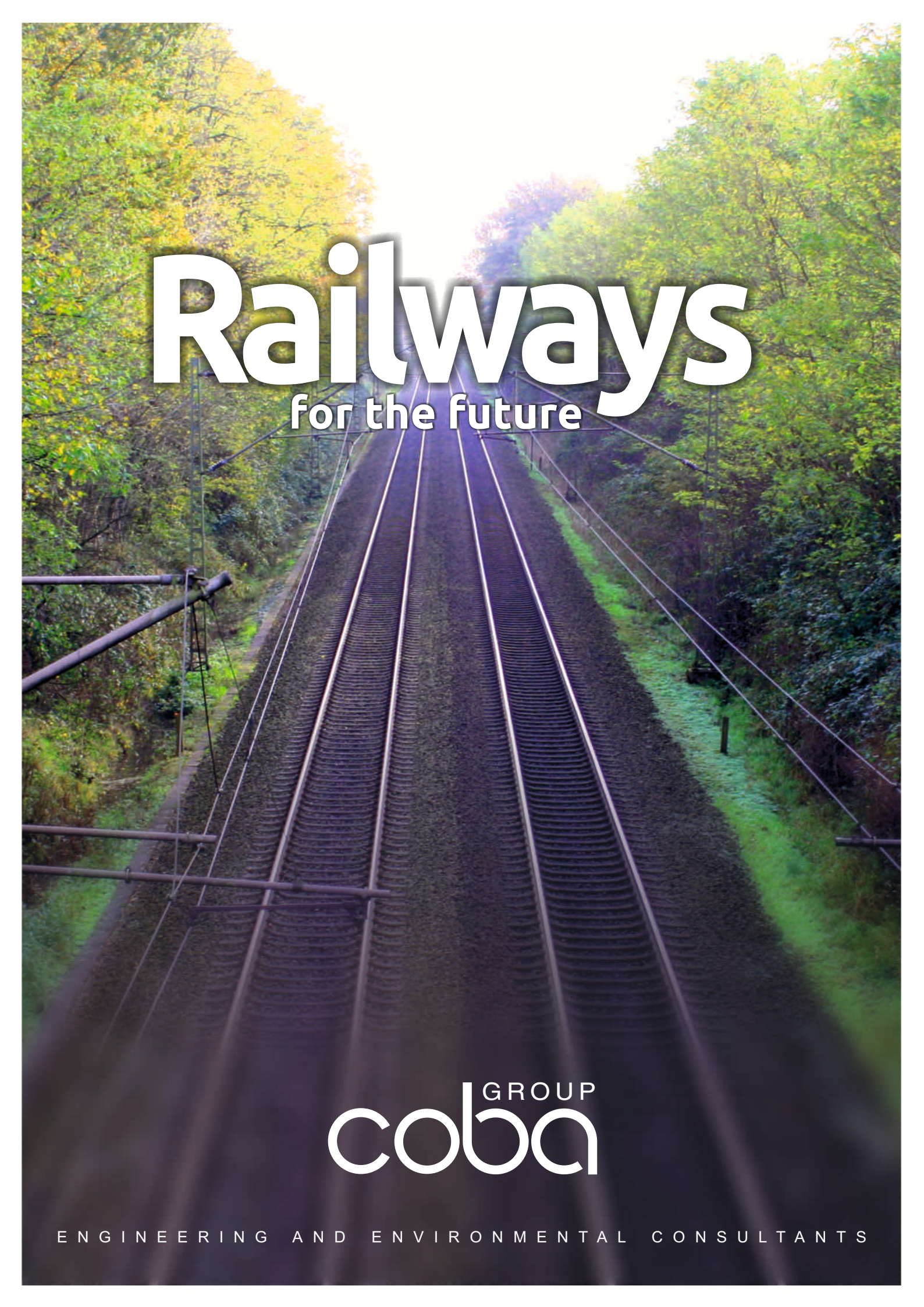




Railways

for the future

GROUP
coba

ENGINEERING AND ENVIRONMENTAL CONSULTANTS

PRESENTATION

COBA is a multinational and multidisciplinary group of Engineering and Environmental Consultants, founded in 1962.

The Group provides engineering consultancy services ranging from basic and planning studies, technical, environmental and economic feasibility studies, design and construction design as well as project management and works supervision, to operation follow-up and behaviour monitoring. The Group has offices/subsidiaries in three continents and experience in sixty countries and encompasses several companies in accordance with functional specializations or geographical areas.

With over six decades of acquired expertise, complemented by state-of-the-art employee knowledge, a stable permanent staff, and extensive international experience, we are equipped to identify optimal solutions that fully satisfy the needs and expectations of both public and private clients.

Throughout its existence, the Group has collaborated with public authorities or private developers in the feasibility of multidimensional projects, some of them being structuring projects and with major impacts on the improvement of people's life conditions in the several countries where it worked.

At present, the Group has a wide number of competences and technical areas that allow the composition of multidisciplinary teams who share knowledge and experiences in the execution of projects.

FIELDS OF ACTIVITY

HYDRAULIC UNDERTAKINGS

Concrete, Earth-fill and Rock-fill Dams | Weirs and Reservoirs | Water Conveyance Systems | Hydraulic Structures

POWER GENERATION AND TRANSMISSION

Hydroelectric Power Plants and Mini-Hydropower Plants | Photovoltaic power plants, Wind Farms and Hybrid Systems | High Voltage Transmission Lines and Substations | Energy Storage through Pumping and Batteries

WATER SUPPLY AND WASTEWATER SYSTEMS

Catchment, Transport and Distribution of Potable Water | Water Treatment Plants | Drainage Systems | Wastewater Treatment Stations | Pumping Stations

AGRICULTURES AND RURAL DEVELOPMENT

Irrigation and Drainage Infrastructures | Economic Assessment

TRANSPORTATION INFRASTRUCTURES

Roads and highways | Railways | Passenger and Freight Railway Stations Metro and Light Rail | Airports | Bridges and other engineering structures

ENVIRONMENT

Environmental and Social Impact Assessment | Environmental Management, Monitoring and Auditing | Pollution Control | Landscaping | Land Management Recovery of Degraded Areas | Waste Landfills

GEOTECHNICAL STRUCTURES

Tunnels and Caverns | Slopes in Fill and Cut Section | Special Foundations Breakwaters | Embankment Works

MARITIME AND FLUVIAL WORKS

Wharfs | River Training | Quay Rehabilitation | Flood and Flow Control

MINING INDUSTRY

Tailings Dams and Associated Structures: Design; Operations, Maintenance, and Monitoring Manual; Safety Assessment and Risk Analysis | Mine Closure Plans

BUILDINGS

Residential and Services Buildings | Industrial Buildings | Steel and Mixed Industrial Structures | Rehabilitation and Restoration of Ancient Buildings

CARTOGRAPHY AND CADASTRE

Geographic Information Systems (GIS) | Digital Cartography | Thematic Cartography | Thematic Cadastres | Land Acquisition

SAFETY CONTROL AND REHABILITATION

Expertise, Monitoring | Inspection and Reinforcement of Dams and Transportation Infrastructures | Works Instrumentation | Project Maintenance and Operation

PROJECT MANAGEMENT AND CONSTRUCTION SUPERVISION

Project Management | Cost Management | Site Supervision Quality Assurance/Quality Control

Railways

for the future

The Railway Studies Division was established in the late 1980s with the objective of contributing to the development program led by the Portuguese authorities to improve, rehabilitate, and upgrade existing railway infrastructure. This sector experienced continuous growth, initially in Portugal, followed by international expansion to countries such as Spain, Algeria, Ireland, Brazil and Colombia.

Over more than 40 years of continuous activity in the railway infrastructure sector, often in collaboration with leading international companies in the field, COBA has been involved in the design and implementation of major railway infrastructure projects in Portugal. These include the modernization of the Northern Line, the North-South Railway Corridor in the Lisbon Region, the Lisbon Metro, the Oporto Metropolitan Light Rail System, the Mondego Light Rail System in Coimbra, and the Dublin Metro in Ireland. In recent years, COBA has been actively involved in the development of Portugal's High-Speed Rail Network, including connections to Spain.

Currently, COBA provides engineering services across multiple disciplines for all types of projects, including conventional and high-speed railways, light and heavy metro systems, freight and passenger stations, and maintenance depots.



HIGH-SPEED RAIL

The initial studies for high-speed railway lines connecting Portugal and Spain began in the early 2000s. Various alternatives were analyzed, including alignments heading east to Madrid or extending north to Tuy.

More recently, COBA has been actively involved in the development of Portugal's national High-Speed Rail network, as the design consultant for the Porto-Lisbon line.

HIGH-SPEED RAIL CONNECTION BETWEEN LISBON/PORTO AND MADRID | PORTUGAL / SPAIN

LOT 1 - Technical Feasibility Study of Transversal Linking Corridors: 2002 / 2004

The following corridors were analyzed:

- **Corridor A:** Connecting the Lisbon-Porto Corridor to Elvas (length: 200 km; speed: 300–350 km/h for passenger traffic).
- **Corridor B:** Connecting the Lisbon-Porto Corridor to Marvão (length: 150 km; speed: 300–350 km/h for passenger traffic).
- **Corridor D:** Connecting Aveiro / Viseu / Almeida (Salamanca) (length: 180 km; speed: 200–250 km/h for mixed traffic).

HIGH-SPEED RAIL CONNECTION BETWEEN MADRID AND LISBON/PORTO | PORTUGAL / SPAIN

- **Phase 1:** Feasibility Study of Corridors.
- **Phase 2:** Preliminary Study of the Selected Corridor – Corridor 1: Elvas/Badajoz (2003/2007).

HIGH-SPEED RAIL CONNECTION BETWEEN LISBON/PORTO AND MADRID | PORTUGAL / SPAIN

- **Corridor 1:** Elvas-Badajoz – High-Speed Lines and Conventional Line (Feasibility Study: 2005).
- **Corridor 1:** Elvas-Badajoz – Environmental and Technical Justification for the Southern Corridor of Serra da Ossa (Évora/Caia) (Environmental Studies: 2007).

MADRID-EXTREMADURA HIGH-SPEED RAILWAY LINE. Mérida / Badajoz Section | SPAIN

- Preliminary Design: Civil Works, Drainage, Utility Relocations, and Expropriations.
- Detailed Design: Civil Works and Expropriations (2006/2007)

HIGH-SPEED RAIL CONNECTION BETWEEN LISBON AND MADRID | PORTUGAL / SPAIN

Elvas / Badajoz International Station (Rio Caia)

Feasibility Study and Preliminary Study: 2008/2010.



HIGH-SPEED RAILWAY LINE BETWEEN LISBON AND MADRID | PORTUGAL

PPP1 - POCEIRÃO – CAIA SECTION

Client/Owner: LGV – Engineering and Construction of High-Speed Lines / RAVE - Rede Ferroviária de Alta Velocidade, S.A.
Preliminary Studies, Preliminary Design, and Detailed Design: 2009/2012 In Consortium with: TYPESA / TECNOFISIL

The High-Speed Railway Line between Lisbon and Madrid is designed to accommodate international passenger services at a speed of 350 km/h and freight transportation at lower speeds. The studies covered by this contract refer to the Portuguese section of this infrastructure, known as the Poceirão - Caia section, and include the following works:

- 168 km of new double-track high-speed rail (HSR) between Poceirão and Caia, with European gauge (1,435 mm, UIC standard), designed for high-speed passenger trains (axle load of 17 tons and maximum

speed of 350 km/h) and freight trains (axle load of 25 tons and speed of 120 km/h).

- 83 km of new conventional line (CL) in single track, parallel to the double-track high-speed line (between Évora and Caia), designed for a maximum speed of 160 km/h (mixed traffic) and axle load of 25 tons.

- 6 km of new conventional line connecting to the West Railway Line.

- 9 km of upgrades to existing conventional line sections, corresponding to the upgrading of the Évora Line.

HIGH-SPEED RAILWAY LINE BETWEEN LISBON AND PORTO | PORTUGAL

LOT A – Aveiro - Vila Nova de Gaia Section

Client/Owner: RAVE - Rede Ferroviária de Alta Velocidade, S.A.

Preliminary Study and Environmental Impact Study: 2003/2005

Revised Preliminary Study and Environmental Impact Study: 2007/2008 - Addendum to the Revised Preliminary Study: 2009

This section of the High-Speed Railway Line spans approximately 70 km, with double tracks designed for exclusive passenger traffic and a speed of 300 km/h. Initially, three alignment solutions were studied: Solutions A, B, and C:

- **Solution A:** 66 km, running south/north, including the Aveiro Station
- **Solution B:** 66 km, running south/north, including the Aveiro Station
- **Solution C:** 28 km, including the Aveiro Station and crossing the Special Protection Area of “Ria de Aveiro”.

Two alignment solutions - Solutions A and B - were developed in the final revised version of the Preliminary Study for this section:

- **Solution A:** 70 km, including the Aveiro Station, 34 bridges, 55 current structures, 5 tunnels, 84 reestablishments, 77 hydraulic crossings, and several retaining structures.
- **Solution B:** 70 km, including the Aveiro Station, 29 bridges, 60 special structures, 7 tunnels, 89 reestablishments, 76 hydraulic crossings, and several retaining structures.

HIGH-SPEED RAILWAY LINE BETWEEN LISBON AND PORTO | PORTUGAL

LOT E – Vila Nova de Gaia - Francisco Sá Carneiro Airport Section

Preliminary Study / Environmental Impact Study: 2005/2006

Revised Preliminary Study: 2009/2012 In Consortium with: EUROESTUDIOS

This section of the High-Speed Railway Line was designed with double tracks, for exclusive passenger traffic at a speed of 300 km/h south of the Douro River and 250 km/h north of it.

Initially, the study involved two alignment alternatives (Lot E1 and Lot E2), starting at Espinho and at Vila Nova de Gaia, respectively, and ending at Francisco Sá Carneiro Airport.

- **LOT E1** – with a length of 20 km, it crosses Boavista / Avenida de França in the city of Porto and the Devesas station in the city of Vila Nova de Gaia and includes a new bridge over the Douro River.
- **LOT E2** (Eastern Solution) – with a length of 30 km, it passes through

Campanhã Station in the city of Porto and includes a new bridge over the Douro River.

In addition to these alternatives, the interconnection between Alternatives E1 and E2 was studied, initially passing through the current São João Bridge, with the final phase foreseeing the construction of an additional new bridge over the Douro River.

In the final revised version of the Preliminary Study, the rail section between Vila Nova de Gaia and Francisco Sá Carneiro Airport was extended to include a Maintenance and Workshop Park (PMO) at the end of the alignment.

HIGH-SPEED RAILWAY LINE BETWEEN PORTO AND LISBON. PHASE 1 – PORTO / SOURE SECTION | PORTUGAL

LOT A - Aveiro (Oiã) / Porto (Campanhã) Section

LOT B - Soure / Aveiro (Oiã) Section

Client/Owner: Construction Consortium led by Mota-Engil

Tender Design: 2023/2024 In Consortium with: GEG

The new High-Speed Railway Line between Porto-Campanhã and Lisboa-Oriente Stations will have an approximate length of 290 km, with double tracks and Iberian gauge (1,668 mm).

The tender design includes **Lot A** (70 km) and **Lot B** (70 km), developed at a Preliminary Study level, covering all areas of expertise.

In addition to the terminal stations of Lisboa-Oriente and Porto-Campanhã, which will be expanded, the trains will serve intermediate stations in Leiria, Coimbra, Aveiro, and Gaia.



MODERNIZATION OF THE NORTHERN LINE | PORTUGAL

The Northern Line connects the two main cities of the country, Lisbon and Porto, and is the most important railway connection in Portugal, serving as the backbone of the Portuguese rail network. It links the southern lines of Lisbon to the northern lines of Porto and these to the Beira Baixa and Beira Alta Lines. The total length of the line is 336 km, between the Lisboa-Santa Apolónia and Porto-Campanhã stations. The entire line is double-track, except for 15 km of quadruple track at the

exit of Lisbon, between the Lisboa-Oriente and Alverca stations, and is fully electrified. This line serves the most populous region of Portugal, where approximately 6.7 million people - 63% of the country's population - live within 35 km of a major station in a straight line.

The modernization of the Northern Line has been an ongoing process, involving numerous studies, designs, and construction interventions.



Northern Line | Subsection 3.3 - Ovar/Gaia

Comprehensive Track Renewal in the Section between Espinho (318.600) and Vila Nova de Gaia (332.780)

Client/Owner: IP - Infraestruturas de Portugal

Supervision: 2020/2024

In Consortium with: PENGEST / TECNOFISIL / TYPESA



The renewal of this railway section, promoted under the modernization and expansion program of the National Railway Network “Ferrovia 2020”, co-funded by the European Union, involved the installation of a new electronic signaling system and automatic speed control, in addition to the track renewal.

The works for this project, largely carried out at night, were of high technical complexity due to the significant constraints and limitations imposed by its urban setting and the need to ensure the continuous availability of the infrastructure for train operations without extended interruptions. This required meticulous planning throughout the development phase to ensure the safety of workers and rail passengers.



Northern Line | Modernization Interventions in Mato Miranda

Relocation of the neutral zone currently located in front of the substation at Entroncamento and construction of the new main track connecting Riachos to Entroncamento on the Up Side
Client/ Owner: IP - Infraestruturas de Portugal - Engenharia
Detailed Design: 2019/2021
Technical Assistance during Construction: 2022/2023
In Consortium with: TECNOFISIL / TYPISA

The intervention involved modernization studies for the Northern Line, with interventions in Mato Miranda between PK 93+000 and PK 95+500. Key aspects of the intervention included: Construction of two storage sidings with a usable length of 750 meters; Modernization of the Mato de Miranda Station; Adaptation of the fixed infrastructures of electric traction, resulting from changes in the Stations and/or rectification of the railway alignment; Adaptation of the Traction Return Current System and Protective Grounding; Infrastructure support for signaling and telecommunications systems; Removal of a level crossing through the construction of a road underpass and an agricultural underpass; Construction of a Pedestrian Overpass to remove an ATV (Automatic Track Warning); Relocation of the Neutral Zone; Construction of the main branch track on the Up side, between Riachos and Entroncamento; and Replacement of the COM 4I/4II from Vale Figueira to PK 83+600.



Northern Line | Subsection 1.3 - Section Between Km 88 and Entroncamento (Exclusive)

Client/Owner: REFER - Rede Ferroviária Nacional, E.P.
Reformulation of the Detailed design: 2004/2009



The project redesign included the following interventions: Construction of a new track adjacent to the existing ones, with approximately 6 km of realignment and 2 km of new track replacing the existing alignment; Complete renovation of the Mato Miranda and Riachos stations; Construction of new bridges over the Alviela River (65 m in length, divided into two spans of 28 m and 37 m) and the Almonda River (31 m in length, single span); A new overpass to reestablish connectivity at Mato Miranda and several underpasses beneath the railway; Installation of LP5-type overhead catenary and electrification of secondary tracks at Riachos station; Reestablishment of Mato Miranda and the Mato Miranda and Riachos interfaces; Environmental Studies.

Northern Line | Section Vila Franca de Xira – Azambuja

Client/Owner: Caminhos de Ferro Portugueses (CP)
Preliminary Study, Detailed Design, and Environmental Impact Assessment: 2001/2007

The Northern Line Modernization Project between km 32+800 (north of Vila Franca de Xira) and Azambuja Station involved the quadrupling of this 14 km section of heavy railway, with the following interventions:

Construction of two new tracks adjacent to the existing ones, including general earthworks, track platforms, retaining structures, drainage systems, fencing, parallel service roads, foundation treatments for embankments in alluvial areas, and noise barriers.

Castanheira do Ribatejo viaduct, integrated into Relocation 1, with a total length of 317 m.

Carregado Halt viaduct, integrated into Relocation 2, with a total length of 306 m.

Carregado power plant viaduct, integrated into Relocation 3, with a total length of 392 m.

Espadanal da Azambuja viaduct, integrated into Relocation 4, with a total length of 306 m.

Installation of LP5-type overhead catenary.

Design of the new Castanheira do Ribatejo Station and the Carregado, Vila Nova da Rainha, and Espadanal da Azambuja Halts.



Northern Line | Lisbon Freight Station

Client/Owner: Caminhos de Ferro Portugueses (CP)
Preliminary Study and Detailed Design: 1992 / 1995
Revised Detailed Design: 1996 / 1998
In Consortium with: DE-CONSULT



The Lisbon Freight Station project includes a set of reception tracks, a set of dispatch tracks, and several loading and unloading tracks designed to accommodate different types of traffic. The project also encompasses Administration, Control, and Workshop buildings.

The railway access to the station from the Northern Line, both at the northern and southern ends of the area, was the subject of a specific design. This included a large flyover, enabling grade separation from the descending tracks of the Northern Line.

Northern Line | Section 1 - Lisbon / Entroncamento

Client/Owner: Caminhos de Ferro Portugueses (CP)
Preliminary Study and Detailed Design: 1992 / 1995
Technical Assistance: 1996 / 2000
In Consortium with: DE-Consult and Mott MacDonald

The consortium led by COBA was responsible for the studies and designs for Section 1 between Lisbon and Entroncamento, spanning approximately 105 km. This section was subdivided into the following subsections, each with distinct projects: Subsection 1.1: Braço de Prata–Alhandra, Subsection 1.2: Alhandra–Setil and Subsection 1.3: Setil–Entroncamento. Construction began with Subsection 1.1, Braço de Prata–Alhandra, with technical assistance for its construction concluding in 2000.

The project for each subsection included the following components: Trackwork (all platform-related works, earthworks, longitudinal and transverse drainage, retaining structures, and fencing); Structures (road overpasses and underpasses, as well as a large railway flyover between Póvoa and Alverca); Stations and Halts (passenger platforms with

canopies, shelters, grade-separated pedestrian crossings, and passenger buildings).

As part of the Northern Line Modernization Project, a Maintenance Depot for tilting trains was designed in Contumil, which includes: a large maintenance workshop building, approximately 200 m long, housing three parallel tracks capable of accommodating three complete trains; a wheel lathe pit building, approximately 50 m long, traversed longitudinally by a single track; A pumping station for train sanitary systems; a series of additional infrastructure projects, including trackwork, overhead catenary systems, a gatehouse building, a large-capacity underground water tank, retaining walls, a technical gallery, roadways, fencing, gates, and landscaped areas.



Évora Line | New Railway Connection between Évora and Caia - 80 km | PORTUGAL

Client/Owner: IP – Infraestruturas de Portugal, Portugal.

Design Phases: Alignment Definition, Preliminary Design, Detailed Design (2016 / 2019), and Technical Assistance during Construction (2020 / ongoing).

In Consortium with: TYPESA / TECNOFISIL / GRID.



The 80 km of new Iberian gauge railway with a double-track electrified platform between Évora and Caia (Eastern Line) is designed to accommodate international passenger services at a speed of 250 km/h and freight transport services at a speed of 120 km/h. The design accommodates trains with a useful length of 750 m and a single traction hauling capacity of 1,400 tons.

This is the first new railway line in Portugal built in the last 100 years.

Évora Line | Bypass of the Railway Connection between Évora and Évora Norte - 10 km | PORTUGAL

Client/Owner: IP – Infraestruturas de Portugal, Portugal.

Design Phases: Alignment Definition, Detailed Design (2018/2020), and Technical Assistance during Construction (2021/ongoing).

In Consortium with: TYPESA / TECNOFISIL / GRID.

The railway line between Évora and Évora Norte spans approximately 10 km of new Iberian gauge track, from PK 117 of the Évora Line to the new connection with the railway line between Évora and Caia (Eastern Line).

Of the 10 km extension of this bypass, 49% corresponds to new track, and 51% to the modernization of the existing line. In the first 5 km, the solution aimed to use an unoccupied corridor, located further from the urban perimeter of Évora. From km 122+700 onwards, the project aligns with the corridor of the existing Évora line, which had been deactivated.

The 10 km railway line includes a platform for a single electrified track equipped with electronic signaling, ensuring the circulation of freight trains with a length of 750 m. The design features optimize the hauling capacity of locomotives (1,400 tons with single traction).



Algarve Line | Electrification of the Algarve Line | PORTUGAL

Client/Owner: IP - Infraestruturas de Portugal

Project Management, Coordination, Supervision, and Safety Coordination: 2022 / Ongoing



Supervision of approximately 100 km related to the electrification of two sections of the Algarve Line.

In the section between Faro and Vila Real de Santo António, the project involves the electrification of approximately 56 km of railway track with a 25 kV/50 Hz system, including the installation of the Traction Current Return System and Ground Protection.

In the section between Tunes and Lagos, the project involves the electrification of approximately 45 km, from km 302+180 to km 347+200, with a 25 kV/50 Hz system, including the installation of the Traction Current Return System and Ground Protection.

The implementation of the fixed infrastructure for electric traction involves the allocation of railway public domain areas near the track for the installation of catenary poles and the traction substation. Efforts were made to minimize this impact through solutions that optimized the use of available space.

Beira Baixa Line | Renewal of the Covilhã - Guarda Section | PORTUGAL

Client/Owner: IP - Infraestruturas de Portugal - Engenharia
Detailed Design: 2016 / 2017
Technical Assistance during Construction: 2018 / 2021
In Consortium with: TYPESA / TECNOSIL / GRID



The Beira Baixa Line, a single track used for both freight and passenger transport, runs between Entroncamento station (connecting to the Northern Line) and Guarda station (connecting to the Beira Alta Line).

The section addressed, Covilhã – Guarda, crosses the municipalities of Covilhã, Belmonte, and Guarda, covering the area between Guarda Station (PK 165+600) and Covilhã Station (PK 211+329), with a length of approximately 46 km. It includes two stations (Guarda and Belmonte) and three halts (Maçainhas, Benespera, and Sabugal). This section of the Beira Baixa Line had been closed since 2009 and was reopened in 2021 following the rehabilitation works.

Douro Line | Electrification and Complete Track Renewal of the Caíde - Marco Section | PORTUGAL

Client/Owner: IP - Infraestruturas de Portugal - Engenharia
Project Management, Coordination, Supervision, and Safety Coordination. Quality Supervision and Control: 2018 / 2019
In Consortium with: TECNOSIL / PENGEST / TYPESA

The Douro Railway Line, between Caíde station and Marco de Canaveses station, spans a section of track that is 14.4 km long and includes six stations (Caíde, Oliveira, Vila Meã, Recesinhos, Livração, and Marco de Canaveses). This line serves a population with a predominant commuting pattern.

The modernization works aimed to extend the urban electric traction transport service to the city of Marco de Canaveses, eliminating the need for transfer at Caíde (municipality of Lousada), improving railway operation conditions, and reducing maintenance costs. To achieve this, the entire track between Caíde and Marco de Canaveses was renewed, tunnels were repaired, and electrification was implemented.



Minho Line | Electrification and Rehabilitation of the Nine/Valença Fronteira Section | PORTUGAL

Client/Owner: IP - Infraestruturas de Portugal - Engenharia
Detailed Design: 2015
Technical Expertise and Assistance during Construction: 2018 / 2019



The electrification and rehabilitation of the Nine/Valença (border with Spain) section of the Minho Line was carried out in its entirety between PK 39+400 and PK 131+449, covering an approximate length of 92 km on single track.

The main objective of this intervention was to create conditions to make rail transport more competitive in the connection to Spain and in the inter-regional links between Greater Porto and the Minho coast. This was achieved through improvements in the safety and operational conditions of the line, reducing travel times and operational costs, in response to the potential growth in demand for connections between Northern Portugal and Galicia, both for passenger and freight transport.

Cintura Line and Cascais Line – Alcântara Rail Grade Separation | PORTUGAL

Grade-separated connection between the Cintura Line, the Cascais Line, and the Alcântara Container Terminal.

Client/Owner: REFER - Rede Ferroviária Nacional, E.P.

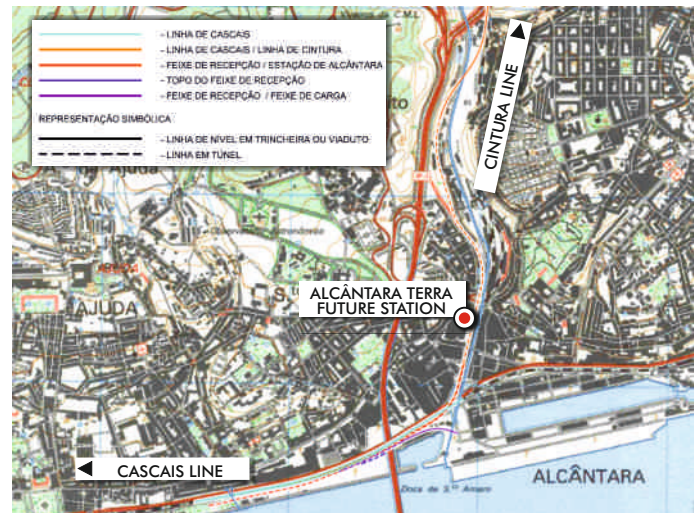
Detailed Design: 2009 / 2011

In Consortium with: FERBRITAS / TIS / INTERGAUP

The Alcântara Rail Grade Separation project involves the construction of a railway tunnel (cut and cover) that connects the Cintura Line to the Cascais Line and the Port of Lisbon, as well as the construction of an underground station to replace the pre-existing Alcântara-Terra Station.

Alcântara, the main area of the project, is a highly heterogeneous region where historical buildings coexist with more recent constructions, which strongly influences the design of the planned infrastructure.

The Cascais Line operates independently, with the Cintura Line currently used only for the passage of a limited number of freight trains and for the circulation of passenger trains heading to the Repair and Maintenance Centers. Since the 1960s, the railway connection between the Cascais Line and the Cintura Line has been studied with the aim of extending the former and improving its integration into the national railway network.



Sintra Line | Queluz-Belas Railway Station | PORTUGAL

Client/Owner: REFER – Rede Ferroviária Nacional, E.P.E.

Studies and Detailed Design: 1990 / 1998

Technical Assistance during Construction: 1999 / 2003

In Consortium with: DE-CONSULT



The detailed design between km 10+800 and 11+741, corresponding to Queluz-Belas Station, was developed based on studies carried out for the Queluz – Massamá station.

The work planned prior to the commencement of the studies only included a halt served by a pedestrian overpass, with a small passenger distribution hall to be installed for access to the platforms.

The final version included the quadrupling of the track (5,500 m of new track); catenary for the quadruple track; a new Passenger Building; widening of the Carenque underpass; various other underpasses; a viaduct with a length of 200 m; a road-rail interface; an underpass (tunnel) equipped for pedestrians and commercial use; several roadways in Amadora and Queluz; and a car park for 200 vehicles.

Beira Alta Line | PORTUGAL - Reformulation of the Sections between Carregal do Sal and Fornos de Algodres, and between Guarda and Vilar Formoso

Client/Owner: CP - Caminhos de Ferro Portugueses

Preliminary Study: 1990 / 1991

Detailed Design: 1992 / 1993

In Consortium with: DE-CONSULT / GAPRES

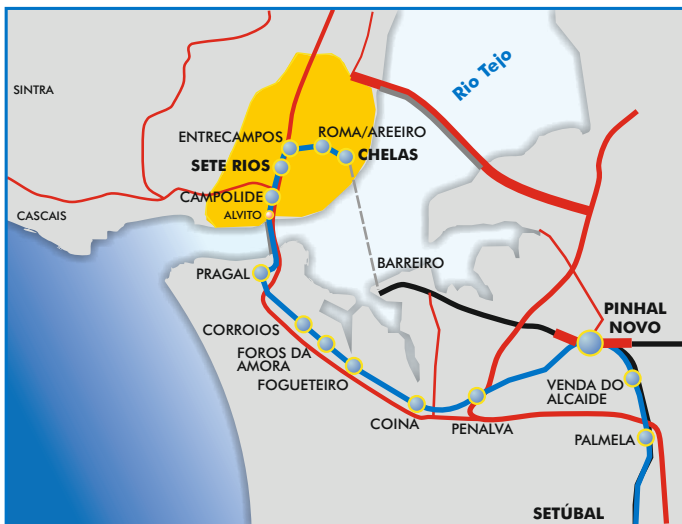


Study for the modernization of 100 km of the Beira Alta Line, in the section between Carregal do Sal and Fornos de Algodres, with a length of 54.3 km, and in the section between Guarda and Vilar Formoso, with a length of 45.7 km. A total of 31 intervention areas in curves were identified, affecting approximately 30 km of the railway.

The aim of this study was to upgrade the alignment geometrical parameters to optimize travel times to minimize waiting times at crossing stations. As a result, speeds were increased to 160 km/h on sections where the required investments were lower, while in sections where investments would be more costly, improvement interventions were more limited.

The goal was to reduce the travel time between Pampilhosa and Vilar Formoso by approximately 1 hour and 30 minutes. To achieve this, it was necessary to realign the track, execute 18 over and underpasses and modernize three stations: Canas/Felgueira, Oliveirinha/Cabanas, and Cordeira.

NORTH-SOUTH RAILWAY AXIS | PORTUGAL



The North-South Railway Axis in the Lisbon Region establishes the connection between the northern and southern banks of the Tagus River via the 25 de Abril Bridge. This infrastructure has a total approximate length of 24 km, from Chelas to Fogueteiro.

The North-South Railway Axis (Northern Section), comprising the railway line that crosses the city of Lisbon and connects the North Line (Lisbon - Porto) with the South Line (Lisbon - Algarve), included the construction of 4 Railway Stations (Entrecampos, Sete-Rios, Campolide, and Roma-Areeiro), 3 transportation interfaces with buses and the Lisbon Metro, several viaducts, the renewal of existing lines (such as the Cintura Line), and the construction of grade-separated crossings.

North-South Railway Axis | Pinhal Novo Station and Interface

Client/Owner: Infraestruturas de Portugal, SA / REFER - Rede Ferroviária Nacional, E.P.

Preliminary Study and Preliminary Design: 2001

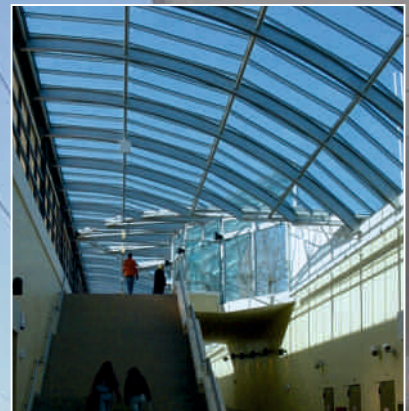
Detailed Design: 2001 / 2002

Technical Assistance during Construction: 2003 / 2006

The Pinhal Novo Station is part of the expansion to the South of the existing railway infrastructure, which was operational up to Fogueteiro. It completes the North-South Railway Axis within the existing railway network, connecting with the Southern and Alentejo Lines.

The project included an underground station and underpass to the railway platform, covering a gross area of 3,640 m²; four passenger

platforms, three with 300 m and one with 400 m in length; conversion of the existing Passenger Building, adapting it for telecommunications facilities, railway operations, and a cultural center/exhibition hall; a road-rail transport interface; surface parking areas at the road accesses; and the improvement and integration of the surrounding areas.



North-South Railway Axis | Chelas - Sete Rios Section

Client/Owner: Gabinete do Nó Ferroviário de Lisboa (GNFL)

Preliminary Study and Detailed Design: 1995 / 1997

Technical Assistance during Construction of the Chelas – Sete Rios Section: 1997 / 1999

In Consortium with: FERBRITAS / GIBB

This section, located between Chelas and the Access Viaduct to the 25 de Abril Bridge, passing through Sete Rios, runs along the northern bank of the Tagus River and spans approximately 8 km through a densely populated urban area.

The consulting services provided included the preparation of studies and projects for the renovation and modernization of the section Chelas / Sete Rios of the Cintura Line, covering a length of approximately 4 km. In addition to the track works, this section includes the new Sete Rios, Rego, Entrecampos, and Roma/Areeiro Stations.

As part of the track works, studies and designs were developed for the superstructure and supporting infrastructure of the railway system, which, along most of the route, involves the installation of four tracks. Studies and designs were carried out for the track and catenary, as well as for the infrastructure, including geology and geotechnics; retaining structures, some of which reach heights of approximately 20 m and serve as containment in densely built-up areas; slope stabilization; earthworks, involving the movement of a total volume of around 300,000 m³ of earth, with 225,000 m³ excavated and the remainder as fill.



North-South Railway Axis | New Sete Rios Station Complex

Client/Owner: Gabinete do Nó Ferroviário de Lisboa (GNFL)

Preliminary Study and Detailed Design: 1995 / 1997

Technical Assistance during Construction of the Chelas – Sete Rios Section: 1997 / 1999

In Consortium with: FERBRITAS / GIBB



The new Sete Rios Station complex extends approximately 350 meters between the connection area with Campolide and the Sintra Line, and the area of Rua Prof. Lima Bastos. It integrates the following buildings and structures: two railway viaducts, with a span of 220 meters; three passenger platforms incorporated into the new deck structure, one central and the other two lateral; a Passenger Building covering an area of approximately 3,200 m², consisting of four floors, one of which is below ground level with a connection to the access gallery of the Lisbon Metro.

North-South Railway Axis | New Entrecampos Station Complex

Client/Owner: Gabinete do Nó Ferroviário de Lisboa (GNFL)

Preliminary Study and Detailed Design: 1995 / 1997

Technical Assistance during Construction of the Chelas – Sete Rios Section: 1997 / 1999

In Consortium with: FERBRITAS / GIBB

The new Entrecampos Station complex extends approximately 400 meters between the area where the former Halt of Av. 5 de Outubro was located and Rua de Entrecampos. It integrates the following buildings and structures: two new railway viaducts over Av. da República and Av. 5 de Outubro, located to the north and south of the previously existing viaducts, with a total length of 230 meters; two passenger platforms, including the renovation of the existing structures over Av. da República and their extension as a viaduct over Av. 5 de Outubro; the Passenger Building, located between Av. da República and Av. 5 de Outubro, covering an area of approximately 4,700 m² and consisting of four floors, one of which is below ground level with a connection to the access gallery of the Lisbon Metro.



Railways between Bogotá-Belencito, Caro-Zipaquirá, and Bogotá-Facatativá | COLOMBIA

Client/Owner: FINDETER

Comprehensive Supervision of Administration, Operation, and Maintenance of the Lines: 2023 / Ongoing

Supervision contract for 308 km of railway tracks:

- Bogotá - Belencito: 257 km
- Facatativá - Bogotá: 20 km
- La Caro - Zipaquirá: 31 km

The railway lines are primarily used for freight transportation, except for the Bogotá-Zipaquirá line, which also serves passenger transport and a tourist train to the famous Zipaquirá salt mines.

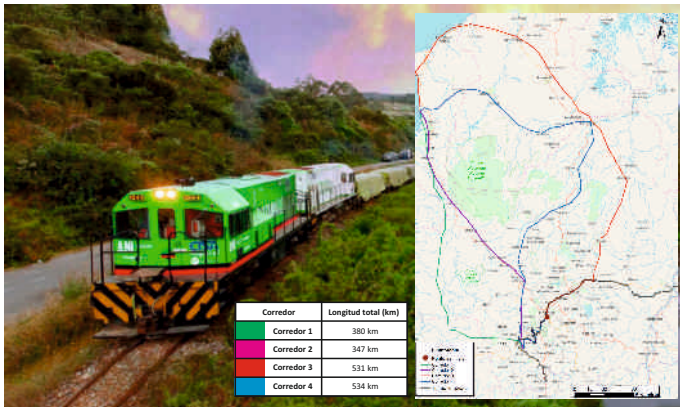


Railway Line between Medellín and the Urabá Region | COLOMBIA

Client/Owner: Promotora Ferrocarril de Antioquia

Supervision of the Feasibility Study: 2020 / 2021

In Consortium with: B&C



The project for the construction of a new freight railway line between Medellín and the Urabá region, covering approximately 350 km, will connect Medellín to the Atlantic seaports in the Gulf of Urabá. This project has been of interest to several entities since the early 20th century.

The objective of this study was to define and evaluate the feasibility of four corridors proposed by the client, resulting from earlier studies, and to select the best alternative, followed by the development of the corresponding feasibility studies.

Antioquia Railway Line | COLOMBIA

Client/Owner: Promotora Ferrocarril de Antioquia

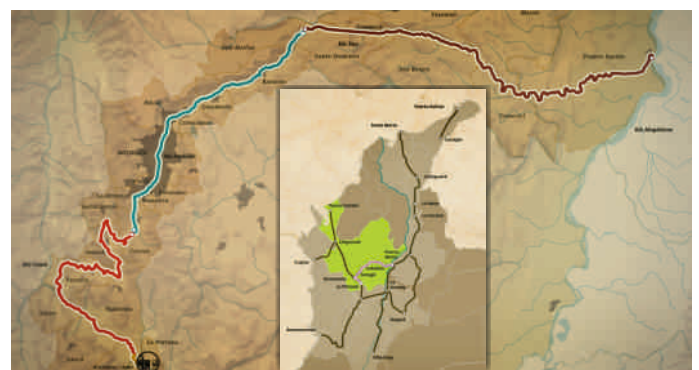
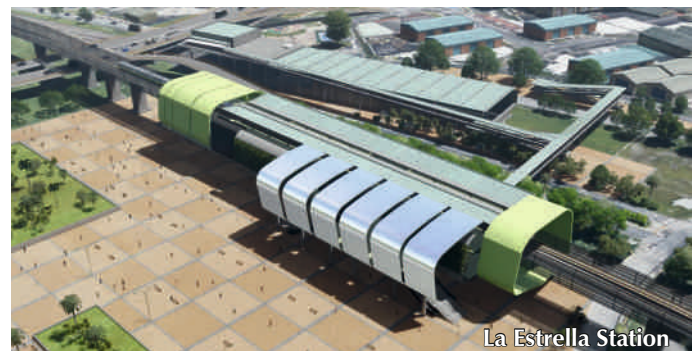
Feasibility Study and Detailed Preliminary Study: 2018 / 2020

In Consortium with: PROGIN / CIP

Feasibility Study and Advanced Preliminary Study for the renewal, modernization, and reactivation of a multipurpose railway line between Alejandro Lopez Station and Puerto Berrio Station, in the Department of Antioquia.

The project aims to reactivate the Antioquia railway line, running from La Pintada to Puerto Berrio and passing through Medellín. Originally conceived in the late 19th century and completed in the early 20th century, the line spans 332 km. The existing railway, built with a narrow gauge, has been abandoned for several years, with certain sections no longer intact due to corridor encroachment by buildings or destruction caused by watercourse erosion.

Aligned with the Colombian government's objective to rehabilitate rail transport in the country, Promotora Ferrocarril de Antioquia S.A.S. launched a tender for the preparation of studies covering technical, environmental, urban, social, legal, and financial aspects for the first section of railway to be reactivated and modernized. The studies and designs aimed at establish a multipurpose railway line that would allow the transportation of passengers, freight, and solid waste. The project is considered by Colombian authorities as a "visionary project that triggers development."



New Railway Line between Boughezoul and M'Sila | ALGERIA

Client/Owner: COSIDER TP / ANESRIF - Agence Nationale d'Etudes et de Suivi de la Réalisation des Investissements Ferroviaires
Detailed Design: 2011 / 2012
Technical Assistance during Construction: 2013 / 2016



The new railway line between Boughezoul and M'Sila spans approximately 151 km and is located in the high plateaus, about 200 km south of Algiers. It enables the transportation of both freight and passengers between several cities along the Boughezoul / M'Sila axis. Designed for a speed of 160 km/h, this single-track, non-electrified line includes planned duplication at crossing points and bridges.

Along the 151 km, four stations were built: Boughezoul, Birine, Bouti Sayah, and Ain Lahdjel.

The project involved approximately 3 million m³ of excavation, 6.5 million m³ of embankment, 40 km of track reinstatement, and around 250 hydraulic structures. The design of the railway infrastructure was developed entirely by COBA.

Sena Line | Rehabilitation and Expansion of the Line | MOZAMBIQUE

Client/Owner: Administração dos Portos e Caminhos de Ferro de Moçambique, E.P. (CFM)
Construction Supervision: 2014 / 2016
In Consortium with: TECNICA

The Mozambican section of the Sena Line connects the Port of Beira, via Dondo, to Malawi and includes 11 stations along its 357 km length. The line also comprises the Inhamitanga–Marromeu branch (88 km) and the Dona Ana–Moatize section (254 km). It is a single-track, non-electrified railway primarily used for coal transportation from Moatize by mining companies operating in the region.

The rehabilitation and expansion of the Sena Railway Line covered a total length of 547 km, extending from Dondo to Moatize. The project involved capacity enhancements, including an axle load increase to 20.5 tons and a train configuration of 100 wagons and 6 locomotives. It also included upgrades to improve operating conditions and the execution of several complementary works.

Provided technical advisory services to CFM and oversaw the supervision of capacity enhancement works, ensuring compliance and effective project monitoring. Targeted technical missions were also conducted.



El Gourzi / Biskra / Touggourt Railway Line | ALGERIA

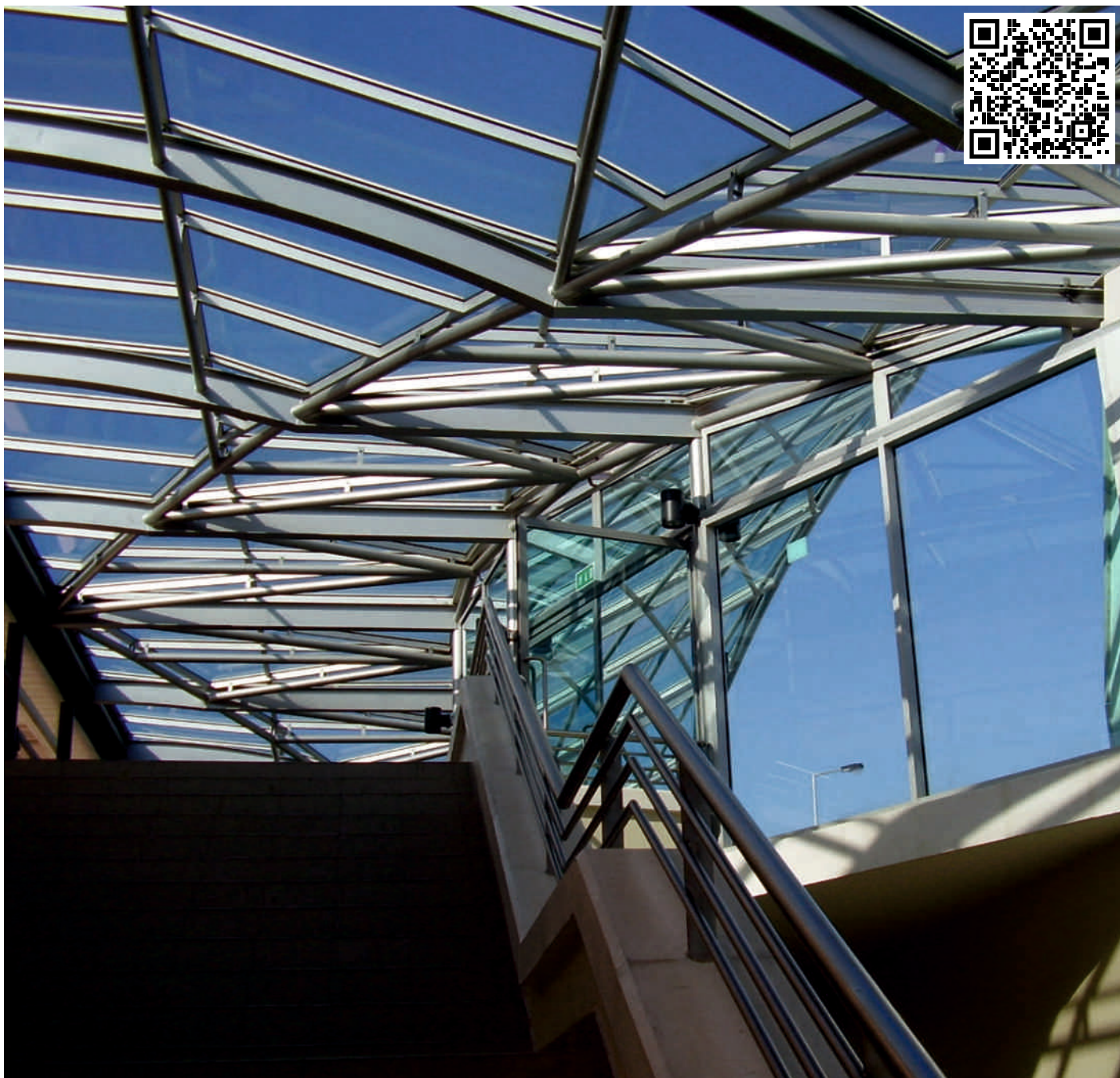
Client/Owner: SOMAFEL / ANESRIF - Agence Nationale d'Études et de Suivi de la Réalisation des Investissements Ferroviaires
Detailed Design: 2007 / 2009



The Biskra / Touggourt railway line is a single-track, non-electrified line used for both freight and passenger transport.

The project included an alignment development study, maintaining the existing platform while incorporating adjustments to enable speeds of 120 km/h for passenger trains and 80 km/h for freight trains. Along the studied section, four stations were identified, whose layouts were preserved.

COBA's involvement included geological and geotechnical studies of the entire line, as well as alignment design, earthworks, longitudinal and transversal drainage, structures, and railway superstructure.



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