



Airbus A321s parked on the new remote stands to cater for unprecedented traffic growth | Copyright: Derek MacPherson

YVR East Apron VI Remote Stands

2020 Canadian Consulting Engineering Awards

HATCH

Higher-than-anticipated growth in passenger traffic at Vancouver International Airport resulted in the need to expedite the transborder facility expansion. With the cost and timeline of new or expanded buildings exceeding targets, a more economically viable solution was proposed, at almost a fifth of the cost per aircraft stand. Innovative engineering principles were used to minimize earthworks, safeguard the local environment, and accelerate construction; allowing Hatch to deliver the project within two years and under budget.

New narrow-body remote stand providing the airport with a much-needed increase in aircraft capacity

Innovation

Vancouver International Airport (YVR) has experienced significant strain on its facilities over the past several years from unprecedented growth in passenger numbers, more flights, and new airlines entering the market. With growth far exceeding forecasts, a solution was urgently needed to handle the expected traffic. By working together with YVR stakeholders, Hatch developed a fast-track solution during the planning stage – a new remote apron, completed within two years, providing ten AGN IIIb (i.e. Airbus A320), two AGN V (i.e. Boeing B777), and one AGN IV (i.e. Boeing B767) aircraft stands.

Delivering a major airfield project in two years that provides a new concept of operations for YVR was a significant challenge with continually changing and developing stakeholder requirements. In some cases, requirements were either not clearly associated with or even more stringent than published aerodrome standards, which led to significant changes throughout design and construction. Nevertheless, Hatch provided a safe and sustainable design for the public while still meeting the requirements of the Owner.

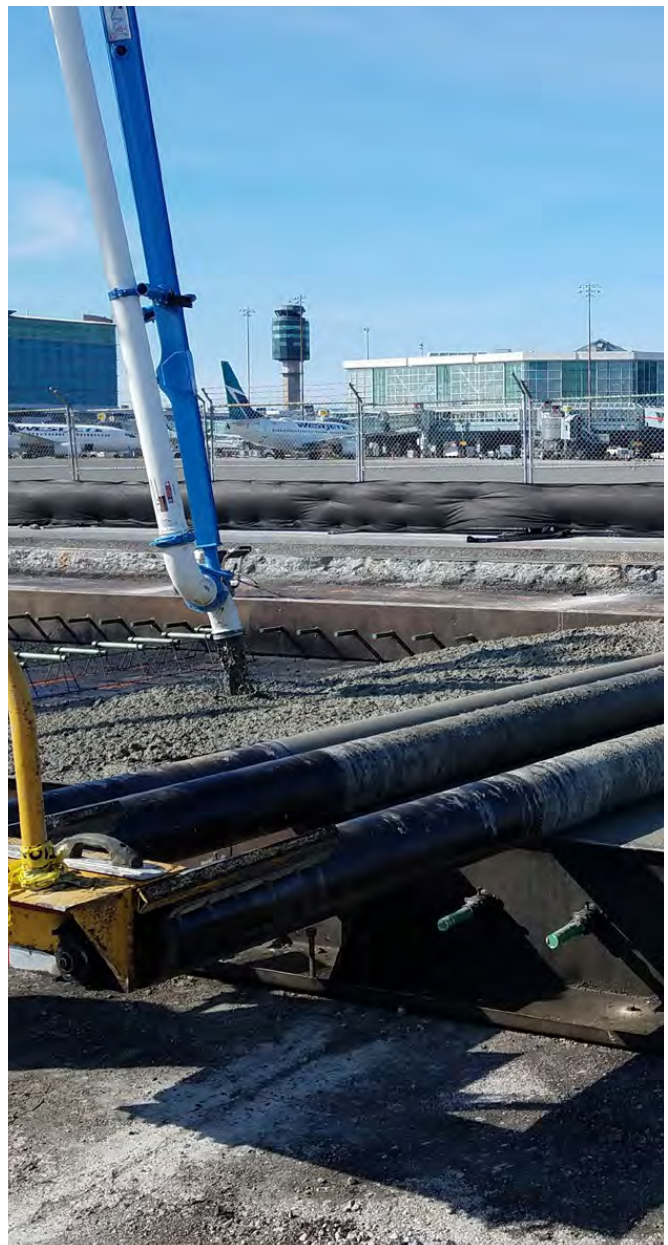
One of the most important time- and cost-saving decisions made by Hatch was to reuse and recycle the existing in-situ asphalt pavement structure as a subbase layer. This significantly minimized the need for excavation and hauling of material offsite, leading to major cost, time, and environmental benefits. Existing asphalt at the airport owned long-term parking was milled and left in place, and the apron was raised to ensure enough depth for a suitable pavement structure and utility network for aircraft loading and apron operations.

The new raised apron structure was supported by a lockblock retaining wall using mainly salvaged blocks from existing structures. The design and construction of the lockblock retaining wall minimized disposals and need of new processed materials, and hence cost and time, compared to a conventional retaining wall structure.



Winter weather paving in sub-zero temperatures to meet the fast-tracked project delivery schedule

Another important aspect that greatly benefited the overall project schedule was the wet- and cold-weather paving performed during the winter construction period. Most paving work at YVR is performed during the summer months to ensure the best quality of work is delivered. With the fast-track schedule of this project, a suitable winter weather paving methodology was put in place to ensure that identical paving work was delivered within the specifications expected by the Airport Authority. Following the methodology prepared by Hatch, almost four-hundred concrete slabs for the wide-body stands were poured during the winter months without affecting the integrity and performance of the pavement.



Concrete paving for the new wide-body stands with minimal disruption to active taxiways and aircraft gates

Complexity

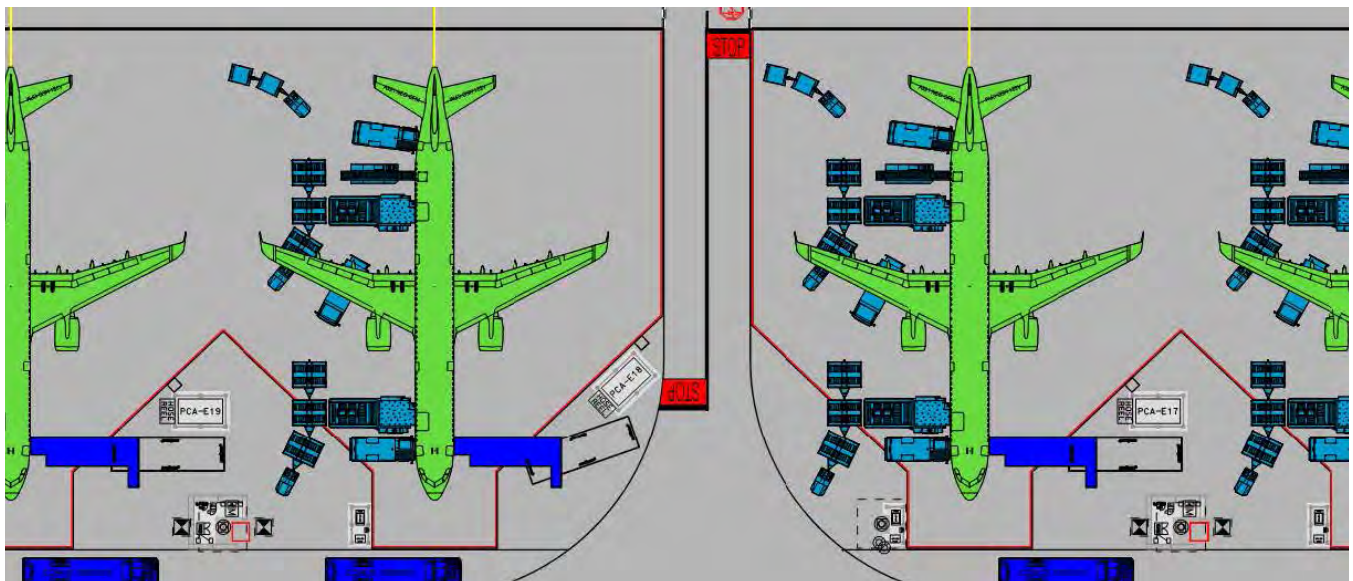
Delivering a major airfield project within two years with minimal effect on airside operations and aircraft capacity, and without airfield closures, is almost an impossible task on its own. Hatch worked closely with sub-consultants, contractors, suppliers, and stakeholders over the two-year period to ensure that the project was delivered on schedule and within budget, and that all requirements were met.

Splitting the work into different packages allowed construction to begin much earlier in the schedule, providing Hatch more time to design and coordinate critical components of the project while work was proceeding on site. This included the new closed-pipe drainage infrastructure and the optimization of the new apron in terms of staging areas, service equipment, and pavement design. With aviation related work being strictly regulated by federal authorities, every component had to be thoroughly checked against local Transport Canada and international regulations.

Phasing the construction ensured minimal disruption of airside operations over the duration of the project, even with record traffic numbers being achieved every quarter. One of the packages, for example, was phased into seven different work areas. Hatch was also able to ensure that airport planners and schedulers had the necessary aircraft parking capacity they needed on the airfield to support the unprecedented growth, even while reconfiguring the existing Apron VI. This was challenging for the consultants and contractors as all work areas had to abide by the very strict aircraft clearance requirements set by Transport Canada regulations, significantly limiting the available work space and access during construction.



Replacing a critical ditch system with a closed network, twin-piped, drainage network adjacent to an active airfield



Remote Aircraft Servicing at the New Narrow-body Stands

Social and/or Economic Benefits

The East Apron VI Remote Stands project was brought by the immediate need for additional aircraft capacity to support unprecedented passenger traffic growth at YVR. This increase is also a product of the significant economic and social growth witnessed over the past few years in Metro Vancouver, with more people and businesses moving into the region. With the addition of new capacity at YVR, the airport will be able to provide more flights and destinations to the public, furnishing the community with greater flexibility and more choice.

The initial plan was to construct a brand new transborder pier at the airport to meet the forecasted traffic demand. However, with the budget and schedule of the new building exceeding the set targets, a more economically viable

solution was proposed and accepted. The new remote stands were not only completed within two years (as opposed to at least five years for the new pier), but at only a fifth of the cost per aircraft stand. Further to this, the new remote stands now provide the airport with much higher transborder capacity.

Providing immediate additional capacity at a crucial port-of-entry such as YVR has a direct impact on the economic and social development of the region. With more frequent flight connections to important American and international cities, and other new destinations, the ability of communities and industries in the local and wider Pacific Northwest area to expand and create jobs is much more attainable in a convenient and affordable manner.



Increased capacity and traffic from new remote stands will benefit regional economic growth | Copyright: Vancouver Airport Authority - Social Media

Environmental Benefits

Even though the remote stands are an interim solution, the layout, pavement design, and infrastructure systems ensure the apron can be converted and integrated for future projects with minimal effort.

Surface grading and drainage were optimized to capture all surface water within the new drainage system, eliminating water runoff and waste. All the captured water passes through oil-water separators before entering the wider public system to ensure no harmful contamination (such as jet fuel) is transferred into the local environment. With the replacement of a critical ditch with a closed-pipe system and the accompanying reduced water storage capacity, a system-wide flood analysis of the YVR drainage network was performed with positive results.

Earthworks were optimized for a positive material balance, minimizing the need to haul material on and off site. Material hauled off site was tested for contamination and high metal concentration prior to disposal, whereas all new material was sourced locally. Furthermore, existing sand subbase was reused for the new concrete pavement structure, the Jetset parking lot asphalt was recycled as a subbase for the new flexible pavement structure, and crushed concrete was reused as a granular base fill.

Electrical buses were purchased by the Airport Authority to handle all flights to minimize the carbon footprint of bussing passengers to the remote stands. Ground service vehicle and bus charging stations were also installed to move away from fossil fuels and help the airport get closer to its sustainability goal of running a fully electric fleet of airside vehicles.



Installation of oil-water separator to capture harmful contamination, such as jet fuel, from surface water before it enters the public waterways

Meeting Client's Needs

Hatch worked closely with the YVR stakeholders to identify possible interim solutions that would be cost- and time-efficient for the airport expansion. These options ranged from simple expansions of existing holdrooms to phased construction plans of new buildings. The planning team concluded that a dedicated remote apron would be the best solution. To accommodate this plan, the airport would also have to change their operational and security procedures, and add new passenger holdrooms and bussing facilities. A strategy which Hatch has helped implement as part of other projects.

With the fast-track timeline to deliver the project and an already-congested airfield, we selected the partly airport-owned Jetset and rental car lots as the most suitable site for the new remote apron. Even though this decision saved

significant time and cost on expropriating or clearing large areas of land, it added significant scope to the project – replacing a critical ditch system in YVR's drainage network, reconfiguring the Jetset and rental car facilities, and relocating an entire rental agency to a brand new facility. The location and layout of the apron was also chosen with consideration to the YVR Master Plan and sustainability goals.

Despite major changes and challenges along the way, and the seemingly impossible task of completing the required work within just two years, the Client is quoted as saying: “Thankfully my fears were not realized, we completed the project on time and under budget – an achievement I attribute a great deal of to the outstanding work of the Hatch team.”



Remote servicing of a commercial Boeing 737 flight at a newly delivered stand. Passengers are transported to the aircraft from the terminal on fully electric buses.



Boeing 767 at new wide-body remote stand

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