



Billy Bishop Airport Ground Run-Up Enclosure

Canadian Consulting Engineering Awards
Transportation





SUMMARY

Billy Bishop Toronto City Airport (BBTCA) recently opened a Ground Run-up Enclosure (GRE) a three-sided, open-top facility, that absorbs noise during high power aircraft engine ground run-up inspections. WSP Aviation provided project management, planning, performance specifications and construction inspection. The project team designed the first GRE in Toronto and built this facility in a location with unceasing commercial and residential activities. Since the facility opened, the community has appreciated noise reduction from the airport.

PROJECT HIGHLIGHTS

INNOVATION

The GRE facility at Billy Bishop Toronto City Airport is only the second facility of its kind in Canada (the first one was built at the Vancouver International Airport). The interior walls of the GRE facility are lined with 1,726 acoustic panels designed specifically for the low frequency noise generated by aircraft engines. One of the main concerns expressed by the public was noise. Noise can be a result of acoustic reflections from materials used; therefore, the panels developed were designed specifically to absorb or “muffle” the low frequency noise created by aircraft engines thus eliminating the reflection concerns.



The other concern frequently raised various stakeholders was whether residents who reside on higher floors of high-rise residential buildings along the waterfront of downtown Toronto would also benefit from the reduction in ground run-up noise. The design team prepared acoustic calculations and exhibits that showed that the noise reduction benefits would go as high as the top levels of the CN Tower. The acoustic objectives were realized by developing an innovative design requirement that the north side of the GRE facility (the side the faces downtown Toronto) be the optimal height to meet the acoustic objectives while the south side, which face an area with a much lower population density, be reduced to a reasonable height that meets aerodynamic and acoustic requirements without straining the project budget.

The WSP team worked carefully in developing performance specifications for this project, selecting BDI as the preferred design-build contractor and then working with them in tailoring the facility design for Billy Bishop Airport. WSP drew on their previous experience from managing the design and construction of another GRE facility located at the Spirit of St. Louis Airport in Chesterfield, Missouri (USA). The U.S. and Canada-based WSP teams collaborated throughout all stages of the project ensuring that lessons learned from the previous GRE project were applied to this one as well. This coordination contributed to this project being deemed a success by our Client as well as all of the stakeholders involved in the project.



COMPLEXITY

The only vehicle access to BBTCA is a ferry that operates between the mainland and the airport and is entrenched in the Bathurst Quay and York Quay Neighborhood communities. WSP had to develop a creative solution to reduce the impact of construction activities on the waterfront neighbourhoods. This involved utilizing a temporary construction barge that would traverse between the industrial Port Lands and the south side of the Airport, thus eliminating construction traffic when bringing materials and equipment to the airport. Limited as-built information about the dock walls was available and water depths at the docking point were low, therefore the temporary barge dock and access point had to be engineered carefully. Avoiding impacts on Navigational Aids and the marine exclusion zone protecting the runways had to be considered in the design.

Due to delays in the execution of the agreement between the City of Toronto and PortsToronto, construction activities were shifted from mid-summer to the fall, creating a much smaller window to construct facility foundations before the inclement weather. WSP had to rely on information from real-time monitoring of construction activities to ensure that all measures were being taken by the contractors to keep the project on schedule. A jobsite camera mounted onto a 12m post tall powered by a solar voltaic system took images that were uploaded to a project website every 10 minutes, 24 hours per day.

Regular images from the camera helped the construction team recover the schedule, so the facility was completed as originally planned.



SOCIAL AND/OR ECONOMIC BENEFITS

As a good community neighbour, the BBTCA is continuously working to minimize operational impacts on the surrounding communities. While regulated as part of standard aircraft maintenance, aircraft engine run-ups at the airport can be a disturbance to the community as testing is often done at high power creating significant noise which can be bothersome to neighbouring residential and commercial communities. The objective of this project was to reduce the impact of noise during aircraft engine run-ups in the neighbourhood. To do so, PortsToronto has undertaken the construction of a GRE facility, which is the most effective and modern infrastructure / technology solution for reducing noise during aircraft engine run-ups. Acoustically and aerodynamically designed, a GRE can dramatically dampen the acoustic impact from engine run-ups, maximizing usability in varying wind conditions. The facility was constructed on the southwest side of the airfield. The location was chosen with the goal of keeping the facility as far away from the neighbourhood as possible while at the same time taking Airport's operational constraints into consideration. The GRE was also built with the intention of minimizing the disturbance in day to day operations in the neighbourhood. The project team maximized the use of a temporary barge dock to transport materials and equipment for construction, which tremendously reduced construction traffic. This barge dock remains operational for the 3-year long Airfield Rehabilitation Program at the BBTCA.

ENVIRONMENTAL BENEFITS

The airport is home to commercial airlines, general aviation aircraft, and aircraft maintenance activities. Prior to aircraft getting back into service, ground engine run-ups are often necessary (and mandated by Transport Canada) which include bringing the engines to high speeds while on the ground. These tests generate significant noise that affect the surrounding neighbourhoods. While the Airport has limited the timing and frequency of the tests to the extent possible, a number of noise complaints were traditionally received related to these tests.

With the construction of the new GRE, the majority of these run-ups can now be undertaken inside the facility. To verify the facility effectiveness on reducing the noise from the engine run-ups and to ensure that contractual requirements were met, acoustic acceptance testing of the facility was completed in accordance with ANSI 12.8-1998, "Methods for Determining the Insertion Loss of Outdoor Noise Barriers." The acoustic measurements completed after the construction of the facility have shown that the GRE performance surpassed an arithmetic average insertion loss of 15 dBA (in fact the average of 19.1 dBA was achieved). Since this facility was put into service, there was not a single noise complaint received to date by the Airport related to engine run-up operations, whereas these types of complaints were constant in the years prior. Reducing noise pollution emanating most especially from aircraft engine run-ups has, therefore, been achieved.





MEETING CLIENT'S NEEDS

WSP's project management team played a significant role in all stages of the project. In the planning stages, the team worked diligently with PortsToronto's staff in securing support for the project from the public and the airport stakeholders (including securing the Consent Agreement with the City of Toronto). The PM team delivered presentations at a number of stakeholder and public consultation sessions. They prepared visual material including renderings that were created using real photography from six different locations around the Airport to demonstrate that the facility would not create a visual detriment to the public enjoying the Toronto's waterfront. The team worked on preparing performance specifications for the GRE facility and worked closely with the pre-qualified design-builder, Blast Deflectors, Inc. (BDI) and the General Contractor Pave-AI Ltd., to ensure that design and construction were completed on schedule and within the available budget. At the same time, the PM team was mandated by PortsToronto to find solutions to reduce the impact of construction traffic in neighbouring communities. A temporary marine dock was then created to transport material and equipment by barges from the Port Lands to the Airport (which is located on the island). This effort eliminated a large number of trucks which would otherwise use the roads in the neighbouring communities.

The BBTCA Ground Run-up Enclosure was solely intended to reduce the acoustic impact of ground run-ups performed at the Airport. BBTCA has received compliments from community members who noticed and appreciated the reduction in noise.

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