

MAJOR INFRASTRUCTURE PROJECTS IN MEXICO

A Resource Guide for U.S. Industry



Sponsored by the U.S. Trade and Development Agency



Prepared under contract by:



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About This Guide

The U.S. Trade and Development Agency (USTDA) helps companies create U.S. jobs through the export of U.S. goods and services for priority development projects in emerging economies. USTDA links U.S. businesses to export opportunities by funding project planning activities, pilot projects and reverse trade missions while creating sustainable infrastructure and economic growth in partner countries.

This guide has been developed to provide U.S. companies and exporters with an overview of Mexico's infrastructure sectors, the sector development plans in place through 2018, and to provide profiles of a sample of specific, upcoming projects of potential interest.

Currency amounts converted from Mexican Pesos (MXN) to United States dollars (USD) have been done so using a rate of 13.12 pesos to one dollar. Due to fluctuations in currency values, different levels of engineering and cost estimation completion for different projects, and differing timing of cost information publication, the monetary values within this report should only be considered approximate. Unless explicitly indicated otherwise, all currency values are in United States Dollars (USD).

All exhibits and images are sourced from Mexican government publications, unless otherwise indicated.

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3.15 Mass Transit and Intelligent Transportation Systems

Sector Background

Mexico's urban environments face critical transportation challenges, such as:

- Rapid, continuing urbanization. Mexico's urban population is over 78 percent and urbanization continues at a 1.2 percent rate. Mexico City by itself is the tenth largest urban area by population in the world.
- A high and rising motorization rate. Motorization is increasing in Mexican cities at rapid 10 percent per annum pace.
- Disproportionate public funding patterns that favor automobile transportation (65 percent of funding in 2012) over more sustainable mass transit and non-motorized modes.
- Low-density sprawling development patterns, leading to long transit times.
- Inefficiently allocated land and street space, discouraging public transport.
- An urban transport environment dominated by small private operators and aging, limited capacity vehicles.
- Inadequate fuel specifications contributing to inefficiency and pollution. Mexico's transport sector is highly carbon-intensive, accounting for 18 percent of greenhouse gas emissions generally, with concentrations as high as over 40 percent in cities.
- Rising public impacts, including accidents, road maintenance costs, congestion, and noise pollution.
- A particular burden is imposed on poorer segments of society who face increasing transit times and high costs associated with urban transport.

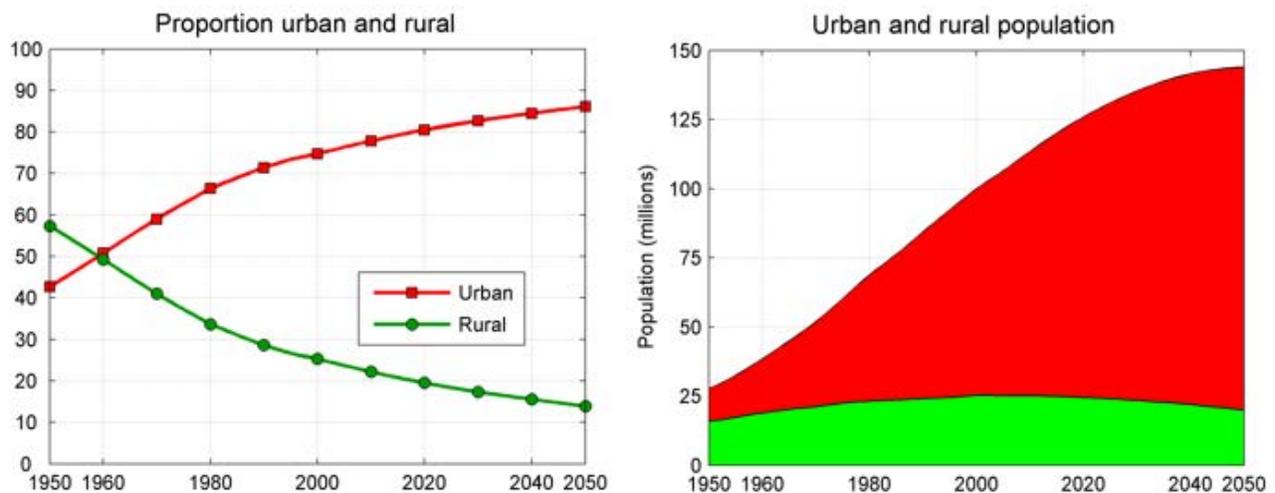


Figure 29: United Nations Projections for Urban Population Growth in Mexico through 2050

At the federal level, the **Secretariat of Social Development (SEDESOL)** is responsible for formulating the federal policies on urban development and transport. The **Secretariat of Communications and Transport (SCT)** is responsible for the development and maintenance of the federal railroad and highway network, sections of which often enter and traverse urbanizations. For many cities, the responsibility for transport matters such as short- and medium-term land use and planning is divided among agencies at the state and municipal level, between different departments within individual agencies or even between different municipalities within the same metropolitan area. In order to increase coordination of mass transit policy at the federal level, the

government has created a new **Secretariat of Agricultural, Territorial and Urban Development (SEDATU)**. SEDATU will serve to coordinate the support of other Secretariats, including SCT and SEMARNAT in the area of sustainable urban development.

The strategic objectives for the urban transport sector established in the SCT's official program through 2018 include:

- Reduce urban transport costs in terms of operating costs, tariffs and lost time for users.
- Improve intermodal connections and promote integration of passenger transportation between modes.
- Reduce accidents within public transport systems.
- Incentivize a modal shift away from personal automobiles.
- Encourage more rational use of personal automobiles.
- Promote the financing and development of mass transit systems including BRT, articulated buses, light rail, non-motorized transport, and metros.
- Reduce fuel consumption and generation of greenhouse gases (GHGs).
- Promote urban transport accessibility for the elderly, handicapped and parents with children.
- Promote accessibility to low cost, efficient transport for poorer populations.
- Promote the implementation of intelligent transportation systems.
- Promote the implementation of security and surveillance systems in public transport, with a particular focus on the safety of women and children.

Mexico's government has responded to the challenges it faces with a multi-pronged approach to rationally develop and improve urban mass transit systems across the country. Mexico created the **National Mass Transit Program (PROTRAM)** in 2009 within FONADIN to improve the efficiency of the sector and steer it towards a lower-carbon development path. PROTRAM offers grants to sub-national governments to cover up to 100 percent of studies and 50 percent of infrastructure costs for public transport projects that meet certain criteria. This is the first program in Mexico that provides federal funding for urban public transit. All mass transit projects supported by PROTRAM have climate change considerations and have emission baselines. **The Center for Sustainable Transport Mexico (CTS-Mexico)** serves as the government's main advisor to PROTRAM. It has reviewed the technical and financial feasibility of 21 public transportation projects across the country and improved the quality of eight project designs in Guadalajara, Mexico City, Chihuahua, Mexicali, Tijuana, Culiacan, Monterrey and Veracruz. By providing project evaluation guidelines and assistance, CTS-Mexico not only improves individual project proposals, but also strengthens PROTRAM's institutional capacity to provide funds effectively in the future. Since PROTRAM only funds mass transit projects with private sector participation, the Mexican government has also established a National **Urban Transport Transformation Program (UTTP)**, to complement PROTRAM. UTTP emphasizes complementary measures including support for non-motorized transport, such as bicycle and pedestrian projects. Together FONADIN's PROTRAM and UTTP are the core of the government strategy to transform Mexico's urban transport to a lower carbon growth course.

The major components of this development and financing strategy include:

1. Urban Institutional Capacity Building
2. Development of Integrated Urban Mass Transit Systems
3. Project Management

The bulk of the original scope of USD \$2.6 billion in funding for these program activities was shared between FONADIN (28 percent), local government contributions (27 percent) and private participation (31 percent). The World Bank Group is providing the balance of 13 percent of funding. BANOBRAS serves as the coordinating institution for these activities and investments, performing the roles of procurement and financial management oversight, credit monitoring and project evaluation.

Mexico's quantified goal for 2018 for mass transit development is to increase the number of major cities with dedicated mass transit systems from 22 percent to 47 percent. The following 34 major cities are the urbanizations being measured, each with populations that currently exceed 500,000, or that will by the year 2018.

- Valle de Mexico
- Guadalajara
- Monterrey
- Puebla-Tlaxcala
- Toluca
- Tijuana
- León
- Juárez
- La Laguna
- Querétaro
- San Luis Potosí
- Mérida
- Mexicali
- Aguascalientes
- Cuernavaca
- Acapulco
- Tampico
- Chihuahua
- Morelia
- Saltillo
- Veracruz
- Villahermosa
- Reynosa – Río Bravo
- Tuxtla Gutiérrez
- Cancún
- Xalapa
- Oaxaca
- Celaya
- Poza Rica
- Pachuca
- Puerto Vallarta
- Tepic
- Tlaxcala-Apizaco
- Matamoros

The PNI released in 2014 identifies over USD \$3 billion in total investment in specific mass transit projects or programs, while total investment projected for urban mass transit projects underway and in the pipeline is estimated at over USD \$6 billion by BANOBRAS, including in that number the Toluca Passenger Train project. The mass transit projects included in the PNI are:

- **Expansion of the urban light rail system in Guadalajara (CG-004):** This project will expand one existing light rail line and construct a completely new third line. The total investment is projected at USD \$1.35 billion.
- **Establish a mass transit system in the eastern part of the State of Mexico (CG-133):** This project will extend line A of the Sistema de Transporte Colectivo (STC), Mexico City's metrorail system, from La Paz to Chalco de Diaz Covarrubias. With a projected total investment of USD \$839 million, this project will be carried out from 2015 to 2017.
- **Expansion of the Metrorrey Rail System and Ecovía BRT (CG-033):** This project involve construction of a new Line 3, and expansion of Line 4, of the Metrorrey rail system. The Ecovía Project will implement a 30.1 kilometer BRT system with 39 stations, running between Lincoln in the northwest of the city and Valle Soleado east of the center city. The fleet of 80 initial buses will feature low-emissions engines, air conditioning, modern passenger information systems and farecards, and Wi-Fi. The total investment is projected at USD \$434 million.

- **Modernize the Urban Public Transport in the Lagunera region (CG-116):** This project primarily involves development of a new 32.5 kilometer BRT corridor that will run from Lerdo, in the State of Durango, to Matamoros, in the State of Coahuila. The total investment is expected to be USD \$171 million.
- **Establishment of a BRT system in Tijuana (CG-123):** This new BRT system will cover a 25 kilometer main corridor and serve 34 stations with strong integration through station connectivity to 32 feeder routes. With an estimated investment of USD \$151 million, this project is to be carried out between 2015 and 2016.
- **Construction of a mass transit system in Mérida (CG-238):** This project is expected to create total investment of USD \$137 million. The mode and scope are yet to be finalized. Preliminary feasibility studies found that the proposed BRT system would not be viable due to the layout and physical characteristics of the city streets.
- **Modernization of the Atlacomulco Bus Terminal (CG-174):** This project, located in the northwest of the State of Mexico, will have a total projected investment of USD \$5.3 million.

As of this writing, mass transit projects in execution according to BANOBRAS included:

Project	State	PNI	CG	Total Investment (Rounded to Millions)
Metrorrey Line 3	Nuevo Leon	Yes	CG-033	USD \$ 374,000,000
Expansion of Line 1 SITEUR Guadalajara	Jalisco	Yes	CG-004	103,000,000
BRT Monterrey ECOVIA 1	Nuevo Leon	Yes	CG-033	131,000,000
BRT Tijuana	Baja California	Yes	CG-123	136,000,000
BRT Chihuahua 1: North - South	Chihuahua			68,000,000
BRT Mexicali Express Line 1	Baja California			54,000,000
BRT Puebla 1: Chachapa - Tlaxcala	Puebla			112,000,000
BRT Acapulco - Ciudad Renacimiento	Guerrero			142,000,000
BRT Chimalhuacán- Pantitlán	State of Mexico			147,000,000
BRT Puebla 2 Norte-Sur (2 BRTS)	Puebla			155,000,000
BRT Pachuca Centro Téllez	Hidalgo			65,000,000
BRT Ecatepec Indios Verdes	State of Mexico			154,000,000
TOTAL				USD \$ 1,641,000,000

Table 23: BANOBRAS - PROTRAM Mass Transit Projects in Execution

The following 12 mass transit projects were identified as in preparation by BANOBRAS:

Project	State	PNI	CG	Total Investment (Rounded to Millions)
BRT ZM de la Laguna	Coahuila-Durango	Yes	CG-116	USD \$ 165,000,000
BRT Mérida	Yucatan	Yes	CG-238	249,000,000
BRT Zacatecas	Zacatecas			95,000,000
BRT Oaxaca Primary Corridor	Oaxaca			83,000,000
BRT León Optibús Third Phase	Guanajuato			60,000,000
BRT Durango	Durango			87,000,000
BRT San Luis Potosí	San Luis Potosi			34,000,000
BRT Aguascalientes	Aguascalientes			137,000,000
Tren Chalco-La Paz (Metro)	State of Mexico	Yes	CG-133	648,000,000
Línea 3 de Tren SITEUR Guadalajara	Jalisco	Yes	CG-004	1,350,000,000
Tren México-Toluca	State of Mexico			2,943,000,000
Suburbano 1 Expansion to Huehuetoca	State of Mexico			457,000,000
TOTAL				USD \$ 6,308,000,000

Table 24: BANOBRAS - PROTRAM Mass Transit Projects in Pipeline

Projects

Expansion of the Guadalajara Light Rail System

	Project Type:	Mass Transit (Light Rail)
	State(s):	Jalisco
	Projected Investment:	USD \$1.3 billion
	Timeline:	2014 - 2018
	Project Sponsor(s):	SCT, BANOBRAS, SITEUR

Project Background and Scope

Guadalajara is the second most populous city in Mexico with over 1.5 million inhabitants in the city proper. The Guadalajara Metropolitan Area includes the municipalities of Zapopan, Tlaquepaque, Tonalá, El Salto and Tlajomulco de Zuñiga, with a total population of over 4.2 million persons.

The Guadalajara Light Rail System (SITEUR) was inaugurated in 1989 with the construction of the first line with nineteen stations, running 15.5 kilometers from the stations Periférico Norte south to Periférico Sur. 6.6 kilometers of this alignment are underground. Line 2 was inaugurated in 1994 running 8.8 kilometers from station Juárez (interchange with Line 1) east to station Tetlán. The present fleet consists of 48 articulated electric multiple units receiving power via overhead catenary. The original suppliers for equipment and systems included Mitsubishi, Siemens and Bombardier. Today, SITEUR transports more than 240,000 passengers per day, making it the 9th largest system by ridership in Latin America.

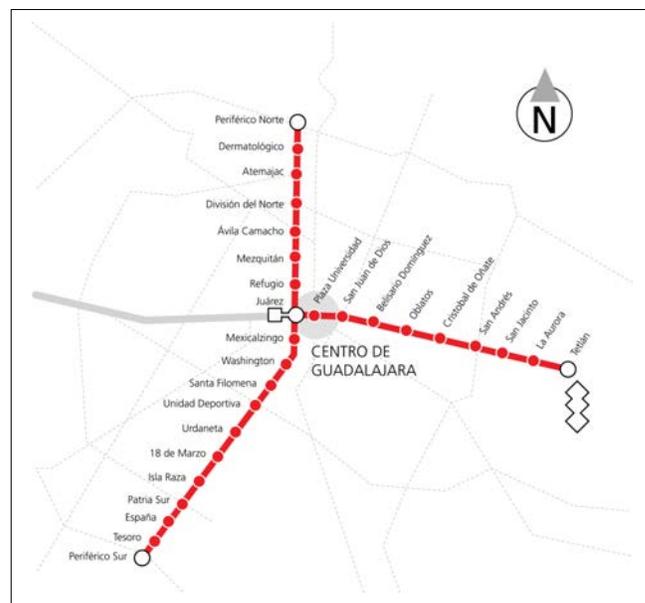


Figure 30: Present Extension of the Guadalajara Light Rail System

Population growth for the area exceeds 1.5 percent. As the core of the city has shifted to more intense commercial uses, residential population has moved to the periphery, increasing demand for transportation. Motorization rates have more than doubled since 2000, to over 1.2 million automobiles. Major city corridors have witnessed a steady decline in average speed as congestion has increased, and negative impacts including road maintenance costs, pollution and accidents are a growing problem.

To address these problems the federal and local governments are planning a significant expansion of the SITEUR system, which includes a completely new line.

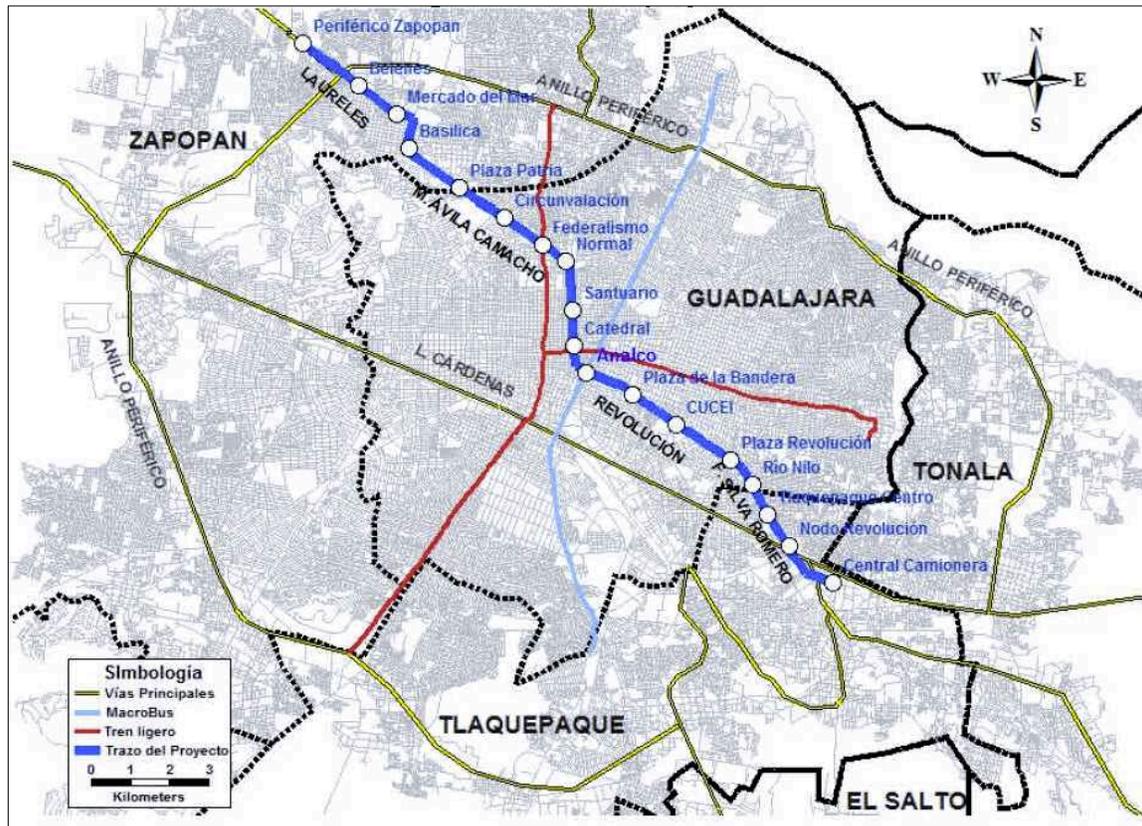


Figure 31: Guadalajara Light Rail System Line 3

The new Line 3 of SITEUR will extend from the station Periférico Zapopan in the northwest of the urban area, running 21 kilometers southeast to station Central Camionera in Tlaquepaque. This primarily double-track rail line will be at ground level on the outer extensions, on an elevated viaduct for 15.65 kilometers on either side of the city core, and underground for 3.1 kilometers within the core.

18 stations will be constructed as part of this project, 13 surface stations and 5 underground, with platform lengths of 75 meters capable of servicing consists of 3 EMUs. The infrastructure will include yards and maintenance workshops.



Figure 32: Guadalajara SITEUR Line 3 Station Concept

Planned rolling stock will be bi-directional EMU's with a length of 29.56 meters, width of 2.65 meters, height of 3.57 meters and maximum pantograph reach of between 3.868 and 6.268 meters. The trains should have a

capacity for 500 passengers each, with seating for 100. Power will be provided by 600V DC overhead catenary and the vehicle top service speed will be 70 kilometers per hour.

The system will require at least 6 substations for conversion of external AC power to DC for rolling stock operation. At least 22 substations will be built for electrical power provision for operations of the passenger stations, the ventilation system, and the maintenance facility.

Systems to be procured include a high-speed digital data network, integrated ticketing, centralized control and digital trunked radio. Centralized customer service center and a passenger information system will be part of the project, including multimedia message screens in all stations.

Project Status and Implementation Timeline

This project is in advanced planning stages with procurement expected to begin in 2014. Construction is expected to span four years.

Project Cost, Financing and Procurement

Based on the current federal presentation, the project budget is as follows:

Source	Federal	State	Private
Amount	1,081,680,771	144,685,115	122,590,081
Total	USD \$1,348,955,966		

Table 25: Guadalajara Light Rail Line 3 Sources of Funds

Year	1	2	3	4
Amount	274,377,855	464,175,236	496,026,186	114,376,689
Total	USD \$1,348,955,966			

Table 26: Guadalajara Light Rail Line 3 Projected Spending by Project Year

*The project cost includes the following component breakouts. These are approximate, sourced from a late 2013 technical study, at which time the project was budgeted at USD \$1.16 billion.

Category	Item	Cost (Rounded, Millions)	Category Total
System Civil Works	Workshops and Yards	\$33,000,000	\$747,000,000
	Underground Stations	\$147,000,000	
	Tunnel Track	\$154,000,000	
	Transitions/Trenches	\$12,000,000	
	Elevated Track	\$173,000,000	
	Elevated Stations	\$225,000,000	
	At-Grade Track	\$3,000,000	
Complementary Works	Plaza Basilica Pedestrian Tunnels	\$12,000,000	\$34,000,000
	Other	\$3,000,000	
	Intermodal Center	\$19,000,000	
Electromechanical	Signalization	\$55,000,000	\$235,000,000
	Information Systems	\$19,000,000	
	Electrification	\$119,000,000	
	Communications	\$42,000,000	
Management	Project Management	\$6,000,000	\$6,000,000
Land	Right of Way Acquisition	\$34,000,000	\$34,000,000
Rolling Stock	Electric Multiple Units	\$106,000,000	\$106,000,000
Grand Total*			USD \$1,162,000,000

Table 27: Guadalajara Light Rail Line 3 Budget Breakdown

U.S. Export Opportunities

Export opportunities for U.S. firms are diverse. Track and infrastructure components are an area where U.S. firms actively export goods to Mexico. Communications and information systems, or components and subsystems of these items, are another potential market. The rolling stock will be provided by non-U.S. headquartered companies. Many of these companies have vehicle manufacturing facilities in the United States that could conceivably produce the EMU's for shipment to Mexico. Opportunities would also exist for U.S. companies to serve as suppliers to these vendors for components or sub-systems.

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La Laguna Metropolitan Zone BRT

	Project Type:	Mass Transit
	State(s):	Coahuila and Durango
	Projected Investment:	USD \$165 million
	Timeline:	2014 - 2015
	Project Sponsor(s):	SCT

Project Background and Scope

The Metropolitan Zone of La Laguna is formed by four cities: Torreón and Matamoros in Coahuila and Gómez Palacio and Lerdo in Durango. More than 1.2 million people live in this urbanization, it is the ninth largest metropolitan region in the country.

Infrastructure and Rolling Stock

This project will include all the infrastructure, equipment and systems necessary to initiate the bus rapid transit (BRT) service along a first major corridor. This 32.5 kilometer corridor will run from Lerdo, in the State of Durango, to Matamoros, in the State of Coahuila. There will be 34 intermediate stations. Of these, 26 stations will be 5 meters wide, and 8 will be 2.5 meters wide. There will be three major terminals. Terminal Durango will be 10,850 square meters and Terminal Coahuila which will be 11,093 square meters. 30,000 square meters of bus parking will be provided at Terminal Coahuila. The Muzquiz Intermodal Center will cover 6,262 square meters and serve to link the BRT to trunk and feeder transportation connections. Between Terminals Coahuila and Durango operations will occur in dedicated BRT lanes, with mixed traffic operations occurring on the corridor segments beyond the two terminals.

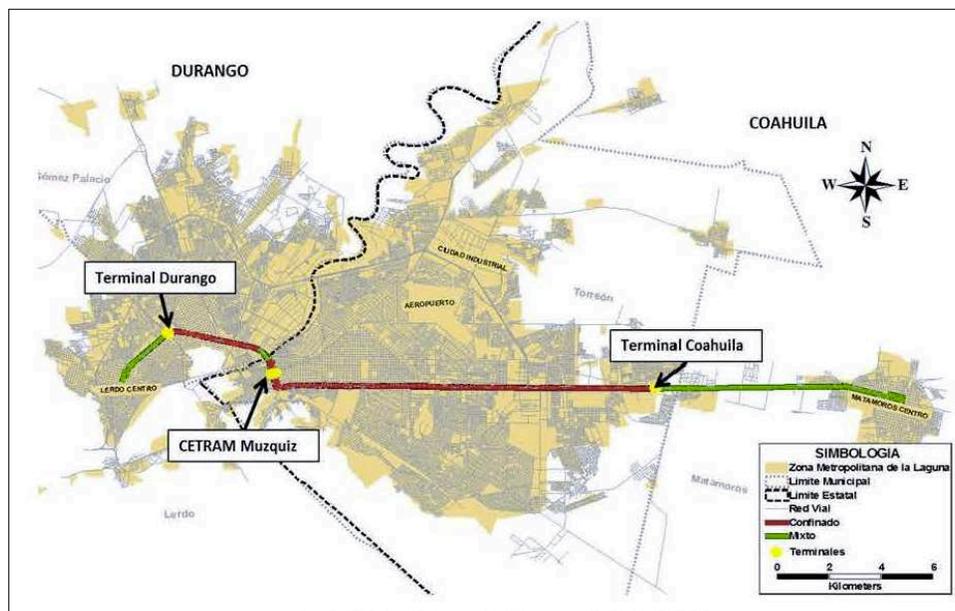


Figure 33: Map of the La Laguna BRT Corridor Project

This corridor is meant to serve as a base for future expansion of the BRT system along additional alignments, as well as to leverage and coordinate the offerings of the other multimodal transportation providers in the region. The ticketing system will be designed to integrate the BRT with future line expansion as well as other transportation service providers.

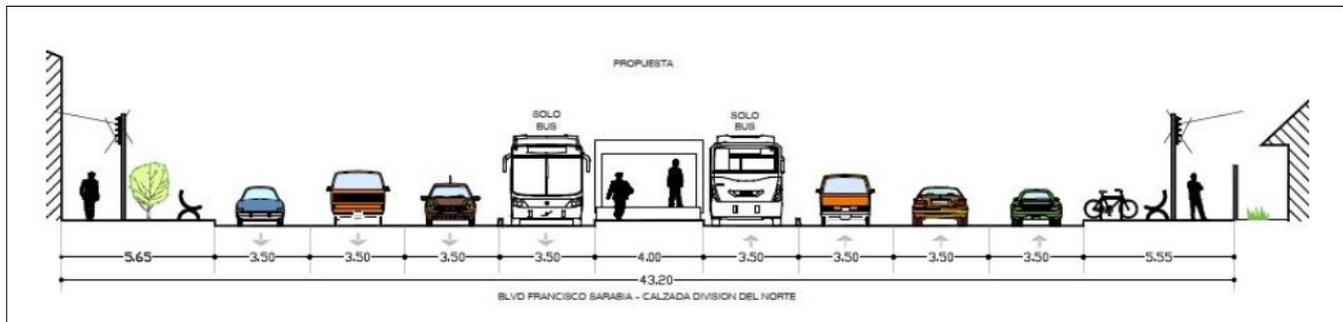


Figure 34: Laguna BRT Station Cross Section

The primary passenger vehicle for the BRT is specified as a bus 12 meters in length, with roughly 35 seats and capacity for 100 passengers, with three doors on the left and two on the right. Smaller buses - ten meters in length with capacity for 80 passengers, and 8.5 meters in length carrying 75 passengers - are envisioned as serving less dense feeder routes. A short bus for special services or low density connectors is envisioned as measuring 6 meters long and having capacity for 40 passengers. This fleet is expected to be diesel powered. This project expects to procure 184 of the 12 meter buses to initiate operations.

Information Systems

A key component of this BRT project will be investments to provide a state-of-the-art integrated intelligent transportation system providing safety, signaling, security, communications and control functions. There will be three major subsystems.

- Ticketing System:** This system will enable the operator to control and manage all aspects of user payment; accounting; and system access, validation, and control. It will enable analysis, processing and reporting, including drilling down to individual transactions, throughout the system's operating cycle. This system will be based exclusively on smart cards for fare payment, at stations or aboard the buses, and feature equipment enabling unattended fare payment and card purchases. The system will have an analytics capability supporting operational and business planning of the service. The system selected will have a capability of accommodating future expansion of the BRT as well as integration of fare payments for connecting multimodal transportation services. It needs to be capable of dynamic adaptation of tariffs within programmable parameters. The system database needs to be based on an open and documented technology.

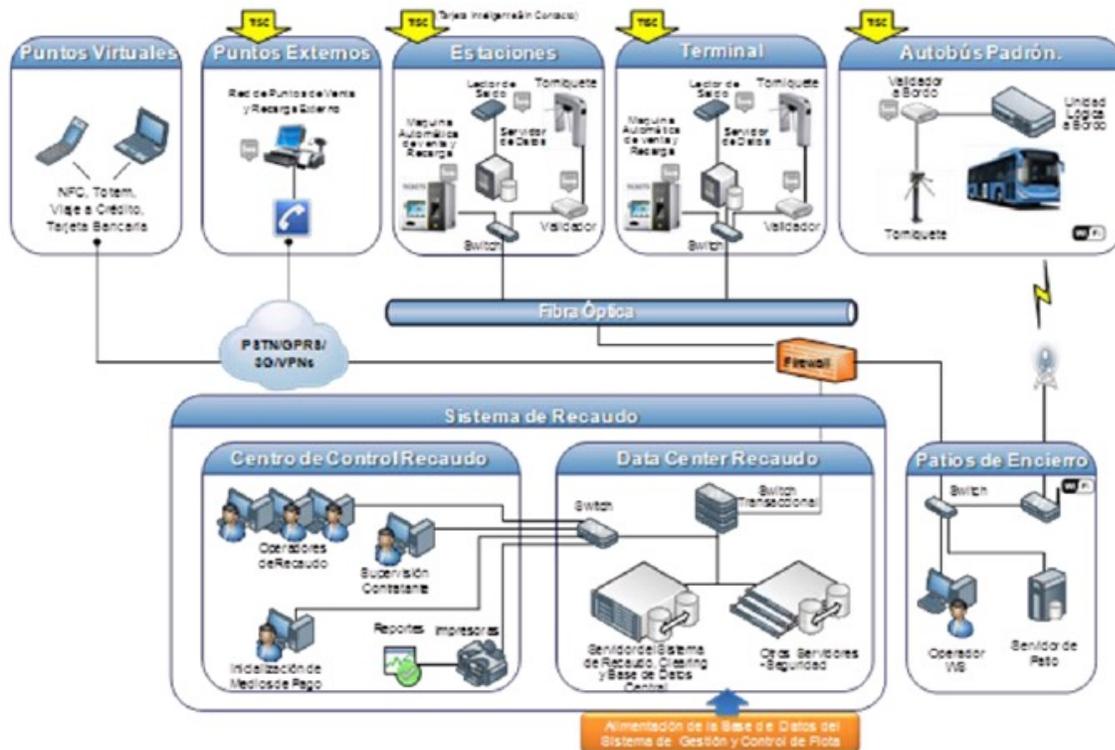


Figure 35: Laguna BRT Ticketing System Conceptual Diagram

- Fleet Management and Control System:** This system will enable the operator and sponsoring governments to monitor and manage the system operations dynamically in real time to respond to passenger demand requirements. Bus-based GPS components will transmit real-time data to the Control Center and enable visualization and regulation of the buses. There will be a Wi-Fi based automatic data interchange capacity between the buses and the facilities systems. Communications between the Control Center and the buses, between buses and to groups of nodes within the network will be required. There will be closed circuit surveillance cameras in the stations. Buses must be equipped with onboard systems incorporating functions to include: panic buttons; open door detection; loudspeaker and intercom; passenger information displays; and onboard fare payment systems. The Control Center segments will be designed with modern technologies to manage and disseminate information in times of crisis.

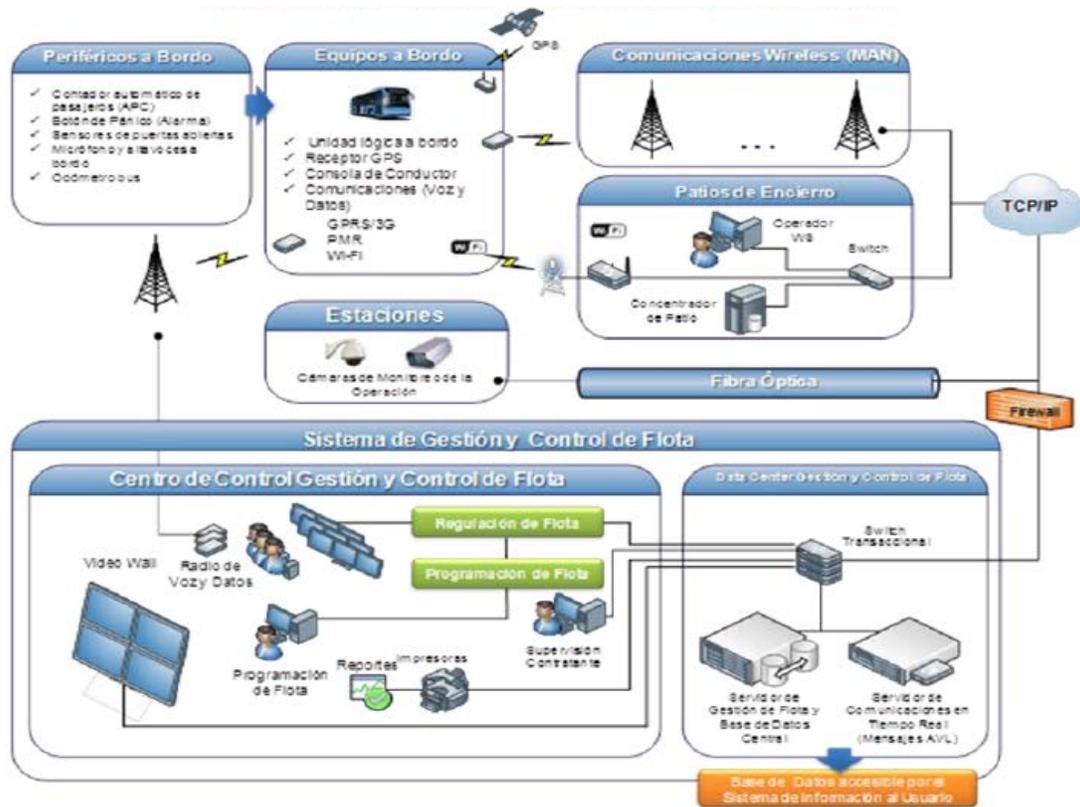


Figure 36: Laguna BRT Operations Management System Conceptual Diagram

- Passenger Information System:** This system will enable the operator to provide users with useful and opportune information on the services offered, routes, schedules, tariffs, and special access features such as for the handicapped. Station displays will provide passengers with real time information on approaching buses and onboard systems will inform them of approaching stops. They system will integrate telephone and web based components to provide interactive passenger access to the ticketing and fare system, as well as to receive real time updates on operations.

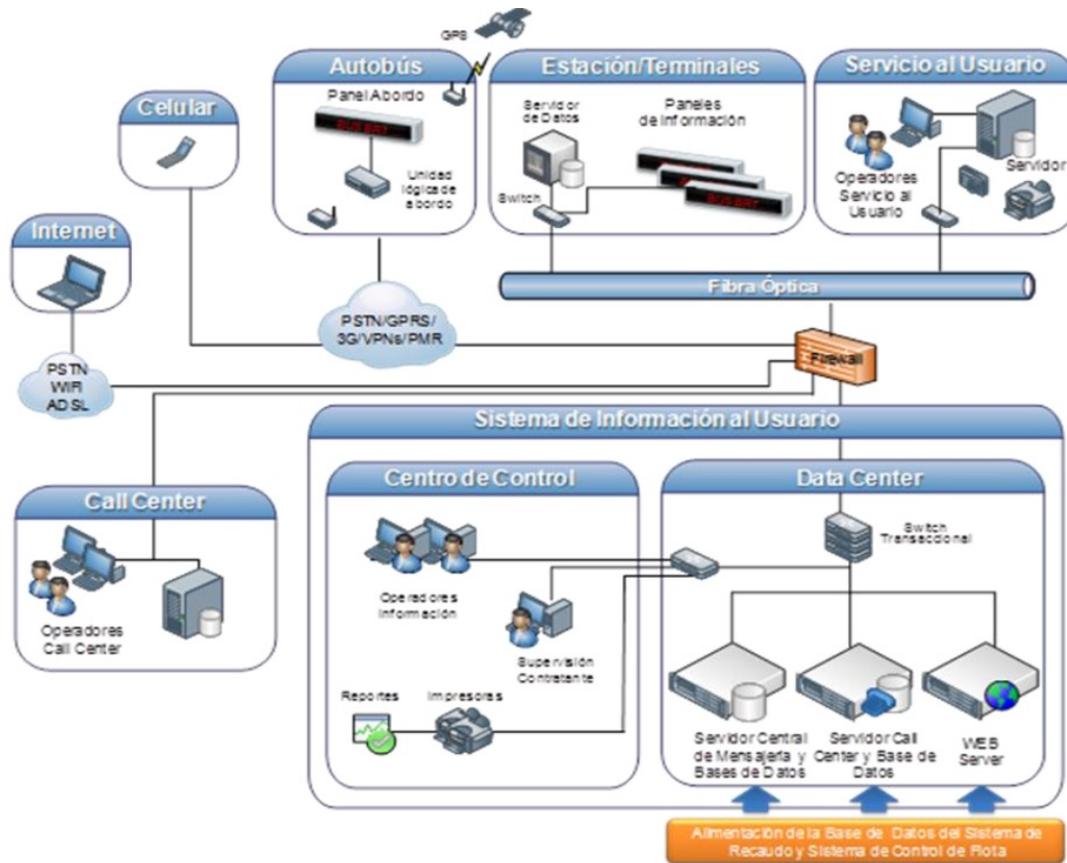


Figure 37: Laguna BRT Passenger Information System Conceptual Diagram

Project Status and Implementation Timeline

As of October 2014, the major project planning studies had been completed. Discussions between local and federal project stakeholders were underway to finalize remaining details. Procurement is expected to occur before the end of 2014, with construction beginning in 2015 and operations commencing two years later.

Project Cost, Financing and Procurement

This project is expected to be constructed with a mix of funding, including private participation. The original plan saw funds distributed by sources over time as follows:

Year	Totals	Federal Funds	Municipal Funds	Private Funds	Trust Funds
2014	36,629,420	24,123,087	-	4,203,763	8,302,569
2015	28,269,164	43,954,900	-	56,819,183	27,495,081
Total	164,898,583	68,077,987	-	61,022,946	35,797,650

Table 28: Lagunera Region BRT System Sources of Funds (USD)

This spending plan will shift into 2016 as the project is past the start date originally conceived in early planning. Within these amounts approximately USD \$22 million is planned to be spent on information, control, safety and communications systems. USD \$32.8 million will be spent on the initial fleet of 184 buses.

U.S. Export Opportunities

This project will present several opportunities for U.S. participation. U.S. companies could participate as investors or concession operating partners. The system will include procurement of four types of bus rolling stock. Information and communications systems are a key component of the BRT where there is potential for U.S.-origin software and hardware provision. Competition from European suppliers for these opportunities will be strong.

Project Contacts

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Expansion of the Metrorrey Rail and ECOVIA BRT System

	Project Type:	Mass Transit
	State(s):	Nuevo León
	Projected Investment:	USD \$434 million
	Timeline:	2013 - 2018
	Project Sponsor(s):	SCT, STC Metrorrey, BANOBRAS

Sistema de Transporte Colectivo (STC) Metrorrey is a public transit agency, an independent agency of the government of the State of Nuevo Leon. It was initially established in 1987 to construct, operate and maintain an urban transport system.

Metrorrey is a heavy rail passenger rail system that operates electric-multiple unit trainsets powered by overhead catenary at 1.5 kV DC. The present rail system consists of lines 1 and 2. Line 1 was initiated in 1998 and completed in 1991. It covers 18.8 kilometers, running east to west, and services 19 stations. This entire line, excepting one short segment and station, is elevated. Line 2 construction was begun in 1993 and the extension to Municipio de Escobedo completed in 2008, the total extension is 13.8 kilometers, running generally north to south. Servicing 13 stations, the segment from terminal General Zaragoza to Regina is elevated and the remainder of the line is subterranean. The lines interchange at Cuauhtémoc Station. The extension of Line 2 was performed by the consortium of Siemens, Bombardier and Grupo Garza Ponce. The system fleet of 84 articulated EMU's has been provided by CNCF, Bombardier and CAF of Spain.

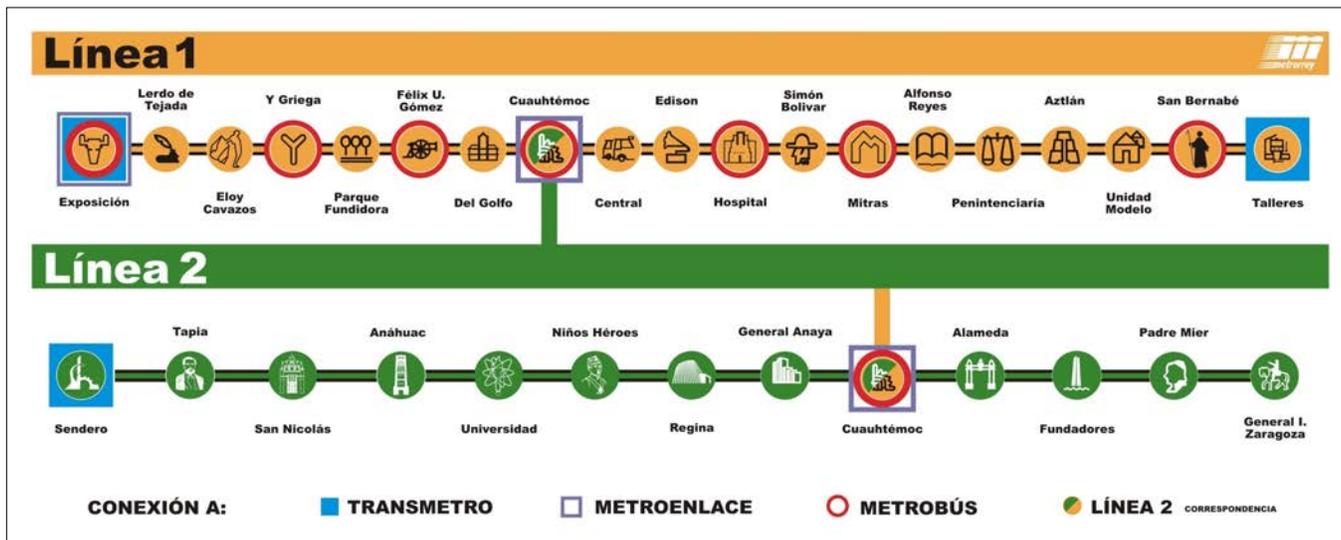


Figure 38: Current Lines of the Metrorrey Rail Transit System

Metrorrey's rail system is complemented by a bus system. MetroBús serves 22 routes with a fleet of 450 buses. Users of the Metrorrey system pay bus and train fares through a single integrated farecard system. A special service called TransMetro features high-quality bus service along priority corridors that are future extensions or

additions to the Metrorrey rail system. This service features air conditioning, dedicated stations, a fixed route of stops and schedule coordination with rail operations.

A new bus rapid transit line, Ecovía, was initiated in Spring of 2014. This service provides a fleet of 80 modern, natural gas-powered passenger buses running along a single east-west alignment, with dedicated lanes for substantial portions of the route. This line serves 43 stations including two terminals and two rail intermodal connecting stations where Ecovía passengers can connect with Lines 1 and 2 of Metrorrey. This line will connect with the new Line 3. The system operates the citywide integrated farecard system and buses feature air conditioning, passenger information systems, Wi-Fi, security cameras and handicapped accessible features.

Project Background and Scope

Metrorrey and the complementary bus systems have witnessed steady growth. Metrorrey has seen annual ridership rise from 153 million in 2011 up to 168 million in 2013. The new Metrorrey Line 3 will be 7.5 kilometers in length and serve 8 stations. 550 meters of the alignment will be underground, from Zaragoza to Barrio Antiguo Station, and 6,650 meters will be elevated between Macroplaza and Hospital Metropolitano. The original master plan for the basic network of Metrorrey envisioned four lines with a total length of 80.5 kilometers, and the government intends to have the fourth line scoped, funded, built and in operation by 2018.

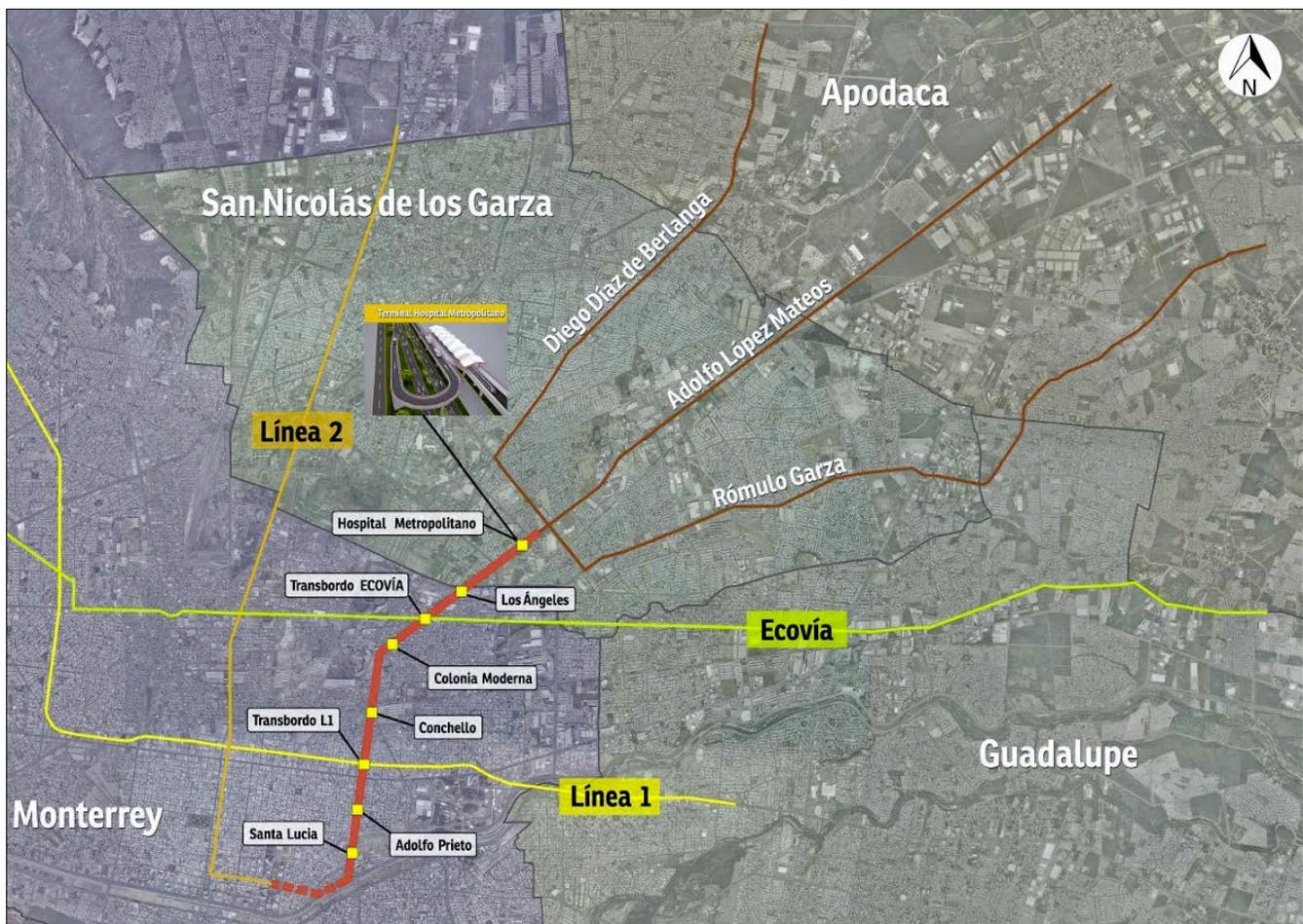


Figure 39: Map of the Planned Metrorrey Line 3 and the Present Ecovía BRT Line 1

The Ecovia system will be expanded by an additional two lines. Line 2 will run from Avenue Bonifacio Salinas in Guadalupe to Miravalle Bridge in San Pedro, generally along the alignment of Constitution Avenue. Line 3 will connect lines 1 and 2, extending south from Avenue Ruiz to Avenue Colon.



Figure 40: Map of BRT Ecovia Monterrey Proposed Lines 2 and 3

Project Status and Implementation Timeline

The contract to build the new Line 3 of Metrorrey was awarded to Siemens Mesoamerica in May of 2014. Operations are expected to begin in the fourth quarter of 2015. The feasibility study for Line 4 of Metrorrey was begun in January of 2014. It is expected to be complete by the first quarter of 2015, enabling the formal request of funds from the federal budget and for the project to go to bid. Several potential alignments are being studied.

The Ecovia Linea 1 corridor concession (construct and operate) was awarded to Servicio de Transporte Tecno Ecológico in June of 2013. As of June of 2014, 42 Hyundai natural gas buses had been purchased and service was being provided to all stations. The technical and feasibility studies are underway for the proposed Lines 2 and 3.

Project Cost, Financing and Procurement

The Ecovía Line 2 and 3 expansion is expected to be financed with a mix of federal, state and private funding. A structure similar to the 20-year concession for Line 1 (of design, project management, construction, provision of equipment, operation, and maintenance) is the probable procurement strategy.

U.S. Export Opportunities

There are expected to be numerous export opportunities between the Metrorrey Line 4 and Ecovía Lines 2 and 3 projects. For the BRT projects, this will include low-emission passenger buses, fueling stations, passenger information systems, station fittings and systems, signage, security, access control, lighting, data and electrical components, and cabling. For the rail projects, infrastructure components including track and track components are potential exports. Operations and maintenance will be an opportunity for both modes of projects. The competition for major system components and services will be challenged as established consortiums of suppliers will likely be faced, including major firms such as Siemens, Alstom, Hyundai and Bombardier, with established operations and local partners. U.S. firms may find opportunities as second tier suppliers.

Project Contacts

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Establishment of an Articulated BRT System in Tijuana

	Project Type:	Mass Transit
	State(s):	Baja California
	Projected Investment:	USD \$151 million
	Timeline:	2015 – 2016
	Project Sponsor(s):	SCT, BANOBRAS (FONADIN), State of Baja California, City of Tijuana

Project Background and Scope

Sharing 15 miles of international border with sister city San Diego, California, Tijuana is the capital and largest city in the Mexican State of Baja California. With a population exceeding 1.3 million, underdeveloped transport systems and infrastructure, based on automobiles and a decentralized system of buses, limit opportunities both within Tijuana and throughout the metropolitan region. Tijuana has an average population growth rate of 5 percent and is projected to reach over three million residents by 2020. The city is sprawling, expanding at more than 8 acres per day, and much of this growth is uncontrolled and informal. This growth is outstripping city services and planning capacity, and has created new origin-destination dynamics that were not anticipated. The rate of motorization is increasing rapidly, with a city average of one car for every three persons, much higher than the national average of 8 persons per car. This passenger vehicle demand is saturating the poorly connected and maintained urban road network, which lacks bypasses and hierarchies, and is also experiencing rapid growth of road freight traffic. This leads to steadily increasing congestion. Prices paid for transport are generally high for the quality of service.

Tijuana is an important center for cross-border commerce between the United States and Mexico. There are three (soon to be four) ports of entry between the cities. In 2013 over 42 million persons crossed the San Ysidro border crossing (the largest by volume in the Western Hemisphere) and the Otay Mesa crossing. Otay Mesa, specialized for road freight, saw over 769,000 truck pass through in the same period. Congestion at these crossings has led over USD \$500 million in public investment in expansion projects that will be completed in 2015. While the crossings are specific chokepoints, the overall quality of the transportation networks and services in the adjacent urban areas is critical to maintaining mobility for personal and commercial purposes, within, and between, these cities. In addition to congestion, pollution is a common challenge for both communities, as these cities share natural resources such as air basins and watersheds. San Diego County is an EPA-designated non-attainment or maintenance area for multiple air pollutants, with emissions on both sides of the border contributing to poor air quality.

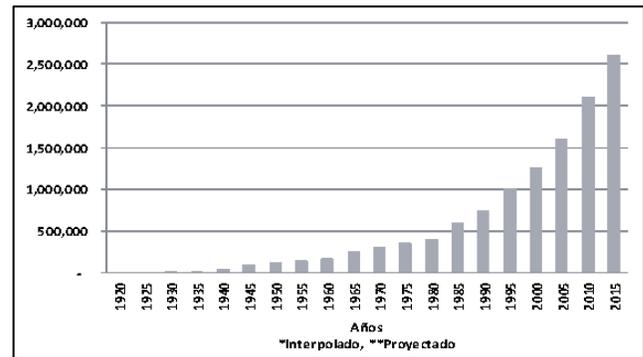


Figure 41: Historical and Projected Population of Tijuana

In order to provide sustainable mobility for residents and address the environmental and commercial challenges described, Tijuana will implement the city's first bus rapid transit (BRT) system. The new BRT system will serve the city center, with initial coverage set to meet demand for 30 percent of the 250,000 daily trips taken throughout the city. This project will consist of two new BRT lines crossing the city in an "X" shape. Corridor 1, Puerta Mexico – El Florido, will be 10.6 miles long serving 22 stations. Of this alignment, 7.7 miles will operate in dedicated lanes, the rest in mixed traffic lanes. Puerto Mexico Terminal will be located nearly adjacent to the San Ysidro Port of Entry Facility. Proposed in the planning documents, although not included in the BRT Corridor budget, is a plan to construct a connecting pedestrian structure between the Puerta Mexico BRT station and the San Ysidro facility "El Chaparral" expansion. The multimodal El Florido terminal will be the site of the system bus storage lots, maintenance shop, a transfer facility for passengers transiting to and from feeder bus routes and other modes, the system control center, and administrative offices. The initial BRT corridor fleet will consist of 45 articulated passenger buses, with left hand doors, 59' in length and with a maximum capacity of 188 passengers. Buses supplied will be expected to meet stringent emissions standards, the European Union Euro V standard is identified specifically in planning documents, potentially utilizing either diesel or natural gas fuel. Over the twenty-year system forecast the fleet is expected to be expanded by an additional 23 articulated buses, added incrementally to match growth in ridership demand. Articulated buses are expected to have an operational life of 11 years. Twenty feeder bus routes will serve Corridor 1. A significant share of the feeder bus fleet is expected to be sourced from buses currently in operation on the routes, excluding some number based on age and condition. The proposed budget is sufficient to acquire approximately 100 new feeder buses. This corridor will support an estimated 109,000 trips per day at startup. This line will serve as a complement to the major investments under way at the San Ysidro Land Port of Entry (El Chaparral), and to the proposed investments by SANDAG for the San Ysidro Intermodal Transit Center project, that is proposed to improve mass transit connectivity to rail and bus on the northern side of the crossing.

As part of the Corridor 1 project a new electronic fare system will be implemented. This system will include contactless smart cards; administration/accounting/analysis and control software; operating software for fare gates and card readers in stations and buses; a flexible payment system, and; wired and wireless communications infrastructure. A key requirement for this acquisition is that the system offered shall be modular and expandable to incorporate the planned Corridor 2 BRT system expansion, as well as multimodal integration in the long-term.

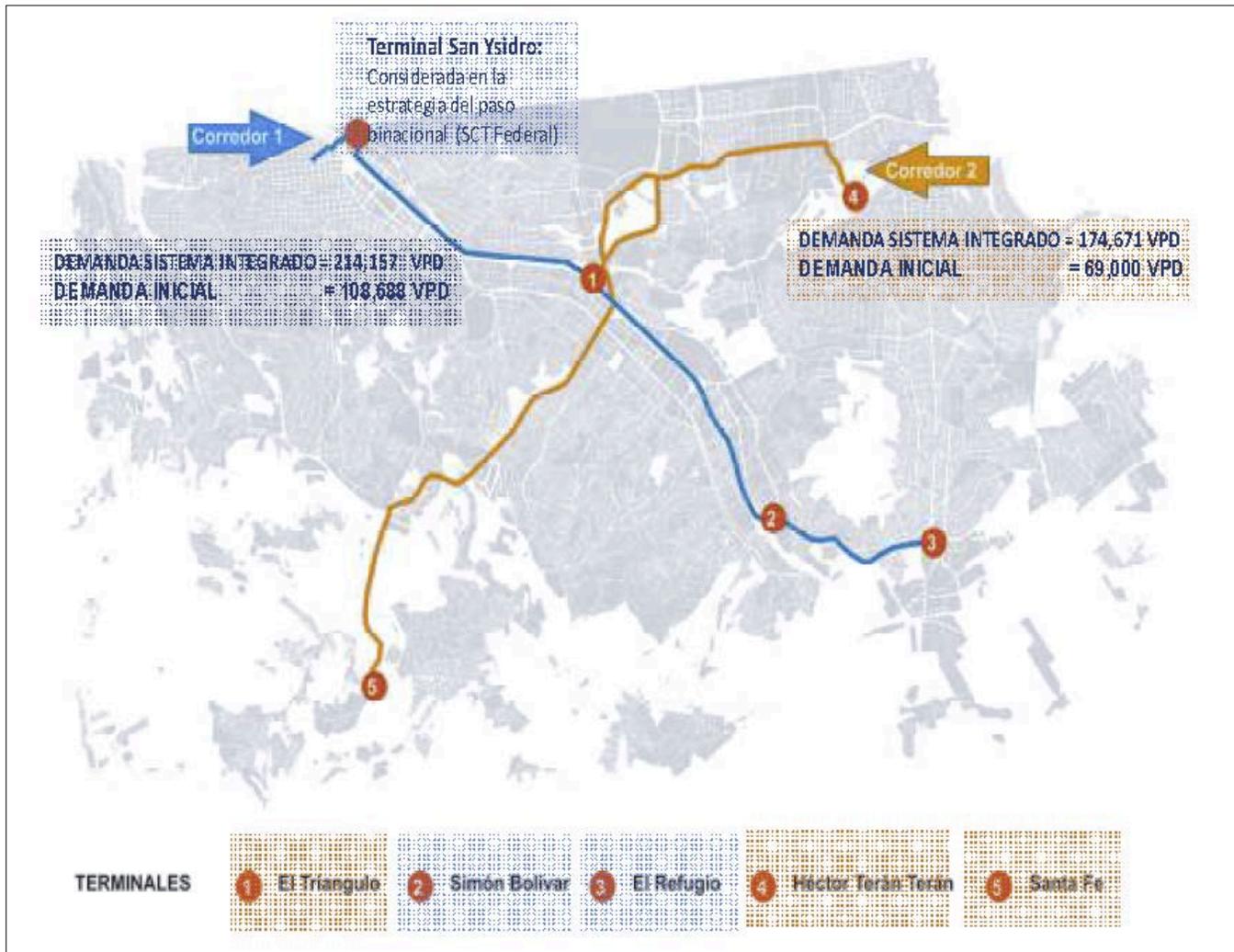


Figure 42: Map of the Planned Tijuana Bus Rapid Transit System Corridors 1 and 2

Corridor 2, Garita Otay - Santa Fe, is planned to be 11.8 miles in length. It will serve 29 stops, with major stations at Santa Fe and Terán Terán, including workshops and vehicle storage lots at both of these locations. The lanes will be a mixture of dedicated and mixed, and the central station of the line will be at El Triangulo with an intermodal transfer to Corridor 1 service. This line service, including feeders, is projected to serve an initial traffic level of 69,000 trips per day. Service on this corridor would be provided by an initial fleet of 32 articulated buses for the trunk corridor, 62 conventional buses for feeder routes and an additional 18 microbuses.

Project Status and Implementation Timeline

The federally required major feasibility, planning, and technical studies and benefit-cost analysis have been completed, and the project has been formally allocated funding in the SHCP's project portfolio for mass transit. Development of Corridor 1 is currently planned to begin in 2015, including all infrastructure construction, concession award, acquisition of rolling stock and implementation of the fare payment system. CTS-EMBARQ Mexico supported a procurement and implementation planning workshop in April of 2014 in which key local, state and federal officials participated.

Project Cost, Financing and Procurement

Based on the most recent estimate provided by the National Infrastructure Plan, the total cost to implement Corridor 1 is USD \$151 million, split between federal (FONADIN), state, local and private sources of funds. The private contributions are expected to be contributed as a component of the concession structure that will be used to procure the construction and operation of the new BRT system. Concessions will be awarded in accordance with FONADIN regulations and the federal Public Works Law and Regulations. They will be for up to 20 years duration. The following table breaks down the Corridor 1 component funding based on the budgets provided in preparatory studies completed in 2012.

Major Project Component	MXN	USD	As %
Infrastructure	MXN 1,254,418,368	\$ 95,641,044	76%
Mainline (Corridor) Bus Fleet	MXN 225,000,000	\$ 17,154,751	14%
Feeder Route Buses	MXN 114,000,000	\$ 8,691,741	7%
Investment in Line Prepayment	MXN 62,426,900	\$ 4,759,635	4%
Total	MXN 1,655,845,268	\$ 126,247,171	100%

Table 29: Tijuana BRT Corridor 1 Funding by Major Category

The table below identifies selected component costs that would be potential targets for imports, and the expected sources of project financing. It is important to note that the concessionaire(s) will control or heavily influence purchasing decisions. Accordingly, interested U.S. suppliers should plan to evaluate participating as a partner or investor in a bidding team or by securing relationships as a vendor to potential winning firms.

Corridor 1: Puerta Mexico - El Florido Selected Project Components	EXPECTED SOURCES OF FUNDS		
	FONADIN	STATE/LOCAL	PRIVATE
Intermediate Stations	\$ 2,830,509	\$ 943,503	\$ -
Puerta Mexico Terminal	\$ -	\$ -	\$ 117,706
El Florido Terminal	\$ -	\$ -	\$ 7,956,206
Simon Bolivar Transfer Terminal	\$ -	\$ -	\$ 4,189,879
Mainline Corridor Bus Fleet (18M)	\$ -	\$ -	\$ 17,154,751
Feeder Route Bus Fleet (12M)	\$ -	\$ -	\$ 8,691,741
Ticketing System	\$ -	\$ -	\$ 4,912,122
Workshops and Parking Facilities	\$ -	\$ 8,537,009	\$ -
Control Center	\$ -	\$ 1,524,867	\$ -
Construction of Voice/Data Network	\$ -	\$ 709,825	\$ -
Crossing Signals	\$ -	\$ -	\$ 659,709
Total	\$ 2,830,509	\$ 11,715,204	\$ 43,682,113

Table 30: Tijuana BRT Corridor 1 Selected Items of Cost and Sources of Funds

U.S. Export Opportunities

This project will present several opportunities for U.S. participation. U.S. companies could participate as investors or concession operating partners. The system will include procurement of three types of bus rolling stock. Information, ticketing and communications systems are a key component of the BRT where there is potential for provision of U.S. software and hardware. Opportunities could also exist for U.S. firms indirectly in the role of vendors to the winning concessionaire and its prime contractors. Competition from European suppliers for these opportunities will be strong.

Project Contacts

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USTDA Projects

Puebla ITS Technologies Feasibility Study

USTDA has financed a feasibility study to evaluate the BRT system in Puebla as well as the identification of new ITS technologies that are likely to improve the BRT's operational efficiency, safety, and security. Some of the technologies evaluated included Computer Aided Dispatch Systems (CAD), Automatic Vehicle Location (AVL) Systems, Advanced Communication Systems (ACS) for BRT, Safety and Security systems (BRT), Integrated Fare Collection Systems, Passenger Information Systems, Automatic Passenger Counter Systems, Radio Communication Systems, Fleet Management and Maintenance Systems, Transit Signal Priority (TSP) Systems, Traffic Control Systems, on-board technologies such as on-board passenger displays, Automatic Voice Annunciation Systems (AVAS), on-board Video Monitoring (OVM), silent alarms, Mobile Data Computers (MDCs), built-in Mobile Data, Terminals (MDTs), Global Positioning Systems (GPS), Command and Control Centers for BRT operations and other ITS technologies related to BRT systems. This feasibility study has been completed and the public version of the Feasibility Study report will be available through USTDA's online library in the fourth quarter of 2014: <http://www.ustda.gov/library>

Contacts

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