Sendai Mediatheque
せんだいメディアテーク

ARCH 631-Architectural Structure III
Project Presentation

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Data

Sendai Mediatheque
Architect: Toyo Ito & Associates, Architects
Location: Sendai City, Japan

Site area: 3,948.72m
Building area: 2,933.12m
Total floor area: 21,682.15m
Max height: 36.49m
Size: 2 floors below ground + 7 floors above ground + rooftop structure: steel-ribbed with partial reinforced concrete (rc) construction
Construction cost: approx 13 billion yen
Opening: 26 Jan 2001
Information

Sendai mediatheque is a center for activities in the fields of art and film, serving as a public facility to help people freely exchange information with each other through various media and learn how to use that information.
Sendai mediatheque principles and services

**concept**
- Sendai mediatheque flexibly serves the needs of people by supplying the latest knowledge and culture.
- Sendai mediatheque maximizes networking potentials not through terminals but nodes.
- Sendai mediatheque serves all people, including the disabled, users, providers, and people of different languages and cultures, through freeing them of all barriers.

**services**
- The space for presentation, such as gallery and theater, is provided.
- Artworks and film works are exhibited for people to appreciate.
- The space for activities, such as studio and workshop, is provided.
  - Media-oriented lifelong education and cultural activities are promoted.
  - Information-oriented support and voluntary activities, such as helping the disabled use its devices, are encouraged.
  - Workshops related to production of visual/digital contents and media are arranged.
- The latest knowledge and information are supplied.
  - The Sendai Shimin Library
  - This library is divided into the following genres and purposes:
    - Art/culture, focuses on researches on art and culture
    - Film/sound
    - Library designed for the disabled of vision and hearing
    - Audio-visual materials for educational purposes
- The environments, in which anyone can collect, accumulate, edit, and dispatch information, are provided.

**programs**
- Exhibitions, film screenings, and workshops related to art, films, and media are arranged.
- Educational promotion and voluntary activities are supported so that all people, including the disabled, can use media freely.
- Cooperation with many people to collect information and store digital records in archives is encouraged.
- Collaboration with outside libraries and various organizations is developed.
Model

Three elements

- Flat slab (plate)
- Column like sea weed (Tube)
- Screen of the exterior (skin)
Sketch of Ito toyo
The light fittings are unified with the architecture and are designed to differentiate the spaces and functions on each floor.
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Detailed floor plan
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Interior elevation of tube glazing

The structure is comprised of 13 tree-like tubes that unify and penetrate the plates perpendicularly.
There are no walls or braces in this structural system of 7 layers of flat floors supported by 13 tubes.
A. The changeable prism glass situated at the top of the tube revolves to track the sunlight automatically, transmitting light downward within the tube.

B. In summer, the covering at the top is opened to let the rising air current through. In winter, the covering is closed and the warm air is kept inside.

C. The structural honeycomb lattice chamber functions in support of the air conditioning, disaster prevention, and lighting unit systems.
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Climatization System

- upper vents on double glass ("double skin") south facade reduce air-conditioning costs.
- opening the vents in summer creates a cooling updraft; closing the vents in winter creates an insulating layer of air to seal in heat.
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Structural System

the building is composed of 13 independent steel-ribbed shafts (tubular columns: mainly steel-tube truss construction) and 7 steel-ribbed slabs ("honeycomb" slabs: sandwiched steel-plate construction), giving each floor a different floorplan. basement (b1) structures feature seismic energy-absorbing mechanisms.
Steel is used for the main structure, which is composed of 13 tubes and plates. The tubes are built up of thick small diameter steel pipes (outer diameter) evenly spaced at the four corner, support both vertical and horizontal loads. The other 9 tubes support only vertical loads.
Earthquake Design

- Tube Typical plan
- Bending Moment of tube by earthquake
- Structural Axonometric
- Deformation of tube by earthquake
- Bending Moment of plate by earthquake
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tubes for light wells, ducts, vertical mobility

the tubular column structures serve as light wells, with rooftop devices to reflect sunlight down the tubes into the building. and also as vertical connector "pipelines" for network cables, wiring, elevators and stairways.
Various exterior/interior skin
Difference
The relation of tube and interior
Sendai mediatheque
Construction
Sendai Mediatheque

The Sendai Mediatheque faces the rich greenery of Jozenji Avenue. In conventional terms the building’s four main functions are a library, a citizens’ galley, an information service center for the visually and aurally handicapped, and a visual media center. The composition of our design could not be simpler. The building consists of seven steel honeycomb structural plates arranged in layers. These plates are plates by twelve tubular steel hyper-shell tubes. Finally, the internal lighting and air-conditioning environment is controlled by a ‘skin’.

- Toyo Ito