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Revolutionising
the Construction Industry
in Jordan

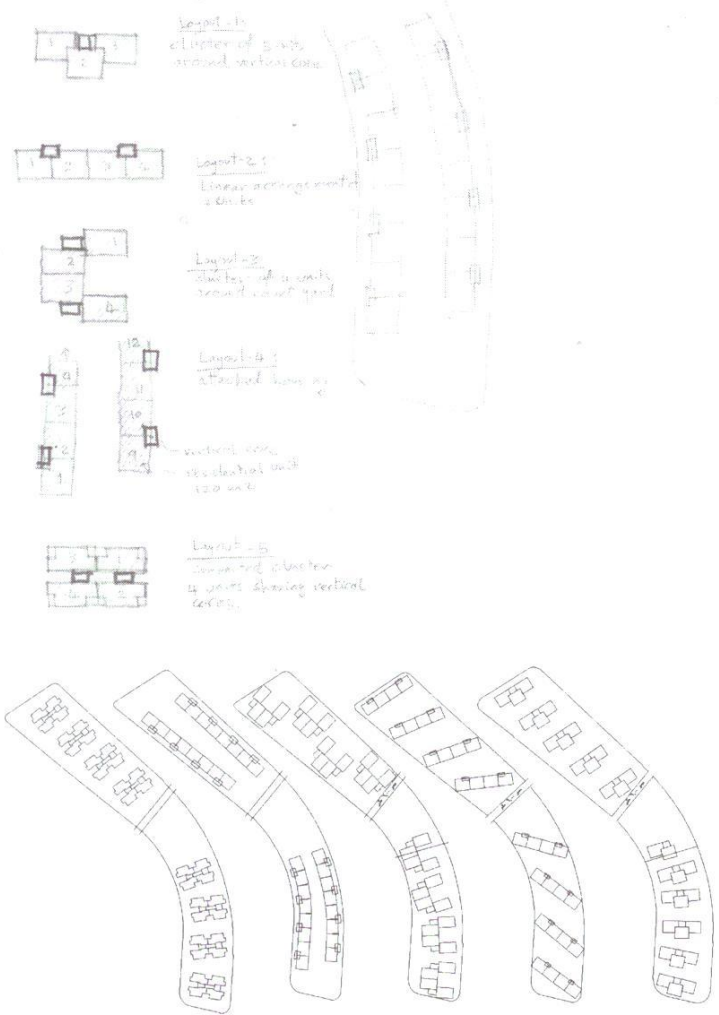
Abu Alanda Housing Competition

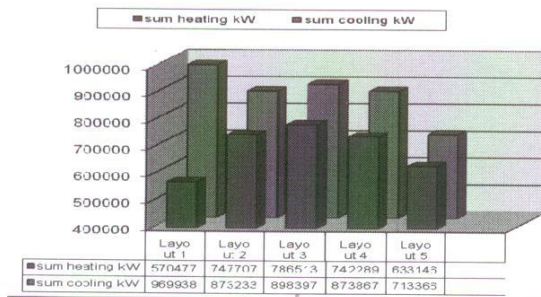
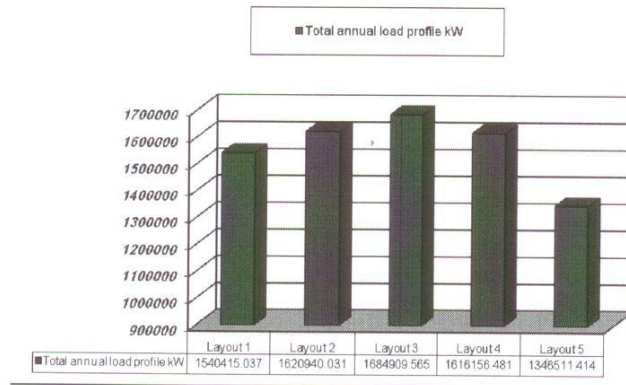
This report initially explains set of measures to improve the building thermal performance and reduce the energy consumption while maintaining the thermal comfort of inhabitant

The aim of the project is to develop an understanding of how appropriate design, building construction method and material, occupant behaviour can minimize the energy and water consumption. Taking into account the behaviour of the people and building in such urban context and with a special culture, nature and circumstances.

The design on the urban level:

Five different layout were suggested based on the number of units needed-168- and based on the known formation in such type of housing and social interactive life that could be acquired. The layouts were simulated using computer program in assess the consumption of energy needed for all units to maintain the comfort zone in spaces. The results show that the compact design is the optima. Please refer to the charts below.





The compacted form is based on green *design simulations*, and it reduces the foot print of the equal 20/24 units on land.

The suggested design incorporates the “Charter of the New Urbanism” in several ways:

- The physical definition of the street and the central public space as places of shared use, building community spirit . Encouraging social interaction while maintaining privacy
- Linked to the surroundings through terraces emphasizing the natural land form
- Accessible open shared space that is safe, welcoming, comfortable, and interesting
- Addressing the needs of vulnerable groups, such as seniors and children
- Accommodating vehicles without compromising pedestrian use
- Capitalizing on the natural resources such as sunlight and wind.

The design on the unit level

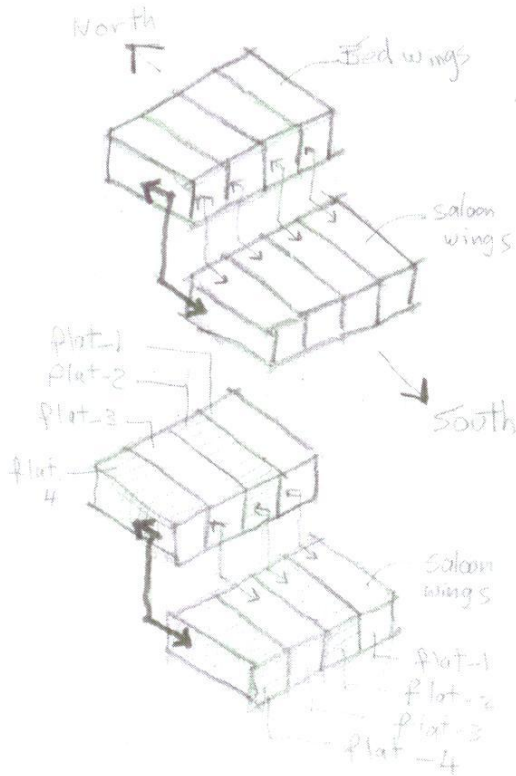
The challenge is to design energy efficient apartment that has high density and keep yet the aspect of equality from natural light, ventilation, sun.

The design incorporates 8 buildings on separate plots. six buildings contain

20 apartments and two buildings contain 24 apartments. That is 168 units.
The area of each building is about 2770 m². To keep the FAR=1.76.

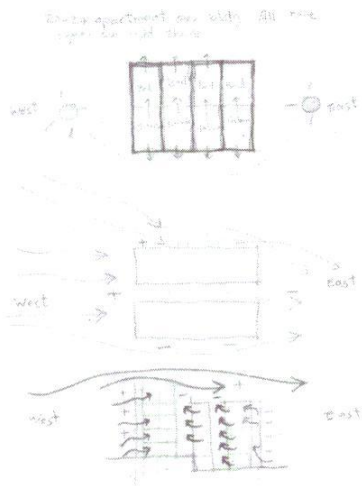
Sun layer:

The CONCEPT of the design is that every single apartment has lower southern saloon wing and upper northern bed wings linked by lateral staircase to preserve *Equal sunlight share for all apartments*.



Wind layer

The design incorporate using open middle core that contain vertical elements for public and private circulation, and open courts. This vertical tunnel is facing west to capitalize the wind pressure for natural cross and stack ventilation



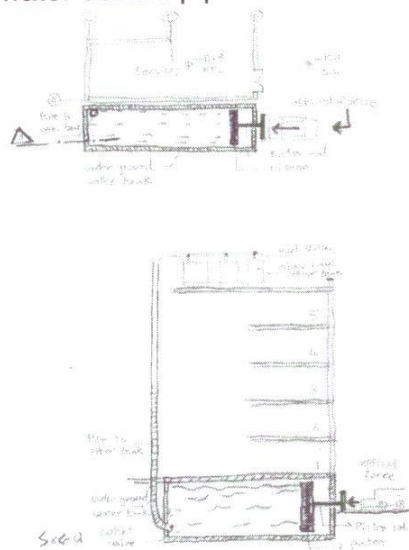
Building construction:

The high thermal mass of concrete is exploited when it faces the internal spaces, proper wall and roof insulation to preserve the proper U-value is used. Moreover, proper details for edges to prevent the thermal bridges through slabs is used.

The design is combining the climatic design with form to maximize the performance, and adding to them the 'comfort' equity by providing proper orientating for saloons and beds for all at the same level. Yet it affordable.

Water measures:

Rain water harvesting, underground water tank for collection of rainwater and passive pumping to the roof upper tank using car to push a piston arm. Grey water double pipe to be used.



Thermal solar panel is incorporated in design.

Helping residence to reduce energy expenditures by preparing user guidance.

Construction materials

All materials and method of construction are local

Slabs are one way ribbed slabs , 25 cm thickness

Internal partitions: 10 cm concrete blocks

External building walls : cavity walls , consists of 10 and 15 cm concrete block with 3 cm extruded polystyrene 35 kg/m³ density, of total thickness 30 cm

Slab on grade isolation: 4 mm membrane

Roof insulation: 4 mm membrane and foam concrete

Car parks floorings: 10 cm trowel-ed concrete

Main entrance flooring: local marble

Stairs from local marble

All internal floorings: terrazzo tile

Kitchens and bathrooms finishes: local ceramic, accessories and fixtures are local two

All timber doors: Swedish soft wood

All walls and ceilings finishes: typical plaster with emulsion paint

Sidewalks floorings: cement tile

Cost analysis

Taken into account that the contractor is classified not less than 2nd or 3rd degree and that reinforced concrete is ready mix concrete; the cost estimate is as follows:

Sub structure quantities: for items under slab of ground level

Skelton works, sub-structure = 300000 JD

Skelton works, super structure = 100000 JD

Total Skelton works = 400000 JD

Of about 115 JD /m²

Finishes Works = 300000 JD

Finishes Works = 86 JD / m²

Insulation works = 17000 JD

Boundary walls and sidewalks = 50000 JD

Total cost 770000 JD

That is about 220 JD/m²