INFILL ROADMAP: ACTION 2 REVIEW INFRASTRUCTURE CAPACITY

Mobility Technical Report

January 18, 2022 | FINAL

Information contained in this document is for planning purposes and should not be used for final design of any project. All results, recommendations, concept drawings, cost opinions, and commentary contained herein are based on limited data and information and on existing conditions that are subject to change. Further analysis and engineering design are necessary prior to implementing any of the recommendations contained herein.

Geographic and mapping information presented in this document is for informational purposes only, and is not suitable for legal, engineering, or surveying purposes. Mapping products presented herein are based on information collected at the time of preparation. Toole Design Group Canada Inc makes no warranties, expressed or implied, concerning the accuracy, completeness, or suitability of the underlying source data used in this analysis, or recommendations and conclusions derived therefrom.

Opinions of probable cost were developed by identifying major pay items and establishing rough quantities to determine an order of magnitude cost. Additional pay items have been assigned approximate lump sum prices based on a percentage of the anticipated construction cost. Planning-level cost opinions include a 50% contingency to cover items that are undefined or are typically unknown early in the planning phase of a project. Unit costs are based on 2021 dollars and were assigned based on historical cost data from the City of Edmonton and based on unit rates used for the Mobility Network Assessment project. Cost opinions do not include easement and right-of-way acquisition; permitting, inspection, or construction management; engineering, surveying, geotechnical investigation, environmental documentation, special site remediation, escalation, or the cost for ongoing maintenance. A cost range has been assigned to certain general categories such as utility relocations; however, these costs can vary widely depending on the exact details and nature of the work and the costs associated with utility expansions in included under separate report completed by AECOM. The overall cost opinions are intended to be general and used only for planning purposes. Toole Design Group Canada Inc makes no guarantees or warranties regarding the cost estimate herein. Construction costs will vary based on the ultimate project scope, actual site conditions and constraints, schedule, and economic conditions at the time of construction.

CONTENTS

INTRODUCTION

In 2018, the City of Edmonton established the Infill Roadmap to support the expansion and enhancement of infill development within the City. The plan sought to determine how the City could welcome more people and new homes into established areas. As part of the work, 25 Actions were identified to answer this question and support future infill development. The focus of this project is on the Infill Roadmap: Action 2 Review Infrastructure Capacity (Infrastructure Capacity Review).

The goal of the review is to assess the ability of selected nodes and corridors within older neighbourhoods to accommodate the City's future growth for additional people and new homes. Where existing infrastructure capacity is insufficient, the review will also identify the type and scale of infrastructure and high-level cost estimates needed to support the infill development anticipated by *The City Plan*. The review of infrastructure investments is broken down into transportation infrastructure and utility infrastructure. The scope of this report is on the analysis of mobility and the transportation infrastructure used to support all modes of travel. A separate assessment has been completed to provide similar analysis for the utility infrastructure capacity and can be found in a related report.

The focus of the review is on nine study areas (shown in Figure 1) consisting of three nodes and six corridors:

1. Centre City Node
2. University-Garneau Node
3. Stadium Node
4. 97 Street Corridor
5. 118 Avenue Corridor
6. 111 Avenue Corridor
7. Stony Plain Road Corridor
8. 109 Street Corridor
9. Whyte Avenue / 99 Street Corridor

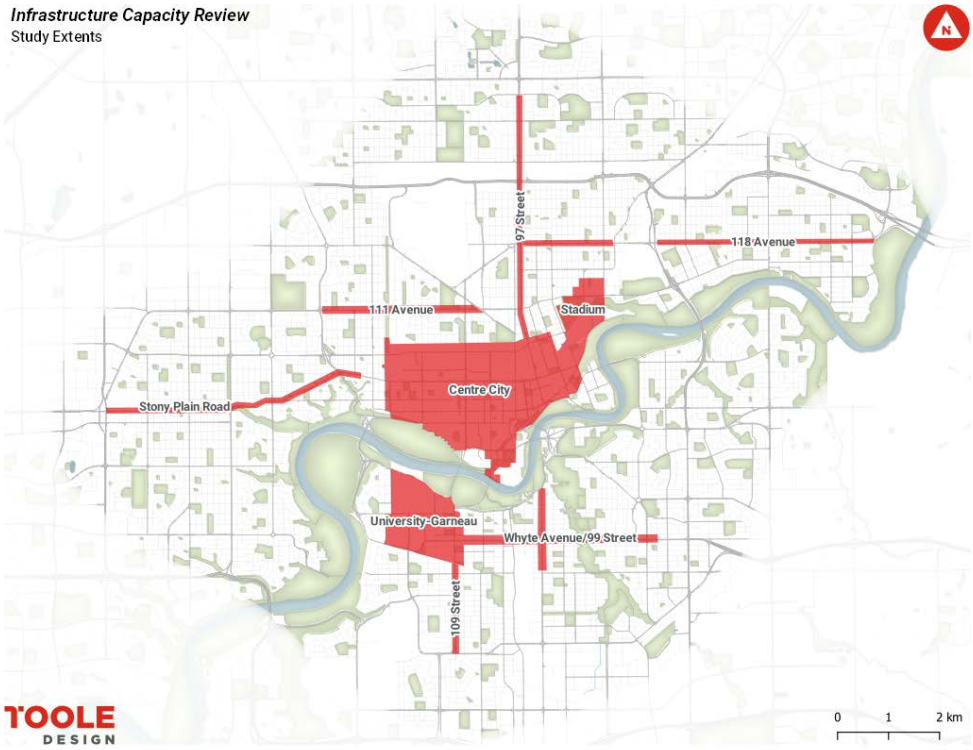


Figure 1: Infrastructure Capacity Review Study Extents

In December 2020, City of Edmonton's City Council approved Edmonton's new *City Plan*, which charted the course to a future population horizon of two million people. The *City Plan* outlined the development goals and outcomes further and established how to achieve the infill targets envisioned. The *City Plan* policies and outcomes have been incorporated within the Infrastructure Capacity Review and are described further within the *City Plan* Review section of this report.

The analysis within this report is organized as follows:

Infill Roadmap

- This chapter provides details about the City of Edmonton's workplan to promote infill development.

City Plan Review

- This chapter includes a review of the broad outcomes and specific policy directions from the *City Plan*, which have guided the project.

Target Development Scenarios

- This chapter provides details for the two development scenarios that were considered within the analysis – models with and without the Levers of Change described in the *City Plan*.

Existing System Capacity and Quality Assessment

- This chapter shows the results of the capacity assessment for vehicles, transit, walking, and cycling and the quality assessment for the public realm.

Recommended Capacity and Quality Changes

- This chapter shares the results of the analysis completed to identify infrastructure improvements.

Cost Estimation

- This chapter shares high-level costs for the investments needed for improvements in transportation infrastructure capacity and the quality of the public realm.

Conclusions and Recommendations

- The final chapter provides the conclusions and recommendations for the Infill Roadmap: Action 2 Review Infrastructure Capacity.

While the *City Plan* and the Infrastructure Capacity Review study looked at the demands at a population of 2 million, the nodes and corridors selected for the Infrastructure Capacity Review were chosen based on the highest anticipated demands for growth defined by additional residential dwelling units. The selected nodes and corridors are anticipated to see up to 5,000 new residential dwellings at the 1.25 million population threshold with varying activation approaches of Strategize, Invest, and Nurture.

INFILL ROADMAP

The *Infill Roadmap* was developed by the City of Edmonton in 2018 to help support increased amounts of infill development within the City's core, mature, and established neighbourhoods. The *Roadmap* identifies 25 actions that are needed to achieve the goals for infill development in the city. The outcomes of the project can be seen in the figure below from the *Infill Roadmap:*

Figure 2: *Infill Roadmap* Project Outcomes (Source: *Infill Roadmap*)

The focus of this project is Action 2 Review Infrastructure Capacity, which is described as the following in the *Infill Roadmap*:

- Review infrastructure capacity in Edmonton's older neighbourhoods and identify the infrastructure investments needed to support infill.

While this report is for the transportation infrastructure investments required, concurrent work has been completed to identify the utility investments required as well. Together, both studies will provide the City of Edmonton with the knowledge needed to help achieve the outcomes of the *Infill Roadmap*.

CITY PLAN REVIEW

To ensure alignment with City of Edmonton policy, a review of the *City Plan* was completed prior to the analysis. The following section outlines elements of the *City Plan* that are relevant to the Infrastructure Capacity Review and how they impact the decision making for the analysis and recommendations. The review has helped to establish how specific *City Plan* policies impact the evaluation of existing streets and the development of future street cross-sections. The *City Plan*'s policies were organized into Outcomes, Intentions, and Directions. These have been shared within this report, and are described further within the *City Plan* Review within Appendix A.

Selected Outcomes, Intentions and Directions

The following Outcomes, Intentions and Directions define the look, feel, and operation intended for the nodes and corridors. The look, feel, and operation of streets are impacted by specific cross-section elements. To help establish the link between the policies and street cross-sections, for each outcome and its corresponding intentions and directions, right-of-way implications have been identified. These will help to evaluate cross-sections and frame discussions about trade-offs.

Table 1 – *City Plan* Outcomes, Intentions, and Directions and Right-of-Way Implications

***City Plan* Policy**	**Right-of-way Implications**
Outcome 1.2 Edmontonians can connect, be active in their community and celebrate Edmonton's heritage, diversity and unique identity	Prioritize allocation of street right-of-way for use by people of all ages, abilities, and backgrounds can move through and gather within.
Intention 1.2.2 Ensure vibrant and inclusive communities where children, youth and families can live, learn and grow together	
Direction 1.2.2.5 Apply a gender-based equity lens in the design and application of City infrastructure, policy, programs and services.	
Outcome 1.3 Edmonton's city design fosters a sense of place by celebrating our unique attributes, diversity and opportunities within the region	Prioritize allocation of right-of-way to enable safe and comfortable movement for people walking, cycling, and using transit. Prioritize allocation of right-of-way to facilitate safe and comfortable environments in winter. Consistent with the Complete Streets Design & Construction Standards, "people walking" includes people running; people standing; people using manual/motorized wheelchairs or scooters; people using canes or walkers; people pushing strollers or carts; people pushing bicycles; and users of various other low-speed forms of human locomotion (e.g., skateboards).
Intention 1.3.3 Support the elimination of poverty, its root causes and disparity in Edmonton's communities	
Direction 1.3.3.2 Address equity in the delivery of policies, programs, public services, investment and infrastructure delivery.	
Direction 1.3.3.5 Prioritize transportation investments and operations for people experiencing vulnerability.	
Intention 1.3.2 Support Edmonton's identity as a winter city through its infrastructure, design, events and economy	
Direction 1.3.2.4 Improve and integrate winter city design through the development of buildings, the public realm and open spaces.	
Outcome 1.4 Edmontonians demonstrate shared leadership as stewards of the environment	Prioritize allocation of right-of-way to support people-movement and over vehicle-movement.
Intention 1.4.1 Support Edmontonians' transition to a low carbon future in their daily lives	
Direction 1.4.1.2 Design and deliver mass transit and active transportation network infrastructure to enable energy efficient mobility.	

City Plan Policy	Right-of-way Implications
Outcome 2.2 Edmontonians have the ability to live locally, with access to diverse and affordable housing options in communities that support their daily needs	Prioritize allocation of right-of-way to encourage engaging gathering spaces, provide comfortable spaces that support walking and cycling trips, and support enhanced transit services and access where necessary.
Intention 2.2.1 Promote compact, mixed use development within districts that supports equitable access to employment, education and amenities	
Direction 2.2.1.1 Design and retrofit street layouts to facilitate intensification and ongoing adaptability.	
Direction 2.2.1.2 Improve local open space and public amenities to support density increases.	
Direction 2.2.1.5 Facilitate housing and job growth and intensification within nodes and corridors.	
Intention 2.2.3 Ensure that walkable and attractive mixed-use development occurs at nodes and along corridors in a manner that is integrated with accessible mass transit	
Direction 2.2.3.1 Implement mass transit to support nodes and corridors.	
Direction 2.2.3.2 Preserve and strengthen the role of Centre City as Edmonton's principal employment and residential node, regional economic and mobility hub, urban and traditional meeting place and celebration space.	
Direction 2.2.3.5 Prioritize the building, activation and maintenance of beautiful, comfortable public spaces at nodes and corridors.	
Outcome 2.3 Edmonton's growth and development mutually benefit the city and region	Ensure allocation of right-of-way can support high-quality walking and cycling environments as well as efficient transit service to accommodate intensification in priority growth areas.
Intention 2.3.1 Promote opportunities to accommodate growth through the compact development of new and existing neighbourhoods	
Direction 2.3.1.4 Strategically expand infrastructure capacity to enable future redevelopment and intensification in alignment with priority growth areas.	
Direction 2.3.1.5 Sequence development and align infrastructure upgrades to leverage and optimize existing infrastructure.	
Intention 2.3.2 Ensure that growth is managed with regard to long term fiscal impacts and full lifecycle costs of infrastructure and services	
Direction 2.3.2.5 Maximize the efficiency of the existing mobility network through a holistic analysis of system capacity and targeted infrastructure improvements.	
Outcome 2.4 Edmonton is a leader in efficient, sustainable and resilient community design, development and living	Prioritize facilities for walking, cycling, and transit to support sustainable mobility options. Prioritize the curbside zone within cross-sections for micro-mobility, new mobility, green infrastructure, and low impact development solutions. Where necessary, consider curbside zone and furnishing zone as one large combined zone to maximize public assets.
Intention 2.4.2 Ensure public building and infrastructure are sustainable and resilient	
Direction 2.4.2.1 Manage the impacts of climate change on City assets in the design, maintenance and retrofit of buildings and infrastructure.	
Direction 2.4.2.3 Encourage and support emerging mobility technologies in alignment with a compact, livable community	
Direction 2.4.2.4 Design roadways and manage road rights-of-way to be adaptable to future mobility and land use needs.	
Direction 2.4.2.5 Manage parking and curbside space as a strategic public asset.	
Direction 2.4.2.6 Prioritize and enable green infrastructure including low impact development solutions.	

City Plan Policy	Right-of-way Implications
Outcome 3.2 Edmonton fosters a vibrant economy by supporting business and attracting skills, talent and investment	Prioritize allocation of right-of-way to provide basic pedestrian comfort and access within cross-sections regardless of land use context. Prioritize public realm space which creates engaging environments.
Intention 3.2.1 Ensure that development and public infrastructure is designed to support a vibrant local economy and competitive business environment	
Direction 3.2.1.3 Partner to align placemaking initiatives with infrastructure and renewal projects.	
Direction 3.2.1.5 Adapt public infrastructure to respond to disruptive change.	
Intention 3.2.2 Promote the attraction and retention of a highly skilled and talented workforce in support of ongoing innovation, investment, education, entrepreneurship and quality of life	
Direction 3.2.2.2 Provide pedestrian connections, amenities and facilities to support employees in non-residential areas.	
Outcome 4.1 Edmonton advances equity through access to universally accessible spaces, services, facilities and transportation networks	Ensure that basic accessibility and safety requirements within public realm street zones are never compromised.
Intention 4.1.1 Support inviting and inclusive transportation options for Edmontonians of all ages, abilities, and incomes	
Direction 4.1.1.1 Design and build high quality, aesthetically pleasing and user-friendly transit facilities.	
Direction 4.1.1.3 Respond to gaps in the mobility system to improve accessibility and safety.	
Direction 4.1.1.4 Enhance street design through building and renewal to improve connectivity, amenity space and beauty.	
Intention 4.1.2 Ensure safety of all users in the planning and design of city infrastructure, networks and spaces	
Direction 4.1.2.1 Provide safe streets and convenient pedestrian crossings that appropriately serve the context of the area.	
Direction 4.1.2.3 Design, operate and maintain the mobility system so people are safe and secure.	
Intention 4.1.3 Ensure the equitable access of affordable services and amenities to all Edmontonians	
Direction 4.1.3.4 Connect districts to one another through a diverse range of transportation options.	
Outcome 4.2 Edmontonians live closer to what they need and are supported by walkable communities, active transportation networks and greater connectivity across all travel modes	Prioritize allocation of right-of-way for high-quality walking and cycling environments and to support efficient transit. Focus on people movement and gathering spaces, particularly for short trips, rather than vehicle movement.
Intention 4.2.1 Ensure that transportation investment supports urban intensification and diversification	
Direction 4.2.1.2 Plan and design active transportation and transit networks in support of nodes and corridors.	
Intention 4.2.2 Ensure a mobility system where people can move seamlessly from one travel option to another to conveniently fulfill their daily needs	
Direction 4.2.2.1 Incorporate mobility hubs in select nodes.	
Direction 4.2.2.4 Design transportation infrastructure that is intuitive and user friendly.	
Intention 4.2.3 Ensure active transportation networks serve a variety of purposes including recreation, commuting, commerce and fun	

City Plan Policy	Right-of-way Implications
Direction 4.2.3 Develop a coordinated network of pathway throughout the city that supports active transportation and recreation in connection with Edmonton's river valley, open spaces and regional connections.	
Outcome 4.3 Edmonton's mobility system connects residents and businesses, creating opportunities and building partnerships through the region	Prioritize allocation of right-of-way to focus on people-movement rather than vehicle-movement and promote better long-term use of resources.
Intention 4.3.1 Ensure that the mobility system enables the efficient movement of people and goods within Edmonton and in the Metropolitan Region	
Direction 4.3.1.2 Accept levels of congestion in different contexts to ensure an efficient use of resources.	
Outcome 4.4 Edmontonians benefit from improved public transit and high-quality active transportation networks that reduce greenhouse gas emissions	Prioritize allocation of right-of-way to meet or exceed accessibility requirements and support transit efficiency. EV charging systems could be incorporated within the furnishing zone.
Intention 4.4.1 Support a low-carbon mobility system	
Direction 4.4.1.1 Encourage a shift to transit and active transportation options.	
Outcome 5.1 Edmonton protects, expands and improves access to its natural systems and open spaces in support of biodiversity and the health and enjoyment of all Edmontonians	Ensure allocation of right-of-way supports trees and green infrastructure are given as much importance as mobility features. Species selected during design should be adaptable and resilient to future climate conditions.
Intention 5.1.2 Promote the conservation and restoration of natural systems to improve ecological connectivity and reduce habitat fragmentation	
Direction 5.1.2.2 Expand and diversify Edmonton's urban tree canopy and native vegetation.	
Outcome 5.2 Edmonton protects and enhances its image and identity through heritage	Prioritize right-of-way allocation to create sense of place and unique environments.
Intention 5.2.1 Promote Edmonton's history and encourage a sense of local identity by preserving and enhancing heritage	
Direction 5.2.1.4 Preserve, enhance and create view and vistas of significant buildings, streetscapes and natural landscapes.	
Outcome 5.4 Edmonton's natural and physical systems provide security and resilience against extreme weather events and other environmental hazards	Prioritize allocation of right-of-way to promote green infrastructure and low impact development design solutions within the furnishing and curbside zones.
Intention 5.4.1 Ensure the safety and security of Edmonton's water supply, food systems, infrastructure and natural systems to support long-term resilience to flooding, droughts and extreme weather events.	
Direction 5.4.1.1 Manage stormwater runoff and improve water quality through the design and development of the built environments.	
Direction 5.4.1.2 Improve flood resilience through ongoing risk management, infrastructure planning and operation, financial analysis and stakeholder engagement.	
Outcome 6.1 Edmonton fosters citizen leadership, capacity building and co-creation	Prioritize street elements which allow for engaging places for gathering.
Intention 6.1.2 Promote community-based placemaking to retrofit and redevelop open spaces and public facilities	
Direction 6.1.2.2 Encourage activation of public rights-of-way to allow formal and informal gathering spaces.	

City Plan Policy	Right-of-way Implications
Outcome 6.2 Edmonton is where creative spaces emerge and arts, design and culture flourish	Prioritize allocation of right-of-way to contribute to high-quality urban design in spaces for people to linger in.
Intention 6.2.2 Promote a well-connected, attractive, and delightful city through beautiful architecture, animation and urban design excellence	
Direction 6.2.2.2 Encourage a high standard of design for public and private development with an emphasis at nodes, corridors and city entrances	

Summary

The *City Plan* outlines policy direction for the City of Edmonton and sets targets that will see 600,000 additional residents will be welcomed into the redeveloping area, 50% of net new units added through infill city-wide, Nodes and Corridors support 50% of all employment in Edmonton, two million new urban trees planted, and net per-person greenhouse gas emissions are zero. The *City Plan* establishes specific policy intentions and directions for the transportation system to be able to accommodate this growth with two targets:

- 50% of trips are made by transit and active transportation; and
- 15-minute districts that allow people to easily complete their daily needs.

A review of this document has helped to understand what the specific policies mean for evaluating the future capacity of the City's streets and what is needed to be able to achieve the City's goals. The review has also helped to shape the following areas of this project:

- Methodology:
    - Specific qualitative street conditions are required to achieve the policy outcomes described within the *City Plan.* As a result, aspects of street quality must also be considered within the analysis methodology.
- Analysis:
    - The trade-off implications provided within this review identify which street zones (travel way, pedestrian through zone, furnishing and frontage zone, and curbside zone) are impacted by each of the *City Plan* policies. The amount of space allocated for each of these zones has a direct impact on the look, feel, and operation of the street. As part of the analysis, these specific dimensions must be evaluated to determine how well the goals of the *City Plan* can be met through the existing allocations.
    - The Networks presented in the *City Plan* will guide allocation and prioritization of right-of-way for the Nodes and Corridors and the potential transportation facility and capacity needs within the broader city-wide transportation network.
    - The 50% sustainable transportation mode share target will be a major input in the analysis of capacity and recommendations for allocating right-of-way; the *City Plan* policies related to the quality of the built environment will also be important to prioritize and may require compromises on transportation capacity and will require mitigations to support the recommended right-of-way allocations.
- Recommendations:
    - Developing future options which address the gaps within existing streets requires an approach to the prioritization of different modes and amenities. For each of the nodes and corridors contexts, trade-off discussions will need to connect back to the *City Plan* policies.

TARGET DEVELOPMENT SCENARIOS

The Edmonton that is being analyzed as part of this project is a much different Edmonton than exists today. To appropriately frame the future scenario that is being analyzed, the following text from the *City Plan* is provided for reference:

PLANNING & DESIGN

"*As we double our population within our existing city boundary, how will we create great places for people to live and businesses to thrive? Planning and Design in Edmonton is about working with what we have today and continuously adapting and reimagining our built environment to meet the needs of two million people in the future. To begin with, it means we are going to grow and change in all areas of the city while stewarding the resources, places and stories we have inherited for future generations. We will be sensitive as we design and renew Edmonton's urban form, density, image and identity. Planning and Design must be informed by our relationship with what makes Edmonton unique and consider development influences and constraints. Creating more room to grow will be supported by prioritized investment in both the developing and redeveloping areas of the city, so that we can provide the facilities and services that Edmontonians need.*

The proportion of city-wide growth that occurs through redevelopment will strategically increase over time. This will result in more activity, destinations and different types of development closer to home. We will be healthier as we use a variety of modes of transportation to get around, which also reduces our environmental impact. The good news is that many of the ingredients we need for a successful future are already present in Edmonton today: our neighbourhoods, our river valley and ravine system, our downtown, our commercial and industrial areas, our facilities and roads, pathways and sidewalks and our people."

MOBILITY

"*As Edmonton grows from one to two million people, the way we move around our city needs to evolve to meet the needs of people and respond to changing contexts and technologies. How will we meet the mobility demands of double our current population?*

A mobility system is essentially about moving people and goods in an efficient and accessible manner. Any vibrant and prosperous city must have integrated transportation networks that provide residents with convenient options. Such a system should facilitate opportunity, connection, and health while being safe, inclusive and barrier free for all users.

Edmonton can anticipate in the future that socio-political and technological changes will disrupt how transportation looks and works. Emerging mobility technologies will be delivered in ways that advance equity, improve health and reduce emissions.

The City Plan is a plan for people, and a vision for mobility that reflects the importance of people and creates the opportunity to make a collective commitment to strive together to achieve that vision."

MANAGING GROWTH

"*As Edmonton's population expands to accommodate two million people within our current boundary, when, where and how will we grow? The City Plan welcomes ongoing change and*

> *opens up new opportunities for development across Edmonton. Being ready for growth sets our community up to attract and retain new residents and private investment and helps make every tax dollar count.*
>
> *The City Plan is a critical part of Edmonton's investment strategy. It sets out high level development priorities around physical, environmental and social infrastructure investments and their fiscal implications. Growth management considers the regional context and starts at the city-wide scale; it provides the direction needed to prepare more detailed development and investment plans at the district and local levels. The City Plan carefully considers how to phase growth areas over time to ensure the best social, environmental and economic return on investment for Edmonton. It's about being smart with your money.*
>
> *To support efficient development and track progress over the short, medium and long term, Edmonton's population growth from one to two million residents has been sequenced into increments of 250,000 residents. New development opportunities are aligned with these population growth thresholds and will be phased incrementally over time in redeveloping, developing and future growth areas. Supporting diverse development opportunities, intentionally, allows the City to provide guidance over the long term while staying relevant through emerging industry trends.*"

As part of this transforming future state of Edmonton, the *City Plan* also identifies a number of targets which create a city that will look different from the one that exists today and will result in different travel choices and behaviours of Edmontonians. The targets related to the *City Plan*'s Big City Moves are as follows:

- Achieve total community-wide carbon budget of 135 megatonnes
- Two million new urban trees planted
- Net per-person GHG emissions are zero
- 50% of net new units added through infill city wide
- 600,000 additional residents will be welcomed into redeveloping area
- 50% of trips are made by transit and active transportation
- 15-minute districts that allow people to easily complete their daily needs
- Less than 35% of average household expenditures are spent on housing and transportation
- Nobody is in core housing need
- There is no chronic or episodic homelessness in Edmonton
- Nodes and corridors support 50% of all employment in Edmonton
- Innovation Corridor attracts 50,000 more jobs
- Hold 70% of total regional employment in Edmonton

Based on the above directions and targets from the *City Plan*, city-wide population and employment projections were produced including those for the Nodes and Corridors being analyzed in this report. As part of the *City Plan*, the Regional Travel Model was run to generate, distribute, select travel modes, and assign transportation demands to the transportation network for trips to, from, and within Edmonton for the *City Plan*'s two-million population scenario. The model was developed with a target active transportation and transit mode share of 50% at the two-million population horizon based on the City Plan's targets.

It was found that to achieve the 50% mode share target, additional measures beyond the intensification of land uses and further development of mass transit and active transportation infrastructure would be required. These measures were referred to as Levers of Change and are described as the following with the *City Plan*:

- **Policy:** Is a municipal planning instrument that can guide, direct, manage or shape how we provide strategic direction for land, infrastructure, or services to influence or change the behaviour of residents and markets or market groups.
- **Partnerships and Advocacy:** Require fostering relationships with private, community, institutional and not-for-profit entities to activate strategies, initiatives, and actions to advance common goals, recognizing shared interests and aspirations.
- **Incentives, Pricing, and Subsidies:** Include applying a premium to cost or a reduction in cost to support a shared outcome or influence behaviour. This can include off-setting the costs of services and amenities for certain user groups or types of activities, or it can include applying charges and fees for users through available financial mechanisms.
- **Infrastructure Investment:** Is about providing capital or operational investment in physical infrastructure, City assets, services, and planning activities to activate and encourage specific city building outcomes.

More information on the levers and assumptions can be found in *Urban Form and Corporate Strategic Development Report CR_7810* presented to Council Committee on March 16, 2020.

To test sensitivity of the model, an alternative was developed without the Levers of Change described above. The resulting model had a mode share of 30% for active transportation and transit.

Travel demands from the two models were used within the analysis of the existing and future system capacity. Within the report, the two models are discussed in the following order and are referred to as the following:

- **Model without Levers of Change**
  - This model explored the regional travel demands in absence of the Levers of Change identified above. The city-wide daily mode share achieved in this modelling was approximately 70% private motor vehicle and 30% for transit, walking, and biking.
- **Model with Levers of Change**
  - This model explored the regional travel demand with the Levers of Change identified above. The city-wide daily mode share achieved in this model was 50% motor vehicles and 50% for active transportation and transit.

Both models are described within the Existing Capacity Memorandum, which can be found within Appendix B.

MODEL WITHOUT LEVERS OF CHANGE

This future demand scenario represents an approach that is consistent with assumptions made in Edmonton for long term mode share adjustments during the preparation of transportation impact assessments (TIAs) to reflect increased transit use assumptions and other travel demand shifts to sustainable transportation. For example, TIAs have assumed the mode share for driving would shift by 5% from the current approximately 77% to 72% when evaluating long term scenarios. The approximately 70% private motor vehicle mode share for daily trips achieved in the Regional Travel Model without the Levers of Change is consistent with this general rule of thumb.

The AM and PM peak hour motor vehicle volumes (in vehicles per hour) from the Model without Levers of Change can be seen in Figure 3 and Figure 4, respectively.

Only the motor vehicle travel demand was outputted from the Model without Levers of Change as it was used to test the sensitivity of the existing motor vehicle infrastructure. Results from the analysis can be found within the Existing Capacity and Quality Assessment section of this report.

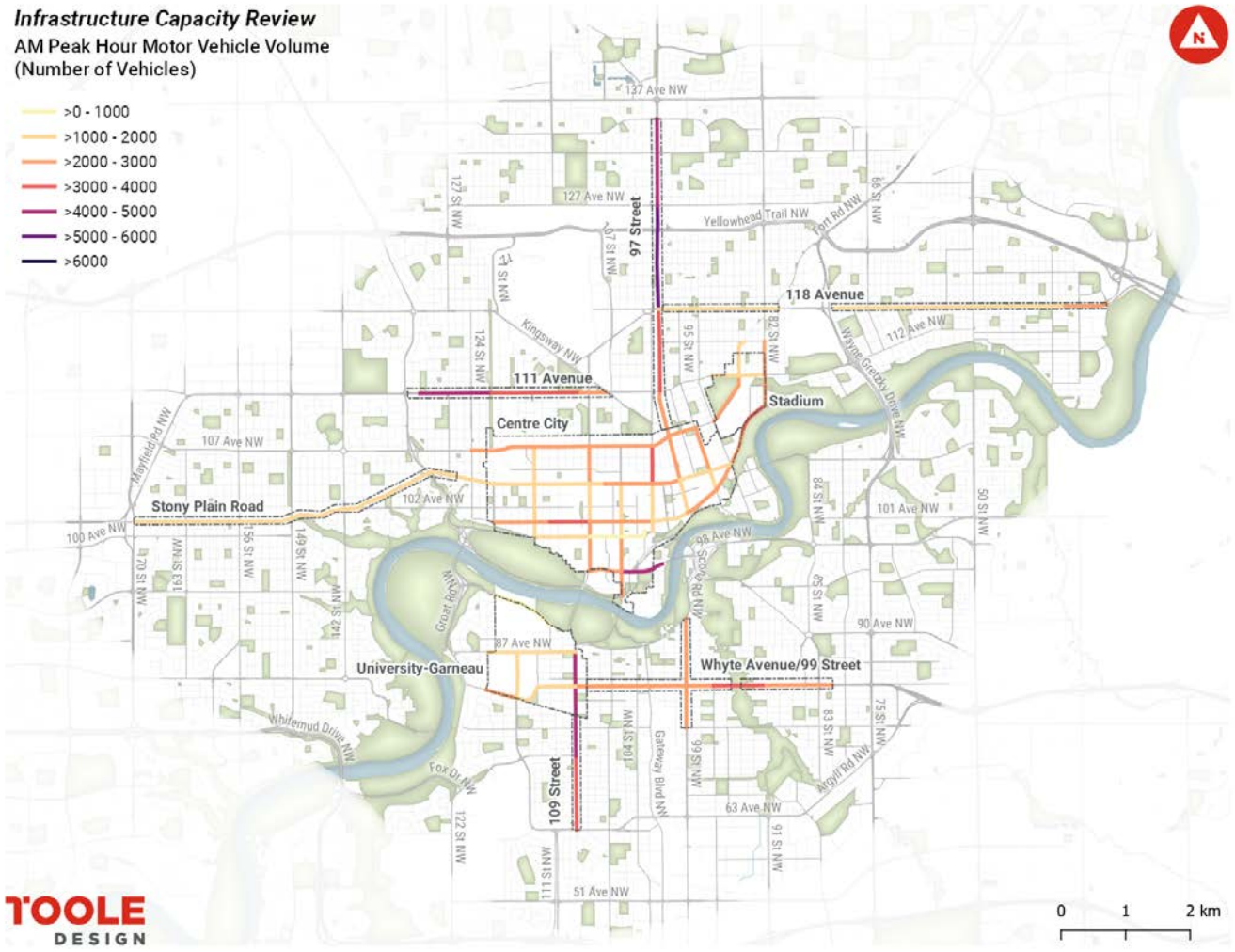


Figure 3: AM Peak Hour Motor Vehicle Volumes (Model without Levers of Change)

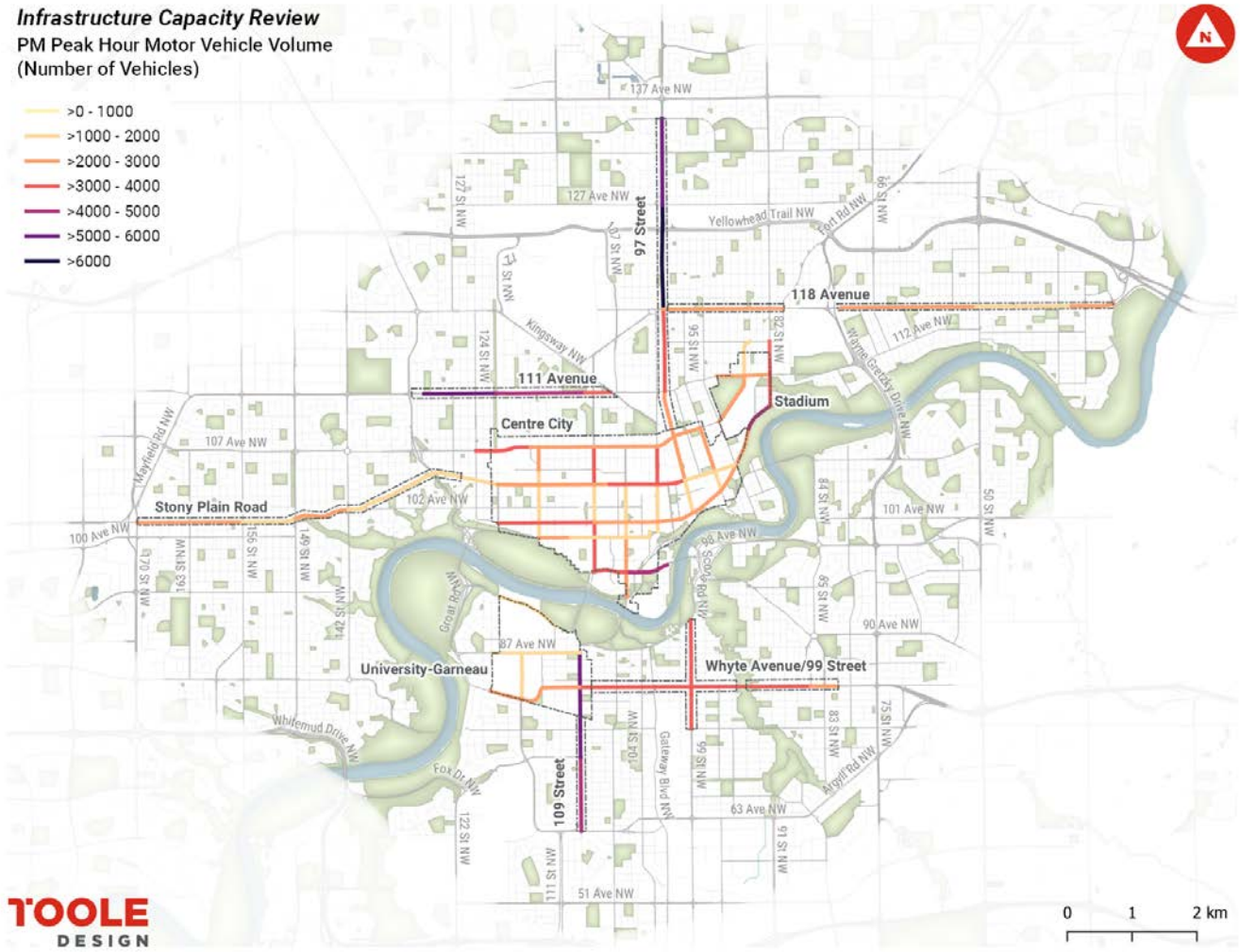


Figure 4: PM Peak Hour Motor Vehicle Volumes (Model without Levers of Change)

MODEL WITH LEVERS OF CHANGE

The volumes from the Model with Levers of Change included assumptions for pricing and policy levers in addition to infrastructure to achieve a city-wide daily mode share of 50% for active transportation and transit.

Motor Vehicle – Future Demand

- The Regional Travel Model outputs provided AM and PM Peak motor vehicle traffic volumes assigned to the corridors being reviewed as part of the study (i.e., 6 corridors and corridors in the 3 nodes).
- The AM and PM Peak volumes for motor vehicle travel were provided in terms of number of single-occupant motor vehicles, and number of high-occupancy motor vehicles.
- Representative AM and PM Peak private motor vehicle travel demands were identified from the model outputs for each segment of each corridor. The number for vehicles per hour was calculated as a single value by summing the single-occupant and high-occupancy vehicle volumes.

- Based on the modelled demands, some corridors were further split into additional segments to reflect differences in motor vehicle travel demands along the length of the corridor. This resulted in an increase in the total number of segments defined in the study as compared to the number of segments identified when only considering the Existing Capacity based on right-of-way width and its allocation.
- AM and PM Peak private motor vehicle demands were assigned to each segment of each corridor in terms of vehicles per hour and people per hour in motor vehicles.
- The volumes were graded by ranges of 500 vehicles each and assigned a separate colour for each grade.

The AM and PM peak hour motor vehicle demand (in vehicles per hour) from the Model with Levers of Change can be seen in Figure 5 and Figure 6.

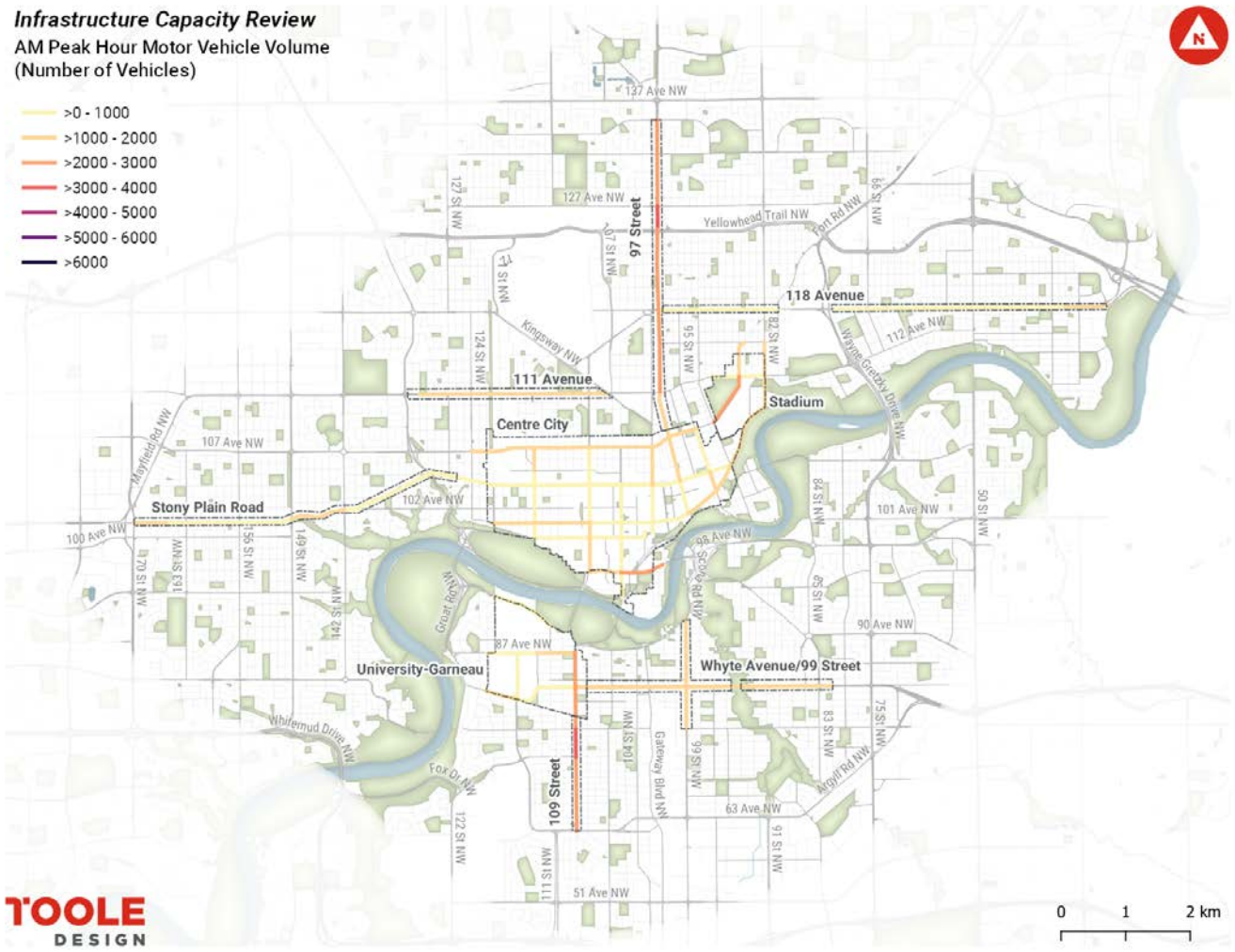


Figure 5: AM Peak Hour Motor Vehicle Volumes (Model with Levers of Change)

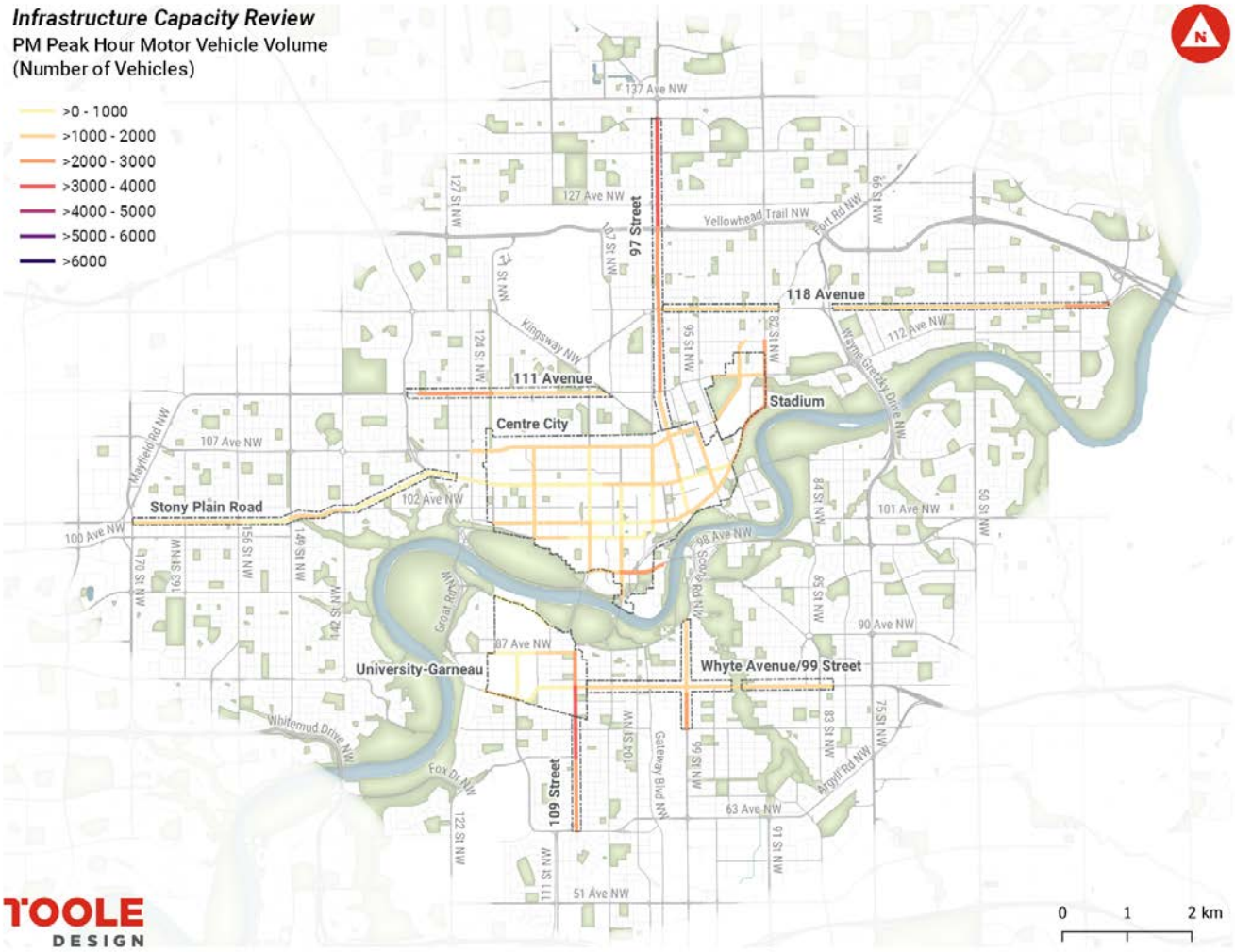


Figure 6: PM Peak Hour Motor Vehicle Volumes (Models with Lever of Change)

Transit – Future Demand

The Regional Travel Model outputs provided AM and PM Peak volumes for transit in terms of number of buses and number of transit passengers. Representative transit demands were identified from the model outputs for each segment of each corridor for the AM and PM Peaks. AM and PM Peak transit demands were assigned to each segment in terms of people per hour. Figure 7 and Figure 8 below display the AM and PM peak transit demand modelled as part of the Model with Levers of Change.

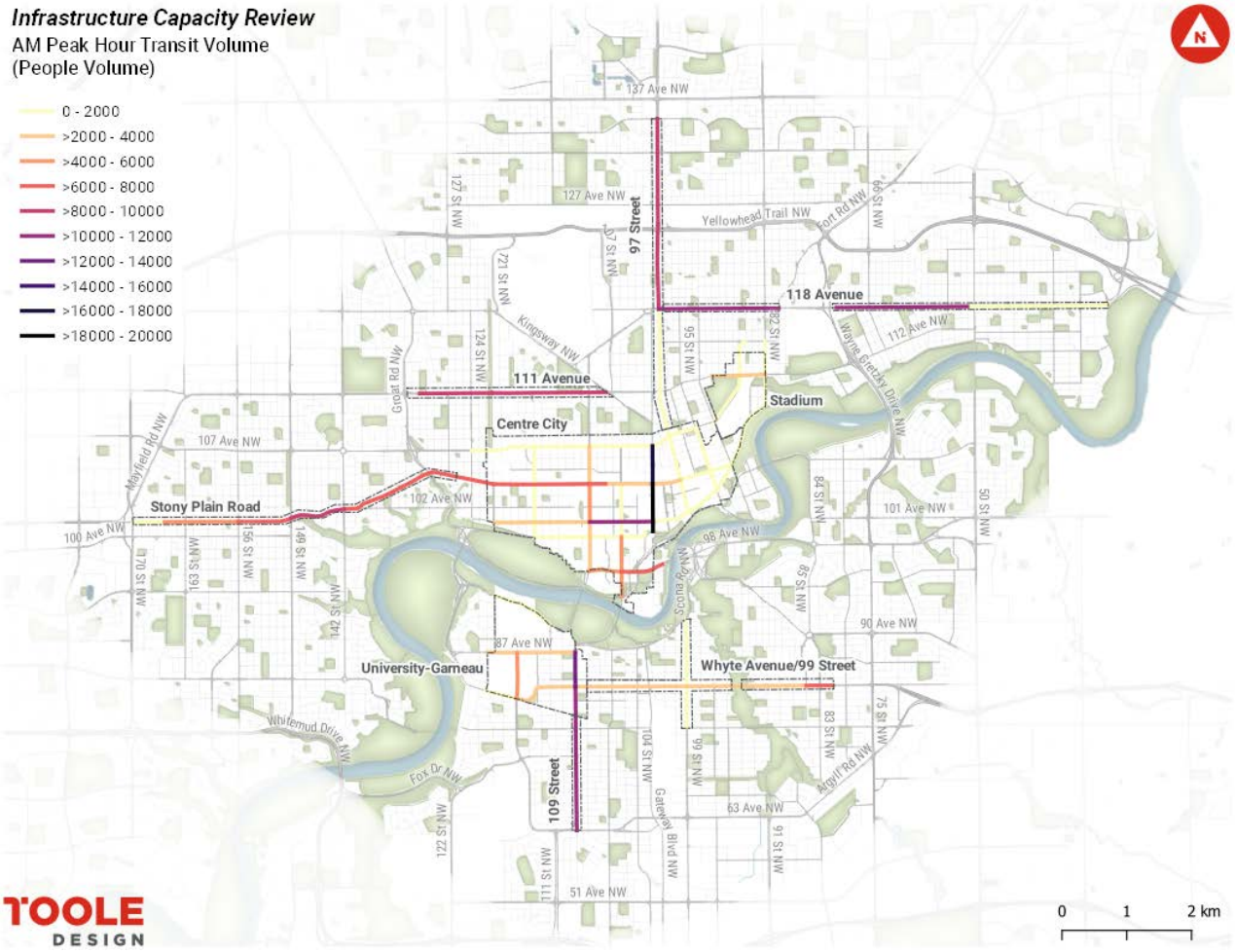


Figure 7: AM Peak Hour People in Transit Volumes (Model with Levers of Change)

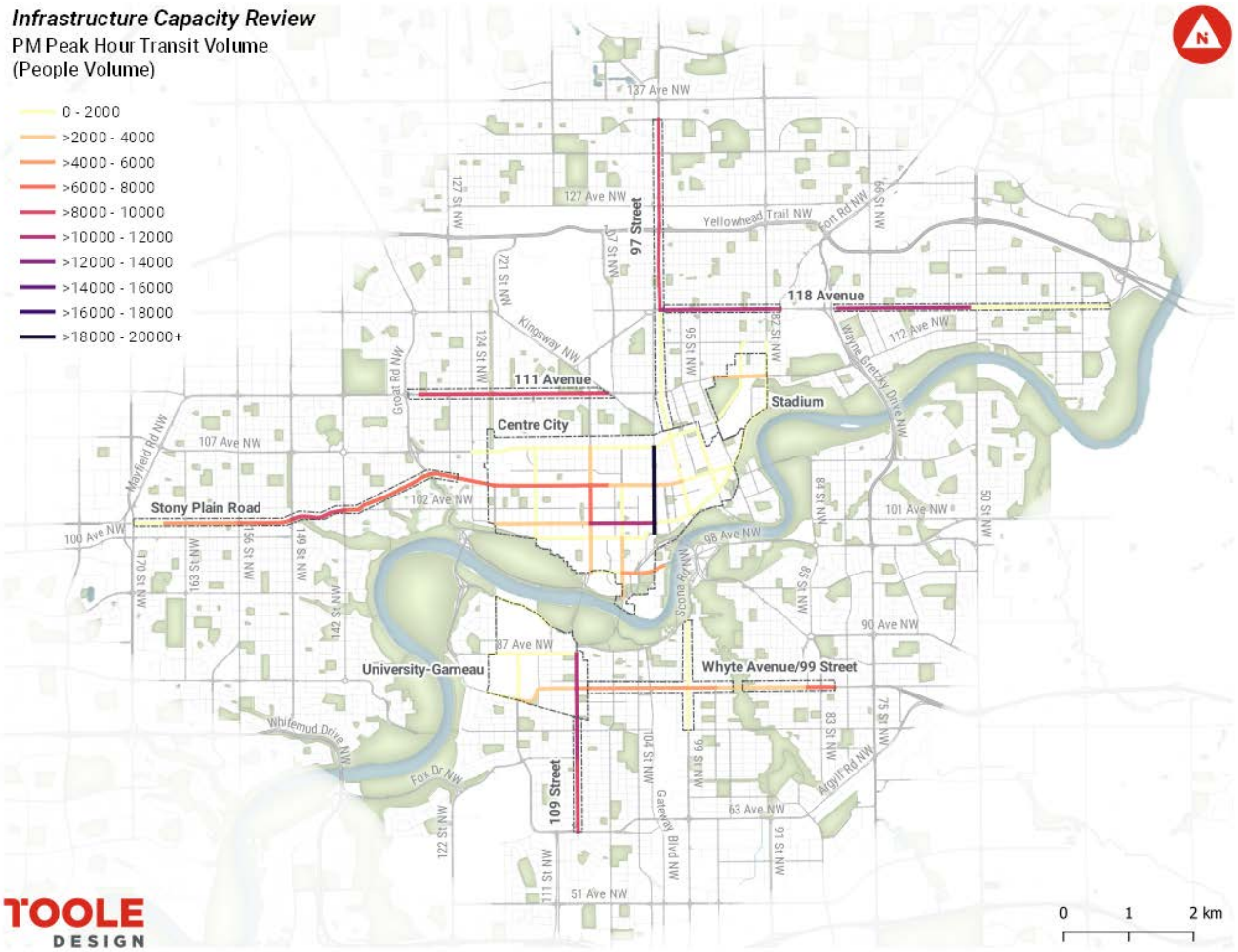


Figure 8: PM Peak Hour People in Transit Volumes (Models with Lever of Change)

Walking & Cycling – Future Demand

The Regional Travel Model outputs do not include walking and cycling trips assigned to the corridors. The Model does output origin-destination trip matrices between the travel zones that are used to define the city and surrounding region, but the walking and cycling networks are not coded into the model, which means these travel demands cannot be assigned to specific corridors across the city. Analysis was attempted to create proxy corridor-level demands for walking and cycling trips that related the motor vehicle AM and PM peak hour volumes to peak walking and cycling volumes. However, through that analysis and subsequent validation checks, it became apparent this approach would not create representative corridor-level travel demands for walking and cycling trips. As such, the evaluation of walking and cycling capacity uses a quality-based approach that applies industry best practices and established analysis methodologies.

EXISTING SYSTEM CAPACITY AND QUALITY ASSESSMENT

The analysis of the existing conditions was split up based on the different zones of a street. Figure 9 illustrates the zones within a street as described in the City of Edmonton's *Complete Streets Design & Construction Standards*.

Figure 9: Design Zones for Multimodal Streets

The zones shown in the figure above are defined as the following:

- Travelled Way: This zone serves movement of people in motor vehicles and transit, and movement of goods.
- Ancillary Zone: This zone is flexible and may support public realm functions such as patio/parklet space or it may support vehicle parking, bicycle parking, loading zones, bus stops zones, or curb extensions.
- Furnishing Zone: This zone supports street furniture such as signage, light and signal poles, landscape elements, and transit amenities.
- Pedestrian Through Zone: This zone supports mobility for pedestrians of all ages and abilities.
- Frontage Zone: This zone supports activation of the adjacent land use and can include features such as signage and seating.
- Adjacent Lands: This area includes the land uses that serve as origins and destinations of people and vehicle trips.

Initially, the existing system analysis consisted of a capacity-based analysis for motor vehicles, transit, walking, and cycling, and a quality-based assessment for the public realm of streets. However, the capacity-based analysis for walking and cycling travel demand had a limitation. Travel demands at a corridor-level for walking and cycling were not provided through the City's modelling and required development using the motor vehicle travel

demands and a conversion factor based on the mode share percentages provided from the model data. The mode share percentages provided were for large areas such as the Centre City Node, The University-Garneau Node, the Stadium Node, and City-wide. Using the mode share percentages from the Nodes to convert travel demand for individual corridor-level demand yielded walking and cycling travel demands that were not consistent with field observations and available multimodal traffic counts for the corridors. For example, the generated number of walking trips for Whyte Avenue were lower than for 109 Street because the motor vehicle volumes that were used to generate the walking trips are higher along 109 Street than along Whyte Avenue. The generated walking volumes do not reflect the higher walking trips that have been captured from multimodal traffic counts along these two corridors or the field observations that have been completed.

To manage the limitation in evaluating capacity and demand for walking, walking was evaluated based entirely on the public realm quality assessment. However, it should be noted, that the width of the pedestrian through zone, which contributes to and is a key component of capacity, is evaluated within the quality assessment, capturing the importance of the space available to people walking and wheeling. The public realm quality assessment methodology is described further below.

To manage the limitation in evaluating cycling travel demand as compared to capacity, the analysis was also shifted towards a quality assessment based on the Level of Traffic Stress definitions provided within the City's *Bike Plan*.

The resulting analysis for the design zones described in Figure 9 included:

- Travelled Way: Capacity analysis using modelled travel demands for motor vehicles and transit demands, and quality assessment for cycling
- Pedestrian Through Zone, Frontage Zone, Furnishing Zone, and Ancillary Zone: Quality assessment based on dimensions for each of the individual zones for walking and cycling

A summary of the existing capacity methodology and analysis is shared in this chapter and further details can be found within the Existing Conditions Memorandum in Appendix B. Similarly, a summary of the methodology and analysis for the public realm quality assessment is shared within this chapter, while further details can be found in the Quality Assessment Memorandum in Appendix C. The methodology for the Level of Traffic Stress was produced as part of this report and can be found within the section below.

METHODOLOGY

CAPACITY ASSESSMENT

Capacity Calculation

Calculating the existing multimodal transportation capacity for each corridor was completed as follows:

- For each corridor:
  - The City of Edmonton CADASTRAL base was used to determine the existing right-of-way and allocation of the right-of-way to different zones and uses of the street. Measurements were taken for the total right-of-way, width of sidewalks, width of shared-use paths, width of bike lanes, width of furnishing and frontage zones, width of curbside zone/ancillary zone (typically used for parking), and width of the travelled way, while the number of bike lanes and number of motor vehicle travel lanes were counted.
  - Google Streetview and site visits were used to confirm the presence, number, type, and time of operation for bus lanes and parking and loading zones.

  - » Where the existing street design was known to be under construction or have approved funding for reconstruction based on an approved design, the allocation of the "existing" right-of-way was based on available design drawings from the City of Edmonton's website for the project. Examples include Jasper Avenue New Vision, Reimagine Jasper Avenue, and Valley Line West LRT along 104 Avenue and Stony Plain Road.
  - » The type of "existing" transit facility along a corridor was updated to reflect the *Bus Network Redesign* in terms of high frequency transit. This was used to determine whether motor vehicle travel lanes should be designated as Mixed Traffic Operation Lanes with Frequent Transit.
- The right-of-way allocation for each corridor was reviewed at an approximate spacing of 400m along each corridor and at locations where the right-of-way changed significantly (e.g., introduction of a service road).
- Each corridor was broken into segments by grouping portions of the corridor where adjacent right-of-way and right-of-way allocations were relatively equal.
- The transportation capacity for each segment was then calculated for each mode based on the allocation of right-of-way, transit operations, and travel lane designations (e.g., bus lane). The capacity was calculated based on the values presented in Table 2 by multiplying the right-of-way allocation by the capacity. For example, the number of motor vehicle travel lanes was multiplied by the private motor vehicle capacity per lane to calculate the lower and upper threshold capacities for the number of people per hour those lanes could move.
- The capacity for each mode was calculated by summing the lower and upper threshold capacities, respectively, for each transportation facility type that accommodated the mode. For example, the capacity for transit is calculated by summing the transit capacity of dedicated transit lanes and the transit capacity of mixed traffic lanes with frequent buses.
- The total multimodal transportation capacity for each segment of each corridor was calculated by summing the people capacities for each mode.

Table 2: Multimodal Transportation Capacity by Mode and Facility Type

Mode / Transportation Facility Type	Capacity – Lower Threshold	Capacity – Upper Threshold
Private Motor Vehicles – vehicles (per lane)	555 vehicles / hour	925 vehicles / hour
Private Motor Vehicles – people (per lane)	620 people / hour	1,300 people / hour
Mixed Traffic Lane with Frequent Buses (total capacity per lane) ▪ **Private motor vehicle capacity per lane** ▪ **Transit capacity per lane**	1,000 people / hour 310 people / hour 690 people / hour	2,800 people / hour 650 people / hour 2,150 people / hour
Dedicated Transit Lane (per lane)	4,000 people / hour	8,000 people / hour
On-Street Transitway – BRT or LRT (per lane)	10,000 people / hour	25,000 people / hour
Sidewalk (per metre of sidewalk)	1,400 people / hour	2,000 people / hour
Shared-Use Path (walking capacity, per minimum 3m path)	300 people / hour	400 people / hour
Shared-Use Path (biking capacity, per minimum 3m path)	400 people / hour	600 people / hour
Protected Bikeway (per one-way lane)	3,250 people / hour	3,750 people / hour

Comparison to Future Demand

The future multimodal travel demands for each corridor were compared to the available multimodal transportation capacity based on the existing allocation of right-of-way and transportation operations.

- **For private motor vehicle and transit demand:**
  - If the future demand is below the lower threshold capacity, the existing capacity exceeds the future demand and the corridor segment was coded as green.
  - If the future demand is between the lower and upper threshold capacities, the existing capacity meets the future demand and the corridor segment was coded as amber.
  - If the future demand is above the upper threshold capacity, the future demand exceeds the existing capacity and the corridor segment was coded as red.
  - Corridor segments coded as red require options to address the issue of insufficient existing capacity to meet future demand.
- **For walking and cycling demand:**
  - A similar procedure was used for walking and cycling; however, as described above, the capacity-based analysis for walking and cycling demand was replaced in favour of a quality-based assessment.
  - Details of the capacity-based walking and cycling demand initially used are provided within the Existing Conditions Memorandum in Appendix B.

QUALITY ASSESSMENT – PUBLIC REALM AND WALKING

Measuring the quality of the public realm aligns with the *City Plan*'s objectives for the vibrancy of the Nodes and Corridors to support walking, livability, and vitality of these areas. The evaluation of quality of the walking environment was based on the right-of-way width allocated to each of the following public realm zones that form part of the street design zones illustrated in Figure 9.

- Pedestrian Through Zone
- Furnishing Zone/Frontage Zone
- Ancillary Zone (also referred to in some guidelines and jurisdictions as the Curbside Zone)

The Furnishing Zone and Frontage Zones were combined for the purposes of this analysis for the following reasons:

- In measuring widths of the zones for existing streets, where mono-sidewalks adjacent to the travel lanes are provided the Frontage and Furnishing Zones are difficult to delineate and serve similar purposes.
- Both the Frontage and Furnishing Zones can help to create visually appealing spaces which allow people to linger. In some cases, features such as restaurant patio tables could be accommodated within either Zone.

Criteria were developed to define widths which meet or exceed quality requirements, meet the basic requirements, or did not meet the basic requirements for each of the zones. The dimensions selected for the criteria are from those defined in the City of Edmonton's *Main Streets Guideline* and *Complete Streets Design and Construction Standards*. The Quality Assessment Criteria can be seen in Table 3.

Table 3: Quality Assessment Criteria

	Pedestrian Through Zone	Frontage & Furnishing Zones	Ancillary Zone (Curbside Zone)
Meeting or Exceeding Quality Requirements	• Universally Accessible (i.e., wide enough for two people using wheelchairs to pass) • Width sufficient for varying ages and abilities of users and allows people to comfortably interact with each other and with businesses (i.e., space for lingering and queuing or for groups of people to pass each other)	• Width allows for healthy street trees • Width allows for transit stops with shelters • Width allows flexibility for location of seating, amenities, and other street furniture • Width sufficient for business advertising and activation including patios	• Zone is provided and allows for deliveries, ride hailing loading/unloading, parking of vehicles, accessible parking spaces, parklets, patios, boardwalks, bike corrals, curb extensions/bus bulbs, or space for street vendors
Widths	≥ 3.0 m Centre City	≥ 2.5 m Centre City	2.5 m (all contexts)
	≥ 3.0 m Major Node	≥ 2.5 m Major Node	
	≥ 2.5 m District Node	≥ 2.5 m District Node	
	≥ 3.0 m Primary Corridor	≥ 2.5 m Primary Corridor	
	≥ 2.5 m Secondary Corridor	≥ 2.5 m Secondary Corridor	
Meeting Basic Quality Requirements	• Universally Accessible (i.e., wide enough for two people using wheelchairs to pass) • Width accommodates basic interaction between people and businesses	• Width accommodates landscaping and trees • Width accommodates basic transit stop access and bus shelters	• If Furnishing Zone Quality Requirements are met or exceeded, pocket locations for Ancillary Zone uses can be accommodated
Widths	1.8 m up to the Quality Requirements Width for the Corridor based on its context	1.7 to < 2.5 m Centre City	0 m (accommodated into Furnishing Zone where quality requirements are met or exceeded)
		1.7 to < 2.5 m Major Node	
		1.7 to < 2.5 m District Node	
		1.7 to < 2.5 m Primary Corridor	
		1.0 to < 2.5 m Secondary Corridor	
Not Meeting Quality Requirements	• Width too narrow for two people using wheelchairs to pass	• Width cannot support healthy trees or transit stop access and shelter	• Not provided and requires accommodation on side streets or via alleys
Widths	< 1.8 m	< 1.7 m Centre City	0 m
		< 1.7 m Major Node	
		< 1.7 m District Node	
		< 1.7 m Primary Corridor	
		< 1.0 m Secondary Corridor	

Using Table 3, various combinations of conditions for the Pedestrian Through Zone, Frontage and Furnishing Zones, and Ancillary Zone were arranged and rated as Good, Fair, and Poor. The ratings are each accompanied by a small scoring matrix indicating how each of the zones scored.

The example table below shows how to read the scoring matrix:

- The table represents an "outside-to-inside" approach to street design. The scoring matrix can be viewed as if a building (i.e., Adjacent Lands) was on the left of the street and the Travelled Way towards the right.

- From the outside, the most important aspect for determining the scoring was the width dedicated to the Pedestrian Through Zone as it supported universal accessibility.
- Second, the Furnishing Zone adjacent to the Pedestrian Through Zone was also an important determinant for street quality. For the purposes of this analysis, the Furnishing Zone width was combined with the Frontage Zone as both zones provide street amenities and, from street to street, the configuration and provision of Frontage and Furnishing Zones varies greatly. Combining these Zones in the analysis simplified the assessment.
- Lastly, the Ancillary Zone available for additional street uses such as street parking, green infrastructure, or other street amenities was also considered within the scoring matrix.
- Meeting or Exceeding Quality Requirements is shown in Green.
- Meeting Basic Quality Requirements is shown in Amber.
- Not Meeting Quality Requirements is shown in Red.
- There are some instances where an entire row is coloured grey. For example, for one of the "Poor" quality scores, the Frontage and Furnishing Zones and the Ancillary Zone are coloured grey in the case when Pedestrian Through Zone does not meet quality requirements. This is to indicate that when the Pedestrian Through Zone quality requirements are not met, the street is rated as poor regardless of the quality of the conditions in the other two zones.

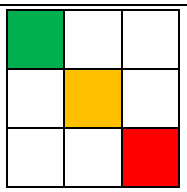
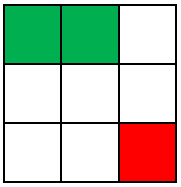
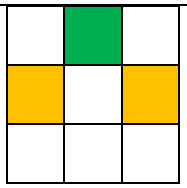
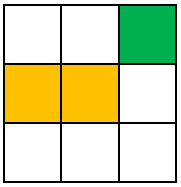
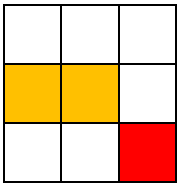
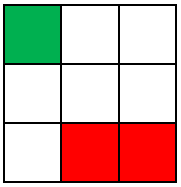
	Pedestrian Through Zone	Frontage and Furnishing Zone	Ancillary Zone (Curbside Zone)
Meeting or Exceeding Quality Requirements			
Meeting Basic Quality Requirements			
Not Meeting Quality Requirements			

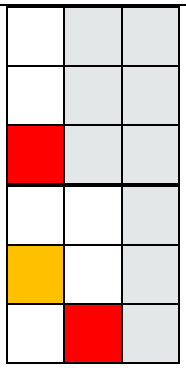
Figure 10: Example Quality Assessment Scoring Matrix

The scorings for each of the zones can be seen in the following table and how they combine to achieve an overall rating of quality.

Table 4: Quality Assessment Rating Descriptions

RATING	DESCRIPTION	SCORE TABLE
GOOD =	» Meeting or Exceeding Quality Requirements for ALL Design Zones (Pedestrian Through Zone, Frontage & Furnishing Zones, Ancillary Zone)	
	» Meeting or Exceeding Quality Requirements for Pedestrian Through Zone, Meeting or Exceeding Quality Requirements for Frontage & Furnishing Zones, AND Meeting Basic Quality Requirements for Ancillary Zone	
	» Meeting or Exceeding Quality Requirements for Pedestrian Through Zone, Meeting Basic Quality Requirements for Frontage & Furnishing Zones, AND Meeting or Exceeding Quality Requirements for Ancillary Zone	
	» Meeting Basic Quality Requirements for Pedestrian Through Zone, Meeting or Exceeding Quality Requirements for Frontage & Furnishing Zones, AND Meeting or Exceeding Quality Requirements for Ancillary Zone *(NOTE: In this scenario, the hardscaped Frontage & Furnishing Zones that are meeting or Exceeding Quality Requirements are assumed to also be used to support social exchange and walking and wheeling activities to occur outside of the Pedestrian Through Zone.)*	

RATING	DESCRIPTION	SCORE TABLE
	» Meeting or Exceeding Quality Requirements for Pedestrian Through Zone, Meeting Basic Quality Requirements for Frontage & Furnishing Zones, AND Not Meeting Quality Requirements for Ancillary Zone	
	» Meeting or Exceeding Quality Requirements for Pedestrian Through Zone, Meeting or Exceeding Quality Requirements for Frontage & Furnishing Zones, AND Not Meeting Quality Requirements for Ancillary Zone *(NOTE: In cases where bike facility precludes use of furnishing zone for parking)*	
FAIR =	» Meeting Basic Quality Requirements for Pedestrian Through Zone, Meeting or Exceeding Quality Requirements for Frontage & Furnishing Zones, AND Meeting Basic Quality Requirements for Ancillary Zone	
	» Meeting Basic Quality Requirements for Pedestrian Through Zone, Meeting Basic Quality Requirements for Frontage & Furnishing Zones, AND Meeting or Exceeding Quality Requirements for Ancillary Zone	
	» Meeting Basic Quality Requirements of Pedestrian Through Zone, Meeting Basic Quality Requirements for Frontage & Furnishing Zones, AND Not Meeting Quality Requirements for Ancillary Zone	
	» Meeting or Exceeding Quality Requirements for Pedestrian Through Zone, Not Meeting Quality Requirements for Frontage & Furnishing Zones, AND Not Meeting Quality Requirements for Ancillary Zone	

RATING	DESCRIPTION	SCORE TABLE
POOR =	» Not Meeting Quality Requirements for Pedestrian Through Zone *(NOTE: If the Pedestrian Through Zone has poor quality, the quality of the Frontage and Furnishing Zones and the Ancillary Zone does not matter since Universal Accessibility cannot be achieved.)* » Meeting Basic Quality Requirements of Pedestrian Through Zone AND Not Meeting Quality Requirements for Frontage & Furnishing Zones *(NOTE: If the Pedestrian Through Zone meets the basic quality requirements and the quality of the Frontage and Furnishing Zones does not meet the quality requirements, the quality of the Ancillary Zone does not matter since basic offsets from street amenities and devices, such as street lights, negatively impact the quality of the walking environment and shy distance buffers from these features cannot be provided.)*	

This quality scoring and rating system was applied to each of the streets within the Nodes and Corridors by using the existing allocations of right-of-way for the Pedestrian Through Zone, Frontage and Furnishing Zones, and Ancillary Zones.

The following provides details for how the right-of-way widths were determined:

- In locations where the concrete sidewalk could be differentiated from the grass Furnishing and Frontage Zones, the calculation of the Pedestrian Through Zone was measured as the width of the sidewalk. The width allocated to the Frontage and Furnishing Zone was equal to the Pedestrian Through Zone subtracted from the total space measured between the face-of-curb and the property line.
- In locations where a hardscaped Furnishing and Frontage Zone made it challenging to differentiate the different zones, the Pedestrian Through Zone was estimated based on the Furnishing Zone amenities that were visible and the clear walking space that was evident. The Frontage and Furnishing Zone width was calculated by subtracting the Pedestrian Through Zone from the total space measured between the face-of-curb and the property line.
- For each of these cases, a typical cross-section was considered. In the situation that a pinch point occurred along a corridor, it was not considered within the analysis as it did not represent the overall typical segment/corridor characteristics.
- Parking was measured from the adjacent travel lane marking to the face-of-curb.

Additionally, there was a roadway segment which was not evaluated within the Quality Assessment. The 97 Street underpass segment has sufficiently wide sidewalks to exceed the quality requirements for the Pedestrian Through Zone. However, it was not an expectation for the underpass to provide a quality public realm environment beyond safe and comfortable passage underneath the railway tracks (e.g., sufficient width, sight lines, lighting) because the adjacent land use context are not active uses, but rather a retaining structure. As such, this segment was not considered within the assessment.

QUALITY ASSESSMENT – CYCLING

To assess the quality of the cycling infrastructure a Level of Traffic Stress (LTS) analysis was used. Level of Traffic Stress differentiates cycling facilities based on the level of interaction with traffic along the corridor and the type of crossing facility provided at intersections. The City of Edmonton's *Bike Plan* provides descriptions for four Levels of Traffic Stress:

- LTS 1: Strong separation from all traffic except low speed, low volume traffic and has simple crossings. LTS 1 indicates a facility suitable for children.
- LTS 2: Except in low speed/low volume traffic situations, people cycling have their own place to ride that keeps them from having to interact with traffic except at formal crossings. Limits traffic stress to what the mainstream adult population can tolerate.
- LTS 3: Involves interaction with moderate speed or multi-lane traffic or close proximity to higher speed.
- LTS 4: Involves being forced to mix with moderate speed traffic or close proximity to high speed traffic.

The City of Edmonton's *Complete Streets Design and Construction Standards* uses the following decision matrix to select a suitable all ages and abilities bikeway to achieve LTS 1 based on the characteristics of the street.

Street Context				
Posted Speed	*Max Motor Vehicle Volume (AADT)*	*Motor Vehicle Lanes*	*Key Operational Considerations*	*Bicycle Infastructure Type*
Any	Any	Any	Any of the following: - high curbside activity - frequent buses - motor vehicle congestion - turning conflicts	***Protected Bike Lane***
Up to 15 km/h	Less Relevant	No centerline, or single lane one-way	People walking share the travelled way	***Shared Street***
Up to 30 km/h	Up to 2000		Less than 50 motor vehicles per hour in peak direction	***Bicycle Boulevard***
Up to 40 km/h	Up to 1500			
Up to 50 km/h	1500 to 3000	Single lane each direction, or single lane one-way	Low curbside activity or low congestion pressure	***Painted or Buffered Bike Lane or Protected Bike Lane***
	3000 to 6000			***Buffered or Protected Bike Lane***
	Over 6000			***Protected Bike Lane***
	Any	Multiple lanes per direction		
Over 50 km/h	Up to 6000	Single lane each direction	Low curbside activity or low congestion pressure	***Protected Bike Lane or Reduce Roadway Speed***
		Multiple lanes per direction		***Protected Bike Lane or Reduce Roadway to Single Lane and Reduce Roadway Speed***
	Over 6000	Any	Any	***Protected Bike Lane (rigid barrier if 60 km/h or more) or Shared-Use Path***
High Speed (80 km/h or more) limited access roadways, natural corridors, utility corridors, or geographic edge conditions with limited conflicts		Any	High pedestrian volume (more than 33 per hour)	***Segregated Shared-Use Path (i.e, with separate sidewalk and bike path) or Protected Bike Lane with rigid barrier***
			Low pedestrian volume	***Shared Use Path or Protected Bike Lane with rigid barrier***

The figure below illustrates the existing LTS 1 bike network based on analysis completed for the *Bike Plan*.

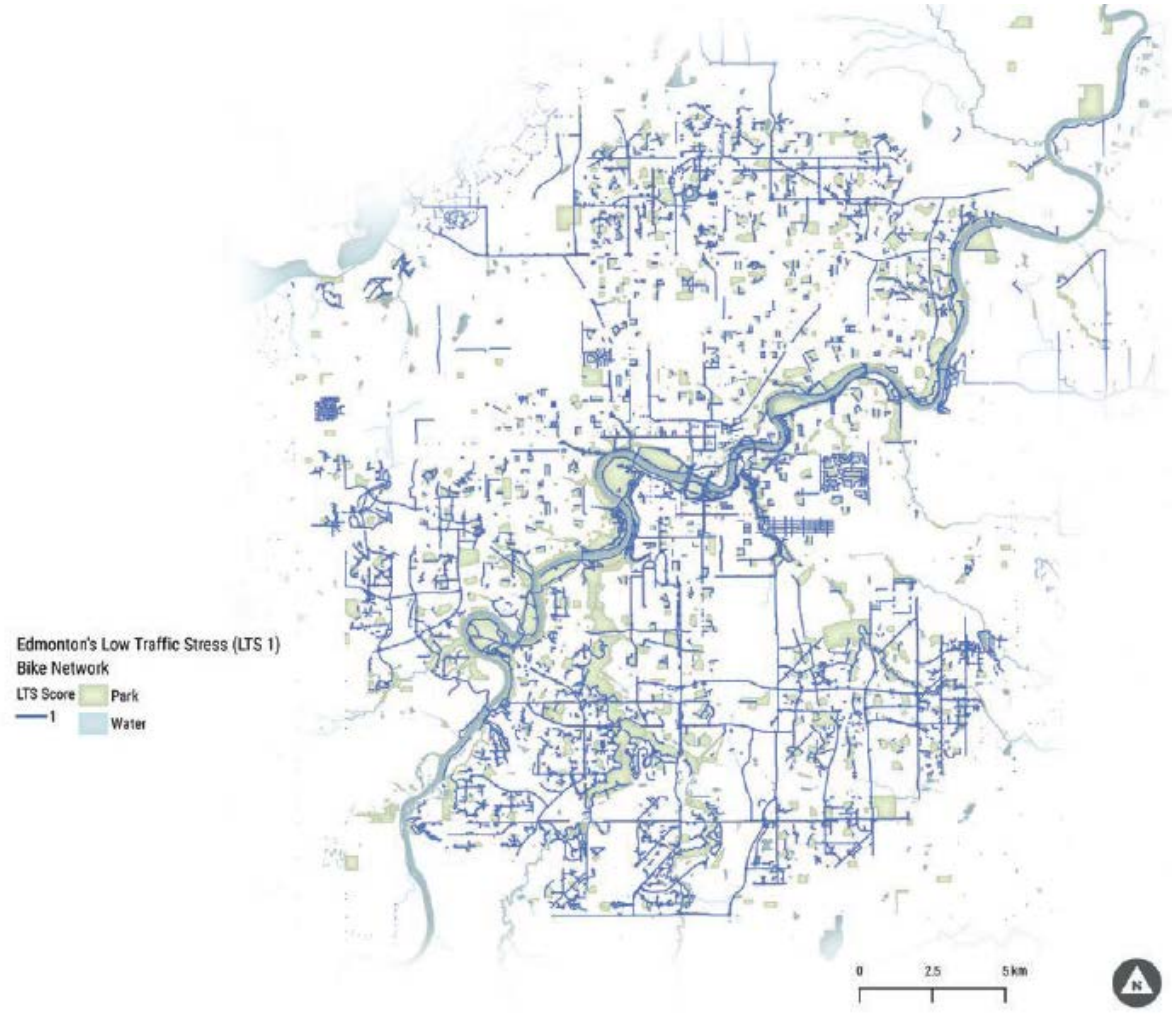


Figure 11: Edmonton's LTS 1 Bike Network (Source: The *Bike Plan)*

The ratings from the *Bike Plan* were developed into a colour-based rating for this analysis, similar to the motor vehicle capacity, transit capacity, and walking/public realm quality assessments. The following ratings were used for the quality assessment for cycling:

- Green – indicates LTS 1
- Amber – indicates LTS 2
- Red – indicates LTS 3 and 4

Only the cycling infrastructure along each corridor was considered within this methodology. However, it should be noted that it is quite typical within the existing transportation system for cycling demand for a corridor to be served by a cycling facility located on a parallel corridor. For example, the 83 Avenue bikeway supports travel along the parallel Whyte Avenue.

The results of the cycling quality assessment for each corridor are identified in a series of maps and tables in the following section. These results only consider the specific corridor evaluated. Where there is a high quality, all ages and abilities, cycling facility on a parallel corridor, that information has been added for context to the table that summarizes the performance of each corridor.

RESULTS

This section shares the results for the comparison of existing capacity to the future demand for motor vehicle and transit travel as well as the quality assessments for walking and cycling. The following results are described:

- Model without Levers of Change – The future motor vehicle demand for the 30% mode share model compared with the existing capacity.
- Model without Levers of Change – The future motor vehicle, transit, walking, and cycling demand for the 50% mode share model compared to the existing capacity.
- Quality Assessment for Public Realm & Walking – The results of the quality assessment applied to the existing street network to evaluate the quality of the walking environment.
- Quality Assessment for Cycling – The results of the quality assessment for cycling.

CAPACITY ASSESSMENT – MODEL WITHOUT LEVERS OF CHANGE

The motor vehicle capacity to demand comparison for the Model without Levers of Change is shown in the figure below for the AM and PM Peak Hours.

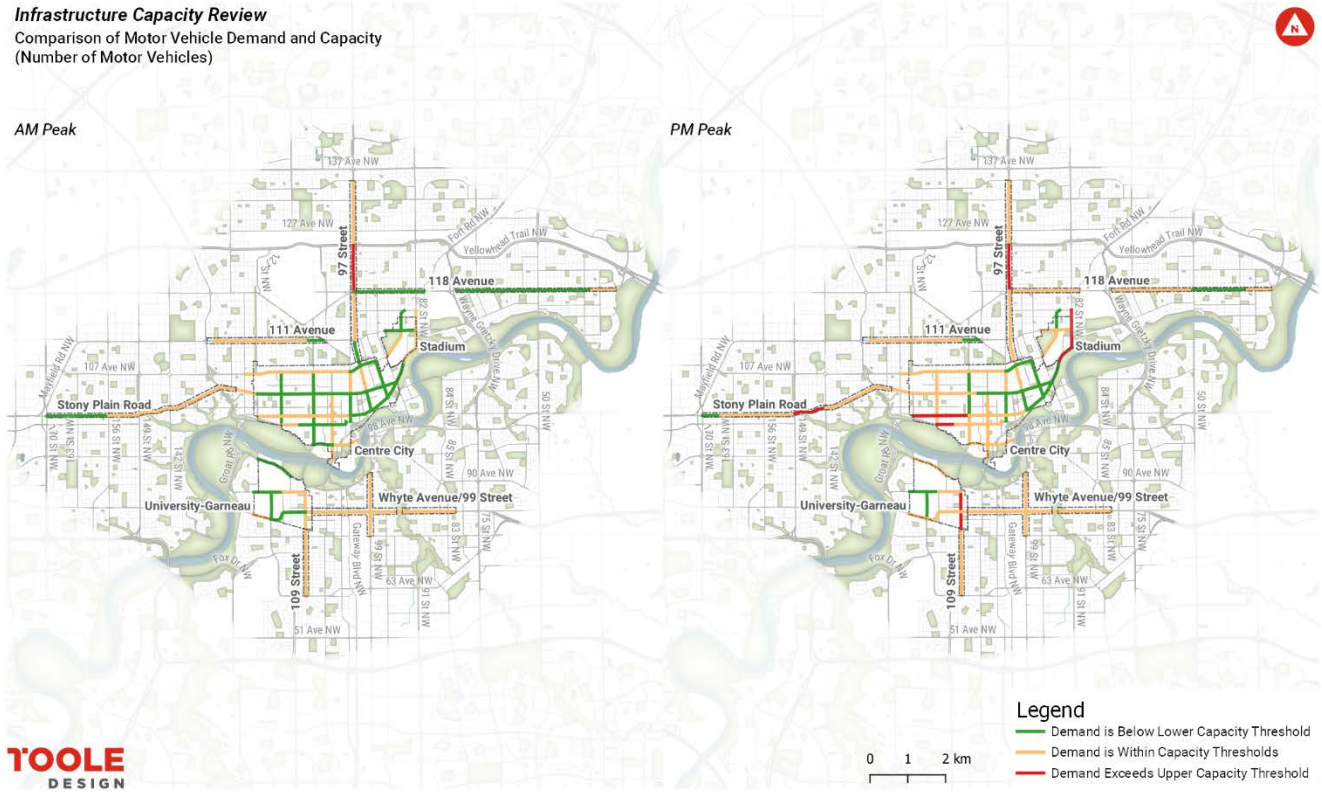


Figure 12: Comparison of Motor Vehicle Demand and Existing Capacity (Model without Levers of Change)

The increased motor vehicle travel demands generated in the absence of the Levers of Change result in numerous corridor segments with insufficient capacity to meet the future travel demands, particularly in the PM Peak. Many of the corridor segments are shown in red. There are also far more corridor segments where the future motor vehicle travel demand is shown in amber, indicating that the demand is within the existing capacity

range, but not below the lower range. Taken together, the significantly higher motor vehicle demands in this future scenario without implementing the Levers of Change will make it far more difficult to reallocate right-of-way from private motor vehicles to space-efficient travel modes and to create people-friendly places.

In addition, the ability to increase the capacity of the corridor segments to meet motor vehicle travel demand within the Nodes and along the Corridors is limited.

- Supporting high-quality street environments envisioned in the *City Plan* requires more right-of-way for public realm zones, which conflicts with allocating more right-of-way to private motor vehicle travel.
- Increasing the capacity for private motor vehicle travel by expanding the right-of-way would require the demolition of existing buildings, homes, and businesses along the corridors. This is contrary and in conflict with the goals and objectives of the *City Plan* and would result in poorer quality of life outcomes.

This analysis underscores the critical importance of implementing infrastructure investments and related operating expenditures to increase the capacity, safety, and comfort of space-efficient travel modes (transit, walking, and biking) paired with policies that incentivize travelling by these modes. If the 50% non-driving mode share is not achieved through application of the Levers of Change[1], the City of Edmonton will not be able to meet the goals and objectives of the *City Plan* nor its targets. This will have significant detrimental effects to the environment and the livability, mobility, and accessibility of the city for Edmontonians.

[1] See Target Development Scenarios section for more information on Levers of Change.

CAPACITY ASSESSMENT – MODEL WITH LEVERS OF CHANGE

The results of the analysis of existing capacity versus future demand based on implementation of the Levers of Change are shown within the sections below.

Private Motor Vehicle Demand

The comparison of motor vehicle capacity to future demand can be seen in Figure 13. The existing capacity meets or exceeds the future demands for all corridor segments when considering motor vehicle volumes (majority of the segment links are green with a few amber links).

- Overall, the existing capacity for private motor vehicles exceeds what is required for the future demands.
- Current right-of-way allocated for private motor vehicles can be reallocated to address capacity and quality deficiencies for sustainable, space-efficient travel modes.

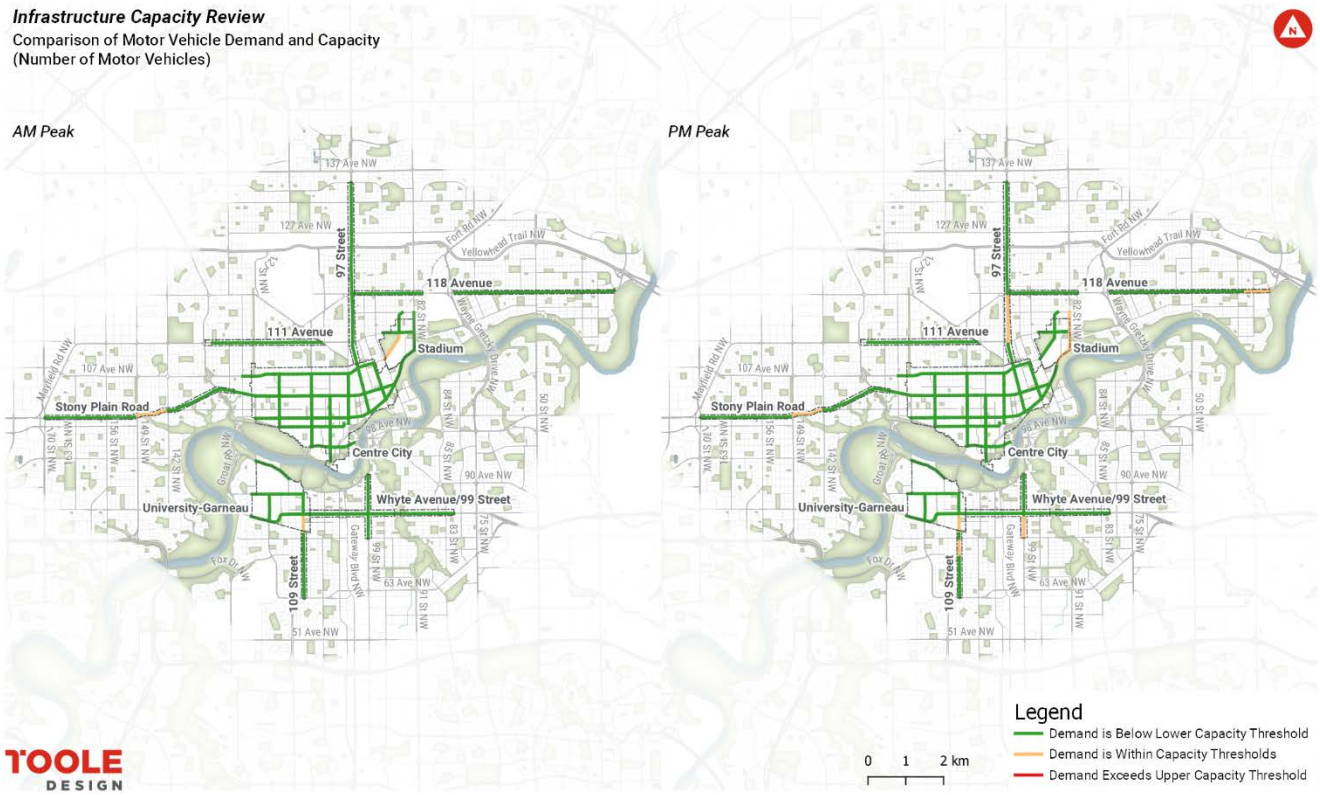


Figure 13: Comparison of Motor Vehicle Demand and Existing Capacity (Model with Levers of Change)

Transit Demand

Many corridor segments meet or exceed the capacity required for the future travel demands (green or amber links); however, there are corridor segments within each Node and along each Corridor, with the exception of the Stadium Node, where the existing capacity will not meet the future transit demand (red links).

- Providing dedicated transit facilities will be required along many corridors to support and realize the future transit travel demand envisioned by the *City Plan*.
- In some constrained corridors, this may not be possible and other measures concentrated at intersections could be used to increase travel time reliability and transit capacity. Using higher capacity transit vehicles is another measure that could increase capacity to better support demand.

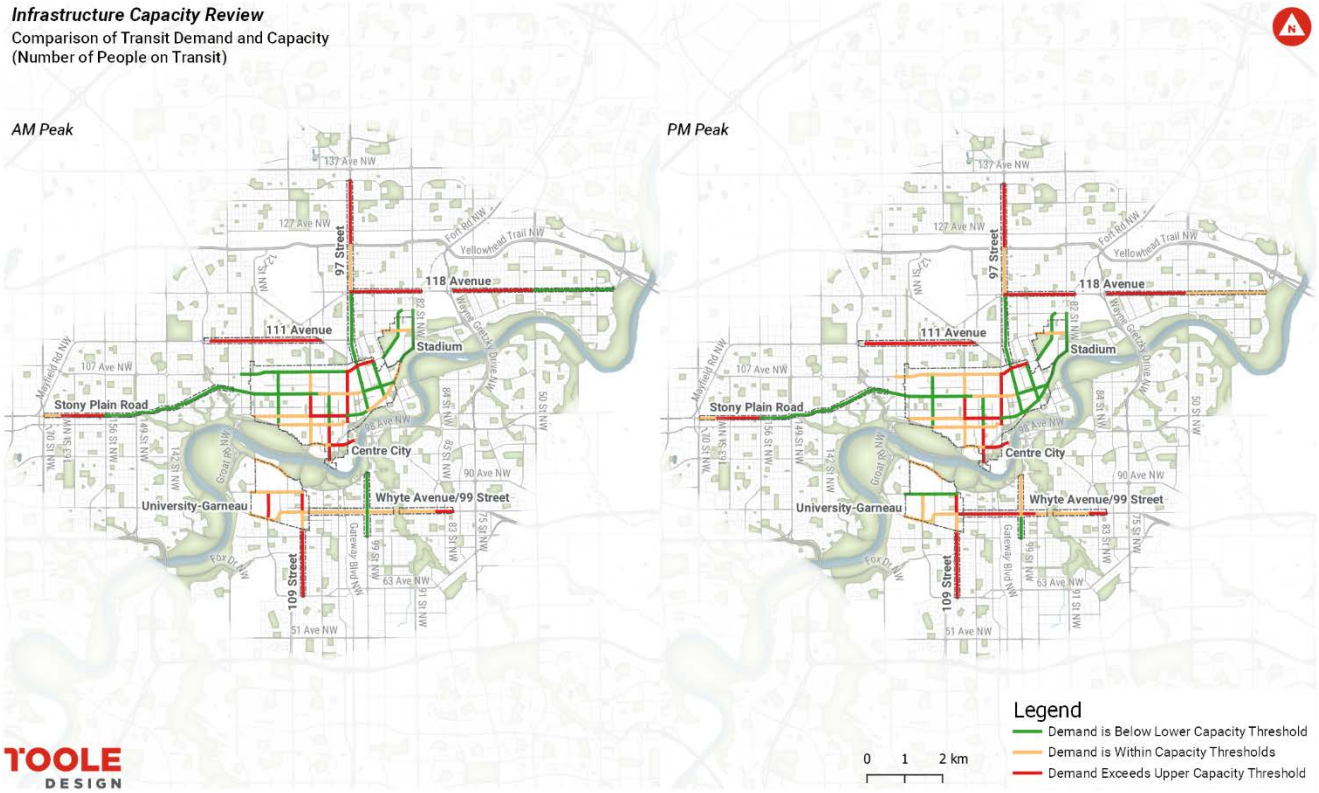


Figure 14: Comparison of Transit Demand and Existing Capacity

QUALITY ASSESSMENT – PUBLIC REALM AND WALKING

The following figure displays the results of the public realm quality assessment analysis related to walking.

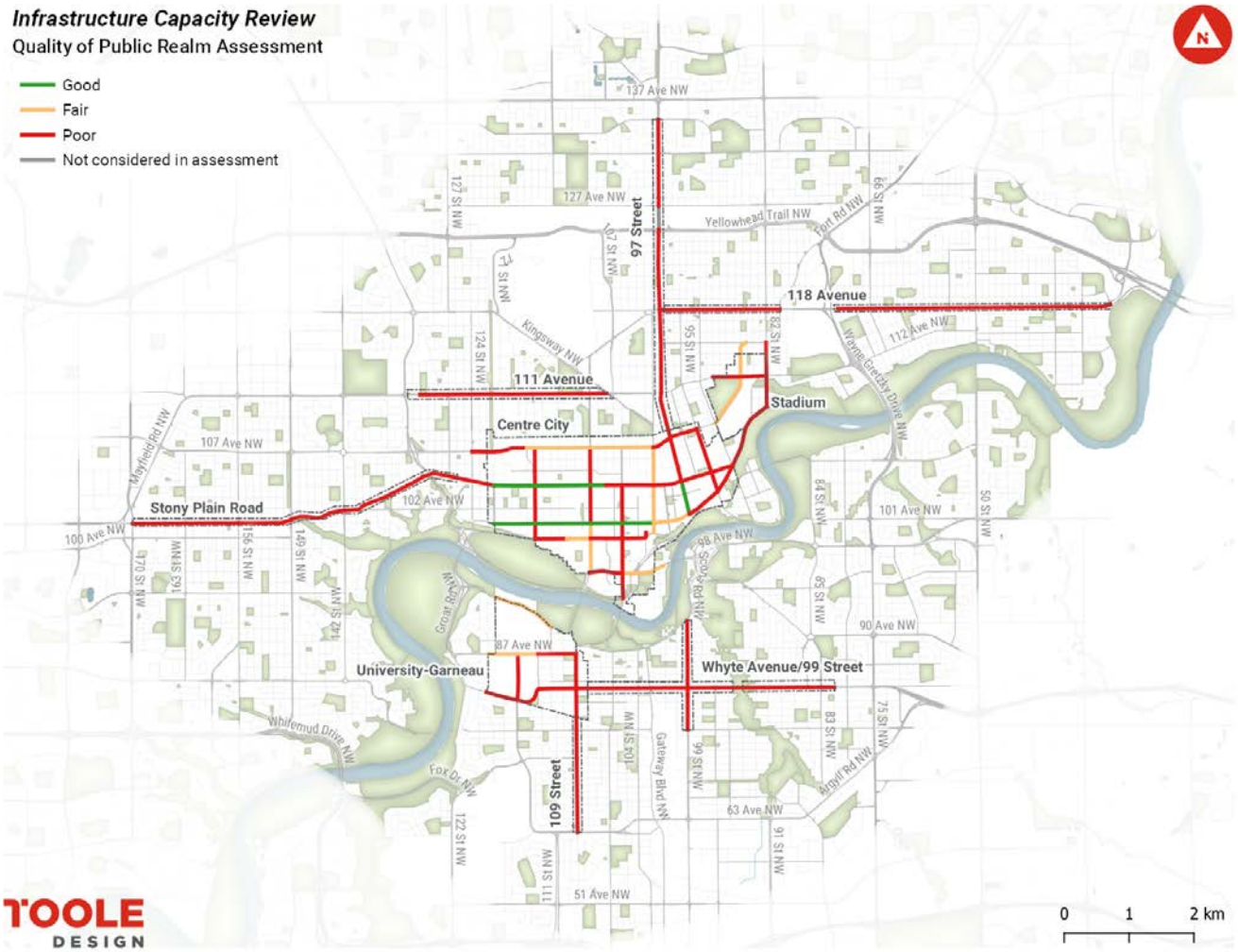


Figure 15: Nodes and Corridors Existing Conditions Quality Assessment for Walking

As can be seen in Figure 15, a significant portion of the streets within the Nodes and Corridors currently are rated as poor for the public realm quality.

- According to the Quality Assessment Framework, any street with less than 1.8m sidewalk, the width required for Universal Accessibility, was rated as “Poor” quality regardless of the condition of the other zones. This was one reason many streets were assessed as poor.
- In some cases, the Pedestrian Through Zone met the basic quality requirements (i.e., 1.8m width) but the Furnishing and Frontage Zone was not sufficient for healthy street trees, transit stop infrastructure, or other street amenities. These streets were also assessed as “Poor” for meeting the public realm requirements for Nodes and Corridors Streets.
- Poor-quality streets require significant improvements within the Pedestrian Through Zone and the Frontage and Furnishing Zones to be able to improve the quality of the public realm environment, including supporting winter operations where the Furnishing Zones are sufficient width to accommodate snow storage.

Several streets have been rated as “Fair,” particularly within the Centre City Node:

- Many of these streets had at least a 1.8m Pedestrian Through Zone but were not wide enough to exceed the basic quality requirements. This is because the Centre City Node is anticipated to generate far more walking trips than other locations due to its much higher development intensity. Many of these corridors also had Furnishing Zones that were at least 1.7m. The combination of these two scores resulted in a “Fair” rating.

“Good” Streets:

- As can be seen within the map, only Jasper Avenue from 121 Street to 97 Street, 104 Avenue from 121 Street to 107 Street, and 97 Street from Jasper Avenue from 103A Avenue are rated as “Good” within the quality assessment. All of these corridors are under construction or have recently approved designs that are pending construction that improve the public realm and walking environment.
- These segments of each corridor provide sufficient space for the Pedestrian Through Zone and the Furnishing and Frontage Zones.

QUALITY ASSESSMENT – CYCLING

The following figure shows the results for the quality assessment of the cycling infrastructure.

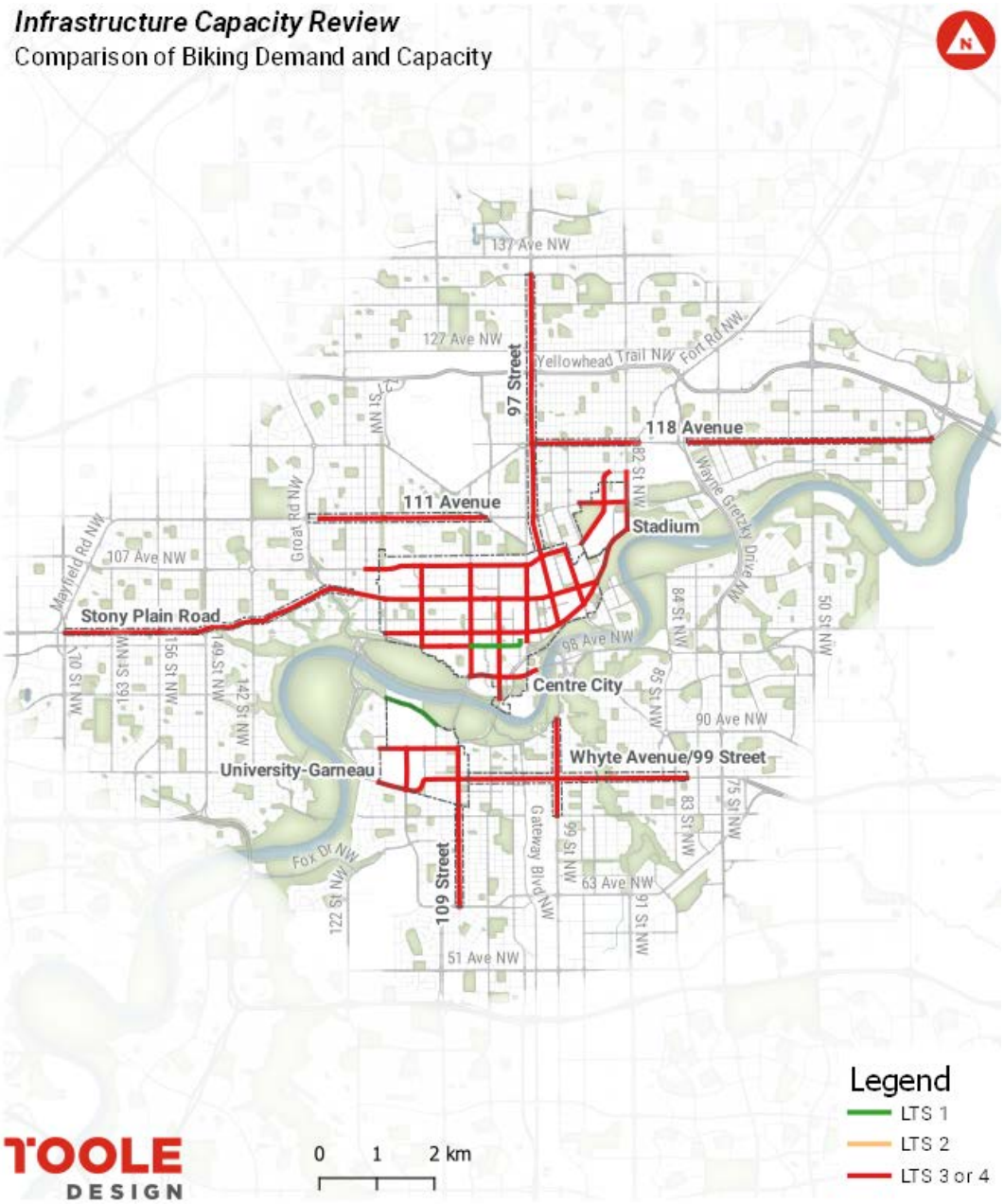


Figure 16: Quality Assessment of Cycling Infrastructure

As can be seen in the figure above, except for 100 Avenue and University Drive, the cycling infrastructure for existing streets is rated as LTS 3 or 4. Significant investments are required to provide strong separation from traffic and convert the LTS 3 and 4 facilities to LTS 1 facilities. The investments into cycling infrastructure will become more important as each corridor develops to add more population and employment intensity. In the interim, bicycle facilities on parallel corridors may continue to serve the cycling demand on some of the above corridors. Where a LTS 1 facility is available one block from a corridor, it has been noted within the Individual Street Profiles, in the next section, as a viable facility to help support cycling demand along the specific corridor.

OVERALL RESULTS – INDIVIDUAL STREET PROFILES

The above results for the capacity of the different modes for the Model with Levers of Change and the quality assessment for the public realm/walking and cycling provided insights into the gaps that exist for each of the corridors. To better understand the next steps of how to address these gaps, individual Profiles were assembled for each of the corridors. The Individual Street Profiles reflect information shown within the maps above; however, the Individual Street Profiles are separated into each of the corridors and are shown in a tabular form for clarity.

Within each of the Individual Street Profiles, the tables draw attention to the aspects of each corridor that did not meet the capacity or quality requirements. The tables use icons which refer to the same red-amber-green scale that is displayed within the maps above:

Table 5: Icon Legend for Individual Street Profiles

Icon	Motor Vehicle and Transit	Public Realm / Walking Quality	Cycling Quality
✓	The demand is below the lower capacity threshold	The street is rated as “Good”	Level of Traffic Stress 1
+	The demand is between the upper and lower capacity thresholds	The street is rated as “Fair”	Level of Traffic Stress 2
×	The demand exceeds the upper capacity threshold	The street is rated as “Poor”	Level of Traffic Stress 3 or 4
⊖	Not applicable	Public realm quality was not assessed	Not Applicable

The Individual Street Profiles also highlight the areas to address within each corridor segment. The modes of travel which require investments have been identified within the table. Where multiple areas are included, this row indicates the complexity of trade-offs.

The summaries provided within the Individual Street Profiles help to provide a more consolidated approach towards addressing network deficiencies. For example, every street may not be able to accommodate additional motor vehicle lanes or dedicated cycling infrastructure or dedicated transit infrastructure. Knowing which streets can be prioritized is very important for the development of options and additional mitigation and travel demand management measures.

Corridors

97 Street

The table below shows the performance profile for 97 Street from 108 Avenue to 135 Avenue.

Table 6: 97 Street (108 Avenue to 135 Avenue) Performance Profile

Capacity and Quality Profile	111 Ave to City Centre Node (108 Ave)	111 Ave to 118 Ave	118 Ave to Yellowhead Trail	Under Railway	North of the Railway to 135 Ave
Motor Vehicle Capacity Comparison - AM	✓	✓	✓	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	+	✓	✓	✓
People on Transit Capacity Comparison - AM	✓	✓	+	✗	✗
People on Transit Capacity Comparison - PM	✓	✓	+	✗	✗
Public Realm / Walking Quality Assessment	✗	✗	✗	⊖	✗
Cycling Quality Assessment	✗	✗	✗	✗	✗
Areas to Address	• Cycling (although parallel facility exists along 96 St) • Public Realm Quality	• Cycling (although parallel facility exists along 96 St) • Public Realm Quality	• Cycling • Public Realm Quality	• Transit • Cycling	• Transit • Cycling • Public Realm Quality

109 Street

The table below shows the performance profile for 109 Street from 61 Avenue to University Avenue.

Table 7: 109 Street (61 Avenue to University Avenue) Performance Profile

Capacity and Quality Profile	61 Ave to 72 Ave	72 Ave to 76 Ave	76 Ave to University Ave
Motor Vehicle Capacity Comparison - AM	✓	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	+	✓
People on Transit Capacity Comparison - AM	✗	✗	✗
People on Transit Capacity Comparison - PM	✗	✗	✗
Public Realm / Walking Quality Assessment	✗	✗	✗
Cycling Quality Assessment	✗	✗	✗
Areas to Address	• Transit • Cycling • Public Realm Quality	• Transit • Cycling • Public Realm Quality	• Transit • Cycling (although parallel facility under construction along 110 St) • Public Realm Quality

118 Avenue

The table below shows the performance profile for 118 Avenue from 97 Street to Rundle Park Road.

Table 8: 118 Avenue Performance Profile

Capacity and Quality Profile	97 St to 80 St/Fort Rd and 71 St to 51 St	51 St to 36 St	36 St to Rundle Park Rd
Motor Vehicle Capacity Comparison - AM	✓	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓	+
People on Transit Capacity Comparison - AM	✗	✓	✓
People on Transit Capacity Comparison - PM	✗	+	+
Public Realm / Walking Quality Assessment	✗	✗	✗
Cycling Quality Assessment	✗	✗	✗
Areas to Address	• Transit • Cycling (although parallel facility exists along 119 Ave from to the LRT) • Public Realm Quality	• Public Realm Quality • Cycling	• Public Realm Quality • Cycling

111 Avenue

The table below shows the performance profile for 111 Avenue from 131 Street to Kingsway Avenue.

Table 9: 111 Avenue Performance Profile

Capacity and Quality Profile	131 St to Shared-use Path west of 120 St	Shared-use Path west of 120 St to 110 St	110 St to Kingsway Ave
Motor Vehicle Capacity Comparison - AM	✓	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓	✓
People on Transit Capacity Comparison - AM	✗	✗	✗
People on Transit Capacity Comparison - PM	✗	✗	✗
Public Realm / Walking Quality Assessment	✗	✗	✗
Cycling Quality Assessment	✗	✗	✗
Areas to Address	• Transit • Cycling • Public Realm Quality	• Transit • Cycling • Public Realm Quality	• Transit • Cycling • Public Realm Quality

Stony Plain Road

The table below shows the performance profile for Stony Plain Road from 170 Street to 121 Street.

Table 10: Stony Plain Road Performance Profile

Capacity and Quality Profile	170 St to 166 St	166 St to 156 St	156 St to 149 St	149 St to 142 St	142 St to 121 St
Motor Vehicle Capacity Comparison - AM	✓	✓	✓	+	✓
Motor Vehicle Capacity Comparison - PM	✓	✓	✓	+	✓
People on Transit Capacity Comparison - AM	+	✗	✓	✓	✓
People on Transit Capacity Comparison - PM	+	✗	✓	✓	✓
Public Realm / Walking Quality Assessment	✗	✗	✗	✗	✗
Cycling Quality Assessment	✗	✗	✗	✗	✗
Areas to Address	• Cycling • Public Realm Quality	• Transit • Cycling • Public Realm Quality	• Cycling • Public Realm Quality	• Cycling • Public Realm Quality	• Cycling • Public Realm Quality

Whyte Avenue

The table below shows the performance profile for Whyte Avenue from 109 Street to 81 Street. It should be noted that although a LTS 1 or LTS 2 facility currently does not exist along Whyte Avenue, the 83 Avenue bike lanes run parallel one block away and help to meet the demand for destinations along Whyte Avenue.

Table 11: Whyte Avenue (109 Street to 81 Street) Performance Profile

Capacity and Quality Profile	109 St to 97 St	97 St to 91 St	91 St to 85 St	85 St to 81 St
Motor Vehicle Capacity Comparison - AM	✓	✓	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓	✓	✓
People on Transit Capacity Comparison - AM	+	+	+	✗
People on Transit Capacity Comparison - PM	✗	+	+	✗
Public Realm / Walking Quality Assessment	✗	✗	✗	✗
Cycling Quality Assessment	✗	✗	✗	✗
Areas to Address	• Transit (PM) • Cycling (although parallel facility exists along 83 Ave) • Public Realm Quality	• Cycling (although parallel facility exists along 83 Ave up to Mill Creek Ravine) • Public Realm Quality	• Cycling • Public Realm Quality	• Transit • Cycling • Public Realm Quality

99 Street

The table below shows the performance profile for 99 Street from Saskatchewan Drive to 76 Avenue.

Table 12: 99 Street Performance Profile

Capacity and Quality Profile	Saskatchewan Dr / 92 Ave to 81 Ave	81 Ave to 76 Ave
Motor Vehicle Capacity Comparison - AM	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	+
People on Transit Capacity Comparison - AM	✓	+
People on Transit Capacity Comparison - PM	+	✓
Public Realm / Walking Quality Assessment	✗	✗
Cycling Quality Assessment	✗	✗
Areas to Address	• Cycling (although parallel facility exists along 100 St) • Public Realm Quality	• Cycling • Public Realm Quality

Centre City Node

There are numerous streets within the Centre City Node. The analysis focused on those Corridors that support travel within as well as through the Node. As such, the analysis focuses on arterial streets within the Downtown and surrounding area and those Downtown Streets that provide connectivity to the broader street network. Specifically, the following streets and avenues are evaluated:

- 95 Street
- 97 Street
- 101 Street
- 105 Street
- 109 Street
- 116 Street
- 97 Avenue
- 100 Avenue
- Jasper Avenue
- 103A/104 Avenue
- 107 Avenue

95 Street

The table below shows the performance profile for 95 Street.

Table 13: 95 Street Performance Profile

Capacity and Quality Profile	Jasper Ave to 103A Ave	103A Ave to 107 Ave
Motor Vehicle Capacity Comparison - AM	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓
People on Transit Capacity Comparison - AM	✓	✓
People on Transit Capacity Comparison - PM	✓	✓
Public Realm / Walking Quality Assessment	✗	✗
Cycling Quality Assessment	✗	✗
Areas to Address	• Cycling (although parallel facility exists along 96 St) • Public Realm Quality	• Cycling (although parallel facility exists along 96 St) • Public Realm Quality

97 Street

The table below shows the performance profile for 97 Street.

Table 14: 97 Street Performance Profile

Capacity and Quality Profile	Jasper Ave to 103A Ave	103A Ave to 108 Ave
Motor Vehicle Capacity Comparison - AM	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓
People on Transit Capacity Comparison - AM	✓	✓
People on Transit Capacity Comparison - PM	✓	✓
Public Realm / Walking Quality Assessment	✗	✓
Cycling Quality Assessment	✗	✗
Areas to Address	• Cycling (although parallel facility exists along 96 St) • Public Realm Quality	• Cycling (although parallel facility exists along 96 St)

101 Street

The table below shows the performance profile for 101 Street.

Table 15: 101 Street Performance Profile

Capacity and Quality Profile	107 Ave to 105A Ave	105A Ave to 104 Ave	104 Ave to Macdonald Dr
Motor Vehicle Capacity Comparison - AM	✓	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓	✓
People on Transit Capacity Comparison - AM	✗	✗	✗
People on Transit Capacity Comparison - PM	✗	✗	✗
Public Realm / Walking Quality Assessment	+	+	+
Cycling Quality Assessment	✗	✗	✗
Areas to Address	• Transit • Cycling	• Transit • Cycling	• Transit • Cycling

105 Street

The table below shows the performance profile for 105 Street. Although the existing 105 Street conditions do not meet LTS 1 or 2, the protected bike lanes on 106 Street between 104 Avenue and 100 Avenue are LTS 1 and are located one block away.

Table 16: 105 Street Performance Profile

Capacity and Quality Profile	95 Ave to 100 Ave	100 Ave to 104 Ave
Motor Vehicle Capacity Comparison - AM	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓
People on Transit Capacity Comparison - AM	✗	✓
People on Transit Capacity Comparison - PM	✗	✓
Public Realm / Walking Quality Assessment	✗	✗
Cycling Quality Assessment	✗	✗
Areas to Address	• Transit • Cycling • Public Realm Quality	• Cycling • Public Realm Quality

109 Street

The table below shows the performance profile for 109 Street from 97 Avenue to 107 Avenue (within the Centre City Node). The existing conditions along 109 Street do not provide a LTS 1 or LTS 2 cycling facility. However, an existing shared-use path along the streetcar right-of-way and along Railtown Park provide an LTS 1 facility one block away from 109 Street to the west.

Table 17: 109 Street (97 Avenue to 107 Avenue) Performance Profile

Capacity and Quality Profile	97 Ave to Jasper Ave	Jasper Ave to 104 Ave	104 Ave to 107 Ave
Motor Vehicle Capacity Comparison - AM	✓	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓	✓
People on Transit Capacity Comparison - AM	+	✗	+
People on Transit Capacity Comparison - PM	+	✗	+
Public Realm / Walking Quality Assessment	+	✗	✗
Cycling Quality Assessment	✗	✗	✗
Areas to Address	• Cycling (although parallel facility exists along Ribbon of Street shared-use path corridor)	• Transit • Cycling (although parallel facility exists along Ribbon of Street shared-use path corridor) • Public Realm Quality	• Cycling • Public Realm Quality

116 Street

The table below shows the performance profile for 116 Street.

Table 18: 116 Street Performance Profile

Capacity and Quality Profile	100 Ave to 104 Ave	104 Ave to 107 Ave
Motor Vehicle Capacity Comparison - AM	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓
People on Transit Capacity Comparison - AM	✓	✓
People on Transit Capacity Comparison - PM	✓	✓
Public Realm / Walking Quality Assessment	✗	✗
Cycling Quality Assessment	✗	✗
Areas to Address	• Cycling • Public Realm Quality	• Cycling • Public Realm Quality

97 Avenue

The table below shows the performance profile for 97 Avenue.

Table 19: 97 Avenue Performance Profile

Capacity and Quality Profile	100 St to 105 St	105 St to 109 St
Motor Vehicle Capacity Comparison - AM	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓
People on Transit Capacity Comparison - AM	✗	+
People on Transit Capacity Comparison - PM	✗	+
Public Realm / Walking Quality Assessment	+	✗
Cycling Quality Assessment	✗	✗
Areas to Address	• Transit • Cycling	• Cycling • Public Realm Quality

100 Avenue

The table below shows the performance profile for 100 Avenue.

Table 20: 100 Avenue Performance Profile

Capacity and Quality Profile	116 St to 112 St	112 St to 109 St	109 St to 102 St
Motor Vehicle Capacity Comparison - AM	✓	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓	✓
People on Transit Capacity Comparison - AM	+	+	+
People on Transit Capacity Comparison - PM	+	+	+
Public Realm / Walking Quality Assessment	✗	+	✗
Cycling Quality Assessment	✗	✗	✓
Areas to Address	• Cycling • Public Realm Quality	• Cycling	• Public Realm Quality

Jasper Avenue

The table below shows the performance profile for Jasper Avenue from 121 St to 87 St (within Centre City Node). Though the Jasper Avenue existing conditions do not meet the LTS 1 or 2 cycling quality, the future requirements could be met through the protected bike lanes on 102 Avenue to the north and 100 Avenue to the south.

Table 21: Jasper Avenue (121 St to 87 St) Performance Profile

Capacity and Quality Profile	121 St to 114 St	114 St to 109 St	109 St to 101 St	101 St to 97 St	97 St to 87 St
Motor Vehicle Capacity Comparison - AM	✓	✓	✓	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓	✓	✓	✓
People on Transit Capacity Comparison - AM	+	+	✗	✓	+
People on Transit Capacity Comparison - PM	+	+	✗	✓	✓
Public Realm / Walking Quality Assessment	✓	✓	✓	+	✗
Cycling Quality Assessment	✗	✗	✗	✗	✗
Areas to Address	• Cycling (although parallel facility exists along 102 Ave)	• Cycling (although parallel facility exists along 102 Ave)	• Transit • Cycling (although parallel facility exists along 102 Ave)	• Cycling (although parallel facility exists along 102 / 102A Ave)	• Cycling (although parallel facility exists along 102 Ave up to 96 St) • Public Realm Quality

104 Avenue

The table below shows the performance profile for 104 Avenue. The existing 104 Avenue conditions do not support an LTS 1 or LTS 2 cycling facility. However, an LTS 1 facility exists one block away along 105 Avenue.

Table 22: 104 Avenue Performance Profile

Capacity and Quality Profile	121 St to 107 St	107 St to 97 St	97 St to 92 St
Motor Vehicle Capacity Comparison - AM	✓	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓	✓
People on Transit Capacity Comparison - AM	✓	+	✓
People on Transit Capacity Comparison - PM	✓	+	✓
Public Realm / Walking Quality Assessment	✓	✗	✗
Cycling Quality Assessment	✗	✗	✗
Areas to Address	• Cycling (although parallel facility exists along 105 Ave)	• Cycling (although parallel facility exists along 102 Ave) • Public Realm Quality	• Cycling • Public Realm Quality

107 Avenue

The table below shows the performance profile for 107 Avenue.

Table 23: 107 Avenue Performance Profile

Capacity and Quality Profile	124 St to 117 St	117 St to 101 St	101 St to 95 St
Motor Vehicle Capacity Comparison - AM	✓	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓	✓
People on Transit Capacity Comparison - AM	✓	✓	✗
People on Transit Capacity Comparison - PM	+	+	✗
Public Realm / Walking Quality Assessment	✗	+	✗
Cycling Quality Assessment	✗	✗	✗
Areas to Address	• Cycling • Public Realm Quality	• Cycling	• Transit • Cycling • Public Realm Quality

Stadium Node

Stadium Road / 86 Street

The table below shows the performance profile for Stadium Road / 86 Street. The existing conditions along Stadium Road do not support a LTS 1 or LTS 2 cycling facility. However, there is a shared-use path along the LRT right-of-way one block away which would accommodate LTS 1 cycling quality.

Table 24: Stadium Road / 86 Street Performance Profile

Capacity and Quality Profile	92 St to 112 Ave	112 Ave to 115 Ave
Motor Vehicle Capacity Comparison - AM	+	✓
Motor Vehicle Capacity Comparison - PM	✓	✓
People on Transit Capacity Comparison - AM	✓	✓
People on Transit Capacity Comparison - PM	✓	✓
Public Realm / Walking Quality Assessment	+	+
Cycling Quality Assessment	✗	✗
Areas to Address	• Cycling	• Cycling

82 Street

The table below shows the performance profile for 82 Street.

Table 25: 82 Street Performance Profile

Capacity and Quality Profile	Jasper Ave to 114 Ave
Motor Vehicle Capacity Comparison - AM	✓
Motor Vehicle Capacity Comparison - PM	+
People on Transit Capacity Comparison - AM	✓
People on Transit Capacity Comparison - PM	✓
Public Realm / Walking Quality Assessment	✗
Cycling Quality Assessment	✗
Areas to Address	• Cycling • Public Realm Quality

112 Avenue

The table below shows the performance profile for 112 Avenue.

Table 26: 112 Avenue Performance Profile

Capacity and Quality Profile	89 St to 82 St
Motor Vehicle Capacity Comparison - AM	✓
Motor Vehicle Capacity Comparison - PM	✓
People on Transit Capacity Comparison - AM	+
People on Transit Capacity Comparison - PM	+
Public Realm / Walking Quality Assessment	✗
Cycling Quality Assessment	✗
Areas to Address	• Cycling • Public Realm Quality

Jasper Avenue

The table below shows the performance profile for Jasper Avenue between 87 Street and 82 Street (within the Stadium Node).

Table 27: Jasper Avenue (87 St to 82 St) Performance Profile

Capacity and Quality Profile	87 St to 82 St
Motor Vehicle Capacity Comparison - AM	✓
Motor Vehicle Capacity Comparison - PM	+
People on Transit Capacity Comparison - AM	✓
People on Transit Capacity Comparison - PM	✓
Public Realm / Walking Quality Assessment	✗
Cycling Quality Assessment	✗
Areas to Address	• Cycling • Public Realm Quality

University-Garneau Node

109 Street

The table below shows the performance profile for 109 Street from University Avenue to 87 Ave.

Table 28: 109 Street (University Avenue to 87 Avenue) Performance Profile

Capacity and Quality Profile	87 Avenue to Whyte Ave	Whyte Ave to University Avenue
Motor Vehicle Capacity Comparison - AM	✓	+
Motor Vehicle Capacity Comparison - PM	✓	+
People on Transit Capacity Comparison - AM	✗	+
People on Transit Capacity Comparison - PM	✗	+
Public Realm / Walking Quality Assessment	✗	✗
Cycling Quality Assessment	✗	✗
Areas to Address	• Transit • Cycling (although parallel facility exists along 110 Street) • Public Realm Quality	• Cycling (although parallel facility exists along 110 Street) • Public Realm Quality

82 Avenue / Whyte Avenue

The table below shows the performance profile for 82 Avenue / Whyte Avenue between 114 St and 109 St (within University-Garneau Node). It should be noted that although a LTS 1 or LTS 2 facility currently does not exist along Whyte Avenue, the 83 Avenue bike lanes run parallel one block away and help to meet the demand for destinations along Whyte Avenue.

Table 29: 82 Avenue / Whyte Avenue (114 St to 109 St) Performance Profile

Capacity and Quality Profile	82 Ave / Whyte Ave W of 109 St
Motor Vehicle Capacity Comparison - AM	✓
Motor Vehicle Capacity Comparison - PM	✓
People on Transit Capacity Comparison - AM	+
People on Transit Capacity Comparison - PM	+
Public Realm / Walking Quality Assessment	✗
Cycling Quality Assessment	✗
Areas to Address	• Cycling (although parallel facility exists along 83 Ave) • Public Realm Quality

114 Street

The table below shows the performance profile for 114 Street.

Table 30: 114 Street Performance Profile

Capacity and Quality Profile	University Ave to 87 Ave
Motor Vehicle Capacity Comparison - AM	✓
Motor Vehicle Capacity Comparison - PM	✓
People on Transit Capacity Comparison - AM	✗
People on Transit Capacity Comparison - PM	+
Public Realm / Walking Quality Assessment	✗
Cycling Quality Assessment	✗
Areas to Address	• Transit (AM) • Cycling • Public Realm Quality

87 Avenue

The table below shows the performance profile for 87 Avenue.

Table 31: 87 Avenue Performance Profile

Capacity and Quality Profile	116 St to 112 St	112 St to 109 St
Motor Vehicle Capacity Comparison - AM	✓	✓
Motor Vehicle Capacity Comparison - PM	✓	✓
People on Transit Capacity Comparison - AM	+	+
People on Transit Capacity Comparison - PM	✓	✓
Public Realm / Walking Quality Assessment	+	✗
Cycling Quality Assessment	✗	✗
Areas to Address	• Cycling	• Cycling • Public Realm Quality

University Avenue

The table below shows the performance profile for University Avenue.

Table 32: University Avenue Performance Profile

Capacity and Quality Profile	117 St to 114 St
Motor Vehicle Capacity Comparison - AM	✓
Motor Vehicle Capacity Comparison - PM	✓
People on Transit Capacity Comparison - AM	+
People on Transit Capacity Comparison - PM	+
Public Realm / Walking Quality Assessment	✗
Cycling Quality Assessment	✗
Areas to Address	• Cycling • Public Realm Quality

Saskatchewan Drive

The table below shows the performance profile for Saskatchewan Drive.

Table 33: Saskatchewan Drive Performance Profile

Capacity and Quality Profile	116 St to 111 St
Motor Vehicle Capacity Comparison - AM	✓
Motor Vehicle Capacity Comparison - PM	✓
People on Transit Capacity Comparison - AM	+
People on Transit Capacity Comparison - PM	+
Public Realm / Walking Quality Assessment	+
Cycling Quality Assessment	✓
Areas to Address	• None

Summary of Results

Based on the above results, the following are key findings of the capacity and quality analysis based on the 50% mode share by transit, cycling, and walking.

- **Vehicle Capacity:**
  - There are no instances of the motor vehicle demand exceeding the upper limit capacity.
- **Transit:**
  - Out of the 28 individual corridors, 14 require transit improvements to meet the transit demand. Dedicated bus lanes or a transitway would be required for these streets. Where bus lanes or transitways cannot be accommodated, mitigations will be provided to resolve the capacity deficiency.
- **Quality of Public Realm for Walking:**
  - Portions of three streets meet the public realm quality requirements. Most corridors will require changes to expand the Pedestrian Through Zones and Furnishing/Frontage Zones through reallocating right-of-way.
- **Cycling:**
  - Saskatchewan Drive is the only corridor which achieves LTS 1 along all segments evaluated. Additionally, a segment of 100 Avenue, from 109 Street to 102 Street, also achieves LTS 1.
  - As the cycling goals outlined within the *City Plan* are crucial for meeting future population growth and mode share targets, cycling facilities should be added along all corridors.
  - However, it should be noted that an LTS 1 or LTS 2 cycling facility is located one block away from segments of Whyte Avenue, 105 Street, 109 Street, 99 Street, Jasper Avenue, 104 Avenue, and Stadium Road. Depending on the other capacity and quality deficiencies, the parallel facilities may provide sufficient quality of bicycle access to destinations and homes along these corridor segments in the near term.

RECOMMENDED CAPACITY AND QUALITY CHANGES

This chapter details the process for recommending changes to the existing capacity and allocation of right-of-way along the corridor segments and presents results of the analysis. The information in this chapter is organized as follows:

1. Capacity and Quality Expansion Methodology
    - This section explains the approach for reviewing and addressing the capacity and quality deficiencies within the existing corridor segments through new cross-section options.
2. Options to Meet Capacity and Quality Requirements
    - This section shares details of typical cross-sections for various commonly observed rights-of-way widths among the corridor segments analyzed. The cross-sections have been developed to incorporate all modes of transportation. The cross-section options provide public realm zone widths that meet quality requirements for walking and provide cycling facilities that meet an LTS 1 quality rating.
3. Performance of the Recommended Cross-Sections
    - Based on the assignment of new cross-sections to the corridor segments, this section shares the resulting capacity and quality comparisons for motor vehicles, transit, walking, and cycling.
4. Recommended Cross-Sections – Individual Street Profiles
    - This section details how the recommended cross-section improves the corridor segment and whether further mitigations are required to meet quality and capacity needs.

CAPACITY AND QUALITY EXPANSION METHODOLOGY

Rights-of-way allocation changes and the increased use of dedicated bus lanes and protected bike lanes are required to achieve the necessary transit capacity and cycling quality requirements for the two-million population horizon. To assist with this process and to ensure that the capacity and quality requirements could be met, cross-sections that provide infrastructure for all modes and meet the quality requirements were developed for representative right-of-way widths.

A comparison of the rights-of-way for the corridor segments showed there are three commonly found right-of-way widths for the Nodes and Corridors being assessed – a 20.1m width, a 24.4m width, and a 30.5m width. Cross-sections options were developed for each of these representative widths and they were applied to the existing corridor segments to calculate their capacity and assess their quality.

For corridor segments that have different right-of-way widths that do not fit one of the three representative cross-sections, modifications were required to meet the specific needs for each corridor segment. The goal of this process was to be able to provide infrastructure for all modes within each cross-section to support basic access requirements while also meeting public realm quality requirements to support the vibrancy goals for Nodes and Corridors outlined in the *City Plan*.

Once the cross-sections were assigned and modifications were made where necessary, the corridor segments were once again evaluated to compare the multimodal capacity to the future multimodal travel demands and evaluate the quality of the walking and cycling environments. The following sections describe the representative cross-section options.

It should be noted that the purpose of this methodology was to evaluate the ability for each of the existing right-of-way widths to be able to provide the infrastructure identified to meet the multimodal capacity and quality requirements. These cross-sections do not represent recommendations for concept plans for each of these corridor segments. Rather, they help illustrate that reallocation and redistribution of space is possible to achieve better capacity and quality outcomes. Further planning and design are required to develop concept design plans.

OPTIONS TO MEET CAPACITY AND QUALITY REQUIREMENTS

Three representative right-of-way widths formed the basis of the corridors within the study area:

1. 20.1m right-of-way
2. 24.4m right-of-way
3. 30.5m right-of-way

Each of the cross-sections and associated alternatives for these rights-of-way are discussed below. These configurations were used as starting points for developing options for each corridor segment. The base and variant options were selected based on the quality and capacity needs for each corridor segment. In some cases, the base or variant option needed further revisions to meet the unique mobility and placemaking needs of the corridor segment. For example, shifting a protected bike lane to be located adjacent to the sidewalk and the landscaped furnishing zone to be located adjacent to the travelled way allows for parking pockets to be developed between street trees and transit lanes to be added to a corridor.

20.1m Right-of-Way

The 20.1m right-of-way was one of the most frequently observed rights-of-way for the corridor segments analyzed. Existing cross-sections within this right-of-way width mainly accommodate four lanes of motor vehicle traffic and a public realm with poor quality. The following streets currently have a segment or segments with a 20.1m right-of-way width:

Table 34: Streets with 20.1m Right-of-Way Width

Node/Corridor	Streets
Corridors	97 Street, 118 Avenue, Stony Plain Road, 99 Street
Centre City Node	95 Street, 97 Street, 104 Avenue
Stadium Node	Stadium Road, 82 Street
University-Garneau Node	87 Avenue

Various expansion option configurations with this right-of-way were developed to provide better space allocation for other modes and improve the quality of the public realm. An option with transit lanes was not developed for this right-of-way as providing two lanes for transit and two lanes for motor vehicles would have reduced the quality of the pedestrian through zone, furnishing zone, and frontage zone. This trade-off was considered appropriate only where an exception was required due to very high transit travel demand. An exception of this type was encountered along the 118 Avenue and the Stony Plain Road corridors and is described further within the Individual Street Performance for the Recommended Expansion for each corridor.

The following figure displays a typical cross-section for the 20.1m right-of-way used for the recommended options.

Base 20.1m Right-of-Way Cross-Section

Figure 17: 20.1m Right-of-Way Base Cross-Section

Some key features of this cross-section include:

- A public realm quality that is rated as Good
- Pedestrian through zones that are 3.7m wide on both sides
- Furnishing zone widths which can accommodate healthy trees, transit infrastructure, activation by adjacent businesses, and/or vehicle parking where necessary
- Two motor vehicle travel lanes

Benefits of this cross-section include:

- Added trees to create more supportive micro-climates along the street, clean the air, and create a people-friendly environment
- Space between trees could be used for patios and other street activations
- A frontage zone adjacent to the buildings provides a space for small advertising and displays for businesses that are located outside of the walking route
- Wide sidewalks support more people walking, allow people to stop and gather, and provides space for people using mobility aids or walking with service animals to pass one another
- The public realm can incorporate low impact development features to reduce stormwater flows into underground pipes through the use of rain gardens, permeable materials, and other methods
- The amount of road surface and base is reduced, reducing costs of construction and maintenance and stormwater run-off
- Snow storage accommodated within the furnishing zones on both sides of the street
- Loading zones or short term parking could be provided in parking pockets between trees, if necessary, but this would reduce the number of trees along the corridor

Drawbacks of this cross-section include:

- No dedicated cycling facilities are provided and cycling connections would have to occur along parallel streets with connections at every block from the parallel street to the corridor with bicycle parking located at these cross streets
- No dedicated transit facilities; transit operations within mixed traffic

20.1m Right-of-Way Cross-Section Variant with Two-way Bikeway

Figure 18: 20.1m Right-of-Way Cross-Section Variant with Two-way Bikeway

To provide cycling infrastructure within the same width, an alternative cross-section was developed. Some key features of this cross-section include:

- 3.0m pedestrian through zone on both sides
- A furnishing zone wide enough to provide healthy trees, bus stops, activation by adjacent businesses, and/or parking only on one side. Where parking is not required, the furnishing and frontage zones could be redistributed equally on both sides and still accommodate healthy trees
- Two-way protected bike lanes that could be at the street level or sidewalk level
- Two motor vehicle travel lanes

Benefits of this cross-section include:

- Added trees to create more supportive micro-climates along the street, clean the air, and create a people-friendly environment
- Space between trees could be used for patios and other street activations
- Dedicated cycling infrastructure supports access for people of all ages and abilities
- A frontage zone adjacent to the buildings provides a space for small advertising and displays for businesses that are located outside of the walking route
- Wide sidewalks support more people walking, allow people to stop and gather, and provides space for people using mobility aids or walking with service animals to pass one another
- The public realm can incorporate low impact development features to reduce stormwater flows into underground pipes through the use of rain gardens, permeable materials, and other methods
- The amount of road surface and base is reduced, reducing costs of construction and maintenance and stormwater run-off
- Snow storage accommodated within the furnishing zones on both sides of the street
- Loading zones or short-term parking could be provided in parking pockets on one side of the street between trees, if necessary, but this would reduce the number of trees along the corridor

Drawbacks of this cross-section include:

- Trees can only be provided along one side of the street if parking pockets between trees is desired
- Less space for snow storage on the side of the street without trees
- No dedicated transit facilities; transit operations within mixed traffic

20.1m Right-of-Way Cross-Section Variant with One-way Bikeways

Figure 19: 20.1m Right-of-Way Cross-Section Variant with One-way Bikeways

Another variation was created to incorporate one-way bike lanes. However, this version could not accommodate a curbside zone. Key features of this cross-section include:

- 2.5m pedestrian through zone on both sides separated from the protected bike lanes by a 0.3m buffer
- Furnishing zones wide enough to accommodate trees and bus stop infrastructure
- One-way bike lanes separated from traffic by the furnishing zone (could be at street-level, sidewalk-level, or mid-level)
- Two motor vehicle travel lanes

Benefits of this cross-section include:

- Added trees to create more supportive micro-climates along the street, clean the air, and create a people-friendly environment
- Dedicated cycling infrastructure supports access for people of all ages and abilities and with one-way operations which simplifies operation at intersections
- A frontage zone adjacent to the buildings provides a space for small advertising and displays for businesses that are located outside of the walking route
- Wide sidewalks support more people walking, allow people to stop and gather, and provides space for people using mobility aids or walking with service animals to pass one another
- The public realm can incorporate low impact development features to reduce stormwater flows into underground pipes through the use of rain gardens, permeable materials, and other methods
- The amount of road surface and base is reduced, reducing costs of construction and maintenance and stormwater run-off
- Snow storage accommodated within the furnishing zones on both sides of the street

Drawbacks of this cross-section include:

- Narrower sidewalks will provide less space for people walking as compared to the base 20.1m right-of-way cross-section
- Limited space for patios and street activation due to the narrower furnishing zone
- Providing loading zones or short-term parking would have to occur on private property, at intersecting streets, or at the rear of buildings

24.4m Right-of-Way width

Another commonly found width is a 24.4m cross-section. The existing streets using this cross-section typically have four or six travel lanes, do not accommodate cycling, and many have poor public realm quality. The following streets currently have a segment or segments with a 24.4m right-of-way width:

Table 35: Streets with 24.4m Right-of-Way Width

Node/Corridor	Streets
Corridors	111 Avenue
Centre City Node	101 Street, 105 Street, 116 Street, 100 Avenue, Jasper Avenue, 107 Avenue
Stadium Node	112 Avenue
University-Garneau Node	Saskatchewan Drive

The goal of the options developed was to ensure that the public realm space could be a higher quality and to provide access and capacity for all modes. In locations where the existing cross-sections were slightly narrower or wider, slight modifications were made to each of the dimensions.

Base 24.4m Right-of-Way Cross-Section

Figure 20: Base 24.4m Right-of-Way Cross-Section

Key features of this option include:

- 3.4m pedestrian through zone on both sides
- Furnishing zone wide enough to accommodate healthy trees, bus stop infrastructure, activation by adjacent businesses, and/or parking, where necessary
- One-way bike lanes on both sides of the street separated from the pedestrian through zone with a 0.6m buffer and from the travelled way by a furnishing zone (could be at street-level, sidewalk-level, or mid-level)
- Two motor vehicle travel lanes

Benefits of this cross-section include:

- Added trees to create more supportive micro-climates along the street, clean the air, and create a people-friendly environment
- Space between trees could be used for patios and other street activations
- Dedicated cycling infrastructure supports access for people of all ages and abilities
- A frontage zone adjacent to the buildings provides a space for small advertising and displays for businesses that are located outside of the walking route
- Wide sidewalks support more people walking, allow people to stop and gather, and provides space for people using mobility aids or walking with service animals to pass one another
- The public realm can incorporate low impact development features to reduce stormwater flows into underground pipes through the use of rain gardens, permeable materials, and other methods
- The amount of road surface and base is reduced, reducing costs of construction and maintenance and stormwater run-off
- Snow storage accommodated within the furnishing zones on both sides of the street
- Loading zones or short-term parking could be provided in parking pockets between trees, if necessary, but this would reduce the number of trees along the corridor

Drawbacks of this cross-section include:

- No dedicated transit facilities; transit operations within mixed traffic

24.4m Right-of-Way Cross-Section Variant with Transit Lanes

Figure 21: 24.4m Right-of-Way Cross-Section Variant with Transit Lanes

For corridors which required higher order transit accommodation, 24.4m cross-section was developed with transit lanes. Some key features include:

- 3.0m pedestrian through zone on both sides
- Furnishing zone on one side of the street wide enough to accommodate healthy trees and bus stops
- Two-way protected bike lane separated from the travelled way by a furnishing zone (could be at street-level, sidewalk-level, or mid-level)
- Dedicated bus lanes
- Two motor vehicle travel lanes

Benefits of this cross-section include:

- Added trees to create more supportive micro-climates along the street, clean the air, and create a people-friendly environment
- Space between trees could be used for patios and other street activations
- Dedicated cycling infrastructure supports access for people of all ages and abilities
- Dedicated transit lanes to support frequent or express bus service
- A frontage zone adjacent to the buildings provides a space for small advertising and displays for businesses that are located outside of the walking route
- Wide sidewalks support more people walking, allow people to stop and gather, and provides space for people using mobility aids or walking with service animals to pass one another
- The public realm can incorporate low impact development features to reduce stormwater flows into underground pipes through the use of rain gardens, permeable materials, and other methods
- Snow storage accommodated within the furnishing zones on both sides of the street

Drawbacks of this cross-section include:

- Limited space for patios and street activation due to the narrower furnishing zone; as redevelopment occurs, property setbacks could be a requirement to create space for street activation
- Providing loading zones or short-term parking would have to occur on private property, at intersecting streets, or at the rear of buildings
- Less space for snow storage and trees only provided on one side of the street

30.5m Right-of-Way width

The following streets had a segment or segments with a right-of-way width of 30.5m:

Table 36: Streets with 30.5m Right-of-Way Width

Node/Corridor	Streets
Corridors	111 Avenue, Whyte Avenue, 99 Street
Centre City Node	97 Street, 109 Street, Jasper Avenue
Stadium Node	None
University-Garneau Node	109 Street, 82 Avenue / Whyte Avenue, 87 Avenue

Several cross-section options were developed to enhance the public realm quality and to increase transit and cycling capacity. Where cross-sections were slightly narrower or wider, modifications were made to these cross-sections.

Base 30.5m Right-of-Way Cross-Section

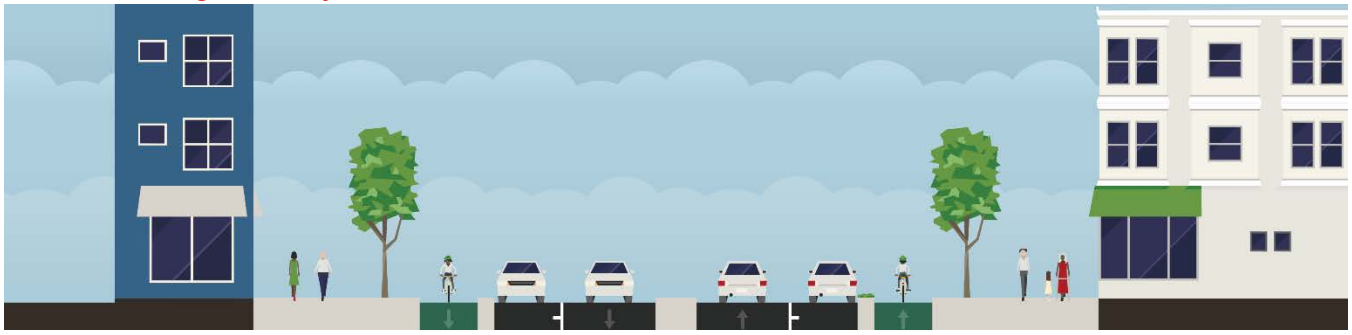


Figure 22: Base 30.5m Right-of-Way Cross-Section

Key features of this cross-section include:

- 3.0m pedestrian through zone on each side
- 0.5m frontage zones and 2.5m furnishing zones to accommodate healthy trees and support street activation by adjacent businesses on both sides of the street
- One-way protected bike lanes on both sides of the street separated from the ancillary zone by a 0.6m buffer (could be at street-level, sidewalk-level, or mid-level)
- 2.5m parking lanes in the ancillary zones on both sides of the street that can also be used to provide high-quality bus stops, add curb extensions with trees and plantings, and/or be used for activation by adjacent businesses
- Two motor vehicle travel lanes

Benefits of this cross-section include:

- Added trees to create more supportive micro-climates along the street, clean the air, and create a people-friendly environment
- Space between trees could be used for patios and other street activations
- Dedicated cycling infrastructure supports access for people of all ages and abilities
- A frontage zone adjacent to the buildings provides a space for small advertising and displays for businesses that are located outside of the walking route
- Wide sidewalks support more people walking, allow people to stop and gather, and provides space for people using mobility aids or walking with service animals to pass one another
- The public realm can incorporate low impact development features to reduce stormwater flows into underground pipes through the use of rain gardens, permeable materials, and other methods
- The amount of road surface and base is reduced, reducing costs of construction and maintenance and stormwater run-off
- Snow storage accommodated within the furnishing zones on both sides of the street
- Parking and loading zones provided along both sides of the street

Drawbacks of this cross-section include:

- No dedicated transit facilities; transit operations within mixed traffic

30.5m Right-of-Way Cross-Section Variant with Transit Lanes Option 1

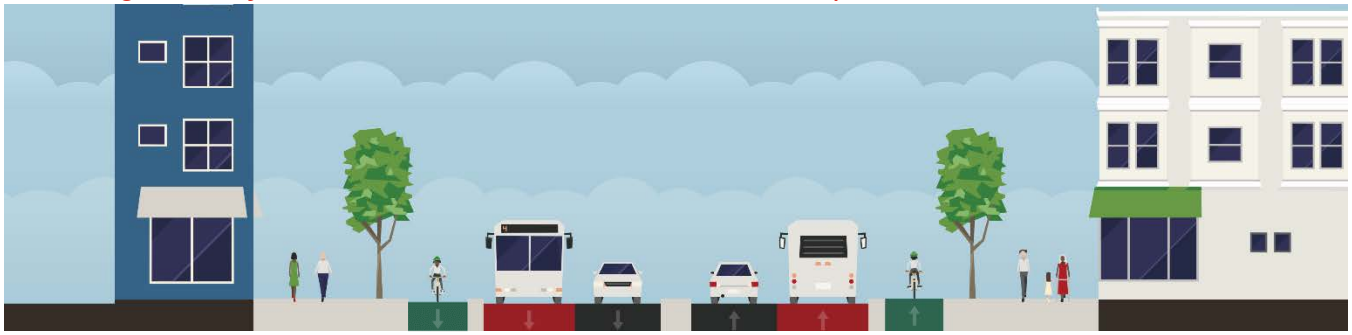


Figure 23: 30.5m Right-of-Way Cross-Section Variant with Transit Lanes Option 1

Key features of this cross-section include:

- 3.0m pedestrian through zone on each side
- Furnishing zone wide enough to accommodate healthy trees and floating bus stops (where the bike lanes would bend away from the street to create floating bus stops)
- One-way protected bike lanes separated from the travelled way by a 0.6m buffer (could be at street-level, sidewalk-level, or mid-level)
- Dedicated transit lanes
- Two motor vehicle travel lanes

Benefits of this cross-section include:

- Added trees to create more supportive micro-climates along the street, clean the air, and create a people-friendly environment
- Space between trees could be used for patios and other street activations
- Dedicated cycling infrastructure supports access for people of all ages and abilities
- Dedicated transit lanes to support frequent or express bus service
- A frontage zone adjacent to the buildings provides a space for small advertising and displays for businesses that are located outside of the walking route
- Wide sidewalks support more people walking, allow people to stop and gather, and provides space for people using mobility aids or walking with service animals to pass one another
- The public realm can incorporate low impact development features to reduce stormwater flows into underground pipes through the use of rain gardens, permeable materials, and other methods
- Snow storage accommodated within the furnishing zones on both sides of the street

Drawbacks of this cross-section include:

- Providing loading zones or short-term parking would have to occur on private property, at intersecting streets, or at the rear of buildings

30.5m Right-of-Way Cross-Section Variant with Transit Lanes Option 2

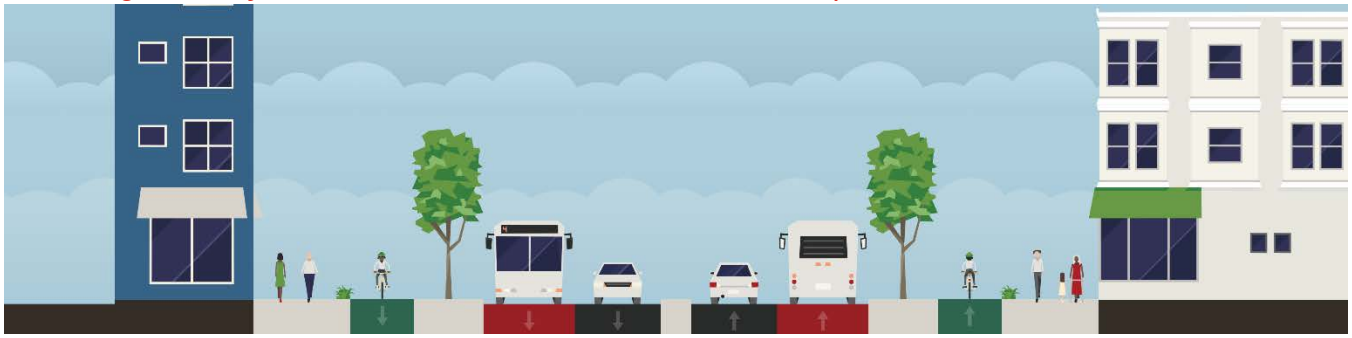


Figure 24: 30.5m Right-of-Way Cross-Section Variant with Transit Lanes Option 2

Key features of this cross-section include:

- 3.0m wide pedestrian through zone on each side
- Furnishing zone wide enough to accommodate healthy trees, bus stops, activation by adjacent businesses, and/or parking
- One-way protected bike lanes separated from the pedestrian through zone by 0.6m buffers (could be at street-level, sidewalk-level, or mid-level)
- Dedicated transit lanes
- Two motor vehicle travel lanes

Benefits of this cross-section include:

- Added trees to create more supportive micro-climates along the street, clean the air, and create a people-friendly environment
- Space between trees could be used for patios and other street activations
- Dedicated cycling infrastructure supports access for people of all ages and abilities
- Dedicated transit lanes to support frequent or express bus service
- A frontage zone adjacent to the buildings provides a space for small advertising and displays for businesses that are located outside of the walking route
- Wide sidewalks support more people walking, allow people to stop and gather, and provides space for people using mobility aids or walking with service animals to pass one another
- The public realm can incorporate low impact development features to reduce stormwater flows into underground pipes through the use of rain gardens, permeable materials, and other methods
- The amount of road surface and base is reduced, reducing costs of construction and maintenance and stormwater run-off
- Snow storage accommodated within the furnishing zones on both sides of the street
- Loading zones or short-term parking could be provided in parking pockets between trees, if necessary, but this would reduce the number of trees along the corridor

Drawbacks of this cross-section include:

- Narrower sidewalks will provide less space for people walking as compared to the other 30.5m right-of-way cross-sections
- Less space for patios and street activation due to the narrower furnishing zone, its separation from the pedestrian through zone, and not providing a frontage zone; as redevelopment occurs, property setbacks could be a requirement to create space for street activation

PERFORMANCE OF THE RECOMMENDED CROSS-SECTIONS

Using the cross-section options developed for each of the typical right-of-way widths, the capacity and quality were evaluated and mapped for each corridor segment. The future demand to capacity comparison for motor vehicles and transit travel and the quality of the walking and cycling environments are shown within the sections below. Based on the projected future travel demands and the performance of the base and variant cross-sections for each corridor segment related to capacity and quality, further refinements to the allocation of right-of-way were completed as described in the Recommended Cross-Sections – Individual Street Profiles section of the report.

Vehicle Demand

The figure below illustrates the performance of the recommended options for motor vehicle demand.

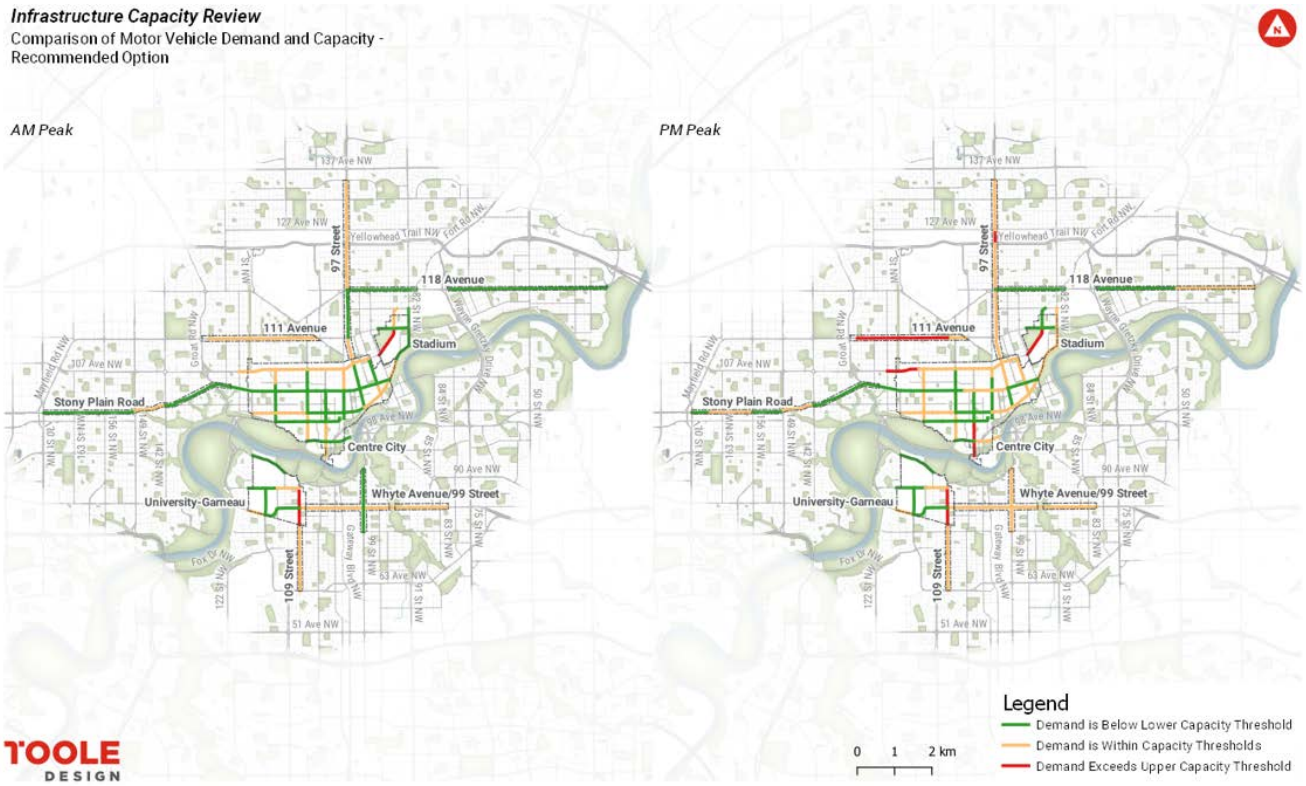


Figure 25: Recommended Options Vehicle Capacity Comparison

The vehicle demand would be generally met through the recommended options for the corridor segments. The vehicle demand within the following corridor segments would exceed the upper capacity threshold:

- 97 Street (at underpass – PM Peak only)
- 111 Avenue (AM Peak only)
- 107 Avenue (west of 116 Street – PM Peak only)
- Stadium Road
- 105 Street (97 Avenue to 100 Avenue – PM Peak only)
- 109 Street (University Avenue to 87 Avenue)

The corridor segments where motor vehicle demand would not be met by the future capacity are discussed further in the Individual Street Profiles. Mitigations for the excess demand are also discussed within each of the profiles.

It should also be noted that, as the city grows and the ability to expand vehicle infrastructure becomes more challenging, the level at which congestion is considered acceptable will also change. In addition, as experienced by larger cities around the world, motor vehicle travel demand will adjust as people driving adjust their travel times to spread the peak hour into more than a single hour, as drivers adjust their travel routes, and as connected and autonomous vehicle technology is incorporated into more of the vehicle fleet, which will reduce following distances and increase capacity.

Transit Demand

The figure below illustrates how well the recommended options meet the transit demand.

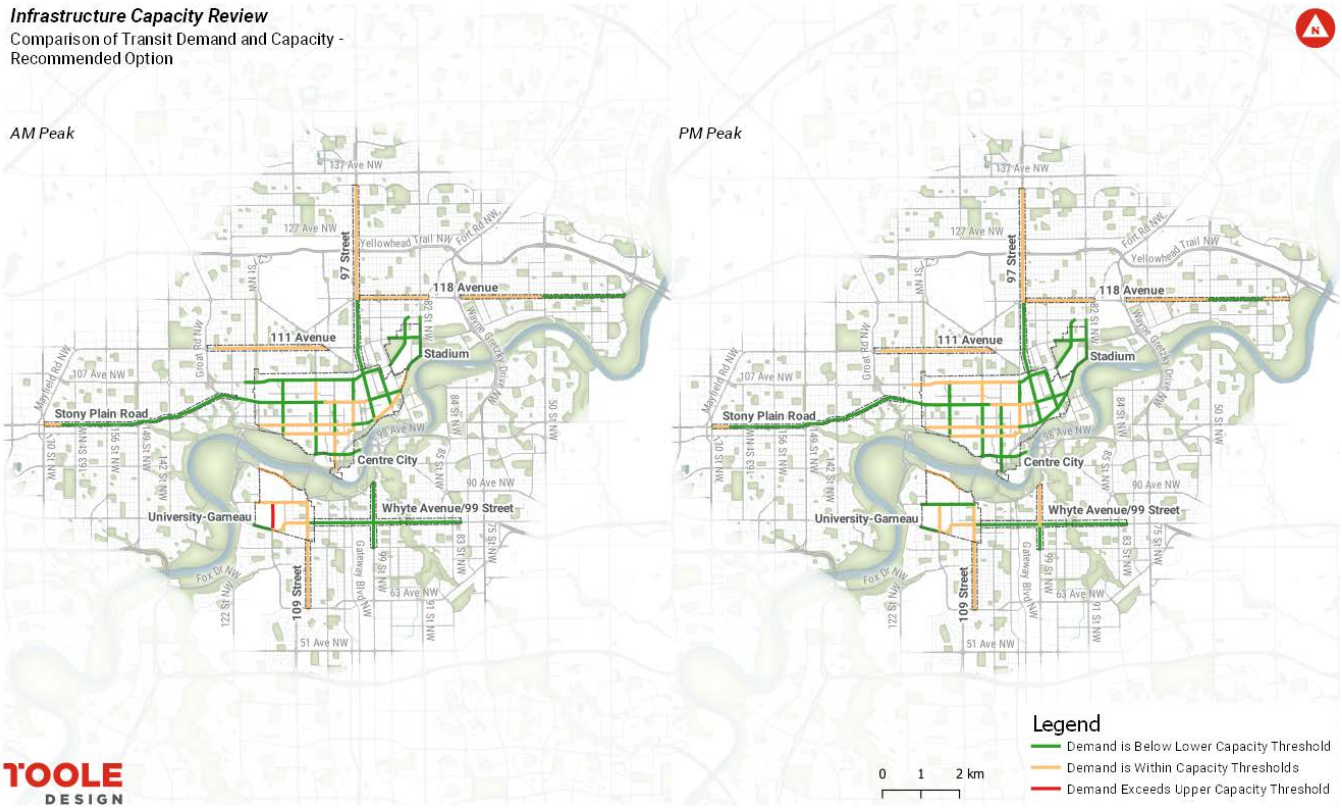


Figure 26: Recommended Options Transit Capacity Comparison

Transit demand would be met through the recommended options for all corridor segments except one. The transit demand for 114 Street between University Avenue and 87 Avenue exceeds the upper capacity threshold. This is further discussed within the Individual Street Profile for 114 Street where mitigations are also shared.

Quality Assessment – Public Realm for Walking

The below figure indicates the quality of the public realm would be significantly improved by applying the recommended options. There would still be some corridor segments for which the public realm quality would still be rated as "poor." These include:

- Stony Plain Road (156 Street from 121 Street)
- Jasper Avenue (97 Street to 92 Street)

Details for Jasper Avenue and Stony Plain Road are shared further in the Individual Street Profiles including mitigations to improve the public realm.

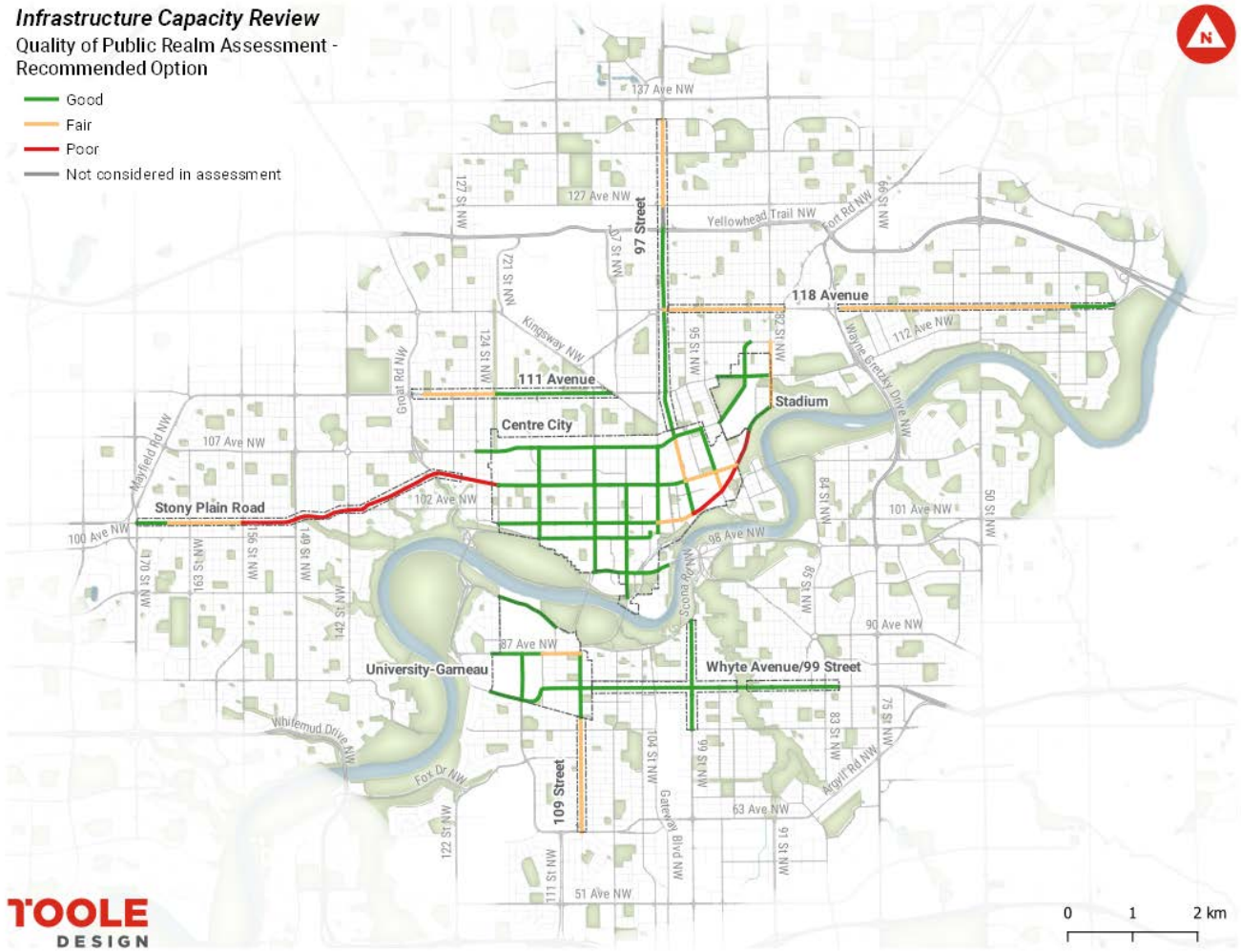


Figure 27: Recommended Expansion Public Realm Quality Assessment

Quality Assessment – Cycling

The following figure illustrates the performance of the recommended options for meeting the cycling requirements along the corridor segments assessed.

A significant number of corridor segments would meet the cycling demand and quality requirements by applying the recommended cross-section options. The performance of the recommended options would be a marked improvement over the existing network which only provided sufficient quality for cycling on portions of 100 Avenue and on Saskatchewan Drive.

Cycling quality requirements along some corridors would still not be met with the recommended options, mainly due to constrained rights-of-way or past design decisions which have precluded cycling infrastructure from being located along the corridor. The locations where cycling capacity would not meet requirements are the following; however, while not preferred, each of these corridors could be served with cycling facilities located on parallel corridors and connections between the parallel facilities and the main corridor.

- 118 Avenue
- Stony Plain Road
- Jasper Avenue
- 101 Street
- 104 Avenue

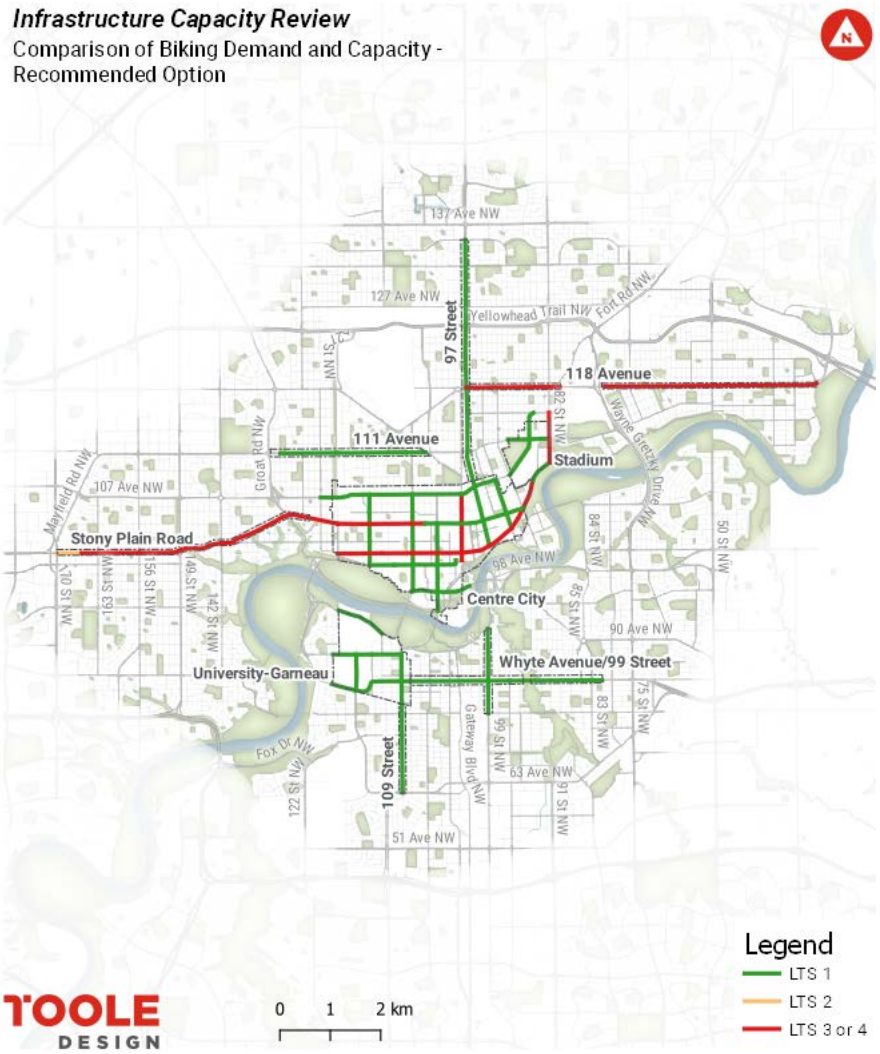


Figure 28: Recommended Options Cycling Capacity Comparison

Details of the right-of-way allocation decisions for these corridors and mitigation strategies to accommodate the future cycling demand are noted in the Individual Street Profiles below.

It should also be noted that the cycling facility requirements under consideration for this study differ from the network outlined in the City of Edmonton's *Bike Plan*. Whereas the *Bike Plan* has a focus for implementation of bicycle infrastructure and supporting programs over the next decade or so, the Infrastructure Capacity Review is considering a much longer time frame. During this longer time horizon, Edmonton will become a much denser, more highly populated city, which will require a denser cycling network than outlined in the *Bike Plan.*

RECOMMENDED CROSS-SECTIONS - INDIVIDUAL STREET PROFILES

This section summarizes the results of the reallocation of right-of-way to improve the quality of the public realm for walking, provide comfortable facilities for cycling, and address capacity needs for transit and driving. Each of the Individual Street Profiles describes the following:

- Existing Corridor Performance – This row illustrates the ability of the existing right-of-way width to be able to meet the capacity and quality requirements for the street.
- Recommended Cross-section – This row provides details of the cross-section options and modifications that are recommended for the corridor.
- Recommended Cross-section Performance – This row illustrates the ability of the recommended cross-section to be able to meet the capacity and quality requirements for the street.
- Further Mitigations Required – This row provides information on further mitigations to address insufficient capacity or quality.

The icons shown for the existing and recommended corridor performance are described below:

A green check mark indicates that the capacity or quality is sufficient.

A yellow warning sign indicates that the capacity or quality is insufficient and can be managed through minor mitigations

A red cross indicates that the capacity or quality is insufficient and requires management through major mitigations.

The cross-sectional elements have been shown to present the change in modal accommodation between the existing cross-sections and recommended options. The following icons have been used in illustrating the cross-sections. For each cross-section, the left side represents the north or west side of the street and the right side represents the south or east side of the street. A frontage road or service road with on-street parking has been shown using a travel lane and parking lane icon separated from the through travel lanes by a frontage zone icon.

Table 37: Cross-section Element Icons

Cross-section Element	Icon	Cross-section Element	Icon	Cross-section Element	Icon
Pedestrian Through Zone (Sidewalk)		General Purpose Travel Lane		Furnishing Zone / Parking (wide enough for healthy trees with pockets of parking along the street's length)	
Shared-use Path		Parking Lane		Furnishing Zone (wide enough for healthy trees)	
Protected Bike Lane		Peak Hour Bus Lane / Off-Peak General Purpose Travel Lane of Parking Lane		Furnishing Zone (not wide enough for healthy trees)	
Dedicated Bus Lane		LRT		North Arrow	

Corridors

97 Street

The Individual Street Profile for the 97 Street corridor from 108 Avenue to 135 Avenue can be seen in Table 38.

Table 38: 97 Street (Corridor) Individual Street Profile

<table>
<tr><td rowspan="2">Existing Corridor Performance</td><td>Motor Vehicle</td><td>Transit</td><td>Cycling</td><td>Walking / Public Ream</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Recommended Cross-section to Address Existing Corridor Deficiencies</td><td colspan="4">» 111 Ave to 108 Ave
▪ 20.1m Two-way Bikeway Variant recommended to support vehicles, transit, walking, cycling, and the public realm
» 111 Ave to 135 Ave
▪ The right-of-way width is 32.0m or wider
▪ The 30.5m Transit Lanes Option 2 Variant is recommended
▪ The option was modified to add additional travel lanes to support the significant vehicle travel demand along this corridor</td></tr>
<tr><td rowspan="2">Recommended Cross-section Performance</td><td>Motor Vehicle</td><td>Transit</td><td>Cycling</td><td>Walking / Public Ream</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Notes</td><td colspan="4">» The PM Peak motor vehicle demand is <10% above the upper capacity threshold for a very short segment (<0.5 km) at the railway underpass
» Motor vehicle demand can be mitigated by assuming slight peak hour spreading, adjusted routing during congested time periods, or increased capacity from decreased following distances with Connected and Autonomous Vehicle technology</td></tr>
</table>

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 97 Street.

Table 39: 97 Street (Corridor) Cross-section Comparison

Segment	Existing	Recommended
111 Ave to 108 Ave		
111 Ave to 118 Ave		
118 Ave to Yellowhead Tr		
Railway Underpass		
Railway Underpass to 135 Ave		
Direction of North: 		

109 Street

The Individual Street Profile for 109 Street between 61 Avenue and University Avenue can be seen in Table 40.

Table 40: 109 Street Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✗	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 61 Ave to University Ave ▪ The existing corridor right-of-way is 33.5m ▪ The 30.5m Transit Lanes Option 2 Variant recommended to meet the future needs for this corridor ▪ The cross-section was modified to add two additional travel lanes as some additional right-of-way width was available and some space from the public realm could be reallocated to support the motor vehicle travel demands			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 109 Street.

Table 41: 109 Street Cross-section Comparison

Segment	Existing	Recommended
61 Ave to 72 Ave		
72 Ave to 76 Ave		
76 Ave to University Ave		
Direction of North: 		

118 Avenue

The Individual Street Profile for 118 Avenue can be seen in Table 42.

Table 42: 118 Avenue Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✗	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 97 St to Fort Rd and from 71 St to 51 St ▪ Base 20.1m Cross-Section recommended and modified to add dedicated transit lanes ▪ There is significant transit demand through this corridor so dedicated bus lanes are required ▪ Cycling improvements are also required; however, as this is a constrained corridor, cycling infrastructure could not be accommodated and would need to be provided on a parallel corridor » 51 St to 36 St ▪ Base 20.1m Cross-Section recommended and modified to add dedicated transit lanes » 36 St to Rundle Park Rd ▪ Base 30.5m Cross-Section modified to add two travel lanes			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	⚠	✓
Notes	» Cycling demand will have to be met through high-comfort cycling facilities located on 119 and 117 Avenues With this approach, north-south connections from the parallel routes to 118 Ave will be required at regular intervals to access destinations along 118 Ave			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 118 Avenue.

Table 43: 118 Avenue Cross-section Comparison

Segment	Existing	**Recommended** (with cycling facilities along 117 and 119 Avenue)
97 St to 80 St		
71 St to 51 St		
51 St to 36 St		
36 St to Rundle Park Rd		
Direction of North: 		

111 Avenue

The Individual Street Profile for 111 Avenue can be seen in Table 44.

Table 44: 111 Avenue Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✗	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 131 St to Shared-use Path west of 120 St ▪ 24.4m Transit Lane Variant recommended » Shared-use Path west of 120 St to Kingsway Avenue ▪ 30.5m Transit Lanes Option 1 Variant recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✗	✓	✓	✓
Notes	» 131 St to Shared-use Path west of 120 St ▪ Vehicle demand of 2,800 vehicles exceeds the capacity of 1,900 ▪ Through traffic would need to be shifted to alternate routes ▪ There is also capacity on transit along 111 Ave for additional mode shift from driving to transit along the corridor » Shared-use Path west of 120 St to 110 St ▪ The motor vehicle demand is <5% above the upper capacity threshold ▪ Motor vehicle demand can be mitigated by assuming slight peak hour spreading, adjusted routing during congested time periods, or increased capacity from decreased following distances with Connected and Autonomous Vehicle technology			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 111 Avenue.

Table 45: 111 Avenue Cross-section Comparison

Segment	Existing	Recommended
131 St to Shared-use Path west of 120 St		
Shared-use Path west of 120 St to 110 St		
110 St to Kingsway Ave		
Direction of North: 		

Stony Plain Road

The Individual Street Profile for Stony Plain Road can be seen in Table 46.

Table 46: Stony Plain Road Individual Street Profile

<table>
<tr><td rowspan="2">Existing Corridor Performance</td><td>Motor Vehicle</td><td>Transit</td><td>Cycling</td><td>Walking / Public Ream</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Recommended Cross-section to Address Existing Corridor Deficiencies</td><td colspan="4">» 170 St to 166 St
▪ This is a 47.1m right-of-way with a frontage road on the south side
▪ A shared-use path would improve the existing corridor if it can connect to other facilities parallel to Stony Plain Road
» 166 St to 156 St
▪ This is a constrained 20.1m section with significant transit demand and requires cycling and public realm improvements
▪ A 20.1m cross-section is recommended with modifications to accommodate bus lanes
» 156 St to 121 St
▪ Existing 20.1m right-of-way width
▪ The right-of-way is designed to accommodate the West Valley Line LRT
▪ Accommodating LRT and two travel lanes does not allow for reallocation of right-of-way to improve the quality of the public realm or provide cycling capacity</td></tr>
<tr><td rowspan="2">Recommended Cross-section Performance</td><td>Motor Vehicle</td><td>Transit</td><td>Cycling</td><td>Walking / Public Ream</td></tr>
<tr><td>  </td><td>  </td><td>  </td><td>  </td></tr>
<tr><td>Notes</td><td colspan="4">» Cycling
▪ Parallel routes required between 121 St and 166 St to meet demand
▪ Between 121 St and Groat Rd, cycling could be accommodated on 102 Ave / 103 Ave to the south and 107 Ave to the North
▪ Between Groat Rd and 149 St, cycling could be accommodate on 104 Ave to the north and 102 Ave / MacKinnon Ravine trail
▪ Between 149 St and 166 St, cycling could be accommodated on 104 Ave / 103 Ave / 102 Ave to the north and 100 Ave Shared-use Path to the south
▪ With this approach, north-south connections from the parallel routes to Stony Plain Rd will be required at regular intervals to access destinations along Stony Plain Rd</td></tr>
</table>

	» Public Realm ▪ Focus should be to provide as much space as possible for pedestrian through zone ▪ Function of furnishing zone as gathering space to be met at side streets and where additional right-of-way exists ▪ As properties redevelop along the corridor, setbacks could be required to provide additional public realm space or easements

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for Stony Plain Road.

Table 47: Stony Plain Road Cross-section Comparison

Segment	**Existing**	**Recommended** (with cycling facilities provided on parallel routes ~ 1 block north and south of each corridor segment)
170 St to 166 St		
166 St to 156 St		
156 St to 149 St		
149 St to 142 St		
142 St to 121 St		
Direction of North: 		

Whyte Avenue

The Individual Street Profile for Whyte Avenue from 109 Street to 81 Street can be seen in Table 48.

Table 48: Whyte Avenue Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✗	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» Whyte Ave exists as a 30.5m right-of-way width ▪ Some wider sections exist between 91 St and 81 St with frontage lanes on one or both sides ▪ A 30.5m Transit Lanes Option 2 Variant cross-section is recommended to support the requirements			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for Whyte Avenue.

Table 49: Whyte Avenue Cross-section Comparison

Segment	Existing	Recommended
109 St to 97 St		
97 St to 91 St		
91 St to 85 St		
85 St to 81 St		
Direction of North: 		

99 Street

The Individual Street Profile for 99 Street can be seen in Table 50.

Table 50: 99 Street Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» Saskatchewan Dr to 81 Ave ▪ A 20.1m One-way Bikeways Variant cross-section recommended » 81 Ave to 76 Ave ▪ Base 30.5m Cross-Section recommended ▪ To meet the vehicle demand along this section, the recommended option was modified to add two travel lanes and the parking lanes were removed			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 99 Street.

Table 51: 99 Street Cross-section Comparison

Segment	Existing	Recommended
Saskatchewan Drive to 81 Ave		
81 Ave to 76 Ave		
Direction of North: 		

Centre City Node

95 Street

The Individual Street Profile for 95 Street can be seen in Table 52.

Table 52: 95 Street Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» Jasper Ave to 103A Ave ▪ 20.1m One-way Bikeways Variant recommended » 103A Ave to 107 Ave ▪ 20.1m One-way Bikeways Variant recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 95 Street.

Table 53: 95 Street Cross-section Comparison

Segment	Existing	Recommended
Jasper Ave to 103A Ave		
103A Ave to 107 Ave		
Direction of North: 		

97 Street

The Individual Street Profile for 97 Street between Jasper Avenue and 108 Avenue (within the Centre City Node) can be seen in Table 54.

Table 54: 97 Street (Centre City Node) Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» Jasper Ave to 103A Ave ▪ Base 30.5m Cross-Section recommended » 103A Ave to 108 Ave ▪ 20.1m One-way Bikeways Variant recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 97 Street.

Table 55: 97 Street (Centre City Node) Cross-section Comparison

Segment	Existing	Recommended
Jasper Ave to 103A Ave		
103A Ave to 108 Ave		
Direction of North: 		

101 Street

The Individual Street Profile for 101 Street can be seen in Table 56.

Table 56: 101 Street Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✗	✗	✓
Recommended Cross-section to Address Existing Corridor Deficiencies	» 107 Ave to MacDonald Dr ▪ Transit demand is in the range of 17,000 – 20,000 people/hr, which is outside the 8,000 – 16,000 people/hr range that could be served with dedicated bus lanes ▪ On-Street Transitway for BRT can serve 20,000 people/hr at the lower capacity threshold through centre-running transit lanes and fewer stops. Transitways are typically supported by increased levels of transit priority and increased turn management at intersections. ▪ A 24.4m Transit Lane Variant is recommended with modifications to support transitway instead of dedicated bus lanes ▪ A trade-off of accommodating the modifications with the transitway is that the cycling infrastructure cannot be accommodated within the cross-section ▪ Includes transfer of demand from 105 Street			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	⚠	✓
Notes	» The cycling demand along this corridor will have to be met through a parallel corridor along 103 Street with bikeways on intersecting avenues to provide access to destinations along 101 St			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 101 Street.

Table 57: 101 Street Cross-section Comparison

Segment	**Existing**	**Recommended** (with cycling facilities on 103 Street)
Macdonald Dr to 104 Ave		
104 Ave to 105A Ave		
105A Ave to 107 Ave		
Direction of North: 		

105 Street

The Individual Street Profile for 105 Street can be seen in Table 58.

Table 58: 105 Street Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✗	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 104 Ave to 95 Ave ▪ Base 24.4m Cross-Section recommended to improve transit, walking, and cycling capacity and to improve public realm quality			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	⚠	✓	✓	✓
Notes	» Between 95 Ave and 100 Ave, the PM peak motor vehicle demand of 1,200 vehicles exceeds capacity of 1,000 vehicles » Motor vehicle capacity is available on parallel routes along 109 St to the west and 101 St to the east to accommodate shifting demand » Some motor vehicle demand can also be accommodated through peak spreading, adjusted routing during congested time periods, and increased capacity from decreased following distances with Connected and Autonomous Vehicle technology			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 105 Street.

Table 59: 105 Street Cross-section Comparison

Segment	Existing	Recommended
95 Ave to 100 Ave	 (Note: this is a one-way northbound)	 (Note: this is a one-way northbound)
100 Ave to 104 Ave		
Direction of North: 		

109 Street

The Individual Street Profile for 109 Street between 97 Avenue and 107 Avenue (within Centre City Node) can be seen in Table 60.

Table 60: 109 Street (Centre City Node) Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✗	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 97 Ave to 104 Ave ▪ 30.5m Transit Lanes Option 2 Variant recommended ▪ Includes motor vehicle demand transfer from 105 Street » 104 Ave to 107 Ave ▪ Base 30.5m Cross-Section recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 109 Street.

Table 61: 109 Street (Centre City Node) Cross-section Comparison

Segment	Existing	Recommended
97 Ave to Jasper Ave		
Jasper Ave to 104 Ave		
104 Ave to 107 Ave		
Direction of North: 		

116 Street

The Individual Street Profile for 116 Street can be seen in Table 62.

Table 62: 116 Avenue Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 107 Ave to 100 Ave ▪ Base 24.4m Cross-Section recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 116 Street.

Table 63: 116 Street Cross-section Comparison

Segment	Existing	Recommended
100 Ave to 104 Ave		
104 Ave to 107 Ave		
Direction of North: 		

97 Avenue

The Individual Street Profile for 97 Avenue can be seen in Table 64.

Table 64: 97 Avenue Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✗	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 109 St to 100 St ▪ 30.5m Transit Lanes Option 2 Variant recommended and modified to add two vehicle travel lanes to meet demand as additional right-of-way width is available			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 97 Avenue.

Table 65: 97 Avenue Cross-section Comparison

Segment	Existing	Recommended
109 St to 105 St		
105 St to 100 St		
Direction of North: 		

100 Avenue

The Individual Street Profile for 100 Avenue can be seen in Table 66.

Table 66: 100 Avenue Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 116 St to 102 St ▪ Base 24.4m Cross-Section recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 100 Avenue.

Table 67: 100 Avenue Cross-section Comparison

Segment	Existing	Recommended
116 St to 112 St		
112 St to 109 St		
109 St to 102 St		
Direction of North: 		

Jasper Avenue – 121 St to 109 St

The Individual Street Profile for Jasper Avenue from 121 Street to 109 Street can be seen in Table 68.

Table 68: Jasper Avenue (121 St to 109 St) Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✓
Recommended Cross-section to Address Existing Corridor Deficiencies	» 121 St to 109 St ▪ Established through Imagine Jasper Project			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	⚠	✓
Notes	» The Imagine Jasper project has been established with a long-term vision and the design does not include cycling infrastructure along Jasper Avenue. » If there is an opportunity in the future to update the design, adding cycling infrastructure should be investigated » In the interim, the cycling demand along Jasper Avenue will require accommodation along parallel corridors with both 100 Ave to the south and 102 Ave to the north requiring protected bike lanes to accommodate the demand and bikeways also provided on intersecting streets to access Jasper Avenue destinations.			

The table below shows an illustration of the cross-section of Jasper Avenue established through the Imagine Jasper Project.

Table 69: Jasper Avenue (121 St and 109 St) Cross-section

Segment	**Imagine Jasper Design** (with cycling facilities on 100 and 102 Avenues)
121 St to 114 St	
114 St to 109 St	
Direction of North: 	

Jasper Avenue – 109 St to 87 St

The Individual Street Profile for Jasper Avenue from 109 Street to 87 Street can be seen in Table 70.

Table 70: Jasper Avenue (109 St to 87 St) Individual Street Profile

<table>
<tr><td rowspan="2">Existing Corridor Performance</td><td>Motor Vehicle</td><td>Transit</td><td>Cycling</td><td>Walking / Public Ream</td></tr>
<tr><td>✓</td><td>✗</td><td>✗</td><td>✓</td></tr>
<tr><td>Recommended Cross-section to Address Existing Corridor Deficiencies</td><td colspan="4">» 109 St to 101 St
▪ Established through Jasper Avenue New Vision
▪ Slight modifications could be made in the future to accommodate transit lanes
» 101 St to 92 St
▪ Established through Jasper Avenue New Vision increases to the pedestrian through zone and furnishing zone are required to achieve the public realm quality requirements
» 92 St to 87 St
▪ Outside of Jasper Avenue New Vision and can achieve capacity and quality outcomes with 24.4m recommended cross-section</td></tr>
<tr><td rowspan="2">Recommended Cross-section Performance</td><td>Motor Vehicle</td><td>Transit</td><td>Cycling</td><td>Walking / Public Ream</td></tr>
<tr><td>✓</td><td>✓</td><td>⚠</td><td>✗</td></tr>
<tr><td>Notes</td><td colspan="4">» Cycling
▪ The Jasper Avenue New Vision project has been established with a long-term vision and the design does not include cycling infrastructure along Jasper Avenue.
▪ If there is an opportunity in the future to update the design, adding cycling infrastructure should be investigated and can likely be accommodated based on right-of-way widths
▪ In the interim, the cycling demand along Jasper Avenue will require accommodation along parallel corridors with both 100 Ave to the south and 102/102A Ave to the north and along intersecting streets to access Jasper Avenue destinations
» Public Realm
▪ Focus should be to provide as much space as possible for pedestrian through zone
▪ Function of furnishing zone as gathering space to be met at side streets and where additional right-of-way exists
▪ As properties redevelop along the corridor, setbacks could be required to provide additional public realm space or easements</td></tr>
</table>

The table below shows an illustration of the cross-section of Jasper Avenue established through the Imagine Jasper Project.

Table 71: Jasper Avenue (109 St to 87 St) Cross-section Comparison

Segment	**Imagine Jasper/Jasper Ave New Vision Design** (with cycling facilities on 102/102A and 100 Avenues)
109 St to 97 St	
97 St to 92 St	
92 St to 87 St	
Direction of North: 	

104 Avenue – 121 St to 107 St

The Individual Street Profile for 104 Avenue from 121 Street to 107 Street can be seen in Table 72.

Table 72: 104 Avenue (121 St to 107 St) Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✓
Recommended Cross-section to Address Existing Corridor Deficiencies	» 121 St to 107 St ▪ Established through West LRT design ▪ Based on vehicle, transit, and public realm needs, cycling demand may not be accommodated through right-of-way			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	⚠	✓
Notes	» The cycling demand can be met through parallel cycling corridors along 105 Ave to the north and 103 Ave to the south with bikeways along intersecting streets to provide access to destinations along 104 Ave			

The table below shows the cross-sections for 104 Avenue between 121 Street and 107 Street established through the West LRT design.

Table 73: 104 Avenue (121 St to 107 St) Cross-section Comparison

Segment	**West LRT Design** (with cycling facilities along 103 and 105 Avenues)
121 St to 107 St	
Direction of North: 	

104 Avenue – 107 St to 92 St

The Individual Street Profile for 104 Avenue from 107 Street to 92 Street can be seen in Table 74.

Table 74: 104 Avenue (107 St to 92 St) Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 107 St to 97 St ▪ Base 30.5m Cross-Section recommended » 97 St to 92 St ▪ 20.1m One-way Bikeways Variant recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 104 Avenue between 107 Street and 92 Street.

Table 75: 104 Avenue (107 St to 92 St) Cross-section Comparison

Segment	**Existing**	**Recommended**
107 St to 97 St		
97 St to 92 St		
Direction of North: 		

107 Avenue – 124 St to 117 St

The Individual Street Profile for 107 Avenue from 124 Street to 117 Street can be seen in Table 76.

Table 76: 107 Avenue (124 St to 117 St) Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 124 St to 117 St ▪ Base 24.4m Cross-Section recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	⚠	✓	✓	✓
Notes	» The motor vehicle demand is <5% above the upper capacity threshold » Motor vehicle demand can be mitigated by assuming slight peak hour spreading, adjusted routing during congested time periods, or increased capacity from decreased following distances with Connected and Autonomous Vehicle technology			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 107 Avenue between 124 Street and 117 Street.

Table 77: 107 Avenue (124 St to 117 St) Cross-section Comparison

Segment	**Existing**	**Recommended**
124 St to 117 St		
Direction of North: 		

107 Avenue – 117 St to 95 St

The Individual Street Profile for 107 Avenue from 117 Street to 95 Street can be seen in Table 78.

Table 78: 107 Ave (117 St to 95 St) Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✗	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 117 St to 95 St ▪ Base 24.4m Cross-Section recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 107 Avenue between 117 Street and 95 Street.

Table 79: 107 Avenue (117 St to 95 St) Cross-section Comparison

Segment	Existing	Recommended
117 St to 101 St		
101 St to 95 St		
Direction of North: 		

Stadium Node

Stadium Road / 86 Street

The Individual Street Profile for Stadium Road / 86 Street can be seen in Table 80.

Table 80: Stadium Road / 86 Street Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✓
Recommended Cross-section to Address Existing Corridor Deficiencies	» 92 St to 112 Ave ▪ 20.1m One-way Bikeways Variant recommended » 112 Ave to 115 Ave ▪ 20.1m One-way Bikeways Variant recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✗	✓	✓	✓
Notes	» For the 92 St to 112 Ave segment, motor vehicle demand of 2,500 vehicles exceeds capacity of 1,900 vehicles in the AM Peak » This is a constrained corridor and cannot accommodate additional vehicle traffic without impacting walking capacity, cycling capacity, or public realm quality » AM peak hour motor vehicle demand will need to be met through mode shift to transit and through parallel vehicle corridors including 82 Street » For the 92 St to 112 Ave segment, motor vehicle demand exceeds capacity in the PM Peak by 5%, which can be accommodated though peak hour spreading			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for Stadium Road / 86 Street.

Table 81: Stadium Road / 86 Street Cross-section Comparison

Segment	Existing	Recommended
92 St to 112 Ave		
112 Ave to 115 Ave		
Direction of North: 		

82 Street

The Individual Street Profile for 82 Street can be seen in Table 82.

Table 82: 82 Street Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» Jasper Ave to 114 Ave ▪ Base 20.1m Cross-Section recommended and modified to add two travel lanes			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✓
Notes	» The cycling capacity will have to be accommodated through parallel cycling routes such as the LRT shared-use path or the Stadium Rd cycling facility, which are more than 1 to 2 blocks from 82 Street for part of its length			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 82 Street.

Table 83: 82 Street Cross-section Comparison

Segment	Existing	**Recommended** (with cycling facilities along the LRT corridor or Stadium Road)
Jasper Ave to 114 Ave		
Direction of North: 		

112 Avenue

The Individual Street Profile for 112 Avenue can be seen in Table 84.

Table 84: 112 Avenue Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 89 St to 82 St ▪ 24.4m Transit Lanes Variant recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 112 Avenue.

Table 85: 112 Avenue Cross-section Comparison

Segment	Existing	Recommended
89 St to 82 St		
Direction of North: 		

Jasper Avenue

The Individual Street Profile for Jasper Avenue between 87 Street and 82 Street (within Stadium Node) can be seen in Table 86.

Table 86: Jasper Avenue (87 St to 82 St) Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 87 St to 82 St ▪ Base 30.5m Cross-Section recommended and modified to add two travel lanes as additional right-of-way width is available			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for Jasper Avenue between 87 Street and 82 Street.

Table 87: Jasper Avenue (87 St to 82 St) Cross-section Comparison

Segment	Existing	Recommended
87 St to 82 St		
Direction of North: 		

University-Garneau Node

109 Street

The Individual Street Profile for 109 Street between University Avenue and 87 Avenue (within University-Garneau Node) can be seen in Table 88.

Table 88: 109 Street (University Ave to 87 Ave) Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✗	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» Whyte Ave to 87 Ave ▪ 30.5m Transit Lanes Option 1 Variant recommended » University Ave to Whyte Ave ▪ 30.5m Transit Lanes Option 2 Variant recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✗	✓	✓	✓
Notes	» Whyte Ave to 87 Ave ▪ AM Peak motor vehicle demand of 2,450 and PM Peak of 2,850 exceeds capacity of 1,900 vehicles ▪ Some vehicle demand would require rerouting to an alternate parallel corridor ▪ There is also sufficient transit capacity along this corridor to support additional mode shift from driving to transit » University Ave to Whyte Ave ▪ AM Peak motor vehicle demand of 2,850 and PM Peak of 3,300 exceeds capacity of 1,900 vehicles ▪ Some vehicle demand would require rerouting to an alternate parallel corridor ▪ There is also sufficient transit capacity along this corridor to support additional mode shift from driving to transit			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 109 Street between University Avenue and 87 Avenue.

Table 89: 109 Street (University Ave to 87 Ave) Cross-section Comparison

Segment	Existing	Recommended
University Ave to Whyte Ave		
Whyte Ave to 87 Ave		
Direction of North: 		

82 Avenue / Whyte Avenue

The Individual Street Profile for 82 Avenue / Whyte Avenue between 114 St and 109 St (within University-Garneau Node) can be seen in Table 90.

Table 90: 82 Avenue / Whyte Avenue (114 St to 109 St) Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 114 St to 109 St ▪ Base 30.5m Cross-Section recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 82 Avenue / Whyte Avenue between 114 Street and 109 Street.

Table 91: 82 Avenue / Whyte Avenue (114 St to 109 St) Cross-section Comparison

Segment	Existing	Recommended
109 St to 114 St		
Direction of North: 		

114 Street

The Individual Street Profile for 114 Street can be seen in Table 92.

Table 92: 114 Street Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✗	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» University Ave to 87 Ave ▪ 20.1m One-way Bikeways Variant recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	⚠	✓	✓
Notes	» AM peak transit demand of 5,000 people is not met by mixed lane capacity of 4,300 » This is a constrained corridor and is also served by LRT (which is not included in the evaluation) » Additional bus service connections to LRT would allow for passenger transfers to LRT at South Campus, McKernan/Belgravia, and Southgate LRT Stations			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 114 Street.

Table 93: 114 Street Cross-section Comparison

Segment	Existing	Recommended
University Ave to 87 Ave		
Direction of North: 		

87 Avenue

The Individual Street Profile for 87 Avenue can be seen in Table 94.

Table 94: 87 Avenue Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✗	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 116 St to 112 St ▪ Base 30.5m Cross-Section recommended » 112 St to 109 St ▪ 20.1m One-way Bikeways Variant recommended			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for 87 Avenue.

Table 95: 87 Avenue Cross-section Comparison

Segment	Existing	Recommended
116 St to 112 St		
112 St to 109 St		
Direction of North: 		

University Avenue

The Individual Street Profile for University Avenue can be seen in Table 96.

Table 96: University Avenue Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✗	✗
Recommended Cross-section to Address Existing Corridor Deficiencies	» 117 St to 114 St ▪ Base 30.5m Cross-Section recommended and modified to provide frontage road on south side and a wider median ▪			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for University Avenue.

Table 97: University Avenue Cross-section Comparison

Segment	Existing	Recommended
117 St to 114 St		
Direction of North: 		

Saskatchewan Drive

The Individual Street Profile for Saskatchewan Drive can be seen in Table 98.

Table 98: Saskatchewan Drive Individual Street Profile

Existing Corridor Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Recommended Cross-section to Address Existing Corridor Deficiencies	» 116 St to 111 St ▪ Although no action is required, in the long term, the available right-of-way can still be improved upon to support the amount of active recreation use the corridor receives from people walking, jogging, running, and biking ▪ Base 24.4m Cross-Section is recommended to provide improved walking and cycling infrastructure and opportunities for better public realm ▪ Dedicated bike facilities will separate cyclists and pedestrians and reduce conflicts			
Recommended Cross-section Performance	**Motor Vehicle**	**Transit**	**Cycling**	**Walking / Public Ream**
	✓	✓	✓	✓
Notes	» No mitigations required			

The table below shows a comparison of the modes served and amenities provided between the existing and recommended cross-sections for Saskatchewan Drive.

Table 99: Saskatchewan Drive Cross-section Comparison

Segment	**Existing**	**Recommended**
116 St to 111 St		
Direction of North: 		

Summary

The goal of this study has been to evaluate the multimodal capacity and quality of the public realm to meet the future travel demands for the *City Plan*'s two-million population horizon scenario. The analysis is based on achieving the 50% mode share for transit, cycling, and walking through implementation of the *City Plan*'s Levers of Changes as well as identified transit and active transportation infrastructure investments.

Evaluating the recommended cross-sections for each corridor has articulated the scale of trade-offs required to address the deficiencies within the existing cross-sections with respect to capacity and quality. As shown within the Individual Street Profiles above, many of the corridors can accommodate future capacity and quality requirements through a recommended cross-section. In cases where a recommended cross-section is not able to meet either the motor vehicle or transit capacity or accommodation of cycling facilities and quality of the public realm environment for walking, mitigations have been provided to illustrate alternatives which avoid right-of-way acquisition, deterioration of public realm quality, or the removal of more than one mode of travel.

The analysis above should not be taken to mean that development along the Corridors and within the Nodes cannot be accommodated unless the recommended cross-sections are implemented for each corridor. The growth of the city to a population of two million will be incremental as will the renewal of these transportation corridors. Changes to these corridors could occur at any point from now to the two-million population horizon and could be based on several different factors such as timing and extent of property redevelopment, regional transit demand along a corridor, supporting the bicycle network implementation outlined in the *Bike Plan*, achieving the safety outcomes within the *Safe Mobility Strategy*, and upgrading utility infrastructure based on demands and capacities for those assets. The Mobility Network Assessment project, being completed in parallel with this Infrastructure Capacity Review for the *Infill Roadmap*'s Action 2, evaluates a nearer term population horizon and is more informative about the more immediate timing of investments.

The analysis in this report has shown that when long-term development within each of the Nodes and Corridors is fully built-out, the recommended transportation cross-sections can support the capacity and quality needs of these corridors as well as the city-wide travel demands that flow along them. This means that, while the residential and employment density within the Nodes and Corridors incrementally increases towards the two-million population horizon, the city-wide mass transit and bike network must also incrementally grow and the quality of the public realm to support walking and businesses must be invested in.

COST ESTIMATION

For planning purposes, high-level cost estimates have been developed for the recommended cross-section for each of the corridor segments evaluated within the Nodes and Corridors assessed in this study. As redevelopment along these Corridors and within each Node is expected to occur over time, the costs presented below for the Nodes and Corridors are intended to reflect the total investment required to provide the necessary multimodal capacity and quality requirements, rather than project specific costs.

To provide consistency with other planning documents, unit rate information from the Mobility Network Assessment was used in the development of the cost estimates for this study. Where required, this information was supplemented with estimated unit rates based on previous project experience in Edmonton. These estimates have been prepared using 2021 construction costs and have not been escalated to reflect future construction costs or inflation.

The total cost to meet the multimodal transportation capacity and quality requirements for each Node and Corridor is summarized in Table 100 below. A breakdown of the costs for each segment can be found in the report appendices. The total cost for all corridor segments in all Nodes and Corridors, including a 50% contingency, is estimated at approximately $982 million.

Table 100: Estimated Costs by Corridor Segment (2021 Dollars)

Node/Corridor	Corridor Segment	High-Level Cost
97 Street	111 Avenue to City Centre Node (108 Ave)	$ 7.3 M
	111 Avenue to 118 Avenue	$ 24.6 M
	118 Avenue to Yellowhead Trail	$ 31.8 M
	Under the CN Railway	$ 7.8 M
	North of Railway to 135 Avenue	$ 23.2 M
	97 Street Corridor Total	**$ 94.7 M**
109 Street	61 Avenue to 72 Avenue	$ 21.4 M
	72 Avenue to 76 Avenue	$ 6.6 M
	76 Avenue to University Avenue	$ 3.2 M
	109 Street Corridor Total	**$ 31.2 M**
118 Avenue	97 Street to 80 Street/Fort Road and 71 Street to 51 Street	$ 31.9 M
	51 Street to 36 Street	$ 24.1 M
	36 Street to Rundle Park Road	$ 16.0 M
	118 Avenue Corridor Total	**$ 72.1 M**
111 Avenue	131 Street to Shared-Use Path West of 120 Street	$ 15.7 M
	Shared-Use Path West of 120 Street to 110 Street	$ 33.5 M
	110 Street to Kingsway Avenue	$ 7.1 M
	111 Avenue Corridor Total	**$ 56.3 M**
Stony Plain Road	170 Street to 166 Street	$ 14.5 M
	166 Street to 156 Street	$ 17.9 M
	156 Street to 149 Street	$ 12.4 M
	149 Street to 142 Street	$ 12.8 M
	142 Street to 121 Street	$ 37.8 M
	Stony Plain Road Corridor Total	**$ 95.4 M**

Node/Corridor	Corridor Segment	High-Level Cost
Whyte Avenue & 99 Street	Whyte Avenue – 109 Street to 97 Street	$ 36.5 M
	Whyte Avenue – 97 Street to 91 Street	$ 13.8 M
	Whyte Avenue – 91 Street to 85 Street	$ 13.3 M
	Whyte Avenue – 85 Street to 81 Street	$ 8.5 M
	Whyte Avenue Total	*$ 72.1 M*
	99 Street – Saskatchewan Drive/92 Avenue to 81 Avenue	$ 7.0 M
	99 Street – 81 Avenue to 76 Avenue	$ 18.6 M
	99 Street Total	*$ 25.6 M*
	Whyte Avenue & 99 Street Corridor Total	**$ 97.7 M**
Centre City	95 Street	$ 13.0 M
	97 Street	$ 17.5 M
	101 Street	$ 23.6 M
	105 Street	$ 24.3 M
	109 Street	$ 23.9 M
	116 Street	$ 20.0 M
	97 Avenue	$ 24.7 M
	100 Avenue	$ 24.4 M
	Jasper Avenue – West of 114 Street to 109 Street	$ 33.4 M
	Jasper Avenue – 109 Street to 97 Street	$ 27.8 M
	Jasper Avenue – East of 97 Street	$ 19.7 M
	Jasper Avenue Total	*$ 80.9 M*
	104 Avenue – West of 107 Street	$ 43.5 M
	104 Avenue – 107 Street to 97 Street	$ 25.1 M
	104/103A Avenue – East of 97 Street	$ 12.6 M
	104 Avenue Total	*$ 81.2 M*
	107 Avenue – West of 117 Street 101 Street	$ 39.4 M
	107 Avenue – East of 101 Street	$ 11.0 M
	107 Avenue Total	*$ 50.4 M*
	Centre City Node Total	**$ 383.9 M**
Stadium	Stadium Road / 86 Street	$ 15.9 M
	82 Street	$ 9.8 M
	112 Avenue	$ 11.3 M
	Jasper Avenue	$ 24.8 M
	Stadium Node Total	**$ 61.7 M**
University	109 Street	$ 17.8 M
	82 Avenue / Whyte Avenue	$ 17.2 M
	114 Street	$ 9.0 M
	87 Avenue	$ 19.8 M
	University Avenue	$ 10.8 M
	Saskatchewan Drive	$ 14.0 M
	Stadium Node Total	**$ 88.7 M**

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

City Plan

1. The Outcomes, Intentions, and Directions from the *City Plan* outline several implications for the allocation of street right-of-way. The policies direct the prioritization of street right-of-way to create places to gather, support accessibility by people of all ages, abilities, gender, race, and background, and promote the use of sustainable transportation modes.

Model without Levers of Change

1. The Model without Levers of Change (30% mode share for transit and active modes) shows that the capacity needed to support travel demands by private motor vehicles would limit the ability to support increased capacity for non-driving modes and the ability to improve the quality of the public realm. In many cases, the number of existing motor vehicle lanes would need to be increased and would involve demolition of existing homes and businesses.
2. If the 50% non-driving mode share is not achieved through implementation of the Levers of Change, the City of Edmonton will not be able to meet the goals and objectives of the *City Plan* within the Nodes and along the Corridors related to Healthy City, Urban Places, Climate Resilience, nor Regional Prosperity.

Model with Levers of Change

1. Overall, the existing capacity for private motor vehicles exceeds what is required for the future demands when the *City Plan* Levers of Change are implemented. The current right-of-way allocated for private motor vehicles can be reallocated to address capacity deficiencies for sustainable, space-efficient travel modes of walking, cycling, and transit.
2. Dedicated transit facilities are required along many corridors to support and realize the future transit travel demand envisioned by the *City Plan*. In some constrained corridors, this may not be possible and other measures concentrated at intersections could be used to increase travel time reliability and transit capacity. Using higher capacity transit vehicles is another measure that can be deployed to increase capacity and meet future transit demand.
3. The public realm quality assessment of the existing streets shows there is significant room for improvement for many of the corridors to support a higher quality public realm that is envisioned by the *City Plan* for the Nodes and Corridors.
4. Only two streets assessed currently include cycling infrastructure that is rated as Level of Traffic Stress 1. The remaining facilities are all Level of Traffic Stress 3 or 4. However, it should be noted that Whyte Avenue, 105 Street, 109 Street, Jasper Avenue, 104 Avenue, and Stadium Road are located one block away from LTS 1 facilities. With the high population and employment densities in the Nodes and along the Corridors and the number of destinations that exist or are envisioned by the *City Plan* in the future, higher quality bicycle infrastructure is required along all corridors to meet the anticipated quality requirements.

Right-of-way Widths

1. Common right-of-way widths observed for the streets evaluated include 20.1m, 24.4m, and 30.5m. These widths can form the basis of representative cross-section options to achieve capacity and public realm requirements for each corridor segment evaluated as part of the project.

Development Readiness

1. Many of the corridors can accommodate future motor vehicle and transit capacities and walking and cycling quality requirements through a recommended cross-section that could be implemented within the existing right-of-way widths. In cases where a recommended cross-section is not able to meet the motor vehicle or transit capacity, provide a Level of Traffic Stress 1 cycling facility, or provide a high-quality public realm supportive of walking and businesses, further mitigations have been provided to illustrate alternatives which avoid right-of-way acquisition, deterioration of public realm quality, or the removal of more than one mode of travel.
2. The analysis should not be taken to mean that increases in development along the Corridors and within the Nodes cannot be accommodated unless the recommended cross-sections are implemented for each corridor. The growth of the city to a two-million population horizon will be incremental, as will the renewal of these transportation corridors. Changes to roadways could occur at any point from now to the two-million horizon and could be based on several different factors to support not only population and employment growth along these corridors, but also the city-wide population and employment growth and corresponding travel demand. The changes to roadways could also occur as utility infrastructure is upgraded (included in a related and separate document).
3. As the residential and employment density within the Nodes and Corridors incrementally increases towards the two-million population horizon, the city-wide mass transit and bike network must also incrementally grow to be able to support the Nodes and Corridors. In addition, the quality of the public realm must be improved to create comfortable and accessible corridors for walking and vibrant corridors for businesses and people and create a climate resilient urban environment.
4. The timing of investment and implementation of the recommendations in this study are longer term. For more near-term recommendations for investment timing, the Mobility Network Assessment project should be reviewed and used to inform shorter-term capital budgeting along with assessment of real estate and redevelopment market pressures.

RECOMMENDATIONS

Recommended Capacity and Quality Expansion

1. The cross-section options described within the Options to Meet Capacity and Quality Requirements Section should be used as the basis for expanding multimodal capacity and improving public realm quality along the corridors.
2. The cross-sections assigned to each corridor segment within the Performance of the Recommended Cross-Sections Section and those noted in the Recommended Cross-Sections – Individual Street Profiles Section should be used as a guide to allocate future street right-of-way allocation during the preparation of concept plans.
3. It is important to remember that over time, as the city grows and the ability to expand vehicle infrastructure becomes more challenging, the level of vehicle congestion will increase. As motor vehicle infrastructure is constrained and nears capacity, travel behaviours will change. Typical changes include adjusting the timing of trips (including "peak hour spreading" which refers to the peak travel period associated with commuting extending to be longer than one hour), travelling on different routes, shifting to another mode of transportation, or choosing to not make the trip when it is congested. In addition, there are expectations in the transportation industry that growth in connected and autonomous technology-equipped vehicles may allow for reduced following distances between motor vehicles, increasing roadway capacity. Finally, changes to working location, as exhibited during the COVID-19 pandemic with growth in work-from-home, would also have a significant impact on travel demands and associated capacity requirements.
4. Table 101 includes corridors where future motor vehicle demand exceeds the capacity of the recommended option. The following mitigations are recommended:

Table 101: Motor Vehicle Mitigations

Corridor	Mitigation
97 Street	» The PM Peak motor vehicle demand is <10% above the upper capacity threshold for a very short segment (<0.5 km) at the railway underpass » Motor vehicle demand can be mitigated by assuming people will adjust travel times with slight peak hour spreading, adjusted routing during congested time periods, or increased capacity from decreased following distances with Connected and Autonomous Vehicle technology
111 Avenue	» 131 St to Shared-use Path west of 120 St ▪ Vehicle demand of 2,800 vehicles exceeds the capacity of 1,900 ▪ Through traffic would need to be shifted to alternate routes ▪ There is also capacity on transit along 111 Ave for additional mode shift from driving to transit along the corridor » Shared-use Path west of 120 St to 110 ▪ The motor vehicle demand is <5% above the upper capacity threshold ▪ Motor vehicle demand can be mitigated by assuming slight peak hour spreading, adjusted routing during congested time periods, or increased capacity from decreased following distances with Connected and Autonomous Vehicle technology
107 Avenue	» Motor vehicle demand can be mitigated by assuming slight peak hour spreading, adjusted routing during congested time periods, or increased

Corridor	Mitigation
	capacity from decreased following distances with Connected and Autonomous Vehicle technology » As the city grows and the ability to expand vehicle infrastructure becomes more challenging, the level at which congestion is considered acceptable will also change, further reducing the need for vehicle mitigation for this corridor
Stadium Road	» This is a constrained corridor and cannot accommodate additional vehicle traffic without impacting walking capacity, cycling capacity, or public realm quality » AM peak hour motor vehicle demand will need to be met through mode shift to transit and through parallel vehicle corridors including 82 Street » For the 92 St to 112 Ave segment, motor vehicle demand exceeds capacity in the PM Peak by 5%, which can be accommodated though peak hour spreading
105 Street	» Motor vehicle capacity is available on parallel routes along 109 St (Centre City Node) to the west and 101 St to the east which have capacity to support additional motor vehicle demand » Some motor vehicle demand can also be accommodated through peak spreading, adjusted routing during congested time periods, and increased capacity from decreased following distances with Connected and Autonomous Vehicle technology » As the city grows and the ability to expand vehicle infrastructure becomes more challenging, the level at which congestion is considered acceptable will also change, further reducing the need for vehicle mitigation for this corridor
109 Street (University-Garneau Node)	» Whyte Ave to 87 Ave ▪ AM Peak motor vehicle demand of 2,450 and PM Peak of 2,850 exceeds capacity of 1,900 vehicles ▪ Some vehicle demand would require rerouting to an alternate parallel corridor ▪ There is also sufficient transit capacity along this corridor to support additional mode shift from driving to transit » University Ave to Whyte Ave ▪ AM Peak motor vehicle demand of 2,850 and PM Peak of 3,300 exceeds capacity of 1,900 vehicles ▪ Some vehicle demand would require rerouting to an alternate parallel corridor ▪ There is also sufficient transit capacity along this corridor to support additional mode shift from driving to transit

5. Table 102 includes corridors where future transit demand exceeds the capacity of the recommended option. The following mitigations are recommended:

Table 102: Transit Mitigation

Corridor	Mitigation
114 Street	» This is a constrained corridor and is also served by LRT » Additional bus service connections to LRT would allow for passenger transfers to LRT at South Campus, McKernan/Belgravia, and Southgate LRT Stations

6. Table 103 includes corridors where the recommended option did not provide a LTS 1 cycling facility. The following mitigations are recommended:

Table 103: Cycling Mitigations

Corridor	Mitigation
118 Avenue	» Cycling demand will have to be met through high-comfort cycling facilities located on 119 and 117 Avenues » With this approach, north-south connections from the parallel routes to 118 Ave will be required at regular intervals to access destinations along 118 Ave
Stony Plain Road	» Cycling ▪ Parallel routes are required between 121 St and 166 St to meet demand ▪ Between 121 St and Groat Rd, cycling could be accommodated on 102 Ave / 103 Ave to the south and 107 Ave to the north ▪ Between Groat Rd and 149 St, cycling could be accommodated on 104 Ave to the north and 102 Ave / MacKinnon Ravine trail ▪ Between 149 St and 166 St, cycling could be accommodated on 104 Ave / 103 Ave / 102 Ave to the north and 100 Ave Shared-use Path to the south ▪ With this approach, north-south connections from the parallel routes to Stony Plain Rd will be required at regular intervals to access destinations along Stony Plain Rd
101 Street	» The cycling demand along this corridor will have to be met through parallel corridors along 102 and 103 Streets with bikeways on intersecting avenues to provide access to destinations along 101 St
Jasper Avenue	» The Imagine Jasper project has been established with a long-term vision and the design does not include cycling infrastructure along Jasper Avenue » If there is an opportunity in the future to update the design, adding cycling infrastructure should be investigated » In the interim, the cycling demand along Jasper Avenue will need to be accommodated through 100 Ave to the south and 102 Ave to the north
104 Avenue	» The cycling demand can be met through parallel cycling corridors along 105 Ave to the north and 103 Ave to the south

7. Table 104 includes corridors where the public realm quality could not be met. The following mitigations are recommended:

Table 104: Public Realm Quality Mitigations

Corridor	Mitigation
Stony Plain Road (121 St to 156 St)	» The focus should be to provide as much space as possible for the pedestrian through zone » The function of the furnishing zone as a gathering space is to be met at side streets and where additional right-of-way exists » As properties redevelop along the corridor, setbacks could be required to provide additional public realm space or easements
Jasper Avenue (101 St to 92 St)	» The focus should be to provide as much space as possible for pedestrian through zone » The function of the furnishing zone as a gathering space is to be met at side streets and where additional right-of-way exists » As properties redevelop along the corridor, setbacks could be required to provide additional public realm space or easements

Cost Estimates

The total cost to meet multimodal transportation capacity and quality requirements for each Node and Corridor is summarized in **Table 105** below. A breakdown of the costs for each segment can be found in the Cost Estimation section of the report. Implementation of changes to capacity and quality of the street environments within these Nodes and along these Corridors will occur over approximately 50 years. The investment requirements can be budgeted and aligned with other City of Edmonton capital programs, for example Arterial Renewal, to manage the overall costs of these necessary investments.

Table 105: Estimated Costs – Nodes & Corridors

Node/Corridor	Estimated High Level Opinion Cost
97 Street	$94.7 Million
109 Street	$31.2 Million
118 Avenue	$72.1 Million
111 Avenue	$56.3 Million
Stony Plain Road	$95.4 Million
Whyte Avenue & 99 Street	$97.7 Million
Centre City	$383.9 Million
Stadium	$61.7 Million
University/Garneau	$88.7 Million
TOTAL	**$981.7 Million**