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# **BRIDGE ENGINEERING IN POLAND 1990 - 2014**

## **Bridges in south-western Poland**

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*60th ECCE General Assembly, Warsaw, 16-18 October 2014*

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## BRIDGE ENGINEERING IN POLAND 1990-2014

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# 1. Introduction

For the last ten years an intense road network development program has been carried out in Poland. The total number of bridge structures along the main roads and motorways, equal to 4509 in 2010, increased by 1653 (**37 %**) till the end of 2013.

The majority of road bridges (86 %) are concrete structures. Increasing use of prestressed concrete in construction of new bridges can be noticed.

In Poland for the last few years several long-span road bridges have been erected, few are still under construction or are planned.

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*Planned network of **motorways** and **expressways** in Poland*





## ► Long-span bridges in Poland

Type	Name and location	Main span	Year of completion
<b>BEAM BRIDGES</b>			
Concrete bridge	Bridge along the A1 motorway over the Vistula River in Grudziądz	180.0 m	2011
Steel bridge	Northern Bridge over the Vistula River in Warsaw	160.0 m	2011
Glued lamin. timber bridge	„Dog footbridge” over the old city moat in Wrocław	40.6 m	2009
<b>ARCH BRIDGES</b>			
Concrete bridge	Bridge along the S69 expressway in Milówka	103.8 m	2006
Steel bridge	Bridge over the Vistula River in Toruń	270.0 m	2013
<b>CABLE-STAYED BRIDGES</b>			
Single pylon concrete bridge	Rędziański Bridge over the Odra River in Wrocław	256.0 m	2011
Single pylon steel bridge	John Paul II's Millenium Bridge in Gdańsk	230.0 m	2001
Single pylon glued laminated timber bridge	Footbridge over the Dunajec River in Sromowce Niżne	90.0 m	2006
Two pylon concrete bridge	Millenium Bridge over the Odra River in Wrocław	153.0 m	2004
Two pylon steel bridge	The Solidarity Bridge over the Vistula River in Płock	375.0 m	2005
<b>SUSPENSION BRIDGES</b>			
Steel bridge	Footbridge over the San River in Witryłów	150.0 m	2010

## 2. Motorway viaducts

### 2.1. Typical viaducts

#### ► Prestressed concrete beam viaducts



*Beam viaducts over the S8 expressway*

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► **Viaducts made of precast beams**



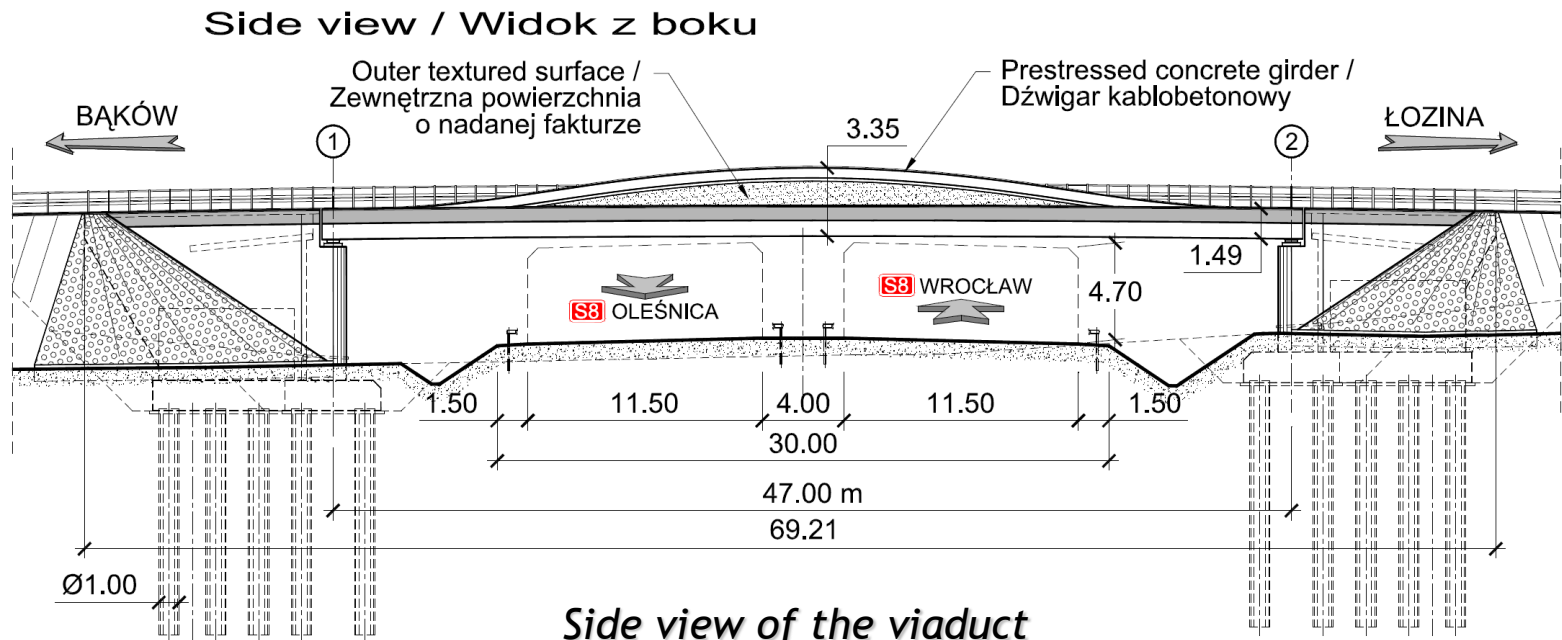
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## 2.2. Landmark viaducts

### ► WN-9 viaduct over the S8 expressway (2012)

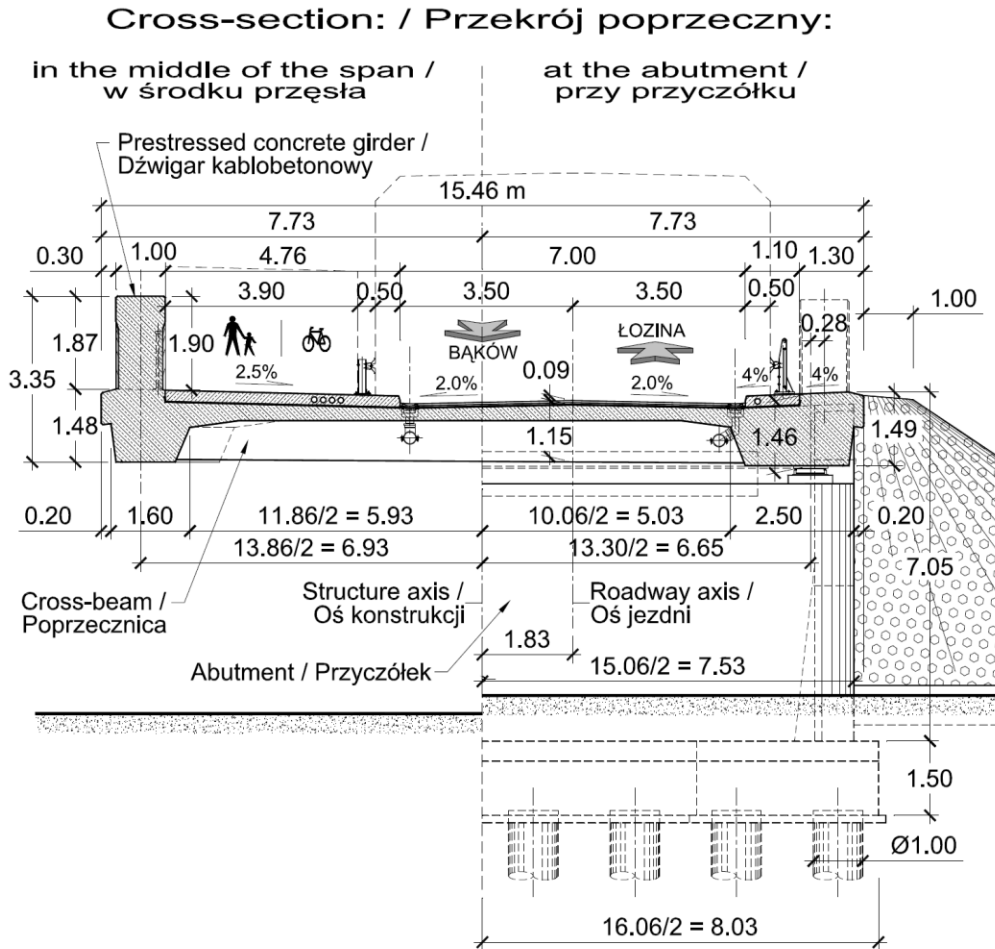
#### Characteristics :

- simply supported prestressed concrete structure, span length 47.0 m;
- superstructure: beam-slab deck, side beams of variable height.





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*Cross-section of the viaduct*



*Completed viaduct*



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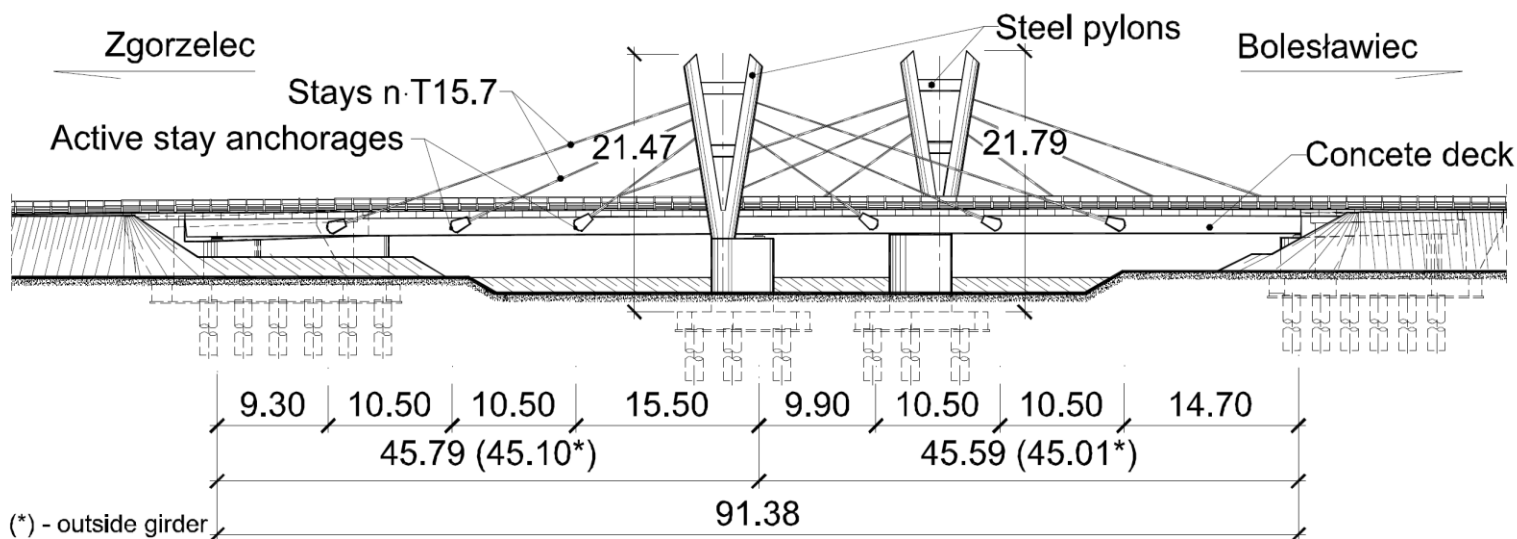
*Views of completed viaduct*

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► **WD-22 viaduct over the A4 motorway (2008)**

**Characteristics:**

- two-span cable-stayed concrete viaduct;
- curved in plan, span lengths: 45.47 + 45.28 m;
- superstructure: beam-slab deck consisting of two prestressed concrete girders connected by reinforced concrete crossbeams;
- steel pylons, 15.3 m high, fixed in separate concrete pillars.



*Side view of the viaduct*

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*View of completed viaduct*

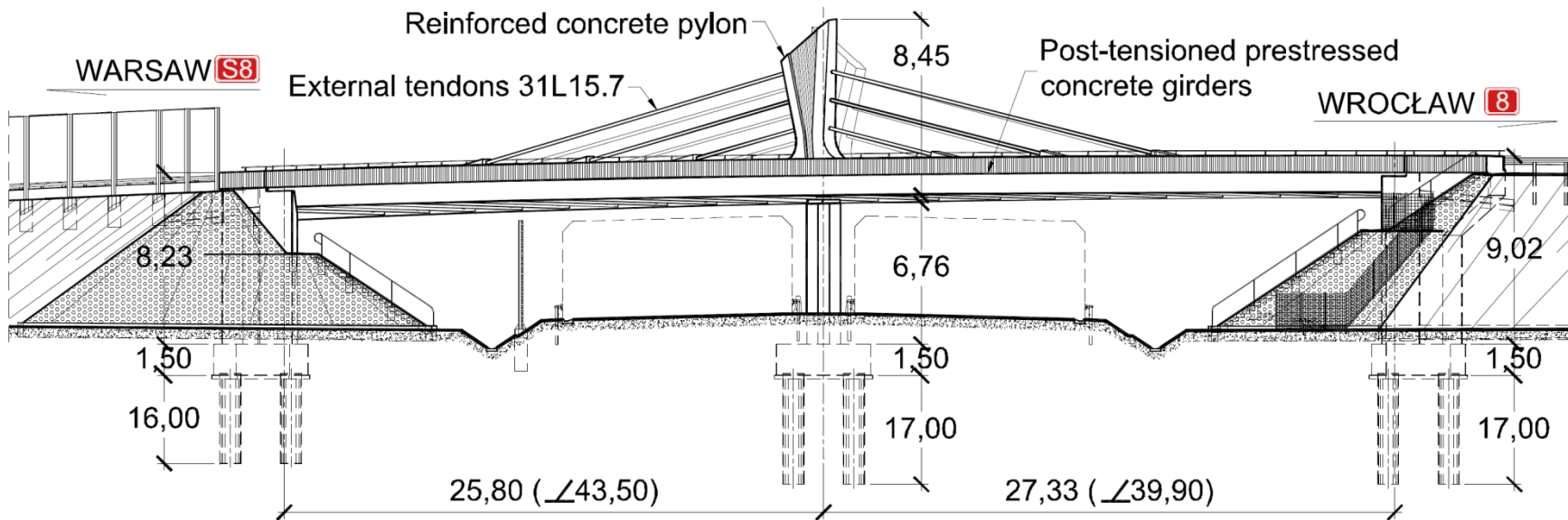


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**► WN-20 viaduct over the S8 expressway (2012)**

**Characteristics :**

- two span prestressed concrete extradosed structure;
- curved in plan, span lengths: 43.50 + 39.90 m;
- beam-deck structure with two side girders.



*Side view of the viaduct*





## 3. Multi-span flyovers

### ► Gądowska flyover in Wrocław (2002)

#### Characteristics:

- built along the inner city ring road;
- two parallel, curved in plan 15-span prestressed concrete box structures, span lengths varying from 33.0 to 52.0 m;
- longitudinal launching method.



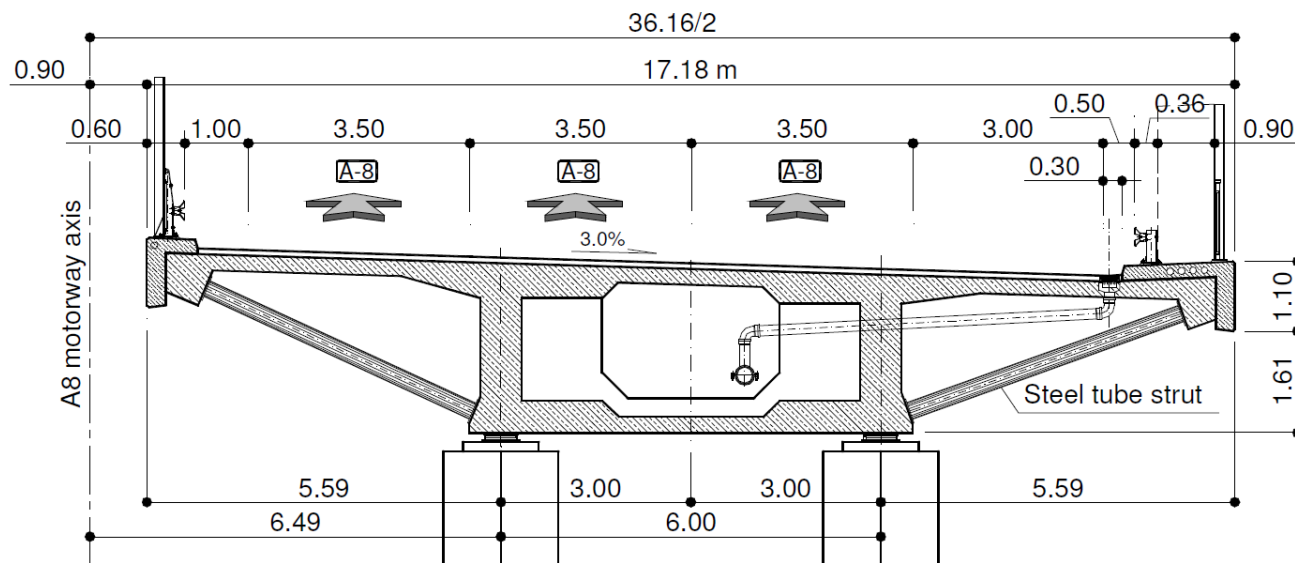
*View of the Gądowska flyover and view of side precast elements*

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► **Flyovers along the A8 motorway in Wrocław (2011)**

**Characteristics:**

- prestressed concrete beam structures, spans up to 60 m;
- superstructure: box girder, deck overhangs supported by steel tube struts;
- construction method: longitudinal launching (WA-17), traditional scaffolding (WA-19).



*WA-17 flyover - cross-section*

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*Construction of WA-17 flyover*



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*Completed WA-19 flyover*

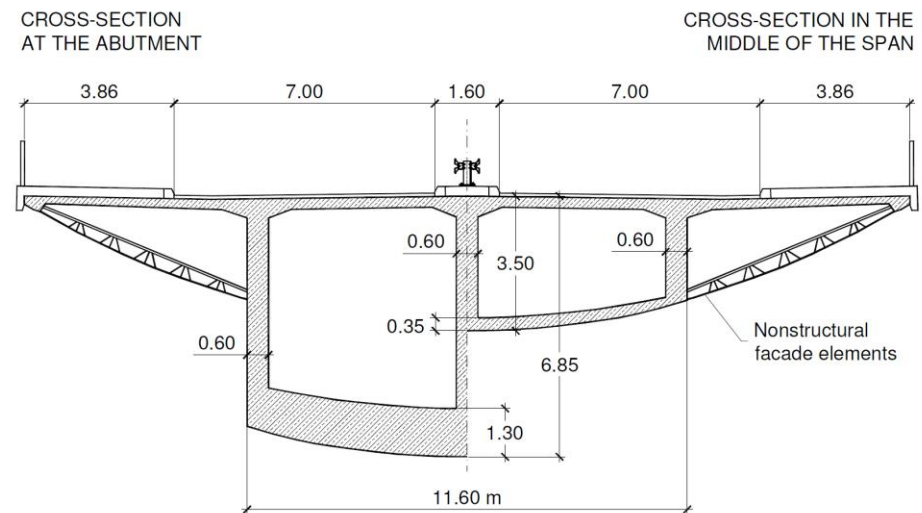
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## 4. Cantilever bridges

### ► Zwierzyniecki Bridge in Cracow (2000)

#### Characteristics:

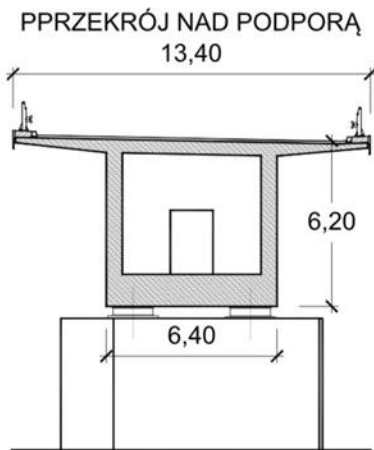
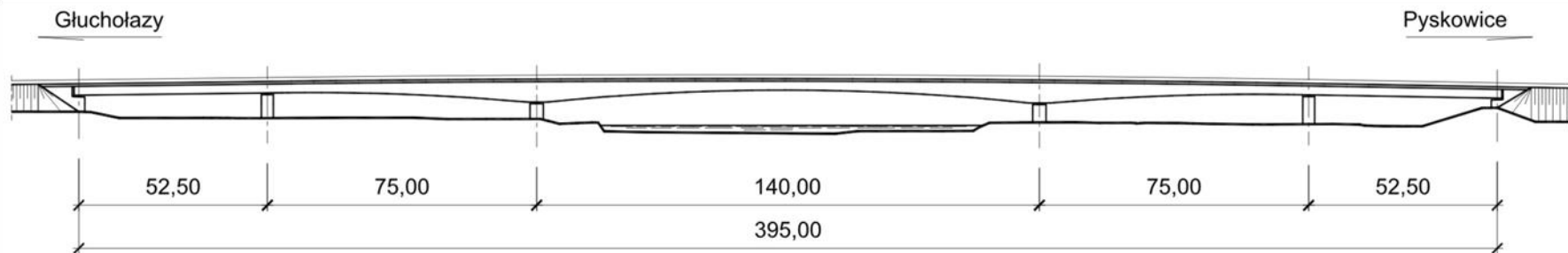
- configuration based on the result of an architectural competition;
- single beam with a span of 132 m fixed in massive, complex abutments.





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► **Bridge over the Odra River in Kędzierzyn-Koźle (2010)**



*Configuration of the bridge in Kędzierzyn-Koźle*

## 5. Arch bridges

### ► Bridge in Milówka (2007)

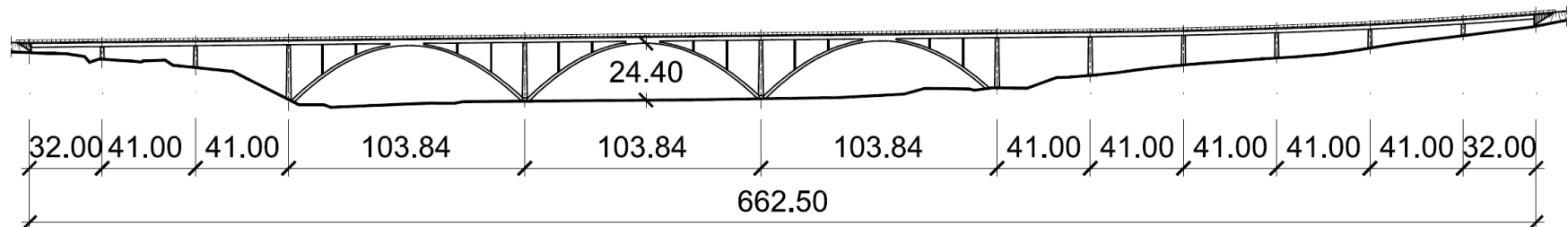
#### Characteristics:

- part of the S69 expressway;
- concrete structure - nine beam spans with a typical length of 41.0 m and three upper deck arches with a span of 103.84 m.



Żywiec

Zwardoń



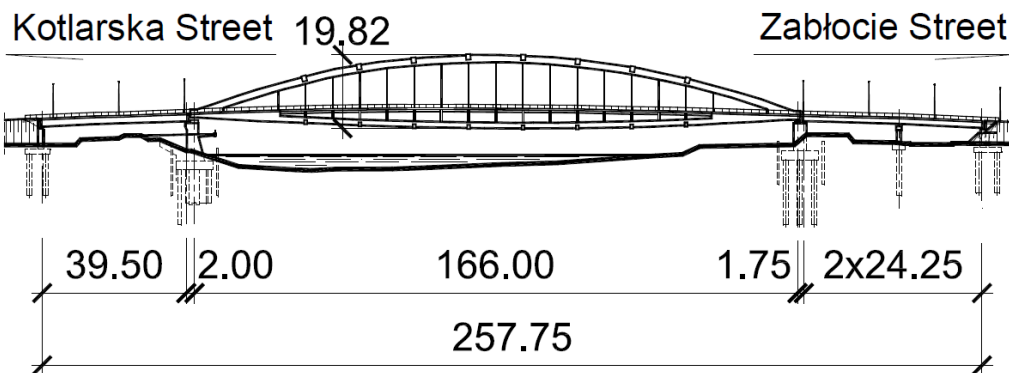
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### ► Kotlarski Bridge in Cracow (2001)

#### Characteristics:

- simply supported spatial structure, formed by four (two internal and two external) "lens" shaped arch girders and orthotropic deck;
- girders consist of parabolic upper arches and circular lower arches of various rise.





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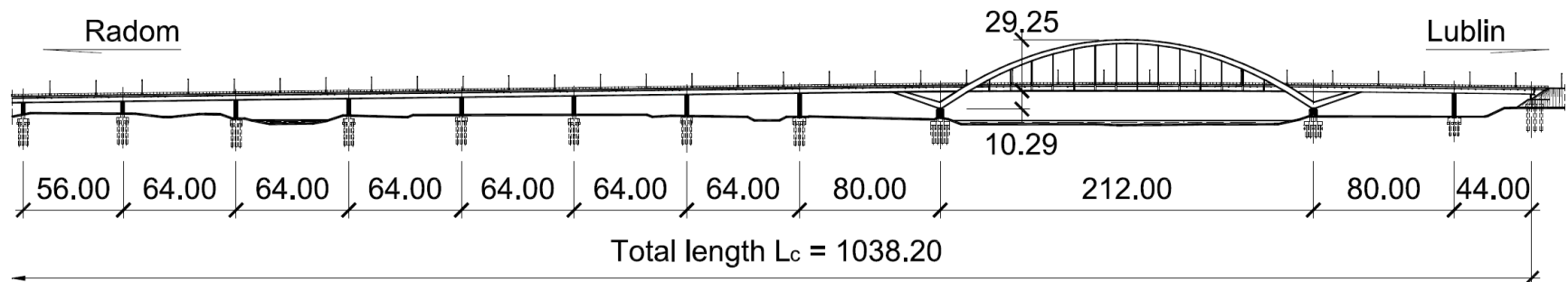
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### ► Bridge over the Vistula River in Puławy (2008)

#### Characteristics:

- part of the ring road of Puławy along the S12 expressway;
- continuous 14-span structure with a total length of 1038 m;
- main span: 212.0 m long tied through arch suspended by 28 units of hangers.



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*Completed bridge in Putawy*

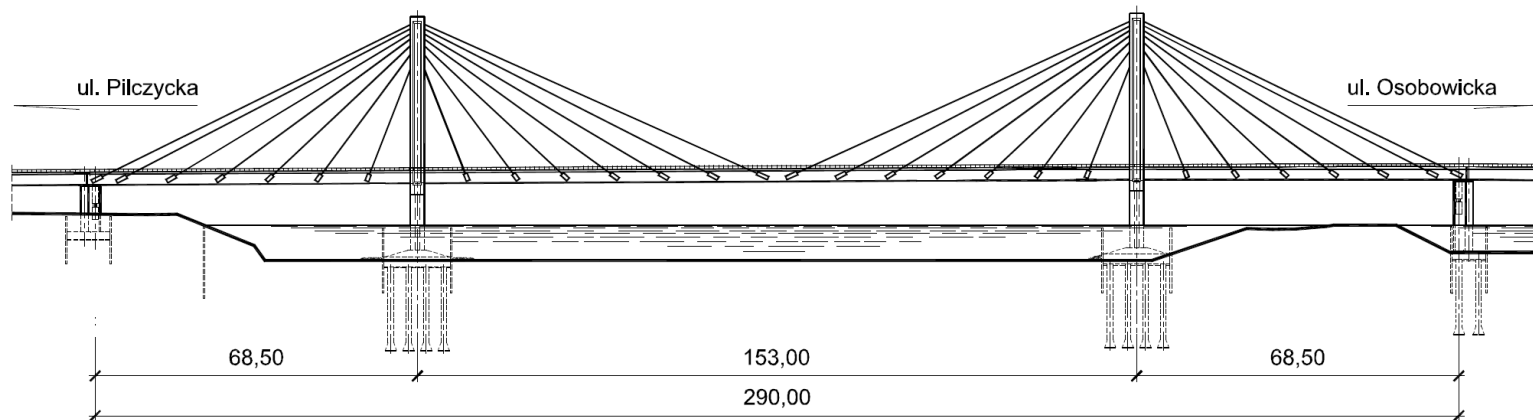


## 6. Cable-stayed and extradosed bridges

### ► Millenium Bridge over the Odra River in Wrocław (2004)

#### Bridge characteristics:

- situated along the inner city ring road of Wrocław;
- span lengths: 68.5 + 153.0 + 68.5 m;
- two concrete H-shaped pylons, height: 50.0 m above the ground, 33.0 m above the deck level.



Side view of the bridge

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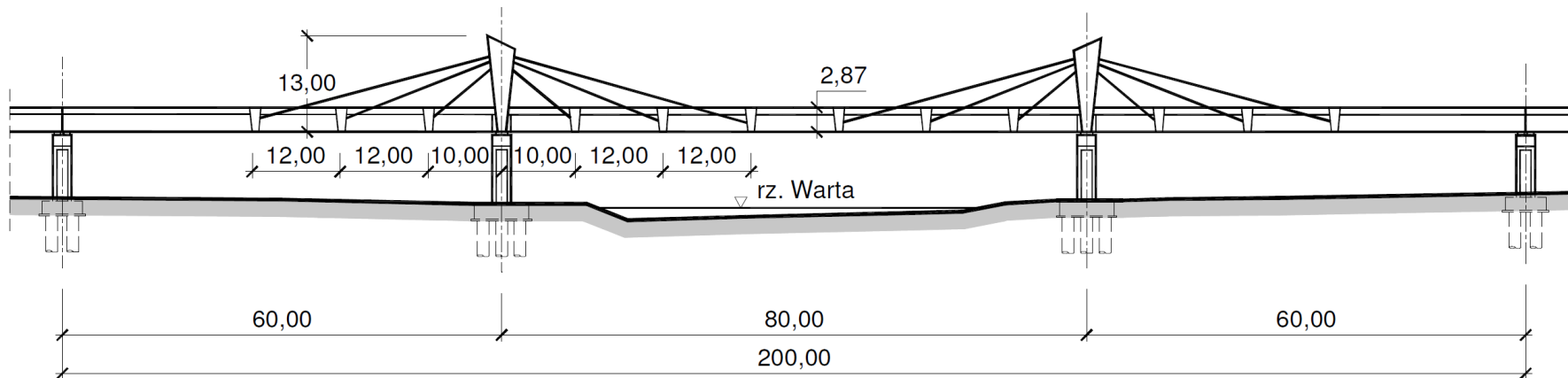


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► **Bridge over the Warta River in Konin (2007)**

**Bridge characteristics:**

- first extradosed bridge in Poland;
- superstructure: beam-slab deck suspended to low pylons;
- erected using longitudinal launching method.



*Side view of the bridge*



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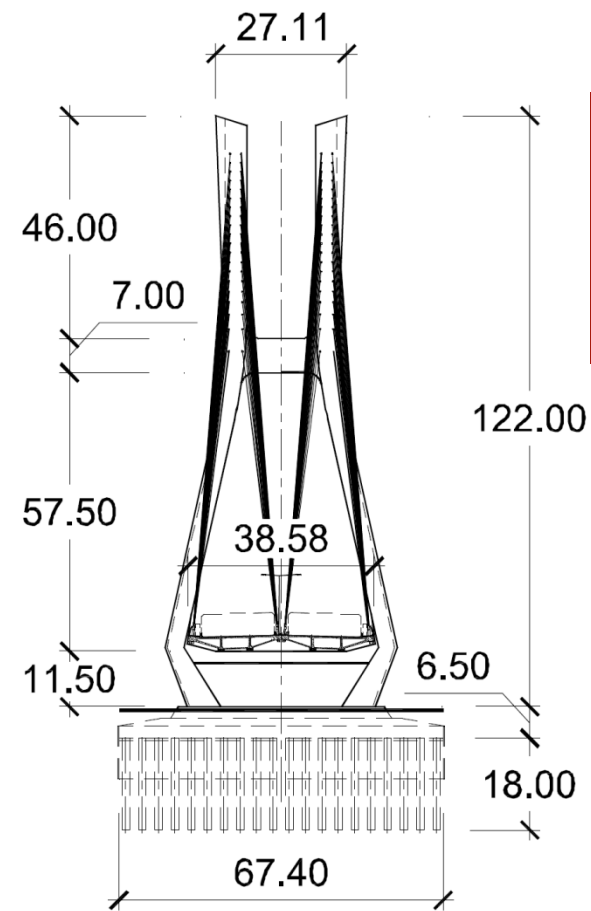


*Bridge in Konin*

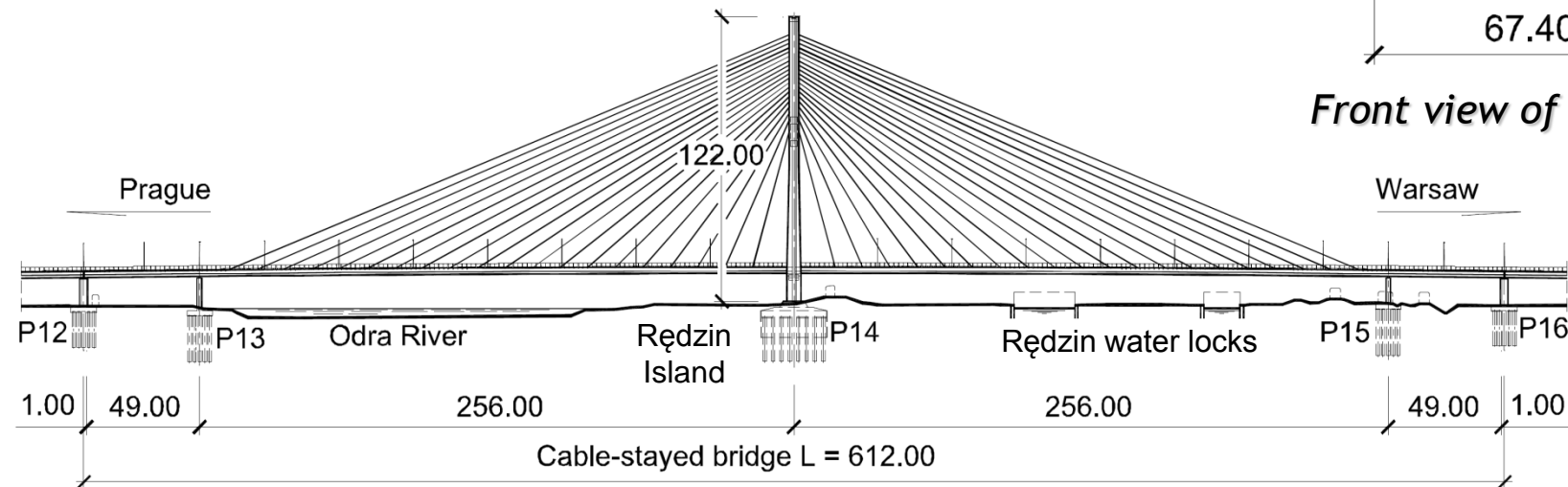
## ► Rędziański Bridge over the Odra River in Wrocław (2011)

### Main bridge:

- total length: 612 m,
- 4 spans: 49 + 2 x 256 + 49 m,
- separate decks,
- 4 planes of cables (160 stays),
- single H-shaped pylon (height: 122 m).



*Front view of the pylon*



*Side view of the main bridge*



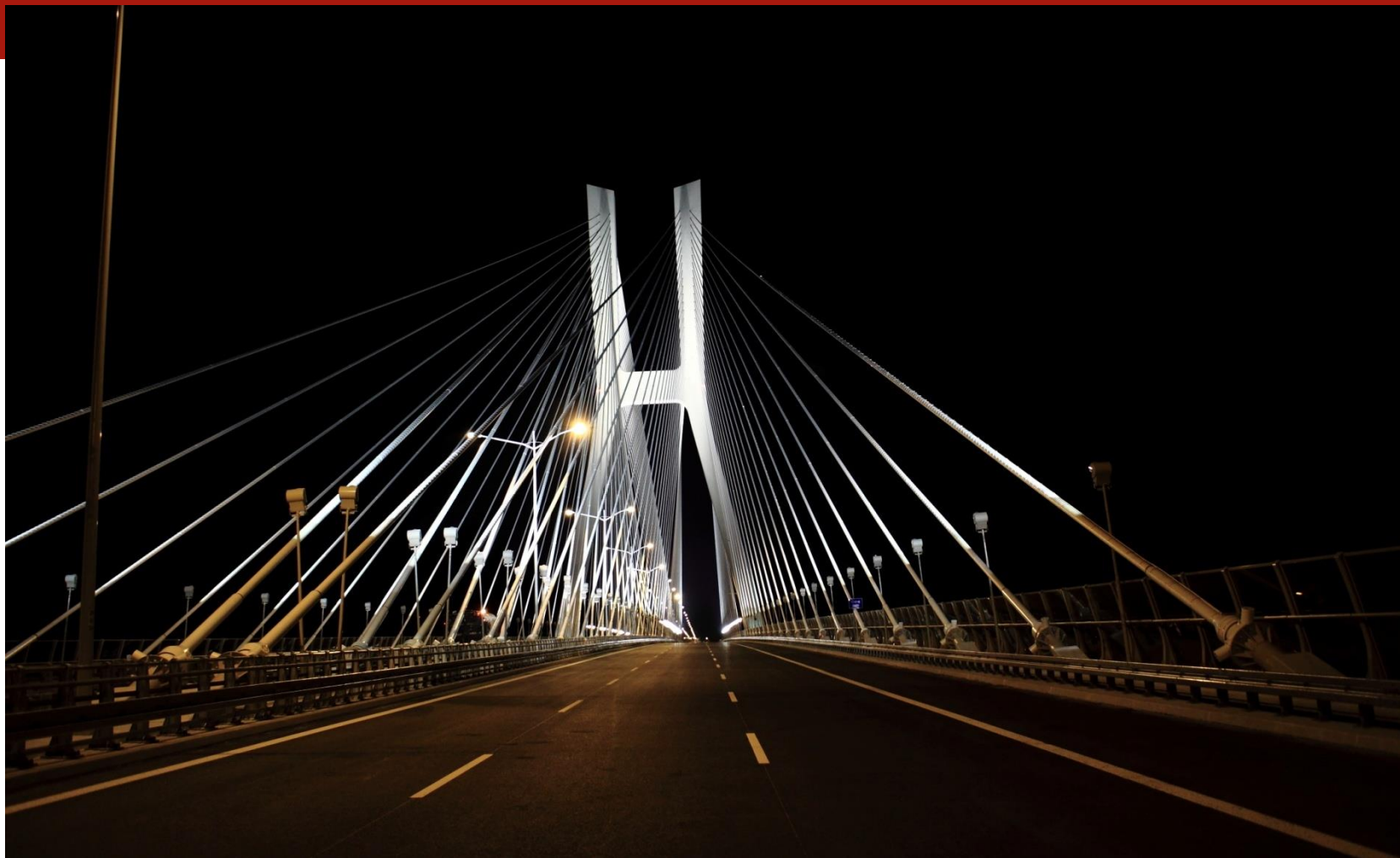
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*Rędziński Bridge in Wrocław*



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*Ręziński Bridge in Wrocław*

## 7. Footbridges

### ► Słodowa Footbridge in Wrocław

#### Characteristics:

- main part of the footbridge: 48 m long tied arch consisting of two high rise interpenetrating steel tubes;
- deck: steel multi-cell box girder suspended by inclined hangers.

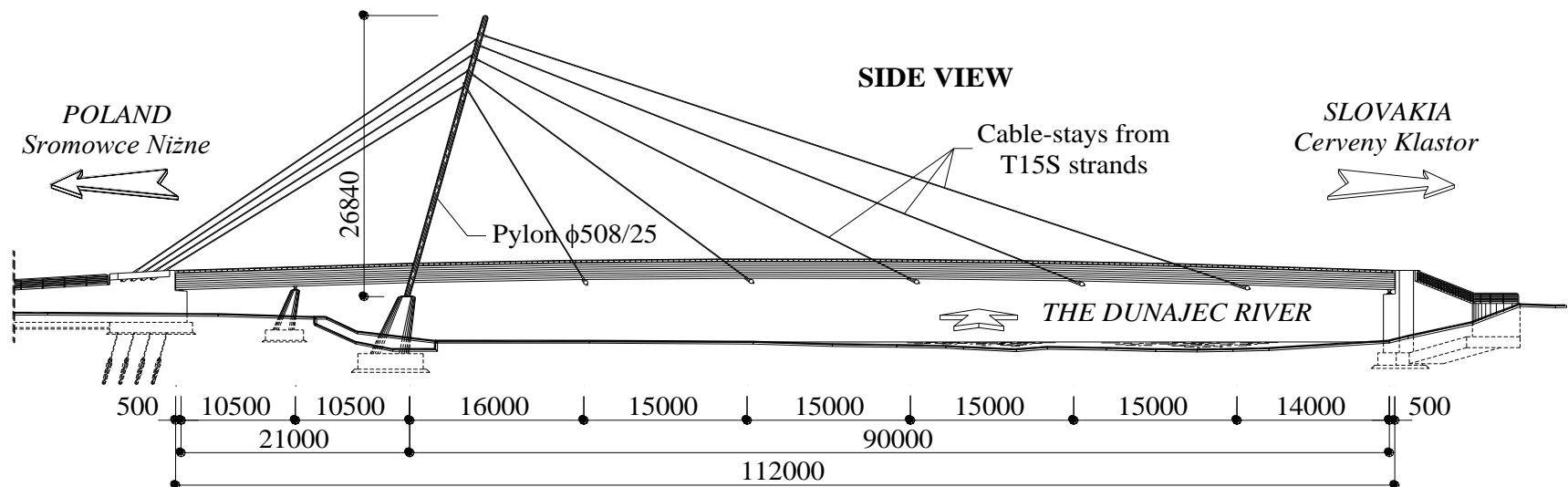


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► **Footbridge over the Dunajec River in Sromowce Niżne**

**Characteristics:**

- footbridge localized in a direct vicinity of the Pieniny National Park;
- main span: 90 m long, deck made of glued laminated timber girders braced by steel frames suspended to a steel pylon;
- 26.8 m high inclined pylon made of steel tubes.







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► **Footbridges over the A4 motorway**



*„Krzywy kij” footbridge*



*„Łuk erosa” footbridge*



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► **What in the future?**



*Footbridge in Cracow  
(concept)*



*Footbridge in Wrocław  
(concept)*



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*Thank you  
for your attention!*

