

Toronto Airport Rail Link

Comparator rail links and other services

DRAFT Technical note - for discussion

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Comparator rail links and other services

About Pearson Airport

- 1.5 Lester B. Pearson International Airport (LBPIA) is located in the City of Mississauga and serves the population of Toronto and the Greater Toronto and Hamilton Area (GTHA). In 2010, 33 million passengers travelled through LBPIA. By 2031 this is forecast to reach 52 million¹. The airport is located 22.5 kilometres from downtown Toronto.

Our base case forecasts

- 1.6 **Exclusion per Committee Direction** During the first three years of operation we have assumed that passenger numbers will “ramp-up”:
I Year One: 65% , Year Two: 80%, Year Three: 90%, Year Four: 100%
- 1.7 This period represents the time lag required for passengers to change their existing behaviour and to learn about the new airport rail link. The ramp-up values and period of time have been selected based on professional judgement, using a broad range of rail schemes that we have worked on over the past 30 years.
- 1.8 Table 1.1 presents our base case forecasts of passengers, both with and without ramp-up assumptions. The market share shown is of the **in-scope market** which includes: those travelling to/from in-scope areas in Toronto and whom are not in transit between flights, during the hours of operation of the rail link, and currently using modes of travel from which they might reasonably transfer.

TABLE 1.1 BASE CASE FORECASTS Exclusion per Committee Direction

	2015	2016	2017	2018	2019	2020
LBPIA passengers (millions, including transfers)	36.5	37.3	38.2	39.1	40.0	40.8
In-Scope demand (millions)	10.7	10.9	11.1	11.3	11.6	11.8
Forecast passengers (millions, no ramp-up)	2.1	2.9	2.9	3.0	3.0	3.1
Market share (in-scope no ramp-up)	19.6%	26.6%	26.1%	26.5%	25.9%	26.3%
Average daily passengers (no ramp-up)	8,122	8,285	8,453	8,623	8,797	8,974
Ramp-up profile	65%	80%	90%	100%	100%	100%
Forecast passengers (millions, with ramp-up)	1.4	2.3	2.6	3.0	3.0	3.1

Source: Steer Davies Gleave

- 1.9 The ARL share amongst the **total market** of those travelling to or from the airport by all modes, at all times and from all directions, is equivalent to 10.3%.

¹ Source: Steer Davies Gleave forecast of air passengers, validated against GTAA forecasts

Comparator rail links and other services

2.4 The TARL service corresponds well with published statistics for other air-rail links both in North America and across the world. With 36.5 million passengers forecast to use Pearson in 2015 and a steady-state market share of around 10%, Toronto is forecast to perform similarly to international examples:

- I Sydney (Kingsford Smith) where a dedicated rail service runs every 10 minutes with a travel time of 13 minutes for a one way fare of between AUS \$15 and \$16, (broadly equivalent to CAD \$) depending on whether travel is from the domestic or International terminal²
- I Kuala Lumpur, where an express non-stop service to downtown takes 28 minutes, runs every 20 minutes for a fare of RM 35.00, which is equivalent to CAD \$11.30³.

2.5 And in North America to:

- I Seattle: where a light rail service runs between the airport and downtown every 10 minutes at a relatively low adult fare of USD \$2.75 one way⁴.
- I Orlando: where transit options are primarily local and shuttle buses⁵.

Market share and distance to downtown

2.6 There is some relationship between market share and distance to downtown, but the key issue is whether demand is focussed on the downtown area served by rail or dispersed over a wider geographical area.

International comparison

2.7 Figure 2.2 illustrates this, where the size of the 'bubble' indicates the relative volume of airport passengers. The red bubbles are London airports which clearly shows the relationship between market share and distance.

2.8 The following observations can be drawn:

- I Market share tends to be lower for airports closest to downtown areas where taxi provides a reasonably cost-effective alternative to transit.
- I Comparing Oslo and Stockholm, which are similar distances, the impact of higher fares on the Arlanda Express in Stockholm is quite clear in the market shares. This system is operated by a concession that sets fares to maximise profit.
- I Oslo and Narita airports both have high shares as they capitalise on well-defined markets and long-distance (but direct connection) to city centre transit networks.

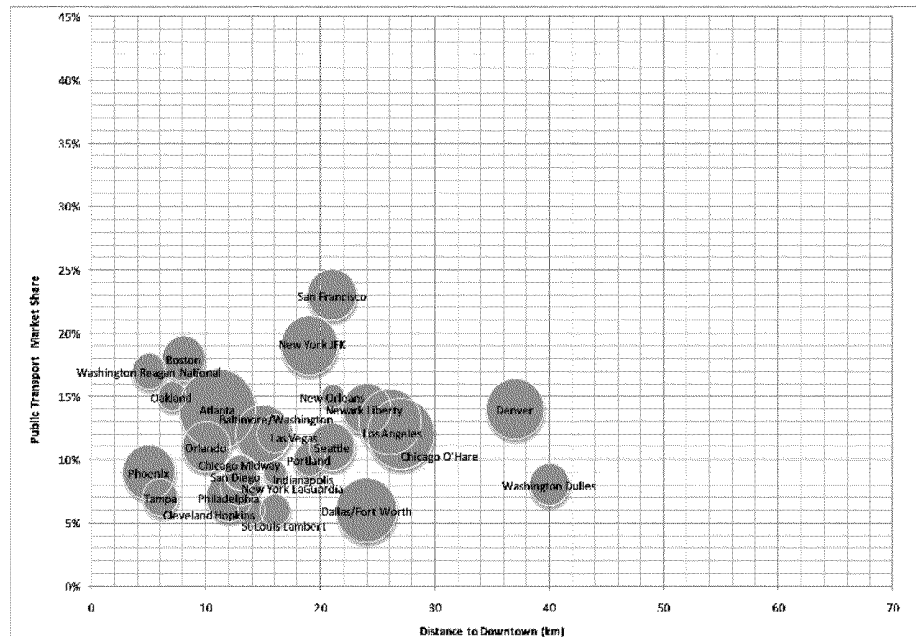
² <http://www.sydneyairport.com.au/go/by-train.aspx>

³ http://www.klia.com.my/index.php?option=com_content&view=article&id=15

⁴ <http://www.portseattle.org/Sea-Tac/Parking-and-Transportation/Ground-Transportation/Pages/Public-Transit.aspx>

⁵ <http://www.orlandoairports.net/gt.htm>

FIGURE 2.3 DISTANCE FROM DOWNTOWN AND 'RAIL' SHARE: USA



Source: Steer Davies Gleave analysis

Market share and travel time

- 2.12 The door-to-door travel time of the fixed rail link is an important factor in ensuring competitiveness with car and taxi. However directness of service and connectivity cannot be ignored.
- 2.13 Rail links that connect into a fully-integrated rail system attract a wider catchment area / market. Whereas journeys requiring multi-modal connections to reach the final destination (i.e. bus-rail or rail-bus) become a much less attractive option, given the increased uncertainty of connection / wait time.
- 2.14 In particular:
- I JFK in New York the highest public transport mode share of all US airports (Rail 8%, Bus 11%) however it suffers from lack of a direct service to downtown, low frequency and stopping services and a dispersed airport layout.
 - I Zurich has an exceptionally high modal share given the downtown and airport rail stations both act as hubs for onward travel both nationally and internationally.
 - I In Hong Kong, the cheaper MTR service from Tung Chung station (reached via free shuttle bus) captures only 3% market share compared to the 25% for the Airport Express. Tellingly, the slower but more direct bus services capture 35% of the market share.
 - I In Paris, the relatively poor connectivity of Paris Orly to the regional rail system (via people mover / shuttle bus) may explain this gap in performance to Charles de Gaulle.

Comparator rail links and other services

- I Dedicated rail links of a similar type to TARL, which focus on airport passengers, rather than network or metro systems that are part of a wider city or national system;
 - I Links which have some competition, but not those where there are multiple choices or relatively free flowing road networks.
- 2.18 In each case we provide a summary of the airport profile, the ground transportation options and their relative market share and key metrics of the transport offer. We include:
- I London Gatwick
 - I Hong Kong
 - I Oslo Gardemoen
 - I Brussels
 - I Amsterdam
 - I Frankfurt
 - I Stockholm Arlanda
 - I Vienna
 - I New York JFK
 - I Chicago Midway
 - I Vancouver

London Gatwick

Airport Profile

- I Annual Passenger Volume (2008): 34 million - second busiest airport in UK
- I Offer: 280 inter-continental destinations, 102 airlines, large charter market
- I Distance to Downtown: 45km
- I Market: serves two catchments - 7.5m population of London and 5-10m of the UK's most affluent area of SE England

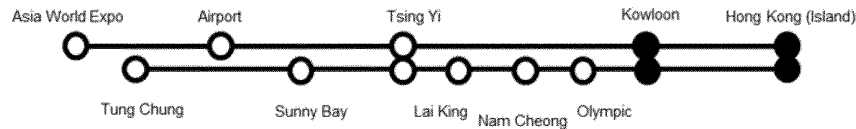
Ground Transportation

- I **Rail (20% share):** dedicated 4 trains per hour (tph) "Gatwick Express" to London Victoria and West End (30 mins), and other mainline rail services including 4 tph Thameslink services to London Bridge, King's Cross St Pancras and Luton Airport, and South Central services to south coast
- I **Car (54% share):** easy access to motorway network (M23) and London Orbital (M25) / peripheral road network suffers no significant congestion, car parks accessed by frequent bus shuttles
- I **Coach/Bus (14% share):** Scheduled national coach services to/from central London and coastal regions plus shuttle to/from Heathrow airport (100 service per day)
- I **Taxi (12% share):** many licensed operations offering fares from £25 to local destinations up to £75-£100 to central London

Comparator rail links and other services

- I **Taxi (37% share includes car):** to Hong Kong Island costs more than \$50 and takes 30 minutes, although can take longer in congested conditions. Taxis are colour-coded according to their operating areas.

Rail network



Transport offer to downtown: key metrics

TABLE 2.2 HONG KONG: COMPARISON METRICS

	Airport Express	MTR	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	12	12	10-20	-	-
Interchange required?	No	Yes	No	No	-
Journey time (mins)	24	40	40	30-40	40
Service quality	High	Good	Medium	Good	-
Access to terminal (mins)	05-10	05-10	10-15	10	5-20
Peak / off-peak fare (\$CAD)	15	10	6.5	50	-
Integrated ticketing?	Yes	No	No	No	No
Remote check-in?	Yes	No	No	No	No

Source: Steer Davies Gleave analysis

Oslo Gardemoen

Airport Profile

- I Annual Passenger Volume (2008): 19 million is Norway's largest airport
- I Offer: 90 international (5 inter-continental) and 24 regional destinations, 40 airlines
- I Distance to Downtown: 48km
- I Market: catchment of 2.5 million, over 70% of which is concentrated along the airport-city corridor (incl 48% for Oslo)

Ground Transportation

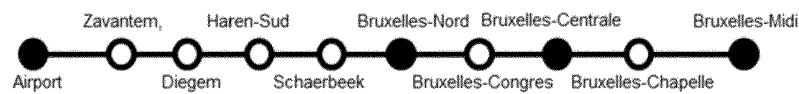
- I **Rail (39% share):** the Oslo Airport Express (Flytoget) has a competitive advantage over other modes given the distance to downtown Oslo, offer journey times of only 19 minutes with a frequency of 6 tph to Oslo (3 of which continue beyond to Asker). Norwegian State Railways (NSB) also operate services to the airport on the Kongsberg-Eidsvoll line.

Comparator rail links and other services

and Liège. In 2000 the original station was replaced by a new three-platform terminus, fully integrated with the new air terminal above.

- I **Car (74% share includes taxi):** the airport is situated just off the R0 highway and offers secure, but very expensive, parking facilities with about 2,500 spaces. Parking must be reserved in advanced and is accessed via free shuttle bus.
- I **Coach/Bus (10% share):** A large bus station is located on the ground floor, from which “Airport Express” buses operate to Brussels, and other Belgian, Dutch and French cities
- I **Taxi (74% shares includes car):** not competitive with rail given that it takes about the same amount of time at a much higher cost.

Rail network



Transport offer to downtown: key metrics

TABLE 2.4 BRUSSELS: COMPARISON METRICS

	Rail Link	Other Rail	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	15	-	15	-	-
Interchange required?	No	-	No	No	No
Journey time (mins)	20	-	30	20	20
Service quality	Good	-	Medium	Medium	-
Access to terminal (mins)	10		5	05-10	05-10
Peak / off-peak fare (\$CAD)	7	-	5	45	-
Integrated ticketing?	No	-	No	No	No
Remote check-in?	No	-	No	No	No

Source: Steer Davies Gleave analysis

Amsterdam

Airport Profile

- I Annual Passenger Volume (2008): 47 million, Europe's fourth largest airport
- I Offer: 220 international destinations, 80 airlines
- I Distance to Downtown: 19 km sits within the Randstad (ring city) and serves centres of Den Haag and Rotterdam
- I Market: serves a very wide geographic feeder area with many important rail connections made at the airport

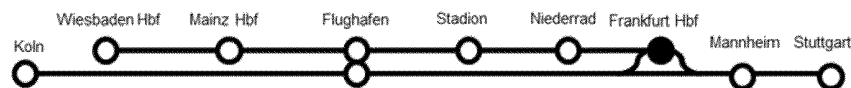
Comparator rail links and other services

- I Distance to Downtown: 9 km
- I Market: has the largest airport catchment area in Europe with some 38 million inhabitants within a 200 km radius

Ground Transportation

- I **Rail (15% share dedicated rail, 12% other):** the airport is served by two separate rail services. Intercity high speed trains between Frankfurt-Koln-Stuttgart stop at the airport while S-Bahn services to Frankfurt, Mainz, Wiesbaden, Darmstadt are substantially cheaper, and can be used for free to /from the airport with a valid air ticket. Mode share on intercity service is slightly higher.
- I **Car (67% share includes taxi):** takes 20-30 minutes to get to Frankfurt Central Station or the city centre, with multi-level car parks throughout the airport. Car represents 31% mode share of “other” while rental car accounts for a further 5%.
- I **Coach/Bus (6% share):** many local bus routes serve the airport, with Lufthansa regional bus service to Heidelberg, Mannheim, and Talheim.
- I **Taxi (67% share includes car):** represents 21% mode share of “other”.

Rail network



Transport offer to downtown: key metrics

TABLE 2.6 FRANKFURT: COMPARISON METRICS

	Intercity (ICE)	S-Bahn	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	10-15	10-15	20 - 30	-	-
Interchange required?	No	No	No	No	No
Journey time (mins)	11	11	30	20-30	30
Service quality	High	Good	Medium	Good	-
Access to terminal (mins)	5-15	5-15	5-15	5-15	15
Peak / off-peak fare (\$CAD)	15	5	2-5	30-40	-
Integrated ticketing?	Yes	Yes	No	No	No
Remote check-in?	No	No	No	No	No

Source: Steer Davies Gleave analysis

Comparator rail links and other services

	Arlanda Express	State Railways	Coach / Bus	Taxi	Car
Remote check-in?	No	No	No	No	No

Source: Steer Davies Gleave analysis

Vienna

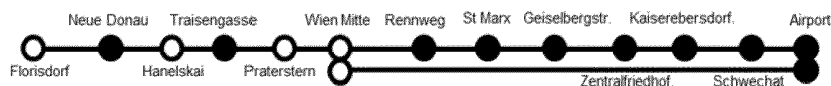
Airport Profile

- I Annual Passenger Volume (2008): 20 million, busiest airport in Austria
- I Offer: 4 inter-continental (North America) and 80 international destinations, 75 airlines
- I Distance to Downtown: 18 km south east of Vienna near town of Schwechat
- I Market: Vienna is Austria's primary city with a population of 1.7 million

Ground Transportation

- I **Rail (14% share dedicated rail, 16% other):** A dedicated City Airport Train "CAT" service offers non-stop connections to the airport in under 16 minutes as well as commuter S-Bahn services. In the downtown train station, Wien Mitte, there are dedicated airport facilities including remote check-in and at the airport there are dedicated platforms for Express and Commuter services.
- I **Car (59% share includes taxi):** the airport can be reached in less than 25 minutes in uncongested conditions and the central car park is also fully integrated within the terminal buildings.
- I **Coach/Bus (11% share):** Postbus runs services to the main downtown transport hubs, including Schwedenplatz (20 mins), UNO-City (20 mins) Südbahnhof (25 mins) and Westbahnhof (35 mins). A luxury bus service operates to Bratislava and Budapest.
- I **Taxi (59% share includes car):** a number of limousine and taxi services operate.

Rail network



Transport offer to downtown: key metrics

TABLE 2.8 VIENNA: COMPARISON METRICS

	CAT	S-Bahn	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	30	30	30	-	-
Interchange required?	No	No	No	No	No
Journey time (mins)	16	24	30	25	25
Service quality	Good	Medium	Medium	Good	-

Comparator rail links and other services

Transport offer to downtown: key metrics

TABLE 2.9 NEW YORK JFK: COMPARISON METRICS

	A-line	LIRR	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	10-20	10-20	20 / 30	-	-
Interchange required?	Yes	Yes	No	No	No
Journey time (mins)	60	60	60	60	60
Service quality	Medium	Medium	Good	Good	-
Access to terminal (mins)	10-15	10-15	10-15	10-15	05-10
Peak / off-peak fare (\$CAD)	8	20	15	45	-
Integrated ticketing?	No	No	No	No	No
Remote check-in?	No	No	No	No	No

Source: Steer Davies Gleave analysis

Chicago Midway

Airport Profile

- I Annual Passenger Volume (2008): 17 million, second largest airport in Illinois after O'Hare
- I Offer: 60 North American destinations, 10 airlines, dominated by low cost carriers including Southwest Airlines
- I Distance to Downtown: 13 km south of Chicago
- I Market: Population of 2.8 million in the Chicago metropolitan area

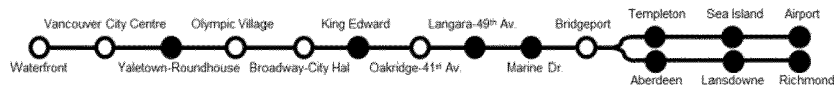
Ground Transportation

- I **Rail (5% share):** Is one of only a handful of North American airports with a direct rail connection. The terminal building is the terminal station on Chicago Transport Authority's Orange Line station, running into downtown Chicago and the Loop in 25 mins. It captures on 6% mode share, poor compared to JFK, which has 8% mode share despite no direct link.
- I **Car (91% share includes taxi):** downtown can be reached in as little as 19 minutes depending on prevailing traffic conditions.
- I **Coach/Bus (4% share):** the rail station also acts as a hub for CTA bus services to surrounding areas number of bus companies operate regional services to Iowa, Wisconsin, and around Illinois, while Continental Airport Express provides door-to-door hotel shuttles.
- I **Taxi (91% share includes car):** although easier to reach than O'Hare, fares can double during rush hour with all taxis running on meters.

Comparator rail links and other services

- I **Taxi (90% includes all non-rail modes):** offers a quick and easy alternative and is particularly competitive to rail service for groups of three or more. The approximate current fare to downtown Vancouver is between \$30 - \$32 (taxes included)⁸.

Rail network



Transport offer to downtown: key metrics

TABLE 2.11 VANCOUVER: COMPARISON METRICS

	Rail Link	Other Rail	Coach / Bus	Taxi	Car
Peak / off-peak Interval (mins)	04-06	-	06-08	-	-
Interchange required?	No	-	Yes	No	No
Journey time (mins)	26	-	40	20	30
Service quality	Good	-	-	Good	-
Access to terminal (mins)	05-10	-	15	05-10	10
Peak / off-peak fare (\$CAD)	9	-	3.75	30	-
Integrated ticketing?	Yes	-	No	No	No
Remote check-in?	Yes	-	No	No	No

Source: Steer Davies Gleave analysis

Ramp-up evidence (limited)

- 2.19 In the sections below we provide further detailed information about a selection of services for which we have been able to source ramp-up information or early year passenger numbers. These examples have been selected largely due to availability of data in the public domain.

Canada Line, Vancouver, Canada

- 2.20 As noted earlier in the sections above, the Canada Line opened in August 2009, in advance of the Winter Olympic Games. It forms part of Translink's SkyTrain metro service serving Vancouver and Vancouver Airport.
- 2.21 In a publically available document (http://www.translinkcommission.org/KPMG_Report.pdf) dated July 2008 it is noted that forecasts produced by PWC for the system were:

⁸ <http://www.yvr.ca/en/getting-to-from-yvr/taxis.aspx>

Comparator rail links and other services

- 2.28 In 2002, Halcrow established the following ramp-up profile for TARL based on the passenger build up on Heathrow Express:

- I Year one: 60%
- I Year two: 90%
- I All subsequent years: 100%

Other services

- 2.29 There are very few comparable airport link services with passenger information in the public domain. For this reason we cite ramp-up periods which have been observed on a number of high speed rail services around the world. Although not directly equivalent to airport links, these demonstrate the range of ramp-up values that have been observed in practice. We also note that advice produced for the American high speed rail alliance, a common ramp-up period is between three and five years¹². Furthermore in research published by the Transport Cooperative Research Programme (TCRP)¹³ ramp-up assumptions are noted to be typically based on rule of thumb or professional judgement.

High speed services

- 2.30 Demand ramp-up on a number of European services has been published in the documentation produced for the proposed Californian (CA) high speed rail service, available at:

<http://www.cahighspeedrail.ca.gov/assets/0/152/302/321/739f2a3b-1d66-4c59-9e2e-3541581dbcdb.pdf>

TABLE 2.12 EUROPEAN HIGH SPEED SERVICES

Service	Country	Ramp-up period
Madrid-Seville	Spain	2 years
TGV	France	3 - 4 years
Thalys system	France/Germany/Netherlands/Belgium	6 years

Source: California High Speed Rail study

- 2.31 Based on this information the ramp-up profile which has been assumed for the CA system is fairly long:

- I Year one: 40%
- I Year two: 55%
- I Year three: 70%
- I Year four: 85%
- I Year five: 100%

¹² Source: <http://americanhsra.org/wp-content/uploads/2011/07/Ridership-Shortfall-Guarantee.pdf>

¹³ [Onlinepubs.trb.org/onlinepubs/tcrp/tcrp_syn_66.pdf](http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_syn_66.pdf)

Comparator rail links and other services

interchanging trips an express link would compare less favourably when taking into consideration waiting times for onward connections.

- I Hong Kong and Stockholm: high service quality but market share is depressed by high prices compared to cheaper (and more direct) bus services.
- I Düsseldorf: the airport serves a widely dispersed region of smaller cities clustered together - Köln, Aachen, Essen, Leverkusen, Mönchengladbach, Duisburg - and so the dedicated link to Düsseldorf serves only a relatively small proportion of the 18 million people who live within 65 miles of the airport.
- I Shanghai: extremely fast travel time but the service is poorly used because it does not reach downtown - in this case the speed advantage does not compensate for the necessary transfer onto the metro system.

- 3.6 The adoption of a high quality, dedicated airport-to-downtown rail service is not necessarily the optimal solution in each case.

Ramp-up evidence

- 3.7 Where ramp-up assumptions are available in the public domain (actual or assumed) a wide range of values have been observed. The assumptions however that have been adopted in our forecasts are reasonably consistent with what was assumed on the Canada Line in Vancouver, which in turn was based on the profile observed at London Heathrow.

CONTROL SHEET

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