

Access Solutions for BRIDGES

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- ➔ **Glossary**
- ➔ **Access Solutions ... what for ?**
- ➔ **Bridge Types ?**
- ➔ **Why Tractel Secalt ?**

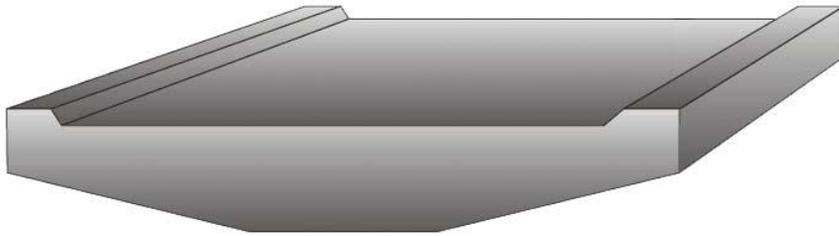
- ➔ **Underdeck Access**
- ➔ **Access to Towers / Pylons**
- ➔ **Access to Cables**
- ➔ **Inspection inside Viaduc Piers**

- ➔ **Bridge Construction**

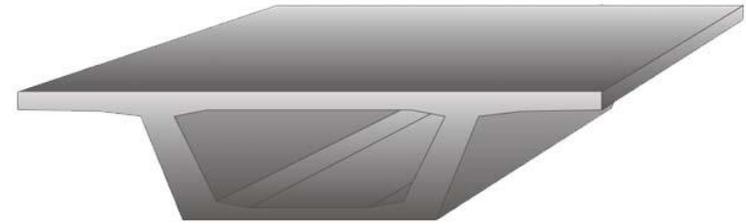
- ➔ **Interesting links**



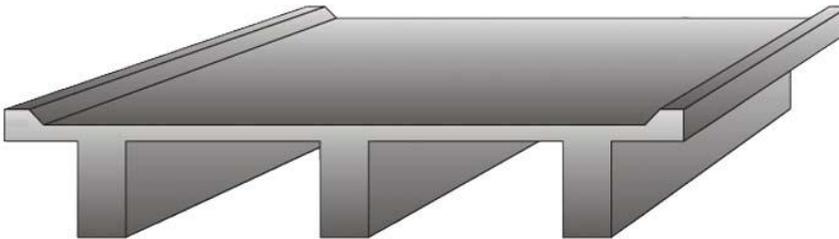
Access solutions for underdeck maintenance of all bridge types



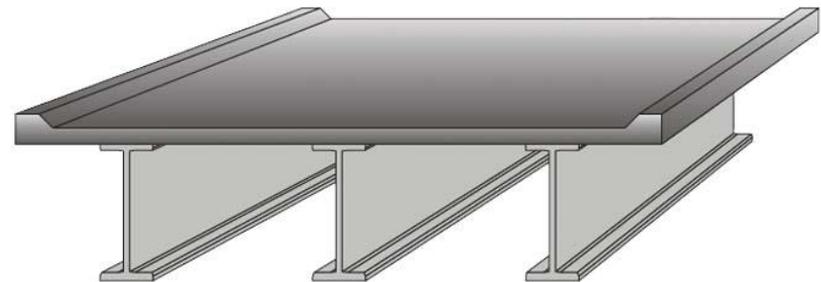
Solid slab bridge with sloped edges



Girder bridge



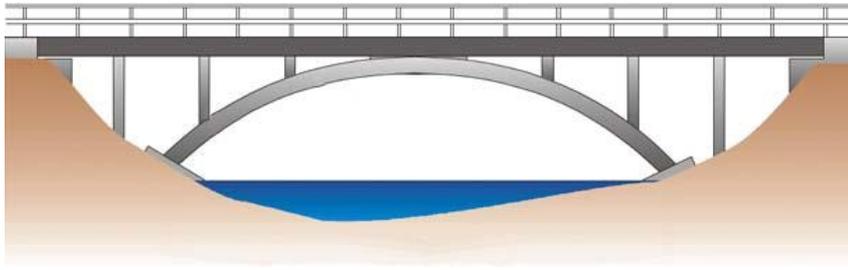
Beam bridge, concrete T-beams



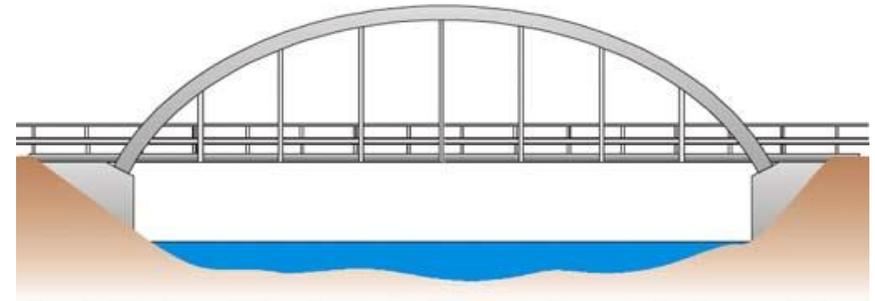
Beam bridge, steel I-beams



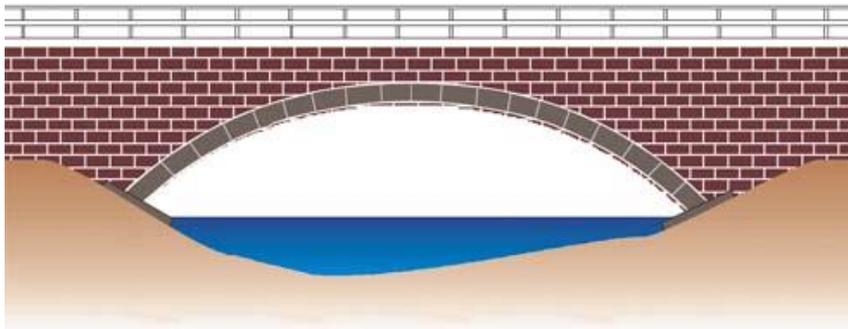
Access solutions for all arch bridge types



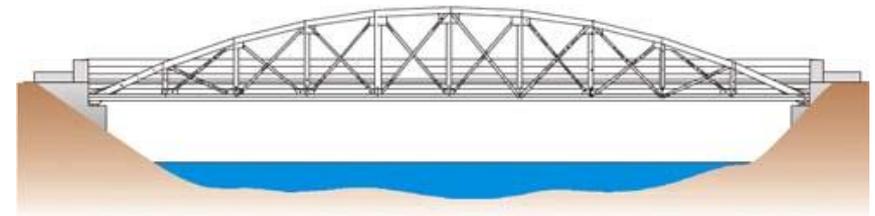
Open Spandrel Arch Bridge
with deck on top



Arch bridge with underlying deck



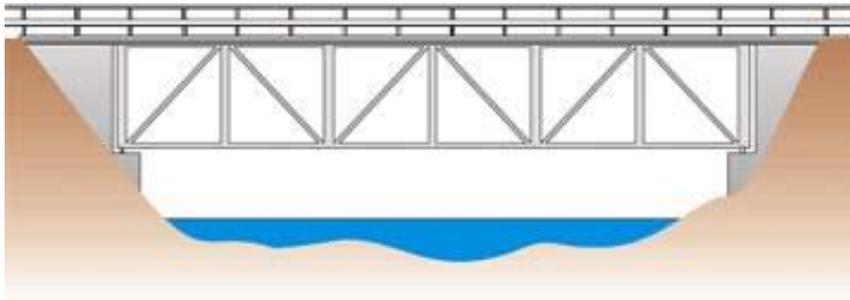
Vault bridge



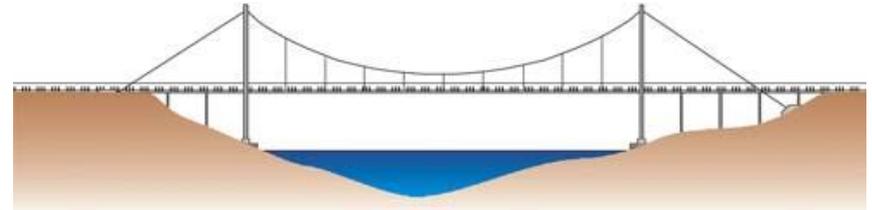
Truss Bridge with arched top chord



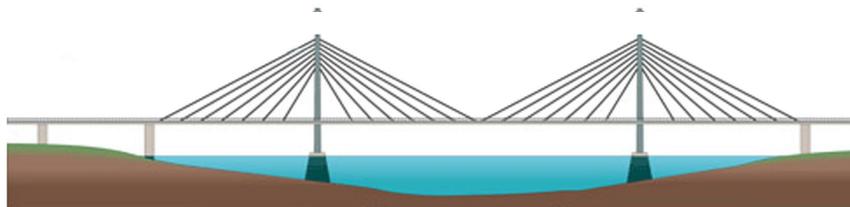
Access solutions for truss bridges, suspension and cable-stayed bridges



Deck Truss Bridge



Suspension Bridge

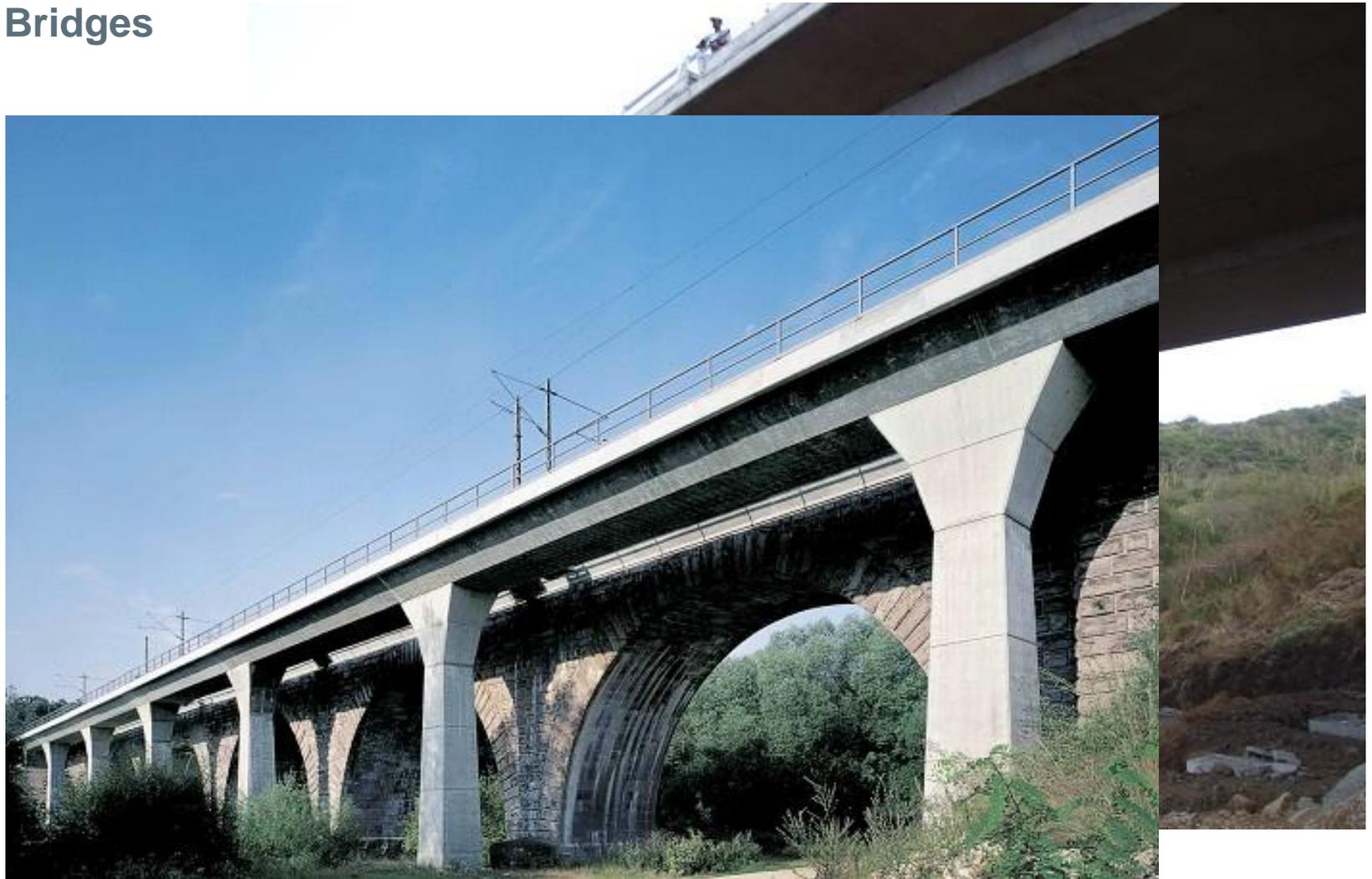


Cable-stayed bridge – fan cable stays

➡ Why Tractel Secalt ?



Slab Bridges





Girder Bridges



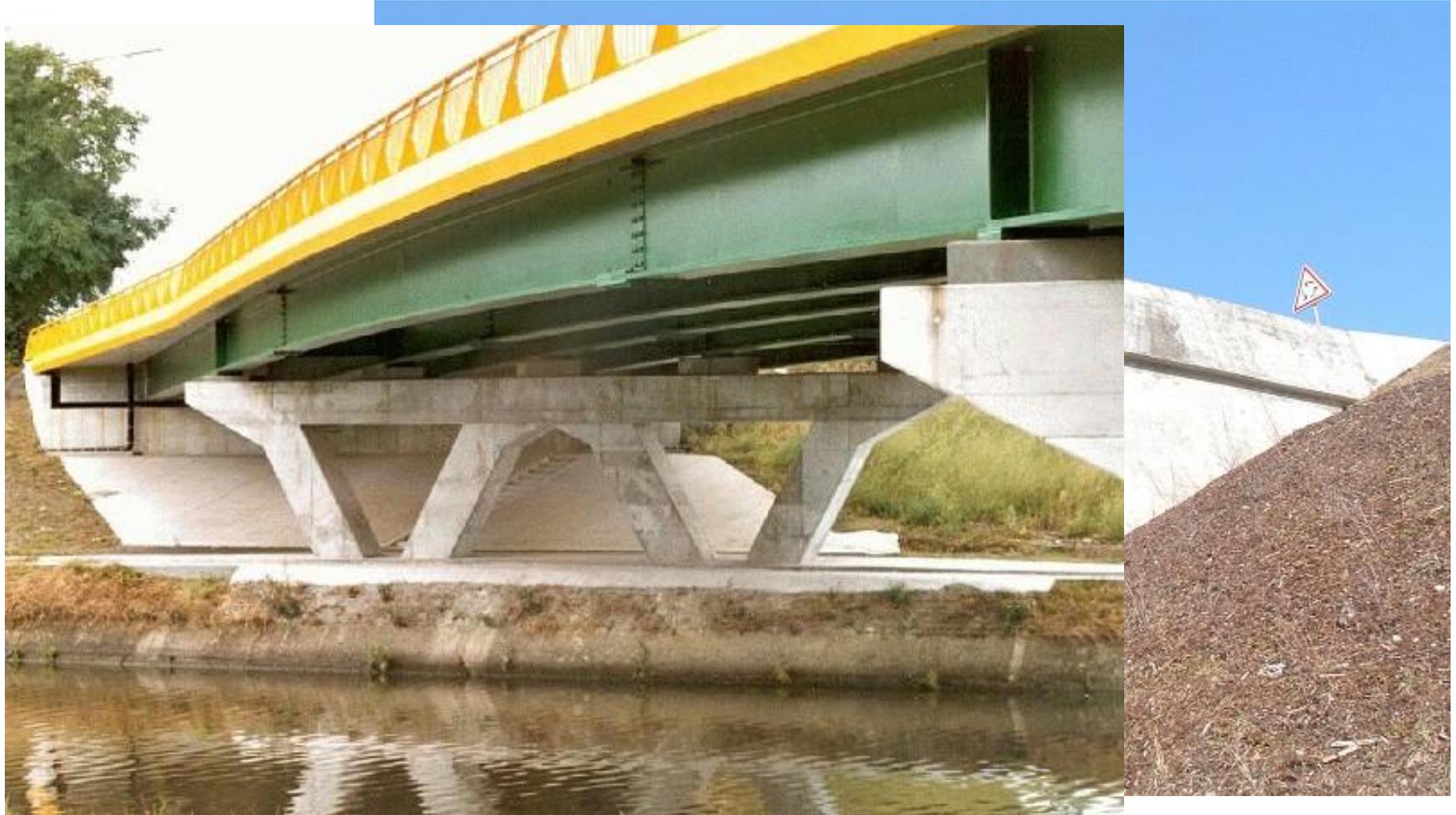


Beam Bridges (Concrete Beams)





Beam Bridges (Steel Beams)





Arch Bridges with deck on top





Arch Bridges with underlying deck





Vault Bridges





Truss Bridges with arched top chord





Deck Truss Bridges





Suspension Bridges



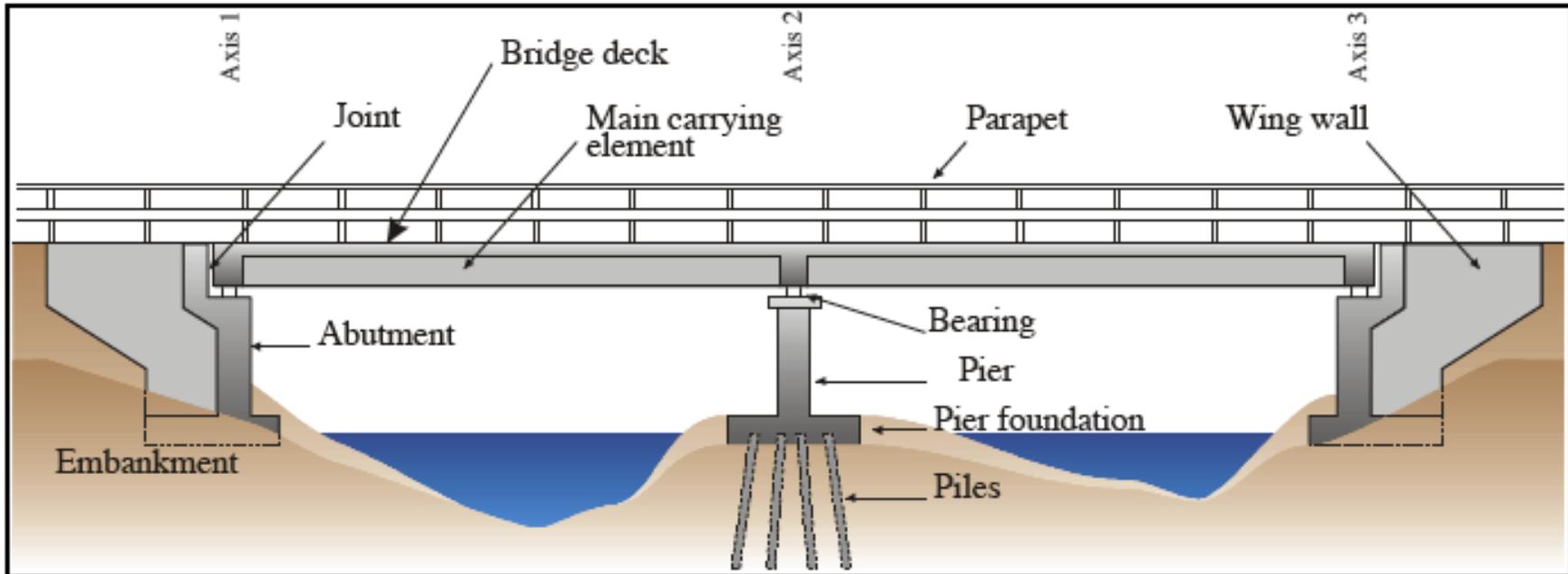


Cable-stayed Bridges

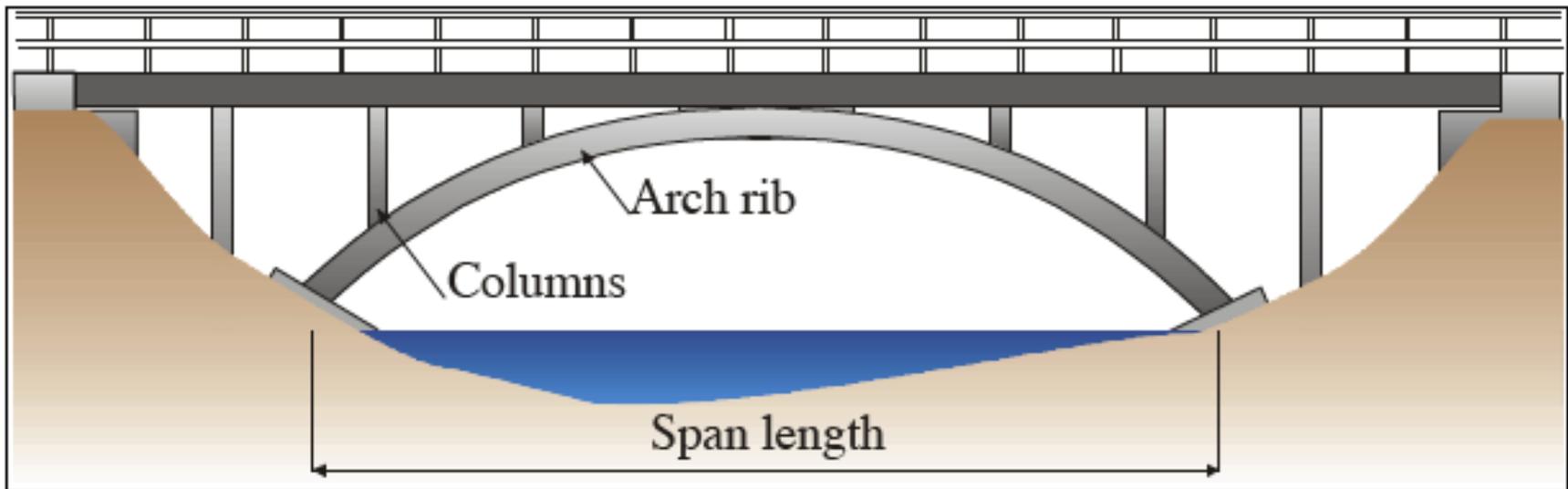




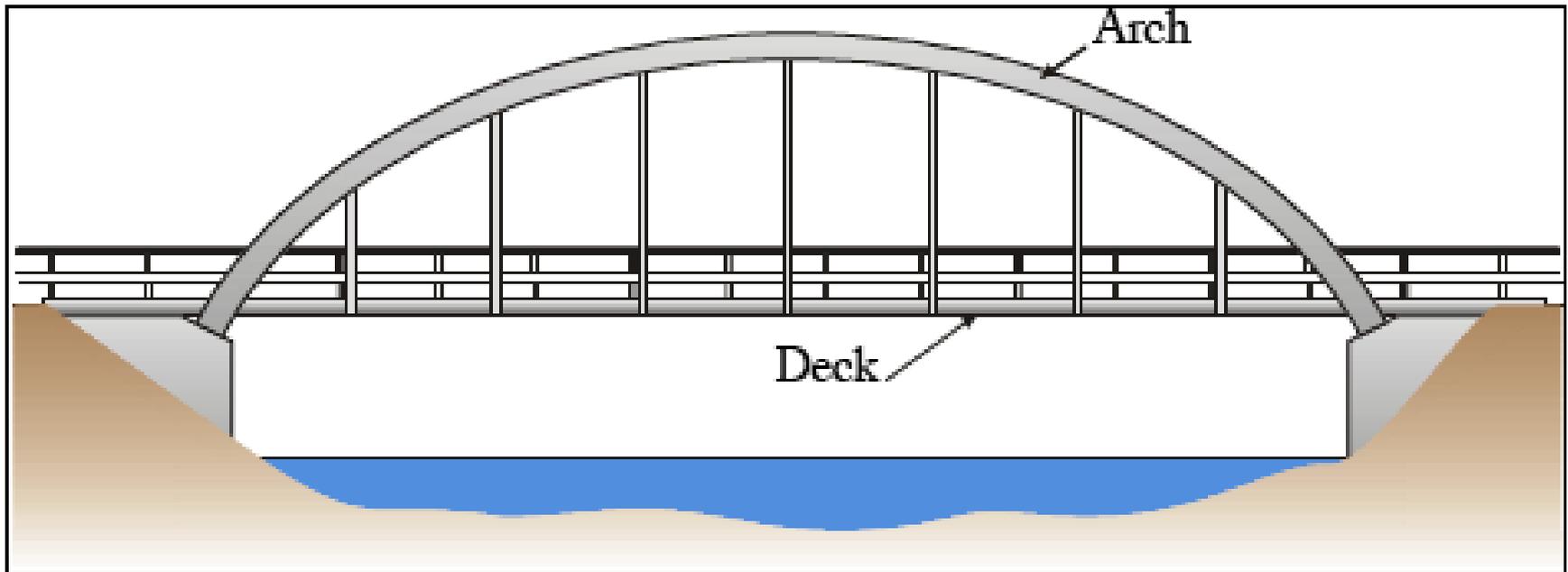
BRIME = BRidge Management in Europe



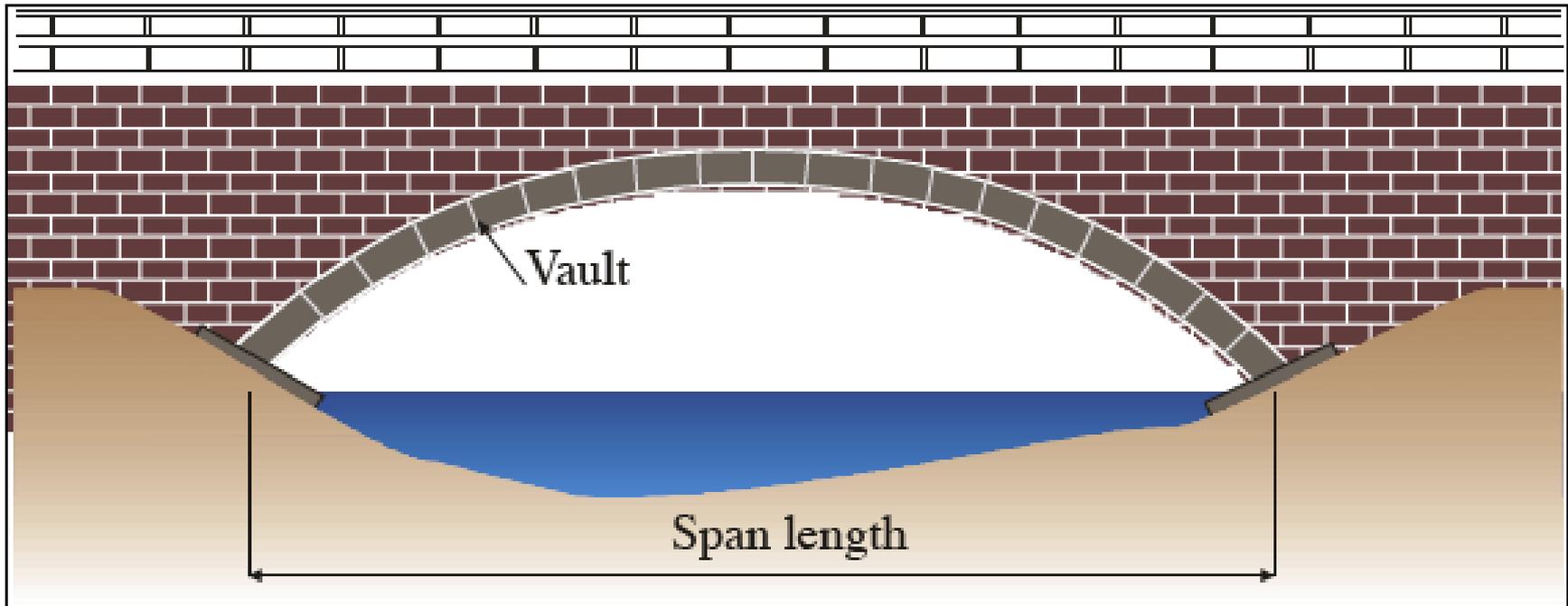
Word list



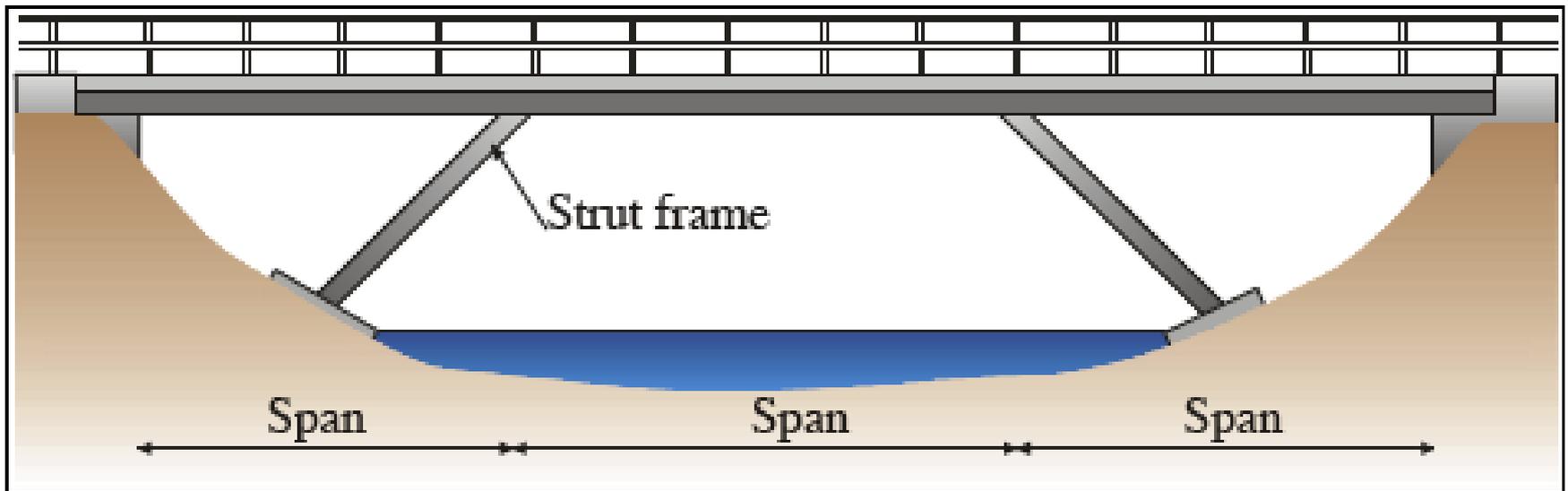
Open Spandrel Arch Bridge with deck on top



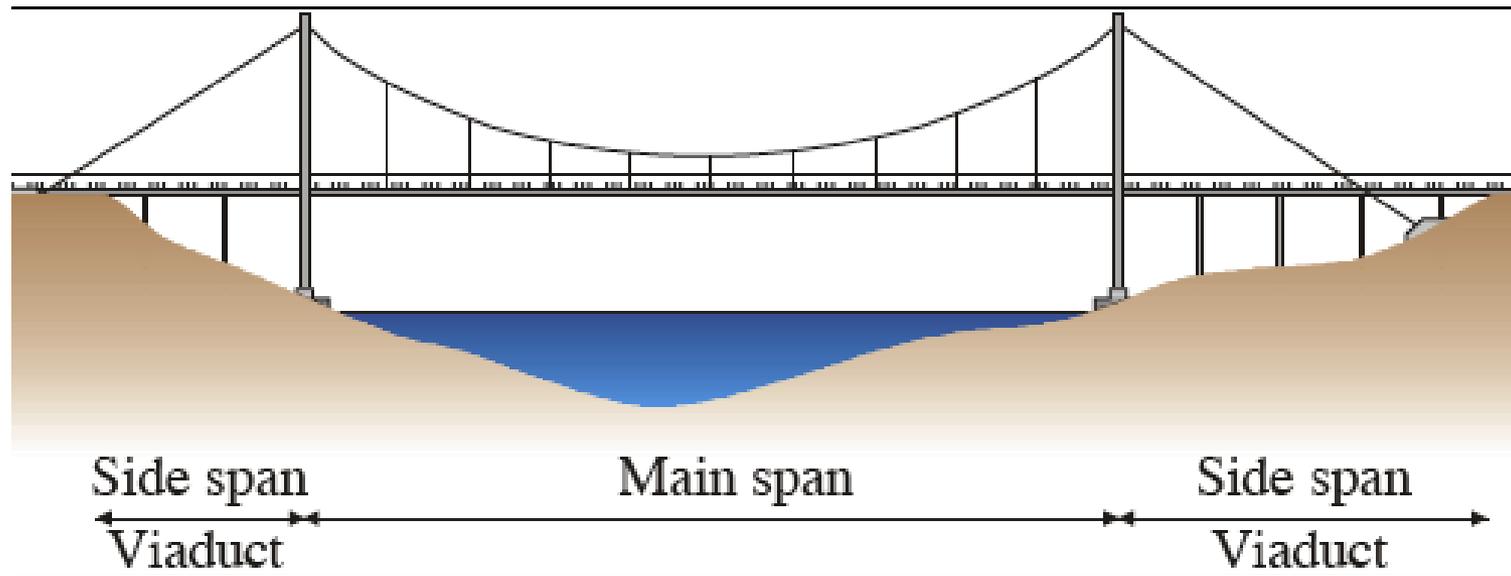
Arch bridge with underlying deck



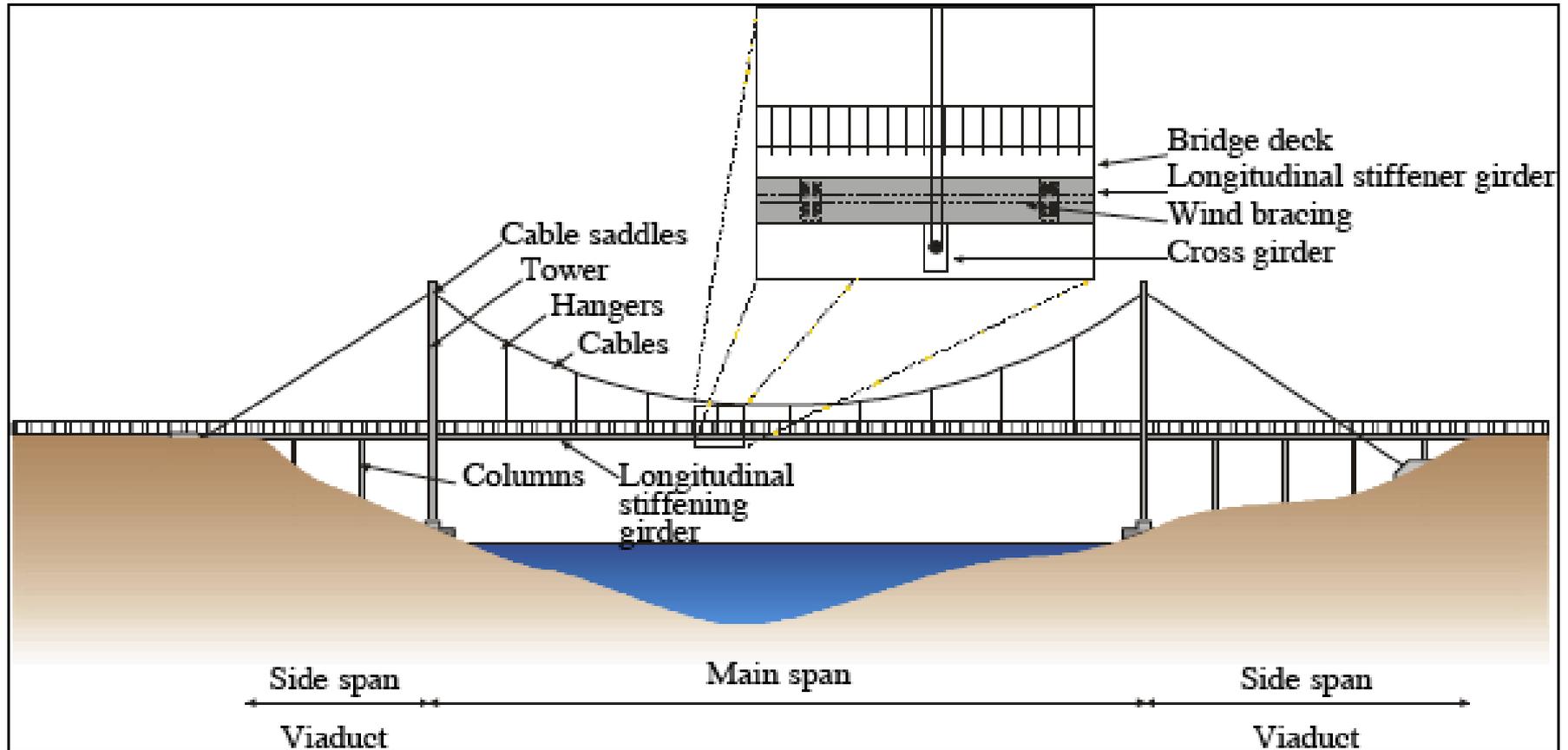
Vault bridge



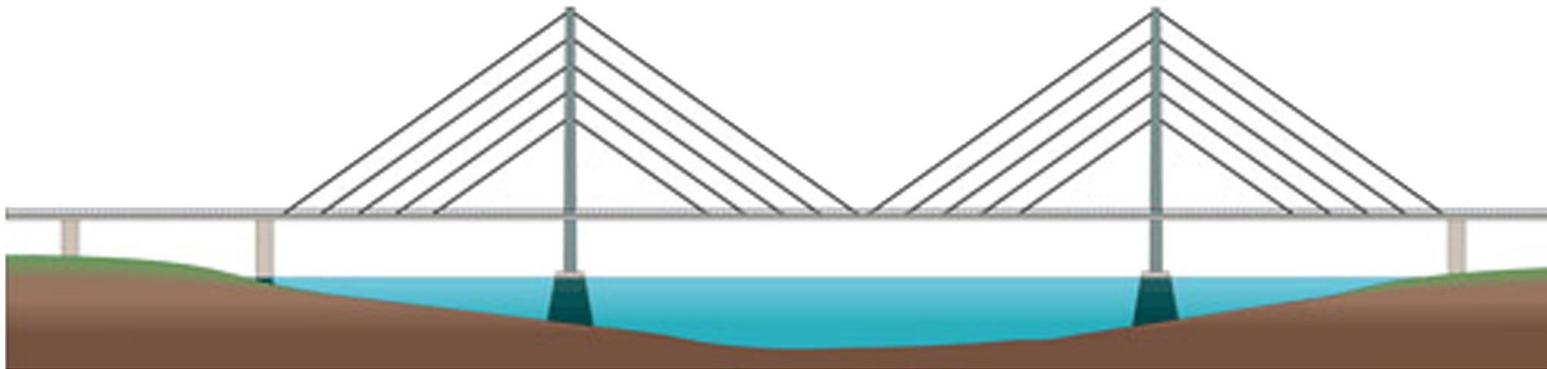
Strut frame bridge



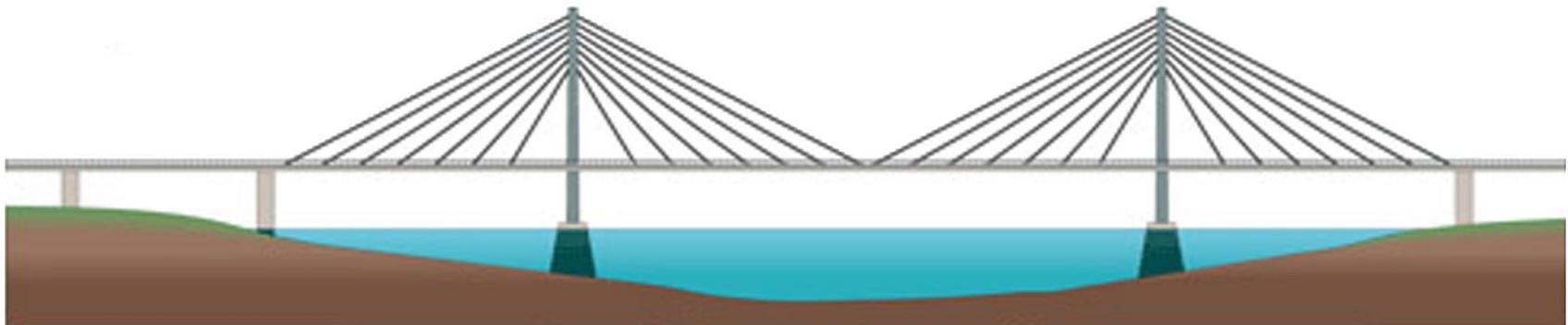
Suspension bridge



Suspension bridge



Cable-stayed bridge – harp cable stays



Cable-stayed bridge – fan cable stays

List of Words – refer to Excel sheet

Glossary "Handbook for Bridge Inventory" (translation by BRIME partners)

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5/5/14

English	French - français	German - deutsch
Abutment Abutment foundation	Culée Fondation de la culée	Widerlager Widerlagergründung
Abutment wall	Mur de culée	Widerlagerwand
Access equipment	Equipements d'accès	Zugangsmöglichkeiten
Accessories	Equipements	Zubehör
Aerial obstruction lights	Feux de signalisation pour les avions	Flugsicherungsbeleuchtung
Anchoring	Ancrage	Verankerung
Anchoring	Ancrage	Verankerung
Angle Box beam	Poutre-caisson constituée de cornières	Aus Winkeln zusammengesetzter Kastenträger
Applied loads	Charges appliquées	Angewandte Lasten
Approach road	Route d'accès	Zufahrtsstraße
Approach slab (Run-on slab)	Dalle de transition	---
Apron	Protection contre l'affouillement	Frontschürze
Arch bridges	Ponts en arc	Bogenbrücke
Arch ribs	Arcs	Bogenaussteifung
Arch structure with deck on top	Arc à tablier supérieur	Bogenbrücke mit aufgeständerter Fahrbahnplatte
Arch structure with intermediate deck	Arc à tablier intermédiaire	Bogenbrücke mit mittiger Fahrbahnplatte
Arch structure with underlying deck	Arc à tablier inférieur	Bogenbrücke mit abgehängter Fahrbahn
Arch System	Système en arc	Bogensystem
Arch truss bridge	Bowstring	Fachwerkbogenbrücke, Fachwerkbrücke mit bogenförmigem Obergurt
Arch with one hinge	Arc à une articulation	Bogen mit einem Gelenk
Arch with three hinges	Arc à trois articulations	Bogen mit drei Gelenken, Dreigelenkbogen
Arch with two hinges	Arc à deux articulations	Bogen mit zwei Gelenken, Zweigelenkbogen
Arch without hinges	Arc encastré	Bogen ohne Gelenk, eingespannter Bogen
Arched Superstructure	Structure en arc	Bogenförmiger Überbau
A-tower	Pylône en forme de A	A-förmiger Turm
Balanced Swing Bridge	Pont tournant à deux volées symétriques ou non	---
Ballast wall	Mur garde-grève	Kammerwand
Bar railing	Garde-corps	Holmgeländer
barrier	Barrière de sécurité	Absperrung

List of Words_EN-FR-DE-ES-NO-SL_de BRIME - bridge glossary D14_App3 (version 1).xls

1 / 14



➔ Construction

➔ Inspection

➔ Maintenance

➔ Painting

➔ Repair work



Periodical Inspections

1. Superficial inspections
(continuously,
by maintenance
personnel)
2. General inspections
(frequency 1 to 3 years,
by qualified technicians)
3. Major inspections
(frequency 5 to 10 years,
by experienced bridge
engineers)

➔ **No access
equipment required**

➔ **Access equipment
required**

- Specific inspection intervals in each country.
- Specific inspection plan for each bridge.



Other Inspections

1. Acceptance inspections (before traffic opens, by experienced bridge engineers)
2. Guarantee inspections (before the end of the guarantee period, by experienced bridge engineers)
→ **Access equipment required**
3. Special inspections (for a particular problem, after an incident, by experienced bridge engineers)
→ **Access equipment required**

Computerised Monitoring

A tool within the Bridge Management

→ Access equipment required for placing the sensors

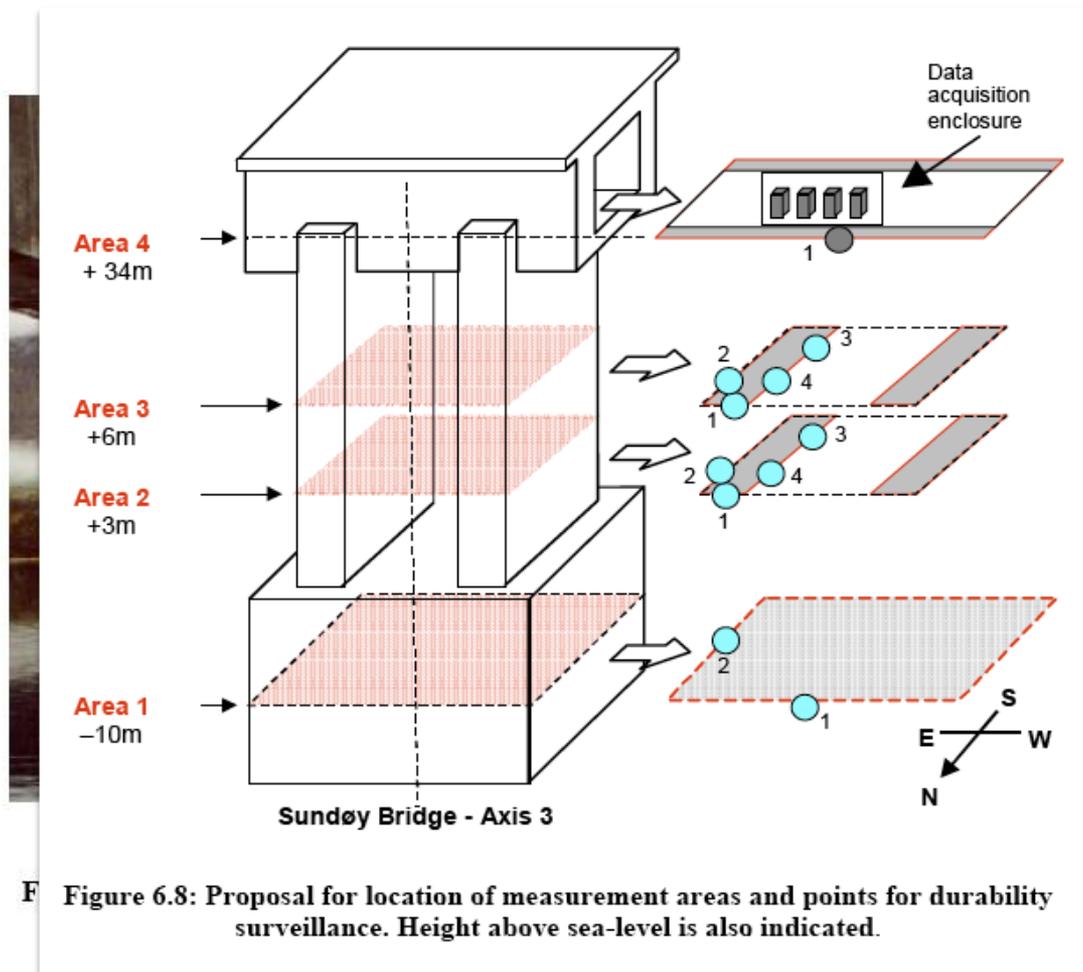


Figure 6.8: Proposal for location of measurement areas and points for durability surveillance. Height above sea-level is also indicated.



Use of Neural Networks

A tool within the
Bridge Management

- **Access
equipment
required for
field
measurements
and**
- **Non
Destructive
Testing (NDT)**

Classification of defects and deterioration of bridges (extract – refer to D9)

- Erosion
- Abrasion
- Deformation
- Wetting
- ...
- Freeze-thaw damage
- Reinforcement corrosion (concrete)
- ...
- Damage of surface protecting coatings
- Corrosion of steel
- ...

Why Tractel Secalt ?

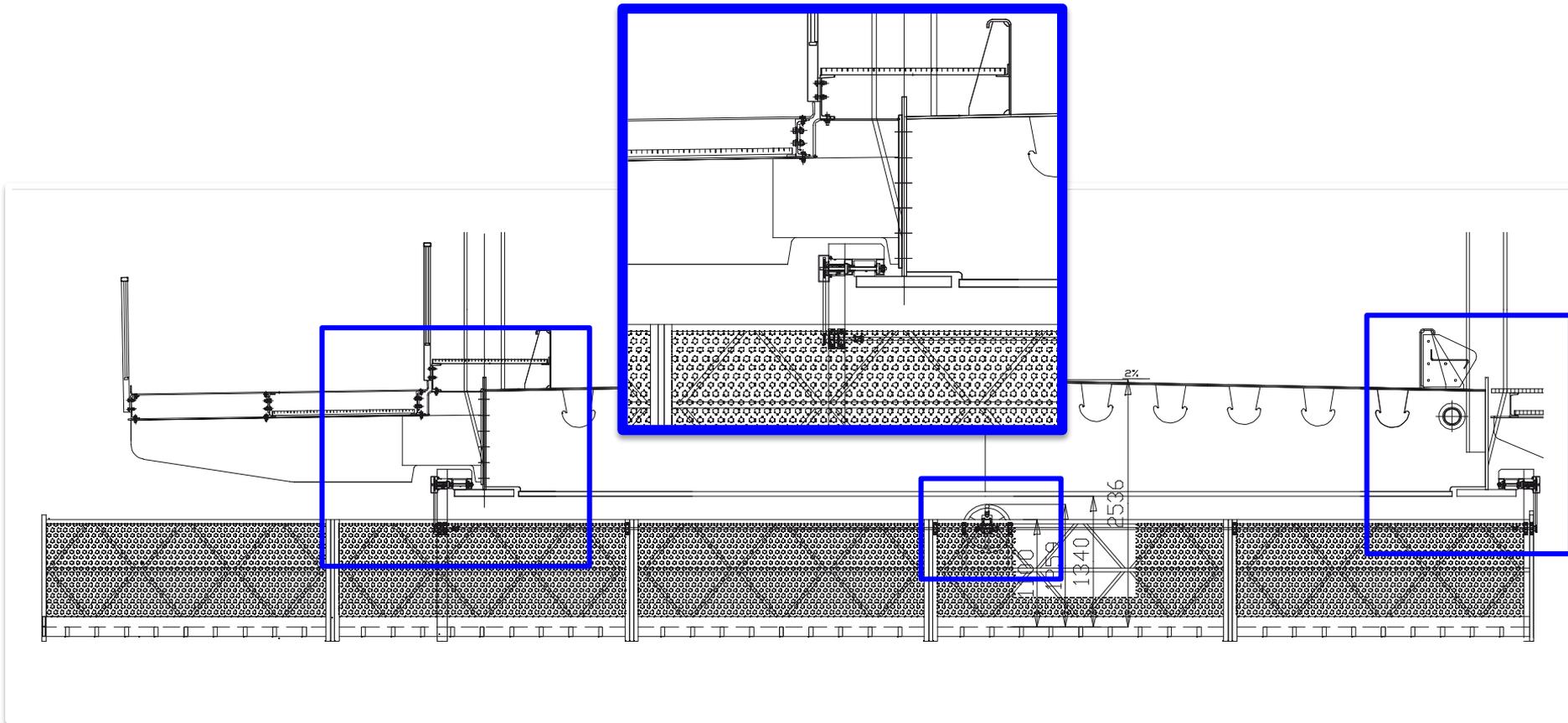




Netebruggen Duffel-Bridge, Belgium

- Two gantries suspended from bridge steel beams
- Manual traversing by hand wheel
- Fall arrest trolleys
- Electric power generator set installed on the gantry





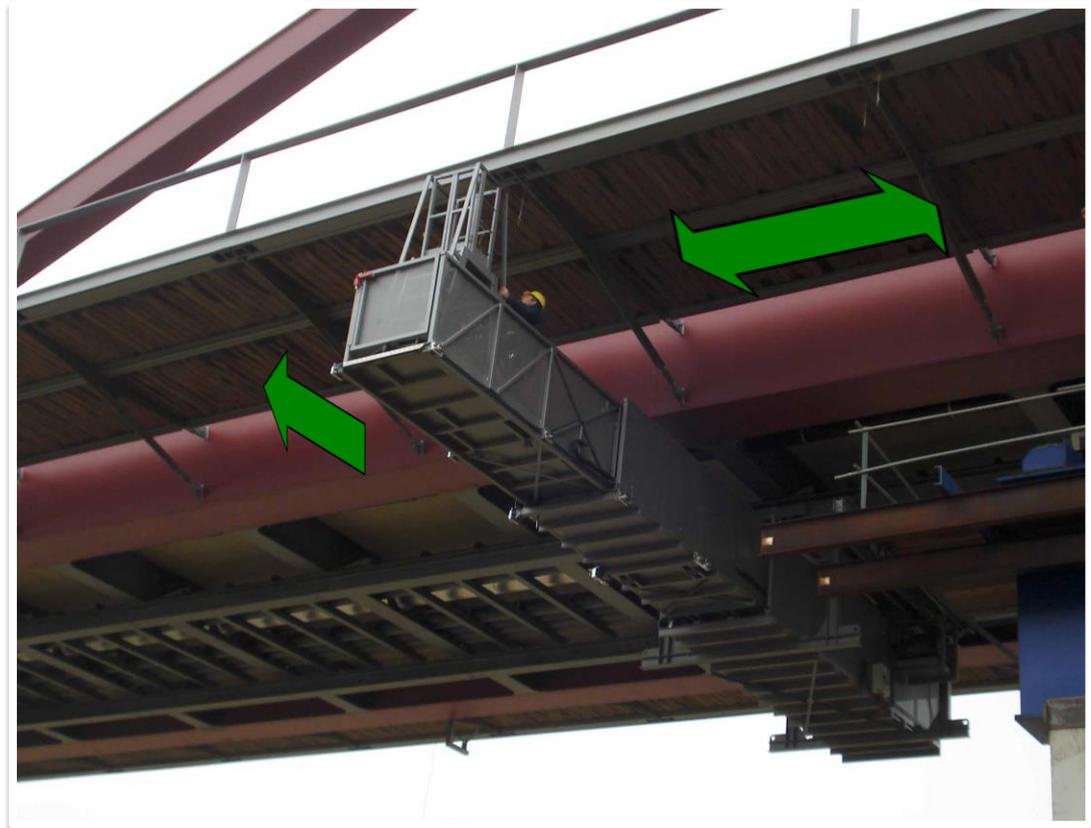
Netebruggen Duffel-Bridge, Belgium

- Two gantries suspended from bridge steel beams
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Albertkanaal Brug Vroenhoven, Riemst Bridge

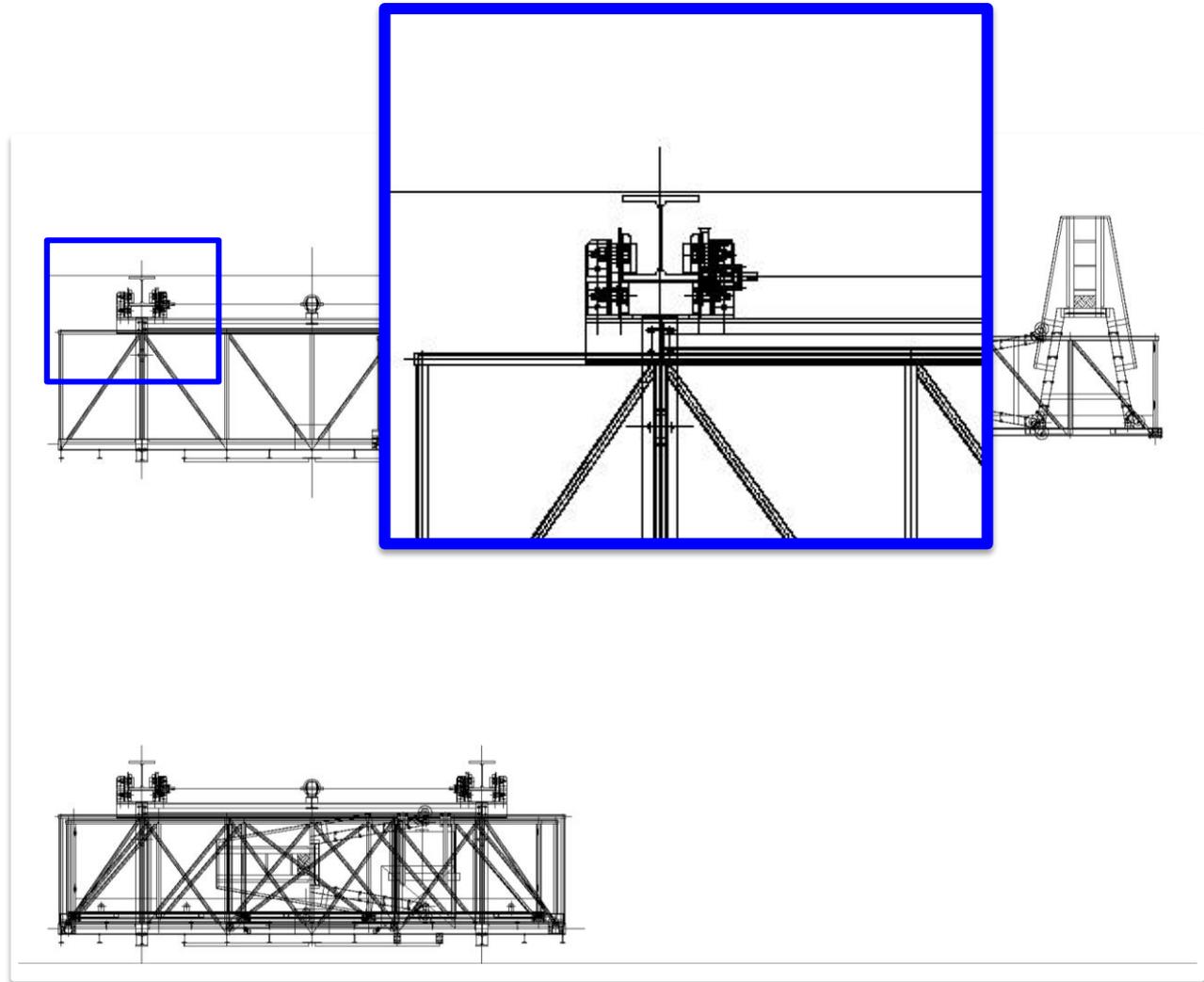
- Telescopic gantry for inspection and maintenance work
- Suspended from electrically powered trolleys
- Foldable stepladder at each platform end





Albertkanaal Brug Vroenhoven, Riemst Bridge

- Telescopic gantry for inspection and maintenance work
- Suspended from electrically powered trolleys
- Foldable stepladder at each platform end





Sully bridge / Loire France

- 6 m ALTA "S" platform with slewing ring
- 4 powered trolleys and 2 chain operated trolleys. 500 kg or 4 persons and materials
- Chain operated trolleys, which allow sideways movement of 1 m each way
- Traversing lengthways with powered trolleys (2 speeds: 7/22 m/min)
- Electric power generator set installed on the gantry





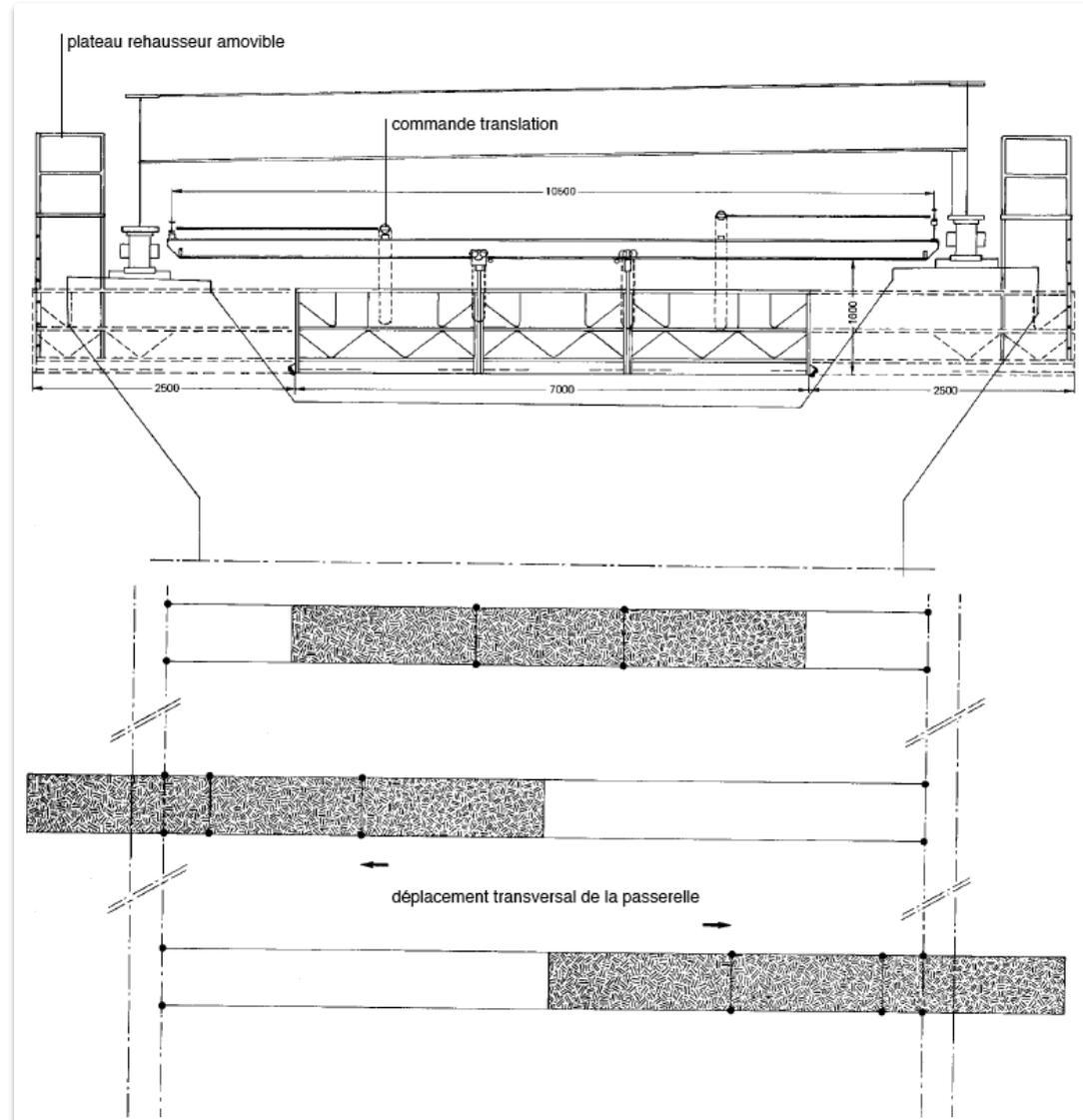
Seyssel Bridge / Rhone France

- One 7 m ALTA "S" special platform, with fixed stirrups and 2x2 chain operated trolleys.
- Sideways movement of 2.5 m each way.
- Capacity: 1000 kg.



Seyssel Bridge / Rhone France

- One 7 m ALTA "S" special platform, with fixed stirrups and 2x2 chain operated trolleys.
- Sideways movement of 2.5 m each way.
- Capacity: 1000 kg.





TGV-Bridge, Herent,
Belgium



**TGV-Bridge, Anvers,
Belgium**



**TGV-Bridge, Prester,
Belgium**



Tsing Ma Bridge, Hong Kong

- 27 gantries powered by hydraulic motors designed for inspection and maintenance.
- They have also been used for completion of the bridge construction.
- Main features:
 - Dimensions: 11 x 4 m.
 - SWL: 1000 kg.
 - Deadweight: 6 T.
 - Travelling length: 1377 m.



[➔ More about construction](#)

[➔ Back to Access Solutions
... what for ?](#)



Chao Phraya Bridge, Bangkok/Thailand

- 2 Platforms traversing on two double rail tracks,
- powered by two hydraulic TIRAK THB-1000M hoists,
- mounted on the platforms, with the ropes anchored at each end of the track.



Underdeck Inspection during construction



Saint-Nazaire bridge, France

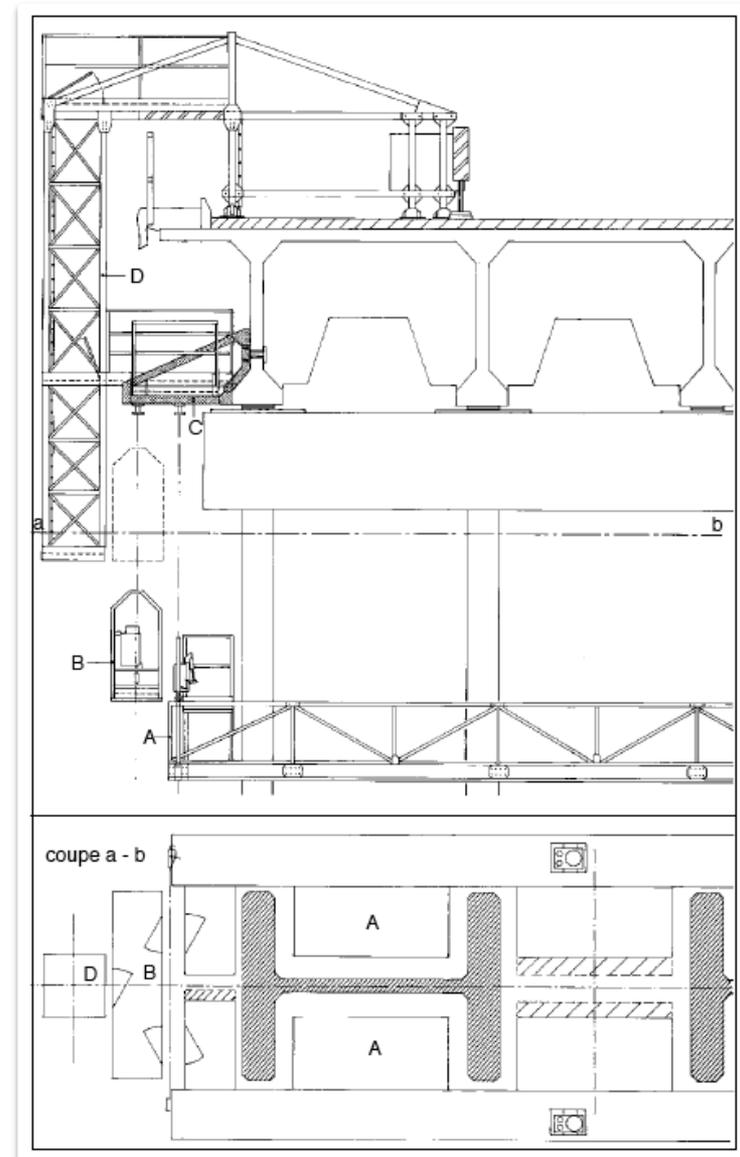
- Two 13 meter long working ALTA platforms (A), each operated by 2 hydraulic TIRFOR machines(TU-16H).
- One 3 meter ALTA platform (B) equipped with TIRAK hoists and used as an elevator to bring the personnel from the gantry (D) down to the working platforms (A).
- Two suspension brackets (C) which are fixed under the roadway of the bridge straight above the piers.
- One gantry (D) with a ladder, sited on the roadway and giving access to the suspension brackets (C) and to the platform (B).





Saint-Nazaire bridge, France

- Two 13 meter long working ALTA platforms (A), each operated by 2 hydraulic TIRFOR machines(TU-16H).
- One 3 meter ALTA platform (B) equipped with TIRAK hoists and used as an elevator to bring the personnel from the gantry (D) down to the working platforms (A).
- Two suspension brackets (C) which are fixed under the roadway of the bridge straight above the piers.
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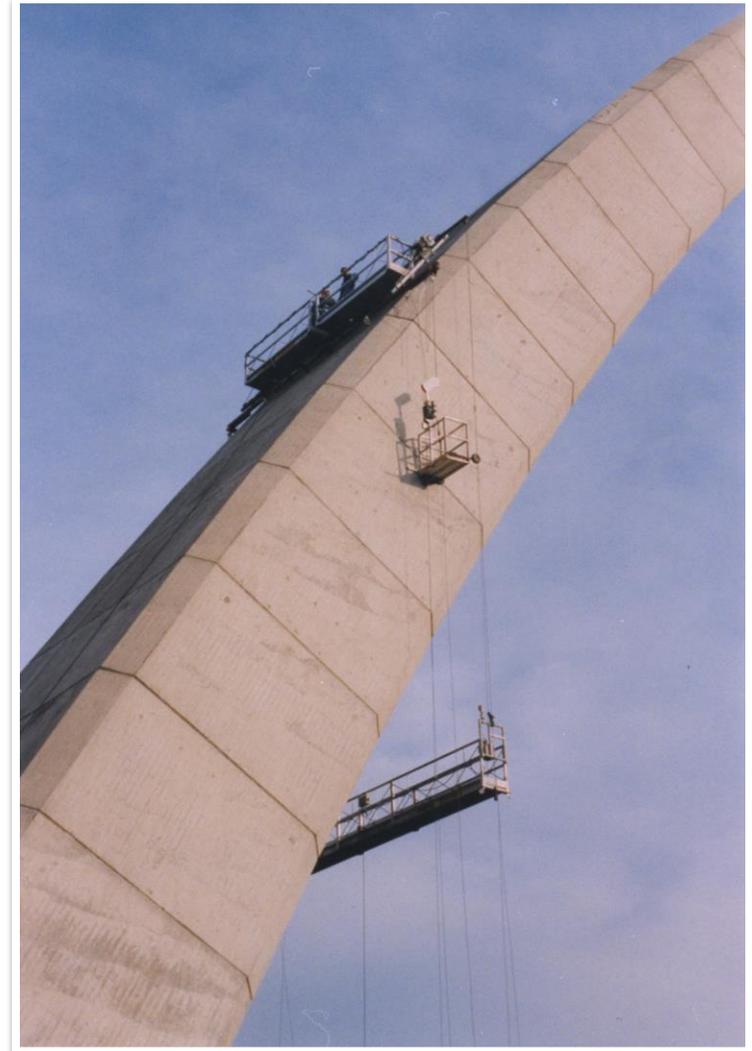




Fuldatalbrücke Morschen

Renovation work on concrete arch.

- 1 special platform running on the upper surface
- 1 suspended ALTA platform for access to the lower surface
- 1 SOLO cradle used as elevator





Hohenzollern Bridge, Cologne

- Heavy working platform running on the upper framework of the arch, driven by 4 powered TIRAK T-2000/3000 hoists.
- 1 ALTA cradle for emergency escape.



More about construction



Recent similar application :

Les Camemberts, Paris

- Temporary 15 m platform running on curved facade
- Lifting by two TIRAK X-800
- Slope detection, manual adjusting of inclination by 2 TIRFOR TU7A 2000 hoists

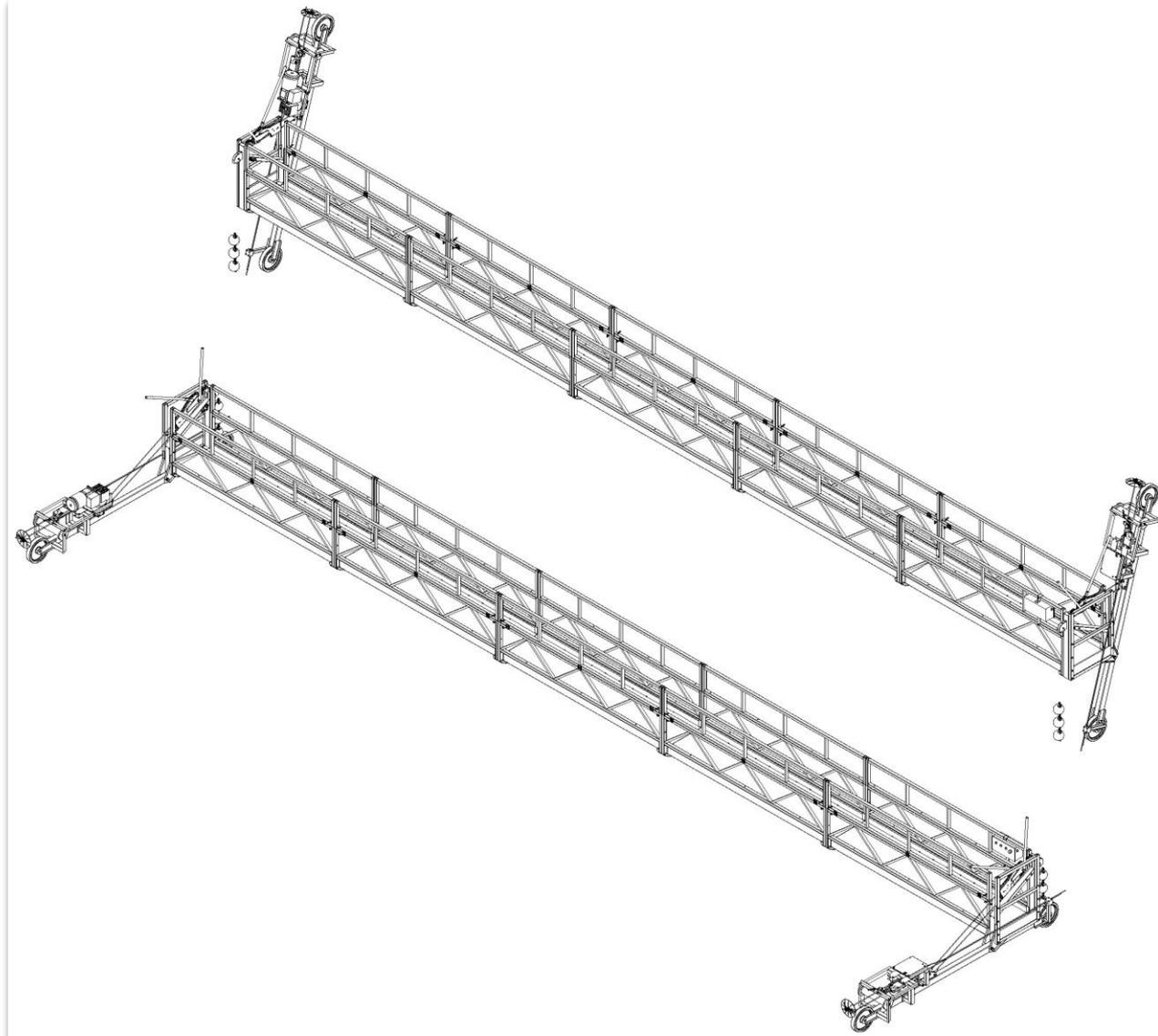




Recent similar application :

Les Camemberts, Paris

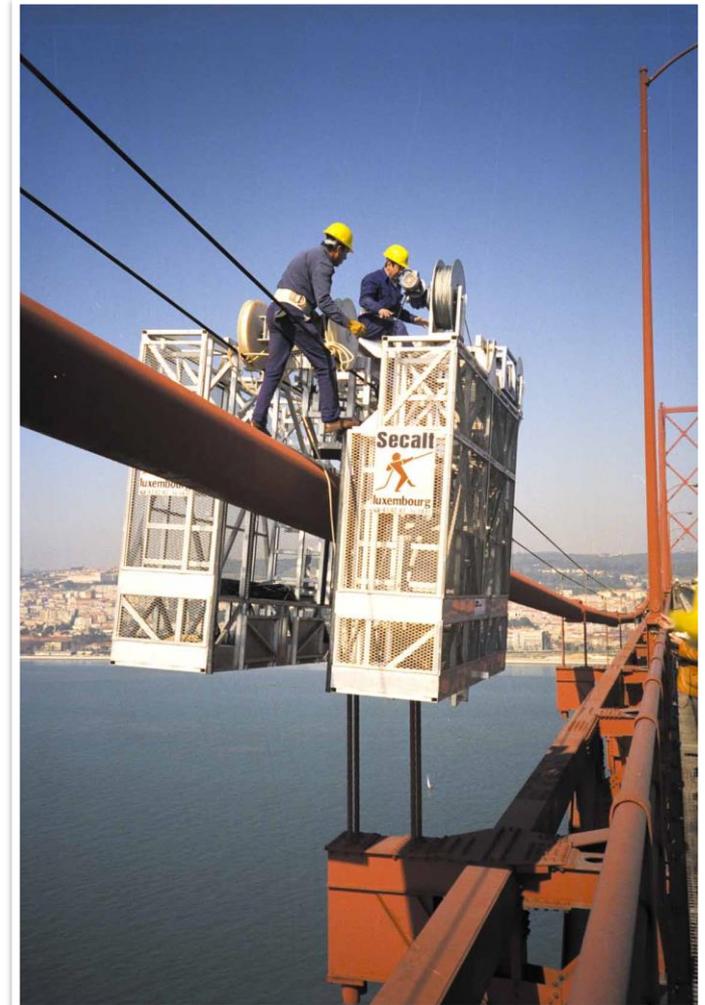
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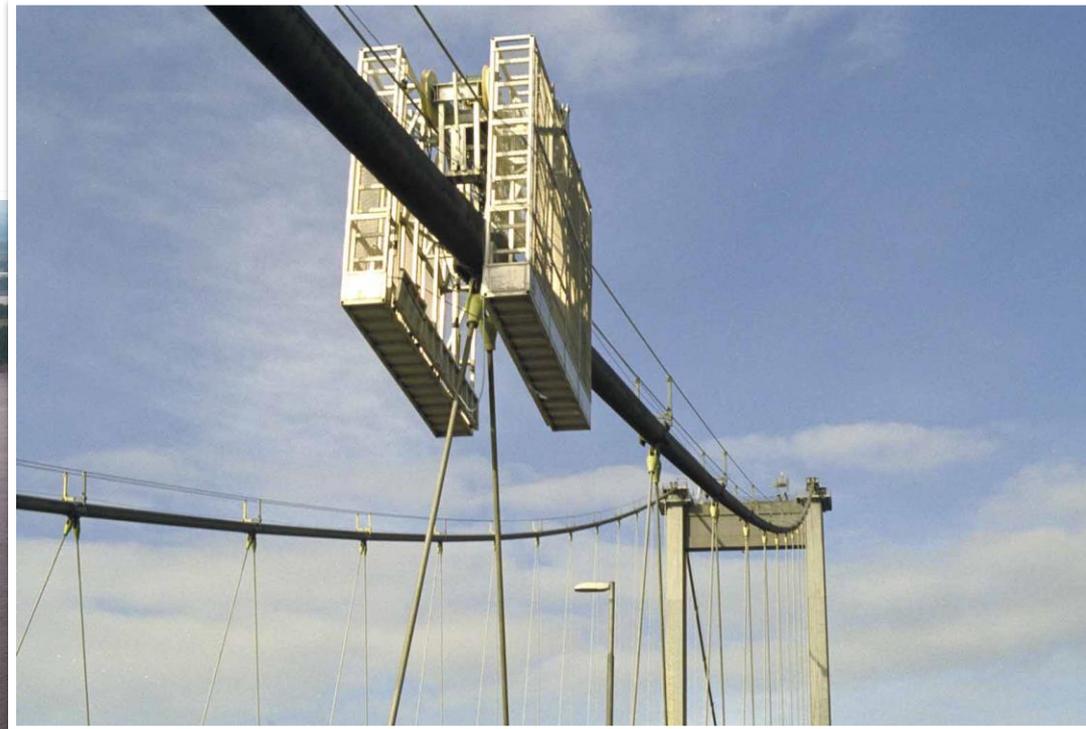




Tagus Bridge Lisbon, Portugal

- Inspection and maintenance of suspension cables
- Traversing trolley running on two "hand" ropes
- Gantry comprising 2 cages straddling the main suspension cable
- Operated by a TIRAK T-1020 hoist mounted on the platform
- The traction and safety wire ropes are anchored and tensioned on the bridge deck using 2 manual TIRFOR winches
- 1 material lifting cradle





Severn Bridge, United Kingdom

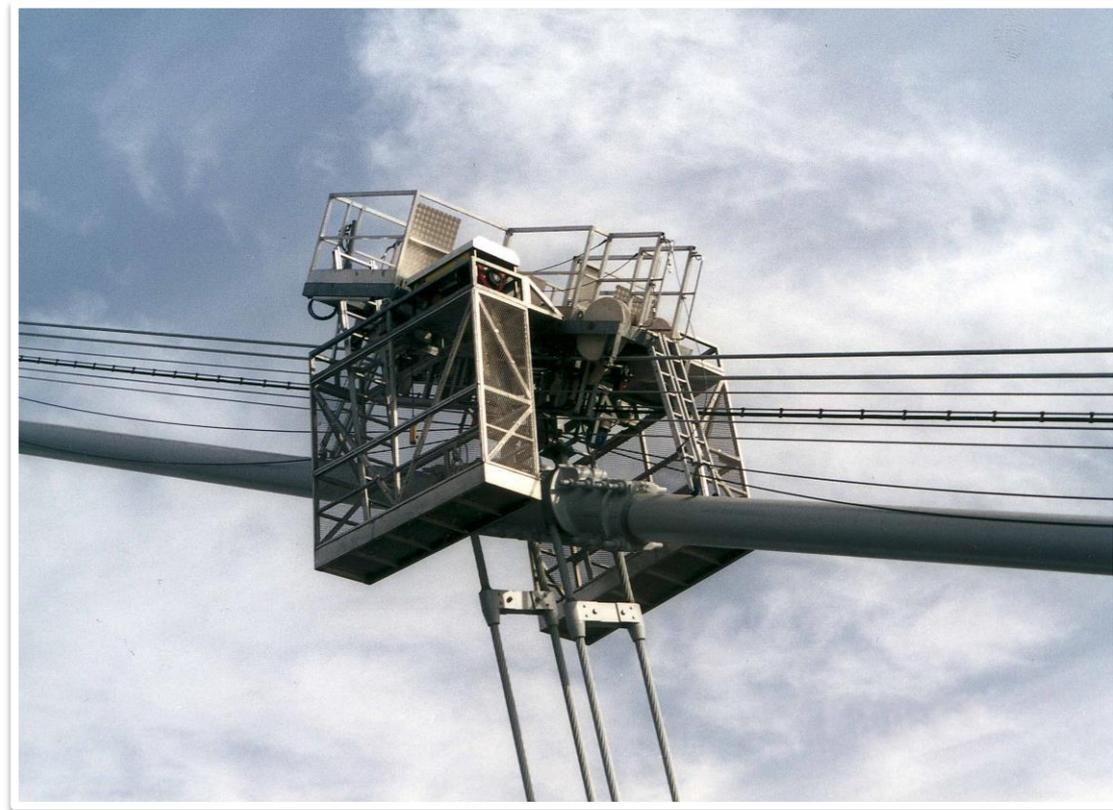
- Gantry for inspection and maintenance of suspension cables, identical to the Tagus Bridge equipment.



Access to Main Cables

Young Jong Bridge, Seoul

- Gantry with 2 cages traversing powered by T-1000 hydraulic TIRAK hoist.

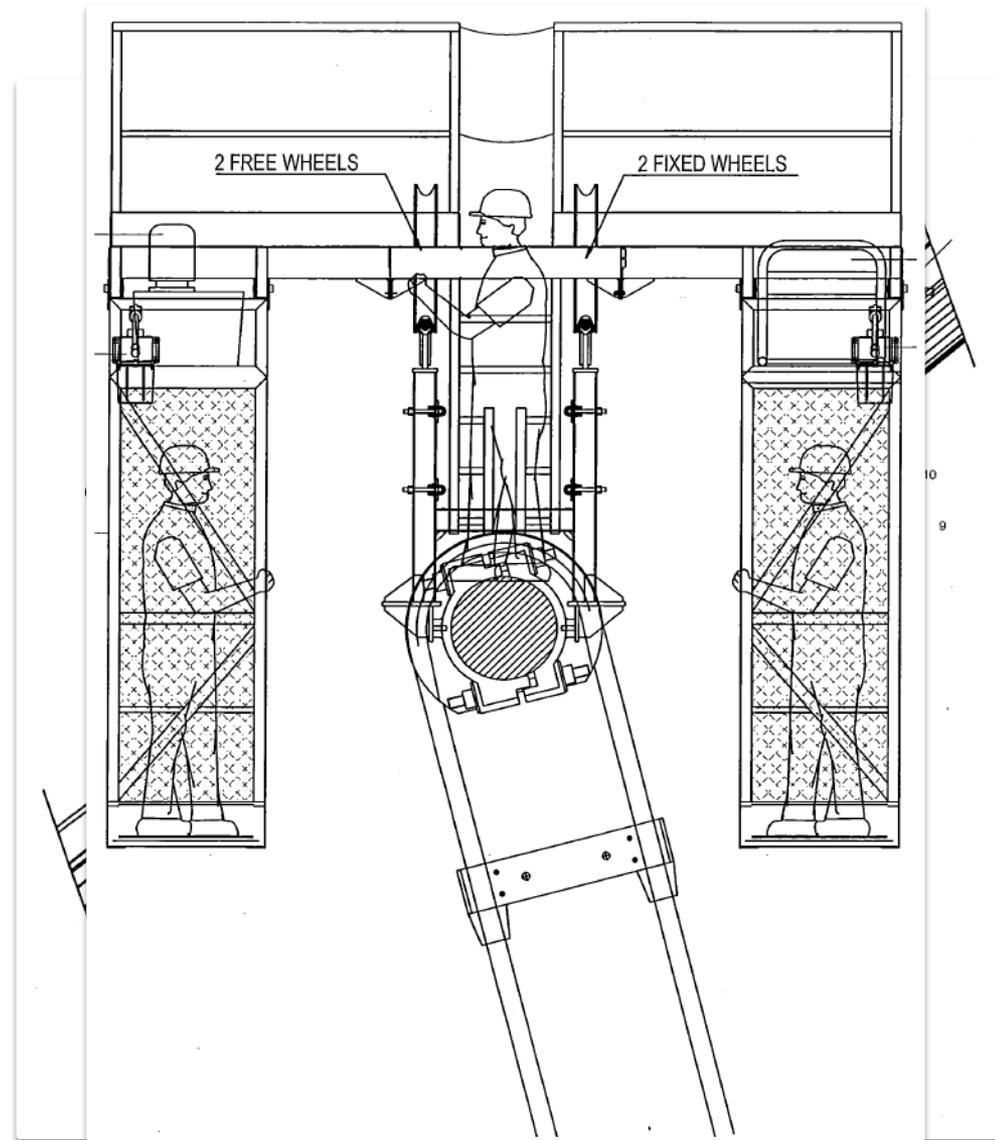




Access to Main Cables

Young Jong Bridge, Seoul

- Gantry with 2 cages traversing powered by T-1000 hydraulic TIRAK hoist.





Access to Suspenders

Young Jong Bridge, Seoul

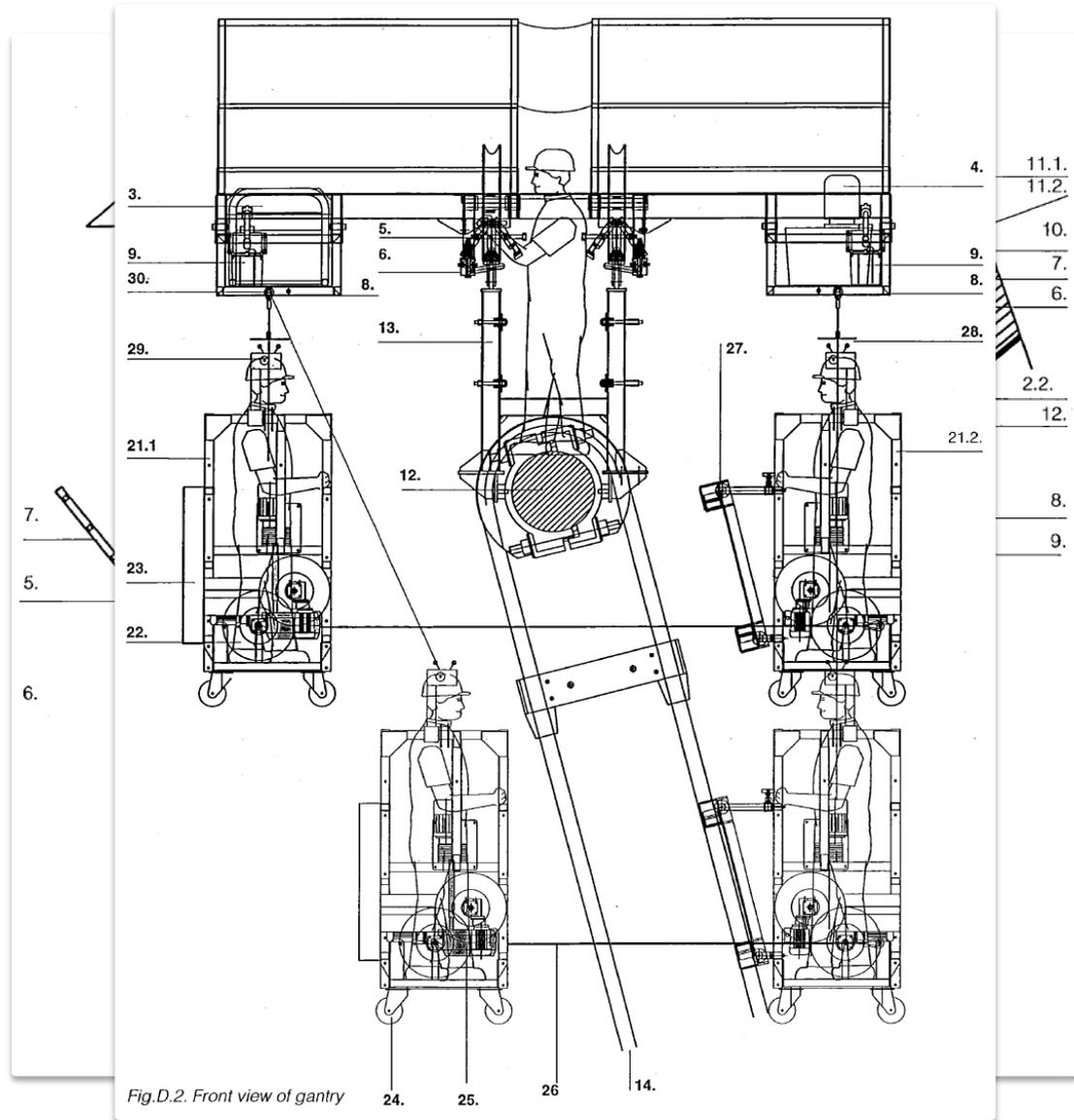
- 1 traversing trolley with 2 suspended cradles powered by T-1000 hydraulic TIRAK hoists for inspection of vertical suspension cables.



Access to Suspenders

Young Jong Bridge, Seoul

- 1 traversing trolley with 2 suspended cradles powered by T-1000 hydraulic TIRAK hoists for inspection of vertical suspension cables.

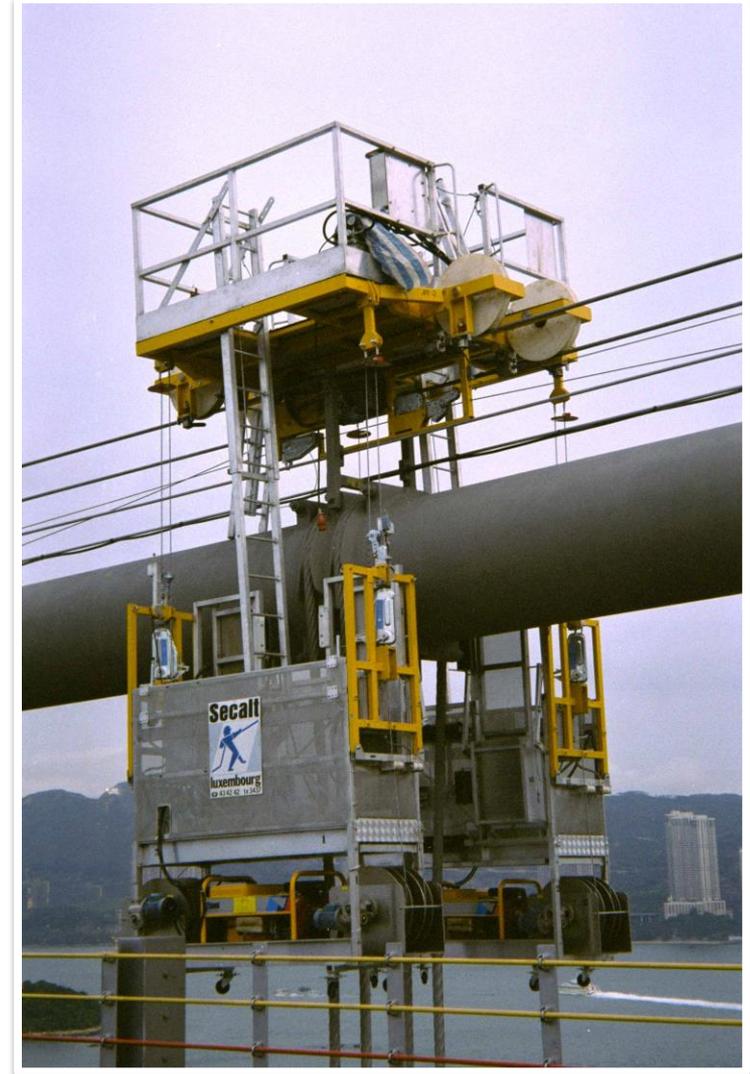




Access to Main Cables

Tsing Ma Bridge, Hong Kong

- 2 suspended cradles powered by electrical TIRAK hoists for inspection of vertical suspension cables
- TIRFOR winches for emergency operations
- Electric power generator set installed under the cradle.





Access to Main Cables



Clifton Bridge



Access to Cables

Newport Transporter Bridge, United Kingdom

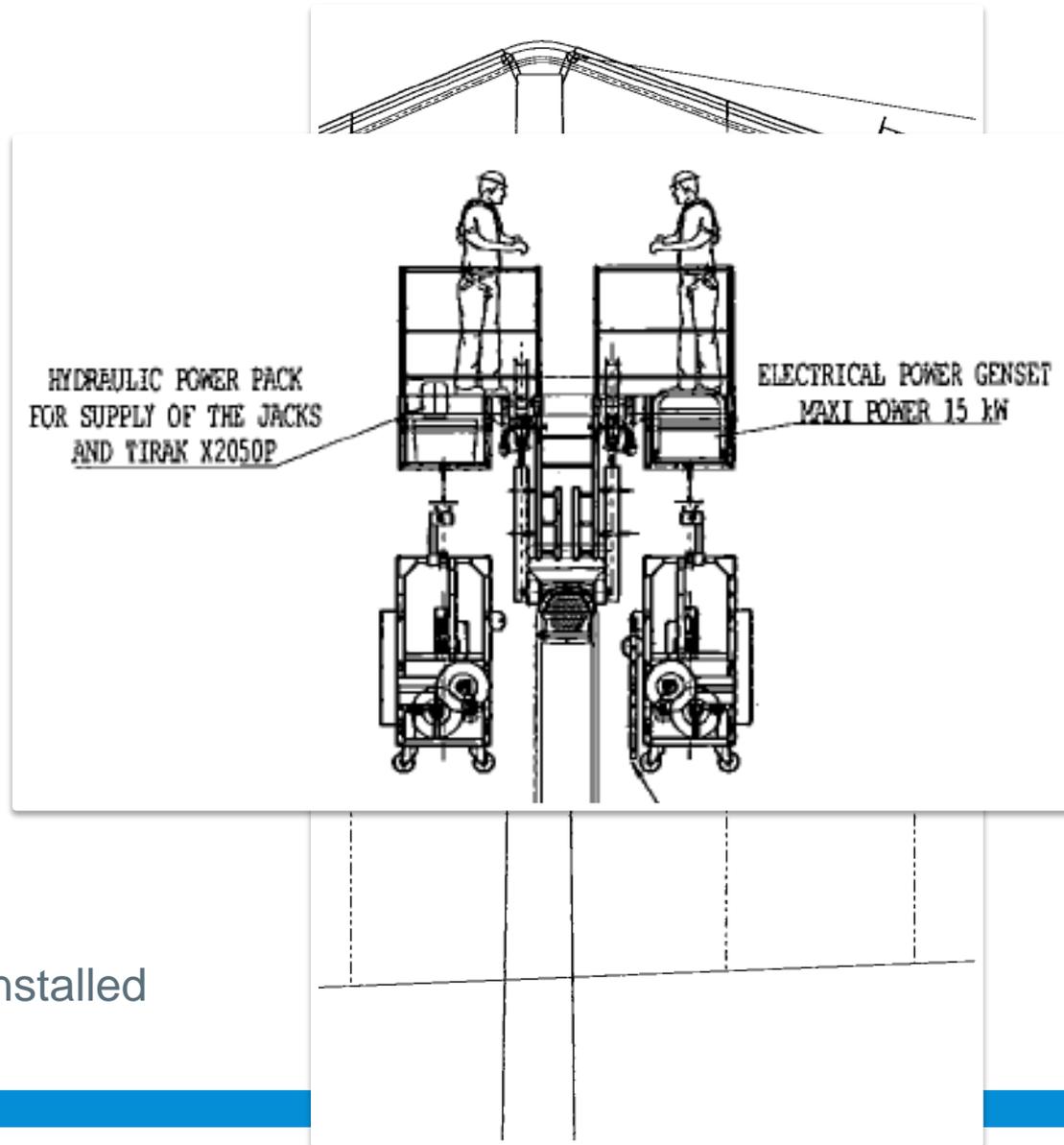
- 1 ALTA L platform suspended by two TIRFOR TU-8 winches
- 1 Trolley running along the wire ropes and manoeuvred by a mobile electrical TIRAK T-500 hoist with reeler for 300m wire rope.
- To control the hoist from the platform our patented MAGTRON system was used.



Access to Cables

MacDonald and Mackay Bridge, Canada

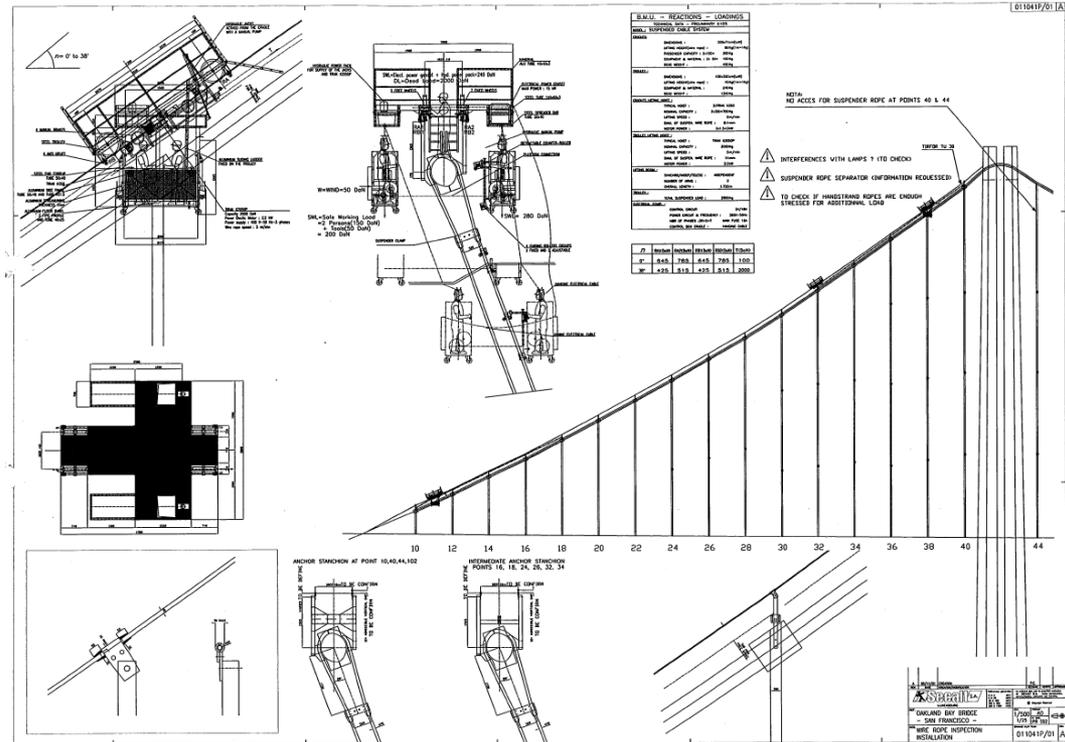
- 1 Gantry running on the main wire ropes and manoeuvred by an electrical X-2050P TIRAK hoist
- Two 2 m ALTA L platforms suspended from the trolley for the inspection of the suspenders
- Manual gantry slope adjustment with hydraulic jack
- Electric power generator set installed under the cradle.



Access to Cables

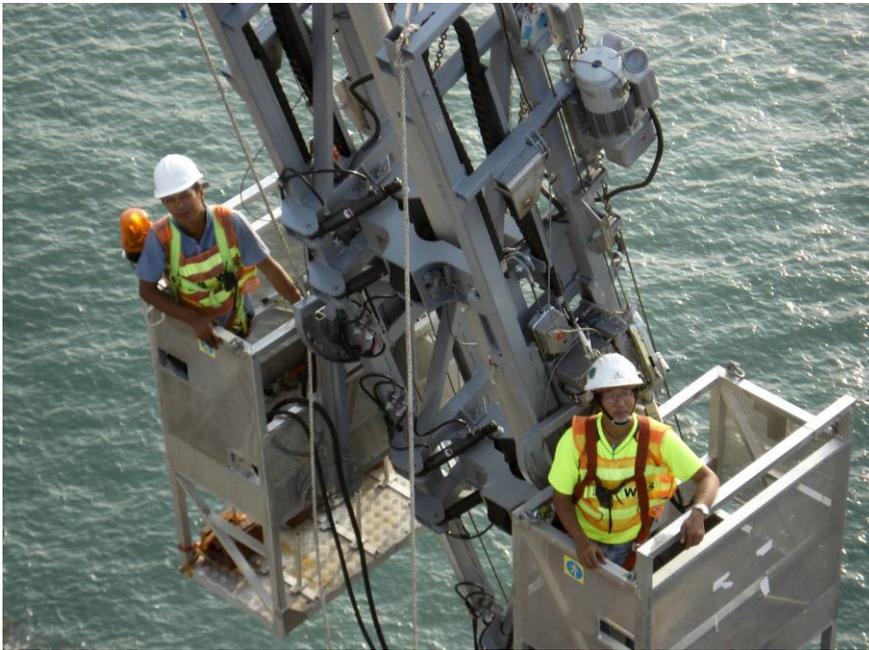
Oakland Bay Bridge, San Francisco

- 1 Gantry running on the main wire ropes and manoeuvred by an electrical TIRAK X-2050P hoist
- Two 2 m ALTA L platforms suspended from the trolley for the inspection of the suspenders
- Manual gantry slope adjustment with hydraulic jack
- Electric power generator set installed under the cradle.





Access to Cables



Stonecutters Bridge, Hong Kong

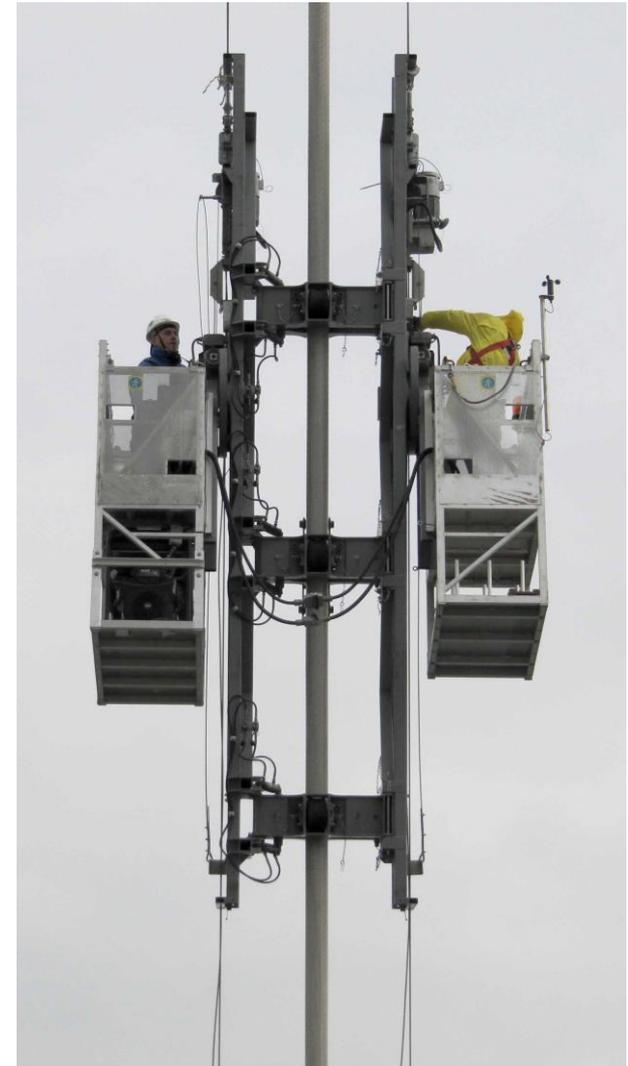




Access to Cables

Stonecutters Bridge, Hong Kong

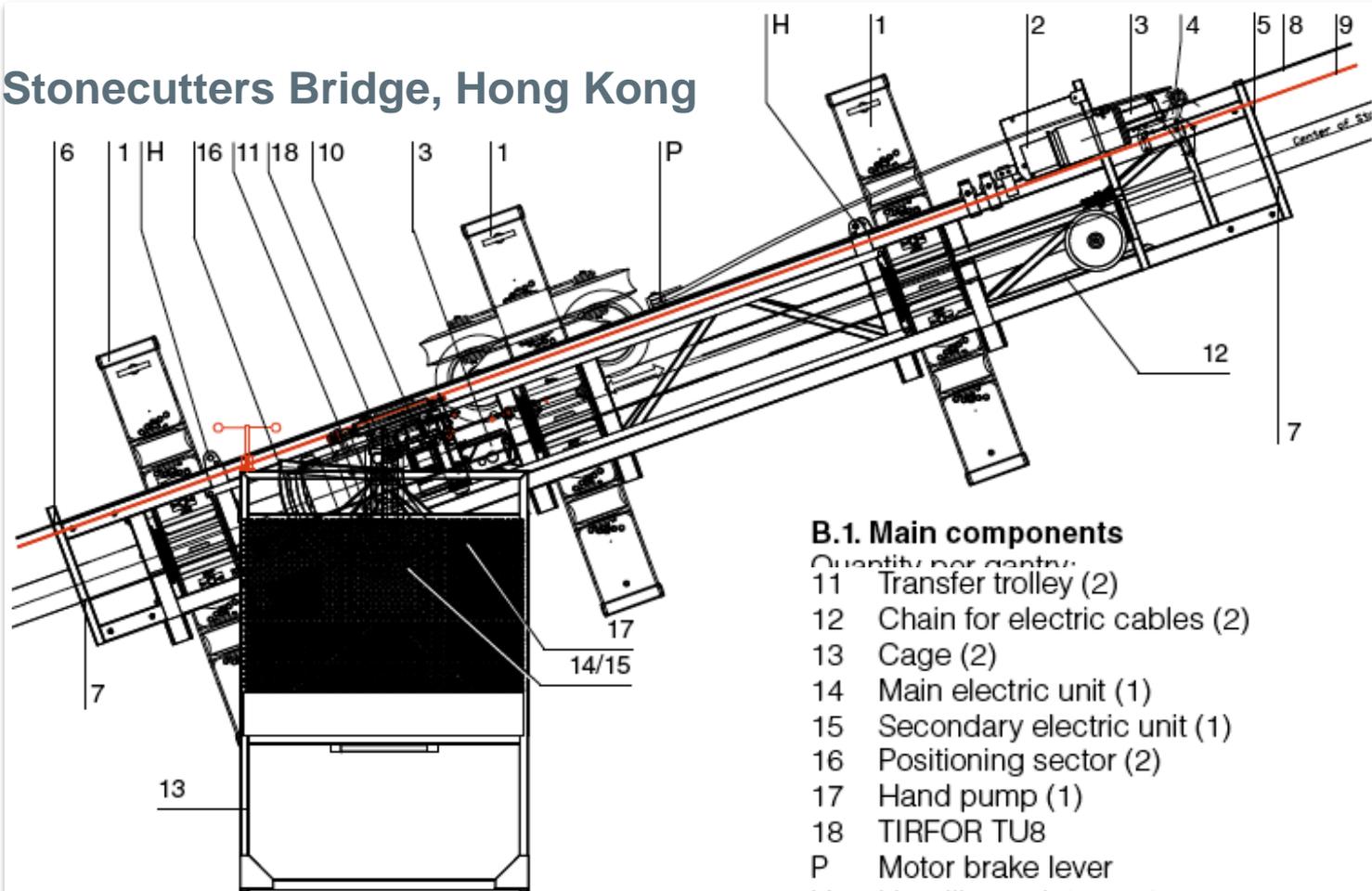
- Gantry with 2 cages powered by T-1030P electric TIRAK hoist ,
- 3-clamps technology - gantry passes over cross ties





Access to Cables

Stonecutters Bridge, Hong Kong



B.1. Main components

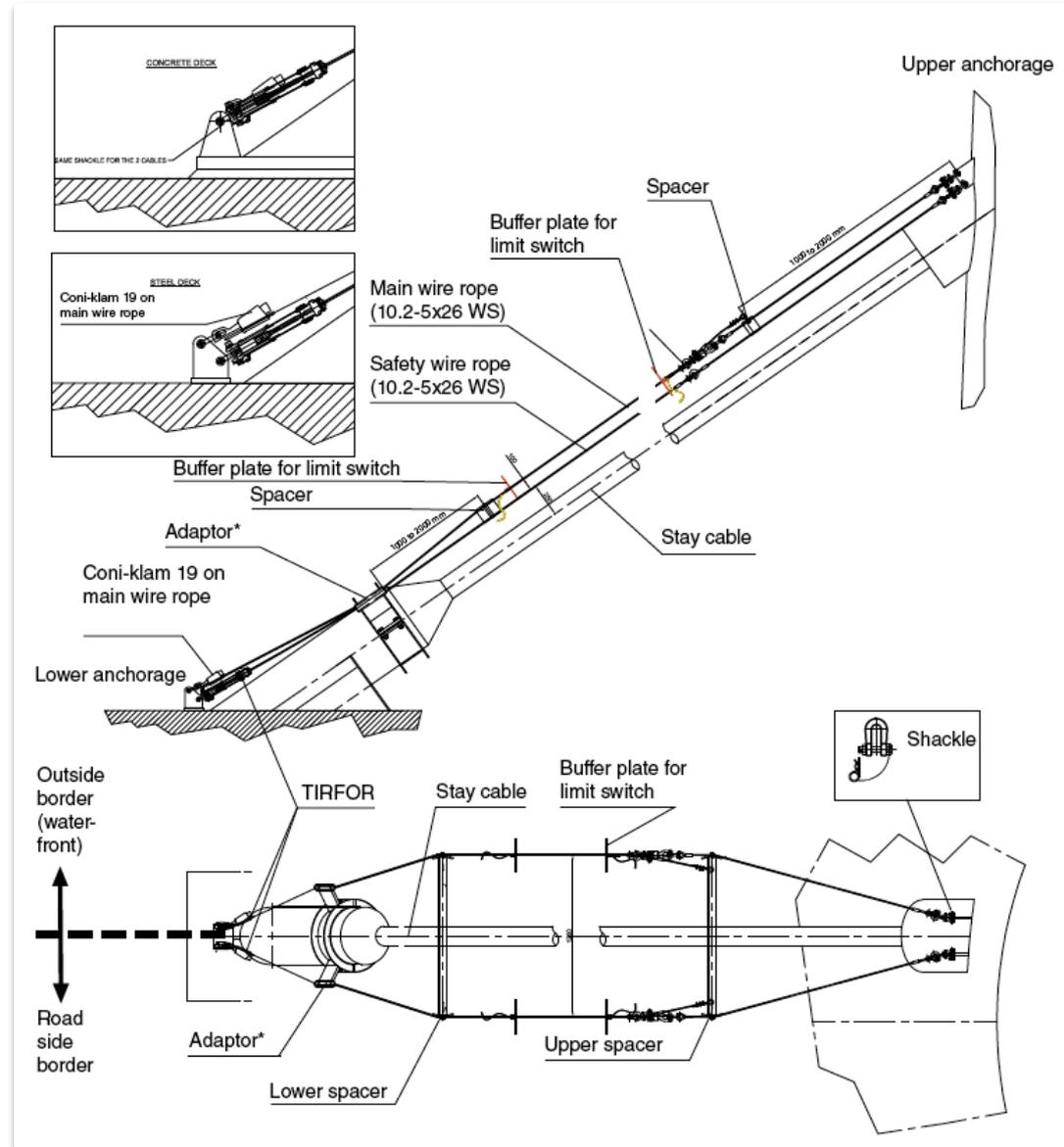
Quantity per gantry:

- 11 Transfer trolley (2)
- 12 Chain for electric cables (2)
- 13 Cage (2)
- 14 Main electric unit (1)
- 15 Secondary electric unit (1)
- 16 Positioning sector (2)
- 17 Hand pump (1)
- 18 TIRFOR TU8
- P Motor brake lever
- H Handling points gantry

Access to Cables

Stonecutters Bridge, Hong Kong

Wire rope attaching principle

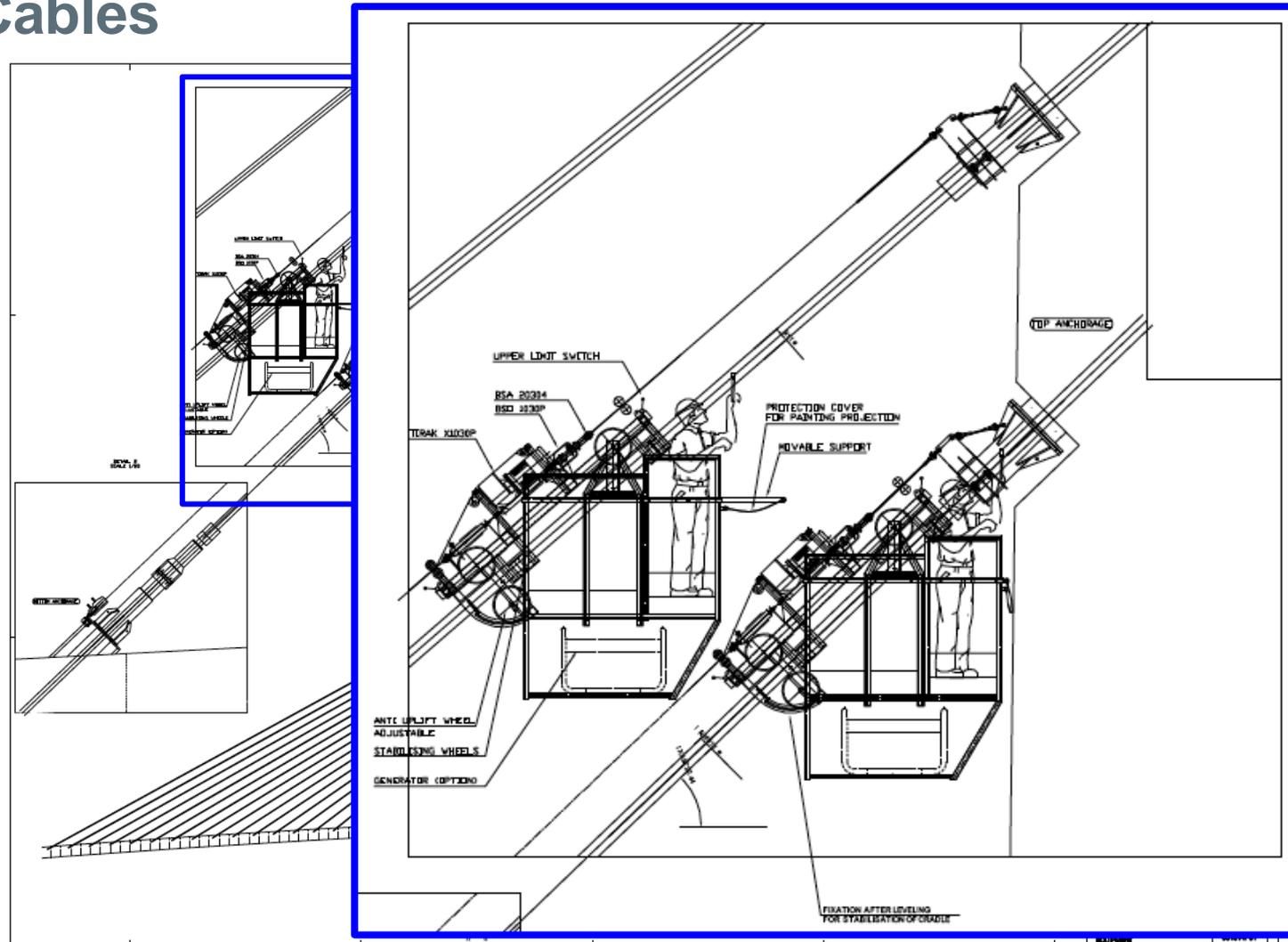




Access to Cables

Rama 9 Bridge, Thailand

- Gantry with 1 cage powered by electrical TIRAK X-1030P hoist

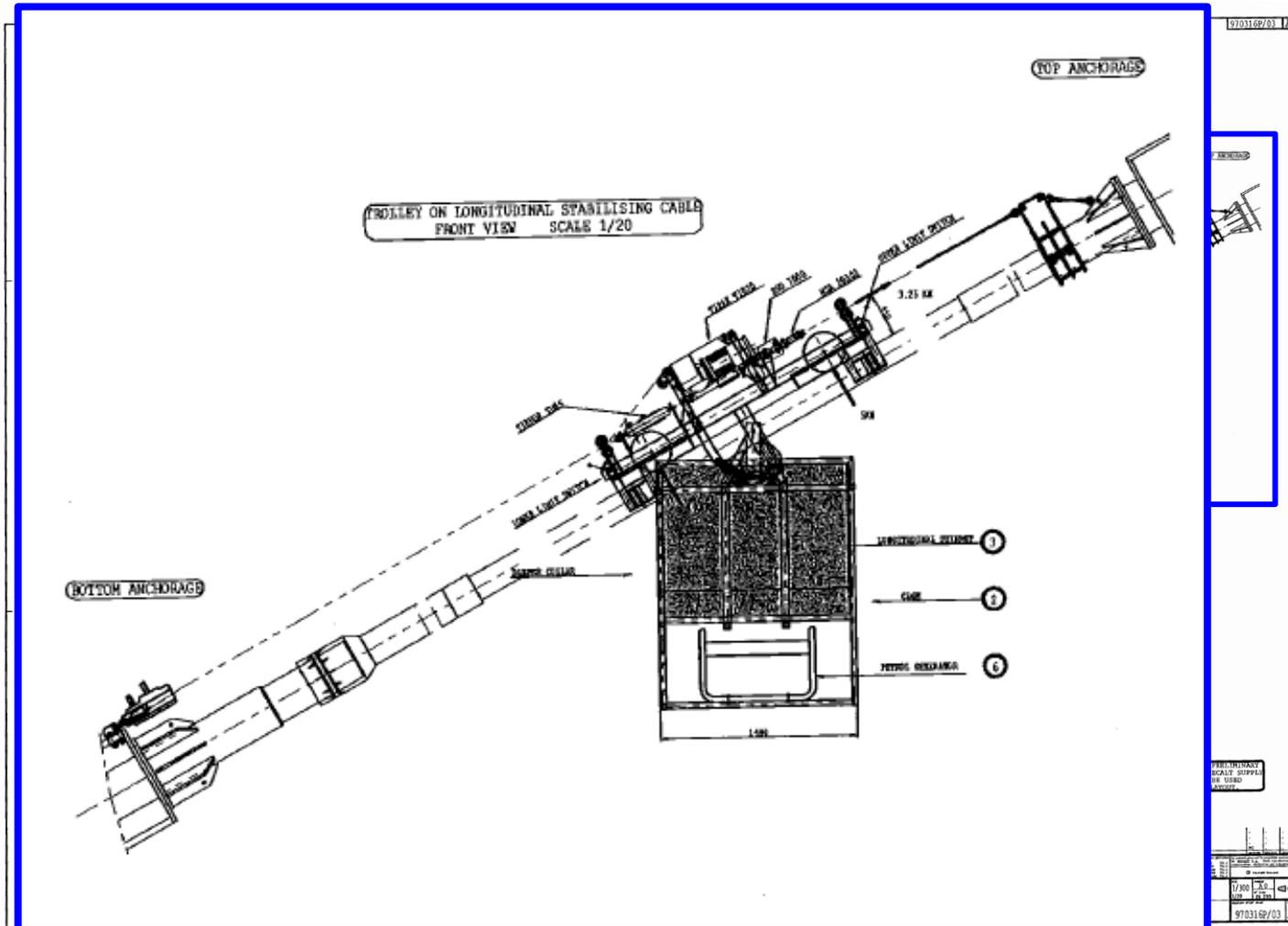




Access to Cables

Seohae Grand Bridge, Thailand

- Gantry with 2 cages powered by electrical TIRAK T-1020 hoist.





Access to Cables

1. Installing the protective sheaths on the stayed cables.



Normandy Bridge, France

1. 4 traversing trolleys, each fitted with a TIRAK T-1020 powered hoist and a cradle.



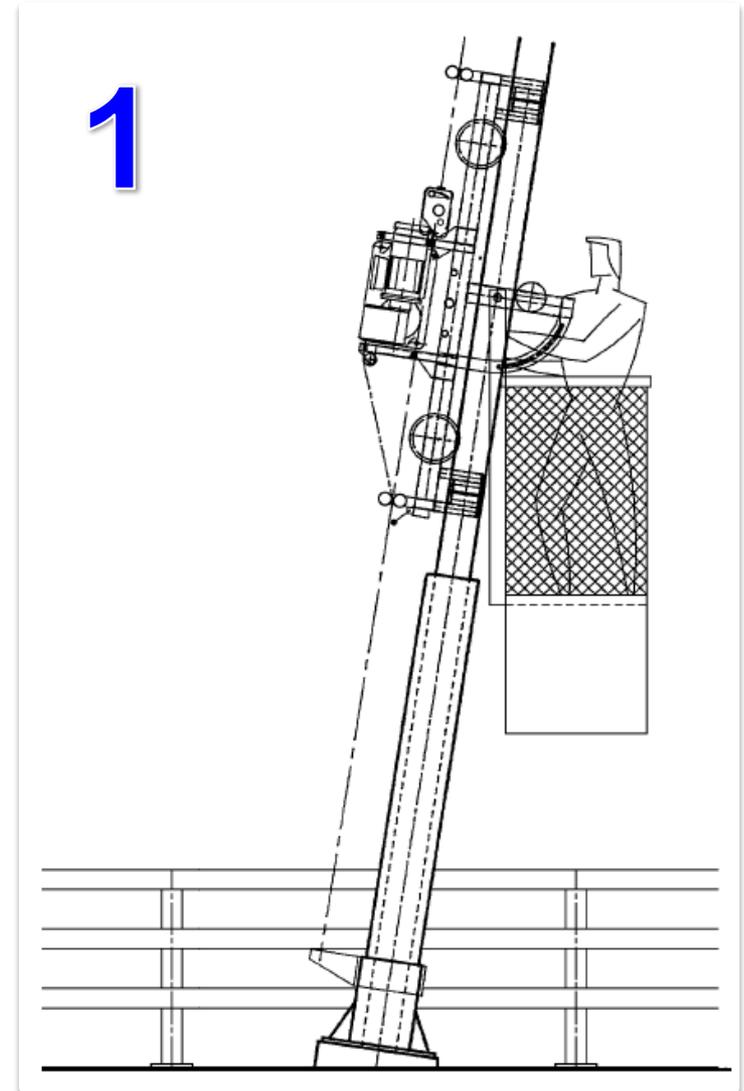


Access to Cables

1. Installing the protective sheaths on the stayed cables.

Normandy Bridge, France

1. 4 traversing trolleys, each fitted with a TIRAK T-1020 powered hoist and a cradle.





Access to Cables

2. Regular inspection of the stayed cables.

Normandy Bridge, France

2. 4 special trolleys, each fitted with 2 TIRAK T-1020 powered hoists and 2 cradles.





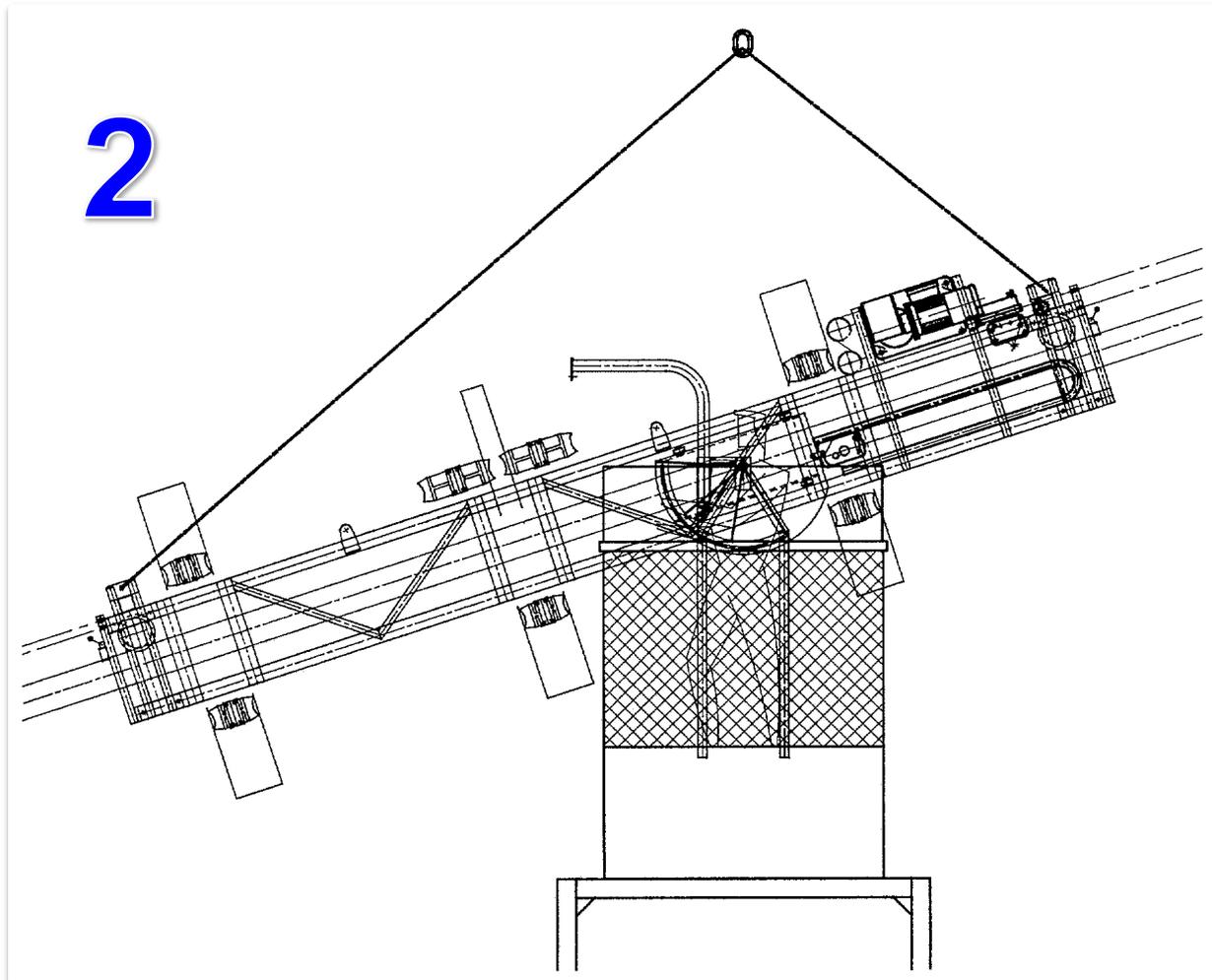
Access to Cables

2. Regular inspection of the stayed cables.

2

Normandy Bridge, France

2. 4 special trolleys, each fitted with 2 TIRAK T-1020 powered hoists and 2 cradles.



Cable anchor points

Normandy Bridge,
France





Access to Cables



Tin Kao Bridge, Hong Kong
Maintenance access equipment for
cables



Access to Cables

Tin Kao Bridge, Hong Kong

- Gantry running on the cables driven by electrical TIRAK T-1000 hoist
- SOLSIT work seat suspended from a Maxi Davit on the top of the towers is used to install the anchorings of the lifting and safety wire ropes
- Electric power generator set installed on the gantry





Access to Cables

Chao Phraya Bridge, Bangkok/Thailand

Operating inspection cradles on the guy ropes and the bridge pylons. The cradles for the inspection of the pylons and guy ropes are also fitted with powered TIRAK hoists.





Installation of Cables

Motorway bridge at Hespérange, Luxembourg.

- 2 special platforms equipped with TIRFOR TU-32H
- 1 ALTA cradle fitted with TIRAK hoists, previously used for the WandreViaduct

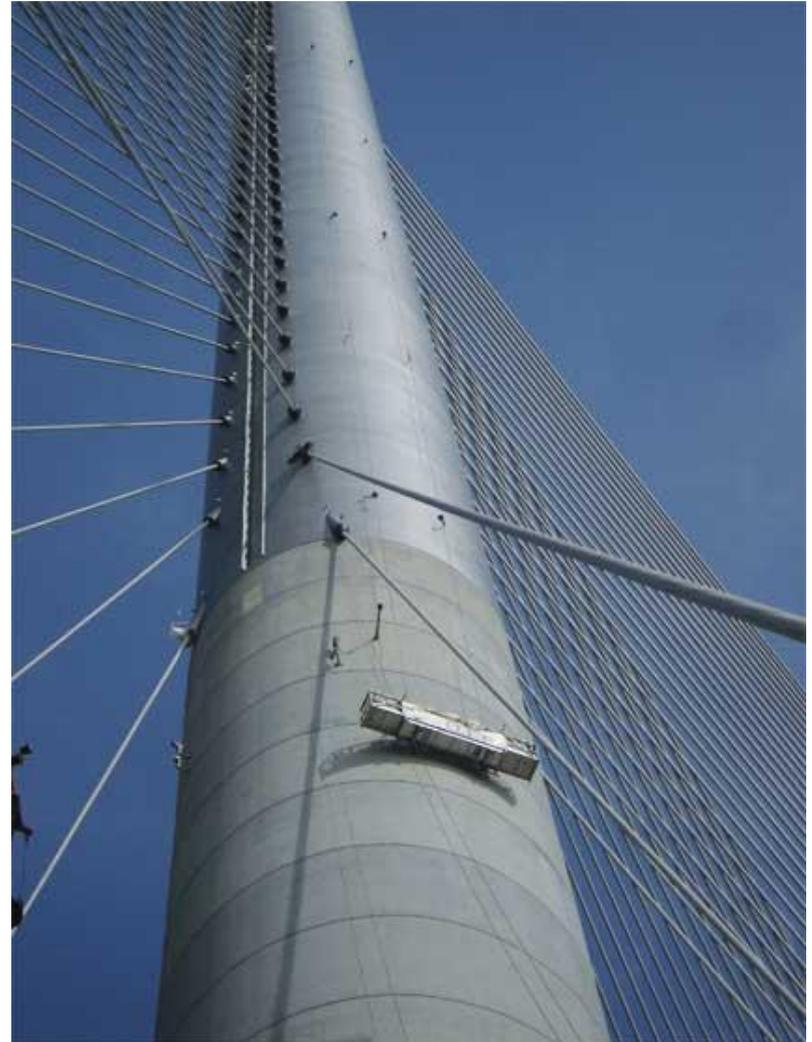


More about construction



Stonecutters Bridge, Hong Kong

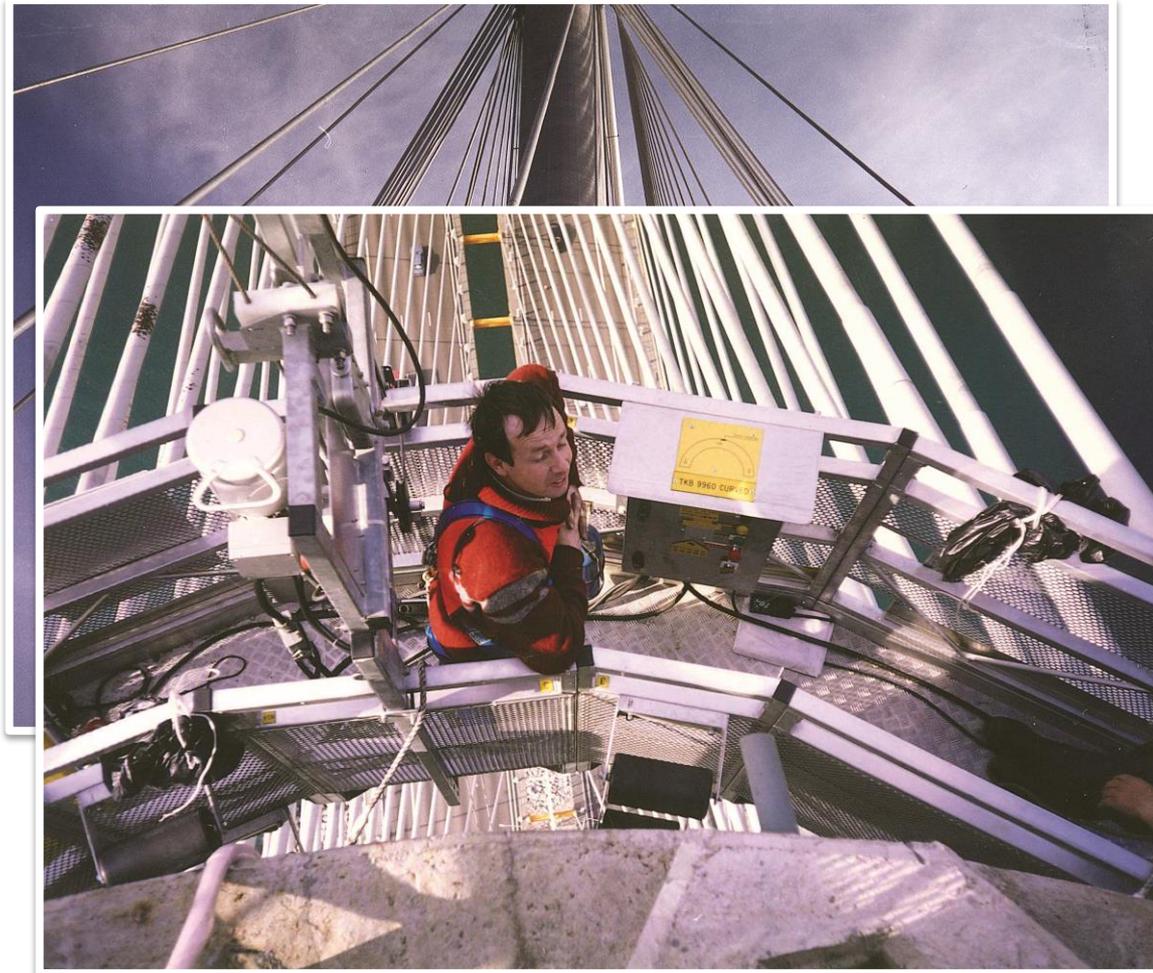
- 1 fix TMUs (MUSTANG) on each bridge pylon
- MAGTRON 5020
- 1 one-man cradle
- 1 two-men-cradle

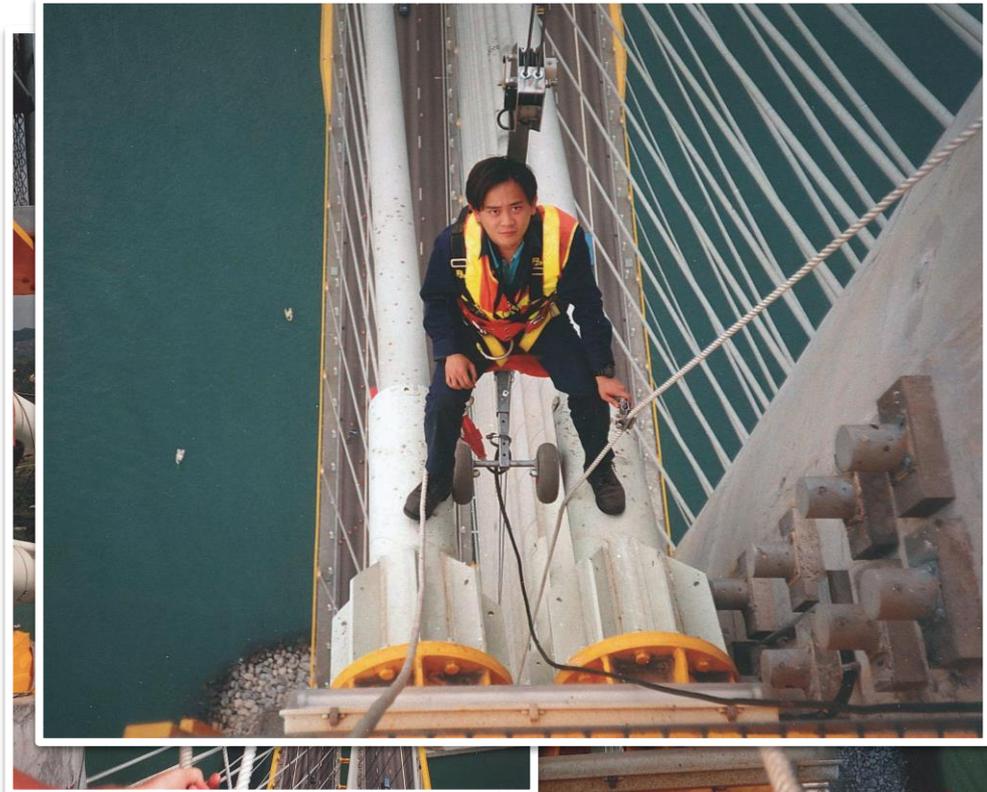




Tin Kao Bridge, Hong Kong

- 1 modular semi-circular ALTA S platform (4 to 6 m) for bridge tower inspection
- Suspended from Maxi Davits on the top of the tower
- Lifting height 220 m



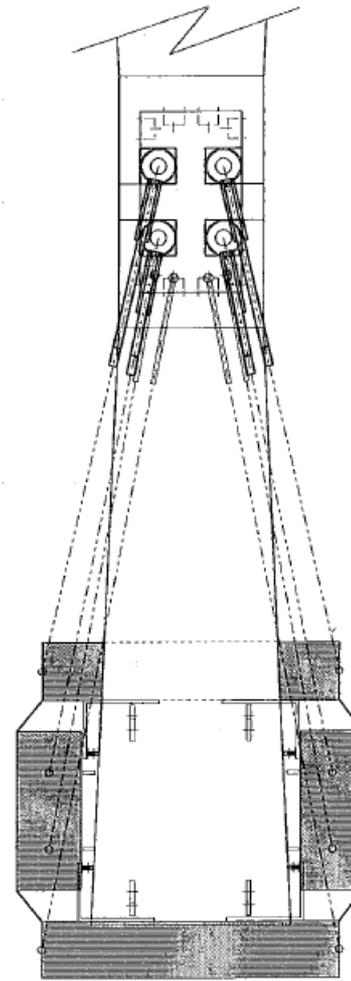


Tin Kao Bridge, Hong Kong

- 1 SOLO cradle and powered SOLIST work seat for inspection of cable anchor points
- Suspended from Maxi Davit on the top of the tower
- Lifting height 220 m

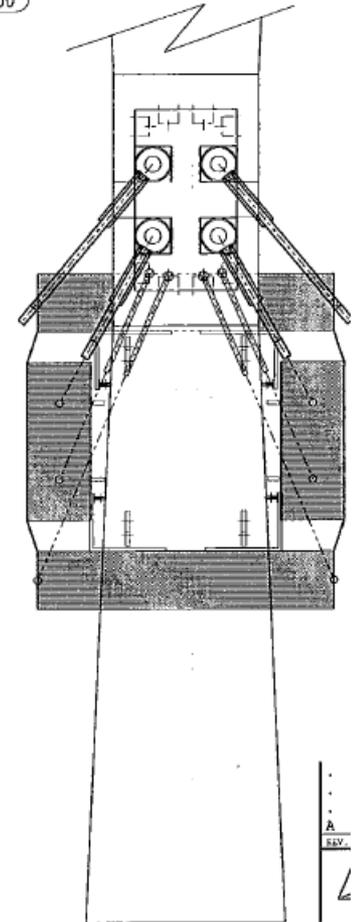


SYSTEM IN LOW POSITION



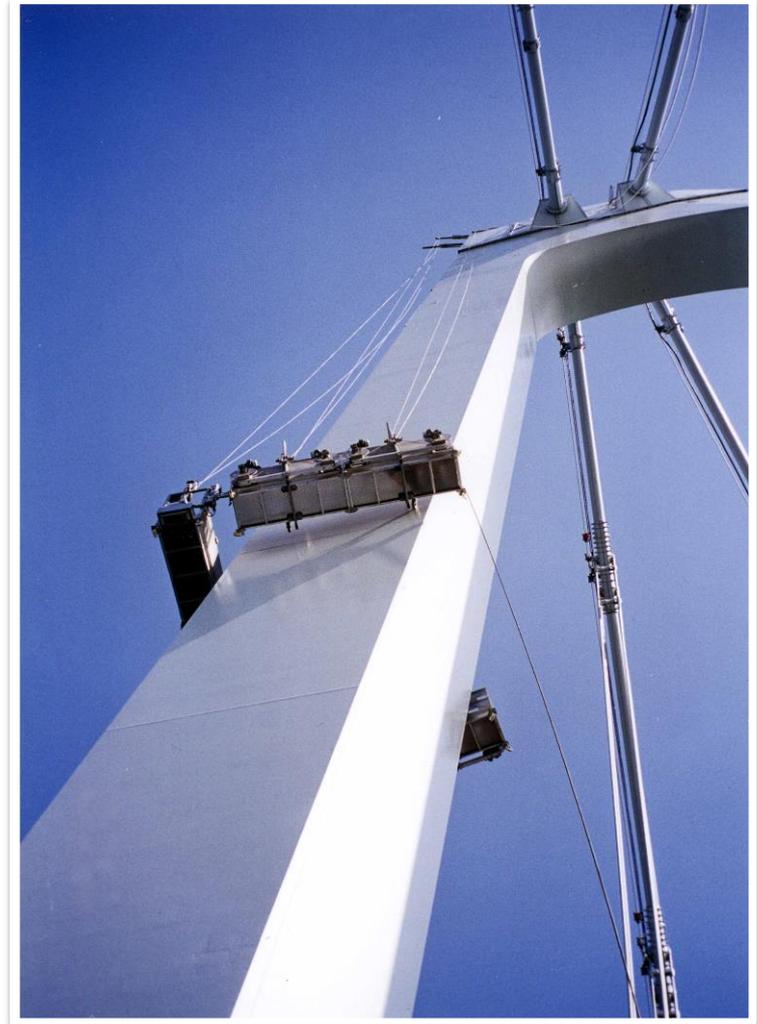
SECTION A-A
SCALE 1/50

SYSTEM IN HIGH POSITION



Gugum Bridge

- Two 4 m cradles and two 2 m cradles for inspection of cable anchor points
- Suspended from 4 Maxi Davits and 4 MINI Davits on the top of the tower
- Lifting height 50 m



Young Jong Bridge, Seoul

- 3x ALTA S cradles (6 and 8 m) for bridge tower inspection
- Suspended from Maxi Davits on the top of the tower



Tsing Ma Bridge, Hong Kong

- 2 nos. special semi-circular cradles fitted with 3 TIRAKs > 700P and powered by a generator



- Fitting the anchor points for the cables of a cable-stayed bridge

Wandre Viaduct at Herstal, Belgium

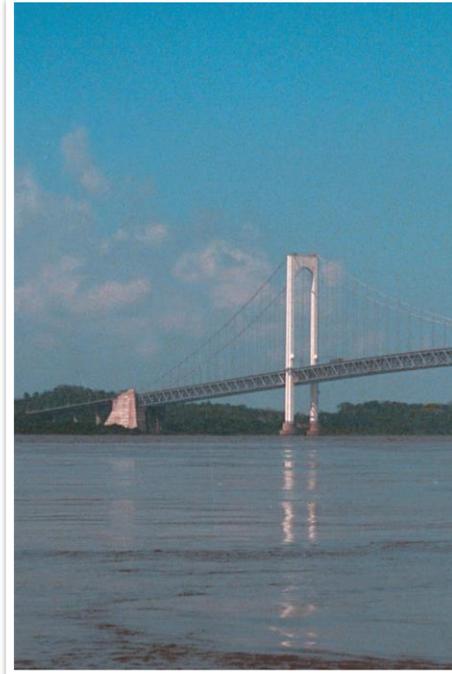
- 2 special 9 m work platforms, each fitted with 4 hydraulic TIRFOR TU-32H winches
- Working load 1 tonne



More about construction



- Repainting the pylons of a suspension bridge



Angostura bridge over the River Orinoco, Venezuela

- Suspended standard platforms with powered TIRAK hoists.

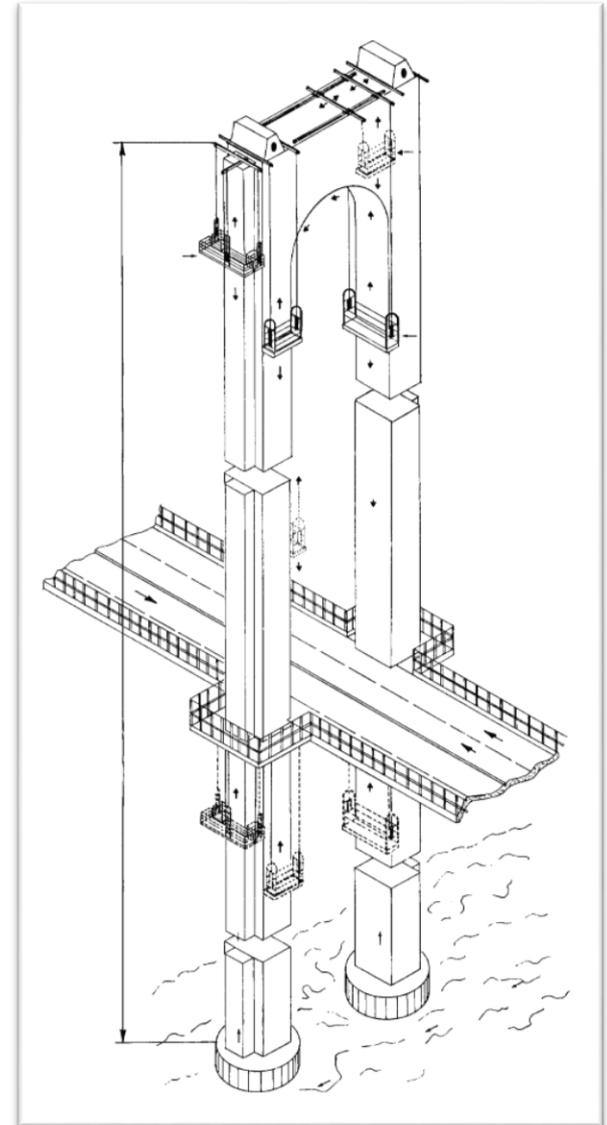




- Repainting the pylons of a suspension bridge

Angostura bridge over the River Orinoco, Venezuela

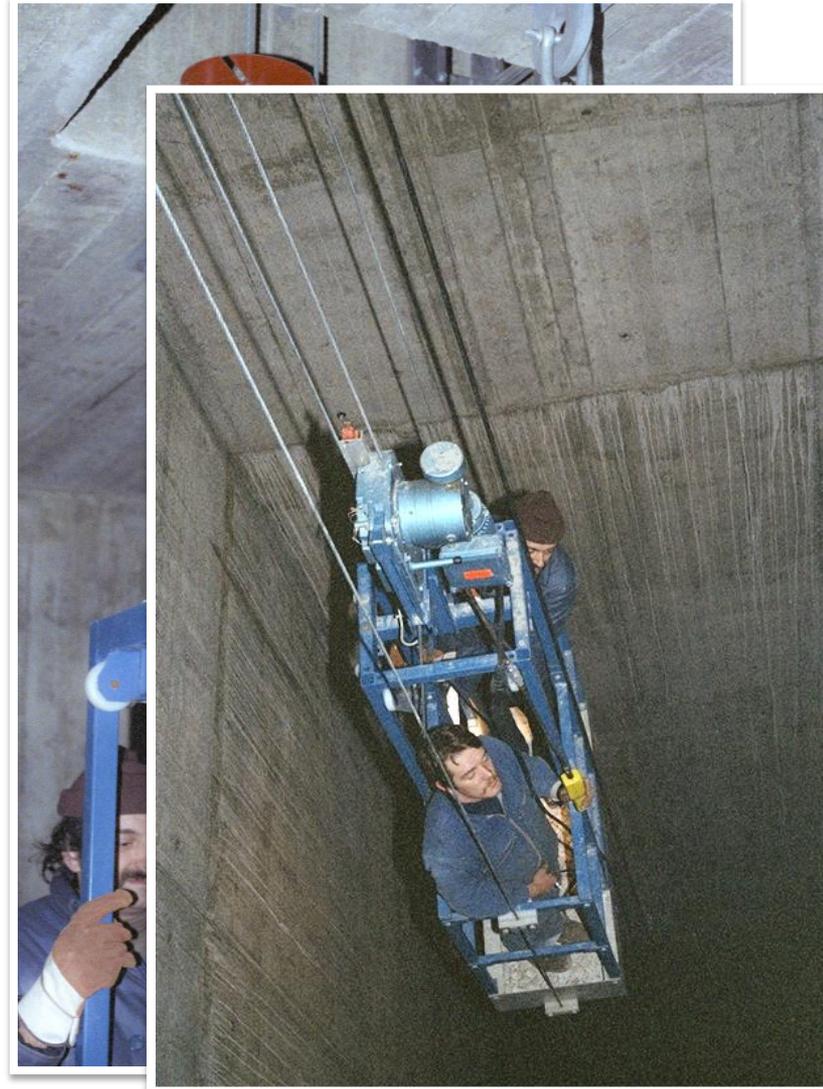
- Suspended standard platforms with powered TIRAK hoists.





Viaducts of Steinbrück, Breinfeld, Recht and Amblève, Belgium

1 telescopic platform with 1 TIRAK
T-500 machine and BLOCSTOP
safety device.





Positioning and pre-stressing prefabricated bridge sections

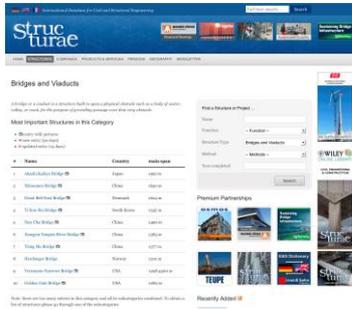


Viaduct Recht River, Belgium

2 special pre-stressing platforms, 2000 kg capacity, each fitted with 2 hydraulic TIRFOR TU-32H machines, mounted in a multiple sheave system, and 2 pre-stressing rams.

 [More about construction](#)

Interesting Links



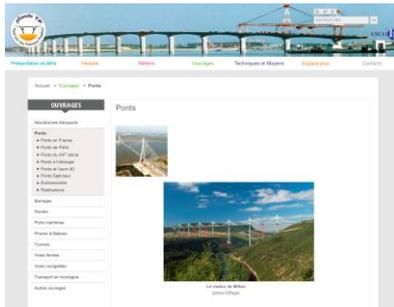
structurae.net (EN/DE/FR)



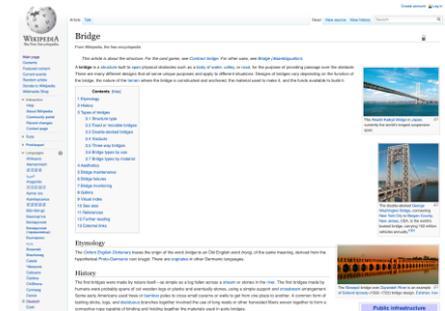
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bdeibig.com (EN)



planete-tp.com (FR/EN)



Wikipedia.org (EN/FR/...)



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- ouvrages souterrains ; construction, entretien
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Objective:

develop a framework for the management of bridges on the European road network and implement an appropriate management system.

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BRIME

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**Thank you very much
!**