

A Railway Operator's Perspective
on the Lessons of
the Great Hanshin-Awaji Earthquake

WEST JAPAN RAILWAY COMPANY

Takayuki Sasaki

Introduction

Welcome to Kyoto!

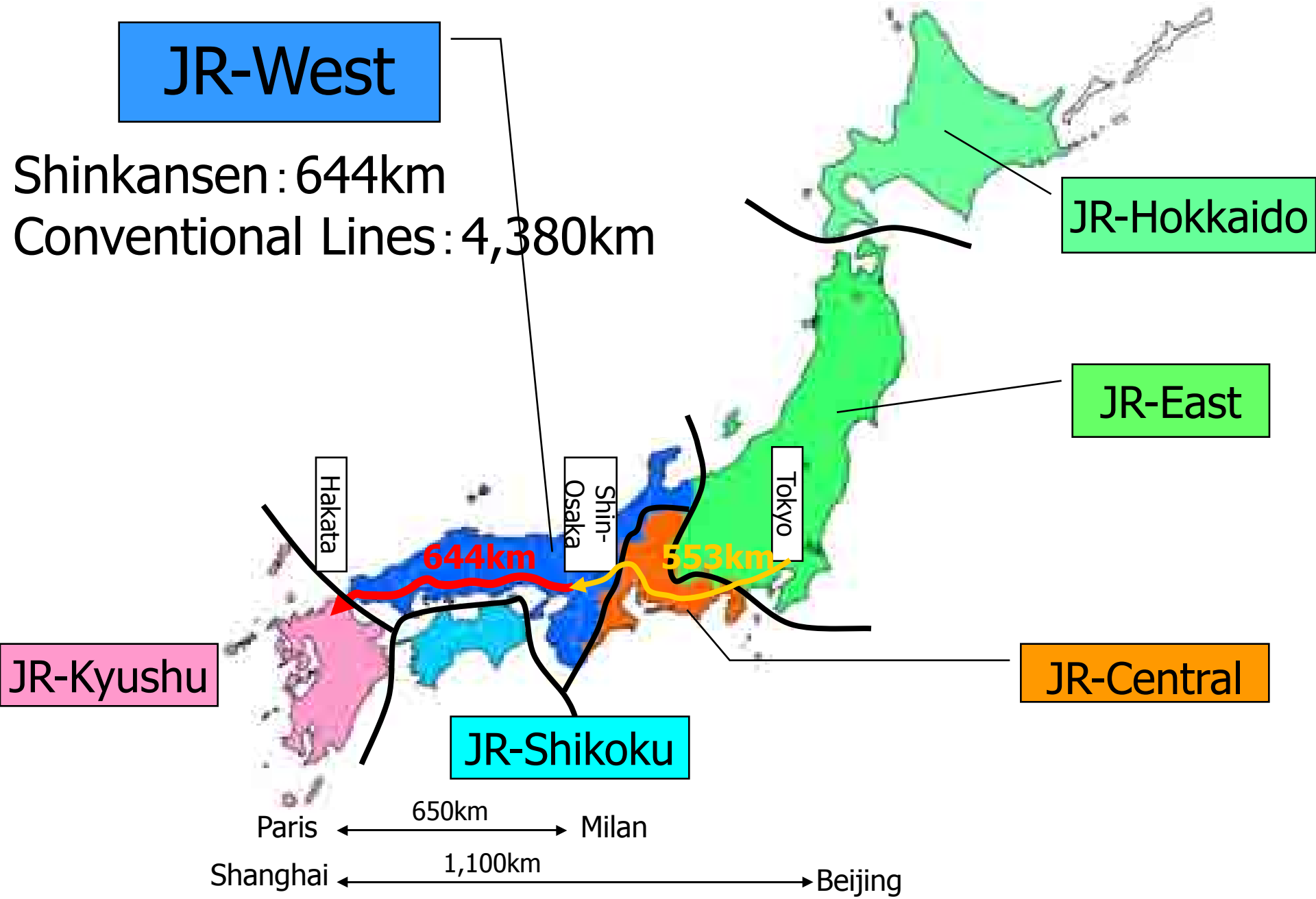
➤ Outline of JR-West

JR West Service Area

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JR-West

Shinkansen: 644km
Conventional Lines: 4,380km



JR-West Railway Network

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Seismic Damage Status (DVD Pictures)

- Appearance of earthquake
- Appearance of quake-hit area immediately after earthquake
- Recovery work

Help from the Global Community and Local Citizens' Own Efforts

- Aid from 30 countries
- Composed behavior of citizens in the affected area

The Great Hanshin-Awaji Earthquake

- Time and date of occurrence :
January 17 (Tue), 1995 5:46 a.m.
- Seismic Intensity: “7”
(Maximum seismic intensity until then had been 6.)

About the Kansai Region

7

<Population>

Osaka-city: 2.7 million

Kobe-city: 1.5 million

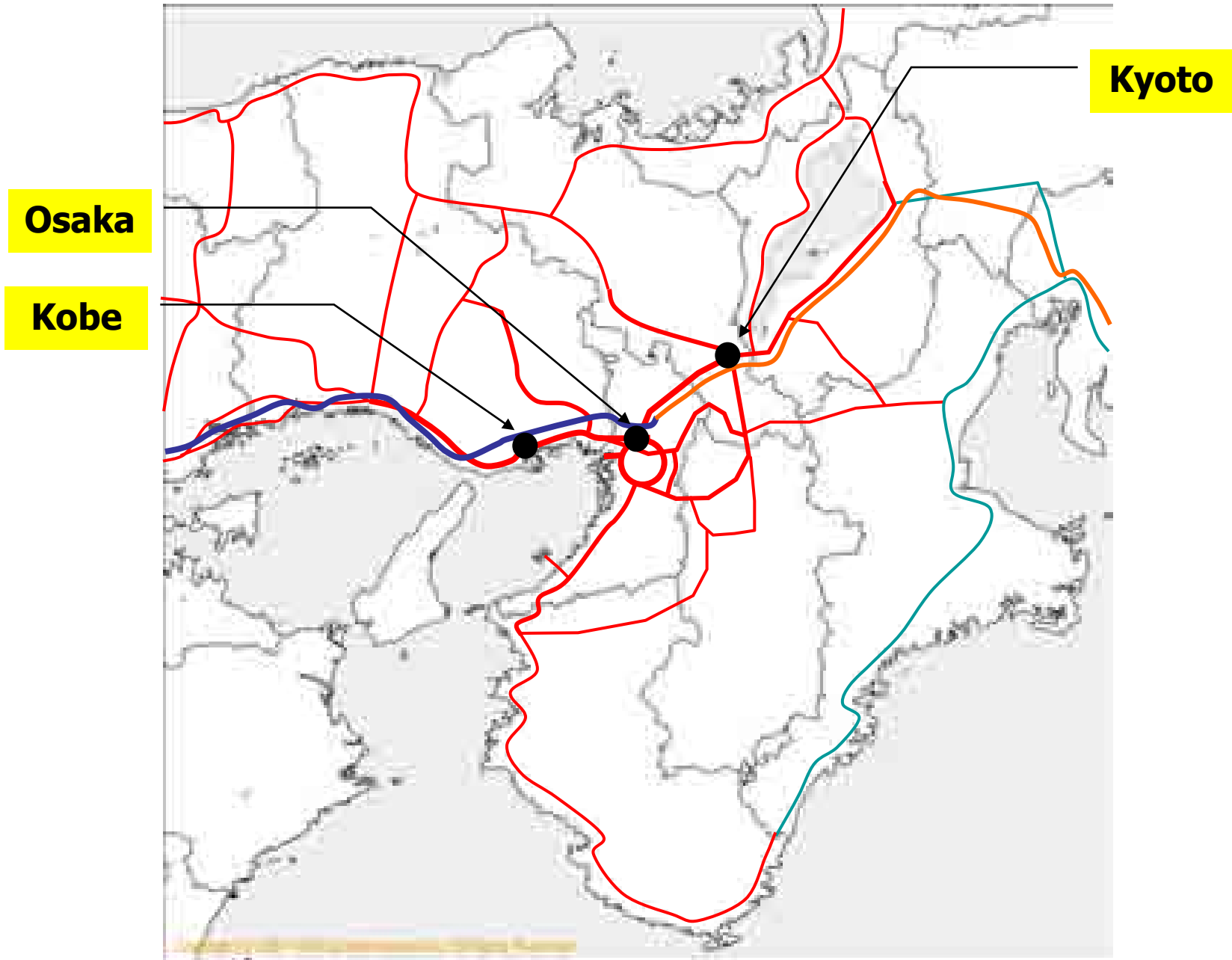
Kyoto-city: 1.5 million

**Kyoto-Osaka-Kobe Commuting Area
: approx. 20 million**



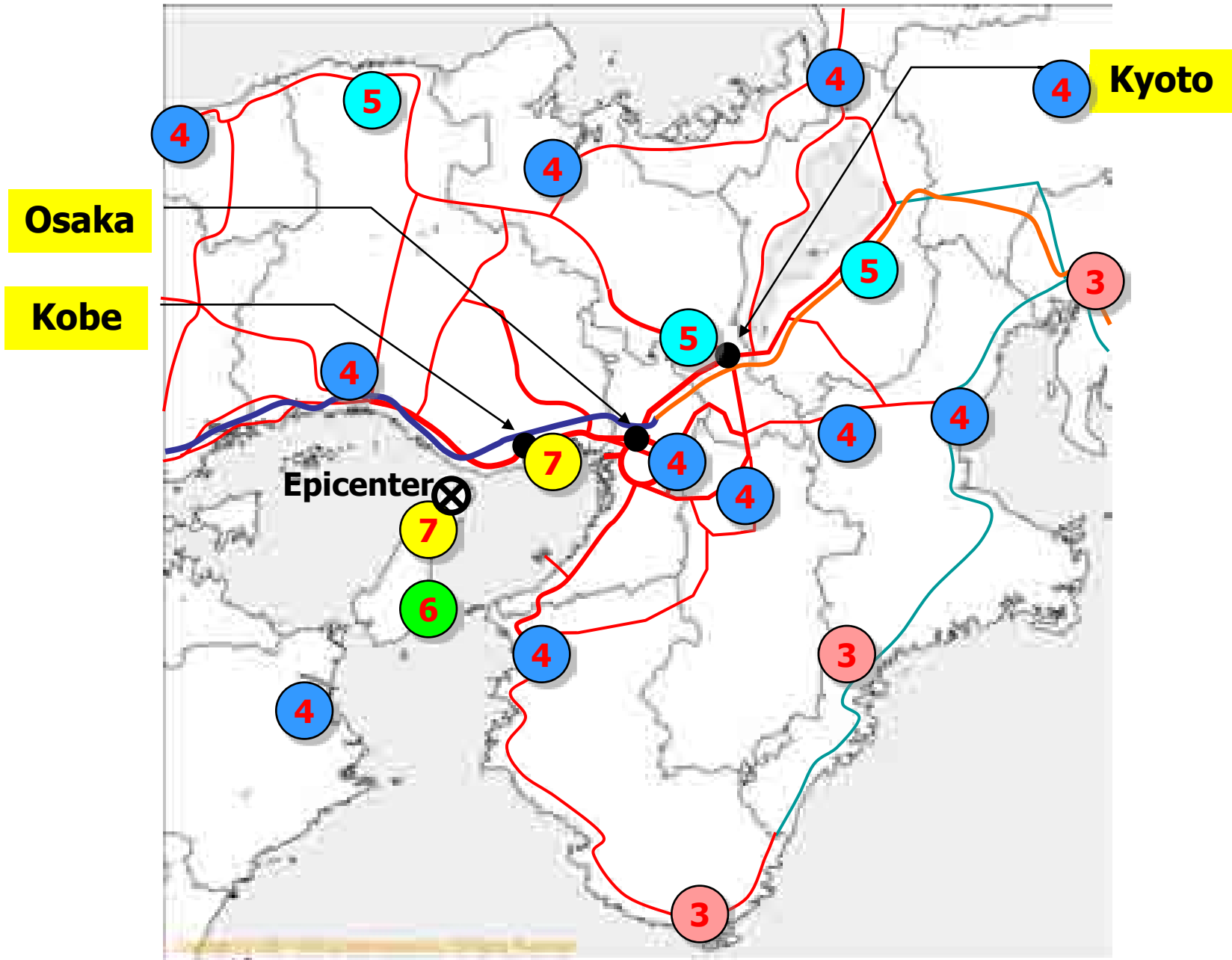
JR-West Railway Network (Kansai Area)

8

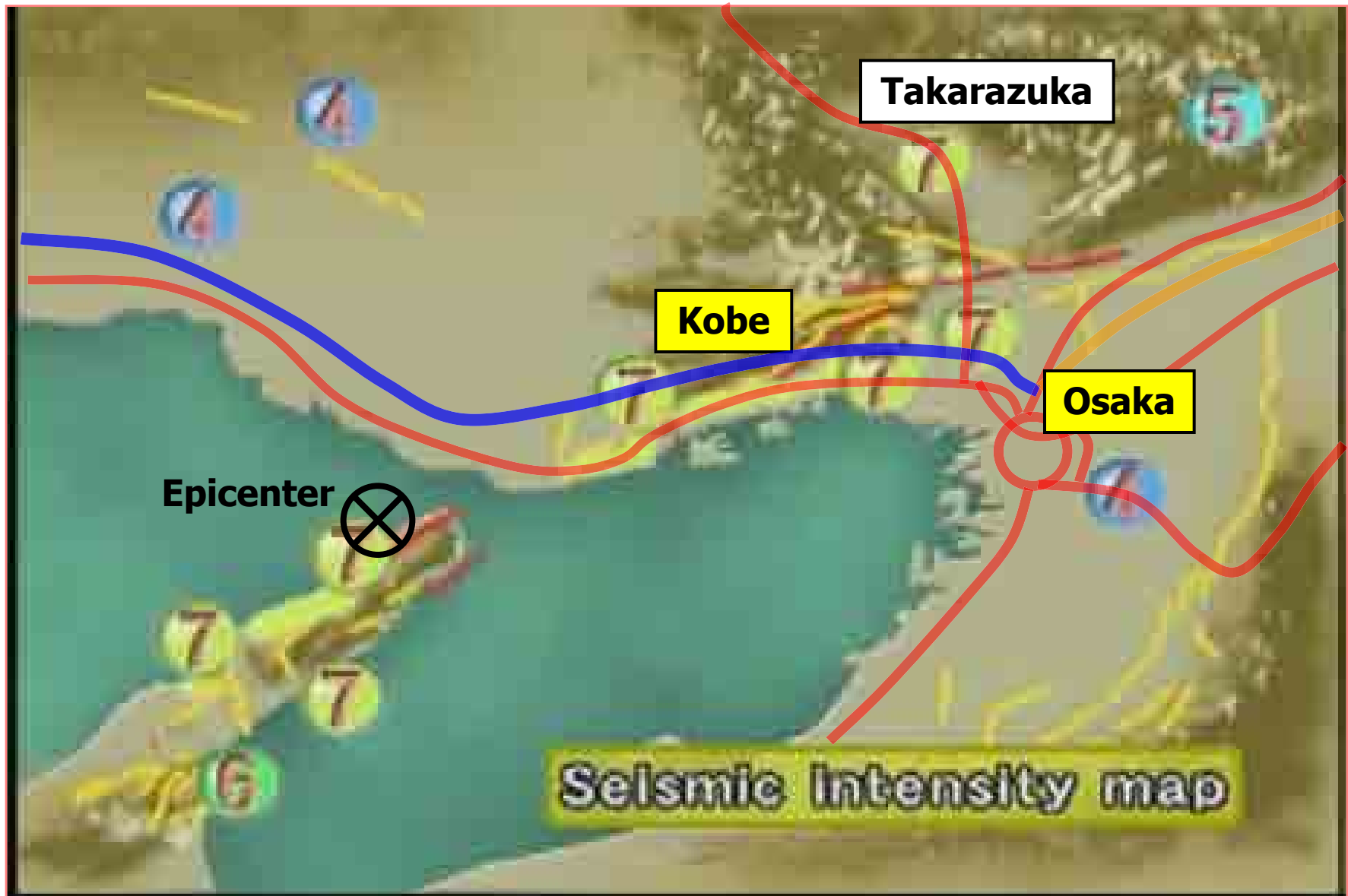


Damage Situation at JR-West

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Disaster Area and Seismic Intensity



Damage Overview

- Deaths: 6,433
- Completely and semi-destroyed homes:
Approx. 250,000 houses (460,000 households)
- Estimated cost of damage:
Approx. \ 10 Trillion
(Worst damage since World War II in Japan)

Damage Situation at JR-West (Shinkansen)



Damage Situation ① (Shinkansen)



Damage Situation ② (Shinkansen)

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Damage Situation ③ (Shinkansen)

15

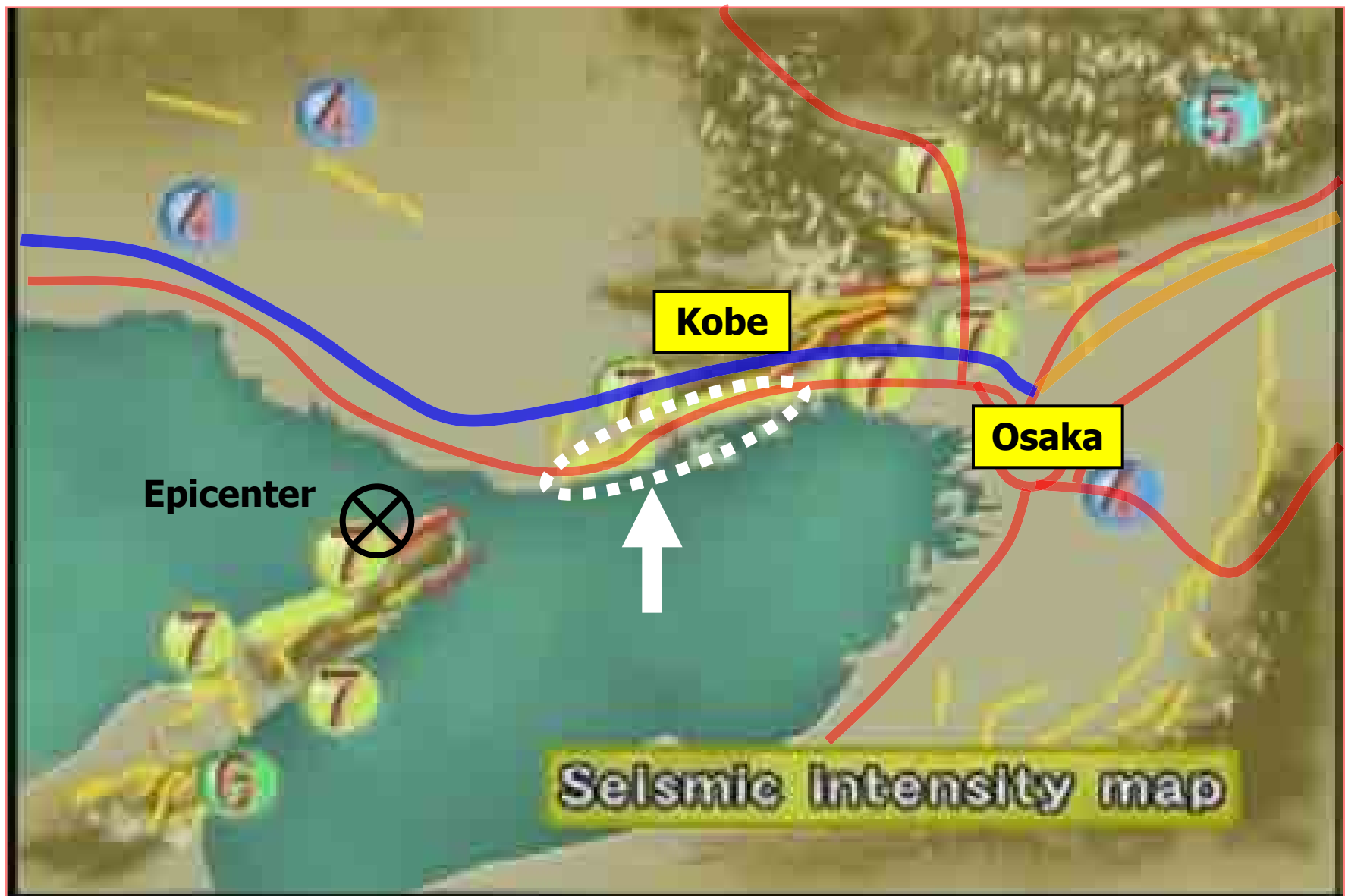


Damage Situation ④ (Shinkansen)

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Damage Situation at JR-West (Conventional Lines)



Damage Situation ⑤ (Conventional Lines)



Takatori Depot

Damage Situation ⑥ (Conventional Lines)

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Around Takatori Station

Damage Situation ⑦ (Conventional Lines)

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Shin-Nagata Station

Damage Situation ⑧ (Conventional Lines)

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Shin-Nagata Station
closed by fire



Damage Situation ⑨ (Conventional Lines)

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Around Rokkomichi

Damage Situation ⑩ (Conventional Lines)

23



Around Rokkomichi

Damage Situation ⑪ (Conventional Lines)

24



Rokkomichi Station
completely destroyed

Damage Situation ⑫ (Conventional Lines)



Ashiya Station

Unexpected Damage

- Hardly any recognition that a major earthquake could occur in the Kansai region
- Collapse of solidly constructed elevated concrete bridges

Events leading up to Restoration of Services

- Establishment of **Recovery System Headquarters** to unify power and authority
- **"Spirit of the Railways"**
(DNA of 130 years of history)

Civil Engineering Work: Bridge Beam Reuse



Civil Engineering Work: Bridge Beam Reuse

- Bridge beam raised by jack for reuse



Civil Engineering Work: Bridge Beam Reuse

➤ Collapsed bridge pier



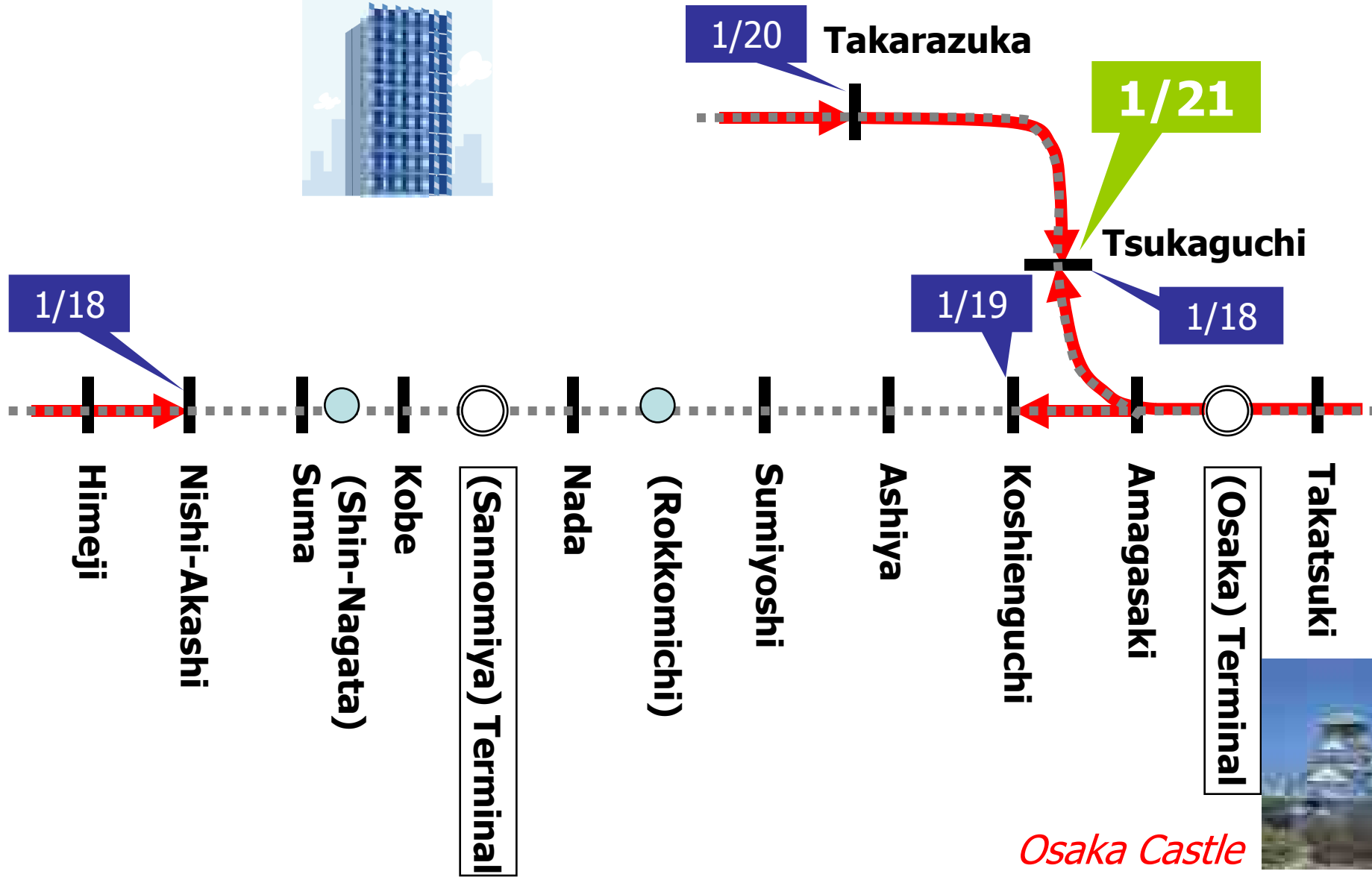
Civil Engineering Work: Bridge Beam Reuse

➤ Iron sheet supported technique



Daily Timetable Changes

Kobe City Hall



Daily Timetable Changes

33

- Takarazuka Line reopened four days after earthquake (1/ 21) by working around the clock

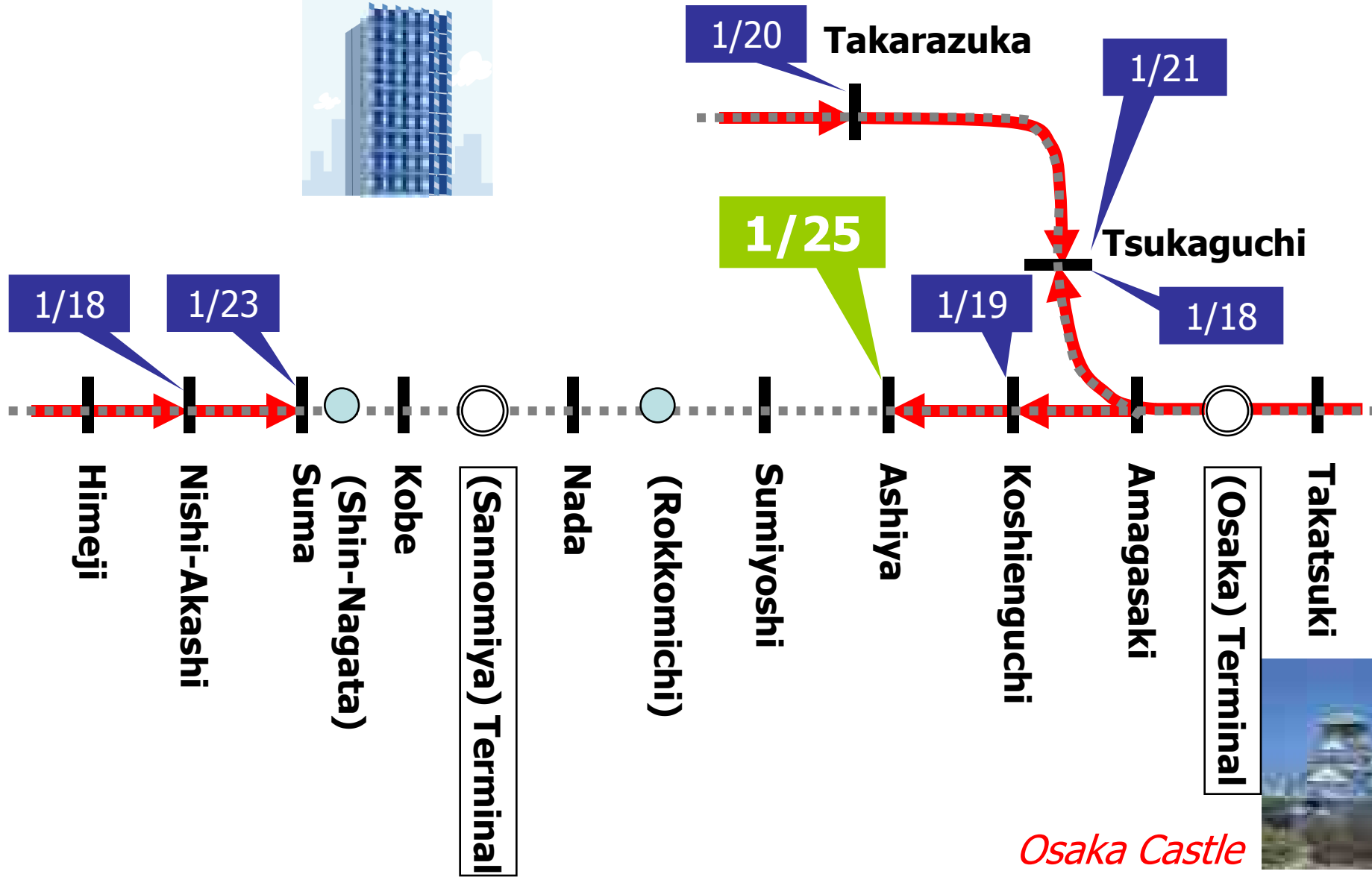


Status immediately after earthquake



Daily Timetable Changes

Kobe City Hall

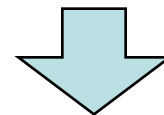


Daily Timetable Changes

- Resumption of services using a makeshift platform

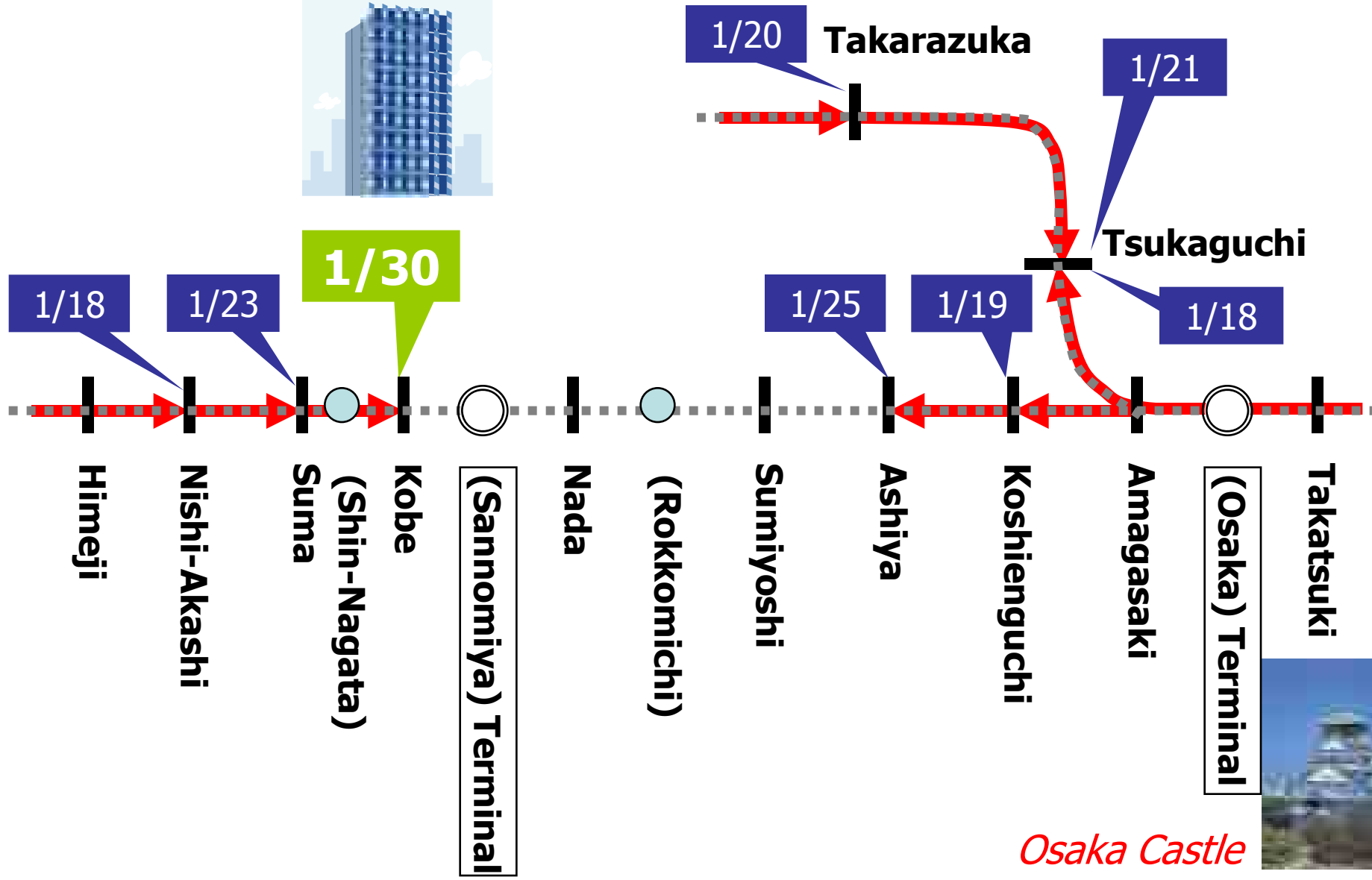


1/25
(8 days after)



Status immediately after
earthquake

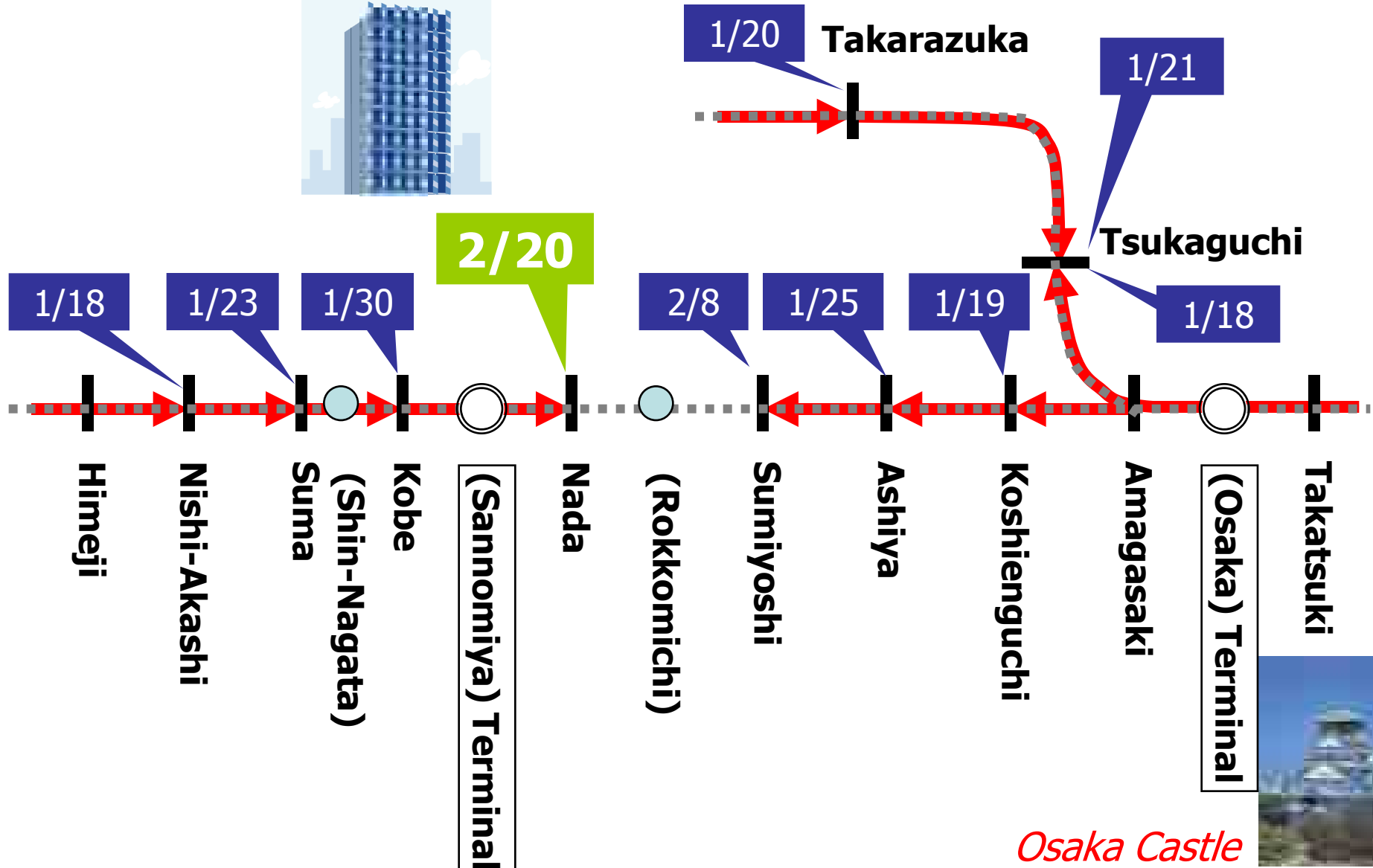
Ashiya Station



Daily Timetable Changes

- Trains did not stop at heavily-damaged stations





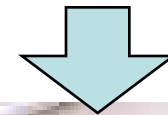
Daily Timetable Changes

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2/20

(34 days after)

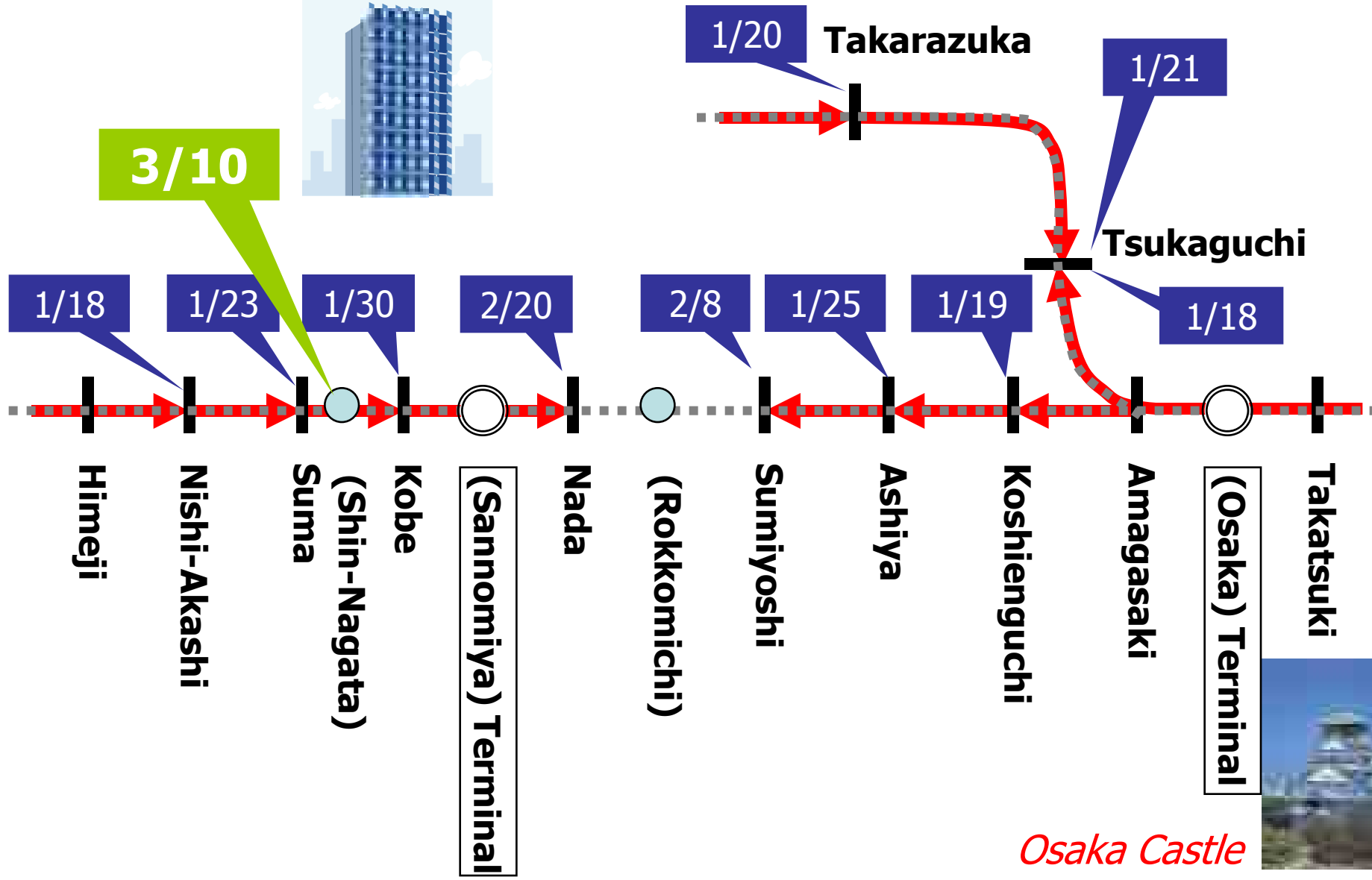


Nada Station



Daily Timetable Changes

Kobe City Hall

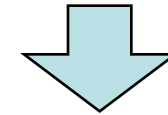


Daily Timetable Changes

- Resumption of services at makeshift stations



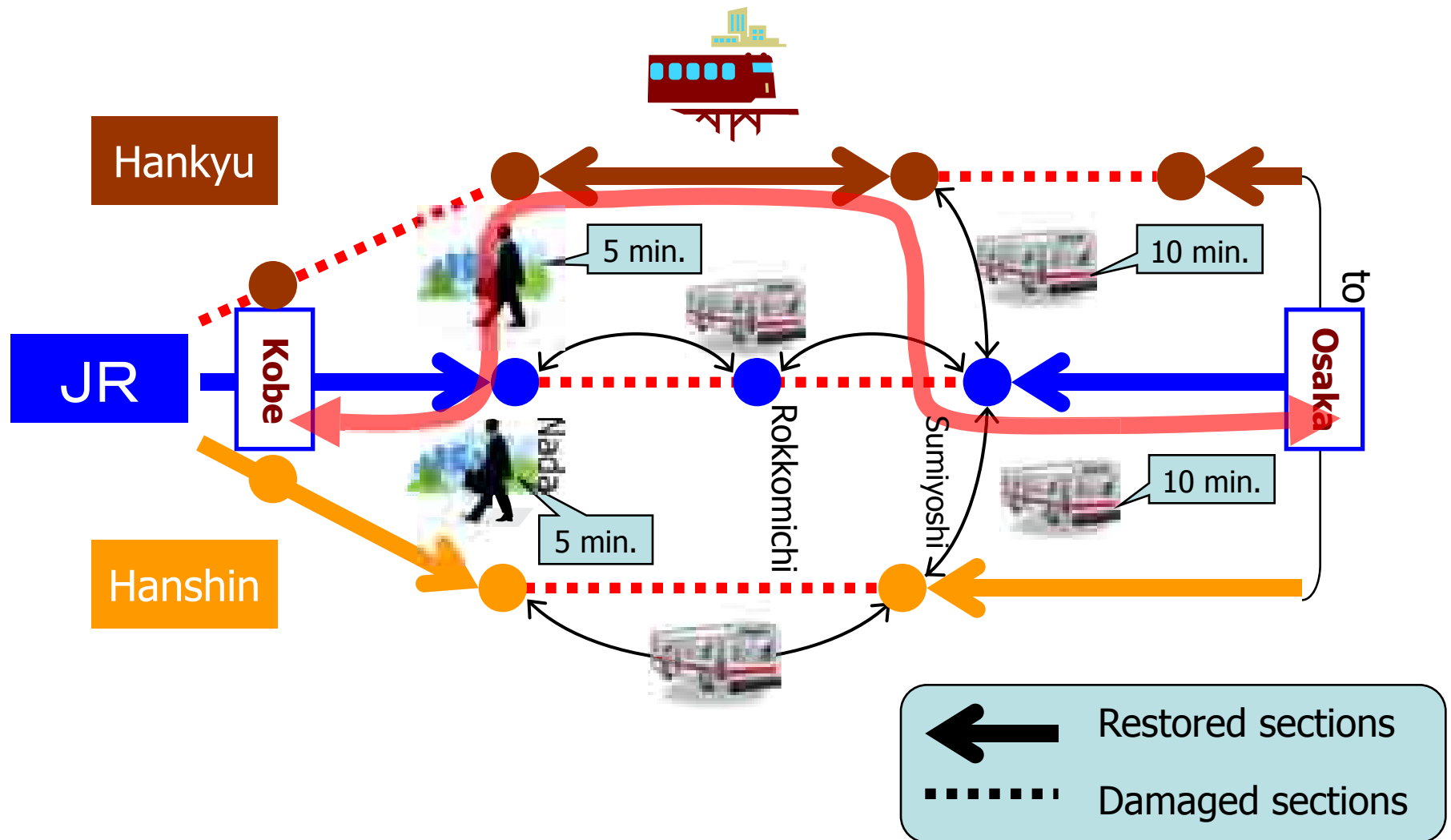
3/10
(52 days after)



Shin-Nagata Station

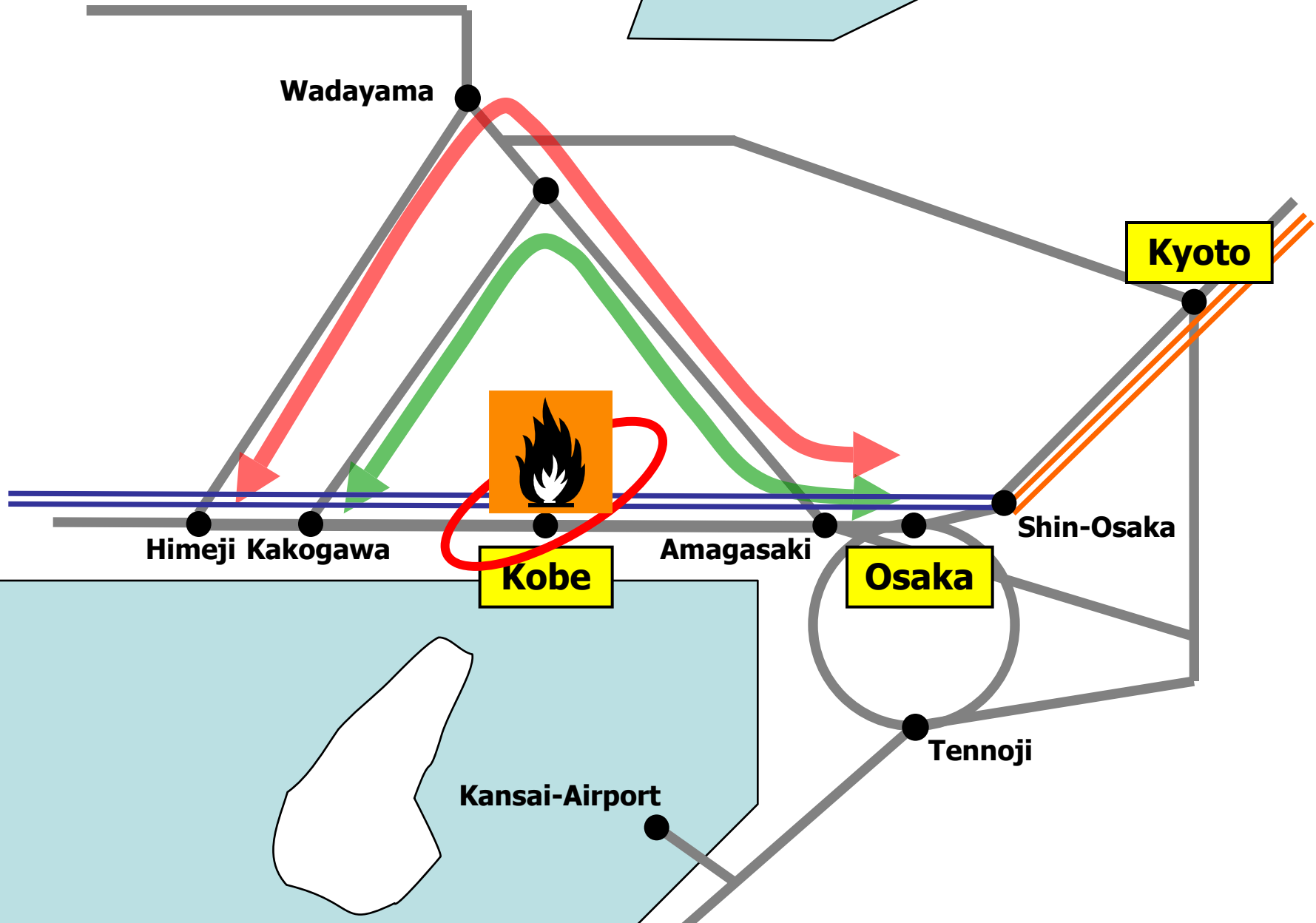


Teaming Up with Rival Railway Companies



Circuitous Route

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Circuitous Route

- Heavily crowded with transfer passengers



Wadayama Station

Daily Timetable Changes

- Appearance of timetable adjustment



Self-Composed Behavior of Local Citizens in Afflicted Area

- Commuters queuing neatly
- 10 yen coin in a public telephone
⇒ Consideration for others

Commuters Queuing Neatly for Alternative Bus Services

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Resumption of Services along Entire Line (Conventional Lines)

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Rokkomichi Station



Resumption of Services along Entire Line (Conventional Lines)



Rokkomichi Station

Resumption of Services along Entire Line (Conventional Lines)

➤ Test run
3/30



Resumption of Services along Entire Line (Conventional Lines)

51

4/1(73 days after)



Rokkomichi Station

"Thank you to everyone involved in recovery work. Rokkomichi will be reborn."

Resumption of Services along Entire Line (Shinkansen)

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Before



After



Resumption of Services along Entire Line (Shinkansen)

4/8 (80 days after)



high- speed
rail test vehicle



Shin-Kobe Station

Role of Financial Director

- Publication of financial results at a time when cost of recovery was still uncertain
- Profit registered ahead of public offering

Crisis Control Measures after Earthquake

- Introduction of urgent earthquake detection and alarm system
- Antiseismic reinforcement work
- Establishment of Second Shinkansen General Control Center

Response to Earthquake Experience

- Shift from disaster prevention to disaster mitigation
- Recognition of need for wide-ranging cooperation in various fields
- Review of risk management system

IT Risk Management

- 1995 was the first year of the age of the Internet and voluntarism
- Further responses for the Web 2.0 age

Lessons Learned from Earthquake Experience

- Be humble in the face of nature!
- Decision-making process in abnormal circumstances