Construction of Inclined Bridge Frames



Overview

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

Key Takeaways

Inclined bridge frames are constructed using a combination of carefully designed foundations, inclined leg supports, formwork, and sequential concrete pouring to ensure structural integrity and safety.

Structural Overview

Inclined bridge frames, also known as oblique-leg rigid frame bridges, rely on frame action to transfer vertical loads efficiently, similar to arches. The inclined legs act as both supports and load-transferring elements, making them suitable for overpasses, flyovers, and grade separations. Orthogonal and trapezoidal frames are commonly used for smaller spans, while composite steel-concrete frames are preferred for longer spans due to cost and construction efficiency.

Foundation and Support

The construction begins with leveling and preparing the foundation according to the support design. Common foundation types include H-piles, pipe piles, bore piles, or precast concrete piles, which provide stability for the inclined legs and the bridge deck. The foundation must accommodate the inclined geometry and the loads from both the legs and the superstructure.

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Erection of Inclined Legs

Two main methods are used for erecting inclined legs: Full-space support method: A complete bracket system is erected to support the inclined legs and the beam body. This method ensures stability but can be complex, with high safety risks and potential for uncontrollable deformation at the rigid connection between the legs and the beam. Steel pipe column less support method: This method uses fewer upright columns and steel pipes, allowing road traffic to continue during construction and reducing material waste.

It is more adaptable to varying leg heights but requires careful monitoring of load distribution.

Formwork and Reinforcement

After erecting the supports, formwork is installed for the inclined legs and the beam body. This includes: Bottom dies for the inclined legsSteel templates for the beam bodySide molds and cover molds for the legsInner side dies for web platesTop plate and wing plate templates Reinforcing steel bars are bound within the inclined legs, web plates, and top plates to ensure structural strength and rigidity.

Concrete Pouring Sequence

Concrete is poured in a sequential manner: Inclined leg concrete is poured first and allowed to reach initial set. Beam body concrete is poured after the inclined legs have gained sufficient strength. Pre-pressing and monitoring of the bracket system are performed to measure elastic and inelastic deformations, ensuring proper alignment and load transfer.

This sequence minimizes construction cracks at the rigid connections and ensures the integrity of the frame.

Monitoring and Adjustment

During construction, elastic and inelastic deformations of the supports are continuously monitored. Elevations of the bottom dies and alignment of the inclined legs are adjusted based on pre-pressing data to maintain structural accuracy and safety.

Practical Considerations

Falsework complexity: Inclined leg frames require careful design of temporary supports, especially for long spans. Traffic management: Steel pipe column less support methods allow ongoing traffic beneath the bridge. Durability: Hinges are generally avoided in modern construction to improve long-term performance.

Material efficiency: Proper planning reduces steel cutting waste and ensures optimal use of concrete and reinforcement. By following these steps, engineers can construct safe, durable, and efficient inclined bridge frames suitable for a variety of traffic and span requirements.

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Article Content

Frame bridges

Frame bridges are often the most economical solution for smaller spans. Orthogonal and trapezoidal frames are particularly suitable for grade separations (flyovers, underpasses – modest structures in

CN101481902A

The invention belongs to the job practices of continuous rigid frame bridge V-type pier battered leg, be specifically related to a kind of V type pier inclined leg combined type support for...

Construction method of highway-crossing inclined-leg rigid frame ...

technical field The invention belongs to the technical field of construction engineering, and in particular relates to a construction method for a high-speed oblique-leg rigid

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Taking daquanhu super large bridge as an example, the bridge is a prestressed concrete V-shaped rigid frame bridge, full width of bridge of 38.0m, and main girder of single box three chamber section.

Construction of Bridges, Sep 16 [Compatibility Mode]

This form of construction can be used for bridges having constant cross sectional shape throughout their length. The bridge should be straight or have a constant horizontal and vertical curvature.

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Analysis of inclined leg angle on stress of V-shaped Pier Rigid Frame Bridge Bao Biyu Urban Construction School, Beijing City University, Beijing, 100083, China *Corresponding author''s e

Analysis and Design of Inclined Columns

reinforcement, and construction practices to minimize effects procedures that were required to meet Class 1 requirements of bugholes and cracking in the finished concrete surface. for inclined columns

Una breve panoramica

Inclined-legs bridges present the static scheme of frame bridges, namely those bridges formed by bending-resistant connections called frame stringers and by

Inclined Column Design

The inclined column is not a common type of column observed in buildings or any other structure. Steel, timber, concrete use as construction materials.

Seismic Response Analysis of Inclined Leg Rigid Frame Bridge ...

Abstract: In this article, an inclined leg bridge is taken as the research object. The three-dimensional finite element model is established, and soil spring is used to simulate soil-pile interaction. The

Stress Analysis of Rigid Frame Bridges with Inclined Legs

Methods of direct moment distribution applied to the rigid frame bridges with inclined legs are introduced in this paper. Formulas are derived for the anti-symmetric loading conditions. By using these

Analysis of inclined leg angle on stress of

Taking daquanhu super large bridge as an example, the bridge is a prestressed concrete V-shaped rigid frame bridge, full width of bridge of 38.0m, and main girder of single box three chamber section.

Bridge Geometry Manual

geometry is fundamental accurately to successful on bridge bridge construction. and detailed Detailed drawings superstructures to engineers and technicia at a specific substructures. Geometric

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Cross-frames are important components to ensure stability of pre-composite skewed steel I-girder bridges and have considerable effects on bridge behavior during construction , , .

An inclined tower crane suited to bridge tower construction ...

The inclined tower crane body can be tilted at some angle, which suits the construction of buildings with inclined architectural outlines, especially for the construction of bridge towers.

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