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Draft Primer on Truck Lanes in Canadian Urban Areas

Truck transportation is vital to the economic development of a region—effectively all economic endeavours rely on transportation connections made by trucks. Despite the increasing demand for freight movement by trucks in urban areas, these vehicles are not always properly considered in road planning, design, operations, and management. Failure to accommodate trucks in urban areas can reduce their productivity, increase congestion, delay, safety concerns, and emissions, and hinder economic development.

Accommodating trucks in urban areas requires a balanced approach that gives trucks appropriate priority throughout the infrastructure planning, design, operation, and management phases, recognizes the multimodal nature of urban transportation systems, and mitigates the potentially negative social and environmental impacts of trucks operating in urban areas. For example, widening lanes and increasing curb radii can facilitate larger and more productive trucks; however, these treatments can increase pedestrian exposure to traffic and the risk of a collision.

Truck lanes are a relatively unexplored approach to address urban traffic issues which have the potential to improve truck travel time, reliability, safety, and reduce emissions. When implemented and operated appropriately, truck lanes have the ability to increase truck productivity, improve the overall mobility and safety performance of a transportation system, and contribute to the economic development of a region. Although truck lanes offer the potential to address multiple transportation issues, insufficient data and lack of experience with their operation make it difficult to determine their impact.

Urban truck lane definition

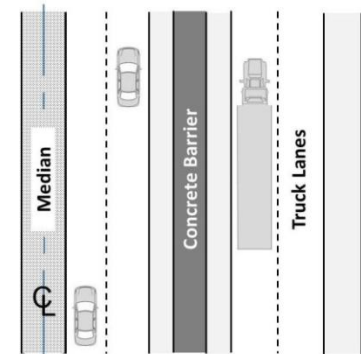
An urban truck lane is a lane for preferential truck use where trucks are separated from other traffic either through physical or operational treatments. The purpose of these lanes is to reduce travel time, improve system reliability and safety, and reduce emissions in the movement of goods in urban areas.

This definition specifically identifies truck lanes as permissively operated facilities which trucks may use at their discretion but which other vehicles are prohibited to use. This is an important distinction from truck restrictions which prohibit trucks from operating on certain lanes and allow other vehicles to use a lane.

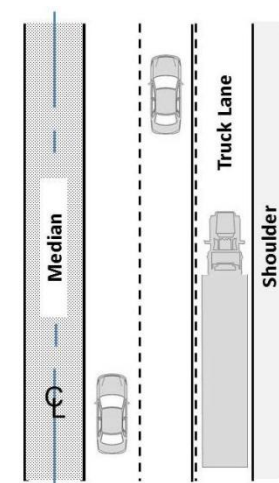
Types of urban truck lanes

Truck lanes can be separated using physical barriers or operational measures (e.g., rumble strips, signage, and paint striping) and can be operated during specific hours of the day if appropriate. A spectrum of urban truck lane treatments exists as shown below, beginning with those that are most preferential for trucks.

- Physically-separated truck lanes on freeways:**
Lanes that physically separate truck lanes from general purpose lanes on freeways.
- Truckway to a major freight generator:**
An exclusive road for trucks to access a major freight origin or destination, e.g., rail intermodal terminals, marine terminals, truck staging areas, or a large industrial park. Though the intent of the truckway is to be truck-exclusive, in practice it may also be used by employees of the freight facility being accessed.
- Truck bypass:**
A facility that removes trucks from potential traffic bottlenecks such as merge areas at interchanges, access/egress ramps, or congested urban street systems.
- Operationally-separated truck lanes on freeways:**
These freeway lanes are operationally separated using traffic control treatments or special policies. Operational separation may only be in effect for certain periods.
- Truck lanes on major arterials:**
Operationally-separated truck lanes on urban arterials that service large truck volumes. They may permit transit operations (ideally with bus pullouts) or use a lane which is designated as a parking lane during certain times of the day.
- Truck routes for specially-permitted vehicles:**
Some routes in Canadian cities permit access for specially-permitted higher productivity vehicles, such as longer combination vehicles. These vehicles require special consideration in the urban context. As such, they are typically permitted only on certain routes during certain temporal periods. This approach is a form of operationally-separating



Truck lanes can be separated physically (above) using Jersey barriers or a median or they can be separated operationally (below) using pavement markings, signage, rumble strips or other non-physical treatments. Although these figures show truck lanes adjacent to the shoulder, they can also be located adjacent to the median.



Source: Montufar Group



Waller St in Ottawa is the only urban truck lane in Canada. It is 300 m long, operates in the south-bound direction only, and is separated from other lanes using signage. Despite its short length and relatively low traffic volumes (2,285 total vehicles per day and 30 to 150 trucks per hour), it has operated successfully since the 1980s.

Photo: Montufar Group

Thresholds in the literature are primarily based on U.S. studies and situations and might not be transferrable to Canadian urban areas.

Truck lanes as envisioned in the U.S. are unlikely to be feasible in Canada.

larger vehicles from general traffic, particularly at times and places where their interaction is perceived to be potentially detrimental operational efficiency and road safety.

Current state of urban truck lanes

Truck lanes are a relatively new concept which is under-researched and sparsely implemented. There has been little research conducted, few planning studies completed, and only several truck lanes implemented worldwide. Urban truck lanes that have been implemented are:

- Waller St – Ottawa, Ontario, Canada
- South Boston Bypass – Boston, Massachusetts, USA
- Clarence Henry Truckway – New Orleans, Louisiana, USA
- Tampa Bay Crosstown Connector – Tampa, Florida, USA
- No-car lanes, Newcastle, United Kingdom
- A16 and A20 motorways, Rotterdam, The Netherlands

Truck lanes are frequently viewed as large-scale solutions where trucks are physically separated from general traffic, though not always for providing preferential treatment for goods movement. Current experience and understanding about urban truck lanes is limited and primarily originates from a small sample of studies and research in the United States. Most existing knowledge concerns physically-separated truck lanes on freeways in the largest U.S. cities with extensive infrastructure and high traffic volumes (e.g., 200,000 vehicles per day). These studies often use economically-based rationale, such as benefit-cost analyses, to support recommendations concerning potential implementation. They either find that the cost to implement these types of truck lanes exceeds their benefits or that there is inconclusive evidence to determine their benefits. Existing truck lanes, including Waller St in Ottawa, lack the empirical data necessary to quantify their benefits.

The performance of existing urban truck lanes has not been measured adequately. This data gap stems from the inability to quantify changes in travel time, reliability, safety, and emissions before and after their implementation. Detailed urban truck lane models have been developed to address this shortcoming; however, these models have their own limitations, particularly the inability to model crashes and the lack of data for calibration, validation, and verification. Despite limited experience with truck lanes, the literature is consistent in identifying challenges associated with their operation. These include underutilization of truck lanes, truck-car interaction and weaving at the ingress and egress points of the truck lane, the trade-off between increasing access to the truck lane at the expense of mobility performance of the truck lane, and right-of-way requirements for physically-separated truck lanes.

Conclusions drawn from the literature and the opinions of representatives from the trucking industry, government agencies, and researchers suggest that truck lanes other than physically-separated

truck lanes on freeways are the most feasible in Canadian urban areas. However, there is an absence of information for these types of truck lanes. Most trucking industry representatives recommend implementing truck-friendly treatments (e.g., improving geometry, adjusting traffic signal timings to accommodate performance characteristics of trucks) prior to considering truck lanes.

New approach for truck lanes in Canadian urban areas

Most experience and literature pertaining to urban truck lanes originates from the U.S. In terms of urban truck lanes, Canada differs from the U.S. in the following critical ways: generally, Canadian urban roads have fewer through-lanes per direction (although some exceptions exist), there is no highway network similar to the U.S. Interstate Highway System (in urban areas), and the scale of issues that truck lanes are addressing in the U.S. are different than the scale in Canada. These differences necessitate a new approach for truck lanes in Canadian urban areas than what is currently available. This approach should consider alternative types of urban truck lanes (as listed previously) to address a broader range of transportation issues beyond congestion.

Due to the uncertainty surrounding urban truck lanes in terms of their performance and the lack of experience with their implementation and operation, truck lane guidelines are not available for transportation engineers and planners. However, there are many considerations to take into account prior to implementing a truck lane and for the planning, design, operation, and analysis and evaluation of truck lanes.

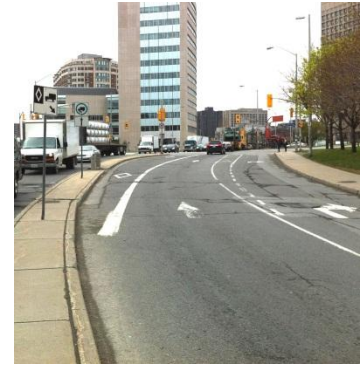
Considerations prior to evaluating truck lanes as an option

Important issues to consider prior to implementing a truck lane are: understanding the urban freight transportation system; defining the problem; identifying options for accommodating urban truck traffic; and if truck lanes are selected as an option, determining the most appropriate truck lane configuration for the given situation.

Planning and design considerations

Truck friendly options first: Truck lanes should be considered as one component among a much broader group of treatment and policy options that can be used to improve truck travel time, reliability, safety, and reduce emissions in urban areas. Truck-friendly options are often capable of addressing these issues and should be considered prior to truck lanes. Generally, truck lanes should form part of an easily-understood truck route network.

Land use planning and zoning: Natural segregation of cars and trucks is possible by protecting and developing land exclusively for



Southbound Waller St in Ottawa accommodates the variety of road users with dedicated lanes. From left to right is a transit lane, truck lane, bike lane, and general purpose lane.

Photo: Montufar Group

Truck lanes should be considered within the context of a network, complement a broader group of treatments for truck transportation, and only be considered after other truck-friendly options have been explored and implemented.



Signs on Waller St restrict vehicles other than trucks from travelling straight on the truck lane.

Photo: Montufar Group



Container trucks queuing along a two-lane road leading to a Canadian rail intermodal terminal entrance. These delays are caused by the terminal; therefore a truck lane would not necessarily reduce delays for these trucks.

Photo: Montufar Group

Adequate accessibility must be provided to accommodate the routing needs of urban trucks without degrading the mobility benefits to the point where the truck lane is no longer attractive for trucks.



Lack of compliance on the Waller St truck lane threatens to reduce the benefits to trucks. Observations indicate that up to one-third of vehicles on the truck lane are not trucks.

Photo: Montufar Group

industrial purposes and thereby discouraging passenger vehicles from using roads serving these areas.

Need for stakeholder consultation: Insufficient empirical data about urban truck lane performance hinders urban truck lane planning and design. Consequently, threshold criteria to screen for truck lane candidates are unavailable. Stakeholder consultation and involvement are therefore essential for helping decide if truck lanes are appropriate for a given situation.

Operational considerations

Mobility issues associated with the operation of truck lanes: The ability of truck lanes to address mobility issues for trucks depends on factors such as weaving, truck lane directionality, and scale of analysis. Weaving interactions between cars and trucks pose an operational and safety concern; specific truck routing needs should be understood as they will impact how trucks access the facility. Truck lanes do not necessarily need to operate bi-directionally as truck demand and traffic characteristics vary by direction of travel. Truck lane analyses should be conducted at a macroscopic scale that includes mobility issues at trip endpoints (i.e., origin and destination) and not limited to on-road performance. For instance, the mobility benefits of truck lanes serving an intermodal terminal may become insignificant if most of the delay for the entire freight movement occurs within the terminal.

Safety performance of truck lanes: The safety performance of truck lanes may be the deciding factor for implementation; however, the safety performance of truck lanes is currently uncertain.

Truck lane compliance: Experience with preferential lane treatments for other modes indicates that compliance for truck lanes may be higher for newly constructed lanes compared to lanes that are converted from general purpose lanes. In certain jurisdictions, enforcing truck lane compliance may require legislative changes.

Analysis and evaluation considerations

Empirical data can be gained through pilot testing and microsimulation: A lack of empirical data about truck lane performance and their economic costs and benefits hinders analysis and evaluation of the potential use of these lanes in Canadian urban settings. Pilot testing and purposeful monitoring and evaluation of truck lanes are a principal means of developing the empirical knowledge necessary for analysis and evaluation.

Quantifying the benefits of truck lanes: Uncertainties impeding the calculation of truck lane benefits include truck diversion rates (i.e., the number of trucks that divert from general purpose lanes to truck lanes), the value of truck travel time savings and travel time reliability, truck trip distance along a truck lane, site-related delays, and safety performance.

Evaluation with appropriate metrics: Consideration should be given to establish and monitor performance indicators that are appropriate to determine whether the intended objectives of truck lanes are achieved. Detailed characterization of traffic and truck traffic volumes (e.g., temporal and directional distributions) is necessary and should be done in an absolute sense wherever possible, rather than relying on metrics such as truck percentages or passenger car equivalents (PCEs) which may mask the true performance impacts of truck lanes.

Future opportunities for advancing urban truck operations in Canada

The development and implementation of research that creates more information about urban truck operations is essential for Canada. The extent to which freight is accommodated in the planning, design, and operations process of a jurisdiction is highly linked to the existing level of understanding about the needs and characteristics of goods movement in the region. The following are practical opportunities for advancing understanding truck lanes in Canadian urban areas, and urban truck operations in general.

- Development of resources and guidelines for improving truck accommodation in urban areas using truck-friendly approaches and treatments
- Collection of empirical data through implementation of truck lane pilot tests
- Development of guidelines for the implementation of truck lanes

More information

The information in this primer is extracted from the Transportation Association of Canada publication entitled *Truck Lanes in Canadian Urban Areas*. This resource document is intended to assist transportation professionals to make more informed decisions regarding the potential use of truck lanes as a tool for efficient sharing of facilities by all road users in Canadian urban areas. The document contains 61 considerations regarding the planning, design, operation, analysis, and evaluation of urban truck lanes in Canada based on an extensive literature review, interviews with industry representatives, government officials, and researchers, and case studies conducted in six Canadian cities. This publication is available for purchase in TAC's online bookstore.

Disclaimer

Every effort has been made to ensure that all information in this primer is accurate and up-to-date. The Transportation Association of Canada assumes no responsibility for errors or omissions. The primer does not reflect a technical or policy position of TAC.



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