

# Disaster Risk Management of Cultural Heritage Based on the Experience of the Great Hanshin Earthquake

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The Great Hanshin-Awaji Earthquake (officially named “Southern Hyogo Earthquake” by the Meteorological Agency. Below, “The Kobe earthquake” substantially) was a major earthquake that struck a highly developed metropolitan city. It was also the first earthquake in Japan’s earthquake history to register a seismic intensity of level 7, which has sufficient power to destroy 30% of all buildings in the affected area. For this reason, the numerous types of damage that actually occurred to cultural heritages had never been anticipated before, and were therefore unable to be addressed by the Law for the Protection of Cultural Properties in that time alone.

The comprehensive inspection marking the tenth year of the Kobe Earthquake reconfirmed the understanding that “culture (cultural property) is a fundamental public property that is essential to society and people’s lifestyles,” and that the loss of groups of irreplaceable cultural properties has long-term impacts on the historical environment of the region. In fact, cases of solitary deaths continue to occur in new high-rise buildings that have sprouted in large-scale redevelopment areas that were previously a neighborhood community before it was reduced to rubble. Under this situation, there has emerged a growing awareness that the loss of cultural properties and their values as society-related capital is essentially the loss of a common catalyst that creates a “sense of place” for all generations of people.

## 1. History of the Devastated Area - the Hanshin Region-

The Hanshin region has the advantage of numerous ports, which led to development from ancient times. The name Owada (later Hyogo-minato) appeared in the Manyo-shu (The Anthology of Myriad Leaves), compiled in Nara Period, the middle of the seventh century. It is clear that this region was conveniently located, facing Osaka Bay, in terms of transportation.

In the Middle Ages, Mitsunaka Minamoto, the Lord of Settsu, built Tada-in Temple (Kawanishi City), and laid the foundations for the Settsu-Genji clan in this region. Later, with the growing importance of marine transport in the Seto Inland Sea, the ports in Nishinomiya and Amagasaki as well as Hyogo-minato Port flourished.

Middlemen-merchants also became very active. From the upheavals in the late middle Ages to the age of provincial wars (15th to 17th century), this region was also caught up in wars. In the Edo Period (1600- 1868), Amagasaki Domain, Akashi Domain, and later Sanda Domain were established. In addition, the region was subdivided into the Shogunate area, retainers' area, and so on. Mixed-proprietor divisions of this region continued until the end of the Edo Period.

Concerning industry, high-value-added gardening and brewing



Fig.1 Goshikizuka-kofun (mound)



Fig.2 Tada shrine

flourished.

In particular, sake (Japanese rice wine) brewing groups were formed in Ikeda, Itami, and Nada Gogo (the five sake-producing areas in the Nada district). These sake breweries, major contributors to the creation of Hanshin culture, continued during the Meiji Period (1868-1912) and provided a base for industrial capitalists in the age of the rise of the modern capitalist economy.

The modern age of the Hanshin region started with the opening of Hyogo-minato Port and establishment of Osaka City. A foreign settlement was established in Kobe, where many western-style houses were built. Many Chinese lived on the outskirts of this settlement, where they created their own Chinese society. A prototype of the international city of Kobe, which is still there to see, was built at that time. Western houses in Kitano and on Yamamoto Street is evidence of the growing influence of overseas cultures.



**Fig.3 Foreigners life style in Kobe Meiji Period**



**Fig.4 Guandi Mausoleum**

In 1874, a steam railway opened between Osaka and Kobe, and an electric railway also opened at the end of the Meiji Period. New residential districts were developed along a railway. Kansai Horse-riding Club's Racetrack and Koro-en Park, a large complex comprising a zoo, hotel, and concert hall, was opened in Naruo Village. In 1913, performances by a female revue company started in the Takarazuka Hot Spring area. Development of new residential districts continued from the Taisho to the Showa Periods and Bunkamura residential area including Kotoen and Ashiya Rokuroku-so were developed. This established the image of the Hanshin region as residential region. At this time, many magnates of the Kansai business world started to move into the Hanshin region. In addition, many writers and artists, the best known of who is Junichiro Tanizaki, moved temporarily or permanently to the region. "Fukae Bunkamura" was built between Ashiya City and the Higashi-nada area of Kobe City. This "Fukae Bunkamura" was planned by Seitaro Yoshimura, with a disciple of the American architect William Merrell Vories. Many Russian musicians, including Michael Alexander Roucin lived here, and Koichi Kishi, a violinist, also came from this area.

At the time, businessmen believed they should practice the tea ceremony. They set up tea-ceremony rooms in their houses, and hosted tea ceremonies as a major means of social interaction. Consequently, businessmen collected tea utensils, vases, calligraphic works and paintings, and antiques. These collections are now exhibited in many art museums and other museums in the Hanshin region. The Hakutsuru Fine Art Museum, opened in 1934, was one of the first of these museums.



**Fig.5 Tea-ceremony room & Residence of Businessperson**

Breweries devoted themselves to the field of education and cultural activities in addition to economic activities such as the development of residential districts. In 1911, Konan University was already established. Local capitalists made combined efforts to educate a class of industrialists for the coming age. In the Showa Period, Nada Junior High School was established, and Kwansei Gakuin University, backed by a Catholic organization, relocated to what is now Uegahara in Nishinomiya City. In addition, Kobe Women College, also backed by a Catholic organization, relocated to Nishinomiya City in 1934.



**Fig.6 Hakutsuru Fine Art Museum**

The Hanshin region was already an important center of private school education around that time.

As described above, the Hanshin Region took the lead in developing residential cities full of new culture driven by the power of the private sector, centering on capitalists and social activists between the modern age and the beginning of the Showa Period (late 19th century to the early 20th). This remarkable characteristic was preserved even through war and the high-growth period.

## 2. Significance of the Timing of the Kobe Earthquake

The Kobe earthquake occurred on January 17, 1995, at 5:46 in the morning. It was an urban underground-type trembler that erupted off the coast of the northern end of Awaji Island in Hyogo Prefecture and registered a magnitude of 7.2 and a seismic intensity of level 7. Kobe Marine Meteorological Observatory which is located on solid ground near the epicenter, indicated that the maximum acceleration were North-South 818 gal, East-West 617 gal and Up-Down 332 gal. In a mere twenty seconds, the worst earthquake disaster in post-war Japan paralyzed 3.5 million urban functions in ten towns and ten cities in the Hanshin-Awaji district, destroyed more than 200,000 homes including those that burned down in ensuing fires, took more than 6,400 lives, and left some 30,000 people injured.

The earthquake caused the girders of elevated highways to collapse in many places, shut down all railroad services, and severed water and other utility lifelines. The number of people who evacuated to public facilities and parks in the bitter cold after losing their homes to the earthquake and ensuing fires peaked at 320,000.

Cultural properties also suffered severe damage. In Hyogo Prefecture, 46 national cultural properties, 54 prefecturally designated cultural properties, and 43 municipally designated cultural properties were damaged, corresponding to a total damage worth more than 8 billion yen. Among these cultural properties, traditional buildings particularly received the brunt of the damage. In fact, all traditional buildings located in “Important Preservation District for Groups of Historic Buildings Kobe Kitano-chō Yamamoto Street” were damaged in the earthquake.



Fig.7 Nada Junior High School

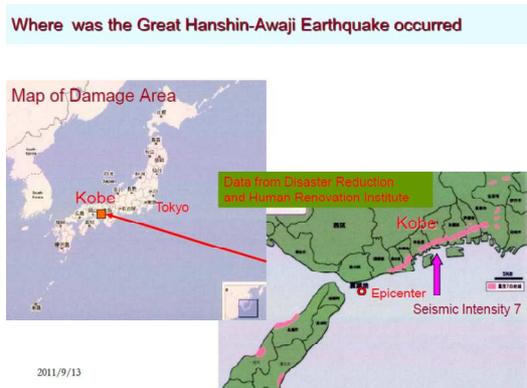


Fig.8 Map of Damage Area

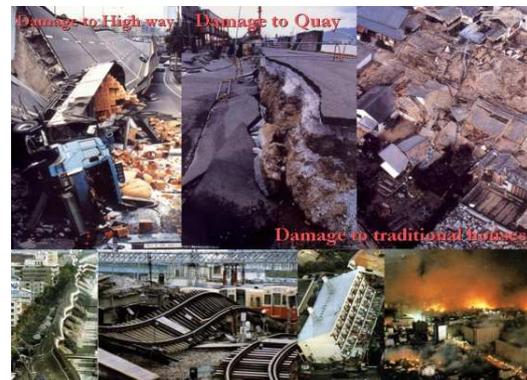


Fig.9 Damage situation of structures

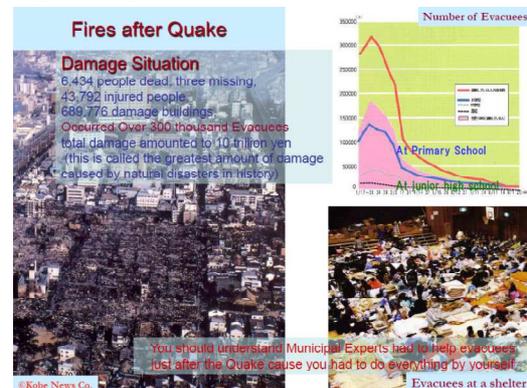


Fig.10 Damage situation caused by fires after Quake

Let us examine what the social conditions were like at the time of the Kobe earthquake. In its aftermath, there was large demand from scholars and local residents for the repair and preservation of not only nationally, prefecturally and municipally designated cultural properties, but also cultural heritage valued by the local community (commonly called undesignated cultural properties). Thus, rescue projects for undesignated historic buildings were launched, subsidized by the provisional Great Hanshin-Awaji Earthquake Restoration Fund, and various other measures were implemented to rescue and temporarily safeguard the large numbers of undesignated cultural properties that embody the historical culture of the local region.

**Table1 Comparison between before & after Kobe earthquake on Regulation systems**

Immediately after the earthquake, however, the only system that was in place was a designation system for cultural properties of academic value. The loose-knit system for the protection of registered cultural properties did not yet exist, and there were no stipulations or provisions in existing systems for the rescue of undesignated cultural properties in the event of a disaster.

Regulation System	Before	After
Master plan for Disaster Prevention	No mention about cultural heritage	Cultural heritage is mentioned as important item which should measure in Agency plan
Agency plan for Disaster Prevention	No rescue protection measure for undesignation	Outline of establishment for Rescue committee for cultural heritage (involving undesignation) Dispatch staffs & support request to local Go. & volunteer groups
The law for the Cultural Property		Resister system introduced Guideline for reinforcement of historic buildings
Regional plan for Disaster Prevention (Prefecture, city & town)	No agreement	Agreement of mutual support system in prefectures at disaster event Cities & Town also have linked to rescue committee for cultural heritage
Volunteer training system		Heritage manager system introduced in (hyogo prefecture & another)

### 3. Devastation by the Earthquake -Introduction-

The timber buildings, especially dwellings built in the poor conditions immediately after the World War II, were suffered from very serious damage, partly owing to the deterioration of materials as a result of aging. Dr. Prof. Emeritus Nobuo Ito says that the damage was most devastating in wooden buildings with:

- 1) Poor foundations and sills;
- 2) Insufficient diagonal bracing;
- 3) Inadequate connecting elements;
- 4) Insufficient areas of solid wall;
- 5) Heavy roofs.

Many of Tangible cultural properties integrated with people's memory destroyed and lost instantaneously in the Great Hanshin Earthquake. In this Earthquake, 162 properties out of 6,144 important cultural properties in the Kinki district, and 109 properties out of 2,663 prefecturally-designated cultural properties, in total 271 properties, were damaged. In the damaged properties, building structures accounted for 73%. The Great Hanshin Earthquake severely destroyed buildings. In Hyogo Prefecture, 46 national cultural properties, 54 prefecturally-designated cultural properties, and 43 municipally-designated cultural properties were damaged, and the amount of damage reached nearly ¥10 billion only with designated cultural properties.



**Fig.11 House 15 of Former Kobe foreign settlement**  
**After Earthquake (Upper)**  
**After Restoration (Lower)**



Fig.12 Damaged buildings

Table 2 Number of damages of designated cultural properties in Hyogo Prefecture

Designation type	Buildings	Arts and crafts	Tangible folk C.P.	H.S.	I.P.D.	Total
National	33	5	1	6	1	46
Prefectural	44	3	4	3	-	54
Municipal	22	9	3	9	-	43

H.S. : Historic site, Places of Scenic beauty and/or Natural monument

I.P.D.: Important Preservation Districts for Groups of Historic Buildings

### 3. Outline of the Damage to Historic Buildings (note 1)

Note 1: cf. 1997 Kobe/Tokyo International Symposium Risk Preparedness for Cultural Properties — Special Reports on the Great Hanshin–Awaji Earthquake and Cultural Properties— Nobuo Ito. Yasumichi Murakami. Hiroshi Adachi. Takayuki Yamazaki

In Japan Legal provision has started in 1897 for the protection of historic buildings as cultural properties. The government has designated buildings mainly from temple and shrine structures, castle buildings, and upper-class residences. In the post-war period, it has widened the designation categories such as vernacular houses and western-style buildings, dating from the mid-late early modern period and extending to modern times. However, the number of designated buildings dating from the 18th century or later is still below what it should be. Alongside this system, however, since 1975, the government has designated for conservation areas in which traditional buildings have survived, under the title "Important Preservation Districts for Groups of Historic Buildings (hereafter, I.P.D.)".

The Agency for Cultural Affairs is the government department responsible for designated buildings, and it has specific officials charged with their protection. In addition there is an incorporated foundation which is the "Japanese Association for the Conservation of Architectural Monuments" (J.A.C.A.M.) where three quarters of conservation architects in Japan are working who is capable of the recognition for the restoration subsidy works of designated buildings.

Consequently, a notably systematic investigation of the damage to national cultural property of buildings has been carried out. In the case of the Great Hanshin Earthquake Government's and J.A.C.A.M stuffs investigated systematically and planned rescue projects immediately.

In order to offset the tendency for the designation system not to extend protection to younger aged buildings, prefectures, cities, towns and villages have been designating historic buildings from their aspects. Furthermore, since such local authorities have no system corresponding to the preservation districts for groups of historic buildings in Hanshin area. They have tried to plan the preservation or promotion of aged buildings by establishing independent categories of their own, such as "District for the Preservation of the Cultural Environment" and "Municipally Designated Buildings in Urban Scenic Areas".

Damage surveys and the recovery of cultural properties after the Kobe earthquake proceeded as follows.

During the first week of the earthquake, any systematic survey of damage to cultural properties was impossible. A survey of designated cultural properties was launched a week after the earthquake, and a full-scale survey of undesignated cultural properties was begun after about a month.

Figure 13 shows the actions this writer personally took immediately after the earthquake. Amid ongoing aftershocks and numerous fires throughout the region, I surveyed areas of extensive damage, and visited the marginal areas of earthquake damage, acquired information from friends, made a rough estimation of the damage, booked

accommodations for a rescue party, and secured a forward base.



Fig. 13 Initial response



Fig.14 Damage survey system

At the level of prefectures, cities, towns and villages the number of architectural conservator is extremely low. Accordingly, the investigation of earthquake damage to designated buildings by local authorities and undesignated historic buildings apart from national cultural properties was supported by the Architectural Institute of Japan (A.I.J.) instead of local authority staffs. The A.I.J. Committee for the Study of History and Design at the Institute's Kinki Branch took the initiative. And Architectural historians and other researchers from various universities and technical colleges in the Kinki region made a concerted effort to survey the damage to those historic buildings which were already known as a result of earlier research. The report which they produced was entitled "Report of the Survey on Historic Buildings Damaged by the Great Hanshin Earthquake" (Japanese edition, April 1995).

Table3 Outline of damages to historic buildings both of designated cultural properties and un-designated "Report of the Survey on Historic Buildings Damaged by the Great Hanshin Earthquake" Japanese edition, April 1995, Kinki Branch A.I.J

Designation type	C	S	P	Tilted	S	G	N	Total
N.C.P.	3	5	11	0	25	8	1	53
I.P.D.	0	8	11	0	5	0		24
P.D.C.P.	4	4	4	6	4	30	1	53
M.D.C.P.	2	3	2	0	5	19		31
M.D.B.S.A	4	3	9	2	14	3		35
M.D.B.C.E	2	0	0	3	3	17		25
Total of designated historic buildings	15	23	37	11	56	77	2	221
U.H.B.	148	82	203	44	325	237		1,039
Grand Total	163	105	240	55		314	2	1,260

C: complete collapsed S: semi-collapsed P: parcial damaged S: slight damaged G: good N: non-investigated

N.C.P.: National Important Cultural Property of buildings

I.P.D.: Important Preservation Districts for Groups of Historic Buildings

P.D.C.P.: Prefecturally Designated Cultural property of buildings

M.D.C.P.: Municipally Designated Cultural property of buildings

M.D.B.S.A.: Municipally Designated Buildings in Urban Scenic Areas

M.D.B.C.E: Municipally Designated Buildings in District for the Preservation of the Cultural Environment

U.H.B: Un-designated Historic Buildings

### 1) Designated Cultural Property of Buildings

The conditions of damage incurred by cultural property buildings as the result of the earthquake are noted in the Table 3. There were 116 cultural property buildings designated by the nation that was damaged, 81 of those designated by prefectures, and 34 (100%) historic buildings within Preservation Districts for Groups of Important Historic Buildings.

**Table 4 Summary of the conditions of Damage to Historic Buildings**  
(National Designation)

Region (Prefecture)	Shiga	Kyoto	Osaka	Hyogo	Nara	Wakayama	Sum
Number of Designated Buildings	(22) 176	(46) 277	(5) 92	(11) 99	(61) 256	(7) 73	(152) 973
Number of Damaged Buildings	6	(10) 47	31	(2) 33	3	0	(12) 120
Number of I.P.D	1 [295]	5 [454]		1 [34]	1 [504]		8 [1287]
Number of damaged I.P.D.	0	0		1 [34]	0		1 [34]

(Prefecture Designation)

Number of Designated Buildings	59	132	53	184	92	50	570
Number of Damaged Buildings	2	20	14	44	0	1	81

INDEX: ( ) National treasure [ ] historic buildings within I.P.D.

## 2) Historic Buildings, including Undesignated Buildings

The A.IJ investigated a total of 1211 buildings, among them historic buildings designated by municipalities and candidate buildings as well as those undesignated buildings that have already been introduced in publications as historical buildings. This investigation showed that close to 40% of these buildings were damaged, including 154 buildings (13%) that were totally collapsed, 100 (8%) that were semi-collapsed and 218 (18%) that were partially damaged. If we add to these numbers those buildings which had tilted or were only slightly damaged, the ratio of damaged historic buildings amounted to 74%.

**Table5 Historic Houses remaining status in Takarazuka**

Organization Date	Modern house						Farm house						Town house						Sum
	C	S	P	S	G	N	C	S	P	S	G	N	C	S	P	S	G	N	
A.IJ Feb. 1995	2	2	4	16	23	11	6	2	9	6	2	5	-	3	2	-	-	-	93
After Quake																			
Pref.. board of Education July 1995	R	-	1	3	15	22	7	-	-	3	1	2	1	-	2	-	-	-	57
	D	2	1	1	1	4	6	2	6	5	-	4	-	1	2	-	-	-	36
Pref. Board of Education July 1996	R	-	1	3	15	22	7	-	-	3	1	2	1	-	1	-	-	-	56
	D	2	1	1	1	4	6	2	6	5	-	4	-	2	2	-	-	-	37

**R:remaining D:demolished**

**C: complete collapsed S: semi-collapsed P: partial damaged S: slight damaged G: good N: non-investigated**

Furthermore, the investigation after half a year about damaged undesignated historic buildings showed that 62 out of 104 farmhouses (60%), 7 out of 14 townhouses (50%), and 18 out of 45 modern residential houses (40%) had already been dismantled and removed from their locations. A look at the damage degree of demolished those buildings showed what involved 18 semi-collapsed buildings and 35 partially damaged buildings.

Thus we can see that sudden changes in the environment due to the earthquake had created conditions difficult for the maintenance and management of buildings which in the future may have been designated cultural properties. We cannot but say that this, from the point of view of the protection of cultural properties, is a critical condition.

## 4. Damage Trends Related to Different Building Types (note 2)

Note 2: cf. Report on the Damage to Historic Buildings in the Great Hanshin Earthquake (1995) Commissioned and Sponsored by UNESCO edited and coordinated by Nobuo Ito

We had discussed about the damage trends of Historic Buildings with the author and other researchers. I quoted the Sentences from the report where historic building researchers agree with.

### 1) The Damage to Temples and Shrines

The designated temples and shrines were not located in the area of severe shocks, but rather in peripheral areas. On the other hand, the number of undesignated modern shrines and temples located within the area of severe shocks, which were badly

damaged, was by no means small.

In the case of shrines, the collapse of the one-bay Nagare style Yakujin Honden of the Rokko Hachiman Shrine is worthy of note. The way in which it had collapsed, just as if its legs had been kicked from under it, makes one think that it was thrown off balance in an instant and the body of the building was crushed by the weight of the heavy roof. There can be little doubt that, as Dr. Kuroda has reported, the main cause was that the roof covering had been changed from cypress bark roofing to heavy classic roof-tile, but it is thought that the rather unbalanced Nagare roof form was also a contributory factor. In the case of the Kasuga style Honden within the precinct, only the veranda collapsed, but if the direction of the earthquake forces had been different, it is thought that this could have led to greater damage. Also, the worship hall (haiden) was leaning over at an angle, similar damage occurred in many cases with this kind of worship hall, it may be said that improving the earthquake resistance of worship hall, with their lack of walls to absorb horizontal forces is a difficult problem.



Fig.15 Damage to Temple

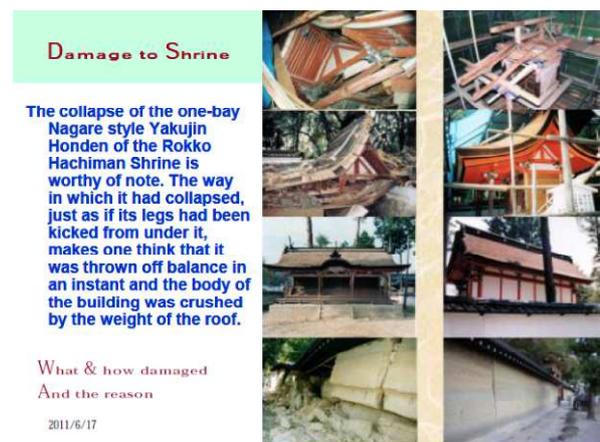


Fig. 16 Damage to Shrine

Among other things, one type of damage particularly associated with shrines was that caused by the collapse of the shelters (oiya). Shelters are essentially very simple structures in many cases, but in some instances the roofs are covered with heavy tiles, and some shrine buildings such as the main shrine structure at Hachiman Shrine in Takarazuka were damaged by the collapse of the shelter.

In the case of temples located in the area of severe shocks, the main hall of Kakujoji was demolished. There were many temples in this area, but the bulk of them was modern period buildings and unfortunately had not been surveyed.

Yet even in the surrounding areas, where the shocks had been rather weaker, there was widespread damage. But damage amounting to complete destruction was rare, and for the most part it was limited to semi-collapse. The guest hall and domestic quarters of Joonji, temple in Amagasaki suffered severe damage, such as posts breaking and leaning. But this illustrates the difficulties associated with buildings of residential type (as opposed to a Buddha hall) in a temple context, since they call for the support of a spacious open hall with enclosing few walls, using only slender posts.

## 2) The damage to vernacular houses

Considered as a building type, vernacular houses, along with modern Japanese-style houses, suffered particularly heavy damage. In the areas of severe shocks, the damage was so devastating that it was difficult to grasp what had happened to the buildings, but in peripheral areas, it is possible to identify some of the trends.

Firstly let us consider traditional urban commoners' houses (machiya). By their nature, they line the street and have openings facing it, while at right angles to the street frontage there are walls dividing neighboring plots. As a result, their earthquake resistance varies enormously depending on the direction of the seismic shocks. The Ikawa house in Takarazuka, was built along a street running from north-east to south-west, and it is thought that the seismic waves hit it from the south west, its weak side.

As a result, the entire building leant over heavily to the north. On the other hand, in the case of the nearby Wada house, there were numerous walls running in a south-westerly direction, and for that reason, it is thought, it suffered little damage, although earthquake forces caused some twisting.

In farmhouses, as Dr. Prof. Oba's report explains, the construction of the old loft type of upper story involved simply supporting the upper-floor posts on the beams of the lower-story frame, and this led to distortion or collapse of the upper-floor structure only when the quake struck.

Among other things, in the earth-floored area (doma) of farmhouses, posts are close together and the surrounding walls are more or less continuous, making this part of the house comparatively strong, whereas the reception rooms (zashiki) at the other end of the house are more open, with fewer walls and posts. For this reason, it is reported, there was a characteristic trend for damage to be concentrated in the reception rooms.

Another point that has been noted with respect to farmhouses is the strength of thatched vernacular houses. The Kosaka house, in Ashiya, was one of the few thatched farmhouses still surviving in the area of severe shocks, and it suffered only slight damage. the center of gravity of a thatched vernacular house as a whole is low. Moreover the whole roof frame is a flexible network held together with rope, and as a result the roof frame can evade earthquake forces, making it highly earthquake resistant.

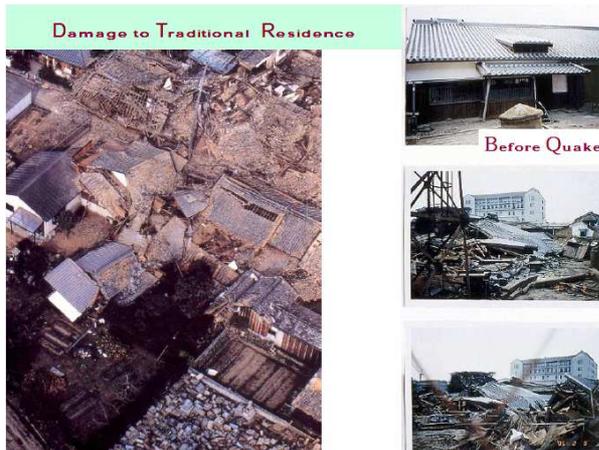


Fig. 17 Damage to Traditional Residence

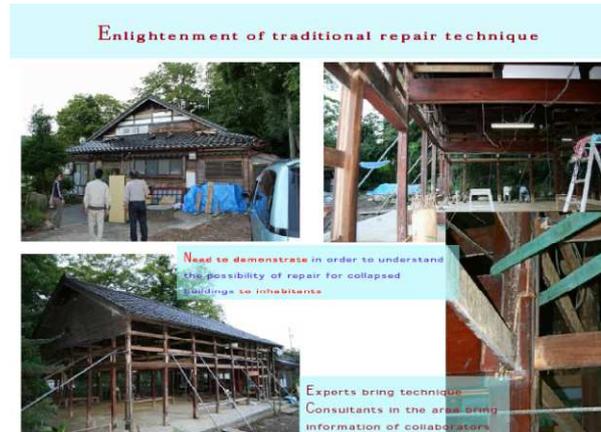


Fig. 18 Traditional techniques for repair



Fig.19 Traditional techniques (Hikiya Tateokoshi) for repair

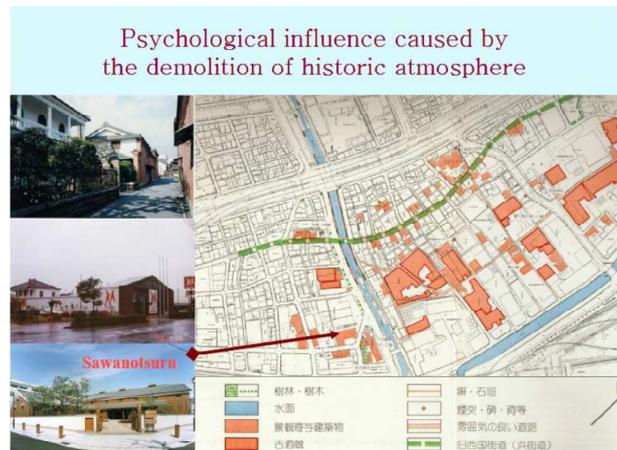


Fig.20 Orange marks indicate destroyed sake breweries factory buildings

With the kind of vernacular houses mentioned above, there is a need to inform widely that one of the advantages of the traditional method of building is that, even in the case of severe damage such as cracking of the walls and inclination of the posts, it is possible to repair the structure. Craftsmen known as house pulling carpenters (hikiya daiku) make a profession of moving

buildings, but they can also undertake this kind of straightening of the frame of a building. Since they can easily correct a degree of inclination of the structural frame that ordinary carpenters would regard as hopeless, we have come to appreciate their true worth in the aftermath of this earthquake. In the Hanshin area there are no longer any such craftsmen, and it is deeply regret that there are not more hikiya daiku .

### 3) The Damage to Sake Breweries

Eastern part of Kobe is famous for sake breweries. Before the Earthquake there were over 300 sake breweries' traditional factory buildings. In Kobe it was reported the level of damage suffered by sake breweries was 95%, while in Nishinomiya, 3 sites in 5 were totally destroyed. This level is strikingly higher than for any other building type, and revealed its weakness in the face of earthquakes. Sake breweries have a large internal space with few walls, and many of them are tall structures of two stories and with no-tie beams. Moreover, many of the sake breweries in Kobe were built on the most unstable ground of the coastal strip, close to the fault.

### 4) The damage to modern buildings

In this survey, modern architecture (i.e. architecture dating from the Meiji Period to the World War II ) is divided broadly into two categories, namely modern architecture and modern housing. "Modern architecture" thus here refers to non-residential structures, representative types being public buildings schools, offices, religious architectures, station buildings, etc. Residential buildings principally comprise the merchant houses of the former Foreign Concession, the houses built by foreigners, known as "foreign residences", and the "Western style residences" built by Japanese who had absorbed foreign culture. However gradually, from the late-Meiji period, these types blended with the Japanese domestic tradition, and an eclectic "Euro-Japanese" (Wayo) house type, which it would be difficult to define as either Japanese or Western, began to appear. Alongside and not unrelated to the above, houses in what is generally called the "Japanese" (Wafu) architectural style continued their development. These constituted a modernized form of the sukiya style and the Japanese vernacular tradition.

#### i) Foreign residences

These buildings also exhibit certain structural characteristics with posts spaced at half-bay (i.e. about 1m.) intervals and walls faced on both faces with timber siding and laths. Compared with the traditional Japanese house, the frame is strongly constructed, and it seems that in no case was the main frame broken in this earthquake. There are cases such as, for instance, the building of the Chinese Overseas Merchants Association where there was partial damage caused by rotten posts.

And if one were to venture to point out a disadvantage with this system, it would probably be that there is no way of visually checking the walls for rot, thus making maintenance difficult.

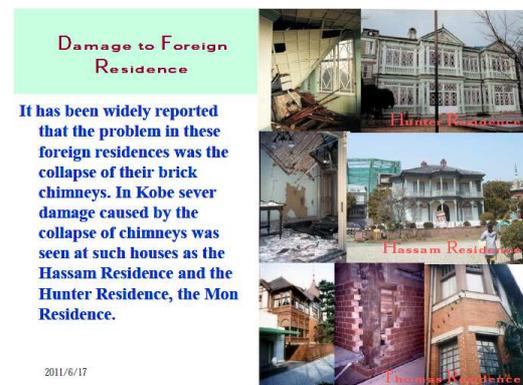


Fig.21 Damage to Foreign Residences

It has been widely reported that the problem in these foreign residences was the collapse of their brick chimneys. In Kobe severe damage caused by the collapse of chimneys was seen at such houses as the Hassam Residence and the Hunter Residence, the Mon Residence, the building of the Chinese Association and the former house of Catherine Andersen in Kitano, as well as the Shioya Hostel of the Takeuchi Oil Manufactory. Since Western style residences in other areas suffered similar damage, this will be a problem for building preservation in the future.

#### ii) Western-style Residences

More than 10% suffered damage equivalent to total or semi collapse. The fact that posts were spaced more widely than in the foreign residences, and that they tended to become slenderer as time went by, the use of tiles to make a base for external walls, and the tendency to spread thick mortar on the external walls, making them remarkably heavy, all appear to have contributed to this.

Among examples in this category, special mention should be made of the Shibakawa Residence (1912) in Nishinomiya. Although it stands on an unstable hillside and moreover has an open and delicate layout, in which a western design has been given a sukiya treatment in a pioneering manner, remarkably it survived with no more than partial damage. From the investigation, we found that almost all the members were fastened together with metal fittings and that diagonal braces had been used almost perfectly. It was also discovered that in a Japanese style room on the second floor where there was an opening over two bays wide, the lintel had been strengthened with a tie bar and diagonal bracing, in a very original manner.

It is thought that this careful design may have been prompted by two factors: firstly, the designer underwent his architectural training in the aftermath of the Great Nobi Earthquake (1891) and more importantly, immediately before designing the Shibakawa Residence, he actually went to visit the site of an earthquake which had just occurred in southern Italy (Messina, 1908), apparently absorbing a number of lessons.

### iii) Japanese-style Houses

In the Kansai region, where there had been no earthquakes for a long period, countermeasures against typhoons had been given priority. The use of comparatively heavy tiled roofs, despite the light eaves detailing and the wide south facing openings, seems to have been an adaptation to cope with such local climatic conditions. Sukiya (Fig.5) houses of the kind referred to as modern Japanese-style houses were built in large numbers in Hanshin area until the last war. These houses developed as if each were competing to be the most delicate and the least enclosed, but it cannot be denied that, with their lack of solid walls and ill-balanced layouts, they were ill conceived for an encounter with an earthquake on this scale.

### iv) Brick-built Architecture

In Japan it is generally said that the need for earthquake resistant measures to strengthen brick buildings has been recognized since the Great Nobi Earthquake(1891), but it was not only old buildings, such as the former Koizumi Linen Factory (1890 or later) and brick brewery buildings like the Hakushika Brewery Museum, brick buildings dating after Nobi Earthquake were also completely destroyed.

However, care is called for when we consider that even in the case of two buildings by the same designer, there could be a considerable difference between the ways of brick structures performed. For instance, at the former Hyogo office of Tokyo Soko (the Ishikawa Building, Sone Tatsuzo, 1906), differential slippage occurred between brick courses, while in the former Kobe Branch of Mitsubishi Bank, there was little damage. It is possible that there may have been steel reinforcement in the floor of the latter building.



Fig. 22 Damage to Brick-built buildings

## 5. The Damage to Arts and Crafts

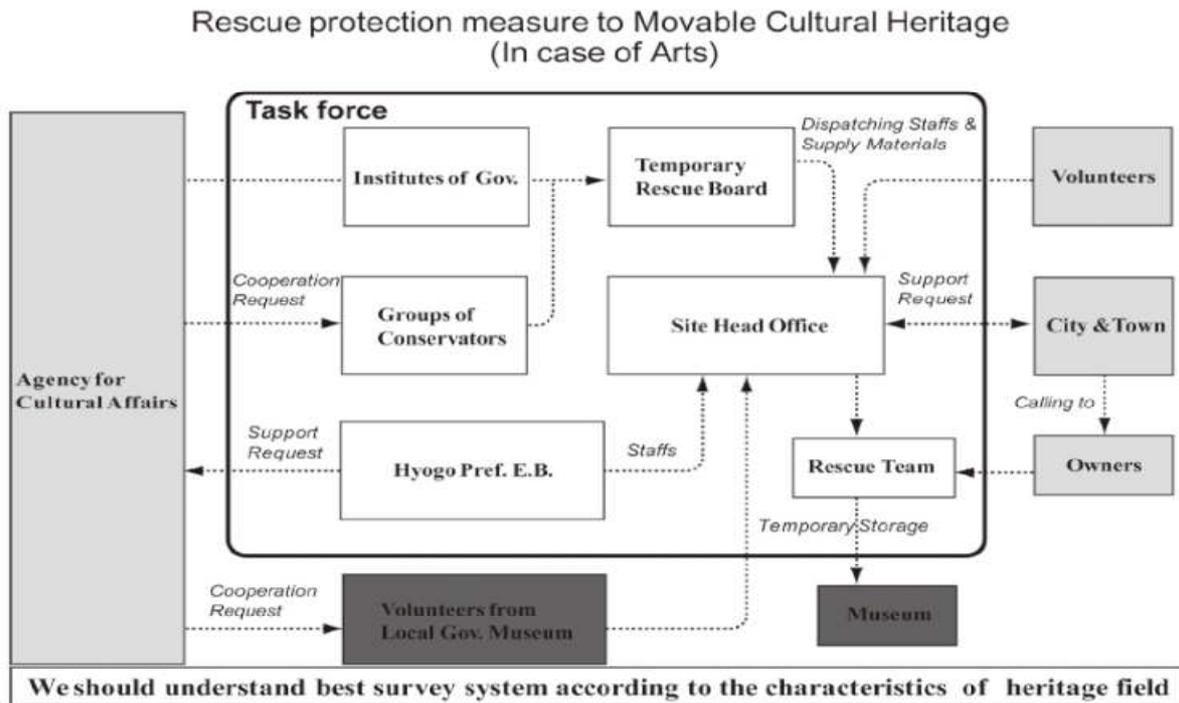
There were numerous undesignated arts and crafts in the Hanshin region. Their damages were totally unknown since their locations were not listed. Therefore, “Rescue Committee for cultural properties damaged in the Great Hanshin Earthquake” was established in February 17, one month after the Earthquake, in order to prevent disposal and dissipation of movable cultural properties including precious arts and crafts at the time of removing numerous damaged buildings. This Committee was composed of 30 organizations in total, including the Agency of Cultural Affairs, other national organizations, museums belonging to local public organizations such as Hyogo



Fig.23 Damage to Arts and crafts and Rescue operation

Board of Education, and private organizations such as NPOs. Movable cultural assets in need of urgent conservation were rescued, and they were temporarily stored at facilities with storage fixtures such as museums in Hyogo Prefecture and other surrounding prefectures.

In addition, the cultural information section of a local NGO rescue group issued “Cultural Assets Rescue Newsletter” to emphasize the need of conservation of cultural properties in corporation with volunteer groups in each area and companies involved in arts.



**Fig.24 Rescue operation system for Movable C.P**

Historical Records Preservation Archivist’s Network (shortly Rec-net) of the Great Hanshin Earthquake Rescue Committee aggressively visited sites, a so-called "Patrol survey," as well as taking activities upon request of the victims of the Earthquake, and clarified locations of many of partially-damaged cultural assets. These activities, same as survey of monuments, led to the start of a damage survey by industry-government-academia cooperation at occurrence of earthquake.

Through emergency programs for damaged cultural assets, including cultural asset rescue, several ten thousands of cultural assets were saved from collapsed houses. However, we also learned that not negligible numbers of cultural properties were disposed of together with household stuff at removing houses. With respect to consciousness toward cultural assets, there was a gap in the sense of value of each cultural asset between residents who disposed of assets together with household stuff and surveyors.

## **6. The Damage to Folklore Cultural Properties**

"Brewing tools of Nada" which are designated as important tangible folklore cultural assets and other "Set of brewing tools of Nada" which are prefecturally-designated important tangible folklore cultural assets were damaged because the building where they were kept collapsed. The entire "OHISHI brewing house of SAWANOTSURU Co., Ltd." collapsed, and designated brewing tools stored there were also damaged. About 300 buildings of Japanese sake brewing houses which accounts for 95% of brewing houses, including KIKUMASAMUNE memorial house and the OHISHI brewing house of SAWANOTSURU Co., Ltd, were collapsed.

The cause of collapse of these brewing houses lied in their simple structure of vertical beams without horizontal supports. In the brewing houses in the Nada sake-producing area, three houses were reconstructed in the form same as before the Earthquake,

and 14 houses were reconstructed newly using reinforced concrete (RC) or iron-frame structure. There is only one brewery, which is Yunosuke Izumi Brewery (Nada-izumi) brewing Japanese sake in a conventional brewing house built in the late Edo Period. According to the present building codes, conventional brewing houses do not conform to the standard for structural strength, and thus it was impossible to reconstruct using traditional construction method.



Fig.25 Damage to the factory of SAKURAMASAMUNE

### 7. The Influence to Buried Cultural Properties

From the day of Earthquake to the end of May, 1995, the life line recovery works and individual houses and small apartments related to restoration plan were exempted from notification in accordance with the Law for the Protection of Cultural Properties based on notification from the Agency of Cultural Affairs. In other words, they were omitted from excavation and research. Number of notifications related to the restoration plan roughly doubled compared to the previous year, but excavation and research was conducted at 18% of the number of notifications (30% compared to the previous year) based on this easing measure.



Fig.26 Emergency excavations for buried C.P

At first, objection of regional residents against research of devastated area was of particular concern. However, residents were relatively understanding toward research through on-site briefing session. The next statement was indicated in the summary of 6-year restoration of Nishinomiya City from the Earthquake: "Attitude or opinions toward no need of excavations of cultural properties were never heard. Many local residents attended on-site briefing sessions held at the site of preliminary research prior to the local restoration project. Many residents also attended lectures."

Table 6 Devastated sites and area

City/town name	Number of ruins	Devastated area	Major ruins
Kobe	154	234.2ha	Sumiyoshi Miyamachi site, Gunge site, Higure site, Matsuno site
Amagasaki	15	4.6	Tsukaguchi castle ruin, Amagasaki castle ruin, Higashi-muko site
Nishinomiya	13	47	Nishinomiya-shatou site, Koshienguchi site
Ashiya	33	4.9	Ashiya deserted temple, Tsuchi site, Narihira site
Itami	18	22	Itami-gocho site, Arioka castle ruin
Takarazuka	1	0.1	
Kawanishi	10	0.8	
Akashi	2	1.3	Old samurai residential area in Akashi castle, Taidera site
Tsuna-gun	34	0.8	Toshima-nishi site
Total	280	253.6ha	

### 8. Actions taken during Restoration Period

#### 1) Initial Period-Need of survey of Historic and Cultural Resources

Since only designated cultural properties were considered targets for Preservation before the Earthquake, few lists of undesignated cultural properties including information on location and owner were prepared by both Prefecture and city. In particular, no information was available on arts and crafts, such as antiques, because they often belonged to individuals for their own sake. As mentioned earlier, the cultural properties rescue was conducted to prevent disposal and disperse of precious

cultural properties at the time of removing damaged buildings. However, rescues conducted upon requests of disaster victims were seldom. A door-to-door patrol survey implemented by the resource network group was needed. This indeed became an opportunity for establishing a system to survey devastated area with cooperation among industry, government, academia, and private sectors. However, it revealed the importance of prior preparation of a location list for the effective survey.

## 2) Recovery Period-Changes in Management of Cultural Properties

### i) Funding

In disaster recovery of cultural properties, a viewpoint of 'communities' property' was first introduced in Japan. Undesignated cultural properties (historic buildings, etc.) were supported on full scale by an effort of the private sector. For repairing designated cultural property and undesignated cultural property, a budget for almost 400 properties in total was reserved from the restoration fund. The motorboat revenue of ¥310 million was subsidies to 44 properties, and the Foundation for Cultural Heritage and Art Research contributed about ¥70 million. The private sector covered assistance of restoration at area, which is difficult by the public sector due to the separation of state and religion. In addition the Foundation for Cultural Heritage and art Research raised fund throughout Japan with the intention of building nation-wide assistance in line with increasing the awareness of preservation of cultural properties. Nation-wide movement of preserving community's cultural properties broadened since then, and bore the fruit of revision of the Law for Protection of Cultural Properties. Table 7 shows the restoration plan for cultural properties. The restoration plan for undesignated cultural properties exceeded about 600 cases, which is five times greater than restoration of national, prefecturally- and municipally-designated cultural properties, which totaled 128 cases.

**Table 7 Restoration assistance system of public and private sectors**

Item	Public fund	Quasi-public fund	Private funding
Main entity	Nation, prefecture, city, town	Restoration endowment	Foundation for Cultural Heritage and Art Research Motorboat revenue foundation, etc.
Financial resource	Public funds (tax)	Local allocation tax, profit from lotteries	Individual and corporate donations Motorboat revenues, etc.
Concept	Public nature, impartiality (uniform subsidy to all designated cultural properties), assessment needed for religious structures (Division of cultural property is determined by public notification)	Impartiality (Uniform subsidy to all designated cultural properties) Assessment needed for religious structures (Subsidized as cultural structures rooted in the community)	Specific and complement (limited subsidy is also available) Religious structure is also applicable (subsidized as a cultural monument rooted in the community)
Target cultural property	National, and prefectural-and municipally-designated cultural properties	1. National, and prefecturally-and municipally-designated cultural properties 2. Undesignated cultural properties (Cultural monuments, Historic buildings)	1. Undesignated cultural properties (arts and crafts, historic buildings) 2. Part and property not subsidized by the nation or prefecture 3. Others which are difficult to restore and repair
Purpose	1. Compensation for damage against restrictions 2. Urgent restoration	1. Reduction of personal/corporate expenses for promoting urgent restoration 2. Increasing awareness of owners of historic buildings on restoration and reduction of personal expenses 3. Restoration of culture rooted in the community, centering on temples.	1. Encouragement of national support by increasing awareness of the need of conservation of cultural properties 2. Complementary subsidy to those not subsidized by governments 3. Reduction of personal/corporate expenses on restoration
Subsidy	National: 90-95% Prefecturally-designated : 2/3 Municipally-designated : 1/2 (Total subsidies of nation, prefecture, city, and town)	1/2 of owner's expense Undesignated cultural properties (¥5 million max.)	Foundation for Cultural Heritage and Art Research: Fixed subsidy (¥5 million max.) Motorboat: (¥2.5 to 25 million)
Number of properties	128 properties	About 500 properties (targets) Subsidies upon application from owners	About 100 properties (targets) Subsidized upon applications by owners

### ii) Person-Power

For the repair of designated cultural properties, about 150 members were fostered. These members included skilled staff

belonging to Nation-wide Japanese Association for the Conservation of Architectural Monuments and cultural properties management sections of six prefectures in the Kinki district. For arts and crafts, about 100 members including restoration experts of the Japan Art Academy were fostered. However, both members were engaged exclusively in repair of national cultural properties. Accordingly, the experts did not almost have experience in repairing undesignated cultural properties, which involves selection of inexpensive ways of repair or conservation while being used in the daily life. It was thus extremely difficult to repair enormous amount of undesignated cultural properties. For monuments, we needed to start from teaching repair methods to designers of general buildings.

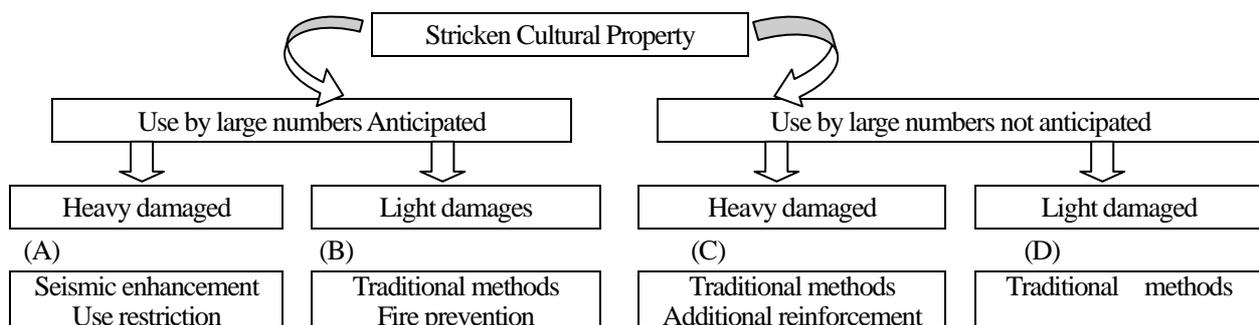
Arts and crafts were repaired by Buddhist creators, which have experience in working for the Japan Art Academy. However, they collapsed from extreme fatigue due to concentrated works, resulted in extending the repair period.

Until the Earthquake, this type of repair was not expected. Shortage of human resources revealed the defect of the cultural property preservation strategy in Japan, which only targeted designated cultural properties. Therefore, as described above, we made a proposal on the registered cultural property system so as to protect cultural properties while being gently utilized in daily life, and this was legally established in 1996.

In the field of buried cultural properties, a vast area of 253.6 ha needed to be researched along restoration from the Earthquake. It was, as was expected, impossible to conduct research in line with a progress of recovery works with the existing manpower. Accordingly, the government consigned a part of approval authorization to local governments, and engineers of buried cultural properties nation-wide were requested to cooperate in the research. Staffs in charge of buried cultural properties were 8,000 people nationwide, including staff of cities, towns, and villages. Compared to other fields of cultural properties, availability of human resources was not a problem. However, clerical works for several thousand properties a year were troublesome, and thus simplification became a task. For simplification, special disaster exception was provisionally created. Then, in 2000, a part of authority with respect to application to prefectures and cities was consigned so as to simplify clerical works.

### 3) Issues Arising from Stricken Important Cultural Properties

The Japanese national important cultural property of buildings is exempt under Article 3 of the Building Standards Law from application of building standards. While the Law for the Protection of Cultural Properties provides that the director-general of the Agency for Cultural Affairs may supervise and control the management and repair of national cultural properties. In the situation surrounding the Great Hanshin Earthquake, which involved many deaths, questions could have arisen concerning responsibility in the case of cultural properties.



- (A) Difficult to guarantee the safety of human life in present condition. Use restriction or enhancement of seismic resistance necessary.
- (B) Little danger to human life. Limited measures such as prevention of falling members feasible.
- (C) No danger to human life. Danger only to preservation of building elements.
- (D) No danger to human life. No danger to preservation of building elements

**Fig. 27 Scheme of Repairs to Stricken Cultural Properties**

For the buildings which are designated as cultural properties by prefecture or local authorities, according to Article 3 of the Building Standards Law, restoration or repair work requires a permit to be issued upon the consent of the Building Council in

local authorities advised by the National Ministry of Construction. However, some of the buildings damaged by the earthquake underwent unapproved construction. Concerning the safety of cultural property buildings, preservation measures will face difficulties so long as clear proposals are not forthcoming, and hence the need arises for model policies for the enhancement of safety through repairs.

**i) Enhancement of Seismic Resistance**

Precise understanding of earthquake damage and studies on enhancement of seismic-resistance are indispensable requirements for consideration of the future preservation of cultural property buildings. Therefore the Temporary Council on Earthquake Resistance (hereafter, the Council) was established at the sites and charged with organizing the repair measures for six damaged national cultural properties of various structural types which required large-scale repairs with reinforcements.

The Council was made up of architectural historians, structural engineers and researchers, conservation architects and experts related architectural restorations from each of the project teams, under the overall supervision of a government official with responsibility for cultural properties.

The tasks of the Council were to analyze the earthquake damage to each structure; assess the seismic-resistance of cultural property buildings based on the results of a structural diagnosis of each building; investigate modes for providing the requisite structural enhancement in the cases where seismic performance was questionable; and in cases where the methods for structural reinforcement were unclear, to perform destructive or non-destructive testing and make proposals for reinforcement methods utilizing new techniques.

The basic approach to reconstruction of the stricken cultural properties, as shown in Fig.22, was to separate them first into those for which use by large numbers of people was anticipated or not anticipated, and then categorize them as lightly or heavily damaged. The job of the Council was to organize repairs for the buildings which fell under category A. They are listed in Table 7.

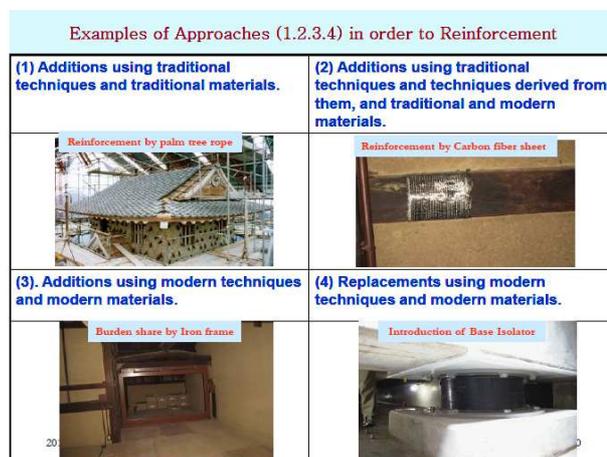
**Table 8 Earthquake Recovery Projects Organized by the Council on Earthquake Resistance**

Structure species	Cultural Property	Topics Investigated
Half-timber build.	House 15, Former Foreign Settlement	Subsoil reinforcement Enhancing seismic resistance of half-timbered brick structures
Wooden framed brick build.	Former Thomas Residence	Reinforcement of brick walls and brick chimneys
Wooden framed build. with mud walls	Former Okada Residence	Enhancing seismic resistance of wooden structure
R.C. builds.	Former Yamamura Residence	Enhancing seismic resistance of reinforced concrete structure
Traditional wooden build.	Arch-bishop Quarters & Founders Hall, Honkouji Temple	Reinforcement of traditional wooden structure and broken post
Wooden framed build. with mud walls	Akashi Castle	Reinforcement of stone walls, subsoil and foundation

**ii ) Harmony between Authenticity and Safety**

It is hoped that the reinforcement methods for cultural property buildings will harmonize the two objectives of Authenticity and Safety, but at that time no definite assessment method has been found for striking such a balance. No reinforcement methods which consider the balance of these objectives are mentioned in the Principles for the Preservation of Historic Timber Structures of the ICOMOS International Wood Committee in 1995.

At the Symposium on Risk Preparedness for Cultural Properties, held in Kobe and Tokyo in January 1997 and attended by representatives of UNESCO, ICOMOS, ICCROM



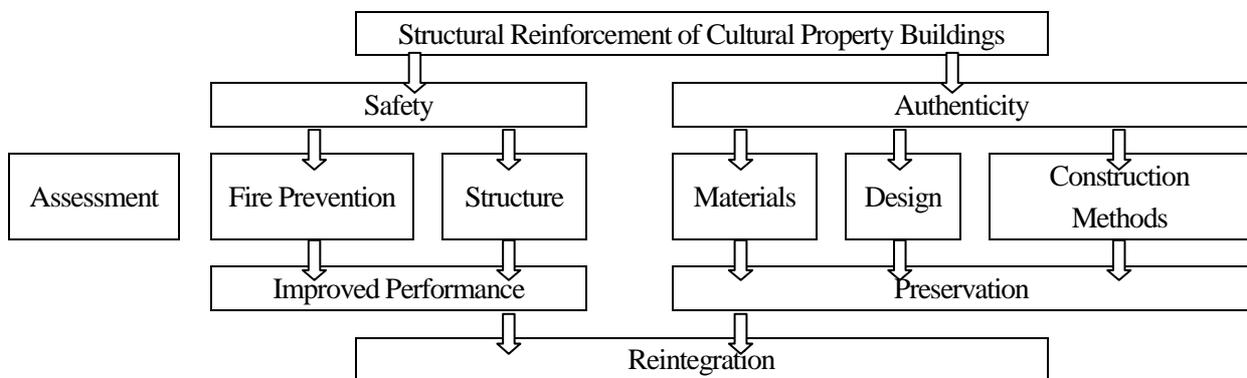
**Fig.28 Approaches for Reinforcement**

and other international agencies for the preservation of cultural properties as well as experts from 16 nations, the priority of human life in the preservation of cultural properties was not referred.

Concerning judgments of authenticity, on the global level many standards of judgment have been discussed, such as those involved in the Venice Charter, and at the national level in Japan a legal system is established, based on regulation of alterations to the existing state.

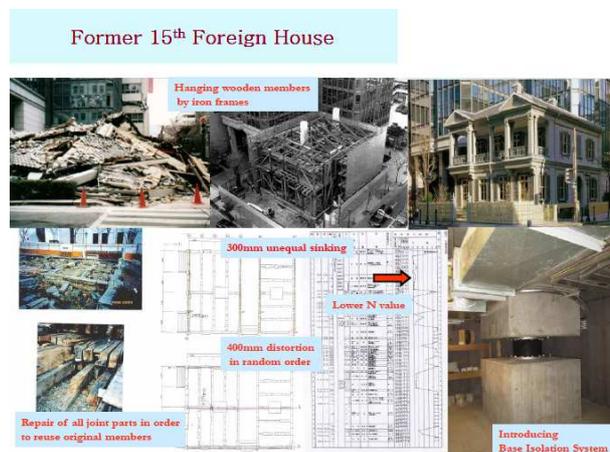
I would propose that the methods for structural reinforcement of buildings such as those in category A be chosen according to the following approaches, in order of priority:

1. Additions using traditional techniques and traditional materials.
2. Additions using traditional techniques and techniques derived from them, and traditional and modern materials.
3. Additions using modern techniques and modern materials.
4. Replacements using modern techniques and modern materials.



**Fig. 29 Author's Approach to Structural Reinforcement of Cultural Property of Buildings**

Taking as an example the reinforcement of a broken post, approach (1) might include strengthening the foundation joint with a fishplate splice which is the traditional good joint system, while approach (2) could involve covering the traditional joint by wrapping the post with carbon fiber threads. An example of approach (3) would be to add a steel frame in order to reduce the load on the existing structural materials. Approach (4), for cases when safety cannot be guaranteed by adding reinforcement to the existing structural system, could involve the introduction of something like anti-vibration apparatus as a replacement for part of the existing structural system. In adopting approach (4), careful consideration must be given to keeping a balance with the preservation of the authenticity of the building, including soft measures such as entry restrictions for protection of human life. Since alteration of the structural system of a designated building is involved, this should be regarded as the last resort.



**Fig.30 Example of introducing Base Isolation System**

Performance assessment is an important consideration for the first priority approach in this proposal, that of traditional techniques and traditional materials. Since the strength of structural systems employing traditional techniques and materials is difficult to reckon unlike with current structural systems, it is essential to combine several different structural assessments to obtain measurements of strength. I will now review some of the proceedings of the Council from the standpoint of my proposal.

#### 4) Proceedings of the Council on Earthquake Resistance

##### i) Akashi Castle Towers

At the first meeting, the expert on building structure offered two opinions. First, modern foundation engineering holds that to insure the safety of a building, the weight of the upper section must be transmitted directly to a sturdy supporting layer. And second, during the recent earthquake there was uneven subsoil subsidence beneath the towers (about 18 cm), and another earthquake of similar strength could cause them to collapse.

In response, the expert on cultural property conservation offered two opinions. First, it ought to be possible to build the stone walls back up without reinforcement. (The stone walls outside the towers, which are not designated,

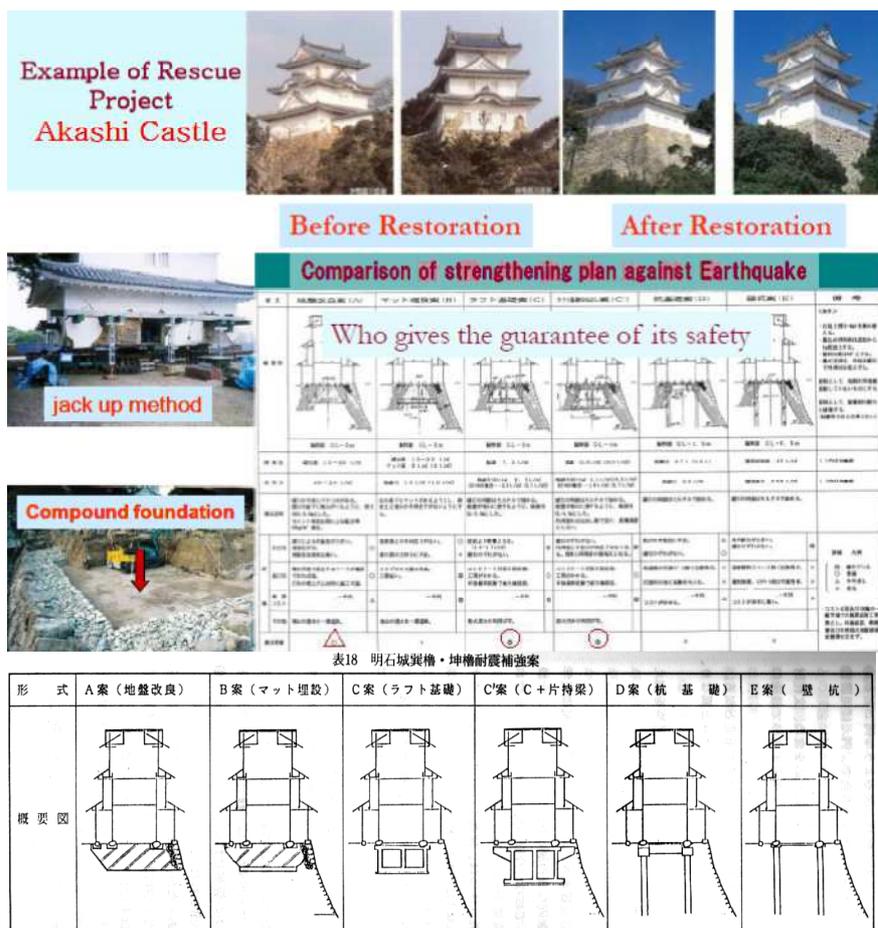


Fig.31 Rescue Project of Akashi Castle

were to be built back up in the traditional way, with the work subsidized by the Ministry of Construction.) And second, if a large area of the stone walls is dismantled, authenticity will be lost.

At the second meeting, judgment of the subsoil was deferred because the survey results were insufficient. The expert on cultural properties claimed that the corners of the castle's stone walls were very solid, noted that they hadn't even fallen down during the recent earthquake, and demanded that traditional construction techniques be followed since the walls would become still sturdier if the building weight were increased.

At the third meeting, the results of the subsoil survey were presented, confirming that the ground had dropped substantially, and six construction plans were presented. (See Fig.31) As plans D and E were technically impossible because of inability to transport heavy equipment to the site, only four of the plans, A, B, C and C', were discussed. The expert on building structure noted that in principle, (1) footings should be built on stable ground, and (2) buildings should not be erected on uneven footings.

He suggested that C' was the best plan. On the other side, the expert on cultural properties presented the opinions that; (1) he felt resistance to the idea of reinforced-concrete footings; (2) a method that matches the lay of the ground, along the lines of the ancient HANCHIKU (compound) method of spreading successive layers of an earth-lime mixture, might be possible; and (3) the C' plan would not solve the problem of subsidence after construction of the stone walls.

The expert on building structure rebutted that there had indeed been problems with previous use of traditional construction techniques, and a careful comparison with modern engineering was necessary. Another speaker supported him, stating that a traditional method could not be undertaken without some guarantee as to exactly how safe it would be, but the room was divided and the decision was postponed.

At the fourth meeting, it was said that at least 3 meters of fill would be needed, and perhaps 10 meters or more at some points. A plate load test showed that the ground resistance force would be at least  $10 \text{ t/m}^2$ , and the results of related tests including the circular slip method were heard and discussed.

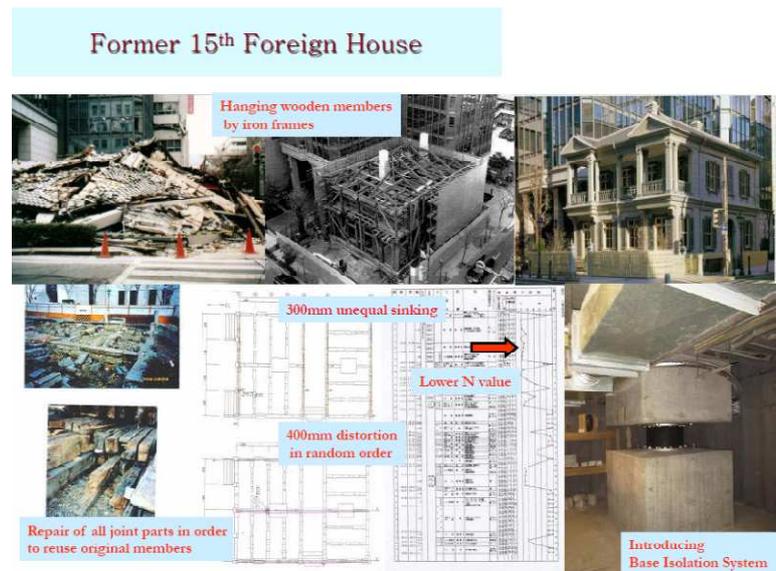
In the end, new data was presented confirming the safety of plan A, which was similar to the HANCHIKU-type compound ground-matching idea that the cultural property expert had pushed for during the third meeting, and as a result the group settled on that plan.

### ii ) House 15 of the Former Kobe Foreign Settlement

At the first meeting, after background on the character and structure of the building was presented, the discussion progressed as follows:

1. The building had been one of the first cases where full-scale efforts were made for utilization as a cultural property, so it should be made earthquake resistant on the premise of public use.
2. There is a need to consider the extent to which the essence of the cultural property might be sacrificed through reinforcement.
3. A plan to alter the building by reinforcing it in installments split the room into two vigorous camps.

At the second meeting, five construction techniques were presented: a traditional technique, three earthquake-proofing techniques



**Fig.32 Rescue Project of House 15 of the Former Kobe Foreign Settlement**

(an outer-perimeter steel frame, wood with reinforced concrete, and a steel frame with reinforced concrete), and an anti-vibration technique. They were compared with respect to the goal of maintaining the existing 70% level of wood materials (which was surprised reuse ratio cause the building was collapsed into pieces completely), and it became clear that safety could not be assured with the traditional technique.

A steel frame on the outside perimeter was unacceptable on aesthetic grounds. Both of the reinforced concrete options were rejected as involving too much alteration of the construction system. As the relatively attractive option, the anti-vibration plan was adopted. It was then supplemented with ground improvements in view of the fact that liquefaction had occurred.

### iii) Towards Recommending Treatment

In the rescue projects following the Kobe Earthquake traditional construction method were used mainly like Akashi castle rescue project did. And the case required the change of the structure system, for instance introducing of Base Isolation Device, were 2 examples of 29 projects.

Also, in Joonji temple main hall, the inclined pillars returned with time passing. The main gate of Koyadera temple moved 20cm and the ridge was inclined, with the process of jacking up we found such a phenomenon that the roof distortion returned.

It is hardly understood with only a current thought in those of both. The important element of the cultural property is to remain the system which has grown through the long history, since the high originality needs an evaluation about an individual case. In such examination we should avoid the judgment that eliminates different ideas and systems with a dogmatic evaluation. It is important to observe to equivalence of value from the idea when a historic building was constructed, to the present idea. The aspects of the committee mentioned above are so important that specialists gathered from various fields and they discussed with including diversity viewpoints and had decided the reconstruction methods.

On the other hand, especially historic buildings have the faculty people use inside and which is difficult to separate safety. Every committee chose the reinforcement methods from traditional techniques as much as possible after recognition of the actual data through various experiences. At the many rescue projects sites they tried to evaluate the traditional mud walls, we found such walls had the strength over our expectation. And the restoration project of Hotoji temple in Kyoto analyzed the mud wall was damaged by the Fushimi Earthquake of 400 years ago and they compared with the repaired old wall and the new wall by the traditional technique. They show the data which repaired old wall is stronger.

In the case of Joonji temple projects they tried to introduce carbon fiber sheets to the broken wooden pillars as a reinforced material and succeeded to reuse those pillars we abandoned in ordinal methods. Through the experience of the evaluation during the rescue projects, we found incomplete materials we thought were reused by supplemental reinforcements.

**Table9 Rescue projects for Important Cultural Properties**

[A] Non-specific Multiple Use / Heavy Damage				[B] Non-specific Multiple Use / Light Damage			
Property	Work Period	Damage	Repair Policy	Property	Work Period	Damage	Repair Policy
1 Mansion No. 15, Foreign Settlement District of Kobe	1995-97	Brick walls and other building elements collapsed, the foundation subsided unevenly up to 27 cm, and the ground shifted 48 cm southward and 43 cm westward. The majority of the building's wood, brick, tile and stone materials were destroyed or damaged in the collapse.	Unstable ground was judged to be the main cause of collapse. The plans called for maximum reuse of damaged materials, employment of traditional building techniques, ground stabilization and installation of dampers to alleviate stress.	7 Kobayashi Residence	1995	All three chimneys were damaged and collapsed, two causing slight damage to the roof surfaces, and the third falling through the attached roof and causing considerable damage to the interior.	The chimneys were rebuilt using the original methods, except steel reinforcing rods were added and they were changed to score-brick false chimneys.
2 Thomas Residence	1995-96	Cracks opened in the exterior brick walls with partial separation creating danger of collapse. The brick chimney collapsed.	The framework was not damaged by the quake, and was judged to have sufficient earthquake resistance, but there was danger that exterior brickwork could fall. To prevent collapse of the outer walls, the brick was tied to the framework.	8 Former Hassam Residence	1995-96	A brick chimney fell into the dining service room damaging the roof, ceiling and floor. Walls peeled and fell away in several places, and the wainscot and mantelpiece members came off.	The chimney was reinforced with steel rods and made into a score-brick false chimney. Other damage was repaired using the original building methods.
3 Former Yamamura Residence	1995-97	The attached entrance hall and east lean-to roof tilted significantly, and the overhanging section of the study room detached from the west side. Posts were tilted up to 30 mm between threshold and lintel with cracks in the upper part of the corner posts, and bowing of other posts beneath the lintels.	Damaged posts were reinforced with carbon-fiber plates to allow their reuse. Due to insufficient wall height, the 1.8-meter-high part of the walls above the lintels (the koshiabe) was reinforced with plywood.	9 Tasanji Temple, Main Hall	1995	Parts of the walls peeled off and fell away.	Rebuilding was done by the original methods, with no special reinforcement.
4 Former Yamamura Residence	1995-97	Cracks occurred in many building elements including the main walls and slab, the inner walls and lime sand-plastered ceilings, the Oya tuff stone-covered posts and floors, and the foundation stones. The ground supporting the basement floor wall, and the north wall and second-story floor slab of the vestibule were destroyed.	Underground retaining walls were added to prevent the foundation soil from washing away. Damaged reinforced-concrete members were shored up. Based on extensive testing of the actual structure, certain walls were reinforced with carbon fiber for enhanced earthquake resistance. The concrete walls were repaired, after extensive testing of the actual structure, in three stages: 1) exterior cracks were patched, 2) grout was injected into interior cracks, and 3) epoxy resin was injected into hairline cracks.	10 Choenji Temple, Main Hall	1990	Clamps holding the cantilevers to the outer girders of the roof structure fell off, and parts of the outer girders were damaged.	As the roof was found to have sufficient strength, it was rebuilt by the original methods with some additional reinforcement of the roof truss joints. The restorative capacity of the slanted large-diameter posts was noted.
5 Former Okada Residence	1995-96	The east wall of the house tilted westward, the northwest corner of the roof collapsed, and interior earthen walls peeled off. The west wall of the wine cellar collapsed, and there was displacement of the frame and roof tiles.	The strength of the existing earthen walls was evaluated, and some parts were reinforced with steel rods.	11 Honkoji Temple, Founder's Hall	1995-96	The veranda on the front wall separated from the posts and moved outward, and the joints of the veranda rail came apart. The plaster wall on the front face peeled off, and numerous cracks and	As the structure was found to have sufficient strength, the veranda was anchored to the posts with tie beams to prevent it from moving, and reinforced using the original methods.
6 Akashi Castle, Southeast and Southwest	1995-99	The stone walls beneath the towers subsided up to 18 cm, and warping and tilting occurred in the towers.	On inspection the towers were judged to be structurally sound, although the ground beneath them was found to be common fill	<b>How we should recover historic buildings which has original weakness</b>			

Of the two, the House 15 of the former Kobe foreign settlement clearly had a more comprehensible discussion process, and it resulted in adoption of one of the structural reinforcement alternatives. With Akashi Castle, on the other hand, the discussion was often tangled as the cultural properties expert pushed to the end for following traditional construction methods, and was unwilling to compromise on structural assessment of the traditional method. The result was that the most suitable option for preserving authenticity was adopted.

We may suppose that there are few cases like House 15 of the former Kobe foreign settlement, where the strength is being reckoned traditionally when problems clearly exist with respect to safety. The majority seem to lean toward the Akashi Castle pattern of assured safety, but without ever conducting a traditional structural evaluation.

It may be time-consuming to do make such an evaluation. Still, it would surely be worthwhile to open the discussion process into something more than an automatic progression from one modern structural reinforcement option to the next.

## 9. Actions after the Earthquake

### 1) Present state and task of undesignated cultural properties (historic buildings)

Many human lives and property were lost in the Kobe Earthquake, which included many precious historic and cultural properties. These needed urgent restoration. Accordingly, Hyogo Prefecture Council for Cultural Property Protection recognized the current conditions as critical from the standpoint of cultural property protection, and made urgent proposals on the need to support restoration, particularly of severely damaged buildings that were historic symbols in communities but not designated as such. Based on this proposal, the Subsidized Project for the Repair of undesignated cultural property of buildings was inaugurated from the Recovery fund for the Great Hanshin Earthquake.

This project was designed to provide assistance for the repair of historic buildings, which are important in regional history. Since the grant covers up to 50% of costs, up to a maximum of ¥5 million, the subsidy was not very generous. However, there were 284 cases using this subsidy for restoration. The project was very effective in preserving much-loved historic buildings.

Based on the experience of the Earthquake, we learned that preservation using the "cultural property designation system" was insufficient for protecting historic cultural properties closely relate to local residents. Since 1897, for over 100 years, 2,177 building structures have been designated as national treasures and important cultural properties. If those designated by local public organizations are included, we have been protection about 10,000 building structures.

However, it soon became apparent that it was impossible to protect overall regional characteristics where many types of historic and cultural properties are located by using the designation system which is only applied to 'prototypes of each period or cultural configurations.' Therefore, the Hyogo Prefecture Board of Education and other experts and related organizations proposed establishing a new system aiming at protecting historic and cultural properties familiar to the region as a system complementary to the existing designation system. In response to this, the central government established the Cultural Property Registration System in 1996.

Since the introduction of the Cultural Property Registration System, the number of registered Cultural Property of Buildings has exceeded 8,525 nationwide in 15. In Hyogo Prefecture alone, 519 properties had been registered as of Sep.01, 2011. Interest in the preservation and utilization of historic and cultural properties is higher than ever before.

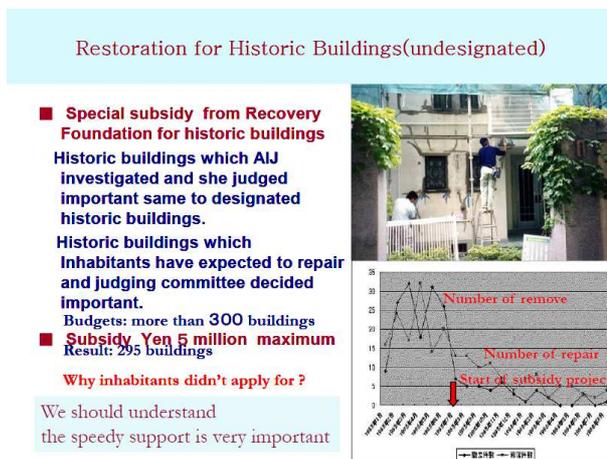
Next, after the Earthquake, it became clear that better earthquake resistance of cultural property of buildings was needed, since 73% of damage to cultural properties by the Earthquake affected buildings and structures.

In this respect, an international symposium on "Protection of Cultural Properties from Disaster" was held in 1996. At the symposium, a proposal was made on examining the balance between the value of cultural property and safety related to measures for reducing damage to cultural properties by disasters. Diverse discussions have so far been held.

In Japan, it is clearly specified in Chapter 5 - 3 (1) of the Agency of Cultural Affairs' Anti-disaster Plan that "Restorations of buildings which are designated cultural properties shall be conducted to improve the strength of target buildings for securing the safety of human lives, in particular cultural properties of buildings open to the public."

## 2) Stimulating the Development of Region and Human Relations utilizing Cultural Properties

Since the Earthquake, there have been cases where cultural properties of buildings are revitalized while their characteristics are still being efficiently utilized. For example, the former Union Church in Chuo-ku, Kobe, which is a registered cultural property of buildings, was purchased by an individual when the church was abandoned after the Earthquake. The building was revitalized



**Fig.33 Special subsidy for Undesignated Historic Buildings**

as a store after repair and refurbishment. Another example is that a mansion house built in the Taisho period, is planned to be converted into a restaurant. The Hyogo Architects' Association (an urban development working group and PR working group) visits regions where cityscape conservation activity is implemented and holds seminars with members of



**Fig.34 Former Union Church**

local conservation activity groups to study about how cities should be developed from the viewpoint of historic and cultural properties. Furthermore, there is one town seeking a way to develop their town entirely as an open-air museum in cooperation with the local town development committee. Similarly, local public organizations, universities, and volunteers are cooperating in researching traditional resources and the revitalization of the Kabuki theater of the Meiji period(1868-1912).

Based on the "Survey of conservation and utilization of historic and cultural resources and regional revitalization utilizing regional volunteer activities (note3)" related to the regional revitalization project promotion costs of the Ministry of Land, Infrastructure, and Transport implemented in 2001, typical activities carried out by these organizations are holding seminars, including observation of activities (19%), maintenance management such as cleaning (18%), the holding of events and exhibitions (13%), and research and study (12%). Each organization mostly consists of 26 to 50 people (24%), and the average age of the members is 61 or above (35%). Their financial backing for their activities comes from member fees (36%). The members are mainly self-employed (26%). No communication exchange is implemented among organizations (64%).

Most requests of these organizations for future administrative support measures were "Educational projects, including awareness"(22%), "Provision of information on activity expertise" (19%),"Support for human development"(15%), and "Dispatch of expert" (11%). We can find that these organizations wish to learn how to go about their activities and obtain advanced knowledge as well as funding. However, only 27 NPOs were recognized as a result of these activities, an extremely small proportion of the 13,250 NPOs in total announced by the Cabinet Office (as of September 2003). The average age of members of each activity group is increasing, and their information is not being shared. It is clearly an urgent task to establish a public system to help create the kind of approachable climate that will encourage young people to participate, and to enhance the activities, personnel development, dispatch of manpower, and networking among activity groups.

Note 3: Conducted a questionnaire on conservation and utilization of cultural properties by residents in 1,060 cities and towns nationwide that have at least one cultural property of building (national treasure, important cultural property, or registered cultural property) or traditional building in Important Preservation Districts for Groups of Historic Buildings; and received replies from 648 cities and towns. Issued by: Building Section, Cultural property Department, Agency for Cultural Affairs Edited by: Manu Urban Construction Research Institute Yasumichi Murakami participated as a committee member.

### **3) Repair of Cultural Properties starts from Renewed Thinking**

Restoration and repair of devastated cultural properties are different from normal restoration in many ways. Temples and individuals are major owners of cultural properties. Normally, repair starts when a sufficient reserve for repair costs is collected and an application is submitted to a public organization for a grant. However, in case of repairs after the Earthquake, reserves were insufficient due to the unexpected nature of the calamity. Repairs started with the population in traumatized mental state. One owner who narrowly escaped death in a building was very choked up, and wished to immediately demolish the structure. Another owner sagged visibly when he was told that the repair costs would be equivalent to 100 years'-worth of grants. At sites where many people were buried alive, everyone was stunned into silence. In Kobe, many foreigners were the owners of cultural properties, and thus we had to discuss restoration with their children all over the world, and also needed to appeal to their sense of connection with the region.

Researchers also had a hard time. In Kobe City, 300 brewing houses in Nada Gogo had been investigated in the three years before the Earthquake. However, all the buildings were damaged by the Earthquake before their research was published. Inspection on the damage started immediately after the Earthquake. A group of researchers, while climbing over debris, saw a single flower in a milk bottle, the memory of this flower is burned into their memory.

Damage caused by the Earthquake has both quick impacts and slow impacts: instantaneous and long-term impacts. Cultural properties suffered the latter type. The most difficult issue when discussing restoration was to avoid making snap decisions based on the temporary psychological states of disaster victims and researchers.

In one church, the congregation immediately decided to rebuild a completely collapsed cathedral, and opted for a totally different structure. However, in accordance with the words of the priest who explained the importance of conserving the continuity of memory without widening the break caused by the Earthquake, the church was in the end reconstructed according to the original design. In one temple, the abbot and the Buddhist parishioners discussed and determined to re-examine restoration after 10 years, since the reserves for restoring the entire temple were minimal. They started their repairs on a praying room.

Many religious persons went around the devastated areas to assuage the concerns of communities. Some decided to devote themselves to alleviating the mental suffering of residents, rather than repair their damaged temples. The priests tried to reduce the direct impact, and suggested approaches for returning to mental stability while shortening the duration of visible damage and respecting people's memories.

A survey targeting residents two years after the Earthquake, conducted by newspaper companies, showed that residents wanted the continuity of their former cityscape and local culture. It can be assumed that actions taken by religious persons encouraged the residents, and this led to "mental healing" which enabled residents to consider the restoration of cultural properties, i.e., embodiments of their history and memories, and what should be handed on to the next generation. We can learn a lot from the actions to be taken by these religious persons.

## 10. Increasing Awareness of the need for Disaster Prevention and promoting a System for Reducing Damage

The results of the survey on damage to cultural properties showed two trends in the prevention of damage to cultural properties. One was individual measures for improving the seismic resistance of buildings and exhibition cases which are related to arts and crafts and tangible folklore cultural properties. The other was comprehensive disaster mitigation measures for improving the disaster resistance of cultural properties, including the surrounding social conditions.

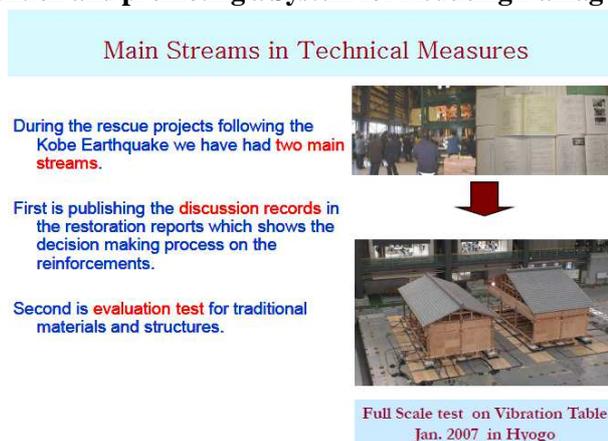


Fig.35 Main streams in technical measures

### 1) Measures for improving Seismic Resistance

Accurate identification of state of damage and reinforcement of seismic resistance are essential factors to be considered when preserving cultural property of buildings in the future. Accordingly, a seismic resistance committee was organized to examine repair policies for properties which require large-scale repairs and complicated seismic resistance measures

Topics discussed include: (1) Analysis of damage to buildings by the Great Hanshin Earthquake, (2) Evaluation of conventional structures by experimentation and evaluation of the seismic resistance of cultural property of buildings according to structural diagnosis results, (3) Examination of structural reinforcement needed when seismic resistance is considered insufficient, (4)

Proposals on reinforcement methods incorporating new techniques designed not to destroy the value of the cultural property wherever possible after conducting non-destructive testing and destructive testing for those with questionable seismic resistance, and so on.

## 2) Disaster Mitigation measures for Cultural Properties

### i ) Basic Concept

This section summarizes the lecture on “Disaster prevention and cultural property” (Note4) given by Dr. Prof. Yoshiteru Murosaki, Ex-General Director, National Research Institute of Fires and Disasters.

Note 4: Based on “Research on advanced recurrent learning system – Hyogo Heritage Manager Seminar Report (March 2003, Hyogo Recurrent Learning System Research Association)” which was compiled by trainees of his lecture at the Heritage Manager Seminar. Yasumichi Murakami participated as an editor.

Many people who handle and respect cultural properties are inspired by them, and understand their history and origins. Interaction between people and cultural properties is important for the preservation of cultural properties. In the case of cultural properties that are dwellings, such as private houses and merchants' houses, we need to preserve the building itself, minimize any risk to the people living there, and also protect their way of life. We must therefore find solutions to protect three factors simultaneously: way of life, safety, and the cultural property itself. In the case of temples and shrines, it is important to preserve the cultural property itself, protect the safety of visitors coming to the cultural property, and preserve Buddhist statues, arts, and crafts placed inside. What needs to be protected varies according to type of cultural property. This relationship must be carefully reviewed when examining tasks related to cultural properties and disaster prevention.



**Fig.36 Measures for protection**

### ii ) Damage to cultural properties

Statistically, major causes of damage to cultural properties in the past can be classified into the following.

#### +Typhoons and earthquakes

Cultural property of buildings in Japan have tendency that those strong to typhoons are weak to earthquakes, and those strong to earthquakes are weak to typhoons. Because of this, it appears that people have the idea that temples and shrines can be rebuilt if they are damaged. This idea came about because of the flexibility of wooden architecture: temples can be repaired and rebuilt, although they have been demolished, as long as the parts remain. Respect for human life has been added to this simple idea, so at present, advanced disaster-preventive technology is required.

#### +Fire and lightning

Since there are many wooden cultural properties in Japan, loss of cultural properties by fire is common. Arson of temples and shrines is increasing and becoming a serious problem. Cultural properties can be protected from lightning by providing a lightning rod.

#### +War and crime

The chief cause of destruction of cultural properties worldwide is wars. In Japan as well, cultural properties have been destroyed in wars, such as the Ohnin war (1467-77). During World War II, the most recent war, 66 national cultural properties of buildings including Nagoya castle and Hiroshima castle; and 22 arts and crafts items were destroyed. Nowadays, cultural properties are regarded as valuable antiques, so prevention of robbery is also becoming a major task.

#### +Unintentional destruction by development

Cultural properties are lost also through shortsighted development and other negligent actions. Unlike designated cultural properties, which are protected by laws and regulations, undesignated historic and cultural properties may be altered or lost due

to changes in sense of value. We need to understand that cultural properties of this type will be destroyed if we cannot provide protection and utilization of cultural properties corresponding to the changing times and changes in life styles and social structures.

### iii) Protection Measures

Protection measures start from prevention such as by anti-seismic reinforcement. Emergency actions are taken at the time of occurrence of disasters and restoration measures lead to the next set of preventive measures. Each step of taking preventive measures, emergency actions, and restoration measures needs to be examined as part of the entire cycle.

Preventive measures refer to systems for seismic resistance, fire resistance, and efficient robbery-prevention. Emergency actions refer to how we can protect cultural properties when a disaster actually occurs. This includes, to give a small-scale example, the installation of gear for carrying Buddhist statues on one's back. A system for providing seismic resistance measures to devastated cultural properties to extend their life is also included. Restoration measures are assumed to include measures such as installing seismic safety devices during reconstruction and not simply restoring the original structure. One example is the House 15 of the former Kobe foreign settlement.

Disaster-prevention of cultural properties involves creating a plan that links, in a series, emergency actions to preventive measures. However, disaster-prevention of cultural properties has up to now been more focused on emergency actions.

For example, a water supply infrastructure for extinguishing fire is the main task of fire prevention. However, other ideas must also be examined in the risk management of cultural properties alongside a system for disaster-preventive management. For example, old town houses in Kyoto have a high-ceiling space called a 'Hibukuro ' in their kitchens. This is a spatial design intended for preventing occurrence of fire.

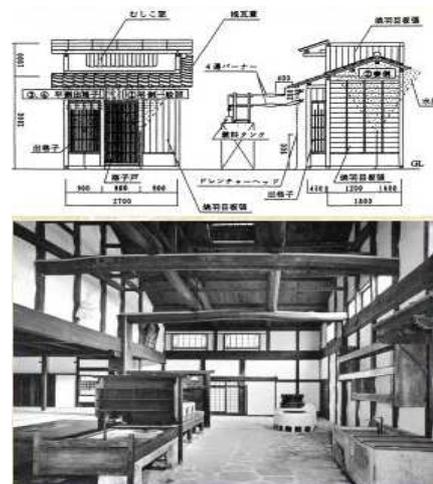


Fig.37 Fire Proof test for traditional wooden House (upper) and Hibukuro design in kitchen (lower)

## iv) Environment of Cultural Properties with Respect to Disaster Prevention

### +Human resource Environment

As described above, it is important to utilize the capability for disaster prevention that each cultural property originally possesses. Therefore, from the viewpoint of disaster prevention, we need to know about the environment surrounding cultural properties in today's society compared to the time when they were built.

Cultural properties are supported by the additive strengths of technical experts in a wide range of professions. Accordingly, cultural properties cannot demonstrate their full capability unless the best quality skills and techniques are passed down. In fire experiments, we have confirmed that a half-timbered wall, conscientiously made using a traditional process, showed a better resistance to fire than a cement wall. Anti-seismic structure experiments also revealed the half-timbered wall to be stronger. However, this result applies only to half-timbered walls made by a skilled carpenter such that no fire passes through the cracks. The required performance is only achievable by skilled carpenters.

Traditional Japanese processes depend largely on the skills of individual masters. We need to consider carefully the results of experiments, which reveal that securing of skilled hands broadens preservation approaches for cultural properties.

### +The Surrounding Environment

Spaces such as groves in village shrines are increasingly being transformed into graveyards or parking lots, and dense housing is being built around temples and shrines. In the past, there was a space, which acted as a buffer zone that sheltered temples and shrines from outside fire. At present, however, cultural properties are exposed to external threats such as direct fire. In the past, shrine parishioners also came to fight any fires that broke out. This system no longer exists, and the protective environments

surrounding cultural properties are vanishing.

We surveyed the management system in temples and shrines, and found that about 30% of temples and shrines did not have a custodian. Even if there was a custodian, it is often a single aged person who stays to look after the house alone. We tend to focus on the improvement of performance of building structures; however, it is increasingly difficult to rely on individual efforts without examining a management system for protecting properties. The social system for managing cultural properties is weakening. We need to think about creating a new social system with respect to disaster-prevention capability.

#### **v) Comprehensive and Systematic Disaster Prevention for Cultural Properties**

Several years ago, a fire broke out in Hida Takayama, one of Japan's most Important Preservation Districts for Groups of Historic Buildings, but did not spread to the adjacent houses, as had been predicted in the disaster-prevention plan. The fire did not spread thanks to software fire-prevention, which was the ratio between eave height and road width, and a hardware fire-prevention method based on *udatsu* (a thick sidewall under the roof, *nurikomikabe* (a plastered wall), and the positioning of thick-walled warehouses.

According to old records in Kyoto, most major fires were caused by wars, and large-scale accidental fires were rare. The town of Kyoto is full of clever mechanisms for protecting safety in the case of major fires. For example, the *hibukuro* structure for allowing sparks to burn out before landing on any surfaces, lattice windows which are easily detachable from inside to allow evacuation, and eaves at the same height in neighboring houses that provide a safe escape route over the roofs. A system of disaster prevention built in accordance with community rules establishes a harmonious order with neighboring communities. It is a very logical system for protecting a town.

To reduce disasters using modern technologies, it is important to understand and utilize mechanisms and techniques for traditional disaster prevention, which was developed by wisdom because technology was fairly primitive in the past.

In the disaster prevention of cultural properties, it is necessary to build a single system by carefully coupling systems with different characteristics: area-wide protection of precious properties by guarding the surrounding area; improvement of the anti-seismic performance of individual properties; ongoing measures for prevention, emergency actions, and restoration; integration of traditional techniques and the latest techniques; and integration of hardware and software technology.

Concerning the improvement of anti-seismic performance related to individual measures, a policy of "Improving the strength of target cultural property of buildings for securing the safety of human live" was specified in the aforementioned disaster-prevention plan of the Agency of Cultural Affairs. The plan specifies observing the state of damage, analyzing the destruction mechanism, and making proposals on preservation methods, including anti-seismic measures. In 2001, the Agency of Cultural Affairs issued their "Evaluation policy of anti-seismic capacity for important cultural properties and "Reference materials."

However, with respect to development of comprehensive disaster-reducing system for cultural properties, the need to broaden the category of what are called cultural properties, from a few designated cultural properties to regional historic and cultural properties, was a lesson learned from the Kobe Earthquake. In 2004, a part of the Law for Protection of Cultural Properties was revised to incorporate the registered cultural property system. This encouraged area-wide actions including the area surrounding the designated cultural properties. We can conclude from this that our recognition is legally established. In the future, it appears that there will be a serious shortage of human resources with knowledge of cultural properties, since actions taken in the Kobe Earthquake will become standardized in other areas in anticipation of future earthquakes.

### **11. Establishment of a Disaster Mitigation System**

A disaster mitigation system is established through the process in which three countermeasures—preventive measures, recovery measures, and reconstruction measures—rotate and eventually develop into a higher-level

countermeasure. With respect to preventive measures, the Kobe earthquake shed light on the necessity of preparing a database of cultural properties and establishing networks and wide-area agreements with volunteers in order to increase response capacities. At the stage of implementing recovery measures, circumstances change rapidly, so it becomes extremely important to establish the priority of surveys and to calculate budgets in a speedy manner in accordance with the urgency of the measure. At the reconstruction stage, an evaluation committee needs to be organized and reconstruction efforts need to be documented, to establish an official perspective.

The next step in preparing against earthquakes and large-scale natural disasters consists of establishing legal systems and developing anti-seismic technologies. It also involves three important measures. One is to develop human resources who could put the large numbers of locally valued historical and cultural heritages to good use in society. The second is to introduce an inventory system that incorporates local residents' views in managing the historical and cultural heritages of the community. The last is to develop a system of wide-area cooperation to respond to large-scale disasters that cannot be addressed by individual communities alone.

### **1) Human Resource Development**

The comprehensive inspection marking the tenth year of the Kobe Earthquake pointed out that securing human resources capable of envisioning meaningful uses for cultural property of buildings and large numbers of other heritages is essential to their preservation. It also pointed out the need to develop architects who have proper management capacity to repair the large numbers of historic buildings, which, unlike designated cultural properties of buildings, shall continue to be used.

Based on the experience of disaster response, the Hyogo Prefecture Board of Education launched an initiative to develop human resources who would participate in community development efforts, and began offering "Hyogo Prefecture heritage manager training seminars" since 2001 in collaboration with the Hyogo Association of Architect Building Engineers. The seminars enroll applicants from various occupational backgrounds, from people engaged in design and construction, to members of government offices and artisans. In addition to the cultural property of building category, fine arts and crafts category, natural monuments category, and places of scenic beauty category combined have received a total of 357 applicants as of fiscal 2009.

One of the greatest features of the seminars is that they provide an opening for those who wish to engage in activities as a heritage manager after completing the seminar. For example, those who complete the building program may participate in a heritage committee that has been organized in the Hyogo Association of Architect Building Engineers. They may also register with the Hyogo community development Technology Center, which operates a system for dispatching registered members to organizations engaging in community development activities. Thanks to these opportunities, the training program does not simply help improve individual qualifications, but also encourages participants to become part of a network of people who have participated in the program (known as Hyogo Heritage Organization H<sup>2</sup>O) and supports their activities.

In other categories as well, work opportunities are offered in cooperation with related institutions. For example, in the natural monuments category, which is intended for tree doctors and provides qualification as a "green heritage manager," the Hyogo Branch Office of the Japan Tree Doctors Association assumes a main role in providing work opportunities. In the fine arts and craft category, the "Hyogo History and Culture Forum" has been established within the Hyogo Prefectural Museum of History as a center for relevant activities. Kobe University has also established a regional cooperation center, and organized a Archivist' Network within the center for the rescue of archives and historical materials in the event of a disaster.

In 2004, when Typhoon No. 23 struck Hyogo Prefecture, Toyo-oka City, Sumoto City, and other nearby cities were designated as “serious disaster zones” under the Ministerial Ordinance Concerning the Designation of Serious Disasters and Applicable Measures for Coping with Serious Disasters. This was the first time since the Kobe Earthquake for any region to be designated a serious disaster zone, so it essentially put to the test the adequacy of the disaster response for cultural heritages. Human resource development efforts proved effective in rescuing historic buildings, as demonstrated by heritage managers who undertook the survey of historic buildings and held a reporting meeting in December of that year. Kobe University Archivist’s Networks initiated an inventory survey of archives and historical materials in the region in cooperation with industry, government, academia, and the private sector, and responded promptly to the disaster. It also functioned efficiently after the heavy rain disaster that occurred in 2009, as well as ensured inter-regional cooperation in the aftermath of the Western Tottori Earthquake (2000) and various other earthquakes that occurred throughout Japan. It has since developed into a nationwide network connecting regions that have experienced an earthquake.

Region-based heritage managers and human resources possessing specialized knowledge about cultural heritages can be expected to act voluntarily in the event of an emergency. They are integral to comprehensive disaster mitigation systems, which are expected to go beyond systematically identifying the targets of recovery efforts and disseminating knowledge about those targets. It goes without saying that a large manpower is needed in times of disaster. Therefore, disaster mitigation should be considered in conjunction with the introduction of people who naturally have interest in cultural heritages and value them as part of their lives. It is through the development of this type of survey framework that a mature society that is resilient to disasters can be achieved.

## **2) Establishment of an Inventory System**

It is important to have accurate information about the locations of historical and cultural heritages that embody regional culture and that are found in large numbers throughout Hyogo Prefecture. It is also important to have preliminary knowledge of these properties as a historical and cultural heritage unique to the region, because such information and knowledge would allow speedy responses in the event of a disaster when response time is limited. Based on this awareness, the cultural property registration system for the moderate utilization and maintenance of cultural properties has just been included in the scope of the Law for the Protection of Cultural Properties, in addition to designated cultural properties.

However, as experienced in the Kobe earthquake, the local residents sought protection of not only designated and registered cultural properties in the aftermath of the disasters, but also the vast properties of the historical and cultural heritage of their community. This indicated the need to develop a different type of system from the Law for the Protection of Cultural Properties and other ordinances—a system that could respond to temporary protection needs based on regional reconstruction plans.

The above-mentioned Hyogo Prefecture heritage managers engage in, among other tasks, preparing a list of information on the locations of diverse historical and cultural heritages that embody the regional culture, creating distribution maps and other types of maps, and organizing information that would be helpful in creating an inventory system. They also organize public tours and awareness-raising activities, to foster a sense of affinity with the cultural heritage of the community. Moreover, they consult with the owners of historical and cultural heritages about their effective utilization, and strive to introduce preventive care, such as by offering regular inspections and proposals for the regeneration of historical and cultural heritages at no cost, in conjunction with the prefecture’s “Best 100 Modern Houses” and “Folk House Regeneration” projects.

### **3) Wide-area Disaster Support Framework**

The nine Kinki prefectures are bound by an agreement for mutual support in the event of an earthquake disaster, in preparation against earthquakes and other large-scale disasters. Under this agreement, they have created guidelines for cultural properties, including an outline of preliminary preparations to be carried out by each prefecture, procedures for requesting and responding to requests for support, and methods for conducting supporting surveys of each type of cultural property.

As advance preparation, they have (1) created a roster of personnel and managers of relevant departments in each prefecture, (2) mutually exchanged information about cultural properties, and (3) prepared a common damage survey format to be kept on hand by each prefecture. In regard to making requests for support, each prefecture has primary responsibility of responding to requests from a certain prefecture in the event of a disaster, and the response framework ensures that the prefecture with primary responsibility would organize damage surveys if the disaster-stricken prefecture cannot take action.

It is assumed that wide-area support would be requested when a prefecture has suffered devastating damage and cannot function at its normal capacity, as in the Kobe earthquake. Therefore, damage surveys are expected to be carried out through the concerted efforts of industry, government, academia, and the private sector. This requires the cooperation of the above-mentioned heritage managers and universities, as well as the development of human resources per region. It is also apparent that the cooperation of these human resources is necessary in creating a list of historical and cultural heritages as regional society-related capital.

### **4) Focusing on the Disaster Mitigation by Personnel Development**

Hyogo Prefecture implemented their International Verification Project for Earthquake Disaster Countermeasures in 1999. In this project, Hyogo Prefecture was required to re-examine the concept of restoration of cultural properties from the viewpoint of integral restoration of historic landscapes, cultural properties and community based town development. A proposal was also made to train architects in managing the restoration of numerous historic building structures, which continue to be used, unlike building structures, which are designated cultural properties.

In response to this changing set of circumstances, the Hyogo prefecture council for cultural properties protection made a proposal on “Utilization of historic and cultural heritages in a recycling-based society.” It proposed the fostering of a heritage manager for re-discovering, preserving, and utilizing historic buildings.

Overview of the proposal

-Measures to increase registered cultural properties and stimulate the restoration market

- Extension to comprehensive measures

Leading to comprehensive measures by reinforcing cooperation with related departments so as to utilize historic buildings in daily life, including cultural sightseeing.

- Consideration of integrity with regional culture

Developing a community utilizing culture by cooperation between restoration and maintenance of historic buildings (hardware) and exchange of traditional culture (software).

- Training in technical knowledge

Focusing on the development of an organization for wide-area support which has a technical background, and considering building a network with community based local town development organizations.

- Enhancement of the system

Strengthening cooperation between departments in charge of cultural properties and departments in charge of landscape to integrate community based town development such that it leads to both the building of a living space and preservation and

utilization of historic and cultural heritages.

- Introduction of heritage managers

To embody these measures, heritage managers with the following capabilities must be fostered.

1. Discovering the historic, cultural, and social factors of historic buildings (undesigned).
2. Planning of conservation, maintenance, and utilization of historic buildings (undesigned).
3. Participation in community based town development as a 'family doctor' of historic buildings (undesigned).

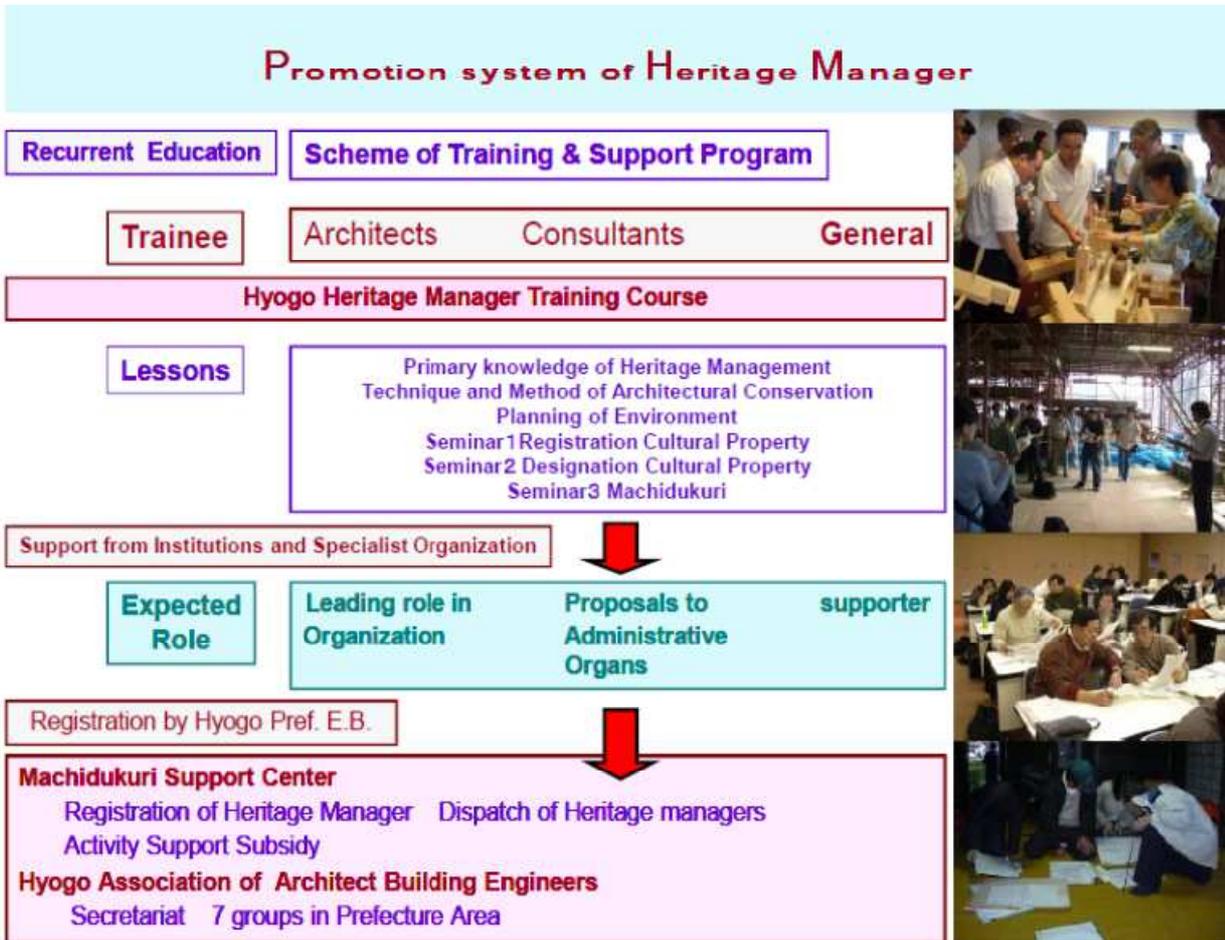


Fig.38 Promotion system of Heritage Manager

1. Historic and cultural properties
2. Town revitalization organizations
3. Assistance and consultation of comprehensive town revitalization
4. Experts in area A
5. Experts in area B
6. Experts in area C
7. Experts in area Z

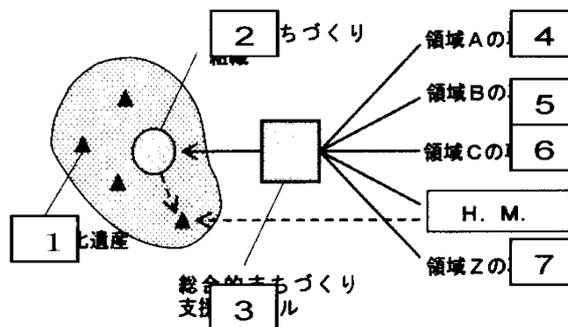
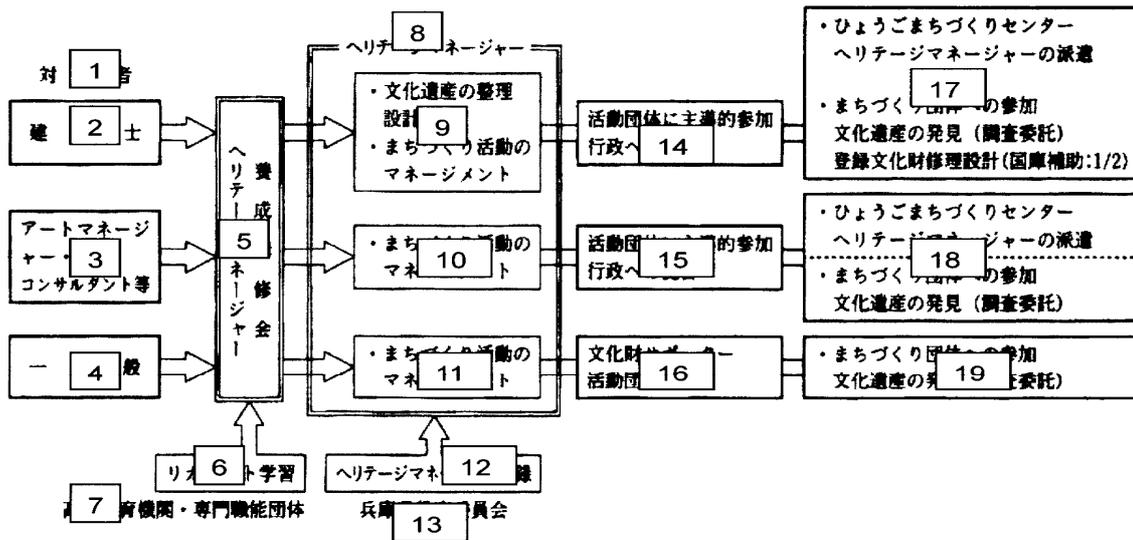


Fig.39 Schematic view of involvement by the Heritage Manager (H.M.)

i ) Fostering of Heritage Managers



- |   |   |
|---|---|
| 1 Target  | 15. Leading role in organization<br>Proposals to administrative organ                                       |
| 2 Architects  | 16. Cultural properties supporter<br>Participation in organization  |
| 2. Art managers and consultants   | 17. Hyogo town revitalization center<br>Dispatch of the heritage manager                                    |
| 4. General  | 18. Hyogo town revitalization center<br>Participation in a town revitalization organization                 |
| 5. Heritage manager seminar   | 19. Participate in a town revitalization organization<br>Discovery of cultural properties (cosigned survey) |
| 6. Recurrent learning   |   |
| 7. Institutions of higher learning and specialist organizations                                       |   |
| 8. Heritage manager   |   |
| 9. Organization of cultural assets, design technology<br>Management of town revitalization activities |   |
| 10. Management of town revitalization activities  |   |
| 11. Management of town revitalization activities  |   |
| 12. Registration as heritage manager  |   |
| 13. Hyogo Board of Education  |   |
| 14. Leading role in organization<br>Proposals to administrative organs                                |   |

Fig.40 Plan for fostering heritage manager

The seminar consists of 60 hours, comprising 30 hours of lectures and 30 hours of practical studies. The lecture session consists of three major subjects: Basic management, construction and repair technology, and community based town development activities. The practice session also consists of three subjects: Creation of research reports on registered cultural properties, measurement of actual candidates for registered cultural properties, and townscape research in scenic areas. The characteristic of this seminar is that an employment basis was provided in advance to give an opportunity to start activities right away.



Fig.41 Training Course for H.M

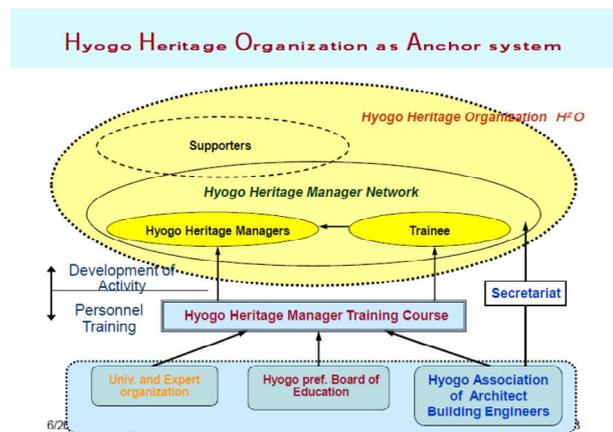


Fig.42 Hyogo Heritage Organization as Anchor system

## ii ) Activities of Heritage Managers

In June 2003, a prefecture-wide network, whose secretariat is the heritage committee of the Hyogo Association of Architect Building Engineers, and six regional networks (rising to seven in 2004) centering on regional caretakers were established. Each of the regional networks holds a study session about once a month. The heritage committee issues an Annual Report on Hyogo's Heritage to report on consigned surveys of registered cultural properties, comprehensive research on the revitalization of properties, and activity records. In addition, they actively submit articles to newspapers to make known the role of heritage managers to the public at large. (<http://www.hyogo-heritag.org/>)

Activities of the Heritage Manager comprise three stages: rediscovery, preservation, and utilization. First, the Heritage Manager needs to rediscover previously unknown historic or cultural heritages and apply for it to be registered as cultural properties. Registration is actively promoted as an efficient way to encourage discovery and familiarization. The number of registered cultural properties in Hyogo Prefecture was 505 after fiscal 2009 when the Heritage Managers started their activities: Heritage Managers had applied for registration of 235 of these. With the job of Heritage Managers becoming increasingly recognized, the number of inquiries from cities, towns, and private organizations is steadily growing.

The Heritage Manager now proposes to create a "clinical record" of each historic building based on the damage survey result. The locations of historic buildings, which were unknown before the Earthquake, are now becoming available.

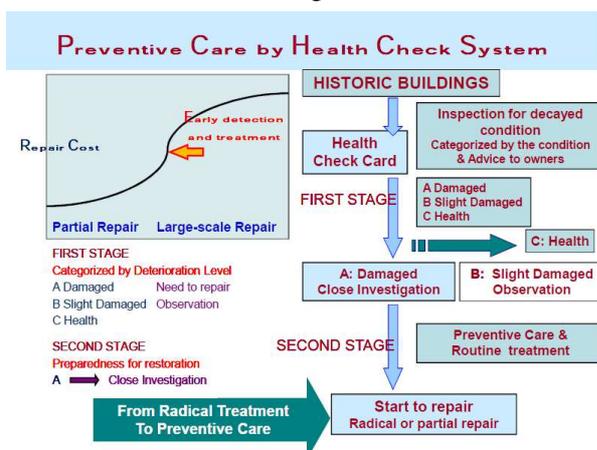


Fig.43 Preventive care by H.M

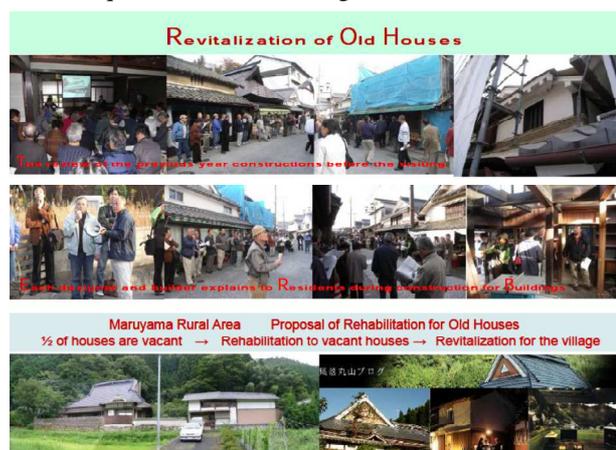


Fig.44 Revitalization by H.M

## 12. Summary

To promote the above initiatives, the Hyogo Prefecture Board of Education has established the "Vision for the utilization of historical and cultural heritages" and policies for the same, and by proposing methods for creating a

list of historical and cultural heritages in the prefecture and incorporating the large numbers of such heritages into community based regional development plans, it strives to create a society that is ordinarily fully versed in the historical and cultural heritages of the region.

The Japanese government is also implementing various initiatives with the vision of creating a social framework that values history and culture. The Agency for Cultural Affairs established a Planning and Survey Committee under the Subdivision on Cultural Properties in the Council for Cultural Affairs, and in 2007 stated that “the government should support initiatives for comprehensively assessing, preserving, and utilizing regional cultural heritages, including their surrounding environment, that are launched mainly by regional public organizations.” In 2008, the Council for Social Capital Development in the Ministry of Land, Infrastructure and Transport made the recommendation that “a framework for a new system should be created to actively promote community based regional development efforts that aim to preserve and inherit the existing beauty of traditional sceneries and regenerate traditional sceneries that are at risk of being lost.” These proposals led to dramatic changes, including the enactment of the Law Concerning Maintenance and Improvement of Traditional Scenery in Certain Districts (commonly referred to as the Historical Community Based Regional Development Law) in May 2008. Traditional sceneries and cultural heritages that are central to such sceneries have finally come to occupy a core position in the process of regional revitalization and the development of communities with distinct characteristics.

### Postscript

On March 11, 2011, a major earthquake struck the Tohoku region of Japan. While a cultural property rescue project is being carried out, new aspects of damage are making any progress extremely difficult. Amid this situation, however, efforts are being made to rescue a single pine tree that has somehow survived the catastrophic damage from the tsunami that hit the Important Natural Monument Takata pine forest in Rikuzen-Takata City in Iwate Prefecture. As the sole tree that survived in a forest of 70,000, it has been named the “Pine of Hope.” Although our generation cannot expect to witness the recovery of the pine forest, the local residents say they wish to pass on the story to posterity. On children’s day, members of the community who had evacuated to various locations gathered once again and together cleaned a local shrine that miraculously remained standing. It is said that a resident who happened to find a lion mask among the rubble performed a spontaneous lion dance and put tears in everyone’s eyes. There are many such stories as this that convey the real meaning of history and culture, as discussed above. In disaster-stricken communities, there are people who pin their hopes on protecting a single pine tree or a single *jizo* (guardian deity of children) statue that has survived the tsunami as though to piece together the fragments of their memories, and everywhere that people assemble, a traditional rite is performed. The historical and cultural heritage of a community has the potential to keep memories intact and to provide reassurance to its residents. This is why, at this precise moment in time, society must appreciate the true value of *jizo* statues and other symbols of culture and provide emotional support to people who wish to protect and carry on the history and culture of their community.



Fig.45 North-East Japan Earthquake (Mar.11 '11)