Milestones in Recovery and Reconstruction from the Great East Japan Earthquake

2011
Mar.11 Great East Japan Earthquake struck, (tsunami hit the area)
Mar.14 Evacuation centers opened (a peak of 105,947 evacuees on Mar.16)
Mar.15 Sendai City Disaster Volunteer Centers opened (until Aug.10)
Mar.16 Gas utilities fully recovered (excluding evacuation advisory areas, etc.)
Mar.24 Collection of waste from tsunami flooding began
Mar.28 Construction of prefabricated temporary housing begun (Aotsu-Nagamachi area)
Apr.01 Sendai City Basic Policy for Disaster Prevention and Reconstruction
Apr.05 Committee for Agricultural Reconstruction in Eastern Sendai established
Apr.07 Largest aftershock struck (seismic intensity: Upper 6)
Apr.11 Applications for primary recruitment of emergency temporary housing opened
Apr.16 Gas utilities fully recovered (excluding evacuation advisory areas, etc.)
Apr.22 Tsunami-flooded residential area debris removal begun (tsunami-flooded eastern area)
May 01 Post-Disaster Reconstruction Bureau established
May 10 Consultation desk for recovery in affected residential areas opened
May 21 Reconstruction Symposium held (six meetings through May 29)
May 23 Applications accepted for demolition and removal of destroyed houses
May 30 Sendai City Disaster Reconstruction Vision formulated
May 31 Policy for Development of Disaster Reconstruction Municipal Housing announced
Jun.01 Reception of personnel from local governments nationwide on long-term assignment begun
Jun.12 Opinions exchanged on reconstruction and community building
Jun.16 All 1,505 prefabricated temporary housing units completed
Jun.17 Applications accepted for demolition and removal of destroyed houses
Jun.19 Great East Japan Earthquake Memorial Service held in Sendai
Jun.20 Ozon Park Festival held in Sendai (until Jul.17)
Jun.31 Debris removal in residential area completed (tsunami-flooded eastern area)
Aug.12 All evacuation centers in Sendai closed
Aug.20 First briefing session for community building in eastern Sendai held (until Aug.31)
Sep.10 Sendai City Disaster Reconstruction Plan (draft) formulated
Oct.01 Debris incineration begun with temporary incinerators
Oct.08 Briefing sessions started for the Sendai City Earthquake Disaster Prevention Promotion Project (seven meetings through Oct.16)
Oct.09 Briefing sessions held with tsunami flooding simulations (until Nov.4)
Nov.09 Briefing sessions began for the Farmland Consolidation Project in eastern Sendai
Nov.30 Sendai City Earthquake Disaster Reconstruction Plan formulated
Dec.01 Regional Support Center Project began
Dec.09 City gas supply resumed with liquefied Natural Gas (LNG)
Dec.10 Aotsu-nagamachi temporary housing units completed
Dec.17 Briefing sessions began for the Disaster Prevention Collective Relocation Promotion Project (until Dec.26, tsunami-flooded eastern area)
Dec.28 Debris removal in Farmland completed (tsunami-flooded eastern area)
Dec.29 Applications for recovery in affected residential areas (until Dec.25, hilly inland area)
Dec.29 Debris removal in Farmland completed (tsunami-flooded eastern area)
Dec.30 Citizens surveyed on Disaster Prevention Collective Relocation Promotion Project and other projects (until Feb.5, 2012)

2012
Jan.10 Consultation desk for recovery in affected residential areas opened (tsunami inland area)
Jan.16 Individual counseling on Disaster Prevention Collective Relocation Promotion Project (until Feb.6, tsunami-flooded eastern area)
Jan.30 Subsidy for the Recovery of Residential Land Damaged in the Great East Japan Earthquake created; applications opened (hilly inland area)
Mar.11 Debris removal in Tohoku completed (tsunami-flooded inland area)
Mar.13 Sendai City Disaster Volunteer Centers opened in Sendai
Mar.29 Sendai City Disaster Volunteer Centers opened in Sendai
Apr.01 Sendai City Post-Disaster Reconstruction Bureau established
May 05 Establishment of a recovery plan announced
Jun.05 Applications accepted for residential relocation aid for eastern Sendai (tsunami-flooded eastern area)
Jul.17 Policies for Redevelopment of Northern Gamo area set to advance as land readjustment project (tsunami-flooded eastern area)
Sep.03 Minami-Gamo Wastewater Treatment Plant repairs began (groundbreaking ceremony)
Sep.10 Disaster Risk Areas designated (Midorigaoka 4-chome hilly inland area)
Oct.15 Elevated road project started on Shiogama-Watari Prefectural Road
Dec.21 Applications accepted for 12 units in first Disaster Reconstruction Collective Relocation in Arai (tsunami-flooded eastern area)

2013
Feb.13 Development of Gamo-Zatsukofukuro Disaster Prevention Collective Relocation Area started (tsunami-flooded eastern area)
Mar.11 Great East Japan Earthquake Memorial Service held in Sendai
Mar.12 Sendai City’s Five Year Activity Reports from the Disaster
Mar.13 Disaster Risk Areas designated (Matsumori-Jingahara hilly inland area)
Apr.01 Sendai City Regional Disaster Prevention Plan revised (general information, earthquake and tsunami measures)
Apr.29 Debris (combustible) incineration completed
May 10 Applications accepted for residential land in seven areas for Disaster Prevention Collective Relocation (tsunami-flooded eastern area)
May 27 Applications accepted for 461 units in six Disaster Reconstruction Municipal Housing
Jul.18 Applications accepted for 2,447 units in 36 Disaster Reconstruction Municipal Housing
Aug.09 Damage recovery work began in Kaigan Park
Aug.20 Procurement of prefabricated temporary housing completed
Sep.17 Applications accepted for 2,447 units in 36 Disaster Reconstruction Municipal Housing
Oct.01 Sendai City Regional Disaster Prevention Plan formulated
Oct.25 National Eastern Sendai Land Improvement Project (farm land development) groundbreaking ceremony
Oct.31 Development of the Disaster Prevention Collective Relocation areas begun (tsunami-flooded eastern area)
Dec.27 Debris treatment and disposal completed

2014
Mar.11 Great East Japan Earthquake Memorial Service held in Sendai
Mar.13 Single family sites restored to original state
Mar.16 Road elevation work on Shogawa-Wataten Prefectural Road began (groundbreaking ceremony)
Mar.31 Program for the Rehabilitation of Disaster Victims’ Lives formulated
Apr.01 Revision of Sendai City Regional Disaster Prevention Plan (section on wind, water and other disaster preparedness)
Apr.01 Development of Sendai City Regional Disaster Prevention Plan (section on nuclear disaster preparedness)
Apr.01 Applications accepted for residential land in seven areas for Disaster Prevention Collective Relocation (tsunami-flooded eastern area)
May 10 Applications accepted for residential land in seven areas for Disaster Prevention Collective Relocation (tsunami-flooded eastern area)
Jul.10 Applications accepted for 2,447 units in 36 Disaster Reconstruction Municipal Housing
Aug.10 Northern Gamo Disaster-Affected Area Urban Redevelopment Project started
Aug.12 Construction started on Kaigan Park Evacuation Hill
Sep.26 Sendai Subway Total Line began operation

2015
Feb.03 Concept for use of land after collective relocation announced
Feb.14 Construction completed on the first Tsunami Evacuation Tower in Sendai
Mar.11 Great East Japan Earthquake Memorial Service held in Sendai
Mar.13 The Third UN World Conference on Disaster Risk Reduction took place in Sendai (until Mar.18)
Mar.13 ¥300 billion allocated for the Speedy Relocation of Disaster Victims’ Lives
Mar.14 National Eastern Sendai Land Improvement Project (farm land for farmland) began (tsunami-flooded eastern area)
Aug.10 Northern Gamo Disaster-Affected Area Urban Redevelopment Project started
Aug.12 Construction started on Kaigan Park Evacuation Hill
Dec.26 Sendai Subway Total Line began operation

2016
Feb.03 Concept for use of land after collective relocation announced
Mar.11 Great East Japan Earthquake Memorial Community Center fully opened
Mar.11 Great East Japan Earthquake Memorial Service held in Sendai
Mar.15 Sendai City Symposium for Disaster Risk Reduction and the Future Held
Mar.21 Sendai City Post-Disaster Reconstruction Bureau closed in connection with the end of the Sendai City Earthquake Disaster Reconstruction Plan
Apr.01 Minami-Gamo Wastewater Treatment Plant repairs fully completed
Apr.19 Open call for ideas for use of land after collective relocation began (tsunami-flooded eastern area)
May 07 GFDRF Finance Minister and Centre Bank Governors’ Meeting, Sendai (held until May 21)
Jun.30 At 3,026 houses for Disaster Reconstruction Municipal Housing
Sep.30 Four Parkage Evacuation Hills completed
Oct.15 Part of Kaigan Park reopened for use
Oct.28 Provision of prefabricated temporary housing completed

2017
Mar.07 "Sendai City’s Five Year Recovery Records from the Disaster” published
Mar.11 Great East Japan Earthquake Memorial Service held in Sendai
Mar.12 2017 Sendai Symposium for Disaster Risk Reduction and the Future Held
Mar.28 All 13 Towns Commenced implementation of prefabricated temporary housing
Apr.01 Sendai City’s Five Year Recovery Records from the Disaster” published
Apr.03 Disaster Ruins of Sendai Analama Elementary School opened to the public
The Earthquake Disaster
Sendai and the Tohoku region were hit by the most powerful earthquake ever recorded in Japan, along with a tsunami of a magnitude seen only once in a thousand years, causing a level of destruction never before seen.

Earthquake Overview
Name of the Earthquake:
The 2011 off the Pacific coast of Tohoku Earthquake
Date and Time:
March 11, 2011, 2:46 pm
Location of the Epicenter:
Off the Sanriku coast (38°5.2'N, 142°51.6'E)
Scale: Magnitude 9.0, Maximum Intensity: 7 on the Japanese Scale (1 to 7)
Highest Recorded Seismic Intensity: 7 in Kunihara City, Miyagi Prefecture
Seismic Intensity in Sendai City:
Upper 6 in Miyagino Ward, lower 6 in Aoba Ward, Wakabayashi Ward and Izumi Ward, upper 5 in Taihaku Ward
Height of Tsunami: 7.1 meters at Sendai Port (estimated)
*Largest Aftershock: April 7, 11:32 pm; Magnitude 7.2, off the Coast of Miyagi Prefecture, upper 6 in Miyagino Ward, lower 6 in Aoba Ward and Wakabayashi Ward, upper 5 in Izumi Ward, lower 5 in Taihaku Ward

Extent of the Destruction (as of March 1, 2017)
Casualties: 904 Fatalities, 27 Missing, 2,275 Injured
Damage to Buildings:
30,034 Destroyed, 27,016 Severely Damaged, 82,593 Partially Damaged, 116,046 with Minor Damage
Residential Areas Confirmed to be Either “Dangerous” or “Requiring Caution”: 5,728
Tsunami Flooded: 8,110 Households Affected (including 1,160 farming households)
Flooded Area: Approximately 4,500 ha (including approximately 1,860 ha of farm land)
Cost of the Damage in Sendai City: Estimated at 1,300.6 billion Japanese Yen

Evacuation Status
Evacuation Centers (Refuge Areas):
In Sendai, elementary, junior and senior high schools are the Designated Evacuation Centers (Refuge Areas) for the surrounding areas. During the 2011 disaster, as many as 100,000 people, approximately 10% of the population of Sendai, evacuated to these centers.
At their peak on March 14, there were 288 centers set up throughout the city. The number of evacuees declined after transportation services and essential utilities such as electricity, water supply, and gas had resumed. By consolidating evacuation centers and moving people into temporary housing, all evacuation centers in the city were closed by July 31.

Evacuation Centers
(Number of Evacuation Centers: Places)

Emergency Temporary Housing
At its peak Sendai city had more than 12,000 households flee to emergency temporary housing which included evacuees from outside of the city and other prefectures. 1,505 prefabricated temporary housings were set up in parks etc. and large numbers of private rental accommodation (private rental housing) were also utilized as emergency temporary housing.
Due to the efforts in constructing Disaster Reconstruction Municipal Housing and revitalizing peoples lives, Sendai city closed their grants for temporary housing for affected victims by March 2017. Currently approximately 95 percent of households have been rebuilt.

*As of March 2017 there were 0 people who moved into prefabricated temporary houses the buildings were deconstructed.
Recovery
Our goal is to help victims of the disaster rebuild their lives as soon as possible. By the end of November 2011, after asking for opinions from victims of the disaster, City Assembly members and experts, the shortest possible 5-year Sendai City Earthquake Disaster Reconstruction Plan was formulated.

Sendai City Earthquake Disaster Reconstruction Plan

Four directions were outlined in the Sendai City Earthquake Disaster Reconstruction Plan towards recovery.

1. Rebuilding disaster prevention systems based on disaster reduction
   Rather than attempting to completely control nature, we build disaster prevention infrastructure based on the goals of protecting lives and minimizing damage.

2. Addressing energy issues
   We secure energy and fuel while sources advancing the use of renewable energy.

3. Reconstruction with self-help, independence, cooperation, and mutual support
   By protecting ourselves by ourselves (self-help), and helping those in need following the disaster in our own communities (mutual assistance) while rebuilding the public aid infrastructure (public assistance), we promote the creation of cities that mitigate disaster.

4. Creating economy/urban vitality to drive the reconstruction of Tohoku
   Reviving the local economy to create a new driving force to push the Tohoku’s recovery forward.

Rebuilding Homes

The most important challenge facing the recovery process is getting those affected by the disaster back to their regular lives as soon as possible. Sendai implemented three major projects that were aimed at rebuilding homes.

Disaster Prevention Collective Relocation Promotion Project
Through the Disaster Prevention Collective Relocation Promotion Project, which is the relocation to safer inland housing from the eastern coastal areas affected by the tsunami, we developed relocation land in residential areas for those affected by the disaster.

Restoring Disaster-Damaged Residential Land
This public project restored residential land in hilly inland areas that was severely damaged by landslides.

Disaster Reconstruction Municipal Housing
This project provided 3,206 Disaster Reconstruction Municipal Housing for those who had lost their homes in the disaster and had difficulties in securing housing.
Lessons Learned
In 1978, Sendai experienced the Miyagi-ken-oki Earthquake. The lessons of that time allowed us to anticipate the next earthquake off the coast of Miyagi Prefecture, and put in place a range of earthquake preparedness measures. While those measures had a definite effect during the recent disaster, new problems also became apparent. Based on this experience, Sendai is taking on the challenge of preparing new disaster prevention measures for future disasters.

Lesson 1  From Disaster Prevention to Disaster Mitigation

1. Multiple Defense for Comprehensive Tsunami Protection

Sendai now has multiple lines of protection against tsunamis, such as a coastal levee and an elevated road. At the same time, the city does not rely on these alone, and the city is equipped with facilities that place importance on evacuation. Even so, in areas where safety cannot be secured, we are promoting measures including home relocation that places importance on “disaster mitigation” and minimizing damage.

Coastal Levee Construction
We are building a coastal levee that will be +7.2 meters above T.P.* The coastal levee will protect against large tsunamis and high tides which occur only once every few decades or centuries.

* T.P. = Average sea level in Tokyo Bay

Replanting Coastal Disaster-prevention Forests
We are replanting coastal disaster prevention forests in order to slow the momentum of tsunamis.

Elevated Road Construction
An elevated road measuring 6 meters in height is being constructed by the sides of the road that runs north to south in preparation for the largest class of tsunami.

Evacuation Facilities
To help people evacuate, we have constructed evacuation facilities such as evacuation towers, buildings, and evacuation stairs leading to the roofs of schools (13 locations in total) and four evacuation hills. We have also been creating three evacuation roads. Furthermore, NEXCO EAST, which manages the Sendai Tobu Road, has installed evacuation stairs at five locations along the Sendai Tobu Road.

Relocation to Safer Inland Areas
In order to help those affected by the disaster move to a safe place to live, we constructed Disaster Prevention Collective Relocation Sites and Disaster Reconstruction Municipal Housing.

Disaster Prevention Collective Relocation Sites and Disaster Reconstruction Municipal Housing

Construction Site for Collective Relocation (Minami-Fukumuro area)

Nakano 5-chome Tsunami Evacuation Tower

Evacuation Stairs to Sendai Tobu Road
Lessons Learned

2. Building a City with the Strength to Withstand Disaster

Since the Miyagi-ken-oki Earthquake, Sendai City has been supporting disaster prevention measures for essential utilities such as water supply, sewage, and City gas.

Utilities Recovery

The earthquake and tsunami caused approximately half of all households to lose water supply. City gas and electrical services (provided by private electric power companies) to all households stopped. Sewage lines continued to carry wastewater away, however, a wastewater treatment plant near the coast (Minami-Gamo Wastewater Treatment Plant) was critically damaged by the tsunami.

Preparation Until Now

Following the recent disaster, our earlier efforts to prepare the city’s utilities to withstand earthquakes allowed us to minimize the damage and quickly restore service. Furthermore, these efforts also allowed Sendai to quickly begin recovery work.

Preventing flooding in urban areas and eliminating usage limits during disasters.

Preventing flooding in urban areas and eliminating usage limits during disasters.

Utilities Recovery

The earthquake and tsunami caused approximately half of all households to lose water supply. City gas and electrical services (provided by private electric power companies) to all households stopped. Sewage lines continued to carry wastewater away, however, a wastewater treatment plant near the coast (Minami-Gamo Wastewater Treatment Plant) was critically damaged by the tsunami.

Preparation Until Now

Following the recent disaster, our earlier efforts to prepare the city’s utilities to withstand earthquakes allowed us to minimize the damage and quickly restore service. Furthermore, these efforts also allowed Sendai to quickly begin recovery work.

Preventing flooding in urban areas and eliminating usage limits during disasters.

Preventing flooding in urban areas and eliminating usage limits during disasters.

Utilities Recovery

The earthquake and tsunami caused approximately half of all households to lose water supply. City gas and electrical services (provided by private electric power companies) to all households stopped. Sewage lines continued to carry wastewater away, however, a wastewater treatment plant near the coast (Minami-Gamo Wastewater Treatment Plant) was critically damaged by the tsunami.

Preparation Until Now

Following the recent disaster, our earlier efforts to prepare the city’s utilities to withstand earthquakes allowed us to minimize the damage and quickly restore service. Furthermore, these efforts also allowed Sendai to quickly begin recovery work.

Preventing flooding in urban areas and eliminating usage limits during disasters.
Lessons Learned

Lesson 2  Local Communities and The Power of Disaster Preparedness

After the 1978 Miyagi-ken-oki Earthquake that occurred off the coast of Miyagi, citizens in Sendai City actively formed Volunteer Disaster Preparedness Organizations* (mostly at the Neighborhood Association level) to take charge of disaster preparedness for their local area. Volunteer Disaster Preparedness Organizations are the primary entities capable of enhancing an area’s ability to withstand disaster. The recent earthquake highlighted their importance once again.

*Volunteer Disaster Preparedness Organizations, usually a part of Neighborhood Associations, are volunteer groups led by local residents joining together to take charge of disaster preparedness activities. Sendai has a high level of participation in Volunteer Disaster Preparedness Organizations relative to Japan as a whole. The rate was 97.4% as of March 31, 2017.

Creating Original Operation Manuals for Each Evacuation Center

After the disaster in Sendai, community groups, the local government and facility operators have worked together to review the operation of every evacuation center and to create a tailored manual for each community (Community-Based Evacuation Center Operation Manuals). They are also making an effort to operate evacuation centers that can accommodate to diverse needs by taking into account the characteristics of each community. This includes the perspectives of women, people with disabilities, and foreign residents.

Cultivating Sendai City Community Disaster Preparedness Leaders

Since the earthquake, Sendai City has encouraged the activities of Volunteer Disaster Preparedness Organizations in order to further enhance the city’s communities and their disaster preparedness. With this in mind, Sendai has started an independent program to cultivate group leaders called “Sendai City Community Disaster Preparedness Leaders.” Under normal circumstances, Sendai City Community Disaster Preparedness Leaders will draft their Neighborhood Association’s disaster response plan and plan effective disaster drills. During a disaster, they will be expected to shepherd local residents to shelter as well as participate in and lead rescue and relief operations.

Partnering with Businesses on Measures to Help Those Stranded During a Disaster

At the time of the earthquake, many people were in Sendai for work, business, study, and leisure. Due to the earthquake and other causes, the trains and other forms of public transportation stopped operation, and many people were left stranded in the city. Stranded and unable to return home, these people gathered in nearby evacuation centers. In some cases the centers became full and there was no room for local residents. Sendai City, after experiencing the problems faced by commuters and travelers during the disaster, reached agreements with private businesses and rail companies to secure temporary stay locations for those stranded at major transportation hubs. These agreements will avoid and stop confusion that would be generated if all commuters tried to go home at once.

Locating approximately 5km from the coast, the Namiwake Shrine serves to mark how far the tsunami reached.

Lesson 3  Connecting with the Future

Throughout its history, Sendai has withstood numerous large scale tsunamis, like those following the Jogan Earthquake of 869 and the Keicho Earthquake of 1611. Despite the variety of ways in which our ancestors tried to pass on this history to us, modern people have failed to come to grips with their warning. This time it is the responsibility of those of us who experienced the disaster to share our experience and the lessons we learned with the next generation.

In Sendai, in addition to promoting disaster preparedness education for children, we are also organizing programs to share records and memories of the disaster with future generations.

Promoting Disaster Preparedness Education

Ordinary people are the ones who, by protecting themselves and their families, give their communities the strength to withstand disaster. For this reason, it is important to educate people who can take appropriate actions during a disaster. Following the earthquake, Sendai decided on a new disaster preparedness education policy. Students in all municipal public elementary and junior high schools are now receiving disaster preparedness education. All schools appoint a member of staff to take charge of disaster preparedness, and all students receive a copy of the new supplementary reader on disaster readiness published by the city, to be used in their lessons.

Sendai City Disaster Reconstruction Memorial Projects

It is up to the citizens of Sendai who experienced the disaster first hand, that believe it is important to actively plan and share the earthquake records, experiences and memories with future generations. Sendai City is actively going ahead with plans to preserve records of the earthquake and tsunami in photos and videos, and have preserved a tsunami-damaged elementary school and opened it to the public. Through these activities, we try to warn about a possible disaster that may occur in the future to help protect the lives of future residents.