A GLOBAL BRIDGE NETWORK

SYSTRA has been a world leader in the field of transportation infrastructure for 60 years. Bridges are a major product line and a cornerstone of our technical excellence in providing safe, efficient, and economical solutions.

International Bridge Technologies joined SYSTRA in 2017. The two companies have combined their complementary technical expertise to offer specialized engineering services in all facets of bridge design, construction, and maintenance.

SYSTRA’s Global Bridge Network consists of over 350 bridge specialists deployed worldwide, with Bridge Design Centers located in San Diego, Montreal, São Paulo, Paris, Dubai, New Delhi, and Seoul.
SERVICES

- Tender Preparation
- Conceptual Design
- Pre-Bid Engineering
- Proposal Preparation
- Specifications Preparation
- Bids Analysis
- Estimating
- Independent Checking
- Detailed Design (Preliminary & Final)
- Demolition Design Analysis
- Load Ratings
- Special Analyses
  - Dynamic Analyses
  - Wind Analyses
  - Site-Specific Seismic Studies
  - Seismic Analyses
  - Passenger Comfort Analyses
  - Rail-Structure Interaction
  - Environmental Impacts Evaluation
  - Interface Management
- Geotech/Foundation
  - Recommendations for Investigation
  - Results Interpretation
  - Foundation Design

- BIM / BrIM
- Complex Drafting & Specialized Detailing
- Realistic Graphics
  - 3D Renderings
  - Visual Animation
  - Construction Sequence Animation
- Technical Assistance During Construction
- Construction Supervision
- Construction Engineering
  - Integrated Shop Drawings
  - Conflict Identification and Resolution
  - Construction Planning / Scheduling
  - Step-by-Step Construction Analyses
  - Camber Computations
  - Geometry Control Systems
  - Temporary Works Design
  - Construction Manuals
  - Prefabrication Plant Design
- Assessment / Repair
  - Structural Assessment
  - Maintenance Manual Preparation
  - Condition Evaluation and Inspection
  - Design of Repair Works
  - Rehabilitation
  - Stay-Cable Replacement Design
  - Seismic Retrofit
The Chacao suspension bridge, which connects Chiloé Island with mainland Chile, is the longest suspension bridge in Latin America. It is also the world’s longest double suspension bridge with three pylons. The bridge is located near an active fault, and it is designed to resist severe seismic motion.

Owner: Ministry of Public Works, Chile
Contractor: HDEC - OAS and AAS-Jakobsen-SYSTRA as JV member
Our Role: SYSTRA, along with JV Partner, AAS-Jakobsen, was responsible for the full detailed design of the bridge. SYSTRA led the seismic studies and design, geotechnical engineering, and the design of the steel orthotropic deck, central pylon, suspension cable anchor blocks, and foundations.

Design Build
Main Spans: 1,155 m and 1,055 m (3,789 ft and 3,461 ft)
Total Length: 2,754 m (1.7 mi)
Width: 23.8 m (78 ft)
Construction: In progress

CHACAO BRIDGE
Chacao, Chile
This is a signature bridge that crosses the Santa Catarina River in Monterrey, Mexico. The bridge was delivered on a fast track schedule, and it was designed and built in 23 months. In 2004, the project received the prestigious Grand Award from ACEC, the top award for a bridge project in the United States.

Owner: State of Nuevo León Secretary of Communications and Transport
Contractor: Grupo Garza Ponce and VSL Corporation
General Consultant: Sistemas Óptimos Constructivos, S.A. (SOCSA)
Our Role: Detailed design and construction engineering for the cable-stayed bridge, technical assistance on site
Fast Track
Main Span: 137 m (449 ft)
Total Bridge Length: 304 m (997 ft)
Width: 24 to 33 m (79 to 108 ft) (four traffic lanes, shoulders, and a central walkway)
Construction Completed: 2003
This 1.3 km (0.8 mi) long bridge connects Abu Dhabi to Hodariyat Island. It consists of a 36.3 m (119 ft) wide single cell precast segmental concrete box girder with stiffening struts inside and outside the box. The 55 m (180 ft) long approach spans were built by incremental launching and the cable-stayed main spans were built in balanced cantilever. The approach piers are made of precast segments, and precast shells were used to form the foundation caps.

Owner: Tourism Development & Investment Company
Contractor: Overseas AST / VSL Joint Venture
Our Role: Detailed design and construction engineering
Design-Build: Completed in 27 months

Main Span: 200 m (656 ft)
Total Length: 1.3 km (0.8 mi)
Width: 36 m (118 ft) (six lanes, shoulders, and two walkways)
Construction Completed: 2011
This 2,073 m (6,801 ft) long bridge carries the Trans Canada Highway over the Fraser River. It is the second widest bridge in the world. The 850 m (2,789 ft) long cable-stayed structure includes a 470 m (1,542 ft) main span and 190 m (623 ft) side spans. Each separate roadway is supported by two planes of stay cables and consists of a composite structure of steel edge girders and floor beams with precast concrete deck panels. The approach spans consist of three parallel precast segmental box girders built in balanced cantilever above the water and span-by-span on land.

Owner: Ministry of Transportation, British Columbia, Canada
Design/Build Contractor: Peter Kiewit Sons Co. / Flatiron Constructors
Bridge Design Consultants: T.Y. Lin International / SYSTRA IBT
Our Role: Detailed design, construction engineering
Design-Build
Main Span: 470 m (1,542 ft)
Total Bridge Length: 2.1 km (6,889 ft)
Width: 65 m (213 ft) (2 x 5 lanes, shoulders, and a sidewalk)
Construction Completed: 2012
3rd Panama Canal Crossing

Colón, Panama

The 3rd Panama Canal Crossing is a 3,081 m (10,108 ft) long bridge near the city of Colón, Panama. At 530 m (1,739 ft), the main span will be the longest all-concrete deck in the world. The cable-stayed spans consist of two parallel box girders connected with transverse diaphragms. The deck, which is built using the balanced cantilever method, is supported by two planes of stay cables anchored along its edges.

Owner: Panama Canal Authority
Owner’s Engineer: Louis Berger Group-CCCC Consortium
Contractor: Vinci Construction Grands Projets
Our Role: Redesign and construction engineering for main span, independent checking for approaches
Design-Bid-Build-Value Engineering

Main Span: 530 m (1,738 ft)
Total Length: 3,081 m (10,108 ft)
Width: 20.8 m (68 ft) (approaches)
Construction Completed: 2019
This cable-stayed bridge, which opened in 2017, has the longest all concrete span in India. The bridge provides a bypass around the city of Kota, thereby reducing congestion within the city. The deck, built using the cantilever method, consists of 30.2 m (99 ft) wide, 4.1 m (13.5 ft) deep prestressed concrete box girder segments. Noise barriers were installed on the deck to avoid disturbing river crocodiles.

Owner: National Highway Authority of India
Owner’s Engineer: Louis Berger Group
Contractor: Hyundai E&C and Gammon India
Our Role: Tender design, detailed design of the entire bridge and construction services
Design-Build

Main Span: 350 m (1,148 ft)
Total Length: 1,100 m (3,608 ft)
Width: 30.2 m (99 ft)
Construction Completed: 2017
Bridge Opening: 2018
TIANXINGZHOU BRIDGE

Wuhan, China

When built, this bridge held the world record for the longest railway cable-stayed span. It supports mixed-use roadway and rail traffic. The 17 m (56.7 ft) deep double-deck truss superstructure provides a 455 m (1,492 ft) wide by 20 m (65.6 ft) high navigation channel. The bridge carries six roadway lanes on the upper deck level and four railway tracks on the lower deck level.

Owner: Ministry of Railway, China
Contractor: CRCC (China Railway Construction and Corporation) and MBEC (Major Bridge Engineering Co., Ltd)
Our Role: Independent check of detailed design, geometry control, construction supervision
Design-Build: Completed in 27 months

Main Span: 504 m (1,654 ft)
Total Length: 4,657 m (2.9 mi)
Width: 31.3 m (103 ft) (six roadway lanes on the upper level and four railway tracks on the lower level)
Construction Completed: 2009
LEWIS AND CLARK BRIDGE

The bridge links Kentucky Highway 841 to Indiana Highway 265, creating an alternate route across the Ohio River. It is supported by two planes of stay cables in a semi-fan arrangement anchored along the edges of the deck with arched diamond shape pylons.

Owner: Indiana Finance Authority
Design/Build Contractor: Walsh Construction Group/Vinci Construction Grands Projets JV
Prime Consultant: Jacobs Engineering
Our Role: Bridge design consultant and construction engineering
Design-Build-Operate-Maintain
Main Span: 1,200 ft (365 m)
Total Length: 2,280 ft (695 m)
Width: 124 ft (38 m)
Construction Completed: 2016
This bridge will span the St. Lawrence River from Île-des-Sœurs to Brossard downstream from the existing Champlain Bridge. The 240 m (787 ft) cable-stayed main span crosses the St. Lawrence Seaway.

Developer: Signature on the Saint Lawrence Group
Contractor: Signature on the Saint Lawrence Construction (SNC-Lavalin Major Projects, Dragados Canada and Flatiron Constructors Canada Joint Venture)
Bridge Design Consultant: TYLIN-SYSTRA IBT-SLI Joint Venture
Our Role: Design of steel approach superstructure, independent check of cable-stayed main span
Design-Build
Total Bridge Length: 3335 m (10,942 ft)
Approach Spans: 80.4 m (263 ft) Typical, 110 m (360 ft) Maximum
Width: 50.255 m (164 ft) wide deck allows for 8 lanes of traffic, 2 lanes of a transit corridor, and a multiple-use-path.
Construction Completed: 2019

CHAMPLAIN BRIDGE CORRIDOR PROJECT
Montreal, Quebec, Canada
This bridge connects the municipalities of Pitt Meadows and Port Coquitlam. The 380 m (1,250 ft) long main bridge, which consists of a steel-concrete composite deck supported by three planes of stays in a “harp” arrangement. The project was delivered over a three-year design and construction period.

Owner: Ministry of Transportation, B.C. Canada
Design/Build Contractor: Kiewit Corp.
Prime Consultants: ND LEA Inc., Associated Engineering

Our Role: Detailed design and construction engineering for the main bridge, technical assistance on site

Design Build
Main Span: 190 m (623 ft)
Total Bridge Length: 380 m (1,250 ft)
Width: 40-48 m (131-158 ft) (seven traffic lanes, bikepath, shoulders, provision for eighth traffic lane)
Construction Completed: 2009

PITT RIVER BRIDGE
Vancouver, British Columbia, Canada
ELEANOR SCHONELL BRIDGE

This bridge across Brisbane River in Australia connects Dutton Park to the University of Queensland campus. This project received the 2008 Golden State Award, ACEC’s highest honor for projects engineered in the State of California.

- **Owner:** Brisbane City Council
- **Contractor:** John Holland
- **Prime Consultant:** GHD
- **Our Role:** Detailed design and construction engineering for the cable-stayed bridge, technical assistance on site

**Design-Build**

- **Main Span:** 184.4 m (604 ft)
- **Total Bridge Length:** 391.4 m (1,284 ft)
- **Width:** 19.4 m (63 ft) (two traffic lanes, two sidewalks with canopies for pedestrians and bicycles)

**Construction Completed:** 2006
COAST MERIDIAN OVERPASS

This bridge provides a critical transportation link between the north and south of Port Coquitlam, British Columbia. It includes a new structure over the Canada Pacific Railway yard and the Lougheed Highway. In order to maintain operations for one of the busiest railroad yards in the world, the entire bridge was push-launched from the south abutment. The 125 m (410 ft) maximum span was one of the longest ever to be launched in North America.

Owner: City of Port Coquitlam, B.C., Canada
Design/Build Contractor: SNC-Lavalin
Our Role: Detailed design and construction engineering
Design-Build
Maximum Span: 125 m (410 ft)
Total Length: 580.3 m (1,903 ft)
Width: 23.8 m (78 ft) (four traffic lanes, shoulders, two bicycle paths, and a sidewalk)
Construction Completed: 2010
GOLDEN HORN BRIDGE

The Golden Horn Bridge allows the Istanbul Metro to cross the Golden Horn River. It carries two tracks and two pedestrian walkways. It includes access viaducts made from prestressed concrete, a cable-stayed bridge made entirely from steel (piles, pile caps, piers, deck, pylons), and a steel swing span for navigational purposes. A station is located on the main 180 m (591 ft) span.

Owner: Istanbul Metro Company
Developer: Hakan Kiran
Contractors: Astaldi SpA-Gülermak JSC
Our Role: Conceptual and basic design, tender preparation
Main Span: 180 m (591 ft)
Total Length: 917 m (3,009 ft)
Width: 36 m maximum (118 ft)
Construction Completed: 2016

Istanbul, Turkey
CHARLES W. CULLEN BRIDGE  Rehoboth Beach, Delaware, USA

This cable-stayed bridge carries the SR1 Coastal Highway across the Indian River Inlet in Delaware. The superstructure consists of all concrete edge girders, floor beams, and deck slab.

Owner: State of Delaware Department of Transportation
Design/Build Contractor: Skanska USA
Prime Consultant: AECOM
Our Role: Subconsultant for cable-stayed spans, concept design, and detailed design in association with AECOM

Design-Build
Main Span: 950 ft (289 m)
Total Bridge Length: 2,600 ft (792 m)
Width: 106 ft (32 m) (four traffic lanes, shoulders, and a sidewalk)
Construction Completed: 2011
This is a signature structure on the long awaited roadway between Montreal and Laval in Quebec, Canada. The Olivier-Charbonneau Bridge Completion Project is a 7.2 km (4.5 mi) long toll road between Boulevard Henri Bourassa in Montreal and Highway 440 in Laval. The 1.2 km (0.75 mi) main bridge consists of a plate girder approach with continuous spans up to 96 m (315 ft) and a 512 m (1,678 ft) long cable-stayed structure with a 280 m (918 ft) long main span. The 36 m (118 ft) wide bridge superstructure consists of a steel-concrete composite deck supported by two planes of stay cables in a fan arrangement along the edges.

Owner: Le Ministère des Transports du Québec
Design/Build Contractor: Kiewit - Parsons JV
Prime Consultant: Parsons
Our Role: Conceptual design, detailed design, and construction engineering for the main bridge

Design-Build
Main Span: 1.2 km (0.75 mi)
Total Length: 280 m (918 ft)
Width: 36 m (118 ft)
Construction Completed: 2010
This cable-stayed bridge for the Mumbai Metro Line-1 (VAG Corridor) includes laterally inclined pylons and a U-shaped concrete deck girder. The main span was built in cantilever with form travelers.

Owner: Mumbai Metro
Contractor: SEW
Our Role: Concept design, basic design and detailed design
Main Span: 86 m (282 ft)
Total Length: 178 m (584 ft)
Construction Completed: 2013
PRECAST/SEGMENTAL BRIDGES

VIADUCTO K61, Xalapa, Mexico
HUNTS BAY BRIDGE, Kingston, Jamaica
PR-181 BRIDGE, San Juan, Puerto Rico
EVERGREEN POINT FLOATING BRIDGE, Seattle, Washington, USA
ELWHA RIVER BRIDGE, Port Angeles, Washington, USA
OTAY RIVER BRIDGE, San Diego, California, USA
DCR ACCESS ROAD BRIDGE, Randolph, Massachusetts, USA

NELAMANGALA EXPRESSWAY, Bangalore, India
GANGA RIVER BRIDGE, Bakhtiyarpur, State of Bihar, India
SHEIKH JABER CAUSEWAY MAIN LINK, Kuwait City, Kuwait
AL GHOUSE ROAD RA2/264, Kuwait City, Kuwait
SHEIKH JABER CAUSEWAY DOHA LINE, Kuwait City, Kuwait
DOHA NEW ORBITAL HIGHWAY PACKAGE 2, Doha, Qatar
SOUTH ROAD SUPERWAY, Adelaide, Australia
This is an 8,700 ft (2,652 m) long crossing of Lake Washington near Seattle, Washington. It includes both floating and fixed-based bridge components. The unique design consists of a 5,135 ft (1,566 m) long low-rise structure of precast segments supported at a typical 30 ft (9.1 m) spacing. The project received the 2017 ACEC Grand Conceptor Award – the highest honor for an engineering project in the United States.

Owner: Washington State Department of Transportation  
Design/Build Contractor: Kiewit-General-Manson JV  
Prime Consultant: KPFF Consulting Engineers  
Our Role: Conceptual design, detailed design, and construction engineering  
Design-Build  
Total Bridge Length: 5,135 ft (1,566 m)  
Width: 113 ft (34.5 m) (six traffic lanes, shoulders, pedestrian walkway)  
Construction Completed: 2017
SHEIKH JABER AL-AHMAD AL-SABAH CAUSEWAY
Kuwait City, Kuwait

The total length of this bridge is 48.5 km (30.1 mi) including Main and Doha links. The Main link project includes an access bridge, off-shore bridge, reclamation island and a cable-stayed bridge to allow for a larger navigation channel. The construction started in 2013 and the inauguration is planned for 2019. This sea link will be the world’s longest at the time of inauguration. SYSTRA is responsible for the full design and all activities from the tender to detailed design stages. 

Owner: Public Authority for Roads and Transportation (PART), Kuwait
Design-Build
Main Link:
Contractor: Hyundai E&C and CGCC
Our Role: Conceptual design, full detailed design
Total Bridge Length: 36 km (22 mi)
Typical precast span: 60 m (197 ft)
Width: Two decks of 17 m (56 ft) each

Doha Link:
Our Role: Independent check
Total Bridge Length: 12 km (7.5 mi)
Construction Completed: 2019
This high-level valley crossing is part of a toll road connection between State Route 54 south of San Diego, California and State Route 905 near the Mexican border. It was designed in accordance with Caltrans’s rigorous standards for state-of-the-art bridges in high seismic zones. The twin side-by-side precast segmental box girders were built in balanced cantilever from the top using a single side-shifting overhead gantry.

**Owners:** South Bay Expressway and Caltrans  
**Design/Build Contractor:** Otay River Constructors (Washington Group and Fluor Joint Venture)  
**Prime Consultant:** Washington Infrastructure Services  
**Our Role:** Detailed design and construction engineering, technical assistance on site  
**Design-Build**  
**Typical Span:** 90.5 m (297 ft)  
**Total Length:** 1,012 m (3,320 ft)  
**Width:** 23.1 m (75 ft)  
**Construction Completed:** 2007
UNIQUE BRIDGE TYPES

**FOOT BRIDGES**
- EL LIMÓN BRIDGE, Costa Verde, Nicaragua
- CHOLOMA CHICO BRIDGE, Choluteca Chico, Bolivia

**INCREMENTAL LAUNCHING**
- COAST MERIDIAN OVERPASS, Vancouver, B.C., Canada
- CHALLOMA CHICO BRIDGE, Challoma Chico, Bolivia

**EXTRADOSED BRIDGES**
- India
- Vietnam
- South Korea
- Taiwan

**ARCH & TRUSS BRIDGES**
- LIZ BRIDGE, Toulouse-Montpellier HSL, France
- VÉSICULE BRIDGE, Nîmes-Montpellier HSL, France
- DODAM BRIDGE, Daegu, South Korea
- MOAM BRIDGE, Seoul-Busan HSL, South Korea
- MOAM TRUSSES, Seoul-Busan HSL, South Korea
- TAIWAN TRUSSES, Taiwan HSL, Taiwan

**ST. CROIX CROSSING**
- Oak Park Heights, Minnesota, USA

**2ND RING ROAD**
- Hanoi, Vietnam

**DIEN BIEN PHU BRIDGE**
- Ho Chi Minh City, Vietnam

**GYEONG AN BRIDGE**
- Gyeong An, South Korea

**MOOLCHAND BRIDGE**
- New Delhi, India

**SECOND VIVEKANANDA BRIDGE**
- Kolkata, India

**VIDOURLE BRIDGE**
- Nîmes-Montpellier HSL, France

**LEZ BRIDGE**
- Nîmes-Montpellier HSL, France

**DODAM BRIDGE**
- Dodam, South Korea

**MOAM BRIDGE**
- Seoul-Busan HSL, South Korea

**MOAM TRUSSES**
- Seoul-Busan HSL, South Korea

**TAINAN TRUSSES**
- Taiwan HSL, Taiwan
SECOND VIVEKANANDA BRIDGE
Kolkata, India

Designed to replace the existing Vivekananda Bridge spanning the Hooghly River in Kolkata, this bridge forms part of a toll highway with six lanes of traffic. The structure is a multiple-span extradosed bridge with a central plane of stay cables.

Owner: National Highways Authority of India
Developer: Second Vivekananda Bridge Tollway Company
Design/Build Contractor: Larsen & Toubro
General Consultant: Consulting Engineering Services and Parsons Brinckerhoff Asia

Our Role: Preliminary design for approach spans and main bridge, detailed design for main bridge superstructure, construction engineering for main bridge

Design-Build-Operate-Maintain

Main Span: 110 m (360 ft)
Total Length: 880 m (2,887 ft) (main bridge)
Width: 29 m (95 ft)
Construction Completed: 2007
GYEONG AN BRIDGE

This signature bridge is part of the Seongnam-Janghowon highway in South Korea. The 30 m (98 ft) wide extradosed structure supports six lanes of traffic over the Gyeong An River. The extradosed concrete box girder main bridge includes a 130 m (427 ft) main span and has a total length of 270 m (886 ft).

Owner: Ministry of Land, Infrastructure and Transport
Design/Build Contractor: Hyundai E&C
Our Role: Tender design (concept and basic design) for the entire bridge and detailed design for the main bridge superstructure

Main Span: 130 m (427 ft)
Total Length: 270 m (886 ft)
Width: 30 m (98 ft)
Construction Completed: 2013

MOOLCHAND BRIDGE

This bridge, located on the Delhi Metro Violet Line, crosses a busy roadway and highway. The structure is an extradosed bridge with a central plane of stay-cables. The deck is a precast segmental concrete box girder built in balanced cantilever.

Owner: Delhi Metro Rail Corporation (DMRC)
Design: SYSTRA
Contractor: Gammon India
Our Role: Conceptual design, preliminary design, detailed design and technical site assistance, geometry control

Main Span: 65.5 m (215 ft)
Total Length: 167.5 m (550 ft)
Width: 9.36 m (31 ft)
Construction Completed: 2010
This project is a double-track railway bridge on the Dodam-Yeongcheon line and crosses the Nama Han River over a length of 480 m (1,575 ft). The structure of this bridge is a combination of steel truss and arch bridges with a maximum span length of 120 m (394 ft).

Owner: Korea Railway Network Authority
Design/Build Contractor: Hyundai E&C
Our Role: Responsible for the tender design and detailed design
Design-Build

Main Span: 120 m (394 ft)
Total Length: 480 m (1,575 ft)
Construction Completed: 2017
The Lez bridge is located on the high-speed railway line between Nîmes and Montpellier in southern France. It is a steel box girder bowstring arch with a 90 m (295 ft) span and a 17.5 m (57.4 ft) rise. This bridge carries the first railway line in France to support both high-speed and heavy freight trains. For aesthetic reasons, the hangers are oriented radially rather than vertically.

Owner: Oc’via-Bouygues
Contractor: Oc’via-Bouygues
Our Role: Independent check
Design-Build
Span: 90 m (295 ft)
Construction Completed: 2018
VIDOURLE VIADUCT

The Vidourle Viaduct is a composite steel-concrete bridge with steel trusses above the River Vidourle. It carries two tracks, and the design allows for the use of both high-speed rail passenger and heavy freight trains with a maximum speed of 350 km/hr (210 mph).

Owner: Oc’via-Bouygues
Contractor: Oc’via-Bouygues
Our Role: Concept, basic design, independent check of the detailed design
Design-Build
Span: 90 m (295 ft)
Construction Completed: 2018

MOAM BRIDGE

This bridge is a composite steel-concrete boxstring arch. When completed, it was the world record span for high-speed rail bridge. It was erected in one piece parallel to the roadway then rotated into its final position.

Owner: Korea Railway Network Authority
Client: DAEWOO E&C
Our Role: Detailed design variant for Daewoo and assistance during construction
Span: 125 m (410 ft)
Width: 14 m (46 ft)
Construction Completed: 2003
The Green Line and Red Line of the Dubai Metro include 58.7 km (36.5 mi) of elevated guideway, mainly consisting of a U-shape precast segmental superstructure. The project won the French Engineering Award, the nation’s highest honor for an engineering project.

Owner: RTA  
Contractor: Obayashi-Kajima-Yapi Merkezi JV  
Our Role: Concept, basic design, checking of detailed design, construction supervision  
Length: 58.7 km (36.5 mi)  
Construction Completed: 2010
This 5 miles (8 km) stretch of light rail elevated guideway extends from Boeing Field, at the southern outskirts of the city of Seattle, to the Seattle-Tacoma Airport. The project includes 4 miles (6.4 km) of elevated guideway carrying twin tracks. A unique X-shaped cross section was developed for the typical precast segmental superstructure built span-by-span. The long-span structures with spans ranging from 220 ft (67 m) to 350 ft (107 m) were built in balanced-cantilever using the same gantry used to erect the typical spans.

**Owner:** Central Puget Sound Regional Transit Authority

**Prime Consultant:** Hatch Mott MacDonald

**Contractor:** PCL

**Our Role:** Detailed guideway design, construction supervision

**Design-Bid-Build**

**Main Span:** 350 ft (maximum), 130 ft (36.6 m) typical

**Total Bridge Length:** 4 mi (6.4 km)

**Width:** 26.5 ft (8.1 m)

**Construction Completed:** 2008
The Riyadh Metro is a rapid transit system under construction in Riyadh, Saudi Arabia, which includes six lines with a total length of approximately 180 km (112 mi). It is scheduled to open in 2019. Lines 1 and 2 contain 20 km of prestressed segmental viaduct consisting of simple spans, balanced cantilever bridges, and station viaducts. Line 3 comprises 26.4 km (16.4 mi) of segmental box girder viaduct with 37 m (122 ft) typical spans, 50 m (164 ft) continuous spans, and special structures with spans varying from 60 m to 96 m (197 ft to 312 ft). Typical and continuous spans are erected with an overhead truss, and long spans are erected in balanced cantilever.

**Owner:** Arriyadh Development Authority  
**Lines 1 and 2:**  
**Contractor:** Bechtel, Almabani, CCC, Siemens  
**Lead Consultant:** AECOM  
**Our Role:** Cat 3 check of foundations, substructure and superstructure  
**Construction Completed:** 2019

**Line 3:**  
**Contractor:** Impregilo, Larsen & Toubro, Nesma & Partners, Ansaldo, Bombardier  
**Lead Consultant:** Idom  
**Our Role:** Detailed design of bridges, construction engineering, and site support to contractor  
**Construction Completed:** 2019
This critical link transports pilgrims between holy locations during the Hajj. When built, this system provided the greatest passenger capacity of any line in the world. It comprises a 17 km (10.6 mi) precast concrete guideway. The typical deck consists of twin precast single-train U-tubes. The line includes nine 300 m (984 ft) long stations. The entire project was design and built within a 17-month period. This project received the FIDIC Centenary Award, the organization’s highest honor.

**Owner:** MASHAAER  
**Contractor:** CRCC  
**Our Role:** Concept, basic design, detailed design, construction supervision  
**Length:** 17 km (10.6 mi)  
**Construction Completed:** 2010
GREATER JAKARTA LRT

Jakarta, Indonesia

This project includes six corridors totaling 83 km (52 mi). Each span is composed of twin single-track U-girders. Typical simple spans are utilized for span lengths up to 30 m (98 ft). Extended pier caps connected by typical 30 m spans allowing up to 45 m crossing. The longest 27 long spans, with lengths between 45 m and 120 m (148 ft and 394 ft), are constructed using balanced cantilever box girders.

Owner: Ministry of Transport Indonesia: Directorate General of Railways (DGR)
General of Railways (DGR)
Contractor: PT ADHI KARYA (Persero) TBK
Lead Consultant: PT Adhi Karya
Our Role: Concept and detailed design of viaduct deck and pier caps, special bridge deck and substructures

Design-Build
Total Bridge Length: 42 km (26 mi)
Long Span: Three continuous span (main span: 75 m (246 ft), 90 m (295 ft), 120 m (394 ft) U-box and box girder type
Width: 12.1 m (39.7 ft)
Construction: In progress
The HCMC Urban Railway is a rapid transit system under construction in Ho Chi Minh City, Vietnam. It is scheduled to open in 2021. The alignment consists of a 2.6 km (1.6 mi) underground section and 17.1 km (10.6 mi) of elevated metro. The line includes three underground stations, eleven elevated stations, five special bridges, two substations, and one depot. The viaducts are precast segmental U-girders with a typical span length of 35 m (115 ft). The typical spans were erected with a launching gantry.

Owner: People’s Committee of Ho Chi Minh City
City: Management Authority for Urban Railways
Contractor: Sumitomo-Cienco6 Consortium
Our Role: Designer for technical design of contract package 2 - elevated structure and depot (viaduct, bridges, elevated stations, buildings inside the depot)

Design-Build
Total Bridge Length: 17.1 km (10.6 mi)
Typical precast U-girder span: 35 m (115 ft)
Long Span: Three span continuous (main span 70 m (230 ft), 102.5 m (336 ft), 105 m (344 ft), 110 m (361 ft)) box girder, four span continuous (main span 70 m (230 ft)) extradosed bridge
Width: 11.1 m (36.4 ft)
Construction Completed: 2021
DMRC LINE 6 EXTENSION BADARPUR

FARIDABAD CORRIDOR

New Delhi NCR, India

This extension of the Delhi Metro includes 13.8 km (8.55 mi) of elevated viaduct and nine stations. Twin precast single-track U-girders comprise each span. Typical 27 m (88.58 ft) spans were erected with a launching gantry or a mobile crane. Extended pier caps were utilized together with typical spans to achieve span lengths of up to 36.5 m (120 ft).

Owner: Delhi Metro Rail Corporation Limited
Contractor: Larsen & Toubro

Our Role: Tender and detailed design of viaduct structures, station structures, architecture and MEP services

Total Corridor Length: 13.765 km (8.55 mi)
Station No. & Length: Nine elevated stations, each 140 m (459 ft)
Typical Precast Span: 27 m (88.58 ft)
Width: Two decks of 10.15 m (33.30 ft)
Construction Completed: 2018
The automatic metro line (LRT) connecting Busan and Gimhae via Busan airport is being constructed under the Korean Act governing private public partnerships in infrastructure projects. The 23 km (14.3 mi) long line is entirely built as a composite viaduct and includes 18 stations and one depot. It is operated with 28 m long driverless trainsets.

HDC, POSCO and SYSTRA:
Design of the viaduct superstructures (23 km) and review of the design (substructure and stations) produced by our Korean subconsultant Dong Il, management of the interfaces between civil engineering and systems, assistance with testing and commissioning.

Total Corridor Length: 23 km (14.3 mi)
Station: 18 elevated stations,
Typical spans: 37.5 m (123 ft) to 50 m (164 ft)
Width: 8.9 m (29 ft)
Construction Completed: 2011
SYSTRA has developed its own solution to tackle the challenges of BIM applied to bridge and linear infrastructure. Our in-house tool allows us to develop and manage a consolidated model to address the requirement of different BIM use cases. From feasibility studies to final operation, our models can assist the contractor in consolidating design and ensuring constructability (asset management, compliance with British Standards, etc.).

INNOVATION: UHPC (ULTRA HIGH PERFORMANCE FIBER REINFORCED CONCRETE)

For 25 years, SYSTRA has developed and designed U-Girder bridges throughout the world. Today, we are developing a new concept using UHPC.

TRANSPARENCY

- 45 m spans
- Neat, adaptable design to blend into every context (concrete colors, open patterns)

PRECAST CONSTRUCTION

- Constructability validation through precastor partnership
- Two prototypes built in 2015 for design validation
- Optimized to reduce construction time

LIGHT, SUSTAINABLE STRUCTURE

- Better durability and less maintenance thanks to UHPC higher compactness
- Reduced deck weight: 35% lighter than conventional box-girder solution
- Foundation loads: 15% lighter