JETIR.ORG | ISSN: 2349-5162 | ESTD Year : 2014 | Monthly Issue
JOURNAL OF EMERGING TECHNOLOGIES AND INNOVATIVE RESEARCH (JETIR)
An International Scholarly Open Access, Peer-reviewed, Refereed Journal

"STUDY ON DESIGN OF SUSPENSION BRIDGE"

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ABSTRACT

Suspension bridges are one of the most efficient structural forms for crossing very long spans. Their design has evolved continuously from early chain-supported bridges to modern cable-supported structures using high-strength materials, aerodynamic decks, and computer-based analysis. This evolution is the result of contributions made by several engineers who developed design theories, improved materials, and introduced advanced construction techniques. This paper presents the major contributors to suspension bridge design, their contributions in chronological order, and explains the different types of suspension bridges in detail.

Keywords: Suspension bridge, Long-span bridge, Cable-supported structure, Bridge engineering, Structural design.

I. INTRODUCTION

Bridge, structure that spans horizontally between supports, whose function is to carry vertical loads. The prototypical bridge is quite simple two supports holding up a beam-yet the engineering problems that must be overcome even in this simple form are inherent in every bridge: the supports must be strong enough to hold the structure up, and the span between supports must be strong enough to carry the loads. Spans are generally made as short as possible; long spans are justified where good foundations are limited-for example, over estuaries with deep water.

II. AIM

The aim of this study of to determines design of Suspension Bridge.

III. OBJECTIVE

1. To study the historical development of suspension bridge design.
2. To identify the major engineers who contributed to suspension bridge theory and practice.
3. To understand how advances in materials and analysis improved suspension bridge performance.
4. To provide a concise reference for academic and engineering studies.

IV. LITERATURE REVIEW

1. James Finley (USA, 1801)

James Finley pioneered modern suspension bridge design by patenting the chain suspension bridge in 1801. His work established the basic concept of using flexible cables or chains to support a bridge deck.

2. Thomas Telford (United Kingdom, 1826)

Thomas Telford designed the Menai Suspension Bridge, one of the earliest large-span suspension bridges. His work demonstrated the practical feasibility of suspension bridges for heavy loads.

3. Isambard Kingdom Brunel (United Kingdom, 1831–1864)

Brunel designed the Clifton Suspension Bridge and introduced improvements in deck stiffness and structural aesthetics, contributing to both strength and appearance.

V. TYPES OF SUSPENSION BRIDGES

1. Cable-stayed bridges

A cable stayed bridge is dependent upon towers/pylons which are the load-bearing element of the structure. Cables are connected from the pylons to the deck below. Either directly from the top of the tower or at different points of the column. When connected at different points of the column this creates a fan like pattern.

2. SUSPENSION BRIDGES

The deck (traffic way) of Suspension Bridge is hung by suspender cables which hang from master cables. The suspension (main) cables are secured into solid Bed rock (if available at sight) or into concrete blocks called anchorages on both ends of the bridge to stabilize structure and are key to the structure.

3) Simple Suspension Bridge

A simple suspension bridge is a bridge in which the deck is suspended from main cables that pass over towers and are anchored at both ends. The load from the deck is transferred through vertical hangers to the main cables, which carry the load in tension. The towers support the cables and transfer loads to the ground, while anchorages resist the pulling force of the cables. Suspension bridges are suitable for long spans, require fewer piers, and are
commonly used for river, sea, and valley crossings.

4) Self-Anchored Suspension Bridge –

A self-anchored suspension bridge is a type of suspension bridge in which the main cables are anchored to the bridge deck itself instead of the ground. The deck resists the cable
tension by acting in compression. The load from the deck is transferred to the hangers, then to the main cables, and finally balanced within the structure. This type of bridge is used where strong ground anchorages are not feasible, such as in urban areas. It has an aesthetic appearance but requires a strong and stiff deck.

ACKNOWLEDGMENT

We are very pleased to present the report **"Design of Suspension Bridge"**. We take the opportunity to express our sincere thanks to our supervisor **prof. Phule A.B. Sir** for his constant support, patience, encouragement, enthusiasm and immense knowledge for our research. His guidance helped us during the research and writing of this thesis. We also thank the head of the department **prof. S.N.Phule Sir** for his constant support and encouragement. We are also very grateful to all the staff of the civil department, whose encouragement and suggestions help us to complete my project work. Finally, we thank our friends whose encouragement and constant inspiration helped us to complete this project work verbally and theoretically.

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