

**The first case applied CM to Renovation Project
for
Cultural Asset Structures of
Higashi-Honganji-Temple
in Kyoto**

2017.03.14

NIKKEN SEKEI Construction Management, Inc.

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**Side view of
Founder's Hall**

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Introduction

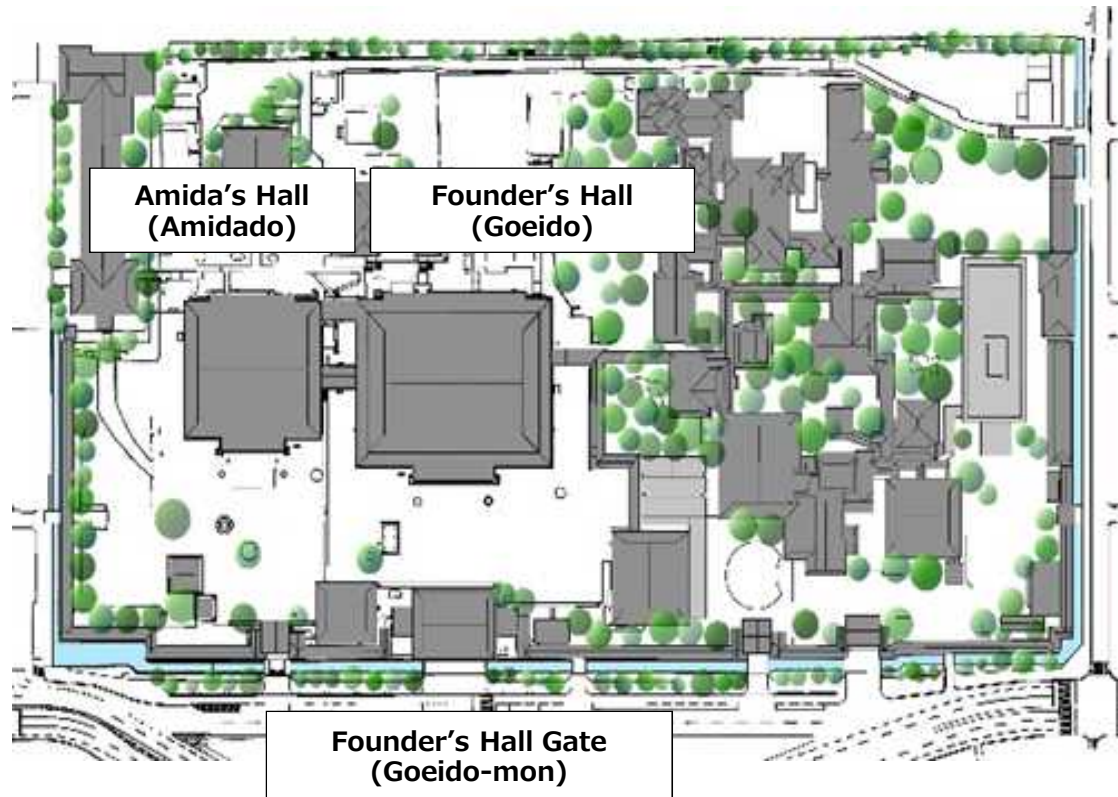
Executive Summary of CM services performed

- **The first case of applied CM** to renovation of traditional wooden buildings
- **Separate Contract composed of 48 packages** was employed to take advantage of modern techniques and traditional techniques
- **Through information disclosure**, publication of newly developed techniques, and maintaining the authenticity of traditional wooden structures

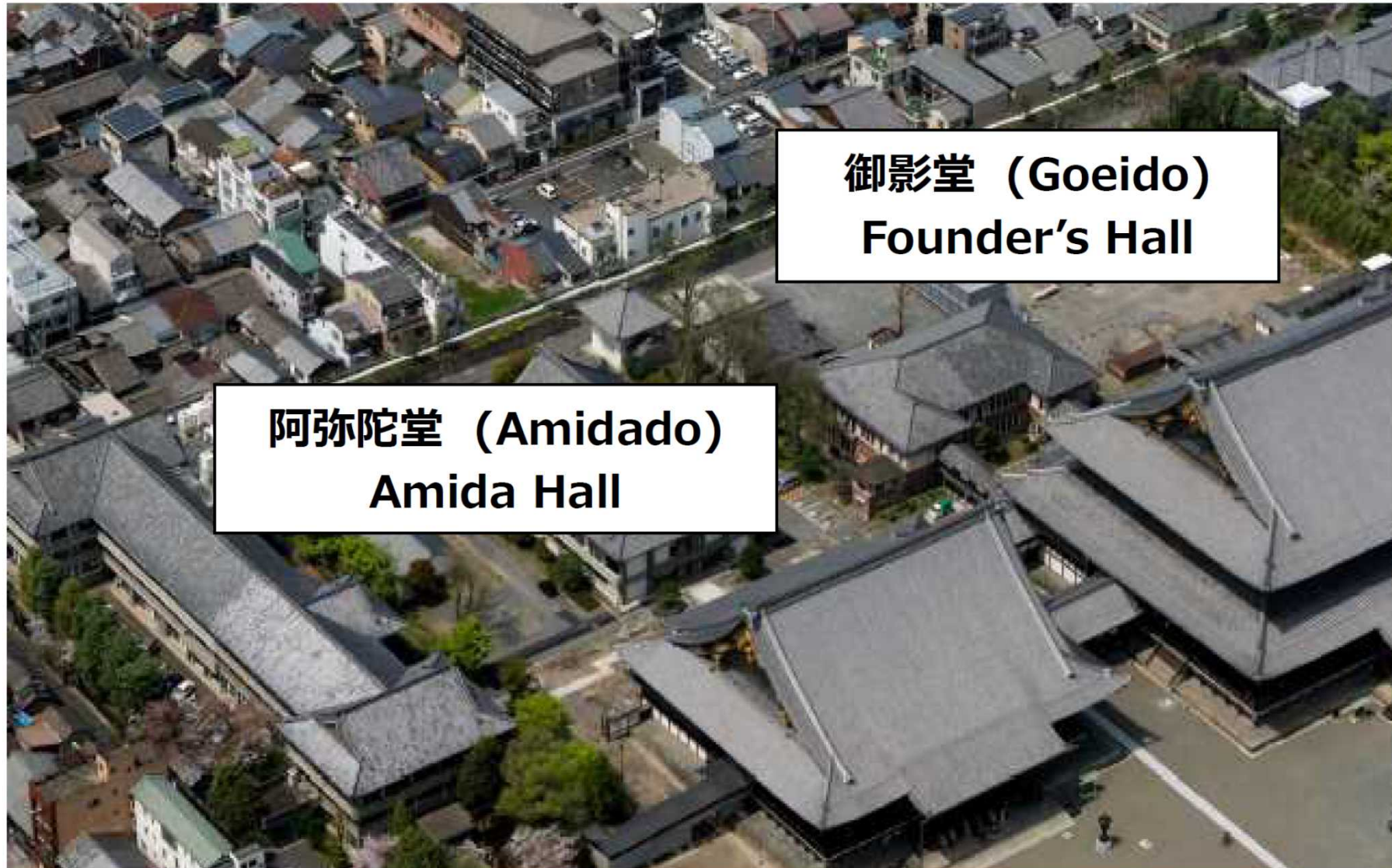
1. Project Features

Overall view of Higashi Honganji

- Restoration of a registered cultural asset for which **110 years have elapsed** since its reconstruction in the Meiji Era, 1895
- Special commemorative project celebrating the **750th anniversary of the passing of the Founder**
- View toward future also **“Important Cultural Asset” certification**



1. Project Features



1. Project Features

Major Structure to be renovated



Renovation Completed Founder's Hall



Renovation Completed Amida Hall



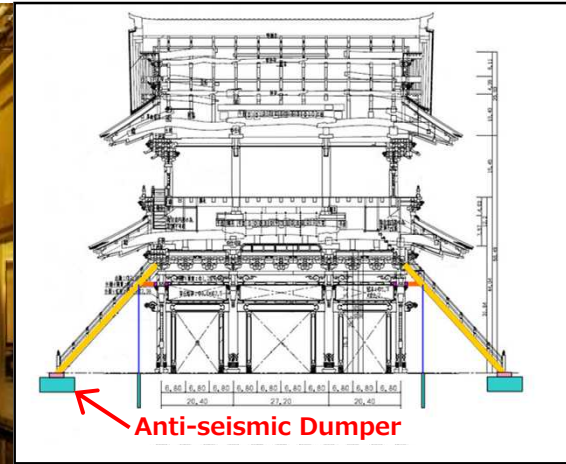
Renovation Completed Gate



Wooden Structural System in Roof



Sublime Interior Space of Amida Hall



Anti-seismic Element of Gate

1. Project Features



Founder's Hall after renovation

14th March 2017

NIKKEN SEKKEI Construction Management Inc.

1. Project Features



Amida Hall after renovation

1. Project Features



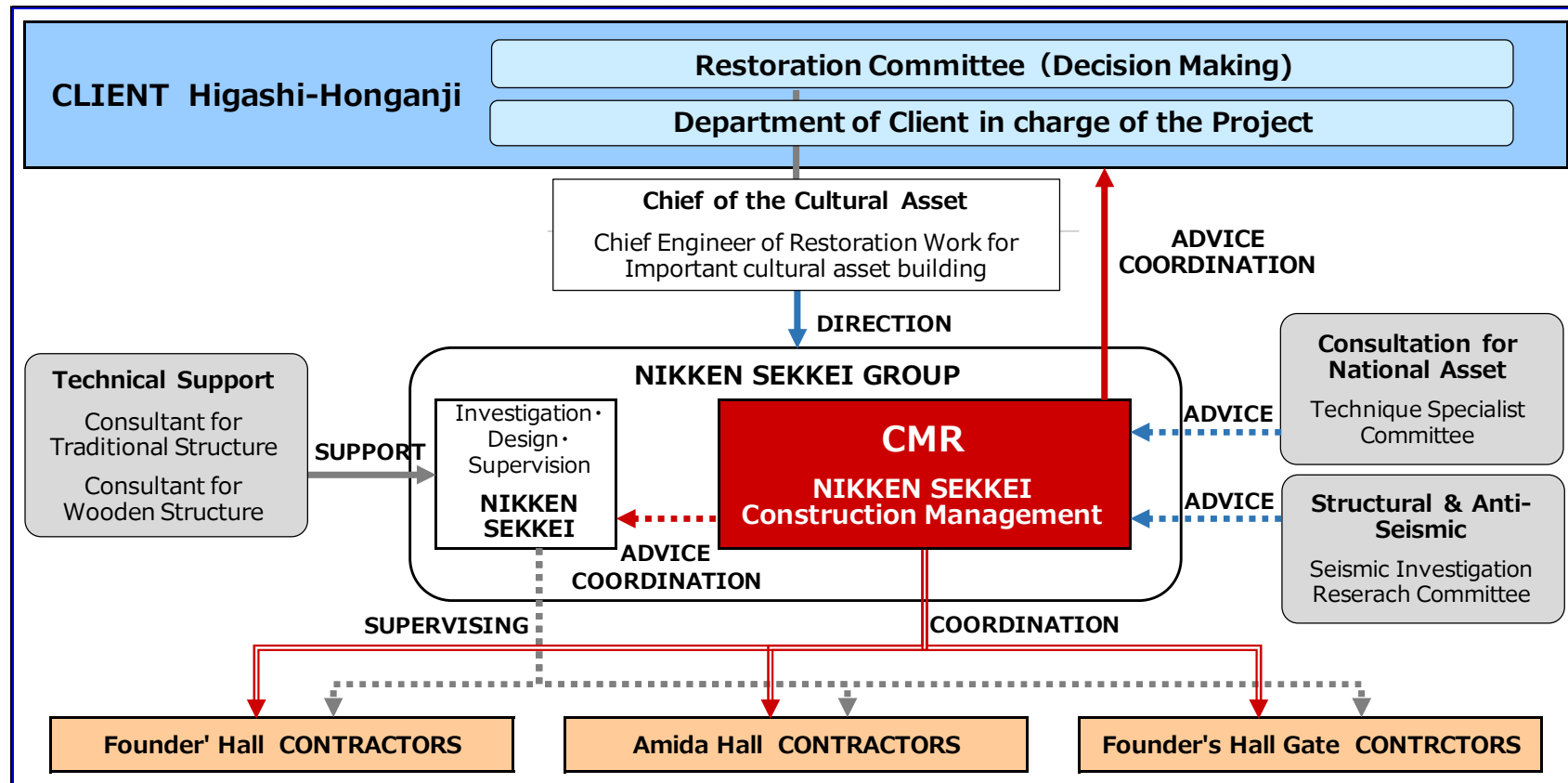
Founder's Hall Gate after renovation

Outline of Building		founder's Hall	Amida Hall	Founder's Hall Gate
Site Area		92,388.30㎡		
Duration Period		2004/03/04~2009/02/28 (60 Months)	2012/01/01~2015/12/31 (48 Months)	2012/01/01~2015/12/31 (48 Months)
Dimension	Length: North-South	76m	52m	20.6m
	Width: East-West	58m	47m	12.8m
	Building Height	38m	29m	26.6m
	Building Area	around 3,300㎡	around 1,610㎡	around 270㎡
	Numbers of Roof Tiles	around 175,000枚	around 108,000枚	around 59,000枚
	Numbers of "Tatami"	927 Sheets	401 Sheets	-

1.

2. Overall Management

Nikken Sekkei Group participated as a Designer and Construction Manager



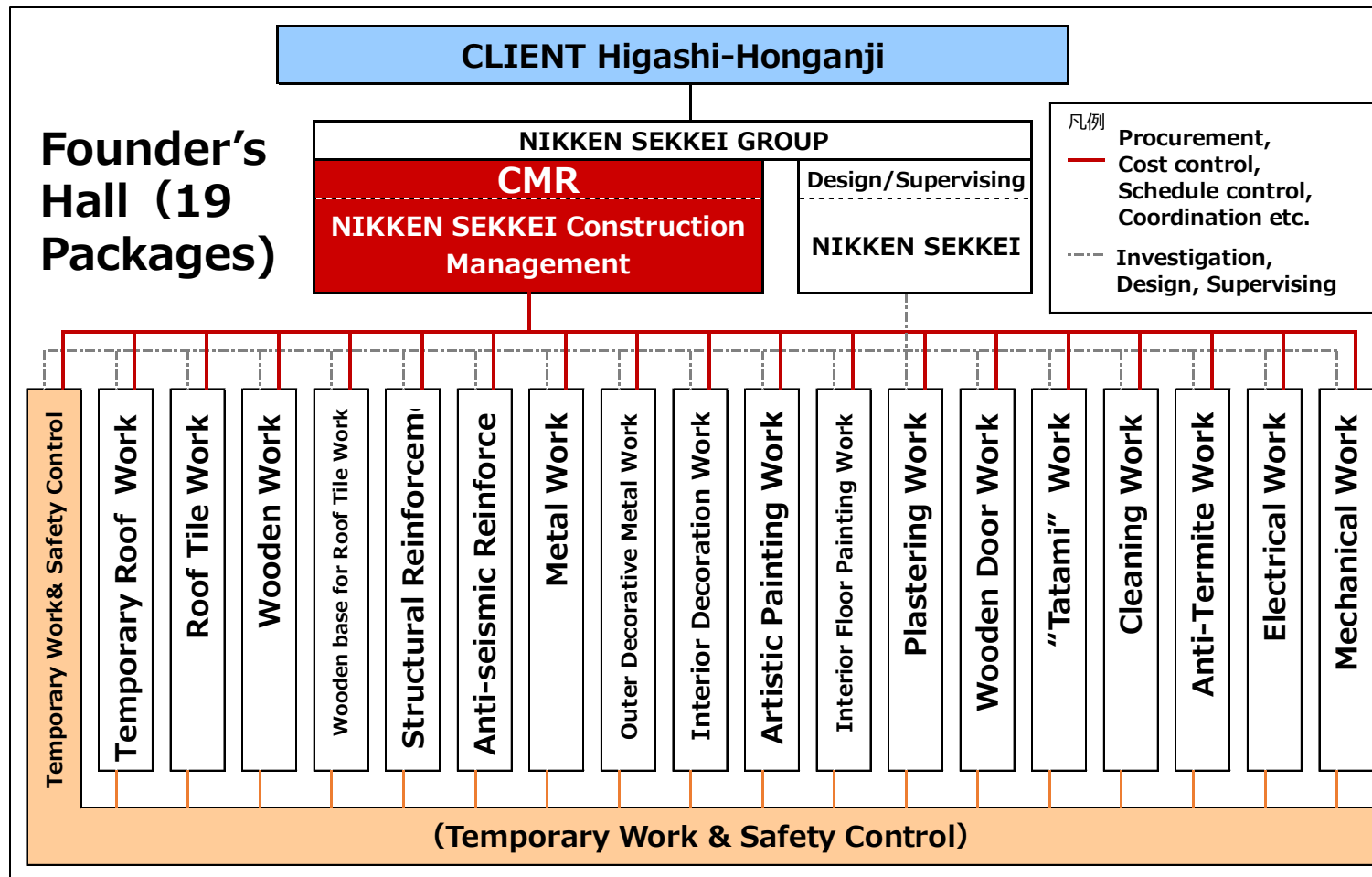
Organization for Project Execution

2. Overall Management

- **Many experts** provided support from the traditional techniques aspect and modern techniques aspect under the client
- **The information disclosure policy** proposed by the CMR at the project's initial stage achieved highly transparent ordering
- **In the formation of consensus** at many stages, the CMR took the lead and performed coordination to overcome problems
- **Construction cost estimation methods** and VE proposal for each specialized construction task
- Demonstrating **the effectiveness of applying the CM method** to the long-term complex renovation of traditional wooden structures
- **Precise handling of the uncertain elements** associated with the renovation of traditional wooden structures

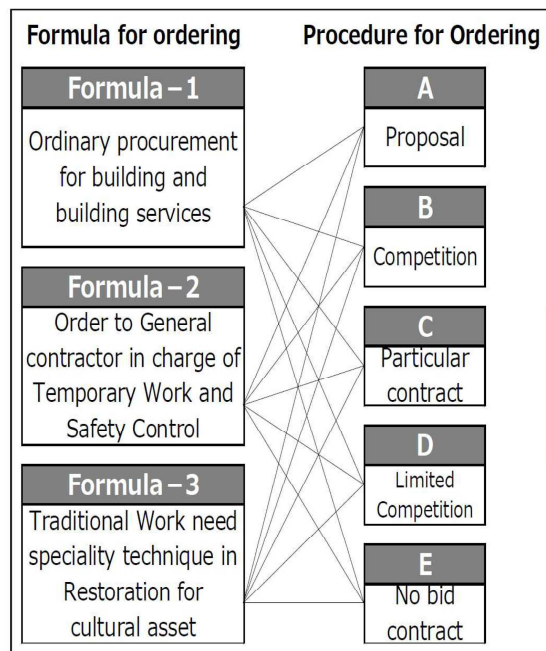
2. Overall Management

Employment of Separate Contract for specialized construction(48 packages)



2. Overall Management

Flexible application of diverse ordering methods to complete construction within budget



Note:

Ordinary construction work	Restoration Work for traditional asset
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Major Ordering Principle			Major Ordering Principle		
Specific Work	Formula	Procedure	Specific Work	Formula	Procedure
① Temporary Roof	1	A & B	⑪ Interior Floor Paint	3	B
② Roof Tile	3	C	⑫ Plastering	3	B
③ Wooden	3	A	⑬ Wooden Door	3	E
④ Wooden base for Roof Tile	3	B	⑭ "Tatami"	3	D
⑤ Structural Reinforce	2	E	⑮ Cleaning	3	E
⑥ Anti-seismic Reinforce	2	E	⑯ Anti-Termite	1	B
⑦ Metal	3	E	⑰ Electrical	1	B
⑧ Outer Decoration Metal	3	A	⑱ Mechanical	1	B
⑨ Interior Decoration	3	C	⑲ Temporary & Safety Control	1	E
⑩ Artistic	3	B	⑳ Temporary Roof Demorition	1	E

Combination Chart of Formula and Procedure for Ordering

3. Main Achievement

Main objectives of project

Schedule objective: To complete all renovation work within the allotted overall construction period. Prioritize client's event plan.

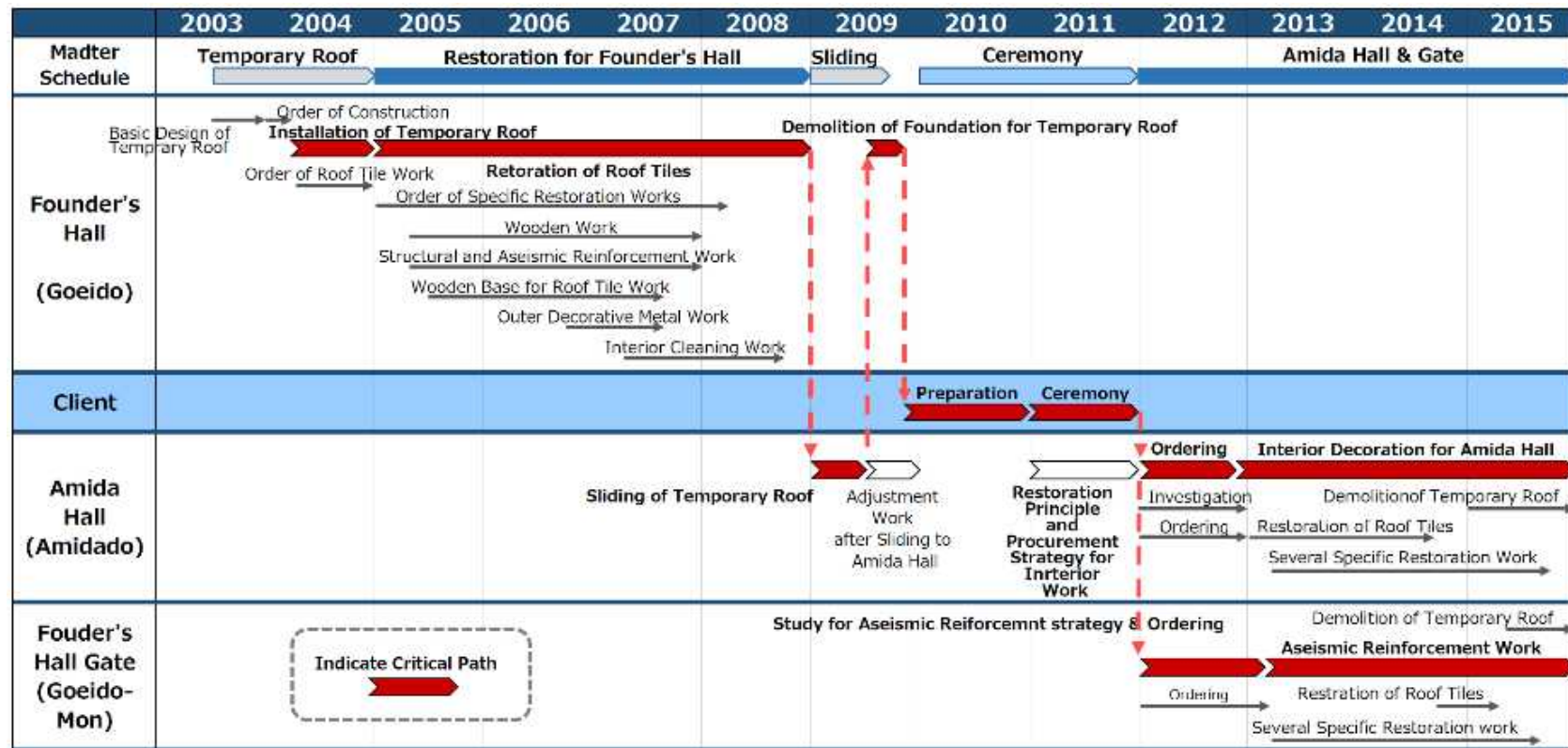
Quality objective: As traditional wooden structures and cultural assets, to perform renovation that preserves their authenticity.

Cost objective: To achieve reasonable ordering costs according to ordering procedures with high transparency while striving to reduce the total budget.

3. Main Achievement

Schedule Management

- Implementation of **accurate process management** for construction spanning a long period of 12 years

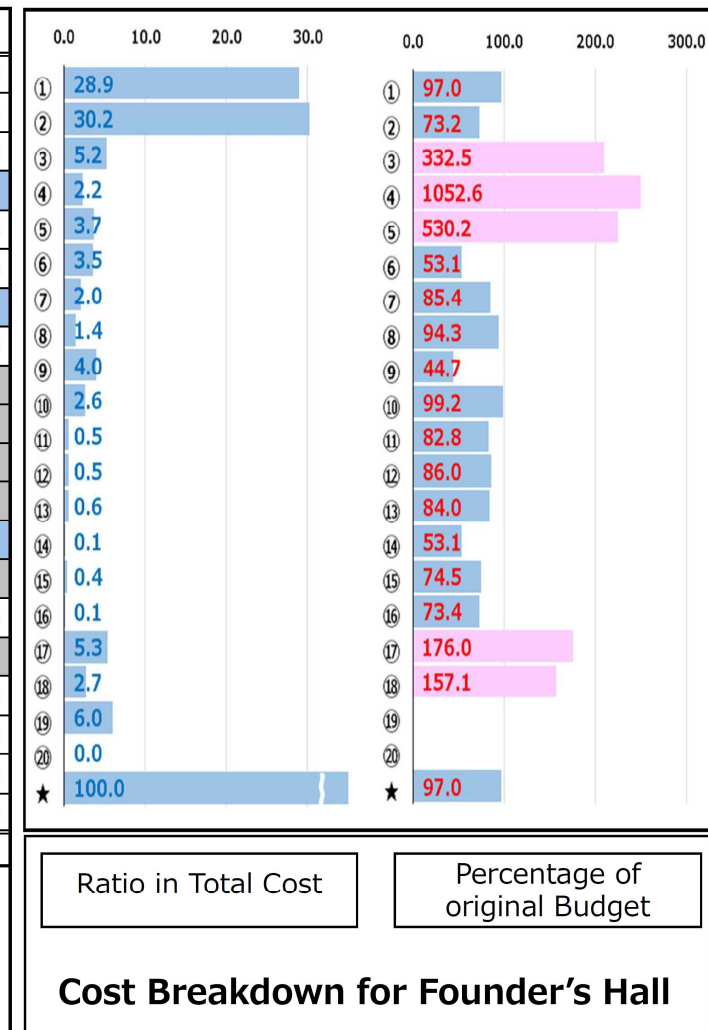


Overall Time Schedule of the Project

Cost Management

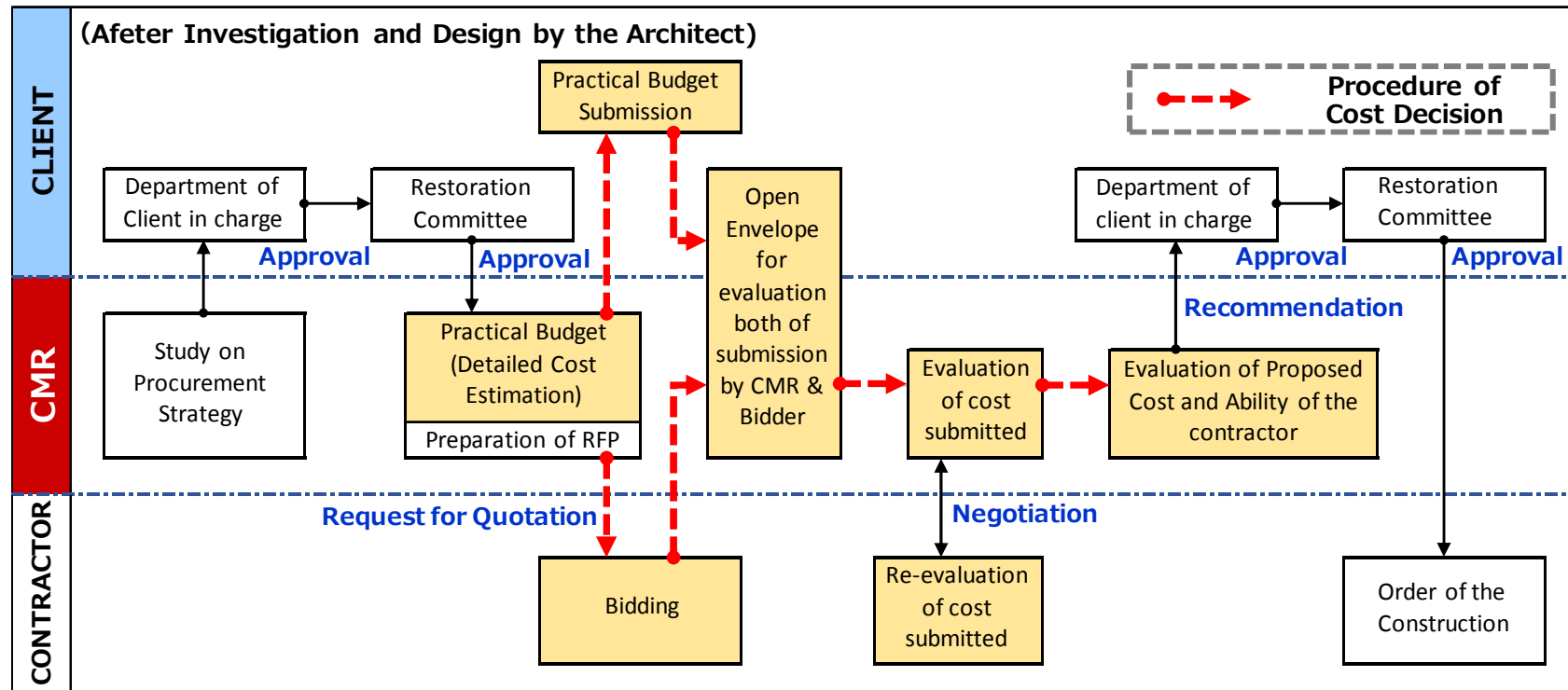
- Renovation of the three structures (Founder's Hall, Amida Hall, and Founder's Hall Gate) **within budget** was achieved.

Separate Packages	Founder's Hall		Amida Hall		Gate	
① Temporary Roof	28.9	97.0	31.4	98.5	21.8	95.3
② Roof Tile	30.2	73.2	22.1	93.1	35.8	88.0
③ wooden	5.2	332.5	→ 3.1	88.3	→ 8.8	132.0
④ Wooden Base for Roof Tile	2.2	1,052.6	→ 0.0	0.0	→ 0.0	0.0
⑤ Structural Reinforce	3.7	530.2	→ 0.0	0.0	1.9	130.0
⑥ anti-seismic Reinforce	3.5	53.1	→ 2.0	76.0	9.7	90.0
⑦ Metal	2.0	85.4	1.3	125.6	→ 0.0	0.0
⑧ Outer Decorative Metal	1.4	94.3	1.9	99.5	4.2	192.0
⑨ Interior Decoration	4.0	44.7	9.6	171.1	-	-
⑩ Artistic Painting	2.6	99.2	1.3	76.0	-	-
⑪ Interior Floor Painting	0.5	82.8	0.3	77.5	-	-
⑫ Plastering	0.5	86.0	0.7	125.8	-	-
⑬ Wooden Door	0.6	84.0	0.4	73.3	0.0	0.0
⑭ "Tatami"	0.1	53.1	0.1	89.2	-	-
⑮ Cleaning	0.4	74.5	0.4	75.3	→ 4.0	557.0
⑯ Anti-Termite	0.1	73.4	0.1	81.8	-	-
⑰ Electrical	5.3	176.0	0.9	39.2	0.8	55.0
⑱ Mechanical	2.7	157.1	1.8	79.0	0.8	47.0
⑲ Temporary work	6.0	-	4.4	93.3	5.4	94.0
⑳ Demolition of Temporary Roof	-	-	18.1	96.3	6.9	81.0
★ Total Cost Index	100.0	97.0	100.0	95.2	100.0	90.8
Note: Blue Letter: Percentage Red Letter: Rate compare with Budget ※ Including in Cost for Sliding			 : Not considered in original Budget  : Large different items from original Budget  : Effective item by Sliding  : Integrated Items based on cost amount			



3. Main Achievement

- Cost determination procedure for this Project to ensure **transparency and accountability**



Flow Chart for Decision Making of Project Cost

3. Main Achievement

- Sliding the Temporary Roof Structure for renovation which comprised just under 30% of the construction costs for Founder's Hall and reusing it for Amida Hall **greatly reduced time and costs**



Sliding the Temporary Roof Structure

3. Main Achievement

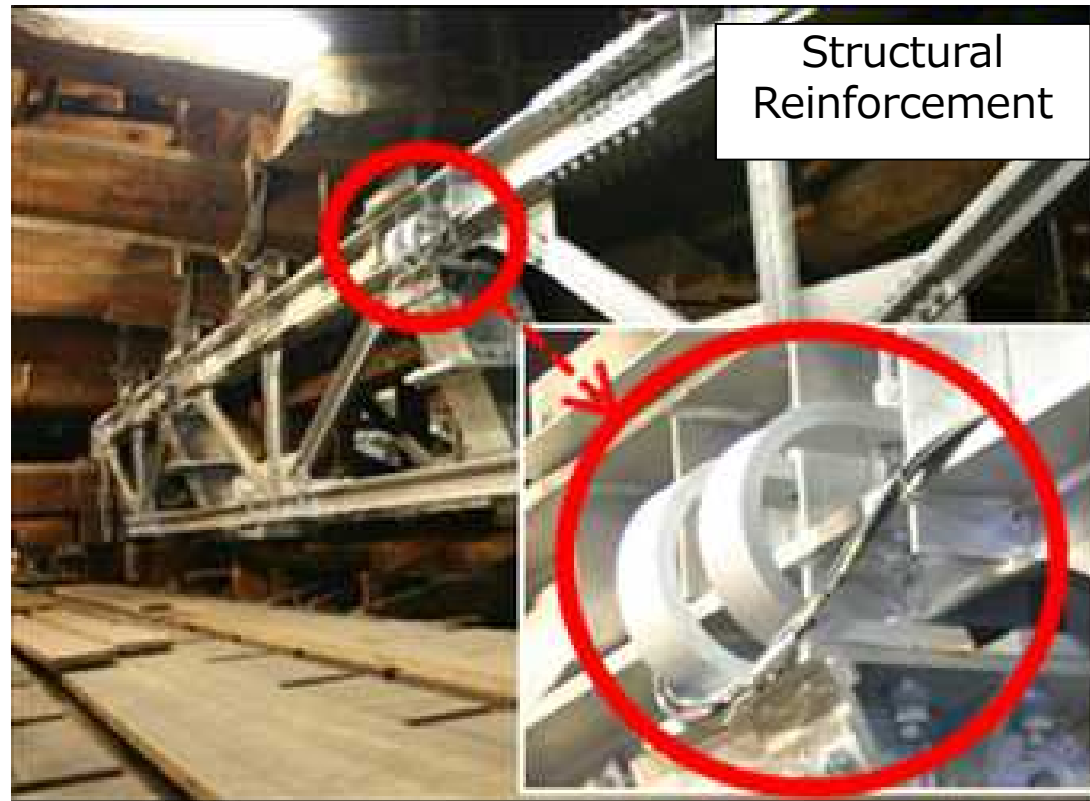
Quality Management

- **Ensuring high quality** through accurate selection of specialists who preserve the techniques unique to traditional structures.
- **Construction ordering methods** used to ensure quality in renovation of traditional wooden structures
- Placing construction orders was performed by skillfully combining the ordering method and ordering procedure in order to **select the best contractor**.
- Maximum consideration given to making the renovation **environmentally friendly**

3. Main Achievement

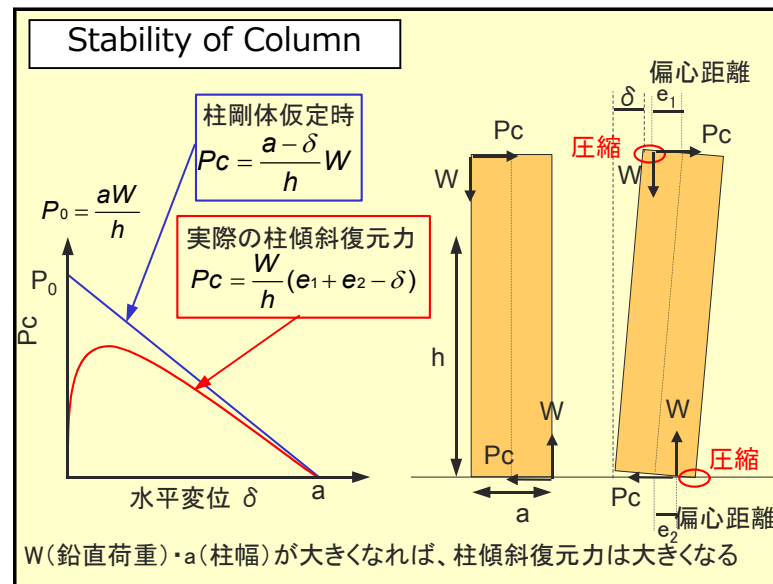
Other Specialties

- Application of **modern technology** to traditional wooden buildings (for seismic reinforcement, structural reinforcement, etc.)

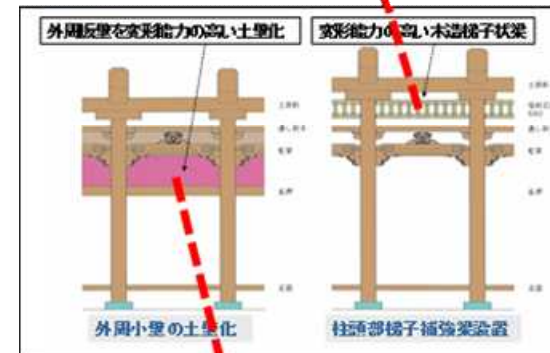


3. Main Achievement

- Selected **Ladder-shaped Beams** and **Wall Panels** for seismic reinforcement to prevent loss of deformation performance.



Deployment of unique techniques in this Project have potential to other projects.



Closing Notes

Preserving the authenticity of traditional structures

- Achievements of this project can be said to be "**national achievements**" and were brought about through the client's strong intention to contribute to society and the mobilization of the wisdom of specialists in various fields.
- **CMR** fulfilled its role as a management specialist to bring the desires of the client to fruition.
- Coordination work, ordering of specialized construction work, long-term schedule management, cost management of construction comprising numerous specialized techniques, etc. practiced by the CMR for implementing this project can be **considered to be universal management methods.**

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