

Spring 2018
CE 761-Bridge Engineering-Cr. Hrs: 3
T-Th: 8:00-9:15 am
ESB 501

References: Design of Modern Highway Bridges by Taly; Highway Bridges by Baker & Puckett; Design of Highway Bridges (AASHTO-LRFD) by Barker & Puckett, Wiley Sci

1. Bridge Types

1.1 Introduction

1.2 Selection of Bridge Type

1.2.1. Factors to be considered

1.2.2. Bridge Types Used for Different Span Lengths

1.2.3. Selection of Bridge Types

(2 Lectures)

2. General Design Considerations

2.1. Development of Design Procedures

2.1.1. Allowable Stress Design (ASD)

2.1.2. Variability of Loads

2.1.3. Load and Resistance Factor Design

2.2. Design Limit States

2.2.1. Service Limit State

2.2.2. Fatigue and Fracture Limit State

2.2.3. Strength Limit State

2.2.4. Extreme Event Limit State

2.3. Principles of Probabilistic Design

(3 Lectures)

3. Loads

3.1. Introduction

3.2. Gravity Loads

3.2.1. Permanent Loads

3.2.2. Transient Loads

3.3. Lateral Loads

3.4. Forces Due to Deformations

3.4.1. Temperature

3.4.2. Creep and Shrinkage

3.4.3. Settlement

3.4.4. Fatigue

(4 Lectures)

4. Prestressed Concrete Bridge (LRFD)

4.1. Design Examples

4.2. Limit States

- 4.2.1. Service Limit State
- 4.2.2. Fatigue Limit State
- 4.2.3. Strength Limit State
- 4.2.4. Extreme Event Limit State
- 4.3. Rehabilitation Using FRP Wraps-Example
(6 Lectures)
- 5. Steel Bridge (ASD and LRFD based Design Examples)**
 - 5.1. Effects of Repeated Stress (Fatigue)
 - 5.2. Brittle Fracture Considerations
 - 5.3. Limit States
 - 5.3.1. Service Limit State
 - 5.3.2. Fatigue and Fracture Limit State
 - 5.3.3. Strength Limit States
 - 5.3.4. Extreme Event Limit State
 - 5.3.5. General Design Requirements
 - 5.3.5.1. Effective Length of Span
 - 5.3.5.2. Dead Load Camber
 - 5.3.5.3. Minimum Thickness Steel
 - 5.3.5.4. Diaphragms and Cross Frames
 - 5.3.5.5. Lateral Bracing
 - 5.3.6. Tension Members
 - 5.3.6.1. Types of Connections
 - 5.3.6.2. Tensile Resistance
 - 5.3.6.3. Strength of Connections for Tensile Members
 - 5.3.7. Shear Connectors
 - 5.3.7.1. Fatigue Limit State for Stud Connectors
 - 5.3.7.2. Strength Limit State for Stud Connectors
 - 5.3.8. Stiffeners
 - 5.3.8.1. Transverse Intermediate Stiffeners
 - 5.3.8.2. Bearing Stiffeners
 - 5.3.9. Example Problems
 - 5.3.9.1. Non-composite Rolled Steel Beam Bridge
 - 5.3.9.2. Composite Rolled Steel Beam Bridge
 - 5.3.9.3. Steel Plate Girder Bridge
- 6. Bridge Rehabilitation**
(4 Lectures)

Grading:

Homework - 40% Two major projects will be assigned
Mid-term Exam - 30% (in-class, open book)
Final Exam - 30%

Attendance is Mandatory - this is not a contract, but a guide that will be followed very closely.