Greater Vancouver Gateway Council
Lower Mainland Air Cargo Study

- Final Report -

Vancouver, August 31, 2010

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This report is based on information provided by the Greater Vancouver Gateway Council, its respective advisers and representatives, and selected third parties. It is limited in scope and content by the nature and quality of such information and the time available for the analysis. IATA Consulting has undertaken limited independent investigation of the factual or substantive accuracy or validity of such information. IATA Consulting makes no representations, warranties or other assurances, express or implied, about the accuracy of the information contained herein.

The analysis and conclusions contained herein are based on many things, including certain assumptions and the analysis of information available at the time this report was prepared. The estimates, assumptions and findings underlying the recommendations are inherently subject to significant economic and competitive uncertainties and contingencies, many of which are beyond the control of the Greater Vancouver Gateway Council. IATA Consulting makes no representations, warranties or other assurances, express or implied, that any such conclusions will be realized.

IATA Consulting has undertaken the preparation of this report and the analysis contained herein pursuant to IATA Consulting's agreement for consulting services dated May 13, 2009 between IATA and the Greater Vancouver Gateway Council.

This report is provided exclusively for the information of the senior management and key stakeholders of the Greater Vancouver Gateway Council and its representatives. Neither this report nor any information contained herein may be disclosed or furnished (in whole or in part) to any other person or entity, or quoted or referred to (in whole or in part) in any document or communication without IATA's prior consent. Nothing may be inferred beyond the matters expressly stated in this report. This report is provided as of the date hereof and IATA Consulting undertakes no, and disclaims any, obligation to advise the Greater Vancouver Gateway Council of any change in any information set forth herein occurring after the date hereof.

2. Acknowledgement

This report summarizes the analysis and findings of a study focusing on Lower Mainland Air Cargo Development for the Greater Vancouver Gateway Council. The Greater Vancouver Gateway Council is an organization comprised of senior executives from industry and government who are concerned about maintaining the position and function of Greater Vancouver as a commercial gateway for North America.

Major guidance for this project was provided through the tireless efforts of an advisory group, which worked with the consultant team to help maintain the study direction. This advisory group was led by Bob Wilds (Greater Vancouver Gateway Council); with Raymond Segat (Vancouver International Airport Authority); Trevor Todd, Naina Sloan and Caroline Chapdelaine (all from the Western Economic Diversification Canada); David Bachynski (BC Ministry of Transportation); Joe Fardell and Parm Sidhu (Abbotsford International Airport); Brian Mills (TransLink); and Mimi Sukhdeo (Transport Canada).

The study was carried out by staff of IATA Consulting. The staff benefited from substantial data provided by the Vancouver International Airport Authority, Abbotsford International Airport, BC Ministry of Transportation, BC Stats, Transport Canada and Statistics Canada, as well as internal information available to IATA through its PaxIS, AirportIS and Cargo IS databases. Any errors or omissions in the data collection, analysis, presentation and/or interpretation of findings are solely the responsibility of the consultant team.

3. General findings

3.1 Introduction

This Management Summary (the Summary) is intended to build toward a cargo strategy for the international airports of Vancouver (YVR) and Abbotsford (YXX) located in the Lower Mainland (the Region) of British Columbia (BC). The Management Summary emphasizes the opportunities identified in the Lower Mainland Gateway Study (the Study) completed by IATA Consulting for the Greater Vancouver Gateway Society. The Society previously sponsored studies of seaports, rail and trucking, so the current study completes the study of the Region's modal capabilities and strategies. Primary messages of the report are included in the management summary but it does not attempt to summarize that entire document. Details of the study are only available to the Funding Parties.

3.2 Elements of the Air Cargo Industry

Air cargo is transported on passenger aircraft (belly cargo) and on freighters. Freighters are operated by all-cargo airlines, as well as by combination carriers operating both passenger and freighter aircraft. Integrated carriers (integrators) operate freighter aircraft and proprietary trucking fleets to provide door-to-door service. In the Study, the term "all-cargo airline" applies to non-integrators operating only freighters to provide only airport-to-airport service. ACMI (aircraft, crew, maintenance and insurance) carriers use their own aircraft to operate scheduled flights on behalf of other carriers and occasionally freight forwarders. Detailed descriptions are given in the Study's "Analysis of the Structure and Present State of the Air Cargo Aviation Industry in the Region."

Table MS-1: Types of Carriers Presently Serving YVR

(all types are represented, but not all carriers)

Integrated Carriers	Passenger (Belly) Carriers	
DHL	Air Canada	KLM
FedEx Express	Air China*	Korean Air*
Purolator	American Airlines	Lufthansa*
UPS	British Airways	Northwest
All-Cargo Airlines	China Airlines*	Philippine Airlines
Cargojet	Continental Airlines	Scandinavian Airlines
Combination Carriers	EVA Air*	United Airlines
Cathay Pacific Airways	Japan Airlines	WestJet Airlines

** operates only passenger service to YVR, but freighters elsewhere*

As shown in **Table MS-1**, all-cargo flights at YVR are operated by Cargojet, Cathay Pacific, DHL, FedEx, Purolator and UPS. Belly capacity is offered by a large number of passenger carriers, including five (Air China, China Airlines, EVA Air, Korean Air and Lufthansa) that operate freighters at other airports in western North America.

Major integrators FedEx and UPS ranked #1 and #2 in international freight tonnes flown in 2008. FedEx operates its western region hub at Oakland International Airport (OAK) and UPS at Ontario International Airport (ONT) inland of Los Angeles. Both integrators operate limited transpacific service from these regional hubs but rely on Anchorage International Airport (ANC) as their transpacific gateways. DHL abandoned the US domestic market in January 2009 but is still active in the Canadian domestic market and internationally. Besides operating aircraft, all three international integrators purchase capacity from commercial carriers.

Canada's largest courier company, Purolator, does not rank globally due to its almost entirely Canadian network. Canada's Cargojet operates Canada's largest fleet of all-cargo aircraft to provide critical capacity for DHL Express Canada and UPS Canada, as well as for German forwarder Schenker, which is the "sister company" of BAX Global. Cargojet is an important interlining partner for international carriers serving Canada.

Critical domestic belly capacity is provided by Canadian passenger carriers Air Canada and WestJet Airlines, which give interlining partners and freight forwarders critical intra-Canada frequencies and destinations. Non-North American international belly carriers include Air China, British Airways, China Airlines, EVA Air, Japan Airlines, KLM, Korean Air, Lufthansa, Philippine Airlines and Scandinavian Airlines (SAS). US belly carriers include American Airlines, Continental Airlines, Delta/Northwest and United Airlines.

Combination carriers dominate in Asia and Europe, extracting economies of scale from the combined cargo capacity of freighter and passenger aircraft. Since Air Canada eliminated its freighters in June 2008, Hong Kong-based Cathay Pacific is YVR's sole combination carrier, with three weekly freighter flights to Hong Kong (five during cherry season). Commenting on Air Canada's decision to abandon freighters, Klaus Moller, Lufthansa Cargo Vice President for the Americas, stated[1], "We see potential in the (Canadian) market, especially after the withdrawal of

[1] "Canada – Blue Skies Attract Emirates," by Ian Putzger, *Air Cargo World,* October 2008

Air Canada." Moller added that forwarders have supported Lufthansa's freighter service recently introduced in Toronto.

Cargo carriers depend heavily on freight forwarders to function as consolidators and retailers of their capacity. Forwarders build volume by collecting smaller shipments from shippers and negotiating rates with carriers based on higher volumes achieved by consolidating multiple shippers' cargo. Belly cargo carriers may rely entirely on forwarders to act as sales forces rather than have their own staff on-site. Including integrators, freight forwarders control about 76% of international shipments.

None of the top 14 forwarders are headquartered in Canada but rather in the US, Europe and Asia. Much of the balance of the top 25 is comprised of Canadian firms. Vancouver is more of a regional market, with local and national forwarders playing a much more substantial role than at other gateways – particularly in niche cargo. Perishables International Transport, at #15 the highest-ranked Canadian forwarder, specializes in the handling and transportation of fresh and frozen perishable goods, as does YVR-based Flying Fresh Air Freight. British Columbia-headquartered Locher Evers International is a leader in the sea-air segment, also served by Sea Air International Forwarders. Vancouver-based Maple Freight has traditionally focused on trade with the Far East, as has Transpacific Customs Brokers.

Among other critical allied services, ground handling includes warehouse operations (storage, buildup and breakdown of containers/pallets), but may also include aircraft unloading and loading (ramp operations) and transport between the ramp and warehouse. Fulfillment of documentation requirements is also performed for many clients. Cargo handling companies at YVR include Air Cargo Handling Service, A.E.S. Warehouse and Distribution, Hutchison Cargo Terminal Inc., Isaac Freight Ltd., Mega Int'l Freight Services Ltd., Menzies Aviation, Swissport and WestPoint Terminal Inc. Carriers may also be self handled or handled by other carriers.

Operating as both an essential complement and as a substitute, trucking is vitally important to the air cargo industry. 'Cartage' usually represents pick-up and delivery of un-palletized/un-crated cargo between the airport and the local service area. Alternatively, over-the-road (OTR) trucks may haul consignments hundreds of kilometers to support international consolidations. Road Feeder Service (RFS) between BC and SEA is limited. The motivation to truck from BC to SEA is primarily driven by the occasional need to access wide body all-cargo flights to Europe only at SEA. Alternatively, shipments are customarily trucked to YVR from south of the border to take advantage of cheaper rates for transpacific belly capacity available at YVR.

Rising fuel costs magnified the cost advantage of ground transport, such that from 2005 to 2007, the number of truck-flight routes increased 9.0% and frequency of truck flights increased 34%. Belly cargo capacity lost due to the shift from larger to smaller aircraft, as well as frequencies during the recent economic downturn, was largely replaced by RFS that provided comparable service to flights. However, as time windows shrink and/or line-haul distance increases, trucks lose their competitiveness.

The Study includes detailed analyses of trucking networks and service areas as well as border crossing and road infrastructure applicable to the Lower Mainland. The results show that neither border crossings nor road infrastructure are a hindrance to support increases of cargo shipments.

3.3 Recent Cargo Experience & Competing Airports[2]

BC's airports do not operate in a vacuum, but rather are affected by economic conditions beyond the airfield. Local demand has a direct functional relationship with output and consumption tied to area manufacturing and agriculture, as well as to the demands of end consumers. The Study includes detailed analysis of the industrial profile of BC and the extended service area beyond. As an international gateway, YVR is also affected by macroeconomic conditions on both sides of the Pacific and less so of the Atlantic. YVR faces competition from other airports both for local distribution and gateway operations. Perhaps more importantly, YVR competes with US western region airports for the limited capacity transpacific carriers can dedicate to that service.

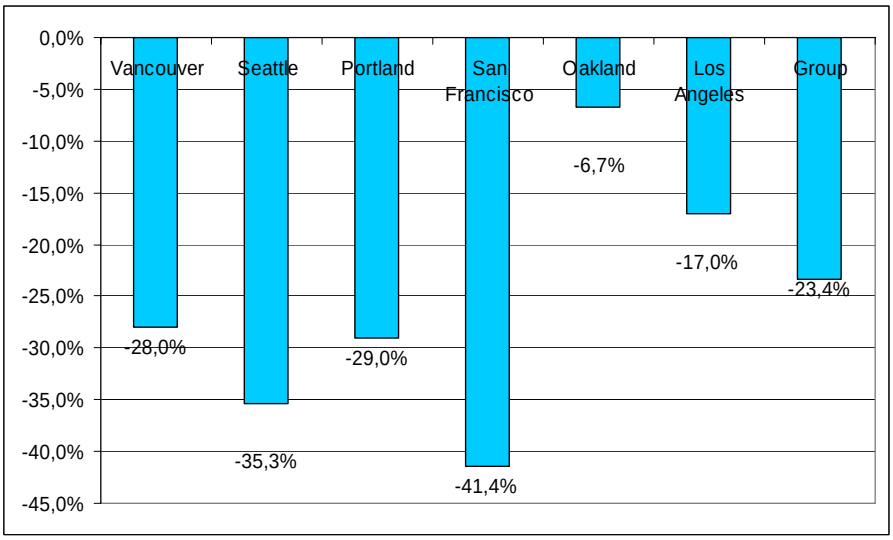
Competing gateways within 250 miles include Seattle-Tacoma International Airport (SEA) and Portland International Airport (PDX). San Francisco International Airport (SFO) is about 800 miles away and further still Los Angeles International Airport (LAX), North America's dominant West Coast gateway. YVR can also be combined with other gateways to build volume on relatively weak westbound segments ("triangulation"). As previously described, YVR also competes with cheaper, high frequency Road Feeder Service to other gateways. Expanding freighter operations at YVR may depend on reversing that pattern, using YVR as the air gateway for markets used to complement (feed) local demand in the Vancouver area.

[2] This section emphasized YVR as the only BC airport with sufficient existing operations for comparison purposes.

YVR competes to only a limited degree against Canadian airports such as Calgary for dedicated capacity, limited either by aviation regulations or commercial concerns. According to Airports Council International, YVR finished calendar year 2008 ranked #28 in North America in total cargo (freight, express and mail). The only Canadian airport ranked higher, at #15, was Toronto. YVR does not compete in any real sense against other Canadian airports; it is Canada's transpacific gateway and best strategic option to access the economic engine of the next 20 years – Asia.

As revealed in Figure MS-1, YVR's substantial cargo losses between 1999 and 2008 were typical of North America's western region airports. YVR's loss of 28% was less than its most immediate competitors, Seattle-Tacoma (-35.3%), Portland (-29.0%) and especially San Francisco (-41.4%). Like YVR, these three airports were more dependent on international belly capacity than FedEx regional hub Oakland (-6.7%) and Los Angeles (-17.0%), which offers an extensive mix of wide body passenger and freighter aircraft.

Table MS-1: North American West Coast Airports, Total Cargo: 1999-2008



Source: Airports Council International – North America

SEA's international freight accounts for 34% of its total freight; of this, Europe accounts for 53% and Asia 47%. SEA has gained international service and freight largely at PDX's expense, with both Korean Air and Lufthansa pulling air service from PDX to focus on SEA. SEA also has freighters from European all-cargo airlines Cargolux and Martinair. Operating freighters between SEA and Asia are EVA Air and Taiwan-based China Airlines. SEA has lost China-based Great

Wall Airlines and China Cargo Airlines. SEA has belly service to Europe from British Airways, Air France and Icelandic Air. Pure belly service is also offered by Asiana Airlines. International service is also offered by US belly carriers Delta/Northwest and United Airlines. PDX is largely a domestic integrator market with international accounting for less than 6% of its annual tonnage. Air China has a small cargo presence, but PDX has not reversed the losses of Korean Air and Lufthansa despite waiving landing fees and offering subsidies. As **Table MS-2** demonstrates, international service at YVR compares favorably to PDX. While its international passenger service is superior to SEA, its freighter service is inferior. Service at LAX is included mostly for potential triangulation possibilities to add stops at YVR on LAX flights, while SFO's tenant base may offer other opportunities.

Table MS-2: International Freighter & Wide Body Passenger Service

	YVR	YYC	SEA	PDX	SFO	LAX
Air China	P			F	P/F	P/F
Asiana		P/F	P		P/F	P/F
Cargolux		F	F			F
Cathay Pacific	P/F				P/F	P/F
China Airlines	P		F		P/F	P/F
China Cargo Airlines					F	F
EVA Air	P		F		P	P/F
Great Wall						F
Japan Airlines*	P				P	P
KLM	P	P			P	P
Korean Air	P	P/F	F		P/F	P/F
Lufthansa	P	P	F		P	P/F
Martinair			F			F
Nippon Cargo Airlines*					F	F
Qantas					P	P/F
Shanghai Airlines Cargo						F
Singapore Airlines					P	P/F

P = Passenger Only Service; F = Freighter Only Service; P/F = Both

3.4 Regulatory Liberalization

As they pursue international passenger flights (providing belly cargo capacity) and freighter flights, as well as technical stops (used for refueling, crew changes and catering), BC's airports may benefit in the future from policy initiatives and programs introduced by Canada's federal

regulators to at least "level the playing field" for Canadian markets competing against US gateways.

The Study's Analysis of the Political Environment and Regulatory Framework explores prevailing developments in deregulating the international air transportation industry and compares the regulatory approach of Canada with the US. The Summary's narrower emphasis is how Canada's regulatory reforms could support air cargo development at BC's airports.

Canada's "Blue Sky" International Air Policy (implemented in November 2006) takes a nuanced approach that seeks to liberalize air service agreements. Under the "Blue Sky" policy, Canada has concluded or signed liberalized air agreements with over 50 countries (27 of which are EU Member States), and totaling twenty-six (26) air services agreements to date:

- Nine (9) bilateral Open Skies-type agreements: US (signed in 2007 but negotiated in 2005), Ireland, Iceland, New Zealand, Barbados, the Dominican Republic, Costa Rica, El Salvador and South Korea;
- Eight (8) expanded bilateral agreements: Mexico, Japan,[3] Jordan, Singapore, the Philippines, Cuba and Morocco;
- Eight (8) new "first-time" bilateral agreements: Kuwait, Serbia, Croatia, Panama, Turkey, South Africa, Ethiopia and Tunisia; and,
- A comprehensive air transport agreement between Canada and the EU covering all 27 Member States, which effectively equates to 27 "open" bilateral air services agreements; this agreement is now applied administratively.

These agreements cover 84% of Canada's international traffic and to date, Canada has achieved an "open" agreement with a total of 35 countries, representing 72% of its international air traffic. While "Blue Sky" has irrefutably liberalized international air transport in Canada, the nine bilateral open-skies type agreements (as opposed to other expanded bilateral agreements) are far fewer than for the US, which has "open skies" agreements with 68 countries, including nearly all major markets of Asia and Europe.

An air service agreement signed on December 18, 2009 between the EU and Canada effectively allows European cargo airlines to operate from Canada to the US or another third country without restriction and eventually allows European carriers to operate cargo flights from points within Canada to any point in the Americas. Given YVR's geographic advantage as a

[3] Two separate sets of expanded rights were agreed upon during the January 2007 and April 2009 negotiations.

transpacific gateway, it is unfortunate that Asia is far less represented among countries with which Canada has concluded agreements, but Transport Canada observes that six countries among Canada's top 20 air transport markets have not currently expressed an interest in negotiating an Open Skies-type agreement. Prominent among these are several Asian countries that have historically been more restrictive.

As a complement to "Blue Sky," Canada extended the Air Cargo Transshipment Program (ACTP) to allow foreign air carriers to be authorized by the Canadian Transportation Agency (CTA) to carry international cargo shipments via approved Canadian airports from and destined to points outside Canada, when there are no rights provided in Canada's bilateral agreements.

Transit cargo may be stored in bond at approved Canadian airports pending transportation by air or another mode to its final destination. Where foreign carriers are permitted under bilateral air transport agreements or arrangements and authorized under a separate CTA license to carry Canadian O&D cargo, they may combine this activity on flights also involved in cargo transshipment activity. In addition, Canadian carriers are entitled to carry foreign-to-foreign cargo in bond separately or in combination with an existing authority to carry Canadian O&D cargo.

Transportation between Canada and the US may be operated by road-feeder service using an air waybill. Hence, an air carrier may use trucking for a portion of the routing between Canada and the US for goods ultimately moving between the US and Europe.

As Air Canada abandoned freighters, foreign carriers have increasingly added stops in Canada to supplement loads on freighters departing the US to Asia and Europe. In March 2009, Asiana began routing weekly B747-400F service through Halifax, en route from New York to Brussels and on to its Seoul hub. Asiana has allocated 40 tonnes of capacity to the Canadian market, primarily for seafood exports. Cathay Pacific does similarly at Vancouver with its freighters, as does Cargolux at Calgary.

Precisely what is so encouraging about "Blue Sky" is its potential to mitigate past market-constraining regulatory policies – both Canada's and its negotiating partners. Singapore Airlines has publicly stated that its ability to build the network volume required to sustain service to YVR was compromised when its requested expansion to seven weekly flights was rejected. The carrier had served YVR for almost 20 years when it suspended its three weekly flights through Seoul.

While its YVR operations were passenger-driven, Singapore Airlines Cargo is a global force and its freighter operations illuminate the role of deregulation in market development. SIA Cargo has been a beneficiary of the Singapore government's pursuit of liberalized cargo rights, using fifth and seventh freedom rights with the US extensively. Using seventh freedom rights, SIA Cargo has operated continuing flights from Chicago and Los Angeles onward to Brussels. Such flights require permission of both the US and EU (or any other destination). SIA has used fifth freedom rights in China, carrying cargo between a trio of Chinese markets to Los Angeles and Chicago. Similarly, all-cargo airline Cargolux considers fifth freedom rights essential to its network strategy. [4]

Table MS-3: List of Traffic Rights

Degree of freedom	Description
First or Transit Freedom:	The right to fly across another country without landing
Second Freedom:	The right to land in another country for purposes other than carrying passengers, e.g. re-fueling or maintenance
Third Freedom:	The right to land in a country other than the home country for the purpose of commercial services.
Fourth Freedom:	The right to fly from another country to the home country for the purpose of commercial services.
Fifth Freedom:	The right to carry passengers to one country, and then fly on to another country with the right to carry passengers and cargo from second country to the third country and from the third country to second country.
Sixth Freedom:	The right to carry traffic between two other countries via an airport in the home country.
Seventh Freedom:	The right to operate stand-alone services between two other countries.
Eighth Freedom:	The right to carry passengers and cargo within the borders of another country ("cabotage").

[4] The agreement Canada negotiated with Singapore in 2007 permits "any number of air carriers from either country to operate non-stop passenger and all-cargo scheduled air services as frequently as desired, between any city in Canada and Singapore". The agreement also includes substantial fifth freedom rights for all-cargo operations and fifth freedom points for passenger-combination service in the Asia-Pacific region.

Between the general market liberalization of the “Blue Sky” Policy and the Cargo Transshipment Program, the former is more likely to benefit BC in the near-term. Additional capacity provided by international passenger carriers using wide body aircraft better suits the current regional market. Intercontinental passenger carriers have indicated that passenger flights are rarely established on the basis of cargo potential, but cargo revenues may be the difference in profitability on thin operating margins.

Given the longer economic development horizon in the recruitment of demand-driving manufacturers and distributors, the Cargo Transshipment Program holds more medium- to long-term promise. Freighter operators are already taking advantage of freedom rights (detailed in the Study) to justify freighter stops in Canada that might not be reasonable without the substantial contribution of additional US stops. Therefore, the BC markets do not need to justify the entire payload requirement, but simply make sufficient contributions, as long as the carrier is already allowed by the bilateral terms. A strategic location and favorable regulatory environment have teamed to sustain freighter operations where local demand has been otherwise inadequate. Shippers pay a premium for air transport’s expediency, intending to minimize the delivery window and therefore minimizing one of the principal benefits (duty deferral) derived from Free Trade Zones (FTZ). Moreover, the liberal treatment of in-bond cargo under the Transshipment Program provides many additional benefits usually sought from the FTZ program.

3.5 Multimodalism

As previously noted, international freight forwarders control about 76% of international air cargo shipments. The Canadian market is dominated by non-Canadian forwarders but the YVR market is more Asia-focused than Canada, in general. It also has several local or national forwarders emphasizing transpacific trade, as well as the sea-air freight niche that has occasionally been unusually high in BC. While individual offices may concentrate on air or ocean freight, most international forwarders are multimodal and BC’s strengths across all modes largely establishes parity with US West Coast competitors and establishes YVR as Canada’s optimal solution to provide access to Asia.

For forwarders, BC’s multimodal offerings are of tremendous significance both in offering comprehensive transportation solutions to their shipper-customers and in giving forwarders revenue opportunities using all modes. By weight, air cargo tonnage barely rates against sea, truck and rail, so BC provides forwarders the opportunity to maximize their revenues regardless

of the composition of provincial trade. This is critical because – as detailed in the Study – BC's commodity production is dominated by natural resources and resource-based manufacturing that does not offer the value-weight proposition necessary to justify air transport. Consequently, forwarders supporting an air cargo-focused initiative at BC's airports would not necessarily have to depend on such revenues in the development phase. BC's multimodal capabilities are examined more intensively in the Study, as well as past studies commissioned by the Greater Vancouver Gateway Council.

BC's multimodal capabilities are also significant because of the rare opportunity for sea-air combinations that have been significant in YVR's past. Until around 2002, demand for sea-air cargo was driven by high air cargo rates on direct service routes between Asia and Europe. Sea-air transport served as a compromise between all-air and all-sea in terms of transfer times and rates. Compared to all-air service, the slower, yet less costly maritime part of the trip reduces overall costs at the expense of a longer transfer time. In earlier decades, strong demand elevated air cargo rates between Asia and Europe. However, air rates fell with demand during the prolonged economic crisis. More direct connections between Asia and Europe also became more competitive and available. Since this type of cargo is highly price sensitive, it is expected to recover as demand grows again and excess capacities decrease.

3.6 Facilities

Between 2000 and 2010, industry consolidation and widespread contraction of freighters due to record fuel prices and economic recessions eroded demand for on-airport cargo space. Greater productivity (throughput utilization) through use of third-party ground-handlers also contracted demand for cargo space.

YVR provides dedicated facilities for air cargo handling in two general locations: there is a cargo village with a total of 41,600 sq. meters of multi-tenant warehouse space and further warehouses on the southern side of the access road, as well as a single-tenant facility north of runway 26R, which is owned and operated by UPS. No dedicated cargo facilities are provided at YXX, but a forwarder is operating a 500-sq-meter in-bond facility at the airport.

YVR's cargo warehouse space is adequate for current demand, having accommodated much greater peak volumes in previous years. A shortage of freighter aircraft parking positions was previously cited, but positions have become available in front of the Air Canada cargo hangar.

YVR has at least as much warehouse capacity as it had prior to losing more than 20% of its throughput during the last 10 years – this should theoretically result in surplus capacity. YVR has a recognizable "cargo village" that currently imparts operational efficiencies lacking at other gateways, but which must be considered during potential relocation or redevelopment at YVR. Its closest major Canadian competitor – YYC – ranks relatively high in facilities, having developed its existing cargo terminals on a largely build-to-suit basis and already initiating improvements.

3.7 The Opportunities

In the context of all preceding – largely constituting the strengths, weaknesses and threats to air cargo development at BC's airports – the opportunities fall into two basic categories: 1) Passenger flights carrying belly cargo and 2) Freighters, including technical stops. Developing these is far from mutually exclusive, but rather may involve pursuing passenger and then freighter operations from the same carriers. In terms of results, however, the IATA consultants believe BC is likely to benefit first from expanded international passenger flights by expanding YVR's belly cargo capacity offerings, which ideally will nurture shipping patterns sufficiently to attract freighters.

3.7.1 Passenger Service (Belly Cargo)

As Canada's transpacific gateway with existing passenger service provided by six Asian-based carriers, YVR is likely to benefit from the liberalized regulatory environment created by Canada's "Blue Sky" Initiative. While that program is not specifically focused on air cargo, YVR's air cargo development will benefit from the additional cargo capacity offered by Asian wide body service. Although long-haul passenger flights are not likely to be driven by potential cargo volumes, carriers readily acknowledge that air cargo revenues often mean the difference between losing money and making a profit on routes with thin operating margins. Consequently, IATA Consulting recommends highlighting air cargo opportunities in all documents distributed to international investors.

For YVR, the benefits of the "belly cargo" emphasis are several. As the Study details, BC does not presently enjoy a competitive advantage in the commodity mix of industry currently based in the province. Moreover, North America already suffers a tremendous directional imbalance with heavier loads eastbound from Asia. Belly carriers transporting passengers on predominantly roundtrip flights are more able to endure cargo imbalances.

As noted earlier, freight forwarders control 76% of international shipments and greatly prefer gateways with the superior mixes of carriers, frequencies and destinations, and that offer both belly and freighter capacity. These elements provide the network connectivity that causes forwarders to favor one gateway. As was determined in the Road Feeder Services analysis, forwarders are already trucking cargo from Washington State to YVR to take advantage of lower freight rates offered by transpacific belly carriers, but this is occurring on only a limited basis.

Because YVR already has extensive transpacific passenger service, prospects for new service are limited. Heading the list would be Singapore Airlines, a carrier that already knows the market well. The carrier's previous decision to suspend service should not be considered a referendum on YVR as a market. Singapore is in the group of eight expanded bilateral agreements negotiated under the "Blue Sky" policy that unfortunately was not an "Open Skies-type" agreement.

3.7.2 Freighters

As previously observed, the BC industrial profile is not presently conducive to attracting extensive new freighter operations. Consequently, BC's airports will require greater gateway consolidations of transit cargo either trucked to/from other markets or interlined by air carriers until BC is able to expand its regional demand. While not limited to freighters, Canada's Air Cargo Transshipment Program could be particularly beneficial to extending the use of BC's airports as regional consolidation nodes, even for shipments originating or destined south of the national border.

YVR has resources to support freighters in the near- to mid-term. BC has comprehensive multimodal resources used by freight forwarders and – compared to other Canadian international gateways -- YVR has a more local base of forwarders potentially serving as allies in supporting new freighter service. Most obviously, YVR management should coordinate its efforts more closely with the sea-air specialists identified in the Study. Moreover, even in a liberalized environment, foreign cargo carriers cannot replicate the extensive Canadian domestic networks of a carrier like CargoJet, which has already demonstrated interest in advancing its international profile through interlining. Airport management and its allies in the trade development community should not only coordinate promotion of its multimodal resources with its seaport, but should also extend its cooperative marketing to include private freight

forwarders and potential interlining partners such as CargoJet and Air Canada, as well as RFS trucking companies in order to give foreign carriers as much confidence as possible.

Drawing from its current tenants that operate only passenger service at YVR but freighter service at other gateway airports in western North America, YVR should target initial efforts at potential expansions into freighters by Air China (operating freighters at PDX, LAX and SFO), China Airlines (freighters at SEA, LAX and SFO), EVA Air (freighters at SEA and LAX), Korean Air (freighters at Calgary, SEA, SFO and LAX) and Lufthansa (freighters at SEA and LAX). Given BC's origin and destination cargo demand, it is unlikely international carriers would be drawn to YVR as freighter-only operators. YVR's most promising approach is to have the airport added as an intermediate stop on existing service between North America and Asia, as is presently done by Cathay Pacific – which couples YVR freighter service with stops at SFO[5] to build westbound loads.

Not unrelated to the preceding strategy of promoting YVR as an intermediate stop for transpacific carriers already serving North America, both YVR and YXX offer potential as technical stops for long-range transpacific freighters that helped make Anchorage International Airport (ANC) one of North America's busiest airports in terms of cargo operations. British Columbia's potential regional contribution to payloads should compare favorably to Anchorage, and the previously mentioned Canadian transshipment program offers international carriers interlining and other opportunities somewhat analogous to the preferential treatment US regulators gave Alaska's airports. Perhaps most importantly, ANC recently lost Northwest Airlines' freighter hub operation when acquirer Delta Airlines terminated its freighters. Vancouver Airports can take full advantage of this opportunity once it overcomes the current fuel cost and tax disadvantage. Fuel costs represent up to 50% of a cargo carrier's operating cost and are a major decision-making factor for a cargo carrier in choosing its tech-stops destinations.

The strong imbalance over the Pacific that favors fuller loads eastbound has already allowed carriers flying longer-range, more fuel-efficient aircraft to routinely skip Alaskan technical stops on westbound flights. Asian carriers reduced freighter service during the global recession. ANC's 35% drop in freighter landings and 17.2% decline in cargo traffic have caused it to fall from being the second busiest airport in the world to the fifth. "We are trying to hold down costs

[5] Seasonal adjustments were introduced during the writing of different chapters. In some cases CX combines YVR service with LAX and sometime with SFO, depending on market conditions

to remain competitive with airports globally,"[6] said ANC Airport Manager, John Parrott. BC's airports may be in their best competitive position since ANC's ascent, given how little ANC's local market contributes to payloads and the loss of transfer volumes and connectivity previously provided by Northwest Cargo – especially with Canada's own Air Cargo Transshipment Program offering benefits similar to the Alaska Air Cargo Transfer Initiative. Korean Air appears to be the best initial prospect for Vancouver and Abbotsford. But both also could serve as technical stops for (among others) Air China Cargo, Asiana Cargo, China Airlines Cargo, China Cargo Airlines, EVA Air Cargo, Great Wall Airlines, JAL Cargo, Korean Air Cargo, Nippon Cargo Airlines and Singapore Airlines Cargo.

[6] "Alaskan Airports Cut Jobs as Fortunes Fall," *Air Cargo News*, September 4, 2009

4. Executive Summary

4.1 Introduction

The Greater Vancouver Gateway Society commissioned the Lower Mainland Air Cargo Study (the Study) to develop cargo opportunities for the international airports of Vancouver (YVR) and Abbotsford (YXX) located in the Lower Mainland (the Region) of British Columbia (BC). Completing numerous interviews with carriers, freight forwarders, ground handlers and constituents in the Region, as well as relying on extensive primary and secondary data, IATA Consulting completed the Study between April 2009 and March 2010. IATA completed the study with extensive consultation of an advisory group comprised of representatives from the Greater Vancouver Gateway Council, Vancouver Airport Authority, Western Economic Diversification Canada, BC Ministry of Transportation, Abbotsford International Airport, TransLink and Transport Canada.

4.2 Analysis of the General Economic Environment

For air transport in general and air cargo in particular, the relevant economic environments comprise the home (base) market, the destination markets, and markets that can be served through transfer operations. While origin and destination markets are fairly self-evident, feeder markets allow hubs to sustain more traffic than would be justified if the airport were purely dependent upon demand between the two markets on a route.

In 2008, British Columbia (BC) had a population of 4.4 million, representing about 13% of Canada's total. About 60% (2.6 million) of the province lives in the Lower Mainland with 87% of that in the Greater Vancouver area. The Fraser Valley with the city of Abbotsford is the second largest population center with a population of about 276,000.

BC is relatively rich in natural resources and even its manufacturing is largely resource-based, although gradually diversifying into high-tech and computer-based industries. Still, the service sector accounts for 78% (2008) of BC's GDP, while manufacturing with 9% is the second-largest sector. About 44% of manufacturing is related to wood and paper products, while only 4% is related to production of computers and electronics.

Employment in the Greater Vancouver and Abbotsford metropolitan areas differ with natural resources having only a small role in Vancouver and (agriculture, in particular) having a strong role around Abbotsford. Nearly 89% of BC businesses with employees had 1 to 19 employees,

while only 4% employed more than 49. Between 2000 and 2008, a structural shift toward smaller businesses occurred in Greater Vancouver, owing to the number of start-ups. This trend points positively toward economic diversification and yet leaves relatively fewer large shippers capable of anchoring demand for new service. To directly benefit air cargo demand, BC's diversification would need to be in manufacturing of the high-value, time-sensitive goods, such as IT components or mobile communication devices need likely to be transported by air.

4.2.1 International Trade

The US is BC's main foreign trading partner, providing a market for 53% (all transportation modes) of BC's exports and producing 42% of its imports. The Pacific Rim countries account for 32% of BC's exports and 38% of its imports. Indicative of trade imbalances, PR China accounts for only 6% of BC's exports but generates 23% of its imports. Western Europe is a distant third, accounting for only 8% of BC's goods exports and 6% of its imports.

4.3 Analysis of the Political Environment and Regulatory Framework

The aviation industry is regulated by global protocols, intergovernmental agreements and national regulations. The consultants gave particular emphasis to regulations pertaining to market access controlled through trade agreements, as well as to potential cargo screening requirements. Acknowledging both its importance as a trading partner with BC as well as competition for limited air service, the US provided the logical comparison for Canada's aviation market regulation and for air cargo security.

In pursuing international passenger flights (providing belly cargo capacity) and freighter flights, as well as technical stops (used for refueling, crew changes and catering), BC's airports may benefit from policy initiatives and programs introduced by Canada's federal regulators to "level the playing field" when competing against U.S. gateways, which benefited from the US's passage of the 1978 Airline Deregulation Act.

"Open-skies" agreements have eased traditional barriers controlling flights between countries and through countries to third countries, by limiting the number of flights and participating airlines, and often gauge of aircraft. Generally, all-cargo flights have been given greater market access than have passenger flights. From what had been exclusively bilateral negotiations, agreements have gained multilateral contexts, involving the following eight "Freedoms":

- **First or Transit Freedom:** The right to fly across another country without landing
- **Second Freedom:** The right to land in another country for purposes other than carrying passengers, e.g. re-fueling or maintenance
- **Third Freedom:** The right to land in a country other than the home country for the purpose of commercial services.
- **Fourth Freedom:** The right to fly from another country to the home country for the purpose of commercial services.
- **Fifth Freedom:** The right to carry traffic to one country, and then fly on to another country with the right to carry passengers and cargo from second country to the third country and from the third country to second country.
- **Sixth Freedom:** The right to carry traffic between two other countries via an airport in the home country.
- **Seventh Freedom:** The right to operate stand-alone services between two other countries.
- **Eighth Freedom:** The right to carry passengers and cargo within the borders of another country ("cabotage").

For air cargo service between markets with imbalances (volume deficits on one side), the Fifth Freedom has been particularly useful in allowing carriers to build a triangular route structure that might, for example, allow a carrier to supplement weak westbound loads by stopping in both a US and Canadian west coast market before heading across the Pacific.

4.3.1 "Blue Sky"

Under its **"Blue Sky"** International Air Policy (implemented in November 2006), Canada has concluded or signed liberalized air agreements with over 50 countries (27 of which are EU Member States), negotiating a total of twenty-six (26) air services agreements:

- Nine (9) bilateral Open Skies-type agreements: US (signed in 2007 but negotiated in 2005), Ireland, Iceland, New Zealand, Barbados, the Dominican Republic, Costa Rica, El Salvador and South Korea;
- Eight (8) expanded bilateral agreements: Mexico, Japan,[7] Jordan, Singapore, the Philippines, Cuba and Morocco;
- Eight (8) new "first-time" bilateral agreements: Kuwait, Serbia, Croatia, Panama, Turkey, South Africa, Ethiopia and Tunisia; and,

[7] Two separate sets of expanded rights were agreed upon during the January 2007 and April 2009 negotiations.

- A comprehensive air transport agreement between Canada and the EU covering all 27 Member States, which effectively equates to 27 "open" bilateral air services agreements – this agreement is now applied administratively.

These agreements cover 84% of Canada's international traffic. To date, Canada has achieved an "open" agreement with a total of 35 countries representing 72% of its international air traffic. While "Blue Sky" has irrefutably liberalized international air transport in Canada, the nine bilateral "open-skies type agreements" (as opposed to other expanded bilateral agreements) are fewer than for the US, which has "open skies" agreements with 68 countries, including nearly all major markets of Asia and Europe. Transport Canada (TC) has not always had a willing partner for such negotiations. Specifically, there are six countries in Canada's top twenty air transport markets that have been unwilling to open negotiations on an Open Skies-type agreement with Canada. Given BC's geographic advantage as a transpacific gateway, it is unfortunate that several prominent Asian markets have been among the most averse would-be partners.

An air service agreement signed on December 18, 2009 between the EU and Canada initially allows for open all-cargo third, fourth, fifth and sixth freedom operations. Effectively, EU cargo airlines are allowed to operate from Canada to the US or another third country without restriction and likewise a Canadian carrier to fly from an EU member state to a third country. Initially, EU and Canadian airlines have unrestricted access to EU-Canada routes, with full pricing freedom, comparable to the EU-US agreement. Eventually, the agreement allows EU carriers to operate cargo flights from points within Canada to any point in the Americas.

4.3.2 Air Cargo Transshipment Program

Canada extended the Air Cargo Transshipment Program (ACTP) to allow any airport to participate, subject to meeting application requirements. Originally intended to promote only small and underutilized airports, the ACTP allows foreign air carriers to be authorized by the Canadian Transportation Agency (CTA) to carry international cargo shipments via approved Canadian airports from and destined to points outside Canada, when there are no rights provided in Canada's bilateral agreements.

Transit cargo may be stored in bond at approved Canadian airports pending transportation by air or another mode to its final destination. Where foreign carriers are permitted under bilateral air transport agreements or arrangements and authorized under a separate CTA license to carry Canadian O&D cargo, they may combine this activity on flights also involved in cargo

transshipment activity. In addition, Canadian carriers are entitled to carry foreign-to-foreign cargo in bond separately or in combination with an existing authority to carry Canadian O&D cargo. Transportation between Canada and the US may be operated by road-feeder service using an air waybill. Hence, an air carrier may use trucking for a portion of the routing between Canada and the US for goods ultimately moving between the US and Europe.

4.3.3 Practical Impact of Aviation Deregulation

As Air Canada abandoned freighters, foreign carriers have added stops in Canada to supplement loads on freighters departing from the US to Asia and Europe. In March 2009, Asiana began routing a weekly B747-400F service through Halifax, en route from New York to Brussels and on to its Seoul hub. Cathay Pacific does similarly at Vancouver with its freighters, as does Cargolux at Calgary.

"Blue Sky" has the potential to mitigate past market-constraining policies by both Canada and its negotiating partners. Singapore Airlines has publicly stated their ability to build the network volume required to sustain service to YVR was compromised when its requested expansion to seven weekly flights was rejected. The carrier had served YVR for almost 20 years when it suspended its 3 flights (through Seoul) per week, although the carrier cited economic difficulties in press releases at the time.

While its YVR operations were passenger-driven, Singapore Airlines Cargo is a global force and its freighter operations illuminate the role of deregulation in market development. SIA Cargo has been a beneficiary of the Singapore government's pursuit of liberalized cargo rights, using fifth and seventh freedom rights with the US extensively. Using seventh freedom rights, SIA Cargo has operated continuing flights from Chicago and Los Angeles onward to Brussels. SIA has used 5th freedom rights in China, carrying cargo between a trio of Chinese markets to Los Angeles and Chicago. Canada and Singapore have concluded an agreement that entitles Singapore carriers to operate daily services to/from any 2 Canadian cities with Fifth Freedom, except to select EU points. [8]

[8] The agreement Canada negotiated with Singapore in 2007 permits "any number of air carriers from either country to operate non-stop passenger and all-cargo scheduled air services as frequently as desired, between any city in Canada and Singapore". The agreement also includes substantial fifth freedom rights for all-cargo operations and fifth freedom points for passenger-combination service in the Asia-Pacific region.

Between the general market liberalization of the “Blue Sky” Policy and the Cargo Transshipment Program, the former is more likely to benefit BC in the near-term because additional capacity provided by international passenger carriers using wide body aircraft better suits the current regional market.

Given the longer economic development horizon in recruitment of demand-driving manufacturers and distributors, the Cargo Transshipment Program holds medium to long-term promise. Freighter operators are already taking advantage of freedom rights (detailed in the Study) to justify freighter stops in Canada that might not be reasonable without the substantial contribution of additional US stops. Therefore, the BC markets do not need to justify the entire payload requirement but simply make sufficient contributions, as long as the carrier is already allowed by the bilateral terms.

A strategic location and favorable regulatory environment have been teamed to sustain freighter operations where local demand has been inadequate otherwise. The Study details how the Alaska International Airport System used favorably targeted regulatory treatment and a geographic advantage to cultivate opportunities for Anchorage International Airport (ANC) as a technical stop for long-range cargo flights between North America and East Asia. The Study provides a similar analysis of Kazakhstan’s Almaty International Airport’s rise from technical stop to intercontinental sort center.

4.3.4 Air Cargo Security

Threat-assessments emphasize securing cargo on passenger aircraft and securing the aircraft, itself, for freighters. This two-tiered approach is particularly challenging in markets such as YVR with a relatively high volume of belly cargo and with interlining between carriers, shipments may be carried on a freighter for one segment and then transferred to a passenger aircraft.

Transport Canada (TC) is the regulator principally charged with implementation and continued maintenance of Canada’s air cargo security efforts, which endeavors to ensure the continued safety and security of air transportation without needlessly burdening supply chains. The Air Cargo Security (ACS) Program takes a two-pronged approach entailing: hardening of supply chain security; and improving air cargo screening techniques and technologies.

The ACS Program has received broad industry support. Under the Air Cargo Security Initiative (2006 – 2009), Transport Canada designed and piloted components for an enhanced air cargo

security program. The initiative reviewed and tested both the updating of screening technologies and the introduction of a secure supply chain management program. Under a voluntary program, industry stakeholders were active participants in the extensive testing and trial implementation of these components. Transport Canada has also been consulting regularly with Canadian stakeholders through a technical advisory committee of the Advisory Group on Aviation Security (AGAS). In fall 2009, a cross-Canada speaking tour was conducted to raise awareness of program as well as face-to-face consultations with key stakeholders on the proposed new security measures.

Some have suggested that overzealous security in the US could push air cargo flows over Canadian airports but carriers and forwarders are only likely to reroute cargo if they believe differences are substantive and sustainable, which is unlikely given the interdependence of the two markets. Compatibility has been pursued from the outset of the ongoing enhancements with the two governments cooperating on the development of their respective program components and testing of technology.

4.4 Analysis of the Structure and Present State of the Air Cargo Industry in the Region

Air cargo is transported on passenger aircraft (belly cargo) and on freighters. Freighters are operated by all-cargo airlines, as well as by *combination* carriers operating both passenger and freighter aircraft. Integrated carriers (*integrators*) operate freighter aircraft and proprietary trucking fleets to provide door-to-door service. In the Study, the term “all-cargo airline” applies to non-integrators operating only freighters to provide only airport-to-airport service. ACMI (aircraft, crew, maintenance and insurance) carriers use their own aircraft to operate scheduled flights on behalf of other carriers and occasionally freight forwarders. **Table ES-1** provides examples of each type of carrier at YVR.

Table ES-1: Types of Carriers Presently Serving YVR

(all types are represented but not all carriers)

Integrated Carriers	Passenger (Belly) Carriers	
DHL	Air Canada	KLM
FedEx Express	Air China*	Korean Air*
Purolator	American Airlines	Lufthansa *
UPS	British Airways	Northwest
All-Cargo Airlines	China Airlines*	Philippine Airlines
Cargojet	Continental Airlines	Scandinavian Airlines (SAS)
Combination Carriers	EVA Air*	United Airlines
Cathay Pacific Airways	Japan Airlines	WestJet Airlines

** operate only passenger service to YVR but freighters elsewhere*

All-cargo flights at YVR are operated by Cargojet, Cathay Pacific, DHL, FedEx, Purolator and UPS. Belly capacity is offered by a large number of passenger carriers, including five (Air China, China Airlines, EVA Air, Korean Air and Lufthansa) that operate freighters at other airports in western North America. Only Hong Kong's Cathay Pacific operates both freighters and passenger aircraft at YVR on a scheduled basis.

Major integrators FedEx and UPS ranked #1 and #2 in international freight tonnes flown in 2008. FedEx operates its western region hub at Oakland International Airport (OAK) and UPS at Ontario International Airport (ONT) inland of Los Angeles. Both integrators operate limited transpacific service from these regional hubs but rely on Anchorage International Airport (ANC) as their principal transpacific gateway. DHL abandoned the US domestic market in January 2009 but is still active in the Canadian domestic market and internationally. Besides operating their own aircraft, all three international integrators purchase capacity from commercial carriers.

Canada's largest courier company, **Purolator,** does not rank globally due to its almost entirely Canadian network. Canada's **Cargojet** operates Canada's largest fleet of all-cargo aircraft to provide critical capacity for DHL Express Canada and UPS Canada, as well as for German forwarder Schenker which is the "sister company" of BAX Global. Cargojet is an important interlining partner for international carriers serving Canada.

Belly capacity is provided by Canadian passenger carriers Air Canada and WestJet Airlines which give interlining partners and freight forwarders critical intra-Canada frequencies and

destinations. Non-North American international belly carriers include Air China, British Airways, China Airlines, EVA Air, Japan Airlines, KLM, Korean Air, Lufthansa, Philippine Airlines and Scandinavian Airlines (SAS). US belly carriers include American Airlines, Continental Airlines, Delta/Northwest and United Airlines.

Combination carriers dominate in Asia and Europe, extracting economies of scale from the combined cargo capacity of freighter and passenger aircraft. Since Air Canada eliminated its freighters in June 2008, Hong Kong-based Cathay Pacific with three weekly freighter flights to Hong Kong (five during cherry season) is YVR's sole combination carrier. Further to Air Canada's decision to abandon freighters, Klaus Moller, Lufthansa Cargo Vice President for the Americas, stated[9] "We see potential in the (Canadian) market, especially after the withdrawal of Air Canada".

Cargo carriers depend heavily upon **freight forwarders** to function as consolidators and retailers of their capacity. Forwarders build volume by collecting smaller shipments from shippers and negotiating rates with carriers based on higher volumes achieved by consolidating multiple shippers' cargo. Belly cargo carriers may rely entirely on forwarders to act as sales forces rather than have their own staff on-site. Freight forwarders, including integrators, control about 76% of international shipments.

None of the top 14 forwarders in Canada are headquartered in Canada but rather the US, Europe and Asia. Much of the balance of the top 25 is comprised of Canadian firms. Vancouver is more of a regional market with local and national forwarders playing a much more substantial role than at other gateways – particularly in niche cargo. The highest ranked Canadian forwarder, #15 Perishables International Transport specializes in the handling and transportation of fresh and frozen perishable goods, as does YVR-based Flying Fresh Air Freight. British Columbia-headquartered Locher Evers International is a leader in the sea-air segment, also served by Sea Air International Forwarders. Vancouver-based Maple Freight has traditionally focused on trade with the Far East, as has Transpacific Customs Brokers.

Among other critical allied services, **ground handling** includes warehouse operations (storage, buildup and breakdown of containers/pallets), but may also include aircraft unloading and loading (ramp operations) and transport between the ramp and warehouse. Fulfillment of documentation requirements is also a function performed for many clients. Cargo handling companies at YVR include: Air Cargo Handling Service, A.E.S. Warehouse and Distribution,

[9] "Canada –Blue Skies Attract Emirates" by Ian Putzger, Air Cargo World, October 2008

Hutchison Cargo Terminal Inc., Isaac Freight Ltd., Mega Int'l Freight Services Ltd., Menzies Aviation, Swissport and WestPoint Terminal Inc. Carriers may also be self handled or handled by other carriers.

Operating as both an essential complement and as a substitute, **trucking** is vitally important to the air cargo industry. 'Cartage' usually represents pick-up and delivery of un-palletized/un-crated cargo between the airport and the local service area. Alternatively, over-the-road (OTR) trucks may haul consignments hundreds of kilometers to support international consolidations. **Road Feeder Service** (RFS) between BC and SEA is limited. The motivation to truck from BC to SEA is primarily driven by the occasional need to access wide body all-cargo flights offered to Europe only at SEA. Alternatively, shipments trucked to YVR from south of the border are customarily to exploit cheaper rates attributable to transpacific belly capacity available at YVR. Generally, forwarders reported an aversion to risking border delays with trucking.

Rising fuel costs magnified the cost advantage of ground transport, such that from 2005 to 2007, the number of truck-flight routes increased by 9.0%, and frequency of truck flights increased 34%. Belly cargo capacity lost due to the shift from larger to smaller aircraft, as well as frequencies during the recent economic downturn was largely replaced by RFS that provided comparable service to flights. However, as time windows shrink and/or line-haul distance increases, trucks lose their competitiveness.

4.4.1 Local Cargo Facilities

Vancouver International Airport (YVR) is Canada's second-busiest airport and the third largest international passenger gateway on the West Coast of North America. YVR provides dedicated facilities for air cargo handling in two general locations: a cargo village with a total of 41,600 sq. meters of multi-tenant warehouse space and further warehouses on the southern side of the access road, as well as a single-tenant facility north of runway 26R, owned and operated by UPS.

Between 2000 and 2010, industry consolidation and widespread contraction of freighters due to record fuel prices and recent economic recessions eroded demand for on-airport cargo space. Greater productivity (throughput utilization) through use of third party ground-handlers also contracted demand for cargo space. YVR's cargo warehouse space is adequate for current demand, having accommodated much greater peak volumes in previous years. A shortage of

freighter aircraft parking positions was cited repeatedly but positions have become available in front of the Air Canada cargo hangar.

YVR has at least as much warehouse capacity as it had prior to losing more than 20% of its throughput during the last 10 years – which theoretically should result in surplus capacity. YVR has a recognizable “cargo village” which currently imparts operational efficiencies lacking at other gateways but which must be considered during potential relocation or redevelopment at YVR. Its closest major Canadian competitor YYC ranks relatively high in facilities having developed its existing cargo terminals on a largely build-to-suit basis and already initiating improvements.

Several respondents reported that tug times between the cargo village and passenger apron is a critical concern for perishables, particularly if the cargo village is relocated to north of runway 26R (next to the UPS terminal). This move may be necessary when a taxiway connecting the parallel runways is constructed.

All commercial air service at YXX is provided by passenger aircraft. WestJet provides flights to Calgary and Edmonton and dominates YXX’s passenger market with only a small percentage of passengers using charter services to vacation destinations in Mexico during winter, or flights by airlines like Island Express, which connect Abbotsford with Victoria and Nanaimo. As of July 2009, the airport handled seven daily WestJet flights and two daily flights to Victoria/Nanaimo; i.e. a total of 18 daily aircraft movements.

No dedicated cargo facilities are provided at YXX but a forwarder operates a 5,000 sq. meter in-bond facility there. Cargo turnover at YXX was reported as about 100 tonnes per month with flowers for the Calgary market as the main driver. The Fraser Valley is an agricultural area producing raspberries and blueberries with some of the latter reportedly exported to China but flown from the US.

4.4.2 Demand

The YVR cargo market suffered a -5.1% drop in total cargo in calendar year 2009 – a relatively modest decline that actually enabled YVR to pass Portland in annual cargo tonnage. Interestingly, the imbalance between exports and imports – which had been 60/40 – grew more balanced. Non-integrator cargo was hit hardest with a loss of 10.4%, whereas integrator cargo achieved a modest increase of 1.4%.

About 50% of total exports are perishables, strongest to the Far East. Exports include personal effects, meat, live animals, flowers, seasonal fruit (cherries, blueberries, raspberries), seafood and fish (salmon). Imports include tropical fish, flowers, electronics such as flat screen TVs and notebook computers, as well as garments. Thus, exports are more concentrated on perishables, while imports mainly consist of dry cargo.

A relatively large share of dry cargo is comprised of ad-hoc shipments and personal items due to a lack of consistent generators of substantial air cargo demand in the Region. Kodak and Nortel were such generators, before the former relocated its production to Mexico and the latter went out of business.

Until around 2001, **sea-air cargo** had generated significant volumes but demand was driven by high air cargo rates on direct routes between Asia and Europe. As air rates were depressed, demand for sea-air eroded. Sea-air transport is a compromise between all-air and all-sea transport in terms of transfer times and rates. Compared to all-air service, the slower, less costly maritime segment reduces overall costs. As demand recovers and freight rates increase again, part of this business may return.

4.4.3 Air Services/Cargo Uplift Capacity

In recent years, structural changes had a negative effect on air cargo uplift capacity with Air Canada replacing wide-body with narrow-body aircraft on domestic routes while reducing frequencies and destinations in the Far East, thus reducing available belly capacity. Because YVR is more of a capacity-driven market given the relatively weak demand from BC industry, capacity reductions are a significant cause of cargo losses.

While belly capacity decreased, all-cargo service to the Far East has not expanded. Cathay Pacific operates three-weekly all-cargo services triangulating between LAX[10] and HKG to top off capacity. During the months of June, July and August, it increases the frequency to five times weekly, to ease tight demand during the cherry season. While marginal and limited to belly capacity, forwarders reported capacity to Europe is sufficient. Similar to Asia, capacity to Europe is tight during the cherry season.

[10] Seasonal adjustments were introduced during the writing of different chapters. In some cases CX combines YVR service with LAX and sometime with SFO, depending on market conditions

4.5 Road Infrastructure and Road Travel Demand Analysis

Given trucking's role as both a critical complement as cargo is trucked to/from airports, but also as a competing modal substitute, attention was given to regional roadways' ability to accommodate movement of goods to and from the airport, seaport, over the border to the United States and to service industries that rely on goods movement. This part of the study was primarily roadway focused, emphasizing linkages between major transportation infrastructure facilities in this region – such as Port Metro Vancouver, Vancouver International Airport, Seattle-Tacoma International Airport (SEA), the Port of Seattle and the border crossing area around Blaine, WA, extending from the Vancouver, BC metro area to SEA. This analysis's reliance on maps and other exhibits does not lend itself to a synopsis typical of an executive summary. Not only does the analysis entail the Study's Chapter 9, but also includes 24 maps in Annex 9.

In addition to the roadway analysis, the consulting team reviewed the Region's intermodal linkages to provide an overview of specialized services available that use air and other modes of transportation. There is also a brief overview of cross-border trade showing tonnages, commodities and the value of goods moving in this trade. Finally there is an outline of the major line haul trucking companies operating in the study area.

The method of analysis of the roadways in the study area provides a layered view, starting with functional classification and types of roadways, moving to annual average daily traffic, then to the Level of Service (LOS) analysis and finally to the unconstrained trip analysis. The LOS analysis provides the key findings of the traffic analysis, revealing significant areas of congestion in some main corridors in the Vancouver, BC metro area. This traffic analysis also provides a view of roadway segments with the highest truck usage, providing an opportunity to analyze whether truck traffic could be diverted to other less congested roadways. This study's roadway focus was limited to how surface transportation may impact air cargo transport, In completing an independent overview of road infrastructure issues, this study may contribute insights to surface transportation-focused efforts led by TransLink, Transport Canada and British Columbia but does not presume to supersede any of these.

4.5.1 Cross-Border Traffic

During the recession, there have been significant declines in value and volume of goods transported by truck between Washington State and BC. Ascending volumes add trucking

capacity that potentially accommodates air cargo, as well as pure surface cargo. The Blaine and Sumas border crossings continue as the highest volume border crossing points. While there are congestion issues at the Blaine crossing, the roadways appear able to handle the traffic, particularly the lower volumes of the past two years. Short-sea shipping could be an alternative to trucking when this border crossing becomes more congested, although more likely as a substitute for pure surface transportation than as a complement to air transport.

4.5.2 Multimodalism

As previously noted, international freight forwarders control about 76% of international air cargo shipments. The Canadian market is dominated by non-Canadian forwarders but the YVR market is more Asia-focused than Canada, in general, and also has several local or national forwarders emphasizing transpacific trade, as well as the sea-air freight niche that has periodically been unusually high in BC. While individual offices may concentrate on air or ocean freight, most international forwarders are multimodal and BC's strengths across all modes largely establishes parity with U.S. West Coast competitors and establish YVR as Canada's optimal solution to provide access to Asia.

For forwarders, BC's multimodal offerings are of tremendous significance both in offering comprehensive transportation solutions to their shipper-customers and in giving forwarders revenue opportunities by all modes. By weight, air cargo tonnage barely rates against sea, truck and rail, so BC provides forwarders the opportunity to maximize their revenues regardless of the composition of provincial trade. This is critical because – as detailed in the Study – BC's commodity production is dominated by natural resources and resource-based manufacturing that does not offer the value-weight proposition necessary to justify air transport. Consequently, forwarders potentially supporting an air cargo-focused initiative at BC's airports would not necessarily have to depend upon such revenues in the development phase. BC's multimodal capabilities are examined more intensively in the Study, as well as in a series of past studies commissioned by the Greater Vancouver Gateway Council.

BC's multimodal capabilities are also significant because of the rare opportunity for sea-air combinations that have been considerable in YVR's past. Sea-air cargo generated significant volumes until around 2002. Demand for sea-air cargo was driven by high air cargo rates on direct service routes between Asia and Europe. Sea-air transport was a compromise between all-air and all-sea in terms of transfer times and rates. Compared to all-air service, the slower, yet less costly maritime part of the trip reduces overall costs at the expense of a longer transfer

time. In earlier decades, strong demand elevated air cargo rates between Asia and Europe. However, air rates fell with demand during the prolonged economic crisis. More direct connections between Asia and Europe also became more competitive and available. Since this type of cargo is highly price sensitive, it is expected to recover as demand grows again and excess capacities decrease.

4.6 Air Cargo Market Analysis

The chapter comprises a cross-sectional analysis of demand and the air transportation services offered at each of BC's airports, complemented by a time-series analysis centering on development of demand and supply over time. Because cargo capacity is supplied by both passenger (belly capacity) and freighter operations, both are examined. The chapter takes maximum advantage of IATA's proprietary databanks holding passenger, cargo and schedule information which are productive in the context of analysis but which again defy easy summarization.

Apart from a global setback following 9/11, YVR's passenger demand has mostly ascended since 1992. Domestic passengers represent the largest share of the market, followed by transborder passengers. Non-US international passengers represent the smallest segment but have expanded their market share over the years. The volume of passenger aircraft landings does not wholly reflect passenger demand. Landings decreased after 1999 and have not yet recovered from a downturn largely related to the demise of Canadian Airlines.

After mostly positive growth until 1999, YVR's air cargo has suffered regular losses for much of the decade. It bears noting that this loss occurred in the non-integrator segment, while integrator traffic remained mostly unaffected and even enjoyed growth. Both integrator and non-integrator landings have decreased in annual landings but integrators replaced propeller-driven aircraft with capacity-augmenting larger aircraft. Non-integrator landings introduced a small but growing base of wide body aircraft. The larger proportion of operations is represented by narrow-body aircraft.

Non-integrator cargo volumes most closely track with annual wide body passenger aircraft landings. Landings of wide body aircraft were greatly reduced over the decade and since these aircraft provide greater cargo capacity even on longer domestic routes, the cuts substantially reduced cargo capacity. Most damaging during the period was the demise of Canadian Airlines, which operated a hub at YVR and held traffic rights for Asian destinations. These rights were acquired by Air Canada which exercised these rights for through flights to and from Toronto.

Hence, YVR lost a large share of transpacific flights and related cargo capacity. Tonnage fell along with capacity.

Further diminishing cargo capacity was a downscaling of aircraft size on international routes. With a drop in seats per aircraft on these routes since 2001, in combination with growing passenger demand, passenger load factors grew which in turn left less surplus payload available for cargo.

At Abbotsford International Airport (YXX), low-cost airline WestJet (WS) accounts for about 97% of passengers, serving nonstop flights to Calgary and Edmonton. Albeit from a small base, YXX has experienced rapid growth in passenger numbers since 1997. Between 1997 and 2008, passenger volumes at YXX increased from 72,700 to 505,800 or an average of 19.3% annually. It does not currently have scheduled all-cargo service but about 100 tonnes of cargo per month is currently transported on WestJet flights.

Besides WS, YXX is served by Orca Airways and Island Express, which operate scheduled flights to Victoria and Nanaimo. These scheduled flights are supplemented with seasonal charter services to tourist destinations such as Los Angeles and Las Vegas in the US or Puerto Vallarta in Mexico.

4.7 Competitive Analysis[11]

BC's airports do not operate in a vacuum but rather are affected by economic conditions beyond the airfield. Local demand has a direct functional relationship with output and consumption tied to area manufacturing and agriculture, as well as to the demands of end consumers. Earlier sections of the Study included detailed analysis of the industrial profile of BC and the extended service area beyond. As an international gateway, YVR is also affected by macroeconomic conditions on both sides of the Pacific and less so of the Atlantic. Both for local distribution and gateway operations, YVR faces competition from other airports. YVR competes with US western region airports for the limited capacity transpacific carriers can dedicate to that service.

Competing gateways within 250 miles include Seattle-Tacoma International Airport (SEA) and Portland International Airport (PDX). About 800 miles away is San Francisco International Airport (SFO) and further still Los Angeles International Airport (LAX) – North America's

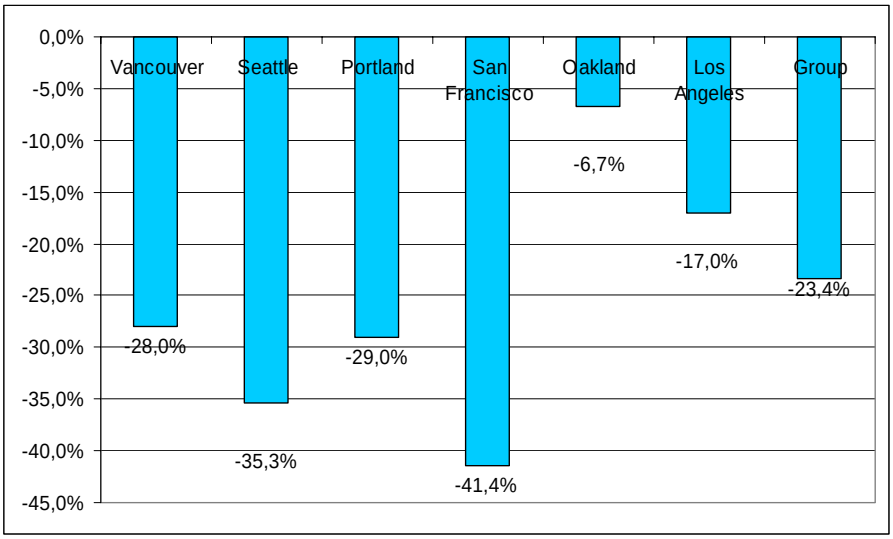
[11] This chapter focused only on YVR as the only BC airport with sufficient existing operations for comparison purposes.

dominant West Coast gateway. YVR can also be combined with other gateways to build volume on relatively weak westbound segments ("triangulation"). As previously described, YVR also competes with cheaper, high frequency Road Feeder Service to other gateways. Expanding freighter operations at YVR may depend upon reversing that pattern, using YVR as the air gateway for markets used to complement (feed) the Vancouver area's local demand.

To only a limited degree, YVR competes against Canadian airports such as Calgary for dedicated capacity limited either by aviation regulations or commercial concerns. According to Airports Council International, YVR finished calendar year 2008 ranked #28 in North America in total cargo (freight, express & mail). The only Canadian airport ranked higher was Toronto at #15. YVR does not so much compete against other Canadian airports, as it is Canada's transpacific gateway and best strategic option to access the economic engine of the next twenty years – Asia.

As revealed in Figure ES-1, YVR's substantial cargo losses between 1999 and 2008 were typical of North America's western region airports. YVR's loss of roughly 28% was less than its most immediate competitors, Seattle-Tacoma (SEA = -35.3%), Portland (PDX = -29.0%) and especially San Francisco (SFO = -41.4%). Like YVR, these three airports were more dependent on international belly capacity than FedEx's regional hub Oakland (OAK = -6.7%) and Los Angeles (LAX = -17.0%), which offers an extensive mix of wide body passenger and freighter aircraft.

Figure ES-1: North American West Coast Airports, Total Cargo: Period 1999 - 2008



Source: Airports Council International – North America

Source: Airports Council International – North America

SEA's international freight accounts for 34% of its total freight and of this, Europe accounts for 53% and Asia for 47%. SEA has gained international service and freight largely at PDX's expense with both Korean Air and Lufthansa pulling air service from PDX to focus on SEA. SEA also has freighters from European all-cargo airlines Cargolux and Martinair. Operating freighters between SEA and Asia are EVA Air and Taiwan-based China Airlines. SEA has lost China-based Great Wall Airlines and China Cargo Airlines. SEA has belly service to Europe from British Airways, Air France and Icelandic Air. Pure belly service is also offered by Asiana Airlines. International service is also offered by US belly carriers Northwest and United Airlines. PDX is largely a domestic integrator market with international accounting for less than 6% of its annual tonnage. Air China has a small cargo presence but in spite of waiving landing fees and offering subsidies, PDX has not reversed the losses of Korean Air and Lufthansa. As **Table ES-2** demonstrates, international service at YVR compares favorably to PDX. While its international passenger service is superior to SEA, its freighter service is inferior. Service at LAX is included mostly for potential "triangulation" possibilities to add stops at YVR on LAX flights, while SFO's tenant base may offer other opportunities.

Table ES-2: International Freighter & Wide Body Passenger Service

	YVR	YYC	SEA	PDX	SFO	LAX
Air China	P			F	P/F	P/F
Asiana		P/F	P		P/F	P/F
Cargolux		F	F			F
Cathay Pacific	P/F				P/F	P/F
China Airlines	P		F		P/F	P/F
China Cargo Airlines					F	F
EVA Air	P		F		P	P/F
Great Wall						F
Japan Airlines*	P				P	P
KLM	P	P			P	P
Korean Air	P	P/F	F		P/F	P/F
Lufthansa	P	P	F		P	P/F
Martinair			F			F
Nippon Cargo Airlines*					F	F
Qantas					P	P/F
Shanghai Airlines Cargo						F
Singapore Airlines					P	P/F

P = Passenger Only Service; F = Freighter Only Service; P/F = Both

YVR competes less with Canadian airports than with US gateways for transcontinental air service. YVR is likely more impacted by regulatory policies limiting frequencies than by competitive pressures from other Canadian airports. Fueled by animal charters and the energy industry, Calgary International Airport (YYC) enjoyed more than 100% cargo growth from 1999 through 2008 – during which YYC added freighter service from Cargolux and Asiana combination carriers. YYC also attracted international passenger service from KLM, Lufthansa and British Airways. YYC must also be considered a contender for potential service from Emirates should that carrier obtain adequate Canadian frequencies. FedEx, UPS and Purolator have upgraded their YYC freighters, as well. Already hosting relatively contemporary cargo facilities, YYC has initiated expansion that will add 400,000 sq. ft. of dedicated cargo ramp and 300,000 sq. ft. of warehouse. YYC has also attracted industrial users to surrounding business parks.

More recently, Prince George International Airport (YXS) has targeted transpacific technical stops, upgrading its refueling facilities and runway in 2009 and charging no landing or parking fees. In November 2009 a Southern Air Boeing 747 refueled en route to Miami and Caracas. YXS plans to compete with Anchorage for technical stops initially, then capture cargo processing and finally develop a multimodal light-industrial and logistics park. While YXS presently lacks the market basis to compete with YVR for conventional commercial flights, its initial success suggests potential competition for the technical stop market.

4.8 Route Analysis

IATA assessed the potential for YVR to serve technical stops for flights between North America and Asia, as well as the potential for a cargo carrier to use YVR as a transit hub between the regions. Scheduled[12] technical stops typically allow carriers to refuel aircraft, make crew changes and possibly receive catering. Ideally, they can also be leveraged for more intensive cargo operations once routing patterns are established. Traditional technical stops have been required on longer routes on which aircraft could not fly direct – at least not without compromising revenue payloads by carrying more fuel. As detailed in the Study's case studies, Anchorage International Airport (ANC) has enjoyed past success with this approach for transpacific flights.

Other than collecting landing fees and fuel sales, the direct revenue benefit of technical stops to an airport operator may be marginal; for airports with congestion it may mean inefficient uses of strained airspace and runways. However, for airports with a capacity glut, technical stops can augment utilization of fixed infrastructure investments and may lead to economic development should carriers later initiate freight sorting and interlining.

The main objective of the technical stop analysis is twofold:

- To analyze the potential of YVR as a cargo transit airport for selected flights between Asia and the Americas (North, Central and South)
- To compare the potential profitability of operations for three types of aircraft (plus the B747-800F in a separate report) on routes with technical stops at YVR.

[12] We differentiate between scheduled technical stops occurring on regular intervals and unscheduled technical stops due to unanticipated mechanical and similar issues.

The primary determinant on technical stops is the strategic location between origin and destination on long-haul routes. Multiple airports may fall within that trajectory, so factors separating geographical equals include airport operating costs, fueling costs and provisions, adequacy of airfield resources, safety/security, availability of aircraft maintenance and even crew preferences.

YVR is well located to serve as a technical stop for some international air cargo routes, being close to the natural ground path of aircraft flying between Asia and Latin America while evenly distributing distances between the two areas. The advantage favors ANC in serving routes between Asia and much of North America, suggesting YVR may more productively pursue triangulated cargo service (described in the regulatory chapter), rather than technical stops.

4.8.1 Vancouver, Anchorage and Seattle

Freighter aircraft used in the analysis model included the B777F, B747-200F and the B747-400F (plus estimations for the not-yet-in-production B747-800F). As with previous elements, the analysis is sufficiently quantitative and detail-oriented as to justify its inclusion as an appendix to the Study, making individual model simulations unwieldy for summarization. However, for each aircraft the models consistently showed YVR did not compete favorably with either Seattle or Anchorage for technical stops between Asia and North America. The model's results are products of specific combinations of aircraft performance, airport characteristics (like elevation, length, obstacles, etc), assumed cargo fares, fuel prices, hourly operating costs (HOC) and fuel surcharges. This does not mean using YVR as a technical stop could not be profitable or viable, but that the analyzed alternatives (ANC and SEA) generate more profitability or smaller losses.

For the B777F, the results indicate that for all analyzed routes, ANC or SEA provided greater profitability. For the B747-200F and B747-400F, the models revealed that 81.1% and 91.0%, respectively, of routes yield better results when using ANC or SEA. A quantifiable downside for YVR was a higher average fuel price than those of ANC and SEA. Results vary for each carrier based on specific fleets, network and cost structures.

IATA ran additional simulations introducing Calgary and Abbotsford as alternatives to YVR for serving technical stops. These simulations found YVR as a better choice than either Canadian alternative based only on financial results of technical stops. Again, these simulations derive from multiple variables that impact results, in particular a combination of longer distances (resulting in lower payload and extra flight time) and higher airport operating costs. Contribution

to revenue payload was not factored into the models because these would not then be mere technical stops but as was explored in earlier sections, Calgary has attracted international freighters at least in part by the potential of local industry to generate significant demand for freighter capacity.

4.9 Forecasts

In preceding chapters and annexes, IATA consultants analyzed the socioeconomic environment, the political environment and regulatory framework, the competitive situation, and current trends in the air cargo industry in BC's Lower Mainland. All of these elements form the context in which the Region's air transport demand develops. The consultants also analyzed the air transport market at YVR and YXX and conducted numerous interviews with both airport operators and their cargo tenants, as well as met with regulators and constituents. All of this qualitative and quantitative feedback was introduced into the forecasts, which are essentially projections of past and current trends informed by current and future external influences on demand.

Among a variety of options, the consultants prefer the statistical modeling approach to forecasting. However, developing a statistical model is only an option when adequate statistical time series data on past development is available, which was made possible by YVR's provision of sufficient time series data. When adequate time series data does not exist or insufficient relevant air service exists – as for cargo at YXX – alternative forecast methods must be applied. Examples are top-down forecasting and/or benchmarking.

Any forecast entails a set of assumptions relating to future development of socio-economic, market and/or other indicators. Therefore, a forecast is fraught with uncertainty and requires producing a set of forecasts within which actual development may occur with an acceptably high degree of probability. IATA consultants developed a conventional set of three scenarios: a most likely, a high and a low scenario for both YVR and YXX.

Because YVR is greatly influenced by belly cargo capacity, a set of passenger forecasts was required to inform the airport's cargo forecasts. As described previously, integrators have actually achieved modest growth during the most challenging recent periods for the cargo industry and therefore consultants applied different models to belly cargo versus that carried by integrators. Only integrator volumes were used as inputs for forecasting aircraft operations, as belly cargo will be carried on passenger aircraft driven largely by its own cost center.

Again, the detail-oriented forecast models do not lend themselves to an executive summary treatment but the actual forecasts are included in **Table ES-3**.

Table ES-3: YVR Cargo Forecast Scenarios

Year	Most Likely			High			Low		
	Integrator	Non-Integrator	Total	Integrator	Non-Integrator	Total	Integrator	Non-Integrator	Total
2009	75	114	188	75	114	188	75	114	188
2010	78	115	193	81	117	198	76	111	187
2011	85	116	201	88	122	210	80	103	183
2012	92	118	210	96	126	222	83	96	179
2013	98	120	218	104	135	239	87	96	183
2014	105	122	226	113	144	256	91	96	187
2015	111	124	235	122	152	275	96	96	191
2016	118	128	246	133	161	294	100	96	196
2017	126	132	257	144	170	313	104	96	200
2018	133	136	268	155	178	334	109	96	205
2019	140	140	279	165	187	352	113	96	209
2020	146	144	290	174	196	370	117	96	213
2021	153	148	301	183	204	388	121	96	217
2022	160	152	312	193	213	406	126	96	221
2023	167	156	323	202	222	424	130	96	226
2024	174	160	334	211	230	442	134	96	230
Growth 2008-2024	5.5%	1.0%	2.9%	6.8%	3.3%	4.7%	3.7%	-2.2%	0.5%

Cargo in thousands of tonnes

Source: IATA

YXX is sufficiently different from YVR as to require a considerably different forecasting approach. Small air cargo volumes of 100 tonnes per month may be considered a by-product. The only base of data available for demand modeling is a 1997-2008 passenger time series and monthly passenger numbers for 2009. Since no time series data for air cargo at YXX exists and the airport does not currently handle cargo other than that carried on WestJet (WS) passenger flights, the cargo forecast will have to apply a method different from statistical modeling.

While belly cargo on WS flights can be derived from the number of relevant aircraft movements, cargo on all-cargo flights requires a different forecast method. In this case, the consultants determined benchmarking as the most appropriate approach. A review of airports in the range from 400,000 to 1.5 million annual passengers shows that, as passenger numbers increase, so has cargo tonnage. The team therefore applied ratios of cargo per passenger to passenger forecasts to project cargo demand scenarios.

The team expects YXX to continue catering mainly to low-cost airlines and vacation charters, which carry very little or no cargo. The minimum annual tonnage required to attract services from an all-cargo operator is in the range of 4,000 tonnes, which amounts to a schedule of three weekly flights (six operations) with aircraft equal to a B727.

Table ES-4: YXX Most Likely Cargo Forecast Scenario

Year	Belly	All-Cargo	Total
2009	1,091	0	1,091
2010	1,119	0	1,119
2011	1,260	0	1,260
2012	1,417	0	1,417
2013	1,593	0	1,593
2014	1,758	4,252	6,011
2015	1,918	5,008	6,926
2016	2,083	5,758	7,841
2017	2,236	6,521	8,756
2018	2,387	7,285	9,672
2019	2,534	8,053	10,587
2020	2,681	8,821	11,502
2021	2,829	9,589	12,417
2022	2,976	10,357	13,332
2023	3,123	11,125	14,248
2024	3,270	11,893	15,163
Growth rates			
2014-2024	N/A	10.8%	N/A
2009-2024	7.6%	-	19.2%

Cargo in thousands of tonnes

Source: IATA

According to the most likely forecast scenario, cargo volumes at YXX grow to 15,163 annual tonnes by 2024. Growth between 2009 and 2024 will be at an average rate of 17.7% in the most likely, 19.8% in the high and 14.3% in the low scenario. In all scenarios, these high-growth figures are due to the low basis and the volumes added by all-cargo flights. Growth of belly cargo will be 7.0%, 8.8% and 4.5% in the most likely, high and low scenario, respectively.

4.10 Opportunities

In the context of all preceding content, the opportunities for BC's airports fall into two basic categories: 1) Passenger flights carrying belly cargo and 2) Freighters, including technical stops. For YVR in particular, developing these is far from mutually exclusive but rather may involve pursuing passenger and then freighter operations from the same carriers. In terms of results, the IATA consultants believe BC is likely to benefit first from expanded international passenger flights augmenting YVR's belly cargo capacity offerings that ideally will nurture shipping patterns sufficient to justify freighters.

4.10.1 Passenger Service (Belly Cargo)

As Canada's transpacific gateway with existing passenger service from six carriers based in Asia, YVR is likely to benefit from the liberalized regulatory environment created by Canada's "Blue Sky" Initiative. While that program is not specifically focused on air cargo, YVR's air cargo development will benefit from the additional cargo capacity offered by Asian wide body service. Although long-haul passenger flights are not likely to be driven by potential cargo volumes, carriers readily acknowledge that air cargo revenues often comprise the difference between losing money and making a profit on routes with thin operating margins. Consequently, IATA Consulting recommends emphasizing air cargo information in presentations YVR staff may give to international passenger carriers.

For YVR, the benefits of the "belly cargo" emphasis are several. As the Study details, BC does not presently enjoy a competitive advantage in the commodity mix of industry currently based in the province. Moreover, North America already suffers a tremendous directional imbalance with heavier loads eastbound from Asia. Belly carriers transporting passengers on predominantly roundtrip flights are more able to endure cargo imbalances.

As noted earlier, freight forwarders control 76% of international shipments and greatly prefer gateways with the superior mixes of carriers, frequencies, destinations and that offer both belly

and freighter capacity. Together, these constitute the network connectivity that causes forwarders to favor one gateway over another for consolidations. As was determined in the Road Feeder Services analysis, forwarders are already trucking cargo north to YVR from Washington State to access lower freight rates offered by transpacific belly carriers but only on a limited basis.

Because YVR already has extensive transpacific passenger service, prospects for new service are limited but heading the list would be a carrier that already knows the market well – Singapore Airlines. The carrier's previous decision to suspend service should not be perceived as a referendum on YVR as a market. Singapore is in the group of eight expanded bilateral agreements negotiated under the "Blue Sky" policy.

4.10.2 Freighters

The BC industrial profile is not presently conducive to attracting extensive new freighter operations. Consequently, BC's airports will require greater gateway consolidations of transit cargo either trucked to/from other markets or interlined by air carriers until BC is able to expand its regional demand. While not limited to freighters, Canada's Air Cargo Transhipment Program could be particularly beneficial to extending the use of BC's airports as regional consolidation nodes even for shipments originating or destined south of the national border.

YVR has resources in the near to mid-term in supporting freighters. BC has comprehensive multimodal resources used by freight forwarders and compared with other Canadian international gateways, YVR has a more local base of forwarders potentially serving as allies in supporting new freighter service. Most obviously, YVR management should coordinate its efforts more closely with the sea-air specialists identified in the Study. Moreover, even in a liberalized environment, foreign cargo carriers cannot replicate the extensive Canadian domestic networks of a carrier like CargoJet, which has already demonstrated interest in advancing its international profile through interlining. Airport management and its allies in the trade development community should not only coordinate promotion of its multimodal resources with its seaport but should also extend its cooperative marketing to include private freight forwarders and potential interlining partners such as CargoJet and Air Canada, as well as RFS trucking companies in order to give foreign carriers as much confidence as possible.

Drawing from its current tenants that only operate passenger service at YVR but freighter service at other gateway airports in western North America, YVR should target initial efforts at

potential expansions into freighters by Air China (operating freighters at PDX, LAX and SFO), China Airlines (freighters at SEA, LAX and SFO), EVA Air (freighters at SEA and LAX), Korean Air (freighters at Calgary, SEA, SFO and LAX) and Lufthansa (freighters at SEA and LAX). Given BC's origin and destination cargo demand, it is unlikely international carriers would first be drawn to YVR as freighter-only operators. As is presently done by Cathay Pacific which couples YVR freighter service with stops at SFO[13] to build westbound loads, YVR's most promising approach is to have the airport added as an intermediate stop on existing service between North America and Asia.

Not unrelated to the preceding strategy of promoting YVR as an intermediate stop for transpacific carriers already serving North America, both YVR and YXX offer potential as technical stops for long-range transpacific freighters that helped make Anchorage International Airport (ANC) one of North America's busiest airports in terms of cargo operations. Compared with Anchorage, British Columbia's potential regional contribution to payloads should compare favorably and the previously mentioned Canadian transshipment program offers international carriers interlining and other opportunities somewhat analogous to the preferential treatment US regulators gave to Alaska's airports. Perhaps most importantly, ANC recently lost Northwest Airlines' freighter hub operation when acquirer Delta Airlines decided to terminate its freighters.

The strong imbalance over the Pacific favoring fuller loads eastbound has already allowed carriers flying longer-range, more fuel-efficient aircraft to routinely skip Alaskan tech stops on westbound flights. Asian carriers have reduced additional freighters during the global recession. ANC's 35% drop in freighter landings and 17.2% decline in cargo traffic have caused it to drop from being the second busiest airport in the world to the fifth. "We are trying to hold down costs to remain competitive with airports globally"[14], said ANC Airport Manager, John Parrott. Given how little ANC's local market contributes to payloads and the loss of transfer volumes and connectivity previously provided by Northwest Cargo, BC's airports may be in their best competitive position since ANC's ascent – especially with Canada's own Air Cargo Transshipment Program offering similar benefits to the Alaska Air Cargo Transfer Initiative. Korean Air projects as the best initial prospect for Vancouver and Abbotsford but it also serves tech stops from (among others) Air China Cargo, Asiana Cargo, China Airlines Cargo, China Cargo Airlines, EVA Air Cargo, Great Wall Airlines, JAL Cargo, Korean Air Cargo, Nippon Cargo Airlines and Singapore Airlines Cargo.

[13] Seasonal adjustments were introduced during the writing of different chapters. In some cases CX combines YVR service with LAX and sometime with SFO, depending on market conditions

[14] "Alaskan Airports Cut Jobs as Fortunes Fall", Air Cargo News, September 4, 2009

4.11 Highlights

- The Lower Mainland Air Cargo Study is an essential complement to successful past BC efforts in maritime, rail and trucking. The air cargo effort will leverage the area's stronger transport modes to benefit its smallest (in tonnage).
- Especially after losing two large former shippers (Kodak & Nortel) the industrial profile of BC is not presently conducive to new international freighter frequencies, absent substantial feeder traffic by truck or an interlining air carrier
- Internationally, YVR is more belly cargo capacity-driven than demand-driven.
- In terms of regulatory reforms, YVR is more likely to benefit in the near-term from passenger service opportunities afforded by Canada's "Blue Sky" International Air Policy, while the government's Air Cargo Transshipment Program is more of a medium to long-term proposition.
- Differences in air cargo security requirements between Canada and the US are unlikely to be substantial or enduring and therefore unlikely to provide a competitive advantage to airports on either side of the border.
- The opportunity to combine an YVR freighter stop with other markets – as presently done by Cathay Pacific over LAX[15] – is critical.
- While carriers suggest cargo rarely influences the expansion of passenger routes, representatives freely admit cargo revenues are critical to retaining such operations.
- While belly cargo and other all-cargo airlines have experienced dramatic losses, integrated carriers have expanded their dominance at YVR, not least through their contracts with Canadian carriers such as Cargojet.
- YVR has competitive advantages in having a much more local base of powerful freight forwarders than is typical of other markets. Including forwarder units of integrators, freight forwarders control about 76% of international shipments.
- Cargo facilities at YVR generally generate positive reviews from cargo tenants, aided by YVR's recent retention of additional freighter parking positions.
- Sea-air cargo should return to its former prominence as rebounding economies drive air cargo rates up and magnify the spread between air and ocean rates.
- Currently air cargo is trucked from BC to Seattle to leverage superior freighter capacity to Europe, while it is trucked to YVR from Washington State to exploit cheaper belly rates on transpacific routes.

[15] Seasonal adjustments were introduced during the writing of different chapters. In some cases CX combines YVR service with LAX and sometime with SFO, depending on market conditions

- In recent years, YVR's cargo volumes have trended more like those of the US western region than like its Canadian peers. Simply by having a smaller loss in 2009, YVR passed Portland among North America's largest cargo airports.
- YVR's competition with other Canadian airports is mostly limited to competing for the limited capacity carriers are willing to dedicate to the Canadian national market.
- Near-term marketing priorities should likely focus on expanding international passenger flights with belly capacity, as well as encouraging Asian combination carriers to add freighters to passenger-only services.
- Currently, YVR may offer strategic advantages on technical stops between Asia and Latin America but compares unfavorably to Anchorage on routes to most major North American destinations. However, Anchorage has been weakening as a dominant gateway for such operations.
- Maintain an enduring marketing effort that leverages all modal resources at BCs disposal and thereby provides Vancouver International Airport and Abbotsford International Airport with the leverage found in its competitive strength by ocean, truck and rail