



Infrastructure products



Project References – USA



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mageba supports the following organizations:





George Washington Bridge (NY/NJ)

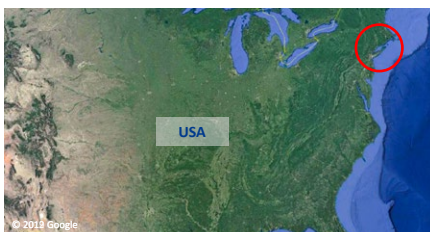


Project description

The George Washington Bridge is a double-decked suspension bridge that connects the New York City borough of Manhattan with New Jersey across the Hudson River. Named after the first president of the United States, the bridge is believed to be the world's busiest motor vehicle bridge, carrying over 103 million vehicles in 2016 – over 280,000 vehicles per day, and over twice as many axle loads, each impacting on the expansion joints that facilitate the superstructure's movements.

After 89 years in service, it is planned to do a full replacement of the existing sliding finger expansion joints and substructures, as originally designed by the renown Civil Engineer Othmar Hermann Ammann.

The George Washington Bridge connects Manhattan with New Jersey across the Hudson River

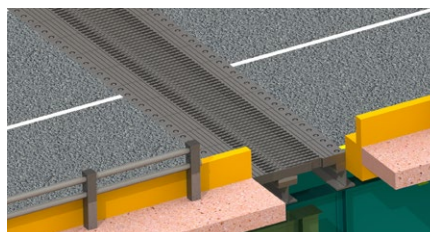


mageba scope

mageba is supplying a total of eight sliding finger joints ranging in longitudinal movements from 18 to 52 inches. The heaviest joint weighs 156,000 pounds (71 tons) once fully assembled. mageba is fabricating the finger plates, as well as the substructures that attach the finger joints to the bridge. The joint substructures are 3 sets of dams (W beams) that connect to the bridge floor beams. The finger plates connect to the outer dams with long bolts through a series of fill plates that provide the required height for assembly. The center dam, is not physically connected to the finger plates, allowing the finger plates to slide over the top stainless steel surface.

The finger plates and substructures will be fully assembled in the shop in lengths of up to 2 bridge lanes, and delivered to site ready to be attached to the bridge, allowing a quick bridge installation during the staging work.

Simulation of a fully installed finger joint on site



Highlights & Facts

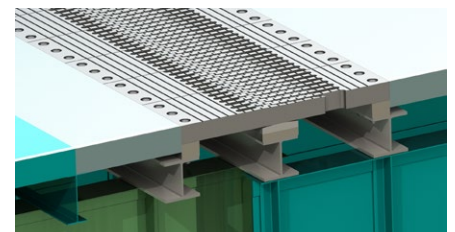
mageba Products:

Type:	TENSA® FINGER GF finger joints
Feature:	Movement of 18 to 52 in (457 to 1,320 mm)
Installation:	2021

Structure:

City:	New York & New Jersey
Country:	United States
Type:	Suspension bridge
Main span:	3,500 ft. (1,067 m)
Length:	4,760 ft. (1,451 m)
Completion:	2021
Owner:	Port Authority of New York & New Jersey
Contractor:	El Sol Contracting & GCOM Construction JV
Engineer:	Modjeski & Masters Engineering

Close-up render of the finger expansion joint





North Washington Street Bridge (MA)



Project description

The new North Washington Bridge in Boston, MA will replace the existing bridge which has served northern Boston for over 100 years. Construction of the new bridge started in 2018 and will continue through till spring 2023. Once complete, the new bridge with an arch main span will feature a dedicated bus lane and bicycle track and sidewalk in each direction. The new structure will also improve water flow and conditions for boaters by reducing the number of piers in water from 12 to 5. The total estimated cost of the bridge is about \$177 million.

mageba scope

mageba's scope on this project included design and supply of 48 disc bearings of fixed and guided type. The range of bearings includes vertical loads from 580 kips up to 2,270 kips. All bearings feature beveled sole plates, sloped in both longitudinal & transverse directions. To support the construction process, some of the guided & fixed bearings were also equipped with temporary locking & temporary sliding systems respectively.

To ensure long service life of bearings and to minimize maintenance, the upper and lower bearings, sole plates, and masonry plates were hot dip galvanized, while the sliding plates (with welded stainless-steel sheets) were zinc spray metalized.

All bearings were manufactured and delivered in January 2021.

Highlights & Facts

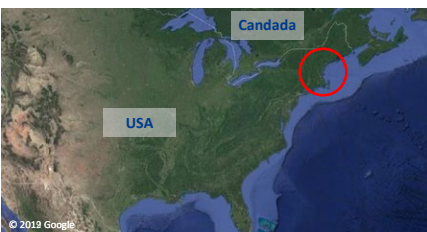
mageba Products:

Type: RESTON®DISC bearings
Feature: Loads up to 2,270 kips (10,100 kN)
Installation: 2021

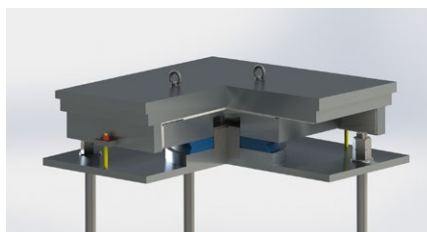
Structure:

City: Boston, MA
Country: USA
Type: Arch Bridge
Main span: 190 ft (57 m)
Length: 1,089 ft (332 m)
Completion: 2021
Owner: City of Boston
Contractor: J.F. White Contracting
Engineer: MassDOT

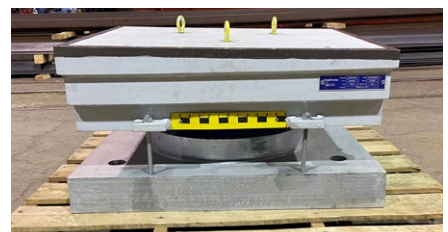
The Washington Street Bridge is located in northern Boston



3D render view of a guided disc bearing



Assembled disc bearing in factory, showing its movement scale





Corpus Christi Harbor Bridge (Texas)



Project description

This project involves the replacement of the current US 181 Harbor Bridge in Corpus Christi, Texas, along with a change in the alignment to interchange between US 181 and Interstate 37. The current bridge does not provide enough clearance for ocean-bound ships travelling to and from the Port of Corpus Christi.

The proposed improvements both to US 181/SH 286 and Harbor Bridge will address structural deficiencies and navigational restrictions of the current bridge, and improve safety, connectivity, and level of service.

The new Harbor Bridge accommodates larger ships and will be the longest cable-stayed bridge in the U.S. and Canada when completed. The old bridge was demolished, making way for the new, six-lane bridge (3 lanes in each direction, as well as a bike/pedestrian path).

mageba scope

mageba is supplying 12 RESTON®DISC bearings for the main span and 156 RESTON®DISC bearings for the south approach bridge. In addition, 8 TENSA®MODULAR LR8 (mov. capacity 24" (609 mm)) and 10 TENSA®FINGER RSFD finger joints (mov. capacity 10" to 12" (254–305 mm)) will be also supplied.

To ensure 50 year service life, all disc bearings were equipped with high grade ROBO®SLIDE sliding material.

The TENSA MODULAR joints being supplied on this project have been extensively tested in accordance with the AASHTO fatigue testing requirements. Such rigorous testing gave mageba the confidence to issue the 50-year warranty required by the owner for these joints.

The installed finger joints' design allows the easy replacement of any portion of the joint in case of any damage or if parts have to be removed for inspections and maintenance.

Highlights & Facts

mageba Products:

Type: TENSA®MODULAR LR8 modular joints
TENSA®FINGER RSFD finger joints
RESTON®DISC free and guided disc bearings

Installation: 2019–2021

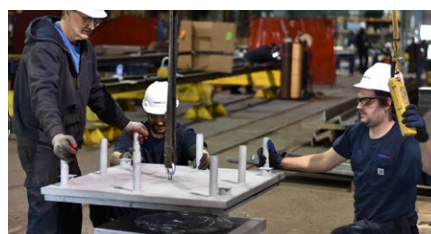
Structure:

City: Corpus Christi, TX
Country: United States
Main span: 1,661 ft. (506 m)
Length: 5,818 ft. (1,773 m)
Completion: 2021
Owner: Texas Department of Transportation
Contractor: Flatiron/Dragados LLC

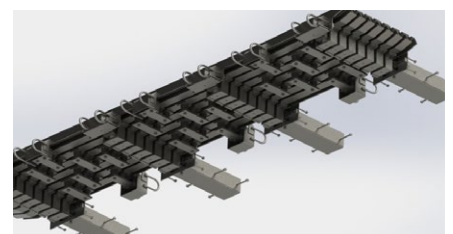
The US 181 connects Corpus Christi and Portland in Texas



A free sliding bearing is being assembled



A 3D isometric image of the installed TENSA®MODULAR LR8 expansion joints





Delaware Memorial Bridge (Delaware)



Project description

The Delaware Memorial Bridges is a twin suspension bridge crossing the Delaware River. The toll bridges carry Interstate 295 and U.S. Route 40 between Delaware and New Jersey.

It is one of only two crossings of the Delaware River with both U.S. Highway and Interstate Highway designations, the other being the Benjamin Franklin Bridge.

Scope of this project was to replace the existing pin & links, with modern uplift spherical bearings which offer lower friction as well as a robust uplift restraint.

mageba scope

In 2019 mageba supplied 16 RESTON® SPHERICAL bearings, designed to resist frequent service limit state uplift loads of up to 302 kips (1,344 kN).

All bearings are equipped with structural health monitoring, comprising of embedded pressure sensors, tiltmeter, displacement sensor and proximity sensors, that measure the load, rotation, movement and wear of sliding material respectively. The monitoring system is accessible 24/7 by the owner, through a user friendly web interface.

A full scale production bearing was tested to 150 % proof tension load, as well as cyclic tension compression loading to simulate the frequent uplift load case.

In November 2020 mageba installed two flexible plug expansion joints to replace some of the aging and damaged strip seal joints on the bridge.

Highlights & Facts

mageba Products:

Type:	RESTON®SPHERICAL bearings with up-lift control TENZA®POLYFLEX Advanced flexible plug expansion joints
Feature:	SHM for bearings
Installation:	2019 / 2020

Structure:

City:	Wilmington, DE
Country:	United States
Type:	Suspension bridge
Span:	2,150 ft. (655 m)
Length:	10,765 ft. (3,281 m)
Owner:	Delaware River and Bay Authority
Contractor:	American Bridge Company
Engineer:	HNTB Corporation

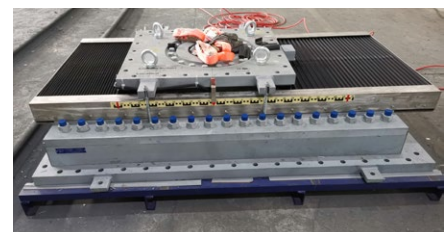
The Delaware Memorial Bridge is located in Wilmington, in the state of Delaware



Installation of the POLYFLEX joint on two lanes at a time allowing traffic to remain flowing



One of the bearings ready for shipping





Queensboro Bridge (New York)



Project description

The Queensboro Bridge, officially named the Ed Koch Queensboro Bridge, is a signature cantilever bridge situated over the East River in New York City, that was completed in 1909.

It connects Long Island City in the borough of Queens with Upper East Side Manhattan, passing over Roosevelt Island.

The replacement of 200,000 ft² (18,580 m²) of roadway deck, which underwent years of overloading, entailed significant challenges, including the selection of a lightweight but durable replacement that will extend the service life of the structure.

mageba scope

mageba was selected to supply a total of 12 TENSA®MODULAR expansion joints, in the LR3, LR6 and LR8 models.

These products allow for a maximum of 9", 18" and 24" (228, 457 and 609 mm) of longitudinal movements respectively, as per the project requisites.

PP-1 and PP-123 Orthotropic Deck Plate Connection Hardware was also provided for the work on the upper roadways of the bridge.

All fabrication was carried out at mageba's AISC-certified production plant in the USA.

Highlights & Facts

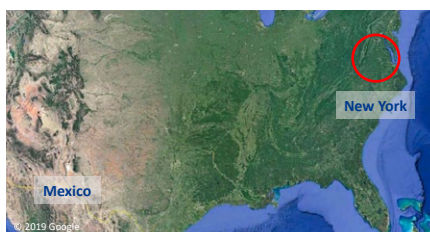
mageba Products:

Type:	TENSA®MODULAR LR3, LR6 and LR8 modular joints
Features:	PP-1 and PP-123 Orthotropic Deck Plates Connection Hardware
Installation:	2019

Structure:

City:	New York, NY
Country:	United States
Type:	Cantilever bridge
Main span:	1,182 ft (360 m)
Length:	3,724 ft (1,135 m)
Owner:	City of New York Department of Transportation Division Bridges
Contractor:	American Bridge

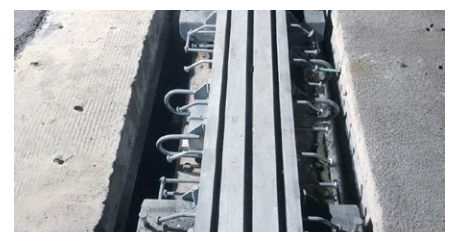
Queensboro Bridge crosses the East River in downtown New York



A TENSA®MODULAR LR joint ready for shipping



TENSA®MODULAR LR 3 joint in it recess





Bill Emerson Memorial Bridge (Missouri)



Project description

The Bill Emerson Memorial Bridge is a cable-stayed bridge connecting Missouri's Route 34 and Route 74 with Illinois Route 146 across the Mississippi River between Cape Girardeau, Missouri and East Cape Girardeau, Illinois.

The project consisted on the rehabilitation the West approach, on the Missouri side of the bridge, by replacing the approach slab, repairing the back wall of the abutment and exchanging the modular expansion joints.

mageba scope

mageba supplied two TENSA®MODULAR LR8 modular expansion joints to replace the existing 15 year old modular joints at the Missouri abutment, for East and West bound traffic.

The rehabilitation project required the new joints to have 8-gaps for a new capacity of 24 inches (609 mm) of longitudinal movement compared to the existing 6-gaps, of only 18" (457 mm) of movement.

In addition, mageba supplied the barrier cover plates at the parapets and provided on-site installation supervision.

Highlights & Facts

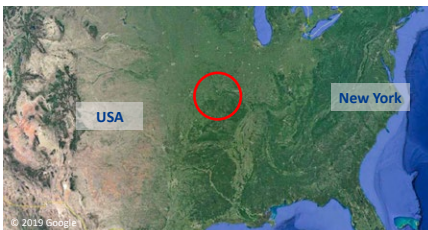
mageba Products:

Type: TENSA®MODULAR LR8 modular expansion joints
Installation: 2019

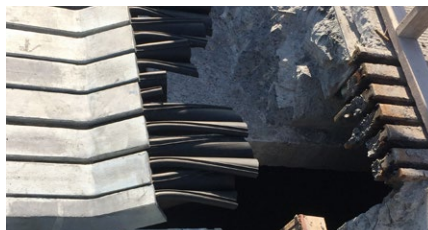
Structure:

City: Cape Girardeau, MO
Country: United States
Type: Cable-Stayed bridge
Main span: 1,150 ft (350 m)
Length: 4,000 ft (1,219 m)
Completion: 2003
Owner: MoDOT
Contractor: Phillips Hardy
Engineer: HNTB

The Bill Emerson Memorial Bridge crosses the Mississippi River and connects Missouri with Illinois



New mageba expansion joint next to existing joint to be replaced



Modular joint installation





US-35 deck Replacement (Indiana)



Project description

The US-35 Deck Replacement in La Porte, Indiana was a project that intended to transform the outer shoulders of the bridge into new traffic lanes.

The project also covered replacing old shoulders converted to accommodate traffic, with new ones.

mageba scope

mageba provided two 72 ft. (21.95 m) TENSA®MODULAR LR3 modular expansion joints for the project, to be used for free movement in all directions featuring barrier cover plates.

However, welding was avoided in all highly stressed connections to accentuate the durability of the expansion joint.

Each joint was installed in two sections as traffic remained open on the bridge, and mageba utilized a special, fatigue resistant, bolted splice connection design for this application.

All of the joint's well-proven wear resistant parts can be replaced with little effort and without disrupting traffic in the future.

Highlights & Facts

mageba Products:

Type:	TENSA®MODULAR LR3 modular joints
Feature:	Barrier cover plates Bolted splice connection
Installation:	2019

Structure:

City:	La Porte, IN
Country:	United States
Main span:	147 ft (44.8 m)
Length:	1,103 ft (336 m)
Completion:	2019
Owner:	Indiana Department of Transportation
Contractor:	Superior Construction Co., Inc.
Engineer:	Burgess & Niple, Inc.

The bridge repair and road construction took place on US 35 in the town of La Porte, Indiana



TENSA®MODULAR LR3 joint is being installed



One of the installed modular joint under traffic





Tappan Zee Bridge (New York)



Project description

The New Tappan Zee Bridge, also known as the New NY Bridge and officially named the Governor Mario M. Cuomo Bridge after the late former governor Mario Cuomo, is a twin cable-stayed bridge built to replace the original Tappan Zee Bridge over New York's Hudson River. The \$4.0 billion bridge structure, completed in June 2018, contains a total of eight lanes for vehicular traffic as well as a shared-use bicycle and pedestrian path.

Additionally, an allowance has been made for the future construction, between the two structures, of a rail line to assist with trans-Hudson public transportation.

The Tappan Zee Bridge is a critically important transportation link in the New York Metropolitan Area, with over 138,000 vehicles crossing it each day.

mageba scope

mageba North America Corp. supplied all 23 of the TENSA®MODULAR (type LR) expansion joints required for the new Tappan Zee Bridge, in fully continuous lengths, the longest of which is 105 feet (32 meters). The largest joints are type LR18, each with 18 individual movement gaps which accommodate total longitudinal movements of up to 54 inches (1.4 meters).

mageba also supplied 16 RESTON®STU shock transmission units (STU, also known as lock-up devices), with lock-up capacities of 800 kips (3,550 kN) and pressure release valves rated for 1,600 kips (7,100 kN). Each STU weighs 13,500 lbs (6,150 kg), and have been individually tested to ensure that the performance meets the required design criteria.

Highlights & Facts

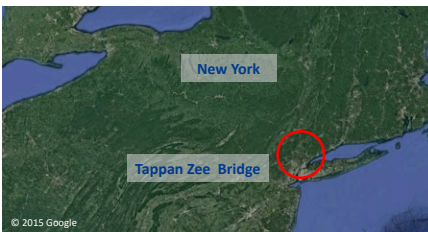
mageba products:

Type:	23 TENSA®MODULAR LR expansion joints
	16 RESTON®STU shock transmission units
Installation:	2015–2018

Structure:

City:	New York
Country:	USA
Type:	Cable stay Bridge
Completed:	2018
Length:	3.0 miles (4,800 m)
Builder:	Fluor Corporation, American Bridge Copany, Granite Construction Northeast & Traylor Bros

The Tappan Zee Bridge is located close to New York City



Installation of a TENSA®MODULAR expansion joint type LR8



Installed shock transmission unit





LaGuardia Pedestrian Bridge (New York)



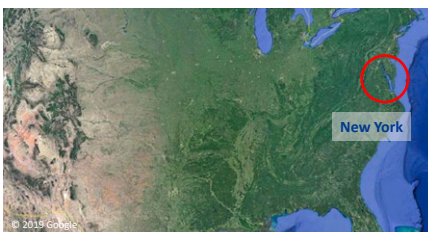
Project description

LaGuardia is a large industrious airport located in the northernmost section of East Elmhurst, Queens in New York City. Open to the public in 1939, LaGuardia Airport is one of the busiest airports in the United States of America.

For the next few years, LaGuardia will be subject to an entire reconstruction. The project will include reorganizing the space and building a new facility 183 m (600 ft) closer to the Grand Central Parkway.

The facility will link the four terminals pushing the airport towards the highway and improving aircraft movements. The new airport will span 2.7 million square feet, with six new concourses and 72 gates. The project's estimated cost is approximately \$8 billion, and it is expected that the facility will reach completion by 2022.

The airport is situated in the New York City borough of Queens



mageba scope

mageba RESTON®DISC bearings are uniquely defined by their Polyether-Urethane (PU) rotational elements.

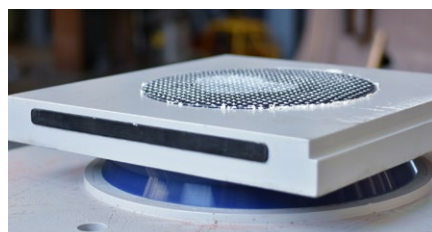
The element's rotational elasticity enables tilting movements around any horizontal axis.

In this project, mageba designed and delivered 4 RESTON®DISC disc bearings for Pedestrian Bridge A of the LaGuardia Airport.

The bearings, equipped with mageba's high grade sliding material ROBO®SLIDE, are of fixed and guided (unidirectional) types, and are capable of withstanding 2,500 kips of vertical load.

The bearings are also designed to accommodate longitudinal movements during the construction period which are then locked (fixed type) with the completion of the construction.

RESTON®DISC bearing fitted with ROBO®SLIDE high grade sliding material



Highlights & Facts

mageba Products:

- Type: RESTON®DISC disc bearings
- Feature: ROBO®SLIDE sliding material
- Installation: 2018

Structure:

- City: New York, NY
- Country: United States
- Type: Airport
- Completion: 2022
- Owner: The Port Authority of New York & New Jersey
- Contractor: Skanska/Walsh Design-Build JV
- Architect: Parsons Brinckerhoff/HOK Design JV

One of the project's RESTON®DISC bearing being load tested per AASHTO LRFD, after fabrication





Atlanta Airport (Georgia)



Project description

Hartsfield–Jackson Atlanta International Airport, also known as Atlanta Airport, is an international airport 7 miles (11 km) south of downtown Atlanta, Georgia. Atlanta has been the world’s busiest airport by passenger traffic since 2000, and by number of landings and take-offs every year since 2005 except 2014.

\$6 billion expansion and makeover project corrected deficiencies of existing airfield pavements and safety areas at the Hartsfield-Jackson Atlanta International Airport.

Full depth of slab replacements of airfield pavements, spall repairs, trench drain repairs, replacement of storm drainage and removal of unused access roads have also been completed.

Hartsfield–Jackson Atlanta International Airport is one of the busiest airport in the USA



mageba scope

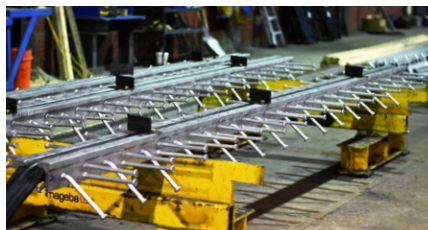
mageba supplied 32 pieces of TENZA®GRIP Type RS-LS-P3 expansion joints which were fabricated at mageba AISC certified facility in Pottstown, PA.

Due to a short delivery period, the sinus plates were fabricated and shipped to the U.S. from our production factory in Shanghai.

mageba was contacted by the consulting engineering firm during the design stage to provide a single gap joint that was able to provide a movement of up to 4” (101 mm), which resulted in mageba RS-LS joint type to be specified on the plans.

The length of joints are 16 ft. (4.9 m) each. Their total length measured 512 ft (156 m). All the installed joints were equipped with noise reducing sinus plates to meet the needs of the client.

One of the TENZA®GRIP expansion joints in the factory



Highlights & Facts

mageba Products:

Type: TENZA®GRIP RS-LS-P3 expansion joints
Installation: 2018

Structure:

City: Atlanta, GA
Country: United States
Built: 2018
Type: Airport
Owner: City of Atlanta
Contractor: Kiewit-Lewis, a Joint Venture

A close view of the sinusoidal plates of an installed joint





Interstate 70 Vail Pass (Colorado)



Project description

Interstate 70 in Colorado connects the capital city of Denver to the western portion of the state, winding its way up and over the peaks of the Rocky Mountains. Near the summit, just east of the world famous ski and snow sport town of Vail, the I-70 crosses Wilder Gulch with a concrete box girder bridge.

Previously equipped with armored strip seal joints that needed replacement every 3-5 years due to heavy traffic and steep grade, Colorado DoT decided to replace the existing joints with POLYFLEX®ADVANCED PU to put it to the test in this harshest of environments.

mageba scope

For this project mageba provided a TENSA®POLYFLEX®ADVANCED PU plug expansion joint with a movement capacity of +/-1.5" (38 mm) and technical assistance for the Colorado DoT maintenance department to install this product.

The joint installation was done one lane at a time to keep traffic moving over the bridge even during construction, something that is not possible with an armored strip seal joint.

The TENSA®POLYFLEX®ADVANCED PU joint is expected to have a lifespan significantly longer than the old expansion joints due to its impermeability to freeze/thaw cycles, road salts, snowplows and the overall durability of the polyurethane material.

Highlights & Facts

mageba products:

Type: TENSA®POLYFLEX® Advanced PU flexible plug expansion joints

Installation: 2018

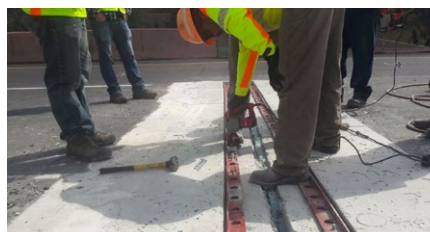
Structure:

City: Vail, CO
Country: USA
Type: Precast box girder bridge
Main span: 160 ft (48.8 m)
Length: 227 ft (69 m)
Owner: Colorado DoT

Location of the bridge in Vail Pass, Colorado, USA



Installation of steel angles into the joint blockout



The completed flexible plug expansion joint high in the Rocky Mountains of Colorado





Interstate 880 Overcrossing (California)



Project description

The Alameda County Transportation Commission in cooperation with the City of Oakland has been implemented operational and safety improvements on Interstate 880 (I-880) at 23rd and 29th Avenues.

The project included the replacement of the freeway overcrossing structures, safety improvements to the northbound on- and off-ramps plus the freeway mainline and installation of sound walls in the northbound direction between 29th and 23rd Avenues.

In addition, local streets were also modified and landscape enhancement works were implemented.

The total cost of the project was around \$113,652,000.

mageba scope

mageba provided two TENSA[®]MODULAR LR3 expansion joints in which each joint was about 90 ft long (27 m). In addition, two TENSA[®]GRIP RS single gap joints (total length 116 ft (35 m)) were in the delivered scope of products.

Along with the joints, mageba also supplied two sliding concrete barrier plates for each of the modular and strip seal joints. All joints were fabricated and delivered in full length, meaning without the need of field splicing the beams on site.

All items were designed and fabricated in accordance with the AASHTO LRFD Bridge Construction Specifications.

The installed modular expansion joints were fatigue tested according to AASHTO's Appendix A19 at Lehigh University.

Highlights & Facts

mageba Products:

Type: TENSA[®]MODULAR LR3 modular joints
TENSA[®]GRIP RS-R3 single gap joints

Features: Sliding plates
Installation: 2018

Structure:

City: Oakland, CA
Country: United States
Completion: 2019
Owner: State of California DOT
Contractor: RGW Construction Inc.

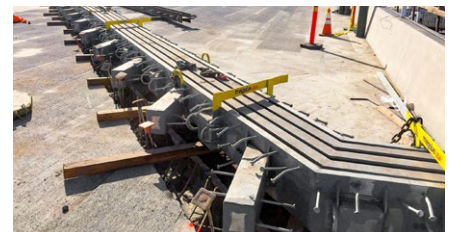
The structure is located in close to Brooklyn Basin Oakland, California



Modular joint after lifting to its final position



The delivered modular joint during installation



Transbay Transit Center (USA)



Project description

The new Transbay Transit Center has replaced the former Transbay Terminal that was built in 1939 in downtown San Francisco. This modern transit hub serves 11 transportation systems and contains more than one million square feet. The highlights are a 5.4 acre (22 000 square meters) rooftop public park, Grade Hall, dramatic Light Column, and stay cable pedestrian bridge. The construction was completed in 2018.

mageba scope

mageba USA worked on different sections of this landmark project. On one side, mageba supplied eight RESTON®PENDULUM Mono bearings with load capacities of 2,500 kips (11,120 kN) and 2,000 kips (8,900 kN) for the terminal superstructure and eight RESTON®SPHERICAL bearings able to withstand blast forces of 171 kips and with 41.5" of max. sliding capacity for the glass roof structure.

On the other side, mageba also supplied two TENSA®MODULAR expansion joints designed with 8 and 11 gaps to accommodate 24 in and 33 in of movement respectively at the bus storage facility ramp.

Highlights & Facts

mageba products:

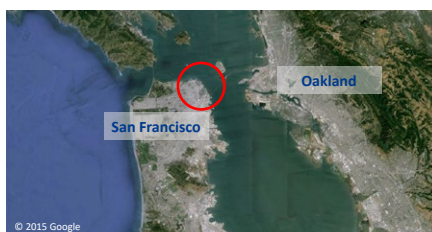
Type: RESTON®PENDULUM Mono bearings
 RESTON®SPHERICAL bearings
 TENSA®MODULAR expansion joints of type LR8 and LR11

Features: Table hysteretic behavior
 Installation: 2016–2018

Structure:

City: San Francisco, CA
 Country: USA
 Type: Transit Center
 Owner: TJPA
 Builder: Shimmick, Greenlite, MCM

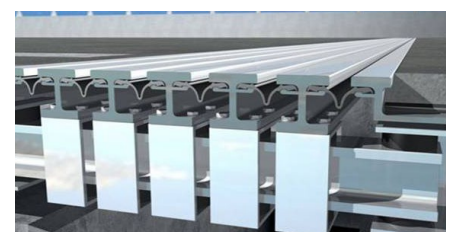
The Transbay Transit Center is located next to the San Francisco – Oakland Bay Bridge



Installation of RESTON®PENDULUM Mono on terminal superstructure



Movements at the Bus storage facility ramp will be facilitated by modular joints





SR 520 West Approach Bridge (USA)



Project description

The Governor Albert D. Rosellini Bridge-Evergreen Point (commonly called the SR 520 Bridge) carries State Route 520 across Lake Washington from Seattle to Medina. The SR 520 Bridge Replacement development has reached its latest construction phase with the West Approach Bridge North Project. Expected to be completed in the summer of 2017, the new West Approach Bridge North will carry westbound cars, buses and trucks from the new floating bridge to the Montlake area.

mageba scope

The pre-stress girder structure will feature wider lane, shoulders and have a 14-foot-wide bicycle/pedestrian shared path on the north side of the bridge. mageba USA is supplying seven TENSA®MODULAR (type LR) expansion joints for the new West Approach Bridge North. The joints range from 6 to 8 gaps that allows up to 25 in (640 mm) longitudinal service movement. The joints are equipped with noise-reducing “sinus plates”, which provide a smooth driving surface for vehicles, minimizing vibration and noise by up to 80 %. Another feature is the ROBO®MUTE blanket panels, a system of mat layered membrane that reduces noise transmitted from beneath the joint.

Highlights & Facts

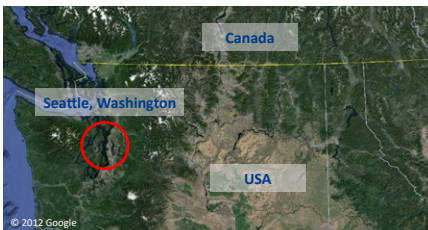
mageba products:

- Type: TENSA®MODULAR expansion joints (types LR6, LR7, LR8)
- Features: Noise-reducing “sinus plates” on surface ROBO®MUTE Sliding Panels
- Installation: January – June 2017

Structure:

- City: Seattle, WA
- Country: USA
- Type: Highway bridge
- Built: 2014–2017

The bridge connects Seattle to Medina crossing Lake Washington



TENSA®MODULAR expansion (LR8) equipped with sinus plate noise reduction surface



Pouring the concrete into the recess



Anaerobic digester (California)



Project description

In the Californian town of San Luis Obispo, a modern food and green waste treatment facility is being built.

The facility, which is to be commissioned in the summer of 2018, will considerably reduce the volume of green waste sent to landfill in the area, in the process producing renewable biogas fuel and high-grade fertilizer.

The facility's key element, its anaerobic digester, must be protected against earthquakes, and this is being achieved by seismically isolating the structure from the ground.

mageba scope

To seismically isolate the structure, it is supported by LASTO®LRB isolators, 52 in total – each designed for a design displacement of 60 mm, a vertical load of 5,000 kN, and a horizontal load of 1,057 kN at the design displacement.

The elastomeric bearings have a diameter of 800 mm, and a lead core of diameter 260 mm which is suitable for the target natural frequency and provides energy dissipation.

The performance of the isolators was verified prior to use by comprehensive laboratory testing. Full “type testing” was carried out on two prototypes, and factory production control (FPC) testing was carried out on all 52 isolators prior to delivery to site.

Highlights & Facts

mageba Products:

- Type: LASTO®LRB seismic isolators
- Features: Designed per AASHTO specifications
- Installation: 2017

Structure:

- City: San Luis Obispo
- Country: United States
- Type: Environmental industry building
- Completion: 2018
- Owner: HZIU Kompogas SLO Inc.
- Contractor: Hitachi Zosen Inova
- Engineer: Hitachi Zosen Inova

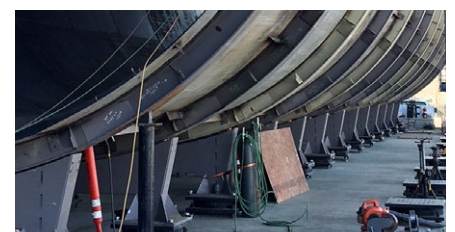
The anaerobic digester is located in San Luis Obispo, California



View of the LRBs following installation to support the anaerobic digester



Construction of the anaerobic digester on top of the installed LRBs





Cabinet Gorge Reservoir Bridge (MT)



Project description

The new Cabinet Gorge Bridge, opened to traffic in December 2017, replaced the old load-limited truss bridge originally built in 1920. In 2011, MDT hired Morrison Maierle to design a replacement structure who selected a 375 foot main span structure with uneven backspans of 110 and 275 feet. The new structure is one of the longest steel plate girder spans in the Northwest. In addition, a unique approach was used by linking the two piers back to a fixed abutment on one end with fixed disc bearings, and to a free abutment on the other end with a modular expansion joint. The construction involved lifting the center span off a barge and installing it in place.

mageba scope

mageba’s scope on this project included design and supply of 9 disc bearings of fixed and guided type. The range of bearings includes vertical loads from 380 kips up to 1308 kips. All bearings feature beveled sole plates, sloping in the longitudinal direction to accommodate the bridge camber. To support the future replacement process, the bearings were anchored to the substructure using bolted dowels allowing easy removal and replacement.

mageba also supplied one LR4 modular expansion joint, that was installed on one bridge abutment.

The bearings and expansion joint were manufactured and delivered in the summer of 2017.

Highlights & Facts

mageba Products:

Type: TENSA®MODULAR LR4 expansion joint
RESTON®DISC bearing
Installation: 2017

Structure:

City: Heron, Montana
Country: USA
Type: Beam Bridge
Main span: 375 ft (114 m)
Length: 760 ft (231 m)
Completion: 2017
Owner: Montana Department of Transportation
Contractor: Dick Anderson Construction
Engineer: Morrison Maierle

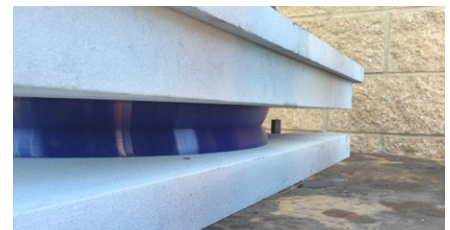
The Cabinet Gorge Bridge is located in Heron, Montana



Fully assembled fixed RESTON®DISC bearings



RESTON®DISC bearing during load testing





Bayonne Bridge (New York)



Project description

The Bayonne Bridge connects the City of Bayonne, NJ with Staten Island, NY. After its completion in 1931, the Bayonne Bridge was the longest steel arch bridge in the world, but today it sits in fifth place.

In 2013, prompted by the expansion of the Panama Canal, a \$743.3 million project was awarded to raise the bridge deck within the original steel arch in order to accommodate larger post-Panamax class ships.

The significance of this project cannot be overvalued as fully 12 % of all US-bound international container ships currently pass under the Bayonne Bridge.

mageba scope

To support the newly raised deck, mageba is supplying 158 RESTON®DISC bearings. All of the approach span bearings are being specially fabricated with the capability to be temporally locked against longitudinal movements during the construction phase, but allowing free movement after construction is completed.

The new bridge deck will also be equipped with 18 TENSA®MODULAR expansion joints, designed with up to 6 gaps to accommodate 17.7 in (450 mm) of movement, and 4 TENSA®FINGER sliding finger joints to accommodate 31.5 in (800 mm) of movement. Additionally, mageba is supplying sliding plate expansion joints for the shared use pedestrian and cycle paths.

Highlights & Facts

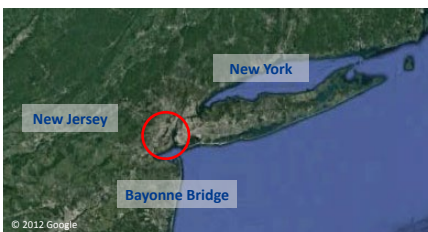
mageba products:

- Type: TENSA®MODULAR LR expansion joints, TENSA®FINGER GF sliding finger joints, RESTON®DISC bearings
- Features: Uplift Bearings
- Installation: 2015–2017

Structure:

- City: Staten Island, NY
- Country: USA
- Type: Steel arch
- Completed: 1931
- Length: 5,780 ft (1,762 m)
- Contractor: Skanska Koch-Kiewit JV
- Owner: Port Authority of NY and NJ

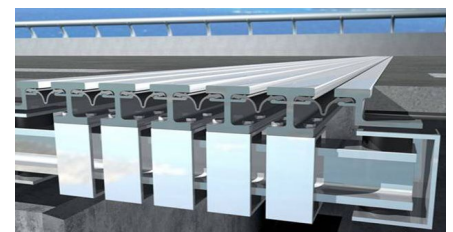
The bridge is one of three that connect Staten Island, New York to New Jersey



A finished Disc bearing before delivery



Deck movements will be facilitated by modular joints (as shown) and sliding finger joints





Ohio River Bridges – Downtown (Kentucky)



Project description

The Ohio River Bridges project involves the construction of two new bridges across the Ohio River between the states of Indiana and Kentucky. The Downtown Crossing will connect the downtown areas of the cities of Louisville in Kentucky and Jeffersonville in Indiana, and the East End Bridge is located eight miles upstream.

The Downtown Crossing project is a cable-stayed bridge with three sets of twin towers. When opened in 2016, it will be tolled to partially refinance its construction.

mageba scope

mageba is supplying 20 structural bearings to support the deck of the new bridge. 10 of these are LASTO®BLOCK elastomeric bearings, and 10 are RESTON®DISC disc bearings.

A number of the disc bearings will be installed vertically to primarily resist horizontal forces at the pylons.

With a service life of 50 years, the sliding bearings feature ROBO®SLIDE high-grade sliding material instead of the commonly used PTFE, to enhance resistance to wear and abrasion, and therefore maximize overall durability.

Highlights & Facts

mageba products:

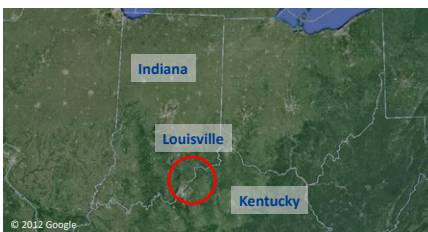
Type: RESTON®DISC disc bearings
LASTO®BLOCK elastomeric bearings

Special: 50-year service life
Installation: 2015–2016

Structure:

City: Louisville, KY
Country: USA
Construction: Cable-stayed bridge
Type: Highway bridge
Built: 2013–2016
Contractor: Walsh Construction Co.
Owner: KY DOT

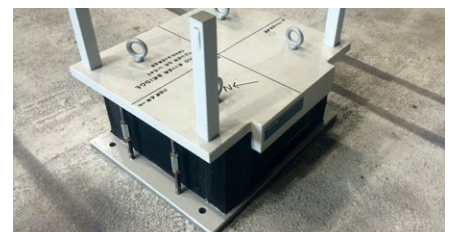
The Ohio River Bridges Downtown Crossing connects Louisville (KY) and Jeffersonville (IN)



A finished RESTON®DISC bearing with adjustable height and presetting



A finished LASTO®BLOCK elastomeric bearing





Verrazano Narrows Bridge (New York)



Project description

The Verrazano Narrows, a body of water which separates the New York boroughs of Brooklyn and Staten Island to the south of Manhattan, is the gateway to New York City's harbor. The bridge that spans the Narrows creates a vital connection for road traffic, carrying about 200,000 vehicles per day. The double-decked suspension bridge has a central span of 4,260 feet (1,298 m), and was the longest suspension bridge in the world from the time its upper level opened in 1964 until 1981.

Currently, it has the longest bridge span in the Americas.

mageba scope

The bridge's existing finger joints, each accommodating enormous deck movements of 2,700 mm (approx. 9 ft) are to be replaced with new finger joints. Due to the great length of the individual fingers, they will receive intermediate support at mid-span. The challenge of designing and supplying these exceptional joints is increased by the need to tailor them to precisely match existing geometry and conditions.

Various single gap joints, also tailored to suit the existing structure, are also being supplied to accommodate much smaller movements at other locations.

Highlights & Facts

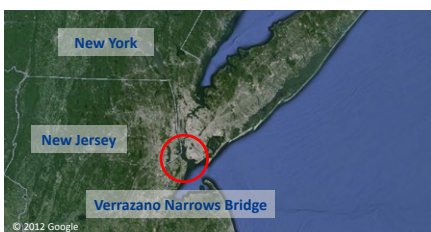
mageba products:

Type: Sliding finger joints
Features: Enormous movements
Installed: 2015–2016

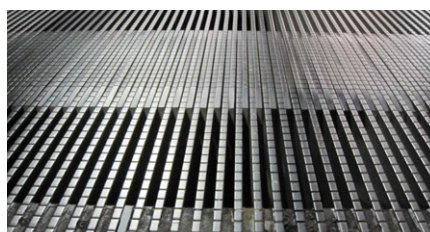
Structure:

City: New York, NY
Country: USA
Construction: Suspension bridge
Type: Road bridge
Built: 1959–1969
Length: 4,260 feet (1,298 m)
Contractor: Tutor Perini
Owner: City of New York

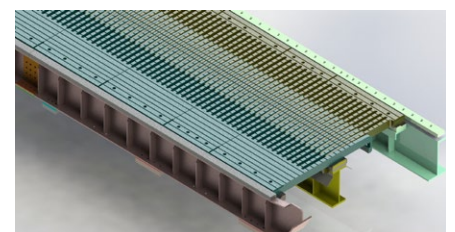
The bridge spans the Verrazano Narrows – the gateway to New York City's harbor



The bridge's sliding finger joints, designed for enormous movements, must be replaced



3D view of a new sliding finger joint, facilitating longitudinal movements of 2,700 mm (approx. 9 ft)





SR 520 Floating Bridge (Washington)



Project description

The Governor Albert D. Rosellini Bridge-Evergreen Point, commonly called the SR 520 Bridge, is the longest floating bridge on the planet. At 7,580 ft. (2,310 m), it carries State Route 520 across Lake Washington from Seattle to Medina.

The four lane toll bridge was opened in 1963 after four years of construction.

Due to its age and deteriorated condition as well as increased traffic, the Evergreen Point Floating Bridge was replaced by a new floating bridge at the same site. The new bridge was opened in April 2016 and carries six lanes as well as a multi-use path for bicyclists and pedestrians. With its length of 7,708.49 feet (2,349.55 m) it is officially certified for the Guinness World Records.

mageba scope

mageba supplied nine TENSA®MODULAR expansion joints for the new bridge. The largest of these expansion joints has 16 gaps and allows 48.4 in (1,230 mm) of longitudinal movement, or 70.4 in (1,790 mm) of extreme limit state movement.

Smaller modular joints, with 2 and 6 gaps, and single gap joints, were also supplied by mageba.

These TENSA®MODULAR expansion joints will accommodate the significant transverse movements as well as the rotations about all axes that can be expected in a floating bridge.

Highlights & Facts

mageba products:

Type: TENSA®MODULAR joints, Types LR16, LR6, LR2; TENSA®GRIP, Type RS-B5

Features: Large rotations

Installed: 2015–2016

Structure:

City: Seattle, WA

Country: USA

Construction: Floating pontoon bridge

Type: Highway bridge

Built: 2013–2015

Length: 7,710 ft (floating)

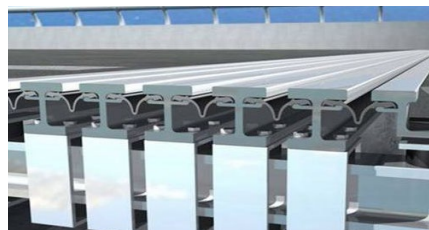
Contractor: Kiewit/General/Manson

Owner: WSDOT

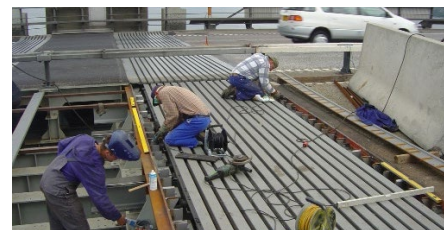
The bridge crosses Lake Washington between the cities of Seattle and Medina



TENSA®MODULAR expansion joint of types LR6 and LR2 are ready for transportation.



Installation of a 16-gap TENSA®MODULAR joint (Type LR16) on the Lillebaelt Bridge in 2003





St. Croix Bridge (Minnesota/Wisconsin)



Project description

Interstate traffic across the St. Croix River, between the states of Minneapolis and Wisconsin, has been served for over 80 years by the Stillwater Lift Bridge – a structure which is now in a poor state of repair, functionally obsolete and over capacity. The new St. Croix Crossing, when opened in 2016, will enable the old bridge to be closed to vehicular traffic. The new structure will be an extradosed bridge – a combination of a box girder and cable-stayed structure. The resulting low profile will minimize visual and environmental impacts.

mageba scope

mageba is supplying 68 RESTON®DISC bearings to support the deck of the new bridge. The key component of a disc bearing is the disc at its centre, which carries the load of the structure above and allows rotations

about any horizontal axis. The disc is moulded from high-strength Polyether Urethane (PU), an aromatic thermoplastic with excellent mechanical properties. The allowable compressive stress on the disc is as high as 35 MPa, and it does not require confinement, as does, for example, the elastomeric pad at the heart of a pot bearing. The disc is also highly resistant to environmental impacts, and remains effective at a very wide range of temperatures, from -94 °F to 249 °F (-70 °C to +121 °C).

The bearings supplied by mageba include all three types (fixed, free sliding, and guided bearings) with vertical load capacity of upto 6,584 kips (29,300 kN), and horizontal load capacity of upto 1,310 kips (5,830 kN).

Highlights & Facts

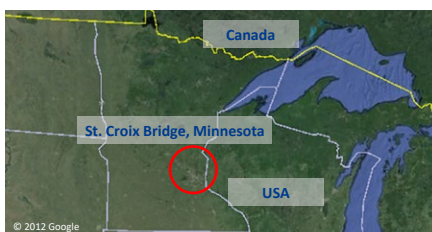
mageba products:

Type: RESTON®DISC bearings
Installation: 2015

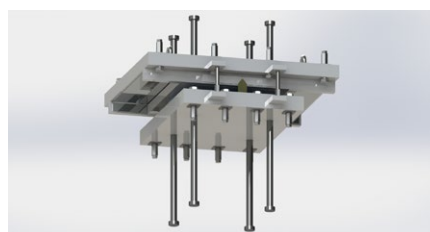
Structure:

City: Oak Park Heights (MN)
Country: USA
Construction: Extradosed bridge
Type: Highway bridge
Built: 2013–2016
Builder: Lunda/Ames JV

The bridge will connect Oak Park Heights (MN) and St. Joseph (WI) across the Ohio River



3D render of a mageba Disc bearing



A finished Guided Disc bearing ready for delivery





Audubon Bridge (Louisiana)



Project description

In 2011, The John James Audubon Bridge opened in southern Louisiana. With a 1,581 ft (482 m) main span supported by two 492 ft (150 m) towers, and an overall length of 12,883 ft (3,927 m), the John J. Audubon Bridge became the longest cable stayed bridge in North America. The structure carries four lanes of traffic 65 ft (20 m) above the Mississippi River and replaces the unreliable ferry service. It is the only Mississippi crossing between Natchez and Baton Rouge, a distance of approximately 93 mi (150 km).

mageba scope

TENSA®FINGER sliding finger joints, type GF and type RSFD, were selected to fulfill the requirements of both the client and the designer. Finger joints were preferred by the client for their low maintenance demands,

and the specific type of finger joint was determined by the movement demands of the bridge at each joint location. Cantilever finger joints, type RSFD, were chosen to facilitate the smaller movements of 12 in (305 mm) at one bridge axis, while sliding finger joints, type GF, were chosen for the bridge axes requiring movements of 28 in (710 mm) and 49 in (1,240 mm).

The GF joints feature sliding support for the ends of the finger plates which span across the bridge gap, and a downward pre-tensioning of the finger plates to ensure that they remain in contact with the sliding surface below.

Weighing 24 tons each, the joints, which allow 49 in (1,240 mm) of movement, are the largest sliding finger joints of their type ever manufactured.

Highlights & Facts

mageba products:

Type: TENSA®FINGER joints of type GF (sliding) and type RSFD (cantilever)
Installation: 2010

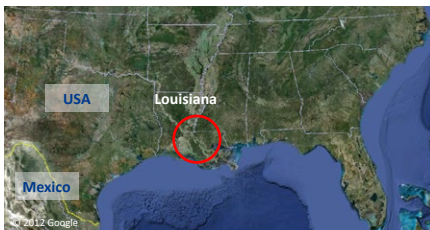
Structure:

City: New Roads, LA
Country: USA
Built: 2007–2011
Type: Cable stayed bridge
Length: 2.44 mi (3,927 m)
Main span 1,581 ft (482 m)

Contractor: Audubon Bridge Constructors (Flatiron and others)

Owner: LA DOT

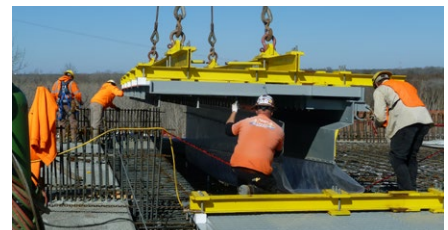
The bridge spans the Mississippi River in Louisiana, upriver from New Orleans



Sliding finger joint with transportation and installation frame, ready for delivery



Installation of a TENSA®FINGER sliding finger joint





Infrastructure products



Project References – Canada



mageba
mageba-group.com



Index Canadian References

Project	Location/Country	mageba's completion	Bearings	Expansion joints	Seismic devices	Monitoring & Services	Page
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Deh Cho Bridge	Fort Providence, NWT	2012		•			11
Golden Ears Bridge	Vancouver, BC	2009	•	•			12

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mageba supports the following organizations:





Pattullo Bridge Replacement (BC)



Project description

The existing Pattullo Bridge was constructed in 1937 and represents a key connection between the growing suburbs of Metro Vancouver (Surrey and New Westminster) Canada. During its 80 year life, it has become apparent that the bridge is in desperate need of modern design as it still features narrow traffic lanes and as a result, heavy congestion and safety concerns for the public.

The new Pattullo Bridge Replacement Project will help provide a safer crossing with four wider lanes, a dedicated multi-use path for pedestrians on both side of the bridge, and provide more efficient approaches to and from the bridge.

The bridge is located in an earthquake sensitive region and as a result, demands bearings and expansion joints that can sustain large movements.

mageba scope

Due to the seismic classification of the region, this bridge design demands very high loads considering both the 975y and 2975y earthquake load cases.

mageba has designed over 100 special seismic isolation bearings (lead rubber bearings) that can withstand a 2975y earthquake event and still safely operate and support the bridge structure.

Additionally, special construction conditions require a few bearings to be longitudinally guided during construction stage, then locked during final stage.

The project also requires four horizontal spherical bearings at the main span tower to dissipate large movements caused by an earthquake. A special spring system is utilized to ensure that the spherical bearings are in constant compression.

The bearings are to be installed in 2022 with the anticipated bridge opening in 2023.

Highlights & Facts

mageba Products:

Type: LASTO®LRB lead rubber bearings
RESTON®SPHERICAL and RESTON®POT bearings

Feature: Large seismic isolation
Installation: 2022

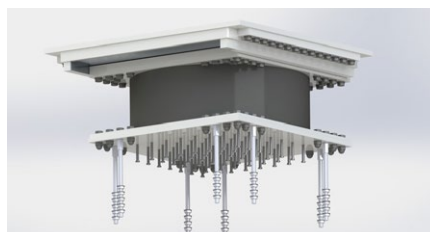
Structure:

City: New Westminster
Country: Canada
Type: Cable-Stayed Bridge
Main span: 284 m (931 ft)
Length: 1,235 m (4,052 ft)
Completion: 2023
Owner: BC Ministry of Transportation
Contractor: Fraser Crossing Constructors General Partnership
Engineer: LAP and Hatch

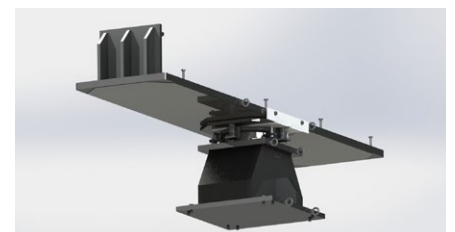
The Pattullo Bridge crosses the Fraser River, linking the city of New Westminster to the city of Surrey



Rendering of a mageba lead rubber bearing as to be installed in new bridge structure



Rendering of a mageba spherical bearing used for horizontal installation





Halfway River Bridge (British Columbia)



Project description

Halfway River Bridge is one of the multiple projects that have been created by the Site C Hydro Dam project in Northern British Columbia.

Due to the construction of the dam, the Highway 29 at Fort St. John requires a realignment of its 66 miles (90 km) stretch.

The whole project includes the construction of a 12,139 ft. (3.7 km) long new two-lane highway, and that of a 3,280 ft. (1,042 m) long bridge.

mageba scope

The bridge deck is expected to experience movements of up to 1,135 mm at each end and in order to accommodate the large movements TENSA®FINGER GF sliding finger joints were selected and delivered.

The supplied joints, each measuring 36 ft. (11 m) in length, can accommodate movements of 1,150 mm and feature a drainage trough at a 10 % slope.

During the design phase of the joints the harsh weather conditions including frequent heavy snowfalls had to be also taken into account.

Additionally, there were numerous other project-specific requirements and different national design and fabrication standards that had to be considered.

Highlights & Facts

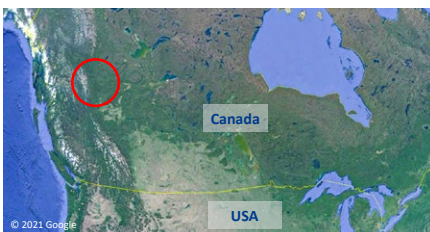
mageba Products:

Type: TENSA®FINGER GF sliding finger joints
Installation: August 2021

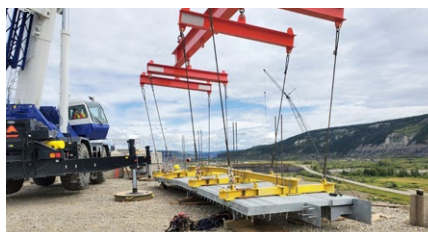
Structure:

City: Fort St. John, British Columbia
Country: Canada
Length: 3,280 ft. (1,042 m)
Completion: September 2021 (estimated date)
Owner: BC MoTI
Contractor: Eiffage Infrastructure Canada
Engineer: WSP

The bridge is situated in Northern British Columbia



Finger joint prepared for lifting and installation into the block out at the abutment



Finger joint is lowered into the bridge deck block out





Samuel De Champlain Bridge (Quebec)



Project description

The Samuel De Champlain Bridge is located in Montreal, Canada, and replaced the old Champlain bridge over the St. Lawrence River. This crossing is one of the busiest in Canada with over 60 million vehicles and \$20 Billion in international trade passing over it on a yearly basis.

The \$4.2 billion project consisted of two main bridges – the New Bridge on the St-Lawrence and the Île-des-Soeurs Bridge – fully opened for the traffic on June 2019.

The bridge, 3.5 km long, is a stayed cable bridge designed for a 125 years long service life. This has been possible by taking into consideration the smartest forethoughts and high quality products and materials for a challenging project of a structure subjected to approx. 160,000 vehicles every day – sometimes in harsh weather conditions.

The new bridge is located in Montreal, Canada, and is part of the government’s extensive corridor project



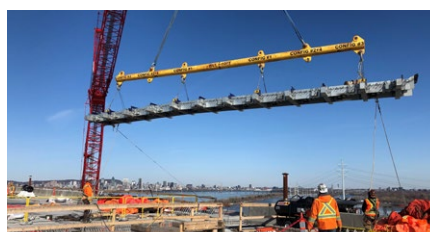
mageba scope

mageba provided Structural Health Monitoring service and modular joints for this iconic bridge.

In the course of the project duration, more than 50 embedded and 150 surface sensors are being installed on the bridge, allowing the Government of Canada to monitor displacement, corrosion, movements, temperature, stresses, strain and environmental conditions of the bridge over the next 30 years. This will most certainly optimize the maintenance supporting the owner to keep the structure at his best performances. Moreover, the ingenious system provides the ability to react instantly to changes and deterioration.

In parallel, the largest expansion supplied will span over 20 meters and cover upwards of 800 mm in movements (10 gaps).

A TENSA®MODULAR expansion joint typ LR8 is being lifted into place



Highlights & Facts

mageba products:

Type:	ROBO®CONTROL permanent Monitoring System
	TENSA®MODULAR expansion joints types LR8, LR9 & LR10
Features:	approx. 200 sensors
Installation:	2016–2019

Structure:

City:	Montreal
Country:	Canada
Type:	Cable-stayed bridge
Completed:	2019
Owner:	Infrastructure Canada
Contractor:	SNC Lavalin, Dragados, Flatiron Canada, TY Lin, MMM Group Preliminary
Design:	Arup

Corrosion Sensor installed on the pier starter reinforcement





Nipigon River Bridge (Ontario)



Project description

Upon completion in 2017, the \$106-million Nipigon River Bridge will be the first cable-stayed bridge of its kind on the Ontario highway system. The 252 meters (827 feet) bridge will consist of three towers with cables supporting the bridge deck and a separate sidewalk for pedestrians. Nipigon River is renowned for its brook trout and the bridge is located directly in a spawning area, presenting environmental challenges.

mageba scope

mageba will deliver all expansion joints for this bridge. This includes a 37 meter long TENSA®FINGER GF sliding finger joint accommodating both vertical (20 mm) and longitudinal (160 mm) displacements.

mageba will also provide a TENSA®FINGER RSFD cantilever finger joint which will allow a 160 mm longitudinal displacements.

Highlights & Facts

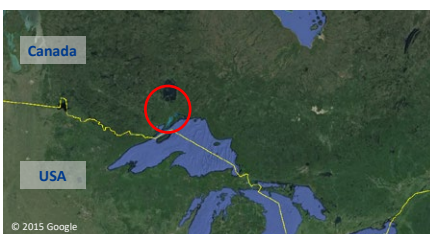
mageba products:

Type:	TENSA®FINGER joints of Type GF (sliding) and Type RSFD (cantilever)
Features:	Vertical movements allowed
Installation:	2017

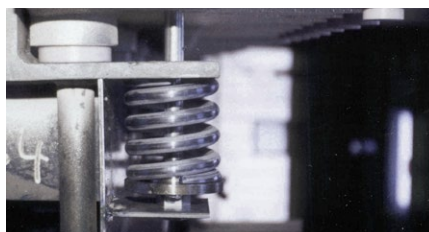
Structure:

City:	Town of Nipigon, Ontario
Country:	Canada
Completed:	2017
Type:	Cable stayed bridge
Length:	252 meters (827 feet)
Builder:	Bot Ferrovia Nipigon Joint

Nipigon, Ontario – Canada



Spring Sytem TENSA®FINGER GF allowing vertical movements



TENSA®FINGER RSFD finger joint during production in the factory





St. Lawrence Seaway Bridge (Ontario)



Project description

Linking Lake Ontario to Lake Erie, The Welland Canal cuts 42 km across Canada's Niagara Peninsula from Port Colborne to Port Weller. A series of eight locks lift and lower vessels 100 meters and enables maritime commerce to bypass Niagara Falls.

Located adjacent to Lock 2, the St. Lawrence Seaway Bridge is also named as route 83 or Carlton Street. The length of the structure is 80 meter and it is supported by a total of five spans.

mageba scope

The flexible plug expansion joint system, POLYFLEX®ADVANCED PU, is a complete new development based on elastic polymers and a further development of the traditional asphaltic plug joint, whereby disadvantages of the traditional bituminous plug joint (e. g. debonding, plastic deformation, rutting, overload due to standing traffic, etc.) can be eliminated and increasing the durability greatly.

Highlights & Facts

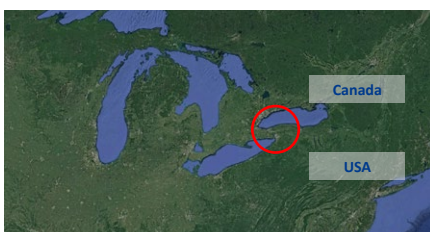
mageba products:

- Type: POLYFLEX®ADVANCED PA30
- Features: +20/-10 mm movement
Support ribs
- Installation: 2017

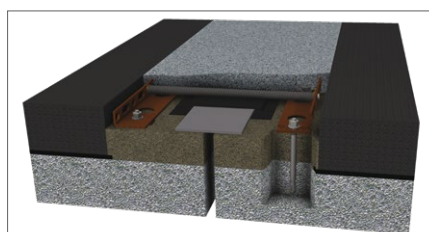
Structure:

- City: St. Catharines
- Country: Canada
- Type: CIP Concrete
- Length: 80 m
- Built: 2017
- Owner: St. Lawrence Seaway
- Contractor: Rankin Construction

The Welland Canal links Lake Ontario to Lake Erie near the Niagara Falls



Typical joint section detail, a total of four joints will be replaced in this project



Installation of the POLYFLEX®ADVANCED PA30 expansion joint and support ribs





Macdonald & MacKay Bridges (Canada)



Project description

The Angus L. Macdonald and A. Murray MacKay bridges are critically important structures for the city of Halifax, capital of the Canadian province of Nova Scotia. They were opened to traffic in 1955 and 1970 respectively, and several decades later, it was determined that both structures were in need of significant reconstruction / maintenance work in order to meet the demands of modern traffic for decades to come.

The Angus L. Macdonald Bridge, in fact, is receiving an entire new deck, and computer modelling of the deck, verified by measured data, is playing a key role in the design process.

The A. Murray MacKay Bridge, on the other hand, is retaining its existing deck, but is being subjected to significant renovation work.

mageba scope

Early in the project, it was determined that a fully automated ROBO®CONTROL structural health monitoring (SHM) system should be used to measure and record the movements and rotations of the bridge decks. The installed system has provided the data needed by the computer modelling of the new deck of one bridge, and assisted in the planning of remedial works of the existing deck of the other, enabling the bridge's engineers to optimize their designs and minimize the life-cycle costs of the bridges.

In 2015, it was decided to install new TENSA®MODULAR expansion joints with up to seven gaps each (type LR7) at four axes of the Angus L. Macdonald Bridge, replacing the existing joints. These joints were designed for steel connection, and feature noise-reducing "sinus plates" surfacing.

Highlights & Facts

mageba products:

Type: ROBO®CONTROL automated SHM system
 TENSA®MODULAR expansion joints of type LR3 & LR7 LS
 Installed: 2012 (SHM), 2015 (joints)

Structure:

City: Halifax
 Country: Canada
 Type: Suspension bridges
Angus L. MacDonalD Bridge
 Built: 1955
 Length: 4,265 ft (1,300 m)
 Main span 1,447 ft (441 m)
A. Murray MacKay Bridge
 Built: 1970
 Length: 3,937 ft (1,200 m)
 Main span 1,398 ft (426 m)

Location of the bridges in Halifax, Nova Scotia, Canada



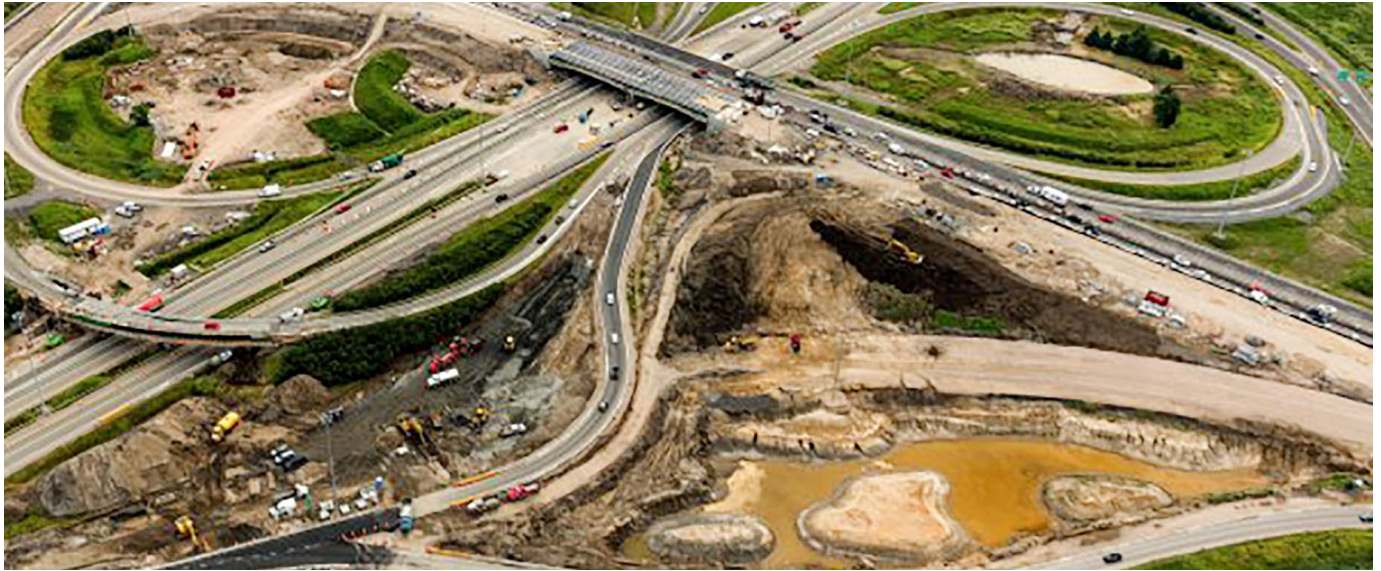
Presentation of measured data (in graphic form) from the applied SHM system



Temporary plates at the point of future installation of the expansion joints



Highway Interchange A40/A73 (Quebec)



Project description

Just north of Quebec City this project was a strategic redevelopment of highways Felix-Leclerc (40) and Laurentienne (73) interchange.

The interchange is located in the St-Lawrence Lowland part of a rift valley making it one of the rare regions prone to seismic events in the eastern part of Canada. In addition to seismic activity, the climate in Quebec City is known to vary over 40 °C from -17 °C during the winter and over 25 °C during the summer.

Based on these unique conditions, the Ministry of Transport of Quebec opted to seismically isolate this highway overpass increasing safety.

mageba scope

mageba supplied 18 Lead Rubber Bearings (LRB) seismic isolators. However, prior to production two full size prototypes had to go through a very stringent testing protocol, based on CAN/CSA S6-06, S6-14 and AASHTO LRFD.

The protocol included cooling of the two LRB prototypes at -30 °C for 72 hours prior to testing followed by additional testing after another 72 hours of cooling at -8 °C. Making this an unprecedented accomplishment.

Each guided LRB have a vertical load capacity of approximately 3,200 kN.

Highlights & Facts

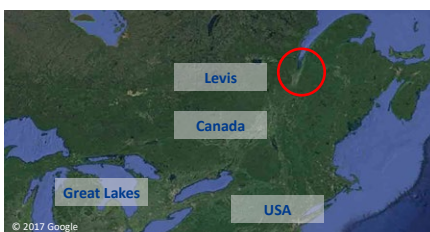
mageba products:

Type: LASTO®LRB lead rubber bearings of type S-550
Installation: 2015

Structure:

City: Quebec
Country: Canada
Type: Highway Interchange
Completed: 2016
Length: 80 m
Builder: EBC
Owner: Ministère des Transports du Québec (MTQ)

The structure is located in Levis, Quebec, Canada



The bearing after 72 hours of cooling at -30 °C



Prototype testing





Port Mann Bridge (British Columbia)



Project description

The Port Mann Bridge is one of British Columbia’s most significant bridge structures, carrying the Trans-Canada Highway (Canada’s Highway 1) across the Fraser River to the west of Vancouver. As part of the major Port Mann Highway 1 project, which also includes the widening and upgrading of 23 miles (37 km) of highway, the bridge has been replaced with a new structure, and was opened to traffic at the end of 2012.

The new bridge is designed for 10 lanes of traffic, and with its main span of 1,542 ft (470 m), it is the second longest cable-stayed span in North America. At 164 ft (50 m) wide, the new bridge is also the widest span bridge of any type in the world.

mageba scope

mageba has delivered the modular expansion joints required for the entire bridge including both approaches. The joints have up to 11 movement gaps and thus can facilitate movements of up to 35 inches (880 mm). In noise-sensitive areas, several joints are equipped with noise-reducing “sinus plates” on the surface.

mageba also supplied, in cooperation with R.J. Watson Inc., disc bearings for the bridge. These are designed for loads of up to 19,000 kN and a number feature “double discs” to achieve this load capacity.

Highlights & Facts

mageba products:

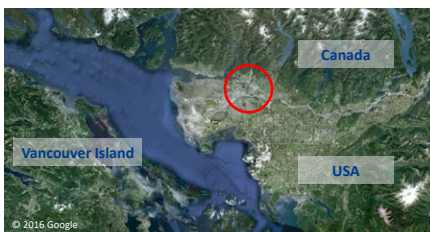
- Type: Modular expansion joints and disc bearings*
- Features: Expansion joints with movements of up to 35 in (880 mm), some featuring “sinus plates”
- Installation: 2012

Structure:

- City: Vancouver
- Country: Canada
- Built: 2008–2012
- Type: Cable stayed bridge
- Length: 1.37 mi (2,200 m)
- Maintained: Transportation Investment Corporation
- Contractor: Kiewit Flatiron General Partnership

* in cooperation with R.J. Watson Inc.

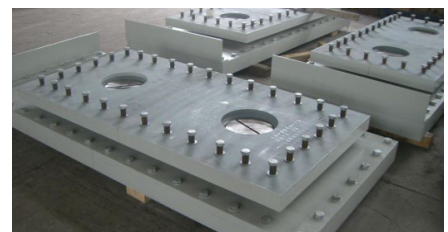
Location of the bridge in British Columbia



A modular expansion joint featuring noise-reducing “sinus plates” on its surface



Disc bearings (with double discs per bearing) ready for delivery



Deh Cho Bridge (Northwest Territories)



Project description

The Deh Cho Bridge, located in Canada's Northwest Territories, was completed in the fall of 2012. The \$202 million cable stayed bridge spans the Mackenzie River near Fort Providence, replacing an existing ferry service in the summer, and an ice crossing route in the winter. The Deh Cho Bridge is the only permanent crossing of the Mackenzie River. The structure ensures that the region to the north will not be cut off from southern Canada for an annual 8 week period, when forming or melting ice, not strong enough to carry the ice road, prevents the passage of the ferry. The new 0.68 mi (1.1 km) long bridge has nine spans of lengths ranging between 294 ft (90 m) and 624 ft (190 m).

mageba scope

mageba was awarded the contract to design and manufacture the modular expansion joints required at each end of the Deh Cho Bridge. mageba provided an 11 gap TENSA®MODULAR expansion joint at one abutment, and an 8 gap modular expansion joint at the other. These modular expansion joints, reliable in the most extreme conditions of northern Canada, are able to facilitate movements of up to 35 in (889 mm). In addition, they are also exceptionally flexible, allowing movements in every direction as well as limited rotations about every axis.

Highlights & Facts

mageba products:

Type: TENSA®MODULAR LR expansion joints of types LR8 and LR11

Installation: 2010–2012

Structure:

Location: Northwest Territories, Canada

Completed: 2012

Type: Cable stayed bridge

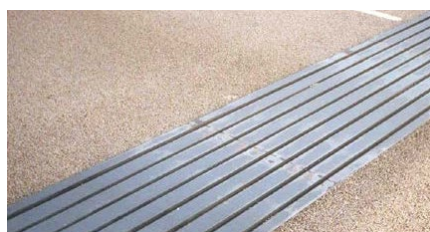
Length: 3,642 ft (1,100 m)

Contractor: Ruskin

Location of the Deh Cho Bridge in northern Canada



A modular expansion joint of the type required by the new bridge



View of a modular expansion joint from beneath, showing its control mechanisms





Golden Ears Bridge (British Columbia)



Project description

The Golden Ears Bridge, near Vancouver, British Columbia, creates an important new transportation link across the Fraser River. The bridge, with three main spans each 242 m (795 ft) long, features an unusual hybrid cable stayed system designed to ensure a specified performance in the case of defined earthquake events. The bearings and expansion joints for the bridge are also subjected to such demands, making their design and fabrication an interesting challenge.

mageba scope

Main Span Bearings:

mageba supplied four custom-designed uplift bearings, pre-compressed for frequent load reversal. Each bearing weighs a massive 17 tons and can accommodate a wide range of loads from 4,170 kN to -2,790 kN (up-

lift), longitudinal movements of 3,100 mm (122 in), transverse movements of 50 mm (2 in) and rotations of 0.039 radians about the x-axis and 0.010 radians about the y-axis.

Expansion Joints:

In addition to the bearings, 12 TENSA®MODULAR LR expansion joints were supplied by mageba. The largest, type LR17 with 17 individual gaps, will allow longitudinal movements of 1,350 mm (53 in). The joints are also equipped with 'Fuse-Box' earthquake protection devices which prevent serious damage to the joint, and the connecting bridge structure, in the event of an earthquake. The 'Fuse-Box' also enables the modular expansion joint to continue to allow passage of emergency vehicles after a seismic event.

Highlights & Facts

mageba products:

Type: 12 TENSA®MODULAR expansion joints, with up to 17 gaps, and 4 special uplift bearings
Features: Uplift bearings
Installation: 2009

Structure:

City: Vancouver
Country: Canada
Type: Hybrid cable stay design
Completed: 2009
Length: 2,410 m 1.45 mi with 3 main spans each 242 m (794 ft) long
Contractor: GCCJV (Bilfinger Berger and others)
Owner: TransLink

The bridge crosses the Fraser River near Vancouver, Canada



Preparing the special bearings for transport



Installation of LR17 expansion joint featuring "Fuse-Box" seismic protection

