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SOME CONSIDERATIONS BASED ON OBSERVATIONS OF DISASTER-STRICKEN AREAS IN MIYAGI, IWATE AND AOMORI PREFECTURES AFTER THE GREAT EARTHQUAKE AND THE ISLAND OF OKUSHIRI

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ABSTRACT: The author visited disaster-stricken areas in Miyagi, Iwate, and Aomori prefectures after the 2011 great east Japan earthquake, and after that, visited the disaster-stricken areas in the island of Okushiri in Hokkaido. This paper reports on damage conditions of houses, buildings, breakwaters, tide embankments, and so on in those areas, and presents considerations of what can be learned from observations of Okushiri island, which was damaged about 19 years ago.

Key Words: Miyagi Prefecture, Iwate Prefecture, Aomori Prefecture, Okushiri Island, Damage by Tsunami, Damage by Earthquake

INTRODUCTION

The author visited Miyagi, Iwate and Aomori prefectures, four times between May and July 2011 to examine the damage from the Great East Japan Earthquake and Tsunami of March 11th, three times as a member of the Research and Restoration Support Headquarter for Great East Japan Earthquake, AIJ(Architectural Institute of Japan), and then once more as a member of the AIJ Oceanic Architecture Committee, and as part of the Nihon University College of Science and Technology Disaster Recovery Project.

In October 2011, I also visited Okushiri Island in Hokkaido, damaged by the Hokkaido South-West Oki Earthquake of July 12th 1993. This was part of the Nihon University College of Science and Technology Disaster Recovery Project.

This paper will present a brief report of the findings from these visits (Shingu 2012).

OBSERVATIONS FROM DISASTER ZONES IN TOHOKU AND OKUSHIRI

Miyagi Prefecture (Saturday April 16th, 2011)

After being briefed regarding the disaster area by Professor Reiji Tanaka (Tohoku Institute of

Technology, Head of the Tohoku Chapter of Architectural Institute of Japan), I inspected damaged buildings on the Tohoku University campus and in Sendai city, and of coastal areas of Sendai and Natori cities, guided by Professor Masato Motosaka (Tohoku University) (Photos 1 – 4).

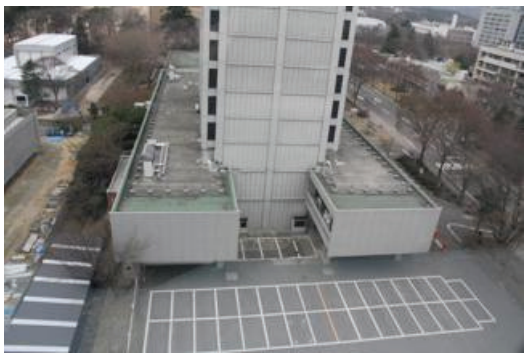

Photo 1: Building damage at Tohoku University (esp. 3rd floor column base)

Photo 2: Reinforced concrete building destroyed by the earthquake. (Sendai city)

Photo 3: Leaning high-rise residential building. (Sendai city)

Photo 4: Tsunami-damaged reinforced concrete apartment building.
Wooden houses were washed away, and only the foundations remain. (Natori city)

Miyagi Prefecture (Sunday April 17th, 2011)

Professor Hiroshi Yoshino (Tohoku University) drove me to the disaster zones in Onagawa town and Ishinomaki city to make observations (Photos 5 - 10).

Photo 5: Overturned reinforced concrete structure and damage to coastal structure.
A cylindrical tank is visible in the distance. (Onagawa town)

Photo 6: Overturned reinforced concrete structure and damage to coastal structure.
The aforementioned cylindrical tank (Photo 5) is seen on its side. (Onagawa town)

Photo 7: Washed away and destroyed homes.
A mound of rubble has been formed in the foreground. (Ishinomaki city)

Photo 8: Interior of a house destroyed by the tsunami.
The floor has been swept away by water pressure. Taken with consent. (Ishinomaki city)

Photo 9: Interior of a house destroyed by the tsunami.
Water pressure has made holes in the wall.
Taken with consent. Same house of the Photo 8. (Ishinomaki city)

Photo 10: Tsunami damage in river basin. (Ishinomaki city)

Iwate Prefecture (Tuesday May 3rd, 2011)

Observations were made in Fudai village, Miyako city, Yamada town, Otsuchi town, Kamaishi city, Ofunato city and others (photos 11 – 16). Fudai village is famous for the giant seawall that protects it.

Photo 11: 15.5m high seawall. The houses behind the wall remain undamaged.
Photo taken from the sea side of the wall. (Fudai village)

Photo 12: The 15.5m seawall from the previous photo, photographed from the opposite (village) side.
Compare size with the two people on the steps. (Fudai village)

Photo 13: Sluice gates (sea side). Trees have been knocked down in the foreground. (Fudai village)

Photo 14: Sluice gates (village side). The tsunami exceeded the height of the gates slightly, so some trees have been knocked down, but the wave did not reach the residential area and so human casualties were avoided. (Fudai village)

Photo 15: Fallen seawalls by the tsunami and destroyed town.
There is a person who is standing in dumb surprise in the lower left.
(Kamaishi city, Touni town)

Photo 16: Bell tower at a hilltop temple destroyed by the earthquake
(Kamaishi city, Touni town)

Aomori Prefecture (Saturday May 28th, 2011)

Professor Pei-shan Chen of the Hachinohe Institute of Technology guided me in observations in Hachinohe city, Oirase town, Misawa city, Rokkasho village and others.
The scale of damage here was, on the whole, less severe than in Miyagi and Iwate prefectures. Rokkasho village was the most northerly site observed, and was almost free of damage.

Photo 17: Area around Kabushima, Port of Hachinohe, Aomori prefecture.
The force of the tsunami has tilted the reinforced concrete toilet building in the centre of the image.

Northern Part of Iwate Prefecture (Sunday May 29th, 2011)

Professor Chen, together with S. Sasaki and I. Yato of the Kuji municipal government drove me to, and guided me around, Kuji city and Noda village to inspect the damage there.

Photo 18: Steel frame structure at national oil reserve facility.
The site, excavated from a mountainside, escaped damage (Kuji city)

Photo 19: Steel frame structure of aquarium near oil reserve facility.
Only the skeleton remains. On the day of the disaster, all visitors were able to retreat to safety thanks to advance warnings. (Kuji city)

Photo 20: Steel frame structure used as an occasional concert venue.
The floor of the near side of the building has been pulled out by the tsunami. (Noda village)

Miyagi Prefecture (Friday July 22nd – Sunday July 24th, 2011)

I conducted observations of schools, railways stations and ports on the coast of Miyagi prefecture with Oceanic Architecture Committee chairman Professor Takuji Hamamoto (Tokyo City University), Professor Tetsuya Matsui (Meijo University) and others.

Photo 21: Broken breakwater by the tsunami that is located very close to Fukushima Prefecture (the right). The Pacific Ocean is visible (the right).

Photo 22: A mat foundation flown by the tsunami from another place to here. A northern part in the prefecture.

Okushiri Island, Hokkaido (Wednesday October 27th – Thursday October 28th, 2011)

I made observations from a full circuit of the island. In the Aonae area, most heavily damaged in the 1993 earthquake, significant investment was made in building the Boukai-bashi refuge facility, shown in photo 23. Additionally, evacuation routes to high ground, both covered and open, have been established (photo 24).

Photo 23: Seaside refuge facility, Boukai-bashi. (Aonae area)

Photo 24: Covered evacuation route to high ground. (Aonae area)

CONCLUSIONS

Through inspection of the disaster area of the Great East Japan Earthquake and Tsunami in the Tohoku district, and the disaster area of Okushiri island in Hokkaido, now rebuilt, vital resources pertaining to rebuilding and recovery have been obtained. A couple of mechanical problems of those are listed as follows.

1) Big trees in an emergency green area, ships and cars hit houses, buildings, schools, gymnasiums, and so on.
2) Many reinforced concrete gravity type breakwaters except few ones have been broken by the tsunami, because there had been no piles.

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REFERENCE

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