34) Recovery and reconstruction of road networks [emergency response phase, recovery phase, early and late reconstruction phases]

[Issues] (1) How to quickly build emergency road networks immediately after a disaster.
(2) How to efficiently construct fully functional road networks by taking different perspectives into account.

[Situation and issues created by the Great East Japan Earthquake]

The road network was cut off by the Great East Japan Earthquake, key infrastructure for the transport of people and logistics. Right after the disaster, emergency restoration work was needed quickly to allow for the passage of emergency vehicles to save lives and transport relief supplies, which included the immediate establishment of rescue routes (elimination of obstacles) with the minimum removal of debris as quickly as possible.(1)

Approximately 570 elementary and junior high school students in the Unosumaicho district of Kamaishi City, Iwate Prefecture, which was damaged by the tsunami, were all saved by escaping to the Sanriku Coast Expressway (Kamaishi Yamada Road), which had been constructed on higher ground just before the earthquake. The students were able to use that road to move to a gymnasium where they found shelter. The road was also used as a detour route to move people and goods around, which demonstrated its function as a “path to life” during a disaster and as a way to avoid isolating the area.(2) The subsequent full-scale road network restoration and reconstruction processes that were based on these experiences called for the establishment of a new disaster-resilient network connecting the region inside and out that would include functions to facilitate reconstruction in each area, support people in their daily lives (e.g., medical services, industries, tourism), and protect lives in a disaster (evacuation, critical care, recovery).(3)

[Initiatives in the aftermath of the Great East Japan Earthquake]

・Recovery and reconstruction of roads (Issues 1, 2)

<Emergency response>

Starting one day after the earthquake, the national government worked together with local construction companies, Japan’s Ground Self-Defense Force, police, and other groups to clear roads of debris to ensure they were wide enough for ambulances, police, the SDF, and other emergency vehicles to pass through, based on an agreement concluded by the Tohoku Regional Development Bureau with local construction industry associations on the emergency restoration of roads. Amidst relentless aftershocks immediately after the disaster and tsunami warnings, workers pushed through the debris to open up roads, in consideration of both survivors and those who had perished. Emergency restoration work was carried out on collapsed areas with an eye on full restoration. In less than a week after the disaster, the vertical axis along the inland and coastal areas, and multiple horizontal lines connecting them had been cleared for use as access roads for relief supplies and aid (Case study 34-1).(1)(4)

National and prefectural roads in the coastal region flooded during high tide due to land subsidence, so the roads were raised using embankments. Finely tuned responses were taken, such as checking the tide level and only closing the road when it flooded. The Japan Prestressed Concrete Contractors Association and Japan Bridge Association performed emergency inspections of bridges that are important for emergency transport until mid-May.(1)

<Recovery and reconstruction>

With the restoration and reconstruction of roads, access to newly constructed disaster prevention group relocation housing complexes was ensured. Road construction was integrated with land readjustment projects, and bridges and other structures were built to be more earthquake resistant with extended service lives in many areas.(5)

Road projects were developed for reconstructed roads, such as the Sanriku Coast Expressway (Pacific coastal axis which serves as the backbone for reconstruction), and reconstruction support roads (cross-sectional roads connecting the Pacific coastal area and Tohoku Expressway), both of which are instrumental to reconstruction, and road construction connecting the entire Tohoku region was completed within fiscal 2020, the reconstruction and revitalization period, excluding some sections. In light of experiences during the disaster in the Unosumaicho district and other areas, the basic design was reviewed in order to complete reconstruction of the roads equipped with required functions within 10 years from the disaster. Six design concepts were formulated ((1) Ensure resilience [routes should avoid tsunami flooding areas], (2) Achieve low costs [construct two lanes and compact ICs], (3) Support reconstruction city planning [consider access with residential zones planned to be constructed on higher ground in Minamisanriku Town], (4) Flexible location of ICs connected to hubs [additional installation of half IC in Miyako City that connects to commercial and industrial facilities around rest stops], (5) Strengthen evacuation functions [set up emergency escape routes and stairs], and (6) Check accessibility through ICT (information and communication technologies).(3)(6)(7)

Interviews were held with local leaders on routes, IC locations, and IC types during the preliminary design process, and by working with local communities, it was possible to open all but a few roads during the reconstruction and revitalization period. Undoubtedly, only roads that are truly necessary should be constructed and wasteful spending should be eliminated, built on the premise of future city development in the region.

Road development in Iwate Prefecture has also been coordinated with reconstruction city planning. For example, the Noda section of the Noda-Yamagata route, a major regional road, was newly developed (and opened to traffic in December 2018) to connect areas that have been relocated to higher ground to National Route 45 in conjunction with a project on promoting group relocation for disaster prevention.(8) The Omoehanto route, a key regional road in Miyako City (Kumanotaira—Tsugaruishi) was constructed by relocating a prefectural road along the coast to the mountain side in order to eliminate any sense of isolation caused by flooding from the tsunami. This route also serves to support the region’s key fisheries industry by improving access from the Omoe fishing port to National Route 45. Connected to the general prefectural highway Tsugaruishi-Teishajo route (Tsugaruishi), this route was put into service prior to the opening of Sanriku Railway (March 2019)

and is directly connected to the reconstructed Tsugaruishi Station, which opened on the Sanriku Railway's Rias Line in March 2019.[9][10]

[Lessons learned and know-how gained]

(1) Develop systems to ensure quick recovery based on diverse partnerships.

- Develop a collaborative system before a disaster occurs with related organizations to ensure emergency responses and recovery for road networks, as it will be necessary to collaborate in a number of different ways, including securing routes immediately after a disaster.
- Road work should be done quickly during emergency response and recovery periods, but with an eye on the main restoration work ahead.

(2) Aim to complete reconstruction roads as quickly as possible, taking different perspectives into consideration.

- When roads being constructed will help in the reconstruction process, roads should be developed as quickly as possible, taking different perspectives into consideration, such as improving disaster prevention capabilities and use in city development.

Refernces

(1) 岩手県「東日本大震災津波からの復興　岩手県からの提言」2020 年３月
https://www.pref.iwate.jp/_res/projects/default_project/_page_/001/027/741/fukkou_teigen_i_all.pdf
(2) 国土交通省東北地方整備局三陸国道事務所「釜石山田道路（先行整備区間）が開通して(開通～約１年後)」
https://www.thr.mlit.go.jp/sanriku/05_area/kouka/data/120611kamaishiyamada1year.pdf
(3) 国土交通省東北地方整備局道路部「３.11　復興道路・復興支援道路情報サイト　復興道路」
http://www.thr.mlit.go.jp/road/fukkou/
(4) Car Watch「【特別企画】東日本大震災から１年　世界が驚愕した日本の高速道路（後編)」2012 年４月９日
https://car.watch.impress.co.jp/docs/news/523328.html
(5) 宮城県震災復興・企画部震災復興推進課「東日本大震災 再生期後半（平成 28・29 年度）の取組記録誌」2019 年３月 p93-98, https://www.pref.miyagi.jp/uploaded/attachment/742385.pdf
(6) 国土交通省東北地方整備局三陸国道事務所「三陸沿岸道路専用『公共プラント』(宮古地区)の完成及び稼働開始についてのお知らせ　参考資料①」(2014 年８月８日 記者発表資料)，
https://www.thr.mlit.go.jp/Bumon/kisya/kisyah/images/52847_1.pdf
(7) 国土交通省東北地方整備局三陸国道事務所「令和２年度 三陸国道事務所事業概要」2020 年６月，
https://www.thr.mlit.go.jp/Bumon/kisya/kisyah/images/52847_1.pdf
(8) 岩手県県北広域振興局土木部「平成 30 年 12 月 25 日　主要地方道野田山形線　野田工区が開通しました！！」（2018 年 12 月更新），https://www.pref.iwate.jp/kenpoku/doboku/1015039/1017061.html
(9) 岩手県県北広域振興局宮古土木センター「【復興関連道路】(主) 重茂半島線の道路整備がついに着工！＜大沢～浜川目工区＞」(2019 年２月 20 日更新)，https://www.pref.iwate.jp/engan/miya_doboku/1014417.html
(10) 岩手県県北広域振興局宮古土木センター「＜平成 31 年３月 16 日＞主要地方道重茂半島線、一般県道津軽石停車場線（熊の平～津軽石）の開通式を開催しました！」(2019 年６月 21 日更新)，
https://www.pref.iwate.jp/engan/miya_doboku/1019189.html