

MODULE CODE: M4X01858
TITLE: Civil Engineering Technology 1
DATED: 24/09/2017

LEVEL: 4
CREDITS: 20

JACS CODE: K210
LECTURER: Dr Keerthi Ranasinghe (k.ranasinghe@uwtsd.ac.uk)

Date: 28.01.2018

5 Shoring & Piling

5.1 Shoring

- 5.1.1 Introduction
- 5.1.2 Open excavations
- 5.1.3 Closed excavations

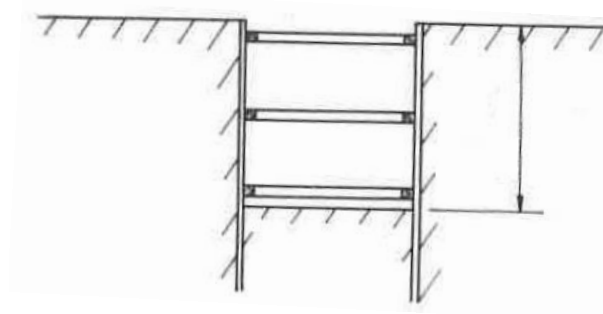
5.2 Piling

- 5.2.1 Drainage theory
- 5.2.2 Urban storm drainage
- 5.2.3 Land drainage
- 5.2.4 Highway drainage

5.1 Shoring

5.1.1 Introduction

- Needed to excavate on congested sites
- Depends on
 - the depth,
 - the space available,
 - the nature and permeability of soil,
 - the depth of water table



5.1.2 Open excavations

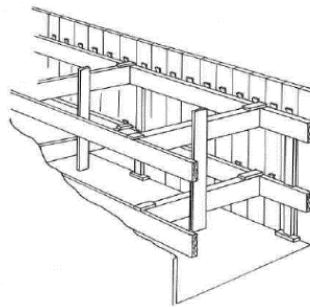
- Slopes in dry sands and gravel form their natural angle of repose
- Angles of repose

Soil type	Horizontal: Vertical
Solid rock	1:1
Compacted angular gravels	0.5:1
Rounded gravels and shingles	1.25:1
Dry sand	1.5:1
Dry soil	1.75:1
Wet sand	2.5:1
Wet clay	3.5:1

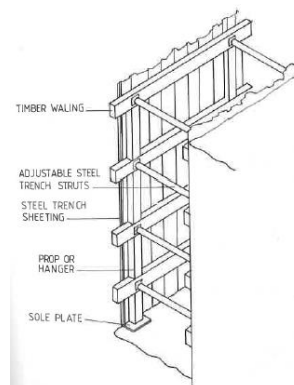
- Moist sands are misleading as they tend to stand vertically initially
- Water bearing soils cause more potential hazards
- Cohesive soils such as clay can theoretically, depending on the strength of the cohesion, stand vertically to a certain depth, but if fissures are available then unpredictable
- In wet situations, the fissures can get filled with water and can break away. Even when fissures are not present, there is a high chance of fissuring during drying

5.1.3 Closed excavations

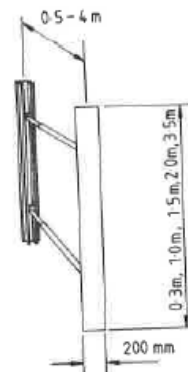
- Trenches
 - Self-support – unless the sides are battered, the sides may need support
 - Using planks and struts



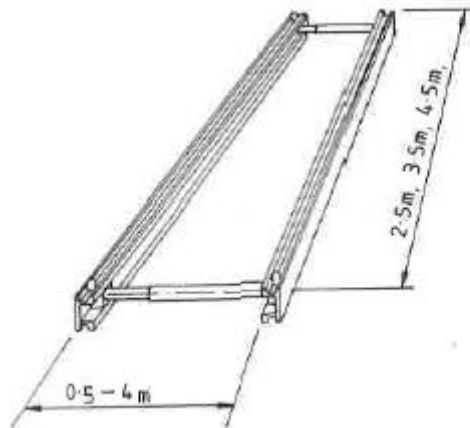
- Trench sheets and props



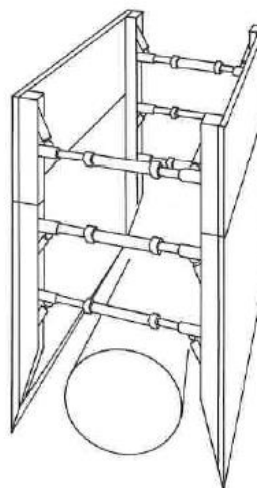
- Hydraulic shoring
 - Vertical



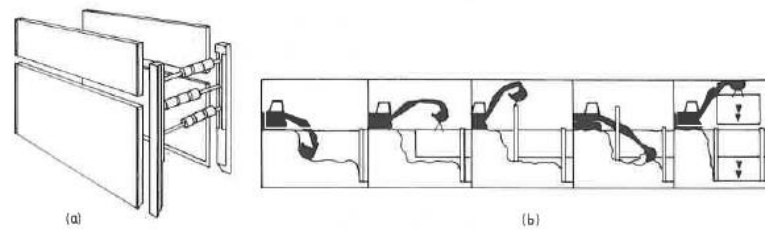
- Horizontal



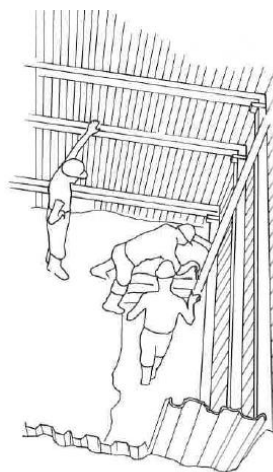
- Trench boxes



- Slide rails



- Cofferdams and sheet piling



- Reinforced concrete piled walls
- Contiguous diaphragms
- Injected membranes
- Ground freezing
- Ground anchors
- Caissons

5.2 Piling

5.2.1 Pile hammers

- Drop
- Hydraulic
- Vibratory

5.2.2 Pile helmets and dollies

- Helmets
- Dollies

References Used:

Harris, F. (1994), "Modern Construction and Ground Engineering Equipment and Methods", Longman Group Ltd, ISBN:0-582-23657-6