



**RESARO AB**  
energy and construction system



**NCC Bostad Stockholm Norr** erects four semi-detached hillside houses in Bollstanäs, Upplands Väsby, Stockholm.

## T H E F O U N D A T I O N



Foundation work at the cold season, no problem.

Even surface layers without levels results in a fast laying of ground.



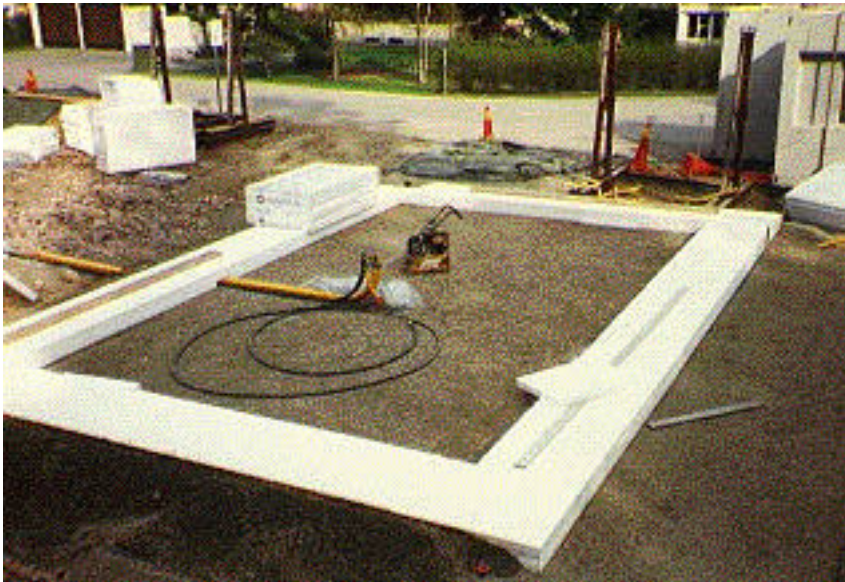
Easy to work.



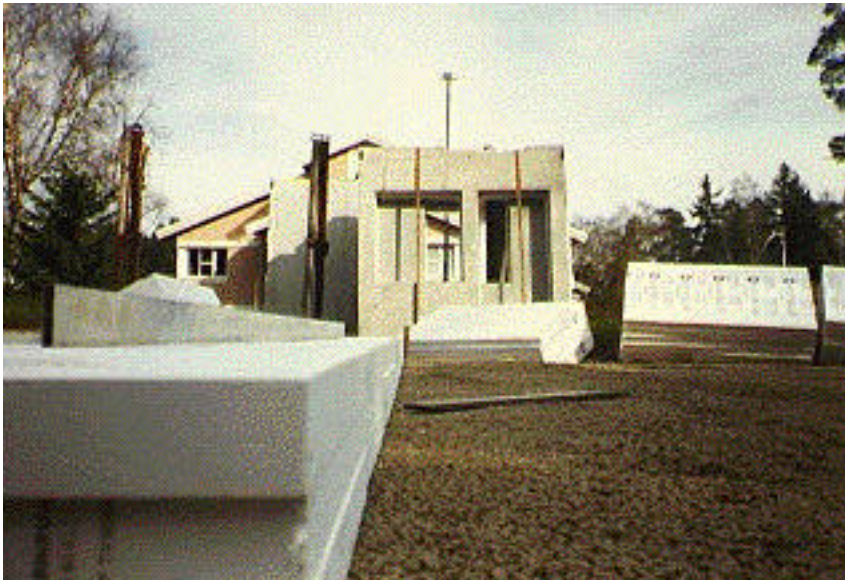
An even drainage bed above a particularly strong all over welded radon proof tarpaulin.

The green tarpaulin covers temporarily against frost.





The gravel bed carries the supporting thermal insulation which in turn supports the bottom floor elements which are self suspended like the upper floor elements.



The straight ruler shows NCC's precision



The inner parts of the foundation is now insulated.

The insulation encloses both the bottom floor elements and the outer wall elements with a constant even thickness.

No cold bridges outwards to the winter cold or downwards to the ground.





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**BOTTOM FLOOR AND OUTER WALLS**



The bottom floor structural elements during fitting.

Please remark the gap below the element plates in the inner part of the foundation

A self-suspended floating floor structure.



The bottom floor structural elements for the semi detached house

(two residences)  
mounted in position.



The plates of the structural elements are fixed to each other with welds.

The joint is then filled with jointing composition in order to get the elements to work together and to prevent draft.





The bottom structural floor elements and the walls are fixed with welded sheet metal in a level below the bottom floor surface, inside the structural floor.



Jointing composition in the horizontal joint gaps between the wall elements and the edge-beams of the bottom floor elements, guarantees for making draught tight.



The welded sheet metal is hid inside the upper floor structural elements.

The walls are sealed inside the vertical joints. These have been designed as groove-like recesses and are filled with expanding jointing composition.

**Draught tight!**



**Here you can see the recesses for the supply of the tooth-like support projections on the floor element plates.**

**The floor elements gives a central load at the wall plate without causing bending forces.**

**The wall above rests on the tooth-like projections of the lower wall, which projections can be seen in the picture on the top of the wall element.**

**Also this load works central and without causing moments.**

**Without bending forces on the wall, the wall plate can be made much thinner, which also increases the thickness of the thermal insulation outside of the framework.**

**In addition without cold bridges!**

**Such an energy effective utilize of the building materials results in considerable less heating costs.**

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## ERECTING OF WALLS OF BOTTOM FLOOR



Erecting of outer walls.

Time for the partition walls.

One part of the double partition walls is furnished with mineral wool for better sound-absorbing.



Fast install of walls.

Light walls.

The walls stands on jointing composition which hardens and works as support.

This proceeding also gives the maximum impenetrability against air leakage.



**Precision adjustment.**

**Open truss webs  
all the way to the walls.**



**The vertical resesses in  
the joints of the walls  
are filled with jointing  
composition.**

**Groove-like resesses  
with irregularities in  
bottom gives better  
fixation against share  
movements.**





**Detail of an outer edge.**

The houses maid all separated from each other gives the best sound-absorbing effects between the two residences.

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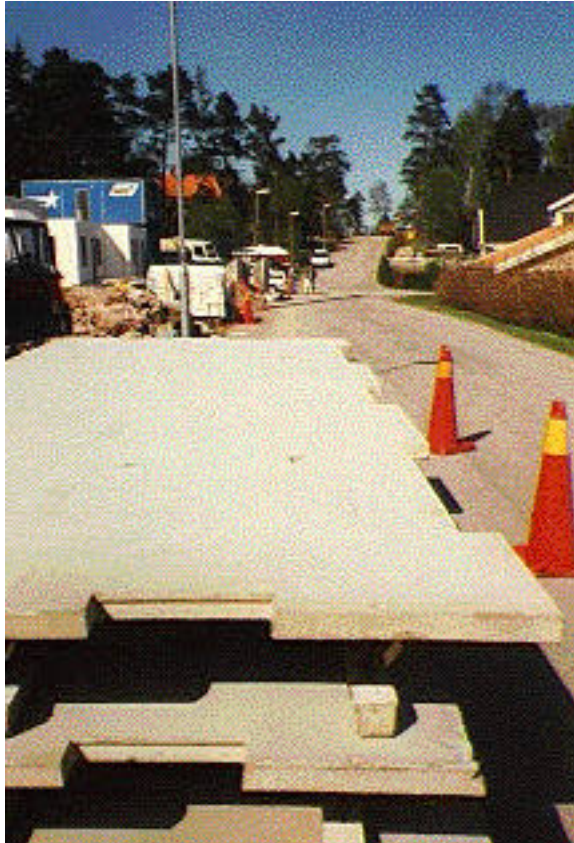
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## UPPER FLOOR ELEMENTS AND THE BOTTOM FLOOR



Upper floor thin-plate structural elements furnished with tooth-like projections for supply.

Gable elements.

The teeth of the floor plate, instead of the cords, rests on the walls, which gives advantages.



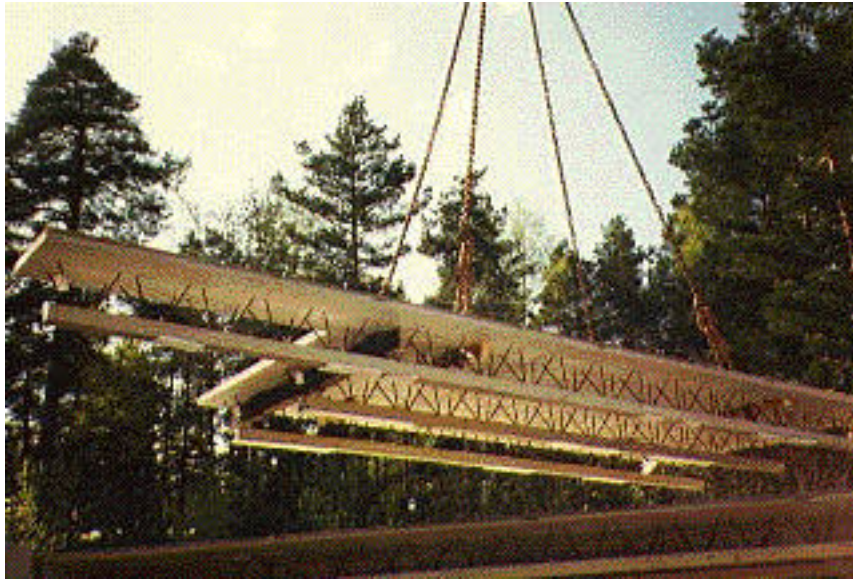
Quick erecting.

Lighter elements.

Open truss webs all the way out to the supporting walls.

Installations inside the structural elements.



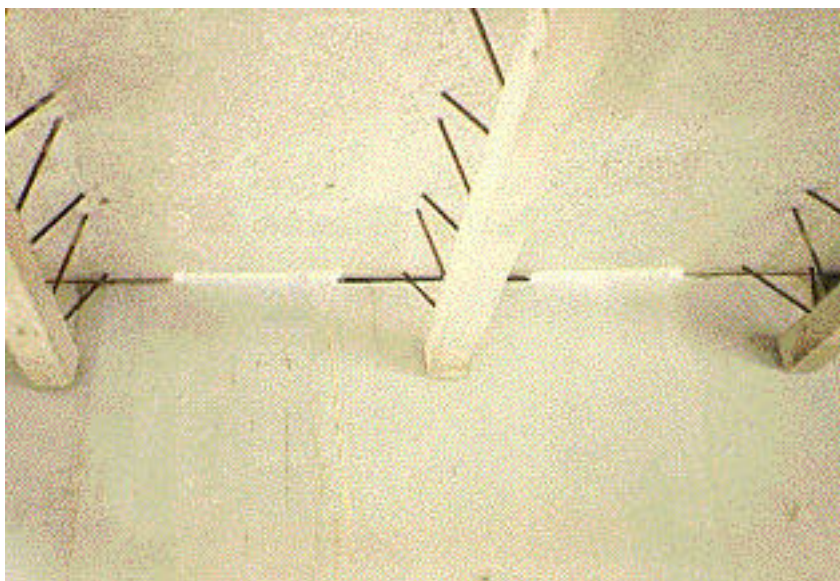


**Hole for the stairwell with a secondary steel beam.**

**Gaps between the floor plate and the wall plate for circulating heat air and ventilating air up into the living rooms.**

**The gaps are utilized for electrical cables in a new electrical installation system.**

**Gives current to moveable wall sockets being an integral part of the "stationary electrical system".**



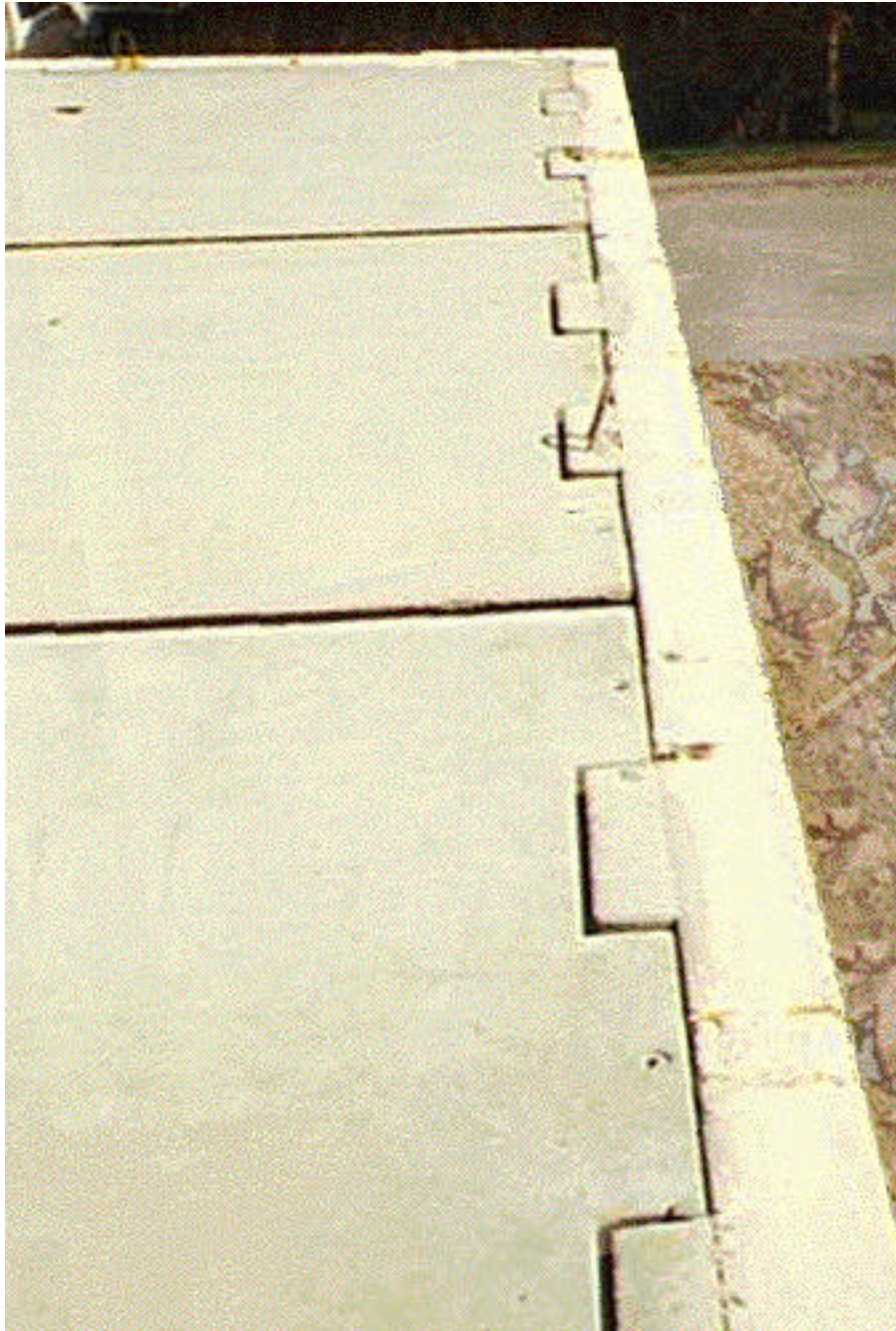
**Circulating warm air inside the structural floors gives the residents "soft" underfloor heat in both floors.**

**Evening of temperature when the concrete slabs conserves energy.**

**This lowers the heat costs still more.**

**Into the bargain you get a considerably better sound climate between the floors.**





The upper floor structural elements mounted in position.

The heat insulation covers the projections of the concrete floor plate and the wall concrete plate with equal thickness, from the ground up to the upper floor surface.

The wall tooth-like projections exceeds a slight level above the floor surface.

Then the teeth belonging to the floor elements can turn a slight angle "freely" in the space created between the upper and the lower wall element plates.

Therefore the floor element plate can be made thinner without to break at angle turns caused by loads.







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## THE OUTER WALLS OF THE SECOND FLOOR AND THE ROOF MOUNTED



These houses are equipped with Resaro's structural elements in bottom and upper floor, including outer walls in bottom floor.

Upper floor outer walls are made with framework of wood.

In the future we will see small houses and villas with Resaro's energy conserving concrete walls, right up to the roof.

Outer walls without cold bridges, manufactured by use of Resaro's new fast low cost casting procedure.

Furnished with i.e. wood panel if desired.

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## INSTALLATIONS

### SEWAGE



Sewage pipes from shower, toilet and washing machine at bottom floor.

Easily accessible in the future.



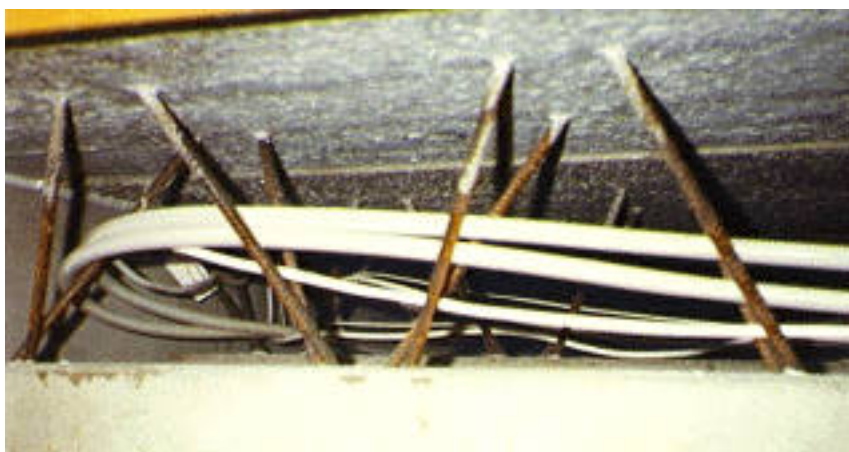
Common throughout for waste pipe and exhaust air down into the ground through the bottom structural floor concrete plate.



Sewage pipes from bath and toilet at upper floor is invisibly installed inside the structural upper floor.

Easely accessible in the future.

## ELECTRICAL INSTALLATIONS



The electric installation work goes very fast inside the structural floor.

Easely accessible in the future.

## INTERIOR WALLS & CEILING



The picture is taken at the stairwell and shows the interior walls with one side boarding.

The ceiling on steel studs can be seen below the Resaro structural floor.

Electrical cables for stair lighting.  
(A steel stud stands leaning against the corner)



## HEAT AND VENTILATION UNIT



### **Rough filter.**

All circulation air together with the ventilation air passes two filters before it enters the living rooms.

The rough filter is simply cleaned about two times a year by giving it a shower in the bathtub.

A pressure guard tells you when it is time.



### **Fine filter:**

A bag filter with standard dimensions and big filter areas.

The fine filter, of which you settle the fineness, needs to be changed every second year.

A rapid connection system facilitates the change.

All filth which gets caught in the filters you are spared from inhaling.

There are space enough for an alternative electrostatic filter.

New filter models of Gore Tex which can be washed and recycled is developing.

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