City of Castlegar

West Kootenay Regional Airport

Airport Master Plan

June 21, 2019

Stantec

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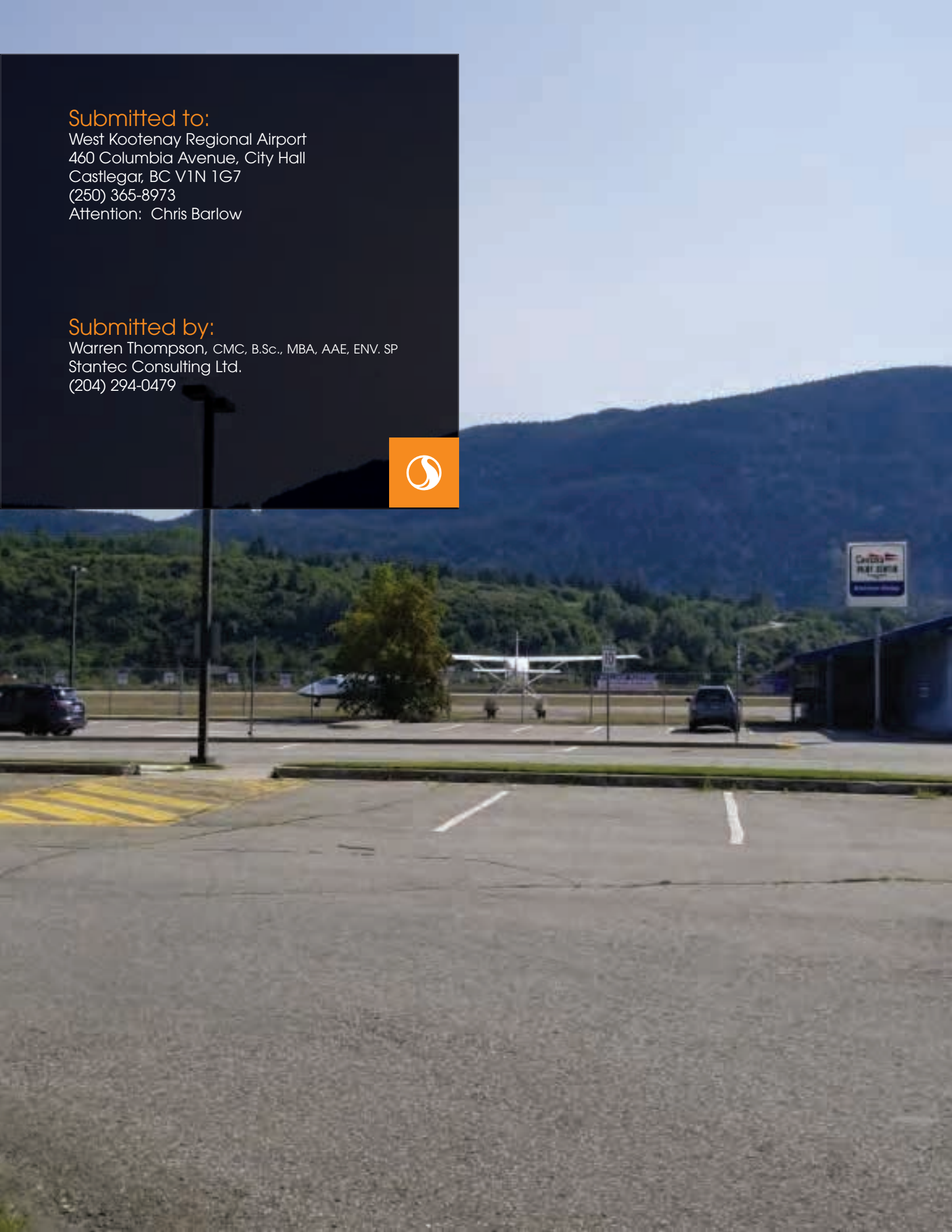

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PREFACE

This document entitled Airport Master Plan was prepared by Stantec Consulting Ltd. (“Stantec”) for the account of the City of Castlegar (the “Client”). Any reliance on this document by any third party is strictly prohibited. The material in it reflects Stantec’s professional judgment in light of the scope, schedule and other limitations stated in the document and in the contract between Stantec and the Client. The opinions in the document are based on conditions and information existing at the time the document was published and do not take into account any subsequent changes. In preparing the document, Stantec did not verify information supplied to it by others. Any use which a third party makes of this document is the responsibility of such third party. Such third party agrees that Stantec shall not be responsible for costs or damages of any kind, if any, suffered by it or any other third party as a result of decisions made or actions taken based on this document.

The West Kootenay Regional Airport (WKRA) Master Plan is not a commitment on the part of the City of Castlegar to expand and/or improve the infrastructure at the Airport, but to serve as a framework within which future project proposals will be scrutinized. Justification of these projects and programs, however, will be detailed in program documentation once sufficient growth is realized. Implementation of these projects will be subject to the city priorities and the availability of funds.

Prepared by _____

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Table of Contents

1.0 INTRODUCTION

The City of Castlegar contracted with Stantec Consulting Ltd. to develop an Airport Master Plan to guide future development of the West Kootenay Regional Airport (WKRA). This Master Plan program includes site analysis with review of airport ground access, runway, taxiways, aprons, Air Terminal Building (ATB) and services, hangars, vehicle and aircraft parking, air navigation infrastructure, utilities and services, airport maintenance buildings, emergency response services, noise management, environmental planning, security and land use. The relationship of the Airport Master Plan with the Official Community Plan (OCP) and adjacent planning is also considered. There is also an operational assessment that includes review of current staffing levels and future requirements, oversight and required service level delivery.

The primary strategic direction of the Airport Master plan is to manage and operate the airport in a safe, secure and efficient manner, maximize commercial revenue and achieve ongoing financial viability. **The Airport Master Plan provides guidance for airport development over a 25-year horizon.**

In the process of conducting site analysis and input, Stantec has consulted with Nav Canada, Transport Canada, CATSA, CBSA, air carriers, airport stakeholders and others to ensure that the recommended design and infrastructure investments meet current and anticipated regulations and demand. The Final Airport Master Plan includes:

- Land Use Plan
- Development Concepts
- Capital Financial Plan
- Revenue Plan
- Final Airport Master Plan for the City
- A Presentation on the Final Plan to City Council.

1.1 OVERVIEW

The West Kootenay Regional Airport, (WKRA) is a regional airport located two (2) nautical miles (3.7 km) south southeast of the city of Castlegar, British Columbia, Canada. It serves the West Kootenay region, including Castlegar, Nelson and Trail. It is owned and operated by the City of Castlegar and has a 15,317 ft^2 (1,423 m2) passenger terminal. The airport lies in the Columbia Valley between the Monashee and Selkirk Mountain Ranges. Due to the mountainous terrain impinging on both runways approaches a curved approach to the runway is required. The weather is often a factor throughout the winter months and the main reason behind flight cancellations.

1.2 MASTER PLAN OBJECTIVES

The project goal for the Airport Master Plan is to provide the long-term planning details for West Kootenay Regional Airport (WKRA) and its sub sectors. It is the blueprint to identify the opportunities for improving the operating environment at the airport to become a sustainable and critical catalyst for economic growth in the local catchment area and region.

The Master Plan provides an overview of current and future airport operations and provide guidance to the airport on how to develop the site. The Airport Master Plan provide a fundamental planning and vision document that will guide the growth of WKRA over the next 25-years. It will ensure that short- and long-term growth satisfies both the local community and region.

The plan's objective is to ensure infrastructure and services will support current and future commercial air services and private aviation activities at the airport. The plan considers forecasted passenger and aircraft traffic and includes short, medium, and long-term planning with Land Use Zoning, an airfield plan for runways, taxiways, apron, the ATB, hangars, vehicle and aircraft parking, air navigation, utilities and services, maintenance and aircraft hangars, fire support, environmental planning, airport security and airport access. This activity and planning is initiated by forecasting aviation activity to determine demand over the lifespan of the Master Plan. Peak hour demand for aircraft and passengers over the planning period is also a major contributor to the phasing and capacity analysis for the airport.

The Master Plan provides a detailed financial management plan for future capital improvements and program initiatives. It will identify capital improvements and evaluate alternatives for the future development of WKRA in the short (0-5 year), medium (6-10 year) and long (11-25 year) terms, taking into consideration the dynamic nature of the aviation industry, the City of Castlegar and the West Kootenay catchment area. The information identified through the master planning process will also allow for the continued operation of a safe, efficient and environmentally compatible airport.

The Airport Master Plan has been developed with strong commitment and direction from the WKRA Administration, the CAO of the City, the aviation community at large and commercial organizations at WKRA.

2.0 AIRPORT PROFILE

2.1 HISTORICAL BACKGROUND

In the 1920s, the Nelson Board of Trade was scouting locations for an airfield. The location was decided upon bench land at Crescent Valley; however it took until 1938 for the area to be cleared for an emergency field. There were few landings due to its difficult approach and the Department of Transport and Trans Canada Airlines (the forerunner to Air Canada) concluded a better location was needed. Their proposed site was at Ootischenia, on former Doukhobor communal land (the current airport location).[1]

Few landings were made prior to and during World War II, but development began in earnest in 1945, when the newly organized Castlegar Board of Trade got involved. In November 1946, the Nelson Board of Trade visited the airport, which measured 4,000 by 1,000 feet (1,200 by 300 meters), although the runway hadn't been completed. Mayor Norman Stibbs said he was "amazed at the natural field and that the potential for a passenger service seemed excellent."[2]

Following some improvements to the field, the first commercial flight landed there on Sept. 22, 1947 as Canadian Pacific Airlines inaugurated service between Calgary and Vancouver using a 28-passenger Douglas DC-3.[3]

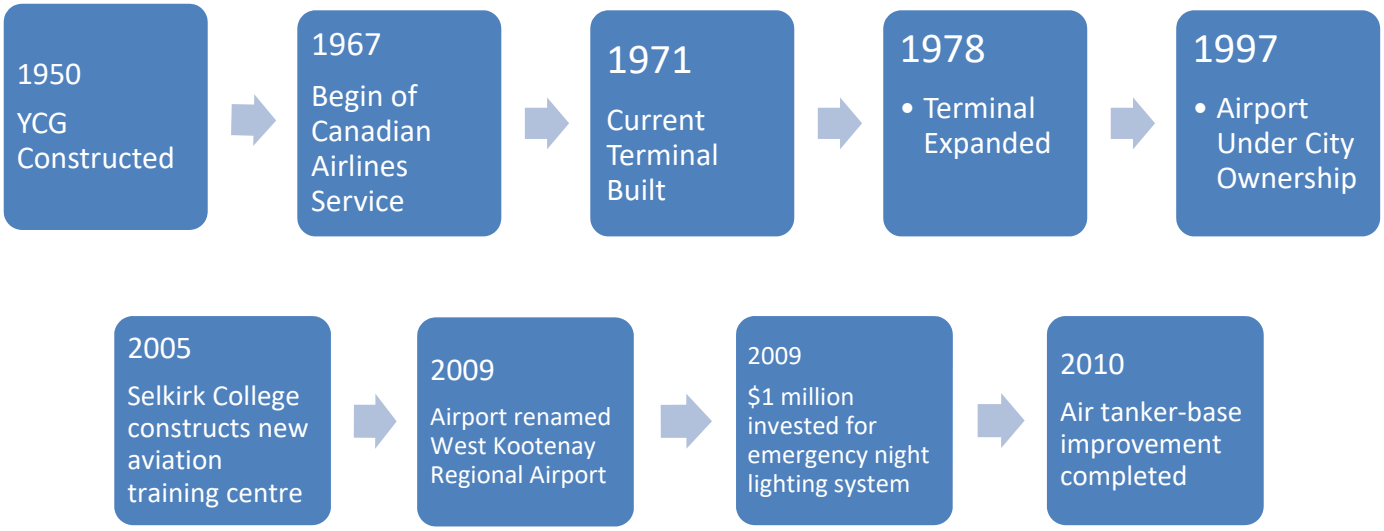
The Castlegar Airport (YCG) was further developed in 1950.It took until 1967 before Canadian Pacific Airlines began jet service between Castlegar and Vancouver. In 1971 the airport built the current terminal that was used to serve Air Canada. Passenger traffic increased and in 1978, the terminal was further expanded to its current size. During that period, the airport was under the leadership of Transport Canada, who, in 1997, in an effort to reduce cost, transferred the airport to the city of Castlegar under the terms of the National Airport Policy.

In 2005, Selkirk College leased land from the city to build an Aviation Training Centre to support its Aviation – Professional Pilot Program that had been in operation since 1971. Unfortunately, this program shut down in 2014. In 2009 – $1 million was spent to install six (6) hazard beacons on surrounding mountains to improve safety for occasional night-time flights (currently emergency/medical flights only). Also in 2009, the Airport was renamed the West Kootenay Regional Airport in an ongoing effort to enhance air services to the West Kootenay catchment area.

To support wildfire forest fighting, in 2010, the airport proceeded with the Air-tanker-base improvements, including a larger apron and other improvements that allowed for the refilling of two air tankers simultaneously, enhancing forest fire fighting capability. A summary timeline is provided in Figure 2.1**Error! Reference source not found.**

[1] https://www.castlegarnews.com/news/the-early-castlegar-airport-story/
[2] 1
[3] 2

Figure 2.1: Airport Main Timeline and Events



2.2 OVERVIEW OF WEST KOOTENAY AIRPORT

The West Kootenay Regional Airport (WKRA) is a small regional airport with a single runway, 15/33 which is 5,299' (1,615 m) long and 150' (45.7 m) wide. The airport is equipped with an NDB (Non-Directional Beacon) and DME (Distance Measuring Equipment). WKRA primarily serves the West Kootenay region, including Castlegar, Nelson and Trail. The airport lies in the Columbia Valley between the Monashee and Selkirk Mountain Ranges. A layout of the airport is presented in Figure **2**.2.

Figure 2.2: West Kootenay Regional Airport (WKRA)

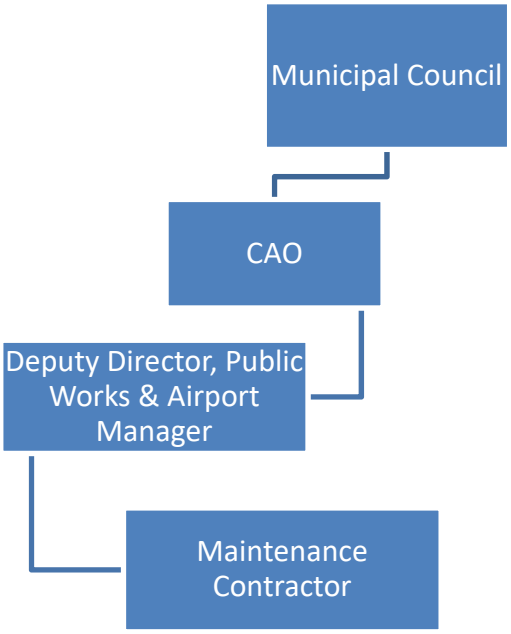
WKRA is one of three (3) Wildfire Management Services tanker bases. Revelstoke and Cranbrook are the two others. The tanker base provides facilities for the crews, offering a building to house aircrew and loaders. During an average fire season, there are six (6) Fixed Wing aircraft based at WKRA including Electra L-188 and AirTractors as well as four (4) medium-lift helicopters throughout the summer.

2.3 GOVERNANCE STRUCTURE

The West Kootenay Regional Airport is owned by the City of Castlegar and overseen by Castlegar City Council; the WKRA is managed the Deputy Director, Public Works and Airport Manager, Castlegar, who reports to the Chief Administrative Officer. The CAO and Airport Manager provides updates to City Council regularly and as required. The airport management organizational structure is provided in Figure 2.3. Within this organization, the CAO is the accountable executive for the airport. Although not full time, the Deputy Director, Public Works and Airport Manager is responsible for the day to day operations of the airport and is supported by a contracted airport maintenance and operations team.

Other airports have added to their organizations since the advent of Safety Management Systems regulations for airports in Canada. **The WKRA should consider the possibility of providing additional administrative and operational management support; this could be in the form of contract employees, additional part-time and full-time employees.** Further study should be considered to determine the overall management of the airport, with consideration for contracted airport management services vs. city run services.

Figure 2.3: Airport Management Organizational Structure



2.4 MAIN TENANTS, KEY BUSINESSES AND PARTNERS

The West Kootenay Regional Airport is home to several enduring aviation companies and organizations, offering much needed flying services to the community. Table 2.1 provides a list of the main tenants, key businesses and partners of WKRA – along with their contact information.

Table 2.1: List of Airport Tenants

Name	Title	Description	Company	Email Address
Sam Lattanzio	Fire Chief	Fire chief, City of Castlegar	Castlegar Fire Dept	slattanzio@castlegar.ca
Will Carey	Security Manager	Responsible for overseeing security and operations in Castlegar	BC Corps of Commissionaires	wcarey@castlegar.ca
Randy Grant	Owner/Operator, Airport Ops Mgr.	Contractor responsible for airside and groundside Maintenance.	Sentinel Airport Logistics (SAL)	sitesup@telus.net
Sherilyn Babaeff	Lead Screener	Conduct screening of passengers, baggage, or cargo to ensure compliance with Transportation Security Administration (TSA) regulations	G4S/CATSA	Ycg.castlegar@ca.g4s.com
Rhonda LeRose	Supervisor	Supervisor for Jazz Air	Jazz Air	Rhonda.lerose@flyjazz.ca
David Palsson	Operations Supervisor	Operations Supervisor, SAS	Strategic Air Services (SAS)	ycg@saaviation.ca
Derek Wood	Team Supervisor, CISM Peer	Team Supervisor, NAV Canada	NAV Canada	woodDR@navcanada.ca
Duncan Wassik	Owner/Operator	DAM Helicopters operates three (3) medium size helicopters. The company is involved in power lines inspection and Fire Fighting. They have also started a pilot Air Ambulance Service. They have a base of operation in Castlegar, one in Nelson and one in Grand Forks.	Dam Helicopters	dunc@damhelicopters.com
Doug Garland	Supervisor	Patient Care Deliver at British Columbia Emergency Health Services	BCAS (BC Ambulance)	Doug.garland@bcehs.ca

Name	Title	Description	Company	Email Address
Sandi Schrader	Manager	The General Manager is responsible for the financial, operational, customer and human resource objectives for the site operations and facility maintenance.	Chances Gaming Centre (Casino)	sandis@berezan.ca
Kandy Schroder	Manager	Asset Management Coordinator	S.E.F.C./Wildfire Mgmt. Branch	Kandy.schroder@gov.bc.ca
Al Janzen	Owner/Operator	Owner of Brilliant Aviation	Brilliant Aviation/World Fuels	aljanzen@brilliantaviation.com
Ann Evdokimoff	Owner/Operator	Owner/Baker – Pie in the Sky Café	Pie in the Sky Café	
Khushali Mashruwala	Manager	Responsible for influencing customer satisfaction, increasing revenue and overseeing operational effectiveness and quality.	Budget Car & Truck Rental	Khushali.mashruwala@bcbudget.com

The airport contracts the airport maintenance activities to Sentinel Airport Logistics (SAL); SAL provides the skilled resources and conducts airside and groundside maintenance, in addition to operational reporting. The contractor provides services, utilizing the airport's equipment and facilities. SAL has four (4) people working on both air and groundsides of the airport. On the airside, they are responsible for snow removal, sweeping and the application of de-icing material on the runway and taxiways (liquid and pellets). SAL is involved in the Safety Management System (SMS) and they follow the procedures and services as indicated in the Airport Operating Manual (AOM). The maintenance personnel follow safety procedures that are consistent with the SMS program.

There is a maintenance building used to store maintenance equipment and which houses the maintenance / operations office. The city-owned equipment is in good condition; the maintenance fleet has been well maintained and newer equipment added through ACAP and city funding.

2.5 PASSENGER AIR CARRIER OPERATIONS

WKRA is served by Air Canada Express (Jazz), with daily flights to both Vancouver and Calgary using a Dash 8-300 aircraft. The airport also serves private aircraft and a small number of business aircraft. On average, the West Kootenay Regional Airport is responsible for moving nearly 75,000 passengers in and out of the West Kootenays.

Weather and topography have historically challenged the capability of the airport and is often the reason behind flight cancellations, particularly in winter. There are a number of flights cancelled every year, having a direct impact on passengers and stakeholders. As a sample, between December 7 and December 14, 2017, Air Canada reported that fog and low cloud ceilings at WKRA caused a significant number of flights to be cancelled.

Table 2.2 provides statistics for the last five (5) years

Table 2.2: Number of Passenger Movements

Year	Enplaning Passengers	Deplaned Passengers	Commercial Flights Operated	Non-Operating Flights	Success Rate
2013	36, 852	36,269	1,368	192	85.3%
2014	40,682	39,545	1,317	178	94.3%
2015	39,276	37,927	1,378	207	84.1%
2016	37,251	37,370	1,348	198	84.4%
2017	37,465	36,606	1,316	225	82.0%

The airport has very few based general aviation (G/A) aircraft and relatively few movements. There are larger bases of general aviation aircraft at the Nelson Airport and at Trail Regional Airport.

3.0 LOCATION AND CATCHMENT AREA DEMOGRAPHICS

3.1 LOCATION

The official name of the airport is an indication of its geographical location, the West Kootenay Regional Airport (WKRA). The airport is located just outside the City of Castlegar.

Transportation and Airport Access

There are several options to get to and from the airport. There is a car rental company located immediately within the airport terminal. The city also has a 24-hour, 7 day a week taxi service upon request.

There are two airport shuttle services that serve the West Kootenay Regional Airport, Queen City Shuttle and Mountain Shuttle. Queen City shuttle operates daily between Castlegar and Nelson. Mountain Shuttle operates daily between Castlegar and Rossland. The Queen City Shuttle travels between the airport and Castlegar in less than 10 minutes and can get to downtown Nelson is just over half an hour. The Mountain Shuttle connects Rossland, a popular ski destination (Red Mountain).

Public transit is available with service between the airport and the city of Castlegar. On weekdays, the city bus runs about every hour from 6:30 am to 7:00 pm. On Saturdays, there are six trips, every 2 hours from 9:30 am, until 5:45 pm. There is no public transit service on Sundays at the Airport.

The roads network allows passengers to travel to and from Nelson (44 km) within only 30 minutes. Trail is another close city (29 km) located only 20 minutes away by car.

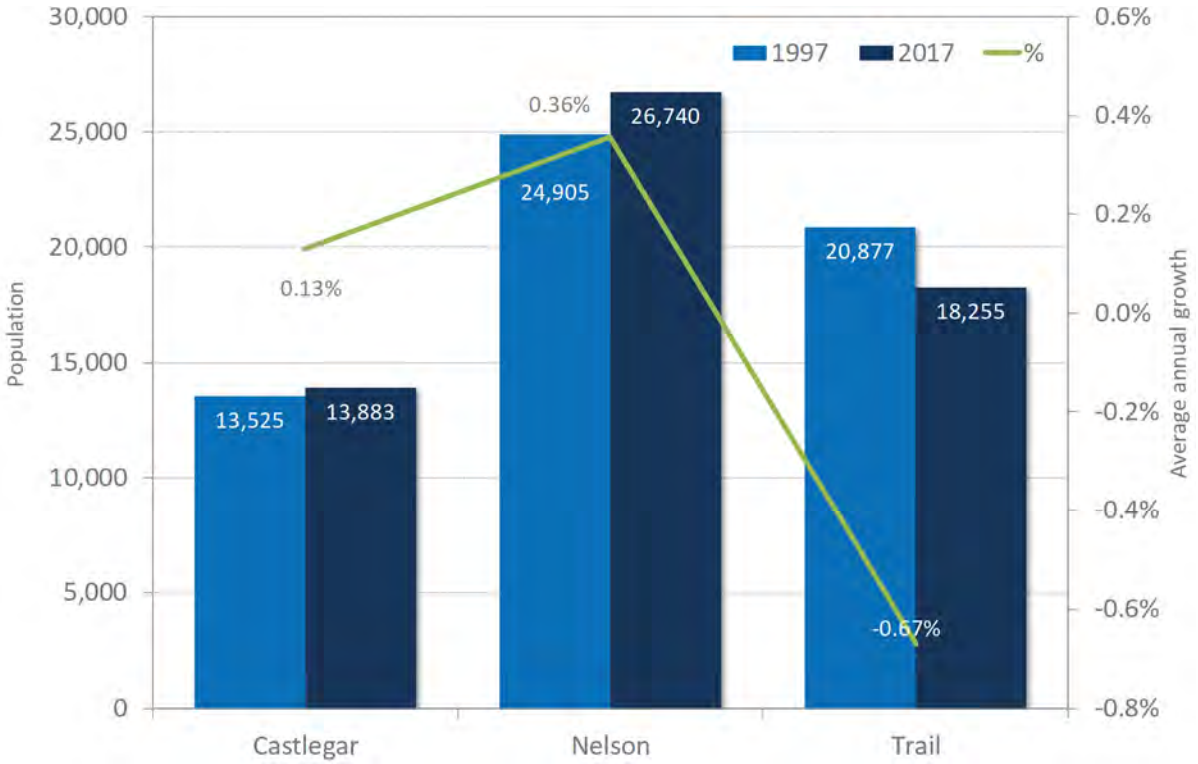
3.2 CATCHMENT AREA

There are six (6) communities within the Castlegar airport catchment area. The catchment area has been defined to fall between the two next most significant airports east and west of WKRA. To the north-west, is Kelowna Airport and to the east is Cranbrook Airport. The following communities fall within a 75 km radius of Castlegar: Trail (29.6 km), Nelson (44.1 km), Rossland (57.2 km), Grand Forks (66 km) and Salmo (42.1 km). There are approximately 80,000 people within the catchment area including rural and town populations. A breakdown of the regional catchment area population is presented in the following section.

3.3 DEMOGRAPHIC PROFILE

According to BC Stats, the cities of Castlegar, Nelson and Trail collectively had a population of nearly 60,000 inhabitants in 2017 and account for 1.2% of the province's population. Nelson is the largest (and also fastest growing) of the three while Trail has seen its population diminish over the last 20-years and Castlegar has remained stable. This leaves a population for rural areas and other smaller municipalities of 23,532. While Nelson, with the larger population in the region, acts as the seat of the Regional District of the Central Kootenay, Castlegar is the regional trade and transportation centre.

Figure 3.1: Historical Populations



Source: BC Stats

Over the past decade the study area's population has marginally diminished (-0.04% per annum) which is in contrast to 1.0% growth for Canada and 1.2% for British Columbia. As a result of this slower growth the study area's population represented 1.2% of the BC population in 2017 compared to 1.5% in 1997.

4.0 SOCIO-ECONOMIC SCAN AND PESTEL

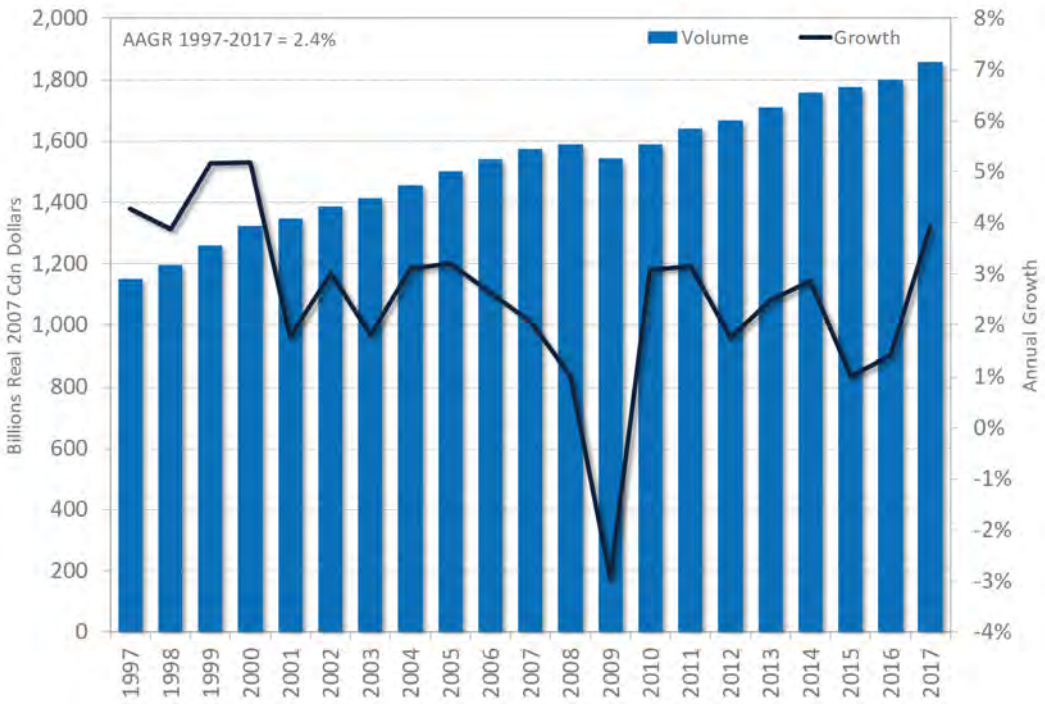
In the field of air traffic forecasting, the strong correlation between growth in a region's income and demand for air travel to/from that region is both intuitive and borne out by experience. Put simply, at an economy's micro level, an individual's demand for air transport will increase in some proportion to an increase in that individual's income. For this reason, the natural starting point for an airport traffic forecast is to assess the socioeconomic prospects for the region in which the airport is located.

4.1 ECONOMIC PERFORMANCE – CANADA AND BC

4.1.1 The Canadian Economy

Canadian real GDP grew at an average annual rate of 2.4% over the past twenty years, and the nation experienced two significant growth interruptions over that period of time: the first resulted from the global financial crisis (2008 and 2009); and second corresponded to the sharp decline in global oil prices that started in mid-2014. Canada's economy was particularly vulnerable to the slide in crude oil prices, given that the country is the fourth largest oil exporter in the world after Saudi Arabia, Russia and Nigeria. Over the past two years, oil prices have gradually drifted to higher levels and, while they are far from their previous peak in early 2014, this increase has been sufficient to stimulate oil production and exports, which have contributed to a rebound in GDP growth.

Figure 4.1: GDP Volumes & Growth

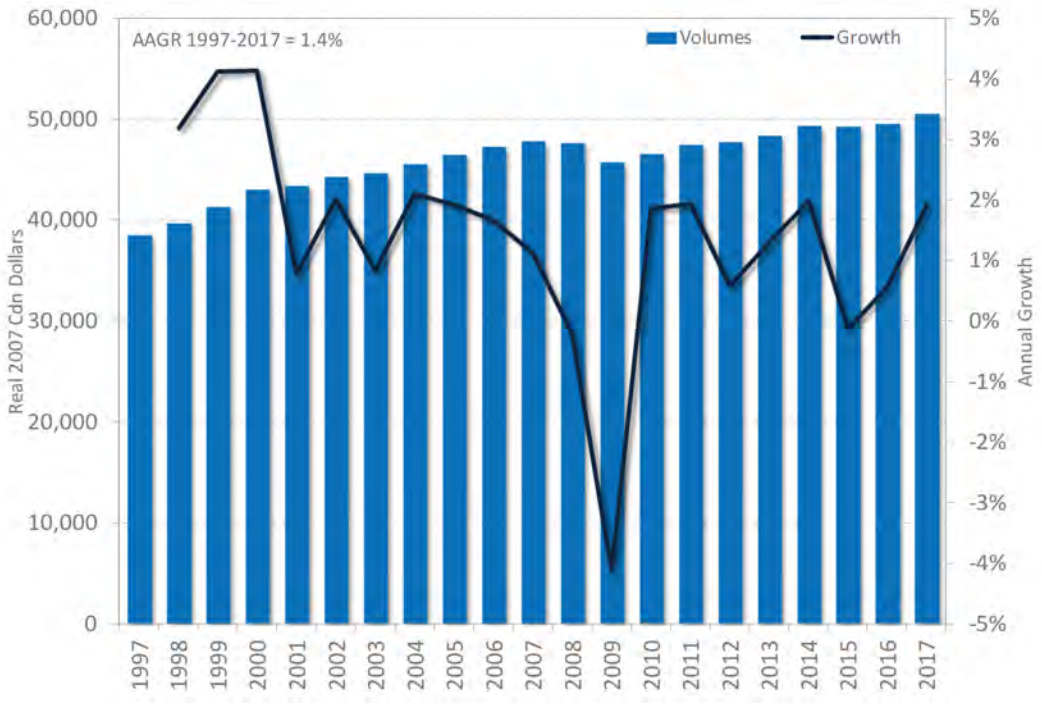


Source: Statistics Canada

Similar to growth trends in national GDP, Canada's annual rates of growth in per capita income saw steep declines as a result of the global financial crisis and the decline in oil prices. However, over the past five years, real growth in

Canadian income per capita is in line with its real average rate of growth per annum over the past two decades (1.4%).

Figure 4.2: GDP Per Capita: Volumes & Growth

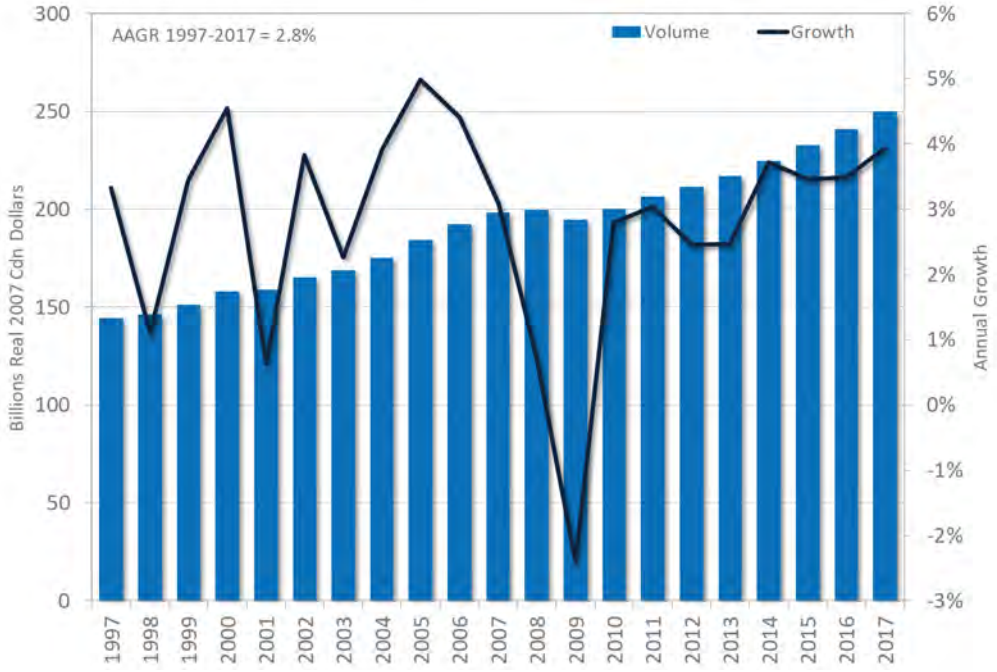


Source: Statistics Canada

4.1.2 The British Columbia Economy

Over the past twenty years, British Columbia's economy has grown at above the national average (2.8% p.a. vs. 2.4% p.a.). British Columbia has a skilled workforce, rich natural resources, and gateway location between North America and the Pacific Rim nations. Vancouver is British Columbia's major commercial and financial centre, with strong trading transport, and economic links to the rest of the world. Other key urban centres in British Columbia include Victoria, Kelowna, Kamloops, Prince George, and Nanaimo. British Columbia also benefits from reliable, renewable, and low-cost hydroelectric power. Resource industries such as forestry, oil and gas, and mining have been other traditional contributors to the provincial economy.

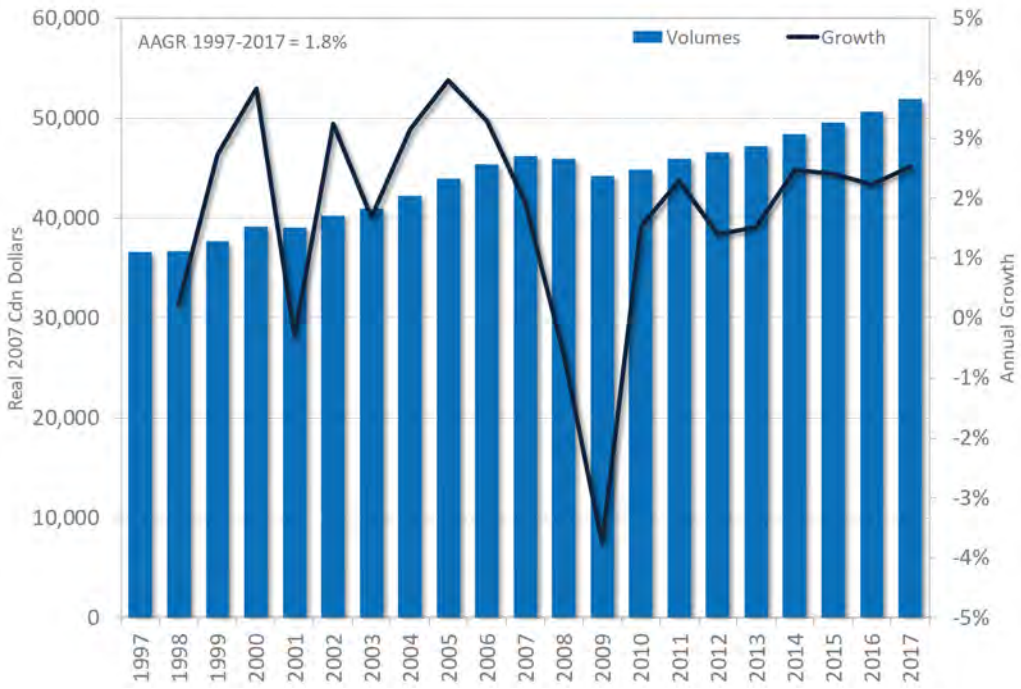
Figure 4.3: BC GDP Volumes & Growth



Source: Statistics Canada

British Columbia's average annual rate of growth in income per capita over the past twenty years has been slightly higher than that of Canada as a whole (1.8% p.a. vs. 1.4% p.a.) and this is largely due to British Columbia's strong economic growth.

Figure 4.4: BC GDP Per Capita: Volumes & Growth



Source: Statistics Canada

4.1.3 The Economy in the Region

Castlegar is the second largest community in the West Kootenay region and is a regional trade and transportation centre. The local economy of West Kootenay is fueled by forestry, mining, education, government, retail and tourism.

Annually 'Destination British Colombia' s a report entitled Regional Tourism Profiles for the 6 tourism regions in the province of BC. The 'Kootenays Rockies' is one of the 6 regions and in its most recent profile (published in 2017) it indicated that the region accounted for 11% of provincial overnight visitors and 7% of related spending.

Alberta residents make up the largest share of overnight visitations (47%) and spending (46%) in the Kootenay Rockies region, the only region where British Columbia residents are not the top market. More than three-quarters of all visitations and two-thirds of spending can be attributed to Alberta and British Columbia residents.

The Kootenay Rockies received 2,070,000 overnight visits in 2014 (most recent statistics), generating more than $654 million in related spending. Domestic overnight travellers accounted for 81% of visitation and 74% of related spending. International travellers accounted for 19% and 26%, respectively. On average, travellers in the Kootenay Rockies stayed 3.2 nights and spent $98 per night during their trip. BC travellers in the Kootenay Rockies stayed 2.4 nights and spent $86 per night during their trip. Other Canadian travellers stayed 3.4 nights and spent $100 per night.

Most people travel to the Kootenays during the peak summer months (July to September).

4.2 EMPLOYMENT

Table 4.1 refers to 2018 employment versus unemployment statistics in Castlegar and British Columbia. Although slightly higher, the unemployment rate of Castlegar compares favourably with the rest of the province.

Table 4.1: Castlegar Employment Data[4]

	Employed	Unemployed	Employment Rate	Unemployment Rate
Castlegar	3,675	305	55.6%	7.7%
British Columbia	2,471,665	165,975	59.6%	6.7%

4.3 MAIN BUSINESS SECTORS

The local economy of the West Kootenay is driven by five (5) most significant pillars – forestry, education, government, retail and tourism.

Forestry: The B.C. Forest Industry makes a significant contribution to the British Columbia economy, generating 59,900 direct jobs. The B.C. Forest Industry generated $32.96 billion in output and $12.94 billion in GDP to the province[5]. Zellstoff Celgar is ranked the 11th largest Forest company in British Columbia with a current staff of 420

[4] BC Stats, 2018, *Castlegar and British Columbia*
[5] https://www.cofi.org/wp-content/uploads/BC-Forest-Report-FINAL-Sept-2017.pdf

employees[6], which makes forestry the **main** economic driver for the area. The forestry sector includes sawmills, pulp mills, associated logistics and services companies. The following are the top five (5) companies for this sector: Interfor, Mercer-Celgar, Kalesnikoff Lumber, DTT Chambers, Sutco.

Education: Selkirk College has six (6) main campuses located in the West Kootenays. There are three (3) in Nelson, one (1) in Grand Forks, one (1) in Trail and its main campus located in Castlegar, making it one of the main economic drivers with 500 employees. Selkirk College has a building on the airport which is currently being utilized but not for aviation training or aeronautical uses. The airport campus was originally used for flight training.

Government: The City of Castlegar is host to many provincial and federal government services such as BC Front Counter, Service Canada and BC Natural Resources offices.

Retail: In 2016, there was a dramatic shift in Castlegar's retail landscape, with more than a dozen new businesses taking root in the city centre. The idea was to attract more people to do business downtown. From September 2016 to June of 2017, there was 17 of 26 empty storefronts and commercial lots filled and it has been growing since, leaving only a few lots available and the need to consider increasing the offerings.

Tourism: This is one of the most important economic drivers. "Destination British Columbia" reports that the Kootenays Rockies region (one (1) of six (6) B.C. regions) accounts for 11% of provincial overnight visitors and 7% of related spending with Alberta residents making up the largest share of overnight visitations (47%) and spending (46%) in the Kootenay Rockies region. Current hotel occupancy rate is 50% with the highest rates in the summer while some hotels are used to house contractors that come to town for some of the companies' shutdowns. Tourism is fueled by over two (2) million overnight visits a year with peaks in the summer months between July and September.

4.4 EDUCATION LEVEL

Each year, Selkirk college is responsible for over $75 million in economic activity, employing over 500 faculty providing post-secondary learning experiences to nearly 3000 students.

Selkirk College previously offered an Aviation Training program at West Kootenay Regional Airport, but the program was cancelled due to cost and competition. Due to a number of factors, the school was unable to reach agreements with flight schools to support the practical component of the training that would have reduced the training cost. The reduced number of students also contributed to the aviation program being cancelled. Selkirk College now offers GIS training in the campus building at the airport. There are a number of research centres in the area. The main ones are indicated in Table 4.2 below.

[6] http://www.celgar.com/

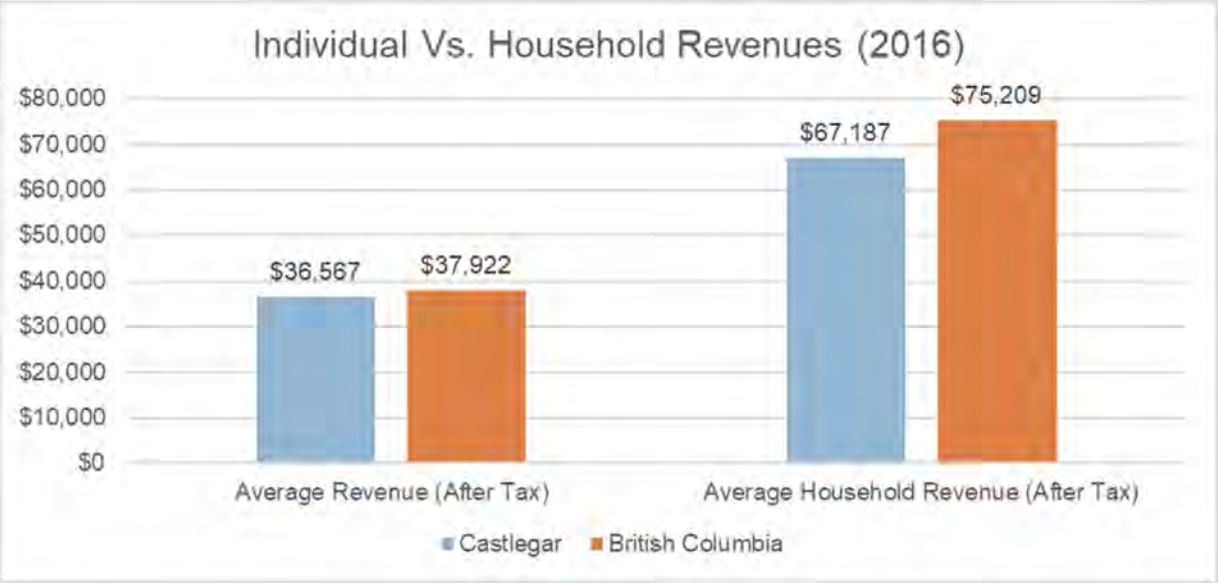
Table 4.2: Research Centres

Name of Center	Affiliation	Sector	Research Specialty
Jim Pattison Centre of Excellence in Sustainable Building Technologies and Renewable Energy Conservation	College	Forestry, Clean Technology	Sustainable Construction Management Technology, Geothermal, Electrical, Carpentry, Green Building Design and Construction, Onsite Alternative Energy Sources, Metering and Monitoring of Green Buildings, Building Envelope Construction, Life Cycle Management, HVAC, Applied Ecology and Conservation, Human Kinetics
Pacific Agri-Food Research Centre	Federal Government	Agri-Food	Food, Nutrition and Health, Food Security, Sustainable Agriculture, Horticultural Crops, Grapes, Tree Fruits
Social, Spatial and Economic Justice, Centre for (CSSEJ)	University	Social sciences & humanities	Research in this Cluster focuses on the social, spatial and economic structures in society that lead to inequality, inequity, marginalization, and oppression.
Okanagan Sustainability Institute (OS)	University	Environment	

4.5 AVERAGE ANNUAL REVENUES

Figure 4.5 is the Average Revenues After Tax and Average Household Revenues After tax in Castlegar and British Columbia. This provides a comparison of the city's population in comparison to the rest of the province. Castlegar individual and family revenues are 10% less than the BC average.

Figure 4.5: Castlegar Revenue Data[7]



4.6 ENVIRONMENTAL SCAN - PESTEL

The environmental analysis is based on the PESTEL (political, economic, social, technological, environmental and legal) model which aims at identifying and explaining the macro-environmental factors likely to have positive and negative impacts on the airport and on its future development projects. This analysis focuses on the political, economic, sociological, technological, ecological and legal elements that may have an impact on the project.

Figure 4.6: PESTEL Model

4.6.1 Political

This analysis looks at regional and local political issues that may have an impact on the growth of the airport and the use of the land for aviation/aeronautical and non-aeronautical projects that will generate additional revenues for the airport.

The municipal council and Mayor are very much in favour of economic growth through airport development which has led to the attribution of this strategic mandate that will provide the council with a plan for the airport future developments. In analyzing the political side of the City of Castlegar, we had a conversation with a number of leaders in Castlegar to better understand, the political landscape.

The City of Castlegar owns the West Kootenay Regional Airport. Reporting to Mayor and Council, the CAO provides oversight and strategic focus, while the Deputy Director, Public Works and Airport Manager oversee the airport administration, support for planning initiatives, in addition to managing airport operations and maintenance services.

City officials spoke with the local MLA, Katrine Conroy, who is very supportive of the future developments of the airport. She is a member of the current New Democrat minority government. The local MP, Richard Cannings, is also supportive and had offered to help lobby Nav Canada and Transport Canada for the approval of RNP at Castlegar.

4.6.2 Economic

Approximately 75,000 passengers fly out of this airport every year, and the airport is a prime source of economic development for Castlegar and the West Kootenays. The airport generates revenues from non-aeronautical revenues (space rentals, land leases) and aeronautical fees. Aeronautical revenues related to aircraft operations, are presented in Table 5.1. Other revenues are procured from a small percentage of the local FBO (Brilliant Aviation) fuel flowage. It was, however, not possible to determine the exact revenue from this source.

Table 4.3: Aircraft Fees

Aircraft Landing Fees			
Take Off Weight	**Domestic**	**International**	
Minimum	$22.25	$22.25	
<= 21,000 kg	$4.80	$6.21	
Fr 21,000 to 45,000kg	$6.15	$8.55	
> 45,000 kg	$7.20	$11.52	
General Terminal Fees			N/A
Seating Capacity (Passenger Seats)	**Domestic**	**International**	
0-9	$15.93	$36.3	
10-15	$31.27	$72.58	
Aircraft Parking Fees			
Aircraft Weight	**Daily Fee**	**Monthly Fee**	**Annual Fee**
< 2,000kg	$6.57	$52.74	$333.51
Fr 2,000 to 5,000kg	$6.57	$52.74	$400.19

An important contribution to airport revenues is derived from non-aeronautical revenues, such as car parking and land leases. Land leases provide recurring revenues from each of the airport tenants that has leased land for the construction of their facilities. The airport currently has land leases with the Wildlife Fire Management Base (lease end date of August 21, 2028), Selkirk College Building (lease end date of April 2025) and the Car Wash facility (lease end date of April 30, 2020).

The city sold airport land for the development of two job-creating business at the airport, including a gaming centre and a large, commercial garage used for heavy vehicle maintenance. These development examples provided a one-time infusion of capital. The opportunity to lease land instead of sale of land may allow new and recurring revenues; term-based leaseholds can make land leasing attractive to new, potential developments.

Other non-aeronautical revenues include airport parking. Metered parking is available for short-term visitors and the fee for long-term parking is $5.00 per day.

The City of Castlegar is encouraging commercial development on its ground side land to serve the Columbia/Kootenay Valleys on city-owned airport lands. Adjacent to the airport property, and the recently constructed Chances Gaming Centre, are lands which service a regional population of approximately 80,000 people and are both the largest and most accessible parcels of raw, flat commercial land in the West Kootenay region.

There has not been an economical study performed at the airport in many years. However, it is safe to say that tenants located on the airport offer direct economic impacts not only to the airport but also to the community. In addition, each business generates indirect and induced economic impacts to the region.

- Indirect impacts refer to the chain reactions that airport development activities generate in the regional economy - particularly the jobs and activities generated by subcontractors and regional suppliers. In other words, companies in the region, whose income-generating activities are positively impacted by the vitality of the airport and its traffic, are included in this category.

- The induced impacts are the multiplier effects generated by the expenditures. Expenditures have direct and indirect effects and a portion of this revenue is reinjected into the economy in the form of new spending on goods and services (consumer spending). These new expenditures will become, in part, revenues for other economic agents who will use, in turn, a fraction to make new expenses, and so on.

In addition to the benefits observed with businesses, WKRA generates economic benefits through its users and external visitors. The airport receives several visitors each year from three (3) distinct categories: commercial passenger services, wildlife fire management services and general aviation pilots (limited). During itinerant aircraft visits; pilots, crew and passengers will typically pay for fuel, lodging food in the community and potentially for other related services offered at the airport (i.e.: aircraft maintenance).

While the exact impact of the airport is difficult to quantify further, it is important to remember that the development of the airport does not only benefit the city and the airport tenants, but the entire business community and its local citizens.

4.6.3 Social - Community Impacts

The airport has a minimal noise impact on adjacent properties and citizens, particularly since the airport is a day-use airport only. This enables the benefit of an airport, allowing local citizens to travel out of the region with minimum impact on the population. Additionally, the airport generates a number of jobs both directly and indirectly helping to keep and attract people to the area.

The WKRA benefits the community in terms of facilitating patient transfers and Medical Evacuation Flights to large centres like Vancouver.

Castlegar sits at the crossroads of a network road system that is both East-West and North-South. Roads are the primary source of transportation of goods, however, the WKRA may offer the opportunity to have rapid parcel delivery through air service in future. In today's economy, this is becoming more and more of an expectation by people, particularly with the younger demographics and on-line purchases.

4.6.4 Technological

There are many innovative applications and technologies that are applicable to the WKRA, from mobility on demand, through Uber and Lyft, connected technologies for parking, and even early applications of autonomous vehicle technology. These new innovations have appeared landside and are beginning to proliferate in the terminal and on the airside. While progression of technologies is unlikely to be linear or even predictable, they will be an integral part of planning over the next five years. The application of artificial technology intelligence through autonomous vehicles, security robots, and facial recognition technology catches much of the limelight and imagination. Other technologies such as electrification, connected, and assistive technologies, separately and in combination, merit attention as well. The analysis, management, and sharing of data is already yielding profound challenges and opportunities across airport properties in Canada, North America and globally.

Landside Considerations:

WKRA may have an opportunity to work with the community and hotels to develop new technologies that would benefit the community and passengers. Shared vehicles and shared rides now impact the management of pick up and drop off, wayfaring, parking and potential private rental car demand.

The emergence of autonomous shuttles and the possibility of autonomous transit from the city center is close at hand. Shuttles to parking and rental car facilities and service for those with mobility limitations are well suited for the semi-constrained, campus-like environment of an airport.

Larger buses and other larger types of AVs are being trialled on road and are apt for consideration as driverless trams replacing people movers and similar technologies. Further, application of proliferation of connected technologies and low-level automated technologies like collision avoidance technology and automated braking systems may change capacity requirements, require enhanced digital infrastructure, and afford opportunities to reduce loss from crashes or just errors in docking.

The push to electrification signals both a need to consider electric charging facilities and the assessment of solar and battery powered equipment.

Terminal Considerations:

Although WKRA has a small air terminal building, automated vehicles (AVs) can also be deployed at the curb or inside terminals as personal mobility devices. AVs can also be deployed within the terminal for baggage movement, vending, cargo movement and more. In addition, in-terminal technologies includes:

- customer assistance with new and advanced security screening through facial recognition at boarding to aircraft in a systematic way with airline support staff overseeing functions, special needs passengers, equipment, etc.
- passenger use of smart technology (personal phones) for improved timing and scheduling, Way-Finding and notices for retail or food and beverage services within the terminal,
- facial recognition to process passengers from terminal curb to the aircraft without being confronted with airline or security staff;
- automated kiosks, (check-in, bag-drop, information).

Airside Considerations:

Autonomous Pax Transport: Like landside and within the terminal, AVs can transport passengers and air crews. Though no airport in North America has yet piloted movement on the tarmac, Gatwick recently completed a six-month pilot with Oxbotica to provide AV service to crews and aircraft.

Robotic Aircraft Tugs: Another example of a strong business case for AV technology is the use of robotic tugs. British Airways has used the Molotok – a robotic tug -- to push back aircraft and report at 53% reduction of delays.

Autonomous Baggage Systems: Automated technologies could improve the movement of luggage on both fixed baggage conveyor systems and non-conveyor systems. Nayva and EasyMile have both developed autonomous luggage carts which have been deployed in Europe. Baggage movement systems could be automated without the fixed luggage conveyor systems. Smart tech could be used to support smaller airport terminals like WKRA in place of large belts. More efficient movement of bags could occur on the check-in and arrival processes as a result.

Snow Removal: Automated technologies could be used to improve snow removal and ground maintenance services. The Yeti, SnowBot and others have piloted autonomous snow ploughs in Finland and Norway. Landscaping, tarmac and runway maintenance may also improved through AV technology. Winnipeg International Airport is currently testing and working with airport maintenance equipment manufacturers to test autonomous snow removal equipment.

Drone inspection and cargo applications: RPAS (remotely piloted aircraft systems, or drones) could provide topographical surveys (obstructions) and security services (monitoring fence lines), deliver equipment, support runway condition reporting (depth of ice on runways, type of precipitation) or monitor the environmental concerns (grass heights, tree heights close to airport, wildlife monitoring and deflection). Commercial RPAS services could deliver cargo to the airport from private / public locations within a flyable radius from the airport.

WKRA may benefit from improved technology to enable a more reliable air access through various weather conditions. In this regard, WKRA should consider implementation of satellite-based navigation aids such as RNP (Required Navigation Performance) for improved approaches, and new instrument departure procedures.

Many, if not all of these technological advancements may be implemented in some form in the near to medium future at WKRA to the benefit of the City of Castlegar.

4.6.5 Environmental

The environmental standards applicable in the airport sector are numerous. In order to minimize the issues related to the natural environment surrounding the airport, it is necessary to understand the regulations at all levels to identify potential impacts on the airport. This PESTEL segment also focuses on the natural environment of the airport grounds by analyzing wetlands and protected areas.

4.6.5.1 Canadian Law on Protection of the Environment

Canadian airports are required to follow the Canadian Environmental Protection Act. The law imposes a regulatory framework, procedures for the sound management of the natural environment and proposes good environmental management practices according to various types of interventions.

In the event of a breach of the law, there may be financial and operational impacts. Without going into the details of the law, here are some topics that can affect airports:

- PART 4: Pollution Prevention - Airports are required to put in place a pollution prevention plan to reduce and / or eliminate pollutants.
- PART 5: Toxic Substances - In the case of airports, it is mainly fuel and is regulated by the Canadian Standards Association (CSA).
- PART 6: Animated Biotechnology Substances - not applicable.
- PART 7: Pollution Control and Waste Management - This section addresses, among other things, the protection of marine and wet environments, the emission of vehicles, engines and equipment, and the control of hazardous materials.

4.6.5.2 Wildlife Management

In terms of wildlife management practices, the West Kootenay Regional Airport has a Wildlife Management Plan with identified that the species of concern at the airport are birds – specifically geese, eagles, hawks and gulls.

The airport practices both proactive and reactive wildlife management practices. Airfield grass is kept short in the spring and is kept short throughout the summer. The residential properties, including rural fields surrounding the airport provide, may habitat for a range of species that would be in proximity to the airport, at least at certain times of the day or year, and which may be hazardous to aircraft. There is however no single area or environmental feature that represents a significant or overwhelming hazard to aircraft.

At the end of each month, a written summary is provided within the Wildlife Management Log that discusses any environmental changes or unusual conditions that may have led (or might lead) to unusual wildlife hazard situations or changes in risk assessment. The monthly summary provides an opportunity for any new information on policies, new laws, changes in the status of rare species known to frequent the airport, training programs or management reviews to be written and stored in a readily accessible location.

4.6.6 Legal

The key legal aspects in relation to the WKRA is the ability for the City of Castlegar to maintain the airport certificate issued by the Minister of Transport (through Transport Canada). The airport certificate is the legal mechanism, while the Airport Operations Manual, is the tool used to maintain certification. The certificate, and the AOM in detail, outlines the conditions in which the airport is operated.

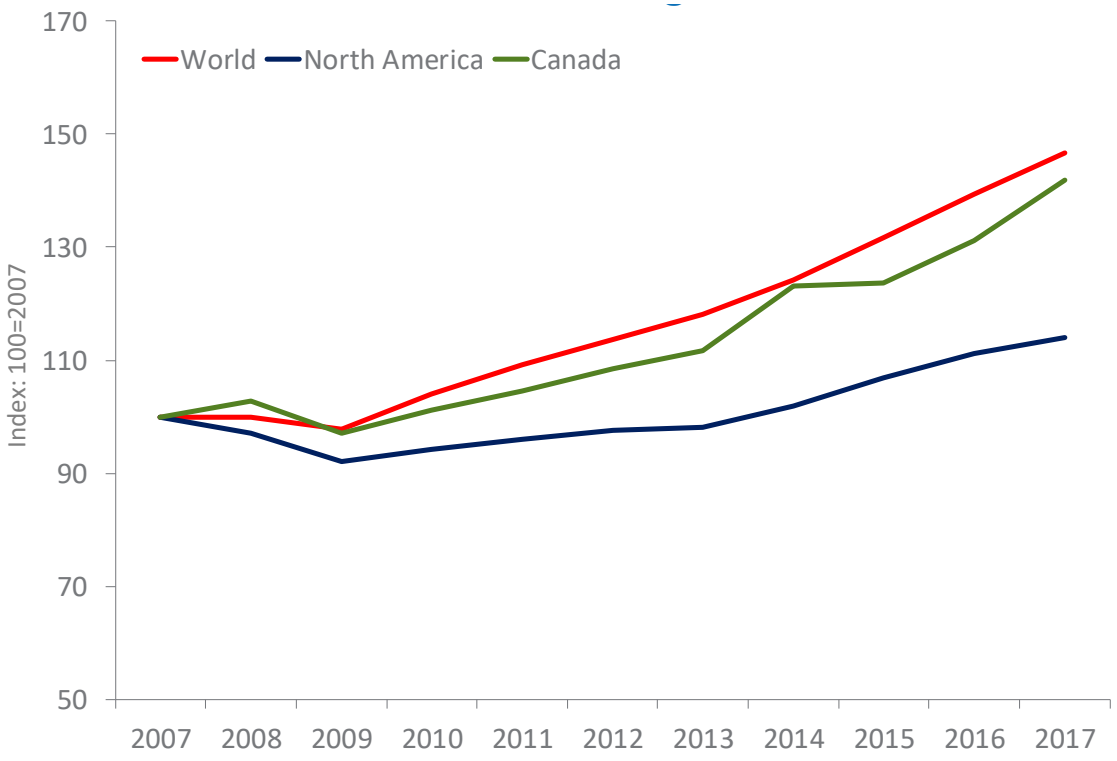
The certificate does not allow WKRA to permit night flights; Transport Canada has indicated that they feel it is unsafe to add runway edge lighting to enable night flying. However, this situation should be studied further; although no edge lighting is permitted based on current airport certification, the WKRA may add new approach lighting to augment the arrival aircraft with improved visual landing aids.

5.0 AVIATION ACTIVITY AND TRAFFIC FORECASTS

5.1 OVERVIEW OF AIR TRANSPORT IN CANADA AND IN BRITISH COLUMBIA

Following the global recession of 2008-2009, air transportation has enjoyed an uninterrupted period of growth. Since 2007 the global air transport industry has grown at 3.9% p.a., but North America has lagged this, with average annual growth of 1.0%. Within North American, Canada accounts for about 10% of passenger demand (or 2% of the global total) and the country's passenger volumes, led by a fairly strong economy, averaged an annual growth of 3.3%, closely tracking the world's growth.

Figure 5.1 Historical Passenger Growth



Source: DKMA based on ACI statistics

During the last decade, the Canadian market grew annually by 3.3%, meaning that in 2017 the market was about 40% larger than in 2007. Broadly speaking, this is linked to two key factors: a relatively strong domestic economy and, strong air carrier competition, fueled by the emergence of WestJet but also by the more niche airlines such as Porter Airlines, which have stimulated demand by injecting competition.

Figure 5.2 Total Passengers, Canada

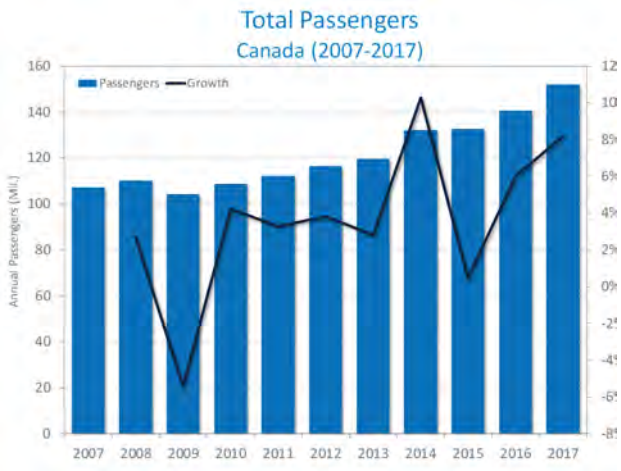
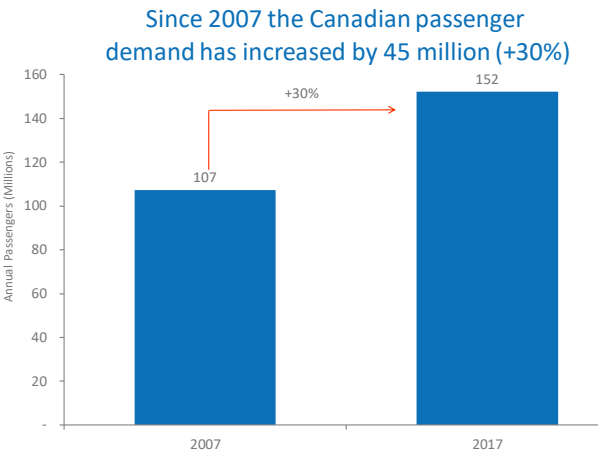


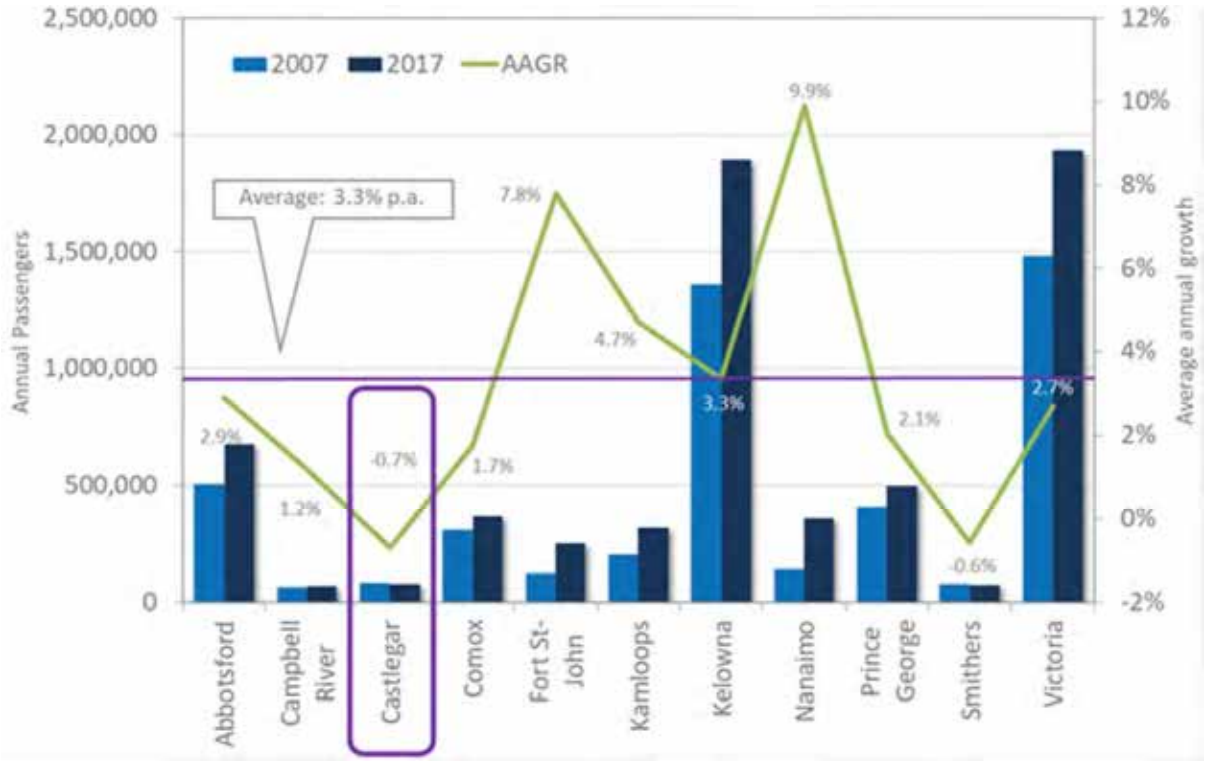
Figure 5.3 Canadian Pax Demand



Source: DKMA based on ACI statistics

Figure 5.4 below highlights passenger development during the last decade for a selected list of regional airports in British Colombia. Collectively these airports have seen passenger demand increase by 3.3% per annum since 2007 which is in line with the Canadian average (3.3% p.a.). Fort St-John and Nanaimo have been the fastest growing during this period while Castlegar/ West Kootenay Regional Airport and Smithers Airport were the only airports who experienced a traffic decline during this period (-0.7% and -0.6% respectively).

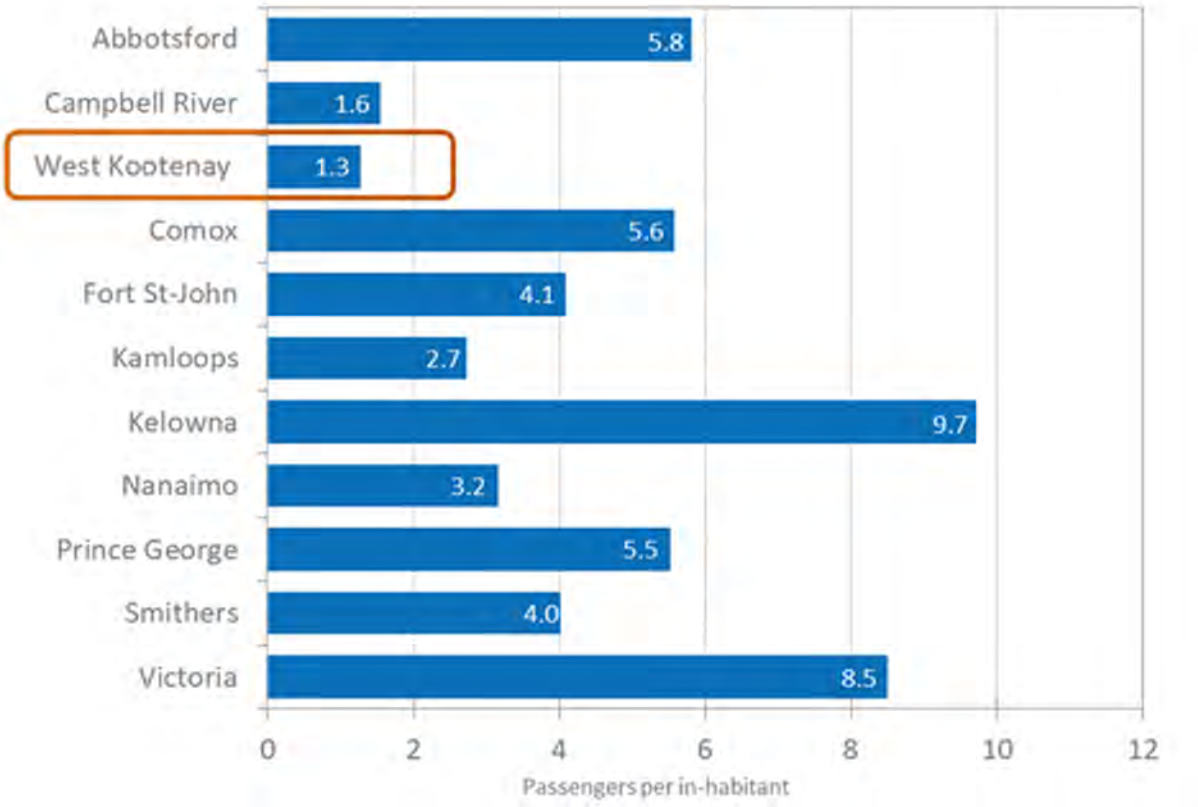
Figure 5.4 10-Year Passenger Growth Rate, BC Airports



Source: ACI Statistics, Web pages and Annual Reports

Finally, the next chart shows, for the same airports, the ratio of passengers to population. Although this measure is imperfect, it gives an indication regarding the level of service for a given population, where the higher the ratio the better the air service. Within the group of airports Kelowna Airport has by far the most passengers per inhabitants while West Kootenay Regional Airport has the lowest. Kelowna Airport is over 300km from West Kootenay and the airport's network (which includes winter flights to sunny destinations and service to Toronto) will enable the airport to have a larger ground catchment area including being able to attract residents from West Kootenay.

Figure 5.5 Pax to Inhabitant Ratio, BC Airports (2017)



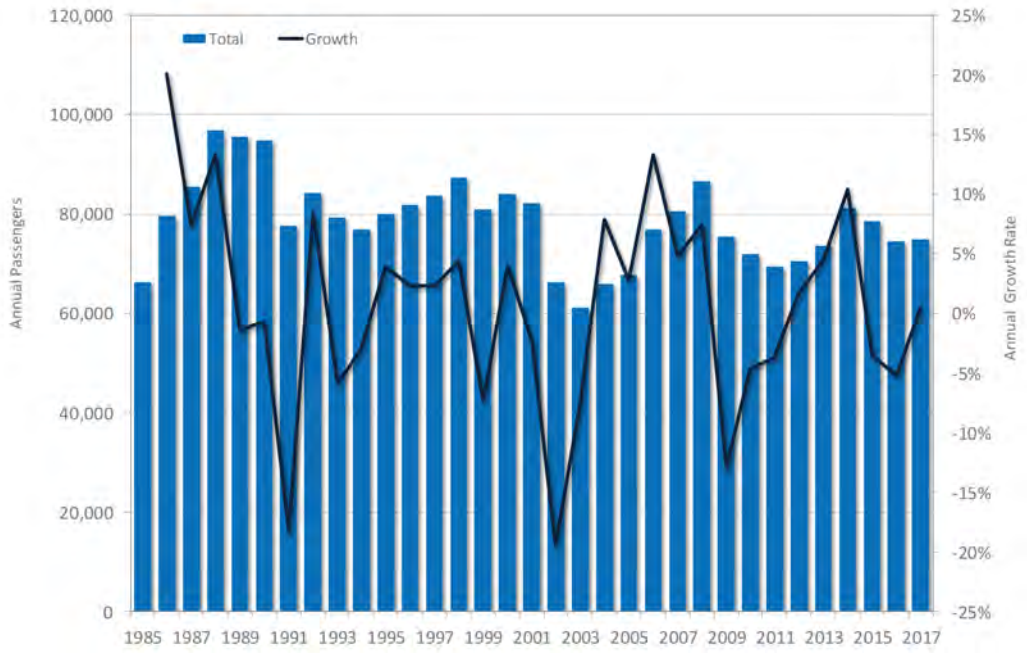
Source: DKMA analysis-based Airport Statistics and Statistics Canada

5.2 TRAFFIC DEVELOPMENT AT WEST KOOTENAY REGIONAL AIRPORT

5.2.1 Passengers

The West Kootenay Regional Airport (WKRA) primarily serves the region of West Kootenay which includes the cities of Castlegar, Nelson and Trail. Air Canada/ Jazz operates daily scheduled flights to both Vancouver and Calgary using Dash-8-300s. In 2017, the WKRA handled 74,621 passengers translating into an annual growth of 0.4% since 1985; refer to Figure 5.6.

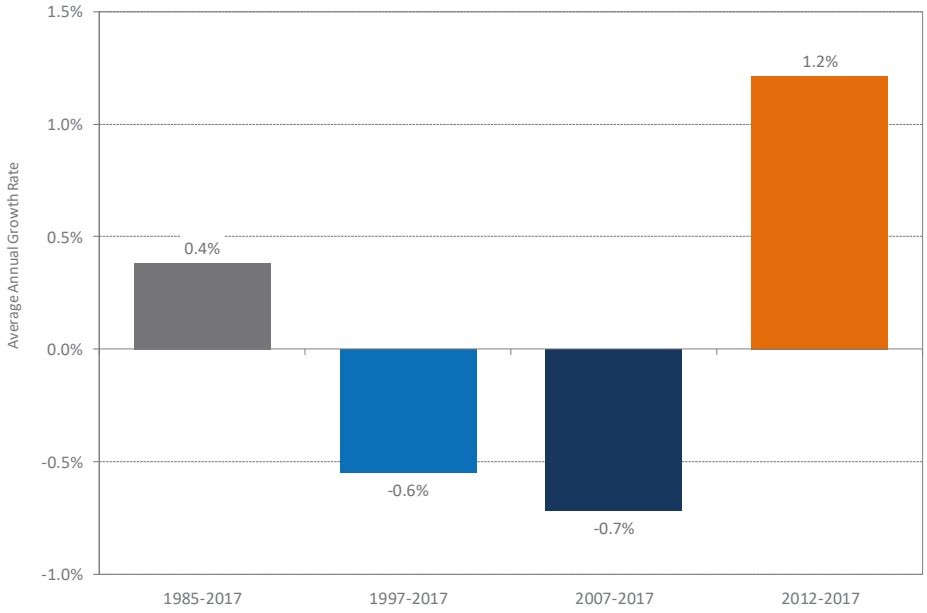
Figure 5.6 Historical Passenger Growth at WKRA



Source: DKMA analysis based on Airport Statistics

While passenger growth has been modest since 1985 it is worth noting that during the last five years growth at the airport has somewhat accelerated by an average of 1.2% per annum. During this period Air Canada/Jazz increased capacity by 1.2% per annum on the route to Vancouver whereas the smaller route to Calgary has seen an annual capacity increase of nearly 3%.

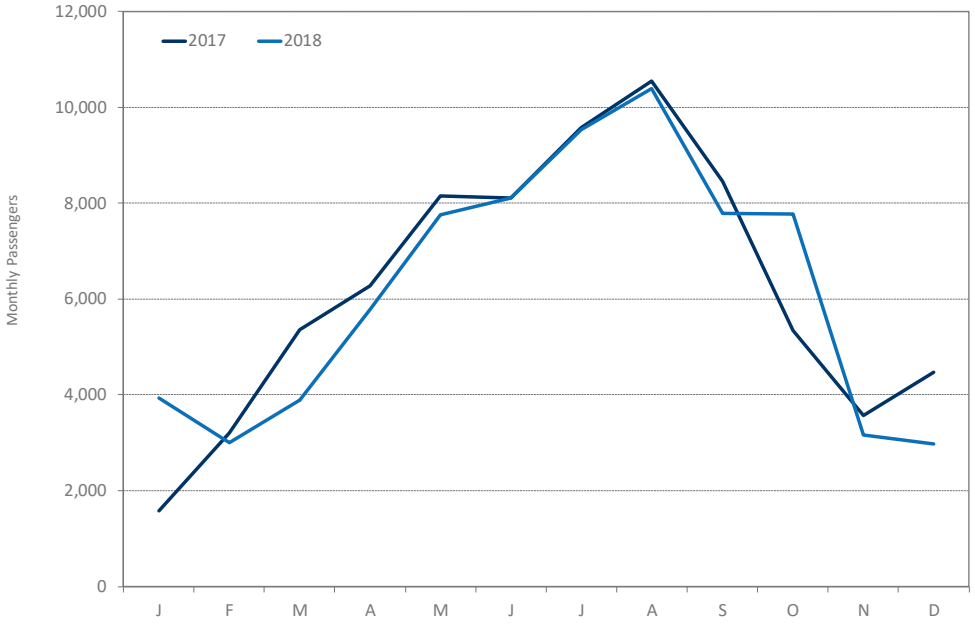
Figure 5.7 Historical Passenger Growth Rate, WKRA



Source: DKMA analysis based on Airport Statistics

As can be seen in Figure 5.8 below monthly passenger volumes at the Airport were fairly stable and most passengers travel during the summer months.

Figure 5.8 Monthly Passengers, WKRA

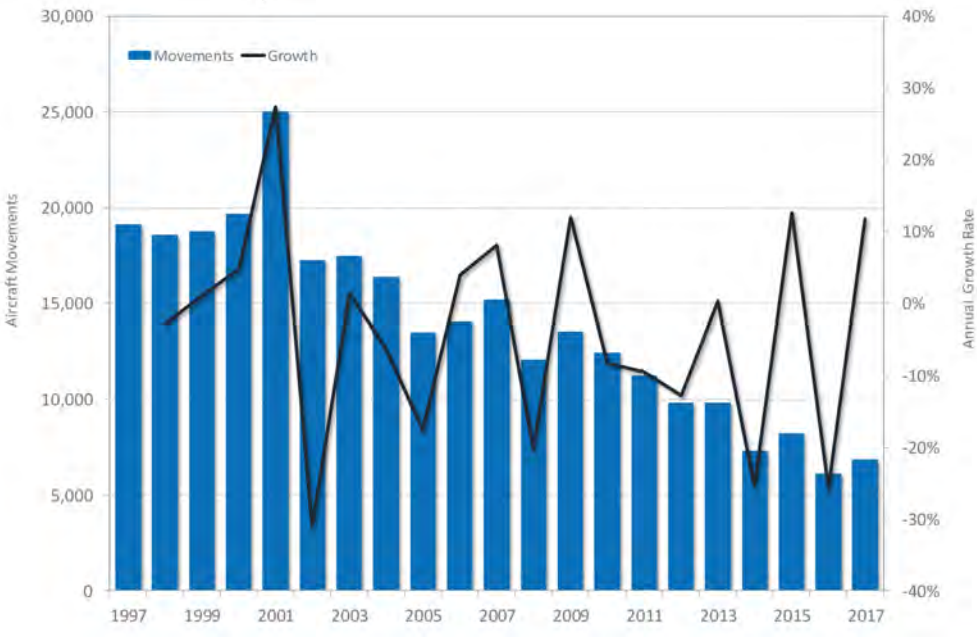


Source: DKMA analysis based on Airport Statistics (note: December 2018 figure is an estimate)

5.2.2 Aircraft Movements

In 2017, the airport handled 6,862 movements; since 1997 aircraft movements at the airport have decreased, on average, by 5.0% annually. Figure 5.9 indicates the annual statistics during this time period.

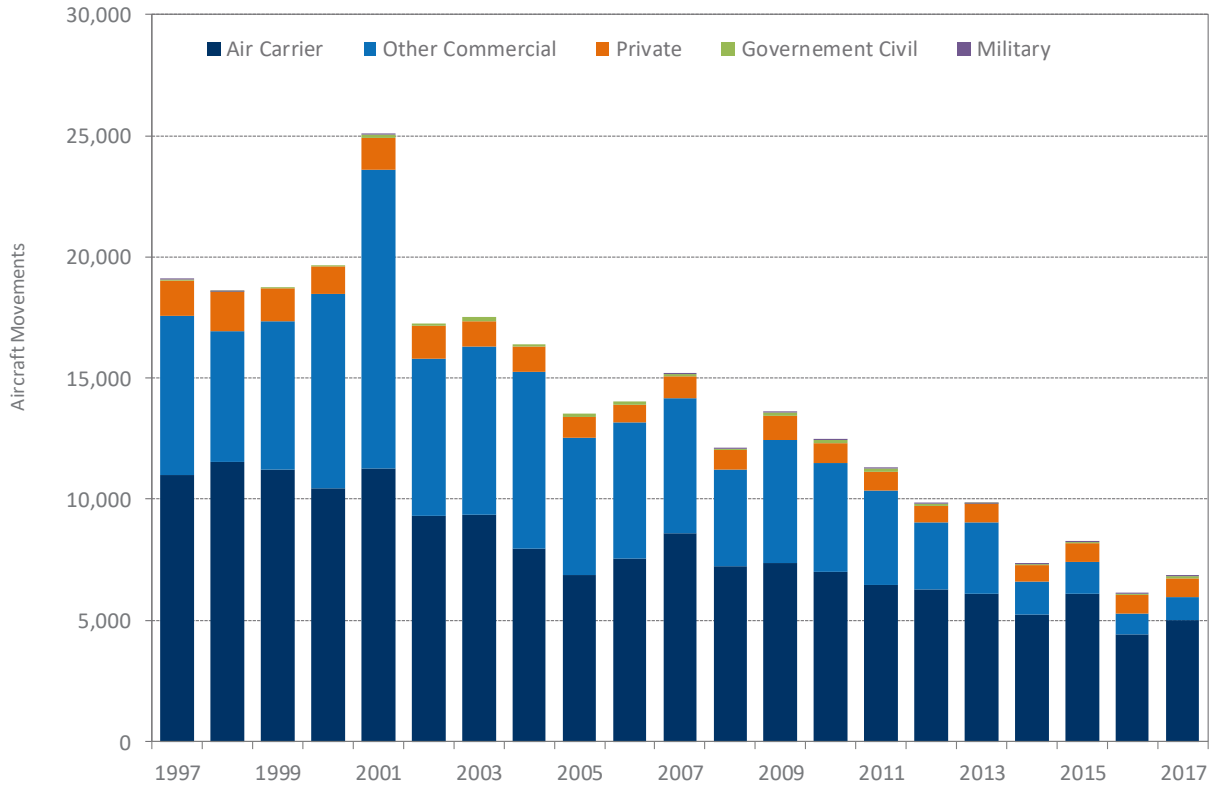
Figure 5.9 Total Aircraft Movements, WKRA



Source: DKMA analysis based on Statistics Canada

Commercial Air Carriers are the predominant types of aircraft movements at the WKRA, accounting for 73% of the total in 2017. Movements of all categories of aircraft have declined during the last 20-years but '*other commercial carriers*' who provide charter services have seen the fastest decline averaging, at -9.1% annually.

Figure 5.10 Total Itinerant Aircraft Movements, WKRA



Source: DKMA analysis based on Statistics Canada

5.3 PASSENGER ASSUMPTIONS AND METHODOLOGY

5.3.1 Forecast Assumptions

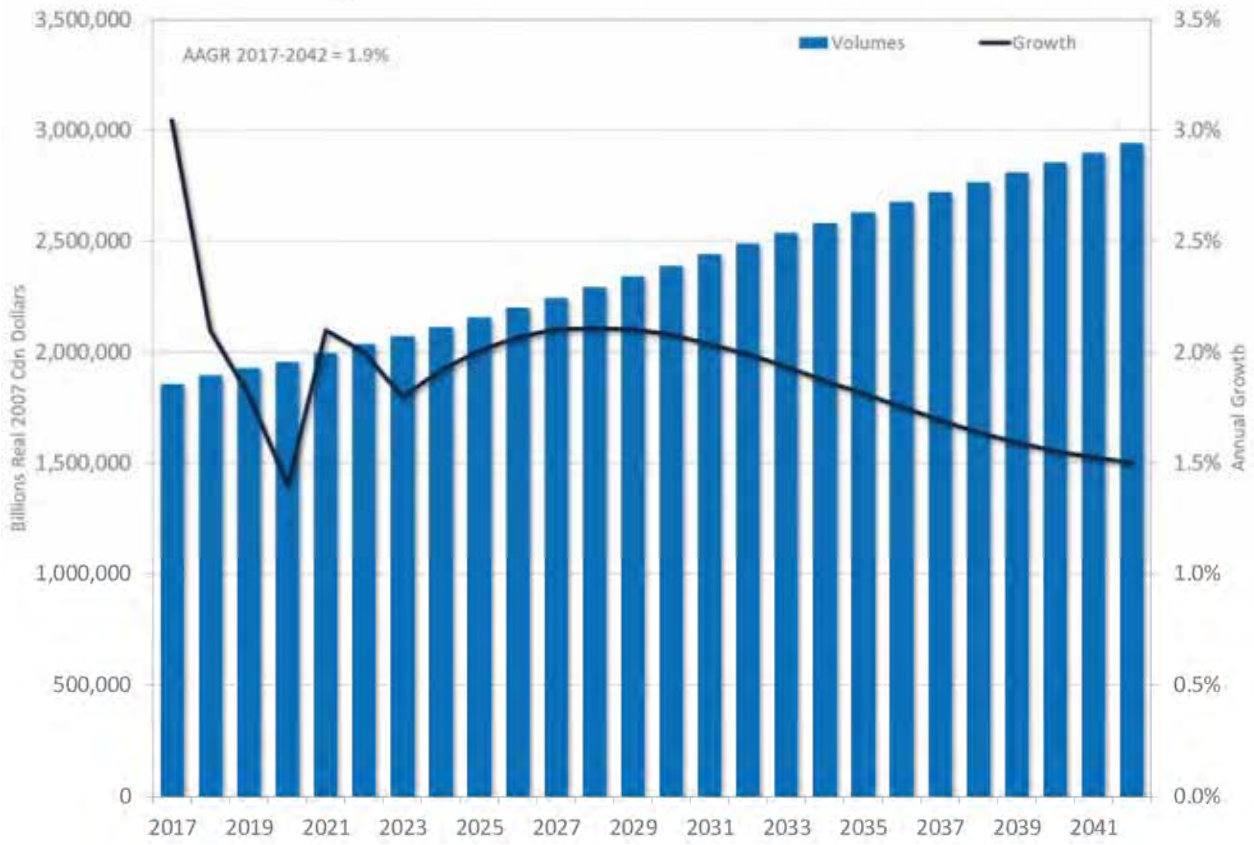
The forecast assumptions centre on demand-side (socio-economic) and supply-side drivers (e.g. airline strategies).

5.3.1.1 Demand Side: Socioeconomic and Population Assumptions

It should be noted that long-term macroeconomic forecasts are principally driven by population growth and productivity improvements in the production of goods and services. Within that context, the following points are the key demand-side assumptions underlying this forecast. Based on forecast data sourced from the EIU, the Canadian economy is expected to experience average growth per annum of 1.9% over the forecast period (2018-2042).

As noted in the socioeconomic section of this report, the British Columbia economy has expanded above the national average pace of growth (2.8% vs. 2.4%) per annum over the past twenty years. While the EIU doesn't produce provincial forecasts, DKMA has assumed that in the future, BC will on average continue to experience faster growth than Canada.

Figure 5.11 Canadian GDP Forecast: Volumes & Growth

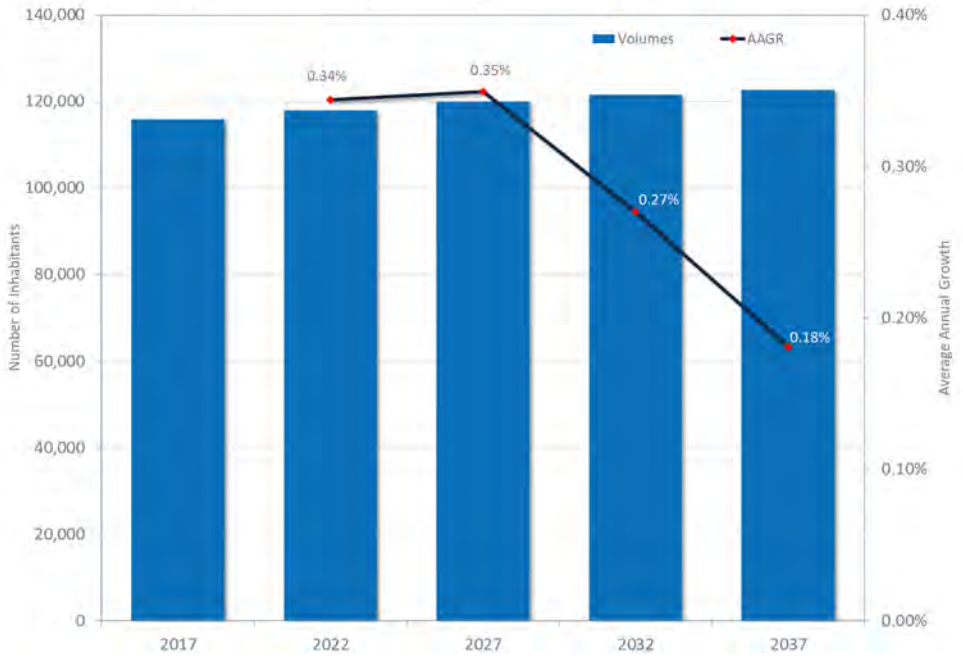


Source: EIU and DKMA

Concerning demographics, growth of the region's population, like most areas, will largely depend on its ability to attract workers from other regions in the province, Canada or from abroad and, despite investments in local economy there is stiff competition from other regions. Hence, while these investments will certainly stimulate growth, they are unlikely to provide sustained long-term growth that will attract workers to move/ relocate to the region. Accordingly, BC Stats does not expect the region to attract significant numbers of workers from other regions and its population is expected to experience slow average annual growth (0.3%) over the next 20-years. In comparison, during the same period, the population of British Colombia is expected to grow annually by 1.1%.

Note: BC regional projections do not go beyond 2037.

Figure 5.12 Study Area Population: Volumes & Growth



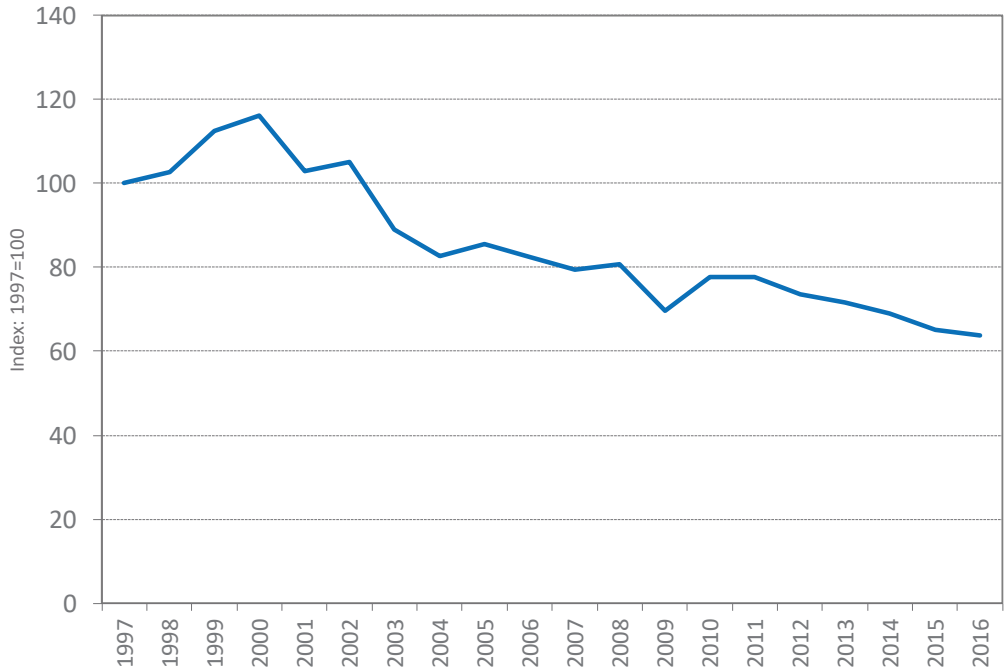
Source: BC Statistics

5.3.1.2 Supply Side: Carrier Development

Air Fares: Productivity improvements, advanced technologies and competition have helped to make air transport more affordable for passengers. As can be seen in the following chart, the average domestic fare has decreased steadily since 2000. At the end of the 90s the Canadian market was a duopoly centered on Air Canada and Canadian. At the time Canadian was struggling financially and reduced its capacity across the country and this limited competition led to higher fares in Canada. In 2001 Canadian was acquired by Air Canada and the void left by Canadian was slowly filled by other carriers most notably WestJet, which expanded significantly in the early 2000s including expansion into eastern Canada. In parallel other carriers such as Jetsgo who operated from 2001 to 2005 came and went. In 2006 Porter Airlines was launched and they have established a very successful niche market based at Toronto Billy Bishop Airport. The new era of competition that was ushered in with the demise of Canadian has consequently led to a steady decline in Canadian domestic fares.

New ULCCs (ultra low-cost carriers) are entering the Canadian domestic market; Flair and Swoop are the latest to emerge, and Canada JetLines is on the horizon to offer new low-cost air services. Figure 5.13 below indicates the average domestic fare. Since 1997, domestic fares have declined by 2.3% annually but moving forward we estimate that yields will decline during the next 20 years by 0.4% per annum. This is a marked slowdown but DKMA believes that part of the recent decline in yields across Canada was linked to the emergence of strong domestic carriers such as Porter and WestJet, forcing yields down. While competition will remain in the future its impact will be less significant (even if the ultra-low cost carriers manage to get traction in the Canadian market).

Figure 5.13 Index of the Average Domestic Fare (Real)



Source: DKMA estimates based on Statistics Canada data

Airport Operations (Future RNP): Given the terrain, weather and airport configuration, landing and take-offs are often cancelled at the airport in winter months, particularly with low cloud conditions. Given that airport activity is tied to airport operational reliability the airport is working to increase reliability by introducing a designated Required Navigation Performance (RNP) procedure which would reduce operational ceiling minima. Once implemented, we have assumed that RNP would improve the reliability of the airport, resulting in passenger and aircraft movement growth in the range of 20 to 30%; improved air access reliability would likely spurn additional growth in general aviation aircraft based at WKRA and reverse the downward trend of aircraft movements. .

Airport Terminal: Currently the airport terminal is unable to accommodate the Dash 8-Q400, but we have assumed that by 2022 the terminal would be expanded to accommodate this type of aircraft.

5.3.2 Forecast Methodology

The framework for this forecast was based upon the development of a consensus between a likely set of forecasts of demand, accompanied by potential adjustments (up or down) resulting from changes to basic assumptions underlying the likely set of forecasts. By way of explanation, a twenty five-year forecast of aviation demand carries inherent uncertainties and these uncertainties grow as the timeframe extends.

Long Term Passenger Forecast: In the field of air traffic forecasting, the strong correlation between growth in a region's income and demand for air travel to/from that region is both intuitive and validated by experience. Stated differently in the future; passenger traffic is expected to change due to changes in factors which drive air travel demand most notably the economy. For this reason, the natural starting point for long term passenger projections was to develop a demand forecast linked to future economic projections.

The elasticity parameters were determined using historical data and numbers of passengers from 1996 to 2017. Regression analysis was used to estimate the elasticity parameters and, in some models, aside from GDP, DKMA also introduced an air fare variable. Various combinations of the factor-variables and time period were examined.

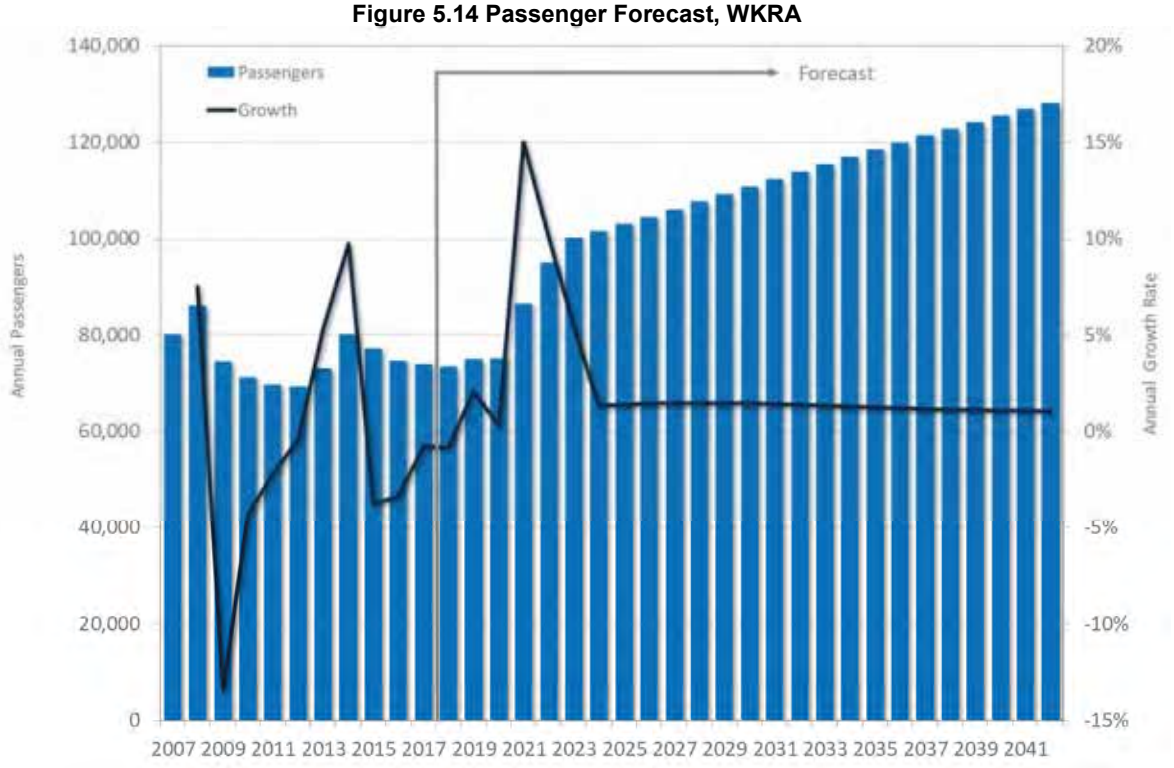
The models which introduced an air fare variable typically provided weaker results (either incorrect sign or statistically insignificant) and as such were dropped. The models centered on GDP gave a range of results and in the end the team selected a GDP elasticity of 0.7.

Air Traffic Movements: The projection of aircraft movements was forecast separately for itinerant and local and for itinerant by segment: civil commercial, private and government and military. For the long-term forecast, the projection of commercial movements was derived from the projection of passenger traffic and is expected to grow over time. With respect to aircraft movement linked activities other than commercial, (e.g. G/A, military) they have declined significantly over the last 20 years and moving forward this is expected to continue (albeit at a slower pace).

5.4 PASSENGER TRAFFIC FORECASTS (2018-2042)

The annual baseline passenger forecast for West Regional Kootenay Airport (WKRA) covers passenger and movement traffic, where movements are split between itinerant and local flights and itinerant are further split between air civil commercial, private and government and military. The following chart highlights the baseline long-term passenger forecast for the airport. During the forecast period, passenger traffic is forecasted to grow at an average annual rate of 2.2%, reaching 128,148 passengers by 2042.

Figure 5.14 Passenger Forecast, WKRA



Source: DKMA

In the period January to November 2018, passenger figures indicate a decline of 1.1%; for the entire year, the airport is projected to handle 73,442 passengers (a year-over-year decrease of 0.8%).

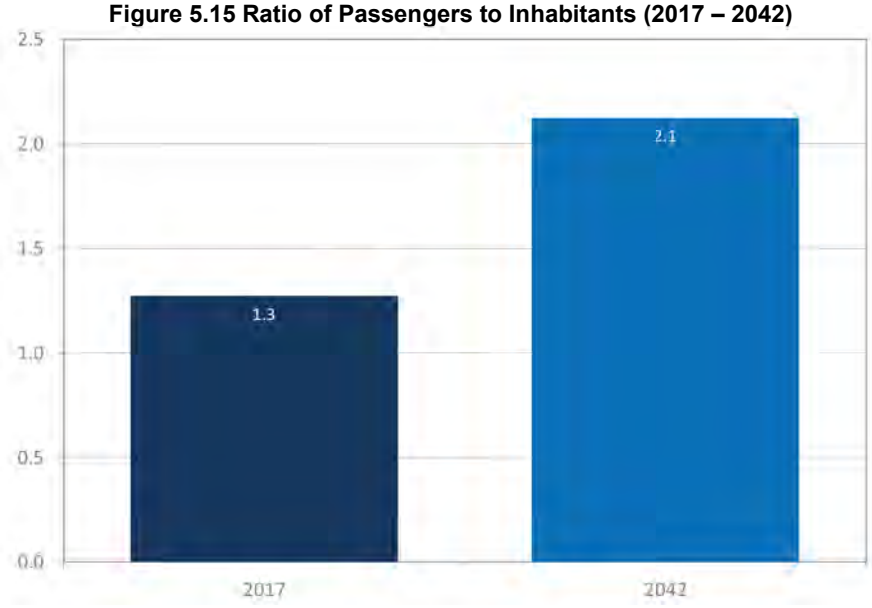
As indicated in the Assumption section, we expect the airport to be RNP capable in 2024 which will have a dramatic impact on the airport's reliability. Historically the load factor at the airport has been about 50%[8] and in 2024 we expect the load factors to increase to about 62% driven mainly by improved operational reliability. While this figure is below the industry average, we anticipate that it will take some time for the passengers to realize that that airport is reliable and start to book flights into it on a consistent basis. More specifically, we anticipate that Air Canada (and maybe the Airport itself) will need to develop a marketing campaign so that with time, passengers will come to understand that reliability is no longer an issue at WKRA.

In 2024 DKMA also assumed that the airport would have a terminal capable of handling the Dash 8 Q400 and based on this we assumed that Air Canada would, over time, replace some Dash 8 Q300 operations with the Dash 8 Q400 (with its lower seat costs). More specifically in 2024 DKMA assumed that all flights to/ from Calgary would remain on the Dash 8 Q300, but that half of the flights to/ from Vancouver would be operated with the Dash 8 Q400 (while the rest would continue as Dash 8 Q300 operations).

Over this two-year period passenger demand at the airport is expected to grow by 25% and reach 95,000 at the end of 2024. For the remainder of the forecast (i.e. beyond 2024) the airport is projected to grow annually by 1.3% and for the entire 20-year forecast period annual growth is projected to average 2.2%.

A benchmark done by the team estimated the current and future propensity to fly of the local residents. As mentioned earlier, as disposable income increases over time it is reasonable to assume that residents will travel more but within a boundary. As can been seen in the graphic below, the passengers per inhabitant will increase by over 60% the next 25 years driven in large part by the increased reliability and expanded terminal.

Figure 5.15 Ratio of Passengers to Inhabitants (2017 – 2042)



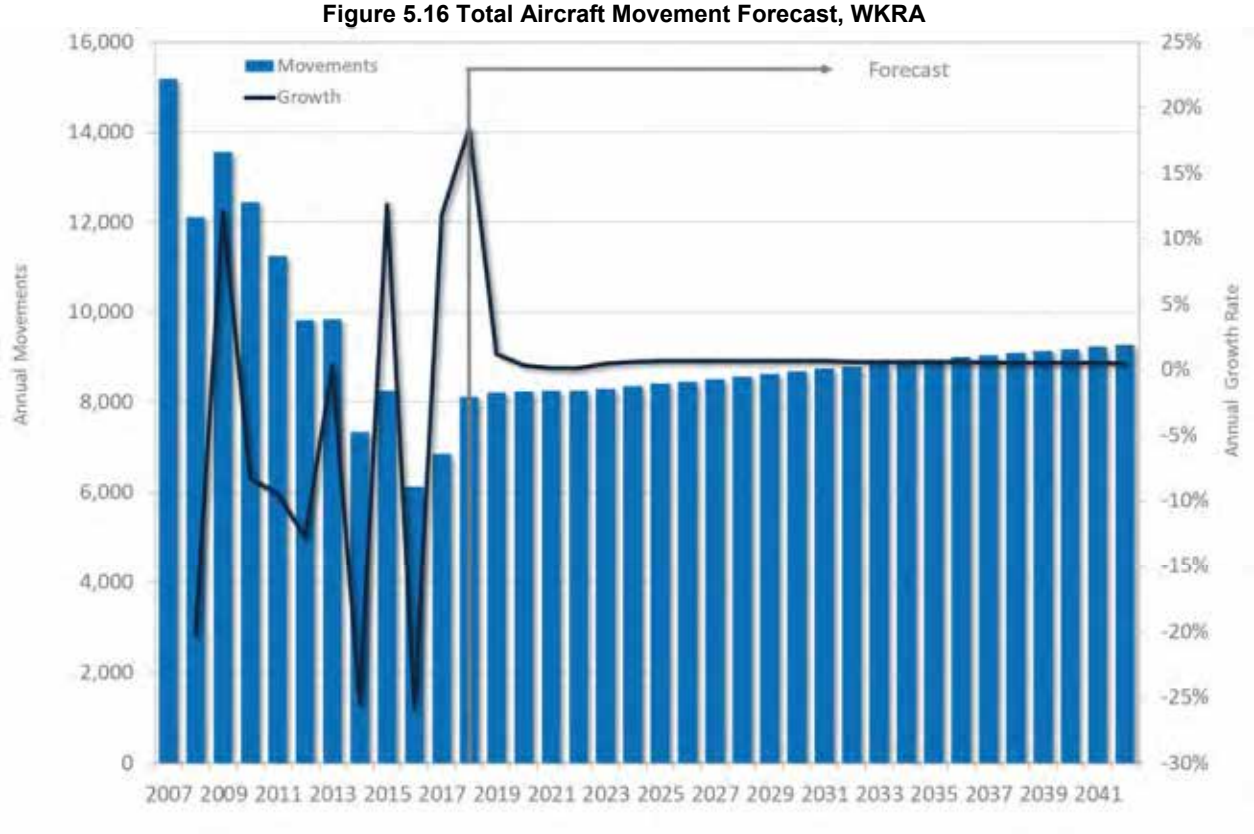
Source: DKMA

[8] This load factor is derived from OAG seating capacity and passengers.

5.5 AIRCRAFT MOVEMENTS

The movement forecast (see Figure 5.16 below) is based on forecast passenger levels, historical trends, industry development and local economic factors affecting aviation. Over the next 25 years we expect movements to increase annually by 1.2% reaching 9,276 by 2042.

Figure 5.16 Total Aircraft Movement Forecast, WKRA



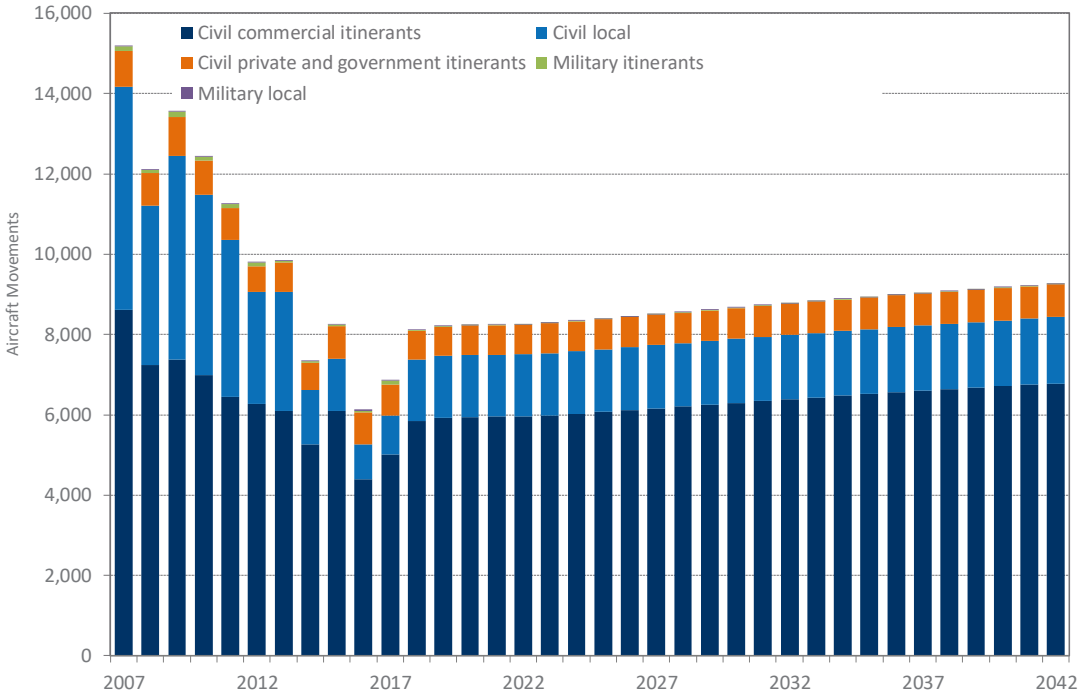
Source: DKMA

Allowing for changes in aircraft size and improving load factors, during the entire forecast period, commercial passenger movements will grow less rapidly than passengers (1.2% vs. 2.2% p.a.).

Private, government and military represent about 13% of movements at the airport and they are expected to decrease from 889 to 843 translating into an annual decline of -0.2%. See Figure 7.4.2.

Note: The 2018 year-to-date figures indicate that these movements have decreased by 16% and if we exclude 2018, growth during the forecast period is expected to increase by 0.5% annually.

Figure 5.17 Total Aircraft Movement Forecast by Category, WKRA



Source: DKMA

Note: 2018 figures are based on actual January to October statistics (source: Statistics Canada)

5.6 PEAK HOURS ESTIMATES

Because it is essential to ensure that an airport's facilities meet future traffic demand, one critical element of a forecast is the conversion of annual demand into a peak hour value (passengers and movements). Based on historical analysis, forecasters have determined that there is a gradual decline in the peak hour percentage of annual traffic as annual activity increases. This suggests that, when estimating future changes in the peak period percentage, DKMA considered where the current peak period percentage lies in comparison with other airports of similar activity levels. For example, if it is already at the low end of the range, peak spreading is likely to be much less than if it lies at the high end of the range. In addition, the variability in the peak hour percentage is much greater for small airports than for large airports. Other factors that can also influence the extent of peak spreading and include:

- **Average aircraft size**: *If airlines reduce the average size of the aircraft serving an airport, flight frequency increases but the size of the aircraft serving the peak decreases. This tends to increase peak spreading. Conversely, peak spreading is less likely if the average aircraft size increases.*
- **Number of airlines**: *When airport growth is achieved by adding more airlines, they often compete during the peak, thereby reducing the extent of peak spreading. Conversely, when growth is achieved by existing airlines adding new flights, the flights tend to be added during off-peak hours, thereby increasing the degree of peak spreading.*

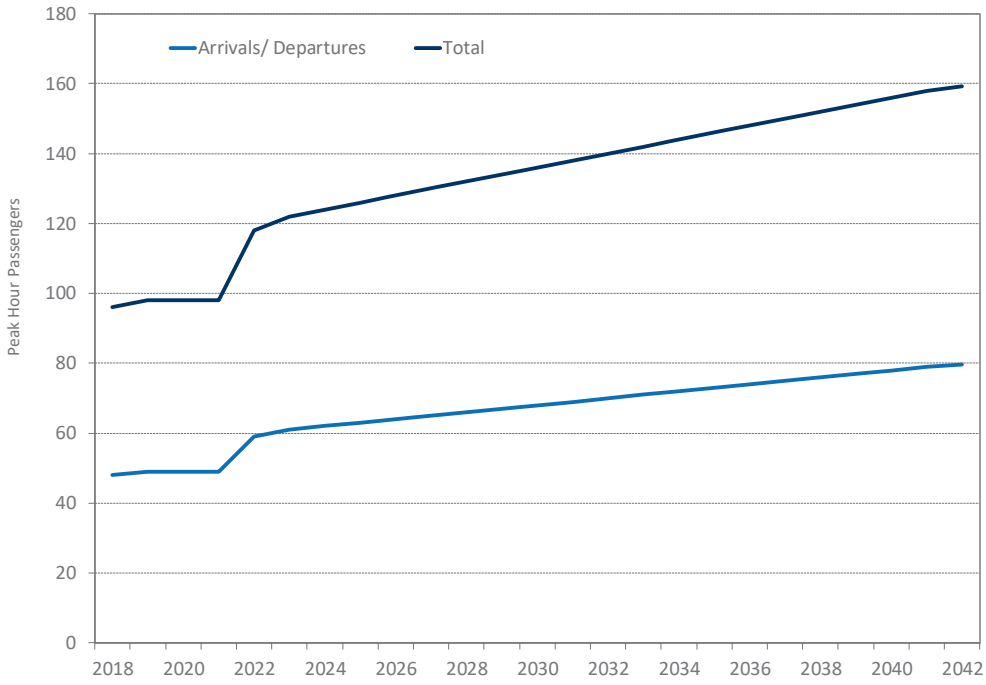
To estimate peak hour passenger (arrivals, departures and total) DKMA used the IATA methodology. This consists of identifying the passenger peak month and from there constructing an average week during the peak month where the average week will be based on airline scheduled seats. Once this average week is built, the second busiest day is selected (in terms of seats) and within that busy day the peak hours are selected. To translate seats into passengers, assumptions on the passenger load factors are made. For West Kootenay Regional Airport the peak month in 2018 was July where Air Canada handled 10,380 passengers (representing 14% of annual demand).

During that month Air Canada's load factor was 90% and for the peak hour we assumed that load factors reach 95%. Given that the carrier operated Dash 8 Q300 this translates into 48 passengers by direction.

Peak hour passenger forecasts were developed by first estimating the likely future ratios of peak hour to annual traffic by traffic segment (arrival/departure/total) allowing for a reduction in "peakiness" of flights over the day as the numbers of flights increases. Peak hour passenger forecasts were then determined by multiplying the annual traffic values by these projected peak-to-annual passenger ratios. Another assumption was that starting in 2022 (when the terminal will no longer be constrained) Air Canada would operate some Q400s into the airport.

The following chart, Figure 5.18 presents the forecast peak hour passenger values.

Figure 5.18 Passenger Peak Hour Projections, WKRA



Source: DKMA

For the peak hour movements we did not have access to annual NCAMS[9] data which normally serves as the basis to estimate peak hour movements. Therefore, to estimate peak hour movements the team analysed the peak hour movement ratio of other small Canadian airports and assumed that West Kootenay Regional Airport would have a ratio comparable to these peer airports. Based on this methodology DKMA assumed that the peak hour movements in 2017 were 4 movements.

Similar to peak hour passengers, peak hour movement forecasts were developed by first estimating the likely future ratios of peak hour to annual traffic by traffic segment allowing for a reduction in "peakiness" of flights over the day as the numbers of flights increases. Peak hour movement forecasts were then determined by multiplying the annual traffic values by these projected peak-to-annual passenger ratios.

[9] The team had monthly data from September to October 2018 only.

5.7 SUMMARY OF AVIATION FORECASTS

Airports are critical assets for the communities they serve; operating an airport includes investing in infrastructure projects which are costly, complex, have long-lead times and involve many resources. Airport facilities such as airside pavements and air terminal buildings have life cycles of 20+ years. Therefore, investment decisions such as terminal expansion can lock in the airport to a particular design, service level and operating cost for long periods of time.

Forecasts of future airport activity are thus an essential tool for airport planning and financing decisions. These forecasts provide guidance on future passenger, cargo, and aircraft activity that the airport may face. When these forecasts are compared to existing facility capability and capacity, they can help to define future facility, commercial, and financing requirements to meet the future demand. Forecasting traffic and passenger activity levels as accurately as possible is paramount; however, it should be noted that the critical forecast *parameters* (i.e., those essential for the preparation of air traffic forecasts such as the economy) are volatile and uncertain.

Aside from being used for airport planning and investment decisions, forecasts can also be utilized for route development and as a marketing tool for tourism strategies. Given that the forecasts prepared are used to define facility requirements in the airport masterplan study, it is important to develop baseline long-term projections which are realistic and pragmatic. While these projections are considered as a baseline demand forecast, DKMA recognizes that long-term demand at the West Kootenay Regional Airport could rise below (in a pessimistic scenario) or above (in an optimistic scenario) the baseline cases presented here.

An unsupported traffic management strategy may lend to a stagnant, or pessimistic, traffic and passenger activity forecast scenario which may also be reflected by:

- Unsupported (without resource allocation) with respect to the development of airport commercial and marketing strategies and actions to address business and economic development opportunities;
- Declining itinerant and local aircraft movements due to expiring or unmaintained instrument approaches;
- Reduction in the number of based aircraft or closure of the Ministry fire base; and
- Reduction in daily commercial flights or elimination of existing route(s).

An optimistic traffic and passenger activity growth forecast scenario may be reflected by:

- Improved, satellite-based navigation aids supporting lower limits and improved instrument approach and departure procedures at YCG, and with more aircraft suitably equipped to fly such improved approaches;
- Additional based general aviation and corporate or commercial use aircraft;
- More competitive aviation fuel supply and prices at YCG, additional, quality hangar space and pilot facilities (i.e. refurbished, expanded or new FBO facilities) to met growing demand;
- Sustained marketing and community support to actively promote itself as a tourism destination; and
- Hold strategic discussions with air carriers to introduce new air services and/or additional flights.

Actual future demand may be below, close to forecast, or well above the figures presented here; success factors in achieving sustained growth is most often based on the implementation of strategies indicated in the airport master plan, marketing, development and management strategies for the WKRA.

6.0 AIRSIDE INFRASTRUCTURE

6.1 EXISTING AIRFIELD CONDITIONS

The existing airfield infrastructure was reviewed on desktop (drawings, pdf images) and a site inspection was held at YCG on October 10, 2018 by the planning team. The airside infrastructure, including the runway, runway strip, taxiways and aprons, appeared to be in a well-maintained condition. This report does not delve into the actual condition however we have referenced the WKRA Facilities / Infrastructure Condition Report by SAL and updated some of these conditions with our visual inspection. Figure 8.1 below provides a Google Earth View of the airfield.

Figure 6.1: Existing Airfield Conditions at YCG

6.1.1 Runway 15 – 33

The West Kootenay Regional Airport, (WKRA) is indicated in the Canada Flight Supplement as CYCG. The airport configuration is centered around a single runway, Runway 15-33 and the airport is certified to Transport Canada's TP312 4th Edition standards. Runway 15 (154°) – 33 (334° degrees) is classified as a Non-Instrument, Code 3C runway, and is only certified for daytime operations (currently no runway edge lighting). The runway is 150ft (45m) wide by 5,299ft. (1,615m); the current Critical Aircraft is the DH-8-300, operated by Air Canada Jazz. The typical aircraft wingspan for this runway environment is from 24 m up to but not including 36m, (49ft. to 79ft). **Refer to Table 6.1 Runway Characteristics below for a summary of the runway environment.**

Runway 15-33 is a daytime use only runway, there are no runway edge lights. The air traffic frequency (ATF) / mandatory frequency (MF) is 122.1 and is available between 1330-0130Z (DT 1230-0430Z) within an aeronautical zone of 5 Nautical Miles from the airport reference point (ARP) to an altitude of 6,500 ft. ASL. An Aerodrome Beacon is located west of the mid-point of the runway on top of the old Air Traffic Control tower. There are 3 windsocks, at either runway end, and at midfield. The ODALs for the Runway 33 approach are non-standard, with only 3 aligned lights, not 5. There are only Runway Identification Lights (RILS) at the Runway 15 threshold. The current public approaches are per the Canada Flight Supplement (CAP) and are provided in Appendix A.

Table 6.1: Runway Characteristics, CYCG

Airfield Facility / Information	**RUNWAY 15 – 33**	
Runway Length	5,299 ft. / 1,615 m	
Runway Width	150 ft. / 45.7 m	
Runway Reference Code	Code 3C	
Critical Design Aircraft	Bombardier DH-8-300	
Runway Slope (%)	0.13% Slope (down from TH33 to TH15)	
Pavement Type	Asphalt (Flexible)	
Pavement Strength	PLR 11 / PCN 67 / F / A / Y / T	
Runway Lighting	N/A	
Runway Markings	Non-Instrument	
Runway Threshold	**Runway 15**	**Runway 33**
Threshold Elevations (ASL)	492.2 m (1,619.9 ft.)	494.3 m (1,623 ft.)
Threshold Coordinates		
Approach Lighting Systems	AS (RILS)	AO SF (Sequenced Flashers – RILS, the ODALS are partial – check length (5 lights, 1500' length from RILS to 5th ODAL)
Visual Approach Aids	P2 PAPI, OCL to 3NM	P2 PAPI, OCL to 2NM, (*OFFSET 12° LEFT*)
Runway Touch Down Zone Elev. (ASL)	1616 FT	1623 FT
Navigational Aids (NAVAIDS)	NDB/DME/LOC	NDB/DME/LOC
Lowest Instrument Approach Min. Available	N/A	N/A
Runway End Safety Areas (RESA)	Planned 90x150m	Planned, 90 x 150m
Declared Distances TORA	5299	5299
TODA	5299	5299
ASDA	5299	5299
LDA	5299	5299
CYCG Airport Reference Point (ARP)	N49° 17' 46" (N49 17.77) / W117° 37' 57" (W17 37.95) Elevation at ARP: 1626' (ASL)	
Magnetic Variation	15° E (2016)	

The runway pavement condition is relatively good, due to the light loads (relatively few annual aircraft movements); pavement maintenance has been undertaken regularly (runway / taxiway pavements crack sealing). Despite nearing the end of it's planned useful life cycle; the pavement is wearing well since the last asphalt overlay and should be capable of lasting another few years before the next asphalt repair and overlay is undertaken. There are localized areas of Runway 15-33 that experience heaving, due to potential frost issues. **An ACAP submission should be prepared to include repairing the localized frost heave areas and completing the asphalt overlay for the runway, taxiways Alpha and Bravo, and portions of the apron that air carriers utilize**. The runway strip is grass covered, sloped down and away from the runway, with silty-sandy soil, draining relatively well.

The pavement paint markings are faded and are scheduled to be re-painted in 2019. Other than the obvious terrain, there are no obvious obstacles within the OLS; however, a new obstacle survey should be completed in 2019 to confirm OLS is not being penetrated by any new obstacle, such as growth of trees.

Airfield signage, approach lighting (partial ODALS) and airfield electrical systems are due to be replaced in 2019 and an ACAP submission has been completed. It is unlikely that TC would entertain allowing runway edge lighting on the airfield to enable night operations; this subject should be further explored between the airport management and Transport Canada as a future possibility, pending improved navigational aids for instrument approach and departures are enabled. **New or improved edge and/or runway approach anything would enhance safety and better enable the community support for reliable access for fixed wing MEDEVAC and commercial flights**.

6.1.2 Taxiways

Based on the layout and size of the WKRA, and in order to protect for an AGN-IIIB Non-Precision Instrument Runway Level of Service, the airfield will need to protect for 90 m to the taxiway centreline from the runway centreline (CL). There is enough space between the runway and apron to add a future parallel taxiway on both east (AGN II Taxiway) and west (AGN IV Taxiway) sides of the runway while meeting the standards indicated in TP312 5th Edition. Alpha taxiway is the only available taxiway exit / entrance for the air carrier. Taxiway Bravo is in need of repair and is weight restricted. Additional taxiway infrastructure would improve the operational efficiency and safety of the runway system while contributing to improving the environmental footprint of the airport. Alpha and Bravo Taxiways should be built to an AGN IV standard, or at least large enough to enable the Q400 to utilize pavements while providing the minimum offset distances to edge of pavement from the outer main gear of the aircraft.

The Tanker Base has their own direct to runway access from Charlie and Delta Taxiways; these taxiways are not used by Air Canada Jazz or other itinerant aircraft unless operating with the Ministry.

6.1.3 Aprons

The main apron has a combination of asphalt and concrete; the concrete pads are used as parking positions for the DH-8 300 (Air Canada Jazz). There is limited space available for aircraft parking and concurrent use of Taxiway Alpha for large aircraft taxiing operations. However there is space to allow the apron to be expanded; the eastern edge may not be expanded closer to the runway if a parallel taxiway is built in future.

The development of additional apron parking space, at the south of the main terminal apron, should be considered. Although it may not be required in the short term, it can be used to support FBO parking, and to accommodate the parking requirements for unscheduled arrivals of larger aircraft. This apron can also be used to accommodate the un-screened passengers that occasionally arrive on Pacific Coastal Airlines at YCG due to conditions at the Trail Airport. These passengers cannot be mixed on the airside (sterile areas) with screened Air Canada passengers (both arriving from YYC or YVR or departing YCG to YYC or YVR).

Airside access gates and roads, cargo storage/staging areas and additional hangar space are three areas which are currently underserved at YCG. There is land and apron space available to accommodate smaller, general aviation businesses that are unrelated to air carrier and passenger operations. Improved facilitation of aviation businesses on the airfield will better enable airport management to accommodate new aviation business at YCG, namely new or expanded FBO, hangarage, and related GA services.

Airport maintenance services are provided under contract; consideration should be given to reviewing the organization and duties of staff and contractors.

6.2 TP312 5TH EDITION STANDARDS

The original runway design completed under Transport Canada Standards, (TP312-3rd / 4th Editions) were considered to be a “Design Based Approach” (the longer / wider the runway, the bigger the aircraft to be accommodated). The airport operator selected a type and classification of aerodrome based on the largest, most critical aircraft that could use the runway. The standards were based on best engineering judgment of the era and not on empirical operational data and risk-based assessment.

Today, the industry as a whole is moving towards an “Operational Based Approach” to airport certification. The updated TP312-5th Edition standards, (soon to become 6th edition) are considered to be an “Operational Based

Approach" since they are based on the types of aircraft operating (or planned operation) into the aerodrome. These standards are more closely harmonized with current Instrument Approach Procedures and new lighting technologies. The Transport Canada design standards now require that an aerodrome level of service be chosen based on:

- an aircraft size group (predicated on an aircraft's wingspan, main gear span, tail height and approach speed);
- runway operational approach capabilities (e.g. precision, non-precision and non-instrument nav-aids); and
- an aerodrome's visibility.

It is recommended that the WKRA become compliant with the latest 5th Edition standards of TP312 in a planned way, beginning with the runway strip and obstacle limitation surfaces, in order to improve the capability of the WKRA to offer improved level of service in future with a Non-Instrument Precision Runway.

6.3 AIRFIELD CAPACITY ANALYSIS

6.3.1 Overview of Conditions Related to Airfield Capacity Analysis

The airfield capacity analysis of the single runway, Runway 15-33 YCG is provided in two conditions;

1. When the runway is being occupied by a departing aircraft from Runway 33 or Runway 15; and
2. When the runway is not occupied by a commercial carrier or large aircraft obtaining flight (departure) clearances.

When a large aircraft or large commercial carrier aircraft is occupying the runway, the following activities hampers runway hourly capacity (during the hours in which the commercial air carrier is operating at YCG), and includes:

- departing the apron and taxiing onto Alpha Taxiway;
- observing weather from Taxiway Alpha and ATC clearance to enter the runway;
- entering the runway, taxi back-tracking to the runway threshold of departure (33 end is furthest away from Alpha Taxiway);
- making a 180° turn at the threshold buttons, awaiting ATC FSS clearance to depart;
- departure roll and take-off from runway.

During the hours in which the commercial air carrier is departing at YCG, the following hourly observations were made.

- The time occupying the runway when a commercial aircraft back tracked to threshold Runway 33, the runway was occupied for 9+ minutes;
- in another instance, when a commercial air carrier back tracked to threshold Runway 33, the runway was occupied for 7+ minutes;
- In another instance, when a commercial air carrier back tracked to threshold Runway 15, the runway was occupied for 8+ minutes

The **observed capacity** of the runway is severely limited when ATC clearances are required after Jazz aircraft are in position for take-off. Having a taxiway holding bay off the runway, adjacent to the tower, would lower the impact of the hourly runway capacity and would allow increased VFR departures or landings. The typical busy hour, with just 2 to 3 air carrier aircraft departing would mean that the hourly capacity in those hours could be as low as 15 to 16 movements per hour (under the achievable peak hour).

6.3.2 Calculation of Runway Capacity

The calculated capacities of Runway 15-33 at CYCG has been completed with reference to two basic methods:

1) the FAA's Airport Capacity & Delay Manual, (Advisory Circular AC: 150/5060-5). This program can provide an adequate capacity determination of runway and taxiway capacity.

2) A practical approach, based on average time per aircraft movement given existing conditions, (weather limits, daytime use only, non-linear app / dep paths, etc.) and is expressed in movements per hour and total annual hours, IFR and VFR (25% IFR - 75% VFR split estimated).

The FAA handbook method assumes the following conditions:

- Mix index split into 4 categories, based on maximum aircraft take-off weight;
- IFR assumes cloud ceiling is at least 500 feet but less than 1,000 feet and visibility is at least 1 statute mile, but less than 3 statute miles;
- Touch and Go factor is 1.0 in IFR conditions (no T&G operations during IFR);
- Percent Arrivals is the ratio of arrivals to total operations;
- Runway-use configuration is the number, location and orientation of the active runway(s).

The single runway airfield configuration allows for pragmatic approach to the capacity analysis. Runway 15-33 connects to Taxiways Alpha and Bravo and are public use, therefore will be included in the capacity analysis. We did not consider use of Charlie and Delta taxiways in capacity planning for two reasons:

(1) both of these 90° runway entrance / exit taxiways are too close to Bravo to improve runway capacity; and
(2) Charlie and Delta taxiways are private and only used seasonally by the BC Forestry Air Tankers).

The Main Apron accommodates the commercial air carrier, and the aprons further south accommodate general aviation aircraft, helicopters and seasonally - aerial fire fighting at the BC Forestry Air Tanker Base). The main apron will accommodate all air carrier traffic in the peak hour and the maximum (considering mix) number of parking positions for the critical aircraft types (DH-8, Saab 340, BE1900D).

Airspace capacity is not measured in the context of this Airport Master Plan. However, we can summarize that the airspace capacity is quite challenged due to *three key considerations*:

(1) The mountainous terrain obviously limits airspace capacity for air traffic in the flight circuit and approach / departure paths (see current Aerodrome Chart and aerodrome details in CFS in Appendix A);

(2) Weather limits (low visibility, low cloud ceilings, fog, etc.) can at times, particularly in the winter season, reduce capacity by effectively closing the runway to traffic until weather and visibility conditions improve; and

(3) The lack of runway taxiway entrances and/or exits, parallel taxiways which requires all aircraft to backtrack to the departure threshold prior to take-off, or back-tracking to Alpha Taxiway to exit the runway after landing. Thus, the timed and observed hourly / daily number of flights may be limited and considered very low (below theoretical capacity).

However, while there may be an opportunity to develop an RNP approach in future to improve air access reliability, a combination of visual aids and navigational solutions for improving the existing departure limits should be considered. Additional taxiway exits, and a short portion of the parallel taxiway, can be added to the airfield over time to improve peak hour movements on the runway, should demand warrant such taxiway expansion. The apron area is capable of expanding to allow for additional aircraft parking and possible apron-edge taxiway (closer to runway than existing east apron pavement edge).

6.3.3 Aircraft Mix Index

The first step in calculating the capacity of the existing single-runway configuration is determining the mix of aircraft. The mix of aircraft relates to the size of aircraft and it comprises the percentage of operations conducted by each of

four classes of aircraft (A, B, C and D). The class of aircraft relates to the separation required between aircraft to meet wake turbulence standards; refer to Table 6.2.

Table 6.2 Aircraft Capacity – Aircraft Mix Index Parameters

Aircraft Class	Number of Engines	Wake Turbulence Classification	Max. Certified Take Off Weight (lbs.)	Aircraft Classes Operating at SGIA (2007 data)
A	Single	Small (S)	12,500 or less	50%
B	Multiple			
C	Multiple	Large (L)	12,500-300,000	50%
D	Multiple	Heavy (H)	Over 300,000	0%

Mix Index Calculation: (Based on preliminary 2018 traffic forecast data). The mix of aircraft at YCG consists of approximately the following:

Aircraft Mix Class	% of Total Mvts.
Class A (*i.e. Cessna 172*)	25
Class B (*i.e. Beech King Air*)	25
Class C (*i.e. DH-8-300s*)	50
Class D (*i.e. Boeing 767*)	0

Mix Index is Shown as C + (3 x Class D)

Thus, 50% Class C + (3 x 0% Class D) = 50 + 0 = **Mix Index of 50** *
***** *the Mix Index is used in theoretical capacity calculations*

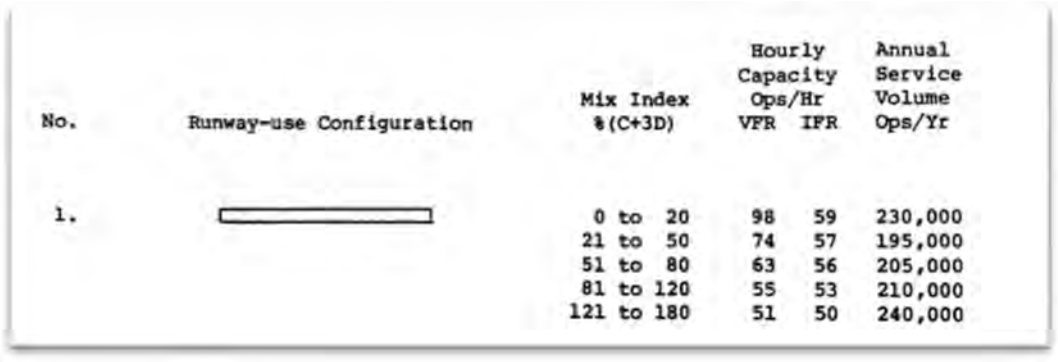
6.3.4 Runway Configuration and Capacity

Runway systems are supported by entrance and exit taxiways; runway capacity can be measured in terms of the number of operations, or movements, that can safely occur within an hour. (One movement or operation is equal to 1 take-off or 1 landing or 1 Touch-and-Go). Having multiple runways can allow for an increase in the number of hourly movements. A significant factor in runway capacity is the mix of aircraft operating from the runway (i.e. small single engine, medium twin engine, etc.) which is represented by the Mix Index.

The WKRA has a single runway. In order to evaluate the capacity of the single runway system, the FAA method was utilized using the single runway configuration. Runway 15-33 is a single, independent runway operation as depicted in Configuration #1 below. The Hourly Capacity (Operations / Hour) in VFR and IFR conditions are the highest

theoretical, or achievable, hourly movements, with supporting taxiway infrastructure. CYCG Runway 15-33, with a Mix Index between 21 and 50, effectively enables a practical maximum of 74 VFR movements and 57 IFR movements per hour, as indicated in Figure 6.2 below.

Figure 6.2 Single Runway - Hourly Capacity & Annual Service Volume (Operations / Year)



No.	Runway-use Configuration	Mix Index %(C+3D)	Hourly Capacity Ops/Hr VFR	IFR	Annual Service Volume Ops/Yr
1.		0 to 20	98	59	230,000
		21 to 50	74	57	195,000
		51 to 80	63	56	205,000
		81 to 120	55	53	210,000
		121 to 180	51	50	240,000

6.3.5 Theoretical Runway Capacity

Using the chart contained in Figure 6.3 (figure 3-3 of FAA Advisory Circular AC 150/5060-5) together with the calculated mix index and an assumption of 50 percent arrivals in the peak hour, the hourly capacity in VFR conditions and the annual capacities shown in Figure 3-3 below were determined for the configuration indicated above.

VFR CAPACITY: The hourly capacity calculations assumes 50 percent arrivals in the peak hour, Touch-and-Go operations only during VFR conditions, (with a factor of 1.04) and NO Touch-and-Go operations during IFR conditions. The runway exit factor for Runway 15 is 0.76 as there is no exit taxiway. (Note: *Factors below 1.0 indicates aircraft take longer on the runway, and therefore an insufficient number of runway exits in the appropriate locations)*.

The suitable taxiway exit range from runway threshold for the identified mix of aircraft is between 3,000 ft and 5,500 ft. An additional Runway exit, to a parallel taxiway or to a runway turn-around / holding pad, would improve capacity of Runway 15. An additional taxiway exit would result in a runway exit factor improvement from 0.76 to 0.84, resulting in greater runway hourly capacity.

Figure 6.3 Hourly Capacity of Runway Use Diagram Number 1 for VFR Conditions

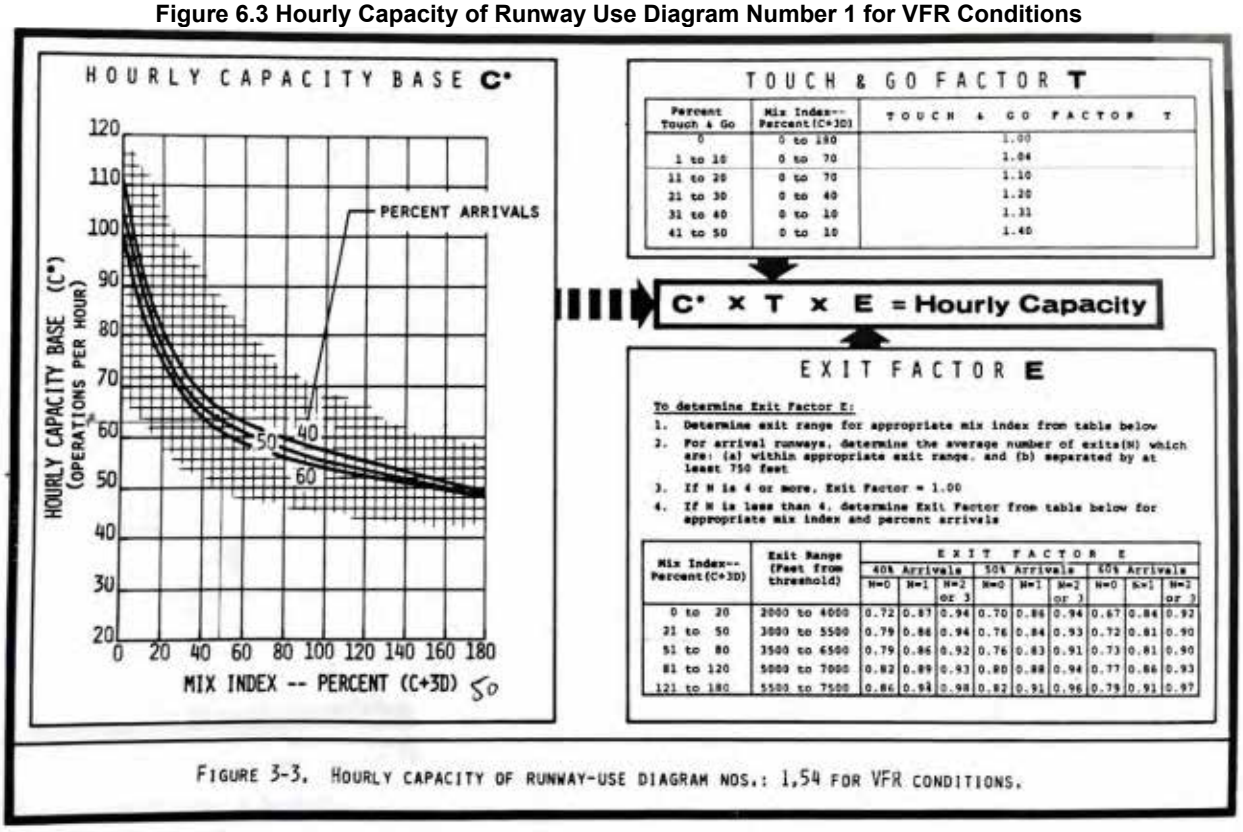


FIGURE 3-3. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 1,54 FOR VFR CONDITIONS.

The runway exit factor for Runway 33 is 0.84, as there is one exit taxiway (Alpha) in the suitable range of 3,000 to 5,500 ft, with one (1) runway exit at ~ 5,250 ft. An additional runway exit taxiway from Runway 33 would improve the hourly capacity of Runway 33; having an additional runway exit taxiway at the Runway 15 threshold, and a short parallel taxiway back to the apron would result in a runway exit factor improvement from 0.84 to 0.93, enhancing the hourly capacity of Runway 33 accordingly.

The following calculation indicates the hourly capacity in VFR conditions for **Runway 15**:

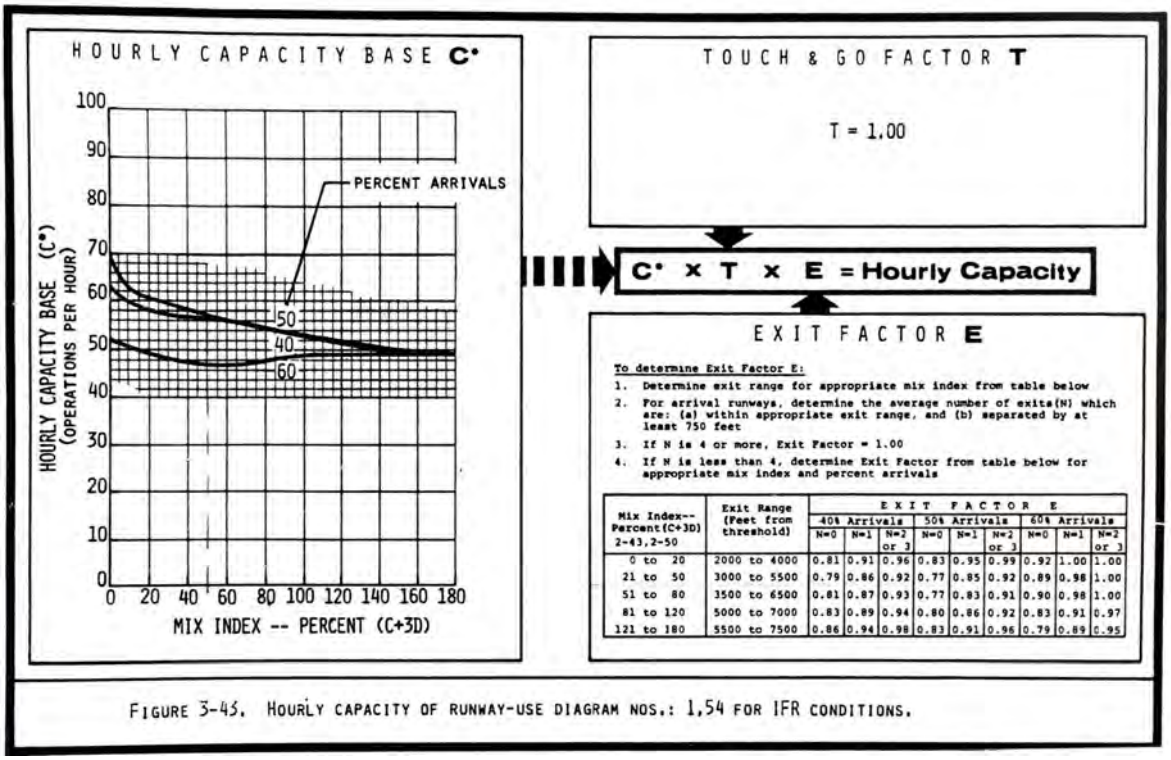
C* (base) **x T** (touch & go factor) **x E** (runway exit factor) **= Hourly Capacity**
63 x 1.04 x 0.76 = **50 Movements / Hour in VFR Conditions**

The following calculation indicates the hourly capacity in VFR conditions for **Runway 33**:

C* (base) **x T** (touch & go factor) **x E** (runway exit factor) **= Hourly Capacity**
63 x 1.04 x 0.84 = **55 Movements / Hour in VFR Conditions**

IFR CAPACITY: Using the chart contained in Figure 6.4 (FAA Figure 3-43 below, from the FAA Advisory Circular AC 150/5060-5) together with the calculated mix index and an assumption of 50 percent arrivals in the peak hour, the hourly capacity in IFR conditions and the annual capacities were determined for the configuration indicated above.

Figure 6.4 Hourly Capacity of Runway-Use Diagram #1 for IFR Conditions



Mix Index--Percent(C+3D) 2-43,2-50	Exit Range (Feet from threshold)	EXIT FACTOR E								
		40% Arrivals			50% Arrivals			60% Arrivals		
		N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3	N=0	N=1	N=2 or 3
0 to 20	2000 to 4000	0.81	0.91	0.96	0.83	0.95	0.99	0.92	1.00	1.00
21 to 50	3000 to 5500	0.79	0.86	0.92	0.77	0.85	0.92	0.89	0.98	1.00
51 to 80	3500 to 6500	0.81	0.87	0.93	0.77	0.83	0.91	0.90	0.98	1.00
81 to 120	5000 to 7000	0.83	0.89	0.94	0.80	0.86	0.92	0.83	0.91	0.97
121 to 180	5500 to 7500	0.86	0.94	0.98	0.83	0.91	0.96	0.79	0.89	0.95

FIGURE 3-45. HOURLY CAPACITY OF RUNWAY-USE DIAGRAM NOS.: 1,54 FOR IFR CONDITIONS.

The hourly capacity calculations assume 50 percent arrivals in the peak hour, Touch-and-Go operations only during IFR conditions, (with a factor of 1.00) indicating NO Touch-and-Go operations during IFR conditions.

The runway exit factor for Runway in IFR conditions 15 is 0.77 as there is no exit taxiway. The suitable taxiway exit range from runway threshold for the identified mix of aircraft is between 3,000 ft and 5,500 ft. An additional Runway exit, to a parallel taxiway or to a runway turn-around / holding pad, would improve capacity of Runway 15. An additional taxiway exit would result in a runway exit factor improvement from 0.77 to 0.85, resulting in additional runway hourly capacity.

The runway exit factor for Runway 33 in IFR conditions is 0.85, as there is one exit taxiway (Alpha) in the suitable range of 3,000 to 5,500 ft, with one (1) runway exit at ~ 5,250 ft from Threshold 33. An additional runway exit taxiway from Runway 33 would improve the hourly capacity; having an additional runway exit taxiway at the Runway 15 threshold, and a short parallel taxiway back to the apron would result in a runway exit factor improvement from 0.85 to 0.92, enhancing the hourly capacity of Runway 33 accordingly.

The following calculation indicates the hourly capacity in IFR conditions **for Runway 15**:

C* (base) **x T** (touch & go factor) **x E** (runway exit factor) **= Hourly Capacity**
56 x 1.00 x 0.77 = **43 Movements / Hour in IFR Conditions**

The following calculation indicates the hourly capacity in IFR conditions **for Runway 33**:

C* (base) **x T** (touch & go factor) **x E** (runway exit factor) **= Hourly Capacity**
56 x 1.00 x 0.85 = **48 Movements / Hour in IFR Conditions**

A summary of Runway 15-33 Capacities Theoretical Capacities is summarized in Table 6.3.

Table 6.3 Runway 15-33 Capacity Calculations

Runway	Runway Exit Factor	Hourly Runway Capacity (mvts./hr)	Annual Service Volume (mvts.)
15 – VFR	76%	50	186,000*
15 – IFR	77 %	43	
33 – VFR	84%	55	174,000*
33 – IFR	85%	48	

** With appropriate exit / entrance taxiways and straight-in approach / departure segments.*

Theoretically, assuming a 24 hour per day, 7 day per week airport operation, Runway 15 should be capable of achieving 43 operations per hour (IFR) and approximately 186,000 operations per year. Runway 33 should be capable of achieving 48 operations per hour (IFR) or approximately 174,000 operations per year. However, this is not the case in practical terms, as there are significant airfield capacity limitations, such as a lack of runway exit and entrance taxiways at the runway thresholds.

6.3.6 Practical Runway Capacity

There are several factors which inhibit runway capacity at the WKR airport, negatively impacting the number of hourly aircraft movements or annual service volume that can be permitted on the runway system and for which and cannot be calculated accurately. However, we can use experience and observation to verify the approximate practical runway capacities.

The runway is closed at nighttime, and the number of daylight hours varies over the year. We assumed an average of 10 hours per day over the course of a year. Another factor is mountains; the surrounding terrain generally requires that pilots fly partially curved or offset runway approaches in order to avoid terrain obstacles. Weather, in combination with the obstacle environment, also inhibits capacity. Instances of low visibility and low cloud ceiling, which obscures the mountain tops, effectively closes the runway for approximately 25% of the year or more. Lastly, as shown in the theoretical calculations above, the lack of taxiways limits runway capacity. The runway has no parallel taxiway, or portion thereof, and has only one useable public taxiway entrance/exit. As such, aircraft landing on Runway 15 will have to backtrack ¾ the length of the runway to exit on Alpha; these time values were observed and recorded in Table 6.4 below:

Table 6.4 Sample Commercial Aircraft Departure Timing

Aircraft Landing Operation	Cumulative Timing, (seconds) Runway Occupied
Arriving Aircraft on Final Approach	0
Arriving Aircraft Over Threshold	13
Arriving Aircraft Touch Down	18
Arriving Aircraft Touch Down Roll	33
Arriving Aircraft 180° turn on Runway	44
Arriving Aircraft back-tracking runway to exit onto Alpha Taxiway (off runway)	60
Arriving Aircraft taxi off Alpha onto Apron Parking position	65
Arriving Aircraft requires approximately 70 seconds occupying the runway (and single taxiway serving runway); add an additional safety buffer between operations of 20 seconds prior to next arriving aircraft while allowing a departure operation between arrivals.	65 + 20 = 85 seconds *Add departing aircraft timing below*
Departing aircraft begins taxi roll to Alpha	85 seconds (0)
Departing aircraft on Alpha Taxiway	100 seconds (15)
Departing aircraft backtracks to Threshold	120 seconds (20)
Departing aircraft starts take-off roll	130 seconds (10)
Departing aircraft take-off and exits runway on departure path	145 seconds (15)
Thus, the YCG Runway can practically accommodate 1 arrival and 1 departure within 145 seconds, (2.41 minutes) thus achieving a practical peak hour capacity (60 / 2.41 = 24.89) of approximately 25 movements per hour in VFR conditions.	1 arrival + departure movement every 145 seconds Or 25 aircraft movements in the peak hour

Thus, the practical hourly capacity is estimated to be **24 to 30 movements per hour** (not including helicopters arriving / departing away from the runway on private aprons). *This practical capacity makes the assumption that air carrier aircraft are not happening during these hours. As mentioned in the opening statements, air carrier traffic was observed to take between 6.5 and 8.5 minutes to depart, therefore* ***practical capacity could be as little as 15 - 16 movements in the peak hour****. The addition of a taxiway to the Runway 12 Threshold and the addition of a jug-handle turn-around bay, with taxiway holding positions at Runway 33 threshold would alleviate the runway capacity limitations by reducing runway occupancy times.*

Annual runway capacity is limited by daytime hours during the year, with approximately 3,650 hours of useable runway per year (avg. 10 hrs daylight per day). Based on the current aircraft mix, the estimated practical annual service volume of the single runway, (daytime use only) is 73,000 aircraft movements per annum.

Annual Service Volume: 73,000 Aircraft Movements

Based on the forecasted demand for aircraft movements, WKRA is far from achieving their maximum annual service volumes, although it is common to expect occasional delays in peak hours due to the lack of apron and runway

access/egress taxiways. In terms of annual aircraft movements, WKRA's strongest year in recent history was approximately 25,000 aircraft movements; they are currently below 8,000 movements per annum and therefore have lots of capacity to grow. In future, the provision of a flight school, and new based aircraft at WKRA would bolster the number of aircraft movements.

Additional taxiway entrance / exits from Runway 15-33 thresholds would enhance runway capacity in the peak hour, and enable air carrier operations to operate without delays, with the mix of general aviation aircraft operations in the peak hour, thereby improving runway safety and operational efficiency. Reducing delays will result in reduced engine fuel burn and noise, providing a tangible benefit for the WKRA's environmental sustainability objectives.

6.4 RUNWAY, TAXIWAY EXPANSION & APRON ANALYSIS

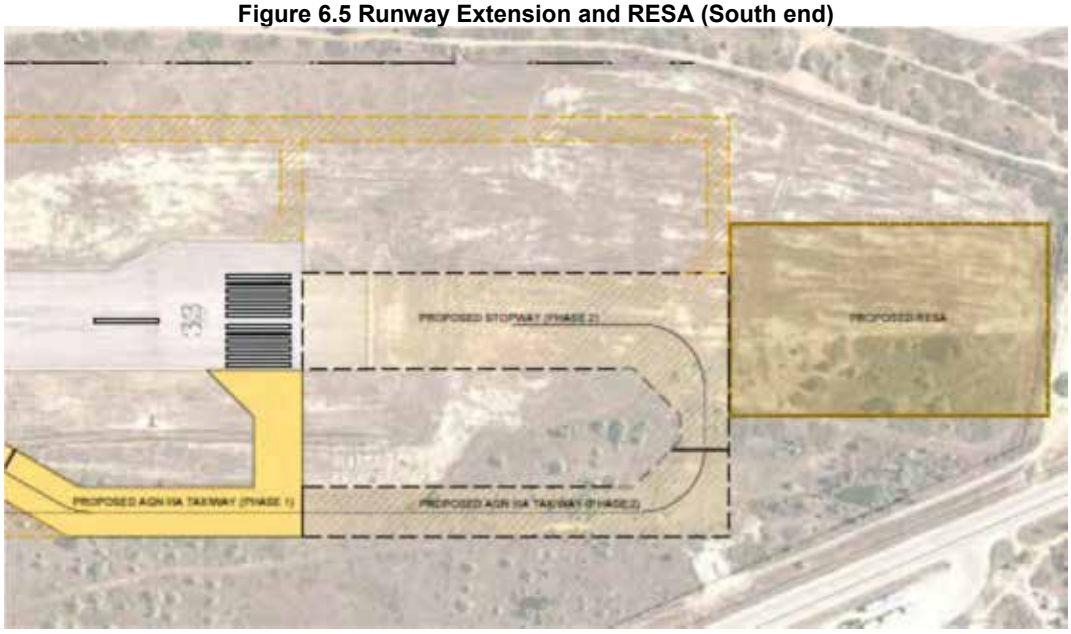
6.4.1 Runway Expansion & Future Capability

In addition to the figures in this section, overall master plan and land use drawings are provided in Appendix D.

Runway 15-33 is capable of being expanded to the south by a small distance. Air Canada reported that additional runway length would benefit their aircraft performance, particularly during hot summer weather. A marginally longer runway would allow improved take-off performance by air carrier aircraft, permitting greater weight and fuel on board.

The runway can be extended approximately 200 m to the south. Since the runway environment is rich with obstacles on the approaches (mountains, power lines) it is proposed that the extension take the form of a Runway 15 Stopway, or a pre-threshold area for departures from Runway 33. This would allow the Runway 33 threshold to remain in the current location, while maintaining the corresponding OLS Approach Surface at the runway threshold / strip end. Figure 8.4.1 indicates the location of the runway extension, with a RESA (runway end safety area) within the property boundary at the very south end. RESAs are built at double the runway width and 90 m extended from the end of the runway strip. A RESA has also been planned for at the north end of the runway.

Figure 6.5 Runway Extension and RESA (South end)



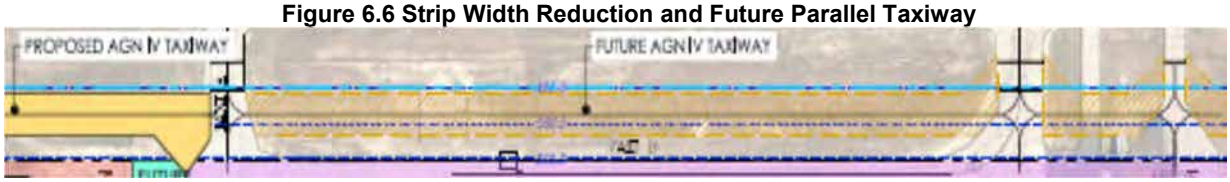
6.4.2 Taxiway Expansion & Future Capability

The YCG airfield has two public use taxiways connecting the aprons with Runway 15-33; Taxiway Alpha and Taxiway Bravo. Taxiway Alpha is AGN III capable but could accommodate a larger outer main gear span for AGN-IV aircraft types (i.e. Dash 8-Q400) if it were expanded by approximately 15 – 20 cm in width. Taxiway Bravo is weight restricted to 50,000 lbs. but capable of accommodating AGN-IIIA/B aircraft types (i.e. Dash 8-300). Taxiways Charlie and Delta (AGN II) are private use only (Ministry).

There are no runway entrance / exit taxiways from the runway thresholds, which reduces practical capacity, and leads to increased inefficiencies regarding fuel burn and operating time on the runway for aircraft conducting backtracking taxi operations to runway thresholds for departure (or to turn around and exit the runway back on Alpha or Bravo).

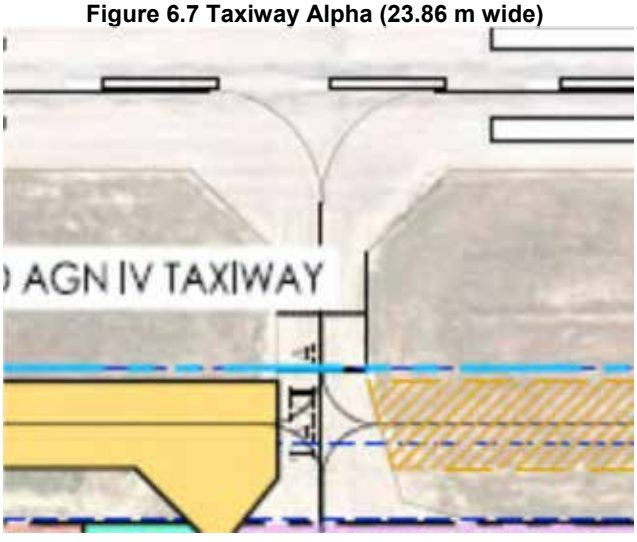
There is sufficient space on either side of the runway strip to protect for future parallel taxiways (or portions thereof) which would enable an entirely new development zone on the east side of the runway and would protect for future expansion of Bravo to the north of the Main Terminal Apron, and to the south, enabling larger aviation leaseholds and aircraft parking positions. See Figure 6.6 below.

Figure 6.6 Strip Width Reduction and Future Parallel Taxiway



The portion of apron edge, where the current taxiway Bravo runs parallel to Runway 15-33 (between Alpha and Bravo turn to runway) could be moved closer to the runway, when the airport adopts the TP312 5th certification standards. This would improve the strip width, future taxiway alignments and potential apron expansion while accommodating larger aircraft, such as Dash 8-Q400. If / when YCG becomes certified to Transport Canada's TP312 – 5th Edition Aerodrome Standards, Taxiway Bravo centreline could be shifted closer to Runway 15-33 to enable additional apron and hangar areas south of the Terminal Apron; this would also enable more space between the existing Air Traffic Control Tower and the Runway, for either aircraft parking or taxiway expansion to the south. Figure 8.4.3 depicts the potential to re-align Taxiway Bravo closer to the runway, with a widened Alpha Taxiway.

Figure 6.7 Taxiway Alpha (23.86 m wide)



Taxiway Alpha can accommodate a Code C (AGNIIIA/B) aircraft, although the width (22.86 m) is just shy of an AGN IV taxiway (23 m). The taxiway is not lighted but has reflective blue edge markers. It is recommended to expand Alpha Taxiway by 0.14 m to accommodate AGNIV (Q400) aircraft). Figure 8.3.3 indicates the alignment and location.

Bravo Taxiway can accommodate a Code C (AGNIII-A/B) aircraft, but it is weight restricted (50,000 lbs.). The Air Canada DH8-300 does not typically utilize Taxiway Bravo, due to weight restrictions. It was observed that there are, at times, itinerant aircraft parked on adjacent aprons that may be too close to Taxiway Bravo to allow safe passage by aircraft with larger wingspans. It would be useful to strengthen and Bravo Taxiway to accommodate all AGNIIIA/B aircraft. In future, the taxiway can be expanded to an AGN IV to allow for a larger mix of aircraft, including larger aerial water tankers, and the Bombardier DH-8-Q400. At a minimum, the wingspan clearance required for Code C (AGNIII) aircraft should be maintained along Bravo to facilitate aircraft operations on the airfield.

There are also two private taxiways, (Charlie and Delta) which are exclusively used by BC Forestry Services aerial firefighting water tankers. Having two private taxiways, Charlie and Delta connected to Runway 15-33 immediately south of Taxiway Bravo, could lead to confusion and does NOT enhance runway capacity. Closure and removal of Charlie Taxiway should be considered, particularly if Bravo Taxiway (taxiway connector portion to the Runway) is expanded and strengthened. Figure 6.8 indicates the location of Bravo, Charlie and Delta taxiways.

Figure 6.8 Bravo, Charlie and Delta Taxiways

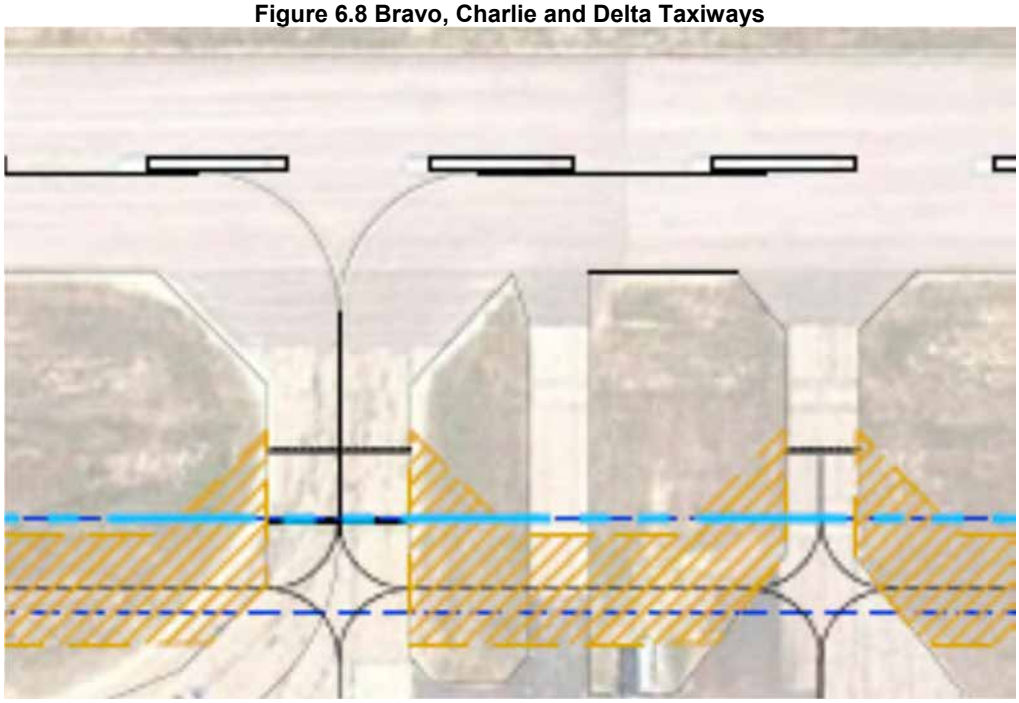


Figure 6.9 indicates the addition of a new portion of parallel taxiway, beginning at Alpha Taxiway and the Terminal Apron, 250 m to the north, turning east to the Threshold Runway 15 would improve runway capacity in the peak hour, provide time for pilots to complete checks and obtain ATC clearances prior to entering the runway, and will improve future aircraft parking positioning and access/egress (utilizing power-in and power-out operations. This taxiway expansion should be considered in the short to medium term airport infrastructure development plan.

Figure 6.9 Proposed Future Taxiway to Threshold Runway 15 from Alpha

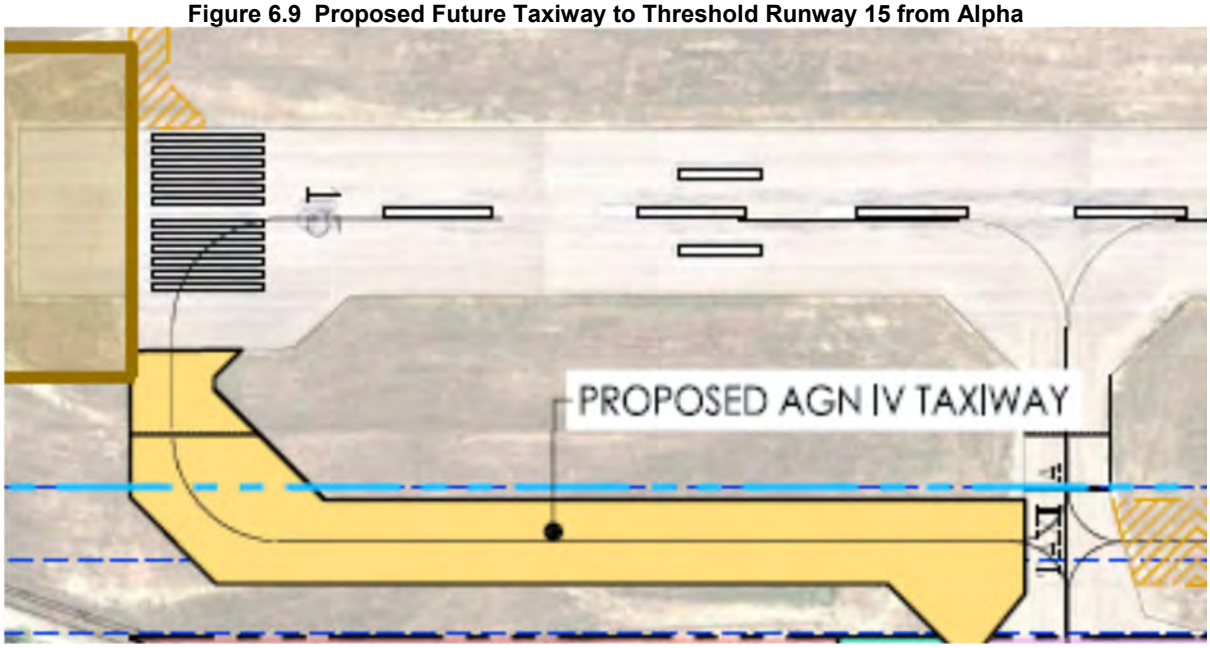
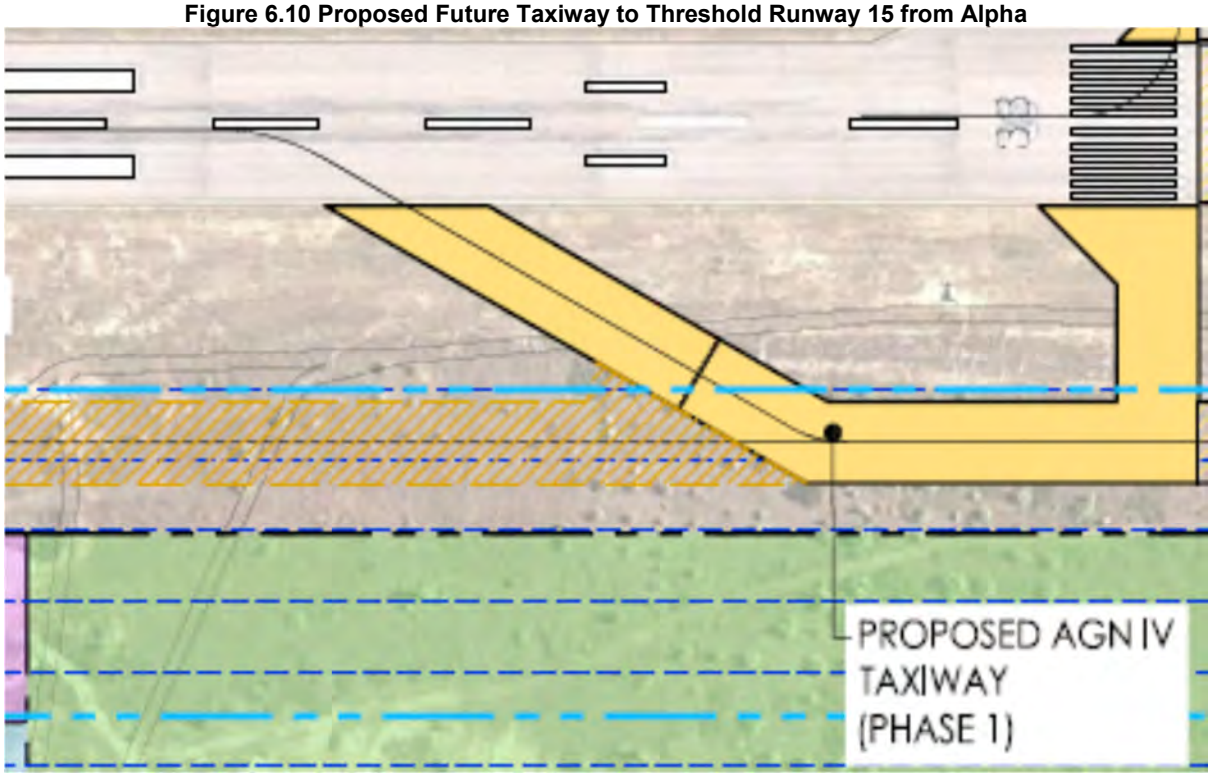


Figure 6.10 indicates the addition of an exit taxiway at the Threshold of Runway 33, with a turn-around bay (and holding bay) at appropriate setbacks from the Runway Centreline would improve runway capacity and operational performance by aircraft in busy peak hour periods. This development could be considered as and when aircraft movement demand warrants but may be particularly beneficial during the peak hours in busy fire fighting seasons.

Figure 6.10 Proposed Future Taxiway to Threshold Runway 15 from Alpha



6.4.3 Future General Aviation Area – East side of Runway 15-33

The east side of Runway 15-33 is currently undeveloped; the land is relatively flat, with silty-sandy soil conditions, which allows for good drainage of water. There is approximately 125 m distance from the runway to the property boundary / wildlife perimeter fence line.

The City of Castlegar may have the opportunity to acquire an additional 25 m of land, which is part of an easement running north-south along the eastern airport fence line. There is enough space to accommodate light general aviation facilities by preserving an area for an AGN-II future parallel taxiway connected to Runway 15-33. From this future parallel taxiway, additional stub-taxiways can be added to enable access for aircraft onto new G/A aprons.

Development of the East Side General Aviation Area could be initiated at the South-East corner, (Option A) or at the North-East corner (Option B) and built as demand grows and lots are leased out. The parallel taxiway and additional lots can be expanded to the north or the south from the ends of GA development area to the central runway area. Figure 6.11 (A) and Figure 6.12 (B) below indicates the potential layout of small aircraft taxiways, aprons, private hangars and T-Hangars on the east side of the runway. Development of the east side should be considered as part of the medium to long-term airport infrastructure development plan.

Figure 6.11 (A) General Aviation Hangars at South end, East of Runway 33

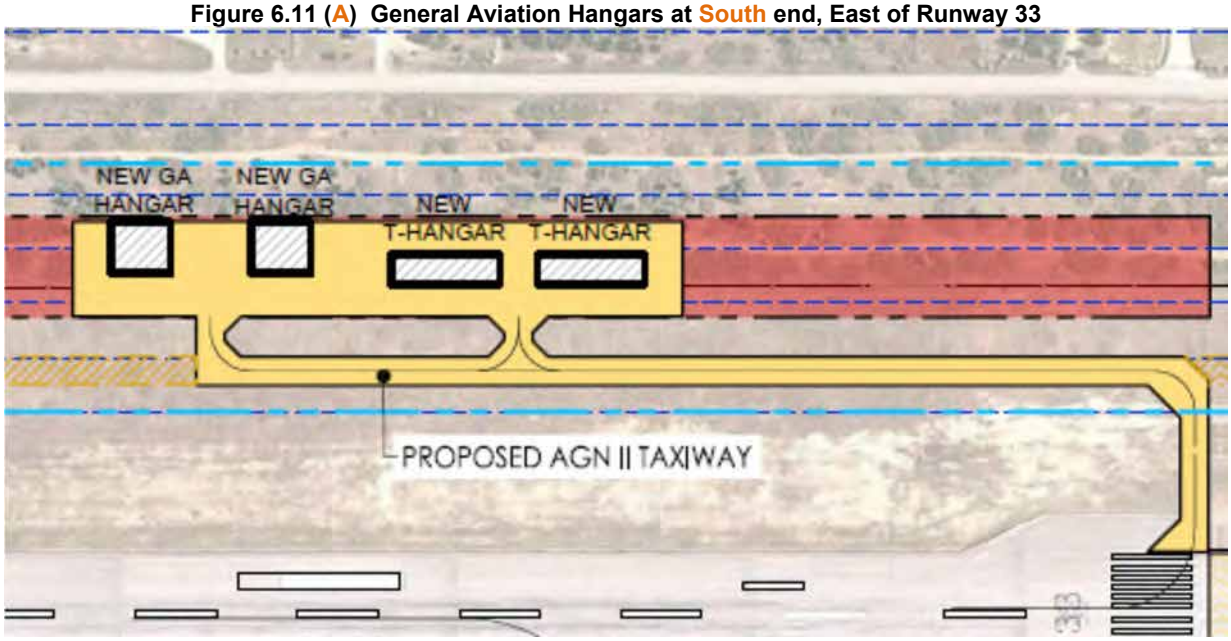
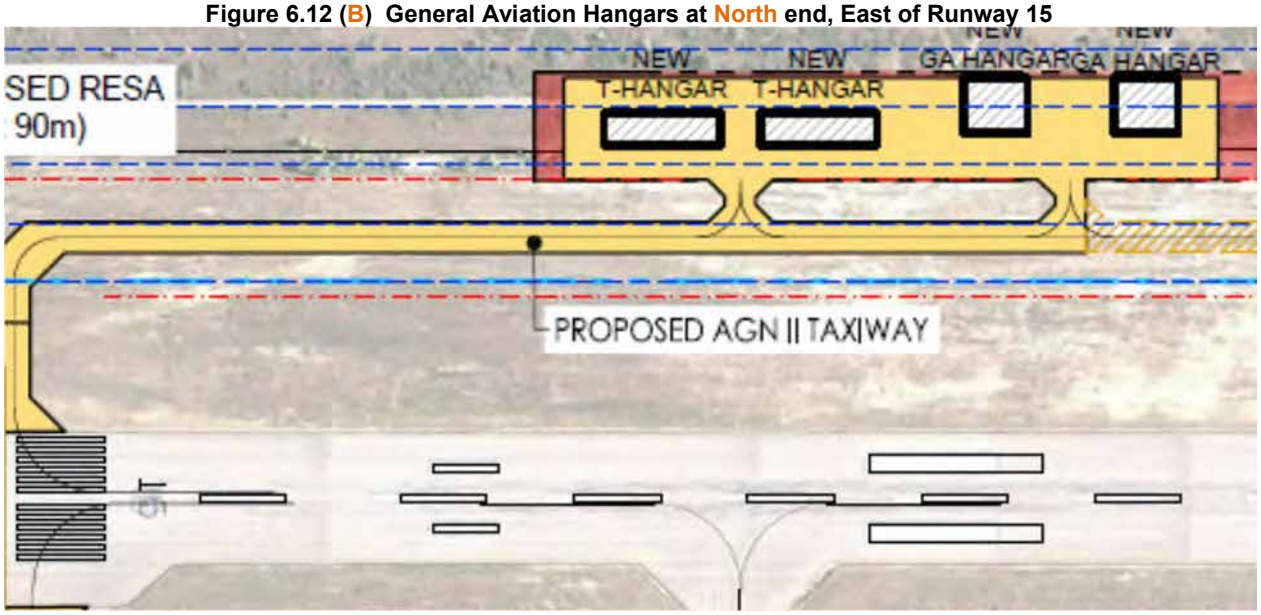


Figure 6.12 (B) General Aviation Hangars at North end, East of Runway 15



6.4.4 Apron and Air Carrier Parking Positions

The main apron is not large enough to accommodate parking for more than 2 DH-8-300 aircraft currently with room for aircraft turn-around and taxi-in / taxi-out by an additional aircraft. The main terminal apron could be expanded to the south; if needed, some or all grass islands could become paved aircraft parking areas as demand for aircraft parking grows in the peak hour in future.

The eastern pavement edge of the apron (at taxiway Bravo) could remain in place, providing an obvious demarcation of the edge of the future parallel taxiway object free area. This is particularly useful if the airport was to provide a new parallel taxiway between Alpha and Bravo taxiways, leaving all existing apron areas for aircraft parking and the taxiways take the aircraft movements. Alternatively, the apron pavements could be expanded towards the taxiway; this would result in an apron taxi-lane to allow aircraft to push back and taxi away while allowing existing terminal parking positions to remain available for longer Dash 8-Q400 aircraft in future.

The development of additional apron parking space, at the south of the main terminal apron, should be considered as future development. Although it may not be required immediately, it can be used to support FBO parking, and to accommodate the parking requirements for unscheduled arrivals of larger aircraft. This apron can also be used to accommodate the un-screened passengers that may occasionally arrive on Pacific Coastal Airlines at YCG due to conditions at the Trail Airport. These passengers cannot be mixed on the airside (sterile areas) with screened Air Canada passengers (both arriving from YYC or YVR or departing YCG to YYC or YVR). There is sufficient room for 2 DH8-Q400 aircraft on the ATB apron, but with severe limits on taxiing operations to/from Alpha Taxiway to/from the ATB apron. Taxiway Bravo should be upgraded to meet air carrier aircraft loads (DH-8-300 / -Q400 MTOW) in future.

6.4.5 Commercial Aviation and Helicopter Related Activity

Due to the mix of both fixed and rotary wing aircraft, consideration should be given to defining separate helicopter approach / departure path and helipads that ensure these aircraft are safely accommodated and kept as much as possible, separate from fixed wing operations on the runway. The Forestry Services has helicopters operating to the

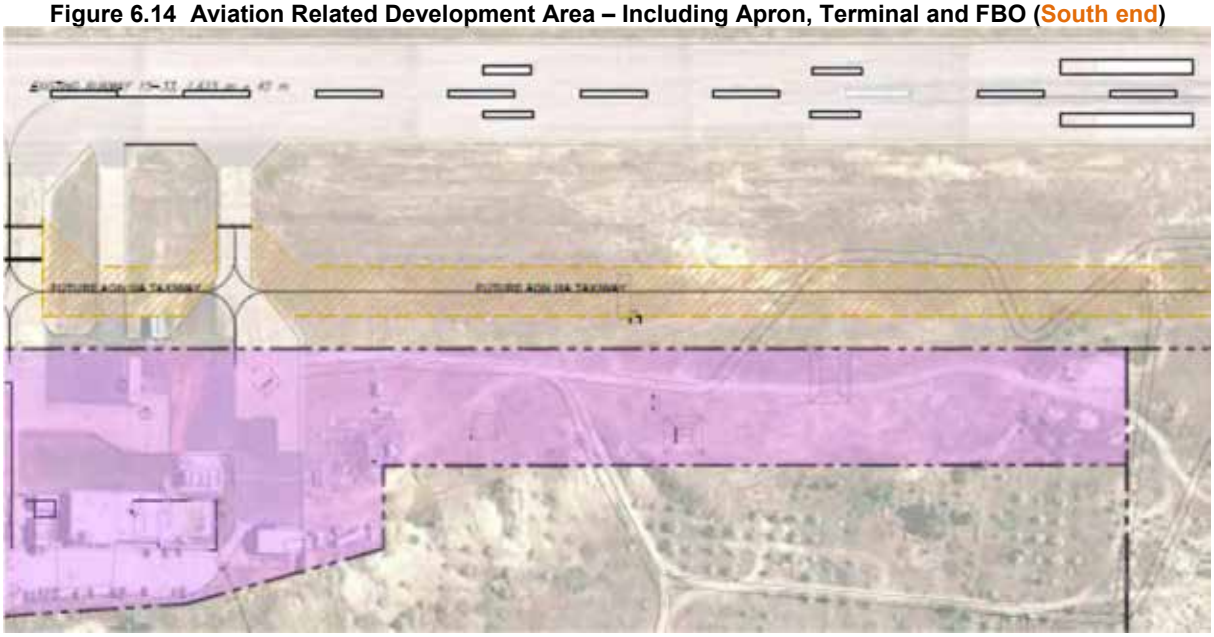
south of the old ATC Tower, and there are private helicopter operations east and south of the Air Terminal Building parking lot.

Future expansion of taxiways and aprons can be supplemented by coordinating with the helicopter operators to define suitable procedures and locations for rotary wing operations. In terms of expanded aviation lease lots, the area west of Bravo, south of the ATB parking lots and north of the old ATC tower should be considered for apron / taxiway expansion to the west (towards the highway) and in connection with expansion of other commercial lots on the landside of the airport closer to the highway.

Figure 6.13 and 6.14 indicate the areas associated with those areas on the airport where commercial aviation (aeronautical) services and leaseholds may be expanded.

Figure 6.13 Aviation Related Development Area – Including Apron, Terminal and FBO (North end)

Figure 6.14 Aviation Related Development Area – Including Apron, Terminal and FBO (South end)



6.5 AIRFIELD FACILITIES VISUAL CONDITION ASSESSMENT

A brief visual assessment of airfield pavement conditions was completed in October 2018 and there were no major concerns noted. The airfield pavements appeared to be in relatively good condition overall; Taxiway Bravo is weight restricted, and sections of the terminal apron pavement appear to be in need of an overlay in the short term.

The runway pavement is in relatively good condition. This is likely due to the few numbers of annual aircraft movements and the fact that pavement maintenance and crack-sealing have been conducted regularly. Despite nearing the end of its planned useful life cycle the runway and taxiway Alpha pavements are wearing well and should be capable of lasting another two to three years before the next asphalt repair and overlay is undertaken. Pavement overlay project should be planned for the short term due to the concerns over localized frost heaving under runway and other airfield pavements, as noted in the WKRA Airport Facility Infrastructure Condition Report by SAL.

A load bearing surface evaluation should be carried out at least once every five years. If an ACAP submission is required in the near future, then an engineering report should be provided with the pavement strength known in order to understand the extent of the rehabilitation required.

The paint markings on pavements were faded and should be re-painted as soon as possible (autumn 2019 latest). Two (2) windsocks are fading and should be replaced in the short term. Consider lighting the windsocks only if night operations are planned.

Approach lighting, PAPI units, all airfield signage and runway / taxiway / apron edge reflectors (white / blue / amber / red) could be upgraded and / or replaced with energy efficient (LED) lights and new pavement edge reflectors and signs, all of which must meet TC standards. Some signs are faded; consider improving / upgrading signage such that all signs on the airfield meet TC standards, particularly if the airfield electrical system is being upgraded in the short term. Renewing Airport Certification to meet TP312-5th standards should be aligned with all airfield improvements.

6.6 OBSTACLE LIMITATION SURFACES & SAFETY AREAS

The West Kootenay Regional Airport has a single runway, Runway 15-33 and the airport is certified to Transport Canada's TP312 4th Edition standards. Runway 15 (154°) – 33 (334° degrees) is currently classified as a Non-Instrument, Code 3C runway, and is only certified for daytime operations. The runway is 150ft (45m) wide by 5,299ft. (1,615m); the current Critical Aircraft is the DH-8-300. The Obstacle Limitation Surfaces (OLS) is are also designed to meet TP312 4th End. Standards and Recommended Practices; Transport Canada have indicated approved deviations to the Approach Surfaces of the OLS, as indicated in the Airport Operations Manual (AOM).

The Runway Strip for 15-33 has a total length of 1,735 m (60 m at each runway end) and a total width of 90 m, (45 m each side of runway centerline) under existing TP312-4th certification standards. The purpose of the OLS is to protect the airspace and runway approaches from any obstruction in the vicinity of the airport that may pose a hazard to aircraft. The OLS begins at the Runway Strip edge and includes an Approach Surface at each runway end, and a Transitional Surface on each side of the runway.

The airport is surrounded by significant mountainous terrain (obstacles) and the approaches for Runway 15 are impacted by the mountain penetrating the approach surfaces, or portions of the approach surfaces. Changing the straight-in approach to an offset approach for Runway 15 should be considered.

Refer to Table 6.5 below for details of the OLS for Runway 15-33 at West Kootenay Regional Airport.

Table 6.5 Existing Conditions, OLS Characteristics Runway 15 – 33

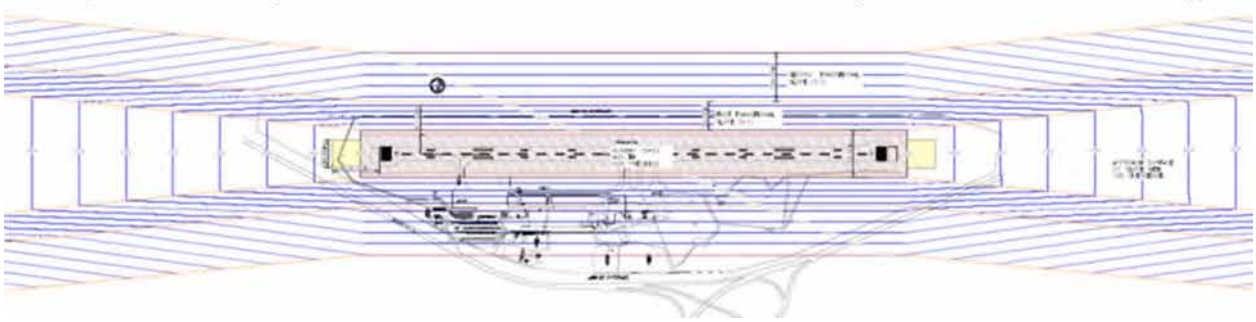
ITEM	Runway 15	Runway 33
Type of Runway	Non-Instrument	Non-Instrument
Aircraft Size (based on wingspan)	36 m	36 m
Strip Width (each side of runway centerline)	45 m	45 m
Strip Length (prior to threshold / beyond departure end)	60 m	60 m
Elevation of Strip (= runway threshold EL)	492.2 m (1,616 ft.)	494.3 m (1,623 ft.)
Clearway	n/a	98 m (320 ft.) long x 45 m wide
Approach / Take-Off Surface Slopes and Dimensions		
Length of Inner Edge	90 m	90 m
Distance from Threshold	60 m	60 m
Divergence	10%	10%
Length	2,500 m	2,500 m
Slope	1:40m (2.5%)	1:20 (5%)
Transitional Surface Slope	1:7 (14.3%)	1:7 (14.3%)
Inner Surface Elevation		
CYG Airport Reference Point (ARP)	N49° 17' 46" (N49 17.77) / W117° 37' 57" (W17 37.95) Elevation at ARP: 1626' (ASL)	
Outer Surface		
Radius	4,000 m	
Height (above ARP)	45 m	

Mountainside intrudes into the approach surface of Runway 33, in addition to Power line (40 ft. AGL crosses approach surface approximately 1,500 ft. from threshold 33. Approach slope steepened and set to 5% vs. 2.5% standard in TP312-4th.

The opportunity to upgrade the airfield and associated OLS to TP312-5th Edition Standards would allow improvements in strip width, while enabling the WKRA to improve the level of service to a Non-Precision Instrument

Runway from a Non-Instrument Runway today. The changes to the transitional surface will enable improved land use and development of parcels in closer proximity to the runway strip, while respecting height limitations on fixed objects (i.e. buildings) and moving objects (i.e. aircraft, vehicles). The TP-312 5th Edition OLS is indicated in Figure 6.15.

Figure 6.15 Runway 15 – 33 OLS, AGN IIIA, Non-Precision Instrument (TP-312 5th Edition Standards)



An improved level of service, with associated TP312-5th Non-Precision Instrument OLS (AGN IIIA) will enable the potential for improved air access and reliability, if instrumentation can allow aircraft to approach YCG in lower ceiling / visibility conditions. Refer to Table 8.6.2 below for details of the planned TP-312 5th OLS for Runway 15 – 33 in a non-precision instrument environment at WKRA.

Table 6.6 Planned TP312-5th AGN-IIIA Non-Precision Instrument OLS Characteristics Runway 15 – 33

ITEM	Runway 15	Runway 33
Type of Runway	Instrument, Non-Precision	Instrument, Non-Precision
Aircraft Size (based on wingspan)	36 m	36 m
Strip Width (each side of runway centreline)	75 m	75 m
Strip Length (prior to threshold / beyond departure end)	60 m	60 m
Elevation of Strip (= runway threshold EL)	492.2 m (1,616 ft.)	494.3 m (1,623 ft.)
Clearway	n/a	98 m (320 ft.) long x 45 m wide
Approach / Take-Off Surface Slopes and Dimensions		
Length of Inner Edge	150 m	150 m
Distance from Threshold	60 m	60 m
Divergence	10%	10%
First Section – Length	2,500 m	2,500 m
First Section – Slope	2.5 % 1:40m (5th - 3.33 %)	1:20 (5%) (5th – 3.33%)
Second Section – Length	n/a	n/a
Second Section - Slope	n/a	n/a
Transitional Surface		
Slope, First segment	1:4 (25 %)	1:4 (25 %)
Slope, Second segment	1:7 (14.3 %)	1:7 (14.3%)
Inner Transitional		
Distance from runway centreline	61 m	61 m
Slope	vertical	vertical
CYG Airport Reference Point (ARP)	N49° 17’ 46” (N49 17.77) / W117° 37’ 57” (W17 37.95) Elevation at ARP: 1626’ (ASL)	
Obstacle Identification Surfaces		
Outer OIS Surface – Radius	4,000 m	
Outer OIS Surface - Height (above ARP)	45 m	
Approach ID Surface	n/a	

It should be noted that an Approach OIS is not required for Non-Precision AGN-IIIA runway but is applicable for an AGN-IIIB runway. The overall strip width for a Non-Precision Instrument Runway AGN-IIIB demands is 244 m; (122 m

each side of runway) it would be impossible based on the existing infrastructure. Furthermore, it would be beneficial if the airport could be certified to an AGN-IIIB Precision Runway, but the strip width required eliminates this option.

It is recommended that the WKRA consider implementing TP312 5th Edition Standards and protecting for an AGN-IIIA Non-Precision Instrument Runway. This will support the opportunity to implement new advanced instrument approach / departure procedures in future, in addition to re-aligning the approaches to better avoid mountainous terrain. Offset approaches are better described and now an acceptable standard in TP312-5th. The development of the TP312 5th Edition Standards begins with a gap analysis (comparison between 4th and 5th editions of TP312 standards and recommended practices). The gap analysis will indicate all relevant areas to be revised in order to meet the 5th edition standards. One all relevant areas are indicted as TP312 5th capable (or incapable), a plan prioritizing the various areas to be upgraded to TP312 5th standards can be implemented.

6.7 AIRSPACE & NAVIGATION AIDS (RNP)

Consideration should be given to improving the Navigational Aids and Visual Aids to support low-visibility / low-ceiling operations and future RNP (required navigational procedures) approaches. An RVR (runway visual range) system, additional approach lights (Medium Intensity Approach Lighting System, Runway End Id Lights, etc.) could be installed to improve pilot sighting of the runway on approach. Preparing the WKRA to become an Instrument, Non-Precision Runway will enable reliable air access through improved flight approaches and departure procedures.

The key technological improvement with the most to offer WKRA in terms of reliable air access is an RNP (required navigation performance); however, it should be noted that an instrument departure procedure must also be considered, since aircraft that land in low-cloud conditions will also need to depart / take-off in the same conditions. It would be a great disbenefit if aircraft can land, but not depart, defeating the purpose of investing in approach improvements with an RNP system.

To determine the possibility of having an RNP approach system, the municipal and regional governments in the West Kootenay partially funded a Jeppesen report in 2016 on how to increase the reliability of the West Kootenay Regional Airport. One of their suggestions was to implement an RNP system. The minimum cloud ceiling for takeoff and landing at the WKRA could be lowered from the current 3,000 feet to 1,000 feet, according to the Jeppesen report, which would result in making the airport more reliable for air carriers and passengers .

An RNP system consists of computer software developed by Nav Canada for a specific airport and run by the airline. It requires no additional equipment at the airport. Nav Canada is the company that runs navigational systems in all Canadian civil airports. Most airports have no problem implementing RNP software, where the narrower valley and steeper mountainsides in Castlegar make RNP protocols more difficult to develop. The airline would have to commit to first testing the newly developed system in a simulator and training its pilots. For Air Canada, it would involve changing the type of aircraft it currently uses for the Castlegar route (Dash 8) and upgrade to a more advanced plane, proposing the Q400 . Advanced avionics in another aircraft could also meet the requirements.

The WKRA will need to consider the basic steps required in order to obtain improved air access through low cloud weather conditions:

- Undertake consultations with Nav Canada and Transport Canada on potential implementation of an RNP procedure, potential non-precision instrument departure procedures that would improve safety and air accessibility and reliability;

- Discussions with Air Canada Express / Jazz to become partners in the opportunity to improve the air access conditions, which would drastically improve flight reliability, and cost effectiveness;
- Consideration of new approach lighting and potentially new / additional hazard beacons to enhance the safe operations during approaches through weather, allowing pilots to 'see' the runway during marginal cloud cover conditions;
- Consideration of offset runway approach / departure paths from Runway 15 – 33, allowing aircraft to avoid dangerous mountain terrain; and
- Investment planning with the aid of government funding from Transport Canada, (through the Airports Capital Assistance Program).

Air Canada is currently not in a rush to incorporate RNP at WKRA, since their aircraft (DASH 8 – 300) are not currently equipped with supporting instrumentation. The Dash 8 Q400, which is planned to replace the older Dash 8-300s, are equipped with the technology. Air Canada is also studying the possibility of utilizing the Q400 at WKRA.

The airport should continue to communicate with Air Canada, Nav Canada, and Transport Canada to determine how best an RNP procedure can be implemented. Introducing RNP may take between 2 and 5 years to become operational and an in-depth review of the process must begin with agreement by Air Canada and Nav Canada to move ahead with these improvements to their shared operation at WKRA. In parallel we have also assumed that Air Canada's Dash 8 Q300, while they currently not RNP capable, could be retrofitted with applicable instrumentation.

An instrument departure procedure must also be explored, to enable arriving aircraft utilizing an RNP approach to depart successfully also. With RNP, an aircraft can arrive, but may not be able to depart pending visibility and cloud ceiling conditions.

6.8 HELICOPTER OPERATIONS

There are based commercial helicopter operators at WKRA as well as many seasonally based BC Forestry Services helicopters. There are often many rotary wing operations daily during active forest fire seasons. Dam Helicopters operates helicopters from their base, just south of the Main Terminal and west of the terminal area parking lots. They also have a facility at the CSB and the former Selkirk College Aviation hangar.

There is a single, concrete helipad located just north of the main ATB apron. This location is seldom used but there for itinerant helicopter operators, who may require fuel and so would park on this helipad; this is a rare occurrence. WKRA should further investigate this facility as a potential hazard, as it may conflict with safe air carrier operations where passengers are enplaning / deplaning nearby. This helipad should be removed, allowing the opportunity to expand the apron while better enabling a connection to a future taxiway from the apron to Threshold Runway 15.

Heliport Standards (CARs 305, 325) exist that may provide guidance for accommodating safe Helicopter Operations at Aerodromes. The mix of fixed wing and rotary wing operations is considered a safety hazard and as such should be mitigated. This report includes recommendations for a suitable area for rotary wing (helicopter) operations that do not interfere with fixed wing operations and which does not inhibit helicopter operators either.

6.9 DEICING REQUIREMENTS

Air Canada Jazz currently contracts the local ground handling services for de-icing of aircraft. The de-icing is from a small spray boom on pick-up sized truck; de-icing operations are done on the terminal apron. There is no glycol recovery system in place; glycol runoff will eventually drain into the ground water and / or sewer systems without first being separated. Water sampling / testing should be considered to assess the environmental impacts of de-icing operations at YCG.

It is recommended that a system of sewers and catch-basins to collect all glycol run-off should constructed which would separate all drainage in winter into a glycol/water separator tank. Run-off and effluents could be stored in a small pond to allow settlement and controlled run-off of clean water back into the local environment. It is important that the sustainable use of de-icing fluids is monitored, measured and mitigated which typically involves removal of contaminants prior to any surface drainage effluents reaching the surrounding environment.

6.10 AVIATION FUELING & GROUND HANDLING SERVICES

Aviation fueling is provided by Brilliant Aviation, an Esso branded reseller, as World Fuel Services. WFS has three fuel tanks on the airport, both above and below grade tanks. Jet-A, 100LL and AvGas are sold by WFS at YCG. Fuel is carried by Fuel Truck / Bowser with a hose and nozzle and appropriate fittings to fuel various aircraft types, from single engine piston to multi-engine turboprops and light jets.

The WKRA is not involved in the Aviation Fuel business at YCG, but operations have Unleaded and Diesel fuel tanks at the CSB.

Brilliant Aviation also provides contract ground handling services for Air Canada; this includes baggage services, ramp (under wing) services, and aircraft marshalling services.

The underground fuel tanks just north of the Terminal Apron should be removed; these tanks are too close to the ATB and serve no purpose, since the DH-8 aircraft is fueled by a fuel bowser / truck, not directly from this tank. The tank is old and despite there being no recent leakage, it would be prudent to remove the tank. In addition, removal of the underground fuel tank would allow future expansion to the Terminal Apron, which could be beneficial if larger aircraft serve the WKRA in the near future, (i.e. Dash 8-Q400 by Air Canada or other operators).

6.11 OPERATIONAL SUPPORT FACILITIES

The airport has three (5) airport maintenance facilities; the first four are owned and operated by the City of Castlegar (WKRA) and the fifth is owned by Nav Canada:

1. **Combined Services Building:** This building is in relatively good condition for its age; it needs some exterior maintenance. The building houses the airfield and groundside maintenance equipment, including plow trucks, anti-icing spreader, grader, snow blower, and grass cutting equipment.

2. **Old Maintenance Garage:** This building is also in relatively good condition for its age; it requires some exterior maintenance, painting.

3. **Powerhouse:** This building is in good condition and only requires minor maintenance. The generator is old, and parts are difficult to find. The back-up diesel generator and FEC should be renewed / replaced in order to ensure safe and operational airport facilities at WKRA.

4. **Sand Shed:** Fire extinguisher retardant is stored in this building and unnecessary materials should be properly disposed of or donated to local fire department if it can be used. This building should be upgraded or replaced if it poses a hazard to personnel.

5. **Castlegar FSS (former Air Traffic Control Tower):** The old ATC tower currently houses Nav Canada's Flight Service Station, which provides advisory services to aircraft in the vicinity. Castlegar FSS provides air traffic services during 0530 – 1730 hours (Pacific Daylight Time). The future of this facility should be discussed with Nav Canada, as it may have a limited life expectancy (equipment, serviceability). The WKRA could re-purpose such a facility for future operations, such as collaboration with BC Forestry Services.

Maintenance of existing facilities may extend the useful life of important facilities; future plans should include expansion or upgrades to necessary maintenance facilities that improve operational efficiencies and meet regulatory requirements.

The WKRA does not provide Emergency Response Services directly, but an emergency response plan exists that provides response support from the Police, City of Castlegar Fire Department and the BC Ambulance Services. There is an access control program to limit airside access to authorized personnel only. An apron management plan exists, providing guidance for safe operations by ground services personnel around aircraft.

6.12 OPERATIONAL MANAGEMENT

The WKRA is managed by a part-time airport manager, with administrative assistance provided for a half-day every week. The maintenance functions are contracted out to a private company, SAL (4 employees) that has many years' experience maintaining the airport facilities. Based on the significant responsibilities required in maintaining airport certification, airport operations manuals, airport administration, stakeholder and tenant engagement and the administration of the airports' safety management system, the City should consider increasing the amount of time the airport manager and the airport administrative assistant are able to dedicate to these positions.

Despite the level of human resources at the WKRA, the customers (airlines, passengers, others) have commented on how well the airport is maintained. There is a continued opportunity to maintain a low-cost operation while delivering excellent services to airport users. It should also be noted that the City also provides legal, financial and other administrative support to the WKRA on an as-needed basis. However, the time and dedication of management resources to non-operational and business administrative functions is greater than the available time permitted by the part-time human resources.

The number of maintenance employees / operators is sufficient in the current context of operations. The current level of administration and management personnel is limited to part-time hours. The WKRA should consider creating a full-time airport manager's position (or full-time assistant airport manager) who can support the Deputy Director of Public Works / Airport Manager in order to manage the obligations of the airport operator.

6.13 AIR CARGO, MRO & HANGAR FACILITIES

There are no dedicated Cargo or MRO facilities at WKRA. There are a few private hangars and aviation facilities, but there are hangars available for rent. Brilliant Aviation has a small hangar from which they lease space out to aircraft owners. There are very few private or commercial aircraft owners with hangar facilities at WKRA; there is an opportunity to change this by making additional lands available for T-Hangars, Private Hangars, and Large Commercial Hangars with space for aircraft / avionics related maintenance activities.

There is only one Fixed Base Operator (FBO) capable of providing hangar and fueling services but has limited space currently (Brilliant Aviation). Encouraging Brilliant Aviation Services to expand into a larger FBO, offering aircraft and avionics maintenance services, or inviting expressions of interest to develop a competing FBO should be considered.

Attracting an MRO facility requires significant time and resources and likely faces stiff competition from airports with longer runways, fewer terrain / obstacles and night-time operations. The WKRA should focus on improving the level of services provided by the FBO and or consider attracting a new FBO to the airport.

6.14 AIRFIELD DEVELOPMENT PLANNING RECOMMENDATIONS

There are a number of recommended facility improvements to be considered for the West Kootenay Regional Airport.

Phase 1: Short Term Airside Improvements

- Partial parallel taxiway, from the Runway 15 Threshold to Alpha Taxiway at the Terminal Apron.
- Strengthening and widening Taxiway Alpha and Bravo to AGN IV pavement widths (23 m)
- Taxiway work will accommodate future air carrier movements of Bombardier Dash 8-Q400s and larger aerial water-bombers for the Ministry of Forests, Lands and Natural Resources (MFLNR).
- The helicopter pad and the underground fuel tanks, adjacent (north) to the Main / Terminal Apron should be removed to allow for and extension to the apron for additional aircraft parking and maneuvering (and/or aircraft servicing equipment) by air carrier aircraft. This will also protect the new / planned intersection with the future parallel taxiway.

Phase 2: Medium Term Airside Improvements

- Extend Runway 15 – 33 by 200-250 m in the medium term if existing air carrier confirms their intentions and capabilities for flying the DH-8-Q400 into CYG / WKRA on a regular basis.
- Construct a ‘runway end safety area’ (RESA) at both ends of Runway 15 – 33
    - RESA and runway extension projects will require extensive fill at the runway ends to allow for an appropriately graded runway strip and RESA. Local road elevations and alignments, along with telephone / power / light poles, may need to be adjusted to suit safe flight operations without impeding the obstacle limitation surfaces.
    - A runway extension will benefit many aircraft types, and in particular will enable current Air Canada Jazz Dash 8-300s to operate with better margins for safety during hot temperatures which may be a more common occurrence with expected climate changes in future. The safety margins are improved due to aircraft having longer take-off distance available, resulting also in reduction in aircraft load restrictions.
    - The extended runway will allow additional service by larger aircraft operating to WKRA such as the DH-8-Q400.
- Should larger aircraft (DH-8-Q400) begin to operate from WKRA, or should additional aircraft parking demand in the peak hour be greater than 2 aircraft, it is recommended that the Main / Terminal Apron pavements be expanded to allow for additional air carrier aircraft parking and/or larger aircraft parking

stands, while allowing taxi and push-back operations to occur without being impeded by the adjacent parked aircraft nor the intersections with Alpha or Bravo taxiways.

- Expanding a taxiway and apron areas to improve airside access to existing and potential aeronautical lease lots.
- The area south and east of the Main / Terminal Apron would be a prime area for an expanded Fixed Base Operator (FBO) with larger hangars, additional space for aviation maintenance and servicing, and consolidated fuel tank farm. This area should be reserved for commercial aviation services, although a mix of private and commercial is also suitable.
- This extended apron area would allow for a safer and more efficient area for fixed wing aircraft to operate and base, while the proximity to existing helicopter operations allows for the expansion of both fixed / rotary wing operations with access to aviation maintenance (and related) services nearby.
- An additional taxiway should be added to the runway complex in the medium to long term, to enable development of the planned General Aviation (G/A) area on the east side of Runway 15-33. This taxiway can be extended as demand warrants. This taxiway is connected to the threshold of Runway 15 at the north end of the runway then turns south to allow aircraft to access the runway from new lots leased. The continued development of the East Side G/A area through the medium to long term, should allow for potential of a long-term lease for larger lots in order to enable a developer to design / build / lease hangar homes or other private aviation uses. (sale is not recommended) for lands not considered necessary for future airport reserve.

Phase 3: Long Term Airside Improvements

- An airport maintenance garage / combined services building could be co-located in the long-term with the FSS / old ATC Tower. This area could be purchased acquired from Nav Canada in future should they choose not to continue delivering navigation services at YCG. The tower could be operated privately, catering to air carrier and aerial fire suppression activities in addition to managing increased traffic loads in future. WKRA should entertain the possibility of partnering with Nav Canada and/or acquiring these lands and facilities in the long term while planning for locating a combined services building (maintenance garage / fire hall, equipment storage sheds).
- Given the number of rotary wing operations at YCG, it is recommended the WKRA develop a public use helipad, with appropriate setbacks and safety areas, FATO and TLOF defined for the largest helicopters that may require access. The helipad could be accessed from this above noted west-bound taxiway and expanded apron area. This may also prove to be beneficial to plan for an improved airside access gate for emergency, MEDEVAC (medical evacuation) and patient transfer operations from ground ambulance to air ambulance (and vice versa).

Please refer to Appendix C for the 'Probable Costs, WKRA Airside" projects for cost estimates of suggested airside projects.

7.0 AIR TERMINAL BUILDING ANALYSIS

7.1 AIR TERMINAL PASSENGER DEMAND

Providing sufficient capacity in an air terminal building is one of the main considerations when promoting the commercial growth of airports. Insufficient space leads to congestion affecting both passengers and airline operations. The alternative, too much space, creates overcapacity issues that increase the cost of operations. There are several broad objectives for planning the terminal building:

- Redress the existing deficiencies within the terminal
- Ensure that sufficient space is provided to efficiently process the passenger numbers forecast throughout the planning period (based on peak hour passenger volumes)
- Provide for the development of an optimal, sustainable terminal system that is cost-effective, makes the most effective use of existing facilities and minimizes the environmental impact.

Figure 7.1 Existing ATB Layout

The future demand for the terminal building depends on the anticipated volume of passengers and the types of aircraft utilizing WKRA. Between 2017 and 2042, WKRA is forecasted to grow from 78,000 to 128,000 passengers. The design aircraft are the DH8-300 and the Q-400. Terminal expansion is predicated using peak hour passenger volumes. Table 7.1 below highlights the forecast growth in these peak hour volumes.

Table 7.1: Forecast Passenger Growth

	2017	2042	% Change
Annual Passengers	74,071	128,148	+73%
Peak Hour Departing Passengers	47	80	+70%
Peak Hour Arriving Passengers	47	80	+70%

The implications of the peak hour forecast are sizable for terminal planning. Continuous flows of arriving passengers can present congestion challenges as the peak hour passenger traffic increases over time. Congestion from high passenger numbers is expected to be most evident in key systems such as the pre-board screening, the hold room and the baggage carousel.

7.2 AIR TERMINAL BUILDING ASSESSMENT & CONSTRAINTS

The original Castlegar airport terminal building was built by Transport Canada in 1971 with subsequent additions in 1998 and 2004. The building footprint is 27 meters by 67, with a total area of 1340 square meters, the majority of that on grade with a portion of the original in a split level, with services below and the weather office, currently unoccupied, above. While the latest building addition is designed in contemporary architectural expression, the overall feeling, both inside and out, retains that distinctive 1970s Transport Canada imprint.

EXISTING TERMINAL DEVELOPMENT

In November 2018 Sentinal Airport Logistics Ltd completed a Facility / Infrastructure report, covering the terminal building, the paved surfaces, airfield support and equipment. The building elements from that report have been included in the ATB Condition Report matrix included in the pages following.

While the building is generally in good condition, the most significant deficiencies include:

- the controls for the heating system
- a defunct humidifier
- security and the door keying
- the public address system
- the washroom fixtures and finishes
- the plumbing supply and waste lines
- the finishes within the old weather office
- floor finishes throughout
- the roof over the weather office
- efflorescence on the brick facade

Operationally, the following shortcomings are evident:

- congestion at the pre-board screening and overcrowded hold room
- the proximity of the airside arrivals and departure doors
- noncompliant CATSA facilities
- an undersized boardroom
- inadequate kitchen facilities in the café
- no flight information display screens and poor signage.

In developing the building plans for the Masterplan, Stantec has considered the constraints noted above, along with the projections for the 70 percent passenger growth over the forecast period, and the opportunities presented by the evolving usage patterns and new technologies. The ATB Condition Report is indicated below as Table 9.2.1.

Table 7.1 Air Terminal Building Condition Assessment

	ITEM	+	SAL ($) Estimate	NOTES
A-Site				
1	Landside sidewalk	F		
B-Structure				
1	Foundations	G		
2	Slab	G		
3	Columns	G		
4	Beams	G		
C-Exterior enclosure				
1	Roofing	P		* replace roof on old weather office, remainder replaced in …
2	Metal siding	F		recently repainted, but dated
3	Stone façade	G		
4	Brick façade	P		efflorescence
5	Soffit	G		
6	Windows	F		original double glazed, 1988 e-glass
7	Passenger doors, hardware	R	$ 6,700	* rekey or provide card access
8	Service doors, hardware	R		* rekey or provide card access
9	Roll up doors	F		
10	Canopies	F		dated
D-Interior partitions & finishes				
1	Carpet	P		
2	Floor tile	P		
3	Concrete	F		
4	Wall gwb	G		

5	Wall tile	P		* $ in D8
6	Ceilings - tile, gwb	F		replace in weather office
7	Doors	F		D9, D10
8	Counters	P	$ 40,000	* $ includes D5, D9, D10 and E2
9	WC millwork	P		* $ in D8
10	WC partitions	P		* 4 in D8
E-Mechanical				
1	Roof drainage	G		original
2	WC fixtures	R		* $ in D8
3	Plumbing	R	$ 6,000	* copper pipe replacement scheduled for Dec '18, replace humidifier - $ tbd
4	A/C Controls	R	$ 40,000	*
5	HVAC	R	$ 30,000	* new AC unit for weather office
6	Sprinklers	G		drypipe system
F-Electrical				
1	Fire alarm	P		relocate panel to vestibule
2	Lighting - interior	P	$ 40,000	contract in hand for replacement with LED
3	Lighting - exterior	F		contract in hand for replacement with LED
4	Generator	P	$ 1.65 m	replacement in 2019, 95% funding available
5	Security	P		* $ in C6
6	Telecommunication	P		
7	PA	R	$ 8,000	* 30 years old, chronic failure, parts not available
G-Systems & Equipment				
1	Security screening - CATSA	P		option for checked bag screening
2	Baggage claim	F		
3	Passenger information	P		currently no FID's
4	Signage	P		new signage required throughout
	* as noted in SAL report, 14 November 2018			
G - Good	F - Fair		P – Poor	R – Replace ASAP

7.3 FUNCTIONAL PROGRAMMING

Table 7.2 below is based on the traffic forecast for passenger growth at the airport terminal building. The resultant figures have been developed using the current IATA formulae and metrics for level of service, the review of comparable terminals, the anecdotal evidence provided by WKRA and Stantec's experience in terminal development.

Table 7.2 Air Terminal Building Condition Assessment

	ATB Facility	Phase / Year				Notes
	DEPARTURES					
1	**Year**	**0 / 2017**	**1 / 2027**	**2/2037**	**3 / 2042**	
2	Annual total pax (passengers)	74,071	106,068	121,364	128,148	
3	Peak Hour (PHP) Pax, departing	47	65	75	80	
5	Dep queuing	32				
6	Check in Desks	3	4	4	4	
7	Kiosks	0	0	5	5	
8	PBS queuing	45				
9	PBS screening	1	1	2	2	existing line becomes bag-drop and 2nd, pbs
10	Holdroom seating (80% seated)	55 seats / 80 sm	76	87	93	seats prorated from existing 55, not 47 php
11	Holdroom (20% standing)	14	19	22	24	
12	Gates	1	1	1	1	
13	Airside concession	none	-	-	-	vending machines
14	Airside WC's	none	1	1	1	unisex family
	ARRIVALS					
15	PHP Arriving	47	65	75	80	
17	Gates	1	1	1	1	
18	Bag claim units	1	1	1	1	
19	Bag presentation	8.5 lm	13.3	15.2	21.6	IATA formula. 2017 by IATA = 9.2 lm
20	Car rental	1 / 24 sm	2 / 24	2 / 24	2 / 24	
21	Landside café	118	118	118	118	convert to chef's kitchen
22	Retail	0	20	20	20	
23	Landside WC's	2 sets / 60 sm	2 sets / 60 sm	2 sets / 60 sm	2 sets / 60 sm	expand south set into sidewalk area?
24	Pax information	3 sm	5 sm	5 sm	5 sm	add FIDs
	OPS & ADMINISTRATION					
25	Admin offices	50 sm	114*	114*	114*	offices + conference
26	Airline offices	2 / 17 sm	4/40*	4/40*	4/40*	
27	Security offices, CATSA	21 sm	3/30*	3/30*	3/39*	offices + lunchroom
28	Bag strip	66	74*	74*	74*	
29	Bag make up	34	92*	92*	92*	
30	Maintenance / janitorial	2 / 8 sm	2/8*	2/8*	2/8*	
31	General storage + equipment	3 / 50 sm	2/20*	2/20*	2/30*	
32	Unoccupied	122 sm	0	0	0	former weather office

* as shown on plans

Four phases have been identified. The first, noted as ‘Existing (x) 2017’, reflects the configuration of the terminal as it existed in 2017, the baseline year for the passenger traffic projections. The next columns present the requirements for the design years of 2027 and 2037, and 2042, respectively.

Note that the projected passenger volume increases from 2017 to 2027 is 43%, and from 2017 to 2037 73%. If no other formulae or metrics are available, the future area requirements are based on the space shown on the proposed plan.

7.4 PHASED CONCEPT DEVELOPMENT

The diagrams in this section illustrate the development of the ATB at the WKRA. This concept is a direct response to the following factors - the passenger forecast to 2042, the maintenance of IATA Level of Services B – aka ‘optimum’, the existing constraints noted in the previous section, and the necessity to maintain a safe, attractive, and operational and energy efficient building. The existing ATB has a footprint of 1340 square meters and a gross building area of 1480 square metres. The proposal is to expand the existing building to 1940 square metres, by extending 2.5 metres onto the existing apron and 13 to the north.

The key initiatives in this concept are as follows:

- A modest expansion of the preboard screening area to allow passengers, on arrival, to drop their checked luggage for screening, and then return to the amenities of the landside concourse until the flight is called, at which point they would re-enter for personal and hand baggage screening
- Space for a future screening line, when on installation, the original line would be a bag drop only, and the new line for personal pre-board screening
- Expansion of the hold room to the 93 seats and standing room for 24, with the addition of a washroom and vending
- A new, expanded arrivals area, with 16 meters of baggage belt frontage and an oversize baggage chute
- A new administration suite in the old weather office

Other features of the proposed concept include:

- New check-in counters
- New airline offices, with provision for two airlines
- A new suite for the CATSA office and lunchroom
- A new passenger lounge area
- Refurbished washrooms
- An upgraded kitchen for the café
- A new commissionaire’s station and information desk
- A new retail concession and relocated car rental
- An expanded baggage make-up area with space for two airlines
- Provision for future check in kiosks.

The following items would not usually be included in the scope of a masterplan, rather in subsequent architectural commission, but it is useful to note them for that future reference.

- New façade material to replace, or cover, the deteriorating brick
- Replacement of the outdated plastic canopies on landside
- New floor finishes throughout
- Replacement of existing lighting
- A new humidification system
- An art and advertising plan
- New signage and flight information system
- A concept to illustrate a West Kootenay ‘sense of place’

The building plans illustrated in figures 7.3 and 7.4 show the construction to be built in two phases. The first phase is the major one. The second is triggered by the arrival of a second airline. This requires additional airline offices and an expansion of the baggage make up area. Also included in the latter phase is the additional of a second CATSA screening line – the first to be dedicated to a bag drop and the second to the passenger screening. However, given the much smaller scope of that second phase, it may be decided that it is more cost effective to integrate both phases into a single construction project.

Figure 7.3: Phase 1 ATB Expansion – Arrival Hall, Departure Holdroom and Concessions

Figure 7.4: Phase 2 ATB Expansion (Baggage Room & Airline Offices)

7.5 ATB CLASS D COST ESTIMATE

The following table indicates the approximate cost of construction of the ATB Expansions in phases.

Figure 7.5: ATB Class D Cost Estimate

	Additions @ $7,900 / sq. m*	Renovations @ $2,700 / sq. m*	Totals
Existing			1480 sm
Phase 1	394 sm $3,112,600	692 sm $1,868,400	1880 sm ** $4,981,000
Phase 2	62 sm $498,000	49 sm $132,300	1940 sm ** $630,300
Subtotal	456 sm $3,610,600	741 sm $2,000,700	1940 sm ** $5,611,300
Allowance for civil work at ATB			$100,000
Design & construction contingencies at 23%			$1,313,600
Total building construction			**$7 025 000**

* Net construction cost prorated from BTY 2015 figures for WKRA expansion
** Total building area

The cost estimate in Figure 7.5 specifically ***excludes*** the following items:

- Land costs
- Professional fees and disbursements
- Planning, administrative and financing costs
- Legal fees and agreement costs / conditions
- Building permits and development cost charges
- Removal of hazardous materials
- Screening and baggage equipment
- Loose furnishings and equipment
- Unforeseen ground conditions and associated extras
- Off-site works
- Phasing of the works and accelerated schedule
- Decanting and moving
- Costs associated with “LEED” certification
- Project commissioning
- Erratic market conditions, such as lack of bidders, proprietary specifications
- Seismic upgrade work
- Unforeseen existing building conditions
- Code upgrades
- Cost escalation past January 2019

8.0 AIRPORT ACCESS AND TRAFFIC IMPACT ASSESSMENT

Airport access is a critical aspect of accommodating future traffic growth and separating the various flows by key airport destination (passenger terminal, cargo and other aviation / non-aviation commercial) from the gaming / hotel destined traffic. The main entrance to the airport currently funnels all traffic into the airport through this single access point, and gaming centre traffic must proceed past the terminal. There is an opportunity to redevelop the main entrance such that the flows of traffic to the gaming centre can be separated from traffic destined for the passenger terminal and aviation commercial lots. In future, as new commercial lands develop, a 2nd airport access point at the south-west corner of the airport should be planned for.

With respect to current traffic volumes, a review was conducted on the *McElhanney Traffic Impact Study for Airport Lands – Draft Report* (unknown date – assumed 2012) with specific reference to the base volumes, development related volumes and access considerations. As the McElhanney Report is dated 2012, a brief update on the traffic volumes was completed as described below.

8.1 WEEKDAY PM PEAK HOUR BASE VOLUMES, 2012 AND 2025

The weekday PM Peak Hour base volumes are provided in the McElhanney Traffic Impact Study with traffic data gathered from intersection counts completed on September 21 and 28, 2011. Surrounding area permanent count stations were reviewed via the BC MoTI (Ministry of Transportation & Infrastructure) website (https://prdoas3.pub-apps.th.gov.bc.ca/tsg/ and identified an average compound annual growth rate of 1.0%. The 2012 based traffic data was then projected to 2025 PM Peak Hour data. Both the 2012 and 2025 Weekday PM Peak Hour base volume data is presented in Figure 8.1 and Figure 8.2 below.

Figure 8.1 – 2012 PM Peak Hour Pre-Development Volumes

Figure 8.2 – 2025 PM Peak Hour Pre-Development Volumes

8.2 DEVELOPMENT RELATED TRAFFIC VOLUMES, ACCESS POINTS AND DISTRIBUTION

8.2.1 Previous 2012 Development Related Trip Generation

The trip generation calculations proposed by the previous 2012 TIA were reviewed and the proposed Gross Floor Area (GFA) of the buildings appear to be overly conservative and quite aggressive for the City of Castlegar and surrounding area and are more applicable to a major metropolitan center such as Kelowna, Burnaby or Surrey, BC. Based on back-calculations on the McElhanney Report, the data suggests building footprints of >140,000 sq. ft. for the Home Improvement Store, >190,000 sq. Ft. for the Department Store, etc. Traffic analysis for this TIA is not based on the previously assumed trip generation

8.2.2 Proposed 2020 Development Trip Generation – High Density

In consideration of a high-density and "aggressive" format of development to include a Retail Commercial Subdivision format, the trip generation was developed to a more community-appropriate sizing based on the 40-acre development. Table 8.1 identifies the GFA, the proposed occupancy and the development related volumes proposed for this assignment.

Table 8.1 Trip Generation for the Weekday PM Peak Hour – High Density

ITE Land Use Category	Rate or Formula	Total Trips	Trips Entering	Trips Exiting
Specialty Retail Store (50,000 s.f.)	Avg Rate = 5.02	250 trips	125 trips	125 trips
Home Improvement Store (75,000 s.f.)	Avg Rate = 2.33	176 trips	88 trips	88 trips
Department Store (50,000 s.f.)	Avg Rate = 1.95	98 trips	49 trips	49 trips
Discount Club (60,000 s.f.)	Avg Rate = 4.18	250 trips	125 trips	125 trips
TOTAL		**774 trips TOTAL**	**387 trips ENTERING**	**387 trips EXITING**

8.2.3 Internal Capture Rate

The internal trip generation characteristics of a mixed-use development site are directly related to the mix of on-site land uses. When combined with a single mixed-use development, these land uses tend to interact and affect a portion of each other's trip generation. For purposes of this TIS and based on the projected development format, an

internal capture rate of 15% was implemented and reduces the total trip generation for this development as outlined in Table 8.2.

Table 8.2 Trip Generation for the Weekday PM Peak Hour – High Density

ITE Land Use Category	Internal Capture Rate	Total Trips	Trips Entering	Trips Exiting
Specialty Retail Store (50,000 s.f.)	15%	212 trips	106 trips	106 trips
Home Improvement Store (75,000 s.f.)	15%	150 trips	75 trips	75 trips
Department Store (50,000 s.f.)	15%	82 trips	41 trips	41 trips
Discount Club (60,000 s.f.)	15%	212 trips	106 trips	106 trips
TOTAL		**656 trips TOTAL**	**328 trips ENTERING**	**328 trips EXITING**

8.2.4 Access Points and Directional Distribution

The existing access at Highway 3A and the Airport Access / Frank Beinder Way is a two-way stop-controlled intersection with free flow on the highway. The geometric features of the intersection appear to support future traffic signals due to the right-turn cut-off islands and will be confirmed under future detailed design. It is known due to site visits and airport use that the outbound (westbound) left-turn movement experiences occasional significant delays when trying to exit the airport heading southbound. Based on the authors experience on two-way stop-controlled intersection, neither of the two development scenarios identified in Table 8.1 and 8.2 will be supported via a two-way stop-controlled intersection.

There has also been discussion on a second all-directional access point along Highway 3A located south of the Highway 3 / 3A interchange and north of the Commercial Truck Weigh Scale. This intersection will provide considerable resources from a traffic and transportation planning perspective for airport functions and for the proposed commercial development. For purposes of discussion, this new access is called Airport Access South and is located approximately 1.3km south of Airport Access North / Frank Beinder Way. Considering both the existing traffic and the proposed development related traffic, the following is assumed:

- Existing Traffic - 80% of existing traffic to/from Airport Access / Frank Beinder Way remain at this access and the other 20% are redistributed to the Airport Access South.

- Development Related Traffic - 25% of the Commercial or Light Industrial Traffic are directed to the existing Airport Access and 75% are directed to the new Airport Access South.
- Directional Distribution - 75% of traffic enters and exits from the south with the remaining 25% entering and exiting to the north.

8.3 NORTH ACCESS INTERSECTION ANALYSIS

8.3.1 High Density Development – Two-Way Stop Control at Highway 3A and Frank Beinder Way

The 2025 Weekday PM Peak Hour was analyzed for the Trip Generation based on the high-density assumptions listed in Table 1 and 2 above with the 2025 PM Peak Hour Post-Development related volumes identified in Figure 8.3 below. For initial analysis purposes, the traffic control was maintained as two-way stop control with free flow on Highway 3A.

Figure 8.3 – 2025 Weekday PM Peak Hour Post-Development Traffic Volumes

The resulting traffic considerations based on stop-control on the high-density option identify a concern with the westbound left movement that operates under a Level of Service E with >55 seconds of delay and queues extending over 50 meters. With consideration of the westbound approach and the potential elliptical roundabout within Airport Grounds west of the highway, the queue lengths are a major concern and may queue up to the outbound approach to Chances Casino. This is highly not recommended due to queue lengths, driver frustration, egress complains and safety on the highway due to reduced safety thresholds with drivers escalating risk to complete the outbound movement.

8.3.2 High Density Development – Traffic Signals at Highway 3A and Airport Access North / Frank Beinder Way

Due to traffic operations and safety concerns, the intersection of Highway 3A and Airport Access North is projected to yield poor traffic operation for the outbound (westbound) left-turn movement. As such, other forms of traffic control are explored and may include traffic signals. A standard signal timing plan was implemented and in recognition of highway operations, the cycle time was set to 100 seconds with the northbound and southbound directions set on maximum recall (i.e. priority green provided to Highway 3A).

The implementation of traffic signals changes traffic operations on the highway with delays at this "new" signalized intersection as previously northbound and southbound movements were un-interrupted. The overall results of the intersection are very good with an intersection LOS A with <10 seconds of delay and the westbound (outbound) movement projected to operate with a LOS B with 19 seconds of delay and a 95th percentile queue length of 35 meters (previously was 50 meters). In future conversations with MoTI and under detailed signal analysis, it could be expected that the signalized intersection may be adjusted and refined further and potentially reduce the delay and queue length further.

8.3.3 High-Density Development – Roundabout at Highway 3A and Airport Access Road North / Frank Beinder Way

A single lane roundabout with an inscribed circle diameter of 40 meters was considered at this location and from an operational perspective, the roundabout provides an overall LOS A with all approaches operating with a LOS A and would provide great LOS for future years of traffic and development. However, there are high concerns if the physical geometrics between the Highway 3A Roundabout and the potential internal Airport Roundabout can be accommodated. In review of the very conceptual review, the use of both roundabouts is unlikely from a geometric perspective due to the distances between roundabouts.

Figure 8.4 – Roundabout at Highway 3A

8.3.4 Cost Estimate, Airport Access Road North

The cost of the proposed high-density access / roundabout at the airport's entrance is summarized in Table 8.3:

Table 8.3 – Cost of High-Density Roundabout

COST ESTIMATE	Unit	Quantity	Rate ($)	Cost
Mob/Demo	ea.	1	200000	$ 200,000.00
AC removal	m2	1160	15.00	$ 17,400.00
AC milling	m2	300	15.00	$ 4,500.00
Asphalt	tonne	835.68	200.00	$167,136.00
25mm IGB (top gravel)	m2	744.5	75.00	$ 55,837.50
SGSB (lower gravel)	m3	753	60.00	$ 45,180.00
Excavation	m2	2337	20.00	$ 46,740.00
Retaining Wall	m2	55	1,500.00	$ 82,500.00
Curb & Gutter	m	450	150.00	$ 67,500.00
Landscaping	m2	1610	10.00	$ 16,100.00
	Sub-total Estimate			$702,893.50
	Contingencies		30%	$ 210,868.05
TOTAL COST ESTIMATE*				**$ 913,761.55**

The landside cost estimate does not include the following:

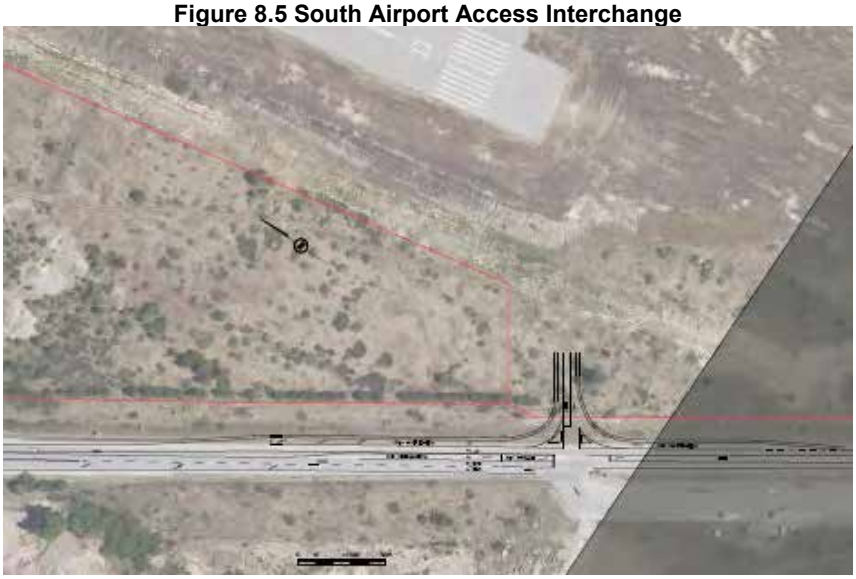
- Shallow services (BC Hydro, Telus, Communications, Fibre)
- Deep services (water, sewer, LDS)
- Engineering
- Property
- Permits
- Archeological investigation, environmental investigations
- Consultations with First Nations, General Public

8.4 AIRPORT SOUTH ACCESS ANALYSIS

A second airport access point will be required in the future when additional commercial areas are developed. The access point is located at the South-West corner of the airport across the road (3A) from another entrance; refer to Figure 8.5.

Weaving lane(s) will be required along Highway 3A from the proposed Airport South Intersection to the interchange 3/3A off-ramp. The weave works, but we only have about 100 meters distance of "full lane width" from the end of the taper of the acceleration lane for Airport South Access to the start of the departure lane near the interchange to depart onto Highway 3. This should be a future discussion point with the Ministry of Transportation and Infrastructure (MoTI) on whether or not the 100m full lane width will be appropriate.

Figure 8.5 South Airport Access Interchange



In Figure 8.6, Airport South Access is shown with full acceleration and deceleration lanes for northbound and southbound directions (similar to the existing North Airport Access). Right-turn cut-offs (RTCO's) and median left-turn lanes are identified for the Airport Commercial side only. The west side access leads to a Road Maintenance Yard. There likely needs to be more review on what the west side approach should look like (i.e. right-turn cut-off islands) and who should pay to accommodate future traffic signals. We may not absolutely need the RTCO's on the west side and this is also a required discussion with MoTI. Traffic signals may be accommodated without RTCO's.

Figure 8.6 South End Airport Access Concept – Turning Lanes

Table 8.4 below provides a high-level cost estimate for the on-highway improvements of Highway 3A at the Airport South Access junction. Note that there is a significant embankment along the property line that we need to remove for a portion of the assignment. Also included are the traffic signals at $450k that "may" be a shared cost with MoTI.

Table 8.4 Signalized Intersection at Airport South Access

Item	Unit	Quantity	Rate	Cost / Item
Mob/Demob.	ea.	1	$200,000	$200,000.00
AC removal	m2	1160	$15.00	$17,400.00
AC milling	m2	350	$15.00	$5,250.00
Asphalt	tonne	650	$200.00	$130,000.00
25mm IGB	m2	550	$75.00	$41,250.00
SGSB	m3	1300	$60.00	$78,000.00
Excavation	m2	13000	$20.00	$260,000.00
Revegetation	m2	1610	$10.00	$16,100.00
Traffic Signals	m	1	$450,000.00	$450,000.00
Landscaping	m2	1610	$10.00	$16,100.00
		Sub-total Estimate		$ 1,214,100.00
		Contingencies	30%	$ 364,230.00
	Total CONSTRUCTION ESTIMATE			**$ 1,578,330.00**

The cost for the South Airport Access junction estimate does not include:

- Shallow services (BC Hydro, Telus, Comm / Fibre)
- Deep services (water, sewer, LDS)
- Engineering
- Property acquisition
- Permits
- Archeological or environmental investigations

8.5 LANDSIDE ACCESS RECOMMENDATIONS

Based on the analysis identified and discussed above, there will be a need to develop a second access within the Airport lands to accommodate the future commercial development. Discussions between the West Kootenay Regional Airport and the BC Ministry of Transportation and Infrastructure (MoTI) should be held to identify an appropriate location for this all-directional access to Highway 3A.

Future accommodation for the installation of traffic signals at Highway 3A and Airport Access Road North / Frank Beinder Way should also be considered and discussed with MoTI on timing, design and payments. Based solely on traffic projections from 2011 base data and without additional development, the existing intersection will likely work within acceptable limits for several years with intermittent delays for the westbound (outbound) left-turn movement. Collision data was not obtained for this intersection; hence the Signal Warrants Analysis was not conducted. Figure 8.7 below indicates the potential alignment of the main intersection.

The proposed second access (Highway 3A at Airport Access South) will likely require the installation of traffic signals as the commercial development advances and grows to fruition and actual traffic volumes are obtained and analyzed.

Figure 8.7: Potential Alignment of Intersection at Highway 3A and Airport Access Road

As development progresses, intersection traffic counts should be conducted and collision data obtained to identify appropriate due-diligence, data sharing with MoTI, identify the appropriate timing for the installation of signals, identify the needs and timing for development of Airport Access South.

9.0 LAND USE PLAN AND GROUNDSIDE DEVELOPMENT

9.1 ZONING BY-LAWS

Currently, the airport has a well-defined zoning by-law plan that should be assigned to each developable parcel. In moving forward with the development of airport parcels, it is required to take into consideration The City of Castlegar Zoning Bylaw. In addition to local by-laws, Stantec has provided airport land development guidelines, which will assist the City of Castlegar with common areas of concern and best practices developed over many years of combined experience working with a variety of airports in Canada and abroad. The land development guidelines are provided in Appendix G.

Considering the development concepts presented in section 4, two (2) major zoning categories should be considered:

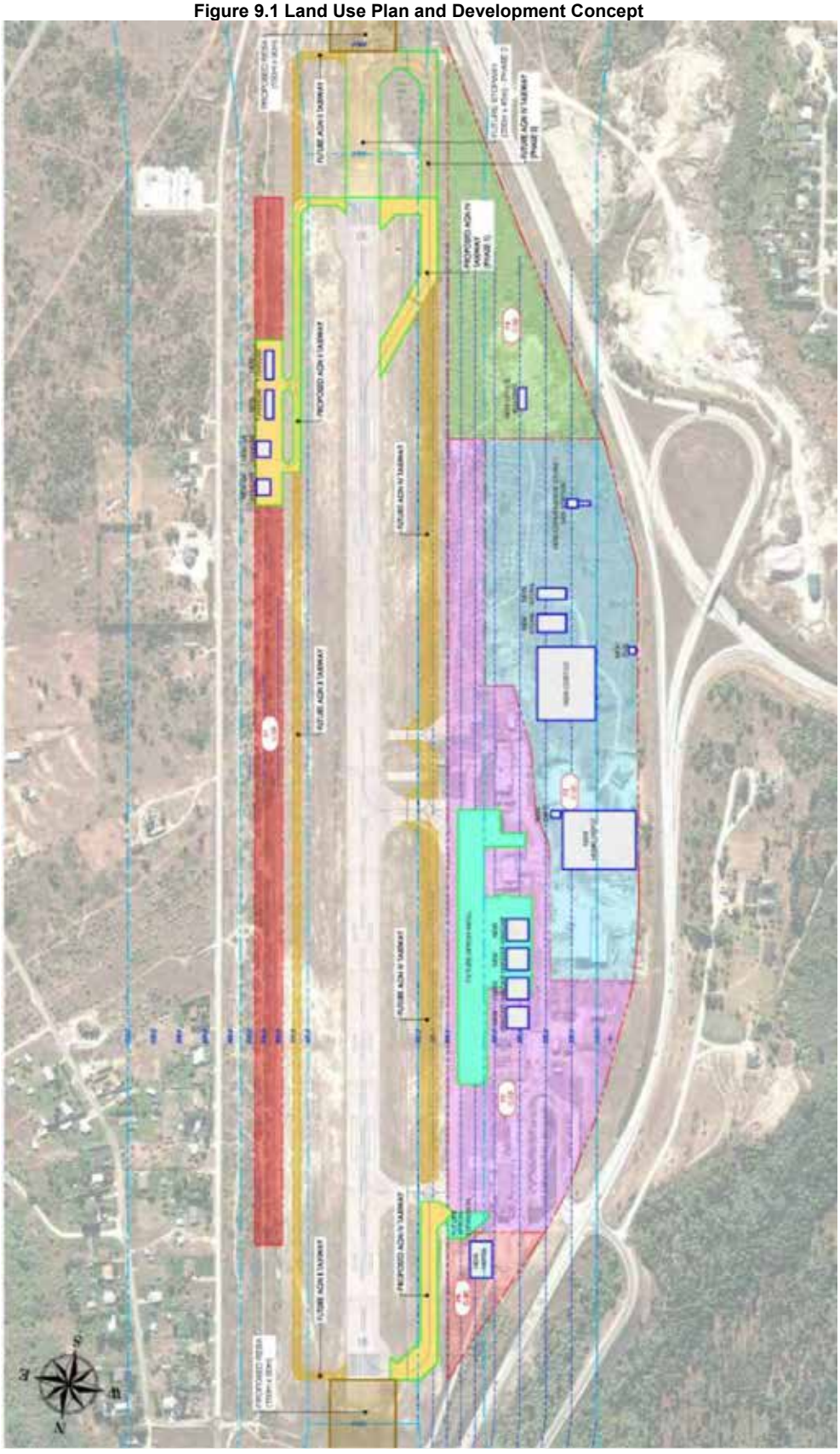
- Lots to be created through subdivision in C-3B Zone shall be large enough to encompass a horizontal rectangle which is 36.0 m (118.1 ft) wide and 30.0 m (98.4 ft) long
- Where a lot line forms a common boundary with Highway #3 or Highway #3A, a buffer strip shall be provided along the lot line.
- All developed portions of the lot not covered by buildings, structures or paved areas shall be landscaped and maintained

9.2 VALIDATION SUMMARY

Consultation sessions took the form of on-site One-on-One meetings and telephone interviews. Following those consultation sessions, a number of potential concepts were identified. The next step in the process was to carry out a high-level validation process to determine which concepts should be retained. This section presents the list of concepts that were retained for YCG. All parcel details are indicated in full in Appendix D.

Figure 9.1 indicates the overall land use plan and development concept that is proposed for the WKRA.

Figure 9.1 Land Use Plan and Development Concept



9.3 RETAINED DEVELOPMENT CONCEPTS

Table 9.1 below presents a list of retained development concepts for each of the available land parcels. The list of parcels in the table refers to those illustrated in Drawing SP-1 (over page). It also provides a short summary of the proposed development concepts. The full details are provided in the following section..

Table 9.1 Retained Concepts

Concept	Parcel	Justification for retention
General Aviation Airpark and Cabins	**P1**	For many years, General Aviation has found a home elsewhere. With this current Master Plan there is an opportunity to identify an area of the airport that will provide a purposed developed area for the use of GA pilots where T-Hangars, regular hangars and Cabins will be constructed and used by GA pilots. This is a real opportunity to get a portion of the GA clientele back at the airport that will generate revenues in terms of hangar leased or built and any other expenses they may make at the airport (fuel, food, etc.).
ATB, Aeronautical and Aviation Related Commercial	**P2**	The western ramp area already has a number of businesses and organizations that have elected to reside on the airport. There are, however, a number of other parcels of land available for number of other buildings. Also, the land at the airport offers two-level situation. It is desirable to keep the top level for airside use and if necessary, build a taxiway extension and ramp toward the highway to accommodate additional hangars. This is really the only land left for the airport to develop aviation and aeronautical activities.
Commercial Development	**P3**	The lower western area of the airport close to the highway is quite large at 126,900 square feet. It is easily accessible from the highway and hence offers an opportunity for Castlegar to benefit from out of town customers. By selecting the right tenants, this commercial development park would bring great retail and revenue generation opportunities to Castlegar. In selecting tenants for this parcel, it is important to ensure that we don't create an exodus from the downtown core. This would greatly enhance the economic development ecosystem.
Light Industrial Park	**P4**	The lower level of the south-western portion of the airfield cannot be used for airside development and no accesses can be constructed to allow that access. This is a perfect area to accommodate other industrial uses. It is proposed to use a portion of that lower land to develop a light industrial park where businesses can setup their facility and be near the highway, making it easy to leave town on the way to their market clients/customers. This Light Industrial Park would bring economic development as well as creative landscaping to the city to help drive growth to Castlegar
Hotel Implementation	**P5**	Castlegar has a number of hotels that cater to businesses, workers, and sports teams. Creating a small entertainment ecosystem with the Casino by the attraction of a high-end boutique hotel would fill a gap in the tourism and business industry. It is a very active community especially during summer months, and a hotel would at the airport would not only extend the travel ecosystem but also the economic development.

9.4 PROPOSED DEVELOPMENT CONCEPTS

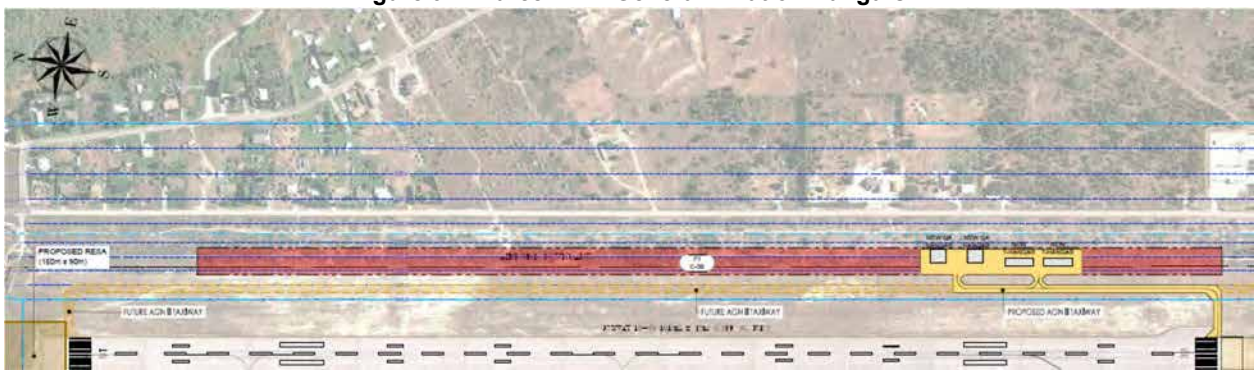
For the purpose of this mandate, we have identified five (5) parcels of land for future land use developments. Each of the parcels has been labelled and a vocation provided for each of them. The following sections provide a description of the vocation for each of the identified developable parcels along with full details on the proposed concepts. To assist in the preparation and calculation of a 20-year financial revenue forecast modelling, average construction costs were obtained (and adjusted to reflect the Southern Interior of British Columbia) from the 2019 Canadian Cost Guide which is published annually by Altus Group – a leading provider of software, data solutions and independent advisory services to the global commercial real estate industry. In addition to the figures in this chapter, the overall master plan land use drawings are provided in Appendix D.

The City of Castlegar is not required to fund all of the WKRA developments outlined in the proposed development parcels. Third party private investors and business owners are expected to fund their buildings, pavements, tie-in utilities, laneways and parking lots. The City should consider preparing the development of the parcels and funding a fair portion of the cost of access roads, utilities and related infrastructure. Common airside pavements (public aprons, taxiways, runway related) should be funded by the City with available federal and provincial funding support.

9.4.1 Parcel P1 – General Aviation (GA) Air Park - Hangar Developments

Parcel P1 is located on the upper north air side of the airport beside the main runway. Parcel P1 represents additional space that could be dedicated to GA hanger development. Figure 9.2 illustrates parcel P1 location on the airport in red hatch.

Figure 9.2: Parcel P1 – General Aviation Hangars



9.4.1.1 General Concept Definition

In order to pursue and grow its activities related to general aviation (GA), West Kootenay Airport should consider promoting the development of hangars. The objective of this development concept would be to construct the necessary infrastructure to support the needs of both the local pilot community and attracting aircraft owners from outside the region interested to base their aircraft at YCG on the short, medium or long term. Another proposed purpose in generating additional revenue is to construct T- hangers for an aviation airpark. Pilots can store their plane within the hangar, as well as live in a residential like community with sewer, water, natural gas and individual electric meters. The T- hangers could also be rented out to anyone who is not a pilot, however it should be noted they would be zoned for commercial use, not residential use – nevertheless they would be deemed “living spaces”.

The construction of hangars would also generate additional air activities at the airport. In addition to income from land leasing and hangar leasing, the concept would result in additional revenue from fuel sales in addition to other airport fees (e.g. parking fees) and potentially new contracts and customers for local MRO companies. At this time, MRO activities are very limited. The increase in aircraft on the airport would favour the attraction of aircraft maintenance facilities to support pilots' needs for their aircraft. In addition, additional pilots would increase terminal restaurant traffic, leading to potentially growth of the present facility. In general, there would be significant economic impacts for the airport and the community generated from the development of a GA community at YCG.

9.4.1.2 Concept Validation and Market Demand

Currently, there are 5,795 aircraft in British Columbia[10]. The airport does not have any significant numbers of GA aircraft on the airport and does not currently hold a waiting list for GA hangars. However, the continuation of GA developments for the identified area is logical, mainly because the parcel offers easy access to the runway. Additionally, given other proposed development concepts detailed in this study (for example the Aviation Park), it is anticipated that more pilots will be attracted to the airport which should create a higher demand for aircraft hangars. In the area, there is a total of approximately 100 GA aircraft that can be located at YCG, feeding the development of this parcel and generating revenues for the airport. This is a long-term strategy for which some initial investments would be required.

9.4.1.3 Development Approach

Proposed construction of zoning for P1 would begin with an AGN II (small single or twin-engine G/A aircraft) parallel taxiway that is 10.5 meters wide that connects to two (2) taxiways spanning 10.5 meters wide accessing the G/A apron and access for aircraft into the T-hangars. The hangar specs used are 60' W x by 51' D x 18' H. Square footage ranges from nine hundred and sixty (960) square feet to one thousand seven hundred and thirty (1,730) square feet - with the majority at one thousand forty 1,040 square feet. The T-Hangar specifications are typically, 11 m x 40 mand are designed to hold four (4) single-piston engine or small aircraft.

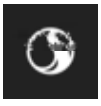
The development approach for the aviation condo hangars will depend on the perceived demands. The proposed plan for the airport would be to choose (in advance) either the northern or southern side of P1 for this development project. The airport would make the investment to construct the first hangar and once fully leased, would then proceed with the development of the second hangar and potentially construct additional hangars as demand increases. The airport will own the T-Hangars and lease them to interested users.

For financial projections purposes, it is considered that the first T-hangar will be constructed in year three (3) and the second T-hangar in year six (6). The first privately-owned and constructed box hangar is projected to be constructed in year five (5) and subsequent box hangars will be constructed every five (5) years (based on demand). This means that following a period of 20-years, six (6) T-hangars and four (4) box hangars would be built on P1.

9.4.1.4 Zoning

Parcel 1 is located in Zone C-3B. The proposed development for this parcel falls within the city zoning permitted uses. No exemptions would be required. As a best practice however, we are suggesting that the city restrict some of its proposed land uses in Zone C-3B as it currently denotes permissible development activity that could include department stores, motels, office uses, recreational vehicles, etc. (see Appendix B). Additionally, this would fall

[10] http://wwwapps.tc.gc.ca/Saf-Sec-Sur/2/CCARCS-RIACC/SmRp.aspx



within Transport Canada requirements as they want to ensure there is an aviation/aeronautical mandate associated with this type of land development.

9.4.1.5 Infrastructure Requirements and Costs, Parcel P1

Considering the importance of those investments for the airport, the infrastructures were financed at a 5% interest rate over 25 years in the financial projections. Table 9.2 describes all the assumptions used for this concept.

Table 9.2 Proposed AGN II Parallel Taxiway Connecting to Hangar Aprons

P1 Development Area		Units	Estimated Quantity	Unit Rate	Total Cost
F.1	Clearing and Grubbing	m2	11,350	$3.00	$34,050.00
F.2	Common Earth Excavation	m3	11,350	$45.00	$510,750.00
F.3	Crushed Aggregate Base Course	m3	3,450	$65.00	$224,250.00
F.4	Crushed Aggregate Sub-Base Course	m3	5,700	$65.00	$370,500.00
F.5	Hot Mix Asphalt Airside Pavement	Tonne	2,900	$250.00	$725,000.00
F.6	Asphalt tack coat	L	3,675	$3.00	$11,025.00
F.7	Painted traffic lines and markings -	LS	1	$12,000.00	$12,000.00
F.8	Taxiway Subdrain	linear m	700	$300.00	$210,000.00
F.9	CB Structures	ea.	8	$12,000.00	$96,000.00
				Sub Total	$2 193 575.00
				20% (Contingency)	$519 660,00
				Total	**$2,632,290.00**

9.4.1.6 Financial Analysis

Tables 9.3 and 9.4 provide the assumptions that have been used in the 20-year financial projections for the proposed developments on parcel P1. The taxiway, apron and access road will be the responsibility of the airport. Since the cost of the two (2) proposed box hangars will be covered by the hangar owner, it will not be included as a cost to be incurred by the city. The actual cost of construction of the two (2) T-hangars (which will be absorbed by the city) will be used as a guide for calculating the approximate value of the two (2) box hangars necessary for calculating the appropriate tax assessment.

Table 9.3: Parcel P1 Financial Analysis Assumptions for T-Hangars

Item	Rate per T-Hangar	Annual Amount per T-Hangar
Single Building Footprint	440 sqm (4,736 sq ft)	
Land Lease Rate	$2.69/sqm ($0.25/sq ft)	$1,184
Building Assessment Value (Construction Costs)	$562.41/sqm ($52/sq ft)	$247,460
Annual Inflation Rate	2%	

The estimated capital expenditure for 2 T-Hangars is $520,000 including a 20% contingency, all of which would be borne by the City of Castlegar. Revenue streams for hangar space rentals may offset investment costs over time.

Table 9.4: Parcel P1 Financial Analysis Assumptions for Box Hangars

Item	Rate per Box Hangar	Annual Amount per Box Hangar
Building Footprint	418 sqm (4,499 sq ft)	
Municipal Tax Rate	$19.7103 / $1,000	$885
Land Lease Rate	$2.69/sqm ($0.25/sq ft)	$1,124
Building Assessment Value (Construction Costs)	$1,175.96/sqm ($109/sq ft)	$491,551
Annual Inflation Rate	2%	

The estimated capital expenditure for two (2) Box Hangars is $1,800,000 including a 20% contingency, of which 25% would be borne by the City of Castlegar to cover cost of services to the east side G/A area. Revenue streams for box hangar land leases and municipal taxes may offset investment costs over time.

Based on the previous assumptions, the 20-year financial revenue projections for P1 Parcel is:

Projected Revenues:

Airport-owned T-Hangars, x Two (2), Space leases:	$ 1,682,170
Privately-owned Box Hangars, x Two (2), Land lease:	$ 116,354
Municipal taxes:	$ 1,002,576
Total Revenues over 20 years:	**$ 2,801,100**

Estimated Capital Expenditures:

Two (2) T-Hangars (airport owned):	$ 519,670
Two Box Hangars (privately owned, city share of servicing cost:	$ 294,931
East side G/A taxiway, phase 1 (50% grant funding):	$ 1,316,145
Total Expenditures:	**$ 2,130,746***

**not including the cost of borrowing*

It is important to recognize the lease rate used in the calculation of the T-Hangars. The assumption is made that the T-hangar lease of $48.44/sqm is a reasonable figure for the area. This figure can be adjusted according to market values as the city nears construction. For the privately-owned lots, the land lease rate will need to be validated before the lots are leased. The assumption has been made that the land lease rate would be $2.69/sqm *for the privately-owned box hangars.*

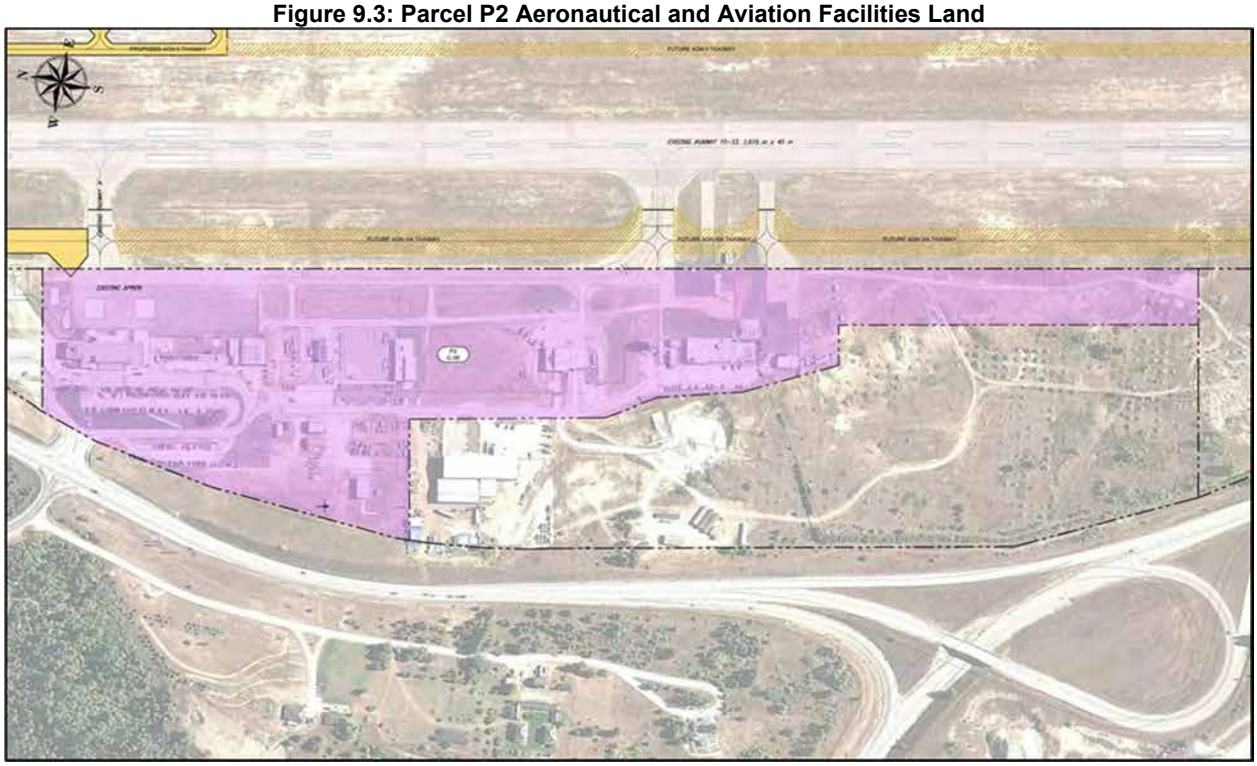
9.4.2 Parcel P2 – ATB, Aeronautical and Aviation Related Commercial

9.4.2.1 Parcel P2 Location on the Airport

Parcel P2 is located on the western side of the runway, covering a large amount of land. Some of this land is already in use by the airport and the rest is ready for development for aeronautical and aviation activities. P2 parcel includes the Air Terminal Building, the main apron and the parking lots. The area to the south of the ATB complex includes general aviation facilities and green space that could accommodate additional large hangars.

There is vacant land also adjacent to the Dam Helicopters leasehold which could also be utilized for private and public helicopter transport (charter, medical evacuations and patient transfer). We can also contemplate that this area and that to the south end of Parcel P2 can be utilized for future air/ground connectivity related to cargo, drone delivery zones and other logistical services.

Figure 9.3: Parcel P2 Aeronautical and Aviation Facilities Land



9.4.2.2 General Concept Definition

In Parcel P2, there is a demand for more helicopter operations and other aviation companies to promote aeronautical activities at West Kootenay Airport. As there is already land that is developed and buildings ready to rent, the concept is to extend the south taxiway to allow for general aviation aircraft (GA) and helicopters to access new hangar lease lots. As for the vacant land, it is available for the airport to develop aeronautical buildings. The buildings could be anywhere from 929 sq. meters (10,000 ft^2) to 2,787 sq. meters (30,000 ft^2).

9.4.2.3 Concept Validation and Market Demand

In speaking with Brilliant Aviation Helicopters – they already see a demand for more general aircraft hangar space. According to their experience, another hangar that is of similar size would rent quickly and they would consider the opportunity of building a hangar on the airport. The company has a small hangar (3000 sq. ft.) that is rented to small general aircraft (GA) (4 or 5 aircraft depending on size) owners mostly through the winter (between $300 and $400 a month). Similar to Brilliant Aviation, Wildfire Management Services also sees a need for more hangar space. An aircraft management engineer gets deployed from Kamloops when repairs are required. Access to a hangar could be an asset if space was available for maintenance and repairs.

9.4.2.4 Development Approach

Proposed construction of zoning for P2 would begin with a parallel taxiway extension ramp that is 422 metres x 13.5 metres which makes for a surface coverage area of 5,697 square metres. As the ramp would be required on either side of the taxiway, this doubles the surface coverage by bringing it up to 11,394 square metres. The purpose of this extension ramp would be to serve new and existing hangars for larger business aviation aircraft and helicopter

aviation services. The rest of the land is available for development for aeronautical activities for the airport such as additional hangars, maintenance and repairs. To accommodate for a 30.5-metre-wide taxiway between the two ramps, the average hangar size is being proposed at 1,395 square metres (45 metres x 31 metres). Construction of the taxiway, access road (with angle parking) and ramps will be the responsibility of the airport. The plan would be to develop a new hangar every five (5) years beginning with the area closest to the taxiway and then progressing further back to develop the third and fourth hangar by years 15 and 20.

Figure 9.4: Parcel P2 Aeronautical and Aviation Facilities Land

9.4.2.5 Infrastructure Demands and Costs

The infill of grass islands on the aprons can be done when demand for aircraft parking exceeds the current available capacity. The future parallel taxiways, and portions thereof, are indicated in the overall airside facilities cost estimates. The calculated costs below are for the hangar options, including connecting taxiway and hangar aprons.

To assist in the calculation of the infrastructure requirements and costs for the proposed two-phased Large Hangar developments in P2, the following surface coverage assumptions are being made:

- **Phase I: 7,438.5 sqm:**
  - Two (2) hangars: 2,790 sqm (45m x 31m x 2 hangars)
  - Ramp: 1,336.5 sqm (49.5m x 13.5m x 2m)
  - Taxiway: 3,019.5 sqm (99m x 30.5m)
  - Three (3) metre paved areas surrounding the sides and rear of each hangar: 292.5 sqm
    - North side: 153 sqm (51m x 3m)
    - East side: 93 sqm (31m x 3m)
    - West side: 46.5 sqm (31m x 1.5m)

- **Phase II: 7,438.5 sqm:**
    - Two (2) hangars: 2,790 sqm (45m x 31m x 2 hangars)
    - Ramp: 1,336.5 sqm (49.5m x 13.5m x 2m)
    - Taxiway: 3,019.5 sqm (99m x 30.5m)
    - Three (3) metre paved areas surrounding the sides and rear of each hangar: 292.5 sqm
        - North side: 153 sqm (51m x 3m)
        - East side: 93 sqm (31m x 1.5m)
        - West side: 46.5 sqm (31m x 13m)

The cost of providing taxiway access and apron areas to the new hangar area is indicated in Table 9.5.

Table 9.5 P2 New P2 Apron & Taxiway Estimated Costs

P2 Development Area		Units	Estimated Quantity	Unit Rate	Total Cost
F.1	Clearing and Grubbing	m^2	7,439	$3	$22,316
F.2	Common Earth Excavation	m^3	7,439	$45	$334,733
F.3	Crushed Aggregate Base Course	m^3	7,439	$65	$483,503
F.4	Crushed Aggregate Sub-Base Course	m^3	5,580	$65	$362,700
F.5	Hot Mix Asphalt Airside Pavement	Tonne	5,580	$250	$1,395,000
F.6	Asphalt tack coat	L	5,580	$3	$16,740
F.7	Painted traffic lines and markings	LS	1	$5,000	$5,000
F.8	Apron / Taxiway Subdrain	Linear m	400	$3,000	$1,200,000
F.9	CB Structures	ea	6	$12,000	$72,000
				Sub Total:	$ 3,891,992
				Contingency (20%):	$ 778,398
				Total:	**$ 4,670,390**

9.4.2.6 Financial Analysis Assumptions

Table 9.6 provides the assumptions that have been used in the 20-year financial projections for Parcel P2. The hangar owners will design and build the hangar and lease the lot. The taxiway to the new apron will be the responsibility of the airport and the cost of building the aprons will be borne by the hangar owners. Since the cost of building the proposed box hangars will be covered by the hangar owner, it will not be included as a cost to be incurred by the city.

Table 9.6 Financial Analysis Assumptions

Item	Rate per Hangar	Annual Amount per Hangar
Single Building Footprint	1,395 sqm (15,015 sq ft)	
Building Assessment Value (Construction Costs)	$1,506.95/sqm ($140/sq ft)	$2,102,195
Municipal Tax Rate	$21.0872 / $1,000	$44,270
Land Lease Rate	$1.89/sqm ($0.25/sq ft)	$2,637
Annual Inflation Rate	2%	

The estimated capital expenditure for four (4) Large Box Hangars is $8,408,780 including a 10% contingency. The City of Castlegar will assume the cost of services to the new hangar development area in P2. Revenue streams for box hangar land leases and municipal taxes may offset investment costs over time.

Based on the previous assumptions, the 20-year financial revenue projections for the P2 hangar development is:

Projected Revenues:

Large Box Hangars, x Two (2), Land leases:	$ 115,861
Municipal taxes:	$ 1,941,623
Total Revenues over 20 years:	**$ 2,057,484**

Estimated Capital Expenditures:

Four (4) Box Hangars (privately owned, city share of servicing cost:	$ 462,483
West side taxiway / apron, new hangars (75% private)	$ 1,167,598
Total Expenditures:	**$ 1,630,081***

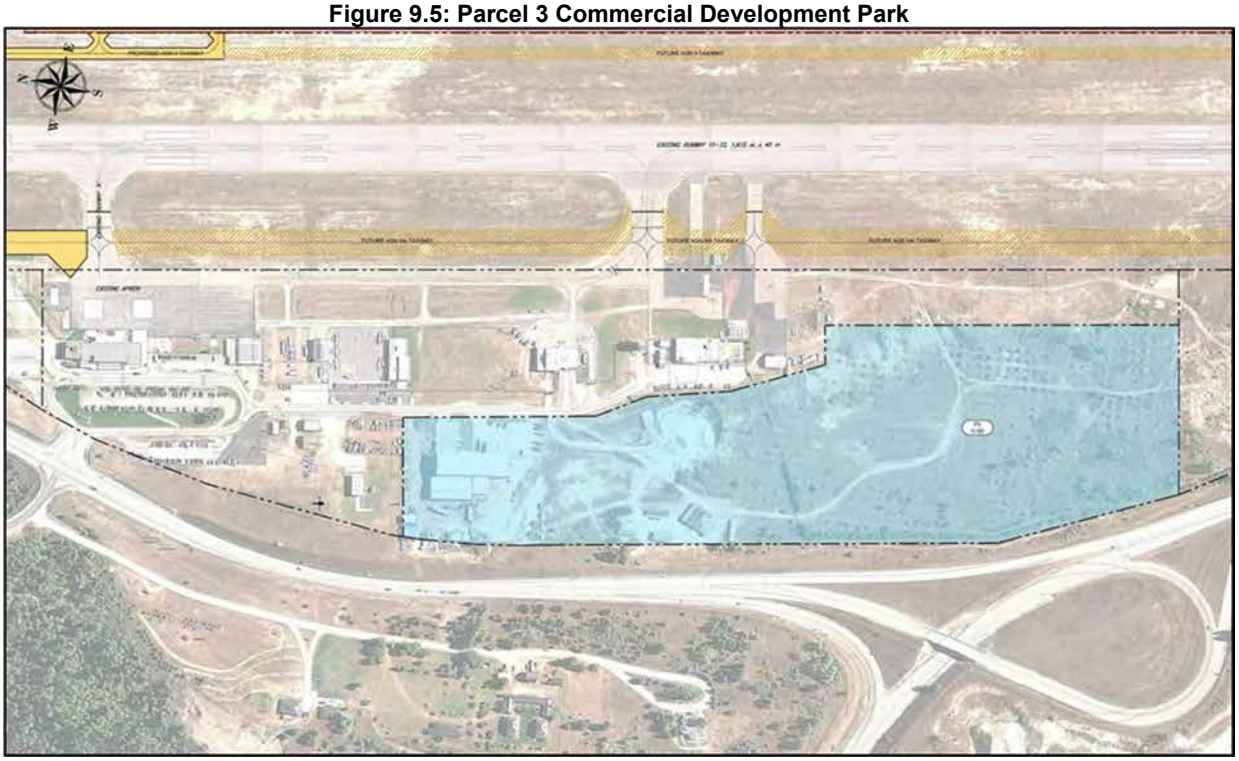
**not including cost of borrowing*

9.4.3 Parcel P3 – Commercial Development

9.4.3.1 Parcel Location on the Airport

The proposed location for the development of commercial lands. Parcel P3 is located on the west and south-west landside of the airport, shown in light blue hatch in the figure below. There is a large amount of land to build upon the commercial development. Figure 9.5 presents the approximate location of the development site:

Figure 9.5: Parcel 3 Commercial Development Park



9.4.3.2 General Concept Definition

In considering a highest and best land use scenario for future development opportunities at the YCG, the possibility of creating a commercial development zone on the groundside of the airport (representing the west side of the runway where there is a significant amount of land). In considering this type of development opportunity, we investigated the surrounding areas and their commercially designated land uses, their proximity to the airport and evaluated a number of relevant commercial services that are believed to have the highest chance for long-term success. In order to establish the proposed commercial development zone, slight modifications to the existing road network must take place in order to free up enough space to support the proposed commercial development opportunities and ensure that enough space is kept for future parking development. As presented in Figure 9.5, the new layout proposes a larger parking lot to ensure sufficient space for the commercial development zone.

Based on the layout of the proposed commercial development zone, the area will host a Costco, Shopping Centre, Convenience store, Home Depot, Pub and Café which entails a total surface coverage of approximatively 11,789.4 square metres, which represents approximately 9.3% of the entire parcel of P3.

9.4.3.3 Zoning

In moving forward with the development of parcel P3, two (2) major zoning categories should be considered:

- The City of Castlegar will not be selling any of the AirPort lands for development. All developments will be by way of lease. We will, however, amend the existing land use covenant to be applied to all of the titles contained in the proposed zone.

- No building or structure except a fence may be located within 15m of highway 3 or highway 3A

9.4.3.4 Concept Validation and Market Demand

The city of Castlegar spoke with big box companies including but not limited to Walmart and Fields who had in indicated interest in further exploring this opportunity. Additional discussions were held by our staff during the validation process for this Master Plan to confirm the interest of some of the box stores for YCG groundside land.

9.4.3.5 Development Approach

The aim is to attract companies that do not require flight line access. The location at the airport on the lower land along the highway is beneficial in terms of transportation access. Illustrated in Figure 9.6 is a preliminary perspective of the proposed layout of the P3 commercial development zone followed by an explanation of each of the commercial businesses being proposed for development within the commercial development zone.

Along the west side of P3 (visible from Highway 3) is a ten (10) metre wide groundside access road which will span approximately 450 metres through P3 and continue along P4 (and ultimately connect to Highway 3 with a proposed highway interchange).

The ideal location for the proposed Pub is to be situated alongside the groundside access road. On the northeastern side of the proposed development area will be two anchor tenants which will be in the form of a big box store. A Home Depot is being proposed as the first big box store with a size of 8,000 square metres (100 metres x 80 metres). Attached along the south side will be a Costco of equal size. Continuing along the south side will be three smaller

commercial businesses which sizes are 1,000 square metres (25 metres x 40 metres), 600 square metres (15 metres x 40 metres) and 400 square metres (10 metres x 40 metres). At the south end of the commercial development zone will be a gas station and convenience store. The pump station will be 102 square metres (17 metres x 6 metres) and the convenience store will be 180 square metres (12 metres x 15 metres).

The ratio of parking spaces required to validate the total square footage leased for business is calculated at 2.75 times the building size. To support these parking requirements and in paying particular attention to the parking needs of the two anchor tenants, a paved parking area will extend 53 metres out from the store fronts in order to meet the minimum required space.

Figure 9.6 Preliminary Perspective of Proposed Development Approach for P3

** This visual is provided solely for illustration purposes.*

Costco

A proposed Costco (not full-size) for within the commercial development zone will provide retail opportunities and revenue generation for the airport. Costco is an efficient, innovative retail store, able to keep their prices low and makes available a number of items available from within a variety of departments ranging from groceries, to retail,

children's apparel, electronics, toys, appliances, automotive, pharmaceuticals and more. It has been proven that when a new Costco store is built, its location becomes an anchor tenant and begins to immediately attract additional businesses to establish themselves nearby. Residents from the surrounding communities would travel into the area to do their shopping and would remain within the city limits to further purchase other consumables, services, dining and even engage in recreational/leisure activities. If a community does not have such a store of their own, residents would typically commute to a neighbouring town that does. The economic impact of having a Costco within Castlegar would be even larger by serving neighbouring communities that are in need of the products and services they make available (for example). This will lead to the creation of many new jobs for residents of the Castlegar area. Costco alone typically employs approximately 200 individuals at each of their sites. An average Costco is 8,000 square metres (with the smallest being 6,781.9 square metres and the largest at 19,045.1 square metres. To be conservative in our financial projects, a Costco of 8,000 square metres was used for estimation purposes.

Shopping Centre:
A shopping centre i**s** being evaluated for consideration at the airport commercial development zone. Fields has expressed some interest with the city in potentially moving forward with this project. With sixty-four (64) locations across western Ontario, Fields can cater to serving families in remote and rural communities throughout Western Canada. Fields offers discounted retail products to its customers. A typical Fields store ranges from 743 to 1,858 square metres.

Home Depot:

A **t**ypical Home Depot prototype store averages 9,922 square metres with approximately 2,601 additional square metres of outside area for garden and landscaping products. The typical store's wall construction is non-insulated concrete tilt panels or insulated precast concrete panels, depending on the region. To be conservative in our financial projects, a Home Depot of 8,000 square metres was used for estimation purposes.

Café

A café can be considered as an element of the airport commercial development zone. A customized approach can be taken to establish a coffee shop presence and could range from a 'coffee corner' or a 'kiosk' within the convenience store, to its own branded space beside the convenience store or a full extension with all the supporting services such as drive-thru and patio could be added. The size of café will depend on 'kiosk' (18.6 square metres) or coffee corner (157.9 square metres). This café will provide an opportunity for shoppers to wind down at the end of their shopping but also for highway traffic to easily have access to this convenience.

Gas Station / Convenience Store

A gas station can be taken into consideration in this commercial development zone as it would benefit passengers, employees, airport staff and those passing by on their adjacent highway. The gas station will be an added value to those who rent a vehicle (from Budget Car Rental) and must return the vehicle with a similar fuel level at the time of drop off. The gas station will also come in handy for rental vehicle agency staff who may also require access to a gas station in close proximity in the event that a vehicle is returned with lower than expected levels of fuel. The gas station will also benefit passengers who have left their vehicles in the parking lot or those responsible for passenger drop-off and/or pick-up and require a fuel fill up prior to leaving the airport. Given it will be easily accessible from

Highway 3, it will also benefit from highway traffic as well as residents that are occupying new homes in the sub-division east of the airport.

A convenience store that resides on the commercial development zone beside the gas station will provide additional retail and revenue generation opportunities. Additionally, with its proximity to the airport terminal, it has the potential to provide passengers (arriving or departing) with quick and easy access to travel amenities, and employees of airport tenants in addition to the general public with snacks and other concessions. The average size of a typical convenience store is approximately 176.5 square metres in size. To be conservative in our financial projects, a Gas & Convenience Store with Pumps of 282 square metres was used for estimation purposes.

Pub:

A pub will provide an additional source of revenue, as well as a potential to provide passengers (arriving or departing), tourists and residents of Castlegar with a 'local' area to enjoy food and beverage while watching airplanes arrive and depart. It is beneficial to make this a pub that offers a variety of beer products, as a recent report indicated that most of the revenue in the restaurant industry comes from beer sales. It is noted that most of the beer sold in Canada is brewed domestically, with nearly 85% of beer sales in the country originating from a local brewery. Meanwhile, sales of imported beer accounted for 15.7% of all beer purchased in Canada—up 4.8 percentage points over the previous 10 years.[11] To be conservative in our financial projects, a Pub of 100 square metres was used for estimation purposes. It is expected that several out of towners will come to Castlegar for shopping at this commercial development complex. The pub will offer an opportunity for some food and refreshments before they return home, making it a more complete experience. Finally, there is a new sub-division east of the airport for which there are very few amenities, this will provide an option close to home.

9.4.3.6 P3 Infrastructure Requirements and Costs

To assist in the calculation of the infrastructure requirements and costs for the proposed two-phased developments in P3, the following surface coverage assumptions are being made:

- P3 total surface coverage: 36,782 sqm:
    - Home Depot, Costco and three (3) smaller stores: 18,000 sqm
    - Parking A: 5,300 sqm (100m x 53m)
    - Parking B: 5,300 sqm (100m x 53m) – includes 100 sqm Pub building footprint
    - Parking C: 2,650 sqm (50m x 53m) – includes 282 sqm Gas & Convenience building footprint
    - Groundside Access Road: 4,500 sqm (450m x 10)
    - Laneway A:1,032 sqm (258m x 4m)

[11] https://www.newswire.ca/news-releases/despite-challenges-beer-industry-is-brewing-up-benefits-for-canadas-economy-669350493.html

Table 9.7 P3 Infrastructure Requirements and Costs

P3 Development Area		Units	Estimated Quantity	Unit Rate	Total Cost
F.1	Clearing and Grubbing	m^2	36,782	$3	$110,346
F.2	Common Earth Excavation	m^3	36,782	$45	$1,655,190
F.3	Crushed Aggregate Base Course	m^3	36,782	$65	$2,390,830
F.4	Crushed Aggregate Sub-Base Course	m^3	18,782	$65	$1,220,830
F.5	Hot Mix Asphalt Airside Pavement	Tonne	18,782	$250	$4,695,500
F.6	Asphalt tack coat	L	18,782	$3	$56,346
F.7	Painted traffic lines and markings	LS	1	$5,000	$5,000
F.9	CB Structures	ea	6	$12,000	$72,000
				Sub Total:	$11,706,042
				Contingency (20%):	$2,341,208.4
				Total:	**$14,047,250**

Based on private investment into commercial development lots, the City may anticipate participating in the land development costs for supporting infrastructure (roads, services, utilities) with a portion (25%) of the overall infrastructure development costs expected, which equates to $3,511,813 and the developer with a 75% share may invest $10,535,438.

9.4.3.7 Financial Projections

Table 9.8 provides the assumptions that have been used in the 20-year financial projections for parcel P3.

Table 9.8: Parcel P3 - Financial Analysis Assumptions

Item	Rate	Amount	Annual Municipal Tax Revenue Generated	Annual Land Leases Generated
Municipal Tax Rate	$19.7103 / $1,000	-	-	-
Land Lease Rate	$1.89/sqm ($0.176/sq ft)	-	-	-
Annual Inflation Rate	2%	-	-	-
Building Assessment Value (Construction Costs)	Home Depot: 18,000 sqm (86,111 sq ft) @ a cost of $2,045.14/sqm ($190/sq ft)	$16,361,120	$322,480	$15,120
	Costco: 8,000 sqm (86,111 sq ft) @ a cost of $2,045.14/sqm ($190/sq ft)	$16,361,120	$322,480	$15,120
	Shopping Centre: 2,000 sqm (21,528) @ a cost of $2,045.14/sqm ($190/sq ft)	$4,090,280	$80,621	$3,780
	Gas Station/Convenience Store: 282 sqm (3,035 sq ft) @ a cost of $2,045.14/sqm ($190/sq ft)	$576,729	$11,368	$533
	Pub: 100 sqm (1,076) @ a cost of $2,045.14/sqm ($190/sq ft)	$204,514	$4,031	$189
	Cafe: 18 sqm (194 sq ft) @ a cost of $2,045.14/sqm ($190/sq ft)	$36,813	$726	$34
		Total:	**$741,705**	**$34,776**

Based on financial forecasting for lease lot and municipal taxes, after a 20-year period, the airport could realize financial revenues of $15,516,819 as shown in the summary below:

Revenues from P3 Parcel over 20 years:

Land leases:	$ 697,124
Municipal taxes collected:	$ 14,819,694
Total Revenues:	**$ 15,516,819**

City / WKRA Portion of P3 Capital Expenditures:

Parcel preparations, roads, utilities:	$ 3,511,813
Land Servicing for 5 building plots:	$ 568,810
	$ 4,080,623*

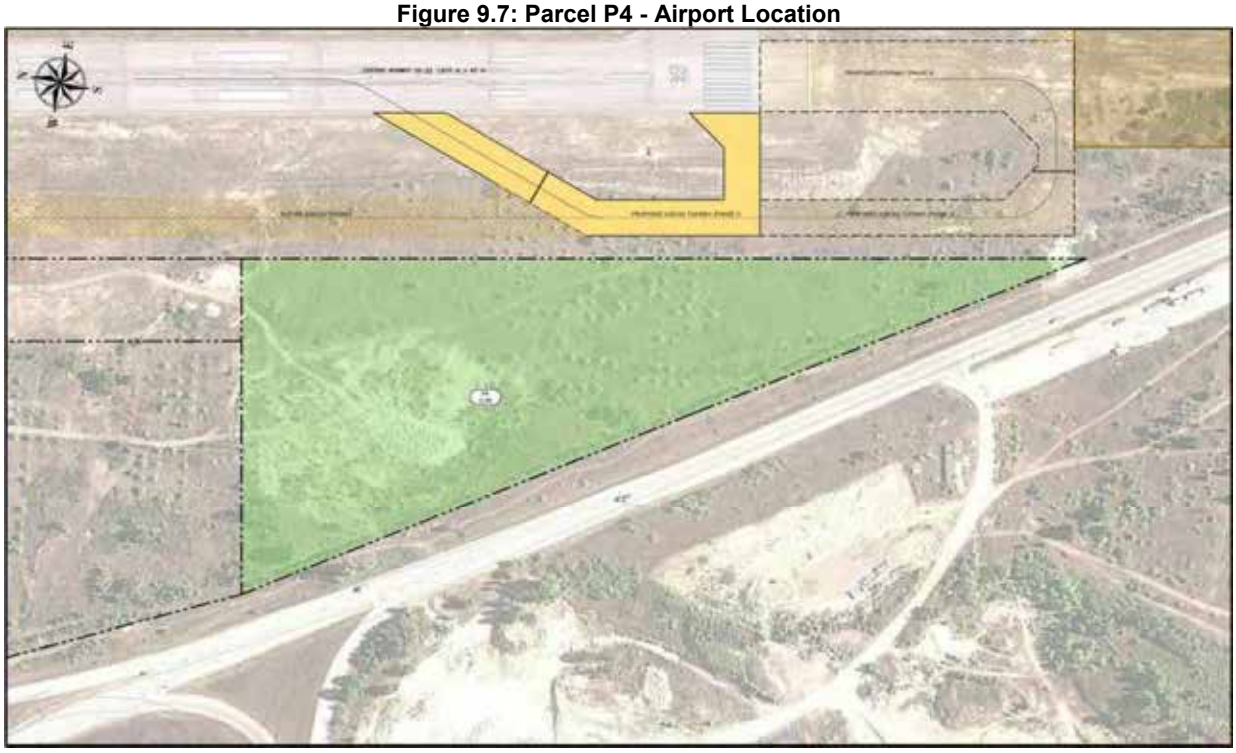
**not including cost of borrowing*

9.4.4 Parcel P4 – Light Industrial Park

9.4.4.1 Parcel Location on the Airport

The most appropriate development site for Parcel P4, light industrial park, is indicated in Figure 9.7 in the green hatch at the south-west corner of the airport, below the elevation of the airfield, between the airfield and the highway.

Figure 9.7: Parcel P4 - Airport Location



9.4.4.2 General Concept Definition

The Light Industrial Park concept aims to promote the airport grounds for light industrial development. This concept fits with the current airport environment, local needs, the subdivision near the airport as well as the airport's wish to further attract industrial activities. This would allow buildings and roughly equal parking space. For other lots without airside access, light industrial companies from any sectors could be targeted. To support the business model, we believe that the leasehold approach over a long period would be ideal in order to maximize long-term airport revenues since the sale of lands does not offer long-term financial benefits. However, in the real estate industry, organizations tend to prefer to own the land on which they construct their buildings. The airport will have to consider this factor when defining the land rental rate. It needs to be attractive for businesses and reflect the price of other local industrial land.

9.4.4.3 Concept Validation and Market Demand

In speaking with local companies, many were supportive of the idea of a Light Industrial Park, stating that it would benefit the local economy through the creation of new direct, indirect and induced jobs, generate new property tax revenue for the city and support the local-area commercial construction industry. Buildings within the Light Industrial Park would ideally range in size from 929 to 4,645 square metres and would be aesthetically pleasing to passersby travelling along the adjacent Highway 3.

9.4.4.4 Development Approach

The aim is to attract companies that do not require flight line access. The location at the airport on the lower land along the highway is beneficial in terms of freight and transportation access. Illustrated in Figure 9.8 is a preliminary perspective of the proposed layout of the Light Industrial Park which follows with an explanation provided by four

potential companies interviewed that expressed an interest in the possibility of establishing a presence at the proposed Light Industrial Park.

Figure 9.8 – Preliminary Perspective of Proposed Development Approach for P4

**This visual is provided solely for illustration purposes.*

In understanding the conceptual layout of P4, a 10-metre groundside access road (representative of the thick black line) would be accessible from a proposed off-ramp from Highway 3. The groundside access road would follow parts of the existing road infrastructure towards P3 and then loop around the far west side of the parking lot (adjacent to Highway 3) before reconnecting with the original road infrastructure. as it passes through P3 to the east of the access roadway is the supporting parking lot for each industrial business (shaded in with black). The industrial buildings themselves are each projected to be 3,000 square metres in size (60 metres x 50 metres). The minimum parking area in the Light Industrial Park is representative of being 2.75 times the footprint of each industrial building.

In considering a Light Industrial Park, we interviewed four (4) local companies:

- **Company A** is one of the world's largest lumber providers is situated in Castlegar and employs approximately 190 employees. With annual capacity of 3 billion board feet, Company A serves the needs of its customers and contributes to strengthening local economies (in which it is located). The company completed a major upgrade of their Castlegar mill in 2017 and have no further expansion plans, however they are always looking to grow their business. The company also has operations in Grand Forks and Naksup which employee an additional 140 employees. This could mean a potential development site on the airport for future developments.

- **Company B** operates a modern, multi-species mill with a capacity of 75 million fbm. The mill is extremely flexible and is currently able to offer over 1,000 different products in custom and standard dimensional lumber sizes. The company has a reputation for excellent drying capabilities and a high degree of flexibility in their product development. This company primarily serves Canada, the United States and Japan. Employing 150 employees in Castlegar, they are currently looking to expand their industrial site. The proposed site is 15 acres and the company would propose to look to the airport as an option. This company has two other industrial sites, one is outside the city on the way to Nelson (15 acres) and the second site is south sand junction (17 acres).

- **Company C** is part of five world class pulp mills producing high-quality NBSK and NBHK pulp, green energy and bio-chemicals. The company also owns and operates one of the largest softwood sawmills in the world. The mills are strategically located close to excellent fiber sources and key global end-use markets. In addition, they are recognized by many different operational and environmental certifications.

  Company D is a family owned and operated, serving all of North America for more than 20 years. The company continues to maintain its head office in Salmo, BC with a large support office/terminal located in West Kelowna, and additional terminals in both Chilliwack and Creston, BC.

9.4.4.5 Infrastructure Requirements and Cost

To assist in the calculation of the infrastructure requirements and costs for the proposed two-phased developments in parcel P4, the following surface coverage assumptions are being made:

- P4 total surface coverage: 19,700 sqm:
  - Three (3) industrial buildings: 9,000 sqm (60m x 50m x 3)
  - Parking A: 2,400 sqm (60m x 40m)
  - Parking B: 2,400 sqm (60m x 40m)
  - Parking C: 2,400 sqm (60m x 40m)
  - Access Roadway: 3,500 sqm (350m x 10)

Table 9.9: P4 Infrastructure Requirements and Costs

P4 Development Area		Units	Estimated Quantity	Unit Rate	Total Cost
F.1	Clearing and Grubbing	m^2	10,700	$3	$32,100
F.2	Common Earth Excavation	m^3	16,050	$45	$722,250
F.3	Crushed Aggregate Base Course	m^3	12,900	$65	$838,500
F.4	Crushed Aggregate Sub-Base Course	m^3	11,800	$65	$767,000
F.5	Hot Mix Asphalt Pavement	Tonne	12,900	$250	$3,225,000
F.6	Painted traffic lines and markings	LS	1	$8,000	$8,000
F.7	CB Structures	ea	6	$12,000	$72,000
				Sub Total:	**$5,664,850**
				Contingency (20%):	$1,133,000
				Total:	**$6,797,850**

9.4.4.6 Financial Analysis

For financial projections purposes, estimations were made on the approximate size of the future industrial buildings. We assumed that 3,000 square metre-sized buildings are realistic in an industrial context. However, the industrial park concept should also consider smaller industrial buildings (such as 1,500 square metres). Here again, the airport will be able to promote a variety of different sizes depending on the demand. The share of costs that City of Castlegar may incur include approximately 10% of the cost of servicing and preparing lands for P4 Light Industrial land development, which is estimated to be approximately $777,000, not including the cost of servicing debt.

The suggested development schedule considers the construction of one (1) new building every four (4) years. Over a 20-year period, with an adequate development campaign, this development schedule would result in the construction of five (5) buildings. The first building will be erected only at year four (4) in order to allow time for the airport to plan the development and to build a segment of the access road. This will follow with a new development project every four (4) years on average. The 20-year financial projections also consider the various infrastructure requirements. The following table presents the estimated costs for the access road and lot preparation work. Table 9.10 provides the assumptions used in the 20-year financial projections for parcel P4.

Table 9.10: Parcel P4 - Financial Analysis Assumptions

Item	Rate	Amount	Annual Municipal Tax Revenue Generated	Annual Land Leases Generated
Municipal Tax Rate	$21.0872 / $1,000	-	-	-
Land Lease Rate	$1.89/sqm ($0.176/sq. ft)	-	-	-
Annual Inflation Rate	2%	-	-	-
Building Assessment Value (Construction Costs)	Building #1: 3,000 sqm (32,291 sq. ft) @ a cost of $3,169.97/sqm ($295/sq. ft)	$9,509,910	$200,537	$5,670
	Building #2: 3,000 sqm (32,291 sq. ft) @ a cost of $3,169.97/sqm ($295/sq. ft)	$9,509,910	$200,537	$5,670
	Building #3: 3,000 sqm (32,291 sq. ft) @ a cost of $3,169.97/sqm ($295/sq. ft)	$9,509,910	$200,537	$5,670
		Total:	**$601,612**	**$17,010**

Based on the noted assumptions, Parcel P4 could realize revenue gains through land leases and municipal taxes. After the initial 20-year period, the airport would realize the following revenues and expenditures:

Land leases:	$ 907,225
Municipal taxes:	$ 31,981,686
Total Revenues over 20 years:	**$ 32,888,911**

City Portion of Capital Expenditures

Parking lots and road access, utilities:	$ 373,890
Building lots, services, land preparation:	$ 627,660
Total (City portion) P4 Development Costs:	**$ 1,001,550***

**not including cost of borrowing*

9.4.5 Parcel P5 - Hotel Development Concept

9.4.5.1 Parcel P5 – Parcel Location on the Airport

The most appropriate location for a hotel development is located on the southwest airside of the runway and east of Airport road. The proposed concept's layout is depicted in Figure 9.9 in the light red hatch. The hotel developer has submitted a concept for their hotel in the Hotel and Gaming District, shown below in Figure 9.10.

Figure 9.9 - Proposed Hotel and Parking

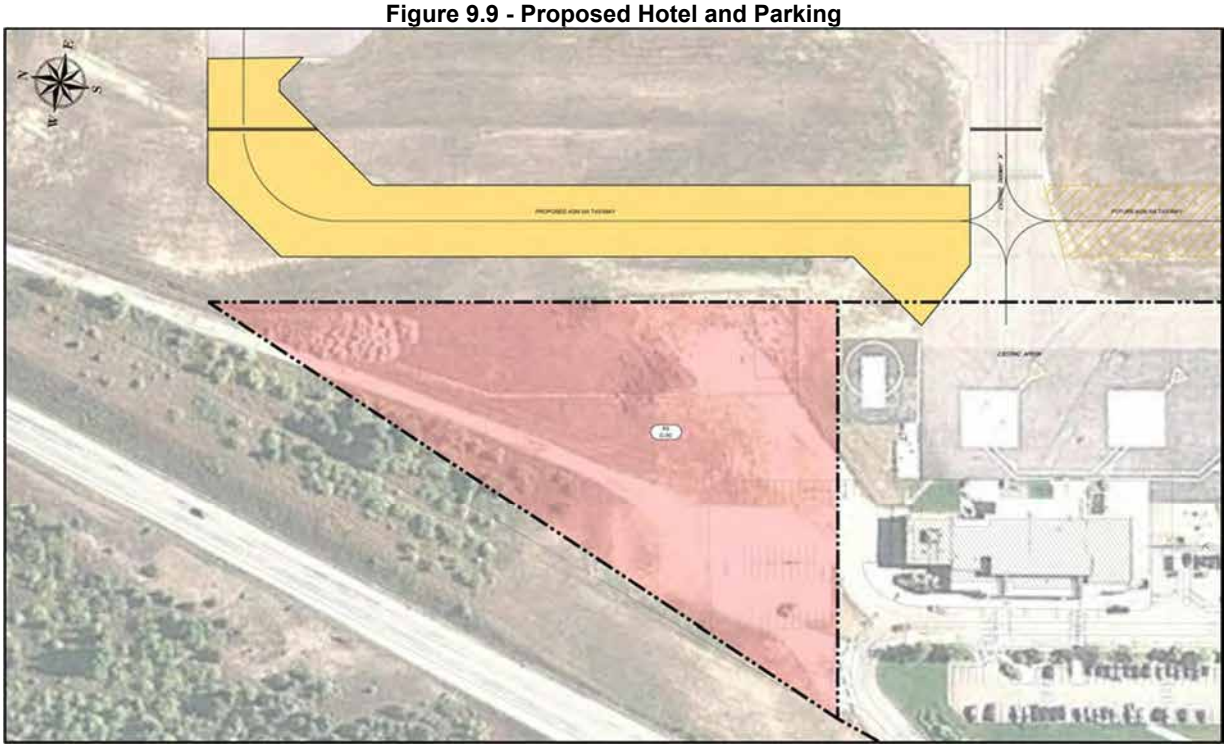


Figure 9.10 – Preliminary Location of Hotel and New Parking, Parcel P5

9.4.5.2 General Concept Definition

Figures 9.9 and 9.10 above indicates the proposed concept for the Hotel Development consists of constructing one (1) building, beside Chances Casino of approximately 48,000 square feet. The usual vacancy rate at a Castlegar hotel is 68% with the most consistent guests being blue collar workers and hockey teams. The proposed hotel would be built as a boutique style hotel with higher end amenities and accommodations. Currently, the city of Castlegar does not have a higher end hotel for tourists and business travelers that is unique and different – this is a niche for Castlegar, it will drive not only tourists to stay at the hotel but also passengers who are waiting for their flights will be able to spend time at the hotel. The boutique hotel would include amenities such as a reception area, lounge area and dining area. A big tourism driver is Chances Casino packages. The hotel can consider Casino Packages as a marketing strategy. The closest hotel to the airport is a Super 8 Motel at 3.5 kilometers from West Kootenay Regional Airport.

9.4.5.3 Concept Validation and Market Demand

As part of the process to determine the feasibility of developing a hotel at the West Kootenay Airport in Castlegar, we spoke with a contact at the Berezen Hospitality Group. They completed a research and market analysis study from 2014-2019 that found the following:

- Location is a crucial aspect to any hotel and the proposed development of the hotel is in a prime area. The proposed site is well located relative to many demand generators in Castlegar and also on lands fronting the West Kootenay Regional Airport. The prosed site is located on the east side of Highway 3A, which fronts the property and provides for good visibility. The proposed site is also the location of the new Chances Gaming and Entertainment venue

- Berezen Hospitality group suggests that the hotel should be in the range of 60 to 70 guestrooms in size given current demand levels in the market as well as the size of existing accommodation properties
- The hotel is projected to reach occupancy of 58.5% in 2019 with an average daily rate of $134.20, market penetration of 121.5% and rate penetration of 125.0%[12]
    - A hotel of this nature typically requires 70.0% occupancy by its third to fifth year of operation to support its level of investment

If the hotel concept remains a boutique hotel, as opposed to a Best Western as proposed in the Berezen study, it is estimated to gain more traction in the first five years as it would not only attract tourists, but also local residents, passengers held at the airport due to weather, or passengers in transit. The region currently offers a number of good quality hotels that tend to cater mostly to seasonal workers (sawmill shutdowns) or to team sports. This would offer an interesting option to the discerning business traveller. Development Approach

In considering a boutique-style hotel with approximately 60-70 rooms, the average hotel room is approximately 30 square metres (4 metres x 7.5 metres) in size. Overall costs will fluctuate depending on the number of onsite amenities such as restaurant, fitness centre, swimming pool and hot tub, business centre and boardroom for example, but typical hotel construction costs are suggested to be approximately $4,983 per square metre. This cost estimate can be somewhat high as it takes into consideration common spaces such as the lobby, hallway, etc. By

[12] Proposed Hotel Development for Castlegar, PFK Consulting Canada, June 2013.

better understanding the approximate building value, the city will more easily be able to determine its corresponding tax assessment.

9.4.5.4 Infrastructure Requirements and Costs

To assist in the calculation of the infrastructure requirements and costs for the proposed hotel and related parking development in P5, the following surface coverage assumptions are being made:

- P5 total surface coverage: 9,000 sqm:
    - Hotel footprint: 1,590 sqm
    - Parking lot: 7,410 sqm

Table 9.11: P5 Infrastructure Requirements and Costs

P4 Development Area		Units	Estimated Quantity	Unit Rate	Total Cost
F.1	Clearing and Grubbing	m^2	9,000	$3	$27,000
F.2	Common Earth Excavation	m^3	9,000	$45	$405,000
F.3	Crushed Aggregate Base Course	m^3	9,000	$65	$585,000
				Sub Total:	$1,017,000
				Contingency (20%):	$203,400.0
				Total:	$1,220,400

9.4.5.5 Financial Analysis

Table 9.12 provides the assumptions that have been used in the 20-year financial projections for parcel P5.

Table 9.12: Parcel P5 – Financial Analysis Assumptions

Item	Rate	Amount
Building Footprint	-	1,590 sqm
Municipal Tax Rate	$19.7103 / $1,000	-
Land Lease Rate	$1.89/sqm ($0.176/sq. ft.)	-
Annual Inflation Rate	2%	-
Building Assessment Value (Construction Costs)	Hotel (Main Floor): 1,590 sqm (17,114 sq. ft) @ a cost of $4,294.80/sqm ($399/sq. ft)	$6,828,732
Annual Municipal Tax Revenue Generated	-	$491,319
Annual Land Leases Generated	$1.89	$3,005

The City is not expected to be a significant contributor to the cost of developing the Hotel parcel, as the development could occur almost entirely with private investment. However, this plan indicates a small portion (~3%) to ensure services and utility connections from airport property, additional signage and road access costs are considered.

Based on the noted assumptions, the potential revenue after 20 years, and the expected capital expenditures the City should consider investing for the development of Parcel P5 is indicated below:

P5 Expected Revenues to City:	
Land Lease:	$ 60,300
Municipal taxes:	$ 2,691,925
P5, 20-Year Potential Revenue:	**$ 2,752,224**
City Portion of P5 Capital Expenditures	
Signage, services, road access	$ 261,937
Total anticipated Capital Expenditures:	**$ 261,937**

9.4.6 Concept – Tourism Packages (Marketing Plan Inputs)

Along with construction of a hotel, we recommend growing the General Aviation activities at YCG through the development of Tourism Fly-In Packages. This section describes the different packages we suggest developing for West Kootenay Airport in order to promote local tourism
attractions, entice pilots to fly to the airport and visit the region

9.4.6.1 Tourism Fly-In Packages for GA Pilots

Packages will help attract additional traffic, increase fuel sales and activity at the airport. The increased volume of airport users also represents a great opportunity to market the hangar construction at YCG. The development of the packages as well as the marketing material that will accompany the promotional efforts should be done in collaboration with local, county and regional tourism organizations.

The proposed packages should also focus on the "turn-key" aspect of the trip. That means that once the pilot has selected the desired package, accommodations, means of transportation and activities should be planed and organized seamlessly through a single entity. Finally, each of the proposed packages should offer small rebates (e.g. 5% to 10%) at restaurants, equipment rental companies and local activity providers that will have sign a partnership agreement.

9.4.6.2 Proposed Fly-In Packages

The proposed packages revolve around three (3) themes, which are: 1) Fly and Fish; 2) Fly and Ski; 3) Fly and Hike.

1) Fly and Fish (seasons vary, typically May – October)

Located right on the Columbia River, one of the longest waterways in the Pacific northwest areas of North America offers some of the best fishing on the continent. Castlegar is also located near the Kootenay River, which offers its own bounty for anglers including Kokanee salmon and bull trout. Aside from the big rivers, there are countless rivers and mountain streams in which to cast. Castlegar has partnered with Trail to ensure you get the best Fish and Fly experience from take-off to landing to cast and reel.

2) Fly and Ski (Early December – Mid April)

The city is the perfect hub for backcountry skiers, resort goers and snowboarders because it's located equal distance (a 45-minute-drive) between two of the world's best ski resorts: Red Mountain in Rossland and Whitewater Resort near Nelson. And as for Red Mountain, people have been skiing there for over a century and it now boasts seven lifts

and 110 marked runs. For those who want to explore areas away from the resorts, the good news is Castlegar is located within the Selkirk mountain range and there are is plenty of terrain just a short car ride away.
There are also plenty of cat-ski and Heli-ski operations based nearby as well.

3) Fly and Hike (March – November)
One of the most popular hiking trails in the region is in Valhalla Provincial Park, which is about a 1.5-hour drive from Castlegar. The Gimli Peak trail starts at the end of a logging road and winds it's way to Gimli, which looks like the prow of a giant ship, and the 13 other peaks of the Mulvey Basin area. The hike itself takes about 1.5 hours one way but you'll want to allow for my time to take photographs and soak in the unbelievably beautiful surroundings. And that's only one example of the hundreds of hikes you can enjoy in and around the city of Castlegar. Hiking trails are located within and all around Castlegar. There are a dozen smaller hikes in the city or within a 15-minute drive and then innumerable hiking trails in the surrounding mountains that can take anywhere from one to three hours to get to depending on the quality of the access roads. Castlegar offers everything from mellow day hikes on flat, well-maintained terrain to multi-day adventure treks in the surrounding mountains.

9.4.6.3 Concept Validation and Market Demand

The development of the Fly-In packages concept is viable and relevant due to various market drivers. With a booming economy and developing tourist rate, Castlegar is well-positioned to attract a large population of GA pilots from various regions. According to our estimates, there are approximately 5,986 registered aircraft in a one (1) to two (2) hours of flight time from Castlegar which represent a good market to tap into.

This concept also aligns with some current and future economic development strategies of the County. Tourism being one of the key industries and focus for the City of Castlegar. We identified compelling activities that can catch the interest of various clienteles. These packages also align with the city's objectives to attract more tourists and increase spending, which can be achieved through catering to new client segments with higher income. Pilots fit well with those two (2) objectives.

9.4.6.4 Development Approach

Since this concept doesn't require physical infrastructures or assets, most development efforts will involve the creation of partnership with local activity providers, and of course marketing tools development to promote the different packages. To support the development of the concepts, a Tourism Fund could be set up. The **Tourism Fund s**upports projects that encourage three (3) key streams: tourism investment, tourism product development and industry capacity building. The Tourism Development Fund program provides non-capital, project-based funding to:

- Develop research-based innovative and emerging tourism sectors;
- Support tourism organizations' capacity building;
- Encourage new private sector tourism investment attraction; and
- Enhance Ontario's overall economic competitiveness and opportunities for the Castlegar tourism industry

9.4.7 Parcel Development Summary

Several of the concepts put forward will require advanced planning before the construction phase can begin with the exception of the various tourism fly-in packages. The tourism packages can be marketed immediately and generate new revenue streams through fuel sales and aircraft landing / parking activity, as well as draw in potential new hangar owners. The objective should be to simplify the financial modeling and provide the airport with a realistic and easy to understand financial plan for the airport.

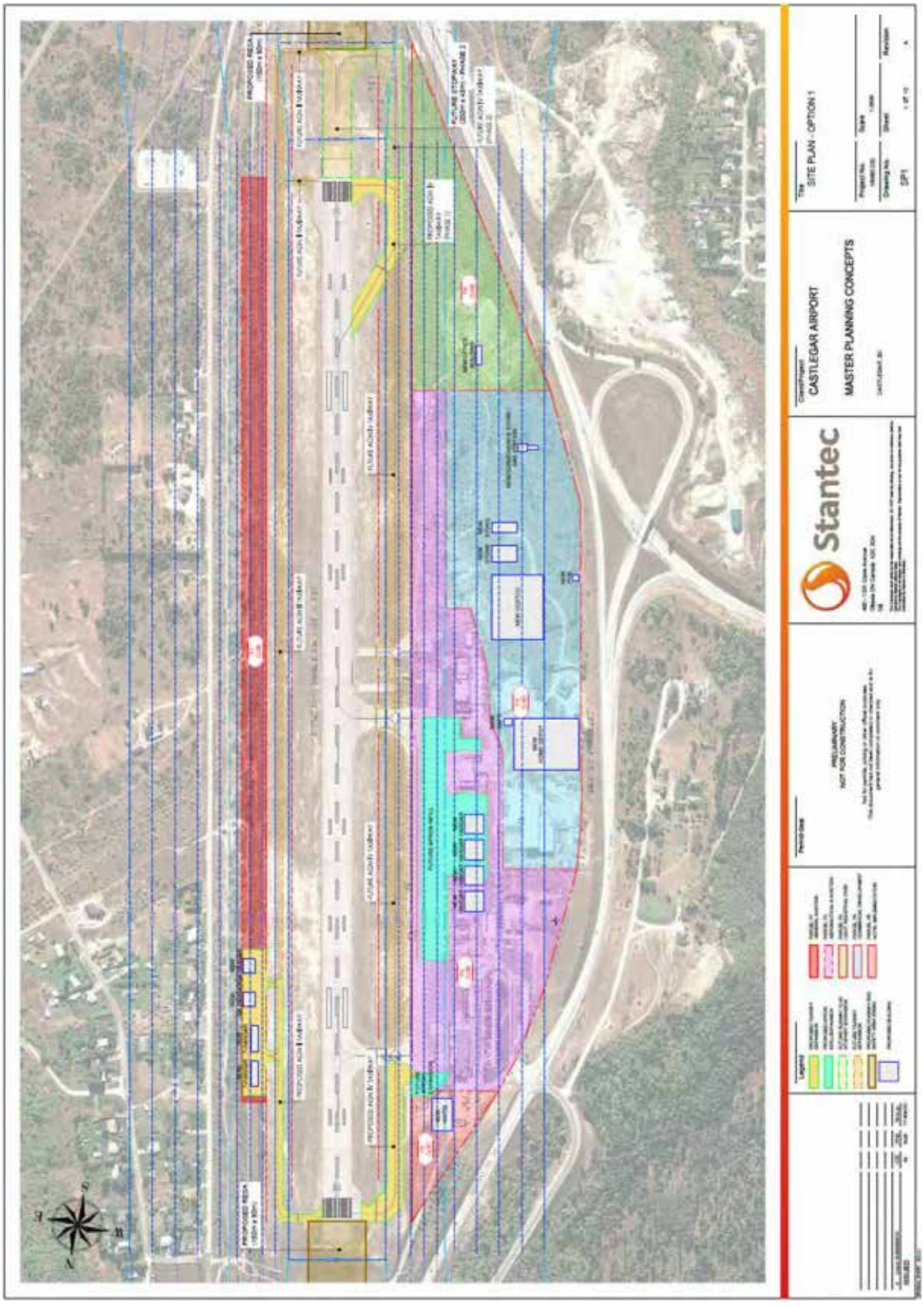
Based on the amount of funding that can be obtained for capital infrastructure needs and opportunities, the City of Castlegar must focus on obtaining grant funding from a variety of sources, particularly those that will result in creation of jobs and economic growth.

The proposed Light Industrial Park in land parcel P4 clearly demonstrates the largest source of pre-tax revenue for the airport at $32,888,911 over a 20-year horizon. This is followed by the proposed commercial development concept in land parcel P3 with an estimated $15,516,818 in pre-tax revenue over the same period.

These two development concepts also have the potential to contribute the largest economic impact, however a further study is required to validate the true extent and reach that they can have on the local community.

While some may prioritize these development activities based on potential sources of revenue, the airport should also be prepared to address the immediate needs of any active investor ready to make a commitment in the short-term.

9.5 LAND USE PLAN



10.0 CAPITAL FINANCIAL PLAN

10.1 25 YEAR PROJECTION

Refer to Table 10.1 for details of the WKRA Capital Financial Plan.

Table 10.1 WKRA 25 year Capital Financial Plan

Description	Grant / Pvt. Funds	Eligibility	Subtotal of Costing	Contingency [Applies to Master Plan Items Only]	Total	Potential Grant / Pvt Funding of Capital Costs	WKRA Share of Capital Costs
AIRSIDE - Runway							
Runway 15-33, 200 m Extension (Stopway/Pre-Threshold - at SOUTH END)	BCAAP	75%	$3,269,750	20%	$3,923,700	$2,942,775	$980,925
RESA 15 Excavation and Restoration (SOUTH END)	ACAP	80%	$250,000	20%	$300,000	$240,000	$60,000
RESA 33 Excavation and Restoration (NORTH END)	ACAP	80%	$500,000	20%	$600,000	$480,000	$120,000
Taxiways							
New AGN II General Aviation Taxiway, East-Side (Phase 1 - Box and T-Hangars)	BCAAP	50%	$2,193,575	20%	$2,632,290	$1,316,145	$1,316,145
New AGN IV Taxiway from TH Runway 15 to Taxiway Alpha	BCAAP / SPF	75%	$1,482,650	20%	$1,779,180	$1,334,385	$444,795
New AGN IV Runway Exit Taxiway, (Jug-Handle /w cx to TH Rwy 33)	BCAAP / SPF	75%	$1,442,950	20%	$1,731,540	$1,298,655	$432,885
Future AGN II Taxiway, East side, Full Length	BCAAP	50%	$3,684,050	20%	$4,420,860	$2,210,430	$2,210,430
Future AGN IV Taxiway, Txwy Alpha to Taxiway Bravo (exist B becomes Apron)	BCAAP / SPF	50%	$2,324,100	20%	$2,788,920	$1,394,460	$1,394,460
Future AGN IV Taxiway, Taxiway Bravo to Txwy Delta	BCAAP / SPF	50%	$472,850	20%	$567,420	$283,710	$283,710
Future AGN IV Taxiway, Taxiway Delta to Runway Exit, Jug-Handle	BCAC / SPF	50%	$2,780,500	20%	$3,336,600	$1,668,300	$1,668,300
Aprons							
ATB Apron, Minor Expansion (fuel tank removed, helipad removed)	ACAP	80%	$665,000	20%	$798,000	$638,400	$159,600
ATB, South of Main Apron - pavement in-fill of Grass Islands	BCAAP	50%	$504,000	20%	$604,800	$302,400	$302,400
Approach Lighting							
Runway 15 MALSF (medium intensity approach lighting, seq. flashers)	ACAP	80%	$1,500,000	20%	$1,800,000	$1,440,000	$360,000
Lighted Wind Direction Indicators							
Runway 15-33 (2)	ACAP	80%	$20,000	10%	$22,000	$17,600	$4,400
GROUNDSIDE							
Existing Main Access Road, New Round-about	SPF	90%	$702,894	30%	$913,762	$822,386	$91,376
New Ground Access Road, South - end (Commercial / Industrial Access)	SPF	90%	$450,000	20%	$540,000	$486,000	$54,000
DEVELOPMENT PARCELS							
Parcel P1 -General Aviation Hangars							
2 Box Hangars (10% city portion to cover site preparation)	Private	75%	$983,102	20%	$1,179,722	$884,792	$294,931
2 T-Hangars (Airport Owned)	City	0%	$494,924	5%	$519,670	$0	$519,670
P2 - Aeronautical / Aviation Use Commercial							
South Apron Expansion Lots (2 Large Hangars) - Phase 1	Private	95%	$4,204,390	10%	$4,624,829	$4,393,588	$231,241
South Apron Expansion Lots (2 Large Hangars) - Phase 2	Private	95%	$4,204,390	10%	$4,624,829	$4,393,588	$231,241
Apron & Taxiway / Taxilane	City / Private	75%	$3,891,992	20%	$4,670,390	$3,502,793	$1,167,598
P3 Commercial Lots							
Land servicing, paving of roads	City / Private	75%	$11,706,042	20%	$14,047,250	$10,535,438	$3,511,813
Home Depot	Private	95%	$5,173,700	10%	$5,691,070	$5,406,517	$284,554
Costco	Private	95%	$1,068,450	10%	$1,175,295	$1,116,530	$58,765
Shopping Plaza	Private	95%	$120,000	10%	$132,000	$125,400	$6,600
Gas Station / Convenience Store	Private	95%	$2,305,900	10%	$2,536,490	$2,409,666	$126,825
Pub	Private	95%	$605,500	10%	$666,050	$632,748	$33,303
Café	Private	95%	$1,068,450	10%	$1,175,295	$1,116,530	$58,765
P4 - Light Industrial Lots							
Building 1	Private	98%	$9,510,000	10%	$10,461,000	$10,251,780	$209,220
Building 2	Private	98%	$9,510,000	10%	$10,461,000	$10,251,780	$209,220
Building 3	Private	98%	$9,510,000	10%	$10,461,000	$10,251,780	$209,220
Parking Lots and Internal Roadways	City / Private	95%	$6,798,000	10%	$7,477,800	$7,103,910	$373,890
P5 - Hotel & Gaming Centre							
Hotel - Building	Private	98%	$6,829,050	20%	$8,194,860	$8,030,963	$163,897
Hotel, Parking Lot	Private	98%	$1,220,400	20%	$1,464,480	$1,435,190	$29,290
Signage - Airport / Tenants (new business) Signs at Entrances, Information signs	Shared	50%	$125,000	10%	$137,500	$68,750	$68,750
BUILDINGS							
Air Terminal Building Phase 1 ADDITIONS (Departure Room / Bag Hall Expansion)	BCAAP	60%	$3,112,600	23%	$3,828,498	$2,297,099	$1,531,399
Air Terminal Building Phase 1 RENOVATIONS	BCAAP	60%	$1,868,400	23%	$2,298,132	$1,378,879	$919,253
Air Terminal Building Phase 2 ADDITIONS	BCAAP	60%	$498,000	23%	$612,540	$367,524	$245,016
Air Terminal Building Phase 2 RENOVATIONS	BCAAP	60%	$132,300	23%	$162,729	$97,637	$65,092
Combined Services Building (CSB)	ACAP	50%	$350,000	20%	$420,000	$210,000	$210,000
Equipment Storage Building	ACAP	50%	$275,000	20%	$330,000	$165,000	$165,000
Parking System Upgrades	BCAAP	50%	$260,000	20%	$312,000	$156,000	$156,000
Field Electrical Centre (FEC) EXPANSION	ACAP	80%	$500,000	20%	$600,000	$480,000	$120,000
TOTALS			**$108,567,909**		**$125,023,503**	**$103,939,526**	**$21,083,977**

SPF _ Strategic Priorities Fund (Gas Tax)

ACAP _ Airport Capital Assistance Program

BCAAP _ British Columbia Air Access Program

Private - Investor / Developer Financed Capital

10.2 REVENUE PLAN

Important Note: All information presented below was obtained through interviews with airport managers in November and December 2018. Therefore, all the information below is 2018 data.

10.2.1 Hangars and Land Leasing Rates

The first benchmarked elements were the portrait of the hangar park for each airport, the number of hangars owned by each airport and the land leasing rates, and hangar leasing rates (if applicable). Refer to Table 10.2.

Table 10.2 Hangars, Land and Hangar Leasing Rates

Airport	Hangars	Land and Hangar Leasing Rates
Sudbury (YSB)	21 hangars (15 GA hangars and 6 commercial hangars) 2 hangars owned by the airport.	Land: $3.337 per sq. meter ($0.31 per sq. ft.) Hangar 1: $166.84 per sq. meter ($15.50 per sq. ft.) for the 16,000 sq. ft. hangar and $122.71 per sq. meter ($11.40 per sq. ft.) for the 11,573.5 sq. ft. hangar. Hangar 2: (T-hangar): Short-term agreement (1 year at the time)
North Bay (YYB)	25 hangars, varying from small GA (169 m²) to large commercial hangars (6 260 m²) 3 hangars owned by the airport. All hangars are currently occupied (each approximatively 750 m²) All hangars are currently occupied.	Land lease Airside: Serviced: $2.46 per sq. meter ($0.228 per sq. ft.) and un-serviced: $1.70 per sq. meter ($0.158 per sq. ft.) Land lease Groundside: $1.12 per sq. meter ($0.104 per sq. ft.) Hangar lease: $21.90 per sq. meter ($2.034 per sq. ft.)
Rouyn-Noranda (YUY)	2 hangars A third one to be built soon. YUY does not own any hangar.	$1.862 per sq. meter ($0.173 per sq. ft.) The airport has no defined Airport Maintenance Charge (AMC)
Thunder Bay (YQT)	17 hangars (only 1 GA hangar) One 4-bay GA hangar owned by the airport	Land lease based on the local real estate market Approximatively $500 per month for the airport's GA hangar
Sault Ste. Marie (YAM)	13 hangars (5 commercial and 8 for GA) The airport owns 1 commercial hangar and 2 t-hangars (GA).	$2.76 per sq. meter ($0.256 per sq. ft.) Commercial hangar leasing rate: $56 per sq. meter ($5.20 per sq. ft.) T-hangars leasing rate: $33 per sq. meter ($3.065 per sq. ft.) No specific Airport Maintenance Charge, it was removed years ago and is not mixed in the land lease rate (no distinction between both rates).
Timmins (YTS)	Approx. 14 hangars (1 T-hangar with 9 spaces) The airport does not own hangars.	$1.40 per sq. meter ($0.13 per sq. ft.) Includes the airport maintenance fee, which ranges from $0.67 to $0.72 per sq. meter. ($0.062 to $0.067 per sq. ft.). Will be mixed with the land lease rate in the upcoming years.

Airport	Hangars	Land and Hangar Leasing Rates
Fort St. John (YXJ)	25 hangars All hangars are privately owned *Note: 26 tenants (excluding GA)*	$2.07 per sq. meter with serviced airside ($0.192 per sq. ft.) $1.82 per sq. meter un-serviced airside ($0.169 per sq. ft.) $1.66 per sq. meter serviced groundside ($0.154 per sq. ft.) (average of $0.172) All land leases are subject to a maintenance fee of $0.72 per sq. meter ($0.067 per sq. ft.)
Grande Prairie (YQU)	25 GA hangars Multiple commercial/industrial hangars (no exact number) The airport does not own hangars.	Land lease rate: $2.75 per sq. meter ($0.255 per sq. ft.) The airport has no Airport Maintenance Charge Terminal Building Space Office: $301.20 to $544 per sq. meter ($27.98 to $50.56 per sq. ft.) Industrial/Cargo: $250.94 per sq. meter ($23.31 per sq. ft.)

Observations indicate that Sudbury has about the same number of hangars as North Bay, Fort St. John, Thunder Bay and Grande Prairie. Rouyn-Noranda airport has the least hangars. Among the studied airports, Sault Ste. Marie and Thunder Bay also own hangars. All the airports, with the exception of Timmins, mentioned that all their buildings (or hangars) are currently occupied (Autumn 2018). More precisely, two (2) private hangars were empty in December 2018.

When analyzing the land leasing rates, we observe that Sudbury has the highest rate among the studied airports ($0.31 per sq. ft.). Sault Ste. Marie and Grande Prairie rates are almost the same ($0.256 and $0.255 per sq. ft. - a difference of approximatively $0.054 with Sudbury). There is a difference of $0.082 per sq. ft. between the land lease rate of Sudbury and North Bay. The average land lease rate is $0.2056 per sq. ft. (excluding Sudbury).

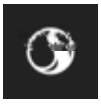
10.3 PARKING AND LANDING FEES

This section highlights the aircraft parking and landing fees (see Table 19 below). By analyzing other airport fees and pricing structure, we can determine Sudbury airport competitiveness and evaluate other pricing structures. The fees are presented under the assumption that no fuel was purchased to obtain a discount (easier to compare).

Table 10.3 – Landing and Parking Fees

Airport	Landing Fees	Parking Fees
Sudbury (YSB)*	Under 10,000 kg: $4.98 per 1,000 kg 10,001 to 21,000 kg: $7.98 per 1,000 kg 21,011 to 45,000 kg: $8.64 per 1,000 kg 45,001 kg and over: $9.78 per 1,000 kg Minimum charge: $25.00	Commercial Aircraft: Under 5,000 kg: $19.53 ($195.38 monthly) 5,001 to 10,000 kg: $25.87 ($195.38 monthly) 10,001 to 30,000 kg: $79.21 ($1,584.52 monthly) 30,001 to 60,000 kg: $79.21 ($1,584.52 monthly) 60,001 to 100,000 kg: $119.83 ($2,391.61 monthly) 100,001 to 200,000 kg: $199.93 ($3,998.82 monthly) Private Aircraft: Same pattern, lower fees

Airport	Landing Fees	Parking Fees
North Bay (YYB)	No fee for piston aircrafts weighing 2,000 kg or less 4,000 to 21,000 kg: $7.20 per 1,000 kg ($9.05 for Int'l) 21,001 to 45,000 kg: $9.00 per 1,000 kg ($10.60 for Int'l) Over 45,000 kg: $10.60 per 1,000 kg ($14.00 for Int'l) Minimum charge: $26,35	Under 2,000 kg: $10.00 ($200.00 monthly and $1,200.00 yearly) 2,001 to 5,000 kg: $17.10 ($332.10 monthly and $1,500.00 yearly) 5,001 to 10,000 kg: $30.05 ($593.95 monthly) 10,001 to 30,000 kg: $53.05 ($1,124.00 monthly) 30,001 to 60,000 kg: $84.90 ($1,724.45 monthly) 60,001 to 100,000 kg: $127.45 ($3,073.45 monthly) 100,001 to 200,000 kg: $212.40 ($4,310.60 monthly) 200,001 to 300,000 kg: $298.55 ($6,041.25 monthly) Over 300,001 kg: $384.50 ($7,695.25 monthly)
Rouyn-Noranda (YUY)	Under 21,000 kg – $6.71 per 1,000 kg 21,000 to 45,000 kg – $8.48 per 1,000 kg Over 45,001 kg – $10.10 per1,000 kg	Under 5,000 kg – $13.05 daily ($104.37 monthly) 5,001 to 10,000 kg – $23.02 daily ($466.49 monthly) 10,000 to 30,000 kg – $42.60 daily ($867.97 monthly) 30,000 to 60,000 kg – $65.92 daily ($1,334.60 monthly) 60,001 to 100,000 kg – $99.35 daily
Thunder Bay (YQT)	Under 15,000 Kg: $6.54 per 1,000 Kg (turboprop) $8.09 per 1,000 Kg (Jet) 15,001 to 45,000 Kg: $9.13 per 1,000 Kg (turboprop) $11.48 per 1,000 Kg (Jet) Over 45,000 Kg: $10.86 per 1,000 Kg (turboprop) $11.48 per 1,000 Kg (Jet)	Under 2,000 Kg: $18.25 ($72.56 monthly) 2,000 kg to 5,000 Kg: $18.25 ($72.56 monthly) 5,000 kg to 10,000 kg: $22.10 ($431.86 monthly) 10,000 kg to 30,000 kg: $43.56 ($880.85 monthly) 30,000 kg to 60,000 kg: $65.99 ($1,352.14 monthly) 60,000 kg to 100,000 kg: $102.07 ($2,051.40 monthly) 100,000 kg to 200,000 kg: $170.91 ($3,418.26 monthly) 200,000 kg to 300,000 kg: $239.08 ($4,785.60 monthly) 300,000 kg and over: $307.76 ($6,155.29 monthly)
Sault Ste. Marie (YAM)	Commercial: $8.30 per 1,000 Kg G.A.: Piston Aircraft are $5.00 per 1,000 Kg Minimum charge: $10	5,000 Kg or less: $5.00 per 1,000 Kg (Minimum $10) 5,001 Kg to 20,000 Kg: $25 plus $2.50 per 1,000 Kg More than 20,000 Kg: $62.50 plus $1.25 per 1,000 Kg (For monthly charge: 12.5 times daily rates. For annual charge: 75 times daily rates)
Timmins (YTS)	Turbine / Jet (per 1,000 kg): Under 21,000 kg: $8.80 21,001 to 45,000 kg: $11.13 Over 45,001: $13.23 Minimum charge: $25 Piston / Commercial (per 1,000 kg): 2,001 to 6,000 kg: $5 6,001 to 15,000 kg: $6.60 Over 15,001: $8.80 Minimum charge: $15	Under 6000 kg: $10 ($166.11 monthly) 6001 to 15,000 kg: $20 ($300 monthly) 15,001 to 20,000 kg: $36.63 ($742.59 monthly) 20,001 to 30,000 kg: 67.75 ($1100 monthly) 30,001 to 60,000 kg: $106.19 60,001 to 100,000 kg: $159.30 100,001 to 200,000 kg $203.54



Airport	Landing Fees	Parking Fees
Fort St. John (YXJ)	Piston/Rotary and Jet/Turbo aircrafts (per 1,000 kg): Under 21,000 kg: $6 21,000 to 45,000 kg: $7.60 Over 45,000 kg: $8.30 Minimum charge: $20	Under 2,000 kg: $10 ($75 monthly – $500 annually) 2,000 to 5,000 kg: $15.00 ($100 monthly – $500 annually) 5,000 to 10,000 kg: $20 ($750 annually) 10,000 to 30,000 kg: $25 30,000 to 60,000 kg: $45 Over 60,000 kg: $1.75 per 1,000 kg
Grande Prairie (YQU)	Only applicable for Turbo or Prop Jet (per 1,000 kg): Under 21,000 kg: $4.57 21,000 to 45,000 kg: $5.76 Over 45,000 kg: $6.86 Minimum charge: $16.03	(First 6 hours are free) Under 5,000 kg: $8.31 5,001 to 10,000 kg: $15 10,001 to 30,000 kg: $27.68 30,001 to 60,000 kg: $42.30 60,001 to 100,000 kg: $64.72

* YSB offers a series of exemptions for landing fees, which are available on the airport's website.

Here are the takeaways based on **Table 10.3**:

Landing fees:

- All airports (except Sault Ste. Marie) have similar weight categories. Sault Ste. Marie is the only airport that doesn't propose pricing by weight categories. Timmins has different fees for Turbine/Jet and Piston/commercial aircraft.
- Sudbury has the lowest first weight category (under 10,000 kg) while other airports have their first weight category "under 15,000 kg" or "under 21,000 kg".
- North Bay landing fee rates are slightly higher than Sudbury.
- Overall, Grande Prairie and Fort St. Johns have lower fees for similar weight categories. Timmins and Thunder Bay landing fees are similar to Sudbury.
- Rouyn-Noranda and Thunder Bay have no minimum landing fees.
- Grande Prairie seems to offer the most competitive landing fees.

Parking fees:

The price structure varies a lot since airports with longer runway weight bearing capacity can accommodate heavier aircraft. For example, Grande Prairie is capped at 100,000 kg, Thunder Bay at 300,000 kg, Sudbury and Timmins at 200,000 kg.

For similar weight categories, Sudbury proposes parking fees:

- Slightly lower than North Bay;
- Higher than Rouyn-Noranda;
- Higher than Thunder Bay;
- Similar to Timmins;
- Much higher than Fort St. John; and
- Higher than Grand Prairie.

Sudbury is the only airport that proposes specific fees to Private Aircraft owners. On the other hand, Grande Prairie only applies landing fees to Turbo or Prop Jet (no fees for piston).

10.4 AIRPORT REVENUE PLAN – SHORT TERM BUDGET

There is an opportunity to increase revenues over the existing incomes created at WKRA. In particular, the passenger departure fee and groundside parking fee revenues can be adjusted upwards. For the short-term revenue plan / budget, please refer to Appendix F.

Departure Fees: There is a current $7 per departing passenger fee. This fee can be adjusted upwards to the $12.50 mark as a minimum and may even suggest $15.00 per passenger, but this would need to be allocated to approved projects coming out of the airport master plan recommendations and the terminal expansion in particular. This could generate $600,000 in fees and perhaps a significant portion of this ($300,000) could go into the capital fund annually for their contribution for the terminal facility upgrades as well as other capital requirements. It is recommended that they create a capital budget deposit for Year 1 projects and by Year 2 WKRA would have $600,000 for terminal expansion and capital projects.

Groundside Parking Fees: The parking revenues could provide a significant increase with reasonable increases to the hourly and daily rates. Current parking fees are $5.00 per day and $0.50 for 30 minutes. WKRA could increase the rates as follows:

- The hourly rate minimum amount should be at least $1.00 per hour (so actually stays the same charge but minimum time is 1 hour not 30 minutes).
- The daily rate minimum is $8.00 for a daily rate for a 12-hour period, (6 am to 6 pm). Add in a 24-hour rate and which becomes $12 per 24-hour period.
- The weekly rate could come in at $50.00 to $60.00 per week. This will substantially increase the parking fees as well and should be linked into the parking lot and entranceway renovations.

Rental and Ground Leases: Some airport benchmarking has been provided above that guide both the future fee / rates decisions as well as the land lease rates. There is currently $46,000 for airline and office rent and $78,000 for land rents indicated. Both these both can be improved; it is recommended that once the terminal expansion project begins, space rental rates will increase. The land lease revenue can likely increase to over $100,000 from new opportunities as long as land is not sold. The entire GA development area can be new revenue stream as well as improved fuel business.

10.5 GOVERNMENT FUNDING

There are very few sources of funding that can be utilized for airport capital projects and operating budgets. It is recommended that the City of Castlegar continue to create funding partnerships together with other levels of government where possible.

Operating budgets are not usually eligible for funding and there are very few if any operational funding programs in which WKRA is eligible; however, the City is encouraged to continue to look for opportunities that may come about in future.

Once capital projects are strategically prioritized, there are significant funding opportunities available.

10.5.1.1 Airport Capital Assistance Program

The federal government's main airport funding comes through the Airport Capital Assistance Program (ACAP). Airside safety related projects are typically funded between 50 and 100%, depending on eligibility and applicability. Castlegar / WKRA is listed by Transport Canada at a 95% funding eligibility level. There are three categories of project types eligible for ACAP.

Priority 1 projects commonly approved for funding include airside pavements (runway, taxiway, apron at ATB) utilized by the air carriers, airfield lighting and visual aids, aircraft fire fighting equipment if required by regulation.

Priority 2 projects commonly approved include airside mobile equipment (safety related) such as snow blowers, snowplows, runway inspection vehicle, runway sweepers, heavy airside mobile equipment shelters.

Priority 3 projects include groundside capital projects including terminal building (safety related) such as sprinkler systems, asbestos removal and barrier free access. Priority 3 projects are rarely funded.

The total annual funding limit is $38 million, across all regions. BC has historically access approximately 22% of the national share of ACAP funds. Eligible airports that can receive ACAP funding:

- Are not owned or operated by the federal government;
- Meet certification requirements; and
- Offer year-round regularly scheduled commercial passenger service (min 1000 passengers / year for 3 most recent years).

10.5.1.2 National Trade Corridors Fund

The $2 Billion National Trade Corridors Fund (NTCF) helps fund various transportation infrastructure projects in Canada, including airports, ports, rail yards, transportation facilities and access roads. Funding will be spread out over 11 years (2017 – 2028).

Funding approval must result in the following:

- improved flow of goods and people in Canada
- increased trade in to and out of Canada
- assists the transportation system to withstand the effects of climate change
- better adapt to new technologies and innovation.

Approvals may also be obtained for projects that address bottlenecks near major ports, airports or along road and rail corridors in Canada that contribute to generating or increasing international trade. Prince George Airport is eligible for NTC funding

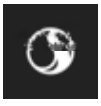
10.5.1.3 British Columbia Air Access Program

The British Columbia Air Access Program (BCAAP) is a provincial fund that airports may utilize for the following purposes. The goal of BCAAP is to support communities across the province and enhance the long-term potential of B.C.'s aviation sector. BCAAP is a cost-sharing program to assist the aviation community with funding capital infrastructure projects, with applications assessed on economic, environmental and social parameters, including:

- Safe and reliable aviation facilities;
- Significant, incremental economic benefits; and
- Improved environmental performance of the facility.

The BCAAP is a capital cost sharing program administered by the BC Ministry of Transportation and Infrastructure. BCAAP encourages sharing of overall project costs between Federal (ACAP) and municipal government budgets. The BCAAP share of project costs are set at:

- 75% for airside projects (aircraft parking aprons, hazard beacons, airside pavements, other)
- 60% for transitional projects (terminal building, fencing, gates)
- 50% for groundside projects (parking, airport access).



11.0 IMPLEMENTATION PLAN & SUMMARY

The capacity development and associated infrastructure for the continued growth and development of the West Kootenay Regional Airport will require well managed and phased investments. The increased activity in passenger volumes forecasted for the airport through the 2039 planning window, combined with the demand and potential for an expanded route network, are the primary drivers for the significant early investments related the redevelopment and expansion of the air terminal building.

The updated airport Standards for Canada, TP312 5th edition, provides some strategic opportunities to comply with the new standards and gain some valuable airside real estate for development. A runway extension and the consideration for updating the new OLS would allow for a future parallel taxiway (Bravo) which could be set closer to the main runway to create expanded area for airside aprons and aviation lease lot development; it can be done in phases. The future runway extension has been protected for as well as Runway End Safety Areas (RESA) for all runways. The potential for larger Q400 aircraft into the market would benefit from the 200 ft runway extension (stopway) and future added portions of taxiway and protecting for a full parallel taxiway would enhance the capacity through reduced runway occupancy times.

The importance of improving the approaches and departure instrumentation such as a new RNP capability cannot be understated; should air carriers fly Q400 (RNP Capable) aircraft in future, having a strategy in place and a collaborative approach to a partnership between WKRA, Air Carriers, Nav Canada and Transport Canada will be important.

The WKRA is situated close to the City of Castlegar and must be cognizant of concerns related to vicinity development and it is fortunate to have reasonable road access and modest land reserves to protect the future airport expansion requirements as well as significant land development for both aviation related and non-aviation purposes. However, a secondary road access for future commercial and industrial land parcels on landside should be contemplated. Additional G/A development lots should attract new based aircraft owners to WKRA, which will improve operational and land lease revenue streams.

The commercial, industrial and hotel land development opportunities will support the airport through valuable land rents and the stimulation of air travel through the business-related activities of the industries investing around the airport. The priority developments are: a) the airside aprons and aviation commercial lands for development, b) the expanded general aviation development area on the east and south end of runway 15-33, and c) the non-aviation opportunity for land development on the south-west portion of the airport, for improved property and commercial opportunities.

The ***terminal development may be the most critical investment*** if new Q400 aircraft or additional flights serve the WKRA. The terminal renovation and expansion will resolve current concerns regarding facilitation, consumer choice and comfort levels in the ATB.

Landside development must consider improved road access and segregation of the passenger traffic and other commercial / industrial / hotel traffic. The concepts provided within this report provide an opportunity to plan an improved future access and separation of traffic types and destination.

11.1 OVERVIEW OF THE DEVELOPMENT PHASES

11.1.1 Phase 1: 2019 – 2024

Development triggers:

- Improved approach / departure instrumentation (RNP capability) and go-forward confirmation with ACA Jazz, Nav Canada and Nav Canada
- Q400 aircraft serving WKRA and / or DH-8-300 aircraft become RNP capable
- G/A demand for hangar space growing and new hangar plots leased
- Demand for commercial and light industrial development, new leases

Infrastructure Works

- Apron Expansion, removal of helipad and fuel tanks near ATB
- Addition of new approach lighting
- Terminal building expansion, departure lounge and facilities
- Taxiway Expansion, Taxiway Alpha to Threshold of Runway 15
- North / Main airport entrance road and roundabout
- Land services and preparation for new lease lots in P3, P4
- Hotel announcement next to Chances, P5 land development

11.1.2 Phase 2: 2025 – 2029

Development triggers:

- Additional frequency of air carrier movements and new destinations
- Additional G/A activity and based aircraft, FBO expansion and additional fuel services
- Growing passenger demand, new air services and
- Growth in commercial and industrial lease lot demand and actualization of new businesses

Infrastructure Requirements

- Apron Expansion (to south), parallel taxiway expansion Alpha to Bravo
- General aviation lots / FBO and Hangar expansion
- Runway extension and RESA construction
- Partial parallel taxiway / jug-handle taxiway works
- Additional airport access for commercial areas at the south-west end of the airport

11.1.3 Phase 3: 2029 and Beyond

Development triggers:

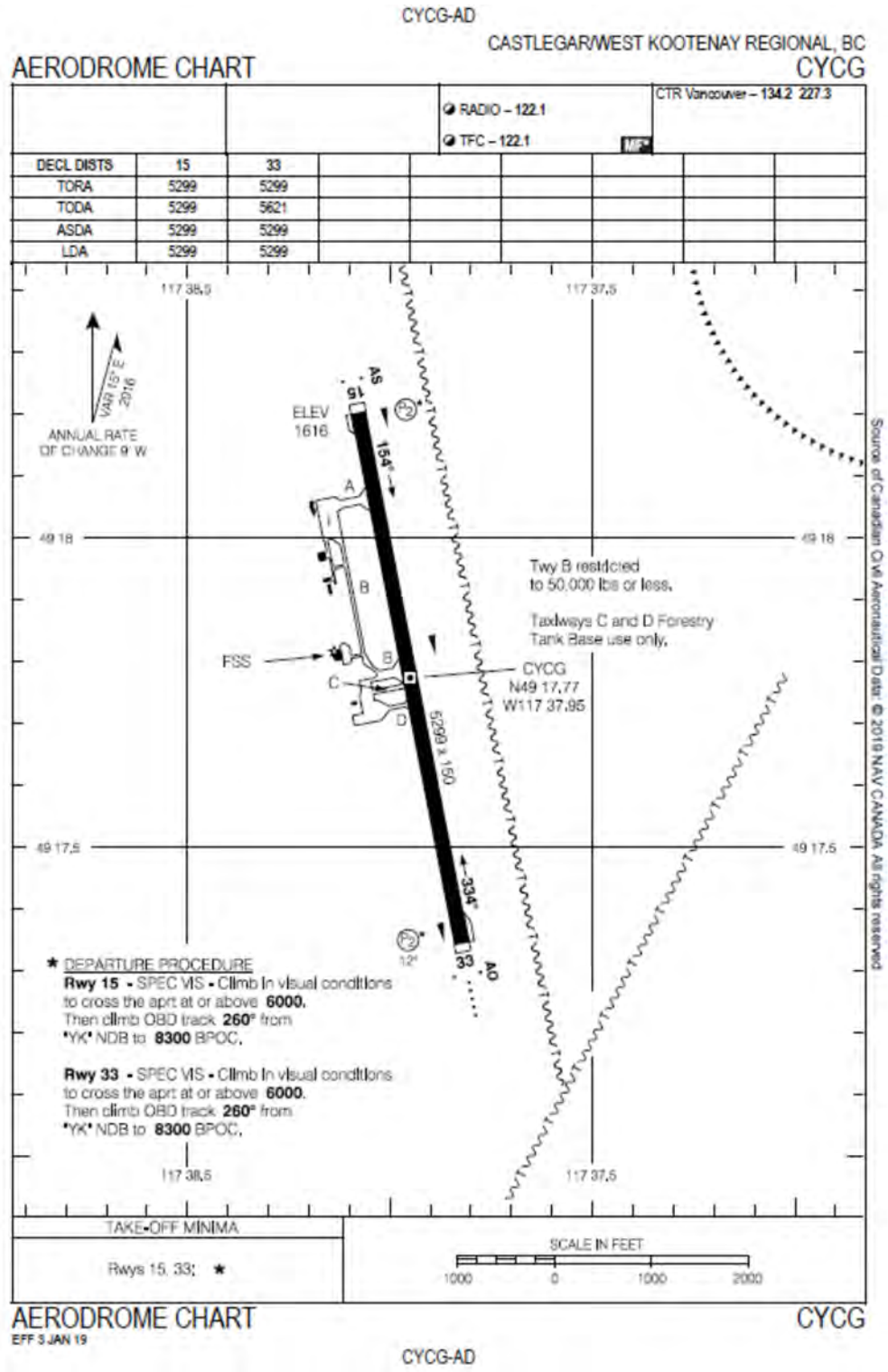
- Additional air carrier frequency
- New cargo and/or logistics operations
- Growing general aviation activity and additional lease lot demand by based aircraft

Infrastructure Requirements

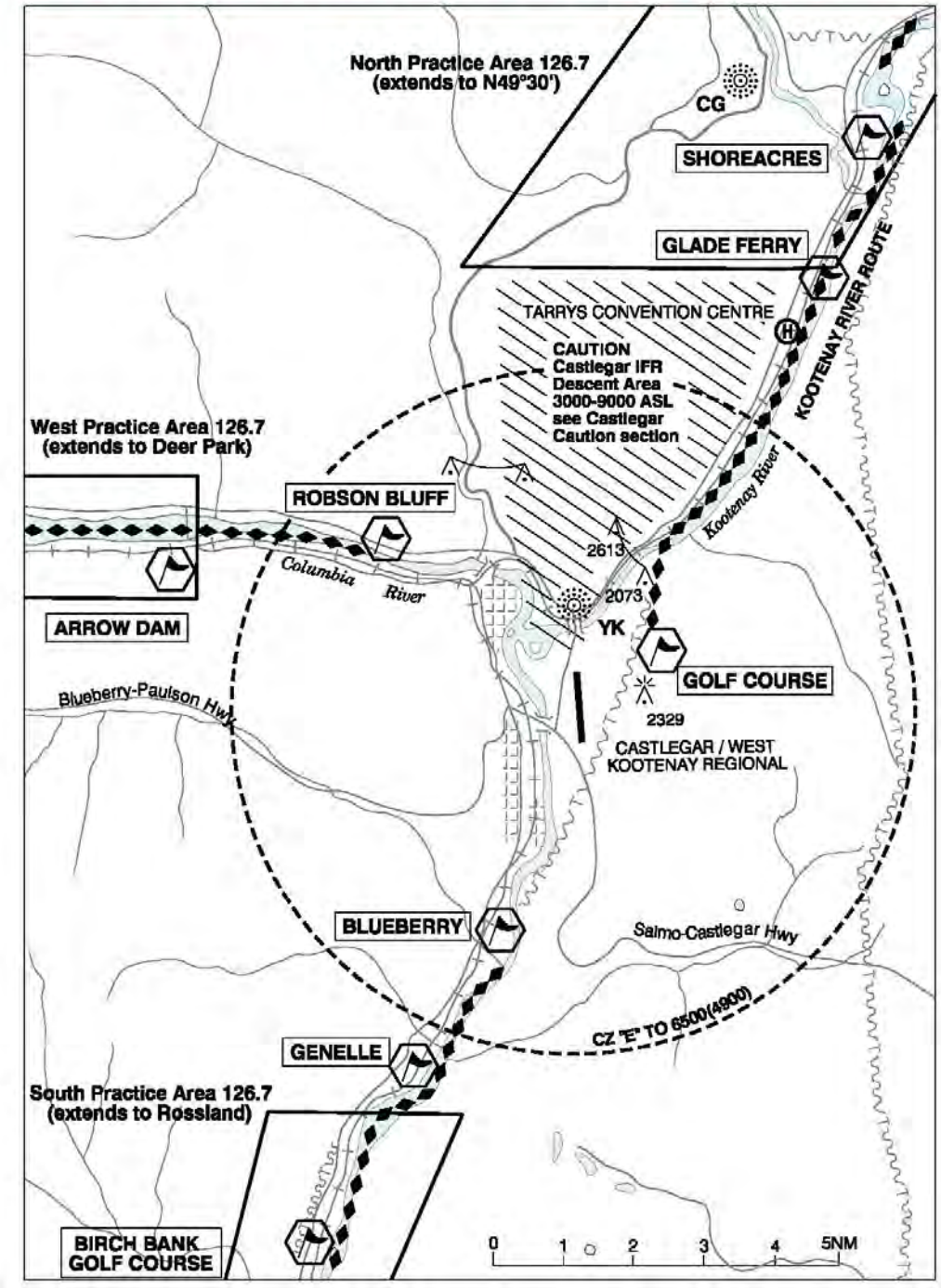
- Completion of full parallel taxiway, west side and new apron / taxiway for P2 parcels
- Additional general aviation lot development, and new partial parallel taxiway, east side
- Terminal building expansion, improved and updated passenger facilitation processes
- Expanding lease lots in P2 and P1

APPENDICES

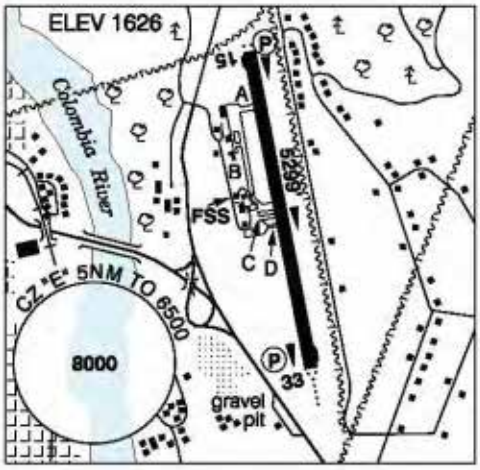
APPENDIX A: WKRA AERODROME CHART & CFS



CASTLEGAR / WEST KOOTENAY REGIONAL VFR TERMINAL PROCEDURES CHART



CASTLEGAR / WEST KOOTENAY REGIONAL BC CYCG



REF	N49 17 46 W117 37 57 2SSE 15°E (2016) UTC-8(7) Elev 1626' A5005 LO2 HI3 CAP
OPR	City 250-365-7227 Cert day only
PF	A-1,2,3,6 C-4,5
CUST	AOE/15 888-226-7277 avbl daylight hrs
FLT PLN	NOTAM FILE CYCG
FIC	Kamloops 866-WXBRIEF (Toll free within Canada) or 866-541-4101 (Toll free within Canada & USA)
WX	METAR 14-01Z (DT 13-04Z) O/T LWIS TAF 16-01Z (DT 15-04Z), issue times: 16, 19Z (DT 15, 19, 01Z).
SERVICES	
FUEL	100LL, JA, SP 250-365-5935
OIL	All
S	1,2,4,5,6 16Z-SS
RWY DATA	Rwy 15(154°)/33(334°) 5299x150 asphalt
TWY	Twy B rstd to 50,000 lbs or less. Twys C & D Forrestry Tanker Base use only.
RCR	FSS CRFI, PLR/PCN.
LIGHTING	15-AS P2, 33-AO P2 (offset 12° left). PAPI will not read correctly unless acft positioned on 12° offset apch flt path. PAPI limitation/restriction. PAPI Rwy 15 to be used only within 3NM of thld; PAPI Rwy 33 to be used only within 2NM of thld.
COMM	Comm at 10NM may not be possible all quads due to terrain
RADIO	122.1 (V) 1330-0130Z (DT 1230-0430Z) (emerg only 250-365-3013)
RCO	Pacific rdo 125.85 (FISE)
MF/ATF	rdo 1330-0130Z (DT 1230-0430Z) O/T tfc 122.1 5NM 6500 ASL (CAR 602.98)
PAL	Vancouver Ctr 134.2 227.3
NAV	
NDB	CG 227 (M) N49 26 49 W117 34 30 BRILLIANT YK 269 (L) N49 19 31 W117 38 00 CHAMPION EF 206 (M) N49 15 22 W117 38 06
DME	XCG 110.1 Ch 38 N49 15 09 W117 39 48 (1718')
LOC	XCG 110.1
PRO	**AIRPORT RESTRICTION:** Pursuant to CAR 602.96 (3) (d) aprt use rstd to daylight hrs only exc for emergencies. Rgt hand circuits Rwy 15 (CAR 602.96). When arriving via Kootenay River route, proceed to GOLF COURSE then join rgt hand circuit Rwy 15/left hand circuit Rwy 33 (CAR 602.96).
CAUTION	Mtns sur the aprt & protrude into tkof/apch areas of both rwys. P-line 40 AGL crosses apch to Rwy 33 aprx 1500' fr thld. Acft on inst apchs may use high rates of descent (see hatched area on VTPC). Hi terrain reduces operational lengths of Rwys 15 and 33 PAPI.

APPENDIX B: ORGANIZATIONS AND PERSONNEL INTERVIEWED

The following provides a list of personnel and organizations that were consulted during the preparation of the Master Plan.

Name of the organization	Contact person	Business Description
Castlegar Fire Department (Airport Tenant)	Sam Lattanzio, Fire Chief	Fire prevention and fire fighting in the city and at the airport
Sentinel Airport Logistics (Airport Tenant)	Randy Grant, Owner	Airport maintenance
Castlegar Economic Development	Mark Laver, Regional Manager	Responsible for the economic development of the Castlegar Area
Chances Casino (Airport Tenant)	Sandi Schrader, Manager	Casino - Entertainment
Town of Castlegar	Chris Barlow, CAO	City Operation
West Kootenay Regional Airport	Patrick Gauvreau, Airport Manager	Airport Operation
Brilliant Aviation/World Fuels (Airport Tenant)	Aaron Janzen, Co-Owner	Fuel dispensing and GA maintenance
Wildfire Management Services	Kandy Schroder, Assets Manager	Government organization responsible for wildfire fighting.
Selkirk College (Airport Tenant)	Angus Graeme, President	Education. Local college
Interfor	Duncan Davies, CEO	Lumber production
Mercer Celgar	Bill MacPherson, Managing Director	Pulp Mill
Kolesnikoff	Chris Kolesnikoff, CEO	Lumber production
Berezan	Steve Berezan, Director	Investor (hotels, casino, stores etc.)
BCIT	Sanja Boskovic, Associate Dean Aerospace	Education
Castlegar Chamber of Commerce	Tammy Verigin-Burk, President	Entrepreneurs

APPENDIX C: ESTIMATE OF PROBABLE COSTS, AIRSIDE INFRA

ESTIMATE OF PROBABLE COST
CASTLEGAR AIRPORT
CASTLEGAR, BC

4/30/2019

A. Runway Extension and Turnaround (Runway 15-33)		Units	Estimated Quantity	Unit Rate	Total Cost
A.1	Clearing and Grubbing	m^2	15,375	$3.00	$46,125.00
A.2	Common Earth Excavation	m^3	15,375	$45.00	$691,875.00
A.3	Crushed Aggregate Base Course	m^3	4,650	$65.00	$302,250.00
A.4	Crushed Aggregate Sub-Base Course	m^3	7,700	$65.00	$500,500.00
A.5	Hot Mix Asphalt Airside Pavement	Tonne	5,800	$250.00	$1,450,000.00
A.6	Asphalt tack coat	L	5,000	$3.00	$15,000.00
A.7	Painted traffic lines and markings -	LS	1	$12,000.00	$12,000.00
A.8	Runway Subdrain	lm	600	$300.00	$180,000.00
A.9	CB Structures	ea	6	$12,000.00	$72,000.00
				Sub Total	$3,269,750.00
			Contingency	20%	$653,950.00
				A. Runway Extension (Runway 15-33) - TOTAL	**$3,923,700.00**

B. Proposed AGN II Parallel Taxiway w/ Hangar Apron		Units	Estimated Quantity	Unit Rate	Total Cost
B.1	Clearing and Grubbing	m^2	11,350	$3.00	$34,050.00
B.2	Common Earth Excavation	m^3	11,350	$45.00	$510,750.00
B.3	Crushed Aggregate Base Course	m^3	3,450	$65.00	$224,250.00
B.4	Crushed Aggregate Sub-Base Course	m^3	5,700	$65.00	$370,500.00
B.5	Hot Mix Asphalt Airside Pavement	Tonne	2,900	$250.00	$725,000.00
B.6	Asphalt tack coat	L	3,675	$3.00	$11,025.00
B.7	Painted traffic lines and markings -	LS	1	$12,000.00	$12,000.00
B.8	Taxiway Subdrain	lm	700	$300.00	$210,000.00
B.9	CB Structures	ea	8	$12,000.00	$96,000.00
				Sub Total	$2,193,575.00
			Contingency	20%	$438,715.00
				B. Proposed AGN II Parallel Taxiway w/ Hangar Apron	**$2,632,290.00**

C. Proposed AGN IV Taxiway from Rwy 15 End to Taxiway A		Units	Estimated Quantity	Unit Rate	Total Cost
C.1	Clearing and Grubbing	m^2	7,200	$3.00	$21,600.00
C.2	Common Earth Excavation	m^3	7,200	$45.00	$324,000.00
C.3	Crushed Aggregate Base Course	m^3	2,200	$65.00	$143,000.00
C.4	Crushed Aggregate Sub-Base Course	m^3	3,600	$65.00	$234,000.00
C.5	Hot Mix Asphalt Airside Pavement	Tonne	1,800	$250.00	$450,000.00
C.6	Asphalt tack coat	L	2,350	$3.00	$7,050.00
C.7	Painted traffic lines and markings -	LS	1	$12,000.00	$12,000.00
C.7	Taxiway Subdrain	lm	650	$300.00	$195,000.00
C.8	CB Structures	ea	8	$12,000.00	$96,000.00
				Sub Total	$1,482,650.00
			Contingency	20%	$296,530.00
				C. Proposed AGN IV Taxiway from Rwy 15 End to Taxiway A - TOTAL	**$1,779,180.00**

D. Proposed Rapid Exit Taxiway (Jug Handle)		Units	Estimated Quantity	Unit Rate	Total Cost
D.1	Clearing and Grubbing	m^2	7,300	$3.00	$21,900.00
D.2	Common Earth Excavation	m^3	7,300	$45.00	$328,500.00
D.3	Crushed Aggregate Base Course	m^3	2,200	$65.00	$143,000.00
D.4	Crushed Aggregate Sub-Base Course	m^3	3,650	$65.00	$237,250.00
D.5	Hot Mix Asphalt Airside Pavement	Tonne	1,825	$250.00	$456,250.00
D.6	Asphalt tack coat	L	2,350	$3.00	$7,050.00
D.7	Painted traffic lines and markings -	LS	1	$12,000.00	$12,000.00
D.8	Taxiway Subdrain	lm	550	$300.00	$165,000.00
D.9	CB Structures	ea	6	$12,000.00	$72,000.00
				Sub Total	$1,442,950.00
			Contingency	20%	$288,590.00
				D. Proposed Rapid Exit Taxiway (Jug Handle) - TOTAL	**$1,731,540.00**

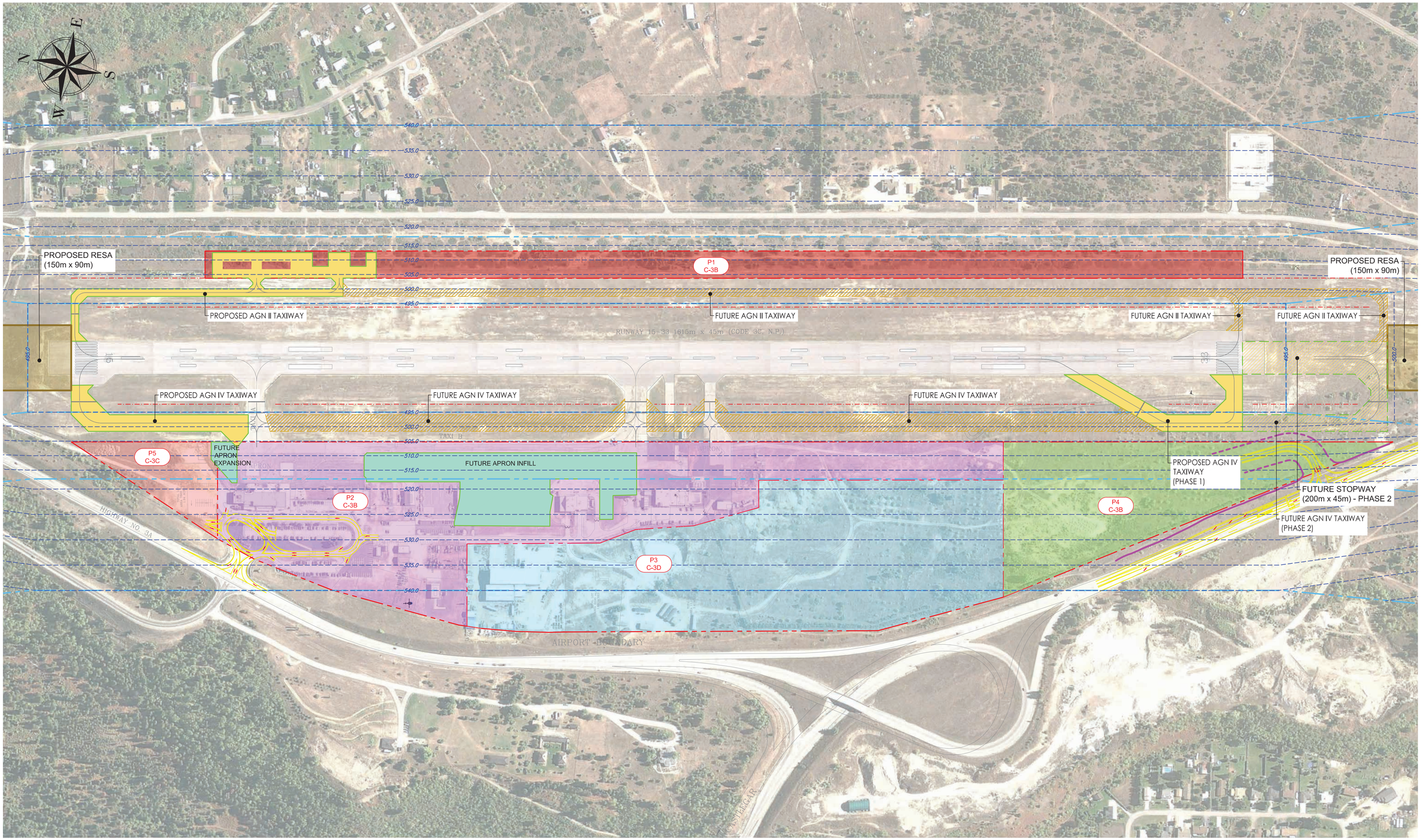
E. Future AGN II Taxiway (Full length parallel)		Units	Estimated Quantity	Unit Rate	Total Cost
E.1	Clearing and Grubbing	m^2	16,700	$3.00	$50,100.00
E.2	Common Earth Excavation	m^3	16,700	$45.00	$751,500.00
E.3	Crushed Aggregate Base Course	m^3	5,010	$65.00	$325,650.00
E.4	Crushed Aggregate Sub-Base Course	m^3	8,350	$65.00	$542,750.00
E.5	Hot Mix Asphalt Airside Pavement	Tonne	4,200	$250.00	$1,050,000.00
E.6	Asphalt tack coat	L	5,350	$3.00	$16,050.00
E.7	Painted traffic lines and markings -	LS	1	$24,000.00	$24,000.00
E.8	Taxiway Subdrain	lm	2,200	$300.00	$660,000.00
E.9	CB Structures	ea	22	$12,000.00	$264,000.00
				Sub Total	$3,684,050.00
			Contingency	20%	$736,810.00
			E. Future AGN II Taxiway - TOTAL		**$4,420,860.00**

F. Future AGN IV Taxiway (From Taxiway A to Taxiway B)		Units	Estimated Quantity	Unit Rate	Total Cost
F.1	Clearing and Grubbing	m^2	11,500	$3.00	$34,500.00
F.2	Common Earth Excavation	m^3	11,500	$45.00	$517,500.00
F.3	Crushed Aggregate Base Course	m^3	3,450	$65.00	$224,250.00
F.4	Crushed Aggregate Sub-Base Course	m^3	5,750	$65.00	$373,750.00
F.5	Hot Mix Asphalt Airside Pavement	Tonne	2,900	$250.00	$725,000.00
F.6	Asphalt tack coat	L	3,700	$3.00	$11,100.00
F.7	Painted traffic lines and markings -	LS	1	$18,000.00	$18,000.00
F.8	Taxiway Subdrain	lm	1,000	$300.00	$300,000.00
F.9	CB Structures	ea	10	$12,000.00	$120,000.00
				Sub Total	$2,324,100.00
			Contingency	20%	$464,820.00
			F. Future AGN IV Taxiway (From Taxiway A to Existing Taxiway) - TOTAL		**$2,788,920.00**

G. Future AGN IV Taxiway (From Taxiway B to Taxiway D)		Units	Estimated Quantity	Unit Rate	Total Cost
G.1	Clearing and Grubbing	m^2	2,200	$3.00	$6,600.00
G.2	Common Earth Excavation	m^3	2,200	$45.00	$99,000.00
G.3	Crushed Aggregate Base Course	m^3	700	$65.00	$45,500.00
G.4	Crushed Aggregate Sub-Base Course	m^3	1,100	$65.00	$71,500.00
G.5	Hot Mix Asphalt Airside Pavement	Tonne	550	$250.00	$137,500.00
G.6	Asphalt tack coat	L	750	$3.00	$2,250.00
G.7	Painted traffic lines and markings -	LS	1	$2,500.00	$2,500.00
G.8	Taxiway Subdrain	lm	200	$300.00	$60,000.00
G.9	CB Structures	ea	4	$12,000.00	$48,000.00
				Sub Total	$472,850.00
			Contingency	20%	$94,570.00
			G. Future AGN IV Taxiway (Center Portion Only) - TOTAL		**$567,420.00**

H. Future AGN IV Taxiway (Taxiway D to Rapid Exit / Jug Handle Taxiway)		Units	Estimated Quantity	Unit Rate	Total Cost
H.1	Clearing and Grubbing	m^2	14,000	$3.00	$42,000.00
H.2	Common Earth Excavation	m^3	14,000	$45.00	$630,000.00
H.3	Crushed Aggregate Base Course	m^3	4,200	$65.00	$273,000.00
H.4	Crushed Aggregate Sub-Base Course	m^3	7,000	$65.00	$455,000.00
H.5	Hot Mix Asphalt Airside Pavement	Tonne	3,500	$250.00	$875,000.00
H.6	Asphalt tack coat	L	4,500	$3.00	$13,500.00
H.7	Painted traffic lines and markings -	LS	1	$18,000.00	$18,000.00
H.8	Taxiway Subdrain	lm	1,100	$300.00	$330,000.00
H.9	CB Structures	ea	12	$12,000.00	$144,000.00
				Sub Total	$2,780,500.00
			Contingency	20%	$556,100.00
			H. Future AGN IV Taxiway (Center Portion to Rapid Exit Taxiway) - TOTAL		**$3,336,600.00**

APPENDIX D: WKRA LAND USE PLAN, PARCEL LAYOUTS & ATB EXPANSION PLANS



A FINAL SUBMISSION	CDZ	PVM	19,06,10
ISSUED	By	Appd.	YY,MM,DD

Legend

- PROPOSED TAXIWAY EXPANSION
- PROPOSED APRON INFILL/EXPANSION
- FUTURE RUNWAY 12-30 STOPWAY EXPANSION
- FUTURE TAXIWAY EXPANSION
- PROPOSED RUNWAY END SAFETY AREA (RESA)
- PROPOSED BUILDING
- PARCEL P1 GENERAL AVIATION
- PARCEL P2 AERONAUTICAL & AVIATION
- PARCEL P3 LIGHT INDUSTRIAL PARK
- PARCEL P4 COMMERCIAL DEVELOPMENT
- PARCEL P5 HOTEL IMPLEMENTATION

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Client/Project

CASTLEGAR AIRPORT

MASTER PLANNING CONCEPTS

CASTLEGAR, BC

Title

SITE PLAN - OPTION 1

Project No.	Scale	
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Drawing No.	Sheet	Revision
SP1	1 of 10	A

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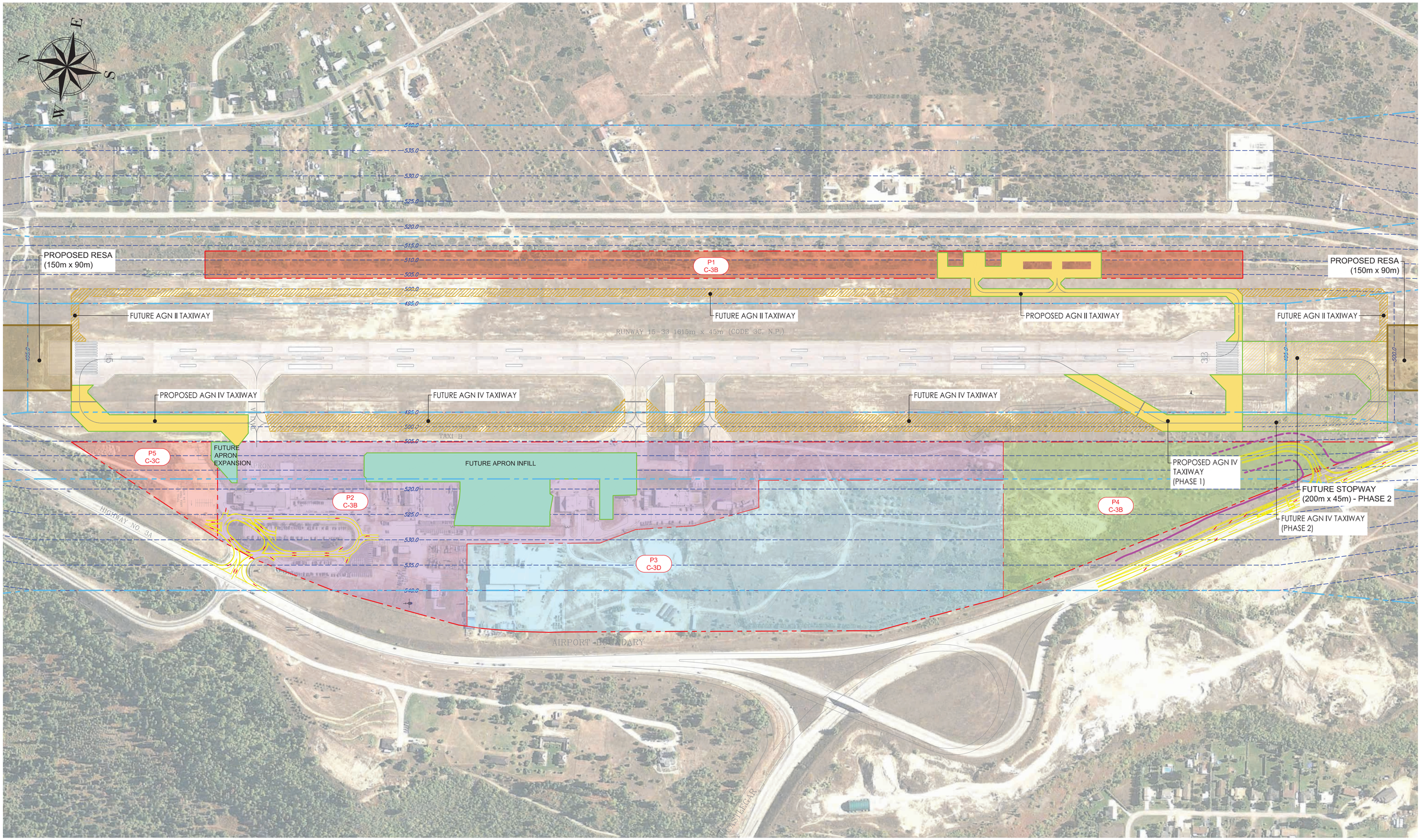

A FINAL SUBMISSION	CDZ	PVM	19,06,10
ISSUED	By	Appd.	YY,MM,DD

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- PROPOSED APRON INFILL/EXPANSION
- FUTURE RUNWAY 12-30 STOPWAY EXPANSION
- FUTURE TAXIWAY EXPANSION
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- PARCEL P4 COMMERCIAL DEVELOPMENT
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CASTLEGAR, BC

Title

SITE PLAN - OPTION 2

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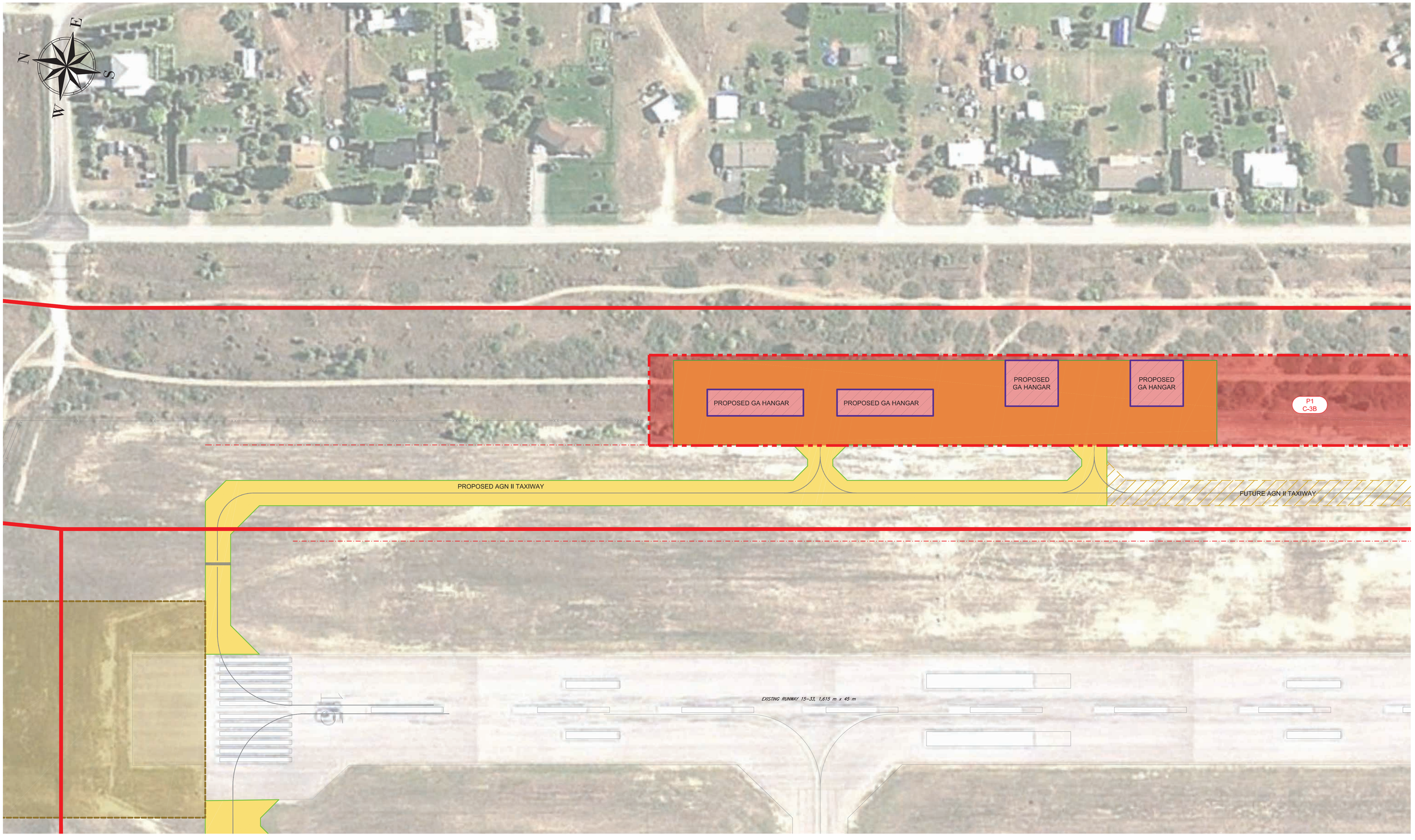

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Title
PARCEL P1A LAYOUT

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Drawing No.	Sheet	Revision
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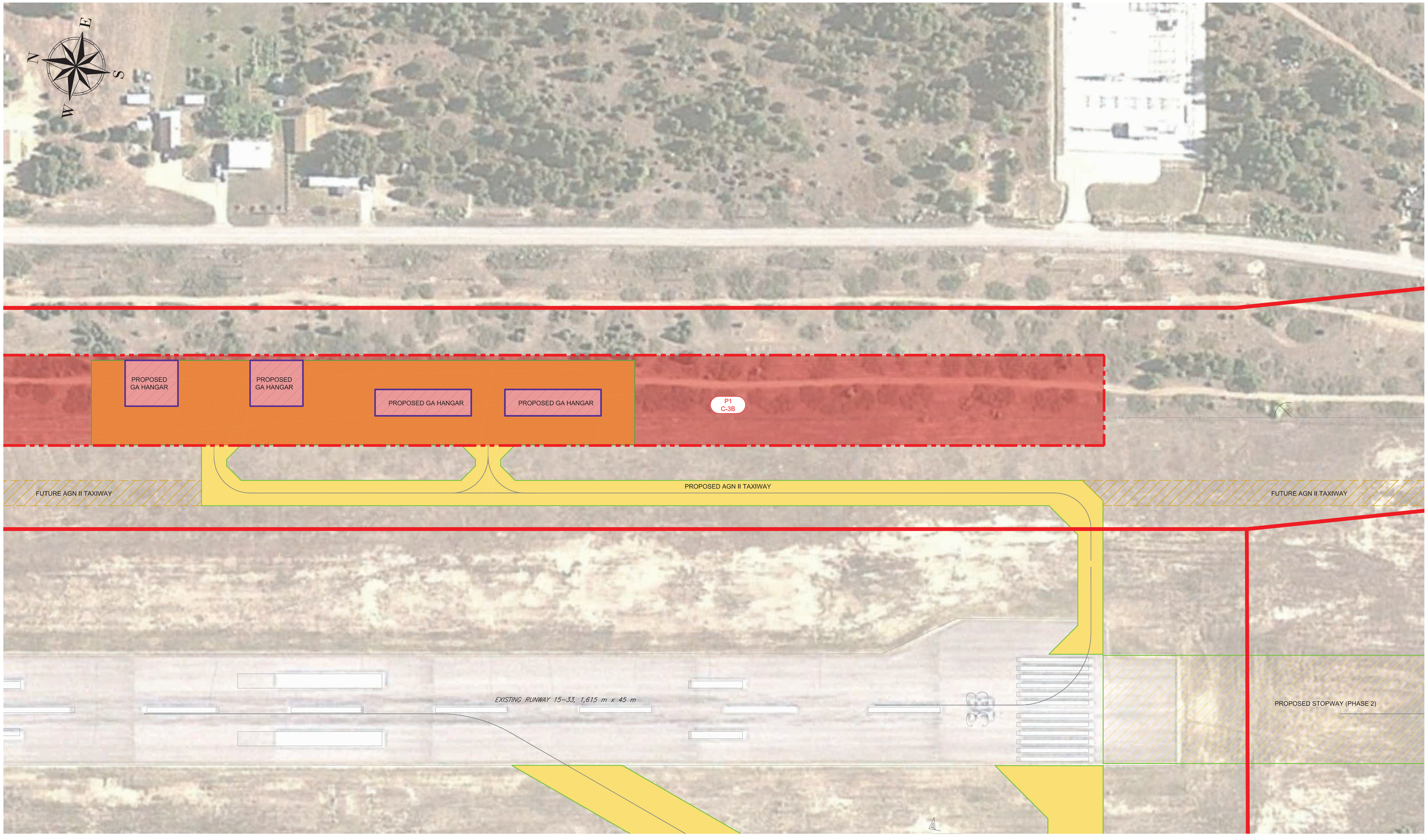

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MASTER PLANNING CONCEPTS

CASTLEGAR, BC

Title
PARCEL P1B LAYOUT

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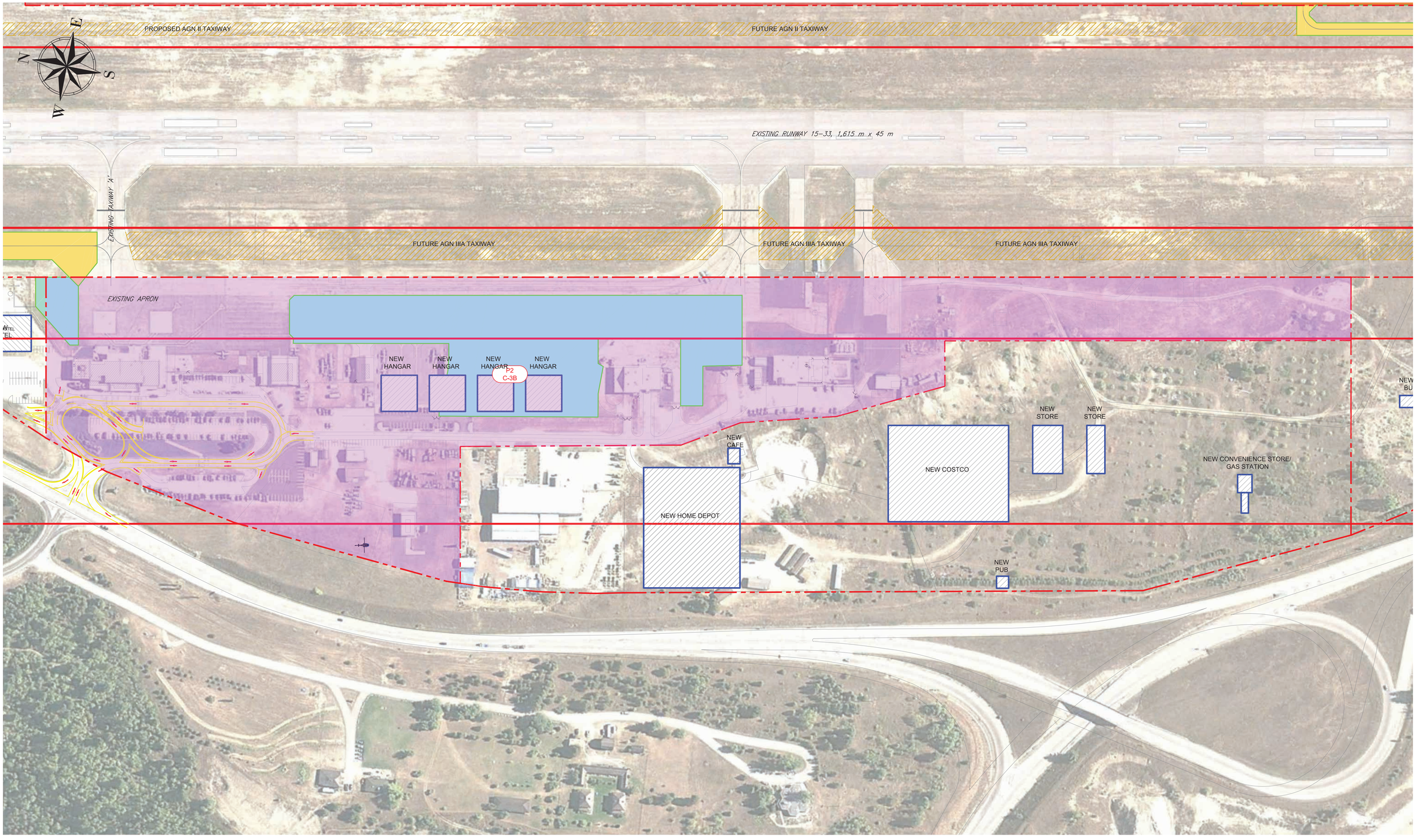

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ISSUED	By	Appd.	YY.MM.DD

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CASTLEGAR, BC

Title
PARCEL P2 LAYOUT

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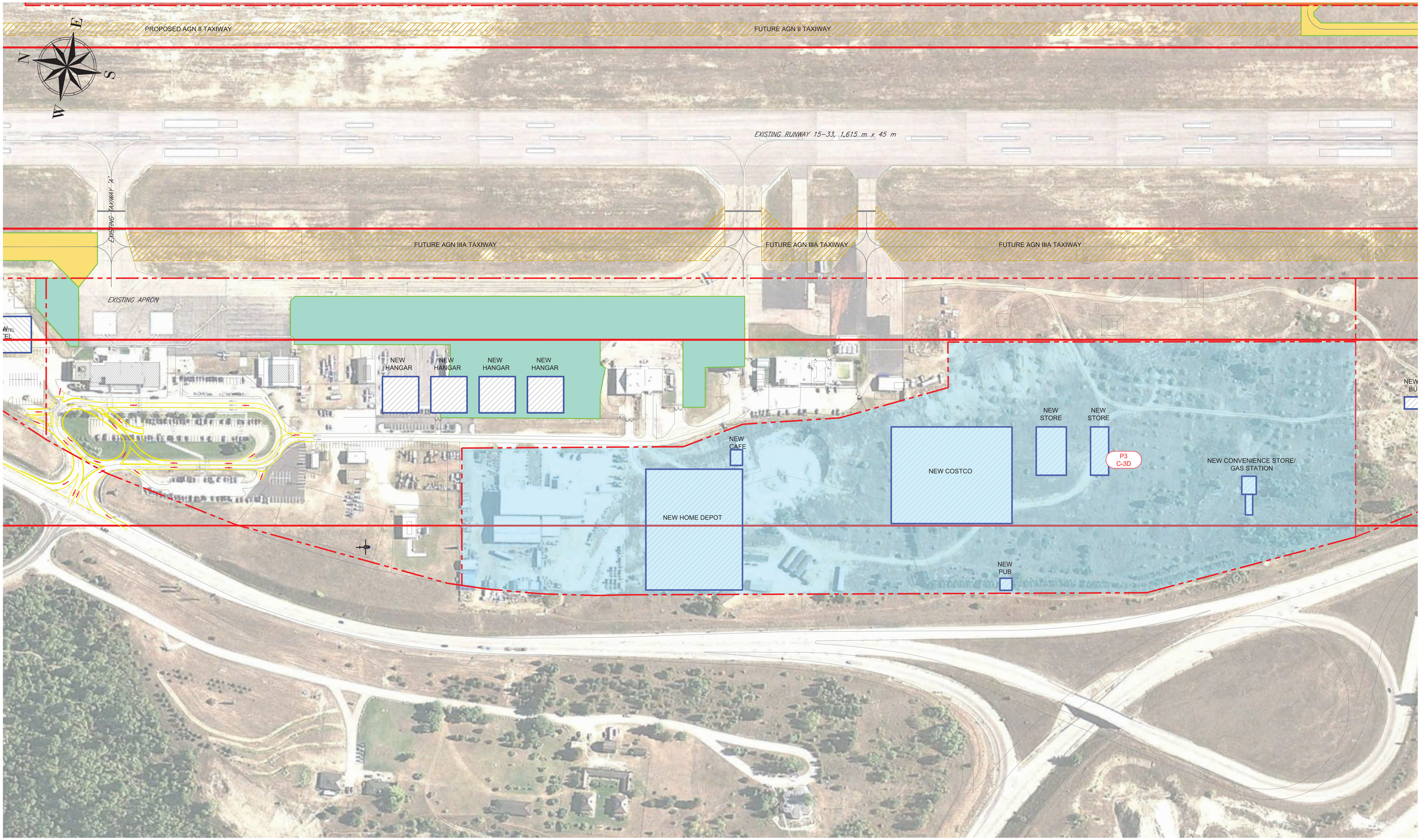

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MASTER PLANNING CONCEPTS

CASTLEGAR, BC

Title
PARCEL P3 LAYOUT

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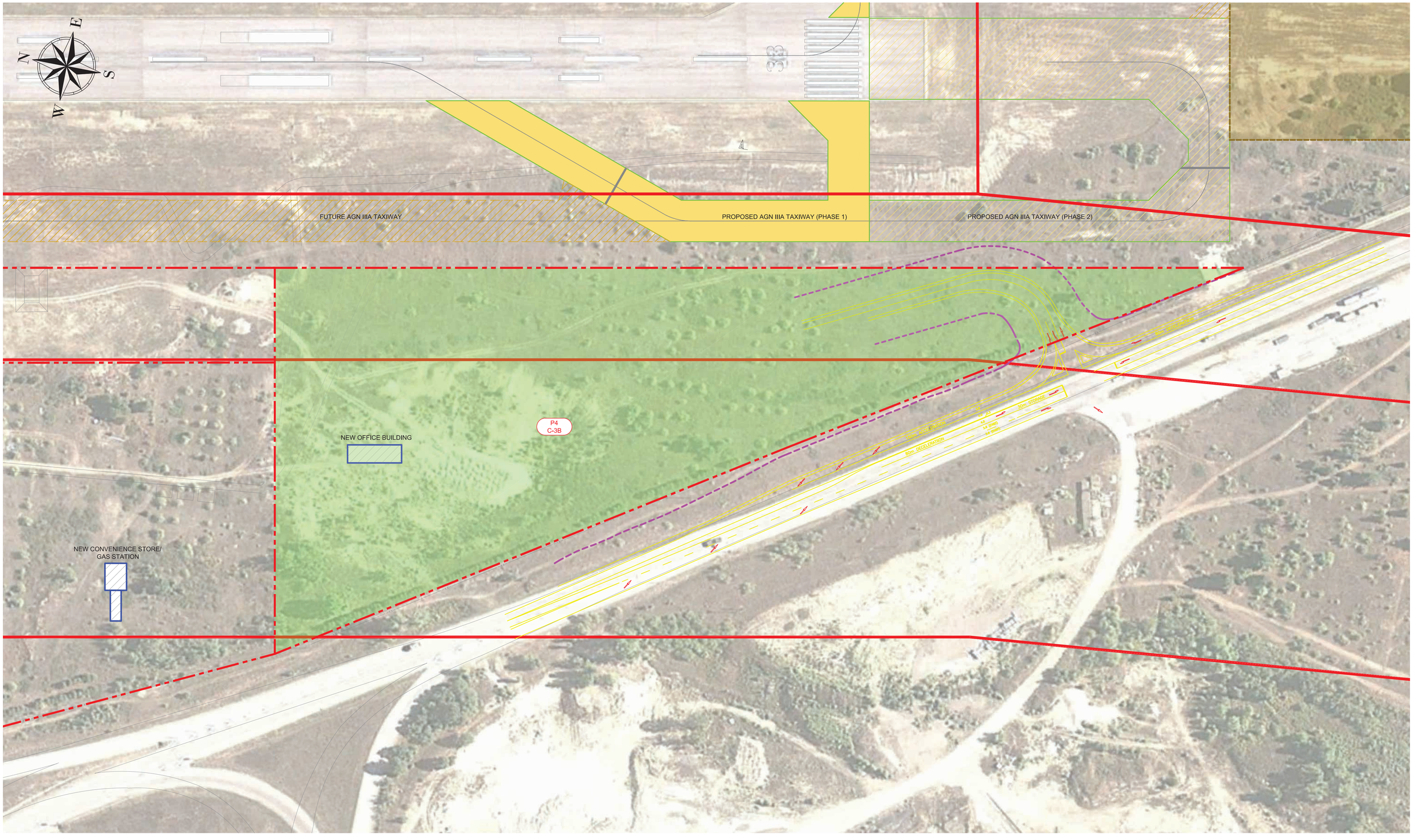

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ISSUED	By	Appd.	YY,MM,DD

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MASTER PLANNING CONCEPTS

CASTLEGAR, BC

Title
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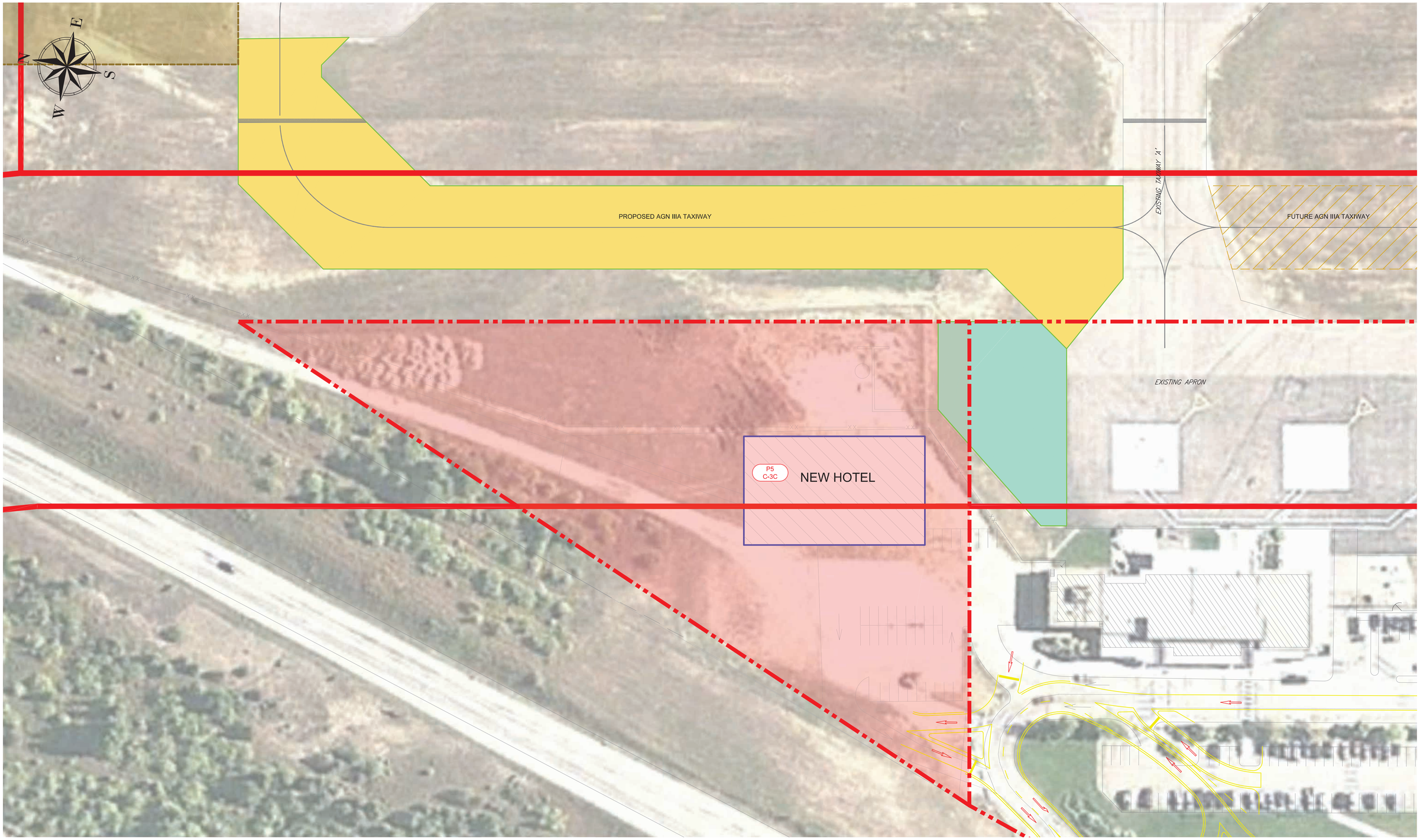

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MASTER PLANNING CONCEPTS

CASTLEGAR, BC

Title
PARCEL P5 LAYOUT

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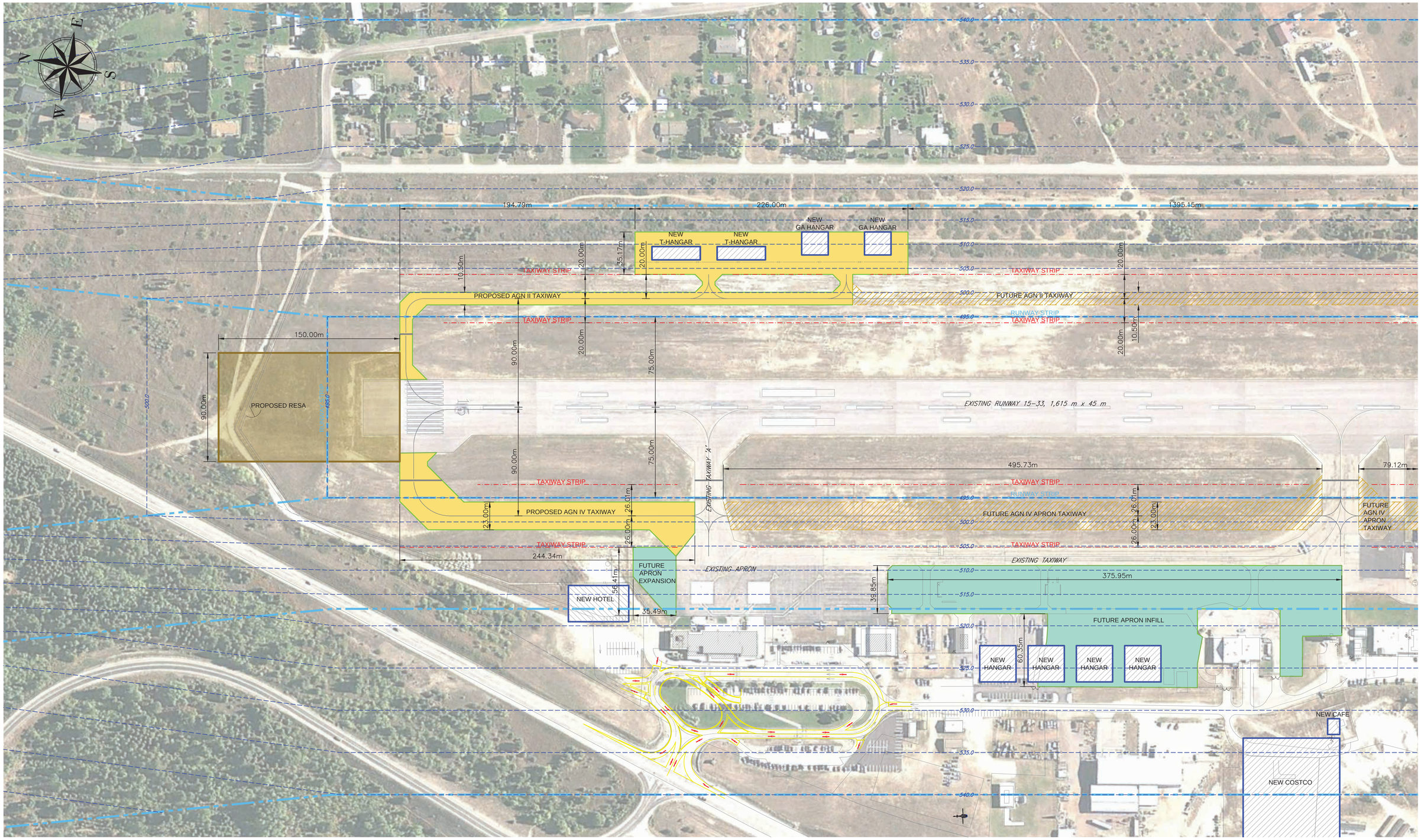

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Client/Project
CASTLEGAR AIRPORT

MASTER PLANNING CONCEPTS

CASTLEGAR, BC

Title
PROPOSED AIRFIELD
PAVEMENT EXPANSION LAYOUT I

Project No.	Scale	
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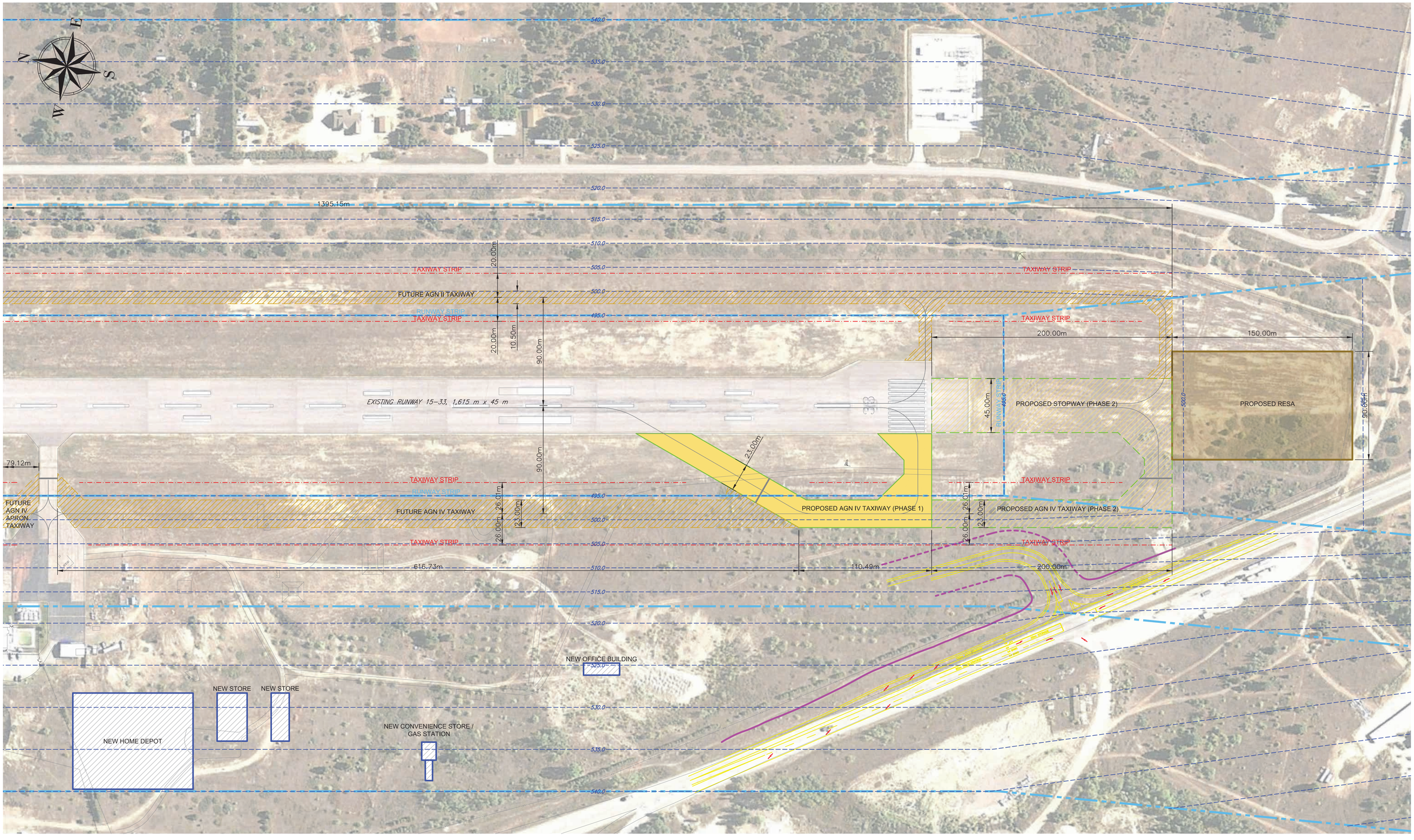

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CASTLEGAR AIRPORT

MASTER PLANNING CONCEPTS

CASTLEGAR, BC

Title
PROPOSED AIRFIELD
PAVEMENT EXPANSION LAYOUT II

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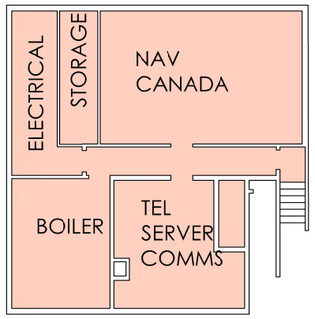

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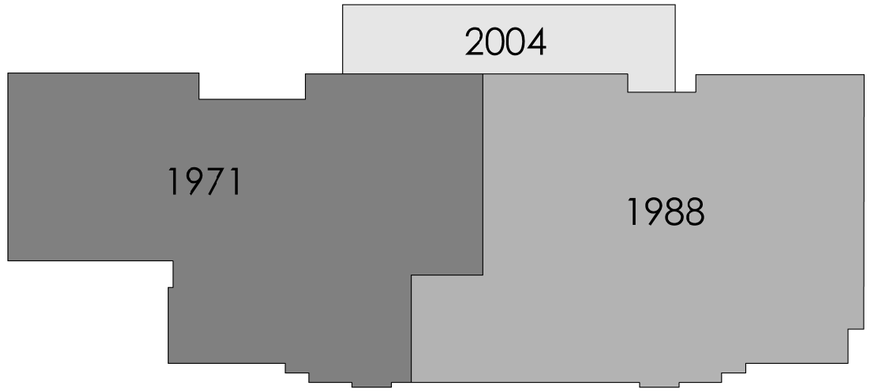

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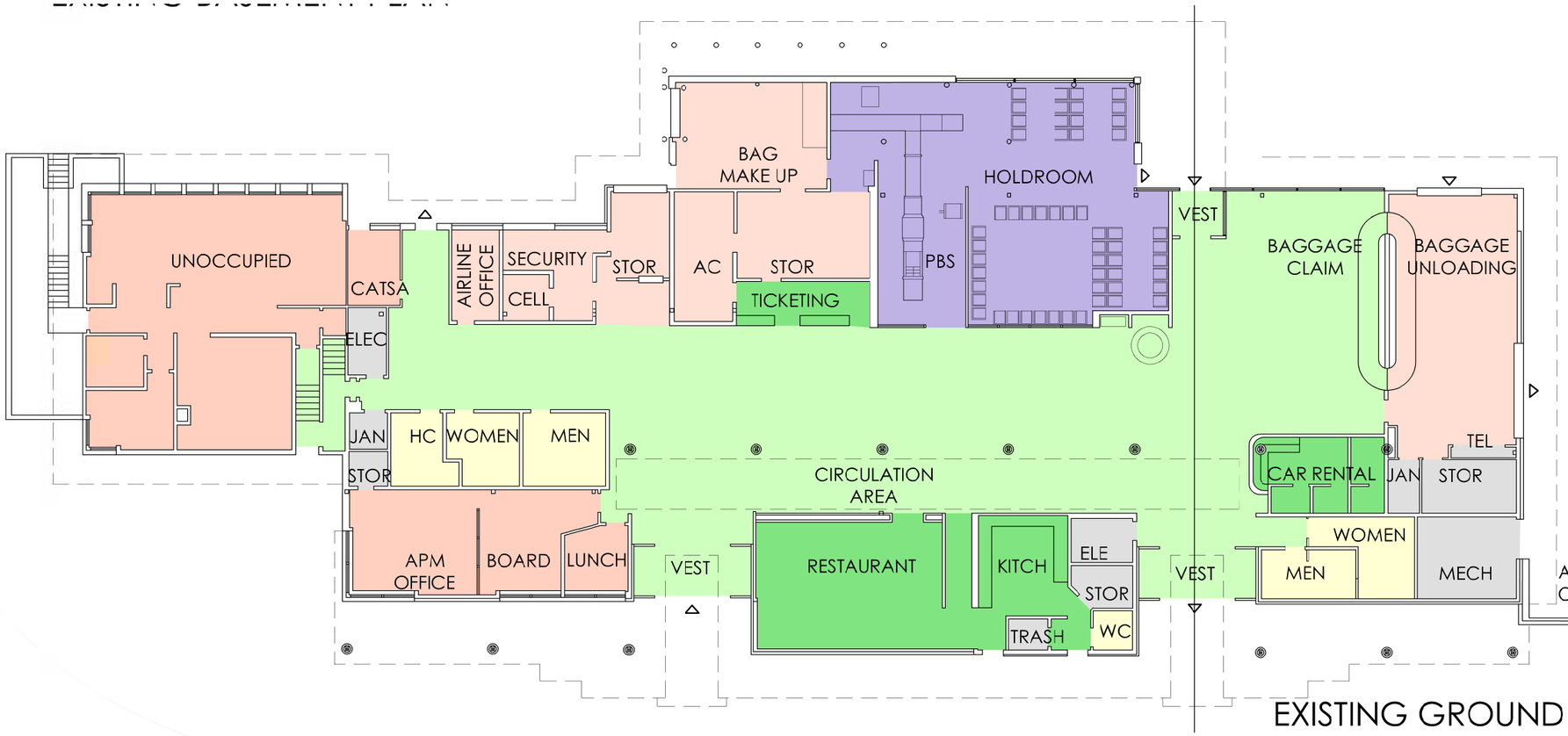

EXISTING GROUND FLOOR PLAN

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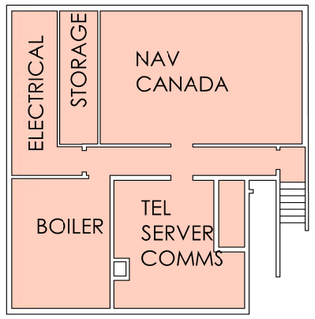
West Kootenay Regional Airport

EXISTING FLOOR PLAN

26 APR 2019
163601232

Stantec



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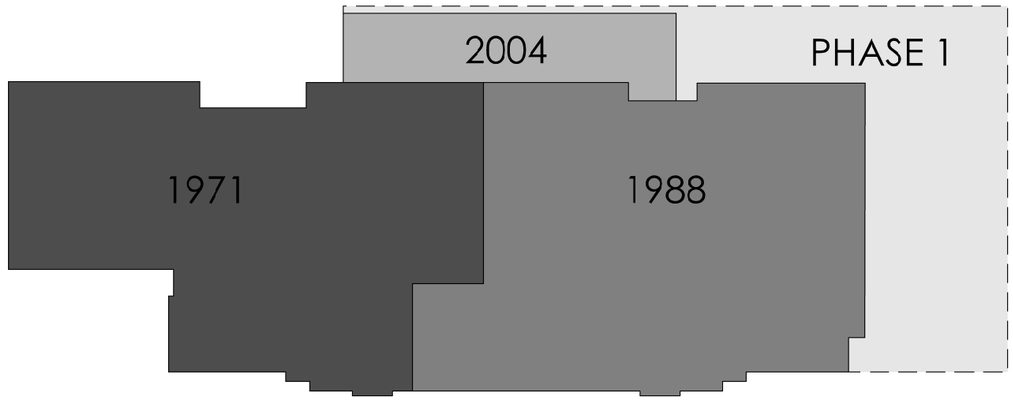

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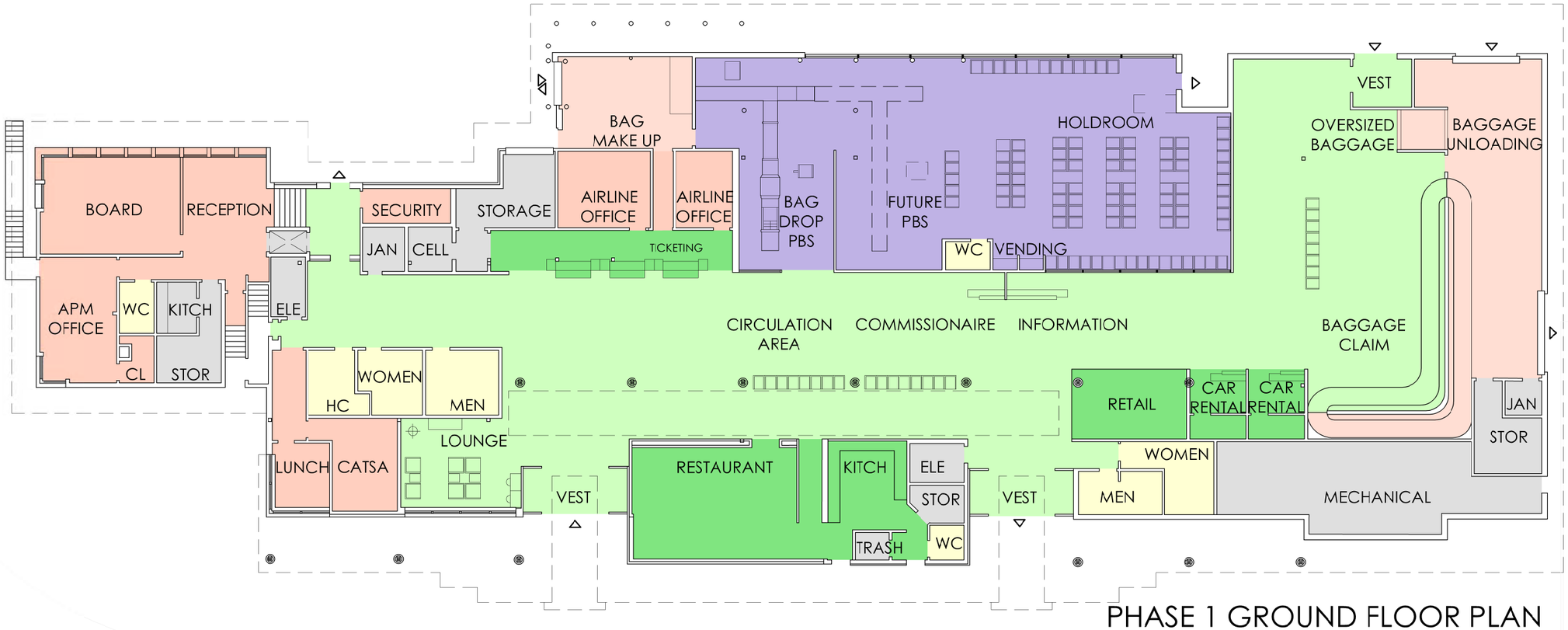

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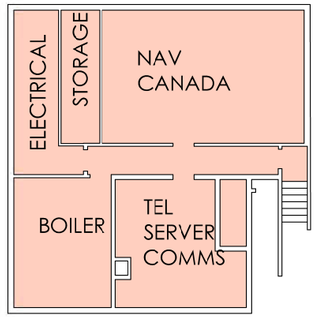
West Kootenay Regional Airport

PHASE 1

26 APR 2019
163601232

Stantec



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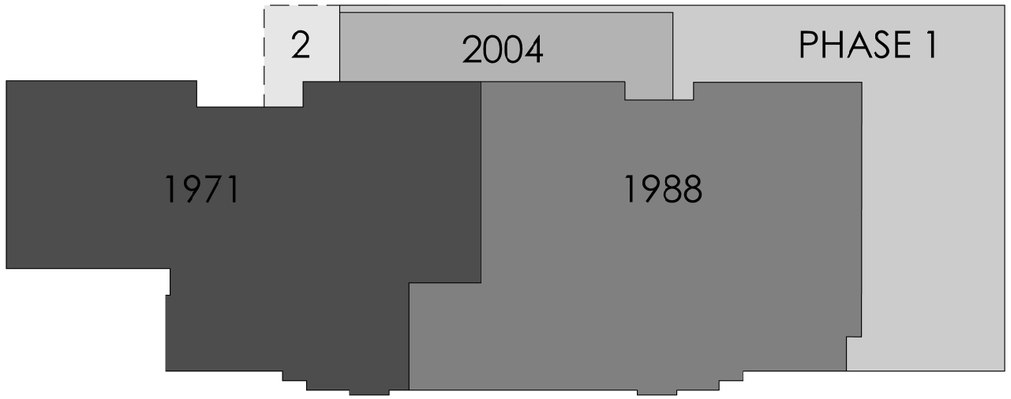

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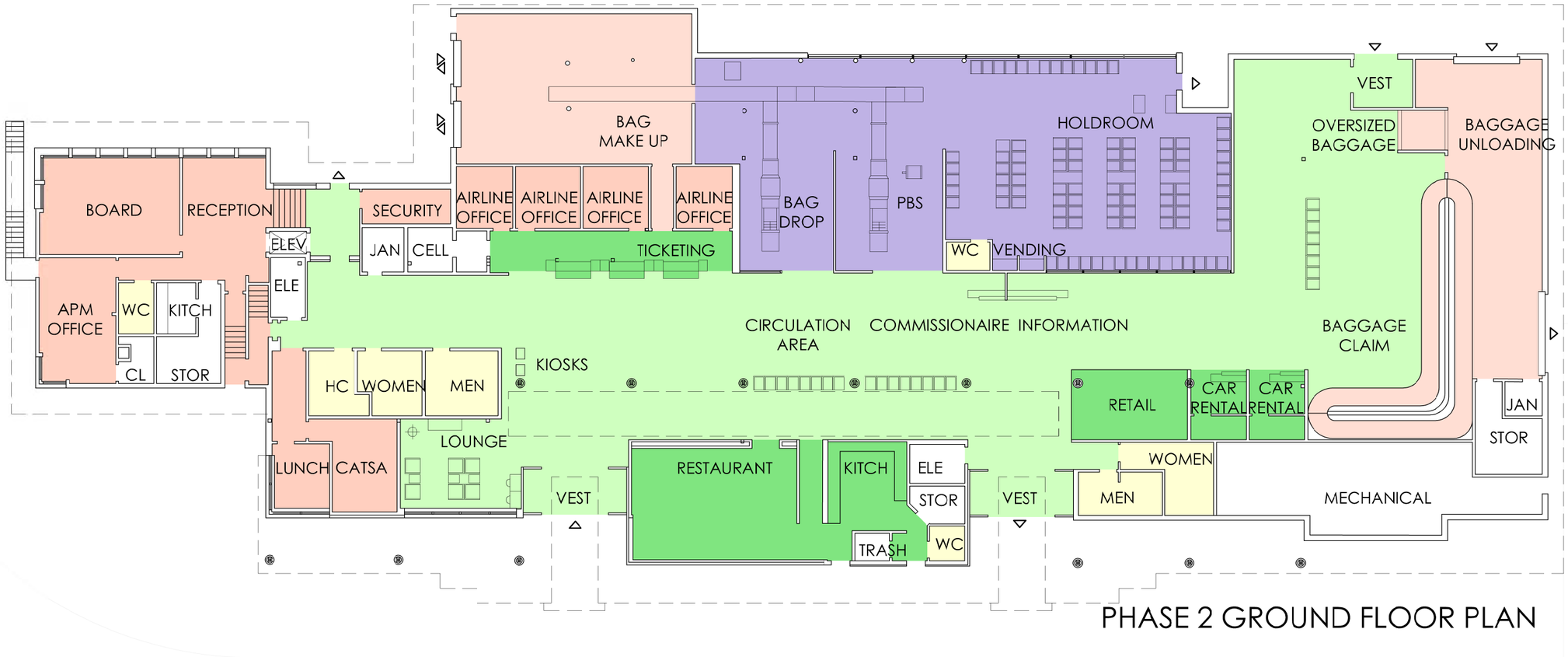

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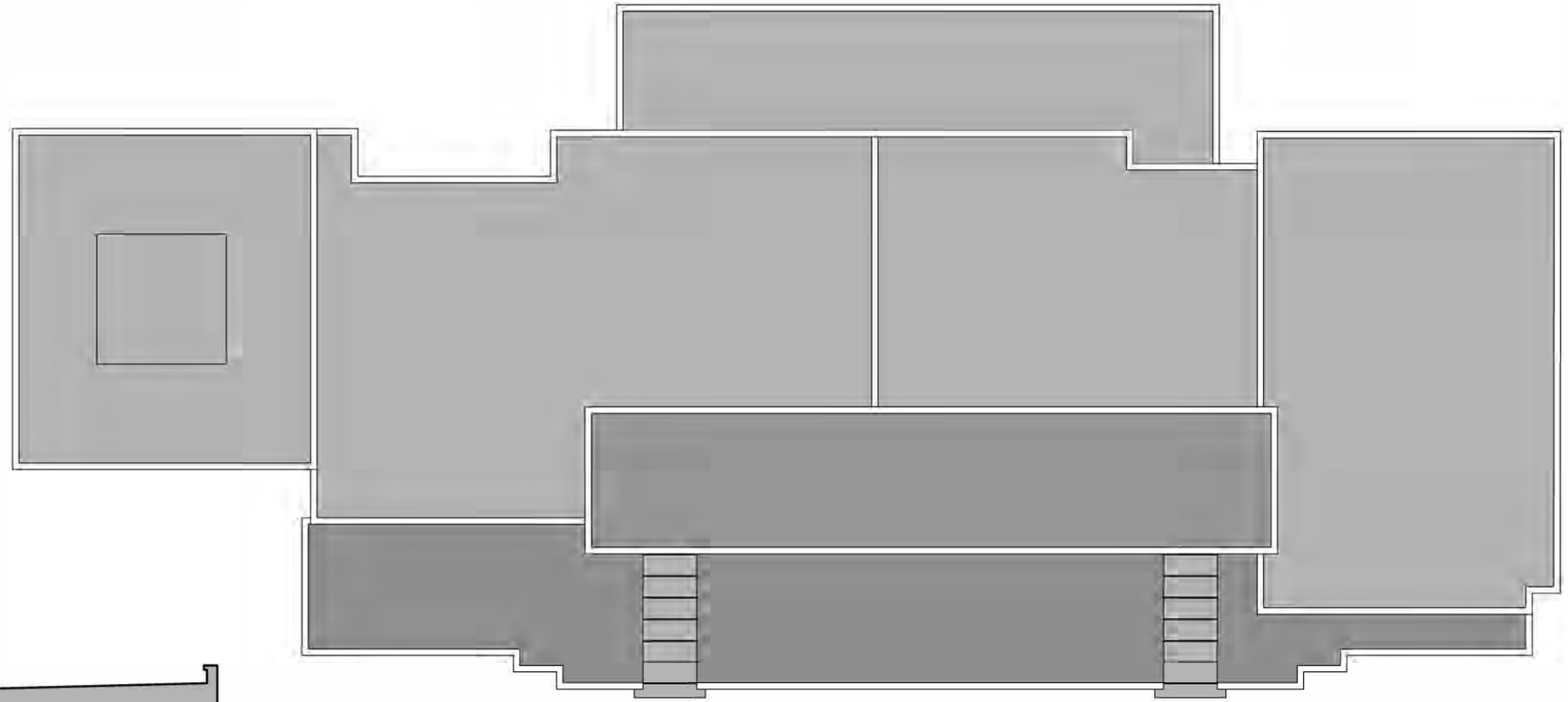
West Kootenay Regional Airport

PHASE 2

26 APR 2019
163601232

Stantec



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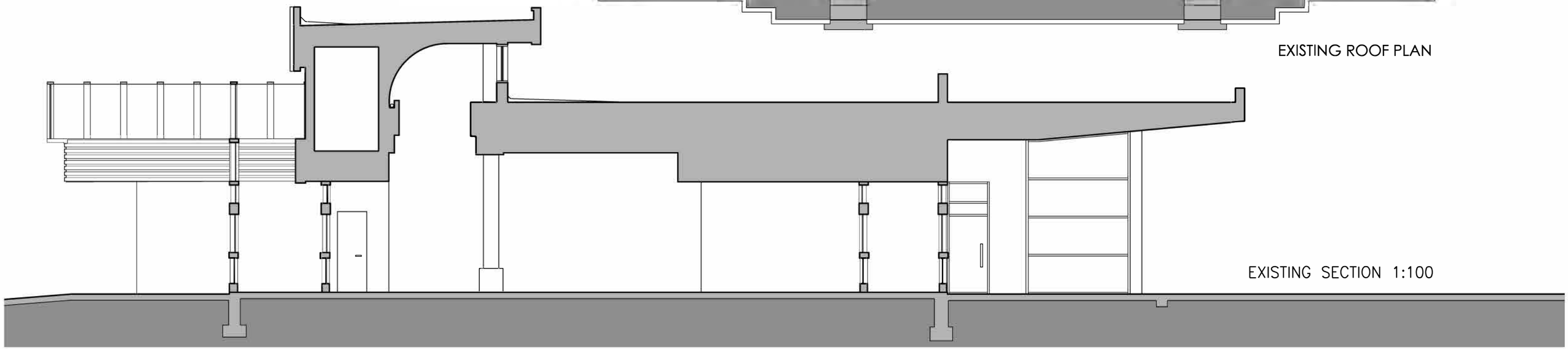

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WEST KOOTENAY REGIONAL AIRPORT

EXISTING

26 APR 2019
163601232

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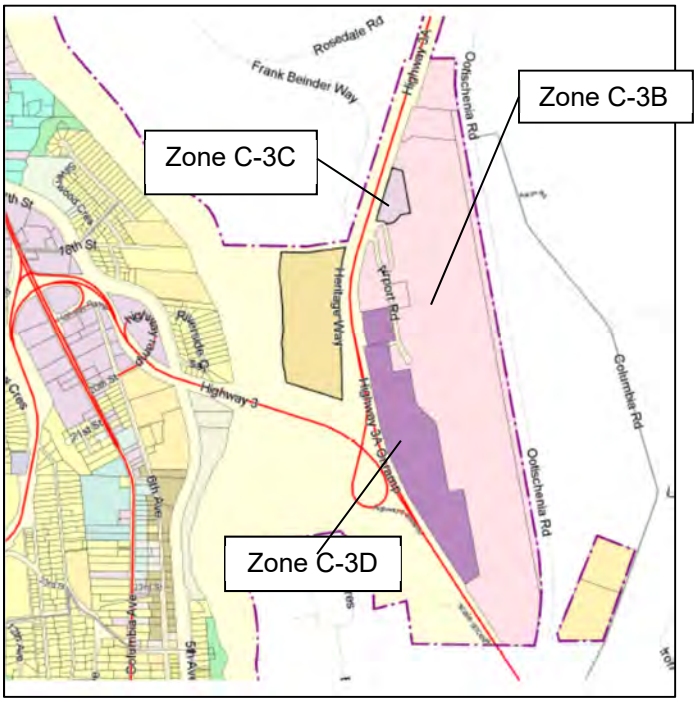
APPENDIX E: EXISTING AIRPORT ZONING BY-LAW

The following is an extract from the Castlegar Zoning Bylaw 800. The extract aims specifically at zoning and around the airport. The airport has three (3) development zones; Zone C-3B, C-3C and C-3D.



Airport Zone (C-3B)

Permitted Uses

Lands, building, and structures in C-3B Zone may be used for the following purposes only:

a. Department stores, shopping centres, retail warehouses **(Bylaw 966);**
b. Hotels, motels;
c. Restaurants, neighbourhood pubs;
d. Office uses;
e. Arcades, billiard halls, bowling alleys;
f. Automobile dealers, automobile rentals;
g. Recreational vehicle dealers;
h. Auto-repair shops, gasoline stations, car washes;
i. Auto-body shops, truck repair shops;
j. Aircraft fuel sales, gasoline key locks, bulk fuel depots;
k. Driving schools, flight training schools, flying clubs;
l. Taxi dispatchers, bus depots;
m. Airports;

n. Aircraft sales, repairs and rentals;

o. Small warehouses;

p. Retail stores (**Bylaw 966).**

Lot Sizes

Lots to be created through subdivision in C-3B Zone shall conform to Table 3

Table 3 - Lot Sizes - C-3B Zone

Zone	Minimum *Lot Area*	Minimum *Frontage*	Minimum *Lot Width*	Minimum *Lot Depth*
C-3B	1,620 m² (17,438 ft²)	36.0 m (118.1 ft)	36.0 m (118.1 ft)	30.0 m (98.4 ft)

Lots to be created through subdivision in C-3B Zone shall be large enough to encompass a horizontal rectangle which is 36.0 m (118.1 ft) wide and 30.0 m (98.4 ft) long.

Setbacks and Building Height

Buildings and structures in C-3B Zone shall be sited and have heights in accordance with Table 4.

Table 4 - Setbacks and Building Height - C-3B Zone

Zone	Minimum Front Lot Line Setback	Minimum Exterior Side Lot Line Setback	Minimum Interior Side Lot Line Setback	Minimum Rear Lot Line Setback	Maximum Building Height
C-3B	7.5 m (24.6 ft)	7.5 m (24.6 ft)	6.0 m (19.7 ft)	6.0 m (19.7 ft)	9.0 m (29.5 ft)

No building or structure except a fence may be located within 15 m (49.2 ft) of Highway 3 or Highway 3A.

Lot Coverage and Density

The size of the buildings and structures shall conform to Table 5.

Table 5 - Lot Coverage and Density - C-3B Zone

Zone	Maximum *Lot Coverage*	Maximum *Floor Area Ratio (FAR)*
C-3B	70%	1.4

Notwithstanding the above dimensions, the buildings and structures within C-3B Zone shall obtain an approval from the Ministry of Transport regarding their location, size and materials used prior to the commencement of construction.

Out-door Storage and Landscaping

Garbage containers, recycling bins or material not stored within a building except aircraft, automobiles and recreational vehicles shall:

- be enclosed by a *barrier screen*; and
- not be piled higher than the *barrier screen*.

All developed portions of the lot not covered by buildings, structures or paved areas shall be landscaped and maintained.

Where a lot line forms a common boundary with Highway 3 or Highway 3A, a buffer strip shall be provided along the lot line.

Landscaping required under above statements shall not include growing crops.

Airport Development Zone - Zone C-3C

Permitted Uses

Lands, building, and structures in C-3C Zone may be used for the following purposes only:

a. Hotels, motels;
q. Restaurants, neighbourhood pubs;
r. Gaming centres, entertainment;
s. Assembly halls, convention centres;
t. Recreational vehicle park; and
u. Office uses associated with the operation of a. and e. above.

Lot Sizes

Lots to be created through subdivision in C-3C Zone shall conform to Table 6 and Table 7 that form a part of this Bylaw.

Table 6 - Lot Sizes - Zone C-3C

Zone	Minimum *Lot Area*	Minimum *Frontage*	Minimum *Lot Width*	Minimum *Lot Depth*
C-3C	1,620 m² (17,438 ft²)	36.0 m (118.1ft)	36.0 m (118.1 ft)	30.0 m (98.4 ft)

Table 7 - Setbacks and Building Heights - Zone C-3C

Zone	Minimum *Front Lot Line Setback*	Minimum *Exterior Side Lot Line Setback*	Minimum *Interior Side Lot Line Setback*	Minimum *Rear Lot Line Setback*	Maximum *Building Height*
C-3C	7.5 m (24.6 ft)	7.5 m (24.6 ft)	6.0 m (19.7 ft)	6.0 m (19.7 ft)	15.0 m (49.2 ft)

Despite the above, no *building* or *structure* except a fence may be located within 7.5 m (24.6 ft) of Highway 3A.
Despite the above, the maximum building height shall not exceed the limits identified by Table 8 Non-Instrument Standard with respect to the proximity of the airport runway.
The requirements to protect the runway from obstacles being erected/constructed too close and affecting aircraft operations is site specific. Table 8 illustrates the current requirements around the runway at Castlegar.

What this means is that from a line running parallel to the runway and 45 m from the runway (both sides), a transitional surface begins at ground level and rises (uniformly along that line) at 14.3%. The City of Castlegar is obligated to prevent anything from being erected/built that would violate that surface.

The ends of the runway are more restrictive - they start 60 m from the end of each runway at a width of 90 m (45 m either side of extended runway centre line) and diverge 10% as they extend out from the runway. The slope of this take-off/approach surface is 2.5% on the north end and extends out 2,500 metres to the north.

Table 8 - Code 3 - Non-Instrument Standard [13]

Castlegar Airport - CYCG				
Code 3 Non-Instrument Standards Apply.				
O.L.S. Table	**Runway 15 (Non-Instrument)**		**Runway 33 (Non-Instrument)**	
Take Off Approach				
Length of Inner Edge; distance from Centerline	148 ft	45 m	148 ft	45 m
Distance from Threshold	197 ft	60 m	197 ft	60 m
Divergence	10%		10%	
Length	8202 ft	2500 m	8202 ft	2500 m
Slope	2.5%		5%	
Transition Surface				
Slope	14.3%		14.3%	

Lot Coverage and Density

[13] https://www.castlegar.ca/dmsdocument/698

The size of the buildings and structures shall conform to Table 9.

Table 9 - Coverage and Density - Zone C-3C

Zone	Maximum *Lot Coverage*	Maximum *Floor Area Ratio (FAR)*
C-3C	70%	1.4

Note: In addition to the above sections, the buildings and structures within C-3C Zone shall obtain an approval from the Ministry of Transport regarding their location, size and material prior to the construction.

Out-door Storage and Landscaping

Garbage containers, recycling bins or material not stored within a *building* except aircraft, automobiles and *recreational vehicles* shall:

- Be enclosed by a *barrier screen*; and
- Lot be piled higher than the *barrier screen*.

All developed portions of the lot not covered by buildings, structures or paved areas shall be landscaped and maintained.

Landscaping shall not include growing crops. **(Bylaw 1062)**

Airport Commercial/Light Industrial - Zone C-3D

Permitted Uses

Land, buildings, and structures in C-3D Zone may be used for the following purposes only:

a. Department stores, shopping centres, retail warehouses
b. Hotels, motels;
c. Restaurants, neighbourhood pubs;
d. Office uses;
e. Arcades, billiard halls, bowling alleys;
f. Automobile dealers, automobile rentals;
g. Recreational vehicle dealers;
h. Auto-repair shops, gasoline stations, car washes;
i. Auto-body shops, truck repair shops;
j. Aircraft fuel sales, gasoline key locks, bulk fuel depots;
k. Driving schools, flight training schools, flying clubs;
l. Taxi dispatchers, bus depots;
m. Airports;

n. Marihuana production facilities
o. Aircraft sales, repairs and rentals;
p. Small warehouses; and
q. Retail stores

Lot Sizes

Lots to be created through subdivision in C-3D Zone shall conform to Table 10.

Table 10 - Lot Sizes - Zone C-3D

Zone	Minimum *Lot Area*	Minimum *Frontage*	Minimum *Lot Width*	Minimum *Lot Depth*
C-3D	1,620 m² (17,438 ft²)	36.0 m (118.1 ft)	36.0 m (118.1 ft)	30.0 m (98.4 ft)

Lots to be created through subdivision in C-3D Zone shall be large enough to encompass a horizontal rectangle which is 36.0 m (118.1 ft) wide and 30.0 m (98.4 ft) long.

Setbacks and Building Height

Buildings and structures in C-3D Zone shall be sited and have heights in accordance with Table 11 which forms a part of this Bylaw.

Table 11 - Setbacks and Building Height - Zone C-3D

Zone	Minimum Front Lot Line Setback	Minimum Exterior Side Lot Line Setback	Minimum Interior Side Lot Line Setback	Minimum Rear Lot Line Setback	Maximum Building Height
C-3D	7.5 m (24.6 ft)	7.5 m (24.6 ft)	6.0 m (19.7 ft)	6.0 m (19.7 ft)	9.0 m (29.5 ft)

Despite the above, no building or structure except a fence may be located within 15 m (49.2 ft) of Highway 3 or Highway 3A.

Lot Coverage and Density

The size of the buildings and structures shall conform to Table 12.

Table 12 - Lot Coverage and Density - Zone C-3D

Zone	Maximum Lot Coverage	Maximum Floor Area Ratio (FAR)
C-3D	70%	1.4

Note: In addition, the buildings and structures within C-3D Zone shall obtain an approval from the Ministry of Transport regarding their location, size and material prior to the construction.

Out-door Storage and Landscaping

Garbage containers, recycling bins or material not stored within a building except automobiles and recreational vehicles shall:

- be enclosed by a barrier screen; and
- not be piled higher than the barrier screen.

All developed portions of the lot not covered by buildings, structures or paved areas shall be landscaped and maintained.

Where a lot line forms a common boundary with Highway #3 or Highway #3A, a buffer strip shall be provided along the lot line.

Landscaping shall not include growing crops. **(Bylaw 1257)**

APPENDIX F: WKRA OPERATING REVENUES AND EXPENSES

West Kootenay Airport Income Statement_MP Years 2019 - 2021

AIRPORT OPERATING FUND	2016 ACTUAL	2017 ACTUAL	2018 ACTUAL	2019 ACTUAL-YTD (End of April)	2019 BUDGET	2020 BUDGET	2021 BUDGET
REVENUES							
FEES AND SERVICE CHARGES AIRPORT FEES							
50-1-4700-4220 Airport Permits & License	-2,391.04	-2,764.91	-2,164.79	0	-2,000.00	-2,000.00	-2,000.00
50-1-4700-4685 Landing Fees	-130,988.65	-140,879.88	-154,618.59	-33,114.62	-142,000.00	-142,000.00	-142,000.00
50-1-4700-4690 General Terminal Fees	-139,437.24	-132,893.39	-132,506.66	-39,748.63	-130,000.00	-130,000.00	-130,000.00
50-1-4700-4695 Parking Fees	-125,552.96	-134,558.58	-131,081.07	-27,525.67	-132,000.00	-230,000.00	-230,000.00
50-1-4700-4700 Departure Ticket Fees	-263,060.00	-262,339.00	-259,903.00	-37,751.00	-262,500.00	-525,000.00	-525,000.00
50-1-4700-4705 Airport Office Space & Sh	-55,190.58	-45,134.15	-49,503.45	-19,556.88	-46,000.00	-46,000.00	-50,000.00
50-1-4700-4710 Airport Land Rent	-78,062.63	-78,258.12	-75,613.36	-11,013.86	-78,000.00	-78,000.00	-78,000.00
50-1-4700-4715 Airport Other Rent	-2,341.86	-2,550.80	-2,383.59	-344.98	-2,500.00	-2,500.00	-2,500.00
50-1-4700-4720 Airport Car Rental Conce	-131,534.83	-139,025.73	-152,725.78	-39,746.25	-130,000.00	-130,000.00	-130,000.00
50-1-4700-4725 Airport Ground Transit C	0	0	0	0	-350	-350	-350
50-1-4700-4725 Airport Ground Transit C	-532.59	-168.23	-375.04	0	0	0	0
50-1-4700-4730 Airport Other Concession	-6,529.99	-6,061.50	-6,000.00	-2,500.00	-6,000.00	-6,000.00	-6,000.00
50-1-9999-9999 Old Unused GL Codes	0	-180.24	0	0	0	0	0
50-1-9999-9999 Old Unused GL Codes	-197.4	0	0	0	0	0	0
Total FEES AND SERVICE CHARGES	**-935,819.77**	**-944,814.53**	**-966,875.33**	**-211,301.89**	**-931,350.00**	**-1,291,850.00**	**-1,295,850.00**
INTEREST AND OTHER INCOME							
50-1-4700-4890 Interest on Investments	-11,287.71	-15,332.38	-25,014.10	-1,446.84	-14,000.00	-14,000.00	-14,000.00
Total INTEREST AND OTHER INCOME	**-11,287.71**	**-15,332.38**	**-25,014.10**	**-1,446.84**	**-14,000.00**	**-14,000.00**	**-14,000.00**
INTERCOMPANY							
50-1-0900-9020 Tfr In From Airport Capita	0	0	0	0	0.00	0	0
50-1-0900-9045 Tfr In From Airport Opera	0	0	-180,737.12	0	-163,800.00	0	0
TOTAL INTERCOMPANY	**0**	**0**	**-180737.12**	**0**	**-163800**	**0**	**0**
Total REVENUES	**-947,107.48**	**-960,146.91**	**-1,172,626.55**	**-212,748.73**	**-1,109,150.00**	**-1,305,850.00**	**-1,309,850.00**

West Kootenay Airport Income Statement_MP Years 2019 - 2021

AIRPORT OPERATING FUND	2016 ACTUAL	2017 ACTUAL	2018 ACTUAL	2019 ACTUAL-YTD (End of April)	2019 BUDGET	2020 BUDGET	2021 BUDGET
EXPENSES							
AIRPORT GENERAL & ADMINISTRATION							
50-2-4710-5000 Wages - Exempt Salaries	41,277.71	13,284.99	53,527.02	21,471.68	68,000.00	68,000.00	68,000.00
50-2-4710-5100 Education and Training	1,195.00	1,691.00	2,686.13	0.00	0.00	0.00	0.00
50-2-4710-5100 Education and Training	0	0	0	0	2,700.00	2,800.00	2,900.00
50-2-4710-5100 Education and Training	0	0	-281.88	0	0	0	0
50-2-4710-5160 Dues, Memberships & Licencing	0	0	6,524.34	0	1,600.00	1,600.00	1,600.00
50-2-4710-5170 Hardware/Software Licencing	0	0	0	3,196.28	2,000.00	2,000.00	2,000.00
50-2-4710-5220 Cellular Services	0	0	2,003.57	88.82	1,000.00	1,000.00	1,000.00
50-2-4710-5270 Cable Services	0	0	0	189.33	800	800	800
50-2-4710-5290 Discretionary Advertiisng	8,371.05	11,312.90	7,083.69	5,007.75	6,000.00	6,000.00	7,000.00
50-2-4710-5300 Consulting	3,510.20	50,800.02	38,255.00	11,723.66	50,000.00	50,000.00	50,000.00
50-2-4710-5330 Auditing Services	3,500.00	0	0	0	3,500.00	3,500.00	3,500.00
50-2-4710-5345 IT Consulting and Services	3,700.00	4,625.00	4,955.41	0	0	0	0
50-2-4710-7000 Office Supplies	8,370.23	1,750.00	946.45	17.61	2,100.00	2,100.00	2,100.00
50-2-4710-7150 Computer Hardware, Software	0	0	202.28	0	1,000.00	1,000.00	1,000.00
50-2-4710-7190 Website Expenses & Call	0	0	97.58	0	0	0	0
50-2-4710-7725 Financing Charges	736.23	0	1,010.78	0	1,250.00	1,250.00	1,250.00
TOTAL AIRPORT GENERAL & ADMINISTRATIVE	**70,660.42**	**83,463.91**	**117,010.37**	**41,695.13**	**139,950.00**	**140,050.00**	**141,150.00**
AIRPORT OPERATIONS							
50-2-4720-5590 Passenger Facility Fee	7,769.79	12,610.38	7,753.20	1,922.19	9,000.00	14,000.00	14,000.00
50-2-4720-5595 Passenger Facility Fee	15,001.23	6,139.39	5,746.57	454.74	7,000.00	2,000.00	2,000.00
50-2-4720-5600 Operations & Maint Contract	564,387.75	572,518.96	597,054.65	148,171.23	597,600.00	614,100.00	626,000.00
50-2-4720-5740 Liability Insurance	15,369.20	14,229.30	13,648.10	0	8,500.00	8,500.00	8,500.00
50-2-4720-5790 Security Services & Main	104,646.94	107,950.69	109,023.75	33,751.12	109,000.00	110,000.00	112,200.00
50-2-4720-7520 Airport Runway De-Icing	53,069.66	68,377.68	143,240.15	0	70,000.00	71,400.00	71,400.00
50-2-4720-7525 Airport Runway Maintenance	0	0	24,486.87	0	0	0	0
50-2-4720-7530 Operational Supplies and	0	0	0	9,698.31	0	0	0
50-2-4720-7630 Airport Hazard Beacon T	191.00	991.00	0.00	14.45	800.00	800.00	800.00
TOTAL AIRPORT OPERATIONS	**760,435.57**	**782,817.40**	**900,953.29**	**194,012.04**	**801,900.00**	**820,800.00**	**834,900.00**
AIRPORT FACILITY							
50-2-4730-5005 Wages - Union Regular	0	0	0	1,108.34	0	0	0
50-2-4730-5210 Telephone Services	14,100.53	13,660.42	3,626.31	302.42	3,800.00	3,800.00	3,800.00
50-2-4730-5250 Internet Services - CBBC	0	0	6,355.80	1,701.30	9,000.00	9,000.00	9,000.00
50-2-4730-5260 IRU Maintenance Costs -	0	0	2,457.00	0	0	0	0
50-2-4730-5565 Solid Waste Pickup - Rec	0	0	560	0	0	0	0
50-2-4730-5780 Janitor Services	40,253.71	40,782.91	36,357.48	12,119.16	37,000.00	37,000.00	37,000.00
50-2-4730-5840 Building Maintenance Co	9,077.09	16,418.57	5,742.38	2,321.31	11,400.00	11,400.00	11,400.00
50-2-4730-5850 Electrical Service Contract	6,161.14	1,880.37	4,474.11	1,620.58	2,000.00	2,000.00	2,000.00
50-2-4730-7200 Electricty	57,717.91	53,851.56	53,351.51	0	55,000.00	56,100.00	57,200.00
50-2-4730-7400 Natural Gas	12,096.25	21,462.54	12,264.95	2,526.70	22,000.00	22,000.00	22,400.00
50-2-4730-7530 Operational Supplies	0	0	1,684.85	0	1,500.00	1,500.00	1,500.00
50-2-4730-7540 janitor Supplies	0	0	5,275.05	118.9	4,000.00	4,000.00	4,000.00
Total AIRPORT FACILITY	**139,406.63**	**148,056.37**	**132,149.44**	**21,818.71**	**145,700.00**	**146,800.00**	**148,300.00**
AIRPORT FLEET AND EQUIPMENT							
50-2-4740-5380 Vehicle Inspection - Airport	0.00	0.00	839.95	0.00	0.00	0.00	0.00
50-2-4740-5770 Vehicle Insurance	0	0	0	0	6,000.00	6,000.00	6,000.00
50-2-4740-5770 Vehicle Insurance	0	0	399	0	0	0	0
50-2-4740-5900 Contract Service - Airport	0	0	4,304.62	0	0	0	0
50-2-4740-7445 Diesel	6,460.56	14,944.04	15,448.08	0	0	0	0
50-2-4740-7445 Diesel	0	0	0	0	15,600.00	15,900.00	16,200.00
50-2-4740-7450 Biodiesel	0	0	0	6,114.66	0	0	0
50-2-4740-7450 Biodiesel	0	0	0	3,932.25	0	0	0
50-2-4740-7550 Equipment Parts - Airport	0	0	1,941.37	0	0	0	0
Total AIRPORT FLEET AND EQUIPMENT	**6,460.56**	**14,944.04**	**22,933.02**	**10,046.91**	**21,600.00**	**21,900.00**	**22,200.00**
Total AIRPORT EXPENSES	**976,963.18**	**1,029,281.72**	**1,173,046.12**	**267,572.79**	**1,109,150.00**	**1,129,550.00**	**1,146,550.00**
INTERCOMPANY							
50-2-0900-9520 Tfr Out To Airport Capital	0	0	0	0	0	176,300.00	163,300.00
Total INTERCOMPANY	0	0	0	0	0	176,300.00	163,300.00
Total EXPENSES	**976,963.18**	**1,029,281.72**	**1,173,046.12**	**267,572.79**	**1,109,150.00**	**1,305,850.00**	**1,309,850.00**
Total AIRPORT OPERATING FUND	**29,855.70**	**69,134.81**	**419.57**	**54,824.06**	**0.00**	**0.00**	**0.00**

West Kootenay Airport Income Statement_MP Years 2019 - 2021

AIRPORT OPERATING FUND	2016 ACTUAL	2017 ACTUAL	2018 ACTUAL	2019 ACTUAL-YTD (End of April)	2019 BUDGET	2020 BUDGET	2021 BUDGET
AIRPORT CAPITAL FUND							
REVENUES							
GOVERNMENT GRANTS							
IRREGULAR GRANTS							
51-1-4700-4910 Other Govt Conditional G	-67,900.00	-122,100.00	-15,000.00	0	0	0	0
51-1-8452-4900 Federal Conditional Gran	0	0	-227,394.93	0	0	0	0
51-1-8452-4910 Other Govt Conditional G	0	0	0	0	0	-1,050,000.00	0
51-1-8452-4910 Other Govt Conditional G	0	0	0	0	-1,296,750.00	0	0
51-1-8452-4910 Other Govt Conditional G	0	0	0	0	0	-20,000.00	0
51-1-8452-4910 Other Govt Conditional G	0	0	0	0	0	-479,750.00	0
Total IRREGULAR GRANTS	**-67,900.00**	**-122,100.00**	**-242,394.93**	**0.00**	**-1,296,750.00**	**-1,549,750.00**	**0.00**
Total GOVERNMENT GRANTS	**-67,900.00**	**-122,100.00**	**-242,394.93**	**0.00**	**-1,296,750.00**	**-1,549,750.00**	**0.00**
INTERCOMPANY							
51-1-0900-3520 Future Airport Capital Revenue	0.00	0.00	0.00	0.00	-420,250.00	-425,250.00	-115000.00
51-1-0900-9150 Tfr In From Future Airport	0.00	0.00	-105,199.09	0.00	0.00	0.00	0.00
51-1-0900-9150 Tfr In From Future Airport	-240,000.00	0.00	0.00	0.00	0.00	0.00	0.00
51-1-0900-9152 Tfr In From Airport Equipment	0.00	0.00	-37,301.00	0.00	0.00	0.00	0.00
Total INTERCOMPANY	**-240,000.00**	**0.00**	**-142,500.09**	**0.00**	**-420,250.00**	**-425,250.00**	**-115,000.00**
Total REVENUES	**-307,900.00**	**-122,100.00**	**-384,895.02**	**0.00**	**-1,717,000.00**	**-1,975,000.00**	**-115,000.00**
EXPENSES							
CAPITAL EXPENDITURE							
ENVIRONMENTAL CAPITAL EXPENDITURE							
51-2-8452-5300 Consulting	33,539.94	0.00	21,560.94	42,387.36	0.00	0.00	0.00
51-2-8452-7480 Small Tools and Minor Equipment	0.00	0.00	0.00	62,598.15	62,000.00	0.00	0.00
51-2-8452-7550 Equipment Parts	0.00	0.00	0.00	3,355.71	0.00	0.00	0.00
51-2-8452-8500 Capital Purchase	0.00	0.00	25,379.81	0.00	0.00	0.00	0.00
51-2-8452-8500 Capital Purchase	0.00	0.00	0.00	0.00	90,000.00	20,000.00	20,000.00
51-2-8452-8500 Capital Purchase	0.00	0.00	0.00	0.00	50,000.00	1,400,000.00	0.00
51-2-8452-8500 Capital Purchase	0.00	0.00	0.00	0.00	30,000.00	0.00	0.00
51-2-8452-8500 Capital Purchase	0.00	0.00	0.00	0.00	1,365,000.00	0.00	0.00
51-2-8452-8500 Capital Purchase	0.00	0.00	0.00	0.00	30,000.00	0.00	0.00
51-2-8452-8500 Capital Purchase	0.00	0.00	0.00	0.00	0.00	40,000.00	40,000.00
51-2-8452-8500 Capital Purchase	0.00	0.00	0.00	0.00	0.00	145,000.00	0.00
51-2-8452-8500 Capital Purchase	0.00	0.00	0.00	0.00	0.00	0.00	40,000.00
51-2-8452-8500 Capital Purchase	0.00	0.00	0.00	0.00	0.00	360,000.00	0.00
51-2-8452-8500 Capital Purchase	0.00	0.00	0.00	0.00	0.00	0.00	45,000.00
51-2-8452-8500 Capital Purchase	0.00	0.00	0.00	0.00	10,000.00	10,000.00	10,000.00
51-2-8452-8500 Capital Purchase	19,113.75	15,806.35	7,707.01	0.00	0.00	0.00	0.00
51-2-8452-8500 Capital Purchase	0.00	0.00	0.00	0.00	80,000.00	0.00	0.00
51-2-8452-9999 Old Unused GL Codes	135,859.86	129,640.53	0.00	0.00	0.00	0.00	0.00
Total ENVIRONMENTAL CAPITAL EXPENDITURE	**188,513.55**	**145,446.88**	**54,647.76**	**108,341.22**	**1,717,000.00**	**1,975,000.00**	**155,000.00**
Total EXPENSES	**188,513.55**	**145,446.88**	**54,647.76**	**108,341.22**	**1,717,000.00**	**1,975,000.00**	**155,000.00**
Total AIRPORT CAPITAL FUND	**-119,386.45**	**23,346.88**	**-330,247.26**	**108,341.22**	**0.00**	**0.00**	**40,000.00**

APPENDIX G: WKRA LAND DEVELOPMENT GUIDELINES

Table of Contents

1.0 Overview

The West Kootenay Regional Airport has undertaken an update to its Airport Master Plan that identifies initiatives for short term, medium term and long term growth prospects. The WKRA and City of Castlegar positioned a Vision Statement for the WKRA as ***"To be a reliable customer focused aviation Hub for the West Kootenay Region, including general aviation, and being an important economic catalyst for Castlegar and the Region".***

The main focus for this section is to provide advice to the airport management in its commercial and land development practices to take advantage of the infrastructure enhancements and the aviation environment that is projected for the region.

2.0 Background

2.1 THE OWNERSHIP

The WKRA is owned by the City of Castlegar and serves the West Kootenay catchment area.

Taxation Authority City of Castlegar

Description of Land

Parcel Identifier: 028-585-771

Legal Description:

LOT 1 DISTRICT LOT 4598 KOOTENAY DISTRICT PLAN EPP10768 EXCEPT PLAN EPP13601

HERETO IS ANNEXED EASEMENT LB324532 OVER PART OF LOT 1 PLAN NEP86529 SHOWN ON PLAN NEP89384

(AS TO PART FORMER LOT A PLAN NEP67028)

THIS TITLE MAY BE AFFECTED BY A PERMIT UNDER PART 14 OF THE LOCAL GOVERNMENT ACT, SEE CA6703836

THIS TITLE MAY BE AFFECTED BY A PERMIT UNDER PART 14 OF THE LOCAL GOVERNMENT ACT, SEE CA6729965

THIS TITLE MAY BE AFFECTED BY A PERMIT UNDER PART 26 OF THE MUNICIPAL ACT, SEE KP40204

Services include: public terminal building, car park, aviation fuel (100 LL and Jet-A), aircraft parking, lease areas for hangars and navigation aids. The WKRA and its airport management are challenged with managing a capital intensive environment with a constantly changing airline and aviation market. The airports that can best diversify their revenue base and activity as well as control the airport lands and establishes sound development or zoning caveats on surrounding property are well positioned to face the challenges of the aviation industry. Setting rates, charges and fees are also a critical element of establishing a solid cost recovery environment for the airport and its tenants and users.

2.2 THE EXISTING DEVELOPMENT ENVIRONMENT

The airport's entire lands consist of over 100 ha. While a majority of these lands are reserved for airport operational requirements (i.e. runways, taxiways, navigational aids, parking, aprons, etc.), the Master Plan will identify four (4) specific Commercial Development Areas, each of which are phased developments. The areas are as follows:

1. The commercial development area
2. The hotel reserve area
3. The Industrial zone adjacent to airport
4. The east side – general aviation development

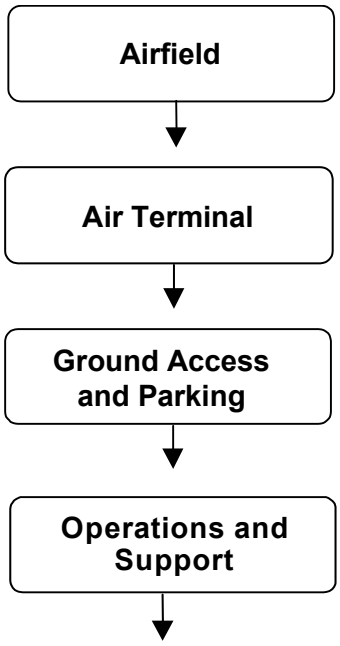
3.0 Land Development Principles

Airport land ownership is the best assurance of managing the airport infrastructure in a safe, secure and effective manner with compatible land uses. In reviewing the aviation industry and airport lands, several related issues are now explored.

3.1 THE LAND USE PLAN

The airport lands are defined through an Airport Land Use Plan and it will identify the planning hierarchy and areas that are necessary to protect airside operational requirements, future airfield requirements, air terminal building and reserve areas, while providing land for general aviation, airside commercial, groundside commercial lands and ground transportation reserves. The Land Use Plan is specific to the lands that are owned by the airport. It may identify future land requirements for acquisition while coordinating the protection of these lands through the municipal planning authority as they are not directly under the airport's control. Airport Area Studies and Vicinity Development Plans act as planning tools to broaden the reach of the airport and its control and protection of lands it does not own but are affected by airport zoning. Land is the most valuable asset for an airport and primarily provides protection for the aviation environment.

Airport land ownership is the best assurance of managing the airport infrastructure in a safe, secure and effective manner with compatible land uses.

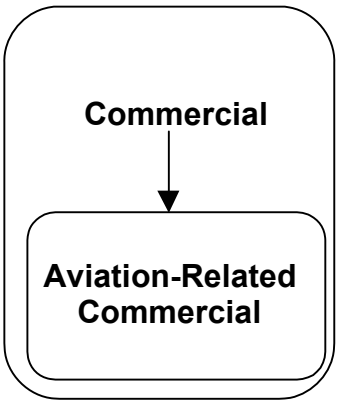


Airfield – includes current and future runway system components, the lands needed for aeronautical zoning, as well as electronic protected zones for air navigation aids and other safety-related needs.

Air Terminal – accommodates the Air Terminal Building and related expansion areas.

Ground Access and Parking – includes existing roadways, designated parking areas, as well as public and commercial transportation vehicle holding areas. It also includes protected land for future expansion of access roads and parking.

Operations and Support – includes airport support maintenance, emergency response, and police and NAV CANADA facilities.



Commercial – involves all remaining land that is not part of an operational area (airfield, terminal, etc.) and includes aviation-related (cargo, aircraft maintenance, hangars, FBO's, etc) and non-airport-related (industrial, warehousing/distribution, hotel, gas stations, etc.). The all-inclusive Commercial designation is intended to provide optimal flexibility in addressing future aviation development opportunities that may occur on otherwise non-aviation land designated land.

Aviation-Related Commercial – is a subset of the *Commercial* land use designation, only permits aviation-related activities that require direct airside access and applies to land currently offering direct airside access. Specific uses include cargo facilities, aircraft maintenance, hangars, and FBO's.

Airport Reserve – Designates areas reserved to accommodate very long-term development. These areas may accommodate Commercial activities on an interim basis.

Once the capital investment and airside infrastructure is developed, there is a requirement to establish fees and charges for the use of the airfield to support the overall operating cost recovery. There are few airports that recover all the airfield costs through its airfield fees and charges. The airport would lose an ability to be cost competitive if it simply recovered the airside costs solely through the air carrier user community. Thus, the airport looks to develop alternate revenue streams. Land development is an excellent source of airport revenue and can provide new investment into the airport as well as securing a long-term client base. The other benefit of land development on airport property is that it is not as sensitive to economic swings and rents can be a stable source of income in slower periods of aviation activity.

Land development is an excellent source of airport revenue and can provide new investment into the airport as well as securing a long-term client base.

The lands to consider for development will be designated as industrial or commercial lands with further definition for airside access or groundside development only. This is an important designation as the ***lands that have direct access to the airport's airside and airfield are premium properties that generally command a higher price than airport groundside lands***. The other factor in the valuation of the land is the level of servicing. ***Fully serviced lots command a higher rate and price*** that reflects the full service costs while unserviced land has limited use and/or implications for the developer to provide the services to the land.

3.2 AIRPORT VICINITY DEVELOPMENT

Most airports own their own land and designate land uses that identify areas for business parks or industrial and commercial development that is consistent with the overall airport Development Plans. The issue is a little more tenuous when there is surrounding development around the airport that is not owned by the airport. The proper aeronautical zoning does provide protections for height and hazards on approaches that are critical for aviation activity, but it still requires a careful watch and active communication with the surrounding properties and their owners to protect the aviation environment.

3.3 LEASEHOLD VS FEE SIMPLE OWNERSHIP

The decision to develop airport lands, as is the case with WKRA and its four (4) distinct development areas, requires a framework and the approach to attracting interest in the airport lands for development. The positioning of airport lands into a Business Park or Trade Zone is a common practice at airports (particularly larger airports). ***The zones or business parks are tailored to support the core businesses at the airport.*** The existing environment has done that to a degree with its three areas and this will be further reviewed later in this module.

The framework for the airport starts with the significant decision on whether the airport strictly leases its land or considers land sales, and under what conditions.

The Industry Norm

The industry norm is to lease land and **not to sell unless it is surplus to the airport's immediate and long term requirements and airfield protections**. This surplus land can be sold for the benefit of generating cash to reinvest in the airport (or put into a reserve fund) and to remove the land from its inventory and reduce its tax (or grant in lieu of tax) exposure and cost. There are occasionally reduced operating costs associated with the sale of airport land. ***Land is the only asset category that does not depreciate,*** and the airport can hold onto this asset through leasing while providing the future tenant/lessee the opportunity to develop the 'improvement' on the property that is depreciable. The improvement is the structure or development that is added to the land, consistent with the purpose clause in the lease, and its scope and investment is generally tied to the length of term of the Lease. The more significant the capital and the financing requirements to pay for the 'improvement' (or asset), the longer the Lease term that is usually granted.

Leasing of land is the common practice on airports around the world to provide tighter control over the property's use as well as generating a return on the land that is a valuable income stream for the airport.

There is occasion where a developer or prospective airport client has difficulty getting financing associated with Leasing of land. This is generally not strictly related to the concept of Leasing but rather the term and the renewal opportunities associated with the Lease. ***The financing party wants to have security to hold against the loan or mortgage and this can be simplified if it has title to the land.*** The provision of a legal description and the naming of the financial institution in any insurance policy against the leased land as well as their interest in the asset developed can assist in meeting the security requirements.

3.4 SELLING AIRPORT LAND

The selling of land is referred to as **Fee Simple transaction** and it transfers permanent title to the buyer. Fee simple is "absolute ownership unencumbered by any other interest or estate, subject only to the limitations imposed by the governmental powers of taxation, etc." The WKRA has sold interest in its property for development in the past and this has certainly constrained future development flexibility and provided some challenges to the airport's long term planning.

Selling Land – the FAA: A US comparison

A change in use of airport property has the potential to endanger the survival of the airport through incompatible land use, encroachment, safety implications, and loss of revenue, all combining to decrease the viability of the airport. This threat is why it is imperative that all parties involved in this process, including users, are familiar with both the implications of such an action and the procedures that have to be followed. Too often, AOPA has seen development projects on airports that subsequently create a precarious situation for the airport. This occurs when changes to the airport property are made with intentions other than to improve the viability of the airport.

A change in use of airport property has the potential to endanger the survival of the airport through incompatible land use, encroachment, safety implications, and loss of revenue, all combining to decrease the viability of the airport.

The FAA will consider a change to the Airport Layout Plan (ALP) as long as the action protects, advances, or benefits the public interest in civil aviation. This means that there is a need for the sponsor, users, and the FAA to ascertain the

benefit to aviation in real and documented terms. The interests of real-estate developers, businesses, or other non- aviation interests do not take precedence over the aviation interests, especially at a federally obligated airport.

In many cases, use of airport property for non-aviation revenue-producing activities that provide revenue back to the airport is not necessarily an adverse activity. **What is important is that the airport benefits from that activity, usually financially.** Federal law, FAA regulations and orders, as well as current policies on revenue diversion, mandate that revenue produced by the sale, disposal, leasing, or any other revenue-producing activity of airport property stay at the airport for aeronautical improvements. This is, of course, an integral part of the "benefit to aviation." The FAA shall assess current versus proposed revenue to determine the highest reasonable return to the airport.

Another issue is that the FAA, as part of the conditions of receiving federal financial assistance, **requires the airport owner to take appropriate zoning action to prevent noise and safety problems near the airport** (grant assurance number 21). It is important to ensure that any development at or near the airport provides appropriate airport land-use compatibility, which primarily focuses on safety and noise-related issues. Creating land- use compatibility between airports and proposed developments near airports will help protect the airport's future viability.

Pros and Cons of Selling Airport Land

Pro's of Selling Airport Land	Con's of Selling Airport Land
It generates greater cash up front for the airport;	The airport loses title to the land and can lose some control over its environment and protection of its investment in the longer term;
It can support airport development in underdeveloped areas of the airport;	The revenue potential is mostly up front and then it is reduced compared to the leasing of land;
It can be of assistance in financing significant private investments and developments at the airport through title transfer (and land transfer in perpetuity);	The land owner has rights of quiet enjoyment and can create a disruptive environment for the airport while still meeting the terms of sale;
It can secure a long term commitment from a desirable partner/investor;	The land owner may dispute fees associated with the airport and it may create a challenging environment to isolate or remove access for the owner to the airport once the land is sold;
It can reduce the airport's footprint and reduce its tax or grant in lieu of taxes;	The land owner may not maintain the property to a degree that is satisfactory to the airport and there is limited ability to enforce on the land owner's property;
The airport can minimize its exposure to environmental concerns and liability;	Despite purpose intent, the land use could change to be somewhat compatible (ie airside commercial to groundside commercial) but affect the access and utilization of the airfield and its significant investment;
	The land owner has the right to re-sell and can benefit from the expansion and development of the airport while not participating in its continuing investment or development.

Questions to ask if selling airport land

In determining the impact of a property release at the airport, the following questions are a great guide:

1. *Will the airport benefit from the release of this property?*
2. *Will the airport still maintain control over the property (such as an access Licence), or will they implement land-use control measures such as zoning, aviation easements, or real estate disclosures?*
3. *Does the Airport Master Plan or Airport Layout Plan show an aeronautical use for the property to be released?*
4. *Will the proposed use of the property be the source of future noise or safety concerns at the airport or for the surrounding community?*
5. *Is the use and location of the property compatible with aeronautical uses of the airport?*

These actions will ensure that a property release at the airport will benefit the airport, that the land is not needed for future airfield expansion, and that the proposed usage is compatible with airport operations.

3.5 LEASING OF AIRPORT LANDS

Commercial real estate developers and investors often favor total ***fee simple ownership*** of income property. The propensity to own - and the emotions attached to it - sometimes can result in misguided decisions and strategies and lost opportunities. Once developers move beyond the notion of ownership as an investment goal, new opportunities that may not have been visible before, such as ground leases, become apparent. ***In its most basic form, a ground lease, or land lease, separates the ownership of land from the ownership of the improvements on the land, such as an office building or aircraft hangar.*** The landowner leases the land to the developer of the improvements, who pays rent for use of the land. Typically ground leases are long term and include set rent escalations, foreclosure rights should the lessee default, and a ***reversionary right, which means improvements on the property revert to the landowner at the end of the lease term.*** While such lease terms do not particularly favor developers, ground leases offer some distinct advantages.

Once developers move beyond the notion of ownership as an investment goal, new opportunities that may not have been visible before, such as ground leases, become apparent.

Ground leases transfer control - not ownership - of a property and for landowners, are considered one of the most secure forms of real estate investment. But landowners are still investors through supply of the land and may be open to developers who offer them a stake in the improvements erected on their land. ***Generally, the land lease will have 20 to 50 year terms to provide the timeframe to properly amortize the investment and provide it with a correlated 'useful life' of the asset.*** Prior to the end of the Lease there may or may not be the opportunity to re-lease the land and/or the improvement. The developer/Lessee is responsible for the operating costs associated with the Leased property (ie. Parking lot and landscaping/grass cutting) and contribute to other common use costs (airport maintenance costs or AMC) associated with the airport. The general structure for revenue of the Land Lease includes the following components:

Ground leases transfer control - not ownership - of a property and for landowners, are considered one of the most secure forms of real estate investment.

- Land Rent (market based);
- Improvements (facilities – market based; if the improvement has been developed or transferred to the landlord/airport);
- Common use charges (AMC);
- Taxes; and
- Operating costs are tenant responsibility (there can be an additional service fees for handling the tenant's requirements such as snow clearing parking lots and aprons that can be profit centres for the airport).

3.6 VESTING PRINCIPLES

The reversionary right or vesting of improvements to the landowner occurs in a leasing environment where there is an improvement on the land that has reached or surpassed its useful life and the land owner has not requested removal of the improvement. The developer/Lessee enters a Lease with a reasonable term for properly financing and generating a higher cashflow for its business than would be the case in a fee simple environment. ***The developer's requirement for cash in the deal is reduced because of the value that the landowner brings to the deal in the land.*** The reduction in cash usually causes the investment yield to increase when the income stream is extended into the future.

The reality is that this can be a positive environment on Day 1 but contentious as the Lease needs expiry. This can be mitigated through other Ground Lease considerations include the length of the lease term, the approach to the reversion covenants (to provide clarity on vesting and some added benefit to the Lessee), and extension and renewal rights and options. These renewal rights may provide the Lessee additional use of the improvement at existing conditions based on

This can be mitigated through other Ground Lease considerations include the length of the lease term, the approach to the reversion covenants (to provide clarity on vesting and some added benefit to the Lessee), and extension and renewal rights and options.

upgrades, new investment credit that relates to term extensions. Additionally, there may be preferable treatment outlined that provides the Lessee the opportunity to utilize the improvement (recognizing it has transferred to the land owner) at an additional rent to be determined at that point and based on a predetermined rate.

Pros and Cons of Leasing Airport Land

Pro's of Leasing land for airport	Con's of Leasing Airport lands
Lower entry price for the developer/tenant than Fee Simple property;	The Lessee improvements revert to the Land owner at end of the Lease and this can cause conflict with Lessees/tenants (this is known as vesting and will be discussed later);
Lease payment may be tax deductable where Fee Simple land cannot be depreciated or written off against income;	
The airport can generate a good rental income with annual increases that match inflation and cost indexes;	There may be some environmental exposure to the land use (although this is passed along to the tenant in the Lease, there is always some residual responsibility of the land owner);
The airport can recover common use charges and taxes on the property with no concerns about payment (terms for disputes and non payment are clearly spelled out);	
A tenant that has not maintained the property or breaches the conditions of the agreement can be dealt with and can lead to termination of the lease and forfeiture of the improvements;	
The airport maintains complete development control over the land and its improvements;	
The airport can coordinate the long term development of the airport through its leasing environment while protecting its assets;	
The airport can have improvements removed or transferred to the airport in title through vesting;	

3.7 THROUGH THE FENCE

There are instances when the owner of a public airport permits access to the public landing area by independent operators offering an aeronautical activity or by aircraft based on land adjacent to, but not a part of, the airport property. This type of arrangement is commonly called a through-the-fence operation. Through-the-fence operations include businesses or individuals that have access to the airport infrastructure from outside airport property, or that utilize airport property to conduct a business but do not rent business space at the airport.

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There is no obligation for an airport to provide such access; rather the issue is dependent in negotiating an agreement, which will benefit the airport. If an airport allows such access, the service provided by the newcomer should include some type of compensation, similar to those paid by other business tenants at the airport. **Frequently, a yearly fee, percentage of the gross profits or an access fee may be satisfactory ways of allowing this type of operation.** Again, it is important that the airport operator ensure that a through the fence operator be subjected to conditions similar to those applicable to the businesses at the airport.

The development of neighboring airport property for use by an individual or firm that utilizes the airport can provide the airport additional service or introduce "airport friendly" neighbors. However, the airport must contend with the legal, insurance, safety, and management implications of such development. Allowing access to one through-the-fence operator may invite future or previously denied operators the opportunity for the same privilege. Ultimately, the airport will have to consider all of the pros and cons of through-the-fence agreements at their airport.

Airport businesses, the majority of them small businesses, invest billions of dollars in creating on-airport service facilities that provide for the needs of the flying public. Airport businesses are controlled

by stringent oversight by the airport sponsor to ensure their services support the needs of the airport and the public.

3.8 CONDOMINIUM CONCEPTS

A condominium may be a high-rise apartment building, a garden type housing development, an office building, a shopping center of an industrial complex, or an airport hangar where each attached or semi-detached unit, office space unit, etc., is individually owned, with joint ownership and control of common areas and facilities. In each of these situations, the unit owner has a fee interest that may be sold, exchanged, mortgaged, and separately assessed for tax purposes.

Developers who wish to create a condominium must declare their intent with the recording of the declaration, sometimes referred to as the master deed, as well as the by-laws and the floor plans. With these documents, the condominium project has its legal inception. It must comply with the local condominium law. The declaration contains fundamental ownership covenants that run with the land so that it binds every person who becomes a property owner in the project. In essence, this document provides for dividing ownership, a veritable declaration of independence for the separate units created by this process as well as affirmation by unit owners of the shared obligation for commonly used areas or common elements.

One of its most important features is the statement in fractions of each owner's common interest, i.e., share of rights and duties with respect to the common elements. This fraction fixes the unit owner's pro rata burden of the common expenses. The percentage is necessary to calculate each unit owner's liability for the maintenance of the common areas and improvements.

Most condominium documents include a provision allowing the board to hire a property manager to handle the day-to-day administration of the community. It is the board, however, who has the ultimate responsibility for monitoring and overseeing the management company. In the case of the airport, the property manager could be the airport management and it could handle the day to day management of the condominium project(s).

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4.0 Establishing Land Rental Rates

Most rental rates are established by using local market rates that reflect the supply of and demand for rental land in a local area. The general approach used to determine an appropriate rental rate is to gain information on a lease transaction in the region. This can be difficult with few transactions for comparison so a market capitalization rate is often used. **Where sufficiently detailed information is not available, the capitalization rate will be useful in calculating out a rent**. It should be noted that competitive airport rates from larger (and high land value) airports can provide a cost advantage for an operator in targeting a prospective tenant.

Capitalization rates, or cap rates, provide a tool for investors to use for roughly valuing a property based on its Net Operating Income. ***Reciprocally, when there is an indication of the value of property, it can use a cap rate to determine the appropriate rent to charge an occupant.*** The variables are the land value, the cap rate and the rental rate.

A comparatively lower cap rate for a property would indicate less risk associated with the investment (increasing demand for the product), and a comparatively higher cap rate for a property might indicate more risk (reduced demand for the product). Some factors considered in assessing risk include creditworthiness of a tenant, term of lease, quality and location of property and general volatility of the market.

4.1 AIRPORT MAINTENANCE CHARGE

The airport maintenance charge is to be applied to all airport properties and recalculated every five years with an annual CPI increase to annually adjust the charge. The recalculation is based on the common use costs of the development areas (roads, utility corridors, and public access areas that are utilized by airport tenants and the airport maintains) and divided by the total area of the developed and planned land for development in the next five years.

Due to the current approach with the AMC, ***it may require a phased implementation and transition for the fully implemented AMC to be in effect.*** It would be a first step though to carry out a detailed cost analysis to re-establish the accurate AMC for the airport development lands for the 2019 – 2024 period.

4.2 SALE OF EXISTING WKRA LAND

The WKRA has sold land in past and has considered this in its development plans over the next 20 years. ***The sale of land is not recommended in the commercial development areas of the airport.***

Airport Returns - Sale versus Lease

The tax environment is neutral as the tenants on a lease basis are required to pay the taxes on the land they occupy, as does the owner of the fee simple land sale. There is an opportunity to generate some upfront cash through a land sale and this may be useful in considering a capital project or the establishment of a valuable reserve fund. ***The long term impacts of sale are generally not as favourable as leasing due to the land still being owned by the airport at the end of the lease term and the tighter control on the use of the land and its operations.*** The tenant may require a longer term for security of their facility investment and that is negotiable based on the size of the development and type of facility.

5.0 Summary

The opportunity for WKRA to increase its tenant mix and secure long term revenues through its land development program is very good. To fully gain the economic benefits from its land, WKRA requires better definition of the commercial uses and target markets for the three primary areas of development. There is some positioning benefit that may appeal to some companies through the availability of 'fee simple' sale of land in the industrial development area but this should not be 'pushed' but rather made available if inquired about.

The general aviation community in the region could be enticed back with a changed culture as well as a planned development area on the east side. The City and Chambers of Commerce can support any airport efforts in attracting development to the airport.

The land rent fees and charges environment needs updating and it is recommended that the principles proposed be adopted as a framework for the airport. The Airport Maintenance Charge should be a new recovery for the airport.

It must be emphasized that the airport efforts to attract an air service on a scheduled basis will both increase the utilization and activity at the airport but have a very positive effect on the land values at the airport as well.


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