

Tohoku Chapter, Architectural Institute of Japan
Reconnaissance Report (01) of Sendai and Miyagi Prefecture
The 2011 off the Pacific Coast of Tohoku Earthquake
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1. Central Part of Sendai City

Very few structural damage was observed in the central business area. Breakage of window glass panes could be seen occasionally. Photo 1 shows a 37-story steel and steel encased reinforced concrete office building utilizing vibration control devices and a 29-story reinforced concrete base-isolated building; both were structurally undamaged. The elevator system, electricity and water services were resumed their operation two days after the earthquake. Photo 2 shows a bank building without structural damage.



Photo 1: a 37-story office building and a 29-story office building in Sendai without structural damage



Photo 2: An undamaged bank building

Photo 3 shows the scene of the central Sendai: All buildings are undamaged.



Photo 3: Overall views of Central Sendai City

2. Damage in Residential Areas

As an example of damage in residential areas, the damage of Yagiyama district is shown. As seen in Photos 4 and 5, damage cannot be seen.



Photo 4: Yagiyama district (1)



Photo 5: Yagiyama district (2)

3. Fall of Concrete Block Walls

Some concrete block walls at the periphery of residence plot fell down during the 1978 Miyagi-ken Oki earthquake, killing school children. Sendai Municipal Government promoted the seismic strengthening of concrete block walls. This earthquake revealed the effectiveness of the program; not many concrete block walls fell down. On the other hand, masonry walls made of tuff stone called Oya-ishi were observed to fall down in many places (Photos 8 and 9).



Photo 6: Concrete block walls (Undamaged)



Photo 7: Concrete Block walls (Undamaged)



Photo 8: Fall of tuff masonry walls



Photo 9: Damage of tuff masonry walls

Damage observed in Cities, Towns in Miyagi Prefecture

1. Cities and Towns Reported in the following section (See Map at the end)

- (1) Sendai City
- (2) Natori City
- (3) Iwanuma City
- (4) Yamamoto-machi
- (5) Ishinomaki City
- (6) Motoyoshi-machi
- (7) Kesenuma City
- (8) Wakuya City
- (9) Shiogama City
- (10) Matsushima-machi
- (11) Higashi-Matsushima City

2. Observed Damage

Structural damage is caused either by (1) ground shaking or (2) tsunami tidal wave. The building near coast line was mostly damaged by tsunami waves rather than ground shaking. The damage in various cities and towns (machi) are outlined in the following sections.

2.1 Natori City (South of Sendai City)

Very few structural damage was seen in the central part of the city. The region from the coast to 5 km east of the Sendai Toubu (East) Highway suffered tsunami attack. Photos 1 and 2 show the damage by tsunami attacks. The severity of damage becomes worse toward the coast.

Next report	Next report
Photo 1: Natori City (1)	Photo 2: Natori City (2)

2.2 Iwanuma City (South of Natori City)

Very few structural damage was observed in the central part of the city. The region from the coast to 5 km east of the Sendai Toubu Highway suffered tsunami attack. In a hospital building, tsunami wave reached as high as the third floor (possibly 7 m). There is no photo.

2.3 Yamamoto-machi (South of Iwanuma City)

Damage was not many in the central part of the town. The region from the coast to 3 km east of National Route 6 suffered tsunami attack. Photos 3 and 4 show the damage by tsunami attack.



Photo 3: Debris was carried to National Route 6



Photo 4: Carried away debris

2.4 Shiogama City (North of Sendai)

Buildings on the hill side suffered no damage. Building damage increases toward the coast. Photos 5 and 6 show the damage.



Photo 5: Damaged area of Shiogama City



Photo 6: Undamaged area of Shiogama City

2.5 Ishinomaki City (North-east of Shiogama City)

The central part of the city was also attacked by tsunami waves (Photos 7 to 10).



Photo 7: Chuo 3-chome near Manga-kan (1)



Photo 8: Chuo 3-chome, near Manga-kan (2)



Photo 9: Tachimachi commercial district (1)



Photo 10: Tachimachi commercial district

2.6 Motoyoshi-machi (North of Ishinomaki City)

From Sendai, the investigation team came to Kesenuma City through Motoyoshi-machi, using National Route 4 and National Route 346. It took three hours from Sendai to Motoyoshi-machi. Before Motoyoshi-machi, the team visited Tajiri-machi and Semine-machi to find very few structural damage. The team saw some damage in Sanuma-machi. All these towns are located inland, the damage was mainly caused by ground shaking, No photos are shown herein.

In Motoyoshi-machi, a school and the municipal building both on the hill side showed no structural damage. The damage near the coast was quite severe by tsunami wave attack (Photos 11 to 16). The tsunami wave height was estimated to be 20 to 30 m near Ohtani coast.



Photo 11: Damage by tsunami wave



Photo 12: Tsunami wave height could be seen



Photo 13: Tsunami wave passed across the bank



Photo 14: Tsunami wave reached the top of the blue sheet



Photo 16: A drive-in building near the shore



Photo 16: Devastation by tsunami wave

2.7 Kesenuma City (North of Motoyoshi-machi)

It is possible to go to Kesenuma City from Motoyoshi-machi through National Route 45. Those buildings located on the hill suffered small damage. The buildings in the low land suffered severe damage from tsunami attack. Photos 17 to 20 show the damage on the "sight-seeing pier (look-out ocean view

building).” The tsunami wave reached the third floor of a three-story reinforced concrete building across the ocean view building; the wave height must have reached as high as 7 m..



Photo 17: “Sight-seeing Pier (Ocean View Building)”



Photo 18: Tsunami Damage in the first Story



Photo 19: Damage on the second floor deck



Photo 20: Damage on staircase landing

The area along the Kesenuma Railway Line suffered tsunami damage due to the flooding of the Ohkawa River (Photos 21-24).



Photo 21: Damage due to flooding of the Ohkawa River



Photo 22: Damage on railway of the Kesenuma Line



Photo 23: Tsunami wave crossed the railway line



Photo 24: The tsunami wave height may be estimated

The Kesenuma Municipal Office building is located on the hill and suffered no damage (Photo 25). Mikka-machi is located on the hill and the area suffered no damage(Photo 26).



Photo 25: Kesenuma Municipal Office building



Photo 26: Mikkamachi township



Fig. 1 Route Map