



CASE STUDY:

BILLY BISHOP

TORONTO CITY AIRPORT

AIRFIELD REHABILITATION PROGRAM



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I. Introduction

In September 2018, PortsToronto, owner and operator of Billy Bishop Toronto City Airport, completed the Billy Bishop Airfield Rehabilitation Program – a significant three-year project that included the reconstruction of aging runways, taxiways and aprons, a complete LED airfield lighting and signage retrofit, and the construction of a Ground Run-up Enclosure (GRE) designed to dampen the noise associated with high-power aircraft engine ground run-up operations required and regulated by Transport Canada as part of standard aircraft maintenance.



The program has completely modernized the entire airfield with energy-efficient lighting and significantly enhanced the airport's noise management program with a nearly 100 per cent reduction in noise complaints related to engine run-ups since the GRE came into service. Further, the innovative way in which the program was implemented ensured that construction work was practically invisible to passengers, carriers and the surrounding airport community which can be attributed to innovative planning and thorough community consultations.

The Airfield Rehabilitation Program serves as a case study for other urban airports looking to develop similar programs to mitigate the impacts of operational and construction related impacts on the community and the environment.

II. Challenges

The airfield rehabilitation program was one of the most complicated construction operations ever undertaken by our organization with challenges ranging from the airport's location on an island, merely 300 metres from a thriving downtown community and waterfront, to not having the option to simply close down a runway during construction activities as the airport has only one primary commercial runway and a limited seven-hour window each night to work while the airport was closed to commercial operations.

Further, Billy Bishop Airport is one of the most noise-restricted airports in North America. As such, the airport runs a comprehensive Noise Management Program and observes operational best practices that reduce and limit the noise from airport operations to be respectful to the community.

III. Solutions

A) Introduction of a Ground Run-Up Enclosure

To further enhance the airport's Noise Management Program, the airfield project included the addition of a Ground Run-Up Enclosure (GRE), designed to dampen the noise associated with high-power aircraft engine ground run-up operations. While required and regulated by Transport Canada as part of standard aircraft maintenance, engine run-ups have been cited by the community as a primary source of noise as testing is often done at high power. For example, in 2013, 161 noise complaints related to engine run-ups were received, which made up 32% of all noise complaints that year.



Standing 14-16 metres in height, the three-sided, open-top facility is located on the south-west side of the airfield and is only the second of its kind in Canada. The enclosure effectively absorbs noise with specialized acoustic panels that line the interior of the three walls, which feature vents for optimal aerodynamic performance.

Did You Know?

The Ground Run-Up Enclosure facility's three walls are lined with approximately 1,750 sound-absorbing panels supported by an external frame.



B) Innovative and Sustainable Implementation

Given that the majority of airfield construction activities took place overnight when the airport was closed to commercial and general aviation air traffic, the Airfield Rehabilitation Project was implemented with an innovative approach to minimize the impact on air quality, in this case noise, light and emissions from construction and traffic on the community.



These measures included a barging operation that moved materials via water from the Port Lands, quietly across the harbour to a temporary dock located on the east side of the airport. Over the course of the three years the project was underway, the floating barge, which could accommodate 16 trucks made 400 trips across the lake accounting for 6,000 fewer truck movements via the airport neighbourhood's roadways, reducing vehicle noise and emissions.

Did You Know?

To avoid disrupting the airport's surrounding community during the Airfield Rehabilitation Project, Billy Bishop Airport made use of PortsToronto's barges to transport construction materials across Toronto's Harbour.

Operating in full compliance of the City of Toronto night work noise by-laws, additional measures to reduce the impacts of construction on the surrounding community included casting project lighting downward and away from the city to avoid disturbing those in residential buildings, as well as reconfiguring construction activities and traffic to minimize reversing equipment and vehicles and the associated use of back-up alarms which further aided in reducing disturbances from noise and light.

Additionally, the overall project plan incorporated multiple individual project elements into a single construction contract that would otherwise have been completed over a longer construction period and by numerous contractors, thus reducing the overall impacts of construction.

C) Local Procurement

As part of PortsToronto's Sustainable Procurement Policy that seeks out businesses that share our commitment to sustainability, including local procurement where feasible, the construction of the GRE included a team of local Greater Toronto Area (GTA) contractors including general contractors Pave-All Ltd. of Mississauga, Tri-Star Inc. of Mississauga responsible for installing electrical and communications infrastructure, Specialized Metal Fabricators of North York responsible for assembling the acoustic panels, Scott Steel of Burlington responsible for erecting the steel for the facility and Belmont Concrete of Toronto, responsible for constructing the concrete apron for the facility. The lead engineering consulting team, WSP Canada, were also Toronto-based.

D) Re-Use of Materials

The quantity of earthworks required for the project was also reduced through specific pavement design strategies including the re-use of quality granular material from the existing pavement structure. In addition, a large quantity of asphalt millings was re-used in the construction of new facilities such as the airside perimeter roads, offsetting the total volume of new granular material required.



Did You Know?

Approximately 20,000 tonnes of recycled asphalt millings were reused for various projects such as the construction of the airside perimeter roads.

IV. Implementation

Much of the Airfield Rehabilitation Program's successful implementation can be attributed to thoughtful collaboration with community, government and airport stakeholders, project teams and partners. This process provided an honest, effective dialogue between PortsToronto and its neighbours that allowed for all parties to listen, be responsive, and identify and implement solutions to mitigate the effects of construction-related disturbances, both during the project and in the future.

A) Community and Stakeholder Engagement

As part of our efforts to reach out to residents and businesses in the community on the rehabilitation project, a comprehensive outreach plan was developed that included a project-specific website (www.BillyBishopAirfieldProject.com). This website was updated weekly over the course of the three-year program and provided community and government stakeholders with detailed information related to project developments and milestones. The website included weekly photos, time-lapse videos, a comprehensive GRE FAQ document that addressed specific community questions, as well as a direct line of contact for project-related queries. Community members were encouraged to sign up for updates which allowed an ease of information sent directly to interested parties in a concise and easily accessible format.



PortsToronto facilitated two public meetings regarding the construction of the GRE in 2016. These consultations were held in concert with the City of Toronto and our Community Liaison Committee (CLC), established in 2010 to provide our neighbours, local politicians and businesses with a forum for discussing issues and concerns related to airport operations. These public meetings included presentations, the display of project renderings and 3D models, and direct engagement with the community on questions pertaining to the planned GRE facility.

Additionally, a standing agenda item was included at quarterly CLC meetings from the pre-planning stages in late 2015 until the end of the project in 2018. PortsToronto also provided the local federal Member of Parliament, City of Toronto Mayor and City Council with individual briefings and direct letters regarding the program. Additionally, PortsToronto engaged with Fisheries and Oceans Canada to gain approval on the installation of a temporary dock on the east side of the airport to allow for the transportation of equipment and materials via waterway.

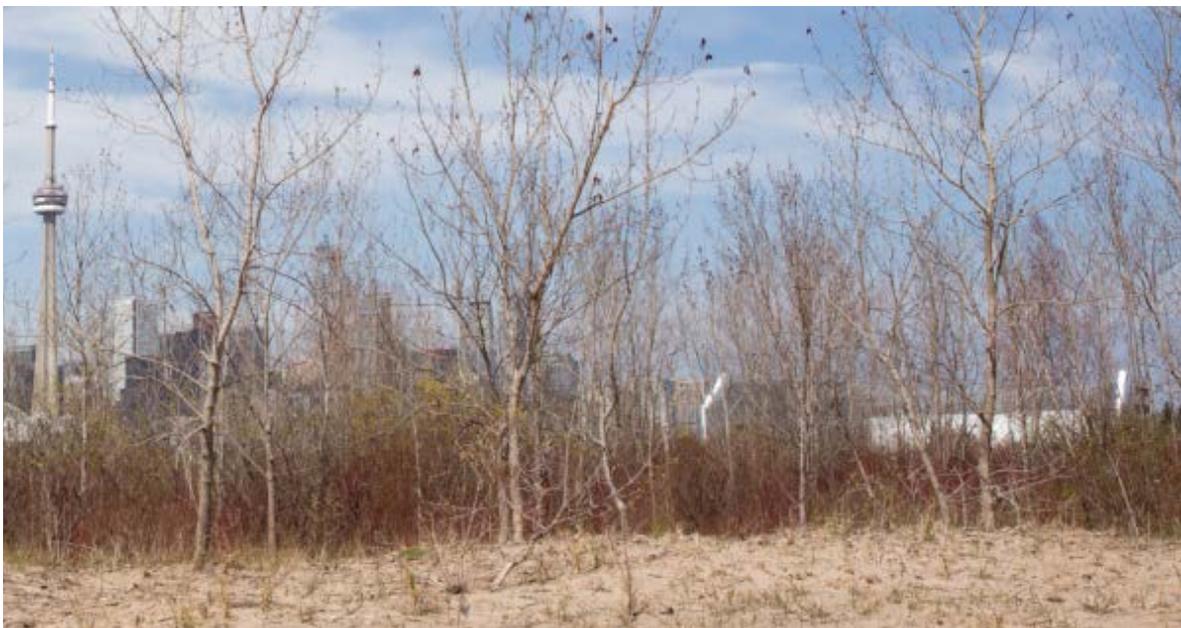
B) Unhindered Public Views of the Natural Landscape and Tree Canopy

During the June 23, 2016 public consultation, PortsToronto presented renderings of the GRE facility super-imposed from six different public vantage points along the waterfront to illustrate how the facility would blend in with the landscape and overall tree canopy. Additionally, to protect the natural aesthetic of these waterfront views, the facility's colour scheme was carefully considered to ensure the GRE would not be an 'eye sore' to the general public. The below images demonstrate how the original GRE rendering and the GRE facility that is in place today appear exactly the same.

The first image is a photorealistic rendering of the GRE facility that was created using 3D modeling software to present a realistic visualization of a potential future condition.



The second image is an actual photograph taken from the same vantage point after the GRE was constructed.



C) Engagement through Interactive Demonstrations

During the June 28, 2016 community meeting, a representative from Blast Deflectors Inc. (BDI), world-leaders in GRE development, provided an interactive session with sample acoustic panels to demonstrate how the facility would absorb, and not amplify, noise related to engine run-ups, which had been cited as a primary concern by some members of the community.

D) Archeological Assessment

PortsToronto engaged and consulted with First Nation and Métis communities that have an interest in projects on land and water within PortsToronto's jurisdiction and met with the Mississaugas of the New Credit First Nation community in late 2015 and early 2016 on the planned GRE facility and the three-year airfield program. Mississaugas of the New Credit field archaeologists accompanied PortsToronto and consultants on an archaeological assessment in May 2016 on the site of the planned GRE facility. The assessment concluded that there was no evidence of archaeological materials on site and the Stage 1 Archaeological Assessment report was filed with the Provincial Government and the City of Toronto. PortsToronto received a letter from the Provincial Government in 2016, confirming the Stage 1 Archaeological Assessment was complete and that works could proceed at the GRE site, pending any archaeological finds during excavation. During the Stage 2 Archaeological Assessment field investigation, which included representatives from Mississaugas of the New Credit, it was concluded that no artefacts were found.

E) Partners in Excellence

PortsToronto worked together with our airline partners to effectively manage operations and ensure that passengers were impacted as little as possible by construction work.

As referenced in the study, only one six-minute delay in reopening the runway was experienced over the course of the three-year project. While certainly an impressive statistic, it is also a validation of the careful thought, innovation and engagement that went into executing the program.



This accomplishment could not have been achieved without the support of our award winning commercial air carriers, Porter Airlines and Air Canada. Ongoing cooperation from our carriers continues to help us implement effective noise mitigation policies and practices, and throughout the airfield project, both carriers worked together with PortsToronto to ensure the success of the program's implementation, as well as the GRE and the associated 100 per cent reduction in engine testing complaints last year.

Did You Know?

Over the course of the three-year project, construction crews completed over 3,000 hours of night time work.

V. Results

From the project's inception to its completion, every aspect of the program was thoughtfully planned and executed by PortsToronto. In fact, despite the complexities involved in carrying out the work, the program was completed on budget, 60 days ahead of schedule, with only one six-minute delay reopening the runway (which did not impact any aircraft movement), and just two community complaints received over the course of three years.

The airfield rehabilitation program was one of the most difficult projects ever undertaken by our organization. However, with detailed planning and coordination, innovative thinking and thorough community and stakeholder engagement, we received only two complaints from the community related to noise and lighting disturbances over the course of the three-year project.

A) Only One Aircraft Delay

From an operations standpoint, the project was virtually invisible to passengers. In fact, only one six-minute delay reopening our runway was experienced in the three years the project was underway. To put this into perspective, work began every evening after the last flight was in at 11:00 p.m., and the runway was clear and operational for start-up at 6:45 a.m. the next day. Nearly from start to finish, the airfield rehabilitation was seamlessly executed. For context, Billy Bishop Airport operates under a curfew that closes the runway to commercial and general aviation traffic at 11:00 p.m. Only emergency and air ambulance services can use the runway between 11:00 a.m. and 6:45 a.m. as stipulated by our operational contract. With our main runway effectively closed at night, the vast majority of construction activity took place overnight so as not to interfere with aircraft movements.

B) No Noise Complaints Related to Engine Run-Ups

Since the Ground Run-Up Enclosure (GRE) facility was opened in April 2017, the GRE has immediately and significantly reduced the acoustic impact of engine runs-ups on the surrounding community. The GRE design requirement aimed to reduce the noise impacts of engine run-ups by 15db. However, the actual acceptance tests have shown a reduction in reduced noise impacts from engine run-ups of 18db, **exceeding the requirements by 20 per cent**. Further, in 2016, the airport received 36 complaints related to engine run-ups, while in 2017, the airport received only one complaint related to engine run ups – a 97.7 per cent reduction. **In 2018, there were no complaints related to engine run-ups – a 100 per cent reduction from 2016**, prior to the facility being put into operation. In addition to this positive data, we have received encouraging feedback from the community who have indicated their satisfaction with the facility's performance.

C) 100 per cent LED Lighting Retrofit

The rehabilitation project included replacing all of the airfield lighting with energy efficient medium and high high-intensity LED lighting, as well as the installation of new runway inset centerline lighting to provide additional guidance to pilots on approach especially during periods of low visibility. In total, 345 old incandescent lights were replaced with new energy efficient LED elevated airfield lights. In addition, 80 new LED inset lights were added to the runway and taxiways and 70 old incandescent airfield guidance signs were replaced with new LED signage. Further, inset lighting is equipped with snow-plow rings to protect the lights from damage during snow removal operations.



This substantial energy retrofit provides both an improved safety component to operations and an environmental benefit including a reduction in overall energy consumption. Moreover, our airline carriers have indicated that they have heard from their pilots who immediately recognized

Did You Know?

Over 20 kilometers of new power cables were installed during the rehabilitation project.

D) Sustainable Design

Through a combination “shave and pave” process and full reconstruction methods, the airfield project replaced the existing pavement which was mostly built in the 1960s, and restored the majority of airfield surfaces, including the active main runway, taxiways and apron area. The newly resurfaced main runway now features pavement grooving that allows aircraft to slow down more rapidly in wet conditions, which in turn, can result in shorter taxiing distances, reducing fuel consumption.

In addition, the pavement grooving evaporates water on the runways more quickly reducing the potential for flooding and aircraft hydroplaning. The efficacy of this design element was put to the test during the spring of 2017 when the city of Toronto experienced record-breaking high-water levels, specifically on Toronto Island where Billy Bishop Airport is located. The Island saw some of the worst flooding in history with baseball diamonds literally turned into small lakes and all tourist attractions closed for the season. Yet, at Billy Bishop Airport, it was business as usual as the new runway grooving helped to keep runways dry and operations unaffected.

E) Overall Improvements

While components of the rehabilitation program are relatively new, we are already experiencing significant benefits as a result of the project. From improving air quality as it relates to noise and emissions to modernizing airport infrastructure to make it more environmentally sustainable, this project represents a key investment in both the long-term future of the airport and in the community in which we operate.



From the Airfield Rehabilitation Program's development and implementation to the positive results demonstrated by the introduction of the GRE facility, the initiatives, policies and innovative measures detailed in this study have the potential to be implemented by other airports with a single runway configuration who wish to implement complex construction projects with minimal impact to their communities and airport operations.

VI. Cost

The Billy Bishop Airfield Rehabilitation Program, including the construction of the GRE facility, was completed on budget at a cost of \$35 million – paid for by PortsToronto through the Airport Improvement fund and not taxpayers. The value and efficacy of the rehabilitation program can best be proven by the positive results outlined in this case study.

It is impossible to put a monetary value on the work we do with the community and our stakeholders to mitigate the impacts of our operations. Without the important dialogue with our neighbours, it is highly likely that the airfield rehabilitation project would not have been implemented as effectively. In the years ahead, we will continue to strive to achieve balance by adhering to a managed growth approach and working to mitigate the impacts associated with running an airport.

VII. Conclusion

A positive future for our airport, our neighbourhood and our environment are behind all of our sustainability efforts including the work we do to minimize the impact of our operations on the surrounding community. It is through this lens that PortsToronto developed and successfully implemented the Airfield Rehabilitation Program.

As outlined in this study, the success of the Billy Bishop Airfield Rehabilitation Program can be attributed to innovative planning and thorough consultation with all stakeholders, airline partners and tenants. The environmental benefits of the rehabilitation program as well as the unique measures implemented during the project to mitigate construction-related disturbances on our passengers and community neighbours present a unique and valuable case study for other urban airports looking to implement a project of this scope and magnitude.