

## **Development of a Strategic Goods Movement Network in Peel Region**

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## **ABSTRACT**

The Region of Peel is Canada's largest multi-modal freight hub. Located just west of Toronto, Peel is home to nationally important freight facilities, notably Pearson International Airport, intermodal rail terminals and several expressways. Peel also has some of the country's largest manufacturing and assembly plants and distribution centres. Given the importance of its goods-generating infrastructure and industry to the regional and national economies, Peel has championed a public-private goods movement Task Force, which aims to coordinate and improve the efficiency and interconnectedness of the region's multi-modal goods movement network. In support of these aims, in early 2012 the Task Force identified 23 go-forward actions.

One of the first of these actions was to develop a region-wide strategic goods movement network (SGMN), which in turn will serve as the framework for coordinating and prioritizing other actions. The SGMN is a holistic approach to developing a goods movement network in a systematic way. Roads from all jurisdictions (municipal and Regional) were eligible for consideration in the SGMN. The strategic network is the highest level of a hierarchical network, in which goods-generating activity centres are connected with each other and to the regional expressway system in the most direct way possible. At the lowest level, existing truck routes on municipal and Regional roads complement and feed into the SGMN.

This paper describes the development of the SGMN. The approach is unique in Canada, in that it combines best practices from across North America and extensive stakeholder consultation. A scan of best practices identified issues that were important to other jurisdictions in the development of their networks. It also identified guiding principles for assessing whether or not a particular link should be in the SGMN, as well as performance indicators for monitoring the effectiveness of the network as the Region grows. This insight from elsewhere informed the stakeholder consultation, which was the basis of the approach. The consultation featured workshops, a web survey and interviews among public and private stakeholders in the goods movement community.

The final concept plan respects planning policies (e.g., avoiding where possible routes through residential neighbourhoods and reliance upon proposed BRT/LRT corridors) while promoting direct connectivity and accessibility to goods-generating activity centres. The SGMN concept – essentially a map - is supported recommended 'next step' implementation actions to actualize the network. Together with the criteria and performance indicators, these provide both the basis for implementing the network now and the 'rules' for future updates.

## **1. INTRODUCTION**

### **1.1 Overview**

This paper describes the process used to develop a comprehensive goods movement network for the Region of Peel.

Located just west of Toronto, the Region of Peel is home to Canada's largest airport and two intermodal rail facilities. As such, it has one of the country's most important concentrations of multimodal goods movement hubs and goods-generating industries. Jurisdiction over its road network is divided among several levels of government;

namely: Provincial highways (the 400-series expressways and the Queen Elizabeth Way [QEW]); Regional roads; and roads that are under the jurisdiction of Peel's three area municipalities - the City of Mississauga, the City of Brampton and the Town of Caledon (see Figure 1). The region's truck route network similarly has evolved among these various jurisdictions.



An urban region's economic vitality depends on many factors. One of them is the efficient movement of trucks to, from, within and through the region, connecting goods-generating activities and intermodal terminals with each other and with the major transportation system. Efficiency is critical because, to the goods movement industry, 'time equals money' and the real costs of circuitous routes, delays and bottlenecks detract from an industry's competitiveness and economic viability. Hence, efficient goods movement is linked to the provision of jobs and to a region's quality of life.

**Figure 1. Peel Region Study Area**

Accordingly, Peel and the three municipalities recognized that, in order to maintain and enhance the region's economic competitiveness and wellbeing, there was a need to develop a comprehensive hierarchy of truck routes. To address this need, the Regional Municipality of Peel (the Region of Peel) initiated the *Strategic Goods Movement Network Study* (SGMNS). The study's Steering Committee comprised the Region of Peel, the three area municipalities, Transport Canada, the Ministry of Transportation of Ontario (MTO) and Metrolinx (the transportation planning authority for the Greater Toronto Hamilton Area). The study was completed in the spring of 2013.

The objective of the SGMNS was to develop a systematic, hierarchical truck route network throughout Peel. The network and the process used to develop it will also help in promoting public and political awareness of the importance of efficient goods movement to Peel's economy and quality of life.

The SGMNS is key among the 23 action items put forth in the *Peel Region Goods Movement Strategic Plan 2012 to 2016*, which was adopted by Regional Council in April 2012. Its importance lies in its role of providing a framework within which locations and priorities for other *Strategic Plan* action items can then be determined.

The *Strategic Plan* was developed by the *Peel Region Goods Movement Task Force*, a joint public-private forum on goods movement in the Region. The *Task Force* and the *Strategic Plan* are championed by the Regional Municipality of Peel, with participation by other government partners and by the private sector, as appropriate. Attaining efficiency in goods movement is a priority of Regional Council.

Regional Council strongly supports the need to enhance goods movement in Peel, and is fully committed to implementing the *Peel Region Goods Movement Strategic Plan*.<sup>1</sup>

#### 1.4 Study Scope

The scope of this study was based on several key principles, as follows:

- Roads of all jurisdictions within Peel were regarded as being within scope for consideration in the SGMN.
- The SGMN addresses only the road-based movement of goods – i.e., it is comprised only of roads and highways. Other freight modes (air, rail, marine and pipeline) are considered only insofar as they connect with the road network at airports, intermodal terminals, etc.
- Roads outside Peel were not considered, except insofar as they connect with Peel. The study looked at truck routes and restrictions beyond Peel's boundaries to help ensure that the network was effectively integrated (i.e., no dead-ends).
- The SGMN was concerned with the spatial definition of a network. Additional restrictions, such as by time of day or by season, were considered separately, based upon this 'framework.'
- The existing network of truck routes / truck restrictions was key to developing the SGMN. Its disposition must be considered separately, again based upon the SGMN framework.

The principal study outputs were a map of the final SGMN concept and supporting documentation, which explains the derivation of the concept and a proposed implementation plan.

#### 1.5 What is a Strategic Goods Movement Network?

What is meant by the term *strategic goods movement network*? Peel and its area municipalities already had detailed networks of truck routes and truck restrictions – so how did the SGMN differ from what existed already?

A useful definition of a *strategic network* is provided by the 2008 South Carolina state-wide strategic corridor plan:

“A strategic system of corridors [that forms] the backbone of the state's transportation system... This system provides a connected, continuous network that serves both the traveling public and facilitates the movement of freight. This strategic system provides the needed connectivity that will allow South Carolina to maintain and enhance its economic vitality.” (1)

This definition introduces the concepts of *connectivity* and *continuity*. It also indicates that the strategic network is the *backbone* of a larger, more detailed system (Note that in this case, the network refers to both passenger and goods movement; nonetheless, the definition is appropriate for the Peel SGMNS.)

For Peel, this meant several things:

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<sup>1</sup> See <http://www.peelregion.ca/pw/roads/goodsmovement/> for more information on the Task Force and on the *Strategic Plan*.

- The SGMN is at the top of a *hierarchy* of truck routes, within which the existing detailed routes and the associated truck restriction policies and regulations fit.
- *Connectivity* requires that the elements of the SGMN are well connected with each other; with major goods-generating activity centres (e.g., distribution centres) and intermodal terminals (such as Toronto Pearson International Airport); and with the more detailed truck route network.
- *Continuity* implies the need to connect all points on the network in the most *direct* way feasible. However, it is important to note that the need for directness still had to respect existing land use and other planning policies.
- In turn, the SGMN had to comprise elements of roads and highways that were under all jurisdictions - Provincial, Regional *and* municipal. The need to avoid limiting eligibility to one jurisdiction or another is vital in providing a seamless, continuous and connected strategic network.

Finally, as adapted for the SGMNS, two other definitions were important:

- *Strategic* refers to a network that supports Peel's goals for economic vitality, mobility for both people and goods, and quality of life. Thus, the SGMN was linked to Peel's planning and development policies.
- *Network* refers to a transportation system that allows for multiple means of reliably transporting goods within, to and from Peel. Here, the concept of *reliability* referred to the need to allow for redundancy in the SGMN, so that alternatives are generally available in the case of accidents or other unforeseen delays. It also pointed to the need to promote system optimization in order to increase throughput and the efficient use of the existing network (the *Strategic Plan's* third strategic direction).

## 1.6 Study Approach

Two complementary approaches were used to develop the SGMNS:

- A comprehensive stakeholder outreach sought input throughout the study. The outreach began by asking for input on issues, needs and opportunities; all of which fed into the development of initial SGMN concepts. The outreach continued by asking stakeholders for their comments on the concepts as these were successively refined into the single SGMN concept.
- A technical process guided and supported the stakeholder outreach, through the examination of best practices in developing strategic goods movement networks elsewhere, land uses, truck volumes, truck origins and destinations and network connectivity.

## 2. GUIDING PRINCIPLES USED TO DEFINE GOODS MOVEMENT NETWORKS

The SGMNS developed six guiding principles to inform the development of goods movement networks and start the identification process of key items that will be monitored to measure the network's implementation over time. Guiding principles often include a careful mix of such things as maximizing limited resources, accommodating political and institutional objectives, and mitigating freight / non-freight conflicts. The six principles were determined from best practices elsewhere as the most commonly used from an operations, planning and/or industry perspective. They are intended to promote economic growth while also supporting quality of life objectives. Table 1 summarizes and defines the principles, and explains how they impact both industry and public policy.

**Table 1. Guiding Principles for Developing a Strategic Goods Movement Network**

Guiding Principle	Rationale / Definition	Impact / Application
<b>1. Leverage existing networks in future freight planning and design work</b>	Most freight networks utilize decades-old routes and rights-of-way that follow efficient natural and man-made designs that can no longer be cost-effectively replaced.	Ensures that existing, efficient routes and networks are utilized.
<b>2. Incorporate economic and commodity supply / demand data into network planning</b>	As freight movement is a derived demand of business and consumer production/ consumption, efficient freight networks provide direct links to production / consumption centres.	Maximizes and optimizes freight transportation, minimizes secondary consequences.
<b>3. Incorporate land use requirements and trends</b>	To address both long-term plans as well as emerging trend impacts, formal and emerging zoning and land use data must be incorporated into planning and design.	Minimizes conflict between designated zones, neighbourhoods and emerging demographic / economic changes.
<b>4. Obtain and utilize freight data sets</b>	It is important to obtain and analyze historical, present and predictive data on freight operations, flows and commodity types, as well as freight costs. These data are essential to all aspects of accurate and meaningful freight planning and network design.	Ensures that network, corridor and infrastructure planning and design are based on accurate, real-world data.
<b>5. Determine design requirements specific to the freight network</b>	For all modes, collect and map vehicle and operations requirements to the existing or proposed network. These would include vehicle design and operating physics, which may be anomalies from standard transportation designs.	Freight technical data are critical precursors to standard infrastructure designing and engineering, particularly because freight operations and assets typically deviate substantially from standard design guidelines.
<b>6. Develop pavement / infrastructure requirements</b>	Based on existing and potential mode and vehicle requirements, planners and engineers can determine design and infrastructure requirements, utilizing common standards such as the Green book, to develop bridge, pavement, lane widths and other freight infrastructure requirements.	Once the design requirements specific to the freight network are identified, standard and customized infrastructure and pavement plans can be developed.

### 3. STAKEHOLDER OUTREACH

To ensure that the final network strategy was appropriate, on-target, and balanced for both public and private stakeholder interests, key members of the goods movement industry were engaged from the outset, in order to gather information and solicit feedback throughout the course of the study. Stakeholder participation was encouraged and the consultant team reached out in various settings and forums to draw their concerns and opinions for how a strategic goods movement network could better serve them and the Region of Peel as a whole.

Information was gathered from a wide variety of public sector and industry stakeholders via three different methods:

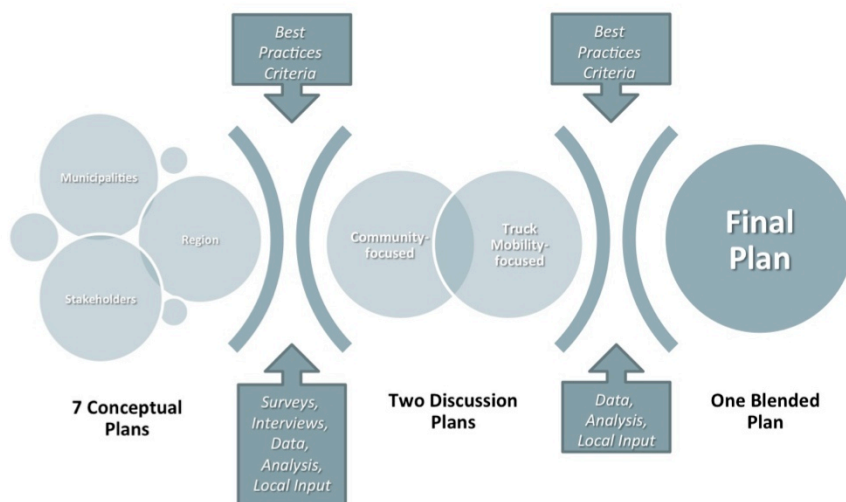
- Paper questionnaires were distributed to stakeholders of at other Peel workshops. The questionnaires asked about goods movement issues and opportunities.
- Stakeholders were invited to take a short (10 minute) online survey asking about their experience with goods movement in and around Peel.
- Interviews were conducted with a selected number of stakeholders to gain greater understanding of the issues that various organizations faced in the goods movement industry.

This three-pronged approach at the start of the project (June and July 2012) helped draw awareness to the study and allowed for a wide range of transportation, goods movement, and planning stakeholders to become vested in the project, and provide insight and input that would help guide the project in the initial phases of development.

Consistent with the best practice guiding principles described above, stakeholders identified several critical “needs” as important elements for the successful development of a goods movement network; notably, *connectivity*, *sensitivity to land use* and *coordination of a hierarchical road network*.

#### 4. DERIVATION OF SINGLE CONCEPT AND FINAL STRATEGY

The derivation of the SGMN involved an ongoing process of consultation with the local, Regional and Provincial freight stakeholder communities (private and public sectors) and the three municipalities. As depicted in Figure 2, each cycle of consultation and review supported the progression from a set of loosely defined network concepts to the single network concept identified for implementation.



**Figure 2. Distillation of Network Concepts**

At each stage of the network development process, Region of Peel staff and the consultant team actively sought input and feedback from relevant concerned organizations and individuals. Comments and concerns received from these

stakeholders were used to systematically refine the network concept as the planning effort progressed.

#### **4.1 Existing Conditions**

The process began through an assessment, characterization and compilation of existing and planned transportation facilities, land uses, economic activities and truck volumes, and origins and destinations within the region. This assessment provided a means by which Peel could understand where and how goods movement occurs within the region, and the extent to which there may be efficiencies to be gained and conflicts to be minimized.

#### **4.2 Initial SGMN Concept Planning**

The working session convened in August 2012 brought together officials and staff from various agencies and governmental levels to develop initial conceptual plans for the SGMN. Through a breakout group process, participants employed their collective expertise and local knowledge to interpret goods movement data and information provided by the Region of Peel and its consultants. Seven breakout groups each developed a conceptual SGMN map that identified what they believed to be important goods movement facilities, routes and corridors. Many of the groups also highlighted parts of the Region that they believed to be sensitive to goods movement activities, such as existing or planned residential neighbourhoods, community centres and environmentally fragile areas. The concern about potential incompatibilities between intensive goods movement activities and Peel's residential and mixed-use centres was echoed in subsequent discussions of each of the concept strategy maps.

#### **4.3 Distillation to Two SGMN Concept Plans**

With the seven concept strategy maps as a foundation, the challenge was then to create an SGMN that would integrate the priorities and concerns expressed in the working session with the public and private sector consultation results obtained throughout the planning process.

Through the surveys, the private sector stakeholders had universally expressed a desire to improve the transportation system to facilitate efficient, high-volume truck movements throughout the region, with a particular interest in connectivity between major highways and major industrial and logistics clusters.

Public sector stakeholders, while recognizing the importance of goods movement to the region's economy, generally expressed a desire to minimize truck movements in areas with existing or planned residential, mixed-use, park or natural areas. In addition, some municipal officials sought to minimize truck traffic in transit corridors where bus rapid transit (BRT) and/or light rail transit (LRT) operations are proposed.

With these perspectives as guiding principles, two SGMN concept plans were developed:

- **Scenario 1 – Truck Mobility Focus.** This scenario assumed no truck restrictions across the Region; emphasized connecting terminals and major industrial areas with the most direct routes to the major highway network; included all 400-series highways, the Queen Elizabeth Way, all major arterials, and all existing LCV routes; and, established a hierarchy of goods movement road types to facilitate logical flows of truck movements.



- **Scenario 2 – Community Development Focus.** This scenario was based upon a synthesis of the seven concepts from the agency working session; reflected municipal planning concepts and priorities; and, connected major industrial areas, terminals and the major highway system while avoiding BRT/LRT corridors, town centres and the disruption of neighbourhoods; incorporated planned long term facilities (the GTA West corridor and the Highway 427 Extension). The scenario also acknowledged that some established industrial areas in southern Mississauga were not well connected (reflecting potential re-uses of existing industrial lands in the future).

Public and private sector goods movement stakeholders reviewed and commented on the two scenarios during and after the first Workshop in October 2012. Generally, the stakeholders and reviewers suggested that Scenario 1 (Truck Mobility Focus) would offer the greatest potential for facilitating goods movement in Peel. However, there was also a consensus that some of the features of Scenario 2 (Community Development Focus), particularly those that help protect residential neighbourhoods from intensive trucking activity, should be considered.

#### **4.4 Distillation to a Final SGMN Strategy**

Based on the October 2012 Workshop discussions, as well as input from agency staff and stakeholders after the workshop, the two scenarios were refined into a final SGMN strategy. This was presented for final stakeholder review a second Workshop in January 2013.

### **5. SGMN FINAL CONCEPT AND ROUTE HIERARCHY**

Figure 3 presents the final SGMN concept, as approved by Peel Regional Council in May 2013. The final SGMN concept provides a logical system of routes that allows for and facilitates efficient and safe truck mobility within, to and from Peel. A key element of this design was the establishment of a hierarchy of SGMN route types.

As shown in Figure 3, this hierarchy includes Strategic Routes, Primary Routes and Truck Route Connectors. The Strategic and Primary Routes comprise the “spine” of the SGMN. These roads, mainly Provincial highways and Regional and municipal arterials, are generally designed, operated and constructed to accommodate significant truck volumes and function as key mobility corridors between major industrial and logistics origins and destinations. Connectors are roads that provide access between Primary Routes and individual destinations or small clusters of logistics activities. These roads are generally designed and operated to accommodate periodic truck movements. Connectors will be the main access for trucks between Primary Routes and shippers, receivers and/or urban centres. Table 2 provides more detailed definitions of each SGMN route type.

Figure 3 shows several other important pieces of information. In addition to municipal and regional boundaries, the final SGMN concept map shows roads and highways by jurisdiction and future proposed / conceptual roadways. The map also shows major generators of truck traffic, including Pearson Airport and the intermodal facilities within and surrounding Peel; major business / industrial clusters; and quarries and sand and gravel pits (which are also generators of truck traffic).

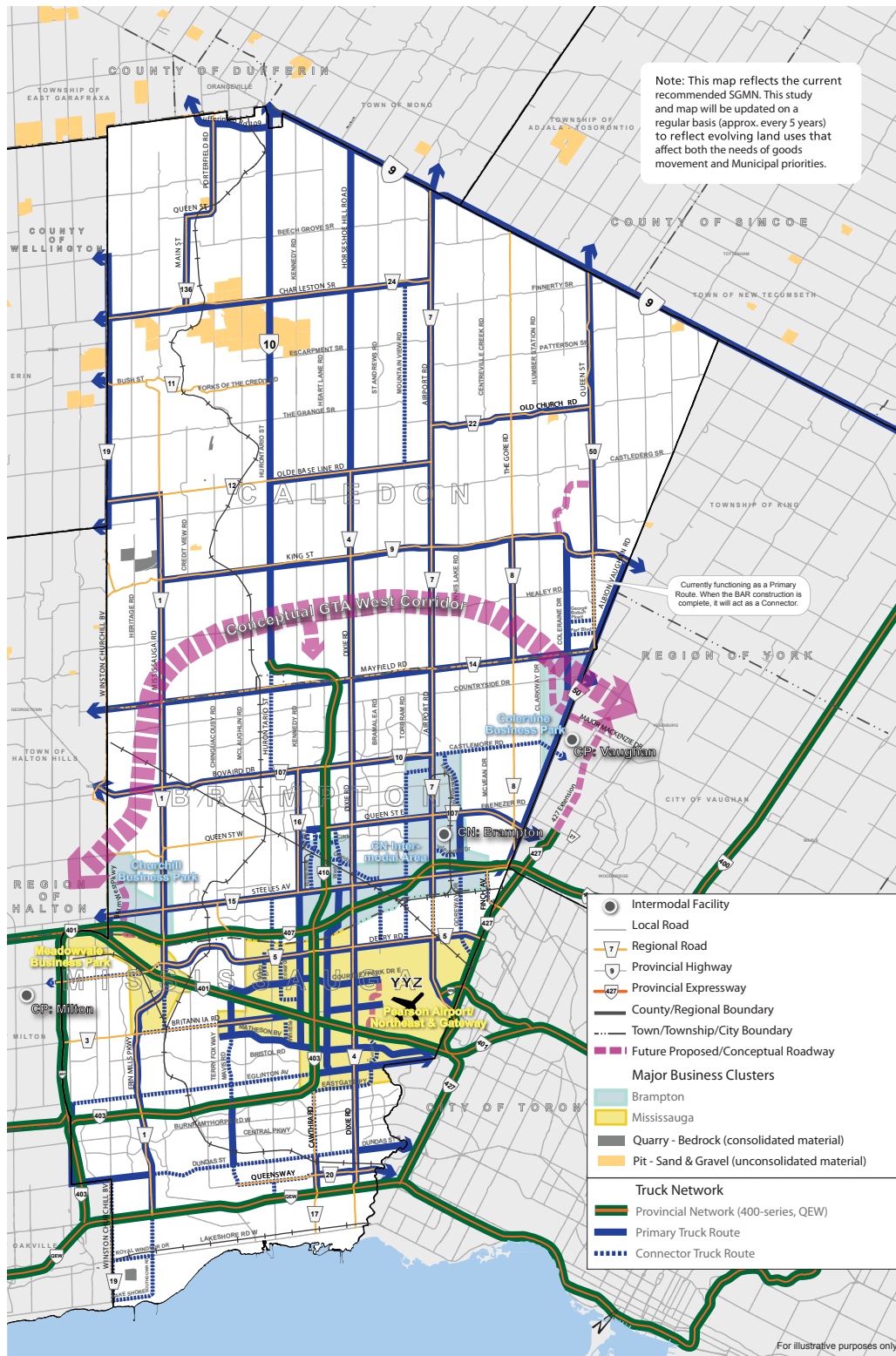


Figure 3. Final SGMN Concept

**Table 2. SGMN Route Type Hierarchy**

<b>SGMN Route Type</b>	<b>Definition</b>
<b>Strategic Truck Route</b>	Access-controlled 400-series Highways / QEW, which are designed, constructed, maintained and operated to accommodate and facilitate movement of large volumes of both general and truck traffic. Provides the strategic connections between the Region of Peel and neighbouring Regions and municipalities, the Province of Ontario, the nation and cross-border destinations. Strategic routes are generally not within the jurisdiction of the Region of Peel or the area municipalities.
<b>Primary Truck Route</b>	Route designed, maintained and operated to facilitate general mixed traffic, while supporting significant truck movements, particularly related to movements connecting major trucking activity clusters with Strategic Truck Routes.
<b>Truck Route Connector</b>	Route maintained and operated for general mixed traffic but with key intersections and segments managed/operated to facilitate safe and efficient truck movements between Primary Truck Routes and shippers, receivers and/or urban centres. Physical and regulatory obstacles to efficient and safe truck movement are minimized, particularly in loading/unloading areas. May include pedestrian/bike facilities as determined appropriate by jurisdiction.

## **6. IMPLEMENTING THE NETWORK**

### **6.1 Implementation Strategy and Actions**

A phased, logical approach was proposed for implementing the Strategic Goods Movement Network. The implementation approach and a series of performance measures (discussed in the next section) provide the steps for actualizing the SGMNS. Implementation of the SGMN will require close collaboration and cooperation among the many interests and stakeholders in Peel’s goods movement community – the Region of Peel itself, the three area municipalities, the Province, goods movement operators, shippers, receivers and land developers. As noted, the recommended network balanced local needs with the needs of the goods movement community, to help ensure that Peel maintains its competitive strength to attract and retain business. It was envisioned that the SGMNS would be a living document that is updated regularly (approximately every 5 years).

The implementation approach comprised four overarching strategies. The strategies address policy; priority planning measures to support the SGMN; types of operational, management and capital improvements to support the SGMN; and assessment measures to monitor and update the SGMN implementation. The strategies, and the accompanying specific actions, are described below. A proposed timeframe, based on an assessment of the complexity of and resources required for each action, is also provided in parentheses after each action’s title.

### **Strategy 1: Strengthen the Official Plan to Further Support Goods Movement (2013-2014)**

In order to give the SGMN Study “standing” and enable its implementation, the Region of Peel needs to designate the Study as an official Regional policy document. Key tasks and tactics that Peel can pursue to execute this strategy include the following:

- **1A. Regional Council Adopt SGMN Plan (2013)**  
The first step toward making the SGMNS part of Regional policy is for Regional Council to adopt it.
- **1B. Implement Components Relating to Regional Roads and Circulate to Area Municipalities for Appropriate Action (2013-2014)**  
Once the Regional Council adopts the SGMN Plan, the Region can begin to implement Plan components relating to Regional Roads. As the Region initiates implementation of the SGMN Plan, the Plan will also be circulated to the municipalities for appropriate implementation action.

### **Strategy 2: Prioritize Operational, Management and Capital Improvements that Support the SGMN (2014-2015)**

The SGMN Strategy contemplates a range of improvements to the region’s road system that support improved truck mobility, efficiency and safety as well as that mitigate negative community impacts as the volume of goods movement in Peel grows. With limited financial and staffing resources, the Region of Peel needs to take a methodical and logical approach to deciding the order in which improvements should be made across the SGMN. The following actions discuss an approach to prioritizing SGMN-supportive operational, management and capital improvements.

- **2A. Use Existing Data to Assess Gaps between the SGMN Strategy and Existing Conditions to Identify Improvement Needs (2014)**  
Much of the Region of Peel’s roadway infrastructure is already designed and managed to accommodate significant truck traffic. However, in order achieve the SGMN’s goal of facilitating efficient and safe truck movements to and from key locations across the region, the Region of Peel needs to develop a detailed assessment of the locations and character of any gaps between the SGMN routes and existing conditions. This assessment will provide information critical to identifying and prioritizing capital, management and operational needs.
- **2B. Conduct Truck Operation-focused Reviews/Inspections of All Primary and Connector SGMN Routes (2014-2015)**  
As noted above, many roads in Peel already accommodate significant truck movements. However, it is not uncommon for roads, especially Truck Route Connectors and other roads not on the SGMN but periodically used by trucks, to contain physical and operational issues that impede efficient and safe truck movement, often resulting in congestion and safety impacts on general traffic and surrounding communities. These issues are often relatively minor, such as curbing at intersections that is too tight for trucks to navigate without riding over the curb or a loading dock that requires trucks to block roadway traffic while positioning to back into the dock. By identifying such issues throughout the SGMN, Peel can develop a list of low-cost/high-impact improvements for prioritization and implementation in the near-term. To ensure efficiency and cost-

effectiveness, Peel could conduct these truck operation-focused reviews in conjunction with its existing Asset Management program. This program includes regular road, pavement and structure inspections and data collection/analyses that support maintaining the Region of Peel's road network in a reliable, safe and sustainable manner.

As part of the Asset Management program, Peel's Transportation Division uses a pavement management system (PMS) that has been refined over many years. The PMS is a repository of data for the road network, including such attributes as dates of rehabilitation, rehabilitation type, number of lanes, AADT, truck percentages and all road condition data attributes. The PMS optimizes the selection of road construction projects based on a formula that considers factors such as rehabilitation type, expected lifecycle, truck routes and truck percentages. While the actual algorithm used is very complex, the strategy is simple. The goal of the PMS system is to recommend the optimal rehabilitation strategy at the most effective time. Another key feature of the system is the ability to predict future asset condition and to show how assets will perform under varying budgets.

- **2C. Prioritize Needed Improvements based on Traffic Volumes and Significance of Origins/Destinations Served (2014-2015)**

Because Peel's funding and staff resources are constrained, it is important to ensure improvements that will be made to the transportation system as part of SGMN implementation are appropriately prioritized. Among the key inputs for such prioritization are the existing and forecast volumes of truck travel on SGMN roads and the relative significance (primarily the magnitude of truck activity) of trucking origins and destinations within Peel. To the extent that prioritized improvements fit within them, such improvements could be addressed as part of Peel's existing Asset Management Programs.

### **Strategy 3: Execute SGMN-Supportive Improvements (2014-2020)**

Following the analyses and prioritization of needs and improvements identified under Strategy 2, Peel and its partners in the municipalities and MTO would move into execution of those improvements. The following describes the key actions required as part of this execution.

- **3A. Implement Operational and Management Improvements on Prioritized SGMN Routes**

Based on the results of the analyses and prioritization conducted under Strategy 2, Peel would implement improvements to how SGMN roads are operated and managed. These types of improvements generally would be lower-cost projects and activities that can provide important incremental improvements to truck mobility, safety, access and efficiency. Examples include signage improvements and expansion, traffic signal timing and optimization, peak hour parking restrictions on appropriate SGMN roads and reconfiguring curbing in intersections with documented truck navigation problems.

As the Intelligent Transportation System (ITS) infrastructure in Peel is developed by the Region of Peel and MTO, Peel may wish to partner with the Ontario Trucking Association and/or private operators to provide in-cab traffic, safety and informational advisories to truckers that allow for more informed truck routing

decisions (e.g., avoid road segments blocked by accidents). In addition, Peel may wish to collaborate with the municipalities to identify and implement appropriate off-hour truck pickup and delivery schedules in parts of the Region that are highly congested during normal business hours. New York City recently pilot-tested such an initiative, which the City reports has been very effective in decreasing delivery-related congestion and increasing goods movement efficiency. Expansion of this initiative is underway.

- **3B. Add Prioritized SGMN Capital Projects to Regional and Municipal Capital Programs**  
Also based on the prioritization process conducted under Strategy 2, Peel should develop a long-range capital project plan for implementation through the Regional and Municipal Capital Programs as appropriate. Such improvements could include intersection geometry and capacity improvements, lane/cross-section expansions, roadway reconstruction/bridge replacements and upgrades and ITS / signalization installations and expansions.
- **3C. Build Capital Projects in Support of SGMN Based on Priority**  
As identified and funded in the capital programs of the Region of Peel, the municipalities and MTO, capital projects that support the SGMN implementation would be built over time. To the extent possible, these improvements should be coordinated with projects and programs already considered in the capital project pipelines that are not necessarily goods movement-specific.

#### **Strategy 4: Assess SGMN Impacts and Make Improvements as Needed (2020-2030)**

Strategy 4 involves actions that would help the Region of Peel monitor and understand the impacts of SGMN implementation and take future actions to help ensure goods movement mobility well into the future.

- **4A. Establish and Expand the Goods Movement Data Collection Program within Peel and Monitor/Report SGMN Performance and Impacts on the Community**  
Peel has a well-established system for collecting data on various aspects of the transportation system's performance through its previously-referenced Asset Management System. This system collects and analyses data on physical road conditions, bridge and structure (culvert) condition, overall traffic volumes and truck traffic volumes. To help the Region of Peel more fully understand and assess goods movement performance and how implementation of the SGMN affects that performance, however, a supplementary program for collecting data and information specific to goods movement should be established. Such data would potentially include, but not be limited to, truck volumes and types on Primary and Connector SGMN Routes, truck travel times between key points, congestion levels between major industrial hubs and 400-series highways, measures of automobile/truck conflicts and safety, and percent or amount of SGMN roadways with adequate or better pavement and bridges. Peel would likely need to cooperate and collaborate with the area municipalities, MTO, Transport Canada and possibly private operators in order to obtain and maintain data such as these. Collecting these additional goods movement-specific data would provide the Region with information on which to base future planning and investment decision-making specific to the SGMN. Further, as the Region

develops goods movement data sets over time, its ability to assess the impact of SGMN investments and actions would become more robust and beneficial.

- **4B. Update the SGMN Strategy based on Needs Identified through Performance Monitoring**

The performance, conditions and needs associated with the SGMN and the overall transportation system in Peel will change over time. Similarly, Peel's population, demographics and land development patterns are quite dynamic, with significant regional growth projected over at least the next decade. It is therefore important for the Region of Peel to revisit the SGMN Strategy on a regular basis (e.g., every 5 years and/or as part of the Regional Official Plan updates) and use the performance and impacts data collected over time as a foundation for appropriately updating and revising the Strategy. This will help ensure the SGMN continues to facilitate optimal goods movement mobility across Peel.

## **6.2 Relationship between the SGMN and Existing Truck Restrictions**

Routes included in the SGMN will be protected and prioritized for goods movement. These include truck routes used previously, as well as additional strategic routes that will enable better connectivity of freight and logistics activity centres. The SGMN designation does not place any new truck restrictions on existing truck routes that are not included in this strategic network. Routes that previously admitted truck traffic will continue to do so, even if they are not designated as strategic. However, they will not be prioritized for maintenance or upgrades to the same level as primary and connector routes in the SGMN.

New truck routes that have been designated in the SGMN may evolve into truck routes pending infrastructure or restriction suitability analyses. This will depend upon the upgrades required and the level of truck activity assessed to be appropriate for the area. Some of these routes may require structural enhancements and upgrades, such as in the case of routes that were previously Axle Load Restricted (for the entire year or seasonally) and/or Heavy Truck Restricted. Others, such as Time of Day Restricted routes prohibiting heavy trucks during certain hours or days in the week, will require suitability assessments to determine the impact of removing the truck restriction and allowing more access to truck traffic.

These upgrades and modifications will occur as a part of the Region of Peel's Asset Management Program, as and when other enhancements are scheduled. This is a long-term investment in the Region of Peel's transportation infrastructure, and will be implemented in different time horizons, based on the benefits offered by each improvement in the network.

This relationship between the various roads in the strategic network, which fall under several jurisdictions, and the change in truck restrictions, as well as the associated actions required to assess the feasibility of implementation, were documented by Peel staff in a detailed table for future reference. An associated reference guide provides a detailed overview and definition of the existing truck restrictions, criteria used to support the inclusion of each segment, as well as the intended actions to be executed for each change in the truck network.

Finally, it should be noted that the Region of Peel operates several Long-Combination Vehicle (LCV) routes. The SGMNS does not change any of the existing LCV routes or

LCV policies. There is a separate process for the approval of LCV routes. If infrastructure changes are implemented as a result of the SGMNS, they will support the LCV program.

## **7. PERFORMANCE MEASURES AND APPLICATIONS**

Performance measures are used by both public and private sector entities to monitor and evaluate the condition and/or efficacy of programs, products, services and infrastructure. In particular, freight performance measures (FPM) focus on various components of the freight distribution system. Private sector freight entities typically use standardized measures for monitoring and evaluation. However, the competitive and proprietary nature of business ensures that most of the input and output data collected and used by the private sector to populate the measures are deemed confidential. The public sector's role in developing, monitoring and evaluating transportation system performance is long-standing. However, government use of freight performance measures is a relatively new and emerging function. Most freight performance measures used by government still include components of transportation and mobility – primarily because the public sector has quick access to vehicle and roadway monitoring data, and is most familiar with manipulating and analyzing such data. That said, more and more transportation planning and management agencies have begun expanding their FPM work into innovative measures that often require data support from industry.

The importance of developing performance measures for the SGMN is explained as follows. As discussed in implementation Strategy 4 above, the Region of Peel should monitor and understand the impacts of SGMN implementation and take future actions to help ensure goods movement mobility well into the future. First, it was recommended that the Region of Peel should establish and expand a Goods Movement Data Collection Program within Peel. These data would form the foundation of SGMN performance measures (PMs). Second, as PMs are established and monitored, the Region of Peel should subsequently update the SGMN strategy at regular intervals based on the needs identified through performance monitoring.

### **7.1 Defining Performance Measures**

As previously noted, indicators and measures are typically developed and implemented to track the status of a system or the attainment of certain objectives. Indicators generally monitor a component without a relation to a specific goal. Performance measures often relate to performance goals. Traditionally, freight transportation PM focus areas have related to system capacity, efficiency, safety, security, pavement and infrastructure condition, congestion levels, energy consumption and environmental measures.

Not all freight transportation measures created and monitored by government have the support of industry, but many are closely related to private sector measures including average travel times, average travel speeds, reliability measures, incident delay times, et cetera. In the instance of “transportation cost” measures, government and industry are usually interested in different cost centres and measures (e.g. fuel, labour and shipper delay penalty costs versus roadway construction and aggregate costs), but interests come together where transportation delay costs are calculated and monitored. More pragmatic and “customer-driven” measures that are now emerging require close working relationships between government and industry. These include measures such as “value of time” impacts, shipper delay costs, cargo/asset damage (from poor pavement and design), and environmental measures relating to carbon production, particulates and fuel consumption.



Common FPM categories and measures were presented, for future consideration by Peel and the other implementing agencies. Three categories were defined: carriers and their supply chains; community and environmental sustainability; and the public sector.

## **7.2 Carrier and Supply Chain FPMs**

Given the criticality of maintaining continuous production lines, “just-in-time” (JIT) business operations are well instituted throughout the supply chain. JIT manufacturing and stocking maintain extremely tight delivery schedules of inbound commodities and parts and daily or hourly delivery of outbound products to store shelves. Some of these measures relate directly to shipper-carrier contracts, taking the form of:

- On-time delivery measures (usually a percentage of total trips).
- Cost-of-delay indices (time-based or production delay-based).
- Cost of goods movement measures.
- Modal access measures.

## **7.3 Community and Environmental Sustainability FPMs**

These measures are becoming more common with the merging of different zoning and planning activities and with changing demographic trends. Sustainability measures seek to identify, monitor and manage (transportation) systems in a way that ensures long-term viability for all stakeholders; needless to say they can become very subjective depending on each stakeholder’s perspective and expectations.

## **7.4 Public Sector FPMs**

While there are numerous other measures used throughout the world, the following measures are those that are most commonly developed and monitored. They generally reflect the highest priority measures for industry and government, and are relatively easy to implement. Finally, because they are common across most jurisdictions, comparative analyses can be conducted. In a number of instances, Peel is already engaged in the development and monitoring of these freight performance measures.

Among these are truck travel / efficiency FPMs. These measures typically relate to truck travel activities such as truck volumes, truck travel times, average speeds and related reliability measures:

- “Average Travel Time” is a measure that determines the average travel time needed for a truck to transect a segment or corridor.
- “Average Travel Speed” is a slightly different measure and is often used for more granular or local assessments. For example, localized changes in travel speeds can be used to pinpoint specific truck bottlenecks. It should be noted that auto travel speeds are not a good surrogate for the unique operational requirements of large trucks.
- “Travel Time Reliability” is a suite of measures that calculate and monitor some condition of travel confidence, whereby segment or system users can generally assume the likelihood that certain travel times and/or speeds are stable and reproducible.
- “Travel Time Delays” (duration) relate to the deviation from ideal travel times and speeds, and provide multiple benefits to government agencies. In particular, delay

time measures offer a measurement tool for testing new and innovative planning and construction programs (e.g. night-time work zones, turn-key projects, signal-timing, etc.). Since travel time delays impact all system users, but are particularly expensive for commercial vehicles, this measure is typically high on FPM priority lists.

From a freight industry perspective, truck travel times/speeds are most important from an economics (benefit-cost) aspect, with “travel time reliability” following as a close second (the standard concern is, “if I’m going to be delayed, tell me how long and how often”). From a public sector perspective, travel times are equally important to safety and environmental measures. Other FPMs include measures of transportation cost, freight system condition, freight-related environment impacts, truck safety, and freight network investment.

While it is clear that freight performance measures are as diverse as the stakeholders involved in transportation, these FPMs would likely have the greatest utility and impact to the Region of Peel. The design and implementation of such FPMs requires the synthesis of existing and emerging data sources, but the FPM outputs from such an endeavour help ensure that limited transportation funds are strategically and judiciously utilized. Ideally, FPMs would be incorporated into all relevant freight transportation plans and policies, and the PM outputs would be reviewed and evaluated on a regular basis.

## **8. CONCLUSION**

This paper has presented a comprehensive process for developing a strategic goods movement network in a major Canadian freight hub. The process blended extensive local consultation among constituent public agencies and private sector stakeholders, with supporting best practice guiding principles and the technical review of available data. The process allowed for flexibility while continuously moving forward towards the development of a ‘living’ SGMN concept map and a set of guidelines to allow for future changes.

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This paper does not reflect any official position of the Region of Peel or of the SGMNS Steering Committee’s member agencies.

## **10. REFERENCES**

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