Subject:	Year:	Semester:	Classroom /Dates:
Building Constructions - Skeleton Frame Structures	2010/2011	Fall	Tuesdays at 8:00 K348
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Workshop Exercise no. 3. – Poured wall type structural systems

A summary for foreign students

This exercise aims to demonstrate the poured wall system typical components and the selection steps involved.

1. Selection of the structural system:

The example building is a five story college residence, with full basement, no ground water and minimal flexibility requrements. Note the neighbouring, existing building.

Legal standards define the various acquistic reqirements, mainly since there are no alternative or competing functions, the standard Rw +C =47dB is satisfied by 15-20 cm r.c., 20 cm limes-sand brick, 24 cm Porotherm noise insulating brick or double support drywall.

Based on function and disposition, the walled system may be selected, however due to the height, only poured wall construction may be considered. Lontitudinal structure could be more economical only from a structural point, but the horizontal (perpendicular) solution is by far better on an acqoustics basis.

If the façade wall is also poured, this structure becomes load bearing as well and may carry any heavy (eg. concrete crust) façade paneling.

In case of the ground floor common spaces, large support beams may partially replace perpendicular structural walls.

2. Explanation of the structural system

2.1 Poured walls

Poured walls are made with large form systems such as DOKA, PERI, HÜNNEBECK etc. with a thickness that is the result of statics calculation, in our case 20mm.

Connection to the neighbouring building must be made with r.c. form that cannot be removed after construction. Dilatation and thermal insulation must, at the same time, be also adequately solved. Some manufacturers (LEIER etc.) solve these issues with wall form units that serve as in-situ forms for the concrete and will intentionally remain in place after construction.

2.2 Slabs

On the basis of span alone, almost all current slab systems could be used, however due to the systems concept and because of the relative high speed of the poured wall system, pre-fabricated slab solutions are not ecouraged in this case. Semi-monolithic slab systems do not represent a weight that could satisfy acoustic requirements for the example building. Pre-fabricated slab plank units could be used, but these would suit much more the pre-fabricated wall panel systems. Because of the above, the consideration narrows to on site r.c. or crust panel slab systems. R.c. is the choice in this case, with small form units as the large form elements could not be removed through the window openings.

2.3 Foundations

As there is no ground water, calculated strip foundations alone may be used. Monolithic load bearing r.c. walls are connected to foundation ring beams, while basement walls are connected to foundation beams. Both the beams and the ring beams assure even sinking and load distribution. Notice connection details to the neighbouring building.

2.4 Protection against ground water and vapour

Functional disposition requires dust dryness in the basement, which, in turn, means that insulation must be provided agains groundwater humidity. Due to the r.c. technology, the insulation sheets cannot be continued under the load bearing walls. The solution is a cement based insulation compound used around the load bearing steel connections that is connected to the bitumen sheets in the general area.

2.5 Elevators, Stairs

The elevator shafts are r.c. walls with 15cm thickness, for example made with a sliding form system. The triple flight stair may be pre fabricated or monolithic r.c., with various statics disposition (console on elevator shaft, console on stairwell walls, dual beam type resting on beams etc.)

2.6 Roof

The roof is flat, with reverse, non-walkable layer disposition.

2.7 Crust panel covered façade walls

Since a modern architectural solution is composed, the varied façade is well suited to the crust panel system. Due to the ventilated layers used, only non-combustible, fibrous insulation material may be considered. The external, decorative panels are a max. 2,5m2 area 3cm thick fibre reinforced fine r.c. crust panels. These are fixed with stainless steel fixtures to the large, 10-20m2 area 8-12cm thick, structural, back panel elements. These structural elements are only to be connected directly to the r.c. load bearing frame via stainless connectors. All panel fixtures allow for 3d fine setting of the panel positions.

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 pracital classes. Lecture information will superceed.