

VÍA PARQUE RÍMAC - LIMA



Vía Parque Rímac, Lima, Peru

New tunnel under the Rio Rímac, Lima

Double-tube toll tunnel under the Rio Rímac, located in the core of Lima

Scope

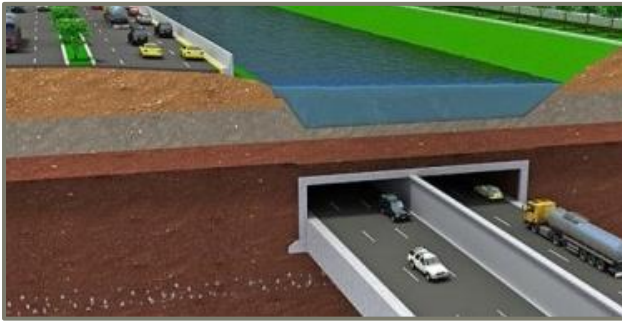
- Double-tube tunnel
- Unidirectional traffic
- Three lanes per tunnel tube
- Length 1.620km

Challenges

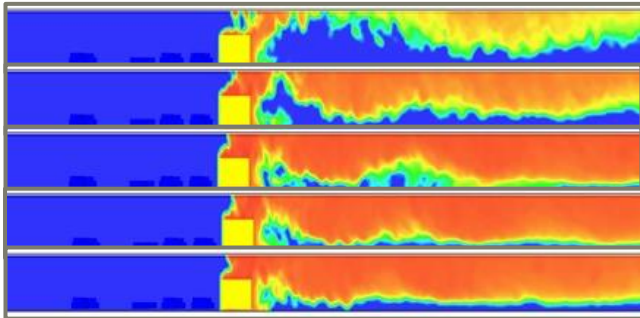
- Innovative construction under the Rio Rímac
- Comprehensive optimization of ventilation in a difficult urban environment
- Comprehensive safety optimization and verification
- Definition of a completely new safety organization and training of the relevant staff
- Safety documentation including intervention strategies and plans

Amberg Services

- Preliminary investigation
- Safety review
- Ventilation and ventilation-control design
- Quantitative Risk Analysis
- Tendering and follow up of realization
- Investigation of special topics: thermal protection and water penetration
- Commissioning
- Safety organization and documentation



■ The final configuration



■ Analysis of fire scenarios (CFD)



■ Tunneling under the Rio Rímac

AMBERG FACTS

Contracted value JV

- USD 324'752
- EUR 275'552
- CHF 271'225

Contracted value Amberg

- USD 227'326
- EUR 192'886
- CHF 189'858

Project Phases & Duration

- Preliminary investigations 2013
- Ventilation and safety design 2014 - 2015
- Tendering 2015 - 2016
- Installation 2016 - 2017
- QRA 2016
- Safety organization + documentation 2016 - 2017
- Commissioning 2017

Project details

Tunnel key characteristics

- Double tube
- 3 traffic lanes per tube
- Length 1'600m
- Cross section 80m² per tube

Safety characteristics

- 8 cross connections
- 4 exits to the outside
- State-of-the-art safety equipment

Tunnel ventilation

- Longitudinal ventilation with jet fans
- Norma operation mode for congested traffic
- Emergency ventilation for fire and escape tube

CLIENT FACTS

LAMSAC

- LAMSAC is a company belonging to the group VINCI Highways
- Address: Av. El Derby 250, Piso 18, Edificio Capital Derby, Monterrico, Surco

Overview Project

- LAMSAC received the concession of the Vía Expresa Línea Amarilla from the Municipalidad de Lima in 2009 for a total of 25 km of new highway
- The contract covers design, financing, construction, operation and maintenance
- Section 1 consists of 16 km of the Vía Evitamiento
- Section 2 includes 9 km of new roads
- The new tunnel is part of section 2

Contact person



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CHALLENGES



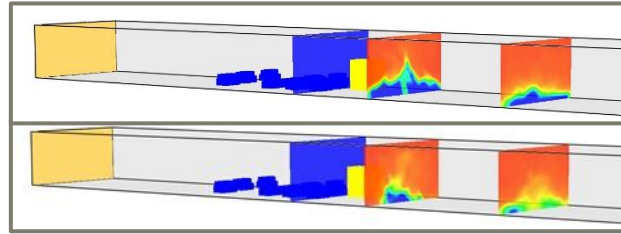
Comprehensive design support for a unique endeavor in the core of Lima

- A very special tunnel located in the core of the city, under the river Rio Rímac

Special challenges

- Construction in the core of the city
- Intense traffic
- Very heterogeneous traffic composition
- New type of infrastructure for Peru

ENGINEERING APPROACH



Comprehensive engineering services in the field of tunnel safety

- Safety is a key requirement for this tunnel
- Safety issues were accounted for since the beginning of the design effort

State-of-the-art safety concept

- Verification and optimization of safety concept and safety equipment
- Self-rescue and intervention concept based on cross connections protected by sliding doors
- Additional exits to the surface
- State-of-the-art safety equipment
- Safety level verified by means of Quantitative Risk Analysis (QRA)

State-of-the-art ventilation

- Longitudinal ventilation with jet fans
- Comprehensive ventilation-control scenarios
- Detailed simulations of fire scenarios

State-of-the-art safety concept

- New safety organization for the tunnel, with internal and external services
- Detailed tunnel safety documentation

TECHNICAL SOLUTIONS



Amberg Engineering provided a comprehensive support during all the project phases

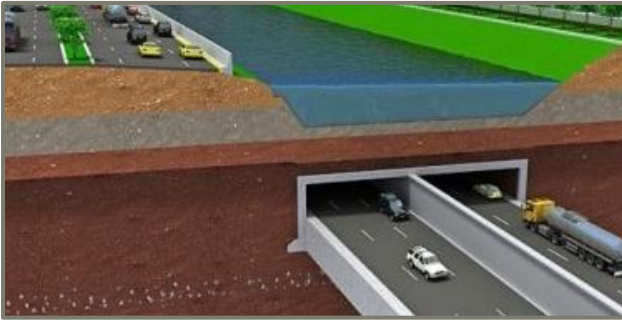
Project phases

- Preliminary investigations
- Design
- Tendering
- Construction
- Commissioning

Specific topics

- Ventilation design and analysis
- Safety design and analysis
- Support on specific technical issues (thermal protection, water leakages etc.)
- Safety organization and training

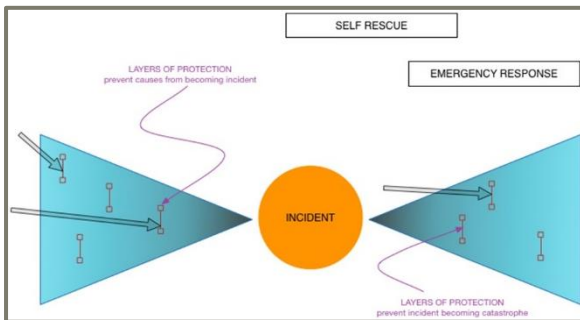
CHALLENGES



- A unique tunnel concept

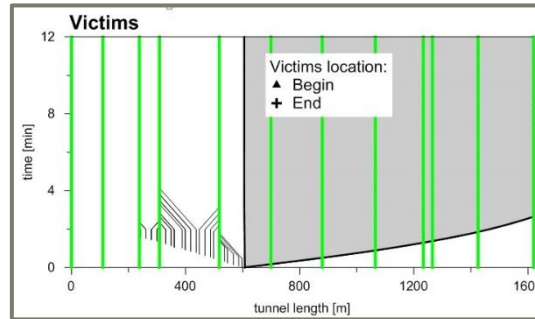


- Highly urbanized environment

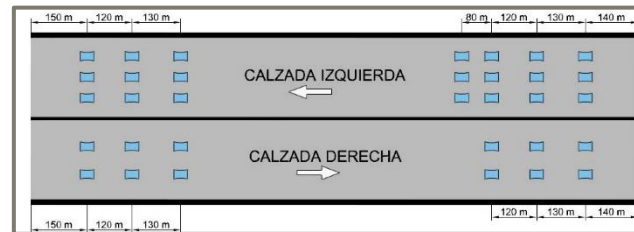


- Innovative safety design

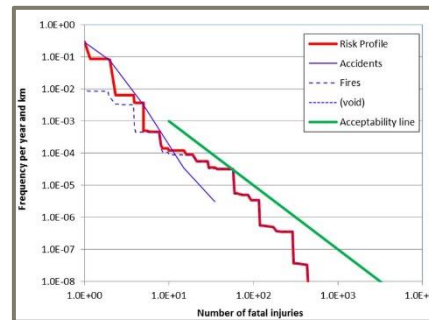
ENGINEERING APPROACH



- Comprehensive simulation of incident scenarios

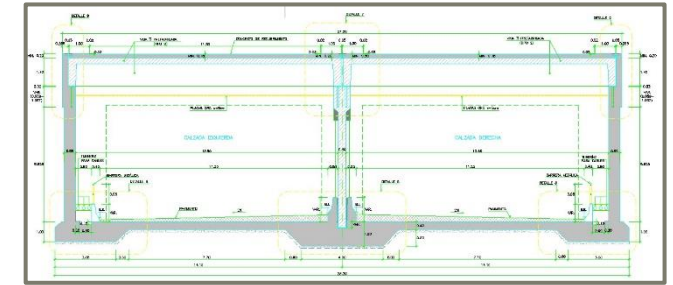


- Highly optimized ventilation design



- Design verification through QRA

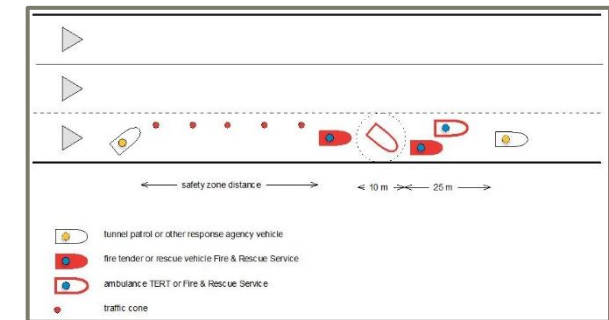
TECHNICAL SOLUTIONS



- Two tunnel tubes under the Rio Rímac



- A comprehensive system of emergency exits



- Detailed safety organization and intervention plans

AMBERG KEY PEOPLE INVOLVED



Dr. Marco Bettelini

MSc. ME, PhD

Project leader, main investigator for ventilation and safety, all phases

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Natalia Montenegro Palmero

MSc degree in Mines

Ventilation, safety and structural issues (thermal protection etc.)

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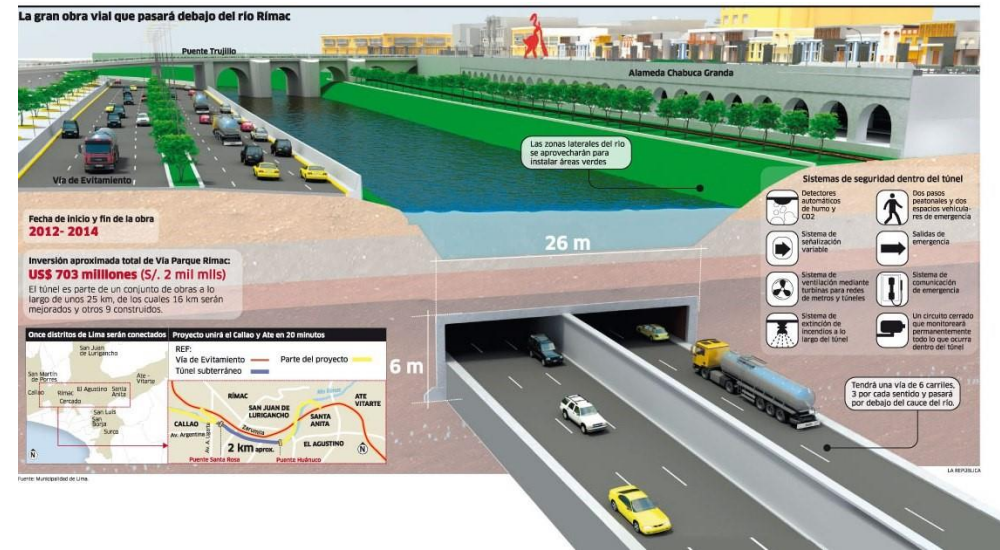
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Safety

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AMBERG TEAM @ WORK



AMBERG SPECIALIST' TESTIMONY

“ This challenge was unique, both from the technical and from the cultural point of view. The unusually comprehensive work carried out by Amberg Engineering’s team ranged from design and design verification all the way to safety organization, training of LAMSAC’s staff and tunnel commissioning. A demanding, open environment, with plenty of space for innovative approaches and solutions. A genuine technical and personal enrichment! ”