Master Plan

2023 - 2042

FIRST NATIONS ACKNOWLEDGEMENT

We wish to acknowledge that Victoria Airport Authority operates from the homeland of the W̱SÁNEĆ people whose historical relationship to the land continues to this day. We are committed to further strengthening our relationships with the Tseycum First Nation, Tsartlip First Nation, Tsawout First Nation and Pauquachin First Nation by finding opportunities for meaningful partnership in the airport's ongoing operations and future developments.

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Executive Summary

EXECUTIVE SUMMARY

Purpose, Vision and Project Directives

PURPOSE

This Airport Master Plan provides a long-term strategy for the development of the airport as required by the Transport Canada Ground Lease. This Master Plan addresses the following topics:

- Socio-economic profiles
- Airport activity
- Airport environment and environmental impact
- Airfield infrastructure
- Airport terminal building
- Ground transportation
- Airport commercial services and facilities
- Airport operational support services
- Noise management
- Land use

VISION AND PROJECT DIRECTIVES

The priorities of the Master Plan are guided by the Responsible Stewardship principles identified in the YYJ Strategic Plan - to manage the future planning of the asset responsibly:

- To plan the airport infrastructure and its impact on the environment in an appropriate and timely manner, with financial responsibility.
- To reflect the airport business plan, goals and objectives.
- To plan capital investment to the needs of the evolving market, and implement capital expenditure when demand dictates, in such a way that:
  - The overarching objective of safe, secure and environmentally responsible airport operations are delivered every day, and
  - that economic development for and of the region is enabled by the airport, capturing as much latent demand for air transportation (passenger and cargo) as possible.

The IT Framework and the Sustainability Plan are overarching and strategic in nature and should be considered when initiating and completing airport infrastructure changes.

Forecast

The growth patterns at YYJ are typical of airports, with mature demand, which tend to be influenced by a range of growth drivers, such as GDP and population growth. YYJ reached a peak of just over 2 million annual enplaned and deplaned passengers in 2018.

The COVID-19 pandemic has had a major impact on aviation around the world and YYJ experienced a 70% decline in annual passengers in 2020 relative to 2019. YYJ is now, summer of 2022, experiencing strong growth as passenger numbers return to pre-pandemic levels. Some of this growth has been driven by the emergence of Ultra Low Cost Airlines (ULCCs) in Canada with three now operating out of YYJ.

The domestic market continues to be the dominant sector at YYJ, making up 86% of all passengers in 2019. Transborder flights, representing flights to and from the United States of America (USA), made up 12% of passengers in 2019, while other international flights made up 2% of passengers travelling through YYJ. During the pandemic, both international and transborder flights were impacted more than domestic flights, resulting in much lower proportions of overall passengers at YYJ.

FORECAST APPROACH

Aviation forecasts would typically involve a consistent approach to determining the forecasted annual passengers. That is, the demand driver forecast would determine the annual passenger forecasts for the entire planning horizon.

This approach needed to be modified to suit the unique situation of emerging from a global pandemic. A hybrid approach has been used where short-term (2021-2025) assumptions were developed to represent the recovery from the pandemic, while the typical approach to forecasting is applied only beyond 2025 using socio-economic drivers of demand (regional gross domestic product and population forecasts).

FORECAST OUTPUTS

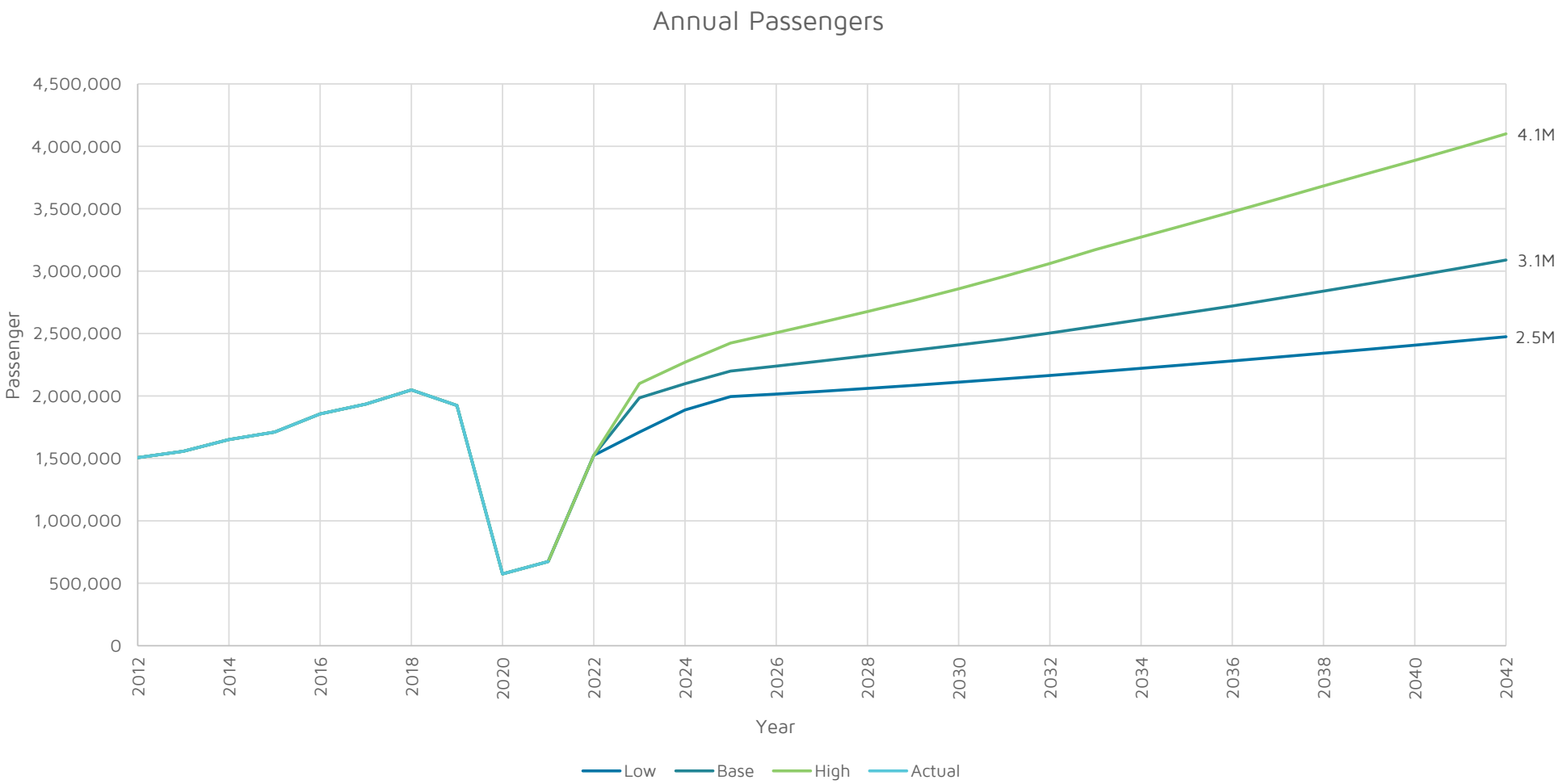
The demand drivers all have an impact on the forecast and provide a range of possible future realities for YYJ in terms of annual passengers. Three scenarios have been developed to give an indication of this possible range of future demand. The most likely forecast for annual passengers is used to drive infrastructure decisions throughout the Master Plan.

It is anticipated that YYJ will return to pre-pandemic demand by 2023 with strong growth remaining till 2025. Beyond 2025 growth will continue, but at a lower rate, approximately 2% per annum. The forecast projects that by 2042 YYJ should expect to process 3.1 million passengers per annum. This will be driven by growth in all sectors - domestic, transborder (US destinations) and international.

EXECUTIVE SUMMARY

Forecast

Annual Passengers



Airport Development Plan

The Master Plan identifies infrastructure growth that will be required to meet expected demand and satisfy project directives. The scope of expansion includes airfield, the passenger terminal building, landside (roads, parking, and recreational areas) and commercial areas. A summary of developments over two stages is provided below.

Area of Development	2023-2032	2033-2042
Airfield	• Runway end safety areas • Enhanced taxiway filets for larger aircraft • Apron IV expansion to support demand growth • Upgrade Runway 09 approach lighting to CAT I SSALR • Runway 09-27 extension would provide a greater safety buffer for long haul flights to potential future international destinations	• Apron IV expansion to support demand growth • Closure of Runway 03-21 to enable growth of the terminal building and Apron IV • Northern taxiway development to support demand for airside commercial lots
Terminal	• Eastern expansion to support demand growth for aircraft gates, check-in area, outbound baggage system and offices • Western expansion to support demand growth for aircraft gates, international/CBSA facilities, and inbound baggage system • Central expansion to support demand growth for pre-board screening	• Western expansion to support demand growth for aircraft gates
Landside	• Expanded Electra Boulevard and development of a roundabout at the new intersection with Willingdon Avenue • Parking expansion at the terminal building to support demand growth • Ongoing improvement to the recreational path and supporting areas	• Parking expansion at the terminal building to support demand growth • Ongoing improvement to the recreational path and supporting areas
Commercial	• Leasing of commercial lots that are readily available • Improvements to infrastructure to make additional lots available as required by demand	• Increased land availability due to closure of Runway 03-21 • Leasing of commercial lots that are readily available • Improvements to infrastructure to make additional lots available as required by demand

EXECUTIVE SUMMARY

Airport Development Plan

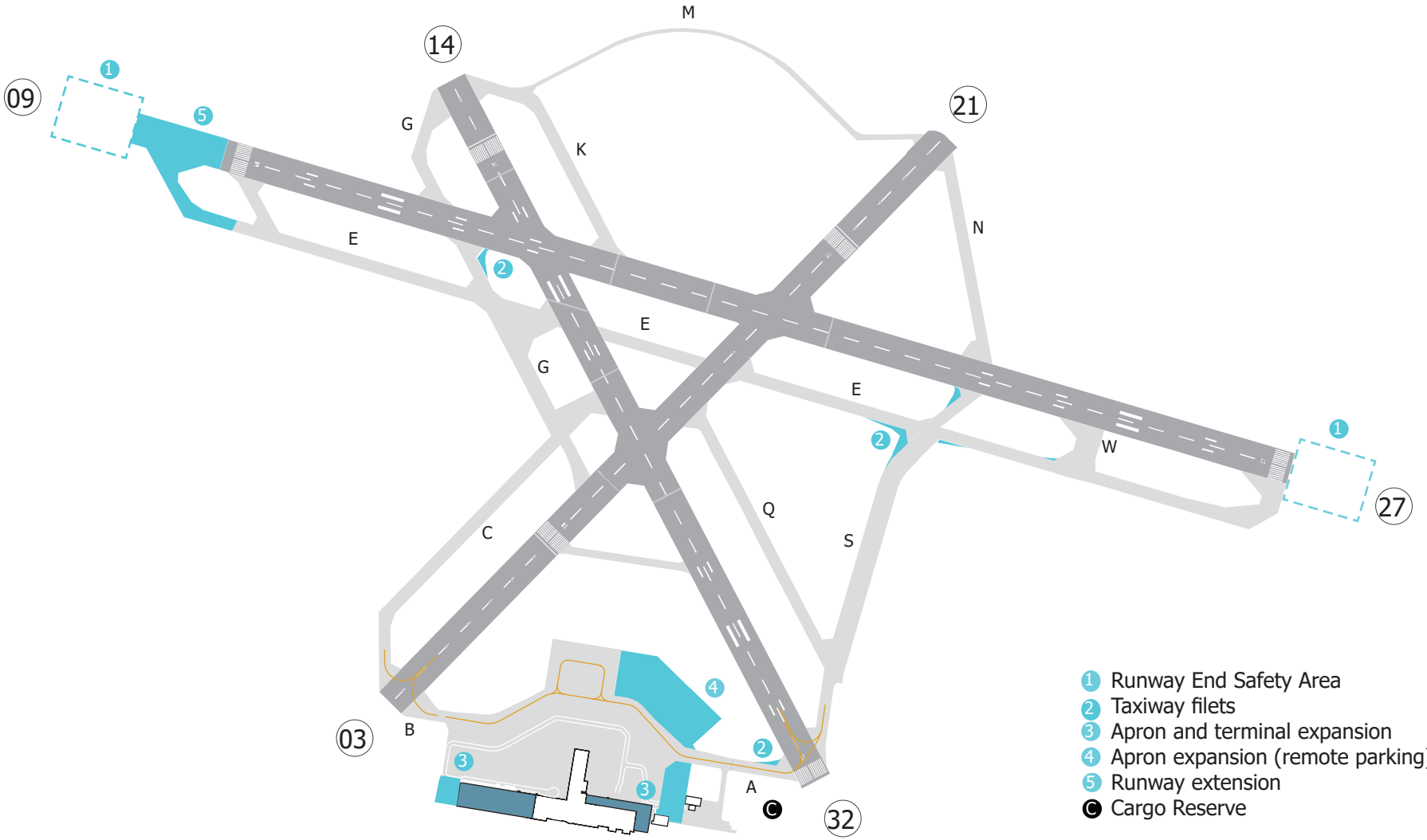
Preliminary order of magnitude cost estimates were developed for the major developments identified in the Master Plan. Costs were split into 5 year increments. Commercial development costs were not included as the need for development is still to be determined. Costs are provided in 2022 dollars. A detailed breakdown of project costs have been provided in the Appendix.

Area of Development	2023-2027	2028-2032	2033-2037	2038-2042
Airfield	$14,100,000	-	$57,686,250	$27,425,000
Terminal	$108,500,000	$125,000,000	$28,250,000	$125,000,000
Landside	$23,291,260	$12,784,208	$56,380,000	$2,000,000
Total	$145,891,260	$137,784,208	$142,316,250	$154,425,000

YYJ

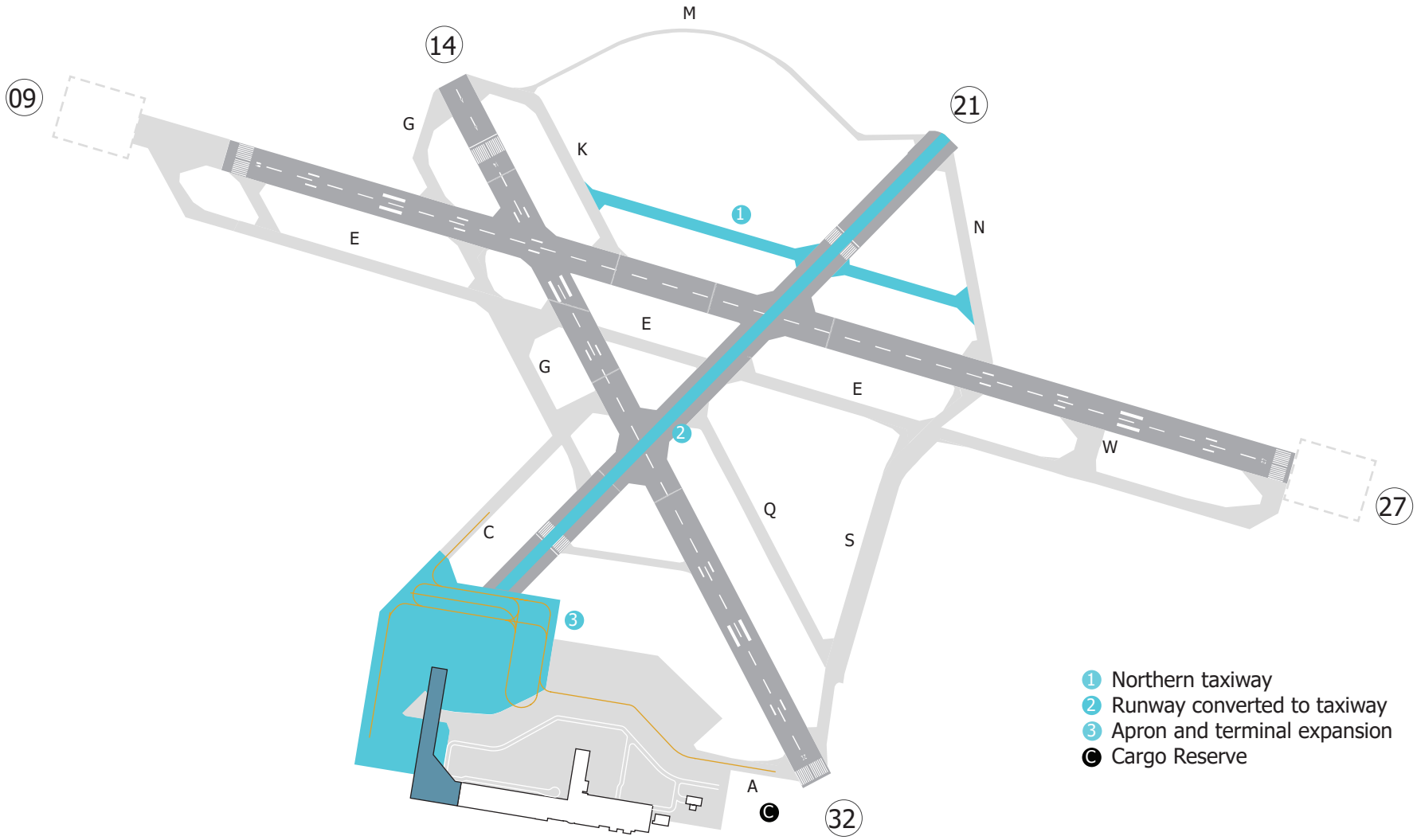
AIRFIELD

2023-2032



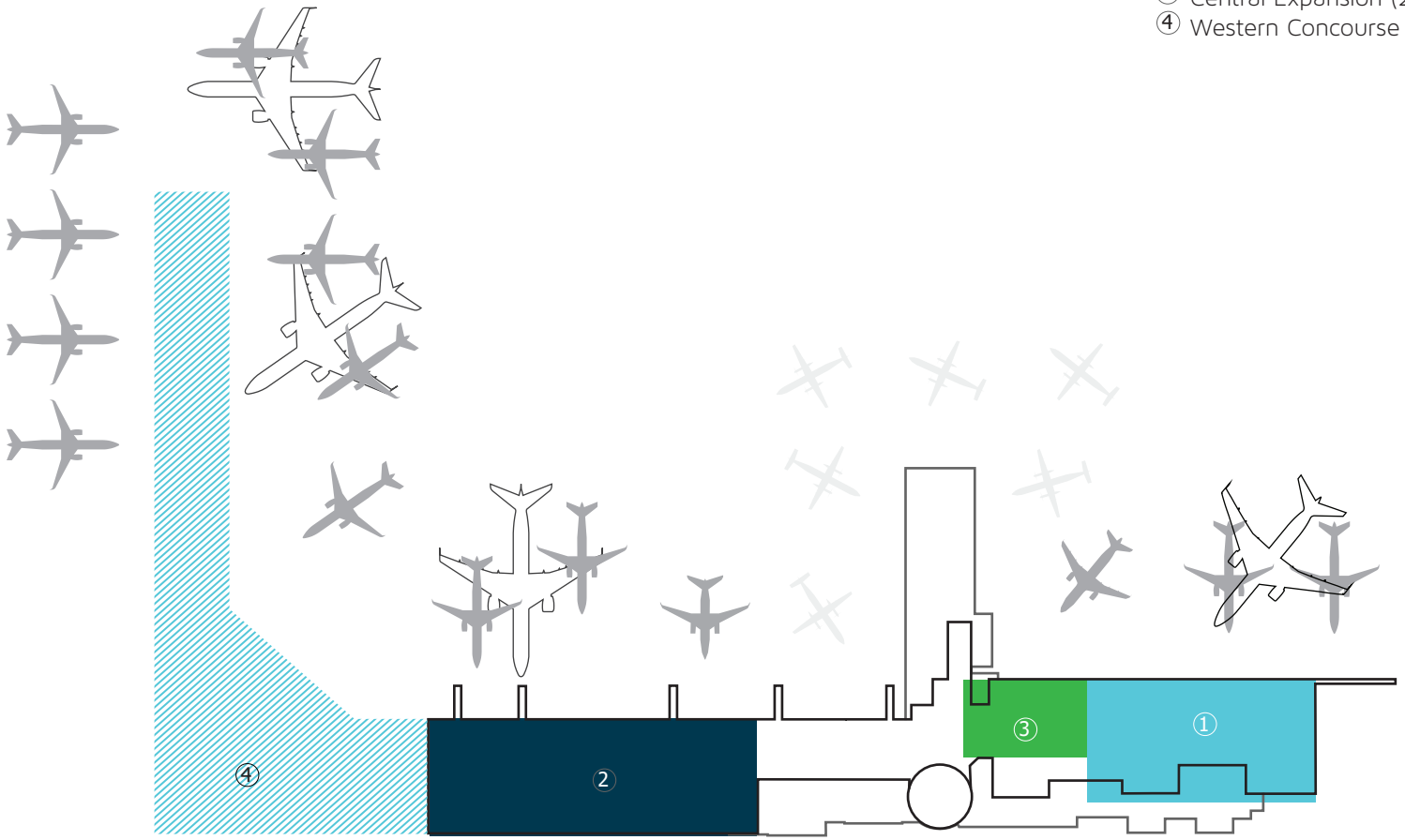
AIRFIELD

2033-2042



Development Staging

Development Stages
① Eastern Expansion (2023-2027)
② Western Expansion (2028-2032)
③ Central Expansion (2023-2027)
④ Western Concourse (2033-2042)

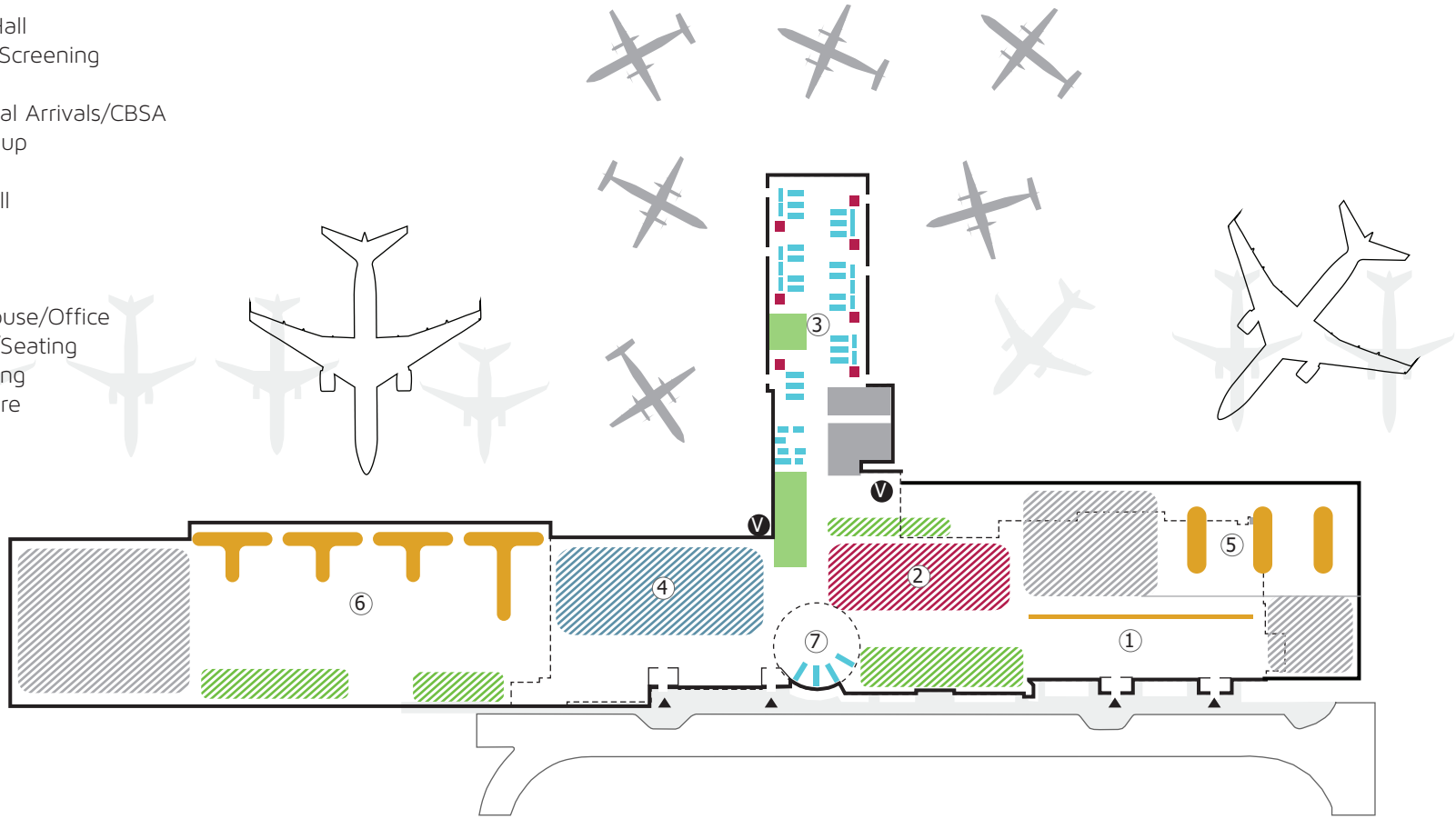


TERMINAL

2032 Terminal (Level 1)

① Check-In Hall
② Pre Board Screening
③ Holdroom
④ International Arrivals/CBSA
⑤ Bag Make-up
⑥ Bag Claim
⑦ Arrivals Hall

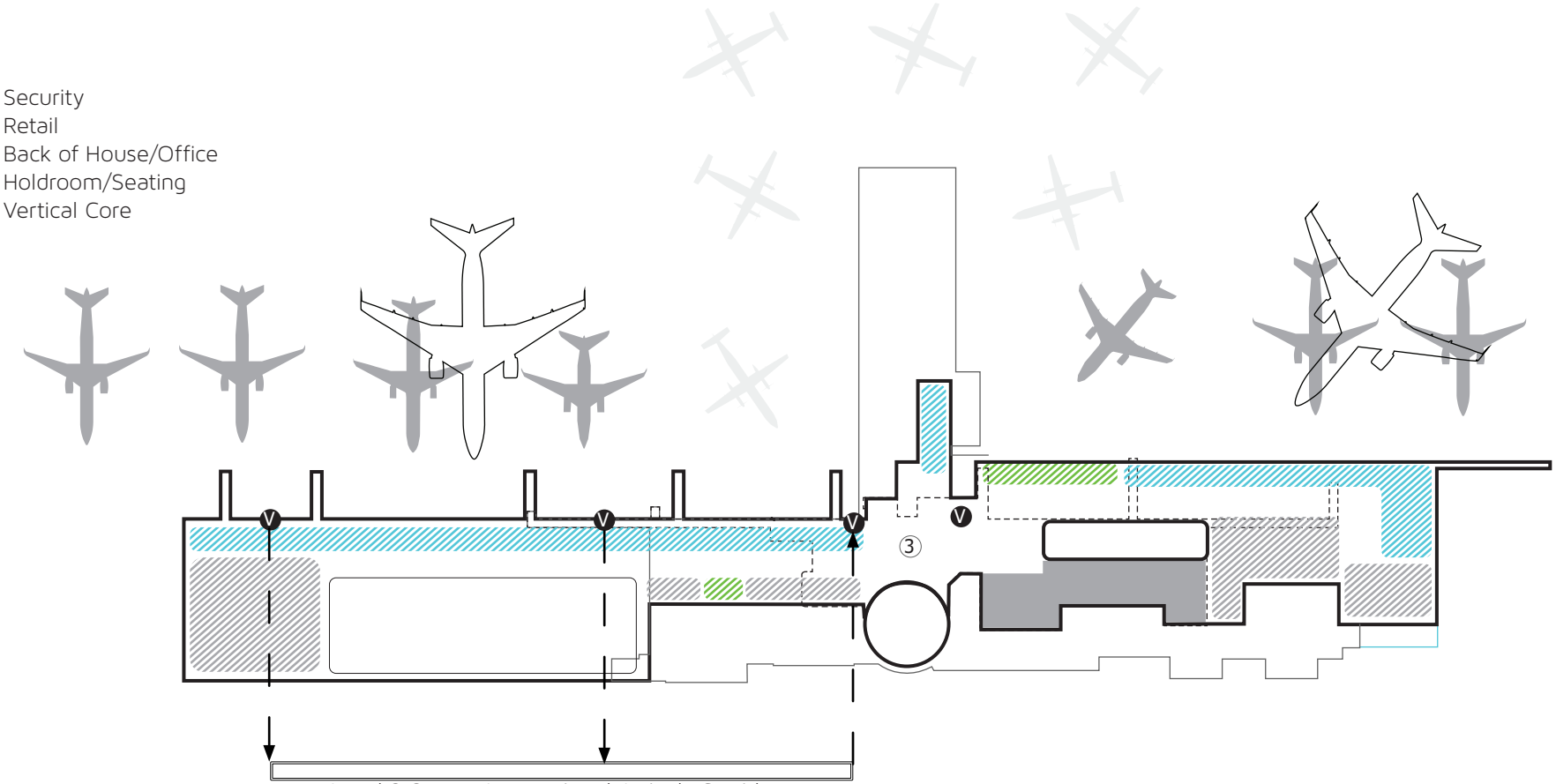
Security
Retail
Back of House/Office
Holdroom/Seating
Bag Handling
Ⓥ Vertical Core



2032 Terminal (Level 2)

③ Holdroom

Security
Retail
Back of House/Office
Holdroom/Seating
Ⓥ Vertical Core

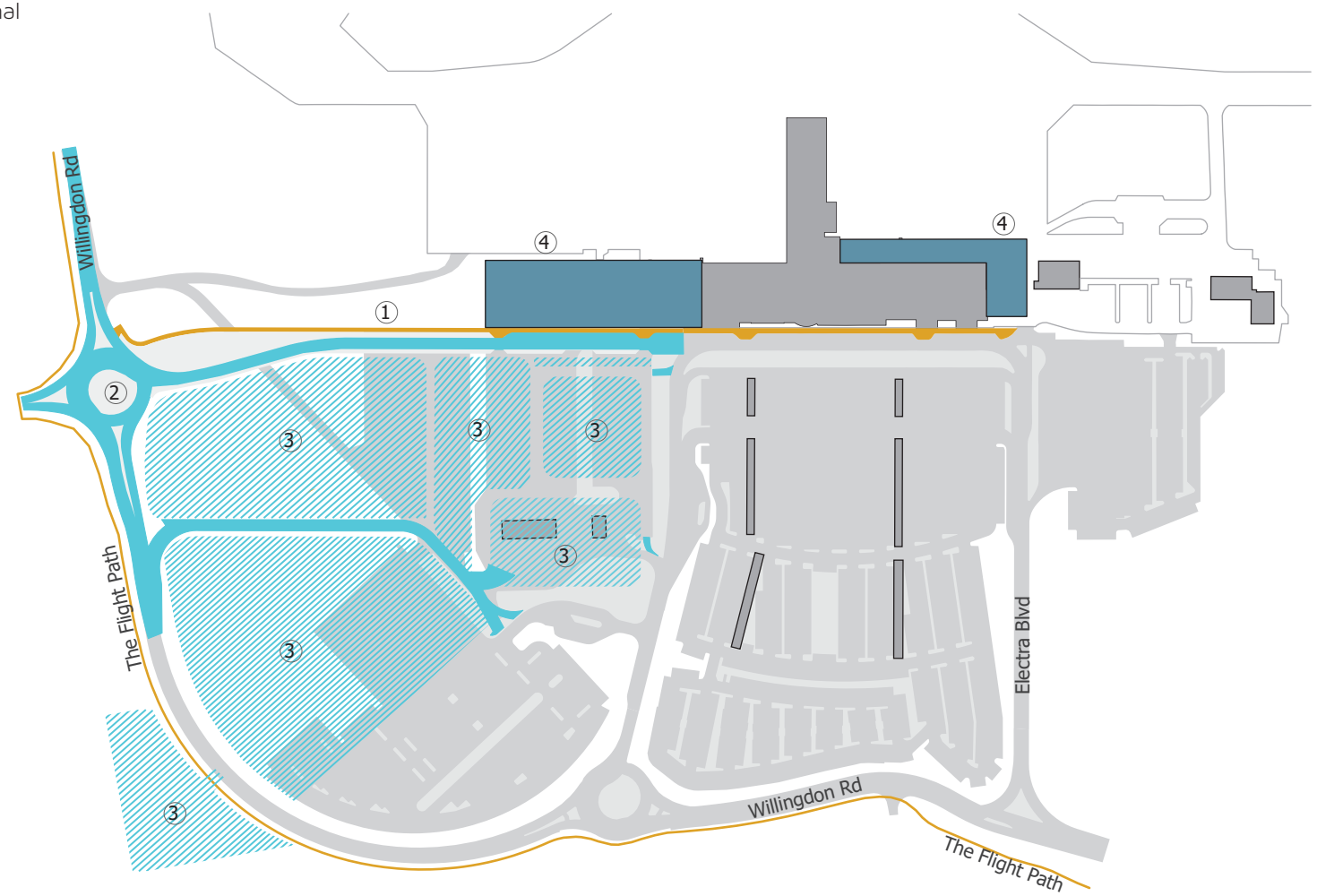


LANDSIDE

2023-2032

① Expanded terminal curb
② New roundabout
③ Expanded/reconfigured parking
④ Expanded terminal

Parking Products	Parking Provided	2032 Parking Requirement
Long Term, Short Term, Rental Car (Ready Lot)	3,813	3,363

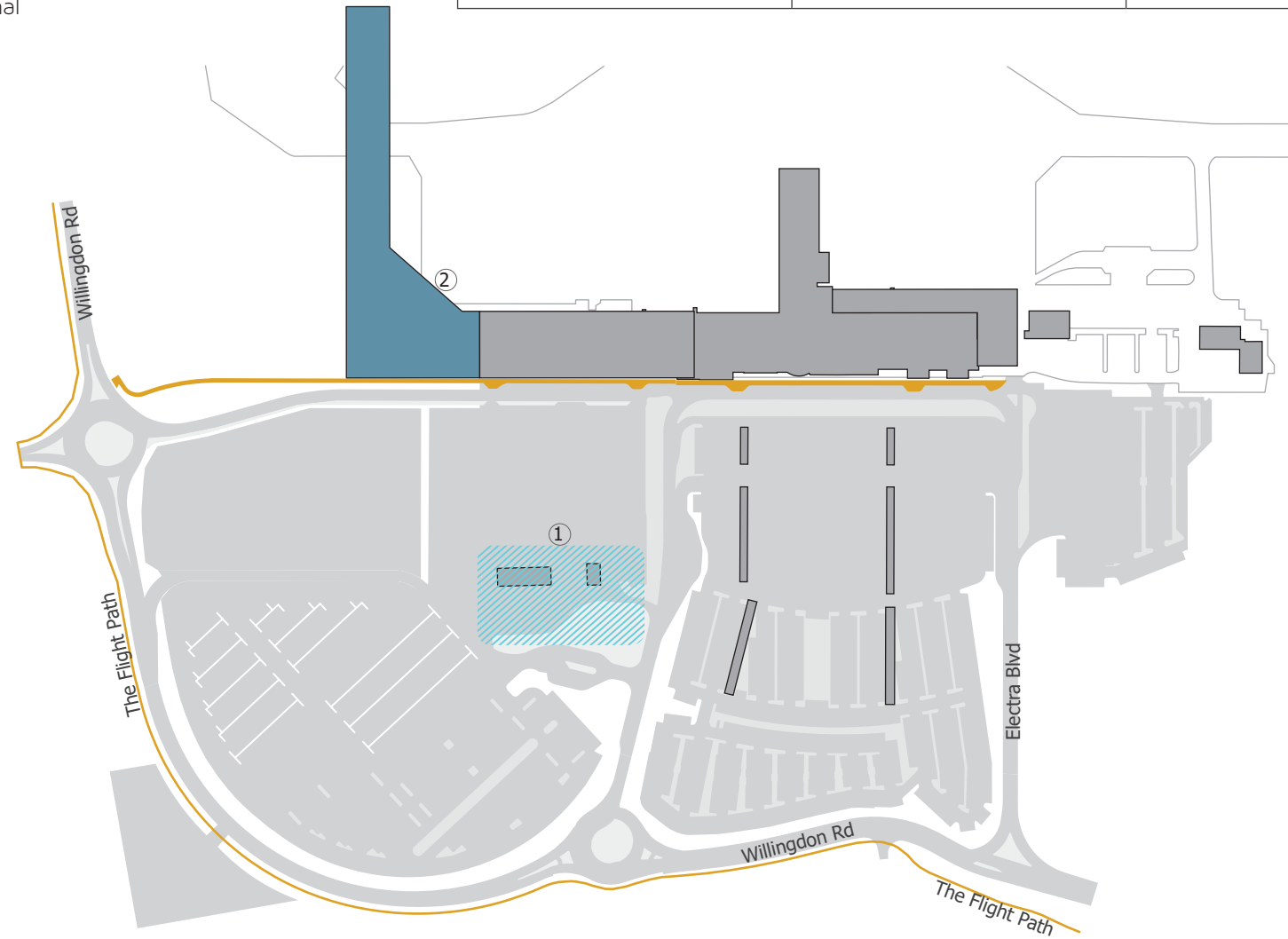


LANDSIDE

2033-2042

① Expanded/reconfigured parking
② Expanded terminal

Parking Products	Parking Provided	2042 Parking Requirement
Long Term, Short Term, Rental Car (Ready Lot)	4,160	4,148



EXECUTIVE SUMMARY

Land Use Plan and Environment

LAND USE PLAN

YYJ is currently reviewing the existing Land Use Plan with the aim to achieve a simplified approach that enables greater flexibility in developing the land on airport property. YYJ is consulting with relevant stakeholders, including Transport Canada and the municipal government. There will be no major changes to the runway system, air terminal and airport reserve areas.

The major changes to the land use plan anticipated within the horizon of this Master Plan will primarily be around the terminal building. Due to the need to expand the terminal building to accommodate additional gates there will be a requirement to close Runway 03-21. This will impact the runway system and airport reserve areas with an expansion of the air terminal reserve.

ENVIRONMENT

YYJ recognizes the importance of balancing the key strategic directives of the Master Plan with its duty of care for the environment and the commercial realities of operating the airport. The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The Victoria Airport Authority (VAA) has adopted the SDGs as a basis towards addressing global sustainable development challenges.

The Master Plan has identifies that all airport development needs to be guided by their Sustainability Plan, which is updated every 5 years. Environmentally focussed goals in the current Sustainability Plan feature:

- Waste diversion rate of 75% by 2025 and 90% by 2030
- Increase by biodiversity by 20% and achieve Aichi Targets
- ACI carbon accreditation: 2025 target – Level 3 (Optimization), 2030 target – Level 4 (Carbon Neutrality)
- Reduce water use by 25% per passenger by 2030

NOISE MANAGEMENT

Aircraft noise is the most significant cause of adverse community reaction related to the operation and expansion of airports. It is, therefore, critical to identify problems as they arise and identify various measures to reduce noise in collaboration with stakeholders and the community. Noise management initiatives can take many forms, the following are employed by YYJ:

- Land use planning driven by Transport Canada recommendations relating to Noise Exposure Forecast (NEF) contours
- Airport consultative committee
- Operational mitigation

01

Introduction

INTRODUCTION

Airport History

TRANSPORT CANADA REQUIREMENTS FOR MASTER PLANS

The Master Plan addresses the Transport Canada ground lease requirements, which need to be updated every 10 years. The Master Plan provides the strategy for the long term development of the Airport and addresses the following:

- Socio-economic profiles
- Airport activity
- Airport environment and environmental impact
- Airfield infrastructure
- Airport terminal building
- Ground transportation system
- Airport commercial services and facilities
- Airport operational support services
- Noise management
- Land use

AIRPORT HISTORY

In 1930, a private airport owned by British Columbia Airways Ltd, located on the southeastern portion of Vancouver Island started the humble beginning of air services in Victoria. Before the establishment of the airport, air travel was only available via float plane.

By the late 1930s, the Department of Transport realized the need for a large military airport on southern Vancouver Island, and it was determined that Sidney would be the site of the future Victoria International Airport. As such, the Departments of National Defence and Transport formed a joint committee and commenced construction of the airport in 1939, which was then known as Patricia Bay Airport.

The airport was ready for use in the 1940s and the runways were reinforced and extended in 1942. During this time the airport accommodated the Royal Canadian Air Force, the Royal Air Force, and the Royal Canadian Navy. The airport became a base for bomber reconnaissance and fighter units, and was the home of two operational training units. The RCAF left the airport in 1952.

Scheduled passenger service commenced at the airport in 1942 when the Department of National Defence granted Trans-Canada Airlines permission to use the airport for scheduled service to Vancouver. By 1944, Seattle was

Airport History

added to the route which resulted in eight daily flights to the airport by 1946. In 1947, areas to the east of the airport were set aside by the Department of National Defence in order to commence civil utilization of the airport. Soon after in 1948, the airport was transferred to Transport Canada where a temporary airport license was granted for civil operations.

By the mid-1950s the airport reached 77,000 aircraft movements and the seaplane base located to the west was reactivated. In 1959, the airport was renamed to its current name of Victoria International Airport

Extensive airfield improvements were made during the 1960s and 70s by Transport Canada to extend Runway 08-26 to 7,000 feet and an ILS (Instrument Landing System) was installed on the Runway 26 approach path. In 1964, a new terminal building was constructed and expanded in 1987 to accommodate significant increases in passenger traffic. In 1979 the main Runway designation was changed to 09-27 as it is commonly referred to today.

Following continued growth in the 1980s, the federal government began a process of devolving airports to local not-for-profit authorities in the 1990s. In 1997, Transport Canada transferred YYJ to the Victoria Airport Authority (VAA) to operate under a 60 year lease with an option of a 20 year extension.

Over the past 25 years, the VAA began the process of renovating and expanding the passenger terminal in order to meet passenger growth demand. Since transfer, $226 Million has been in airport infrastructure. Some of the larger projects undertaken included:

- terminal expansions
- road realignment
- circulation core
- runway overlays and grooving
- apron expansions
- lower holdroom expansion
- parking expansions

INTRODUCTION

Vision, Mission and Guiding Principles

As a strategic document it is important that the Master Plan is aligned with the VAA Vision, Mission, and Strategic Plan.

VISION

The vision of Victoria International Airport (YYJ) is "to be the best airport anywhere".

MISSION

The purpose of YYJ is "to provide a safe, secure and efficient airport that creates prosperity for our region by connecting Greater Victoria with the world".

GUIDING PRINCIPLES (STRATEGIC PLAN)

The following guiding principles are defined in the airport Strategic Plan:

Guiding Principles	
1. Safety, security and the environment	Ensure that safety, security and environmental responsibility are at the forefront of everything we do
2. Customer service	Deliver exceptional levels of service and value
3. Partnership and accountability	Work openly and constructively with our stakeholders and community
4. Employer of choice	Treat all employees with fairness, dignity and respect
5. Responsible stewardship	Manage our finances, infrastructure and environment prudently
6. Economic development	Promote sustainable economic development and tourism for/of the region
7. Leadership and innovation	Foster leadership and innovation

Project Directives

The airport Master Plan considers the various stakeholder groups when developing a holistic plan that enables growth within the property of the airport. The Workshop Sessions, as part of the Engagement and Consultation process, and the airport Strategic Plan were fundamental to developing the Master Plan Directives. These Directives directly influenced the entire Master Plan approach.

PROJECT DIRECTIVES

The priorities of the Master Plan are guided by the Responsible Stewardship principles - to manage the future planning of the asset responsibly:

- To plan the airport infrastructure and its impact on the environment in an appropriate and timely manner, with financial responsibility.
- To reflect the airport business plan, goals and objectives.
- To plan capital investment to the needs of the evolving market, and implement capital expenditure when demand dictates, in such a way that:
    - The overarching objective of safe, secure and environmentally responsible airport operations are delivered every day, and
    - Economic development for and of the region is enabled by the airport, capturing as much latent demand for air transportation (passenger and cargo) as possible.

The Project Directives are fundamental to the decision-making involved in master plans. It is also important to consider other strategic documents used by YYJ to ensure corporate consistency with the vision and mission. Two strategic plans have been reviewed as part of the Master Plan:

- Sustainability Plan
- IT Framework

The IT Framework and the Sustainability Plan are overarching and strategic in nature and should be considered when initiating and completing airport infrastructure changes. The Master Plan identifies developments on the airfield, in the terminal and also on landside areas. Each one of these developments will need to be guided in part by the IT Framework and the current Sustainability Plan to ensure objectives are achieved. This approach will ensure sustainable growth while also realizing the benefits of latest innovations in technologies. A summary of these strategic documents is provided on the following pages.

INTRODUCTION

Sustainability Plan

Sustainable development is development that meets the needs of the present without compromising future generations. The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The Victoria Airport Authority (VAA) has adopted the SDGs as a basis towards addressing global sustainable development challenges.

SHORT TERM GOALS

The Sustainability Plan is updated every 5 years and focuses on the short term goals for YYJ. All goals are aligned with the SDGs and local priorities. The following areas of focus feature in the current Sustainability Plan.

WASTE

Waste diversion rate of 75% by 2025 and 90% by 2030

ECOLOGY + BIODIVERSITY

Increase by biodiversity by 20% and achieve Aichi Targets

SOCIAL IMPACT

Contribute to all UN Sustainable Development Goals (SDGs), Engage 5 new programs by 2025, Advance all 17 SDGs by 2030

GHG

ACI carbon accreditation

2025 target – Level 3 (Optimization)

2030 target – Level 4 (Carbon Neutrality)

WATER QUALITY + CONSERVATION

Reduce water use by 25% per passenger by 2030

ECONOMIC IMPACT

Generate $1.1 billion in economic impact by 2025 to promote sustainable economic development and tourism on Vancouver Island (established prior to COVID-19 pandemic)

IT Framework

OBJECTIVE

The IT Framework features four pillars that aim to support current operations while also enabling the airport and the various on-site operators the flexibility to grow, realize potential revenues and innovate in a safe, secure, and environmentally responsible manner.

INFRASTRUCTURE

Provide a robust and flexible physical and virtual layer to enable current and future technology, innovation and growth.

DATA

Deploy best of breed software and analytics alongside easily accessible secure data warehousing wherever it is needed.

DEVELOPMENT

Utilize leading edge solutions to employ a reliable and secure environment.

SECURITY

All pillars are designed and defined with security at the forefront.

INTRODUCTION

Stakeholder Consultation

The process of engagement and consultation launched the master planning process with the interested stakeholders. Consultation was done both in group and individual settings

Principal Stakeholders consulted include:

- Airlines
- CATSA
- CBSA
- Department of National Defence
- Nav Canada
- VAA leadership
- Airport Consulatative Committee
- First Nations
- Airport Board of Directors

DISCOVERY SESSIONS

Consultation was the initial step in formation of the Master Plan document.

VAA leadership held meetings with stakeholders outlining:

- The purpose of the Master Plan
- The Master Plan requirements, as defined by the Ground Lease
- Project timeline and consultation plan
- Information requests (to be used in the master planning process)

Stakeholders were also given the opportunity to comment on the draft Master Plan document.

02

Forecasting

FORECASTING

Forecasting Approach

The Master Plan project directives outlined that airport infrastructure should be planned in an appropriate and timely manner, with financial responsibility. In order to satisfy this directive it is critical to understand the demand profile going forward. This chapter of the Master Plan presents the demand forecasts over the planning horizon, which are used to make key infrastructure decisions later in this report.

Historical Demand

The first step of developing a forecast is to review historical demand. The growth patterns at YYJ are typical of airports with mature demand which tend to be influenced by a range of growth drivers. YYJ reached a peak of just over 2 million annual passengers in 2018.

The COVID-19 pandemic has had a major impact on aviation around the world and YYJ experienced a 70% decline in annual passengers in 2020 relative to 2019. YYJ is now experiencing strong growth as passenger numbers return to pre-pandemic levels.

DOMESTIC SECTOR

The domestic sector is the largest at YYJ, typically representing between 80% and 90% of all passengers. During the COVID-19 pandemic, the domestic market share increased to almost 100% as travel restrictions and advisories impacted international travel more than domestic travel.

The domestic sector can be broken down into two sub-categories – short haul (under 600km) and long haul (over 600km). The short haul category is predominantly driven by flights to Vancouver International Airport (YVR) which is the highest volume route for YYJ. Long haul domestic routes have been stagnant until the last year as Ultra Low Cost Carriers (ULCCs) have entered the market and are stimulating strong growth. There are three ULCCs currently operating at YYJ (SWOOP, Flair Airlines and LynxAir).

TRANSBORDER SECTOR

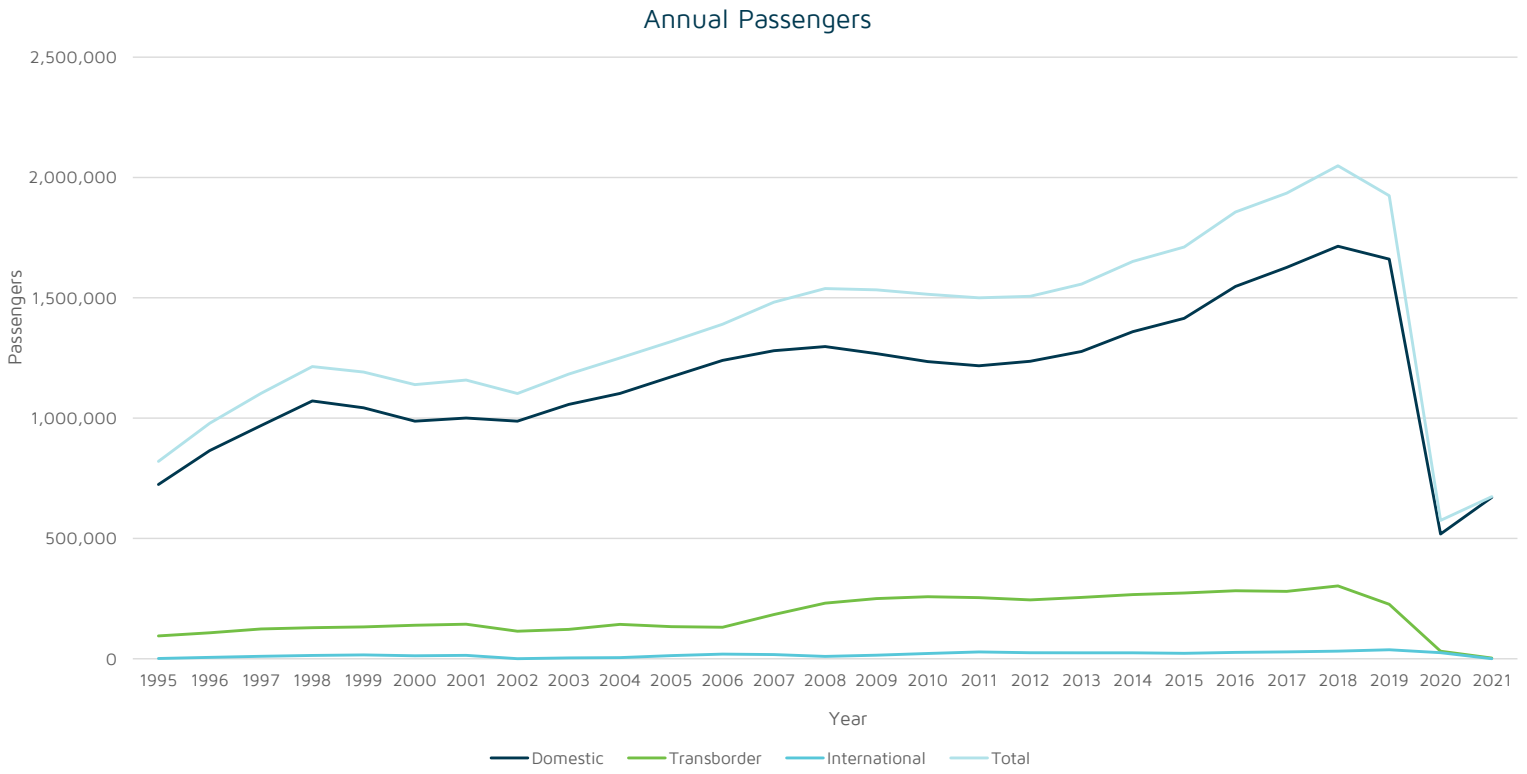
Transborder flights represent flights to and from the United States of America (USA). Similar to the domestic sector, transborder can be broken into two sub-categories – short haul (under 600km) and long haul (over 600km). The short haul category represents flights to Seattle-Tacoma International Airport (SEA), which is a consistent, mature route from YYJ. Since the departure of United from YYJ in 2019, the long haul transborder market has declined to zero.

INTERNATIONAL SECTOR

The international sector represents all other international destinations, excluding the USA. Today it features seasonal sun destination flights such as Cancun, Mexico. Historically, the international sector only represents 1% to 2% of all passengers at YYJ.

Forecasting Approach

Historical Demand



FORECASTING

Forecasting Approach

Air Service Development Opportunities

Although the approach taken is determined by macro socio-economic drivers, it is an important exercise in forecasting to identify opportunities for air service development. There are three primary areas of development that are anticipated in the planning horizon that could make up the projected demand.

GROWTH DRIVEN BY ULCCS

ULCCs have the potential to create new routes on the back of lower fares. These ULCCs could target destinations that are high connection markets for YYJ. The top 10 connecting markets (primarily accessed through Vancouver International Airport), in alphabetical order, from 2019 included:

- Halifax, Canada
- Kahului (Maui), USA
- Los Angeles, USA
- Palm Springs, USA
- Phoenix, USA
- Regina, Canada
- San Francisco, USA
- Saskatoon, Canada
- Winnipeg, Canada

NEW USA ROUTES

In 2018, Delta Airlines and United Airlines operated out of YYJ. There are a number of USA destinations that are in the top 10 connecting markets. Future demand growth could lead to the return of one of the major US carriers, which could lead to other destinations being viable that may not be in the top 10 connecting markets. Larger airlines like Delta and United would likely focus on their broader network connectivity and would provide connection into their hub airports. For example, in the western US states this may provide the opportunity for new destinations such as Denver which is a United Airlines hub.

The addition of pre-clearance facilities at YYJ would provide greater opportunity for additional USA destinations, especially to airports that have limited international passenger processing facilities such as Kahului and Palm Springs. The present US pre-clearance is cost prohibitive from both a capital investment and operating expense perspective. The economics are presently difficult to justify under the current model. Currently there are only 8 Canadian airports with pre-clearance facilities and these airports process significantly more transborder passengers than YYJ.

Forecasting Approach

NEW INTERNATIONAL ROUTES

In the longer term there will be a greater population for YYJ to serve on Vancouver Island. This will result in growing passenger numbers to longer haul international destinations in regions such as Europe. YVR is a major west coast hub for Air Canada and WestJet but as congestion at YVR increases, YYJ will look more attractive for airlines in other countries that may not benefit as much from using YVR. On top of this, next generation aircraft are becoming capable of flying longer ranges. The Airbus A321 XLR, for example, has a maximum range of 4,700 nautical miles, which would theoretically achieve a YYJ to London-Heathrow flight.

The Runway 09-27 extension is noted for planning purposes within the Master Plan primarily as a safety buffer for potential international flights. YYJ will continue to monitor evolutions in aircraft technologies, range capabilities, and market conditions prior to any investment in the extension.

Hybrid Approach

Aviation forecasts would typically involve a consistent approach to determining the forecast annual passengers. That is, the demand driver forecasts would determine the annual passenger forecasts for the entire planning horizon. This approach needed to be modified to suit the unique situation of emerging from a global pandemic. A hybrid approach has been used where short-term (2021-2025) assumptions were developed to represent the recovery from the pandemic, while the typical approach to forecasting is applied only beyond 2025.

FORECASTING

Forecasting Approach

Hybrid Approach

Short term: 2022-2025

Historical actual pax to 2021

>

CAPACITY-BASED MODEL
2022 Seat capacity + Load factor assumptions, generating passengers across market segments

>

IATA profile of recovery 2023-2025, determined by growth factors on 2022 assumed pax across five core markets and high/low variants

Long term: beyond 2025

2025 platform of Low/Base/High pax from Capacity Based Model

>

ECONOMETRIC MODEL
Apply annual growth factors to three segmented markets of Domestic; Transborder; International for three scenarios

>

Apply new air service "**boost**" to high/base creating market stimulus based on likely opportunities.

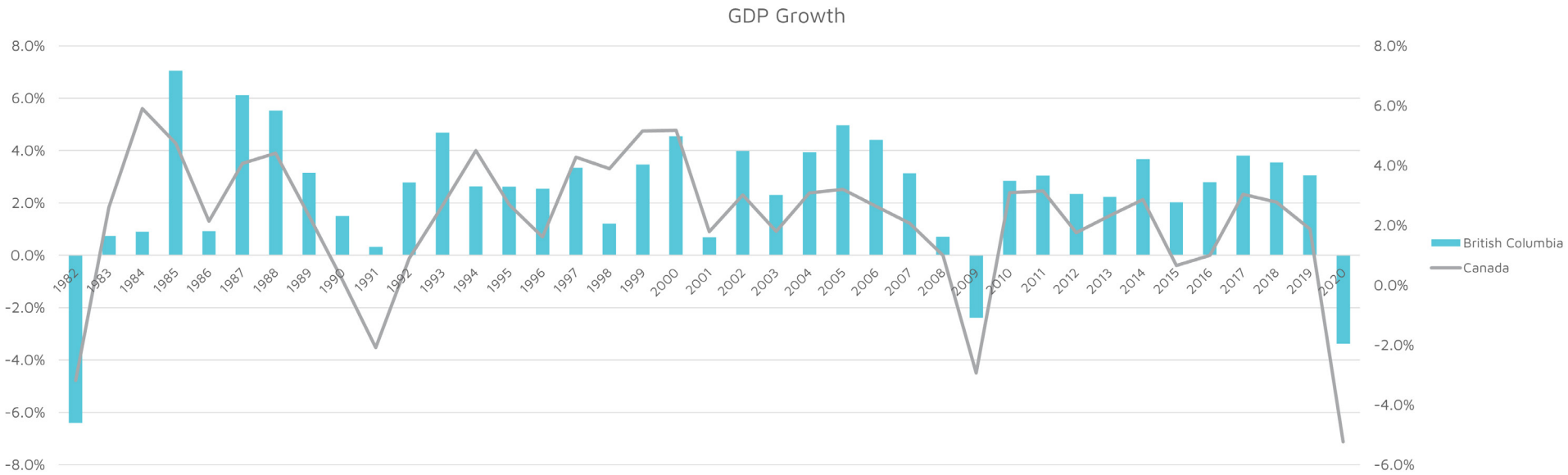
Forecasting Approach

Growth Drivers

There are numerous drivers of aviation activity that can vary based on regional and local economic characteristics. Generally, aviation forecasts will be tied to regional socio-economic factors such as gross domestic product (GDP) and population. This is done through regression analysis of historical growth of these socio-economic factors and annual airport passengers.

GDP

British Columbia has a diverse and growing economy and is generally stronger than the national average in terms of growth in GDP. The local Vancouver Island economy is mostly service-based with key drivers being consumer lifestyle factors such as education and tourism. Each sector of an economy contributes directly or indirectly to the growth of air travel. GDP captures the overall economic throughput of the province. This measure of economic performance typically provides the best correlation to aviation performance at mature airports such as YYJ.



FORECASTING

Forecasting Approach

GDP forecasts for British Columbia and Canada are created by various financial bodies and six forecasts (BMO Financial Group, CIBC Capital Markets, National Bank of Canada, Royal Bank of Canada, Toronto Dominion Economics and Organisation for Economic Cooperation and Development (OECD)) were reviewed to develop low, base and high GDP forecasts.

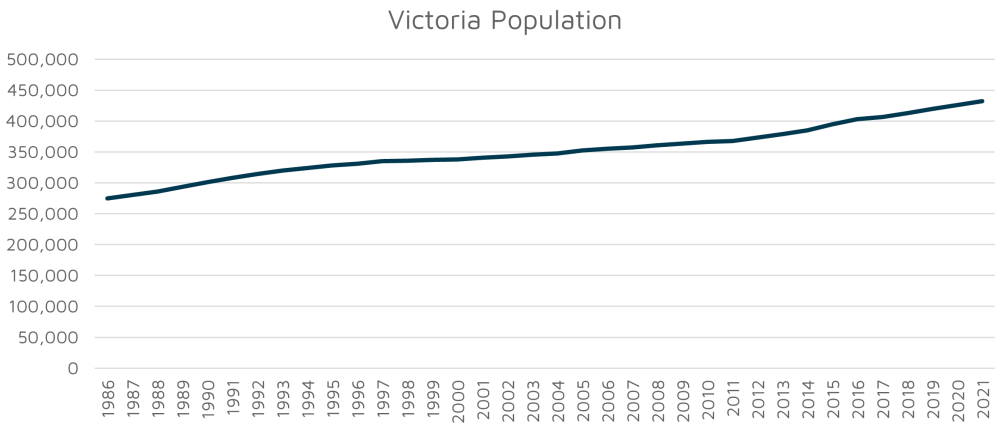
	Forecast Real GDP Growth (%)					
	British Columbia					Canada
Year	BMO	CIBC	National	RBC	TD	OECD
2021	4.0	4.2	4.4	5.1	5.0	
2022	4.6	3.9	4.4	4.3	4.0	
2023	3.7	2.9	2.8	2.6	5.4	
2024					5.3	1.8
2025						1.7
2026						1.6
2027						1.6
2028-2032						1.5
2033-2037						1.4
2037-2041						1.3

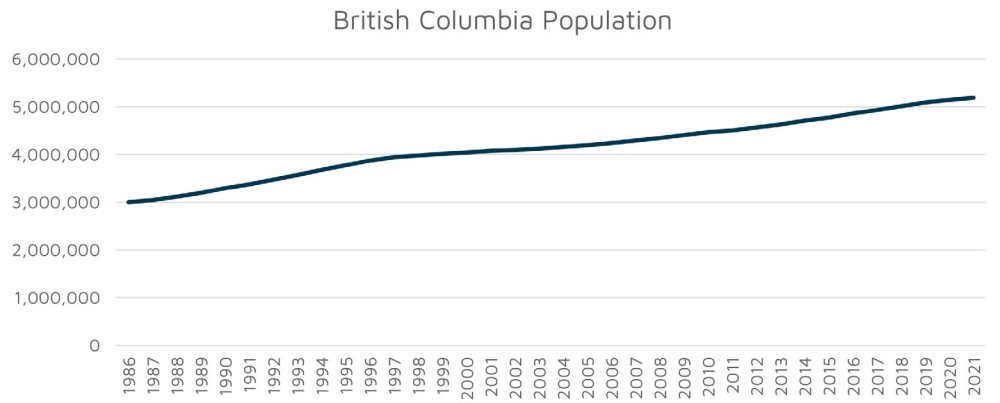
Forecasting Approach

POPULATION

Another socio-economic growth factor that contributes to air travel is population growth. In recent years, the local population around YYJ has risen significantly. In part, this growth was driven by the COVID-19 pandemic.

Historical population for the local areas (Victoria and Cowichan Valley), the province of British Columbia and Canada were analyzed to determine the greatest correlation with annual passengers at YYJ. The BC population forecasts by Statistics Canada was determined to have the greatest correlation and was used to create low, base and high forecasts.





FORECASTING

Forecasting Approach

COVID-19 RECOVERY

Another growth driver that must also be considered within this Master Plan is the impact of the COVID-19 pandemic. The pandemic has had a profound impact on aviation since the first quarter of 2020. The lifting of most travel restrictions and advisories in 2022 has led to strong growth at Canadian airports. This growth driver is expected to have a short term impact on aviation activity with pent-up travel stimulating growth at YYJ over the next few years.

A recent forecast by the International Air Transport Association (IATA) projected that North America would return to 2019 activity levels in 2023. The short term forecast for YYJ is based on this IATA forecast that projected the following annual passenger levels relative to 2019:

- 2023: 102%
- 2024: 107%
- 2025: 112%

Forecast

Passenger Forecast

The demand drivers all have an impact on the forecast and provide a range of possible future realities for YYJ in terms of annual passengers. Low, Base and High scenarios have been developed to give an indication of this possible range of future demand. The Base forecast for annual passengers is used to drive infrastructure decisions throughout the Master Plan.

Note: Demand in 2022 consisted of partially historical data (up to October 2022). It was assumed that the remaining months of 2022 would follow a typical trend for these months. All forecast scenarios assumed identical passenger numbers for 2022.

Aircraft Movement Forecast

Projection of aircraft movements are dependent on commercial carriers fleet sizes. In general, the number of passengers per movement increases as annual demand increases. While international services demonstrate more variability, domestic and transborder traffic has been trending upwards at YYJ. This is very typical of mature airports such as YYJ.

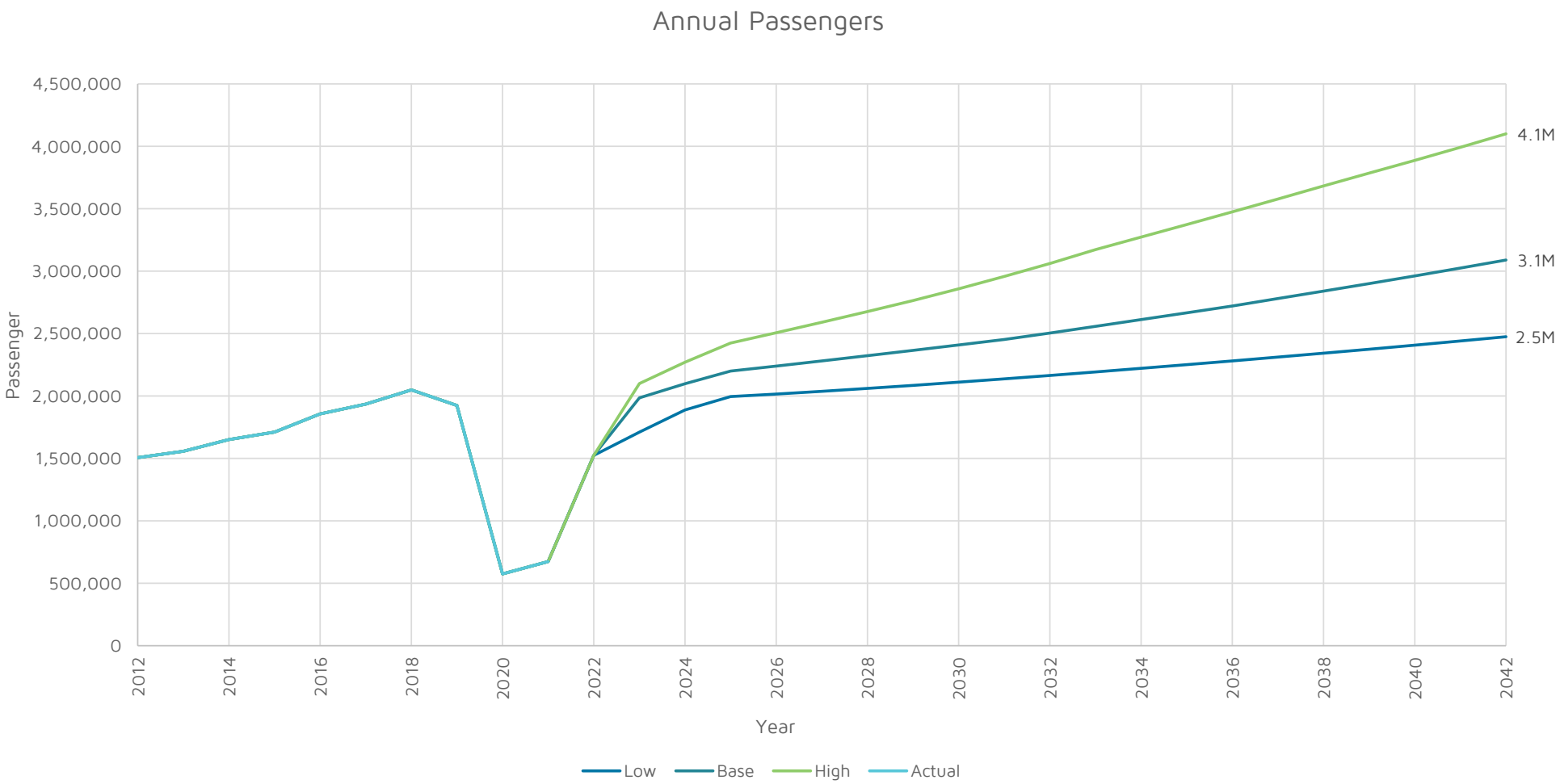
The natural growth in the Canadian aircraft fleet, including the introduction of the B737 Max and the CSeries (A220), as well as the growth in Q400 operations, all support the fact that less aircraft movements will be required to carry the same number of passengers in the future.

A projection of scheduled passenger aircraft movements is provided for the low, base and high scenarios. The projection is tied to the number of passengers per movement for each of the three sectors (domestic, transborder and international).

FORECASTING

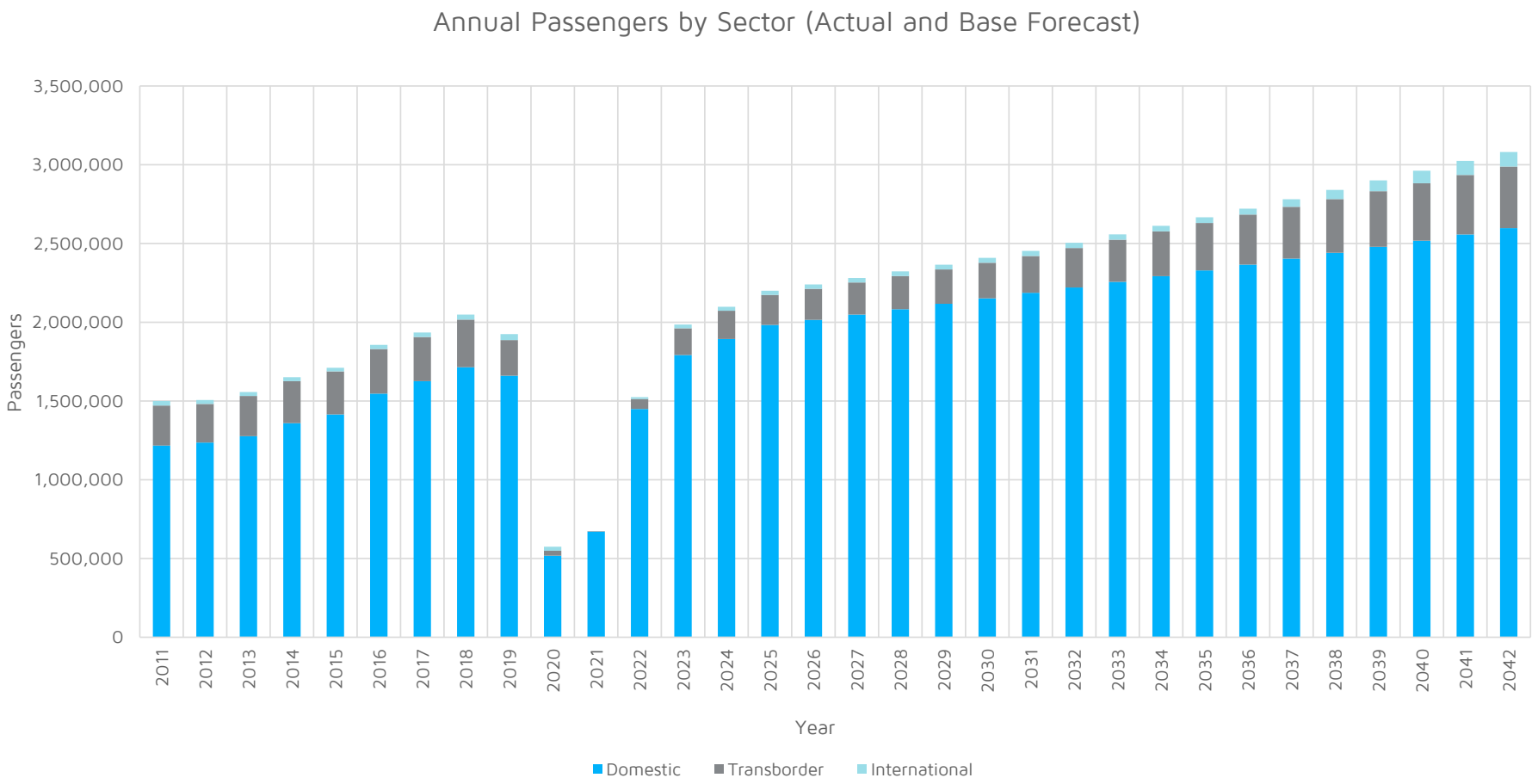
Forecast

Annual Passengers



Forecast

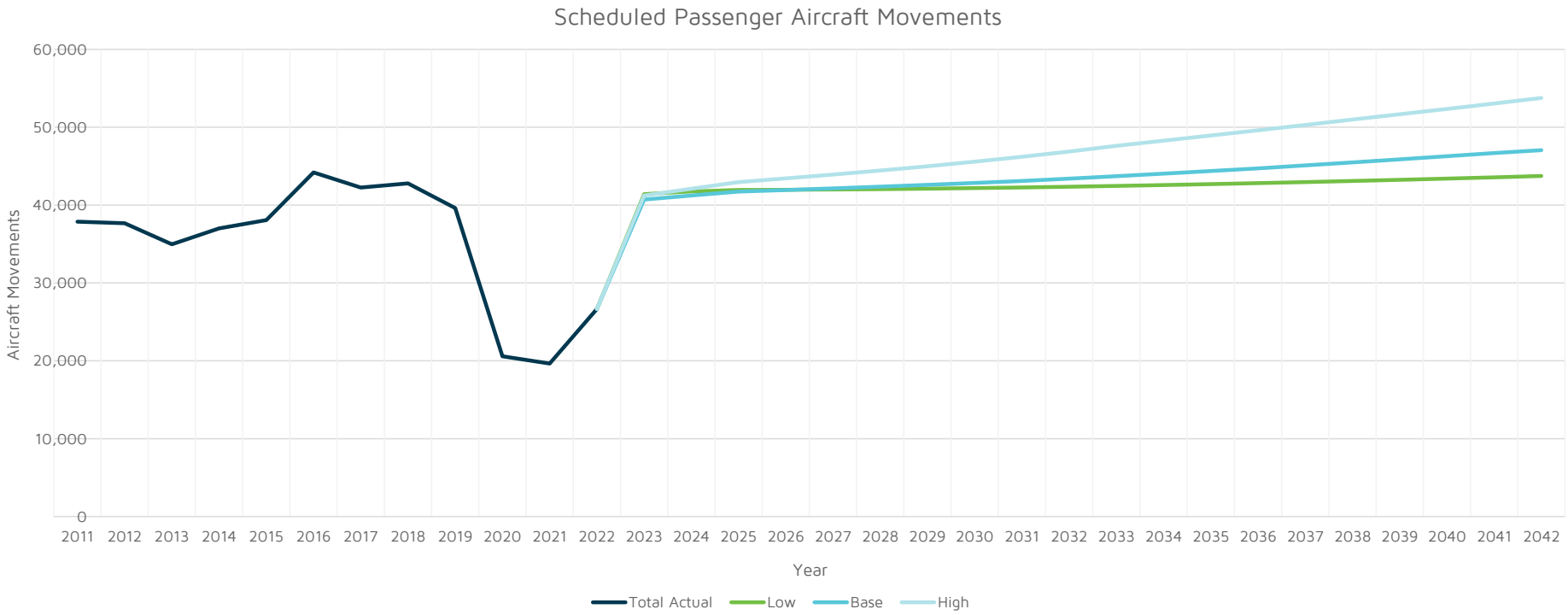
Annual Passengers by Sector (Base forecast)



FORECASTING

Forecast

Annual Scheduled Passenger Aircraft Movements



Forecast

Busy Hour

Developing busy hour passenger forecasts is completed based on the historical correlation between annual passengers and busy hour passengers. A typical approach to busy hour forecasts is to use the 30th busy hour of the year which was applied to forecasting total departure and total arrival busy hours. Busy hour demand is only defined for the Base Case forecast scenario.

The 30th busy hour was not used to determine the baseline international busy hour (includes both transborder and international sector flights). This was due to the fact that the International and Transborder sector arrival busy hours have historically been very volatile.

A scenario-based approach was used instead where a "likely" scenario was selected to represent an international arrival busy hour through historical data analysis and consultation with airport stakeholders. The baseline year (2022) international arrival busy hour features the arrival of a Q400 with 78 seats and a Boeing 737 with 189 seats.

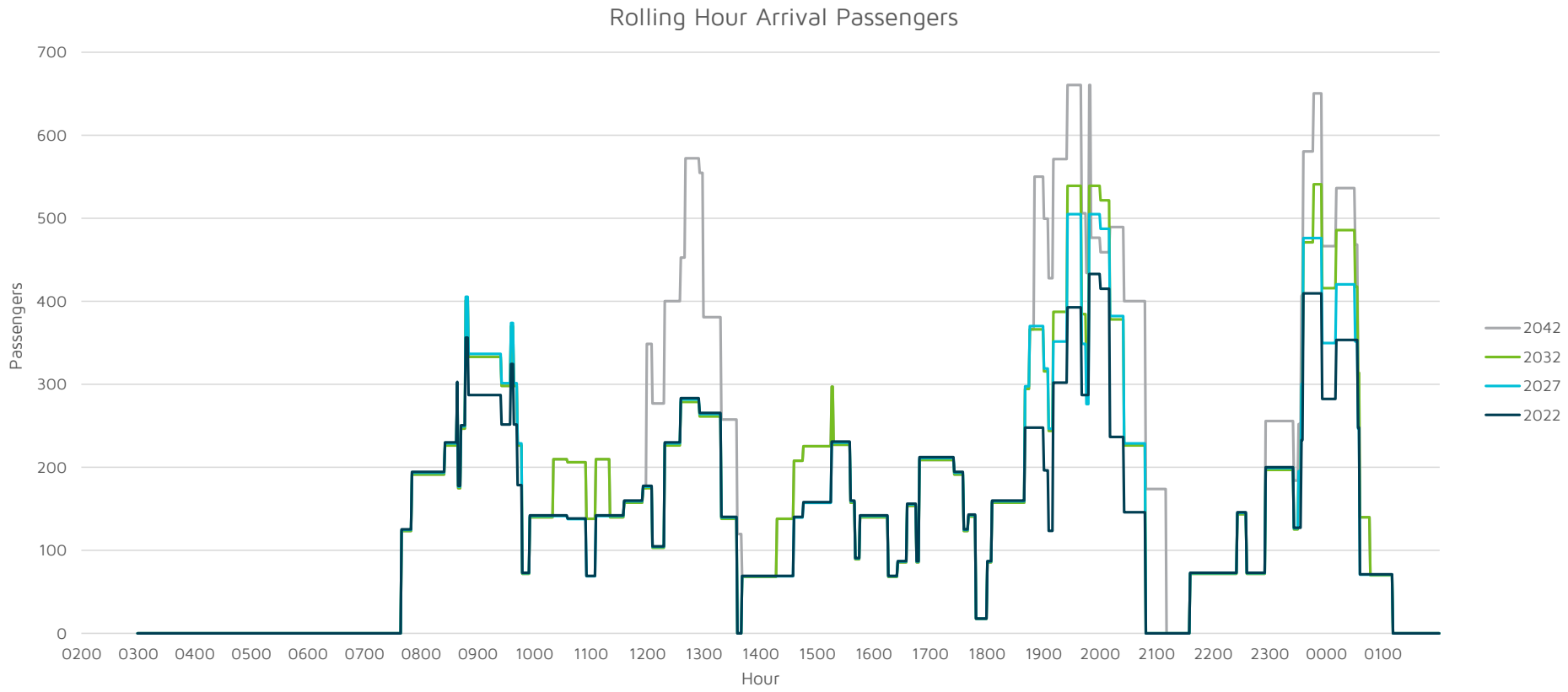
Design day flight schedules were developed from a baseline schedule that was selected from 2019. The baseline schedule was selected as it featured the busy hour targets (i.e. 30th busy hour). Busy hour targets were used to grow the baseline to represent 2022, 2027, 2032 and 2042. The table below highlights the busy hour passengers and subsequent pages provide the arrival and departure rolling hour passenger demand from the design day flight schedules.

Passenger Demand (Base Case)	Busy Hour Passengers			
	2022	2027	2032	2042
Departures - 30th Hour (2004-2019)	430	542	576	697
Arrivals – 30th Hour (2004-2019)	433	505	541	661
Arrivals (INT) – Scenario Based	248	246	314	363

FORECASTING

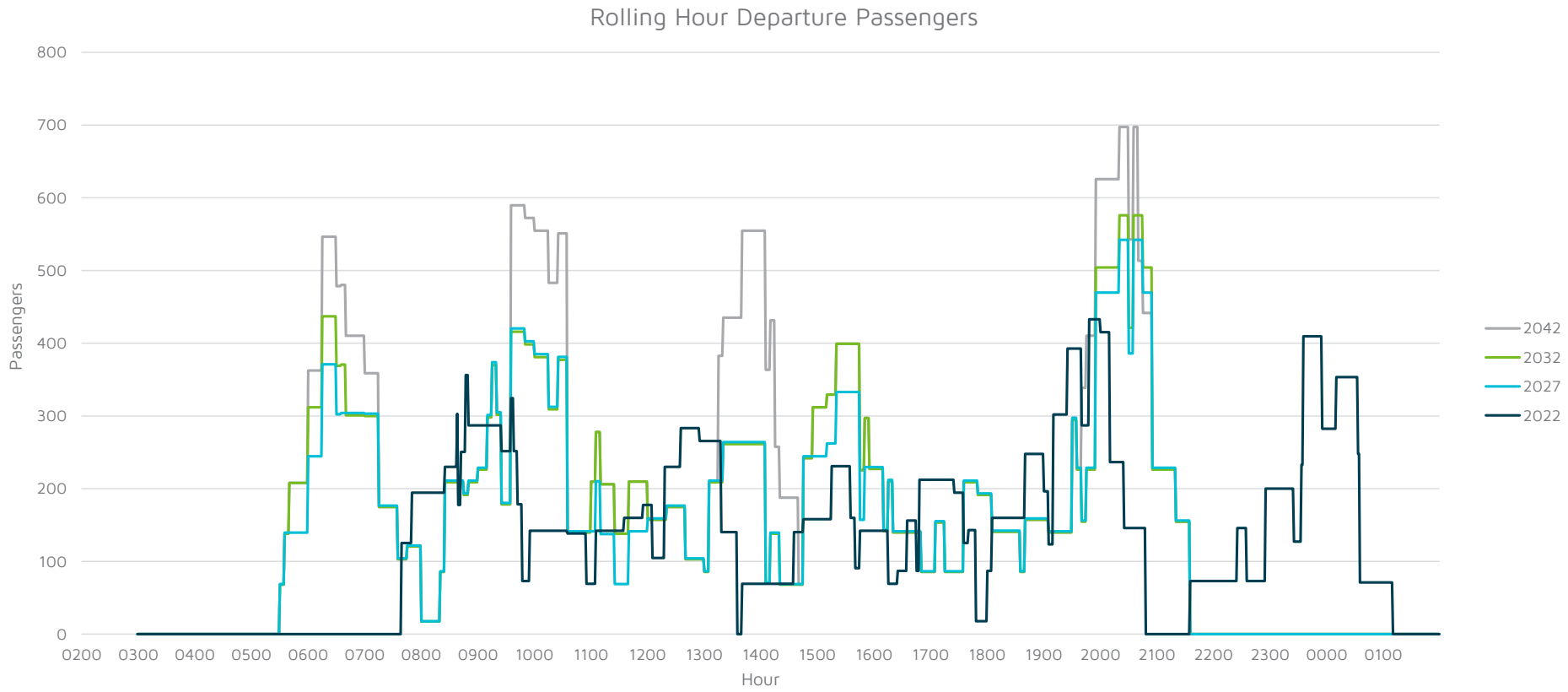
Forecast

Design Day Flight Schedules



Forecast

Design Day Flight Schedules



03 Airfield

Introduction

The most important piece of infrastructure at the airport is the airfield and more specifically the aircraft movement areas (runways, taxiways and aprons). The airfield also includes many ancillary pieces of infrastructure that are critical to the operation of the aircraft movement areas, including navigation systems and service roads. This chapter of the Master Plan provides an overview of the existing airfield facilities and the proposed improvements that will take YYJ to 2042.

AIRFIELD

Existing Airfield Facilities

Runways

The airfield includes three intersecting runways, the predominant runway being 09/27. Runway usage data from 2019, the last pre-pandemic year for which data is available, was analyzed, which highlighted the vast majority of aircraft movements occur on Runway 09/27.

There are currently no declared Runway End Safety Areas (RESAs). RESAs will be need to be constructed/declared for all in-service runways, including Runway 09-27, by the end of 2024 in order to comply with new Transport Canada requirements.

Pavements are classified in relation to the Aircraft Classification Number (ACN) to Pavement Classification Number (PCN) Ratio. The ACN expresses the effect of a specific aircraft on a nominated pavement for a specified standard subgrade strength. The PCN expresses the bearing strength of a pavement for unrestricted movements and is determined from the pavement CBR of the subgrade, design wheel load and pavement thickness.

Any aircraft with an ACN equal to or less than the published PCN of a runway can operate on an unrestricted basis subject to tire pressure constraints. Any aircraft with an ACN greater than the PCN may still operate with a pavement concession issued by the aerodrome. The aerodrome may potentially issue a concession for tire pressure.

Existing Airfield Facilities

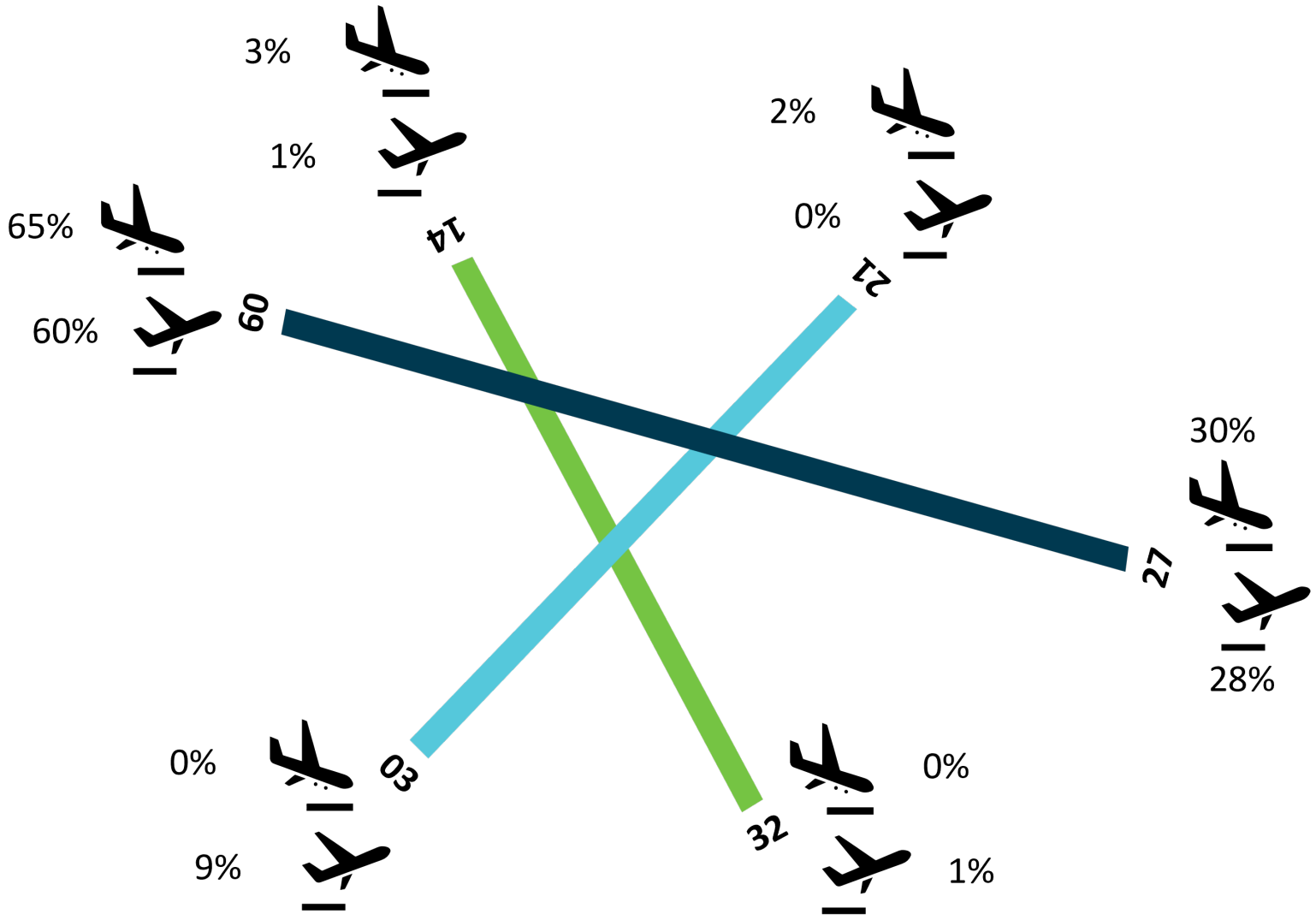
Runway Critical Features

Runway	09	27	03	21	14	32
Runway Environment	AGN V	AGN V	AGN IIIA	AGN IIIA	AGN IIIA	AGN IIIA
Length	2,133m (6,998ft)	2,133m (6,998ft)	1,532.2m (5,027ft)	1,532.2m (5,027ft)	1,524.3m (5,001ft)	1,524.3m (5,001ft)
RESA	No	No	No	No	No	No
Lowest Landing Minima	CAT I	CAT I	Non-instrument	Non-instrument	Non-instrument	Non-instrument
TODA	2432.9m (7982ft)	2432.9m (7982ft)	1262.2m (4141ft)	1104.0m (3622ft)	1524.3m (5001ft)	1394.2m (4574ft)
LDA	2132.9m (6998ft)	2132.9m (6998ft)	1104.0m (3622ft)	1262.2m (4141ft)	1394.2m (4574ft)	1524.3m (5001ft)
PCN	66-103	66-103	21-83	21-83	39-88	39-88

AIRFIELD

Existing Airfield Facilities

Runway Usage - Itinerant Movements



Existing Airfield Facilities

Taxiways

The taxiway system at YYJ is made up of 11 designated taxiways, A, B, C, D, E, G, K, M, N, S and W. Taxiway E runs parallel with the primary Runway 09-27 and meets TP312 5th Edition separation requirements for a precision approach runway. Taxiway G and K are parallel to Runway 14-32. Taxiway B, Runway 03-21, Taxiway G and Taxiway E serve as the primary access between Runway 09 and the terminal building. Taxiway W, E, S, and A, serve as primary access for aircraft from Runway 27 to the terminal building. Taxiway A, G, K, and S provide access and egress from Runway 14-32. Taxiway M, N, B and C provide access and egress from Runway 03-21. Taxiway M connects between Runways 14 and 21.

Aprons

There are four designated aircraft apron areas at YYJ. Apron IV is the main commercial apron serving the air terminal building, with 10 contact gate parking positions (depending on the size of the aircraft). Apron III serves cargo, itinerant, manufacturing and flight school operators and their associated aircraft. Apron II serves the FedEx and Pacific Sky Charters. Apron I only serves the Department of National Defence and the Canadian Coast Guard, when necessary.

Apron IV also features three remote parking positions for aircraft that are also used for de-icing. The de-icing operation can use the three positions in a flow-through manner for greater efficiency. There are another 3 remote parking positions that are not used for de-icing.

AIRFIELD

Existing Airfield Facilities

Taxiway Critical Features

Taxiway	A	B	C	D	E	G	K	M	N	S	W
Code	AGN V	AGN V	AGN IIIB	AGN V	AGN V	AGN V	AGN II	AGN I	AGN IIIB	AGN V	AGN V
Width	23m	23m	23m	23m	23m	23m	14m	8m	23m	23m	23m
PCN	72	66	29	51	57-103	21-83	23-53	21-29	16	57-72	57

Apron Critical Features

Apron	I (DND)	II (West)	III (East)	IV (Air Terminal Building)
Dimensions	185m x 316m	197m x 528m	51m x 466m	303m x 560m
PCN	50-68	12-29	24-83	19-97

Existing Airfield Facilities

Visual Aids and Navigation Systems

YYJ has the following existing lighting visual aids associated with each runway:

Runway 03-21

- Runway Edge Lights (medium intensity)
- Runway Threshold Lights (each end)
- Runway End Lights (each end)
- Runway Guard Lights (intersection of Runway 03/21 and 09/27)

Runway 09-27

- Runway Edge Lights (high intensity)
- Approach Lights 09 (ODALS)
- Approach Lights 27 (SSALR)
- Visual Approach Slope Indicator (PAPI each runway approach)
- Runway Threshold Lights (each end)
- Runway End Lights (each end)

Runway 14-32

- Runway Edge Lights (medium intensity)
- Approach Lights 14 (ODALS)
- Visual Approach Slope Indicator (PAPI each runway approach)
- Runway Threshold Lights (each end)
- Runway End Lights (each end)

Another constraint on airport property is the required protection of telecommunications and electronic systems. Transport Canada provides guidelines on these restrictions in TP1247E Land Use in the Vicinity of Airports.

The following are some key protection areas that apply to YYJ:

ILS LOCALIZER (at each end of RWY 09/27)

- Critical Area (CA) 125m x 300m
- Building Restricted Areas (BRA)*

ILS GLIDEPATH (adjacent each threshold of RWY 09/27)

- Field Monitor Critical Area (FMCA) 30m x 90m
- Critical Area (CA) 125m x 250m
- Sensitive Area (SA)*

DME PROTECTION AREAS

- Area A - 150m radius
- Area B - 3,000m radius

NDB PROTECTION AREAS

- Area A - 200m radius
- Area B - 1,000m radius

*Refer YYJ AOM drawing '2020 A.O.M. - Appendix H' for protection area size.

AIRFIELD

Stand Demand

Stand demand is the number of parking positions required at the terminal building to accommodate the daily flight schedule. The approach used to determine stand demand was to benchmark other Canadian airports and also build design day flight schedules for the planning years.

For the design day flight schedule, a baseline schedule is selected from historical data. The day selected as the baseline schedule was the 95th percentile day which represents a busy day but not the absolute busiest day. This schedule is then built up to the future years (2027, 2032 and 2042) based upon forecast busy hour passengers and expected daily passengers. The benchmarking projection establishes a linear trend line for all data points and rounding is applied for the planning years.

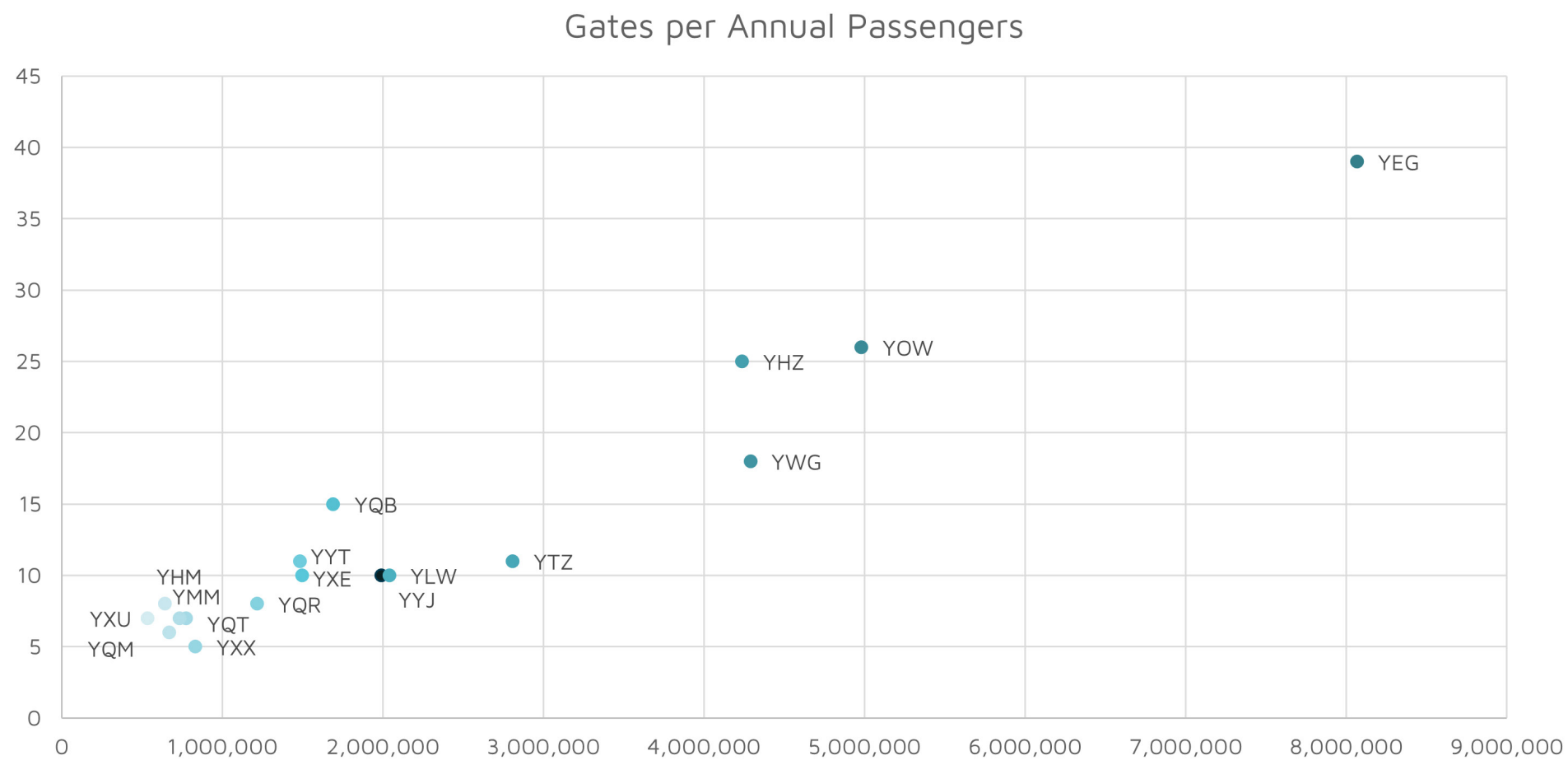
Benchmarking demonstrates that YYJ could see a requirement of up to 15 contact stands by 2042, while the design day flight schedule build demonstrated a requirement of 12 contact stands by 2042. The design day flight schedules reflect the dynamic nature of the fleet mix, which is expected to see the number of passengers per movement grow over the next 20 years. This would in turn reduce the growth in aircraft movements. As such, while there may be less growth in stand demand, existing and new stands will be required to park larger aircraft.

Contact stands are considered those with direct access to the terminal by boarding bridge or by ground loading.

Stand Demand Approach	Contact Stand Requirement			
	2022	2027	2032	2042
Benchmarking Canadian Airports	10	12	13	15
Design Day Flight Schedules	10	11	11	12

Stand Demand

Contact Stands per Annual Passengers (Canadian Airports -2018)



AIRFIELD

Innovation

The airfield operational area is large and relies on numerous technologies. The technological opportunities to improve efficiency, safety and security are great. This section explores a few technologies that could be a part of future YYJ operations.

NAVIGATION SYSTEMS USING THE GLOBAL POSITIONING SYSTEM

The Global Positioning System (GPS) and its Global Navigation Satellite System (GNSS) have long been identified as a possible aircraft navigation system support aid due to the limitations of existing Instrument Landing System (ILS) technology. GPS based systems have many potential applications on the airfield that may impact existing operations and even infrastructure planning. One example application is Ground Based Augmentation Systems (GBAS). GBAS uses GNSS to provide precision aircraft guidance in the air. It is intended as a replacement to ILS that will not have the same ground infrastructure requirements. GBAS would open up land currently used by ILS equipment for other airfield uses (e.g. taxiways).

ELECTRIC VEHICLES/GROUND SERVICE EQUIPMENT

Electrification of vehicles is a focus of many airports, ground service providers and airlines around the world. The transition to Electric Vehciles (EV) will continue over the planning horizon of the Master Plan as operators and YYJ work towards sustainability targets. The obvious infrastructure implication will be the increasing need for charging facilities and getting power to these locations. Detailed planning and consultation with EV operators is required to achieve the optimum outcome - realizing the benefit of reduced emissions.

ELECTRIC AIRCRAFT

Electric aircraft technology is currently under development. The first certified electric aircraft will be smaller aircraft. For example, Harbour Air, in Vancouver, are currently working on the development of the first certified electric de Havilland Beaver seaplane. The "eBeaver" is a 6 seat aircraft. This technology will continue to be refined and will eventually result in some electric aircraft operating at commercial airports like YYJ. Similar to EVs, there will be charging facilities needed to support the operation of electric aircraft.

SUSTAINABLE AVIATION FUELS (SAF)

SAFs in the category of biofuels are made from food waste, waste cooking oil and residue feedstock and are estimated to generate ~80% less carbon emissions over their life-cycle in comparison to kerosene. Due to this, the International Air Transport Association (IATA) has identified SAF as the primary development in the path towards decarbonization for the aviation industry. Businesses, airlines, and governments have spent billions of dollars to develop the fuel source and supply chain. Airports are expected to play a role through the support of supply chains, storage and fueling.

Innovation

CANADIAN COUNCIL FOR SUSTAINABLE AVIATION FUELS (C-SAF)

The Canadian Council for Sustainable Aviation Fuels (C-SAF) was launched in February 2022. This not-for-profit organization recognizes the growing global demand for SAF, and the gap in the Canadian market. C-SAF brings together major players in the aerospace supply chain to accelerate the deployment of SAF. Membership offers connections to other Canadian airports, international airlines, research centers and fuel providers.

HYDROGEN

Globally, hydrogen is being developed as an important contributor to the international goal of net zero by 2050. It is considered a low emissions, multi-purpose, high-torque fuel source, and Canada is positioning itself as a global supplier. British Columbia and Alberta are already considered Canadian hydrogen hubs.

For the aviation industry, companies like ZeroAvia expect to have short haul hydrogen and hybrid aircraft ready for operation over the next five years. The ICAO suggests that large commercial carriers powered by hydrogen (eg Flying-V) will take another 20-30 years to be common-place. Airports need to be prepared in the short-term with new hydrogen fueling. In the long-term, the implementation of large-scale carriers may require new terminal and bridging infrastructure.

URBAN AIR MOBILITY (UAM)

Autonomous Vehicles are expected to become more reliable over the next 20 years for both people and cargo transportation. As the technology continues to advance, airports may need to work with community members, transportation companies and regulators to understand what the impact will be on airport safety, access and parking revenue. Multi-stop, self-driving delivery vehicles can already carry as much as 2000 pounds over a 160–300-mile run. Last mile delivery vehicles, autonomous technologies with long ranges may be used to for the transportation of goods from airport warehouses. Airports can work together with cargo partners to support efficient warehousing.

UAM are also referred to as electric vertical take-off and landing aircraft (eVTOLs). Currently, UAM offer space for 2-4 passengers. Though the technology is not considered a sustainable mass-transit option, over the next ten years the use of UAM is expected to grow for tourism, specialty events, and the last-mile transfer of priority passengers. YYJ may be uniquely attractive to this industry due to the location on Vancouver Island, and the proximity to resort and residential surrounding islands. Preparation for UAM would require both new infrastructure and the close collaboration with Nav Canada and government identities to identify safe pathways.

AIRFIELD

Airfield Development

Runways

RUNWAY LENGTH

The length of Runway 09/27 is sufficient for the current and forecasted flights within Canada and the rest of North America. With the longer-term potential of direct international flights to Europe, with heavier aircraft or wide-body aircraft, there could be resulting flight weight restrictions depending on aircraft size and destinations. Aircraft such as the Boeing 787 were considered for the Master Plan horizon. Results of a study completed by Boeing prior to the Master Plan demonstrated that the current length of Runway 09/27 (approx. 7,000ft) is sufficient for flights to likely European hubs such as London, Amsterdam and Frankfurt. A 180 metre extension at the western end of Runway 09/27 is proposed within the Master Plan to reduce load restrictions and increase the safety buffer of the runway for the potential of future international services.

RUNWAY CAPACITY

Runway capacity is also sufficient for the projected demand. Historical data of Itinerant aircraft movements highlights that busy hour movements are actually decreasing for Itinerant and Local movements at YYJ. For Itinerant movements, which includes scheduled movements using the terminal, this results from upgauging of aircraft as demand grows. This trend is expected to continue throughout the planning horizon of this Master Plan.

Runway capacity was recently increased with the extension of Taxiway E. This eliminated the need for backtracking of aircraft and has resulted in a runway capacity of approximately **44 movements per hour**.

Runway 09/27 was highlighted to be the primary runway used and it is clear that with the recent runway capacity increase and a downward trend of busy hour aircraft movements that runway capacity will not be a concern going forward. Benchmarking other Canadian airports was also completed to validate this conclusion. The Canadian airports with a parallel runway system have more 16 million annual passengers. The largest two runway system in Canada, in terms of annual passengers, is Edmonton International Airport (YEG), which processed over 8 million passengers in 2018.

RUNWAY RELIABILITY

The Master Plan is proposing the eventual closure of Runway 03/21 to provide additional area for the terminal and apron to expand. A runway reliability study (analyzing wind speed and direction) was conducted in 2019 which demonstrated that Runway 09/27 and 14/32 would provide 98% reliability for a cross-wind tolerance of 10kts (used for smaller general aviation aircraft).

Airfield Development

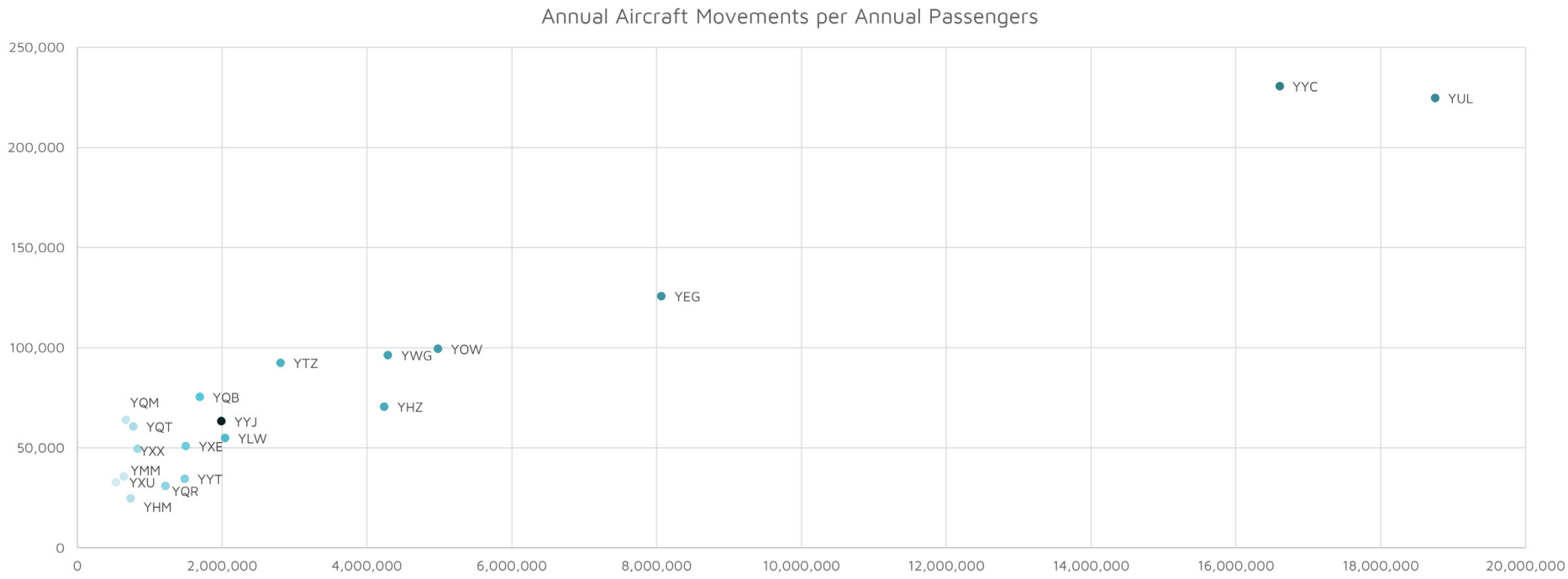
Runway End Safety Area

Runway End Safety Areas (RESA) are cleared and graded areas extending from the end of a runway strip to reduce the severity of damage to an aeroplane in the event of a runway undershoot or overrun. Transport Canada recently amended the requirement for RESA length to be a minimum of 150m in length for airports handling more than 325,000 annual passengers (https://gazette.gc.ca/rp-pr/p1/2020/2020-03-07/html/reg3-eng.html). It is recommended that a 150m length RESAs be developed on Runway 09-27 by 2024 as required by Transport Canada.

AIRFIELD

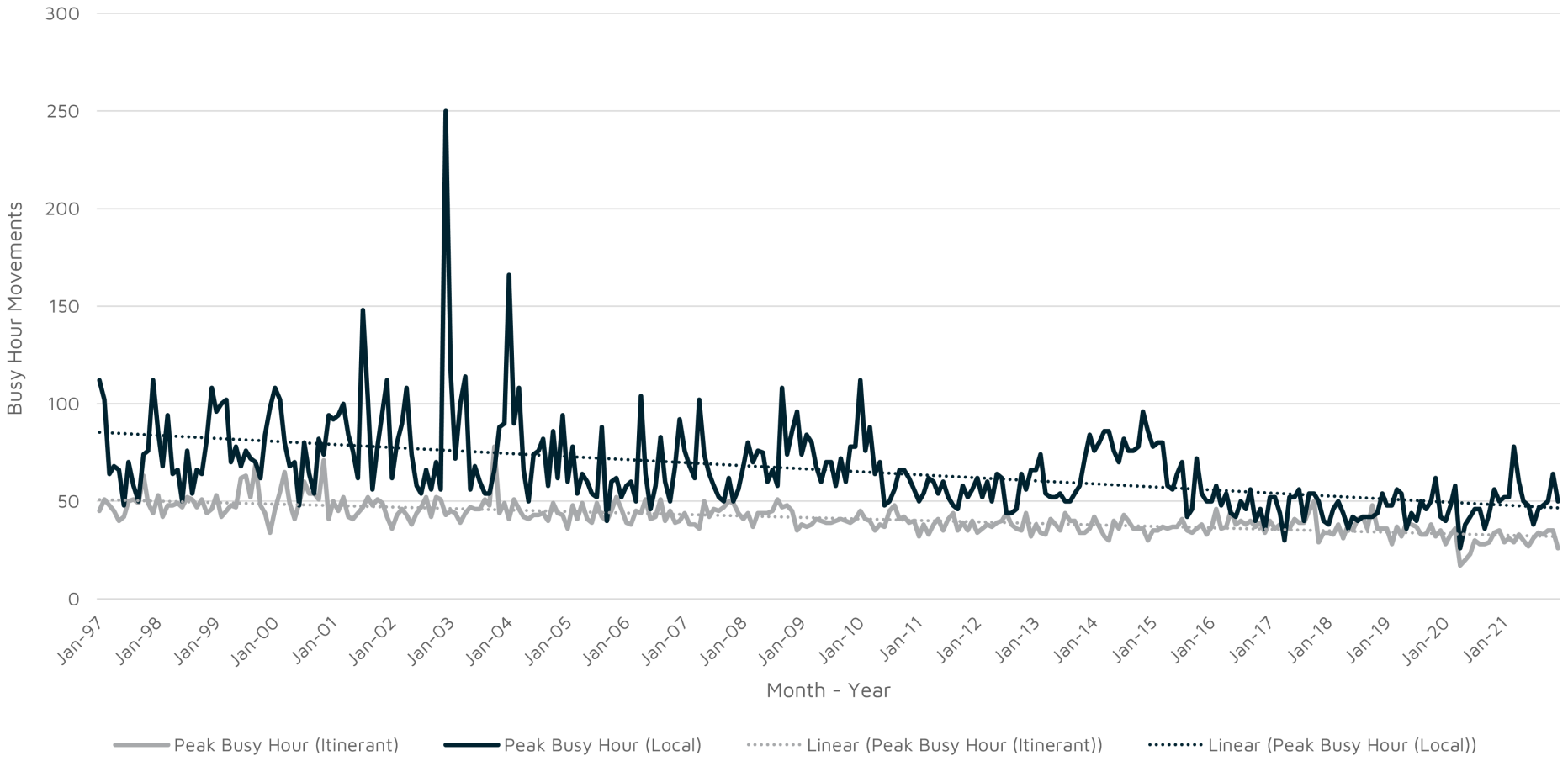
Airfield Development

Runway Systems (Canadian Airports 2018)



Airfield Development

Busy Hour Movements



AIRFIELD

Airfield Development

Runway Reliability

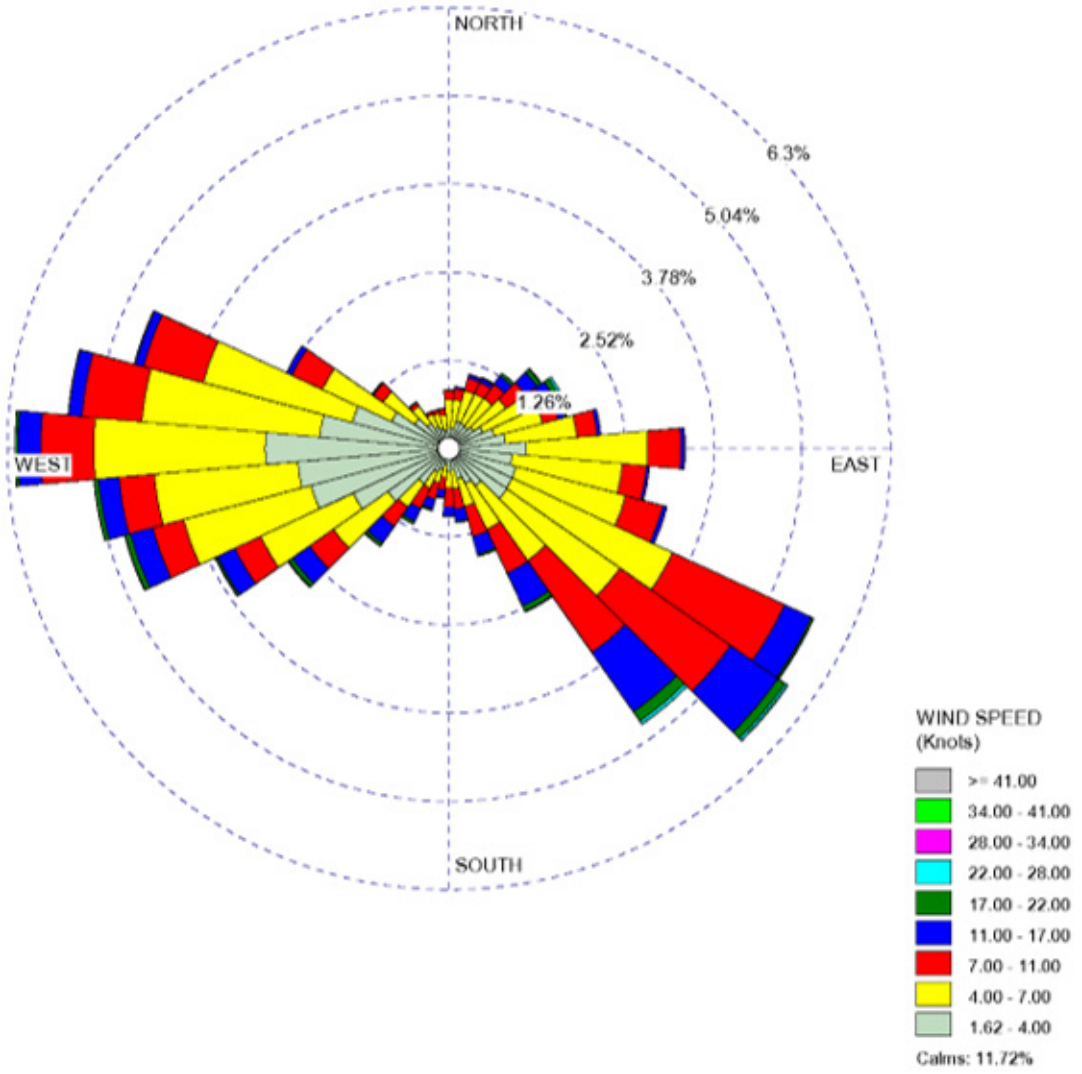
WIND ROSE

Wind data was compiled from Environment Canada's weather station located on the airport. Analyzing this data is the first step in determining the reliability of the runways.

Wind data features:

- Years analyzed: 2012 - 2021
- Hourly wind records were analyzed (wind speed / direction)
- Source: http://climate.weather.gc.ca/

The colours represent the wind speed (knots) and the size of the bars represent the frequency of wind direction and speed. The wind data for YYJ demonstrates that the prevailing winds are from the West and South-East.



Airfield Development

Runway Reliability

CROSS-WINDS TOLERANCE

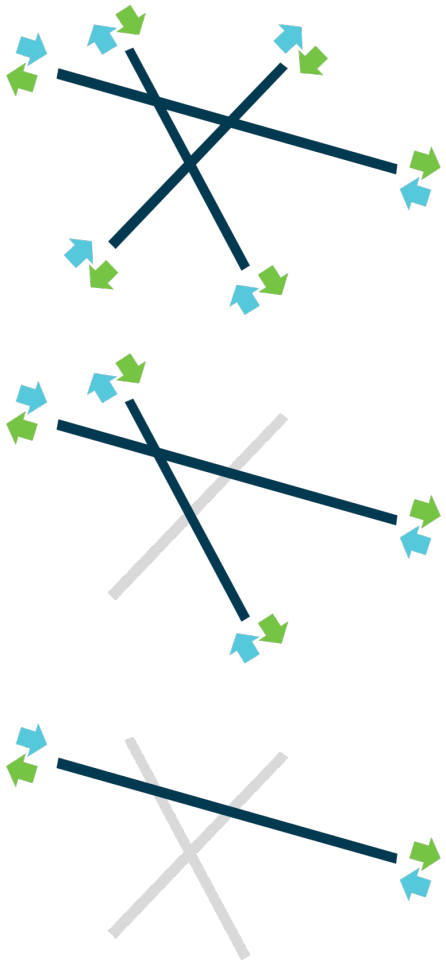
Tolerance of aircraft to cross-winds will vary based on the aircraft size and the pilot experience.

ICAO standards have been used to determine runway reliability. It is assumed that landing or take-off of an aircraft is precluded when the cross-wind component exceeds:

- 20kts (aircraft field length > 1,500m)
- 13kts (aircraft field length 1,200-1,500m)
- 10kts (aircraft field length < 1,200m)

The wind data for YYJ was used to determine the runway reliability of the scenarios presented in the adjacent graphic. Acceptable runway reliability is defined by Transport Canada as greater than 95%.

All scenarios provide sufficient reliability for both commercial and general aviation operations.



	Scenario 1 Reliability
X-Wind tolerance	**09/27 14/32 03/21**
20 kts	100.00%
13 kts	99.99%
10 kts	99.94%

	Scenario 2 Reliability
X-Wind tolerance	**09/27 14/32**
20 kts	99.96%
13 kts	99.17%
10 kts	97.97%

	Scenario 3 Reliability
X-Wind tolerance	**09/27**
20 kts	99.92%
13 kts	98.50%
10 kts	96.49%

AIRFIELD

Airfield Development

Taxiways

To facilitate expansion of passenger terminal building, Runway 03/21 will ultimately be closed and converted to a taxiway. The terminal expansion will include additional taxiways around the new terminal concourse and expansion of remote parking positions that are also used for de-icing of aircraft.

Other improvements to the taxiway system include:

- Additional taxiway filets to enable large aircraft turning radius thereby enhancing airfield operational efficiency
- North parallel taxiway linking Taxiway K and N providing better runway access for future airside commercial lots

Apron

As part of the increased passenger and commercial traffic forecasted over the Master Plan horizon, apron area for additional aircraft stands is needed. Apron IV will be expanded to the east and west of the existing building to include area for up to 11 new commercial aircraft stands. Demand requirements may not require all contact stands to be developed with the Master Plan horizon. The apron will also introduce a new Multi Aircraft Ramp System (MARS) stand that can accommodate either one AGN V or two AGN III aircraft to provide greater flexibility in contact stand usage.

The increased passenger and aircraft traffic over the planning horizon will also increase the demand for aircraft de-icing operations during the winter months. The existing de-icing apron has a combined function of de-icing facility and remote aircraft parking area. Incremental growth of additional remote parking positions will provide greater capacity to de-ice aircraft.

Airfield Development

Cargo Village

E-commerce has driven growth in cargo in recent years as more people make purchases online. The COVID-19 pandemic as exacerbated this trend, so much so that commercial airlines have placed increased focus on cargo operations. To support the expected increase in cargo operations, provision for cargo operations has been identified under two categories.

Belly cargo is carried by commercial airlines in the cargo hold of passenger aircraft. Ideally, this is stored in a location that has convenient access to the passenger terminal building to support efficient operations. A reserve area has been identified to the east of the terminal building.

Freighters are dedicated cargo aircraft, which are less common at YYJ. With ongoing growth in cargo there may be a need to develop dedicated facilities to handle these aircraft and the logistical infrastructure they need to operate successfully. The following preferences were applied when planning the cargo facilities handling freighters:

- Access to existing roadway system
- Not in close proximity to residential areas

The Commercial Development section of the Master Plan identifies some potential areas for this kind of cargo development.

Visual Aids and Navigation Systems

Runway 09-27 is classified as a Category I (CAT I) precision approach runway and is supported by a non-precision omni-directional approach lighting system (ODALS) on Runway 09 and precision simplified short approach lighting system with runway alignment indicator lights (SSALR) on Runway 27.

The Master Plan protects for upgrading the existing Runway 09 approach lighting system from a non-precision system (ODALS) to a precision system (SSALR).

A SSALR is 720m in length, extended along the runway centreline from the runway end. Due to the insufficient space between the runway end and Patricia Bay, part of the approach lighting system will extend beyond the current airport boundary into Patricia Bay.

AIRFIELD

Airfield Development

Development Staging

The project directives outlined that the airport authority will be guided by responsible steward principles. The airfield development must ensure safe operation of aircraft as the highest priority. YYJ completed a detailed Terminal Development Plan in 2019 that informed the details of each Apron IV expansion project.

2023-2032

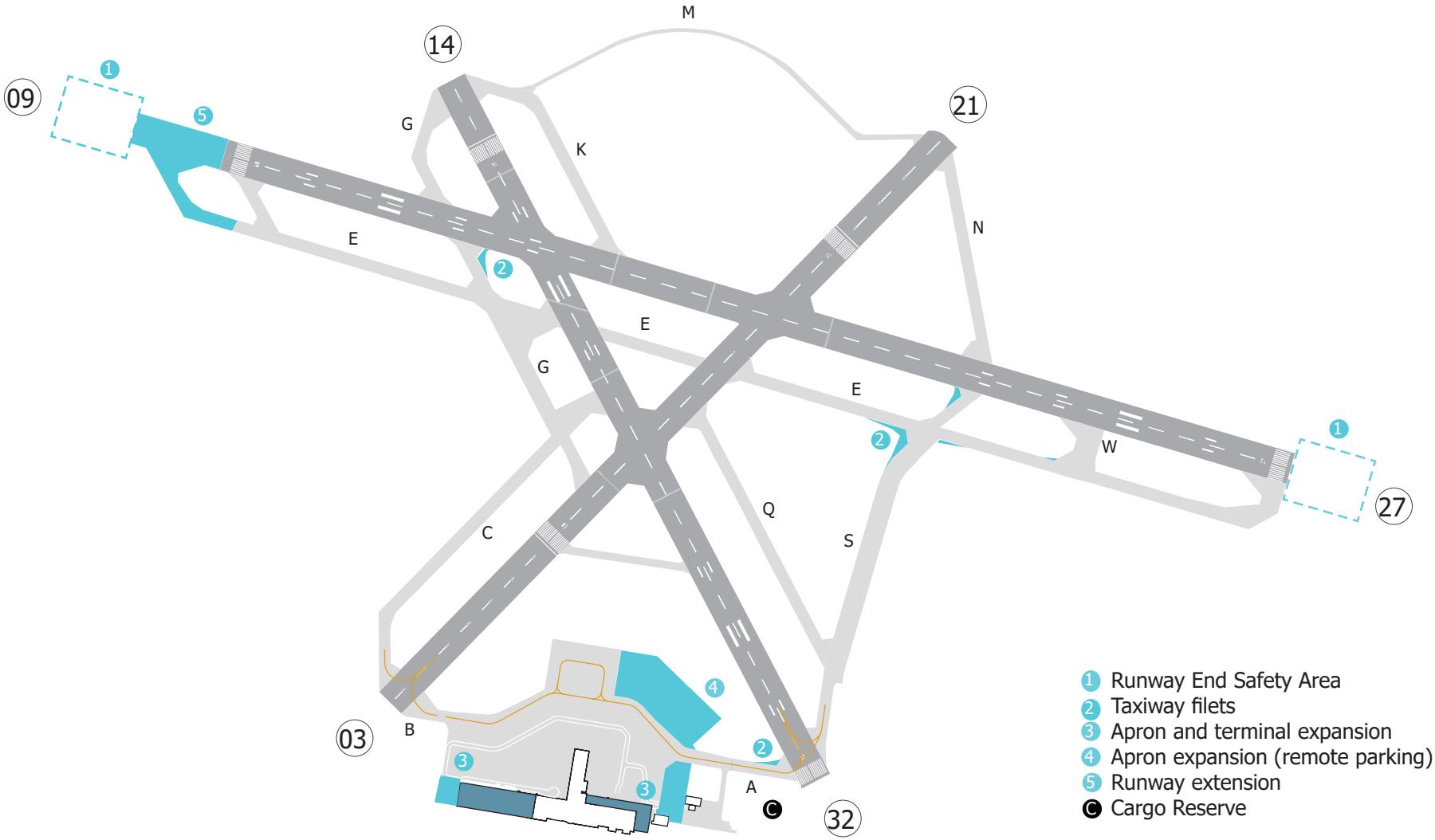
- Runway End Safety Areas (RESAs) will be developed on the primary runway (Runway 09/27).
- Upgrade the existing 09 approach lighting from its current non-precision Omnidirectional Approach Lighting System (ODALS) to a CAT I precision Simplified Short Approach Lighting System with Runway Alignment Indicator Lights (SSALR)
- Taxiway filets will enable larger aircraft to use more taxiway intersections.
- Apron IV expansion will be driven by the terminal development and contact stand requirements.
- Remote aircraft parking on Apron IV will provide greater flexibility for contact stand use and de-icing.
- CAT I approach lighting for Runway 09.
- Runway 09/27 extension would provide a greater safety buffer for long haul flights to potential future international destinations

2033-2042

- Apron IV expansion will be driven by the terminal development and contact stand requirements. This will also result in the closure of Runway 03/21.
- Remote aircraft parking on Apron IV will provide greater flexibility for contact stand use and de-icing.
- A northern taxiway, parallel to Runway 09/27, will provide greater airfield capacity and will improve the access to future airside commercial lots in the north.

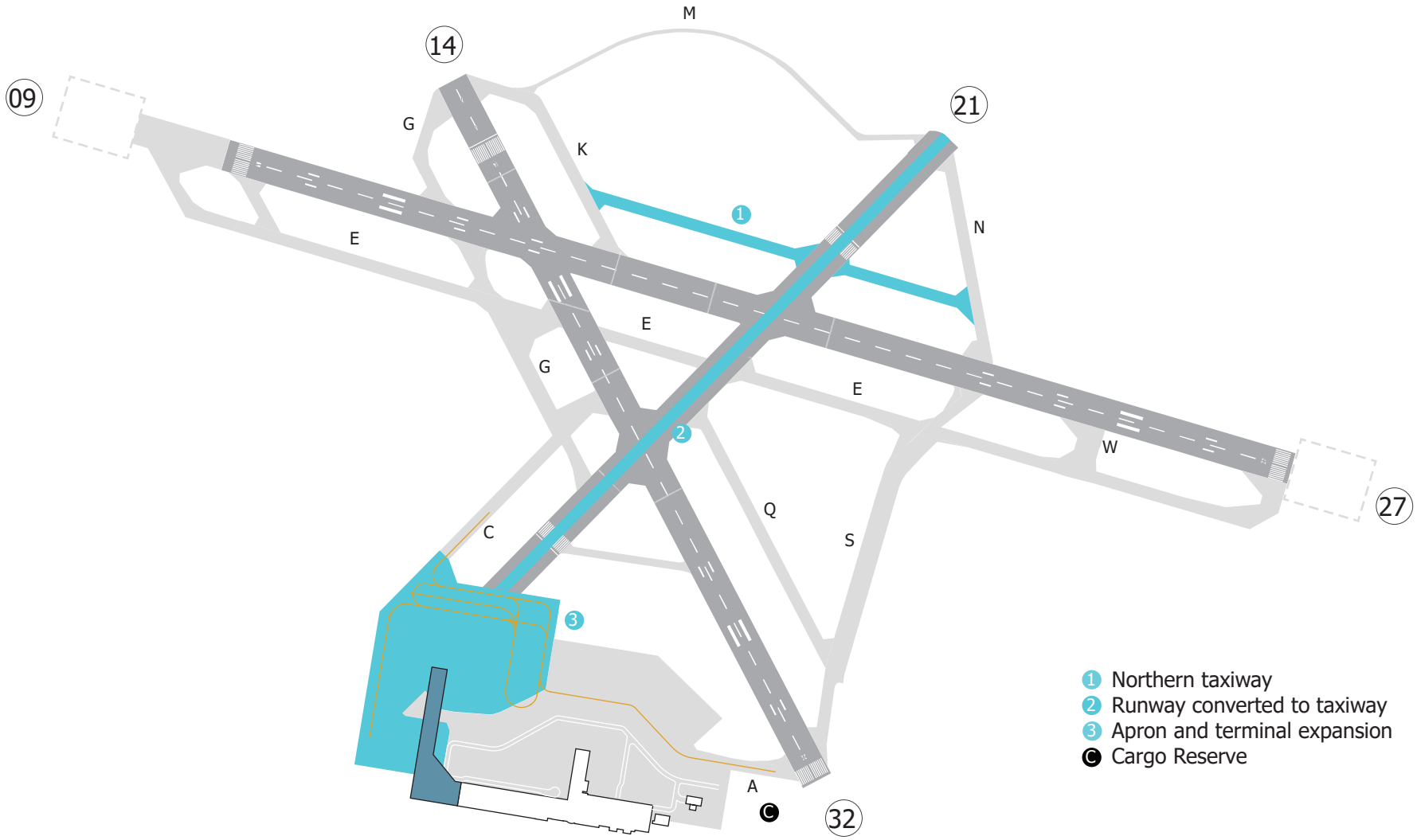
AIRFIELD

2023-2032



AIRFIELD

2033-2042



04 Terminal

TERMINAL

Introduction

The terminal building is the main interface for passengers at an airport. It provides the link between the aircraft operating areas and the groundside elements of an airport. The terminal is a very important piece of infrastructure at the airport as it consistent of many processors that enable conventional air travel. This chapter of the Master Plan provides an overview of the existing terminal facilities/processors and the proposed improvements that will take YYJ to 2042.

Existing Terminal Facilities

The existing terminal building was originally built in 1964 and has been expanded multiple times to accommodate growth in operations. Some of the larger projects include:

- 1964: Initial construction of existing terminal building
- 1987: Significant additions to East and West
- 1997: Airport transfered from Transport Canada to Victoria Airport Authority (1997)
- 2002: West and North expansion including lower holdroom, International and Domestic arrivals areas
- 2006: East expansion including departures lounge, airline offices and hold bag screening
- 2012: Vertical circulation, new concession and expansion of pre-board screening from two to four lanes
- 2016: Outbound baggage system upgrades
- 2020: Lower holdroom expansion

Existing Terminal Facilities

CHECK-IN HALL

The check-in hall provides facilities for passengers to check-in for their flight and drop checked bags before proceeding through security. The hall provides 35 inter-operable counters (common-use terminal equipment) with some operators also utilizing kiosks for self-service check-in. Airline offices are located behind check-in counters. At the time of this study there are 8 active airlines (Air Canada, Air North, Alaska, Flair, Lynx, Pacific Coastal, Swoop, WestJet) that operate out of the terminal building.

BAG MAKE-UP AND SCREENING

A bag conveyor system runs the length of the back wall of the check-in hall (behind the conventional counters) and oversize baggage induction is located in the middle of the check-in counters. Screening of baggage (conducted by the Canadian Air Transport Security Authority (CATSA)) occurs back of house and feeds two bag make-up belts which are shared by all service providers. The bag make-up area includes limited office space for service providers.

PRE-BOARD SCREENING (PBS)

Pre-Board Screening (PBS), operated by CATSA, is where all departure passengers go through security screening before boarding a flight. The area currently has four passenger screening lanes, associated queuing space and offices for staff. Additionally, CATSA provides 2 dedicated screening areas for staff only and 1 for vehicles. These screening locations are separated from PBS.

HOLDROOM

After PBS, passengers enter the secure holdroom. The terminal has a lower and upper holdroom. The ground loaded flights, where passengers walk on the apron to access their aircraft, board via the lower holdroom. The boarding bridge loaded flights board via the upper holdroom.The holdrooms features passenger seating, boarding desks and washrooms. A range of concessions are also available in lower holdroom, including news, gift, food and beverage stores.The most recent expansion of the terminal was completed in 2020 and was primarily focussed on expanding the lower holdroom boarding gates, seating areas, washrooms and concessions.

TERMINAL

Existing Terminal Facilities

BAG CLAIM

The terminal building has three flatbed bag reclaim units, one dedicated for domestic flights, one dedicated for international flights and one that can be used for domestic or international flights. The effective presentation length of the reclaim units range from 46-50m. Each bag belt has an associated back of house presentation length that is enclosed and only accessible to service providers. There are two oversize baggage collection points.

INTERNATIONAL FACILITIES

The Canada Border Services Agency (CBSA) is located on the ground floor of the terminal building and is accessed via the upper holdroom for bridged flights and via the apron for ground loaded flights. The facility includes bag reclaim, a primary inspection lane (PIL), and secondary screening facilities. The PIL area currently has four service counters and associated queuing space.

OTHER FUNCTIONS

The terminal also includes office space for various operators and includes airport authority offices (on the second floor). Four car rental operators service YYJ, which are located in the arrivals hall of the terminal.

Existing Terminal Facilities

Existing Constraints

The following are known constraints within the terminal building:

- Check-in: the number of airlines operating at YYJ has led to virtually all counters being used with little or no room for additional airlines or organic growth of existing airlines.
- Bag make-up: with only two belts, the service provider is required to constantly load bag carts in a constrained area. The current belt configuration also restricts operations to a maximum of three service providers.
- PBS: limited queue area and processing capacity results in queues extending beyond the allocated space. The limited space available cannot accommodate additional processing lanes nor enhanced processing equipment, significantly restricting future growth.
- CBSA: queuing for PIL extends into the bag claim area. Also, CBSA PIL is typically located prior to bag claim which is not feasible in the existing terminal. The current space is also too small to efficiently leverage new technologies to improve the throughput of this key processor.
- Bag Claim: some congestion currently occurs due to the number of belts available. While the bag claim belts have adequate capacity for the mid-term, the space they are in is too small to manage the volume of passengers and general public using the space concurrently.
- Offices: additional space is very limited with little to no room for existing tenant growth or new tenants.

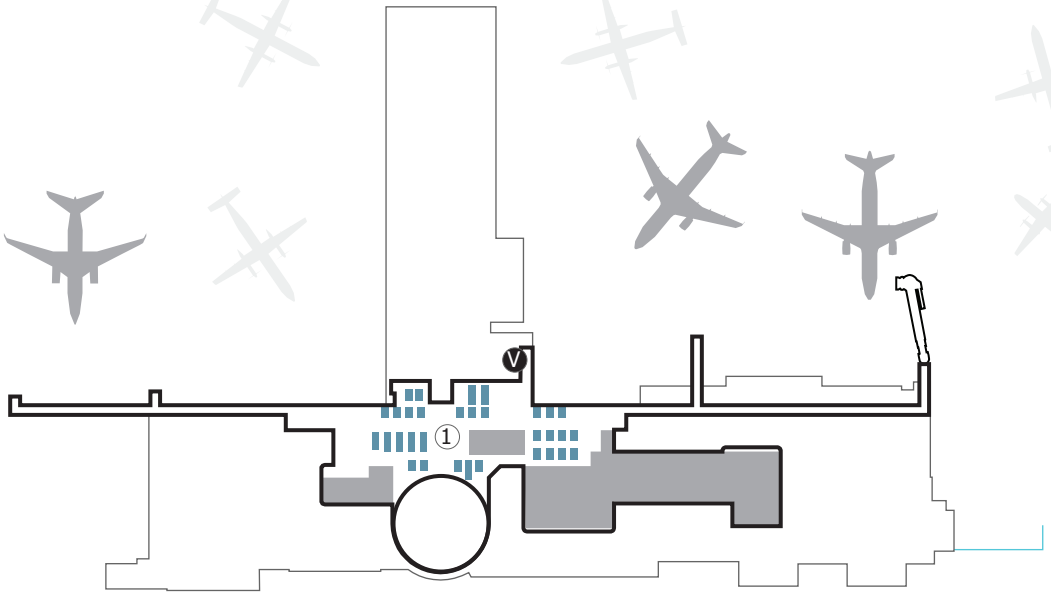
TERMINAL

Existing Terminal Layout (Level 1)

① Check-In Hall
② Pre-Board Screening
③ Holdroom
④ CBSA
⑤ Bag Make-up and Screening
⑥ Bag Claim
⑦ Arrivals Hall
Ⓥ Vertical Core

Existing Terminal Layout (Level 2)

① Departure Lounge
② Holdroom
Ⓥ Vertical Core



TERMINAL

Forecast Demand

The benchmarking of Canadian airport and the design day flight schedules were used to determine the required number of contact stands at the terminal building.

Stand Demand Approach	2022	2027	2032	2042
Benchmarking Canadian Airports	10	12	13	15
Design Day Flight Schedule	10	11	11	12

NOTE: each stand can support a certain maximum size aircraft.

Each functional area is capable of handling a certain number of passengers. These facilities are typically planned based on the anticipated busy hour demand. The following busy hours were derived from the planning year schedules:

Passenger Demand	Forecast Busy Hour Passengers			
	2022	2027	2032	2042
Departures	430	542	576	697
Arrivals	433	505	541	661
Arrivals (INT)	248	246	314	363

Terminal Requirements

Terminal requirements are determined based on assessment of the passenger processors and functional areas available. A typical planning approach was employed to determine functional requirements using optimum level of service as defined by the International Air Transport Association (IATA). Where applicable, operational practices and their impact on system capacities were taken into account.

It is assumed that new technologies could be adopted in the future in the check-in hall (self-serve operation), at PBS (CATSA Plus operation) and in the International/CBSA area (PIK operation). The terminal requirements are provided for both the existing operation and the potential new technology in each of these areas.

TERMINAL

Terminal Requirements

The following processor requirements were determined based on peak hour demand derived from planning year forecasts:

Area	Existing Processors	Forecast Processor Requirements			
		2022	2027	2032	2042
Aircraft Contact Stands	10	10	11-12	11-13	12-15
Existing Check-in Operation					
Kiosks	18	14	16	18	20
Check-in Counters (without ABD)	35	34	42	44	46
Self-Serve Check-in Operation					
Kiosks	18	14	16	18	20
Automated Bag Drops (ABD)	0	6	6	6	6
Check-in Counters	35	24	30	30	30
Existing PBS Operation					
PBS Lanes	4	4	4	5	5
CATSA Plus Operation					
PBS Lanes	0	2	2	3	3
Bag Make-up Units	2	3	3	3	3
Lower Holdroom Seats*	404	344	344	344	344
Upper Holdroom Seats*	420	479	718	838	1,077
Existing CBSA Operation					
CBSA Counters	4	3	4	4	5
CBSA PIK Operation					
CBSA PIK	0	6	7	8	8
CBSA Counters	4	2	2	2	2
Domestic Bag Claim Belts	2	2	3	3	3
International Bag Claim Belts	2	1	1	2	2

*Holdroom seating requirements are based on the aircraft contact stand requirements and the design aircraft.

Terminal Requirements

The following processor area requirements were determined based on peak hour demand derived from planning year forecasts:

Area	Existing Area	Forecast Area Requirements (sq. m.)			
		2022	2027	2032	2042
Check-in Hall - Existing Operation	1,270	1,235	1,525	1,595	1,670
Check-in Hall - Self-Serve Operation	N/A	1,195	1,415	1,415	1,415
PBS - Regular Lanes	440	520	520	650	650
PBS - CATSA+ Lanes	N/A	500	500	750	750
Bag Make-up	610	1,730	1,730	1,730	1,730
Lower Holdroom	820	820	820	820	820
Upper Holdroom	940	1,190	1,790	2,085	2,680
CBSA Primary - Existing Operation	190	120	160	160	200
CBSA Primary - PIK Operation	N/A	310	330	355	355
Bag Claim	1,070	1,080	1,445	1,505	1,555
Retail	1,160	1,095	1,460	1,605	1,980
Arrivals Hall	450	190	220	235	285

TERMINAL

Innovation

The passenger terminal building includes a number of processors that are necessary for passenger facilitation and security. The technological opportunities to improve efficiency, safety and security are great. This section explores a few technologies that could be a part of future YYJ operations.

CATSA PLUS LANES AND BEYOND

Currently operational at larger Canadian airports, these next generation screening lanes improve efficiency and security. It is anticipated that YYJ would feature CATSA Plus lanes in the next 10 years, so it is important that expansion plans accommodate the physical requirements as defined by CATSA.

BIOMETRICS AND SELF-SERVE TECHNOLOGY

Biometric and self-serve technology has been deployed at airports for some time as they provide passenger facilitation and security benefits. Since the COVID-19 pandemic, there has been greater focus on the deployment of this technology due to the ability to provide a touchless experience.

Examples of these technologies are provided below and should be considered in future terminal expansions:

- Self-serve Check-in (kiosks, tablets and automated bag drop units)
- Biometric enabled E-gates for immigration, security and boarding

YEG CATSA Plus

SIN T4 Self-Serve Check-in with Biometric Capability

SYD (Australian Border Force) Biometric "SmartGate"

Terminal Development

CONTACT GATES

5 additional gates will be required to accommodate the forecast demand through 2042. Ultimately this growth will result in the closure of Runway 03-21 between 2032 and 2042. Gate flexibility will be a critical consideration in the longer term to enable transition between international and domestic sector.

CHECK-IN

New technologies such as self-serve check-in will improve efficiency of the check-in hall. However, the deployment of this technology tends to benefit greater passenger volumes than those observed at YYJ today. Area and equipment requirements in the short term will still be determined by the number of airlines operating at YYJ. In recent years, with the increase in ULCCs, the check-in hall has become constrained and will need to expand. In the longer term it is expected that the size of airline operations will better suit the deployment of self-serve check-in technology and efficiencies will be realized, offsetting the need for additional expansion.

BAG MAKE-UP

It is expected that new screening technology will be installed by CATSA within the next 20 years at YYJ, enabling greater throughput. Nonetheless, expansion of bag screening and make-up belts will be required as more flights operate in the busy hour.

PBS

It is expected that new screening technology (CATSA Plus) will be installed by CATSA within the next 10 years at YYJ, enabling greater throughput. This will also result in a requirement for more space as these lanes have a larger footprint compared with conventional screening equipment. Beyond 10 years, we anticipate that more screening lanes will be required to match the busy hour demand.

HOLDROOM

The gate requirement will drive the need for additional seating and boarding areas in the terminal building, which is expected to increase over the planning horizon. The only available area for expansion will be on the upper level of the terminal (boarding bridge gates). Longer term gate additions will require the closure of Runway 03-21. Within the horizon of this Master Plan it is anticipated that an additional concourse will be added to the west of the existing terminal building, while retaining the location of major processors. Concessions and amenities will also grow with the projected demand.

TERMINAL

Terminal Development

BAG CLAIM

Additional bag claim belts will be required to accommodate flights in the busy hour. In order to enable long term growth of bag claim and CBSA, the bag claim area will need to be re-positioned.

INTERNATIONAL

As new international destinations are offered from YYJ it is anticipated that the processing capacity of the CBSA hall will need to increase to meet demand. Opportunities for improving processing capacity through new technology, such as Primary Inspection Kiosks (PIK), will be likely in the next 10 years. Due to the constraints of the existing CBSA area, expansion is planned for in the next 10 years.

OFFICES

As the airport passenger numbers grow there will be a correlated growth in the amount of staff working in the terminal building. This will include the growth of existing tenant staffing and the introduction of new tenants. Since there is no effective space for office growth today, there will need to be short term growth in the office space available in the terminal. Beyond the short term, there will need to be incremental growth of office space over the planning horizon.

Terminal Development

DEVELOPMENT STAGING

The project directives outlined that the airport assets like the terminal should be managed in a financially responsible manner. This can be achieved by continuing to use and incrementally expand the existing terminal. In order to maintain operational continuity in the existing terminal building, the expansion must be achieved over multiple stages. The facility requirements outlined that multiple functional areas require expansion in the short term. Four major projects would be required over the Master Plan. YYJ completed a detailed Terminal Development Plan in 2019 that informed the details of each project.

EASTERN EXPANSION

The eastern expansion would address deficiencies identified under Contact Gates, Check-in Hall, Bag Make-up and Screening and Offices. It would include additional building footprint on Level 1 and 2 of the terminal building and also reconfiguration of existing terminal footprint.

Level 1:

- Expanded check-in hall area within the existing terminal footprint that would displace existing airline offices to create space for additional counters/bag drops.
- New and expanded airline offices directly adjacent to the expanded check-in hall.
- Three new bag make-up units sized to include minimum requirements of a maneuvering lane and a loading lane for baggage carts at each unit. Bag make-up presentation length provided: 26 m (cart loading length only).
- Additional baggage screening capacity.

Level 2:

- One additional holdroom gate with associated seating and boarding area.
- Additional holdroom retail offerings and amenities for passengers.
- Additional landside office space.

This expansion has been planned to ensure retention of the security building and NPS-V that is currently located adjacent to the terminal building.

TERMINAL

Terminal Development

WESTERN EXPANSION

The western expansion would address deficiencies identified under Contact Gates, Bag Claim, International and Offices. It would include additional building footprint on Level 1 and 2 of the terminal building and also reconfiguration of existing terminal footprint.

Level 1:

- Four new bag claim devices in expanded terminal footprint to replace existing three devices. One bag claim unit will have a larger presentation length to handle larger aircraft.
- Additional retail and amenities for passengers.
- Expanded CBSA primary and secondary facilities within the existing terminal footprint. CBSA primary to feature Primary Inspection Kiosks (PIK).
- Relocated car rental counters.
- Additional office space for terminal tenants.
- Basement area for utilities, data rooms, airlines support, and VAA maintenance workshops.

Level 2:

- Two additional holdroom gates with associated seating and boarding area.
- Additional holdroom retail offerings and amenities for passengers.
- Secure corridors and vertical core to enable segregation of inbound international passengers into expanded CBSA area.

CENTRAL EXPANSION

The central expansion would address deficiencies identified under Pre-Board Screening. It would be enabled by the additional building footprint created on Level 1 in the Eastern Expansion.

Level 1:

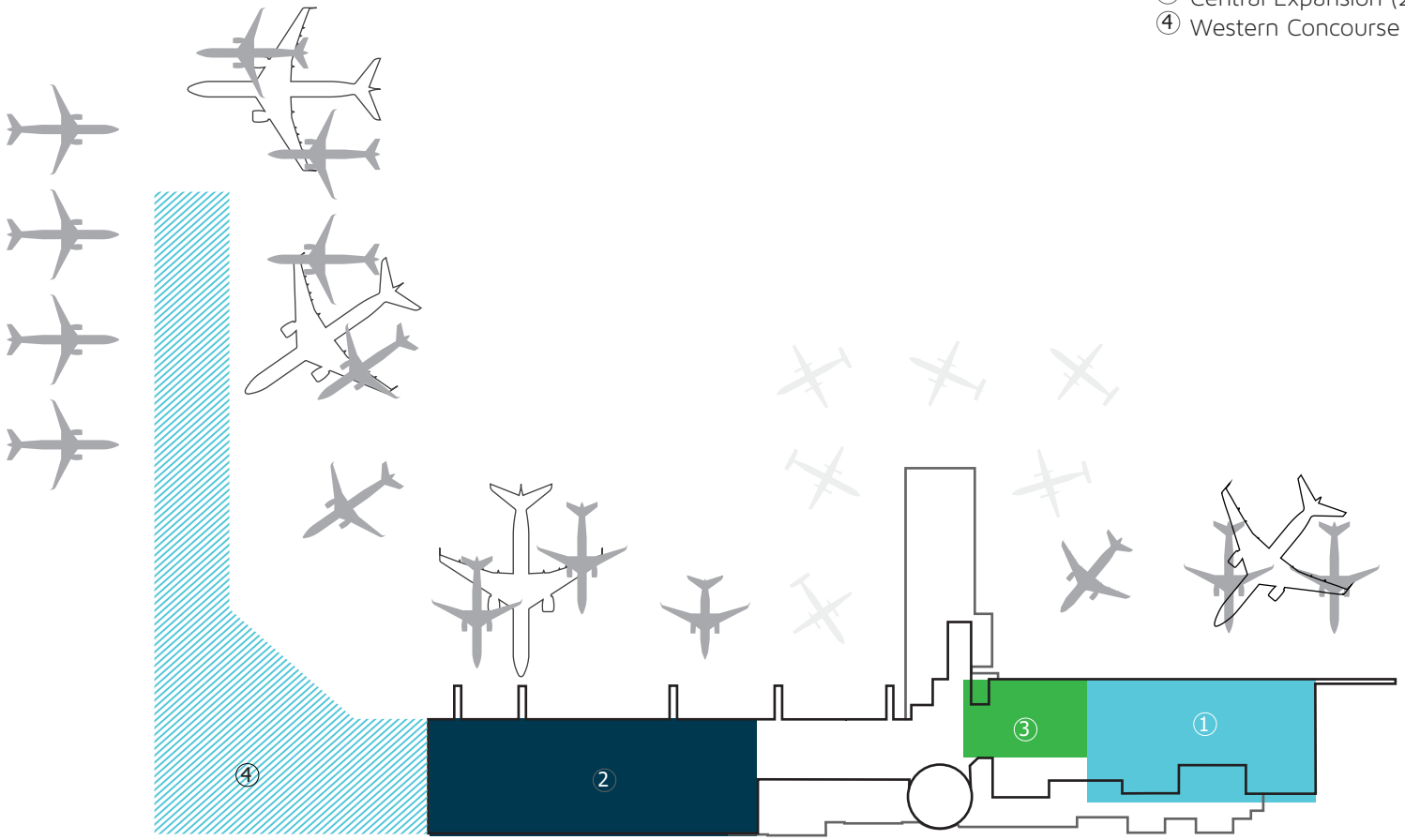
- PBS area rotated and upgraded with CATSA Plus equipment.
- Reconfiguration of existing retail (landside and airside).
- Landside washroom relocated (converted to retail).
- Development of consolidated non-passenger screening to provide airside access for staff and crew.

WESTERN CONCOURSE

The western concourse would address deficiencies identified under Contact Gates. This larger expansion would operate as a concourse still supported by the existing terminal processors such as check-in, bag make-up, PBS, bag claim and CBSA. Detailed layouts were not created as part of the Terminal Development Plan. This expansion could feature up to nine additional contact gates.

Development Staging

Development Stages
① Eastern Expansion (2023-2027)
② Western Expansion (2028-2032)
③ Central Expansion (2023-2027)
④ Western Concourse (2033-2042)

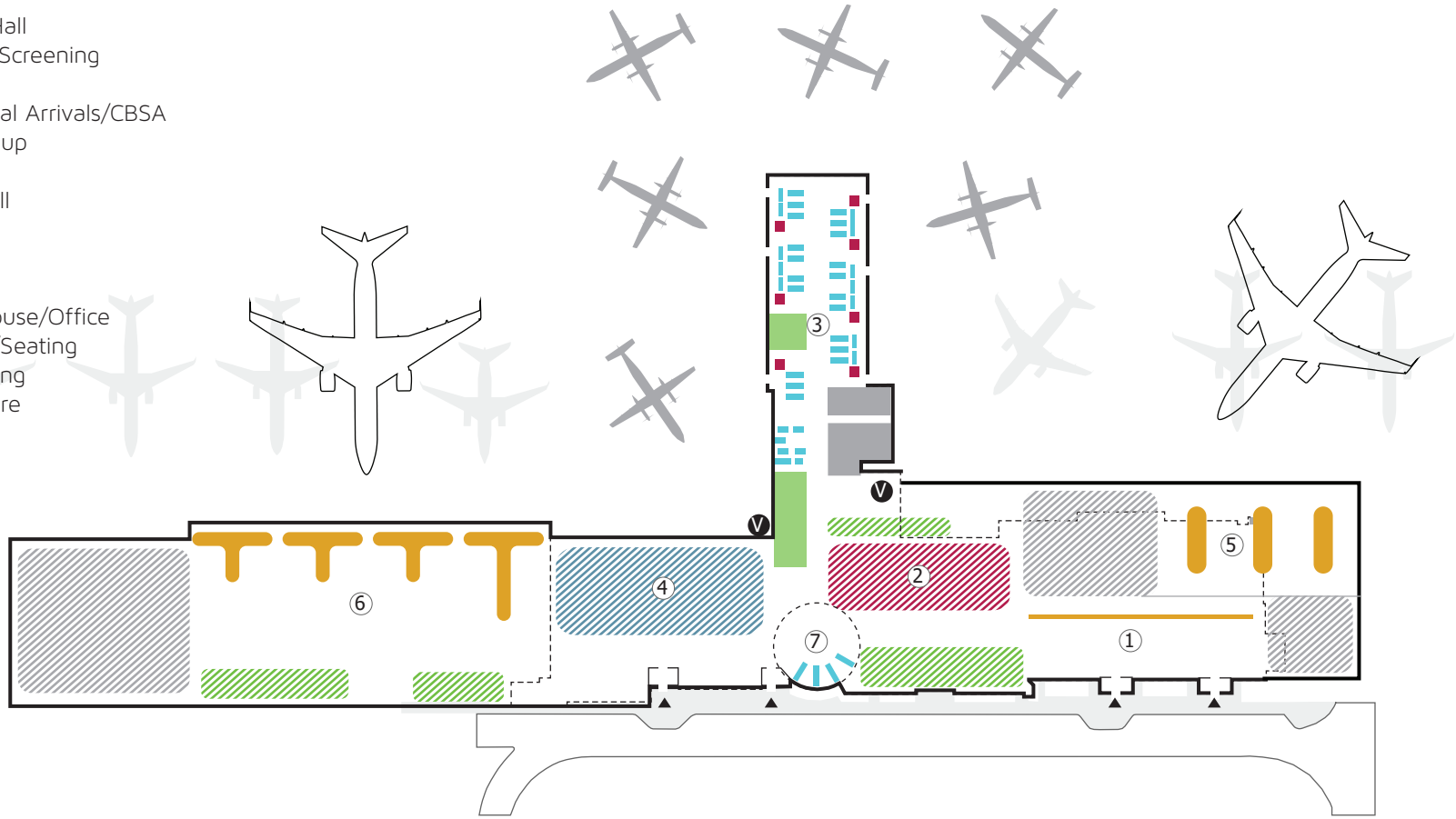


TERMINAL

2032 Terminal (Level 1)

① Check-In Hall
② Pre Board Screening
③ Holdroom
④ International Arrivals/CBSA
⑤ Bag Make-up
⑥ Bag Claim
⑦ Arrivals Hall

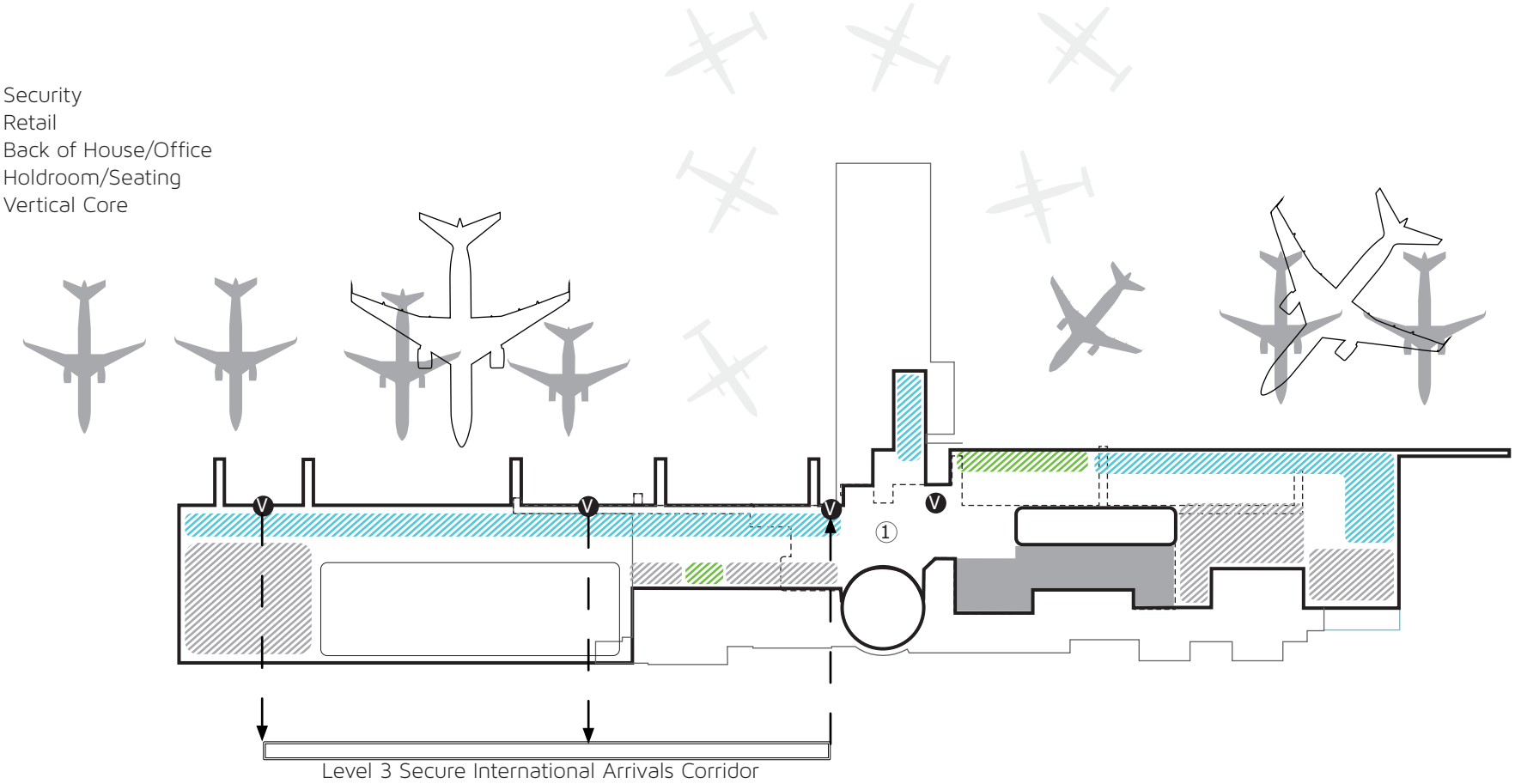
Security
Retail
Back of House/Office
Holdroom/Seating
Bag Handling
Ⓥ Vertical Core



2032 Terminal (Level 2)

① Holdroom

Security
Retail
Back of House/Office
Holdroom/Seating
Ⓥ Vertical Core



05

Landside

Introduction

The landside of an airport includes all areas accessible by the public. The primary pieces of infrastructure of the groundside include ground access infrastructure (roads and pathways), parking facilities, groundside commercial infrastructure and greenspace accessible by the public. Utilities servicing all airport facilities also fall under the category of groundside infrastructure. This chapter of the Master Plan provides an overview of the existing landside infrastructure and the proposed improvements that will take YYJ to 2042.

LANDSIDE

Existing Facilities

GROUND TRANSPORTATION

YYJ is located on the Saanich peninsula in close proximity to the Swartz Bay ferry terminal. Highway 17 provides the major access route between Sidney and Victoria. YYJ is accessed via two major entry points off Highway 17 – Canora Road and Beacon Avenue. Canora Road (via the McTavish Road Interchange and Willingdon Road) is the primary route to access the passenger terminal building. McTavish Road Interchange was updated in 2011 to improve airport access, introducing roundabout to improve safety, reduce vehicle idling and increase capacity.

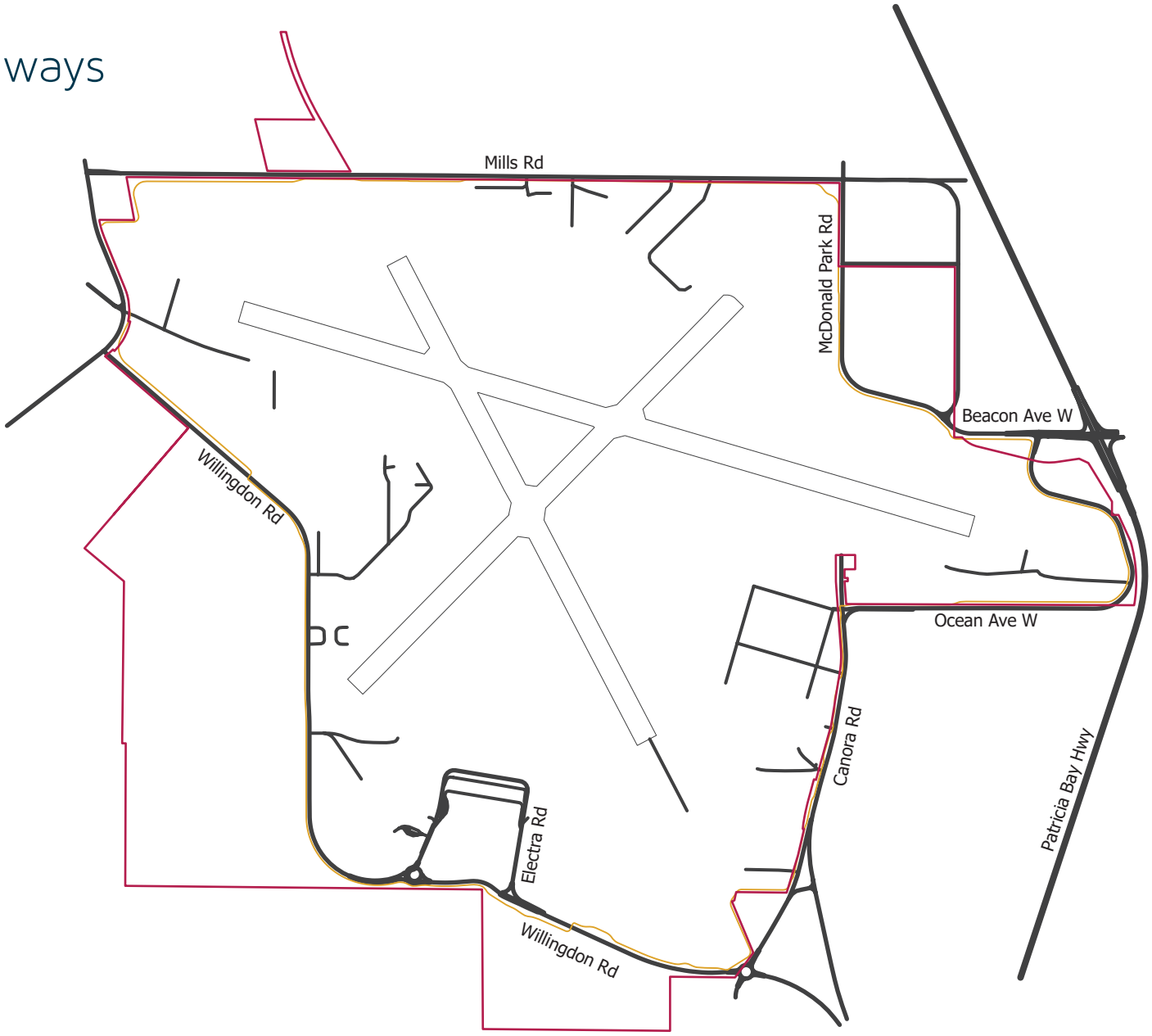
There are various alternate routes to access the airport property in situations where primary roads are congested or closed due to vehicle accidents or maintenance. Both East and West Saanich Road offer alternate access to Victoria, providing redundancy for Highway 17.

A series of roads create a "ring road" surrounding the entire property that provides ideal connectivity between all airport precincts without the need to use Highway 17.

Improvements currently in the planning stages for the road network surrounding the airport include an extension to Stirling Way terminating in a new roundabout intersection at Beacon Ave. and Galaran Rd. The Ministry of Transportation and Infrastructure is working on concepts for a potential future overpass-style improvement to the intersection of Beacon Ave. with Highway 17. District of North Saanich is investigating the benefits of signalizing the intersection of Mills Rd. and McDonald Park Rd.

The airport property can be accessed via private and commercial vehicles (e.g. shuttles and taxis). Victoria International Airport is served by BC Transit with up to 28 daily departures to and from YYJ and the McTavish Transit Exchange with several connections to Swartz Bay, the Saanich Peninsula, and Downtown Victoria. YYJ is served by five on-airport and two off-airport car rental companies. On-airport companies have pick-up and drop-off parking stalls close to the terminal building. Private vehicles can pick-up or drop-off passengers at the terminal curb or use public parking options. The airport is also accessible by foot, bike and, other mobility modes via the Flight Path and its connection to the extensive Capital Region bike path network.

Existing Roadways



LANDSIDE

PARKING

Public parking options available to the public are conveniently located in front of the terminal building. YYJ has 158 short term and 2,445 long term parking stalls (including overflow stalls). Over time, YYJ is embarking on a series of public parking expansion projects that will increase the capacity of the terminal curb, public parking and car rental lots to meet demand as it arises.

TERMINAL CURB

The terminal curb is where passengers are picked-up and dropped-off immediately in front of the terminal building. YYJ currently provides curb space for taxis, public vehicles (including dedicated disabled stalls), BC Transit buses and commercial buses/shuttles.

AIRPORT SUPPORT FACILITIES

In terms of supporting facilities for airport operations the following are considered:

Airside Operations Centre

The Airside Operations Centre is located on the west side of the airport south of the main runway (09-27). It houses all airside maintenance staff, airside operations administrative support staff, environmental operations as well as aircraft rescue and firefighting operations. The facility was constructed in 2010 and the building has adequate capacity to serve the airport in the mid-term.

Additional land adjacent to the facility is available to add additional space both for operations as well as for firefighting activities as needed in the future. The equipment compound is just adequate for the equipment currently in use. The area would benefit from additional area being formally developed for equipment staging and a further improvement would be to provide a covered area to stage winter operations equipment.

A plan should be developed to provide high capacity, fast-charging for electrification of the heavy fleet as the transition from equipment with traditional combustion engines to electric drives takes place. Consideration should also be extended to the provision of maintenance charging for staff vehicles. The facility has adequate staff parking and there is space available to expand this if required. The facility is set up to act as an alternate Emergency Operations Centre (EOC) for the management of critical incidents.

Aircraft Isolation Area

There is a dedicated aircraft isolation area set aside to isolate an aircraft in the event of the need to place the aircraft safely away from ongoing operations. This isolation area is located 300m north of the threshold on Runway 32, on the runway.

Aircraft Rescue and Firefighting Capabilities

In 2022 the airport fire hall is staffed to provide Category 7 fire and rescue protection. The staff are supported by the following vehicles to provide this coverage:

Vehicle	Water Capacity (l)	Foam Capacity (l)	Dry Chemical Capacity(kg)
Red 4 – 4x4	1,140	150	227
Red 5 – 6x6 *	11,356	1,500	227
Red 6 – 4x4	6,050	795	227
Red 7 – 6x6	12,500	1,500	N/A

* This vehicle has a High Reach Extendable Turret for penetrating aircraft fuselages

Based on the forecasted baseline schedule and expected gauge of aircrafts used to meet that schedule, an increase in firefighting Category is not anticipated over the course of the planning period.

Bomb Disposal Area

There is a dedicated location set aside for the defusing of suspected explosive materials safely away from ongoing operations. Over the planning period an initiative to install blast protection around the perimeter of this area should be considered. There is a remote-controlled threat bag delivery system located in the air terminal building. The baggage system has the capacity to deliver a threat bag directly to the system. The system consists of a remotely operated vehicle that can safely transport the threat bag to the disposal area for disarming away from ongoing operations.

Aviation Fuel Storage

There is an aviation fuel storage facility at the airport owned and operated by World Fuels. This facility was completely renewed in 2021. The facility is located on the west side of the airfield adjacent to Taxiway C. The facility has the following capacities:

- Jet A Fuel – 320,000 litres in two equal sized tanks
- Avgas 100 Fuel – 35,000 litres in a single tank

Fuel is distributed to commercial aircraft via tanker/pump trucks by World Fuels as well as Shell. There are no plans to install a hydrant system to directly fuel aircraft on Apron IV in the planning period.

LANDSIDE

Terminal Security Services/EOC

Terminal security services are provided by contract for the air terminal building. The contractor is currently housed in the Security Operations Centre building as is the primary EOC. The building, located just east of the ATB, was constructed in 1984 as an RCMP detachment and its present configuration is not entirely compatible with its current use. In the planning period the EOC function along with a number of the daily operations functions will be relocated to within the air terminal building. This will allow the building floorplan to be modified to better suit the operation going forward.

Seaplane Base

Activity at the base includes float plane operations (both private and non-scheduled commercial) as well as barging operations to support large equipment and used house moves. Tseycum First Nation tie-up a fishing vessel at the dock.

Minimal capital investment has been made in the seaplane base in the past due the previous lack of tenure. In 2022 VAA secured long term tenure over the seaplane base. Now that the property fully vests to VAA capital improvements will be planned. A current project for approach lighting has already included investments in dock and breakwater improvements as well as berthing piles to support barging operations.

UTILITIES AND SERVICES

In terms of supporting facilities for airport operations the following are considered:

Water

VAA purchases metered water from the District of North Saanich (DNS). DNS bulk water is purchased from the Capital Region District (CRD) via the Saanich Peninsula Water System (SPWS). VAA currently has four metered connections to the DNS system and two connections for fire flow only to the CRD system.

The VAA's main terminal area connection to DNS is through two 300mm (diameter) lines located south of the terminal that ultimately originate from the McTavish reservoir. The south east side of the airport is served from two 300mm DNS lines. The northeast corner of the airport is served by a 200mm DNS line. The north side of the airport is served by a 200mm DNS line. The west side of the airport is served from a 200mm VAA line with a fire flow-only connection to a 500mm CRD line. Tenants on VAA lands east of McDonald Park and East Saanich Roads receive water from the Town of Sidney water system

Age, capacity, and condition related replacements are planned over the planning period. A study commissioned in 2013 (KWL Underground Facilities and Condition Report) identified that the water system functions well and has the hydraulic capacity to meet current and forecast water demands through 2031. VAA will commission an update to the KWL report near the end of 2020s to update the planning process.

Sanitary

Many improvements to the site sanitary system have been completed as proposed in the 2013 KWL report including upgrading and upsizing Pump Station #3, which conveys much of the effluent from airport operations as well as effluent from the Pauquachin and Tseycum First Nations and the Institute of Ocean Sciences. Other projects are identified in the 10 year capital plan to address age, capacity and condition issues including projects to address inflow and infiltration.

The system has adequate capacity to meet demand over the planning period. VAA will commission an update to the KWL report near the end of 2020s to update the planning process. The VAA has control of 10% of the capacity of the CRD's Unified Sewage Treatment Plant. Sewage discharged from Pump Station #3 flows in a gravity main under Highway 17 and empties into a Township of Sidney pump station which then conveys the effluent to the plant. Sewage from the north portion of airport lands enters a District of North Saanich (DNS) pump station and ultimately is conveyed to the same treatment plant via DNS infrastructure. There is adequate capacity in all systems to manage capacity for the planning period.

Storm

Based on current uses the capacity of the storm drainage system is adequate to convey 1:10 year storm events with minor local ponding. In 1:100 year events: there is localized flooding with ditches over-topping Willingdon Road west of the air terminal building as well as at the storm culvert conveying Ten Ten Creek as it passes under Willingdon Road. There is also over-topping of the road as KELSET Creek passes under Canora Road as it leaves airport property. There is localized flooding at the corner of Stirling Way and Beacon Avenue. There are planned projects to address all these locations with the exception of KELSET Creek as the constraint driving the flooding is off airport property.

VAA has had a Low Impact Design (LID) policy in place for developments on site for decades. The LID policy addresses 1:10 year events but not 1:100. There will likely be localized flooding associated with those events at those sites.

As a result of the 2013 KWL report many initiatives to address underperforming parts of the system have been completed. There is an ongoing program of restorations to address age, capacity and condition related issues. VAA will commission an update to the KWL report near the end of 2020s to update the planning process.

LANDSIDE

Electrical

The airport lands are principally serviced by three primary circuits, one east, one west, and one south to service the air terminal area. All three circuits are provided by BC Hydro. Capacity on BC Hydro's network is expanded as demand grows.

VAA investigated the viability of having a second primary circuit serve the terminal precinct as a way to enhance redundancy. Working with BC Hydro it was determined that the increase in availability would be highly limited as the second circuit would be coming from the same principal substation therefore this option has not been pursued.

All critical infrastructure on site including the air terminal building, the Airside Operations Centre, security, pump stations and so on all have generator back up with a fuel supply adequate to provide a minimum run time of 24 hours or more.

A recently completed Electrical Master Plan for the air terminal building identified a program of generator improvements to provide backup of 100% of terminal operations. Presently only about 60% of the operation is fully operational during a utility outage. Implementation of this phased program has begun and will be completed within the planning period. This plan also identifies the need to add capacity from the utility to address growth. Installing the required power transformers early on in the process 'reserves' the power in BC Hydro's system for future use as the air terminal grows.

As the world begins to shift away from fossil fuels, greater demand for electricity will occur. Separate and aside from electricity, to meet demand from a growing air terminal building, there will be demands for power for passenger vehicles, heavy fleet vehicles, ground handling equipment for servicing aircraft, and potentially aircraft themselves. Electrical power for these end uses will need to be addressed as they arise and independently of the air terminal building requirements.

Communications

Communications system providers such as Telus, Rogers and Shaw have equitable access to both the site and the air terminal building. There is adequate physical infrastructure in place to allow vendors to meet growing demand. VAA is completing a Network Master Plan. That Master Plan will identify infrastructure requirements for the air terminal building to be able to keep up technological requirements over the planning period. That plan will in turn inform the capital program over the planning period.

Gas

The terminal precinct and western lands at the airport are served by a 168mm high pressure main. The east side of the airport is served by a 168mm high pressure main. The northeast area of the airport is served by a 60mm main. The north side of the airport is served by a 168mm high pressure main. Fortis improves capacity as demand rises. The supply mains and trunk have adequate capacity to meet demand over the planning period.

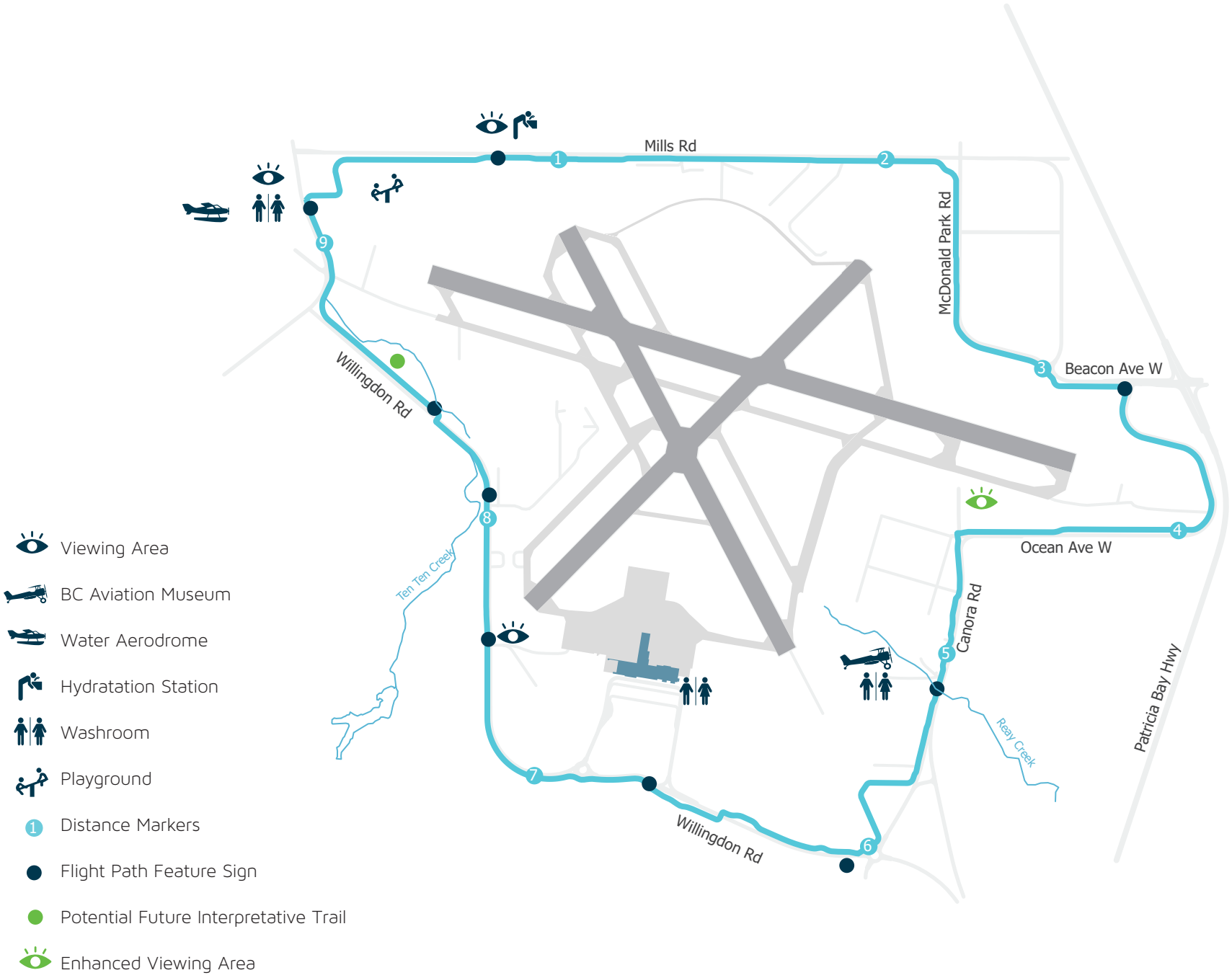
LANDSIDE

PATHS AND GREENSPACE

YYJ developed a complete 9.3km property circuit path, named "The Flight Path" for bikes, mobility devices, and pedestrians. Located around the perimeter of the pastoral Victoria International Airport, path users can enjoy the natural beauty of the Saanich Peninsula. The Flight Path is punctuated with intriguing pit stops, greenspace, playgrounds, the BC Aviation Museum and a number of viewpoints. It's an educating experience about various spects of the historical significanceof the airport and its surrounding land.

The Flight Path and greenspace provided at YYJ are just a couple examples of the YYJ commitment to sustainability, specifically Ecology & Biodiversity and Good Health and Wellbeing.

As part of the Master Plan, areas of opportunity where The Flight Path experience were explored. Some opportunities could be the introduction of an interpretative trail along Ten Ten Creek as well as enhancements to the viewing area near the air traffic control tower.


Mills Rd
McDonald Park Rd
Beacon Ave W
Ocean Ave W
Canora Rd
Patricia Bay Hwy
Willingdon Rd
Willingdon Rd
Ten Ten Creek
Reay Creek
1
2
3
4
5
6
7
8
9
Viewing Area
BC Aviation Museum
Water Aerodrome
Hydratation Station
Washroom
Playground
Distance Markers
Flight Path Feature Sign
Potential Future Interpretative Trail
Enhanced Viewing Area

Demand Requirements

PARKING

It is anticipated that parking demand will grow as more passengers travel through YYJ. The following table outlines the anticipated parking stall requirement for each of the primary parking lots in front of the terminal building:

Parking Lot	Parking Stall Requirement			
	2022	2027	2032	2042
Public Long Term (Daily Lot)	1,970	2,644	2,903	3,581
Public Short Term	158	212	232	286
Rental Car (Ready Lot)	155	207	228	281

Other parking areas are accommodated for in the Landside Development Plan. These areas include: car rental storage/maintenance, employee/contractor parking, taxi staging, cell phone lot and bus/shuttle parking.

LANDSIDE

Innovation

TNCs

Ground transportation is evolving at a rapid pace. Transportation Network Companies (TNC) such as Uber and Lyft have had a significant impact on airport operations in North America. Although the TNCs are yet to have a significant operation at YYJ, these ground transportation options should be expected within the planning horizon of this Master Plan. TNCs can have the following impact on airports:

- Increased airport ground transportation revenues
- Reduced airport parking revenues
- More pricing options (e.g. car pooling) and competitive pricing for passengers
- Increased traffic volumes on roadways and terminal curb
- Increased demand for vehicle storage areas
- Reduced demand for taxis

It is recommended that airports be prepared to accommodate this newer ground transportation option to realize the commercial benefits. Airports should also prepare for additional infrastructure requirements that TNCs can cause.

ELECTRIC VEHICLES

Electric Vehicle (EV) usage is on the rise, particularly in BC. 2019 statistics indicate that up to 11% of new vehicle purchases in BC were EVs. Therefore, it is prudent to plan for the growing demand from customers and staff using the airport parking facilities.

New zero-emission vehicles registration (source Statistics Canada):

- In the third quarter of 2020, 3.5% of total new vehicles registered in Canada were zero-emission vehicles (ZEVs).
- In this period, 54,353 new ZEVs were registered in Canada.
- Among new ZEV registrations in this period, 95.4% were in Quebec, Ontario and British Columbia.
- In the same period, 71.8% of new ZEVs registered in Canada were battery electric vehicles (BEVs)

PLANNING FOR EVS

The following planning recommendations for EV charging stations are provided in the Transportation Research Board (ACRP Synthesis 54):

ELECTRICAL INFRASTRUCTURE

- Account for electrical capacity requirements in the planning and design phase in order to reduce costs

NUMBER AND TYPE OF CHARGING STATIONS

- Exceed the ratio of EVs to traditional vehicles in the area to meet growing customer demand and to encouraging use
- Install appropriate charging stations (Level 1-3). Level 1 charging is more appropriate for stays of 24 hours or more, while Level 2 is more appropriate for stays of 8 hours. Level 3 provides even faster charging (approximately 240 km of charge per hour). Note: some units provide both Level 1 and Level 2 charging

SITING

- Visibility: Locate EV stations together in visible location to terminals, main walkways and elevator banks. This improves awareness and encourages adoption
- Utilization: Locate charging stations in valet lots to ensure highest utilization
- Reimbursement: Locate charging station in high revenue parking facilities to compensate for capital costs
- Infrastructure: Locate charging stations where excess electrical capacity already exists
- Connectivity: Locate charging stations where there are wireless internet signals or cellular services to allow for connectivity to smart EV charging networks

SIGNAGE

- Use signage to highlight the EV stalls to all customers. This will encourage use while also discouraging customers with conventional vehicles accidentally using the stall.

EV RECOMMENDATIONS

Although there is still a cost gap between comparable gas and electric powered vehicles, government incentives are lowering this gap. These incentives have been a major cause for the increased sales in BC and elsewhere in the country and the users of EVs are no longer only high-income passengers and staff.

Eventually the gap between the cost of gas and electric vehicles will disappear as EV manufacturing processes improve and material costs come down. Therefore, in the long-term there will be demand for EV charging at all parking product locations.

A major consideration for introducing new parking products or expansion to existing lots should be electrical capacity requirements. Pre-planning these requirements will greatly reduce cost. Existing lots should also be assessed to determine the most cost-effective ways of introducing charging stations, if at all. At first, demand for EV charging stations will likely be in premium parking products and these areas should be an initial focus.

OTHER INNOVATION

Technologies in the ground transportation industry has evolved significantly in recent times. The following new technologies were explored through the Master Plan and should be considered with future landside development:

Technology	Observed Impact
Car sharing programs (e.g. Turo)	These companies are purchasing dedicated parking stalls at airports like car rental companies
Virtual queuing	Some airports have used technology to implement virtual queues for taxis and TNCs to reduce need for storage areas and reduce wait time for vehciles
Online parking booking system	Enables dynamic pricing to respond to demand
Parking guidance systems	Increased parking utilization Enables tracking of demand and capacity Provides guidance to vehicles, reducing emissions
Geofencing	Currently used by TNCs. Enables tracking of commercial vehicles for billing purposes.
Licence plate recognition	Enables paperless parking system

Development

PARKING

YYJ is about to embark on an expansion of its public and car rental parking lots. This project will also include expansion of the terminal curb. The project will take place over multiple phases to ensure growth in capacity while retaining ongoing operation of existing facilities. The planning concepts presented in this Master Plan are based on detailed engineering concepts and the Landside Development Plan (2019).

The following development priorities have guided the landside development concepts, which are aligned with the Master Plan project directives:

- Identify parking growth areas aligned with terminal expansion areas and parking priorities
- Prioritize major vehicle flows into and out of terminal by providing appropriate capacity
- Provide alternate road access for non-passenger vehicles to relieve terminal curb congestion (e.g. terminal deliveries and airside access)
- Reduce cost by using existing infrastructure and avoiding demolition (e.g. retain existing roads, parking canopy, and stormwater system)
- Provide coach/shuttle pick-up and drop-off area with convenient access to terminal
- Explore dual terminal curb to enable segregation of commercial and public vehicles
- Provide taxi staging lot and cell phone lot with convenient access to terminal access road
- Introduce a remote car rental service/storage area within short drive distance (ready-lot to continue to be close to terminal)
- Preserve public viewing area
- Provide ability to accommodate electric vehicles

DEVELOPMENT STAGING

The priorities of development area are achieved through a key enabling project that will expand Electra Boulevard and develop a new roundabout at the new intersection with Willingdon Avenue. Staging of the project is driven by demand forecasts presented in the master plan.

LONG TERM PLAN

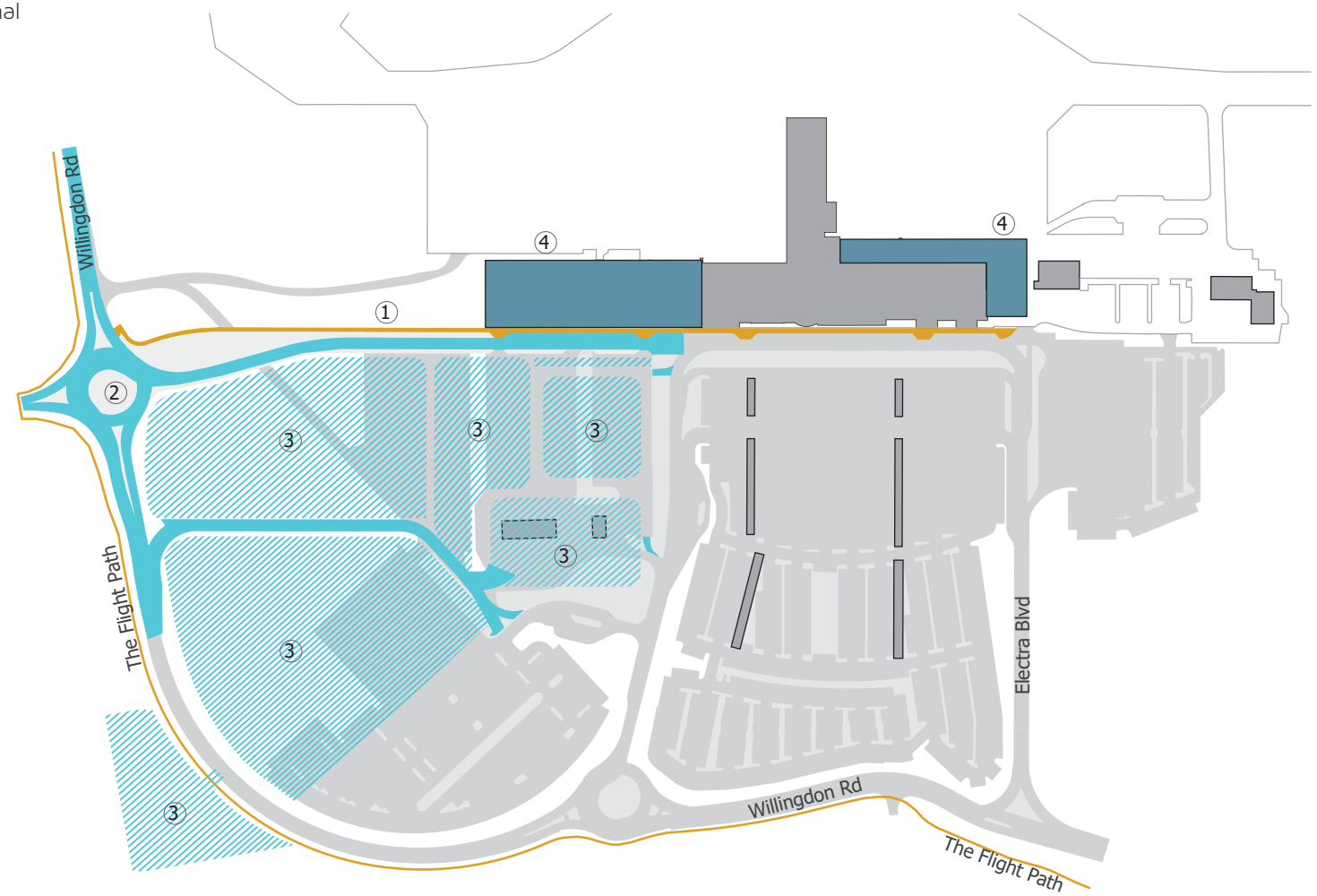
The long term development plan will feature an additional expansion of Electra Boulevard to the east of the terminal building. This will enable the additional expansion of parking and the introduction of a second terminal curb. This expansion isn't required within the planning horizon of the Master Plan. It is important that this planning intent is identified to protect area for this ultimate developmnent goal. More detail is provided in the Landside Development Plan.

LANDSIDE

2023-2032

① Expanded terminal curb
② New roundabout
③ Expanded/reconfigured parking
④ Expanded terminal

Parking Products	Parking Provided	2027 Parking Requirement
Long Term, Short Term, Rental Car (Ready Lot)	3,813	3,363

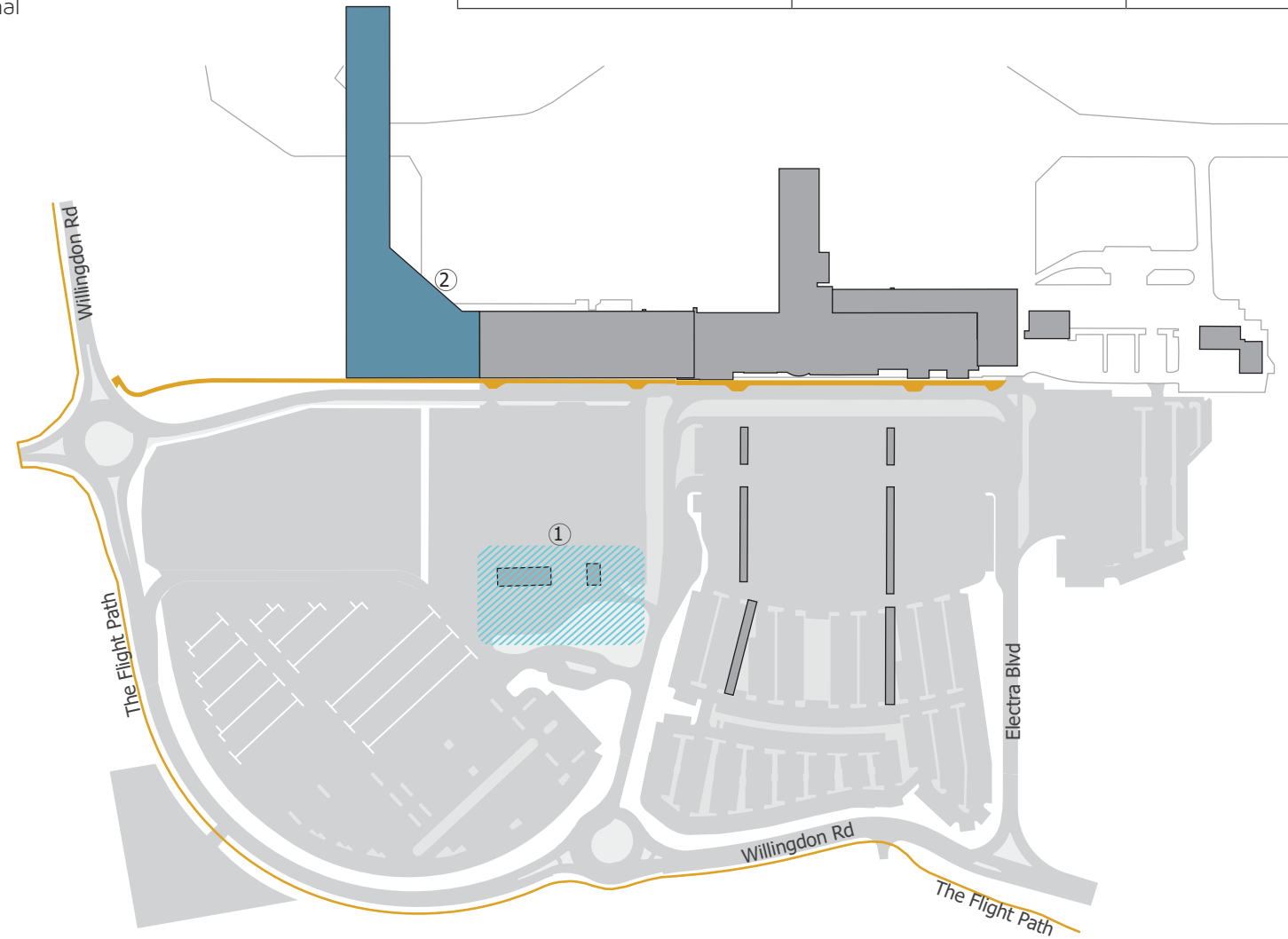


LANDSIDE

2033-2042

① Expanded/reconfigured parking
② Expanded terminal

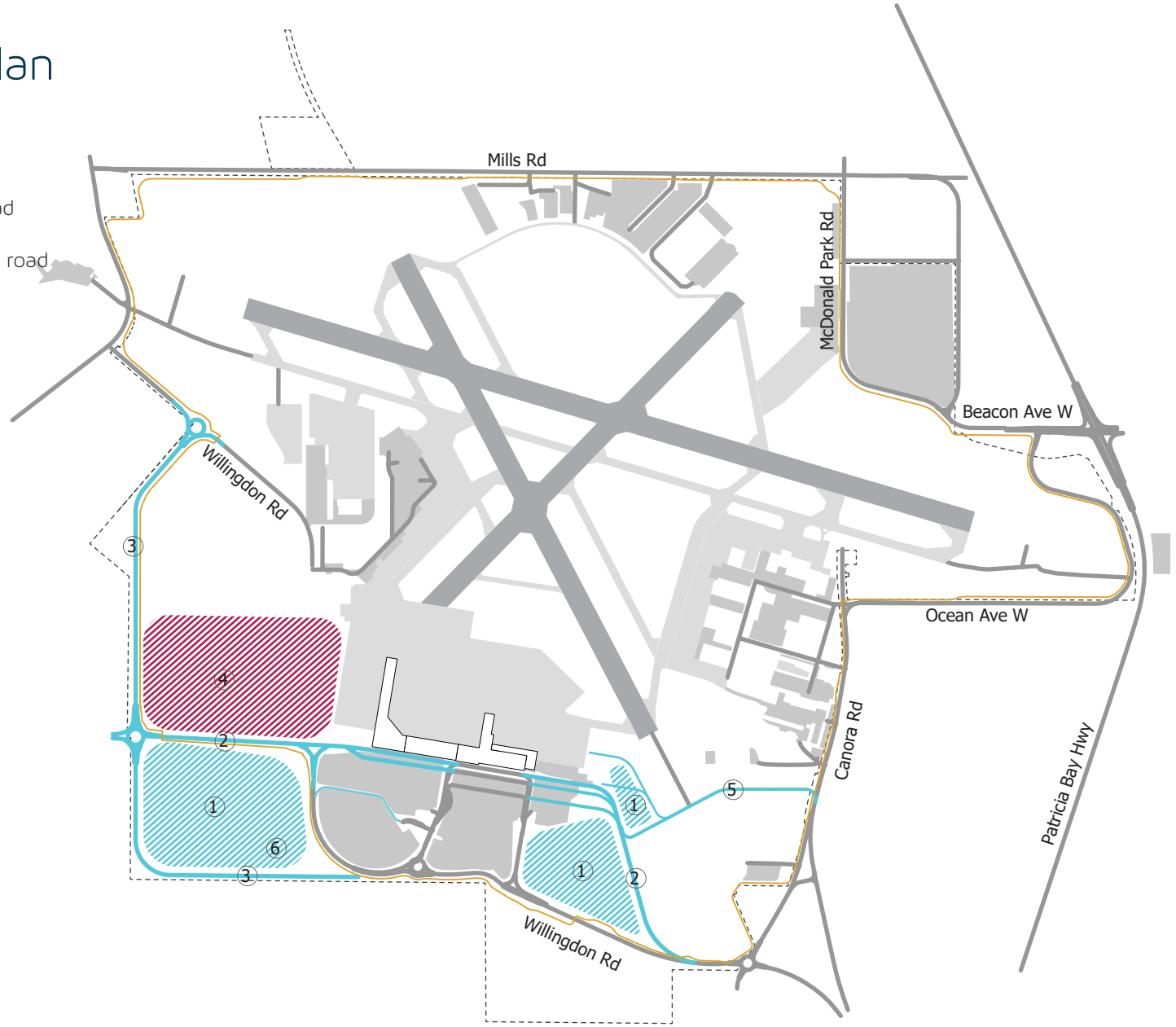
Parking Products	Parking Provided	2042 Parking Requirement
Long Term, Short Term, Rental Car (Ready Lot)	4,160	4,148



LANDSIDE

Long Term Plan

① Expanded parking
② Relocated Electra Road
③ Relocated Willingdon Road
④ Terminal reserve
⑤ Alternate terminal access road
⑥ Car rental service facility



06

Commercial Development

COMMERCIAL DEVELOPMENT

Introduction

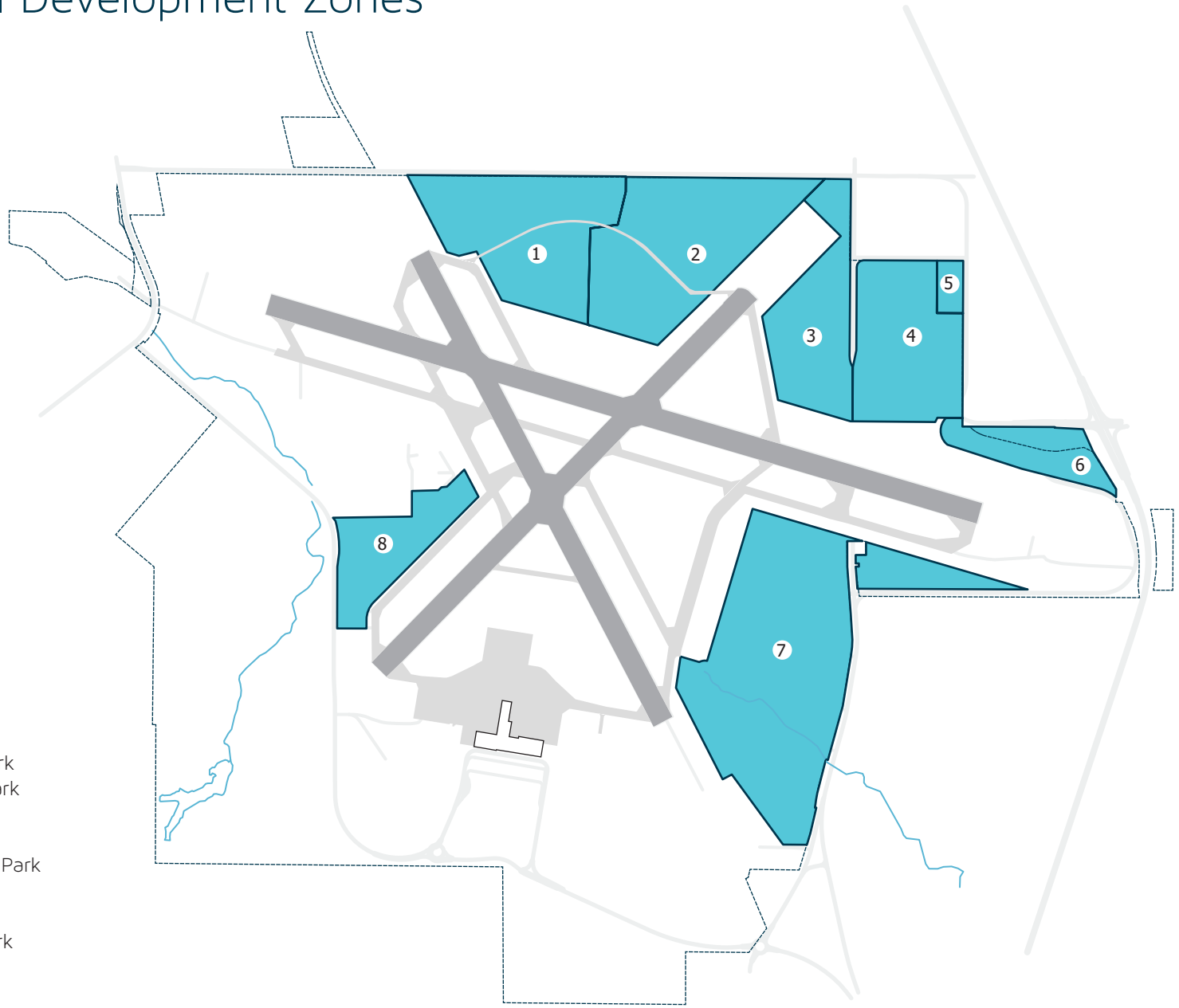
A key part of the Responsible Steward principle is managing finances responsibly and new revenue sources through commercial land development will improve long term financial sustainability of the airport.

YYJ is actively seeking companies to develop vacant land. As a primary economic generator in the region with a large base of aviation, industrial and hi-tech businesses, Victoria International Airport is well positioned for further growth.Located on the Saanich Peninsula approximately 25km north of Victoria, the Airport provides onsite businesses with ready access to Patricia Bay Highway (Route #17), BC Ferries and of course, air transportation.

YYJ offers competitive lease rates and is looking to continue to establish long term relationships with companies who wish to relocate or to expand their business.

A number of sites are available for development immediately or in the future with modest improvements to site condition, access or services. Some areas within the YYJ property are available but would require significant improvements to site condition, access or services.

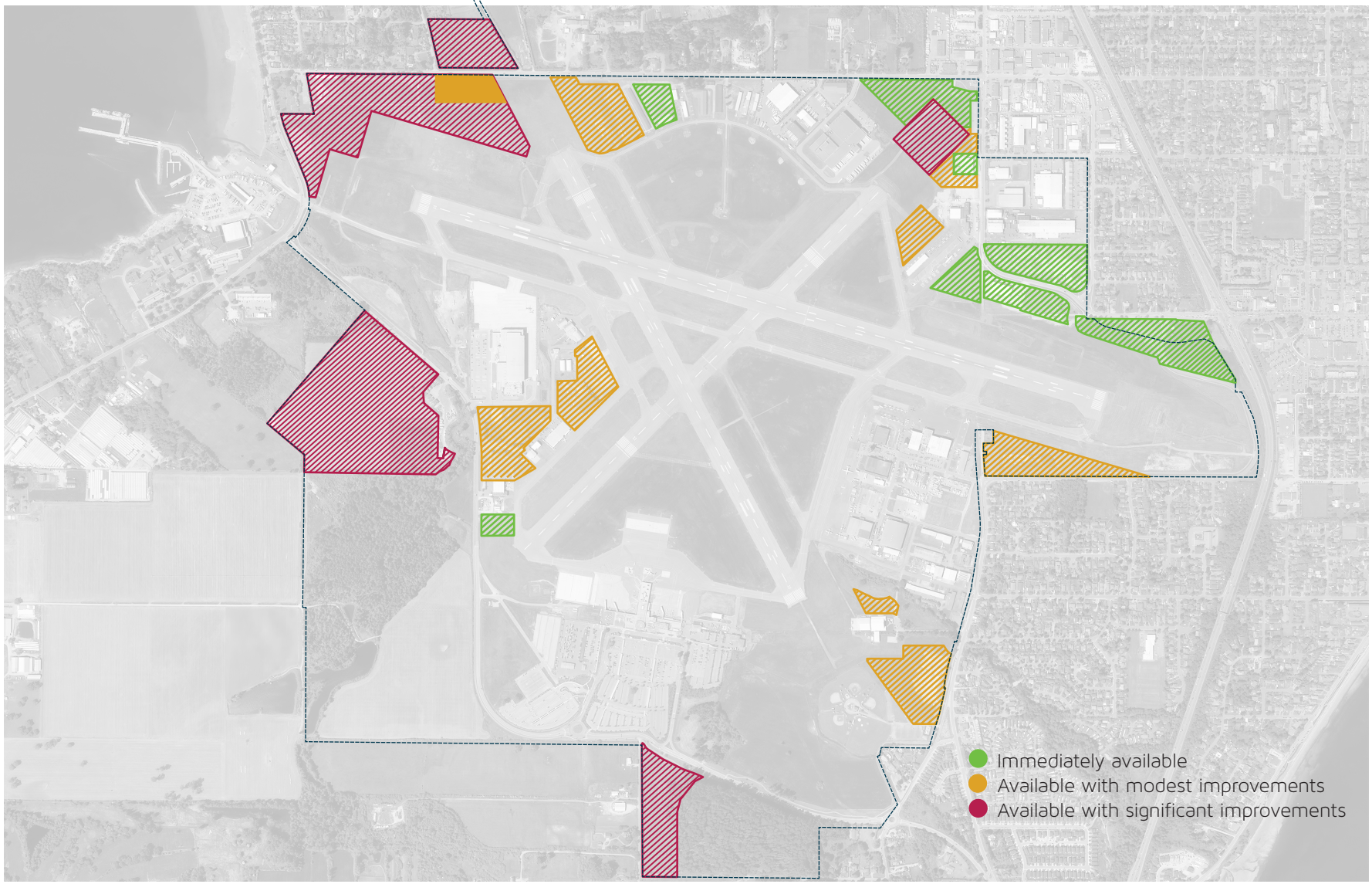
Commercial Development Zones



1. Mills Road Aviation Park
2. Mills Road Business Park
3. McDonald Park West
4. McDonald Park East
5. West Sidney Business Park
6. Beacon Commercial
7. Canora West
8. Kittyhawk Aviation Park

COMMERCIAL DEVELOPMENT

Land Availability



07

Land Use Plan

LAND USE PLAN AND COMMERCIAL DEVELOPMENT

Introduction

A Land Use Plan divides the airport site as a whole into sections with particular land uses. This chapter provides an overview of the Land Use Plan which incorporates all proposed improvements outlined in the Airfield, Terminal and Landside Development sections of this report.

Future Land Use Plan

Short Term Updates

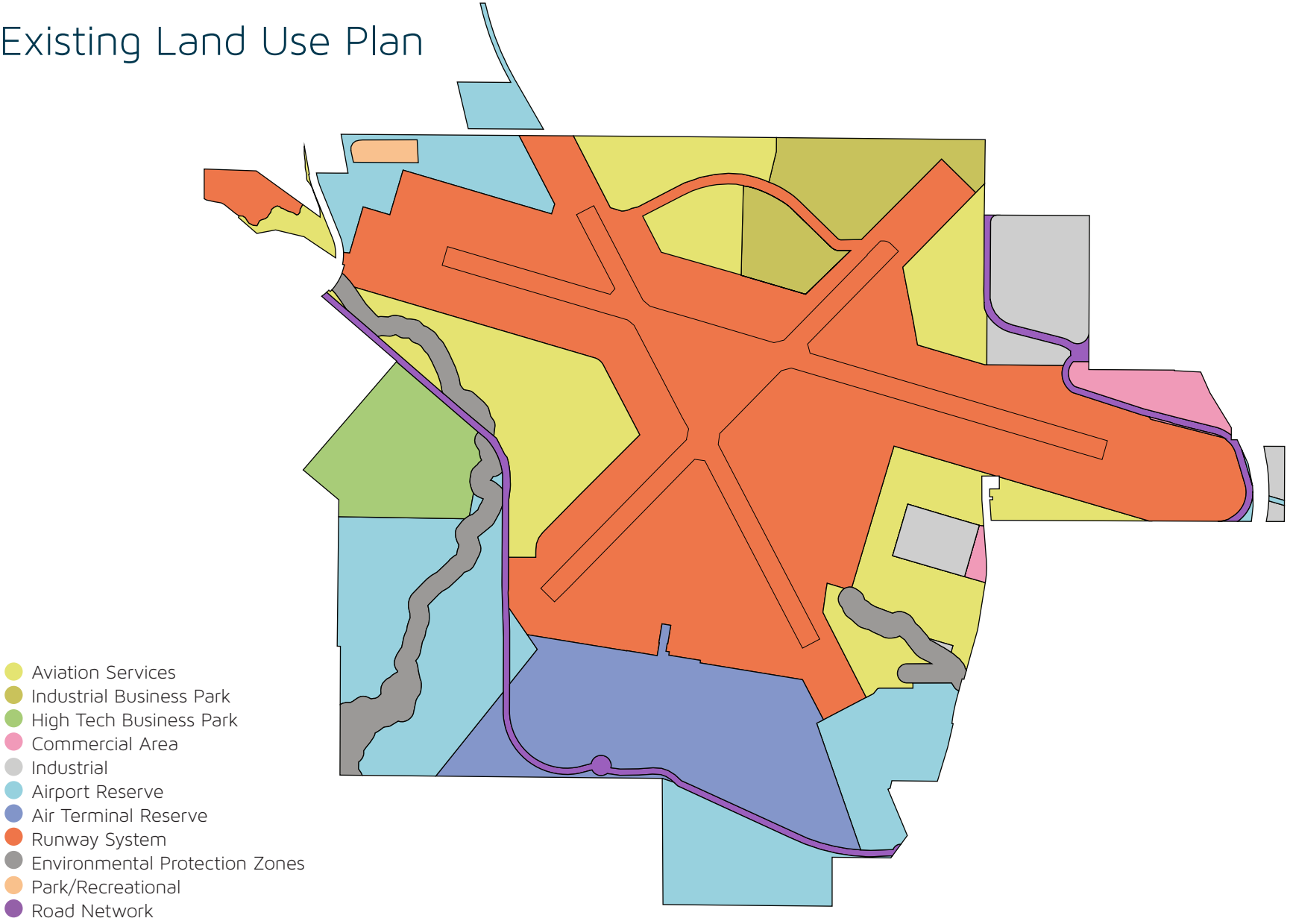
YYJ is currently reviewing the existing Land Use Plan with the aim to achieve a simplified plan that enables greater flexibility in developing the land on airport property. YYJ is consulting with relevant stakeholders, including Transport Canada and municipal government. There will be no major changes to the runway system, air terminal and airport reserve areas.

Long Term Updates

The major changes to the land use plan anticipated within the horizon of this Master Plan will primarily be surrounding the terminal building. Due to the need to expand the terminal building to accommodate additional gates there will be a requirement to close Runway 03-21. This will impact the runway system and airport reserve areas with an expansion of the air terminal reserve.

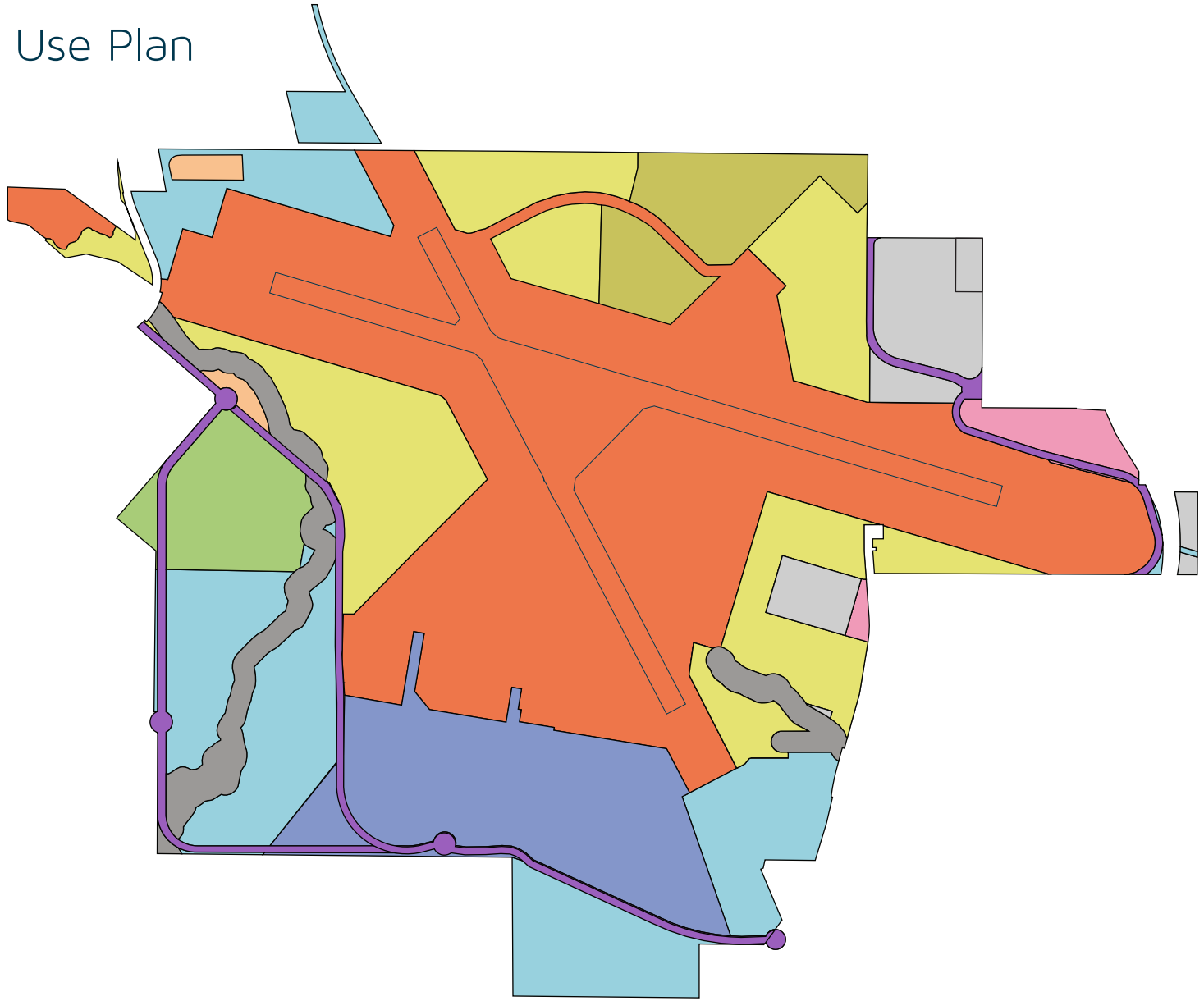
LAND USE PLAN AND COMMERCIAL DEVELOPMENT

Existing Land Use Plan



LAND USE PLAN AND COMMERCIAL DEVELOPMENT

Long Term Land Use Plan



- Aviation Services
- Industrial Business Park
- High Tech Business Park
- Commercial Area
- Industrial
- Airport Reserve
- Air Terminal Reserve
- Runway System
- Environmental Protection Zones
- Park/Recreational
- Road Network

08 Environment

Introduction

YYJ recognizes the importance of balancing the key strategic directives of the Master Plan with its duty of care for the environment and the commercial realities of operating the airport. The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The Victoria Airport Authority (VAA) has adopted the SDGs as a basis towards addressing global sustainable development challenges.

The Master Plan has identified that all airport development needs to be guided by the Sustainability Plan, which is updated every 5 years. The current Sustainability Plan includes the following environmental areas of focus:

- Waste
- Ecology and Biodiversity
- Greenhouse Gas (GHG) emissions
- Water quality and conservation

ENVIRONMENT

Environmental Sustainability

SHORT TERM GOALS

The Sustainability Plan is updated every 5 years and focuses on the short term goals for YYJ. All goals are aligned with the SDGs and local priorities. The following environmental areas of focus feature in the current Sustainability Plan.

WASTE

The VAA acknowledges the role waste plays in the degradation of the environment It is the VAA's goal to ensure sustainable consumption and production patterns among airport stakeholders by making waste diversion accessible and reusing materials to reduce waste.

Goal: Waste diversion rate of 75% by 2025 and 90% by 2030

GHG

Reducing the impact of climate change is one of the most important areas of the VAA's work to protect the environment at YYJ. Since 2013, the VAA has implemented several programs to reduce greenhouse gas emissions and energy, including in its fleet of vehicles and VAA operated buildings.

Goal: ACI carbon accreditation

2025 target – Level 3 (Optimization)

2030 target – Level 4 (Carbon Neutrality)

ECOLOGY + BIODIVERSITY

The VAA is committed to environmental stewardship at YYJ and recognizes the ecological and cultural importance of the forests, salmon bearing creeks, and streams to the local biosphere.

Goal: Increase by biodiversity by 20% and achieve Aichi Targets

WATER QUALITY + CONSERVATION

Water quality and conservation has long been at the forefront of the VAA's environmental priorities. Through initiatives like the VAA's potable water testing, stormwater quality program and glycol collection system, the VAA ensures the efficient use of water to safeguard the community's most precious resource.

Goal: Reduce water use by 25% per passenger by 2030

Noise Management

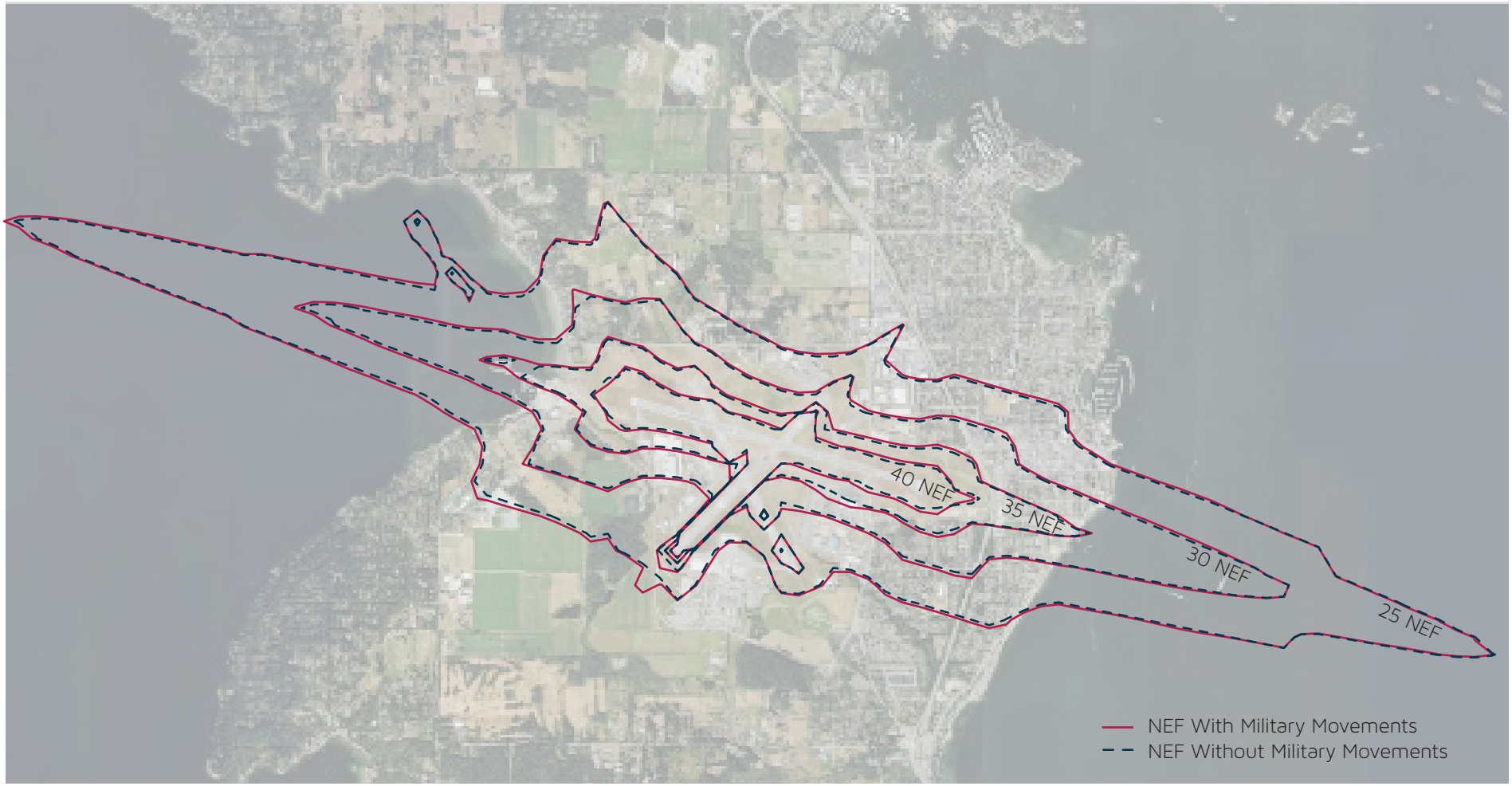
Aircraft noise is the most significant cause of adverse community reaction related to the operation and expansion of airports. It is, therefore, critical to identify problems as they arise and identify various measures to reduce noise in collaboration with stakeholders and the community. Noise management initiatives can take many forms, the following are employed by YYJ:

- Land use planning driven by Transport Canada recommendations relating to Noise Exposure Forecast (NEF) contours
- Airport consultative committee
- Operational mitigation
- Noise survey conducted every 5 years

NEF contours are created based on the airport operational features through noise modelling software. Recommendations for compatible land uses around airports based on NEF contours are provided by Transport Canada in TP1247E - Land Use in the Vicinity of Aerodromes.

ENVIRONMENT

YYJ Current NEF Contours




Arrivals Arrivées

Appendix

Detailed Cost Estimate (2023-2027)

Preliminary order of magnitude cost estimates were developed for the major developments identified in the Master Plan. Costs were split into 5 year increments. Commercial development costs were not included as the need for development is still to be determined. Costs are provided in 2022 dollars.

Area of Development	Projects (2023-2027)	Cost
Airfield	Taxiway turning improvements RESA 09 RESA 27 Apron IV Phase 6 expansion TP 312 5th Edition transformation	$1,675,000 $2,775,000 $4,100,000 $5,100,000 $450,000
Terminal	East expansion Upper hold room washrooms	$105,000,000 $3,500,000
Landside	Phase 1 Parking: Reconfigure rentals and temp. lot Phase 2/Stage 1 Parking: Reconfigure Brown lot Phase 4 Parking: Formalize purple lot, add 252 Phase 5 Parking: Formalize temp lot, rental storage Beacon/Galaran Roundabout East viewing area Stirling Way extension	$7,153,794 $3,850,203 $3,754,153 $1,692,110 $3,500,000 $350,000 $3,000,000
Total		$145,891,260

APPENDIX

Detailed Cost Estimate (2028-2032)

Preliminary order of magnitude cost estimates were developed for the major developments identified in the Master Plan. Costs were split into 5 year increments. Commercial development costs were not included as the need for development is still to be determined. Costs are provided in 2022 dollars.

Area of Development	Projects (2028-2032)	Cost
Airfield		
Terminal	West expansion	$125,000,000
Landside	Phase 2/Stage 2 Parking: Infill from Brown to Willingdon Phase 3 Parking: Extend Electra, Roundabout Car rental care building	$3,544,905 $6,839,303 $2,400,000
Total		$137,784,208

Detailed Cost Estimate (2033-2037)

Preliminary order of magnitude cost estimates were developed for the major developments identified in the Master Plan. Costs were split into 5 year increments. Commercial development costs were not included as the need for development is still to be determined. Costs are provided in 2022 dollars.

Area of Development	Projects (2033-2037)	Cost
Airfield	Extend Runway 09 Convert Runway 03 to a Taxiway Apron IV Phase 8 expansion Long term apron and taxiway system Replace Seaplane dock and floats	$15,775,000 $1,811,250 $4,775,000 $34,650,000 $675,000
Terminal	Replace HBS, add 3rd carousel US Pre-clearance facility	$12,250,000 $16,000,000
Landside	Phase 6/Stage 1 Parking: 2nd curb lane, new toll plaza Phase 6/Stage 2 Parking: Remove old green lot toll booth Car rental service building and lot New East service road Cell lot/Taxi lot/Cargo support road Entrance road from East Saanich Apron/Cargo access road Airline/Cargo support building	$16,850,000 $500,000 $11,980,000 $4,425,000 $900,000 $11,250,000 $2,475,000 $8,000,000
Total		$142,316,250

APPENDIX

Detailed Cost Estimate (2038-2042)

Preliminary order of magnitude cost estimates were developed for the major developments identified in the Master Plan. Costs were split into 5 year increments. Commercial development costs were not included as the need for development is still to be determined. Costs are provided in 2022 dollars.

Area of Development	Projects (2038-2042)	Cost
Airfield	Extend Runway 27 Apron IV Phase 10 expansion	$24,750,000 $2,675,000
Terminal	New West ATB Wing	$125,000,000
Landside	Phase 7 Parking: Infill old car rental area	$2,000,000
Total		$154,425,000