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Kelowna International Airport

KELOWNA INTERNATIONAL AIRPORT
Master Plan 2025

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Executive Summary

Growth at the City of Kelowna International Airport (YLW) represents a significant achievement for the community, and a shining legacy for the decision of civic leaders in 1946 who acquired the site. With over one million passengers enplaning/deplaning at the facility, the airport now generates benefits not only for the City itself, but far beyond its boundaries to surrounding regions.

At the same time however, with growth comes the need to plan for future requirements for the aviation needs of the community. The City of Kelowna International Airport, under the direction of Kelowna City Council and the Airport Advisory Committee, has developed the "Master Plan 2025" document to outline a coherent and phased approach for meeting future demand.

The following conclusions are drawn from the study:

Forecasts	In the next 20 years, the passenger volume through YLW is expected to grow significantly to 1.8 to 2.9 million enplaned/deplaned passengers per annum – more than double 2005 volumes.
Airside	In order to gain a greater market reach, extension of the existing runway to 10,000 feet in 2025 should be undertaken to accommodate larger aircraft with extended flight ranges. The appropriate taxiways should be constructed to facilitate the efficient movement of these larger aircraft.
Terminals	The Airport should maximize the re-use of its existing facilities when undergoing capital expansion. Any terminal expansion should be incrementally paced in preparation for doubling of passenger traffic.
Parking	Parking needs to be re-configured with improvements that allow for incremental expansion to match increasing volumes, including a new 2,500 stall parking structure.
Ground Access	The Highway 97 intersection should be improved with left-turn signals and subsequently by a diamond interchange. As volume increases, the management of rail safety and separation should be considered.
Economic Impact	There will be significant growth over the next twenty years that should lead to over 3,000 jobs by 2015, resulting in over $525 million in economic output.

The Kelowna International Airport Master Plan offers a sound and phased approach towards the future development of the facility. With increased market reach provided through expanded facilities, the Master Plan will ensure that the Kelowna International Airport continues to play an important role for the City of Kelowna and its surrounding regions over the next 20 years and beyond.

To achieve this, a new land use plan is outlined in "Master Plan 2025" to protect for requisite operational, airside and terminal areas (see Figure E-1). This plan also includes about 15 hectares of land outside of the current boundaries of the airport.

Implementing the plan will require more in-depth engineering and phasing studies, together with assessment of impacts on operations and the surrounding community. This will be phased together based on a set of trigger points in order to provide for infrastructure to be timed. The time chart in Figure E-2 outlines the phasing for key developments. Associated work will include environmental mitigation studies as well as detailed planning to meet forecasted requirements.

Plan details were the subject of extensive public consultations including meetings with City Council, the Airport Advisory Committee, the general public, airport stakeholders, tourism industry representatives, surrounding communities and Transport Canada. These efforts have indicated widespread support for the directions of Master Plan 2025.

Figure E-1: 2025 Land Use Plan

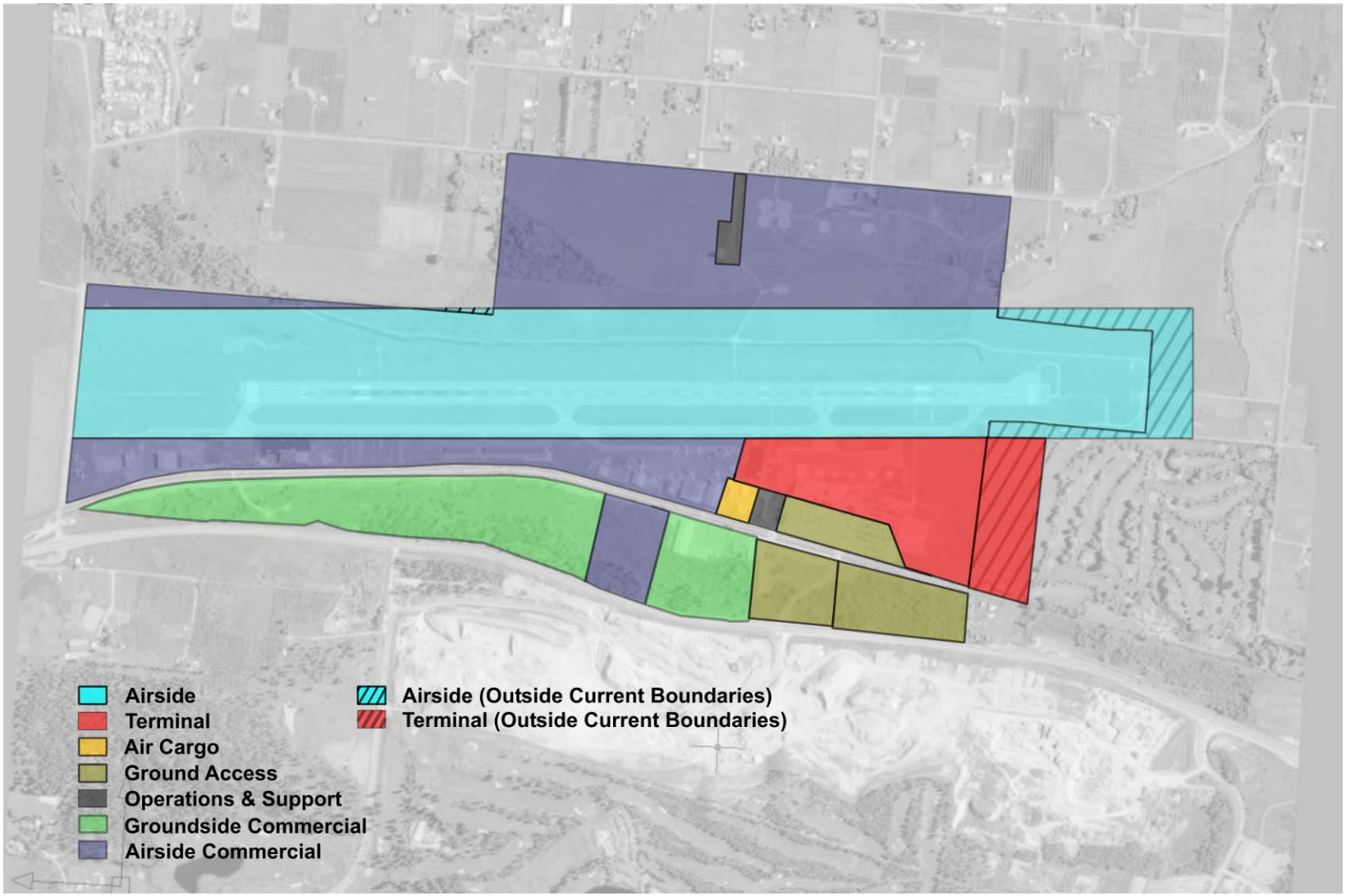
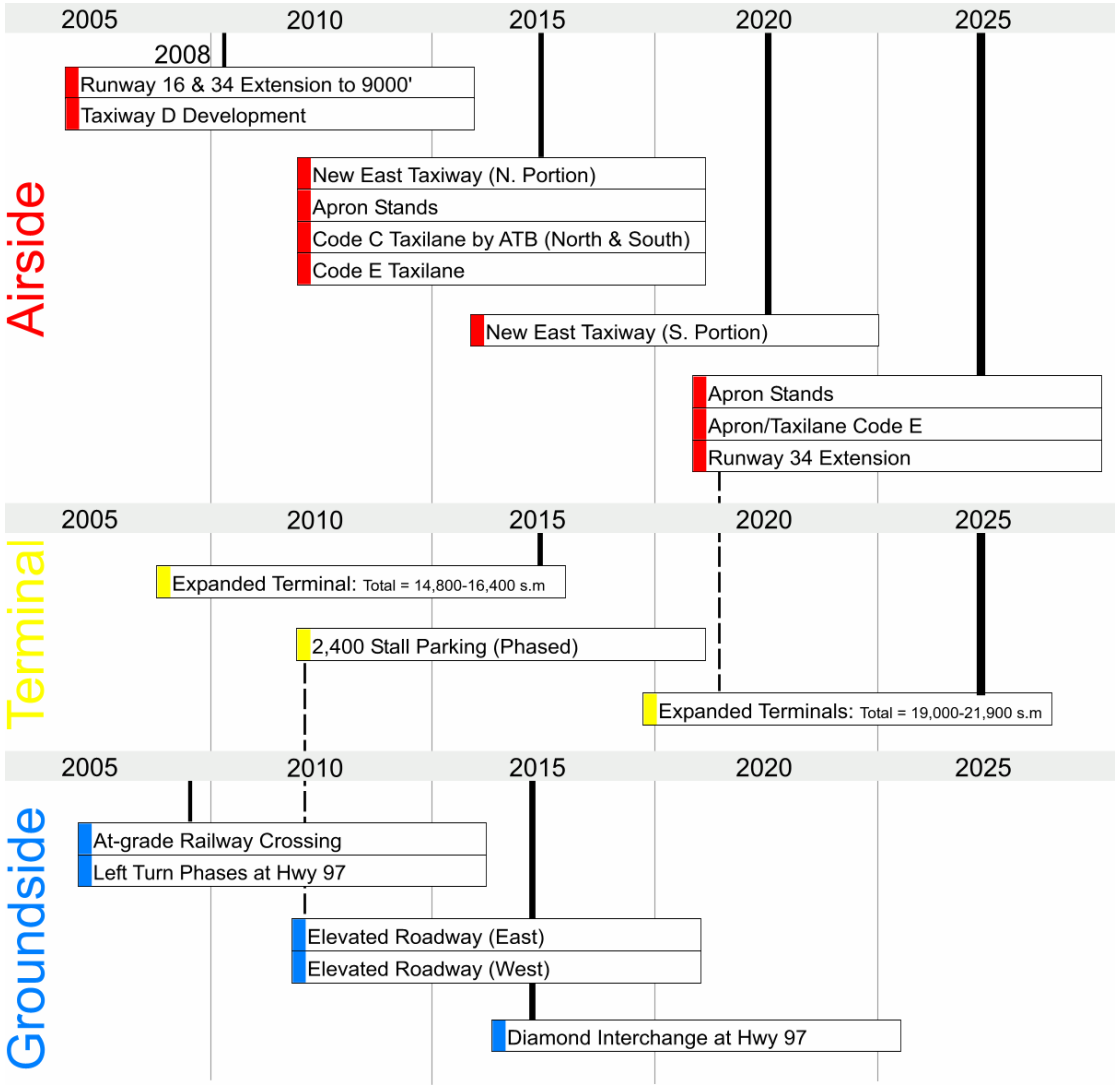


Figure E-2: Master Plan Time Frame



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1.0 Introduction

Growth at the City of Kelowna International Airport represents a significant achievement for the community, and a shining legacy for past decisions to build and grow the facility. With over one million passengers enplaning/deplaning at the facility, the airport now generates benefits not only for the City itself, but far beyond its boundaries to surrounding regions. At the same time however, with growth comes the need to plan for future requirements for the aviation needs of the community. The City of Kelowna International Airport, under the direction of Kelowna City Council and the Airport Advisory Committee, has developed a Master Plan 2025 to outline a coherent and phased approach for meeting future demand.

1.1 Airport History

An important context for the Master Plan 2025 is to understand the key dynamics that have shaped development of the airport throughout its 60-year history.

The Kelowna International Airport's official history took off in 1946, when Kelowna residents voted 466 to 460 in favour of purchasing the 320-acre Dickson Ranch in Ellison for $20,000. In 1947, the grand opening of 'Ellison Field' showcased a small terminal building, a 3,000-foot-long grass airstrip, and a variety of small aircraft.

During the '50s, increasing demand for better service prompted the federal Department of Transport to help gravel the airstrip and pave the parking lot and aircraft parking apron. In 1958, Canadian Pacific Airlines introduced daily, scheduled DC-3 service to Vancouver, which enabled the City to initiate negotiations with the federal government for a longer, paved airstrip.

After buying the land needed for expansion, in 1960 the City extended and paved the runway to 5,350 feet and expanded the taxiway and apron. Then Mayor Dick Parkinson, an avid supporter of aviation and its economic benefits to the Okanagan, spearheaded the $312,000 upgrade.

Increasing aircraft and passenger movements during the early '60s prompted local leaders to seek community support and funding for construction of a new Air Terminal Building at the south end of the runway. The original air traffic control tower was built on the flat deck of a truck.

The early '70s marked the introduction of an air traffic control tower and an on-site weather office. In 1975, a Track Guidance Localizer was installed to reduce poor weather operating limits and improve flight reliability.

During the '80s and early '90s, more than $10 million was invested in upgrading the terminal building, runway, and airlines operating facilities. Increasing passenger and cargo volumes spawned growth in the airport's commercial sector. New businesses located on airport property and helped establish Kelowna as a serious contender in the aviation industry.

By 1997, annual passenger volumes had risen to more than 800,000, making it one of the fastest-growing airports in North America. To prepare for anticipated volumes of one million by 2011, the City of Kelowna embarked on a $20-million expansion program in 1998. The terminal building was doubled in size to 76,000 square feet, parking was increased to more than 1,200 paved stalls, and airside facilities were expanded to accommodate additional aircraft. These upgrades tripled the number of passengers the airport can service from 150 to 450 per hour. The project was funded by a $5 and subsequently an $8 Airport Improvement Fee charged to departing passengers.

At the same time, work began on evaluating the capability of the airport to improve reliability of services. This led to the installation of NAV CANADA's Instrument Landing System (ILS) in February 2003 that significantly improved the reliability of service during conditions of reduced visibility and low cloud ceilings. Subsequent growth of air services have greatly benefited from the landing approach, particularly during the months of January-February.

Kelowna International is now the 10th busiest airport in Canada in terms of passenger volume; in 2006, 1,226,442 passengers traveled through the airport. Passenger activity has more than doubled since 1995 and traffic is expected to continue to grow.

1.2 Airport Location

Kelowna is situated in the interior of southern British Columbia in the Okanagan Valley as shown in Figure 1-1. The province shares its southern border with the states of Washington, Oregon, Idaho and Montana. It is surrounded to the east and west by Alberta and the Pacific Ocean respectively. Within the city, the Kelowna International Airport is located approximately 15 kilometres north and east of downtown Kelowna as demonstrated in Figure 1-2.

Figure 1-1: Kelowna and Surrounding Region

1.3 Strategic Context

In order to frame the Master Plan context when the process started in mid-2005, a Strategic Site Review was undertaken to identify significant challenges and constraints of the site for long-term development. A review of key strengths, weaknesses, opportunities and threats was undertaken for the airport facility in preparation for a 20-year outlook. This is summarized in Figure 1-3 to outline the key issues to be addressed in the analyses.

The Airport has significant market opportunities that can build upon its key strengths. However, in order to deal with these opportunities (e.g. charter traffic to/from Europe), it needs to address some constraints and challenges resulting from the size of the site, terrain as well as infrastructure needs. At the same time, the Airport also needs to retain flexibility to deal with volatility in its operating environment while recognizing potential threats such as competition from other airports.

Figure 1-2: Kelowna International Airport & City of Kelowna

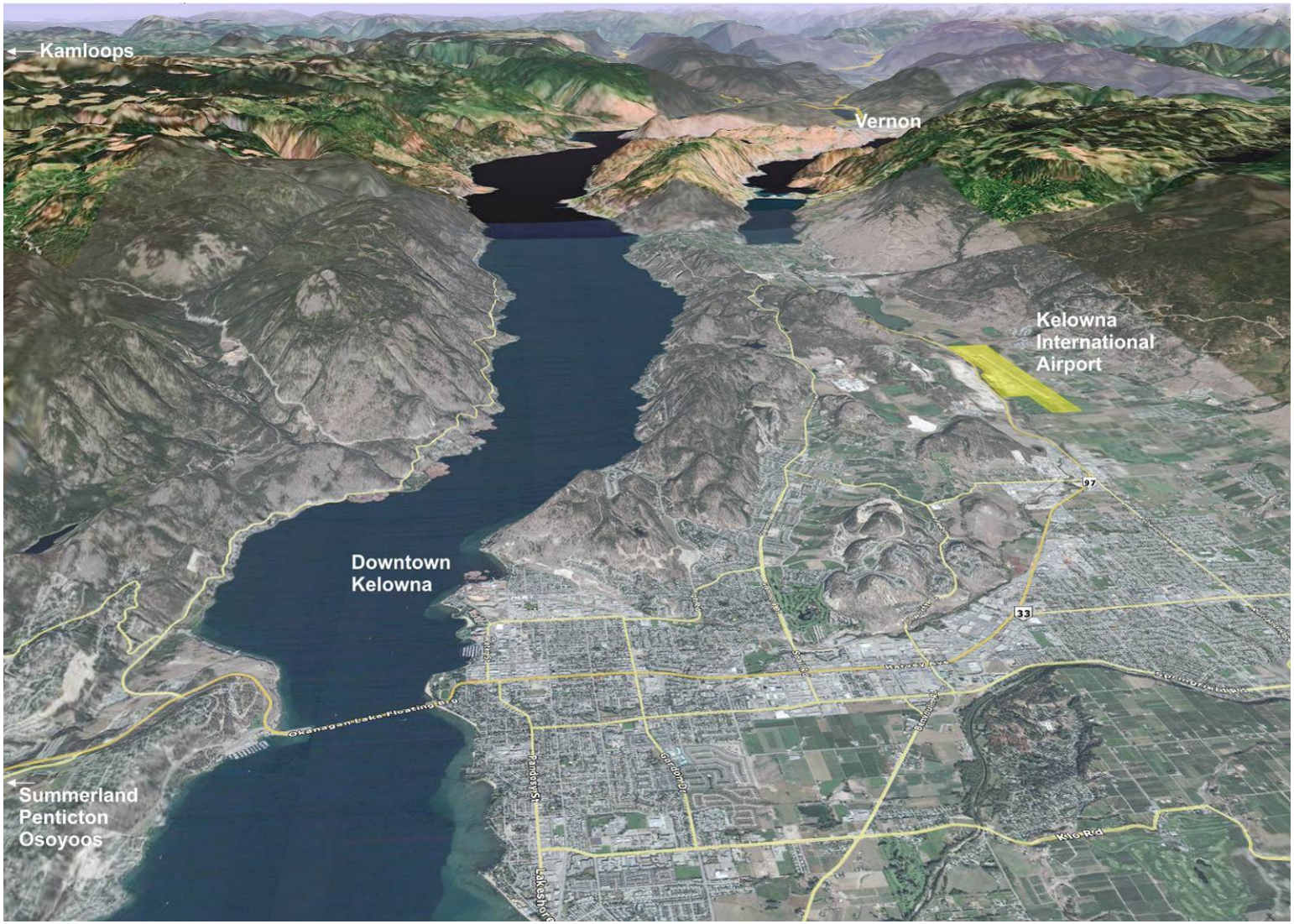


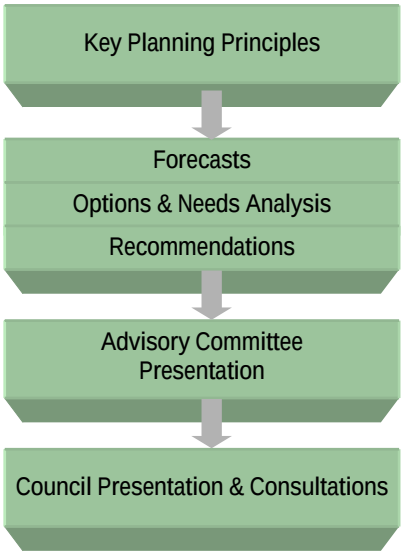
Figure 1-3: Key Strategic Site Review Output (SWOTCH)

STRENGTHS	WEAKNESSES
Cost competitiveness to carriers	Current site dimensions and terrain
Community involvement in airport	Infrastructure limitations of current taxiways/runways
Growing local and regional economy	High dependency on discretionary travellers
Variety of carriers	Airline industry turbulence/realignment
Fast and flexible	Limitations to international clearances
Customer satisfaction	One runway
Accessibility (ground access)	
Partnerships	THREATS
A growing catchment area	Air carrier market decisions
Short dwell time at the facility	Terrorism related disasters
Reflection of community values	Health related disasters
	Access to capital
OPPORTUNITIES	Incremental market competition
Eastern Canadian destinations	
US market access	CHALLENGES
Intercontinental markets	Airspace & airfield limitations
Aerospace development	Runway environment for critical aircraft type
Charter market	Innovate concurrently with all airport stakeholders
2010 Olympics and their legacy	Customer walking distances
Serving regional carrier communities	Flexible & incremental to growth
Innovation in security	Community interface & consultation
Air Cargo	Incorporation of environmental management

1.4 Airport Master Plan Process

Based upon the Strategic Site Review, the following summarizes the process for development of the Airport Master Plan over a 12-month period.

Figure 1-4: Master Plan Process



Key planning principles were developed that led to a set of forecasts, options/needs analyses. This was reviewed iteratively between a consulting team and a steering committee consisting of senior airport management. Recommendations from each of those subsystems were incorporated and provided to the Airport Advisory Committee on May 16, 2006. This was followed by a presentation to Kelowna City Council on July 10, 2006.

Throughout this process, extensive consultations were undertaken with Transport Canada, airport tenants and air carriers. In addition to active engagement, formal meetings were held with each on July 7, 2006, June 20, 2006 and July 19, 2006 respectively.

1.5 Key Planning Principles

The following principles were developed to guide the planning process. The Master Plan aims to:

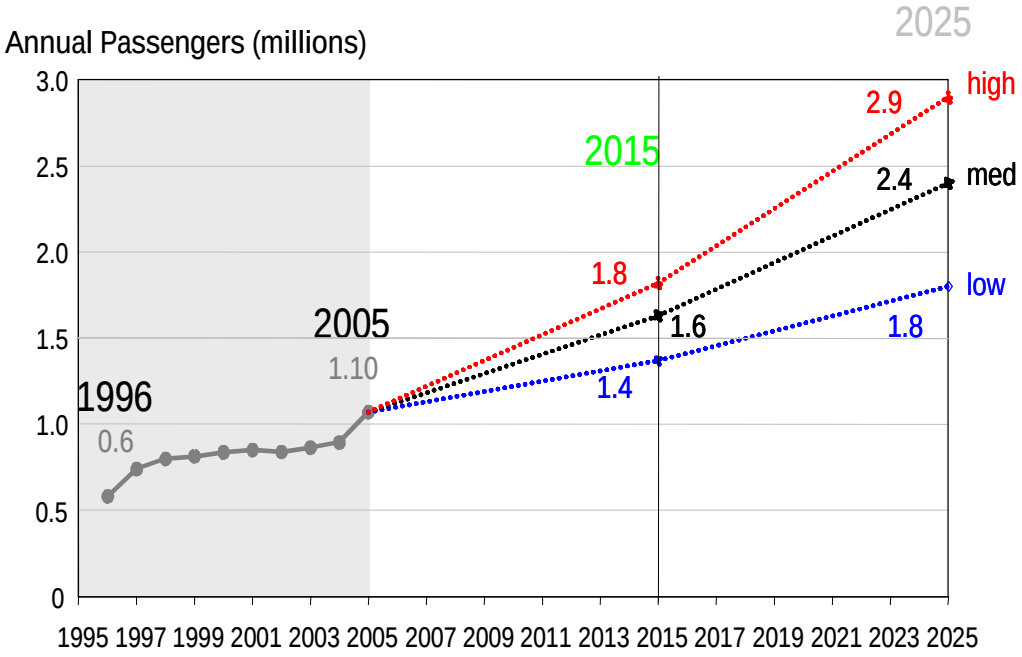
1) Provide high quality airport facilities in a safe and cost effective manner.
2) Support the achievement of the municipality's sustainability objectives (social, economic & environmental).
3) Assure the capability and flexibility to meet future changes in air transportation, technology and operations.
4) Promote economic growth through aviation, aerospace and tourism development and other transportation related initiatives.
5) Maintain low cost structure while meeting customer demand and satisfaction.

2.0 Traffic Forecasts & Economic Linkages

Forecasts were undertaken to gauge different levels of growth from 2005-2025 (Figure 2-1). Aviation forecasts deal with several areas – including number of passengers, aircraft movements and amount of cargo transported. Factored into the forecasts are outlooks for the regional socio-economic environment including population and economic growth, tourism developments, as well as potential market and air services expansion. As well, key developments such as increased alignment between US and Canadian aviation environments, and trends in the air carrier industry that are relevant to the Kelowna market are included in the report.

For the purpose of the Master Plan, low, medium and high scenarios were developed, which call for nearly 2-3 times the volumes of passenger traffic by 2025, as shown in the following chart:

Figure 2-1: Enplaned and Deplaned Passengers
(1996-2005 Actual, Forecasts 2015/2025)



2.1 Purpose and Application

Aviation activity forecasts are essential to airport management, operations and planning. Forecasts are expressed in terms of passengers, aircraft movements and the magnitude of air cargo tonnage. They are typically used to assess operational performance, to establish

future facility/land use requirements, and to identify relative timings for the implementation of capital projects.

It is important to recognise that aviation forecasts are always in a state of revision and update as the inputs used to develop the forecasts are continually changing. The priorities and actions of carriers/operators in response to the changing demand and the industry environment further amplify this variation. Because of the dynamic nature of the forecasts, future facility needs and corresponding land requirements should be established as a function of traffic activity levels. Trigger points for facility expansion can then be identified. In this way, the facilities and corresponding land requirements for a certain activity level remain relatively constant, but the actual implementation schedules can be moved earlier or later as demand warrants. In addition, a forecast range (i.e. low, medium and high) is provided to address some of the uncertainties regarding the socio-economic environment and other factors that may affect the aviation forecasts.

Passenger demand is generally described in terms of annual enplaned plus deplaned (E+D) passengers, which includes all passengers originating from or destined to Kelowna International Airport (YLW), plus those passengers connecting through the Airport en route to other destinations.

Annual aircraft operations are made up of itinerant movements and local movements. Itinerant operations are aircraft movements that depart or arrive at YLW to or from other destinations. Local aircraft movements are those operations that do not leave the air traffic control circuit of YLW, largely related to training/recreational flights. At YLW, itinerant activity has generally accounted for more than 60% of total operations. In 2005, itinerant movements amounted to 70% of total aircraft movements.

Planning peak period forecasts are forecasts of traffic levels (passenger or aircraft) at the busy periods of airport operations. These forecasts reflect the acute nature of traffic demands on airport facilities. Planning peak hour passengers are an essential input for terminal facility planning. Similarly, planning peak hour aircraft movements are critical in the assessment of runway, taxiway and terminal apron facilities.

Air cargo activity is expressed in tonnes of cargo and is generally used to determine the extent of land and facilities required by commercial operators to handle cargo at a particular airport.

2.2 Socio-Economic Environment and Linkages

Kelowna is the largest community in the Okanagan Valley and the biggest centre for business and trade between Greater Vancouver and Alberta. The region continues to grow both economically and in terms of population. Last year, Kelowna experienced an economic growth of 11%.[1]

Kelowna's current growth can be partially attributed to various key developments within the city, including an aggressive downtown redevelopment plan and a five lane bridge upgrade. In addition, the University of British Columbia – Okanagan campus is expanding and plans include a new medical campus, which will attract new students to the region.

The region's key industries include tourism, manufacturing, high-technology and health care. These industries are rapidly expanding, attracting new businesses to the region, and are a primary reason why Kelowna is one of the fastest growing cities in the province. One of the primary reasons why firms are starting up businesses or relocating to the Kelowna area is its cost effectiveness. In KPMG's 2004 Competitive Alternatives Study, Kelowna was rated the most cost-effective place to do business in the Pacific Region of North America. These industries all depend on good air access and the linkages that are provided to reach national and global markets.

Although Kelowna and the Okanagan Valley is already one of the fastest growing tourism regions in B.C. and Canada, its potential growth is significantly greater. There are four major ski resorts within a few hours drive of the city centre. All four of these ski destinations are significant four season resorts – and depend on the Kelowna International Airport to deliver customers. On top of this are vineyards, sporting attractions (e.g. Kelowna Rockets and the Okanagan Sun), outdoor activities, and cultural amenities.

The socio-economic environment will continue to expand over the forecast horizon. Population growth for the Central Okanagan regional district is predicted to increase between 1.6% and 1.8% per annum over the next five years (2006-2011). The regional economy and personal disposable income (PDI) are expected to increase at a slightly faster pace than those of the Province.[2]

1 The Western Investor, May 2006.

2 There are no available forecasts for regional GDP and PDI. Based on historical Census data and Transport Canada economic forecasts for the Province, it is projected that the regional GDP and PDI will grow at 2.3% and 1.8% annually for 2004-2015.

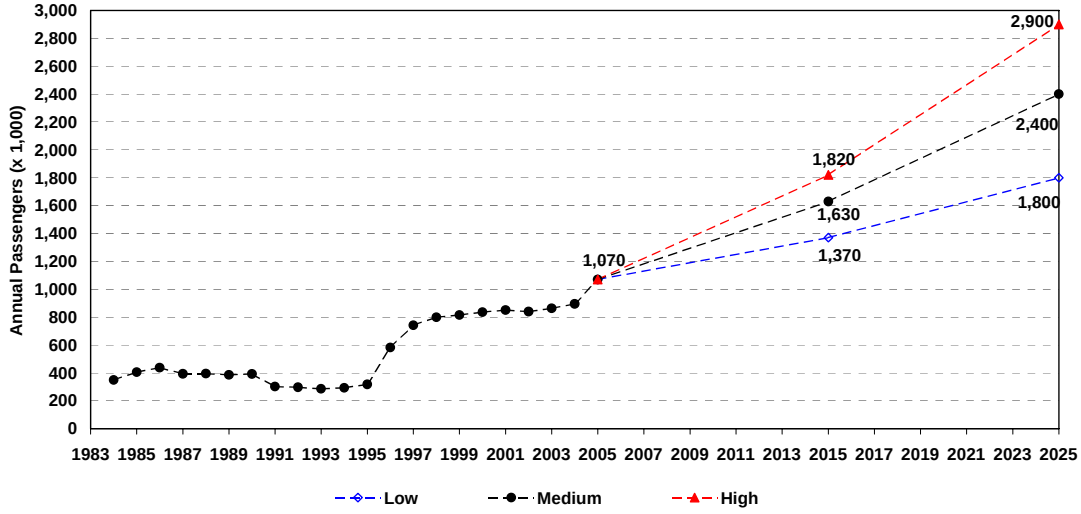
2.3 Passenger Activity

Enplaned and Deplaned Passengers

Passenger traffic at YLW increased substantially during the last decade. In 1996 the arrival of two low-cost carriers, WestJet and Greyhound Air provided the impetus for air service expansion and resulted in significant traffic increases. While Greyhound Air stopped its operations in late 1997, WestJet continues to expand its services. In addition, Horizon Air launched daily non-stop service to Seattle in 1998. Competition between Canadian Regional and Air BC also fuelled the traffic growth. By 1999, some rationalization of regional services took place. In 2000, Air Canada merged with Canadian Airlines, resulting in a further rationalization of scheduled flights throughout their network, which included YLW. The merger, the September 11 terrorist attacks on the US in 2001 and the subsequent general economic slowdown all contributed to stagnant traffic in the early 2000s. However, traffic demand has since recovered and continues to grow along with the regional socio-economic growth. Expanded and new services in 2005 have increased traffic to over one million passengers.

Since 1996, passengers at YLW have been growing faster than the average traffic growth of B.C. as a whole. Supported by a positive regional economic outlook coupled with potential market development, particularly in transborder and international services, Kelowna International Airport is forecast to handle increasing passengers over the planning horizon. For the medium forecasts, traffic is forecast to grow at an average annual rate of 4.3% to 2015, reaching 1.6 million passengers. By 2025, YLW is projected to handle 2.4 million passengers a year. Figure 2-2 presents the passenger forecasts with the forecast range.

Figure 2-2: Enplaned and Deplaned Passenger Forecasts



The medium forecast represents the most likely scenario based on socio-economic outlook and market development.[3] The low forecast assumes slower economic growth for the region and relatively stagnant market growth whilst the high forecast reflects a more optimistic economic outlook plus increased tourism and market development, particularly for international services.

Planning Peak Hour Passenger (PPHP)[4] forecasts took into account annual passenger growth, the peaking characteristics of YLW traffic, the evolution of carrier flight schedules and potential market development. Total airport PPHP volumes are forecast to increase by approximately 90% by 2025, reaching 900 passengers per hour. Figure 2-3 summarises the annual and peak passenger forecasts, which will be input to facility analysis and planning.

Figure 2-3: Annual and Planning Peak Passenger Forecasts

Passengers	2005	2015	2025
Annual (enplaned + deplaned)	1.07 m.	1.63 m.	2.40 m.
PPHP (enplaned or deplaned)	480	680	900
PPHP (combined int'l arrival)	150	400*	400*

*2005 PPHP are estimates based on operating schedules. *Proposed to provide facility flexibility for future services.*

2.4 Air Cargo Activity

Air cargo activity at Kelowna International Airport has not been substantial. The region is well served by easy highway access. Highway 97, the key north-south highway, is connected to several east-west highways, including the Trans Canada Highway. In addition, freight traffic to/from the region is conveniently serviced by over 15 truck lines and various freight forwarders.[5]

Historical air cargo data for YLW is limited and incomplete. Based on reported data to Statistics Canada and consultation with carriers and major freight/courier operators, the Airport is estimated to handle about 2,700 tonnes of air cargo in 2005. Also, cargo traffic at YLW is directionally- imbalanced, with over 60% inbound.

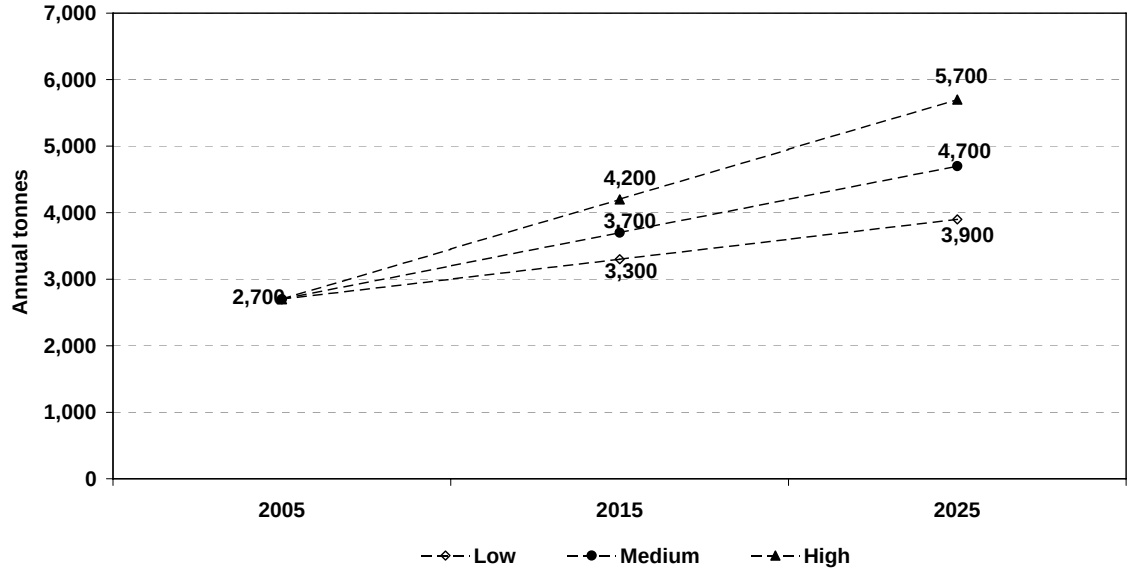
[3] The traffic forecasts incorporated historical growth trends, regional population and economic forecasts, and relevant demand elasticities derived by Transport Canada. Potential tourism/ski market development was also considered.

[4] Planning peak hour demand is a commonly accepted concept for airport facility planning. Planning peak hour passengers are based on the peak hour of a typical busy day of the peak month. This traffic level falls between the average hourly traffic volume and the absolute peak during a year. Facility design based on planning peak demand will not be uneconomically oversized and users should not feel unduly crowded most of the time.

[5] "Economic Profile, Regional District of Central Okanagan", Economic Development Commission, June 2005.

Given the nature of economic activity in the Kelowna region and available convenient access by ground transportation to the region, the potential for air cargo growth at YLW is not expected to be significant. Traffic is forecast to increase along with the regional economy, reaching 3,700 and 4,700 tonnes a year by 2015 and 2025 respectively. The medium air cargo forecasts with the forecast range are depicted in Figure 2-4.

Figure 2-4: Enplaned and Deplaned Air Cargo Forecasts



2.5 Aircraft Movement Activity

The two basic types of aircraft movement activity at YLW are itinerant aircraft movements and local aircraft movements.

2.5.1 Itinerant Aircraft Movements

Itinerant aircraft movements refer to arriving and departing flights with origins and destinations other than Kelowna. Itinerant movement encompasses carriers and general aviation operations. Carrier movements include passenger-related operations and other carrier operations such as cargo, courier and smaller charter activities. General aviation activity includes other commercial operations, corporate/private aircraft and government aircraft operations.

Itinerant aircraft movements at YLW have undergone some cyclical changes. The replacement of scheduled jet services by regional carriers using smaller aircraft in the early 1990s had increased passenger-carrier operations despite a decline in passenger traffic. The substantial growth of carrier activity in the mid-1990s resulted mainly from new services and competition as described in passenger traffic. In the early 2000s, rationalization of domestic regional services led to declines in passenger flights. Variability in other aircraft operations such as fighting forest fires and commercial flight training, etc. also contributed to the historical cyclical changes. Traffic started to recover in 2004 and YLW handled about 50,000 itinerant operations in 2005.

Air Carrier Movement Forecasts

Air carrier movements include operations by Level I-VI carriers offering scheduled and charter services to carry passengers and/or cargo. Scheduled passenger-carrier operations have undergone changes corresponding to passenger activity discussed earlier. In 2005, YLW handled about 21,000 carrier movements related to passengers and 9,600 other carrier operations.

Passenger-carrier operations are forecast to grow in line with passenger demand, albeit at a slightly lower annual rate of 3.3% over the forecast horizon, resulting from increased aircraft productivity due to improved loads and larger average aircraft size. Other carrier movements, including small charter and courier operations, are expected to increase with the regional economy.

Total carrier movements are forecast to increase at 3.2% annually to 42,000 movements by 2015. In 2025, YLW is projected to handle 56,000 carrier movements, ranging between 44,000 (low forecast) and 65,000 (high forecast) operations per year.

General Aviation Movement Forecasts

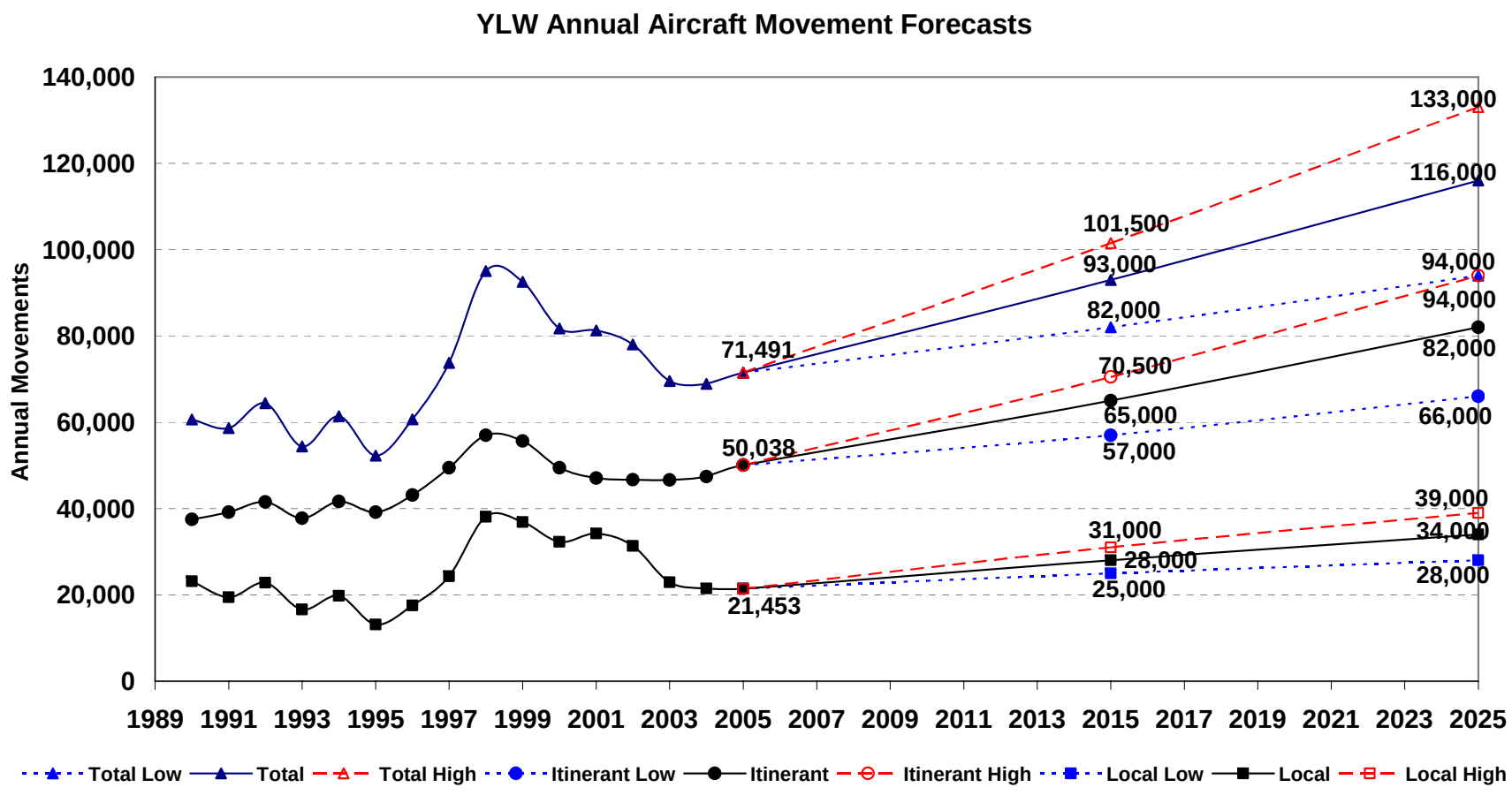
General aviation movements include other commercial activities, private/corporate aircraft and government aircraft (civil/military) activities. Other commercial operations include commercial flight training, sightseeing, aerial surveys and aerial inspection services, etc. by non-government aircraft. Private aircraft movements include both corporate and personal aircraft operations.

General aviation (G.A.) activity has also undergone cyclical changes historically. After peaking in 1997, traffic continuously declined and started to recover in 2002. By 2005, total traffic has increased to 19,400 operations, attributing to recent increases in other commercial operations. G.A. activity is forecast to experience moderate increases through the forecast period. Growth is more likely from other commercial aircraft operations, which is expected to increase in line with the regional economy. Private/corporate aircraft operations are forecast to recover to the level of the late 1990s. Government aircraft operations are expected to fluctuate within the historical range and with minimal growth. Overall, general aviation is forecast to grow to 26,000 operations by 2025, at an average rate of 1.5% per year. The low and high forecasts range between 22,000 and 29,000 movements for 2005.

Total itinerant Movement Forecasts

Itinerant movements (ITM) are the sum of carrier movements and general aviation movements. From the forecasts of the itinerant components as discussed above, total itinerant aircraft operations are expected to increase at about 2.5% per year, reaching 82,000 operations by 2025. For the same year, the low and high forecasts of itinerant movements are 66,000 and 94,000 operations respectively as depicted in Figure 2-5.

Figure 2-5: YLW Aircraft Movement Forecasts



Planning Peak Hour Movement Forecasts

Planning Peak Hour Movement (PPHM)[6] forecasts take into consideration the historical peaking characteristics of aircraft operations at YLW and the annual aircraft movement forecasts, assuming moderate peak spreading over the forecast period. Itinerant Instrument Flight Rules (IFR) peak hour activity has the most impact on the capacity of airside facilities. Planning peak hour movement forecasts are presented in Figure 2-6.

Figure 2-6: YLW Planning Peak Hour Movements

Aircraft Movements	2003	2004	2005*	2015	2025
Annual Total (Itinerant + Local)	69,559	68,894	71,491	93,000	116,000
Annual Itinerant	46,608	47,416	50,038	65,000	82,000
PPHM – Itinerant	19	21	(data not available)	27	33
PPHM – Instrument Flight Rules (IFR)	11	12		17	22

* Preliminary Transport Canada statistics. Data availability anticipated in 2007.

2.5.2 Local Aircraft Movements

Local aircraft movements are movements that originate and terminate at YLW and do not leave the air traffic control circuit. This type of activity is mostly related to flight training.

Local movement traffic had experienced a declining trend since 1990 and started recovery in 1996. Since then, traffic rebounded significantly and continued to grow. A college program that provided more flying training and the transfer of an Air Cadet program to YLW did fuel the growth to a record high of 38,000 operations in 1998. The ending of the Air Cadet program, combined with reduced flight training and competition from other airports have contributed to declining local movements. In 2004, there were 21,500 local aircraft movements at YLW. Traffic stabilized in 2005 at a similar level.

High flying training costs and competition have and will continue to affect local movements at YLW. Some recovery from the existing traffic level is expected over the planning period, with order-of-magnitude forecasts of 28,000 and 34,000 operations a year by 2015 and 2025 respectively. Local movement forecasts and the forecast range are also depicted in Figure 2-5.

[6] Planning peak hour movement is the demand concept for airside facility planning. PPHM is the average demand of the ten busiest hours for each of the three busiest months during a year.

3.0 Airside

The airside system is defined by its runways and taxiways that enable the aircraft to land and circulate to terminals and other buildings. To meet future demands and role of the airport, plans over the next twenty years must provide for the ability to serve anticipated aircraft types. Analyses, rationale and plans are outlined in the following chapter for this critical component.

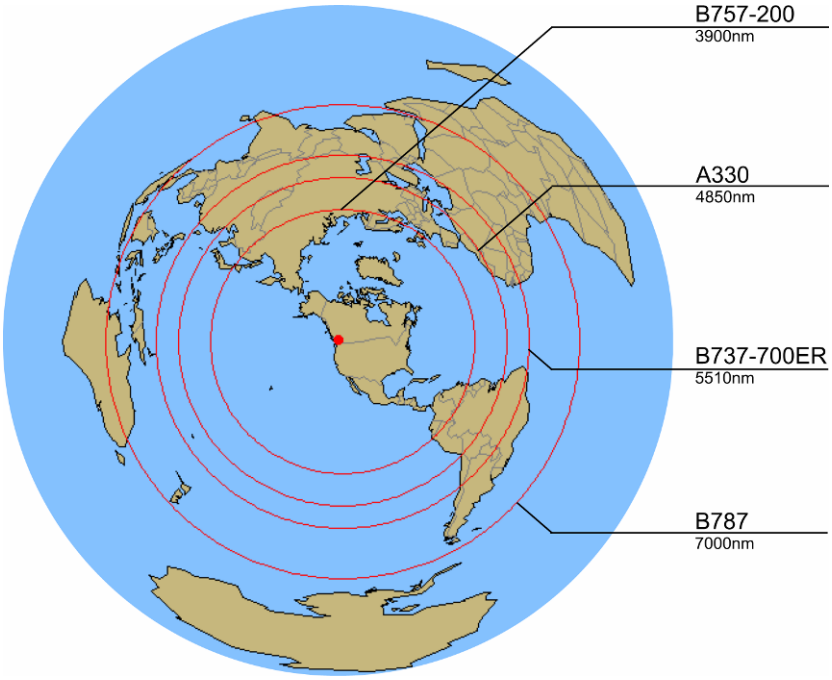
3.1 Key Influences

3.1.1 Aircraft Equipment Trends

One of the key influences impacting Kelowna International Airport is the growing wingspan of aircraft serving the facility. At present, the majority of aircraft serving Kelowna International Airport have wingspans of less than 52 metres. For example, current WestJet B737 and Harmony B757-200 aircrafts have wingspans of 34 and 38 metres respectively. Potential future aircraft for the airport with wingspan categories of 52 to 65 metres include the Airbus 330 and Boeing 787 aircraft.

The ranges for these aircraft are shown in Figure 3-1. While the Airbus 330 is a potential choice for charter operators, the Boeing 787 could also reach distant markets within the runway environment offered in Kelowna.

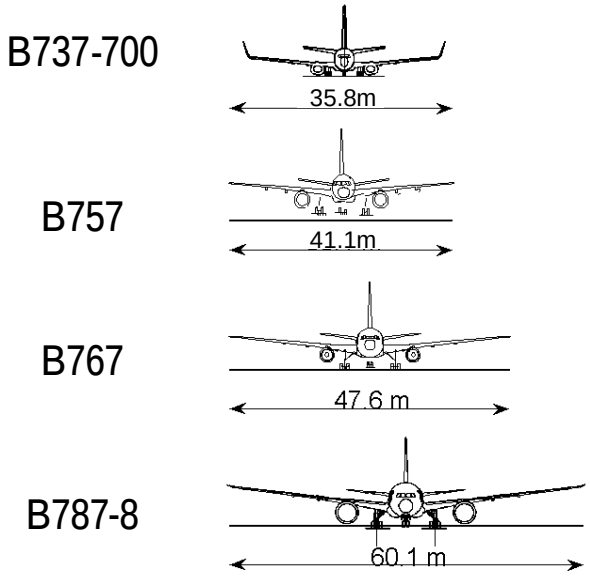
Figure 3-1: Range Diagrams for Select Aircraft Flying From Kelowna*



*Ranges based on estimates from typical payload and fuel in nautical miles (nm)

Also shown in Figure 3-1 are the Boeing 737-700ER -- a good predictor of additional evolution of range for a Code C aircraft, and the B757-200. Some of these potential aircraft types could reach markets as distant as Europe and Australia. However larger aircraft will also have greater demands on land required for operations as well as flight takeoff/landings. Due to the increased wingspan and heavier aircraft (see Figure 3-2), the runway lengths will need to be increased and may require allowances for land outside of current boundaries.

Figure 3-2: Wingspans for Select Aircraft



3.1.2 Planning Assumptions

Due to the narrowness of the existing site, three critical planning assumptions are employed for the future growth of the airport. These include:

- Reduction of runway strip width requirements from 150 m to 120 m
- Transitional surfaces that will be relaxed from current 7:1 ratios
- Runway End Safety Area (RESA) of 152 m (500 feet) on either end of the runway

The long-term options presented in the plan are based on the preliminary draft aerodrome standards of CAR322, which will replace current standards (TP312) sometime in the next 2-3 years. Although Transport Canada Aerodrome Safety Branch found that the preliminary CAR322 standards had been applied correctly in this Master Plan, it is noted these standards are in draft form only and may be modified during the formal Canadian Aviation Regulatory Advisory Council (CARAC) process.

3.2 Current Facilities and Current Airside Requirements

3.2.1 Current Facilities

The airside system planning for Kelowna International Airport (YLW) is structured by the airport's strategic objectives and is undertaken in a manner to facilitate incremental growth.

Single Runway

As shown in Figure 3-3, YLW has one main runway, aligned 160°-340° magnetic, which reflects the prevailing wind directions and surrounding mountainous terrain. Runway 16-34 is currently certified as 4D Non-Instrument, and is 2225m (7300ft) long by 61m (200ft) wide. At each end of the runway is a 304.8m (1000ft) clearway, high intensity runway edge lights, and ODALS for approach lights. An Instrument Landing System (ILS) with DME serves Runway 16. The HMAC runway has a Pavement Load Rating (PLR) of 10, and was last rehabilitated in 1990.

Taxiways

The taxiway system at YLW is made up of five designated taxiways, A, B, C, D and E. Taxiway D runs parallel with the runway, and along with Taxiway A, C and E, serves as primary access to the three aprons and other facilities, as well as access to Runway 34. Taxiways A, B and C provide access and egress from the runway. All taxiways are HMAC pavement with a PLR of at least 10, with the exception of the older portion of Taxiway B which has a PLR of 9.

Aprons

There are three designated aircraft apron areas at YLW in which each has a PLR of at least 10 (see Figure 3-3). Apron I serves the existing Air Terminal Building, and is the primary focus for expansion in the planning period. Apron II serves for itinerant traffic and Apron III acts as a relief apron if there are overflow requirements for large aircraft.

In terms of de-icing, the current process is to perform the operation on the aircraft on-gate in Apron I. This is possible due to the short taxiways and the time for aircraft to travel to the runway.

Figure 3-3: Current Airfield Configuration

3.2.2 Runway Capacity

Runway capacity is influenced by many factors including wind and weather, the types of aircraft using the airport, instrument approach aids and air traffic control procedures. Taking these factors into consideration, runway or "airside" capacity is typically expressed in terms of annual capacity and hourly capacity.

Aircraft movement forecasts for annual movements are provided in Section 2.5, Figure 2-5, and Planning Peak Hour Movements are shown in Figure 2-6. These forecasts provide the basis for capacity planning and analysis.

Annual Runway Capacity

A previous study[7] of the Kelowna International Airport's airside capacity assessed the annual capacity as 170,000 movements. Provided that the taxiway system is enhanced as provided for in this plan, it is not expected that runway occupancy times will change significantly over the period and the 170,000 annual movement total is considered to remain as a valid planning estimate.

With reference to the annual movements forecast, runway capacity is well within the "High" range estimate of 133,000.

Planning Peak Hour Capacity

Based on the findings of the previously cited study, and taking into consideration the improvements that have taken place since and the changes in the type of aircraft using the airport in peak periods in the future, the hourly capacity of YLW's single runway is estimated to be as follows:

Visual Weather Conditions	40 movements per hour
Instrument Weather Conditions	30 movements per hour

These hourly capacities are sufficient to accommodate the forecast 2025 PPHM activity levels of 33 Itinerant movements and 22 IFR movements.

[7] "Airside Capacity Study for the City of Kelowna Airport", Inter*VISTAS* Consulting Inc. with Accuratus Engineering, Ltd., Final Report, August 2000

3.3 Future Requirements

3.3.1 Planning Concept

Within the 20-year planning period, the proposed land use retains the existing runway configuration with short-term extensions to both the north and south ends, and allowance for additional long-term extension to the south end as discussed below. One of the airport's primary objectives is to facilitate the departures of larger aircraft such as the Boeing 757, without the airlines having to incur payload penalties as Harmony Airways does today.

The single runway has sufficient capacity to meet the projected growth over the planning horizon. This is the case even if the high rate of growth is achieved in 2025 resulting in 133,000 annual movements. This increase in traffic will require, however, improvements to the taxiway system to facilitate movement to and from the runway. As noted previously, the non-precision land limits for Code D and E aircraft may not be achievable should draft standards for CAR322 not come to fruition.

3.3.2 Phasing

The phasing for this airside plan is outlined in Figure 3-4 in different time periods, described as follows:

By 2008

YLW's immediate plans within the 5-year horizon include:

- Runway 16 extension by 396.2m (1300ft) to the north
- Runway 34 extension to the south by 121.9m (400ft)
- Extension of Code 'C' Taxiway Delta to the north, with a connector taxiway to the end of Runway 16. The additional taxiway pavement includes 4600m^2 of new HMAC.

5-10 Year Plan (2015)

The five to ten year plan for YLW's airside development is centered on the Code 'D' aircraft size market, which includes aircraft up to a 52m wingspan, and includes Boeing 757 and 767 aircraft.

10-20 Year Outlook (2020)

The 10 to 20 year outlook takes into consideration wide-body aircraft in the Code 'E' category slowly being introduced to YLW. Code 'E' aircraft have wingspans exceeding 52m up to 65m, including the Airbus 330 and future Boeing 787 and Airbus 350 series aircraft.

The trigger point for the 10-year plan is related to the increased peak planning hour and annual aircraft movements, and the expansion of the air terminal building to the south. A Code 'E' parallel taxiway is proposed, initially between Taxiway B and the north end of the extended Runway 16. This new connector and parallel taxiway system is essential for

access to property on the east side of the airport, available to house future FBOs, MROs, general aviation and other airside or groundside commercial activity. Standard perpendicular connectors rather than high speed exits are sufficient for the planning period. Rapid exits to the existing Taxiway D are not possible because of unavailable length, and rapid exits connecting to the new Code 'E' taxiway are ineffective because only a small percentage of traffic would arrive to the east.

The specific airside enhancements shown in the 10-year outlook include:

- Extension of Code 'C' Taxiway Delta to the south, with a parallel Code "C" apron taxilane at the ATB, and a Code 'E' taxiway connector to Runway 34. This would include over 15,000m^2 of new HMAC.
- Apron I extension to the north and south, including vehicle service road and Code 'C' and "D" apron taxilanes. Includes approximately 30,000m^2 of new HMAC.
- Aircraft parking hardstands within the Apron I expansion for up to Code 'D' aircraft, which would include 28,000m^2 of new PCC.
- New parallel Code 'E' taxiway on the east side of the existing runway, requiring over 43,000m^2 of new HMAC.

The 15-year plan trigger point is the increased demand for airside related facilities on the east side of the airport property, and the preparation for increased air traffic and ATB expansion to accommodate Code 'E' aircraft. The new Code 'E' taxiway would extend south to the existing runway end. This extension would include over 41,000m^2 of new HMAC pavement, as well as the relocation of the AWOS.

20-Year Plan (2025)

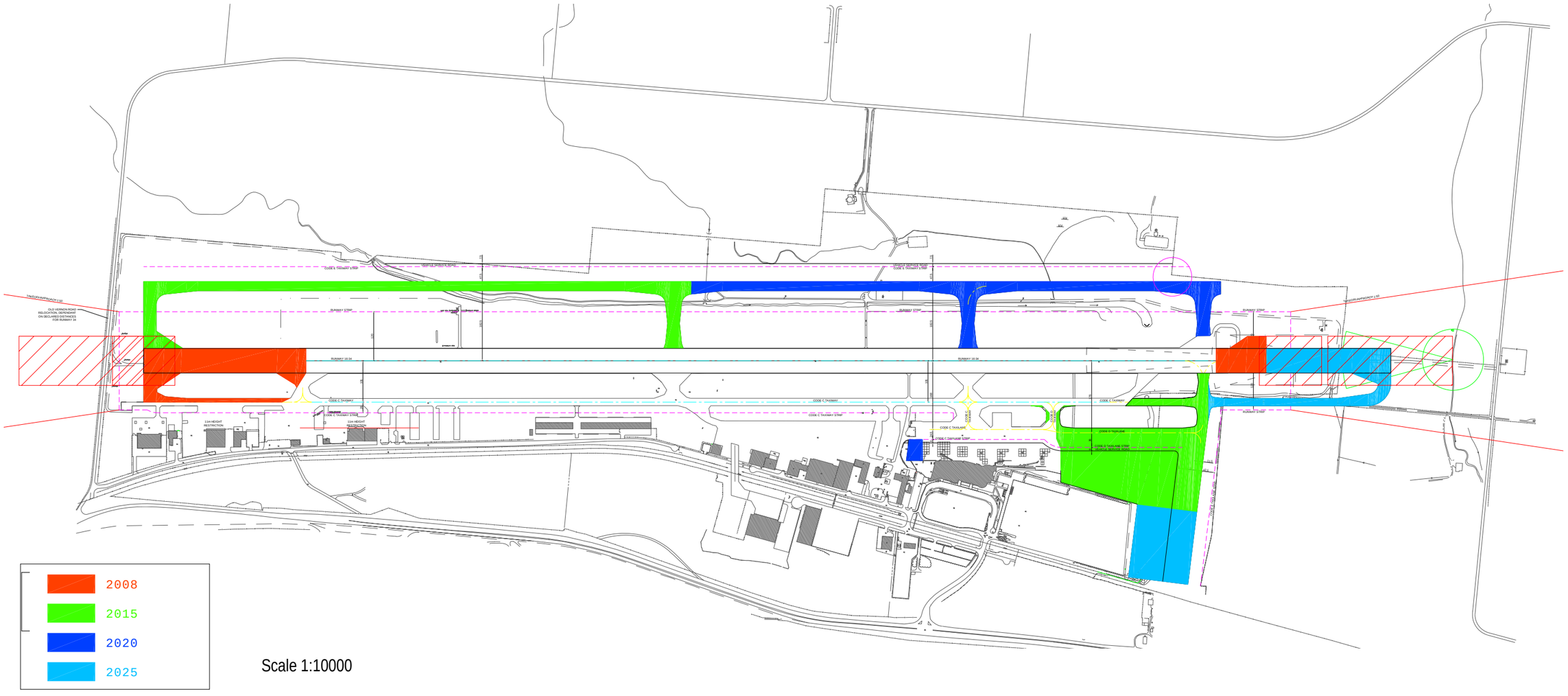
Finally the 20-year plan for YLW envisions the regular service of Code "E" aircraft, and the associated expansion of the ATB to accommodate the wide-body A330 and future B787. A runway extension to 10,000ft coupled with the efficiency of newly developed aircraft technology would put YLW into an intercontinental market. The airside enhancements would include:

- An ATB Apron extension to the west, including vehicle service road and Code "E" Apron Taxilane extension. Includes over 12,000m^2 of new HMAC.
- ATB Apron hardstands within for up to Code "D" aircraft parking, requiring over 10,000m^2 of new PCC within the apron limits.

Runway 34 extension to the south by 304.8m (1000ft). Includes nearly 30,000m^2 of new HMAC, and requires the relocation of the localizer and approach lights.

For long-term runway extension considerations, as shown in the 20-year plan, it is recommended to extend the runway further to the south. By extending to the south, YLW would offset the imbalance of effective take-off length due to the steady downward 0.8% slope of Runway 16, which reduces the Runway 34 effective TORA. Extending the runway further to the south, as opposed to north, also puts the air terminal building and associated facilities in a more centralized location along the runway alignment.

Figure 3-4: Proposed Airside Enhancements 2008-25



3.3.3 Declared Distances

Runway dimensions and declared distances for the staged development of YLW's runways would be as follows:

Figure 3-5: Staging Plan: Runway 16

			DECLARED DISTANCES (ft)				
STAGE	LENGTH (ft)	CLEARWAY (ft)	RESA[t]	TORA	LDA	TODA	ASDA
EXISTING	7300	1000	0	7300	7300	8300	7300
2008	9000	445	500	8945	7645	9445	9000
2015	9000	445	500	8945	7645	9445	9000
2020	9000	445	500	8945	7645	9445	9000
2025	10000	494	1000	9494	8194	10494	10000

Figure 3-6: Staging Plan: Runway 34

			DECLARED DISTANCES (ft)				
STAGE	LENGTH (ft)	CLEARWAY (ft)	RESA[t][8]	TORA	LDA	TODA	ASDA
EXISTING	7300	1000	0	7300	7300	8300	7300
2008	9000	250	500	8750	8350	9250	9000
2015	9000	250	500	8750	8350	9250	9000
2020	9000	250	500	8750	8350	9250	9000
2025	10000	1000	1000	10000	8600	11000	10000

The apron improvements would increase the parallel stand space and would allow for adequate passing clearances for Code 'C' aircraft on the apron taxilane along existing stands 1 through 6, and Code 'D' aircraft for the future stands with a Code 'D' apron taxilane along the southern extension of Apron I.

[8] Includes existing 200ft (60m) length for runway strip

3.3.4 Constraints

Obstacle Limitations on a Narrow Site

Kelowna International Airport has been developed on a narrow property confined by the railway and highway on the west and steeper terrain on the east. Runway 16-34 alignment remains practical based on instrument approaches and wind conditions. The existing Taxiway D and Aprons I, II and III locations relative to the runway provide sufficient clearance requirements for Non-Instrument operations. However, more restrictive clearances are required for Non-Precision and Precision landings. For this reason, operational procedures must be implemented today for Taxiway 'D' when Code 'D' aircraft are in operation.

With the consideration of certifying YLW as a Code 4D Non-Precision airport, the runway strip width increases from 75m to 150m and runway/taxiway clearances for a Code 'D' taxiway increase from 101m to 176m and for a Code 'E' taxiway increases from 107.5m to 182.5m. Transport Canada regulation requires the 150m strip along either side of the runway centerline to be clear of any permanent obstacles (see Appendix B). Combining this requirement with the 7:1 transitional surface slopes, many of the existing hangars and buildings along the northwest side of the existing and future extended runway protrude through the transitional surface. In addition to these buildings, certain Code 'C' and larger aircraft tails parked on the aprons also penetrate the transitional surface. Therefore, if the runway strip and OLS standards remain the same through the planning period, YLW would remain a Non-Instrument certified aerodrome.

Potential Regulatory Changes

However, currently under consideration by Transport Canada is a draft CARS 322, which would include less restrictive runway strip widths and steeper transitional surfaces (see Appendix B). This revision is not necessarily related to ICAO standards, rather an effort to match US airspace regulations. The reduction in strip width combined with the transitional surface slope increase to 4:1 (for the first 92m) would significantly ease the restrictions west of Taxiway D and provide an opportunity for YLW to achieve Non-Precision certification. However, the Skyline Helicopters and Carson Air hangars would still protrude into the transitional surface by up to 2m, even with Runway 16 extending to the north, because the planning period shows the threshold for Runway 16 not being relocated. Also affected would be the trees and fence line of the existing golf course, west of Runway 34.

The extent to which the proposed runway extensions would result in operationally longer declared distances has been clouded by the recent Transport Canada announcement of its intention to adopt the ICAO standard for Runway End Safety Areas (RESA). For a runway of YLW's dimensions, the ICAO standard is for a 90m RESA on each end, in addition to the 60m runway strip. A RESA is twice as wide as the associated runway, and while not necessarily paved, it must be of sufficient surface strength and evenly graded, with no permanent obstacles as to limit damage to an undershooting or overrunning aircraft. With the 15 to 20 year planning at YLW including wide-body Code E aircraft, the RESA standard would likely require the longer 240m length currently recommended by ICAO.

With a 240m long by 120m wide Runway End Safety Area (RESA) requirement for the 15 to 20 year plan, it is recommended to push the RESA to the end of the runway strip at the north end. This could then allow for Old Vernon Road to have a traffic signal placed to ensure no obstructions are in the way of the safety area.

The existing terrain of the airport property exhibits the rolling hill topography of the Okanagan Valley, and the site itself slopes at approximately a 0.8% gradient from north to south, and rises dramatically along the east and west property limits. A substantial amount of surface water is collected by means of an open ditch system, as well as Mill Creek running along the east side of the property. Although the terrain within the airport property does not result in a challenge for future site works and development, it does cause potential conflict for relocation of navaids associated with the ILS. The hills northeast of the airport create a challenge for approaches on Runway 16, and although the 20-year plan does not envision the requirement for extended runway landing distance available, any future consideration for relocating the glidepath would require studies to determine whether or not signals would be deflected from the mountains to the NE.

3.4 Navigational Aids and RVRs

Kelowna International Airport is certified for day and night operations. Electronic navigation and landing aids currently located on or near YLW comprise the following:

- Instrument Landing System (ILS)
- DME
- Three NDBs

Published approaches for Runway 16 at YLW are as follows:

- ILS/DME 1
- NDB B

The published approaches for Runway 34 are as follows:

- RNAV(GPS)

YLW have had discussions with Transport Canada and Harmony to agree upon GPS approach limits of 251ft above airport elevation and 1 statute mile visibility. This would promote a Non-Precision certification for the runways, should CARS 322 become a reality.

For the 20 year time frame of the Master Plan, GPS instrument approaches will continue to gain popularity. However, ILS will remain a stable and popular method for aircraft approaches, and zoning protection for ILS and DME infrastructure should be maintained.

Visual aids to approaches at YLW include a rotating beacon, VASIS units (PAPI), wind indicator, and runway, taxiway, and apron edge lighting. Both runways have threshold and runway edge lights, and ODALS for approach lighting.

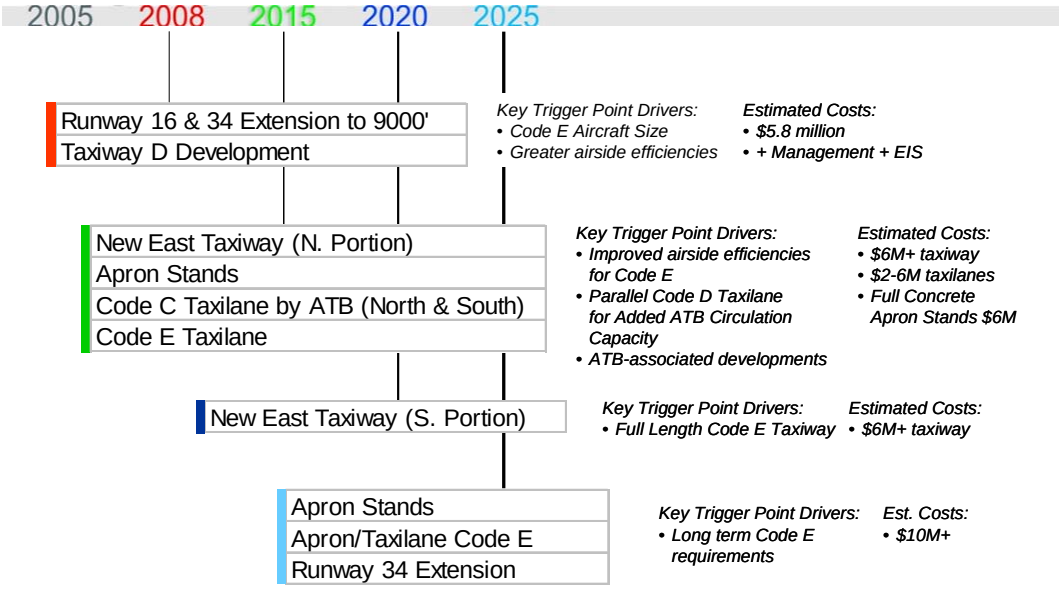
The existing approach lights would require relocation and/or inset components for the displaced thresholds proposed in conjunction with the runway extensions on the north and south ends.

3.5 Summary and Recommendations

3.5.1 Phasing

The summary of recommendations for airside development is provided in the following chart. Costs are estimated for each phase of airside expansion based on existing per metre pavement construction costs; these are subject to change based on variation of estimates and geo-technical analyses.

Figure 3-7: Airside Phasing 2005-25



3.5.2 Zoning Regulations and Navigation Aids

A Communications and Navigation systems study should be conducted to assess the feasibility and impacts of relocation of key ILS navaids to enhance runway capability and increase declared distances. NAV CANADA should be brought on-board prior to the 1000' runway extension proposed in the 20-year plan to assess the implications of moving the localizer.

Property acquisition should be considered as a result of the 20-year plan. It is also necessary to ensure that various planning authorities concerned with development in the airport vicinity are aware of the updated restrictions imposed on land use in the area. Kelowna Airport Zoning Regulations and City planning guidelines should be updated to reflect the required easements for approach lighting, Navaids and height restrictions to protect the approach/take-off surfaces for the future runway.

3.5.3 Geo-technical Review & Pavement Study

When considering the expansive growth of ATB apron and taxiways to the south extents of the airport property, a geotechnical review should be performed to assess subgrade conditions. The existing property south of the airport contains lower land with a high water table, and would require structural fill to meet existing apron and taxiway grades.

As part of the growing airside taxiway, runway and apron systems, consideration must be given to related infrastructure such as shoulder pavements, subdrains, storm drain structures and electrical/communications. With the larger aircraft forecasted at higher frequency, jet blast and aircraft turning movements will require the upgrade of runway and taxiway intersections.

An updated pavement condition survey should be conducted near the 10-year planning period to assess the readiness for heavier and more frequent air traffic arriving and departing YLW. Current PLR ratings for the aprons, taxiways and runways are mostly above 10, with the exception of Taxiway D. This is sufficient for the Code 'D' planning period, but pavement overlays and upgrades would be required for areas not yet meeting a PLR12 rating for Code 'E' aircraft.

3.5.4 Air Traffic Control

The air traffic control tower location on the east side of the airfield is properly situated for all proposed airfield expansion as part of this Master Plan. The line of site should be reviewed with the long term expansion of the apron and taxilane at the south end of the expanded terminal. The terminal expansion height could affect the line of site to the taxiing and parked aircraft only in this area.

3.5.5 Apron

The size of additional apron space shown to the south of the terminal building concepts provides sufficient room for deicing operations for departing aircraft. Rather than deicing the Code 'C', 'D' and future 'E' aircraft at the gates, aircraft en-route to departure could taxi to a dedicated hardstand space where deicing operations would not demand terminal gate time and storm water run-off could be captured for treatment or containment.

3.5.6 Creek Mitigation

The addition of a parallel Code 'E' taxiway, as well as the south expansion of the ATB and apron, will require the mitigation of Mill Creek by means of large storm drain culverts and/or rerouting of the creek alignment. One advantage of a Code 'E' taxiway is that the runway/taxiway separation results in minimal conflict with the existing creek bed. The creek falls outside of the graded area of the taxiway, and would only require a 225m long box culvert where it crosses the new taxiway.

4.0 Terminals and Parking

The current terminal building dates from the 1960's along with a $20 million expansion completed in 2000. The terminal building was doubled in size to 76,000 square feet to prepare for anticipated volumes of one million passengers by 2011. As this milestone was achieved in 2005 – 6 years ahead of schedule with extra additions, there are considerable challenges to meet future volumes of passengers.

Consequently, passenger facilities will require expansion to meet demand through the planning period. The following section presents the results of the requirements analysis and the terminal expansion options to meet the demand. The preferred development concept for terminal and apron expansion is recommended.

4.1 Key Influences

Planning for terminal and parking facilities can no longer meet conventional standards developed over 60 years of commercial aviation history. During the planning horizon, key trends that are just beginning to pronounce themselves in the marketplace will come to bear.

4.1.1 Automation and Self-Service

Process automation and the simplification of passenger travel is emerging. Kelowna International Airport is already a leader in this regards through the introduction of self-serve check-in kiosks to provide passengers with their boarding cards. Dramatic growth of web and mobile phone check-in will also refocus the activity away from the traditional airline check-in function. Although handling of checked luggage will still require a point of interface within an airport terminal, this too is growing to a self-serve model. Border and security agencies will also in coming years advance new ways of re-engineering processes in order to deal more efficiently with passenger flows with limited resources.

4.1.2 Customer Service

The ability for facilities to enhance customer service is an important consideration. Changing demographics of travellers, as well as specialized services, for example to handle skis and golf clubs, will separate Kelowna International Airport from other facilities in its relevance to market demands. The Master Plan 2025 builds forward key results from the annual Customer Satisfaction Surveys in order to inform the key areas that need to be addressed for the future.

4.1.3 Security and Safety

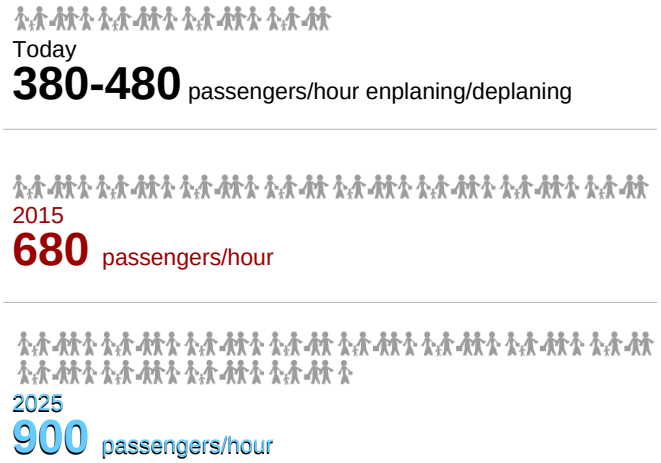
The safety and security of airport operations is a major consideration in the twenty years since the attacks on two Air India flights in 1985. Refocused after 9/11, changes to physical and transportation security are major elements affecting the planning and design of facilities. The flexibility of ensuring sufficient space for operations and installation of new equipment is an important consideration. Moreover, the introduction of new technologies such as anti-tailgating doors, have the potential to increase security while reducing the ongoing operating costs.

4.2 Planning Parameters

4.2.1 Planning Peak Hour

Current peak demand is for space capable of processing between 380-480 passengers in one hour. This peak demand is forecast to increase to 680 by 2015, and 900 by 2025. This represents a volume increase of over 2.4 times the current volume over the planning period. Consequently, the facility and planning requirements need to adequately reflect the rate of increase and the overall peak hour passenger demand.

Figure 4-1: Peak Passenger Demand Forecasts



4.2.2 Gate Facility Requirements

Based upon peak demand forecasts, gate facilities will be required for the following number of aircraft through each planning period (2005, 2015 and 2025). The table has been categorized into the larger-sized jets and smaller turboprop and regional jet aircrafts.

Figure 4-2: Aircraft Requirements Forecast

	Jets	Turboprop/RJ's
2005	3	2
2015	5	3
2025	8	3

4.2.3 Other Parameters

Another planning parameter is to ensure that aircraft have full power in/power out capabilities. The advantages to carriers of this operation include reduced time to depart or turn around a small jet and the potential cost saving of not requiring a push-back tractor or having to pay for this service. The additional apron requirement for this option is also insignificant for the short to medium-term.

Automation is also an important consideration in the evolution of the terminal building. Starting in October 2005, the airport started a program of common use self-serve kiosks. As customer adoption rates of this technology grows, and its eventual use in areas outside of the terminal (e.g. parking), the confines of processing passengers will not be limited to the air terminal building. Similarly, as evidenced in terminal buildings such as Singapore's Budget Terminal that opened in 2006, there are innovations in automation that promise to reduce the space requirement per passenger processed over the planning period.

4.3 Existing Facilities

4.3.1 Terminal Building

In general, the existing terminal building is in a very good condition. The first level of the ATB (Figure 4-3, following page) accommodates the airline ticketing and check-in functions including baggage handling, the baggage claim lobby, a Canada Border Services Agency facility, car rental facilities and some miscellaneous service facilities such as information counters, restaurants, retail and public waiting areas. The second floor of the ATB has offices for the airport management, as well as a public display area for viewing aircraft on the airside.

Analyses were undertaken through an ArcTerm simulation model using available scheduling information. Key conclusions:

- Arrivals queues extend towards claim unit creating potential congestion issues for CBSA processing.

- Arrivals hall area is tight, with occupancy of more than 300 people (passengers and greeters) occurring several times during the day and is primarily comprised of greeters.
- Departures lounge appears adequate to accommodate existing demand, with queues induced by boarding calls might create some congestion.
- No issues with the domestic baggage carousels, with 2006 expansion project.

Figure 4-3: Airport Terminal Building Departures

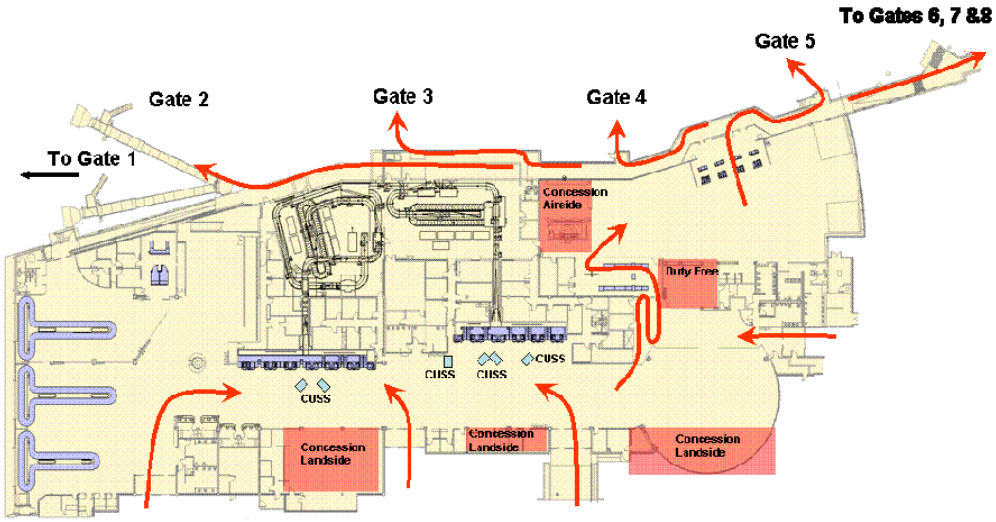
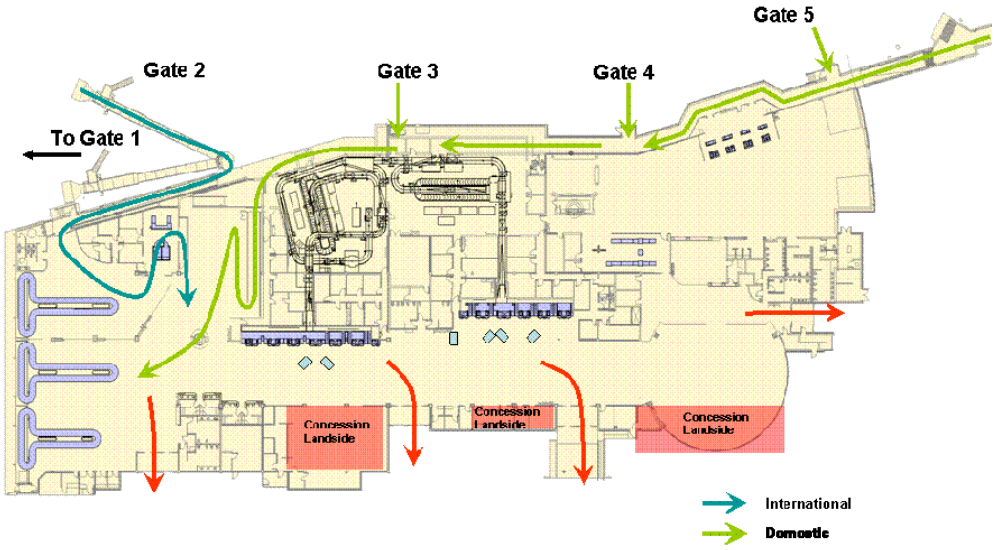


Figure 4-4: Airport Terminal Building Arrivals



4.3.2 Parking Facilities

By the end of 2006, short and long term parking comprise some 2,222 spots including 1,901 stalls in an expanded long-term lot and 321 spots adjacent to the terminal building. In addition to this supply, there are also 250 stalls in overflow, 60 stalls in the rental car lot and 173 stalls in an employee parking lot.

Due to recent changes in the aviation market with increased growth of charter operations, the nature of parking requires spill-over in Christmas seasons to adjacent businesses. Consequently, the availability of parking is not meeting demand, particularly for vehicles that are staying longer.

4.4 Future Facilities

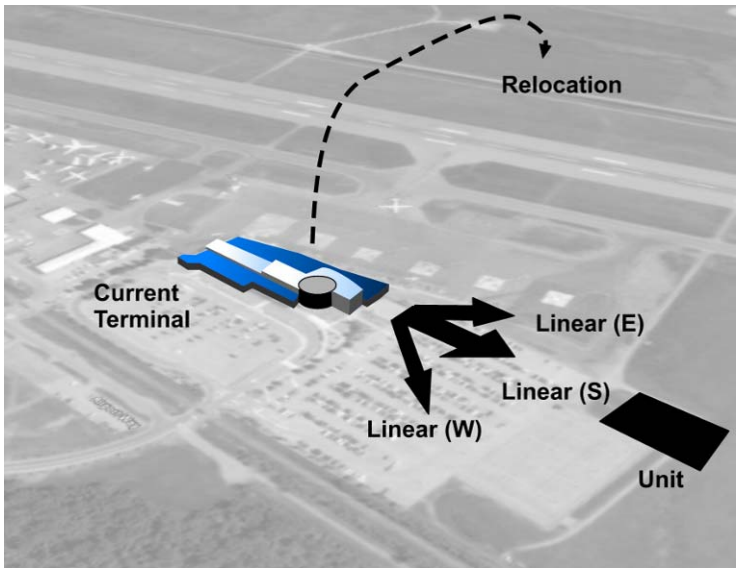
A variety of scenarios were examined in order to determine an appropriate sizing of facilities. The current terminal model does not adhere to normal industry conventions in terms of level of service sizing. The International Air Transport Association model, for example, would provide for a sizing requirement of facilities about 2 times what is currently in place today to meet existing demands.

A review of 10-15 gate facilities worldwide indicate that the City of Kelowna could incorporate key features to meet anticipated demands, while providing a level of service appropriate to the market dynamics and planning parametres.

4.4.1 Expansion Scenarios

A number of expansion scenarios were looked at, including relocation of the entire terminal infrastructure to the eastern portion of the site, a unit terminal to separate several groups of carriers, as well as linear expansion to the east, south and west.

Figure 4-5: Terminal Expansion Scenarios



Due to the provision of tail clearances for aircraft and flight operations, the recommended scenario was an expansion of the terminal to the southwest.

4.4.2 Space Requirements

The terminal will need to be expanded within the planning horizon to 19,000-21,900 square metres – representing double the size of the current facilities (Figure 4-7). Expansion to the southwest will provide the ability to retain and re-use the existing building, while plotting a course for expansion beyond the 20-year time frame of the Master Plan.

4.4.3 Parking Requirements

Existing demand for terminal-area parking was reviewed based on consumption in long-term and short-term lots. Based upon planning peak hour and annual forecasts, the following are planning demand for parking in both lots.

Figure 4-6: Forecast Terminal-Area Parking Demand

	Short	Long	Total
2015	220	1,480	1,700
2025	280	2,220	2,500

As well, to manage the approach over the rail lines, an elevated route from Highway 97 will be directed east bound to serve the terminal building and a 2,500-stall parking facility. An additional 800-1,000 stalls for a new economy parking and employee lot between the rail lines and Highway 97 would bring the total available spots to 3,500. Pricing, as well as other transportation demand measurements are assumed in order to meet the total demand for parking per passenger.

4.5 Summary and Recommendations

4.5.1 Terminal Area Concept

The Master Plan calls for the full re-use of the existing facility, as well as expansion towards the southwest.

4.5.2 Timing

An initial phase by 2015 is called for to provide 14,800-16,400 square metres of space. This is dependent on timing and capacity constraints particularly in the arrivals area as larger aircraft come online.

Figure 4-7: Terminal and Parkade Plan

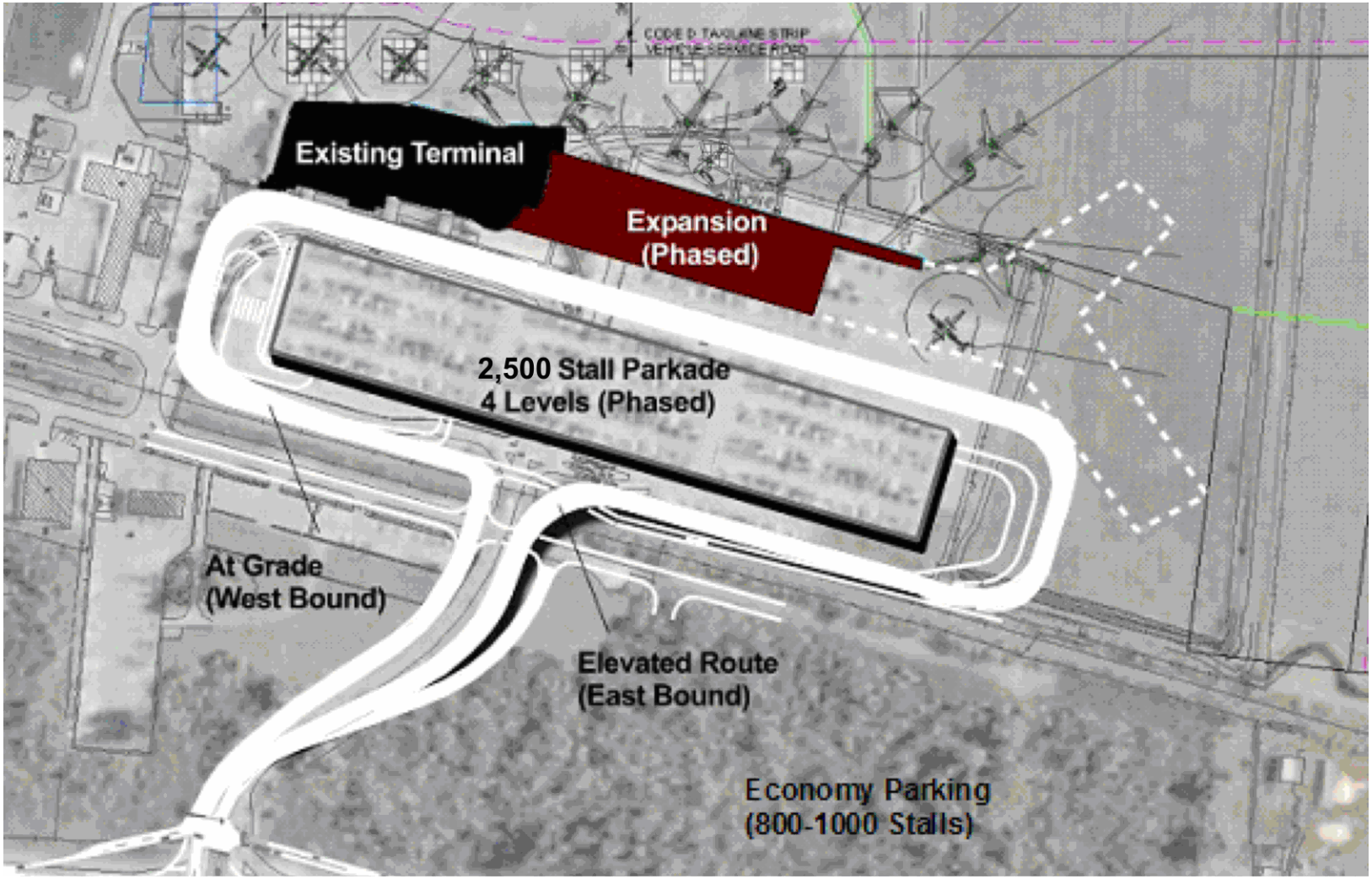
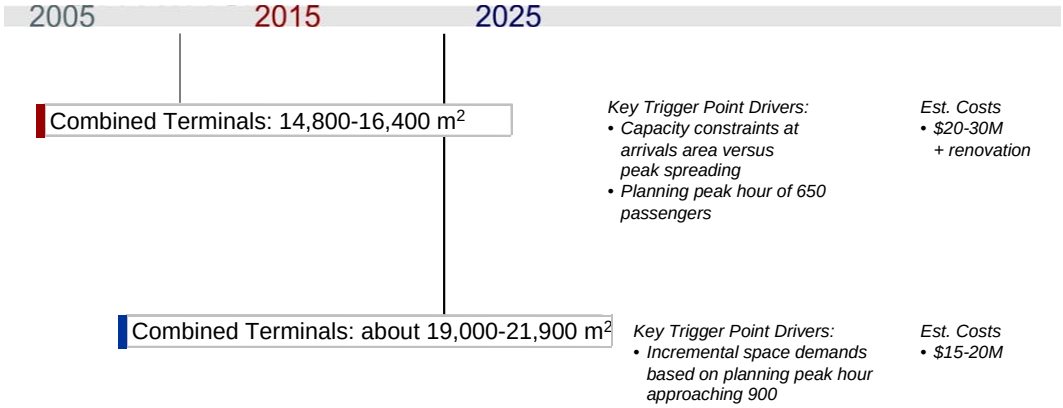


Figure 4-8: Terminal Phasing 2005-2025



A second phase of terminal expansion is set for 2025 in preparation for planning peak hour volumes approaching 900 passengers. This would be a combined terminal of 19,000 to 21,900 square metres.

4.5.3 Recommendation

A phasing plan for the terminal area is recommended immediately following the approval of the Master Plan in order to fully define the strategy and phasing in the 2008-17 period for the terminal and parking structures.

5.0 Ground Access

Kelowna International Airport is increasingly reliant upon efficient ground access to provide customers with a seamless journey to destinations. This is driven in part by the time definite requirements for flight departures and the rapid increase in demand for parking. The dominant theme in ground access planning is to achieve efficient linkage between the airport and municipal/regional road network. In the case of YLW, the prime access to the airport is via Highway 97. Analyses of the ground access assess existing capacity to meet anticipated peak demand. With a growing airport catchment area arising from local and regional development, the competing demands on the highway emphasize the importance of adequate ground access. Existing and future capacity shortfalls are identified and options addressing these deficiencies are presented.

5.1 Key Influences

Planning for future ground access requirements to Kelowna International Airport depends upon the different types of modes that passengers and wellwishers/greeters use. As well, the airport is part of a broader Gateway area, including the UBC Okanagan campus, as well as the Pier Mac development site.

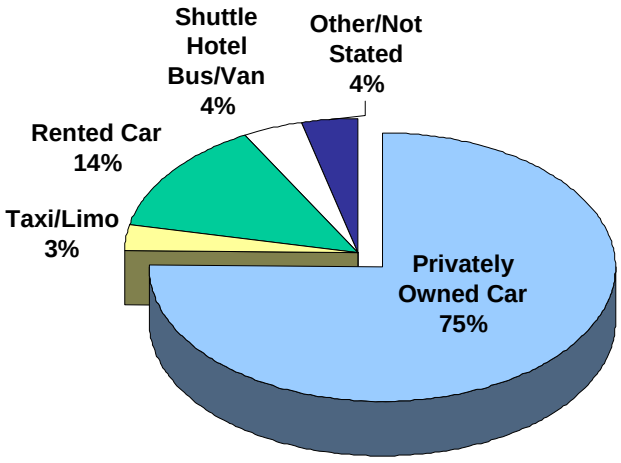
5.1.1 Gateway Transportation Study

Existing demands for highway access was based on the Province of B.C. 2002 Kelowna Gateway Transportation Concept Study. New forecasts were factored based upon growth rates updated for the purpose of this Master Plan. This analysis examined east-west traffic from Highway 97, in association with the Pier Mac development and UBC-Okanagan.

5.1.2 Modal Split

Existing services are primarily based on private vehicles and buses. Alternate forms of travel to the airport include Kelowna Transit Route #23, airport shuttle services, taxis and drop-offs. According to the survey conducted by Kelowna International Airport in 2005, 75% of passengers to the airport rely on the use of private vehicles to get them to the airport. Rental cars make up 14%, while shuttle buses and vans make up 4% (Figure 5-1). Public transportation does not currently play a major role in bringing people to and from the airport. This may change based on local initiatives to boost transit usage and increased transportation demand management measures.

Figure 5-1: Modes of Passenger Ground Transportation

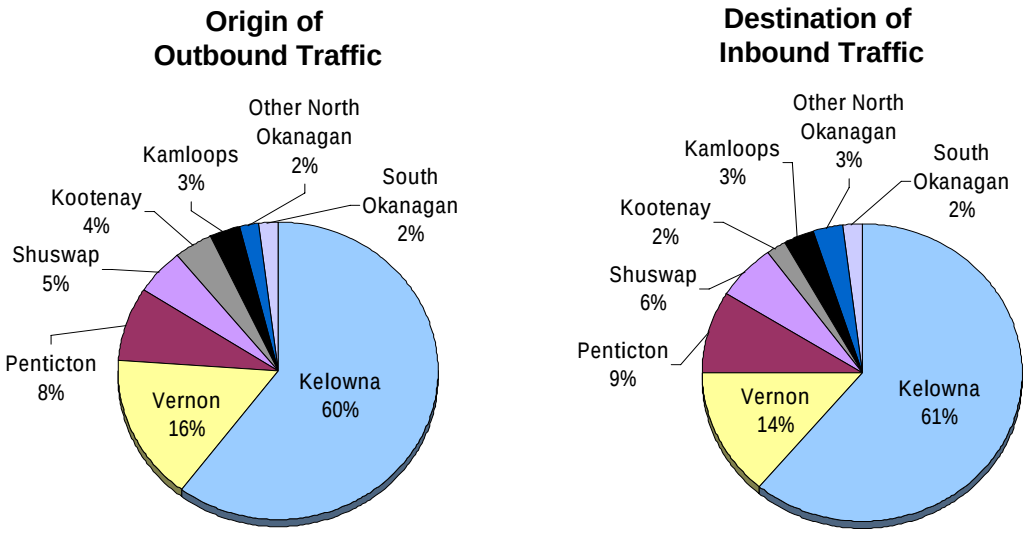


Source: Kelowna International Airport Survey, 2005

5.1.3 Origin and Destination of Passengers by Surface

The average passenger travels 45 km to/from Kelowna International Airport by surface transportation. This figure includes both the outbound (i.e. resident in the catchment flying out of Kelowna International Airport) and inbound (i.e. visitors to the region). As shown in Figure 5-2, there are some variations of inbound and outbound traffic destinations by surface. The YLW survey suggests that of all passengers using the airport, 40% are outbound and 60% are inbound. 60% of the outbound passengers are residents of Kelowna, while 16% are from Vernon. With the remaining percentage of passengers travelling from the Okanagan, Penticton/Summerland, Kamloops, Kootenay and Shuswap regions to access the airport. It is recorded that 61% of all inbound passengers are residents of Kelowna, 14% are from Vernon, while the rest head out to the Okanagan, Penticton and Kamloops regions.

Figure 5-2: Origin and Destination of Passenger Traffic



Source: Kelowna International Airport Survey, 2005

Outbound traffic will be driven by the mix of services available from Kelowna. As more specialized services (e.g. to Mexico, Hawaii) advance forward, the catchment area for the airport will continue to grow based on frequencies and reach.

Inbound traffic will be influenced by the growth of the tourism market and other attractions throughout the region. At present, there are 3 main ski resorts located within the Kelowna region: Big White, Silver Star and Crystal Mountain. It is noted that although located 2 to 2.5 hours drive, Kelowna International Airport is also a major gateway for ski hills in Kamloops (Sun Peaks Resort and Harper Mountain).

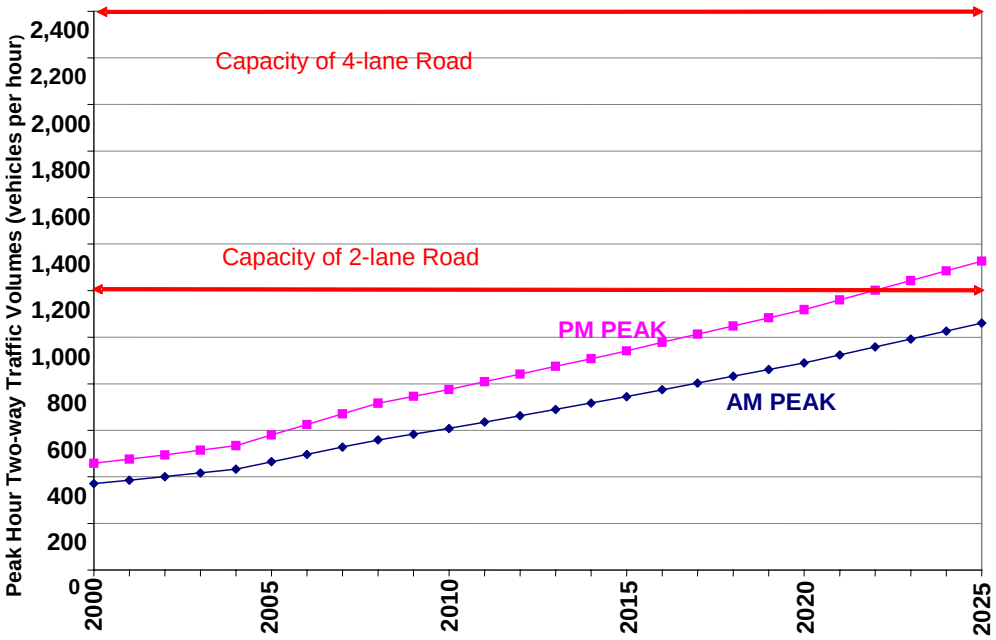
5.2 Highway 97 Access from Airport

The airport is located immediately off of Highway 97, a four-lane roadway. It provides the primary means of passenger ground access to the airport (see Figure 5-4).

5.2.1 Capacity Analysis: Existing Network

In the 2002 Gateway Transportation Concept Study, traffic volumes are projected to grow significantly over the next twenty years based on the network alignment based on today's situation, 2010 and 2020. The peak traffic volumes in the evening are expected to exceed the current 2-lane road capacity around 2020. The overall levels of service for both the AM and PM peaks, however, are expected to be poor before 2010 (see Figure 5-3). This figure illustrates the differences in peak hour two-way traffic volumes illustrated against a 2-lane and 4-lane capacity.

Figure 5-3: Traffic Volumes (Using Existing Network)



5.2.2 Level of Service Analysis

A Vehicle/Capacity Analysis was undertaken to the existing road network (Figure 5-4) to examine the level service vehicles could experience. Detailed analyses are provided in Appendix C and summarized as follows.

Figure 5-4: Airport Way and Highway 97 Intersection Map

With no changes to the roadway configuration, the level of service is anticipated to decline from A-B (good service) to F by 2010. This means that significant delay would arise in the intersection, particularly for westbound and northbound approach to the intersection. The levels of service during afternoons would be inferior to mornings.

5.2.3 2010 Requirements

Analyses were conducted based on the 2010 Network from the 2002 Kelowna Gateway Transportation Concept Study. This includes:

- Hollywood Road extended to College Way
- Majority (80%) of Pier Mac development traffic on Highway 97 will be rerouted to Hollywood Road
- Only 20% of development traffic for northbound left-turn and eastbound right-turn at Highway 97/Airport Way intersection.

The results from this analysis indicates that the overall level is significantly improved through the introduction of left turn phases, with a level of service ranging from B to D in 2010.

While this provides an acceptable level of service, it is anticipated that the modified phasing would provide a level of service decay from C-F in 2015.

5.2.4 2020 Network

A third road network scenario was analyzed: the 2020 network from the 2002 Kelowna Gateway Transportation Concept Study. This concept includes the 2010 network and specifically uses Option 5 from the 2002 study. This includes:

- Three lanes each direction for Highway 97 between College Way and Airport Way.
- Diamond Interchange for the Highway 97/Airport Way Intersection – two traffic signals with coordination at the end of the ramps.
- One Highway 97 northbound lane becomes northbound off-ramp and southbound on-ramp becomes one Highway 97 southbound lane.
- All ramps widened to two lanes at the approach/exit legs for the signal intersections.
- Two through lanes with back-to-back left-turn bays between two traffic signals along Airport Way.

The conclusion from this analyses is that the diamond interchange would provide a good level of service over the 2025 Master Plan timeframe.

5.2.5 Vehicle Access to Airport Businesses

Truck and vehicle access is provided along Old Vernon Road and Airport Way to development areas to the west side of the site. Further analyses in road configuration will be needed as part of the redevelopment of the terminal area to examine the potential routing of all airport business traffic to the north. As well, development areas to the east side of the airport site will also require ground access planning to ensure appropriate levels of service are realized.

5.2.6 Recommendations

Based on the profile drawings provided in 2002 TCS Report, the gradient of Airport Way to grade-separate at the railway would be between 3 and 6 percent uphill from the proposed Highway 97 ramp intersection in order to provide the minimum vertical clearance of the existing railway track. A grade-separated crossing at the existing railway track is feasible.

The existing Acland Road (west of railway track) could be extended and connected to the possible Airport Way between Highway 97 and the railway. The other option is to extend Acland Road to the north, connect Old Vernon Road, maintain the existing at-grade crossing and close the road connected to Airport Way.

The cost of roadway construction is estimated at $75 to $100 per square metre (construction cost only). Therefore, the construction cost of a two-lane road (10m wide) ranges $750 to $1,000 per linear metre. The cost of a new at-grade railway crossing is about $25,000 to $60,000 depending on the control configuration such as cross bucks and flashers (low cost) or warning signals and gates (high cost).

The proposed two-lane Airport Way can accommodate the predicated traffic volumes up to 2023. The four-lane road configuration may be required based on the proposed annual growth rates.

With the existing layout of four-legged signal without left-turn phases, the Highway 97/Airport Way intersection is not expected to provide a satisfactory level of service prior to 2010, even with the additional Hollywood Road extension. The intersection could be improved to an acceptable level of services if left-turn phases are provided. At 2015, the intersection is expected to operate at a poor level of service again and the proposed diamond interchange will be required. The results indicated that the proposed diamond interchange and intersections with Airport Way are expected to operate in acceptable level of services at 2025.

5.3 Railway Access

5.3.1 Short Line Railroad

Two short line railroads operate on a CN Line: Kelowna Pacific Railway and Okanagan Railway. At present, these vehicles have twice daily service with up to 20 cars each. Forecasts into the future are not certain, but could result in as many as six times a day (3

northbound movements, 3 southbound movements). This potentially interrupts access from Highway 97 to the airport terminal throughout various points in the day.

Although the length of the trains are not substantial, the potential impact on airport operations is important to consider. Time-definite departures are an important consideration for air carriers; delays caused by railroad activities could detract from operational effectiveness as traffic grows.

Consequently, an elevated route over the railway should be considered for eastbound movements. There is a less critical emphasis for grade separation on the westbound movement. Incremental costs for building both an eastbound and westbound overpass may result in a single set of overpasses being built during construction.

5.3.2 Rail Transit

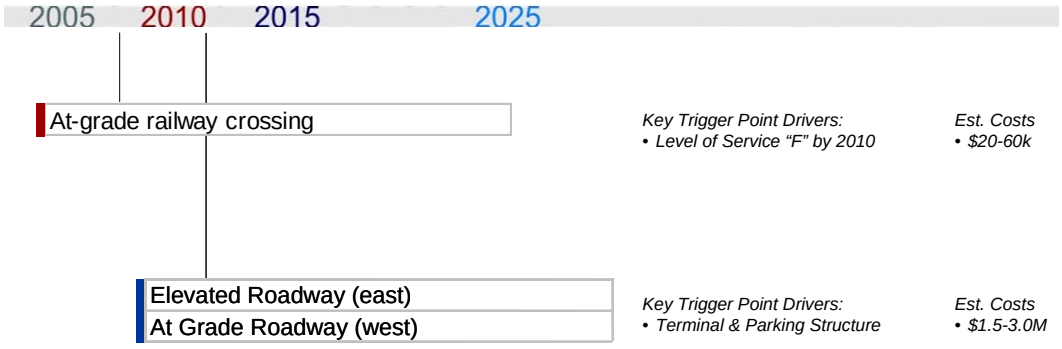
The potential for light rail transit within the Okanagan region has not been fully explored in terms of market, costs and operational models. Should the community or a private operator build a system, allowance should be made for an airport stop adjacent to the proposed parking structure to facilitate transfers to the terminal and surrounding airport businesses.

5.4 Summary and Recommendations

Figure 5-5: Ground Access (By 2010) - Four-legged signal with left turn phases

Figure 5-6: Ground Access 2015 – Hwy 97 Diamond Interchange with overpass eastbound and westbound

Figure 5-7: Ground Access Phasing



6.0 Airport Operations and Support

Adequate airport operation and support facilities are essential for the continuous and efficient operation of Kelowna International Airport. In addition to those facilities discussed in previous sections, major operations and support include airport administration and maintenance areas, as well as utilities and services.

6.1 Current Facilities

6.1.1 Airport Administration

Routine airport operations are managed and directed from the Airport administrative offices on the second floor of the ATB. These offices were opened in 2000, along with an Emergency Command Centre (ECC) located in the former control tower. As the complexity of operations grows along with staffing requirements, new terminal facilities will need to augment the available space for airport administration.

6.1.2 Airport Maintenance

Maintenance, fire and security services are provided in a 1,236 square metre building to the north of the terminal building. This structure houses ground vehicles and other maintenance equipment requisite for operations. Airside access is provided through a secured electric gate to this facility. A heavy equipment storage building will be needed in the near future in order to store snow removal and other large vehicles that are currently housed in temporary open shelter structures.

6.1.3 Utilities

Water is currently provided by a well system at the airport. A more permanent supply of potable and firefighting water is currently being secured from the City of Kelowna Water Utility. In 2006, excavation began for the new water supply located west of the railroad tracks with a trunk connection. The new model for utility provision has the airport paying the City of Kelowna development cost charges, with water and sewer bills directly from the city. The Airport has paid for its share of the cost (in association with Pier Mac and UBC).

Augmentation for sewers to the north side of the airport site is anticipated in the short term with wastewater conveyed to Kelowna's Wastewater Treatment Facility located on Raymer Avenue.

Electricity is currently provided by FortisBC, an investor-owned electric utility serving 150,000 customers in the southern interior of British Columbia. On the airport site itself, generators and a field electrical centre provide redundancy to the airport system. These will require replacement and rehabilitation in the near term of the Master Plan.

At present, no significant problems have been noted in regards to the airport utility network system. However, during the course of the Master Plan, particularly as development moves to the east side of the site, incremental expansion of utilities with the City of Kelowna and Regional District will be needed.

6.2 Recommendations

As the airport advances major infrastructure programs, utilities and support planning will be required associated with the terminal and airside programs.

7.0 Environment

By virtue of its role as airport operator and commercial landlord, the Kelowna International Airport is responsible for the sound management of the land located within airport boundaries. The Kelowna International Airport recognizes that in order to maintain long-term operational viability, as well as a friendly relationship with the City of Kelowna and surrounding communities, it must operate the airport in an environmentally sensitive manner. This section discusses the Airport's existing environmental management policies and practices, and provides a brief status of the site's environmental condition.

7.1 Environmental Policy

The Official Community Plan of 2002 outlines the environmental policy adopted by the City. The Kelowna International Airport is committed to operating the airport in an environmentally responsible manner. The City of Kelowna Airport will:

- identify all aspects of city operations that have a significant impact on the environment;
- manage and control operations and processes to minimize the impacts on the environment;
- ensure compliance with provincial and federal law;
- demonstrate due diligence in the event of a non-compliance; and
- continually improve environmental performance.

7.2 Environmental Practices

Responsible environmental practice employs planning tools and operational procedures to minimize potential negative environmental impacts that might otherwise arise from aircraft operations, land use activities or the development process. Master Plan 2025 recommendations, in particular, will need to lever off of existing practices in order to ensure the mimization of impacts on the environment.

7.2.1 Environmental Assessments

The Kelowna International Airport has committed to reviews and assessments of airport operations and projects to ascertain their potential environmental impacts. The review process considers the biological, physical, and social impacts of all projects, and involves the preparation of an Environmental Review Report by airport personnel before a project is authorized to proceed. The Canadian Environmental Assessment Act (CEAA) is used as a guide for all environmental assessments.

7.2.2 Environmental Audits

These are objective evaluations of the environmental state of the facility. YLW personnel conduct periodic tenant audits to determine the effectiveness of tenant environmental systems and to ensure compliance with environmental legislation. An external firm will perform audits of the entire airport site and YLW facilities to evaluate the environmental management system, the environmental quality of the site, and the fulfilment of legal requirements (as per EBA Engineering Consultants report of 2001).

7.2.3 Environmental Emergency Response

Kelowna International Airport has an Environmental Emergency Response Plan (EERP) that specifies procedures and measures to follow in case of accidental release of hazardous substances on the site. It outlines the responsibilities of YLW staff and the various organizations that may be involved in emergency response and documents response procedures and guidelines for different spillage events. These guidelines are continually updated and posted in the appropriate areas of the facilities. Of note is that all Airport Operations Specialists (AOS) are trained firefighters and fully versed in emergency response and spill cleanup ensuring trained personnel are always present at the airport during operating hours.

7.3 Environmental Management System

The City of Kelowna International Airport undertook an environmental compliance and environmental management system (EMS) audit in 2001. The EMS provides the framework to allow YLW to maintain facilities in a manner conducive to safe, economically feasible and environmentally friendly operations. It outlines the status of the airport's various environmental management components and dictates the basic procedures required for their implementation.

The objectives of the project as they pertain to the City of Kelowna's environmental policy are as follows:

- verify that the existing operations and facilities operated by YLW are in compliance with regulatory and policy requirements;
- assess the adequacy, effectiveness and efficiency of YLW's environmental management system; and
- recommend corrective or preventative action as deemed appropriate.

7.3.1 Findings and Implementation

Since receiving the finalized Environmental Management System and Compliance Report in May 2001, YLW has been actively implementing the recommendations from it. It was generally observed that the City of Kelowna International Airport has made "a strong

commitment to environmental stewardship" and that it is effectively managing environmental issues.

There were some areas of improvement from the report. The following summarizes key environmental practices that have been or will be put in place as a result of the adoption of the EMS. Further details for each practice or policy are provided in the EMS document (2001).

Water Quality

The Airport's EMP addresses deicing fluid mitigation, water quality monitoring, and runway ice control chemicals; these three areas are recognized as having a significant potential impact on water quality. Water sampling is undertaken during environmental audits and, as noted in 2001, the standards outlined in various guidelines were met. Of note, proper groundwater monitoring well standards should be established and maintained.

Air Quality

Air quality is measured and evaluated during environmental audits. As of the most recent audit, no air quality issues of note were associated with YLW operations.

Materials Management

Kelowna International Airport follows stringent guidelines regarding the handling of all hazardous and regulated materials, whether the guidelines are municipal, provincial, or federal. The Airport has taken care to remove all hazardous materials, such as asbestos, known to be present in YLW owned buildings. To properly manage remaining materials on the site (located in tenant facilities or previously undetected) the City of Kelowna Airport has initiated a Hazardous Materials Inventory. The products inventoried include various hazardous materials, ozone-depleting substances, green house gases, PCBs and asbestos. Where appropriate, the inventory will ensure that these substances are removed or their presence phased out from the airport property.

Management of Flora and Fauna

Incidents between wildlife and aircraft, including strikes and near misses, can be a serious safety concern. Although there are relatively few wildlife incidences at the airport, YLW is determined to remain vigilant and minimize aircraft/wildlife conflicts in the most environmentally sensitive manner possible. The Airport possesses a significant amount of resource information on bird and wildlife management and has a consolidated flora and fauna management plan that integrates habitat modification, land use planning, dispersal methods, exclusion methods, and removal methods.

Contaminated Sites

The only contaminated site is the fire training area, which is currently undergoing remediation. Although no other major concerns were cited for contaminated sites, a

recommendation was made to define criteria for and develop a management plan for contaminated or potentially contaminated sites.

7.3.2 Environmental Recommendations

- Incorporate requisite environmental analyses associated with airside and terminal programs.
- Continue monitoring environmental conditions and implement necessary initiatives to mitigate or correct potential deficiencies.

7.4 Noise Exposure

A key issue in airport environmental considerations is that of aircraft noise. Planning tools are used to predict the levels of sound generated by aircraft operations to assist in making land use and zoning decisions.

7.4.1 Noise Exposure Forecasts

The Noise Exposure Forecast (NEF) is the officially recognized metric used in Canada for airport noise assessment. It was designed to encourage compatible land uses in the vicinity of airports, and to predict human annoyance to airport operations within noise zones. The NEF calculates the sound generated by individual aircraft types expected to operate at the airport, and adjusts for the number of operations that are forecast to occur. Due to the higher social impacts of nighttime noise, aircraft movements at night are factored to have 16.7 times the impact of daytime movements. These contours designate areas of equal noise exposure and thereby provide information to assist in planning for compatible land uses. Since the computer-generated result is a compendium of factors, it cannot be directly related to measured noise.

NEF Contours were run to examine the base year (2005) results, as compared to the 2025 airfield configuration described in Chapter 3. Generally, contours are generated to delineate areas of individual noise ranges (greater than NEF 40, NEF 35-40, NEF 30-35, and NEF 25-30). At extended distances from aircraft flight paths, ambient noise levels typically dominate.

Key results were that 2025 contours will be extended beyond the north/south limits of the 2005 contours because of the extensions of the runway.

Figure 7-1: 2005 Noise Contours

Figure 7-2: 2025 Noise Contours (Forecast)

Note: Planning purposes only.

8.0 Implementing the Plan

8.1 Overview

The Airport Master Plan is an overall requirement definition and coordination document that will serve as the blueprint for future growth at Kelowna International Airport. Additional detailed work, engineering, costing and project planning will need to be conducted before any implementation takes place.

8.2 Timeline

8.2.1 Capital Planning

Early estimates of the order-of-magnitude investment for the future runway, terminal, parking and other developments total $150 million (2005 dollars). More refined estimates based on geotechnical and other studies are needed to refine capital outlay requirements.

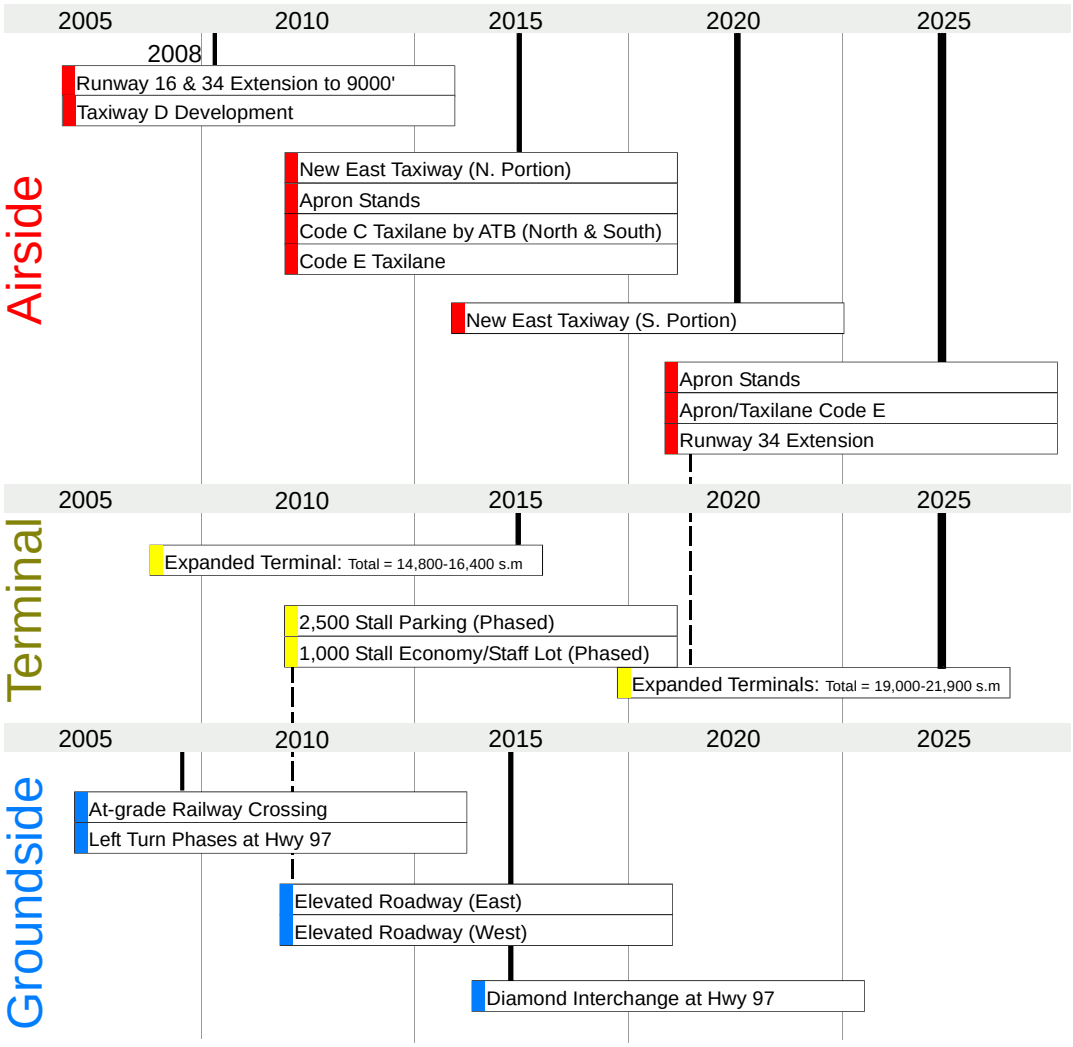
Figure 8-1: Estimates of Capital Requirements for Master Plan 2025

	Millions of Dollars (2005)			
Year	2008	2015	2020	2025
Airside	5.8	18	6	10
Ground Access	2	18		
Terminal & Parking	20	50		20
Total	27.8	86	6	30

Order of Magnitude Estimate : $150 M

8.2.2 Phasing

Figure 8-2: Phasing of Major Infrastructure Projects (2005-25)



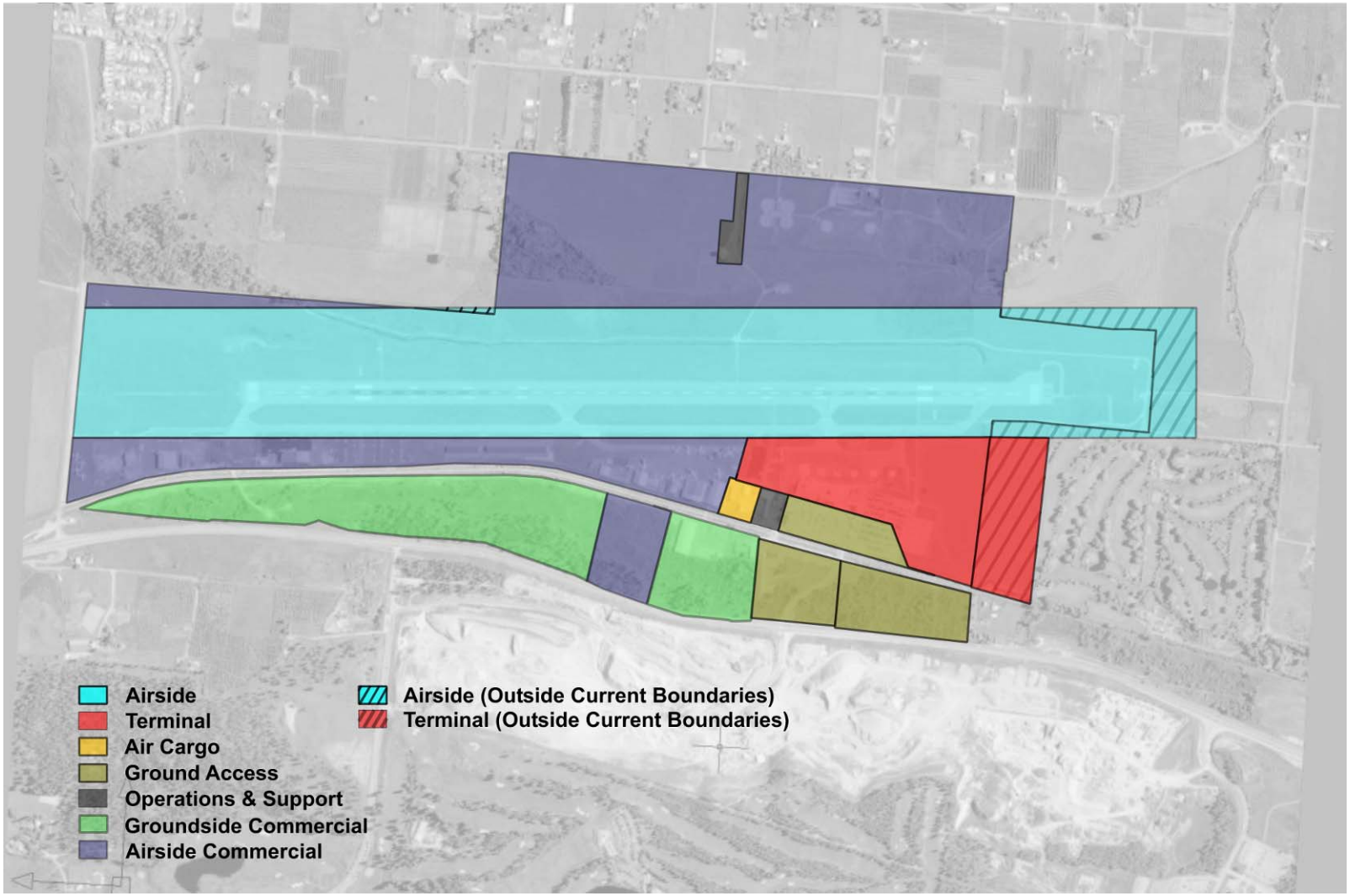
8.3 Airport Land Use Plan

The Airport Land Use Plan provides a delineation of uses in order to meet regulatory obligations for safety, as well as allowing sufficient room for reserves to expand terminal and other operational facilities.

This is shown on the previous page (Figure 8-3) based on seven types of land uses:

- Airside: runways, taxiways, and safety buffers
- Terminal: areas for existing and future terminal development

Figure 8-3: Kelowna International Airport: Proposed Land Use Plan



- Cargo: areas for receiving and processing air cargo for shipments
- Ground access: roadways
- Groundside commercial: development lots for only ground (e.g. truck) access
- Airside commercial: development lots with access to airside infrastructure
- Operations & support: operational areas and NAV CANADA

8.3.1 Land Tenure

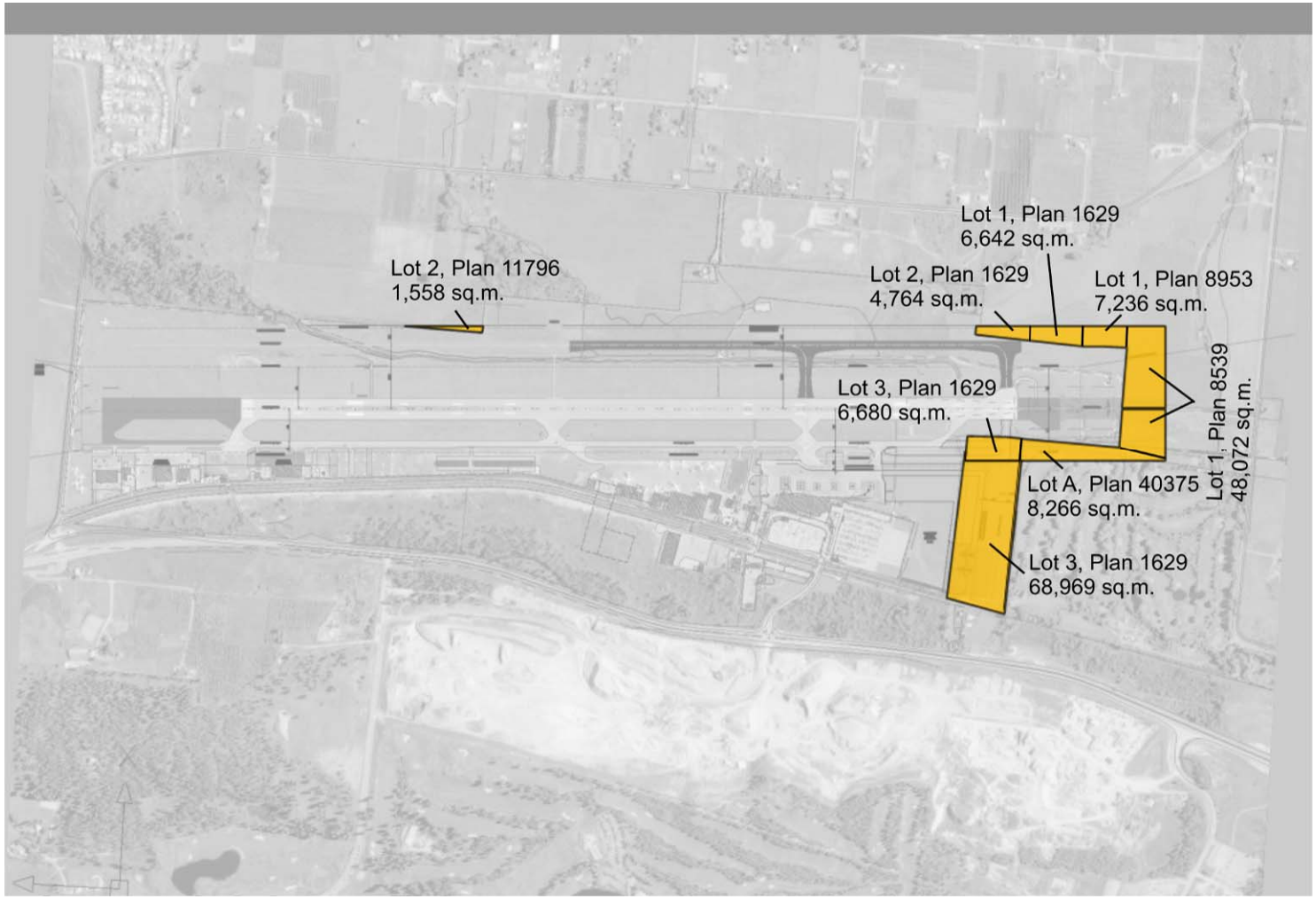
The current airport boundaries cover around 252 ha of land. Based upon the recommendations of each airport subsystem covered, the airport will include an additional 15 ha of land that is currently outside its boundaries (total land = 267 ha). About 7 ha of land are from Regional District properties and 8 ha from properties within the City of Kelowna, shown on the following page.

Without acquiring these additional lands, the ultimate expansion of the terminal area to the south cannot take place. The information is summarized in Figures 8-4 and 8-5.

Figure 8-4: List of Lots & Parcels Impacted by Master Plan 2025

Jurisdiction	Lot #	Parcel #	Area (sq.m.)
Central Okanagan Regional District	2	1629	4,764
Central Okanagan Regional District	1	1629	6,642
Central Okanagan Regional District	1	8953	7,236
Central Okanagan Regional District	1	8935	48,072
City of Kelowna	A	40375	8,266
City of Kelowna	3	1629	6,650
City of Kelowna	3	1629	68,969
City of Kelowna	2	11796	1,558
		Total	152,157

Figure 8-5: Map of Lots Impacted by Master Plan 2025



Note: there is a +/- variation in actual sizing based on measurement methodology used

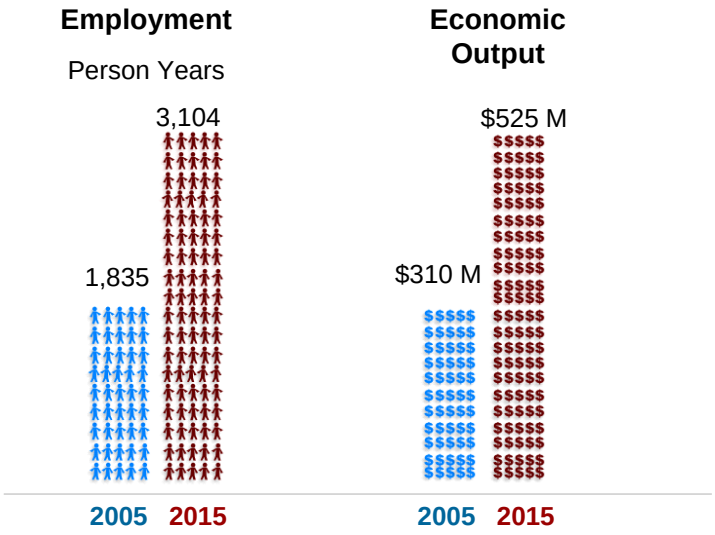
8.4 Economic Impact of Master Plan 2025

Based on analyses of traffic volumes, economic impact estimates were undertaken for the future growth of activity. Direct benefits in employment are estimated to just under 2,000 jobs in 2006. Growth in activity will lead to over 3,000 jobs by 2015, resulting in over $525 million in economic output (Figure 8-6).

The estimates are based on *direct* benefits generated by airport activities. For example, the growth in economic output estimated over the 2025 period involves the production into goods and services for airport activities – ranging from the businesses involved in flight operations and aerospace in the area.

While some economic impact assessments include indirect and induced benefits in characterizing potential outcomes, the methodology used for the Master Plan was conservative. Nevertheless, significant downstream benefits throughout the community in purchase of services as well as supporting the growing tourism base should be anticipated from growth of airport activities.

Figure 8-6: Estimates of Direct Employment and Economic Output from Kelowna International Airport



8.5 Consultations

To assist in implementing Master Plan 2025 and including input from relevant business and community partners, a consultation program was included in the development of the plan. Plan details were the subject of extensive public consultations including meetings with City Council, the general public, airport stakeholders, tourism industry representatives, surrounding communities and Transport Canada. These efforts have indicated widespread support for the directions of Master Plan 2025. Key comments are summarized in Appendix E.

Appendix A: Airport Glossary of Terms

Aerodrome	Any area of land, water (including frozen surface thereof) or other supporting surface used or designed, prepared, equipped or set apart for use either in whole or in part for the arrival and departure, movement or servicing of aircraft and includes any building, installations and equipment in connection therewith.
Aerodrome Beacon	Aeronautical beacon used to indicate the location of an aerodrome from the air.
Aerodrome Elevation	The elevation of the highest point of the landing area.
Aerodrome Reference Code	A code-number and code-letter that provides a simple method to interrelate and identify standards for various sizes of airports and match the aircraft that can operate on them. The code-number (1 to 4) reference the field length (less than 800 m to 1,800 m and over). The code letter (A to E) reference the wing span and the outer main gear wheel span (Up to 15 m wing span and 4.5 gear wheel span to 52-65 m wing span and 9-14 m gear wheel span).
Aerodrome Reference Point	The designated point or points on an aerodrome normally located at or near the geometric centre of the runway complex that establishes the locus of the radius or radii of the outer surface (as defined in a Zoning Regulation).
Aerodrome Reference Temperature	The monthly mean of the maximum daily temperature for the hottest month of the year (the hottest month being that which has the highest monthly mean temperature).
Aeronautical Beacon	An aeronautical ground light visible at all azimuths, either continuously or intermittently, to designate a particular point on the surface of the earth.
Aeroplane Reference Field Length	The minimum field length required for take-off at maximum certificated take-off mass, sea level, standard atmospheric conditions, still air and zero runway slope, as shown in the appropriate aeroplane flight manual prescribed by the certificating authority or equivalent data from the aeroplane manufacturer. Field length means balanced field length for aeroplanes, if applicable, or take-off distance in other cases.
Air Carrier	Any company or person operating a commercial air service.
Air Terminal Building (ATB)	An installation provided with the facilities for loading and unloading aircraft and the intransit handling of traffic (passengers, cargo and mail) which is moved by aircraft.
Air Traffic Control (ATC)	A service as specified in Part VI of the Air Regulations provided for the purposes of preventing collisions between aircraft, and on the maneuvering area between aircraft and obstructions, and expediting and maintaining an orderly flow of air traffic.

Air Traffic Control Tower	A facility established on an airport to provide air traffic control services on and in the vicinity of that airport; a structure containing facilities for the control of airport traffic, including the movement of aircraft, vehicles and pedestrians in the maneuvering areas, as well as aircraft in flight. This structure may be associated with an Air Terminal Building or an operational building or it may be a freestanding structure.
Aircraft	A machine capable of deriving support in the atmosphere from the reactions of the air
Aircraft Approach Category	Category of aircraft based on their approach speed in knots. Categories are the following: A Up to 90 kt B 91 to 120 kt C 121 to 140 kt D 141 to 165 kt E Over 165 kt
Aircraft Mix	The various types of aircraft operating at an airport or in a region. Generally classified on the basis of weight and engine type. Category: Light – 0 to 12,499 lbs. (e.g. Cessna 402) Medium – 12,500 to 299,999 (e.g. Airbus A320) Heavy – over 300,000 (e.g. Boeing B767)
Aircraft Movement	Take-off, landing, or simulated approach by an aircraft. *Itinerant movement* Movements proceeding to or arriving from another location; or leaves the aerodrome traffic circuit but will be returning to land. Includes all fixed wing runway movements and helicopter operations. Excludes flights only passing through the control zone of the airport in question. *Local movement* Local aircraft are considered as aircraft which remain in the circuit or in the vicinity of the airport and will return to the airport.
Aircraft Stand	A designated area on an apron intended to be used for parking an aircraft.
Aircraft Stand Taxilane	A portion of an apron designated as a taxiway and intended to provide access to aircraft stands only.
Airport	An aerodrome for which an airport certificate is in force.
Airport Operator	The holder of an airport certificate, or the person in charge of such airport, whether, an employee, agent or representative.
Airport Reference Temperature	The monthly mean of the maximum daily temperature for the hottest month of the year (the hottest month being that which has the highest monthly mean temperature).
Airport Zoning Regulations	A regulation respecting a given airport pursuant to section S.4 of the Aeronautics Act made by the Governor in Council. A zoning or legal instrument which will prohibit the erection of

	structures which would violate any of the defined plane surfaces.
Airside	Movement area of an airport, including adjacent terrain and buildings or portions thereof where access is controlled.
Apron	That part of an aerodrome, other than the maneuvering area, intended to accommodate the loading and unloading of passengers and cargo, the refueling, servicing, maintenance and parking of aircraft, and any movement of aircraft, vehicles and pedestrians necessary for such purposes.
Apron Management Service	A service provided to regulate the activities and the movement of aircraft and vehicles on an apron.
Area Control Centre (ACC)	A unit established to provide air traffic control service to controlled flights (IFR and CVFR) in control areas under its jurisdiction.
ASDA	Acceleration Stop Distance Available. The length of the take-off runway available plus the length of the stopway, if provided
Automated Weather Observation System (AWOS)	A set of meteorological sensors, and associated systems designed to electronically collect and disseminate meteorological data.
Balanced Field Length	A field length where the distance to accelerate and stop is equal to the take-off distance of an aeroplane experiencing an engine failure at the critical engine failure recognition speed (V1)
Bearing Strength	The structural ability of a surface to support loads imposed by aircraft
Canadian Airport Authorities	Local airport operators responsible for the financial and operational management of local airports.
Capacitor Discharge Light	A lamp in which high-intensity flashes of extremely short duration are produced by the discharge of electricity at high voltage through a gas enclosed in a tube
Chapter 2 Aircraft	An aeroplane that does not conform to the noise emission standards set out in Chapter 3 of ICAO Annex 16, Volume I, second edition, 1988, or the Stage # noise limits set out in section C36.5 (a)(3) of Appendix C of Part 36 of the Federal Aviation Regulations, published by the Government of the United States, in effect on August 18, 1990.
Circling Procedure	Visual maneuvering required after completing an instrument approach procedure
Clearway	A defined rectangular area on the ground or water under the control of the appropriate authority selected or prepared as a suitable area over which an aeroplane may make a portion of its initial climb to a specified height.
Critical Aeroplane	The aeroplane or aeroplanes identified from among the aeroplanes the aerodrome is intended to serve as having the most demanding operational requirements with respect to the determination of movement area dimensions, pavement bearing strength and other physical characteristics in the design of aerodromes

Decision Height (DH)`	A specified height at which a missed approach must be initiated during a precision approach if the required visual reference to continue the approach to land has not been established
Declared Distances	Take-off run available (TORA). The length of runway declared available and suitable for the ground run of an airplane taking off. Take-off distance available (TODA). The length of the take-off run available plus the length of the clearway, if provided. Accelerate-stop distance available (ASDA). The length of the take-off run available plus the length of the stopway, if provided. Landing distance available (LDA). The length of runway which is declared available and suitable for the ground run of an aeroplane landing.
Displaced Threshold	A threshold not located at the extremity of a runway. Displaced thresholds are used when an obstacle in the final approach area intrudes into the specific obstruction clearance surfaces. Displacing the threshold provides the required obstacle free slope. The declared landing distance (LDA) which assumes a specified obstacle clearance plane is therefore measured from the displaced threshold. However, there is no restriction to an aircraft actually landing on the usable runway prior to the displaced threshold. This portion of the runway is also available for take-off or rollout.
Distance Measuring Equipment	Equipment (airborne and ground) used to measure, in nautical miles, the slant range distance of an aircraft from the DME navigational aid.
Elevation	The vertical distance of a point or a level, on or affixed to the surface of the earth, measured from mean sea level.
Emergency Response Services (ERS)	Formerly “Crash, Fire fighting and Rescue Services” (CFR)
Enplaned And Deplaned (E D)	E D passengers leave or board an aircraft at an airport and include all O D passengers plus those who connect to or from another flight.
Federal Aviation Administration (FAA)	The US federal authority responsible for civil aviation. http://www.faa.gov
Fixed Base Operator (FBO)	Private operator located on the airport, providing space (including hangars) and other services, primarily aircraft related.
Fixed Light	A light having constant luminous intensity when observed from a fixed point.
Fleet Mix	The various types of aircraft operating at an airport or in a region. Generally classified on the basis of weight and engine type.
Flight Service Station (FSS)	An aeronautical facility providing mobile and fixed communications, flight information, search and rescue alerting,

	and weather advising services to pilots and other users.
Frangible Object	An object of low mass designed to break, distort or yield on impact so as to present the minimum hazard to aircraft. *Note.- Guidance on design for frangibility is contained in the ICAO Aerodrome Design Manual Part 6.*
General Aviation	All civil aviation operations, other than scheduled air services and non scheduled air transport operations for remuneration or hire.
Geometric Centre	The geographical co-ordinates of the centre of the runway complex that locates the aerodrome for charting purposes. It is determined by the mean of the latitudes of the furthest north runway threshold and furthest south runway threshold and the mean of the longitudes of the furthest east runway threshold and furthest west runway threshold.
Glide Path	A descent profile determined for vertical guidance during a final approach.
Groundside	That area of an aerodrome not intended to be used for activities related to aircraft operations and to which the public normally has unrestricted access.
Hazard Beacon	An aeronautical beacon used to designate danger to air navigation.
Head Of Stand (HOS) Road	Service road provided between the terminal building and the aircraft parking position (stand) for movement of ground vehicles.
Height Above Aerodrome (HAA)	The height in feet of the MDA (for circling approaches) above the aerodrome elevation.
Height Above Touchdown Zone Elevation (HAT)	The height in feet of the DH and the MDA (for straight-in approaches) above the Touchdown Zone Elevation.
Holding Bay	A defined area where aircraft can be held, or bypassed, to facilitate efficient surface movement of aircraft.
Instrument Approach Procedure	A series of predetermined maneuvers by reference to flight instruments for the orderly transfer of an aircraft from the beginning of the initial approach to a landing, or to a point from which a landing may be made.
Instrument Flight Rules (IFR)	Rules set forth in Division IV Part V of the Air Regulations. Aircraft flying IFR depend on ATC to monitor air traffic activity in the surrounding airspace. ATC provides separation from other aircraft operating under IFR rules and from VFR aircraft in Class B airspace.

Instrument Landing System (ILS)	A radio navigation system which provides aircraft with horizontal and vertical guidance during an approach landing. ILS equipment includes: a localizer for an azimuth guidance and glidepath transmitter for vertical guidance. ILS Category I: an approach procedure to a height above touchdown of not less than 200 feet and with runway visual range of not less than 1,800 feet. ILS Category II: an approach procedure to a height above touchdown of not less than 100 feet and with runway visual range of not less than 1,200 feet. ILS Category IIIA: an ILS approach procedure which provides for approach without a decision height minimum and with runway visual range of not less than 700 feet. ILS Category IIIB: an ILS approach procedure which provides for approach without a decision height minimum and with runway visual range of not less than 150 feet. ILS Category IIIC: an ILS approach procedure which provides for approach without a decision height minimum and without runway visual range minimum.
Instrument Meteorological Conditions (IMC)	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling less than the minima specified for visual meteorological conditions.
International Airport	An airport designated by Transport Canada to support international commercial air transport and listed as such in the ICAO Air Navigation Plan - North Atlantic, North American, and Pacific Regions (ICAO Doc 8755/13).
International Civil Aviation Organization (ICAO)	A specialized agency of the United Nations, the objective of which is to develop the principles and techniques of international air navigation and to foster planning and development of international civil air transport. http://www.icao.org

Landing Area	That part of a movement area intended for the landing or take-off of aircraft.
LDA	Landing Distance Available. The length of runway which is declared available and suitable for the ground run of an aeroplane landing.
LIAL	Low Intensity Approach Lighting
Localizer	The component of an instrument landing system (ILS) which provides lateral guidance with respect to the runway centreline.
Manoeuvring Area	That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, excluding aprons.
Marker	An object displayed above ground level in order to indicate an obstacle or delineate a boundary.
Marking	A symbol or group of symbols displayed on the surface of the movement area in order to convey aeronautical information.
Microwave Landing System (MLS)	A precision instrument approach system operating in the microwave spectrum which normally consists of the following components: azimuth station; elevation station: precision distance measuring equipment.
Minimum Descent Altitude (MDA)	A specified altitude referenced to sea level for a non-precision approach below which descent must not be made until the required visual reference to continue the approach to land has been established.
Movement Area	That part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the apron(s).
National Airports Policy (NAP)	A Federal Government policy which establishes the first clear framework for the federal government's role in airports and will shift that role from owner and operator, to landlord and regulator.
National Airports System (NAS)	The core network of Canadian airports comprised of the 26 airports that currently handle 94 per cent of air travellers in Canada. NAS airports include those in the national and provincial capitals as well as airports that handle at least 200,000 passengers each year.

NAV CANADA	The corporation providing air navigation services in Canadian airspace and ATS in international airspace for which Canada has assumed responsibility.
Night	The period beginning one half-hour after sunset and ending one half-hour before sunrise and, in respect of any place where the sun does not rise or set daily, the period during which the centre of the sun's disc is more than six degrees below the horizon.
Noise Abatement Procedures	Noise operating restrictions may be applied at any aerodrome where there is an identified requirement. When applied at an aerodrome, the procedures and restrictions will be set out in the Canadian Flight Supplement (CFS) and/or the Canadian Air Pilot.
Noise Exposure Forecast (NEF)	The officially recognized metric measurement used for airport noise assessment in Canada.
Non-Directional Beacon (NDB)	A radio beacon transmitting non-directional signals whereby the pilot of an aircraft equipped with direction-finding equipment can determine bearing to or from the radio beacon.
Non-Instrument Runway	A runway intended for the operation of aircraft using visual approach procedures.
Obstacle Limitation Surface (OLS)	A surface that establishes the limit to which objects may project into the airspace associated with an aerodrome so that aircraft operations at the aerodrome may be conducted safely. Obstacle limitation surfaces consist of the following: Outer surface. A surface located in a horizontal plane above an aerodrome and its environs. Take-off/Approach surface. An inclined plane beyond the end of a runway and preceding the threshold of a runway. Transitional surface. A complex surface along the side of the strip and part of the side of the approach surface, that slopes upwards and outwards to the outer surface, when provided.
ODALS	Omni Directional Approach Lighting System (FAA/US)
Origin And Destination (O D)	O D passengers are those who either start or terminate their trips at an airport.
PANCAP	Practical Annual Capacity, used in reference to theoretical runway capacity.
PAPI	Precision Approach Path Indicator
Pavement Classification Number (PCN)	A number expressing the bearing strength of a pavement for unrestricted operations.

Peak Hour Movements	Aircraft movements operated during the busiest hour.
PHOCAP	Practical Hourly Capacity; used in reference to theoretical runway capacity.
Planning Peak Day (PPD)	An average day of the peak month.
Planning Peak Hour (Day) Passengers	The hourly (daily) traffic volume used for terminal facility planning purposes. This level (which falls between the average traffic volume and the absolute peak) is determined in accordance with planning standard. For example, the planning peak hour passenger volume or PPHP, for terminal planning at large airports is defined as the 90th percentile of the annual distribution of hourly passengers. Note: The hourly passenger volume refers to clock hour.
Planning Peak Hour (PPH)	The busiest hour during the PPD.
Road-Holding Position	A designated position at which vehicles may be required to hold.
Runway	A defined rectangular area at an aerodrome prepared for the landing and take-off of aircraft.
Runway End Safety Area (RESA)	An area symmetrical about the extended runway centre line and adjacent to the end of the strip primarily intended to reduce the risk of damage to an aeroplane undershooting or overrunning the runway.
Runway Identification Light (RILs)	Lights provided at aerodromes where terrain precludes the installation of approach lights, or where extraneous non-aeronautical lights or the lack of daytime contrast reduces the effects of approach lights.
Runway Strip	A defined area including the runway and stopway, if provided, intended: To reduce the risk of damage to aircraft running off a runway; and To protect aircraft flying over it during take-off or landing operations.
Runway Visual Range (RVR)	The range over which the pilot of an aircraft on the centre line of a runway can see the runway surface markings or the lights delineating the runway or identifying its centre line.
Shoulder	An area adjacent to the edge of a pavement so prepared as to provide a transition between the pavement and the adjacent surface
Step-Down Fix	A fix permitting additional descent within a segment of an instrument approach procedure by identifying a point beyond which further descent can be made

Stopway	A defined rectangular area on the ground at the end of take-off run available prepared as a suitable area in which an aircraft can be stopped in the case of an abandoned take-off.
Taxi-Holding Position	A designated position at which taxiing aircraft and vehicles may be required to hold in order to provide adequate clearance from a runway.
Taxiway	A defined path on a land aerodrome established for the taxiing of aircraft and intended to provide a link between one part of the aerodrome and another, including: Apron taxiway. A portion of a taxiway system located on an apron and intended to provide a through taxi route across the apron. Rapid exit taxiway. A taxiway connected to a runway at an acute angle and designed to allow landing aeroplanes to turn off at higher speeds than are achieved on other exit taxiways thereby minimising runway occupancy times.
Taxiway Strip	An area including a taxiway intended to protect an aircraft operating on the taxiway and to reduce the risk of damage to an aircraft accidentally running off the taxiway.
Threshold	The beginning of that portion of the runway usable for landing.
Threshold Crossing Height (TCH)	The height of the glide path above the runway threshold.
TODA	Take-Off Distance Available. The length of the take-off run available plus the length of the clearway, if provided.
TORA	Take-Off Run Available. The length of runway declared available and suitable for ground run of an aeroplane taking off.
Touchdown Zone (TDZ)	The portion of a runway, beyond the threshold, where it is intended landing aeroplanes first contact the runway.
Touchdown Zone Elevation (TDZE)	The highest elevation in the Touchdown Zone.
Traffic Density	Light: not greater than 15 movements per runway or less than 20 total aerodrome movements; Medium. 16 to 25 movements per runway or between 20 to 35 total aerodrome movements; and Heavy. 26 or more movements per runway or more than 35 total aerodrome movements.
Transport Canada	The federal authority responsible for the regulation of civil aviation in Canada. http://www.tc.gc.ca

Usability Factor	The percentage of time during which the use of a runway or system of runways is not restricted because of the cross-wind component. *Note. - Cross-wind component means the surface wind component at right angles to the runway centre line.*
Very High Frequency Omni-range Navigation Equipment (VOR)	A type of electronic navigation equipment. VOR is a phase comparison system in which an instrument in the cockpit shows the direction of the VOR station.
Visual Approach Slope Indicator System (VASIS)	An airport lighting facility providing vertical approach slope guidance to aircraft during approach to landing by radiating a directional pattern of high intensity red and white focused light beams.
Visual Flight Rules (VFR)	The rules that govern the procedures for conducting flight under visual conditions. The abbreviation "VFR" is also used to indicate weather conditions that are equal to or greater than minimum VFR requirements. In addition, it is used by pilots and controllers to indicate type of flight plan.
Visual Meteorological Conditions (VMC)	Meteorological conditions expressed in terms of visibility, distance from cloud, and ceiling, equal to or better than specified minima.

Appendix B: Obstacle Limitation Surfaces

As outlined in Chapter 3, the current TP312 standards from Transport Canada calls for a 150 m strip for runway/taxiway clearances, as well as increased separation from runway/taxiways for larger Code 'D' and Code 'E' aircraft.

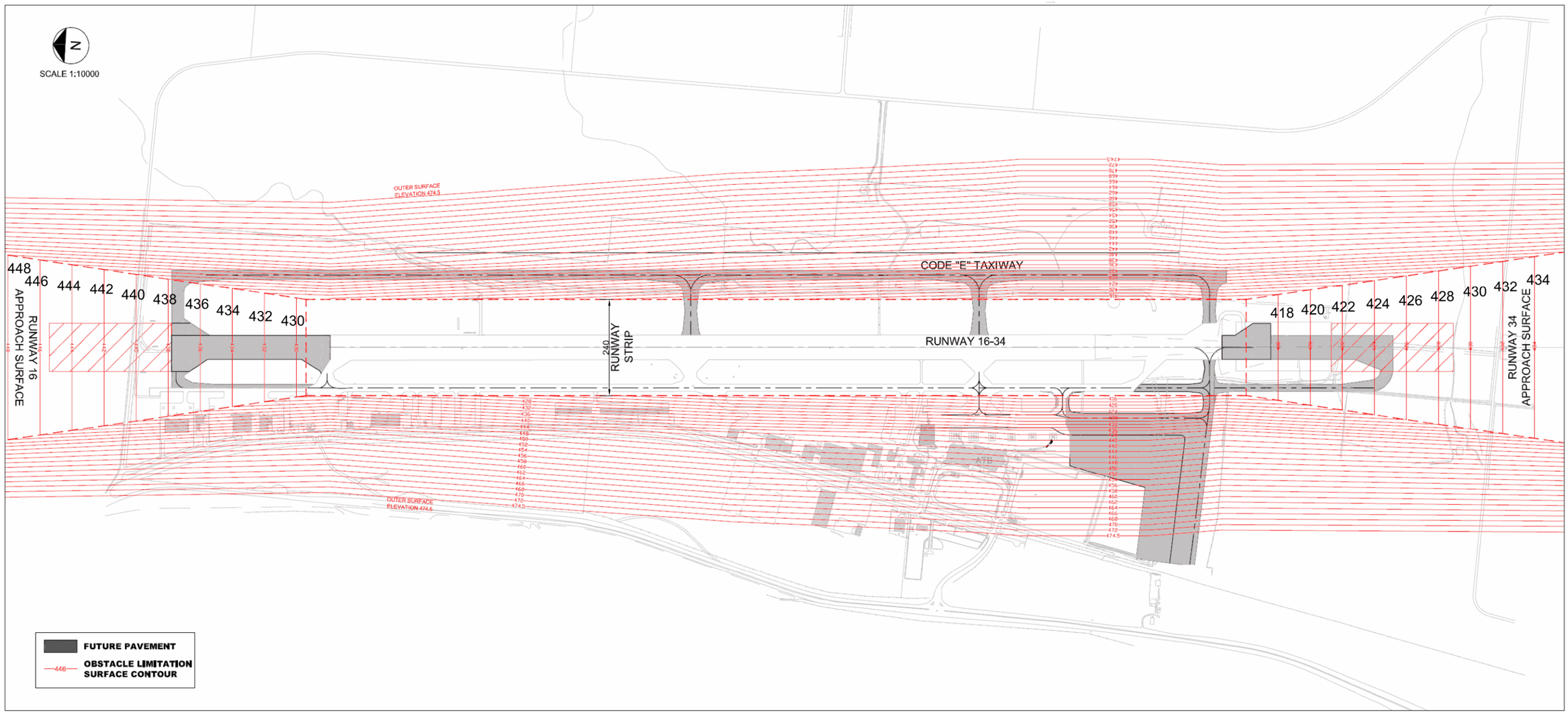
This set of obstacle limitation surfaces is shown on the following page as Figure B-1.

Also under consideration is a modification of the standards through a draft CARS 322 which would call for steeper transitional surfaces, as well as reduction in strip width.

This modified set of obstacle limitation surfaces is shown on Figure B-2.

Figure B-1: Obstacle Limitation Surfaces (TP312)

Figure B-2: Obstacle Limitation Surfaces (120 m Runway Strip + Modified Transitional Surfaces)



Appendix C: Road Network Assumptions

As outlined in Chapter 5, ground access was based in reviewing the Province of B.C. 2002 Kelowna Gateway Transportation Concept Study (TCS). In addition, forecasted traffic volumes were analyzed against level of service and volume/capacity ratios.

The existing network is shown as follows in Figure C-1.

Figure C- 1: Airport Way and Highway 97 Intersection Map

Intersection volumes were forecasted as follows in Figure C-2.

Figure C- 2: Traffic Volumes at Intersection of Airport Way and Highway 97

AM PEAK HOUR		**2000**	**2004**	**2008**	**2015**	**2025**
INTERSECTION TOTAL		*2,087*	*2,362*	*3,506*	*4,295*	*5,589*
Airport Way (e/o int)	Eastbound	240	280	349	461	665
	Westbound	131	153	210	284	395
Airport Way (w/o int)	Eastbound	83	101	308	373	484
	Westbound	95	115	787	920	1,054
Highway 97 (n/o int)	Northbound	676	738	830	1,001	1,241
	Southbound	970	1,104	1,419	1,844	2,468
Highway 97 (s/o int)	Northbound	903	1,005	1,570	1,794	2,242
	Southbound	1,076	1,229	1,540	1,914	2,629
PM PEAK HOUR		**2000**	**2004**	**2008**	**2015**	**2025**
INTERSECTION TOTAL		*2,569*	*2,455*	*4,543*	*5,474*	*6,917*
Airport Way (e/o int)	Eastbound	220	257	339	451	638
	Westbound	238	277	377	490	688
Airport Way (w/o int)	Eastbound	93	113	928	1,063	1,196
	Westbound	79	96	531	595	697
Highway 97 (n/o int)	Northbound	1,140	764	1,581	1,956	2,421
	Southbound	931	1,104	1,322	1,665	2,173
Highway 97 (s/o int)	Northbound	1,307	960	1,914	2,256	2,860
	Southbound	1,130	1,339	2,091	2,471	3,162

Based on the existing network, a considerable problem occurs in the decay of level of service for vehicles using no improvements to the network. This is denoted by direction with Level of Service “E” or “F” which means an unacceptable level of delay. Calculations were based on volume/capacity ratios. Volume/Capacity ratios of greater than 1.0 indicated that the intersection capacity was insufficient.

Figure C- 3: Intersection Traffic Analysis (Using Existing Network)

AM PEAK HOUR	2000	2004	2010	2015	2020	2025
Eastbound Approach	B	B	D	**E**	**E**	**F**
Westbound Approach	C	C	**F**	**F**	**F**	**F**
Northbound Approach	A	A	**F**	**F**	**F**	**F**
Southbound Approach	A	A	A	A	B	B
Overall Levels of Service	A	A	**F**	**F**	**F**	**F**
Maximum V/C Ratio	0.56	0.58	2.58	4.05	8.05	11.59
Average Delay (sec/veh)	7.1	7.4	118.7	187.9	382.0	555.3

PM PEAK HOUR	2000	2004	2010	2015	2020	2025
Eastbound Approach	B	B	**F**	**F**	**F**	**F**
Westbound Approach	D	A	**F**	**F**	**F**	**F**
Northbound Approach	A	C	**F**	**F**	**F**	**F**
Southbound Approach	A	A	C	**E**	**F**	**F**
Overall Levels of Service	B	B	**F**	**F**	**F**	**F**
Maximum V/C Ratio	0.84	0.89	3.12	5.40	8.31	9.08
Average Delay (sec/veh)	11.6	12.8	139.3	233.5	417.1	492.4

This analysis shows that a current level of service ranging from A-C for both the afternoon and morning peak hours. Towards 2010, the overall level of service is anticipated to decline to F, representing a congested condition. This would result in significant vehicle delays and queues leading into and out of the intersection. In general, capacity improvements are required at level of service E or F. Another metric illustrated In Figure C-3 is the volume/capacity ratio. Where this figure is greater than 1.0, the intersection capacity is insufficient.

2010 Network

Analyses were conducted based on the 2010 Network from the 2002 Kelowna Gateway Transportation Concept Study. This includes:

- Hollywood Road extended to College Way
- Majority (80%) of Pier Mac development traffic on Highway 97 will be rerouted to Hollywood Road
- Only 20% of development traffic for northbound left-turn and eastbound right-turn at Highway 97/Airport Way intersection.

The results from this analysis indicates that the overall level is significantly improved through the introduction of left turn phases, with a level of service ranging from B to D in 2010 (Figure C-4). While this provides an acceptable level of service, it is anticipated that the modified phasing would provide a level of service decay from C-F in 2015.

Figure C- 4: Traffic Analysis (Using 2010 Network)

	Existing Phasing		Modified Phasing	
AM PEAK HOUR	**2010**	**2015**	**2010**	**2015**
Eastbound Approach	C	D	C	C
Westbound Approach	**E**	**F**	D	D
Northbound Approach	B	D	B	C
Southbound Approach	A	A	C	C
Overall Levels of Service	B	D	C	C
Maximum V/C Ratio	1.01	1.53	0.76	0.98
Average Delay (sec/veh)	16.4	36.9	20.4	30.0

	Existing Phasing		Modified Phasing	
PM PEAK HOUR	**2010**	**2015**	**2010**	**2015**
Eastbound Approach	D	**F**	C	**F**
Westbound Approach	**F**	**F**	D	**F**
Northbound Approach	C	**E**	D	D
Southbound Approach	C	D	D	D
Overall Levels of Service	D	**F**	D	**F**
Maximum V/C Ratio	1.22	2.14	1.00	1.07
Average Delay (sec/veh)	38.1	85.7	39.8	166.1

2020 Network (from 2002 TCS Report)

A third road network scenario was analyzed: the 2020 network from the 2002 Kelowna Gateway Transportation Concept Study. This concept includes the 2010 network and specifically uses Option 5 from the 2002 study. This includes:

- Three lanes each direction for Highway 97 between College Way and Airport Way.
- Diamond Interchange for the Highway 97/Airport Way Intersection – two traffic signals with coordination at the end of the ramps.
- One Highway 97 northbound lane becomes northbound off-ramp and southbound on-ramp becomes one Highway 97 southbound lane.
- All ramps widened to two lanes at the approach/exit legs for the signal intersections.
- Two through lanes with back-to-back left-turn bays between two traffic signals along Airport Way.

The conclusion from this analyses is that the diamond interchange would provide a level of service A-C.

Figure C- 5: Traffic Analysis (using 2020 Network)

		AM PEAK		PM PEAK	
AM PEAK HOUR		East Int	West Int	East Int	West Int
Airport Way Eastbound	Left-turn	A	-	C	-
	Straight	A	B	A	D
	Right-turn	-	A	-	A
Eastbound Approach		A	A	B	C
Airport Way Westbound	Left-turn	-	B	-	D
	Straight	B	A	C	A
	Right-turn	A	-	A	-
Westbound Approach		B	A	C	C
Highway 97 Northbound	Left-turn	B	-	D	-
	Straight	A	-	A	-
	Right-turn		-		-
Northbound Approach		B	-	C	-
Highway 97 Southbound	Left-turn	-	B	-	D
	Straight	--	A	--	A
	Right-turn	-		-	
Southbound Approach		-	B	-	C
Overall Levels of Service		B	A	C	C
Maximum V/C Ratio		0.76	0.65	0.80	0.96
Average Delay (sec/veh)		11.6	9.2	23.9	26.5

Appendix D: Economic Impact Glossary of Terms

Direct Employment	Direct employment is employment that can be directly attributable to the operations in an industry, firm, etc. It is literally a head count of those people who work in a sector of the economy. In the case of the airport, all of those people who work in an aviation related capacity would be considered direct employment.
Economic Activity (also Output, Production)	The end product of transforming inputs into goods. The end product does not necessarily have to be a tangible good (for example, knowledge), nor does it have to create utility (for example, pollution). Or, more generally, the process of transforming the factors of production into goods and services desired for consumption.
Employment Impact	Employment impact analysis determines the economic impact of employment in terms of jobs created and salaries and wages paid out. In the case of the airport, the direct, indirect, induced and total number of jobs or person years created at the airport is examined to produce a snapshot of airport operations.
Full Time Equivalent (FTE) (also Person Year)	One full time equivalent (FTE) year of employment is equivalent to the number of hours that an individual would work on a full time basis for one year. In this study we have calculated one full time equivalent year to be equivalent to 1,832 hours. Full time equivalent years are useful because part time and seasonal workers do not account for one full time job.[9]
GDP (also value-added)	A measure of the money value of final goods and services produced as a result of economic activity in the nation. This measure is net of the value of intermediate goods and services used up to produce the final goods and services.

[9] *The Dictionary of Modern Economics*, David W. Pearce, General Editor, The MIT Press, Cambridge Mass.,1984

GNP	GNP is equal to GDP plus the incomes of nationals abroad and minus income of foreigners.
Indirect Employment	Indirect employment is employment which results because of direct employment. For the airport, it would include that portion of employment in supplier industries which are dependent on sales to the air transport sector. In some cases, contract work would be considered indirect employment.
Induced Employment	Induced employment is employment created because of expenditures by direct and indirect employees.
Multiplier Analysis	Analysis using economic multipliers in which indirect and induced economic impacts are quantified. Essentially, a multiplier number is applied to the "directly traceable economic impact" to produce indirect and total effects. (See Multiplier.)
Multiplier	Economic multipliers are used to infer indirect and induced effects from a particular sector of the economy. They come in a variety of forms and differ in definition and application. A multiplier is a number which would be multiplied by direct effects in order to calculate indirect or induced effects. In the case of the airport, as in many other cases, multipliers can lead to illusory results, and thus must be used with great care.
Output (also Economic Activity, Production)	The end product of transforming inputs into goods. The end product does not necessarily have to be a tangible good (for example, knowledge), nor does it have to create utility (for example, pollution). Or, more generally, it is defined as the process of transforming the factors of production into goods and services desired for consumption.
Value-Added (also value-added)	A measure of the money value of final goods and services produced as a result of economic activity in the nation. This measure is net of the value of intermediate goods and services used up to produce the final goods and services.

Appendix E: Consultations

The following table summarizes key feedback received in writing from consultations undertaken for Master Plan 2025

Consultation					Key Comments & Linkage to Master Plan 2025
	Organization	Date(s)	# of Participants	Type	
1	Regional Economic Development Commission	Sep 28, 2006	30	Meeting/ Presentation	▪ Well received with letter of support provided
2	Tourism Industry Advisory Council	Sep 20, 2006	18	Meeting/ Presentation	▪ Well received with letter of support provided
3	Vernon City Council	Sep 01, 2006	10	Open public Meeting	▪ No further follow-up on Master Plan
				Presentation	▪ Four council members present ▪ Chamber/Vernon Airport Board and Management in attendance ▪ Master Plan very well received
4	Lake Country Council	<not requested>		<none>	▪ Did not request a public meeting ▪ 2 voicemails/followed with emails with the Mayor
5	Peachland Council	Sep 26, 2006	25	Open public meeting Broadcast on Shaw Cable	▪ Plan was well received
6	Kelowna Chamber of Commerce	Oct 03, 2006	10	Meeting/ Presentation	▪ Well received with letter of support provided
7	Greater Vernon Chamber	Sep 27, 2006	20	Meeting/ Presentation	▪ Well received ▪ Questions raised on the Vernon Airport - role - costs - how is this funded
8	Salmon Arm Council	Oct 02, 2006	15	Meeting, with Salmon Arm Airport Advisory Committee	▪ Well received
	Salmon Arm Development & Planning Committee			Meeting	▪ Presentation well received ▪ Shuttle service between Salmon Arm/Kelowna suggested
	Salmon Arm Airport Advisory Committee			Open Public Meeting	
9	Westbank And District Chamber	Oct 10, 2006	10	Meeting/ Presentation	▪ Well received

Consultation					Key Comments & Linkage to Master Plan 2025
	Organization	Date(s)	# of Participants	Type	
10	B.C. Ministry Of Highways And Transportation	Nov 08, 2006	2	Meeting	▪ Comments received on ground access: -work with Pier Mac on the left turn phases. -consult with Ministry 5 years ahead of proposed diamond interchange improvements
11	Kelowna Ogopogo Rotary	Sep 20, 2006	45	Meeting	▪ Very supportive
12	Ski Industry - M.J. Ballingall			Correspondence	▪ Sent Master Plan presentation ▪ M. Ballingall felt no need for a further presentation
13	Westbank First Nations	Sep 25, 2006	5	Meeting/Presentation	▪ Any Land Claim issues – none ▪ Governance model of the Airport raised
14	Okanagan Indian Band	Nov 07, 2006	15	Open Public Meeting	▪ Some comments received related to: -First Nations & Airport jobs -Archeological study suggested -Impact of aircraft on Duck Lake and zoning restrictions ▪ Requested letter be sent by the band outlining there concerns - none received
15	Lake Country Chamber Of Commerce	Dec 06, 2006	10	General public invited to attend	▪ Well received
16	Airport Advisory Committee (AAC)	Oct 05, 2005	7	General presentation on the master planning process and project overview	
	AAC, with senior City Managers in attendance for the presentation	Mar 16, 2006	17	Master Draft presented	▪ Master Plan Draft presented and unanimously endorsed and proceed to Kelowna City Council ▪ Suggestion received to do both above grade rail crossings at the same time
		Jul 17, 2006		Bulletin	▪ Bulletin issued to the AAC Members providing an update on the master plan and offering presentations to the member organizations

	Consultation				Key Comments & Linkage to Master Plan 2025
	Organization	Date(s)	# of Participants	Type	
17	Kelowna City Council	Jun 19, 2006	8	In-camera meeting to review master plan land issues	▪ Meeting advanced process to public session
		Jul 10, 2006	25	Open Public Meeting Broadcast on Shaw & Castanet	▪ Suggestion received to consider light rail link to the airport - Concept added to master plan draft Oct 2006 ▪ Master Plan subsequently posted on the Airport/City Websites Jul 20, 2006
18	Transport Canada	Jul 7, 2006	3	Presentation	▪ Letter sent to Mike Henderson with copy of presentation as a follow-up
	- Aerodrome Standards	Sep 22, 2006	4	Meeting	▪ Reviewed Master Plan airside planning assumptions with Rob Ogden ▪ Letter received Oct 3, 2006 from Henderson endorsing the master plan ▪ Feedback incorporated in Master Plan
	- Minister Of Transport, Infrastructure and Communities	Oct 12, 2006	10	Presentation	▪ Minister Lawrence Cannon and Mike Henderson given the full presentation
19	Airport Operators Committee	Jun 8, 2006	21	Meeting/Presentation	▪ Well received ▪ Minutes distributed to all that attended plus the airport tenants not present
20	Airline Consultative Committee	Nov 23, 2005	11	Framework of Master Plan study provided to the Airlines	▪ Minutes distributed to the Airlines
		Jul 19, 2006	13	Meeting/Presentation	▪ Well received ▪ Minutes distributed to the Airlines
21	General Public Consultation				
	- Master Plan Posted On City And Airport Website	Jul 20, 2006	290	Website	▪ As of January 27 , 2007 290 unique visitors have viewed the master plan website
	- Castanet Broadcast Of Master Plan Presentation	Jul 10, 2006		Broadcast	
	- Shaw Cable Broadcast And Repeat Broadcast Of Plan	Jul 10, 2006		Broadcast	

Consultation					Key Comments & Linkage to Master Plan 2025
	Organization	Date(s)	# of Participants	Type	
	- Annual Report 2005	Jul 24, 2006		Annual Report	▪ Annual report released on this date with reference to the master plan
	- Newspaper Advertisements	Oct 14/15, 2006		Full page ads taken out in the Courier/Capital News	▪ Public invited to provide feedback
	- YLW Express	Sep 2006		Newsletter	▪ Items outlined on the master plan program
	- General Public Feedback		10	Correspondence	▪ 10 pieces of correspondence were received from individual citizens in response to the master plan ▪ Feedback incorporated as relevant
22	City Of Kelowna - Internal Consultation				▪
	- Senior City Management	Mar 16, 2006	5	Meeting	
	- Airport Staff	Jun 8, 2006	25	Meeting	
	- Roads & Planning	Nov 8, 2006	5	Meeting	▪ Initial presentation
	- Environment	Dec 2006		Meeting	▪ Review of Environmental Issues and the Master Plan
	- Planning	Dec 06/Jan 07		Meeting	▪ Review of OCP Issues