



CANADIAN CONSULTING ENGINEERING AWARDS 2015

Runway 14-32 Reconstruction 2014

project category:
TRANSPORTATION

Project Information

Project name: Runway 14-32 Reconstruction 2014

Location of project: Ottawa Macdonald-Cartier International Airport, Ottawa, ON

Category: Transportation

ENTERING FIRMS

Firm name: WSP Canada Inc.

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Role in the project: Prime consultant

Member of the Association of Consulting Engineering Companies of Canada? : Yes

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Project Outline

Ottawa International Airport Authority desired to reconstruct its longest runway while implementing a number of safety-related infrastructure enhancements. Timely completion of this four-month, \$30M project was essential to minimize delays to travellers. At its peak the project employed over 200 construction workers working 24/7 and placed over 85,000 tonnes of asphalt. The project's essence is the enhanced level of aviation safety provided to the travelling public in the region. WSP was the project's prime consultant.

INNOVATION

The Ottawa Macdonald-Cartier International Airport Authority (OMCIAA) needed to close and reconstruct its longest runway '14-32', last resurfaced in 2000. The use of this runway is critical in inclement weather condition, driving the need for quick reopening. The project included: full-depth reconstruction of the 3048m x 60m runway and six associated taxiways; realignment of taxiways to improve operational efficiency/reduce runway occupancy time; replacement of the existing deteriorated drainage; and airfield electrical infrastructure. In addition, OMCIAA implemented a number of safety-related infrastructure enhancements including: Runway End Safety Areas (RESA) to reduce the risk of damage to aircraft overrunning or undershooting the runway; reconstruction of runway profile to improve drainage and reduce risk of water accumulation on the runway; chamfering of structures within runway graded area to reduce risk of damage to aircraft; and installation of new navigational aids to provide additional visual guidance to aircraft. The above needed to be achieved within four months while maintaining uninterrupted airport operations.

The design team studied a number of technical issues in detail for solutions conducive to quick implementation while maintaining infrastructure quality and longevity. Examples are as follows: modified construction specifications to incorporate locally available material while meeting stringent airfield pavement friction requirements (this includes consultation with experts from National Aeronautics and Space Administration - NASA); designed runway pavements for grooving and resistance to heavy slow-moving aircraft loads; undertook simulation of aircraft movement to optimize taxiways geometry; researched and implemented international airport design best practices related to RESA and underground chamfering; assessed OMCIAA maintenance requirements and site characteristics to specifically address aeronautical lighting installation details; determined optimum width of runway shoulders taking maintenance and operational needs into consideration; incorporated principles of sustainability to reduce project costs by recycling existing pavements and reusing excavated materials; and implemented the best practices for runway pavement line marking to improve durability and conspicuity to aircraft.

As a result, the newly reconstructed Runway 14-32 and associated facilities not only meet Transport Canada (TC) mandatory requirements but also conform to but exceed more stringent standards and recommendations set out by the International Civil Aviation Organization and the United States Federal Aviation Administration. Implementation of 150m x 300m RESAs, chamfering structures within the runway graded area, harmonized PAPI installations, variable brightness Runway End Indicator Lights are just a few examples of project elements exceeding current TC requirements. The final product is a safe, efficient and current.



COMPLEXITY

One of the most challenging aspects of implementing the project was ensuring the efficient and safe execution of construction activities while ensuring that the airport operations run smoothly. Runway 14-32 intersects Runway 07-25, thereby introducing complexity associated with maintaining safe and efficient airport operations. The project was essentially split into two construction sites with work on both sides of the operational Runway 07-25 being completed concurrently. The scenario created a significant risk of runway incursions (unauthorized access to operational runways) and jet blast impacts on construction activities. These risks were mitigated, however, by careful planning of the development and implementation of a complex Plan of Construction Operations (PCO) which was reviewed and accepted by all parties and consequently used to govern the construction operations on the active airfield.

The PCO was created by WSP in collaboration with the OMCAA, NAV CANADA, airlines, security companies and other stakeholders. One of the key technical considerations included in the PCO was the temporary change in the operational classification of Runway 07-25 to accommodate construction in the vicinity. This required consultation with NAV CANADA and resulted in temporary revisions to the Published Instrument Approach Procedures. This temporary change was critical in the timely completion of the project.



SOCIAL AND/OR ECONOMIC BENEFITS

The project's essence is the enhanced level of aviation safety that the newly reconstructed runway provides to the travelling public at the Ottawa airport. The new runway end safety areas, together with new grooved pavements and additional enhanced visual navigational aids, collectively contribute to the optimal safety of aircraft operations and travellers alike.

The newly reconstructed pavements and modern civil/electrical infrastructure will reduce the amount of maintenance required, significantly limiting maintenance-related runway closures. Fewer runway closures result in fewer aircraft delays and therefore, less inconvenience to travellers (social benefit) and lower fuel consumption for the airlines (economic benefit). The project results in economic efficiency and improved passenger comfort.

The project was fully executed by the Ontario-based design and construction teams providing sizable economic contribution to the nation's capital. The project construction at its peak involved over 220 owner, consultants and construction staff with over 100,000 accumulated work-hours.

As in the words of Mark Laroche, the Airport Authority President and CEO, "I am proud of the leadership that Ottawa has shown where runway safety is concerned. Safety has always been the Authority's most important priority, and this project exemplifies that commitment. My thanks to the entire team that made it happen. Once again, our community has supported a very important and necessary project. We know some communities were adversely affected by aircraft noise due to the closure of Runway 14-32. I would like to thank everyone for their patience and understanding now that operations are returning to normal."

ENVIRONMENTAL BENEFITS

Prior to the reconstruction project, the Ottawa airport's pavements on Runway 14-32 were demanding more frequent closures for maintenance and repair efforts. Closing the longest runway at the airport meant increased delays in aircraft operations, longer queues for arriving and departing aircrafts and more emissions produced from idling aircraft. The newly reconstructed Runway 14-32 will require fewer maintenance closures over the 20-year design lifespan of the infrastructure.

The project also encompassed improving the surface drainage, as well as replacing subsurface water collection infrastructure (catch basins, piping, ditches, etc.) along the sides of the runway and taxiways. The environmental benefit from this improvement is realized through collecting and disposing more effectively the spent glycol fluid that sheers off the de-iced aircraft during taxiing and take-off operations. The spent fluid is now collected and conveyed via the new underground infrastructure to Biological Treatment Units for treatment.

In addition, realignment and optimization of taxiways to improve operational efficiency and reduce runway occupancy time will also result in reduced emissions from taxiing aircrafts. Replacement of the existing deteriorated electrical infrastructure is also expected to result in increased efficiency and reduced electrical consumption.

Customized construction specifications to incorporate locally available materials have allowed the project to avoid the need to haul materials long distances, reducing transportation-related emissions during the construction phase.

Finally, existing pavements and reuse of excavated materials contributed to sustainability initiatives.



MEETING CLIENT'S NEEDS

The OMCIAA's primary objectives comprised of: full reconstruction of Runway 14-32 pavements to support current and future aircraft mix; taxiways realignment to improve operational efficiency and reduce runway occupancy time; replacement of the existing deteriorated drainage system and airfield electrical components; implementation of a number of runway safety-related enhancements including RESA, chamfering of structures and installation of new visual navigational aids. All of the above improvements needed to be achieved within four months and the \$30M budget while maintaining the uninterrupted airport operations.

The most significant client needs were completing the project on time and on budget to the stringent technical specifications while maintaining the safe operation of the airport and construction site. The project at its peak employed over 200 construction workers with up to fourteen (14) crews working often six and seven days per week and 24 hours per day to meet major project milestones. The project placed over 85,000 tonnes of asphalt (equivalent of 45km of two-lane highway), 400,000 tonnes of granular material, 8,500 metres of storm sewer and 20 km of electrical cabling. Despite heavy rains at times and airport operational requirements taking precedence over construction, the project remained on schedule and on budget throughout and the facilities were successfully reopened to aircraft traffic as originally planned.

"I was working the terminal this morning and the captain of Air Canada 447 (A320) CYOW-CYYZ took off and wanted me to pass along that "your guys did a very good job. The runway is very smooth".

- Michel Tremblay, NAV CANADA



ANNEX 1

CONSENT FORM



