TRANSPORTATION

A history of innovation

INGEROP
Inventing for tomorrow

BUILDING | **URBAN DEVELOPMENT & TRANSPORTATION** | ENERGY & INDUSTRY | WATER & ENVIRONMENT

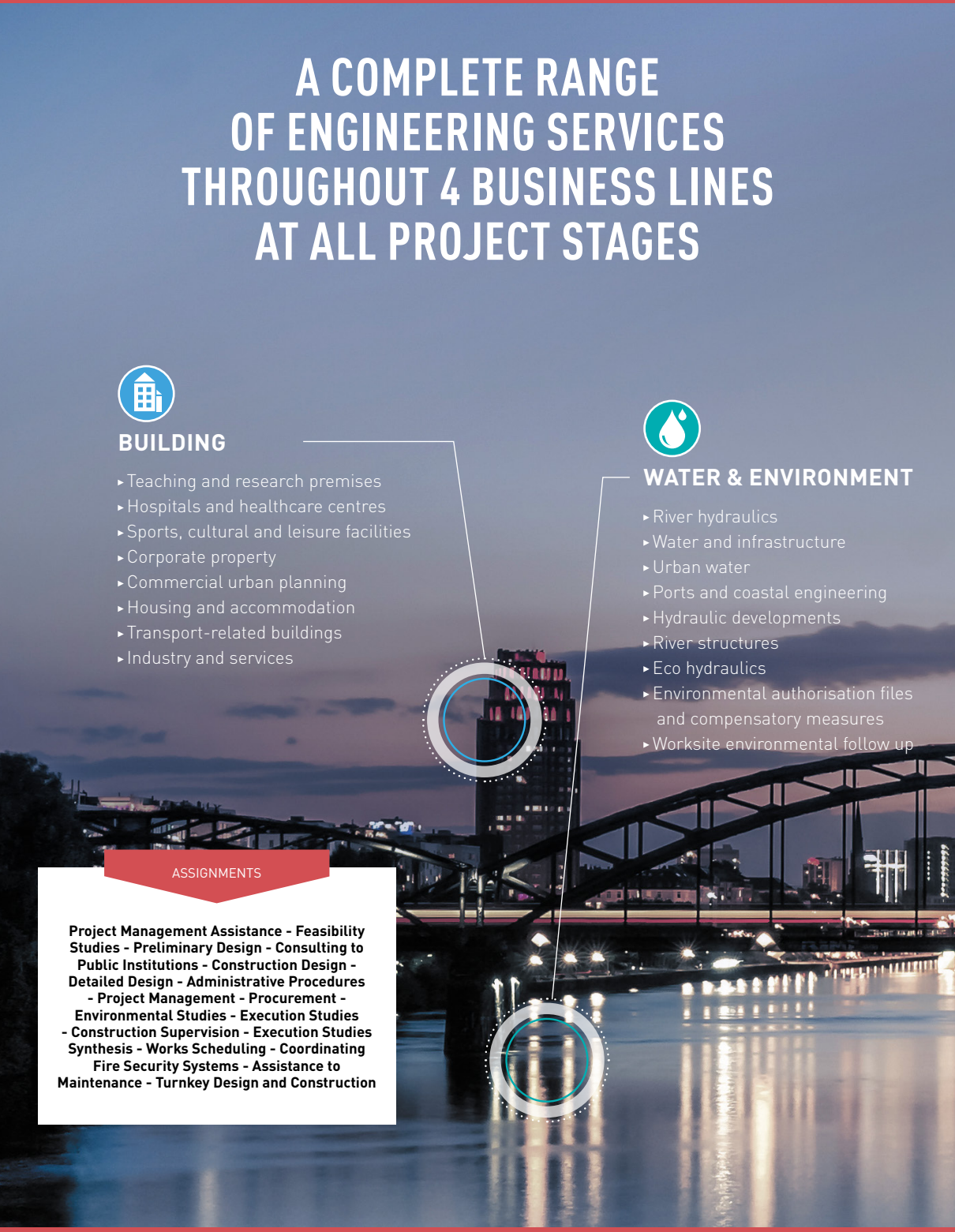
A COMPLETE RANGE OF ENGINEERING SERVICES THROUGHOUT 4 BUSINESS LINES AT ALL PROJECT STAGES

BUILDING

- Teaching and research premises
- Hospitals and healthcare centres
- Sports, cultural and leisure facilities
- Corporate property
- Commercial urban planning
- Housing and accommodation
- Transport-related buildings
- Industry and services

WATER & ENVIRONMENT

- River hydraulics
- Water and infrastructure
- Urban water
- Ports and coastal engineering
- Hydraulic developments
- River structures
- Eco hydraulics
- Environmental authorisation files and compensatory measures
- Worksite environmental follow up



ASSIGNMENTS

Project Management Assistance - Feasibility Studies - Preliminary Design - Consulting to Public Institutions - Construction Design - Detailed Design - Administrative Procedures - Project Management - Procurement - Environmental Studies - Execution Studies - Construction Supervision - Execution Studies Synthesis - Works Scheduling - Coordinating Fire Security Systems - Assistance to Maintenance - Turnkey Design and Construction

URBAN DEVELOPMENT & TRANSPORTATION

- Highways
- Roads
- Structures
- Tunnels and immersed tunnels
- Ports and airports
- Urban planning
- Railways
- Undergrounds
- Tram trains
- Tramways
- Bus with High Level of Service
- River shuttles
- Urban projects
- Territory development
- Transportation hubs

ENERGY & INDUSTRY

- Nuclear plants
- Conventional power plants
- New energy sources
- Data centres
- Pharmaceuticals and biotechnologies
- Cement factories
- Steel plants
- Materials industry
- Defense and military
- Manufacturing and automotive industries
- Aircraft industry
- Chemicals and petrochemicals
- Aluminum smelter
- Wine production

Modeling **the future face of transport**, promoting balance between citizens' wishes and **environmental concerns**, supporting the **transformation of territories** towards a **sustainable urban planning** and designing a **new generation of smart buildings** in the heart of the city of tomorrow, are key parts of the major economic, social and environmental issues of our time.

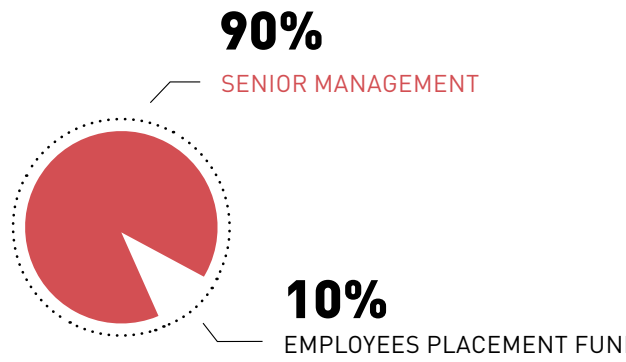
As a major player, in France and abroad, Ingerop faces these new challenges, through **innovative** solutions adapted to reality and everyday life. Ingerop provides **engineering** and **sustainable mobility consulting**, focusing on green energies and developing a new lifestyle.

Ingerop also commits to collective interest sharing, with passionate men and women, **ingenuity, expertise and excellent technique** to create the future world.

CORPORATE ORGANISATION

INDEPENDENCE

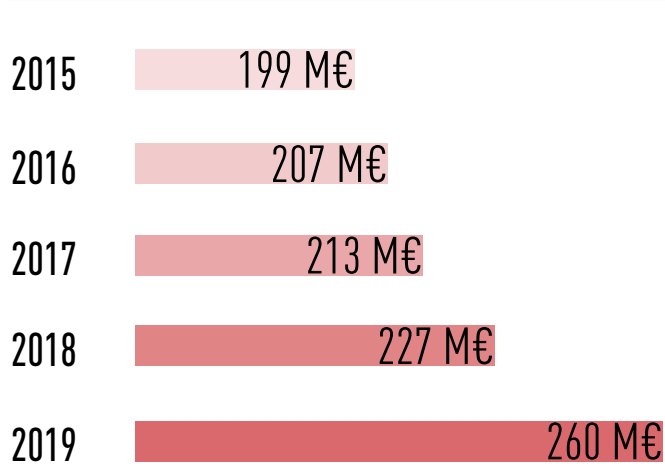
Ingerop is a fully independent engineering company. More than 390 senior managers own 90% of the share capital and, through a Common Placement Fund, 900 permanent staff own the remaining 10%.



URBAN DEVELOPMENT & TRANSPORTATION	ENERGY & INDUSTRY	BUILDING	WATER & ENVIRONMENT
49%	19%	29%	3%

2 100
EMPLOYEES
70% ENGINEERS

70
COUNTRIES WITH OPERATING PROJECTS



A TECHNICAL AND INNOVATIVE JOURNEY

©TDJ 123

› *Coventry Very Light Rail*

INNOVATING TOGETHER TO INVENT TOMORROW

Innovation can be found everywhere. In Ingerop, we believe that small improvement can improve lives. Each of our Senior Engineers will promote the most adapted rather than the habitual solutions.

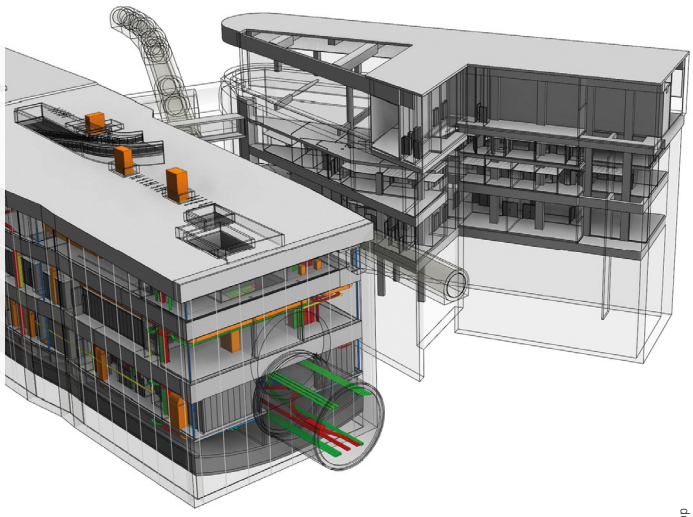
Ingerop independence guarantees we are not influenced by any operator or a producer, and that we are constantly looking for the most fit-for-purpose solutions.

Thanks to this idea, we have participated in the development of innovative solution such as the track system for the Coventry Very Light Rail, a revolutionary type of light rail allowing a low cost and eased implementation combined with comfortable journey for passengers.

BUILDING INFORMATION MODELING

Engineering has undergone a digital revolution in the last 30 years, with the integration of computers in everyday design. Ingerop was one of the first companies to develop Building Information Modeling (BIM) in France, starting with buildings and now extending to transport and city.

We master all tools of BIM and create new ones for contractors, operators and maintenance entities.



©Ingérop

› Line 18 (Orly - Versailles) - Grand Paris Express - BIM

A HUMAN ADVENTURE

INVOLVED IN SOLIDARITY AND RESPONSIBILITY

Ingerop is a group with strong values. We believe that through our projects, we have a mission to promote a better life for all human beings. Managers are trained and encouraged to share, to be inclusive, supporting parity and integrity. Our members aspiration is a genuine engine for the group. This is why we are since 2017 partners with Planete Urgence, a non-profit association sending every year Ingerop volunteers to implement environmental protection projects around the World.

60 | **DIFFERENT NATIONALITIES**

95% | **PERMANENT CONTRACTS**

100% | **OF INGEROP OWNED BY ITS EMPLOYEES**

OUR PURPOSE

Working together to create a sustainable world and offering everyone a better life

INDIVIDUAL AND COLLECTIVE HUMAN DYNAMICS

Being a leader within the transportation sector, Ingerop actively supports scientific education around the world. We participate and encourage students in France, Spain, UK and South Africa to develop their curiosity and pursue technical engineering studies.
By hiring around 100 graduates annually, we are one of the main training centres of the profession in Europe and around the world. Transmitting the passion, our demand for excellence and the awareness of our career opportunities are the pillars of our relations policy.

4 CORE VALUES

Freedom
Innovation
Responsibility
Excellence

TRAVELING THROUGH TIME

1992

Ingerop is created by the merging of two important French engineering companies, SEEE and InterG, inside the French contractor GTM Group.

2001

Thanks to a Leverage Management Buy Out (LMBO), Ingerop becomes 100% independent.

2005

Ingerop acquires Geos, a Swiss expert in geology, geotechnics and tunneling.

1984

GRENOBLE TRAM

Rebirth of the modern tram in France
Grenoble

FRANCE

2003

BORDEAUX TRAM

First tram with ground power supply
Bordeaux

FRANCE

2010

GAUTRAIN

First modern commuter train in Africa
Pretoria - Johannesburg

SOUTH AFRICA

2013

SYDNEY METRO NORTHWEST

The first metro in Pacific region
Sydney

AUSTRALIA

2015

Ingerop acquires Rendel, a leading UK engineering company.

Rendel est. 1838

2018

Ingerop acquires two german engineering companies, Codema and EDR.

Codema

EDR

2019

Ingerop acquires Smart2, a company specialised in transportation system engineering.

Smart2

2014

METROCABLE

An integrated system with a tram and a cable car
Medellin

COLOMBIA

2023

HIGH SPEED 2

Most ambitious railway project launched in Europe
London - Birmingham

UNITED KINGDOM

2024

REM

First automatic metro in Quebec

Montreal

CANADA

2030

GRAND PARIS EXPRESS

The biggest metro project in Western Europe, phased up to 2030
Paris

FRANCE

MULTIMODAL TRANSPORTATION HUBS

LOCATION: RUEIL-MALMAISON, PARIS REGION (FRANCE)

Rueil Malmaison is an existing station on the most used commuter rail in Europe, the RER A. However low intermodality decreased its attractivity.
Applying the principles of Transit Oriented Development (TOD), Ingerop developed a new hub, integrating new businesses and easing the connection with residential areas. This is an example for mixed-use communities surrounding transit stations that Ingerop creates around the world.
Thanks to this improvement, Rueil-Malmaison rapid transit station has become an important interchange hub, with a concentration of residential spaces, employment spaces with smooth pedestrian, cycle and buses functions; resulting in decreased traffic congestion.

A GLOBAL VISION OF TRANSPORT AND MOBILITY

MASTER PLAN

LIGHT RAIL TRANSIT

CONVENTIONAL RAIL

BUS RAPID TRANSIT

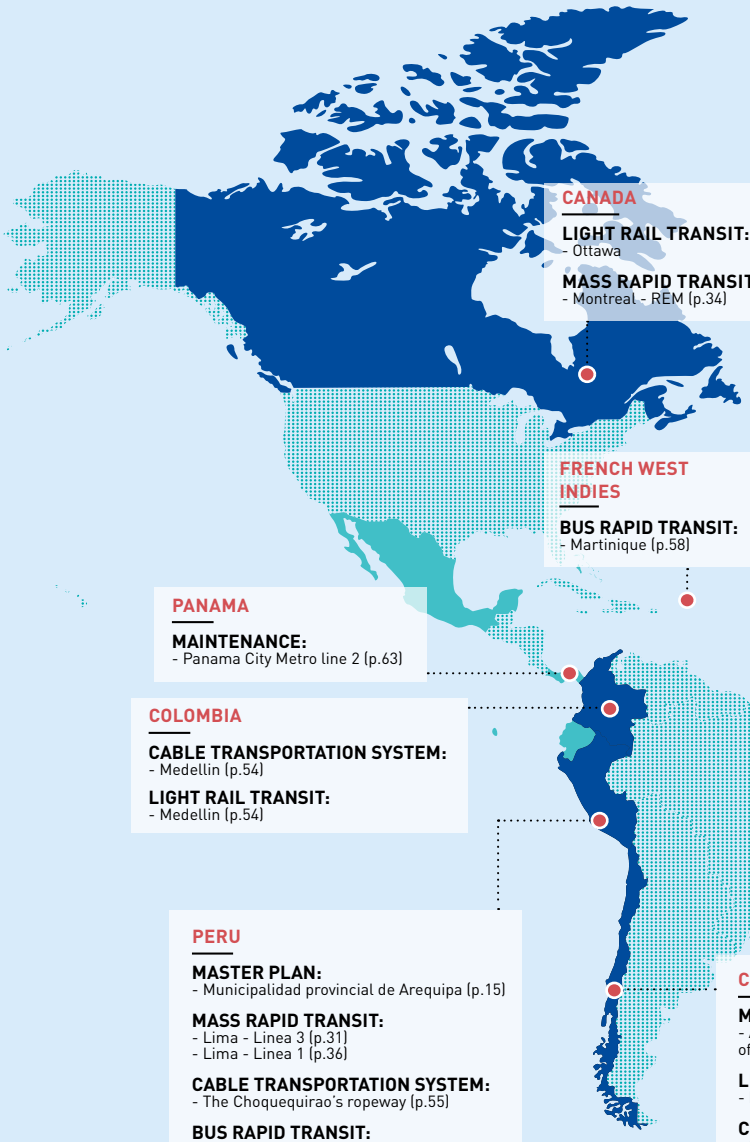
MASS RAPID TRANSIT

HIGH SPEED LINE

CABLE TRANSPORTATION SYSTEM

STATIONS & MAINTENANCE CENTERS

AROUND THE WORLD



UNITED KINGDOM

HIGH SPEED LINE:
- High Speed 2 (p.40)

LIGHT RAIL TRANSIT:
- Coventry (p.24)

SPAIN

LIGHT RAIL TRANSIT:
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- Barcelona (p28)

MASS RAPID TRANSIT:
- Malaga (p.39)

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- Spanish High Speed lines (p.44)

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- Huesca - Canfranc (p.48)

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- Cordoba train station (p.61)

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- Ottawa

MASS RAPID TRANSIT:
- Montreal - REM (p.34)

FRENCH WEST INDIES

BUS RAPID TRANSIT:
- Martinique (p.58)

MOROCCO

MASTER PLAN:
- Taza - Al - Hoceima - Taounate (p.17)

ALGERIA

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PANAMA

MAINTENANCE:
- Panama City Metro line 2 (p.63)

COLOMBIA

CABLE TRANSPORTATION SYSTEM:
- Medellin (p.54)

LIGHT RAIL TRANSIT:
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PERU

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- Municipalidad provincial de Arequipa (p.15)

MASS RAPID TRANSIT:
- Lima - Linea 3 (p.31)
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CABLE TRANSPORTATION SYSTEM:
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CHILE

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- Analysis of the private initiatives of massive transport system (p.19)

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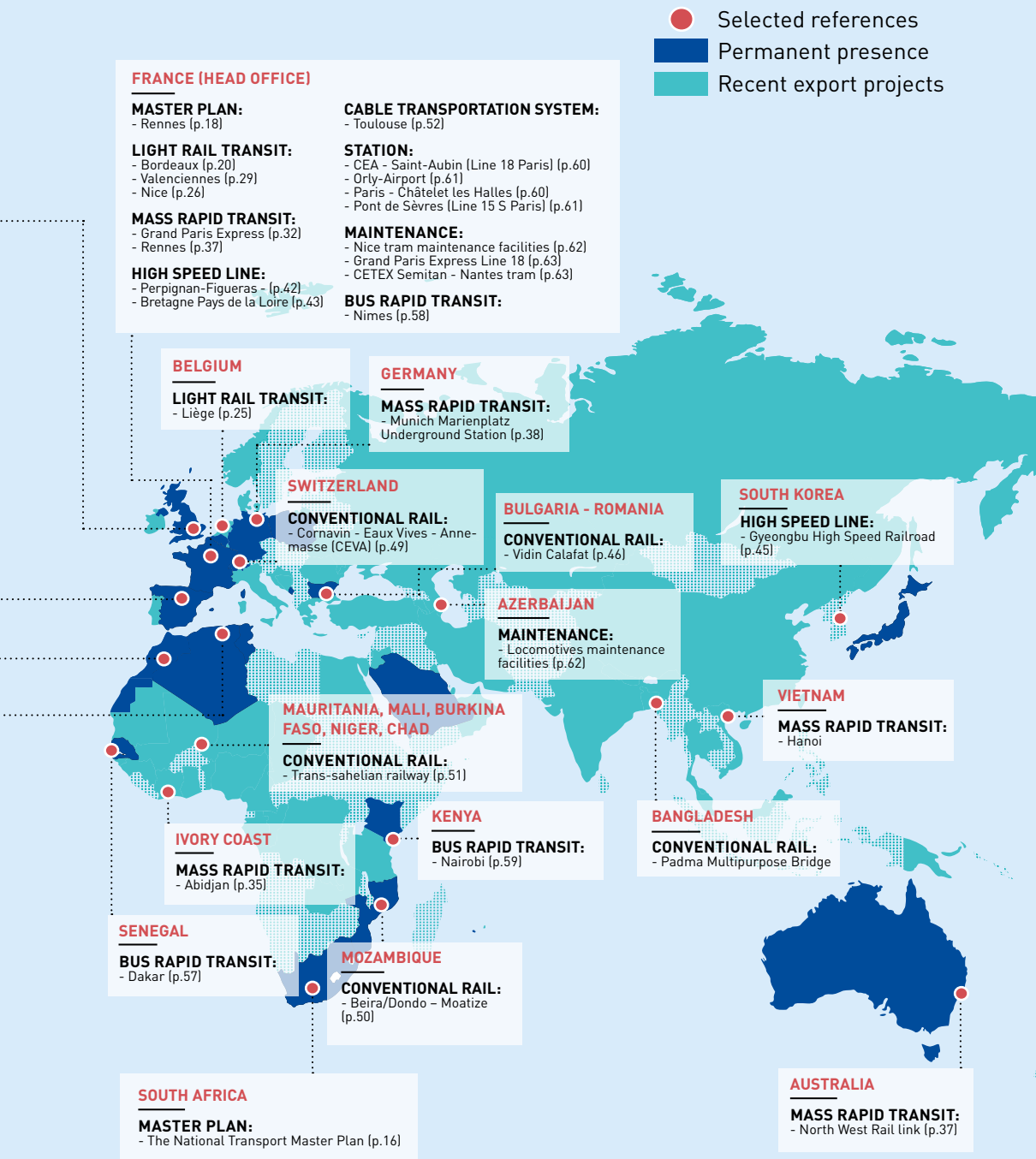
- La Serena - Coquimbo (p.29)

CONVENTIONAL RAIL:
- Corredor La Union


Selected references
Permanent presence
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- Rennes (p.18)
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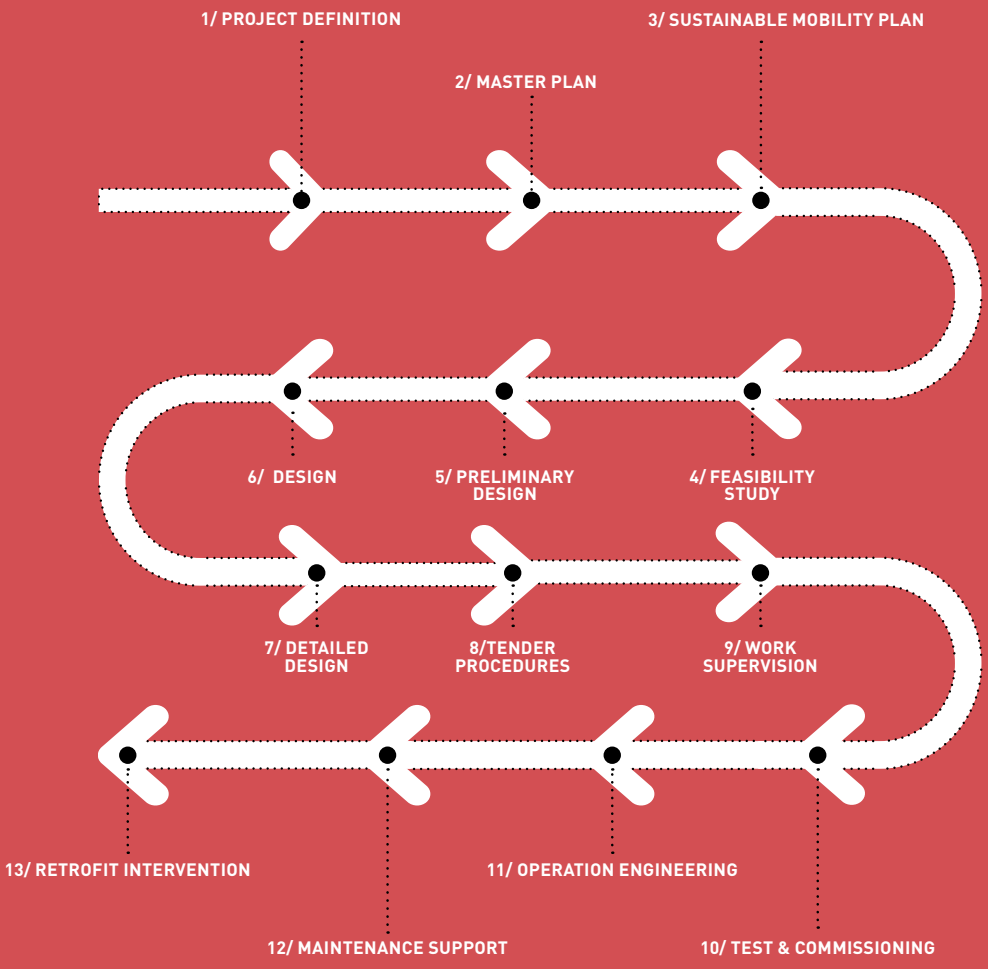
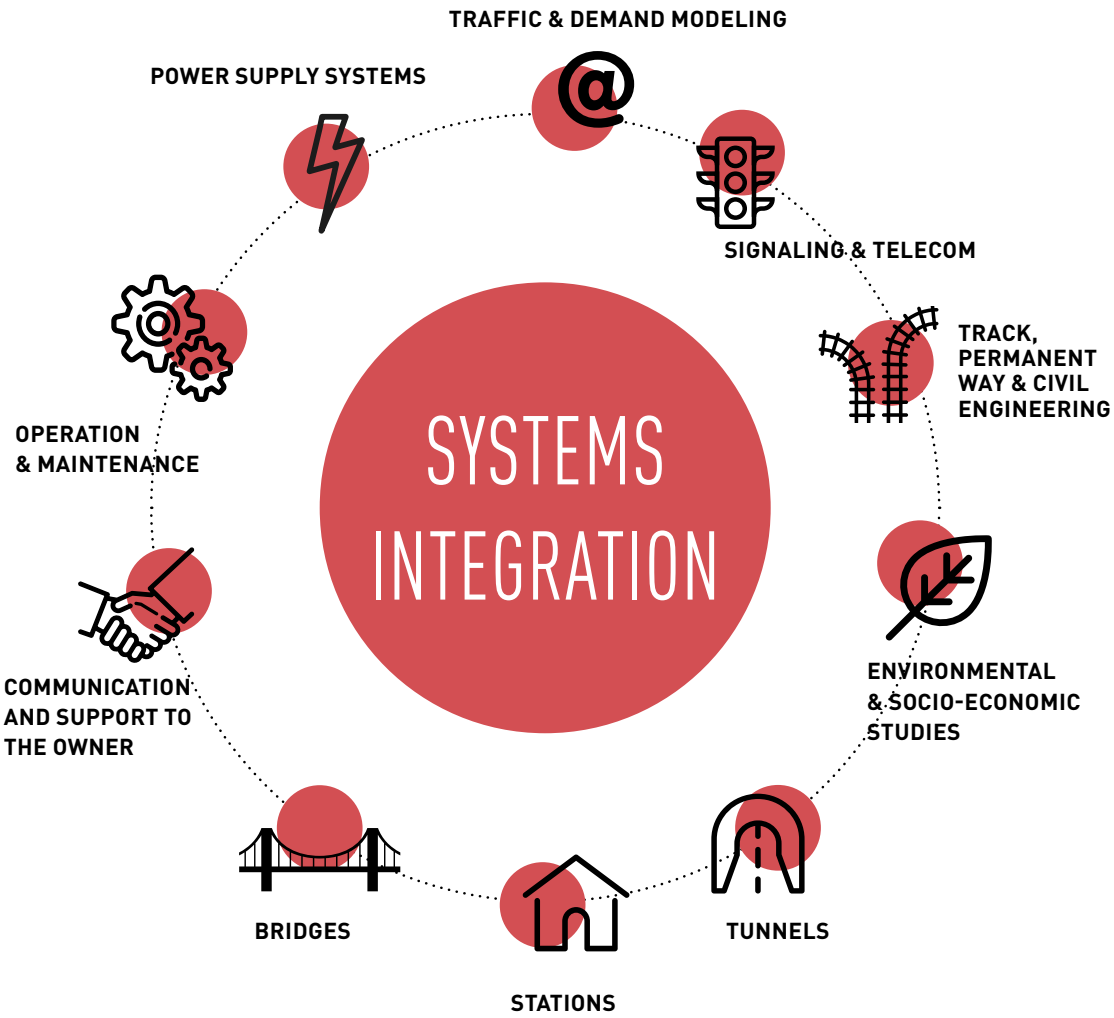
- North West Rail link (p.37)

PRESENT WITH THE CLIENT AT ALL STAGES OF TRANSPORTATION PROJECTS



TECHNICAL SKILLS: A FOCUS ON SYSTEMS INTEGRATION



MASTER PLAN

OUR VISION

Ingerop designs master plans and Sustainable Urban Mobility Plan at all scales. The development of a master plan requires an ability to listen and understand the problems of the citizens living in a city, a region or a country. Every city is different. Our methodology always includes, as a first step, discussions with local stakeholders and partnership with local offices. We prepare a synthesis of all socio-economical aspects, residents' needs and expectations in order to have a comprehensive and efficient model for the city. We use state-of-the-art software to efficiently and solidly base these analyses. By putting human beings at the heart of our expertise, we expect to meet the needs of the greatest number of citizens, helping to make the city more livable, more attractive, greener and less crowded. Our activities include :

- analysis and simulations of passengers flow
- multimodal models of traffic
- socio-economic balance studies

AREQUIPA CITY MASTER PLAN

LOCATION: PERU

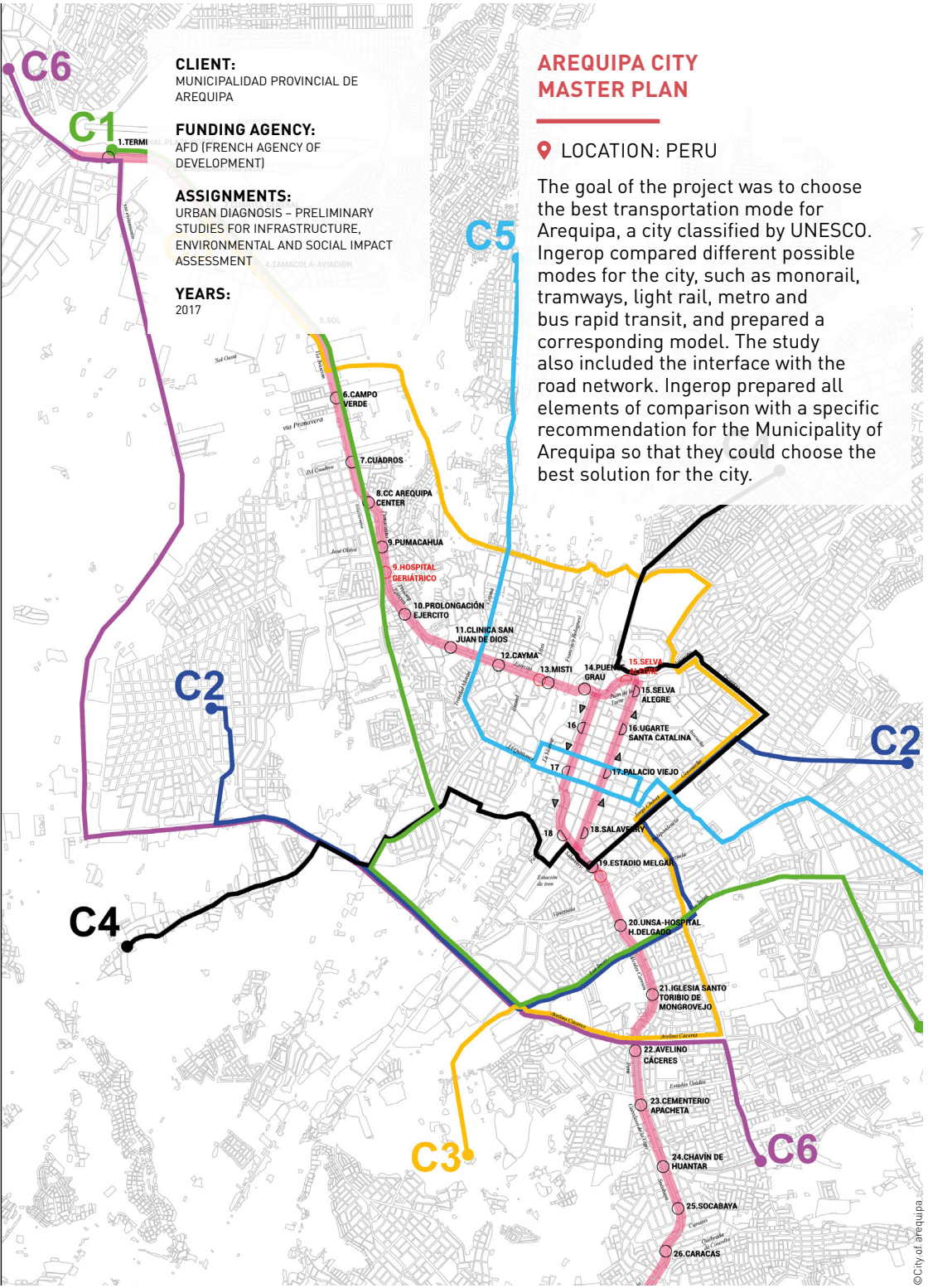
CLIENT:
MUNICIPALIDAD PROVINCIAL DE AREQUIPA

FUNDING AGENCY:
AFD (FRENCH AGENCY OF DEVELOPMENT)

ASSIGNMENTS:
URBAN DIAGNOSIS – PRELIMINARY STUDIES FOR INFRASTRUCTURE, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

YEARS:
2017

The goal of the project was to choose the best transportation mode for Arequipa, a city classified by UNESCO. Ingerop compared different possible modes for the city, such as monorail, tramways, light rail, metro and bus rapid transit, and prepared a corresponding model. The study also included the interface with the road network. Ingerop prepared all elements of comparison with a specific recommendation for the Municipality of Arequipa so that they could choose the best solution for the city.

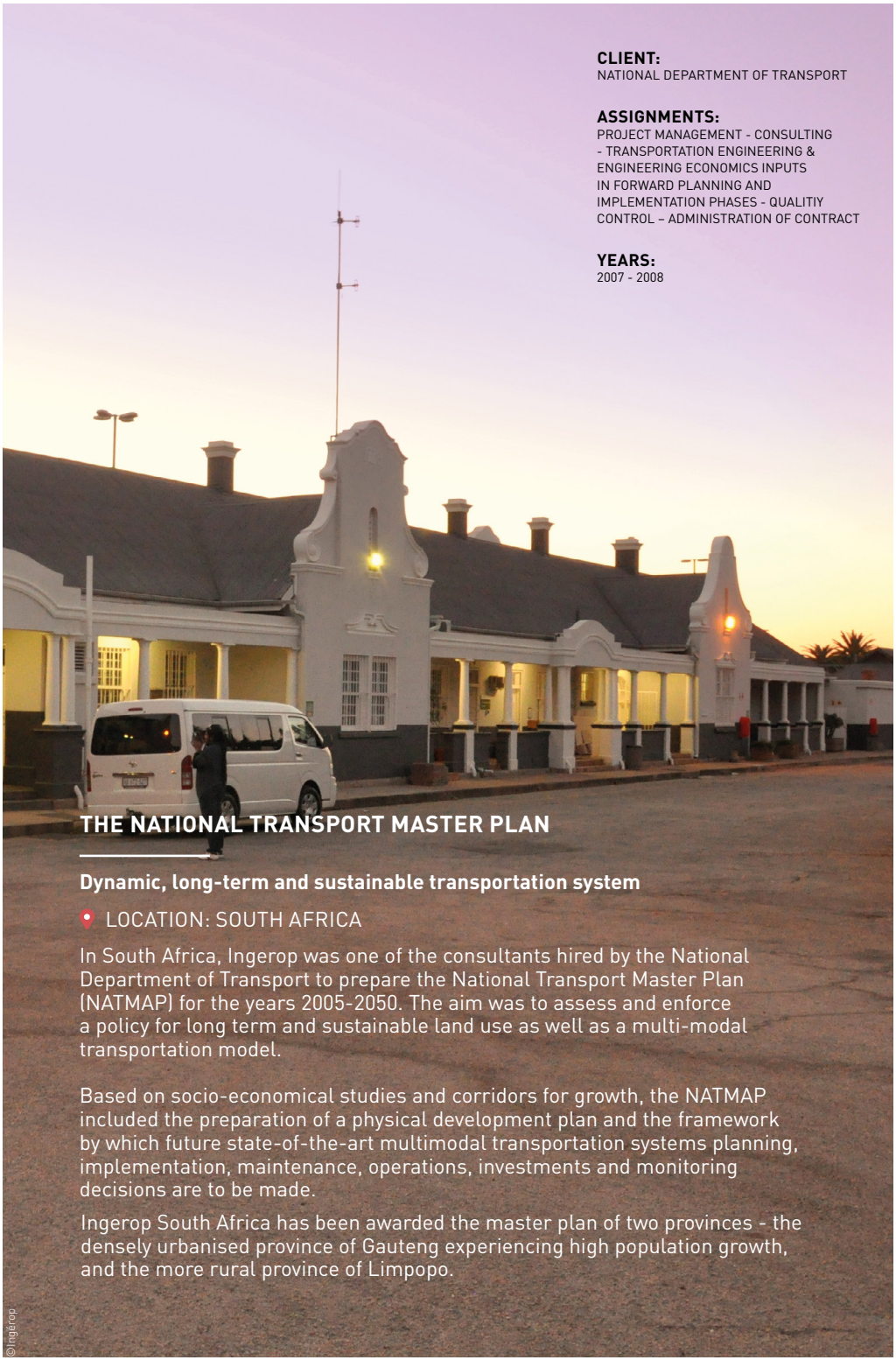


©City of arequipa

CLIENT:
NATIONAL DEPARTMENT OF TRANSPORT

ASSIGNMENTS:
PROJECT MANAGEMENT - CONSULTING - TRANSPORTATION ENGINEERING & ENGINEERING ECONOMICS INPUTS IN FORWARD PLANNING AND IMPLEMENTATION PHASES - QUALITIY CONTROL – ADMINISTRATION OF CONTRACT

YEARS:
2007 - 2008



THE NATIONAL TRANSPORT MASTER PLAN

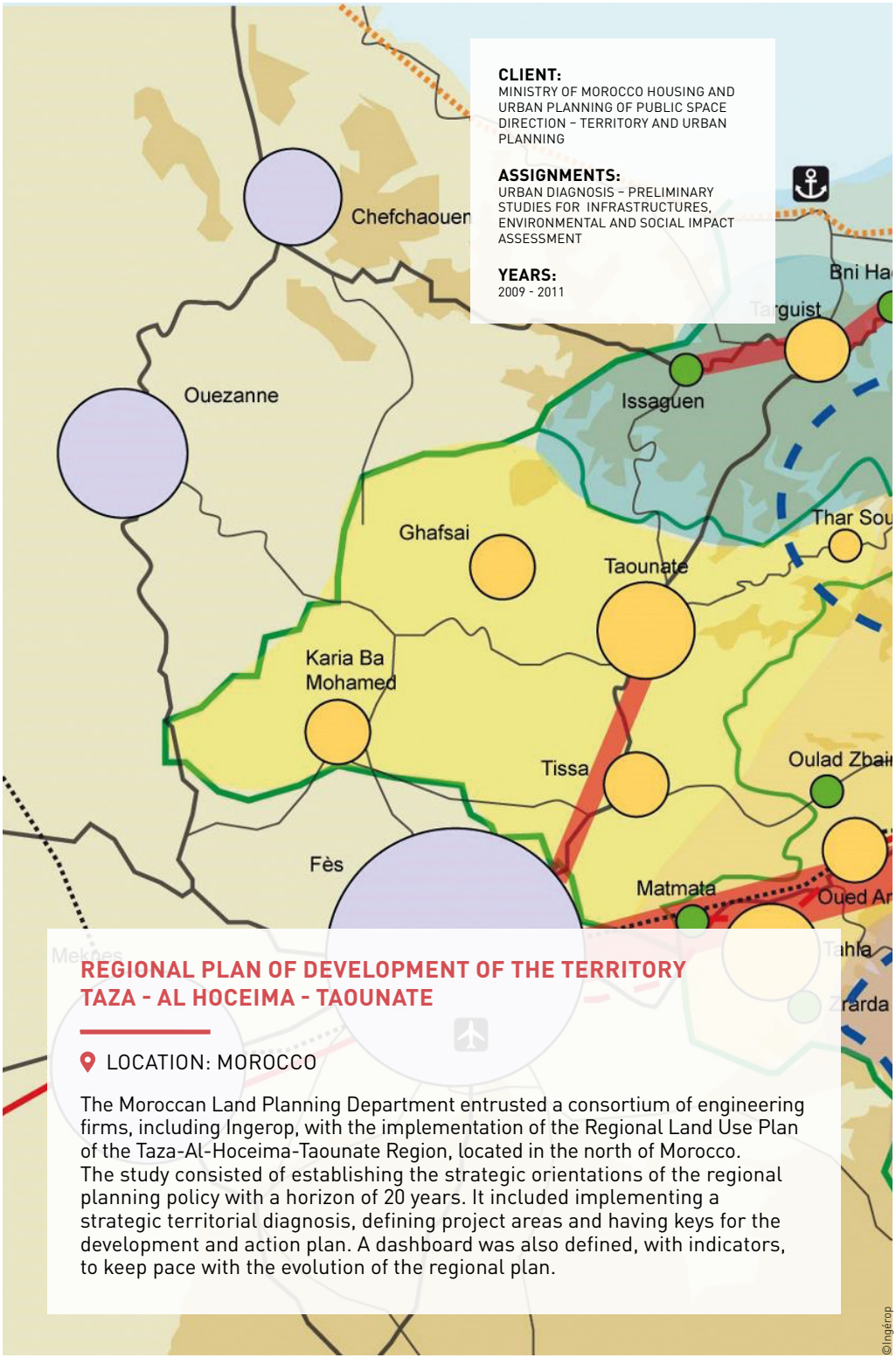
Dynamic, long-term and sustainable transportation system

LOCATION: SOUTH AFRICA

In South Africa, Ingerop was one of the consultants hired by the National Department of Transport to prepare the National Transport Master Plan (NATMAP) for the years 2005-2050. The aim was to assess and enforce a policy for long term and sustainable land use as well as a multi-modal transportation model.

Based on socio-economical studies and corridors for growth, the NATMAP included the preparation of a physical development plan and the framework by which future state-of-the-art multimodal transportation systems planning, implementation, maintenance, operations, investments and monitoring decisions are to be made.

Ingerop South Africa has been awarded the master plan of two provinces - the densely urbanised province of Gauteng experiencing high population growth, and the more rural province of Limpopo.



CLIENT:
MINISTRY OF MOROCCO HOUSING AND URBAN PLANNING OF PUBLIC SPACE DIRECTION – TERRITORY AND URBAN PLANNING

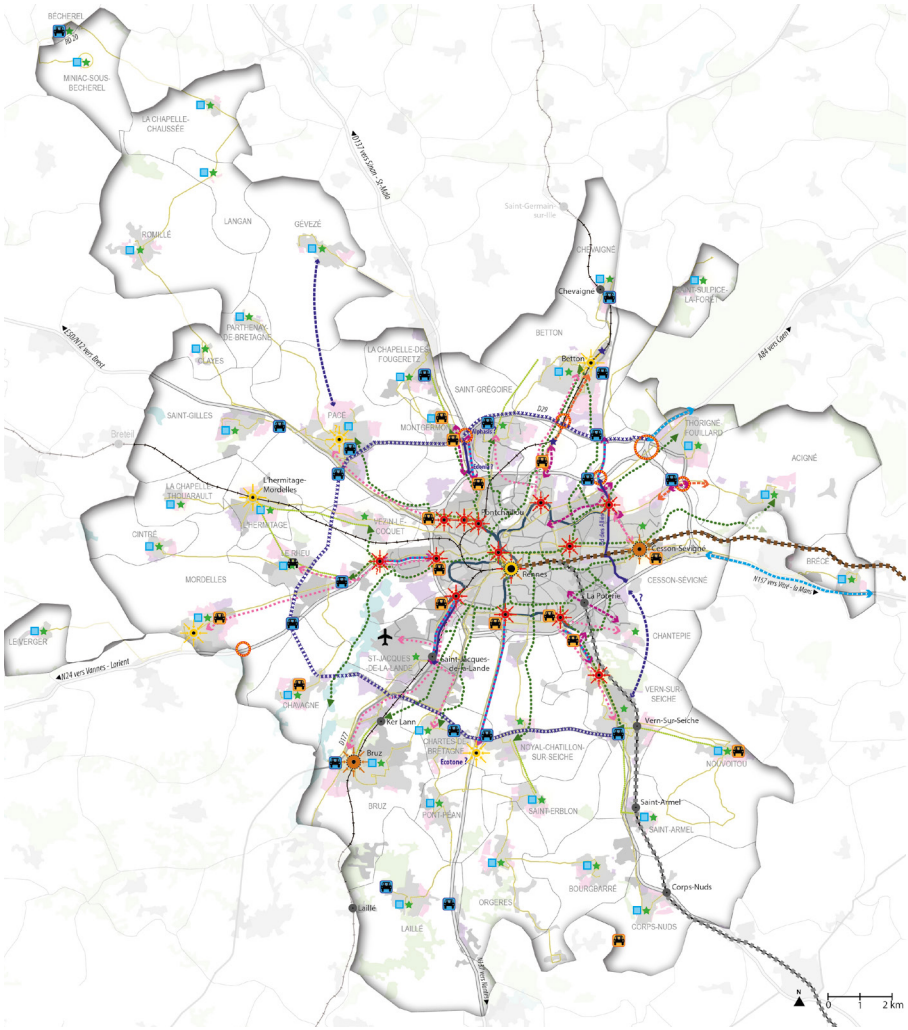
ASSIGNMENTS:
URBAN DIAGNOSIS – PRELIMINARY STUDIES FOR INFRASTRUCTURES, ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT

YEARS:
2009 - 2011

REGIONAL PLAN OF DEVELOPMENT OF THE TERRITORY TAZA - AL HOCEIMA - TAOUNATE

LOCATION: MOROCCO

The Moroccan Land Planning Department entrusted a consortium of engineering firms, including Ingerop, with the implementation of the Regional Land Use Plan of the Taza-Al-Hoceima-Taounate Region, located in the north of Morocco.
The study consisted of establishing the strategic orientations of the regional planning policy with a horizon of 20 years. It included implementing a strategic territorial diagnosis, defining project areas and having keys for the development and action plan. A dashboard was also defined, with indicators, to keep pace with the evolution of the regional plan.



RENNES - SUSTAINABLE URBAN MOBILITY PLAN

Moving in a fast growing city

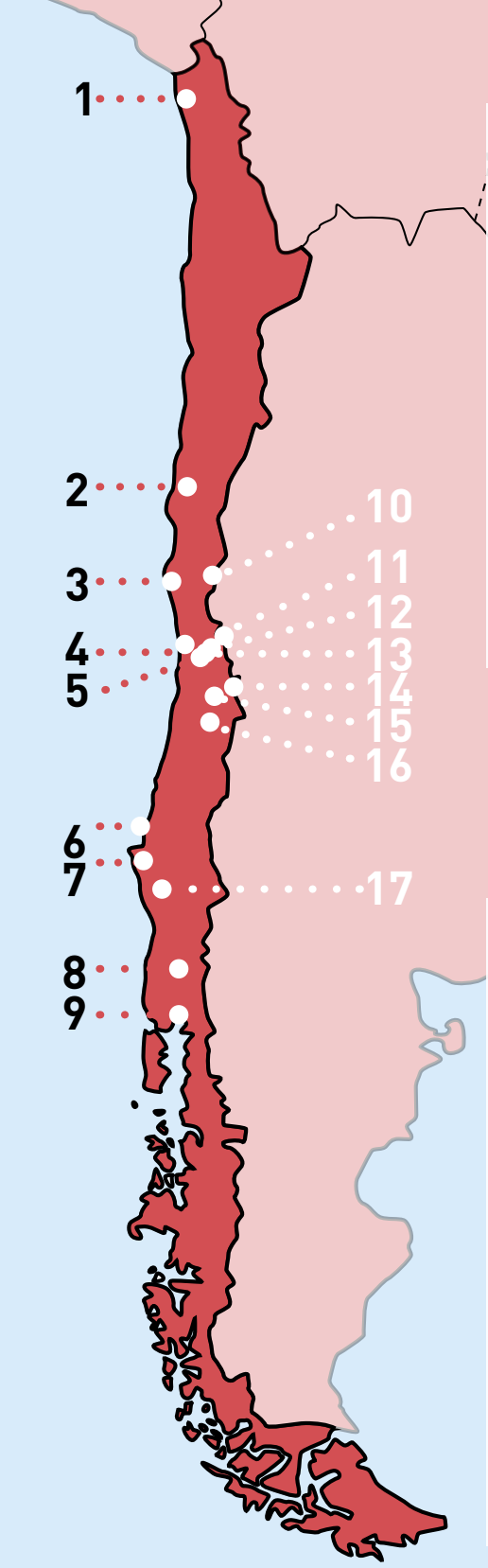
LOCATION: RENNES - FRANCE

Ingerop developed for the city of Rennes, a comprehensive master plan including traffic and transport organisation. The study started with a survey of the use of multimodal travel and included a complete model. Ingerop developed several scenarios in order to determine a comprehensive evolution of the traffic within the city and to create mid-term and long-term support measures. The analysis took into account a large number of projects expected in the next 10 years (new metro, new districts) in the analysis and modeling. The key drivers were the development of soft ways of transportation, an improvement of the quality of services and a reduction of car transit.

CLIENT:
RENNES METROPOLE

ASSIGNMENTS:
MODELING THE TRAFFIC PLAN - FORMULATION OF PROSPECTIVE SCENARIOS - LEADING THE MASTER PLAN REVISION PROCESS - CARRYING OUT A PARKING STUDY WITH A MODELING OF THE TRAFFIC PLAN

YEARS:
FROM 2017 (ONGOING)



1. Iquique – Alto Hospicio cable car
2. Coquimbo – La Serena train
3. Plan – Cerro Valparaiso cable car
4. Viña Reñaca LRT
5. Santiago – Viña del mar Rapid train
6. Cerros de Talcahuano Funicular railway
7. Temuco – Padre Las Casas LRT
8. Puerto Varas – Alerce – Puerto Montt LRT
9. Puerto Montt Cable car
10. Quilicura LRT
11. Las Condes LRT
12. El Rio train
13. Maipu Padre Hurtado LRT
14. La Reina Peñalolén train
15. Tobalaba metro station - Ciudad Empresarial Cable car
16. Rancagua Machali train
17. Valdivia LRT

ANALYSIS OF THE PRIVATE INITIATIVES OF MASSIVE TRANSPORT SYSTEM

LOCATION: CHILE

Ingerop studied 17 suggested projects in Chile such as commuter trains, a light rail system and cable transport to determine their possibilities for future development, on behalf of Sectra, part of Transportation Ministry of Chile. For each of the key cities we provided a complete socio-economic and traffic study to determinate the level of priority of these investments proposed by private partners. The study focused on integrating these transportation systems within the urban environment, requiring processing and analysis of the information collected, diagnosis in the area where the project is located, demand estimate, operational design, risk analysis and cost estimation with financial analysis, and consolidated initiative projects.

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LIGHT RAIL TRANSIT

OUR VISION

Ingerop has been involved for a long time in the reintroduction of LRTs (or tramways) and has become a reference for others; our knowledge and expertise have moved outside France, initially to Spain and now throughout the world. This mixture of expertise has led to high quality projects, and has improved the quality of the lives of town dwellers.

The main idea is to give the LRT priority over the general traffic at crossroads and along its axis. This favours the commercial speed, economy and attractivity of the LRT compared to private cars, leading the public to select the LRT rather than their own car and initiating a virtuous circle ending with a decline in road traffic and better general traffic. This sometimes requires remodeling the axis where the LRT passes through by technical solutions for traffic congestion and helps improving urban life.

TRAMWAY WITHOUT CATENARY IN FRANCE

BORDEAUX

Reviving a heritage old city with a tramway

LOCATION: BORDEAUX (FRANCE)

The urban community of Bordeaux appointed a consortium, including Ingerop, to conduct full engineering for the creation of a network of light rail around the city. Due to the high heritage value of the city centre, a new solution was needed to reduce the visual impact of the overhead traction line. This light rail was therefore the first in the world to have a ground level fully safe power supply system. Since 1997, Ingerop has supported Bordeaux in all aspects of the successive tramway network extensions.

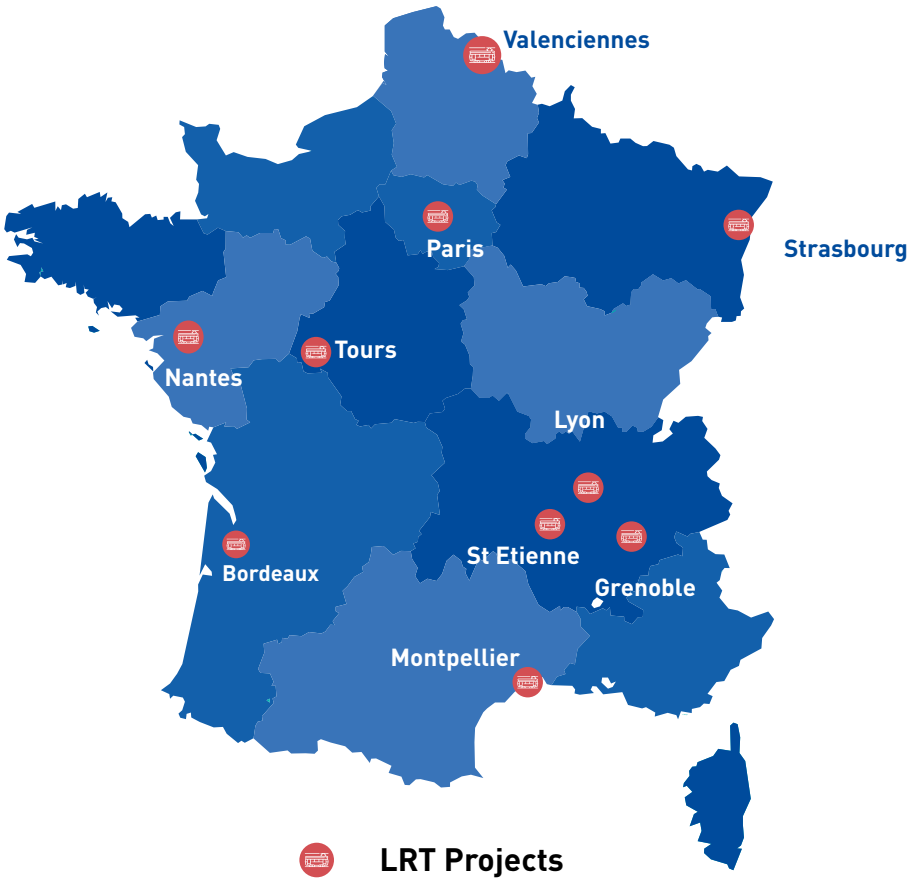
CLIENT:
URBAN COMMUNITY OF BORDEAUX

ASSIGNMENTS:
FULL ENGINEERING SERVICES - DESIGN - WORK SUPERVISION

YEARS:
FROM 1997 (ONGOING)

INGEROP, ONE OF THE MAIN ACTORS

2000

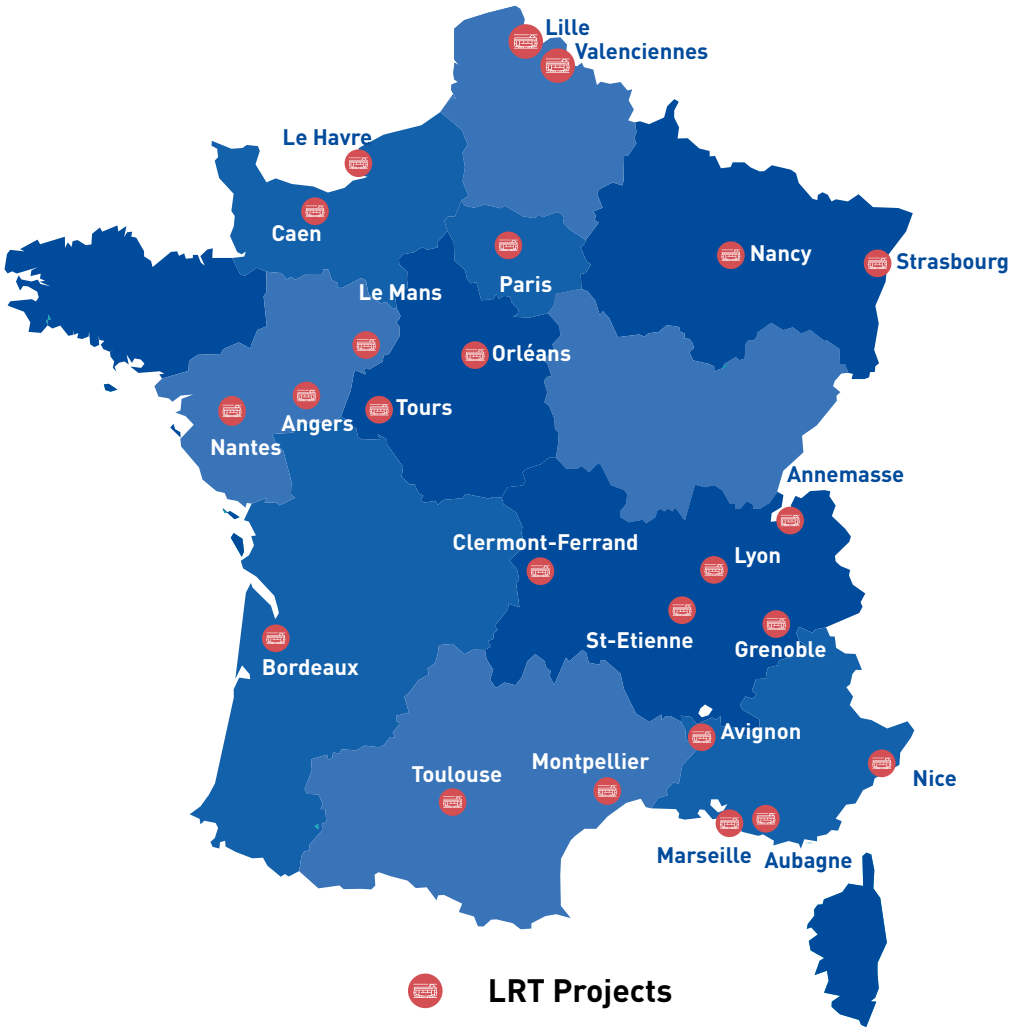


Since 1984, the tramways and light rail projects have been remodelling the cities of France. Ingerop worked on the first two modern tramway projects, in Nantes and Grenoble. It has since consistently supported cities or contractors in their wish to implement this high-performing transport system.
Trams have provided cities with a new mode of transportation and exceptional opportunities to renovate the cities where they have been implemented.

In the last 30 years, Ingerop has worked on over 80% of new tramway lines in France and Spain, at one stage or another. We are currently renovating the first tram lines that were built 30 years ago.
Ingerop's services include feasibility, preliminary, detailed design, administrative services, works supervision, test and commissioning, operation and maintenance services, gaining a precious long-term return of experience on operation and heavy maintenance on mass systems.

OF THE REDEVELOPMENT OF THE LIGHT RAIL IN FRANCE

2020



KEY FIGURES

18 CITIES

300+ KM OF LINEAR IN ONLY

20 YEARS

COVENTRY

A revolutionary urban rail

LOCATION: UNITED KINGDOM

The Coventry Very Light Rail (VLR) project, led by Coventry City Council in collaboration with the University of Warwick, has appointed Ingerop as “innovative partner” to design a new type of tramline.

The project has the potential to revolutionize light rail systems all over the world, as VLR provides a new type of low weight rolling stock, allowing a fast and comfortable journey for all travellers.

Ingerop has developed a new type of track, easy and quick to install, largely prefabricated, which does not imply the reallocation of existing utilities networks (water, gas…), reducing significantly the cost and the construction time of the light rail projects for the cities.

CLIENT:
UNIVERSITY OF WARWICK / COVENTRY CITY COUNCIL

ASSIGNMENTS:
TRACK DESIGN R&D

YEARS:
2020 & ONGOING

LIEGE

Engineering the first light rail PPP in Belgium

LOCATION: BELGIUM

Liege, a 700 thousand inhabitants metropolis is currently building its first 12km-tramline in an original PPP scheme. Ingerop was appointed by the consortium led by Colas and CAF to manage technically the offer, the project and the construction supervision. Ingerop has worked first as a tender support, and helped to provide an efficient cost-effective design for the project. During the implementation phase, Ingerop has carried on Track and Infrastructure design, with a special focus on cost and construction efficiency. Ingerop is also in charge of all the interface management between Civil and Systems. Obviously, the project is being prepared considering the specific requirements for design and construction in Belgium.

CLIENT:
CONSORTIUM COLAS PROJECT, COLAS BELGIUM, COLAS RAIL AND CAF

ASSIGNMENTS:
PROJECT DIRECTION, TRACK AND INFRASTRUCTURE DESIGN, INTERFACE MANAGEMENT

YEARS:
2018 & ONGOING

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CLIENT:
URBAN COMMUNITY OF NICE

ASSIGNMENTS:
PROJECT MANAGEMENT–
DESIGN – WORKS SUPERVISION
(ROLLING STOCK, SYSTEMS,
INFRASTRUCTURE, TUNNELS,
OPERATION)

YEARS:
2010 - 2018

NICE TRAM LINE 2

Going underground to fit in the historical city

LOCATION: NICE (FRANCE)

The backbone of Nice Urban Transport System is two tramlines. Line 1, which was opened in 2007 with the support of Ingerop, was one of the first trams to carry an onboard battery in order to cross place Garibaldi and place Massena without any overhead wire. The line is 10km long with 22 stations.
The first stage of Line 2 was opened in June 2018. This new line has three distinctive attributes:
- It operates the next generation of Alstom Citadis tramway
- It uses an innovative energy system consisting of an onboard battery that recharges in 20 seconds when the tram stops at a station. The tramway system does not need any overhead power-charging system
- The line has an underground section of 4km which crosses the historic district of Nice. This specific section includes four "metro-like" underground station.

©IMICA

ZARAGOZA

A co-construction project

LOCATION: SPAIN

With 25 stops, the 12.8km-long North-South Line of the Zaragoza Tram runs across the centre of the city, connecting the neighbourhoods of Valdespartera and Parque Goya. This tram was the first one using supercapacitor and stored braking energy. The project also supported the requalification of the whole city, making it more livable and attractive.

Ingerop was the project manager, designer and works supervisor, supporting the administration in all aspects including rolling stock, signals, operation, maintenance plan and communication plans.

CLIENT:
ZARAGOZA CITY COUNCIL

ASSIGNMENTS:
PROJECT MANAGEMENT – DESIGN – WORKS SUPERVISION (ROLLING STOCK, SYSTEMS, INFRASTRUCTURE, OPERATION SYSTEMS)

YEARS:
2007 - 2010

1st

PUBLIC PARTICIPATION PROJECT EVER LAUNCHED IN SPAIN

1st

TRAMWAY WITHOUT CATENARY IN SPAIN

EUROPEAN AWARDS

/ TOWN, RAIL & TRANSPORT /

Extract from a communication support

CONSTANTINE

LOCATION: ALGERIA

This tramway line needed specific adaptation for the Algerian context. The line has separated infrastructure or an elevated structure on the major part of its profile. The project consisted of building a connection along the north-south axis of the centre of Constantine to Zouaghi. To face very high traffic expectations, the rolling stock and the infrastructure has been adapted to allow high commercial speeds.

© Ingerop

BARCELONA

LOCATION: SPAIN

Designed in 2004 in Barcelona during World Cities Culture Forum, the second tramway line (TRAMBESOS) consists of a 14km urban track, 29 stations, seven sub-stations and a 12,500m^2 depot for 18 Citadis 302 (Alstom), with administrative buildings and 4,500 m^2 workshops. Ingerop performed all the detailed and execution design of the tramway for FCC, COMSA and NECSO consortium (line and depot).

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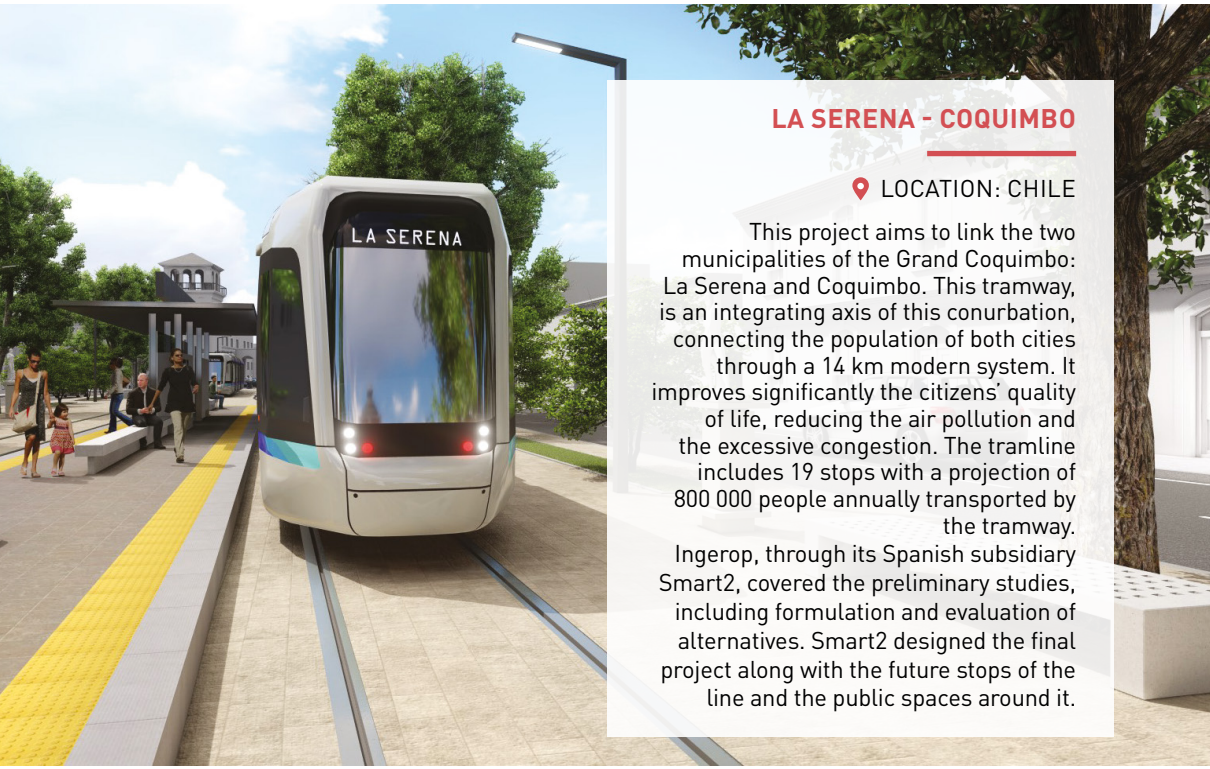


LA SERENA - COQUIMBO

LOCATION: CHILE

This project aims to link the two municipalities of the Grand Coquimbo: La Serena and Coquimbo. This tramway, is an integrating axis of this conurbation, connecting the population of both cities through a 14 km modern system. It improves significantly the citizens' quality of life, reducing the air pollution and the excessive congestion. The tramline includes 19 stops with a projection of 800 000 people annually transported by the tramway.

Ingerop, through its Spanish subsidiary Smart2, covered the preliminary studies, including formulation and evaluation of alternatives. Smart2 designed the final project along with the future stops of the line and the public spaces around it.

VALENCIENNES

LOCATION: FRANCE

Valenciennes is a low density, large agglomeration in the north of France. In order to serve all districts, the alignment covers 33.5km. Ingerop developed a unique concept of single track, dedicated corridor light rail line. Thanks to this, the project became affordable for this 45,000 inhabitants agglomeration. This demontrates Ingerop's ability to adapt to the specific needs of its clients. Ingerop carried out all project management, design and supervision works.

MASS RAPID TRANSIT

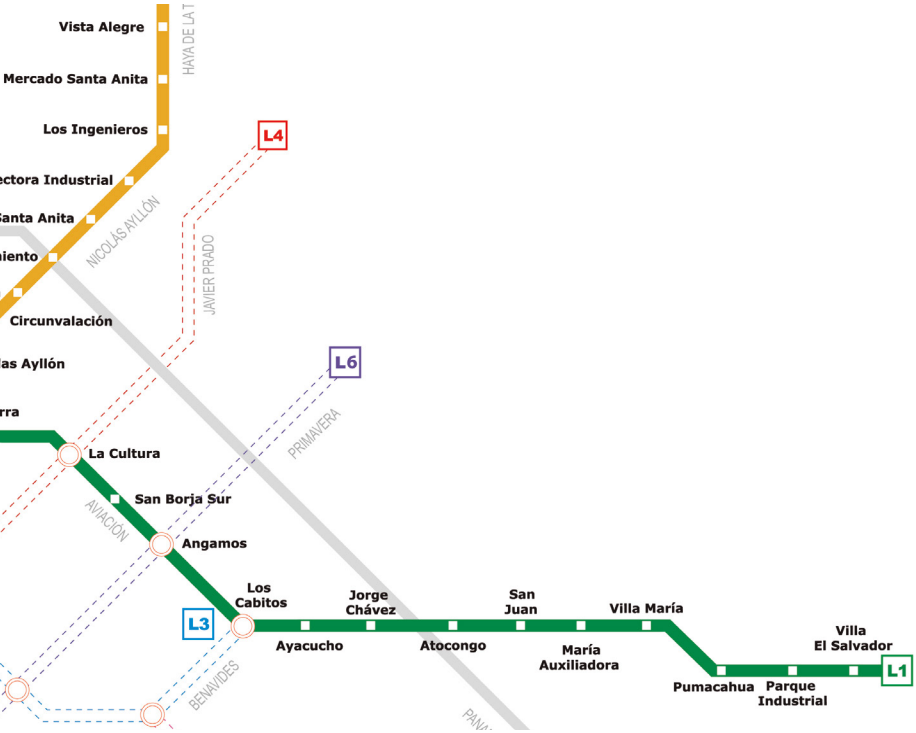
OUR VISION

In view of the tremendous growth of urban population around the world, Ingerop has developed specific skills for mass rapid transport in cities, ranging from high-scale automatic metro to cost-efficient simple metro lines. Over the years, Ingerop has designed metro lines from regional cities such as Rennes (200,000 inhabitants) to major capital cities such as Lima (4 million inhabitants), Cairo (20 million inhabitants) and Paris (10 million inhabitants).

Ingerop has played a key role in the deployment of the most efficient transport modes for major cities for the last 20 years, designing systems on all five continents.

The specialism of Ingerop relies on full independence and an ability to design fit-for-purpose lines, adapted to every situation and not just repeating solutions imposed by a specific operator.

Innovation is certainly the key in the project management, design and work supervision assignments on Lima Line 3 or Grand Paris new metro lines. This is also the key in more specific systems assignments ranging, from air conditioning system for the metro of Rennes, to the Control Command system of Cairo metro.



LIMA - LINE 3

Line 3: A new line

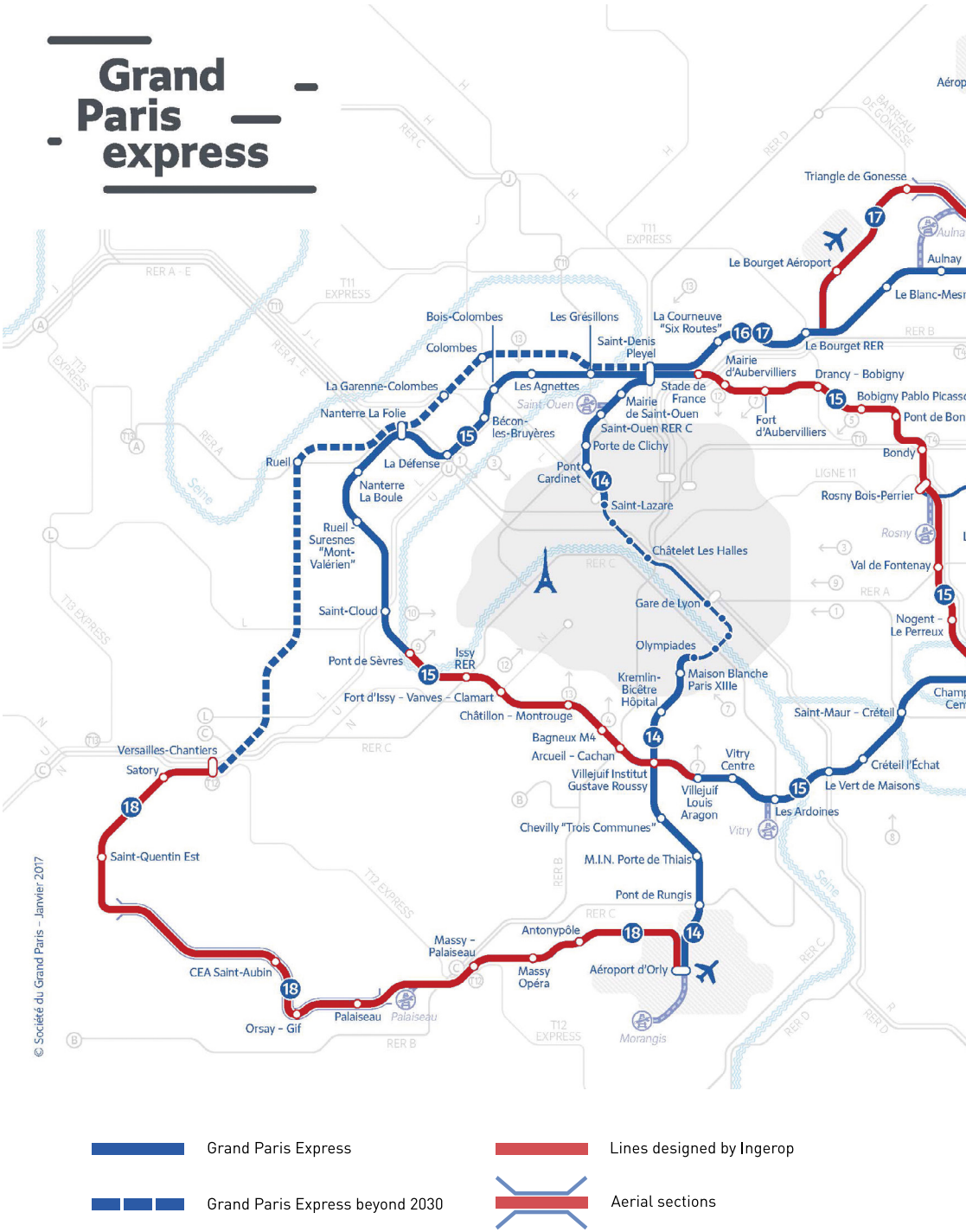
LOCATION: PERU

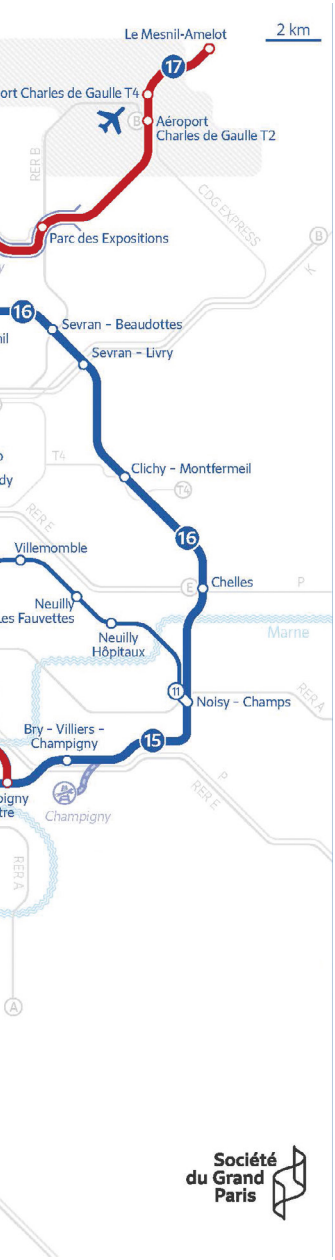
Ingerop is one of the leading engineering firms in Peru, with around 12 contracts currently active in the country. Ingerop leads the consortium for the new Line 3 of Lima. Line 3 is one of the six structural lines of the future metro system of the city of Lima-Callao. Ingerop carried out all socio-economic studies, demand studies, basic design, detailed design for infrastructure and systems. The new line is fully automated (GoA4) and includes a complete Communication Based Train Control (CBTC) signaling system. The line is essentially underground with tunnels under the old city and the river.

CLIENT:
PROINVERSIÓN

ASSIGNMENTS:
AUTOMATIC METRO SYSTEM DESIGN – INFRASTRUCTURE DESIGN - SOCIO-ECONOMIC ANALYSIS – PPP TENDER PROCESS PREPARATION

YEARS:
FROM 2014 (ONGOING)





Société du Grand Paris

GRAND PARIS EXPRESS

Planning the most important metro system in Europe, with a length of 200 km

LOCATION: FRANCE

The Grand Paris Express will serve the major business areas (airports, business centers, research centers and universities) and metropolitan areas that are currently difficult to access. It will bring everyone closer to their workplace and make daily journeys more enjoyable and faster. Above all, by multiplying the possibilities of itineraries, it will facilitate for all access to employment, training, culture and leisure.

Throughout the network, the city will transform and become denser. The construction of the 68 stations of the Grand Paris Express is already accompanied by urban projects ready to welcome thousands of Parisians.

8
STATIONS DESIGNED BY INGEROP

19 km
OF VIADUCTS DESIGNED BY INGEROP

In the coming years, new neighborhoods will be born, combining housing of all categories, shops, offices and equipment to meet the needs of the capital region.

At the heart of this key project planning the Parisian territory, Ingerop is the designer of 4 lines.

MAIN LINES IMPLEMENTED BY INGEROP:

- **Line 15 South (T3)** from Villejuif-Louis Aragon to Pont de Sèvres (an underground 13km-line)

- **Line 15 East** from Saint-Denis Pleyel to Champigny-Centre (an underground 21km-line)

- **Line 17** from Le Bourget to Le Mesnil-Amelot (20 km of length with 6 km of railway viaduct)

- **Line 18** from Orly to Versailles (34 km of length with 13 km of railway viaduct and 1 maintenance center)

MONTREAL

Transforming a railway line into an automated metro

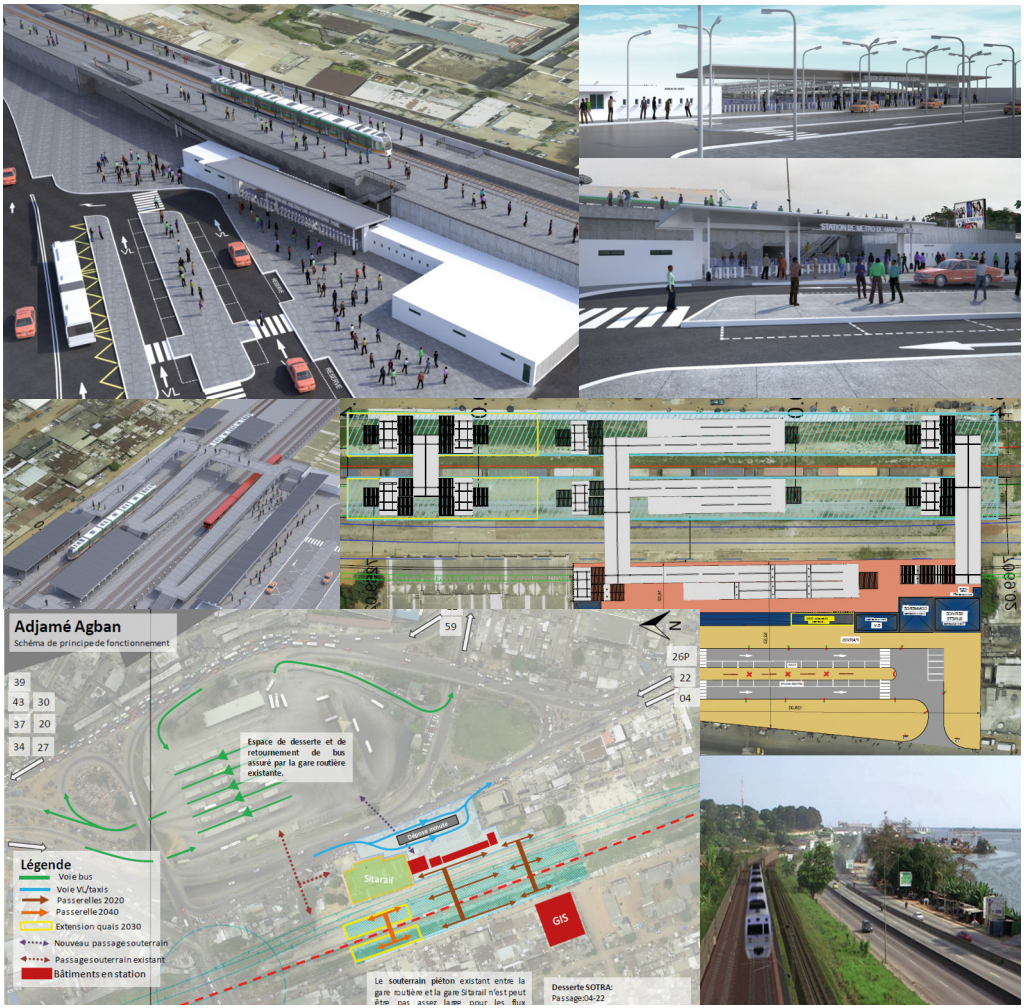
LOCATION: CANADA

The Authorities of Québec decided to transform the existing network of commuter trains in Montreal into one of the most performing automated metro network in the world. Instead of a frequency between 20 mn and an hour, the "Reseau Express Metropolitain" (REM) will allow to have a train every 3min, a direct access from the centre to the airport and allow access to the West Island and the South shore which lacked a proper transport system. Ingerop is a strong partner of Alstom in this project, checking every systems design that will be produced before being implemented, in signaling (CBTC), telecommunication systems, rolling stock and operation & maintenance engineering.

CLIENT:
ALSTOM - SNC LAVALIN

ASSIGNMENTS:
INDEPENDENT CHECK AUTOMATIC METRO SYSTEMS, CBTC & ROLLING STOCK

YEARS:
FROM 2018 (ONGOING)



ABIDJAN

Providing design for the first public transport concession project in Africa

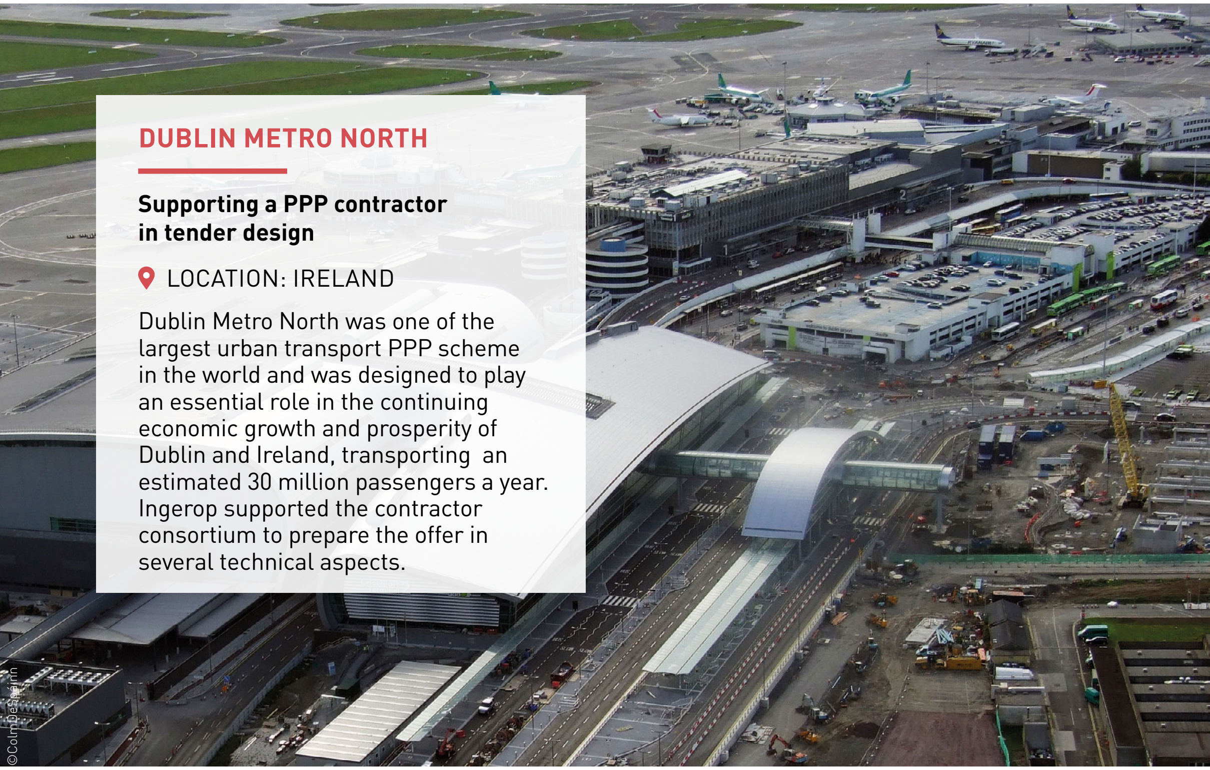
LOCATION: IVORY COAST

On the existing corridor of a freight rail line, Ingerop is designing a new metro for Abidjan, one of the most dynamic cities in Africa. Metro Line 1 spreads along 37km from north to south and crosses Abidjan lagoon via an exceptional bridge. The line will serve 20 new stations. Two intermediate terminus stations will allow operating the central section with a double frequency. For the concessionaire led by Bouygues and Alstom, Ingerop has provided the full layout, civil works and stations including the main track layout study and its impact on infrastructures, earthworks, geotechnical studies or hydraulic studies.

CLIENT:
BOUYGUES TP FOR THE MINISTRY OF TRANSPORT OF IVORY COAST

ASSIGNMENTS:
LAYOUT STUDY - PRELIMINARY AND DETAILED DESIGN

YEARS:
FROM 2015 (ONGOING)

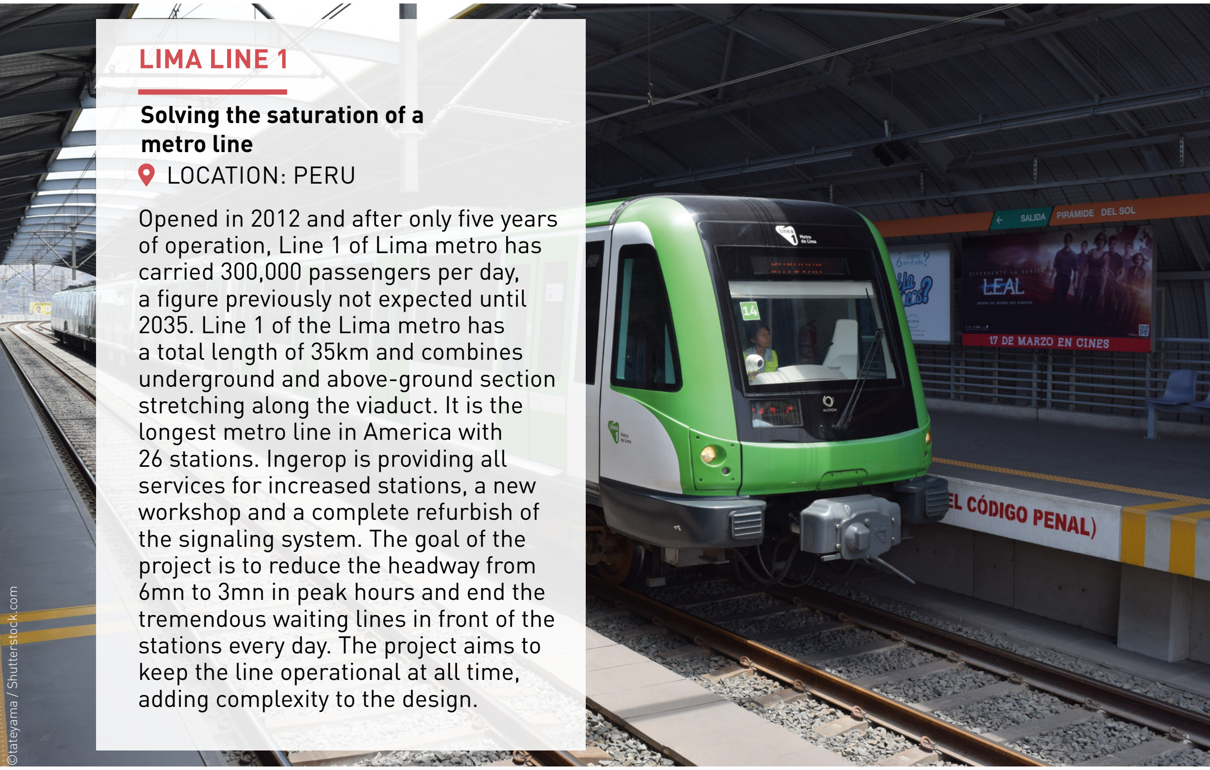


DUBLIN METRO NORTH

Supporting a PPP contractor in tender design

LOCATION: IRELAND

Dublin Metro North was one of the largest urban transport PPP scheme in the world and was designed to play an essential role in the continuing economic growth and prosperity of Dublin and Ireland, transporting an estimated 30 million passengers a year. Ingerop supported the contractor consortium to prepare the offer in several technical aspects.



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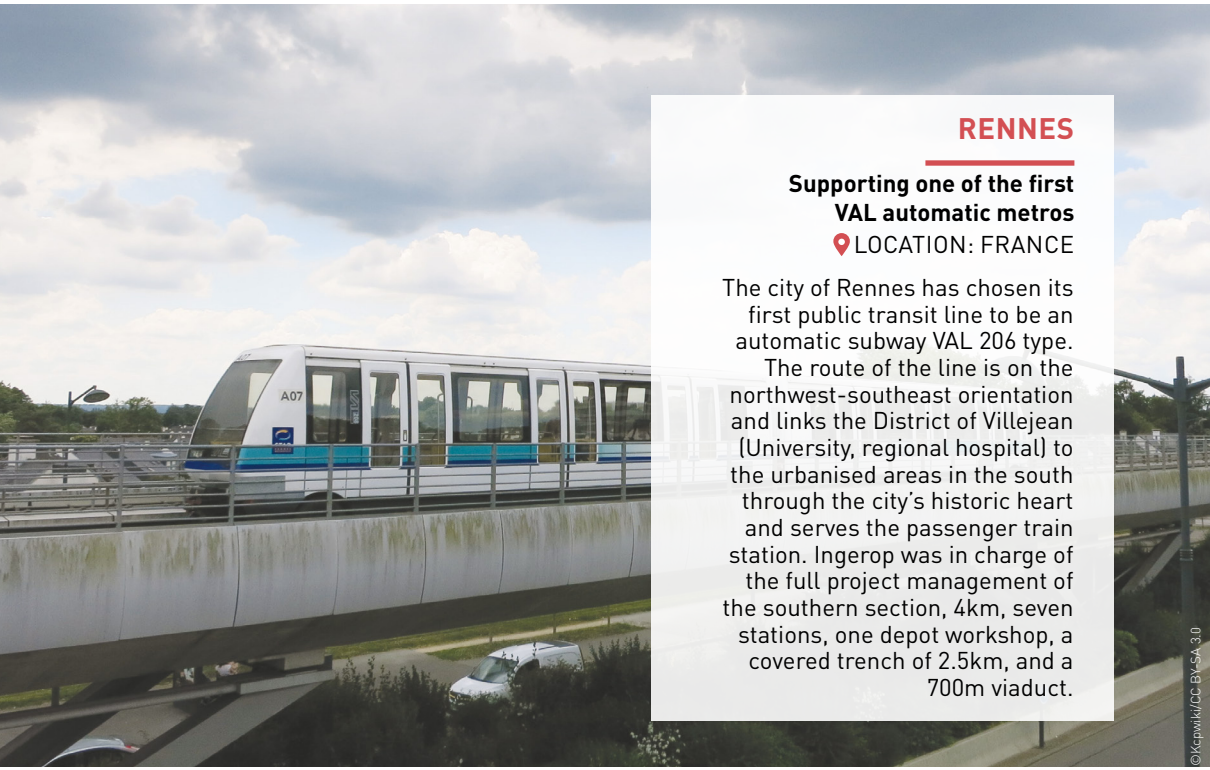
LIMA LINE 1

Solving the saturation of a metro line

LOCATION: PERU

Opened in 2012 and after only five years of operation, Line 1 of Lima metro has carried 300,000 passengers per day, a figure previously not expected until 2035. Line 1 of the Lima metro has a total length of 35km and combines underground and above-ground section stretching along the viaduct. It is the longest metro line in America with 26 stations. Ingerop is providing all services for increased stations, a new workshop and a complete refurbish of the signaling system. The goal of the project is to reduce the headway from 6mn to 3mn in peak hours and end the tremendous waiting lines in front of the stations every day. The project aims to keep the line operational at all time, adding complexity to the design.



RENNES

Supporting one of the first VAL automatic metros

LOCATION: FRANCE

The city of Rennes has chosen its first public transit line to be an automatic subway VAL 206 type. The route of the line is on the northwest-southeast orientation and links the District of Villejean (University, regional hospital) to the urbanised areas in the south through the city's historic heart and serves the passenger train station. Ingerop was in charge of the full project management of the southern section, 4km, seven stations, one depot workshop, a covered trench of 2.5km, and a 700m viaduct.

SYDNEY

Skytrain to minimise the metro footprint

LOCATION: AUSTRALIA

This is one of the Australian government's largest infrastructure projects currently under construction in Sydney. The 'skytrain' has been built to minimise the impact on motorists on Windsor Road and provide greater access to existing communities and new grown areas in North West Sydney. The bridge will be the world's longest railway cable-stayed span on a curve, supported by a single plane of cable-stays. Ingerop, through its subsidiary Rendel, provides the complete independent checking engineer services.

MUNICH

Modernizing a highly frequented metro station

LOCATION: GERMANY

Marienplatz Underground Station in Munich is one of the most important station of the city, with a frequentation up to 24 000 people an hour at peak times. The modernization of this location while the station continues to operate was a real challenge as the site equipment areas were very restricted and the delivery options severely hampered by the pedestrian zone.

Stadtwerke München GmbH asked Ingerop Deutschland, throught its subsidiary EDR, for the project management at planning and construction phase for the renovation and the modernisation of the station, including organisation, quality control and quantities, scheduling and cost control.

CLIENT:
STADTWERKE MÜNCHEN

ASSIGNMENTS:
PROJECT MANAGEMENT AT PLANNING AND CONSTRUCTION PHASE

YEARS:
2010 - 2016

© EDR GMBH/ Hans Sabel

CLIENT:
METRO MALAGA

ASSIGNMENTS:
SYSTEM DESIGN - WORK SUPERVISION - TEST & COMMISSIONNING

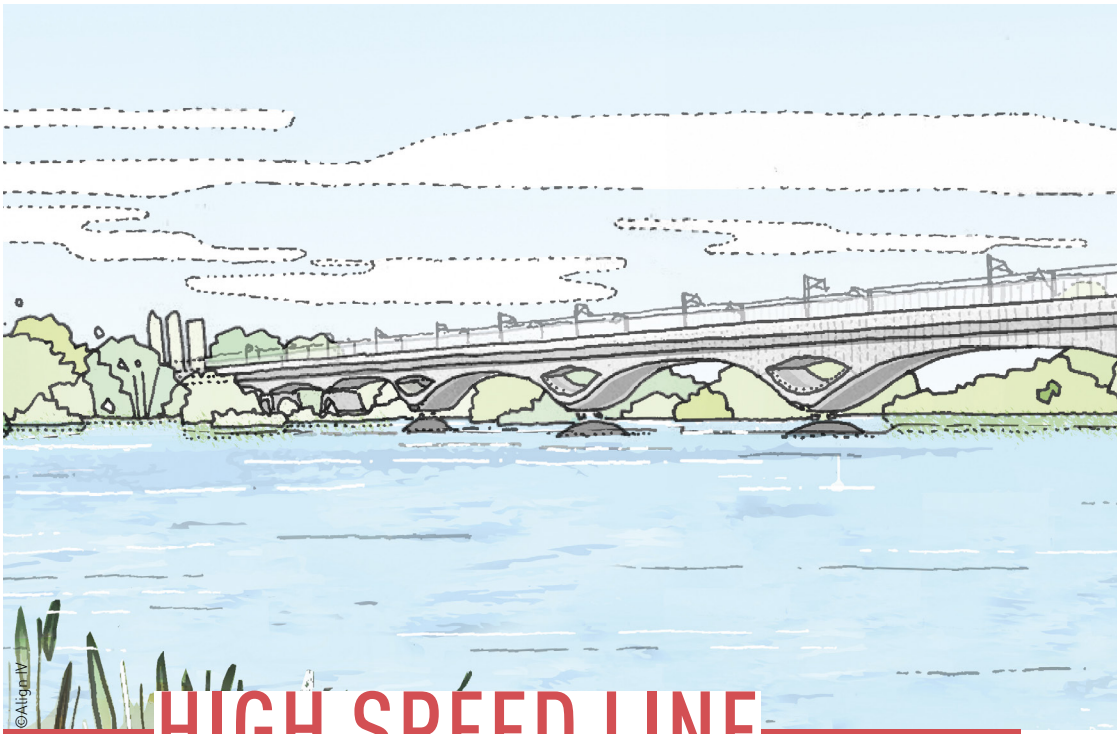
YEARS:
2010-2013

MALAGA

Implementation of a complete metro system

LOCATION: SPAIN

Malaga metro line has a total length of 14.1km, of which 78% is underground. It is fully equipped with a state of the art CBTC system. Ingerop ensured the design review and the works direction for all aspects including infrastructure, systems and railway equipments. These included tunnels, stations, workshops, control command, signals, telecommunications and operations.



HIGH SPEED LINE

OUR VISION

For many years, Ingerop has been developing its rail transportation activity. The division performs numerous consulting and supervision assignments in France and overseas for public authorities, rail authorities and operators, contractors or other entities involved in the field of rail transportation and environmental integration.

Ingerop develops expertise in engineering design and project management in the path to the implementation of the railway works. The company has the skills to intervene in the phases of preleminary studies, realisation, project management, conceptual and detailed design.

HIGH SPEED 2

The fastest high-speed line in Europe

LOCATION: UNITED KINGDOM

The HS2 project consists in the creation of a new high-speed railway linking up London, the Midlands and the North, serving eight of Britain's 10 largest cities. HS2 represents the most important economic regeneration project in Britain for decades. The phase one of the project will connect London and Birmingham by the construction of 160km of rail tracks with a design speed of 360km/h.

Ingerop, with its partners, is in charge of the design service for the C1 section which includes two viaducts, 15km of tunnels, abutment accesses and many other structures. For this section, Ingerop provided the reference design, the scheme design and on a second phase, the design of the assets in 3D modelling (BIM). Ingerop was also appointed for checking the service design for the C2 and C3 neighbouring sections.

CLIENT:
ALIGN JV (BOUYGUES TP, VOLKERFITZPATRICK LTD, SIR ROBERT MCALPINE LTD)

ASSIGNMENTS:
DETAILED DESIGN, CIVIL ENGINEERING DESIGN, 3D MODELLING, ENGINEERING MANAGEMENT

YEARS:
2016 – 2020

PERPIGNAN - FIGUERAS

Managing the first cross-border High Speed Line project

LOCATION: FRANCE AND SPAIN

The 35km project connects the French and Spanish High Speed Rail (HSR) networks under the Pyrenean Mountains along the Mediterranean coast, by means of an 8km tunnel. The traffic on the line is mixed between high speed trains and freight trains.
Technically, the France outdoor works consisted of 18km of high-speed rail line with a punched tunnel entrance to minimise the "sonic boom" effect. Ingerop was leader of the consortium for the whole project and entrusted design check and supervision of the works.
In addition, Ingerop was in charge of the commissionning of the Spanish side of the high speed line.

CLIENT:
TEP (PPP PRIVATE PARTNER)

ASSIGNMENTS:
TECHNICAL ENGINEERING – WORK SUPERVISION

YEARS:
2004-2012

BRETAGNE PAYS DE LA LOIRE (BPL)

From Paris to Rennes in 1 hour!

LOCATION: FRANCE

CLIENT:
CLERE (EIFFAGE)

ASSIGNMENTS:
TECHNICAL ENGINEERING – WORK SUPERVISION

YEARS:
2011-2017

Bretagne - Pays de la Loire (BPL) High Speed Rail is a new investment aiming at bringing the Bretagne region closer to the rest of France. The complete BPL line is 180 km long with 350km/h design speed. CLERE (EIFFAGE), the design and build contractor has appointed a design consortium, including Ingerop, to carry out a large part of the engineering missions. In particular, during the design phase Ingerop provided all the civil engineering of a 70km-long section as well as railway track and platform studies for the whole length of the project. During construction phase, Ingerop provided technical supervision of civil engineering and railway works. Ingerop was also part of the project management team.

SPANISH HIGH SPEED LINE

Supporting the High-Speed Development in Spain

LOCATION: SPAIN

Ingerop with its subsidiary Smart 2 actively supported the development of High-speed lines in Spain. Projects include sections of the 437 km line between Madrid and the Portugal border, through Extremadura and the HS line Madrid – Seville, operating since 1992. Scope of works include Functional Design and Detailed Design of projects of signalling, telecommunications, power supply and catenary on either new sections of High Speed line, or refurbishment of existent sections.
For instance, Smart2 performed detailed design for the very complex refurbishment of railway systems on the Madrid – Seville line. SMART2 has been able to integrate different ERTMS manufacturers products with the existing signalling system.

CLIENT:
ADIF

ASSIGNMENTS:
DETAILED DESIGN,
FUNCTIONAL DESIGN

YEARS:
2012-2019

GYEONGBU HIGH SPEED RAILROAD

Supporting the construction of the first high-speed line in continental Asia

LOCATION: SOUTH KOREA (SEOUL – BUSAN)

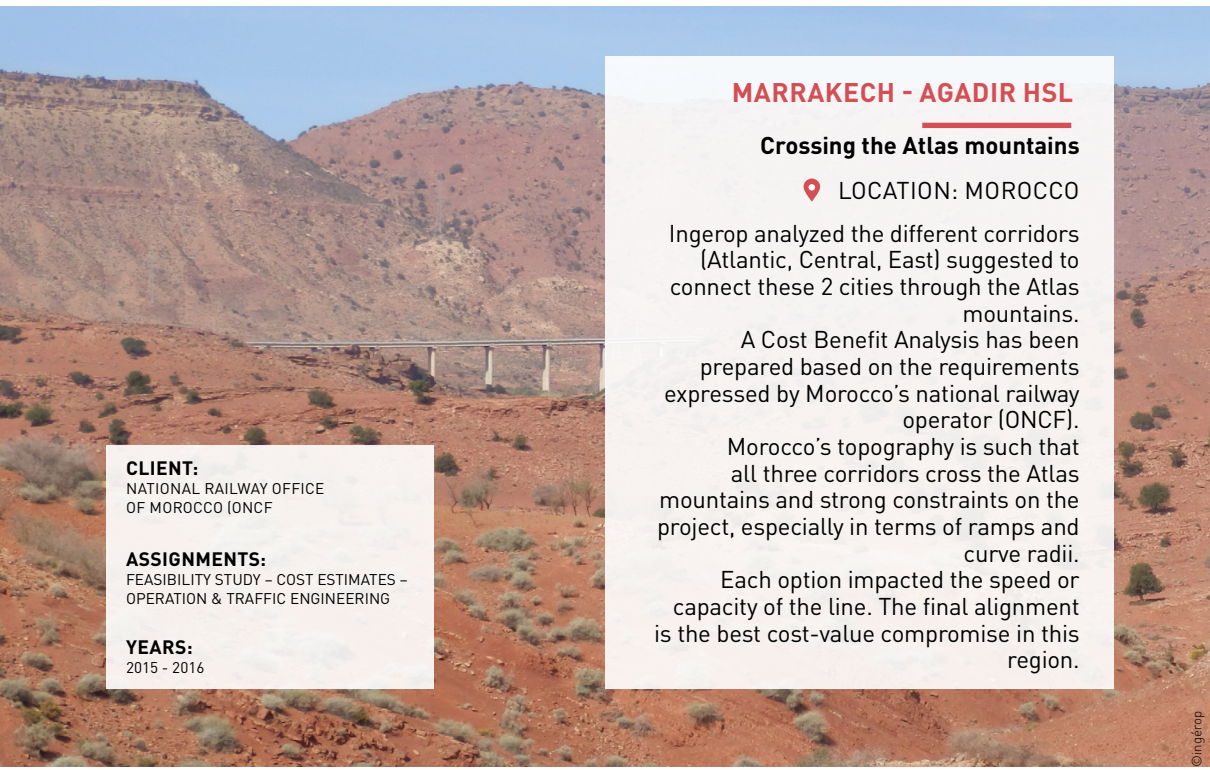
The Gyeongbu between Seoul and Busan is South Korea's first high-speed electric railway line and connects the north and south part of the country. The high-speed railway line has a total length of 423.8km. Four stations have been constructed to accommodate increased traffic within the region and are set to open in conjunction with the new line. The high-speed railroad is designed to reach speeds of 350km/h.

Ingerop was involved in the project within a technical assistance contract including training activities and transfer of technology. Ingerop checked whether construction took place according to the approved design and specifications, and offered technical support during construction on subjects such as quality, safety and construction management.

CLIENT:
KOREA HIGH SPEED RAIL CONSTRUCTION AUTHORITY

ASSIGNMENTS:
TECHNICAL ASSISTANCE – DETAIL DESIGN – CONSTRUCTION MANAGEMENT

YEARS:
1996 – 2004



MARRAKECH - AGADIR HSL

Crossing the Atlas mountains

LOCATION: MOROCCO

Ingerop analyzed the different corridors (Atlantic, Central, East) suggested to connect these 2 cities through the Atlas mountains.

A Cost Benefit Analysis has been prepared based on the requirements expressed by Morocco's national railway operator (ONCF).

Morocco's topography is such that all three corridors cross the Atlas mountains and strong constraints on the project, especially in terms of ramps and curve radii.

Each option impacted the speed or capacity of the line. The final alignment is the best cost-value compromise in this region.

CLIENT:
NATIONAL RAILWAY OFFICE OF MOROCCO (ONCF

ASSIGNMENTS:
FEASIBILITY STUDY – COST ESTIMATES – OPERATION & TRAFFIC ENGINEERING

YEARS:
2015 - 2016

CONVENTIONAL RAIL

OUR VISION

Ingerop has developed an ability to respond, as completely as possible, to the expectations of its public and private clients, be it by emphasising cross-functional and functional approaches in upstream phases of projects or by mobilising proven expertise to bring the best responses in phase work. This includes system design, maintenance and operation for building new lines, as well as for refurbishing existing lines.

Ingerop can perform all functional and operational studies or act as a system integrator enhancing the efficiency of the project management teams.

VIDIN CALAFAT

A massive interoperability project

LOCATION: BULGARIA AND ROMANIA

Over the Danube, the project consists of the construction of a mix rail/road viaduct between Bulgaria and Romania and adjoining infrastructure on the Bulgarian side. The overall length of the project is about 30km including approximately 2km overall length of bridge crossing.
Some particuliar aspects of the project :

- Railway interoperability has been guaranteed for the border crossing, with full ERTMS deployment (European Rail Traffic Management System)
- The viaduct conveys one of the largest rail joints ever manufactured
- Among others, the infrastructures include :
  - a freight station
  - a passenger station
  - a control building with all the data necessary for the operating of the bridge

CLIENT:
MINISTRY OF TRANSPORT, INFRASTRUCTURES AND TECHNOLOGY OF THE COMMUNICATION, REPUBLIC OF BULGARIA

FUNDING AGENCY:
EUROPEAN INVESTMENT BANK

ASSIGNMENTS:
FULL DESIGN CHECK - CONTROL BUILDING - SIGNALING AND TELECOM

YEARS:
2007-2014

CLIENT:
ADIF

ASSIGNMENTS:
FUNCTIONAL, BASIC AND DETAIL DESIGN

YEARS:
2018-2020

HUESCA – CANFRANC RAILWAY LINE

LOCATION: SPAIN

This railway line, opened in 1928, formerly linking Pau to Zaragoza through the Pyrenees mountains was one of the passages between France and Spain, but it has been closed for many decades. The project aims for the reopening of this important trans-country line.

Ingerop, with its Spanish subsidiary, worked on the improvement of the 60km railway line between Huesca and Canfranc in order to increase train speeds and reduce travel duration. Those enhancements included both track alignment and systems. Ingerop covers the functional basic and detail design of signalling and telecommunication systems which will be equipped with ERTMS system and GSM- R.

CLIENT:
FRENCH NATIONAL RAILWAYS (SNCF RESEAU)

ASSIGNMENTS:
FULL E,P,CM (ENGINEERING – PROCUREMENT – CONSTRUCTION MANAGEMENT)
CONCEPT DESIGN
PRELIMINARY DESIGN
DETAILED DESIGN

YEARS:
2009-2018

CORNAVIN - EAUX-VIVES – ANNEMASSE (CEVA)

LOCATION: SWITZERLAND-FRANCE

The Franco-Swiss project Cornavin Eaux-Vives Annemasse (CEVA) aims to complete the missing rail link between Praille and Geneva Eaux-Vives, and to improve the supply of services throughout the Geneva area by offering a modern suburban link to Annemasse. This double-track line, between Praille and Ambilly in France, is operated by the Swiss Federal Railways (CFF) up until the entrance to Annemasse station. A 900m covered trench made with diaphragm walls, which passes under the river Foron delimiting the border, composes the French section. The Challenge is to interface French and Swiss equipment on the line. The work requires the movement of catenary supports, harrow and signals on the line Annemasse-Longeray, to be kept in service during the construction. The project also includes all the required safety and ventilation systems for the tunnel, and a Control and Command system.

THE MAYAN RAILWAY

LOCATION: MEXICO

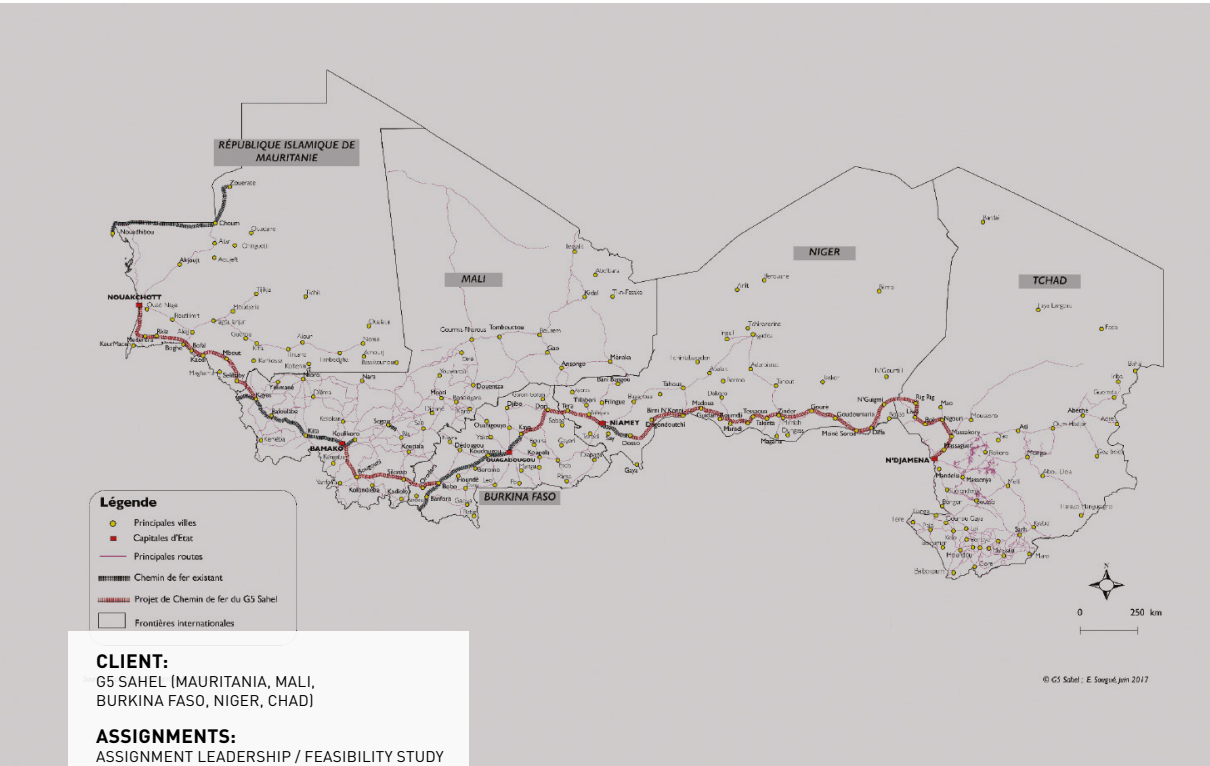
Travelling through the Maya roads

The Mayan Railway will constitute a freight and passenger transport service that will interconnect the main cities and tourist areas in the south-southeast region of Mexico, connecting five of the states with the greatest tourist potential. This 1500km project will allow a maximum speed of 160 kph for passenger trains, and 100 kph for freight trains, boosting tourism and local industry. The construction is particularly difficult due to the dense forest environment and the particular geology of the region.
Ingerop is participating in the detail design of Section 3 of the Mayan Railway (172km length), including maintenance base, auxiliary civil works, RAMS management and interface management.

BEIRA/DONDO – MOATIZE RAILWAY LINE

LOCATION: MOZAMBIQUE

The project consisted of the rehabilitation and rebuilding of 600km of railway line between Dondo and Moatize Coal mine, plus 65km from Inhaminga to Sena Sugar Plant at Marromeu and a short connection to Malawi 23km from Sena to Vila Nova da Fronteira. Ingerop's assignment consisted of supervising platforms, railways, bridges (including Dona Ana metallic structure – 7km long), culverts, drainage systems and all other related facilities such as train stations and buildings required for the operation of the railway. Signalling and telecommunications were also part of the assignment.



CLIENT:
G5 SAHEL (MAURITANIA, MALI, BURKINA FASO, NIGER, CHAD)

ASSIGNMENTS:
ASSIGNMENT LEADERSHIP / FEASIBILITY STUDY

YEARS:
2019 - 2020

THE TRANS-SAHELIAN RAILWAY

LOCATION: Mauritania, Mali, Burkina Faso, Niger and Chad

Connecting the Sahel Region by rail

Decided in June 2016 during the G5 Sahel conference, the Trans Sahelian railway is a massive project aiming at connecting 5 Sahelian countries: Mauritania, Mali, Burkina Faso, Niger and Chad. The 5000km railway will allow the opening up of the region by improving inhabitants and merchandises mobility.

The Trans Sahelian railway is a key project in terms of social and economic development for the concerned countries.
Ingerop, carried on the feasibility study, including establishing a functional program, a definition of the technical reference system, the identification of potential corridors and the proposition of a financing process. Ingerop cooperated actively with the governments of the five countries on legal and institutional bases to allow the construction and operation processes.

CABLE TRANSPORTATION SYSTEM

OUR VISION

Cable transportation systems are particularly well suited to overcoming obstacles and other dividing features in the urban landscape such as railway lines, motorways, altitude differences, large rivers and other watercourses.

As a member of the Cluster Montagne, the innovation hub gathering the global leaders of the cable technology, Ingerop has developed a consequent expertise in the cable-supported transport systems increasingly regarded as an innovative mode of public transportation, adapted to various cities and contexts.

Cluster montagne
Mountain Development France

TOULOUSE

Toulouse in the air

LOCATION: FRANCE

The South Urban Cable car is a detachable cable car that will link the University metro station, about 2.5km. This system will be sized to ensure a flow of 1,500 people per hour and per direction.
The project must be integrated into a sensitive natural environment (Garonne valley, Natura 2000 zone, etc.) and in a delicate industrial environment.
The South Urban Cable is one of the first urban cable cars in France and it will be realised under a design and build scheme.

CLIENT:
TISSEO-SMAT
PUBLIC TRANSPORT AUTHORITY-PUBLIC MOBILITY AUTHORITY –TOULOUSE CITY

ASSIGNMENTS:
TECHNICAL AND LEGAL ASSISTANCE TO THE OWNER

YEARS:
2013-2020

MEDELLIN

Integration of innovation in Latin America with cable tram

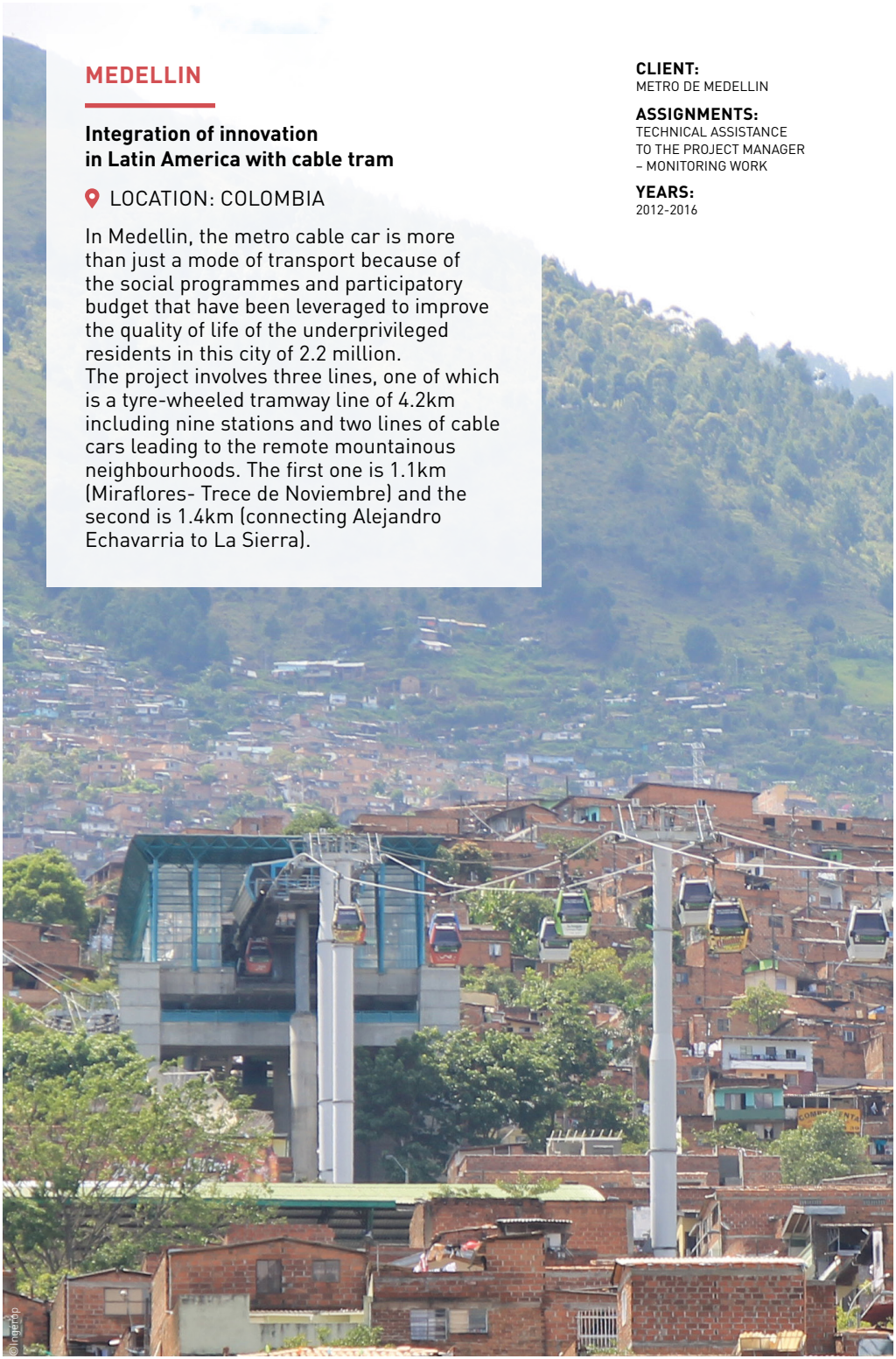
LOCATION: COLOMBIA

In Medellin, the metro cable car is more than just a mode of transport because of the social programmes and participatory budget that have been leveraged to improve the quality of life of the underprivileged residents in this city of 2.2 million.
The project involves three lines, one of which is a tyre-wheeled tramway line of 4.2km including nine stations and two lines of cable cars leading to the remote mountainous neighbourhoods. The first one is 1.1km (Miraflores- Trece de Noviembre) and the second is 1.4km (connecting Alejandro Echavarria to La Sierra).

CLIENT:
METRO DE MEDELLIN

ASSIGNMENTS:
TECHNICAL ASSISTANCE TO THE PROJECT MANAGER – MONITORING WORK

YEARS:
2012-2016



CLIENT:
PROINVERSIÓN (GOVERNMENT OF PERU)

ASSIGNMENTS:
TECHNICAL ASSISTANCE – PROMOTION OF PRIVATE INVESTMENT PROCESS

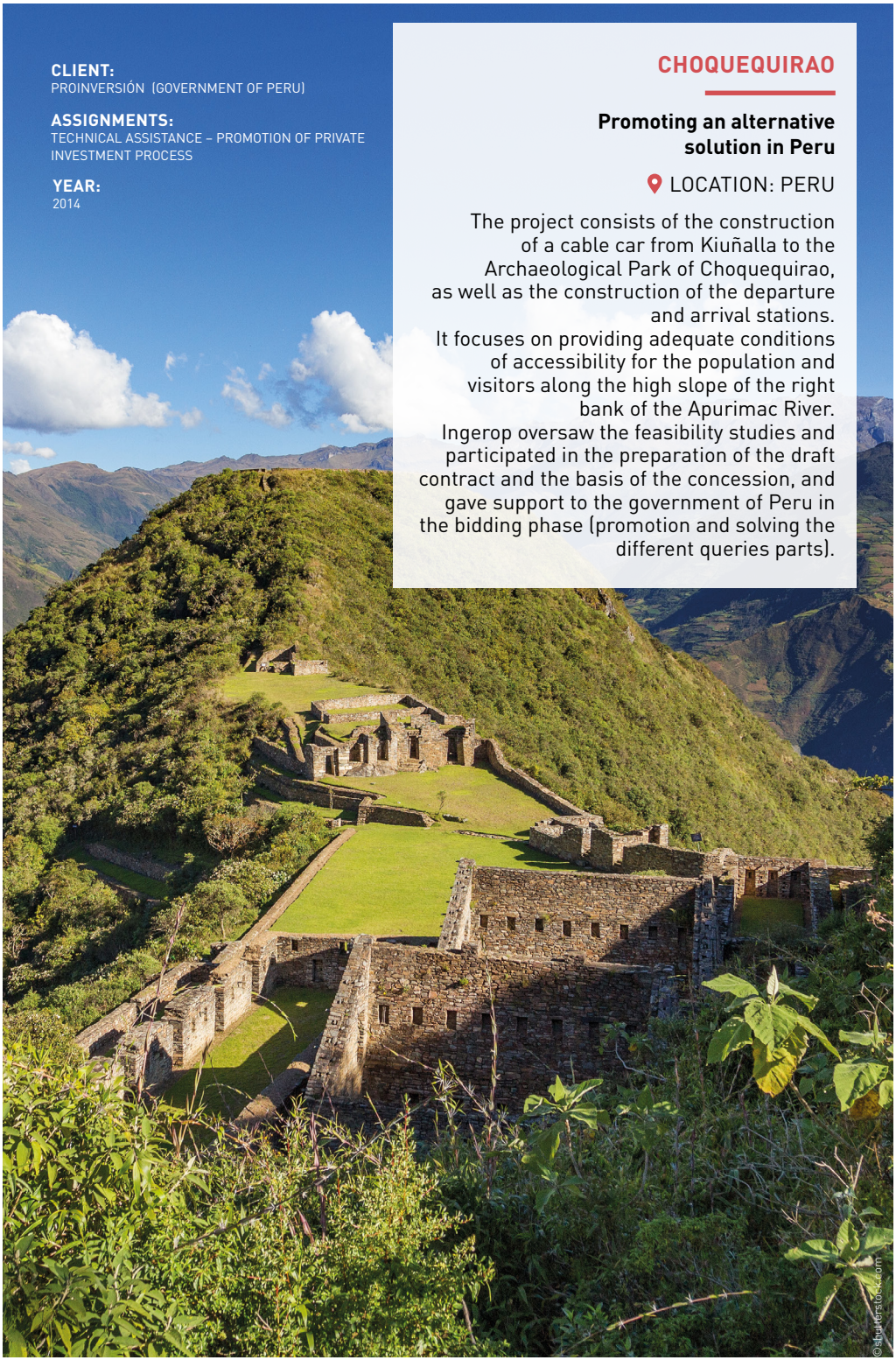
YEAR:
2014

CHOQUEQUIRAO

Promoting an alternative solution in Peru

LOCATION: PERU

The project consists of the construction of a cable car from Kiuñalla to the Archaeological Park of Choquequirao, as well as the construction of the departure and arrival stations.
It focuses on providing adequate conditions of accessibility for the population and visitors along the high slope of the right bank of the Apurimac River.
Ingerop oversaw the feasibility studies and participated in the preparation of the draft contract and the basis of the concession, and gave support to the government of Peru in the bidding phase (promotion and solving the different queries parts).



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BUS RAPID TRANSIT

OUR VISION

Ingerop is currently managing a large number of projects around the concepts of Bus Rapid Transit (BRT) and Bus with a High Level of Service (HLS), in France and abroad. A BRT is a system of public transport of passengers using a dedicated platform, dedicated stations and benefiting from systems and signals resembling those of light rail. A BRT brings many of the benefits of rail transit systems such as speed, predictability, transport capacity and comfort, for an optimised cost. This concept can be implemented in various contexts and in many different forms: developing countries looking for a cost-efficient mass transit mode; cities wishing to complement an existing rail network; and mid-sized cities. In this context, public policy requires BRT projects to reduce urban congestion and encourage modal shift towards more virtuous modes of transportation. As with light rail, BRT projects also allow a reorganisation of public spaces, urban renovation, and a reduction in pollution and emissions of greenhouse gases. The BRTs of Dunkerque (northern France), Tanzania and Kenya are so many projects illustrating Ingerop's success in various contexts, always combining transport and urban planning issues in a global vision.

DAKAR

LOCATION: SENEGAL

With a fast-growing population, the metropolis of Dakar (3,5 million inhabitants) is facing an important increase of transportation needs. To address the situation, the government has launched two major projects of mass transit systems: The Bus Rapid Transit (BRT) and the Train Express Regional (TER). These infrastructures combined with the restructuring of bus network will substantially improve the mobility of Dakar's inhabitants.

Ingerop played a major role in these projects with the whole construction supervision of the BRT 18km line including the test and commissioning phase.

Ingerop was also the leader of the consortium tasked by the CETUD (organizing transport authority) for the restructuring and fare integration schemes of Dakar bus network. This mission included the restructuring of 100 bus lines and a fare policy study. A specific feasibility study and detailed design was prepared for the new infrastructure needed.

CLIENT:
CONSEIL EXÉCUTIF DES TRANSPORT URBAINS DE DAKAR (CETUD)

ASSIGNMENTS:
CONSTRUCTION SUPERVISION (BRT) / BUS NETWORK RESTRUCTURATION

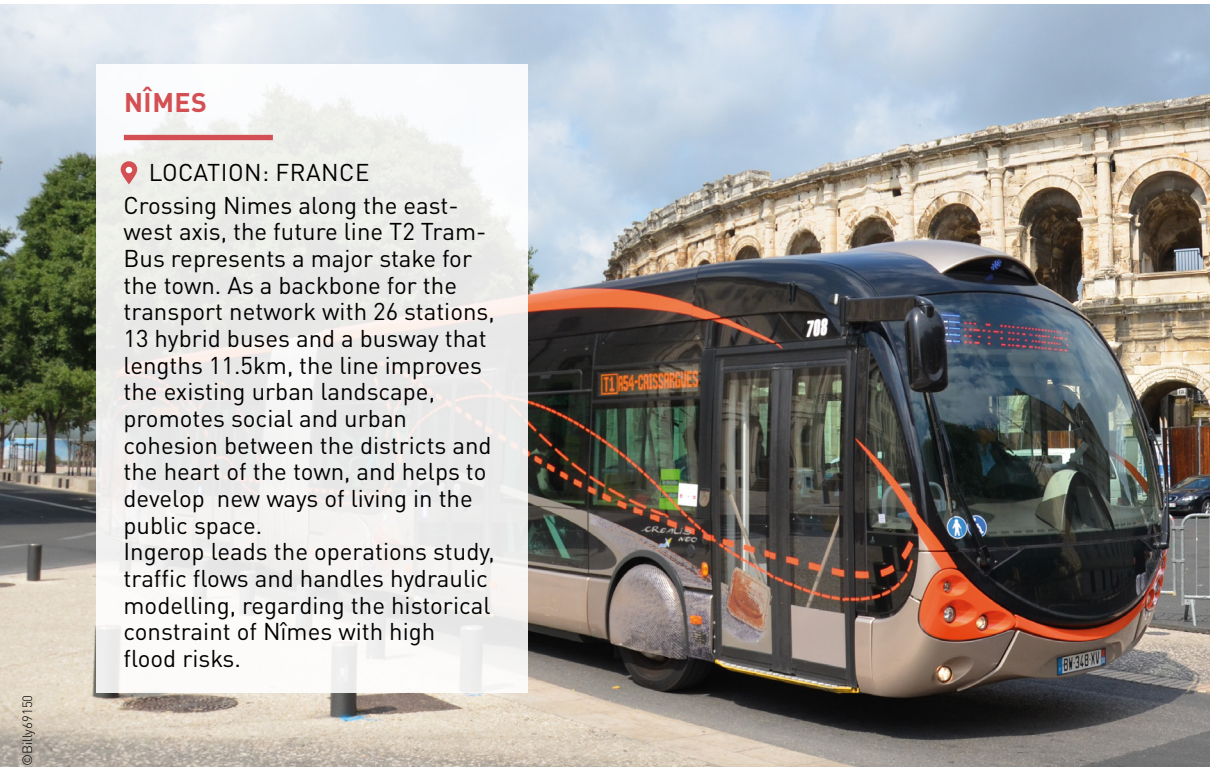
YEARS:
2019-2022

NÎMES

LOCATION: FRANCE

Crossing Nimes along the east-west axis, the future line T2 Tram-Bus represents a major stake for the town. As a backbone for the transport network with 26 stations, 13 hybrid buses and a busway that lengths 11.5km, the line improves the existing urban landscape, promotes social and urban cohesion between the districts and the heart of the town, and helps to develop new ways of living in the public space.

Ingerop leads the operations study, traffic flows and handles hydraulic modelling, regarding the historical constraint of Nîmes with high flood risks.



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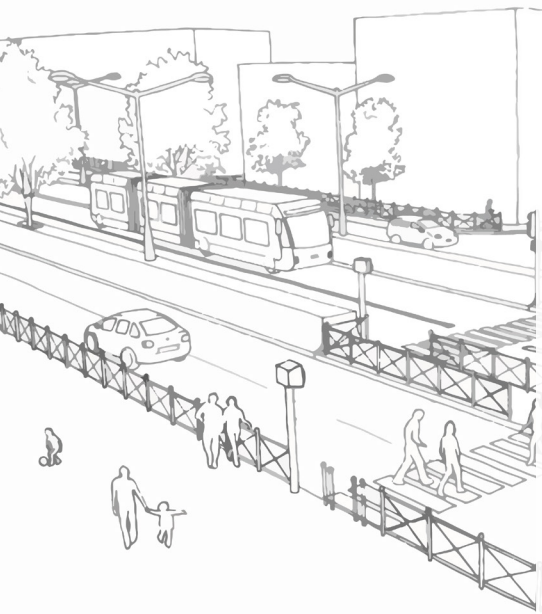


NAIROBI

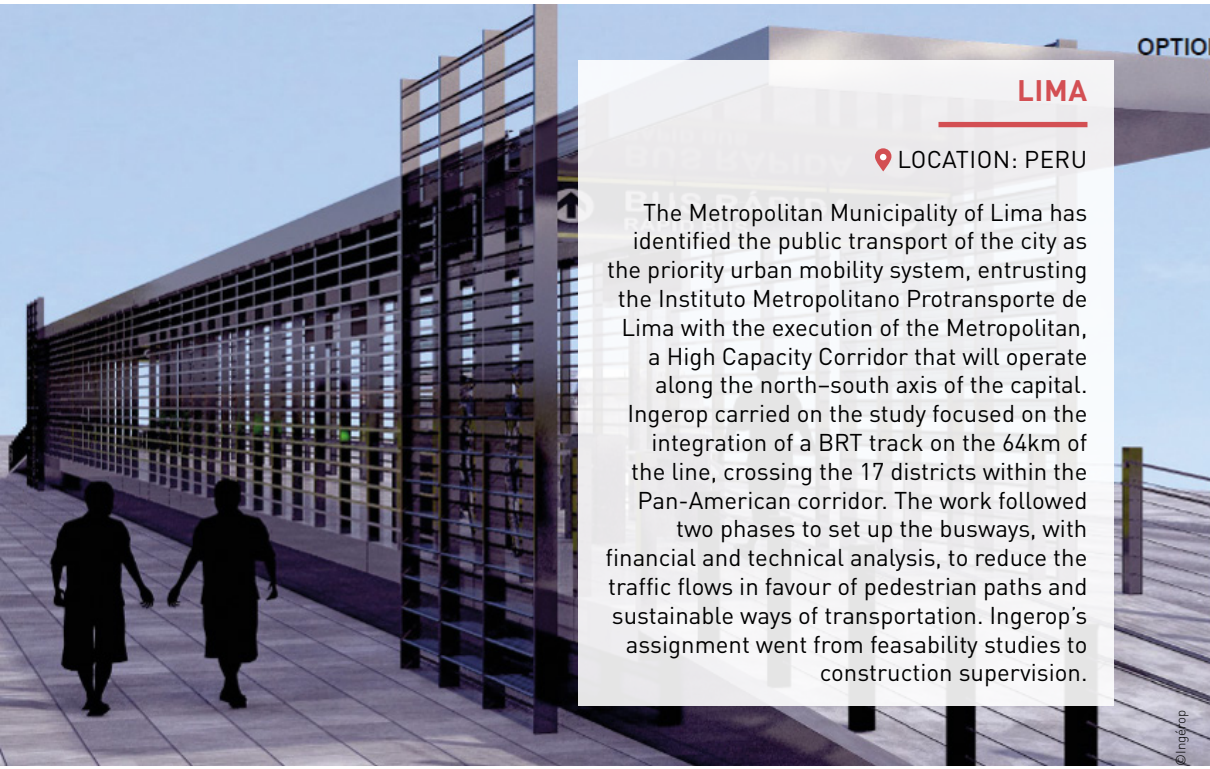
LOCATION: KENYA

With a population of about 3 million inhabitants, Nairobi, the capital city of Kenya, has experienced an annual growth rate in recent years of about 4%. The city is facing heavily-congested conditions and to address this mobility issue, the government has launched ambitious studies and projects to meet the transport needs.

These studies outlined the important challenges hampering urban mobility within the Nairobi metropolitan area. With regard to Mass Rapid Transit (MRT) projects, five major corridors were identified with Bus Rapid Transit as a preferred option.

As leader of the Consortium, Ingerop managed the feasibility and detail design of two lines of the BRT by technical studies , with an important focus on socio-economic issues such as affordability to all.

©Ingérop



LIMA

LOCATION: PERU

The Metropolitan Municipality of Lima has identified the public transport of the city as the priority urban mobility system, entrusting the Instituto Metropolitano Protransporte de Lima with the execution of the Metropolitan, a High Capacity Corridor that will operate along the north–south axis of the capital. Ingerop carried on the study focused on the integration of a BRT track on the 64km of the line, crossing the 17 districts within the Pan-American corridor. The work followed two phases to set up the busways, with financial and technical analysis, to reduce the traffic flows in favour of pedestrian paths and sustainable ways of transportation. Ingerop's assignment went from feasability studies to construction supervision.

MARTINIQUE

LOCATION: FRENCH WEST INDIES

This new BRT line, of a total length of 13.9km interconnects Fort de France, the capital city of Martinique and its neighbouring communities. It is an important link on a dedicated bus lane, with its own maintenance workshop.

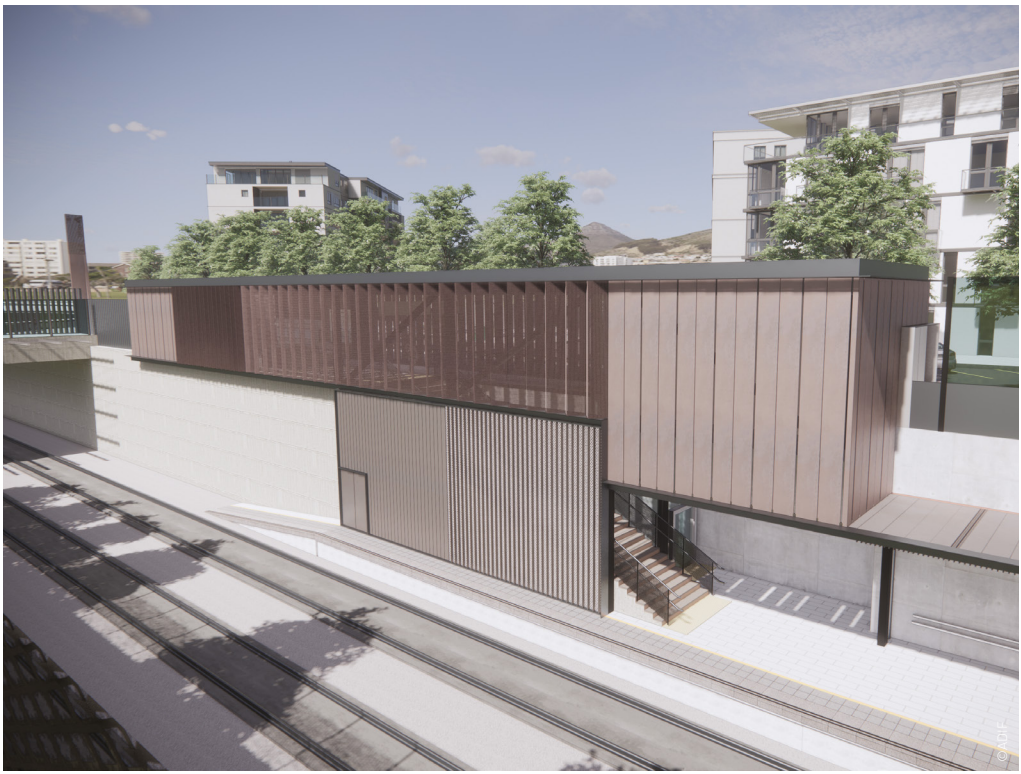
Several Park and Ride facility support the goal of promoting urban integration and intermodality. Ingerop acted as a technical advisor during the design and construction phases up to the BRT commissioning.

STATIONS

GRAND PARIS EXPRESS (LINE 18 STATION CEA SAINT AUBIN) (FRANCE)

PARIS CHATELET LES HALLES (FRANCE)

GAUTRAIN HATFIELD STATION (SOUTH AFRICA)



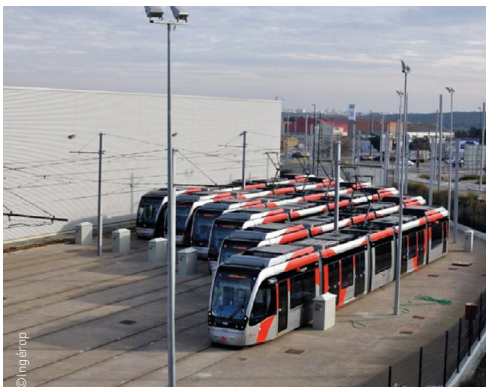
CORDOBA
TRAIN STATION (SPAIN)

ORLY AIRPORT FUTURE HIGH
SPEED STATION (FRANCE)

GRAND PARIS EXPRESS LINE 15
STATION PONT DE SÈVRES (FRANCE)

MAINTENANCE CENTERS

NIKAÏA - NICE TRAM (FRANCE)

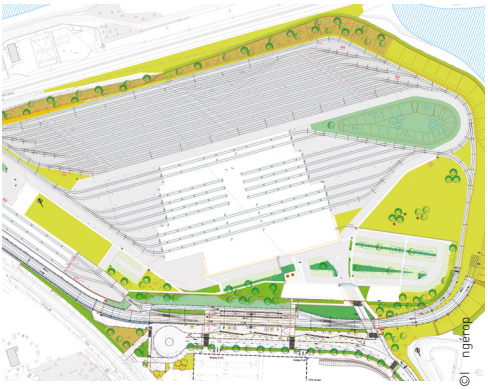


ZARAGOZA TRAM (SPAIN)

MAIN LINES LOCOMOTIVES (AZERBAIJAN)

PANAMA CITY METRO LINE 2
(PANAMA)

GRAND PARIS EXPRESS METRO LINE 18
(FRANCE)



CETEX SEMITAN - NANTES TRAM
(FRANCE)

MOST COMMON COMPUTING SOFTWARE

Ingerop develops specific applications according to the client's needs, creates files at any required format, and adapts constantly to the most recent technological developments, such as 3D modelling and BIM. Ingerop has developed an internal secured document management system: AGORA. This solution of collaborative working has been designed to organise, enhance, share and secure the project documents.

TRANSPORTATION

ARMATIS – ELBAS – SOFTLINE	Railway system design software
TRANSCAD - ERME - VISSIM - AIMSUM – VISUM - DAVIDSUM – POLYDROM – DAVIS - VIS WALK – PIEGE – GIRABASE – CONDOR -	Traffic modelling software – urban planning simulation
OPENTRACK- SAMURAIL – VIRIATO - RAILSYS	Railway operation simulation software
ARCGIS - MAPINFO	Geographic information software (GIS)

INFRASTRUCTURE

ANSYS – CESAR – ROBOT - RIDOA - SCIA – SOFISTIK - ZSOIL	Finite element software
SCOOP	Calculation software developed within Ingerop ; three-dimensional step by step analysis (bridges, tunnels, cut and cover trenches)
MIX - MENSURA – COVADIS – ACOSE – ALIZE – GEOMACO – MOSS/MX – CARACAS - AUTOTURN -	Roads and railways track layout studies
FLUENT – FLOW VENT – FLO EFD – SES – SOLVENT - CAMATT	Ventilation and wind simulation software (tunnels, underground networks)
AUTOCAD 3D - OPEN RAIL - REVIT - CIVIL 3D - GEOMENSURA - COVADIS - RHINOCEROS 3D - TRIMBLE TEKLA - INVENTOR - 3DS MAX - UNREAL ENGINE - INFRAWORKS - NAVISWORKS - VDC EXPLORER	Building Information Modeling (BIM)

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UKAS MANAGEMENT SYSTEMS 001

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