Nowadays, several previous studies have research about disaster emergency plan cause historic preservation areas are vulnerable to disasters rather than normal city area. The town of Khlong Bang Luang is a historic canal residential area, which is an old capital of Thailand in the past. This area is vulnerable to fire disaster. Because of the limited accessibility leads residents in this area to vulnerability for evacuate on emergency times. Furthermore, there are many wooden houses stand close, the narrow street between houses is inconvenient for evacuation and some of building materials are hazards to fire disaster. So this study proposes to simulate fire evacuation routes during emergency time by using applications to clarify the preparedness of the community planning for the best evacuation way. We hope that a guideline of multimodal evacuation will be provided based on the further study also in order to design architecture elements of the area.

【研究等の概要】

In this study, which targets the historic town area in Khlong Bang Luang are finding the vulnerable zone and the blockage area. By using element factors and site’s potential to analyze the vulnerable zone which could led to determination of the multimodal evacuation routes in further study.

We simulate the fire spread in this area by demonstrate temperature result. While temperature is a measure of the degree of molecular activity of a material compared to a reference point, Heat Release Rate (HRR) also used to demonstrate the rate at which fire releases energy. We set the time of fire spread in 5 minutes to investigate how fire could spread in time period. We set 3 areas as origin of fire that we found from vulnerable analysis from GIS. During simulation time, fire is easy to spread to buildings that made from wood and buildings that have shared architecture elements. Also fire distinctively
spread and block streets in this area as in Fig. 8. From 0 second to 10 seconds, fire is starting to spread to surrounding building. In 60 seconds, fire is spreading to the narrow street connected to canal. So (B) Street is the most vulnerable street in early 60 seconds. In 120 seconds, first intersection that located near the narrow street is the most vulnerable. So residents unable to evacuate direct to this area after 120 seconds pass. While area c, residents who adjacent stay at this area able to evacuate direct to Main Street or canal. Between 120 seconds to 180 seconds, second intersection point is becoming vulnerable zone moreover HRR and burn rate become the highest rate in this range. After 180 seconds, fire is spread over in this area.

Here, we should mention the limitations of this study. Elements factors that showed on this paper are result from survey data. During we were surveying in this area, some of building still renovating and destroying to become a new building. Most of building material made from wood. Thus, we can understand this area that is easy for fire spread. Furthermore, most of building usage are residential type and may find accessible difficulty. Some of residential shared the same access to their accommodation because they are relative family. So this increase difficulty for evacuation when fire disaster occurred. Moreover, Public Streets are narrow and block by some of architecture element and being use as parking space. Residents may find difficulty to escape through to temporary safe place or another area.

Lastly, this study was an exploratory survey that can be referred and showed the results of high vulnerable zone and blockage zone in primary stage. Another area, which is same character of this area can follows the methods of this study to be a guideline for finding element factor that can effect to their own area.
Recently, Khlong Bang Luang is an old historical town that basically initiates a fire emergency system. But in terms of architecture and urban design is the one factor that could improve this area by designing, planning and increasing well being of people in this area to live with their traditional way and modern life on fire emergency times. In this study, the result provided essential data for primary state of vulnerable analysis. We found many results that distinctively effect and also time estimation of fire disaster. From this study, we focus on the physical issues consist of building use, building material, building area, building condition and building level conform with the advantage of this site and simulate vulnerable areas with applications. So the results of this analysis provide better understanding in canal community's current situation and fire risk condition. Elements factor also represent important issue for residents to comprehend the vulnerable and blockage zone. This study also imply that residents must concern and realize the evacuation route in this area which route is the most severe than another area to avoid casualty. We will continue to further research by using this study as the one factor that can clarified the vulnerable zone to simulate another area with applications and find the best solution for evacuate on fire emergency time as multimodal access. Furthermore, this research, aim to provide appropriate guideline for living in this area by architectural elements design, determining safety zone and so on.