

Guidelines for Creating Safe and Efficient Freight-Supportive Communities

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Abstract

As communities change, through growth and intensification, it will become increasingly important to consider the needs of the freight movement industry. Efficient and effective freight networks, integrated with freight-supportive developments, will help ensure that consumers and businesses have access to the goods and services they need and will help support local economies. Recognizing that goal, the Ontario Ministry of Transportation has produced this first-of-its-kind draft Freight-Supportive Guidelines.

The purpose of the draft Guidelines is to help municipalities, planners, engineers, and other practitioners create safe and efficient freight-supportive communities. The draft Guidelines address planning, site design and transportation operations, and include strategies in each area to support freight movement. The draft Guidelines indicate how to conduct a freight audit to review existing supply of freight facilities and also measure the demand for these facilities. The freight audit is the first step in data collection and analysis that will help communities in their subsequent planning efforts for freight movement. The draft Guidelines also include case studies of best practices from Canada and international locations.

This paper focuses on key guidelines for supporting freight within multimodal environments. It describes the freight audit process, and highlights best practices examples. This paper is in effect an executive summary of the complete draft Freight-Supportive Guidelines report, and is designed to enhance the reader's understanding of how freight fits into a modern community as it works to achieve other objectives such as complete streets, congestion management and metropolitan mobility.

As the Freight-Supportive Guidelines report has been prepared on behalf of the Ontario Ministry of Transportation, its intended audience is Ontario local municipalities, regions and counties, and private developers working in Ontario. While select guidelines may be Ontario-specific, the Freight-Supportive Guidelines provide pertinent information regarding land use and transportation planning, site design and roadway operations that could help create freight-supportive communities across Canada.

Introduction

A safe and efficient freight transportation system is important to the economic well-being of Ontario. The food that is consumed by Ontario residents, the clothes worn and items used on a daily basis are all transported to Ontario communities by road, rail, sea or air, and the goods produced in Ontario start their journey on these transport networks within the Province. Freight networks enable Ontario businesses to connect with North American and global markets. The freight transportation system relies on the same infrastructure that is used for moving people, and it is important to balance these competing interests when planning communities and transportation systems. Creating communities that are supportive of freight movement is important to the sustainability of the economy, helping to maintain a high quality of life.

The Ontario Ministry of Transportation, together with a consulting team led by MMM Group, has prepared the draft Freight-Supportive Guidelines to provide tangible strategies to help communities in Ontario plan for freight movement in today's environment. The draft Guidelines have undergone considerable review by a wide range of stakeholders, including other Provincial ministries and departments, local, regional and county government staff, and stakeholders from private industry associations such as the Ontario Trucking Association and the Railway Association of Canada.

The draft Guidelines are divided into three main chapters:

- Land Use and Transportation Planning Guidelines;
- Site Design Guidelines; and
- Roadway and Operational Guidelines.

There are also chapters on implementation strategies and best practices, with examples from Ontario, other parts of Canada and other jurisdictions that illustrate how the concepts in the draft Freight-Supportive Guidelines have been put into practice in municipalities across the world.

This paper provides an executive summary of the entire draft Freight-Supportive Guidelines report. It introduces concepts from all of the chapters and focuses on the most important guidelines from the three main chapters. This report provides a "snapshot" and the reader is encouraged to read further to identify appropriate strategies that can be implemented in his or her community to support freight movement.

Purpose of the Freight-Supportive Guidelines

The purpose of the draft Guidelines is to help municipalities, planners, engineers, developers and other practitioners create safe and efficient freight-supportive communities. By coordinating land use planning and freight mobility planning, the Guidelines help to respond to industry needs for freight movement in Ontario, as well as provide linkages between freight movement and land use planning policy and practice. The draft Guidelines include best practices, examples and implementation tools that are applicable to a wide range of communities and municipalities, and also provide direction for long-term, local implementation of freight-supportive policies and practices across Ontario.

In this context, the Guidelines are intended to:

- Provide direction for land use planning, site design practices and operational procedures that help with the movement of freight;
- Assist municipalities in understanding and planning for the various modes and types of vehicles used in the movement of freight; and
- Support the overall economic health and competitiveness of Ontario's municipalities.

The Guidelines are also intended to assist in the creation of communities, individual developments and transportation networks that are capable of supporting freight industries while integrating and balancing the compatibility of surrounding land uses and the needs of other transportation system users. It is expected that this will assist in creating more sustainable communities.

Land Use and Transportation Planning Guidelines

Freight considerations are an important part of planning for complete communities. The land use and transportation planning guidelines address how municipalities can become more freight-supportive through these planning processes, and balance the needs of freight movement with other municipal objectives. The following elements are addressed: protecting employment areas and freight facilities; planning for the freight movement network; and improved integration of transportation and land use planning.

Important land use and transportation planning guidelines include:

- Conduct a Freight Audit;
- Consider freight movement needs through long-range planning;
- Identify and protect all major goods movement facilities and corridors within and between neighbouring jurisdictions; and
- Consider freight movement needs and impacts when expanding existing employment areas or creating new employment areas.

A summary of each guideline is provided in this paper. Readers are encouraged to read the full draft Freight-Supportive Guidelines to learn of specific strategies contained within these and other guidelines.

Conduct a Freight Audit

A freight audit is a planning and economic development tool used to assist in making informed decisions to enable the safe and efficient movement of freight. The objectives of a freight audit include identifying locations where freight activities are generated or to which they are attracted (currently or in the future) and operating constraints, and creating a forum for stakeholder dialogue. It is necessary to conduct a freight audit in order to identify issues affecting local freight movements and help establish priorities to support safe and efficient freight movement.

A freight audit involves the following components:

- Set-up
 - Problem definition
 - Identification of staff and financial resources
 - Project planning
- Data collection and management
 - Quantitative data collection
 - Intelligence gathering and stakeholder consultation

- Site visits
- Analysis
 - Infrastructure
 - Applicable policies, regulations and by-laws
 - Enforcement practices
- Communication
 - Freight audit report

A freight audit will provide a municipality with a firm understanding of its freight-related assets and will help the municipality leverage these assets by identifying opportunities, constraints and next steps needed to support goods movement.

Consider Freight Movement Needs through Long-range Planning

It is very important for municipalities to consider freight when undertaking new long-range planning exercises, such as when developing a new or updated official plan, secondary plan, transportation master plan, or new or updated zoning by-law. Incorporating freight into planning documents is part of planning for complete communities.

In the planning process, it is important to consider establishing links between the freight movement needs and those of existing and future employment areas as identified in local planning documents. The freight audit should be undertaken as a component of the long-range planning process within the municipality.

Identify and Protect All Major Goods Movement Facilities and Corridors within and between Neighbouring Jurisdictions

As more freight is shipped via truck and rail transport, it is increasingly important to ensure that the existing infrastructure is maintained and enhanced, and that future freight corridors and adjacent lands are protected. Inter-regional level truck routes and corridors are key links in providing connections to and from Provincial highways, and also play a key role in serving many businesses with just-in-time delivery and door-to-door services.

Key elements of the guideline:

- Establishing priority routes for freight movement, to facilitate the movement of freight into and out of areas of significant employment, industrial and commercial activity and to provide alternative routes connecting to the provincial network will support efforts for efficient freight movement.
- The location of employment nodes, freight transfer facilities (i.e., railway intermodal yards, airports and major ports) in adjacent municipalities along with connecting corridors and freight volumes passing through the regions should be identified in this process.

Consider Freight Movement Needs and Impacts when Expanding Existing Employment Areas or Creating New Employment Areas

When expanding or creating new employment areas, preference should always be given to selecting locations within existing settlement areas that are near provincial highways, major interregional highway accesses or other key transportation facilities.

Consideration should also be given to creating new employment areas adjacent to existing employment areas. This helps to minimize land use conflicts. Clustering of like uses also minimizes the conflicts that may be experienced along freight routes and corridors and the type of on-coming traffic that transport trucks may run into when exiting or entering a site.

Understanding the accessibility and freight movement needs of different types of employment uses, such as office uses or warehouse uses, will help to determine which sites are more appropriate for which type of employment use. For example, office uses will place higher priority on transit and active transportation, whereas manufacturing or warehousing place higher priority on access to the regional provincial highway system.

Figure 1: Public Transit Stop in an Employment Area



Locating bus stops within employment areas improves transit ridership in highly congested employment areas, which ultimately reduces automobile dependence, and in turn results in more efficient freight movements. However, transit needs should be balanced with freight movement needs.

Site Design Guidelines

Building upon the guidelines presented in the Land Use and Transportation Planning Guidelines chapter, the site design guidelines define a range of strategies that are common to most types of sites, and provide more detailed strategies for specific land uses. The site design guidelines address the following land uses:

- Industrial;
- Office;
- Retail and restaurants;
- Institutional;
- Existing and new urban areas;
- Rural sites (including quarries, mining and agricultural sites); and
- Site design coordination with public transit, cyclists and pedestrians.

Some of the guidelines are applicable to all types of site land uses, including:

- Site Access Arrangements; and
- Loading Docks.

These two guidelines are profiled below.

Site Access Arrangements

Proper access arrangements from the external road network must be provided for trucks, regardless of the type or use of site. The access system must provide a direct connection from the public road network, and must be designed to accommodate the projected types of trucks. The arrangements need to consider turning radii, driveway and turning lane length, and the spacing of access points in relation to adjacent intersections.

Loading Docks

Loading docks are the arrival and departure points for shipment of goods by delivery trucks. The first step in designing a loading dock facility is to determine what loading demands the site will serve. Considerations include:

- The types of trucks required to serve the needs of the site;
- How often truck shipments occur;
- How long the trucks will stay in loading/unloading areas; and
- Site-specific requirements.

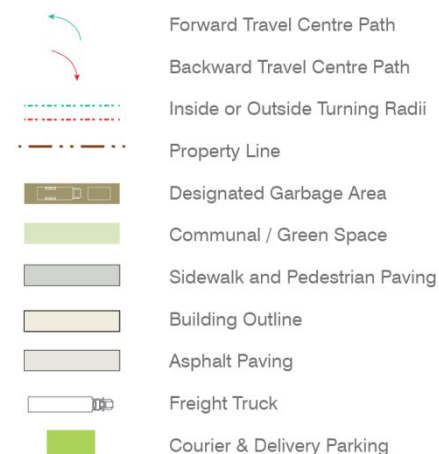
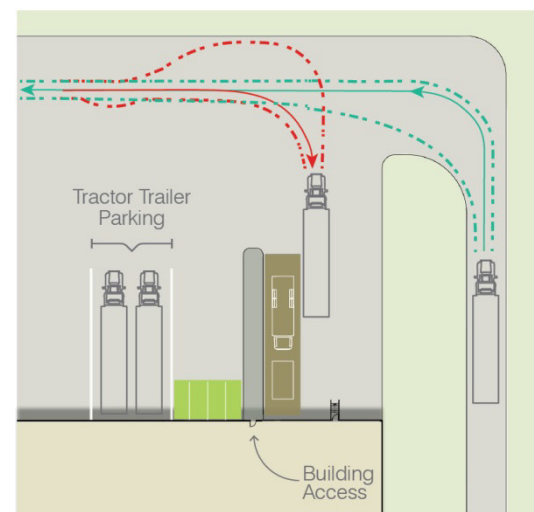
Most municipal zoning by-laws provide standards for the size, type and number of loading spaces required, but specific uses or locations may require consideration of alternate standards. Designers should consider all possible uses of the building in the loading dock design.

In situations where access to the loading dock is impeded, angled access, or “saw-toothed” loading docks are a design solution that allows delivery vehicles to back into the dock yard at an angle without requiring the space to make a complete 90-degree turn for a typical straight back-in loading dock.

In addition to the requirements for loading docks found in most municipal zoning by-laws, there may be specific requirements or operational needs related to specific users. For example, certain retail, commercial, industrial and restaurant operators may have specific standards they use on a company-wide basis to accommodate a certain sized truck in order to keep their operations

Figure 2: Example of a Loading Dock Design

In this diagram, the forward and reverse movements of the truck entering the loading area and backing into the dock are shown. Parking for tractor trailers and delivery vans has been provided. The delivery vehicle parking allows access to the building without crossing the loading bays. Also shown in this diagram is the designated area for garbage pickup.



consistent. Another example is couriers, who may require or prefer on-site, short-term parking areas near the main entrance to the building.

Land Use Specific Site Design Guidelines

There are a number of land use specific guidelines in the site design guidelines chapter. Three of the most important and relevant to the greatest number of situations include:

- Site design to support freight mobility in existing urbanized areas;
- Implement strategies for the efficient and safe flow of goods during the design stage; and
- Site design to coordinate freight transportation with public transit, cyclists and pedestrians.

Site Design to Support Freight Mobility in Existing Urbanized Areas

Individual retail shops, strip malls and mixed use developments in more urbanized areas all require freight, courier and garbage services in order to function effectively. Recognizing that just-in time and next day delivery require deliveries throughout the day is an important consideration when planning for improvements in existing urbanized areas.

Freight movements in historic downtowns sometimes face the added challenge of physical impediments on mobility. Narrow streets in these areas can be difficult for trucks to move due to tight curb radii and narrow right-of-way widths. Smaller delivery vehicles should be considered in these circumstances. High density areas do provide the opportunity for shared facilities. Some locations may be well suited to utilize a centrally located loading dock.

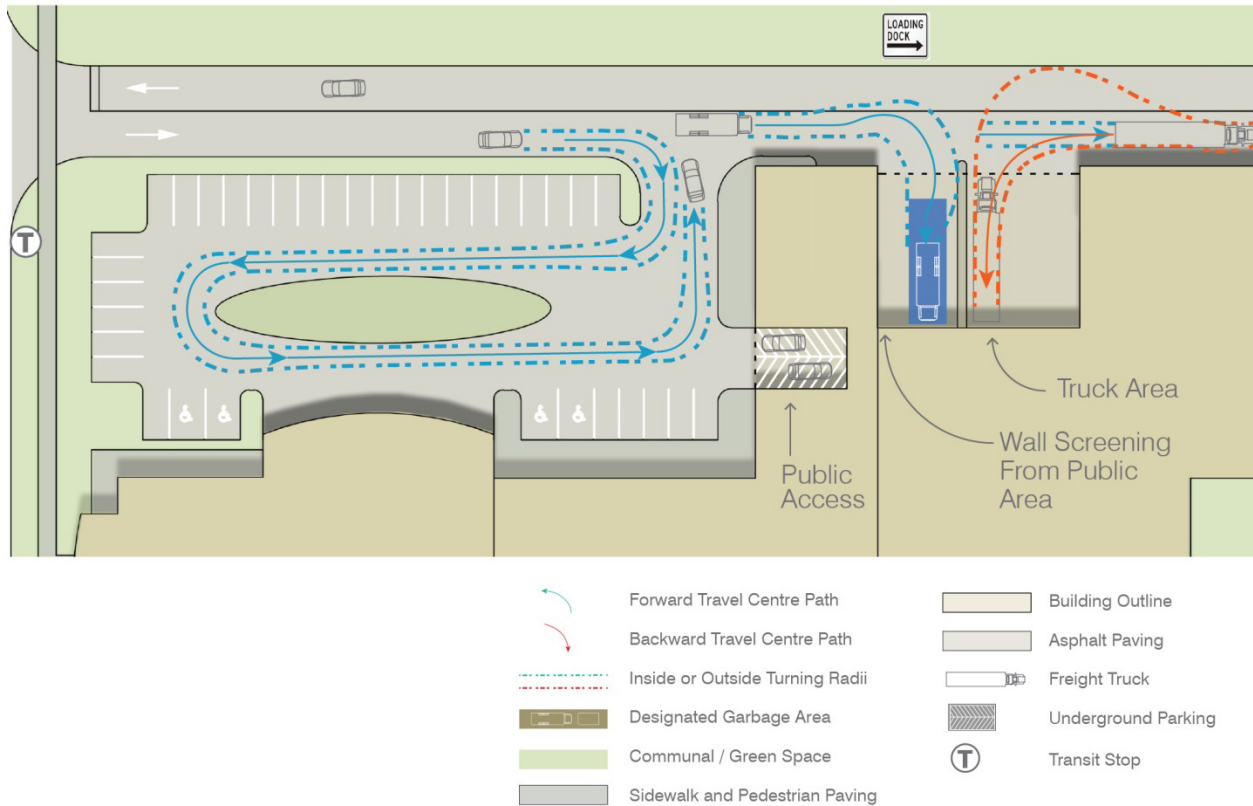
Implement Strategies for the Efficient and Safe Flow of Goods during the Design Stage

In new mixed-use areas, loading areas should be discrete and properly screened, and may provide the opportunity for shared loading dock facilities between multiple buildings and multiple land uses. Conflicts between pedestrians, cyclists, transit vehicles and private automobiles can be minimized in the design stage by providing separate access points for truck and non-truck users.

New mixed-use areas need to take into account municipal zoning by-laws and relevant guidelines, such as the D-6 Guideline from the Ministry of the Environment, which provides guidance on the location of sensitive land uses in relation to industrial land uses.

Figure 3: Example of Site Design in New Mixed-use Areas

Garbage and truck facilities are provided, separated from private vehicle traffic.



Site Design to Coordinate Freight Transportation with Public Transit, Cyclists and Pedestrians

Site design must take into account trucks and their interaction with transit vehicles. Truck parking or loading cannot restrict buses from being able to access their stops. Parked or idling trucks need to be clear of any fixed transit routes, such as streetcars and light rail transit (LRT). At the same time, trucks need to be able to cross transit routes in order to make deliveries on either side of the street.

In cases where transit vehicles operate in the median, physically separated from the rest of the traffic, turning lanes for left and U-turns need to be provided so that trucks can access their destinations.

Road Design and Operational Guidelines

The road design and operational guidelines are intended to help transportation planners and engineers incorporate freight movement into the design and operation of transportation infrastructure. Guidelines are provided for:

- Access and intersections;
- Corridors; and
- Freight gateways.

Specific requirements, by-laws, policies and practice for effective operations are also addressed.

While addressing a host of operational issues, the guidelines seen as most important in this chapter include:

- Truck turning movements;
- Movement along corridors; and
- Harmonization of truck-related requirements and by-laws of the municipality with those in the neighbouring or upper-tier municipalities to support seamless movement of freight across jurisdictional boundaries.

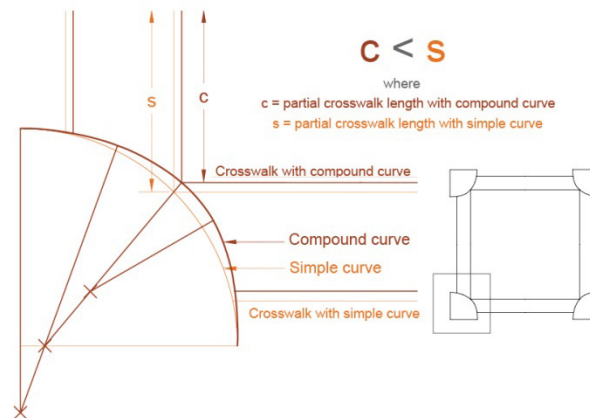
Truck Turning Movements

The spacing between axles and hitch points and the front and rear overhang distances are the main consideration for truck turning radius, off-tracking, and swept path width. These characteristics differ by truck type, and should be considered in the design of various road features to accommodate freight movement. The physical dimensions of trucks are an obvious and often easily measurable metric to consider in roadway design. However, operational characteristics such as a truck's dynamic stability are much more complicated and difficult to measure, and can be overlooked in the design of horizontal curves and cross-sectional geometry, due to low speed operations in these instances.

In low-speed areas, trucks may require special turning movement considerations, such as at-grade intersections and entrances to freight facilities. In high-speed areas, consideration should be given to interchange ramps and long downgrades terminating with a curve. Accommodating turning trucks at low-speed locations usually requires providing adequate geometry to accommodate swept paths during turns. For high-speed areas, truck stability attributes are often more critical.

Figure 4: Compound Curve versus Simple Curve

A compound curve can result in a shorter walking distance for *pedestrians* compared to a simple curve.



Movement along Corridors

Truck movements can be supported along corridors by adding capacity, ensuring that there is enough road geometry, improving signal timing and synchronization, providing road network connections, lowering travel time, and increasing reliability.

An important part of reliable freight transportation is safety. Collisions and accidents are unexpected events and can cause unrecoverable delays, higher insurance costs, equipment imbalances, and lost and damaged cargo. Designing corridors based on the needs of trucks usually produces conservative designs for other vehicles, which can increase safety and reliability for all road users.

Designated or principle truck routes would have a higher need for special truck considerations than that of a local road. Road geometry should follow the complete streets principle to ensure that the road is designed, built, operated and maintained for all road users, including trucks. However, context-sensitive design is an important consideration when planning, designing and operating the overall transportation network.

Harmonize Truck-related Requirements and By-laws

Regulations governing trucking operations in Ontario are diverse, governing aspects such as truck size and weight, vehicle related safety requirements, driver licensing and credentials, and environmental control. These regulations are directed at promoting vehicle productivity while ensuring safety, preserving infrastructure, and limiting negative environmental effects. The Highway Traffic Act and associated regulations pertaining to vehicle weights and dimensions are harmonized across Ontario (Reg. 413-05) and all municipalities follow these.

Harmonizing municipal requirements and by-laws related to designated truck routes, time of day for truck usage and seasonal load restrictions with those in neighbouring and upper-tier municipalities can support the seamless movement of freight across jurisdictional boundaries. Identifying opportunities for harmonization should include regular review of relevant requirements and by-laws and ongoing collaborative stakeholder consultation.

Implementation Strategies

The Implementation Strategies Chapter provides an overview of tools and actions that can be used to implement the guidelines and strategies discussed in the preceding chapters. Elements include:

- Implementation tools, including:
 - Community Improvement Plans;
 - Site Plan control;
 - Development Permit System;
 - Integration of transportation investments and land use planning;
 - Maintenance of an efficient and effective regional freight transportation system;
 - Prioritization based planning;
 - Freight exchanges; and
- Infrastructure and technology investment and funding opportunities.

Case Studies

The case studies identify best practices to help guide Ontario municipalities in the application of the draft Freight-Supportive Guidelines. The case studies provide an overview of an approach to planning, site design, or operational technology, and describe why the case study is relevant to the Ontario context. In keeping with the contents of these guidelines, case studies are presented for freight audits, planning, site design and operations. The case studies include references to complementary guidelines and, where available, provide references for more information about the case study. The case studies come from jurisdictions across North America and Europe, and highlight examples of:

- Freight audits;
- Inter-regional cooperation and planning for freight movement;
- Freight planning in rural settings as well as mid-sized communities outside of major metropolitan areas;
- Public / private partnerships to benefit freight planning;
- Site design guidelines to promote efficient freight movement;
- Innovative technologies to improve the safety of freight movement;
- Education and training for truck drivers and cyclists to promote greater safety of road users; and
- Consolidation of freight operations to benefit multiple stakeholders.

Application across Canada

The draft Freight-Supportive Guidelines are largely applicable across Canada. A highlight of the land use and transportation planning chapter is the freight audit, which is designed to be tailored to the needs of a specific jurisdiction and can be used Canada-wide. While some land use policies may be Ontario-specific, in general, this chapter includes good planning practice for any jurisdiction to plan for freight-supportive communities.

The site design chapter addresses various types of land uses that are found across the country, including urban and rural settings, new development and infill development, and freight interactions with pedestrians, cyclists and transit vehicles.

The Roadways and Operational Design Guidelines chapter does consider the types of trucks permitted on Ontario roads, which may be different than the types permitted in other parts of Canada, however, the principles of this chapter are directly relevant to roadway operational planning country-wide.

Conclusion

The benefits of freight-supportive planning to Ontario's municipalities, in addition to municipalities across Canada, relate to the three pillars of sustainability: economy, society, and environment. Freight movement plays a major role in the provincial and national economy, generating large revenue and supplying jobs for hundreds of thousands of employees. Ontario's economy is multi-faceted, ranging from farming to manufacturing to 21st century knowledge economy businesses. All of these depend on the movement of freight in some way.

Efficient freight movement helps to support safe, livable and complete communities. Conflicts between trucks, trains, and pedestrians, cyclists, transit vehicles and private automobiles are minimized. Sensitive land uses such as residential areas, schools and hospitals are appropriately located, and either set away from freight movement facilities or buffered from them with landscaping, screens and walls.

The environmental benefits of efficient freight movement come from minimizing the amount of air pollution produced, minimizing the amount of fuel consumed and limiting the need for future transportation infrastructure investments. These benefits can be achieved through managing congestion and improving mobility, locating freight movement facilities with the "close to market" approach to reduce travel distances and optimizing the transportation system for efficient delivery of freight. Fuel efficiency is important to the freight industry because it directly impacts the bottom line. All of these efforts limit the environmental footprint of freight movement.

The freight movement industry needs a well-maintained infrastructure system and supportive land use policies to maintain and enhance this valuable industry. The continued success of the freight movement industry in Ontario, as well as the rest of

Canada, reflects the tradition of maintaining and improving these freight-supportive factors. The draft Freight-Supportive Guidelines have been developed to complement ongoing efforts and to provide guidance to enhance freight-supportive communities Ontario-wide. Many of these guidelines have direct application to land use, site design and roadway operational planning across Canada.

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This paper acts as an Executive Summary for the Ontario Ministry of Transportation's draft Freight Supportive Guidelines report. The references provided herein represent some of the sources consulted in preparing the information included in this Executive Summary.

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