P.O. Box 1749
Halifax, Nova Scotia
B3J 3A5 Canada

Item No. 15.1.7
Halifax Regional Council
June 18, 2024

TO: Mayor Savage and Members of Halifax Regional Council

SUBMITTED BY: Original Signed

Cathie O'Toole, Chief Administrative Officer

DATE: April 23, 2024

SUBJECT: **Windsor Street Exchange Redevelopment Project: Functional Design**

ORIGIN

On June 2nd, 2019, the federal Minister of Transport announced funding under the National Trade Corridors Fund for upgrades to the Windsor Street Exchange to facilitate the movement of regional and interprovincial containers by rail to an expanded truck gate at the Fairview Cove facility.

On August 13, 2019, Regional Council passed a motion authorizing the Mayor and Municipal Clerk to sign the Contribution Agreement with the Minister of Transport, to receive $23,500,000 in funding for the Windsor Street Exchange Upgrades (Acct No. CT190010).

On August 24, 2023, Transportation Standing Committee passed a motion directing the Chief Administrative Officer to prepare a staff report on the Windsor Street Exchange redesign to include:

a. Separated and wide sidewalks;
b. Separated and protected bicycle lanes;
c. Dedicated transit-only lanes for people using public transit;
d. Protected intersections that are safe for all vulnerable road users; and
e. Design for 40 KPH traffic speeds.

The Integrated Mobility Plan (IMP) recommends that where strategic improvements to "bottlenecks" in the roadway network can be implemented, consideration should be given to opportunities to integrate transit priority measures and active transportation improvements (Action 122). The IMP also recommends that HRM work with CN and the Halifax Port Authority to retain and augment rail capacity through the South End rail cut (Action 110).

HalifACT recommends the expansion of transit and active transportation infrastructure needed to achieve mode share targets in the Integrated Mobility Plan (Action 8). It also recommends that critical infrastructure be assessed to proactively protect and strengthen infrastructure to withstand impacts due to climate change (Action 16). The Windsor Street Exchange is a critical link in the transportation network, as well as an emergency evacuation route for the Halifax Peninsula.

The approved 2024/25 Capital Budget project CT190010 – Windsor Street Exchange.

RECOMMENDATION ON PAGE 2

LEGISLATIVE AUTHORITY

The *Halifax Regional Municipality Charter*, S.N.S. 2008, c. 39, provides:

> 61(5) (A) The Municipality may acquire property, including property outside the Municipality, that the Municipality requires for its purposes or for the use of the public;
>
> 73 The Municipality may enter into and carry out agreements (a) for highway construction, improvement and maintenance and other purposes pursuant to the *Public Highways Act*.
>
> 322 (1) The Council may design, lay out, open, expand, construct, maintain, improve, alter, repair, light, water, clean, and clear streets in the Municipality.

This report also complies with *Halifax Regional Municipality Charter*, S.N.S. 2008, c. 39, Part VIII, Planning & Development

RECOMMENDATION

It is recommended that Halifax Regional Council

- Suspend the rules of procedure under Schedule 7, the Transportation Standing Committee Terms of Reference, of Administrative Order One, the Procedures of the Council Administrative Order.
- Endorse in principle the Windsor Street Exchange Functional Design to achieve the project objectives as proposed in this report.

It is recommended that Halifax Regional Council direct the Chief Administrative Officer to:

- Advance the development of the design, project specifications, and plans, and identify land requirements, as per the project delivery plan outlined in this report.
- Prepare contract documents to retain a design-build team for the project.
- Proceed with negotiation of an amended Contribution Agreement with Transport Canada to extend the deadline for substantial project completion to the end of 2027.
- Investigate additional opportunities for external funding for consideration in future capital budget updates.

EXECUTIVE SUMMARY

The Windsor Street Exchange (WSE) Redevelopment project involves the planned reconfiguration of the intersection of Bedford Highway, Windsor Street and Lady Hammond Road, and surrounding road network. As one of five roadway access points to the Halifax Peninsula and the downtown core, the WSE accommodates 90,000 – 110,000 vehicles per day, with approximately 48,000 transiting the Windsor Street intersection, and the WSE is currently operating above its available capacity during peak travel periods. The Integrated Mobility Plan (IMP) identifies the WSE as a bottleneck in the network, and capacity improvements can be carried out in a manner that benefits all users. Funding for the project is being provided through Transport Canada under the National Trade Corridors Fund (NTCF), the Province of Nova Scotia and the Port of Halifax, in addition to funding through the municipality's capital budget.

A key focus of the project is improving efficiency and safety and the accommodation of all road users, including those using transit and active transportation. The project objectives include:

- reducing traffic congestion for general traffic;
- reducing travel times for trucking to and from the Fairview Cove Container Terminal;
- improving safety for all transportation users, specifically aiming to reduce collision frequency and severity;
- improving active transportation connections in the area;

- improving reliability of transit by reducing transit run-time variability in the area;
- reducing greenhouse gas emissions; and,
- establishing connections that will improve access to Africville.

The considerations that were key to the development of the design included goods movement (primarily between Fairview Cove Container Terminal and the MacKay Bridge), active transportation, transit priority, projected traffic demand, and future area growth.

The proposed functional design configuration includes three areas of focus, with the primary change focused on the reconfiguration of the Windsor Street intersection, as shown in Figure 1. Traffic traveling between the Bedford Highway and the MacKay Bridge (in both directions) will bypass the intersection, allowing for free-flow of traffic. The local road network will be upgraded to accommodate additional vehicle volumes, and an underpass connection between Bayne Street and Lady Hammond Road will be added. Other areas of focus address traffic entering/exiting the WSE area, at the Bedford Highway-Joseph Howe Interchange, and the entrance to the WSE area from the MacKay Bridge.

Figure 1 Aerial View of the Reconfigured Windsor Street Exchange

The proposed design will provide significant improvements relative to the existing configuration and achieves all the project objectives and goals set out at the outset of the project. The proposed configuration also provides additional benefits beyond those originally targeted through the Transport Canada contribution agreement, specifically related to the addition of dedicated infrastructure for transit and active transportation. A significant increase in throughput traffic capacity, reduction in peak period delays, and conflict movements for the most critical collision types will be eliminated. Access to Fairview Cove Container Terminal will be improved through geometric design improvements and reduced travel distances. A combination of transit priority measures and increased throughput capacity is expected to reduce peak period transit delays, improving transit reliability. A separated multi-use pathway will connect the Bedford Highway, Joseph Howe Drive, the Halifax Peninsula, and Africville Road.

The Windsor Street Exchange project is expected to provide significant benefits, but also has risks that are important to consider at this stage of project delivery:

- Project Funding Risks: The NTCF funding agreement has a deadline for project completion; if the project does not meet the deadline, the funding could be at risk. The project team investigated options for delivery of the remaining design and construction that will allow the project schedule to be accelerated to be completed within this timeline and is pursuing a ‘progressive design-build’ approach for the next steps of the project. Under a progressive design build approach, a design-build team is retained to carry out both the design and construction of the project. A Request for

Supplier Qualification (RFSQ) was issued to prequalify prospective design-build teams. A Request for Proposal (RFP) covering the scope of the initial contract will be issued to pre-qualified teams, with the contract to be awarded following approval of the proposed Functional Design. It is anticipated that the design-build team would begin as soon as possible, working to complete the detailed design, and allow for construction to begin in 2025.

The progressive design-build approach mitigates risks on the WSE project associated with the project delivery, project schedule and phasing, and funding from the NTCF. This method allows the Build Contractor to be involved earlier in the project, saving time on tendering, providing confidence on the development of cost estimates and construction schedules, and allowing the design to be developed in phases, with construction phased to allow for early works to begin before the design completely matured.

- Design Risks: Population growth is now projected to be higher than originally expected, which could lead to less improvement in traffic operations than anticipated. The project team has evaluated many alternative design options to meet the project objectives within the design constraints and have determined that the proposed functional design presents the best results when considering impacts and trade-offs for all modes of transportation.

BACKGROUND

The Windsor Street Exchange (WSE) Redevelopment project involves the reconfiguration of the intersection of Bedford Highway, Windsor Street and Lady Hammond Road. As one of five roadway access points to the Halifax Peninsula and the downtown core, approximately 90,000 – 110,000 vehicles per day travel through this area, and the WSE is currently operating above its available capacity during peak travel periods. The Integrated Mobility Plan (IMP) identifies the WSE as a bottleneck in the network, and capacity improvements can be carried out in a manner that benefits all users. Funding for the project is being provided through Transport Canada under the National Trade Corridors Fund (NTCF), the Province of Nova Scotia and the Port of Halifax, in addition to funding through the municipality's capital budget.

Project activity to date is summarized below:

- Transport Canada announced funding for the project in June 2019 through the National Trade Corridors Fund. The project was approved by HRM council August 13, 2019. The project was kicked off by HRM's project team in March 2020.
- In January 2021, the CAO awarded RFP 20-400 to WSP Canada Inc. (WSP) to provide consulting services preparing the Functional Plan and Preliminary Design for the WSE Redevelopment Project.
- Public/stakeholder engagement to gather information on the existing conditions was held in May 2021.
- The project's consultant, WSP, completed a review of the existing conditions, analyzed traffic data, and developed high-level concepts for the intersection redesign in Spring and Summer 2021.
- Public and stakeholder engagement to gather feedback on the concept design options was held in October and November 2021.
- WSP refined the design options based on feedback gathered and submitted functional design options in February 2022.
- A technical review on the functional design options was completed by an external consultant (EXP Services Inc.) in Spring 2022.
- The results of the review and additional stakeholder feedback were used by WSP to further refine the design options. Revised functional design options were submitted in August 2022.
- A value engineering study of the design options, led by external consultants (HDR Inc. and CBCL Limited), was conducted in February 2023
- A revised functional design incorporating value engineering options, led by CBCL Limited and HDR Inc. was conducted between August 2023 and February 2024.

Project Objectives

The overarching objective of the Windsor Street Exchange Redevelopment Project is to improve the movement of people and goods through the area and provide better access to and from the Fairview Cove Container Terminal. A key focus of the project is improving efficiency and safety and the accommodation of all road users, including those using transit and active transportation. General project goals include:

- Reduce traffic congestion for general traffic;
- Reduce travel times for trucking to and from the Port of Halifax;
- Improve safety of the area for all transportation users, specifically aiming to reduce collision frequency and severity;
- Improve active transportation connections in the area;
- Improve reliability of transit by reducing transit run-time variability in the area;
- Reduce greenhouse gas emissions; and,
- Establish connections that will improve access to Africville in the long term.

Further to the above project goals, on August 24, 2023, the Transportation Standing Committee (TSC) directed staff to consider the following additional elements through the design process:

- Separated and wide sidewalks;
- Separated and protected bicycle lanes;
- Dedicated transit-only lanes for people using public transit;
- Protected intersections that are safe for all vulnerable road users; and,
- Design for 40 KPH traffic speeds.

Key Project Considerations

The following are considerations that played a key role in design development:

Goods Movement
The Fairview Cove Container Terminal is projected to play an increasingly significant role in the movement of goods in the region, and the Port of Halifax is undertaking a concurrent project to upgrade the rail connection between the two Halifax terminals. The Rail Shuttle project is expected to reduce the volume of trucks moving through downtown Halifax by at least 75% and increase the volume of trucks traveling between Fairview Cove and the MacKay Bridge. Accordingly, improving access to Fairview Cove is an important part of this project.

Active Transportation
Addressing the need to reduce a barrier to walking and cycling by adding AT connections through the area, which would connect the Peninsula to planned AT facilities on the Bedford Highway, and Windsor Street, and potential future connections to Africville, Joseph Howe Drive, Lady Hammond Road and the MacKay Bridge.

Transit Priority
The WSE is important to Halifax Transit service, with several existing bus routes and a proposed Bus Rapid Transit (BRT) route that will run through the area.

Traffic Demand
Growth in Fairview, Clayton Park, Bedford, and in nearby growth nodes like Strawberry Hill, may result in a 30 - 40 % increase in vehicular traffic demand by 2031, based on 2016 population projections. Updated population growth projections are expected to increase the travel demand volumes further.

DISCUSSION

The Windsor Street Exchange (WSE) Redevelopment project is an exciting and transformative city-building project, with many ambitious objectives and goals that will make significant improvements to one of HRM's most notorious transportation bottlenecks. The functional design, including a Value Engineering process, has identified a preferred design configuration that is being recommended for further development.

This section provides an overview of the recommended design configuration for the WSE, outlining the key features and describing how they contribute to achieving the goals of the project. It also describes proposed next steps for the project and key project risks. The project is at a critical stage, with staff requiring Council endorsement of a preferred functional design option so that the project can be advanced to more detailed levels of planning and design. There are timeline requirements associated with the NTCF funding agreement, and schedule delays to date (due to various factors that are discussed in this report) have made it critical that the project advance to the next stages to avoid risking the loss of external project funding.

Summary of Functional Design Process

Given the complexity of this project, there have been many design iterations to date, and significant effort has gone into the design process to prepare a final preferred configuration. The forthcoming sections provide a high-level overview of the design and process, and more detailed information is provided in attachments to this report, a summary of which is provided below:

Attachment	Contents
A	Background Report on the Functional Design process, including: • Interim Functional Planning by WSP Canada Inc., which yielded two conceptual design options. • Climate Change Resilience Assessment (WSP Canada Inc.) • External Technical Review: Review and input from an external consultant (Exp) to support the project team in selecting a design option. • Value Engineering Study: Study completed by a consulting team led by HDR Inc, an in-depth review of work completed to data and assessment of potential alternative options for the preferred configuration of the WSE.
B	Value Engineering (VE) Study: • Excerpts from the VE Study report sharing the results that were considered in the development of the functional design.
C	Functional design drawings for the recommended configuration (CBCL)
D	Functional Design Report (CBCL): • Travel Demand Forecasting • Traffic Modeling and Analysis • Design Configuration Options • Structural Requirements • Property and Utility Impacts • Active Transportation and Transit

Overview of the Proposed Functional Design

Project Area

The Project Area, which was originally limited to the Windsor Street Exchange itself, was expanded during the functional design process, recognizing the importance of the immediately surrounding areas on the design. Expanded areas cover more of the Bedford Highway (including the Bayview Road intersection), Joseph Howe Drive, and the approach roads to/from the MacKay Bridge (including Barrington Street). The original and revised Project Areas are illustrated in Figure 22.

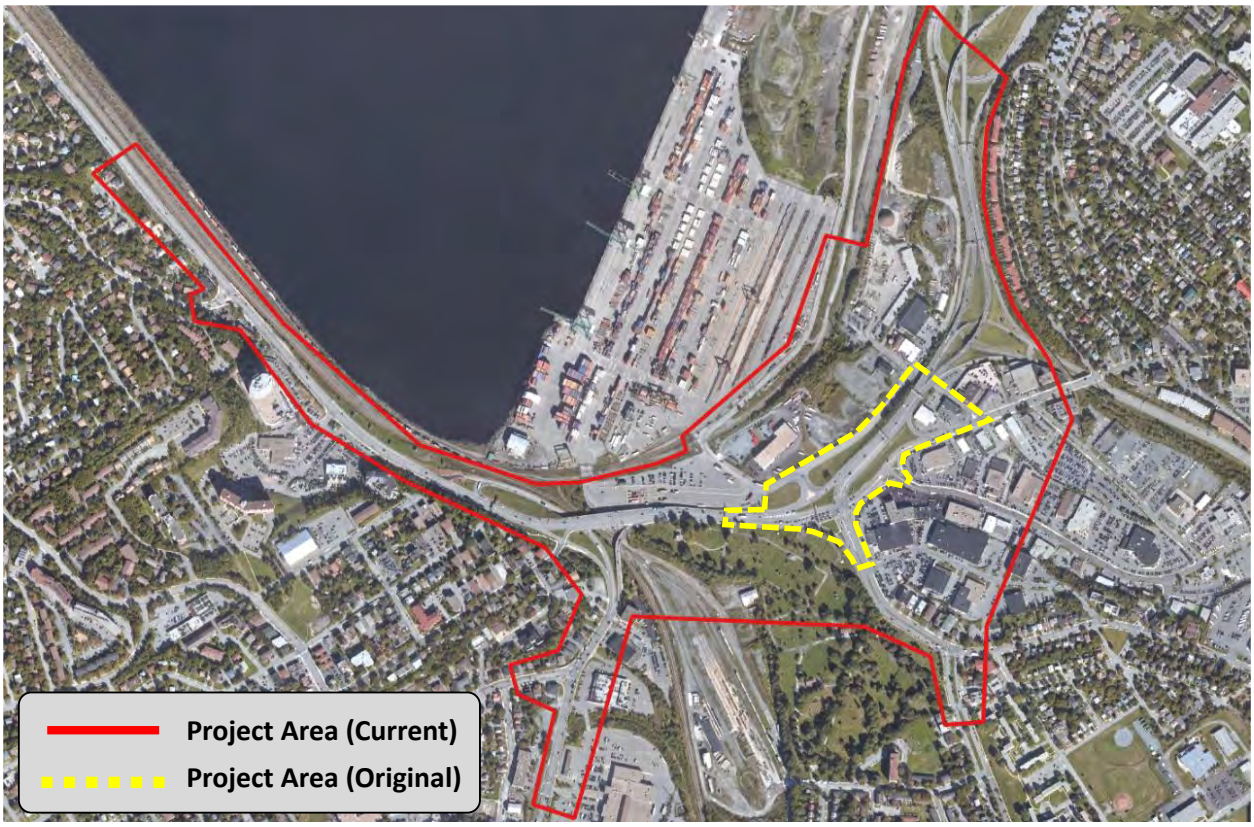

Figure 2: Project Area Extents (Current and Original)

Functional Design Configuration

The proposed overall functional design configuration for the WSE is illustrated in Figure 33. For ease of description of the design the project has been further split into three sub-areas of focus as shown in Figure 4 and described in the subsequent sections of this report:

- Area 1 focuses on the Bedford Highway-Joseph Howe Drive interchange, and how the flow to and from the WSE area can be improved.
- Area 2 focuses on the main intersection within the project area (Bedford Highway – Windsor Street – Lady Hammond Road), and the addition of an underpass connection between Bayne Street and Lady Hammond Road, which allows for a simplified intersection while maintaining local traffic operations.
- Area 3 focuses on the entrance to the WSE area from the MacKay Bridge and Barrington Street, with a new exit to Bayne Street, improving access to the Fairview Cove Container Terminal and Africville Road, and separating local traffic from the mainline traffic operations.

Drawings for the proposed Final Functional Design are provided in Appendix C.

Figure 3: Proposed Functional Design Configuration

Figure 4: Project Sub-Areas

Area 1: Bedford Highway – Joseph Howe Drive

Area 1 includes the Joseph Howe Drive-Bedford Highway Interchange. This area was not originally included in the project scope; however, through more in depth traffic modeling and data review, it was determined that it has a significant impact on traffic flow through the WSE and warrants consideration in the design. Proposed changes to the area include:

- The single lane outbound exit ramp from Bedford Highway to Joseph Howe Drive is modified to include two lanes, which significantly increases capacity for traffic exiting Bedford Highway and traffic flow in general from the MacKay Bridge to the Bedford Highway. Since the space under the Fairview Overpass is constrained, the road cannot be widened – instead, the lanes are narrowed to allow a three-lane cross-section. The design accommodates turning movements for large vehicles (i.e. transport trucks) and improves traffic flow towards the Bedford Highway.
- The intersection of the ramp from Joseph Howe Drive to the WSE (DV-K Ramp) and Bedford Highway is signalized, which better controls traffic flow and provides a safer crossing for people walking/rolling and cycling.
- The single inbound ramp from Bedford Highway to Joseph Howe Drive is modified to include two-way traffic, with the west-bound lane a transit-only lane for buses heading toward the Bedford Highway. This is intended to reduce delays for transit in the morning peak period.
- A multi-use path is proposed for the west side of Bedford Highway. The WSE project will continue the pathway on the west side down the ramp towards Joseph Howe Drive, crossing the Fairview Overpass on the south side, and connecting to a pathway from the DV-K Ramp/Joseph Howe Drive.

Figure 5: Area 1 Design Rendering

Area 2: Bedford Highway – Windsor Street – Lady Hammond Road Intersection

Area 2 is the main Windsor Street Exchange area, including the existing intersection of Bedford Highway, Windsor Street and Lady Hammond Road, the intersections of Lady Hammond Road with Kempt Road and Mackintosh Street, and Bayne Street. Proposed changes to the area include:

- The dominant traffic movement between the Bedford Highway and the MacKay Bridge will be separated to allow free flow in both directions, removing interaction with local traffic and signalized intersections. This significantly reduces delays and conflict zones for vehicle, transit and truck traffic. By separating the highest volume of traffic, the operations of other local traffic movements are improved.
- The intersection of Bedford Highway, Windsor Street and Lady Hammond Road is simplified by reducing number of lanes approaching and exiting the intersection, and an inbound transit priority lane is added. The simplified intersection reduces conflicts and crossing distance for people walking/rolling and cycling. The simplified intersection does remove direct access to Bedford Highway from Windsor Street; traffic and transit traveling from Windsor Street towards Bedford

Highway will use Lady Hammond Road, Mackintosh Street, and Bayne Street to access the west-bound direction of the Bedford Highway.

- The intersection of Kempt Road and Lady Hammond Road is changed to allow right-in-right-out traffic only to/from Kempt Road, removing the need for traffic signals at this intersection and reducing crossing distances for people walking/rolling and cycling.
- A new underpass connection between Lady Hammond Road and Bayne Street, in concert with upgrades to Mackintosh Street, improves local traffic flow and reduces delays during peak hour. It also provides a more direct route between the Fairview Cove Container Terminal and the MacKay Bridge.
- The intersection of Lady Hammond Road and Mackintosh Street is upgraded to a signalized intersection, and a MUP connection along Bayne Street and connecting to Africville Road is added.
- Separated multi-use pathways (MUP) are added through the Windsor Street Exchange. The MUPs will connect to planned active transportation facilities on the Bedford Highway, Joseph Howe Drive (connecting to the Chain of Lakes Trail), and existing facilities on Windsor Street. The MUPs will allow for potential future AT facilities on Lady Hammond Road, Africville Road and upgrades to existing facilities on Windsor Street.

Figure 6: Area 2 Design Rendering

Area 3: Entrance to the WSE Area from the MacKay Bridge and Barrington Street

Area 3 includes Bayne Street, Forrester Street, and the current exits for the MacKay Bridge. Proposed changes to the area include:

- Addition of a direct exit ramp from Highway 111 to Bayne Street. Traffic exiting the MacKay Bridge will be able to chose to stay in the free-flowing traffic lanes direct to the Bedford Highway and Joseph Howe Drive exit ramp, or exit to Bayne Street to make connections towards Windsor Street and Lady Hammond Road (or connect directly to the Fairview Cove Container Terminal).
- Bayne Street will be upgraded to accommodate the anticipated increase in traffic, and traffic signals would be added on Bayne Street at the intersections with Mackintosh Street and the new underpass connection (to Lady Hammond Road). This would allow for a connection to Windsor Street / Lady Hammond Road from the MacKay Bridge, which currently uses the existing Bedford Highway – Windsor Street – Lady Hammond Road signalized intersection. This would also allow for a connection from Windsor Street / Lady Hammond Road towards the Bedford Highway, via Mackintosh Street and Bayne Street.
- The portion of Bayne Street between the new exit from the MacKay Bridge and Mackintosh Street is converted to one-way (westbound). To accommodate access to the existing properties on this section of Bayne Street, Forrester Street also becomes one-way (eastbound), and a connection from the end of Forrester Street will extend to meet the new portion of Bayne Street.

Figure 7: Area 3 Design

Proposed Design Outcomes

The proposed functional design configuration provides significant improvements relative to the existing configuration and achieves all the project objectives and goals set at the outset of the project (in accordance with the NTCF funding agreement). The proposed configuration also provides additional benefits beyond those originally targeted, specifically related to the addition of dedicated infrastructure for transit and active transportation. High-level outcomes for each of the project objectives are summarized below.

Project Goal	Design Outcome
Reduced Traffic Congestion	• Increased vehicle throughput by approximately 1,200 vehicles (12%) in the AM peak and 800 vehicles (8%) during the PM peak compared to future no build conditions. • Reduces traffic delays (including transit) by approximately 46% in the AM peak and 10% in the PM peak based on projected 2031 traffic demand.
Improved Port Access for Trucks	• Reduced traffic delays will lead to a reduction in delays and idling time for trucks traveling through the WSE. It is estimated that these changes will reduce access time between the Port and peripheral destinations (Bedford Highway, Massachusetts Ave, Joseph Howe Dr, MacKay Bridge, Barrington St) by 30-50% and cumulative Port travel time by 21 hours during the PM peak hour. • More direct connections between the MacKay Bridge and the Fairview Cove Container Terminal.

Reduced Collision Frequency / Severity	• Conflict movements for the most critical collision types have been eliminated. • New separated multi-use path and improvements to intersections and crossings improve road safety for all road users.
Improved Active Transportation Connections	• Separated multi-use pathways (MUP) are added through the Windsor Street Exchange. The MUPs will connect to planned active transportation facilities on the Bedford Highway, Joseph Howe Drive (connecting to the Chain of Lakes Trail), and existing facilities on Windsor Street. The MUPs will allow for potential future AT facilities on Lady Hammond Road, Africville Road, and upgrades to existing facilities on Windsor Street.
Improved Transit Operations	• Addition of transit priority measures (e.g. dedicated transit lanes, transit signal priority) • Combination of transit priority measures and improved vehicle throughput reduce peak period transit delays to an average of under 2 minutes (36% reduction in the AM peak, 20% reduction in the PM peak), improving transit reliability run-time variability in the area.
Reduced Greenhouse Gas Emissions	• Reduction in delays, as well as idling time at intersections, reduces projected greenhouse gas emissions. Improvements to active transportation infrastructure and transit reliability will also support transportation mode shifts, further mitigating greenhouse gas emissions.
Improved Access to Africville	• Improved connectivity to Africville in the long term through provision of vehicular and active transportation connections via new underpass connection to Lady Hammond Road and Mackintosh Street.

The following sections provide a summary of design features and benefits by transportation mode.

General Purpose Traffic

Design Objectives	• Reduce traffic congestion and improve road safety.
Design Features	• Free flow condition in both directions between Bedford Highway and the MacKay Bridge. • Grade separated movement between Lady Hammond Road and Bayne Street to facilitate local traffic connections.
Benefits	• Significant increase in throughput traffic capacity and reduction in peak period delays. • Conflict movements for the most critical collision types have been eliminated.
Limitations	• The surrounding road network has capacity constraints that limit the ability of WSE to accommodate growth in traffic demand. Most notably, Joseph Howe Drive and Bedford Highway have limited capacity and can serve as a downstream constraint that limits the effectiveness of throughput capacity increases through the WSE. This can potentially be addressed through future road network improvements.

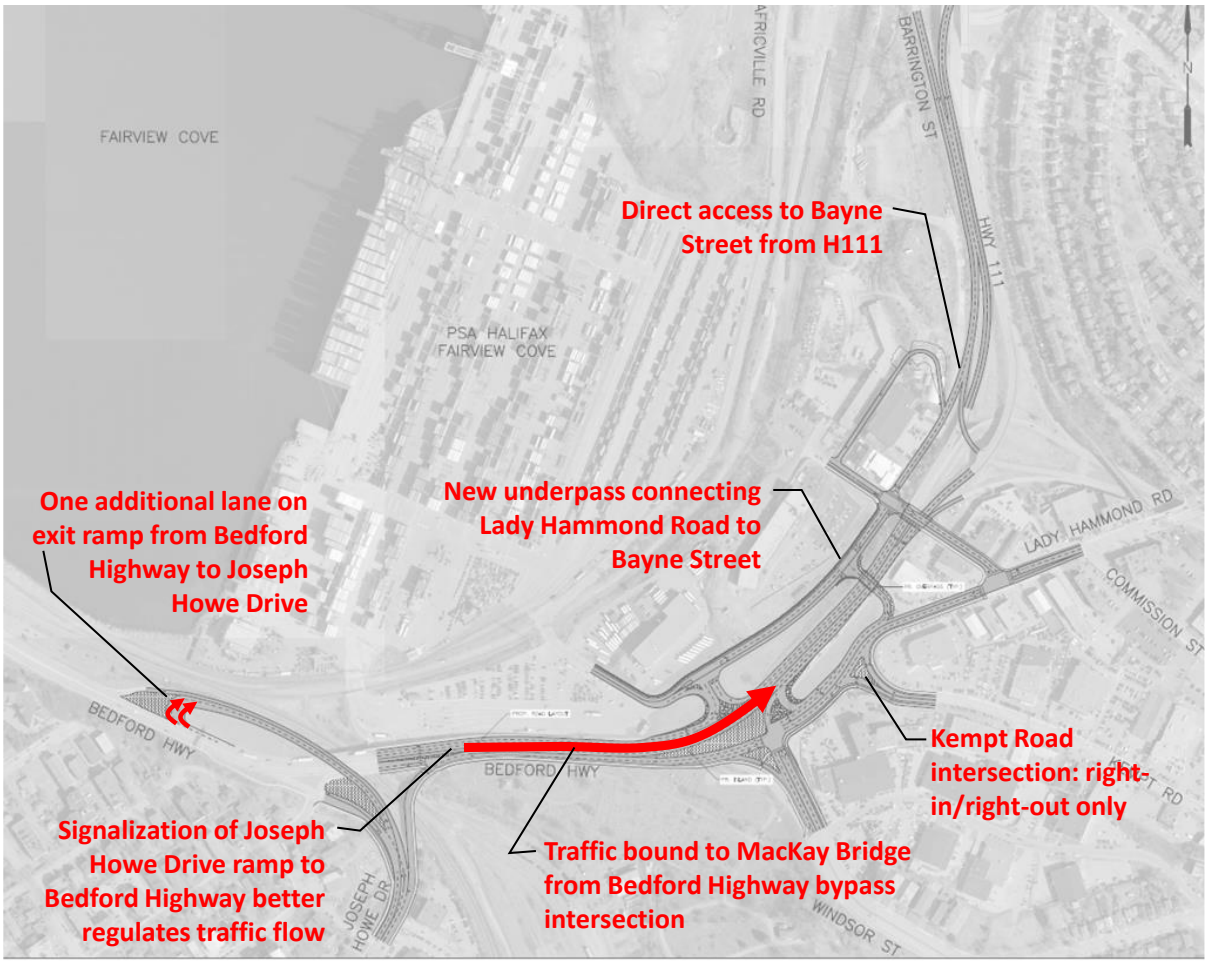

Figure 8 Design Features for General Traffic

Goods Movement / Port Access

Design Objectives	• Improve access and reduce delays for trucks entering / exiting Fairview Cove Container Terminal
Design Features	• More direct access between Fairview Cove and the MacKay Bridge, Barrington Street, and Massachusetts Avenue. • Improved geometry for truck traffic at intersections and ramps.
Benefits	• Increased throughput capacity for general purpose traffic improves efficiency of truck movements. • Multiple entry points towards the Fairview Cove Container Terminal from the MacKay Bridge.
Limitations	• Similar to the observations for general purpose traffic, road network capacity constraints in the area limit the ability of WSE to accommodate growth in traffic demand. This can potentially be addressed through future road network improvements. • The proposed configuration does not incorporate dedicated truck lanes or roads that prioritize the movement of trucks; therefore, the efficiency of truck movements will be similar to that of general purpose traffic.

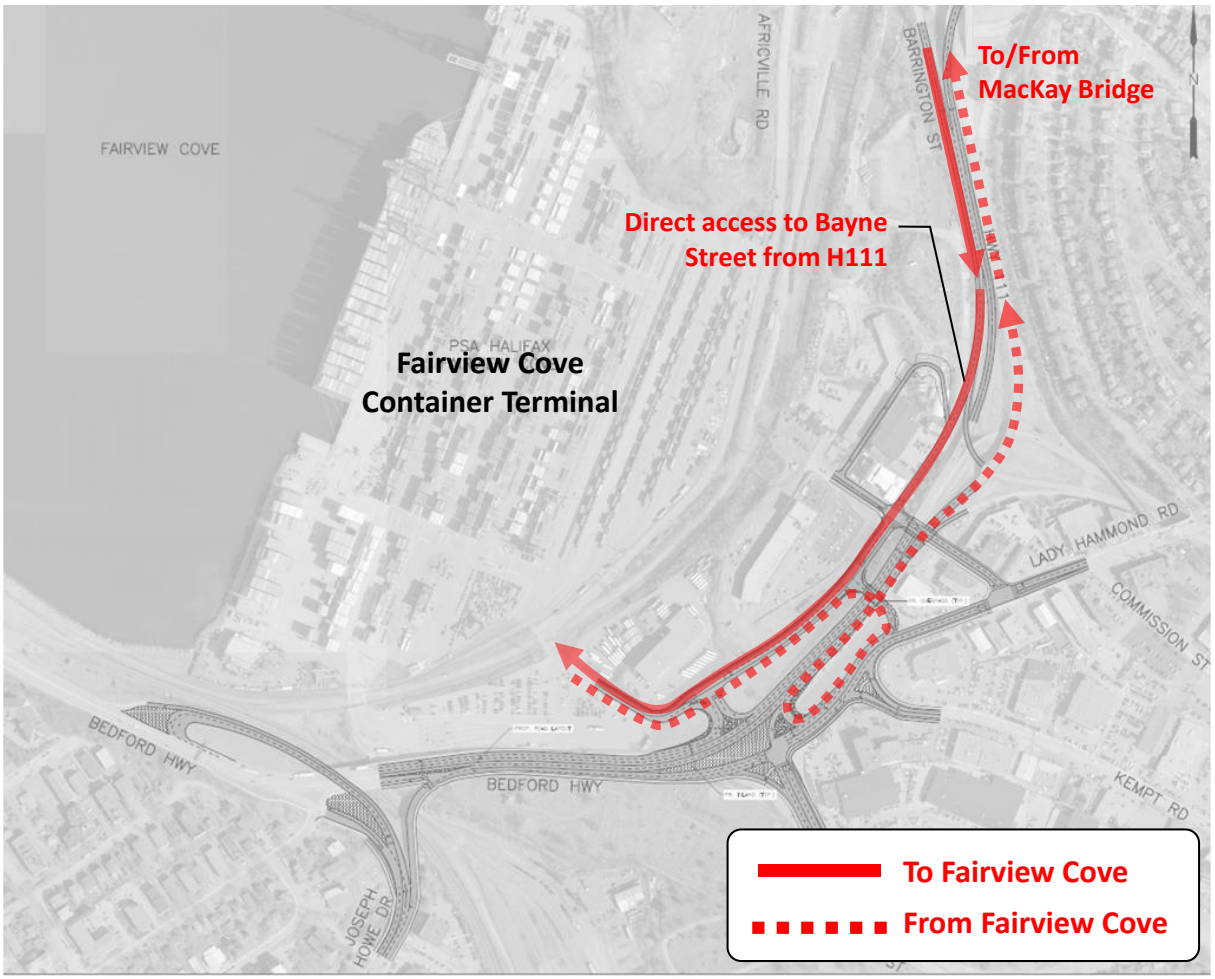

Figure 9 Design Features for Port Traffic

Transit

Design Objectives	• Improve transit reliability and efficiency by reducing delay for buses.
Design Features	• Transit priority lanes are included for critical transit routes from Joseph Howe Drive (future BRT) and at the Windsor Street-Bedford Highway intersection.
Benefits	• Combination of transit priority measures and increased throughput capacity reduces peak period transit delays to an average of under 2 minutes (36% reduction in the AM peak, 20% reduction in the PM peak), improving transit reliability run-time variability in the area.
Limitations	• Due to space constraints, the proposed design configuration does not incorporate dedicated transit lanes throughout the study area, which would be ideal for reducing delay for buses and accommodating future transit service including BRT.

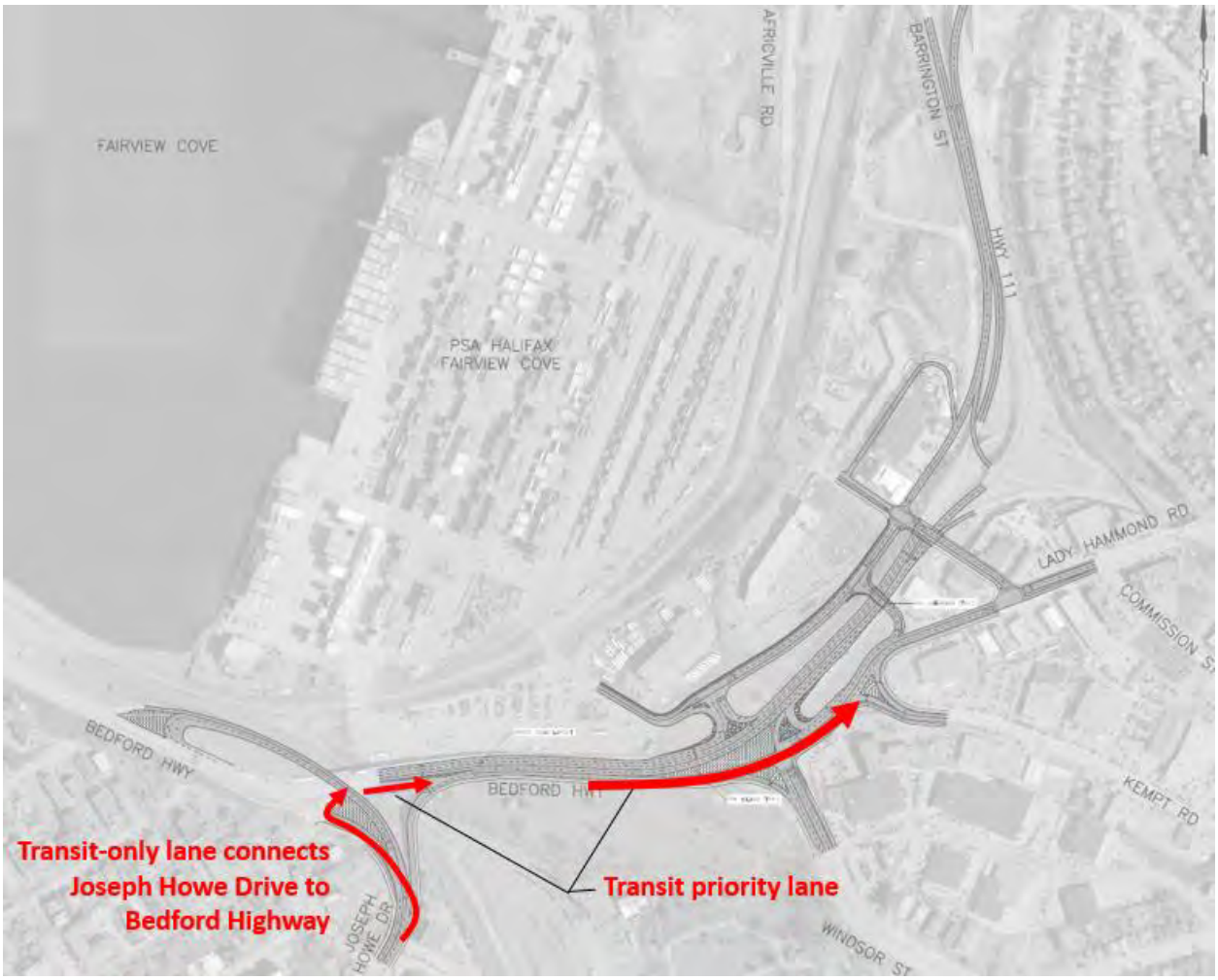

Figure 10 Design Features for Transit

Active Transportation

Design Objectives	• Improve connectivity for people walking/rolling and cycling
Design Features	• Separated multi-use pathways (minimum 3.0m wide, with 1.0m buffer) through the WSE that connect to the Bedford Highway, Joseph Howe Drive (to Chain of Lakes Trail), the Peninsula, and Africville Road (to Africville).
Benefits	• Provides a comfortable, convenient active transportation facility that is suitable for users of all ages and abilities.
Limitations	• Multi-use pathways require people walking/rolling and cycling to share the same space, which can result in conflicts between users. Multi-use pathways can also be challenging for visually impaired persons. Ideally, users would be separated into designated facilities such as sidewalks and bicycle lanes; however, space constraints in the WSE area limit the ability to provide separate facilities. • The proposed 3.0m multi-use pathways are relatively narrow. Subsequent design stages should attempt to increase the width of the facility, ideally to 4.0m.

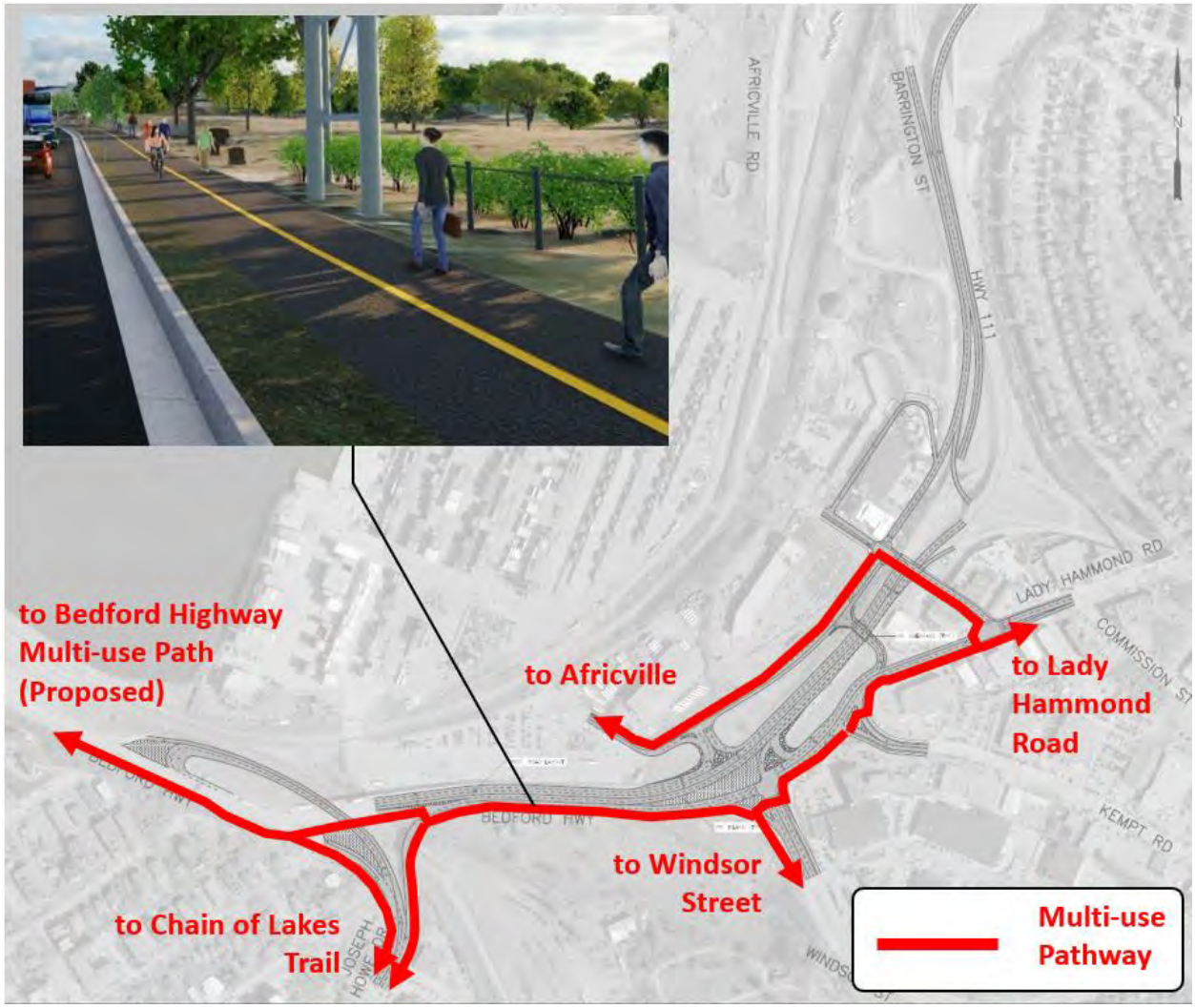

Figure 11 Design Features for Active Transportation

Impacts and Trade-Offs

The proposed final Functional Design has various impacts and trade-offs that have been considered in the development and refinement of the design alternatives and final design decisions.

- *Design recommendations from Active Transportation Advisory Committee (ATAC) and the Transportation Standing Committee (TSC)*: At the June 15, 2023 meeting of ATAC, the Committee received a presentation from Walk 'n Roll Halifax on the redesign of the Windsor Street Exchange. This was accompanied by a document prepared with support from Halifax Cycling Coalition and 'Its More Than Buses' outlining the advocacy groups' recommendations for the WSE project. The presentation and document emphasized the importance of the inclusion of people with diverse mobility needs including walking, biking and transit be considered during the redesign. The Committee passed a motion requesting a staff report on the Windsor Street Exchange redesign to include five key recommendations as outlined in the motion. This motion was passed at the Transportation Standing Committee's meeting on August 24, 2023.

  The information presented, along with previous input from the advocacy groups and the public during two phases of engagement in 2021, was considered in the development of the final recommended Functional Plan. Not all the design recommendations could be achieved as requested; the considerations that the project team made for each are outlined below.

- Separated and wide sidewalks, and separated and protected bicycle lanes: There are significant space constraints within the project area, most notably on the Fairview Overpass structure, and between the existing cemetery and the Port of Halifax lands. The road cross-sections for the proposed design have been updated to current design standards, which has resulted in narrowing of travel lanes compared to existing; however, the removal of any existing lanes would have a significant impact on traffic throughput, and ultimately the design would not meet the project objectives described above. There is insufficient space to install separated pedestrian and cycling facilities – alternatives that considered separated infrastructure required very high capital costs, significant property impacts, and/or safety concerns that would be difficult to address. Given all these considerations, a multi-use path (MUP) with a minimum width of 3.0m (wider where possible), separated by a boulevard of a minimum width of 1.0m is being proposed through the project area, and connected to existing and future active transportation infrastructure. Additionally, the MUP will follow the routing of local traffic connections, separating active transportation users from the mainline and higher volume / speed traffic.
- Dedicated transit-only lanes for people using public transit: Transit only lanes have been included in the proposed design that will allow transit buses to bypass queues at the Joseph Howe Drive interchange and the redesigned intersection of Bedford Highway, Windsor Street, and Lady Hammond Road. It is anticipated that improvements to general purpose traffic flow will improve transit reliability and reduce delays, and queue jump lanes will further improve transit reliability during peak hours. The locations of transit priority measures have been selected based on routing of existing key transit routes and the proposed Bus Rapid Transit service that is planned for the area.
- Protected intersections that are safe for all vulnerable road users: By separating the mainline and highest volume traffic, the intersections within the project area have had their design simplified, allowing for reductions in key features including the number of lanes entering and exiting, crossing distances, and potential critical conflict areas. Through the detailed design, intersections will continue to be designed to the latest design guidelines with best practices for active transportation safety considered.
- Design for 40 KPH traffic speeds: The roads within the project area will be classified as arterial and collector roads, which have minimum design speeds of 50 kph based on current design standards. Given the separated nature of the MUP, it was determined that a reduction to that speed would not be necessary.

- *Resident / Business Impacts*: The proposed functional design changes the road configuration of Bayne Street and Forrester Street, creating a one-way loop to service the home and businesses within the block bounded by Bayne Street, Mackintosh Street, and Forrester Street. The traffic volumes on Bayne Street are expected to increase significantly, and the road classification will be changed from a local road to a collector road. The home at 6353 Bayne Street is reported to be the last home of the original residents of Africville, and the planned changes are expected to have a negative impact on its residents.

  The project team has evaluated design options that do not include the exit to Bayne Street and maintain the existing road configuration in this area. The exit is required to facilitate new local traffic connections separate from the mainline traffic operations and improve access to the container terminal; without the exit, connections from the MacKay Bridge towards Windsor Street, Lady Hammond Road, and Kempt Road would use the right turn onto Bayne Street, with volumes expected to cause traffic delays and queuing extending towards the MacKay Bridge.

- *Right-of-Way / Property Impacts*: Throughout the development of the design options, the project team worked to reduce the need for property acquisition and impacts to properties within the project area. The proposed design does have property impacts; some of the existing roadway and sidewalk is located on third party properties including lands owned by the Province, Halifax Port Authority and CN. This infrastructure will be replaced or upgraded in the proposed design. Prior to the start of construction, these historical boundary issues will need to be reconciled with the respective entities. It is anticipated that these property impacts will be resolved similar to other historical

boundary reconciliation, however those resolutions do present a risk to schedule. No additional impact to third party properties is expected. New roadway and a multi-use pathway in the Bayne Street area will impact existing HRM-owned lands; work to expand the road right-of-way to install this infrastructure will be completed prior to construction.

There is a risk that temporary construction easements and/or permanent access easements may be required on third party properties to facilitate construction and maintenance. There is also a risk that additional property impacts will be identified during the detailed design phase. The project team is working to identify the areas of highest concern, and will advance design and required survey work earlier where possible to confirm property impacts and requirements necessary if the impacts are to be resolved in advance of construction.

- *Utility Infrastructure Impacts*: Efforts have been made during the development of the final Functional Design to reduce potential utility infrastructure impacts; however, some impacts have been identified that will be managed through the detailed design phase and construction. The area of greatest impact is as described in Area 2 above; the road realignments and redesign of the intersections have a significant impact on existing stormwater infrastructure. Additionally, Halifax Water has planned capital improvements within the project area, including a new transmission main and upgraded stormwater sewer. The project team is integrating with Halifax Water to include the design and construction of these projects, along with needed redesign of the stormwater collection system. Other utility infrastructure impacts are typical of a road construction project; the project team will be working with utility operators to design needed relocations, and phase construction work and temporary services to limit impacts to utility services within the project area.

- *Green Infrastructure Impacts*: Given the surrounding land uses within and adjacent to the project area are primarily industrial / commercial, there are minimal impacts to existing green infrastructure such as trees, green space, etc. Through the detailed design, the project team will be evaluating how to include green infrastructure upgrades such as trees to provide shade over the MUP, stormwater management infrastructure, etc.

  A Climate Change Resilience Assessment was completed on the interim functional design options, which provided recommendations to improve the resilience of the final design and construction to the forecasted impacts of climate change in our region. While the proposed final design has changed from what had been evaluated, many of the recommendations continue to be applicable. The project team will work with the designer to incorporate these design details through the detailed design process, and incorporate best practices for the installation of green infrastructure.

- *Traffic Impacts*: Given existing traffic capacity constraints along the Bedford Highway, Joseph Howe Drive, and the MacKay Bridge, reduction in traffic lanes for other uses was avoided wherever possible. Additional traffic lanes were also avoided, except where required to facilitate new local traffic connections created by separating the mainline traffic operations, and an additional traffic lane added to the exit from the Bedford Highway to Joseph Howe Drive. Based on traffic modeling, the additional traffic lane at this exit is needed for any changes to the WSE to have a significant impact on traffic flow. However, the additional lane will be installed within the existing roadway footprint, and the new cross-section will have narrowed lanes that meet current design standards.

- *Transit Impacts:* There will be a change in existing routing required for Transit buses currently using Windsor Street to access the Bedford Highway (routes 4 and 90); these buses will need to use Lady Hammond Road, Mackintosh Street, and Bayne Street to access the Bedford Highway. This will add time, distance, and left turn movements to these routes. Transit routes traveling from Lady Hammond Road to the Bedford Highway will need to turn right onto Mackintosh Street, then left onto Bayne Street to access the Bedford Highway; this is expected to have minimal impact compared to existing conditions.

- *Future Population Growth*: This project was initiated in 2019, and project objectives and anticipated outcomes were based on projected population growth to 2031 (i.e. 2031 was set as the design

horizon). Since the project has progressed, updated goals for future population growth have been released by the federal and provincial governments, which would significantly increase the volumes in the travel demand model that were used to model future growth. The implications of this increase in population growth are currently being studied as part of HRM's Regional Plan and the Joint Regional Transportation Agency (JRTA) Regional Transportation Plan.

Though it is anticipated a significant increase in population growth would impact the volumes of users traveling through the WSE, the development of the final Functional Design has optimized the throughput of the project area given the project constraints. Some of the major design constraints included (i) no changes to the structures of the Fairview Overpass and Mackintosh Street Overpass, (ii) no disturbance of St. John's Cemetery, and (iii) minimizing impact to Port of Halifax property. Traffic modeling of the proposed functional design is compared to the future "do nothing" scenario; if additional population growth was accounted for in the traffic model, it is expected that the relative improvements (i.e. the percent reduction in delays, etc.) would be similar to those included in this report.

The population growth that has been accounted for in the traffic modeling will already place maximum demand on the road network peak hour capacities, as well as on the MacKay Bridge. The additional travel demand associated with an increase in population growth would therefore not change net conditions over the peak hour, but rather extend these conditions over a longer period.

It is anticipated that additional growth will have to be considered as part of a larger Regional Transportation Plan, and that transportation mode shift will be necessary to maintain acceptable operations. The final Functional Design does not prevent future projects that may be initiated based on results of the Regional Transportation Plan, or potential changes to the future MacKay Bridge. Through the detailed design process, the project team will identify if there are opportunities for additional transit priority measures to be included in the final project design.

Next Steps: Project Delivery Plan

The NTCF funding agreement currently requires that construction is complete by December 2024; however, Transport Canada has agreed in principle to extend this deadline to December 2027. The project team investigated options for delivery of the remaining design and construction that will allow the project schedule to be accelerated to be completed within this timeline. Currently the project team is pursuing a 'progressive design-build' approach for the next steps of the project. Progressive design build is a project delivery approach in which a design-build team is retained to carry out both the design and construction of the project. This contrasts HRM's typical project delivery approach, wherein design and construction are carried out in successive distinct phases. While progressive design-build is not an approach that has been used on HRM transportation projects to date, it has been used successfully on transportation projects in other jurisdictions, as well as by the Province of Nova Scotia for new school construction.

In the progressive design-build process, a Request for Supplier Qualifications (RFSQ) is issued to shortlist potential proponents. A Request for Proposals (RFP) is then issued to select a preferred proponent known as the "design-builder". An initial contract is awarded for the design portion only, but will include an ability to accomplish certain early works, if required. This approach contemplates a "cradle to grave" collaborative relationship between HRM, the designer and the contractor to achieve a balanced value between stakeholders, design components, construction schedule and costs by creating partnerships at the bidding stage and throughout the early works. The progressive approach mitigates contract risk by allowing defined "exit points" for HRM if the relationship between the parties is not working. Although the construction budget portion of the contract is inherent in the design phase, it also allows for a defined exit strategy should the design process result in a more costly project than Council has considered. A separate contract would be entered into with the design-build team, at HRM's discretion, before HRM would proceed to the full construction of the Project. Benefits include:

- Continuity of the design-builder's design and construction teams allows for a relationship to be built and facilitates early and frequent constructability feedback. The WSE project is complex and

located in an area of high importance to the regional transportation network; the strong relationship and feedback between the designer and constructor teams should lead to improvements in constructability and a strong understanding of impacts prior to construction.
- The overall project schedule can be compressed by removing the need for tender; the construction portion of the contract can be awarded progressively. Portions of the work can be awarded earlier to allow for advance ordering of materials with long-lead times to facilitate the construction schedule.
- Design elements can be adjusted with input from the construction team using actual construction costs, leading to the potential identification and implementation of cost and overall time saving measures where applicable.

CBCL has been hired to act as an Owner's Advisor to support HRM's oversight of the contract. In February 2024, a RFSQ was issued to prequalify prospective design-build teams. An RFP covering the scope of the initial contract will be issued to pre-qualified teams in June 2024, with the contract to be awarded following approval of the proposed Functional Design. It is anticipated that the design-build team would begin as soon as possible, working to complete the detailed design, and allow for construction to begin in 2025.

Project Risks

Design

Risks related to the proposed configuration include the following:

- Traffic Volume Projections: Population growth is now projected to be higher than anticipated by the travel demand model used to develop the traffic volumes used in the design. This could lead to less improvement in traffic operations than anticipated, most likely through the extension of peak hour volumes.
- Transit Priority: Given the traffic capacity constraints within the existing road network, traffic lanes were not reallocated for other uses such as transit only. Space constraints did not allow for the addition of lanes for dedicated transit use. Dedicated transit priority for all movements throughout the project area would be ideal to future proof the design against increases in traffic volume.
- Goods Movement: Improvements have been made to road geometry and distance traveled for trucks accessing the Fairview Cove Container Terminal. Trucks will continue to use shared travel lanes, and therefore are likely to experience delays during peak hours.
- Active Transportation: Given space constraints within the project area, separated pedestrian and cycling facilities will not be included through the entire project area. Shared facilities can present potential conflicts between differing modes of active transportation.

The project team has evaluated many alternative design options to meet the project objectives within the design constraints, and have determined that the proposed functional design presents the best results with consideration for impacts and trade-offs for all modes of transportation. There is the potential for upgrades to the regional road network that could complement the proposed upgrades at the Windsor Street Exchange; these options are expected to be evaluated through the Regional Transportation Plan.

Funding

Funding for the project through the NTCF is being provided through a contribution agreement between HRM and Transport Canada. The original contribution agreement requires that construction be substantially complete by the end of 2024. Since the contribution agreement was signed, there have been several challenges and risks related to the delivery of the functional design which have caused delays in tendering the project for construction. These challenges and risks include the following:

- Schedule delays in the preparation of the final Functional Plan: Further assessment work of the initial functional design options has been required, involving a technical review by an external consultant, additional assessment work by the design consultant, a value engineering study of the design options, and further assessment of the design options recommended by the Value Engineering Study. This has delayed the selection of a preferred design option to present to Regional Council for consideration.
- Increased inflation has put pressure on the overall project budget, prompting efforts to identify potential cost savings and additional funding that would be required to complete the project.

The HRM project team has communicated these risks and delays to Transport Canada, and there has been an agreement in principle to amend the contribution agreement to require substantial completion by the end of 2027. The amended contribution agreement is dependent on Council approval to proceed with the proposed Functional Design. Despite an amended agreement there is still significant risk that the project cannot be substantially completed by the end of 2027.

Project Delivery

The delivery of the project will be very challenging given land impacts are still being defined and the required construction duration for the project is a minimum of three years and the funding deadline for project completion is the end of 2027. This constrained schedule means the project will need to proceed from the 30% functional design phase to 100% design by the 2025 construction season. For this reason, Progressive Design Build is being proposed for project delivery. This method allows the Build Contractor to be involved earlier in the project, saving time on tendering and allowing the design to be matured progressively while early works construction is able to begin. While progressive design-build is not an approach that has been used on HRM transportation projects, it is expected to provide the best option to accelerate the schedule while maintaining a quality design, and a strong understanding of budget impacts.

Project Schedule and Phasing

A high-level project schedule has been developed based on a phased construction plan using the functional design plan and value engineering. This schedule and phasing plan will need to be validated during the next phase of procurement. The phasing plan will also need to confirm traffic impacts construction. Other ways to expedite the schedule will be reviewed during remaining design, fabrication and construction phases to deliver the project on time.

As part of the value engineering study an option was explored by staff to limit scope to what could have been completed within the original time frame. It was determined that a reduced scope would likely not meet the project objectives of the funding agreement, and therefore the reduced scope has not been considered further. Project schedule and construction phasing remain a high risk to fulfilling the proposed updated funding agreement schedule of December 2027.

Halifax Water has partnered with HRM to integrate planned capital work into the Windsor Street Exchange project. The Halifax Water work includes plans to install the North End water feeder main, sewer separation, and other infrastructure upgrades to support planned development growth. This work is subject to approval of the Utility and Review Board (UARB), which may introduce delays in awarding the construction work; the project team is working with Halifax Water to ensure that necessary approvals are in place prior to construction.

FINANCIAL IMPLICATIONS

Estimated project costs are $103,865,000, which is based on a Class 'D" construction estimate (including a 25% contingency). The estimated costs are preliminary in nature and would be revised based on detailed design. The estimated costs include estimated design fees, property acquisition, and construction costs. The construction costs include integrated planned capital work to be completed by Halifax Water to install a transmission main and upgrade the storm sewer system; the cost sharing agreement for this work will be finalized as part of the detailed design process.

Using the Progressive Design Build process, a Phase 1 contract for the design and early works would be issued to the successful proponent; the contract is estimated to have a value of $6 million. Through the advancement of the design under the Phase 1 contract, the project team will develop further detailed project costs, including for property acquisition and construction costs. The design-build team will develop and submit a proposal for the Phase 2 contract (the construction of the project), which HRM will have the option to accept and issue the Phase 2 contract or reject and complete a traditional construction tender process.

The Value Engineering (VE) Study completed in 2023 evaluated performance measures of the design alternatives considered, as well as the cost of developed design alternatives. A Class 'D' construction estimate completed on the design before the VE Study was $139.5 million. The final functional design incorporating the design alternatives recommended by the VE Study has a Class 'D' construction estimate of $100.5 million, a cost savings of $39 million (28%).

The previously approved capital budget has $51.09M allocated for the Windsor Street Exchange project. The approved 2024/25 Capital Budget and 2025/26-2027/28 multi-year Capital Plan includes the updated project cost estimate of $103,865,000 ($6,865,000 in previous budget, $32,292,000 in 2025/26. $30,500,000 in 2026/27, $24,208,000 in 2027/28, $10,000,000 in future years). The increase in budget reflects an expanded project scope, a more in-depth construction cost estimate that considers current pricing and incorporates expected inflation costs and includes a contingency reflecting the current project conditions.

The cost sharing amounts from external funding sources based on previous project estimates and current approved project capital budget are summarized in Table 1. These amounts, which currently assume that any increases in cost will be HRM's responsibility, result in an increase to HRM's cost share to $67,615,000 (65% of the total). The updated budget amount retains the same external funding amount ($30,600,000.) with the entirety of the project budget increase assigned to HRM.

Table 1 Cost Sharing on the Windsor Street Exchange Project

	Original Cost Share (2019)[1]		**Updated Cost Share (February 2023)[2]**		**Forecasted Cost Share (January 2024)[3]**	
Transport Canada (NTCF)	$23,500,000	50%	$23,500,000	46%	$23,500,000	23%
Halifax Regional Municipality	$10,750,000	23%	$14,840,000	29%	$67,615,000	65%
Province of Nova Scotia	$10,750,000	23%	$10,750,000	21%	$10,750,000	10%
Port of Halifax	$2,000,000	4%	$2,000,000	4%	$2,000,000	2%
Total Estimated Project Costs	**$47,000,000**	**100%**	**$51,090,000**	**100%**	**$103,865,000**	**100%**

Notes:
1. Original cost share based on the 2019 agreement.
2. Forecasted cost share based on updated construction cost estimate (February 2023).
3. Forecasted cost share based on updated construction cost estimate (January 2024; as approved 24/25 Capital Budget and 2025/26-2027/28 multi-year Capital Plan).

The contribution agreements for the project were evaluated and approved based on the original project scope. The project scope has expanded to include a larger study area as a result of updated traffic modeling, and new items have been added which provide additional benefits. Staff are investigating additional opportunities for external funding, which may be considered in future capital budget updates for the project.

COMMUNITY ENGAGEMENT

Stakeholder updates were completed in the last six months to communicate project status to various stakeholders including the JRTA, Port of Halifax, Halifax Harbour Bridges, Halifax Water, Utilities, Property Owners, and Various Advocacy and Community groups.

On August 13, 2019, when authorizing the contribution agreement with Transport Canada, Regional Council directed staff to explore whether community benefits could be part of the selection of a preferred concept. The project team completed initial evaluation of the potential for community benefits, reporting back to Council on August 18, 2020. The proposed plan was to consult with the Africville, Mi'kmaw, and Urban Indigenous communities to identify potential community benefits that could be considered as part of the project. Initial consultation has been limited; however, it was determined that the design concept should look to improve access to Africville. Now that a preferred design option has been selected, further consultation with these communities will be undertaken to identify potential community benefits and determine what can be included in the WSE project. It is anticipated that this consultation will be coordinated with other consultation with these communities, such as the Africville Visioning Process.

ALTERNATIVES

1. Regional Council could choose not to proceed with the Windsor Street Exchange Project and direct staff to cease further design efforts and release their retained consultants and staff. The implications of this alternative would be:
    a. The Municipality would forgo $34.25 Million in combined funding from the Federal and Provincial governments.
    b. Key active transportation connections and transit performance improvements would not be made.
    c. Port access and general traffic performance would remain unchanged and further degrade over time.
2. Regional Council could delay deciding on the project at this time to allow for additional design review and/or for further external funding opportunities to be considered. This is not recommended as it would add unrecoverable delays into an already constrained project schedule and not allow for delivery of the project within the stipulated timelines. It is also expected that additional delays would risk that the requirements of the funding agreement with Transport Canada could not be met, and the funding from the Federal government could be forfeited.
3. Regional Council could direct staff to pursue a smaller alternative of the project focusing on some project components but without the major components. This would likely significantly reduce project benefits, which would risk that the requirements of the funding agreement with Transport Canada could not be met, and the funding from the Federal government could be forfeited.

ATTACHMENTS

Appendix A – Summary of Work
Appendix B – Value Engineering Study Report Excerpts
Appendix C – Proposed Final Functional Design Drawings
Appendix D – CBCL Functional Design Report

If the report is released to the public, a copy can be obtained by contacting the Office of the Municipal Clerk at 902.490.4210, or Fax 902.490.4208.

Report Prepared by: Scott Donahoe, P.Eng., Project Manager, Design & Construction, 902.229.0198
Megan Soroka, P.Eng., PMP, Project Manager, Design & Construction, 902.717.4302