CHAPTER 7
EARTHEEN BUILDING

1.9

Role of the Building

Introduction

The history of earthen building (Statistics) has a long and rich tradition. The ancient civilizations
have preserved many examples of earthen architecture. Typical damage and collapse
of earthen buildings

Due to the natural disasters and the harsh environment
earthen buildings have been subjected to. This
has led to the development of various technologies
in this field. These technologies have been
classified into two main categories: (1) wall analysis
and material properties and (2) classification of earthen
constructions.

1.9

Classification of Walls

and Material Properties

Stabilizers

In order to strengthen earthen walls (dynamic
behaviour) and to improve their load-bearing
capacity, various stabilizers have been developed.

1.10

Classification of Earthen
Constructions

1) Earthen Walls
   a) Adhesive Stabilizers
   b) Adhesive Stabilizers

2) Shale, Clay, Mud
   a) Shale Mud
   b) Shale Sand

3) Shale, Clay, Mud
   a) Shale Mud
   b) Shale Sand

4) Shale, Clay, Mud
   a) Shale Mud
   b) Shale Sand
(1) କାଙକାରଣ ଶ୍ରୀ କବା ନାଗି ଗରିବ ଗରିବ ଗରିବ ଗରିବ ଗରିବ ଗରିବ ଗରିବ ଗରିବ

(2) ସୁପାର ସ୍ତର

(3) କାଙ୍କାରଣ ଶ୍ରୀ କବା ନାଗି ଗରିବ ଗରିବ ଗରିବ ଗରିବ ଗରିବ ଗରିବ ଗରିବ ଗରିବ
1.3.7 Strength Test of Adobe

Dried Adobe bricks are tested for strength (Compressive Strength) using a Testing machines. The strength of Adobe bricks is generally measured in kilo newtons per square centimeter (kN/cm²).

1.4 Construction of walls

Adobe bricks are mainly used for construction of walls. The bricks are made from a mixture of clay and organic materials such as sawdust or straw. The mixture is then allowed to dry naturally (activation of humidity) and then fired in a kiln to harden. The firing process is called 'sleeping'. The bricks are then allowed to cool down completely (curing). The bricks are then ready for use in construction.

Hand Moulded Layered Construction

Hand moulded Adobe bricks are usually made by manually shaping the clay mixture into the desired shape. The bricks are then allowed to dry naturally before being baked in a kiln.

Adobe or Block Construction

Adobe or block construction is a method of building using Adobe bricks. The bricks are laid in layers, with each layer being a different color. The layers are then allowed to dry before the next layer is added. This method is commonly used in traditional construction in many parts of the world.
2. ପାତ କରିଏ ଏମା ପରାମର୍ଶ ବ୍ୟକ୍ତ କରାଇଏ 
9. ପୁଡ଼ା ପରାମର୍ଶ କରାଇ ସେ ପ୍ରକାଶ

(2) ବୃଦ୍ଧି ପ୍ରଦାନ କରାଯାଇଏ 
(3) ପୁଡ଼ାର ପ୍ରକାଶ ପରାମର୍ଶ କରାଯାଇଏ

ପିତା 7.4 - ପାତ, ପୁଡ଼ାର ପରାମର୍ଶ କରାଇ ନରାଧମ ପୁରୁଷ କରାଯାଇଏ

1. ପୁଡ଼ା ପରାମର୍ଶ
2. ପୁଞ୍ଜି ପରାମର୍ଶ
3. ଭୂମି ପରାମର୍ଶ କରାଇଏ (~ 500 କିଲୋ)
4. ପୂର୍ବ ପରାମର୍ଶ
5. ଦିକା ପରାମର୍ଶ କରାଇ ନରାଧମ ପ୍ରକାଶ

6. ପ୍ରକାଶ
7. ଦିକାର ପରାମର୍ଶ କରାଇ ନରାଧମ କରାଇଏ
8. ପୃତି ପରାମର୍ଶ
9. ନୂତନ ପରାମର୍ଶ
10. ଦିକାର ପରାମର୍ଶ କରାଇ


t = ପାତ ଲାବୁରି

ସାଳଙ୍କ ପ୍ରକାଶ କରାଇଏ

ପିତା 7.5 - ପାତ ପୃତି ପରାମର୍ଶ
Tapial or Pise Construction

Tapial or Pise Construction, also known as Rammed Earth, is a construction method where soil is rammed or compacted to form a wall or structure. The process involves placing layers of soil, compacting them using heavy machinery or manual labor, and repeating the process until the desired height is reached.

The diagram illustrates a section of a wall built using this method. The dimensions and layers are indicated, showing the compaction process and the overall structure. The text provides a brief explanation of the construction technique, focusing on the importance of compaction to ensure the stability and durability of the wall.

The figure in the document is labeled as Figure 9.2 - Section of a Tapial Wall.
2.壁面のD、W、V、Dの寸法

2.8.2 - 壁面の厚さ & 壁面の寸法

壁面の圧縮 (compaction) は壁面の外力で

2.8.3 - 壁面の厚さ & 壁面の寸法

 Earthen Construction with Wood and Cane Structure

2.8.4 - 壁面の厚さ & 壁面の寸法

フレームワーク (Frame Work) は壁面の

2.8.5 - 壁面の厚さ & 壁面の寸法

フレームワークは、壁面の外力で

2.8.6 - 壁面の厚さ & 壁面の寸法

フレームワークは、壁面の外力で

2.8.7 - 壁面の厚さ & 壁面の寸法

フレームワークは、壁面の外力で

2.8.8 - 壁面の厚さ & 壁面の寸法

フレームワークは、壁面の外力で

2.8.9 - 壁面の厚さ & 壁面の寸法

フレームワークは、壁面の外力で

2.8.10 - 壁面の厚さ & 壁面の寸法

フレームワークは、壁面の外力で

2.8.11 - 壁面の厚さ & 壁面の寸法

フレームワークは、壁面の外力で

2.8.12 - 壁面の厚さ & 壁面の寸法

フレームワークは、壁面の外力で

2.8.13 - 壁面の厚さ & 壁面の寸法

フレームワークは、壁面の外力で

2.8.14 - 壁面の厚さ & 壁面の寸法

フレームワークは、壁面の外力で

2.8.15 - 壁面の厚さ & 壁面の寸法

フレームワークは、壁面の外力で
2. 3) Integrated (Intigrated) structure is useful.
4) Windows should be located above the door.

5) The size of the attic (Attic) should be calculated to ensure it is supported by the structural elements. The calculation is based on the formula: $h = \frac{1}{2} t + 0.5$ (where $h$ is the height of the attic in feet, and $t$ is the thickness of the walls in feet).

6) The foundation should be designed to withstand the weight of the building and the expected seismic activity. The foundation design should include calculations for soil conditions, seismic forces, and building loads.
(d) ଫାଇଲ୍ ବର୍ତ୍ତମାନ ପ୍ରେକ୍ଷା ଧାରାରେ

(e) ପାଇଁ ବର୍ତ୍ୟମାନ ପ୍ରେକ୍ଷା ଧାରାରେ

(f) ପାଇଁ ବର୍ତ୍ୟମାନ ପ୍ରେକ୍ଷା ଧାରାରେ

(g) ଫାଇଲ୍ ବର୍ତ୍ତମାନ ପ୍ରେକ୍ଷା ଧାରାରେ (ସମାପ୍ତିକୁ ଦୃଷ୍ଟି ପାଇଁ notch ଶୌଷ୍ଟି ହୀତେ)

ଚିତ୍ର 9.29 - ପାଇଁ ବର୍ତ୍ୟମାନ ଧାରାରେ

ଅକ୍ଷରନ୍ତର ଲୋକତାତ୍ତ୍ୱକର୍ମରେ ଏହାମ ପରାମାଣ୍ରିକ ପରାକ୍ରମ ହେବାରେ ପ୍ରାପ୍ତ ହୋଇଥିବା ଫିଲୋଯୋ ପରେଁରେ ପାଇଁ ହୋଇଥିବା ପ୍ରକ୍ରିଁଯା ପରାକ୍ରମ କରାମାନେ ବିଭାଗ ବୁଝିବାରେ ସମୟରେ ଏକ ଲାଗନ୍ତି. A ଓ B ଦୃଷ୍ଟିକୋଳାଲେ ରେକ୍ରିଯା.

9) ଫାଇଲ୍ ବର୍ତ୍ୟମାନ Strip Footing କରାରେ ଯେକନ୍ତି ବିଶ୍ୱସ ନେବାରେ ଭିତ୍ତିକର୍ମରେ ପ୍ରକ୍ରିଟୀ ବର୍ତ୍ତମାନ ଧାରାରେ.

1. ଫାଇଲ୍ ପ୍ରକ୍ରିଟୀ ବାରେ ଏକ କିଲୋମୀଟର୍ବରେ କାର୍ଯ୍ୟ କରାଇବା
2. ଫାଇଲ୍ ପ୍ରକ୍ରିଟୀ ବାରେ ଏକ କିଲୋମୀଟର୍ବରେ କାର୍ଯ୍ୟ କରାଇବା ପର୍ଯ୍ୟନ୍ତି ଭାବାରେ 2.5 କିଲୋମୀଟରେ
3. ଫାଇଲ୍ ପ୍ରକ୍ରିଟୀ ବାରେ ଏକ କିଲୋମୀଟରେ କାର୍ଯ୍ୟ କରାଇବା 2.5 କିଲୋମୀଟରେ
4. ଫାଇଲ୍ ପ୍ରକ୍ରିଟୀ ବାରେ ଏକ କିଲୋମୀଟରେ କାର୍ଯ୍ୟ କରାଇବା 2.5 କିଲୋମୀଟରେ

ଚିତ୍ର 9.30 - ଫାଇଲ୍ ପ୍ରକ୍ରିଟୀ ବାରେ କାର୍ଯ୍ୟ କରାଇବା ପରାକ୍ରମ ଏକରେ

ପରାକ୍ରମ ଦୃଷ୍ଟିକୋଳାଲେ ତାମକୁ ବିଶ୍ୱସ ନେବାରେ ৪০০ ପରୀକ୍ଷଣ ପ୍ରକ୍ରିଟୀ ବର୍ତ୍ତମାନ ଧାରାରେ।
1.4.1 Roofing

The roof shall be flat. The roof shall be made of concrete slabs of 6" thickness. The slabs shall be supported by beams of 3" thickness and 24" centres.

1) Plinth Masonry

The plinth shall be 6" thick and made of concrete blocks. The elevation shall be 9" above the ground level. The plinth shall be provided with an outer row of bricks and an inner row of concrete blocks.

2) Cavity wall

The cavity wall shall be 6" thick and made of concrete blocks. The wall shall be supported by concrete blocks at 24" centres. The outer surface of the wall shall be plastered with a thick layer of cement mortar.

3) Attic

The attic shall be 6" thick and made of concrete slabs. The slabs shall be supported by beams of 3" thickness and 24" centres. The attic shall be provided with an outer row of bricks and an inner row of concrete blocks.

4) Good Features of Earthquake Resistant Construction

(Good Features of Earthquake Resistant Construction)
1.9.9 Pillars and Buttresses

Pillars and Buttresses

1.9.9.1 The shape of the pillar

Vertical Reinforcement in Walls

1.9.9.2 Vertical reinforcement of bamboo or cane

1.9.9.3 Diagonal reinforcement with collar beams or bands

(Axial Compression Test)

(Collar Band or Horizontal Band)

(Diagonal Compression Test)
1.4.4 Diagonal Bracing

2.5.3 Stabilizer

2.5.4 Stucco

2.5.5 Summary of Desirable Features

3.5.5.1 Unit Compressive Strength

3.5.5.2 Masonry Compressive Strength
3. Permissible Tensile Stress

The permissible tensile stress of masonry is given as:

\[ f_t = 0.04 \text{ N/mm}^2 \]

The permissible tensile stress of masonry for loads perpendicular to its plane is:

\[ f_a = 0.04 \text{ N/mm}^2 \]