Ontario

Ministry of Transportation

Highway 7&8 Transportation Corridor Planning and Class EA Study

Greater Stratford to New Hamburg Area
MTO Group Work Project # 13-00-00

Report D: Area Transportation System Alternatives

DRAFT

June, 2008

www.7and8corridorstudy.ca

This report is presented in draft format in order to obtain information and comments from stakeholders. Your input is requested by August 15, 2008 so the report can be finalized.

TSH engineers architects planners

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Table of Contents

LIST OF EXHIBITS

1.0 INTRODUCTION

1.1 Introduction To The Highway 7&8 Transportation Corridor Planning and Class EA Study

The Ministry of Transportation (MTO) has initiated a Highway 7&8 Transportation Corridor Planning and Class Environmental Assessment (Class EA) Study, from Greater Stratford to the New Hamburg area. The study will:

- develop a plan that addresses:
  - capacity, operation and safety needs along the 2-lane and 4-lane sections of Highway 7&8 between Stratford and the New Hamburg area and on Highway 7&8 through the urban centres (Stratford, Shakespeare and New Hamburg) for the movement of people and goods; and
  - linkage needs between the analysis area to transportation corridors serving other regions in the province.
- prepare a preliminary design for the provincial roadway components of that plan; and
- be documented in a Transportation Environmental Study Report for public review at study completion.

This study will also:

- Review and build on the MTO Highway 7&8 Study Design – Greater Stratford to New Hamburg Area, December 2005;
- Address the transportation policies and directions of the 'Growth Plan for the Greater Golden Horseshoe' (recognizing that a portion of the analysis area for this project lies within the GGH);
- Recognize several municipal transportation initiatives in the area;
- Recognize other relevant transportation corridor studies being undertaken by MTO; and
- Be carried out as a Group 'A' project, in accordance with the Class Environmental Assessment for Provincial Transportation Facilities.

Access to the above documents can be obtained through the study website at www.7and8corridorstudy.ca.

A major component of the study will be an outreach and consultation program structured around six key points of decision-making, each of which will be supported by:

- the release of a newsletter;
- the release of draft reports for review and comment;
- a round of Public Information Centres (PICs);
- posting of information on the study website; and
- newspaper notices announcing the above.

At the completion of the study, the filing of a Transportation Environmental Study Report (TESR) will be announced through newspaper notices. Decisions on funding and timing of

detail design and construction are based upon environmental clearance of the TESR, since it determines the type of transportation facilities and their location.

For orientation and reference, a map of the Analysis Area is provided in **Exhibit 1.1** below. The Analysis Area is discussed in Section 2 of this report.

Exhibit 1.1: Map of Analysis Area

Highway 7&8 Transportation Corridor Planning and Class EA Study

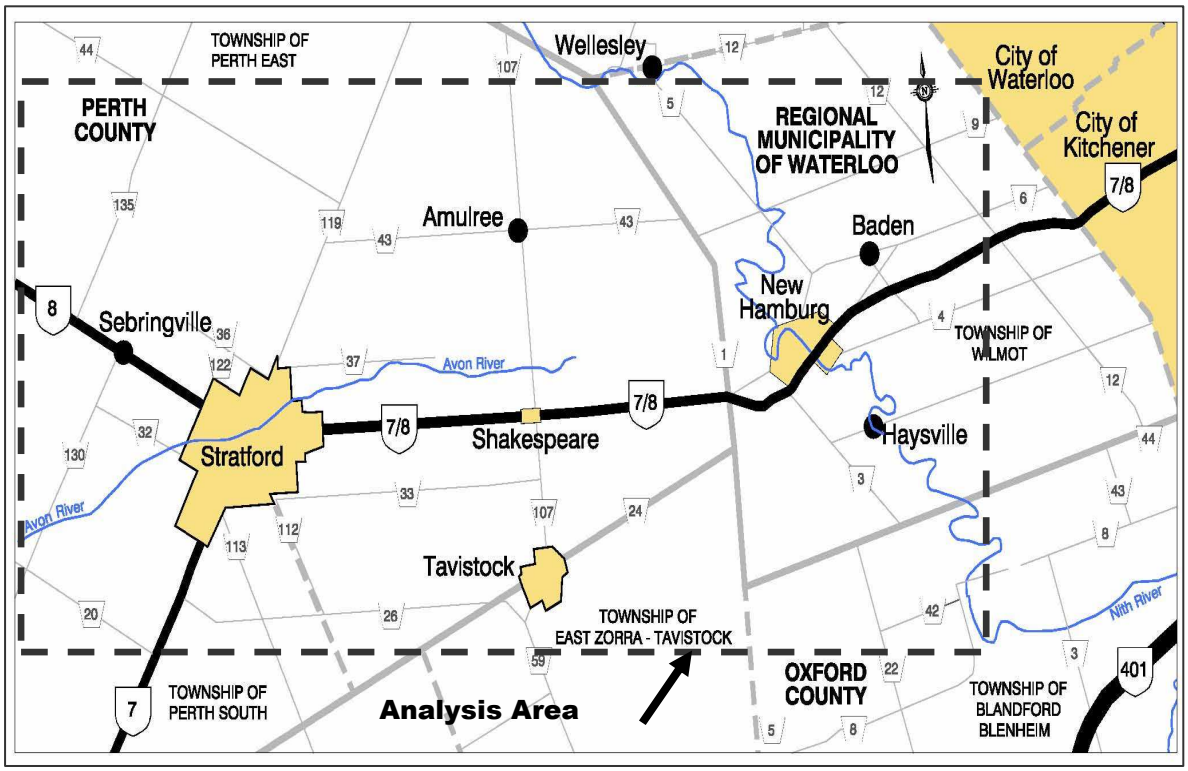


Exhibit 1.2 below provides a summary of study objectives from Report A of this study (the 'Study Plan for Technical Work, Outreach and Consultation'):

Exhibit 1.2: Summary of Study Objectives Highway 7&8 Transportation Corridor Planning and Class EA Study
1. To identify and assess the factors that are driving 'Area Transportation System' needs
2. To apply those driving factors in preparing a Transportation Development Strategy to address long-term multi-year needs for the movement of people and goods
3. To undertake the planning and preliminary design of the provincial roadway components (provincial highways and provincial transitways) of those strategies

Exhibit 1.2: Summary of Study Objectives Highway 7&8 Transportation Corridor Planning and Class EA Study
4. To conduct the planning and preliminary design of provincial roadways with an inherent approach of avoiding or minimizing overall environmental impacts
5. To identify highway access management measures for growth management and highway protection
6. To engage public and stakeholders early in the study process and continue to engage them throughout the study process

Exhibit 1.3 below provides a preliminary statement of transportation problems and opportunities from Report A of this study:

Exhibit 1.3: Preliminary Statement of Transportation Problems and Opportunities Highway 7&8 Transportation Corridor Planning and Class EA Study
1. There is inadequate transportation capacity to meet current and projected needs (to 2031) for the efficient movement of both people and goods along the 2-lane and 4-lane sections of Highway 7&8 between Stratford and the New Hamburg area and on Highway 7&8 through the urban centres (Stratford, Shakespeare and New Hamburg).
2. Provincial / inter-regional traffic through the urban centres (Stratford and Shakespeare) along Highway 7&8 interferes with their "downtown / historic crossroads" function.
3. The connection of the Analysis Area to transportation corridors serving other regions in the province is inadequate for long-term transportation and economic development needs.
4. Geometric and traffic safety characteristics along Highway 7&8 are not appropriate to address forecasted needs in a manner that facilitates their safe and efficient use for the movement of people and goods.
5. There is currently no comprehensive highway access management plan for Highway 7&8 from Greater Stratford to New Hamburg to protect highway function/operation/safety, and to discourage inappropriate highway-related land development/growth.
6. Area transportation system planning and local land use planning in the analysis area need to be co-ordinated, in order to ensure new/intensified development associated with forecasted population and employment growth in the Analysis Area does not negatively affect or even preclude alternatives to address transportation problems and opportunities.
This preliminary statement of problems and opportunities may be refined as appropriate during the Class EA to reflect study findings and input received through consultation and engagement.

1.2 Purpose, Relevance and Position of Report "D" Within the Study Process

The purpose of Report D is to:

- Document the evaluation and selection of Area Transportation System alternatives;
- Document the degree to which Area Transportation System alternatives address the problems and opportunities; and
- Outline the process and criteria for generating and evaluating the preliminary planning alternatives.

This will allow for the appropriate scoping of the remaining technical and consultation requirements of the Class EA and Preliminary Design components of the Study.

As can be seen in **Exhibit 1.4** below, Report D is the fifth of 11 reports to be prepared for this study and the fourth report of Phase 2, Area Transportation System Planning.

Exhibit 1.4: Summary of Reports
Highway 7&8 Transportation Corridor Planning and Class EA Study

STUDY PHASE 1: STUDY PLAN
• Report "A" Study Plan For Technical Work, Outreach And Consultation
STUDY PHASE 2: AREA TRANSPORTATION SYSTEM PLANNING
• Report "B": Working Paper – Overview of Transportation, Land Use and Economic Conditions Within the Analysis Area
• Report "F" 1st Part: Working Paper - Environmental Conditions And Constraints
• Report "C": Working Paper – 'Area Transportation System' Problems and Opportunities
• ***Report "D": Working Paper – Area Transportation System Alternatives***
STUDY PHASE 3: PRELIMINARY PLANNING
• Report "E": Milestone Report – Transportation Corridor Needs Assessment
STUDY PHASE 4: DETAILED PLANNING FOR PROVINCIAL ROADWAYS
• Report "F" 2nd Part: Working Paper - Environmental Conditions And Constraints
• Report "G": Working Paper – Generation of Detailed Planning Alternatives for Provincial Roadway
• Report "H": Milestone Report - Selection of Detailed Planning Alternatives for Provincial Roadway
STUDY PHASE 5: PRELIMINARY DESIGN FOR PROVINCIAL ROADWAYS
• Report "I": Working Paper - Generation of Provincial Roadway Preliminary Design Alternatives
• Report "J": Milestone Report - Selection of Preliminary/Concept Design Alternatives for Provincial Roadway
STUDY PHASE 6: TRANSPORTATION ENVIRONMENTAL STUDY REPORT
• Report "K": Transportation Environmental Study Report

Report D is designed to document the Area Transportation System alternatives. For highlights of the report, readers are referred to the following exhibits:

- Exhibit 1.5: Process Overview for the Development, Assessment and Evaluation of the Area Transportation System Alternatives (Phase 2 of Study)
- Exhibit 2.2: Transportation Problems
- Exhibit 2.3: Transportation Opportunities
- Exhibit 3.9: Assessment of the Long List of Area Transportation System Alternatives
- Exhibit 4.24: Assessment of the Long List of Combination Area Transportation System Alternatives
- Exhibit 4.25: Area Transportation System Conclusions
- Exhibit 5.1: Process Overview for the Development, Assessment and Evaluation of the Preliminary Planning Alternatives for Provincial Roadways (Phase 3 of Study)
- Exhibit 5.2: Evaluation Factors, Sub-factors, Criteria and Indicators for Preliminary Planning Assessment

1.3 Process Overview for the Development, Assessment and Evaluation of Area Transportation System Alternatives

The process for the identification, assessment and evaluation of the 'Area Transportation System' alternatives is depicted in **Exhibit 1.5**. The process is described in detail in Report C. A brief description of the key elements of the process follows:

Step 1: Building upon the groundwork documented in Reports, A, B, F (Part 1) and C, a rationale for the undertaking has been developed that articulates the existing and future transportation problems and opportunities as a basis for identifying alternative solutions.

Step 2: Identify and Define a Long List of Area Transportation System Alternatives – Provides a description and rationale for generic transportation system functional and modal alternatives. The Long List of Alternatives was described in detail in Section 3.0.

Step 3: Determine the degree to which individual Area Transportation System Alternatives address Problems and Opportunities. The potential for generic transportation modal/functional alternatives are reviewed to address the identified problems and opportunities to determine which alternatives should be short-listed for further review.

Step 4: Develop Combinations of Alternatives based on short-listed elements of Area Transportation System Alternatives. The rationale for combining alternatives, as well as a description of each the Combination Alternatives is provided in Section 4 of this report.

Step 5: Determine Degree to which Combinations of Area Transportation System Alternatives address Problems and Opportunities and identify Preferred Combination(s). Each of the Combination alternatives is examined based on the criteria applied in Step 4 above. Document findings in Report D.

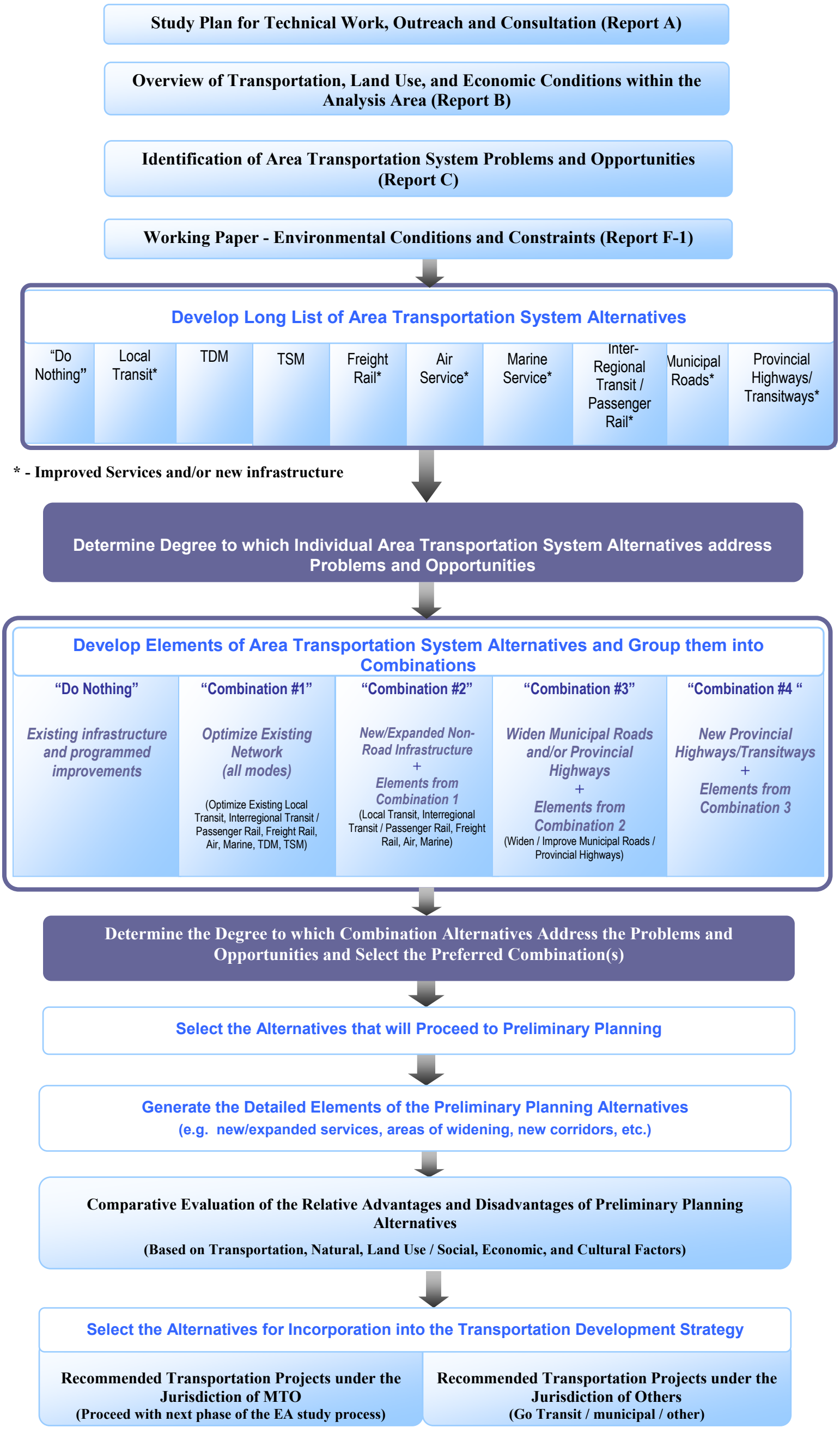
Step 6: Develop and Assess Preferred Combination of Area Transportation System Alternative(s). The Preferred Combination Alternative(s) from Step 6 is further developed, refined and assessed to *"screen out"* inferior options from more detailed analysis. Those alternatives with potential to address the problem and opportunity statement are carried forward for further review.

Step 7: Comparative Assessment of the Relative Advantages and Disadvantages of Short List Combination Alternatives Based on Transportation, Socio-Economic, Land Use and Environmental Factors. The advantages and disadvantages of the short listed combination 'Area Transportation System' alternatives will be compared using a reasoned argument methodology to select a recommended alternative(s). The factors and sub-factors used to assess, evaluate and select a preferred Area Transportation System alternative(s) are described in detail in **Exhibit 5.2** of this report. The reasoned argument method highlights the differences in net effects associated with the various alternatives. Based on these differences, the advantages and disadvantages of each alternative are identified. The relative significance of the impacts are examined to provide a clear rationale for the selection of a preferred alternative.

Step 8: Identify Recommended Area Transportation System Strategy (presented in Report E). Based on the reasoned argument assessment and evaluation, an Area Transportation System Strategy will be developed. To determine next steps, the selected 'Area Transportation System' Strategy will be placed into one of the following four categories:

- If the preferred Area Transportation System alternative is "Do Nothing" – the EA process is complete and no further study will be undertaken.
- If the preferred Area Transportation System alternative is not a provincial roadway recommendation – the current EA process will be halted; MTO will refer the planning alternative to the appropriate agency or jurisdiction for further review and action.
- If the preferred Area Transportation System alternative is a provincial roadway recommendation – the EA process continues and MTO will proceed to the Preliminary Planning phase as outlined in Section 2.2 of the Study Plan Report.
- If the preferred Area Transportation System alternative is a Combination of provincial roadway recommendations and recommendations that are not provincial roadways – the EA process continues for provincial roadway solutions, with MTO proceeding to the Preliminary Planning phase as outlined in Section 2.2 of the Study Plan Report; and Area Transportation System alternatives that are not provincial roadways are referred to the appropriate agency or jurisdiction for further review and action.

Exhibit 1.5: Process Overview for the Development, Assessment and Evaluation of the Area Transportation System Alternatives (Phase 2 of Study)



2.0 SUMMARY OF ANALYSIS AREA EXISTING CONDITIONS AND TRANSPORTATION PROBLEMS AND OPPORTUNITIES

A comprehensive overview of transportation, land use and economic conditions within the Analysis Area was provided in Report B: Overview of Transportation, Land Use and Economic Conditions within the Analysis Area. Report C: 'Area Transportation System' Problems and Opportunities documents 'Area Transportation System' needs, including existing and future problems, deficiencies and opportunities. A summary of the findings of each report is provided in the following sections. The environmental conditions and constraints are documented in Report F, Part 1: Environmental Conditions and Constraints.

2.1 Identification of Analysis Area

The Analysis Area was established to identify transportation problems and opportunities associated with Highway 7&8 between Greater Stratford and the New Hamburg area. The Analysis Area is not intended to represent a Study Area for the planning alternatives to be generated during the course of the study. The Study Area will be generated by the MTO Study Team through consultation with stakeholders.

2.2 Summary of Transportation, Land Use and Economic Conditions within the Analysis Area

As documented in Report B, a number of key factors that influence the 'Area Transportation System' needs were identified through a preliminary assessment based on a field review and the review of available related documentation/reports. The key factors driving 'Area Transportation System' needs were summarized under the following themes:

- Policy Framework;
- Area Economy;
- Modal Outlooks;
- Existing Transportation System Travel Characteristics; and
- Existing Highway Conditions.

The following sections provide an overview of the analysis and conclusions documented in Report B.

2.2.1 Policy Framework

The policy developed by various levels of government is consistent with respect to the direction on land-use planning and transportation to promote strong communities, a clean and healthy environment, and a strong economy. The policies recognize the complex inter-relationships among economic, environmental and social factors in planning.

From a provincial perspective, an improved transportation corridor has to function within the provincial transportation network, and connect to existing provincial facilities at locations that are compatible with existing infrastructure or future plans. Better use of land and infrastructure can be made by directing growth to the existing urban areas. The provincial policy including the Greenbelt Plan and Places to Grow envisages increasing intensification of the existing built-up areas, with a focus on urban growth centres, intensification corridors, major transit station areas, brownfield sites and greyfields. Concentrating intensification in these areas provides a focus for transit and infrastructure investment to support growth.

Area municipal staff and politicians are concerned with the location and function of a future transportation corridor within their respective municipalities, and the compatibility of the future corridor with their land use strategies and plans for future development.

2.2.2 Socio-Economic Conditions

The socio-economic conditions in the Analysis Area can be described as undergoing significant change. Over the period from 1961 to 2001, Southwestern Ontario grew from 1.6 million to 2.8 million people. The region's population is projected to grow at a rate similar to the rest of Ontario, to 4 million by 2026. Southwestern Ontario employment almost doubled between 1961 and 2001 to over 1.1 million jobs. Total employment is projected to grow to almost 1.9 million by 2026.

Population and employment growth is focused on major urban centres beyond the GTA along Highways 400, 401, and 403. Modest growth is projected for the Region of Waterloo, the counties of Simcoe and Middlesex, and in the urban areas of Kitchener-Waterloo, London, Barrie, Cambridge and Guelph. Population and employment forecasts indicate that the Region of Waterloo will continue to grow an average of 2% per year over the next 30 years.

One expected outcome of this growth will be increased travel times and costs for commuting and other travel due to increasing travel distances and congestion within the Analysis Area. Reduced accessibility and increased travel time will affect this region's economic competitiveness as goods movement and employee commuting times increase due to highway congestion.

Even as urban centres evolve and new growth management policies for more compact forms of development and alternative forms of transportation are provided between the major centres, the strong auto-based commuting patterns between Stratford and the New Hamburg area are expected to continue. Accordingly, the continued success of the Analysis Area from a socio-economic perspective would benefit from an improved transportation corridor between Stratford and the New Hamburg area.

2.2.3 Modal Outlooks

The Regional transportation system in and around the Highway 7&8 Corridor comprises automobile/truck modes, pedestrian/cycling modes, and rail, bus, and air to meet inter-city passenger needs. Major freight transportation modes include truck and rail.

Automobiles

Automobile traffic using the provincial highway system is by far the predominant mode of travel, accounting for more than 90% of the passenger kilometers travelled. The remaining transportation modes (bus, rail, air, cycling, and walking) account for 7.5% of the passenger kilometres travelled. The automobile continues to be the preferred mode of travel in Southern Ontario. Auto ownership rates have been growing faster than the population growth rate over the previous decades with the popularity of suburban life being a major contributor.

Trucking

Trucking is the principal means of goods transport in Southern Ontario with highways linking to all major manufacturing centres and international border crossings. The trucking industry is expected to maintain its existing share of the transportation market for short and medium haul shipping, even as rail attempts to expand its long haul share into the short/medium market.

Industrial and commercial development will also continue to require timely access to customers and suppliers located within and external to the Analysis Area. An improved east-west highway between the urban centres is required in order to serve this need.

Railways

The Goderich-Exeter Railway corridor runs parallel to Highway 7&8 from Stratford easterly to Kitchener. The railway is generally located 400 m south of Highway 7&8 from Stratford to approximately 1.5 km west of the intersection with Waterloo Regional Road 1 where the railway crosses the highway. This rail corridor then extends eastward paralleling Highway 7&8 to the north through New Hamburg.

This section of rail carries approximately 8 to 10 trains per day. The volume of rail traffic consists of both freight and passenger trains. The trains using this rail corridor are traveling from destinations to the west, from as far as Sarnia and Chicago, and from Toronto in the east. Via Rail and Amtrak use this track for their personal service.

Transit

Within the Analysis Area, both public and inter-city transit is limited. Currently, the only inter-city bus service provider in the area is Greyhound Bus Lines, which has only one bus terminal in the Analysis Area (located in downtown Stratford). Municipal public transit is only available within the City of Stratford, and offers a limited number of routes through the outer residential areas in the Greater Stratford area.

With regard to future transit improvements, the province has recently announced that GO Transit bus service will be expanded to the Kitchener-Waterloo area. While future transit expansion may lead to increased capacity of transit networks, it is not anticipated that the capacity of the overall

transportation network in the vicinity of the Highway 7&8 corridor will be sufficiently increased to eliminate the need for roadway improvements.

Enhancing the role of transit in the Highway 7&8 corridor would help to achieve the provincial and municipal policy objectives for sustainable transportation and environment.

Airports

The majority of local, national or international air travel is serviced from Toronto's Pearson Airport, approximately 90 minutes southeast. The Stratford Municipal Airport is operational year round servicing charters, flight training and business jet travel along with necessary maintenance services. The Waterloo Regional Airport provides limited international (Detroit) and charter passenger service via small commuter aircraft. It also accommodates cargo, business charter and flight training along with necessary service facilities. The London Airport also provides passenger and cargo services.

Marine

Four major ports are also located within two hours trucking time: Goderich, Toronto, Port Stanley, and Hamilton. This transportation accessibility is one potential advantage for locating businesses with national or international markets in the Analysis Area.

2.2.4 Existing Transportation System Travel Characteristics

The travel pattern for Highway 7&8 from Stratford City Limits to Waterloo Road 1 is Commuter Tourist Recreation (CTR). From Waterloo Road 1 to Waterloo Road 4 – West Junction, Highway 7&8 has a Commuter Recreation (CR) travel pattern. The segment from Waterloo Road 4 – West Junction to 0.8 km east of Waterloo Road 5 has a Commuter (C) travel pattern. Within the Analysis Area, Highway 7&8 experiences a Summer Average Daily Traffic (SADT) greater than the Average Annual Daily Traffic (AADT). Historically, over the past five years, SADT has been approximately 10 to 30 percent greater than the AADT. Seasonal traffic volume variations on the highway are attributed to increases in recreational and tourist trips during the summer months.

The 2004 count data (AADT) provided in **Exhibit 2.1** shows that the highest traffic volumes on Highway 7&8 in the Analysis Area are occurring on the section between Waterloo Road 4 West Junction and Waterloo Road 5. The traffic volumes are high enough to support the need for additional capacity along the 2-lane and 4-lane sections of Highway 7&8 or the diversion of traffic to another corridor (new or existing).

Exhibit 2.1: Highway 7&8 Mainline Existing Traffic Volumes (2004)		
Highway 7&8	**2004 Average Annual Daily Traffic (AADT)**	**2004 Design Hour Volume (DHV)**
Stratford City Limits to 2.9 km East of Stratford City Limits	9,800	980
2.9 km East of Stratford City Limits to Perth Road 107	9,800	980
Perth Road 107 to Waterloo Road 1	10,600	1,060
Waterloo Road 1 to Waterloo Road 4 (West Junction)	13,800	1,380
Waterloo Road 4 (West Junction) to Waterloo Road 4 (East Junction)	19,800	1,980
Waterloo Road 4 (East Junction) to 0.8 km East of Waterloo Road 5	18,400	1,840

Traffic along this highway corridor is mostly uninterrupted free-flow (i.e. no stop or yield control for the Highway 7&8 approaches) except at the following intersections which are signalized:

- Highway 7&8 /Perth Road 107;
- Highway 7&8 /Waterloo Road 1;
- Highway 7&8 /Waterloo Road 4 – West Junction;
- Highway 7&8 /Waterloo Road 4 – East Junction; and
- Highway 7&8 /Waterloo Road 5 (Nafziger Road); and

Under existing conditions, most of the key intersections along Highway 7&8 are currently operating within acceptable levels of service during the a.m. and p.m. peak hours. There are some exceptions at the unsignalized intersections, such as at Perth Road 111, where there are high turning volumes to / from the side street. In all these cases, the critical movements are for the northbound and / or southbound approaches. Thus, eastbound and westbound approaches are operating well; however, notable delays and / or high v/c ratios are experienced on the side streets. There are limited opportunities to improve these conditions, all of which must be cognizant of the minimal side street approach volumes.

The operations at the signalized intersections (Perth Road 107, and West and East Junctions of Waterloo Regional Road 4) revealed LOS 'D' or better, with the exception of the Perth Road 107 intersection during the p.m. peak hour, which was found to be operating at LOS 'F'. It is noted that optimization of the signal timing at these locations resulted in improved intersection operations with no critical movements.

Commercial vehicle data provided by MTO indicates that Highway 7&8 through the Analysis Area is a major through trucking route, with trucks representing approximately 10% to 16% of the total traffic. Concerns have been raised regarding speed of trucks, volume of trucks, traffic safety and excessive noise.

2.2.5 Existing Highway Conditions

Highway 7&8 assumes three distinct cross-sections between Stratford and New Hamburg on the basis of the number of eastbound and westbound lanes that are provided, as well as the degree of separation that is provided between the eastbound and westbound lanes.

At the west end of the study limits, Highway 7&8 is a four-lane rural arterial roadway from the east limits of the City of Stratford to 2.9 kilometres easterly. This segment of Highway 7&8 is referred to as being 'undivided', as there is no separation provided between the eastbound and westbound lanes of the highway. Through the City (in a westerly direction) the highway separates into Highway 8 continuing in a northwesterly direction, and Highway 7 continuing in a southwesterly direction.

From 2.9 kilometres east of the Stratford east city limits to Waterloo Regional Road 1, Highway 7&8 is an undivided two-lane rural arterial roadway. The 700 m long section of Highway 7&8 through Shakespeare was constructed with a two lane urban cross-section and features a reduced posted speed of 50 km/h. (The posted speed for all other sections of Highway 7&8 within the corridor is 80 km/h). There is also a signalized intersection at Shakespeare's main street, Perth Road 107.

From Waterloo Regional Road 1 to the east limits of New Hamburg, Highway 7&8 is a four-lane staged freeway with at-grade intersections and controlled access. This section of the highway is referred to as being 'divided', as there is a 1 m flush median separating eastbound and westbound lanes. There are signalized intersections at Hamilton Road / Bleams Road (east junction of Waterloo Regional Road 4) and Peel Street / Haysville Road (west junction of Waterloo Regional Road 4).

East of the Analysis Area, Highway 7&8 continues as the major link between Stratford and the Kitchener / Waterloo / Cambridge area. Throughout this segment, Highway 7&8 is a controlled access, four-lane, divided rural freeway from east of New Hamburg through to Kitchener and the Greater Toronto Area via Highway 8 and Highway 401.

The west section of Highway 7&8 in the vicinity of Stratford and the central section through Shakespeare pass through the built-up urbanized areas (primarily commercial land uses) with a significant number of access points and/or traffic signals. The remaining sections of Highway 7&8 are generally rural. The numerous intersections and entrances throughout the highway corridor are an indicator that more stringent access management policies would be necessary to improve/maintain the level of capacity along the corridor. For a highway to effectively move people and goods there should be no or limited impediments to through traffic due to traffic control devices or turning traffic.

The applicable design speed for Highway 7&8 is 100 km/h (i.e. 20 km/h higher than the posted speed limit) except through the built-up areas where a reduced design speed applies given the lower posted speed limit. Several horizontal alignment elements and numerous vertical alignment elements do not meet the requirements for the applicable 100 km/h design speed.

Limited passing opportunities exists due to the horizontal alignment, vertical alignment and intersection spacing resulting in through vehicles spending a high proportion of time in platoons and operating at less than their desired speeds.

Numerous safety related concerns have been expressed by the public and stakeholders in previous studies. Concerns relate to alignment deficiencies, accessibility, vehicle speeds, volume of trucks, signage, and general congestion.

The available road allowance along the existing corridor and the built environment towards the west end of the Analysis Area and in pockets throughout the study corridor may be a significant constraint to achieving acceptable capacity and safety improvements along the existing corridor and/or to providing a transitway facility.

2.2.6 Conclusions

The assessment of the existing conditions provided sufficient information to move to the next stage of the Class Environmental Assessment. Specifically, it was concluded that:

- The existing transportation system between Stratford and the New Hamburg area exhibits network congestion in peak periods;
- The Stratford to New Hamburg area travel corridor serves significant flows of people and goods through the Analysis Area; and
- Comprehensive network based strategies are required to address current and future mobility challenges. These strategies must recognize the interrelationship between all elements of the transportation system and land use in the Analysis Area.

2.3 Process to Define 'Area Transportation System' Problems and Opportunities

As noted in Section 10 of Report B, the review of the transportation system and the identification of the problems and opportunities build on a review of the federal and provincial policy framework and a series of related goals and objectives. The goals are summarized below, while the objectives associated with each goal are documented in Report B:

- Optimize the use of existing and new infrastructure;
- Provide sustainable transportation choices;
- Safe and efficient movement of people and goods;
- Ensure the development of infrastructure that links the Analysis Area and provides connectivity between economic nodes and centres within the Analysis Area and the Province;
- Support and promote sustainable economic growth at federal, provincial and municipal levels;
- Support the urban form and intensification strategies embodied in the Growth Plan; and
- Create a multi-modal transportation strategy that promotes the protection, conservation, enhancement and the wise use of natural resources.

2.4 Summary of Preliminary Identification of Existing and Future 'Area Transportation System' Problems, Deficiencies and Opportunities

As documented in Section 2.2, a number of key factors influence the 'Area Transportation System' needs. The analysis of the transportation problem and opportunities has been prepared in consideration of these themes.

2.4.1 Transportation Problems

Exhibit 2.2 identifies the transportation related problems which were identified during the analysis and assessment of existing and potential future operating conditions on the transportation network within the Analysis Area:

Exhibit 2.2: Transportation Problems Highway 7&8 Transportation Corridor Planning and Class EA Study
• There is inadequate transportation capacity to meet current and projected needs (to 2031) for the efficient movement of both people and goods along the 2-lane and 4-lane sections of Highway 7&8 between Stratford and the New Hamburg area and on Highway 7&8 through the urban centres (Stratford, Shakespeare and New Hamburg). A capacity deficiency of 1 lane in each direction will be realized in the corridor between Greater Stratford and the New Hamburg area by 2031. In addition, there are capacity constraints at intersections in urban areas.
• Capacity constraints result in trip diversion to parallel rural roadways in the Analysis Area. Such routes are generally not designed to accommodate high traffic volumes. These routes also travel through rural communities where through traffic results in safety and operational concerns.
• Provincial / inter-regional traffic through urban centres along Highway 7&8 interferes with their "downtown / historic crossroads" function.
• Geometric and traffic safety characteristics along Highway 7&8 are not appropriate to address forecasted needs in a manner that facilitates their safe and efficient use for the movement of people and goods.
• There is currently no comprehensive highway access management plan for Highway 7&8 from Greater Stratford to New Hamburg to protect highway function/operation/safety, and to discourage inappropriate highway-related land development/growth.
• The connection of the Analysis Area to transportation corridors serving other regions in the province is inadequate for long-term transportation and economic development needs.
• Limited inter-city transit service is available so the majority of trips are auto-based.
• Truck trips in the corridor have limited route choice and are subject to either traffic congestion in Stratford and/or New Hamburg or connecting roadways that are inadequate or not intended for commercial vehicle activity.

2.4.2 Transportation Opportunities

In response to the transportation-related problems as noted above, there are opportunities that may be available to address these issues and improve the transportation system within the Analysis Area to the benefit of all users and the environment as noted in **Exhibit 2.3**.

Exhibit 2.3: Transportation Opportunities Highway 7&8 Transportation Corridor Planning and Class EA Study

• Policies and objectives of the Provincial Growth Plan promote opportunities to:
  • Provide for "transit-first" initiatives that support the provision of transit service between urban growth centres; and
  • Recognize the importance of balanced investment in the road and highway system, to better serve goods movement and the needs of the travelling public.

• Area transportation system planning and local land use planning in the Analysis Area need to be co-ordinated, in order to ensure new/intensified development associated with forecasted population and employment growth in the Analysis Area does not negatively affect or even preclude alternatives to address transportation problems and opportunities.
• The local transportation network is an integral part of the overall transportation network within the Analysis Area. The planned road programs of the area municipalities as identified in the Official Plans and Transportation Master Plans aim to preserve, improve and maximize use of the existing infrastructure.
• Implementation of alternative mobility strategies will assist in managing growth and congestion, provide a framework for increased transit use, provide opportunities to consider car pool, HOV and other transportation options, and optimize the current system through continued and necessary infrastructure investment.
• The provision of regular transit service between communities would provide an alternative to the auto in the Highway 7&8 corridor which could reduce auto demands in the corridor.
• Opportunities for use of the rail corridor to improve passenger travel connections between the Analysis Area and urban centres to the east could reduce auto demands in the corridor.
• A new transportation corridor has the potential to avoid overloading existing urban arterials and parallel rural roadways.
• A new transportation corridor linking Greater Stratford and the New Hamburg area would improve reliability and redundancy in the area transportation system.

3.0 IDENTIFY 'AREA TRANSPORTATION SYSTEM' ALTERATIVES

Alternatives to the undertaking represent reasonable means of resolving the stated transportation problems and opportunities, as well as meeting the purpose of the undertaking. The objectives used in the identification of alternatives include, but are not limited to the following:

- Meet the purpose of the undertaking;
- Address the transportation problems and opportunities outlined in **Exhibit 2.2 and 2.3**;
- Consider policy framework goals and objectives in identification, assessment and evaluation of alternatives to the undertaking. The following represents a list of goals extracted from relevant Provincial, Federal and local policy documents, established as a guide to assess infrastructure alternatives;
    (a) *Transportation Goals*
        - Optimize the use of existing and new infrastructure;
        - Provide sustainable transportation choices; and
        - Ensure the safe and efficient movement of goods:
    (b) *Economic Goals*
        - Ensure the development of infrastructure that links the Analysis Area and provides connectivity between economic nodes and centres within the Analysis Area and the Province; and
        - Support and promote sustainable growth at Federal, Provincial and Municipal levels.
    (c) *Land Use Goals*
        - Support the urban form and intensification strategies embodied in the Proposed Growth Plan.
    (d) *Environmental Goals*
        - Promote the protection, conservation, enhancement and the wise use of natural resources.

3.1 Overview of 'Area Transportation System' Alternatives

Area Transportation System alternatives (see Exhibit 1.5) are defined as fundamentally different ways of addressing the identified transportation problems and opportunities. In recognition of these fundamental differences, it is appropriate to examine the effectiveness of each type of alternative in addressing the problems and opportunities at a functional level.

Individual Area Transportation System alternatives are described in detail below.

"Do Nothing" - The "Do Nothing" alternative is considered the status quo, where the area transportation system would be limited to maintenance of current transportation infrastructure and the implementation of approved provincial, regional municipality and local municipality initiatives.

Improved Local Transit Services - The provision of new or improved local transit service could divert people movement from private cars and relieve congestion on existing municipal roadways.

Transportation Demand Management (TDM) - TDM strategies include measures that improve the operation of the current area transportation system by managing travel demand independent of actually expanding or constructing new infrastructure. The emphasis of TDM strategies is to: reduce overall demands on the transportation network, especially auto trips; shift demands to time periods outside of the critical congestion periods; and shift demands from auto based trips to alternative modes of transportation, principally transit, cycling and walking.

Transportation Systems Management (TSM) - TSM can improve the efficiency and safety of the existing area transportation system and optimize the use of existing and planned infrastructure through a wide range of strategies and technology policies and initiatives on municipal roads and provincial highways. TSM measures include: transit priority facilities (e.g. bus priority at intersections), Intelligent Transportation Systems (ITS) strategies, carpooling and park and ride facilities; intersection improvements; and conversion of existing general-purpose lanes or existing shoulders on municipal roads or provincial highways for High Occupancy Vehicle (HOV) lanes and Reserved Bus Lanes (RBL).

Improved and/or New Freight Rail Service - Increased freight rail services for goods movement within existing rail corridors and/or along new rail corridors could encourage the diversion of freight from trucks. The ability to expand rail service and divert longer haul goods to rail may provide some relief to network congestion both on regional arterials and on the provincial highway network.

Improved and/or New Air Transport Service - Modifications to existing air transport services and any associated structural modifications/new infrastructure could result in a change in travel patterns for both passenger and freight.

Improved and/or New Marine Service – Would be limited to navigable waterways. It would have the greatest scope for recreational use as seasons/weather permit.

Improved and/or New Inter-Regional Transit Service / Passenger Rail - Providing inter-regional transit and passenger rail through new/increased services within the existing area transportation system and/or through new services in new corridors, could relieve congestion and increase the performance of the area transportation system. Inter-regional transit could be provided through the following: heavy rail; light rail; provincial transitway; reserved bus lanes on municipal roads or provincial highways; and buses in general purpose lanes of municipal roads or provincial highways.

Improved and/or New Municipal Roads – The provision of improved capacity and operations on existing facilities and/or accommodating required capacity on new municipal road corridors could increase the performance of the transportation network. Congestion could be relieved through additional capacity on existing roadways.

Improved and/or New Provincial Highways/Transitways - The provision of improved capacity and operations on existing provincial roadways, and/or accommodating required capacity on new roadways, could increase the performance of the area transportation system. Provincial highways/transitways maintain a high degree of access control in order to preserve the travel mobility characteristics of the corridor. Commercial and private entrances would be prohibited and access would be limited to: at-grade highway intersections, grade separations or potentially highway interchanges with key municipal arterial roads; and to transit stations for a provincial transitway. Use of sections of existing roadways could also be considered. In this regard, provincial roadways could include the following:

- Provincial highways
- Provincial transitways
- Transportation system management (TSM) facilities on provincial highways, including;
  - new lanes for high occupancy vehicles on provincial highways;
  - new lanes reserved for buses on provincial highways; and
  - new transit priority facilities on provincial highways.
- Combinations of provincial roadway alternatives

3.2 Overview of Combination Alternatives

Given the nature and extent of the problems in the Analysis Area there is a need to assess transportation requirements in a systems context and evaluate the merits of different transportation network alternatives and modal shift opportunities.

A comprehensive transportation strategy must recognize the interrelationship between all elements of the transportation system as well as the inherent relationship between land use, transportation, the economy and the environment. Such a strategy should also recognize the provincial policy directions on sustainable development and the importance of transit in developing balanced transportation solutions.

Elements of the Area Transportation System alternatives, when used in combination, are expected to fall into the following distinct categories:

- **Combination #1** – Optimize existing network (all modes – local transit, inter-regional transit, passenger rail, freight rail, air, marine, TDM, TSM). The objective of Combination #1 is to improve the operation of the current transportation system independent of actually expanding or constructing new transportation infrastructure;
- **Combination #2** – New/expanded non-road infrastructure (local transit, inter-regional transit / passenger rail, freight rail, air, marine) plus elements from Combination #1. The objective of Combination #2 is to provide more area transportation system capacity for the movement of people and goods without providing new/expanded municipal roads and provincial highways;

- **Combination #3** – Widen municipal roads and/or provincial highways beyond what is currently planned, plus elements from Combination #2. The objective of Combination #3 is to provide more area transportation system capacity for the movement of people and goods without providing new provincial highways;
- **Combination #4** – New provincial roadways (highways/transitways), plus elements from Combination #3.

3.3 Detailed Description and Assessment of 'Area Transportation System' Alternatives

The assessment of the long list of individual 'Area Transportation System' Alternatives is presented in the following sections and is summarized in **Exhibit 3.9**.

3.3.1 Do Nothing

As noted in Report C, the "Do Nothing" alternative indicates that the currently planned improvements will not be sufficient to accommodate the future travel demands resulting from planned growth in population and employment. Analysis of the "Do Nothing" alternative, using the travel demand forecasting model, identified that the Highway 7&8 corridor will experience significant capacity deficiencies in the Analysis Area in future horizon years. These deficiencies are detailed in **Report C.**

3.3.2 Improved Local Transit Services

Increasing transit usage is a key component of the strategies for accommodating future travel demands as identified in the Provincial Growth Plan. Increasing transit service in the Analysis Area may reduce auto trips and thereby relieve congestion and increase the performance of the transportation system. Transit service within the Region of Waterloo is currently provided by Grand River Transit (GRT). In Stratford, local transit services are provided within the City.

GRT operates as a broad based bus operator providing service to the Cities of Kitchener, Waterloo and Cambridge. There is currently only limited regular transit service provided outside of these urban areas and no service is provided to Wilmot Township or within the New Hamburg area. MobilityPLUS, a specialized transit service for seniors and physically or mentally challenged residents, does offer service to residents within Wilmot Township on an appointment basis.

The City of Stratford transit system operates a series of 6 fixed transit routes within the City, each running on 30 minute service frequency between the hours of 6:00 am and 10:00 pm on weekdays, and 6:00 am to 8:00 pm on Saturdays. The main transit terminal is located in downtown Stratford, at City Hall, and all routes start and end at that location. To the east, there are two routes that service the east of the City and the neighbourhoods adjacent to the Highway 7&8 corridor, within the Stratford City limits. Service is provided as far east as C.H. Meier Boulevard. To the north, service is provided as far north as Perth Line 36, and to the west, service is provided along the Highway 8 corridor as far west as O'Loane Avenue. The City also provides special services to the industrial areas in the south end of the City, during rush hours

with an extension of the Downie Route and the Queensland Routes south of Lorne Avenue to serve the industrial factories along the Highway 7 /Erie Street and Wright Boulevard areas.

GRT aspires to increase the transit mode share within the Region of Waterloo, as a strategy to more effectively deal with planned population and employment growth. The Region of Waterloo began an Environmental Assessment (EA) in July 2005 for the development of rapid transit in the Central Transit Corridor that extends from Cambridge to Waterloo. A ridership of 31,000 by 2041 and a system-wide ridership increase of 10-15% is anticipated.

An increase in transit mode share resulting from GRT and the anticipated Region of Waterloo Rapid Transit initiative improvements will reduce the rate of growth of auto trip making but growth in auto trips will still occur. The planned Waterloo Rapid Transit system will not offer service in the same corridor as Highway 7&8, although the Region is looking at enhancing their feeder bus network as part of their ongoing Transportation Plan update. With transit connections to the Stratford and New Hamburg areas, the Waterloo Rapid transit initiative could significantly improve the number of destinations that can be conveniently accessed by higher order transit for Analysis Area residents, particularly destinations in the RIM Park, University of Waterloo area, and the industrial areas of south Kitchener and Cambridge.

While the City of Stratford has a general desire to improve transit ridership within their local service area, there are no plans to significantly expand or upgrade service beyond what exists today. It can be expected that the City would extend basic transit service into the newly developing areas in northeast and west Stratford over the 2031 planning horizon.

Despite these positive developments, improved local transit does not provide an opportunity to reduce vehicle demands on the Highway 7&8 corridor between the Stratford and New Hamburg areas. Improved transit in the City of Stratford may have a modest benefit on local traffic on the portions of Highway 7&8 that travel between the east end of Stratford and the downtown. Should the Region of Waterloo decide to implement regular transit service to the New Hamburg and Baden areas of Wilmot Township, this could result in some limited reduction of auto demands for the section of Highway 7&8 to the east of the Analysis Area. There is limited potential to attract through traffic away from the congested two-lane section of Highway 7&8 between the Stratford and New Hamburg communities. As a result, the Area Transportation System will still operate with congestion in the Highway 7&8 corridor between and through the built up areas of both communities.

Local transit is therefore not considered to be effective as an individual alternative in addressing the Analysis Area transportation problems and opportunities.

3.3.3 Transportation Demand Management (TDM)

TDM encompasses a wide range of potential measures, ranging from financial incentives/ disincentives to changes in development patterns. The following list of TDM measures may have some applicability in addressing future travel demands, and a brief discussion about the applicability of each strategy in addressing long term travel demands in the Analysis Area is provided below:

- Land Use Policies (also known as Smart Growth);
- Special Event and Tourist Transport Management;
- Ridesharing;
- Commute Trip Reduction;
- Telecommuting;
- Road Pricing; and
- Vehicle Restrictions.

Land Use Policies (also known as Smart Growth) – Land use policies involve changes in land-use planning to encourage increased density and mixed-use development, to reduce overall travel demand and average trip lengths while facilitating the use of alternative travel modes. The Provincial Growth Plan provides an overarching framework for how these policy objectives are expected to be implemented within the Greater Golden Horseshoe. While portions of the Analysis Area fall outside of the official boundaries where the Growth Plan is applied, the concept of increasing densities, intensification within existing built up areas, and promoting more mixed use development patterns are typically included in most modern Official Plans.

Many of the benefits of land use policies are noticed at the local level, where higher densities and mixed land uses support transit use and increased walking and cycling within neighbourhoods. Increased densities will reduce the amount of land used for housing, commercial, and employment uses and will also result in more centralized activity centres within communities.

One of the other benefits of land use policies is the increased internalization of trip making, where more residents can both live and work within the same community or neighbourhood area. Land use plans that can encourage internalization of trip making can have more of an influence on regional travel patterns although this is subject to how the overall balance of jobs and population is distributed within the Analysis Area.

The benefits of improved land use policies have already been incorporated into the base forecasts of demands in the Analysis Area, primarily through the allocation of population and employment growth (in accordance with Places to Grow targets and local Official Plans) at the zone level. This is also reflected in the assumption that more development growth will be accommodated though intensification in existing built up areas (i.e. community boundaries will not continuously expand to accommodate new growth beyond approved limits).

The benefits of achieving an improved balance between population and employment within a community, which is key to increasing the internalization of trip making, has also already been incorporated through the use of land use forecasts reflecting the Official Plans prepared by each municipality (or the Provincial Growth Plan) which implement policies to achieve the same objectives.

Special Event and Tourist Transport Management: Special Event and Tourist Transportation Management encourages the use of alternative travel modes to areas or events that draw large crowds, such as festivals, games and fairs. These types of programs can include a variety of

specific strategies to improve transport options, integrate alternative transportation into tourist activities, provide disincentives to drive, and promote alternative modes.

These can include the following:

- Introducing special Transit, Shuttle and Ridesharing services in an area;
- Incorporating transit or shuttle costs into the admission fees;
- Providing special Taxi services, such as shared taxi;
- Encouraging carpooling and vanpooling; and
- Providing transportation access guides to nearby special events and tourist areas.

In Ontario there are a few successful examples of Special Event / Tourist Transportation Management that have been implemented already. The Niagara Falls area has a well developed transportation system geared towards tourists, which utilizes shuttles and the Niagara Parks People Mover System to transport visitors to various attractions in the community. The opening of Casino Niagara included an extensive Transportation Management Program including privately operated shuttle buses, satellite parking facilities, and off site employee parking facilities to help manage automobile demands in the prime tourist areas. Similar programs have been implemented for Casino Rama.

The application of Special Event and Tourist Transport Management in the Analysis Area may have some applicability in serving the demands associated with travel to and from the Stratford Festival, which generates between 500,000 and 600,000 visitors per season. To some extent, the Festival has already undertaken some steps to provide and/or promote alternative forms of transportation to and from Festival events. The Festival website provides visitors with a series of travel options for how to get to Stratford, and a special non-stop shuttle is provided between Toronto and Stratford during peak times in the season. Other private operators, such as VIA rail and Greyhound Coach Lines, also provide service to Stratford with schedule options designed to reflect show times at the theatres.

While a more aggressive approach to tourist traffic management could be examined, it is important to note that the deficiency assessment undertaken as part of the Report C work has focused on typical weekday conditions as opposed to weekend or worst case conditions that may be associated with special event and peak tourist seasons. It is expected that more aggressive tourist traffic management strategies would target these peak conditions and would have minimal influence on typical weekday travel patterns. Therefore the base forecasts have been prepared taking into account these existing approaches to managing tourist traffic demands and it has been assumed that these would continue as long as the Festival continues to be the significant tourist attraction that it is today.

Ridesharing – Ridesharing includes a range of measures to encourage carpooling and vanpooling in order to increase the average occupancy of vehicles on the road network during peak periods. Ridesharing includes carpools, which use private automobiles, and vanpools, which use larger vans often provided by employers or government agencies.

Members of each rideshare group have commute trip origins and destinations in the same general vicinity and similar work schedules. They may either agree to meet at a common location (e.g. park and ride lot) or arrange for pick up and drop off at each end of the trip. Participants either share the cost of using one vehicle or take turns driving and providing the vehicle. Car and vanpools are commonly arranged informally through groups of friends and neighbours, or more formally by employers for their employees, or through third parties, often run or supported by government.

Successful ridesharing programs typically include a number of measures to facilitate and promote car and van pooling, including:

- Ride matching tools to help commuters form carpools or vanpools on the basis of common origins, destinations and schedules;
- High occupancy vehicle (HOV) lanes and other HOV priority measures to reduce travel times for car and vanpools, relative to general traffic;
- Incentives such as preferential parking and subsidization of administration costs;
- Emergency transportation to transport carpool members who miss arranged rides due to unexpected schedule changes, mechanical problems, etc; and
- Locally focused advertising/promotion.

The Ontario Ministry of Transportation (MTO) has long had a policy of supporting ridesharing, but practical support for implementation was generally limited to providing free carpool parking lots near freeway interchanges. Recently, the MTO has begun implementing HOV lanes on provincial freeways, including Highway 403 in Mississauga, Highway 404 southbound in Markham/Toronto and Highway 417 in Ottawa. MTO is also incorporating HOV provisions into many of their planning studies for provincial highways in the Greater Golden Horseshoe.

Markets for ridesharing and public transit tend to overlap. This can result in ridesharing capturing transit users, in addition to vehicle drivers, and reducing the overall transit mode split.

Ridesharing can make a small but significant contribution to peak period vehicle travel reductions, and typically has better effectiveness for longer distance trips between large activity centres (population and employment). Although implementation is at a very early stage in Ontario, there is strong government/policy support for ridesharing through the Province's implementation or carpool lots and HOV lanes on GTA highways over the past few years.

Successful examples are available in the United States and Canada to guide implementation in this area, but ridesharing will remain at a disadvantage in the Analysis Area if incentives such as HOV lanes and carpool lots are not widely available or incorporated into existing or planned local infrastructure.

In the long-term, with full implementation of a program of promotion and incentives, ridesharing can be expected to reduce peak period vehicle travel for work trips in the Analysis Area by as much as 3%. This estimate has already accounted for the potential overlap with transit.

Walking/Cycling – Measures aimed at encouraging walking / cycling through the provision of bike lanes, paths, support facilities and other incentives to encourage increased use of non-vehicular travel modes, particularly for short trips have been increasingly used in many jurisdictions to reduce auto demands and improve community liveability. Given the physical nature of walking and cycling, strategies tend to be most able to influence mode choice for short trip lengths, under 5 km in length. In local municipalities, programs and infrastructure design to encourage walking and cycling have been found to reduce short auto trips by up to 5%. Of course these results may be achievable during the summer months, with less trip reductions during the winter and other periods of inclement weather.

The Ministry of Public Infrastructure Renewal document *Places to Grow – Proposed Growth Plan for the Greater Golden Horseshoe* includes a requirement for municipalities to integrate pedestrian and bicycle networks within their transportation planning processes and ensure that appropriate facilities are provided in existing communities and new developments.

While this type of Transportation Demand Management approach may have some localized benefits in terms of reducing auto trips through the urban areas of Stratford and New Hamburg, it is unlikely that inter-regional travelers using the 2-lane section of Highway 7&8 would shift from the auto to other non-motorized forms of travel, even if specialized facilities were provided. Over the long term, a potential reduction in auto trips of 5% could be expected to occur for those trips that are under 5 km in length.

Telecommuting – Telecommuting involves the development of policies and the application of communications technology to allow employees to work from home some days of the week. Workers who telecommute typically do so between one and three days per week, traveling to their employer's location on the other days to complete tasks that cannot be done remotely.

Telecommuting programs are typically implemented by individual employers, although they may be encouraged/supported by government. Employer contributions to telecommuting typically include:

- Policies to define the positions and activities that can be done through telecommuting, as well as the responsibilities of the employee and employer;
- Providing some or all required equipment; and
- Subsidizing communication costs.

Although telecommuters typically work from home, some employers may establish telework centres. These are office facilities located near employees' homes that may be shared by multiple companies. A short trip to the telework centre, often on foot or bicycle, replaces the long commute to the employer's main facility.

Governments / municipalities play a limited role in the implementation of telecommuting, except in the case of their own employees, or in providing funding for enabling technology, such as High Speed Internet services. Promotion of telecommuting by government can increase its adoption. Typical promotional activities can include:

- Providing telecommuting programs for government employees, as an example for others to follow;
- Providing information and resources for employers and employees; and
- Providing tax credits or other financial incentives to offset the costs of implementing telecommuting.

The federal government and most provincial governments currently offer telecommuting programs for their employees. Revenue Canada allows telecommuters tax deductions for some home office expenses.

Telecommuting greatly reduces the work-related travel of those employees who participate. For example, an employee who telecommutes only two days per week reduces their commute trips by 40%. The contribution of telecommuting to reductions in region-wide vehicle-kilometres of travel is small because of the relatively low number of employees who can and do telecommute. Work-related travel reductions are also slightly offset by increases in non-work trips for purposes that would previously have been accomplished as part of the commute to or from work. The ability to telecommute may also encourage employees to live farther from their place of employment, as the length of commute becomes less important than the cost and characteristics of housing.

An assessment of long-term travel trends in the United States concluded that telecommuting does reduce overall vehicle-kilometres of travel (VKT), but the reduction is very small, estimated at 0.8% or less. Other American research estimated that the long-term travel reductions due to telecommuting would be 1-2% or less, but could range as high as 4%, if 10% of the workforce telecommutes on any given day. An assessment of current telecommuting in California estimated an overall travel reduction of approximately 0.6%, with an estimated 6.1% of the workforce participating and 1.5% of the workforce telecommuting on any given day.

In Canada, the proportion of workers who telecommute at least one day a week has been estimated to grow from 6.4% in 2004 to 8.4% in 2008. This would translate into approximately 1.7% of employees telecommuting on any given day, which can be expected to produce an approximate 0.7% decrease in overall travel, assuming characteristics similar to the California data cited above.

Telecommuting is likely to play an increasing role in the commuter transportation mix as more jobs become information-focused and telecommunications technology continues to improve. This is particularly relevant given the proximity of the Analysis Area to the High Tech employment centre in the Region of Waterloo. Telecommuting has the advantage of completely removing some commute trips from the transportation network, and is particularly attractive for long trips.

However, telecommuting faces significant barriers to implementation and can only be applied to certain types of jobs. As a result of these disadvantages, its contribution to overall commuter travel reduction will remain small for the foreseeable future. The maximum contribution of telecommuting to future reduction in overall vehicle travel is probably in the order of 1%.

Road pricing – With road pricing, motorists must pay a fee in order to travel on a particular facility or within a designated area. As a TDM strategy, the objective of road pricing (also called congestion pricing) is to decrease the demand for vehicle travel during peak periods by increasing its cost. The payment of a fee linked to time of day, traffic volumes or congestion levels can induce motorists to change the time of their commute trips, change travel modes, change travel routes or reduce their travel, depending on the nature of the road pricing program.

Road pricing programs have typically been implemented through the use of variable toll rates, central area (or cordon) tolls, high-occupancy/toll (HOT) lanes and variable parking charges. Highway 407 in the GTA uses a form of Road Pricing strategy to maintain free flowing conditions on the facility during peak periods while optimizing revenue during off peak periods by charging lower toll rates and encouraging more usage.

One of the best-known road pricing programs in the world is the London Congestion Charging Zone. Under this program, all private vehicles must pay an £8.00 per day fee to travel within a designated area of central London between 7:00 a.m. and 6:30 p.m. on weekdays. Implemented in 2003, the program has produced significant reductions in traffic volumes and congestion within the designated area.

The effects of road pricing on peak period travel demand are dependent on the type and amount of fees charged, as well as factors such as the availability of alternative travel modes or alternative "free" routes. Research completed by the California Air Resources Board in 1998 indicates that road pricing can be expected to reduce area-wide vehicle kilometres of travel by approximately 1-3%, which the Center for Clean Air Policy recommends for quantifying the benefits of congestion pricing. Other studies, based on modelling or monitoring of actual implementations, have shown travel reductions ranging from less than 1% to over 25%, with the highest rates occurring with area tolling in heavily congested areas.

Road pricing has the advantage of applying a financial cost to motorists that is directly related to the level of congestion at the time and location of travel. As a result, it can strongly influence choice of travel time, route and mode. Given current public and political attitudes to tolls, it is unlikely that road pricing could be implemented in the Analysis Area in the foreseeable future, and any implementation would need to carefully consider the potential adverse impacts on local economies that rely on tourist traffic. As a result of this disadvantage, road pricing is not expected to produce any significant, area-wide reduction in vehicle travel.

Vehicle Restrictions – The use of vehicle restrictions can provide road authorities some tools to manage traffic demands on specific roadways or in localized areas. Examples of vehicle restrictions can include road closings to create pedestrian malls, the use of time of day based vehicle restrictions (such as banning turns during peak hours), or restricting certain vehicles or classes of vehicles from using certain routes (such as the approach sometimes used to restrict heavy truck traffic from using highways that pass through town).

In the context of the Analysis Area, it is unlikely that vehicle restrictions would be implemented to restrict use of the Highway 7&8 corridor, as one of its roles is to facilitate the movement of

people and goods between communities. Vehicle restrictions may have some limited application within the built up areas of Stratford or New Hamburg to limit the unwanted affects of traffic infiltration to local roads as a result of congestion delays on the highway network. These types of applications would have localized affects and would tend to shift traffic to other routes as opposed to reducing the demand. As a result it is not anticipated that vehicle restrictions would have any significant affect in the Analysis Area.

Summary of TDM Measures

The estimated effects of TDM are based on research conducted into each of the TDM measures, and which reflects the results obtained from prior use of TDM in North America. The research results have been translated to the Analysis Area in consideration of the existing and planned land use and transportation characteristics of the Analysis Area. Based on this review of the potential TDM measures that could be utilized in the Analysis Area, ridersharing and telecommuting have the highest potential to reduce auto trip making in the Highway 7&8 corridor, particularly for work related travel.

Additional auto trip reductions may be realized through reductions in the average home-work trip length that are expected to occur with implementation of Provincial Growth Plan policies and objectives, specifically an increase in the proportion of internal trips within each community (which have already been accounted for in the foundation population and employment assumptions in the base forecasts). Measures to encourage walking and cycling have some potential to reduce auto demands, but this potential is limited to short trips under 5 km in length.

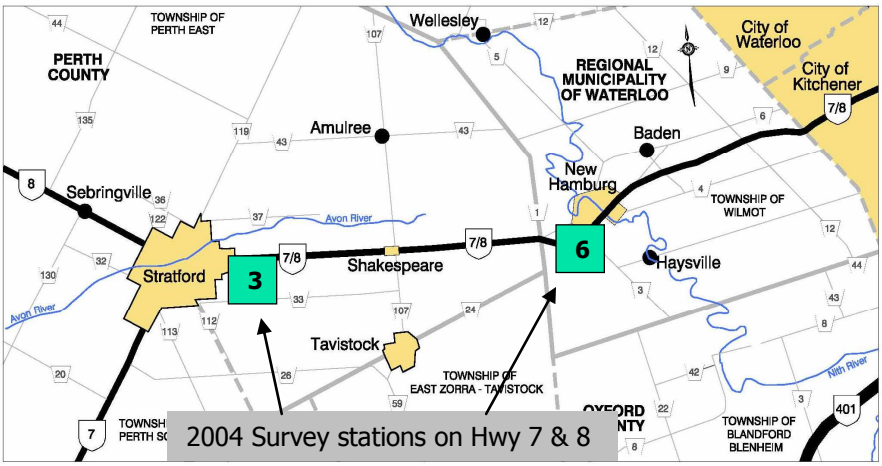
A summary of the potential for variations in auto trip reduction by trip length and for phasing in of trip reductions over time is summarized in **Exhibit 3.1**.

Exhibit 3.1: Summary of TDM Auto Trip Reduction Potential (Exclusive of Transit)

TDM Measure	Short Trips (<10 km)			Long Trips (>10 km)		
	2011	2021	2031	2011	2021	2031
Smart Growth (Provincial Growth Plan Effect)	Accounted for in base forecasts					
Special Event and Tourist Transport Management	Accounted for in base weekday forecasts. Highest potential for weekend demands.					
Ridesharing (numbers reflect potential for overlap with transit)	1%	2%	2%	2%	3%	3%
Walking/Cycling (except winter)	2%	4%	5%	-	-	-
Telecommuting	-	0.5%	0.5%	1%	1%	1.5%
Road Pricing	No effect expected under current policy regime.					
Vehicle Restrictions	No effect expected under current policy regime					

To assess the potential for ridesharing and telecommuting to reduce travel demands in the Analysis Area, the assessment first considered the target market that could be attracted to shift their travel behaviour. As the research has indicated, rideshare programs and programs to encourage employees to work from home are most effective in shifting longer distance trips. To assess this market, the travel patterns observed during the 2004 Origin-Destination Survey were reviewed, with a particular focus on the two survey stations located on Highway 7&8 between Stratford and New Hamburg. The locations of these stations are illustrated in **Exhibit 3.2**.

Exhibit 3.2: Survey Stations on Highway 7&8



For stations 3 and 6, the trip lengths and current auto occupancies were examined for each of the main trip purposes used to categorize the travel demand. As summarized in **Exhibit 3.3**, work trips have the shortest trip lengths, which average 44 km in length. Work trips also share the lowest auto occupancy, with an average of 1.18 persons per vehicle observed for typical weekday conditions.

Shopping and personal trips using the Highway 7&8 corridor have much longer trip lengths, likely reflecting the fact that those who are using this facility are using it for inter-city or inter-regional shopping trips as opposed to their day-to-day shopping at local merchants. This is further supported by the high auto occupancy rates observed for these trips, averaging 1.85 persons per vehicle. This likely reflects the fact that interregional shopping and personal trips tend to revolve around family oriented activities. A similar trend is noted for recreational /vacation trips.

Based on this review, ridesharing is already a significant feature of travel in the Analysis Area for shopping / personal and recreational / vacation trips. The potential for any further increase is not considered significant. There is some potential to improve auto occupancies for work trips, although it is noted that the GTA auto occupancies are closer to 1.2 persons per vehicle during peak periods, in an environment of heavy congestion. The opportunity to improve upon the current occupancies is limited as well.

Exhibit 3.3: Average Weekday Trip Lengths / Auto Occupancies on Highway 7&8

Trip Purpose	Trip Length (km) Station 3	Auto Occupancy Station 3	Trip Length (km) Station 6	Auto Occupancy Station 6
Work / Business	43	1.18	45	1.18
Shopping / Personal	60	1.88	62	1.83
Recreation/ Vacation	131	2.43	112	2.30

To quantify the potential market for work trips that could be attracted to carpooling / telecommuting the current and future origin-destination patterns for trips from the Analysis Area to major / adjacent municipalities was examined. **Exhibit 3.4** summarizes the current and future demands between the Analysis Area and the major urban centres of Waterloo, Kitchener, Cambridge, London, Guelph-Wellington, and the GTA.

Under base forecasts, by 2031 it is expected that there will be approximately 7,300 daily work trips from the Analysis Area (which includes Perth County, Stratford and St Marys), to these key employment areas. About 5,300 of these (73%) will be as Auto Drivers. By applying the 5% auto trip reduction factor, suggested through the background research, the estimated number of daily work person trips that could be diverted due to ridesharing and telecommuting is estimated at 240 per direction. Assuming these are all single occupant vehicles this would translate to a reduction of 240 vehicles per direction or 480 vehicles per day (including the return trips from work to home).

Exhibit 3.4: Estimated Trip Reduction Benefit of TDM on Highway 7&8

From the Analysis Area To:	Total Person Trips 2001	Total Person Trips 2031	Auto Driver Trips 2031 Base	Auto Driver Trips 2031 TDM Scenario	Reduction
Waterloo	780	951	734	702	32
Kitchener	1,110	1,563	1,221	1166	55
Cambridge	259	303	245	234	11
London Area	1,709	2255	1749	1670	79
Guelph-Wellington	1,200	1736	1347	1287	60
GTA	379	406	270	258	12
Hamilton-Niagara	80	53	42	40	2
Total	**5,517**	**7,267**	**5,608**	**5,357**	**251**

Therefore the projected cumulative role of TDM within the Analysis Area is relatively minimal. With a forecasted 2031 AADT of 20,000 on the two lane section of Highway 7&8, the reduction of 480 vehicles per day represents a 2.4% reduction in corridor volume. This reduction alone does not address the forecasted deficiencies identified in Report C.

3.3.4 Transportation System Management (TSM)

TSM strategies can improve the efficiency and safety of the existing transportation system and optimize the use of existing and planned infrastructure through such initiatives as described below:

- ***Access Management:*** This method focuses on controlling access onto major roads, such as Highway 7&8 in order to minimize conflicts and friction caused by multiple, closely spaced intersections. Methods can include removal, consolidation and redirection of existing intersections and entrances and strict restriction to future highway access.

- ***Intersection Modifications:*** Methods usually include intersection improvements, signal timing optimizations, and signal progression. Other innovative solutions include the use of video cameras and a centralized control center to make real-time adjustments to signal operations.

- ***Transit Priority Facility:*** Solutions might include the provision of diamond lanes, queue jumps, and transit signal priority lights.

- ***Intelligent Transportation Systems (ITS):*** Examples of some technology advances that might be beneficial include but are not limited to providing and installing changeable message signs along Highway 7&8, providing and implementing an incident management system, and providing and implementing multimodal traveler information services.

- ***Grade Separation:*** This method can significantly increase roadway capacity, since intersections are a major cause of traffic delay and often reach their capacity before the mainline section of road reaches its capacity. Railroad crossings are also a major cause of traffic delay. Grade separation of rail lines and the implementation of interchanges / or grade separating crossing roads can increase through traffic capacity and may defer the need for highway widening.

Under 2004 traffic conditions, most of the key intersections along Highway 7&8 were operating within acceptable levels of service during the a.m. and p.m. peak hours, except for the existing intersections on the existing 4-lane portion of Highway 7&8 through New Hamburg. Undertaking Transportation System Optimization improvements could defer the need for widening the highway in the short term.

Future growth forecasts to 2031 (as noted in Report C) have shown that the two-lane section of Highway 7&8 from 2.0 km East of Stratford Limits to Waterloo Regional Road 1 will be operating well over its capacity by 2031 resulting in poor levels of service. The existing intersections would be expected to fail before the highway reached its capacity. Improving the intersections, controlling access, or even considering grade separations is not going to increase the mainline through capacity of the highway in the longer term; it will only preserve the existing capacity that is there today.

Therefore, Transportation System Management is not considered to be effective as an individual alternative in addressing the Analysis Area transportation problems and opportunities.

3.3.5 Improved and/or New Air Transport Service

There are currently two airports operating in or near the Analysis Area - the Stratford Municipal Airport, located approximately 6 km northeast of the city, and the Waterloo Regional Airport, located northwest of Highway 401 in Breslau.

The Stratford Municipal Airport was recently expanded to better serve the needs of the business community as well as visitors to Stratford. The airport has two runways and is classified as an airport of entry by NAV CANADA and is staffed by the Canada Border Services Agency.

The Waterloo airport accommodates cargo, business charter, flight training and provides scheduled international (Detroit) and charter passenger service via small commuter aircraft. National or international travel destinations are serviced through Toronto Pearson Airport or Hamilton's Munro Airport approximately.

Air travel for person trips or freight does not have a significant role in the transportation that takes place between the City of Stratford and the Region of Waterloo for a number of reasons including:

- Passenger air travel is most effective over long distances;
- Air transport for freight is effective for high-value, time-sensitive goods shipped over long distances;
- The travel patterns associated with people travel in the Highway 7&8 corridor (existing and future) is not considered a viable market for air travel mode – average work / business trips are 43-45 km;
- The type and volume of goods movement, and the origin and destination of shipping has low potential for diversion to air transport;
- The Stratford Airport does not offer commuter air services, and those who might access air services at the Waterloo Regional airport would still utilize the Highway 7&8 corridor; and
- High operating costs associated with airports and air travel would be prohibitive in terms of using air as an alternative travel mode for inter-regional trip making in the Analysis Area.

Increased air travel is not expected to affect the people or goods flow in the Highway 7&8 corridor.

3.3.6 Improved and/or New Inter-Regional Transit and Passenger Rail Service

Currently, the only inter-city bus service provider in the area is Greyhound Bus Lines, which has only one bus terminal in the Analysis Area (located in downtown Stratford). Greyhound offers 2 buses per day between Stratford & Kitchener (departing Stratford at 9:20 am and 4:20 pm, and

returning from Kitchener at 12:05 pm and 6:05 pm). From Kitchener, connections are available to Guelph, Toronto, Hamilton and most other major destinations in Ontario.

GO Transit currently offers no service in this area of the province but is undertaking a study to investigate improved connections/service to the Analysis Area. Via Rail operates on both CN and CP rail networks throughout Ontario and provides east-west passenger service connections in Brantford and Kitchener.

VIA Rail offers inter-city transit services in the corridor using the Goderich-Exeter Rail Line (GEXR), immediately south of the Highway 7&8 corridor. VIA provides daily service between Sarnia, London, St Marys, Stratford, Kitchener and the GTA, with three trains running per day per direction between Stratford and Toronto. Train service between Stratford and Toronto is provided at 6:09, 8:52, and 21:00, with return trips leaving Toronto at 10:50, 17:40, and 22:00. Travel time by train is 2 hours each way.

Total ridership on the Toronto to Sarnia line for 2007 was approximately 468,000 passengers and is forecast to grow to 480,000 in 2008[1]. The busiest segment of this line is the London to Toronto segment, although ridership by segment is not currently available. VIA ridership to/ from the Stratford station has been increasing significantly between 2004 and 2007, with a reported increase in annual ridership of approximately 50% over this time period. In 2007 there were 47,000 riders that accessed VIA rail services at the Stratford station.

With regard to future transit improvements, the province recently announced that GO Transit bus service will be expanded to the Kitchener-Waterloo area, and there have been feasibility studies examining the extension of Rail service to either Cambridge or Kitchener in the longer term future.

The Region of Waterloo is also undertaking an Individual EA study to implement Rapid Transit in their Central Transit Corridor, running north-south between Waterloo, Kitchener and Cambridge. The Region is planning to integrate this service with both regional surface transit routes and the VIA / future GO rail service should it be extended. While the Waterloo Rapid Transit (RT) service would not directly compete with the Highway 7&8 corridor as a transportation option for commuters, the improved linkages provided to Waterloo and Cambridge could improve the overall market of destinations that will be better served by transit in the future.

Improved intercity transit in the Highway 7&8 corridor, or use of the existing VIA rail service to Kitchener (with a transfer to this improved transit network) could offer a significant opportunity to increase transit use in the Analysis Area and boost ridership from local residents.

The market for transit service for non work related trips is difficult to quantify without detailed information on the purpose of transit trips that are using existing services. Based on information provided by VIA Rail we understand that the London – Toronto segment of the service is heavily used by commuters and business travelers, although it is recognized that vacation travelers,

[1] Information provided by VIA Rail, via email

particularly to Stratford, may also make up some portion of the current demand. It should be noted that many of the Stratford Festival patrons who travel by transit come as part of organized bus tours and/or the Festival bus shuttle service.

Based on the 2001 Census Place of Work data, it estimated that there are approximately 170 daily work trips from the Analysis Area to major municipalities to the east that are currently made by some form of transit. These include trips to the Region of Waterloo, Guelph, and the GTA. Assuming 260 work days per year, this translates into a current demand of approximately 88,000 transit trips per year from the Analysis Area to external municipalities for work purposes. Given the current ridership using the VIA rail station at Stratford and the limited bus service to/from Stratford it is assumed that the majority of the current transit trips using VIA and Greyhound services are for work and business purposes.

Accordingly, the potential for the transit market in the Highway 7&8 corridor has been estimated based on the potential modes shares that may be achievable for work and business purposes, using the 2001 Census Place of Work data as a baseline.

Exhibit 3.4 summarizes the current future base, and future projected transit shares that may be achievable if improvements are made to the current system.

For 2001, the Census Place of Work data shows that the overall demand for travel from the Analysis Area to major municipalities to the East is approximately 5,500 persons per day, in each direction. Of these, 225 are trips made by some form of transit, which represents a current mode share of 4.1% for these longer distance work trips. Forecast of growth in work trips to 2031 indicate that this overall demand would increase to approximately 7,300 person trips per day, with 275 using the transit mode – assuming no change to mode shares.

Future mode share targets were established for each of the major destinations based on current mode shares, and the potential share of future trips that may be achievable with a relatively aggressive focus on improving and marketing future transit services. For trips to and from the Region of Waterloo, a future mode share target of 10% was considered feasible, given the focus that the Region has placed on encouraging new transit ridership, and the potential for integrated rail / bus and RT services through the Central Transit Corridor. Opportunities to enhance the transit service to Guelph and the GTA markets through enhanced VIA rail service of a potential GO bus / rail extension to Kitchener has been assumed to result in a 10% transit share to Guelph (up from 1% today) and a 30% transit mode share to the GTA (up from 21% today).

As illustrated in **Exhibit 3.5**, the potential market for new transit trips is estimated at 700 person trips per day per direction, or 1,400 persons per day by 2031.

In order to serve the existing, estimated and 2031 level of demand as noted above, the following types of transit service could be considered:

- Bus service - with a capacity of 50 persons per bus, the estimated daily demand would require 28 buses (running at 100% occupancy) or 35 buses running at 80% occupancy.

- Light Rail Transit - with a capacity of 200 persons per train (two vehicle sets), the estimated daily demand would require 4 vehicle (train) sets (likely running on 30 minute service frequency) by 2031.
- Train service - with a capacity of 1,400 persons per train, the calculated peak hour demand would require 1 additional train per day by 2031.

Assuming all of these work trips come from the auto mode, and based on the current weekday auto occupancy of 1.18, this translates into a reduction of 1,185 vehicles per day from Highway 7&8.

Exhibit 3.5: Estimation of Future Transit Potential

From the Study Area To:	Total Person Trips 2001	Transit Person Trips 2001	2001 Transit Split	Total Person Trips 2031	Auto Driver Trips 2031 Base	2031 Transit Persons Base	Aggressive Transit Share	2031 Potential Transit Person Trips
Waterloo	780	31	4.0%	951	734	38	10.0%	95
Kitchener	1,110	39	3.5%	1,563	1,221	55	10.0%	156
Cambridge	259	5	1.9%	303	245	6	10.0%	30
London Area	1,709	54	3.2%	2255	1749	71	5.0%	113
Guelph-Wellington	1,200	11	0.9%	1736	1347	16	10.0%	174
GTA	379	81	21.4%	406	270	87	30.0%	122
Ham-Niagara	80	3	3.8%	53	42	2	5.0%	3
Total	**5,517**	**224**	**4.1%**	**7,267**	**5,608**	**275**		**693**

The opportunities to increase the share of trips by transit have been estimated without consideration for capacity constraints within the current transit systems and infrastructure. For example, VIA rail does not own the tracks it uses; they run on tracks owned by Goderich-Exeter Railway (GEXR) which also serves freight demands in this corridor. Depending on the availability of track capacity, adding an additional train per day may require a second track to be provided or layby facilities to accommodate other freight users.

To implement Light Rail Transit, a new corridor would need to be protected (within and beyond the Analysis Area) or a second track would be required in the existing rail corridor as there are operating restrictions for Light Rail Vehicles operating on Heavy Rail lines due to safety and crashworthiness considerations. Conventional transit buses operating on the existing Highway 7&8 corridor may have limited potential to significantly increase ridership and transit mode share, due to travel time and reliability issues inherent in operating in mixed traffic, congested conditions. A separate lane or new facility may be required to ensure travel time competitiveness. The transit service would have to be very cost competitive, convenient and offer a frequency and reliability of service that would rival or exceed the auto use.

While transit is considered an important and required service in the corridor, it cannot on its own reduce auto trip demand or the congested conditions within the corridor to achieve acceptable levels of service.

3.3.7 Improved and/or New Freight Rail Service

As noted previously, some of the freight movements in the Highway 7&8 transportation corridor are serviced by the Goderich-Exeter Railway (GEXR). GEXR is a subsidiary of RailAmerica, and operates approximately 169 miles of track (part owned and part leased from CN) between Georgetown and London, Stratford and Goderich, and between Clinton and Centralia. Between 1998 and 2001, the GEXR averaged 19,000 to 20,000 carloads annually. In 2004 they carried 28,806 carloads[2]. The major commodities carried are Auto Parts; Chemicals; Grain; Heavy Machinery; Paper; and Salt.

Railways are best suited for carrying long distance freight between major terminals. The highest volumes of rail freight are bulk commodities and inter-modal freight containers. Some long-haul freight could be diverted from trucks operating through the Analysis Area, but truck traffic in the Highway 7&8 corridor represents a small component of road-based travel and is predominantly service and delivery oriented (i.e. low potential for diversion to rail). Forecasts of truck usage to 2031 is approximately 1,500 daily truck trips using Highway 7&8, between Stratford and New Hamburg. Based on the 2000 Commercial Vehicle Survey data, approximately 63% of the truck demands are for short to medium distance trips (local to/from the Region of Waterloo). The long distance freight market currently served by trucks is estimated at 560 vehicles per day. Even if all of this could be shifted to rail, this would not remove enough traffic from the Highway 7&8 corridor to address the forecasted 2031 capacity deficiencies.

[2] 2008, Canadian National Railway Company

3.3.8 Improved and/or New Marine Service

The nearest marine passenger/cargo operations are located in Hamilton. Ferry service or other marine passenger transportation/cargo shipping is not presently provided within the greater Analysis Area. Many rivers, in particular the Avon River, are used for recreational purposes but do not serve a passenger transport or goods movement role.

This mode is not considered applicable in terms of reducing travel demand in the Highway 7&8 corridor.

3.3.9 Widen Municipal Roads

The "Do Nothing" alternative includes a range of transportation improvements, including widening of existing roads. Previously planned road network improvements do not however provide sufficient additional capacity to accommodate the travel demands that are forecast to occur in the 2031 horizon years. One potential way of providing the increased capacity required to meet the projected future travel demands is to provide additional improvements to municipal roads, including further widening or new roads.

The needs statement indicates that a road capacity deficiency of 1 highway lane in each direction will be experienced by 2031. In terms of capacity the two-lane section of Highway 7&8 was forecast to carry a two way Design Hour Volume of 2000 vph in 2031, with 1200 vph in the peak direction (based on a 60/40 split). Under current volumes Highway 7&8 is operating at LOS D, based on peak direction flows of 640 vph. For planning purposes, capacity improvements should be considered when LOS D or worse is experienced to ensure the efficient movement of people and goods within the corridor.

To achieve an acceptable operation on this existing facility, peak flows of 600 vph hour (equivalent to a two way demand of 1000 vph) would need to be accommodated on the municipal road network.

Widening or improving Perth Road 33 or Perth Line 37 to the north may provide sufficient capacity to accommodate future demands, but constraints due to reduced speed limits, numerous properties fronting onto these roadways, and lower design standards for these municipal roads would prohibit the development of high capacity / high speed alternative routes that would be capable of drawing enough traffic out of the Highway 7&8 corridor.

The more difficult challenge is to address the capacity requirements through the built up areas of Stratford and New Hamburg in order to provide improved connections between these improved municipal roads and the existing provincial highways leading into the Analysis Area. Forecasts of 2031 volumes on Highway 7&8 through New Hamburg has shown that the mainline sections would operate at capacity by 2031, even with the current 4-lane cross section. Operations at the intersections would fail before that timeframe due to delays caused by sideroad traffic and turning traffic.

In the New Hamburg area (see **Exhibit 3.6**), there are no continuous municipal road connections to the north or south of Highway 7&8 that could serve as a viable alternative route to Highway 7&8, without making a number of jogs at offset intersections. This would significantly limit the effectiveness of these municipal roads in accommodating long distance through traffic demands.

Exhibit 3.6: Local Road Network – New Hamburg Area

Source: Google Maps

In the Stratford area (see **Exhibit 3.7**), there are better local road connections to the provincial highway network, but the local congestion levels in downtown Stratford are the main impediment to widening using these local roads to address Highway 7&8 deficiencies. Perth Road 33, on the south of Stratford becomes Lorne Avenue and becomes much more built up in the urban area of the City. Even if highway oriented traffic could be attracted to use this roadway, this would result in more significant traffic infiltration through the local neighbourhoods as through traffic and trucks try to get to Highway 8 to proceed west. A similar problem exists with the use of Perth Line 37, to the north. At the north end of Stratford, through traffic and trucks would need to follow Perth Road 119 through the downtown area to access Highway 7 to the south and Highway 8 to proceed west.

Exhibit 3.7: Local Road Network – Stratford Area

Source: Google Maps

While the widening of existing roads may be viable, improvements to the Highway 7&8 corridor would be constrained by the existing built-up areas of Stratford and New Hamburg. Municipal roadways are also not designed to carry large volumes of long-distance auto or commercial vehicle traffic. Problems relating to network continuity, network redundancy and safety associated with the high volumes in and through these communities would remain.

It is noted that the routing of additional long distance, provincial traffic to municipal roads would introduce conflicts with local uses of these roads, particularly for the movement of farm vehicles or the movement of pedestrians in the urban built up areas. Additional traffic would increase wear and tear on municipal roadways and increase longer term maintenance costs for municipalities, particularly where heavy truck traffic is diverted to these corridors.

3.3.10 Improved and/or New Provincial Highways / Transitways

Widening of existing Highway 7&8 between Stratford and New Hamburg is one potential way of providing the additional capacity required to meet the projected future travel demands. Another alternative is to provide a new provincial highway / transitway corridor connecting the two communities and providing improved connections between the freeway section of Highway 7&8 and the separate Highway 7 and Highway 8 corridors on the west side of Stratford.

Widening the existing two-lane section of Highway 7&8 to four lanes shows that the widening effectively addresses the east-west deficiency for these segments in 2031.

Exhibit 3.8: Level of Service – Widening Existing 2-Lane Section of Highway 7&8

Highway 7 & 8	Lanes	2004 AADT	2031 AADT	Annual Growth Rate	2031 DHV	2031 DHV v/c Ratio	2031 LOS
Waterloo RR 5	4	19,200	54,200	3.9%	5,420	0.90	E
Waterloo RR 4 (east Junction)	4	20,700	49,200	3.3%	4,920	1.23	F*
Waterloo RR 4 (west Junction)	4	14,400	36,300	3.5%	3,630	0.91	E*
Waterloo RR 1	4	10,600	20,000	2.4%	2,000	0.50	C
Perth Road 107 - Shakespeare	4	10,100	19,100	2.4%	1,910	0.76	C
East of Stratford Limits	4	10,100	19,000	2.4%	1,900	0.48	A
Stratford Limits	4	18,000	28,600	1.7%	2,860	1.07	F
Romeo St							

Segment over capacity

The projected capacity deficiencies are still prevalent through the New Hamburg area. Highway 7&8 between the east and west junctions of Waterloo Road 4 will be over capacity and would require additional widening to 6 through lanes to address the forecasted congestion. For the section of Highway 7&8 between Waterloo Road 4 and Waterloo Road 1, the mainline will be operating close to the planning capacity and the intersections in this area will be congested during peak periods. Additional widening through these intersections could be undertaken to address the intersection capacity deficiencies in this segment.

The analysis also shows that capacity deficiencies are still prevalent in downtown Stratford. For the provincial role and function of the highway to be preserved it is important that the capacity be continuous throughout the Analysis Area. To achieve this function, the widening of Highway 7&8 would result in a need for a by-pass of downtown Stratford that provides a direct connection to Highway 7, to the south, and Highway 8, to the west.

Providing transportation capacity on new corridors would increase the capacity and performance of the transportation network and provide relief to forecasted network congestion. By definition, new provincial highways / transitways would only be considered as higher order corridors that maintain a high degree of access control in order to preserve the travel mobility characteristics of the corridor. Commercial and private entrances would be prohibited and access would be limited to: at-grade highway intersections or potentially highway interchanges with key municipal arterial roads; and to transit stations for a provincial transitway. The following higher order, limited access alternatives could be considered:

- New provincial roadway;

- New higher order priority transit services on new infrastructure such as Bus Rapid Transit (BRT) or Light Rail Transit (LRT); and
- Both a new provincial roadway and new higher order transit service.

3.4 Summary of Assessment of Transportation System Alternatives

The transportation network in the Analysis Area provides service to the urban communities of New Hamburg and Stratford, the rural areas between, plus links to areas beyond through connections via Highway 7 to London, and Highway 8 to Goderich and Grand Bend. The capability of individual alternatives to address all of the identified problems and opportunities, as "stand alone" solutions has been described in detail above and summarized in **Exhibit 3.9**.

The summary table demonstrates that while many of the alternatives would contribute positively to the identified problems and opportunities in the Analysis Area, most are limited in their effectiveness when considered individually. As a result, and in recognition that transportation system solutions require comprehensive, multimodal strategies for long term effectiveness and sustainability, the individual alternatives are grouped into logical Combination Alternatives for further detailed assessment. The Combination Alternatives and their assessment are described in further detail in the **Section 4.0**.

Exhibit 3.9: Assessment of the Long List of Area Transportation System Alternatives

FACTOR	CRITERIA	DO NOTHING	LOCAL TRANSIT	TDM	TSM	FREIGHT RAIL	AIR SERVICE	MARINE SERVICE	INTER-REGIONAL TRANSIT AND PASSENGER RAIL	MUNICIPAL ROADS	PROVINCIAL HIGHWAYS/ TRANSITWAYS
1. Potential to address transportation problems and opportunities	1.1 Potential to address the efficient movement of people between the built up areas of Greater Stratford and the New Hamburg area	Low potential to improve the efficient movement of people. Operational performance of the transportation system will degrade over time with planned population and employment growth in the Analysis Area.	Low potential to improve the efficient movement of people through operation of inter-municipal transit services. Opportunities to shift person trips from auto to transit are limited by broad distribution of trip making within the Analysis Area, and buses operating in congested mixed traffic.	Low potential to improve the efficient movement of people through reduced reliance on the single occupant vehicle (e.g. ridesharing and telecommuting programs will have lower benefits given the current auto occupancy rates - 1.85 person/vehicle for non-work trips and 1.18 person/vehicle for work trips).	Low potential to improve the efficient movement of people through optimization (e.g. intersection improvements, signal upgrades) of existing transportation system.	Low potential to improve the efficient movement of people by removing truck traffic from the transportation system (e.g. shifting goods movement from trucks to rail). Opportunities for mode shift are limited by trip length, commodity types and distribution patterns.	Low potential to improve the efficient movement of people by shifting trips from auto to air. Opportunities to shift person trips from auto to air travel is very limited given that person travel consists of predominantly short distance, commuter based trips.	No potential to improve the efficient movement of people by shifting trips from auto to marine service.	Low to moderate potential to improve the efficient movement of people by shifting trips from auto to inter-regional transit and/or passenger rail service. Effectiveness for inter-regional bus service may be limited by lack of transit service from east end of Analysis Area to Kitchener-Waterloo.	Moderate potential to improve the efficient movement of people through new or improved municipal roads. Local roads are less effective than highways for longer distance, inter-regional travel. Constraints to road widening in the urban areas of Stratford and New Hamburg limit improvement opportunities.	High potential to improve the efficient movement of people through widening of existing Highway 7&8 and/or implementation of new highway/ transitway corridor. Highways are more effective than municipal roads for longer distance, inter-regional travel.
	1.2 Potential to address the efficient movement of goods between the built up areas of Greater Stratford and the New Hamburg area	Low potential to improve the efficient movement of goods. Operational performance of the transportation system will degrade over time with planned population and employment growth in the Analysis Area.	Low potential to improve the efficient movement of goods through removal of auto trips from the transportation system. Opportunities to shift person trips from auto to transit are limited as noted above.	Low potential to improve the efficient movement of goods through removal of auto trips from the transportation system. (e.g. ridesharing and telecommuting programs will have lower benefits given the current auto occupancy rates - 1.85 person/vehicle for non-work trips and 1.18 person/vehicle for work trips).	Low potential to improve the efficient movement of goods through optimization (e.g. intersection improvements, signal upgrades) of existing transportation system.	Low to moderate potential to improve the efficient movement of goods through transfer of freight from truck to rail. Opportunities for mode shift are limited by trip length, commodity types and distribution patterns.	Low potential to improve the efficient movement of goods through transfer of freight from truck to air service. Opportunities to shift freight from truck to air shipping are very limited given lack of air transport services in Analysis Area, commodity types and distribution patterns.	No potential to improve the efficient movement of goods through transfer of freight from truck to marine service.	Low to moderate potential to improve the efficient movement of goods through transfer of auto trips from the transportation system. Opportunities to shift person trips from auto to inter-regional transit are limited as noted above.	Moderate potential to improve the efficient movement of goods through new or improved municipal roads. Constraints to road widening in the urban areas of Stratford and New Hamburg limit improvement opportunities.	High potential to improve the efficient movement of goods through greatest improvement to transportation system congestion and implementation of new highway/ transitway corridor.
	1.3 Potential to address recreational / tourist travel within and through the Analysis Area	Low potential to facilitate recreational and tourist travel. Operational performance of the transportation system will degrade over time with planned population and employment growth in the Analysis Area.	Low potential to facilitate recreational and tourist travel, based on minor improvement to travel through Analysis Area.	Low potential to improve recreation and tourist travel based on minor improvement to travel through Analysis Area.	Low potential to improve recreation and tourist travel through optimization (e.g. intersection improvements, signal upgrades) of existing transportation system.	Low potential to improve recreation and tourist travel by removing truck traffic from the transportation system.	Low potential to improve recreation and tourist travel given lack of air services and low levels of demand to Analysis Area.	No potential to improve recreation and tourist travel based on marine service.	Low to moderate potential to improve recreation and tourist travel given lack of existing rail corridors between the two communities and congestion on existing road network.	Low potential to improve recreation and tourist travel through new or improved municipal roads.	High potential to provide direct access to recreation and tourist destinations through implementation of new highway/ transitway corridor.
	1.4 Potential to address system reliability / redundancy	Low potential to improve system reliability/ redundancy with lowest improvement to transportation system congestion, no improvement to mode choice and no new transportation corridors.	Low potential to improve system reliability / redundancy with low improvement to transportation system congestion, minor improvement to mode choice and no new transportation corridors.	Low potential to improve system reliability. No improvement to system redundancy with no new travel corridors.	Low potential to improve system reliability with low improvement to transportation system congestion. No improvement to system redundancy with no new travel corridors.	Low potential to improve system reliability with low improvement to transportation system congestion. Low potential to improve system redundancy by provision of increased modal choice for freight transport.	Low potential to improve system reliability with low improvement to transportation system congestion. Low potential to improve system redundancy by provision of increased modal choice for person travel and freight transport.	No potential to improve system reliability. No improvement to system redundancy with no new travel corridors.	Low to moderate potential to improve system reliability and redundancy by provision of increased modal choice for person travel.	Moderate potential to improve system reliability and redundancy through new municipal roads.	High potential to improve system reliability and redundancy through implementation of new highway/ transitway corridor for route choice opportunities.
	1.5 Potential to address transportation system safety	Low potential to improve safety. Safety experience generally degrades with increased network congestion.	Low potential to improve safety through minor improvement to transportation system congestion.					No potential to improve safety. Safety experience generally degrades with increased network congestion.	Low potential to improve safety through minor improvement to transportation system congestion.	Moderate potential to improve safety through new or improved municipal roads and associated reduction to network congestion.	High potential increase in safety through greatest improvement to transportation system congestion and provision of new highway/ transitway corridor.

Exhibit 3.9: Assessment of the Long List of Area Transportation System Alternatives

FACTOR	CRITERIA	DO NOTHING	LOCAL TRANSIT	TDM	TSM	FREIGHT RAIL	AIR SERVICE	MARINE SERVICE	INTER-REGIONAL TRANSIT AND PASSENGER RAIL	MUNICIPAL ROADS	PROVINCIAL HIGHWAYS/ TRANSITWAYS
	1.6 Potential to address accessibility between Greater Stratford and the New Hamburg area	Low potential to improve accessibility to urban/work centers or existing provincial highway network with increased network congestion.	Low potential to improve accessibility to urban / work centers and the provincial highway network based on minor improvement to transportation system congestion.					No potential to improve accessibility to urban/work centers or existing provincial highway network with increased network congestion.	Low potential to improve accessibility to urban / work centers and the provincial highway network based on minor improvement to transportation system congestion.	Moderate potential to improve accessibility to urban / work centers and the provincial highway network through new or improved municipal roads.	High potential to increase accessibility to urban / work centers and the provincial highway network based on greatest improvement to transportation system congestion and improved/new municipal roads.
	1.7 Potential to provide transportation modal opportunities in support of provincial policy objectives, including the GGH Growth Plan objective for improved inter-regional transit between Greater Stratford and the New Hamburg area	Low potential to improve modal choice, increase modal splits for person trips and goods movement or address the opportunity for higher order transit within the Analysis Area.	Low potential to improve modal opportunities within the Analysis Area. Opportunities to shift person trips from auto to transit are limited by broad distribution of trip making within the Analysis Area, and buses operating in congested mixed traffic.	Low potential to improve modal choice within the Analysis Area with no improvements to other travel modes.		Low potential to improve modal choice for person trips and goods movement within the Analysis Area based on minor potential for feasible modal opportunities.		No potential to improve modal choice, increase modal splits for person trips and goods movement or address the opportunity for higher order transit within the Analysis Area.	Low potential to improve modal choice for person trips within the Analysis Area. Opportunities to shift person trips from auto to transit are limited by broad distribution of trip making within the Analysis Area, and buses operating in congested mixed traffic.	Low potential to improve modal choice for person trips and goods movement within the Analysis Area through new or improved municipal roads.	High potential to address modal opportunities within the Analysis Area through reduced congestion on transportation system and dedicated transit corridor.
2. Support for provincial and municipal policies (Greater Golden Horseshoe Growth Plan, Official Plans, etc.)	Potential to support designated urban growth centres	Low support for efficient transportation connections between population and employment growth centres.	Low support for efficient transportation connections between population and employment growth centres but transit is a key component in provincial and municipal transportation planning policies.	Low support for efficient transportation connections between population and employment growth centres, but auto reduction strategies are consistent with provincial and municipal transportation planning policies.	Low support for efficient transportation connections between population and employment growth centres.	Low support for efficient transportation connections between population and employment growth centres but auto reduction and multi-modal strategies are consistent with provincial and municipal transportation planning policies.		No support for efficient transportation connections between population and employment growth centres.	Low support for efficient transportation connections between population and employment growth centres but transit is a key component in provincial and municipal transportation planning policies.	Moderate support for efficient transportation connections between population and employment growth centres.	High support as transit is a key component in provincial and municipal transportation planning policies.
3. Supports land use and growth objectives of province and municipalities	Potential to address transportation system and land use planning objectives	Low support for approved population and employment growth in Analysis Area due to transportation system congestion.	Low support for approved population and employment growth in Analysis Area due to transportation system congestion.							Moderate support for approved population and employment growth in Analysis Area based on improvements to transportation system congestion.	High support for approved population and employment growth in Analysis Area based on most improvements to transportation system congestion.
SUMMARY OF ASSESSMENT		The **Do Nothing** Alternative provides low support for transportation and policy objectives as it fails to address transportation system congestion.	**Municipal Transit** is an important element of sustainable transportation planning, but as an individual alternative it provides only minor support for transportation and policy objectives as it fails to address transportation system congestion.	**TDM** is an important element of sustainable transportation planning, but provides only minor support for transportation and policy objectives as it fails to address transportation system congestion.	**TSM** is an important element of sustainable transportation planning, but provides only minor support for transportation and policy objectives as it fails to address transportation system congestion.	**Freight Rail** is an important element of sustainable transportation planning, but provides only minor support for transportation and policy objectives as it fails to address transportation system congestion.	**Air Service** provides only minor support for ground based transportation and policy objectives as it fails to address transportation system congestion.	**Marine Service** provides no support for ground based transportation and policy objectives as it fails to address transportation system congestion.	**Inter-Regional Transit** is an important element of sustainable transportation planning, but as an individual alternative it provides only minor support for transportation and policy objectives as it fails to address transportation system congestion.	**New/ Improved Municipal Roads** provide moderate potential to address transportation congestion but limited support for policy objectives as there are no strategies to promote mode shifts for person trips and goods movement.	**New/ Improved Provincial Highways/ Transitways** provide high potential to address transportation system congestion and support for policy objectives with provision of transitway to promote mode shift for person trips.
RECOMMENDATION		**Carry forward only as a benchmark for comparison.**	**Carry forward as supporting elements of Combination Transportation System Alternatives**								

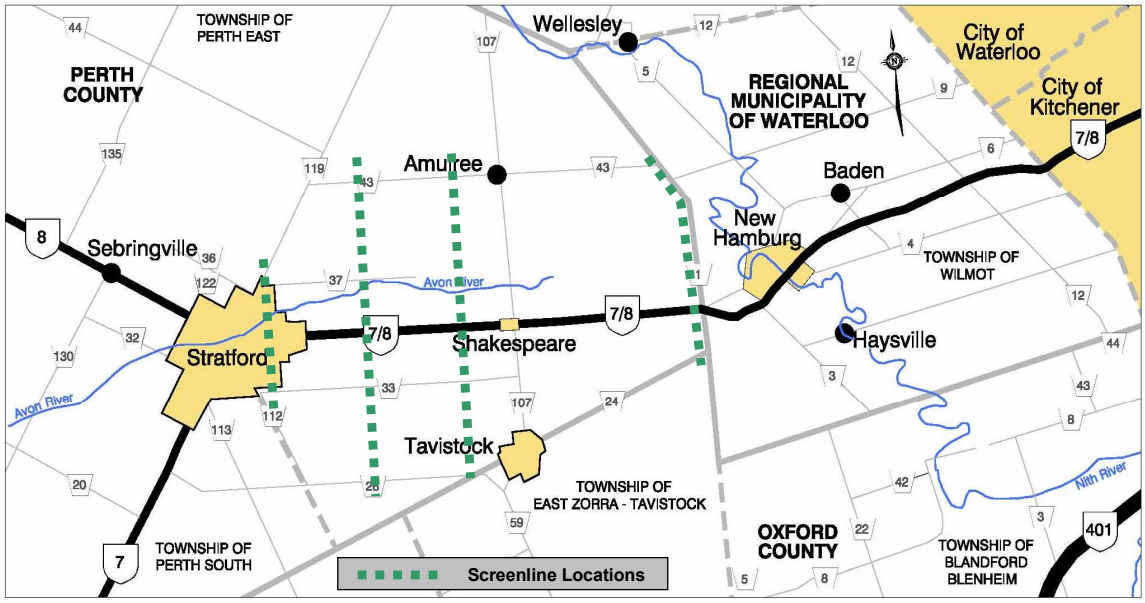
High – Significant potential to address identified problems and opportunities.
Moderate – Some potential to address identified problems and opportunities.
Low – Negligible to minor potential to address identified problems and opportunities.
No - No potential to address identified problems and opportunities.

4.0 DEVELOPMENT AND ASSESSMENT OF COMBINATIONS OF AREA TRANSPORTATION SYSTEM ALTERNATIVES

A combination of the individual "Alternatives to the Undertaking" is desirable to effectively address the identified problems and opportunities. Four separate Combination Alternatives have been developed, with each building upon the most desirable and effective elements of the individual alternatives in successively distinctive ways.

In order to assess the effect of each combination, an assessment was completed for each of the four combinations for 2031. The initial assessment examined the forecasted traffic flows using the Highway 7&8 corridor for each alternative to determine to degree to which the improvement scenario would address the previously identified deficiency. The assessment has also examined the traffic volumes crossing four screenlines, as illustrated in **Exhibit 4.1**. The screenline assessment allows for the consideration of relative impacts and benefits related to shifts in traffic between parallel roadways in the Analysis Area as a result of each alternative.

Exhibit 4.1: Analysis Area Screenline Locations



The following terms are used in each of the analysis tables and are explained below:

Screenline: A screenline is a real or imaginary barrier within the Analysis Area, such as a road, river, rail line, or municipal boundary. It is used to evaluate the cumulative travel demands on the roadways crossing this barrier.

Volume: The amount of traffic measured on a particular roadway (or section of roadway). For the purpose of this assessment DHV (Design Hour Volumes) have been used to represent the volumes that need to be accommodated within the Analysis Area. Design Hour Volumes for local municipal roads have been

assumed to follow the same pattern as for Highway 7&8, and thus 10% of the daily volume has been used in the assessment.

Capacity: The maximum number of vehicles which can pass over a given section of lane or roadway in one direction, or in both directions, during a given time period (typically an hour) under normal, non congested, conditions.

v/c Ratio Volume / Capacity Ratios represent the volume of traffic versus the ability of the roadway to accommodate traffic flow. The v/c ratio provides a measure of traffic volume demand to the available capacity, with a capacity condition represented by a v/c ratio of 1.0 (i.e. volume equals capacity).

The capacity of the roadway is dependant on the prevailing speed, the number of lanes to serve demand, and the role and function of the roadway. For example, the more side street access, driveway access and intersection roadways, the less effective capacity is available on the roadway. The screenline analysis compares the demand flow (traffic volume) across the screenline to the available capacity provided across the screenline.

4.1 Combination #1 – Optimize Existing Network

Optimizing all modes of the existing transportation system would improve system efficiency without major investment in new infrastructure. The assessment of the individual alternatives demonstrated the limitations of transit, transportation demand management (TDM) and transportation system management (TSM) in addressing the efficient movement of people and goods on their own. This Combination Alternative examines the effectiveness of all of these elements working together. **Exhibit 4.2** summarizes deficiency analysis after incorporating the effects of the strategies on the volume and capacity of the network.

A traffic volume reduction of approximately 2.4% has been used, based on the assessment of Transportation Demand Management reductions that could be expected.

Exhibit 4.2: Deficiency Analysis – 2031 – Combination 1 - Comparison to Base Conditions

Highway 7 & 8	Lanes	2031 AADT Base	2031 DHV Base	2031 DHV v/c Ratio	2031 AADT Combo 1	2031 DHV Combo 1	2031 DHV v/c Ratio	Daily Volume Reduction
Waterloo RR 5	4	54,200	5,420	0.90	53,900	5,390	0.90	300
Waterloo RR 4 (east Junction)	4	49,200	4,920	1.23	48,900	4,890	1.22	300
Waterloo RR 4 (west Junction)	4	36,300	3,630	0.91	36,000	3,600	0.90	300
Waterloo RR 1	2	20,000	2,000	1.60	19,800	1,980	1.58	200
Perth Road 107 - Shakespeare	2	19,100	1,910	1.53	18,900	1,890	1.51	200
East of Stratford Limits	4	19,000	1,900	0.48	18,800	1,880	0.47	200
Stratford Limits	4	28,600	2,860	1.07	28,100	2,810	1.05	500
Romeo St								
	Segment over capacity				Average Daily Vehicle Reduction			300

The results show that this combination would not achieve the reductions necessary to negate the need for additional services and/or infrastructure. There is limited reduction in volumes in Highway 7&8 corridor, and the optimization of the existing intersections while improving their operation, does not resolve forecast link capacity deficiencies.

Based on an analysis of the warrant for passing lanes along the two-lane section of Highway 7&8, a condition of lane obsolescence has been identified. This condition occurs when there are a high percentage of slow moving vehicles, and thus the benefit of providing passing lanes is negated since queues will typically accumulate immediately after the termination of the passing lane. Under such conditions, there is no benefit to providing passing lanes and the required capacity improvement involves the provision of additional 'through' lanes, either through widening of the existing highway to four lanes or the construction of a new parallel arterial highway corridor.

Exhibit 4.3 illustrates the screenline assessment results for Combination 1 at the four key screenlines between Stratford and New Hamburg. While many of the local roads will continue to perform at reasonable levels of service, the Highway 7&8 corridor will operate at LOS F (representing congested conditions) at three of the four screenline locations. This reflects the attractiveness of this route for longer distance, regional traffic compared to the local roads in the Analysis Area. Due to congestion in the Highway 7&8 corridor, the screenline analysis shows that some of the local traffic will re-route to the parallel road network. Perth Road 33 and Perth Road 26 are key alternate routes that will see increased traffic. Perth Road 26 is forecast to be operating at LOS D for this scenario.

Exhibit 4.3: Screenline Analysis – 2031 – Combination 1

			Peak Direction			
Screenline	**Facility**	**AADT**	**DHV**	**Capacity**	**V/C**	**LOS**
Perth-Waterloo Boundary	Perth Rd 43	1,800	110	600	0.18	A
	Perth Rd 37	50	10	600	0.02	A
	Highway 7/8	19,800	1,190	750	1.59	F
	Perth-Oxford Rd 101	3,200	200	600	0.33	A
	Total	**24,850**	**1,510**	**2,550**	**0.59**	**C**
West of Perth Rd 107	Perth Rd 43	1,900	120	600	0.20	A
	Perth Rd 37	400	30	600	0.05	A
	Highway 7/8	18,900	1,140	750	1.52	F
	Perth Rd 33	3,100	190	600	0.32	A
	Perth Rd 26	6,700	410	600	0.68	D
	Total	**31,000**	**1,890**	**3,150**	**0.60**	**C**
West of Perth Rd 110	Perth Rd 43	1,700	110	600	0.18	A
	Perth Rd 37	1,300	80	600	0.13	A
	Highway 7/8	18,800	1,130	1,600	0.71	C
	Perth Rd 33	3,900	240	600	0.40	A
	Perth Rd 26	8,200	500	600	0.83	D
	Total	**33,900**	**2,060**	**4,000**	**0.52**	**A**
East of Romeo St	Perth Rd 37	1,200	80	600	0.13	A
	McCarthy Blvd	6,400	390	800	0.49	A
	Highway 7/8	28,100	1,690	1,600	1.06	F
	Douro St	14,600	880	800	1.10	F
	Perth Rd 33	3,900	240	600	0.40	A
	Total	**54,200**	**3,280**	**4,400**	**0.75**	**C**

Operational analysis at the existing intersections in New Hamburg shows that extensive delays could be expected even if the operation of the traffic signals were optimized and additional turning lanes were added. Detailed intersection capacity analysis has shown that the existing intersections (at Haysville Road / Peel Street, and at Bleams Road/ Hamilton Road) would require dual left turn lanes on Highway 7&8, combined with up to two additional through lanes in each direction. At the Highway 7&8 and Bleams Road intersection this would result in up to 11 traffic lanes on Highway 7&8, making pedestrian crossing difficult. Dual left turn lanes would also be required on the Peel Street and Hamilton Road approaches to these intersections, to accommodate left turning traffic to Highway 7&8. Even with these improvements the intersections would operate at Level of Service D in 2031, with the through movements and left turn movements operating at or very close to capacity.

In addition to failing to address the effective movement of people and goods between Stratford and New Hamburg, this alternative has the following added limitations in terms of addressing the problems and opportunities:

- As Combination #1 provides only minor improvement to transportation system congestion it has low potential to improve system reliability for person trips and goods movement. There is no improvement to system redundancy as no new travel corridors are provided.
- Low potential to improve safety, since safety experience generally degrades with increased transportation system congestion.
- Low potential to improve accessibility to urban/work centers or existing provincial highway network as it provides only minor improvement to transportation system congestion and no new travel corridors.
- Low potential to improve modal choice, increase modal splits for person trips and goods movement or address the opportunity for higher order transit within the Analysis Area. Opportunities to shift person trips from auto to transit are limited by buses operating in congested mixed traffic. Opportunities to shift goods movement from truck to other modes are limited without new infrastructure for rail, marine or air transport.
- Low support for efficient transportation connections between population and employment growth centres due to transportation system congestion and no new travel corridors.
- Low support for approved population and employment growth in Analysis Area due to transportation system congestion.

Combination #1 is not considered to be a viable alternative to address the identified transportation problems and opportunities in the Analysis Area.

4.2 Combination #2 – New/Expanded Non-Road Infrastructure plus Elements of Combination #1

Combination #2 includes elements of Combination #1 plus new non-road infrastructure. The focus of this alternative is to determine whether the combination of optimizing the existing network plus improvements to *"non-road-based"* improvements can address the problems and

opportunities. For this assessment we have assumed that the benefits of Transportation Demand Management and System Optimization are combined with improved infrastructure to support enhanced transit ridership in the Analysis Area.

While the analysis suggests that there is a significant market for transit service in the Analysis Area, the potential to shift person trips from auto to transit is not expected to result in a significant reduction of traffic on Highway 7&8.

Exhibit 4.4 details the deficiency analysis that takes into account the reduction to vehicle trips that would be expected through the application of the combined strategies. The overall reduction of approximately 400 vehicles per day in the two lane section and 900 vehicles per day through New Hamburg represents a 2% reduction in auto trips in the corridor.

Exhibit 4.4: Deficiency Analysis – 2031 – Combination 2 - Comparison to Base Conditions

Highway 7 & 8	Lanes	2031 AADT Base	2031 DHV Base	2031 DHV v/c Ratio	2031 AADT Combo 2	2031 DHV Combo 2	2031 DHV v/c Ratio	Daily Volume Reduction
Waterloo RR 5	4	54,200	5,420	0.90	53,300	5,330	0.89	900
Waterloo RR 4 (east Junction)	4	49,200	4,920	1.23	48,300	4,830	1.21	900
Waterloo RR 4 (west Junction)	4	36,300	3,630	0.91	36,200	3,620	0.91	100
Waterloo RR 1	2	20,000	2,000	1.60	19,900	1,990	1.59	100
Perth Road 107 - Shakespeare	2	19,100	1,910	1.53	18,700	1,870	1.50	400
East of Stratford Limits	4	19,000	1,900	0.48	18,700	1,870	0.47	300
Stratford Limits	4	28,600	2,860	1.07	28,200	2,820	1.06	400
Romeo St								
	Segment over capacity				Average Daily Vehicle Reduction			400

The existing 2-lane section of Highway 7&8 would continue to operate over capacity as would the existing 4-lane section between the east and west junctions of Waterloo Road 4. The intersections through the other segments in New Hamburg would continue to experience extensive delays and congestion due to high mainline volumes, approaching capacity, and high turning volumes at the intersections. Capacity issues would also remain through downtown Stratford.

Exhibit 4.5 illustrates the screenline assessment results for Combination 2 at the four key screenlines between Stratford and New Hamburg. While many of the local roads will continue to perform at reasonable levels of service, the Highway 7&8 corridor will operate at LOS F (representing congested conditions) at three of the four screenline locations. This reflects the attractiveness of this route for longer distance, regional traffic compared to the local roads in the Analysis Area. Due to congestion in the Highway 7&8 corridor, the screenline analysis shows that some of the local traffic will re-route to the parallel road network. Perth Road 33 and Perth Road 26 are key alternate routes that will see increased traffic. Perth Road 26 is forecast to be operating at LOS E for this scenario.

Exhibit 4.5: Screenline Analysis – 2031 – Combination 2

Screenline	Facility	AADT	Peak Direction DHV	Capacity	V/C	LOS
Perth-Waterloo Boundary	Perth Rd 43	2,792	170	600	0.28	A
	Perth Rd 37	50	10	600	0.02	A
	Highway 7/8	19,900	1,200	750	1.60	F
	Perth-Oxford Rd 101	5,300	320	600	0.53	B
	Total	**28,042**	**1,700**	**2,550**	**0.67**	**C**
West of Perth Rd 107	Perth Rd 43	2,000	120	600	0.20	A
	Perth Rd 37	800	50	600	0.08	A
	Highway 7/8	18,700	1,130	750	1.51	F
	Perth Rd 33	3,750	230	600	0.38	A
	Perth Rd 26	8,470	510	600	0.85	E
	Total	**33,720**	**2,040**	**3,150**	**0.65**	**C**
West of Perth Rd 110	Perth Rd 43	1,800	110	600	0.18	A
	Perth Rd 37	1,420	90	600	0.15	A
	Highway 7/8	18,700	1,130	2,400	0.47	C
	Perth Rd 33	3,900	240	600	0.40	A
	Perth Rd 26	9,860	600	600	1.00	E
	Total	**35,680**	**2,170**	**4,800**	**0.45**	**A**
East of Romeo St	Perth Rd 37	1,350	90	600	0.15	A
	McCarthy Blvd	5,600	340	800	0.43	A
	Highway 7/8	28,200	1,700	1,600	1.06	F
	Douro St	14,000	840	800	1.05	E
	Perth Rd 33	3,900	240	600	0.40	A
	Total	**53,050**	**3,210**	**4,400**	**0.73**	**C**

In addition to failing to address the effective movement of people and goods between Stratford and New Hamburg, this alternative has the following added limitations in terms of addressing the problems and opportunities:

- Low potential to improve the efficient movement of people, improving mode choice for person trips but only minor improvement to transportation system congestion;
- Low potential to improve the efficient movement of goods. Mode choice for goods movement is limited and only minor improvement to transportation system congestion is provided;
- Provides improved mode choice for recreational and tourist travel but only minor improvement to transportation system congestion;
- Low potential to improve system reliability / redundancy based on a minor improvement to transportation system congestion and limited viability of new freight rail, marine and air services;
- Minor improvement to safety as the transportation system is still operating in congestion;
- Low potential to improve accessibility to urban / work centers and the provincial highway network as there are only minor improvements to transportation system congestion and no new road-based travel corridors;
- Good potential to improve modal choice for person trips and goods movement within the Analysis Area, provided that increased capacity in the rail corridor can be realized. Opportunities to shift person trips from auto to bus transit are limited by buses operating

in congested mixed traffic. Opportunities to shift goods movement from truck to other modes are low based on limited viability of new rail, marine or air transport services;

- Low support for efficient transportation connections between population and employment growth centres due to transportation system congestion and no new road-based travel corridors; and
- Low support for approved population and employment growth in Analysis Area due to transportation system congestion. Auto reduction and multi-modal strategies are consistent with provincial and municipal transportation planning policies.

Combination #2 is not considered to be a viable alternative to address the identified transportation problems and opportunities in the Analysis Area.

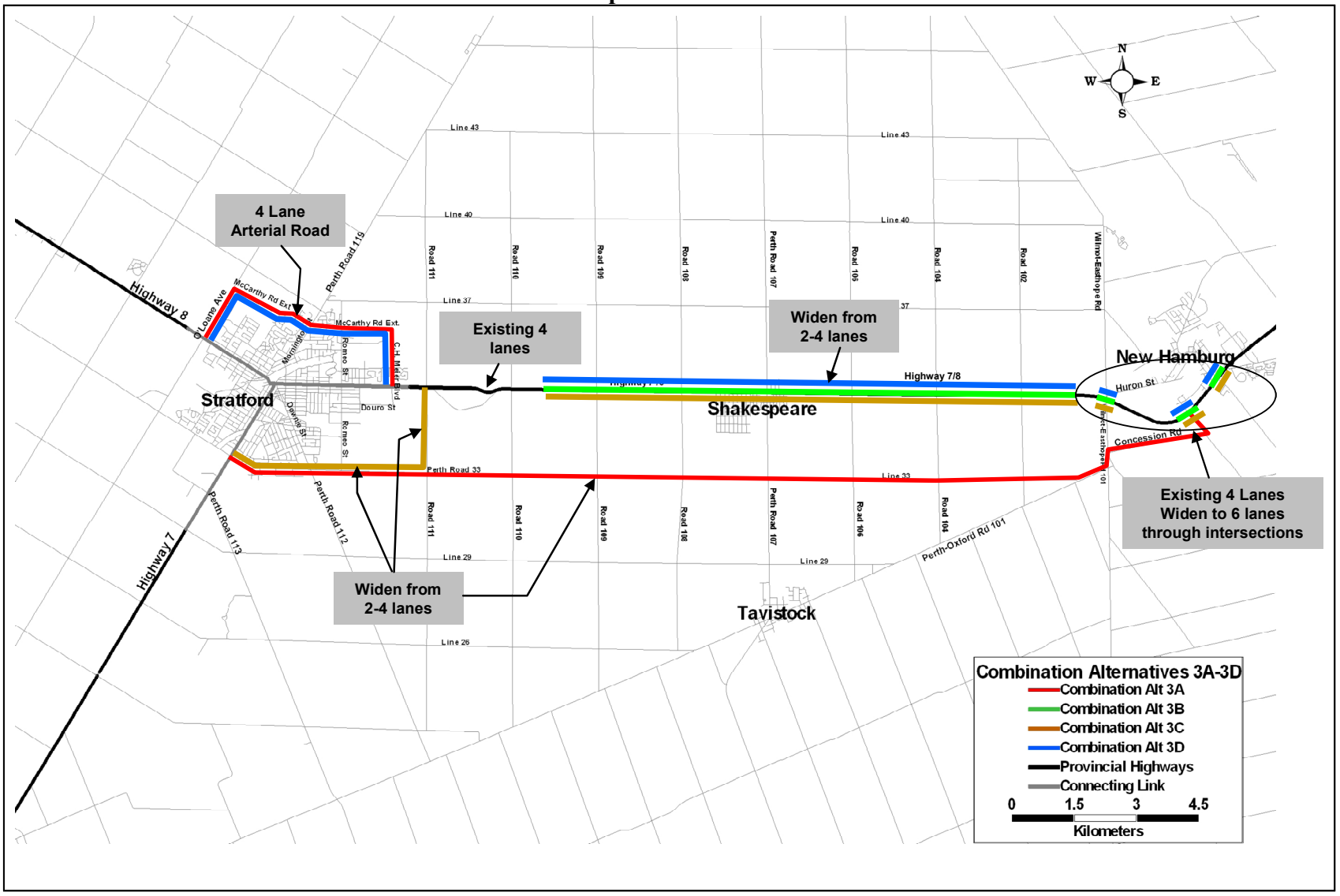
4.3 Combination #3 – Widen/Improve Roads plus Elements of Combination #2

Combination #3 includes elements from Combination #2 (expansion of the transit system(s) and other non-road (TDM) improvements) plus *road-based* improvements created through the widening/improvement of existing roadways, beyond that which is currently planned or contemplated by the province and municipalities. A number of potential combinations for improvements to existing roads could be implemented in the Analysis Area. Further definition of Combination #3 is therefore necessary in the form of network alternatives.

The network alternatives are shown schematically in **Exhibit 4.6** (and will be developed in subsequent sections) and described below:

- **Combination #3A – Widen Perth Road 33 / McCarthy Boulevard / C.H. Meier Boulevard:** Widen Perth Road 33 between Stratford and Waterloo Road 1 in New Hamburg to four through lanes, plus widen the existing and planned sections of McCarthy Boulevard to form a continuous 4 lane roadway around the north-east and north-west sections of Stratford.
- **Combination #3B – Widen Highway 7&8 to 4 Lanes, with Localized Widening to 6 Lanes through New Hamburg:** Widen existing 2-lane section of Highway 7&8 between Stratford and Waterloo Road 1 in New Hamburg and provide localized widening through the intersections of Highway 7&8 and Waterloo Road 1, Waterloo Road 4 (West), Waterloo Road 4 (East), and Waterloo Road 5;

Exhibit 4.6: Road Network Improvement Alternatives – Combinations 3Ato 3D



- **Combination #3C - Widen Highway 7&8 to 4 Lanes, with Localized Widening to 6 Lanes through New Hamburg Plus Widen Municipal Roads to South of Stratford:** Widen existing 2-lane section of Highway 7&8 between Stratford and Waterloo Road 1 in New Hamburg and provide localized widening through the intersections of Highway 7&8 and Waterloo Road 1, Waterloo Road 4 (West), Waterloo Road 4 (East), and Waterloo Road 5. Widen Perth Road 111, between Highway 7&8 and Perth Rd 33, plus widen Perth Road 33 (Loane Ave) west to Highway 7 (Erie Street) to provide an improved municipal road connection around southeast Stratford;
- **Combination #3D - Widen Highway 7&8 to 4 Lanes, with Localized Widening to 6 Lanes through New Hamburg Plus Widen Municipal Roads to North of Stratford:** Widen existing 2-lane section of Highway 7&8 between Stratford and Waterloo Road 1 in New Hamburg and provide localized widening through the intersections of Highway 7&8 and Waterloo Road 1, Waterloo Road 4 (West), Waterloo Road 4 (East), and Waterloo Road 5. Widen the proposed McCarthy Road Extension to 4 lanes to form a continuous north ring road, connecting Highway 7&8 to Highway 8, via C.H. Meier Boulevard, McCarthy Road, and Perth Road 122 (O'Loane Avenue);

Combination #3A - Widen Perth Road 33 / McCarthy Boulevard / C.H. Meier Boulevard

Combination 3A provides for a localized reduction in traffic volumes using the Highway 7&8 corridor, primarily between the west junction of Waterloo Road 4 and Waterloo Road 1, as some traffic that currently uses Waterloo Road 1 is diverted to the improved municipal road south of New Hamburg (via Walker Road and Concession Rd). To the east, Highway 7&8 is still overcapacity and the additional turning traffic at the Walker Road intersection would exacerbate existing intersection congestion.

Exhibit 4.7: Deficiency Analysis – 2031 – Combination 3A -Comparison to Base Conditions

Highway 7 & 8	Lanes	2031 AADT Base	2031 DHV Base	2031 DHV v/c Ratio	2031 AADT Combo 3a	2031 DHV Combo 3a	2031 DHV v/c Ratio	Daily Volume Reduction
Waterloo RR 5	4	54,200	5,420	0.90	55,000	5,500	0.92	-800
Waterloo RR 4 (east Junction)	4	49,200	4,920	1.23	50,000	5,000	1.25	-800
Waterloo RR 4 (west Junction)	4	36,300	3,630	0.91	20,600	2,060	0.52	15,700
Waterloo RR 1	2	20,000	2,000	1.60	19,300	1,930	1.54	700
Perth Road 107 - Shakespeare	2	19,100	1,910	1.53	19,300	1,930	1.54	-200
East of Stratford Limits	4	19,000	1,900	0.48	19,000	1,900	0.48	0
Stratford Limits	4	28,600	2,860	1.07	26,600	2,660	1.00	2,000
Romeo St								
	Segment over capacity				Average Daily Vehicle Reduction			2,400

The widening of parallel municipal roads has less benefits to the west of New Hamburg, as the additional road capacity provided on Perth Road 33 (Line 33) does not attract traffic from the

congested Highway 7&8 corridor. The existing 2-lane section of Highway 7&8 will still be operating over capacity. The lower speed, and additional friction due to entrances and lower design speeds, makes this parallel route less attractive, even in the face of growing delays on the highway corridor.

It is noted that the routing of additional long distance, provincial traffic to municipal roads would introduce conflicts with local uses of these roads, particularly for the movement of farm vehicles. Additional traffic would increase wear and tear on municipal roadways and increase longer term maintenance costs for municipalities, particularly where heavy truck traffic is diverted to these corridors.

Exhibit 4.8 summarizes the screenline analysis completed for Combination 3A. When compared to the results shown for Combination 2, there is some diversion of traffic to Perth Road 33 (estimated at between 100 -300 vehicles per day). Higher diversion results closer to the City of Stratford, where approximately 2,000 vehicles per day would divert to Perth Road 33 (Lorne Avenue), to avoid the congested Highway 7&8 corridor through the built up downtown area. The widening of Perth Road 33 does provide some localized benefits in this area.

Exhibit 4.8: Screenline Analysis – 2031 – Combination 3A

			Peak Direction			
Screenline	**Facility**	**AADT**	**DHV**	**Capacity**	**V/C**	**LOS**
Perth-Waterloo Boundary	Perth Rd 43	2,800	170	600	0.28	A
	Perth Rd 37	50	3	600	0.01	A
	Highway 7/8	19,300	1,200	750	1.60	F
	Perth-Oxford Rd 101	6,500	400	1,200	0.33	A
	Total	**28,650**	**1,773**	**3,150**	**0.56**	**A**
West of Perth Rd 107	Perth Rd 43	1,980	120	600	0.20	A
	Perth Rd 37	540	30	600	0.05	A
	Highway 7/8	19,300	1,200	750	1.60	F
	Perth Rd 33	3,800	230	1,200	0.19	A
	Perth Rd 26	8,300	500	600	0.83	D
	Total	**33,920**	**2,080**	**3,750**	**0.55**	**A**
West of Perth Rd 110	Perth Rd 43	1,800	110	600	0.18	A
	Perth Rd 37	800	50	600	0.08	A
	Highway 7/8	19,000	1,100	2,400	0.46	A
	Perth Rd 33	4,200	250	1,200	0.21	A
	Perth Rd 26	9,600	580	600	0.97	E
	Total	**35,400**	**2,090**	**5,400**	**0.39**	**A**
East of Romeo St	Perth Rd 37	680	40	600	0.07	A
	McCarthy Blvd	4,500	300	1,600	0.19	A
	Highway 7/8	26,600	1,600	1,600	1.00	E
	Douro St	13,300	800	800	1.00	E
	Perth Rd 33	4,200	300	1,200	0.25	A
	Total	**49,280**	**3,040**	**5,800**	**0.52**	**A**

Combination 3A does not address the forecast capacity deficiency in the Highway 7&8 corridor (through the 2 lane section), does not provide sufficient capacity through New Hamburg, and

does not address capacity, operational and safety concerns in downtown Stratford. Congestion in the existing corridor and through the urban areas of Stratford and New Hamburg will continue to reduce the effectiveness of Highway 7&8 for longer distance movement of people and goods. Improving the capacity of parallel municipal roads does not address the need for connectivity of the Provincial Highway network to facilitate this role.

Combination #3B - Widen Highway 7&8 to 4 Lanes, with Localized Widening to 6 Lanes through New Hamburg

The widening of Highway 7&8 in **Combination #3B** attracts additional traffic to the Highway 7&8 corridor due to the improved level of service and operating condition. The additional capacity provide in the corridor attracts an average of 2,100 additional vehicles per day into the Highway 7&8 corridor, primarily from parallel routes such as the Perth-Oxford Road 101 / Perth Road 26 route. Through the New Hamburg area, Highway 7&8 would still be operating at capacity. While widening to provide additional lanes through these intersections would allow for improved signal timing (to better allocate green time and reduce intersection delays), the benefits of the additional lanes would be reduced as congestion would be created where the mainline lanes narrow back down to 4 lanes. Through this area the mainline capacity is also deficient, and would require widening to a full 6 lanes cross section to address future congestion.

Through the existing two-lane section of Highway 7&8, the widening to four lanes does provide the necessary capacity, but additional traffic is drawn to the corridor, slightly increasing traffic volumes through the congested downtown area.

Exhibit 4.9: Deficiency Analysis – 2031 – Combination 3B - Comparison to Base Conditions

Highway 7 & 8	Lanes	2031 AADT Base	2031 DHV Base	2031 DHV v/c Ratio	2031 AADT Combo 3b	2031 DHV Combo 3b	2031 DHV v/c Ratio	Daily Volume Reduction
Waterloo RR 5	4	54,200	5,420	0.90	54,000	5,400	0.90	200
Waterloo RR 4 (east Junction)	4	49,200	4,920	1.23	49,000	4,900	1.23	200
Waterloo RR 4 (west Junction)	4	36,300	3,630	0.91	40,000	4,000	1.00	-3,700
Waterloo RR 1	4	20,000	2,000	1.60	26,000	2,600	0.65	-6,000
Perth Road 107 - Shakespeare	4	19,100	1,910	1.53	22,000	2,200	0.55	-2,900
East of Stratford Limits	4	19,000	1,900	0.48	21,300	2,130	0.53	-2,300
Stratford Limits	4	28,600	2,860	1.07	28,900	2,890	1.08	-300
Romeo St								
		Segment over capacity			Average Daily Vehicle Reduction			-2,100

Exhibit 4.10 summarizes the screenline analysis results for this alternative. As noted above, the widened Highway 7&8 will operate at excellent levels of service, and the improved operation provides some limited reduction in the amount of traffic diverting to alternative local roads.

Exhibit 4.10: Screenline Analysis – 2031 – Combination 3B

Screenline	Facility	AADT	Peak Direction DHV	Capacity	V/C	LOS
Perth-Waterloo Boundary	Perth Rd 43	1,830	110	600	0.18	A
	Perth Rd 37	50	3	600	0.01	A
	Highway 7/8	26,000	1,600	2,400	0.67	B
	Perth-Oxford Rd 101	3,000	200	600	0.33	A
	Total	**30,880**	**1,913**	**4,200**	**0.46**	**A**
West of Perth Rd 107	Perth Rd 43	1,900	110	600	0.18	A
	Perth Rd 37	400	20	600	0.03	A
	Highway 7/8	22,000	1,300	2,400	0.54	A
	Perth Rd 33	2,800	170	600	0.28	A
	Perth Rd 26	6,700	400	600	0.67	A
	Total	**33,800**	**2,000**	**4,800**	**0.42**	**A**
West of Perth Rd 110	Perth Rd 43	1,700	100	600	0.17	A
	Perth Rd 37	1,300	80	600	0.13	A
	Highway 7/8	21,300	1,300	2,400	0.54	A
	Perth Rd 33	3,700	220	600	0.37	A
	Perth Rd 26	8,200	490	600	0.82	D
	Total	**36,200**	**2,190**	**4,800**	**0.46**	**A**
East of Romeo St	Perth Rd 37	1,200	70	600	0.12	A
	McCarthy Blvd	6,400	400	800	0.50	A
	Highway 7/8	28,500	1,700	1,600	1.06	F
	Douro St	14,700	900	800	1.13	F
	Perth Rd 33	3,700	200	600	0.33	A
	Total	**54,500**	**3,270**	**4,400**	**0.74**	**C**

Due to the close proximity to Highway 7&8, volumes using Perth Road 33, are reduced by about 200-300 vehicle per day. Other parallel roads are essentially unchanged.

While Combination 3B partially addresses the forecast capacity deficiency in the Highway 7&8 corridor (through the 2-lane section), it does not provide sufficient capacity through New Hamburg, and does not address capacity, operational and safety concerns in downtown Stratford. Congestion at the intersections in New Hamburg will continue due to the high volumes of turning traffic at the key intersections. As noted previously, extensive widening of Highway 7&8 at these intersections would be required to accommodate forecasted volumes in 2031, including dual left turn lanes and up to four through lanes per direction.

Congestion through Stratford is made worse by attracting additional traffic to the Highway 7&8 corridor and into the already congested downtown core area. In addition to the impacts of this additional traffic on the urban downtown area (in terms of congestion, liveability, and pedestrian impacts), the effectiveness of Highway 7&8 in accommodating the longer distance movement of people and goods would be reduced due to the lack of efficient connections to Highway 7 and Highway 8 to the west of Stratford.

Combination #3C - Widen Highway 7&8 to 4 Lanes, with Localized Widening to 6 Lanes through New Hamburg Plus Widen Municipal Roads to South of Stratford

The widening of Highway 7&8 in **Combination #3C** attracts an average of 2,700 additional vehicles per day into the Highway 7&8 corridor, largely from parallel municipal roads. Similar to Combination 3B, Highway 7&8 would still be operating at capacity through the New Hamburg area. While widening to provide additional lanes through these intersections would allow for improved signal timing (to better allocate green time and reduce intersection delays), the benefits of the additional lanes would be reduced as congestion would be created where the mainline lanes narrow back down to 4 lanes. Through this area the mainline capacity is also deficient, and would require widening to a full 6 lane cross section to address future congestion.

Through the existing two-lane section of Highway 7&8, the widening to four lanes does provide the necessary capacity. This additional capacity draws between 5,400-6,500 vehicle per day into the corridor, although the improvements to Perth Road 111 and Perth Road 33 (Lorne Avenue), accommodates this additional demand and draws an additional 1,000 vehicles per day out of the downtown Stratford area. This level of diversion, however, does not eliminate the congestion through this downtown area.

Exhibit 4.11: Deficiency Analysis – 2031 – Combination 3C-Comparison to Base Conditions

Highway 7 & 8	Lanes	2031 AADT Base	2031 DHV Base	2031 DHV v/c Ratio	2031 AADT Combo 3c	2031 DHV Combo 3c	2031 DHV v/c Ratio	Daily Volume Reduction
Waterloo RR 5								
Waterloo RR 4 (east Junction)	4	54,200	5,420	0.90	54,000	5,400	0.90	200
Waterloo RR 4 (west Junction)	4	49,200	4,920	1.23	49,000	4,900	1.23	200
Waterloo RR 1	4	36,300	3,630	0.91	39,900	3,990	1.00	-3,600
Perth Road 107 - Shakespeare	4	20,000	2,000	1.60	26,500	2,650	0.66	-6,500
East of Stratford Limits	4	19,100	1,910	1.53	24,500	2,450	0.61	-5,400
Stratford Limits	4	19,000	1,900	0.48	23,800	2,380	0.60	-4,800
Romeo St	4	28,600	2,860	1.07	27,600	2,760	1.04	1,000
	Segment over capacity				Average Daily Vehicle Reduction			-2,700

Exhibit 4.12 summarizes the screenline analysis results for Combination 3C. As noted above, the widened Highway 7&8 draws additional traffic into the corridor, but there is sufficient capacity with 4 through lanes to maintain an acceptable level of service. This alternative is more effective in drawing through traffic off of parallel arterial roads, primarily those to the south of the Highway 7&8 corridor. Perth Road 33 and Perth Road 26 will both see a significant reduction in traffic due to the improvements to the north. When compared to Combination #1 the reduction in daily volume on Perth Road 33 ranges from 1,400-1,800 per day. An additional 800 to 1,300 per day is reduced from the volume using Perth Road 26. Within Stratford, Douro Street would see a modest reduction in daily traffic, which is attracted to the improved Perth Road 33 route around the south of the City. The reduction of traffic on the local municipal road

network provides a benefit to the municipalities in terms of reduced maintenance and life cycle costs associated with the preservation of their infrastructure and in terms of compatibility with other users of these corridors, such as farming related traffic or pedestrians in the built up areas.

Exhibit 4.12: Screenline Analysis – 2031 – Combination 3C

			Peak Direction			
Screenline	**Facility**	**AADT**	**DHV**	**Capacity**	**V/C**	**LOS**
Perth-Waterloo Boundary	Perth Rd 43	1,900	110	600	0.18	A
	Perth Rd 37	50	3	600	0.01	A
	Highway 7/8	26,500	1,600	2,400	0.67	C
	Perth-Oxford Rd 101	2,300	100	600	0.17	B
	Total	**30,750**	**1,813**	**4,200**	**0.43**	**A**
West of Perth Rd 107	Perth Rd 43	1,900	110	600	0.18	A
	Perth Rd 37	350	20	600	0.03	A
	Highway 7/8	24,500	1,500	2,400	0.63	C
	Perth Rd 33	1,300	80	600	0.13	A
	Perth Rd 26	5,900	350	600	0.58	A
	Total	**33,950**	**2,060**	**4,800**	**0.43**	**A**
West of Perth Rd 110	Perth Rd 43	1,700	100	600	0.17	A
	Perth Rd 37	1,050	60	600	0.10	A
	Highway 7/8	23,800	1,400	2,400	0.58	A
	Perth Rd 33	2,500	150	600	0.25	A
	Perth Rd 26	6,900	410	600	0.68	B
	Total	**35,950**	**2,120**	**4,800**	**0.44**	**A**
East of Romeo St	Perth Rd 37	980	60	600	0.10	A
	McCarthy Blvd	6,300	400	800	0.50	A
	Highway 7/8	27,600	1,700	1,600	1.06	F
	Douro St	11,600	700	800	0.88	D
	Perth Rd 33	8,900	500	600	0.83	D
	Total	**55,380**	**3,360**	**4,400**	**0.76**	**C**

While Combination 3C partially addresses the forecast capacity deficiency in the Highway 7&8 corridor (through the 2 lane section), it does not provide sufficient capacity through New Hamburg, and does not fully address capacity, operational and safety concerns in downtown Stratford. Congestion at the intersections in New Hamburg will continue due to the high volumes of turning traffic at the key intersections. As noted previously, extensive widening of Highway 7&8 at these intersections would be required to accommodate forecasted volumes in 2031, including dual left turn lanes and up to four through lanes per direction.

Congestion through Stratford is improved to some degree, through the improvements to local roads around the south end of the City. Although some traffic is drawn out of the downtown urban area, Highway 7&8 through the downtown core is still forecast to operate over capacity. As a result, the effectiveness of Highway 7&8 in accommodating the longer distance movement of people and goods would be reduced due to the lack of efficient connections to Highway 7 and Highway 8 to the west of Stratford. The municipal road "by-pass" of Stratford would not provide

an appropriate replacement for this type of connection, and it is unlikely that residents along these routes would want heavy trucks using local roads to by-pass the downtown areas.

Combination #3D - Widen Highway7&8 to 4 Lanes, with Localized Widening to 6 Lanes through New Hamburg Plus Widen Municipal Roads to North of Stratford

The widening of Highway 7&8 in **Combination #3D** attracts an average of 2,300 additional vehicles per day into the Highway 7&8 corridor, again largely from parallel municipal roads. Similar to Combination 3B and 3C, Highway 7&8 would still be operating at capacity through the New Hamburg area. While widening to provide additional lanes through these intersections would allow for improved signal timing (to better allocate green time and reduce intersection delays), the benefits of the additional lanes would be reduced as congestion would be created where the mainline lanes narrow back down to 4 lanes. Through this area the mainline capacity is also deficient, and would require widening to a full 6-lane cross section to address future congestion.

Through the existing two-lane section of Highway 7&8, the widening to four lanes does provide the necessary capacity. This additional capacity draws between 4,400-6,500 vehicles per day into the corridor, although the improvements to C.H. Meier Boulevard and McCarthy Road, accommodates this additional demand and draws an additional 2,200 vehicles per day out of the downtown Stratford area. This level of diversion, reduces the demand below the absolute capacity through the downtown, but does not draw enough traffic to eliminate the congestion through the downtown area.

Exhibit 4.13: Deficiency Analysis – 2031 – Combination 3D - Comparison to Base Conditions

Highway 7 & 8	Lanes	2031 AADT Base	2031 DHV Base	2031 DHV v/c Ratio	2031 AADT Combo 3d	2031 DHV Combo 3d	2031 DHV v/c Ratio	Daily Volume Reduction
Waterloo RR 5	4	54,200	5,420	0.90	53,900	5,390	0.90	300
Waterloo RR 4 (east Junction)	4	49,200	4,920	1.23	48,900	4,890	1.22	300
Waterloo RR 4 (west Junction)	4	36,300	3,630	0.91	39,900	3,990	1.00	-3,600
Waterloo RR 1	4	20,000	2,000	1.60	26,500	2,650	0.66	-6,500
Perth Road 107 - Shakespeare	4	19,100	1,910	1.53	23,500	2,350	0.59	-4,400
East of Stratford Limits	4	19,000	1,900	0.48	23,200	2,320	0.58	-4,200
Stratford Limits	4	28,600	2,860	1.07	26,400	2,640	0.99	2,200
Romeo St								
		Segment over capacity			Average Daily Vehicle Reduction			-2,300

Exhibit 4.14 summarizes the screenline analysis results for Combination 3D. As noted above, the widened Highway 7&8 draws additional traffic into the corridor, but there is sufficient capacity with 4 through lanes to maintain an acceptable level of service. This alternative is more effective in drawing through traffic off of parallel arterial roads than Combination 3C, as Perth

Road 37 also experiences some reduced traffic, closer to Stratford. Perth Road 33 and Perth Road 26 will experience reductions of 600-1000, and 900-1,100 vehicles per day respectively, due to widening of Highway 7&8 and reduced delays through the City of Stratford. The reduction of traffic on the local municipal road network provides a benefit to the municipalities in terms of reduced maintenance and life cycle costs associated with the preservation of their infrastructure and in terms of compatibility with other users of these corridors, such as farming related traffic or pedestrians in the built up areas.

The widening of the existing and planned extensions of McCarthy Road to 4 lanes will attract an additional 6,100 vehicle per day to this corridor, which is the primary reason for the lower volumes on Highway 7&8 and Douro Street, through the Stratford downtown area. McCarthy Road is forecast to operate at capacity in this scenario, which would have significant impacts on the existing and future residential land uses in the two residential growth areas in the City.

Exhibit 4.14: Screenline Analysis – 2031 – Combination 3D

			Peak Direction			
Screenline	**Facility**	**AADT**	**DHV**	**Capacity**	**V/C**	**LOS**
Perth-Waterloo Boundary	Perth Rd 43	1,800	100	600	0.17	A
	Perth Rd 37	50	3	600	0.01	A
	Highway 7/8	26,500	1,600	2,400	0.67	B
	Perth-Oxford Rd 101	2,400	140	600	0.23	A
	Total	**30,750**	**1,843**	**4,200**	**0.44**	**A**
West of Perth Rd 107	Perth Rd 43	1,900	200	600	0.33	A
	Perth Rd 37	300	100	600	0.17	A
	Highway 7/8	23,500	1,500	2,400	0.63	B
	Perth Rd 33	2,500	200	600	0.33	A
	Perth Rd 26	5,800	400	600	0.67	B
	Total	**34,000**	**2,400**	**4,800**	**0.50**	**A**
West of Perth Rd 110	Perth Rd 43	1,700	200	600	0.33	A
	Perth Rd 37	600	40	600	0.07	A
	Highway 7/8	23,200	1,400	2,400	0.58	A
	Perth Rd 33	2,900	200	600	0.33	A
	Perth Rd 26	7,100	500	600	0.83	D
	Total	**35,500**	**2,340**	**4,800**	**0.49**	**A**
East of Romeo St	Perth Rd 37	500	30	600	0.05	A
	McCarthy Blvd	12,500	800	800	1.00	E
	Highway 7/8	26,400	1,600	1,600	1.00	E
	Douro St	13,750	800	800	1.00	E
	Perth Rd 33	2,900	200	600	0.33	A
	Total	**56,050**	**3,430**	**4,400**	**0.78**	**C**

While Combination 3D partially addresses the forecast capacity deficiency in the Highway 7&8 corridor (through the 2 lane section), it does not provide sufficient capacity through New Hamburg. Congestion at the intersections in New Hamburg will continue due to the high volumes of turning traffic at the key intersections. As noted previously, extensive widening of

Highway 7&8 at these intersections would be required to accommodate forecasted volumes in 2031, including dual left turn lanes and up to four through lanes per direction.

Congestion through Stratford is improved to some degree, although Highway 7&8 through the downtown core is still forecast to operate at capacity. As a result, the effectiveness of Highway 7&8 in accommodating the longer distance movement of people and goods would be reduced due to the lack of efficient connections to Highway 7 and Highway 8 to the west of Stratford. The municipal road "by-pass" of Stratford would not provide an appropriate replacement for this type of connection, and it is unlikely that residents along these routes would want heavy trucks using local roads to by-pass the downtown areas.

Summary of Combination Alternative #3

The widening of existing facilities coupled with TDM/TSM and increased transit service has the potential to address specific areas of deficiency within the Highway 7&8 corridor but does not address all of the operating issues within the urban area of Stratford and does not address the mainline capacity issues on Highway 7&8 through New Hamburg. Widening to 6 lanes would be required through this area, which would have significant impacts on adjacent land uses. The Combination 3 alternatives all rely on the existing Highway 7&8 corridor to maintain connectivity between Highway 7&8, and the Highway 7 and Highway 8 corridors on the west side of Stratford for both people and goods movement. Continued congestion in New Hamburg and through downtown Stratford will reduce the effectiveness of this corridor for through traffic movements.

As a result this alternative has the following characteristics in relation to the identified problems and opportunities:

- Moderate potential to improve the efficient movement of people. Combination #3 provides moderate improvement to transportation system congestion and improved mode choice for person trips. Constraints to road widening in the urban areas of Stratford limit improvement opportunities and degree of congestion improvement in transportation system;
- Moderate potential to improve the efficient movement of goods through moderate improvement to transportation system congestion and limited mode choice for goods movement. Opportunities to shift goods movement from truck to other modes are limited based on limited viability of new rail, marine or air transport services;
- Moderate potential to improve recreation and tourist travel. Combination #3 provides improved mode choice for recreation and tourist travel but only moderate improvement to transportation system congestion;
- Moderate potential to improve system reliability / redundancy. Combination #3 provides improved mode choice and alternate routes by providing widened roads in Analysis Area, but only moderate improvement to transportation system congestion due to prevailing congestion in the urban areas;
- Moderate potential to improve safety as transportation system for the Highway 7&8 corridor, although congestion is still experienced in the urbanized pedestrian areas;

- Moderate potential to improve accessibility to urban / work centers and the provincial highway network. Combination #3 provides improved mode choice and new municipal roads but only moderate improvement to transportation system congestion;
- Moderate potential to improve modal choice for person trips and goods movement within the Analysis Area. Opportunities to shift person trips from auto to transit are increased based on moderate improvement to transportation system congestion. Opportunities to shift goods movement from truck to other modes are limited based on limited viability of new rail, marine or air transport services;
- Moderate support for efficient transportation connections between population and employment growth centres due to improved transportation system congestion and new road-based travel corridors; and
- Moderate support for approved population and employment growth in Analysis Area due to improved transportation system congestion. Auto reduction and multi-modal strategies are consistent with provincial and municipal transportation planning policies.

In summary, Combination #3 provides moderate support for transportation and policy objectives but fails to fully address the identified transportation problems and opportunities in the Analysis Area, particularly through the built-up areas.

4.4 Combination #4 – New Municipal Roads and/or Provincial Highways/Transitway plus Elements of Combination #3

Combination #4 includes elements from Combination 3 (expansion of the transit system(s) and other non-road (TDM) improvements plus potential widening of existing roads) plus new *road-based* capacity derived through the provision of a new corridor or corridors beyond those already planned by the province and municipalities (e.g. McCarthy Road Extension which is being studied by others). The general location of new roads (corridors) can have distinctly different performance characteristics in addressing trip types and markets depending on their location and function within the broader transportation system. Further definition of Combination #4 is therefore necessary in the form of network alternatives.

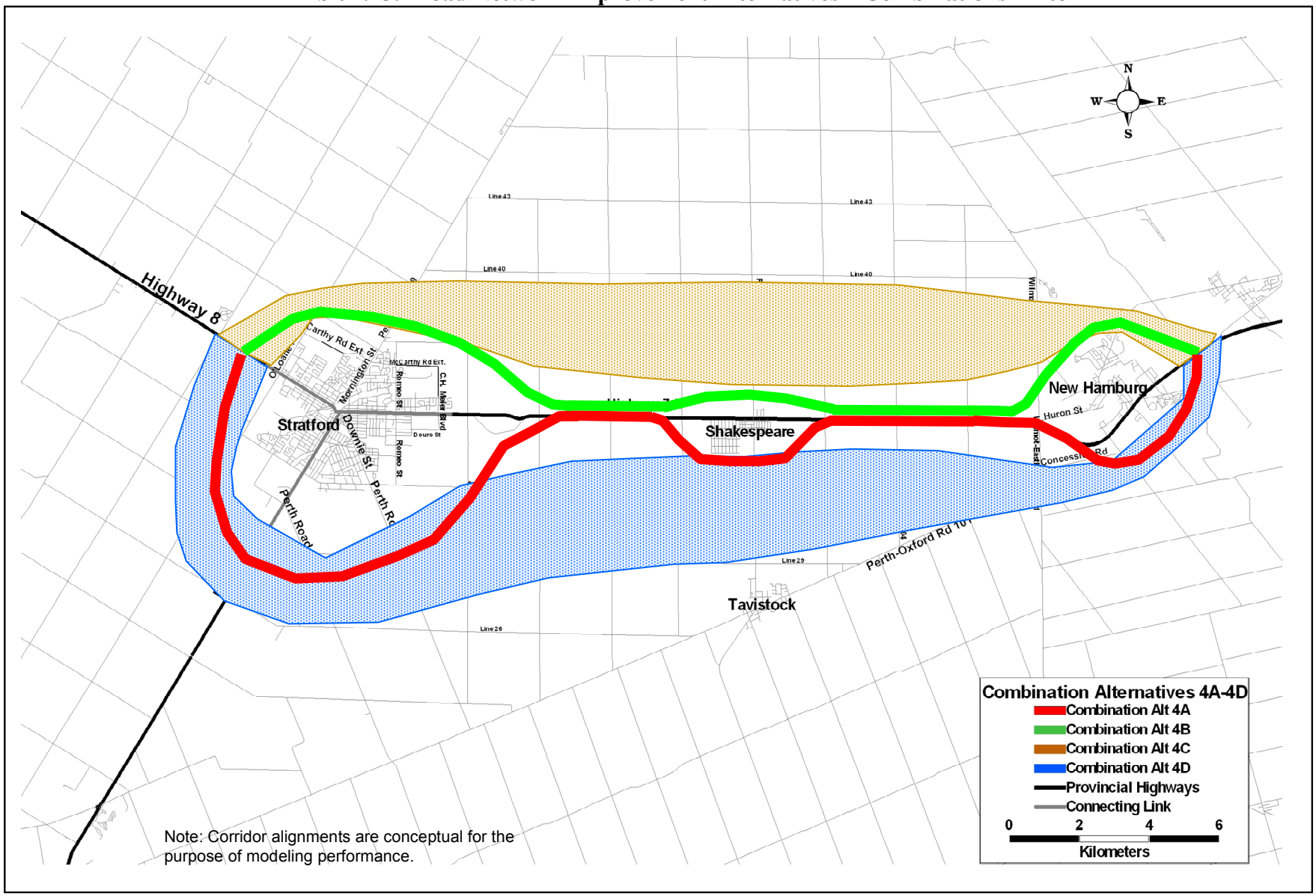
The network alternatives are shown schematically in **Exhibit 4.15** and are briefly described below:

- **Combination #4A – Widen Highway 7&8 & New Local By-Passes to South:** Widen existing 2-lane section of Highway 7&8 between Stratford and Waterloo Road 1 in New Hamburg and provide new local by-passes of New Hamburg, Shakespeare, and Stratford to the south of each community;
- **Combination #4B– Widen Highway 7&8 & New Local By-Passes to North:** Widen existing 2-lane section of Highway 7&8 between Stratford and Waterloo Road 1 in New Hamburg and provide new local by-passes of New Hamburg, Shakespeare, and Stratford to the north of each community;
- **Combination #4C – New Highway Corridor to North:** Provide new provincial highway/transitway corridor to the north of the existing Highway 7&8, by-passing New Hamburg, Shakespeare, and Stratford, and connecting back to Highway 8, west of Perth

Road 122 (O'Loane Avenue); and

- **Combination #4D - New Highway Corridor to South:** Provide new provincial highway/transitway corridor to the south of the existing Highway 7&8, by-passing New Hamburg, Shakespeare, and Stratford, and connecting to Highway 7, south of Perth Line 26, and extending west to Connect to Highway 8, west of Perth Road 122 (O'Loane Avenue).

Exhibit 4.15: Road Network Improvement Alternatives – Combinations 4A to 4D



4.4.1 Combination #4A - Widen Highway 7&8 & New Local By-Passes to South

For Combination #4A, the Analysis Area network was modified to include the widening of the existing Highway 7&8 corridor between New Hamburg and Shakespeare, and between Shakespeare and Stratford. By-passes were assumed to be provided to the south of New Hamburg, Shakespeare, and Stratford as illustrated in **Exhibit 4.15**. Exact locations of the corridors are not necessary to determine the network performance and the relative performance between different combination alternatives. Detailed corridor / route alternatives would be developed at a later stage of project if the Combination #4A alternative was selected as the preferred alternative.

Exhibit 4.16 summarizes the performance results for **Combination #4A**. The widening of Highway 7&8, combined with the by-passes improves the operation of the Highway 7&8 corridor and addresses many of the identified capacity deficiencies. The by-pass to the south of New Hamburg attracts between 36,000 and 41,000 vehicles per day from the existing Highway 7&8 corridor. The remaining traffic using the existing Highway 7&8 alignment largely represents local trip making to/from the New Hamburg area. Based on a four-lane facility with at grade intersections the capacity of this new facility would be similar to the existing 4-lane section through New Hamburg. Assuming a capacity of 2,400 vehicles per hour per lane, this new facility would operate at volume to capacity ratio between 1.00 and 0.91 (Level of Service E). If grade separations were provided at the intersections, the capacity would be improved to 3,600 vehicles per hour, with a resulting volume to capacity ratio between 0.69 and 0.61 corresponding to a Level of Service B (LOS B).

Exhibit 4.16: Deficiency Analysis – 2031 – Combination #4A-Comparison to Base Conditions

Highway 7 & 8	Lanes	2031 AADT Base	2031 DHV Base	2031 DHV v/c Ratio	2031 AADT Combo 4a	2031 DHV Combo 4a	2031 DHV v/c Ratio	Daily Volume Reduction	By-Pass Volume
Waterloo RR 5	4	54,200	5,420	0.90	12,100	1,210	0.20	42,100	41,200
Waterloo RR 4 (east Junction)	4	49,200	4,920	1.23	12,200	1,220	0.31	37,000	36,400
Waterloo RR 4 (west Junction)	4	36,300	3,630	0.91	38,200	3,820	0.96	-1,900	n/a
Waterloo RR 1	4	20,000	2,000	1.60	29,400	2,940	0.74	-9,400	n/a
Perth Road 107 - Shakespeare	4	19,100	1,910	1.53	1,700	170	0.04	17,400	26,300
East of Stratford Limits	4	19,000	1,900	0.48	21,000	2,100	0.53	-2,000	6,700
Stratford Limits	4	28,600	2,860	1.07	29,500	2,950	1.11	-900	n/a
Romeo St									
		Segment over capacity			Average Daily Vehicle Reduction			11,800	

Between New Hamburg and Shakespeare, the widening of the existing Highway 7&8 corridor to 4 lanes will address the forecasted capacity deficiency. This additional capacity would attract an estimated 9,400 additional vehicles per day to the Highway 7&8 corridor, largely from parallel routes. The by-pass of Shakespeare will draw the majority of the through traffic away from the

existing Highway 7&8 corridor, attracting approximately 26,000 vehicles per day. The remaining 1,700 vehicles per day using Highway 7&8 reflect local traffic generated within Shakespeare. Between Shakespeare and Stratford, the widening to 4 lanes will accommodate future demands at a volume to capacity ratio of 0.66, corresponding to a LOS B.

The by-pass to the south of Stratford is forecast to attract approximately 4,300 – 6,900 vehicles per day, although the vehicles using this by-pass route are largely drawn from the adjacent local roads. On the screenline located to the west of Perth Road 110, the by-pass attracts 6,700 vehicles per day. Perth Road 33 would experience a reduction of 2,700 vehicles per day (compared to Combination 1) and Perth Road 26 would see a similar reduction of 2,700 vehicles per day. This represents 80% of the by-pass volume in this segment. The reduction of traffic on the local municipal road network provides a benefit to the municipalities in terms of reduced maintenance and life cycle costs associated with the preservation of their infrastructure and in terms of compatibility with other users of these corridors, such as farming related traffic or pedestrians in the built up areas.

Within the downtown area of Stratford, the widening of Highway 7&8 results in an additional 900 vehicles per day through the congested area. The widening combined with the south by-pass does not draw traffic out of the downtown area, and will not address forecasted deficiencies through the downtown area.

Exhibit 4.17: Screenline Analysis – 2031 – Combination 4A

			Peak Direction			
Screenline	**Facility**	**AADT**	**DHV**	**Capacity**	**V/C**	**LOS**
Perth-Waterloo Boundary	Perth Rd 43	1,700	100	600	0.17	A
	Perth Rd 37	50	3	600	0.01	A
	Highway 7/8	29,400	1,800	2,400	0.75	C
	Perth-Oxford Rd 101	700	40	600	0.07	A
	Total	**31,850**	**1,943**	**4,200**	**0.46**	**A**
West of Perth Rd 107	Perth Rd 43	1,800	110	600	0.18	A
	Perth Rd 37	300	20	600	0.03	A
	Highway 7/8	1,700	100	750	0.13	A
	Highway 7/8 By-Pass	26,300	1,580	2,400	0.66	B
	Perth Rd 33	600	40	600	0.07	A
	Perth Rd 26	4,100	250	600	0.42	A
	Total	**34,800**	**2,100**	**5,550**	**0.38**	**A**
West of Perth Rd 110	Perth Rd 43	1,600	100	600	0.17	A
	Perth Rd 37	1,200	70	600	0.12	A
	Highway 7/8	21,000	1,260	1,600	0.79	C
	Highway 7/8 By-Pass	6,700	400	2,400	0.17	A
	Perth Rd 33	1,200	70	600	0.12	A
	Perth Rd 26	5,500	330	600	0.55	A
	Total	**37,200**	**2,230**	**6,400**	**0.35**	**A**
East of Romeo St	Perth Rd 37	1,100	70	600	0.12	A
	McCarthy Blvd	5,600	340	800	0.43	A
	Highway 7/8	29,500	1,770	1,600	1.11	F
	Douro St	14,600	880	800	1.10	F
	Perth Rd 33	4,600	280	600	0.47	A
	Total	**55,400**	**3,340**	**4,400**	**0.76**	**C**

4.4.2 Combination #4B - Widen Highway 7&8 & New Local By-Passes to North

For Combination #4B, the Analysis Area network was modified to include the widening of the existing Highway 7&8 corridor between New Hamburg and Shakespeare, and between Shakespeare and Stratford. By-passes were assumed to be provided to the north of New Hamburg, Shakespeare, and Stratford as illustrated in **Exhibit 4.15**. Exact locations of the corridors are not necessary to determine the network performance and the relative performance between different combination alternatives. Detailed corridor / route alternatives would be developed at a later stage of project if the Combination 4B alternative was selected as the preferred alternative.

Exhibit 4.18 summarizes the performance results for **Combination #4B**. The widening of Highway 7&8, combined with the by-passes improves the operation of the Highway 7&8 corridor and addresses many of the identified capacity deficiencies. The by-pass to the north of New Hamburg attracts between 29,000 and 38,000 vehicles per day, the majority coming from the existing Highway 7&8 corridor. The remaining traffic using the existing Highway 7&8 alignment largely represents local trip making to/from the New Hamburg area. Based on a four lane facility with at grade intersections the capacity of this new facility would be similar to the existing 4-lane section through New Hamburg. Assuming a capacity of 2,400 vehicles per hour per lane, this new facility would operate at a volume to capacity ratio between 0.73 and 0.96 (Level of Service C-E). If grade separations were provided at the intersections, the capacity would be improved to 3,600 vehicles per hour, with a resulting volume to capacity ratio between 0.48 and 0.63 corresponding to a Level of Service A-B.

Exhibit 4.18: Deficiency Analysis – 2031 – Combination #4B- Comparison to Base Conditions

Highway 7 & 8	Lanes	2031 AADT Base	2031 DHV Base	2031 DHV v/c Ratio	2031 AADT Combo 4b	2031 DHV Combo 4b	2031 DHV v/c Ratio	Daily Volume Reduction	By_Pass Volume
Waterloo RR 5	4	54,200	5,420	0.90	12,600	1,260	0.21	41,600	38,200
Waterloo RR 4 (east Junction)	4	49,200	4,920	1.23	12,400	1,240	0.31	36,800	38,200
Waterloo RR 4 (west Junction)	4	36,300	3,630	0.91	14,600	1,460	0.37	21,700	28,800
Waterloo RR 1	4	20,000	2,000	1.60	30,200	3,020	0.76	-10,200	n/a
Perth Road 107 - Shakespeare	4	19,100	1,910	1.53	1,500	150	0.04	17,600	25,300
East of Stratford Limits	4	19,000	1,900	0.48	13,400	1,340	0.34	5,600	13,200
Stratford Limits	4	28,600	2,860	1.07	26,900	2,690	1.01	1,700	13,400
Romeo St									

Segment over capacity — Average Daily Vehicle Reduction 16,400

Between New Hamburg and Shakespeare the widening of the existing Highway 7&8 corridor to 4 lanes will address the forecasted capacity deficiency. This additional capacity would attract an estimated 10,200 additional vehicles per day to the Highway 7&8 corridor, largely from parallel routes. The by-pass of Shakespeare to the north would draw the majority of the through traffic away from the existing Highway 7&8 corridor, attracting approximately 25,000 vehicles per day. The remaining 1,500 vehicles per day using Highway 7&8 reflect local traffic generated within

Shakespeare. Between Shakespeare and Stratford, the widening to 4 lanes will accommodate future demands at a volume to capacity ratio of 0.63, corresponding to a LOS B.

The by-pass to the north of Stratford is forecast to attract between 9,300-18,000 vehicles per day. The vehicles using this by-pass route are drawn from all of the major adjacent local roads within Stratford. On the screenline located to the east of Romeo Street, the by-pass attracts 13,400 vehicles per day. Perth Road 37 would experience a reduction of 300 vehicles per day (compared to Combination 1), McCarthy Road would see a reduction of 5,300 vehicles per day, and Highway 7&8 through the downtown would see a reduction of 1,200 vehicles per day. Traffic is also shifted from Douro Street and Perth Road 33 corridors (to the south of Highway 7&8) as a result of improved capacity through the downtown area. The reduction of traffic on the local municipal road network provides a benefit to the municipalities in terms of reduced maintenance and life cycle costs associated with the preservation of their infrastructure and in terms of compatibility with other users of these corridors, such as farming related traffic or pedestrians in the built up areas.

Exhibit 4.19: Screenline Analysis – 2031 – Combination 4B

			Peak Direction			
Screenline	**Facility**	**AADT**	**DHV**	**Capacity**	**V/C**	**LOS**
Perth-Waterloo Boundary	Perth Rd 43	1,700	100	600	0.17	A
	Perth Rd 37	50	3	600	0.01	A
	Highway 7/8	30,200	1,800	2,400	0.75	C
	Perth-Oxford Rd 101	800	48	600	0.08	A
	Total	**32,750**	**1,951**	**4,200**	**0.46**	**A**
West of Perth Rd 107	Perth Rd 43	1,480	100	600	0.17	A
	Perth Rd 37	100	10	600	0.02	A
	By-Pass	25,300	1,500	2,400	0.63	B
	Highway 7/8	1,500	100	750	0.13	A
	Perth Rd 33	800	50	600	0.08	A
	Perth Rd 26	6,640	400	600	0.67	B
	Total	**35,820**	**2,160**	**5,550**	**0.39**	**A**
West of Perth Rd 110	Perth Rd 43	1,300	100	600	0.17	A
	Perth Rd 37	1,100	100	600	0.17	A
	By-Pass	13,200	800	2,400	0.33	A
	Highway 7/8	13,400	800	1,600	0.50	A
	Perth Rd 33	1,440	100	600	0.17	B
	Perth Rd 26	6,640	400	600	0.67	B
	Total	**37,080**	**2,300**	**6,400**	**0.36**	**A**
East of Romeo St	By-Pass	13,400	800	2,400	0.33	A
	Perth Rd 37	900	100	600	0.17	A
	McCarthy Blvd	1,100	100	800	0.13	A
	Highway 7/8	26,900	1,600	1,600	1.00	E
	Douro St	13,800	800	800	1.00	E
	Perth Rd 33	1,440	100	600	0.17	A
	Total	**57,540**	**3,500**	**6,800**	**0.51**	**A**

The by-pass to the north does attract some additional traffic to the Perth Road 122 corridor, on the west side of Stratford, increasing the daily volume from 7,700 vehicles per day (in Combination 1) to 8,100 vehicles per day, representing a 5% increase. This increase in partially offset by reductions to traffic on Erie Street (Highway 7), which experiences a reduction of 900

vehicles per day (-7%).

4.4.3 Combination #4C - New Highway/Transitway Corridor to North

For Combination #4C, the Analysis Area network was modified to include a new highway/transitway corridor between New Hamburg and Shakespeare, located to the north of the existing Highway 7&8 corridor. The new corridor would begin to the east of New Hamburg, providing a by-pass of the built up area and would continue to the west of Stratford to tie into Highway 8, as illustrated in **Exhibit 4.15**. Exact locations of the corridors are not necessary to determine the network performance and the relative performance between different combination alternatives. Detailed corridor / route alternatives would be developed at a later stage of project if the Combination 4C alternative was selected as the preferred alternative.

Exhibit 4.20 summarizes the performance results for **Combination #4C**. The new corridor to the north of Highway 7&8 attracts between 21,000 and 31,000 vehicles per day, between Stratford and New Hamburg, with the highest volumes forecast in the New Hamburg area. For the purpose of modelling this alternative, the new corridor was assumed to be located between Perth Line 40 and Perth Line 37. As a result, the volumes using the new route through the New Hamburg area are lower than the volumes observed in Alternative 4B, for the New Hamburg By-Pass, which connects back into existing Highway 7&8. This would suggest that traffic is strongly oriented to the Highway 7&8 corridor, and that volumes on any new corridor would reduce the further north it is located from Highway 7&8.

The section to the west of Stratford attracts between 9,500 and 12,000 vehicles per day, where it ties in to Highway 8. The reduction of traffic using the existing Highway 7&8 corridor ranges from 29,000 vehicles per day in New Hamburg to 11,000 vehicles per day between Shakespeare and Stratford. The new corridor to the north of Highway 7&8 corridor would address the capacity deficiencies on all of the existing sections of Highway 7&8. As summarized in **Exhibit 4.20**, below, the new corridor would operate at a Level of Service A, based on a volume to capacity ratio between 0.54 and 0.58.

Exhibit 4.20: Deficiency Analysis – 2031 – Combination #4C-Comparison to Base Conditions

Highway 7 & 8	Lanes	2031 AADT Base	2031 DHV Base	2031 DHV v/c Ratio	2031 AADT Combo 4c	2031 DHV Combo 4c	2031 DHV v/c Ratio	Daily Volume Reduction	New Corridor Volume
Waterloo RR 5	4	54,200	5,420	0.90	25,000	2,500	0.42	29,200	31,350
Waterloo RR 4 (east Junction)	4	49,200	4,920	1.23	19,700	1,970	0.49	29,500	31,350
Waterloo RR 4 (west Junction)	4	36,300	3,630	0.91	21,500	2,150	0.54	14,800	22,000
Waterloo RR 1	2	20,000	2,000	1.60	6,400	640	0.51	13,600	22,500
Perth Road 107 - Shakespeare	2	19,100	1,910	1.53	7,300	730	0.58	11,800	21,500
East of Stratford Limits	4	19,000	1,900	0.48	7,800	780	0.20	11,200	21,100
Stratford Limits	4	28,600	2,860	1.07	21,940	2,194	0.82	6,660	26,900
Romeo St									
	Segment over capacity				Average Daily Vehicle Reduction			16,700	

Exhibit 4.21 summarizes the screenline analysis results for Combination #4C. The new highway/transitway would draw traffic from Highway 7&8 and from the local road network, both north and south of Highway 7&8. Compared to Combination #1, the new highway to the north reduces daily volumes on:

- Perth Road 43 by about 1,100 vehicles per day;
- Perth Road 37, by about 300 vehicles per day;
- Perth Road 33, by about 2,200 vehicles per day; and
- Perth Road 26, by about 1,000 vehicles per day.

These reductions do not necessary represent the actual users of the new highway corridor, but they do represent a pattern of shifts, where traffic that would otherwise divert to the south in response to congestion, is shifting north to take advantage of capacity that has been "freed up" by the new highway corridor. The reduction of traffic on the local municipal road network also provides a benefit to the municipalities in terms of reduced maintenance and life cycle costs associated with the preservation of their infrastructure and in terms of compatibility with other users of these corridors, such as farming related traffic or pedestrians in the built up areas.

In the downtown Stratford area, the new corridor to the north, does attract additional through traffic away from the congested downtown core, with Highway 7&8 forecast to operate at a volume to capacity ratio of 0.81, representing a LOS D. Additional traffic is attracted from Douro Street and McCarthy Road, providing relief to traffic through these neighbourhood areas.

Exhibit 4.21: Screenline Analysis – 2031 – Combination #4C

Screenline	Facility	AADT	Peak Direction			
			DHV	Capacity	V/C	LOS
Perth-Waterloo Boundary	Perth Rd 43	1,700	100	600	0.17	A
	New Highway Corridor	22,500	1,400	2,400	0.58	A
	Perth Rd 37	50	3	600	0.01	A
	Highway 7/8	6,400	400	750	0.53	A
	Perth-Oxford Rd 101	2,400	144	600	0.24	A
	Total	**33,050**	**2,047**	**4,950**	**0.41**	**A**
West of Perth Rd 107	Perth Rd 43	820	50	600	0.08	A
	New Highway Corridor	21,500	1,300	2,400	0.54	A
	Perth Rd 37	50	3	600	0.01	A
	Highway 7/8	7,300	400	750	0.53	A
	Perth Rd 33	900	50	600	0.08	A
	Perth Rd 26	5,700	300	600	0.50	A
	Total	**36,270**	**2,103**	**5,550**	**0.38**	**A**
West of Perth Rd 110	Perth Rd 43	620	40	600	0.07	A
	New Highway Corridor	21,100	1,300	2,400	0.54	A
	Perth Rd 37	180	10	600	0.02	A
	Highway 7/8	7,800	500	750	0.67	B
	Perth Rd 33	1,350	80	600	0.13	A
	Perth Rd 26	7,100	400	600	0.67	B
	Total	**38,150**	**2,330**	**5,550**	**0.42**	**A**
East of Romeo St	New Highway Corridor	20,900	1,300	2,400	0.54	A
	Perth Rd 37	180	10	600	0.02	A
	McCarthy Blvd	2,100	100	800	0.13	A
	Highway 7/8	21,900	1,300	1,600	0.81	D
	Douro St	13,300	800	800	1.00	E
	Perth Rd 33	1,350	100	600	0.17	A
	Total	**59,730**	**3,610**	**6,800**	**0.53**	**A**

The by-pass to the north does attract some additional traffic to the Perth Road 122 corridor, on the west side of Stratford, increasing the daily volume from 7,700 vehicles per day (in Combination 1) to 9,900 vehicles per day, representing a 29% increase. There is also a slight increase in the volumes using Erie Street (Highway 7) and Downie Street which experience increases of 1,600 vehicles per day (14%) and 1,000 vehicles per day (8%) respectively. The increase in north-south traffic through downtown Stratford as a result of Combination Alternative #4C would reduce the overall effectiveness of this alternative in addressing the capacity issues in the downtown Stratford area.

4.4.4 Combination #4D - New Highway/Transitway Corridor to South

For Combination #4D, the Analysis Area network was modified to include a new highway/transitway corridor between New Hamburg and Shakespeare, located to the south of the existing Highway 7&8 corridor. The new corridor would begin to the east of New Hamburg, providing a by-pass of the built up area and would connect to Highway 7, south of Stratford, and continue to the west of Stratford to tie into Highway 8, as illustrated in **Exhibit 4.15**. Exact locations of the corridors are not necessary to determine the network performance and the relative performance between different combination alternatives. Detailed corridor / route alternatives would be developed at a later stage of project if the Combination 4D alternative was selected as the preferred alternative.

Exhibit 4.22 summarizes the performance results for **Combination #4D**. The new corridor to the south of Highway 7&8 attracts between 18,000 and 44.000 vehicles per day, between Stratford and New Hamburg, with the highest volumes forecast in the New Hamburg area. The section to the west of Highway 7 attracts between 4,200 and 4,900 vehicles per day, where it ties in to Highway 8.

The reduction of traffic using the existing Highway 7&8 corridor ranges from 45,000 vehicles per day in New Hamburg to 14,000 vehicles per day between Shakespeare and Stratford, and 5,000 per day within the Stratford built up area. The new corridor to the south of Highway 7&8 would address the capacity deficiencies on all of the existing sections of Highway 7&8.

Exhibit 4.22: Deficiency Analysis – 2031 – Combination #4D-Comparison to Base Conditions

Highway 7 & 8	Lanes	2031 AADT Base	2031 DHV Base	2031 DHV v/c Ratio	2031 AADT Combo 4d	2031 DHV Combo 4d	2031 DHV v/c Ratio	Daily Volume Reduction	New Corridor Volume
Waterloo RR 5	4	54,200	5,420	0.90	9,500	950	0.16	44,700	44,300
Waterloo RR 4 (east Junction)	4	49,200	4,920	1.23	9,700	970	0.24	39,500	39,500
Waterloo RR 4 (west Junction)	4	36,300	3,630	0.91	4,700	470	0.12	31,600	41,600
Waterloo RR 1	2	20,000	2,000	1.60	4,400	440	0.35	15,600	27,700
Perth Road 107 - Shakespeare	2	19,100	1,910	1.53	5,000	500	0.40	14,100	27,700
East of Stratford Limits	4	19,000	1,900	0.48	12,900	1,290	0.32	6,100	21,200
Stratford Limits	4	28,600	2,860	1.07	23,400	2,340	0.88	5,200	18,400
Romeo St									

Segment over capacity

Average Daily Vehicle Reduction 22,400

Exhibit 4.23 summarizes the screenline analysis results for Combination #4D. The new highway corridor would operate at a Level of Service C between New Hamburg and Shakespeare, based on a volume to capacity ratio of 0.71.

Exhibit 4.23: Screenline Analysis – 2031 – Combination #4D

Screenline	Facility	AADT	Peak Direction DHV	Capacity	V/C	LOS
Perth-Waterloo Boundary	Perth Rd 43	1,800	100	600	0.17	A
	Perth Rd 37	50	3	600	0.01	A
	Highway 7/8	4,400	300	750	0.40	A
	Perth-Oxford Rd 101	2,400	144	600	0.24	A
	New Highway Corridor	27,700	1,700	2,400	0.71	C
	Total	**36,350**	**2,247**	**4,950**	**0.45**	**A**
West of Perth Rd 107	Perth Rd 43	1,800	100	600	0.17	A
	Perth Rd 37	300	20	600	0.03	A
	Highway 7/8	5,000	300	750	0.40	A
	Perth Rd 33	810	50	600	0.08	A
	New Highway Corridor	27,700	1,700	2,400	0.71	C
	Perth Rd 26	2,000	100	600	0.17	A
	Total	**37,610**	**2,270**	**5,550**	**0.41**	**A**
West of Perth Rd 110	Perth Rd 43	1,540	100	600	0.17	A
	Perth Rd 37	1,100	100	600	0.17	A
	Highway 7/8	12,900	800	1,600	0.50	A
	Perth Rd 33	1,200	100	600	0.17	A
	New Highway Corridor	21,200	1,300	2,400	0.54	A
	Perth Rd 26	3,100	200	600	0.33	A
	Total	**41,040**	**2,600**	**6,400**	**0.41**	**A**
East of Romeo St	Perth Rd 37	1,000	100	600	0.17	A
	McCarthy Blvd	4,500	300	800	0.38	A
	Highway 7/8	23,400	1,400	1,600	0.88	D
	Douro St	12,000	700	800	0.88	D
	Perth Rd 33	12,900	800	600	1.33	F
	New Highway Corridor	18,400	1,100	2,400	0.46	A
	Total	**72,200**	**3,300**	**6,800**	**0.49**	**A**

The screenline analysis also highlights the fact that new highway/transitway would draw traffic from Highway 7&8 and from the local road network, both north and south of Highway 7&8. Compared to Combination #1, a new highway to the north would reduce daily volumes on:

- Perth Road 43 by about 100 vehicles per day;
- Perth Road 37, by about 100-200 vehicles per day;
- Perth Road 33, by about 2,300-2700 vehicles per day; and
- Perth Road 26, by about 4,700-5,100 vehicles per day.

These reductions do not necessary represent the actual users of the new highway corridor, but they do represent a pattern of shifts, where traffic that would otherwise divert to alternate routes in response to congestion, is shifting to take advantage of capacity that has been "freed up" by the new highway corridor. The reduction of traffic on the local municipal road network also provides a benefit to the municipalities in terms of reduced maintenance and life cycle costs associated with the preservation of their infrastructure and in terms of compatibility with other users of these corridors, such as farming related traffic or pedestrians in the built up areas.

In the downtown Stratford area, the new corridor to the south reduces through traffic in the congested downtown core by approximately 4,700 vehicles per day, with Highway 7&8 forecast to operate at a volume to capacity ratio of 0.88, representing a LOS D. Douro Street would also experience a reduction in traffic, estimated at 2,600 vehicles per day and McCarthy Road would see a reduction of about 1,900 vehicles per day.

Perth Road 33, between the new highway corridor and Romeo St / Downie Street could see a significant increase in traffic, depending on the final alignment and configuration any connections to the new highway corridor. This route would become a second entrance to the City of Stratford, and could attract up to an additional 9,000 vehicles per day. With this additional traffic Perth Road 33 would operate at a volume to capacity ratio of 1.33, representing LOS F, without improvements. Widening portions of Perth Road 33 to four lanes may be required to support this alternative.

The extension of the new highway corridor to the west of Stratford to connect to Highway 8 would also result in the following changes to traffic volumes on some of the north-south roads in the south end of the City (compared to Combination Alternative 1 representing application of TDM / TSM measures only):

- Downie Street would see a potential increase in traffic of 3,000 vehicles per day (+23%) due to the traffic wishing to access the downtown core area from the new highway corridor. Additional improvements may be required to this road.
- Erie Street (Highway 7) would see a reduction in traffic of about 1,000 vehicles per day (-8%)
- Perth Road 122 would see a reduction of about 1,200 vehicles per day (-16%)

Given the findings from Combination #4C, regarding the attractiveness of a new corridor relative to the distance it is located from the existing Highway 7&8 corridor, a similar sensitivity analysis was undertaken for Combination Alternative #4D. The model was used to test how the major findings for Combination Alternative #4D would change if a new highway corridor was located further to the south, closer to the lower boundary of the conceptual route illustrated in **Exhibit 4.15**.

Preliminary results from this model run indicate that forecasted volumes using a new corridor located further south toward Tavistock would be about 8-9% lower through New Hamburg, about 30-40% lower between New Hamburg and Stratford, and about 4% lower where the highway connects to Highway 7. The sensitivity test confirmed that the further south a new corridor is located, the less effective it would be in reducing traffic volumes on the existing Highway 7&8 corridor. Based on these findings, a new corridor located along this southerly alignment would not draw enough traffic away from the existing Highway 7&8 corridor to address the deficiencies in the 2-lane section of Highway 7&8 between New Hamburg and Stratford.

This sensitivity analysis also confirms the local importance that the Highway 7&8 corridor plays in supporting the day to day travel patterns of the City of Stratford and surrounding municipalities, and the importance of efficient connections between Highway 7&8 and Highway 8 to the west of Stratford.

4.5 Summary of Assessment of Combination Alternatives

It is clear from the previous analysis that no combination addresses all of the forecasted deficiencies in the Analysis Area transportation system. There will be roads in the built-up area of Stratford that will continue to operate at or near their capacity.

However, the assessment of the four network alternatives for Combination #4 demonstrates that Alternatives #4C and #4D, which include a new transportation corridor in combination with elements of the individual alternatives presented in Combination #3 (e.g. local transit service, TDM, TSM, etc.), provide the greatest potential to address the problems and opportunities identified in the Analysis Area. Alternatives #4A and #4B will address the key deficiencies on Highway 7&8 but cannot address the congestion through downtown Stratford as well as the other alternatives.

Additional characteristics of Combination #4 in addressing the problems and opportunities are as follows:

- High potential to improve the efficient movement of people and goods through reduced transportation system congestion and improved mode choice for person trips and goods movement;
- High potential to provide the highest improvement to transportation system congestion and improve mode choice for recreation and tourist travel;
- High potential to improve system reliability / redundancy. Combinations #4C and 4D address transportation system congestion, improve mode choice and provide a new highway/ transitway for route choice alternatives;
- High potential to improve safety relative to other alternatives or the base case based on ability of Combinations #4C and 4D to address transportation system congestion;
- High potential to increase accessibility to urban / work centers and the provincial highway network. Combinations #4C and 4D provide improved mode choice, new highway/ transitway and improved access to communities and the freeway network;
- Moderate potential to address modal opportunities within the Analysis Area. Opportunities to shift person trips from auto to transit are moderate, based on improvement to transportation system congestion and provision of a dedicated transitway corridor in conjunction with the new highway corridor but the effectiveness may be diminished by the lack of transit service from the east end of the Analysis Area to Kitchener-Waterloo. Opportunities to shift goods movement from truck to other modes are limited based on existing rail, marine or air transport services connecting the two communities;
- High support for efficient transportation connections between population and employment growth centres due to most improved transportation system congestion and new highway/transit corridor; and
- High support for approved population and employment growth in Analysis Area due to most improved transportation system congestion. Auto reduction and multi-modal strategies are consistent with provincial and municipal transportation planning policies.

Combinations #4C and #4D are considered to be the most effective alternatives to address the identified transportation problems and opportunities in the Analysis Area. A summary of the effectiveness of each of the Combination Alternatives in addressing the problems and opportunities is presented in **Exhibit 4.24**.

Exhibit 4.24: Assessment of the Long List of Combination Area Transportation System Alternatives

FACTOR	CRITERIA	DO NOTHING	COMBINATION #1 OPTIMIZE EXISTING NETWORK	COMBINATION #2 NEW NON-ROAD INFRASTRUCTURE + ELEMENTS OF COMBINATION #1	COMBINATION #3 WIDEN MUNICIPAL ROADS AND/OR PROVINCIAL HIGHWAYS + ELEMENTS OF COMBINATION #2	COMBINATION #4 NEW MUNICIPAL ROADS AND/OR PROVINCIAL HIGHWAYS/ TRANSITWAYS + ELEMENTS OF COMBINATION #3
1. Potential to address transportation problems and opportunities	1.1 Efficient movement of people	Low potential to improve the efficient movement of people. Operational performance of the transportation system will degrade over time with planned population and employment growth in the Analysis Area.	Low potential to improve the efficient movement of people as Combination #1 provides only minor improvement to transportation system congestion.	Low potential to improve the efficient movement of people. Combination #2 provides mode choice for person trips but only minor improvement to transportation system congestion.	Moderate potential to improve the efficient movement of people. Combination #3 provides moderate improvement to transportation system congestion and improved mode choice for person trips. Constraints to road widening in the urban areas of Stratford and New Hamburg limit improvement opportunities and degree of congestion improvement in transportation system.	High potential to improve the efficient movement of people. Combination #4C & #4D provide highest potential to improve transportation system congestion and improved mode choice for person trips.
	1.2 Efficient movement of goods	Low potential to improve the efficient movement of goods. Operational performance of the transportation system will degrade over time with planned population and employment growth in the Analysis Area.	Low potential to improve the efficient movement of goods as Combination #1 provides only minor improvement to transportation system congestion.	Low potential to improve the efficient movement of goods. Combination #2 provides mode choice for goods movement but only minor improvement to transportation system congestion.	Moderate potential to improve the efficient movement of goods. Combination #3 provides moderate improvement to transportation system congestion. Opportunities to shift goods movement from truck to other modes are limited based on limited viability of new rail, marine or air transport services.	High potential to improve the efficient movement of goods. Combination #4C & #4D provide highest potential to improve transportation system congestion and improved mode choice for goods movement.
	1.3 Recreational / tourist travel	Low potential to facilitate recreational and tourist travel. Operational performance of the transportation system will degrade over time with planned population and employment growth in the Analysis Area.	Low potential to facilitate recreational and tourist travel, as Combination #1 provides only minor improvement to transportation system congestion.	Low potential to improve recreation and tourist travel. Combination #2 provides mode choice for recreational and tourist travel but only minor improvement to transportation system congestion.	Moderate potential to improve recreation and tourist travel. Combination #3 provides moderate improvement to transportation system congestion and improved mode choice for recreation and tourist travel.	High potential to improve recreation and tourist travel. Combination #4C & #4D provide highest improvement to transportation system congestion and improved mode choice for recreation and tourist travel.
	1.4 System reliability / redundancy	Low potential to improve system reliability with lowest improvement to transportation system congestion. No improvement to system redundancy with no new travel corridors.	Low potential to improve system reliability / redundancy. Combination #1 provides only minor improvement to transportation system congestion and no new travel corridors.	Low potential to improve system reliability / redundancy. Combination #2 provides only minor improvement to transportation system congestion, Combination #2 provides improved mode choice but viability of new freight rail, marine and air services is limited.	Moderate potential to improve system reliability / redundancy. Combination #3 provides moderate improvement to transportation system congestion, improved mode choice and alternate routes by providing new roads in Analysis Area.	Highest potential to improve system reliability / redundancy. Combination #4C & #4D provide highest improvement to transportation system congestion, improved mode choice and new highway/ transitway for route choice alternatives.
	1.5 Safety	Low potential to improve safety. Safety experience generally degrades with increased transportation system congestion	Low potential to improve safety as Combination #1 provides only minor improvement to transportation system congestion.	Low potential to improve safety as Combination #2 provides only minor improvement to transportation system congestion.	Moderate potential to improve safety. Combination #3 provides moderate improvement to transportation system congestion.	High potential increase in safety. Combination #4C & #4D provide highest improvement to transportation system congestion and potential to improve geometric design standards on the existing 2-lane and 4-lane sections of Highway 7&8.
	1.6 Accessibility	Low potential to improve accessibility to urban/work centers or existing provincial highway network with increased transportation system congestion	Low potential to improve accessibility to urban / work centers and the provincial highway network as Combination #1 provides only minor improvement to transportation system congestion and no new travel corridors.	Low potential to improve accessibility to urban / work centers and the provincial highway network. Combination #2 provides improved mode choice but only minor improvement to transportation system congestion and no new road-based travel corridors.	Moderate potential to improve accessibility to urban / work centers and the provincial highway network. Combination #3 provides improved mode choice and new municipal roads but only moderate improvement to transportation system congestion.	High potential to increase accessibility to urban / work centers and the provincial highway network. Combination #4C & #4D provide improved mode choice, new highway/ transitway and highest improvement to transportation system congestion.
	1.7 Modal Opportunities	Low potential to improve modal choice, increase modal splits for person trips and goods movement or address the opportunity for higher order transit within the Analysis Area.	Low potential to improve modal choice, increase modal splits for person trips and goods movement or address the opportunity for higher order transit within the Analysis Area. Opportunities to shift person trips from auto to transit are limited by buses operating in congested mixed traffic. Opportunities to shift goods movement from truck to other modes are limited without new infrastructure for rail, marine or air transport.	Moderate potential to improve modal choice for person trips and goods movement within the Analysis Area. Opportunities to shift person trips from auto to transit are limited by buses operating in congested mixed traffic. Opportunities to shift goods movement from truck to other modes are limited based on limited viability of new rail, marine or air transport services.	Moderate potential to improve modal choice for person trips and goods movement within the Analysis Area. Opportunities to shift person trips from auto to transit are increased based on moderate improvement to transportation system congestion. Opportunities to shift goods movement from truck to other modes are limited based on limited viability of new rail, marine or air transport services.	Moderate potential to address modal opportunities within the Analysis Area. Opportunities to shift person trips from auto to transit are moderate based on highest improvement to transportation system congestion. Opportunities to shift goods movement from truck to other modes are limited based on limited viability of new rail, marine or air transport services.
2. Support for provincial and municipal policies	Support for Greater Golden Horseshoe Growth Plan etc.	Low support for efficient transportation connections between population and employment growth centres due to transportation system congestion and no new travel corridors.	Low support for efficient transportation connections between population and employment growth centres due to transportation system congestion and no new travel corridors.	Low support for efficient transportation connections between population and employment growth centres due to transportation system congestion and no new road-based travel corridors.	Moderate support for efficient transportation connections between population and employment growth centres due to improved transportation system congestion and new road-based travel corridors.	High support for efficient transportation connections between population and employment growth centres due to most improved transportation system congestion and new highway/transit corridor.

Exhibit 4.24: Assessment of the Long List of Combination Area Transportation System Alternatives

FACTOR	CRITERIA	DO NOTHING	COMBINATION #1 OPTIMIZE EXISTING NETWORK	COMBINATION #2 NEW NON-ROAD INFRASTRUCTURE + ELEMENTS OF COMBINATION #1	COMBINATION #3 WIDEN MUNICIPAL ROADS AND/OR PROVINCIAL HIGHWAYS + ELEMENTS OF COMBINATION #2	COMBINATION #4 NEW MUNICIPAL ROADS AND/OR PROVINCIAL HIGHWAYS/ TRANSITWAYS + ELEMENTS OF COMBINATION #3
3. Supports land use and growth objectives of province and municipalities		Low support for approved population and employment growth in Analysis Area due to transportation system congestion.	Low support for approved population and employment growth in Analysis Area due to transportation system congestion.	Low support for approved population and employment growth in Analysis Area due to transportation system congestion, but auto reduction and multi-modal strategies are consistent with provincial and municipal transportation planning policies.	Moderate support for approved population and employment growth in Analysis Area due to improved transportation system congestion. Auto reduction and multi-modal strategies are consistent with provincial and municipal transportation planning policies.	High support for approved population and employment growth in Analysis Area due to most improved transportation system congestion. Auto reduction and multi-modal strategies are consistent with provincial and municipal transportation planning policies.
SUMMARY OF ASSESSMENT		The **Do Nothing** Alternative provides the low support for transportation and policy objectives as it fails to address transportation system congestion.	**Combination #1** provides low support for transportation and policy objectives as it fails to address transportation system congestion.	**Combination #2** provides low to moderate support for transportation and policy objectives as it fails to address transportation system congestion.	**Combination #3** provides moderate support for transportation and policy objectives but fails to fully address transportation system congestion through built-up areas.	**Combination #4** provides high support for transportation and policy objectives and effectively addresses transportation system congestion.
RECOMMENDATION		**Do Not Carry Forward**	**Do Not Carry Forward**	**Do Not Carry Forward**	**Carry Forward to Develop and Assess Preliminary Planning Alternatives**	**Carry Forward to Develop and Assess Preliminary Planning Alternatives**

High – Significant potential to address identified problems and opportunities.
Moderate – Some potential to address identified problems and opportunities.
Low – Negligible to minor potential to address identified problems and opportunities.

4.6 Conclusions

Exhibit 4.25 summarizes the assessment of the effectiveness of the transportation system alternatives in addressing the problems and opportunities.

Exhibit 4.25: Area Transportation System Conclusions
• The provision of a new northern or southern Ttansportation corridor between New Hamburg and Stratford provides effective relief to the identified capacity issues in the Analysis Area. Operational issues would remain on some arterials in Stratford, but do not affect the ability of the new corridor to provide an improved transportation connection through the Analysis Area. While the widening of the existing 2-lane section of Highway 7&8, as a standalone solution, will address the capacity deficiencies between New Hamburg and Stratford, it does not address congestion within the built up areas of New Hamburg and Stratford.
• The provision of a new transportation corridor between Stratford and New Hamburg is most effective in diverting vehicle trips away from existing Highway 7&8 the closer it is situated to the existing corridor. There is a strong demand for travel within the existing Highway 7&8 corridor between Stratford and the communities within the Regional Municipality of Waterloo. Trips that would divert to a corridor located significantly north or south of the existing Highway 7&8 would be those currently using the local road networks in these areas, and the longer distance through traffic destined for Highway 8 to the west of Stratford or Highway 7 to the south.
• While the widening of Highway 7&8 provides the required capacity to address the facility capacity issues, between Stratford and New Hamburg, additional widening to 6 lanes would be required through New Hamburg to address capacity deficiencies through this built up area. Furthermore, widening the existing Highway 7&8 does not address capacity deficiencies and the resulting congestion in downtown Stratford and limits the ability of Highway 7&8 to serve as an effective connection to Highway 7 and Highway 8 beyond the City for longer distance person and goods movement demands.
• The preferred strategy for the improvement of the area transportation system should include improved infrastructure necessary to support Transportation Demand Management (i.e. carpool lots and/or HOV lanes), Transportation System Management, and infrastructure to support improved Inter-Regional Transit. There is expected to be a sizeable market for improved Inter-Regional Transit in the Analysis Area which will require the provision of new infrastructure (rail or road or both) and additional rolling stock (buses, train cars, etc) to provide a sufficient service level improvement to attract ridership.

5.0 PROCESS AND CRITERIA TO GENERATE AND EVALUATE PRELIMINARY PLANNING ALTERNATIVES

5.1 Process Overview for the Development, Assessment and Evaluation of Preliminary Planning Alternatives

The process for the identification, assessment and evaluation of the preliminary planning alternatives is depicted in **Exhibit 5.1**. A brief description of the key elements of the process follows:

1 Identify Preliminary Planning Alternatives
- Description and rationale for preliminary planning alternatives.

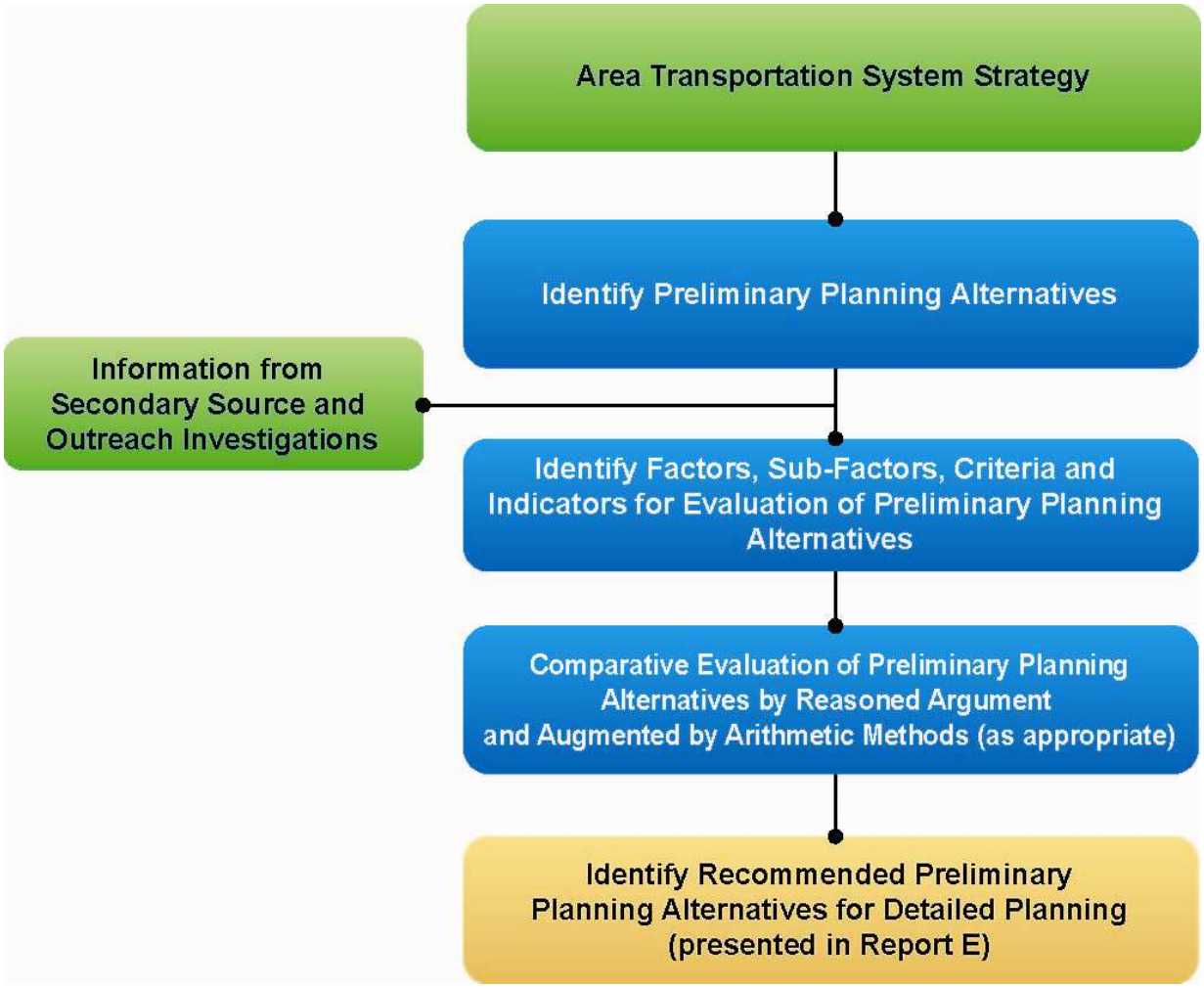
2 Information from Secondary Source and Outreach Investigations
- Document existing environmental conditions/features within the analysis area through secondary source and outreach investigations.

3 Identify Factors, Sub-factors, Criteria and Indicators for Evaluation of Preliminary Planning Alternatives
- Each of the alternatives will be evaluated against the environmental and transportation factors, sub-factors and the evaluation criteria and indicators identified in **Exhibit 5.2** at the end of this section.

4 Comparative Evaluation of Preliminary Planning Alternatives by Reasoned Argument Method
- Each alternative will be evaluated using reasoned argument method using the identified factors, criteria and measures (refer to preliminary listing of proposed factors, sub-factors, criteria and associated indicators provided in **Exhibit 5.2**).

5 Identify Recommended Preliminary Planning Alternative (presented in Report E)
- Selection of recommended preliminary planning alternative based on results of comparative evaluation and taking into consideration stakeholder input received through consultation and outreach program.

Exhibit 5.1: Process Overview for the Development, Assessment and Evaluation of Preliminary Planning Alternatives (Phase 3 of Study)



5.2 Summary of Preliminary Planning Alternatives

Based on the selected Area Transportation System Alternatives carried forward from the Area Transportation System Planning phase, the Highway 7&8 Transportation Corridor Planning and Class EA Study will identify preliminary planning alternatives as follows:

- New Corridor
  - conceptual corridors for new provincial highways
  - conceptual corridors for new provincial transitway
  - environmental protection for the above (by minimizing intrusion into areas of environmental significance)
  - preliminary Analysis Area(s) for the above

- Improve existing Highway 7&8
    - general areas of geometrical improvements and widening to existing highway
    - conceptual areas of limitations to highway access
    - environmental protection for the above (by minimizing intrusion into areas of environmental significance)
    - preliminary Analysis Area(s) for the above

These preliminary planning alternatives are presented in more detail in Supporting Document #3 of Report A: Study Plan. The rationale for the preliminary planning alternatives will be presented in Report "E": Milestone Report – Transportation Corridor Needs Assessment.

Exhibit 5.2 provides a preliminary listing of the proposed environmental and transportation factors and sub-factors to be considered for the generation, assessment and evaluation of alternatives. **Exhibit 5.2** also provides preliminary evaluation criteria and indicators to be applied to these factors and sub-factors during the preliminary planning phase. This preliminary listing will be refined and modified during consultation on the "proposed approach to upcoming work".

5.3 Process for Assessment of Preliminary Planning Alternatives

The assessment of the preliminary planning alternatives identified will:

- be undertaken using a reasoned argument methodology method;
- consider the environmental and transportation factors, sub-factors and the evaluation criteria identified in **Exhibit 5.2**; and
- consider potential impacts on the environment.

5.4 Process for Evaluation and Selection of the Preferred Preliminary Planning Alternatives

The evaluation and selection of preliminary planning alternatives will use a similar process as applied to the 'Area Transportation System" alternatives. The advantages and disadvantages of the various preliminary planning alternatives will be compared using a reasoned argument methodology to select a recommended alternative(s).

The trade-offs used to select a preferred preliminary planning alternative(s) will reflect:

- Government legislation, policies and guidelines;
- Municipal policy (i.e. Official Plans);
- Public, Agencies, First Nations, Consultation Groups, and other stakeholder issues and concerns; and
- Study Team (staff from MTO and their Consultants) expertise.

During the study, the decision making process will be clearly documented to support a traceable process and to ensure that it is understandable to those who may be affected by the decisions. Details on the Reasoned Argument (trade-off) evaluation method are provided in Section 7.2 of Report A: Study Plan.

Exhibit 5.2: Evaluation Factors, Sub-factors, Criteria and Indicators for Preliminary Planning Assessment

FACTOR / SUB-FACTOR	CRITERIA	INDICATORS FOR PRELIMINARY PLANNING PHASE	RATIONALE FOR FACTOR AND SUB-FACTOR EVALUATION
1.0 Natural Environment Factors			
1.1 Fisheries and Aquatic Ecosystems	1.1.1 Fish Habitat	Potential to affect fish species at risk (vulnerable, threatened or endangered fish species) and their habitat.	• The crossing of water bodies by transportation facilities has the potential to affect fish and aquatic habitat features through impediments to fish passage, loss of vegetation, changes to channel geomorphology (channel form and function), substrate and cover, changes to the water quality due to erosion and sedimentation, stormwater discharge and temperature changes. • PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements_ identified below. • PPS Policy 2.1.5 requires that development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements. In addition, policy 2.1.6 restricts development and site alteration on adjacent lands to natural heritage features (e.g. significant - wetlands, woodlands, valleylands etc.) unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions. • It is an objective of the PPS to protect, improve or restore the quality and quantity of surface water, including headwaters. Surface water features are an important part of the natural, economic and cultural landscape. PPS Policy 2.2.2 restricts development and site alteration in or near sensitive surface water features and groundwater features such that these features and their related hydrologic functions will be protected, improved or restored. • The Federal Fisheries Act prohibits the harmful alteration, disruption or destruction of fish habitat, the introduction of deleterious substances to fish habitat and the blockage of fish passage. Where impacts cannot be mitigated, a Fisheries Compensation Plan is prepared in consultation with the CA/DFO to address agency concerns/requirements. • Subsection 36(3) of the Fisheries Act prohibits the deposit of a deleterious substance, directly or indirectly, into waters frequented by fish.
	1.1.2 Fish Community		
1.2 Terrestrial Ecosystems	1.2.1 Wildlife	Potential to affect wildlife species at risk (vulnerable, threatened or endangered wildlife species) and their habitat.	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • The presence of species identified by COSEWIC and COSSARO as vulnerable, threatened or endangered (VTE) requires consideration in the generation of route alternatives. Species or populations may be under pressure or susceptible to stress as a result of development. Since habitat for these species is often limited, impacts to areas where the presence of species at risk is suspected or confirmed should be avoided or minimized. The assessment should have regard for the PPS objective that development and site alteration will not be permitted in significant portions of the habitat of Threatened and Endangered Species. The reported presence of Species of Conservation Concern (as defined by MNR in the Significant Wildlife Habitat Technical Guides (SWHTG – MNR, 2000) and TRCA species of concern will also be considered. • The general prohibitions under the Species at Risk Act, which apply to federally protect migratory bird and aquatic species at risk as well as to all endangered and threatened species on federal lands. • Section 6 of the Migratory Bird Regulations under the Migratory Birds Convention Act, 1994, which prohibits the incidental take of migratory birds and the disturbance and destruction of taking of the nest of a migratory bird. • PPS Policy 2.1.4 prohibits development and site alteration in significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E. The assessment should have regard for this objective. Wetlands serve ecological functions to varying degrees including groundwater recharge/discharge, flood attenuation, wildlife movement corridors, habitat for flora and fauna, and water filtration. • The Canadian Federal Policy on Wetland Conservation promotes the goal of no net loss of wetland function in areas where wetland loss has reached critical levels.
	1.2.2 Wetlands	Potential to affect provincially and locally significant wetlands.	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • It is important to recognize identified ecologically functional linkages between factors and sub-factors (within a natural heritage system) that contribute to landscape connectivity. The assessment should have regard for PPS Policy 2.1.2 which states that the diversity and connectivity of natural features in an area, and the long term ecological function and biodiversity of natural heritage systems, should be maintained, restored, or where possible improved, recognizing linkages between and among natural heritage features and areas, surface water features and groundwater features. The avoidance of wildlife corridors minimizes risks of wildlife mortality during operation of the facility. Secondary information on ecosystem linkages (aquatic and terrestrial) will be reviewed and supplemented by other available sources (including contacts with specialists, field findings).
	1.2.3 Forests (e.g. woodlands [forest stands, woodlots and interior forest habitat] and significant valley lands [valley and stream corridors]) 1.2.4 Vegetation	Potential to affect significant woodlands/ valley lands and areas supporting known populations of vegetation species at risk (vulnerable, threatened or endangered species).	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • The PPS Policy 2.1.4 only permits development and site alteration in significant woodlands south and east of the Canadian Shield where it can be demonstrated that there will be no negative impacts on the natural features or their ecological function. The assessment should have regard for the PPS protection objectives. • The Analysis Area is located within the Carolinian Zone and may have important representations of Carolinian species assemblages. These natural heritage areas require protection. • Small degraded, isolated remnant woodlots and wetlands can have ecological value. Large natural and relatively undisturbed features have high ecological sensitivity and value.
	1.2.5 Designated/Special Areas (such as world biosphere reserves, heritage rivers, ESAs, ESPAs, ANSIs, environmental plan areas, conservation reserves; and the designated special areas of national parks, provincial parks, conservation areas, etc)	Potential to affect designated/special areas.	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • Important habitat areas, which may not be associated with other features protected by other means (ANSIs, ESAs, PSWs), require consideration during the generation and evaluation of alternatives. These areas may be of local or regional significance to wildlife that is not necessarily at risk. Other areas may be identified as important habitat for wildlife species requiring larger habitat blocks or with specialized habitat requirements. The assessment should have regard for PPS Policy 2.1.4 which states that development and site alteration shall not be permitted in certain listed significant wetlands, woodlands, valleylands, wildlife habitat and areas of natural and scientific interest. Development and site alteration may be permitted in significant wildlife habitat if it can be demonstrated that there will be no negative impacts on the natural features or functions for which the area is identified. • Areas that have been designated as Environmentally Significant Areas, Areas of Natural and Scientific Interest or Significant Valleylands may have landforms or plant communities associated with the area that are designated locally, regionally or provincially significant, or provide important corridors. • ESAs are not explicitly included in the Provincial Policy Statement, but are often associated with other features subject to the policy statement (e.g. ANSIs, significant woodlands, significant habitat of endangered species or threatened species, significant wetlands, valleylands and wildlife habitat). They are also reflected in the MNR Land Use Guidelines, Conservation Authority Plans and municipal land use plans. • PPS Policy 2.1.6 provides for development and site alteration on adjacent lands to listed natural heritage features and areas, only where the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological function. • Policy 4.2.1.2 of the Greenbelt Plan 2005 states that the location and construction of infrastructure and expansions, extensions, operations and maintenance of infrastructure in the Protected Countryside are subject to specified criteria.

Exhibit 5.2: Evaluation Factors, Sub-factors, Criteria and Indicators for Preliminary Planning Assessment

FACTOR / SUB-FACTOR	CRITERIA	INDICATORS FOR PRELIMINARY PLANNING PHASE	RATIONALE FOR FACTOR AND SUB-FACTOR EVALUATION
1.3 Groundwater	1.3.1 Areas of Ground water Recharge and Discharge	Potential to affect areas of groundwater recharge and discharge.	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • Section 2.2 of the PPS identifies that the quality and quantity of water (including groundwater) should be protected improved or restored. The assessment should have regard for this objective. Transportation facilities have the potential to impact groundwater resources through removal of recharge areas, interference with discharge areas/shallow groundwater zones, and introduction of contaminated runoff. Consequently, impacts to areas identified as being susceptible to groundwater contamination and/or interference should be avoided/minimized to the extent possible.
	1.3.2 Groundwater Source Areas and Wellhead Protection Areas	Potential to affect groundwater source areas and wellhead protection areas.	
	1.3.3 Large Volume Wells	Potential to affect large volume wells.	
	1.3.4 Private Wells	Not considered in this phase	
	1.3.5 Groundwater-Dependent Commercial Enterprises (e.g. water bottling operations)	Not considered in this phase	
	1.3.6 Groundwater-Sensitive Ecosystems (e.g. groundwater fed wetlands, coldwater streams)	Not considered in this phase	
1.4 Surface Water	1.4.1 Watershed / Sub-Watershed Drainage Features/Patterns	Potential to affect permanent watercourses.	• Surface water features are an important part of the natural landscape in the Analysis Area. There are a number of permanent and intermittent watercourses flowing through the Analysis Area as well as a number of provincially and locally significant wetlands and various unnamed tributaries and agricultural swales present in the analysis area. Consequently, surface water quantity and quality could be negatively affected by the undertaking (e.g., reduction in surface water quantity, degradation of surface water quality, etc.) and therefore the ability to protect surface water quality, including the function of headwaters, need to be considered in the evaluation.
	1.4.2 Surface Water Quality and Quantity	Not considered in this phase	
1.5 Air Quality	1.5.1 Local and Regional Air Quality (Total contaminant and greenhouse gas emissions)	Potential to reduce the air quality consequences of traffic congestion.	• Air Quality impacts have the potential to affect human health. • Alternatives through or near urban areas create the potential for increased contaminant levels. • Dust emissions associated with construction related activities could cause temporary air quality issues. • Greenhouse gases contribute to global warming.
	1.5.2 Sensitive receptors to air pollutants and greenhouse gas emissions	Not considered in this phase	
2.0 Land Use / Socio-Economic Environmental Factors			
2.1 Land Use Planning Policies, Goals, Objectives	2.1.1 First Nations Land Claims	Potential to affect areas for which there are First Nations outstanding land claims	• It is important that Aboriginal People's land claims within the Analysis Area are documented • The Ontario Provincial Policy Statement notes that long-term prosperity and social well-being of Ontarians depends on maintaining strong communities, a clean and healthy environment and a strong economy. Transportation facilities play a key role in achieving these objectives. • There is a need to co-ordinate transportation planning with municipal land planning as established through Official Plans, Secondary Plans and Zoning by-laws as these specify land uses supported by residents, municipalities and the province. • The Greenbelt Plan notes that infrastructure is important to economic well-being, human health and quality of life in southern Ontario and the Greenbelt. • Policy 4.2.1 of the Greenbelt Plan states that, for lands within the protected countryside, as defined by the Greenbelt Plan, 2005, infrastructure must meet one of the following policies; it supports agriculture, recreation and tourism, rural settlement areas, resource use or the rural economic activity that exists and is permitted within the Greenbelt; or it serves the significant growth and economic development expected in southern Ontario beyond the Greenbelt by providing for the appropriate infrastructure connections among urban growth centers and between these centers and Ontario's borders.
	2.1.2 Provincial/Federal land use planning policies/goals/ objectives	Potential to support federal/provincial land use policies/goals/objectives	
	2.1.3 Municipal (regional and local) land use planning policies/ goals/objectives (Official Plans)	Potential to support municipal Official Plans	
	2.1.4 Development Objectives of Private Property Owners	Not considered in this phase	
2.2 Land Use / Community	2.2.1 Indian Reserves	Potential to affect Indian Reserves	• It is important that potential and significance of impacts to Indian Reservations and sacred grounds be recognized and addressed in accordance with Ontario's New Approach to Aboriginal Affairs (Spring 2005) and the Grand River Notification Agreement • Property takings / displacements and changes / effects on local access have a significant impact on owners and tenants as well as the broader community. • Property takings / displacements and changes / effects on local access have a significant impact on owners and tenants as well as the broader community and customer/client base. • Disruption or displacement of institutional features may adversely affect the users of these features / facilities and the broader community.
	2.2.2 First Nations' Sacred Grounds	Not considered in this phase	
	2.2.3 Urban and Rural Residential	Potential to affect urban and residential areas	
	2.2.4 Commercial/Industrial	Not considered in this phase	
	2.2.5 Tourist Areas and Attractions (e.g. museums, theatres, etc.)	Not considered in this phase	
	2.2.6 Community Facilities / Institutions (e.g. hospitals, schools, places of worship, unique community features)	Not considered in this phase	
	2.2.7 Municipal Infrastructure and Public Service Facilities (e.g. sewage and water services, police/emergency services, local utilities)	Not considered in this phase	

Exhibit 5.2: Evaluation Factors, Sub-factors, Criteria and Indicators for Preliminary Planning Assessment

FACTOR / SUB-FACTOR	CRITERIA	INDICATORS FOR PRELIMINARY PLANNING PHASE	RATIONALE FOR FACTOR AND SUB-FACTOR EVALUATION
2.3 Noise Sensitive Areas (NSAs) (residential areas and sensitive institutional uses)	2.3.1 Highway Noise	Potential for increased traffic noise in NSAs	• The Ontario Ministry of the Environment (MOE) has published Noise Pollution Control (NPC) and Land Use (LU) planning guidelines. These MOE documents establish ambient noise criteria, based on one-hour average sound pressure levels (Leq), and evaluate ambient vibration levels based on either Peak or RMS velocity, as applicable. Noise levels generally rise with increased traffic volumes. • MOE/MTO Noise Protocol requires that highway noise be considered in all Provincial (MTO) Transportation projects
	2.3.2 Construction Noise	Not considered in this phase	• The MOE/MTO Noise Protocol requires that construction noise be addressed on MTO construction projects • Construction noise may be subject to municipal (I.e., local) noise by-law
2.4 Land Use / Resources	2.4.1 Aboriginal People's Treaty Rights or Use of Land and Resources for Traditional Purposes (e.g. hunting, fishing, harvesting of country foods, harvesting of medicinal plants)	Potential to affect Aboriginal People's Treaty Rights or use of land and resources for traditional purposes	• It is important that potential and significance of impacts to Indian Reservations and sacred grounds be recognized and addressed in accordance with Ontario's New Approach to Aboriginal Affairs (Spring 2005) and the Grand River Notification Agreement Planning of transportation facilities must address Aboriginal People's treaty rights, and be conducted in accordance with Ontario's New Approach to Aboriginal Affairs (Spring 2005) and the Grand River Notification Agreement
	2.4.2 Agriculture	Potential to affect specialty crop areas and/or areas of Canada Land Inventory Classes 1, 2 and 3 soils	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • Section 2.3 of the Provincial Policy Statement requires prime agricultural areas be protected for long-term use for agriculture. Prime agricultural areas include specialty crop areas and Classes 1, 2 and 3 soils in this order of priority. Ontario Ministry of Agriculture and Food (OMAF) has provincial guidelines for protection of prime agricultural lands as well as agricultural structures or infrastructure
	2.4.3 Parks and Recreational Areas (e.g. national/provincial parks, conservation areas, municipal parks, public spaces, golf courses, trails, greenways and open space linkages)	Potential to affect parks and recreational areas	• Disruption or displacement of recreational / community features may adversely affect the users of the facility/feature. Parks are generally lands in public ownership aimed at preserving significant and sometimes unique components of the environment, and providing recreational opportunities. These areas should be avoided to the extent possible however, in some cases, transportation facilities can be situated along park boundaries without adversely affecting the park. Frequently, parts are isolated islands surrounded by development and as such they can function as wildlife refuge areas or may facilitate wildlife movement opportunities. PPS, 2005, Policy 1.5.1 states that healthy active communities shall be promoted by (d) considering the impacts of planning decisions on provincial parks, conservation reserves and conservation areas.
	2.4.4 Aggregates, Mineral-Resources	Potential to affect aggregate and mineral resources sites	• PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • Sections 2.4 and 2.5 of the Provincial Policy Statement have the objective of protecting mineral and aggregate resources for the long term. The policy statement makes provisions for the protection of both known deposits and areas of potential. MTO adheres to requirements of the Aggregates Act to protect aggregate resources while minimizing sterilization of mineral aggregate resources as much as possible.
2.5 Major Utility Transmission Corridors (e.g. railroads, hydro, gas, oil)		Potential to affect major utility transmission corridors	• Utility corridors are subject to regulations from owners and governing authorities for operation of utilities including National Energy Board, Ontario Energy Board, Transport Canada, Railway Safety Act, etc.
2.6 Contaminated Property and Waste Management (e.g. Landfills, Hazardous Waste Sites, "Brownfield" Areas, other known contaminated sites, and high-risk contamination areas)		Potential to affect landfills (open and closed), hazardous waste sites "brownfield" areas, and other known contaminated sites, and high-risk contamination areas	• Localized significant sources of property contamination can be associated with operating and closed waste disposal sites, the latter being of more significance due to their difficulty in accurately locating them. Consideration should be given to avoiding/ minimizing effects in the "area of influence" of waste disposal sites. • There is the potential that some of the lands in the project area may be contaminated due to the nature of existing and historical land use especially in older commercial/industrial areas and in areas with heavy industrial activity. Sources of potential property contamination in rural areas are most commonly associated with service stations; isolated pockets of commercial/industrial areas; unknown fill areas; scrap yards and other high-risk land uses. Impacts to these areas should be avoided / minimized to the extent possible. • Appropriate assessments will be carried on these sites and the project will comply with the appropriate.
2.7 Landscape Composition	2.7.1 Scenic Composition (total aesthetic value of landscape components)	Not considered in this phase	• Visual impacts on adjacent land use and effects on the visual experiences for users of the facility will be considered.
	2.7.2 Sensitive Viewer Groups	Not considered in this phase	
	2.7.3 Scenic value of views/vistas from the transportation facility	Not considered in this phase	
	2.7.4 Specimen Trees	Not considered in this phase	
3.0 Cultural Environmental Factors			
3.1 Cultural Heritage – Built Heritage and Cultural Landscapes	3.1.1 Buildings or "Standing" Sites of Architectural or Heritage Significance or Ontario Heritage Foundation Easement Properties	Potential to affect buildings or "standing" sites of extreme local, provincial or national interest or Ontario Heritage Foundation easements properties	• A new transportation facility may result in the loss of built heritage features resulting in a depletion of the cultural heritage resources / heritage character in the area. • Impacts to built heritage features should be avoided to the extent possible, or as a secondary alternative relocation rather than demolition could be considered. • MTO is required to operate in accordance with Cemeteries Act MTO is required to operate in accordance with Ontario Heritage Act
	3.1.2 Heritage Bridges	Potential to affect heritage bridges	
	3.1.3 Areas of Historic 19th Century Settlement	Potential to affect areas of historic 19th century settlement	
	3.1.4 Cultural Heritage Landscapes	Not considered in this phase	

Exhibit 5.2: Evaluation Factors, Sub-factors, Criteria and Indicators for Preliminary Planning Assessment

FACTOR / SUB-FACTOR	CRITERIA	INDICATORS FOR PRELIMINARY PLANNING PHASE	RATIONALE FOR FACTOR AND SUB-FACTOR EVALUATION
	(collection of individual man-made features modifying pristine landscape)		
	3.1.5 First Nations' Burial Sites	Not considered in this phase	
	3.1.6 Cemeteries	Potential to affect cemeteries	
3.2 Cultural Heritage - Archaeology	3.2.1 Pre-Historic and Historic First Nations Sites	Potential to affect significant pre-historic and historic First Nations archaeological sites of extreme local, provincial or national interest	• Disturbance or destruction of certain archaeological sites of extreme local, provincial or national interest represents a significant cultural loss. • Impacts to archaeological resources/sites should be avoided or minimized to the extent possible. • Significant archaeological sites shall be preserved and avoided in accordance with Ontario Ministry of Culture (OMC), and Aboriginal People's policies and procedures, and all others shall be excavated to OMC standards
	3.2.2 Historic Euro-Canadian Archaeological Sites	Potential to affect significant historic Euro-Canadian archaeological sites of extreme local, provincial or national interest	
4.0 Area Economy			
4.1 First Nations Industry		Potential to support First Nations industry in the area by efficient and reliable movement of people and goods	• Transportation congestion negatively affects existing business, industry and trade, adding significant costs to doing business and is a deterrent to new businesses considering locating or expanding in the Analysis Area. • Travel reliability for commercial vehicles is a concern given the impacts of construction, maintenance or collisions on the already congested transportation system. • A large proportion of recreational travel is based on longer distance auto based trips, therefore tourism and recreational travel is significantly affected by congestion on the area roadway network. Tourism is currently Ontario's fifth largest export industry and is projected to become the fourth largest in the near future. Tourism includes recreation and the cottage sector. • Agriculture is an important component of the overall economic base of the Analysis Area. Travel for agricultural equipment on local roads is severely affected by longer distance trips diverted from congested highways. Transportation of agricultural supplies and products is affected by congestion on the area road network. • PPS Policy 1.6.6.4 stipulates that when planning for corridors and rights-of-way for significant transportation facilities, consideration will be given to significant natural heritage, water, agricultural, mineral, cultural heritage and archaeological resources. The context is provided in other PPS policy statements identified below. • The Provincial Policy Statement, 2005 stipulates that prime agricultural areas shall be protected for long-term use for agriculture. Prime agricultural areas are areas where prime agricultural lands predominate. Specialty crop areas shall be given the highest priority for protection followed by Classes 1, 2 and 3 soils, in this order of priority.
4.2 Heavy Industry and Trade		Potential to support area heavy industry and trade by efficient and reliable goods movement	
4.3 Tourism and Recreation Industry		Potential to support area tourism and recreation industry by efficient and reliable movement of people	
4.4 Agriculture Industry		Potential to support area agriculture industry by efficient movement of goods	
5.0 Transportation Factors			
5.1 Federal/Provincial/Municipal transportation planning policies/goals/objectives		Potential to support federal/provincial/ municipal transportation planning policies/goals/objectives	• The Official Plans of municipalities within the Analysis Area, and the strategic growth policies and targets embodied in the Provincial Growth Plan, suggest that population and employment growth will continue over time and will be important to future economic prosperity. In order for this economic growth to be realized, an efficient transportation system to move both people and goods within and through the Analysis Area is considered fundamental. • The effectiveness of each alternative needs to be determined. • There is a need to determine how transportation solutions address future needs in relation to existing and proposed future transportation infrastructure. • There is a need to determine how well transportation solutions operate during peak periods. • Transportation agencies have developed design standards to ensure that safety objectives are reflected in all new/expanded infrastructure. These standards are not subject to modification or compromise to avoid/reduce impacts, costs, etc. • Goods movement between economic centres and growth areas incurs out-of-way travel and delay due to congestion through the Analysis Area. Reducing travel times, out-of-way travel and improving travel time reliability would lead to lower transportation costs and benefit the local, provincial and national economy. • There is a need to determine how well transportation solutions operate during peak periods. • There is a need to determine emergency access and safety issues related to transportation solutions. • There is a need to determine the flexibility of transportation solutions to address future needs beyond the forecasted planning horizon. • Physical conditions and staging issues can affect the feasibility of implementing transportation solutions. • There is the need identify the costs associated with possible transportation solutions. Construction costs can influence the feasibility of a given alternative.
5.2 Efficient movement of people		Potential to support the efficient movement of people between communities and regions based on network, screenline and critical link performance measures including Level of Service (LOS) and volume to capacity (v/c)	
5.3 Efficient movement of goods		Potential to support efficient movement of goods between urban growth centres and regional intermodal facilities based on road network and Highway 7&8 corridor performance measures (LOS and travel speed)	
5.4 System reliability / redundancy		Potential to support system reliability and redundancy for travel (people and goods) between regions and communities during adverse conditions	
5.5 Safety		Potential to improve traffic safety based on opportunity to reduce congestion on area road network (LOS and v/c) and reduce the frequency of intersections and entrances in the Highway 7&8 corridor	
5.6 Modal integration, balance and efficiency		Potential to improve modal choice and increase mode split for person trips between communities, regions and major transit station areas based on travel performance indicators (LOS, v/c, travel speed) at critical screenlines and on potential to provide higher order transit service in the Highway 7&8 corridor.	

Exhibit 5.2: Evaluation Factors, Sub-factors, Criteria and Indicators for Preliminary Planning Assessment

FACTOR / SUB-FACTOR	CRITERIA	INDICATORS FOR PRELIMINARY PLANNING PHASE	RATIONALE FOR FACTOR AND SUB-FACTOR EVALUATION
5.7 Linkages to Population and Employment Centres		Potential to improve accessibility to urban growth centres for people and goods movement based on higher order network (roads and transit) continuity and connectivity. Accessibility to rural communities/users.	
5.8 Recreation and Tourism Travel		Potential to support recreation and tourism travel within and to/from the Analysis Area by provision of higher order network (roads and transit) continuity and connectivity and through network performance indicators (LOS, v/c, travel speed)	
5.9 Accommodation for pedestrians, cyclists and snowmobiles		Potential to accommodate pedestrians, cyclists within critical travel corridors in urbanized areas and snowmobiles in recognized rural trails	
5.10 Constructability		Not considered in this phase	
5.11 Construction Cost (excludes property costs and engineering costs)		Not considered in this phase	
5.12 Traffic Operations		Not considered in this phase	
NOTES:	Information to support the evaluation criteria for Preliminary Planning Assessment is drawn from secondary source information and preliminary field reconnaissance (the environmental information is documented in Report "F" – 1st Part)		

6.0 SUMMARY OF INPUT RECEIVED ON AREA TRANSPORTATION SYSTEM ALTERNATIVES AS IDENTIFIED THROUGH OUTREACH AND CONSULTATION, AND MTO RESPONSES/CHANGES

This section to be completed following the 60-day period provided for stakeholders to review and comment on Draft Report D: Area Transportation System Alternatives.