Appendix B

Project Need Report

Transportation

United Counties of Prescott and Russell in partnership with
the City of Ottawa

Project Need Report
Ottawa Road 174 / Prescott-Russell County Road 17
Environmental Assessment Study

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In Association with:
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Project Number:
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Date:
August 2013

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Executive Summary

Note: The Project Need report does not reflect the City of Ottawa's 2013 Transportation Master Plan (TMP) or the supporting 2013 TRANS model. The analysis and report was completed in August 2013, prior to the release of the 2013 TMP. The findings reflect the road and transit network identified in 2008 TMP and were based on the supporting 2008 TRANS model with adjustments for growth in Clarence Rockland and Cardinal Creek Village. Finally, the Needs and Justification report does not consider Peak Period Analysis; a new concept introduced in the 2013 TMP.

Background and Context
The United Counties of Prescott and Russell in partnership with the City of Ottawa are the proponents of a Class Environmental Assessment (EA) Schedule 'C' study for the improvements to Ottawa Road (OR) 174 from the Highway 417/ OR174 Interchange (the "Split") to the City boundary, and improvements to Prescott Russell County Road (CR) 17 from Canaan Road to CR 8 (Landry Road) in Prescott and Russell.

This EA Study considers work undertaken previously by the United Counties, the Cities of Ottawa and Clarence-Rockland, the Ministry of Transportation of Ontario (MTO) and the National Capital Commission (NCC) such as the Official Plans of the municipalities, the Greenbelt Master Plan Review, the Transportation Master Plan of the City of Ottawa and EA studies in and adjacent to the Study Area.

Study Area
As illustrated below, from Highway 417 to Trim Road, the Study Area has been limited to the existing OR 174 corridor. This is in recognition of the presence of the Greenbelt and the Core Natural Areas of Mer Bleue and Green's Creek, which have restricted the number of transportation routes in this area. From Trim Road to Rockland, the study area expands to include the area from OR 174-CR 17 southerly to Innes Road – Baseline Road.

Safety
The need for the project was assessed. Opportunities for safety improvements in the OR 174-CR 17 corridor were identified based on a review of previous safety studies and analysis of collision experience along OR 174-CR 17. Locations identified as having a higher potential for safety improvement included the section of the eastbound OR 174 between Highway 417 and Jeanne d'Arc Boulevard, the section of westbound OR 174 from Montreal Road/ St. Joseph Boulevard to Highway 417 and the mid-block road section between Trim Road and Quigley Hill Road. Other intersection, interchange and roadways sections also had potential for safety improvement.

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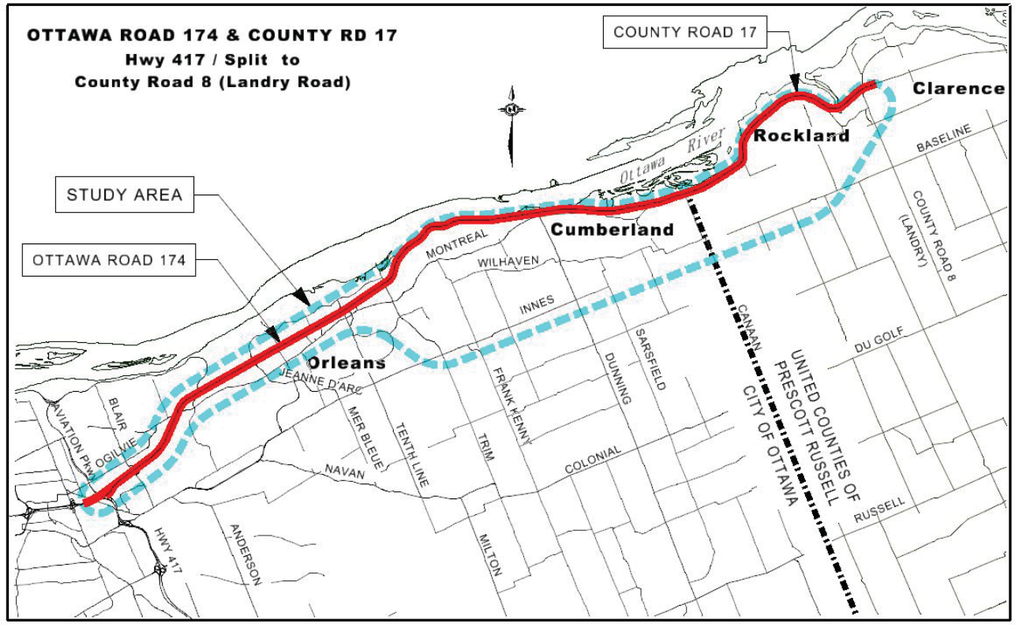

Capacity
A review of existing traffic volumes and travel times that included 2012 travel time surveys confirmed that there is a problem with congestion through many parts of the Study Area. Congestion occurs in the AM and PM peak hours along the OR 174-CR 17 corridor from Clarence-Rockland, through most of Cumberland to Trim Road and again along OR 174 between Place d'Orléans and Jeanne d'Arc Boulevard and between Blair Road and Montreal Road.

Future traffic volume (travel demand) projections were obtained from the travel demand forecasting model maintained by the TRANS Committee, which is the joint technical committee on transportation systems planning in the National Capital Region. Transportation planners examine transportation need using forecasted trips across a "screenline". A screenline is an imaginary or real boundary used to evaluate travel issues. Typically physical barriers (rivers/greenbelts) are used since they limit the number of crossing opportunities.

For this EA study, the traffic analysis examined capacity across three screenlines identified in the Ottawa TMP: Green's Creek in the Greenbelt, Bilberry Creek in Orleans, and Frank Kenny in west Cumberland along with two screenlines established for the study: one to the east of the Village of Cumberland in Ottawa to assess needs in the eastern rural area and a second screenline east of Canaan Road to assess needs in Clarence-Rockland.

The future travel demand projections from TRANS available to this study did not include recent changes to the urban boundary and anticipated developments. The major developments not included in the projections were Cardinal Creek Village east of Trim Road, which is expected to have 4800 residences along with commercial development, and residential development projects in Clarence-Rockland, which are expected to total as many as 5500 units. For the purposes of this study, the trips from these two major development areas were calculated separately and added to the future travel demand projections generated from the current TRANS model.

The impacts of future travel demand projections for the study area were examined in a capacity analysis. A volume to capacity (v/c) ratio represents the capability of a road to accommodate the traffic demand. As the v/c ratio approaches 1.00 there is an increased probability of delays and queuing. Once the v/c ratio exceeds 1.0, excessive delays and queues are expected. Level of service categories are assigned to corresponding v/c ratios as follows:

Level of Service	Volume to Capacity Ratio
A	0 – 0.60
B	0.61 – 0.70
C	0.71 – 0.80
D	0.81 – 0.90
E	0.91 – 1.00
F	>1.00

The objective for this study is that during the peak hour a v/c ratio of 0.90, which is equivalent to a Level of Service of ‘D’, should not be exceeded. The v/c ratios were determined for the planned road capacity for each of the five screenlines identified for this needs assessment. Analysis years of 2021 and 2031 were selected, corresponding to the available TRANS projections.

It is important to note that the needs assessment included the projects already identified as requirements in the Ottawa TMP (including the widening of the OR 174 west of Jeanne d’Arc to six lanes), and was based on the transit modal shares and screenline Level of Service performance thresholds identified in the Ottawa TMP being achieved. The chart below illustrates past, present and future traffic at the five screenlines.

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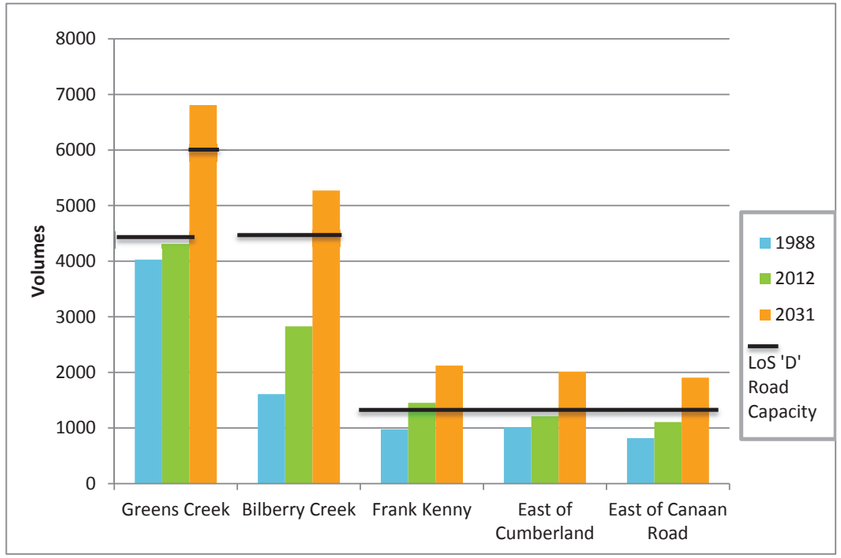

In 2031, the impact of the increased travel demand during the AM peak hour is focused along OR174-CR 17. It is expected that improvements to the East Transitway and Cumberland Transitway will increase transit ridership and provide more stable traffic conditions along the screenlines west of Trim Road. However, LOS ‘D’ will still be exceeded across all screenlines.

If the route choice by drivers across the screenlines remains consistent with the model projections, intuitively there would appear to be a need for additional capacity at the north end of the screenlines, especially given the proximity of the proposed new developments at Cardinal Creek Village and in Clarence-Rockland to the OR 174-CR 17 corridor. The travel demand is larger at the north end of the screenlines due to the continuous link(s) provided from the east end to the west of the study area.

The table below details the travel demand, capacity and level of service across each of the screenlines.

Screenline	Criteria	2021	2031
Project (Clarence-Rockland)	Capacity	1,600	1,600
	Volume	1,876	2,291
	V/C Ratio	1.17	1.43
	Level of Service	F	F
Project (Ottawa)	Capacity	2,200	2,200
	Volume	1,927	2,353
	V/C Ratio	0.88	1.07
	Level of Service	D	F
Frank Kenny	Capacity	3,300	3,300
	Volume	2,676	3,259
	V/C Ratio	0.81	0.99
	Level of Service	D	E
Bilberry Creek	Capacity	9,400	9,400
	Volume	7,700	8,567
	V/C Ratio	0.82	0.91
	Level of Service	D	E
Green's Creek	Capacity	13,080	13,080
	Volume	11,460	12,043
	V/C Ratio	0.88	0.92
	Level of Service	D	E

The analysis indicated that other east-west routes such as Innes Road and connecting links such as Trim Road are also expected to operate at or above LOS 'D' in the future.

Sensitivity Testing
In order to assess the sensitivity of the results to changes in the transit use, the projected "non-auto" modal shares were increased and decreased by 5 and 10 percentage points across the Greens Creek, Bilberry and Frank Kenny screenlines. The analysis showed that a combination of enhanced transit, active transportation (cycling, walking), and TDM may address a portion of the projected capacity deficit, but will not result in sufficient improvements to address the capacity needs demonstrated at the screenlines.

Conclusion
This project needs assessment concludes that additional road capacity is needed to serve the Study Area.

This EA Study will also consider the importance of the addition of more road capacity to the economy, area businesses and to local travellers. Downstream constraints, especially at the Highway 417 interchange, and environmental constraints will be considered in the development of alternatives to address the needs.

Distribution List

# of Hard Copies	PDF Required	Association / Company Name
	1	United Counties of Prescott and Russell
	1	City of Ottawa

Revision Log

Revision #	Revised By	Date	Issue / Revision Description
0	VS/SM	December 2012	Initial draft
1	VS/SM	January 2013	Revised draft
3	VM/SM	August 2013	Draft for Eastern LRT EA RFP
4	VM	April 2016	Final document

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LIST OF ACRONYMS

BBHBP	Blackburn Hamlet Bypass
CR17	Prescott-Russell County Road 17
EA	Environmental Assessment
EB	Empirical Bayes
FI	fatal and injury
IHSDM	interactive highway safety design model
ISRSR	in-service road safety review
MTO	Ministry of Transportation of Ontario
NCR	National Capital Region
OP	Official Plan
OPF	operational performance functions
OR174	Ottawa Road 174
pcus	passenger car units
PDO	property damage only
ppv	persons per vehicle
PSI	potential for safety improvement
SMV	single motor vehicle
TDM	transportation demand management
TMP	Transportation Master Plan
v/c	volume to capacity ratio

GLOSSARY

Class Environmental Assessment - a planning process approved under the Environmental Assessment Act for a class or group of undertakings. Projects implemented under the Class EA process may be implemented without further EA approvals if they are undertaken in accordance with the approved process.

Environmental Assessment (EA) - a decision-making process used to promote good environmental planning by assessing the potential effects of certain activities on the environment.

Modal Share - the ratio of the number of trips by a specific travel mode to the number of trips by all modes.

Screenline - a line that crosses all major transportation facilities in a sector. These lines are typically drawn along a feature (river or railway) that limits the number of crossing points.

Transportation Demand Management (TDM) – strategies that encourage individuals to reduce the number of trips they make, use more environmentally-friendly travel modes, travel outside of peak demand periods and reduce average trip length.

Transportation Master Plan (TMP) - Municipal planning document which establishes infrastructure and program needs supporting policies for the regional transportation system.

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TRANS - Joint technical committee on transportation systems planning in the National Capital Region.

Volume to Capacity Ratio - represents the capability of a transportation facility to accommodate the traffic demand.

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1. Introduction

The Needs and Justification report does not reflect the City of Ottawa's 2013 Transportation Master Plan (TMP) or the supporting 2013 TRANS model. The analysis and report was completed in August 2013, prior to the release of the 2013 TMP. The findings reflect the road and transit network identified in 2008 TMP and were based on the supporting 2008 TRANS model with adjustments for growth in Clarence Rockland and Cardinal Creek Village. Finally, the Needs and Justification report does not consider Peak Period Analysis; a new concept introduced in the 2013 TMP.

1.1 Background

The United Counties of Prescott and Russell in partnership with the City of Ottawa are the proponents of a Class Environmental Assessment (EA) Schedule 'C' study for improvements to Ottawa Road 174 from the Highway 417/ Ottawa Road 174 Interchange (the "Split") to the boundary of the City of Ottawa, and improvements to Prescott Russell County Road 17 from Canaan Road to County Road 8 (Landry Road) in Prescott and Russell.

AECOM, in association with Parsons, LRL Associates Limited, Houle Chevrier Engineering Limited and Golder Associates Limited, were retained to undertake this study.

Ottawa Road (OR) 174 and County Road (CR) 17 from east of the Highway 417 Split to east of Rockland was formerly Provincial Highway 17 and was transferred to Ottawa and Prescott Russell in the 1990s. The natural geographic constraints of the Ottawa River and the Mer Bleue Bog limit the alternative east-west transportation routes in the east urban area. Alternative roads such as Old Montreal Road and Innes Road are not continuous through the study area and the Rockcliffe Parkway is not designed as a high capacity arterial.

Extensive growth in Orléans, Cumberland and Rockland has increased traffic volumes on OR 174/CR 17 leading to congestion during peak periods. In addition, there are road safety concerns related to the numerous driveways and at-grade intersections, lower geometric design standards of the two-lane roadway as well as high traffic demand and the lack of passing opportunities.

Transportation problems in the area have been identified for many years. Projects for the Ontario Ministry of Transportation (MTO) documenting needs along this corridor include Highway 17 Widening Study, from Trim Road easterly to Prescott-Russell County Road 8, Preliminary Design Report, 1992, and Highway 417/17 Hurdman Bridge to Champlain Street, Preliminary Design Report, 1993. More recent documentation of transportation issues in the area is discussed below.

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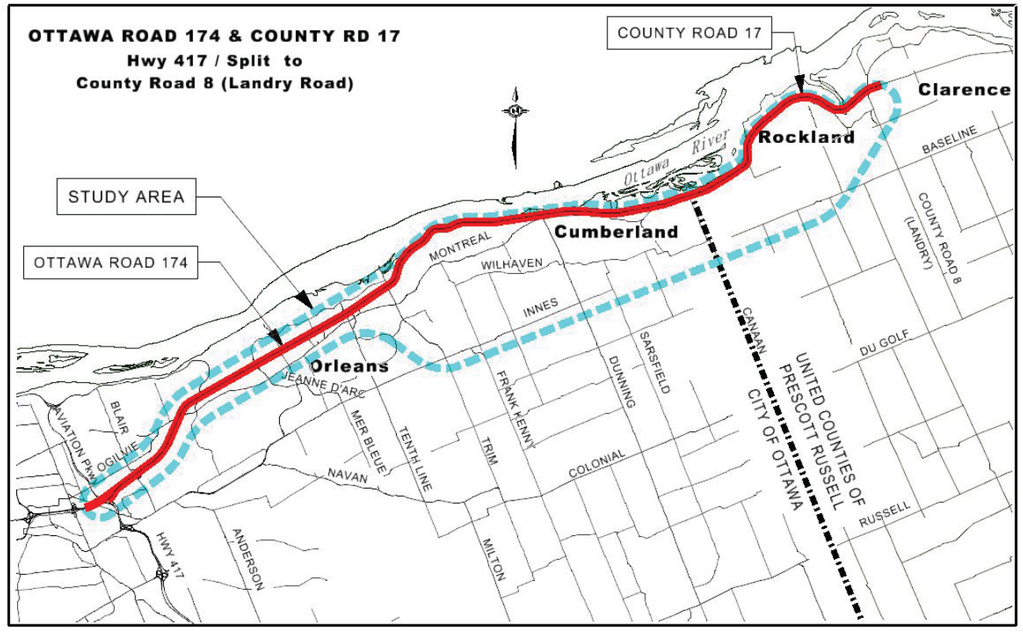
1.2 Project Study Area

The study area includes OR 174 from the Split to Canaan Road in Ottawa, and CR 17 from Canaan Road to CR 8 (Landry Road) in Prescott and Russell. From Highway 417 to Trim Road, the Study Area has been limited to the existing OR 174 corridor. This is in recognition of the presence of the Greenbelt and the Core Natural Areas of Mer Bleue and Green's Creek, which has restricted the number of feasible transportation routes in this area.

From Trim Road to Rockland, the study area expands to include the area from OR 174/CR 17 southerly to Innes Road – Baseline Road. The Innes Road – Baseline Road corridor is considered the furthest southerly corridor that could serve as an alternative route to the dominant east-west flow of traffic. This widened study area will allow consideration of alternative road solutions and alignments that will satisfy the Class EA as reasonable alternatives to reach the eastern study area limit at County Road 8 (**Figure 1-1**). These limits may be adjusted as necessary in order to comprehensively identify the influences on, and the effects of the undertaking as options are developed.

Figure 1-1 Ottawa Road 174/County Road 17 EA Study Limits



2. Planning Context

Recognized planning documents such as Official Plans/Transportation Master Plans provide a foundation for the Class EA process by defining municipal policies and describing anticipated growth areas and associated infrastructure requirements. The Class EA study uses this information along with more site-specific data to examine problems and opportunities as well as alternatives.

1.3 National Capital Commission (NCC)

The NCC manages federal lands in the National Capital Region including the Ottawa Greenbelt. OR 174 passes adjacent to and through the Greenbelt between Blair Road and the community of Orléans. The following work by the NCC is of interest to this EA Study.

A Strategic Transportation Initiative for Canada's Capital Region, 2005: This document describes the NCC's interest in being involved in the planning and design of transportation infrastructures, recognizing that there are federal interests in terms of planning sustainable cities and transportation networks beyond federal land and infrastructure ownership. It acknowledges the predominant role of the automobile and that this will likely continue for many years. However, it notes that issues of pollution, congestion, noise and safety mean that continued expansion of the transportation network is not feasible in the long-term. These issues have impacts on health and quality of life. The strategies described in this document, of interest to transportation infrastructure in the Greenbelt, include NCC support for:

- public transit and roadway network upgrades and rapid transit systems
- transportation management measures, including public transit and alternative modes
- designation of a core network of strategic regional and interprovincial rapid transit systems and roadways
- a sustained and integrated approach to urban transportation funding
- identification of principal routes and gateways to the Capital region and the core area

Greenbelt Master Plan Review: The review of the 1996 Greenbelt Master Plan (GBMP) was initiated in 2008 and is scheduled for completion in 2013. It began with an assessment of the existing physical environment in the Greenbelt such as features of the natural environment, agriculture, recreation, built environment, cultural landscapes and aesthetics. From this work, issues and opportunities were identified including the pressures that growth and intensification puts on the Greenbelt by demanding the accommodation of increased volumes of traffic.

Next a visioning component was completed with a planning horizon of 2067, providing the foundation for the development of land use plans, guiding principles and strategic objectives, sector plans. One challenge related to transportation notes that 92 lanes of arterial traffic cross

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the Greenbelt. The vision looked to opportunities to find alternatives to road-widening and to bundle infrastructure in corridors. The GBMP process calls for context-sensitive design for infrastructure corridors for essential movement. Also, expanded or new facilities should result in no net loss and a demonstrated net benefit to Greenbelt features and roles.

The GBMP Review then developed strategic statements and land use concepts. The recommended land use concept includes:

- Strengthened and expanded natural areas within the existing Greenbelt and addition of natural areas immediately adjacent to the Greenbelt
- Adjustment of natural area boundaries for more natural shape and to provide net ecological benefit
- Added lands to enhance visual resources and recreational opportunities to strengthen the Recreational & Capital Experiences for the Greenbelt and to enhance the connectivity of the Greenbelt Pathway to the regional pathway system
- Retention of existing facilities within the Greenbelt, with a focus specified for federal facilities requiring isolation and location within the Capital
- Location for a continuous recreation pathway and strengthened ecological linkage south of the airport
- Identification of ecological corridor areas that extend from the Greenbelt's core natural areas to significant regional natural features
- Identification and protection of ecological corridors and the regional natural features to which they connect to be achieved through active partnerships
- An overall expanded and strengthened Greenbelt

Interprovincial Crossings Environmental Assessment (EA) Study: The NCC, in partnership with the MTO and the Ministère des Transports du Québec (MTQ), and in cooperation with the City of Ottawa and the Ville de Gatineau initiated the Interprovincial Crossings EA Study in 2006. The purpose of the Study was to examine all reasonable options to improve interprovincial transportation capacity across the Ottawa River to address long-term needs.

Phase 1, completed in 2009, confirmed the need for an additional interprovincial crossing, examined alternative solutions and identified Kettle Island corridor (Corridor 5) as the preferred corridor location. The Study Partners decided to carry forward the three highest ranked corridors identified in the Phase 1 Study for further examination, including corridors at Kettle Island, Lower Duck Island (Corridor 6) and Gatineau Airport/McLaurin Bay (Corridor 7). The routes for Corridors 6 and 7 include OR 174 from the split easterly to east of Greens Creek in the Greenbelt.

Phase 2 was initiated in October 2009 and is being undertaken in two stages. Phase 2A included the preparation of a Study Design Report and Canadian Environmental Assessment Act (CEA Act) Scoping document to direct activities during Phase 2B. Phase 2B, the EA Study, is underway and will lead to a recommended corridor.

The Draft Transportation Report dated April 2012, examined existing and future conditions and the impact of each of the 3 corridors with respect to heavy truck traffic, transit, traffic operations, traffic safety and pedestrians and cyclists. For Corridors 6 and 7 it notes that the OR 174 widening contained in the Ottawa TMP and the Highway 417 widening planned by the MTO will be adequate for the estimated additional interprovincial traffic.

Province of Ontario

Provincial Policy Statement, 2005. The Provincial Policy Statement, which guides land use planning and development in Ontario, is currently under a 5-year review. The 2005 Policy emphasizes the need for safe, energy efficient transportation systems that address projected needs. It calls for efficient use infrastructure and noted the importance of land use planning to reduce the length and number of trips and to support public transit and other alternative transportation modes. The Provincial Policy Statement also notes the need to protect corridors from development in order to meet projected needs.

Highway 417 from Highway 416 easterly to Anderson Road, Transportation Environmental Study Report, 2007: As noted earlier, the MTO undertook projects in the 1990's for improvements to OR 174 and CR 17 when those roadways were part of the provincial highway network. Those studies concluded that widening was needed. In 2007, a Transportation Environmental Study Report for 26 km of Highway 417 through Ottawa was provided for public review and subsequently received environmental clearance. The recommended plan included four lanes in each direction from the split westerly to Metcalfe Street and three lanes in each direction from the split easterly to the new interchange at Hunt Club Road (now under construction). In addition, the recommended plan modified the connection between OR 174, Highway 417 and St. Laurent Boulevard to improve flow in this area. Two lanes on OR 174 would continue onto Highway 417 while the third lane on OR 174 would exit to St. Laurent Boulevard and Highway 417 eastbound ramp. The existing ramp from westbound Highway 417 to St. Laurent Boulevard would be closed.

Figure 2-1 provides a schematic diagram of the interchange of Highway 417 and OR 174 indicating the existing and future lane arrangement relevant to this EA study.

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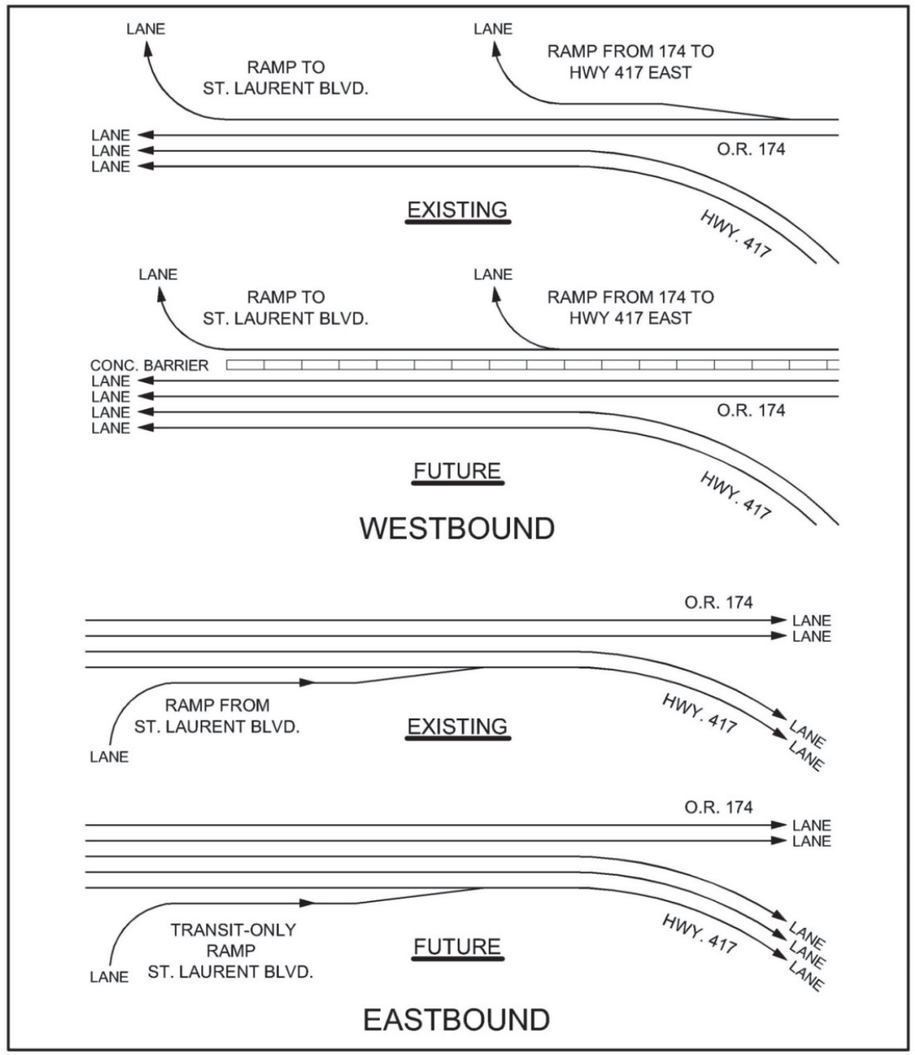

Figure 2-1 Schematic Configuration of the Split

City of Ottawa

The City of Ottawa's Official Plan (OP), 2008, provides the policy framework that guides its physical development to the year 2031. The OP sets direction for the Transportation Master Plan (TMP), 2008, by expressing Council's strategic policies on transportation, such as transit modal split targets. The TMP enhances the OP's policy framework and describes the

infrastructure and transportation networks needed. The plan for intensification and increased population densities is designed to focus on giving priority to public transit and to integrate transportation and land use.

On the road network, the TMP points to the need to build new roads or widen some existing ones to avoid unacceptable levels of congestion. These needs are based on future automobile volumes across key screenlines, with the objective of preserving a maximum 90% demand-to-capacity ratio outside the urban core; operation at 100% of capacity leaves the road network vulnerable to congestion in the event of a minor collision or weather impacts. The widening of Ottawa Road 174 from the Split to Jeanne d'Arc Boulevard is consistent with the City's planning objectives and is identified as a Phase 2 project (2016-2022) in the TMP.

The City has a goal of achieving a transit modal split of over 40% across the Greenbelt through our study area, which will require consideration of additional transit in the study area such as the East Transitway extension from Place D'Orléans to Trim Road, which is also identified in the TMP. The projected transit network (as of 2012) includes Light Rail Transit in the Ottawa Road 174 corridor from the Split to Blair Road, and Bus Rapid Transit from Blair Road to Trim Road.

The TMP identifies OR174 between the split and Jeanne d'Arc as a road with significant potential to increase the use of carsharing through carpool lanes.

On goods movement, the TMP states that "trucking restrictions on arterial roads should be considered "only where community impacts are significant, where the road in question serves exclusively non-commercial land uses and where adequate alternative routes are available".

The Ottawa Cycling Plan indicates that there are no existing or planned cycling facilities along Ottawa Road 174, although a shared use lane is proposed along Wilhaven Drive to connect to Rockland. Other east-west linear facilities in the study area are on Old Montreal Road where certain sections of the road have proposed shared use lanes and other sections have proposed paved shoulders. Some existing cycling facilities cross Ottawa Road 174 while other facilities are planned for the future. A proposed off-road pathway is planned for the long-term (2018-2028) to cross Ottawa Road 174 east of Trim Road.

According to the Ottawa Pedestrian Plan, few pedestrian facilities are located in the study area. The plan indicates a proposed multi-use path crossing Ottawa Road 174 at the Trim Road intersection and existing sidewalks on Cameron Street in the Village of Cumberland and on the roads that cross Ottawa Road 174 at interchange locations.

United Counties of Prescott and Russell

The Official Plan of the United Counties of Prescott and Russell, 2006, has a planning horizon of 2026. It is currently being updated. The widening of County Road 17 from County Road 8 to Canaan Road was identified as a priority in the 2006 - Official Plan. The project had a priority status due to the on-going growth and development in the west part of the United Counties which

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has resulted in a reduced ability for County Road 17 to provide a safe and efficient transportation link to the City of Ottawa. The OP further notes that until a study is completed to evaluate the feasibility of the widening no new development is permitted where access to this section of County Road 17 is required.

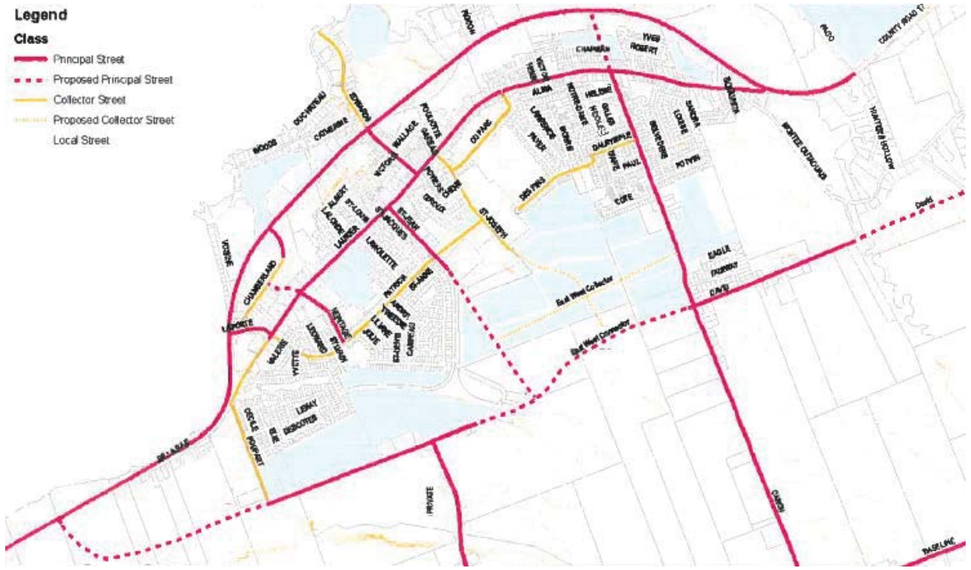
City of Clarence-Rockland

The widening of County Road 17 is also discussed in the City of Clarence-Rockland Official Plan. The OP states that Council with work closely with the County on assessing the social impacts of the widening as this may further split the urban area into two while isolating the southern portion from the river. It states that further consideration should be given to an east-west bypass road with a southern alignment.

The 2005 Strategic Transportation Plan identified that the street pattern in Clarence-Rockland is characterized by two strong east-west streets (CR17 and Laurier Street) in the northern half of the City. The Transportation Plan identified a need to develop a new east-west corridor to the south of the existing urban development. The purpose of this corridor is to better distribute traffic in the community and relieve pressure on CR17; specifically the Laporte Street and Edwards Street intersections.

The proposed east-west corridor would connect to CR17 to the west and follow the existing Poupart Street and David Street corridors. The realignment of key north-south roads, including St. Jean Street (CR21) was recommended as part of the plan. In their OP document, the City of Clarence-Rockland has protected the suggested east-west corridor right-of-way. A Class EA has not yet been undertaken to define the alignment.

Figure 2-2 Clarence-Rockland East-West Connector



(Source: City of Clarence-Rockland Strategic Transportation Plan, June 2005)

Cumberland Village

The widening of OR174 is also discussed in the Cumberland Village Visioning Report (2011). It spoke to the recommendations from the 1992 Highway 17 Widening EA and recommended that any future Highway 17 (now OR174) EA consider and address the community issues relating to connectivity, access and preliminary earthworks for a future waterfront park/public dock. The Visioning Report also recommended that the ultimate cross-section design of OR174 through the village should signal to drivers that they are passing through a settlement area and that they share the right-of-way with pedestrians and cyclists. Additionally, the report recommended a reduced speed limit from Barnett Park to the preferred crossing north of the Museum grounds.

3. Project Purpose and Need

Existing Transportation Issues

Traffic Issues

The review of traffic volumes and travel times indicated that there is a problem with congestion through many parts of the study area. Congestion occurs in the AM and PM peak hours along the OR174-CR 17 corridor from Clarence-Rockland, through most of Cumberland to Trim Road and again along OR174 between Place d'Orléans and Jeanne d'Arc Boulevard and between Blair Road and Montreal Road.

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Project Need Report
Ottawa Road 174 / Prescott-Russell County Road 17
Environmental Assessment Study

Existing traffic volumes and travel times were obtained and using this information we calculated volume to capacity (v/c) ratios for OR174, CR17, St. Joseph Boulevard, Innes Road, Trim Road, and the Rockcliffe Parkway. A **volume to capacity (v/c) ratio** represents the capability of a road to accommodate the traffic demand. As the v/c ratio approaches 1.00 there is an increased probability of delays and queuing. Once the v/c ratio exceeds 1.00, excessive delays and queues are expected. The objective for this study is that during the peak hour a v/c ratio of 0.90, which is equivalent to a Level of Service of 'D', should not be exceeded in the study area.

The level of service categories are assigned to corresponding v/c ratios as follows:

Table 3-1 Level of Service Categories and Corresponding V/C Ratios

Level of Service	Volume to Capacity Ratio
A	0 – 0.60
B	0.61 – 0.70
C	0.71 – 0.80
D	0.81 – 0.90
E	0.91 – 1.00
F	>1.00

We also estimated AM inbound and PM outbound travel times in our study area for CR17, OR174, Trim Road, St. Joseph Boulevard, and Innes Road. In this study, inbound traffic is the traffic that is heading towards the City of Ottawa's downtown core. On west-east roads, inbound traffic is westbound. On north-south roads, the inbound direction is considered northbound towards the OR174. The outbound direction is considered to be traffic opposing the inbound direction.

A description of traffic conditions that occurred during our data collection period is provided below for CR17, OR174, St. Joseph Boulevard, Innes Road, and Trim Road.

County Road 17

In the City of Clarence-Rockland, the AM inbound traffic flow peaked between 6:00 and 7:00 AM and resulted in congested conditions from approximately Edwards Street to Canaan Road. The travel speed was generally low in this area and the v/c ratios were calculated to be between 0.73 and 1.02. PM outbound traffic experienced reduced speed at the approach to the urban area of Clarence-Rockland and the v/c ratios through the City of Clarence-Rockland were between 0.93 and 1.19 based on the traffic data collected.

Ottawa Road 174

East of Trim Road, OR174 has one lane in each direction. The AM and PM peak directional traffic was generally unstable along this corridor. Between Cumberland Village and Canaan Road, both the AM and PM v/c ratios were greater than 1.00. There are very few opportunities for vehicles to enter or exit OR174 along this five kilometre corridor. Between Trim Road and

Cumberland Village, OR174 was congested in the AM peak hour and PM peak hour with a v/c ratio greater than 1.00.

West of Trim Road and east of Blair Road, OR174 has two lanes for vehicles in each direction. Generally, the AM and PM traffic was stable between Trim Road and the Jeanne d'Arc Boulevard interchange with v/c ratios less than 0.70 due to the metering effect of the signals at Trim Road. However, in the AM peak, traffic approaching Jeanne d'Arc Boulevard was travelling at speeds less than 30km/h. Between Jeanne d'Arc Boulevard and Montreal Road, the OR174 was congested in both the AM and PM with v/c ratios greater than 0.90 and 1.00 respectively.

Between the Highway 417 split and Blair Road, traffic on OR174 was generally congested. The AM inbound v/c ratio is approaching 0.90 with speeds less than 30km/h. Inbound traffic benefits from the lane increase from two to three lanes west of Blair Road; however only two lanes continue to Highway 417. The PM outbound v/c ratio is greater than 0.90 and speeds were between 30km/h and 80km/h. Outbound traffic has a lane reduction from three to two lanes east of Blair Road, contributing to congestion on OR174.

If traffic is flowing freely at the posted speed limit, it should take approximately 16 minutes to travel on OR174/ CR17 between CR8 and Trim Road. In the AM peak period, the travel time was variable during our data collection period with trips of between 18 minutes and 31 minutes. In the PM peak period, the travel times varied between 19 and 27 minutes.

In the freeway section of OR174, if traffic is flowing freely at the posted speed limit, it should take approximately 9 minutes to travel between Trim Road and Hwy 417. According to the data that we collected in the AM peak period, the travel time varied between 16 minutes and 23 minutes and in the PM peak period, the travel time was approximately 17 minutes indicating that congestion was occurring. The average speed on the freeway section of OR 174 during the AM peak period was 48 km/h and in the PM peak period was 50 km/h. This indicates a problem with congestion considering that the posted speed limit is 100 km/h.

Montreal Road/St. Joseph Boulevard/Old Montreal Road
Within the Study Area, this east-west route has three names:

- Montreal Road: west of OR174
- St. Joseph Boulevard: east of OR174 and west of Trim Road
- Old Montreal Road: east of Trim Road

Old Montreal Road had stable, free flowing traffic in the AM and PM peak periods with v/c ratios less than 0.70.

St. Joseph Boulevard also had good traffic flow between Trim Road and Jeanne d'Arc Boulevard. However, west of Jeanne d'Arc Boulevard, traffic on St. Joseph Boulevard was heavily

congested with an AM v/c ratio greater than 1.00 and a PM v/c ratio greater than 0.90. It is through this section of roadway that the posted speed limit changes from 60km/h to 70km/h.

In our study area, Montreal Road had stable traffic flows characterized by low speeds. The v/c ratio is less than 0.70 and speeds were good when not interrupted by traffic signals.

Along St. Joseph Boulevard, the average speed during the AM peak period was 46km/h and in the PM peak period it was 38km/h. The posted speed is 60 km/h indicating that congestion occurs. If traffic is flowing freely at the posted speed limit, it is expected that driving this route would take approximately 12 minutes. The travel time in the peak periods was approximately 20 minutes.

Innes Road
The traffic on Innes Road east of 10th Line Road flows freely in both the AM and PM peak periods with a v/c ratio less than 0.70.

In the AM peak period, inbound traffic is unstable from Orléans Boulevard to Hwy 417. Along this 7 kilometre segment of road, the v/c ratio is greater than 0.90 with speeds less than 30km/h. AM inbound travel times along Innes Road from Trim Road to Hwy 417 are generally higher than travel times along St. Joseph Boulevard.

In the PM peak period, outbound traffic is unstable from Anderson Road to 10th Line Road. Along this 9 kilometre segment of road, the v/c ratio is greater than 0.90 with speeds less than 55km/h.

Across Innes Road, the average speed during the AM peak period was 42km/h and in the PM peak period it was 38km/h while the posted speed is between 60 km/h and 80 km/h. If traffic is flowing freely at the posted speed limit, it should take approximately 13 minutes to travel from Trim Road to Highway 417 along Innes Road. The actual travel time in the peak periods was approximately 20 minutes indicating that congestion occurred along Innes Road during our data collection period.

Trim Road
The traffic on Trim Road was flowing well in the AM and PM peak periods but reduced speed occurred at signalized intersections. Along Trim Road, the average speed during the AM peak period was 49km/h and in the PM peak period it was 39km/h while the posted speed is 70 km/h indicating that some congestion occurred. If traffic is flowing freely at the posted speed limit, it is expected that driving this route would take approximately 2 minutes. The travel time measured in the peak periods was approximately double the expected time.

In summary, the existing traffic conditions indicate that there is a problem with congestion through many parts of the study area.

Safety Concerns

Background and Previous Reports

There have been safety concerns associated with the OR174-CR17 corridor in the study area for a number of years including concerns described in MTO class environmental assessment studies of these roads in the 1990s. At that time, increasing development along the roadway was cited as a concern with respect to capacity and safety.

From the split easterly, safety and operational recommendations from the MTO study included construction of a collector lane through the Blair interchange to address weaving, improvements to the Blair Road, Montreal Road and Jeanne d'Arc interchanges (configuration, ramps, tapers, speed change lanes and ramp terminal intersections) and median and illumination improvements. A Freeway Traffic Management System was also proposed.

East of Trim Road to Landry Road, recommendations in the MTO study included a four-lane roadway with access restricted to right in-right out except at major intersections and provision of a full urban cross-section through the Village of Cumberland.

More recently, in-service road safety review studies (ISRSRs) were completed for the City of Ottawa in 2009 by Delphi-MRC for the portion of the study corridor within the City. For the purpose of that review, five years of collision data were analysed, between 2003 and 2007. The study examined a range of factors that may contribute to the safety performance of the study corridor. The framework adopted for the ISRSRs examined safety performance using operational performance function analysis, collision pattern analysis, field investigation, traffic operational review, and interactive highway safety design model (IHSDM). As this collision data was not re-analyzed as part of the current EA Study, the results are summarized below.

In the 5 years of data, there were 657 collisions from the split to Trim Road, including three fatalities. From Trim Road to Canaan Road there were 270 collisions including five fatalities. This number of fatalities and general collision experience prompted the detailed review of safety by the City of Ottawa.

The ISRSRs looked at three interchanges (Blair Road, Montreal Road / St. Joseph Boulevard, and Jeanne d'Arc Boulevard) as well as the mainline freeway itself. The observations from the data for the urban freeway section from the split to Trim Road included:

- Merge and diverge locations associated with interchange ramps identified as areas with more collisions
- Some cross-median collisions occurred
- There were more fatal collisions than expected at the Montreal Road and Jeanne D-Arc interchanges
- Injury collisions were over-represented at the Blair Road interchange

- Blair Road interchange identified as the area with the greatest potential for safety improvement

The observations from the data for the section east of Trim Road included:

- More fatal collisions occurred on OR174 between Trim Road and Cameron Road and between McTeer Road and Canaan Road than might be expected on similar roads
- Injury collisions were over-represented on the sections of OR 174 from West Street to Peter Harkness Street and from Old Montreal Road East to McTeer Road
- Property damage only (PDO) collisions were over-represented at the Trim Road intersection

In the rural roadway sections, collision types were typical for the locations involved, such as rear end, angle and single vehicles collisions at intersections. Collisions during times of reduced lighting were identified as a concern. Collisions during the PM peak period were also identified as a concern, related to vehicle queuing.

The ISRSRs identified the contributors to the collision history as:

- Split to Trim Road
  - Speed (implications for clear zone)
  - Roadside characteristics (slopes, presence of fixed objects, condition of the barrier)
  - Transit accommodation (speed differential with adjacent vehicles, complexity of interchange operations, signage and pavement markings, locations of bus stops)
  - Interchange configuration (length of speed change lanes, merging operations, pedestrian crossings of ramp terminals, sight line obstructions)
  - Positive guidance (design and condition of signage including font size and location, lack of illumination
- Trim Road to Canaan Road
  - Speed (implications for clear zone, queuing)
  - Roadside characteristics (slopes, presence of fixed objects such as driveway culverts, length and condition of barriers, frequency of access and speed differential with through vehicles)
  - Illumination (lack of lighting associated with speeds and number of access)
  - Positive guidance (lack of illumination, design and condition of signage as well as sign clutter)
  - Intersection geometry and operations (length of tapers, width of auxiliary lanes, lack of left turn lanes, presence of queues)
  - Passing opportunities

In summary, the findings from the ISRSRs indicated that there were opportunities for safety and operational improvements in the study corridor. Recommendations and a potential

implementation strategy were provided for the study corridor. Those corridor-wide and location-specific road safety recommendations included roadside improvements, geometric design modifications, pavement widening, speed management measures, signage and pavement marking improvements, among others.

2012 Collision Assessment

Introduction
For the purposes of this current EA Study, more recent collision data was obtained for the overall corridor from Highway 417 to Landry Road. Data corresponding to the City safety studies (2003-2007) was also obtained for CR17 within the United Counties of Prescott and Russell.

OR 174 in Ottawa
In the 3 years of additional data obtained for the 2012 Collision Assessment, there were 1026 collisions (no fatalities).

In the freeway section of OR174 there were 830 collisions, 586 on the freeway, 54 along ramps and 190 at ramp terminal intersections. Observations from the freeway data included:

- Rear end and single motor vehicle collisions made up over 80% of the freeway collisions, over 90% of ramp collisions and over 70% of ramp terminal intersection collisions
- Almost 40% of collisions occurred during reduced lighting (dawn, dusk, dark)
- About 25% of collisions occurred under rain or snow conditions
- Almost 40% of the collisions occurred during AM and PM peak periods.

In the arterial section of OR174 there were 195 collisions, including 125 midblock and 70 intersection collisions. Nine intersections were involved. Observations from the arterial data within Ottawa included:

- At intersections rear-end collisions accounted for over 65% of the total. Intersections with the highest number of collisions were Trim Road and Cameron Street. They accounted for 77% of the intersection collisions. Intersection collisions were more likely to occur during rain/snow conditions
- Single motor vehicle collisions accounted for almost half of the collisions at mid block locations while rear end collisions accounted for another 30%. The midblock section between Old Montreal Road West and Old Montreal Road East was identified as a segment with higher than average proportion of severe (injury) collisions
- About 60% of collisions could be attributed to off-tracking (single motor vehicle collisions and approaching collisions)

- Between Quigley Hill and Trim Road, rain/snow conditions were greater than average

CR17 in Clarence-Rockland
As part of the 2012 Collision Assessment over seven and a half years of collision data was examined on CR17 in the United Counties of Prescott and Russell. There were 287 collisions from east of Canaan Road to Landry Road including two fatalities. (Note that Canaan Road intersection collisions were reported in the section from Trim Road to Canaan Road.) The observations from the data for the section within Clarence-Rockland included:

- About half of the collisions occurred during PM and AM peak periods
- Intersections with the highest numbers of collisions were Edward, Carmen Bergeron (since its construction), Laporte and Chamberland Streets. Peak period collisions were prevalent at the Edwards Street intersection
- Midblock road sections with the highest frequency of collisions per lane per kilometre were Laurier to Landry, Edwards to Industrielle and Canaan to Carmen Bergeron. Almost 60% of mid-block collisions were single motor vehicle type. Almost half occurred during dawn, dusk or dark (reduced lighting). Collisions in reduced lighting were over-represented between Canaan and Carmen Bergeron

Potential for Safety Improvement
Conventional techniques using collision counts and/or rates to assess the safety performance of roadway elements are generally not considered reliable. On one hand, using collision counts could produce a bias in favour of high-volume elements; on the other hand, using collision rates could produce a bias in favour of low volume roadway elements because of the inherent non-linear relationship between collisions and traffic volume. Therefore, to more precisely understand the safety performance of the various roadway elements along the study corridor, the study team calculated the “potential for safety improvement” for each roadway elements within the study corridor. A location with potential for safety improvement was defined as any location that has a collision potential that is significantly higher than the normal collision potential found for a group of similar roadway locations. A discussion of the methodology and calculation of the Potential for Safety Improvement (PSI) values for the roadway elements is provided in **Appendix A**.

The potential for safety improvement (PSI) was identified for each component of the road corridor as “lower”, “medium” and “higher” based on the calculation of their PSI values. Locations with PSI values over 10 were considered to have a “higher” potential for safety improvement; locations with PSI values from 5 to 10 were considered to have a “medium” potential for safety improvement while locations with PSI values under 5 were considered to have “lower” potential for safety improvement. Locations with zero and negative PSI values have no potential for improvement because those locations are expected to have fewer collisions than would be predicted using the safety performance function equations.

Note that the intersection of Carmen Bergeron was constructed and signalized in 2007. The intersections of Chamberland Street and at Food Basics were signalized in 2005. These changes to the road network would affect the collision experience expected and observed at these locations. This was considered in the identification of locations with potential for safety improvement.

A graphical summary of the locations with lower, medium and higher PSI values is shown in **Figure 3-1**.

Figure 3-1 Locations with Safety Concerns

The findings of the collision assessment from the split to Trim Road include:

The section of the eastbound OR174 between Highway 417 and Jeanne d'Arc Boulevard and the section of OR174 in the westbound direction from Montreal Road/St. Joseph Boulevard to Highway 417 exhibit a higher potential for safety improvement. The collision impact types in these sections are mainly rear-end and single motor vehicle (SMV) collisions.

- The majority of the collisions in the eastbound direction occur during the PM peak period and midday time frame when congestion is most likely.
- In the westbound direction, between St. Joseph Boulevard and Blair Road, the majority of the collisions occur in the AM peak period and in the midday.
- Between Blair Road and Highway 417, the collisions are equally distributed throughout the day.

The findings of the collision assessment from Trim Road to Canaan Road include:

The mid-block road section between Trim Road and Quigley Hill Road was identified as a section with "higher" potential for safety improvement and the midblock section between Old Montreal Road (West) and Old Montreal Road (East) was identified as a section with a "lower" potential for safety improvement. The mid-block sections from Peter Harkness Lane to East Shore Road and from Old Montreal Road (West) to Old Montreal Road (East) had a higher than expected number of injury collisions. The Cameron Street and Quigley Hill Road intersections also had a higher than expected number of injury collisions.

The mid-block road section between Trim Road and Quigley Hill Road had a high proportion of collisions during rainy/snowy conditions. This may be attributable to the curvature and presence of reverse curves along this road section. In addition, drivers may not be leaving sufficient distance between vehicles when the road surface is not dry.

The predominant impact type was single motor vehicle collisions, followed by rear-end collisions and approaching collisions. When the approaching and SMV collisions are combined, the percentage of collisions occurring as a result of at least one vehicle out of its travel lane is approximately 60%, a high prevalence of off-tracking collisions. Potential countermeasures could be related to separating the two directions of travel, providing additional roadway width through the widening of existing lanes or the provision of additional lanes, or the introduction of longitudinal rumble strips in the centreline and/or along the edgeline.

At the intersections of OR174 with Cameron Street and Quigley Hill Road, almost all the collisions were rear-end collisions and the majority of the collisions occurred during the AM or PM peak periods. These two intersections were identified as having a "lower" potential for safety improvement. The collision pattern indicates that congestion is a likely factor in the collision experience as drivers fail to allow sufficient stopping distance approaching queuing traffic.

Additional capacity at the intersections could reduce the length of queues and help mitigate this issue.

The findings of the collision assessment from Canaan Road to Landry Road include:

The intersections of Carmen Bergeron Street, Laporte Street, Pouliotte Street and Laurier Street were identified as intersections with “lower” PSI values. The mid-block section from Laurier Street to Landry Street was identified as a location with a “lower” value PSI.

At the intersections of CR17 with Carmen Bergeron, Laporte, Pouilotte and Laurier Streets, almost 60% of collisions were rear-end type, about 20% were turning movement and the rest involved four other collision types. The majority of the collisions occurred from the AM peak through the midday and PM peak periods. It is likely that the collision experience could be improved through modifications at the intersections to improve driver awareness of the signal operation and their speed. There was a fatal angle collision at the intersection of Chamberland Street.

In the mid-block from Laurier to Landry Street, about half of the collisions occurred in reduced lighting conditions (dark, dawn, dusk) and half were single motor vehicle collisions. Animal collisions were prevalent and accounted for approximately 30% of collisions. One third of collisions were associated with rain or snow. There was a fatal head-on collision in this section.

Summary of Collision Analysis

In summary, the 2012 Collision Assessment for OR174-CR17 confirmed the findings in the ISRSRs and assessed the collision experience within Clarence-Rockland.

Widening of OR174-CR17 to address capacity issues in this section would provide an opportunity to advance safety improvements. This could include improvements to unsignalised intersections, signage and pavement markings including rumble strips, interchange configuration and speed change lanes, barriers, roadside hazards, cross-section elements and positive guidance. Future provision of the East Transitway along OR174 west of Trim Road would remove the complexities and safety issues associated with the accommodation of transit along the freeway. Additional capacity may reduce the number of rear-end collisions at queue ends during peak periods and additional and/or wider lanes may provide more recovery area for errant single vehicles.

Potential locations where interim measures might be considered during the staging of improvements include unsignalised intersections along the OR174-CR17 corridor, Trim Road and Cameron Road intersections, driveways and accesses.

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Geometric Issues

In general, between Trim Road and Landry Road (CR 8), OR174-CR17 has a design speed of 100 km/h and a posted speed of 90 km/h. Within this area, there are 19 horizontal curves of which two curves have design speeds of 100 km/h and six curves have design speeds of between 100 and 110 km/h. The curves occur in two main locations. A series of six interconnected curves is located between Trim Road and Quigley Hill Road and another series of curves is located around Rockland within the City of Clarence-Rockland. There are 17 vertical curves located along the corridor between Trim Road and Landry Road. Two of the vertical curves have a design speed of less than 110 km/h and one curve is substandard with a design speed of less than 100 km/h. This curve is located in the urban area of Clarence-Rockland to the east of Pouliotte Street where the posted speed limit is 60 km/h. Therefore the design speed of this vertical curve exceeds 20 km/h over the posted speed.

The lane width is slightly narrower at 3.65m than current standards of 3.75 m between Trim Road and Landry Road. Clear zone dimensions in some areas do not meet current standards and the need for roadside protection will need to be reviewed during design.

Future Baseline Travel Demand

TRANS is the joint technical committee on transportation systems planning in the National Capital Region. The TRANS travel demand forecasting model is used to predict traffic volumes and travel patterns in the future. The model is maintained, enhanced and updated by TRANS based on the most recent data available for use in strategic transportation planning studies.

Transportation planners examine transportation need using forecasted trips across a “screenline”. A screenline is an imaginary or real boundary used to evaluate travel demand and supply issues. Typically physical barriers (rail lines/rivers/greenbelts) are used since they tend to limit the number of crossing opportunities. For our study, we have analysed capacity across three screenlines identified in the Ottawa TMP: Greens Creek, Bilberry Creek, and Frank Kenny. We also created two project screenlines: one to the east of the Village of Cumberland and west of the City of Clarence-Rockland to capture traffic volumes in the rural areas of Ottawa and a second screenline east of Canaan Road to assess capacity needs in Clarence-Rockland.

We obtained baseline TRANS model traffic projections for AM inbound volumes across the existing screenlines in our study area. The use of passenger car units (pcus) allows for the explicit consideration of various vehicle types (such as trucks and buses) and the impact of different operating characteristics for the individual vehicle types within the traffic stream. The 2021 and 2031 baseline projections are shown in **Table 3-2**.

Table 3-2 Future Baseline TRANS Projections – AM Peak Hour Inbound

	2021 TRANS Model Projections		
	Frank Kenny	Bilberry Creek	Greens Creek

2021 TRANS Model Projections			
	Screenline #46	Screenline #45	Screenline #16
	Transit modal split: 0%	Transit modal split: 30%	Transit modal split: 35%
Volume *(pcus)*	**3,092**	**7,897**	**10,526**
Capacity	**9,300**	**12,210**	**13,080**

2031 TRANS Model Projections			
	Frank Kenny Screenline #46	**Bilberry Creek** Screenline #45	**Greens Creek** Screenline #16
	Transit modal share: 0%	Transit modal share: 36%	Transit modal share: 43%
Volume *(pcus)*	**3,476**	**7,808**	**10,175**
Capacity	**10,300**	**12,210**	**13,080**

The TRANS model projections assume the completion of some projects identified in the City of Ottawa's 2008 TMP. A map of our study area, including the five screenlines and locations of relevant TMP projects can be found in **Figure 3-2**.

Figure 3-2 Screenlines and 2008 TMP Projects

In 2021, the model assumes that the following projects, which cross a screenline, have been completed:

- Belcourt / Mer Bleue Connector: new 4-lane collector road between Mer Bleue Road and Belcourt Boulevard
- Blackburn Hamlet Bypass (BBHBP) Extension: new 4-lane road from Navan Road to Tenth Line Road
- Trim Road Widening: widened from 2-lanes to 4-lanes from North Service Road to north of BBHBP Extension
- OR174 Widening: widened from 4-lanes to 6-lanes westbound from Blair Road to Jeanne d'Arc Boulevard

In 2031, the model assumes that the following project, which crosses a screenline, has been completed:

- BBHBP Extension: new 2-lane road from Trim Road to Frank Kenny Road

The baseline travel demand across the four screenlines is shown in **Figure 3-3** (2021) and **Figure 3-4** (2031). The assumed capacity consideration the 2008 TMP projects listed above and the 2021 and 2031 volumes were projected by the TRANS Model (**Table 3-2**).

Trim Road is a key north-south arterial within our study area that connects OR174-CR17 to other potential alternatives for east-west routes. We obtained the 2021 AM inbound volumes from the *Trim Road Realignment – Regional Road 174 to Innes Road, Transportation Review* (July 2011). Using the 2% background growth rate assumed in the 2011 Transportation Review, we calculated background 2031 volumes. These volumes are expressed as passenger car units (pcus) in **Table 3-3**.

Table 3-3 Future Trim Road Traffic Volumes – AM Peak Hour Inbound

Road Link *(crossing northbound)*	**Trim Road Capacity**	**2021 Volumes** *(pcus)*	**2031 Volumes** *(pcus)*
OR174	1800	1,310	1,597
St. Joseph Boulevard	1800	1,742	2,123
Watters Road	1800	1,339	1,632
Portobello Boulevard	1800	1,027	2,252
Trim Road (old alignment)	1800	732	892
Innes Road	1800	668	814

Figure 3-3 Projected Baseline Performance at 2021 - AM Peak Hour Inbound

Figure 3-4 Projected Baseline Performance at 2031 - AM Peak Hour Inbound

Revised Travel Demand

Development Traffic Generation

A proposed major development named Cardinal Creek Village, located in the City of Ottawa between Cardinal Creek and Ted Kelly Lane, is anticipated for full build-out in the medium-term, ten to twenty year planning horizon. This development is expected to contain approximately 4800 residential units, a commercial centre, schools and parks.

Several notable residential development projects are also anticipated in Clarence-Rockland. The projects range in size from 20 units to 3000 units. A map indicating the expected size of the developments and their approximate location is shown in **Figure 3-5**. The higher estimate of units at each location would suggest that multi-family units are anticipated in the development while the lower number suggests that the majority of units are single family homes. Another development project is anticipated in Wendover, which is 13 km east of Clarence-Rockland. This development is expected to have approximately 500 residential units.

The TRANS model has made assumptions with regard to growth in Ottawa and in the surrounding regions. The Cardinal Creek Village Development represents a recent expansion of the City of Ottawa's Urban Boundary and therefore was not accounted for the TRANS baseline projections. In the TRANS model, the number of vehicle trips from the Clarence-Rockland area is assumed to increase by approximately 30% from 2009 to 2031. Given the current knowledge regarding expected development, we have estimated that growth in the number of vehicular trips from Clarence-Rockland could be as high as 50% between now and 2031.

For the purposes of this review, the trips from these two major development areas were calculated separately and added to the future Baseline Travel Demand generated from the current TRANS model. A future update of the TRANS model is expected to address this growth.

Cardinal Creek Village

The Cardinal Creek Village development in the City of Ottawa is expected to generate a large number of trips. In this development, there are 4800 units proposed with 2641 single family homes, 478 apartments and 1680 multi-family homes. There is also a commercial component to the development. Using the equations from the Institute of Transportation Engineers (ITE) Trip Generation Manual related to the type of housing, the number of trips in the AM peak hour was calculated. The total number of person-trips expected from the residential development is 2590 trips, of which 1994 trips are leaving the development. An additional 61 trips are attributed to the commercial development in the AM peak.

A proportion of the trips generated by the Cardinal Creek Village residential development will use transit. Based on the modal split objectives in the 2008 TMP, we expect that 40% of the trips from the residential component of the development will be on transit. Therefore, 800 transit trips will be added to the TRANS model assumptions at the Greens Creek and Bilberry Creek screenlines.

Based on the TRANS model projections, a vehicular occupancy factor of 1.1 was calculated. We used this occupancy factor and the transit use assumption to estimate the number of vehicles to be added to the screenlines. A total of 1148 vehicles were added across the Greens Creek and Bilberry Creek screenlines at the different roadways based on the trip distribution information provided in the Cardinal Creek Village Community Transportation Study (November 7, 2012).

Figure 3-5 Clarence-Rockland Development

Clarence-Rockland Development

In order to determine the number of additional trips generated by the proposed housing developments, the Statistics Canada census data from 2006 and 2011 was reviewed. The number of dwellings in Clarence-Rockland, according to the census data, was compared to the number of vehicular trips counted on CR17 to the east of Canaan Road to establish a ratio of dwellings to trips.

Table 3-4 Trip to Dwelling ratio

	2006	2011
Dwellings	7345	8641
AM Trips	1100	1100
Ratio of trips to dwellings	0.15	0.13

The ratio of trips to dwellings in **Table 3-4** was fairly consistent.

From the values shown in **Figure 3-5**, there is a range in the number of the total planned units in Clarence-Rockland from 3173 units to 5525 units. We calculated both a high and low number of expected trips to take into account this range. The resulting number of future trips varied from approximately 400 trips to 800 trips from the Clarence-Rockland area. We therefore added 800 trips to the CR17 and OR174 westbound traffic in the AM peak hour to account for future growth.

Development Traffic Summary

When the Clarence-Rockland development projects and the City of Ottawa future development were both considered, an additional 1948 vehicles were added to the future volumes estimated by the TRANS model across the Greens Creek and Bilberry Creek screenlines and 800 vehicles were added at the Frank Kenny screenline and at the project specific screenlines in 2031. Some traffic volumes were also added to Trim Road based on the data from the Cardinal Creek Community Transportation Study.

Capacity Analysis

Basic Assumptions

Our capacity analysis of long-term arterial needs at strategic screenline locations is based on the following assumptions:

1. Peak hour directional person-trip data predicted by the TRANS model at the 2021 and 2031 horizon years are assumed to apply.
2. The projected transit modal split projected by the TRANS model is assumed to be achieved in both horizon years. Furthermore, the contribution of person-trips across screenlines by walk and cycle modes is assumed to be negligible, and therefore the transit modal split and non-auto modal share values are considered interchangeable.
3. A private vehicle occupancy rate (persons per vehicle) is assumed to be 1.1 ppv based on the TRANS model projections at the Greens Creek and Bilberry Creek screenlines.

4. Heavy vehicles at screenlines are accounted for by calculating passenger car unit (pcus) using a factor of 1.0 for passenger vehicles and 2.0 for heavy vehicles.
5. Trips generated by developments in Clarence-Rockland and from the Cardinal Creek Village development were added to the baseline trips predicted by the TRANS model.

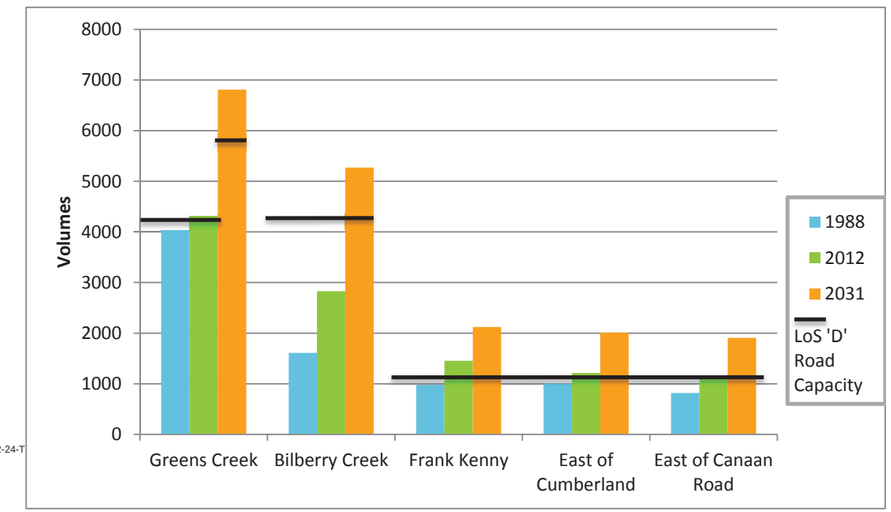
Assessment of Peak Hour Capacity

Our capacity analysis considers the impacts of expected development noted in **Section 0** to confirm that future travel demand projections are reflective of current plans for the study area. It was assumed that 50% of total build-out will occur by 2021 and full build-out will occur by 2031. The v/c ratios were determined for the planned road capacity for each of the three screenlines identified in the TMP as well as project-specific screenlines in Ottawa and Clarence-Rockland. The capacities for the roadways are taken from the supporting documents of the 2008 City of Ottawa TMP.

Given the east-west orientation of the study area, we refined the TRANS screenlines analysis to include roadways that serve east-west traffic and provide a continuous connection to the downstream screenline. This refinement resulted in the removal of five stations on the Frank Kenny screenline and three stations on the Bilberry Creek screenline that were collector roads without a connection across the NCC Greenbelt. An analysis using the original TRANS screenlines is provided in Appendix B.

A graph of traffic volumes along OR174-CR17 at the screenlines is shown in **Figure 3-6**. The traffic volumes from 1988 are taken from the previous studies mentioned in Section 1.1. The 2012 traffic volumes are based on current traffic counts and the 2031 volumes are based on volume projections. The lines indicating roadway capacities are taken from the City of Ottawa TMP and are based on a Level of Service of 'D' which is equal to 90% of the total roadway capacity. The roadway capacity at the Greens Creek screenline increases in 2031 when OR174 roadway widening from the split to Jeanne d'Arc is planned to have been completed. When the volume bars are above the capacity lines, the capacity of the road has been exceeded and congestion is expected.

Figure 3-6 Volumes and Capacities of OR174-CR17 at Screenlines



The peak hour capacity deficiency was determined for each screenline in the AM inbound direction for both the 2021 and 2031 horizons. Where there is a difference between the projected volumes and the available road capacity, we have indicated the type of additional lane capacity that could address the deficiency. A freeway lane is expected to have a LoS 'D' capacity of 1800 pcus, an arterial lane is expected to have a LoS 'D' capacity of 900 pcus and a collector lane is expected to have a LoS 'D' capacity of 500 pcus. A summary of the screenline performance is shown in the following table.

Table 3-5 Projected Screenline Performance – AM Peak Hour Inbound

Screenline	Criteria	2021	2031
Project (Clarence-Rockland)	Capacity	1,600	1,600
	Volume	1,876	2,291
	V/C Ratio	1.17	1.43
	Level of Service	F	F
	Deficiency	Collector lane	Arterial Lane
Project (Ottawa)	Capacity	2,200	2,200
	Volume	1,927	2,353
	V/C Ratio	0.88	1.07
	Level of Service	D	F
	Deficiency	None	Arterial Lane
Frank Kenny	Capacity	3,300	3,300
	Volume	2,676	3,259
	V/C Ratio	0.81	0.99
	Level of Service	D	E
	Deficiency	None	Arterial Lane
Bilberry Creek	Capacity	9,400	9,400
	Volume	7,700	8,567
	V/C Ratio	0.82	0.91
	Level of Service	D	E
	Deficiency	None	Collector Lane
Greens Creek	Capacity	13,080	13,080
	Volume	11,460	12,043

Screenline	Criteria	2021	2031
	V/C Ratio	0.88	0.92
	Level of Service	D	E
	Deficiency	None	Collector lane

In 2031, the impact of the increased travel demand during the AM peak hour is focused along OR174-CR 17. It is expected that improvements to the Transitway will increase transit ridership and provide more stable traffic conditions along the screenlines west of Trim Road. However, capacity will still be exceeded across all screenlines along the OR174-CR17 corridor. At the Green's Creek screenline, although a deficiency in capacity is shown in terms of a collector lane, this deficiency can be addressed through improvements to any of the roadways that cross the screenline. The OR174 is not being considered as a potential candidate road for widening beyond the 6 lanes that are already anticipated by 2031.

The v/c ratios based on the future travel demand in 2021 are shown in **Figure 3-7** and the v/c ratios based on the future travel demand in 2031 are shown in **Figure 3-8**. It is expected that vehicles in the AM inbound peak period will experience increasing congestion as they travel from east to west.

We also considered the Trim Road corridor as a possible connection between OR174 and potential future east-west connections to Clarence-Rockland.

The peak hour capacity deficiency was determined for Trim Road between Innes Road and the OR174 in the AM inbound direction (northbound). We estimated the capacity for the year 2021 based on the information provided in the report "2011 Trim Road Realignment Transportation Review". The results for 2021 and 2031 are shown in the following table.

Table 3-6 Trim Road Projected Capacity Deficiencies - AM Peak Hour Inbound

Cross Street	Trim Road Capacity	2021			2031		
		Volume (pcus)	v/c	Deficiency	Volume (pcus)	v/c	Deficiency
OR174	1800	1425	0.79	None	1834	1.02	Collector Lane
St. Joseph	1800	1771	0.98	Collector Lane	2169	1.21	Arterial Lane
Watters	1800	1339	0.74	None	1632	0.91	Collector Lane
Portobello	1800	1027	0.57	None	1252	0.70	None
Trim	1800	732	0.41	None	892	0.50	None

Trim Road has reserve capacity in 2021 at most locations along the corridor. The section of Trim Road in the vicinity of St. Joseph Boulevard is expected to have a deficiency that could be corrected with the additional roadway capacity related to a collector lane.

A 4-lane Trim Road is expected to be over capacity in 2031 between OR174 and Watters Road intersections.

Figure 3-7 Projected Performance at 2021 - AM Peak Hour Inbound

Figure 3-8 Projected Performance at 2031 - AM Peak Hour Inbound

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Summary of 2031 Screenline Needs

We determined the transportation needs in 2031 across the screenlines in our study area by analysing the Project screenline in Clarence-Rockland, the Project screenline in Ottawa, and the Frank Kenny, Bilberry Creek, and Greens Creek screenlines. It is important to note that the needs determined through our analysis are in addition to the projects identified in the TMP (including the widening of the OR174 west of Jeanne d'Arc to six lanes), and are based on the transit modal shares and screenline Level of Service performance thresholds identified in the TMP being achieved. The general capacity needs to achieve a level of service of 'D' are shown in **Table 3-7**.

Table 3-7 Summary of 2031 Screenline Lane Needs

Screenline	v/c	Projected Deficiency to achieve LoS 'D'
Project Screenline (Clarence-Rockland)	1.43	Arterial Lane
Project Screenline (Ottawa)	1.07	Arterial Lane
Frank Kenny (modified)	0.99	Arterial Lane
Bilberry Creek (modified)	0.91	Collector Lane
Greens Creek	0.92	Collector Lane

In addition to the improvements outlined by the 2008 Ottawa TMP that provide additional capacity across the screenlines, the foregoing demonstrates the need for approximately one lane of additional capacity based on the expected demand. At the Green's Creek screenline, although a deficiency in capacity is shown in terms of a collector lane, this deficiency can be addressed through improvements to any of the roadways that cross the screenline. The OR174 is not being considered as a potential candidate road for widening beyond the 6 lanes that are already anticipated by 2031.

If route choice across the respective screenlines remains consistent with the baseline model projections, intuitively there would appear to be a need for additional capacity at the north end of the screenlines especially given the proximity of the proposed new development at Cardinal Creek Village and Clarence-Rockland to the OR174-CR17 corridor. The travel demand is larger at the north end of the screenlines due to the continuous link(s) provided from the east end to the west of the study area.

Sensitivity Analysis

We completed a sensitivity analysis in order to assess the potential impact of changes in the non-auto modal share on the expected capacity deficiencies at year 2031, which could include trips by walking, cycling or transit. Walking and cycling are possible alternative travel methods that are unlikely to have a meaningful impact for this project as evidenced by the data from the 2005 origin-destination survey for the National Capital Region. This survey found that a negligible number of trips (less than 1%) are currently made by cycle or walk modes during the AM peak hour from the Orléans or Rural East Districts. The majority of trips from our study area in the AM peak hour travel to the west of our study area, which is a distance that is too great to walk and too great for most cyclists.

The projected non-auto modal shares were increased and decreased by 5 and 10 percentage points across our Greens Creek, Bilberry and Frank Kenny screenlines. The resulting auto volumes were compared to our screenline capacities representing an operating level of service of 'D'. The residual capacity was calculated from the difference between the available capacity and the traffic volumes. The residual capacity across our screenlines is indicated in **Table 3-8**.

Table 3-8 Sensitivity of Changes to Non-Auto Modal Shares at 2031 – AM Peak Hour Inbound

		Screenline			Notes
Percentile Change		**Greens Creek**	**Bilberry Creek**	**Frank Kenny**	
+10%	Mode share	53%	46%	10%	There is sufficient capacity to address travel demand
	Residual capacity (pcus)	845	685	27	
+5%	Mode share	48%	41%	5%	The travel demand is met except at Frank Kenny screenline
	Residual capacity (pcus)	287	289	-131	
TMP assumption	Mode share	43%	36%	0%	There is a need for additional capacity at all screenlines
	Residual capacity (pcus)	-271	-108	-289	
-5%	Mode share	38%	31%	0%	One or more additional lanes are required to address travel demand
	Residual capacity (pcus)	-829	-505	-289	
-10%	Mode share	33%	26%	0%	Several additional lanes are required to address capacity deficiencies
	Residual capacity (pcus)	-1387	-902	-289	

The current transit (or non-auto) modal share is estimated to be 37% at the Greens Creek and Bilberry Creek Screenlines. Therefore, the expected 2031 modal share of 43% at Greens Creek represents an increase of 5 percentiles and is considered to be indicative of a very successful transit system serving a suburban area. An additional 5 percentile increase would eliminate the screenline capacity deficiency; however, it is unlikely that a 53% modal share could be achieved.

At the Bilberry Creek screenline, there is an estimated deficiency of 108 pcus assuming the projected 2031 modal share that is generally consistent with the existing experience. With an increase in modal share of 5 percentiles, some residual capacity is available.

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The Frank Kenny screenline has a capacity deficiency even with an increase in transit modal share. If route choice across the screenline remained consistent with the model projections, a capacity deficiency is expected on OR174. This capacity deficiency is not addressed by an increase in transit usage by 10 percentiles. The transit modal share on OR174 at the Frank Kenny screenline would have to be more than 50% before the capacity deficiency would be eliminated.

Transportation demand management (TDM) is another possible method to reduce single occupancy vehicle traffic. TDM is achieved through the implementation of policies or programs to either encourage alternate forms of travel than the single occupant vehicle or to discourage the use of the single occupant vehicle. Carpool programs through places of employment or through on-line membership to a ridesharing website are two programs that currently exist within the City of Ottawa. Preferential treatment for vehicles with more than one person in the form of specific lanes on congested roadways is a typical disincentive for single occupancy vehicle use. Although these types of programs can encourage drivers to increase the number people per vehicle, the net effect on the existing volume of traffic on the CR17-OR174 corridor is expected to be minimal and result in less than a 5% reduction in vehicular traffic. A very successful TDM program, given the context of the study area, could expect a 5-8% reduction in peak hour traffic volumes.

Based on the foregoing, it would appear that achieving more aggressive non-auto mode share and implementing aggressive TDM programs would not result in sufficient reductions in automobile demand to address the projected capacity deficits across the screenlines. Extremely aggressive (if not unrealistic) non-auto modal share assumptions would be needed to address the projected capacity deficits.

4. Opportunities and Constraints

Societal Benefits

Transportation is recognized as a critical element of the economy of an area. Business and institutions consider the transportation network when they locate and when they expand. The provision of a safe and reliable road system is important for the transportation of goods and for the quality of life for employees.

A congested road system generates lost time for travellers while they are not able to move at a free-flow speed. This project provides an opportunity to improve the flow of traffic and thereby reduce lost time for individuals. Congestion also has a negative effect on pollution as internal combustion engines emit greenhouse gases. By reducing the idling time related to congestion on the roads in the study area, the greenhouse gas emissions can also be reduced.

The opportunity exists as part of this project to expand the transit service connections from the rural area of Ottawa to the existing transit service of Clarence-Rockland. This expansion could be in terms of park and ride lots or carpool lots in Clarence-Rockland or at the eastern edge of the

City of Ottawa. Some service exists currently and enhancing the existing facilities or routes could be considered as a possibility for this study.

Active transportation infrastructure enhancements could be included as part of this project. There is an opportunity to construct additional pedestrian and cycling facilities along the waterfront of the Ottawa River and to provide connections between Cumberland Village and the riverfront and between the Clarence-Rockland urban area and the waterfront.

Known Constraints

Downstream Capacity: On Highway 417, the ultimate configuration is to be four lanes in each direction west of the split with two lanes entering Highway 417 from OR 174. The third lane on OR 174 is to exit to St. Laurent Boulevard and Highway 417 eastbound. Similarly, the MTO plan calls for two lanes of traffic to exit from Highway 417 eastbound to OR 174. On Innes Road, no further widening beyond three lanes in each direction is planned and traffic volumes are already significant in the section east of Highway 417. Widening of the Blackburn Hamlet Bypass and the extension of the Blackburn Hamlet Bypass as well as construction of the Cumberland Transitway are planned for the transportation network across the Greenbelt. Future planning for the transportation network for the east side of Ottawa will need to be cognizant of these downstream constraints.

Future Interprovincial Bridge Crossing: The EA Study for the future interprovincial crossing is underway. A preferred corridor has not been selected at this time. The interprovincial bridge EA Study is responsible for assessing the transportation impacts associated with a new crossing, including any impacts on OR 174 and the split. The timing of the completion of the study is unknown. Construction of a new crossing will be subject to the availability of funding and other budget priorities of the responsible agencies.

Environment: There are a number of constraints associated with the characteristics of the physical, natural, land use and social environments in the Study Area including escarpments adjacent to the Ottawa River, slope stability at places along escarpments, deeply incised creek valleys, difficult topography, wetlands, expanding urban area, existing rural residential and protected areas (Greenbelt, Bird Sanctuary). While some constraints can be overcome, the impacts involved and the cost of doing so may be unacceptable and hence careful consideration of the environment is critical in the planning of the transportation network.

2013 City of Ottawa TMP Update

This EA study can provide input to the current TMP update. For example, the information gathered as part of this assessment regarding the potential for major residential development in Clarence-Rockland is being provided to the update of the TRANS model to allow a more accurate portrayal of forecasted traffic volumes. The results from the capacity analyses could be used to determine where road projects may be required in the East sector. We note that the Frank Kenny screenline is likely to have capacity deficiencies across the north end, even though the overall screenline has reserve capacity.

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In our analysis, the extent of the TRANS Frank Kenny screenline made it difficult to analyse traffic in an east-west direction since some of the roadways along the screenline included traffic that flows in a north-south direction. It may be beneficial to split the screenline.

The traffic volume data collected for the Rockcliffe Parkway indicates that the capacity estimates in the current TMP may be underestimated. There were more vehicles counted during peak hours than the capacity that was assigned in the TMP. With an increase in the assigned capacity of the Rockcliffe Parkway to reflect the traffic volumes that are already using the roadway, the capacity deficiencies determined across the Greens Creek screenline may be eliminated.

The current TMP update is expected to be completed during the course of this study (late 2013). It is our understanding that consideration is being given to relaxing the LoS ‘D’ performance threshold across screenlines and addressing peak period conditions rather than just a peak hour. It is also speculated that an affordability factor may also be part of the update, which may affect the timeline for projects or new policy directions.

Summary of Findings

This Needs and Justification Report has examined traffic volumes and collision experience to identify problems and opportunities to be considered in the EA Study. This report found that there is a need for additional roadway infrastructure in the study area based on the results of our safety analysis, 2031 capacity analysis, and 2031 modal share sensitivity analysis. Our analyses focused on the morning inbound (westbound) direction because trips in the morning peak tend to be more concentrated and predictable than in the afternoon peak.

In the **safety analysis** we identified five freeway sections, four ramps and five ramp terminals; three mid-block locations and six intersections on OR174-CR17 with potential for safety improvement (PSI). These were defined as locations where the collision potential is significantly higher than the normal collision potential for similar locations. Ranked highest to lowest PSI, the locations are:

1. St. Joseph Blvd. to Jeanne d’Arc
2. Trim Road to Quigley Hill Road
3. Blair Road to Hwy 417
4. Blair Road eastbound ramp terminal
5. Blair Road to St. Joseph Blvd.
6. Highway 417 to Blair Road
7. Montreal Road/St. Joseph Blvd. to Blair Road
8. Blair Road westbound ramp terminal
9. Old Montreal Road West to Old Montreal Road East
10. Jeanne d’Arc Blvd. eastbound ramp terminal
11. Laporte Street intersection
12. Cameron Street intersection
13. Montreal Road/St. Joseph Blvd. westbound ramp terminal

14. Laurier Street to Landry Road
15. Laurier Street intersection
16. Westbound off ramp to St. Joseph/Montreal Road
17. Carmen Bergeron Street intersection
18. Eastbound on-ramp from Blair Road
19. Westbound off-ramp to Blair Road
20. Pouliotte Street intersection
21. Quigley Hill Road intersection
22. Westbound on-ramp from Blair Road southbound
23. Tenth Line Road eastbound ramp terminal

The widening of the freeway portion of OR174 between Hwy 417 and Trim Road could reduce the potential for rear-end collisions in congested conditions by providing additional capacity. The additional lanes could also provide more recovery area for errant single vehicles.

The high prevalence of off-tracking collisions on OR174-CR17 between Trim Road and Landry Road could be reduced by separating the directions of travel, providing additional roadway width through widening of existing lanes or the provision of additional lanes, or the introduction of longitudinal rumble strips.

The ramps have, in general, lower potential for safety improvement as compared with the freeway and midblock sections. Some of the intersections could benefit from additional capacity where rear-end type collisions predominate.

The 2031 **capacity analysis** indicates that a roadway capacity deficiency is expected of between 100 passenger car units (pcus) and 850 pcus at all five screenlines (Frank Kenny, Bilberry Creek, Greens Creek, Project screenline east of Cumberland Village and Project screenline in Clarence-Rockland) in the morning inbound direction. These projected deficiencies are based on important assumptions that are consistent with the 2008 TMP, including infrastructure projects already planned, modal share targets, and performance criteria.

The **sensitivity analysis** indicates that a combination of enhanced transit, active transportation (cycling, walking), and TDM may address a portion of the projected capacity deficit, but will not result in sufficient improvements to address the capacity needs demonstrated at the screenlines.