

S05: JAE Special Session
S05-01:
Spectacular Projects of
Base-Isolated Buildings

SEISMIC ISOLATION RETROFIT FOR MAJOR TALL BUILDING

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1. INTRODUCTION

- Seismic isolation retrofit for the large-scale cultural assets building built 70 years ago.
- Selection of the most suitable method of seismic retrofit work method by objective evaluation from 5 plans. (FIG.1)
- Consideration to the simulated earthquake motion expected to occur in a giant earthquake based on the latest knowledge.

2. SELECTION OF SEISMIC RETROFIT WORK METHOD

we selected seismic retrofit as the optimum work method in consequence of scrutiny of the main building's characteristics and careful and objective comparisons and examination of methods in cooperation with academic experts.

3. SIMULATION EARTHQUAKE MOTION BASED ON THE LATEST KNOWLEDGE

The designer, and academic experts agreed to jointly create simulated earthquake motions of this district for design at the owner's expense, as the academic experts proposed.

The resultant simulated earthquake motions "Sannomaru Waveforms" were, as expected, earthquake motions with relatively large amplified long-period components. (FIG.2)

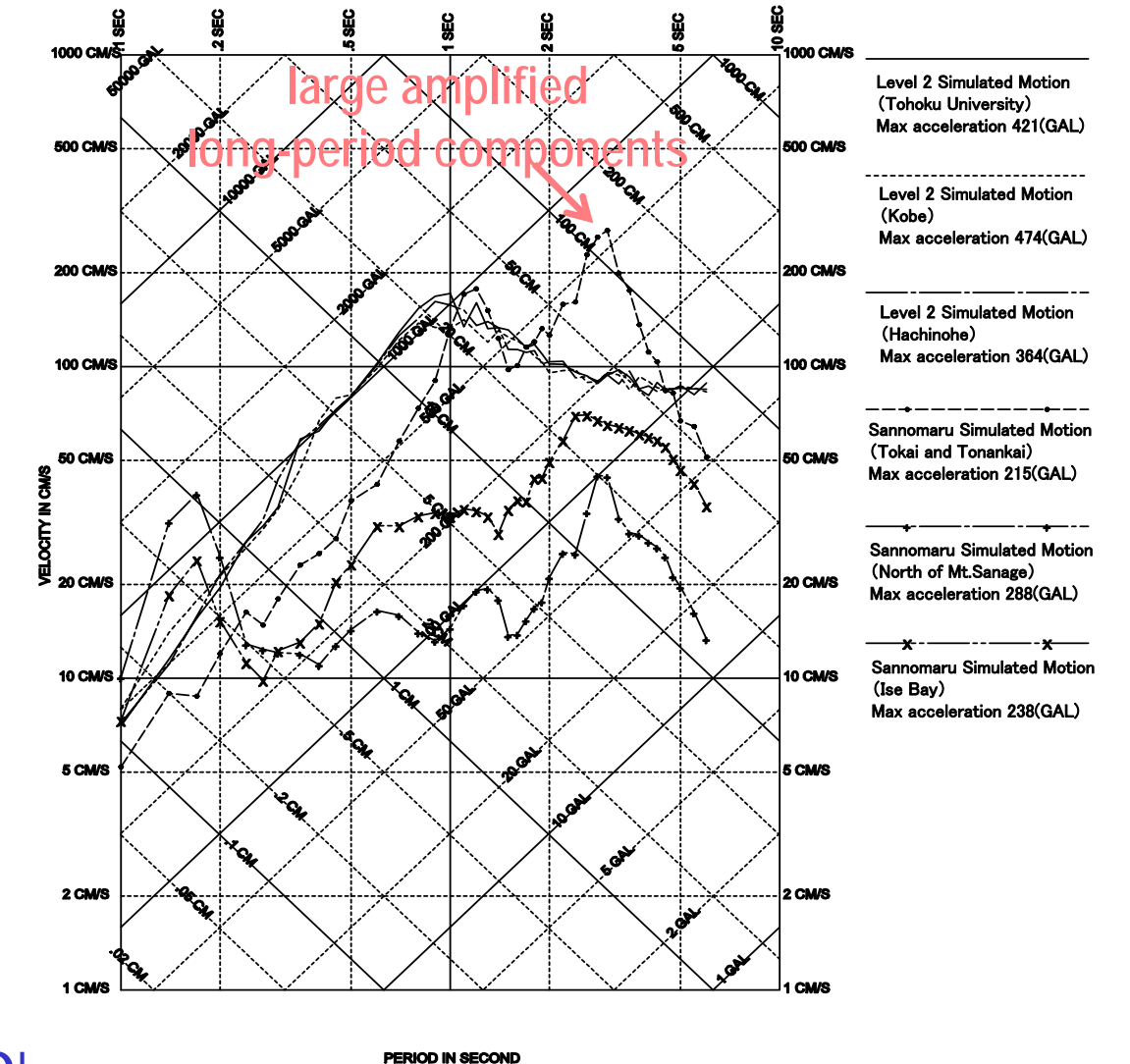
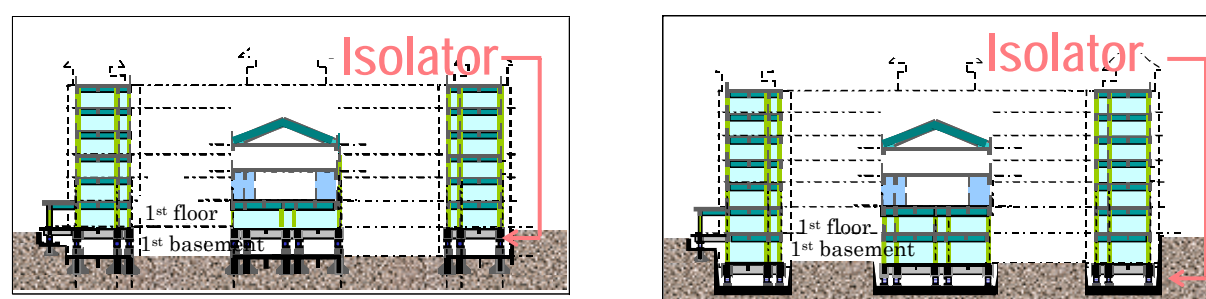


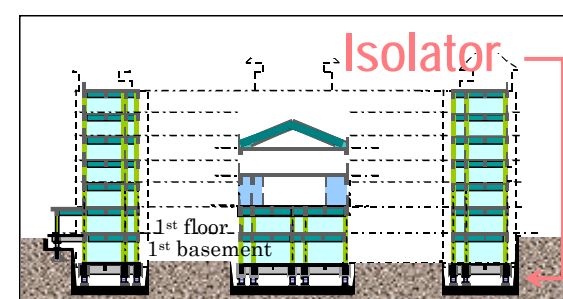
Fig.2 Response spectra of input earthquake motions adopted

4. OUTLINE OF SEISMIC ISOLATION RETROFIT DESIGN

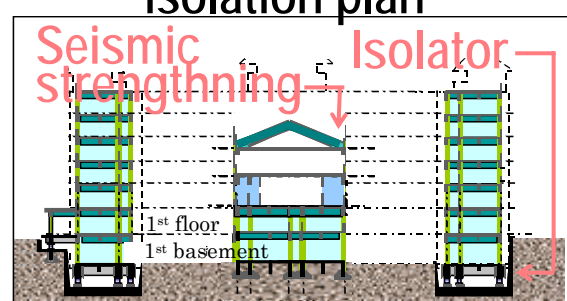
Three features: 1) consideration is given to long-period earthquake motions expected to occur in a giant earthquake; 2) column-to-column intervals are small, up to four columns are collectively supported by a single seismic isolation member as a seismic design approach to the cultural asset with many columns for the purpose of a long-period structure, and cost reduction is achievable by reducing seismic isolation members; (FIG.3) and 3) the E-shaped plane building is designed to exhibit behavior as a seismically isolated, integral building.



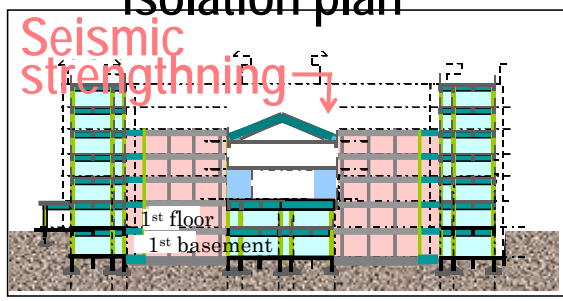
Plan A:
Capital seismic
isolation plan



Plan B:
Base seismic
isolation plan



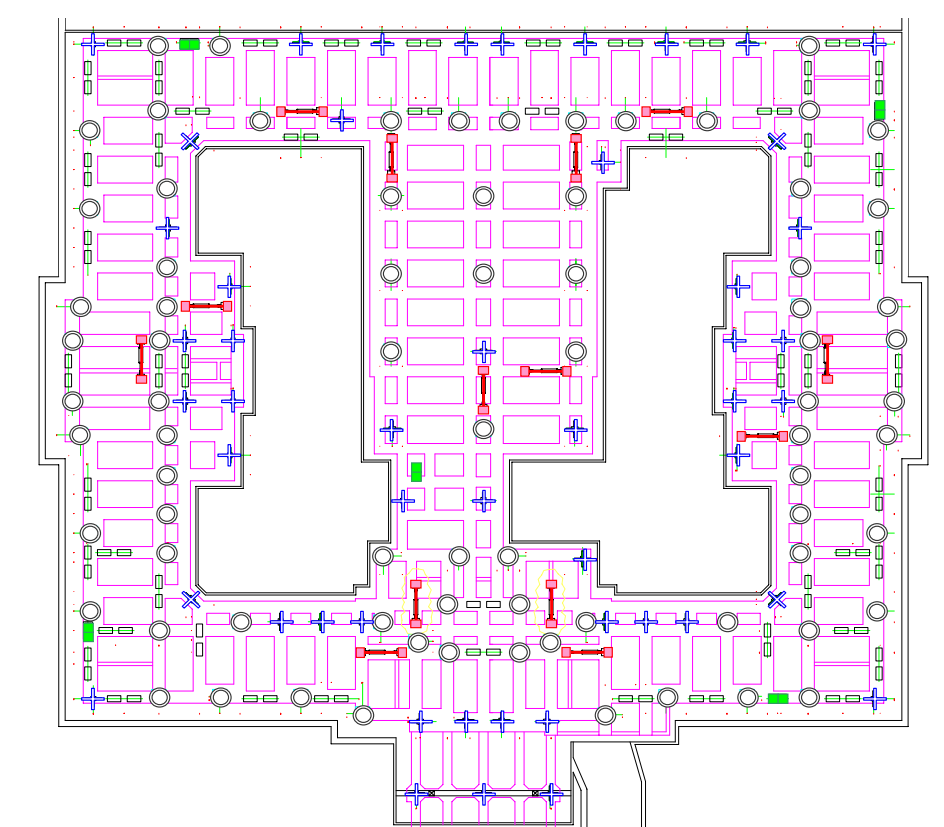
Plan C:
Partial seismic
isolation plan



Plans D and E:
Seismic strengthening
plan (Plan E with
expanded floors)

Table.1 Overall Evaluation Comparison List
(The part of Table)

Seismic performance	Seismic isolation work method		Evaluation Score
	Plan A: Capital seismic isolation plan	Plan B: Base seismic isolation plan	
Seismic response performance	①	③	②
Effects on operation and maintenance work	⑦	⑩	⑧
Effects on operation and maintenance work	⑭	⑫	⑮
Effects on operation and maintenance work	⑤	⑥	④
Terms of work	⑩	⑪	⑨
Total project cost (including retention and temporary work expenses)	⑥	⑦	⑤
Overall evaluation	⑤	⑥	④



Laminated rubber isolator containing a lead plug 78基
Rolling support 50基
Lead damper 4組
Oil damper 14組

Fig.3 Layout of seismic isolation members

Fig.1 Conceptual diagram of each plan