

Beaver Bank Connector Intersection Redesign

Introduction

The Beaver Bank Connector Project consisted of the redesign of two intersections in Lower Sackville, Nova Scotia. The intersection of Beaver Bank Connector with Old Sackville Rd. is currently a signalized intersection, while Walker Ave. and Downsview Dr. meet Old Sackville Rd. at a two-way stop. High commuter traffic as well as transit traffic from the Sackville Bus Terminal on Walker Ave. have resulted in peak-hour congestion and safety concerns in both intersections.

Project Objectives

Safety	Functionality and Operations	Cost
<ul style="list-style-type: none"> • Pedestrian infrastructure • Reduce frequency and severity of collisions 	<ul style="list-style-type: none"> • Pedestrians and Cyclists • Transit • Vehicular Traffic • User-friendly 	<ul style="list-style-type: none"> • Economical options • Effective construction planning

Multi-Modal

A "multi-modal" design approach includes placing an increased focus on active transportation and transit functionality. This approach aligns with HRM's vision of improving personal health and recreation, managing traffic congestion, reducing emissions and creating healthy communities.



Options Analysis

Signalized		Roundabout	
Advantages	Disadvantages	Advantages	Disadvantages
<ul style="list-style-type: none"> - Inexpensive - Familiar 	<ul style="list-style-type: none"> - Turning Conflicts - Limited Capacity 	<ul style="list-style-type: none"> - Less Conflicts - Multi-modal 	<ul style="list-style-type: none"> - Expensive - Larger Footprint

Design Process

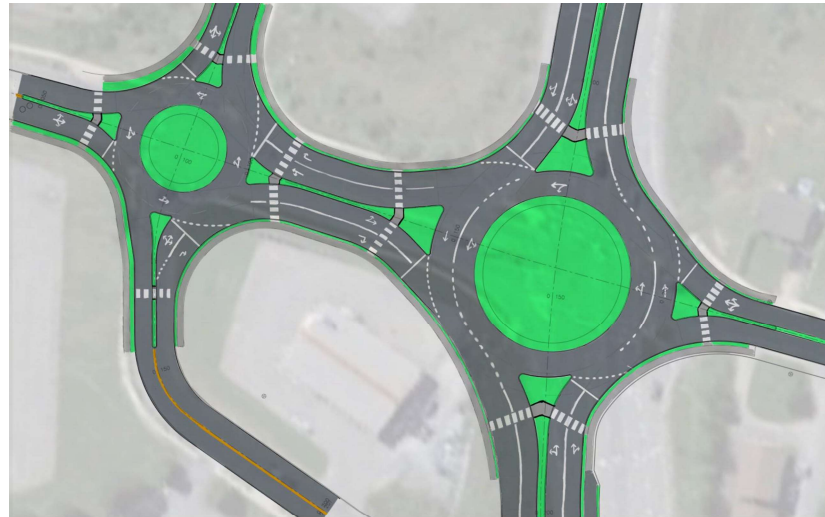
- Conceptual Design**
 - Develop Concepts
 - Options Analysis
 - Traffic Simulation
 - Multi-Modal Analysis
- Geometric Design**
 - Design Roundabout Elements
 - Design Approaches
 - Design Checks and Exceptions
- Grading & Drainage Design**
 - Match Existing Grades
 - Vertical Curve Checks
 - Minimum & Maximum Grades
 - Storm Water System
 - Impervious Area Comparison
 - Catchbasins at Low Points
- Traffic Simulation**
 - Vistro Analysis
 - Vissim Simulation & Modelling
- Construction Management**
 - Traffic Management Plan
 - Construction Schedule
 - Cost Estimation

Beaver Bank Connector and Old Sackville Road Intersection

Road Classification: Arterial Road
Design Vehicle: WB-20
Daily Volumes: 34800
Design Choice: Double Lane Roundabout

Walker - Downsview and Old Sackville Road Intersection

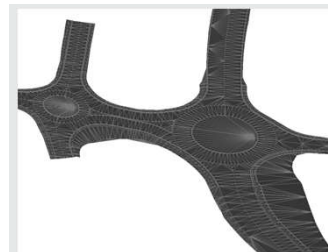
Road Classification: Minor Collector
Design Vehicle: A-Bus
Daily Volumes: 8100
Design Choice: Single Lane Roundabout



Design Exceptions

Existing road grades in the area created challenges for grading the roundabouts. In some cases, blending the new roundabout approaches into the existing grades could not satisfy the maximum road grade and the minimum K value.

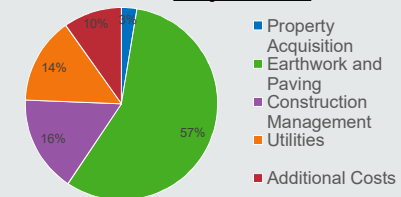
Traffic Simulation



Grading and Drainage Design

- Working with the existing road grades and design constraints, AutoCAD Civil 3D was used to model the finished surface of the two roundabouts.
- Pre- and post-development comparison of impervious area to determine runoff for catchbasin placement at low points.
- Considered conflicts with existing infrastructure.

Project Costs



Total Cost
\$4.1million

Construction Phasing

- Phase 1: April – June 2020
- Phase 2: July – Sept 2020
- Phase 3: April – July 2021
- Phase 4: July – Oct 2021

Project Completion:
November 2021



Conclusion and Recommendations

- Redesigning the two intersections from a traditional layout into double and single lane roundabouts will better serve the community of Sackville and surrounding area. Benefits of implementing roundabouts in this area included:
 - Improved safety
 - Improved traffic flow
 - Multi-modal improvements through the addition of a multi-use trail, transit functionality and pedestrian-friendly infrastructure.
- Full completion of the construction of these two roundabouts is estimated at 13 months over two construction seasons. The total project cost is estimated to be \$4.1million.

Acknowledgements

Our team would like to thank our industry sponsor, Halifax Regional Municipality and Mr. Roddy MacIntyre for the opportunity and resources to explore this topic. We would also like to thank our advisors, Dr. Nouman Ali and Mr. Paul Burgess for their supervision and guidance throughout the project.

References

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 - Geometric Design Guide for Canadian Roads. (1999). Ottawa: Transportation Association of Canada.
 - Transportation Association of Canada. (2017). Canadian Roundabout Design Guide. Ottawa, Ont.: Transportation Association of Canada.
 - Ainley Group of Consulting Engineers & Planners. (2016). Master Municipal Class EA – City Unit Prices. Barrie, Ont.
- Software:
- PTV Vissim, PTV Vistro, Autodesk AutoCAD Civil 3D