SYSTEMATIC PROCESS TO DEVELOP A STRATEGIC GOODS MOVEMENT NETWORK IN PEEL REGION, CANADA

David Kriger (corresponding author)
Principal, David Kriger Consultants Inc.
24 Castletorpe Crescent
Ottawa, Ontario, Canada K2G 5P6
Tel: 613-228-2193
FAX: 613-228-2455
E-mail: david@davidkriger.com

Peter Plumeau
Senior Director, Policy, Planning & Engineering
Resource Systems Group, Inc.
180 Battery Street, Suite 350
Burlington, Vermont 05401
Tel: (802) 383-0118, ext. 3301
FAX: (802) 383-0122
E-mail: peter.plumeau@rsginc.com

Daniel Murray
Vice President, Research
American Transportation Research Institute (ATRI)
2277 Highway 36 West, Suite 302
Roseville, Minnesota 55113
Tel: (651) 641-6162
FAX: (651) 631-9500
E-mail: dmurray@trucking.org

David Pierce
Research Associate
American Transportation Research Institute (ATRI)
2060 Franklin Way SE, Suite 201
Marietta, Georgia 30067
Tel: (770) 432-0628, ext. 4
FAX: (770) 432-0638
E-mail: dpierce@trucking.org

and

Sabbir Saiyed, Ph.D., P.Eng.
Manager, Transportation System Planning
Regional Municipality of Peel
10 Peel Centre Drive, Suite A, 6th Floor
Brampton, Ontario, Canada L6T 4B9
Tel: (905) 791-7800, ext. 4352
FAX: (905) 791-7920
E-mail: sabbir.saiyed@peelregion.ca

Resubmitted 15 November 2013
Word count: 5,993 (+ 6 figures)
ABSTRACT

The Region of Peel, in Ontario, Canada, one of Canada’s most important concentrations of multimodal goods movement hubs and goods-generating industries, conducted a Strategic Goods Movement Network (SGMN) study during 2012 and 2013. The paper describes how the study team, guided by SGMN best practices, created the region’s first SGMN and successfully balanced the importance of facilitating efficient goods mobility with the Region’s goals for smart growth, quality of life and economic vitality. To achieve this balance, using visual treatments the study integrated public and private stakeholder input with truck movement data, GIS layers and modeling outputs. Despite the disparate cross-section of agencies and individuals involved with reviewing and approving the study recommendations, the technical approach used by the research team conveyed the study’s results and proposals in an efficient, compelling, and balanced manner. The final strategy proposes an SGMN founded on a hierarchy of goods movement routes that optimizes the different types of truck movements serving the Region. The route hierarchy emphasizes directness, continuity, connectivity, and reliability for trucking operations. The SGMN is also designed to support Peel Region’s quality of life-oriented planning and development policies, thereby facilitating continuing efforts to achieve “peaceful coexistence” of both the goods movement industry and the Region’s residents and businesses. While this paper focuses on Peel, much of what was experienced is transferable to other areas facing similar goods movement challenges.
INTRODUCTION

This paper tells the story of developing a “Strategic Goods Movement Network” (SGMN) for the Region of Peel, Ontario, Canada through the use of a unique combination of quantitative and qualitative freight data. (1) (The terms “goods movement” and “freight” are used interchangeably in this paper.) Peel, bordering the western boundary of the City of Toronto in southern Ontario, is part of the Greater Toronto and Hamilton Area (GTHA), with a 2011 population of 6.6 million. Peel encompasses one of Canada’s most important concentrations of multimodal goods movement hubs and goods-generating industries, including Canada’s busiest airport (Toronto Pearson International Airport), rail intermodal yards and hundreds of major warehouses and distribution centers. Each day, over 23,000 trucks carry about $600 million (US$) in goods to and from the Region, translating to about 25% of Ontario’s total daily trucking activity.

The Region is an “upper-tier municipality” (i.e., a regional government) that comprises three “lower-tier municipalities:” the Cities of Mississauga and Brampton and the Town of Caledon. Peel is experiencing rapid population growth and development. From 2001 to 2013, Peel’s population grew by 32.5% from 988,948 to 1,311,000. While Mississauga’s lands are largely built out, Brampton still has undeveloped land and Caledon is transitioning from a rural to an urban environment. Nearly one-third of the Region’s economic activity is tied to the goods movement and logistics industries. With this growth has come an increased Regional emphasis on “smart growth” and residents’ quality of life. Goods movement and quality of life do not necessarily conflict; however, governments must pursue thoughtful planning and implementation strategies to achieve acceptable harmonization of freight transportation activities with community interests and needs.

Critical to the SGMN, then, was balancing the importance of facilitating efficient goods mobility with the Region’s goals for smart growth, quality of life and economic vitality. To achieve this balance and create a useful, value-added goods movement network strategy, this study needed to thoughtfully integrate input, data and information from both qualitative sources, such as policy-makers, planners and stakeholders, and quantitative sources, such as truck movement analyses, GIS layers and modeling outputs. Moreover, because of the disparate cross-section of agencies and individuals with a role in reviewing and approving the study recommendations, it would be important to convey the study’s results and proposals in an efficient and compelling manner.

The following describes how this study addressed these challenges and delivered a set of recommendations for a strategic goods movement network that the elected officials of the Region of Peel accepted and approved. We also highlight methodological approaches that may be instructive to others seeking to conduct similar studies elsewhere. While this study centered on the Region of Peel, we believe much of what we experienced and learned is transferable to other regions and urban areas facing similar goods movement challenges.

SGMN AS A PEEL REGION PRIORITY

Jurisdiction over Peel’s road and highway network is divided among three levels of government. The Province of Ontario (Ministry of Transportation of Ontario, or MTO) has jurisdiction over the expressway network (the ‘400-series’ highways and the Queen Elizabeth Way [QEW]). The Provincial expressway network provides access to the rest of Ontario, other provinces and – notably – the US border crossings. Jurisdiction over other roads within the region is divided between the Region of Peel and the three municipalities. The region’s truck route networks similarly have evolved among these various jurisdictions, with different factors such as land use policies and varying growth rates impacting the shape and definition of the respective networks. As with urban regions elsewhere, public concerns about truck movement have resulted in restrictions across different parts of the road network that respond to local residential and political considerations, but are not necessarily consistent with a region-wide perspective.

Given the importance of goods movement industries to Peel’s economic vitality, the Region and the three municipalities recognized that, in order in order to maintain and enhance the region’s
economic competitiveness and wellbeing, there was a need to develop a comprehensive hierarchy of
track routes across all jurisdictions.

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

The SGMN was key among the 23 action items put forth in the Peel Region Goods Movement
Strategic Plan 2012 to 2016, adopted by the Region’s (elected) 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. (2)

The Strategic Plan was developed by the Peel Region Goods Movement Task Force, a joint
public-private forum. The Task Force and the Strategic Plan are championed by the Region 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, which has expressed its full
commitment to implementing the Peel Region Goods Movement Strategic Plan.

DEFINING “STRATEGIC NETWORK” AND SUPPORTING CONCEPTS

The development of the SGMN started with a working definition of a ‘strategic network’ and its
components. 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.” (3)

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 SGMN.) For Peel, this meant several things:

- The SGMN is at the top of a hierarchy of truck routes, within which each jurisdiction’s
  existing detailed route system and the associated truck restriction policies and regulations
  fit.
- Connectivity requires that the SGMN’s elements are well connected with each other, with
  major goods-generating activity centers (e.g., distribution centers) 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. Nonetheless, the need for directness still had to respect existing land use and
  other planning policies.
- In turn, the SGMN must 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 SGMN, 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.

APPROACH TO DEVELOPING THE SGMN

Identifying and Applying Best Practice Strategies

In order to encourage buy-in from the various stakeholder groups, Peel Region staff wished to adapt SGMN strategies that had been successful in other regions. The rationale was that a documented review of what others had done would establish a systematic, objective and transparent basis for developing the SGMN. To accomplish this, a synthesis of best practices was produced, based on a review of relevant freight studies. This synthesis was generated at the outset of the study and guided the Steering Committee’s efforts, stakeholder outreach, and all other components of the SGMN development. A range of metropolitan and state-wide studies was examined from across the US and Canada, in addition to selected studies overseas.

After reviewing the various studies, the team synthesized the results into a series of best practice descriptions of varying detail, ranging from high-level summary themes to recommendations for a comprehensive step-by-step process. The shorter, more generalized summary was effective when presented at public engagements, while the more detailed summary proved to be a valuable reference for the team and Peel staff. The review identified several critical overarching needs, which informed the development of the SGMN:

- **Establish guiding principles.** These are principles that balance the needs of a diverse group of stakeholders provide the framework through which decisions about the network are made. The principles promoted the incorporation into the process of existing goods movement networks as the basis for future network planning and design; economic and commodity supply / demand data into network planning; land use needs and trends; goods movement data; design requirements that are specific to goods movement; and, the need to develop pavement and infrastructure requirements that are specific to goods movement.

- **Conduct extensive stakeholder outreach.** Engaging a diverse group of stakeholders throughout the development process is necessary for understanding the needs of each stakeholder group, building support for the final product, and lessening the potential for political barriers that could derail the process.

- **Collect and analyze data.** A solid understanding of existing and future conditions that affect goods movement provides a strong foundation for informed decisions throughout the planning process. Although the collection of new data was not part of the SGMN development, the study outcomes added support to initiatives to enhance GTHA-wide goods movement data collection.

- **Plan for implementation.** Development of short-, medium- and long-term goals is necessary to ensure that the momentum from the planning process (i.e., the development of the SGMN) translates into action once planning is completed.

- **Monitor performance.** Measures that evaluate system performance are important for understanding the impacts of policy decisions and investments. Not only do these measures evaluate the effectiveness of past actions, they are useful in guiding future decisions.

With a solid procedural framework in place, backed by proof-of-concept from previous studies elsewhere, the team was able to effectively meet study expectations and provide stakeholders with a transparent process. They also helped identify key items for monitoring as the network is implemented over time. The principles aimed to maximize limited resources, accommodate political and institutional objectives, and mitigate freight / non-freight conflicts. They also were intended to promote economic growth while also supporting quality of life objectives.
Employing Two Complementary and Mutually Reinforcing Approaches

As noted earlier, Peel officials recognized the need to establish a goods movement network that would facilitate efficient goods mobility while also supporting the Region’s livability and smart growth goals. The spectrum of disparate interests, however, might prove to be challenging to achieving this balanced perspective in the SGMN. For example, stakeholders from the trucking industry may have significantly different opinions of optimal intersection geometry than public health officials who seek to implement “active transportation” programs in the Region. Such differences could make it very difficult to reach agreement or consensus on the “right” goods movement network plan.

With this in mind, Peel Region officials sought to have issues and options presented in a fact-based, objective and clear manner that would allow stakeholders and decision-makers to reach consensus on the recommended SGMN. Thus, the study employed two complementary and mutually reinforcing approaches:

- **Comprehensive stakeholder outreach 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 through the technical process described below.

- **A technical process that employed detailed data and analysis to define successive network concepts.** These data and analyses included current and future land uses, local, regional and provincial planning policies, current truck route networks and volumes, truck origins and destinations, and overall network connectivity.

This integrated approach enabled the progression from seven initial network concepts to a single adopted final network map and strategy.

Stakeholder Engagement Process

To ensure that the final network strategy was appropriate, on-target, and balanced for both public and private interests, the study team engaged key members of the goods movement industry to gather information and solicit feedback throughout the course of the study. To accomplish this, the team reached out in various settings and forums to draw out stakeholders’ concerns and opinions on how an SGMN could better serve them and the broader region.

The SGMN planning process initially employed a “quick-start” stakeholder engagement strategy that helped guide the project toward a productive trajectory. This three-pronged approach included soliciting input from participants in a workshop for a separate but parallel Peel study, an online survey of public and private goods movement stakeholders on issues and opportunities, and in-person interviews with various public and private officials in the goods movement community. Employing this approach at the earliest stage of the project helped build broad awareness of the study, allowed for a wide range of stakeholders to become vested in the initiative, and provided insight and input that helped guide the project in its initial development phases.

The web surveys, administered to Peel’s existing large stakeholder list, found that private sector respondents universally wanted transportation improvements to facilitate efficient, high-volume truck movements, with a particular interest in connectivity between the expressway system and major industrial and logistics clusters. Public sector stakeholders, while recognizing the importance of goods movement to the region’s economy, generally desired to minimize truck movements in areas with existing or planned residential, mixed-use, park or natural areas. Some municipal officials also sought to minimize truck traffic in transit corridors where bus rapid transit and/or light rail transit initiatives are proposed.

In addition to the “quick-start” stakeholder engagement, the study included a series of interactive workshops with policy-makers, officials and staff of both public agencies and private interests from across Peel and the GTHA. These workshops, convened at regular intervals over five
months, featured interactive concept mapping sessions, discussion groups/stations and facilitated discussions among elected officials and goods movement stakeholders. The primary workshops provided these stakeholders with a meaningful, substantive role in developing the SGMN, thereby facilitating buy-in to and approval of the plan and its recommendations.

The concept mapping exercise, which involved pre-assigned groups of attendees drawing “lines on a [large-scale] map” of the Peel Region, allowed individuals to document their opinions of the “right” infrastructure solutions to regional goods movement challenges. Because of its highly interactive nature, this proved especially useful for “cross-educating” public and private stakeholders about logistics and planning issues across the region, especially related to concern about potential incompatibilities between intensive goods movement activities and Peel’s residential and mixed-use centers. Figure 1 provides a sample of one of the concept maps developed by workshop participants.

![Image](image_url)

**FIGURE 1** Sample of Concept Network Map Developed by Workshop Participants
The workshop maps formed the foundation of the evolving SGMN concept map. With each successive workshop, the study team further refined and solidified the SGMN concept map. These workshops, as well as the final study report, clearly conveyed in both words and images how the study team interpreted and applied the concept maps. In this way, stakeholders understood that their input was taken seriously and a critical element of SGMN development.

Concurrent with the stakeholder outreach and workshops, the Region also convened a Study Steering Committee, comprised of officials from the Regional government, the Cities of Brampton and Mississauga, Town of Caledon, Metrolinx (transportation planning agency for the GTHA), MTO and the Federal Department of Transport (Transport Canada). The Steering Committee facilitated the iterative SGMN development by providing its members with regular opportunities to check on the project status, review the network concepts and discuss any concerns that were brought up during sessions, workshops, and agency meetings. Committee members also circulated interim SGMN products within their agencies, thereby providing inputs from staff who would be responsible for actually implementing the network (e.g., engineering, operations, regulations, and enforcement).

Agency decision-makers were similarly brought into the picture, thereby laying the groundwork for the corporate and political acceptance of the final SGMN concept and its implementation plan.

Technical Process

The foundation of SGMN development was an analysis and characterization 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 for stakeholders to understand where and how goods movement currently occurs within Peel, and the extent to which there may be efficiencies to be gained and conflicts to be minimized.

With this foundation, the Region’s derivation of the SGMN comprised an ongoing process of consultation with the local, Regional and Provincial freight stakeholder communities (private and public sectors) and the three municipalities. 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. As shown in Figure 2, the data assessment and analysis underlying each successive round of SGMN concept refinements were supplemented by stakeholder consultation, which provided critical opportunities to “ground truth” the network evolution. Comments and concerns received from these stakeholders were used to systematically refine the network concept as the planning effort progressed.

FIGURE 2 Distillation of Network Concepts.
Critical to the development and continuing refinement of the SGMN concepts was the application of objective data on where and how trucks travel today within the Region. The study employed two principal sources of such data: the Region of Peel Traffic Counting System, and truck movement data based on global positioning satellite (GPS) “traces” of trucks that ATRI obtains through industry partnerships. ATRI’s GPS data have been used extensively through North America over the past decade, notably as part of the Federal Highway Administration’s Freight Performance Measures program. GIS layers were developed for each data category and integrated into the map sets. These layers were then applied to the network concept maps in each successive refinement to provide important – and easy to understand – insights to how effectively a network concept might manage the region’s truck traffic. Presenting these data in an accessible and compelling visual manner was key to facilitating comprehension of issues and options among both policy-makers and stakeholders, and enabled the continuous progression from initial concept to final plan. The presentation of truck travel information was overlaid onto maps showing the key goods movement activity centers, existing multimodal networks and terminals, major industrial areas, road types, existing truck restrictions, and current and planned land uses. This approach also ensured that the available information was utilized effectively, and allowed meaningful decisions to be made in the absence of a detailed truck origin-destination survey and local commodity flow data.

**APPLYING DATA AND ANALYSIS TO FACILITATE CONSENSUS-BUILDING**

The best practice review highlighted the importance of understanding existing goods movement conditions as being key to the successful definition of a SGMN. The current patterns and characteristics of truck movements within, to, from and through Peel helped define the elements of the SGMN. Furthermore, the data provided a powerful rationale for including (or excluding) certain segments from the SGMN.

In the Peel SGMNS, the ATRI GPS truck traces were used to complement information from Peel’s own databases. The GPS data provide a unique and powerful perspective on truck movements throughout Peel, and are derived through ATRI’s industry partnerships. The overall database is populated by positional information from several hundred thousand unique trucks that generate billions of position reads annually. Each truck in the database reports its position at regular intervals, typically between 1 and 15 minutes. The data represent primarily larger carriers and heavy trucks: As a result, smaller companies – notably, aggregate carriers, whose travel through the (largely rural) sections of Caledon were an important issue for the Town – are underrepresented by the data. On the other hand, the traces cover multiple time periods (hence indicate the frequency of usage) and show the actual routes used by vehicles: In sum, although these data do not cover all movements, they are indicative of the main activity that is the focus of the SGMN; and, as important, they provide an understanding of how truck patterns vary throughout Peel. It is also important to note that the ATRI data and Peel data are complementary to each other, in that they provide different ways of looking at truck movements in Peel.

To demonstrate the complementary nature of the various data sources, Figure 3 presents compares Peel’s average annual daily truck traffic (AADTT) data to indicators of truck volumes from ATRI. While the Peel AADTT data are useful for showing truck and other traffic volumes at specific intersections and screenlines at specific points in time, the dispersed nature of the GPS data allows for readings throughout Peel, independent of the presence of vehicle counting stations. Presenting the datasets together provided a more complete picture on the intensity of trucking activity in Peel. Despite the difference in the actual volume figures behind each data source, the maps presented to stakeholders were translated to a common scale to make comparisons easier. In this case, the use of percentiles allowed the reader to understand how the intensity of truck activity at one location relates to activity at other areas, even when comparing two different data sources. For example, if activity at one segment falls into the 95th percentile, this means that 95% of roads in Peel with some kind of trucking activity have less activity than this segment (and only 5% have more activity).
In some cases it was also valuable to compare datasets that were less obviously connected. Figure 4 shows the major origins and destinations of truck travel, as determined by the ATRI data, overlaid with 2011 land use data from Peel. Origins and destinations were determined from an algorithm that interpreted the vehicle’s movement. Vehicles generally were flagged as being at a destination when no significant movement was recorded for at least 30 minutes. The origin/destination data are expressed in terms of ‘clusters’ of activity: because the GPS traces are accurate within a few yards, two trucks that are located side-by-side at the same location will not have the same coordinates. Accordingly, the clusters represent a concentration of origins and destinations that are within approximately 800 feet of each other. The clusters, measured in terms of diameters of the circles, show the relative magnitude of activity, taken over the course of May 2012. Because the data are indicative, they are expressed in terms of percentiles. These clusters generally coincide with the key goods-generating industrial centers and intermodal terminals within Peel. This information was key to understanding the freight/land-use connection as the SGMN was developed.

OUTCOMES OF THE SGMN PLANNING PROCESS

The final SGMN concept adopted by Regional Council provides a logical system of routes that 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 5, this hierarchy comprises Strategic Routes, Primary Routes and Truck Route Connectors. The Strategic and Primary Routes comprise the “spine” of the SGMN. Connectors are roads that provide access between Primary Routes and individual destinations or small clusters of logistics activities. The SGMN hierarchy is further defined below:

- **Strategic Truck Route**: 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 neighboring 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.

- **Primary Truck Route**: 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.

- **Truck Route Connector**: 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 centers. Physical and regulatory obstacles to efficient and safe truck movement are minimized, particularly in loading/unloading areas. In keeping with municipal and regional ‘complete streets’ initiatives, these connectors may include pedestrian/bike facilities as determined appropriate by jurisdiction.

In addition to municipal and regional boundaries, Figure 5 shows roads and highways by jurisdiction and future proposed / conceptual roadways. This final concept 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 Comparison of Peel AADTT Data to ATRI Volume Indicators.
FIGURE 4 Truck Trip Origin/Destination Clusters and Existing Land Use.
Figure 5  Final SGMNS Concept.
IMPLEMENTING THE SGMN

Four-part Strategy

A phased, logical 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 many goods movement stakeholders – the Region of Peel itself, the three area municipalities, the Province, goods movement operators, shippers, receivers and land developers. It was envisioned that the SGMNS would be a living document that is updated regularly to account for new development (approximately every 5 years).

The implementation approach comprised four overarching strategies. The strategies address policy (to give the SGMN official ‘standing’); supporting priority planning measures; supporting operational, management and capital improvements; and assessment measures to monitor and update the SGMN implementation. Figure 6 lists the strategies and specific implementation actions.

![Figure 6 Implementation Strategy and Action Plan.](image-url)
The actions focus upon tangible initiatives. For example, Action 2B, the review/inspection of all primary and connector SGMN routes from a truck operations perspective, addresses problematic but often relatively minor issues 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 road traffic while positioning to back into the dock. This operationally-focused action builds upon existing asset management and pavement management systems. Other actions are specifically directed at ensuring that improvements are prioritized and budgeted (Actions 3A and 3B, respectively). Still other actions bring in the private sector: For example, Action 3A proposes that the private sector complement Peel’s ITS development plan with in-cab traffic, safety and informational advisories to truckers that allow more informed truck routing decisions (e.g., avoid road segments blocked by accidents).

Implementation of off-hour truck pickup and delivery schedules is another opportunity under Action 3A, to avoid highly congested areas during normal business hours. Action 4A identifies the need for improved goods movement travel data and performance measures. Finally, Action 4B recognizes the need to update the SGMN as traffic conditions, land development and demographic and economic changes dictate.

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

Routes included in the SGMN will be protected and prioritized for goods movement. These include both existing truck routes and routes newly-designated through the SGMN. The SGMN designation does not place any new 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 (permanently or seasonally) and/or Heavy Truck Restricted. Others, such as Time of Day restrictions, 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 the Region’s staff in a detailed reference table. A reference guide provides a detailed overview and definition of the existing truck restrictions, criteria used to support the inclusion of each segment, and a list of the intended actions 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 SGMN does not change any of the existing LCV policies or routes. There is a separate process for the approval of LCV routes. If infrastructure changes are implemented as a result of the SGMN, they will support the LCV program.

**MEASURING SGMN PERFORMANCE AND IMPACTS**

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. 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 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 FPMs used by government still include components of transportation and mobility – primarily because the public sector has quick access to vehicle and road 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.

As discussed in implementation Strategy 4 above, the Region will monitor and understand the impacts of SGMN implementation over time and take future actions to help ensure goods movement mobility well into the future. This means that new and expanded goods movement data are required to support the FPMs. Also, as FPMs specific to the SGMN are established and monitored, the Region should update the SGMN regularly based on the needs identified through performance monitoring.

The SGMN proposed three common FPM categories for consideration by Peel and the other implementing agencies as they move forward: carrier and supply chains FPMs (for example, measuring the cost of delay); community and environmental sustainability; and public sector FPMs that measure travel times, reliability and delays. The design and implementation of these FPMs requires the synthesis of existing and emerging data sources; however, their outputs help ensure that limited transportation funds are strategically and judiciously utilized. Ideally, FPMs would be incorporated into all relevant goods movement plans and policies, and their outputs would be reviewed and evaluated on a regular basis.

CONCLUSIONS

In pursuing and developing the Region of Peel SGMN, a variety of challenges needed to be addressed and overcome in order to reach consensus on a Plan for adoption by policy-makers. The most prominent and far-reaching challenge was to create a goods movement network that would simultaneously facilitate efficient and safe truck movement within, to, from and through the Region while helping to preserve quality of life and economic vitality for Peel’s residents. The SGMN Plan ultimately put forth and adopted by the elected Regional Council comprises a hierarchy of goods movement routes that will support these twin goals through an implementation program of system management, operation and investment strategies.

Achieving consensus among the disparate parties involved in advising and deciding on the SGMN Plan required proactive and innovative approaches to applying both quantitative and qualitative data and information to craft a compelling case for action. From this experience, one may draw several conclusions that are instructive to future similar planning efforts:

- Because goods movement is an unfamiliar and complicated topic to most decision-makers and many planners, one needs to bring the sponsor and stakeholders along in the planning process in a methodical and deliberate manner to avoid becoming entangled in multiple “do-loops.”
- Visualization tools and methods (e.g., maps and overlays of data through GIS) can significantly aid in facilitating consensus-building among different stakeholders and decision-makers because facts and information become clear and compelling to all.
- Useful and applicable data on goods movement are available, but special expertise may be required in order to identify data sources and options (e.g., use of ATRI data to show truck activity in a different way).
- Acknowledging and appropriately addressing “local” issues of high importance to certain key stakeholders may help remove obstacles to achieving multi-jurisdictional consensus on plans and strategies (e.g., aggregate truck traffic had a small Region-wide impact but was a key importance for the Town of Caledon, where much of this traffic occurred).
- Acknowledging and addressing disjointed or inconsistent policies, plans and regulations among key jurisdictions (e.g., discontinuous truck routes) through the planning process can greatly facilitate plan and strategy implementation.

ACKNOWLEDGEMENTS
The authors wish to acknowledge the guidance and direction provided to the work by the SGMN study’s Steering Committee (Region of Peel, City of Mississauga, City of Brampton, Town of Caledon, Transport Canada, MTO and Metrolinx). The authors especially want to acknowledge the efforts of Gary Kocialek, Hillary Calavitta (Peel Project Manager), Alexandra Goldstein and Gurbani Paintal of the Region of Peel; Grace Wu of RSG; and Jeffrey Short of ATRI. This paper does not reflect any official position of the Region of Peel or of the Steering Committee agencies.

REFERENCES