The pioneer in bridge construction, we make dreams come true

Daelim Spirit sets the basis for efforts to proper in the free economic system while seeking new ways to generate value and making contribution to humankind. We strive to realize “pleasantness, abundance, and vast infinity” underlying in Daelim Spirit, and we have made our corporate philosophy, and thus far an ultimate objective, “make life more pleasant and affluent as we push forward with limitless growth and development.”

DAELIM CONSTRUCTION DIVISION
As the leading general contractor, DAELIM Industrial Co., Ltd. boasts the longest history among Korea’s construction companies, and has persistently specialized in the construction business for 73 years. Since 1939, DAELIM has continuously successfully completed numerous projects in the fields of Civil works, Building & Housing and Plants in over 20 countries. Nowadays our technologies and project execution capabilities are highly recognized in both the domestic and overseas construction business.

In particular, DAELIM has world-class construction experience and technology for cable supported bridge such as suspension bridge and cable-stayed bridge. DAELIM started with the construction of Dolson Bridge as Korea’s first cable-stayed bridge in 1984, and then took a step forward by successfully delivering Seohae Bridge, which was the longest cable-stayed bridge in Korea when it was completed in 2000. Our accumulated know-how proved its real worth through the construction of Y1 Sun-sin Bridge, the fourth longest suspension bridge in the world. In order to construct such a monumental landmark bridge, DAELIM has independently developed various installation equipment for cable works as well as construction plans and engineering for erection works.

Hereewith, we have published ‘DAELIM BRIDGE’ in order to give wider publicity to our achievements and highly technical capabilities as one of the leading companies in the bridge construction. I hope DAELIM is internationally recognized as having the best technique in the field of cable supported bridge.

Thank you.

Kim, Dong-Soo
President
Chief Executive / Civil Business Division
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Suspension Bridge

The suspension bridge is one of the oldest types of bridge. Early simple, or catenary, suspension bridges consisted of three or more cables made from vines, where people walked directly on the ropes to cross.

A modern typical suspension bridge is a continuous girder with one or more towers and suspended above piers in the middle of the span. At both ends of the bridge, large anchor or counter weights are placed to hold the ends of the cables. The main cables are strengthened from one anchor over the top of the towers and attached to the opposite anchor. The cables pass over a special structure known as a saddle. The saddle allows the cables to slide as loads pull from one side or the other and to smoothly transfer the load from the cables to the towers. From the main cables, smaller cables known as hanger cables or hanger ropes are hung down and attached to the girder.

The typical suspension bridges are Golden Gate Bridge and Akashi-kyo Bridge. The former is the most beautiful bridge and the latter is the longest bridge in the world.
# Sorok Bridge

## Bridge Specifications

<table>
<thead>
<tr>
<th>Project</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>General Cable Ling - Phase 1</td>
</tr>
<tr>
<td>Location</td>
<td>Daejeon, South Korea, Juknamdo</td>
</tr>
<tr>
<td>Owner / Client</td>
<td>Juknamdo</td>
</tr>
<tr>
<td>Design</td>
<td>Yeosin Eng., Corp.</td>
</tr>
<tr>
<td>Contract Amount</td>
<td>38,4 million USD</td>
</tr>
<tr>
<td>Type</td>
<td>Three-span self-anchored suspension bridge</td>
</tr>
<tr>
<td>Span</td>
<td>170+350+170 (main span: 350m)</td>
</tr>
<tr>
<td>Width</td>
<td>15.7m (2 lanes)</td>
</tr>
<tr>
<td>Design Load</td>
<td>DL, LL, VW, Snow</td>
</tr>
<tr>
<td>Design Speed</td>
<td>80km/h</td>
</tr>
<tr>
<td>Remarks</td>
<td>Seaport area: 3/5</td>
</tr>
</tbody>
</table>

## Deck System

<table>
<thead>
<tr>
<th>Details</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Steelbox</td>
</tr>
<tr>
<td>Height</td>
<td>2.5m</td>
</tr>
<tr>
<td>Depth/Width Ratio</td>
<td>15.9%</td>
</tr>
<tr>
<td>Design Wind Velocity</td>
<td>96.1m/sec</td>
</tr>
<tr>
<td>Total Steel Weight</td>
<td>38,000 kN</td>
</tr>
<tr>
<td>Components</td>
<td>28 (hanger), 12 (hanger &amp; struts)</td>
</tr>
<tr>
<td>Diameter</td>
<td>83.7mm (hanger), 201.5mm (struts)</td>
</tr>
<tr>
<td>Weight</td>
<td>2,525kN</td>
</tr>
<tr>
<td>Const. Meth.</td>
<td>PWS (Prefabricated Parallel Wire Strand) method</td>
</tr>
<tr>
<td>Wrapping</td>
<td>2.0mm x 2.0mm</td>
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</tbody>
</table>

## Main Cable

<table>
<thead>
<tr>
<th>Details</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>High-strength steel cable (1,460MPa)</td>
</tr>
<tr>
<td>Components</td>
<td>28 (hanger), 12 (hanger &amp; struts)</td>
</tr>
<tr>
<td>Diameter</td>
<td>83.7mm (hanger), 201.5mm (struts)</td>
</tr>
<tr>
<td>Weight</td>
<td>2,525kN</td>
</tr>
<tr>
<td>Const. Meth.</td>
<td>PWS (Prefabricated Parallel Wire Strand) method</td>
</tr>
<tr>
<td>Wrapping</td>
<td>2.0mm x 2.0mm</td>
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</tbody>
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## Anchorages

<table>
<thead>
<tr>
<th>Details</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Type</td>
<td>Diamond-shaped concrete pension</td>
</tr>
<tr>
<td>Height</td>
<td>85m</td>
</tr>
<tr>
<td>Materials</td>
<td>Concrete 150m³, 3.01m² Reinforcement 1.7m²</td>
</tr>
</tbody>
</table>

## Pylon Foundation

<table>
<thead>
<tr>
<th>Details</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Pylon foundation</td>
</tr>
<tr>
<td>Materials</td>
<td>Concrete 150m³, 3.01m² Reinforcement 1.7m²</td>
</tr>
</tbody>
</table>

## Application

- Installation of the circular caisson by PYC (20,000KN)
- Application of the diamond-shaped pylon considering the aesthetic aspect
- Erection of the stiffening girder by the large block erection method
- Application of the PPWS cable erection method

---

Maximizing the beauty of suspension bridge by applying mono-cable system

Application of PPWS (Prefabricated Parallel Wire Strand) cable erection method

General layout and cross section
Yi Sun-sin Bridge

**Bridge Specifications**

- **Name**: Yeosu Grandiose Island Bridge Project (Korea)
- **Location**: Yeosu, Yeosu-Do, Jeollanam-do, Yeosu, Yeosu-Do, Yeosu, Yeosu-Do
- **Owner**: Yeosu City, Yeosu Do (Korea)
- **Design**: Yeosu City, Yeosu Do (Korea)
- **Contractor**: ICON Engineering, ICON Engineering
- **Contract Amount**: $434,600,000
- **Construction Period**: 2007 - 2012

**Overview**

- **Type**: Three-span suspension bridge
- **Span**: 972m, 1,646m, 398m (main span: 1,646m)
- **Width**: 29.1m (2 lanes)
- **Design Load**: 0.25t, 0.5t, 2.4t, 6.0t
- **Design Vehicle**: 60km/h
- **Remarks**: The world's 4th longest main span (main span ratio: 3.5:1)

**Deck System**

- **Type**: Streamlined twin steel box
- **Height**: 2.65m
- **Depth/Width Ratio**: 1:1.3
- **Aerodynamic Stabilizing System**: Streamlined twin box shape
- **Pavement**: Asphalt (335,000m²)
- **Stairs**: Upper rib: 304, Lower rib: 454
- **Constructing Method**: Swing method

**Cable**

- **Type**: 2 PVC: 1800 MPa
- **Section**: Main span: 40.3mm x 40.3mm x 40.3mm (5% x 2,228m)
  Side span: 40.3mm x 40.3mm x 40.3mm (10% x 750m)
- **Diameter**: 106.6mm (after wrapping)
- **Weight**: 129,600kg
- **Constructing Method**: Air spining

**Suspension System**

- **Type**: 1,100MPa, 1,600MPa
- **Section**: 27t, 29t, 29t, 8.9t, 11t, 11t
- **Weight**: 4,300kg
- **Arrangement**: 118m, 118m, 118m, 118m, 118m, 118m

**Pylon**

- **Type**: Concrete, 18t, 400MPa
- **Material**: Concrete, 18t, 400MPa
- **Constructing Method**: Up saw

**Foundation**

- **Type**: Concrete, 18t, 400MPa
- **Material**: Concrete, 18t, 400MPa
- **Constructing Method**: RDD

**Anchorage**

- **Type**: Earth anchorage / Gravity anchorage

---

*Construction details and diagrams.*
# Dandeung Bridge

**Type:** Single span, single pylon suspension bridge  
**Const. Method:** Pylon (auto climbing form)  
**Cable:** (air spinning)  
**Remarks:** The world’s longest single pylon suspension bridge (Span 1: 2,807m)

## Bridge Specifications

<table>
<thead>
<tr>
<th>Project</th>
<th>Name</th>
<th>Location</th>
<th>Owner / Client</th>
<th>Design</th>
<th>Contract amount</th>
<th>Const. period</th>
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<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Overview</th>
<th>Type</th>
<th>Span</th>
<th>Width</th>
<th>Design wind velocity</th>
<th>Aero dynamic stability system</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Deck System</th>
<th>Type</th>
<th>Height</th>
<th>Depth / Width ratio</th>
<th>Remarks</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Cable</th>
<th>Type</th>
<th>Section</th>
<th>Diameter</th>
<th>Weight</th>
<th>Const. Method</th>
<th>Weaving</th>
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<tbody>
<tr>
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<table>
<thead>
<tr>
<th>Hanger</th>
<th>Type</th>
<th>Height</th>
<th>Arrangement</th>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pylon</th>
<th>Material</th>
<th>Const. Method</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Foundation</th>
<th>Material</th>
<th>Const. Method</th>
</tr>
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<tbody>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Anchorage</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Erection of A & D-type concrete pylon

- **Main Span:** 2,807m (Pylon, TCC, 1,810 m)  
- **Secondary Span:** 1,810 m  
- **Secondary Span:** 360 m  
- **Total Length:** 5,266 m  
- **Number of Cables:** 44  
- **Cable Diameter:** 7.7 mm  
- **Weight of Cable:** 9,320 Kg  
- **Weaving:** 1,104 m

### Pylon System

- **Type:** A & D-type concrete pylon  
- **Height:** 105 m  
- **Material:** Concrete  
- **Const. Method:** Auto climbing form

### Foundation

- **Type:** Shallow foundation (8.5 m)  
- **Material:** Concrete  
- **Const. Method:** Low heat mixture and dribble placement

### Anchorage

- **Type:** Graciously anchored with the inclined base

### Stiffening girder erection work by PCC

---

The A & D-type concrete pylon

Panoramic view

General layout and cross section
Saecheonnyeon Bridge

Bridge Specifications

<table>
<thead>
<tr>
<th>Project</th>
<th>Nature</th>
<th>Rear Construction Project between Aphae and Ammae (2x6 sections)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Songdo, Anseong, Suwon, and Gwang阳do</td>
<td></td>
</tr>
<tr>
<td>Owner/Client</td>
<td>Busan regional construction management administration</td>
<td></td>
</tr>
<tr>
<td>Design Firm</td>
<td>DAEOM, Design, BrE</td>
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</tr>
<tr>
<td>Contract Amount</td>
<td>143.6 x 10^6 USD</td>
<td></td>
</tr>
<tr>
<td>Contract Period</td>
<td>3.2010 – 05.2019</td>
<td></td>
</tr>
</tbody>
</table>

Overview

Type: Multi-span suspension bridge
Span: 330m + 180m + 330m (main span: 660m)

Width: 16.0m (2 lanes)

Design: DB-24, DL-24

Remarks: Multi-span suspension bridge across a strait ( Exposure ratio: 1/8)

Deck System

Type: Steel box girders

Height: 2.7m

Width: 16.6%

Air aerodynamic

Stiffening system: Streamlined box shape

Total steel weight: 959680 (main girder 554920, sub-girder 314550, 5640)

Pavement: Long asphalt (50mm)

Skids: U shape 325, 250mm x 250mm

Const. Method: Main & side span lifting devices, Main girder: FVTC (200 tons)

Cable System

Type: 2 x 7 strand, 316SS (7 x 19 strands)

Skidder: Diameter: 2.2m, 12 series, 21 strands (P=32667mm)

Diameter: 1850mm (after unloading)

Weight: 16.875kN

Const. Method: PPMS Method

Washing: Rubber sheet washing

Hanger System

Type: CTRC, 200 x 5.00mm x 2.00mm

Skidder: 4700mm, 8 x 1000mm x CTRC

Weight: 1.14kN

Arrangement: 2x(4x3+1)x2+4x1+2x1+2x1, 7+3 x 31.8

Construction of the foundation using PC House method

Plan Foundation Anchorages

Type: Hype concrete pylon

Height: 3 x 18.75m, 2 x 20.0m

Material: Concrete: C40/50, Reinforcement: N + NoC50-1200, DD00

Const. Method: Auto climbing form

Pile System

Type: DRill driven (210, 200 + 100, 200 + 100)

Material: Concrete: C40/50, Reinforcement: N + A400

Const. Method: NCD

Anchorages

Type: DRill driven (175, 120, 120) + Cauzion

Construction plan using the lifting devices (main & side span) and the floating crane (lifter)
Cable-Stayed Bridge

A cable-stayed bridge is a bridge that consists of one or more columns (normally referred to as towers or pylons), with cables supporting the bridge deck. Cable-stayed bridges may look similar to suspension bridges—both have roadways that hang from cables and both have towers. But the two bridges support the load of the roadway in very different ways. The difference lies in how the cables are connected to the towers. In suspension bridges, the cables ride freely across the towers, transmitting the load to the anchorage at either end. In cable-stayed bridges, the towers form the primary load-bearing structure. A cantilever approach is often used for support of the bridge deck near the towers, but areas further from them are supported by cables running directly to the towers. This has the disadvantage, compared to the suspension bridge, that the cables pull to the sides as opposed to directly up, requiring the bridge deck to be stronger to resist the resulting horizontal compression loads; but has the advantage of not requiring firm anchorage to resist a horizontal pull as in the suspension bridge. All static horizontal forces are balanced so that the supporting tower does not tend to tilt or slide, needing only to resist such forces from the live loads. The steel-decked bridge designed at Strömmand by Franz Dischinger (1966) is therefore more often cited as the first modern cable-stayed bridge. The Sutong Bridge is a cable-stayed bridge with a total length of 2,088m and center span of 1,088m, which is longest center span in the world.
# Dolsan Bridge

**Type**: Cable-stayed bridge with steel box girder  
**Remarks**: Streamlined steel box girder and A-type steel pylons

---

## Bridge Specifications

<table>
<thead>
<tr>
<th>Project</th>
<th>Name</th>
<th>Construction of Dolsan Bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Bungpyeong Island – Ulsan, Gyeongsangnam-do, Korea</td>
<td></td>
</tr>
<tr>
<td>Owner/Client</td>
<td>Korea transportation management administration</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>PCL/International: KM Eng Consultants Corp.</td>
<td></td>
</tr>
<tr>
<td>Contract Amount</td>
<td>1,465 million USD</td>
<td></td>
</tr>
</tbody>
</table>

### Overview

- **Type**: Continuous three-span steel cable-stayed Bridge  
- **Span**: 680m + 860m + 680m (main span: 860m)  
- **Width**: 11.5m (2 lanes, road / foot path bridge)  
- **Design load**: 440kN (15,200kgs)  
- **Design velocity**: 80km/hr  
- **Remarks**: Pylon height / Span ratio

### Deck System

- **Height**: 27m  
- **Depth / Width ratio**: 23.3%  
- **Design wind velocity**: 62.5m/sec  
- **Aero-dynamic stabilizing**: Flaring (Spreader, Main span) system

#### Pavement

- **Type**: Concrete (100mm)  
- **Type**: Concrete (200mm)  
- **Type**: Concrete (300mm)  

#### Cable

- **Material**: Steel wire (72mm)  
- **Section**: Area 213.3m² – 39.0m²  
- **Element**: 38 – 87mm  
- **Weight**: 176.5kN – 407.6kN  
- **Length**: 90m – 100m, 56 steps  
- **Arrangement**: Fan type  
  - Main span: 122m  
  - Side span: 212.5m, 25.5m

### Pylon

- **Type**: Angle steel / A-shaped  
- **Height**: 82.3m  
- **Material**: Steel  
- **Const/Method**: Large-block section by F/C

### Pylon / Foundation

- **Type**: Pneumatic caisson  
- **Material**: Concrete (160×355MPa)  
- **Const/Method**: Pneumatic caisson

---

![Night view](image1)  
![Completion (1994)](image2)  
![General layout and cross section](image3)  

---

![Manufacturing of the steel caisson](image4)  
![Piling of the inner part of pylon](image5)  
![Large-block section of steel pylon by F/C](image6)  

---

![Construction of the steel box girder using the demim crane (201kN)](image7)
Seohae Bridge

Type: Cable-stayed bridge with steel-concrete composite girder
Const. Method: Stiffening girder (balanced cantilever method)
Pylen (slip form)

Remarks: Resistance to the fast wind velocity (65m/sec) and earthquake (6 Richter scale)

Bridge Specifications

- **Name**: Construction of Seohae bridge
- **Location**: Nakdong, Pusan, Gyeongnam, Gyeongsangnam-do
- **Dancer / Client**: Korea Expressway Corp.
- **Design**: Samsung Eng. Corp., Amadea 72, JIN (design change)
- **Contract Amount**: $56.8 million USD

**Overview**

- **Type**: Continuous three-span steel-concrete composite cable-stayed bridge
- **Span**: 205+470+205 = 870m (main span: 470m)
- **Width**: 31.6m (6 lanes)
- **Design load**: 250k-24, 50 = 2400kN
- **Design velocity**: 130mph
- **Remarks**: Pylon height / Span ratio: 26.6%

**Deck System**

- **Type**: Intra-deck girder
- **Height**: 2.8m
- **Depth / Width ratio**: 6.7%
- **Design wind velocity**: 60mph
- **Aerodynamic stiffening system**: Solid deck (under construction)
- **Total steel weight**: 130,000 kN
- **Pavement**: Asphalt (30mm)
- **Skid**: Precast RC deck slab (400x400x140mm)
- **Const. Method**: Balance cantilever method

**Cable**

- **Type**: Parallel strand cable (span: 380m, 380mm)
- **Subcontractor**: Frenzen International
- **Section**: 37.47x37.47x37.47x37.47mm
- **Diameter**: 120 – 260mm
- **Weight**: 15,290 kN
- **Length**: 80m – 160m, 160m
- **Arrangement**: Semicircular type: General part: 12.0m, Anchor part: 4.7m

**Pylon**

- **Type**: Intra-deck pylon
- **Height**: 182.3m
- **Material**: Concrete
- **Rotation**: $4,000,000
- **Const. Method**: Slip form

**Foundation**

- **Type**: Shallow foundation (H=6m)
- **Material**: Concrete
- **Rotation**: $4,000,000
- **Const. Method**: Steel caisson

*Construction of the shallow foundation by the cellular coffer dam
Erection of the semi-section cross beam using the heavy lifting device
Erection of the pier table by FC (100,000 kN)
Installation of girders by the demount crane
Construction of the precast concrete slab*
Samcheonpo Bridge

**Overview**
- **Type**: Cable-stayed bridge with steel-concrete composite girder
- **Design**: Resistance to the fast wind velocity (65m/sec) and earthquake (Reither scale)

**Design System**
- **Construction**: Stiffening girder (balanced cantilever method)
- **Pylon**: Auto climbing form

**Bridge Specifications**

<table>
<thead>
<tr>
<th>Project</th>
<th>Name</th>
<th>Location</th>
<th>Owner/Client</th>
<th>Design</th>
<th>Contact Amount</th>
<th>Construction Period</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Changgun-Samcheonpo bridge construction</td>
<td>Suncheon - Gyeongnam, Gyeongnam</td>
<td>Busan regional construction management administration</td>
<td>Newlin Eng, Corp.</td>
<td>38.5 million USD</td>
<td>Sep. 1995 ~ Apr. 2003</td>
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<table>
<thead>
<tr>
<th>Overview</th>
<th>Type</th>
<th>Span</th>
<th>Width</th>
<th>Design load</th>
<th>Design velocity</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Three-span cable-stayed bridge with composite steel girder</td>
<td>103 + 205 + 103 x 48 m (main span: 205 m)</td>
<td>14.85 m (3 lanes)</td>
<td>DB: 24, EL: 24</td>
<td>80 km/h</td>
<td>Pylon height/Spandrel: 24%</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Overview</th>
<th>Type</th>
<th>Height</th>
<th>Depth/Width ratio</th>
<th>Design wind velocity</th>
<th>Seismic resistance system</th>
<th>Aeroacoustic stabilizing system</th>
<th>Total steel weight</th>
<th>Pavement</th>
<th>Slick</th>
<th>Control Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stiffened girder</td>
<td>86.3 m (33.9 ft)</td>
<td>12.5%</td>
<td>80 km/h</td>
<td>Seismic isolation system using elastomeric bearing</td>
<td>Fanning system (wind noise)</td>
<td>28,025 kN (5,000 kips)</td>
<td>Asphalt (2.8 mm)</td>
<td>Precast RC slabs (350 x 600 mm)</td>
<td>Balanced cantilever method</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cable</th>
<th>Type</th>
<th>Substructure</th>
<th>Section</th>
<th>Diameter</th>
<th>Weight</th>
<th>Length</th>
<th>Arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parallel strand cables</td>
<td>Prestressed (international)</td>
<td>17,230mm^2</td>
<td>19.82m</td>
<td>3,371 kN</td>
<td>49.8 km</td>
<td>SawaPan (space: 12.8 m)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pylon</th>
<th>Type</th>
<th>Materials</th>
<th>Height</th>
<th>Control Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Concrete pylon</td>
<td>95.8 x 98.0 MPa</td>
<td>89.2 m</td>
<td>Auto climbing form</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pylon</th>
<th>Type</th>
<th>Materials</th>
<th>Reinforcement</th>
<th>Control Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base type casting</td>
<td>95.8 x 98.0 MPa</td>
<td>99.4 x 99.3 MPa</td>
<td>Submerged by FIC</td>
</tr>
</tbody>
</table>
## Cheongpung Bridge

**Type:** Cable-stayed bridge with steel-concrete hybrid girder  
**Remarks:** Hybrid system for the long main span and short side spans  
**Const. Method:** Pylon: Tauta damping form + Tensioning form  
**Side span (FSM):** Main span (FCM + member erection)

### Bridge Specifications

<table>
<thead>
<tr>
<th>Project</th>
<th>Name</th>
<th>Construction of Cheongpung bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td></td>
<td>Minbu-si, Chongchungnyun, Jecheon, Chungcheongbukdo, Cheongchungnyun S.</td>
</tr>
</tbody>
</table>
| Owner / Client |      | Chungchunbukdo  
| Design |      | DAEIL  
| Contract Amount |      | 16,200 kW  
| Period |      | Apr. 2009 - Sep. 2010 |

### Overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Steel-concrete hybrid cable-stayed bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span</td>
<td>024 (427.521 + 642.031 + 327.521 m)</td>
</tr>
<tr>
<td>Width</td>
<td>14.4 m (2 lane)</td>
</tr>
<tr>
<td>Design Speed</td>
<td>80 km/h</td>
</tr>
<tr>
<td>Remarks</td>
<td>Pylon height / Span ratio: 21%</td>
</tr>
</tbody>
</table>

### Deck System

| Type | Main span: Bridge steel girder  
|------| Side span: Concrete side girder  

| Height | Main span: 22.0 m  
|--------| Side span: 2.0 - 3.0 m  

<table>
<thead>
<tr>
<th>Design wind velocity</th>
<th>38 m/sec</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aeroelastic Stabilizing System</td>
<td>Faking type, main span</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Length</th>
<th>12,300 k (main span + 2x800, subspan + 2x400)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pavement</td>
<td>Asphalt (140mm)</td>
</tr>
<tr>
<td>Deck</td>
<td>Precast RC slab (500x400)</td>
</tr>
<tr>
<td>Const. Method</td>
<td>Main Span: FCM, Side span: FSM</td>
</tr>
</tbody>
</table>

### Cable

<table>
<thead>
<tr>
<th>Type</th>
<th>Parallel strand cable: 17x4-1400kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subcable</td>
<td>Polyethylene isolation</td>
</tr>
<tr>
<td>Section</td>
<td>511.7 mm²/276.5 A, 193.2 - 303.0 kN</td>
</tr>
<tr>
<td>Diameter</td>
<td>160 - 200 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>5.032 kN</td>
</tr>
<tr>
<td>Length</td>
<td>164.7 - 177.3 m, 550 kaw</td>
</tr>
</tbody>
</table>
| Arrangement | Terrestrial form: Main span: 15.1 m  
|              | Side span: 4.72 - 8.1 m |

### Pylon / Foundation

| Type | Hinge concrete pylon  
|------|------------------|
| Material | Concrete  
| Const. Method | Auto climbing form |
| Height | 15 m |

<table>
<thead>
<tr>
<th>Type</th>
<th>Stair cable</th>
</tr>
</thead>
</table>
| Material | Concrete  
| Const. Method | Crane and buoyancy |

### Construction of Pylon

- Construction of pylon
- Construction of side span
- Installation of segment in a way of girder by girder
- Creation of stay cables
**Geobukseon Bridge**

**Bridge Specifications**

<table>
<thead>
<tr>
<th>Project</th>
<th>Name</th>
<th>Construction of the second Incheon bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Subcategorization: Incheon, Daeham, Gyeonggi, Jeonbuk</td>
<td></td>
</tr>
<tr>
<td>Owner/Client</td>
<td>Bahn planning &amp; construction management administration</td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>Young-Ryong Corp.</td>
<td></td>
</tr>
<tr>
<td>Contract Amount</td>
<td>33,500,000 USD</td>
<td></td>
</tr>
</tbody>
</table>

**Overview**

| Type | Continuous T-shaped concrete sub-stayed bridge |
| Span | 58.35×208.7+182×35.0×4=684m (main span: 230m) |
| Width | 24,2m (6 lanes, road/bicycle bridge) |
| Design Year | 2020 |
| Design Code | DB, DB, DL, DL |
| Design Speed | 60km/h |
| Remarks | Pylon height/ Span ratio: 28% |

**Deck System**

| Type | Concrete edge girder |
| Height | 13m |
| Depth/Width ratio | 8.2% |
| Design wind velocity | 46.1 m/sec |
| Aerodynamic system | Wind-bearing system |
| Stiffening system | Pylon modified asail (35m mast, 1800mm) |
| Slab | Casted on RC, 50mm (400mpa, 100mm) |
| Const, Method | Balanced cantilever method |

**Cable**

| Type | Parallel strand cable (VHS, 3.865MPa) |
| Subcategorization | VLS, VLS, international |
| Section | D16.3mm×2.485 - 2.685 |
| Diameter | 160-390 mm |
| Weight | 3.020 kN |
| Length | 158.1-126.4m, 104 strands |
| Arrangement | Semi-Y type |

**Pylon**

| Type | L-shaped concrete pylon |
| Height | PS1: 90m, PS2: 86.4m |
| Material | Concrete: 1.6×305MPa, 3.179m³ |
| Reinforcement | T: 6000mpa, 3.960m² |
| Const, Method | Auto climbing form |

**Foundation**

| Type | Parallel multi-strand cable |
| Height | PS1: Concrete: 121.2m, PS2: 112.5m, 3x515 (515) |
| Material | Concrete: 1.6×265MPa, 3.380mm² |
| Reinforcement | T: 6000mpa, 3.500m² |
| Const, Method | Floating caissons using the floating dock and crane |
| PZ: RCD |

**Images**

- Pull-up and submerging canvas by FC
- Construction of Pylon using auto climbing form
- Heavy lifting of pier table and form transfer
- Cast-in-place FCM
- Installation of Parallel multi-strand cable
Sepung Bridge

Bridge Specifications

- **Name**: National arterial road construction of Gwangyang city
- **Location**: Sepung, Gwangyang-eup, Sungsan-eup, Gwangyang-myeon, Gwangyang-si
- **Owner/Client**: Busan regional construction management administration
- **Design**: Chang&Shi, Eng. Corp., Seoul
- **Contract Amount**: 29.2 million USD

**Overview**

- **Type**: Continuous double cable-stayed bridge (three pylons and single cable plan)
- **Span**: 92.5 + 230.2 + 92.5 + 72.5 m (main span length: 220 m)
- **Width**: 22.0 m (4 trolley)
- **Design load**: DBS + 24 trolley + 24
- **Design velocity**: 95 km/h
- **Remarks**: Pylon height/Span ratio: 24%

**Deck System**

- **Type**: PSC box girder with strut
- **Height**: 9.0 m
- **Depth/Width ratio**: 13.3%
- **Design wind velocity**: 92,7 m/sec
- **Seismic system**: Seismic isolated system using friction & electromagnetic bearing
- **Pavement**: Asphalt 80 mm
- **Slab**: PSC slab, cross (550/1500 mm)
- **Const. Method**: Tensioned cable-stay method

**Cable**

- **Type**: Parallel strand cable (Steel: 1,600 MPa)
- **Subcontractor**: Oya/Aglae Systems International
- **Section**: 171.6 + 74.8 + 11.5 EA, A/72.0 + 91.3 cm
- **Diameter**: 160 – 220 mm
- **Weight**: 4,115 kN
- **Length**: 24.0 m – 132.2 m, 90°
- **Arrangement**: Semi-sharp (w/0/4/34/6)

**Pylon**

- **Type**: Group concrete pylon
- **Height**: P1: 42.7 m, P2: 21.0 m, P3: 42.7 m
- **Material**: Concrete
- **Reinforcement**: Fy = 400 MPa, Fy = 1,600 MPa
- **Const. Method**: Auto-climbing form

**Foundation**

- **Type**: Drilled shaft (FY: 3,700 kN, 4,400 kN)
- **Material**: Concrete
- **Reinforcement**: Fy = 400 MPa, Fy = 1,600 MPa
- **Const. Method**: RC3
Handuri Bridge

Bridge Specifications

- **Name**: Construction of Gymjeong-eui bridge
- **Location**: Gymjeong-eui, Seojeong special self-governing city
- **Client/Owner**: Korea Land & Housing Corp., Yeosu Eng., Corp., Saman Exp., Oly Eng., Corp.
- **Design Load**: CB-20, DC-24
- **Design Speed**: 60km/hr
- **Remarks**: Pylon height / Span ratio: 33.5%

**Type**
- Tensile steel concrete composite cable-stayed bridge
- Span: 203 + 140 + 340 (Main span: 220m)
- Width: 40.5m (B span)

**Deak System**
- Seismic sub-bird system using elastomeric bearing
- Vibration isolation system
- Penetration: Asphalt (240mm)
- Steel: Precast RC slab (fcd 40MPa)
- Construction Method: Side span / IFM

**Cable**
- Parallel strand cable (fct 1,860MPa)
- Sub-contractor: S/L International
- Section: 910.7mm 29-130(A, B, C, D, E, F)
- Diameter: 160-195mm
- Weight: 5.10ton
- Length: 187-175m, 500m stays
- Arrangement: Semi-deck (spacing: 13.5m)

**Pylon**
- Type: Tubular curved concrete pylon
- Height: 92.5m
- Material: Concrete (fcd 40MPa)
- Reinforcement: fcu 400MPa
- Construction Method: Jumping form

**Pylon Foundation**
- Type: Pile foundation (Ø1m x H: 25m x 3m)
- Material: Concrete (fcd 150MPa)
- Reinforcement: fcd 400MPa

**Overview**
- Installation of the anchor head
- Installation of side span girders by C/C
- Free cantilever erection of main span

**General overview and cross section**
Simgok-2 Bridge

Type: Cable-stayed bridge with steel-concrete composite girder
Const. Method: Ellipsoidal steel arch pylon
Remarks: Stiffening girder/full staging method
Pylon (block erection method)

Bridge Specifications

<table>
<thead>
<tr>
<th>Project</th>
<th>Name</th>
<th>Location</th>
<th>Owner</th>
<th>Design</th>
<th>Contract Amount</th>
<th>Contract period</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Overview</th>
<th>Type</th>
<th>Span</th>
<th>Width</th>
<th>Design load</th>
<th>Design vel.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cable-stayed bridge with composite steel girder</td>
<td>80+40+130m (main span: 80m)</td>
<td>44.6m (3.6lvs)</td>
<td>9.2kN</td>
<td>80 km/h</td>
<td>Pylon height/ span ratio: 7.5%</td>
</tr>
</tbody>
</table>

| Deck System | Height | Depth/ width ratio | Design wind velocity | Aerodynamic Stabilizing | Wind shae System | Total steel weight | Pavement | Slab | Pylon/ Foundation |
|-------------|--------|-------------------|---------------------|-----------------------|-----------------|------------------|----------|------|-----------------
|             | 9.1 m  | 7%                | 44.398 m/s          | Wind shae System      | Wind shae System | 14,300 kN (main member: S500SC-WC, sub-member: S500) | 38.7 kg/m² (450mm) | Cast-in-situ RC slab (f_k = 40 MPa, t = 200mm) | 1.8 m, 2.0 m, Steel cables (2 spans: 1.870 MFA) |

<table>
<thead>
<tr>
<th>Cable</th>
<th>Type</th>
<th>Section</th>
<th>Diameter</th>
<th>Length</th>
<th>Weight</th>
<th>Arrangement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parallel wire strand (PWS) cables (2 spans: 1.870 MFA)</td>
<td>37mm – 55% (SST: 1.870 MFA)</td>
<td>75 – 130 mm</td>
<td>56.71m</td>
<td>610 KN</td>
<td>Three-dimensional arrangement</td>
</tr>
</tbody>
</table>

Pylon/ Foundation

<table>
<thead>
<tr>
<th>Pylon</th>
<th>Height</th>
<th>Material</th>
<th>Const. Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>90 m</td>
<td>S500SC (800 kN)</td>
<td>Block erection method</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pier</th>
<th>Type</th>
<th>Material</th>
<th>Const. Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pile</td>
<td>Concrete (f_c = 27 MPa)</td>
<td>RCD</td>
</tr>
</tbody>
</table>

Front view
Night view
General layout and cross section

Installation of steel arch pylon
Erection girders using FISM
Installation of PWS cable
3-Dimensional cable arrangement
Sungai Brunei Bridge

**Bridge Specifications**

| Project | Name | Construction of Bridges Linking Brunei
| Location | Brunei-Muara District, Brunei Darussalam |
| Owner/Client | Works Department, Ministry of Development, Engineering Consultants Ltd. |
| Contract Amount | 163.9 million USD |
| Duration | Jan 2019 - Jul 2021 |

**Overview**

- **Type**: Single-Pylon Cable Stayed Bridge
- **Span**: 60-871.973-193.607 m
- **Width**: 26.1 m (4 lanes)
- **Design Code**: EN 1994-2, Design velocity 90 km/h
- **Remarks**: Pylon height/span ratio = 42.1%

**Deck System**

- **Type**: PSC box girder
- **Height**: 3.6 m
- **Depth/Width ratio**: 14.3%
- **Design wind velocity**: 27 m/s
- **Dynamic System**: Tying with Substructure
- **Aerodynamic system**: Wind Bellowing
- **Steel**: PSC Deck

**Construction Method**: Balanced Cantilever Method

**Cable**

- **Type**: Parallel Strand System (Psy-1,860MPa)
- **Section**: 9.1/1.7mm 27-1272A, 6.66-1315.5mm²
- **Diameter**: 160-250mm
- **Weight**: 6,500KN
- **Length**: 57-25m, 68ways

**Amusement**: Skywalk (span = 7m)

**Pylon**

- **Type**: Reinforced Concrete
- **Height**: 134.031 m
- **Material**: Concrete: 7000m³, Rebar 3200T
- **Construction Method**: ACS

**Pylon/Foundation**

- **Type**: Dinkle shaft
- **Material**: Concrete: 1600m³, 5335m², GFRP: 585m², 3185m², Reinforcement: 1802T, 4553T
- **Construction Method**: RCOD

**National Crescent-shaped Pylon silhouette**

**Floating tourist facility**
Incheon Bridge

Bridge Specifications

<table>
<thead>
<tr>
<th>Project</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Incheon Bridge project</td>
</tr>
<tr>
<td>Location</td>
<td>Yeongjongdo, Jung-gu, Songdo, Yeonsu-gu, Incheon</td>
</tr>
<tr>
<td>Owner / Client</td>
<td>Incheon Bridge Corp. (Design, Construction)</td>
</tr>
<tr>
<td>Contract Amount</td>
<td>KRW 2.088 T, USD 1.67 m</td>
</tr>
</tbody>
</table>

Overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Naverpan continuous steel box cable-stayed bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span</td>
<td>80 + 260 + 260 + 260 + 80 + 1,640 m (main span: 800 m)</td>
</tr>
<tr>
<td>Width</td>
<td>36.4 m (6 lanes)</td>
</tr>
<tr>
<td>Design load</td>
<td>CR-20, OC-24, L-12</td>
</tr>
<tr>
<td>Design velocity</td>
<td>120 km/h</td>
</tr>
</tbody>
</table>
| Remarks            | Pylon/ Span ratio: 30%, Second span: 24

Deck System

<table>
<thead>
<tr>
<th>Type</th>
<th>Steel box girder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>32 m</td>
</tr>
<tr>
<td>Depth/Width ratio</td>
<td>8.5%</td>
</tr>
<tr>
<td>Design wind velocity</td>
<td>30 m/sec</td>
</tr>
<tr>
<td>Aerodynamics</td>
<td>Dynamic bridge shape / Snagging wind load, main span</td>
</tr>
<tr>
<td>Pavement</td>
<td>D5 asphalt (2.5 m)</td>
</tr>
<tr>
<td>Slab</td>
<td>Steel deck reinforced by U-shaped I-beam</td>
</tr>
<tr>
<td>Const. Method</td>
<td>Large girder (side span) + FCM (main span)</td>
</tr>
</tbody>
</table>

Cable

<table>
<thead>
<tr>
<th>Type</th>
<th>Stay Wire (Pu = 1,300 MPa)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Section</td>
<td>57 mm: 103×103 (A = 41.26, 119.44 cm²)</td>
</tr>
<tr>
<td>Diameter</td>
<td>9.87 - 15.8 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>38.73 kg</td>
</tr>
<tr>
<td>Length</td>
<td>110.7 - 415.0 m</td>
</tr>
<tr>
<td>Arrangement</td>
<td>Semih type General part: 16.0 m Anchor part: 6.0 m</td>
</tr>
</tbody>
</table>

Pylon / Foundation

<table>
<thead>
<tr>
<th>Type</th>
<th>Reinforced concrete pylon</th>
</tr>
</thead>
<tbody>
<tr>
<td>Height</td>
<td>230.5 m</td>
</tr>
<tr>
<td>Material</td>
<td>Concrete (fck=45 MPa)</td>
</tr>
<tr>
<td>Const. Method</td>
<td>Auto climbing form</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Orbital shaft (D=2.0 m, 3 x 245m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Material</td>
<td>Concrete (fck=16 MPa) Reinforcement: fy = 400 MPa</td>
</tr>
<tr>
<td>Const. Method</td>
<td>RID</td>
</tr>
</tbody>
</table>

Purpose / Functions

- Auto-climbing form (pylon)
- Installation of steel deck (side span)
- Key-segment closure (main span)
- Approach bridge (PSC Box, FCM)
- Viaduct (PSC Box, full span launching method)
Arch Bridge

The English word ‘arch’ stems from the Latin word ‘arcus’ meaning bow. With this word the word ‘arc’, which refers to something round. We see arch-styled structures frequently in our neighborhoods. The triangle-shaped arches were made in the New Stone Age, so the history of the arch is very long. A curved arch was made for the first time circa B.C. 4000 in Mesopotamia. The structural advantages of transferring force by means of only compression enabled people to construct the arch made of stones in the Egyptian, Greek and Roman era. Around the nineteenth-century, the arch structure was made of steel and became the milestone in civil engineering history in the way that the long span bridge could be constructed with it. Nowadays steel and reinforced concrete are used as main materials, so they carry out the function of a beam as well as the arch itself. From the stone arch bridge as in Cheonggyo, Baekungyo at Bulguksa Temple in the unified kingdom of Silla’s and Geumgang Bridge (Changdeok Palace), Yongjeseok (Gyeongbok Palace) in the Chosun dynasty, to Banghwa bridge (main span length: 130m, completed in 2001), many various arch bridges are being constructed or completed in Korea. Ha-Pu bridge (main span length: 550m, completed in 2003) in China is the longest span arch bridge in the world.
Choyang Bridge

**Bridge Specifications**

<table>
<thead>
<tr>
<th>Project</th>
<th>Owner/Client</th>
<th>Contract Amount</th>
<th>Contract Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>$14.4 million USD</td>
<td>Dec. 1994 – Apr. 2022</td>
</tr>
</tbody>
</table>

**Overview**

- **Type:** Two-pinned suspended deck arch bridge
- **Span:** 232m
- **Width:** 16.5m (Design)
- **Height:** 12.8m
- **Construction Method:** Arch rib (large-block erection)

**Deck System**

- **Type:** prestressed concrete
- **Weight:** 38,000 kN (Design)
- **Coating:** Ultraviolet-proof anticorrosive painting

**Arch Rib**

- **Type:** NPSW 940, 975, 1,000
- **Material:** Steel
  - NPSW 940: 235MPa
  - NPSW 975: 250MPa
  - NPSW 1,000: 300MPa

**Cable**

- **Type:** NPSW 1,975
- **Material:** Steel
  - NPSW 1,975: 2000MPa

**Foundation**

- **Type:** Shallow foundation
- **Material:** Concrete (f:200 kPa)

**Remarks:**

- Suspended deck arch bridge
- Concrete stiffening girder with suspended deck
- Stiffening girder (cast-in-place using the temporary truss)

**Images:**

- Temporary assembly of arch ribs in factory
- Erection of arch ribs
- Large block erection by FIC (20,000 kN)
- Cast-in-place stiffening girder using the temporary truss
- Removing temporary truss by FIC (10,000 kN)
Seonmu Bridge

**Type**: Steel arch bridge supported by cable
**Const. Method**: Arch rib (large-block erection)
**Stiffening girder (large-block erection)**

**Overview**
- **Type**: Steel arch bridge supported by cable
- **Span**: 80m
- **Width**: 10.2m (2 lanes)
- **Design load**: DB + 24, DL + 24
- **Design velocity**: 60km/h
- **Remarks**: Curved asymmetric steel arch

**Deck System**
- **Type**: Deck composite box girder
- **Height**: 1.2m
- **Design wind velocity**: 30.0m/s
- **Seismic resistance system**: Axial system by fixed arch
- **Pavement**: Refraining asphalt (SBS, t=80mm)
- **Slab**: RC slab, t=270mm, b=2400mm
- **Const. Method**: Large block erection by crane

**Arch Rib**
- **Type**: W-shaped steel arch with box section
- **Rise ratio**: 1.5%
- **Weight**: 2,710 kN (main member: SVM50, sub-member: SVM40)
- **Coating**: Weatherproof anticorrosive painting
- **Const. Method**: Large block erection by crane

**Cable**
- **Type**: Parallel wire system (Paw=1,670MPa)
- **Section**: 15mm=1086A, d=21.4mm
- **Weight**: 83kN
- **Diameter**: 75mm
- **Length**: 218~237m
- **Arrangement**: 71m, 37/34plane

**Foundation**
- **Type**: Shallow foundation
- **Bd/Dep**: 10.6m/270m, b=9m×2.4m
- **Material**: Concrete, f'c=40kN/m², 172m²
- **Reinforcement**: fy=500MPa, 370 kN

**Installation**
- Installation of temporary bents and large-block stiffening girders
- Installation of temporary bents for arch ribs, erection by the crane for arch ribs
- Closure of middle arch ribs
- Cable erection after jacking up the stiffening girder
Geumgang Bridge

Bridge Specifications

- **Name**: Seodoro Geumgang bridge construction project
- **Location**: Cheonggung-dong - Cheonggung harbor, Seohwado, Gangwon-do (Gyeonggi Province)
- **Owner/Client**: Seohwado
- **Contract Amount**: 123 billion KRW
- **Contract Period**: Nov. 2006 - Jan. 2010

**Overview**
- **Type**: Cable supported Lohas arch bridge
- **Span**: 180m
- **Width**: 25.8m (98.8ft)
- **Design Wind Velocity**: 50km/h
- **Design Speed**: 60km/h
- **Remarks**: -

**Deck System**
- **Type**: Edge girders, Edge cross beams, Steelbox girder, Stringers, Inner cross beams, Flex girder
- **Height**: 2.3m
- **Seismic Resistance System**: Spherical bearing system
- **Pavement**: Polymer modified asphalt (SBS, 18.83cm)
- **Slabs**: RC slab, slab: (30mm, 100x100cm)

**Arch Rib**
- **Type**: Beam type steel sections with ribs with steel box section
- **Rib Area**: 15.5
- **Weight**: 8,783 KN (main member: SM400, other members: SM350)
- **Coating**: Ceramic coating
- **Construction Method**: Block section

**Cable**
- **Type**: Parallel strand cable (w/c = 1,000KN)
- **Section**: 215.8mm^2 (215.8mm^2)
- **Diameter**: 160–250mm
- **Weight**: 237 KN
- **Length**: 173–270m

**Foundation**
- **Type**: Start position: Steel foundation (H=1.8m, 80x3.5m), Drilled shaft (80x3.5m)
- **Material**: Concrete 164,000 KPa, 5,860 m^3
- **Reinforcement**: 1,790 KN
- **Drilled shaft**: Concrete 164,000 KPa, 3.3 m^3
- **Reinforcement**: 1,790 KN, 535 KN

**Installation of temporary bents and deck stiffening girders**

*Emotion of arch ribs by the crane*

Cable erection

Placing of concrete slab
Haeoreum Bridge

Bridge Specifications

<table>
<thead>
<tr>
<th>Project</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Approach road project of Haeoreum Bridge</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Dong-gu, Ulsan, South Korea</td>
<td></td>
</tr>
<tr>
<td>Owner/Client</td>
<td>Korea Expressway Corp.</td>
<td>Design: KCI Int. Eng.</td>
</tr>
<tr>
<td>Contract Amount</td>
<td>314 million USD</td>
<td></td>
</tr>
</tbody>
</table>

Overview

<table>
<thead>
<tr>
<th>Type</th>
<th>Balanced arch bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Span</td>
<td>45.5+120+85.5+231m (main span=120m)</td>
</tr>
<tr>
<td>Width</td>
<td>37.5m (3 lanes)</td>
</tr>
<tr>
<td>Design Year</td>
<td>2012-24, 2013-24</td>
</tr>
<tr>
<td>Design velocity</td>
<td>100km/h</td>
</tr>
<tr>
<td>Remarks</td>
<td>Hybrid system</td>
</tr>
</tbody>
</table>

Deck System

<table>
<thead>
<tr>
<th>Type</th>
<th>Steel/concrete hybrid system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main span</td>
<td>Steel box + stiffening girder + I-girder (bridge)</td>
</tr>
<tr>
<td>Side span</td>
<td>FSC box girder (8.464)</td>
</tr>
<tr>
<td>Height</td>
<td>Main span: 2.2m</td>
</tr>
<tr>
<td></td>
<td>Side span: 1.1m</td>
</tr>
<tr>
<td>Design wind velocity</td>
<td>114km/h</td>
</tr>
<tr>
<td>Seismic resistance</td>
<td>System: POT base + seismic system applying steel damper</td>
</tr>
<tr>
<td>Weight</td>
<td>8,800 kN (main member: 5,148kN, sub-member: 3,652kN)</td>
</tr>
<tr>
<td>Pavement</td>
<td>UMC (Low Modified Concrete, 1.0% mm)</td>
</tr>
<tr>
<td>Slab</td>
<td>RC (arch: 83, 604MPa; others: 892MPa)</td>
</tr>
<tr>
<td>Const. Method</td>
<td>Black carbon</td>
</tr>
</tbody>
</table>

Arch Rib

| Type                  | Prestressed concrete, Unbonded strand (j=302.2m) |
|                       | Steel: 152.4mm |
|                       | Placing: Air-jet, constant temperature |
|                       | Const. Method: Largely bolt, erection method by strand (3 bolts) |

Cable

| Type                  | Prestressed strand, j=1865MPa |
|                       | Section: Ø16.3mm, A=286.0mm² |
|                       | Diameter: 16.3mm |
|                       | Weight: 79.6 kN |
|                       | Length: 3,213.2m |
|                       | Arrangement: 3,776m |

Foundation

| Type                  | Prestressed strand, Ø16.3mm, 175kN |
|                       | Const. Method: Concrete, fck=64.83MPa, E=31,170 kN/mm² |
|                       | Rebars: Ø15.24mm, Ø20.64mm |
|                       | Const. Method: Concrete, fck=64.83MPa, E=31,170 kN/mm² |
|                       | Rebars: Ø15.24mm, Ø20.64mm |

Roadway view

Public park under the bridge

General layout and cross section
Changnae Viaduct

**Type**: Pony truss bridge with arch shape pier
**Const. Method**: Truss (large block erection)
**Remarks**: Steel arch shape pier strengthened by cables

**Arch Rib**: (large block erection)

---

**Bridge Specifications**

- **Name**: Railroad construction project between Pungsan and Punggi-eup
- **Location**: Hamyang, Hamgyeongnam-do, Seongnam
- **Owner/Client**: Korea Rail Network Authority
- **Design**: DM Eng.
- **Contract Amount**: 42.7 million USD

### Overview

- **Type**: Pony truss bridge with arch shape pier, railroad
- **Span**: 28.6m x 60m
- **Width**: 2.6m (proximal)
- **Height**: 3.65m
- **Design Span**: 15.22m
- **Design Velocity**: 110km/h
- **Remarks**: Steel arch shape pier strengthened by cables

### Deck System

- **Type**: Continuous high-span pony truss
- **Height**: 31.8m
- **Design wind velocity**: 3.25m/s
- **Seismic System**: Automatic system by fixed arch pier and spherical ball joint
- **Weight**: 48.9kN
- **Stay**: RC, steel slab (1.5m x 2.5m, 30cm)
- **Const. Method**: Large block erection by crane

### Arch Rib

- **Type**: Single side arch
- **Weight**: 31.7kN (GM520)
- **Coating**: Weatherproof anticorrosive painting
- **Const. Method**: Large block erection by crane

### Cable

- **Type**: Full EW system (18 wire 1.67KN EA)
- **Section**: (9mm x 0.27EA, 6.8 x 0.26EA)
- **Weight**: 1100kg
- **Arrangement**: 1.6 x 4EA

### Foundation

- **Type**: Steel & R.I foundation
- **Drilled shaft**: 82.0m x 24.5m x 2EA
- **Arch pier position**: footing: 9m x 2.5m x 3EA, Drilled shaft: 82.0m x 22.8m x 4EA
- **Material**: Concrete: 940 MPa
- **Reinforcement**: Yx = 400 MPa

---

**Steel arch pier strengthened by cables**

**FTM structural analysis model**

**Impact load absorber**

**Cable block erection by crane**

---

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**Gyopo Bridge**

**Bridge Specifications**

<table>
<thead>
<tr>
<th>Project</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Railroad construction project between Pohang and Pasongtaek</td>
<td></td>
</tr>
<tr>
<td>Location</td>
<td>Pasanggung-Pasongtaek, Gyonggi-do</td>
<td></td>
</tr>
<tr>
<td>Owner/Client</td>
<td>Korea Rail Network Authority</td>
<td>Design: DM Eng.</td>
</tr>
</tbody>
</table>

**Overview**

| Type | Double tie arch bridge, railroad |
| Span | 95+130+60+230m |
| Width | 8.8m (main lane) |
| Design load | 1.5 t/20 | Design velocity | 70km/h |
| Remarks | The longest arch railroad bridge in Korea |

**Deck System**

| Type | Steelbox stiffening girder |
| Height | 2.0m |
| Design wind velocity | 35m/s |

**Deck system**

| Type | SteelQuake System |
| Slab | RC slab (Flex) 37MPa |
| Const. Method | Erection of the block of the intermediate support |

**Arch Rib**

| Type | Double tie arch |
| Const. Method | Heavy duty weatherproof coating |
| Const. Method | Block erection using the temporary bents |

**Hanger**

| Type | Steelbox hanger |
| Section | 300mm x 300 mm |

**Foundation**

| Type | Deep shaft 90,5m, BFA |
| Material | Concrete: fck=35MPa, Reinforcement: fy=400MPa |

**Construction**

- Cross section view
- Construction of pylons
- Installation of steelbox girder using temporary bents
- Installation of arch rib using temporary bents
Asan Viaduct

Bridge Specifications

**Project**
- **Name**: Construction of Hongseong-Gongju Expressway Double-Track in Seosan Branch
- **Location**: Hongseong-Gongju, Panyang-dong, Goseong-dong
- **Client**: Korea Railroad Authority
- **Design**: OMM Eng.
- **Contract Amount**: 1.65 billion USD
- **Construction Period**: Nov 2012 – Oct 2017

**Overview**
- **Type**: 5 span asymmetry arch bridge, method
- **Span**: 100+125+305+125+112.7=622m
- **Width**: 12.2m (2 lane)
- **Design Load**: HL-25
- **Design Speed**: 250km/h
- **Remarks**: Double rib arch

**Deck System**
- **Type**: Steel composite box girder
- **Height**: 2.5m
- **Design Wind Velocity**: 35.0m/s
- **Stiffening System**: Beating
- **Slab**: Precast slab (Diagonal 850mm, 285mm)
- **Construction Method**: Large-block erection method

**Arch Rib**
- **Type**: Double rib arch
- **Coating**: Weatherproof anticorrosive coating
- **Construction Method**: Large-block erection method

**Hanger**
- **Type**: Steel box hanger
- **Section**: 1,100mm x 650mm

**Foundation**
- **Type**: Drilled shaft
- **Material**: Concrete (fck=35MPa)
- **Reinforcement**: fy=400MPa

**Roadway View**
- Installation of RCD pile
- Installation of PC House
- Installation of approach bridge
- Installation of main bridge
Asan Viaduct

**Overview**
- **Type**: Through bridge of 5 span asymmetry arch bridge
- **Const. Method**: Large-block erection method
- **Remarks**: Double nil arch

**Bridge Specifications**

<table>
<thead>
<tr>
<th>Project</th>
<th>Name</th>
<th>Location</th>
<th>Owner/Client</th>
<th>Design</th>
<th>Contract Amount</th>
<th>Const. Period</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Construction of Hongseong-GoqiengGRAY Bridge</td>
<td>Hongseong-goqiengGray, Pyeongtaek, Gyeonggido</td>
<td>Korea Rail Network Authority</td>
<td>DM Froz.</td>
<td>382.5 million USD</td>
<td>Nov 2012 - Oct 2017</td>
</tr>
</tbody>
</table>

**Overview**
- **Type**: 5 span asymmetry arch bridge, method
- **Span**: 100+125+175+125+110 + 62m
- **Width**: 17.2m (2 lane)
- **Design Load**: HL-25
- **Design Velocity**: 250km/h
- **Remarks**: Double-rib arch

**Deck System**
- **Type**: Steel composite box girder
- **Height**: 2.5m
- **Design Wind Velocity**: 35.2m/s
- **Slab**: Precast slab (64mm X 300mm, 250mm)
- **Const. Method**: Large-block erection method

**Arch Rib**
- **Type**: Double-rib arch
- **Coating**: Weatherproof anti-corrosive painting
- **Const. Method**: Large-block erection method

**Hanger**
- **Type**: Steel box hanger
- **Section**: 1100mm x 650mm

**Foundations**
- **Type**: pile
- **Material**: Concrete (fck=35MPa)
  - Reinforcement: fy = 400MPa

Installation of RCD pile
Installation of PC House
Installation of approach bridge
Installation of main bridge
**Nakdonggang Bridge**

**Bridge Specifications**

<table>
<thead>
<tr>
<th>Project</th>
<th>Name</th>
<th>Location</th>
<th>Owner/Client</th>
<th>Design, Const. period</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Overview</th>
<th>Type</th>
<th>Span</th>
<th>Width</th>
<th>Design load, Design velocity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2-span continuous arch bridge with crossed arch ribs, railroad</td>
<td>120 + 120 = 240m</td>
<td>10.3m (2 lane)</td>
<td>H26, L542</td>
</tr>
</tbody>
</table>

| Remarks | The first application of crossed arch ribs in Korea |

<table>
<thead>
<tr>
<th>Deck System</th>
<th>Type</th>
<th>Height</th>
<th>Design wind velocity</th>
<th>Sway system</th>
<th>Slab</th>
<th>Constr. Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Steel box stiffening girder</td>
<td>2.5m</td>
<td>40kN/m</td>
<td>POT Bearing</td>
<td>RC slab (30MPa)</td>
<td>Erection of the block of the intermediate supports</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Arch Rib</th>
<th>Type</th>
<th>Constr. Method</th>
<th>Constr.</th>
<th>Constr. Method</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Crossed arch rib</td>
<td>Weatherproof anti-corrosive painting</td>
<td>Block erection using the temporary burrs</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hanger</th>
<th>Type</th>
<th>Section</th>
<th>Constr.</th>
<th>Material</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PWX (170KN) or MST160KN type Cable</td>
<td>PWX: 3-φ30mm x 4</td>
<td>HA</td>
<td>Concrete: fcu = 27MPa, Reinforcement: fy = 400MPa</td>
</tr>
</tbody>
</table>

Installation of temporary burts and stiffening girders

Erection of arch ribs by the crane

Erection of cable

Placing of RC slab
Extradosed Bridge

This type of bridge was first proposed by Jacques Mithivil in 1986. The tendons are arranged outside the girders, which are inside conventional girder bridges. It results in the prestressing forces with greater eccentricity acting more effectively on the main girder. The external appearance resembles cable-stayed bridges, but the structural characteristics are comparable to those of girder bridges. The distinctive features of extradosed bridges are as the followings. Applying external prestressing, the girder height can be set shorter than that of standard girder bridges. The cable/prestressing tendons outside the girders need no tension adjustment necessary for cable-stayed bridges, and can be treated as usual tendons in the girder bridge. The height of pylons can be as half as those of cable-stayed bridges, therefore easier construction can be executed. With small stress fluctuation under live load, the anchorage method for the stayed cables can be the same as that of tendons inside the girder, then the excess cost can be cut. It is the best choice that application of this type bridge to a bridge with main span of 110–200m.
Shindae-1 Bridge

Type: Four-span extradosed bridge with continuous prestressed concrete box girder, one pylon and single cable plan (total length: 246m)
Remarks: Landmark of the local area

Overview
Type: Four-span extradosed bridge with continuous prestressed concrete box girder
Span: 45+258+85+258 (main span: 198m)
Width: 22.5m (6 lanes)
Design speed: 120 km/h
Design life: 111 years
Remarks: Minimal disturbance of the flow

Deck System
Type: PSC box section girder (Steel)
Height: General section: 2.5m, 2.5m at the pylon: 3.1m
Depth of pylon: 111%
Design wind velocity: 31.1m/sec
Pavement: Polymer modified asphalt (SB5, Sa900)
Slab: PSC composite deck slab: 20cm+[40cm], 20cm+[60cm], tendons [5.5-6.5A, space (0.9m)
Concrete: Main beam: C60, Pylons: C70

Cable System
Type: Parallel strand cable (Tensile force: 1400kN)
Section: Ø19.7mm - 31EA, Axial force: 248kN
Diameter: 29.0mm
Weight: 448 kN
Length: 16.6 – 103.3m
Arrangement: Symmetrical

Pylon/Foundation
Type: Base concrete pylon
Height: 12.2m
Materials: Concrete: C60, Reinforcement: 0.655m², 1.605kN
Type: Shallow foundation (D=1.5m, β=0.5m, h=1.0m)
Materials: Concrete: 383.5m², 623kN
Reinforcement: 0.525m², 800kN, 623kN
Yangyang Bridge

**Bridge Specifications**

<table>
<thead>
<tr>
<th>Name</th>
<th>Yangyang bridge construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Wonsi – Sogangni, Yongyang, Yangyang-I, Gangwon-do</td>
</tr>
<tr>
<td>Owner / Client</td>
<td>Yongyang-I</td>
</tr>
<tr>
<td>Design</td>
<td>Yedohun Eng. Corp.</td>
</tr>
<tr>
<td>Contract Amount</td>
<td>26.5 m (in USD)</td>
</tr>
</tbody>
</table>

**Overview**

- Type: Five-span extradosed bridge with continuous prestressed concrete box girder, two pylons and single cable span.
- Span: 45+80+100+80t+45m = 390m (main span: 100m)
- Width: 25.3m (3 lanes)
- Design load: DS-25, DL-25
- Design velocity: 100km/hr
- Remarks: Pylon height/Spant ratio: 11%

**Deck System**

- Type: PSC box section girder (Korea)
- Height: 1.15m
- Depth/Width ratio: 12.1%
- Design wind velocity: 56.6m/sec
- Pavement: Polymer modified asphalt (15%, 80mm)
- Slab: PSC concrete deck slab
  - f_{cu}=52.0MPa, 300mm, tension 0.24Aea, span 800mm

**Pylon**

- Type: Drilled shaft + Concrete
  - Diameter: 1.5m, T/P=4pilons, footing: 19.2m dia/10.5m dia/3.0m
- Footing: Concrete
  - f_{c}=80MPa, 900cm²
  - Reinforcement: fy = 400MPa, 3,370kN
- Material: Drilled shaft + Concrete
  - f_{c}=80MPa, 615mm

**Cable**

- Type: Parc/strand cable
  - (Self-fabricated multi-cable, f_{cu}=1860MPa)
- Section: Ø15.3mm, 272.3mm², epoxy coated strand
- Diameter: 115mm
- Weight: 644N
- Length: 25.0 to 34.3m
- Arrangement: Sertian

**Construction**

- Installation bents at North construction part (heavy duty propping system)
- Cable erection
- Construction of the superstructure
- Construction of north and south span is divided for securing sufficient flow area during flood periods

**Type:** Five-span extradosed bridge with continuous prestressed concrete box girder, two pylons and single cable span.
**Const. Method:** FSM by heavy duty propping system considering site conditions
**Remarks:** Landmark of the local area and the long span for minimizing the disturbance of the river flow

**Facts:**
- Monitored on-site to maintain the structural integrity and overall system during construction

---

*Figure Legend:*

- General layout and cross section
- FGM (fabrication, installation, and maintenance) of the pylon and foundation system
Jinwicheon Bridge

Bridge Specifications

- **Project**
  - Name: Nine-bridge construction project between Pusan and Pohang
  - Location: Pusan-up, Pusan-gu, Gyeong-do
  - Owner/Client: Korea Railroad Authority
  - Design: Seoheung Engineering
  - Contract Amount: 2777 M-Bn USD
  - Contract period: 4/5/2012 - 5/14/2014

- **Overview**
  - Type: FSC pier type FSC box girder
  - Span: 62,788m x 25m
  - Width: 9.6m
  - Design load: LS + 22
  - Design velocity: 130km/hr
  - Remarks: Nine-bridge type FSC box girder

- **Deck System**
  - Type: FSC box girder
  - Height: 2.3m
  - Design wind velocity: 35m/s
  - Seismic system: POF Claye
  - Slab: FSC concrete deck slab
  - Const. Method: F. Enlarging method

- **Cable**
  - Section: Ø98.4mm + 26EA
  - Diameter: 1500-1833mm
  - Length: 83m + 95m
  - Arrangement: FSC box girder

- **Pylon**
  - Type: H-type
  - Height: 44.3m
  - Material: Concrete: fck=40MPa
  - Const. Method: Reinforcement: fyk=800MPa

- **Foundation**
  - Type: Concrete
  - Material: Concrete: fck=40MPa
  - Const. Method: RC

- **Installation**
  - Installation of temporary bridge
  - Installation of bent and girder
  - Installation of finback
### 3rd Ring Road Bridge

**Location**: Ha Noi, Vietnam

**Owner/Clients**: Ha Noi Metropolitan Railway Management Board

**Design**

- **Project**:
  - Name: 3rd Ring Road Bridge
  - Location: Ha Noi, Vietnam
  - Owner/Clients: Ha Noi Metropolitan Railway Management Board
  - Design: DAELEIM

**Contract**

- **Contract Amount**: 966,000 USD
- **Contract Period**: Nov 2013 – Apr 2016

**Overview**

- **Type**: Three Span extradosed bridge with continuous posttensioned concrete box girder
- **Span**: 25.4, 70.4, 25.4 m (main span: 70.4 m)
- **Width**: 10.2 m (Double Track)
- **Design Speed**: 100 km/h
- **Remarks**: Pitch height/span ratio: 12.8

**Deck System**

- **Type**: PSC Box section girder (H11)
- **Height**: 2.0 m
- **Design Wind Load**: 20 N/m²
- **Skin**: PSC, concrete deck: fcd=40 MPa, t=50 mm

**Cable**

- **Type**: Parallel tendon arch
- **Section**: Ø16.7 mm x 9.4 (4/4), Ø14.4mm x 4 (4/4)
- **Diameter**: 160 mm, 168 mm
- **Weight**: 1.4 kg
- **Length**: 28,389 m (66.7 km)
- **Arrangement**: Simulspan

**Pier**

- **Type**: Prestressed concrete
- **Height**: 8 m
- **Materials**
  - Concrete: fcd=40 MPa, 628.3 m³
  - Reinforcement: fy = 420 MPa, 198.76 t

**Foundations**

- **Type**: Drilled shaft
- **Materials**
  - Concrete: fcd=30 MPa, 952.2 m³
  - Reinforcement: fy = 420 MPa, 950.6 t

**Viaduct Specifications**

- **Type**: Simple span precast (girders double-track)
- **Span**: 25.2 m
- **Width**: 5.5 m (2 tracks)

---

**Initial Installation of form traveller**

**Cyclic operation of F17**

**Erection of the second cantilever**

**Casting of Mid segment & Stressing**

**General layout and cross-section of viaduct**
Girder Bridge

- Steel orthotropic deck
- Steel-concrete composite girder
- PSC box girder
- Prestressed composite truss girder
Seonammun Bridge
Type: PSC box girder (FCM)
Span: L=86.6+5.8×126+86.8×812m
Location: Bigeum island - Deoho island, Jeollanam-do

Cheonggyye Viaduct
Type: Steel-concrete composite plate girder
Span: L=5864m (max. span: 42m)
Const. period: Aug. 1976 (Completed)
Location: Seoul

Seobusannakdong Bridge
Type: Steel orthotropic deck
Span: L=66.37+18×84.6+50.6×1,639.8m
Location: Busan

Gangdong Bridge
Type: PSC box girder
(FCM=790m, FSM=336m)
Span: L=3×84.6+6×82.5+5×126+82.5+1,126m
Location: Seoul

Ilsan Bridge
Type: Steel orthotropic deck (main span)
Span: L=6.4×(3×60)+16×24×76+16×80
+16×(3×70+4×76)+3×70+3×70+60+2×80 = 1,590m
Location: Geum-ai-Giimp-eui, Gyeonggi-do
Eunam Bridge
Type: PSC box girder (FCM)
Span: L=75+8+185+75=345m
Location: Jeonju island – Anmye island, Jeollabuk-do

2nd Soyang Bridge
Type: Suspended deck arch
Span: L=16@180+180@180=540m
Location: Chuncheon, Gangwon-do

1st Seongsan Bridge
Type: PSC box girder (FSM+FCM)
Span: L=4@75+775+120+775+475=4750m
Location: Gangneung, Gangwon-do

Joongang Bridge
Type: PSC box girder
Span: L=600m
Const. period: 2004 (Completed)
Location: Pukpuem island – Anmye island, Jeollabuk-do

Seokjeok Highspeed Railway Bridge
Type: PSC box girder, Steel composite box girder
Span: L=4(2@92.5)+2@25(120)+2@25(200)+4(40)=400m
Const. period: Dec. 1999 – May. 2002
Location: Chikpo, Gyeonggsangbuk-do
**Sanchock-4 Bridge**
Type: Prestressed Composite/Truss girder
Span: L = 70+85+76+70=272m
Location: Chungju-si, Chungcheongbuk-do

**Noryeok Bridge**
Type: Steel orthotropic deck
Span: L=40+80+90+130+90=480m
Location: Jeongheung, Jeollabuk-do

**Milyang Bridge**
Type: PSC box girder, Langest bridge by LM in Korea
Span: L=1,290m
Const./period: 2006 [Completed]
Location: Milyang, Gyeongsangnam-do

**Angol Bridge**
Type: PSC box girder bridge reinforced with arch ribs
Span: L = 80+110+80=270m
Location: Changwon-si, Gyeongsangnam-do

**Linking Way of Gwangan Bridge**
Type: Steel box bridge
(orthotropic deck, double deck)
Span: L=5×60+80+60×4=600m=1380m
Const./period: Dec. 2002 [Completed]
Location: Busan
<table>
<thead>
<tr>
<th>Type</th>
<th>Name</th>
<th>Span(m)</th>
<th>Construction Period</th>
<th>Girder</th>
<th>Deck</th>
<th>Width(m)</th>
<th>Lanes</th>
<th>Pylon/Arch rib</th>
<th>No.of Pylon/Arch rib</th>
<th>Cable / Hangar</th>
<th>Foundation</th>
<th>Designed by</th>
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<td>Suspension Bridge</td>
<td>Sorok</td>
<td>190.0-200.0-110.0</td>
<td>2007.4 - 2008.6</td>
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<td>Yi Sun-sin</td>
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<td>Stiffened steel plate</td>
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<td>Saecheonmyeon</td>
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Corporate History

Saecheonnyeon Br. 2018, Suspension Br., L=1,750m
Asan Br. 2017, Arch Br., L=625m
Nakdonggang Br. 2017, Arch Br., L=240m
Sungai Brunei Br. 2016, Cable-Stayed Br., L=460m
3rd Ring Road Br. 2016, Extradosed Br., L=175m
Jeolgeum Br. 2016, Suspension Br., L=725m
Dandeung Br. 2016, Suspension Br., L=400m
Gyopo Br. 2016, Arch Br., L=310m
Jinwicheon Br. 2014, Extradosed Br., L=235m
Sepung Br. 2014, Cable-Stayed Br., L=725m
Changnae Br. 2013, Arch Br., L=80m
Guemgang Br. 2011, Arch Br., L=140
Yi Sun-sin Br. 2012, Suspension Br., L=2,280m
Geobukseon Br. 2012, Cable-Stayed Br., L=725m
Simgeol-2 Br. 2012, Cable-Stayed Br., L=310m
Cheongpung Br. 2012, Cable-Stayed Br., L=422m
Handuri Br. 2012, Cable-Stayed Br., L=340m
Haeereum Br. 2009, Arch Br., L=213m
Shihada-1 Br. 2008, Extradosed Br., L=246m
Seonmu Br. 2008, Arch Br., L=80m
Sorok Br. 2008, Suspension Br., L=470m
Yangyang Br. 2008, Extradosed Br., L=350m
Norayegol Br. 2007, Steel Orthotropic Deck, L=450m
Miyaying Br. 2006, PSC Box Girder, L=1,230m
Joongang Br. 2004, PSC Box Girder, L=600m
Choyang Br. 2003, Arch Br., L=202m
Samcheonpo Br. 2003, Cable-Stayed Br., L=428m
Achasan Br. 2003, RC Rahmen-Steel Box Girder, L=2,450m
Seokjeok Highspeed Railway Br. 2002, PSC Box Girder, L=405m
1st Seongsan Br. 2001, PSC Box Girder, L=475m
Seohaee Br. 2000, Cable-Stayed Br., L=870m
2nd Soyugang Br. 1993, Arch Br., L=100m
Seonammeun Br. 1996, PSC Box Girder, L=812m
Eunam Br. 1996, PSC Box Girder, L=675m
Gangdong Br. 1991, PSC Box Girder, L=1,126m
Deolsan Br. 1984, Cable-Stayed Br., L=450m
Seobusanakkdong Br. 1981, Steel Orthotropic Deck, L=1,640m
Cheonggye Viaduct 1975, Steel-Concrete Composite Plate Girder, L=1,664m