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### **Tower Block of Civic Center, Shah Alam Core Project, Malaysia**

Tour du Centre civique, Shah Alam Core Project, Malaysia

Turmaufbau beim Civic Center, Shah Alam Core Project, Malaysia

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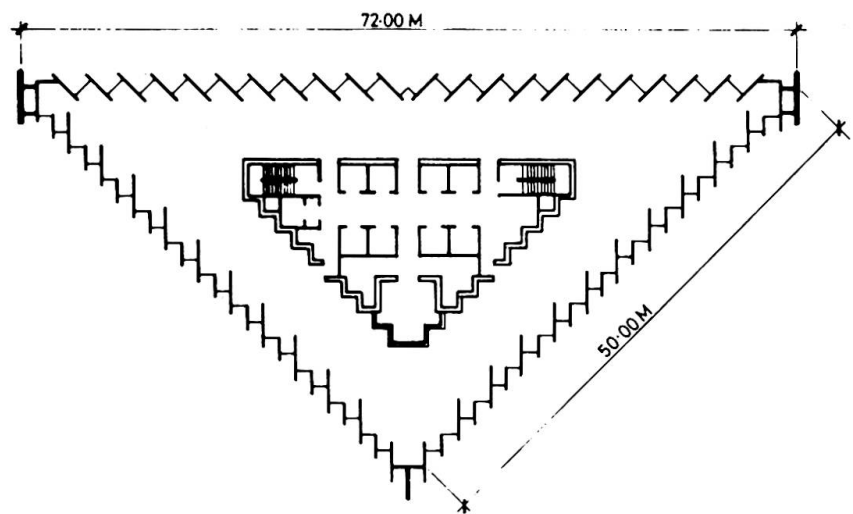
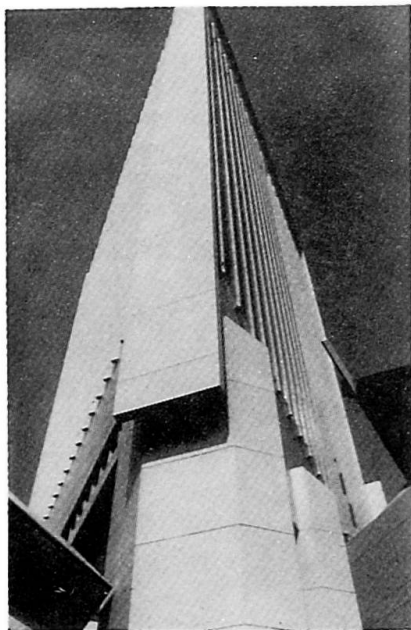
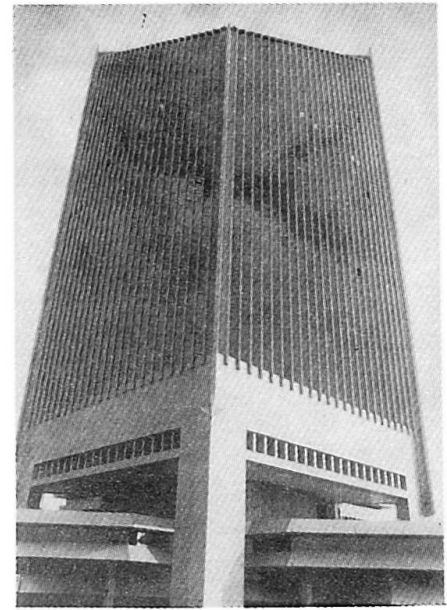
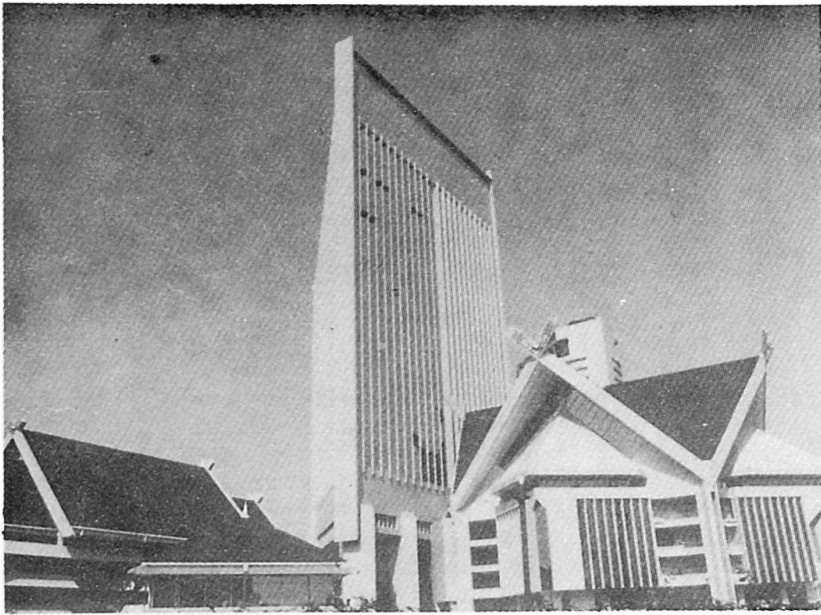
Kumarasivam Tan & ArrifinSTUP  
Kuala Lumpur, Malaysia

The civic centre at Selangor has three major buildings of striking architecture. The main civic office is housed in one of them - a building triangular in plan with two sides of 50 m at right angles and a 72 m hypotenuse.

At the base is a concrete podium of 4 m height above ground with a basement for car parking below. Above the podium, monumental columns at the three apices with two more intermediate columns along the longer side rise 20 metres to the soffit of 12 m (4 stories) deep transfer girders. In the centre of the building there is only a triangular shaft enclosing the lifts and services. The rest of the space is clear for a 20 m height giving a majestic appearance to the building.

The tower rises 30 stories above the soffit level. The external triangular tower functions as a structural tube above the transfer girders. Each face is composed of a frame formed by RCC fins and transverse beams connecting the fins at every floor level. The inner triangular tube carrying the lift shafts and the services is of monolithic reinforced concrete. The outer and inner tubes are connected by floors. This permits the outer and inner tubes to carry vertical loads from the floors as well as to resist in tandem the wind loads. The floors provide lateral support to the external tube which has low lateral strength but good strength along the faces of the tube. The large transfer girders give rise to major variable deformations during construction and long term deformations in service that are as high as 15 cm. The differential temperature effects between the outer tube and the inner tube (the latter is an air conditioned environment) adds differential vertical movement of the order of 15 mm. The floors have therefore to be articulated at supports on the inner and outer triangular tubes.

The structure required very detailed analyses covering the structural behaviour and deformations and appropriate and meticulous detailing. The prestressed concrete transfer girders which are monolithic with the columns act together as a space frame. Their analysis and detailing required special attention. Similarly the construction procedure for the 12 m deep and 4 m wide box transfer girders, constructed on staging 20 m to 32 m high, required very careful detailing.



TYPICAL FLOOR PLAN OF TOWER BLOCK

Tower Block of Civic Center, Shah Alam Core Project, Malaysia