

“From the 3.11 Tragedy to Reconstruction” Higashimatsushima-style?

Higashimatsushima City



Background

Higashimatsushima City experienced three earthquakes in one day on 26th July 2003, including one with an intensity of 6-upper and two of 6-lower (on the Japanese seismic intensity scale), whose seismic centre was the central part of the city. This was when the city was still a town, before the consolidation of municipalities. Although there was no tsunami damage, there were more than a dozen totally collapsed houses, some half-collapsed, landslides, road surface subsidence and damage to road shoulders in several places. No-one died but dozens of people were injured. About 150 temporary housing units were built.

These earthquakes generated approximately 95,000 tons of disaster waste in the two towns, which are now Higashimatsushima City, and it cost about 1.225 billion yen to dispose of it. Sorted collection of waste was impossible due to the disorganized situation at that time, and the waste was left unsorted at temporary storage sites. The disposal cost was estimated at about 800 million yen, but it cost about an extra 400 million yen to complete the disposal. Based on lessons the city learned from the earthquakes in 2003, Higashimatsushima City concluded an agreement concerning mutual cooperation in response to natural disasters with the Higashimatsushima General Construction Association at the inauguration of the city.

Purpose of Project

The implementation of disaster waste disposal operations after the Great East Japan Earthquake occurred on 11th March 2011, based on the “Agreement concerning mutual cooperation for emergency measures in response to natural disasters” concluded with Higashimatsushima City General Construction Association in 2005, in light of the lessons learned from the earthquakes in 2003.

Outline of Project

○ The 3.11 Tragedy

The earthquake occurred at 2:46 pm on 11th March 2011.

The Disaster Measures Headquarters was temporarily established in the parking spaces for the city’s official cars, where information on the earthquake damage and the tsunami damage came in one after the other. Faced with unimaginable tragedy, they were preoccupied with the emergency response to an extremely harsh situation.

■ Overall damage

- Date and time of occurrence: 2:46 pm on Friday, 11th March 2011
- Epicentre: Approximately 130 km east of the Oshika Peninsula, offshore from the Sanriku region
- Depth: 24 km
- Magnitude: 9.0

■ Damage in Higashimatsushima City (As of 1st October 2014)

- 65% of the urban area was inundated (Larger than any other affected municipality in the country)
- Human casualties
Dead 1,109
Missing 25
Total 1,134
- Housing damage
Total collapse 5,515
(1,263 of these houses were washed away)
Half collapse 5,559
Total 11,074
(73% of all households)

○ **Response to the earthquake**

The Higashimatsushima General Construction Association took immediate action after the earthquake occurred on 11th March to check how many vehicles and how much heavy machinery, power generators and drainage pumping equipment, owned by members of the association, were ready for operation. The member companies independently checked the damage situation and whether the roads were passable, and reported this information to the association Chairman.



[Buildings collapsed and washed out, and debris washed up on shore]

It was anticipated that an enormous amount of damaged furniture and household goods would be brought in after the citizens started cleaning up their damaged

houses along with the restoration of lifelines.

Although the city suffered enormous damage, it took very little time to decide that it would implement sorted collection of disaster waste and temporary storage of the sorted waste. However, some issues arose such as sorting categories and how to notify the citizens and ask for their cooperation.

The city decided to sort the disaster waste into 14 categories; wood, plastic, tyres, paper, cloth, stone/concrete, 4 home appliance items(refrigerator, TV, air conditioner, washing machine), other home appliances, iron, toxic waste, hard-to-handle objects, and earth and sand, and notified the citizens through a special edition of the city's newsletter. In addition, it was necessary to guide the citizens at the temporary storage sites, ask them to comply with the rules, and to confirm that the person who brought in the waste was actually a sufferer living in the city.

The temporary storage site for disaster waste (known as "1st yard") was 8 hectares of land. Even though it was separated by category, the waste quickly piled up to a height of 20 m. As it was obvious that the 1st yard was not large enough to store all the waste, the city borrowed a further 12 hectares of land, from the prefecture again, located 300 m east of the 1st yard. This land (known as "2nd yard") was originally to be used for port facilities but it was not in use at the time. Furthermore, the city obtained permission to use two other locations as temporary storage sites; the City Athletic Park, located in the Nobiru district, which was damaged and became unavailable for games (known as "Bounds", the original name of the park), and a square in front of the Youth Outdoor Learning Center owned by an adjacent prefecture. This was necessary because transporting disaster waste collected in the Nobiru district to the Omagarihama district took a lot of time.

The city started crushing stones at the 1st yard and wood at the 2nd yard in September by installing crushers at each yard. Earth and sand was turned into recycled soil through the process of desalting and

removing impurities using rainwater kept in the dug holes (process repeated 5 times), and mixed with approximately 2% of cement. Mixed waste which was inseparable due to sludge was separated into earth and sand, stones, wood and plastic using a trommel (centrifugal machine) and a finger screen (sorting machine). Mixed waste inseparable by machine was manually separated into 19 more categories. Waste which had to be incinerated included fishing nets, futon bedding wet with sludge, tatami mats and plastic that could not be recycled, all of which accounted for 3% of the total amount of disaster waste (combustible/non-combustible) generated in the city. The city entrusted the incineration of this waste to the Miyagi Prefectural Government after it had been crushed.

Progress and Achievements

It was decided that the total cost of disaster waste disposal was to be subsidized by the national government. "The National Treasury will cover all the cost" meant that the citizens of Japan would bear the cost. Given this fact, the city decided to implement the waste disposal without wasting any money, even one yen, and to make the utmost efforts to reduce the cost, even by one yen. To achieve this, the city decided not to introduce a large-scale plant which would only be in operation for three years, nor heavy machines used only for waste disposal, and decided to promote the complete implementation of recycling to secure both recycled materials and employment for the disaster victims, which would lead to their self-reliance.



[The waste was manually separated into 19 categories]

Effects of Project

Thanks to the cooperation of the disaster victims and 42 businesses joining the Higashimatsushima General Construction Association, the city achieved a recycle rate of 97%.

In the first year of the project, the disposal cost was reduced to 16.9 billion yen, 6.3 billion yen lower than the estimate of 23.2 billion yen. The cost for four years of operations from 2011 to 2014 was 58.8 billion yen, which was lower than the estimate of 64.5 billion yen, meaning the city succeeded in cutting the cost by 5.7 billion yen, which accounts for 9% of the estimate.

○ **Progress on the treatment of disaster debris**

(1) Disaster waste disposal

	Broad category	Category	Processed amount (tons)	Treatment
Incineration	Combustible waste	Waste plastic, fishing nets, etc.	22,314	Incineration
		Total (A)	22,314	
Others	Hard-to-handle objects	Coating materials, Asbestos, etc.	3,154	Transport to intermediate treatment companies
		Total (B)	3,154	
Recycling	Combustible waste	(1) Waste tyres	1,352	Treatment by private resource recycle businesses
		(2) Waste wood (chipped)	533,279	
		(used for combustion aid)	99,279	Transport to a temporary incinerator

	Broad category	Category	Processed amount (tons)	Treatment
Recycling		(Recycling unique to the city)	434,000	Used as materials for reconstruction
	Non-combustible waste	(3) Concrete scrap	477,066	Used as materials for reconstruction
		(4) Asphalt scrap	35,000	Used as materials for reconstruction
		(5) Metals	25,835	Sold
		Recycling Total (C=(1)+(2)+(3)+(4)+(5))	1,072,532	
	Total (A + B)	1,098,000		

* Rate of waste treatment 100%

* Recycle rate 97.68%

(2)Tsunami sediments

Category	Processed amount	Treatment
Tsunami sediments	1,480,000 m ³	Used as materials for reconstruction
Tsunami sediments (converted to weight (specific gravity: 1.46))	2,160,800 t	

* Recycle rate 100%

Problems and Responses

It is generally difficult to predict how much waste is generated by natural disasters. The keys to deal with it are the following.

- 1) Integrating the temporary waste storage sites at the largest place possible for efficient operation of waste disposal.
- 2) Concluding cooperation agreements on disaster management with many local governments and companies.
- 3) As the existing infrastructure will be closed down when a disaster occurs, it is necessary to consider possible measures to deal with the situation beforehand.

With a limited number of officials, the city struggled to handle the massive amounts of work coming in at once immediately after the earthquake occurred. The city dealt with the situation with the cooperation of other local governments.

In terms of procuring fuel for transportation vehicles and heavy machinery (light diesel oil), measures need to be considered beforehand including the conclusion of agreements with petrol stations, since the fuel supplied by the Japan Self-Defense Forces happened to be insufficient to cover the necessary amount of fuel.

Disaster waste disposal cannot be completed by one local government alone. It requires as much collaboration as possible. In addition, local businesses should be given priority when selecting companies to implement the disposal operations. This will be a driving force towards reconstruction because large amounts of funds are then returned to the communities.

Outlook

Higashimatsushima-style recycling of disaster waste will be effective in preparing for expected earthquakes, and can be applied, without difficulties, to other regions including developing countries where the infrastructure is still insufficient.

Reference URL

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