

A. Practice and knowledge (Questionnaire for craftsman)

Name:

Present occupation:

Village/ gewog/ Dzongkhag:

Experience of working:

1. When did he start working in the trade?
2. Is he seasonal carpenter or professional?
3. How did he learn- on job or through more formal training?
4. When did he become master craftsman?
5. Frequency of working in the field- how much or many works he has carried out?
6. Working area extent- where or which places he worked?
7. Did he exchange or share his knowledge to others and to what extent?

Rammed earth construction techniques

A. Material

- *Selection of soil*

What kind of soil is adequate for rammed earth wall?

Who selects the soil?

When do you select the soil before starting construction work?

Area of collection?

Who collects and bring the soil? Maximum distance they go to collect soil?

How is required soil quantity estimated?

Cost of soil collection?

- *Preparation of mix*

What are different types of soils mixed?

Is stone removed or kept in the mix?

What other materials such as straw, dung, etc... are mixed?

Addition of water- when and amount?

How is the consistency of mix checked or tested?

What is the duration and environment to keep soil after preparation till use?

Is soil from old wall used/ preferred?

B. Formwork

What is the thickness and total height of walls? Who decide?

Identify and list details of the formwork design and local terminology.

Shape and size of the formwork and type of wood? Number of sections in a formwork?

Who prepares the formwork?

Length of the shutter and *ngashing*? Is it prepared based on requirement of a specific construction or *pazop* prepares beforehand?

Any special type of formwork?

How many set of formworks does a *pazop* have and how many times can it be reused?

C. Ramming practice

Who installs formwork?

Starting point of formwork construction and direction they proceed? Is there any rule for this, or how do you decide?

Number of formworks used at a time?

Any treatment on the surface of the formwork?

Number of workers in each section of a formwork?

Weather conditions suitable for rammed earth work?

Height of soil layer at one time for ramming?

Does the required height of the soil layer determine the amount of soil poured or required amount of soil determine a layer for ramming?

Time required for ramming for one layer?

Types of ramming tools used- name, design, material; and who prepares?

Tools for finishing walls?

Techniques for finishing walls (implementation, timing)?

Any ideal method of ramming?

Design of formwork for tapering walls, inclined walls, wall junctions without 90deg. angle or any other shape?

Appropriate moisture content of soil mix? How do you check and control it?

Indication that compaction is enough?

Joinery and treatment between different lifts?

Detachment of formwork from the constructed lift- is it detached immediately or given time to cure?

Repair or filling up of cracks and other failure- when and how is it done?

How or when floor joists are installed?

Window and door frames are built before or after construction of walls?

D. Special technique of rammed earth construction

Any knowledge about reduction of wall thickness in the upper section? If yes, what is the manner? (eg. thickness reduced in the topmost part, gradually reduced from bottom to top, etc...)

Any knowledge about construction of leaning (tapered) wall? If yes, what is the manner? (eg. any special tools or formworks required? how is degree of the slant decided and controlled?)

E. Reinforcement- improving strength and stability

- Additives for improvement of the soil composition for strength?

- Introduction of reinforcement elements in the wall?

Is introduction of stone or timber at joints for crack prevention or aesthetic?

- Any other technique to prevent vertical cracks at the corner of walls?

F. System of construction

Relationship between different category of workers and their responsibilities for different scale of construction?

G. Social aspect and practices

Is ramming work done through community mutual help system?

Who carry out ramming works?

Wages for ramming works?

Local custom and religious practices (eg. Rituals before and/or after construction work)?

Social taboo (eg. Special date suitable or unsuitable for work or start of construction)?

Other related construction techniques:

Connection between roof truss and walls?

Type and size of foundation of the rammed earth walls?

Technique to keep the top of foundation stone wall level? Any special tool for it?

Plastering works- when is it done?

Any change in the present rammed earth construction techniques from the old?

Before introduction of the yard-pound system, how was the dimension of a “lift” (or size of a formwork unit) decided by using human body scales?

Is the dimension of a “lift” used as a scale unit for deciding plan size and /or height of a building?