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| Subject: Building Constructions - Skeleton Frame Structures | Year: 2019/2020 | Semester: Fall | Classroom /Dates: Tuesdays at 8:15 – K352 |
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Workshop Exercise no. 2. – Wall type structural systems

A summary for foreign students

This exercise aims to demonstrate the walled system typical components and the selection steps involved. Note that some solutions are unique to this system and may not be used elsewhere.

1. Selection of the walled system:

The example given is a weekend house, with a cellular floorplan solution, with minimal variational requirement. By-levels are used because of the incline, there is no basement. Due to the limited area and the minimal number of levels, a walled construction may be selected. Both parallel and perpendicular wall systems could be used, however, perpendicular is the more economical selection.

2. The selection of the various materials for the structural components

The wall structure is assembled from mortar and blocks that make a unified structure. Various r.c. elements are used to reinforce the walled structures, the most important being the ring beam (girth or crown beam) with multiple reinforcement functions. During the lecture the various wall block types were shown in detail. Min width is 30cm. Some manufacturers offer comprehensive overall systems (eg. Porotherm, Ytong, etc.). Unified unit solutions are useful, but difficult to mix as the unit of manufactures differ on purpose (Pt 25cm, Ytong 20 cm, E and Ppb beams 30cm etc.)

2.1 Internal load bearing walls

In this case porotherm 30

2.2 External load bearing walls

Unit thick wall, insulated wall or multi-layer walls may be selected. Note that structurally not the whole layer structure is to be considered. In this case both the Porotherm 44 and the Ytong 37,5 can be used not having heat insulation requirements. Anyway we suggest to fulfil the living house requirements.

2.3 Slabs

Both parallel and perpendicular structures allow almost any available slab system selection either with 18 or 23 cm (1/25) thickness.

Possibly:

- 18 cm r.c.
- 20 cm Fert + 6 cm concrete overlay
- 23 cm Porotherm + 6 cm concrete overlay
- 24 cm E beam + 5 cm r.c. overlay
- 22 cm Ppb slab: 15,4cm inlay with 6,6 cm r.c. overlay
- 20 cm r.c. Ytong casting slab element

The perpendicular system is preferred due to the shortened beams and the easy stair solution. (Within one flat there are much lower acoustic requirements for slabs.)

2.4 Foundations

Linear slabs are used under both load bearing and other walls, connected to a foundation ring beam. Min height 40 cm. Note solutions for pillars and partitions.

2.5 Beams and transoms

Several solutions are possible:

- unified with the ring beam
- semi-beams used as the cast for the ring beam extension
- independent transoms
- unified with the roller shutter (roletta) when required by orientation of the opening

2.6 Openings

Parapet height and opening size preferably adjusted to block unit height multiples. eg. Porotherm unit $4 \times 25 = 100$ for the parapet, and 6 or 5 x 25 for windows of 150cm and 125cm height respectively.

2.7 Stairs

R.c. is preferred since there is a pantry area under the stair. If the stair is non linear, the casting is more difficult. Otherwise a triple flight stair is the simplest, but takes too much space.

2.8 Roof construction

A simple pitched roof is selected, flat roof may also be considered. The incline is relatively low, metal sheeting or similar covering must be used. Insulation is on the slab.

2.9 Chimneys

Used for the hot water and heating combi-heater and for the fireplace. Pre fabricated elements outside of the walls to avoid problematic conflict with the crown beam. Possibly from stainless steel.

2.10 Floor coverings

Insulation is required. Soundproofing is also required, multi-layer floor must be used.

Only for general reference! This guide will not replace class attendance. Complete and comprehensive explanation – that will be required for passing both midterm and final examinations - is given only in lecture and practical classes. Lecture information will supersede.