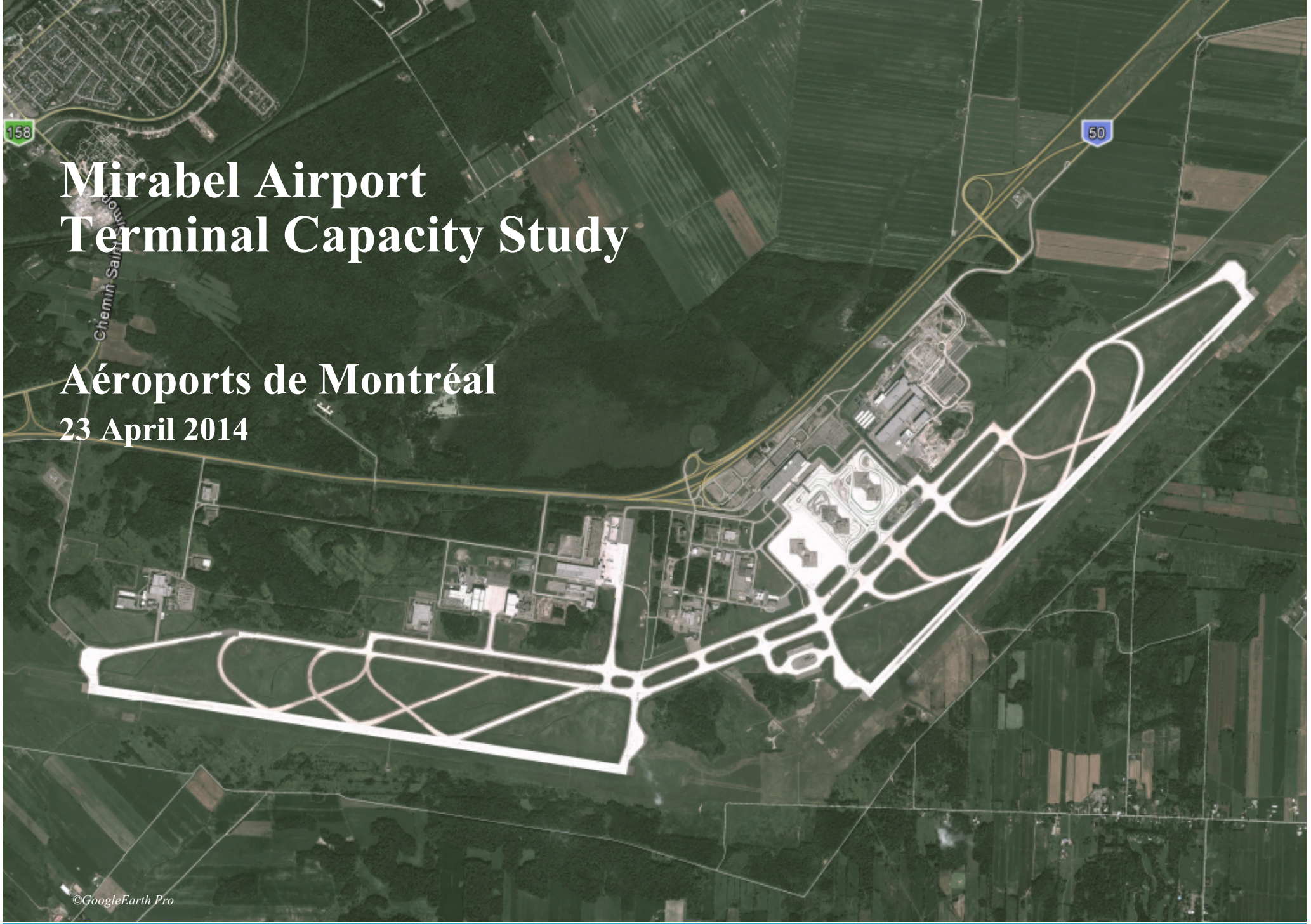


Mirabel Airport
Terminal Capacity Study

Aéroports de Montréal

23 April 2014

ARUP

Contents

- Executive Summary
- Introduction
- Airside Capacity
- Landside Capacity
- Terminal Capacity
- Future Airport Development
- Conclusions

ARUP

Executive Summary

Purpose of Study

It is currently costing Aéroports de Montréal (ADM) over $3 million per year to maintain the Mirabel terminal building and many efforts to find alternative uses have been unsuccessful.

The purpose of this study is to evaluate whether the existing Mirabel terminal and annexes (aeroquay and parking structure) are still suitable to accommodate current trends in passenger processing and commercial facilities and can handle the level and mix of traffic of a major Canadian international airport, or if they should be qualified as obsolete for airport related activities.

This study is focused on airport capacity and planning issues. A separate study is looking at the scope and costs related to the building systems, current codes, security standards and other technical issues.

Findings

It is clear from this analysis that the existing Mirabel terminal does not have the capacity to handle the traffic levels of a major Canadian international airport such as Montreal-Trudeau International Airport.

Airside: In its current configuration with only 24 gates (of which 18 are accessible by Passenger Transfer Vehicles (PTV's), the apron would require major expansion and reconfiguration to handle at least 50 additional gates, the majority of which should be accessible by passenger boarding bridges.

Landside: The parking structure and surface lots would need to more than double in size and there is limited space in the terminal area which could necessitate shuttle bus operations.

Terminal: All of the terminal processing facilities and concession areas would need significant expansion and/or reconfiguration to handle a 3-sector traffic demand. For example, to provide US Preclearance facilities alone would require a 50% expansion of the Departures Level. The constraints of the existing facility make it difficult - or very expensive - to achieve the optimum layouts needed to provide a competitive level of service for passengers and to maximize the commercial opportunities required in a major Canadian international airport. This, combined with the need to upgrade the major building systems, would make it more economical to build new.

Long term development: Recent studies of Montreal-Trudeau International Airport have demonstrated that it can continue to handle traffic growth for many years to come, so the Mirabel facility requirements at that time will be more extensive than indicated above.

Conclusion

Based on the above, the existing terminal building and its aeroquay and parking structure are not suitable to serve as a major Canadian international airport and, therefore, *from an airport capacity and planning standpoint*, these facilities can be qualified as obsolete.

Introduction

The Mirabel terminal building was opened in 1975 and operated as a primarily international facility until 1997 when international flights were transferred back to Dorval (now Montreal-Trudeau International Airport) and 2004 when it was finally closed for charter traffic.

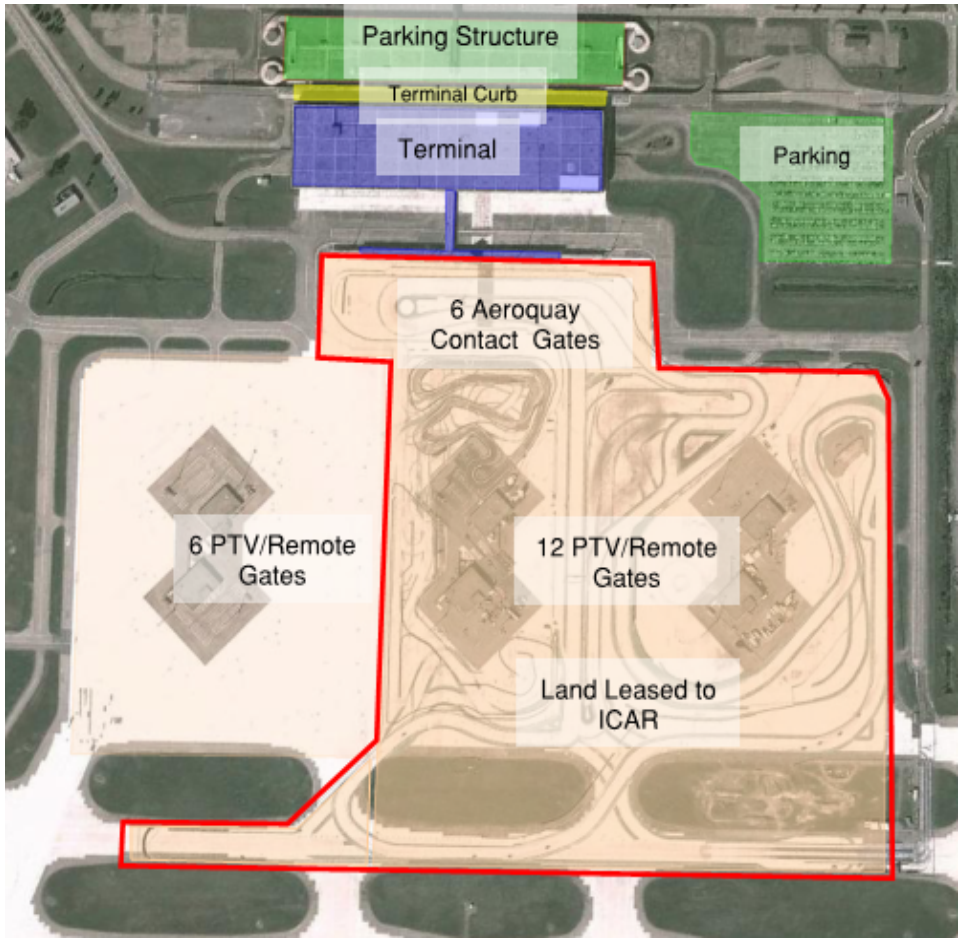
It is currently costing Aéroports de Montréal (ADM) over $3 million per year to maintain the terminal building and many efforts to find alternative uses have been unsuccessful.

Arup has been mandated by ADM to evaluate whether the existing Mirabel terminal and its annexes (aeroquay and parking structure) are still adapted to respond to current trends in key passenger processing activities and commercial facilities in order to handle the current level and mix of traffic of a major Canadian international airport, or if they should be qualified as obsolete for airport related activities. The capacity of airside and landside facilities will also be considered when performing this evaluation.

A separate study is looking at the scope and costs related to the building systems, current codes, security standards and other technical issues.

ARUP

Airside Capacity



©GoogleEarth

No. of Gates	YMX	YUL 2016
Contact/Bridged	6*	62
Remote	18*	11-16**
Total	**24***	**73-78**
* 18 gates are leased to ICAR		
** Depending on aircraft size		

The Mirabel design was based on a Passenger Transfer Vehicle (PTV) type of operation similar to the one pioneered at Washington-Dulles and, to a lesser extent, at several other airports.

This type of operation has proven to be inefficient due to the long boarding/de-boarding process, early check-in close out times, longer connection times, high equipment and operational costs, as well as from a passenger level of service standpoint.

Although many airports rely on a bussing operation to remote stands to deal with peak traffic conditions, most airports strive to serve the majority of their passengers on stands equipped with passenger boarding bridges..*

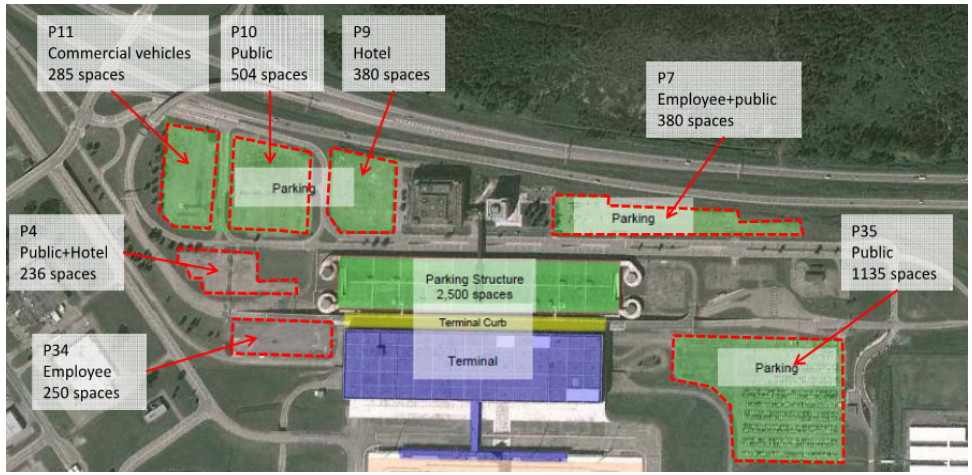
There are only 24 gates in the YMX terminal area of which 6 on the aeroquay had boarding bridges. Of the total, 18 have been leased until 2032 for ICAR racing.

In addition, the apron is planned for a power-in/power-out operation which eliminates the need for push-back manoeuvers, but takes up a great deal of space. ***In order to accommodate the current demand, the apron would need a major expansion and re-configuration into a pier or satellite concept*** with a power-in/push-back operation.

*. * The 2004 IATA Airport Development Reference Manual recommends that 90-95% of annual passengers be served via passenger boarding bridges (PBBs).*

ARUP

Landside Capacity



©GoogleEarth

Landside Plan

Terminal Curb Length Comparison

Airport	2013 mppa	# of Levels	Curb Length (m)	m/mppa	Notes
Mirabel	**14.1**	**3**	**1050**	**74.5**	mppa based on YUL traffic
Montreal-Trudeau	14.1	2	1213	86.0	
Toronto Terminal 1	22.0	3	1735	78.9	including the Service Level
Toronto Terminal 3	11.0	2	1580	143.6	
Vancouver	18.0	2	1600	88.9	
Calgary	14.3	2	1250	87.4	excluding the new Terminal
Edmonton	7.0	2	990	141.4	
Ottawa	4.6	2	840	182.6	

Car Parking

Parking Spaces	YMX*	YUL
Parking Structure	2,410	5,553
Surface Parking	3107*	7,447
Total Parking	**5,580**	**13,000**

* includes hotel & admin spaces

Terminal Curb

The existing terminal curb is about 350m long on three levels for a total length of 1050m. Although this is a reasonable length compared to other airports, the 3 level curb does require additional level changes via moving ramps which may be challenging for passengers with baggage.

Parking

YMX currently has a total of about **5,580** car parking spaces in the terminal area, of which 2,410 are in structured parking and others are surface parking for public as well as the hotel and administration building.

By comparison, **YUL** has over **13,000** spaces including 5,553 in the parking structure (including 500 rental car spaces).

It is not clear whether the existing YMX structure can be expanded upwards or whether a new structure would have to be built to the east. In any case, it is questionable whether it is worth expanding parking in this area if the long term terminal development should be located elsewhere on the site. (Refer to Future Airport Development on page 12).

ARUP

Terminal Capacity – Area Summaries

Total Terminal Area

Facility	YMX	YUL
Total Area (m2)	84,600	281,749
m2/mppa	6,000	19,982

As indicated in the chart above, the total area of the YMX terminal is less than 1/3 the size of YUL. The area per million passengers per annum (mppa) is also far lower than benchmarks for similar terminals. YMX was not designed for the level and type of traffic currently serving YUL. For instance, it does not include facilities for transborder passengers which requires separate security, Customs Border Protection (CBP) facilities and segregated holdrooms and outbound baggage devices.

In addition, YMX was planned with minimal domestic facilities and has no segregation of arriving and departing international passengers in the Aeroquay. One of the advantages of a PTV type of terminal is its inherent space efficiency due to the lack of long piers.

Although the terminal could be expanded***, the scope of work to reconfigure and upgrade it would be very extensive, and it is likely to be more economical to build new.*** Any future investment should take into consideration, the longer term master plan for the airport. (Refer to page12).

Concession Area

Facility	YMX	YUL
Concession Area	3,500	8,574
Concession Area/mppa	248	608

The YMX concession area is very low compared with current standards. Although it would be possible to provide additional area on the mezzanine, it is only accessible from the non-secure zone. Current standards are to have the majority of concession space on the secure side and easily accessible to the passenger flow in order to make them more convenient for passengers and able to generate greater revenue. Duty Free space is particularly critical and YMX has only 225m2 compared to 1,586m2 at YUL. There would be significant costs and challenges to reconfigure the retail area to achieve an appropriate post-security layout.

YMX Mezzanine

ARUP

Terminal Capacity - Departures

Check-in Facilities

Facility	YMX	YUL
DOM/INT Check-in	120	187
TB Check-in	0	58

YMX has 35% fewer domestic/international counters than YUL and no provision for transborder check-in. In addition, the spacing between the check-in islands is 18m compared to over 25m at YUL and Toronto. This leaves inadequate room for installation of self-service kiosks which are critical to current check-in processes. Most of the counters are not fitted with induction baggage belts which are now common in Canadian airports for health and safety reasons. In any case, the check-in area would have to be reconfigured to facilitate the latest processes for self-service bag tagging and bag drop.

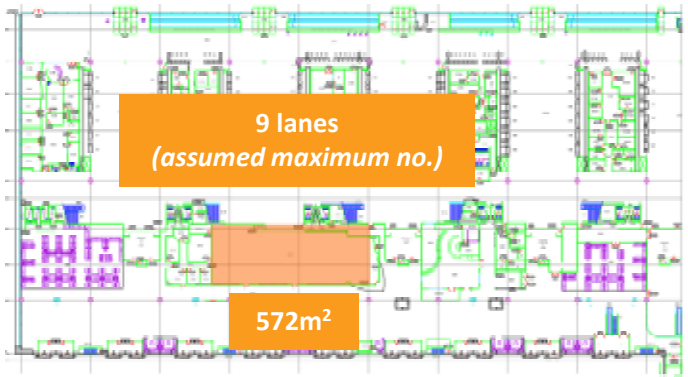
Departures

Security Facilities

Facility	YMX	YUL
DOM/INT Security	9	22
TB Security	0	12

There are several critical deficiencies in the YMX security facilities. First of all, the space provided for pre-board screening is only wide enough for 9 lanes based on current CATSA standards. In addition, the depth is only 12m compared to 20m at YUL. To achieve the recommended depth, the security lanes would have to extend into the already constrained holdroom. The space for queuing is also very restricted.

A separate study should address issues of the primary security line (such as the openings between the mezzanine and holdroom area) and access control.



Departures

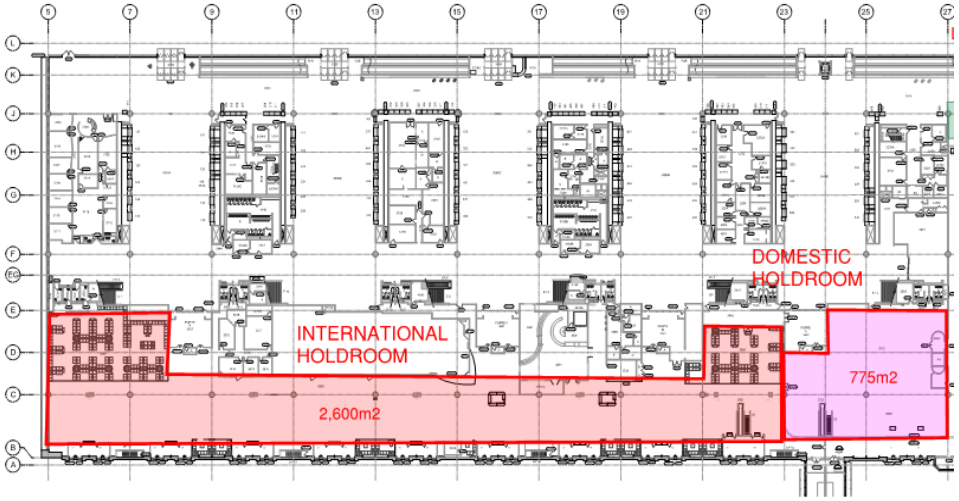
ARUP

Terminal Capacity - Departures

Holdrooms

The YMX holdroom area is very small since it was only designed to handle up to 18 international flights. In addition, there are very few amenities such as concessions and airline lounges. This implies that the original planning concept for YMX was for passengers to circulate up to the mezzanine where they would wait in the seating and concession area until shortly before their flight is called. This was a time when the pre-board screening process was at least four times faster than today.

The total international holdroom is about 2,600m2 of which only 1,500m2 is available for seating once an allowance for circulation is deducted. In order to handle the current number of active stands, as well as appropriate amenities, a significant expansion is required.

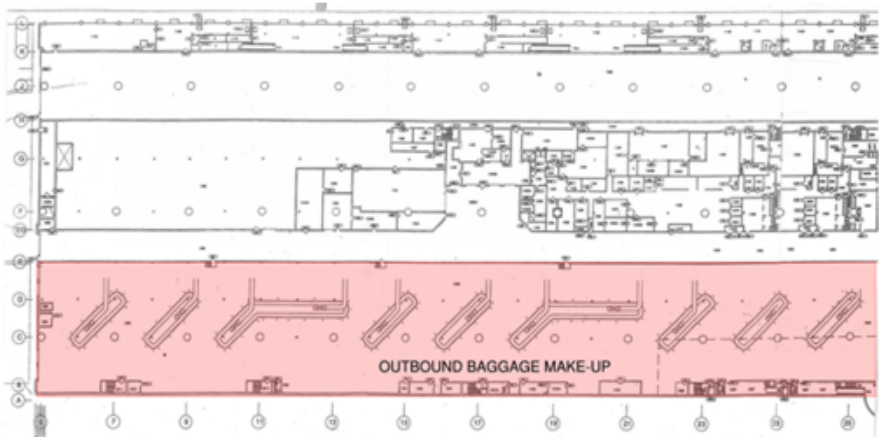


Outbound Baggage Facilities

Facility	YMX	YUL	Notes
DOM/INT O-B Baggage	5,700m2	10,740m2	YUL excl. sortation
TB O-B Baggage	n/a	6,200m2	YUL excl. sortation

The existing YMX outbound baggage system consists of 7 x 40m devices and 2 x 72m devices which are adequate for the check-in counters they support. However this is less than half the capacity of the YUL domestic/international system. In addition, the YUL has a transborder system of chutes which - along with the sortation and early bag storage area - is about 8,500m2.

In order to comply with current CATSA security standards, a new 3-Level Hold Baggage Screening system would have to be installed. Since this area has a double height space, it should be possible to install this system above the existing devices.



ARUP

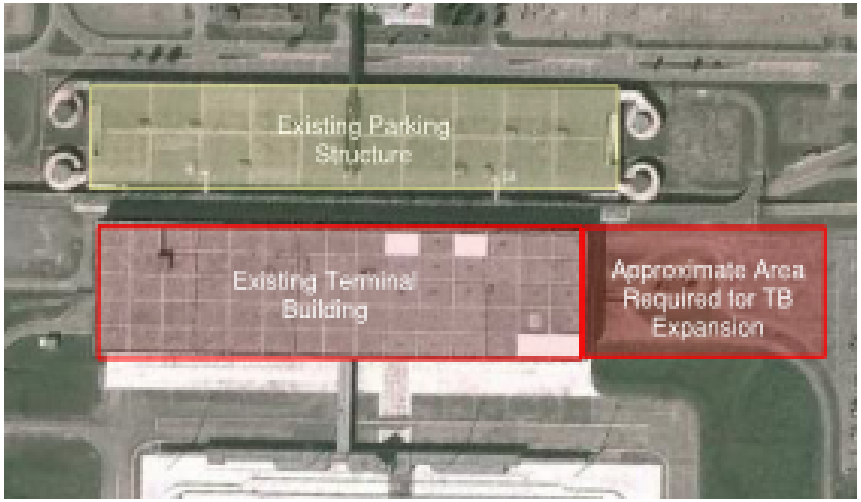
Terminal Capacity - Departures

. **Transborder Facilities**

Transborder traffic represents a sizeable proportion of Montreal's total annual traffic and is important for connections to domestic and international flights. The transborder facilities occupy a significant area at YUL with approximately 13,000m2 on Departures Level for 58 check-in counters, bag drop, 12 security lanes and a CBP facility with 28 inspection counters (with a capacity of 1400 pax/hr), plus 8,500m2 on Arrivals Level for outbound baggage sortation and loading area.

There is currently no provision for transborder traffic at YMX, so the Departures Level would have to be expanded by at least 50% to match current YUL capacity, plus additional area for baggage systems and segregated holdrooms..

YUL Transborder Departures



©GoogleEarth

YMX Site Plan showing extent of TB expansion

ARUP

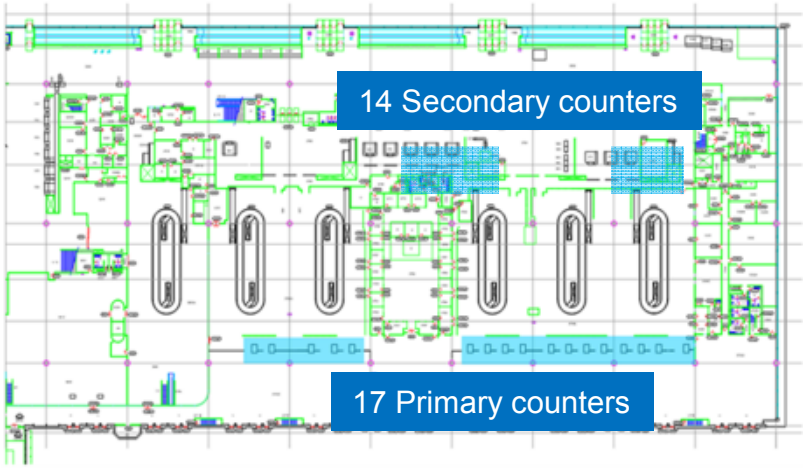
Terminal Capacity - Arrivals

Canadian Border Services Agency (CBSA)

Facility	YMX	YUL
Primary Counters	17	26
Secondary Counters	14	36

Although it would be possible to add additional Primary counters, the queuing depth is only 15m compared to the recommended 30m at YUL, YYZ and YVR. Similarly, for Secondary counters, there is room for several more positions, but again the queuing depth is inadequate.

In addition, CBSA will require considerably more support space to meet the forecast demand. Therefore, significant modifications and expansion of these facilities is required.

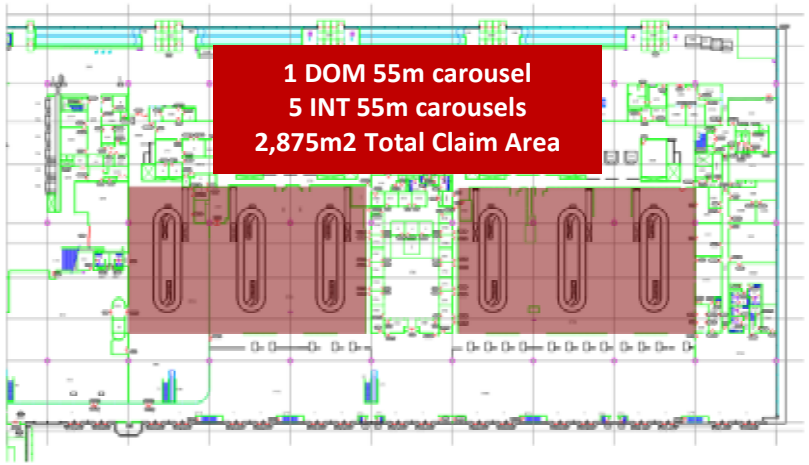


Arrivals

Baggage Reclaim Facilities

Facility	YMX	YUL
DOM Bag Claim Length	1 @ 55 = 55m	66 + 54 + 80 = 200m
TB/INT Bag Claim Length	5 @ 55 = 255m	4 @ 100 + 3 @ 90 = 670m
DOM Bag Claim Area	595m2	1,800m2
TB/INT Bag Claim Area	2,280m2	11,840m2

As shown above, YMX has about 1/3 the baggage claim presentation length as YUL and 20% of the claim area. In addition, the length of the YMX carousels is adequate for Code C and D aircraft, but is insufficient to handle the loads of current Code E and F international aircraft. A major expansion would be required to accommodate the additional and larger devices.



Arrivals

ARUP

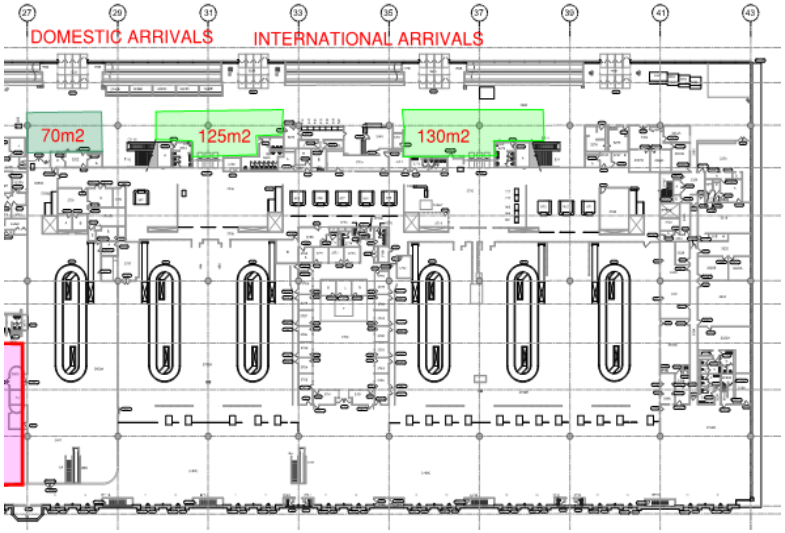
Terminal Capacity - Arrivals

Arrivals Hall Facilities

Facility	YMX	YUL
INT Arrivals Hall	255m2	1050m2
DOM Arrivals Hall	70m2	300m2

The Arrivals Concourse in YMX is quite narrow and restricts the space for international greeters to two small areas which are a fraction of the YUL area. The same issue applies to the domestic greeters area.

The original design may have expected greeters to stay on the mezzanine until they saw their passengers arriving in the bag claim area. Current CBSA standards, however, restrict visibility into their areas. Again, expansion is recommended.



Arrivals

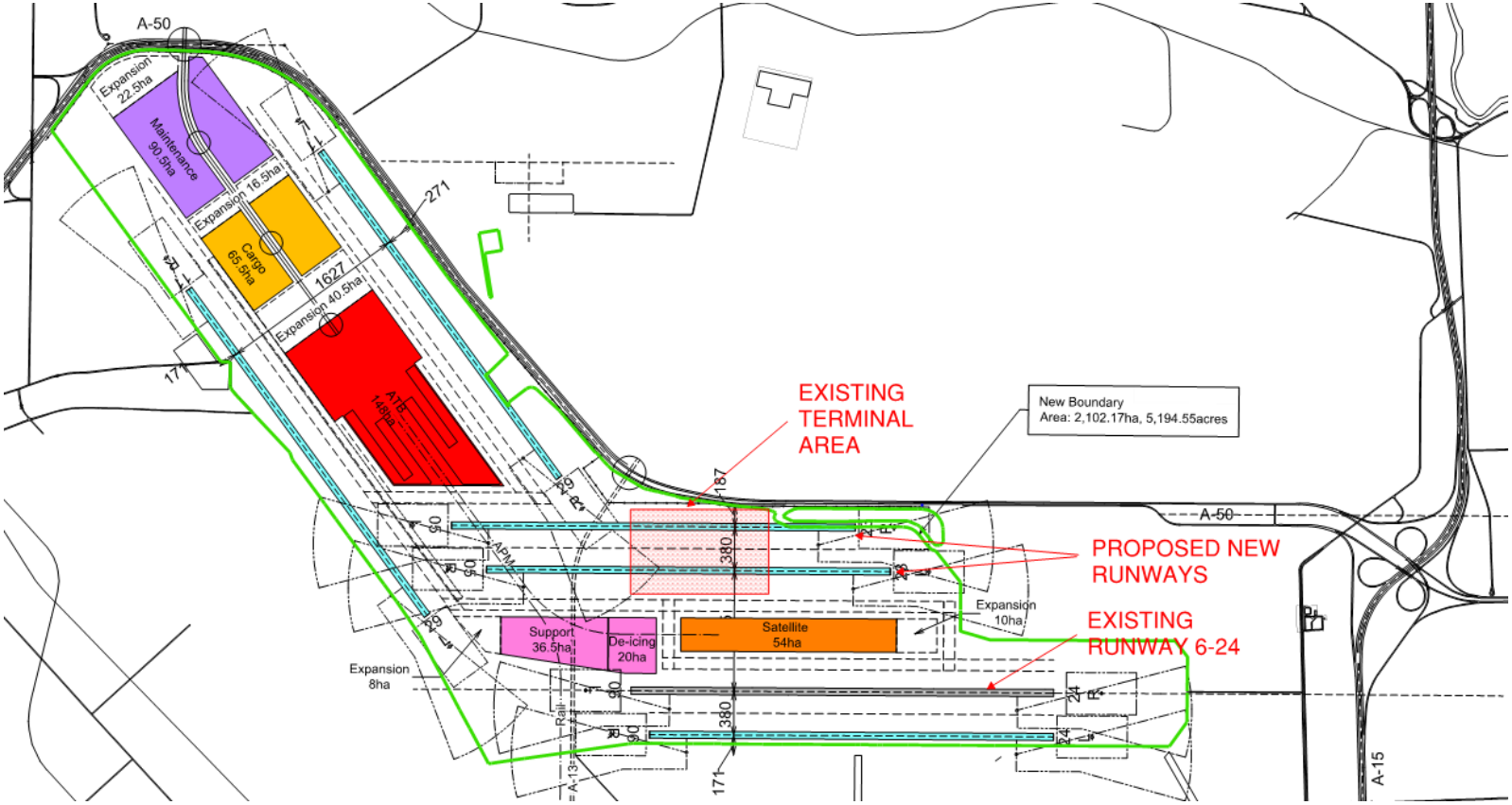
ARUP

Future Airport Development

Any significant investment in the existing terminal area must take into consideration the potential long-term development of Mirabel Airport.

Several recent studies have looked at how YMX can be developed to maximize its capacity within the new boundaries. The drawing below shows one possible layout.

In order to handle long-term demand, a 3 to 4 parallel runway configuration is needed in the 06-24 direction. This will require the eventual relocation of the existing facilities south of the A-50 for future runway development. There are a number of options for accommodating the new terminal and support facilities elsewhere on the site.



ARUP

Conclusions

It is clear from this analysis that the existing YMX terminal does not have the capacity to handle the traffic levels of a major Canadian international airport such as YUL.

Airside: Expand & reconfigure apron to accommodate at least 50 additional gates with at least 90% accessible by boarding bridges.

Landside: More that double the number of structured and surface parking spaces.

Terminal: All terminal processing facilities and concession areas would need significant expansion/reconfiguration to handle a 3-sector traffic demand. The constraints of the existing facility make it difficult or very expensive to achieve the optimum layouts needed to provide a competitive level of service and to maximize commercial opportunities required in a major Canadian international airport. This, combined with the need to upgrade the major building systems, would make it more economical to build new.

Long-term Development: Recent studies have demonstrated that YUL can continue to handle traffic growth for many years to come, so the YMX facility requirements at that time will be more extensive than indicated above. In addition, it is likely that the existing terminal area will be needed for future runway development, so substantial investment in this area is highly questionable.

Based on the above, the existing terminal building and its aeroquay and structured parking are not suitable to serve a major Canadian international airport and, therefore, *from an airport capacity and planning standpoint*, these facilities can be qualified as obsolete.

ARUP