



Case Study:

Combining Transportation and Safety - Riachuelo River Tunnel Project

Webuild Spa incorporates Tunnel SAFE Design on rails to improve safety and transportation at the Riachuelo Environmental Restoration System project.

Hydraulic Tunnel Supports River Cleanup

As part of the large Riachuelo infrastructure project, which has as its main objective the sanitation and sustainable development of the Matanza - Riachuelo Basin in Buenos Aires, Webuild built an outfall tunnel under the bed of the La Plata River.

The excavation of this 12km-long tunnel has led to challenges with safety and personnel transportation. With the help of MineARC Systems TunnelSAFE Rail Design, Webuild has established a safe and efficient way to transport personnel in and out of the tunnel.

Webuild serves as a global infrastructure systems builder seeking to contribute to the economic development, social, and environmental wellbeing of the countries in which they work. Webuild is also committed to developing strategies for ecological and employee protection at each project site.

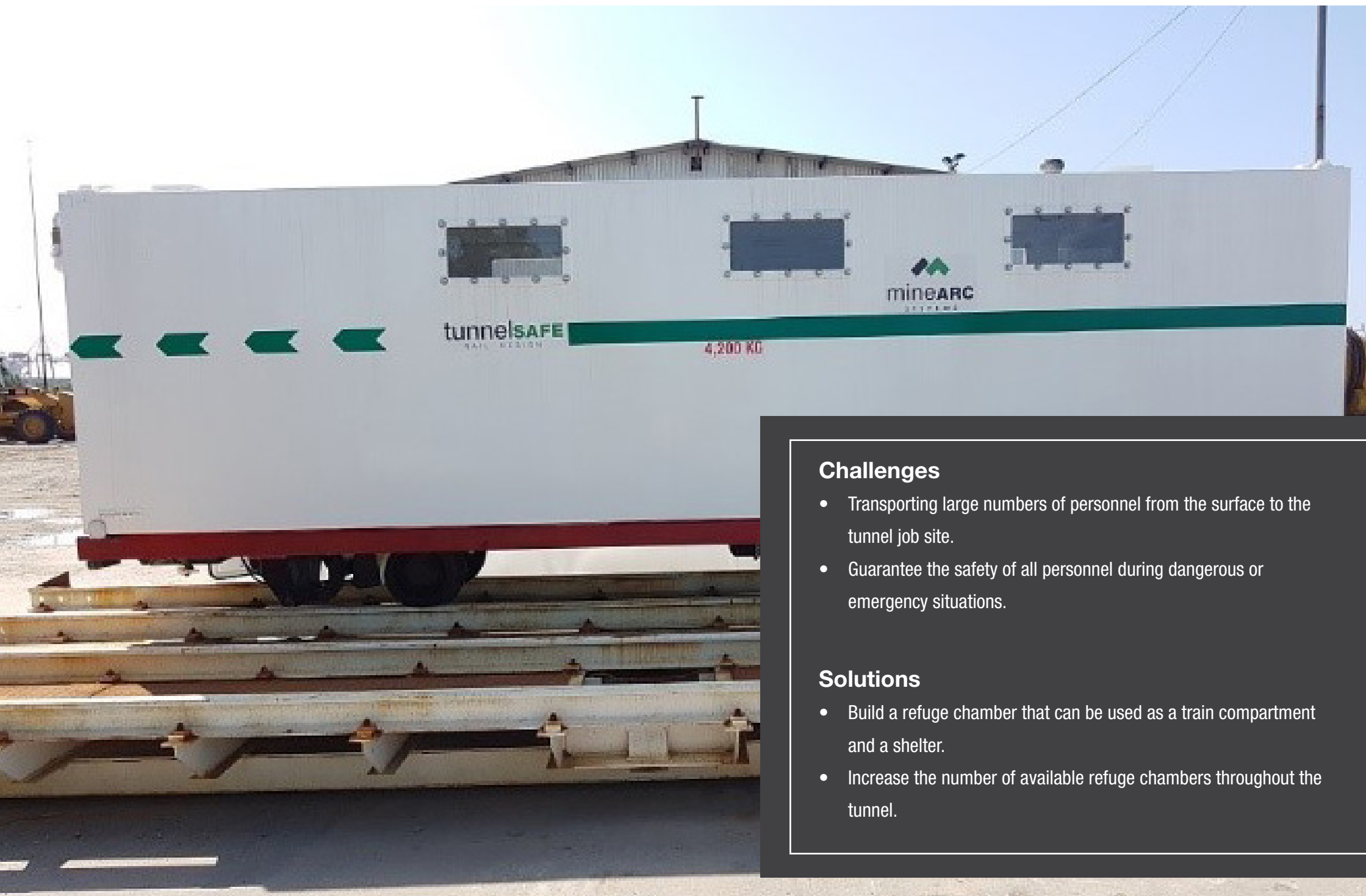
In June of 2019, Webuild acquired the Riachuelo project in Buenos Aires, Argentina. The Riachuelo projects aim to reduce the pollution in the 60km long Matanza - Riachuelo River. Approximately 90,000 tons of heavy metals are dumped into the river each year, making it one of the most polluted rivers in the world. Due to the level of pollution, the Riachuelo has been deemed unsuitable for human inhabitants, who could face serious health risks if exposed to the waters.

Webuild will develop a deep sub-river outlet to redirect the sewage from the Buenos Aires area towards the Riachuelo sewage outfall. The outlet comprises of a 50m deep load shaft, a 10.5km long hydraulic tunnel with an internal diameter of 3.8 m, and a return shaft located at the River Plate.

The length of the tunnel and overall complexity of the project created safety and transportation challenges for Webuild's personnel. Webuild chose to collaborate with MineARC Systems to address these challenges.



Pictured: Riachuelo panorama, La Boca, Buenos Aires, Argentina.



Challenges

- Transporting large numbers of personnel from the surface to the tunnel job site.
- Guarantee the safety of all personnel during dangerous or emergency situations.

Solutions

- Build a refuge chamber that can be used as a train compartment and a shelter.
- Increase the number of available refuge chambers throughout the tunnel.

01.

Refuge Chambers for Shelter and Transportation

The transport of personnel within a 12km tunnel represents a challenging task that impacts on the productivity of the work. At its deepest point, the tunnel, dug with a 5.2m diameter TBM, will have a 35m cap under the riverbed. Due to the size and depth of the tunnel, the portability of the refuge chamber played a vital role in the project.

Before incorporating the TunnelSAFE shelter chamber, Webuild used a train gantry with bench-style seats and open windows to transport workers. To improve the safety of workers in transit, the company decided to mount two MineARC Systems TunnelSAFE Rail Design cameras of 15 people each on a rail cart. This adoption provided staff with a portable shelter chamber that also served as the primary means of tunnel transportation.



Pictured: Inside the TunnelSAFE Rail Design Refuge Chamber



Pictured: The ELV CO & CO2 Scrubber inside the tunnel-specific refuge chamber

A variety of dangers can arise during underground construction; because of this, refuge chambers must be available to personnel throughout the tunnel.

Using two separate styles of MineARC Refuge Chambers, Webuild was able to provide an adequate amount of shelters for their personnel. The two 15-person Rail Design chambers ferried staff to and from the worksite, while also allowing safe transportation for service and maintenance crews. An additional 10-person Gantry Design chamber located on the TBM protects personnel working within the area.

TunnelSAFE Refuge Chambers are sealed environments constructed with 5mm steel plates to protect occupants from fires and the release of toxic gases. Internal life support systems provide a habitable and comfortable environment for personnel seeking shelter. These systems include temperature control, humidity control, oxygen and air quality monitoring, as well as ergonomic seating for personnel. A positive pressure system with visual indicators prevents the ingress of toxic gases, and an ELV CO and CO2 scrubber, and backup medical-grade oxygen with a regulator to maintain breathable air within the refuge chamber.

Lastly, the TunnelSAFE Refuge Chamber is equipped with Aura-FX Digital Gas Monitoring, 24hr UPS battery backup, high visibility fluorescent lighting, radio power supply, external strobe lighting, and an audiovisual warning system for pneumatic disruption.

02.

Increase Accessibility of Refuge Chambers

The addition of the TunnelSAFE Rail Design played a significant role in improving personnel safety and comfort, as well as space optimization by removing the need for additional fixed refuges.



Pictured: 15-person TunnelSAFE Rail Design before installation

Tailored Industry Solutions

Refuge Chambers & Toilets

- TunnelSAFE Rail Design
- TunnelSAFE Gantry Design

Life-Supporting Technology

- ELV CO & CO₂ Scrubber
- Positive Pressure Maintenance System
- Aura-FX Digital Gas Monitoring
- MARCISORB Chemical Cartridges

Training & Education

- Dual language training and operation materials
- On-site operational training
- On-site certified refuge chamber servicing
- Operational guides
- e-learning access

For More Information

To learn more about how MineARC Systems can support your site, visit minearc.com

