CHAPTER 1

INTRODUCTION

1. The U.S. construction industry accounts for some 10% of the nation's gross national product. The approximate distribution of new construction contract value within the industry includes: private building 71%; public nonbuilding 12%; public building 10%; and private nonbuilding 7%.

2. Some major characteristics of the U.S. construction industry include:
   Highly competitive
   Fragmented
   Work is seasonal and sporadic
   High rate of bankruptcy
   High accident rate

3. The purpose of a building code is to protect the public by providing minimum design and construction standards for structural and fire safety of buildings.

4. Construction may be accomplished by any of the following methods:
   Owner construction force
   Owner management of construction:
     Employing hired labor
     Utilizing subcontractors
   Contract construction by a general contractor
   Employing a design/build (or turnkey) construction contract
   Utilizing a Professional Construction Manager

5. A decline in construction productivity in relation to the price of goods and services will limit the demand for construction services. The effect on the national economy would be significant because the industry accounts for a significant portion of the nation's gross national product and its employment.

6. Heavy or horizontal construction projects include highways, airports, railroads, canals, harbors, dams, utility lines, and similar works. Since most such projects fall into the category of public works, they are primarily constructed with public funds.

7. Quality control is the process of assuring that all elements of a constructed project meet the requirements established by the project designer in the project plans and specifications

8. A majority of serious construction injuries occur during the following operations:

> Concrete construction
> Erection of prefabricated trusses, precast concrete elements, and structural steel
> Construction and operation of temporary facilities and construction plant
> Working from elevated positions
> Construction equipment operations

9. An Environmental Impact Statement (EIS) describes and quantifies the effect a proposed project will have on the environment. The preparation of an EIS is a complex, time-consuming, and expensive task which should be undertaken only with the assistance of a professional experienced in such matters.

CHAPTER 2

EARTHMOVING MATERIALS AND OPERATIONS

1. Corner points = 6.0+4.6+3.0+4.0 = 17.6 ft

    [= 1.83+1.40+0.92+1.22 = 5.37 m]

    Border points = 5.8+5.2+4.2+3.6+3.5+4.8+4.8+5.5 = 37.4 ft

    [= 1.77+1.59+1.28+1.10+1.07+1.46+1.46+1.68 = 11.41 m]

    Interior points = 5.0+4.6+4.0+4.9 = 18.5 ft

    [= 1.52+1.40+1.22+1.49 = 5.63 m]

    Average depth = $\dfrac{17.6 + 2(37.4) + 4(18.5)}{36}$ = 4.62 ft

    [= $\dfrac{5.37 + 2(11.41) + 4(5.63)}{36}$ = 1.41 m]

2. Moisture content = $\dfrac{15.0 - 14.2}{14.2}$ x 100 = 5.6 %   (Eq 2-3)

    [= $\dfrac{6.80 - 6.44}{6.44}$ x 100 = 5.6 %]

3. Loose volume = bank volume x (1+ $\dfrac{swell}{100}$)

    = 500 x (1 + $\dfrac{30}{100}$) = 650 LCY

    = 650 x 27 = 17,550 cu ft

    [= 382 x (1 + $\dfrac{30}{100}$) = 496.6 LCM]

    Base diameter = $\left(\dfrac{7.64 \text{ x volume}}{\tan R}\right)^{1/3}$ (Eq 2-12)

    = $\left(\dfrac{7.64 \text{ x } 17{,}550}{\tan 35^{\circ}}\right)^{1/3}$ = 57.6 ft

    { = $\left(\dfrac{7.64 \text{ x } 496.6}{\tan 35^{\circ}}\right)^{1/3}$ = 17.6 m]

    Height = $\dfrac{D}{2}$ x tan R   (Eq 2-13)

    = $\dfrac{57.6}{2}$ x tan 35° = 20.2 ft

    { = $\dfrac{17.6}{2}$ x tan 35° = 6.2 m]

3