Fig. 4.2: Expo Site - Illustrative Masterplan

Fig. 4.3: © September 2016 - ARUP - Expo 25 Toronto - Rights Reserved

ARUP

TORONTO **EXPO 2025**
Site Analysis, Masterplan, Transport and Infrastructure - October 2016 - Final

DESCRIPTION	PLOT AREA FOOTPRINT PER UNIT (m^2)	TOTAL PLOT AREA FOOTPRINT (m^2)	PLOT EFFICIENCY (PLOT BUILDABILITY)	BUILDING FOOTPRINT (m^2)	ESTIMATED NUMBER OF FLOORS	GFA (m^2)
EXPO SITE AREA						
3 Plaza Entrances	approx. 16,500	50,000	100%	N/A	N/A	50,000
1 Expo Center	25,000	25,000	80%	20,000	2.0	40,000
1 Theatre	15,000	15,000	80%	12,000	1.0	12,000
1 Educational Center	10,000	10,000	70%	7,000	2.0	14,000
1 Media Center	20,000	20,000	80%	16,000	1.0	14,000
EXHIBITION PAVILIONS – COUNTRIES (55 COUNTRIES)						
18 Small	500	9,000	60%	5,400	TBD	TBD
22 Medium	2,500	55,000	60%	33,000	TBD	TBD
15 Large	4,500	67,500	60%	40,500	TBD	TBD
EXHIBITION PAVILIONS – HOST COUNTRY AND CITY						
1 Host Country	15,000	15,000	70%	10,500	3.0	31,500
4 Host City / Province (Toronto & Ottawa-Ontario, Montreal-Quebec, Vancouver-British Columbia)	approx. 11,000	45,000	70%	31,500	3.0	94,500
THEMATIC PAVILIONS						
1 Clusters (for 90 countries)		25,000	70%	17,500	1.4	25,000
3 Welcome Pavilions	3,300	9,900	50%	4,950	2.0	9,900
2 Theme Pavilions (Climate change & Innovation)	5,000	10,000	50%	5,000	2.0	10,000
INTERNATIONAL ORGANISATIONS & NGOs						
35 Small	500	17,500	60%	10,500	TBD	TBD
10 Medium	2,500	25,000	60%	15,000	TBD	TBD
4 Large	4,500	18,000	60%	10,800	TBD	TBD
CORPORATE PAVILIONS						
17 Large	2,600	44,200	60%	16,520	TBD	TBD
FOOD AND BEVERAGE						
		75,000	80%	60,000	1.0	60,000
TRANSPORT						
		50,000	100%	N/A	N/A	50,000
SUPPORT/OPERATIONS						
1 Administration / Management (enclosed)		7,150	90%	29,500	2.3	15,000
1 Logistics / Warehouse (enclosed)		4,800	90%			10,000
1 Security and emergency services (enclosed)		4,800	90%			10,000
1 Clean and Waste (enclosed)		2,930	90%			6,000
1 Central Catering (enclosed)		9,550	90%			20,000
1 Site Management: stores, workshops and staff areas (enclosed)		3,600	90%			7,500
1 Site Management: stores, workshops and staff areas (compound)		7,500	100%	N/A	N/A	7,500
1 Logistics / Warehouse (compound)		10,000	100%			10,000
1 Security / Emergency Parking (compound)		4,000	100%			4,000
1 Clean and Waster (compound)		2,000	100%			2,000
1 Central Catering (compound)		8,000	100%			8,000

Table 4.1: Expo Land Use Area Schedule

ILLUSTRATIVE PROGRAM DISTRIBUTION

The Expo program is articulated along the three Expo axis. Two of these axis connect the City of Toronto with the site following the direction of the Don River. The third axis is perpendicular to them and follow the ship channel alignment.

One Expo entrance heads each of these “public space corridors” and feature pavilions and other points of interest that are strategically distributed along them to attract visitors in a uniform way all along the site. Special points of interest such as the Host Country pavilion or Host City pavilion are planned at the end of these corridors to “anchor” them to the site.

Spectators’ services provided at a small/medium scale along all the public space to ensure spectators comfort.

- Entrances Plaza
- Expo Center
- Theatre
- Educational Center
- Media Center
- Small Exhibition Pavilion - Country
- Medium Exhibition Pavilion - Country
- Large Exhibition Pavilion - Country
- Exhibition Pavilion - Host Country
- Exhibition Pavilion - Host Country City
- Cluster Pavilion
- Welcome Pavilion
- Theme Pavilion
- Small International Organisation / NGO Pavilion
- Medium International Organisation / NGO Pavilion
- Large International Organisation / NGO Pavilion
- Corporate Pavilion
- Food & Beverage Zone
- Food & Beverage - Existing Building Reuse
- Support Ancillary Zone
- Parking / Pick up and Drop off
- New Pedestrian Connection (Bridge)

Fig. 4.4: Expo Site - Illustrative Programme Distribution

MAIN PEDESTRIAN ROUTES

The Expo is accessed via a number of spectator entrance plazas that are connected with key transit nodes including a possible water transit point. The entrance plazas on the main pedestrian routes link to each zone of the Expo in a series of pedestrian circuits that are supported by zones of catering and entertainment areas and interspersed by small gardens, fountains and pools between the main activity areas and catering areas. The open space and circulation areas serve all age groups in continuous circulation patterns and avoid dead ends and abrupt transitions. All pavilions and areas of the expo site open to the public will be designed to be fully inclusive and accessible. Fire and emergency equipment is able to circulate on the main pedestrian paths and routine managed service functions can occur out of hours. Access for media staff and VIP guests occurs at selected entrance plazas.

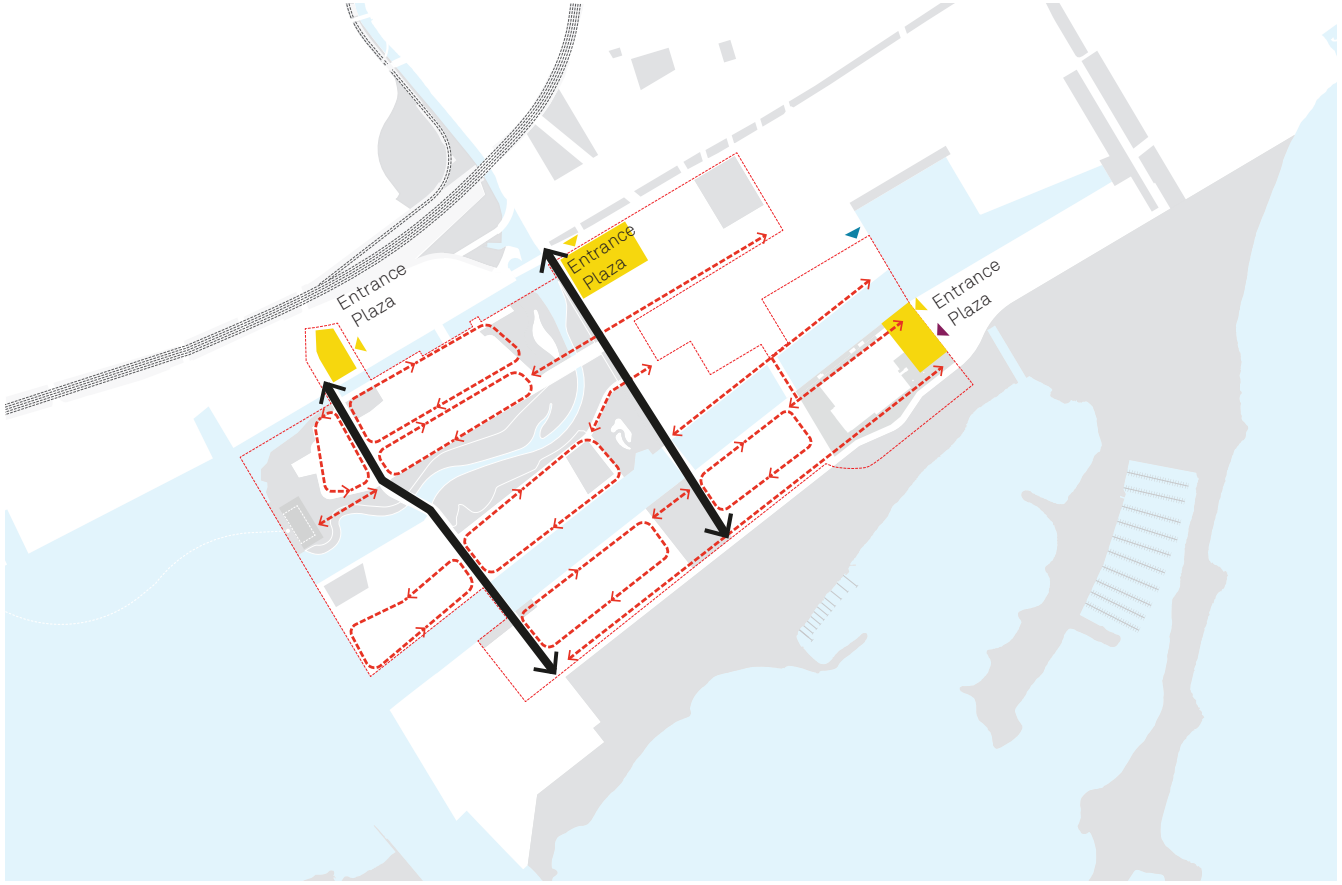


Fig. 4.5: Expo Site - Main Pedestrian Routes

MAIN PUBLIC SPACES

The main pedestrian areas and the open space areas are the principal circulation zones for the spectators within the Toronto Expo and allow enough capacity to accommodate large concentrations of people. The functions of the open space areas vary from those containing food service to those that allow for entertainment venues and recreational activities that provide vibrancy to the adjacent pedestrian areas. The shape of the open spaces are influenced by existing conditions and future land uses that have diverse character from those of natural spaces of the Lower Don Lands and river park to those of set pieces related to key heritage buildings such as the Hearn and waste building that will be integrated into the Expo programme. Public realm areas such as new promenades along the Ship Channel are linked to activate floating Expo programmes and form a key element of the scheme. The design approach will also take into account the climactic conditions adopting areas of shelter, enclosure and covered spaces to enable a favourable pedestrian experience.

Fig. 4.6: Expo Site - Main Public Spaces

FRONTAGES

Expo country pavilions and other standalone buildings will endeavour to have unique architectural characteristics that will differentiate them from each other.

This masterplan provides the early stages of design guidelines in regards to the various pavilion alignments and what building faces should be considered as primary.

The objective of these guidelines is to preserve the visitors' human scale and emphasize the planned pedestrian routes. The pavilions should frame the Common Domain and not compete with it. Pavilions should, with their alignments and facades, guide the pedestrians through this Expo.

By doing so visitors' experience will not only be a sequence of discrete pavilion visits but an overall connected and linked experience with a narrative that Expo organisers can develop.

Fig. 4.7: Expo Site - Frontages

MAIN SERVICE ROUTES

Logistics operations in an Expo need to demonstrate best market practices as well as reflecting the Expo specific themes. Expo should take any opportunity of innovation within the logistics operation and showcase to the visitors these innovative solutions. During the Expo, logistics will provide services mainly to Participant Countries and Sponsors. Logistics may also be responsible for providing some services to visitors, such as mobility assistance, publications delivery, postal services, luggage transfer etc. Our preliminary masterplan captures the following On-Site Logistics area requirements:

- Logistics Compound and Warehouse
- FM facilities (site management)
- Catering center
- Postal center
- Clean and Waste management facilities.

The Logistics operations will require the planning of internal logistics distribution routes. Our Expo site preliminary masterplan incorporates both unrestricted and restricted delivery and servicing routes. Once vehicles have been security screened and gained access to the Logistics compound, unrestricted servicing routes can be used 24 hours a day to access the venues' back of house. During Expo operating hours very few service vehicles will be allowed to access the areas of the site where participants and visitors will be circulating. The following diagram identifies the restricted routes and unrestricted routes in our site, as well as the main logistics areas location.

Fig. 4.8: Expo Site - Main Service Routes

Fig. 7.1: © September [illegible] Expo 25 Toronto - Rights Reserved

Expo Opportunities

As part of the development of the masterplan some key opportunities have been identified. These aim to be aligned with the longer term vision for the site and have the potential to support the Expo being more sustainable and reducing waste.

BUILDING REUSE AND HERITAGE

Expo's have often been the subject of criticism for being wasteful when at the end of the event pavilions are left to ruin or are demolished and sent to landfill. In line with Toronto's aspirations to be seen as a leader in green technology and sustainable living an alternative approach could be taken which will embrace the principles of 'The Circular Economy';

By seizing the opportunity to embrace the principles of The Circular Economy in Toronto's Expo approach delivery efficiencies will be identified and significant amounts of waste avoided. The green credentials of the event could be defendable and the end product, i.e. the legacy Expo site, could be of far greater value to the city both physically and as an example of best practice approaches to construction. By embracing this approach Toronto could become part of a global network of cities leading thinking in this area (CE100 Group) and the Expo could achieve a new benchmark in terms of sustainability, an attractive proposition to the BIE.

Arup, was announced as the Ellen MacArthur Foundation's Knowledge Partner for the Built Environment, at the Foundation's 2016 CE100 Annual Summit. Arup has been a member of the CE100 network for two years, and is already working on opportunities to embed circular economy principles in the built environment.

(https://www.ellenmacarthurfoundation.org)

Building Reused Precedents

Fig. 4.10: Matadero Madrid Centro Creativo, Madrid

Fig. 4.11: Mercedes Benz Arena, Shanghai

Fig. 4.12: Luminato Festival at The Hearn, June 2016

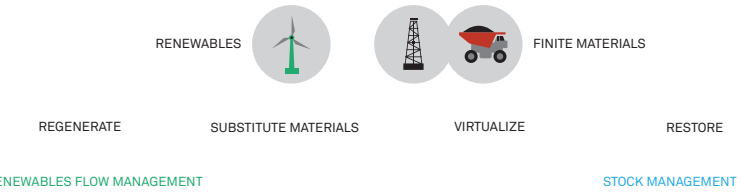
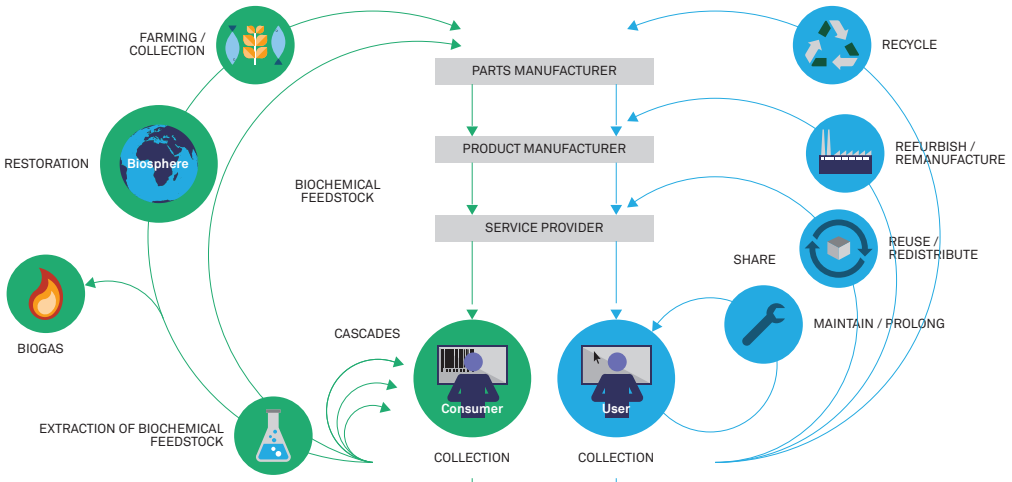
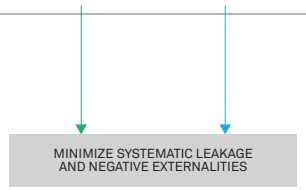
	PRINCIPLES	EXPO OPPORTUNITY	
1	Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows – for example, replacing fossil fuels with renewable energy or using the maximum sustainable yield method to preserve fish stocks.	Regenerate heritage buildings for both front of house and back of house uses during Expo. By considering long term uses at the design stage it will be possible to rapidly and cost effectively repurpose heritage buildings to their legacy form upon close of the Expo.	
2	Optimise resource yields by circulating products, components and materials at the highest utility at all times in both technical and biological cycles – for example, sharing or looping products and extending product use cycles.	Use the legacy precinct plan for the Port Lands to identify opportunities for legacy use pavilions. There is a clear opportunity to take this approach with the Canadian national pavilion(s), theme pavilions, cluster areas and administrative buildings. There are also opportunities to incentivise countries to design self-built pavilions for legacy repurposing, this could involve using a modular design code. Introduce product loops into the operational strategy of the Expo.	
3	Foster system effectiveness by revealing and designing out negative externalities, such as water, air, soil and noise pollution: climate change; toxins; congestions; and negative health effects related to resource use.	Where pavilions are designed to be temporary, i.e. for the event only, the principles of the circular economy should be embraced to ensure that the pavilions are de-constructible into useful re-usable components.	

Fig. 4.13: © https://www.ellenmacarthurfoundation.org - Rights Reserved

Fig. 4.14: Luminato Festival at The Hearn, June 2016

Fig. 4.15: Tate Modern - Herzog & De Meuron and Millenium Bridge - Foster & Partners, London

DIGITAL OPPORTUNITIES

The Toronto-Waterloo Region Corridor is a global center of talent, growth, and innovation. Rivalling the best in the world, this 100km stretch is the second largest technology cluster in North America.

Through the North American Free Trade Agreement (NAFTA), Ontario-based technology companies have long-term access to North America's $17.9 trillion (GDP) economy and 460 million consumers.

Ontario has put in place globally competitive Research and Development (R&D) tax credits as well as tax incentives targeted to companies in the software, wireless, photonics, digital media, life sciences and microelectronics sectors.

Every year over 38,000 students graduate with math, engineering or science degrees from Ontario's 44 colleges and universities. Firms including Adobe, BlackBerry, Cisco, GlaxoSmithKline, Google, IBM, Merrill Lynch, Microsoft, Toyota, Ubisoft and Xerox are already taking advantage of a motivated, loyal and ethnically diverse workforce.

For Ontario to reach its potential as a global tech hub it must address some significant infrastructure challenges. By using the legacy precinct plan as a blueprint for the Expo masterplan there is an opportunity to ensure that planned digital infrastructure is delivered for Expo which in legacy facilitates Toronto's aspiration for the Port Lands to become an exemplar smart community i.e. access to high speed broadband, availability of affordable housing, quality public space and great public transport systems. This will build upon the fibre-to-the-home programme already rolled out across existing Waterfront Toronto developments and continue the legacy that was part of the reason Toronto won the Intelligent Communities Forum (ICF) Intelligent Community of the Year Award in 2014. In addition to this, there is the opportunity to elevate the digital solutions beyond just infrastructure to enable centrally planned digital systems and data insight solutions that provide both greater experience to visitors and residents of the area as well as optimized operations for those managing.

For example, building on and integrating to Toronto's existing open data portal, careful planning of digital data and systems would allow real-time visibility and control into environmental performance of the area and its facilities/buildings, provide digital collaboration through virtual hubs for local businesses and residents driving start up economy and social inclusion as well as providing real-time data feeds for both third party app development and integrating into the wider Toronto open data programmes. Not to mention the opportunities such solutions would bring to driving attendance and awareness of an Expo event.

By potentially having digital and/or smart city/ living as an Expo theme Toronto would showcase and connect all the start-ups, institutions and companies in this space and effectively act as an economic showcase for these companies on the world stage. This would help to enable a key goal of the current 'Smarter Toronto' programme which is to be able to create economic development through selling the 'digital economy' to other nations. Expo to would potentially be the best imaginable way to position Toronto as not just a leading smart city, but the leader in capitalising on the emerging global smart city market.

Use of Digital in Architecture Precedents

Fig. 4.16: UAE Pavilion at Dubai Expo 2020, Calatrava

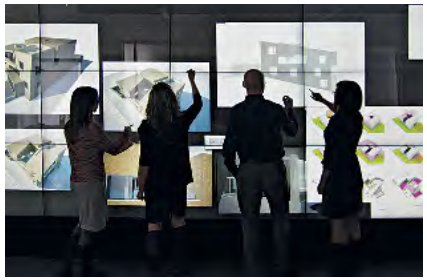


Fig. 4.17: Digital Workshops

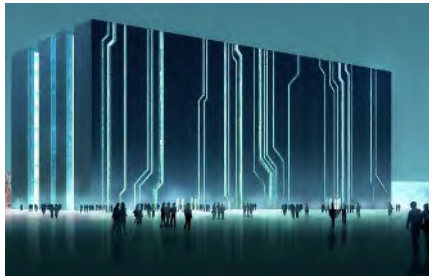


Fig. 4.18: Digital Beijing Building, Pei Zhu

Fig. 4.19: Google's new futuristic campus in North Bayshore district of Mountain View, CA

BARGES, SHIPPING, MODULAR CONSTRUCTION

The unique location of this site in the Toronto Port Lands brings both challenges and opportunities.

Construction Phase - Site Preparation and Infrastructure

If the logistics potential of the Port Lands is fully realised there will be benefits in terms of environmental impact and programme duration. Utilizing barges during construction means that materials can be moved to and away from the site, at scale, without impacting the Toronto road network. Moving materials by water will have a similarly beneficial impact on the Expo carbon footprint.

Construction Phase - Overlay and Pavilions

The same logistics systems that were established for the early phases of the construction can be utilized for the delivery of temporary infrastructure materials and equipment.

Participating countries will be able to fabricate their pavilions, should they wish, at home using their own labour. Pavilions would then be delivered to the site via shipping containers for erection by a Canadian workforce. For exhibiting countries with lower budgets this may bring the opportunity to realise more ambitious pavilions, or involve more of their citizens than would have been possible if they were constructed in Canada.

Given the tight timescales for overlay construction on some parts of the site it would make sense to use off-site fabrication and modular construction techniques. Modular construction can deliver extremely flexible design solutions that are erected on site in very short timescales leaving virtually no waste upon deconstruction.

Event Phase - Pavilions and Water Activation

Whilst a route needs to be maintained through the shipping channel for ongoing Port Lands operations, it presents a fantastic opportunity to activate the water in all manner of ways:

- **Water Pavilions -** Water pavilions as seen in Amsterdam and at the London 2012 Olympic Games provide an opportunity to exhibitors and commercial partners to create high impact experiences which also serve to highlight the unique locale of the event environment.
- **Water Stages and Screens -** Similarly the uninterrupted expanses of open water lend themselves well to theatre experiences, both audio visual and live;
- **Water Features / Artistic Interventions -** Activating the water through the skills of national and international artists can be an extremely effective way of achieving the 'wow' factors that are so important to global events. German artist Julius Popp uses water and robotics technology to create his 'bitfall' sculptures which print out popular search terms from the internet in falling water; and
- **Access to and from the site by boat.**

Water Activation Precedents

Fig. 4.20: Julius Popp - Bit Fall

Fig. 4.21: Peter Lewis - Splash

Fig. 4.22: Floating Pavilion, Drijvend Paviljoen - Rotterdam

Modular Systems Precedents

Fig. 4.23: Maria Lenk Olympic Aquatics Stadium, Rio 2016

Fig. 4.24: © Goodwood Festival of Speed, Volkswagen Pod - TSG - Rights Reserved

Fig. 4.25: © London Olympics Greenwich Equestrian Venue - TSG - Rights Reserved

5 TRANSPORT

Introduction

A preliminary transportation analysis was conducted to gauge the principal Strengths, Weaknesses, Opportunities and Threats (SWOT) associated with proposed Expo 2025 located in Toronto's Port Lands (Table 5.1). A strategic assessment methodology was used focusing on the following variables. Wherever possible, precedent and case-study data was used to inform analysis.

- Different tiers within the transportation network including modes/ systems catering to interregional or international travel, regional travel, district and local trips, and movement around and within the Expo site
- Overall profiles for Expo visitors including forecast diurnal arrivals and departures, and potential primary mode splits
- Comparison of forecast Expo travel metrics to network peak metrics
- Potential high-level trip distribution and assignment to and from the Expo site itself
- Key influencing variables including major transit infrastructure existing or proposed in close proximity to the Expo site (e.g. the planned Unilever Site GO Transit Hub and the East Bayfront LRT) and forecast peak hour arterial road network volume-to-capacity
- Land availability in proximity to the Expo site to cater to parking and pick-up/ set-down activity.

The analysis and its conclusions is not an exhaustive analysis of transportation and should not be relied on to make specific decisions regarding infrastructure or service investments. Future stages of more detailed analysis are necessary. Nevertheless, the work can be used to inform the City of Toronto's decision-making regards proceeding to the next stage of a bid for Expo 2025 based on:

- Identification of a range of modes/ opportunities to facilitate interregional and international travel
- Diversity of options for conveying regional visitors to Toronto's downtown
- Central location of the Expo and its proximity to a wide range of planned mass and rapid transit infrastructure.
- Precedent set by the annual Canadian National Exhibition (CNE) and the 2015 Pan Am/ Parapan Am Games managing travel demands and leveraging added transportation network capacity (especially transit) to meet temporary demands
- Significant international case studies regarding planning for, delivering and learning from major events (especially Expos), which can be used to inform development of the more detailed Transportation Master Plan for Toronto Expo 2025.

The remainder of this chapter discusses:

- Transport planning for mega events and information/lessons applicable to Expo 2025
- Expo 2025 transport analysis including preliminary Travel Demand Management (TDM) proposals. Strategies and implications for transport are also discussed across four tiers or scales:
  - **Tier 4 regional** - trips generally to and from the City of Toronto, around the GTHA and externally
  - **Tier 3 Expo study area** - trip distribution geographically by mode within a few kilometres of the site
  - **Tier 2 Expo 2025 surrounds** - access immediately to, from and around the site
  - **Tier 1 internal to Expo 2025** - internal movement and circulation
- Conclusions.

STRENGTHS	WEAKNESSES
• Central location in close proximity to planned mass and rapid transit infrastructure including the Lakeshore East GO Line, East Bayfront LRT and Broadview Avenue Streetcar • Access to Unilever Site transit facilities (anticipated) • Waterfront location with potential for ferry shuttle servicing • Land availability for temporary parking and arrival facilities • Proximity to an arterial frontage road (Lake Shore Boulevard) and Toronto's freeway network (Gardiner Expressway and Don Valley Parkway) • Site well-served by two long-distance multi-use trails connecting Expo to the east, west and north	• Transit capacity constraints eastwards between the Expo site and along the waterfront (via the proposed East Bayfront LRT) and on the GO Line to Union Station in peak hours • Benefits of the Relief Line are unlikely to be realised by and during the Expo • Major arterial road infrastructure already operates at a poor level of service during peak hours and long shoulder periods: without the addition of Expo traffic • Land available for parking and pick-up/ set-down operations is very limited. Even with an aggressive transit mode share, significant overspill parking may be anticipated requiring a comprehensive off-site parking supply and management strategy **and/or** a basic decked parking structure on-site
OPPORTUNITIES	**THREATS**

• Route choice for both private vehicles and bus/ coach transit services and therefore distribution of district and regional travel demands across the network. This should include coach shuttle connections between the Expo site and outlying mobility hubs/ centers that could include:
  ◦ Scarborough Center
  ◦ Yorkdale Center
  ◦ Pape Subway Station
  ◦ Bloor GO Station
• Dedication of temporary/ temporal HOV and/ or bus priority infrastructure on the arterial road network in proximity to the Expo site to encourage transit rather than private vehicle trips
• Temporary highway toll on portions of DVP, Gardiner to encourage transit use
• Implementation of a ferry shuttle service between the Port Lands (via a control access gate on the Expo site and temporary jetty) and a range of locations including Jack Layton Ferry Terminal and potentially Humber Bay and Port Credit to the west and Bluffers Park to the east
• Erection of temporary and basic decked parking or car stackers to increase capacity of on-site vehicle storage
• Capturing costs of infrastructure supply and service operations through parking pricing
	• Residual uncertainties regarding timing of GO RER service upgrades (especially on the Lakeshore East Line) and Unilever Site transit facilities
	• Passenger congestion at Union Station and the Unilever Site; particularly, a potential lack of platform capacity in peak hours, and effects of contraflows on stairwells and platforms
	• Availability of regional rail rolling stock and ability for the TTC and private sector (as required) to ramp up bus and coach operations to meet demands
	• Parking overspill on adjacent land
	• Potential difficulties procuring coach and ferry fleets to support the preliminary suite of modes
	• Designation and preparation of staging and stabling sites (especially coach transfer hubs)
	• Congestion on the surrounding road network: especially Lake Shore Boulevard E and Gardiner Expressway / Don Valley Parkway
	• Conflict between arriving/ departing vehicles and active transportation users: especially in the vicinity of pick-up/ drop-off zones
	• Implications of automated vehicles and rail-hailing services for access to and from the Expo Site given these are emerging markets/ technologies
	• Construction timing of major infrastructure projects (Downtown Relief Line and Gardiner Expressway, for example) will need to be carefully managed to prevent conflicts with Expo construction and operation

Table 5.1: SWOT Analysis of Transportation for Expo 2025

Transport Planning for Mega Events

INTRODUCTION

Toronto's experiences hosting major events provide important data regarding planning for and implementing transportation strategies facilitative of an Expo. The 2015 Pan Am / Parapan Am and annual Canadian National Exhibition are two key case studies in this regard.

2015 PAN AM / PARAPAN AM GAMES

In July and August 2015, the Greater Toronto and Hamilton Area (GTHA) hosted the Toronto 2015 Pan Am/Parapan Am Games. The Games were held in 15 GTHA communities and featured 364 events in 36 sports. Relevant transportation strategies and reference information for Expo 2025 is summarised in Table 5.2.

VARIABLE	DISCUSSION
SCALE AND OPERATIONS	• 1.4 million visitors to the Games • 10 000 athletes - more than twice the number at the 2010 Vancouver Olympics - were transported successfully across the region to events • 235 km of high - occupancy vehicle (HOV) were designated to encourage carpooling and transit use
MODE CHOICE	• 38% of spectators that took transit said that they did so because of transit ticket integration with event tickets • Metrolinx reports that GO buses using HOV lanes saved an average of 20 minutes per trip • GO Transit reports that the Lakeshore East/West Lines carried 370 000 additional trips; 25% more riders than in the same period in the previous year
PARKING	• A transit-first approach was taken in events planning, and parking was provided only for venues outside of central Toronto • Parking at all venues was managed centrally by the Spectator Parking Operations Control Center • Bicycle parking was provided at every ticketed venue with corrals and valet services located near site entryways
TRANSPORT DEMAND MANAGEMENT	• A Games Route Network comprising of a network of temporary HOV lanes was implemented to encourage carpooling and transit use resulting in an average time saving of six minutes per trip • Public and stakeholder engagement and awareness programs helped prepare the city for anticipated traffic levels and develop travel options and alternatives • An off-peak delivery project between the Ontario Ministry of Transportation (MTO) and more than 100 local businesses shifted 18 000 delivery trips away from peak periods • Event tickets granted holders free day-of-event transit access across all participating GTHA transit systems • A coordinated, region-wide wayfinding system was implemented to direct Games traffic to venues with 80% of spectators reporting that the signage was "clear" or "very clear"
OPERATIONAL ISSUES	• All venues require accessible parking even if no general parking is provided • Monitoring and enforcement is required to ensure that HOV lanes are being used correctly

Table 5.2: Reference Information from Toronto 2015 Pan Am / Parapan Am Games

CNE

The CNE (Canadian National Exhibition) is an annual fair that takes place at Exhibition Place in Toronto, the largest community event in Canada and one of the top five fairs in North America. The 2015 CNE attracted 1.6 million visitors over 18 days (approximately 89 000 visitors per day). Total visitors to the 2015 CNE exceeded the 1.4 million that attended the Pan Am / Parapan Am Games. Relevant transportation strategies and reference information for Expo 2025 is summarised in Table 5.3.

VARIABLE	DISCUSSION
SCALE AND OPERATIONS	• Hours of operation: 10:00 AM-10:00 PM (buildings), 10:00 AM-12:00 AM (midnight, fairgrounds) • Attracted 1.601 million visitors over 18 days in 2015 (approximately 89,000 visitors per day) • Long average dwell (6.2 hours per person in 2015), which is approximately double the assumption for Toronto Expo 2025 • Spread over a land area of 105 ha, including Exhibition Place, Ontario Place, and adjacent sites
MODE CHOICE	• Majority of visitors use transit (streetcars, buses, regional rail) to travel to and from the site • CNE site has a similar level of connectivity to transit • Located along the Martin Goodman Trail, providing a safe east-west route for cyclists and pedestrians to central Toronto
PARKING	• Limited on and off-site parking is provided and charged at market rates • Various restrictions are placed on the surrounding network to discourage visitors from driving to the fair
TRANSPORT DEMAND MANAGEMENT	• Parking pricing and limited supply discourages trips by private car • Temporary traffic and parking regulations are implemented in adjacent neighbourhood to mitigate traffic infiltration • Designation of off-site taxicab stands to limit taxis from congesting roads while looking for fares
OPERATIONAL ISSUES	• Monitoring and enforcement needed to prevent visitors from parking on street boulevards and in residential front yards on lawns and gardens, leads to significant environmental damage

Table 5.3: Reference Information from Toronto CNE

Expo 2025 Transport Analysis

TORONTO TRANSPORT NETWORK 2025

Transportation analysis is based on the projected transit and road network in 2025. Necessarily, it incorporates a number of network and operational assumptions, which have been discussed with and/or provided by government agencies including the City of Toronto, Toronto Transit Commission and Metrolinx. In particular:

- Implementation of GO Regional Express Rail (RER) will have occurred resulting in 15-minute headways all day on the seven GO Transit rail lines
- Construction and operation of a new GO Rail Station at Don Yard/Unilever Site with six platforms
- Extension of the Broadview Streetcar south to Lake Shore Boulevard with construction of a stop at Don Yard/ Unilever Site
- Construction and operation of the East Bayfront LRT from Union Station to Cherry Street
- Operation of Eglinton Crosstown LRT
- Operation of the Toronto-York Spadina Subway extension
- Construction and operation of the Gardiner Expressway and Lake Shore Boulevard Reconfiguration
- Broadview Avenue extension through First Gulf lands, terminating at Lake Shore Boulevard.
- The new stations at Unilever and Gerrard are the aspects of SmartTrack anticipated to have the largest impact on transit access to Expo and have been included in the analysis here. Further aspects of SmartTrack can be added in future Expo analyses as SmartTrack planning develops.

Capital projects assumed not to be completed and operational in 2025 include:

- Downtown Relief Line between Union Station and Pape Station on the Danforth Subway Line
- Scarborough Subway extension
- Broadview LRT extension southwards from Lake Shore Boulevard into the Port Lands.

EXPO OPERATIONS

Schedule

Expo 2025 is proposed to operate daily between 10:00 AM and 11:00 PM. These operating hours would mitigate impacts on the transportation network; especially during the AM peak period. Expo 2025 morning peak arrivals and departures are forecast to occur between 11:00 AM and 1:00 PM and the evening peak between 9:00 PM and 10:00 PM. Table 5.4 compares forecast Expo 2025 and transportation network peaks. The network peak periods include ultra-peak hours although Toronto experiences relatively flat demand distributions between these hours and shoulders. Consequently, the City of Toronto models transportation network peak periods rather than peak hours.

TRAVEL DEMAND FORECASTING

The following subsections describe the input figures for and products of preliminary travel demand forecasting for Expo 2025

Expo Visitors

The number of visitors anticipated for Expo 2025 varies between weekdays and weekends. The daily average number of visitors is forecast to be around 165,000[1]. Application of data from other World Expos and mega events permits analysis of possible weekday versus weekend averages, and maximum daily visitors (Table 5.5). Generally, significantly higher visitor numbers are anticipated on weekends.

[1] Based on calculation conducted by PwC. Please refer to PwC Report.

Daily Arrival and Departure Profiles

The forecast daily visitor arrival and departure profile is based on empirical data collected during previous Expos adjusted to reflect the proposed Expo 2025 schedule (Figure 5.1). The peak arrival time is forecast to occur between 11:00 AM and 1:00 PM and departure time between 9:00 PM and 10:00 PM. Peak site occupancy is forecast between 5:00 PM and 7:00 PM.

The peak arrival and departure times indicate when the largest demands can be anticipated on transportation systems to facilitate visitor trips to and from the Port Lands. The peak occupancy time indicates when the largest demand on parking infrastructure will occur.

CRITICAL TIME PERIOD	PEAK HOUR
EXPO AM PEAK	11:00 AM – 1:00 PM
EXPO PM PEAK	9:00 PM – 10:00 PM
NETWORK AM PEAK	6:00 AM – 9:00 AM
NETWORK PM PEAK	3:00 PM – 7:00 PM

Table 5.4: Comparison of Forecast Expo 2025 and Transportation Network Peak Hours / Periods

DAILY AVERAGE VISITORS	DAILY AVERAGE WEEKDAY VISITORS	DAILY AVERAGE WEEKEND VISITORS	MAXIMUM VISITORS IN A SINGLE DAY
165,000	137,000	231,000	268,000

Table 5.5: Forecast Expo 2025 Visitors (Weekday Versus Weekend Averages and Maximum)

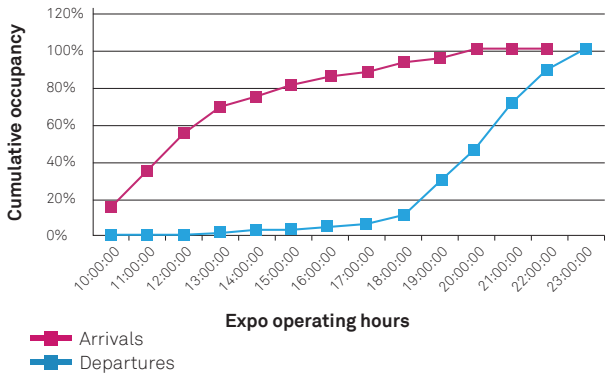


Fig. 5.1: Forecast Daily Visitor Arrival and Departure Profile for Expo 2025

Mode Split

The forecast mode split for Expo 2025 is shown in Figure 5.2 and based on the achieved mode splits for the 2015 Pan Am/Parapan Am Games downtown Toronto venues. The split provides a target ranges for transit (63% - 70%), private vehicle trips (12% - 21%) and active transportation (16% to 18%). The actual shares will depend on:

- Delivery of rail and LRT infrastructure and services in line with or exceeding current expectations
- Extent of investment in supplementary transit services (e.g. coach services, additional TTC buses and ferry shuttles)
- Investment in and encouragement of use of active transportation including new/temporary City of Toronto bikeshare facilities within proximity of the Expo site
- Incentivization of use of transit including free tickets bundled with entry to Expo 2025
- Parking strategy (including decisions regarding quantum of supply and pricing)
- Application of other travel demand management strategies (see Section “Expo Travel Demand Management (TDM)”).

Figures 5.3 to 5.5 show the forecast split between different sub-modes (e.g. types of transit) based on our understanding of supply and potential for supplementary services such as ferry shuttles:

- **Light vehicles -** 10% taxis , 10% pick-up/drop-off , 80% short or long-stay vehicles requiring parking
- **Active transportation -** 81% walking, 19% cycling
- **Transit -** 40% GO train, 35% TTC services , 15% Expo coach, 10% ferry shuttle service.

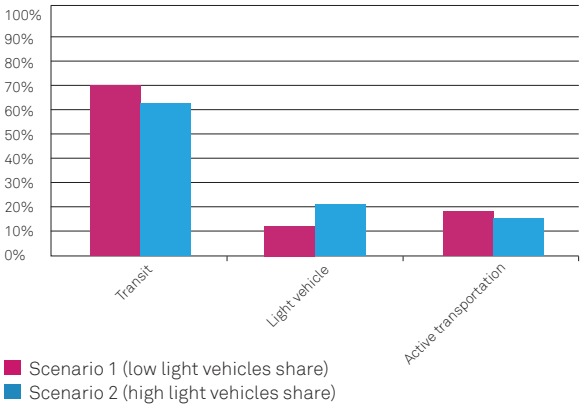


Fig. 5.2: Forecast Expo 2025 Mode Split

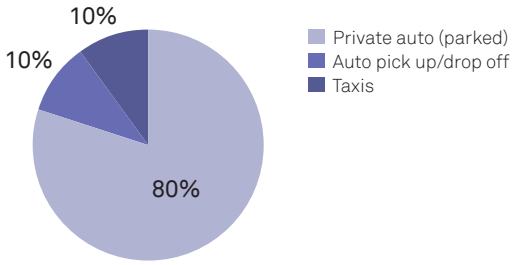


Fig. 5.3: Forecast Intra-Modal Splits (Light Vehicles)

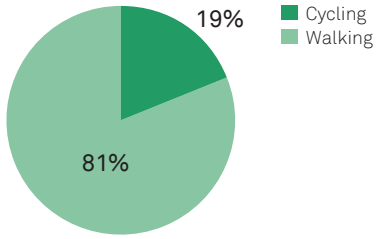


Fig. 5.4: Forecast Intra-Modal Splits (Active Transportation)

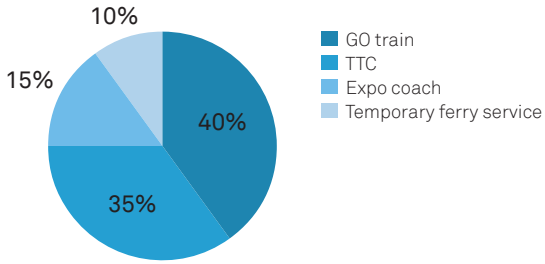


Fig. 5.5: Forecast Intra-Modal Splits (Transit)

Active Transportation

Table 5.6 shows the number of visitors forecast to walk or cycle to Expo 2025. On an average weekday, between 17,000 and 20,000 visitors are anticipated to walk to and from the site, generating 34,000 to 40,000 one-way trips. Between 4,500 and 5,000 cyclists are anticipated generating 9,000 to 10,000 one-way trips.

Forecast typical weekend day flows exceed weekday flows significantly. The Typical weekend day statistics for pedestrians are between 29,000 and 33,000 visitors, and 66,000 to 58,000 one-way trips total, and for cyclists, between 7,500 and 8,500, and 15,000 and 17,000 respectively.

Significantly, visitors arriving by vehicular modes of transport will also become pedestrians, adding to demand flows within plaza areas. In particular, there is forecast to be heavy pedestrian demand between the northern Expo 2025 plaza and the Unilever Site.

Transit

Expo 2025 transit ridership forecast for average weekdays, weekend days and peak day are shown in Table 5.7. The estimates range from 79,000 to 172,000 riders generating approximately twice this number of one-way trips. Table 5.8 shows the forecast increase in transit ridership during morning and evening Expo 2025 peak hours distributed across different transit services according to the sub-modal split assumed.

	AVERAGE WEEKDAY VISITORS	AVERAGE DAILY WEEKEND VISITORS	PEAK DAY VISITORS
PEDESTRIANS	17,000 - 20,000	29,000 - 33,000	34,000 - 38,000
CYCLISTS	4,500 - 5,000	7,500 - 8,500	9,000 - 10,000

Table 5.6: Visitors Forecast to Arrive and Depart Using active Modes as Primary Mode

* Totals can be doubled for an estimate of total one-way trips (accounting for arrival and departure)

	AVERAGE WEEKDAY DEMAND ON TRANSIT	AVERAGE WEEKEND DAY DEMAND ON TRANSIT	PEAK DAY DEMAND ON TRANSIT
VISITORS TRAVELING ON TRANSIT (LOW TO HIGH TRANSIT MODE SHARE)	86,000 - 96,000	146,000 - 162,000	169,000 - 187,000

Table 5.7: Visitors Forecast to Arrive and Depart Using Transit as Primary Mode

* Totals can be doubled for an estimate of total one-way trips (accounting for arrival and departure)

	EXPO AM PEAK (GENERATED BY ARRIVALS)			EXPO PM PEAK (GENERATED BY DEPARTURES)		
	AM PEAK HOUR WEEKDAY	**AM PEAK HOUR WEEKEND DAY**	**AM PEAK HOUR PEAK DAY**	**PM PEAK HOUR WEEKDAY**	**PM PEAK HOUR WEEKEND DAY**	**PM PEAK HOUR PEAK DAY**
EXPO FERRY SERVICE	1,700 – 1,900	2,900 – 3,200	3,400 – 3,700	2,200 – 2,400	3,600 – 4,000	4,200 – 4,700
GO TRAIN	6,900 – 7,600	11,700 – 12,900	13,500 – 15,000	8,600 – 9,600	14,600 – 16,200	16,900 – 18,700
TTC STREETCARS	4,300 – 4,800	7,300 – 8,100	8,400 – 9,400	5,400 – 6,000	9,100 – 10,100	10,500 – 11,700
TTC BUS	1,700 – 1,900	2,900 – 3,200	3,400 – 3,700	2,200 – 2,400	3,600 – 4,000	4,200 – 4,700
EXPO COACH	2,600 – 2,900	4,400 – 4,900	5,100 – 5,600	3,200 – 3,600	5,500 – 6,100	6,300 – 7,000

Table 5.8: Peak Hour Visitor Arrivals and Departures Travelling on Transit (Two-Way Aggregate Totals), Split Across Sub-Modes

The forecast ridership is anticipated to be accommodated on the planned 2025 GO and TTC networks with additional capacity provided through bespoke Expo services. These are recommended to include Expo coach shuttles connecting the site with a number of remote hubs[2] and temporary ferry shuttle services[3].

The evening Expo peak hour (9:00 -10:00pm) is likely to have the greatest impact on Toronto's transportation system. Few visitors are likely to arrive at the site during this period so an overwhelming majority of trips will be outbound. The peak hour of the peak day would require approximately four to five ferry trips, ten to eleven GO train trips, 42 - 47 streetcar trips, 75 - 83 bus trips and 97 – 108 coach trips (see Table 5.9). In practice, actual demands on rolling stock/vehicles will depend on capacities with the greatest unknown being for ferries. Moreover, there is a likelihood of some variability in demand and implementing an effective TDM strategy is a high priority.

Transit services provided exclusively for Expo 2025 – coaches and ferries - will be subject to dead-heading and very low contra-flow volumes during peaks. Future detailed costing plans will need to assess the marginal cost and feasibility of transit service provisions across all modal alternatives to help shape the specific mix of supply. For example, it may be cheaper and still meet travel demands to operate more ferries than to add capacity on East Bayfront LRT.

Light vehicles (private, shared and taxis)

Table 5.10 shows the forecasted number of Expo visitors who will travel to and from the site by light vehicle in peak hours. Assuming average vehicle occupancy of two Expo visitors, Expo is forecast to attract between 1,640 and 2,870 vehicles in the average weekday AM peak hour while 2,050 to 3,590 are forecast to depart in the weekday PM peak hour.

Forecast average weekend day values are between 2,780 and 4,860 for the AM peak, and 3,470 and 6,070 for the PM peak. Forecast peak day values are between 3,220 and 5,630 for the AM peak, and 4,020 and 7,030 for the PM peak.

The low and high forecasts correspond to 12% and 21% light vehicle mode shares, respectively remembering that this mode share includes private vehicles, pick-up/drop-off and taxis. Parking demand is derived demand and is calculated in a subsequent section.

	EXPO AM PEAK (GENERATED BY ARRIVALS)			EXPO PM PEAK (GENERATED BY DEPARTURES)		
	AM PEAK HOUR WEEKDAY	AM PEAK HOUR WEEKEND DAY	AM PEAK HOUR PEAK DAY	PM PEAK HOUR WEEKDAY	PM PEAK HOUR WEEKEND DAY	PM PEAK HOUR PEAK DAY
EXPO FERRY SERVICE	2	3	3 - 4	2	4	4 - 5
GO TRAIN	4 – 5	7 – 8	8 - 9	5 – 6	9 – 10	10 - 11
TTC STREETCARS	17-19	29 - 32	34 - 37	21 – 24	36 – 40	42 – 47
TTC BUS	31 – 34	52 – 58	60 - 67	38 – 43	65 – 72	75 – 83
EXPO COACH	40-44	67 – 75	78 - 87	50 – 55	84 – 93	97 - 108

Table 5.9: Transit Vehicle Trips Required to Meet Peak Ridership Demand (Assumed Full Vehicles / Cars)

	EXPO AM PEAK (GENERATED BY ARRIVALS)			EXPO PM PEAK (GENERATED BY DEPARTURES)		
	AM PEAK HOUR WEEKDAY	AM PEAK HOUR WEEKEND DAY	AM PEAK HOUR PEAK DAY	PM PEAK HOUR WEEKDAY	PM PEAK HOUR WEEKEND DAY	PM PEAK HOUR PEAK DAY
LIGHT VEHICLES	1,640 – 2,870	2,780 – 4,860	3,220 – 5,630	2,050 – 3,590	3,470 – 6,070	4,020 – 7,030

Table 5.10: Peak Hour light Vehicle Volume Generated by Expo Visitors (Low to High Auto Mode Share)

[2] Locations to be determined but in principle, these should be at interchanges where visitors can transfer to and from GO and municipal services. For example, a hub should be established along the Danforth Line so that coach can function to divert some demands from the Lakeshore East GO train service, East Bayfront LRT and Union Station where there may be demand bottlenecks.

[3] The primary desire line is anticipated to be between the Expo site and Jack Layton Ferry Terminal while other peripheral hubs could be situated in Lakeview (eastern Mississauga), Humber Bay (western Toronto) and Cliffside (eastern Toronto).

Tier 4: Regional

Tier 4 of the transportation study is at the regional scale (Figure 5.6). It considers the broad mix of arrival and departure modes for visitors attracted to Expo 2025 from wider Ontario, other regions of Canada and international origins. There are four primary modes that will be used by these populations. They are:

- Air
- Rail services
- Road
- Ferry/boat.

Necessarily, our preliminary study considers the range of options available for regional travel, and the key opportunities and constraints associated with each.

More detailed assessment including capacity evaluations, and both supply and demand strategies will require consideration as part of future stages of work.

Moreover, detailed analysis is necessary to approximate the distribution and assignment of demands by each mode.

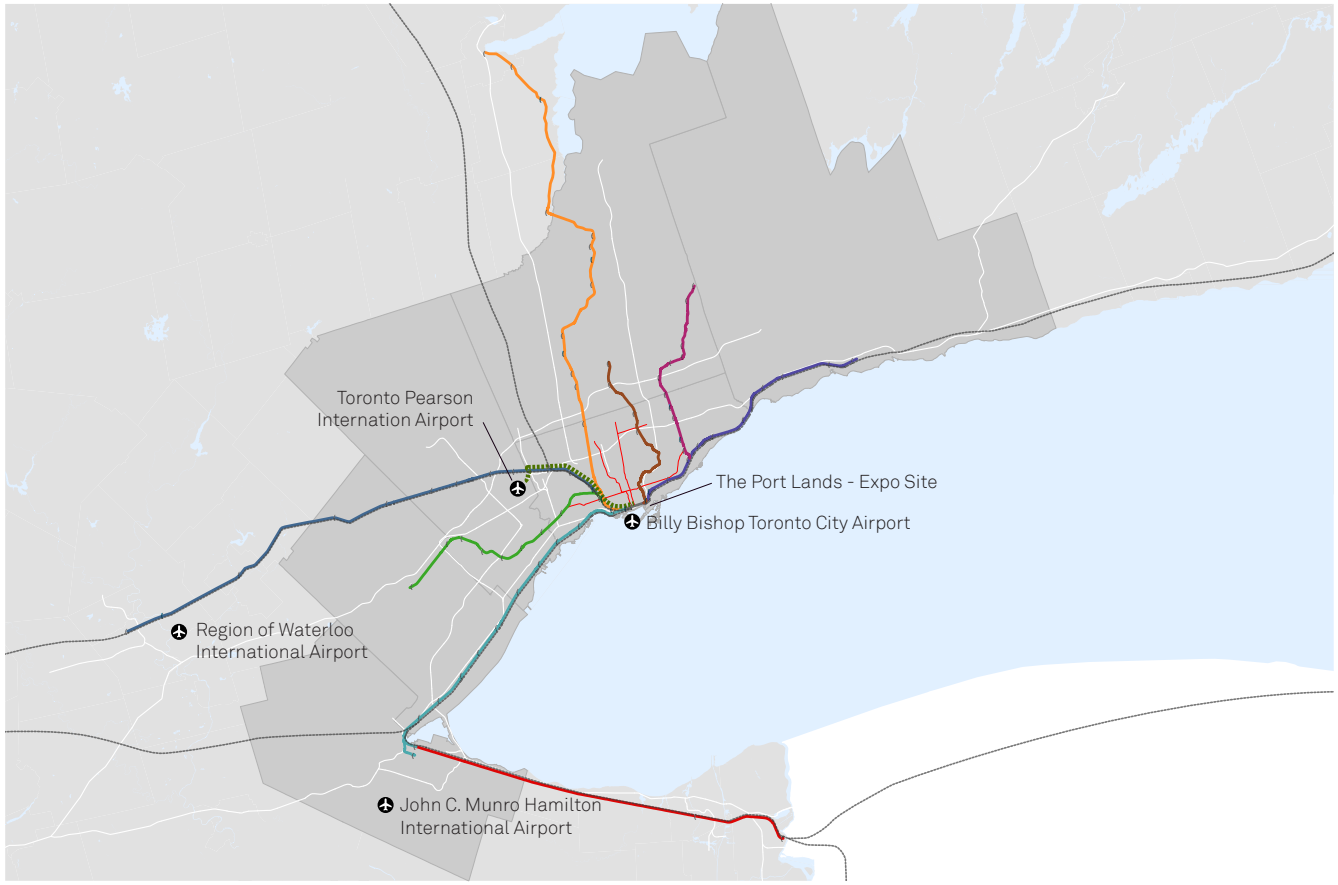


Fig. 5.6: Tier 4: Regional-Scale Transportation Study

AIR TRAVEL

Air travel is likely to be a preferred mode of arrival for international travellers and travellers from other Canadian provinces and territories. Toronto benefits from the air services that operate out of two key airports, which serve different markets and also provide alternatives for some routes (e.g. Montreal-Toronto flights operate out of both Pearson International and Billy Bishop Toronto City Airports).

Pearson International Airport is the primary air passenger hub in the Greater Toronto and Hamilton Area. In 2015, Pearson served 41 million passengers and 443 000 flights. In 2025, the forecast is for annual passengers to reach 60 million. The Greater Toronto Airport Authority continues to plan for and invest in expansion of air and landside infrastructure to support forecast growth in passenger demands. This work includes integration of rapid transit services with the airport, which now includes direct access by the Union-Pearson Express train. The UP Express connects the airport with Union Station, which is anticipated to be popular among Expo 2025 visitors arriving by air and connecting to central Toronto accommodation.

Billy Bishop Toronto City Airport plays a secondary role to Pearson facilitating intra and inter-provincial, and some limited international flights. Air traffic is limited to turboprop planes and therefore aircrafts of limited capacity. Other airports play tertiary roles meeting the GTHA's air passenger travel task.

Subsequent analyses associated with Expo 2025 will need to consider the extent to which air operations can ramp up for the duration of the event to meet the demands generated by each travel market (provincial, inter-provincial and international). Generally, individual airport authorities and the carriers that use their fields will assume responsibility to providing an appropriate level of supply.

RAIL SERVICES

GO Transit

GO Transit operates passenger transit services within the GTHA. Service upgrades envisaged through the GO RER project – importantly, more frequent, all-day operations - will improve substantially the appeal of these services for visitors to Expo 2025 given many trips are likely to be made outside of commuter peaks.

Use of the GO rail network rather than private vehicles should be encouraged for regional trips to reduce network congestion in the City of Toronto and demand for parking at or near the Expo venue; however, the specific implications of accommodating demand at the proposed Unilever GO Station site requires further analysis. A supplementary transit program may be required whereby interchanges between rail and connecting coach services are incentivised at select upstream stations.

There is likely to be sufficient track capacity to cater to demand although there will be costs to the province to provide added peak (especially PM peak) and inter-peak service. Detailed demand assessment is required as part of a subsequent stage of work to determine what supplementary operating capacity will be required on individual GO lines although preliminary analysis shows that considerable added rolling stock capacity will be needed on the Lakeshore East Line.

VIA Rail

VIA Rail operates a trans-Canadian passenger rail network and interfaces with Amtrak services operating in the US via Washington, Michigan and New York. VIA Rail is a competitor to air services for visitors from outside the GTHA; particularly for international visitors travelling across Canada and visitors from Ottawa, Montreal, Niagara/ Buffalo and Windsor/ Detroit.

The passenger rail network has considerable residual capacity although operations are limited by dual-purposing of tracks for freight transportation. Further study is required to assess whether VIA Rail would be required to procure and operate additional rolling stock to meet demands although this is anticipated on key routes including Windsor-Toronto, Niagara-Toronto, Ottawa-Toronto and Montreal-Toronto.

Given passenger rail will be a reasonable alternative mode choice to air services, further work should also be undertaken to compare relative capacities via air and rail, and develop ticketing and travel incentivization strategies to influence mode choice in accordance with where travel demands can be met at lower cost (especially to the public sector).

High Speed Rail

Canadian High Speed Rail is not envisaged to be operational by 2025 and has not been considered as part of this preliminary analysis.

ROAD NETWORK

The GTHA highway network is anticipated to meet the demands associated with regional road traffic. Future analysis will be required to identify and analyse network pinch-points (especially bridges) based on forecast volume-to-capacity (background traffic plus reasonable Expo 2025 demands).

A more detailed Tier 4 network plan is anticipated to include proposals for temporary high-occupancy vehicle lanes – consistent with the approaches used for the Pan Am and Parapan Am Games – and should also contemplate tolls. These tolls could be temporal in nature, applying during network peak hours to encourage spreading of Expo 2025 demands. Many regional Expo 2025 visitors are expected to have some flexibility regarding their times of regional travel.

FERRY

There is likely to be a very small market for regional passenger ferry services operating on Lake Ontario connecting New York State with Toronto. From a travel time perspective, these services would be unlikely to be competitive with air services and not link with significant population centers. Any realised demand may be accommodated by private sector operators. Existing berthing infrastructure on Toronto's waterfront is likely to be sufficient to cater to this market.

Tier 3: Expo 2025 Study Area

Tier 3 of the transportation study is at the mesoscopic scale analysing the movement network around the Expo site (Figure 5.7). This area is bounded broadly by Bloor Street to the north, Jarvis Street to the west and Coxwell Avenue to the east, and will experience significant impacts from visitors approaching and departing from Expo 2025 by a variety of modes of transport.

Fig. 5.7: Tier 3: Mesoscopic-Scale Transportation Study

TRANSIT

GO Train

GO transit services will provide rapid, high-capacity transit access to the Expo site. The planned GO Regional Express Rail (RER) will provide all day, more frequent service and will increase the number of GO stations, most of which are recommended to be located in Toronto[4]. These changes will result in a rail system essential for Expo visitors living across the GTHA.

GO transit will also provide some relief for the subway system. For example, people living near Bloor Street and Landsdowne Avenue will be able to travel to the Expo site using GO transit rather than the subway because of the new, recommended Bloor-Davenport and Don Yard/Unilever stations[5].

The proposed Don Yard/Unilever station located near the Expo site is planned currently to be built to full capacity by 2024. The Lakeshore East line and the Stouffville line will stop at the station, while the passengers on the remaining lines will need to transfer at Union Station[6]. The land owner and developer - First Gulf - has a preliminary design for the station including six platforms with an estimated 24 trains per hour in the peak period by 2024.

The estimated ridership generated by employment at East Harbour (area around Unilever site) in the evening peak hour is 725 people boarding and 200 alighting, leaving significant platform capacity for Expo visitors and others.

Subway

Expo visitors will not be able to access the site directly using the subway, but will need to walk, cycle or transfer to other transit for the final leg of the journey. The subway stations that provide key transfer points in the network are shown in Table 5.11. Of the Line 1 stations, King Street is the only one that connects to a streetcar providing direct access to an entrance. The key transfer stations on Line 2 would have a greater distribution of riders as multiple buses and/or streetcars connect directly to subway stations.

TTC Buses, Streetcars and LRTs

The TTC operates surface transit services within the study area with the exception of GO rail and bus services operated by Metrolinx. The transit services providing the most convenient access to the Expo site include:

North/south routes

- Broadview Avenue streetcar (assuming extension southwards)
- Bus 72 Pape
- Bus 83 Jones.

East/west routes

- 514 Cherry Street streetcar
- East Bayfront LRT (assuming extension eastwards)
- Bus 121 Fort York – Esplanade.

The operating alignments for the 72 Pape and the 121 Fort York bus services include currently segments through the Port Lands. These will require rerouting during Expo 2025. There is an additional opportunity to reroute the 72, 83 and 121 bus services to connect directly to the proposed Expo entrances.

[4] GO RER will impact five of seven GO train lines. The two remaining lines are not owned by Metrolinx and therefore they do not fall under their jurisdiction.

[5] GO recommended new stations information accessed here http://www.metrolinx.com/en/docs/pdf/board_agenda/20160628/20160628_BoardMtg_Regional_Express_Rail_Update_EN.pdf

[6] Lakeshore West passengers may not need to transfer as one train frequently serves the Lakeshore West and East corridor.

BLOOR - DANFORTH TRANSFER STATIONS (LINE 2)	YONGE - UNIVERSITY TRANSFER STATIONS (LINE 1)
Broadview Station	Union Station
Pape Station	King Station
Donlands Station	Queen Station
Greenwood Station	n/a

Table 5.11: Subway Transfer Stations

The East Bayfront LRT, Broadview Avenue streetcar and the Cherry Street streetcar are all important, higher-capacity services that are anticipated to be popular among Expo 2025 visitors. These will all have stops within a short walking distance of the Expo entrance plazas.

Additional surface transit routes likely to experience an increase in demand include:

North/south routes
- Bus 325 Don Mills Blue Night Bus

East/west routes
- 504 King Street streetcar,
- 501 Queen Street streetcar,
- 505 Dundas Street streetcar
- 506 College Street streetcar.

Volume to Capacity

The City of Toronto's Regional Travel Demand Models (RTDM) forecast the projected patronage and capacity of transit services in 2021 and 2031. The statistics can be used to estimate volume-to-capacity and therefore where key pinch–points are likely to occur on the routes that provide convenient connections to the Expo site.

Significantly, the City has developed 2031 and 2041 networks and demand scenarios for its RTDMs. A draft 2021 network has also been developed using less robust assumptions. The RTDMs project future travel demands for a typical weekday split into five time periods. These time periods do not align with the likely peaks for Expo 2025 operations. The models also do not account in any way for Expo 2025 travel demands.

The city's modelled transit services are forecast to have at least 50% residual capacity in both 2021 and 2031 PM peak scenarios – which are generally busier than AM peaks - excepting the 72 Pape bus (north and southbound), 83 Jones bus (north and southbound), eastbound 501 Queen Street streetcar and Danforth subway eastbound. Table 5.12 shows peak volume-to-capacities forecast on the busiest route segments. As expected, 'baseline' volumes-to-capacity tend to be higher in the 2031 model.

ROUTE	2021 PROJECTED VOLUME TO CAPACITY RATIO	2031 PROJECTED VOLUME TO CAPACITY RATIO
72 PAPE BUS NORTHBOUND	~0.7 – 0.9, with volumes highest near Gerrard Street	~1.0 – 1.1, with volume highest near Danforth Avenue
72 PAPE BUS SOUTHBOUND	~0.4 – 0.7, with volumes highest near Gerrard Street	~0.5 – 0.8, with volumes highest near Gerrard Street
83 JONES AVE NORTHBOUND	~0.7- 0.8	~0.8 – 1.0, with volume highest near Danforth Avenue
83 JONES AVE SOUTHBOUND	<0.5	~0.4 – 0.8, with volume highest near Danforth Avenue
501 QUEEN STREET STREETCAR EASTBOUND	~0.5 – 0.7, with volumes highest near Jarvis Street and Don Valley Parkway	~0.5 – 0.6
BLOOR / DANFORTH SUBWAY EASTBOUND	~0.6 – 0.9, with volume highest near Yonge Street	~0.7 – 0.8, with volume highest near Yonge Street

Table 5.12: Forecast Volume-to-Capacity Ratios in Study Area Showing Potential Transit Service Stress

Directional Distribution

Table 5.13 shows the forecast distribution of Expo-related transit trips across various transit services in the edge of the forecast network PM peak. This includes between 2,200 and 2,400 patrons added to streetcars and between 900 and 1,000 riders distributed on TTC bus services.

The visitors forecast to arrive to and depart from the site are approximately equal during the shoulder of the network PM peak period. There is insufficient data available to Arup presently to approximate the likely eastbound, westbound and northbound distribution of visitors. A distribution forecasting exercise will be required as part of next stages of work.

More detailed patronage demand modelling will be required during future stages of work to understand whether the TTC will need to run additional services on routes anticipated to experience significant added demand; especially if these services are already approaching capacity.

TRANSIT SERVICES	TOTAL EXPO RIDERSHIP FORECAST ON EDGE OF NETWORK PM PEAK	INBOUND	OUTBOUND
EXPO FERRY SERVICE	900 – 1,000	450 - 500	450 - 500
GO TRAIN	3,400 – 3,800	1,700 – 1,900	1,700 – 1,900
TTC STREETCARS	2,200 – 2,400	1,100 – 1,200	1,100 – 1,200
TTC BUS	900 – 1,000	450 - 500	450 - 500
EXPO COACH	1,300 – 1,400	650 - 700	650 - 700
TOTAL TRANSIT RIDERSHIP	**8,700 – 9,600**	**4,350 – 4,800**	**4,350 – 4,800**

Table 5.13: Forecast Network PM Peak Hour Expo Ridership Added to Network

LIGHT VEHICLES

Volume to Capacity

The Expo site is located near the intersection of two regional Expressways (the Gardiner and Don Valley Parkway). Other significant arterial roads in the vicinity include Lake Shore Boulevard, Front Street, King Street and Queen Street on east-west alignments and Sherbourne Street, Parliament Street and Broadview Avenue on north-south alignments (Figure 5.8). Collectively, these routes are anticipated to be used by traffic accessing the Expo and provide connections to the regional road network for longer journeys by private vehicle.

Many of these routes will also be important for surface transit accessibility and require further study to identify where transit priority measures such as high-occupancy vehicle lanes should be employed (especially in peak hours).

Fig. 5.8: Major Road Infrastructure in Proximity to the Expo Site

The City of Toronto's RTDMs forecast high levels of congestion in future PM peak hours on a number of route segments. These are summarised in Table 5.14. The roads with a volume that exceeds capacity (v/c > 1.0) are highlighted in red. The forecasted levels of congestion in 2021 and 2031 are similar, with slightly higher volume shown in 2031 on some routes. Most roads have higher volume west of the DVP while the bridge over the DVP is a pinch point for many east-west aligned roads. Some of the roads have high volume distributed evenly across, others gain volume as they reach a major arterial or highway like Bloor Street or the Gardiner Expressway, while others have low volumes with one significant pinch point.

The Gardiner East Expressway and Lakeshore Boulevard reconfiguration is assumed to be completed by 2025. The preferred design involves the removal and reconstruction of the Gardiner east of Cherry Street. The existing ramps to the DVP will be demolished and rebuilt along the northern Gardiner alignment. The Gardiner will also have 2-lane on/off ramps at Cherry Street and the DVP will have a reconstructed ramp at Don Roadway. The ramps at Cherry Street and Don Roadway will provide the primary access points from the DVP/Gardiner to the Expo site. Detailed design for these ramps have not yet been completed.

ROUTE	2021 PROJECTED VOLUME TO CAPACITY RATIO	2031 PROJECTED VOLUME TO CAPACITY RATIO
EAST-WEST ROADS		
GARDINER EXPRESSWAY (E-BOUND)	~0.8 – 1.0, with relatively even volume distribution across study area	~0.8 – 1.0, with relatively even volume distribution across study area
LAKE SHORE BOULEVARD (E-BOUND)	~0.5 – 1.4, with volume highest near Carlaw Ave	~0.6 – 1.4, with volume highest near Carlaw Ave
LAKE SHORE BOULEVARD (W-BOUND)	~ 0.2 – 0.9, with pinch point occurring at Carlaw Ave	~ 0.2 – 1.0, with pinch point occurring at Carlaw Ave
EASTERN AVENUE (E-BOUND)	~ 0.8 – 1.7, with volume highest on bridge over DVP	~ 0.8 – 1.7, with volume highest on bridge over DVP
FRONT STREET (E-BOUND)	~ 0.6 – 0.9, with highest volumes at Parliament St.	~ 0.5 – 1.0, with highest volumes at Parliament St.
KING STREET (E-BOUND)	~ 0.4 – 1.1, with volume highest before the DVP bridge	~ 0.5 – 1.0, with volume highest before the DVP bridge
ADELAIDE STREET (E-BOUND)	~ 0.8 – 1.0, with volume highest near Jarvis St.	~ 0.8 – 1.0, with volume highest near Jarvis St.
RICHMOND STREET (W-BOUND)	~ 0.5 – 0.9 with pinch point occurring at King Street	~ 0.5 – 0.9 with pinch point occurring at King Street
QUEEN STREET (E-BOUND)	~0.6 – 1.7, with highest volumes on bridge over DVP	~0.5 – 1.6, with highest volumes on bridge over DVP
DUNDAS STREET (E-BOUND)	~0.8 – 1.2, with volume highest west of the DVP	~0.9 – 1.3, with volume highest west of the DVP
GERRARD STREET (E-BOUND)	~0.6 – 1.2, with volume highest west of the DVP	~0.6 – 1.2, with volume highest west of the DVP
BLOOR STREET (E-BOUND)	~0.9 – 1.5, with volume highest west of the DVP	~1.0 – 1.5, with volume highest west of the DVP
BLOOR STREET (W-BOUND)	~0.5 – 1.4, with volume highest west of the DVP	~0.5 – 1.4, with volume highest west of the DVP
NORTH-SOUTH ROADS		
JARVIS STREET (S-BOUND)	~0.1 – 1.1, with volume highest near the Gardiner expressway	~0.7 – 1.1, with volume highest near Bloor Street
JARVIS STREET (N-BOUND)	~0.7 – 1.0, with volume highest near Bloor Street	~0.6 – 1.1, with volume highest near the Gardiner Expy
DVP (N-BOUND)	~0.7 – 1.4, with volume highest near Bloor Street and where the Gardiner and DVP meet	~0.8 – 1.4, with volume highest near Bloor Street and where the Gardiner and DVP meet
CARLAW/PAPE AVENUE (N-BOUND)	~ 0.4 – 1.0 with volume highest near Gerrard	~0.8 – 0.9 with relatively even volume distribution across the study area
COXWELL AVENUE (N-BOUND)	~0.2 – 1.1, with pinch point occurring near Gerrard	~0.1 – 1.2, with pinch point occurring near Gerrard

Table 5.14: Forecast Volume-to-Capacity Ratios in Study Area Showing Potential Road Network Stress

Directional Distribution

In the network afternoon peak hours on weekdays, the number of Expo visitors expected to arrive or depart in a light vehicle (shared, taxi or private) is between 1,640 and 2,870, which corresponds to between 820 and 1,435 vehicles (average occupancy of two per vehicle).

Table 5.15 shows the forecast distribution of Expo-related vehicle trips (single and multiple-occupancy vehicle trips and taxis) across the arterial road network in the edge of the forecast network PM peak. The number of visitors to arrive and depart from the Expo site would be approximately equal during the shoulder of the network PM peak period. A distribution forecasting exercise will be required as part of next stages of work.

The Expo site is located near the Don Valley Parkway and the Gardiner Expressway and both will experience higher traffic volumes during Expo. Major arterials in the area and local roads will also experience greater traffic volumes. More detailed modelling will be required during future stages of work to understand the impact of the added demand. The modelling may indicate that small, temporary changes to road design could improve the flow of traffic, including added turning lanes or signal adjustments.

The road network surrounding the Port Lands is forecast to be congested with network volumes in 2021 and 2031, as shown in the 'Volume to Capacity' Section above. Given the congestion projected for the road network, the transportation master plan for Expo will need to emphasise shifting trips from private vehicles to transit and active transportation. Options for discouraging car use are explored in the following TDM section.

MODE	TOTAL EXPO VEHICLES FORECAST ON EDGE OF NETWORK PM PEAK	INBOUND	OUTBOUND
LIGHT VEHICLES	820 – 1,435	410 - 720	410 - 720

Table 5.15: Forecast Network PM Peak Hour Expo Traffic Added to Network (high and low auto shares)

Tier 2: Expo 2025 Surrounds

ACTIVE TRANSPORTATION

The Expo site will be integrated with some of the best active transportation infrastructure in the City of Toronto (Figure 5.9). The Don River Valley trail is aligned parallel to the Don River and through Toronto's ravine system and established forests. The trail extends from the waterfront to E. T. Seton Park near Eglinton Avenue. This trail intersects with the waterfront multi-use path, which extends east-west along the shore of Lake Ontario. These trails provide convenient access for cyclists traveling from eastern, western and mid-town parts of Toronto.

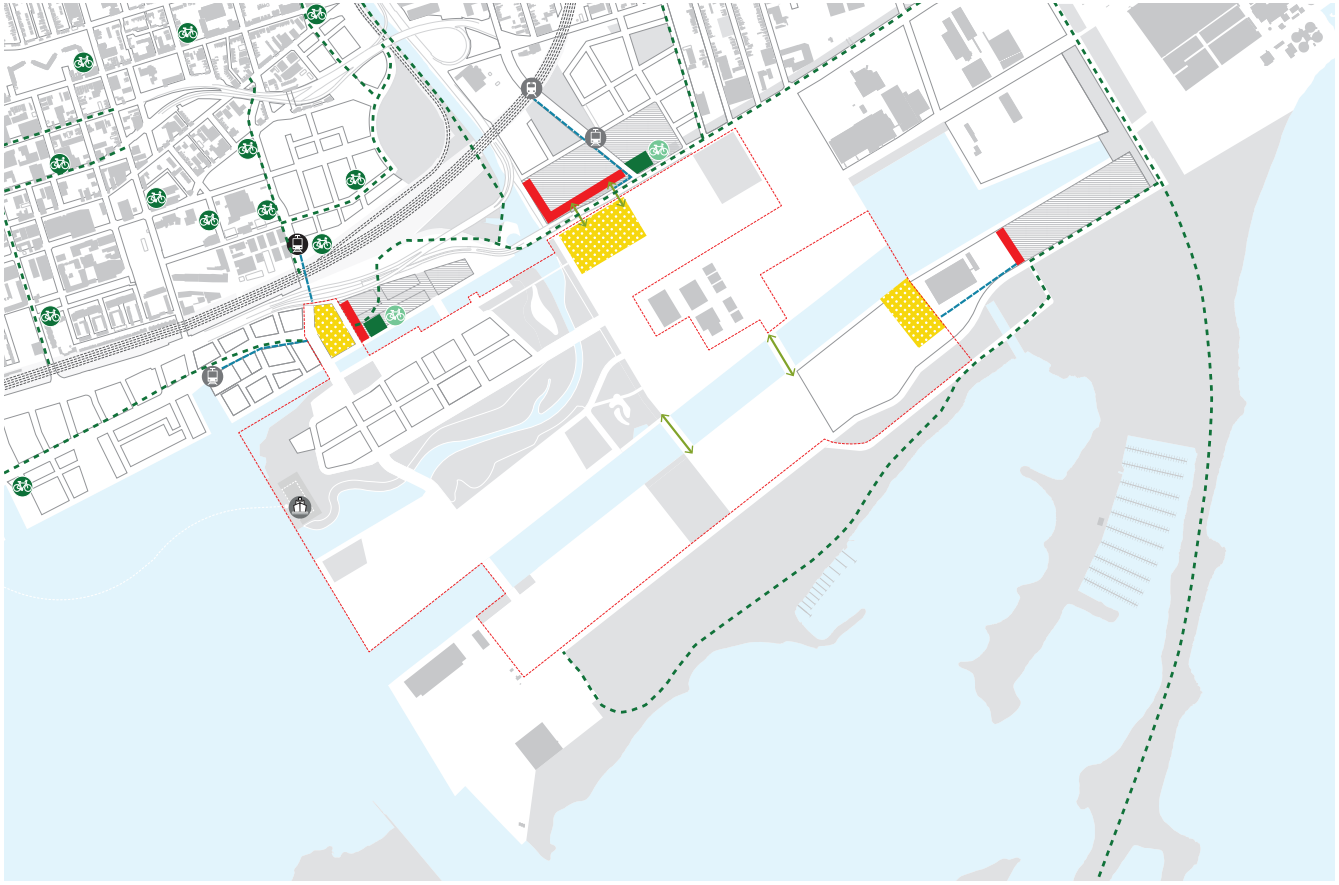


Fig. 5.9: Active Transportation Infrastructure in the Vicinity of the Expo Site

Arup's preliminary forecast is parking demand for approximately 5,800 – 6,600 cycles during the peak period of visitation to Expo on the average weekend day. A variety of cycle parking options can be implemented to address demands including:

- Cycle ring-and-post stands or U-rails
- Bike valets on peak days/ during peak periods
- Covered cycle parking structures incorporating stackers for spatial efficiency.

Convenience and clear directional signage will be critical aspects of a visitor-first experience for cyclists. Cyclists are also likely to want access to a range of different types of facilities with some preferring more secure storage and others, simpler devices they can affix their bikes to. Multi-type cycling hubs located in each arrival plaza is likely to be the preferred approach with sizing to be determined following more detailed demand forecasting.

Some visitors arriving by foot are also likely to use Toronto's existing trail system. Additionally, visitors arriving from nearby accommodation will use the existing footpath network. More detailed analysis of the footpath network is required as part of subsequent stages of analysis to identify segment and spot improvements required and there should be emphasis on improving road crossings. Other visitors arriving on transit will need to walk a short distance from stops/stations to Expo entry plazas. These key desire lines will require high quality infrastructure suitable to accommodate large volumes of pedestrian traffic (especially inbound from transit) and convey them in a safe, direct and intuitive way. This may require a grade-separated crossing of Lake Shore Boulevard or installation of a wide at-grade traffic-signal-controlled crossing. The approximate walking distances from major stops include:

- 500 - 600m from Don Yard/Unilever station
- 100 - 200m from the Broadview streetcar
- 300 - 400m from the Cherry St streetcar
- 400 - 500m from the East Bayfront LRT.

VISITOR ARRIVAL PLAZAS

The three arrival plazas planned adjacent to the Expo site amount collectively to approximately 20 ha of space (see Figure 5.9). Each zone will need to accommodate a range of different modes of arrival including pedestrians, cyclists, transit, pick-up/set-down and private vehicles and priority access in that order.

Pick-Up / Set-Down Requirements

Arup recommends sizing pick-up/set-down facilities based on peak demands on an average weekend day and using the high auto share. In our view this represents a reasonable level of conservatism. Table 5.16 shows bay requirements by applying our demand forecasts, assuming random arrivals over the peak and 85th percentile infrastructure need. The turnover of bays – especially for private vehicle and taxi pick-ups – will require stringent marshalling and construction of separate aisle and curbside space. Additionally, coaches and taxis will require an off-site staging/stabling location from where they can be called up dynamically from on-site marshals.

MODE	ASSUMED CURBSIDE DWELL TIME (AVERAGE)	BAY REQUIREMENTS	SPACE REQUIREMENTS (ALLOWING FOR AISLE/MANOEUVRING)
PRIVATE VEHICLE PICK-UP/SET-DOWN	Two minutes*	25	28m^2
TAXIS	One minute**	13	28m^2
COACHES	Five minutes***	11	110m^2

Table 5.16: Forecast Bay Requirements for Pick-up/Set-down Activities

* Assuming immediate loading and unloading controlled by marshals.
** Accounting for opportunity to call-up taxis dynamically from a staging area when there is demand.
*** Accounting for time for passengers to disembark and embark.

Parking

Approximately 17 ha may be available for private vehicle parking although allocation of land for this use will be contingent on the overall transport policy for Expo 2025 (e.g. whether on-site vehicle parking will be facilitated). This space is sufficient for storage of 6,000- 6,200 vehicles at-grade.

The estimated demand for parking on the peak day, the average weekend day and the average weekday is shown in Table 5.17. The ranges are based on the low and high auto mode shares. On the average weekday at peak occupancy, there is the expected demand for 5,000 to 10,000 parking spaces and on the peak day, this increases to 11,000 to 19,000 spaces.

The parking demand is expected to be higher than the parking supply of at grade parking at peak occupancy on the average weekend day and the peak day. Alternate measures that can be used to meet the demand include:

- Private parking lots in the area (similar to the approach used for CNE, view Section “Transport Planning for Mega Events”)
- Establish partnerships with local grocery stores, box stores to utilize extra parking
- If required, a temporary structure can be put in place to provide a second level of parking on site and this option has been allowed for in the current base masterplan.

The price of parking should be set at a rate to deter visitors from driving to the site. The price could be used to offset the cost of providing a discounted or free transit ticket.

MODE	NUMBER OF VEHICLES REQUIRING PARKING (LOW TO HIGH AUTO MODE SHARE)
Expo parking demand, peak occupancy of peak day	11,000 – 19,000
Expo parking demand, peak occupancy of average weekend day	9,000 – 16,000
Expo parking demand, peak occupancy of average weekday	5,000 – 10,000

Table 5.17: Forecast Bay Requirements for Pick-up/Set-down Activities

Tier 1: Internal to Expo 2025

PEDESTRIAN CIRCULATION

Overall the key issue from a pedestrian capacity perspective will be site access, including interface with external transport and security and ticketing: key pedestrian thoroughfares within the site are acceptably sized based on provided demand estimates and occupancy breakdowns, and there is sufficient space to accommodate given demands with various levels of distribution within the site.

The major issue with the site from a pedestrian experience point of view is the overall size of the site: due to the significant distances within the site some form of internal circulation system should be considered for patrons, particularly aimed at servicing patrons with advanced age or accessibility concerns (view Section on “Internal Shuttle”).

Fig. 5.10: Expo Site: Programmatic Plan & Pedestrian Circulation

Site Appreciation

- The proposed site for the Toronto Expo introduces several grouped pavilions with food and beverage zones throughout the site, and three overall entry/egress points
- Entry will be mediated by three entrance plazas serving different areas to the site: two to the north and one to the east. It is expected the eastern entrance plaza will service parking areas and the northern areas will service a mix of private vehicles and transit
- Entry plazas will have to accommodate arrival surges from either GO buses or GO trains, stressing security positions in peak times
- Access between the grouped pavilions occurs by way of east-west land paths or north-south bridges over the Ship Channel, typically adjacent to food and beverage areas
- Internal circulation between pavilions will occur through major pedestrian circulation channels of a minimum 20m width: capacity of these channels is calculated below
- One of the key issues is the pinch points introduced by the bridges across the canal: three access channels of approximately 25-40m servicing 40% of the site by area provides restricted access options and limited redundancy in the case of imbalanced use. Care should be taken to ensure that programming around the main Host Country pavilion and major food and beverage area does not drive an outsize amount of demand across the central bridge
- Overall the key pedestrian flow areas of concern at a conceptual level are the size of entry plazas, especially if the north-east plaza aims to service a combination of heavy private vehicle and GO train demand. The central bridge will be assessed in terms of average carrying capacity

Preliminary Demand and Capacity

- Based on Arup's experience with both previous Expo events and local events (such as the Pan American Games and Canadian National Exhibition) key areas are entry and egress surges:
- Based on experience with previous Expos, the host country and host country city pavilions and expo center are substantial drivers of demand, which can lead to higher pedestrian volumes in the immediate area.
- Key areas of bidirectional flow within the site will include bridges across the Ship Channel and internal circulation pathways
- Assuming a 40m width of the central Ship Channel bridge, this can accommodate almost 25,000 patrons within a 15 minute period. Assuming a flat profile within the peak hour and given daily attendance and occupancy assumptions, this bridge has capacity for approximately 80% of the overall site 15 minute population. This suggests that the main bridge has capacity to deal with a significant proportion of demand if this proves to be the main interface between the north and south areas of the site
- Each 20m wide pedestrian channel used for internal circulation can accommodate over 12,000 patrons at the City of Toronto's pedestrian circulation standard within a given 15 minute period, capacity for 40% of the overall site 15 minute population. Short term surges within complex sites are difficult to estimate statically but this indicates that internal circulation routes are generously sized given a relatively even distribution of patrons across the site, and that certain routes can accommodate higher ratios of foot traffic.
- Based on the provided daily population of 165,000 and projected occupancy rates, the peak hour total population across the site is 137,000. Dividing this population equally across the site yields a comfortable density per person, but it is likely that there will be higher pedestrian loads in various areas across the day. Assuming that 50% of the overall population interacts with each 'group' area of the site, the average person density ranges between 2 and 3 m^2 per person, equivalent to Fruin Level of Service B. This is considered a comfortable level that accommodates bidirectional flow, exceeding the City of Toronto standard of Level of Service C.

Knowledge Gaps and Next Steps

- The following additional areas of information/ clarification are required:
  - Likely transit/private auto/ferry entrance mix and associated showup profiles for the purposes of entrance plaza sizing
  - Likely security throughput for entrance processing
  - Dwell times per activity, in particular likely/ estimated dwell time for the Expo Center and host country exhibition pavilions
- Next steps include a more detailed breakdown of patron distribution by internal pavilion area in order to assess likely areas of cross flow and increased density
- Partial or full evacuation strategies should be considered: both in terms of feasibility of evacuating one area of the site in the event of a limited scope emergency, and overall evacuation times to places of safety
- Dynamic modelling should be considered as the bid progresses: this would allow for an appreciation of complex bidirectional movements caused by overlapping patron movements

INTERNAL SHUTTLE

A shuttle will be provided within the Expo site, as shown in Figure 5.10. The majority of visitors will move around the site on foot. However, given the significant size of the site, the internal shuttle can be provided for visitors who may have difficulty accessing the whole site. The shuttle could be autonomous and electric to reflect the sustainable and smart themes incorporated in the Expo.

ON-SITE FERRY TERMINAL

A temporary ferry terminal is proposed on or near the Expo site. The ferry passenger pick up locations could be from the Jack Layton Ferry Terminal with peripheral hubs situated in Lakeview (eastern Mississauga), Humber Bay (western Toronto) and Cliffside (eastern Toronto). For further discussion on regional ferry connections, please view Section “Tier 4: Regional - Ferry.”

Expo Travel Demand Management (TDM)

Expo 2025 will yield significant temporary and fluctuating travel demands across all modes of transportation. As with any major event in constrained urban locations, there is a need to manage Expo 2025 travel demands across two key dimensions:

- **Mode choice**
  Minimizing private vehicle trips and on-site parking demands while offering a wide range of alternatives including active transportation, an array of transit options, ride-hailing and some pick-up/set-down.

- **Travel times**
  Encouraging trips away from the morning peak shoulder and out of the evening peak period for the network generally.

TDM can be delivered much more cost-effectively and with minimal legacy infrastructure implications than through trying to increase network capacity to meet peoples' independent travel preferences.

The following strategies are recommended for Expo 2025, which aim to address these needs:

- Scheduling opening and closing times outside of network peak periods. This scheduling shifts the timing of many Expo-related trips to periods where there is excess capacity in the transportation network, eliminating the need for expensive and disruptive infrastructure improvements.

- Scheduling service vehicle delivery hours outside hours of Expo operation and avoiding network peaks to take advantage of excess capacity in the transportation network

- Providing visitors with free transit service passes with purchase of admission. A one-day, day-of-event return transit pass becomes a pricing incentive for visitors to use transit to access Expo 2025

- Ramping up transit services and providing choice for visitors to increase the attractiveness of transit and meet a broader range of travel needs. This includes added rolling stock provision, potential for some TTC bus route deviations, and implementing the proposed district/sub-regional coach operations and ferry shuttle to and from a temporary floating jetty

- Providing new Toronto bikeshare stations and cycle parking facilities adjacent to the Expo 2025 arrival plazas to encourage a higher active transportation mode share. The City of Toronto may resolve to make bikesharing free during Expo 2025 or alternatively, provide a code for ticket-holders to use the system for free

- Operating off-site marshalling to manage arrivals and queuing by taxis, rideshare cars, buses and private passenger pick-up and drop-off. Marshalling activities could include remote taxi and ride-hailing call up stations, off-site stabling areas and curbside space management to avoid long dwell times

- Closing some roads temporarily to reduce traffic circulation and facilitate pedestrian and cyclist movements. Some roads could also be converted temporarily to transit/taxi-only

- Implementing dynamic parking pricing depending on demand to moderate arrivals. Pricing could vary depending on overall utilization of parking supply and time-of-day

- Implementing a comprehensive communications suite:

    - Providing real-time travel information systems using physical and dynamic signage (including variable message signs on roadways), and through release of smartphone apps. These systems could provide real-time reports on transit disruptions, traffic congestion levels, and parking availability and pricing

    - Implementing engagement and awareness campaigns with local businesses, residents and tourism operators early and repeatedly to mitigate the risks of congestion issues during operation of the Expo. This is also a way for visitors to get access to a full suite of transportation information and make more informed choices regarding their travel

    - Operating a comprehensive wayfinding system developed specifically for the differing needs of pedestrians, cyclists, transit users and drivers so visitors are aware of the best routes to access Expo 2025 and providing reassurance en route that each visitor is taking the correct route

- High-occupancy vehicle (HOV) and high-occupancy toll (HOT) lanes: by designating road lanes for HOV use only, the number of passengers per vehicle increases, potentially reducing the number of vehicles on the road. Adding a HOT designation allows single-occupancy vehicles to use the HOV lane for a fee, which can be a flat rate, distance-based, or time-of-day based, better utilizing the capacity of HOV lanes and providing a small means of revenue generation.

Data Limitations and Assumptions

Our preliminary analysis discussed in this section contains a number of limitations although these are expected for a feasibility. These include:

- **Limited reference data**
  The Port Lands is a unique site and while there is reference data available associated with CNE and the Pan Am, Para Pan Am Games, both location and specifics of Expo operations will lead to peculiarities for Expo 2025 compared to these other events. Additionally, reference data for other Expos is useful for understanding overall visitor flows and how these vary throughout and by day, but details regarding mode split, trip distribution and assignment, and other travel factors will be particular to Toronto.

- **Ongoing uncertainties regarding transit infrastructure projects especially when these remain part or unfunded**
  Construction and operation of the Unilever Site GO station, East Bayfront LRT and Broadview Avenue Streetcar extension are all important for successful operation of Expo 2025. In particular, the Unilever Site GO station is likely to be essential.

- **Lack of baseline reference information**
  The City of Toronto does not maintain a traffic and transit model for year 2025: it has models for 2021 and 2031. They also forecast conditions for weekday network peak periods that do not accord with the likely peaks for Expo operations. While the spreading of peaks is positive generally for network management, the lack of models means the impacts of Expo 2025 travel demands on the network cannot be analysed easily.

- **Lack of a working model for reference and sensitivity-testing**
  The feasibility transportation study was conducted at a high level and therefore the recommendations made are subject to more detailed evaluation as part of subsequent stages of work. It is expected that recommendations will be refined subject to understanding better the capacity of the movement network to accommodate the forecast flows by mode and time.

- **Potential for bottlenecks elsewhere on the network**
  The primary focus of our work was key movements by mode and time to and from the site. Given the scale of the event and the visitors it will attract, its impacts will affect the network across a wide geographic area. Our discussion established four tiers of movement and these will each need significantly more assessment as part of future work.

- **Emerging forms of mobility will impact travel demands by 2025**
  There is no reliable way to predict the nine-year impact of emerging mobility on travel. Mobility-on-demand services are evolving rapidly and will undoubtedly be a key part of the future mobility mix. Additionally, Level 3 and potentially Level 4 autonomous vehicles will be operating by 2025 and depending on legislation, will have achieved either minor or major fleet penetration. Given the gross uncertainties surrounding future transportation options, the key goals for Expo 2025 should be facilitating mobility choice and Minimizing capital works.

Stakeholder Consultation

The Toronto Transit Commission (TTC), Metrolinx and City of Toronto were consulted regarding the Expo transport analysis. The following comments were raised in the meetings.

TTC

The TTC meeting attendees identified that the numbers of visitors projected for Expo 2025 are likely to be accommodated by the network and not dissimilar to peaks managed currently for large events in Toronto. If the City of Toronto were to bid on an Expo, there may be some added services or route changes required:

- No concern with local bus rerouting to allow for pick-up and drop-off of Expo riders
- A second track on the 514 Cherry Streetcar route to accommodate loading, unloading and passenger numbers, potentially provided on a temporary basis
- Potentially a temporary dedicated streetcar route on Broadview Avenue
- Bus and streetcar fleet availability will need to be assessed. Additional vehicles may need to be purchased to accommodate Expo ridership
- Available space in bus maintenance facilities may be an issue and an extension or new bus facility may be required to accommodate additional vehicles.

METROLINX

The meeting attendees identified that GO RER and the new station at the Unilever site would likely accommodate additional GO ridership associated with Expo 2025, particularly in off-peak hours. During these times, GO could run extra services if needed. Two primary constraints in the GO network were identified:

- Platform capacity at Union Station to accommodate counter-peak ridership in peak weekday hours
- Train capacity constraints in the peak direction during evening weekday peak hours.

Both identified constraints are known network constraints and not unique to Expo. It was agreed that transport planning for Expo should explore strategies to mitigate impacts on these aspects of the network.

CITY OF TORONTO

Technical staff from the City Planning Department and Transportation Services attended. The number of forecast Expo visitors did not pose a concern. Additional network enhancements should be considered to accommodate Expo visitors, including:

- Extra turn lanes or similar temporary road alterations
- Temporary parking restrictions on nearby residential streets to prevent congestion issues in surrounding neighbourhoods
- If highway tolling on the DVP/Gardiner is not already in place by 2025, these should be considered temporarily during Expo
- A plan will be needed to reroute vehicular traffic if an accident or event requires closure of the DVP or Gardiner Expressway.

Conclusion

This report includes a preliminary transportation analysis for the feasibility of hosting Expo 2025 in Toronto. An Expo held in the Port Lands offers a number of strengths. The site is in a central, waterfront location with a planned rapid, frequent transit hub to be located within walking distance of an Expo entrance. The site sits at the intersection of two major highways and two long-distance multi-use trails which makes it convenient for vehicular and active transportation access.

The primary weaknesses and threats identified in the analysis revolve around uncertainties regarding the future 2025 transportation network. The new GO Regional Express Rail (RER) improvements and the Don Yard/Unilever Station are essential transit services/infrastructure for Expo. While they are planned to be operational by 2025, the possibility that they are incomplete is a threat. Availability of parking space, TTC facility space, rolling stock, ferries, coaches and TTC vehicles are all potential threats if issues with procurement arise. Union Station is a known pinch point in the regional transit network, particularly for counter-peak passengers on weekday afternoons (3:00 – 7:00 PM).

Constraints on the road and transit network will increase with Expo visitors. The forecasted transit volume for 2021 and 2031 shows that while some routes are constrained, the majority can serve Expo visitors as planned or with additional services. The forecasted road volumes without added Expo vehicles will near or exceed capacity for the majority of the roads around the Port Lands.

All identified constraints can be managed through temporary transportation service alterations and travel demand management (TDM). Some of the key TDM strategies include adjusting the Expo schedule to decrease the number of travellers during network peak periods and prioritizing active transportation and transit use over private vehicles through High Occupancy Vehicles lanes, parking pricing, highway tolls and free transit passes.

6 INFRASTRUCTURE AND OVERLAY

OBJECTIVES

In order to enable the Expo that is set out in the masterplan a range of infrastructure must be in place. There are a number of components to this infrastructure, from roads to allow visitors to move around the site to temporary overlay items such as fencing or signage. This section looks in broad terms at these requirements within the context of the Expo and the longer term masterplan for the site.

A layered approach is taken to infrastructure. The base layer is the permanent infrastructure. This includes permanent roads and services. Layered on top of this is the temporary infrastructure which could include temporary landscaping works that fill in spaces between the permanent infrastructure and then on top of this is the overlay which might include fencing or signage placed over the permanent and temporary infrastructure. The overarching approach to infrastructure is that as far as practical infrastructure should be permanent and aligned to the long term development plans with the Expo proposals aligned to make best use of this. Temporary infrastructure is only intended where is it not practical to use the permanent infrastructure.

EXPO INFRASTRUCTURE REQUIREMENTS

The infrastructure requirements of the Expo can be split into two main categories:

Site Servicing, Circulation and Preparation

The key components of this are:

- Roads for circulation around the site, both for visitors and servicing.
- Transit priority infrastructure, pick up and set down areas, parking facilities
- Utility servicing, including water and waste water, electricity and telecoms
- Site preparation works, including where required remediation, earthworks to raise the site, then site surfacing work including paving and landscaping work.
- Preparation works to the edges of the ship channel to provide a suitable environment for docking barges or boats as well as providing ferry services
- Bridges
- Demolition and site clearance works

This includes both permanent and temporary infrastructure. The overarching approach for these elements is that generally the existing provision are not sufficient to serve the needs of an Expo. However in the long term the site of the Expo will be developed to a high density mixed use development. The future utility servicing needs of this development will be high and require extensive new infrastructure. The Expo represents a significantly less intense land use (in terms of built floor area) than the expected future development, even though the number of visitors on the Expo site will be greater than the expected future population. It is therefore assumed that the utility demands of the Expo will be not significantly greater than those of the future development.

Overlay

This overlay does not include the proposed Expo buildings which are described separately in the masterplan.

The typical components of this overlay are as follows:

- Site and Architectural Lighting
- Tent Structures
- Portable Buildings
- Temporary Washrooms, Showers, Kitchens, Prep and feeding area
- Shipping Containers
- Temporary Services including Power, HVAC and Water, waste water
- Security fencing, CCTV and Screening Units and Magnotometers,
- Fencing
- Crowd Control Barriers
- Look and Wayfinding Structures and Signage
- Scaffold – Technology Structures
- Scaffold Bridges for both services and pedestrians, Scaffold Platforms
- Temporary Seating
- Accessibility Structures
- Cable Containment
- Broadcast / Media Infrastructure

The components required for an Expo are wide ranging and many. It is not the intention at this early stage to identify all such elements, particularly where the provision of such overlay elements is unlikely to affect the feasibility of hosting the Expo on the site. It is also worth noting that many of these infrastructure overlay items could be in place for a year and so when they are procured consideration should be given to purchasing or hiring these items. Costing of the overlay infrastructure (undertaken by others) has been done on a benchmarked cost from similar events.