

Construction of the outer bridge frame

Article Overview

The Outerbridge Crossing features a steel cantilever frame constructed to span the Arthur Kill, using trusses and cantilevered arms to support the deck and transfer loads to piers.

Bridge Type and Frame Design

The Outerbridge Crossing is a steel cantilever bridge, designed by John Alexander Low Waddell and built between 1925 and 1928. Its frame consists of truss spans that act as cantilever arms extending from the piers toward the center of the river, meeting at suspended spans to complete the bridge deck. Cantilever bridges are particularly suitable for long spans where falsework in the water is difficult, as the structure can be built outward from the piers without extensive temporary supports.

Materials and Structural Components

The bridge frame is primarily structural steel, forming a network of longitudinal and transverse trusses. These trusses provide rigidity and distribute vertical loads from the deck to the piers and abutments. Key components include:

- o Piers and Foundations: Vertical supports that transfer the bridge's weight to the riverbed, often constructed with deep foundations or caissons for stability.
- o Cantilever Arms: Steel trusses extending from each pier, designed to balance the load and support the central suspended span.
- o Suspended Span: The central section of the bridge deck, supported by the cantilever arms from both sides.
- o Deck: The roadway surface, supported by the truss frame, carrying vehicular traffic across the bridge.

Construction Sequence

- o Site Preparation and Foundation Work: Surveying, cofferdam installation, and construction of deep foundations for piers.
- o Erection of Piers: Vertical supports built to the required height, often using reinforced concrete or steel caissons.
- o Cantilever Frame Assembly: Steel trusses are assembled segment by segment, extending outward from the piers. Temporary supports or cranes may be used for alignment.
- o Suspended Span Installation: The central span is lifted and connected to the cantilever arms, completing the main structural frame.
- o Deck Installation: Roadway deck is placed on the truss frame, followed by guardrails, lighting, and finishing works.
- o Load Testing and Inspection: Structural integrity is verified using methods such as finite element analysis and load rating calculations to ensure safety and compliance with standards.

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Engineering Considerations

Cantilever truss bridges like the Outerbridge Crossing rely on frame action to transfer vertical loads efficiently. The trusses are designed to resist bending and shear, while the cantilever arms balance moments around the piers. Modern inspections often use finite element modeling to assess stress distribution and load capacity, ensuring the frame remains safe under traffic loads. The Outerbridge Crossing's steel frame exemplifies early 20th-century bridge engineering, combining cantilever principles, truss design, and robust steel construction to achieve a long-span, durable structure capable of supporting heavy vehicular traffic.

This form of construction can be used for bridges having constant cross sectional shape throughout their length. The bridge should

Brooklyn Bridge, suspension bridge spanning the East River from Brooklyn to Manhattan in

The construction methods for the deck is shown in the following slides. 6. Bridge anchor - required only for suspension or cable-stay

A study on widening the 99-year-old Outerbridge Crossing is still ongoing, but a report will be released in 2025,

STATEN ISLAND, N.Y. -- A long-awaited study looking at one of Staten Island's oldest bridges is still on track to

Body-on-frame remains the preferred construction method for heavy-duty commercial vehicles (especially

Truss sections stabilize this building under construction in Shanghai and will house mechanical floors. In addition to carrying the

Frame bridges are often the most economical solution for smaller spans. Orthogonal and trapezoidal frames are particularly suitable

MFS Engineers & Surveyors provided professional structural engineering services to Trevcon Construction Company, Inc. in support

geometry is fundamental accurately to successful on bridge bridge construction. and detailed Detailed drawings superstructures to

Multi-cell box sections are common in long span cable supported bridges, where the box girder must adopt an

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aerodynamic form,

Outerbridge Crossing Facts & Info Opened to traffic: June 29, 1928 Length of center span: 750 feet Total length of truss spans: 2,100

How are bridges built? Let's look at the bridge-building process to learn how these

Body-on-frame, also known as full-frame, is a traditional motor vehicle construction method whereby a

A cantilever bridge is generally made with three spans, of which the

Using the knowledge gained from eighteen years of costal construction experience, Outerbridge Construction Inc. continually strives

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