PLANNING FOR A MULTIPLE AIRPORT SYSTEM IN THE LOWER MAINLAND

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ABSTRACT

As the popularity of air transportation has grown, so has the traffic at airports around the world. Many North American airports are becoming increasingly congested as more people are flying and as more aircraft and airlines are operating. As aircraft movements at these airports have risen, so has the call for expansion of these facilities. Vancouver International Airport is one such case.

Built on Sea Island in 1931, Vancouver International has served the people of the Lower Mainland very well over the years. Recent trends in the aviation industry, coupled with Vancouver's strategic location with respect to the Pacific market and the Lower Mainland's rapidly increasing population, have resulted in a major jump in the air traffic volume at Vancouver International over the past decade.

Airport planners and government officials have responded to this rapid growth by implementing various enhancement measures and by proposing the physical expansion of Vancouver International by building a third runway. A third runway will greatly improve conditions at Vancouver International by reducing congestion and consequently decreasing aircraft delays. With the third runway in place, Vancouver International will be able to effectively compete with other west coast airports in attracting new business and investment, especially from the rapidly growing
Pacific Rim. But an important question remains: for how long?

Built on an island, Vancouver International can only expand by so much. The third runway represents the last major expansion possibility available to the airport. If aviation forecasts for the region are essentially correct, or more importantly, are considerably under-estimated, Vancouver International will be congested once again early in the next century.

Therefore there is a need at this time to begin planning for the inevitable: a multiple airport system in the Lower Mainland. Vancouver's growing stature as an international city indicates that growth in this region will continue well into the next century, but all may be for not if this region cannot offer an efficient and effective airport system. Only a multiple airport system will be able to handle the predicted passenger and cargo loads resulting from this growth and recognition of the Lower Mainland.

There is no need to begin building a second airport at this time; however planning for such an airport system must begin soon. This planning involves:

* Deciding on an appropriate location
* Ensuring that land is available for all airport infrastructure requirements (roads, transit links, parking, and airport related industrial complexes)
* Notifying the public of airport development intentions
* Incorporating a development plan for the second airport
The question of when to build a second airport or even if a second facility should be built remains undetermined but if planners wait until it is absolutely necessary to build one, the land and time required may not be available. Everyone will lose. Hence, the time is now to beginning planning for a multiple airport system in the Lower Mainland.
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1.0 INTRODUCTION

In the past, the primary objective of Canadian airport development was to locate airports near the developing urban centres. Although often originally designed for military purposes, these airports served Canadians well as commercial aircraft facilities. Today, many of these original airport sites are no longer ideal for the metropolitan regions that they serve. As Canada's larger urban centres grew, airports became surrounded by non-compatible commercial and residential developments, thereby imposing limitations on any potential future airport expansion or development. To make matters worse, the aviation industry itself has seen unprecedented growth in the past two decades - placing increased pressure on the capacity of many of these airports.

Recently, some of Canada's larger and busier airports have been under increasing pressure to expand operations as air and surface congestion intensified at these sites. For Montreal, Toronto, and Vancouver, airport expansion has been a prominent issue over the past twenty years as air traffic levels approached these airports' capacities. Although each airport may be as unique as the cities themselves, the primary question each city faces in airport development remains the same: do we expand the existing facility or do we develop new facilities in a separate location? Montreal chose to build a new airport site while Toronto chose to expand its existing airport. Now it is
Vancouver's turn to choose.

Over the past decade, congestion at Vancouver International has been a growing problem for not only the airport users and operators, but for the entire province itself. Congestion at the airport results in aircraft delays, thereby inducing higher costs for both the passengers and the airlines. As these delays persist, the province as a whole will lose potential economic investment as people and companies will avoid the congested airport. As air traffic levels and congestion rises, the environment will be further contaminated while natural habitats will continue to be disrupted and displaced. Hence, everyone loses.

In its first decades of existence, Vancouver International experienced various forms of expansion and enhancement of its facilities when air traffic levels at the airport warranted it. Since the 1960's, no substantial expansion program been implemented. This is not to say that expansion has not been considered. Proposed expansion to the site - in the form of a third runway - has been discussed for nearly thirty years. For various political, environmental, and economical reasons, construction of this third runway has been constantly postponed. Congestion at Vancouver International has now reached levels which require the airport to expand in order to remain an important and efficient component in the Canadian airport system. The time has come to build this third runway at Vancouver International as the existing infrastructure has reached its
capacity limit.

The addition of a third runway will no doubt relieve present and future congestion problems at Vancouver International. Available space on Sea Island (location of Vancouver International) is limited. There is only enough room for an additional runway. Further expansion by way of a fourth runway is impossible. If present aviation trends continue and airline industry forecasts are accurate, the addition of a third runway will only represent a short-term "band-aid" solution to the far more serious long-term problem of airport congestion.

Vancouver International can play a pivotal role in Canada's future economic development given Vancouver's strategic location with respect to the Pacific Rim. In order for Canada to reap the potential economic windfall in this constantly growing market, Vancouver must be an effective transportation link between Canada and the Pacific. In other words, Vancouver must be able to offer a productive and efficient airport system. Without such an airport system, Vancouver's economic growth will stagnate and the airport will become a major handicap to the city, province and country.

In order to ensure the future economic strength and well-being of Vancouver and the province of British Columbia, planners must be ready to look beyond the short-term solutions and instead plan for the long-term. Airport planners must be prepared to develop an airport system in the Lower Mainland which will be able to satisfy the needs of the local citizens and the country
itself well into the 21st Century. Now is the time to give careful consideration to developing a multiple airport system in the Lower Mainland. This is not to say that a second international-sized airport site should be developed now or even in the next several years, but thoughtful preliminary planning must begin soon. An airport cannot be built overnight. It can take up to a decade before a new airport is fully operational. This time span does not even include the time required to locate a new site, develop the necessary infrastructure and consult with the public and private sectors. Therefore it is necessary to begin preliminary planning of a multiple airport system soon in order to ensure that, if and when a second airport is required, a efficient and effective airport system can be implemented.

1.1 Purpose and Scope

The purpose of this thesis is to examine the need for the preliminary planning for the development of a multiple airport system in the Lower Mainland. A multiple airport system refers to an air transportation system in which there is more than one airport serving mainline commercial air traffic for a metropolitan area. In the case of the Lower Mainland, a multiple airport system would involve Vancouver International operating in conjunction with a second international-sized commercial airport,
both serving air carriers and cargo operations. Several smaller airports would serve general aviation operations.

This thesis will analyze in detail four specific aspects facing planners when developing a multiple airport system:

1. Why should a second airport site be planned for and developed? In other words, what justifies the decision to build a second commercial airport instead of expanding present facilities?

2. When should this second airport site be planned and developed? Can planners afford to wait until congestion problems force the creation of a multiple airport system?

3. Where should this second site be located? Is there a location presently used as an airport which can be expanded or is there a sufficient amount of undeveloped land available to build a new airport?\(^1\)

4. How will this second site be developed? In other words, how will the airline operations be integrated between the two airports and how will this affect both the passengers and the airlines?

\(^1\) It is important to note that it is not the explicit purpose of this thesis to decide on the best location for a second commercial airport in the Lower Mainland. Although the question of location will be dealt with in this paper, the time and resources required for such an undertaking are not possible within the framework of this paper. Suggestions of suitable locations will be offered.
Certain assumptions or premises are taken into account in presenting this proposal:

* Air traffic at Vancouver International will continue to grow at present or higher rates.

* A suitable second site for a commercial airport in the Lower Mainland is possible.

* Present commercial airport facilities on Sea Island have reached or will soon reach capacity.

* The current surface transportation infrastructure surrounding the present airport site has reached or is near capacity. Moreover, this infrastructure cannot be easily adjusted or expanded to effectively meet increased ground traffic volumes due to heavier air traffic volumes resulting from added capacity at Vancouver International.

Although this paper focuses on the airport system in the Lower Mainland, references will be made to national and international airport systems. Comparing Vancouver's airport system to that of London's or New York's is like comparing night and day as their location, size, and population base are vastly different. Important lessons can be learnt about multiple airport systems and how to implement such a system in the Lower Mainland by using examples from other regions of the world.

The main principles of airport planning will be incorporated within the framework of this paper. These principles can be
summarized as follows:

1. RECOGNITION OF NEED
   - Planners must recognize the need at a time sufficiently in advance of this need to permit the orderly development of facilities.

2. STATISTICS AND FORECASTS
   - A crucial element in the determination of need for an airport. Most planning decisions in airport development are based on statistical analysis and forecasting.

3. EXAMINATION OF ALTERNATIVES
   - At this stage in airport planning, it is important for planners to assess requirements and possible solutions to the current airport situation. In other words, do you expand the present site or develop a new site?

4. SITE SELECTION
   - A critical factor in the potential success of a new airport. Selection of a new site will depend on:
     * availability of land
     * terrain and meteorological conditions
     * access to surface transport
     * environmental concerns
     * effect on airspace

5. LAND ACQUISITION
   - This involves the securing of an agreed upon site in order to prevent undesirable land speculation.

6. DEVELOPMENT PLAN
   - Having decided to build a new airport and where to build it, airport planners must then determine what and how much to build.

7. CONSULTATIVE PROCESS
   - Airport planners must provide a forum for consultation on all important airport planning matters. Parties involved in this process would include: the airlines, the general public, and air transport oriented industries.
8. PASSENGER TERMINAL CONSIDERATIONS
   - This planning involves the level of service at the new terminal, the design of the terminal, and the operating procedures.

9. AIRPORT OPERATIONS PLANNING
   - Airport operations planning involves evaluating operating concepts and management systems. This includes manpower needs, cost recovery and related financial planning, and leasing and marketing activities.

As mentioned, these principles of airport planning will be discussed with respect to the current and possible future airport system in the Lower Mainland. It is important to note that these principles will not be discussed in the above order, but will be dealt with throughout the context of this paper.

Finally, there are many external factors which can affect the demand at an airport. These external factors include the population growth rates of the region, the demographic composition of this population, the economic climate in a regional and national context, and technological innovations in the aviation industry. Although these factors are when planning airport systems for a region such as the Lower Mainland, they will not be dealt directly within the framework of this paper. Each of these factors alone could warrant a report of this size.
1.2 Organization

The organization of the thesis is as follows:

Chapter Two summarizes the principal factors involved in airport planning strategies and airport systems. This chapter will focus on defining what characteristics a good airport is composed of and what elements must be taken into account when planning for the development or expansion of an airport facility. The differences between single and multiple airport systems, including the advantages and disadvantages of each system, will also be discussed along with the factors which help to determine which system is best suited for a particular region.

Chapter Three discusses recent trends in the aviation industry on a regional, national, and international scale. An airport is not solely affected by local or regional factors, international aviation trends and decisions can heavily impact the operations of an airport. Discussion will focus on passenger volumes, aircraft types and sizes, and events such as deregulation and the introduction of a possible "Open Skies" policy - all of which have had major impacts on airport planning strategies and airport systems in Canada.
Chapter Four discusses airport planning and development in British Columbia. It is important to understand the present airport system in existence in the Lower Mainland in order to better understand the argument for a multiple airport system in this region. This chapter will specifically focus on the current situation at Vancouver International, including traffic types and volumes, and will also present current and proposed airport strategies to relieve airport congestion at this airport.

Chapter Five details the concept of a multiple airport system in the Lower Mainland. This chapter presents the factors and elements involved in planning and developing this form of an airport system in the Lower Mainland. Specifically, questions as to why such an airport system should be implemented, when a multiple airport system should be developed, how operations would be split between the facilities and where a second airport would be located, will all be discussed.

Chapter Six summarizes the arguments offered in support of a multiple airport system in the Lower Mainland and proposes which steps should be taken now in order to ensure that the implementation of such an airport system is preformed at the appropriate time and in proper conjunction with the existing facilities and infrastructure.
2.0 OVERVIEW OF AIRPORT PLANNING STRATEGIES AND AIRPORT SYSTEMS

2.1 Introduction

The primary function of an airport is to facilitate the movement of both passengers and cargo by air. As part of a larger logistical system, an airport allows for the efficient flow of goods and people both to and from a region. An airport also acts as a transfer node between two regions. Moreover, an airport allows for the transfer of passengers and cargo from one mode of transport (aviation) to another (surface transport). An airport is a vital component of a national or international air transportation system and as such, is an important transportation and communications link, helping to ensure the effective movement of people, goods, and services.

Airports do not solely affect transportation; airports have a great impact on most facets of urban life. Airports represent the largest land users on the urban periphery. At one point, Mirabel International Airport was roughly twice the size of the city of Montreal. The surface area of the Dallas/Fort Worth Airport is larger than Manhattan Island while Charles de Gaulle Airport is nearly one-third the size of all of Paris.¹

Operations of this magnitude can have both positive and negative impacts. Airports represent a strong source of potential economic benefits in such areas as employment and capital investment. In the case of Vancouver International, the airport generates nearly 3 billion dollars a year in economic output while directly employing or sustaining 45,000 jobs.\(^2\)

The urban environment surrounding the periphery of airports can be seen both as an economic benefit and as a social ailment. The City of Richmond, which surrounds Vancouver International, estimates that the economic impact of the airport on this community in 1987 amounted to 423 million dollars (total direct, indirect and induced) while 35% of all jobs created by the airport are situated in Richmond.\(^3\)

Airports can also have negative impacts on the character of adjacent communities and can alter the everyday lifestyle of its citizens. Problems such as air and noise pollution irritate residents and can make a common act of life such as talking and listening a difficult task. Increased traffic congestion not only generates more noise and air pollution, but also makes the streets more dangerous for children and pets. Other elements such as decreasing real estate values, water pollution, and disrupted

\(^2\) Transport Canada. *The Economic Impact of Vancouver International Airport.* TP 9820 (Vancouver, 1989).

wildlife habitats all help to deteriorate the quality of life in neighbourhoods surrounding an airport.

Each individual may have a different perspective of an airport. Political and community leaders see an airport as an important gateway to the country, an important source of revenue and job creation, and a major component of growth and prosperity. The airlines see the airport as a critical (and obviously necessary) element in their business. Persons living near the airport may see it as a major force in their economy, a necessary evil, or in some cases, a continuous irritant. For the air traveller, his perspective is essentially based on convenience. For example, how easy is it to get to the airport? Are flights constantly delayed? Is parking convenient and easily accessible?

Although there is a large degree of variance in the perspectives on an airport, these facilities can be judged on certain basic and objective criteria:

* Design should be aesthetic and functional.
* Access to and from facility should be convenient and sufficient to handle current and future traffic demand.
* Facility should be safe and efficient.
* Airport should be responsive to future needs dictated by growth and be sensitive to community needs and the needs of its surrounding neighbors.

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An airport which responds positively to this criteria would have to be considered a "good" airport. In other words, both efficient and effective. In most instances, this is not the case. Therefore airport planning and development is a highly complicated and controversial task. It is very unlikely that an airport will suit or please everyone affected by its operations. If certain objectives and precautions are taken into account, an airport will be able to operate with a minimum amount of criticism or concern.

2.2 Airport Development

In general, there are four major decisions associated with airport development, all of which are influenced by various technological, economic and legal factors. These decisions are:

1. Whether to build additional infrastructure.
2. Perceived alternative responses to demand (between expanding existing facilities and the development of a new airport).
3. Site location of new air facilities.
4. Procedures and timing for site acquisition.

Within each decision, various assumptions and considerations must be made. Past airport development has shown that some of these decisions have been compromised or neglected through poor planning.

Commercial aviation forecasting is difficult as major decisions are based on information which, in most cases, can be very questionable. The poor reliability of commercial aviation forecasting is due in part to the wide range of critical variables which continue to expand while the planners' ability to control them appears to be diminishing. For example, during economic growth, it is safe to assume there will be a corresponding growth in the aviation industry. But the world economy is not commanded by transportation planners.

Airport planners will justify expansion by projecting traffic growth which exceeds capacity. There are certain assumptions made by planners with regard to justifying expansion. First, when airport planners decide that future demand will exceed the capacity of a facility, they have done so by calculating the capacity of the facility - a calculation which in itself is based on certain assumptions. Capacity is calculated for the worst case scenario. In other words, the time of the day, week, and year when the airport is under its greatest demand. In many cases, these facilities may be under-utilized throughout most of the year yet planners do not attempt to solve this discrepancy by limiting peak demand. It is rare for airport planners to limit peak hour demand (in some cases by shifting
traffic or moving non-commercial aircraft) and hence these planners assume that public facilities such as airports are open to everyone and function with a minimum amount of operating restrictions.

The decision to expand an existing site or creating a new facility is usually dominated by economic considerations. It is safe to say that a new airport can be built in virtually any region of Canada, however, the incredibly high costs of such a venture often prohibit it. With such a potentially expensive decision, careful calculations must be preformed in order to fully recognize the economic feasibility of expanding a present site (which in many cases may already be feeling the effects of urban encroachment) or developing a new and less restricted site. These economic calculations, like traffic forecasting, are based on certain assumptions. Planners frequently do not include indirect costs such as noise and pollution - which affect the surrounding neighbourhoods - as pertinent economic criteria when making the choice. Planners also tend to be short sighted in their economic considerations. In the short term, expansion of present facilities may seem economically beneficial yet long term forecasts may indicate the need for the development of a new location.

There are many various technical considerations which are required when deciding on the location of a new site. These considerations include topography, meteorological conditions, the surrounding urban and transportation infrastructure and its
relationship to air transport requirements, and the availability of land. Given past experiences, these considerations are not necessarily given sufficient importance. The Charles de Gaulle Airport in Paris is plagued by fog while Chicago's Midway Airport and Washington's National Airport are surrounded by homes. Many of the world's larger and busier airports appear to have been located for reasons based on other considerations rather than technical ones.

2.3 Airport Systems

There are two basic airport systems in operation today: the single airport system and the multiple airport system. Which system is implemented will depend on various factors - all of which will be different for each city. These factors include demand, location, atmospheric conditions, the topography of the region, and facility capability.

7 Ibid, p. 19.
A. The Single Airport

A single airport (and its airlines) serving a particular city will be competing with other modes of transport. The traffic this airport and its airlines will generate depends on the comparative advantages they can provide as compared to the other modes of transport. In this case, the airport's advantage in offering high speed transportation is offset by the generally higher cost of this service. Airports and airlines in general will capture practically all of the long distance trip market. The high speed of aircraft will save the passenger travel time and consequently travel expenses (lodging and meals).

Airports try to entice passengers by offering new, comprehensive, and efficient terminal service. Any additions or up-grading of these facilities will probably lead to increased costs to the passenger since construction costs can be passed on to airport users through increased parking fees or directly through fare increases due to higher charges for aircraft operations.

The location of the airport will have a direct impact on the level of air traffic. Cities like to keep airports as distant as possible due to noise and pollution concerns. Hence when new airports are built to replace existing facilities, they are located at a much greater distance from the city as compared to the old location. Air transportation at these distant airports tend to be relatively less attractive as compared to other modes
of transport, especially with respect to short distance trips. Remote airports will usually require some form of high-speed ground link to the city centre, thereby adding to the overall cost of the development of such an airport.

B. Multiple Airports

As airports become congested, planners and developers attempt to increase capacity by expanding the existing facilities. This is not always possible. If expansion is difficult or impossible, planners look toward the development of a new airport and thus creation of a multiple airport system. Under this system, one or more satellite airports will be associated with the main airport serving a particular metropolitan area. Multiple airports serving one city are becoming more common in the world's airport system. In 1989, eight of the world's top twenty destinations (based on passenger and freight movement figures) operated with multiple airport systems, including the top five. Although the creation of a multiple airport system may solve the problem of air and surface congestion, other difficulties are encountered.

The question of how to split the traffic between satellite airports and the primary airport is very important. In many urban centres, general aviation and pleasure flights operate out of specific facilities created for this purpose. Thus, it is more

important to focus on commercial traffic. In order to do so, the behaviour of both the airlines and passengers must be analyzed. It is a common assumption that traffic at an airport depends on the airport's ability to influence its "catchment area". This catchment area refers to the particular territory surrounding the airport for which this facility serves. Certain studies have shown that airports do not have to depend primarily on their catchment area. Analysis has shown that people may deliberately avoid the closer airport and instead use a larger and busier, although more distant - facility. This phenomenon will usually occur when the more distant airport can offer more efficient service with respect to the number of flights offered to a certain destination and better terminal services. The frequency of airline flights plays an important role in decisions regarding which facility to use. The greater the number of flights to a certain location that an airport can offer will likely mean more convenient departures, and hence more attractive service to the originating passenger.

Moreover, a connecting passenger using a multiple airport system will likely use the airport with greater service since this facility will offer more possibilities for transferring to connections. It is important to note that not all passengers are concerned with frequency. Passengers using charter operations will not be concerned with frequency as there is only one departure time.

A survey in Cleveland showed that over half the air
travellers from Akron (with a population well over 400,000 at the time of the survey) will drive 25 miles beyond Akron's airport to use the facilities at Cleveland.\(^9\) In general, data indicates that more distant satellite airports will generally attract approximately \(\frac{1}{4}\) of their passengers from their catchment area.\(^10\) Therefore, it is important for a second airport to be attractive to potential users outside of the airport's catchment area in order to be effective.

Satellite airports are considered an economic handicap by many airlines due to their lack of attractiveness to passengers. Furthermore, airlines are strapped with added costs by having to double their operations, staff, and equipment. Thus, many airlines prefer to concentrate their services at the main metropolitan airport. Studies have shown that satellite airports may only generate 10% of a metropolitan's total aircraft traffic.\(^11\) Hence policies are often implemented in which airports in a multiple airport system cater to specific markets. In New York, La Guardia caters to domestic flights while Kennedy serves the international market. The same can be said for multiple airport systems operating in cities such as Montreal, Paris, and Chicago. Airport planners must be prepared to accept the fact that airlines are unlikely to offer to divide their services


\(^10\) Ibid, p. 71.

between two or more airports. One way of easing this problem is for each airport to serve a certain designated sector of air traffic.

In order to ensure a proper distribution of traffic between airports, governments and planners have been known to implement certain policies. In the United States, the Federal Government has implemented a quota on the total number of operations that can use a certain airport, as is the case in New York and Chicago. In Britain, certain airlines are authorized to use a particular airport. For Canadian carriers serving London, Air Canada is authorized to use Heathrow Airport while Canadian International is authorized to use Gatwick Airport.

Planning for multiple airports is a complicated process, requiring great consideration to all facets of the aviation industry. Planning for second airports is not simply a matter of organizing traffic separation between the two airports. Operations at each airport must be planned with respect to the service that it will provide to the entire airport system in its region and the aviation system nation-wide.
3.0 RECENT TRENDS IN THE AVIATION INDUSTRY

3.1 Introduction

Before discussing a specific airport system such as that in the Lower Mainland, it is important to analyze the airline industry as a whole. An airport such Vancouver International is not affected solely by factors in the surrounding region, but is affected by many factors on an international scale. Recent trends and events in the aviation industry, such as new aircraft types, increasing passenger volumes, the advent of deregulation, and the growing interest in "Open Skies", have brought about unprecedented growth and changes in this industry.

Air transportation has become a very popular and efficient way to travel and forecasts indicate that this popularity will continue. As this popularity has grown, so has the traffic at airports around the world. Airports are becoming more and more congested as more people are flying and as more aircraft and airlines are operating. Recent statistics in the aviation industry indicate that present congestion levels at airports is not a temporary phenomena and that overcrowding will continue to plague many of the world's busier and more important airports.
3.2 **Passenger Volumes**

World air traffic has grown steadily over the past decade. In 1989, the airlines of the 162 member countries of the International Civil Aviation Organization (ICAO) flew 1,797 billion passengers-kilometers, an increase of 5% from 1988. The total number of passengers carried was over 1 billion for the third straight year and increased by 3% from 1988. A similar organization to ICAO, the International Air Transport Association (IATA) expects overall growth for air travel in 1990 to be 8% and will continue to grow at a rate of 6.5% over the next five years. The fastest growing region will continue to be the Far East, with annual growth estimated at 9.9% for Northeast Asia and 8.8% for Southeast Asia through to 1994. The estimate for North American travel for this same time period is an annual rate of 6.8%, while Europe will show a growth rate of 6.2%.

Statistics for Canada and the United States show the same substantial growth as that of the world market. In Canada, the number of passengers travelling by air has more than doubled

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3. It is important to note that these estimates were made before the Middle East crisis (Gulf War) and the current economic recession that most countries have been experiencing since 1990. It is likely that the 1990 estimates will be higher than the actual rate due to this crisis and due to the present economic conditions.
since 1970 while the number of passengers travelling by air in the United States has almost tripled since 1970. In Canada in 1988, passenger-kilometers increased by 16% from 1987 while there was an 18% increase in takeoffs and landings. Between 1984 and 1988, the total number of passengers using Canadian airports increased by 24%. It is estimated that by the year 2000, over 25 million passengers will have travelled by air in Canada in that year while over 48 million passengers will have either flown in or out of the country. In the United States, it is estimated that over 680 million passengers will have flown within the country in the year 2000 while over 763 million will have flown in or out of the country.\(^4\)

3.3 Aircraft Type\Sizes

As would be expected, the growing popularity and use of air travel in recent years has led to a corresponding increase in the number of aircraft required to satisfy these demands. By the end of 1989, there were 9,160 jet transports operating in the world, 4,464 of which operate in the United States.\(^5\) Anticipated growth in air travel indicates that present fleets are not sufficient in numbers to meet predicted demand. Between 1990 and 2005, it is


estimated that the world's airlines and air cargo companies will require an estimated 10,000 new aircraft in order to replace older aircraft and meet anticipated growth. As the size of airline fleets continues to grow, airports will suffer increased congestion due to the larger numbers of aircraft operating.

There are several misconceptions about the status of the world's aircraft fleet. Firstly, although new aircraft presently being built or being developed are in many cases larger than their present counterparts, the difference in capacity is not that substantial.

**FIGURE 1**

**COMMERCIAL JET AIRPLANES**

<table>
<thead>
<tr>
<th>Committed Products</th>
<th>McDonnell Douglas</th>
</tr>
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<tbody>
<tr>
<td>Boeing</td>
<td>MD80 Series</td>
</tr>
<tr>
<td>737-300/-400/-500</td>
<td>DC10-30/MD11</td>
</tr>
<tr>
<td>757-200/ER/PF/Combi</td>
<td></td>
</tr>
<tr>
<td>767-200/-200ER/-300/-300ER</td>
<td></td>
</tr>
<tr>
<td>747-200/-200 Convertible/-200SR/-200 Freighter</td>
<td></td>
</tr>
<tr>
<td>747-300/-300 Combi</td>
<td></td>
</tr>
<tr>
<td>747-400/-400 Combi</td>
<td></td>
</tr>
<tr>
<td>McDonnell Douglas</td>
<td></td>
</tr>
<tr>
<td>MD-91X</td>
<td></td>
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<tr>
<td>MD-92X</td>
<td></td>
</tr>
<tr>
<td>Airbus</td>
<td></td>
</tr>
<tr>
<td>A320</td>
<td></td>
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<tr>
<td>A310</td>
<td></td>
</tr>
<tr>
<td>A330-600/-600R</td>
<td></td>
</tr>
<tr>
<td>Fokker</td>
<td></td>
</tr>
<tr>
<td>F-28</td>
<td></td>
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<tr>
<td>F-100</td>
<td></td>
</tr>
<tr>
<td>British Aerospace</td>
<td></td>
</tr>
<tr>
<td>146-100/-200/300</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Products in Development/Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boeing</td>
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<tr>
<td>7J7 and Derivatives</td>
</tr>
<tr>
<td>757 Freighter/Convertible</td>
</tr>
<tr>
<td>767 Stretch/Main Deck Freight</td>
</tr>
<tr>
<td>747-200F/747 Advanced Studies</td>
</tr>
</tbody>
</table>

In other words, we will not be seeing aircraft carrying a thousand passengers landing at our airports in the near future and probably not until well into the 21st Century. The development of aircraft capable of carrying twice the number of passengers as today's large-body aircraft can no doubt help relieve congestion at busy airports as less aircraft will be required to carry the same number of passengers as today; however this possible development can not be considered as a viable solution to airport congestion at this point in time.

Secondly, the introduction of new aircraft does not necessarily mean the removal of older aircraft. Many airlines which acquire new aircraft are doing so to add to their capacity, and not to replace existing aircraft. For instance, American Airlines has increased its fleet size by 225 aircraft between 1983 and 1988 but still operates 164 Boeing 727's (a twenty year old aircraft). American Airlines only retired two of these aging aircraft since 1983. On the world scale, in 1985 and 1986, only 45 aircraft were retired while the size of the world fleet increased by 11%. Thus, as airlines hold on to their old aircraft and continue to purchase new aircraft, airports will continue to get busier and consequently will require more space.

Even when airlines do retire their old aircraft, the planes are not necessarily scrapped. For instance, Air Canada is

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7 Ibid, p. 131.
presently phasing out its old 727 aircraft but these aircraft are not being eliminated from the world fleet. Federal Express, an air cargo company, is purchasing these aircraft and hence these planes will still be contributing to the increasing congestion at airports.

Airlines are continuing to order aircraft at a very steady rate. The Boeing Aircraft Company has reported a backlog of over 1,700 aircraft with deliveries of new aircraft scheduled through to the year 2000. Presently, Boeing is attempting to produce commercial aircraft at a rate of 34 per month. In the United States alone, the two largest air carriers (American and United) have, combined, firm orders for 513 aircraft with options to buy roughly another 400 aircraft.

3.4 Deregulation

The advent of deregulation in both Canada and the United States has had profound effects on airports in North America. Under deregulation, airlines are permitted to set their own fares and choose their own routes and the frequency of their service on these routes. Governments will still regulate safety and air


traffic control. Deregulation has resulted in the creation of new airlines and new routes. With more routes and aircraft being offered, airports have become increasingly congested. In the United States, airline service has expanded to the point where there are 40% more flights now serving within the U.S. than prior to deregulation.  

Since airlines are allowed under deregulation to set their own fares, there has been intense fare competition between airlines and thus fares are now less than they would have been under regulation. In the United States, fares have - on average - increased since deregulation but at a rate which is less than that of inflation. With deregulation, airlines are now able to price discriminate and can offer large discounts in the off-peak periods, thereby increasing the number of passengers flying in these usually less busy off-peak periods. In 1980, the average discount % off a coach fare in the United States was 43% while in 1988, this average had reached 63%. Therefore, due to increased fare savings - a direct result of deregulation - more people are now flying who otherwise may not have, thereby increasing demand for air travel and increasing congestion at airports.

Deregulation helped to introduce the concept of the "hub and spoke" system. In the past, airlines would generally operate a linear network in which the majority of cities were served by direct flights. Under the hub and spoke system, an airline will

designate a certain airport as its "hub" while the other cities in this airline's network will be connected by "spokes" to this hub. In other words, a "hub" is the point at which various connecting "spoke" flights are scheduled to arrive and depart with the intent of connecting both passengers and cargo to other on-line destinations. Airlines using this system are able to increase departure frequencies, thereby increasing traffic—particularly at the hub airports. For Vancouver International, the airport is a "hub" of four separate "hub and spoke" systems. These systems are:

1. Links local Canadian and U.S. communities to the rest of the world.
2. Serves national and transcontinental routes.
3. A connection point to destinations in the United States.
4. Serves as a regional hub for British Columbia (including corporate aircraft).

The use of the hub and spoke system has meant a great increase in the number of smaller commuter flights serving the communities surrounding a hub. These small airlines or "partners" (subsidiaries) of larger airlines can offer more frequent service to local and regional destinations; however this same frequent service contributes to the congestion at many of the busier airports.
3.5 Open Skies

In October 1990, aviation officials and politicians from Canada and the United States began discussing the creation of a new bilateral commercial air treaty. Under this new arrangement, commonly referred to as the "Open Skies" policy, airlines from both countries would be allowed unprecedented access to all domestic routes on either side of the border. Instead of requiring approval from both nations, airlines will be permitted to fly passengers in their neighboring nation on any route which that airline deems as being profitable. Essentially, Canadian and American airlines will be able to fly passengers anywhere in North America.

By deregulating cross-border traffic, this pact should result in more service and cheaper fares for the passenger. Moreover, this new deregulation pact will result in increased traffic at airports such as Vancouver International. Presently, Canadian Airlines International (CAI) has limited access to the United States from Vancouver, offering service to Honolulu, San Francisco, and Los Angeles. In anticipation of "Open Skies", CAI has applied for 12 new routes, including three new routes linking Vancouver with the United States. With a new air treaty, it is expected that smaller regional U.S. airlines such as Horizon Air

will extend service beyond Vancouver to cities such as Calgary and Edmonton, thereby increasing the number of passengers and air traffic at Vancouver International. Larger American airlines may begin to fly premium domestic Canadian routes such as Vancouver-Toronto.

Given the present situation at Vancouver International, it would not be surprising to see major growth at this airport in both trans-border service and from new carriers on domestic Canadian routes with the advent of "Open Skies". In the first half of 1990, 1.2 million passengers flew between Vancouver and Seattle, yet 70% of these passengers were travelling either to or from other U.S. destinations which are not served by air from Vancouver. In this same time period, trans-border traffic through Vancouver International increased by 16.4%, thereby indicating the potential of new trans-border routes. Presently, Vancouver International offers service to the west coast of the U.S. and two flights a day to Chicago. With "Open Skies" airlines are hoping to be able to offer service from Vancouver to such destinations as Denver, New York, and Atlanta.

12 Ibid, p. 56.
13 Ibid, p. 56.
4.0 AIRPORT PLANNING AND DEVELOPMENT IN THE LOWER MAINLAND

4.1 Introduction

When the City of Vancouver first began to develop a municipal airport, it was not done so much for necessity as it was done for wounded pride. Charles Lindberg, on a world tour following his successful solo Atlantic crossing, rejected visiting Vancouver in 1929 as this city could not offer a proper airport for him to land at. Two years later, on July 22, 1931 Vancouver's first municipal airport opened on Sea Island (see Figure 2).

In its first years of existence, Vancouver's airport was small in size and importance by today's standards. In 1931, 536 passengers arrived at Vancouver's airport on 309 flights, representing an average of 1.73 passengers per flight. It did not take long for Vancouver's airport to begin to prosper. In 1934, transborder service was introduced when United Airlines began service between Seattle and Vancouver. By 1937, Vancouver's airport had two fully paved runways along with an assortment of taxiways and ramps.

During World War II, Vancouver's airport played a pivotal role in the nation's air defence - it was Canada's largest west

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2 Ibid.
Figure 2

Source: Transport Canada.
coast air base. By the end of the war, Vancouver's airport had undergone an extensive development program which saw the creation of new buildings and hangers, and the lengthening of the two runways.

By the 1950's, Vancouver International (the name of the airport was changed from Sea Island Airport to Vancouver International in 1948) had developed into an important transportation link between Canada and the rest of the world. Improvements continued in 1950 when a new terminal was built at the airport and consequently was later expanded in 1957. During this decade, Vancouver International supplied service to points all across the country and also to points in the United States, Europe, Asia and Australia.

The past several decades have seen substantial growth in traffic at Vancouver International. As the number of passengers and flights using Vancouver International has grown, so has the desire for the expansion of these facilities. For more than twenty years, politicians, planners, airport officials and citizens have been discussing and debating a proposal for the creation of a third runway. As Vancouver International's role in Canada's airport system and economy continues to grow, the question of capacity and expansion will remain a critical issue in planning the Lower Mainland's future airport system.

3 The concept of a parallel runway was first presented for public review in 1972. For various political, economic and environmental reasons, the project has been continuously deferred pending further study. By 1990, over 150 studies have been undertaken on this project.
4.1 The Present Airport System

Vancouver International serves both the Lower Mainland and Southern Vancouver Island - a combined population of approximately 2.2 million people. Greater Vancouver represents the third largest urban area in Canada and is this country's business and financial capital of the West. As a whole, airports in British Columbia generate on average 2.2 billion dollars in business a year - Vancouver International representing 1.6 billion of this amount.\(^4\) Apart from Vancouver International, there are 7 other land airports, six large scale float plane facilities, and various small scale landing strips and heliports serving the Lower Mainland. There are also several airports in the United States which have an impact on the airport system in the Lower Mainland. These airports - in the State of Washington - include commercial (Bellingham), military (Whidbey Island), and general aviation airports (Point Roberts and Blaine).

The seven land airports (apart from Vancouver International) spread throughout the Lower Mainland handled over 800,000 aircraft movements last year - almost three times as many movements than at Vancouver International.\(^5\) It is important to note that the traffic composition is considerably different between Vancouver International and these airports. Whereas


\(^5\) Ibid, p. 32.
Vancouver International deals mostly with large commercial multi-engine aircraft, the other seven airports's traffic is dominated by light single engine aircraft and local flights.

As the following descriptions indicate, each of the seven smaller airports has various characteristics and pertinent elements which help to define each facility's role in the overall airport system in the Lower Mainland.

ABBOTSFORD

Abbotsford Airport is located in the District of Matsqui in the Central Fraser Valley, approximately 80km southeast of Vancouver. The airport is owned and operated by Transport Canada. This airport serves as the primary alternate for Vancouver International when facilities on Sea Island are closed due to poor weather conditions. Although the airport is primarily surrounded by agricultural land, there are some low density residential developments along its periphery. Existing lands designated for airport development allow for some additional expansion at Abbotsford. This expansion can include an additional runway and larger terminal facilities. The surrounding terrain greatly limits the number of aircraft movements per hour.
In 1987, there were 10,400 IFR (Instrumental Flight Rules) movements. Access to the airport is via the Trans Canada Highway with the travel time between Abbotsford and Vancouver International taking between 60 to 90 minutes.

BOUNDARY BAY

Located 25km southeast of Sea Island, Boundary Bay Airport is the closest airport to Vancouver International. The land surrounding the facility is primarily agricultural with some industrial and urban land uses in the west. This airport has been classified by Transport Canada as a regional airport serving light weight aircraft. As a designated reliever airport for Vancouver International, Boundary Bay serves both small commercial and private general aviation operations (business and recreational). Due to residential and ecological concerns, facilities at Boundary Bay will unlikely be enhanced to improve capacity. The airport is well located to serve the Surrey, Langley, White Rock and Delta regions using small commuter aircraft. Travel time between Boundary Bay and Vancouver is between 30 to 60 minutes as there is already severe road

6 Air traffic operates under either Visual Flight Rules (VFR) or Instrumental Flight Rules (IFR). With good visibility, aircraft operate under VFR while IFR is used during conditions of restricted visibility. IFR controls the altitude and flight path of an aircraft either wholly or in part by reference to instruments. Under VFR, pilots are responsible for their own navigation and separation of aircraft. Most large jet and turbo prop aircraft normally fly using IFR.
congestion at peak times of the day in this region.

**PITT MEADOWS**

Pitt Meadows Airport is located approximately 40 km from Vancouver International Airport. Primarily a general aviation airport, Pitt Meadows is owned and operated by Transport Canada. Although the airport is classified as a local commercial airport, it presently has no facilities to accommodate larger scheduled commercial aircraft. Expansion at Pitt Meadows in 1985 allowed for a larger range of aircraft to use the facilities however the airport is located in the arrival flight path of Vancouver International and thus has a limited hourly capacity (as aircraft must fit into the Vancouver air traffic flow). Moreover, Pitt Meadows Airport does not have an instrument (IFR) approach. Travel time between the airport and downtown Vancouver is between 60 to 90 minutes.

**LANGLEY**

Langley Airport is located approximately 60 km southeast of Vancouver International Airport. The facility is owned and operated by the Township of Langley. As a reliever airport for Vancouver International, Langley is classified as a local commercial airport, serving light weight aircraft. Expansion opportunities at this facility are limited due to surrounding
residential/commercial land uses and due to environmental concerns. The airport does not have a terminal building and does not have instrument (IFR) approach. Moreover, the airport's location between Vancouver's and Abbotsford's flight paths make future development of this facility illogical. It is approximately a 40 minute drive from the airport to downtown Vancouver.

CHILLIWACK

Chilliwack Airport is located 110 km east of Vancouver International and is approximately a 90 minute drive from downtown Vancouver. The airport is owned and operated by the Municipality of Chilliwack and is classified as a general aviation facility serving the Lower Mainland. The facility does not have an instrument (IFR) approach and has no control tower. Expansion opportunities at this airport are limited due to residential developments on the northern periphery and the Trans Canada Highway on the southern periphery.

VICTORIA

Victoria International Airport is located 20 km from Victoria and is 75 km from downtown Vancouver. The airport is owned and operated by Transport Canada. Annual capacity at this facility is 175,000 movements, with a terminal capacity of 1,300,000
passengers a year and an aircraft passenger capacity of 200. Terrain west and north of the airport has resulted in constraints to expansion. Victoria Airport's role as an alternate to Vancouver International is limited since travelling from Victoria to downtown Vancouver or Vancouver International requires either another flight or a two hour ferry trip.

VANCOUVER

In the case of Vancouver International, the airport can be considered one of the most conveniently located airports in Canada with regard to the metropolitan market it serves. Vancouver International is located 12 km from downtown Vancouver and therefore is well linked to most developed areas in the Lower Mainland. A car trip from downtown Vancouver to the airport will take approximately 20 minutes (traffic pending). Over 65% of the regional population and more than 80% of regional employment is located within a 25 km radius of the airport.  

Vancouver International plays several important roles on a local, regional and national scale in Canada's airport system. Firstly, Vancouver International is a hub airport for long-haul domestic, transborder and international air services. Secondly, the airport acts as a regional hub for commuter services to British Columbia's interior, Alberta, and the northwest coast of the United States. Thirdly, Vancouver International represents

7 Ibid, p. 34.
the base for British Columbia's resources industries and tourist charter operations. Fourthly, Vancouver International is considered to be Canada's gateway to the Asian-Pacific market, and finally, the airport is an important maintenance and servicing center for airlines. In essence, Vancouver International is the largest and most important of the more than 200 land based airports in British Columbia.
## TABLE 1

### LOWER MAINLAND AND SOUTHERN VANCOUVER ISLAND AIRPORTS: ACCESS TIMES AND CONSTRAINTS

<table>
<thead>
<tr>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>Lower Mainland</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vancouver (International)</td>
<td>325 (38) to 450 (81)</td>
<td>20 Minutes</td>
<td>10 000 000</td>
<td>400</td>
<td></td>
</tr>
<tr>
<td>Boundary Bay</td>
<td>87 (13) to 102 (13)</td>
<td>30 to 60 Minutes</td>
<td>100 000</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Abbotsford</td>
<td>58 (44) to 90 (86)</td>
<td>60 to 90 Minutes</td>
<td>100 000</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Langley</td>
<td>58 (44) to 90 (86)</td>
<td>60 to 90 Minutes</td>
<td>100 000</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Pitt Meadows</td>
<td>33 (40)</td>
<td>60 to 90 Minutes</td>
<td>100 000</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Chilliwack</td>
<td>90 to 120 Minutes</td>
<td></td>
<td>100 000</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>50A (88) to 671 (88)</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vancouver Island</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victoria</td>
<td>210 Minutes</td>
<td></td>
<td>1 300 000</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>Nanaimo</td>
<td>210 Minutes</td>
<td></td>
<td>500 000</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

4.3 The Role of Vancouver International and Its Interaction With The Community

Vancouver International's role is not solely concerned with serving regional, national and international aviation services within Canada's airport system. This airport plays a similarly important role with many different aspects of everyday life in British Columbia. Vancouver International has a strong impact on the economy, it has social and political ramifications, it affects other forms of transportation and it has a strong impact on the environment. Although each impact is important, this paper will analyze three of the more pertinent impacts that Vancouver International has on both the Lower Mainland and British Columbia in general.

4.3.1 Economic Impacts

Vancouver International plays a vital role in British Columbia's economy. The airport generates millions of dollars and creates thousands of jobs for British Columbia. There are three levels of economic activities generated by the presence of the airport. These activities can be summarized as:

A. Direct Economic Activities
   - Created by airport operations occurring at the facility such as: airline passenger and cargo services, fuelling and in-flight catering, airport concessions, travel agencies, hotels, and government agencies.
B. Indirect Economic Activities
- Created by the provision of materials and services to the companies and operators involved in direct economic activities. These activities are commonly preformed at locations away from the facility.

C. Induced Economic Activities
- Created by individuals employed in both direct and indirect economic activities who purchase consumer goods.

Overall, Vancouver International created 2.7 billion dollars in economic output while contributing 2.7% of British Columbia's Gross Domestic Product in 1987. This economic output is created by the airport's ability to allow air carriers and supporting businesses to operate and generate income. This same income is then used to purchase goods and services, employ local people, pay for the use of the airport and to pay for taxes.

The airport directly employs 14,000 people while sustaining over 31,000 jobs (indirect and induced employment) in British Columbia - representing 2.4% of British Columbia's total workforce. In 1987, Vancouver International generated over 1.5 billion dollars in wages and profits for British Columbia. It is estimated that by the year 2001, Vancouver International will generate an economic output of over 5 billion dollars while sustaining over 50,000 jobs.

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8 Transport Canada. The Economic Impact of Vancouver International Airport. TP 9820 (Ottawa, 1989), p. 5.


Communities near the airport receive substantial economic benefits by its presence. Over 85% of the total work force at the airport live in the four surrounding communities - Vancouver, Richmond, Delta and Surrey. In Richmond alone, 25% of this community's work force is employed at Sea Island.\textsuperscript{11}

The importance of the future efficiency of Vancouver International can be seen through the following forecast. The next 10\% increase in the passenger volume at Vancouver International will generate the following into the economy: \textsuperscript{12}

\begin{itemize}
  \item 297 million dollars in economic output.
  \item Gross domestic product of 163 million dollars.
  \item Direct employment of 960 jobs.
  \item Indirect employment of 1,500 jobs in the province.
\end{itemize}

Therefore it is important that Vancouver International remains an efficient and effective airport in order to allow for the maximum economic benefits which can accompany this form of operation. As congestion increases, Vancouver's role in Canada's airport system and the corresponding potential economic benefits will be drastically reduced.

\textsuperscript{11} Ibid, p. 8.
\textsuperscript{12} Ibid, p. 10.
4.3.2 Ground Transportation

The attractiveness and success of an airport is greatly affected by its ability to maintain a strong ground transportation service. In other words, how well is the airport connected to the surrounding community and how fast and effectively passengers and goods can travel between the airport and their intended destination? The most common form of transportation between an airport and the destination or point of origin is by automobile. The roads leading in and out of airports in many of North America's larger metropolitan centers are becoming increasingly congested, thereby adding on both time and cost to a person's journey.

Like many airports, Vancouver International is beginning to feel the effects of a congested road network surrounding the facility. As air traffic at Vancouver International increases, so likewise does the traffic on the surrounding roads - although not necessarily at corresponding rates. The attractiveness of Vancouver International to perspective users becomes diminished as the level of ground transportation service available for both passengers and cargo decreases.

There are several unique characteristics of Vancouver International's ground transportation conditions. First, the airport is located on an island and hence all access to this facility involves the use of bridges or tunnels; in this case only bridges are used to access the island. Presently, there are
three bridges connecting the airport with the rest of the Lower Mainland - the Arthur Laing Bridge, the Moray Channel Bridge, and the Dinsmore Bridge (see Figure 3). Unlike most airports, any new access routes or expansion of existing routes will require the creation of a new bridge or the expansion of a present, both very costly and potentially difficult ventures.  

Secondly, contrary to most airports (as indicated in Table 2), Vancouver International is located very near the metropolitan center it serves. Vancouver International can be reached from downtown Vancouver within twenty minutes - an unusually short distance and travel time for an airport which serves a large metropolitan area.

\[\text{NOTE: The Government of British Columbia is providing funds for the creation of a new bridge connecting Richmond to Sea Island. Construction of the Number 2 Road Bridge may commence once Municipal and Federal authorities have resolved all technical details.}\]
FIGURE 3

AIRPORT ROAD CONGESTION

Source: Transport Canada
### TABLE 2

**EASE OF ACCESS AT CANADIAN AND WORLD AIRPORTS**

<table>
<thead>
<tr>
<th>City</th>
<th>Distance from downtown</th>
<th>Travelling time (min.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halifax</td>
<td>42 km</td>
<td>80</td>
</tr>
<tr>
<td>Edmonton</td>
<td>31 km</td>
<td>30</td>
</tr>
<tr>
<td>Toronto</td>
<td>29 km</td>
<td>30</td>
</tr>
<tr>
<td>Dorval (Mtl.)</td>
<td>22 km</td>
<td>25</td>
</tr>
<tr>
<td>Mirabel (Mtl.)</td>
<td>54 km</td>
<td>60</td>
</tr>
<tr>
<td>Dallas/Ft. Worth</td>
<td>27 km</td>
<td>55</td>
</tr>
<tr>
<td>Tokyo (Narita)</td>
<td>66 km</td>
<td>120</td>
</tr>
<tr>
<td>New York (Kennedy)</td>
<td>24 km</td>
<td>75</td>
</tr>
<tr>
<td>London (Heathrow)</td>
<td>24 km</td>
<td>50</td>
</tr>
</tbody>
</table>

Source: Transport Canada

Thirdly, Vancouver International is poorly connected to the highway network, thereby diminishing effective access to this facility. The primary reason for this deficiency lies in a decision made twenty years ago to forbid the creation of any new expressway system to serve the urban core. This lack of an expressway system has meant high traffic volumes on the roads and bridges surrounding the airport, all of which have a limited capacity.
Finally, Vancouver International is located directly between downtown and a major commuting source. The Dinsmore and Moray Bridges deliver traffic onto Sea Island while the Arthur Lang Bridge connects Sea Island to downtown Vancouver. Not surprisingly, the Arthur Laing Bridge is a popular and convenient commuting channel, thereby increasing congestion on this vital ground transportation link with the airport. It has reached a point where over half the traffic travelling on Sea Island was non-airport commuting traffic.

In a report released in 1989, the Greater Vancouver Transportation Task Force announced projections of traffic volumes for the three bridges serving Vancouver International. Forecasts indicate that the Moray Channel and Dinsmore Bridges will shortly be over capacity while the Arthur Laing Bridge is approaching capacity. Projected increases in commuting traffic alone will push traffic levels over capacity on all three bridges. Between 1987 and 1996, commuting demands will increase by 75% on the Arthur Laing Bridge while it will more than double on the Dinsmore Bridge.  

Apart from the private automobile, there are several other options available to the arriving or departing passenger. There are three private bus companies which serve the airport with regular scheduling. These buses travel to downtown, the Fraser Valley and the Tsawwassen ferry terminal. There are several tour

operators which use buses to transport tour groups between the airport and such places as their hotel or a cruise ship terminal.

An important yet under-utilized and infrequent source of transportation to and from the airport is B.C. Transit. Buses operate between the airport and Vancouver, Richmond, and Ladner. Presently, only 2.6% of airport users utilize B.C. Transit buses to travel to and from the airport.\footnote{B.C. Transit. Submission to Environmental Assessment Panel Parallel Runway Project, Vancouver International Airport. January, 1990, p. 25.} This low ridership can be attributed to the fact that city buses are not designed or equipped to handle passengers with luggage. Furthermore, passengers are not well acquainted with prices and trip characteristics of the bus service. The infrequency of B.C. Transit's service is also a contributing factor. Presently, B.C. Transit airport service operates once every half hour during peak periods (rush hour) and once an hour at off-peak times. Given this infrequent service, it is not surprising that transit ridership is low at the airport. Moreover, airport employee shift changes are not at peak times and since B.C. Transit maintains low frequency service at off peak hours, transit service is not receptive to this off peak demand.

A proposal has been put forward to develop a rapid transit link between downtown Vancouver and Richmond Town Center. If implemented, this new transportation source will help slow increases in road traffic but will not eliminate it. In fact, this rapid transit link will remove little of the present road
traffic and will be geared towards absorbing new commuter travel.

It has been further proposed to create a rapid transit link between the airport and the Richmond line. Such a development will help alleviate the growing problems encountered by the present ground transportation system however the earliest time that such a link would be implemented is late 1996. It is more likely that to begin with, some form of shuttle bus will be used to connect the airport to the Richmond station.

4.3.3 Natural Environment

A growing concern within airport planning revolves around the effects that an airport can have on the surrounding environment. Given the location of Vancouver International in the Fraser River estuary, the environment is of critical importance in this city's airport planning and development. Operations at Vancouver International can greatly affect fish and wildlife resources having not only local, but regional and national significance.

The Fraser River estuary supports a large and varied wildlife habitat. This area is an important overwintering area for waterfowl and a critical staging area on the Pacific flyway. On an annual basis, this region supports over half a million birds a year while nearly 1.5 million birds use the delta during peak migration. On Sea Island alone, over 230 species of birds have
been identified. Raccoons, beavers, rabbits and other large mammals can be found on Sea Island along with an extensive number of smaller mammals. The estuary itself supports 5 different species of Pacific salmon along with an assortment of other aquatic species.

As congestion continues to increase at Vancouver International, the rich wildlife habitat on Sea Island will be in increasing danger. Noise, air, and water pollution will continue to plague both the natural and human environment. This is not to say that no further expansion should be done at the airport or that operations should be reduced. If forecasted movements are essentially correct, Vancouver International - even with a third runway - will have difficulty in preforming everyday operations in a safe and orderly manner and thus will raise the risk of potential environmental disasters on Sea Island.

The human environment is likewise affected by the operations of an airport such as Vancouver International. Aircraft noise and noise generated by airport traffic can hinder the everyday lifestyle of residents in the surrounding communities. The pollution associated with the burning of jet fuel not only has negative health impacts on the entire Lower Mainland, but especially for those working and living near the airport facility. These same gases generated by burnt jet fuel have also been linked to the "greenhouse" effect and the depletion of the

ozone layer. Runoff water from airport activities contribute pollution in the surrounding water thereby increasing health hazards and affecting water recreation activities.

4.4 The Current Situation at Vancouver International

Over the past decade, congestion and delays have become a common sight at Vancouver International as air traffic movements have continued to increase at a steady rate. Forecasts for air traffic movements over the next decade indicate that there is no relief in sight. Moreover, the Pacific market is expected to see the highest rate of growth in this industry, thereby adding to Vancouver International's busy operations given its importance as Canada's gateway to the Pacific. If Vancouver International wishes to be competitive and effective in this growing market and in the world aviation market as a whole, appropriate steps will have to be taken to ensure that Vancouver will be able to handle its important task as Canada's Western gateway.

Vancouver International, Canada's second busiest airport, saw an estimated 9,300,000 passengers pass through its doors in 1989 while aircraft movements reached 325,000 - well above the practical capacity of this facility. As Table 3 indicates, takeoffs and landings at Vancouver International have increased by nearly 50% since 1984 - representing the largest growth rate at any Canadian airport.
Demand at Vancouver International can be characterized as follows:17

* 83% of runway movements involve air carrier operations.
* Turboprop traffic has increased by over 300% since 1980.
* 67% of all movements are under Instrument Flight Rules (IFR).
* Operations are sustained at a rate greater than 40 movements per hour (7am - 7pm local time).
* The practical runway capacity is 277,000 annual movements.
* 8% of runway movements are private aircraft and routine government operations.

17 Source: Transport Canada.
Daily flight delays, a primary result of congestion, are not only costly in both time and money to the passenger, but also become a tremendous burden on the air carriers themselves. Presently, approximately 30% of all flights departing Vancouver International are delayed to some degree.\textsuperscript{18} It has reached a point now where daily delays average 12 hours per day at the airport. These delays cost the airlines close to 600,000 dollars a month. On average, it costs an airline roughly 100 dollars a minute while a 747 large body aircraft remains idle on the ground due to congestion. When these aircraft are delayed due to airport congestion, it is usually the passenger who will pay - both in the short term (late for an appointment) and in the long term (increased fares).

Transport Canada estimates on air traffic at Vancouver International indicate that this facility should continue to experience growth in both passengers and runway movements. The annual passenger volume at Vancouver International is expected to grow to over 16 million by the 2003 - representing a 78% increase from the level in 1989.\textsuperscript{19} Aircraft movements are expected to increase to 441,000 by the same year - an annual rate of increase of 2.4%.\textsuperscript{20}

\textsuperscript{18} Air Canada. \textit{Presentation to Public Hearings Into The Environmental Impact of Runway Expansion at Vancouver International Airport}. February, 1991, p. 4.

\textsuperscript{19} Ibid, p. 5.

\textsuperscript{20} Ibid, p. 5.
Vancouver International's air services can be characterized as follows:\textsuperscript{21}

* 19 flights a day to Eastern Canada
* Approx. 170 flights a day to destinations in Western Canada
* 41 flights a week to Asian destinations
* 33 departures a week to Europe

Vancouver International is now ranked fourth in North America with respect to handling transborder passengers. Between 1988 and 1989, transborder traffic rose 9.2% at Vancouver International. It is forecasted that transborder traffic will grow from 1.6 million passengers in 1989 to approximately 2.7 million in the year 2003 and reach 3 million over the following five years.\textsuperscript{22}

4.5 Strategies to Relieve Airport Congestion

As delays have increased at Vancouver International, airport operators have been forced to develop strategies to help decrease delays by reducing congestion. Strategies of this type will usually involve additions to the facility or the upgrading of present equipment used to monitor the operations. These strategies can be either short term or long term remedies and


\textsuperscript{22} Air Canada. Presentation to Public Hearings Into the Environmental Impact of Runway Expansion at Vancouver International Airport. February, 1991, p. 9.
will vary in cost and effectiveness. In the case of Vancouver International, several strategies have been introduced or proposed to help alleviate congestion at the airport. Some of the short term strategies have already been implemented while long term - generally more expensive and larger in scale - are now being presented to the public for discussion and analysis.

4.5.1 Short Term Initiatives

Short term strategies are being initiated at Vancouver International in order to help make airport operations more efficient under the two runway configuration. Under these strategies, the aircraft-movement capacity of the facility is increased thereby allowing for more aircraft to use the facility but not necessarily decreasing the congestion and delays. Short term initiatives at Vancouver International include:

* Implementation of a computerized runway capacity-management program to help maximize daily runway use.

* Implementation of an Air Traffic Flow Management System that meters traffic into Vancouver International at rates which are consistent with the airport's capacity.
* The use of a minimum landing fee, which in this case, has been set at $25 per aircraft landing.

* Implementation of a flight reservation system which could limit, under extreme conditions, the number of arrivals and departures during peak periods.

Further initiatives have been introduced which will improve the taxiway capacity, enabling aircraft to spend less time on the main runway. The conversion of a taxiway into a "stub" runway has helped to reduce the number of commuter aircraft departures on the two larger runways. Combined, these short term initiatives will help capacity increase at Vancouver International by about 8%. This percentage increase is minimal and can only effectively curtail congestion at the facility for two or three years.

It is important to note that not all these initiatives may produce the desired or expected results. In the case of the landing fee, much discussion and criticism has been made on this decision. Essentially, implementing a minimum landing fee at Vancouver International will help the airport to discourage discretionary aircraft from using this facility. A minimum landing fee increases the costs for aircraft operators using Vancouver International. This fee can help reduce congestion at Vancouver International since some operators will reduce flight activities at the airport due to the higher costs induced by the fee while some aircraft operators may relocate to other Lower
Mainland airports if these higher costs cannot be passed on to their passengers.

There is no doubt that Vancouver International required a minimum landing fee, but the decision to set the fee at $25 cannot be considered effective. This fee of $25 is not considered particularly high, especially compared to fees at other similarly sized international airports. For instance, Heathrow Airport in London has minimum landing fees of up to $500. A $25 minimum landing fee will have little impact on regional air carriers, business aircraft, and charter companies - the principal operators that Vancouver International wishes to consolidate. A higher landing fee of $100 would have a greater impact on these operators and would likely force many of them to relocate at reliever airports.

By implementing a $25 minimum landing fee, it is hoped that by 1996 non-commercial light aircraft will represent only 5% of all existing traffic. In their report, Economic Analysis of Airfield Capacity Enhancement Strategies for Vancouver International Airport, Hickling Consultants indicate that a 25$ minimum landing fee will reduce the estimated 116,700 delay hours for 1993 by over 20,000 hours. More importantly, a minimum landing fee of 100$ would reduce the number of delay hours to an estimated 56,000 by 1993. Moreover, a higher minimum landing fee of $100 will generate considerably higher landing fee revenues for the airport itself.

Large commercial carriers would also be impacted by the
larger landing fee but not enough to change or terminate service at the airport. However in the future, if Vancouver International imposes a larger landing fee than $100, it is possible that the airport may lose some of its business as some commercial carriers may opt to by-pass Vancouver for another nearby airport which impose lower landing fees. Other options are available. For instance, higher landing fees can be adopted at peak periods in order to help make effective use of runway capacity. This landing fee structure is used at Heathrow Airport in London.

4.5.2 Long Term Initiatives

As is indicated by the name, short term initiatives can be useful as temporary solutions in relieving congestion at airports - but these solutions are temporary. In the case of airports such as Vancouver International, long term solutions are required as present traffic levels and forecasted levels indicate that short term solutions are inadequate. Three strategies have been proposed as solutions for congestion and traffic capacity for Vancouver International:

1. Status quo,
2. construction of a new parallel runway, or
3. alternate airport development.
**Status Quo**

As the expression implies, this option requires no additions to the present infrastructure and no transfer of air traffic to other airports. It is considered by some that the present conditions at Vancouver International are exaggerated and that the airport is not presently congested (simply poorly managed) and will not have predicted capacity problems in the foreseeable future. Using this option is both damaging and near-sighted. Current delays at Vancouver International (and the corresponding increase in both financial and environmental costs), along with the fact that the airport is presently operating at capacity and that aircraft movements will invariably increase, render this option useless.

**Parallel Runway**

Analysis has indicated that the development of a new third runway at Vancouver International would be the most beneficial strategy of the three. The proposed third runway would be approximately 3030 meters in length and would constitute a concrete surface. The runway would be located parallel to the present main runway, approximately 1.7 km apart (See Figure 2). The two runways would be far enough apart to allow for simultaneous take-offs and landings by all types of aircraft. The
current runway would be designated as the primary departure runway while the parallel runway would essentially be used for arrivals. Implementation of a third runway could increase capacity at Vancouver International by 70%. Although the creation of a third runway will greatly help the efficiency of this facility, it does not necessarily mean the end of capacity problems at Vancouver International. The addition of a third runway will greatly enhance the capacity of Vancouver International but if the "high" estimates for future traffic levels is achieved at Vancouver International, then congestion will again become a problem at this facility in the near future.

It is also important to note that the creation of a third runway will also require considerable additions both on the tarmac and in the terminal. That is to say, new taxiways, high speed exits, approaches and roads will also have to be constructed to allow the efficient use of the new runway. The terminal building itself will have to be expanded in order to be able to effectively handle the increasing number of passengers using the facility. Increased passenger levels at Vancouver International will also mean increased traffic on the surrounding roads - thereby requiring the addition of new roads and bridges or the expansion of existing roads. Hence when considering the cost of constructing a third runway, one must be prepared to take corresponding factors into account in the overall assessment of this project.
Alternate Airports

In a long term capacity analysis, the addition of a third runway can be considered a short term solution. Given Vancouver International's geographic location, the third runway is the last large scale addition which this facility can implement to compensate for increasing air traffic levels. If aviation traffic levels continue to increase at a steady rate, alternative sites to Sea Island would have to be considered to relieve the high traffic levels at Vancouver International. To accomplish this relief, an existing airport in the Lower Mainland would be augmented to international standards. As indicated in Figure 5, at present there are essentially three candidate sites for this alternate airport: Abbotsford, Pitt Meadows, and Boundary Bay. There may be other possible sites however these three sites already have present airport facilities and operations. It is considerably more expensive and difficult to build a new airport from scratch rather than altering or expanding present airport facilities.

Presently, the only logical location for an alternate airport location is Abbotsford. Under this capacity solution, Abbotsford Airport would be enhanced in order to accommodate future aviation traffic in this region. This air traffic could include regional, national, and international services. Operations and facilities at Boundary Bay Airport would likewise be enhanced in order to handle greater volumes of non-commercial air traffic.
Pitt Meadows could likewise pick up some of the non-commercial air traffic; however, further expansion or enhancement of the facilities is necessary.

In the case of both Abbotsford and Boundary Bay, expansion of present facilities would include extension of runways, terminal building expansion, and increased apron, parking, and taxiway capacity. Moreover, transportation links between these two airports and Vancouver International along with downtown Vancouver would also have to be improved in order to handle the increased vehicle traffic flows. These improvements could include expansion of present highway system (more lanes or new roads) or the extension of the Skytrain light rail system. The overall expansion and enhancement projects necessary to use alternate airports in the Lower Mainland would require at least ten years in order to develop and implement.
5.0 THE CONCEPT OF A MULTIPLE AIRPORT SYSTEM IN THE LOWER MAINLAND

5.1 Introduction

The development of a multiple airport system is a complex and difficult task. The abundance of elements and factors involved in making the decision to develop a second airport facility requires input from various people including planners, engineers, politicians and the aviation community itself. In the case of the Lower Mainland, the concept of a multiple airport system has been discussed with both approval and criticism. Advocates of a multiple airport system tend to be those who see no need for the present airport facility on Sea Island to be expanded. Opponents of a second airport tend to be those who consider expansion of the present airport site as the solution to future airport capacity requirements. Both may be wrong.

The development of a third runway will help relieve congestion at Vancouver International over the next fifteen to twenty years. Like anything which is confined, Sea Island can only endure so much expansion before complete saturation is obtained. The obvious question arises: what next after that?

In this case, a second airport will be the only feasible solution. As with any development of this magnitude and importance, careful and appropriate planning must be done to ensure its success and at the same time cause the least amount of disturbance to the surrounding community and environment.
There will no doubt be major criticism and opposition towards a plan to develop a second airport facility. But planning for such a facility now does not necessarily mean that such an operation will have to be implemented. If planners wait twenty years before planning a second airport, the required land may no longer be available to develop such a project while the length of time needed to plan and develop this facility will result in tremendous congestion and loss of economic output at the present site.

One cannot simply decide to develop a second airport and then begin building it. This kind of development must be thoughtfully planned. Questions such as how to develop a second airport site, where to locate it, when and why this development should occur, must all be answered in order to help justify the need to begin planning for this type of airport system. But it is not as simple as how, when, where or why. Economic, social, political, and ecological factors will also play an important role in the decision making process.

The most important question to be answered in airport development is where to build a new facility. Once the question of location has been answered, other pertinent questions will arise including:

* What represents the correct planning horizon with respect to the number of years required to reach operational capacity?
* What is the best economical staging for the development of a new facility? In economics, short-term gains may, and often do, lead to long-term loses. Hence a proper balance must be maintained.

* How will the new airport operate within the present airport system? In other words, what traffic will be assigned to the new facility, both initially and progressively over time.

It is important for airport planners to plan for the future, not solely for present needs. Development of a new airport cannot be seen as a short-term solution but as a long-term solution thereby requiring long-term planning and long-term foresight.

5.1 Why

Before planning and developing a multiple airport system, the question of why such a development should be pursued must be properly answered. As the development of Mirabel Airport in Montreal has shown, the importance of showing why a multiple airport system should be implemented does not lie in statistical forecasts alone.¹ Many other factors must be taken into account in order to justify why a multiple airport system should be

¹ Forecasts of the number of air passengers who would use the Montreal airport (Dorval) by the late 1970's failed to materialize. A lengthy recession, along with political tensions in the Province of Quebec and poor airport planning reduced potential air traffic levels at the Montreal airports. Today, facilities at Mirabel remain heavily under-utilized.
implemented.

Statistics for Vancouver International indicate that the airport is already operating at capacity levels at certain times of the day and aircraft and passenger movements are forecasted to continue to increase over the next decade. These statistics alone cannot justify the implementation of a multiple airport system in the Lower Mainland. As was shown with Mirabel, statistics may not be as accurate as anticipated and hence a second airport may not be required. As is indicated in Table 3, air passenger forecasts for Vancouver International have in the past been high compared to the actual traffic, although more recent forecasts (1987) have been slightly under actual passenger volumes.

The development of a new airport is usually the result of over utilization of other airport facilities. In the case of Vancouver International, over-utilization is becoming a daily experience. In their report *The Case For The Parallel Runway*, consultants at Sypher:Mueller International list the following damages resulting from constraints at Vancouver International:

* Higher costs and airfares due to extra fuel burned, crew costs and poor utilization of aircraft.
* Undermining Vancouver's role as a domestic hub and consequently losing traffic to Calgary and Edmonton.

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*It is unjust to compare the Mirabel experience with the present circumstances in the Lower Mainland when deciding on which course of action to pursue. That is to say, the economic, social, and political situation in the Lower Mainland today cannot be compared to the corresponding situation in Quebec in the early 1970's.*
TABLE 3


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* Loss of Western Canada - U.S. Pacific Northwest transit traffic. It can pass through either Calgary or Edmonton.

* Regional B.C. services bypassing congested Vancouver and feeding carriers with Seattle, Spokane or Portland hubs.

* Diversion of transAtlantic - Western Canada routes from Vancouver to relatively uncongested Calgary or Edmonton.

* Diversion of long-haul domestic Canadian traffic through the United States. Airlines in the U.S. could siphon Toronto bound traffic off via Bellingham Airport in the State of Washington. In the past, Bellingham has been successful in luring transborder (Vancouver - Seattle) passengers bound for other U.S. destinations.

* Weakening of Vancouver as an air cargo terminal. Vancouver is ideally located for transshipment of high-value transPacific air cargo for air or truck delivery throughout North America. Presently, Vancouver is losing air cargo to Seattle, Chicago and Eastern Canadian points.

The development of a third runway at Vancouver International will help to prevent this type of damage; however, these same problems may reappear in ten years' time if current traffic forecasts are essentially correct. Transport Canada has already admitted that it predicts a 50% increase in traffic at Vancouver International by the year 2010 and consequently admits that congestion will return to this facility by this time, even with the third runway in operation. As Figure 6 shows, if the high forecasts are correct, Vancouver International - even with the third runway and

FIGURE 6
AIRCRAFT DEMAND VS. RUNWAY CAPACITY
VANCOUVER INTERNATIONAL AIRPORT

Source: Transport Canada
capacity improvement programs - will again be reaching capacity by the year 2005. It is not particularly likely that traffic levels will be that high ten years from now yet it is not unrealistic to assume that levels will be around that of the "medium" forecast, thereby indicating that capacity and congestion will still become a problem within the next twenty years. Research performed at the Massachusetts Institute of Technology has found that a primary (or original) airport will require approximately 20 million annual enplanements/deplanements in order to justify the development of a second airport to serve the same region.\(^4\) Transport Canada forecasts indicate that Vancouver International will pass this 20 million passenger threshold early in the next century. In other words, within the next ten to fifteen years. The development of a multiple airport system will allow the Lower Mainland to actively compete in the world aviation market and at the same time will give Vancouver many economic benefits.

Delays at Vancouver International due to congestion are having an adverse effect on both the airport itself and the Lower Mainland as a whole. Travel delays for tourists hurts tourism which is presently British Columbia's second largest industry. Travel delays for business people also have a negative impact on this region. The individual loses both time and money and may

also lose business opportunities. If an airport such as Vancouver International becomes the reason for travel delays, then many travelling business people will simply overfly the airport, thereby avoiding delays. There have been examples in other North American cities where business groups have decided to change the location of annual meetings - after consecutive years at that particular city - due to air travel delays at the local metropolitan airport.

Vancouver is quickly becoming regarded as one of the world's international cities. The city presently has a World Trade Center and a world class convention center. Vancouver's growing international stature is further indicated by the fact that in April of this year, the annual meeting of the Asian Development Bank was held in Vancouver - the first time this meeting has been held outside of Asia. Vancouver is one of Canada's two International Financial Centers and there is a strong indication that Vancouver may also become an International Maritime Center. As an International City, Vancouver must be able to offer efficient and effective airport service. Maintaining all services on Sea Island may help to jeopardize Vancouver's "International" recognition. Planners and politicians must be prepared to plan an appropriate airport system in the Lower Mainland in order to ensure that Vancouver International does not develop a similar reputation as that of other congested West Coast airports such as Los Angeles.

Vancouver's geographic location is strategically placed with
respect to the Pacific market and North American markets. It is estimated that by the end of this century, over 50% of the world Gross Domestic Product (GNP) will be generated in countries on the Pacific Rim.\(^5\) It is forecasted that within this decade, more people will be flying across the Pacific from North America than across the Atlantic. In 1984, three out of every five 747 jumbo aircraft flying in the air were flying over the Atlantic. Today, three out of every five of this aircraft are now flying over the Pacific.\(^6\) The number of passengers flying direct between Canada and Japan has more than doubled to over 430,000 between 1982 and 1989.\(^7\) Asian countries are presently planning for increased traffic levels at their airports. New airports are being built in Hong Kong and Osaka while new capacity is being added at Narita (Tokyo) and Singapore.

As it stands now, Vancouver's position for the Pacific Rim market is already weakening. In their report: *The Case For The Parallel Runway*, Sypher:Mueller Consultants indicate that Vancouver International's role as a Pacific gateway is threatened by:

* Large volumes of Eastern Canada-Pacific traffic being processed through United States gateways.


\(^6\) Ibid, p. 8.

* Hubs in Dallas, Chicago, Minneapolis and Detroit are well positioned to drain traffic from Canada.

* Delta Airline's aggressive expansion on trans-Pacific routes from Portland. Delta is able to offer convenient single-airline services from Vancouver to Tokyo, Seoul and Taipei.

* Continental Airlines offering new service from Seattle in order to better compete with Northwest Airlines on the Seattle-Tokyo run.

If Vancouver cannot offer efficient and effective airport service to the Pacific market, these passengers and aircraft will use other west coast facilities or even eastern locations. The introduction of the Boeing 747-400 aircraft allows airlines to offer non-stop service from the North American East Coast to the Orient. In fact some Asian carriers have already indicated that they would prefer to use Toronto rather than Vancouver as their gateway to Canada.

With respect to transportation by air, Vancouver is closer to many of the rapidly growing economies on the Pacific Rim than either Los Angeles or Seattle. Furthermore, Vancouver by air is closer to many important centers in Europe than large West Coast cities such as Los Angeles and San Francisco. Moreover, easier access to the world's largest market due to the Canada - U.S. Free Trade Agreement has allowed Vancouver to become an important center for the transferring of goods to large wealthy markets in the Western and Southern United States.

In Europe, the gradual introduction of a market economy in

8 Flights from a city such as London to Vancouver are 90 minutes shorter than flights between London and Los Angeles.
East Bloc countries is the greater integration of the European Economic Community (EEC) will result in greater levels of air traffic linking these regions with the rest of the world. The global marketplace will flow through the most efficient and effective hubs, regardless of political affiliation. Hence Vancouver and the Lower Mainland as a whole, has great potential if the appropriate airport infrastructure is in place.

5.2 When

An airport is not something that can be built overnight. It takes years of preparation and planning in order to develop a facility of this magnitude. Time and planning are not only required for the construction of the airport itself, but are likewise required for the creation and modification of surrounding roads and infrastructure which help to connect the airport to the community it serves. The actual construction of an airport facility is relatively quick in comparison to the preparation required. Community forums, environmental assessments, land use conflicts and political wrangling will greatly lengthen the total amount of time that it takes to develop a new airport. A recent example of this time consuming process is in Denver, where after considerable controversy and public debate stretching over almost a decade, the city has finally decided to build a new airport to serve the community.
Even after the airport itself is built, time is required for this new facility to reach its expected level of operation. Past experiences indicate that it takes a new second airport at least ten years to mature. This maturation period indicates the time it would take before a second airport would be able to achieve its full potential. This potential takes time as the market must adjust to the concept of a second airport and airlines and other operators must have time to locate their facilities there.

In the case of the airport system in the Lower Mainland, the development of a second airport will not be required for at least another decade; however this does not necessarily mean putting the issue on the back-burner. Early planning and consultation does not mean that a new airport has to be built or ever will be built. If the time comes when a second airport will be required for the Lower Mainland, then we will be one step closer. The time has come to begin preparation. A site can be chosen. Plans can be developed for the terminal and runway configurations. Potential land use and environmental conflicts can be discussed and hopefully resolved. The land required for the surrounding airport infrastructure and related operations must be available and obtainable. All of these factors can be tackled now without requiring the development of a new airport. If the public is notified of this potential development now, then conflicts and opposition arising from these proposals can be addressed now, thereby clearing way for the development of such a facility when the time has come.
The development of a new airport is a very costly procedure yet these costs can be even higher if the appropriate initial planning has not been taken. For instance, if no action is taken in the near future on developing a second airport in the Lower Mainland, costs for developing such a facility may be greatly increased if a second airport facility becomes a necessity. Preliminary planning helps find the ideal location and helps implement an effective development timetable, whereas developing a second site only when it is absolutely necessary will mean rushed planning and development on what would likely be a less than ideal location and under unfavorable conditions.

Uncontrollable factors can also play a role with respect to when a second facility should be implemented. World crisis such as this year's Gulf War lead to major drops in world aviation traffic. Economic recessions can also lead to major drops in the number of people flying. Therefore one month it may appear that there is an immediate need for a second airport, yet over the next couple of months this need may have been greatly reduced.

Other uncontrollable factors which may affect the decision of when to develop a new airport include conflicting or competing activities at other surrounding airports. Due to geographical location and restraints, airports in the Lower Mainland have conflicting airspace with airports in the State of Washington. These airports compete with each other to attract more business in the form of passengers and cargo. If capacity has been added to an existing airport in the state of Washington or a new U.S.
facility is built near the border, there may be no need to develop a second airport. The Port of Seattle was considering building a new airport and if this decision had passed, Vancouver International would have lost some of its business and the practicality of building a second facility would also have been lost. For the time being there is still a large aviation market to capture.

Any discussion or proposal on a new airport should not commence until there has been a final decision made on the development of the third runway. If this runway project does not materialize, then development of a second airport may be required sooner or possibly never since the option to add considerable capacity at Vancouver International will still be available. It would be impractical to develop alternate airports before adding a third runway to Vancouver International. If a second airport were developed prior to development of a third runway, "reluctant" users of this new airport would likely abandon it once new capacity—in the form of a third runway—was added at Vancouver International. This type of result is already evident in the Lower Mainland. When Boundary Bay Airport was reactivated, traffic levels at Pitt Meadows decreased dramatically. It is interesting to note that this runway project has been discussed.

The Port of Seattle has decided that, for the time being, no new airport will be developed to serve the Seattle-Tacoma region. If a new airport were to be developed, it would likely be done at one of the present Boeing airfields in the region, thereby diminishing both the cost and the time usually required for development of a new airport.
and proposed at various times over the past twenty years. Given this precedent, it is difficult to imagine how long it will take if development of a new airport is proposed.

5.3 How

The question of how to develop a second airport is of critical importance in the future success of that particular airport system. Developing a second airport requires careful and thoughtful planning on what the role of this new facility will be, who will this airport serve, and how can it be conveniently accessible. These are only some of many questions which have to be addressed in any preliminary analysis on a potential multiple airport system.

The first factor which must be addressed is the role that the second airport would play. This second airport should not act as competition to Vancouver International, but act as a partner and reliever. Hence operations at both airports should be under one control with both airports offering the same airport services at comparable prices and quality of service. Presently, Transport Canada controls operations at Vancouver International however by the end of this year it is quite possible that Vancouver International may be controlled by a Local Airport Authority (LAA). Apart from air traffic control and safety, this publicly owned Authority would set all commercial policies and make all
final decisions concerning the airport. If Vancouver International falls under the management structure of a LAA, then any future development of alternate sites should likewise be under this same control. A multiple airport system under one non-governmentally controlled body will allow these airports to follow regional and community goals, while management will be capable of fast and creative responses to market changes and opportunities. Most importantly, airports in the Lower Mainland will be able to pursue policies which will benefit these individual airports themselves, but could not be justified as a national airport policy.

In order to create an efficient airport system, both airports should not be catering to the same market. In other words, air traffic components such as international, regional, charter, and cargo would each be designated to a particular airport. For example, under the airport system incorporated at Paris, each airport serving the Paris region has a certain role. One airport serves national and regional passengers, while a second airport serves international passengers. Other airports serve the remaining traffic. Several facilities serve corporate and business traffic while another facility handles only helicopters and one facility is used for gliding.10

Splitting up national and regional services between two facilities is a costly and cumbersome venture for both the

airline and the passenger. In this case, it would seem to be most logical to designate the second airport as the international and overseas base while Vancouver International would remain the regional and national airport. It is common sense that an airport which is designated for commuter and regional traffic should be located closer to the metropolitan center rather than further away. Placing commuter and regional operations at a second site would increase minimum connecting times by two to three hours (bus travel to and from Vancouver International) thereby essentially preventing same day business travel to and from B.C. communities - apart from those who originated or terminated their travel in Vancouver. Of the 1.8 million passengers who travelled to and from B.C. communities in 1988, 40% of these persons connected at Vancouver International. These 750,000 people would be greatly inconvenienced by moving commuter and regional traffic further away than its present location at Vancouver International.

Moreover, if regional and commuter services were split between two airports, inequities would arise. Commuter and regional airlines still using Vancouver International would have an unfair advantage since competing commuter and regional airlines using the new airport would have additional costs both in ground transportation and time, and thus would be less attractive to the potential customer.

Logistically, it would be easier to move the international operations since these operations are not as extensive as the
local and regional services. As indicated in Table 4, international traffic represented only 12% of the total mainline traffic for Vancouver International in 1989.

**TABLE 4**

**VANCOUVER INTERNATIONAL AIRPORT ENPLANED AND DEPLANED PASSENGERS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic</th>
<th>Transborder</th>
<th>Other Int.</th>
<th>Total</th>
<th>Charter</th>
<th>Unit Toll</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>4,006,673</td>
<td>1,303,153</td>
<td>428,819</td>
<td>5,738,645</td>
<td>581,918</td>
<td>448,493</td>
<td>6,769,056</td>
</tr>
<tr>
<td>1985</td>
<td>4,108,818</td>
<td>1,210,080</td>
<td>430,796</td>
<td>5,749,694</td>
<td>667,852</td>
<td>600,531</td>
<td>7,018,077</td>
</tr>
<tr>
<td>1986</td>
<td>4,699,508</td>
<td>1,705,366</td>
<td>523,203</td>
<td>6,928,077</td>
<td>513,077</td>
<td>973,671</td>
<td>8,414,825</td>
</tr>
<tr>
<td>1987</td>
<td>4,185,271</td>
<td>1,560,545</td>
<td>585,752</td>
<td>6,331,568</td>
<td>394,299</td>
<td>1,096,564</td>
<td>7,822,431</td>
</tr>
<tr>
<td>1988</td>
<td>4,601,400</td>
<td>1,593,600</td>
<td>724,500</td>
<td>6,919,500</td>
<td>370,400</td>
<td>1,550,200</td>
<td>8,890,100</td>
</tr>
<tr>
<td>1989</td>
<td>4,398,500</td>
<td>1,632,500</td>
<td>847,500</td>
<td>6,888,500</td>
<td>443,300</td>
<td>1,822,100</td>
<td>9,143,900</td>
</tr>
<tr>
<td>1996</td>
<td>5,850,000</td>
<td>1,690,000</td>
<td>700,000</td>
<td>8,240,000</td>
<td>420,000</td>
<td>1,800,000</td>
<td>10,460,000</td>
</tr>
<tr>
<td>Med</td>
<td>6,290,000</td>
<td>2,000,000</td>
<td>850,000</td>
<td>9,140,000</td>
<td>520,000</td>
<td>2,290,000</td>
<td>11,860,000</td>
</tr>
<tr>
<td>Hi</td>
<td>7,260,000</td>
<td>2,260,000</td>
<td>940,000</td>
<td>10,460,000</td>
<td>580,000</td>
<td>2,500,000</td>
<td>13,540,000</td>
</tr>
<tr>
<td>2001</td>
<td>6,570,000</td>
<td>1,850,000</td>
<td>850,000</td>
<td>9,270,000</td>
<td>480,000</td>
<td>2,000,000</td>
<td>11,750,000</td>
</tr>
<tr>
<td>Med</td>
<td>7,210,000</td>
<td>2,300,000</td>
<td>1,110,000</td>
<td>10,620,000</td>
<td>610,000</td>
<td>2,500,000</td>
<td>13,730,000</td>
</tr>
<tr>
<td>Hi</td>
<td>8,420,000</td>
<td>2,610,000</td>
<td>1,280,000</td>
<td>12,310,000</td>
<td>690,000</td>
<td>2,850,000</td>
<td>15,850,000</td>
</tr>
</tbody>
</table>

Source: Transport Canada

Presently there are 74 scheduled departures a week from Vancouver International to overseas destinations while there are over 170 departures a day to destinations in Western Canada alone.\(^{11}\) Due to geographical and airspace restraints, any second airport in the Lower Mainland would have difficulty serving local and regional operations due to the high number of hourly landings and

takeoffs this traffic produces (See Table 5).

Vancouver International is a rather unique airport in that it serves a dual role. That is to say, the airport serves as a hub for British Columbia destinations and also serves as the Pacific Rim's gateway to Canada. As the Pacific market continues to grow, Vancouver's role as a gateway for this traffic will become increasingly important and the appropriate facilities must be in place to receive this traffic. Hence it would be beneficial to split operations between airports based on this dual role - one airport serves as a hub while the other serves as a gateway. This form of split operations is common in many multiple airport systems in operation today. Cities such Paris, New York, and Montreal have multiple airports in operation with regional and national service at one site while international flights operate out of a second airport.

As Mirabel Airport in Montreal has demonstrated, splitting airport operations strictly between national and international service does not ensure success. A more effective scenario could involve splitting the operations of the two national carriers between the two airports along with national and international service. In other words, Air Canada would operate out of one airport while Canadian Airlines International would operate out of the other. In this way, passengers arriving at either airport will still be able to make connections to regional or national locations.
### TABLE 5

**RUNWAY UTILIZATION AT VANCOUVER INTERNATIONAL BY POWER PLANT OF AIRCRAFT, 1980 - 1989**

<table>
<thead>
<tr>
<th>Year</th>
<th>JET No.</th>
<th>JET %</th>
<th>TURBO No.</th>
<th>TURBO %</th>
<th>PISTON No.</th>
<th>PISTON %</th>
<th>TOTAL No.</th>
<th>TOTAL %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>92.3</td>
<td>40.0</td>
<td>19.9</td>
<td>8.6</td>
<td>118.7</td>
<td>51.5</td>
<td>230.9</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>97.5</td>
<td>42.6</td>
<td>21.5</td>
<td>9.4</td>
<td>110.0</td>
<td>48.0</td>
<td>229.0</td>
<td></td>
</tr>
<tr>
<td>1982</td>
<td>90.0</td>
<td>44.7</td>
<td>22.5</td>
<td>11.2</td>
<td>88.5</td>
<td>44.1</td>
<td>201.3</td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>84.5</td>
<td>43.0</td>
<td>23.8</td>
<td>12.1</td>
<td>88.2</td>
<td>44.9</td>
<td>196.5</td>
<td></td>
</tr>
<tr>
<td>1984</td>
<td>84.2</td>
<td>44.0</td>
<td>32.3</td>
<td>16.9</td>
<td>74.8</td>
<td>39.1</td>
<td>191.3</td>
<td></td>
</tr>
<tr>
<td>1985</td>
<td>89.5</td>
<td>42.7</td>
<td>40.7</td>
<td>19.4</td>
<td>79.2</td>
<td>37.9</td>
<td>209.4</td>
<td></td>
</tr>
<tr>
<td>1986</td>
<td>96.9</td>
<td>38.8</td>
<td>58.0</td>
<td>23.2</td>
<td>94.6</td>
<td>38.0</td>
<td>249.5</td>
<td></td>
</tr>
<tr>
<td>1987</td>
<td>96.3</td>
<td>35.7</td>
<td>71.7</td>
<td>26.6</td>
<td>101.5</td>
<td>37.7</td>
<td>269.5</td>
<td></td>
</tr>
<tr>
<td>1988</td>
<td>101.4</td>
<td>35.3</td>
<td>86.4</td>
<td>30.0</td>
<td>99.6</td>
<td>34.7</td>
<td>287.4</td>
<td></td>
</tr>
<tr>
<td>1989</td>
<td>102.6</td>
<td>36.4</td>
<td>91.6</td>
<td>32.5</td>
<td>87.3</td>
<td>31.1</td>
<td>281.5</td>
<td></td>
</tr>
<tr>
<td>1990*</td>
<td>100.7</td>
<td>37.4</td>
<td>105.3</td>
<td>39.1</td>
<td>63.2</td>
<td>23.5</td>
<td>269.2</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Transport Canada, YVR Parallel Runway Project EIS, August 1990, TP1073E, Table 3-3 and Figure 3-1.

* Preliminary figures from Transport Canada, 10/1/91.
By designating air traffic in this manner, airlines would not be duplicating their operations, thus making Vancouver a less appealing location. International carriers cannot offer local and regional services using their aircraft and hence would not be required to use the two airports. The two Canadian carriers would not have to duplicate their operations since each would be serving a particular airport.

Splitting up operations in this manner is also more beneficial to the passenger. A businessperson leaving Calgary for Vancouver does not want to travel an hour after landing at the airport in order to reach downtown - making the trip downtown longer than the flight itself. Conversely, someone who has travelled 10 to 12 hours from overseas will not be as hostile towards an hour journey downtown. Generally, business people flying overseas do not arrive an hour before their meeting whereas a businessperson from Calgary would likely do so.

If International operations were removed from the airport, congestion would be alleviated, but not terminated. Other operations would likewise have to be moved. These could include operations such as charter, training and recreation, corporate, civil, and military. Some of these operators can be relocated at various small airports in the Lower Mainland.12

12 Presently at Vancouver International, commercial traffic represents 85% of all traffic while corporate aircraft is 7% and the remainder is represented by private, state, and military traffic. Moving this non-commercial traffic will only mean the removal of 15% of the total traffic at YVR, thereby resulting in a short-term solution.
In fact, over the past five years some of these operators have already been moved to the Boundary Bay Airport. An appropriate linkage with light rail transit between this facility and Vancouver International would make the inconvenience to connecting passengers virtually negligible.

Vancouver is well suited for the air-sea and air-truck transport of cargo and hence cargo traffic is an important operation at Vancouver International. As indicated in Table 6, in 1989 approximately 124,000 tonnes of freight was handled at Vancouver International representing an increase of 17% from 1988.

**TABLE 6**

VANCOUVER INTERNATIONAL AIRPORT
ENPLANED AND DEPLANED CARGO (TONNES)

<table>
<thead>
<tr>
<th>Year</th>
<th>Domestic</th>
<th>Transborder</th>
<th>Other Int.</th>
<th>Int. Total</th>
<th>Charter</th>
<th>Unit Toll</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1984</td>
<td>59,089</td>
<td>10,118</td>
<td>11,948</td>
<td>0</td>
<td>257</td>
<td>0</td>
<td>81,412</td>
</tr>
<tr>
<td>1985</td>
<td>60,631</td>
<td>10,133</td>
<td>12,344</td>
<td>0</td>
<td>1,668</td>
<td>0</td>
<td>84,776</td>
</tr>
<tr>
<td>1986</td>
<td>60,014</td>
<td>11,858</td>
<td>15,675</td>
<td>0</td>
<td>1,891</td>
<td>0</td>
<td>89,438</td>
</tr>
<tr>
<td>1987</td>
<td>60,095</td>
<td>13,758</td>
<td>15,669</td>
<td>0</td>
<td>2,030</td>
<td>0</td>
<td>91,552</td>
</tr>
<tr>
<td>1988</td>
<td>65,925</td>
<td>15,085</td>
<td>19,859</td>
<td>0</td>
<td>2,069</td>
<td>0</td>
<td>102,938</td>
</tr>
<tr>
<td>1989</td>
<td>77,991</td>
<td>18,377</td>
<td>25,938</td>
<td>122,306</td>
<td>2,019</td>
<td>0</td>
<td>124,325</td>
</tr>
</tbody>
</table>

Source: Transport Canada

It has been forecasted that sea-air cargo at Vancouver will grow by up to 20% over the next three years. Moving these cargo operations to another airport location would be an expensive task.

as all necessary infrastructure is presently located at Vancouver International.

Overnight freight service would have to remain at Vancouver International as these operators have a tight time schedule which requires them to be near the metropolitan center. All-cargo carriers with non-rush items could be moved to another facility as this service does not require close proximity to downtown. This option would not be favorable since a considerable proportion of freight arriving in Vancouver is connected to other flights. It is important to realize that 80% of all freight travelling through Vancouver International is carried in the holds of passenger aircraft while the rest is carried by freighter aircraft. Therefore moving cargo operations to a new location would actually represent a small proportion of the total freight operations. If international operations were moved to a new location, an appropriate freight transport link between the two airports would have to be implemented as some of this international cargo would be connecting to other aircraft bound for national and regional destinations.

As Canada's Pacific gateway, Vancouver plays an important role in the cargo industry and thus any airport system in Vancouver must be able to offer both sufficient and efficient cargo services. Like passengers, most cargo is time sensitive and can be easily re-routed to other west coast destinations such as Seattle, Portland, and San Francisco - all of whom would be glad to pick up additional cargo traffic.
A major criticism of a multiple airport system is the inconvenience for connecting passengers of travelling between the airports. Experience from Mirabel Airport and Edmonton International clearly shows the difficulty in attracting customers unless some form of fast and reliable ground transportation is available to the metropolitan center being served. A long journey between airports will cost the passenger both time and money and may result in missed connections or travelling at unfavorable times. By improving travel times between two airports, the newly established airport will be able to attract more traffic. Therefore it is important that an efficient and effective transportation link is available between two airports serving one region.

There are several good examples in other cities of effective transportation links between a distant satellite airport and the metropolitan center it serves. In London, Gatwick Airport is served by a fast and reliable express train. Trains leave every fifteen minutes for downtown London covering the route in 30 minutes. These trains fully accommodate the needs of the travellers. Included on board are extra luggage space, credit card operated telephones and snack bars. Although not presently incorporated, fast and reliable train service is planned to soon serve Heathrow Airport in London. Electric train service is planned for Heathrow running every fifteen minutes.

from early morning until late at night. These trains will link up with London's underground transit service at certain stations. In Paris, planning is underway to link up Charles-de-Gaulle Airport by unmanned metro-style trains with the national high speed train (TGV) network. This will enable passengers using the airport to reach virtually all of France's major towns and other major cities in Europe. Airport authorities in Paris have also implemented a major public information campaign to help relieve peak hour ground traffic congestion at the airport. Called "Papa Bravo", this campaign involves the use of the radio, the press, and posters to inform potential users of the airport. The public is encouraged to use public transport rather than their cars to travel to the airport.\textsuperscript{15}

In the case of the Lower Mainland, a transportation link between Vancouver International and a second airport would likely involve a rapid transit system. Light rail lines could be established along present rights-of-way\textsuperscript{16} and these new lines could also be integrated with the presently established system, thereby linking the new airport not only with Vancouver


\textsuperscript{16}It is important to note that many obstacles may be encountered by attempting to build a new light rail system using existing rights-of-way. Communities will often refuse new rail construction as it may block road transport or eliminate present rail lines. Furthermore, under utilized rights-of-way are being examined for their possible economic benefits and thus these lines may not exist when the time comes for implementing a new light rapid transit.
International, but the rest of the metropolitan area as well. Incorporating such transit service will also be greatly beneficial to urban commuters who presently use the congested road network to travel from their homes in the outlying regions to work in downtown Vancouver.

Constructing such a transportation link would be a costly and timely venture. In their report *Economic Analysis of Airfield Capacity Enhancement Strategies for Vancouver International Airport*, Hickling Consultants estimate that implementing a Sky Train System between airports would cost 38.7 million dollars per kilometer. Given the time it has taken to study possible expansion of the existing Sky Train routes in the metropolitan area itself, it is not wrong to assume that it would take years before any such system would be implemented between two airports. Therefore it is important to plan for such transportation links now in order to help ensure the success of a multiple airport system if such a system were to become reality. This is not to say that construction should begin once a potential second airport site is chosen, but that preliminary planning, such as where and how a rapid transit line could be established and how it would effect surrounding communities, should begin in the near future.
5.4 Where

The question of where to locate a second airport is the most crucial and difficult of all planning decisions associated with a multiple airport system. If poorly chosen, the site for a second airport may actually work against that airport, and the rest of the airport system in general. A poor location would hinder not only airport operations, but also the surrounding communities and the environment. Due to the high costs of airport construction, the issue of location cannot be taken lightly.

It is not the explicit purpose of this paper to decide on where a second airport should be located for this is a decision which must be carefully analyzed by an array of professionals over a considerably lengthy time period. However it is important to discuss what location possibilities exist and what factors must be taken into account with respect to these possibilities.

Each existing airport in a region such as the Lower Mainland will have a considerable number of factors due to its location which will affect the operations of that particular facility. The more significant factors can be summarized as follows:

* Air space factors
* Meteorological considerations
* Topographical conditions
* Environmental considerations
* Surface transportation capacity
An ideal location would have positive characteristics for each of these factors and at the same time be able to operate at an economically justifiable level.

In the case of the Lower Mainland, there is no one location which is ideal for the development of a new airport. As would be expected, it is very unlikely that any location where a present airport exists could meet the demands and requirements of everyone; however some existing airport locations will definitely meet less opposition than others. The one location in the Lower Mainland which has consistently been mentioned as a possible reliever airport is Abbotsford. Compared to other existing airports in the Lower Mainland, Abbotsford appears to be the best suited as it is the only other existing airport capable of handling large air carrier traffic. But it is by no means the perfect location.

Abbotsford Airport, an all weather airport, is ranked 12th in Canada for aircraft movements. The terminal can accommodate aircraft in the twenty passenger range but the airport itself can accommodate any commercial, private, or military aircraft in existence today. The current passenger volume at Abbotsford is approximately 3,500 per year, with an estimated 6,000 by the year 2001.¹⁷

Abbotsford is used as an alternate to Vancouver International when poor weather prevents the use of facilities on Sea Island, hence Air Canada and Canadian Airlines maintain small offices. In 1988, there were 13,400 IFR movements at Abbotsford. The surrounding topography at Abbotsford Airport and airspace restrictions (both in the Lower Mainland and across the border) have resulted in a low average of 15 IFR flight per hour, with this number being as low as 3 under poor weather conditions. New technology and facility improvements will allow the IFR capacity at Abbotsford to be increased over the next decade. By the turn of the century, Abbotsford Airport could have an IFR capacity of 25 flights per hour, making it far more viable as a reliever to Vancouver International, especially for international flights whose hourly movements at Vancouver International are not as frequent as regional and national flights.

In order to make Abbotsford Airport an attractive second airport for Vancouver, considerable changes at the facility will have to occur. These changes include expansion of terminal facilities, extension of runways, taxiways and ramps, and better surface transportation capacity to and from the airport and to and from Vancouver itself. Abbotsford Airport still has a considerably large land reserve allowing for the expansion of facilities and the development of an additional runway.

In the long run, development of Abbotsford may be

18 Transport Canada. Vancouver International Airport Parallel Runway Project Environmental Impact Statement. TP 10173E (Vancouver, 1990), Ch. 3, p. 27.
impractical. Regardless of improved IFR capacity, Abbotsford could never achieve hourly aircraft movements of an airport such as Vancouver International. If air traffic volume predictions for the Lower Mainland prove to be greatly under-estimated, Abbotsford Airport would not be able to effectively function as a satellite airport. Therefore it is important to research other possible locations where there is ample available land (with or without an existing airport) to develop a second airport. Such a development would involve considerably higher costs and a lengthier planning and consultation process, but the Lower Mainland would have an airport system capable of handling air traffic well into the 21st Century.

The same expansion possibilities for Abbotsford cannot be preformed at most other existing airports in consideration in the Lower Mainland. Boundary Bay Airport has been designated by the government as an airport for serving light aviation. As such, the facility at Boundary Bay is quickly approaching capacity (See Table 7). Furthermore, airspace constraints due to the proximity of Vancouver International keep hourly IFR movements low. The airport at Pitt Meadows is likewise constrained in hourly aircraft movements (both IFR and VFR) due to its proximity to Vancouver International. The Langley Airport has the same limitations due to airspace conflicts as it is located between Vancouver and Abbotsford. Operations at Pitt Meadows and Langley are also constrained by size constraints and environmental
<table>
<thead>
<tr>
<th>AIRPORT</th>
<th>ASSUMED TRAFFIC MIX (ICAO)</th>
<th>1988 ANNUAL CAPACITY</th>
<th>1988 DEMAND</th>
<th>FORECAST YEAR WHEN DEMAND EXCEEDS CAPACITY*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Mainland</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vancouver International</td>
<td>62% to 48%</td>
<td>277 000</td>
<td>287 364</td>
<td>1990</td>
</tr>
<tr>
<td>Boundary Bay</td>
<td>1% to 99%</td>
<td>190 000 to 210 000</td>
<td>155 608</td>
<td>1992 to 1996</td>
</tr>
<tr>
<td>Abbotsford</td>
<td>1% to 99%</td>
<td>230 000 to 230 000</td>
<td>153 625</td>
<td>Beyond 2001</td>
</tr>
<tr>
<td>Langley</td>
<td>0% to 100%</td>
<td>190 000 to 210 000</td>
<td>121 041</td>
<td>Beyond 2001</td>
</tr>
<tr>
<td>Pitt Meadows</td>
<td>0% to 100%</td>
<td>290 000 to 310 000</td>
<td>113 891</td>
<td>Beyond 2001</td>
</tr>
<tr>
<td>Chilliwack</td>
<td>0% to 100%</td>
<td>100 000 to 110 000</td>
<td>50 000*</td>
<td>Beyond 2001</td>
</tr>
<tr>
<td>Vancouver Island</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victoria</td>
<td></td>
<td>230 000 to 250 000</td>
<td>200 033</td>
<td>2001</td>
</tr>
<tr>
<td>Nanaimo</td>
<td></td>
<td>100 000 to 110 000</td>
<td>62 776</td>
<td>Beyond 2001</td>
</tr>
</tbody>
</table>

* Currently being expanded to a target 300 000 capacity by an improvement program.

* Estimate

* These forecasts are based on an assumed traffic mix and are dependent on that traffic mix staying constant.

concerns (See Table 8). These airports cannot effectively handle mainline carrier traffic however these facilities can be effective in draining general aviation away from Vancouver International. Small scale commercial and private aircraft operations still operating out of Vancouver International can be designated for Boundary Bay and Pitt Meadows; however some enhancements would be required at these facilities to handle the increased traffic load.

With respect to population distribution in the Lower Mainland, the choice of an airport site such as Abbotsford seems all the more logical. As is stands now, a significant number of people live in the outlying regions of Vancouver and thus are in fact closer to possible alternate airports rather than Vancouver International. Forecasts in population growth for the Lower mainland indicate that these outlying regions (especially south and east of Vancouver) will see the highest increases in population over the next two decades. It would only make sense that should a second airport be required, that its location should be situated somewhere in these rapidly growing regions. Likewise, if the population growth estimates are essentially correct, then the time is now for the preliminary planning of a second airport location since it is not unreasonable to assume that land required for such a development may be difficult to obtain in ten or twenty years from now.

As it stands now, the only existing airport which can effectively handle mainline carrier traffic is Abbotsford.
### TABLE 8
LOWER MAINLAND AND SOUTHERN VANCOUVER ISLAND AIRPORTS: ENVIRONMENTAL ISSUES AND CONSTRAINTS

<table>
<thead>
<tr>
<th>AIRPORT</th>
<th>PHYSICAL CONSTRAINTS</th>
<th>ENVIRONMENTAL ISSUES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower Mainland</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boundary Bay</td>
<td>• Legal restrictions</td>
<td>• Noise, Wetlands</td>
</tr>
<tr>
<td></td>
<td>• Maximum aircraft weight 5670 kg</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Maximum runway length 1145 m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Airspace interaction with Vancouver</td>
<td></td>
</tr>
<tr>
<td>Abbotsford</td>
<td>• Airspace interaction with Bellingham</td>
<td>• Noise</td>
</tr>
<tr>
<td></td>
<td>• High terrain</td>
<td></td>
</tr>
<tr>
<td>Langley</td>
<td>• Land availability</td>
<td>• Noise</td>
</tr>
<tr>
<td>Pit Meadows</td>
<td>• High terrain</td>
<td>• Noise</td>
</tr>
<tr>
<td>Chilliwack</td>
<td>• Land availability</td>
<td>• Noise</td>
</tr>
<tr>
<td>Vancouver Island</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victoria</td>
<td>-</td>
<td>• Urban encroachment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Noise, approach</td>
</tr>
<tr>
<td>Nanaimo</td>
<td>• High terrain</td>
<td>• Noise</td>
</tr>
</tbody>
</table>

be made at this facility, this airport should not be eliminated as a potential site for a second airport. However Abbotsford should not be chosen as the second site until all other possibilities, including building a new airport on undeveloped land, have been effectively ruled out.
6.0 CONCLUSION

Vancouver International Airport is at a crossroad. The time has come for careful planning of this airport facility to ensure its future success. Appropriate planning is not only needed for the future efficiency of the airport, but also for the future potential of the Lower Mainland. If Vancouver wants to meet the aviation demands of the 21st Century, then changes to the Lower Mainland's airport system must begin now.

Given British Columbia's mountainous terrain and consequently its isolated communities, it is not surprising that the people of British Columbia fly more often than anyone else in Canada. Aviation trends such as deregulation and "Open Skies" along with Vancouver International's ideal location for the growing Pacific market, its multiple hub role, and the city's location as an end point for transcontinental services have also added to the heavy demand on Vancouver International. As a result, in the past five years the average rate of growth at Vancouver International has been 6%. Almost 10 million people now use this facility. Forecasts indicate that this number may reach 15 million by the beginning of the next century. If the current airport system remains unchanged, Vancouver International and the Lower Mainland as a whole will not be ready for this demand.

Vancouver International is now preparing for increasing demands on its facility, but is this the final solution? Building a third runway will allow for Vancouver International to compete
with other west coast airports in attracting the growing lucrative Pacific market. Moreover, the added capacity will allow the airport to minimize delays which are presently plaguing this facility. With this enhancement, Vancouver International can become an efficient world-class airport, allowing for British Columbia to prosper and giving Vancouver the opportunity to develop into an international city. But this will not happen over-night. It will take years for the city to build this reputation. Meanwhile, Vancouver's airport will continue to get busier and busier.

Aviation forecasts indicate that Vancouver International, even with its added capacity, may still suffer from congestion and delays early into the next century. This can hardly be considered a selling point for future investment in this province and certainly not a selling point for airlines.

The airline industry is rapidly changing. By the beginning of the next century, several international mega-carriers will emerge through strategic airline alliances. Airports ideally located such as Vancouver International can become an important link in these new mega-carriers' networks. However an airport such as Vancouver International can also be over-flown if it does not have an efficient airport system in tact.

If Vancouver wishes to play an important role in the growing world aviation market, more will have to be done. The time has come to consider expansion not only on Sea Island, but of the airport system as a whole in the Lower Mainland. Expansion of
facilities on Sea Island can only go so far. In other words, it is time to begin planning for a multiple airport system to serve this region.

This does not mean that a second airport should be erected now, but that planning for such a facility should begin soon. An important component of airport planning which needs to be considered now is location. An appropriate location, along with the necessary land and zoning required for airport related infrastructure must be analyzed and decided upon soon. It takes a considerable amount of time to develop an airport yet time is not on Vancouver's side. The Lower Mainland continues to grow both in population and size. Open space for development is becoming more and more of a rare commodity. If planners wait another twenty years before deciding that a second airport is required, it may be too late to develop a second efficient airport.

Currently, there are no plans to implement any such system. In fact, no overall plan for airport development has been implemented or even introduced to this region. A recent Transport Canada public information document states: "Future consideration may have to be given to alternative sites to Sea Island to handle increased aviation traffic that could occur early in the next century".¹ Such vague comments show little concern and lack of preparation for a very imminent problem. If this lack of planning remains the case at Transport Canada, the Lower Mainland's

airport system and its transportation system as a whole will be greatly impeded. The time is now to prepare an airport development plan for the entire Lower Mainland and most importantly, one which takes into account the limited capacity of facilities on Sea Island.
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