

VOLUME III: NEEDS ASSESSMENT

5.0 FUTURE LAND USE SCENARIOS FOR THE YOUNG DISTRICT

To assess the infrastructure needs of the Young District over the next two decades, three future land use scenarios were developed to test the resilience and capacity of the existing transportation, municipal servicing, and power infrastructure systems. These scenarios, summarized in **Table 5-1** and detailed in **Appendix L**, form the foundation of a robust, scenario-based infrastructure planning approach.

Each land use scenario represents a different scale and distribution of redevelopment, based on the assumption that the current low-density fabric of the district is gradually replaced with higher-density, mixed-use development. Collectively, the scenarios reflect a range of plausible growth outcomes over a 20-year horizon which range from moderate infill to more transformative urban intensification across key areas of the district. The scenarios are not part of a comprehensive development exercise and are not intended to predict exact future development, but instead to illustrate potential impacts of growth on the infrastructure.

Table 5-1: Summary of 20-Year Land Use Scenarios

	Scenario A	Scenario B	Scenario C
Total Residential Units	12,500	15,000	19,000
Total Population	24,000 to 26,500	28,000 to 31,000	37,000 to 40,000
Total Non-Residential Gross Floor Area (ft ²)	2.1M	2.7M	3.5M
Estimated Total Number of Jobs	7,000 to 9,000	9,000 to 11,000	11,500 to 13,500

Rather than serving as prescriptive forecasts or development plans, these scenarios are intended as planning tools to help anticipate the potential impacts of future growth. By simulating different rates and patterns of redevelopment, the analysis explores how each scenario would place different demands on infrastructure networks—including street and transit capacity, water and wastewater systems, stormwater management, and electrical power supply and distribution.

Scenario planning and sensitivity testing are essential components of this process. They enable planners and decision-makers to stress-test existing systems and proposed infrastructure solutions under a variety of growth conditions. This ensures that recommendations are not only grounded in current needs but are also resilient to future uncertainties. The approach provides a flexible yet evidence-based framework for identifying which infrastructure investments will be most critical so that public resources can be allocated efficiently and equitably.

Ultimately, this analysis supports the development of infrastructure strategies that are scalable, adaptable, and aligned with the Young District's vision for becoming a complete, connected, and future-ready community. The insights from this exercise inform not only what infrastructure is needed, but also how and when it should be delivered to enable sustainable, transit-oriented redevelopment.

6.0 TRANSPORTATION NEEDS ASSESSMENT

6.1 TRANSPORTATION FORECASTING

6.1.1 APPROACH

The transportation infrastructure needs and demands vary significantly within and outside of the Young District. The following methodology was used in determining the Young District's transportation demands and needs:

- **Calculating Business-as-Usual Demand:** The business-as-usual demand represents a future where travel patterns remain consistent with current trends. Current mode shares for the Young District, the Downtown Halifax area, and the regional mode share targets were used to determine a business-as-usual mode share of future demand.
- **Calculating Business-as-Usual Demand:** The business-as-usual demand represents a future where travel patterns remain consistent with current trends. Current mode shares for the Young District, the Downtown Halifax area, and the regional mode share targets were used to determine a business-as-usual mode share of future demand.
- **Trip Distribution & Assignment:** A regional trip distribution was developed based on a review of existing travel patterns, and the future Young District land use.
- **Screenline Analysis:** A screenline analysis of peak hour and daily traffic was undertaken to assess the upper limits of future vehicle and transit demand produced by the Young District for Land Use Scenario C. Scenario C represents the highest potential for trip generation for the district.
- **Backcasting Transit-Oriented Community Demand:** Transportation demand for the Young District was forecasted using mode share targets aligned with the Regional Plan, setting an upper limit on auto use and incorporating ambitious sustainable mode shares. These Transit-Oriented Community targets reflect a significant shift toward sustainable transportation modes. They also define the maximum level of auto demand that can be generated by the Young District while remaining within the capacity of the existing road network.

6.1.2 MODE SHARE

Mode share is the percentage of people travelling by different transportation modes, including people who walk/roll, cycle, take transit, and travel by private vehicle (driver or passenger). Traditional trend-based mode share forecasting approaches use historical and current trends, demographics, economic indicators, and known developments to project future conditions. This assumes current trends will continue with the new growth. The underlying assumptions are static, become independent of policy decisions, and do not consider long-term opportunities to explore innovative alternative solutions for sustainable transportation.

Backcasting is an analysis approach that identifies a desired future outcome and then works in reverse to determine the necessary conditions to achieve it. The outcome establishes the municipality's need for transportation service and infrastructure to meet this demand, while influencing choices towards sustainable transportation. The forecasting-backcasting approach starts with a business-as-usual mode share which is the expected mode share if no major policy changes, infrastructure investments, or changes in driver behavior occur. It assumes that the trends continue based on historical data. Then, based on the limit of the transportation network to accommodate auto mode share, a target mode share is developed where sustainable modes are prevalent.

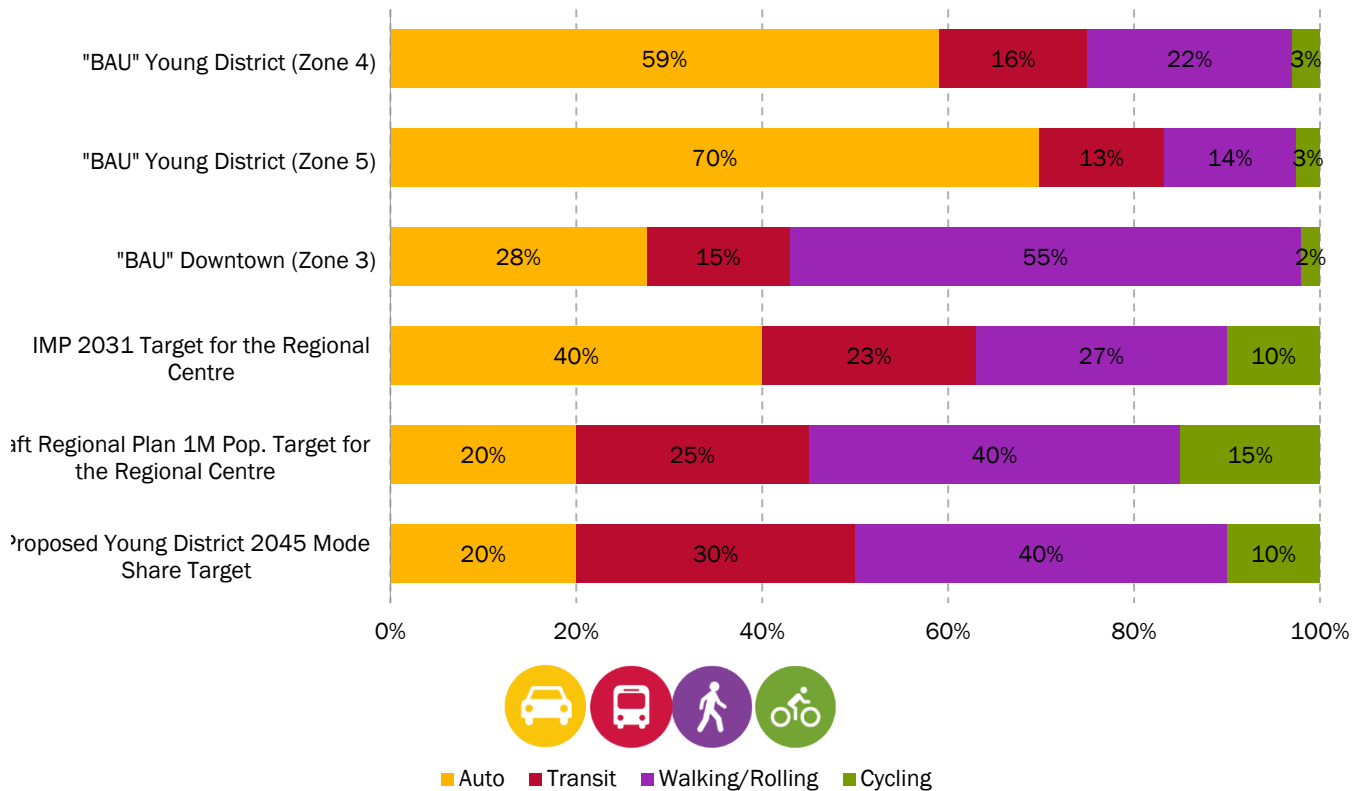
Figure 6-1 illustrates mode shares for business-as-usual as well as the mode share targets established for the Regional Centre in HRM's Integrated Mobility Plan and Draft Regional Centre Plan, for comparison purposes. The

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business-as-usual mode share is based on Statistics Canada's Census data which is collected every five years and is focused on the home to work trips. The various mode shares illustrated for comparative purposes include:

- **Business-as-Usual – Young District (Consolidated Traffic Zone 4 & 5):** This mode share reflects the observed commuting mode share for the Consolidated Traffic Zone IDs 4 and 5. The Young District currently has limited residential development, with some notable employment opportunities nearest Kempt Road and along Young Street/Robie Street.
- **Business-as-Usual – Downtown Halifax (Consolidated Traffic Zone 3):** This reflects the commuting mode share in the downtown area. Young District is envisioned as a future mixed-used transit-oriented community with downtown-level population, so Downtown Halifax is a comparable mode share target for its future travel patterns.
- **'Target' – Integrated Mobility Plan 2031 Target:** The Integrated Mobility Plan reflects the commuting mode share targets set by the region for the Regional Centre area to be achieved by the 2031 planning horizon.
- **'Target' - Draft Regional Plan One Million People Target:** The Regional Plan sets a more ambitious commuting mode share target for the Regional Centre than the Integrated Mobility Plan for 2031, for when the municipality doubles its population to around one million people in the next 20 to 30 years.
- **Proposed Future Young District Mode Share Target:** Section 6.2 presents the analysis for the future Young District mode shares for all trips during the peak hours of weekday travel.

Figure 6-1: Comparison of Mode Share Scenarios



6.1.3 YOUNG DISTRICT TRIP DISTRIBUTION

Trip distribution refers to the origin and destination of a trip. The major changes expected for the Young District area in terms of land use and development will lead to changes in trip purposes and therefore changes in origins and destinations. The future Young District trip distribution was established through an analysis of the HRM Origin-Destination Visualizer Tool. Downtown Halifax's trip distribution was used as a comparable distribution for the future Young District, given its dense mix of jobs and residential dwellings within an urban core. The distribution is the proportion of trips incoming to and outgoing from the Downtown Consolidated Traffic Zone (Zone 3) to each zone. The zones were further consolidated into three distinct regional areas for the purposes of analysis: East, South, and West Regional Area.

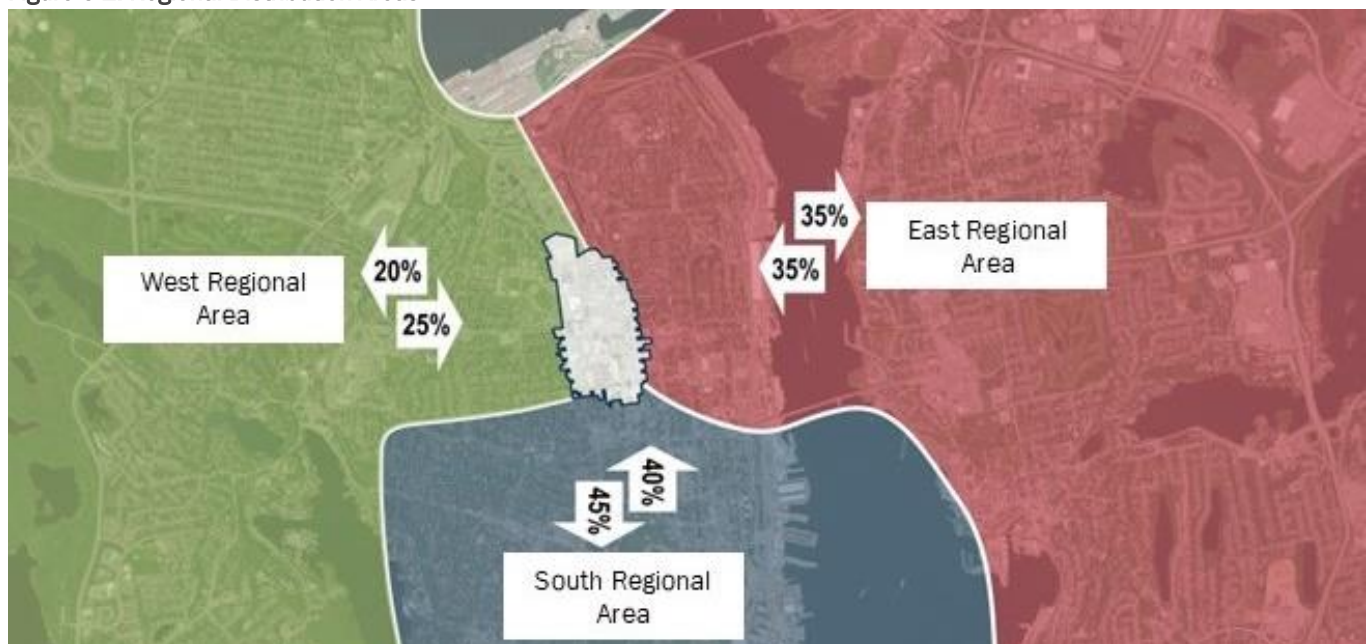
- **East Regional Area:** This area includes the North End community immediately to the east of Young District, as well as regional areas such as Dartmouth, Burnside, and Cole Harbour.
- **South Regional Area:** This area includes of the south half of the Halifax peninsula and represents a significant attractor for jobs as it encompasses Downtown Halifax, Dalhousie University, Saint Mary's University, as well as the hospitals.
- **West Regional Area:** This area encompasses west of the Young District, which includes the Halifax Shopping Center, Bayer's Lake Business Park, and Bedford.

Table 6-1 summarizes the Downtown Zone regional distribution and the adjusted regional distribution for the Young District. Trips between the Downtown Zone and the Young District Zone were adjusted to reflect the expected high proportion of commuting trips between the two areas. **Figure 6-2** illustrates the regional area distribution of trips to and from the Young District.

Table 6-1: Regional Distribution for Downtown and the Young District

		East Regional Area	South Regional Area	West Regional Area
Downtown	Inbound	45%	25%	30%
	Outbound	50%	30%	20%
Young District	Inbound	35%	40%	25%
	Outbound	35%	45%	20%

Figure 6-2: Regional Distribution Areas



6.1.4 THE YOUNG DISTRICT SCREENLINES

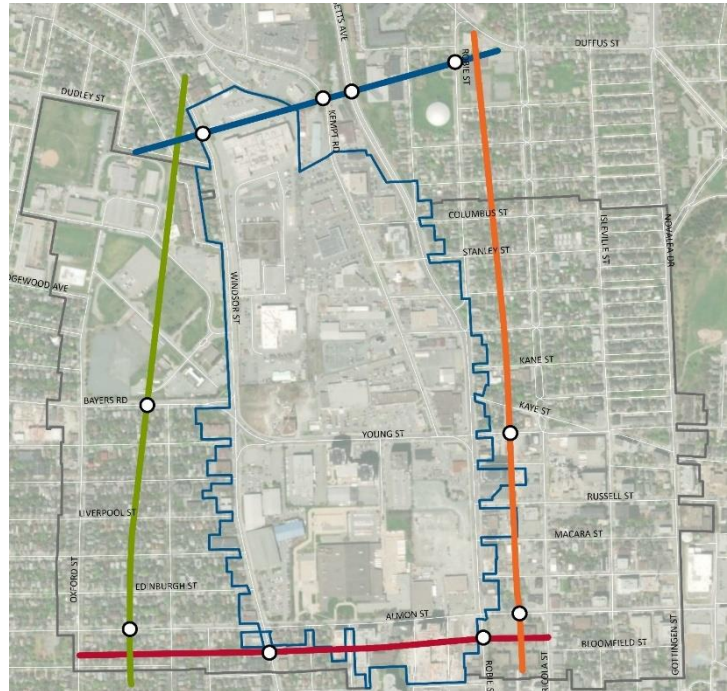
A screenline analysis is a tool used to analyze transportation demand and capacity. A screenline is an imaginary line that crosses key roadways to measure and assess the volume of people crossing that point against the theoretical capacity of the roadway. The screenline capacity is the sum of the total capacity of the transportation facilities it intersects, which represents the maximum amount of auto or transit riders that can be accommodated. The screenline analysis identifies trigger points within the transportation network where the demand may approach or exceed the capacity. The four external screenlines are shown in **Figure 6-3** and include:

- **North of Young District (Blue):** Key intersecting roadways include Windsor Street, Kempt Road, Massachusetts Avenue, and Robie Street.
- **South of Young District (Red):** Key intersecting roadways include Windsor Street and Robie Street.
- **East of Young District (Orange):** Key intersecting roadways include Almon Street and Young Street.
- **West of Young District (Green):** Key intersecting roadways include Almon Street and Bayers Road.

The theoretical screenline capacities used in this analysis are based on the existing roadway capacities. The theoretical capacity represents the maximum number of vehicles that can be accommodated across each screenline under current street configurations. It is acknowledged that future changes to street typologies, such as the introduction of transit priority lanes, cycling infrastructure, road safety improvements or other public realm improves may reduce the available roadway space for general vehicle traffic, thereby lowering the throughput capacity for general purpose vehicles.

To evaluate whether a screenline is approaching or exceeding its capacity, the volume to capacity (v/c) ratio is used as a standard performance metric. This ratio compares observed or projected traffic volumes to the maximum theoretical capacity of a given roadway segment. As the v/c ratio approaches 1.0, it indicates that the roadway is nearing full capacity and may experience congestion, delays, or operational challenges. In practice, a v/c ratio of 0.9 or below is typically considered acceptable, as it provides a buffer for traffic fluctuations and helps maintain reliable network performance.

Figure 6-3: Screenlines



6.2 FUTURE TRANSPORTATION DEMAND

6.2.1 EXISTING CONDITIONS SCREENLINE ANALYSIS

A screenline analysis was applied to existing conditions to identify any triggers and gaps in today's network. The existing hourly and daily roadway capacities, as well as the peak hour and daily volumes for each intersecting roadway and screenline are summarized in **Table 6-2**. Both Windsor Street and Robie Street at the South screenline are operating near capacity with v/c ratios exceeding 0.9, as highlighted in red in the table below. This screenline is of concern due to its limited remaining capacity to accommodate new vehicle trips generated by Young District.

Table 6-2: Existing Screenline Auto Capacities and Volumes

Screenline	Intersecting Road	Total Capacity		AM Peak Hour (trips/h)		PM Peak Hour (trips/h)		Typical Weekday (trips/day)	
		Hourly	Daily	In	Out	In	Out	In	Out
North Of Young District	Windsor Street	700	16,800	514	205	383	496	4485	3505
	Kempt Road	600	14,400	301	155	368	210	3345	1825
	Massachusetts Avenue	2000	48,000	1088	618	348	1430	7180	10,240
	Robie Street	600	14,400	126	184	122	162	1240	1730
	Total	3900	93,600	2029	1162	1221	2298	16,250	17,300
South Of Young District	Windsor Street	700	16,800	416	597	681	372	5485	4845
	Robie Street	1000	24,000	627	714	960	639	7935	6765
	Total	1700	40,800	1043	1311	1641	1011	13,420	11610
East Of Young District	Almon Street	700	16,800	222	320	476	282	3490	3010
	Young Street	1000	24,000	345	359	415	374	3800	3665
	Total	1700	40,800	567	679	891	656	7290	6675
West Of Young District	Almon Street	700	16,800	381	323	335	578	3580	4505
	Bayers Road	1000	24,000	563	428	449	683	5060	5555
	Total	1700	40,800	944	751	784	1261	8640	10,060

Notes: Red indicates that the v/c ratio is above 0.9

Similarly, a screenline analysis was completed for transit mode share to assess the existing transit service. The transit passenger demand was calculated based on the weighted average load per Halifax Transit bus and the frequency of existing bus routes. The capacity was determined using the average capacity of Halifax Transit buses (80 passengers per bus) as well as the existing bus route frequency. There are different bus route frequencies depending on the time of day.

The existing transit capacity of the screenlines are summarized in **Table 6-3** and the existing transit ridership volumes are summarized in **Table 6-4**. Where there is no capacity, there is no bus service. The v/c ratios indicate that the current transit demand in the Young District is well within its available capacity, suggesting that the existing service is adequate for present ridership levels.

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Table 6-3: Existing Screenline - Average Weekday Peak Hour Transit Capacity

Screenline	Intersecting Road	AM Peak Hour (trips/h)		PM Peak Hour (trips/h)		Typical Weekday (trips/day)	
		Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
North of Young District	Windsor Street	640	640	800	800	6720	6720
	Kempt Road	1200	-	-	-	2000	-
	Massachusetts Avenue	-	-	-	800	-	2400
	Robie Street	320	320	320	320	5840	5760
	Total	2160	960	1120	1920	14,560	14,880
South of Young District	Windsor Street	640	640	800	800	6720	6720
	Robie Street	480	480	640	640	9760	9760
	Total	1120	1120	1440	1440	16,480	16,480
East of Young District	Almon Street	-	-	-	-	-	-
	Young Street	-	1440	960	-	2880	2880
	Total	-	1440	960	-	2880	2880
West of Young District	Almon Street	-	-	-	-	-	-
	Bayers Road	480	160	160	480	4320	4320
	Total	480	160	160	480	4320	4320

Notes: Red indicates that the v/c ratio is above 0.9

Table 6-4: Existing Screenline – Average Weekday Peak Hour Transit Volumes

Screenline	Intersecting Road	AM Peak Hour (trips/h)		PM Peak Hour (trips/h)		Typical Weekday (trips/day)	
		Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
North of Young District	Windsor Street	200	140	170	230	1176	1176
	Kempt Road	237	-	-	-	350	-
	Massachusetts Avenue	-	-	-	136	-	342
	Robie Street	36	24	24	16	365	144
	Total	473	164	194	382	1891	1662
South of Young District	Windsor Street	128	204	235	150	1134	1134
	Robie Street	72	111	112	136	1037	1464
	Total	200	315	347	286	2171	2598
East of Young District	Almon Street	-	-	-	-	-	-
	Young Street	-	231	136	-	414	342
	Total	-	231	136	-	414	342
West of Young District	Almon Street	-	-	-	-	-	-
	Bayers Road	138	17	25	132	1026	945
	Total	138	17	25	132	1026	945

Notes: Red indicates that the v/c ratio is above 0.9

6.2.2 EXISTING BUSINESS-AS-USUAL DEMAND

The future Young District land uses will generate additional person trips to and from the area, and these additional trips will increase the demand for transportation infrastructure. Future traffic generated by each development scenario were forecasted using trip generation rates from the *Institute of Transportation Engineers (ITE) Trip Generation Manual, 11th Edition*. Trip rates published in this manual are widely accepted by the traffic engineering community as an industry standard.

The ITE trip generation rates represent all vehicular movements entering and exiting the site. Appendix B of the *ITE Trip Generation Manual, 11th Edition* provides additional surveys where person trips (all modes) were captured. For multi-unit residential developments, the data sample size was considered insufficient for use within this study. To develop person trip generation rates, the vehicular trip generation rates were based on a typical vehicular occupancy rate of 1.15 (North American average) and an auto mode share of 90%. Therefore, to convert ITE vehicle trip rate to ITE person-trip rates, a conversion factor of 1.28 has been applied. In comparison to Appendix B, the resulting person-trip rates comparable.

Table 6-5 summarizes the vehicle and people trip rates for the morning (AM) and evening (PM) peak hours of travel demand. The trip generation is based on the number of dwelling units for residential developments and gross floor area for commercial developments. The land use codes selected from ITE's Trip Generation Manual include those listed in the table below.

Table 6-5: Young District Person Trip Rates for Residential and Commercial Land Uses

Land Use		Data Source	Vehicle Trip Rates		Person Trip Rates	
			AM Peak	PM Peak	AM Peak	PM Peak
Residential	Multifamily Housing (High-Rise)	ITE 222	T = 0.27(du)	T = 0.32(du)	T = 0.35(du)	T = 0.42(du)
Commercial	General Office Building	ITE 710	T = 1.52(1000ft² GFA)	T = 1.44(1000ft² GFA)	T = 1.98(1000ft² GFA)	T = 1.87(1000ft² GFA)
	General Light Industrial	ITE 110	T = 0.74(1000ft² GFA)	T = 0.65(1000ft² GFA)	T = 0.96(1000ft² GFA)	T = 0.85(1000ft² GFA)
	Specialty Retail	ITE 826	T = 1.36(1000ft² GFA)	T = 2.71(1000ft² GFA)	T = 1.77(1000ft² GFA)	T = 3.52(1000ft² GFA)
Note: T = Average Vehicle/Person Trip Ends; du = Dwelling Units, 1,000ft2 GFA = 1,000ft2 Gross Floor Area						

Table 6-6 summarizes the business-as-usual mode share for the Young District, based on 2016 Census data. These mode shares were adopted for the purposes of the testing a range of mode shares. Given the site context of a transit-oriented community, transit services as well as active transportation modes are expected to increase, lowering the share of personal auto mode share.

Table 6-6: Business-as-Usual Mode Share

Travel Mode	Mode Share
Auto Driver	53%
Auto Passenger	6%
Transit	16%
Walking/Rolling	22%
Cycling	3%

Table 6-7 and **Table 6-8** summarize the forecasted peak hour and daily trips generated from the residential development and commercial land uses forecasted in Scenario C. The trip generation for Scenarios A and B are provided in **Appendix M**.

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Land use composition is a key determinant of trip generation. In mixed-use transit-oriented communities, the integration of residential, commercial, and institutional uses supports a higher share of internal trips and pass-by trips. Internal trips begin and end within the Young District and do not impact external road networks. These trips are typically shorter, often made by walking or cycling. Internal capture rates were derived from *NCHRP Report 684: Enhancing Internal Trip Capture Estimation for Mixed-Use Developments*. Pass-by trips are typically vehicle trips that involve a stop at a destination on route to another location. These do not generate new trips but reallocate existing ones. Pass-by trip reductions were based on the *ITE Trip Generation Handbook (11th Edition)*.

Table 6-7: AM Peak, PM Peak, and Daily Trips Generated by Residential Development in Scenario C

Mode Share		AM Peak (trips/h)			PM Peak (trips/h)			Daily (trips/day)		
		Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
Auto Driver	53%	959	2728	3688	2709	1660	4370	18,341	21,945	40,286
Auto Passenger	6%	109	309	418	307	188	495	2076	2484	4561
Transit	16%	289	824	1114	818	501	1,320	5537	6625	12,162
Walking/Rolling	22%	398	1133	1531	1,125	689	1,814	7613	9109	16,723
Cycling	3%	54	154	209	153	94	248	1038	1242	2281
Total Person Trips	100%	1809	5148	6960	5112	3133	8247	34,605	41,405	76,013
Less Internal Trips		5%	4%	5%	22%	21%	22%	14%	13%	13%
		48	116	170	604	353	951	2503	2799	5309
Total Auto Trips		911	2,612	3,518	2,106	1,308	3,419	15,838	19,146	34,977
Total Person Trips		1761	5032	6790	4508	2780	7295	32,102	38,606	70,704

Table 6-8: AM Peak, PM Peak, and Daily Trips Generated by Non-Residential Development in Scenario C

Mode Share		AM Peak (trips/h)			PM Peak (trips/h)			Daily (trips/day)		
		Inbound	Outbound	Total	Inbound	Outbound	Total	Inbound	Outbound	Total
Auto Driver	53%	2256	1053	3309	1996	3273	5270	21,258	21,629	40,286
Auto Passenger	6%	255	119	375	226	371	597	2407	2449	4561
Transit	16%	681	318	999	603	988	1591	6418	6530	12,162
Walking/Rolling	22%	936	437	1374	829	1359	2188	8824	8978	16,723
Cycling	3%	128	60	188	113	185	299	1203	1224	2281
Total Person Trips	100%	4256	1986	6245	3766	6176	9945	40,110	40,810	76,013
Less Internal Trips		5%	5%	4%	5%	22%	21%	22%	14%	13%
		48	113	45	152	445	696	1147	2901	2759
Less Pass-By		447	351	798	699	890	1589	5729	6203	11933
Total Auto Trips		1696	657	2359	852	1688	2534	12628	12667	25303
Total Person Trips		3696	1590	5295	2,622	4591	7209	31480	31848	63337

6.2.3 FUTURE BUSINESS-AS-USUAL SCREENLINE ANALYSIS

The business-as-usual screenline analysis tested a future condition where the existing roadway and transit capacity remains the same, and there are additional trips given the future development. The auto capacity and volumes of the screenlines for Scenario C are summarized in **Table 6-9**. The volumes are the result of a 59% auto mode share for trips generated by the Young District superimposed on the existing volumes.

The additional trips generated cause several intersecting roadways to have a v/c ratio above 0.9 as highlighted in red in the table. These findings emphasize the need for improved options to shift the mode share from auto

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drivers to sustainable modes of transportation. Once a roadway capacity is exceeded, the roadway can no longer provide for additional traffic so that traffic must shift routes, changes travel modes, or change travel periods. This is considered an ‘all or nothing’ assignment and reflects the fundamental demand for roadway infrastructure across each screenline. The auto volumes and v/c ratios for all three scenarios under the business-as-usual case can be found in **Appendix M**.

Table 6-9: Future Business-as-Usual Screenline Auto Capacities and Volumes for Scenario C

Screenline	Intersecting Road	Total Capacity		AM Peak Hour (trips/h)		PM Peak Hour (trips/h)		Typical Weekday (trips/day)	
		Hourly (trips/h)	Daily (trips/day)	In	Out	In	Out	In	Out
North of Young District	Windsor Street	700	16,800	761	318	518	737	6455	5357
	Kempt Road	600	14,400	456	232	478	340	4805	2977
	Massachusetts Avenue	2000	48,000	1708	955	601	2205	11,770	16,227
	Robie Street	600	14,400	173	215	145	214	1583	2210
	Total	3900	93,600	3098	1720	1742	3497	24,613	26,771
South of Young District	Windsor Street	700	16,800	632	839	923	582	7976	7365
	Robie Street	1000	24,000	982	1297	1513	1021	12,602	11,628
	Total	1700	40,800	1614	2136	2436	1603	20,578	18,993
East of Young District	Almon Street	700	16,800	410	1048	1109	526	7424	7433
	Young Street	1000	24,000	579	1094	1036	647	7820	8270
	Total	1700	40,800	989	2142	2145	1173	15,244	15,702
West of Young District	Almon Street	700	16,800	563	471	474	823	5211	6528
	Bayers Road	1000	24,000	926	703	697	1126	8420	9464
	Total	1700	40,800	1489	1174	1170	1949	13,631	15,992
Notes: Red indicates that the v/c ratio is above 0.9									

The future transit volumes for Scenario C are summarized in **Table 6-10** (transit capacity in Table 6-3). The volumes are the result of a 16% transit mode share for trips generated by the Young District superimposed on the existing transit volumes presented in Table 6-4. A transit v/c ratio exceeding 1.0 indicates that the current transit capacity is inadequate to meet user demand demonstrating a need for improved transit service, including more frequent buses across these screenlines. The transit volumes and v/c ratios for all three scenarios can be found in **Appendix M**.

Table 6-10: Future Business-as-Usual Screenline Transit Volumes for Scenario C.

Screenline	Intersecting Road	AM Peak Hour (trips/h)		PM Peak Hour (trips/h)		Typical Weekday (trips/day)	
		In	Out	In	Out	In	Out
North of Young District	Windsor Street	422	258	337	456	2702	2143
	Kempt Road	423	0	0	0	1647	0
	Massachusetts Avenue	0	0	0	628	0	3056
	Robie Street	182	115	132	148	1179	553
	Total	1027	373	470	1232	5528	5753
South of Young District	Windsor Street	210	297	370	255	2246	2234
	Robie Street	204	315	384	324	3017	3465
	Total	414	612	754	579	5263	5699
East of Young District	Almon Street	0	0	0	0	0	0
	Young Street	0	712	677	0	3515	3779
	Total	0	712	677	0	3515	3779
West of Young District	Almon Street	0	0	0	0	0	0
	Bayers Road	340	172	222	478	3150	3471
	Total	340	172	222	478	3150	3471

Notes: Red indicates that the v/c ratio is above 0.9. A volume of 0 indicates that there is no existing transit service on that road.

6.2.4 FUTURE TRANSIT-ORIENTED MODE SHARE

The Young District transit-oriented community demand was developed by placing a maximum on the auto capacity (v/c ratio of 0.9). This requires a reduction in auto trips to and from the Young District. **Table 6-11** summarizes the total amount of future Young District peak hour traffic volumes that can be accommodated without exceeding the target v/c ratio of 0.90. The AM outbound and PM outbound periods are considered critical with regards to capacity. A Young District mode share of 36% auto driver would result in approximately 2,600 AM peak hour outbound trips and 3,200 PM peak hour inbound trips, which would exceed the target v/c ratio of 0.90.

Table 6-11: Displaced Peak Hour Vehicle Trips to Accommodate Scenario C

	AM Peak Hour (veh/h)		PM Peak Hour (veh/h)	
	In	Out	In	Out
Young District Demand Business-as-Usual	3215	3781	4705	4933
Total Reduction to Achieve v/c <0.90	-241	-1218	-1522	-1052
Maximum Demand that can be Accommodated	2974	2563	3183	3882

The screenline analysis resulted in a new mode share for the Young District, as summarized in **Table 6-2**. The table also provides rationale for the proposed target and justification for how the target future mode share is achieved. A 20% auto mode (driver and passenger) share target reflects HRM sustainable mode share goals for the Regional Centre. To achieve this target, the Young District transportation network will need to reduce reliance on private vehicles while promoting a safe, connected community for sustainable modes. The Young District

riect will need to be a complete community, providing land uses, density and built form arrangements that align with the sustainable mode share goals.

Table 6-12: Target Future Transit-Oriented Community Mode Shares

Travel Mode	Mode Share	Rationale
Walking/Rolling	40%	Target: Achieve the target for the Regional Centre under the 1M Population Scenario. Justification: The vision and design objectives for the Young District intend for the district to be a complete community with destinations within a walkable distance from home. Following the pillars of the IMP, the future network and neighborhood is to be planned to be connected, healthy, affordable, and sustainable. The mixed-use of the neighborhood and its proximity to surrounding areas will promote walking and rolling as the predominant mode share.
Cycling	10%	Target: Achieve the target for the Regional Centre under the 1M Population Scenario. Justification: The vision and design objectives for the Young District intend for the district to be planned with a complete AAA cycling network. The cycling network is to provide safe cycling options within and connections to surrounding cycling corridors. Cycling will be promoted for short-to-medium length trips.
Transit	30%	Target: Exceed the target for the Regional Centre under the 1M Population Scenario. Justification: The vision and design objectives for the Young District intend for the district to be planned to provide higher-order rapid transit in the form of a central transit terminal, rapid transit station(s) and dedicated transit priority infrastructure. Transit is to be the primary mode for moderate length trips.
Auto Driver	15%	Target: Achieve the target for the Regional Centre under the 1M Population Scenario. Justification: The vision and design objectives for the Young District intend for the district to focus on sustainable modes, where the objective is to move people and manage congestion. While vehicles will travel slower, this will increase safety for all modes.
Auto Passenger	5%	

6.2.5 FUTURE TRANSIT-ORIENTED COMMUNITY DEMAND

Table 6-13, Table 6-14, and Table 6-15 summarize the AM peak hour, the PM peak hour and the daily trip forecasts, respectively, when adopting the transit-oriented community mode shares for Scenarios A, B, and C. Appendix N provides summary tables for residential and non-residential trips for all three land uses scenarios assuming the transit-oriented community mode shares. Figure 6-4 and Figure 6-5 illustrate existing and forecast daily traffic and bus volumes that cross each screenline, respectively. The Young District is forecasted to generate the following AM and PM peak hour demands:

Scenario A:

- 3300 and 4600 walking/rolling trips
- 900 and 1100 cycling trips
- 2500 and 3500 transit trips
- 1000 and 1000 auto trips

Scenario B:

- 4000 and 5600 walking/rolling trips
- 1000 and 1400 cycling trips
- 3000 and 4200 transit trips
- 1200 and 1200 auto trips

Scenario C:

- 5300 and 7300 walking/rolling trips
- 1300 and 1800 cycling trips
- 4000 and 5500 transit trips
- 1600 and 1600 auto trips

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Table 6-13: Young District's Future TOC Demand - AM Peak Hour Trips by Mode with TOC Mode Shares, All Scenarios

Mode Share		Scenario A			Scenario B			Scenario C		
		AM Peak Hour (trips/hour)			AM Peak Hour (trips/hour)			AM Peak Hour (trips/hour)		
		In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	15%	567	675	1,243	704	812	1,517	910	1,070	1,981
Auto Passenger	5%	189	225	415	235	271	506	303	357	661
Transit	30%	1,135	1,350	2,486	1,408	1,625	3,033	1,820	2,140	3,961
Pedestrians	40%	1,513	1,800	3,314	1,877	2,166	4,044	2,426	2,854	5,280
Cyclists	10%	378	450	829	469	542	1,012	607	713	1,321
Total Person Trips	100%	3,783	4,499	8,287	4,693	5,415	10,112	6,065	7,134	13,204
Less Internal Trips		5%	4%	5%	5%	4%	5%	5%	4%	5%
		28	29	57	35	35	70	46	46	91
Less Pass-By		94	74	167	119	93	212	151	119	270
Total New Auto Trips		445	572	1,018	550	684	1,235	713	906	1,620
Total New Person Trips		3,661	4,397	8,062	4,539	5,287	9,830	5,868	6,970	12,843

Table 6-14: Young District's Future TOC Demand – PM Peak Hour Trips by Mode with TOC Mode Shares All Scenarios

Mode Share		Scenario A			Scenario B			Scenario C		
		PM Peak Hour (trips/hour)			PM Peak Hour (trips/hour)			PM Peak Hour (trips/hour)		
		In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	15%	837	872	1,709	1,017	1,079	2,097	1,332	1,396	2,729
Auto Passenger	5%	279	291	570	339	360	699	444	465	911
Transit	30%	1,673	1,744	3,417	2,035	2,157	4,193	2,663	2,793	5,457
Pedestrians	40%	2,231	2,325	4,557	2,713	2,876	5,590	3,551	3,724	7,275
Cyclists	10%	558	581	1,140	678	719	1,398	888	931	1,820
Total Person Trips	100%	5,577	5,812	11,393	6,783	7,190	13,977	8,878	9,309	18,192
Less Internal Trips		22%	22%	21%	22%	21%	22%	22%	21%	22%
		186	185	372	227	229	456	297	297	594
Less Pass-By		147	187	333	186	237	422	237	302	539
Total New Auto Trips		503	500	1,004	605	613	1,218	798	798	1,597
Total New Person Trips		5,244	5,440	10,688	6,370	6,724	13,098	8,344	8,711	17,060

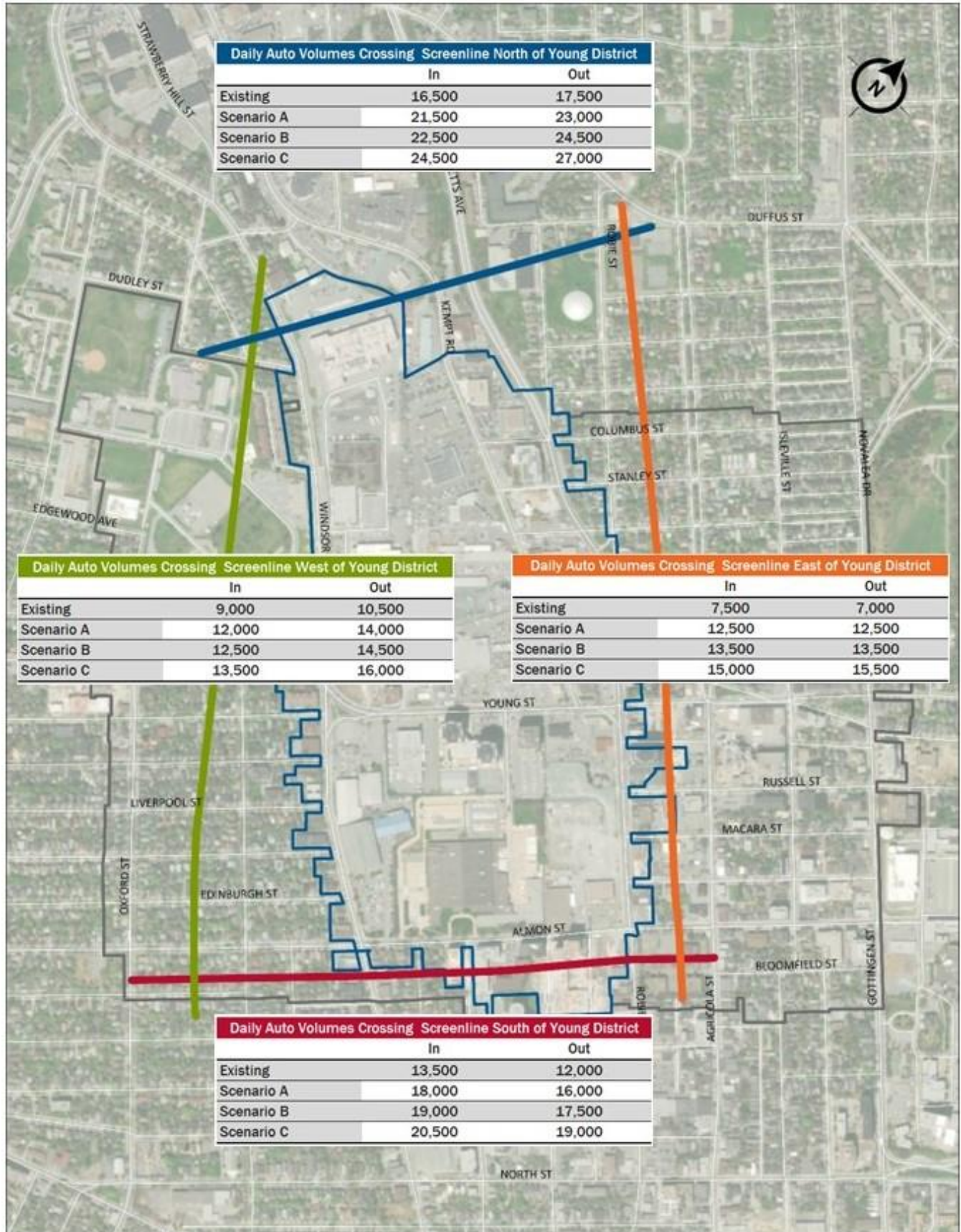
Transportation Needs Assessment

Table 6-15: Young District's Future TOC Demand - Daily Trips by Mode with TOC Mode Shares, All Scenarios

Mode Share		Scenario A Daily (trips/day)			Scenario B Daily (trips/day)			Scenario C Daily (trips/day)		
		In	Out	Total	In	Out	Total	In	Out	Total
Auto Driver	15%	7,020	7,733	14,754	8,607	9,454	18,062	11,207	12,332	23,540
Auto Passenger	5%	2,340	2,578	4,919	2,869	3,151	6,021	3,736	4,111	7,847
Transit	30%	14,040	15,467	29,507	17,214	18,908	36,122	22,415	24,665	47,079
Pedestrians	40%	18,720	20,622	39,342	22,952	25,210	48,162	29,886	32,886	62,772
Cyclists	10%	4,680	5,156	9,836	5,738	6,303	12,041	7,472	8,222	15,693
Total Person Trips	100%	46,800	51,555	98,358	57,380	63,025	120,408	74,715	82,215	156,931
Less Internal Trips		14%	13%	13%	14%	13%	13%	14%	13%	13%
		958	986	1944	1174	1206	2380	1529	1573	3102
Less Pass-By		1202	1302	2504	1523	1649	3172	1942	2103	4045
Total New Auto Trips		4,860	5,445	10,306	5,910	6,599	12,510	7,736	8,657	16,393
Total New Person Trips		44,640	49,267	93,910	54,683	60,170	114,856	71,244	78,539	149,784

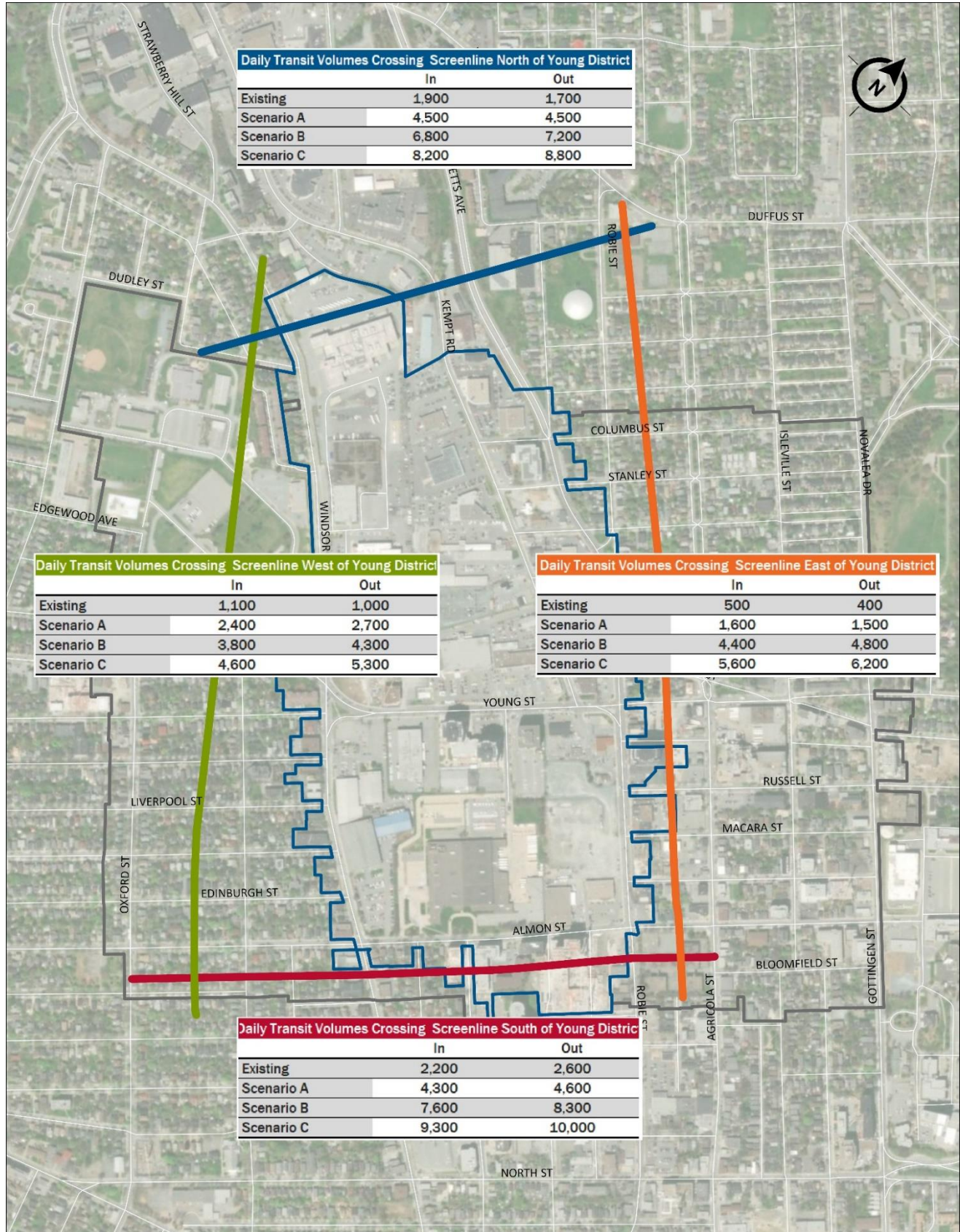
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Figure 6-4: Summary of Future Auto Volumes Crossing Screenlines based on the Young District's TOC Mode Share



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Figure 6-5: Summary of Future Daily Transit Volumes Crossing Screenlines based on the Young District's TOC Mode Share



6.2.6 PARKING DEMAND FORECAST

CURRENT HALIFAX ZONING BY-LAW PARKING REQUIREMENTS

The historical goal of off-street parking minimums is to ensure that each development has enough off-street parking spaces, usually determined by the building's use and size. However, many local governments are now acknowledging the importance of restricting parking to promote sustainable modes. As a result, they are implementing parking maximums in their regulations, which set a limit on the number of parking spaces permitted for a particular use, thereby managing the amount of land dedicated to parking.

Based on the Halifax Regional Centre Land Use By-law and Provincial Minimum Planning Requirements Regulations, there are no minimum parking requirements for residential and commercial uses within the Young District. Although the By-Law includes parking maximums for some land uses (e.g. office), no maximum parking requirements currently apply to the planned residential and commercial land uses.

JURISDICTIONAL SCAN OF PARKING REQUIREMENTS FOR TOC AREAS IN CANADA

Table 6-16 summarizes a jurisdictional scan of parking bylaws within major Canadian cities. The City of Ottawa's proposed zoning bylaw introduces significant changes to off-street parking regulations by eliminating minimum parking requirements and instead, implementing maximum parking limits in TOD areas. Similarly, the City of Edmonton and City of Toronto include progressive zoning by-laws that also include elimination of minimum parking requirements, in addition to maximum parking requirements in areas with high transit accessibility. The City of Vancouver also has zoning by-laws which eliminate the minimum. **Table 6-16** also applies the off-street parking rates to the forecasted Young District land uses scenarios. There is a notable range between the minimum and maximum parking requirements. This analysis is considered preliminary as there are a number of nuances within parking bylaws which are not captured.

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Table 6-16: Off-Street Parking Space Rate Requirements for TOD Areas in Other Municipalities

Young District Scenario		Scenario A	Scenario B	Scenario C
Total Residential Future Young District Units		12,500	15,000	19,000
Total Non-Residential Gross Floor Area (Gfa) Sq. Ft		2.1M	2.7M	3.5M
City Of Ottawa	Minimum Parking	Residential Visitor: ~0.1 per dwelling	Residential Visitor: ~0.1 per dwelling	Residential Visitor: ~0.1 per dwelling
		Total Visitor Minimum = 1,250 spaces ³	Total Visitor Minimum = 1,500 spaces ¹	Total Visitor Minimum = 1,900 spaces ¹
		Total Tenant Minimum = 0 Spaces	Total Tenant Minimum = 0 Spaces	Total Tenant Minimum = 0 Spaces
	Maximum	Residential: 1.25 per dwelling ⁴ = 15,625 spaces Commercial: 2.75 per 100 m ² of GFA ⁵ = 5,365 spaces Total Maximum = 20,990 spaces	Residential: 1.25 per dwelling ² = 18,750 spaces Commercial: 2.75 per 100 m ² of GFA ³ = 6,900 spaces Total Maximum = 25,690 spaces	Residential: 1.25 per dwelling ² = 23,750 spaces Commercial: 2.75 per 100 m ² of GFA ³ = 8,940 spaces Total Maximum = 32,650 spaces
City Of Toronto	Minimum Parking	Residential Visitor: 2.0 plus 0.01 per dwelling unit	Residential Visitor: 2.0 plus 0.01 per dwelling unit	Residential Visitor: 2.0 plus 0.01 per dwelling unit
		Total Visitor Minimum = 130 spaces	Total Visitor Minimum = 160 spaces	Total Visitor Minimum = 190 spaces
		Total Tenant Minimum = 0 Spaces	Total Tenant Minimum = 0 Spaces	Total Tenant Minimum = 0 Spaces
	Maximum	Residential: 1 per dwelling ⁶ = 12,500 spaces Resid. Visitor: ~0.1 per dwelling = 1,250 spaces Commercial: 3.5 per 100 m ² of GFA ⁷ = 6,830 spaces Total Maximum = 20,580 spaces (1.1 stalls/residential unit)	Residential: 1 per dwelling ⁴ = 15,000 spaces Resid. Visitor: ~0.1 per dwelling = 1,500 spaces Commercial: 3.5 per 100 m ² of GFA ⁵ = 8,780 spaces Total Maximum = 25,280 spaces (1.1 stalls/residential unit)	Residential: 1 per dwelling ⁴ = 19,000 spaces Resid. Visitor: ~0.1 per dwelling = 1,900 spaces Commercial: 3.5 per 100 m ² of GFA ⁵ = 11,380 spaces Total Maximum = 32,280 spaces (1.1 stalls/residential unit)
City Of Vancouver	Minimum Parking	Accessible Parking, Residential: ~0.034 spaces per dwelling = 425 spaces Accessible Parking, Commercial: ~0.4 per 1,000 m ² GFA = 80 spaces Total Minimum = 525	Accessible Parking, Residential: ~0.034 spaces per dwelling = 510 spaces Accessible Parking, Commercial: ~0.4 per 1,000 m ² GFA = 130 spaces Total Minimum = 640	Accessible Parking, Residential: ~0.034 spaces per dwelling = 645 spaces Accessible Parking, Commercial: ~0.4 per 1,000 m ² GFA = 100 spaces Total Minimum = 745
	Maximum Parking	N/A	N/A	N/A
City Of Edmonton	Minimum Parking	Total Minimum = none	Total Minimum = none	Total Minimum = none
	Maximum	Residential: 1.5 per dwelling ⁸ = 18,750 spaces Commercial: 1 per 50 m ² of GFA ⁹ = 3,900 spaces Total Maximum = 22,650 spaces	Residential: 1.5 per dwelling ⁶ = 22,500 spaces Commercial: 1 per 50 m ² of GFA ⁷ = 5,020 spaces Total Maximum = 27,020 spaces	Residential: 1.5 per dwelling ⁶ = 28,500 spaces Commercial: 1 per 50 m ² of GFA ⁷ = 6,500 spaces Total Maximum = 35,000 spaces
Note: Due to Provincial legislation, HRM cannot apply minimum parking requirements.				

³ No more than twenty visitor parking spaces are required per building

⁴ Residential Dwelling unit inclusive of visitor parking, TOD within Inner Urban Area (B)

⁵ Personal Service Business, Retail Store, Restaurant, TOD within Inner Urban Area (B)

⁶ Dwelling Unit in a Multiple Dwelling Unit Buildings

⁷ Tier 4 Land Use Category, Area with high transit accessibility (PZA)

⁸ Based on 2-bedroom units, within 600m of rapid transit

⁹ Non-residential uses, within 200m of rapid transit station or within parking maximum areas

PROJECTED PARKING DEMAND

The hourly turnover rate indicates how many times a parking space is used by different vehicles during an hour. This calculation was used to determine the number of off-street parking spaces required to accommodate peak hour traffic, considering how quickly spaces are being used and vacated.

Based on the future auto trips forecasted, the parking demand is estimated using the following formula:

$$\text{Parking Demand} = \text{Peak Hour Auto Trips} / \text{Hourly Turnover Rate}$$

Assuming that most parking is provided for commercial uses and residential visitor parking only (i.e. limited parking provided for residents), and assuming that:

- Approximately 70% of peak hour parking demand is associated with commercial trips with an average hourly parking turnover rate of 2.5 vehicles/space/hour, and
- Approximately 30% of peak hour parking demand is associated with residential trips with an average hourly parking turnover rate of 1.5 vehicles/space/hour,

The commercial off-street parking demand is estimated as follows:

- **Scenario A:** $2,308 \times 70\% = 1,616$ trips/hour/2.5-4.0 parking turnover = 400 to 650
- **Scenario B:** $2,806 \times 70\% = 1,964$ trips/hour/2.5-4.0 parking turnover = 490 to 790
- **Scenario C:** $3,673 \times 70\% = 2,571$ trips/hour/2.5-4.0 parking turnover = 640 to 1030

The visitor (residential) off-street parking demand is estimated as follows:

- **Scenario A:** $2,308 \times 30\% = 692$ trips/hour/0.5-1.5 parking turnover = 460 to 1,380
- **Scenario B:** $2,806 \times 30\% = 842$ trips/hour/0.5-1.5 parking turnover = 560 to 1685
- **Scenario C:** $3,673 \times 30\% = 1,101$ trips/hour/0.5-1.5 parking turnover = 735 to 2200

Based on the above, the future Young District area may consider providing approximately 400 to 1030 off-street parking spaces to meet commercial parking needs, either located off-street or on street. For residential needs, approximately 460 to 2,200 off-street parking spaces to meet visitor residential parking needs would be anticipated based on the future scenarios. These needs assume no parking is provided for residential tenants.

It is noted that the current supply of public parking within the Young District is primarily located at the Halifax Forum site, with approximately 380 off-street parking spaces, in addition to some publicly accessible parking at the Monaghan Square Apartments located at the southwest corner of Young Street and Monaghan Drive. As determined in the existing conditions analysis, on-street parking within the Young District is limited to streets such as Monaghan Drive and Almon Street. It is also noted that the projected parking supply aims to support the projected modal shift for the district and will likely require notable restrictions to the maximum parking supply provided by developments.

The Young District's parking strategy should support a transit-oriented community by limiting parking supply and managing parking demand. On-street parking can be provided in the Young District. Surface off-street parking lots should be limited to loading, pick-up, drop-off and other short-term parking uses. Transportation demand management (TDM) measures should be developed include a maximum limit to parking spaces, parking prices that are separate from residential dwelling fees, shared mobility programs, encourage no parking for ground-floor commercial uses, and sustainable transportation incentives (transit incentives, indoor bike storage, etc). The following parking demands have been determined for the Young District:

- Commercial Parking: 400 to 1,030 stalls.
- Residential Visitor Parking: 460 to 2,200 stalls (10% of units)

IMPLICATIONS OF INDUCED DEMAND FROM PARKING

The supply of parking has a relationship with auto demand:

More parking → more driving → more perceived need for parking → pressure to build more parking → repeat

This feedback loop is one of the main reasons why managing parking effectively is critical to sustainable transportation planning for the Young District. The following broader impacts are experienced when more parking is provided:

- **Traffic Congestion:** Increases with more vehicle trips generated by easy parking availability
- **Land Use Efficiency:** Excess surface parking reduces density, walkability, and housing supply
- **Environmental Impact:** More emissions due to higher vehicle kilometers traveled
- **Equity:** Prioritizes drivers over transit users, walkers, cyclists, and non-car owners
- **Public Costs:** Municipalities often subsidize infrastructure and maintenance of parking

BENEFITS OF MAXIMUM PARKING REQUIREMENTS

Implementing maximum parking requirements in the Young District would offer several benefits aligned with its transformation into a transit-oriented community. By capping the number of parking spaces, the District can discourage excessive car use and promote alternative transportation modes such as walking, cycling, and public transit. Additionally, limiting parking can free up valuable land for other uses, such as green spaces, affordable housing, and commercial developments, thereby enhancing the overall livability and sustainability of the community.

POTENTIAL PARKING MANAGEMENT STRATEGIES

The implementation of a Transportation Demand Management (TDM) strategy focused on increasing mobility options and reducing parking demand over time can play a significant role in reducing the existing and future parking demands within the study area. In addition to the planned investment in increased transit and active transportation infrastructure, and the potential implementation of maximum parking requirements (as discussed above), parking related TDM policies and techniques which can be used include:

- **Implementation of Parking Pricing:** Introducing parking fees can help manage demand and encourage the use of alternative transportation modes.
- **Provision of Car and Bike Share Services:** Offering shared mobility options can reduce the need for private vehicle ownership and parking.
- **Discounted Transit Passes for Residents:** Providing incentives for public transit use can shift mode share away from private vehicles.
- **Secure Bicycle Parking in Buildings:** Ensuring safe and convenient bicycle parking can promote cycling as a viable transportation option.

6.3 TRIGGER POINTS FOR TRANSPORTATION INFRASTRUCTURE

6.3.1 PEDESTRIAN NETWORK

The need for pedestrian infrastructure is based on the fundamental requirement to provide a high degree of convenience, comfort, safety, level of service, connectivity and accessibility. Identifying specific triggers for pedestrian infrastructure improvements ensures that the community adapts to growth and changing needs over time. The following are key considerations in developing alternative network solutions for people walking and rolling to, from and within the Young District:

- **Growing Population Density:** As population density increases, so does pedestrian activity, creating greater demand for safe, accessible, and well-connected infrastructure. To support a thriving downtown community within the Young District, alternative solutions may include widening sidewalks, establishing pedestrian-only zones, adding public seating areas, and enhancing crosswalk safety measures.
- **A Complete Community Vision:** The Young District is being planned as a complete community, where key destinations such as jobs, schools, and shopping are within walking distance. The development of new residential, commercial, educational, and recreational hubs will significantly increase foot traffic, necessitating upgraded pedestrian connections, improved lighting, shaded areas, and pedestrian-friendly routes to major destinations, including schools, parks, and transit stations.
- **Safety and Accessibility:** A growing number of pedestrians increases the potential for conflicts with vehicular traffic, highlighting the need for proactive safety measures. A systems-based approach to street design should prioritize safety for all modes of transportation. This can include policies for slow streets, integration of traffic calming measures (e.g., raised intersections, curb extensions), improved signage, enhanced pedestrian signals, and highly visible crosswalks.
- **Transit-Oriented Development:** As transit service expands, improved pedestrian access to transit stops and the transit terminal will be essential. Improving access includes enhancing connectivity through well-designed pedestrian pathways, direct access routes, and safe pedestrian crossings which will ensure the Young District's transportation system is accessible and convenient for all users.

6.3.2 CYCLING NETWORK

The selection and design of cycling infrastructure in the Young District must consider future growth, network connectivity, safety, and integration with other transportation modes. This Needs Assessment evaluates key factors that signal where upgrades or expansions to the cycling network may be required, ensuring that future alternative network solutions provide appropriate cycling facilities. Cycling infrastructure improvements are essential to promote sustainable transportation, reduce car dependency, and enhance public health. The following are key considerations in developing alternative network solutions for people cycling to, from and within the Young District:

- **Projected Growth in Population and Cycling Demand:** As population density increases, so too does the demand for people who bike, provided that sufficient investments are made in the cycling network. This includes adding dedicated cycling routes, providing a connected network, implementing safe bike infrastructure, and integrating bike amenities within the district. A well-connected and accessible cycling network encourages more residents to choose cycling as a primary mode of transportation.
- **Existing Gaps in the Cycling Network:** The Young District presents an opportunity to improve cycling connectivity by filling network gaps and ensuring all areas of the community are accessible by bike. This assessment considers whether new routes are needed to link key destinations, close missing links in existing corridors, or provide seamless connections to adjacent communities and regional cycling networks.
- **Safety and Accessibility Considerations:** As the demand for people who bike increases, so does the potential for conflicts with motor vehicles. The design of the future Young District's infrastructure should adopt a systems-based safety approach to ensure that all modes of transportation can coexist safely. This includes implementing slow streets, dedicated cycling infrastructure, protected intersections, traffic calming measures (e.g., raised crossings, curb extensions), improved signage, and community bike programs to support cycling as a viable mode of travel.

- **A Complete Community Approach:** The Young District is envisioned as a complete community where major destinations such as workplaces, schools, and commercial hubs are accessible by biking. The development of new residential, commercial, educational, and recreational centers will increase local trip demand, reinforcing the need for upgraded cycling connections, improved lighting, dedicated facilities, and conveniently located bike parking.
- **Integration with Transit-Oriented Development (TOD):** The expansion of transit service will require improved first/last-kilometre cycling connections. The Needs Assessment considers whether additional cycling facilities are needed to provide direct access to transit hubs, whether bike storage facilities should be included at key transit nodes, and whether seamless multimodal connections can be achieved.

6.3.3 TRANSIT NETWORK

The future Young District transit network needs to prioritize a high transit level of service. From a network alternatives approach, this is accomplished by providing streets that are connected to a central mobility hub and are designed to accommodate future transit service. The following are key considerations in developing alternative transit network solutions for to, from and within the Young District:

- **Transit Service:** The type of transit service has several options which depend on the available network and demand. The Young District could be serviced by local service, corridor service, express service, rapid transit, or other rapid transit (such as rail). As demand for transit increases, so does the demand for increased service.
- **Transit Network:** The future network is to be composed of arterial, collector and local streets which accommodate transit. The transit network should include streets that are designated as Transit Priority Corridors that include transit priority measures, such as curbside bus lanes, queue jumps, median transitway and transit signal phases. If required, future streets within the Young District can be designated as rapid transit streets that are intended to facilitate a higher transit capacity to, from, and within the community. The need and trigger for transit priority is based on operations, the transit service type, and HRM's objectives for the overall transit network. Rapid transit streets (and therefore transit priority) are to be provided for all rapid transit routes within the Young District.
- **Mobility Hub:** The Rapid Transit Strategy identified the need for an enhanced rapid transit station within the Young District. There exists the opportunity to achieve HRM transit objectives by implementing a transit terminal within the district. The need and trigger for a transit terminal is based on the operational objectives of HRM. Local stops can also be considered for improvements such as passenger amenities, seating, larger platforms, etc.

Ridership demand can be one of several factors considering the infrastructure trigger points for the above network elements. Ensuring adequate capacity contributes toward a reliable and flexible transit system. The capacity of a transit system can refer to the maximum number of people or transit vehicles that can be moved past a point by the system. The following demand thresholds can be considered with regards to the future transit service:

- **Local/Corridor Service:** Local/corridor service typically operates with moderate headways, stopping frequently to service transit riders, and connecting the Young District to various local origins and destinations. Local service can operate on arterial, collector and local streets. It is not necessarily provided the highest transit priority. A local service with a 20-minute headway (80 passengers per bus) has a capacity of approximately 150 to 200 passengers per hour, per direction.
- **Bus Rapid Transit Service:** Bus rapid transit service typically operates with lower headways, provides infrequent stops, and connects the Young District to various regional origins and destinations. Bus

rapid transit service typically operates on rapid transit corridors that provide transit priority lanes to minimize transit delays. Off-board fare collection and level boarding improve accessibility and reduce time spent at stops. A bus rapid service with 10-minute headways (per RTS) has a capacity of approximately 480 passengers per hour, per direction (80 passengers per bus).

- **Light Rail Transit Service:** Light rail transit service can vary significantly depending on the type of rapid transit provided. LRT requires specific infrastructure and operating characteristics to function. Rail rapid transit can include streetcars, light rail and heavy rail operations. For the Young District, light rail and streetcar operations could be considered as possible solutions.
 - A streetcar system with 10-minute headways and 200 passengers per streetcar can achieve a capacity of 1,200 passengers per hour, per direction.
 - A light rail transit with a headway of 12 minutes and a per-train capacity of 450 passengers can provide a capacity of 2,250 passengers-per-hour, per direction.

When it comes to bus transit service, a variety of local, express (i.e. peak hour/peak direction), and rapid transit service can overlap to provide capacity across the project screenlines. The links within the transit network depend on the type and location of service. While this is largely unknown, the development of alternative network should consider the following when establishing transit streets:

- **Transit Priority for Rapid Transit:** Where rapid transit service is routed, transit priority should be provided to improve transit travel times and transit reliability. At a network level, this would include bus lanes on rapid transit segments and intersection improvements such as bus queue jump lanes and transit signal priority.
- **Maximize Transit Ridership:** The arrangement of the street network should seek to maximize transit ridership by promoting an effective walkshed. This would include providing continuous sidewalks on all streets within 800m walksheds of a rapid transit station.
- **Minimize Transit Disruption:** The arrangement of streets should seek to minimize turns which can incur delays to transit. They should be organized to promote synergies between local and rapid transit to improve network efficiency and the effective use of transit infrastructure.

The selection of the Mobility Hub as a central transit hub in the Young District will play a crucial role in supporting multimodal connectivity and facilitating seamless transfers. Depending on future transit demand and network integration, the district may require one of or a combination of the following:

- **Enhanced Transit Station:** A high-quality transit stop with improved shelters, passenger amenities, and real-time arrival information. Enhanced stations benefit riders by increasing comfort, efficiency, access and providing information. Per the RTS, enhanced rapid transit stations with high ridership and at transfer points will be larger and provide more amenities than standard stations. They are also intended to become multi-use destinations rather than just places to wait. For example, stations may include small shops or a small park or plaza, they may be integrated into surrounding buildings, or they may emphasize a nearby attraction through their design.
 - For a bus rapid transit system with 80 passengers per bus, 2 shelters, and 5-minute bus headways, can accommodate ~960 passengers per hour. More than one enhanced station can service the Young District and can be increased in size if required.
- **Transit Terminal:** A transit terminal is a larger facility with multiple bus bays, waiting areas, passenger and driver amenities, and integrated walking and cycling connections. Per the RTS, rapid transit lines stop at Halifax Transit terminals to offer convenient transfers to local routes. The need for a transit terminal is based on the operational requirements of the transit service. Therefore, the number of required bus bays within a transit terminal is based on project bus volumes, and can be determined

using The Transit Cooperative Research Program (TRHP) *Transit Capacity and Quality of Service Manual* (3rd Edition) (Figure 6-6). The resulting capacity of a transit terminal can then be based on the number of bus bays, such as:

- For a bus rapid transit system with 10 buses per hour per bay: 6,000 passengers per hour
- For a light rail transit system with 450 passengers per train, 5-minute headways, 2 platforms): 10,800 passengers per hour

Figure 6-6: TCRP Loading Area Bus Capacity Calculation Method

Loading Area Bus Capacity (buses/ hour)	
$BI = \frac{3,600 \left(\frac{g}{C} \right)}{t_c + t_d \left(\frac{g}{C} \right) + Z(c_v)(t_d)}$	
Variable	Meaning
3,600	Number of seconds per hour
$\frac{g}{C}$	Green time ratio (ratio of effective green time to total traffic signal cycle length, equals 1.0 for unsignalized streets and bus facilities)
t_c	Clearance time (s)
t_d	Average (mean) dwell time (s)
Z	Standard normal variable corresponding to a desired failure rate (assumed to equal 1.0 minus the failure rate, where typical failure rate is 0.25)
c_v	Coefficient of variation of dwell times (typically 0.6)

6.3.4 STREET NETWORK

Improvements to the street network involve strategic investments to build a new community. The following triggers can warrant investments in the Young District street network:

- The need to develop a network which supports future development through a fine-grained grid with proper lot depths, access, and delivery opportunities.
- The need to facilitate municipal services throughout the community such as maintenance, snow clearing and waste collection.
- The need to provide access and circulation for emergency vehicles throughout the community.
- The need to alleviate safety concerns for all road users by providing well designed, safe streets which are intuitive and accessible.
- The need to optimize existing road infrastructure to protect prior investments while fostering the new community. This can include investments in new technologies which can optimize the entirety of the multimodal street network.
- The need to provide a continuous and well-connected network for all modes, including delivery and heavy vehicles travelling through the network and to support redundancy in the transit network.

While street improvements are typically based on the amount of vehicle demand for the particular roadway link, improvements within the Young District are warranted to support it as a complete community. These

improvements are related to connectivity and safety intended to optimize existing capacity and support the movement of transit vehicles, and of people walking and cycling.

6.4 SUMMARY OF THE YOUNG DISTRICT'S TRANSPORTATION NEEDS

6.4.1 PEDESTRIAN NETWORK

Table 6-17 summarizes the sidewalk width needs assessment for the existing Young District collector and arterial streets for each land use scenario. The trip demand analysis demonstrates a network-level need for sidewalks throughout the Young District. For each collector and arterial street, a pedestrian activity level is assigned based on the future land use scenario and context. The range of sidewalk widths should be considered within the future cross-section alternatives analysis. In summary:

- **Almon Street:** Almon Street is anticipated to provide access to mid-rise, mixed-use land uses. Moderate sidewalk widths of 2.1m with a boulevard of 1.0m or greater is required.
- **Kempton Road:** Kempton Road is anticipated to serve as a north-south spine with the opportunity to service higher density mixed-use land uses on either side of the corridor. It is likely to have a significant role in the future transit network given that it connects to the future Strawberry Hill FGN. The forecast Kempton Road pedestrian demands are anticipated to be highest near Young Street, where sidewalks should be 3.0m wide with a boulevard of 1.5m or greater to enable street trees.
- **Massachusetts Avenue:** Massachusetts Avenue is anticipated to maintain its current function as a vehicle-moving street connecting to the Windsor Street Exchange to the north and the MacKay Bridge. Low pedestrian volumes are anticipated on this corridor. A typical sidewalk of 1.8m-2.1m is required. A wide boulevard with tree planting should be considered to separate pedestrians from the travel lanes.
- **Robie Street:** Robie Street will have an active street frontage with high density mixed-use developments on either side of the roadway. It will have a notable role in the future transit network. Future pedestrian volumes are anticipated to be high. A sidewalk width of 3.0m and boulevard width of at least 1.5m would be required.
- **Windsor Street:** Windsor Street has notable existing pedestrian demands fronting the Halifax Forum site. Pedestrian demands would increase should the Windsor Street frontage redevelop into a mixed-use land use.
- **Young Street:** Young Street will have an active street frontage with high density mixed-use developments on either side of the street. It may have a notable role in the future transit network unless alternative east-west transit routing can be explored. Future pedestrian volumes are anticipated to be high. A sidewalk width of 3.0m and boulevard width of at least 1.5m would be required. Future opportunity to increase the sidewalk width to 3.5m should be reviewed depending on land availability.
- **Future Local Streets:** Future local streets should seek to provide typical sidewalks (+2.1m) with boulevards capable of tree plantings (+1.5m). Local streets fronting parks and public spaces can consider wider sidewalks and boulevards to improve the public realm.

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Table 6-17: Preliminary Pedestrian Network Needs Assessment for Existing Collector and Arterial Streets

Existing Street	Segment	Scenario	Future Land Use	Forecast Pedestrian Activity Level	Sidewalk/Boulevard Width Required (per direction)
Almon Street	Windsor Street to Robie Street	All	Medium Density Mixed-Use	Moderate	2.1 to 3.0m/ 1.0 to 2.5m
Kempt Road	Rail Bridge to Stairs Street	Scenario A	Low Density	Low	1.8 to 2.1m/ 0 to 2.5m
		Scenarios B & C	Medium Density Mixed-Use	Moderate	2.1 to 3.0m/ 1.0 to 2.5m
	Stairs Street to Young Street	All	High Density Mixed-Use	Moderate	2.1 to 3.0m/ 1.0 to 2.5m
Massachusetts Avenue	Columbus Street to Stairs Street	All	Medium Density Mixed-Use	Low	1.8 to 2.5m/ 0 to 2.5m
Robie Street	Stairs Street to Almon Street	All	High Density Mixed-Use	High	3.0 to 4.0m/ 1.5 to 2.5m
Windsor Street	Maxwell Avenue to Young Street	Scenarios A & B	Low Density	Low	1.8 to 2.5m/ 0 to 2.5m
		Scenario C	High Density Mixed-Use	High	3.0 to 4.0m/ 1.5 to 2.5m
	Young Street to Almon Street	All	Medium Density Mixed-Use	High	3.0 to 4.0m/ 1.5 to 2.5m
Young Street	Windsor Street to Robie Street	All	High Density Mixed-Use	High	3.0 to 4.0m/ 1.5 to 2.5m

6.4.2 CYCLING NETWORK

Table 6-18 summarizes the cycling network needs assessment, which demonstrates an evaluation the suitability of cycling infrastructure improvements across different street segments in the Young District. It considers existing infrastructure, cycling network gaps, land use context, projected auto demand, and implementation feasibility to support the development of a complete, AAA cycling network. The table helps identify where investments in cycling infrastructure are most needed to align with community design objectives and future growth with regards to existing streets. There can be additional need for new streets within the Young District which have not been identified in the table. In summary:

- **Almon Street:** Almon Street is currently a AAA cycling street undergoing improvements to provide separated bike lanes. Almon Street will maintain its current function.
- **Kempt Road:** Kempt Road is anticipated to serve as a north-south spine with the opportunity to connect Strawberry Hill to the Young District. There is an opportunity to provide a key north–south cycling link to Almon Street filling in an existing gap.
- **Massachusetts Avenue:** Massachusetts Avenue is anticipated to maintain its current function as a vehicle-moving street connecting to the Windsor Street Exchange to the north. Given the availability of Kempt Road to the west and Isleville Street to the east, cycling facilities are not needed on Massachusetts Avenue.
- **Robie Street:** Robie Street presents an opportunity to provide a north-south cycling link parallel to Windsor Street and Isleville Street. It has limited right-of-way to accommodate additional cycling

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infrastructure in addition to its role in the rapid transit network. While a AAA designation would be beneficial to the overall cycling network, it is not a requirement given the availability of Kempt Road.

- **Windsor Street:** Windsor Street is currently a AAA cycling street undergoing a functional design for strategic improvements. Windsor Street will maintain its function and has a need for improved separated cycling facilities as vehicle volumes increase.
- **Young Street:** Young Street provides an opportunity for an east-west cycling link north of Almon Street, connecting from Windsor Street to Isleville Street. The opportunity to provide a AAA cycling designation should be explored.

Table 6-18: Preliminary Pedestrian Network Needs Assessment for Existing Collector and Arterial Streets

Street	Segment	Existing Cycling Infrastructure	Future Auto Demand/Speeds	Future AAA Designation Potential	Gap in Cycling Network?	Recommended Cycling Designation/Infrastructure
Almon Street	Windsor Street to Robie Street	AAA Cycling Street Protected Bike Lanes	Moderate Demand Low Speeds	High	No	No Change Remains AAA Bicycle Route
Kempt Road	Rail Bridge to to Young Street	None	Moderate Demand Moderate Speeds	High	Yes – Between Strawberry Hill and the Young District	AAA Designation Protected Bike Lanes
Massachusetts Avenue	Columbus Street to Stairs Street	None	High Demand High Speeds	Low	No	None
Robie Street	Stairs Street to Almon Street	None	High Demand Moderate Speeds	Moderate	Yes North-south Cycling between Windsor Street and Isleville Street	None
Windsor Street	Maxwell Avenue to Young Street to Almon Street	On-Street Bike Lanes	Moderate Demand Moderate Speeds	High	No	No Change Remains AAA Bicycle Route
Young Street	Windsor Street to Robie Street	None	Moderate Demand Low Speeds	Moderate	Yes Only major east- west link north of Almon Street	AAA Designation Protected Bike Lanes

6.4.3 TRANSIT NETWORK

Table 6-19 summarizes the future peak hour inbound/outbound (to/from the Young District) bus demand for each land across the project screenlines. The analysis considers the sum of existing and future demands. The table compares the future peak hour bus demand to existing transit service to identify the potential increase in bus trips across each screenline required to service the Young District.

This high-level analysis intended to demonstrate the transit needs for each screenline for based on existing and projected trip distributions. Additional analysis of origin-destination patterns would be required to ascertain the need for increased frequency of specific routes or the need for new routes. The table assumes 80 passengers per bus for the purposes of this analysis. In summary, the following basic headways were found to be required by this analysis:

- For Scenario A, an additional 6 to 8 buses per direction during the peak hour across the South screenline, which is an additional bus every 8 to 10 minutes.

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- For Scenario B, an additional 10 to 15 buses per direction during the peak hour across the South screenline, which is an additional bus every 4 to 6 minutes. Additional frequency is needed across the North screenline (AM inbound, PM outbound), the East screenline (AM outbound, PM inbound) and the west screenline (AM inbound, PM inbound/outbound)
- For Scenario C, an additional 15 to 20 buses per direction during the peak hour across the South screenline, which is an additional bus every 3 to 4 minutes. All other Screenlines require additional frequency of up to 8 buses per hour in the peak directions (7 to 8-minute headways). Additional frequency is needed across the North screenline (AM inbound, PM outbound), the East screenline (AM outbound, PM inbound) and the West screenline (all).

Table 6-19: Transit Service Needs Assessment, Bus Service

		Future Bus Demand 80 Passengers/Bus Existing + Future Demand				Existing Service (Buses/hour)				Required Service Increase Above Existing (Buses/hour)			
		AM Peak		PM Peak		AM Peak		PM Peak		AM Peak		PM Peak	
		Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound
A	North	11	4	5	12	11	8	9	11	0	0	0	1
	South	5	6	8	7	0	3	2	0	5	6	8	7
	East	2	4	4	2	7	7	9	9	0	0	0	0
	West	4	2	2	6	3	1	1	3	1	0	0	3
B	North	13	6	7	16	11	8	9	11	2	0	0	5
	South	7	13	15	10	0	3	2	0	7	13	15	10
	East	4	10	9	5	7	7	9	9	0	3	2	0
	West	6	3	4	8	3	1	1	3	3	0	1	5
C	North	15	7	9	19	11	8	9	11	4	0	0	8
	South	8	16	19	11	0	3	2	0	8	16	19	11
	East	4	12	12	7	7	7	9	9	0	5	5	0
	West	7	4	5	10	3	1	1	3	4	1	2	7

Note: Inbound and outbound refer to directions relative to the Young District and crossing the project screenlines.

The future transit service is to include rapid transit on the Green Line and Purple Line. The rapid transit service is anticipated to augment existing local, corridor and express bus service. **Table 6-20** analyzes the adequacy of the Purple Line and Green Line future rapid transit service for meeting the future Young District demand assuming 10-minute headways for bus rapid transit. The 10-minute headway is based on the RTS. The tables summarize the additional service required beyond the rapid transit, demonstrating the need for either additional rapid transit service, additional local and corridor service or alternative service methods (light rail transit). It assumes existing transit service remains in place. A value of zero indicates the transit service is sufficient or exceeds the demand from the Young District. A review of **Table 6-20** indicates:

- For Scenario A, the 10-minute rapid transit headway can meet the forecast Young District demand for most screenlines. The South Screenline would need additional service in the order of 1 to 2 additional buses per hour.
- For Scenario B, the 10-minute rapid transit headway can meet the forecast Young District demand for most screenlines. The South Screenline would need additional rapid transit service in the order of 7 to 9 additional buses per hour. A shorter headway would be required to increase capacity for the rapid

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transit (i.e. five-minute headways) with some additional local service improvements (1 to 3 additional local/corridor buses per hour).

- For Scenario C, similar to Scenario B, the 10-minute rapid transit headway is insufficient to meet future demand across the South Screenline. The South Screenline would need additional rapid transit service in the order of 10 to 13 additional buses per hour. A shorter headway would be required to increase capacity for the rapid transit (i.e. four-minute headways) with some additional local service improvements (1 to 4 additional local/corridor buses per hour).

The above analysis indicates that the planned rapid transit service would need to be supplemented by additional local service regardless of the land use scenario. Land use Scenarios B and C would require more frequent headways than planned by the RTS.

Table 6-20: Analysis of Future Bus Service Needs, 10-Minute Rapid Transit Headways

Scenario	Screenline	Future Rapid Transit Service Serving Screenline	Number of Buses/hour Rapid Transit Headway of 10 Minutes	Required Service Beyond Rapid Transit at 10-minute headways			
				AM Peak		PM Peak	
				Inbound	Outbound	Inbound	Outbound
A	North	Green Line	6	0	0	0	0
	South	Green Line	6	0	0	2	1
	East	Purple Line	6	0	0	0	0
	West	Purple Line	6	0	0	0	0
B	North	Green Line	6	0	0	0	0
	South	Green Line	6	1	7	9	4
	East	Purple Line	6	0	0	0	0
	West	Purple Line	6	0	0	0	0
C	North	Green Line	6	0	0	0	2
	South	Green Line	6	2	10	13	5
	East	Purple Line	6	0	0	0	0
	West	Purple Line	6	0	0	0	1

TRANSIT TERMINAL

A transit terminal services buses with the Young District by providing bus bays and amenities among other things. For the purposes of this needs assessment, assumptions were made for bus dwell and clearance times, and default rates for other variables. The TCRP calculation suggests that each individual loading area (bus bay) can serve up to 37 buses per hour (assuming an average dwell time of 60 seconds per bus and 10 seconds clearance time). To be slightly conservative, the Young District can assume a capacity of 30 buses per hour per bus loading area or one bus every two minutes.

Based on the projected bus volumes of 50 to 90 buses per hour in the peak hour, this would require a transit terminal with three loading areas (90 bus per hour capacity). However, the TCRP capacity calculations do not account for several other important factors which need to be considered in transit terminal planning, including:

- Longer dwell times needed for bus routes terminating or originating at the transit terminal or buses waiting at a timepoint.
- Grouping of routes by service type, destination, direction, etc. to assist in customer wayfinding and convenience.

- Need for spare capacity to accommodate future growth or new routes.

Table 6-21 summarizes the transit terminal bus bay needs based on the established bus volumes and assumptions made with respect to grouping of services as well as the number of buses per hour each bay would need to support. The number of bus bays presented in the table would allow transit service to increase alongside the Young District, as well as service growth outside the Young District area.

In terms of on-street terminal requirements, the number of bus bays required will be a reflection of the capacity assumptions. Assuming a single bus loading area can accommodate 30 buses/hour, **three bus loading areas per direction** (90 buses/hour capacity) would accommodate projected demand and have capacity for future growth. Double bus loading areas would be an alternative, allowing for grouping of routes by destination. The impact of traffic signal operations at either end of the terminal will need to be further assessed during future design stages to ensure signal timing (cycle lengths) does not negatively impact terminal capacity; similarly the interaction between transit vehicles and general purpose traffic will need to be reviewed further with consideration given to measures such as turn prohibitions or a transit-only roadway through the terminal.

Table 6-21: Identified Transit Terminal Needs based on Bus Bay Assignment and Buses per Hour

Bay	Routes Served	Buses/Hour (Max)
1	Green Line OB + PM (OB) express via Kempt	22
2	Purple Line OB + PM (OB) Express via Bayers	22
3	Green Line IB + AM (IB) Express via Kempt	28
4	Purple Line IB + AM (IB) Express via Bayers	23
5	Route 7A + 8 OB	8
6	Route 7B + 8 IB	8
7	Route 90 OB + NEW OB	6
8	Route 90 IB + NEW IB	6
9	Spare	0
10	Spare	0

The type and length of buses to be accommodated does not influence capacity, however is critical in determining the footprint of the terminal required. Halifax Transit has indicated that articulated buses are 18.3 m in length, which is the longest bus which will need to be accommodated. Additional buffer space to account for bus maneuvers will need to be provided.