中華民國自來水協會
CTWWA

Damage and Restoration of Drinking Water Systems on the 2016 Tainan Earthquake

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Outline

I Overview of 0206 Earthquake

II Emergency Operation of Water Supply Systems

III Lessons Learned from the Tainan Earthquake

IV What To Do Next

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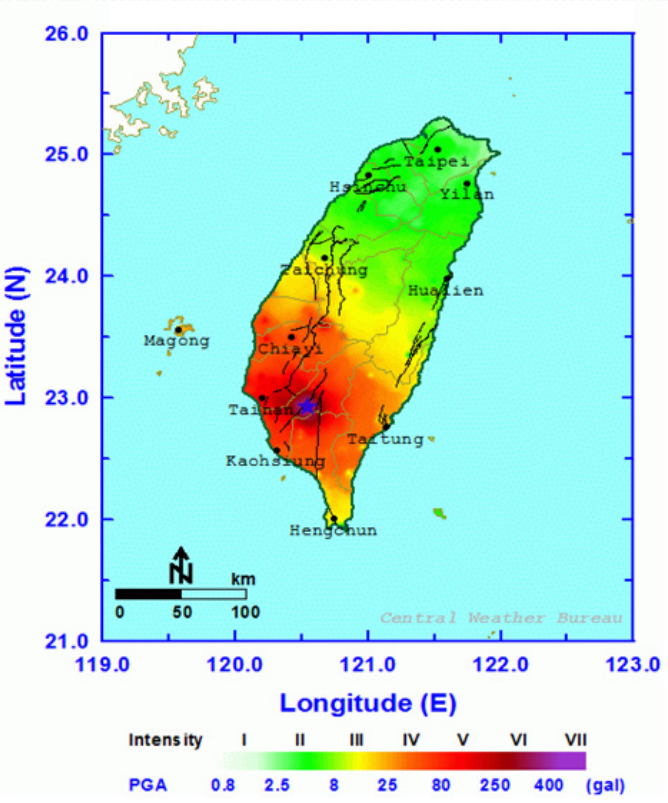
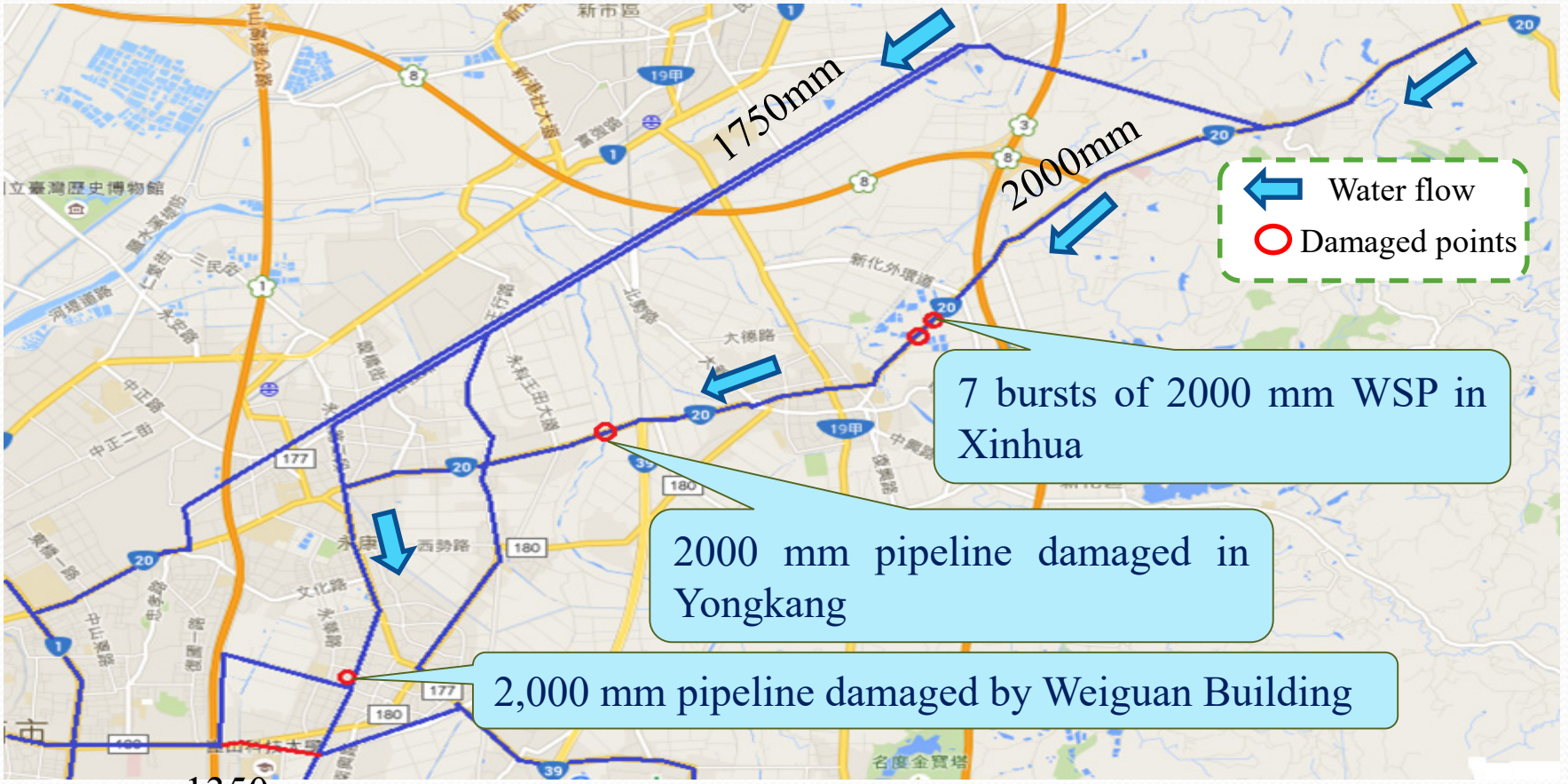
Overview of Tainan Earthquake (1/3)

- At 03:57 a magnitude of 6.4 earthquake struck southern Taiwan. The quake came just before the start of the most important family holiday—the Lunar New Year.
- The earthquake caused widespread damage and 117 deaths. Most of the deaths were caused by the collapse of a 17-story building in Tainan City.
- Tainan Water System was seriously damaged, of which 2,000 mm main pipeline was located under the collapsed building.

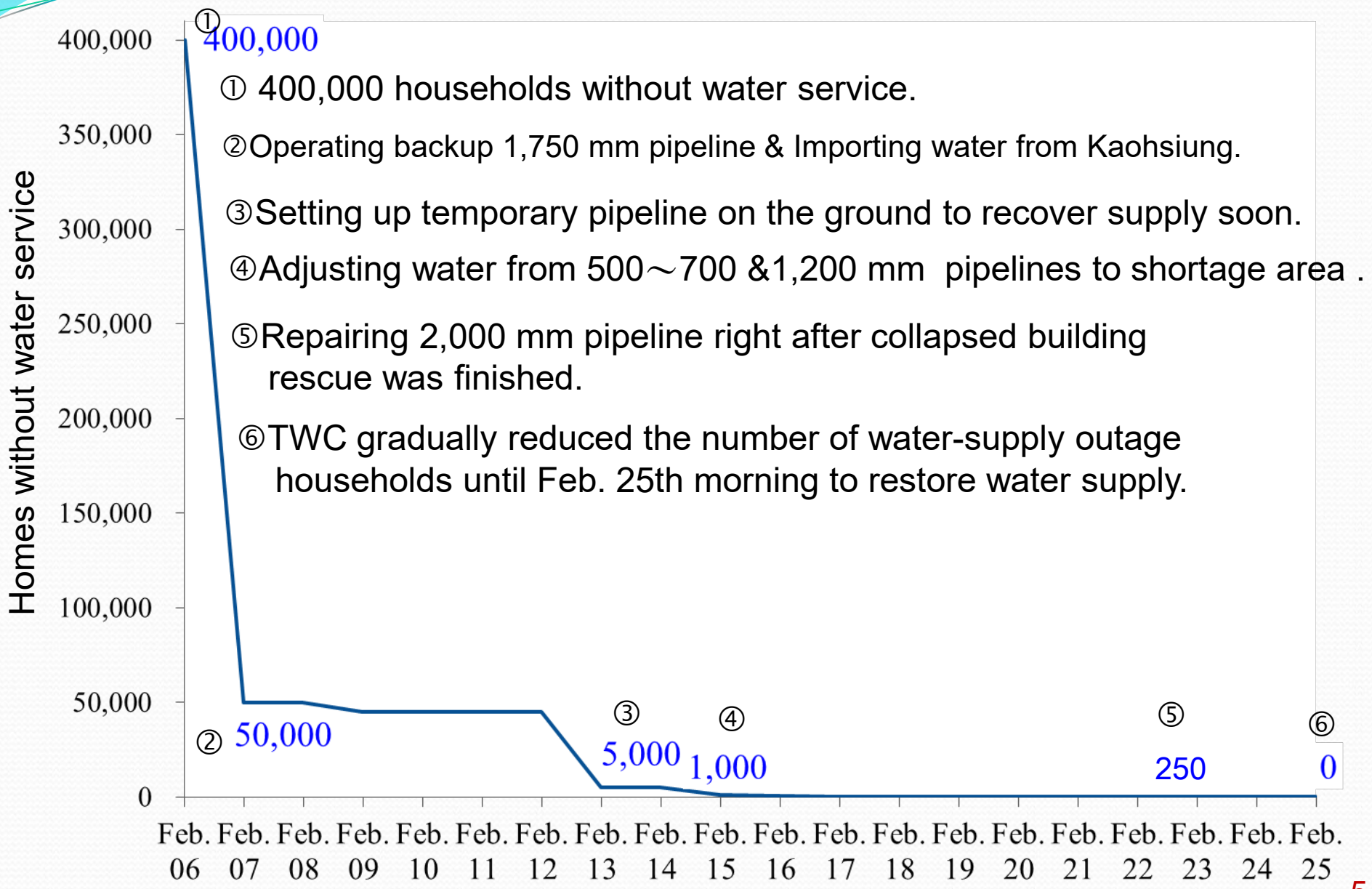


Overview of Tainan Earthquake (2/3)

- Taiwan Water Corporation (TWC) immediately set up an emergency response team at 5 a.m.
- Three main pipelines and thousands of distribution pipelines were damaged, resulting in water loss and service interruptions.



Overview of Tainan Earthquake (3/3)



① 400,000 households without water service.

②Operating backup 1,750 mm pipeline & Importing water from Kaohsiung.

③Setting up temporary pipeline on the ground to recover supply soon.

④Adjusting water from 500～700 &1,200 mm pipelines to shortage area .

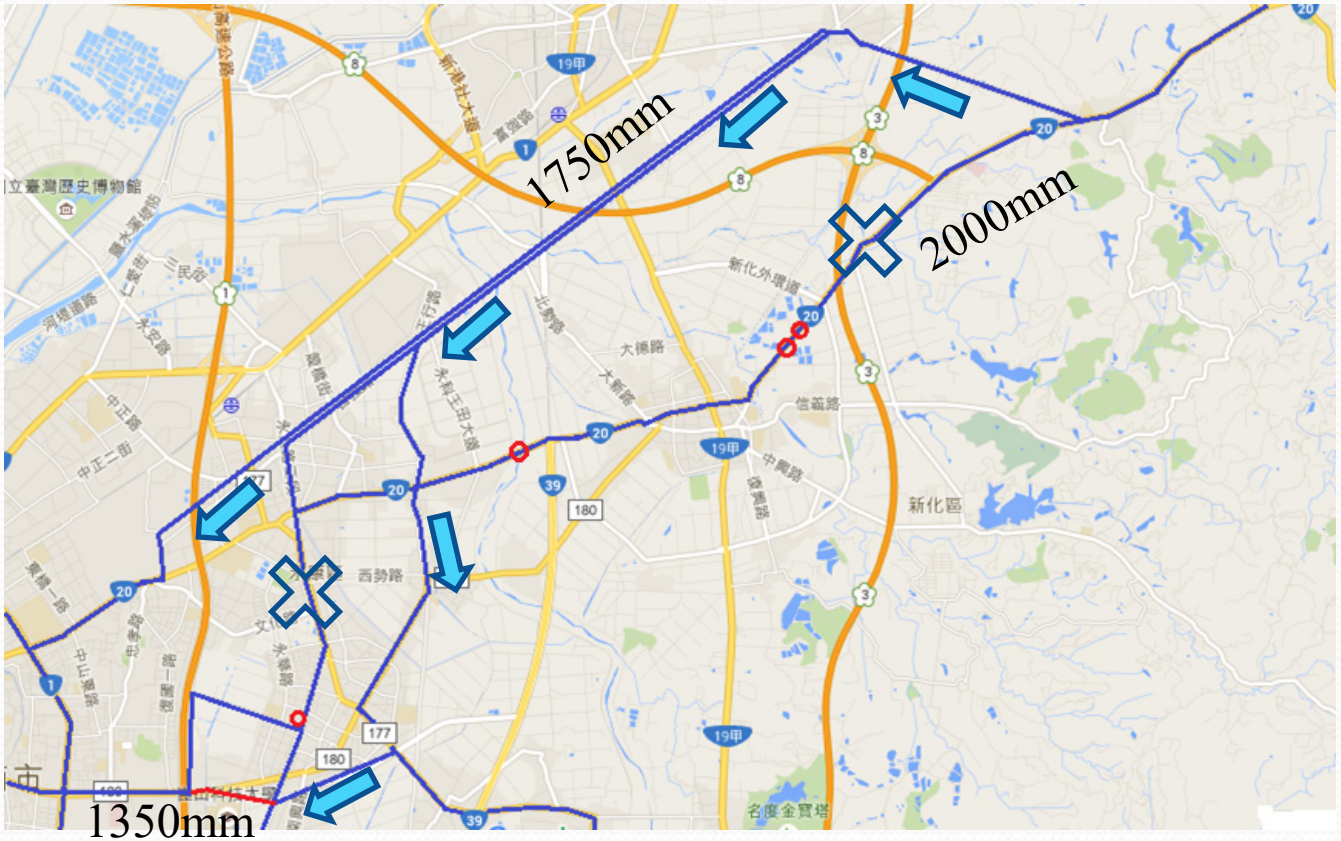
⑤Repairing 2,000 mm pipeline right after collapsed building rescue was finished.

⑥TWC gradually reduced the number of water-supply outage households until Feb. 25th morning to restore water supply.

Emergency operation of Water Supply Systems(1/8)

◆Emergency Water Supply Operation

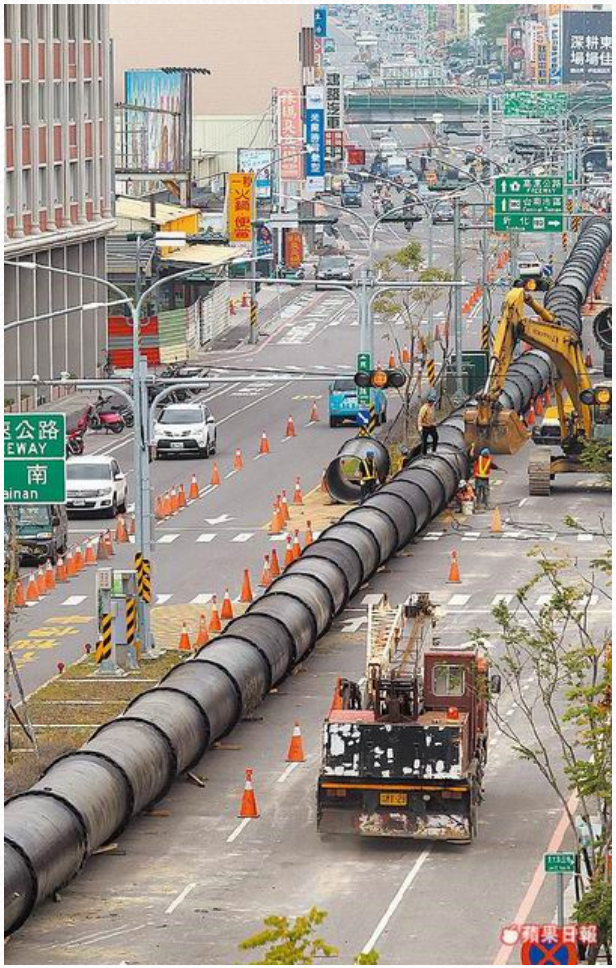
- Tainan Water System was seriously damaged, TWC used 1,750mm transmission pipeline to transfer water.
- Owing that the total volume of water is insufficient and water pressure is low, highland regions and dead end areas are still suffering water shortage.



Emergency operation of Water Supply Systems(2/8)

◆Emergency Water Supply Operation

- TWC set up temporary 1,350mm pipeline (1km long) on the ground of the Kun-Da Road to restore water supply.



Emergency operation of Water Supply Systems(3/8)

◆Emergency Water Supply Stations (Vehicle Transportation)

- Setting up 124 emergency water supply stations (water supply points) at suspension areas.
- Patrolling water supply: 22 vehicle route/stop to send water tankers for providing patrol service.

Emergency operation of Water Supply Systems(4/8)

◆ **Highland regions**:

By adjusting the valves during night time to supply water.

◆ **Dead end areas**：

By using water tanker or fire-fighting truck injecting water into pipelines for supplying water to consumer's water tank.

Emergency operation of Water Supply Systems(5/8)

◆Repairing Pipelines

- 7,948 cases of water interruption, and 4,710 pipeline bursts (72 cases with DN ≥ 300mm) were reported.
- Repairing teams cooperating with outsourcing contractors dispatched immediately to fix leaking pipes.

Emergency operation of Water Supply Systems(6/8)

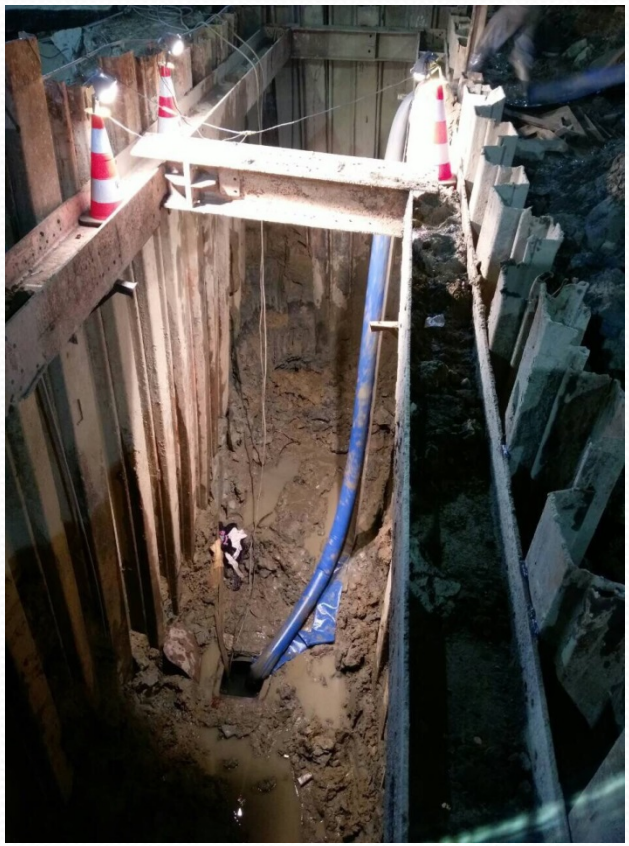
◆Yongda Road damaged 2,000mm pipe

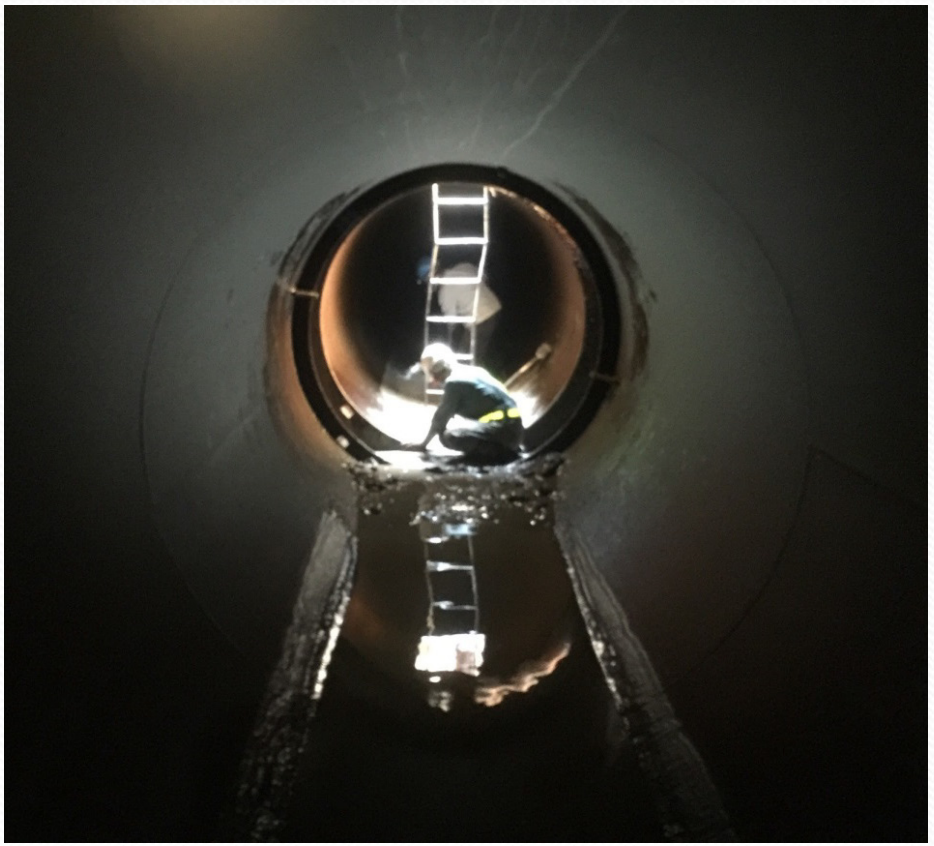
- After the Tainan City Government has cleaned up the collapsed building, TWC's repairing team immediately started to repair the pipes.
- It had been completed at 24:00 on Feb. 24th then restore water supply.

Emergency operation of Water Supply Systems(7/8)

◆Xinhua Zhongxiao Road damaged 2,000mm pipe

- The damaged pipeline was constructed by pipe jacking method and 8 meters deep, total length of 1,200 meters. There were 7 cracks in the pipeline.
- Repair works was completed at 00 : 30 on Feb. 24th.





Emergency operation of Water Supply Systems(8/8)

Daily press release on TWC website for information on water supply.

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Free ‘Mobile Water Housekeeper APP’ for query service.

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Creating a Facebook account for customers service.

+

Toll-free number

Lessons Learned from Tainan Earthquake

1. Establishing Forward Command Post.
2. Establishing Text Messaging Group (LINE) for Government officials.
3. Setting up a media center to provide complete, accurate, and timely information for the public.
4. Continuously strengthening the safety of supply system and taking anti-earthquake measures.
5. Shortening the time required to restore water services for highland regions and dead end areas.

What To Do Next

- Constructing dual transmission pipeline system.
- Plans for improving water supply in Highland region.
- Developing smart water networks.
- Surveying seismic and geologic hazards across the system.
- Replacing aging pipeline remains a big source for work.
- Seismic vulnerability assessment and condition assessment for large-diameter (DN≧800mm) water pipelines.

Conclusion

- Scientists have tried lots of different ways of predicting earthquakes, but none have been successful.
- We can do our best to strengthen the water system and well prepare to face the coming hazards.
- In response to the earthquake challenges, we need to:

- Improving the aging facilities.
- Strengthen supporting and backup system.
- Developing cooperative relationships with local governments, private businesses and the citizens .

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Thanks for your attention.