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3. ARK Buildings, Tokyo

<i>Client:</i>	<i>Association for redevelopment of Akasaka-Roppongi blocks.</i>
<i>Consultant:</i>	<i>Mori Buildings Co., Ltd.</i>
<i>Architect:</i>	<i>Irie Miyake Architects & Engineers</i>
<i>Engineer:</i>	<i>Irie Miyake Architects & Engineers</i>
<i>Contractors:</i>	<i>Kajima Corporation, Toda Construction Co., Ltd. and Fujita Corporation</i>
<i>Dimensions:</i>	
<i>Number of storeys:</i>	<i>37</i>
<i>Total floor area:</i>	<i>181,924 m</i>
<i>Maximum height:</i>	<i>153,55 m</i>
<i>Materials:</i>	<i>Steel, Reinforced concrete</i>
<i>Construction Period:</i>	<i>28 months</i>
<i>Service date:</i>	<i>March 1986</i>

Introduction

The office building described is one of the buildings being constructed for the redevelopment project of the Akasaka-Roppongi blocks. A hotel, a concert hall, a TV studio and two high rise residences are under construction. The structural system of the building is a steel framework with the reinforced concrete floors and the concrete shear walls which have some slits to provide ductile deformation in severe vibrations caused by earthquakes. The precast concrete sheets are installed as the exterior walls. The exterior walls were so designed as to make a unique facade and to interrupt the direct ray of the sunshine. With these walls less energy consumption is expected. The precast concrete is reinforced by carbon fibers.

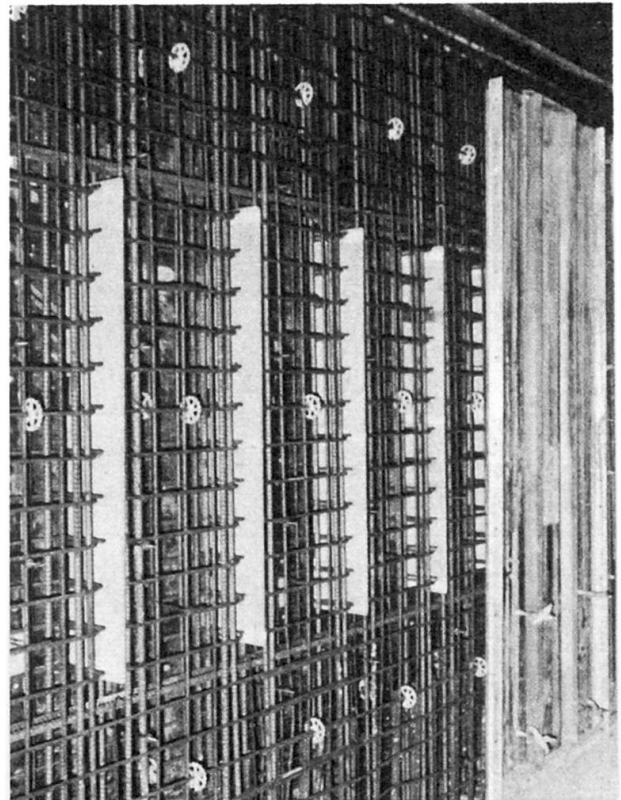
Design

In plan the building consists of two rectangular parts of 45×42 m, each of which comprises the beam spans of 15 m, 6 m, 9 m and 15 m in the east-west direction and the 6 m spans of beams in the south-north direction. At the centre of each plan the core of 84×15 m surrounded by the shear walls is placed as shown in Fig. 1. The thickness of the shear walls varies from 15 cm to 20 cm. The shear walls can transmit the storey shear due to the earthquake motions from the upper floor girder to the lower floor girder through steel bars in the wall. The 1 cm wide vertical slits are cut every 50 cm distance. These slits can change the brittle shear failure of the shear wall into the flexural failure. The flexural failure can provide the large energy absorption against earthquake excitations. Large viscous damping is also expected during vibration. The floor slabs in the basements were designed as a flat slab structure without beams, in order to save as much storey height as possible.

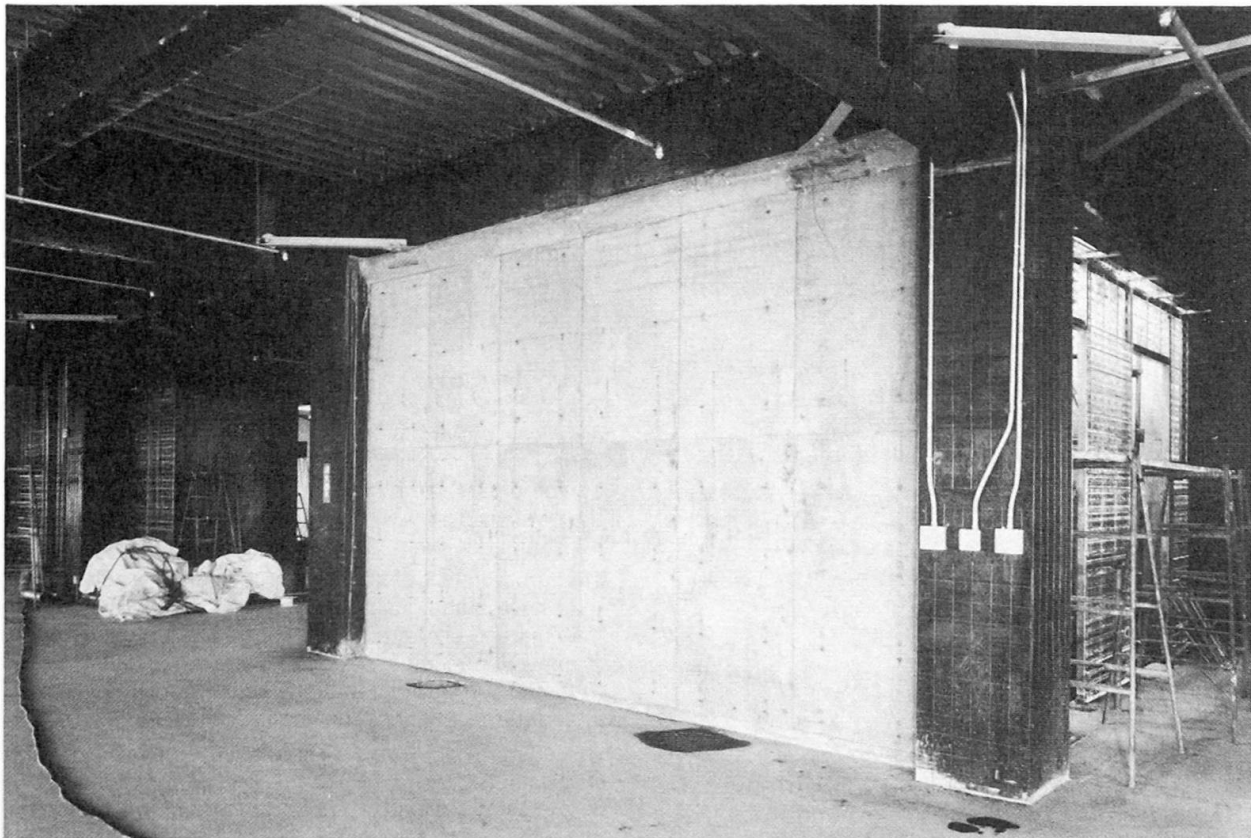
(Y. Tsuchiya)



ARK Building



Shear wall



Shear wall

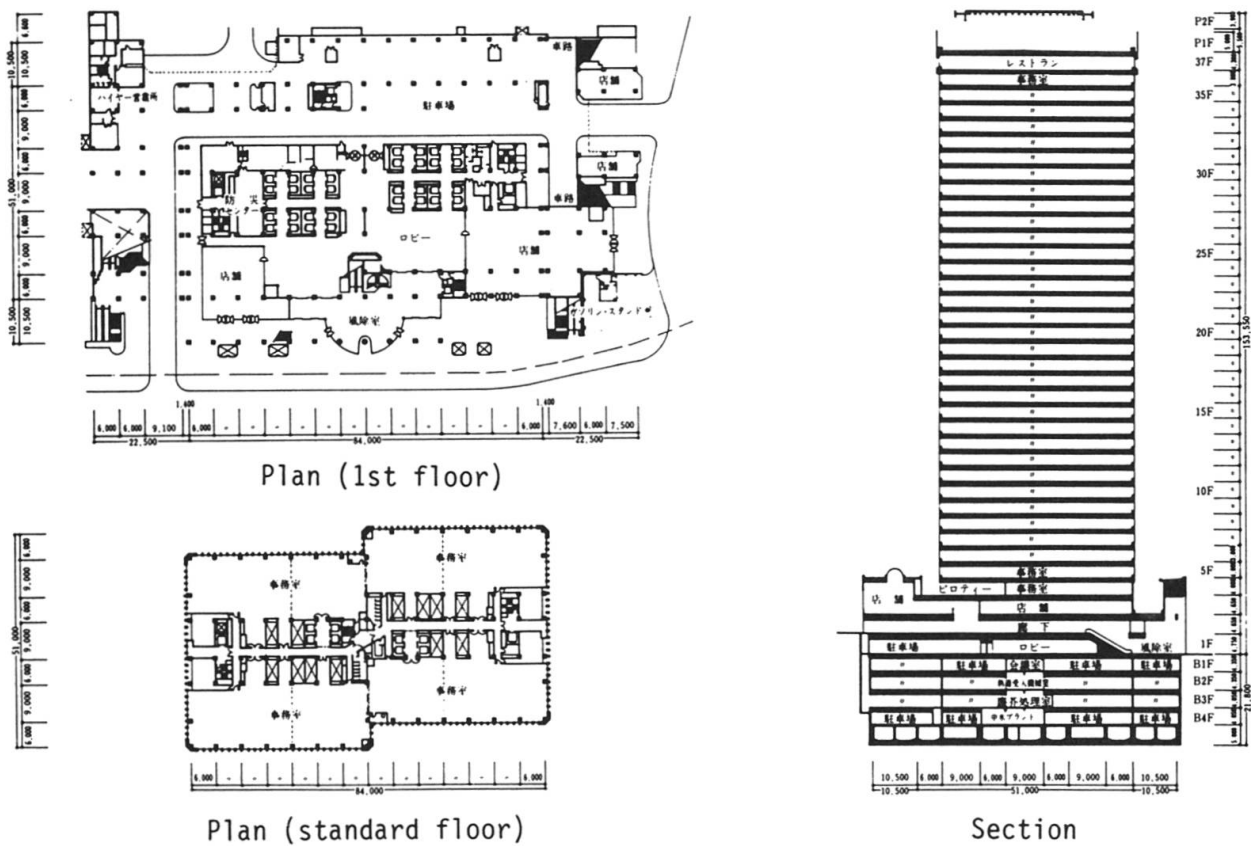


Fig. 1