

Design Philosophy and Methodology Required for the Survivors of Japan's 2011 Tsunami

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Abstract: This paper discusses the philosophy and methodology of Civil Engineering Design upon a case study of a design project; small public space created to encourage and heal the survivors in the aftermath of the March 2011 Tsunami of Japan. Our team proposed creating bar/food stands where people can gather, relax, eat, drink and chat freely out of the shelters to cope with their severe loss in Otsuchi Iwate. They had suffered from two kinds of loss; the loss of bonds among people and with the land. The citizens not only lost their family and/or friends but were split off from their local communities. The citizens lost their hometown overnight. After weeks of preparation, a small square finally opened and recreated the scenes of citizens gathering and chatting right in the center of the town, which symbolically represented the recovery of the two bonds. An important role of Civil Engineering Design lays in a philosophy of enriching people's emotional QOL rather than designing shapes or colors. This case suggests a methodology to restore the bonds at an earlier stage of regeneration from disasters.

Keywords: Design Philosophy, Design Methodology, Regeneration from Disaster, Design Project

Introduction

This paper discusses the philosophy and methodology of designs created by civil engineers, based upon the authors' design practice where a site/scenery was created to encourage the local citizens' social gathering and healed each other's hurt minds in a downtown area where catastrophic damages had been caused by the Tsunami of the Great East Japan Earthquake on March 11th, 2011. Before going into details, we would like to briefly introduce the history of civil engineering designs in Japan as the background of this case.

Overview of Japanese Civil Engineering Design History

Civil Engineering has rapidly modernized in Japan under a strong influence of European Civil Engineering technologies from the mid 19th century when the Meiji Restoration occurred in 1868 and the national isolation policy ended. Technology developed and construction materials progressed from "Wood and Stone" culture to "Iron and Brick", and then to "Iron and Concrete". Due to rapid population increase during the high economic growth period after WWII, the basic Design Standards were created to cover up rapidly increased quantitative needs of infrastructures. As a result, infrastructures in cookie-cutter designs have appeared all over the country. This system has also caused an issue that such cookie-cutter infrastructures ruined the unique landscapes of the local area which had diverse, beautiful natural resources generated from unique

climate conditions and topographies. In consequence, the Ministry of Land, Infrastructure, Transport and Tourism admitted that their former policies had lacked sensitivity to the quality of infrastructure designs, and announced a release of "Outline of Policy for a Beautiful Country" in 2003, where the government defined that the "beauty" should be regarded as one of the purposes of civil engineering designs. Finally Landscape Act, a new system to maintain local landscapes, enacted in 2004. As of today, Landscape Act and other associated systems are not necessarily performing in full effect, but somehow society have started to realize that infrastructure designs should blend in with or add values to the local landscapes. In fact, there have been a lot of discussions that Japanese Civil Engineering Design should be regarded as part of the local landscape, and a number of actual works developed on this belief. As the population ages with declining birth rates after the peak of population in 2008, Japan is turning into a mature society, and we are still in search for how to be to cope with the changing society This has a lot of meaning to Civil Engineering Design and mature local life is in demand today.

Otsuchi Town and its Damage From the Tsunami in 2011

Otsuchi is a town located along the Pacific Ocean in the middle of Iwate prefecture, with 200 square kilometers land area and a population of approximately 15,000 before the Tsunami. Since its

flatlands are mostly located along the coastal area, the population density of the habitable land area used to be as high as 680 people/square kilometers, which ranked the fifth highest of all municipalities in Iwate prefecture (Figure 1). In other words, Otsuchi is a town that consists of high population density residential areas along the coast, which were mostly devastated by the Tsunami (Figure 2).



Figure 1. The Location of Otsuchi Town

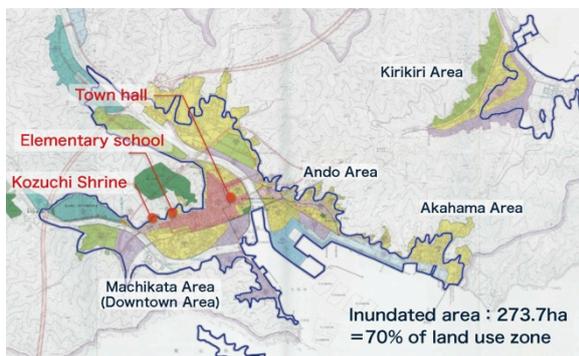


Figure 2. The Inundation Line and Land Use Areas of Otsuchi Town

At 2:46PM on March 11th, 2011, a gigantic earthquake of magnitude 9.0, with its epicenter off the Pacific coast of Sanriku, has occurred, followed by a fierce tsunami generated by the earthquake that attacked vast areas of Eastern Japan, mainly along the coast of Sanriku, which left approximately 22,000 people dead or missing according to the newest report from the government (Fire and Disaster Management Agency, 2016). This was the worst disaster on record since the modern period started in Japan. Of all

affected areas, Iwate, where Otsuchi is located, and Miyagi that lays in the south of Iwate were the worst affected prefectures. The damage to Otsuchi was so significant that the town was designated as one of the four “most catastrophically damaged” municipalities by Iwate prefecture in accordance with its damage state classification standard.

In Otsuchi, most of its downtown area turned to a pile of debris (Figure 3) and approximately 1,300 people went missing or died. The damage included the loss of its human resources of the local government office; majority of its town officials in managerial positions including the mayor died of the disaster. Due to the absence of the local government’s decision making function and the significant damage to its administrative processing abilities, the roadmap to a recovery remained still unclear. Under such situation, many citizens of Otsuchi who lost their home, where they were grown up and had spent time with their beloved, were forced to stay at the evacuation shelters that scattered on the higher ground of the town, where they were allotted only a few square meters space per person. The center of Otsuchi’s downtown area were so ruined that there was not a single store open in the area, with not a single light to be seen during the night. That was where this project launched and it was 70 days since the earthquake occurred.



Figure 3. The Downtown Area After the Tsunami (Up: April 19th, Down: May 31st, 2011)

Aim and Methodology of the Design Project

The authors' involvement with Otsuchi started when Yu Nakai, one of the authors, was appointed as an advisor to Iwate Prefecture with regards to the reconstruction of Otsuchi, further details of which are reported (Nakai, 2013).. Since Otsuchi government was missing its mayor, the town had to hold a mayor election first before starting to build up a strategic plan for reconstruction. Otsuchi was the only municipality of all affected areas where its mayor died, and this has kept its reconstruction project on hold when other municipalities already started planning for reconstruction. It is easy to imagine that this has worsened the citizens' anxiety even further.

In May 2011, a team of specialists and student volunteers in the areas of Civil Engineering, Urban Engineering, and Fisheries Science at the University of Tokyo, including the Landscape and Civic Design lab where the authors belong to, was established to support the regeneration of Otsuchi and started working to help the citizens as volunteer. That is how this design project started.

The objective of this design project was to help relieve the distress of the local residents. There were so many survivors who had lost someone special and the houses they had been attached to. Many of them were in the depth of despair from having lost their connection with people and connection with the land overnight. We decided to create a "site with a *Yatai* (portable restaurant and bar stand)", where survivors can gather, aiming to bring back such connections, which prove the existence of human beings.

This methodology was created based on the spirit of "yui." "Yui" stands for collaborative work done in a small settlement or community. All residents helping each other as a team would enable a project that can never be done by a single person for financial, lead-time or labor reasons. This is the mutual aid system which had traditionally been adopted by the fisherman or agricultural communities in Japan. Otsuchi had developed with the fisheries business as its main industry, and therefore its local communities still have the spirit of "yui." We have decided to create a "site with a *Yatai*" by bringing out the local connections, or the power of "yui" that is.

Process of the Design Project

Simultaneously, the local residents of Otsuchi started to work for regeneration by themselves. At the end of May, "Yuikko Otsuchi", a team of local residents, was established. The objective of this alignment was to set up "Otsuchi Residents' Conference for Community Development and Regeneration," in order to create opportunities for the local residents to exchange their opinions for regeneration. Soon after the first conference was held, we have met with Mr.

Tomohiro Akazaki and Mr. Hiromi Kashiwazaki, the key members of Yuikko Otsuchi, to present our idea of creating a site with a *yatai* stand and they have confirmed their agreement to carry out this design project on a collaboration between Yuikko Otsuchi and our team right on the spot.

After several email correspondence, followed by a meeting at Ando Elementary School, where their evacuation shelter was located, we have mutually agreed to the following points;

- We will ask Mr. Katsushi Nagumo, a designer, to design the *yatai* stand
- The *yatai* site shall be completed by the end of July.

This is how this project started. This project required mainly four elements; "Design of Stands", "Site Allocation", "Materials and Manufacturing" and "Construction and Setting." The following context describes how these elements were planned and executed. For further reference, a detailed timeline of the project including these points is attached as Table 1. The operation of *yatai* stand was left to Mr. Kashiwazaki, who used to own an *izakaya*-style restaurant and bar before the earthquake.

Table 1. Timeline of the Design Project

Date	Events
May 17th	"Otsuchi Regeneration Support Team" was established in University of Tokyo
May 31th	"Otsuchi Residents' Conference for Community Development and Regeneration" held by Yuikko Otsuchi at a hall of Ando Elementary School
June 2nd	Meeting with Mr. Akazaki and Mr. Kashiwazaki in a tent on the ground of Ando Elementary School
June 7 th	Mr. Nagumo agreed to join the project as a designer of <i>yatai</i> stands
June 14th	Visited Kozuchi Shrine but not all members agreed with the site. Visited Ueda lumber-mill to ask for materials and machines. The president agreed with us.
June 28th	Mr. Nagumo presented his <i>yatai</i> stand design at a hall of Ando Elementary School Decided the opening day as July 24 th
June 29th	Kozuchi shrine denied us to use the place. Started looking for a landowner of a site just in front of Kozuchi shrine and found he is an old classmate of Mr. Kashiwazaki's
June 30th	A landowner of the site just in front of Kozuchi shrine agreed with us to use the place. Started <i>yatai</i> stands construction.
July 23rd	Started site construction. Pre-opening Party was held.
July 24th	The opening day
Sep. 24-25th	Festival of Kozuchi Shrine; one of the most crowded days.
Oct. 20th	The closing day
Dec. 17th	Re-opened in a temporary store of Mr. Kashiwazaki in Fukkou Mall located by Otsuchi river.

Design of Stands

There were three key requirements for the design of the stand. Firstly, the stand had to be designed without any complex structure, since the residents had to assemble by themselves. For this reason, the frame was made of simple mortise and tenon joints and other parts can be attached with nails. Secondly, the design had to be minimal and in a simple shape so that the residents can make by themselves if they wish to reproduce more units. Thirdly, the size had to be small enough to be able to load onto a small truck so that the residents can transport the stand by themselves. To summarize these requirements, the most important point for the stand design is that residents are able to produce and manage the units without any help of us supporters. (Figure 4)



Figure 4. Models of *Yatai* Stands

Site Allocation

Kozuchi Shrine was chosen as the site, since it had a special meaning to Otsuchi town and the shrine was believed to play an important role even after the regeneration. The foundation of Kozuchi Shrine dates back to 829 and the shrine was relocated to the current location in 1629. Before being merged into Otsuchi town, Kozuchi Shrine used to be the local deity of Kozuchi village. Even after the merger, the shrine's annual festival is the biggest event of Otsuchi town, which had always attracted the faithful local residents. Considering the future state of the community structure given the population aging with low birth rate, the authors believed it would be best to locate a compact downtown adjacent to the hills, rather than letting residential area turn into urban sprawl where buildings spread in low density. In view of this, Kozuchi Shrine, which is situated on the mountain side, is believed to be one of the most important community hubs after the regeneration.

We have reached out to the Shrine priest to ask for their permission for us to locate the *yatai* stand inside the shrine grounds only to learn that they could not make any decision for the moment, since their parishioner representatives, the governors of the shrine, were staying in separate evacuation shelters, which made it difficult to hold representative

meetings where decisions are supposed to be made. When we were beginning to feel hopeless, we happened to know that the owner of the land in front of the shrine was Mr. Kashiwazaki's old classmate. The landowner gladly agreed to let us use the estate at free of charge. This is how the site was secured. (Figure 5)



Figure 5. Site of *Yatai* Stands Square

Materials and Manufacturing

Production of the *yatai* stand required lumber and a lumber-mill. The priority was put on completing the stand solely by the partnerships among the residents rather than relying on subsidies or fund-raise, and the team decided to ask Ueda Lumber-mill, the only lumber-mill in town, for their support. Although Ueda Lumber-mill was also affected by the earthquake and tsunami, though not a major damage, the president sympathized with our project and kindly offered their lumber, mainly the ones that were damaged by getting soaked in sea water, at free of charge. Their support was not limited to offering the lumber and their facility; they have also offered to share the know-how to use the sawmill machine and allowed us to use their work space so we could assemble the unit. (Figure 6) Especially their executive managing director, Mr. Yasuhiro Ueda, the president's son, has kindly provided a great amount of help including sourcing of the necessary materials.



Figure 6. Manufacturing at Ueda Lumber-mill

Construction and Setting

The stands, tables and stools were assembled mostly by the volunteers. Not only the local carpenters, Mr. and Mrs. Kashiwazaki, Mr. Akazaki, the team of the University of Tokyo and Mr. Katsushi Nagumo, but a number of volunteers from out of Otsuchi town have also participated in turn with a chisel, hammer, drill or impact in their hands and worked in the barn in the backyard of Ueda Lumber-mill. The deliverables were 2 units of *yatai* stands, 2 tables, 4 benches and 1 weather protection canopy. After completion, a friend of Mr. Kashiwazaki's who works for a building constructor offered to transport the finished units to the *yatai* site on a small truck.

There were many people who offered help in setting up at the *yatai* site. The evening before the opening day, Mr. Kashiwazaki's friend, a building constructor, has delivered two piles of crushed stones to the site. The site needed a layer of crushed stones to cover the ground in order to prevent people from getting hurt by the pieces of broken glasses, etc. fallen from the damaged buildings. When the team started to lay the stones using a shovel in our own hands, a building constructor in the neighborhood offered a help; it took only a few minutes to finish laying the stones using their heavy equipment. The local residents also offered many other necessities, including LPG cylinders and power units for cooking, parasols and camping table-bench units were donated. Thanks to many people's support provided out of the connections among people, "Yatai Stands Square" finally opened in front of Kozuchi Shrine on July 24th, 2011. It was 4 months after the tsunami when the residents saw lights at night in the central downtown area of Otsuchi.



Figure 7. Construction of *Yatai* with Volunteers

Afterwards

Once the *Yatai* Stands Square opened, residents staying at the evacuation shelters nearby came down to visit the square. People ordered food or drinks and spent their time as they wished. Some of them told Mr. Kashiwazaki how thankful they were with tears in their eyes. (Figure 8) After the opening, the square with *yatai* stands was visited by people including the

local evacuees as well as volunteers. Unfortunately there is no record of visitors counted given the emergency situation they were still in, but the report from Mr. Kashiwazaki and the photos taken during that time proved how the square was crowded with visitors.



Figure 8. Opening Party of *Yatai* Stands Square (July 24th, 2011)

Winter comes so early in Otsuchi that people cannot spend time outdoors at night without a bonfire in a drum. Mr. Kashiwazaki decided to close the *Yatai* Stands Square in late October. Coincidentally, it was confirmed to build a public temporary shopping mall in December, and the *Yatai* Stands Square closed when Mr. Kashiwazaki opened his restaurant-bar in the temporary shopping mall. Two units of *yatai* stands, tables and benches were moved to Mr. Kashiwazaki's new restaurant-bar in the temporary shopping mall. (Figure 9)

In September 2012, this design project was nominated as Good Design Best 100 of the Good Design Award (Japan's Ministry of Economy, Trade and Industry and Japan Institute of Design Promotion), Japan's most prestigious design award, and received the special award from the chairman of JDP. The judge highly evaluated this project with the following comment; "we believe that the people would recall this scenery with *Yatai* Stands Square after their recovery from the disaster, and they will always remember how this scenery healed their broken hearts and think of the connections with those who have encouraged. This project indicates a new mission and a great potential that a design has to offer. (Japan Institute of Design Promotion, 2012)



Figure 9. *Yatai* in Mr. Kashiwazaki's new restaurant

Discussion

The following context discusses the philosophy and methodology that are required for civil engineering design.

Design Philosophy Required for the Survivors

As described in the beginning, Japan is facing the issue of population aging with low birth rates and is currently in transition to a mature society. What philosophy is required for civil engineering designs in a mature society then? We have concluded that the philosophy is how much contribution a design can make to improve the people's emotional QOL (Quality of Life). Ever since the years of spectacular economic growth in Japan, the target had always

been to build up key infrastructures of national land to meet the demand in a quantitative basis, while the suicide rate continued to rise. In this society, aside from the convenience, environments where people can live their emotionally affluent lives are required. We believe that the importance should be placed on how the quality of the local residents' lives can be improved, rather than the aesthetic quality of the constructed infrastructure itself. Based on the aforementioned philosophy, what should be prioritized after such devastating attacks of natural disaster like the Great Eastern Japan Earthquake and Tsunami?

The survivors had been in the depth of despair from having lost their family members, relatives and friends. While there were frequent announcements of tsunami warnings after the collapse of seawalls, the only shelters the disaster victims could evacuate to were the facilities located up on the hills, but these shelters only had small space and were dotted all over the town. This means that the local communities of the evacuated survivors had also been torn apart due to the sudden attack of tsunami during the daytime. Needless to say, there was no place remained where people could gather. In other words, the survivors lost their connections with people. Even worse, the survivors lost their home; they have lost their own houses and hometown where they were born and raised. As mentioned earlier, the government of Otsuchi town suffered a serious damage and thus there was no concrete reconstruction plan in place and visible to the residents. They could only spend time staring at their hometown that is totally washed away by the tsunami, feeling hopeless with a concern that they may not be able to return to where they used to live. The survivors lost their connections to both the people and land they had been attached to.

We regard the connections among people and people's connections to the land as the common reasons for our lives. People cannot live alone or physically apart from the land. Our ordinary everyday lives are secured by these two kinds of connections. That is to say, these connections are also the benchmarks of the healthiness of the local and traditional communities settled on a specific land. The fundamental philosophy of this design project is how we can restore the healthiness of a community.

Design Methodology Required for the Survivors

The aim of this design project was to restore the connections among people and the people's connections to the land, which are both the common reasons of people's lives, and eventually to improve the healthiness of a community. For this purpose, we have proposed that small public space should be created for the community and by the community. Our proposal was also to recreate the scenery that shows a healthy state of the community in a symbolic

location of the town before the tsunami. The following three methodologies were considered as especially important;

Firstly, we have tried to restore the lost connections among people by offering “*Yatai Stands Square*” as a place where people can gather, confirm each other’s safety and exchange normal emotions that any people can have. This was accomplished by creating a square with *Yatai Stands*.

Secondly, instead of having a designer create the space based on his/her own ideas or creativity, the importance was rather placed on making a design that reflects the power of “*yui*” (the ability to collaborate with others) that the local residents already had, which is to say the connections or partnerships among people (i.e. the locals of Otsuchi and the supporters from outside). This was achieved by keeping the design of *yatai* units simple so that the residents can manufacture and manage the units on their own and by utilizing people’s connections or collaborations in the manufacturing process.

Lastly, we aimed to bring back the scenery with people gathering and spending time as they wish to the location where their hometown used to be, by selecting a site that had been a key location in their lost homeland. This was realized by designating the location in front of Kozuchi Shrine, a landmark of Otsuchi with a lot of meanings to the locals.

In the former framework, the *Yatai* stand itself would have been regarded as an architectural or furniture design, and the site allocation as city planning. There are no “infrastructure” or civil engineering structures such as a bridge or a road associated with this project. We as civil engineers have come up with this idea supposedly out of our fundamental belief that the civil engineering designs in Japan have nearly same meaning of local scenery design. The design that we have executed here was not about considering the shape or colors of a single structure, but was to restore the scene of people living their lives. We define this as part of the civil engineering design in a broader sense.

Conclusion

This paper introduced the authors’ practice of a design project of creating a square with *yatai* restaurant-bar stands in Otsuchi town, which was devastated by the Great Eastern Japan Earthquake and Tsunami in March 2011. The aforementioned practice suggests that the core of civil engineering design philosophy lies in how a design can improve people’s emotional QOL in a matured society. Especially after the occurrence of a major natural disaster, it is important to restore the connections among the people and the people’s connections to the land, as these connections would give reasons to people’s lives. Three methodologies believed to be

effective are;

- Offer a place where survivors can gather to communicate with each other; which is believed to restore connections among people.
- Propose a design that can reflect the connections among people (i.e. connections among victims and supporters and/or their collaborations), which is believed to restore connections among people.
- Lastly, we aimed to bring back the scenery with people gathering and spending time as they wish to where their hometown used to be, by selecting a site that had been a key location in their lost homeland, which is believed to restore people’s connections to the land.

To conclude, the efforts to bring back the scenery with people living their lives should be regarded as part of civil engineering design, given that civil engineering designs should blend in with the local scenery.

Acknowledgements

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