











ARCH BRIDGES

SC Institute Giprostroymost – Saint Petersburg Since 1968

A rational engineering solution is at the heart of all projects developed and implemented by the Institute. Combining the expertise of both structure and technology developers, the Institute solidified its leading position among its peers in the industry.

Over the 55 years, the Institute Giprostroymost–St. Petersburg contributed to construction and reconstruction of over 750 infrastructural, civil and industrial facilities. Hi-tech structures designed by the Institute team are spread over various regions of Russia and abroad – in Vietnam, Latvia, Finland, Kazakhstan & Turkmenistan.

SC Institute Giprostroymost – St. Petersburg is widely recognized for solution of complex challenges with a lot of ingenuity involved. For each project development innovative solutions are implemented, which then often become the mainstay of transport infrastructure construction. Such an innovative approach produces truly unique structures that combine cutting-edge technologies, economic effectiveness and a distinctive architectural appearance.

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KRYMSKY BRIDGE, RUSSIA

Kerch Strait Bridge Crossing





The bridge is situated between Crimea's city of Kerch and the village of Taman in the Temryuk District of the Krasnodar Region, along Tuzla Island and the Tuzla Spit.

- The crossing consists of two parallel bridges a motorway bridge and railroad bridge
- The decks for the highway are beam composite reinforced concrete, simple and continuous ones of individual design.
- Steel decks with an orthotropic plate are located above the water area of the Kerch Strait. The design span is from 54.21m to 64.20m
- There will be a separate deck for each traffic direction. In the crosssection, two main I-beams create the span: they are connected via transversal beams and the system of vertical and horizontal braces
- The decks for the railway tracks are simple, made of solid metal with an orthotropic plate and a ballast bed
- The design span is from 54.6 m to 62.56 m
- The decks are separate, one for each railway track and connected on the piers with jacking beams
- The main box-section girders of the deck are divided into two segments horizontally
- Arch spans with a design span of 227 m are located over the Kerch-Yenikalsky Channel and provide a clearance of 185 m x 35 m

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- category of railway track II
- category of motor road 1B
- designed length of the crossing 19,000 m
- length of the motorway bridge 16,857.28 m
- length of the railroad bridge 18,118.05 m

LIST OF WORKS

- general design
- design of main structures (design documentation and working documentation)
- design of construction technology
- development of SAC&D
- design (design documentation and working documentation)

CLIENT

Taman Road Department, federal state enterprise

GENERAL CONTRACTOR

DESIGN PERIOD

Project Documentation: 2015 Working Documentation: 2015 – 2018

CONSTRUCTION PERIOD

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BRIDGE OVER THE MOSCOW CHANNEL



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Bridge and further motorway over the Moscow Channel with viaducts structures of PK 258+58,93 is being crossing the following:

- Motorway A-104 Moscow Dimitrov Dubna (Dmitrovski Highway), with four lanes within spot of intersection (without divisor), width of carriageway is 14 m, sub grade width is 15 m
- Two rail tracks of Sevelovskiy Direction of Moscow Rail Roads between Iksha Station and Morozki Station with further arrangement of double additional ways per one in each direction
- Moscow Channel: area between Yachromski and Ikshinski impoundments, within Sluice 4 and Sluice 5 (530 m from Sluice 5 entrance). Artificial fairway within spot of intersection has width of 112 m and depth of 4.5 m with bridge clearance of 17.0 m. Approaches of three meters width should be completed along that channel embankments.
- 12 meters is maximum width of Iksha River.

TECHNICAL SPECIFICATIONS

- type of construction New one
- Road Class IA
- designated speed 140 km/h
- lane's quantity 2x2 pcs.
- lane width 3.75 m
- width of technical approach- 1.0 m
- carriageway width 2(G-11)
- width of divisor (including emergency lanes) 4.1m
- bridge width 27.3m
 bridge schema: 41.75+41.95+87.05+150.0+87.05+61.95+4x65.0+8x63.0+3x42.0+41.19
- type of road pavement capital
- type of cover asphalt-concrete
- temporary vertical loads A14, H14

- bridge length 1,410.15 m
- bridge area 38,497 m²

LIST OF WORKS

- work documentation analysis and optimization
- design documentation development per stages technical and structural features of linear construction site
- main structures development
- construction arrangement project
- development of SAC&D

Working Documentation:

construction technology development

CLIENT

SC Avtoban

DESIGN PERIOD

2016 - 2017

CONSTRUCTION PERIOD 2016 - 2020



RECONSTRUCTION OF **BRIDGE** OVER THE **VUOKSA** RIVER **LENINGRAD REGION, RUSSIA**





Reconstruction of the bridge over the Vuoksa River regarding the following project: The motor road from St. Petersburg through Priozersk, Sortavala to Petrozavodsk, including the constructed section from St. Petersburg Ring Road through Skotnoe to Magistralnaya motor road at the section km 57+550km 81+000, Leningrad Region.

- bridge diagram (for each direction) 1 x 73.0 m
- length 28 m
- roadway overall dimension 2(Γ-9)+2x5 m
- total weight of steel 850 tonnes
- reinforced concrete slab of superstructures 260.2+252.3=512.5 m
- total volume of RC 593.8 m³

LIST OF WORKS

- architectural solutions
- main structures (design documentation and working documentation)

- design of technology of construction
- development of SAC&D

CLIENT

Sevzapupravtodor

GENERAL CONTRACTOR

JSC VAD

DESIGN PERIOD

Design documentation – 2011 – 2012 Working Documentation – 2014

CONSTRUCTION PERIOD

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2014 - 2015



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RAILWAY **'AMERICAN' BRIDGES** OVER THE **OBVODNY CANAL** IN **ST. PETERSBURG, RUSSIA**



Reconstruction of railway bridges over the Obvodny Canal in the direction of Moscow of Octaybrskaya Railway in St. Petersburg.

Five railway bridges:

- one single-track bridge
- three two-track bridges
- one vehicle passway combined for a single-track railway

Bridge superstructures are made in the form of combined arched steel superstructures without transferring the bearing reaction on pier, with a roadway on bottom boom.

Design span is 100 m. The camber of arch is 20 m. Cross section of the superstructure consists of two arches combined by the system of longitudinal and transverse braces.

Basic parameters for two-track bridges:

- design span 100 m
- camber of arch 20 m
- distance between the arches 10.5 m
- weight of steel structures 1,290 t
- volume of mallet plate's reinforced concrete 415 m³

Basic parameters of single-track bridge:

- design span 100 m
- camber of arch 20 m
- distance between the arches 6.1 m
- weight of steel structures 770 t
- volume of mallet plate reinforced concrete 245 m³

Basic parameters for combined bridge:

- design span 100 m
- camber of arch 20 m
- distance between the arches 12.7 m
- weight of steel structures 1,360 t
- volume of mallet plate reinforced concrete 510 m³

The roadway of bridges is a flooring steel plate with thickness of 12 mm plus cast reinforced concrete slab of mallet plate on the top.

The flooring plate is reinforced by longitudinal ribs on the side of the RC slab. Russian Grade. Design load is C14.

Reconstruction of bridges meant the replacement of old superstructures with the new ones for increasing the traffic capacity of the embankment and enhancing the architectural attraction of the structure:

- span length was increased from 50 to 100 m
- under clearance was raised up to 5 m

LIST OF WORKS

- architectural solutions
- design of main structures
- construction technology
- development of SAC&D
- Method Statement issue
- design of existing bridge unbuttoning
- scientific and technical support
- field supervision

CLIENT

JSC Russian Railways

JSC Lengiprotrans

GENERAL CONTRACTOR

SMT-1 of JSC RZDstroy

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DESIGN PERIOD

2006 - 2007

CONSTRUCTION PERIOD







BELYAYEVSKY BRIDGE OVER THE BOLSHAYA OKHTA RIVER IN ST. PETERSBURG, RUSSIA

PROJECT DESCRIPTION

The bridge on the ring road around ST. Petersburg in the area from Priozersky highway to Rossiya road: the section from Rzhevka to Shafirovsky prospect (PK 750+00 - PK 795+72.43). Lot 5.

The structure consists of two parallel narrow bridges, per two parts along its length: continuous steel-reinforced concrete superstructure 48.4 + 63.0 + 48.4 m and an arch span without transferring the bearing reaction on pier, with a design span of 161.4 m. The span is a rigid arch combined system without horizontal thrust, with a flexible tie, and with a roadway on bottom boom.

- schema-Γ(2.0 +2.0 +4x3.75+2.0)
- camber 30 m
- height of binding beams 2 m
- weight of steel structure 1,762.7 t
- volume of RC slab 1,191 m³
- total length of cables 10,503 m
- weight of cables 12.3 t
- Maurer Sohne bearing members with a loading capacity of 2,000 t

LIST OF WORKS

Working Documentation:

- general design
- development of architectural solutions

- design of main structures
- design of construction technology
- development of SAC&D
- Method Statement
- Construction Method Statement
- field supervision

CLIENT

FSI Directorate for Construction of vehicle by-road of the city of St. Petersburg

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DESIGN PERIOD

2003 - 2006

CONSTRUCTION PERIOD



BRIDGE OVER THE ISHIM RIVER IN NUR SULTAN CITY(ASTANA)



ARCH BRIDGES

City bridge over the Ishim River with 8 traffic lanes. Schema - Γ (0.5 x 3 + 4.5 +2.0 +4 x 3.5 + 0.5) + two sidewalks per 3 m each. Over-water length is overspanned by an arch of 151.2 m. This arc-form design is a combined system without horizontal thrust with a roadway on bottom boom – a flexible curve with a rigid tie. The camber is 30 m.

Our structure is combined with the roadway via sophisticated suspension system, consists of two planes in each arch. The bridge is a doubled arch in cross-section plus two arches inclined to the vertical at an angle of about 30°.

Inclined arches are combined with each other by means of rigid spacers in order to provide plane stability. Those arches support the steel-reinforced concrete roadway by means of hangers. The height of binding beams is 3 m. The hangers are cable-stayed elements consisting of 12 strands made by monostrand technology.

- diagram of the over-water length of the bridge: 35.5+150.0+31.9 m
- bridge roadway width 32.8 m
- total weight of steel 2,448 t
- total volume of roadway reinforced concrete slab 1,340 m³

- weight of cables 16 t
- Maurer Sohne bearing members with a loading capacity of 2,900 t

LIST OF WORKS

- development of architectural solutions
- structural design of superstructure
- design of construction technology
- development of SAC&D
- preoperational inspection and tests
- field supervision

CLIENT

NPO Mostovik LLC

DESIGN PERIOD

2004 - 2005

CONSTRUCTION PERIOD



BRIDGE OVER THE **IRTYSH** RIVER, KHANTY-MANSIYSK, **RUSSIA**



Construction of the bridge over the Irtysh River on the road Khanty - Mansiysk - Nyagan.

bridge diagram: 3x70.0+94.5+136.5+231.0+136.5+94.5+5x70.0+49

- full length 1,315.9 m
- dimensions 11.5+2x1.5 m
- transversal girders: the central part is a continuous combined system of the length of 693 m with the diagram 94.5+136.5+231.0+136.5+94.5 m, wherein the main span L=231 m with a roadway below is a continuous braced arch with a flexible tie and lattice beam superstructures symmetrically integrated with it, passing into full-wall beams with a roadway above at the end spans. The elements of the main trusses of adjacent spans are the support and the truss rod of full-wall beams
- arch height 42.7 m
- roadway orthotropic deck
- approach flyovers full-wall steel beam superstructures
- roadway on orthotropic plate
- total weight of steel 11,000 t

LIST OF WORKS

- design of construction technology
- development of SAC&D
- design of Method Statement
- afloat transportation of arch span
- computational analysis
- field supervision

CLIENT

Administration of the Khanty-Mansiysk Autonomous District

JSC Transmost

GENERAL CONTRACTOR

JSC Mostostroy 11

DESIGN PERIOD

2001 - 2004

CONSTRUCTION PERIOD 2002 - 2004

DESIGN OBTION





ARCH BRIDGES

TRAFFIC INTERCHANGE IN **KRASNOGVARDEYSKAYA** SQUARE, **ST. PETERSBURG,** RUSSIA

PROJECT DESCRIPTION

Architectural concept of the interchange, Krasnogvardeyskaya Square, St. Petersburg.

- length of the section 355.1 m (along the base line of the route)
- length of the bridge structure 266.7 m + 89 m
- length of retaining walls 131.9 m
- width 24.64 m (4 traffic lanes)
- width 28.14 m (5 traffic lanes)
- total area of wall structures (flyover, retaining walls) -7,617.6 m²+507.7 m²
- amount RC (flyover, retaining walls) 18,930 m³
- weight of high-tensile reinforcement 172 t
- number of cables 250 pcs (8.2 t)
- height of retaining walls over the ground surface up to 4.2 m
- maximum longitudinal slope 4%

LIST OF WORKS

- design of the bridge over the Bolshaya Okhta River
- pre-design proposal for the construction of a bridge near Tulskaya Street and Yakornaya Street

CLIENT

Committee for the Development of the Transport Infrastructure of SPb

FSUE Giproinzhproekt

DESIGN PERIOD



DESIGN OBTION

ARCH BRIDGE OVER THE **KARAKUM** RIVER**, ASHKHABAD**, TURKMENISTAN



Architectural concept of renewal of the Karakum River embankment in the city of Ashkhabad. Arch bridge over the Karakum River, Niyazov street

- half-through arch bridge
- span length 220 m
- camber of arch 30 m
- bridge diagram: 1.5 m+3x3.5 m+5 m+3x3.5 m+1.5 m

LIST OF WORKS

architectural concept

CLIENT

JSC Production Association Vozrozhdeniye Municipality Service Department of the city of Ashkhabad



DESIGN OBTION

ARCH BRIDGE OVER THE KARAKUM RIVER, ASHKHABAD, TURKMENISTAN



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LIST OF WORKS

architectural concept

CLIENT

JSC Production Association Vozrozhdeniye Municipality Service Department of the city of Ashkhabad.



DESIGN OBTION



ARCH **BRIDGE** OVER THE **KARAKUM** RIVER, **TRETYA PYATILETKA** STREET, **ASHKHABAD**, TURKMENISTAN

PROJECT DESCRIPTION

Arch bridge over the Karakum River, Tretya Pyatiletka Street, Ashkhabad. Half-through arch with flexible cable-stayed suspenders.

- schema: 26.4 m + 118 m + 28.4 m
- bridge width 39 m

LIST OF WORKS

- options for architectural solutions
- preparation of tender offer

CLIENT

JSC Production Association Vozrozhdeniye Municipality Service Department of the city of Ashkhabad





DESIGN OBTION



BRIDGE OVER THE MOSKVA RIVER IN THE TOWN OF ZHUKOVSKY, RUSSIA

PROJECT DESCRIPTION

The bridge over the Moskva River as a part of the project of construction of the approach to the town of Zhukovsky (Flight Research Institute named after M.M. Gromov) of M-5 Ural highway. Road bridge with a continuous steel-reinforced concrete superstructure.

- bridge diagram: 40+60+60+165+40 m
- central navigation arch span of 165 m
- suspensions of the arch span are made via cables
- full length 420 m
- width 43.5 m

LIST OF WORKS

- architectural solutions development
- design solutions
- development of SAC&D

- Construction Method Statement
- design of lighting and power supply
- estimate documentation

CLIENT

Mosavtodor Highway Administration of the Moscow region

JSC Petersburg Dorservice

DESIGN PERIOD





OUR EXPERTISE

DESIGN

- highway bridges
- railway bridges .
- combined bridges .
- viaducts and technological flyovers
- footbridges .
- underground structures
- embankments and mooring berths
- road interchanges .
- highways and streets retaining walls

FULFILLMENT

- general design
- sophisticated engineering analysis
- aerodynamic analysis
- financial estimates completion
- engineering supervision
- protection of intellectual property
- engineering geodetic, geological, meteorological, environment survey
- economic survey .
- implementation of research on the construction, repair and maintenance of highways
- design and survey works in concerning of reconstruction and maintenance of any engineering networks and communications
- transportation status modeling
- optimization of public passenger transportation route networks .
- macroeconomic analysis for large interregional transport projects
- technological and price audit of DD .
- estimation of capital and operating costs for transport facilities
- diagnostics and assessment of the technical condition of roads as well as artificial structures
- certification and inventory of highways
- planning and distribution of needed materials, technical and financial costs for the repair and maintenance of motorways by means
 - of cutting edge automated customized software systems

DEVELOPMENT

- architectural concepts of construction and improvement of embankments, industrial and residential buildings, sports, scientific, concert complexes;
- construction technology of bridge crossings and transportation structures
- projects regarding special auxiliary construction and devices (SAC&D) .
- . method statements (MS)
- construction method statements (CMS) .
- projects for structural renovation, bridge maintenance and transport structures ×.
- traffic management projects ×.
- road maintenance projects
- design of monitoring systems for civil engineering structures .
- technical and economic feasibility study .
- design and proof of nuclear defense measures .
- measures relating environment safety
- measures regarding fire safety
- measures concerning civil defense in case of force majeure
- measures regarding transportation safety
- measures to improve road safety
- strategies, concepts and programs for the development of transportation infrastructure
- integrated traffic management schemes
- concepts of toll collection system for toll roads and development of tariff policies in transport
- financial and economic models .

PREPARATION

- tender documentation
- methodological guidelines, recommendations, regulatory and technical documentation.
- technological solutions for the protection of nuclear and energy facilities

- buildings and structures of different heights .
- sophisticated floors of buildings and structures .
- foundations in complex environment status













