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A Comparative Study on Temporary Shelters for Emergency Disasters of Thailand: Case Study of Emergency Shelter of Japan

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Abstract

Since there were some spatial physical problems of temporary shelters in Thailand regarding the use of temples as temporary shelters for supporting victims of emergency disasters that failed to meet with international standards, the researcher conducted this study to decrypt spatial physical condition of temporary shelter of Japan that was the case study of this research. The objective of this research was to conduct comparative study on temporary shelters for emergency disasters of Thailand: case study of emergency shelter of Japan. Research process used in this research was qualitative research and research tools were divided into 2 parts including: document research for studying on documents related to temporary shelters of Japan and Thailand; and field survey. The samples were obtained from considering on 5 temples. The results Japan's temporary shelter that was the case study of this research the residential place of victims was a gymnasium located in primary school with utility spaces for supporting behaviors and daily life activities of victims. When comparing to Thailand, the building used as temporary shelter of victims was multipurpose building the major utility space of multipurpose building was the hall. Conclusions on environmental improvement or arrangement of temples for supporting temporary shelters to meet with international standards were divided into 3 alternatives. The researcher divided suggestions in to 2 dimensions including: 1) Operations of Government Sector; and 2) Participation in Establishment of Temporary Shelters in Temple Areas, in Thai context in order to obtain temporary shelters with international standards.

Introduction

Emergency disasters are a kind of disasters that is occurred unexpectedly and suddenly without forecasting or abnormal situations that are occurred with a short period of time for preparation. These

situations can be called as emergency conditions with high severity of disasters. These emergency disasters are often public hazard affecting people leading to extensive damages. In Asia, Japan is considered as a country with frequent severe disasters requiring preparation of shelters for groups of damaged people therefore temporary shelters are distributed to various areas. The Cabinet Office (Disaster Management Bureau) has established temporary shelters under government's operations whereas the municipality will improve living condition of temporary shelters to obtain good environment, i.e., 1) necessary things for living, facilities, and appropriate residential condition must be provided; 2) necessary structure or equipment must be provided; 3)temporary shelters must be located in places with low risk on disasters; and 5) temporary shelters must be easily utilized by older persons, disable persons, babies, and persons requiring special attention. This will help to build good environment for older persons whereas operating system is safe with supporting team and shelter models defined by local agencies. From surveying on opinions of local government, primary school was defined in the first rank of the place used as shelter by 95.4% (Cabinet Office, Report of 2016 Fiscal Year on Assistance Given to Victims at Shelters, April 28th, 2016).

Currently, Thailand has to encounter with several problems and Thailand has no laws or regulations on establishment of temporary shelters. On the other hand, there are only some rules contained by Department of Disaster Prevention and Mitigation in Bangkok areas in the legislation of Bangkok Metropolitan covering assistance on migration. Establishment of temporary shelters can help victims and mitigate public hazard and there is the policy prescribing temple areas as emergency shelters of communities because temples are public areas that can be accessed by everyone easily and they are also located near communities. Normally, temples are the places for making merit and performing religious activities based on cultures and tradition of Thai people. In temple areas, there are some infrastructure and facilities, for example, public utility system, toilets, and buildings for supporting a large number of people. It can be seen that temporary shelters are existing buildings which are not designed for residential purposes (Guidelines on Temporary Shelter Management. : 2010). For utility space management of temporary shelter center, each center requires different utility spaces based on social characteristics and residential duration (Asian Disaster Preparedness Center,2017).

From collecting empirical data, the researcher found some spatial physical problems of temporary shelters in Thailand when temples were prescribed as temporary shelters for supporting victims from emergency disasters but failed to meet with international standards. As a result, the research conducted the study to decrypt spatial physical condition of temporary shelter of Japan that was the case study of this research. The obtained results would be applied as the guidelines on spatial physical development of temporary shelters for

supporting victims in Thai context in order to obtain temporary shelters with international standards. In addition, the researcher also established the model policy as the guidelines on establishment of temporary shelters for preparing areas as temporary shelters of emergency victims. For this procedure, government sector must plan further for dealing with migration in case of emergency condition. According to the goals of Policy on Establishment of Temporary Shelters, it is required to consider on safety and convenient living of victims while staying at temporary shelters (National Disaster Prevention and Mitigation Plan, 2015) in Thailand.

Literature Review

Establishment of temporary shelter is considered as the solution of the problem on temporary residence for victims. It is also considered as the procedure that must be planned by government sector for further operations after migration in emergency cases because it directly affects to living and dignity of victims. Building used as temporary shelter must be defined with internal management. Place for establishing temporary shelter must be selected by Administrative Division of Disaster Prevention and Mitigation in each level. Responsible person of each temporary shelter must be defined. From previous emergency incidents in Thailand, most locations of shelters were schools, government agencies, and religious places. This is consistent with information of Department of Disaster Prevention and Mitigation which defined temples and schools under Bangkok Metropolitan as temporary shelters in Thailand with the Director of the Bangkok Metropolitan Administration as responsible person holding the power to order those temples and schools to become temporary shelters in case of emergency migration. In the event of any disaster in Bangkok, District Director of such area will become the controller and commander National Disaster Prevention and Mitigation Plan B.E. 2558). From emergency disasters in Thailand, establishment of shelters still lacks of readiness in management that can respond to demands of victims and fail to meet with international principles while being complex due to involvement of several organizations in various levels, for example, roles and duties, management, problems like problems on personnel, management with diversity of organizational culture, cooperation, power and relationship of organizations, and extension of establishment of temporary shelter.

According to the Act on Department of Disaster Prevention and Mitigation, temples in Bangkok are prescribed as temporary shelters for victims from emergency disasters. The advantage was that temples were classified as public areas (Pitch Ya-in, 2017) and many of them

located in existing communities that could be accessed by victims easily. From facts obtained from primary data collected by the research regarding emergency disasters in Bangkok, the abbots prepared multipurpose building as temporary shelter. However, since these buildings were not designed for residential purpose but they were constructed as sermon halls for studying Buddhism. On weekdays, monks and Buddhists mutually utilized multipurpose buildings for making merit on Buddhist Holidays. These multipurpose buildings look like large pavilions located on platforms with the height equal to the head of a standing person. They were surrounded by verandahs and wall of each side is open. One side is located on a platform as "a seat" for monk to chant prayers. One side of the tope of such seat is the location of Buddha image and offerings. The remaining areas of these buildings are open.

In Japan, temporary shelters are established in primary schools distributed to various communities and several temporary shelters in Japan fail to meet with standards. From Heisei 28 Kumamoto Earthquake in 2016, the size of shelter per person was 3.3 square meters but it was provided by Japanese government in the size of 2 square meters. For toilets, the proportion should be one-fiftieth during 48 hours after disaster and one-twentieth in other cases but Japanese government provided toilets to temporary shelters after 48 hours of disaster and 1 toilet per 20 persons although toilet was necessary for long stay. As a result, improvement and preparation of temporary shelters for victims from emergency disasters was reviewed. From studying on 2009 L'Aquila Earthquake in Italy with rapid preparation for disaster, Shelter Management Handbook was created that was the measures on shelters management and preparation of spatial layout of shelters. From the example of layout of primary school in Aichi Prefecture (model school), gymnasium was prescribed as residential place of victims. This Handbook was also applied as the guidelines on shelters management (Cabinet Office, Report of 2016 Fiscal Year on Assistance Given to Victims at Shelters as of April 28th, 2016).

Utility Space Management of Temporary Shelters

Asian Disaster Preparedness Center (ADPC) and Department of Disaster Prevention and Mitigation developed Handbook on Management of Temporary Shelters in Community Level that was developed from the guidelines on temporary shelter management under international standards. Details of utility space management of temporal shelters were as follows:

Demands on utility space of each temporary shelter center were different based on social characteristics and residential duration of each center. When considering on minimum standard, areas of temporary shelter must be prepared as follows: (Asian Disaster Preparedness Center,2017)

1. Areas for working or coordination of the Temporary Shelter Committee that must be managed proportionally with operating equipment and safety system;

2. Areas for first aid that should be contained with partitions as spaces for treating injured persons or patients;

3. Personal areas for sleeping. In the event that victims were not family members of one another, personal areas should be separated for males and females. In the event that it tended to stay at temporary shelter over than 3 days, there should be some laundry, cooking, and garbage dropping areas.

4. Proportional areas for looking after patients with special needs, for example, older persons or bedridden patients, disable women requiring help for changing clothes and health care, etc.

Table 2.1: Management of Personal Areas and Utility Spaces of International Temporary Shelters based on Minimum Standard (Source: Asian Disaster Preparedness Center, 2017)

Types of Utility Space		**Quantity/Persons**
Residential Areas	Personal/Sleeping Area	3.5 sq.m./person
Utility Spaces	Toilets (must be 6 meters away from residential area but not over than 20 meters and must be 30 meters away from water source minimally.)	1 toilet per 20 females 1 toilet with urinal per 35 males
	Drinking Water Service Area	1 water supply area per 80 victims minimally depending on characteristics and content of water flow.
	Laundry Area	1 area per 100 victims minimally
	Garbage Dropping Area (must be 100 meters away from residential area)	2 areas per 80 victims minimally
	Kitchen	1 kitchen based on productivity and number of persons
	First Aid Area	As proper but there must be at least 1 area
	Area for Religious Activities	1 area as proper

Research Methodologies

The process for studying and comparing temporary shelters for emergency disasters in Thailand with the case study of Japan was conducted in the form of qualitative research started from studying on related secondary data for analyzing and comparing multipurpose building with temporary shelter of Japan. Data obtained from field survey were collected by surveying context and environment of temples in order to find the guidelines on spatial physical development of temporary shelters for victims from emergency disasters.

Research tools were divided into 2 parts including: Part 1) document research for gathering data and sources of documents consisted of: 1) Cabinet Office (Safety Bureau), Japan, Report of 2016 Fiscal Year on Assistance Given to Victims at Shelters as of 3/12/2019 for analyzing on Example of Preparation of Spatial Layout of Temporary Shelter from Establishment of Temporary Shelter in the Model Primary School (Aichi Prefecture); and 2) Handbook on Selection of Safe Areas and Management of Temporary Shelters in Thailand for analyzing on utility spaces management of temporary shelter; and Part 2) field survey obtaining data from photographing and notes taking for data analysis.

The scope of this research was Thonburi District that was one of districts in Bangkok, the capital city of Thailand and the most crowded place of Thailand. There were many slums in this area with the risk on fire that was considered as unexpected public hazard or emergency disaster. In addition, fire was already occurred in some areas of this district due to physical condition of these communities which most houses were made of wood and located next to one another. In Thonburi District, there were 25 temples totally therefore the samples used in field survey at multipurpose buildings conducted in October 2020 were 5 temples located near slums with risks on fire and they could be accessed with the distance less than 1 kilometer including: 1) Santithammaram temple; 2) Kantatharam temple; 3) Yai Sri Suphan temple; 4) Bang Sai Gai temple; and 5) Pradittharam temple.

The procedure of research area selection is shown below:

Bangkok is the city with the highest number of slum communities and fire incidents. It can be found in the public disaster statistics of 2017 that there are 1,625 fire incidents in Bangkok (2016 Bangkok statistics, Strategy and evaluation department)

From all fifty districts of Bangkok, there are 111,027 populations in 44 slum communities located in Thonburi district, which is the highest number in Bangkok. (2016 Bangkok statistics, Strategy and evaluation department)

There are 44 temples in Thonburi district.
The research area selection conditions are:

- Located near the slum community within the walking distance of 1 kilometer.
- Good car accessibility.
- The temple's hall of worship has a strong structure and ready for the people to stay.
- Basic facilities.

The researchers found that there are only 5 temples that fit the above criteria:

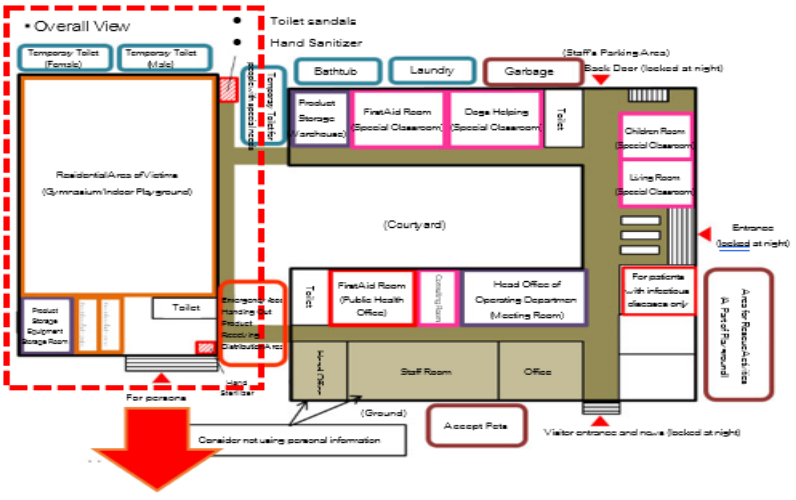
1. Santithammaram temple
2. Kantatharam temple
3. Yai Sri Suphan temple
4. Bang Sai Gai temple
5. Pradittharam temple

Results

A Study on Example of Preparation of Spatial Layout of Temporary Shelter from Establishment of Temporary Shelter in the Model Primary School (Aichi Prefecture)

Source: Cabinet Office (Safety Bureau), Japan, Report of 2016 Fiscal Year on Assistance Given to Victims at Shelters as of 3/12/2019

Figure1.1: Model Primary School (Aichi Prefecture) School Layout for Prescribing Utility Spaces of Temporary Shelter



Residential Area (Gymnasium/Indoor Stadium)

Figure1.2: Gymnasium Layout Temporary Shelter Layout Adapted from School's Gymnasium

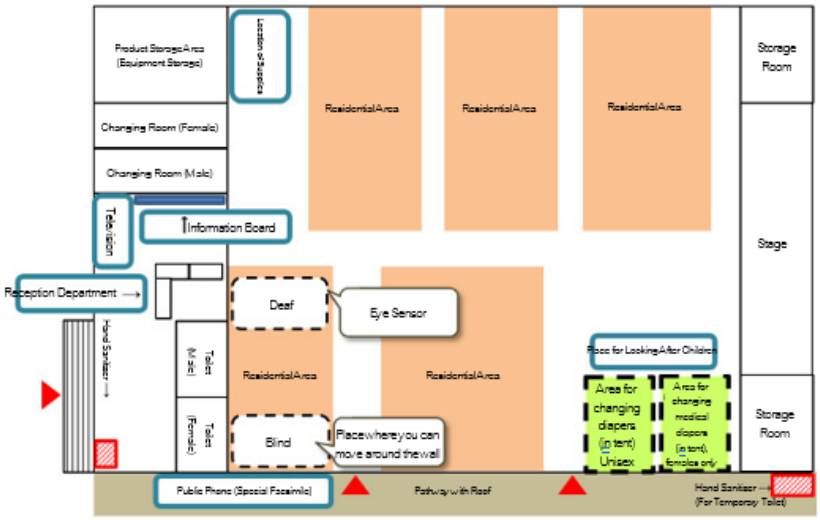


Table 4.1: Analysis on Primary School Layout in Japan that was adapted as Temporary Shelter for Rapid Preparedness with Disasters. (Figure1.1-1.2)

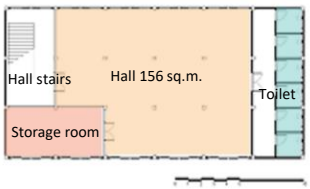
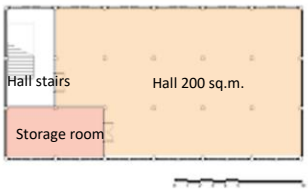
This model has been used throughout the country with the following details:

School Building		**Gymnasium**	
Indoor Utility Spaces During Normal Situation	**Adjusted for Supporting Victims**	**Indoor Utility Spaces During Normal Situation**	**Adjusted for Supporting Victims**
Classrooms	-First Aid Room -Dog Helping Area -Children Room -Living Room -Room for Patients with Infectious Diseases	Gymnasium Hall	-Residential Area -Area for changing diapers (Unisex area and separated area for females)
Meeting Room	Head Office		
Public Health Office	-First Aid Room -Consulting Room	-Equipment Storage Room -Male/Female Changing Room -Male/Female Bathrooms	
Warehouse	Store possessions/equipment		
Bathrooms			

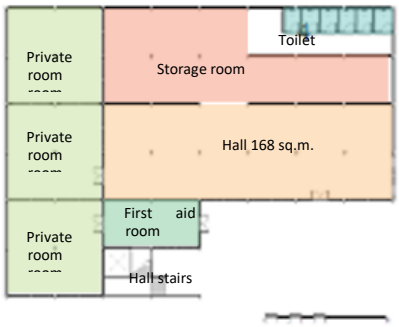
Additional Things or On-Site Installation	
-Male/Female Temporary Bathroom -Temporary Bathroom for Persons with Special Needs -Bathtubs/Showers -Area for Rescue Activities (a part of playground) -Tents	-Laundry Area/Washing Machines -Garbage Management/Garbage Dropping Area -Emergency Space for Food Distribution/Kitchen -Reception/Registration Area

From Table 4.1, it showed utility spaces of school after being adjusted as shelter for supporting victims. In each area, it was flexible for supporting behaviors and primary demands of victims. In addition, additional facilities were also prepared by installing necessary things like mobile toilet, kitchen, and surrounding areas, to respond to living at temporary shelter in the school.

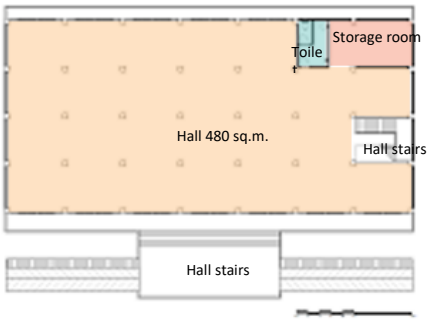
Table 4.2: Analysis on Multipurpose Building Layout in Temple Prescribing as Temporary Shelter for Victims from Emergency Disasters in Thailand

T1 Santithammaram temple		
Multipurpose Building Layout	Indoor Utility Spaces During Normal Situation	Adjusted for Supporting Victims
(a)  (b)  	Hall	Residential Area - Area for changing diapers (Unisex area and separated area for females)
	Storage Rooms	
	Toilets	

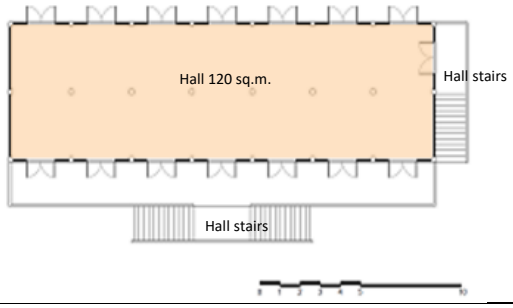
T2 Kantatharam temple		
Multipurpose Building Layout	Indoor Utility Spaces During Normal Situation	Adjusted for Supporting Victims
	Hall	Residential Area - Area for changing diapers (Unisex area and separated area for females)

	Storage Room	
	Toilets	
	First Aid Room	
	Private room	Unalterable

T3 Yai Sri Suphan temple

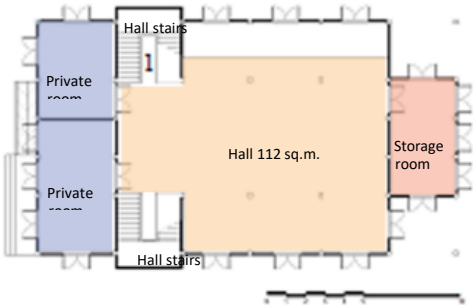
Multipurpose Building Layout	Indoor Utility Spaces During Normal Situation	Adjusted for Supporting Victims
	Hall	Residential Area - Area for changing diapers (Unisex area and separated area for females)
	Storage Room	
	Toilet	

T4 Bang Sai Gai temple

Multipurpose Building Layout	Indoor Utility Spaces During Normal Situation	Adjusted for Supporting Victims
	Hall	Residential Area - Area for changing diapers (Unisex area and separated area for females)

T5 Pradittharam temple

Multipurpose Building Layout	Indoor Utility Spaces During Normal Situation	Adjusted for Supporting Victims

	Hall	Residential Area - Area for changing diapers (Unisex area and separated area for females)
	Storage Room	
	Toilet	
	Private room	Unalterable

From analyzing on layout of the primary school in Japan with adjustment as temporary shelter for preparedness to deal with disasters, it could be seen that utility spaces shown in Table 4.1 were zoned as personal areas (gymnasium) and common areas (school buildings, surrounding areas). Inside the gymnasium, it was used as residential area of victims with 4 parts of utility spaces including: 1) gymnasium's hall that was prescribed as residential area of victims and area for changing diapers (Unisex area and separated area for females; 2) equipment storage room; 3) changing rooms for males and females; and 4) toilets for males and females. It could be deemed that utility spaces in gymnasium were personal areas of victims whereas utility spaces in school buildings as shown in Table 3.1 were common areas that could be accessed by persons related to victims, for example, doctors, nurses, or officers, etc. Surrounding areas, additional areas, or onsite-installation areas were the areas that could be accessed by outsiders easily.

Japan's temporary shelter that was the case study of this research and the residential place of victims was a gymnasium located in primary school with utility spaces for supporting behaviors and daily life activities of victims including sleeping area that was the hall area, storage area, changing room, and toilets for males and females. When comparing to Thailand, the building used in Thailand as temporary shelter of victims was multipurpose building. From studying on 5 temples that were cases study of this research, their multipurpose buildings were also different. From Table 3.2, the major utility space of multipurpose building was the hall and there were only some multipurpose buildings that had other additional utility spaces, for example, storage room or toilet. It could be seen that utility spaces of multipurpose buildings used as temporary shelter were inconsistent with behaviors and daily life activities of victims from emergency disasters.

Discussion

Research procedure was started from studying on related secondary data before analyzing and comparing multipurpose buildings with temporary shelters of Japan. Field data were collected by surveying physical of multipurpose buildings, context and environment of 5 temples in Thonburi area in order to obtain the guidelines on spatial physical development of temporary shelters for supporting victims from emergency disasters that were divided into 3 parts as follows:

5.1 Residential Area

Building used as residential building of victims from emergency disasters must had necessary utility spaces including open space used as residential area of victims, storage room, and toilet that can be used for showering or toilet with separated bathroom. The number of those rooms and areas must be sufficient for number of victims for convenience of daily life activities with privacy and safety without any จุดอับสายตา. Toilet must be conveniently accessed from residential area with separation between males and females. Inside toilet, there must be facilities for disable persons.

5.2 Necessary Utility Spaces of Temporary Shelter in Temple Area

Besides residential areas, there must be reception/registration area, emergency Space for food distribution/kitchen, first aid area, garbage management/garbage dropping area, laundry area, and area for religious activities as proper. In the event that toilets or bathrooms were insufficient, there must be some spaces for installing mobile toilets. These utility spaces should be located near residential building for convenience of accessibility. These areas were zoned separately from the areas for daily routine of temple preventing disturbance against other people who came to temple for performing religious activities and preventing insecurity and disturbance against life and assets of victims caused by outsiders.

5.3 Security

The area for establishing temporary shelter was divided into zones facilitating priorities. In temple areas with monks, it may not be convenient and may affect to attitudes leading to social conflicts. When women had to stay at the temple, there should be clear entrance sign for safety and prevention of sexual harassment. CCTVs should be installed in order to facilitate visibility throughout the area for safety of life and assets. However, it was found that toilet's doors were too narrow with handrails and number of toilets that failed to meet with international standards plus with insufficient lighting.

According to former attitude in the past, it was believed that the entrance of the multipurpose building must be located on high level as if the mountain. As a result, the entrance level was higher than normal floor whereas many temples had no slopes for perforated floors

causing difficulties for older persons or injured persons and disable persons to access the building. Consequently, slope installation could facilitate building accessibility. On environmental improvement or management of temples for using as temporary shelters under international standards, in accordance with the design for everyone a environment or modifications that everyone can make use of as widely as possible by without restrictions on age and people with disabilities.

Conclusions

From studying and comparing between temporary shelters of Thailand and Japan on environmental improvement or management of temples for using as temporary shelters under international standards, there were 3 alternatives as follows:

Alternative 1 – Multipurpose building was defined as residence: Spatial physical of building areas must be improved and developed to respond to utilization as residences for supporting victims with diversity of genders, ages, and vulnerable persons.

-Install slopes on areas with lifted floors with the distance as defined by laws, i.e., 1:12.

-Increase toilets that could be connected with residential areas in personal areas with separation of males and females. Extension or division of building areas were based on limitation of area. There should be at least 1 toilet for disable person.

-Renovate and repair bathing equipment as well as install facilities, for example, door with clear distance of 0.90 meters and install bathing equipment and handrails while considering on sufficient lighting.

-Increase storage rooms for storing bedding, blankets, dried food, drinking water, and necessary donated things for using in emergency cases immediately.

Alternative 2 – Multipurpose building was used as convenience center: It was used for storing processions or equipment, foldable furniture, bedding, tents, dried food, drinking water, and necessary donated things for temporary shelters and other facilities in temple, for example, kitchen and toilets outside multipurpose building.

-Use courtyard in temple as residential area with utility spaces zoning consisted of: 1) common areas for installing mobile toilets with separation between males and females, registration tent, first-aid area, donation area, and laundry area, etc.; and 2) personal area as sleeping area with mattresses separated for males and females and these mattresses were tents or simply assembled mattresses.

-Post layout on the wall for acknowledgement of victims from emergency disasters, for example, additional diagram in order to enable victims to access the areas conveniently and diagram showing toilet entrance. Other necessary areas like emergency exits must be lined with red color and they should not be the same way with main entrance. These things should be consulted with temple for reparation.

Alternative 3 – Temple aims to build new multipurpose building

Multipurpose building in temple area was utilized for religious and community benefits therefore it could be deemed as public building. As a result, to design multipurpose building, it was necessary to consider on Building Control Act B.E. 2522 and ministerial regulations related to design.

This multipurpose building was defined for 2 manners of utilization, i.e., 1) as the place for making merit or performing religious ceremonies with high capacity; and 2) as temporary shelter of victims. As a result, utility spaces of this multipurpose building were divided into 3 zones, i.e., Zone 1: areas for monks to perform religious activities consisting of entrance hall for monks, seats for monks, and equipment storage area for ceremonies, for example, set of altar table, seats, etc.; Zone 2: front entrance hall and area with hall and long pathway for using as pathway in building and connecting with front entrance hall and entrance hall for monks. Open central hall was used as the area for general people to make merit and perform religious activities. This are should be flexible and adjusted as sleeping area of victims from emergency disasters; and Zone 3: areas for supporting victims consisted of: 1) toilet that could take shower with separation between males and females and there should be at least 1 toilet for disable persons; 2) storage room with necessary equipment, for example, bedding, tents, foldable mattresses, dried food, drinking water, and common household remedy, etc.; 3)ฬcooking area; 4) first aid area; 5) laundry area; and 6) area for performing religious activities to meet with consideration on temporary shelters under international standards (Asian Disaster Preparedness Center,2017)

Recommendations

As the guidelines on spatial physical development of temporary shelters for victims from emergency disasters in Thai context in order to obtain the model of temporary shelters with international standards, the researcher divided recommendations into 2 dimensions including: 1) Operations of Government Sector; and 2) Participation in Establishment of Temporary Shelters in Temple Areas among Government Agencies, Communities, and Temples. Details were as follows:

1) Operations of Government Sector

-Establish policy and guidelines for establishing model temporary shelter and creating Handbook on Temporary Shelters Management in the model temple areas as the guidelines for establishing temporary shelters in temple areas throughout Thailand.

-Legislate laws and regulations on public building control and temporary shelters for supporting victims from emergency disasters, for example, multipurpose building or sermon hall must have the following areas for supporting victims from emergency disasters; 1) sleeping area; 2) toilet that can be used for showering with separation between males and females and at least 1 toilet for disable persons; 3) storage room for storing necessary equipment; 4) cooking area; 5) first aid area; 6) laundry area; and 7) area for performing religious activities. In addition, good environment must be built with safe operating system for simple usage of older persons, disable persons, babies, and persons requiring special attention.

-Allocate budget with support department to supervise areas of temple prescribed as temporary shelter whereas municipality must improve living condition of temporary shelter in temple areas to have good environment without leaving any burden to temple.

2) Participation in Establishment of Temporary Shelters in Temple Areas among Government Agencies, Communities, and Temples

- Perform public criticism between temples and communities as well as make understanding on temporary shelters management.

-Separate management system, build systematical network on preparedness among sub-district administrative organizations, Civil Defense Volunteers, Village Heath Volunteer Club of Thailand, temples, and communities for assigning roles and duties.

-Check bedridden patients, infected patients, pregnant women, older persons, and disable persons in community as well as coordinate with community public health or community hotels.

-Evaluate temple to find its capacity and appropriate groups of victims.

This research was conducted to study and compare temporary shelters for supporting emergency disasters of Thailand with an emergency shelter in Japan. It was spatial physical comparison conducted in areas of some temples in Thonburi District only. For further development, anyone interested can apply recommended issues to future studies, for example, expanding research areas to other areas with the risks on emergency disasters, studying and comparing other types of public building with infrastructure or mobile shelters, participation in

temporary shelter management, designing multipurpose building that can be adjusted as temporary shelter, etc.

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