SYSTRA SOLUTIONS

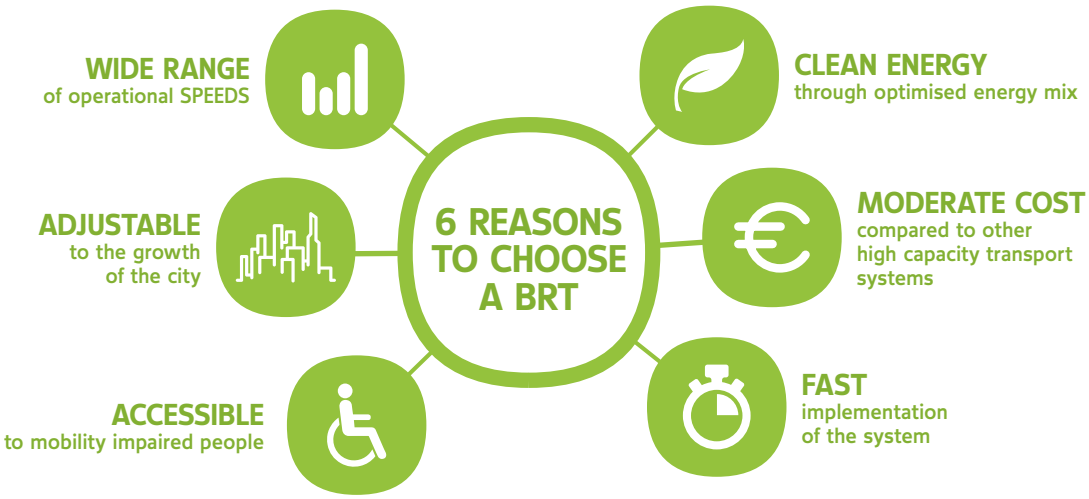
The partner you can trust to design your Bus Rapid Transit line

BUS RAPID TRANSIT,
A SUSTAINABLE SMART SOLUTION FOR URBAN MOBILITY

The socio-economic development of cities is directly linked to the ease of access to education, public services, work and leisure. An efficient public transportation system is one of the main structuring elements of connection between residential neighbourhoods and points of interest of the population. Thus, a high-quality public transport system is an essential element for the development of large urban centres.

Modern and high-performance, BRT systems could combine the flexibility of a bus with the benefits offered by semi-dedicated or dedicated corridor transportation. BRT could be synonym of highly efficient transportation mode: with up-to-date intelligent transport systems (ITS) on board and in station providing services to passengers (accurate information flexible fare payment), station levelled with vehicles enabling comfortable and fast boarding faster.

The solutions developed by our team result in a power efficient system, based on the use of high technology, reducing congestion and CO_2 emissions. Providing well-being to citizens, aligned with large cities environmental commitments and compatible with their level of investment.



4 CATEGORIES (GOLD, SILVER, BRONZE AND BASIC BRT) TO RANK OPERATIONAL PERFORMANCE, EFFICIENCY AND QUALITY OF SERVICES

Having objectives consistent with the level of investment and the feasible and acceptable urban integration and insertion is the stage to a successful BRT implementation.

The Bus Rapid Transit standard* ranks BRT into 4 main categories (Gold, Silver, Bronze and Basic BRT). They differ on the achievable level of operational performance, efficiency and quality of service.

For instance, the capacity varies from less than 1000 PPHPD** to more than 12000 PPHPD. Of course, the level of investment and footprint in the city is impacted by the performances. The highest capacities request fully segregated lanes and even multiple segregated lanes, full priority at cross road and even infrastructure allowing cross road avoidance, comfortable stations with significant size, articulated or bi articulated vehicles and state of the art ITS systems.

* Institute for Transportation & Development Policy
** Peak Passengers per Hour per Direction

FOR YOUR BRT, CHOOSE SYSTRA
AND GET THE BEST

More than 60 years of experience
in complex infrastructures and transportation systems with private and public customers

Projects construction
based on the know-how of our technical teams and on the feedback from our partners and customers

Tailor-made consultancy services
for transport operating companies during all phases of the project

BIM implementation tools used from design through to operation and maintenance phase

Experience in projects
for stations with high level of service, with integrated fare collection systems, safe, air-conditioned, accessible and smart, keeping the passenger always informed

SYSTRA is ready to deliver the best solutions based on their market knowledge and comprehensive experience.

Acting in all phases of the project, from feasibility studies to commissioning and support to operation & maintenance, we are one of the largest BRT experts worldwide participating in several large-scale projects.

Our work internationally is an asset that allows us to state that we have the required tools and expertise to support our customers to successfully achieve their goals by proposing unusual and practical solutions.

CONCILIATE SYSTEM & URBAN INTEGRATION

WE MATERIALISE YOUR VISION INTO AN ACHIEVABLE PROJECT OF FAST IMPLEMENTATION AND OPTIMISED BUDGET.

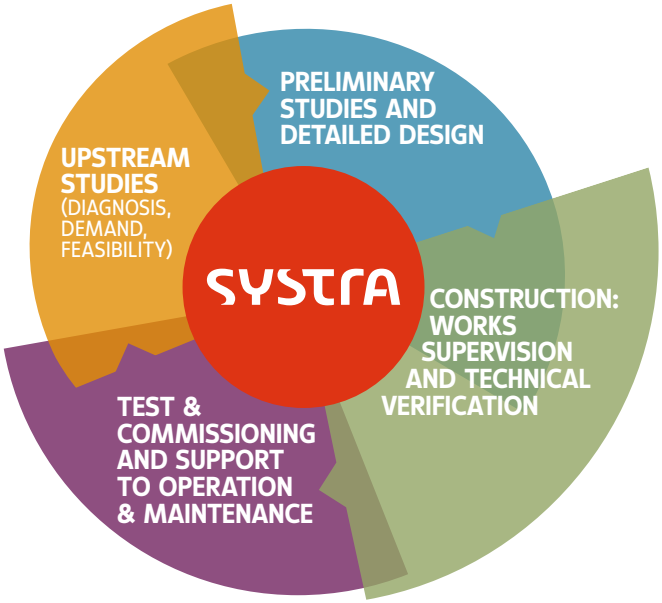
Our multidisciplinary approach in urban transportation allows us to work on all aspects of a BRT: public space sharing, passenger needs, operating system, infrastructure, capital operational expenditures, and environmental impact. We propose and develop tailor-made solutions for each location considering their specificities. We work to create adequate solutions in planning and structuring collective transportation networks, in operational organisation and in sizing lines and infrastructure projects.

1
DEFINITION OF OBJECTIVES
that are clear and aligned with the development strategy of the region.

2
ANALYSIS OF EXISTING PUBLIC TRANSPORTATION MODES
and definition of the solution which best meets requirements.

3
INVESTIGATION
and analysis of the related demand in the region of interest.

4
ANALYSIS OF URBAN PLANNING CONSTRAINTS
and requirements. Technical choice of corridors and alignments for the system.



ZOOM

BRT STATION DESIGN

BRT stations are the meeting points between the city and the transit system and therefore are an essential link of the mobility chain. They are also at the interface between the infrastructure, the rolling stock and the Intelligent Transportation System. For all these reasons, they are complex elements and their design necessitate the full spectrum of the skills involved in a public transit project. Indeed, a BRT project is not the juxtaposition of a busway, platforms, vehicles and ITS, but the coordinated design of all these elements, and the station is the place where this coordination is the most critical. The main implications in a BRT station design lie in accessibility and pavement design.

1. Accessibility

Our approach: as much as possible, give direct accessibility from the platform to the BRT vehicle floor, like a tram. However, it is not always possible to achieve the necessary conditions for direct accessibility. An accessibility device has then to be integrated in the BRT vehicle design (retractable bridge or ramp), and it is of utmost importance to coordinate the design of the vehicle and the design of the infrastructure.

2. Pavement design

BRT particularity regarding pavement lies in traffic channelisation. Due to the operation mode (reserved lanes, accessibility in stations), vehicles which are all identical run, start, accelerate, brake and turn all in the same places.
The undesirable consequence of this localised stress accumulation is the appearance of rut in the pavement.
This phenomenon can occur and reduce the transportation system performance.
Experience demonstrates that this phenomenon is sharper in stations.
After investigating this issue, the French transport research institutes has proposed recommendations for BRT lanes pavement design.
Based on these recommendations, SYSTRA is fully able to design enduring pavement solutions for BRT lanes and BRT stations.

ZOOM

DIGITAL TRANSPORT PLANNING

With our decision-support web services you can use your data to model and optimise your transport networks in a few clicks.

ITSIM

Rapidly calculate the main performance indicators from a network redesign with a user friendly web interface.

LINEDRAFT

Optimise your network building within a reasonable budget.

PARAMICS

3D State-of-the-art traffic modelling software to enable transport professionals to design, evaluate and present amazing solutions.

QUETZAL

Estimate the use of your transport networkTraffic forecasts are performed with a 4-step model [Generation, Distribution, Modal Choice, Assignment] built from free Python library, interfaced with QGIS.

- **BRT SYSTEM SPECIFICITIES**
- **HIGH CAPACITY VEHICLES**
- **DEDICATED LANES**
- **STATIONS WITH HIGH LEVEL OF SERVICE**
- **SMART ROAD SIGNALING SYSTEM**

ZOOM

WHY SHOULD YOU SHIFT TO GREEN MOBILITY?

Transport represents almost a quarter of greenhouse gas (GHG) emissions and is the main cause of air pollution in cities. Within this sector, road transport is by far the biggest emitter accounting for more than 70% of all GHG emissions from transport in 2014.

National and local authorities are implementing a broad set of measures to answer to this emission reduction challenge in the transport sector.

ZOOM ON THE "FRENCH TOUCH"

	URBAN PUBLIC TRANSPORT			INTERCITY PUBLIC ROAD TRANSPORT
	Areas of over 250,000 inhabitants (official list)		Areas with less than 250,000 inhabitants	
	Dense areas	Other areas		
Electric	●	●	●	●
Hydrogen	●	●	●	●
Bio natural gas	●	●	●	●
Natural gas		●	●	●
Hybrids		●	●	●
Biofuel		●	●	●
Euro VI			●	●

Our approach

- Elaborate a 3D digital replica of the existing depot (valuable input for design phase)
- Calibrate the fleet of electric vehicles to be stabled at the depot, and the electric power they need
- Prepare BIM design of the upgraded depot and supervise construction
- Manage the interfaces and system integration with BIM (technical coordination, clash detection, RAMS performance review…)
- Prepare and anticipate the handover of the depot to bus operators and maintainers

CASE STUDY

SHIFTING A DEPOT TO SERVE ELECTRIC BUSES

- **Paris region bus depot** (France)
- **100% electric fleet**
- **245 e-buses**
- **2x12 MW energy demand**
- **0 service disruption**
- **2022-23: commissioning**
- **Client: RATP** (4,700 buses/26 depots)

THES – Our digital solution

1. Estimate how much power your network will need
2. Calibrate charging docks to meet your needs

CONFIDENCE MOVES THE WORLD

The Group assists growing towns and regions that need reliable, fast, clean transport systems, to make a lasting improvement to their residents' living standards.

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