SWIFT: Preservation of Airfield Pavements through Innovation

Case Study: YVR East Apron IV Remote Stands



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OUTLINE

- Airport Overview
- Project Brief
- Planning and Design
- Construction
- Usage during Pandemic
- Current State
- Future Outlook

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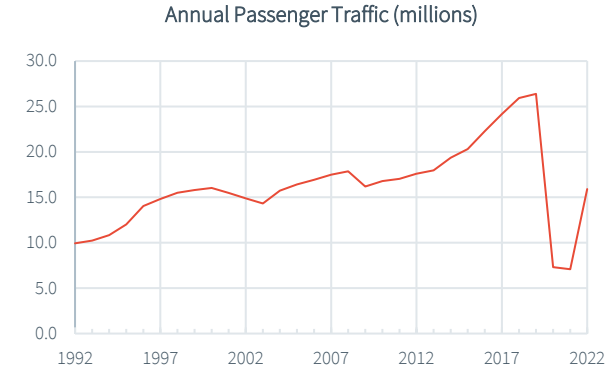
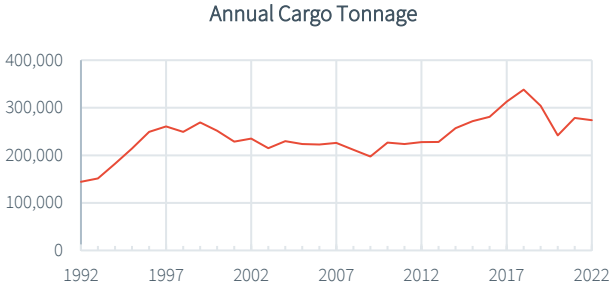
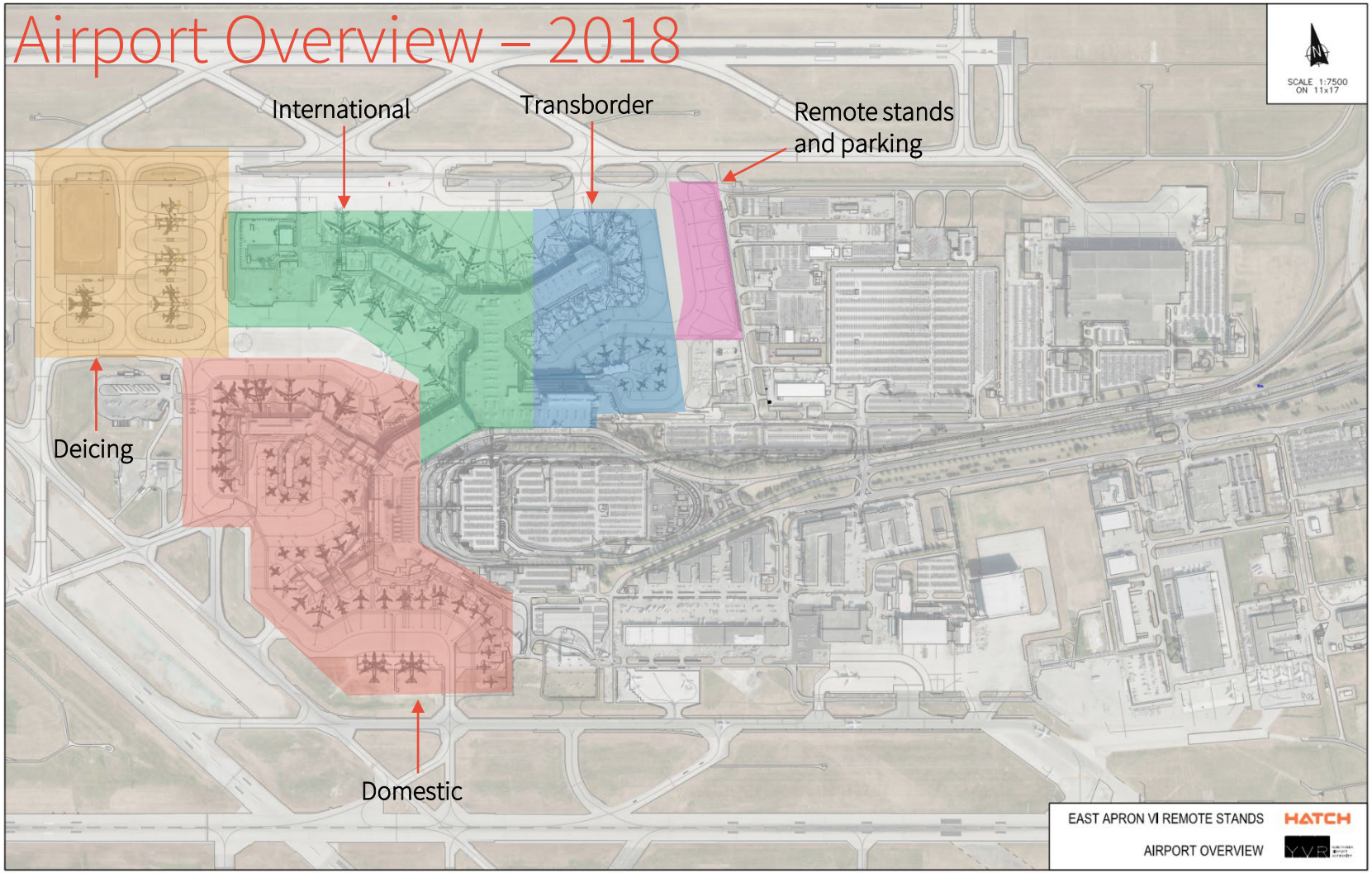
Vancouver International Airport (YVR)

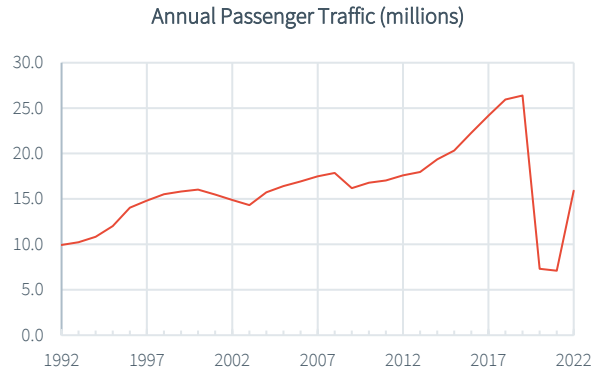




Airport Overview – 2018



Project Brief



Status Quo (Pre-COVID):

+ Rapid growth in traffic and passenger numbers, exceeding forecast
+ Lack of available aircraft stands
+ Construction of new Piers will not be completed until at least 2022

Stakeholder Requirements:

+ At least 10 new AGN IIIb stands for transborder flights by summer 2019
+ At least 2 AGN V and 1 AGN IV stands for international flights by winter 2018 / spring 2019
+ Minimize impact on airside operations and airport tenants
+ Phased construction plan to maintain existing remote stands and completion date of early summer 2019

Solution:

+ Construct remote stands to meet airport requirements within the expedited project schedule

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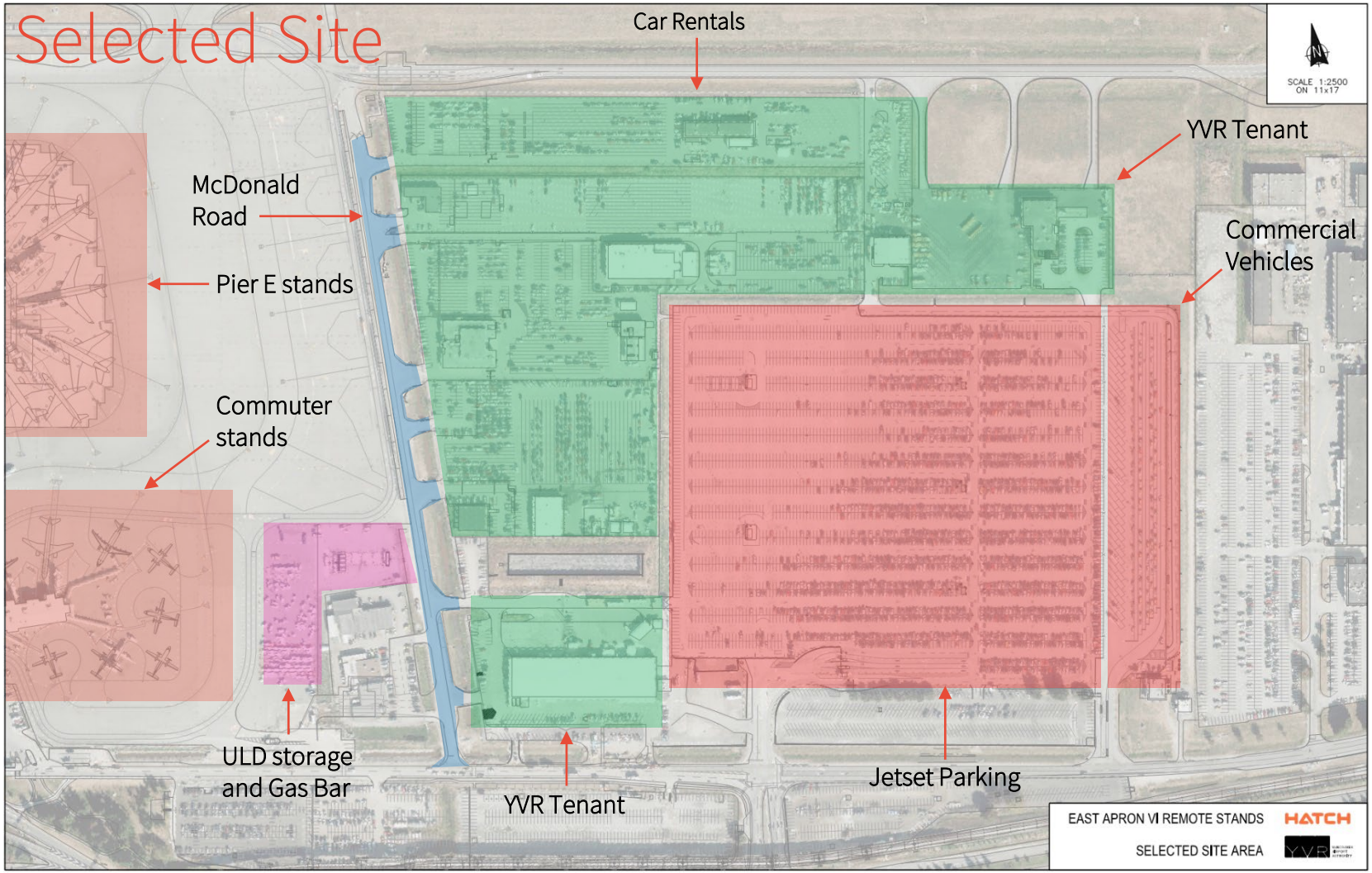
Selected Site
Car Rentals
SCALE 1:2500
ON 11x17
YVR Tenant
McDonald
Road
Commercial
Vehicles
Pier E stands
Commuter
stands
ULD storage
and Gas Bar
YVR Tenant
Jetset Parking
EAST APRON VI REMOTE STANDS
HATCH
SELECTED SITE AREA
YVR

Options

- **Stands** – Up to AGN IIIb aircraft only
- **Operations** – dual taxilane system
- **Stakeholders** – Relocate three tenants
- **Schedule** – Difficult to meet target

SCALE 1:2500
ON 11x17

Creating a Connecting Hub	Provide sufficient remote stand capacity	Deliver Customer Experiences	Minimize impacts to MIAL Business Partners	Be a Leader in Sustainability
	Support minimum connect times by minimizing airside delay		Carrier support	Environment – GHG emissions from aircraft taxi
	Support minimum connect times by minimizing transfer times for passengers and baggage		Impacts to airside operations	Social – Impacts to surrounding community.
Build on our Foundation	Implementability / Schedule			
	Scalability / Flexibility			

EAST APRON VI REMOTE STANDS
OPTION D

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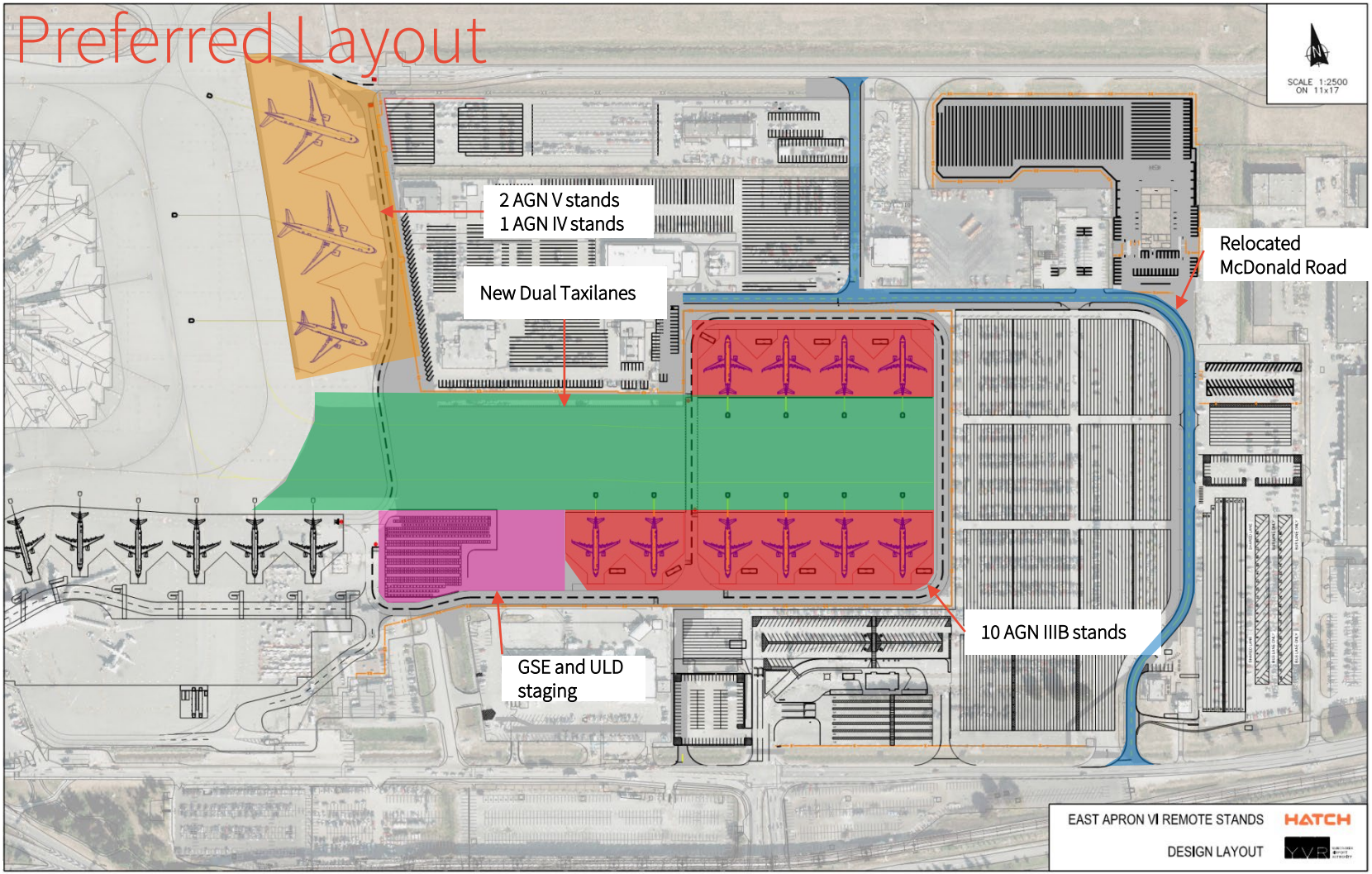
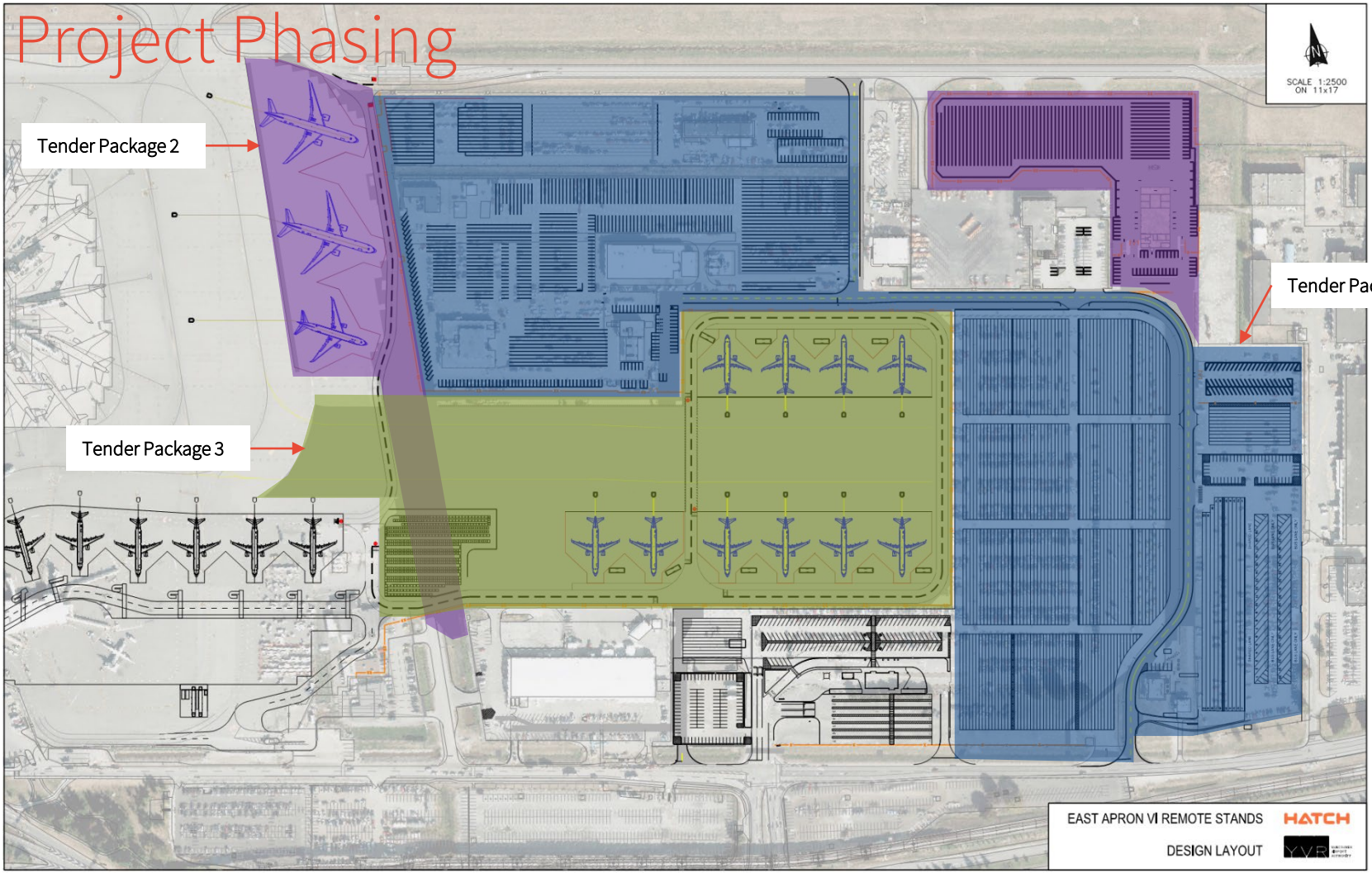
Preferred Layout



Project Phasing



PCC Pavement Design

Inputs:

Aircraft Mix	Predominantly B777-300ER
Subgrade Modulus	20.68 MPa (Soft Clay)

PCC Structure:

490mm P-501 PCC (R=4.8 MPa @ 7-days)
250mm P-306 Lean Concrete
200mm P-209 Crushed Aggregate
700mm P-154 Uncrushed Aggregate
Geotextile & Geogrid on Subgrade
PCR 1439/R/D/W/T

Highlights:

Phased Tenant Relocation
Staged Opening of Gates
Groundside Island to Maximize Efficiency
430+ PCC Panels (6mx6m)
32,000 m^2 Asphalt
2-AGN V & 1-AGN IV Remote Stands
August 2018 – July 2019


PCC Pavement Challenges

Stormwater Management:

+ Existing major ditch with flooding concerns
+ Extensive stormwater modelling for Pre and Post Construction
+ Bypass Pumps for max flow rate of 19,000 GPM

Phased Utility Relocation (Comm, Power, Sanitary, Water, Gas)

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PCC Pavement Construction

+ Geogrids and Geotextiles
+ Reuse existing subbase
+ Lean Concrete (4 to 10 MPa)
+ Steel Forms used to minimize sawcutting

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PCC Pavement Challenges

Cold Weather Paving:

- Temperature of mixed concrete shall not be less than 10°C
- Concrete shall not be placed on frozen surfaces

Defective when:

- Surface Temperature 5°C or less within 72 hours after placement
- Frost is visible on concrete surface within 72 hours after placement

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AIR CANADA

In-Service

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HMAC Pavement Design

Inputs:

Aircraft Mix	AGN IIIb (A321)
Subgrade Modulus	20.68 MPa (Soft Clay)

HMAC Structure	Taxilane	Apron Stands
P-401/P-403 HMAC	150	150
P-306 CTB	225	175
P-209 CrAg	250	250
P-154 UnCrAg	600	600
Geotextile & Geogrid on Subgrade		
PCR	655/F/D/X/T	623/F/D/X/T

Highlights:

Phased Tenant and Parking Lot Relocation
Groundside to Maximize Efficiency
84,000 m^2 of HMAC
10 AGN IIIb Remote Stands, GSE parking
April 2019 – November 2019

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HMAC Pavement Imported Fill

Imported fill: well graded, granular material free from organic matter, wood chips, sawdust, frozen lumps, weeds, sod, roots, logs, stumps, chemical or other contamination, or any other unsuitable material and shall comply with one of the following gradations as proposed by Contractor and approved for use in the Work by Consultant

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HMAC Pavement
Cement Treated Base

Compressive Strength	4 to 10 MPa
Density	2301-2345 kg/m^3
Compaction	98% of Wet Density
Curing	Within 2 hours
Prohibit vehicle traffic for 3 days	
Offset joints at least 600 mm from HMAC joints	

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HMAC Paving

Asphalt Cement	PG 64-22 (4.40%)
Density	2400-2460 kg/m3
Compaction	98% of 75-blow Marshall Density
Paving in echelon, rollers (breakdown, second, finish rolling)	
Offset transverse joints	600 mm
Offset longitudinal joints	200 mm

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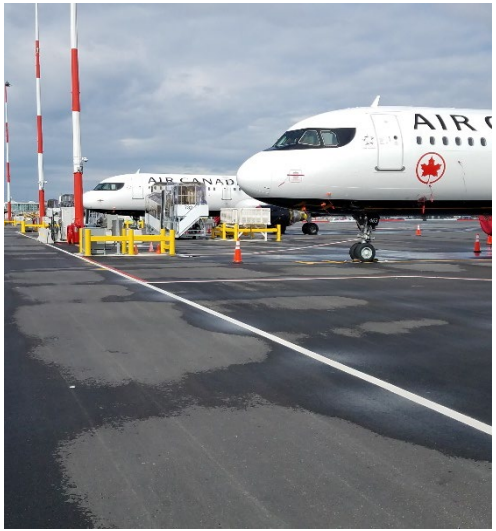
HMAC Paving Longitudinal Joints

+ Offset longitudinal joints in succeeding lifts by at least 200mm
+ Cold joint is defined as joint where asphalt mix is placed, compacted and left to cool below 120°C prior to paving of adjacent lane
+ If cold joint cannot be avoided, cut back by sawcutting previously laid lane, by at least 200 mm, to full depth vertical face, and tack face with thin coat of hot asphalt on adjacent lane

In-Service

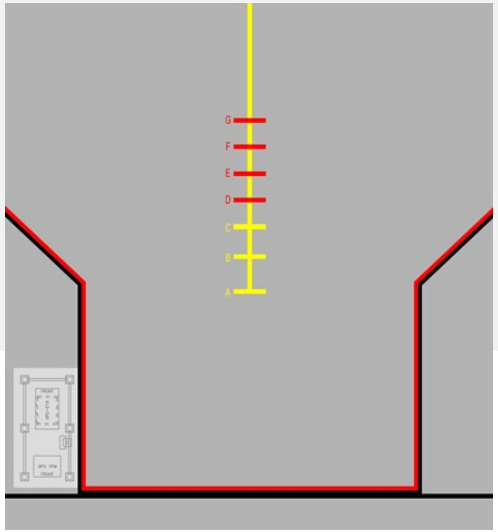
In-Service

Photo Credit: YVR



Long-Term Parking

- Domestic aircraft parking
- Overnight parking for international widebody aircraft
- GSE staging
- COBUS parking and charging
- Aviramp staging



Preservation through Innovation

+ Long-Term Parking Rotation Cycle
+ Aircraft Stand Capability / Restrictions
+ Minimize localized settlement
+ Rotated aircraft types
+ Rotated aircraft between stands

Thank you.

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