



# An Introduction to Flexible Pavement Design

An Online Continuing Education Course for Engineers

**Course Number: T-3001**

**Credit: 3 Hours / 3 PDH / 3 CPD**

# An Introduction to Flexible Pavement Design



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## **CONTENTS**

### **1. INTRODUCTION**

- 1.1 Basis of Design**
- 1.2 Computer Aided Design**

### **2. PRELIMINARY INVESTIGATIONS**

- 2.1 General**
- 2.2 Investigations of Site**
- 2.3 Soil Conditions**
  - 2.3.1 General Survey of Subgrade Conditions
  - 2.3.2 Preliminary Subsurface Explorations
  - 2.3.3 Soil
- 2.4 Borrow Areas**

### **3. VEHICULAR TRAFFIC**

- 3.1 Effect on Pavement Design**
- 3.2 Traffic Evaluation**
  - 3.2.1 Pneumatic-tired Vehicles
  - 3.2.2 Tracked Vehicles and Forklift Trucks
  - 3.2.3 Selection of Design Index

### **4. FLEXIBLE PAVEMENT SUBGRADES**

- 4.1 Factors to Be Considered**
- 4.2 Compaction**
- 4.3 California Bearing Ratio**
- 4.4 Selection of Design CBR Values**

### **5. FLEXIBLE PAVEMENT SELECT MATERIALS AND SUBBASE COURSES**

- 5.1 General**
- 5.2 Materials**
  - 5.2.1 Select Materials
  - 5.2.2 Subbase Materials
- 5.3 Compaction**
- 5.4 Selection of Design CBR Values**

### **6. FLEXIBLE PAVEMENT BASE COURSES**

- 6.1 Materials**
- 6.2 Compaction**
- 6.3 Selection of Design CBR**

## **6.4 Minimum Thickness**

# **7. FLEXIBLE PAVEMENT DESIGN**

## **7.1 General**

## **7.2 Design Procedures**

7.2.1 Conventional Flexible Pavements

7.2.2 Stabilized Soil Layers

7.2.3 All Bituminous Concrete

## **7.3 Design Index**

## **7.4 Thickness Criteria – Conventional Flexible Pavements**

## **7.5 Example Thickness Design – Flexible Pavements**

7.5.1 Total Thickness

7.5.2 Minimum Base and Pavement Thicknesses

7.5.3 Thickness of Subbase and Base Courses

## **7.6 Thickness Criteria – Stabilized Soil Layers**

7.6.1 Equivalency Factors

7.6.2 Minimum Thickness

## **7.7 Example Thickness Design – Stabilized Soil Layers**

## 1. INTRODUCTION

This is an introduction to flexible pavement design for engineers. It is not intended as definitive treatise, and it does not encompass the design of rigid pavements. Engineers are cautioned that much of pavement design is governed by codes, specifications and practices of public agencies. Engineers must always determine the requirements of the regulatory authority within whose jurisdiction specific projects fall.

**1.1 Basis of Design.** The prime factor influencing the structural design of a pavement is the load-carrying capacity required. The thickness of pavement necessary to provide the desired load-carrying capacity is a function of the following five principal variables:

- Vehicle wheel load or axle load.
- Configuration of vehicle wheels or tracks.
- Volume of traffic during the design life of pavement.
- Soil strength.
- Modulus of rupture (flexural strength) for concrete pavements.

The procedure presented here for design of flexible pavements is generally referred to as the California Bearing Ratio (CBR) design procedure. This procedure requires that each layer be thick enough to distribute the stresses induced by traffic so that when they reach the underlying layer they will not overstress and produce excessive shear deformation in the underlying layer. Each layer must also be compacted adequately so that traffic does not produce an intolerable amount of added compaction. Use ASTM D 1557 compaction effort procedures to design against consolidation under traffic.

**1.2 Computer Aided Design.** In addition to the design procedures presented herein, computer programs are available for determining pavement thickness and compaction requirements for roads, streets, and open storage areas.

## 2. PRELIMINARY INVESTIGATIONS

**2.1 General.** The subgrade provides a foundation for supporting the pavement structure. As a result, the required pavement thickness and the performance obtained from the pavement during its design life will depend largely upon the strength and uniformity of the subgrade. Therefore, insofar as possible, a thorough investigation of the subgrade conditions before construction will be necessary. The importance of the uniformity of the subgrade is emphasized by the fact that the

**2.2 In** the site determination of the moisture characteristics of the soil, such factors as drainage, increasing rainfall, and existing pavement should be used to correct the Unified

**2.3 Soil Co**nditions should be investigated by a combination of a general survey of the site conditions, preliminary subsurface investigations, and soil borings.

**2.3.1 General Survey of Subgrade Conditions.** Sources of data should include the landforms, soil conditions in ditches, and cuts and tests of representative soils in the