

Large Size Structure Laboratory

● Laboratory Outline

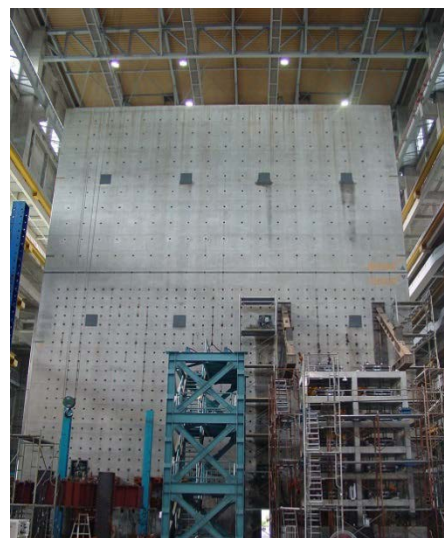
Large Size Structural Laboratory is designed to examine the strength, deformation properties of a building structure and its elements. The test area is 400 m² and mainly consists of two areas.

This lab is capable of performing full size scale building structure such as 7 story building (25m of building height). To observe the ultimate limit state of building structure, huge and stiff 2 reaction floors and 2 reaction walls are installed in each test area. This lab is the one of largest testing facilities all over the world.

The pseudo dynamic testing system, which is a unique technique to simulate directly the earthquake response behavior of building structures, is introduced. Using this system, we can observe and analyze the failure process to collapse state of building structure under severe earthquake. This makes it possible not only to evaluate damage states of building structure due to earthquake quantitatively but to investigate the validity of structural performance of building with new technologies and innovative materials. The outcome of these experiments is used to verify structural design concepts and techniques to meet high level and/or multi-purpose performance requirements to building structures.



Outside appearance



Inside appearance

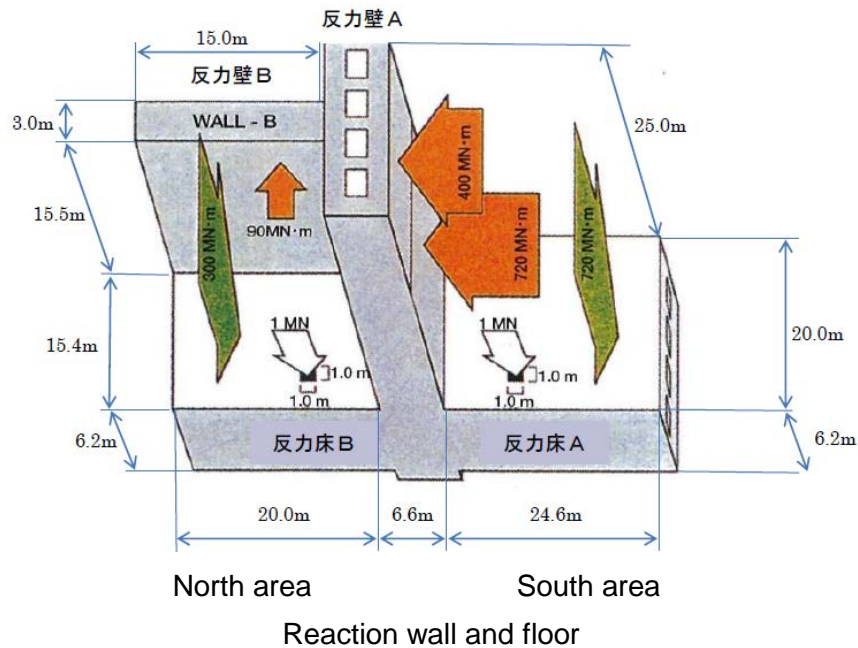
● Facility Outline

● Reaction Floor, Reaction Wall, Steel Frame for Vertical Loading

Reaction wall A has 25m height, 20m width, allowable shear force is 40,000kN, and allowable moment at wall end is 720,000kNm.

In the north test area, there is reaction wall B locates perpendicular plane of Wall A.

Each reaction wall has holes for anchorage to attach specimens and loading machines and port-blocks to connect hydraulic power hoses, electrical cables for control of actuators.



Full scale specimen at North area



Full scale specimen at South area

1 story building with non-structural components in 2010 / 5story building utilizing wing-wall in 2014

Experimental test at each test area

●Actuators (Loading Machines);

Actuator is a machine for loading specimen and set between specimen and reaction wall. Actuator has 3 types (JA, JB, JC). JA type is for vibration test. JB type is for horizontal load of static test and pseudo dynamic test and has not only analogue servo control function, but digital servo control function which makes it possible to perform the high-precision and complex, advance loading test. JC type is for vertical load of static test and pseudo dynamic test and maximum loading capacity is 3000kN.

There is an oil tank for actuators in the basement. The capacity is 1800l/min (6 oil pumps of 300l/min). The operation of actuators and oil tank is done in the loading control room at 2nd floor.



JA actuator



JB actuator



JC actuator



Loading Control Room