

Air-Rail Link Ridership Due Diligence Report

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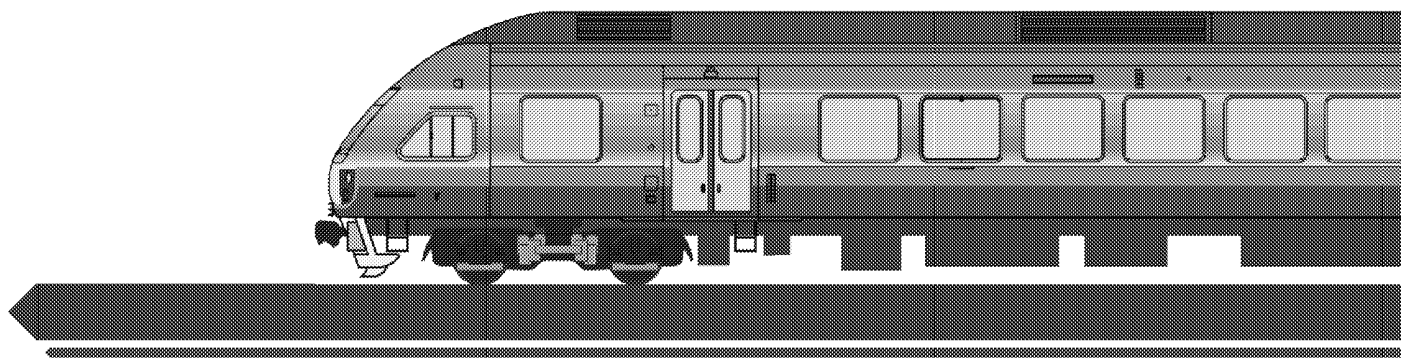
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Union-Pearson Air Rail Link

Ridership Due Diligence

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Works Cited

- Cadillac Fairview and Armadale Properties. "Buttonville Presentation to Development Services Committee." 22 November 2011. *City of Markham*.
<http://www2.markham.ca/markham/ccbs/indexfile/Agendas/2011/Development%20Services/pl111122/Buttonville%20Presentation.pdf>. 3 July 2012.
- City of Toronto. *Union Station Revitalization*. 2012.
http://www.toronto.ca/union_station/index.htm. 3 July 2012.
- Cowan, James. "Can Air Canada be Saved?" *Canadian Business* (2012): 1. Website. Online:
<http://www.canadianbusiness.com/article/79337--can-air-canada-be-saved>.
- Greater Toronto Airport Authority. *A World of Possibilities - GTAA Annual Report 2011*. Annual Report. Toronto, 2012. Online:
http://www.torontopearson.com/uploadedFiles/GTAA/Content/Publications/GTAA_2011_AR.pdf.
- . *Taking Flight - The Airport Master Plan 2008-2030*. Master Plan. Toronto, 2007. Online:
<http://www.torontopearson.com/en/gtaa/master-plan/#>.
- Halcrow Group Ltd, Consult Ltd. *Air Rail Link from Lester B. Pearson International Airport to Union Station Revenue & Ridership Study*. Final Report. London, 2002. Document.
- Jacobs Consultancy. *Toronto Air Rail Link Lenders Traffic Due Diligence Audit*. Final Report. Toronto, 2010. Document.
- Leslie Woo, Metrolinx. "Refining the Big Move." 29 June 2010. *Metrolinx.com*. Online. 30 June 2012.
- Marshall, Sean. *Expressways of Toronto*. 12 July 2009. Website. 16 July 2012.
- Metrolinx. *Costs of Congestion*. 1 December 2008. Report. 6th July 2012.
- Mordant, Nicole. *Reuters - Westjet picks Bombardier planes for regional carrier*. 1 May 2012. Online:
<http://ca.reuters.com/article/businessNews/idCABRE84010920120501>. 7 July 2012.
- Porter Airlines. *News Releases - Porter finishes 2011 with record 2.1 million passengers*. 5 January 2012.
<https://www.flyporter.com/About/News-Release-Details?id=184&culture=en-CA>. 3 July 2012.
- Regional Municipality of York. *York Region Official Plan*. 7 September 2010. Website. 16 July 2012.
- Steer Davies Gleave. *Blue 22 Ridership and Revenue Forecasts Final Report*. London, 2004. Report.
- . *Georgetown Corridor Airport Rail Link Forecasting Update 2011/12*. Report. Toronto, 2012. SlideShow.
- . *Toronto Airport Rail Link 2009 Traffic and Revenue Update*. Final. London, 2009. Document.
 The contents of this report are proprietary and confidential.

Transport Canada. *Needs Assessment Study - Pickering Lands*. 10 February 2012. Online:
<http://www.tc.gc.ca/eng/ontario/pickeringstudy.htm>. 7 July 2012.

—. *Transport Minister Announces Winning Proposal For Toronto Air-Rail Link*. News Release. Ottawa, 2003. Online:
<http://www.westoncommunitycoalition.ca/Nov%202003%20Selection%20of%20SNC%20and%20Backgrounder.pdf>.

TTC. *Rapid Transit Expansion Study*. Information. Toronto: Toronto Transit Commission, 2002. Document.

Wallace, Scott Deveau and Kenyon. *Buttonville Airport set to close within five years*. Newspaper Article. Toronto: The National Post, 2010.
<http://news.nationalpost.com/2010/10/27/buttonville-airport-set-to-close-within-five-years/>.

Waterfront Toronto. *West Don Lands*. 19 June 2012.
http://www.waterfronttoronto.ca/explore_projects2/west_don_lands. 3 July 2012.

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1 Introduction

1.1 Background

This report presents a comparison and due diligence audit of the ridership Exclusion per Committee Direction forecasts prepared over the past 15 years for the previous and current owners of the Union-Pearson Air Rail Link project (ARL).

The ARL has been in various stages of planning and implementation over the past 15 years by various bidders. As a result of winning the bid for the 2015 Pan American Games, the City of Toronto, the Province of Ontario, and the Government of Canada have given the project greater priority. The most recent iteration of the project—owned as part of the Metrolinx family of companies—has relied on Steer Davies Gleave (SDG) for ridership Exclusion per Committee Direction forecasting. Following the initial review of the draft Final Report produced by SDG, analysis into archived ridership reports produced by SDG and others was conducted.

1.2 Contents of this Document

This report summarizes all the major previous studies and work relative to the Toronto Air Rail Link ridership and assumptions.

It attempts to connect the studies into a series of relatable documents to know the history and reasoning behind the system as it has evolved since 1999.

The review discusses the changes in conditions and projections throughout the various iterations of the ARL project and describe:

- changes in City land use, planning mechanisms, traffic, and transit conditions;
- the methodologies used in the forecasts of passenger and ridership data;
- the modifications and iterations of the ARL project and design;
- ridership/revenue projections;

1.3 The Air-Rail Link Project

The Union-Pearson Air Rail Link (ARL) will provide a direct, express rail service between Toronto's Union Station and Lester B. Pearson International Airport (LBPIA) in Mississauga. The ARL routing includes the western portion of the Union Station Rail Corridor (USRC) to Bathurst, the Canadian National Railway (CN) Weston Subdivision from the USRC to Highway 27 at Milepost 13.4 sharing tracks with GO Transit, Via Rail, and CN freight trains. A new elevated right-of-way between the Weston Subdivision and Terminal 1 Parking Garage in the LBPIA lands will take trains directly into the airport.

With direct station connections to the Greater Toronto Airport Authority (GTAA) LINK Automated People Mover (APM) station and the rest of Terminal 1, the route will include stops at Weston GO/ARL Station, and Bloor GO/ARL Station with connections to the Toronto Transit Commission (TTC) at Dundas West Station. Figure 1 illustrates the alignment of the ARL as described above.

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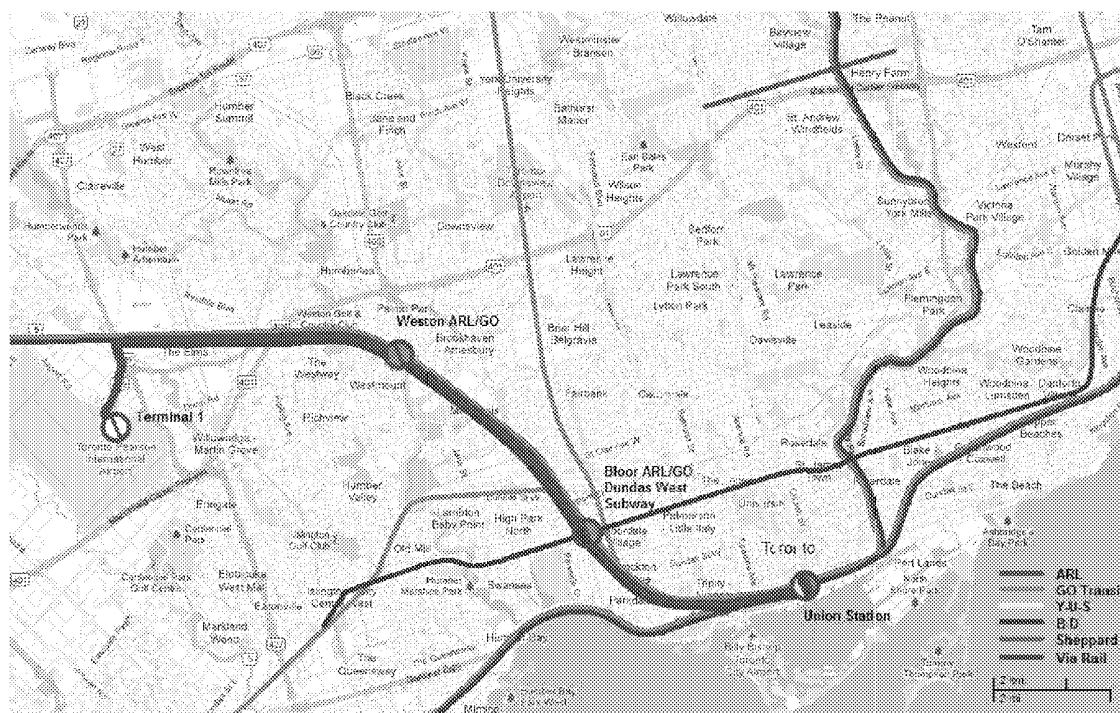


Figure 1: Air-Rail Link General Alignment with Connections

The ARL service will provide an elevated customer experience while being fiscally responsible. The brand will draw from local inspiration, and will showcase the best of Ontario and the City of Toronto. By providing a smooth, comfortable, hassle-free ride to and from the airport, the ARL will contribute to the shift from road transportation to rail, and set a North American and International standard in airport-to-city-centre transportation. For more information on the current ARL project, see *ARL System Configuration Summary and Standards*.

1.4 Previous Ridership Studies

Previous ridership studies come from the various iterations of the ARL project since the late 1990s. Studies were commissioned by Transport Canada, SNC-Lavalin and Metrolinx.

Six studies are discussed in this report:

- 1999 study by IBI Group
- 2002 study by Halcrow Group Ltd.
- 2004 study by Steer Davies Gleave
- 2009 study by Steer Davies Gleave
- 2010 Due Diligence audit by Jacobs Consultancy
- 2012 study by Steer Davies Gleave

The important details of each of these reports and their contribution to the development of the ARL project are discussed in the report.

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2 Air-Rail Link Corridor and Market (Market Analysis Comparison)

2.1 Toronto Pearson International Airport

Toronto Pearson International Airport (LBPIA) is Canada's largest and busiest airport.

LBPIA is located at the northeast corner of Mississauga, bordering Toronto to the east. It features two airline terminals, five runways, airline storage facilities, and an automated people mover connecting the two airline terminals. As of 2012, 66 airlines, as of 2012, have flights originating or terminating at LBPIA. It is a major airport for both passenger and goods movement.

2.2 Airport Accessibility

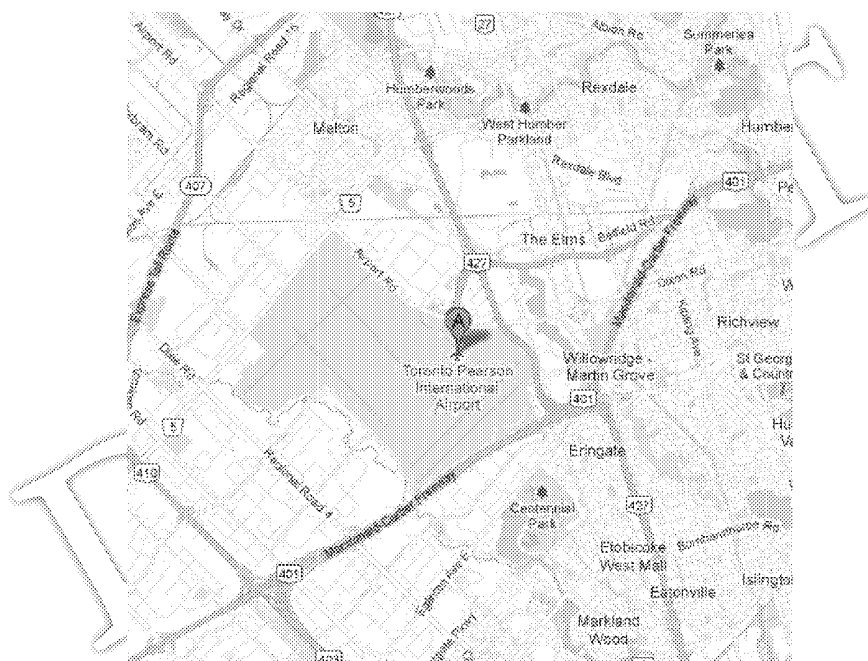


Figure 2: Immediate area around LBPIA

Access to LBPIA using public roadways includes Highway 409, which terminates at the airport and provides connections to Highways 27, 401 and 427. Airport Road/Dixon Road can also be used to access the airport.

From downtown, private vehicles usually utilise the Gardiner Expressway west, heading north onto Highway 427.

Modes of transport to the airport include private cars, car rental, public transportation, taxis and limousines. LBPIA offers parking for both the short-term and the long-term. Five agencies at LBPIA provide passengers with car rental.

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Taxis make up a large percentage of trips to and from the airport. 360 taxis and 276 limousines are licensed to provide service to/from LBPIA. The average cost per trip is \$50 from the downtown core.

Current public transit connections to LBPIA are by Toronto Transit Commission (TTC) bus routes from the Bloor-Danforth subway and the Spadina subway. The 192 Airport Rocket from the Bloor subway boasted a daily ridership of 4200 in 2011, while the 58 Malton had ridership of 17000 (though this number includes riders that locally travel along Dixon Road and Lawrence Ave). All other transit connections to LBPIA from Mississauga and Brampton are also provided by buses. 24-hour transit access is available through TTC buses.

GO Transit currently provides service to LBPIA using coach buses along Dixon Road, Highways 401, 407 and 409. These services do not connect to downtown Toronto but connect to municipal transit providers (e.g. route 34 connects to Yorkdale).

Direct bus service to downtown Toronto is privately operated by Pacific Western as the Airport Express bus. It operates at thirty minute headways. Travel times on this bus vary from thirty minutes to one hour (due to traffic), and it stops at both airport terminals. The Airport Express bus offers pickup and drop off locations at ten different locations in downtown Toronto.

Can-Ar Coach parallels the Pacific Western service however it operates at a much lower frequency and continues into Kincardine and Port Elgin.

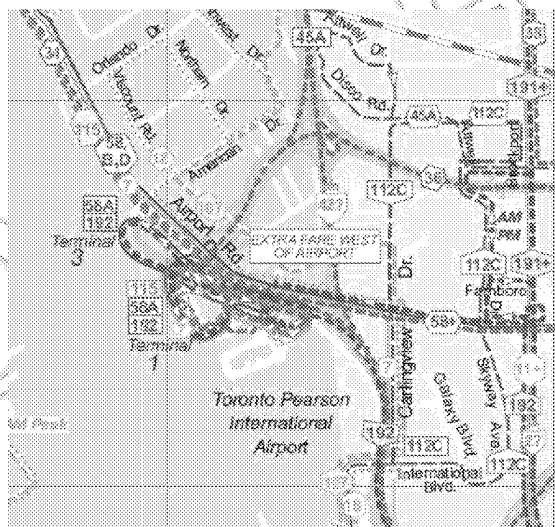


Figure 3: Transit Connections to LBPIA. Red denotes TTC, orange Mississauga, green GO Transit, and blue Brampton

Appendix A illustrates various modes of airport travel around the world.

2.3 The Air-Rail Link Project

The Air Rail Link project will provide a consistent service with 15-minute headways and a one-way trip time of 25 minutes in a high quality environment, using dedicated diesel rolling stock. It is a premium express rail service and is clearly differentiated from commuter services such as GO.

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Figure 4: Rendering of Air Rail Link rolling stock

As the Air Rail Link project progressed to today, the scope was changed various times. Each report has a slightly different project scope in terms of service offering and frequencies.

2.3.1 1999 IBI Group

This report discusses the alignment for the ARL. The report recommends following the existing Union Station Corridor, turning north along the Georgetown South corridor, and then running along a new spur line to connect with a new terminal at LBPIA. Potential line stations were identified at Bloor Street (to connect with the existing subway system) and at the Woodbine entertainment complex.

2.3.2 Halcrow 2002 Report

The 2000 ridership study prepared by Halcrow for Transport Canada is at the foundation of the Air Rail Project as it is known today.

Transport Canada commissioned this study at the request of the shortlisted private sector bidders for a “bankable” feasibility study. The results of this ridership study informed the bidders of the anticipated ridership demand for this service based on a set of parameters created by Transport Canada with input from the bidders. These parameters included the baseline requirement for an express rail service connecting Union Station to Pearson Airport’s new T1 facility.

The assumptions also included the possibility of a stop at Bloor/Dundas West (to connect with the TTC Bloor-Danforth subway) and another stop to serve/connect with the Woodbine Entertainment Group lands.

The recommended service discussed in the Halcrow report is a twenty minute (one-way) express service from Union to a new terminal at LBPIA, with a single stop at Bloor Street, operating on

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fifteen minute intervals. It also discusses the line as if there were another stop at the Woodbine entertainment complex. The line would use diesel multiple units (DMUs); however, no mention is given as to a specific vehicle model. Service would begin in 2005 and would run daily from 6am to midnight.

2.3.3 SDG 2004 Report

The ARL service proposed in the 2004 SDG report is Blue 22, a high-quality premium rail service with a single stop at Bloor. One-way travel times are pegged at twenty-two minutes, with headways of fifteen minutes on the line. Transport Canada suggests that the line could be operational by 2008, and would use refurbished Budd Rail Diesel Cars (RDCs). (Transport Canada).



Figure 5: Budd RDC rolling stock proposed for Blue22 service

2.3.4 SDG 2009 Report

ARL service in the SDG 2009 report is with two intermediate stops at Bloor and Weston. The one-way travel time is twenty-four minutes, with headways of fifteen minutes on the line such that a seat is guaranteed for each passenger. The service will begin in 2015, utilizing high-quality diesel multiple units similar to that of London's Heathrow Express. This is the same case as for the Jacobs Consultancy report.



Figure 6: Proposed benchmark rolling stock

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2.3.5 SDG 2011 Report

Steer Davies Gleave's current report assumes a system similar to their previous report, with service beginning in April 2015, intermediate stops at Bloor and Weston, and fifteen minute frequency with a twenty five minute travel time between Union and Pearson. The service would make use of Nippon-Sharyo DMUs in two-unit train sets (with three-unit trains arriving in July 2015) providing initial capacity of 120 seated passengers per train (180 in a three-unit trainset).

3 GTA Growth, Land Use, and Traffic Patterns

3.1 Population Growth Projections

Most growth in the Greater Toronto Area is taking place in suburban regions, such as York Region and Peel Region. However, this development is physically limited by the Greenbelt, a natural feature bordered by the Oak Ridges Moraine to the north and the Niagara Escarpment to the west. Growth rates ranged from 15.7% to 8.4% from 2006 to 2011, with York Region growing the fastest and Durham Region growing the least.

A total of 6,053,823 people live in the GTA as of 2011, up from 4,235,590 in 1991. This is a 42.9% change in population. Most of the population increase is due to immigration. There is an increase in counterflow peak hour commutes as more offices and industrial parks are built in suburban areas such as Markham. However, the peak amount of jobs continues to be in and around the downtown Toronto area.

This data is reflected in all studies as it is continually updated to better meet relevant GTA projections. The 2009 SDG reports projects a population of approximately 8.6 million by 2031.

3.2 Land Use and Infrastructure Changes

Metro Toronto Planning, a subsidiary of the Metro Toronto municipal government, envisioned city centres in each borough ('downtowns') which were linked by rapid transit lines. This resulted in the creation of North York Centre and Scarborough Centres, which were to be linked by the Sheppard Subway, as well as the development of York Centre connected to the rest of Metro by the Eglinton West subway (TTC).

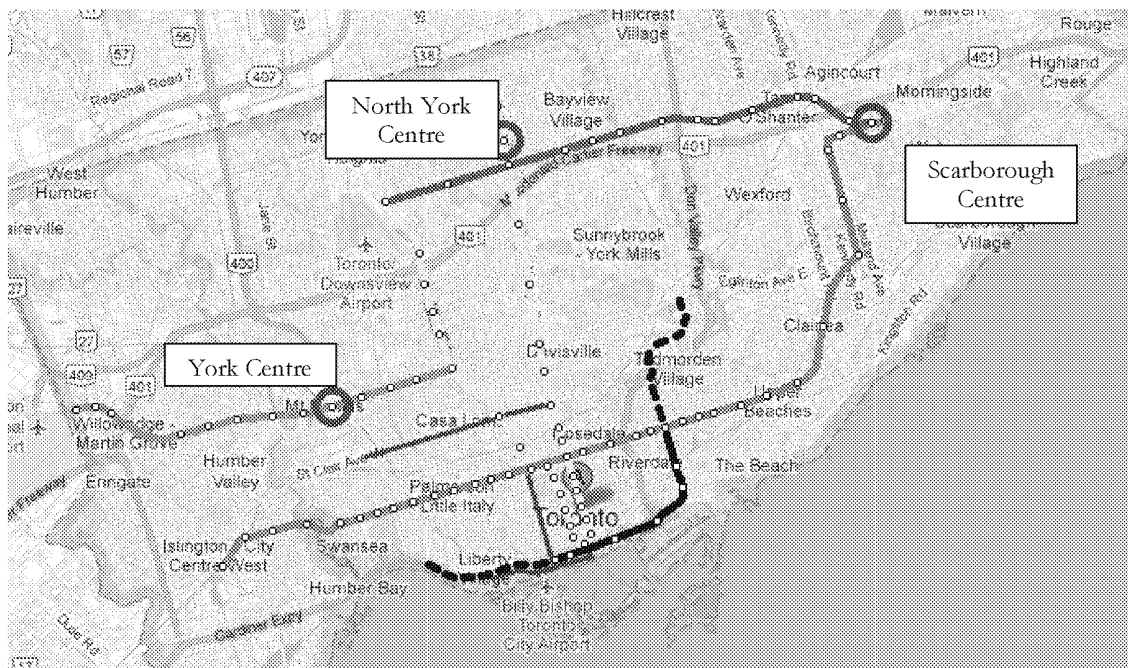


Figure 7: Network 2011 Plan and City Centres – Eglinton West Alignment approximate

Metro had projected high changes in population at these centres. However, population growth in centres was considerably lower than Metro projections. The amalgamated City of Toronto's planning policy has now shifted from development of centres to development along Avenues.

Most of the land in City of Toronto borders is currently being used for residential. In suburban areas, most of this residential is fairly low density and consists of cul-de-sac, non-pedestrian friendly roadways and tract housing. Downtown Toronto has an increasing population density with more high-rise residential being built in multiple areas.

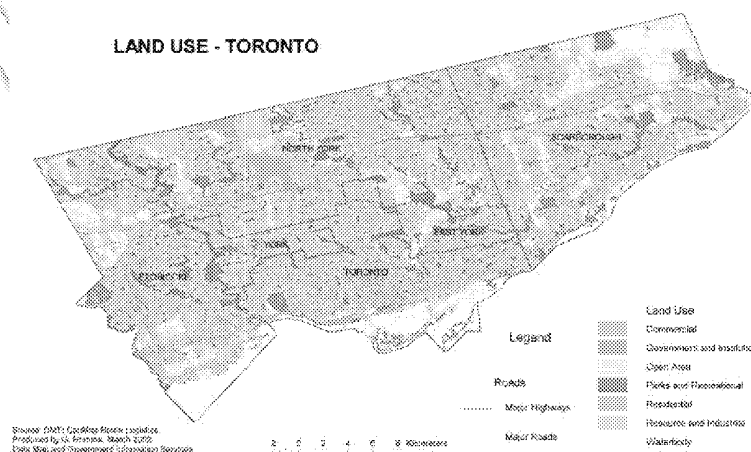


Figure 8: Toronto Land Use in 2002

Development in surrounding regions has increased in the past few years. Mississauga is currently developing around the City Centre area (Square One), and York Region is constructing

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centres in its towns/cities. Markham, Richmond Hill, and Vaughan all expect to have new 'downtowns' within the next twenty years (Regional Municipality of York).

3.3 Traffic and Transportation Patterns

3.3.1 Private Vehicle

Metro Toronto planning originally had priorities set on establishing a network of expressways. This was brought to a stop by urban activists and resulted in a truncated network of expressways which consists of the Gardiner Expressway, Don Valley Parkway, and Allen Road (Marshall).



Figure 9: Canceled Metro Toronto Expressway Project

Coupled with a lack of transit expansion into the early 80s, private vehicle use increased and traffic conditions worsened.

The increased growth in surrounding regions has placed increased strain on congested roadways in the City of Toronto, such as Allen Road, the Don Valley Parkway and Leslie Street. The most congested roadways in the City are in suburban areas.

A constriction in the existing Highway 404-Don Valley Parkway-Highway 401 interchange causes southbound traffic flow problems in AM peak, as people continue to flow downtown for work and leisure. Daily traffic problems are evident along the full extent of the Gardiner Expressway and Highway 401 (in Toronto) at almost any time of day.

Toronto's gridlock has slowly worsened over time, being named the worst commute in all of North America ahead of Los Angeles. An estimation of the effects of this lost time adds up to approximately \$3.3 billion to commuters (\$2.7 billion in GDP) in 2006, projected to meet upwards of \$7.8 billion to commuters in 2031 (\$7.2 million in GDP) (Metrolinx).

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3.3.2 Local Transit

Municipal regions around the City of Toronto operate their own transit (bus) systems. All systems (Brampton Transit, Burlington Transit, Durham Region Transit, MiWay (Mississauga), Oakville Transit, and York Region Transit) feature some form of integration with GO Transit through fares and scheduling. The main provider for local transit in Toronto is the Toronto Transit Commission (TTC), which runs a network of subways, streetcars, and buses.

The subway system expanded with a 5.5 km subway line along Sheppard Avenue in 2002 and a 2 km extension of the Spadina subway from Wilson Avenue to Sheppard Avenue in 1996. An 8.6 km, 6-station subway extension of the Spadina subway is currently under construction, making six total station stops, including York University and Highway 7 West.

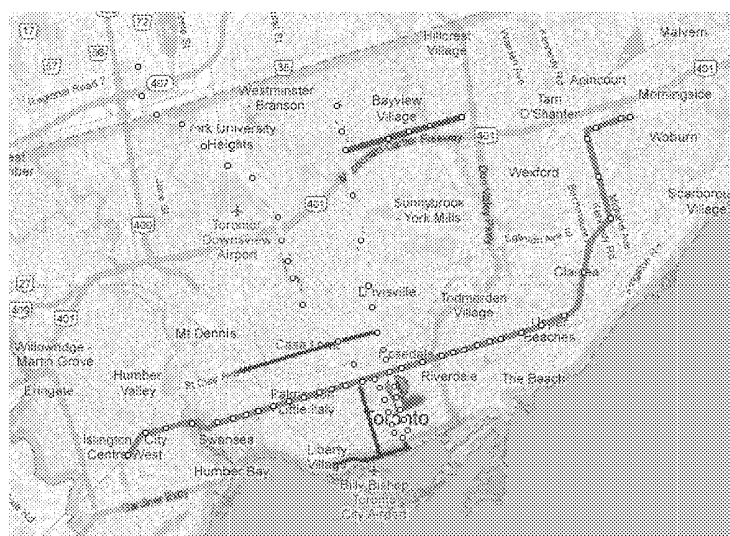


Figure 10: Existing Rapid Transit System and Spadina subway extension

The TTC currently runs three subway lines, one light rail line which uses unconventional rolling stock, and three streetcar routes which run in dedicated corridors. They also run eight streetcar routes in mixed traffic, operate 141 bus routes throughout the City and into York Region, and provide paratransit services.

Ridership has steadily grown on every municipal network. The TTC has a daily ridership of approximately 2.5 million, increasing annually.

In earlier reports, mention was given to the Eglinton West subway which was cancelled a year after groundbreaking. This subway, when completed as planned, would have connected with LBPIA. One report briefly mentioned the SmartRide LRT proposal by a consortium of engineering consultants but it was quickly dismissed due to poor public opinion of LRT.

LRT made a comeback in 2007 when Transit City was announced, which included seven LRT lines and improved feeder bus service. This plan was cancelled in 2010 by the new municipal government.

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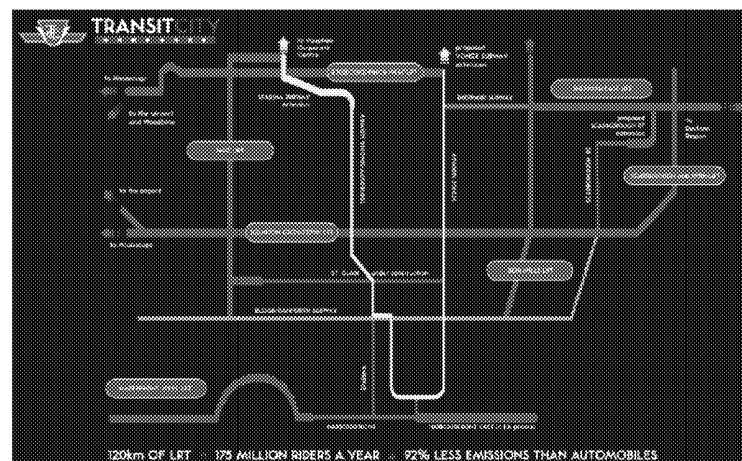


Figure 11: Transit City proposal

The newer reports factor in the local transportation aspects of Metrolinx' plan 'The Big Move', which included some Transit City Light Rail Transit (LRT) lines along Finch Ave West, Sheppard Ave East, Eglinton Avenue, and the replacement of the Scarborough RT line with conventional light rail technology. The Eglinton Crosstown line was originally anticipated to connect to LBPIA; however, due to funding constraints, the extension from Jane Street to LBPIA has been given lower priority. Brampton, Mississauga and York Region currently run Bus Rapid Transit (BRT) routes in mixed traffic.

3.3.3 Regional Transit

GO Transit is the operator of regional bus and commuter rail lines in and around southern Ontario. Train operations consist of seven commuter rail lines, of which two feature all-day service. The train lines converge at Union Station and provide a means of access to the ARL.

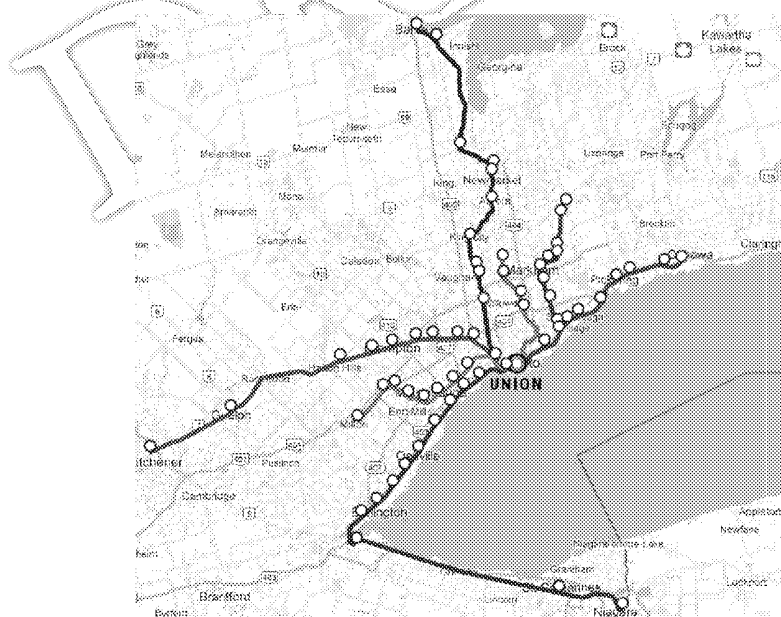


Figure 12: Existing GO Commuter Rail network

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GO Transit ridership has steadily increased, with slight overcrowding on most trains between 0745 and 0845. GO plans to orient service towards customers such that frequency will be high enough to provide every passenger with a seat.

Via Rail provides interregional commuter rail services in and out of Toronto to other popular Canadian destinations. It is centred at Union Station and frequently provides trains along the Windsor-Quebec City corridor (known as 'the Corridor'). No service is provided to LBPIA; however, Union Station is connected to Billy Bishop Airport by a shuttle bus and ferry service. It provides occasional stops along the Corridor.

Ontario Northland also provides inter-county commuter rail and bus services into Toronto from areas to the north. One train route connects downtown Toronto to towns such as Huntsville and North Bay.

3.3.4 Developing Projects

Municipal Transit

The current local transit plan '5-in-10' is to build four light rail lines for 2021 as well as York viva full BRT in York Region along Highway 7 East, Yonge Street, and Davis Drive. A bus rapid transit route is also being constructed in Mississauga along Highway 403. All lines are being built by Metrolinx in conjunction with the local system.



Figure 13: Projected Toronto Rapid Transit System for 2021 with Sheppard East LRT, Scarborough RT, Eglinton Crosstown LRT, and Finch West LRT (Not all stops shown)

Future plans for local rapid transit include an LRT line along Hurontario Street in Mississauga, bus rapid transit along Highway 7 West and Yonge Street. Durham Region is planning to start a BRT-lite service into Toronto in July 2013, with full BRT running by 2016.

A new Toronto transit plan was politically announced in June 2012 called the 'OneCity Transit Plan' which would provide extensive rapid transit coverage around Toronto. This plan is conceptual and is subject to Council study. It included ten LRT lines (most from the Transit City proposal, with the Scarborough RT removed) and six subway lines/extensions. Much of the plan is focused on Union station and a downtown subway line that would provide easier access to the ARL.

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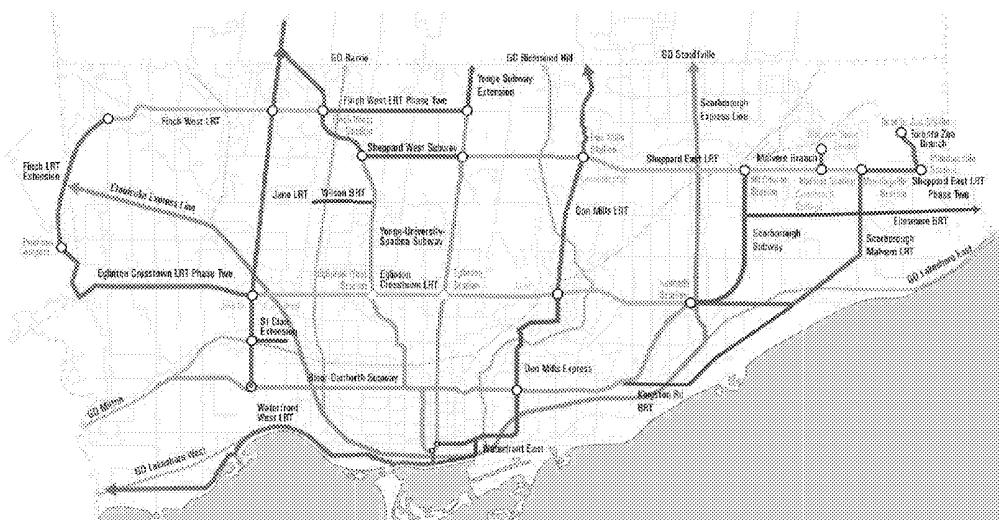


Figure 14: OneCity Transit Plan as of June 2012

Metrolinx, the regional transportation planner, has a transportation plan called 'The Big Move' which looks at transit, goods movement, and improving flow on existing roadways. An updated version of The Big Move (named The Big Move 2.0) is to be released sometime in 2012 (Leslie Woo). A key directive of the plan is to develop a network of interconnected "Mobility Hubs" throughout the city. These hubs are transit stations and transfer points that through human activity and mixed-use, transit-oriented development, bring together transit, cycling, and pedestrian networks.

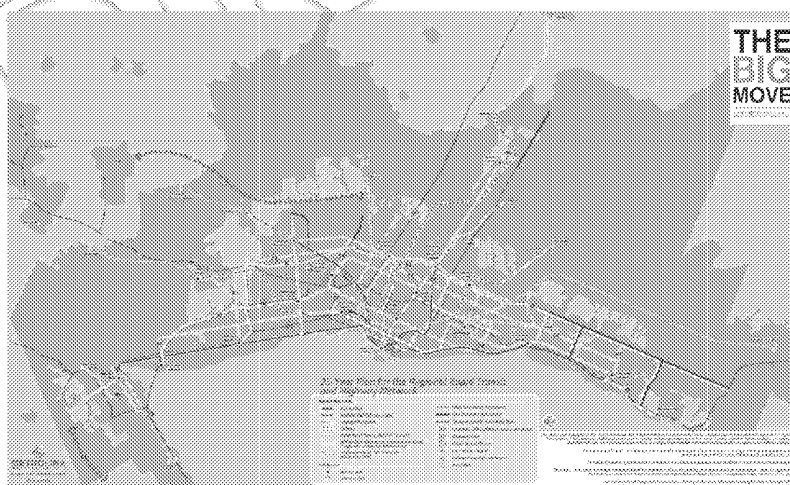


Figure 15: Big Move plan in 2008, looking ahead to 25 years later

For GO Transit, there are plans to introduce capacity improvements along all railway corridors, including signalling, double tracking, and increasing train lengths from 10 cars to 12 cars.

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However, these improvements are hindered by capacity issues during peak hours at Union Station. A temporary solution to increase train density at Union is to extend platforms to allow double berthing.

Pearson Airport has the potential of becoming one of the largest, most significant mobility hubs in the network. According to the 2009 SDG report, this would be satisfied by the following initiatives to revitalize public transit, commuter service, and private travel to and from the airport:

- Eglinton LRT, Finch West LRT, 403 Transit Way LRT, and the 427 Transit Way LRT
- Union-Airport Rail Link
- Upgrading existing highway and arterial road connections to include HOV lanes on 400, 427 and QEW, and a widened 401 from the 410 to Hurontario

The ARL would contribute to this development, linking the two largest transit hubs in the country by an express link.

Union Station Revitalization

The Union Station Revitalization is a multi-stakeholder project that has engaged GO Transit, TTC, the City of Toronto, and the Province of Ontario to improve Canada's busiest transportation hub. The project, with the first phases of construction completed for the Pan American Games in 2015, is to provide capacity for a projected 400% increase in use over the next 25 years (City of Toronto).

The revitalization includes the following:

- Restoration of the heritage structure
- A new glass train shed roof to partially replace the aging structure
- Revitalization of the eastern and western portions of the current train shed
- Creation of a new York Street GO Transit concourse
- Revitalization of the Bay Street GO Transit Concourse
- Revitalization of the Via Rail Concourse
- A new retail mall beneath the GO and Via Rail concourses
- A new, second platform at the TTC's Union Station Subway
- Glass roofs for the moat areas
- A new Northwest PATH extension connecting to Union Station
- Numerous other projects and sub-projects to improve the experience in and around Union Station

Waterfront Toronto Mixed-Use Development

Created in 2001, Waterfront Toronto is responsible to turn the 800 hectares of brownfield lands on Toronto's west waterfront into sustainable, mixed use communities with dynamic public spaces. The area is expected to house about 6000 new residents and 8000 new jobs.

The area would be public-transit focused, and would preferably be served by an LRT extending from Union Station, along Queens Quay to the east.

The Waterfront Toronto development is expected to be completed in phases with some already completed or in advanced development. The West Don Lands site has been accelerated for

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completion prior to June 2015 as it is the location for the Pan American Games Athletes Village (Waterfront Toronto).

Report Findings

Each report considered future developments to varying degrees, partially due to the stage in development each was in during the development of the report. The SDG 2009 and 2012 reports consider all of the developments outlined above in Section 3.3.4.

4 Airport Passenger Growth

4.1 Introduction

Airport travel continues to increase all over the world. LBPIA is indifferent to this and has expanded to accommodate record numbers of passengers. There are many projections for what the ridership will increase to, and these projections have a direct impact on the mode share and ridership of the Air Rail Link. A summary of the projections is included in Table 1.

Table 1: Summary of Air Traffic Growth Predictions for Pearson International Airport

	Opening Year	Traffic (Opening Year)	Opening Year + 5 (Maturity)	Traffic (Maturity)	Traffic (2015)
Halcrow	2005	32.8	2010	39.9	45.5
SDG 2004	2008	33	2013	39.9	42.5
SDG 2009	2015	37.9	2020	43.1	37.9
SDG 2011	2015	36.5	2020	40.8	36.5

4.2 Current and Historical Traffic

Over the past twenty years, air traffic has been negatively affected by a few major events. In general, times of conflict, economic slowdown, or widespread illness severely reduce air traffic. These events are difficult to predict and generally not considered when predicting growth. However, considering the past impacts of these events has allowed for comparing the differences in growth across the five studies.

Some historical events that negatively impacted air travel include:

- North American recession of 1982
- Persian Gulf War of 1990/1991
- September 11 terror attacks in 2001
- SARS outbreak in 2003
- Global recession of 2008/2009

4.2.1 SDG 2009

The Steer Davies Gleave 2009 Report developed their growth forecasts for LBPIA while the world suffered from the global recession. SDG used historical trends to estimate the effect and the degree to which the recovery would take place, noting that downturns in traffic growth due

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to conflict, economic downturns, and events such as the SARS epidemic affect air traffic in the near-term, but recovery is quick to rebound before returning to slower, more natural growth.

SDG noted that the main influences on traffic patterns between 2003 (the previous SDG report) and 2009 were:

- Strong post 9/11 and SARS recovery in 2003-2004
- Consolidation of the Canadian Low-Cost Carrier Market
- Expansion of WestJet
- Establishment of Porter at TCCA
- The Global Financial Crisis of 2008-2009

Figure 15 indicates the most the historical growth at LBPIA from 2003 to 2008.

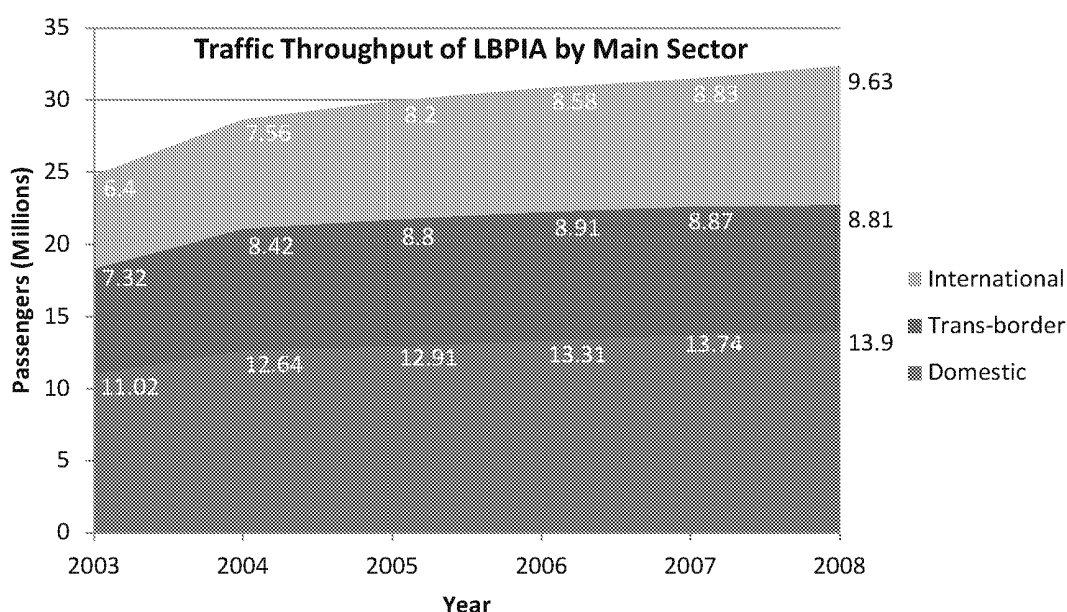


Figure 16: Historical Traffic Growth at LBPIA

4.3 Limits to Growth

GTAA estimates that Terminal 1 and Terminal 3 have enough capacity for 50 million passengers per year, so this is not foreseen as a major limit to growth. Runway capacity is capable of 120 movements per hour in visual conditions or 105 movements per hour under instrumental conditions. However, a capacity limit of 84 movements per hour has been imposed which is more than sufficient capacity to sustain higher traffic levels.

The largest barrier to growth at LBPIA is competition from other local airports. In particular, Toronto City Centre Airport (TCCA) has considerable potential, but currently operates with many financial, physical, and political constraints.

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4.3.1 Competing Airports

Toronto City Centre Airport

Toronto City Centre Airport has the potential to compete with local domestic and trans-border flights from LBPIA. Over the past decade, TCCA has grown from offering 1,340 flights in 2006 to 9,505 flights in 2007 following the introduction of Porter Airlines. Capacity increased a further 84% in 2008 and an expected 21% in 2009. Porter offers short-haul flights between Toronto and cities such as Halifax, Chicago, Ottawa, Montreal, Newark, Thunder Bay, and Washington DC.

Porter Airlines focuses on a niche market of business-class travelers, advertising itself as a more convenient option than traveling through LBPIA. However, Porter Airlines operates within a number of physical and political constraints that limit its operations to providing service using only turboprop aircraft.

Currently, Porter Airlines operates a fleet of Canadian-designed and built Bombardier Q400 turboprop aircraft. These are the largest aircraft that fly through TCCA since runway length limits jet and turbofan aircraft takeoff and landing only for emergencies.

Expansion of the runways and service areas at TCCA is limited by the Tripartite Agreement, which operates TCCA until 2033 under the provision that there will be no additional runways or extensions to existing runways, and that no bridge or vehicular tunnel will link the island to the mainland. However, following an amendment in 1998, a fixed link for pedestrian access is allowed.

Changes to the Tripartite Agreement require the authorization of both Toronto City Council and the Federal Government.

Porter Airlines has been continuously expanding service since its launch in 2006. In 2011, Porter Airlines served over 2.1 million passengers, up from 1.56 million in 2010, an increase of nearly 35% (Porter Airlines). However, its expansion continues to be in the short-haul, business traveler market, which will likely draw these trips away from LBPIA and into Toronto City Centre instead.

Other GTHA Airports

Hamilton Airport, Buttonville Airport, Windsor Airport, and the potential Pickering Airport Lands have all been considered by Steer Davies Gleave, but none are considered to be an immediate concern to growth at LBPIA.

Hamilton Airport is not an ideal alternative to LBPIA since transit options are limited and private vehicle commute times can be very high due to highway congestion. Traffic at the airport has been shrinking since WestJet and Air Canada's Jazz services pulled out of the airport. WestJet currently continues to operate services to multiple locations in North America as an alternative to LBPIA, albeit with reduced frequency.

Buttonville Airport does not operate any commercial flights, and its location along the congested 404/DVP corridor into the city makes it a difficult commute. However the airport does provide service for private jet service that TCCA and LBPIA are unable to handle (Wallace). Plans to develop the land were confirmed in 2010 (Wallace) and a conceptual design for the mixed use development was proposed in November 2011 (Cadillac Fairview and Armadale Properties)

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Windsor Airport is a considerable distance from the city core, and most scheduled services operate through the LBPIA hub network, so Windsor Airport is not considered competition.

Since the development of the Pickering Lands as future relief for LBPIA has been put on hold, Steer Davies Gleave does not believe that it will be operational prior to 2018 and therefore is not perceived as immediate competition.

The Region of Waterloo International Airport is very briefly discussed in the 2004 SDG report; however, it is not considered to be a competitor due to its distance from LBPIA. It also operates relatively few commercial flights, with only three operators and direct flights to only five cities.

4.3.2 Dominant Carrier Failure

Dominant Carrier Failure is a potential, major effect on air traffic through LBPIA. Air Canada offered 46% of all flights in 2008, and has been in increasingly more difficult financial circumstances over the past few years. In order to estimate the potential impact of Air Canada's failure, other relevant examples have been studied

Air Canada has come under increasing pressure as a result of competition and market factors, resulting in a loss of over \$1bil in 2008 – a sharp reversal from the \$429mil profit of 2007. High interest and debt payments have fueled speculation of pending bankruptcy. The airline has been negotiating with the federal government to defer pension fund payments to maintain liquidity.

In 2008, Air Canada reduced capacity by 5.4% and initiated an aggressive capacity management system.

Some comparably sized airlines have failed at other airports. The collapse of Swissair at Zurich Airport resulted in a 25% loss of traffic that took three years to start the recovery. When Sabena collapsed at Brussels International Airport, it resulted in a 27% loss in traffic. However, due to Sabena's large transfer flight operation out of Brussels, that sector suffered a 76% reduction and did not recover to previous levels. This may have been partially due to competition from low cost operators out of nearby Brussels Charleroi (Steer Davies Gleave).

Steer Davies Gleave determined in their 2009 report that it was unlikely (although not impossible) that the Canadian Government would allow a complete failure of Air Canada. Should Air Canada enter bankruptcy protection, it could result in a significant reduction in capacity, transfer traffic, and the number of employees commuting to the airport.

4.4 Airport Growth Projections

Airport passenger traffic forecasts vary for each of the five studies. The cause of the variance is largely attributed to unforeseen circumstances of the past twelve years, including the September 11th Terror Attacks, the SARS outbreak, the Iraq War, and the Recession of 2008/2009. Figure 17 includes each projection, and offers a comparison to historical GTAA forecasts as well.

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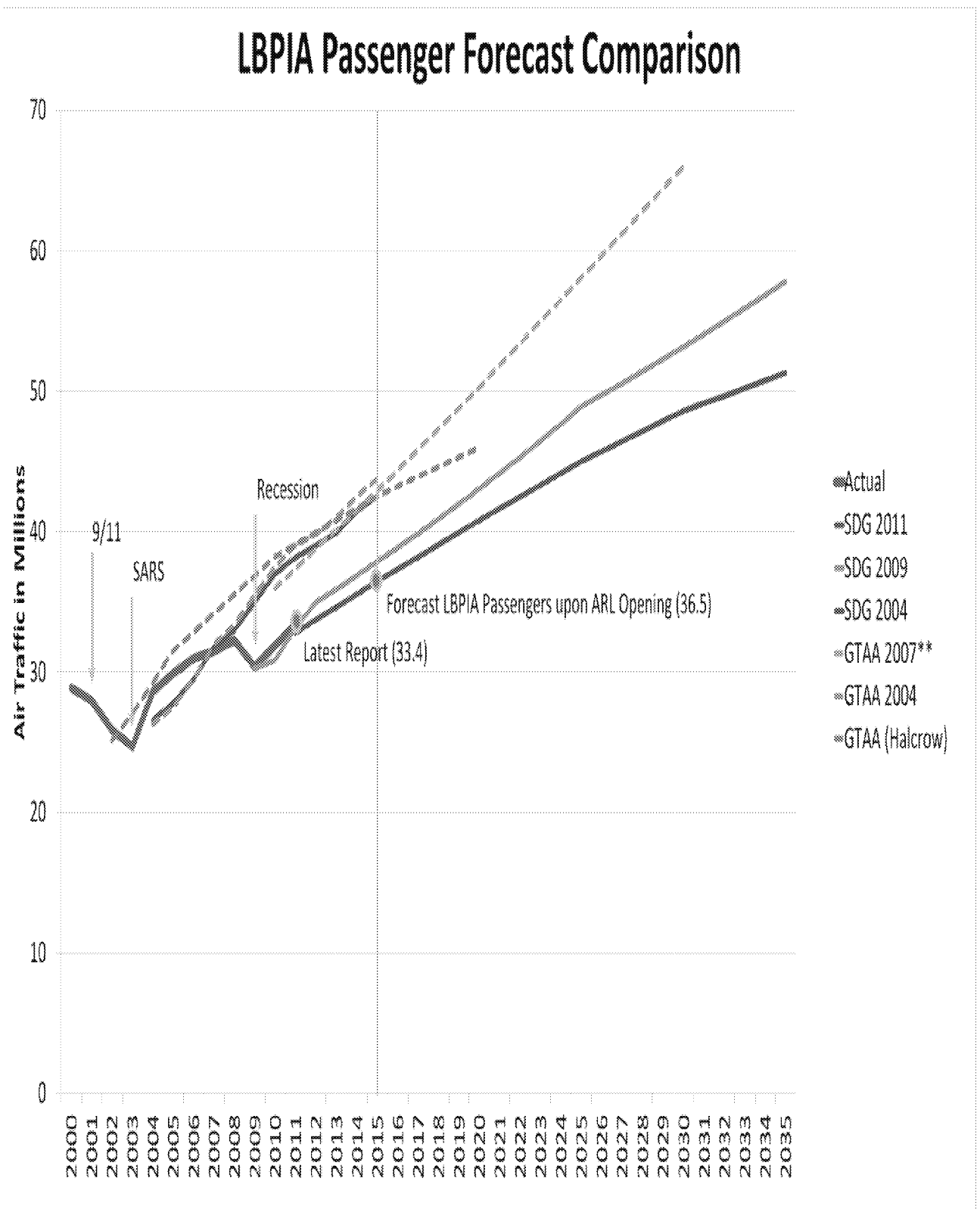


Figure 17: LBPIA Passenger Forecast Comparison – Data collected and extrapolated from various sources

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The following subsections discuss the assumptions and considerations made in each report.

4.4.1 Halcrow 2002 Report

In the Halcrow 2002 report, projections were created by Transport Canada for the GTAA using a revised model that built upon the World Trade Center September 2001 attacks. The estimates include connecting passengers, which makes up about 25% of total passengers. These passengers are not considered to be leaving the airport.

The distribution of traffic in 2000 is estimated at 44% for domestic travel, 32% for trans-border travel, and 24% for international travel.

4.4.2 SDG 2004 Report

In their 2004 report, Steer Davies Gleave predicted that the total air traffic would be lower than that predicted by the GTAA and Transport Canada. The report considered the following:

- Transport Canada's base numbers adjusting them through their own impact estimations
- Immediate post SARS recovery estimated at 75% for domestic travel, 58% for trans-border, and 80% for international
- Connecting passengers account for about 25% of the total passenger count

4.4.3 SDG 2009 Report

In Steer Davies Gleave's 2009 report, the main driver of growth was considered GDP. In particular, the GDP growth as predicted by Statistics Canada and Transport Canada was used in combination with fare price changes to allow for cost-side factors (ie: fuel and operation costs) to be considered. This resulted in the following assumptions:

- GDP Growth based on consensus forecast from 2009-2014 and Transport Canada's long term forecast of 2.3% per year thereafter (See SDG2009 Pages 47-48)
- Air fare reduction of 1% per year until 2025 to account for improving operational efficiencies and lower-cost travel options

The SDG report considers competition primarily from TCCA and Porter, and initially believed that once traffic reached 1.5 million annual passengers, growth would remain at roughly 1% per year. As Porter indicated in their annual report, however, growth has allowed ridership to surpass 2.1 million in 2011 after an increase of nearly 35% from 2010 ridership levels (which had already exceed 1.5 million).

The SDG report also considers the trend indicated in Table 2 for transferring passengers at LBPIA.

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Table 2: Percentage Connecting Passengers of Total at LBPIA

	Domestic	Trans-border	International
2009	22%	22%	22%
2015	21%	21%	21%
2020	20%	20%	20%
2026-2059	19%	19%	19%

The SDG report also made the following growth assumptions:

- Decrease of 6.3% as a result of recession
- Slow recovery in through 2012
- Approximate growth rate of 2.6% until 2025
- Growth slows down after 2025 due to maturing of air traffic market

Comparison GTAA SDG 2004 and SDG 2009

Growth has been consistently lower than original GTAA and SDG predictions despite their being periods of relatively strong economic times.

This indicates that the lower growth rate is not solely a result of events such as SARS and 9/11, but rather an indication that the overall demand for air travel has dropped. This could be a result of the maturing domestic and trans-border market.

In the GTAA forecasts, they assume an average growth rate of 3.5% per year between 2015 and 2025, whereas the actual growth rate over a similar period from 1990 to 2000 was only 2.8%, leading the GTAA forecasts to be unrealistically high. See Section 4.4.5 and Section 4.4.6 for more information on the GTAA forecasts

4.4.4 SDG 2011 Report

Steer Davies Gleave updated their 2009 report for Metrolinx in 2011, using flight-sector traffic trends and projections, GDP forecasts, projected costs of air travel, changes in airline strategy (in particular, with Porter Airlines), and capacity constraints at each airport.

The adjusted figures consider a slower average growth rate (2%) indicative of a more mature air-travel market over the period from 2011 through 2031. Historical and projected trends in the three flight-sectors are illustrated in Figure 18.

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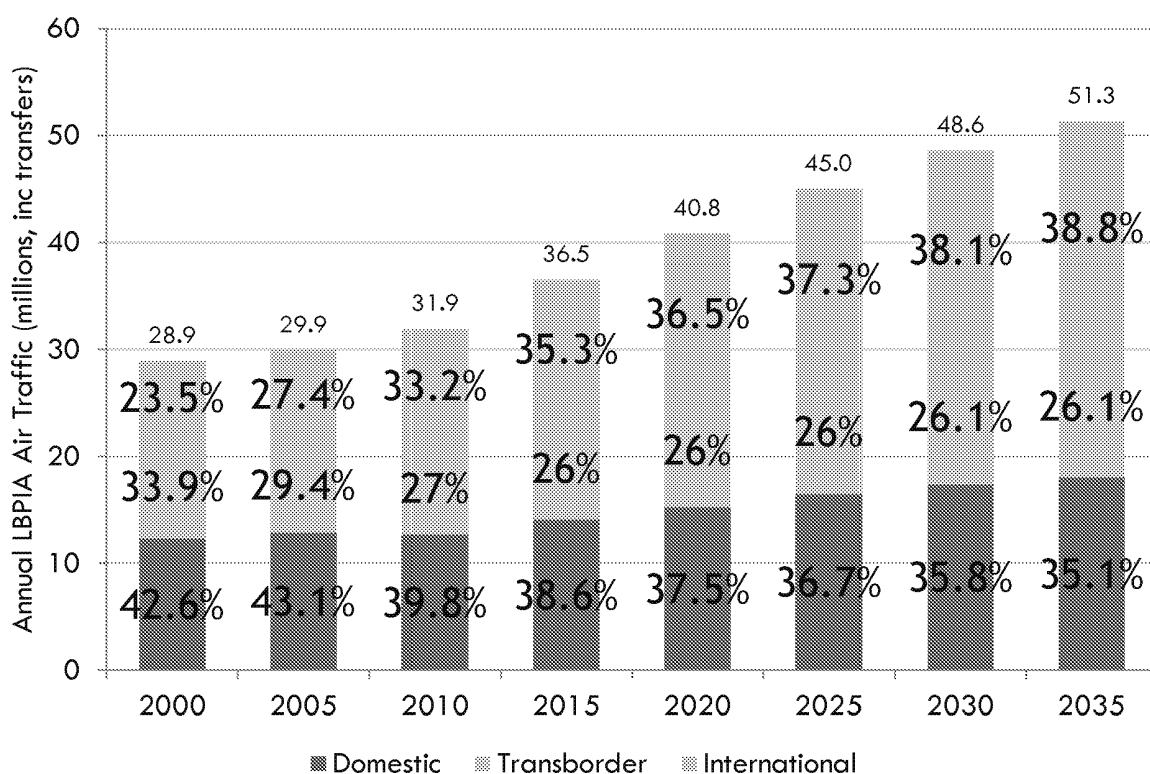


Figure 18: Pearson International Airport Air Traffic (Steer Davies Gleave)

4.4.5 GTAA 2009 Report

- Forecast from 2009 to 2026
- Main driver considered is Canadian Economic Forecast – which itself is derived from the US Economic Outlook. They appear to be broadly driven by assumptions based on GDP growth, although precise methodology is not explained.
- Assume an overall 5.9% drop from 2008 – 2009 due to the recession with slow recovery until 2011

4.4.6 GTAA 2012 Report

The GTAA projects the following passenger numbers after recovery from earlier global events. However, the recent recession is ignored, and the most recent actual counts are from 2006. It must be noted that despite actual passenger counts being available for 2011, the GTAA continues to use these projections for the future.

Year	Domestic Passengers	Transborder Passengers	International Passengers	Total Passengers
2005 (actual)	12906000 (43.1%)	8803000 (29.4%)	8205000 (27.4%)	29914000

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2006 (actual)	13466000 (43.5%)	8923000 (28.8%)	8583000 (27.7%)	30972000
2010 (projected)	15121000 (42.0%)	10375000 (28.8%)	10520000 (29.2%)	36016000
2015 (projected)	17139000 (40.0%)	12703000 (29.6%)	13049000 (30.4%)	42891000
2020 (projected)	19184000 (38.1%)	15206000 (30.2%)	15896000 (31.6%)	50286000
2025 (projected)	21233000 (36.5%)	17883000 (30.8%)	18992000 (32.7%)	58108000
2030 (projected)	23233000 (35.2%)	20609000 (31.2%)	22188000 (33.6%)	66030000

Projections of up to 50 million people will be using LBPIA by 2035, leading to the GTAA's plan to have the Pickering Airport begin service sometime in 2027-2029 (Transport Canada).

4.5 Commercial Aviation Developments

4.5.1 Halcrow 2002 Report

The Halcrow report does not discuss aviation developments as a whole or for individual airlines. It only states that LBPIA's passenger numbers are forecast to increase.

4.5.2 SDG 2004 Report

In the 2004 SDG report, consideration was given to many of the expanding airlines. Increased airline traffic directly correlates with increased ARL passenger numbers.

The Toronto City Centre Airport at this time only had one tenant – Air Canada Jazz. It was projected that the number of passengers would grow from 100,000 to 450,000 by 2008. SDG predicts that the passenger profile is mostly business travellers. However, passenger profile is not considered in their model.

In 2001, Air Canada took over Canadian Airlines and expanded its monopoly over the domestic market. However, due to increased activity by competitors and increased world events/disasters, the company filed for bankruptcy protection in 2003 for corporate restructuring. It planned to build hubs out at Vancouver and Toronto as layover facilities to reduce needs at other North American airports.

WestJet was a fairly new low-cost airline that first started Ontario operations at Hamilton airport. The company grew rapidly and moved some operations to LBPIA in May 2002, directly competing with Air Canada. It provides services from both LBPIA and Hamilton that parallel Air Canada's services.

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CanJet and JetsGo were two low-cost airlines that also operate out of LBPIA. Similar to WestJet, they operate standardized fleets and low frequency services to international destinations.

4.5.3 SDG 2009 Report

In 2003, Air Canada underwent corporate restructuring, and added a new low-cost service to compete with WestJet. However, it is still reporting losses of up to \$1.0 billion in 2008. It is believed it will re-enter bankruptcy.

WestJet has continued to grow and has become Canada's second largest airline. Touting low-cost transportation with praised customer service has continued to allow it to expand its customer base. In 2008, 16.5% of WestJet's departing flights were stationed from LBPIA. Code-sharing agreements with other airlines have allowed it to boost travel options.

Porter Airlines is a rapidly growing airline operation out of the Toronto City Centre airport. It has increased flight capacity by 48% from 2007 to 2008 and is annually adding new short-haul flight options.

American carrier activity is also increasing. However, as they are prohibited from providing services between Canadian destinations, flights are only provided to large US hubs where connections are made to travel elsewhere. A large part of the Canadian airline market is controlled by American carriers. Seven of ten airlines in 2008 in the Canadian market (by seats) were American airlines.

4.5.4 Jacobs Consultancy Report

The Jacobs Consultancy report believes the SDG report provides a fair overview of the Canadian carrier market in 2008-2009. It also includes Virgin Airlines (a US low-cost carrier) service to LBPIA, as well as briefly mentioning mergers between large, international carriers.

4.5.5 Today

Today, Air Canada continues to be Canada's largest airline. However, it has recently come under fire due to discussions of a potential third bankruptcy, as well as many discussions with its unionized personnel with regards to wages and benefits, causing multiple legislations to ensure undisturbed flight activity. The potential for another bankruptcy lies in rising fuel costs, labour relations, and pension concession costs (Cowan). It has also begun to operate flights out of the Toronto City Centre airport.

WestJet has continued with sustained passenger growth as low-cost flight activity becomes increasingly popular as well as excellent labour relations allowing service to continue, being non-unionized. The airline has added multiple popular destinations (through their own fleet and code-sharing) and is now directly competing with Porter by adding new service between LBPIA and New York LaGuardia airport. It has plans to introduce a new local carrier service, similar to Porter, with access to smaller communities using a fleet of turboprop aircraft (Mordant).

Porter has added multiple new destinations to their routes, increasing service where necessary. However, it has been toted to be a money-losing operation overall. It is not expected to enter

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bankruptcy or cease operations in the near future. However, it continues to operate under tight restrictions imposed by the Toronto Port Authority.

5 Ridership Forecasting Model Comparison

5.1 Forecasting Approach

5.1.1 Halcrow 2002 Report

The Halcrow report uses a model based off of Transport Canada's projections for the GTAA. It makes many overall assumptions that allow the model to be built.

The assumed one-way fare for air passengers at the start of service is \$20 from Union to Pearson, while fare from Bloor to Pearson is \$15. Meeters and well-wishers pay a fare of \$10 and \$7.50 for Union and Bloor respectively, of which the fare also includes a return time limitation (i.e. similar to existing two-hour transfer policies for municipal bus systems, though no information is given as to what the proposed time limitation is). For frequent travellers such as airport employees, it uses a monthly fare system that reduces the one-way fare to \$5, comparable to that of the existing GO Transit.

The ridership base is constructed of six distinct passenger categories:

- Airline passengers – people that either board or alight from a flight. It is unknown if this includes connecting passengers.
- Passenger meeters/well-wishers – these people accompany airline passengers to see them off or pick them up upon arrival.
- Airport employees – these people work at the airport.
- Non-air passengers – these people are commuting or connecting to other transit services.
- Employees of other firms – these people are connecting to their place of employment outside the airport.
- Employees and visitors – tourists, businesspeople.

The various elements of Halcrow's forecasting approach are summarized in the following flow chart.

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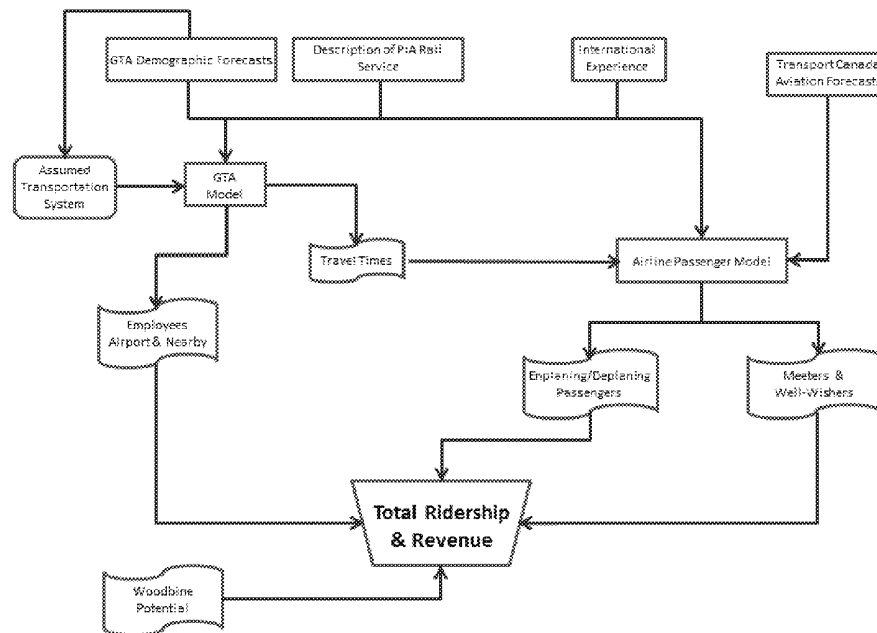


Figure 19: Halcrow Forecasting Approach elements

To better estimate the ridership of airline passengers, three strategies were used – benchmarking of existing systems, the collection of new data through a Stated Preference Survey (SPS), and the development of a special forecasting model.

The benchmarking strategy looked at existing air-rail links all over the world – seven in the United States, four in the United Kingdom, one in Australia, and twelve in Europe. These air-rail links were selected based on global metropolitan characteristics (i.e. urban density, public transit passenger-kms, etc.), geographic position of airport from the core city (i.e. downtown), and supply and demand characteristics of the rail link.

Comparison of Key Indicators

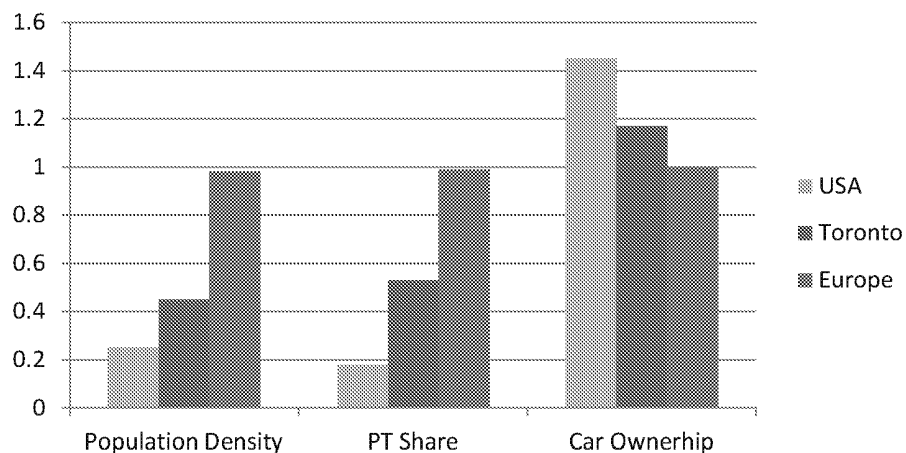


Figure 20: Comparison of Key Indicators

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The Key Indicators denote that European cities have much higher population density and public transit share, with car ownership significantly lower than North America. For Toronto, population density and public transit use is incrementally higher than that of the United States.

To put a value on the geographic distance from the airport to the metropolitan urban area, Halcrow put together an 'isolation index', I , which is calculated as:

$$I = \frac{d_{\text{downtown-airport}}}{d_{\text{downtown-edge}}}$$

The isolation index is a fraction of the distance from downtown to the airport over the distance from downtown to the edge of the urban area. For an area where the airport is further from the city, but the city is considerably denser, the isolation index would be higher. This result is generally displayed in Halcrow's data where higher rail mode share (%) is met with a higher isolation index.

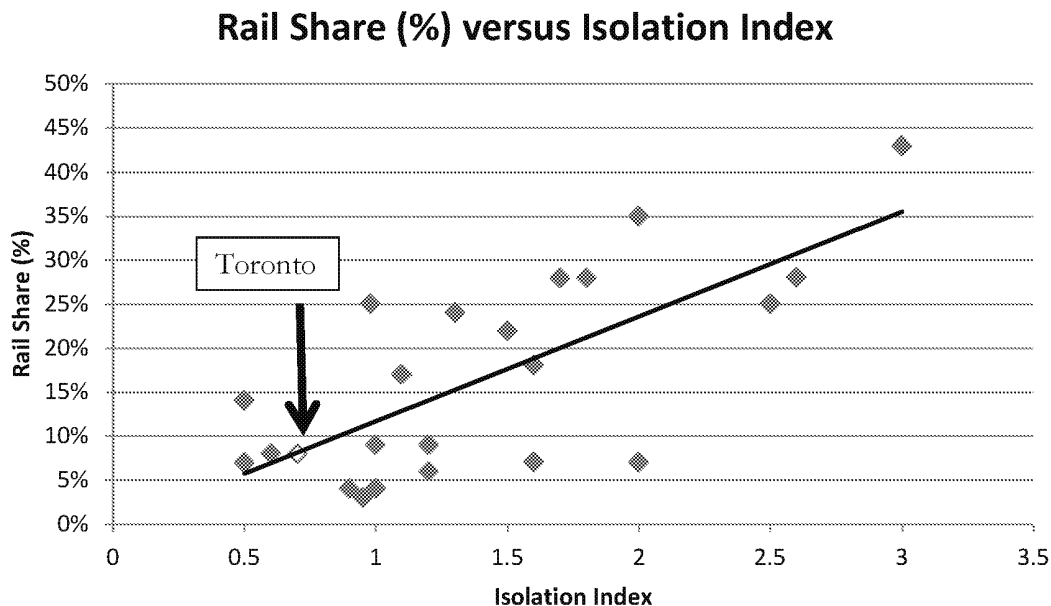


Figure 21: Rail Market Share when Traveling To/From Airport

Toronto's isolation index is approximately 0.7; estimating with linear regression, the Air Rail Link will have a rail mode share of 8%.

Halcrow next looked at supply-side characteristics of the Air Rail Link, including various factors such as ease of access, frequency, comfort, pricing, and journey times. However, as most of these values are immeasurable, Halcrow provides an example based on the travel time ratio of rail to taxi against rail mode share. A higher ratio number implies that rail travel is slower.

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Rail Share (%) versus Travel Time Ratio

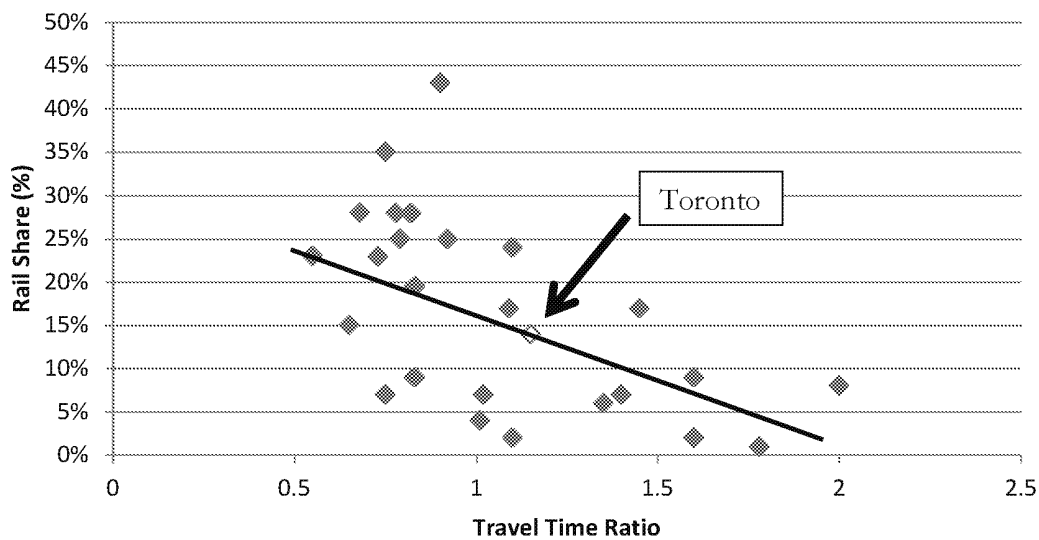


Figure 22: Rail Market Share when Traveling To/From Airport

Toronto's results are approximately at the center and expect to have a rail mode share of approximately 14% through this test.

Lastly, Halcrow looked at the demand side characteristics of the passenger market – i.e. who needs to get from downtown to the airport. Data was generally unavailable so there are very few points in this regression formula, leading to error.

Rail Share (%) versus Downtown Origins

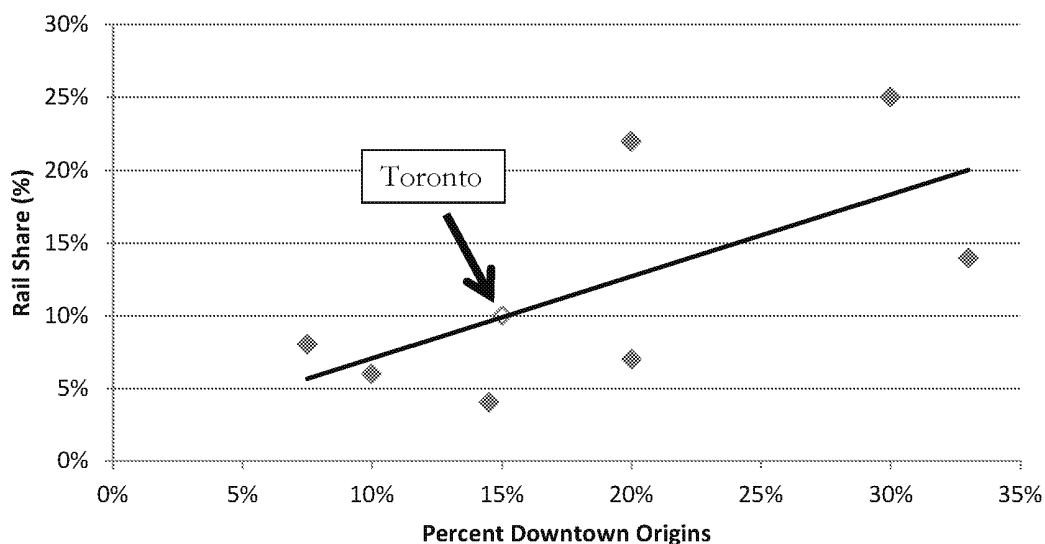


Figure 23: Rail Market Share when Traveling To/From Airport

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Halcrow lists Toronto's rail share from this test as approximately 12%, but its associated graph indicates it is closer to 10%.

The Stated Preference Survey creates a series of logistic, probabilistic, and diversion models through various parameters depending on the results from passengers, along with network data such as diversion rates of air passengers, current mode, trip purposes, and residential status. This survey was taken in terminal departure lounges with $n = 2566$ passengers. The results of the Stated Preference Survey can be found in Appendix B.

5.1.2 SDG 2004/2009 Reports

The forecasting approach is similar in both the 2004 and 2009 SDG reports. It is based on a three-step approach:

- Quantification of the in-scope market
- Forecasting Toronto ARL mode share of airport origin-destination trips
- Application of projected market growth

This approach is similar to the 2011 SDG report.

5.1.3 SDG 2011 Report

Steer Davies Gleave's overall approach relies on determining the in-scope market of the service, and then determining the probable traffic capture within this market.

For Metrolinx, SDG's approach assessed LBPIA air traffic growth, the in-scope demand, the level of traffic capture for the ARL and competing modes, and the key operational and experiential assumptions that would affect the ARL service. The process that details this is outlined in Figure 24.

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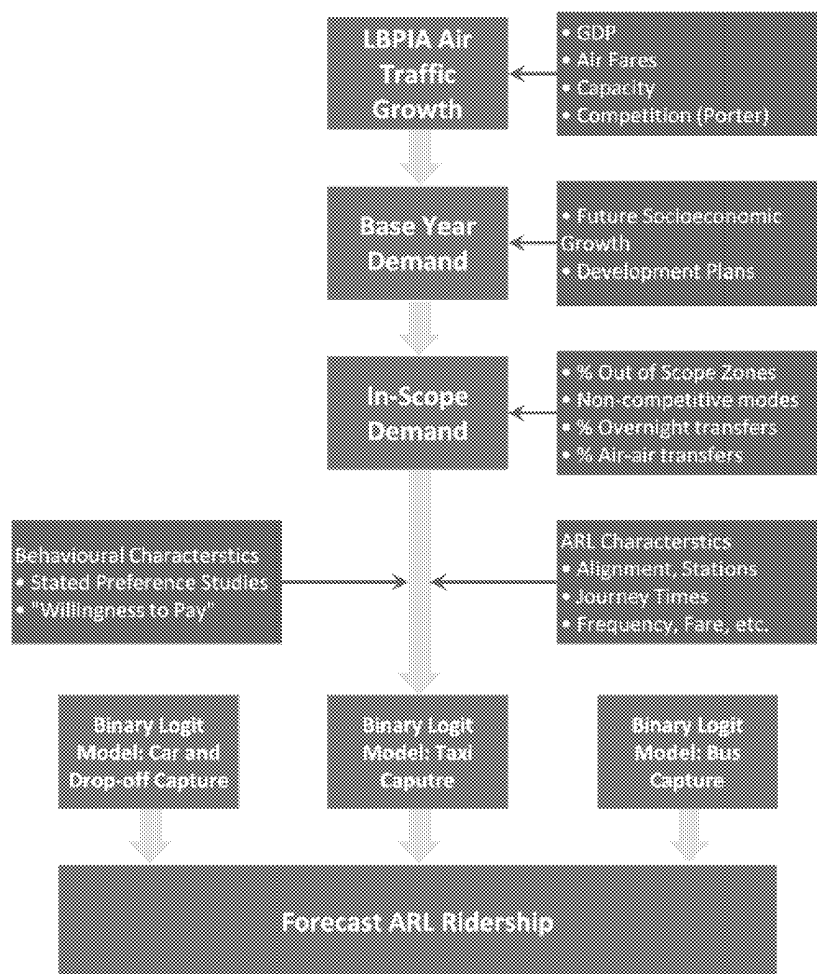


Figure 24: SDG 2011 Report Forecasting Approach (Steer Davies Gleave)

5.2 Base Year Model

5.2.1 Halcrow 2002 Report

The Halcrow report uses a base year model for service beginning in 2004 with ramp-up. Prices are given in constant 2002 dollars.

Base case forecasts include airline passengers, greeters/well-wishers, airport employees and non-passenger business travellers. Users from employment around the airport and at Woodbine station are excluded.

Two base case models are considered – a Union-Pearson non-stop express service and a service with an intermediate stop at Bloor station.

5.2.2 SDG 2004 Report

The base case is the Blue 22 scheme. Four points were assumed:

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- The Airport station is connected to Terminal 1, with access to Terminal 3 via the automated people mover.
- Bloor/Dundas station will connect to the subway station via an elevator.
- Union Station will operate from Platform 1, where there will be a passenger lounge.
- Service frequency is fifteen minutes and the expected one-way runtime is twenty-two minutes.

5.2.3 SDG 2009 Report

In Steer Davies Gleave's 2009 report, the operating assumptions included the following:

- The ARL will open for service in 2015
- Trains operating daily throughout the year (365 days)
- Service operation from 1am to 5am the following morning
- Trains will operate on 15min frequencies, servicing all stops four times per hour
- Every train will call at Union Station, Bloor Station, Weston Station, and Terminal 1 Station
- The duration of a trip from endpoint to endpoint (between T1 and Union) would be 24 minutes
- A one-way fare from Union to Terminal 1 Station would be \$27.50 on opening day including taxes (and remains constant throughout the forecasting period)

SDG used a common, but conservative estimation technique known as service "ramp-up" where the first year of service is projected to have 65% of the mature demand, the second at 80% and the third at 95%, to adjust their results.

5.2.4 SDG 2011 Report

Steer Davies Gleave developed a base year model based on the following operational assumptions among others:

- The ARL will open for service on April 5th 2015
- Trains will run daily throughout the year (365 days)
- Service operation will be from 1am until 5am the following morning
- Trains will operate on 15min frequencies, servicing all stops four times per hour
- Every train will call at Union Station, Bloor Station, Weston Station, and Terminal 1 Station
- The duration of a trip from endpoint to endpoint (between T1 and Union) would be 25 minutes
- A one-way fare from Union Station to Terminal 1 Station would be \$20 on opening day including taxes

SDG once again considered "ramp-up" when developing forecasts. However, the percentage increase was adjusted from 65%, 80%, 95% to 65%, 80%, 90%.

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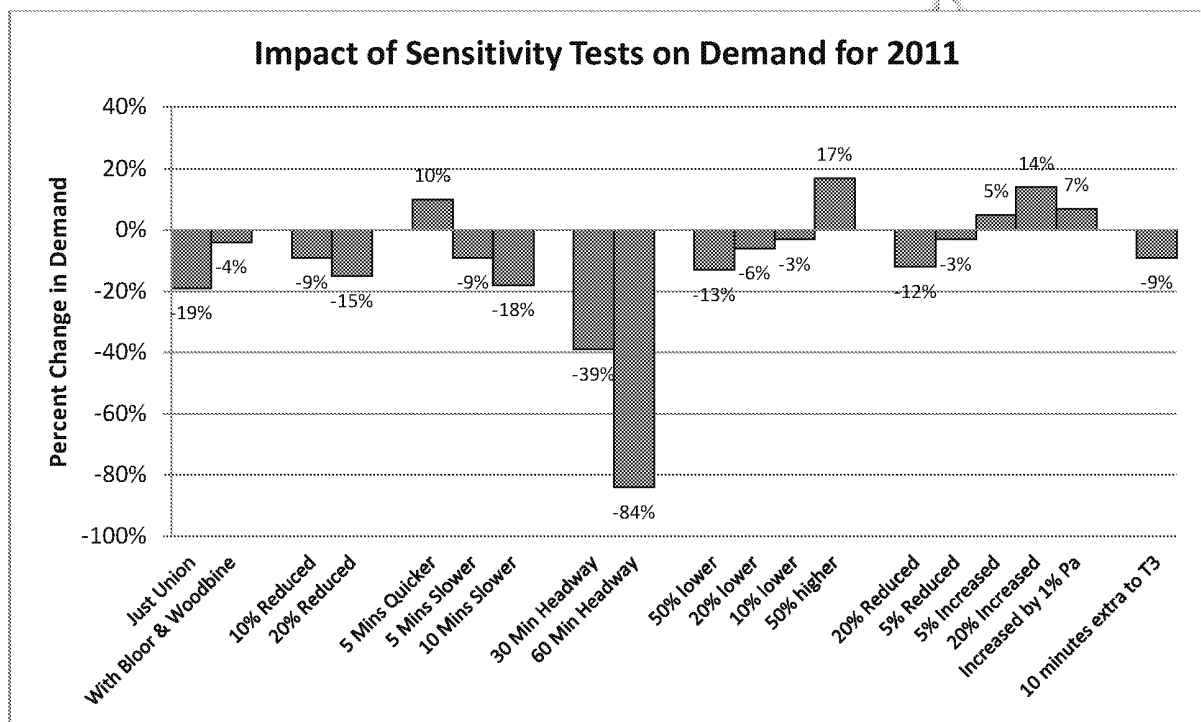
5.3 Sensitivity Analysis

5.3.1 Halcrow 2002 Report

Halcrow has carried a series of sensitivity tests to measure change in potential demand through one variable at a time. These variables are:

- additional stations
- changes in rail service travel times
- rail headways
- changes in time take by passengers to access the ARL
- changes in travel times by highway modes
- changes in estimated values of time for air passengers
- accessibility to T3 (access/egress)

Results are below in graphical format.



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Exclusion per Committee Direction

Results:

- One way running time +2 minutes if additional station at Woodbine
- 2 minute difference insignificant to pax; not a primary concern
- Inverse change between demand and revenue as travel time increases
- Frequency is a staple of the system; comfort in knowing another train will arrive soon
- If highway/road access gets worse (i.e. more congested), ARL demand will increase
- Assuming 25% of all airport pax use T3, the T1 station will be a hindrance as it will add 10 minutes

5.3.2 SDG 2004 Report

SDG's sensitivity tests are highly methodical and only change one parameter at a time. Its assessment is broken into two parts: in-scope demand, and behavioural parameters and travel costs and times.

In-Scope Demand

Four key issues were considered by SDG. These issues are, with their respective tests:

- Background passenger growth – testing GTAA background passenger growth rates $\pm 1\%$;
- Scale and rate of recovery from anomalies on air travel – proposing that there is no recovery from SARS and 9/11, or full recovery by 2006;
- Proportion of business trips – setting the proportion of business travellers to 45.2% and 28.4%, and;

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- Competition from other airports – assuming that the City Centre airport is constrained at 200,000 passengers, or increasing its capture rate at twice the planned rate up to one million passengers per year.

Behavioural Parameters and Travel Costs and Times

Four main variables were believed to best reflect public opinion of Blue22:

- Value of Time – how users juggle between time and money;
- Access Weight – the inconvenience factor of using other modes of transport after riding Blue22; in this model, it has a value of 1.95, but for testing it has changed to 1.5 and 2.5;
- Headway Weight – what users think of train frequency; values go from 1.0 to 3.0 for business users, while leisure users have values of 1.0 to 1.5, and;
- Rail Constant – a factor that reflects how users compare different modes of transport. Values vary for the mode being compared to Blue22.

Miscellaneous factors discussed include the change in airport parking costs ($\pm 20\%$), a change in taxi fares ($\pm 20\%$), and a change in road journey times (stays constant or gets worse).

The results of the sensitivity tests are tabled in Appendix C. It illustrates that the most important issues are airport passenger growth, ridership recovery from anomalies, model parameters (e.g. access weight), and taxi charges.

Several other sensitivity tests were taken. These are:

- A change in fares by $\pm \$5$, which resulted in ridership changes of -18% to 20%, to the point at which revenue is adversely affected;
- A change in runtime by ± 5 minutes, which resulted in changes of -10% to 10% in ridership
- A factor that tries to accommodate uneven growth in the GTA, which resulted in some passenger trips being redistributed to outside the City of Toronto, as well as a 5% drop in projected ridership in 2021.

5.3.3 SDG 2009 Report

The methodology is generally unchanged from the 2004 report with the exception that SDG develops new Air Traffic forecasts based on GDP and air-fare projections rather than using the GTAA's report as a baseline, and making adjustments. The report highlights single change sensitivity tests. Three subheadings were outlined: in-scope demand, behavioural assumptions, and travel times and costs.

In-Scope Demand

Similar to the previous report, this category is subdivided into a further six key factors.

- Growth in economic activity – two tests where economic growth is $\pm 20\%$ than the assumption in the central case
- Relation between economic activity and air traffic growth – two tests where GDP elasticity is $\pm 25\%$

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- Scale and rate of recovery from the current slowdown in air travel – one test where recovery is reduced to 66% of the trend and a test where recovery is achieved over three years rather than two
- Sector sensitivities – three tests were undertaken; a restructuring of Air Canada as a result of a second bankruptcy, higher growth at the City Centre airport, as well as a test if Porter was to fail.
- High oil prices – a test by fare increase due to a substantial increase in oil prices
- Distribution of demand between downtown and other areas. – this last test assumes a higher percentage of total trips to the airport are from areas other than downtown (i.e. a 10% loss in downtown demand).

Results of the in-scope demand tests are tabled below.

Test	2020 Patronage	% Change	2025 Patronage	% Change
Central Case	2.63		2.85	
GDP growth increase by 20%	2.71	3.2%	2.99	4.8%
GDP growth decrease by 20%	2.55	-3.1%	2.72	-4.5%
GDP Elasticity increase by 25%	2.75	4.6%	3.03	6.4%
GDP Elasticity decrease by 25%	2.51	-4.4%	2.68	-5.9%
Economic Recovery 66%	2.57	-2.2%	2.76	-2.2%
Air Canada Restructure	2.62	-0.3%	2.84	-0.2%
Higher TCCA growth	2.62	-0.3%	2.85	-0.2%
Collapse of Porter	2.69	2.3%	2.91	2.3%
Long Term Oil Prices >\$100	2.62	-0.3%	2.79	-2.1%
Share of Downtown Demand -10%	2.43	-7.6%	2.63	-7.6%

Behavioural Assumptions

Another four factors, based on the human factor, were analyzed for sensitivity testing.

- Value of Time – adjusted the values by $\pm 15\%$
- Access and Wait Time Weight –
- ARL Constant – perception of the mode against others, varied by ± 10 minutes
- Acceptance of Transit – an LRT mode penalty of 10 minutes based on significant transit improvements

The contents of this report are proprietary and confidential.

5.3.4 SDG 2011 Report

The SDG methodology changed little from the 2009 to the 2011 report, but various parameters affecting land use patterns and growth in the GTA have resulted in adjusted ridership values. The sensitivity tests test for many similar changes both to infrastructure, operating plan, and use of other indicators and forecasts.

The results of the 2011 Sensitivity Analysis are included below in Figure 25.

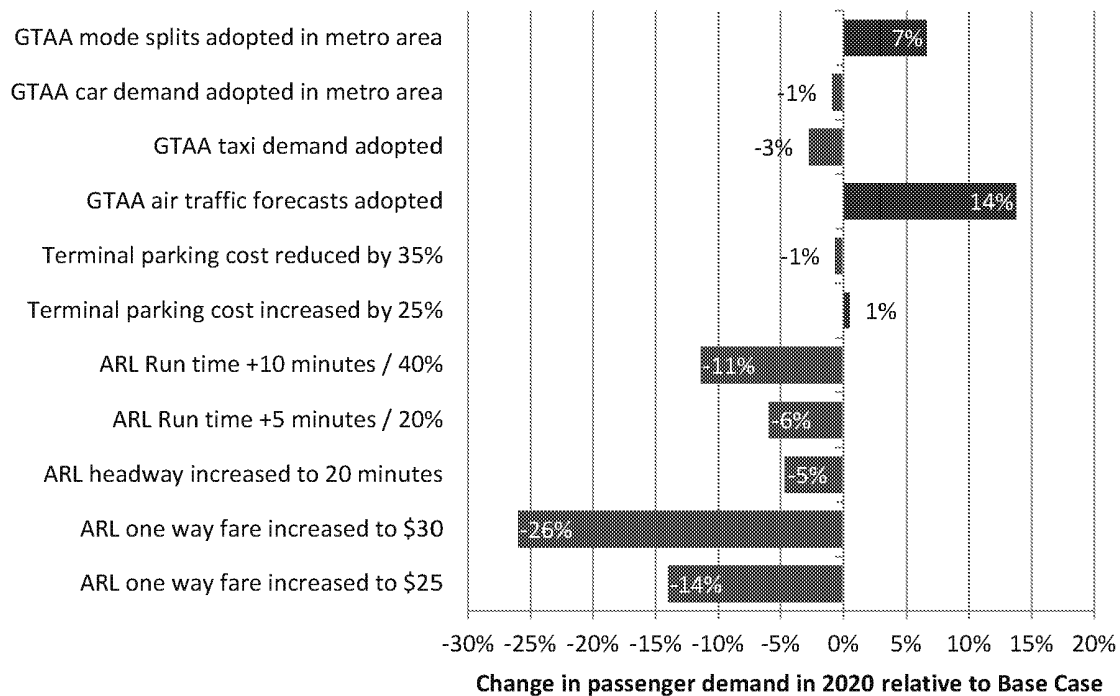


Figure 25: SDG 2011 Sensitivity Analysis

6 Ridership and Revenue Forecasts

6.1 Introduction

Halcrow and Steer Davies Gleave have each provided forecasts for future ridership and revenues, based on historical data of passenger activity at LBPIA. The Jacobs Consultancy report uses the 2009 SDG study and discusses potential error and questions with regards to the forecasts.

The following tables summarize the ridership and revenue forecasts for each of the reports.

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Table 3: Summary of Air Rail Link Ridership Forecasts (in millions)

	Opening Year	Ridership (Opening Year)	Opening Year + 5 (Maturity)	Ridership (Maturity)	Ridership (2015)
Halcrow	2005	1.57	2010	3.15	33.58
SDG 2004	2008	2.21	2013	2.73	2.9
SDG 2009	2015	1.49	2020	2.63	1.49
SDG 2011	2015	1.35	2020	3.08	1.35

Table 4: Summary of Air Rail Link Revenue Forecasts (in millions of dollars, currency value not standard)

	Opening Year	Revenue (Opening Year)	Opening Year + 5 (Maturity)	Revenue (Maturity)	Revenue (2015)
Halcrow	2005	\$ 21.07	2010	\$ 50.84	\$ 57.70
SDG 2004	2008	\$ 43.00	2013	\$ 53.04	\$ 56.37
SDG 2009	2015	\$ 35.50	2020	\$ 62.40	\$ 35.50
SDG 2011	2015	\$ 25.38	2020	\$ 57.84	\$ 25.38

6.2 LBPIA O/D Passenger Demand

Origin-Destination demand is assumed to be fairly constant throughout all the reports.

However, the Jacobs Consultancy report (in response to the lack of discussion in the 2009 SDG report) discusses potential changes in O/D demand, naming two main factors for change due to projected land use and demography:

- Regional Population changes – the population in the GTHA is forecast to reach 8.6 million by 2031.
- Waterfront and downtown area development – it is believed that intensification and mixed use development will increase ridership.

6.3 ARL Service Levels

The current ARL proposal is a two-stop, 25-minute one way travel time service with a frequency of 15 minutes per train. Ticket pricing is still being decided. It is expected to operate at roughly the same hours as LBPIA, with lieu time to accommodate late night and early morning flights.

6.3.1 Halcrow 2002 Report

The services discussed in the Halcrow report is 1) a twenty-two minute (one-way) running time express service from Union to a new terminal at LBPIA, with a single stop at Bloor Street, operating at fifteen minute intervals; and 2) a twenty-minute non-stop express service at fifteen minute frequencies. Trains would operate between 6am to midnight at a one-way fare cost of \$20.

The contents of this report are proprietary and confidential.

6.3.2 SDG 2004 Report

The ARL service proposed in the 2004 SDG report is Blue 22, a high-quality premium rail service with a single stop at Bloor. One-way travel time is twenty-two minutes, with headways of fifteen minutes.

6.3.3 SDG 2009 Report

The SDG 2009 service base case is a twenty-four minute (one-way) service with intermediate stops at Bloor Street and the Weston community (approximately Lawrence Avenue West and Weston Road). Service would operate between 0500 and 0100 every day.

6.3.4 Jacobs Consultancy

The ARL service discussed in this report is the same as the SDG 2009 report.

6.4 Future Airport Access and Egress Provision

Factors considered in future access to the airport considered by Jacobs Consultancy are:

- Driving – an increase in 20% time between 2009 and 2020.
- Pearson parking charges – kept constant at 2009 prices.
- Transit services stay at 2009 levels of service.
- Airport express bus stays in service.
- Taxis, with fares at 2009 levels.
- Eglinton-Scarborough Crosstown LRT second phase, previously projected to begin operation in 2021.

None of these factors are expected to drastically affect ARL ridership. It is expected that the Gardiner Expressway will increase in total traffic volume over time, making the Air Rail Link a viable option for downtown-airport travellers.

The Eglinton LRT will not affect ridership as the currently funded design of the line does not reach LBPIA; however, there is a possibility that the line will eventually reach LBPIA. The Eglinton LRT also does not serve the same traffic catchment as the ARL.

6.5 Future Competitive Modes or Service Changes

The SDG 2009 report considered a format of the Eglinton LRT that included service, beginning in 2021, that would call at LBPIA every 8 minutes and cost \$5 per trip (integrated with the TTC Subway Fare). It is expected that the Eglinton LRT will not have a significant effect on the ARL ridership.

6.5.1 Bus Services

Bus service to LBPIA is expected to increase as passenger traffic to LBPIA increases. However, this is not expected to be a competitive mode to the ARL in the future as it does not provide the same service from the same origin. Bus services are expected to connect to suburban areas outside of the City of Toronto.

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The TTC may begin service of an airport express bus service from the Jane terminus of the Crosstown LRT. The TTC is undergoing procurement for high-capacity articulated buses which may be used for this service.

The Mississauga bus rapid transit plan includes provisions for GO buses to access LBPIA from the west.

6.5.2 Rapid Transit

The Eglinton-Scarborough Crosstown LRT line is planned to connect to LBPIA. A transfer is still required from downtown commuters to reach LBPIA via the LRT, and the expected time of travel is 45 minutes.

As a rapid transit line, it will be tailored towards everyday commuters rather than the same market as the ARL. It will feature 2.65 m wide Light Rail Vehicles with only two areas with high mobility, which may deter airport travellers due to limited space.

Access to the Crosstown LRT from downtown will require use of the Yonge or Spadina subway lines, which are currently not fully accessible. Many potential passengers of the ARL will likely believe taking the TTC to the airport to be a hassle, and will instead take the ARL.

It is possible that a connection be made to the ARL from the LRT line and increase ridership. Passengers that do not mind short-haul rapid transit or those that do not need to make transfers on the TTC would likely be enticed to take the ARL to complete their trip to the airport.

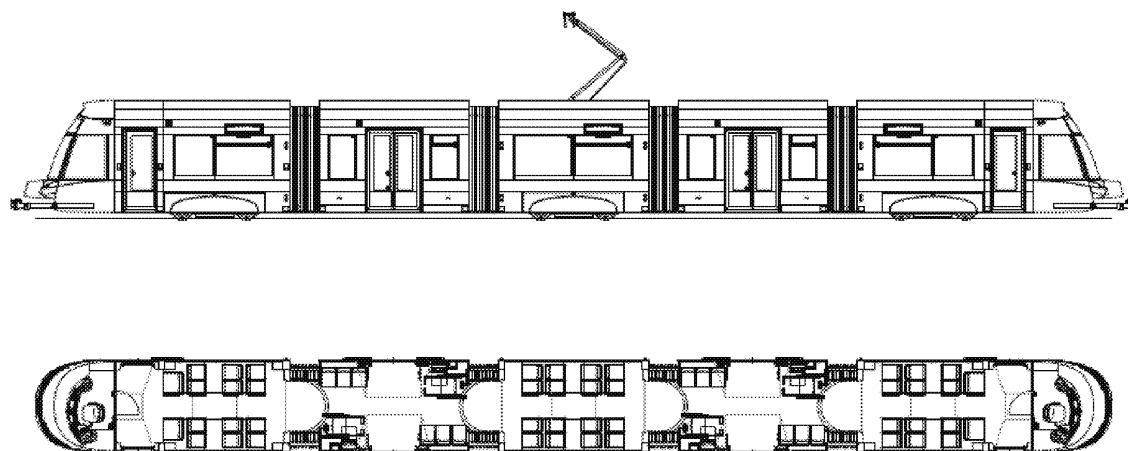


Figure 26: Elevation and plan of proposed Light Rail Vehicle. Areas for mobility are in 2nd and 4th sections

The Finch West LRT is also planned to eventually connect with LBPIA, providing access from the north. It will run the same vehicles as the Crosstown LRT and therefore have the same mobility issues. This line is not expected to reduce ridership because it serves a completely different area and market from the ARL.

A subway extension to LBPIA is not being considered at any time. Mode changes for routes 192 Airport Rocket and 58 Malton are not expected.

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6.6 Behavioural Values

The 2009 SDG report created behavioural values based on Stated Preference research by surveying n = 1260 people. This data is summarized in (Actual report: section 3.3.4, table 3, 4). Behavioural values considered important were:

- In-vehicle time
- Access and egress time
- Wait time
- Interchanges
- Mode constants
- Scale parameters

6.7 Induced Demand

All reports do not seem to consider induced demand as a significant factor for increased ridership. The Jacobs Consultancy report briefly touches upon this and believes it is a reasonable assumption to ignore induced demand.

This is a reasonable assumption because it is not expected that people will take the ARL as a regular commuter line. Since it is a premium service, it will be priced accordingly to reach the goal of revenue neutrality and will be unattractive to transit commuters.

6.8 Traffic Ramp-Up

6.8.1 Halcrow 2002 Report

The Halcrow report bases the ridership ramp-up profile on statistics from Heathrow Express. (page 41) Based on this, it assumed ramp-up profiles of 60%, 90%, and 100% for years 1, 2, and 3 respectively.

6.8.2 SDG 2004 Report

In the SDG 2004 report, ramp-up is not included in ridership forecasts. However, the report provides recommendations as to how to adjust the forecasts to fit ramp-up. SDG believes that ramp-up is difficult to predict and determines that Halcrow's numbers are reasonable. However, they also believe that ramp up profiles are highly dependent on a benchmarked rail link. For example, SDG based another set of ramp-up profiles on the Arlanda Express and ended up with ramp-up numbers of 75%, 95%, and 100% in years 1, 2 and 3 respectively.

6.8.3 SDG 2009 Report

In the 2009 SDG report, ramp-up profiles of 65%, 80%, 95%, and 100% are used for years 1, 2, 3, and 4 respectively. Jacobs Consultancy agrees with these values.

6.8.4 SDG 2011 Report (Current)

Ramp up values in the SDG 2011 report are reported as 65%, 80%, 90%, and 100% for years 1, 2, 3 and 4 respectively.

The contents of this report are proprietary and confidential.

6.9 Fraud and Evasion

Fraud and fare evasion poses a significant risk to operations revenue. This section discusses possible revenue loss due to fare evasion.

6.9.1 Halcrow 2002 Report

The Halcrow report accounts for fraud and fare evasion by reducing revenue by 4%. No mention is given as to how a potential guest would fare evade.

6.9.2 SDG 2004 Report

The SDG 2004 report briefly discusses revenue loss. The recommended strategy to mediate revenue loss is through access control and ticket enforcement. The easiest situation to evade fare is to under-purchase/over-travel on a fare. This is when someone purchases a \$15 ticket to Bloor from Pearson, but actually travels to Union.

6.9.3 SDG 2009 Report

The SDG 2009 forecasts do not include revenue losses into the forecasting model; Jacobs Consultancy believes that a small loss in revenue should be included. However, as there is allowance in the financial model for revenue loss, it is not included in Jacobs' forecasts.

6.9.4 Today

The currently proposed fare collection system reduces risk of fare evasion. Most tickets will be electronically issued. Roving transit enforcement will be on hand to check tickets and ensure alighting at the correct station. It is not expected that a significant loss in revenue will occur due to fare evasion.



Figure 27: Example of fare card and device

6.10 ARL Ridership Exclusion per Committee Direction

The Toronto Air Rail Link will be a premium Exclusion per Committee Direction express service. In order to achieve revenue neutrality, revenues must equal operating costs. Numbers in this section only concerns fare revenue – non-fare revenue, such as from advertising, are not discussed.

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6.10.1 Halcrow 2002 Report

Two base cases were established to build forecasting models – a non-stop express service between Union and LBPIA, and an express service that stops once at Bloor Street. It assumes an air-traveller fare of \$20 for Union-LBPIA travel and a fare of \$15 for Bloor-LBPIA travel. Meeters and well-wishers pay half of the standard fare. Forecasts are split up by category of passenger.

For the Union-Bloor-LBPIA case, Appendix D illustrates forecasted ridership and revenue in both tabular and graphical formats. This does not include employee trips from a loyalty fare. The following Appendix E forecasts ridership and revenue for the non-stop Union-LBPIA case.

6.10.2 SDG 2004 Report

SDG has produced multiple forecasts based on uncertainty. The base case is modelled and values are changed to create upper and lower boundaries for forecasted numbers. These are available graphically in Appendix F.

- uncertainty increases (confidence decreases) as time goes on; ranging from 5% in 2005 to 17% in 2015

6.10.3 SDG 2009 Report

- In opening year, the service will see 1.49 million passengers
- By service maturity in 2020, annual ridership will be 2.63 million passengers (about 8% modal share)
- 89% of passengers will travel to/from Union Station, 8% to/from Bloor, and 2% to/from Weston

6.10.4 SDG 2011 Report (Current)

SDG produced the following results for base demand:

- In opening year (April – December 2015), the service will see 1.35 million passengers
- By service maturity in 2020, annual ridership will be 3.08 million passengers (modal share of 10.3%)
- 76% of passengers will travel to/from Union Station, 16% to/from Bloor, and 8% to/from Weston

The following charts illustrate hourly demand on an average day in both directions

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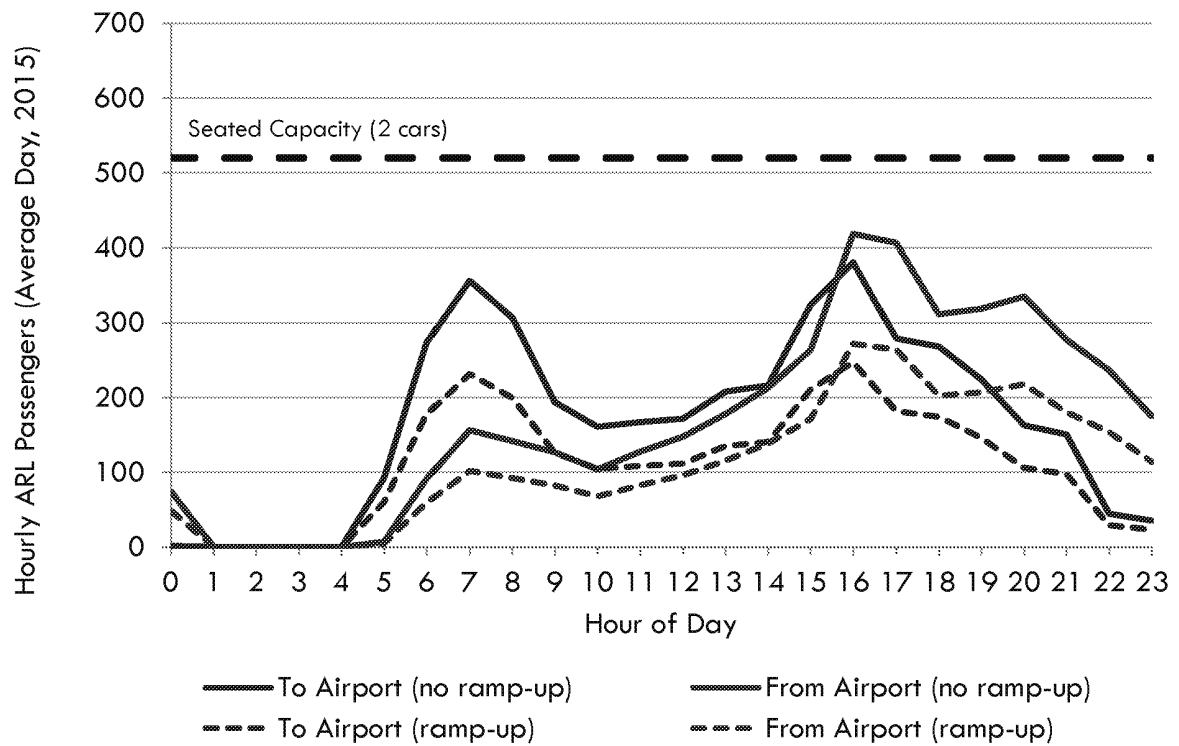


Figure 28: Hourly ridership on average weekday 2015 (Steer Davies Gleave)

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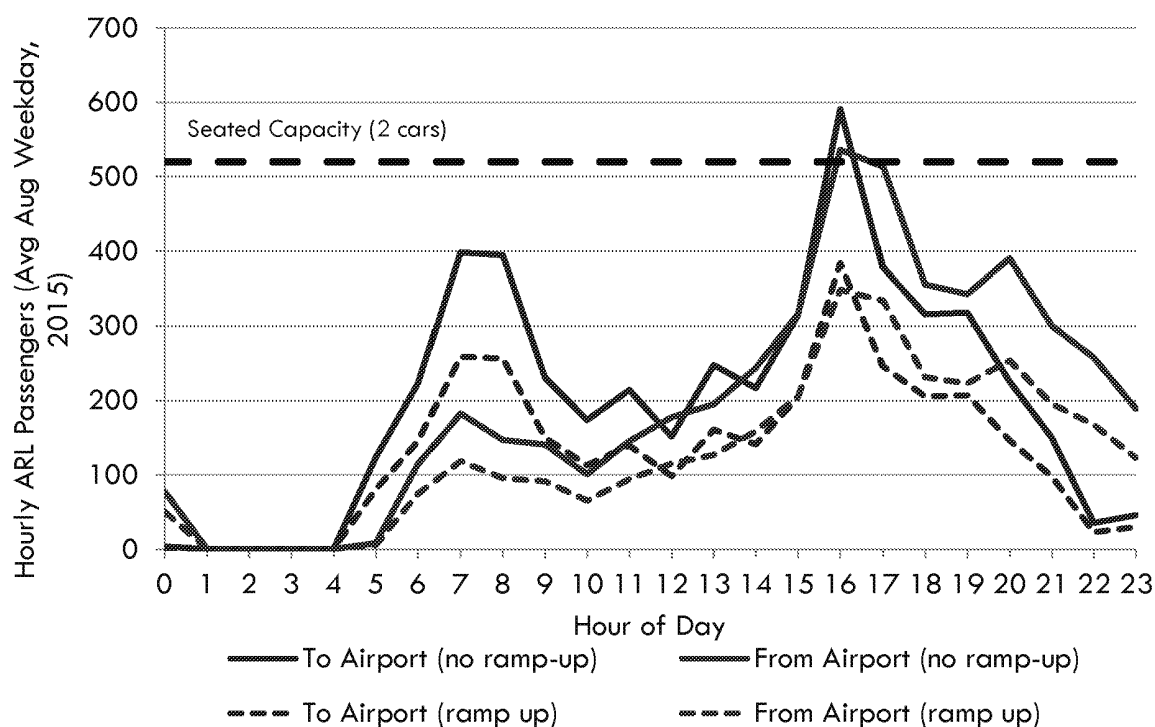


Figure 29: Hourly ridership on average August weekday 2015 (Steer Davies Gleave)

6.11 Benchmarking

All reports compare the proposed Toronto Air Rail Link to existing Air Rail Links around the world. It was determined that all existing North American air rail links are either:

- commuter rail (passenger trains not built for airport access)
- heavy rapid transit (subways)
- light rail transit (light metros and streetcars/trams in private right-of-ways)

These modes were determined to be fairly high-frequency, low fare, and relatively slow in travel time due to stop frequency. It is not designed to cater to the airport passenger; rather, they were built to cater to the typical commuter and supplement the public transit network in cities rather than connect downtowns and airports through a premium express service.

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Figure 30: Example of commuter rapid transit access to an airport

Overseas, the majority of air rail links are dedicated, premium services which run at moderate frequencies (i.e. fifteen minutes), with amenities to accommodate passenger comfort and experience. These rail links are more similar to the proposed Toronto air rail link.



Figure 31: Example of a dedicated, express air rail link overseas

6.11.1 Halcrow 2002 Report

The forecasting approach includes a significant amount of study of other air rail links. It looked at existing air rail links all over the world – seven in the United States, four in the United Kingdom, one in Australia, and twelve in Europe. Factors that the study looked at include global metropolitan characteristics (i.e. urban density, public transit passenger-kms, etc.), geographic position of airport from the core city (i.e. downtown), and supply and demand characteristics of the rail link.

6.11.2 SDG 2004

The SDG 2004 report looks at multiple airport rail link experiences globally. It looks at a total of 38 airport links, some of which are regular commuter lines and some of which are dedicated

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air rail links. It tables the nature of service as well as the fare in 2004. It also briefly tables five planned airport links.

6.11.3 SDG 2009

The SDG 2009 report originally listed fifty global air rail links, but reduces benchmarking to six air rail links. This reduction is based on whether the lines are dedicated airport expresses, the distance between the airport and the downtown core, and the passenger throughput of the airport.

The six rail links are London's Gatwick Express, London's Heathrow Express, Oslo's Flytoget, Stockholm's Arlanda Express, Hong Kong's Airport Express, and Kuala Lumpur's KLIA Ekspres. These lines are described with detail regarding pricing, travel time, and passenger amenities. Furthermore, it briefly discusses lessons from these ARLs that the Toronto ARL should consider.

6.11.4 Jacobs Consultancy

A basic average of air rail link mode share (in %) was calculated using nineteen North American rail links (all commuter transit) and eighteen overseas air rail links (mostly dedicated train services). These results, along with simple averages, are tabulated in Appendix G.

6.11.5 SDG 2011

The latest SDG report takes a look at twelve other rail links. These are:

- London Gatwick
- Hong Kong
- Oslo
- Brussels
- Amsterdam
- Frankfurt
- Stockholm
- Vienna
- New York JFK
- Chicago Midway
- Vancouver
- Various European high speed rail services

7 Conclusions

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Union-Pearson Air Rail Link

Appendices

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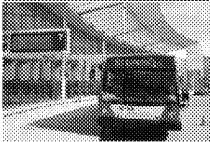
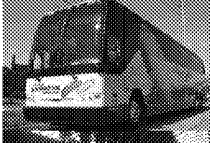
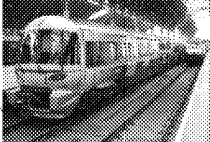
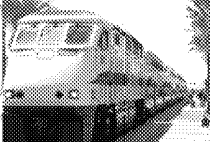
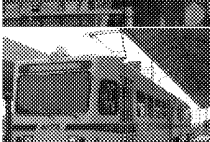
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Appendix A

Modes of Airport transportation to elsewhere in the city. Omitted: hotel shuttle buses

Mode	Photo	Example cities
Car		
Taxi		
Local transit bus service		Toronto, New York
Premium express bus service (run by local transit)		Montréal, Edmonton, Calgary
Coach bus		Toronto
Premium rail link		London, Hong Kong, Tokyo
Commuter rail link		Los Angeles
Rapid transit (subway)		Vancouver
Light Rail (light metro/ROW streetcars)		Baltimore, Portland
Rail shuttle		New York

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Appendix B

Halcrow Stated Preference Survey Results

	SP Survey %	Other Surveys %
Samples by Terminal		
T1	10.3	9-32
T2	59.2	37-47
T3	30.5	32-51
By Age		
Under 24	9.9	12-13
25-34	22.5	24-25
35-44	27.0	25-26
45-54	22.0	22
55-64	13.1	11
65+	5.5	4-5
By Gender		
Male	59.4	54-56
Female	40.6	44-46
Airport Access		
Taxi/Limo	42.2	25-37
Hotel/Airport Bus	2.8	5-9
Other Bus	5.0	4-9
Rented Car	3.8	9-11
Car Parked	9.9	7-15
Car Lift	36.3	29-35
Other	0.0	<1
Residency		
Resident	60.7	71-75
Non-resident	39.3	25-29
Party Size to LBPIA		
1	41.5	46-59
2	36.4	28-33
3+	22.0	12-20
Bags Checked-In		
0	17.9	7-22
1 or more	82.1	78-93
Meeters/Greeters		
Mean per passenger	0.48	0.08-0.6
Income		
Up to \$20000	5.3	*
\$20000 - \$40000	8.9	
\$40000 - \$60000	16.4	
\$60000 - \$80000	16.7	
Over \$80000	45.9	
Don't know	6.4	
Trip Purpose		
Business	40.2	29-45
Non-business	59.8	55-71
Choice of Rail Link Station		
Union Station	69.5	*
Bloor & Dundas	30.5	
Access to Rail Link	Union	Bloor/Dundas
Walk	17.8	5.2
Taxi/Limousine	23.9	18.7
TTC Bus/Streetcar	1.7	8.3
Car	10.2	23.0
TTC Subway	32.8	43.9
GO Train	12.0	0.4
Other	1.6	0.4

* Data not available

(Halcrow Group Ltd, Cansult Ltd)

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Appendix C

Ridership And Revenue Forecasts

TABLE 7.1 BLUE22 SENSITIVITY TESTS

Test	2012 Patronage	Difference from Central Case	2022 Patronage	Difference from Central Case
Airport passenger growth minus 1% per year growth	2.42m	-8%	2.89m	-17%
Airport passenger growth plus 1% per year growth	2.89m	+9%	4.17m	+20%
Full SARS and 9/11 recovery by 2006	2.65m	0%	3.47m	0%
No SARS and 9/11 recovery	2.20m	-17%	2.89m	-17%
Business travellers 28.4% of total	2.56m	-3%	3.36m	-3%
Business travellers 45.2% of total	2.69m	+2%	3.53m	+2%
City Airport constrained to 200,000 pax	2.67m	+1%	3.51m	+1%
City Airport maximum 1,000,000 pax	2.62m	-1%	3.45m	-1%
Value of Time plus 15%	2.59m	-2%	3.41m	-2%
Value of Time minus 15%	2.72m	+3%	3.57m	+3%
Access time parameter increased to *2.5	2.25m	-15%	2.96m	-15%
Access time parameter reduced to *1.5	3.02m	+14%	3.96m	+14%
Headway parameter increased to *3.0 Business and *1.5 Leisure	2.09m	-21%	2.76m	-21%
Headway parameter reduced to *1.0 Business and *1.0 Leisure	3.17m	+20%	4.14m	+19%
Constants 10 minutes more	2.14m	-19%	2.82m	-19%
Constants 10 minutes less	3.19m	+21%	4.18m	+20%
Airport parking costs reduced by 20%	2.62m	-1%	3.44m	-1%
Airport parking costs increased by 20%	2.68m	+1%	3.52m	+1%
Taxi charges reduced by 20%	2.39m	-10%	3.12m	-10%
Taxi charges increased by 20%	2.87m	+8%	3.76m	+8%
Congestion does not worsen over time	2.53m	-4%	3.32m	-4%
Congestion worsens twice as fast as assumed	2.77m	+4%	3.63m	+4%

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Appendix D

Halcrow Base Case Annual Forecasts (Table) (Excludes Employee Trips) (Union-Bloor-Pearson)

Base Case Annual Forecasts: Union Station - Bloor - T1 with a 15-Minute Headway

Year	Annual Demand in Millions			Annual Revenue in \$2002 Millions					
	Air Passengers	Meeters&Greeters	Total	Air Passengers	Meeters&Greeters	Total	Fare for Air Passengers	Fare for Meeters&Greeters	
2005	1.40	0.17	1.57	\$ 19.86	\$ 1.20	\$ 21.06	\$ 14.19	\$	7.06
2006	2.18	0.26	2.44	\$ 35.16	\$ 2.13	\$ 37.29	\$ 16.13	\$	8.19
2007	2.52	0.31	2.83	\$ 43.01	\$ 2.61	\$ 45.62	\$ 17.07	\$	8.42
2008	2.62	0.32	2.94	\$ 44.65	\$ 2.71	\$ 47.36	\$ 17.04	\$	8.47
2009	2.71	0.33	3.04	\$ 46.29	\$ 2.81	\$ 49.10	\$ 17.08	\$	8.52
2010	2.81	0.34	3.15	\$ 47.93	\$ 2.91	\$ 50.84	\$ 17.06	\$	8.56
2011	2.91	0.35	3.26	\$ 49.57	\$ 3.01	\$ 52.58	\$ 17.03	\$	8.60
2012	2.98	0.36	3.34	\$ 50.77	\$ 3.09	\$ 53.86	\$ 17.04	\$	8.58
2013	3.05	0.37	3.42	\$ 51.98	\$ 3.16	\$ 55.14	\$ 17.04	\$	8.54
2014	3.12	0.38	3.50	\$ 53.18	\$ 3.24	\$ 56.42	\$ 17.04	\$	8.53
2015	3.19	0.39	3.58	\$ 54.39	\$ 3.31	\$ 57.70	\$ 17.05	\$	8.49
2016	3.26	0.40	3.66	\$ 55.59	\$ 3.39	\$ 58.98	\$ 17.05	\$	8.48
2017	3.33	0.41	3.74	\$ 56.79	\$ 3.47	\$ 60.26	\$ 17.05	\$	8.46
2018	3.40	0.42	3.82	\$ 58.00	\$ 3.54	\$ 61.54	\$ 17.06	\$	8.43
2019	3.47	0.42	3.89	\$ 59.20	\$ 3.62	\$ 62.82	\$ 17.06	\$	8.62
2020	3.54	0.43	3.97	\$ 60.41	\$ 3.69	\$ 64.10	\$ 17.06	\$	8.58
2021	3.61	0.44	4.05	\$ 61.61	\$ 3.77	\$ 65.38	\$ 17.07	\$	8.57
2022	3.68	0.45	4.13	\$ 62.81	\$ 3.85	\$ 66.66	\$ 17.07	\$	8.56
2023	3.75	0.46	4.21	\$ 64.02	\$ 3.92	\$ 67.94	\$ 17.07	\$	8.52
2024	3.83	0.47	4.30	\$ 65.22	\$ 4.00	\$ 69.22	\$ 17.03	\$	8.51
2025	3.90	0.48	4.38	\$ 66.43	\$ 4.07	\$ 70.50	\$ 17.03	\$	8.48
2026	3.97	0.49	4.46	\$ 67.63	\$ 4.15	\$ 71.78	\$ 17.04	\$	8.47
2027	4.04	0.50	4.54	\$ 68.83	\$ 4.23	\$ 73.06	\$ 17.04	\$	8.46
2028	4.11	0.50	4.61	\$ 70.04	\$ 4.30	\$ 74.34	\$ 17.04	\$	8.60
2029	4.18	0.51	4.69	\$ 71.24	\$ 4.38	\$ 75.62	\$ 17.04	\$	8.59
2030	4.25	0.52	4.77	\$ 72.45	\$ 4.46	\$ 76.91	\$ 17.05	\$	8.58
2031	4.32	0.53	4.85	\$ 73.65	\$ 4.53	\$ 78.18	\$ 17.05	\$	8.55
2032	4.39	0.54	4.93	\$ 74.85	\$ 4.61	\$ 79.46	\$ 17.05	\$	8.54
2033	4.46	0.55	5.01	\$ 76.06	\$ 4.68	\$ 80.74	\$ 17.05	\$	8.51
2034	4.53	0.56	5.09	\$ 77.26	\$ 4.76	\$ 82.02	\$ 17.06	\$	8.50
2035	4.60	0.57	5.17	\$ 78.47	\$ 4.84	\$ 83.31	\$ 17.06	\$	8.49

(Halcrow Group Ltd, Cansult Ltd) Page xv, Table S.4

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Appendix D

Halcrow Base Case Annual Forecasts (Graph) (Excludes Employee Trips) (Union-Bloor-Pearson)

Exclusion per Committee Direction

(Halcrow Group Ltd, Cansult Ltd) Page xiv, Figure S.8. Blue indicates ridership; red indicates revenue.

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Appendix E

Halcrow Base Case Annual Forecasts (Table) (Excludes Employee Trips) (Union – Pearson non-stop Express)

Base Case Annual Forecasts: Union Station - T1 with a 15-Minute Headway

Year	Annual Demand in Millions		Total
	Air Passengers	Meeters&Greeters	
2005	1.19	0.13	1.32
2006	1.86	0.20	2.06
2007	2.14	0.23	2.37
2008	2.21	0.24	2.45
2009	2.28	0.25	2.53
2010	2.36	0.26	2.62
2011	2.43	0.26	2.69
2012	2.49	0.27	2.76
2013	2.55	0.28	2.83
2014	2.60	0.28	2.88
2015	2.66	0.29	2.95
2016	2.72	0.30	3.02
2017	2.78	0.30	3.08
2018	2.83	0.31	3.14
2019	2.89	0.32	3.21
2020	2.95	0.32	3.27
2021	3.01	0.33	3.34
2022	3.06	0.34	3.40
2023	3.12	0.34	3.46
2024	3.18	0.35	3.53
2025	3.24	0.36	3.60
2026	3.29	0.36	3.65
2027	3.35	0.37	3.72
2028	3.41	0.38	3.79
2029	3.47	0.38	3.85
2030	3.52	0.39	3.91
2031	3.58	0.40	3.98
2032	3.64	0.40	4.04
2033	3.70	0.41	4.11
2034	3.75	0.41	4.16
2035	3.81	0.42	4.23

Exclusion per Committee Direction

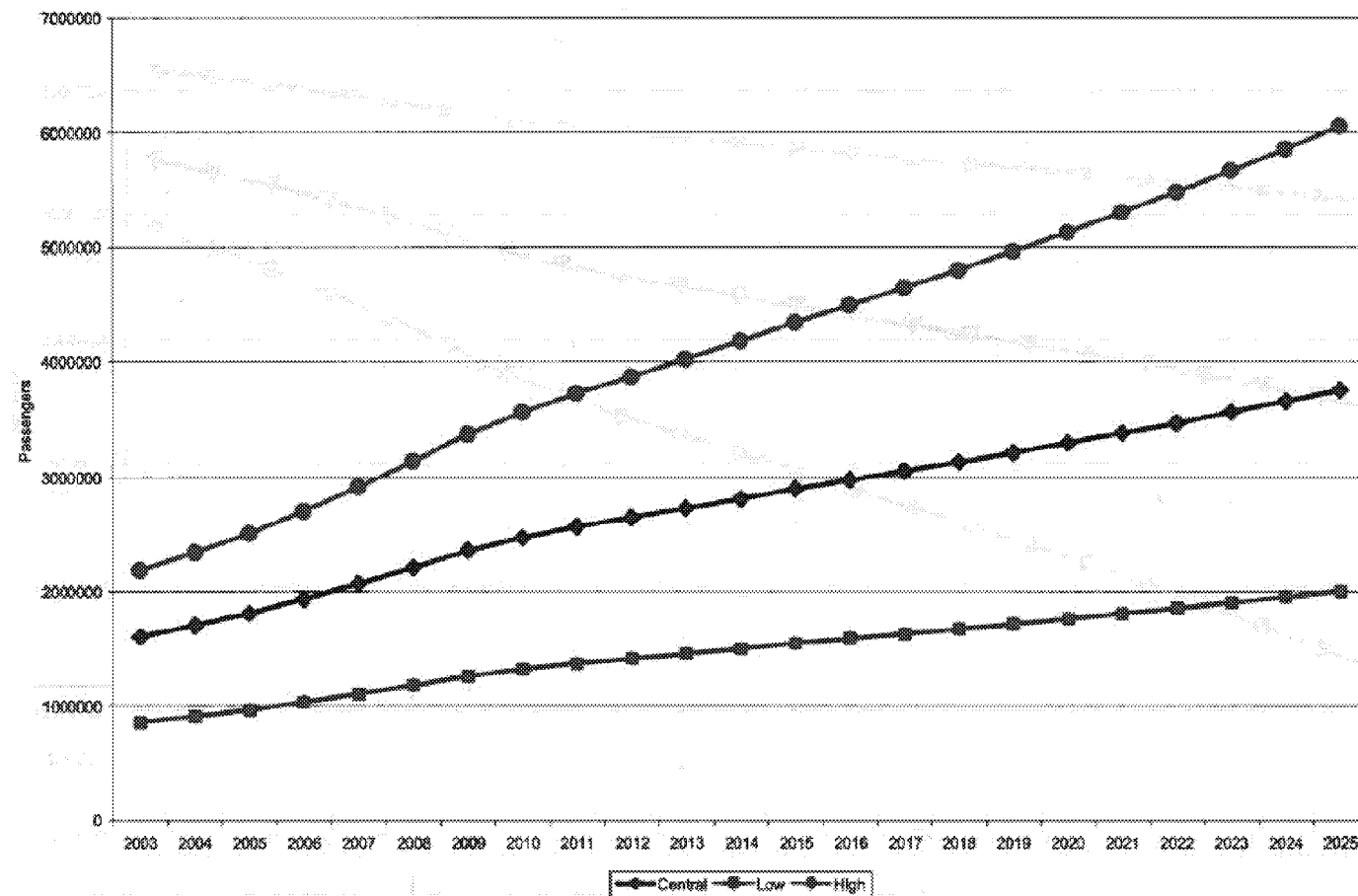
(Halcrow Group Ltd, Consult Ltd) Page 51, Table 3.18

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Exclusion per Committee Direction

Appendix F

SDG 2004 Annual Passenger Forecasts with Low, Central and High Forecasts (Graph) (No Ramp-Up)



(Steer Davies Gleave)

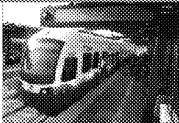
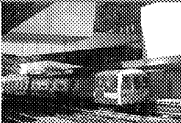
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Exclusion per Committee Direction

Appendix G

Jacobs Consultancy Rail Link Mode Shares

Air Rail Links – Mode Shares (%)

Airport	Heavy Rail - Dedicated	Heavy Rail - Other	Light Rail	Subway/Rapid Transit
				
North American airport rail links				
Atlanta	-	-	-	10
Baltimore/Washington	-	-	3	-
Boston	-	-	-	6
Chicago Midway	-	-	-	6
Chicago O'Hare	-	-	-	5
Cleveland	-	-	-	2
Minneapolis-Saint Paul	-	-	-	New service
New York JFK	-	8	-	-
New York LaGuardia	-	-	-	1
New York Newark	-	5	-	-
Oakland	-	-	-	9
Philadelphia	-	3	-	-
Portland	-	-	6	-
San Francisco	-	-	-	7
Seattle	-	-	-	New service
St. Louis	-	-	-	3
Vancouver	-	-	-	New service
Washington Dulles	-	-	-	1
Washington Reagan	-	-	-	13
Simple Average	-	5	5	6
Other airport rail links				
Amsterdam	-	35	-	-
Barcelona	10	-	-	-
Birmingham	-	11	-	-
Frankfurt	-	28	-	-
Hong Kong	-	-	-	23
Kuala Lumpur	17	-	-	-
London Gatwick	30	-	-	-
London Heathrow	10	-	-	16
London Stansted	25	-	-	-
Milan Malpensa	13	-	-	-
Moscow (3 airports)	19	-	-	-

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Munich	-	-	-	33
Oslo	36	7	-	-
Paris Orly	-	-	-	13
Stockholm Arlanda	19	-	-	-
Sydney	4	-	-	-
Tokyo Narita	41	-	-	-
Vienna	20	-	-	-
Simple Average	20	20	-	21

(Jacobs Consultancy)

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Ridership And Revenue Forecasts

TABLE 7.1 BLUE22 SENSITIVITY TESTS

Test	2012 Patronage	Difference from Central Case	2022 Patronage	Difference from Central Case
Airport passenger growth minus 1% per year growth	2.42m	-8%	2.89m	-17%
Airport passenger growth plus 1% per year growth	2.89m	+8%	4.17m	+20%
Full SARS and 9/11 recovery by 2006	2.65m	0%	3.47m	0%
No SARS and 9/11 recovery	2.20m	-17%	2.89m	-17%
Business travellers 28.4% of total	2.56m	-3%	3.36m	-3%
Business travellers 45.2% of total	2.69m	+2%	3.53m	+2%
City Airport constrained to 200,000 pax	2.67m	+1%	3.51m	+1%
City Airport maximum 1,000,000 pax	2.62m	-1%	3.45m	-1%
Value of Time plus 15%	2.59m	-2%	3.41m	-2%
Value of Time minus 15%	2.72m	+3%	3.57m	+3%
Access time parameter Increased to *2.5	2.25m	-15%	2.98m	-15%
Access time parameter reduced to *1.5	3.02m	+14%	3.96m	+14%
Headway parameter increased to *3.0 Business and *1.5 Leisure	2.09m	-21%	2.76m	-21%
Headway parameter reduced to *1.0 Business and *1.0 Leisure	3.17m	+20%	4.14m	+19%
Constants 10 minutes more	2.14m	-19%	2.82m	-19%
Constants 10 minutes less	3.19m	+21%	4.18m	+20%
Airport parking costs reduced by 20%	2.62m	-1%	3.44m	-1%
Airport parking costs increased by 20%	2.68m	+1%	3.52m	+1%
Taxi charges reduced by 20%	2.38m	-10%	3.12m	-10%
Taxi charges increased by 20%	2.87m	+8%	3.76m	+8%
Congestion does not worsen over time	2.53m	-4%	3.32m	-4%
Congestion worsens twice as fast as assumed	2.77m	+4%	3.63m	+4%

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