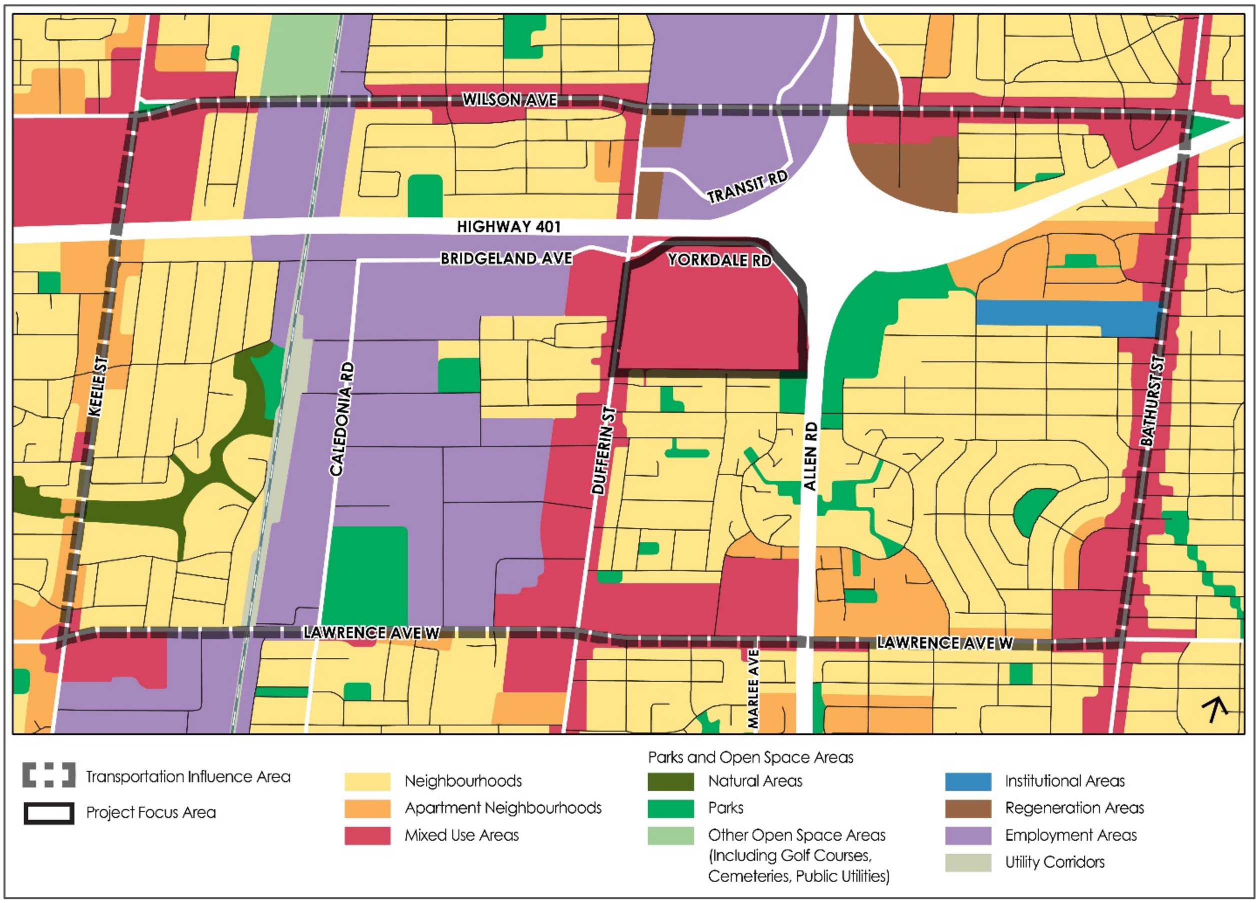
Detailed assessments of cultural and archaeological Heritage are provided in **Appendix C.**

4.2 Land Use and Demographics

4.2.1 Land Use

The City of Toronto's OP outlines the land use designations across the City, including the study area as illustrated in **Figure 4-1**. The larger study area is mainly designated *Neighbourhoods*, with *Apartment Neighbourhoods* along Keele Street and at Lawrence Avenue West and Allen Road. There is a large area designated *Employment Areas* to the east of the project focus area and *Mixed-Use Areas* along Dufferin Street, Bathurst Street, Wilson Avenue, and Lawrence Avenue West.

Figure 4-1. Land Use Designations



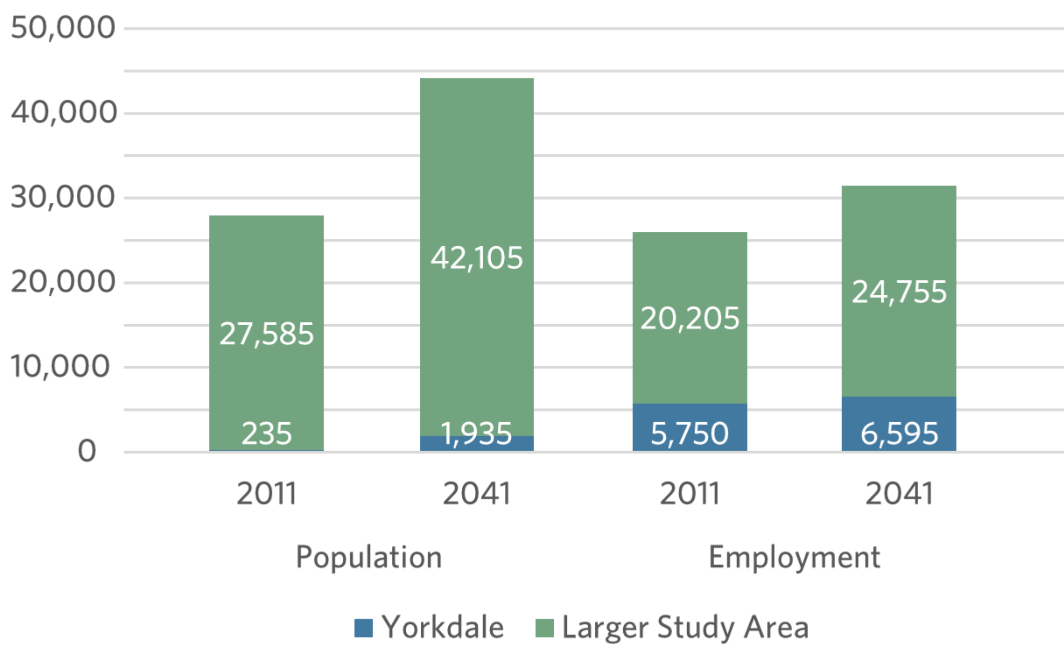
Source: City of Toronto Official Plan – Map 16, 2019 (https://www.toronto.ca/wp-content/uploads/2017/11/9811-cp-official-plan-Map-16_LandUse_AODA.pdf)

4.2.2 Population and Employment Forecasts

There are significant plans for growth and development both on the Yorkdale Shopping Centre lands as well as in the surrounding areas. **Figure 4-2** illustrates the existing and future population and employment growth for the project focus area and the larger study area.

The Yorkdale zone is expected to experience a significant increase in population, from 235 to 1,935 people, representing an increase of 723% over the next 30 years. The larger study area will experience a 58% growth in population and a 21% growth in employment.

Figure 4-2. Population and Employment Forecasts



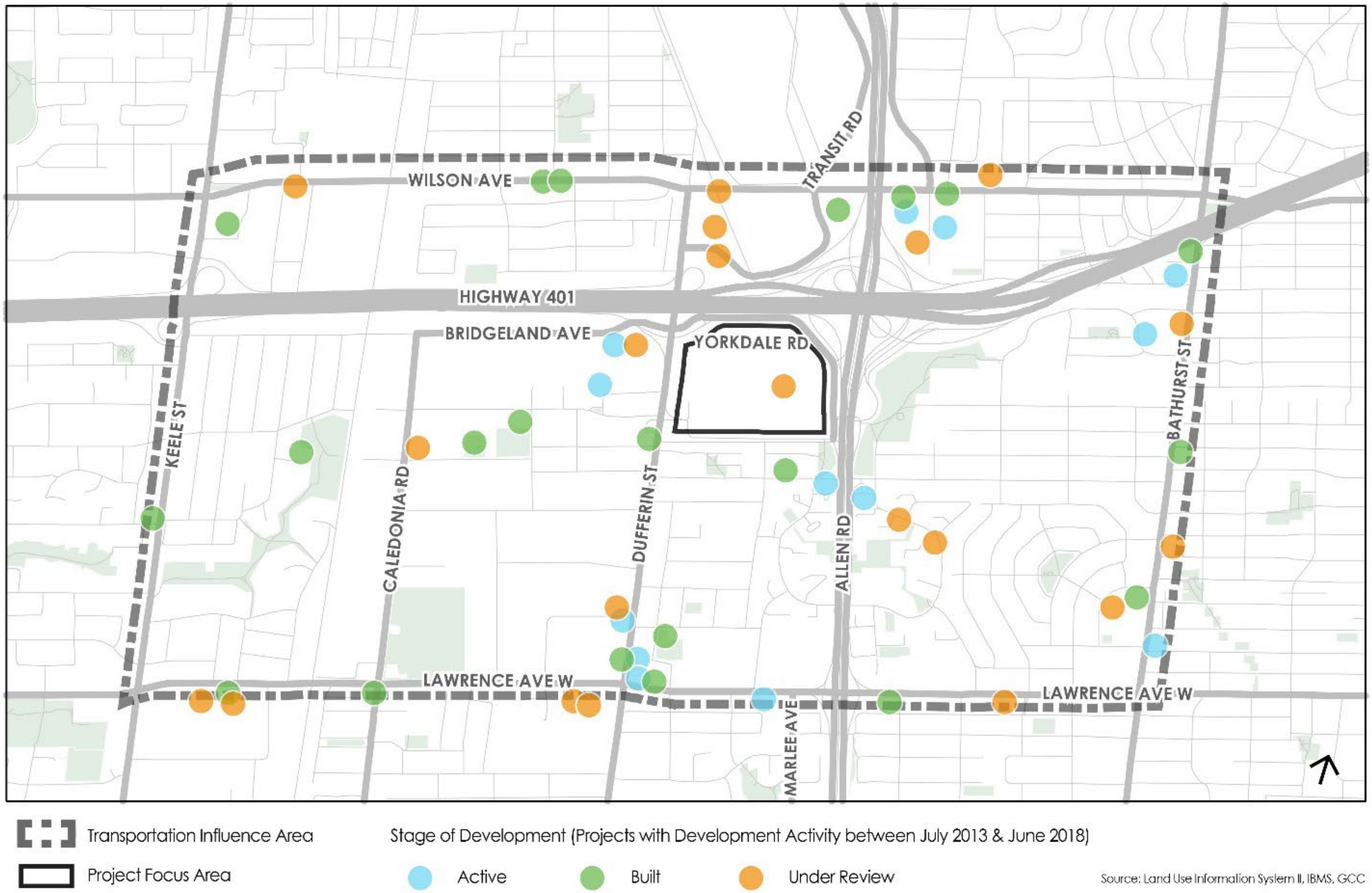
Source: City of Toronto's Greater Toronto Area Model Version 4 (GTAMv4) (2041 represents Medium Growth with SmartTrack).
Note: Growth excludes potential increase in retail trips. The Yorkdale zone within the GTAMv4 model includes the residential neighbourhood to the south of the shopping centre, between Yorkdale and Ranee Avenue.

4.2.3 Development Applications

Figure 4-3 illustrates the status of the development applications within the larger study area as of November 2020. They are defined as recently built (21), active or on-going[2] (13), and applications currently under review (19), for a total of 53 applications. The majority of these applications are found along the major arterials within the larger study area, including Dufferin Street, Bathurst Street, and Wilson Avenue.

[2] Active or on-going applications refer to any applications which are not recently build or currently under review. This includes applications which are council approved, conditional consent, new hearing date, or Toronto Local Appeal Board appeal.

Figure 4-3. City of Toronto Development Applications



Source: City of Toronto Application Information Centre

4.3 Travel Trends

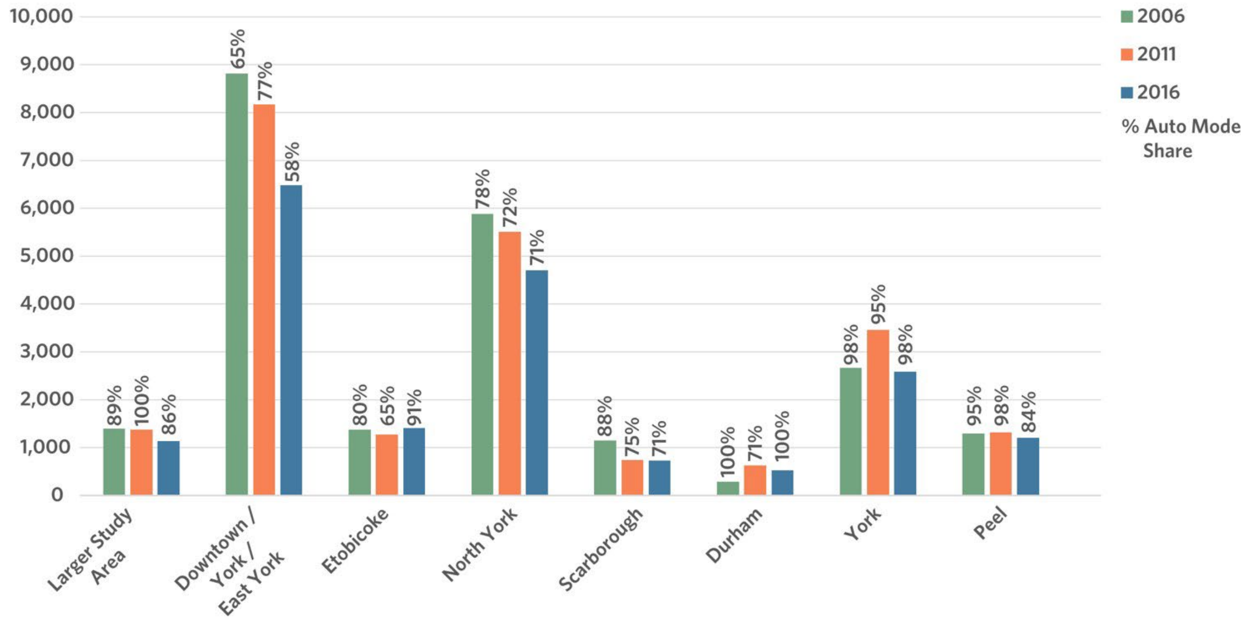
Travel trends in the study area can be extracted from the Transportation Tomorrow Survey (TTS), which is a household travel survey that is conducted every 5 years, coinciding with the Census. Data from the 2006, 2011, and 2016 TTS survey years have been extracted in order to establish and analyze travel trends to the Yorkdale Shopping Centre and the larger study area.

The TTS is predicated on asking the survey respondent what their travel patterns (trip origins and destinations) and modes used are on a typical fall weekday for the respondent and the rest of the household members. It has been well noted by the Data Management Group (DMG), the institution that is primarily responsible for the survey, that there has historically been an under-reporting of discretionary (i.e., non-commuting) trips, particularly non-home-based trips. Given that Yorkdale is a shopping centre, travel demand from TTS will likely be lower than what is typically experienced at the shopping centre on a weekday. TTS also does not provide information on weekend demand, so additional sources must be consulted. One such source is Streetlight Data which can provide travel pattern data to capture the retail trip shortfall from TTS for both weekdays and weekends. Other sources include driveway counts at the Yorkdale Shopping Centre.

4.3.1 Travel Demand

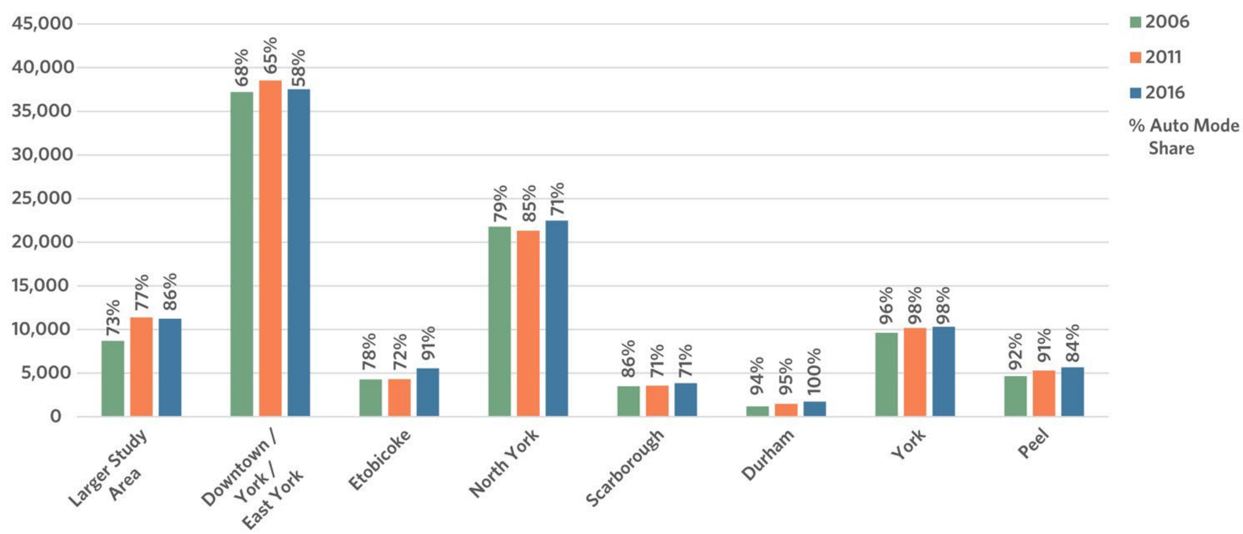
Daily trips to Yorkdale come primarily from across Toronto as well as the rest of the GTA. **Figure 4-4** shows the number of daily trips destined to Yorkdale Shopping Centre by origin as well as the auto mode share of those trips. The majority of trips are coming from Downtown Toronto, York and East York, North York, and York Region. There appears to be a downward trend in trips to Yorkdale over the years, but as previously stated, TTS has a known issue of under-reporting discretionary trips (which includes shopping trips), which may explain lower than expected volumes. Outside of Toronto, trips destined to Yorkdale are almost entirely auto based. Even trips coming from the larger study area have relatively high auto mode shares. The patterns for the larger study area are relatively similar as can be seen in **Figure 4-5**.

Figure 4-4. Origins of Historic Daily Trips Destined to Project Focus Area (2006-2016)



Source: TTS

Figure 4-5. Origins of Historic Daily Trips Destined to Larger Study Area (2006-2016)



Source: TTS

Notes: It is important to note that the TTS represents a 5% sample size. Therefore, although the graph may show 100% auto travel from Durham Region in 2016, this represents a sample of only 17 trips. Comparatively, other origins, such as North York, are based on a sample of 218 trips. Trips to Yorkdale Shopping Centre are also based on one traffic zone, which means it is more susceptible to variability in survey results as it represents a small area. Ultimately, data from TTS should be used to help guide judgment on travel patterns, but should not be taken as absolute fact.

Travel demands in the study area at the link and intersection level are further described in **Section 4.4.6.**

4.3.2 Travel Patterns

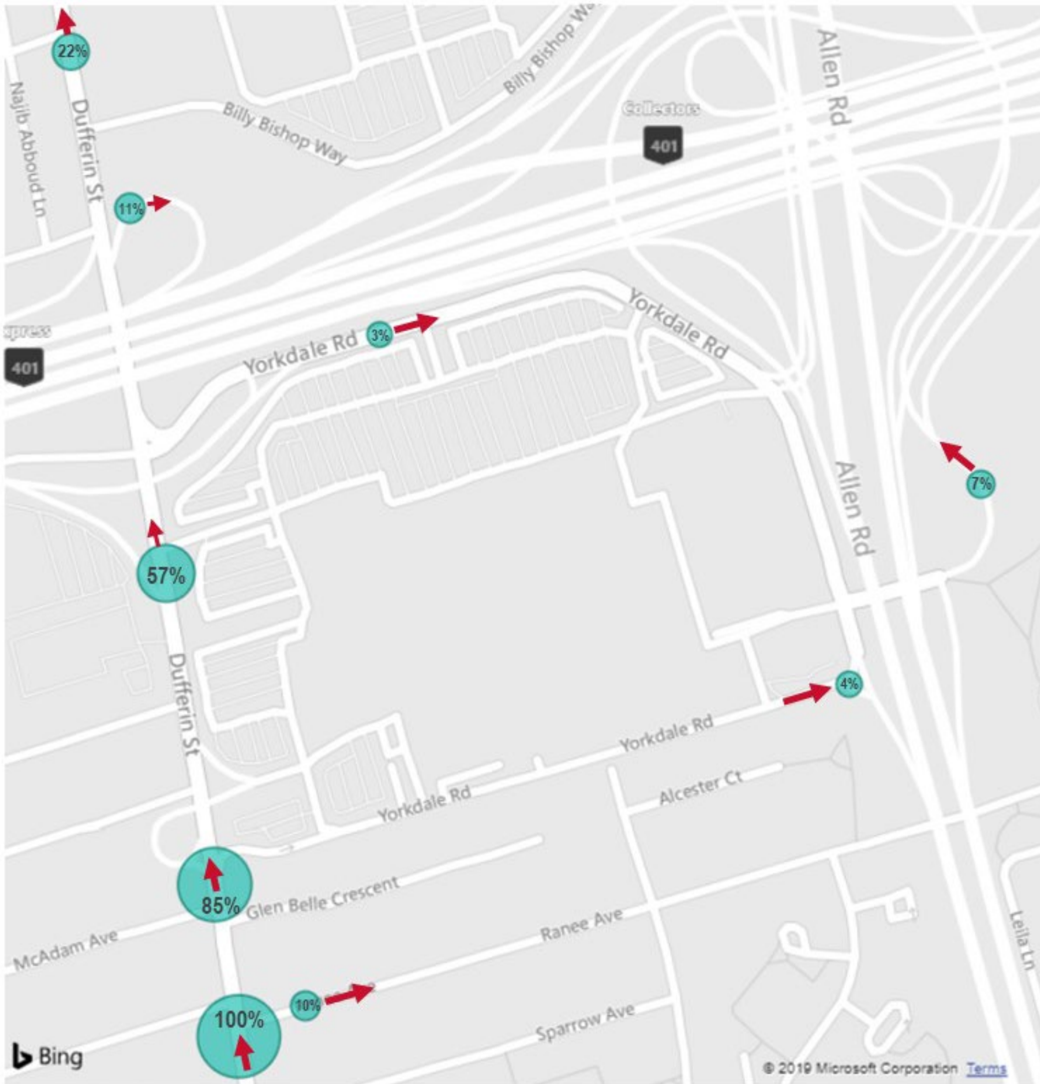
In addition to the TTS data, a detailed analysis was conducted using the StreetLight InSight platform, which allows analyzing local traffic patterns for key corridors in the project focus area. The StreetLight data captures approximately 20% of all transportation trips anonymously using location-based data. While this data provides similar insights to TTS data, the key benefit is that it can help identify commercial/leisure trip patterns which is typically not captured in TTS.

Figure 4-6 and **Figure 4-7** provide the key findings of the StreetLight analysis, which focus on out-of-way travel along Dufferin Street and Yorkdale Road. The key takeaway is that some traffic destined toward public roads use the private facility to bypass congestion.

Based on **Figure 4-6,** key findings for trips along Dufferin Street northbound at Ranee Avenue include:

- The partial interchanges and lack of direct access to Highway 401 eastbound have led to short-cutting through Yorkdale Road and South Service Road and out-of-way travel;
- Of the 7% trips that access Highway 401:
  - 4% Trips Use Yorkdale Shopping Centre South Service Road (private road);
  - 3% Trips use Yorkdale Road (public road); and,
- Short-cutting will continue to increase as traffic volumes and delays increase on Dufferin Street and Yorkdale Road.

Figure 4-6. Travel Patterns on Dufferin Street Northbound at Ranee Avenue – Weekday PM Peak Hour

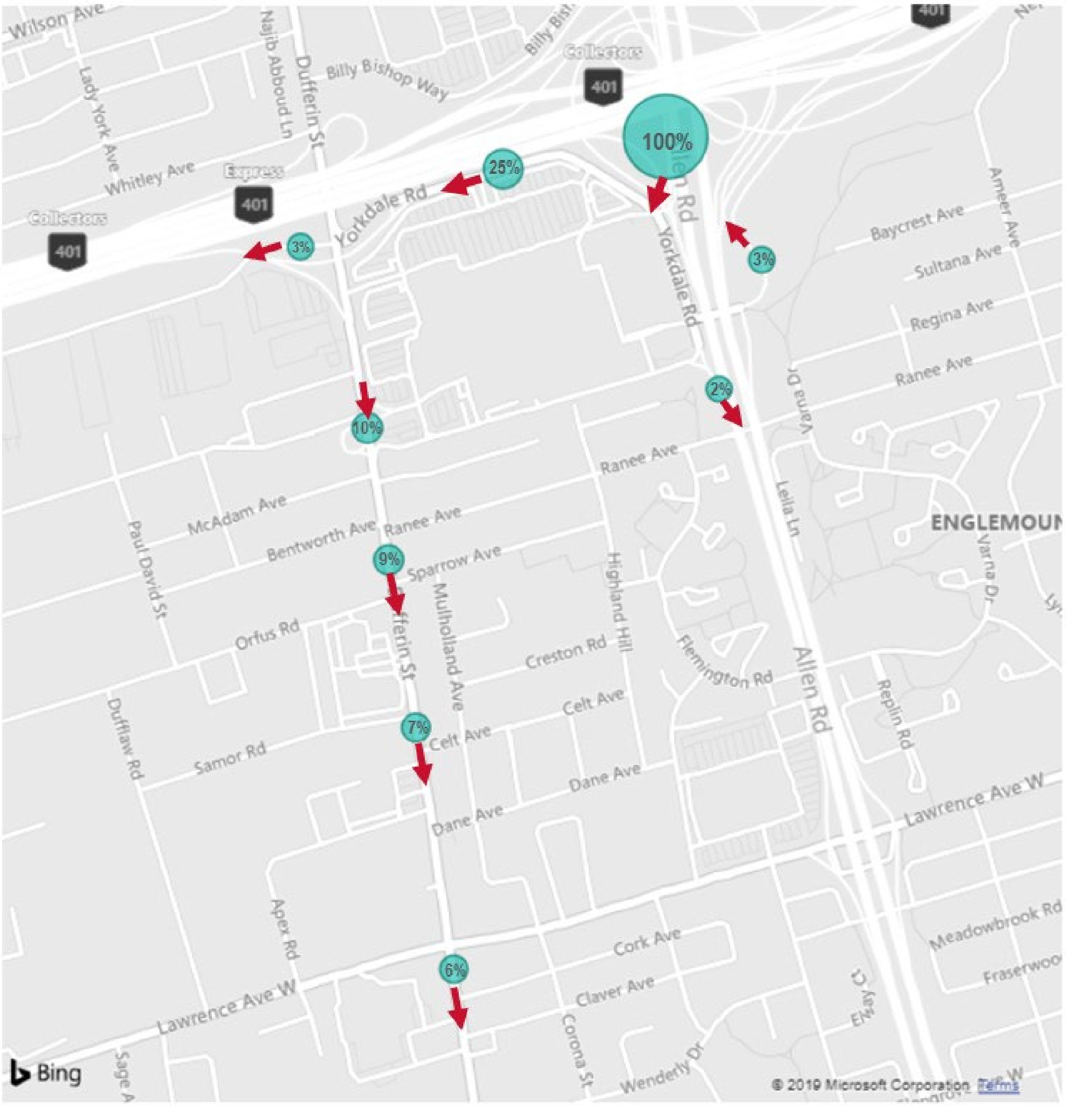


Origin Trip Data Filters:
- Average Weekdays (Monday-Friday)
- Peak PM Conditions (4-6pm)

Based on **Figure 4-7**, key findings for the Highway 401 / Allen Road / Yorkdale Road Off-Ramp include:

- 25% of Trips on this ramp use Yorkdale Road to access Dufferin Street;
- 75% of Trips using this ramp are destined to Yorkdale Shopping Centre; and
- This ramp is serving the needs of Yorkdale Shopping Centre, however diverting to increase capacity may be required in the future.

Figure 4-7. Travel Patterns at the Highway 401 / Allen Road / Yorkdale Road Off-Ramp – Weekday PM Peak Hour

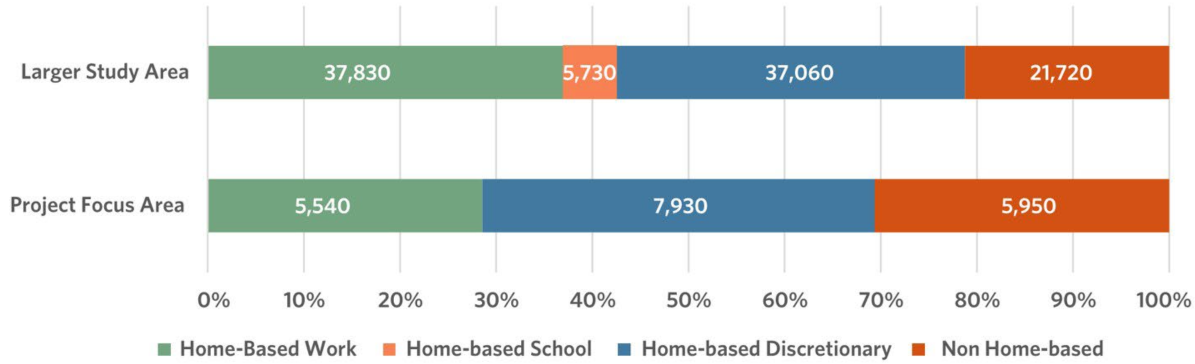


Origin Trip Data Filters:
- Average Weekdays (Monday-Friday)
- Peak PM Conditions (4-6pm)

4.3.3 Trip Purpose

A large proportion of daily trips destined to Yorkdale are for the purpose of shopping, as would be expected. **Figure 4-8** shows that approximately 30% of trips destined to the Yorkdale Shopping Centre are home-based work trips, with the remaining trips being either home-based discretionary or non-home-based trips.

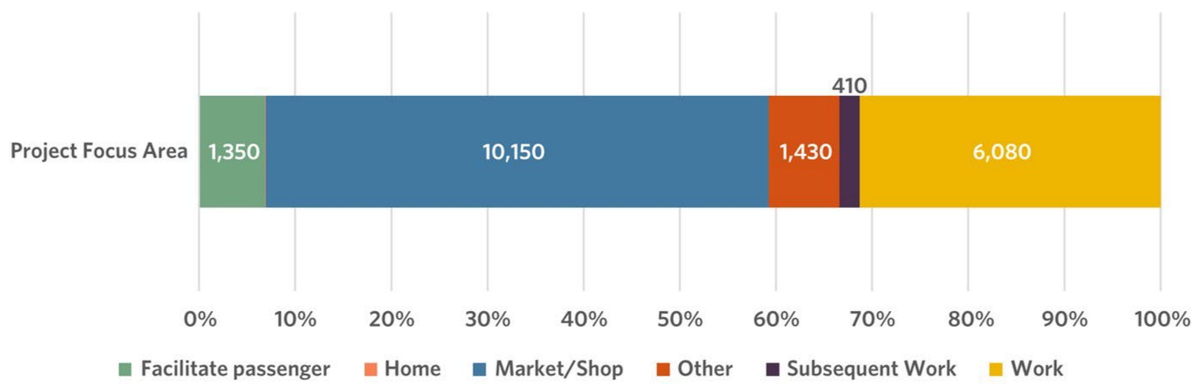
Figure 4-8. Daily Trip Purpose for Trips Destined to Larger Study Area and Project Focus Area (2016)



Source: TTS

Figure 4-9 breaks down the trip purposes in more detail, revealing that about 50% of all daily trips destined to Yorkdale are for shopping purposes, the remaining being for facilitating passengers, work, or other purposes. Compared to the wider study area, Yorkdale Shopping Centre has a smaller proportion of home-based work trips, and a larger proportion of non-home-based trips.

Figure 4-9. Detailed Breakdown of Daily Trip Purpose for Trips Destined to the Project Focus Area (2016)

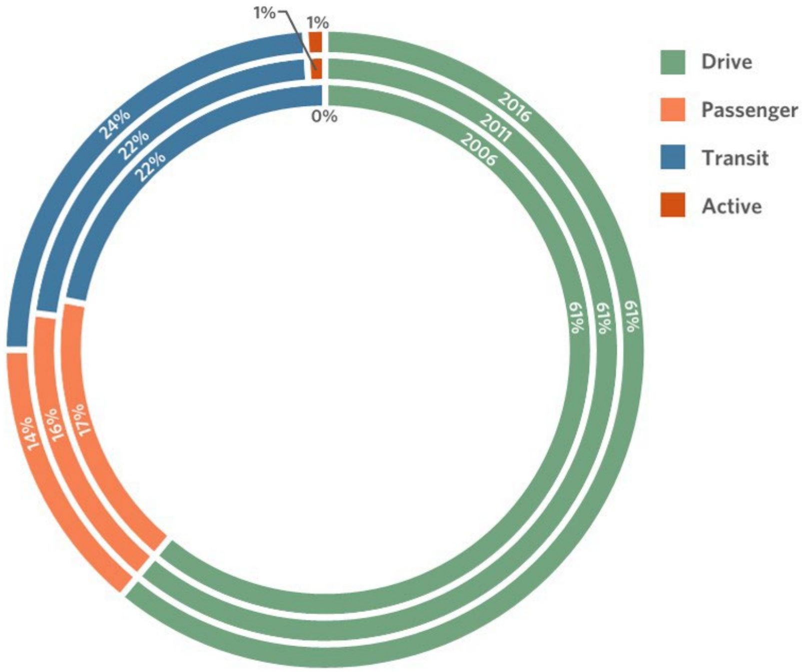


Source: TTS

4.3.4 Mode Share

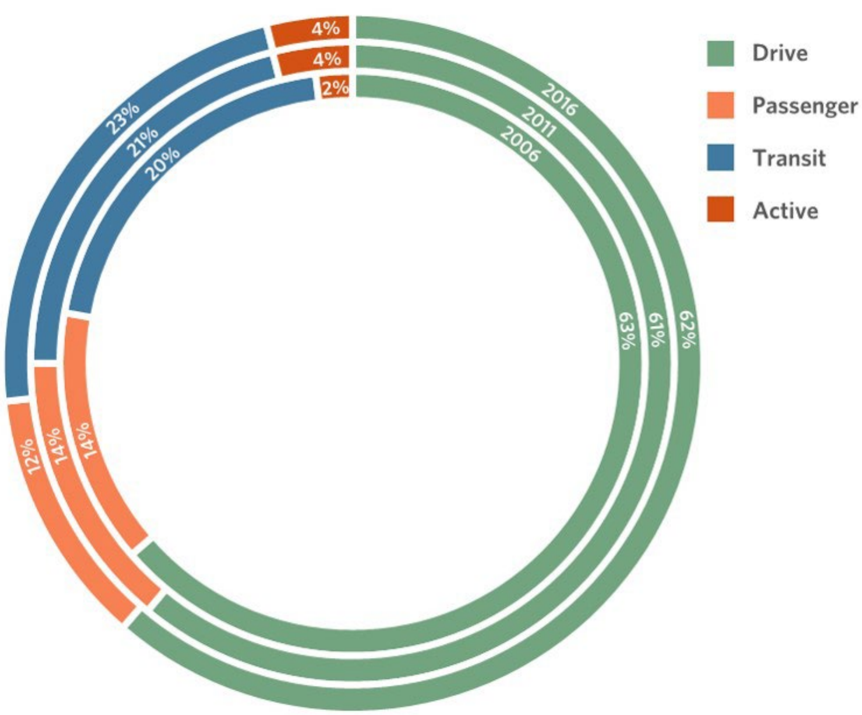
Daily travel to the Yorkdale Shopping Centre and to the larger study area is primarily auto oriented and has remained relatively stable between 2006 and 2016. As can be seen in **Figure 4-10**, the auto mode share to Yorkdale has remained consistent at 61%, passengers have ranged from 14-17%, transit has increased slightly from 22% to 24%, and active transportation has remained very low at about 1%. The trends are quite similar for the larger study area as seen in **Figure 4-11**, although there is a slightly higher proportion of active trips, ranging from 2% in 2006 to about 4% in 2016.

Figure 4-10. Historic Daily Mode Share for Trips Destined to Project Focus Area (2006-2016)



Source: TTS

Figure 4-11. Historic Daily Mode Share for Trips Destined to Larger Study Area (2006-2016)

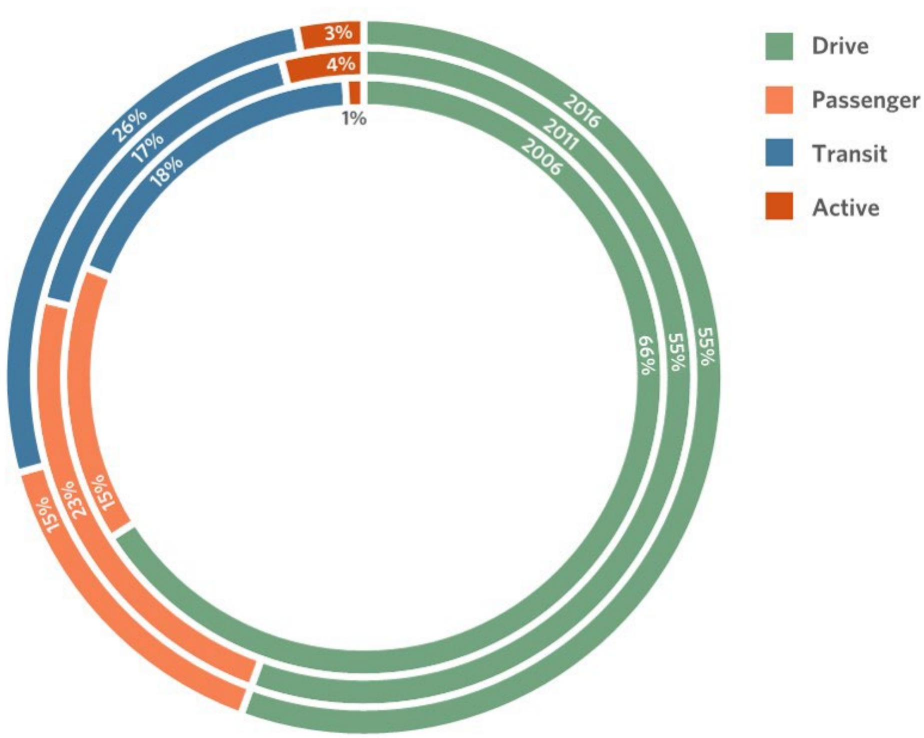


Source: TTS

4.3.5 Active Transportation Trips

Additional analysis regarding the active mode share was conducted to consider trips with distances that may be converted into walking and cycling trips. The proportion of trips under 5 kilometres compared to all trips varies by survey year, with about 26% in 2006, 24% in 2011, and 19% in 2016 which suggests a declining trend. Trips with distances less than or equal to 5 kilometres in length could be considered trips which could be walked and/or cycled. A review of the daily trips destined to the Yorkdale Shopping Centre which are less than or equal to 5 kilometres in length reveals that the majority of these trips are made by auto modes (**Figure 4-12**). Although auto driver trips are decreasing, active trips represent a small portion of all trips.

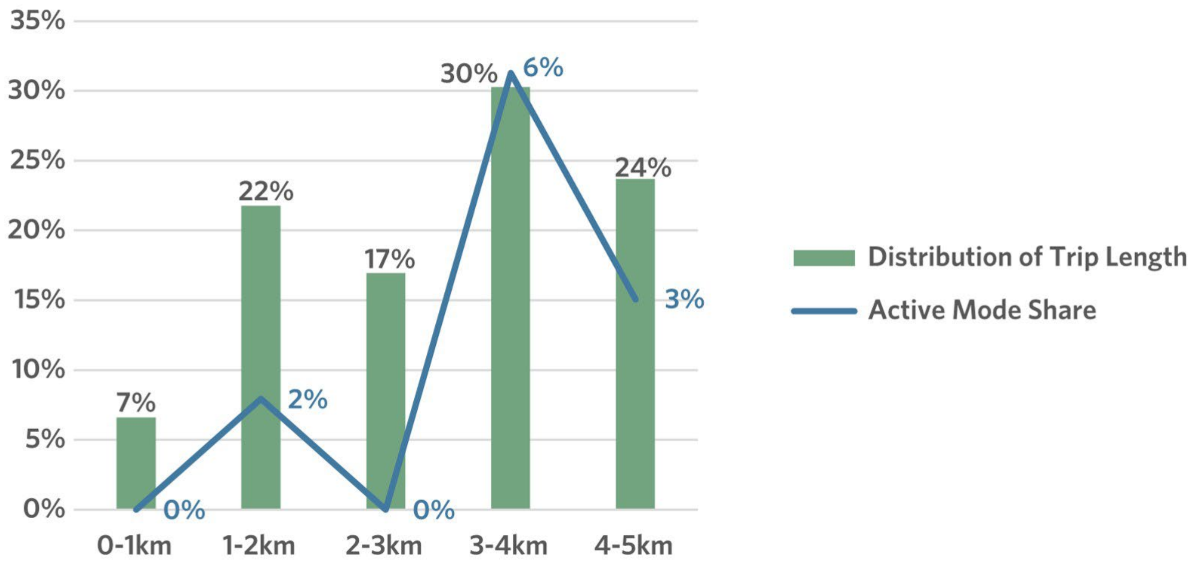
Figure 4-12. Historic Daily Trips Destined to Project Focus Area for Trips Less Than or Equal to 5 Kilometre in Length (2006-2016)



Source: TTS

Figure 4-13 shows the trip lengths in more detail. The 2016 TTS data reports 3,644 trips destined to the Yorkdale Shopping Centre that are under 5 kilometres. A small proportion of these trips are very short – under 1 kilometre; however, it is interesting to note that all of these trips were made with non-active modes. The largest proportion of trips is in the 3 to 4 kilometre range, which coincides with the highest active mode share at 6%.

Figure 4-13. Trip Length Distribution for Daily Trips Less Than or Equal to 5 kilometre in Length (Project Focus Area) (2016)



Source: TTS

Note: Trips under 5 kilometres represent a small proportion of trips destined to Yorkdale Shopping Centre. As Yorkdale is represented by one traffic zone in TTS, it is suspect to variability in survey results due to the relatively small sample size. While the figure is still instructive, counter-intuitive results can be explained by this small sample size.

4.4 Existing Street Network

The larger study area street network was built in the 1960s and 1970s and was built to support an auto-oriented street network. There have been no major changes to the transportation network.

This section details the road classification, network connectivity and continuity, network constraints, right-of-way, connectivity index, intersection density, intersection operations, collision analysis, and goods movement analysis.

4.4.1 Road Classification and Network Continuity

The Yorkdale Shopping Centre and adjacent residential and employment areas are supported by a network of arterial, collector, and local streets, as shown in **Figure 4-14**.

Dufferin Street is the primary north-south major arterial that serves the Yorkdale Shopping Centre. Yorkdale Road provides direct access to the Yorkdale Shopping Centre and provides connections to Allen Road and Highway 401.

While Yorkdale is situated south of Highway 401 between Allen Road and Dufferin Street providing exposure and highway access, the proximity to these facilities also have created non-traditional access between these roads and Yorkdale Shopping Centre. The unique network configurations in the neighborhood also create limited direct access to/from the larger study area causing congestion and confusion to road users. Highway

401, Allen Road, and the large swaths of surface parking act as a barrier to pedestrians and cyclists.

The existing street network has several instances of jogged intersections and discontinuous roads (**Figure 4-15**). As mentioned above, these unique network configurations create limited direct access across the larger study area, leading to congestion.

Figure 4-14. Road Network and Classification

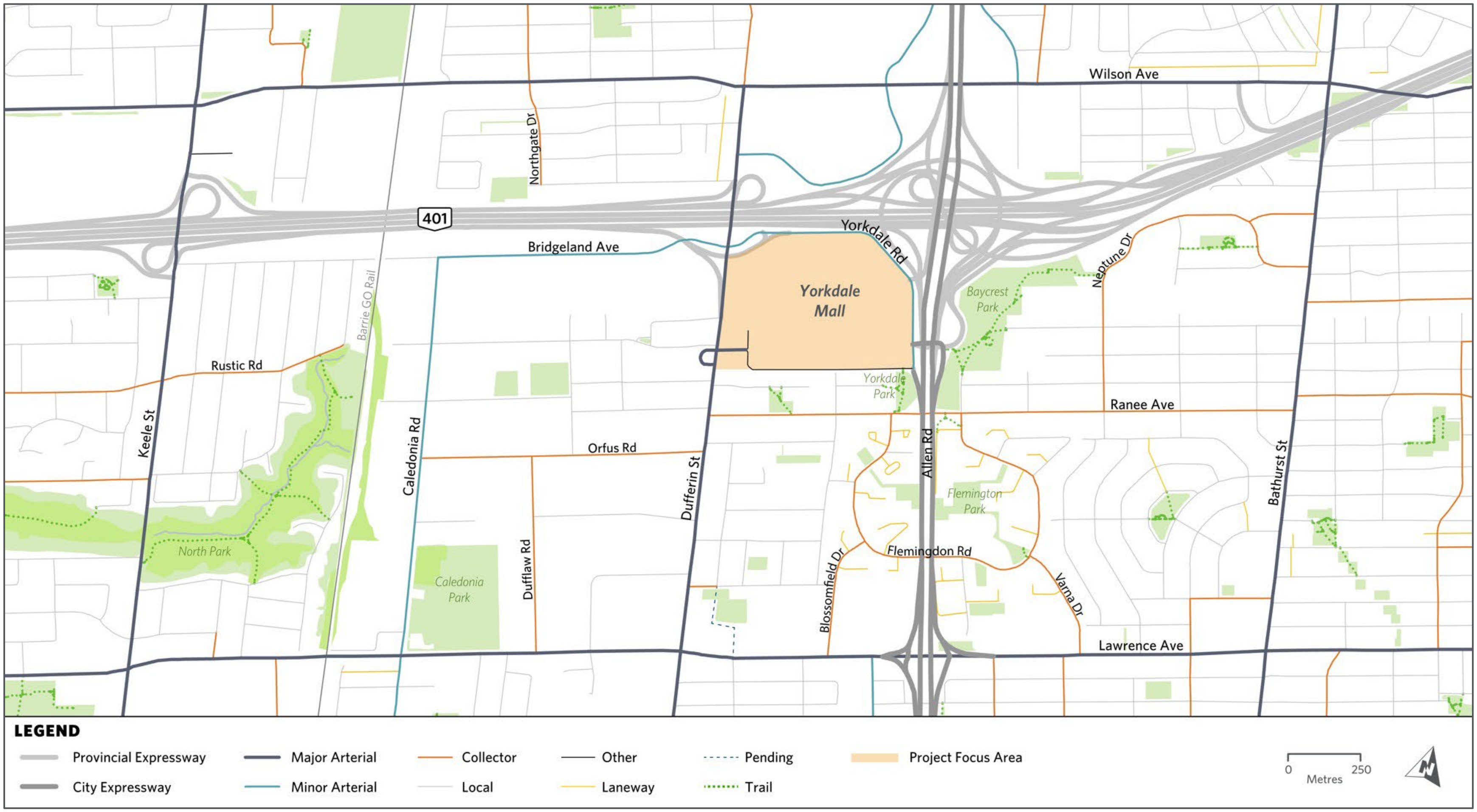


Figure 4-15. Network Continuity

4.4.2 Existing Network Constraints and Challenges

Figure 4-16 illustrates the existing network constraints and challenges in the larger study area. The partial interchanges at Dufferin Street, Bathurst Street, and Yorkdale Road have created inefficient travel patterns and circuitous travel, where vehicles must pass through Yorkdale as a means of access between the highway network and local roads. In addition to highway access constraints, there are infrastructure barriers including the highways themselves (Highway 401 and Allen Road) and the Barrie GO Rail corridor, which limit continuity and connectivity of the local street network for all modes.

There are also limited active transportation connections along Dufferin Street frontage of the Yorkdale Shopping Centre, with only four connections along this frontage. The limited active transportation connections on Dufferin Street coincide with the available signalized intersections, which are illustrated in **Figure 4-17.**

Figure 4-16. Existing Network Constraints and Challenges

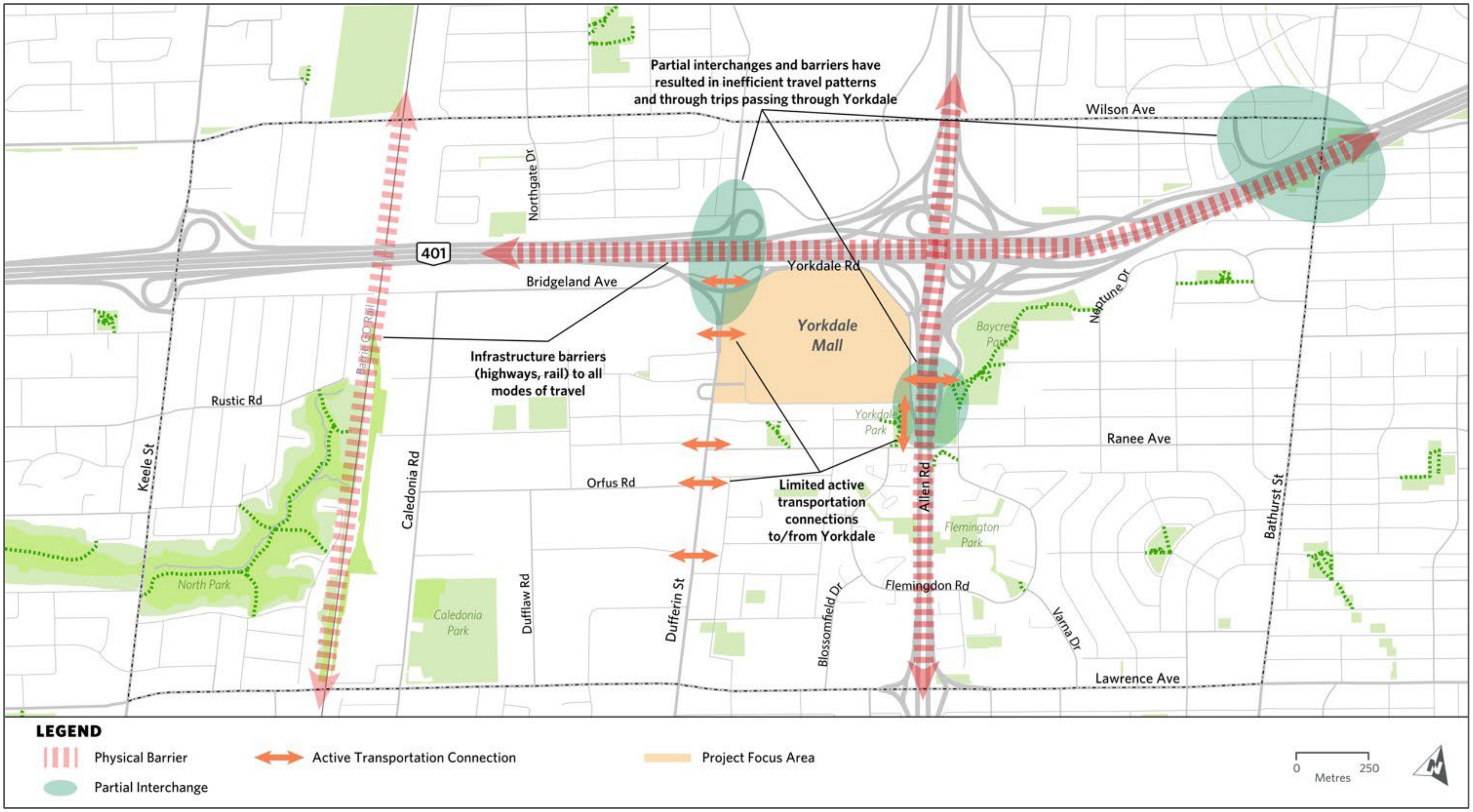
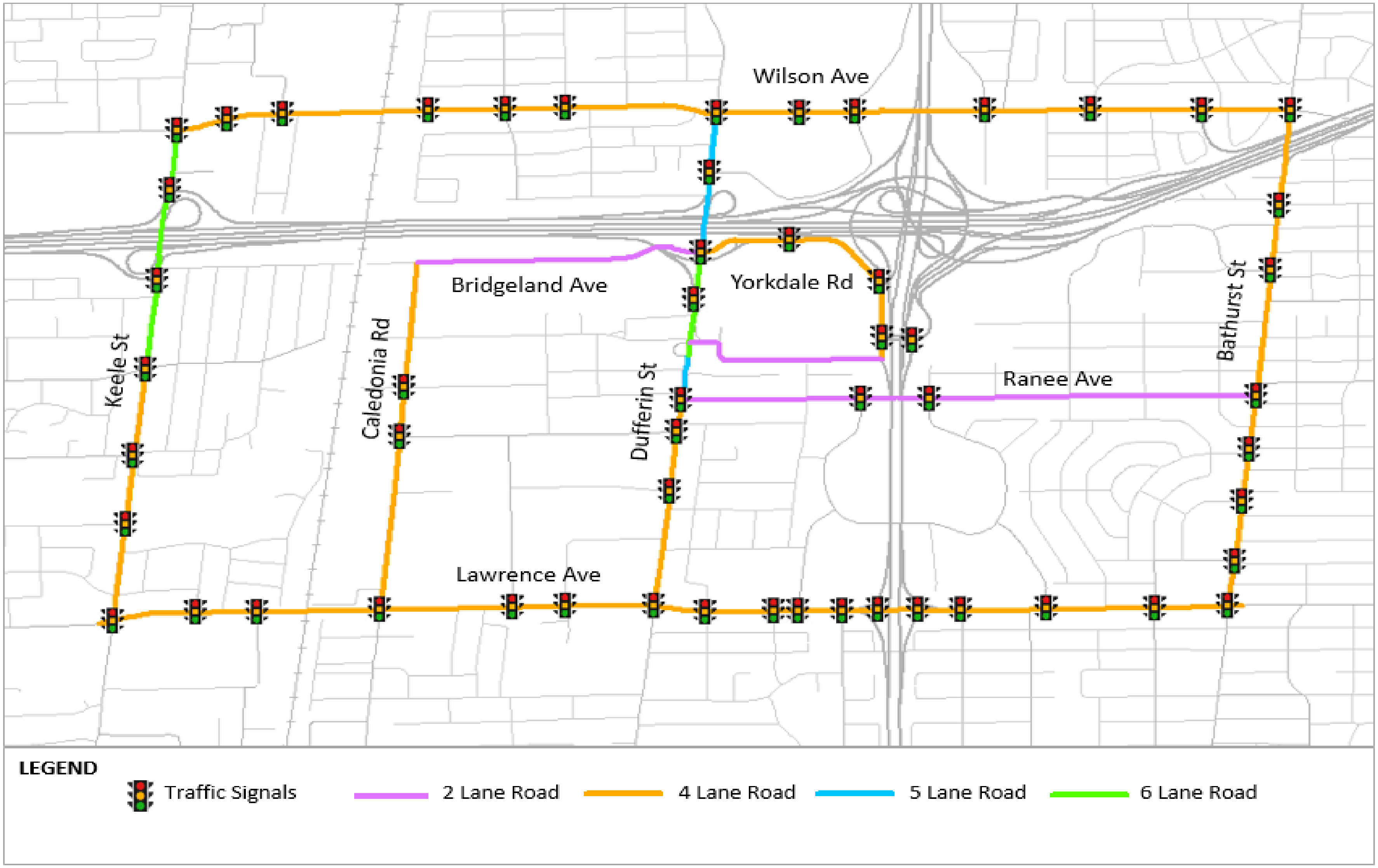


Figure 4-17. Existing Signalized Intersections and Number of Lanes



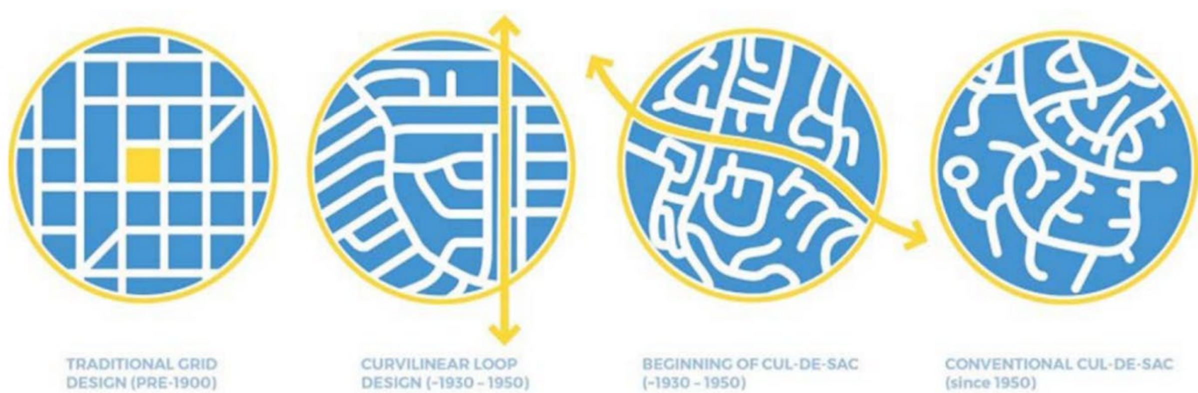
4.4.3 Street Connectivity Index

A well-connected transportation network provides multiple options for different modes of transportation, such as walking, cycling, transit, or car. According to the Victoria Transport Policy Institute[3], "connectivity refers to the directness of links and the density of connections in path or road network". A well-connected road or path network has many short links, numerous intersections, and minimal dead ends (cul-de-sacs). As connectivity increases, travel distances decrease and route options increase, allowing more direct travel between destinations, creating a more accessible and resilient system. Based on the City of Calgary Transportation Plan (CTP) draft Connectivity Handbook, increased connectivity has numerous benefits including:

- Improving public health by providing walking and cycling as a sustainable transportation option;
- Enhancing accessibility to arterial and collector streets and reducing delays for motorists; and,
- Reducing walking distances to and from transit stops.

In urban areas, street network concepts are traditionally hierarchical with local, collector, and arterial streets. Local streets provide access to land uses while collector streets provide access to local streets, increasing vehicular mobility by increasing distances between access points. Arterial streets are generally found on the outskirts of neighbourhoods and are designed to maximize vehicular mobility while minimizing access points. Many post-World War II neighbourhoods were designed with the primary purpose of funneling automobile traffic, minimizing access points (intersections) while including unfriendly elements to walking or cycling in cul-de-sacs and dead ends. **Figure 4-18** illustrates the types of street network design which ranges from the most to least connected neighbourhoods.

Figure 4-18. Types of Street Network Design and Connectivity



Source: Neighbourhood Street Design Guidelines: A Recommended Practice of the Institute of Transportation Engineers (2010)

[3] Roadway Connectivity, 2017

It is possible to quantify the degree of connectivity of a neighborhood street network. Better connectivity is a key component of good neighborhood design to provide more direct access for transit and active transportation users. In this TMP, connectivity is measured through the Connectivity Index method developed by the City of Calgary.

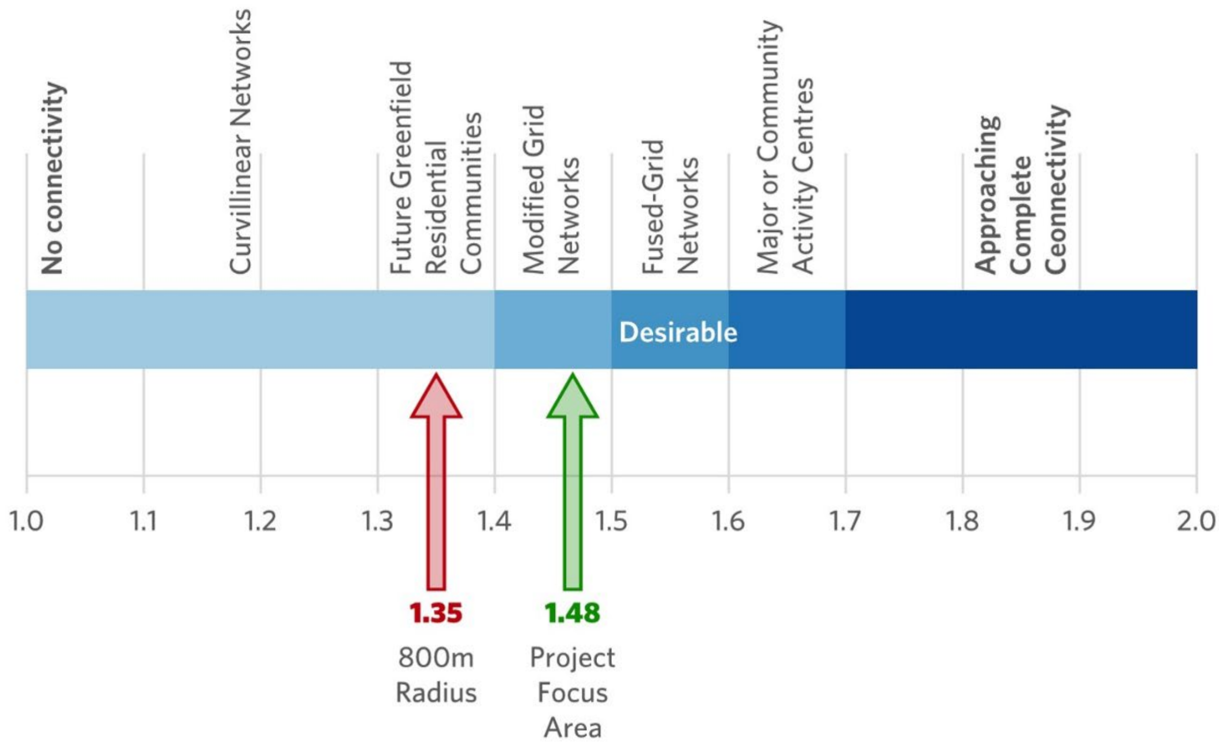
The Connectivity Index (CI) uses the “Links and Nodes” method and measures “street connectivity” for vehicles and an “active mode” index for active transportation users. In this study, Calgary’s draft Connectivity Handbook methodology is used to measure the CI.

The “Links and Nodes” methodology for the street connectivity calculates the ratio between the streets (links) and intersection (nodes) and crossing the CI analysis area. To calculate the number of links for the CI analysis, all links inside the boundary, with the exclusion of alleys and private driveways, are summed.

To calculate the number of nodes for the CI analysis, all intersections within the boundary are summed. The lowest possible ratio is 1.00 which indicates no connectivity in the study area while the maximum ratio of 2.00 indicates complete connectivity. Based on the paper Roadway Connectivity: Creating More Connected Roadway and Pathway Networks (2017) by the Victoria Transportation Policy Institute, a CI of 1.4 to 1.7 indicates a desirable index zone for street connectivity.

The street connectivity index was calculated for the project focus area and for the area encompassed by an 800-metre radius from all shopping centre entrances and the Yorkdale TTC Line 1 subway station (further detailed in **Section 4.7.4**). The connectivity index for the project focus area and the radial area was calculated as 1.48 and 1.35 respectively (**Figure 4-19**). Within the project focus area, the street CI lands within the desirable range. However, when this is expanded to incorporate the 800-metre radius, the street network has less connectivity. This can be attributed to the large block pattern, discontinuous road network, and jogged intersections noted in **Section 4.4.1**.

Figure 4-19. Street Connectivity Index



4.4.4 Intersection Density

In addition to the CI, intersection density can also be used to evaluate the connectivity of the street network. High scores (intersections per hectare) indicate a grid network that maximizes connectivity while low scores indicate large block sizes and poor connectivity. Based on the Ministry of Transportation's (MTO's) Transit Supportive Guidelines (2012), mixed-use nodes and corridors should achieve an intersection density of over 0.6. **Figure 4-20** provides examples of street networks and their associated intersection density score.

Figure 4-20. Examples of Street Network and Intersection Density Score

Source: Transit Supportive Guidelines, 2012
(http://www.mto.gov.on.ca/english/transit/supportive-guideline/layout-local-streets.shtml)

The project focus area has a total of 23 intersections over approximately 44.6 hectares, resulting in an intersection density of 0.52. Within the 800-metre radius of the shopping centre entrances and the Yorkdale TTC Line 1 subway station, the intersection density is even lower, falling to 0.32 intersections per hectare. These low resulting intersection density scores are reflective of an area that is comprised of large blocks, undeveloped lots (such as surface parking) and a road network that is predominantly access-controlled.

4.4.5 Travel Demand Modelling and Analysis

To assess the existing transportation conditions (and eventually the future transportation conditions with all planned and proposed developments) in the study area, four levels of modelling and analyses were undertaken:

- Subarea macro modelling;
- Mesoscopic modelling;
- Microsimulation modelling; and,
- Intersection capacity analysis.

The macro model subarea analysis was undertaken to refine and adjust the regional-scale traffic flows from the City's GTA Model Version 4 (GTAMv4) EMME model to, from, and within the larger study area. This focused especially on traffic to and from the

Yorkdale Shopping Centre as well as through key gateways on the borders of the larger study area, with the aim of developing an origin-destination (OD) trip matrix that produces passenger vehicle volumes on the existing road network matching closely to observed 2019[4] traffic count data.

As an initial step, HDR worked with the City to identify network detailing and modifications to achieve a more realistic depiction of roads within the study area, which were incorporated into the City's model. The resulting subarea network is shown below in **Figure 4-21**. The City provided subarea passenger vehicle matrices from their base year model (2011) for the AM and PM peak hours, as well as a subarea network comprising the larger study area.

Figure 4-21. Yorkdale Subarea Model Network

Source: EMME Subarea Model

Using these networks and matrices, HDR carried out the following adjustments:

- Applying factors to increase demand to and from the Yorkdale Shopping Centre traffic zone to match observed counts and account for any underestimated retail trips that may not have been captured in the TTS data and the City-wide macro model. The observed counts for Yorkdale are sourced from Oxford's YSCTMP (2017);

[4] 2019 is noted as the reference year; however, in reality the counts calibrated to were from earlier years in some cases. Due to congestion and variable flows it was not practical to calculate growth rates, so no count adjustments were applied.

- Using the EMME demand adjustment process to apply a further OD adjustment to flows through locations with counts, so that the flows through those locations would match counts as closely as possible; and,
- Applying a final balancing step using bi-proportional updating to adjust the OD matrices to gateway totals at the borders of the subarea, for those gateways that had counts available. Flows to and from gateways without counts were not considered and were unaffected by this step.

The results of these steps were total vehicle matrices (as the counts being adjusted to also include trucks) for the AM and PM peak hours and Saturday midday. As there was no initial Saturday matrix (because the City's model does not include the weekend), the PM OD matrix was used as the starting point and then adjusted to Saturday midday counts and balanced to gateway totals in the same way as the weekday time periods. The reasonability of the flows was verified through assigning the resulting demand matrix to the network and verifying the distribution matched to prevailing conditions (very high through volumes on Highway 401, reasonably high volumes on arterial roads, and so on).

Table 4-1 summarizes the weekday PM peak hour volumes for Yorkdale and the larger study area between the City's original GTAMv4 volumes and the adjusted GTAMv4 volumes. A comparison was also conducted to Oxford's transportation analysis within the YSCTMP and found that the refined model more closely matched the volumes in their report.

Table 4-1. Comparison of Travel Demand Model Volumes

Weekday PM Peak Hour	Yorkdale Trips In	Yorkdale Trips Out	Larger Study Area Trips In	Larger Study Area Trips Out
Oxford YSCTMP (Table G-4)	1,844	1,901	-	-
City of Toronto GTAMv4 EMME Model	587	1,345	47,260	49,740
Yorkdale TMP Model (Adjusted City of Toronto GTAMv4 EMME Model)	1,844	1,892	44,493	46,799

Trucks are not included in the City's model, but truck matrices were estimated using counts. The passenger vehicle matrix was factored down to 3-5% of its original total (depending on time period) to reflect the approximate percentage of trucks on the network, and then the reduced matrix was adjusted to truck counts on the network. Noting that the counts show significant variations for adjacent intersections, but that truck volumes in most of the subarea are very low, this provided a rough estimate of truck OD demand in the study area.

4.4.6 Existing Intersection Operations

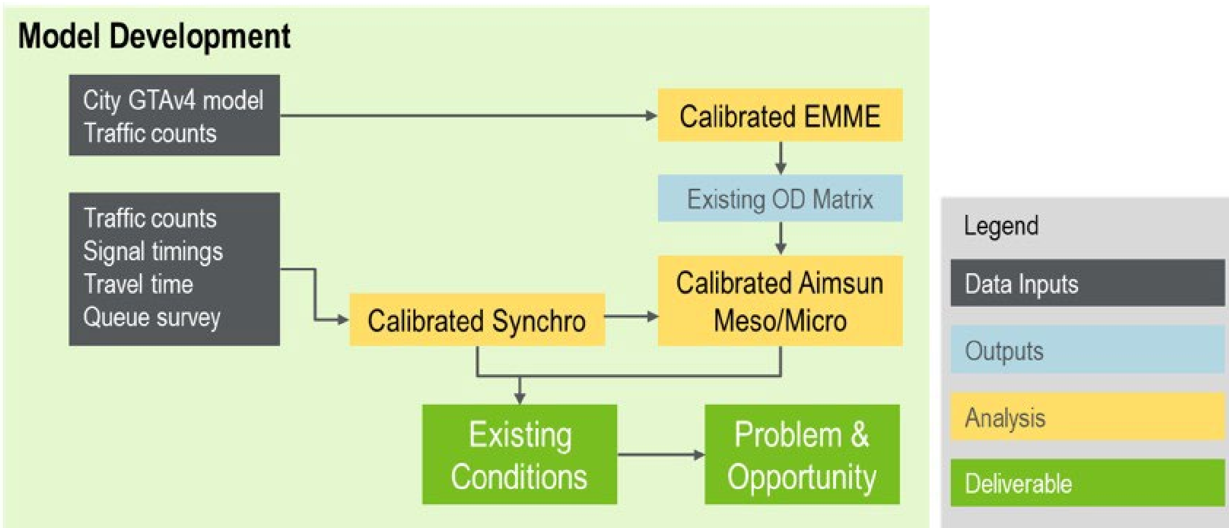
Methodology and Workflow

To assess intersection operations, two key models were developed for the larger study area to access intersection capacity and multi-modal traffic operations:

- Synchro models were developed for the weekday AM, PM, and Saturday peak hours; and,
- An Aimsun meso/microscopic simulation model was developed for the larger study area for the same peak periods.

The modelling workflow is demonstrated in **Figure 4-22**.

Figure 4-22. Traffic Modelling Workflow

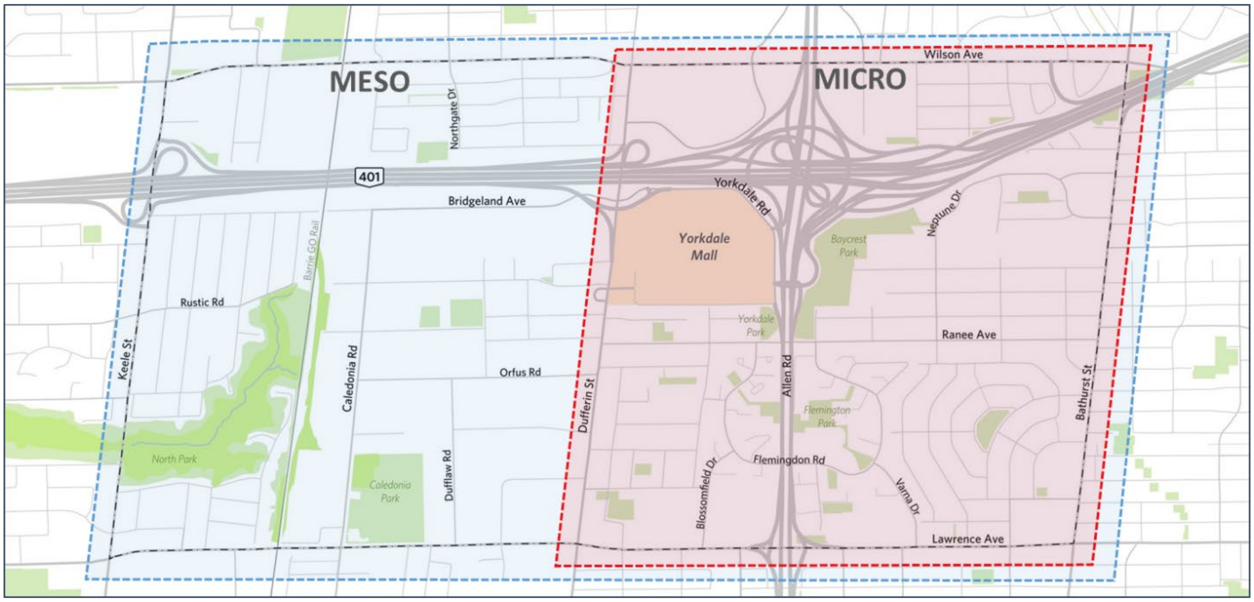


A total of 56 signalized intersections were developed in microscopic detail for the area bound by Wilson Avenue, Bathurst Street, Lawrence Avenue West, and Keele Street (larger study area). Mesoscopic simulation runs were conducted for the larger study area using the subarea model demands described in **Section 4.4.5**.

The objective of the mesoscopic model is to refine demand routing using the OD matrix provided by the GTAv4 macro model, as mesoscopic is an efficient “middle ground” between deterministic traffic assignment by macro and agent-based individual decisions by micro. Intersection queuing, traffic signal delays, and turning movements penalties are accounted for at this level for the larger study area.

A microscopic subarea within the mesoscopic model was then refined for the micro model area that include 37 intersections bounded by Wilson Avenue, Bathurst Street, Lawrence Avenue West, and Dufferin Street (shown in **Figure 4-23**). The micro model area is then simulated in the microscopic simulation environment to provide refined traffic routing, vehicle interaction, and speed/delay analysis.

Figure 4-23. Meso-Micro Modelling Areas



Both Synchro and Aimsun models were developed and used in this study because each has dedicated functions due to each software's strength in reporting existing traffic conditions. Therefore, both tools are used to extract distinct outputs as shown in **Table 4-2**.

Table 4-2. Designated Functions for Synchro/Aimsun Models

	Synchro / SimTraffic	Aimsun
Intersection Capacity Analysis (Volume-Capacity Ratio)	Yes	No
General Traffic Level of Service	Yes	Yes
Pedestrian Delays	Yes	Yes
General Traffic Travel Time / Delays	Yes	Yes
Truck Travel Time / Delays	Not explicit (part of general traffic)	Yes
Transit Travel Time / Delays	Not explicit (part of general traffic)	Yes
Traffic queues	Yes	Yes
Traffic Routing/Trip Distribution	No	Yes
Traffic Signal Optimization	Yes	No

Intersection Capacity Analysis

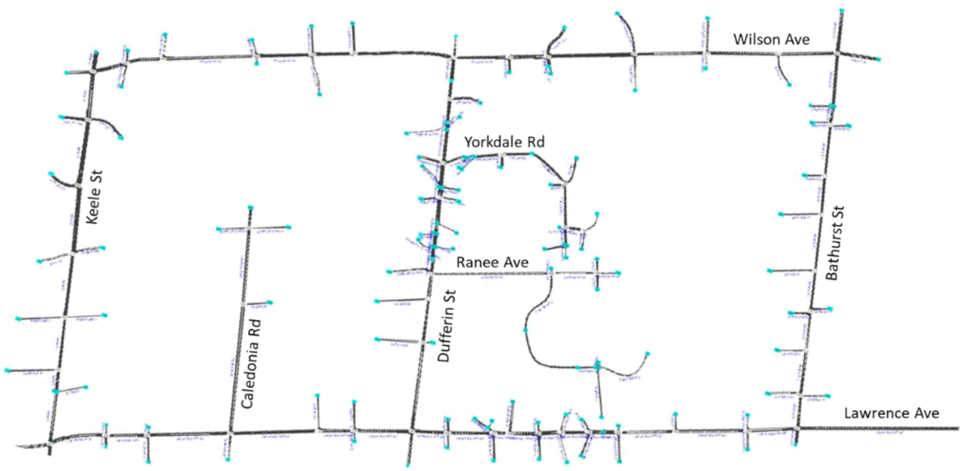
Existing intersection operations were assessed for the signalized intersections along the corridor, based on methodology consistent with the Guidelines for Using Synchro 9 (Including SimTraffic 9) dated 18 March 2016. Three analysis periods were analyzed: weekday AM peak hour (8-9 AM), the weekday PM peak hour (5-6 PM), and the weekend peak hour (1-2 PM). The peak hour for each analysis period was identified through the Turning Movement Counts (TMC) provided by the City, detailed further below.

Available models from recent signal coordination studies, latest signal timing plans, and most recent intersection turning movement volumes were modelled in Synchro to identify existing intersection capacity constraints. The Synchro model boundary is shown in **Figure 4-24**.

The intersection TMCs were provided by the City. Any TMC's more than 3 years old were re-counted and any gaps in the data were counted by a sub-consultant hired by HDR for the purpose of this study. Data collection was conducted in June 2019 at a total of 19, 12, and 14 locations for AM, PM, and Saturday peak period, respectively.

A summary of the intersection turning movement volumes are provided in **Appendix D.**

Figure 4-24. Synchro Model Boundary



The analysis was conducted using the software program Synchro 9.2. Synchro can analyze both signalized and unsignalized intersections in a road corridor or network considering the spacing, interaction, queues, and operations between intersections. The intersection analysis considers two main types of Measures of Effectiveness (MOEs):

- The capacity of all intersection movements, which is based on a volume to capacity ratio (v/c); and,
- The level of service (LOS) for all intersection movements, which is based on the average control delay per vehicle for each of various movements through the intersection, and for the overall intersection.

LOS 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. The v/c ratio is a measure of the degree of capacity utilized at an intersection. Delays and corresponding letter grades derived from Highway Capacity Manual (HCM) are shown below in **Table 4-3**.

Table 4-3. Signalized Intersection Level of Service

Level of Service (LOS)	Control Delay per Vehicle (s)
A	≤ 10
B	> 10 and ≤ 20
C	> 20 and ≤ 35
D	> 35 and ≤ 55
E	> 55 and ≤ 80
F	> 80

Note: HCM indicates LOS A, B, and C are considered acceptable. LOS D indicates that delays are more perceptible. LOS E and F indicate notable delays but may be acceptable in urban contexts.

Figure 4-25 through **Figure 4-27** provide an overview of the intersection operations for all signalized intersections within the larger study area for each peak period.

Figure 4-25. Intersection Level of Service – Weekday AM Peak Hour

During the Weekday AM peak, most critical intersections are observed along Lawrence Avenue West and Bathurst Street. The Yorkdale Road / Allen Road off-ramp also observe some constraints during the AM peak.

Figure 4-26. Intersection Level of Service – Weekday PM Peak Hour

During the Weekday PM peak, critical intersections are observed along Lawrence Avenue West, Bathurst Street, and Keele Street. The Yorkdale Road / Highway 401 on-ramp also observe some constraints during the PM peak.

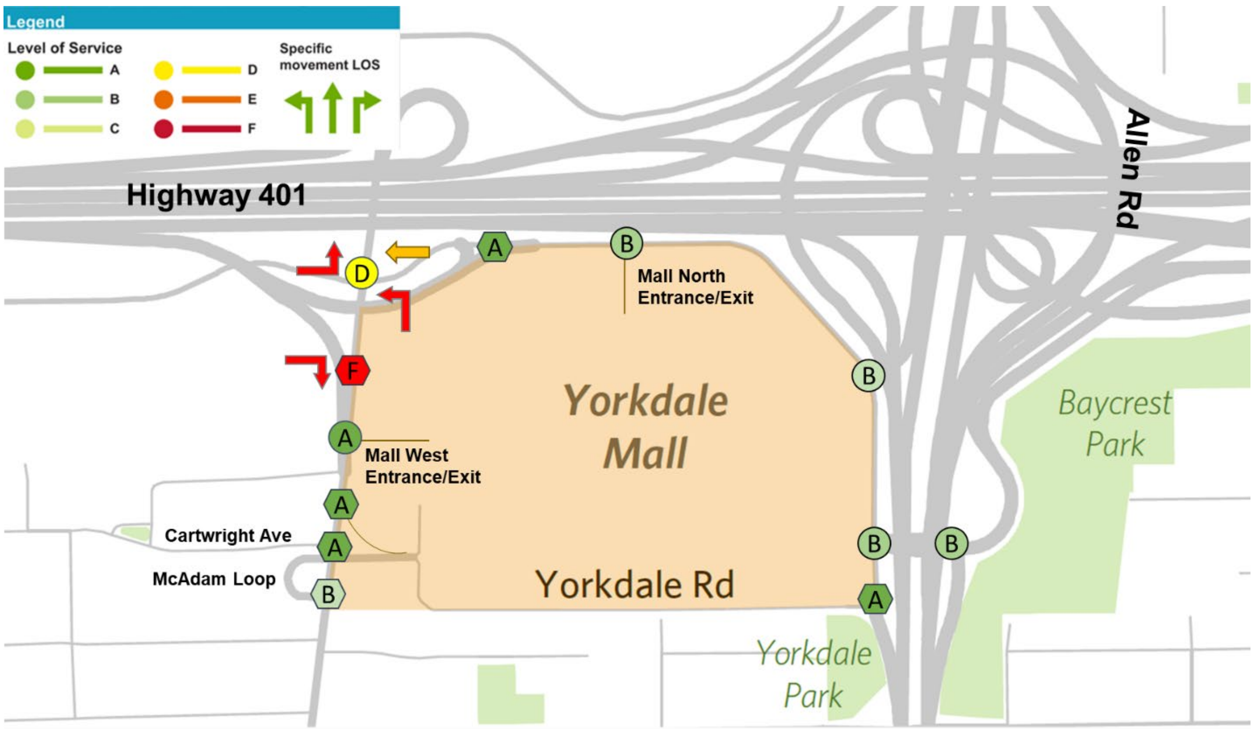
Figure 4-27. Intersection Level of Service – Saturday Midday Peak Hour

During the Saturday Midday period, critical intersections are only observed along Lawrence Avenue West. There are no critical movements within the project focus area around the Yorkdale Shopping Centre.

Critical movements are defined for the purpose of this study as turning movements that exceed a v/c ratio of 0.85 for shared through / right and through / left movements, and 1.0 for dedicated left and right turn lanes. This is consistent with the City of Toronto Guidelines for the Preparation of Transportation Impact Studies.

Figure 4-28 to **Figure 4-30** illustrate the critical movements for the project focus area around Yorkdale Shopping Centre. The critical movements for both signalized and unsignalized intersections are illustrated.

Figure 4-28. Critical Movements – Project Focus Area – Weekday AM Peak Hour



Based on the AM peak hour shown in **Figure 4-28**, critical movements are observed at the following intersections:

- Dufferin Street and Bridgeland Avenue: The northbound left and eastbound left movement observe LOS 'F' and the westbound through movement observes LOS 'E' during the AM peak hour. This intersection was partly impacted by the Dufferin Street and Highway 401 construction at the time of the counts; and,
- Dufferin Street and Highway 401 eastbound off-ramp: This yield-controlled channelized off-ramp observes LOS 'F' during the AM peak hour due to merging delays onto Dufferin Street southbound.

Figure 4-29. Critical Movements – Project Focus Area – Weekday PM Peak Hour

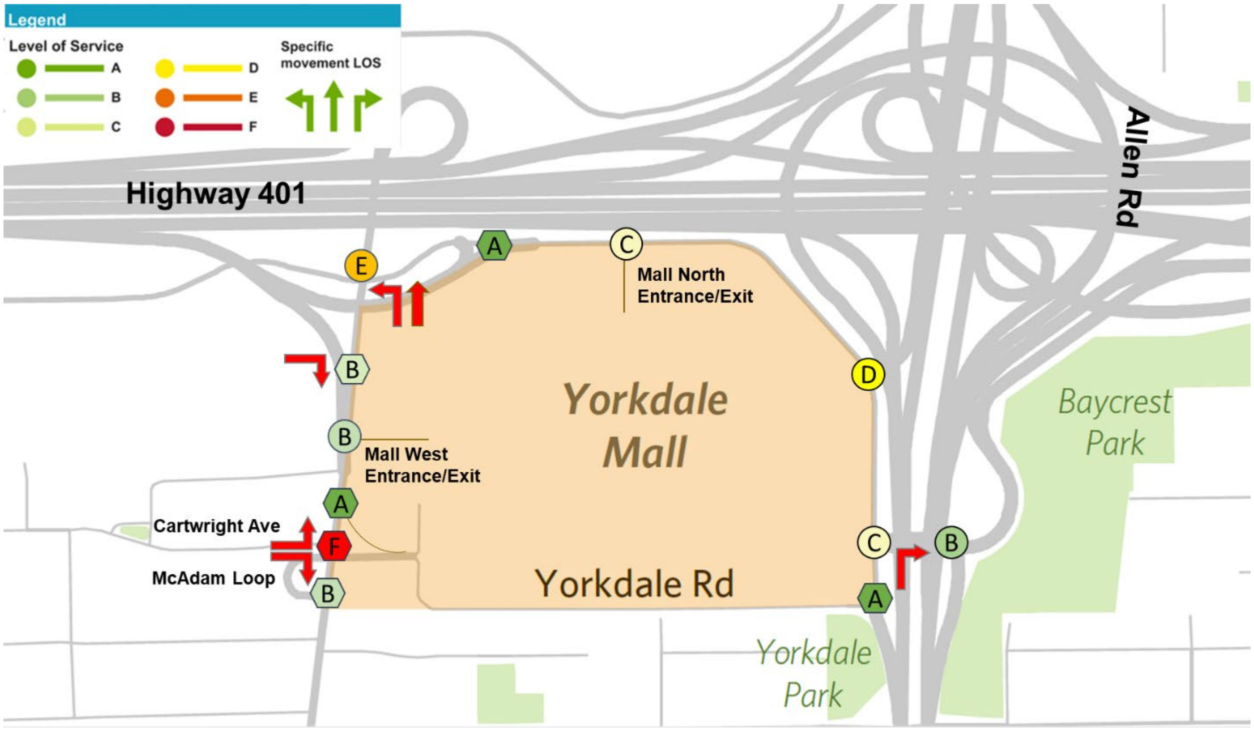
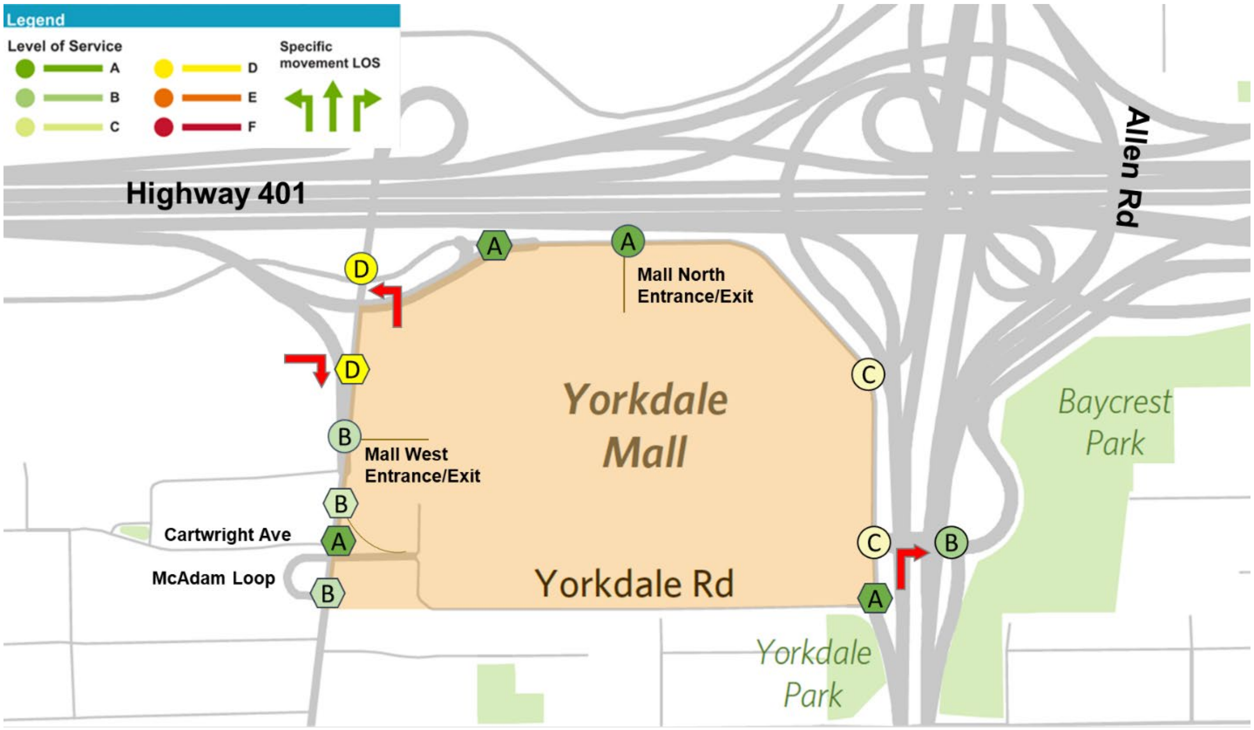


Figure 4-29 illustrates the critical movements for the PM peak hour, where critical movements are observed at the following intersections:

- Yorkdale Road and Highway 401 on-ramp: The northbound right movement is at LOS 'F' during the PM peak, the intersection as a whole is also operating at LOS 'E';
- Dufferin Street and Bridgeland Avenue: The northbound through and northbound left movements observes LOS 'F' during the PM peak. This intersection is partly impacted by the Dufferin Street and Highway 401 construction being undertaken at the time of this report; and,
- Dufferin Street and Cartwright Avenue: The stop-controlled eastbound approach observes LOS 'F' during the PM peak due to difficulties with gaps turning onto Dufferin Street.

Figure 4-30. Critical Movements – Focus Area – Weekend Midday Peak Hour



Based on the weekend midday peak hour shown in **Figure 4-30**, critical movements are observed at the following intersections:

- Dufferin Street and Bridgeland Avenue: The northbound left movement is at LOS F during the weekend midday. This intersection is partly impacted by the current Dufferin Street and Highway 401 construction being undertaken;
- Dufferin Street and Highway 401 eastbound off-ramp: This yield-controlled channelized off-ramp observes LOS 'F' during the weekend due to difficulties with merging onto Dufferin Street; and,
- Dufferin Street and McAdams Loop: The stop-controlled eastbound right movement observes LOS 'F' during the weekend due to difficulties with gaps turning onto Dufferin Street.

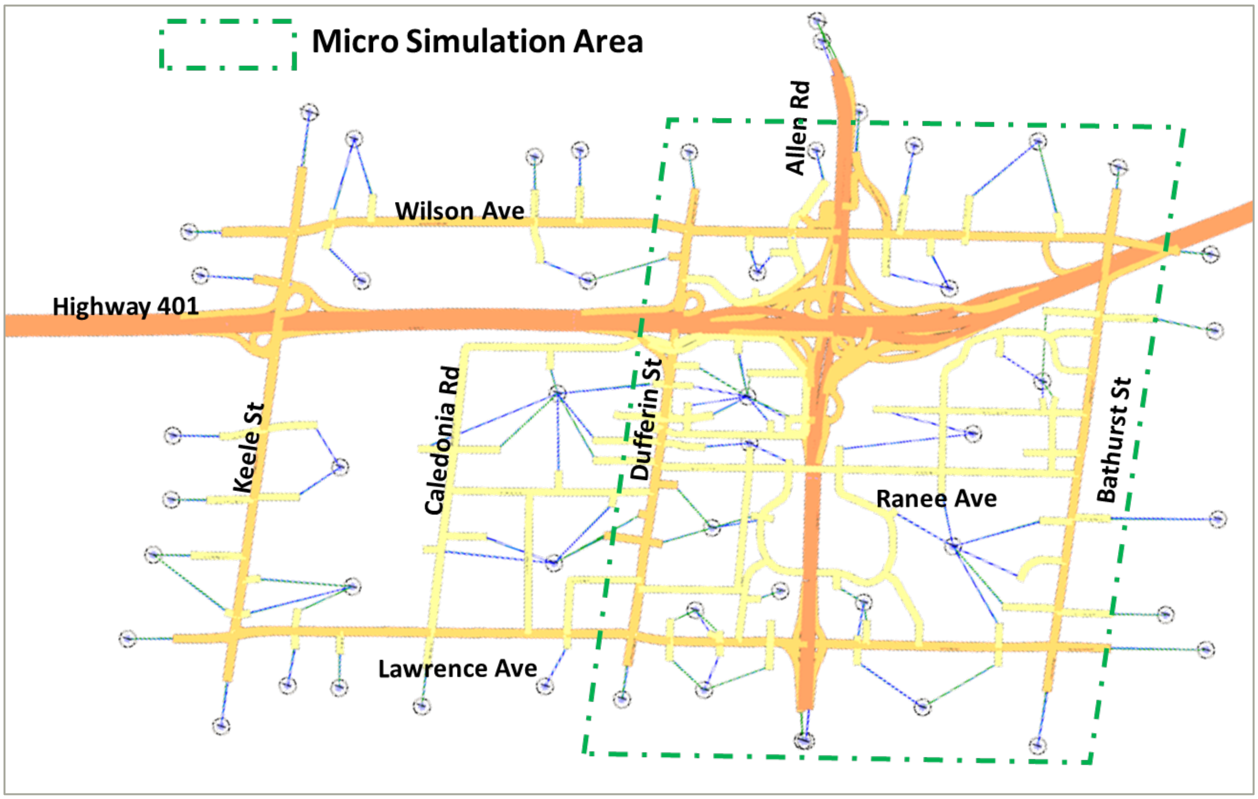
The Yorkdale TMP will review the potential off-site improvements to address the critical movements noted from the existing conditions findings. However, from the background study review, it was already recognized that off-site improvements alone would be insufficient to the address transportation needs in the focus area and in the larger study area. Therefore, the study will also consider on-site improvements surrounding Yorkdale.

Mesoscopic / Microsimulation Analysis

A meso-micro hybrid simulation model was created in Aimsun for the existing conditions, with an aim to provide more detailed analysis including traffic routing, turning movement forecast, network scenarios such as highway interchange and transit priority, and analyze person delays by mode.

Figure 4-31 illustrates the extents of the Aimsun model.

Figure 4-31. Aimsun Meso/Micro Hybrid Model Study Area



This Aimsun model is calibrated to existing conditions for the AM, PM, and weekend peak periods that correspond to the intersection capacity analysis. While the Synchro model is developed for the peak hours, the Aimsun model is developed to analyze 2-hour peak periods. The intent of the microsimulation model was created to:

- Simulate traffic patterns for existing and future conditions, based on OD traffic forecasts from the subarea EMME model and to reflect network constraints, operations, and congestion that cannot be reliably assessed at the macro level or from Synchro. This forecast traffic can also be iteratively fed back into Synchro to illustrate intersection capacity as well as to optimize traffic signal timings;
- Analyze traffic delays and queues amongst signalized and unsignalized intersections for auto traffic, transit, trucks, and pedestrians explicitly, which is not possible in Synchro;
- Analyze person delays based on vehicle occupancy for each mode; and,

- Analyze impacts to each mode for infrastructure configurations such as highway interchange reconfiguration, transit priority measures, revised connectivity, etc.

The base model is calibrated to traffic volumes on a link and turning movement basis as per guidelines recommended in the City of Toronto Aimsun Model Guideline as well as Federal Highway Administration Microsimulation Guidelines. The model is also validated based on travel time for auto and transit within the study area. Details of the meso / microsimulation model development, calibration/validation and findings are documented under Aimsun Microsimulation Memorandum (**Appendix E**).

Average Vehicle Travel Speeds

Figure 4-32 to **Figure 4-34** illustrate the average vehicle travel speeds for the larger study area based on City of Toronto HERE travel time data and travel time survey data from MTO (for Highway 401 only). HERE travel time data are only available for the arterial road network and Yorkdale Road. The average vehicle travel speeds consider the delays and congestion encountered on the road network and at signalized intersections.

The larger study area network today experiences significantly slower travel times during the PM peak hour compared to the AM and Saturday peak periods. The arterial roads during all peak hours of analysis experience slower than usual (off-peak / free flow) travel times.

Figure 4-32. Weekday AM Peak Hour Average Vehicle Speed

Figure 4-33. Weekday PM Peak Hour Average Vehicle Speed

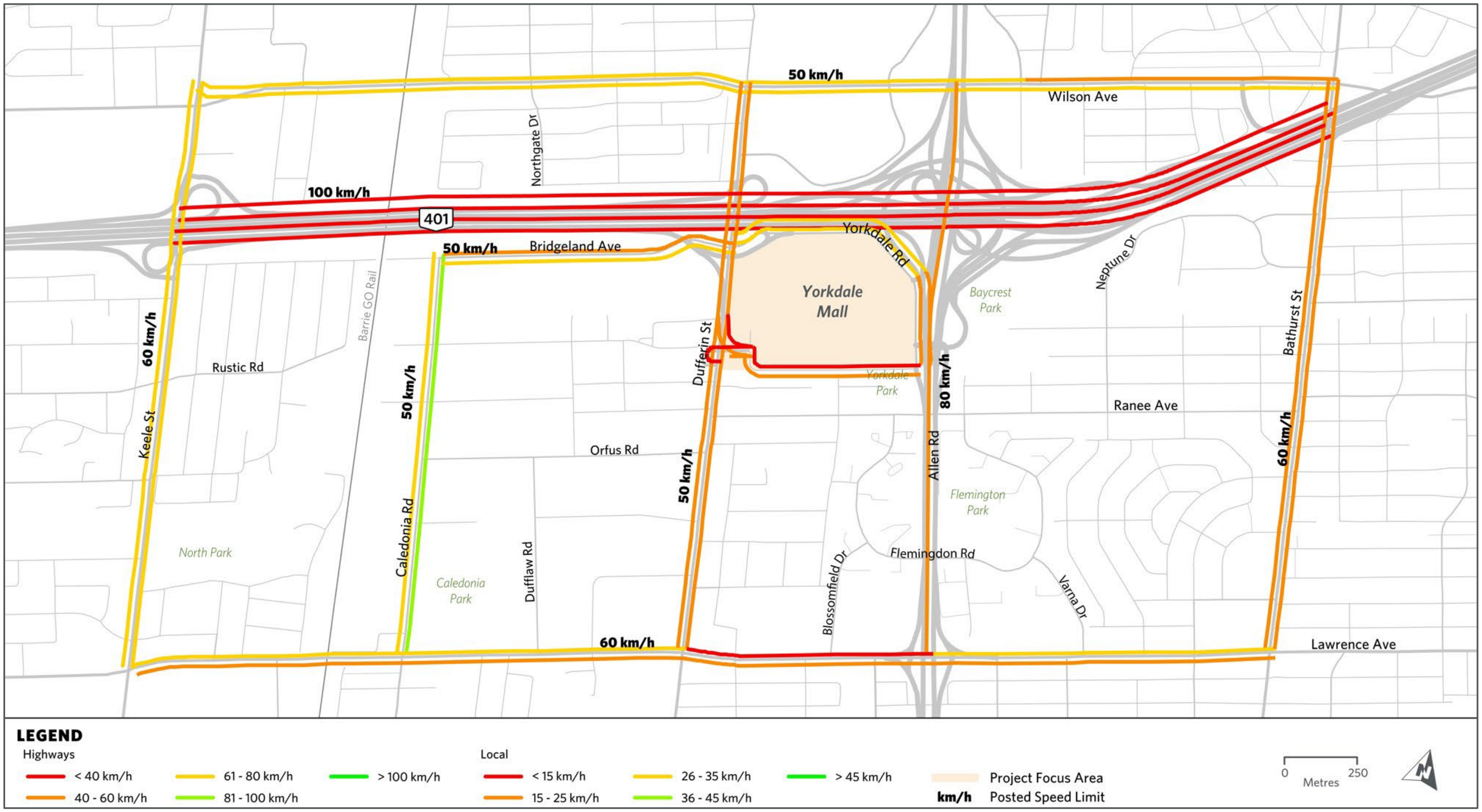
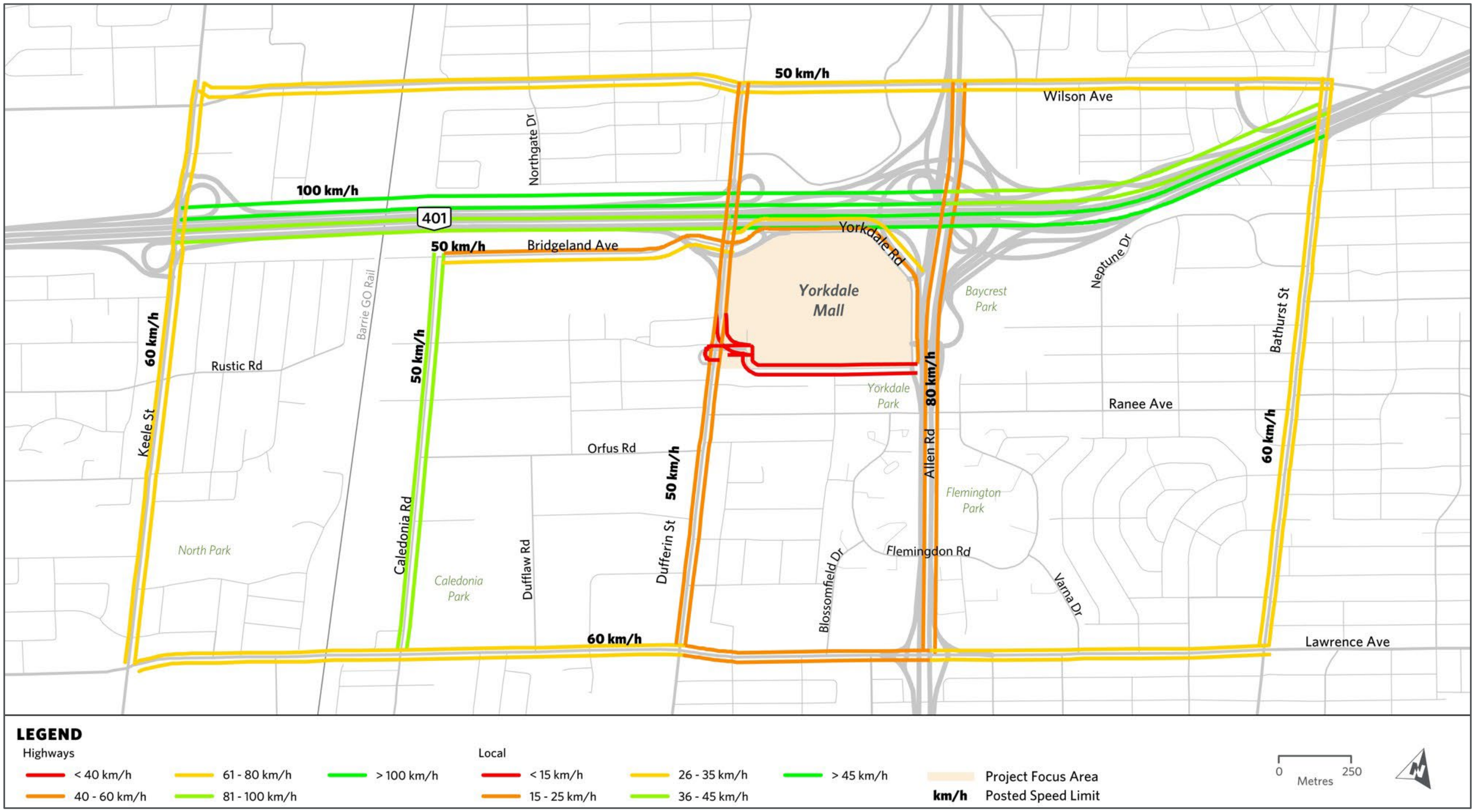


Figure 4-34. Weekend Midday Peak Average Vehicle Speed



4.4.7 Collision Analysis

A safety assessment and collision review were completed for the micro model study area (bound by Dufferin Street, Wilson Avenue, Bathurst Street, and Lawrence Avenue West) as shown in **Figure 4-31**. The analysis is based on intersection-related and segment-related collision records from the City of Toronto's Traffic Safety Unit. The collision records are for the years between 2013 and 2018. There were 6,081 collisions reported between 2013 and February 2018 in the study area along public roads.

Figure 4-35 shows an overall heat map of collisions for the micro model study area, with color schemes that highlight where collisions were most prominent. Collisions in the micro model study area between 2013 and 2018 showed that most collisions were observed at the major-major intersections of arterial roads, the Allen Road interchange at Lawrence Avenue West, and the Bridgeland Avenue / Dufferin Street intersection.

Figure 4-35. Collision Heat Maps of the Focus Study Area

Figure 4-36 provides an overview of key collision statistics for the micro model study area. Based on the key statistics, there were 7 fatal collisions in the micro model study area, which were observed along Wilson Avenue, Bathurst Street, and Lawrence Avenue West. There is a slight upward trend in the number of collisions observed each year. Over 75% of all collisions involved auto and 3% of all collisions involved vulnerable road users such as pedestrians and cyclists. Throughout the day, peak collisions were observed during the PM peak, where traffic volumes and pedestrian activities were high; therefore, more conflicts.

Figure 4-36. Key Collision Statistics for the Micro Model Study Area

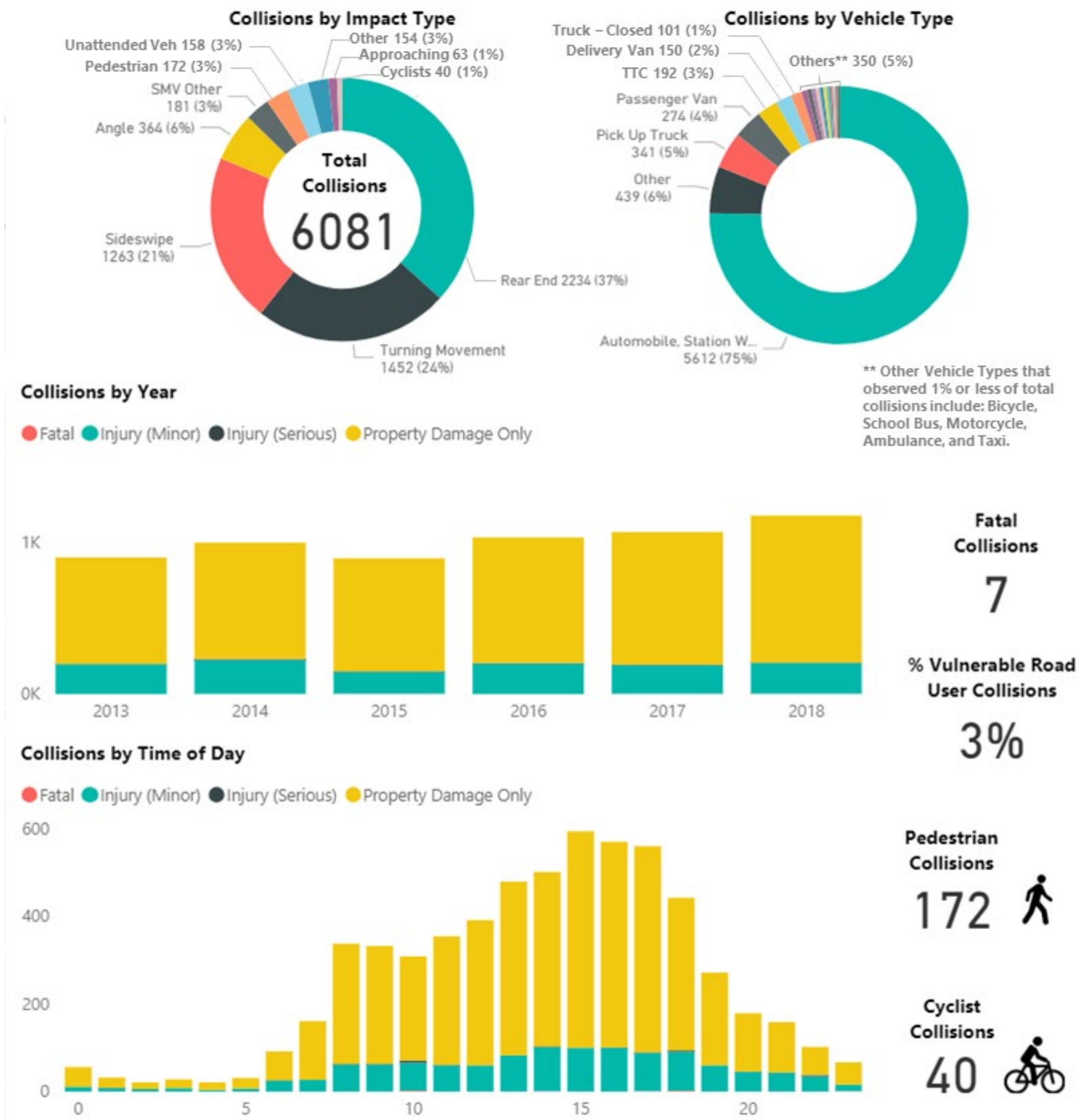


Figure 4-37 provides a heat map of where collisions were most prominent within the project focus area around Yorkdale Shopping Centre. As shown, the collision pattern is clear that the hotspot is at the Bridgeland Avenue / Yorkdale Road intersection.

Figure 4-37. Collision Heat Maps of the Project Focus Area

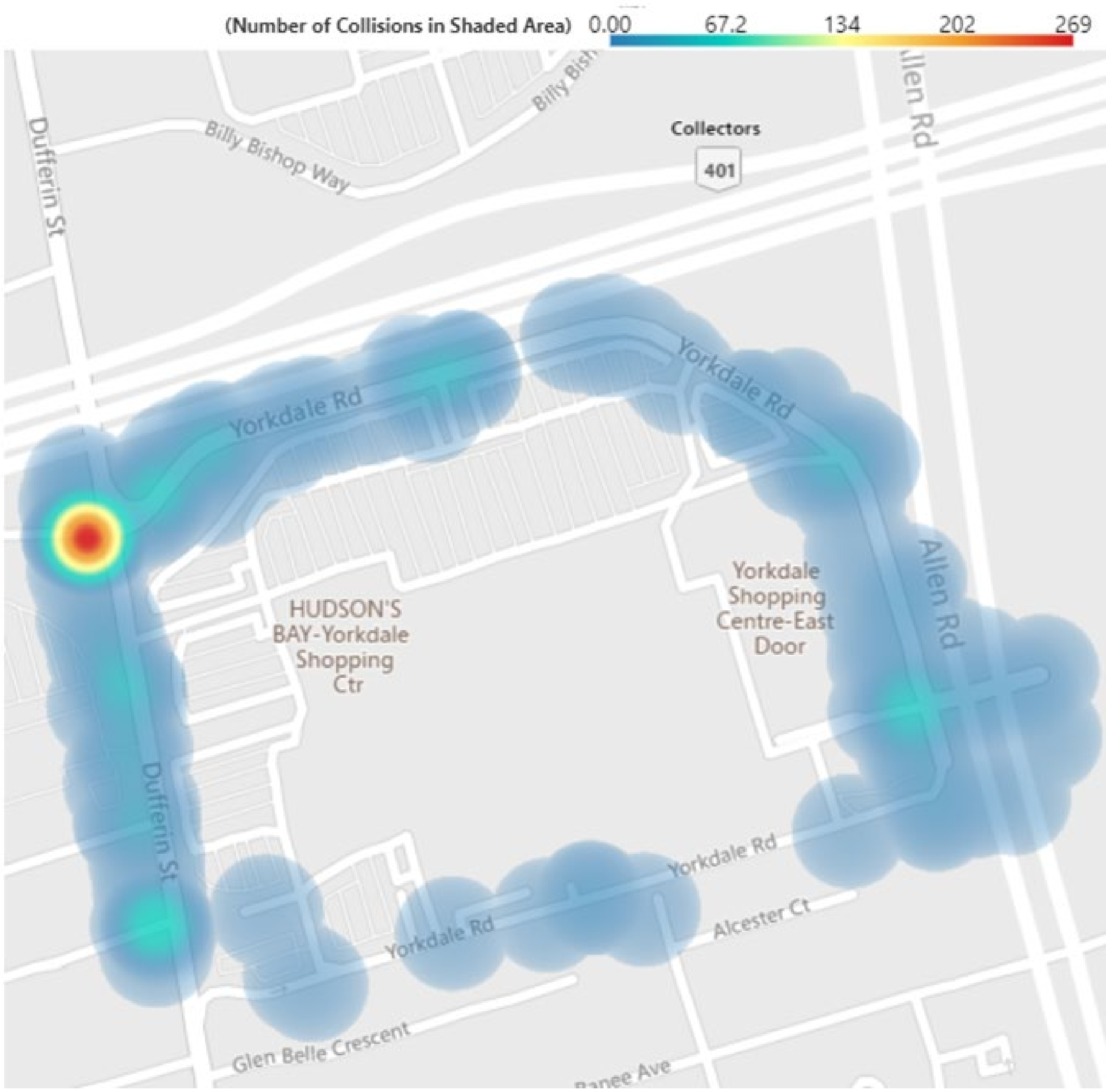
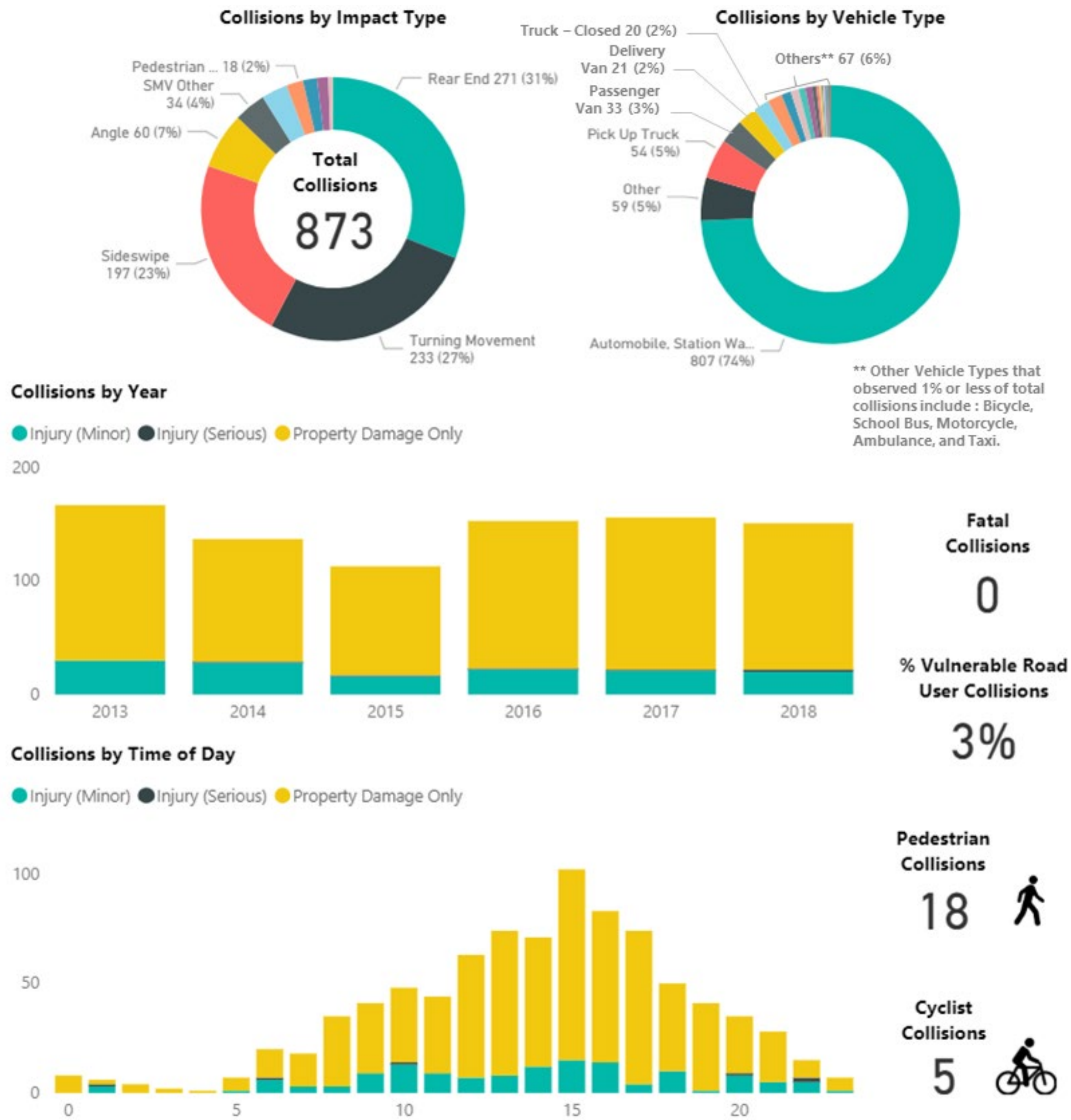


Figure 4-38 provides an overview of key collision statistics for the project focus area. There were no fatal collisions observed between 2013 and 2018. Collisions by mode is similar compared to the overall study area, where majority of the collisions involved automobiles. The percentage of collisions that involve vulnerable road users is consistent with the micro model study area, at 3%. For the project focus area, collisions between 2013 and 2018 were largely flat with no significant upward or downward trend.

Figure 4-38. Key Collision Statistics for the Project Focus Area



Collisions with Vulnerable Road Users

Further analysis was also conducted to focus on collisions that involve vulnerable road users such as pedestrians and cyclists.

Micro Model Study Area - Pedestrians

- Pedestrian collisions observed in the micro model study area for the last five years showed similar hotspots as the overall collision patterns, including major-major intersections of arterial roads, as well as the Allen Road interchange at Lawrence Avenue West.
- There were 5 fatal collisions that involved pedestrians, at the Dufferin Street/Wilson Avenue, Bathurst Street /Ranee Avenue, Bathurst Street /Lawrence Avenue West, and the Lawrence Avenue West/Allen Road Interchange.

- There number of pedestrian collisions observed each year within the micro model study area has been flat / trending downwards.
- Over 71% of all pedestrian collisions were car-pedestrian collisions.
- Throughout the day, peak collisions were observed during 10 AM and 6 PM peak.

Project Focus Area – Pedestrians

- For the project focus area, the collision pattern is clear that the hotspot is at the Bridgeland Avenue /Yorkdale Road intersection.
- There were no fatal pedestrian collisions observed in the area between 2013 and 2018.
- Collisions between 2013 and 2018 observed an increasing trend.

Micro Model Study Area - Cyclists

- Cyclist collisions observed in the micro model study area between 2013-2018 showed similar hotspots as the overall collision patterns, including major-major intersections of arterial roads, the Dufferin Street/Highway 401 interchange, and the Bridgeland Avenue /Dufferin Street intersection.
- There were no fatal collisions that involved cyclists in the micro model area between 2013 and 2018.
- There number of cyclist collisions has been trending downwards.
- Throughout the day, peak collisions were observed at the 10 AM and 6 PM.

Project Focus Area – Cyclists

- For the project focus area, the highest number of cyclist collisions occurred at the Bridgeland Avenue and Yorkdale Road intersection; however, it was based comparatively small sample size.
- There were no fatal collisions observed that involved cyclists
- Collisions between 2013 and 2018 were largely flat, however the sample size is not significant enough to identify a trend.

4.4.8 Goods Movement

Commercial truck traffic is estimated using heavy vehicle volumes from the TMCs. Heavy vehicle is typically expressed as part of the TMC volumes or a ratio of the total volumes for each movement. **Figure 4-39**, illustrates the total commercial vehicle traffic volume observed at each intersection.

Heavy vehicle volumes are significantly higher along Lawrence Avenue West and Keele Street within the larger study area during AM, PM, and Saturday peak hours. This is likely because these two corridors provide good connectivity between Highway 401 / Allen Road and the employment area west of Dufferin Street.

Figure 4-39. Commercial Vehicle Demand (AM, PM, and Saturday Peak Hour)

4.5 Transit Network

4.5.1 Local Transit

The Yorkdale TMP larger study area is served by the TTC transit network, as illustrated in **Figure 4-40**.

The project focus area is currently served by the Yorkdale TTC Subway Station on Line 1 which connects north to the Vaughan Metropolitan Centre and south to Union Station. Line 1 operates most of the day, and is generally closed between 2:00 a.m. and 6:00 a.m. on weekdays and Saturdays, and 2 a.m. to 8 a.m. on Sunday. Trains arrive at stations 2–3 minutes during peak periods and 4–5 minutes during off-peak periods[5].

Yorkdale Station is located between Yorkdale Road and Ranee Avenue, elevated from the surrounding lands in the Allen Road median. Yorkdale Station can be accessed via the Yorkdale Service Road entrance, the Ranee Avenue entrance and through the elevated, covered walkway connecting the station with the Yorkdale Bus Terminal. In 2019, construction began on accessibility improvements to make the station more accessible under the TTC's Easier Access Program. Completion is expected for 2020, per the 2019-2023 TTC Multi-Year Accessibility Plan.

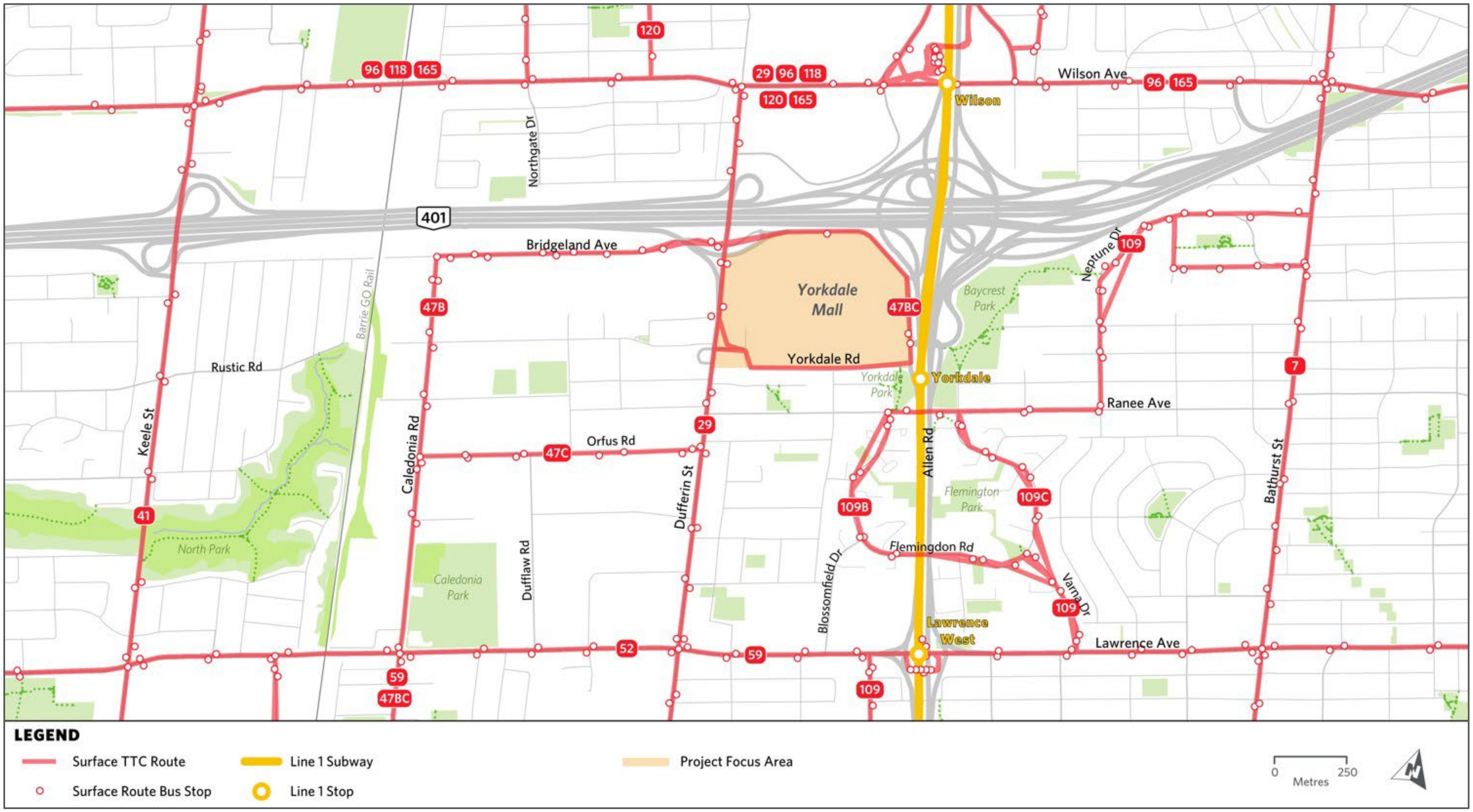
Two local TTC bus routes service Yorkdale Shopping Centre including:

- **The 29 Dufferin bus route:** The 29 Dufferin bus route operates north-south on Dufferin Street between Wilson Station on Line 1 and Exhibition Place, with 2 stops along the Dufferin Street frontage of the shopping centre. The 29A (Wilson Station-Exhibition/Dufferin Gate) is one of two branches along this route, and runs during the midday and evening from Monday to Friday, and during the evening on Saturdays, Sundays, and holidays during the Fall and Winter. During the Spring and Summer, the 29A operates at all times, seven days a week. The other branch, the 29C (Wilson Station-Exhibition/Princes' Gate) operates during the peak periods from Monday to Friday, and during the daytime.

  The 29 Dufferin bus route is part is part of the 10 Minute Network, with a service frequency of 10 minutes or better, all day, every day. Moreover, the 329 bus offers overnight service between the hours of 2:00 AM and 4:00 AM from Dufferin Street and Steeles Avenue West to the Princes' Gate Loop.
- **The 47B and 47C Lansdowne bus routes:** These two branches of the 47 Lansdowne bus travel between the area of Lansdowne Avenue and Queen Street West, the area of Lansdowne Avenue and St. Clair Avenue West, and Yorkdale Station on Line 1, generally in a north-south direction. They intercept Lansdowne Station on Line 2. The 47B (Queen-Yorkdale Station via Caledonia and Bridgeland) bus operates at all times, seven days a week. On the other hand, the 47C (Queen-Yorkdale Station via Caledonia and Orfus Roads) bus operates during the peak periods, from Monday to Friday only. No service is provided for these routes between 2:00 AM and 4:00 AM.

[5] http://www.ttc.ca/Subway/Stations/Yorkdale/station.jsp

Figure 4-40. Existing TTC Network



Demand and Quality of Service for Surface Routes

Table 4-4 summarizes the surface transit ridership for the 7 TTS bus routes in the larger study area. Several arterial transit routes experience congestion in the PM peak hour, including 41 Keele, 52 Lawrence West, and 96 Wilson.

Table 4-4. Summary of Surface Transit Demand

Bus Route	Peak Direction Ridership Peak Hour AM (PM)	Buses per Peak Hour AM (PM)	Transit Route Capacity[1] AM (PM)	Max. Segment Volume-to-Capacity Ratio[2] AM (PM)
7 Bathurst	239 (224)	8 (8)	383 (408)	0.73 (0.65)
29 Dufferin	237 (173)	8 (8)	383 (408)	0.53 (0.28)
41 Keele	187 (220)	5 - 10 (6-10)[3]	255-510 (266-485)	0.87 (1.0)
47 Lansdowne	117 (101)	3-5 (3-5)[4]	127-255 (113-226)	0.54 (0.41)
52 Lawrence West	597 (886)	11-15 (11-15)[4]	561-765 (561-765)	0.87 (1.0)
96 Wilson	163 (286)	6 (5)	306 (255)	0.55 (1.1)
109 Ranee	122 (143)	2-3 (3-5)[4]	77-153 (118-235)	0.68 (0.59)

Notes:

[1]TTC bus capacity is based on the TTC crowding standards, which limits capacity to approximately 51 people.

[2]The V/C ratios are defined as follows: sufficient capacity (acceptable) under 0.75, experience some crowding between 0.75 and 1, and over capacity (unacceptable) at 1 and over

[3]Range due to express service that stops only at major intersections

[4]Range due to multiple branches of bus routes that serve slightly different areas within the corridor

Figure 4-41 and **Figure 4-42** illustrate the AM and PM peak hour transit volumes and volume-to-capacity ratio, respectively. In the AM peak hour, most surface routes operate within 74% of their capacity, excluding 41 Keele and 52 Lawrence West, which experience congestion.

In the PM peak hour, 41 Keele, 52 Lawrence West, and 96 Wilson experience significant congestion for both directions, with some areas at 100% of their capacity as defined by TTC's crowding standards. In both peak hours, the transit routes serving the Yorkdale Shopping Centre have capacity to accommodate additional demand.

Figure 4-41. Existing Transit Ridership and V/C Analysis for AM Peak Hour

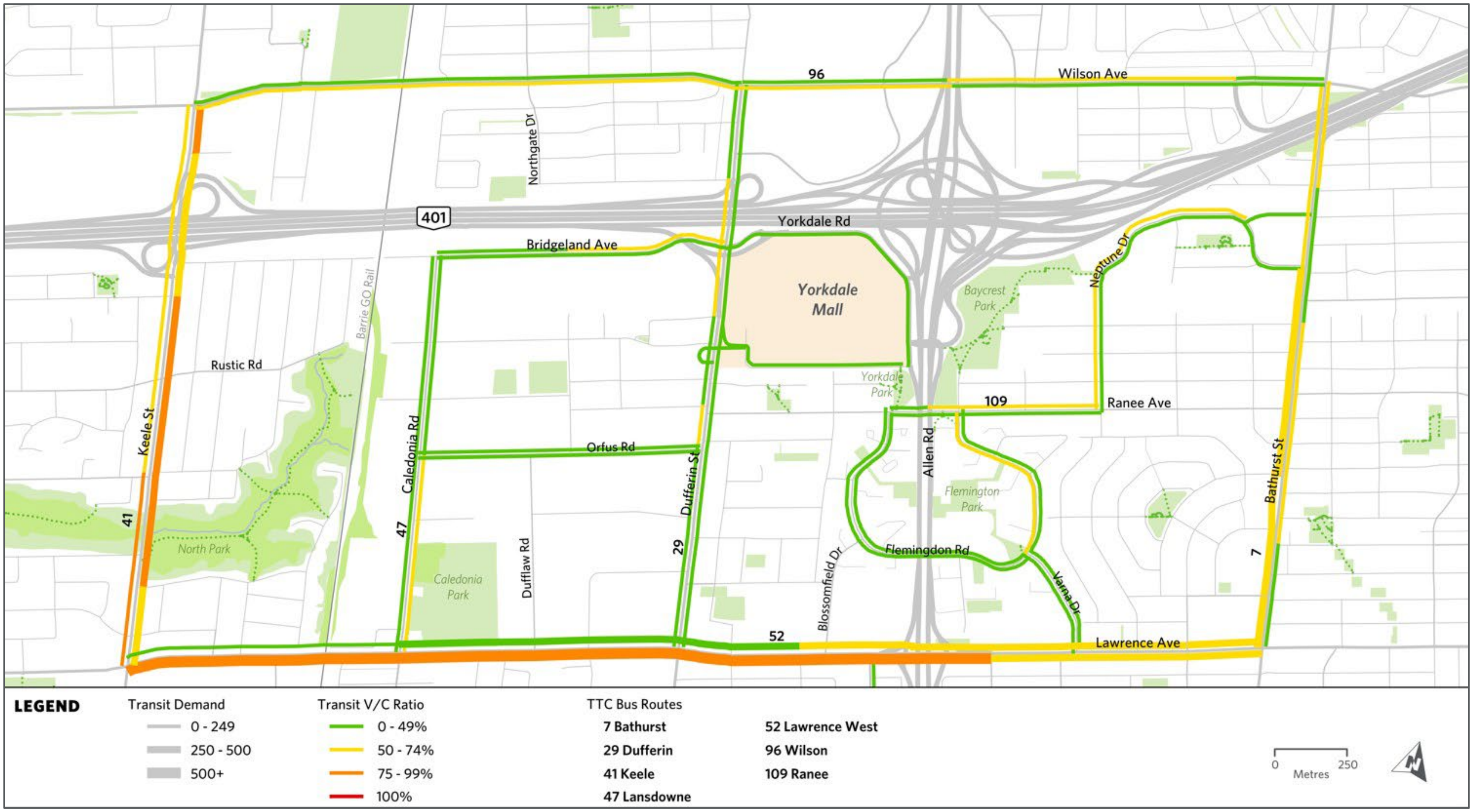
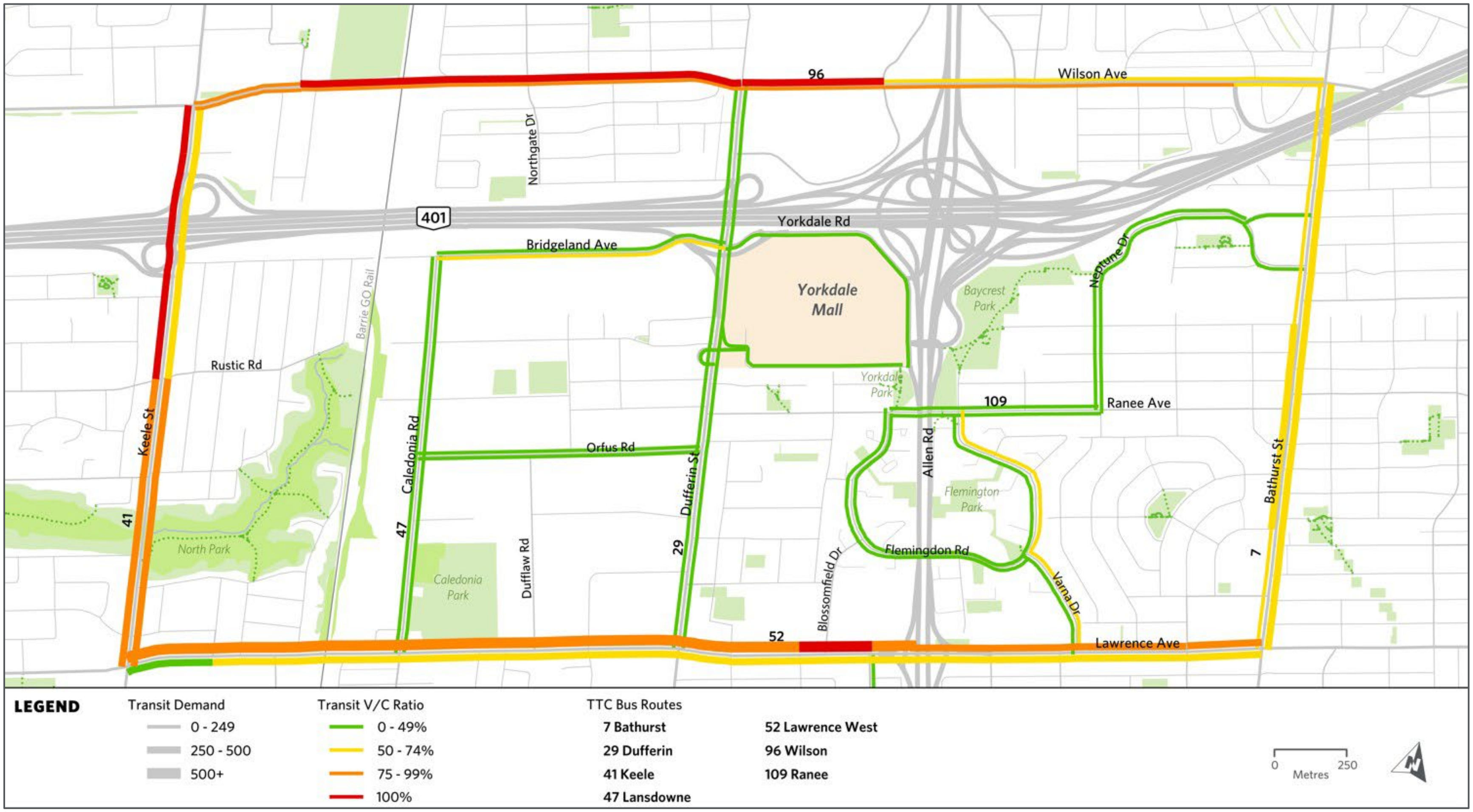


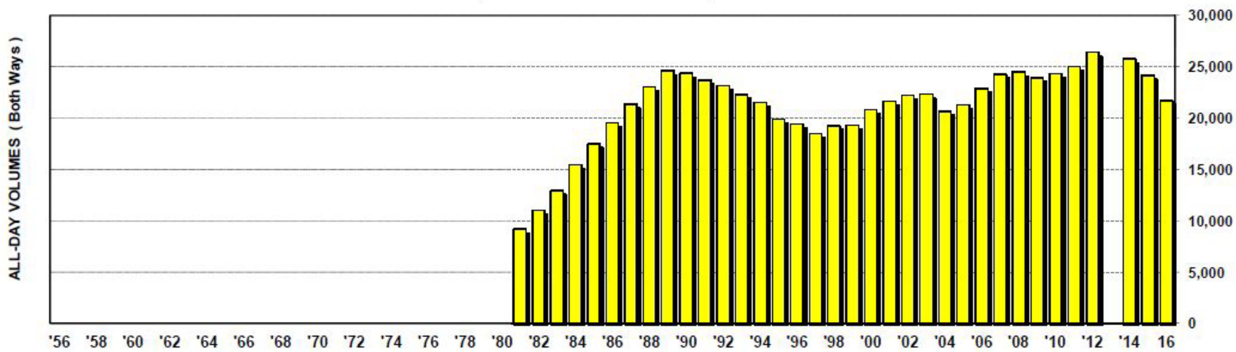
Figure 4-42. Existing Transit Ridership and V/C Analysis for PM Peak Hour



Line 1

The historical ridership at Yorkdale Subway Station shows an increase in ridership since its opening in 1978; however, it has seen decline in recent years (**Figure 4-43**). In recent years, with the opening of the Vaughan subway extension, there is potential for increase ridership on Line 1, however this was not captured in the historical data. The redevelopment of Yorkdale Shopping Centre will also influence the use of this subway station to support the future development in this area. It is to be noted that the missing data for 2013 may be explained from the loss of a parking lot due to construction[6].

Figure 4-43. Historical Ridership on Line 1 at Yorkdale Station



Source: TTC

A time-lapse of boarding/alighting numbers at Yorkdale Subway Station can be seen in **Figure 4-44**. Weekend data was not made available at the time of the analysis. Demand is highest during the PM peak period, with demand during midday and evening being comparable or even higher than the AM peak period. This is likely attributed to Yorkdale Shopping Centre being a retail destination between the midday and evening peak periods.

6 https://www.ttc.ca/About_the_TTC/Operating_Statistics/2013.jsp

Figure 4-44. Weekday Yorkdale Station Boardings and Alightings

Source: TTC

Service Planning Standards

The TTC maintains service planning standards and criteria for various performance measures. **Table 4-5** shows the analysis for the TTC service planning standards analysis for the surface transit routes in the larger study area. On average, only 58% of the time transit service reliability within 3 minutes of the scheduled headway. There is an opportunity to improve surface transit reliability within the larger study area.

Table 4-5. TTC Service Planning Standards Analysis

Criteria	TTC Service Standard	Observed Service
Average Travel Speed[1]	No speed criteria – slower speeds however impact operating costs	• 7 Bathurst – 13 km/h • 29 Dufferin – 14 km/h • 41 Keele – 13km/h • 47 Lansdowne – 15km/h • 52 Lawrence West – 12km/h • 96 Wilson – 14km/h • 109 Ranee – 12km/h
In-Vehicle Volume / Capacity[2]	Peak: 50-63 persons max for regular bus, 77 for articulated buses	• 7 Bathurst – Sufficient Capacity • 29 Dufferin – Sufficient Capacity • 41 Keele – Approaching Capacity • 47 Lansdowne – Sufficient Capacity • 52 Lawrence West – Approaching Capacity • 96 Wilson – Approaching Capacity • 109 Ranee – Sufficient Capacity

Criteria	TTC Service Standard	Observed Service
In-Vehicle Volume / Capacity[2]	Peak: 50-63 persons max for regular bus, 77 for articulated buses	• 7 Bathurst – Sufficient Capacity • 29 Dufferin – Sufficient Capacity • 41 Keele – Approaching Capacity • 47 Lansdowne – Sufficient Capacity • 52 Lawrence West – Approaching Capacity • 96 Wilson – Approaching Capacity • 109 Ranee – Sufficient Capacity
Average Stop Spacing	300 – 400m	• 7 Bathurst – 233m • 29 Dufferin – 233m • 41 Keele – 299m • 47 Lansdowne – 260m • 52 Lawrence West – 242m • 96 Wilson – 342m • 109 Ranee – 192m
Reliability[3]	+/- 3 minutes of scheduled headway	• 7 Bathurst – meets the standard 54% of the time • 29 Dufferin – meets the standard 67% of the time • 41 Keele – meets the standard 44% of the time • 47 Lansdowne – meets the standard 57% of the time • 52 Lawrence West – meets the standard 80% of the time • 96 Wilson – meets the standard 48% of the time • 109 Ranee – meets the standard 52% of the time

Notes:
[1]Operating speed extracted from the City's GTA Model v4 PM peak period within study area
[2]Approaching capacity is based on a threshold v/c ratio of over 0.75
[3]Reliability values based on the TTC 2014 Q4 Quarterly Route Performance Report

Average Surface Transit Travel Speeds

Figure 4-45 to **Figure 4-47** illustrate the average transit speeds for surface bus routes. Bus routes on arterial roads experience slower travel speeds when compared to collector roads due to local background traffic on these routes. Slower travel speeds may be a cause of the reliability issues calculated in the previous section.

Figure 4-45. Average Surface Transit Speeds AM Peak Hour

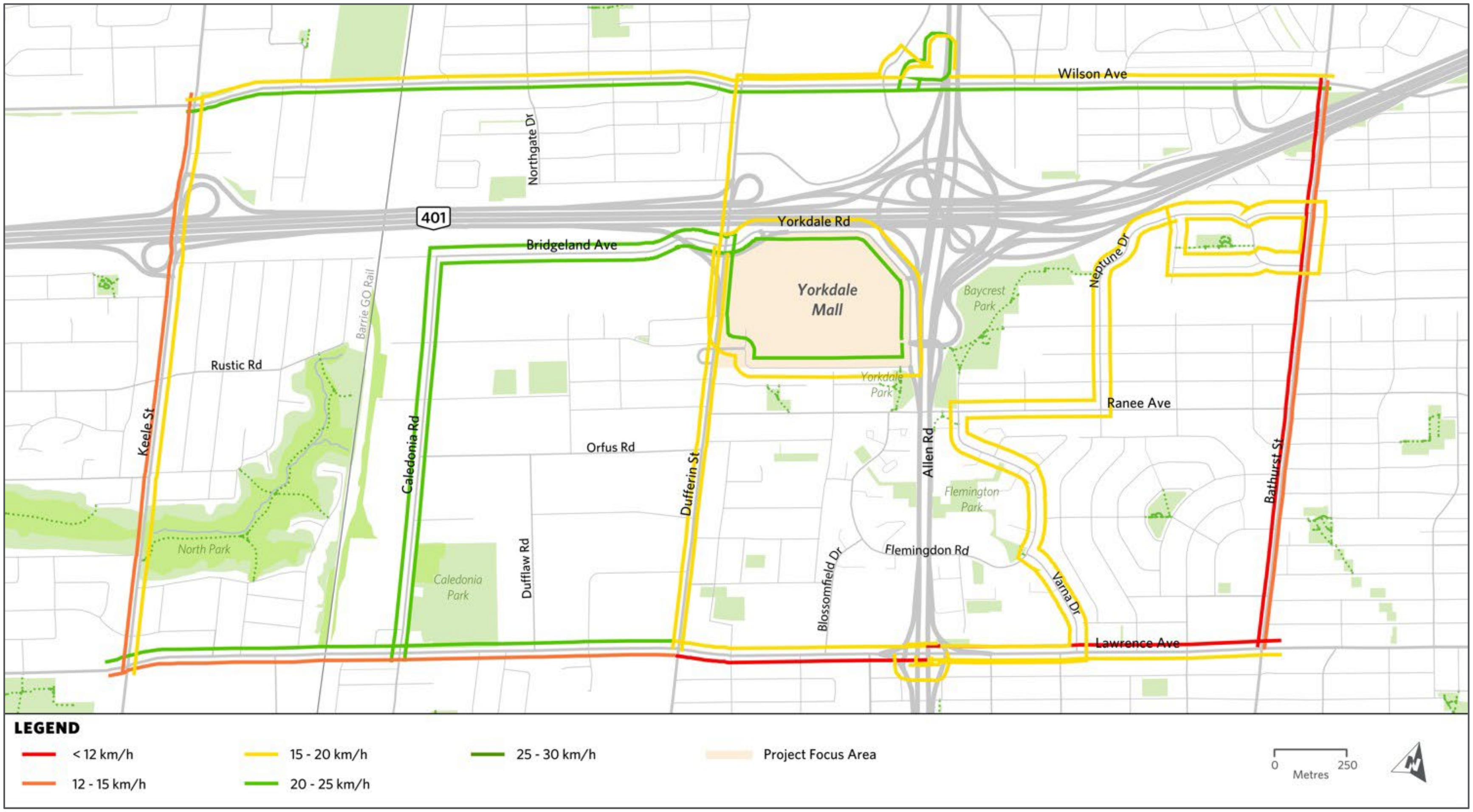


Figure 4-46. Average Surface Transit Speeds PM Peak Hour

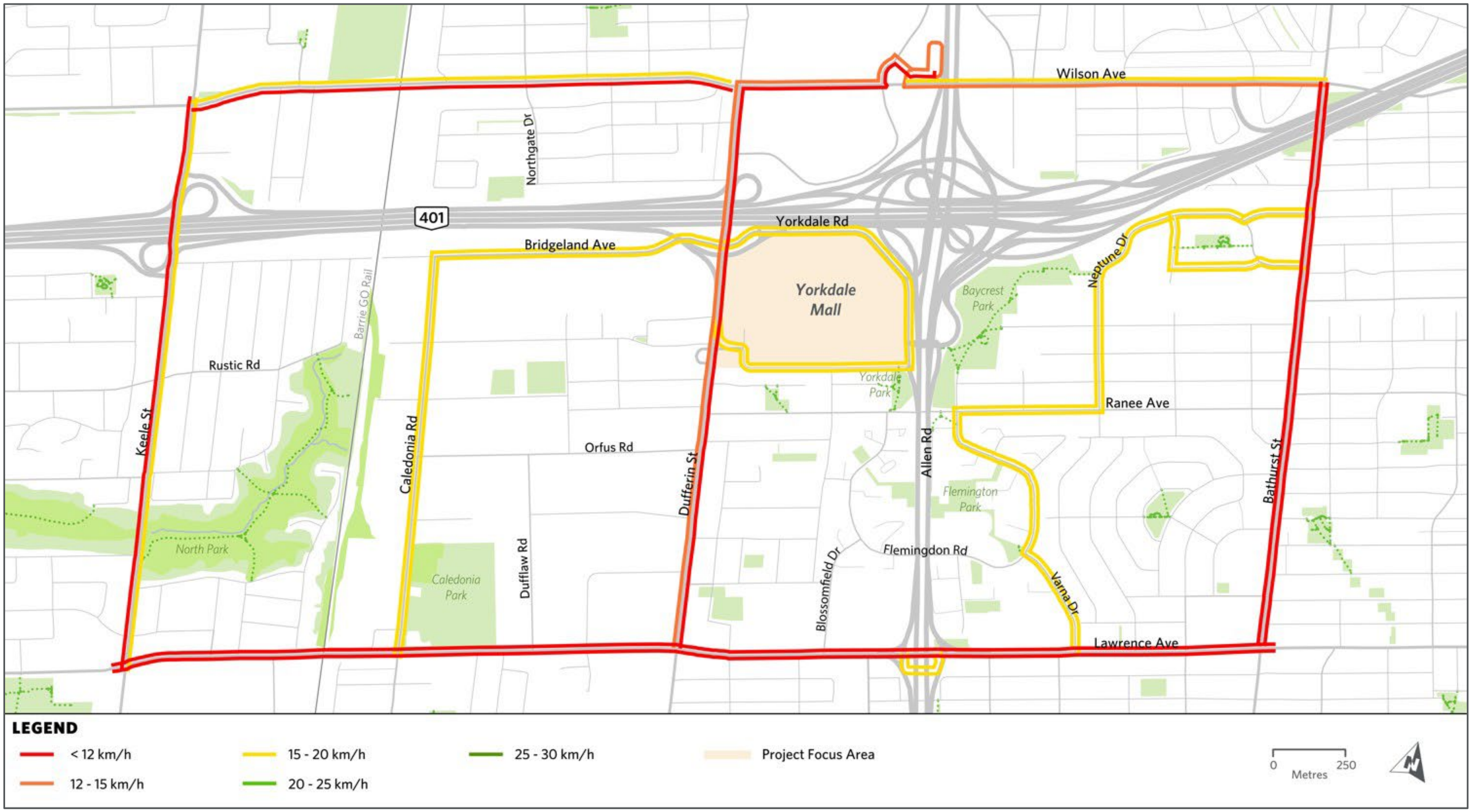
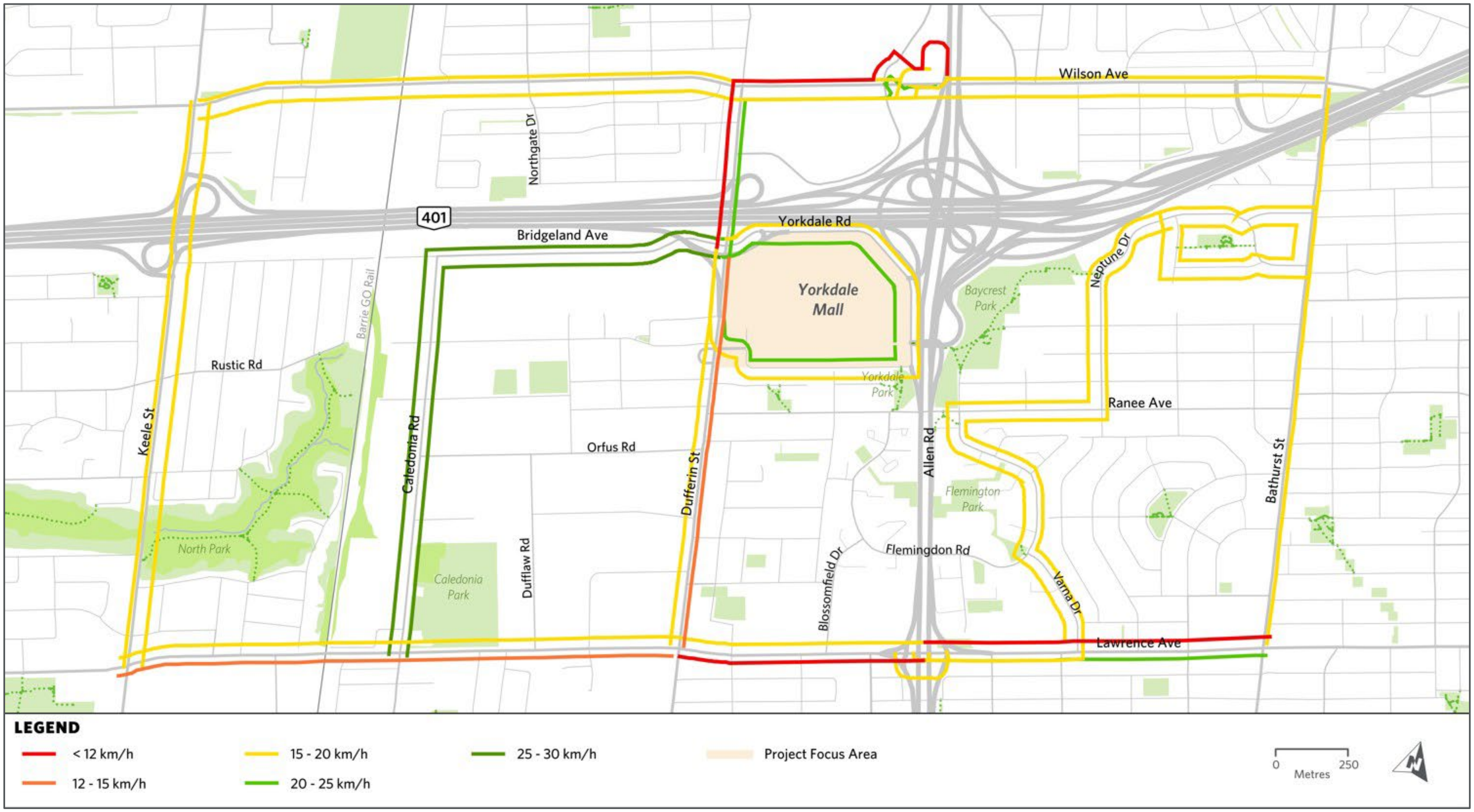


Figure 4-47. Average Surface Transit Speeds Saturday Peak Hour



4.5.2 Regional Transit

GO Transit offers inter-regional transit to Yorkdale Shopping Centre through the bus terminal located in the lowest level of the office building at 1 Yorkdale Road, at the southeast corner of the shopping centre. Because of the office building directly above, there is a height restriction within the terminal, preventing GO Transit from operating its current fleet of double-decker buses into the terminal.

The GO Transit Bus Terminal offers connections to bus routes operated by GO Transit, Greyhound, and Ontario Northland, which serves as access point for destinations including Barrie, Waterloo, London, Sudbury, Winnipeg, Parry Sound, and North Bay. Buses coming to and from the terminal have a direct access to Highway 401 through the City-owned portion of Yorkdale Road.

The terminal provides connections to the following GO Bus routes:

- **Route 19: Mississauga / North York**, which operates between Square One Bus Terminal and Finch Bus Terminal
- **Route 27, 27A, 27F: Milton / North York**, which operates between Milton GO Station and Finch Bus Terminal
- **Route 33, 33A, 33B, 33E: Kitchener**, which operates between York Mills Bus Terminal and Guelph Central / University of Guelph
- **Route 34: Pearson / North York Service to Pearson Airport**, which runs every hour, every day, between Finch Bus Terminal and Pearson Airport Terminal 1
- **Route 36, 36B: Brampton / North York**, which operates between Brampton GO Station and York Mills Bus Terminal
- **Route 66, 66A: East Gwillimbury / North York Express**, which operates between East Gwillimbury GO Station and Yorkdale Bus Terminal
- **Route 92, 92A: Oshawa / Yorkdale**, which operates between Oshawa Bus Terminal and Yorkdale Bus Terminal

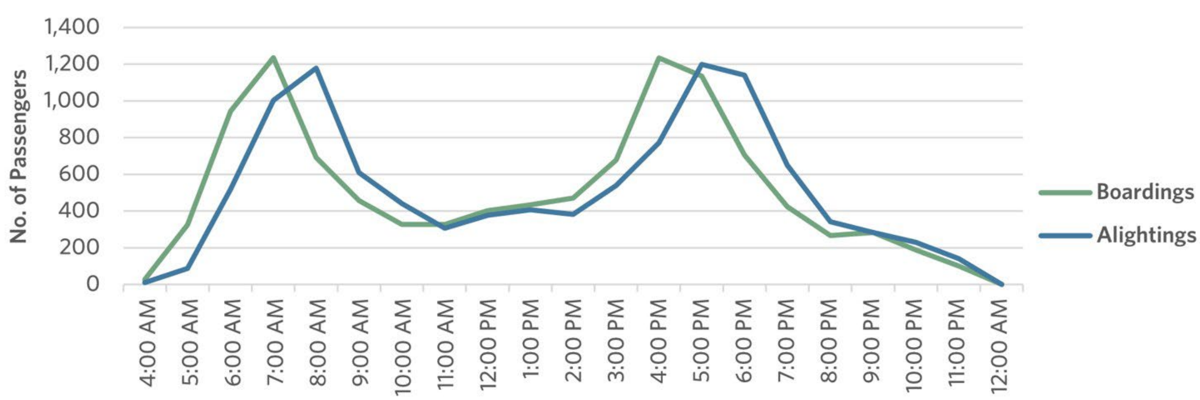
The terminal is connected directly to the Yorkdale TTC Line 1 subway station by a pedestrian bridge, as shown in **Figure 4-48**.

Figure 4-48. Yorkdale GO Bus Terminal (Connection to Yorkdale TTC Subway Station)

Source: Google Streetview (2011)

Figure 4-49 and **Figure 4-50** illustrate the weekday and weekend boardings and alightings at the Yorkdale GO bus terminal. The bus terminal experiences higher ridership on weekdays; however, weekend ridership is still high. There are clear morning and evening peaks in the weekday boardings and alightings, indicating use of the terminal for commuter travel patterns. The weekend boardings and alightings are steady throughout the day, with a peak occurring during the evening.

Figure 4-49. Weekday Yorkdale GO Station Boardings and Alightings (2017)



Source: GO Transit

Figure 4-50. Weekend Yorkdale GO Station Boardings and Alightings (2017)

Source: GO Transit

4.6 Cycling Network

4.6.1 Cycling Network

Figure 4-51 illustrates the existing cycling network for the larger study area. There are no existing cycling facilities which provide direct access to the Yorkdale Shopping Centre. Demand for cycling is limited around the focus area, as illustrated in **Section 4.3**. This can be largely attributed to the poor cycling environment along main access points to the shopping centre.

The only dedicated cycling facility is located along a 250 metre segment of Ranee Avenue between Flemington Road and Varna Drive. The on-road bike lane provides cyclists with a dedicated space below the Allen Road Expressway, as shown in **Figure 4-52**. Signed bike routes along Ridgevale Drive and Lynnhaven Road also are part of the existing cycling network, yet offer no access to the Yorkdale Shopping Centre (**Figure 4-53**).

The redevelopment of the Yorkdale Shopping Centre will offer opportunities to fill in the gaps of the disjointed cycling network and allow better connectivity to the shopping centre itself.

Figure 4-51. Existing Cycling Network

Figure 4-52. Bike Lanes along Ranee Avenue

Source: Google Streetview (July 2018)

Figure 4-53. Signed Bike Route along Ridgevale Drive

Source: Google Streetview (July 2018)

4.6.2 Bicycling Level of Service (BLOS)

The methodology employed to evaluate cycling conditions for this study is based on the City of Ottawa Multi-Modal Level of Service (MMLOS) Guidelines (2015). This approach was selected for both its intuitiveness and for consistency with analysis previously conducted by the City of Toronto, including the Golden Mile Transportation Master Plan.

The methodology allows the consideration of contemporary facility designs and explicitly recognizes that Bicycling Level of Service (BLOS) should be based on user comfort, safety, and convenience. BLOS is calculated at the intersection and mid-block in recognition that a cyclist's experience is determined by the conditions both between crossings and at the crossing itself.

The **segment BLOS** evaluation utilizes a look-up table approach based on roadway characteristics and facility type and quality. The score is influenced by factors such as facility type, street width, operating speed, and parking characteristics.

For **intersection BLOS**, a similar look-up table approach is used to evaluate the left and right-turning conditions for cyclists at the intersection. Intersection BLOS is affected by turning and operating speeds, dual turning lanes, and bike boxes. Other impediments to cyclists seeking to turn right or left (such as right-turn lane length and crossing distances) are also assessed. The average score of all approaches (north, south, west, and east) is then used to determine the overall intersection BLOS.

Segment BLOS is most sensitive to facility type, with physically separated bikeways such as cycle tracks, protected bike lanes and multi-use paths receiving a score of 'A' while cycling in mixed traffic conditions with varying operating speeds and street widths generally scoring lower – 'D' to 'F'. The scoring ranges as follows:

BLOS 'A' to 'C' – Physically separated facilities such as cycle tracks, protected bike lanes, and multi-use paths (MUP) are attractive to most cyclists. At intersections, continuous cycling facilities are provided and separated from vehicles and pedestrians.

BLOS 'D' to 'E' – Designated bike lanes adjacent to high speed traffic lanes or shared facilities on low volume, low speed streets with wide curb lanes provide some comfort, but the majority of potential cyclists typically will not cycle. Greater conflicts at intersections with turning vehicles are experienced.

BLOS 'F' – Non-separated, shared roadways with high traffic volumes and speeds, and no accommodations at intersections.

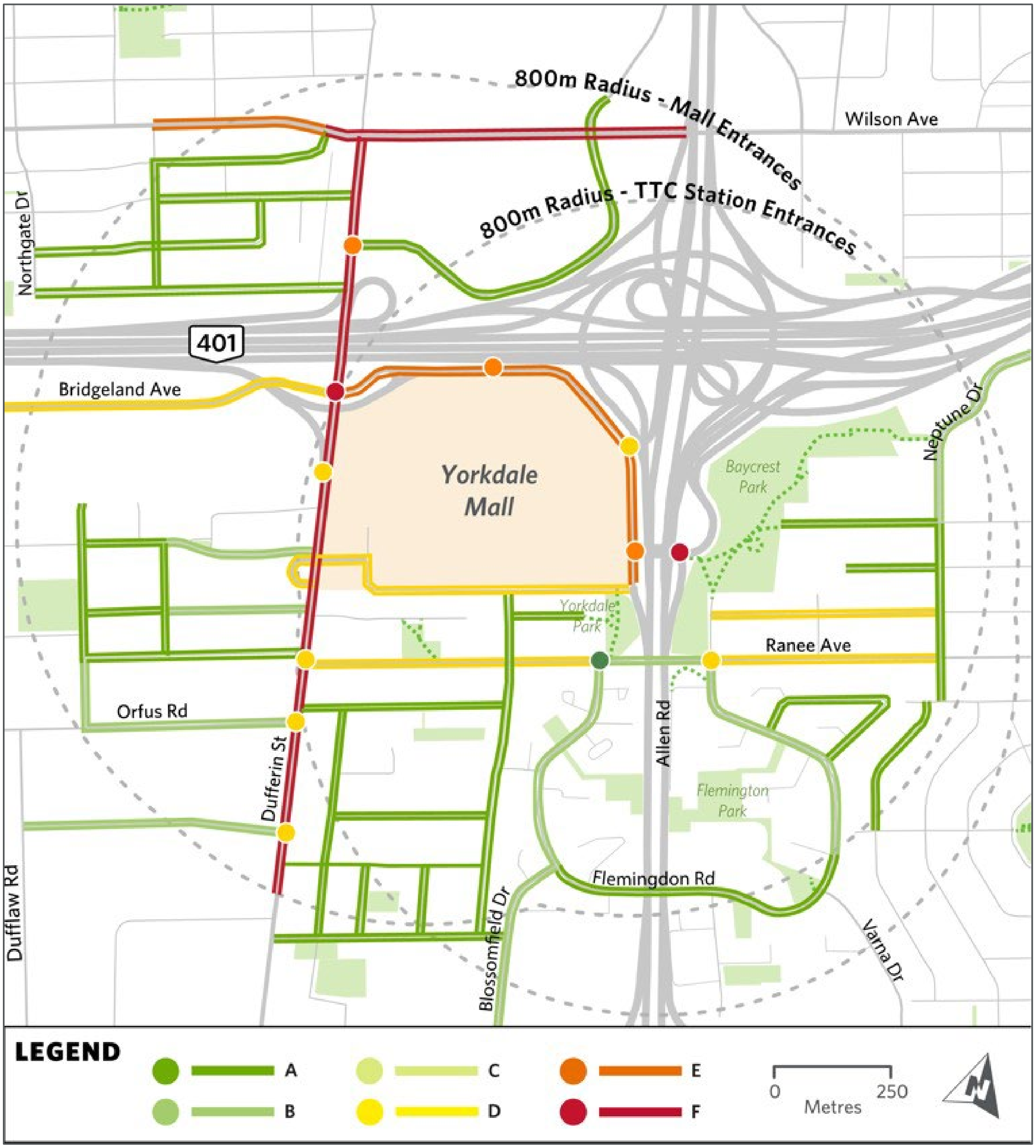
Examples of segment BLOS are shown in **Figure 4-54.**

Figure 4-54. Examples of BLOS Environment with Scores

Source: Google Streetview

The BLOS analysis was completed for the area covered by a radius of 800 metre around the entrance to Yorkdale TTC Line 1 station and the entrances to Yorkdale Shopping Centre to analyze the connectivity to and from the surrounding areas. Only the BLOS for signalized intersections was assessed for this study as the Ottawa MMLOS approach was not designed for unsignalized crossings. The results of the analysis are illustrated in **Figure 4-55**.

Figure 4-55. Bicycle Level of Service (BLOS)



The main thoroughfares adjacent to Yorkdale Shopping Centre experience a BLOS of D or worse. Poor existing cycling conditions surrounding the shopping centre result in a destination that is essentially inaccessible to cyclists and one that is isolated from the greater cycling network. The combination of factors such as the lack of separated and dedicated facilities, high vehicular operating speeds, and high traffic volumes adversely impact the cycling experience along Dufferin Street and Yorkdale Road, even Ranee Avenue. Signalized intersections within the vicinity are similarly hostile to cyclists, often requiring them to cross several lanes of traffic, cope with high turning speeds and interact with vehicles merging into traffic.

Compared to the main thoroughfares such as Dufferin Street, residential streets score better levels of service for cyclists, with scores varying between “A” and “B”. Even in the absence of dedicated cycling infrastructure, these quieter, local streets are pleasant for cycling due to their lower volumes, smaller cross-sections, and slower speeds (some residential neighbourhoods in the larger study area are located in Traffic Calming Zones).

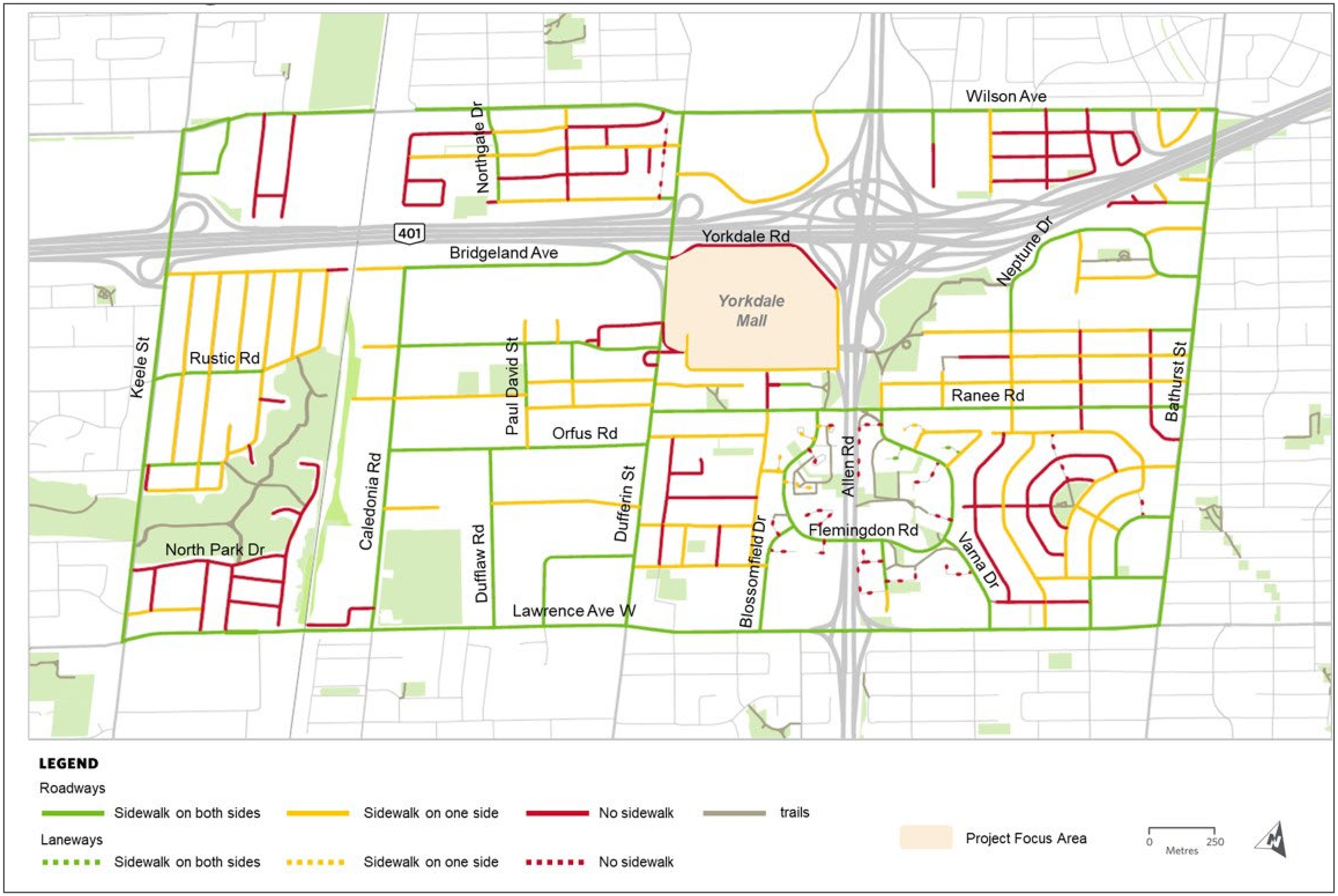
Although the larger study area experiences improved BLOS results on neighborhood streets, the road network surrounding the Yorkdale Shopping Centre does not facilitate safe cycling movement. Enhancements to the cycling facilities are required to improve the cycling mode share.

4.7 Pedestrian Network

4.7.1 Pedestrian Environment

Figure 4-56 illustrates the pedestrian network for the larger study area. There are several gaps in the pedestrian network, including on roadways which provide direct access to the Yorkdale Shopping Centre such as Yorkdale Road. Other roads which provide direct access to the shopping centre only have sidewalks on one side of the road. A significant number of roads in the larger study only have a sidewalk on one side of the road.

Figure 4-56. Existing Sidewalk Network



The pedestrian environment was further investigated for an area covering an 800 metre radius around the Yorkdale Shopping Centre entrances and the Yorkdale TTC Line 1 station to analyze pedestrian connectivity and continuity. An 800 metre walkshed represents an approximately 10 minute walking distance.

Overall, the existing level of connectivity and accessibility for pedestrians is less than desirable. The streets in the study area are unsuccessful from a place-making perspective. The pedestrian environment is particularly in need of attention along main arterials such as Dufferin Street.

Functionally, Dufferin Street is acceptable, as it provides continuous sidewalks that are separated from moving vehicles by asphalt buffers. However, the street fails at providing a pleasant and comfortable experience for pedestrians and does not satisfy the City of Toronto's 2.1 metre minimum for pedestrian clearways

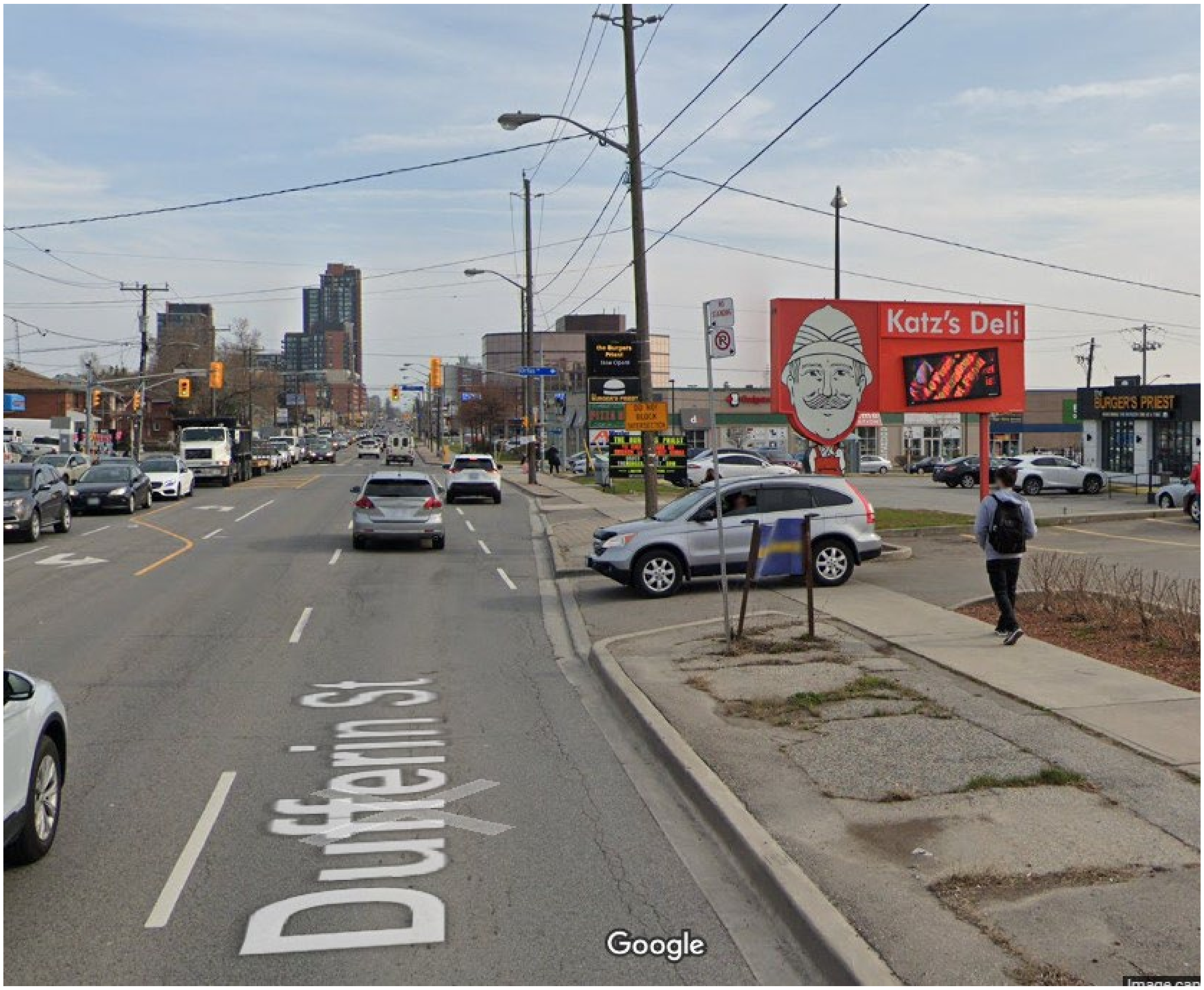
There are encroachments onto the pedestrian boulevard (**Figure 4-57**), few amenities or trees, insufficient pedestrian crossings, and limited connections for pedestrians to access the TTC Yorkdale subway station.

Figure 4-57. Encroachment on Boulevard

Source: Google Streetview (2019)

The abundance of driveways and accesses points to retail plazas and businesses along Dufferin Street creates constant interference with the sidewalks, forcing pedestrians to share the space with entering and exiting vehicles, as seen in **Figure 4-58**.

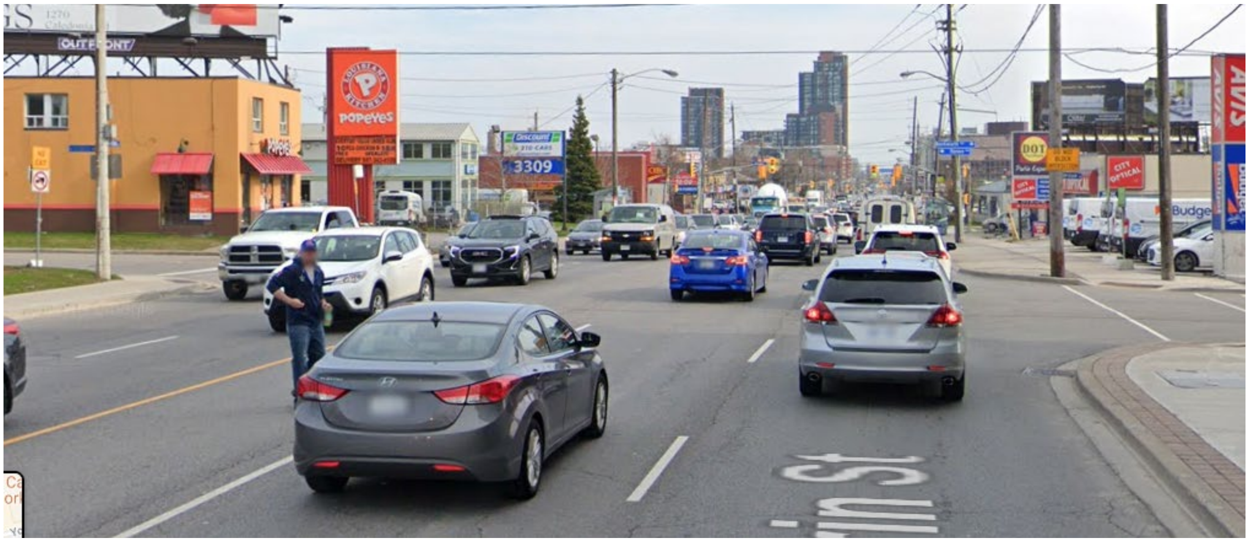
Figure 4-58. Several Ingress/Egress Points to Retail along Dufferin Street



Source: Google Streetview (2019)

Unsignalized intersections near Yorkdale Shopping Centre and the Highway 401 ramps often have no margins showing pedestrians where to cross, reducing pedestrians' visibility, and increasing potential for conflict, as seen in **Figure 4-59**. Moreover, entrance and exit ramps to Yorkdale Shopping Centre, including the McAdam Loop, and Highway 401 lack marked crossings and are poorly designed for pedestrians. The Bridgeland Avenue/Yorkdale Road intersection at Dufferin Street has little separating the sidewalks and the curb and is hostile to pedestrians.

Figure 4-59. Absence of Markings at Unsignalized Intersections



Source: Google Streetview (2019)

Pedestrian facilities on existing local and collector streets are in better condition generally but sidewalks within the residential neighbourhoods are often missing on at least one side of the street.

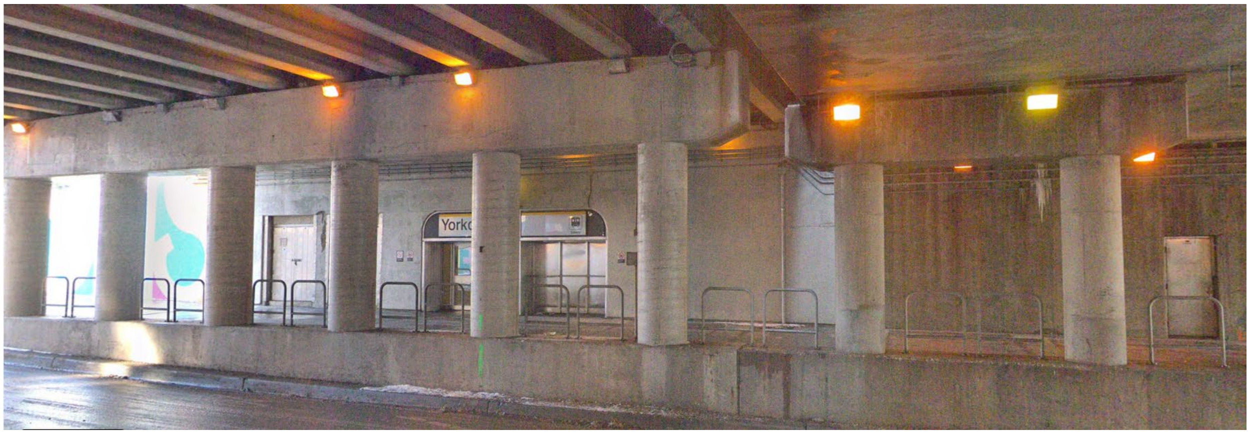
Public realm is also an issue near both entrances to the Yorkdale subway station. At Yorkdale Road, the entrance is located via a staircase underneath Allen Road and does not provide access for the mobility impaired. The pedestrian environment around this north entrance is unconducive to congregating due to minimal pedestrian amenities, signage, and lighting. The entryway is also unsheltered from the elements and is cluttered with trash bins as seen in **Figure 4-60**.

Figure 4-60. Yorkdale Station Subway North Entrance from Yorkdale Road

Source: Google Streetview (2017)

The pedestrian environment is not very welcoming at the Ranee Avenue entrance either, as seen in **Figure 4-61**. This southern entrance to Yorkdale subway station is tucked away mid-block and can be difficult to locate. Lighting and signage can be improved to help visibility and beautification considered for successful place-making.

Figure 4-61. Yorkdale Subway Station South Entrance from Ranee Avenue



Source: Google Streetview (2017)

As of the writing of this report, construction to make Yorkdale Station accessible is underway and will continue through summer 2020. Pedestrian access will be enhanced through the installation of a new elevator and accessible fare gates and shortcomings in the urban realm will be addressed through a redesign of the main entrance with a glass canopy and sheltered areas for bike parking and seating.

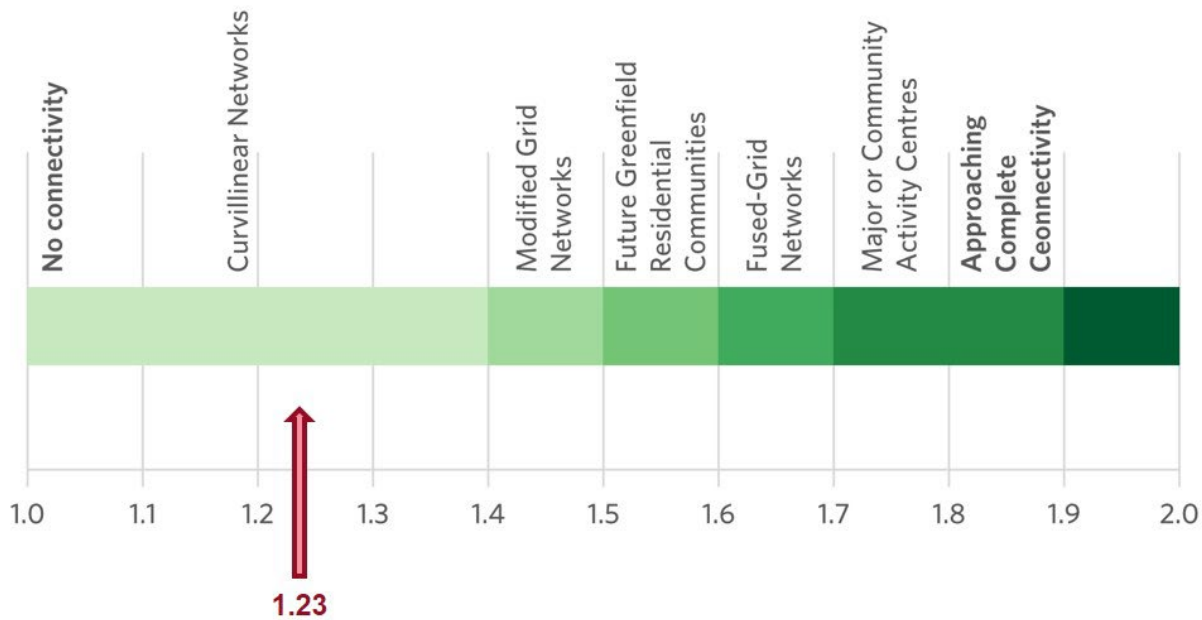
4.7.2 Active Connectivity

The active modes connectivity index is calculated in a similar manner to the street connectivity index (**Section 4.4.3)** as it also uses the "Links and Nodes" methodology. The main difference with the active modes' connectivity index is what is classified as a link. Links for active modes includes Multi Use Pathways (MUPs), including walkways and pathways, in addition to streets. Streets can only be included in the calculation if they have a sidewalk on one side.

As long as a street has some type of active transportation facilities in the right-of-way (ROW), it can be counted as a single link, no matter the number of active facilities. Based on the Roadway Connectivity: Creating More Connected Roadway and Pathway Networks (2017) paper by the Victoria Transportation Policy Institute, a ratio of 1.5 to 1.8 indicates a desirable index zone for active modes connectivity, as seen in **Figure 4-62**.

With a value of 1.23, the active mode CI for the 800 metre radius from the shopping centre entrances is below the desired threshold. Typically, connectivity indices for active modes are higher than connectivity indices for streets due to additional pathways and trails that link to the street network. However, in this case, since the study area has many links that are missing sidewalks (typically local / residential streets), streets omitted in the active mode CI calculations offset any additional paths and trail. If all links had sidewalks on at least one side, the active CI would be 1.51 instead of 1.23. Therefore, addressing discontinuities in the existing sidewalk networks is a crucial step in improving active mobility and flow. Indeed, any redevelopment of the Yorkdale Shopping Centre should drive toward a complete community with the necessary connections and infrastructure for all modes of travel.

Figure 4-62. Active Connectivity Index for 800m Radial Area



4.7.3 Pedestrian Demand

Based on the TMCs, the surface pedestrian crossings for all approaches at an intersection level were summarized for AM, PM, and Saturday peak (**Figure 4-63**).

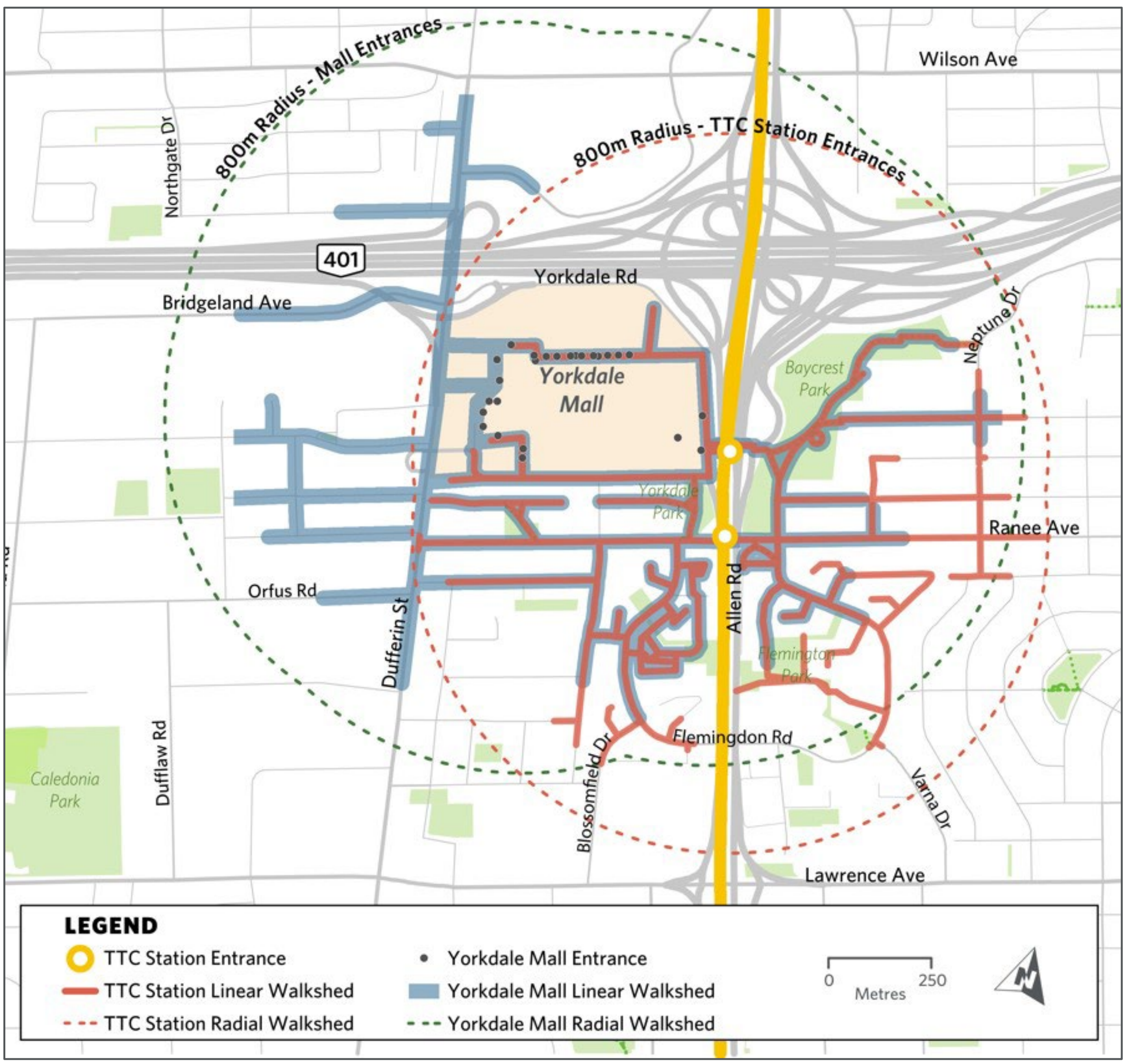
Figure 4-63. Existing Pedestrian Demand (AM, PM, and Saturday Peak Hour)

Pedestrian crossings within the larger study area are concentrated at locations where two arterial roads intersect, as well as intersections nearby Lawrence West subway station. This may be attributable to the presence of heavily used TTC bus routes along arterial roads, where the major-major intersections and substation function as transfer points. A significantly lower pedestrian demand was identified at intersections around Yorkdale Shopping Centre as the demand derived from Yorkdale subway station and GO Transit users can access the shopping centre via the pedestrian bridge, which were not captured on surface crossing at the intersection.

4.7.4 Walkshed Analysis

Figure 4-64 illustrates the radial and linear walkshed analysis for a distance of 800 metres from the Yorkdale Shopping Centre entrances and Yorkdale Subway Station entrances. The curvilinear collector network surrounding the Yorkdale Shopping Centre limits the linear walkshed analysis. The highway surrounding the shopping centre also acts as a physical barrier which limits the linear walkshed analysis.

Figure 4-64. Radial and Linear Walkshed Analysis (800m)



4.7.5 Pedestrian Level of Service (PLOS)

Similar to the BLOS, the methodology employed to evaluate pedestrian conditions for this study is based on the City of Ottawa MMLOS Guidelines.

PLOS is also calculated at the intersection and mid-block, acknowledging that a pedestrian's experience is determined by the conditions both between crossings and at the crossing itself.

Segment PLOS employs a look-up table approach base on cross-section and roadway characteristics. The segment PLOS score is influenced by sidewalk and boulevard widths, traffic volumes, the presence of on street parking, and operating speeds.

Intersection PLOS uses the Pedestrian Exposure to Traffic at Signalized Intersections (PETSI) and assigns points based on a number of crossing characteristics (e.g., crossing distance, presence of a median, presence of a crossing refuge, turning restrictions, right hand turn characteristics, curb radii, right-turn on red). The average score of each intersection approach is averaged to determine the overall intersection PLOS.

Scoring ranges as follows:

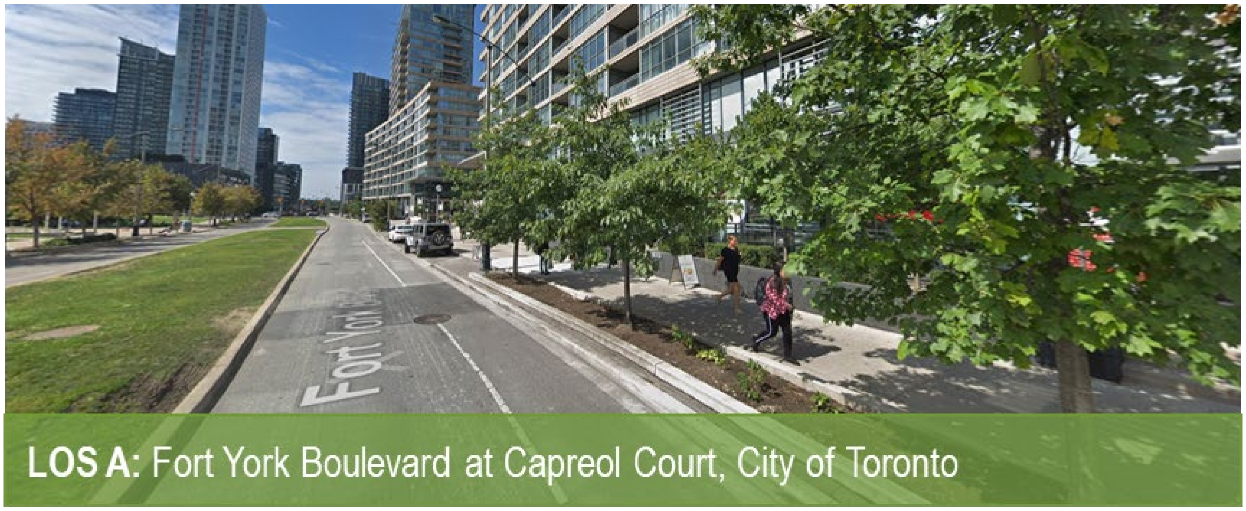
PLOS 'A' to 'C' – Attractive to most pedestrians, including locations where lower speeds and volumes, wider sidewalks (greater than 2.1 metres for main streets and 1.8 metres for local roads), and larger boulevards with ample separation from moving traffic are present. Crosswalks are provided on all four legs of the intersections and with shorter crossing distances at intersections.

PLOS 'D' to 'E' – Elements may not appeal to pedestrians due to narrow sidewalks, lack of separation from traffic, longer crossing distances, etc.

PLOS 'F' – Not adequate – locations without any facility or where no buffer is provided adjacent to high speed and high volume traffic. No crosswalks provided and long crossing distances at intersections.

Higher segment scores are characterized by locations where lower vehicle speeds and volumes, wider sidewalks (greater than 2.1 metres for main streets and 1.8 metres for local roads), and larger boulevards with ample separation from moving traffic are present. Lower segment scores are observed in locations where high vehicle speeds, narrow sidewalks, and minimal separation from traffic are present. Representative examples of Pedestrian LOS scores are shown in **Figure 4-65**.

Figure 4-65. Examples of PLOS Environment with Scores

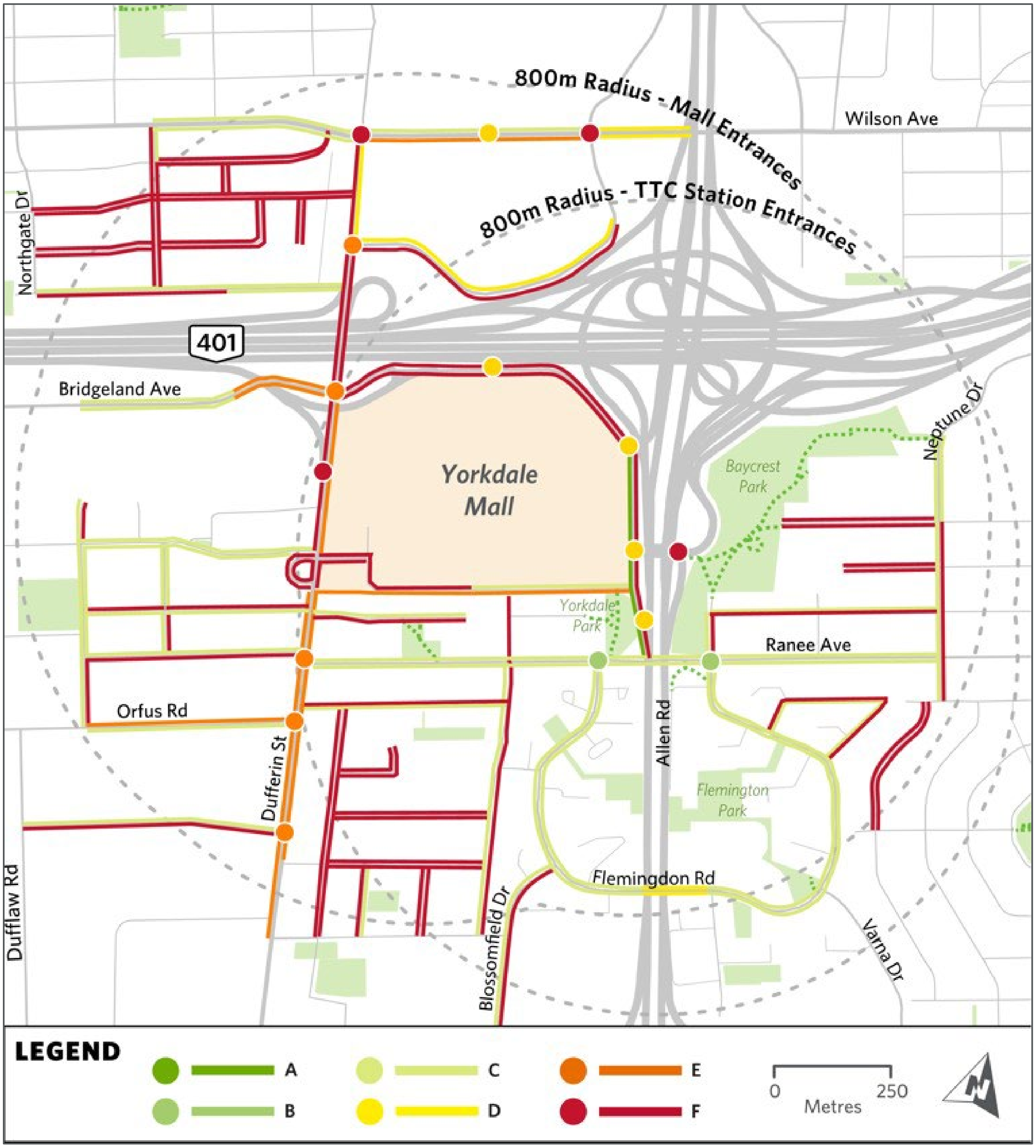


Source: Google Streetview

The PLOS analysis was completed for an area delimited by a radius of 800 metres around the entrance to Yorkdale TTC Station and the entrances to Yorkdale Shopping Centre. This area represents a 10 minute walking distance to the shopping centre.

Only the PLOS for signalized intersections was assessed for this study as the Ottawa MMLOS approach was not designed for unsignalized crossings. The results of the PLOS analysis are illustrated in **Figure 4-66**.

Figure 4-66. Pedestrian Level of Service (PLOS)



The segment analysis shows that most arterials and main thoroughfares experience a PLOS of 'E' or 'F' due to high vehicle operating speeds, narrow sidewalks (less than 1.8 metres), and little to no separation from vehicular traffic. It must be noted that other factors, not captured through the Ottawa MMLOS approach, also worsen existing conditions for pedestrians. For example, the abundance of driveways and accesses points to retail plazas and businesses, particularly along Dufferin Street, create constant interference with the sidewalks and exacerbate the pedestrian experience. The poor condition of pedestrian facilities adjacent to Yorkdale Shopping Centre, along with the surface parking lots surrounding it, are complicit in isolating the shopping centre from a pedestrian perspective. Signalized intersections within the vicinity perform poorly due to the large crossing distances for pedestrians, lack of islands for refuge, permissive instead of protected controls for turning movements, large curb radii that enable high turning speeds and faded markings.

The portion of Yorkdale Road east of the shopping centre has a PLOS of “B” due to the Nordstrom expansion which brought with it significant improvements to the public realm for pedestrians. This offers the potential of recreating the same level of service connecting to Dufferin Street and the Lawrence-Allen Community to facilitate future planned growth.

Quieter residential streets received both good and bad levels of service for pedestrians, with scores varying between “C” and “F”. The presence of sidewalks and boulevard separation with the roadway were reflected in the higher scores whereas locations that lacked sidewalks and had speeds over 30km/h received a failing score.