Ground Run-up Enclosures for Commercial, General Aviation & Military Aircraft

Reducing Airport Noise and Improving Safety Since 1957
BDI pioneered a cost-effective, technologically-advanced solution for ground run-up noise attenuation. We offer ground run-up enclosure (GRE) facilities that use patented components, proven designs and a spotless track record of successful installations. BDI’s philosophy is to balance project requirements with practical solutions.

**Planning & Design Support**
- Ground run-up noise assessments
- Photorealistic renderings for communicating concepts to stakeholders
- Support for FAA Part 150 studies, airspace studies, obstacle free conflicts, aerodynamic usability, etc.

**Engineering**
- Continuous innovation using computational fluid dynamics (CFD) and finite element (FE)
- Computer aided design (CAD) and 3D structural models for BIM integration
- Local code compliance of concrete foundations, anchoring systems and structural design

**Fabrication & Supply**
- ISO 9001:2015 certification ensures that the highest quality standards are followed
- Global manufacturing capability offering the highest quality materials and production techniques
- Custom-manufactured solutions to meet unique project requirements

**Delivery**
- GRE material delivered to any location in the world via truck, rail, ocean or air freight
- All material is professionally packed in easily-handled bundles
- Project management team oversees design, delivery and construction to meet schedules and deadlines

**Installation**
- BDI’s staff of field technicians provide site assistance to ensure a smooth and efficient installation
- Our diverse capabilities enable BDI to offer turnkey installation service
- All BDI projects are backed by a performance guarantee and material warranty

**Performance Verification**
- Upon completion of an installation, BDI can assist with field validation of the GRE performance
- Field measurements of jet blast exhaust, air flow and acoustic performance are compiled into a report
- BDI’s R&D department uses field data to develop new products and solutions

**Support**
- Spare parts and replacement components are stocked at various BDI facilities around the world
- Refurbishment program to evaluate and repair older facilities to extend service life
- Archives of documentation and details from more than 1,500 past projects available

“**BDI’s extensive knowledge of acoustics and aerodynamics, along with an extraordinary commitment during the design and construction phases, were critical factors in the overall success of the project.**” - Airbus Group

Martin Tzschichhold | Project Manager
BDI’s approach is based on providing our customers with the highest quality products and services that match our international reputation of performance and value earned over the last 60 years. This reputation includes technically-sound designs, timely deliveries, professional installation and outstanding post-project customer service.

The combination of the aerodynamically advanced Stabile Flow™ design with the effectiveness of Noise Blotter™ acoustic panels provide an aerodynamically efficient GRE with very high usability and outstanding noise reduction.

BDI can design and build ground run-up enclosures for any aircraft mix including commercial, general aviation and military.

BDI utilizes the latest aerodynamic, acoustical and structural software packages, combined with scale modeling and field measurements, to ensure project requirements are met.

Let us assist you with your project by providing a complimentary analysis demonstrating how BDI’s GRE technology can mitigate a specific ground run-up noise challenge.
# EXTRACT OF BDI PROJECTS AROUND THE WORLD

## Americas

**Argentina**
- Buenos Aires

**Brazil**
- Goiania

**Canada**
- Abbotsford
- Calgary
- Cold Lake
- Edmonton
- Josephburg
- Montreal, Dorval
- Montreal, Trudeau
- Ottawa
- Puvirnituq
- St. John's

**Chile**
- Santiago

**Colombia**
- Bogotá

**Cayman Islands**
- Grand Cayman

**Panama**
- Panama City

**Trinidad & Tobago**
- Trinidad

**USA**
- Akron
- Albany
- Albuquerque
- Altus AFB
- Anchorage
- Andrews AFB
- Atlanta
- Atlantic City
- Austin
- Baltimore
- Bangor
- Barksdale AFB
- Battle Creek
- Beale AFB
- Beaufort, MCAS
- Birmingham
- Boca Raton
- Bradley
- Buffalo-Niagara
- Burbank
- Carlsbad
- Cecil Field, NAS
- Charleston
- Charlotte
- Chennault/Lake Charles
- Cherry Point, MCAS
- Chicago, Midway
- Chicago, O'Hare
- China Lake
- Chino
- Cleveland
- Colorado Springs
- Columbus
- Dallas, DFW
- Dallas, Love Field
- Deer Valley
- Denver
- Des Moines
- Detroit
- Dobbins AFB
- Dyess AFB
- Edwards AFB
- Eglin AFB
- Eielson AFB
- Ellsworth AFB
- Elmendorf AFB
- Fairbanks
- Fairchild AFB
- Fallon, NAS
- Flint
- Fort Bliss
- Fort Dix
- Fort Worth
- Glendale
- Grand Forks AFB
- Grand Junction
- Grand Rapids
- Greensboro
- Greenville
- Grissom ARB
- Harrisburg
- Hawthorne
- Hickam AFB
- Hill AFB
- Holloman AFB
- Honolulu
- Houston, Bush
- Houston, Hobby
- Huntsville
- Independence

**Indiana**
- Indianapolis
  - Jacksonville, Cecil
  - Jacksonville, Int'l
  - Jacksonville, NAS
  - Keanoe Bay, MCAS
  - Kansas City
  - Killeen
  - Knoxville
  - Kona
  - Kulis
  - Lafayette
  - Las Vegas
  - Laurel
  - Leigh Valley
  - Lemoore, NAS
  - Lexington
  - Lihue
  - Little Rock
  - Long Beach
  - Long Island
  - Los Angeles
  - Louisville
  - Madison
  - March AFB
  - Marietta
  - Martinsburg
  - McAllen
  - McConnell AFB
  - McGuire AFB
  - Melbourne
  - Memphis
  - Mercedita
  - Miami
  - Milwaukee
  - Minneapolis
  - Mobile Brookley
  - Moffett Field
  - Mojave
  - Monterey
  - Montgomery
  - Moody AFB
  - Morristown
  - Mountain Home AFB
  - Naples
  - Nashville
  - Nellis AFB
  - Nevada Test Site
  - New Orleans
  - New York, JFK
  - New York, LaGuardia
  - Newark
  - Newcastle
  - Norfolk
  - Oakland
  - Oceana, NAS
  - Omaha
  - Onslow
  - Ontario
  - Oscoda
  - Palmdale
  - Patuxent River, NAS
  - Pensacola
  - Philadelphia
  - Phoenix
  - Pittsburgh

**Point Mugu, NAS**
- Portland (Maine)
- Portland (Oregon)
- Providence
- Portsmouth
- Randolph AFB
- Reno
- Republic
- Roanoke
- Robins AFB
- Rochester
- Sacramento
- Saginaw
- Salt Lake City
- San Antonio, Int'l
- San Antonio, Kelly
- San Diego
- San Francisco
- San Jose
- Santa Monica
- Sarasota
- Savannah
- Scott AFB
- Scottsdale
- Scranton
- Seattle, Boeing Field
- Seattle, Everett
- Seattle, Renton
- Seymour Johnson AFB
- Shav AFB
- Sikorsky
- South Bend
- St. Augustine
- St. Joseph
- St. Louis
- Stewart
- Tallahassee
- Tampa
- Tinker AFB
- Tonopah
- Travis AFB
- Truckee
- Tucson
- Tulsa
- Tyndall AFB
- Van Nuys
- Victorville
- Washington, Dulles
- Washington, Reagan
- West Palm Beach
- Westchester
- Westfield-Barnes
- Whidbey Island, NAS
- Wichita
- Wilmington
- Wright-Patterson AFB
- Yuma, MCAS

**GRE Locations**
GLOBAL PRESENCE IN OVER 55 COUNTRIES

EUROPE
Austria
Vienna
Bulgaria
Sofia
Czech Republic
Prague
Estonia
Ämari Air Base
France
Bordeaux
Paris, CDG
Toulouse
Germany
Augsburg
Berlin Schönefeld
Berlin Tegel
Dortmund
Finkenwerder
Frankfurt
Friedrichshafen
Hanover
Köln
Munich
Ramstein AB
Saarbrücken
Hungary
Budapest
Iceland
Reykjavík
Ireland
Dublin
Shannon
Italy
Aviano AB
Bologna
Cameri AB
Naples
Latvia
Lielvārde AB
Riga
Lithuania
Zokniai AB
Luxembourg
Luxembourg
Netherlands
Schiphol
Norway
Oslo
Portugal
Lisbon
Porto
Romania
Camp Turzii AB
MK Air Base
Russia
Moscow Sheremetyevo
Spain
Almeria
Barajas
Granada
Ibiza
La Coruna
Lanzarote
Madrid
Moron AB
Murcia
Seville
Tenerife
Zaragoza
Switzerland
Basel
Bern
Stans
Zurich
United Kingdom
Birmingham
Brough
Broughton
Cambridge
Exeter
Lakenheath, RAF
Liverpool
London, Luton
London, Stansted
Manchester
Mildenhall, RAF
Norwich
Warton
MIDDLE EAST / AFRICA
Algeria
Algiers
Afghanistan
Bagram
Kandahar
Bahrain
Manama
Djibouti
Camp Lemonnier
Egypt
Beni Suef AB
Cairo
Fayid AB
Helwan AB
Ethiopia
Addis Ababa
Iraq
Al Asad AB
Balad AB
Jordan
Amman
Kuwait
Al Jaber AB
Kuwait
Morocco
Ben Guerir AB
Oman
Adam AB
Al Musannah AB
Thumrait AB
Qatar
Al Udeid AB
Doha
Saudi Arabia
Dhahran AB
Dammam
Jeddah
King Faisal AB
Medina
Riyadh
Turkey
Incirlik AB
Istanbul, Ataturk
Istanbul, Grand Airport
Istanbul, Sabiha Gokcen
United Arab Emirates
Abu Dhabi
Al Ain
Al Dhafra AB
Dubai, DWC
Dubai, DXB
ASIA / OCEANIA
Afghanistan
Bagram
Kandahar
Australia
Amberley, RAAF
Darwin, RAAF
Hobart
Melbourne
Newcastle-Williamtown
Sydney
Tindal, RAAF
China
Hong Kong
India
Hindon
Mumbai
Nagpur
Diego Garcia
Japan
Iwakuni AB
Kadena AB
Komaki
Misawa AB
Korea
Kunsan AB
Osan AB
Sacheon
Seoul
Suwon AB
Malaysia
Kuala Lumpur
Labuan
Subang
Pakistan
Lahore
Karachi
Philippines
Manila
Singapore
Changi
Paya Lebar
Seletar
Sudong
Tengah
Sri Lanka
Colombo
Taiwan
Taipei
Thailand
Bangkok
Turkmenistan
Ashgabat
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Running aircraft engines at high power settings while stationary can be challenging for various reasons:

- Aircraft engines require smooth and turbulence-free air
- Modern aircraft are efficient and powerful, and the latest turbofan engines use high bypass ratios with larger fan diameters that are closer to the ground than previous generation aircraft, which can create significant aerodynamic challenges
- Ground-running aircraft in a GRE is more complicated than open-field conditions due to the fixed facility orientation, tall acoustic walls, and atmospheric conditions
- Successful ground-running of aircraft engines requires avoiding turbulence at the nacelle (inlet)

**BDI’S SOLUTION**

Through the use of scale model testing, computational fluid dynamics (CFD) and field evaluation of more than 30 completed facilities, BDI’s GRE facilities have innovative aerodynamic features that maximize facility usability.

“Users of the Billy Bishop Toronto City Airport are able to successfully test aircraft inside the BDI GRE in almost all wind conditions ensuring excellent facility usability.” - PortsToronto

Bojan Drakul | Manager – Infrastructure, Planning and Environment
GRE aerodynamic design is a critical factor in usability. An aerodynamically efficient, curved jet blast deflector at the rear of the GRE redirects the jet blast vertically and maintains the jet efflux momentum to drive the flow inside the facility.

Our 3-sided GRE design starts with sloped entry walls with a rolled top to improve airflow into the facility and eliminate vortex formation, due to separation, at the front and top of the side walls.

Our 4-sided GRE design uses large, vented front gates with sufficient open area to supply the necessary air into the facility. The side walls of our GRE facilities use large, acoustically-treated vents to provide engine entrainment air and to improve usability in cross-wind conditions.

BDI’s patented, vented rear-wall, the Vertivent™, directs entrainment air to the discharge lip of the jet blast deflector. The Vertivent™ improves the jet blast discharge angle, reduces high intensity turbulence due to the jet blast discharge, and dramatically improves usability in tail wind conditions. BDI GREs are designed to use the momentum of aircraft engines to smoothly drive air with minimal turbulence generation, not only through the jet engines but through the entirety of the facility. Our aerodynamic know how and the outstanding performance of our facilities is one reason BDI builds the best GREs on the market.
Engine run-ups typically occur at night, precisely when communities near airports are most sensitive to noise. With over 30 successful GREs constructed to date, BDI understands that the primary reason to build a GRE is the acoustic benefits such a facility brings to airports and communities. BDI works with all stakeholders to develop a solution that, first and foremost, meets the project’s acoustic requirements.
BDI uses the latest computer noise modeling programs and truly understands the complex issues and regulations involved in analyzing aircraft noise challenges. BDI’s GREs incorporate high-performance materials and designs in our patented Noise Blotter™ acoustic panel, which were designed specifically for control of the low frequency noise generally associated with aircraft ground run-ups.

These panels feature a high transmission loss (STC) of 36 and effectively absorb low frequency noise. These panels have demonstrated a noise reduction coefficient (NRC) of 1.25 and maintain an absorption coefficient of 1.0 at 100Hz. The use of hydrophobic materials and acoustically-transparent wrap materials ensure that the panels will provide a long, maintenance-free service life.
FEATURES OF A BDI 3-SIDED GRE

- Noise Blotter™ Acoustic Panels
- Optional Vented Rear Wall (not shown)
- Curved Jet Blast Deflector
- Optional Aesthetic Cladding
- Access/Egress Doors
- Acoustically-Treated Aero Vents

Pontiac (USA)  Memphis (USA)  Budapest (Hungary)  Kuala Lumpur (Malaysia)
BDI’s line of 3-sided GREs provides the optimal balance of acoustic performance, aerodynamic usability and budget considerations. Having completed more than 30 such facilities, BDI can design the ideal solution to accommodate any commercial or military aircraft.
FEATURES OF A BDI 4-SIDED GRE

- Acoustically Treated Front Gates
- Control Room
- Motorized Gates
- Emergency Vehicle Access

Airbus Finkenwerder (Germany)
BDI’s line of 4-sided GREs provides 360 degrees of acoustic protection, which is ideal for projects in highly congested areas or when stringent acoustic performance is required. The patented Vertivent design delivers smooth, turbulence-free air that results in a facility with very high aerodynamic usability.

- **Safety Features**
- **Vented Rear Wall**
- **Curved Jet Blast Deflector**
- **Optional Aesthetic Cladding (not shown)**

Aerial Photo: Marshall of Cambridge (UK)
Founded in 1957 in San Francisco, Blast Deflectors, Inc. is a world leader in jet blast deflectors and aircraft acoustic enclosure technology. Our innovative solutions have set the standard for the jet blast deflector industry for more than 60 years. We safeguard our reputation for excellence through a focus on research and development combined with state-of-the-art manufacturing. The result is a complete range of jet blast deflectors suitable for all applications.

BDI works with aircraft manufacturers, civil aviation authorities and airport consultants to analyze the potential jet blast impacts of aircraft. That, coupled with our years of experience and thousands of successful installations across the world, allows us to plan, design and implement the most cost effective and practical solutions. BDI’s commitment for customer service and continuous improvement is evidenced by our ISO 9001:2015 certification.
BDI has a long history of consistently providing quality blast deflectors and ground run-up enclosures that meet project requirements. This commitment has been reinforced by receiving registration to ISO 9001:2015 standards.

“After more than ten years of service, Emirates Airline continues to be very happy with the GRE facility by BDI, which is used on a daily basis for ground run-ups.” - Emirates Engineering

Robert Aiken | Senior Manager Eng. Facilities

BDI closely controls the construction activities for each GRE project site using both on-site personnel and remote web-based monitoring in order to ensure optimal quality standards are followed.

Featured Facility: Toronto City Airport
LET BDI’S 60+ YEARS OF EXPERIENCE BENEFIT YOUR PROJECT

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• Visual Screens
• FOD Barriers
• Acoustic Barriers

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