

ECCE Workshop

The bridges connect people and nations

Emblematic Bridges on European Roads Itineraries  
in France

Georges Pilot 

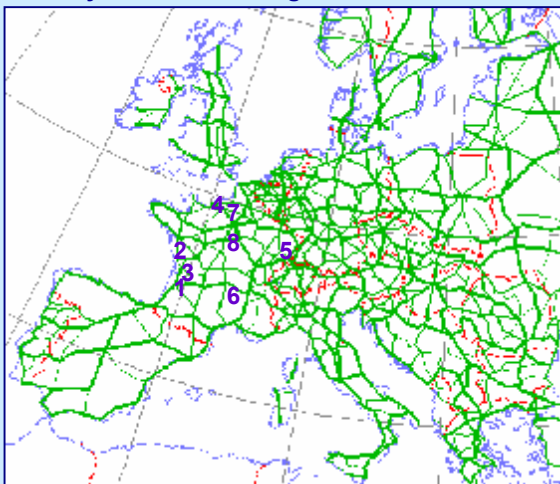
Bridges on European Roads Itineraries in France

High level requirements for alignments of European Motorways

> Long Bridges, High Bridges

> New design, Sophisticated construction processes, High performance materials

>> Many remarkable bridges



**1. Bordeaux**

Stone Bridge (1822)

**2. Rochefort**

Transporteur bridge (1900)

**3. La Rochelle**

Ile de Ré bridge (1988)

**4. Le Havre**

Normandie Bridge (1995)

**5. Strasbourg**

Pierre Pffimlin Bridge (2002)

**6. Millau Bridge** (2004)

**7. Rouen**

Gustave Flaubert Bridge (2008)

**8. Paris**

Alexandre III Bridge (1900)

Route Royale N°11. Paris-Bordeaux..... N° 152 to Spain and Portugal  
Bordeaux. The Stone Bridge (1822)



Picture: Georges Pilot

- . Objective : - to connect Provinces, north and south of the Garonne River  
- the north-south road to Spain
- . One of the most important bridges in France at the time of construction
- . 487 m long, 17 spans with circular arc profile. Stone and brick facing
- . Engineers: Jean-Baptiste Billaudel, Claude Deschamps

The Bordeaux Stone Bridge (1822)



- . A road link ? Yes.....but an obstacle for river navigation.
- . Transfert of Airbus A 380 elements ... Arches are too small.
- . Dedicated special lowered barges
- . Accurate navigation at low tidal!

E 5. Greenok/Southampton (UK), Le Havre/Paris/Bordeaux (FR), San-Sebastian, Madrid/Algeciras (Spain)  
**Bordeaux. The Aquitaine Bridge (1967)**



- . Objective : to improve the north-south car traffic, and to decrease car traffic downtown
- . 1767 m long, central span 394 m
- . Pylons 105 m high, deck 58 m over river
- . Recent heavy job : replacing main suspension cables.

E 602. La Rochelle-Saintes : a short itinerary.....for an heavy tourism needs  
**The Rochefort/ Martrou transborder Bridge (1900)**



- . Crossing of the Charente river..and soft clays.....but the transborder!
- . A steel bridge. 193 m long including the 175 m long main span. 66 m high
- . The last one in France (Only 3 in Europe + Spain, UK). Historical monument
- . *One of the many transborder bridges designed by Ferdinand Arnodin*

**E 3. Cherbourg/Nantes/La Rochelle (France)....and connexions  
La Rochelle. The Ile-de Ré Bridge (1988)**



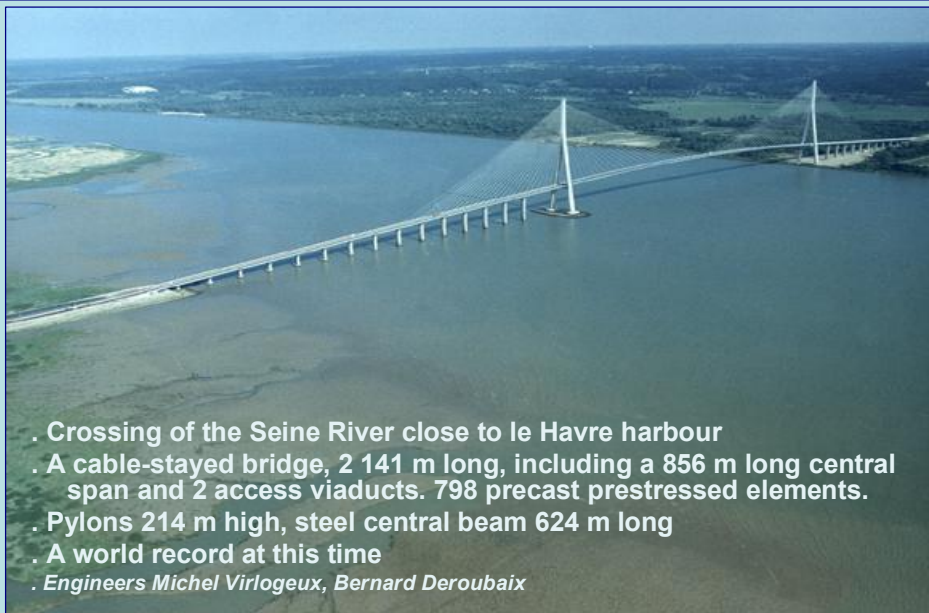
Picture: Bouygues



Picture: Vinci

- . A reinforced concrete bridge to link the Island and the coast.
- . A 2927 m long bridge, comprising 24 spans 110 m long each.
- . 798 precast prestressed elements.
- . *Engineer J. Placidi, Contractor Bouygues-Construction*

**(E 44 + E 46 + E 5) Interchange  
Le Havre. Normandie Bridge (1995)**



- . Crossing of the Seine River close to le Havre harbour
- . A cable-stayed bridge, 2 141 m long, including a 856 m long central span and 2 access viaducts. 798 precast prestressed elements.
- . Pylons 214 m high, steel central beam 624 m long
- . A world record at this time
- . *Engineers Michel Virlogeux, Bernard Deroubaix*

E 52. Strasbourg (France)/ Munchen (Germany)/ Salzburg (Austria)  
**Strasbourg. Pierre Pfinlin Bridge (2002)**



Picture: Jacques Mossot/Structurae

- . Objective: to improve road traffic between France and Germany
- . A reinforced-concrete bridge on the Rhin River
- . A main bridge 452 m long and 2 access bridges, 216 and 294 m
- . Central span 205 m long, constructed with precast segments implemented by the cantilever method. The longest in France.
- . Contractors : *Bilfinger Berger, Max Früh, Freyssinet*

[E 9 , North]> E 11 Vierzon/Clermont-Ferrand/Montpellier(France) >[E 80, South]  
**Millau Bridge (2004)**



- . The Challenge: crossing the Tarn River deep valley
- . The solution : a very long cable-stayed bridge (2.460 m long) :
  - a continuous series of 7 cable-stayed bridges, with a steel deck and single cables in simple axial fans
  - pilars in high performance concrete and steel pylons of exceptional height, all together 343 m at its maximum, a world record.
- . Engineer-designer : *Michel Virlogeux, Contractors : Eiffage TP/Freyssinet*

Not so far from the Millau Bridge.  
**The Garabit rail Viaduct (1884)**



Picture : Guy Sauvage (SNCF Direction de l'Ingénierie)

- . The Challenge: crossing the deep «La Truyère River » valley
- . The solution : long iron bridge
  - Sister bridge of the Maria Pia Bridge in Porto
  - 565 m long, 125 m high, including a parabolic arch 165 m span.
- . Designer Gustave Eiffel, Engineers : Maurice Keochlin, Leon Boyer.
- . Contractor : Eiffel et Compagnie

[UK] > E 402 Calais/Rouen/ Le Mans (France) > [E 501 and Spain]  
**Rouen. Gustave Flaubert Bridge (2008)**

Crossing by the sailing boat « Le Belem »



Picture: Nicolas Vercellin

- . The Challenge: crossing the Seine River, with a high clearance for ships
- . The solution : a movable bridge
- 870 m long bridge, comprising:
  - The central span, 119 m long
  - 2 Access bridges, 168 and 408 m long
- Main performances:
  - Concrete towers 66,4 m high
  - 2 moving steel decks, 119 m long, 16 m large
  - Sophisticated movements control

Engineers : Bernard Gosset, Michel Moussard, Michel Virlogeux  
 Contractors : Eiffage construction, Eiffel, Quille

## North-South car traffic in Paris Alexandre III Bridge (1900)



Picture: Georges Pilot

- . The Challenge: linking north and south banks of the Seine River
  - . Opportunities : the World Fair in Paris (1900), celebration of Friendship between French people and Russian people.
  - An exceptional steel bridge, 140 m long, 1/17 lowering.
  - Steel segments smelted and molted in factory, then bolted in situ.
- Engineers : Jean Résal, M d'Alby.

## Conclusion



Picture: Georges Pilot

**There is a dense European roads network  
French motorways, the link between Northern and Southern countries  
Big bridges in France participate in connection of countries and people**

**Thank you for your attention!**