East Japan Railway Company

July 3, 2012

Further Enhancement of Seismic Reinforcement and Other Countermeasures for the earthquake

In March 2012, East Japan Railway Company ("JR East") announced that it would invest about ¥100 billion to implement seismic reinforcement countermeasures against an anticipated earthquake directly beneath the Tokyo metropolitan area and strengthen its seismic observation system. Since then, JR East has conducted a series of reviews of earthquake countermeasures.

As a result of these reviews, JR East has decided to implement further seismic reinforcement and other countermeasures at an additional cost of about ¥200 billion. Specifically, JR East will implement the following countermeasures described below:

(1) To prepare for an anticipated earthquake directly beneath the Tokyo metropolitan area, we will conduct seismic reinforcement of embankments, cutouts, brick arch viaducts, electrical poles and other infrastructure. In addition, we will implement station/platform ceiling and wall collapse prevention countermeasures, among other initiatives. We will also bring forward seismic reinforcement of bridge piers, which we have also implemented in the past.

(2) Based on experience derived from the Great East Japan Earthquake, we will seismically reinforce train station buildings serving more than 3,000 passengers per day, along with the seismic reinforcement of Shinkansen electrical poles, which were heavily damaged in the Great East Japan Earthquake.

(3) We will work to enhance communications functions in preparedness for a disaster. Countermeasures include increasing the communications speed for seismometer measurement data, and upgrading backup power supplies for the communications network.

We will now promote seismic reinforcement and other countermeasures at a total cost of approximately ¥300 billion, positioning the next five years or so as an intensive implementation period.

Through these countermeasures, we will endeavor to build a railway capable of withstanding natural disasters.

Details of the approximately ¥200 billion enhancement of seismic reinforcement and other countermeasures are provided below.

See Attachment 1 for a map showing the boundaries of the South Kanto area, Sendai, etc. area and Other areas. [Attachment 1]

1. Seismic reinforcement countermeasures for an earthquake directly beneath the Tokyo metropolitan area (South Kanto area) [Attachment 2]

(1) Structures subject to reinforcement

- Bridge piers	Shinkansen	About 680 piers
	Conventional lines	About 1,090 piers
- Electrical poles	Shinkansen	About 1,370 poles
	Conventional lines	About 390 poles

(about 360 poles will be surveyed)

- Station/platform ceilings — About 290 stations
- Station/platform walls — About 40 stations

Embankments, cutouts and brick arch viaducts on nine line sections, including Yamanote and Chuo Lines (about 220 km)

- Embankments — About 19 km
- Embankments close to Ochanomizu Station — About 1.2 km
- Cutouts — About 23 km
- Embankments behind bridge abutments — About 190 places
- Anti-derailing guards — About 72 km
- Steel girders — 1 bridge
- Tunnels — 4 tunnels
- Brick arch viaducts — About 70 spans

(2) Construction cost: About ¥184 billion
Position the next 5 years or so as an intensive implementation period

2. Further seismic reinforcement countermeasures in addition to 1. above (Sendai, etc. area, Other areas) [Attachment 2]

(1) Structures subject to reinforcement

- Electrical poles (for Shinkansen within the Sendai, etc. Area) — About 1,600 poles
- Station/platform ceilings — About 270 stations
- Station/platform walls — About 20 stations
- Station buildings serving more than 3,000 passengers a day — About 85 buildings

(2) Construction cost: About ¥22 billion
Position the next 5 years or so as an intensive implementation period

3. Enhancement of communications functions, etc. (all areas) [Attachment 3]

Based on experience derived from the Great East Japan Earthquake, we will increase the transmission speed of earthquake information for conventional lines. The March 2011 earthquake caused power outages for extended periods of time over a wide area, rendering communications facilities unusable. Accordingly, we will take the following countermeasures.

(1) Countermeasures

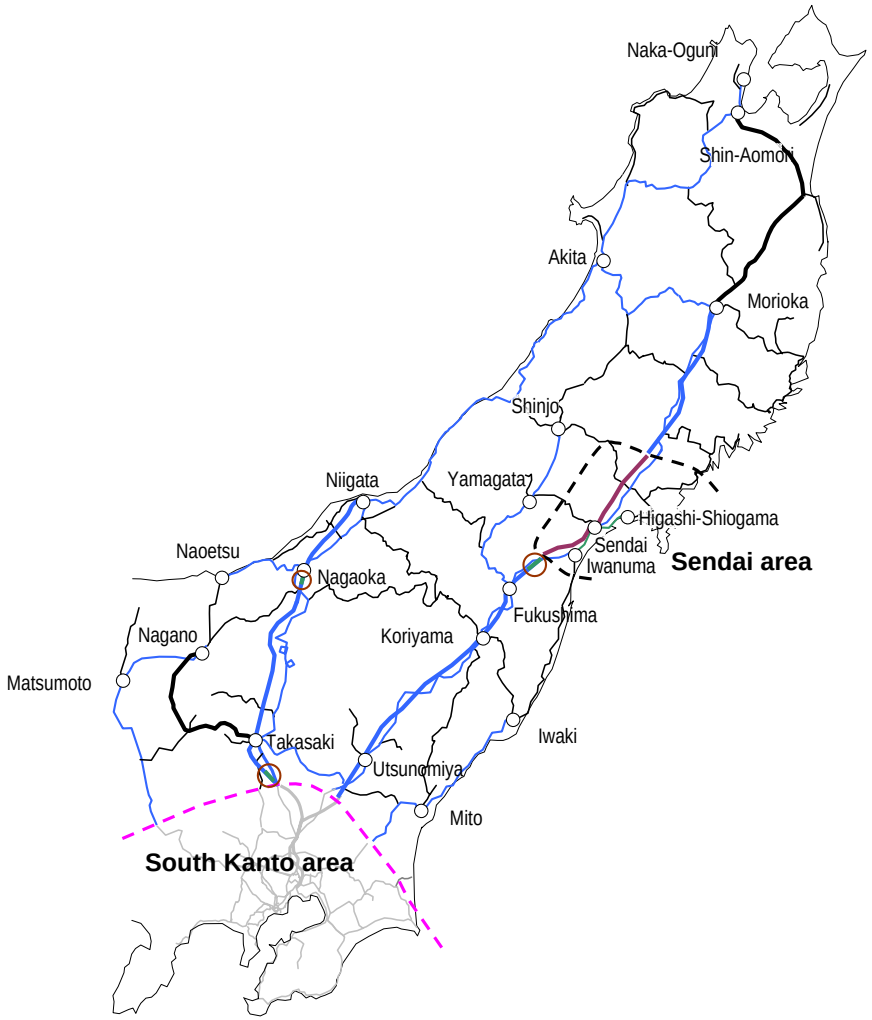
- Enable high-speed transmission of seismometer measurement data for conventional lines (establish dedicated lines)
- Enhance batteries for communications equipment rooms (install batteries with 48 hours of power)
- Install uninterruptible power outlets for communications equipment in head office and branch office buildings

(2) Construction cost: About ¥3.0 billion

Line Sections Subject to Seismic Reinforcement Countermeasures for Eathquakes

[Attachment 1]

[Boundaries of South Kanto area, Sendai, etc. area and Other areas]



Note

Line sections subject to countermeasures in each area

South Kanto area: (right map)

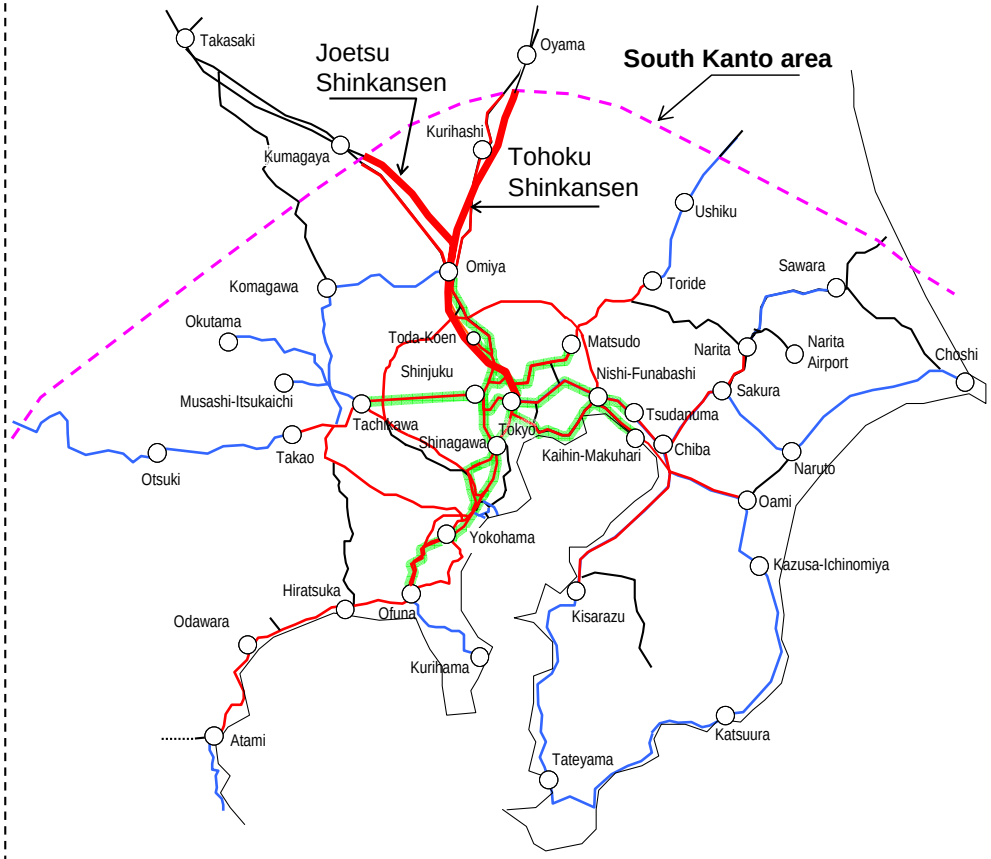
Sendai, etc. area:

Other areas:

* "Sendai, etc. area " includes Sendai area and three sections near active faults on Shinkansen (with a mark ○ on the map).

[Line sections subject to seismic reinforcement countermeasures for an earthquake directly beneath the Tokyo Metropolitan area]

(South Kanto area)



Note

Line sections subject to seismic reinforcement of viaducts, bridge piers, electrical polls and ceiling and walls of platforms:

- Shinkansen in South Kanto area:
- Conventional lines in South Kanto area with 10 or more trains running one way per hour at peak times:

Line sections subject to seismic reinforcement of embankments, cutouts, brick arch viaducts, etc. :

[9 sections, about 220 km]

Yamanote Line: About 34 km
Chuo Line: About 37 km
Joban Line: About 16 km
Sobu Line: About 27 km
Keiyo Line: About 32 km
Tohoku Line: About 23 km
Tokaido Line: About 40 km
Akabane Line: About 6 km
Saikyo Line: About 5 km

Seismic reinforcement countermeasures

[Attachment 2]

【Seismic reinforcement countermeasures for an earthquake directly beneath the Tokyo metropolitan area 】

			Structures subject to reinforcement	Past damage example	Reinforcement image	Line sections subject to seismic reinforcement
Shinkansen	Viaduct columns and bridge piers		Announced on Mar. 6 Viaduct columns: About 1,100 columns To be newly begun Bridge piers: About 680 piers	【Damage to electrical poles】	【Reinforcement of electrical poles, conversion to gate structure】 Prevent collapse using beams, Reinforce foundation	— + — line sections in the right-side diagram in Attachment 1
	Electrical poles		To be newly begun Electrical poles: About 1,370 poles			
Conventional lines	Viaduct columns and bridge piers		Announced on Mar. 6 Viaduct columns: About 5,630 columns To be newly begun Bridge piers: About 1,090 piers	【Damage to bridge piers】	【External steel-plated reinforcement】 Steel plating	
	Electrical poles		To be newly begun Electrical poles: About 390 poles (about 360 poles will be surveyed)	【Damage to electrical poles】	【Reinforcement of electrical poles, conversion to gate structure】 Prevent collapse using beams, Reinforce foundation	
	Fallen objects from ceilings and walls	Ceilings	To be newly begun Station/platform ceilings: About 290 stations	【Ceiling collapse】	【Diagonal bracing】	
		Walls	To be newly begun Station/platform walls: About 40 stations			
	Embankments and cutouts, etc.	Embankments	To be newly begun Embankments close to Ochanomizu Station About 1.2 km; To be newly begun (under design) Embankments of 8 m or greater: About 8 km; To be newly begun Embankments from 6 m to less than 8 m: About 11 km	【Collapse of embankments】	【Reinforcement of embankments】	····· line sections in the right-side diagram in Attachment 1
		Cutouts	To be newly begun Cutouts of 6 m or greater: About 23 km	【Collapse of cutouts】	【Reinforcement of cutouts】	
		Embankments behind bridge abutments	To be newly begun Embankments behind bridge abutments linked with embankments of 6 m or greater: About 190 locations	【Sinking of embankments behind bridge abutments】	【Reinforcement of embankments behind bridge abutments】 Reinforcement of ground	
		Anti-derailing guards	Announced on Mar. 6 Close to Ochanomizu Station: About 2 km; To be newly begun Front and back of abutments: About 72 km		【Anti-derailing guards】	
	Unreinforced concrete bridge piers		Announced on Mar. 6 Unreinforced concrete and other bridge piers: About 60 piers	【Dislocation of bridge piers】	【External steel-plated reinforcement】	
	Steel girders	Sloping girders	Announced on Mar. 6 Steel girders: About 120 bridges	【Sloping steel bridge piers】	【Reinforcing rings】	
		Steel bridge piers				
		Fallen bridges	To be newly begun Steel girders: 1 bridge Bridge collapse prevention work: 70 bridges			
	Tunnels		To be newly begun 4 tunnels	【Tunnel lining and changes in state】	【Mortar injection】	
	Brick arch viaducts		To be newly begun Brick arch viaducts: About 70 spans	【Cracks】	【Internal steel plating】	

: To be newly begun ¥184 billion : Announced on March 6 ¥52 billion Total: ¥236 billion

【 Seismic reinforcement measures 】 (Sendai, etc. Area, Other Areas)

			Structures subject to reinforcement	Past damage example	Reinforcement image	Line sections subject to seismic reinforcement
Shinkansen	Viaducts		Announced on Mar. 6 Viaducts: About 7,540 columns	【Damage to electrical poles】	【Reinforcement of electrical poles, conversion to gate structure】 Prevent collapse using beams, Reinforce foundation	— + — line sections in the left-side diagram in Attachment 1
	Electrical poles		To be newly begun Electrical poles: About 1,600 poles			
Conventional lines	Viaduct columns and bridge piers		Announced on Mar. 6 Viaduct columns: About 970 columns Bridge piers: About 820 piers	【Damage to bridge piers】	【External steel-plated reinforcement】 Steel plating	
	Fallen objects from ceilings and walls	Ceilings	To be newly begun Station/platform ceilings: About 270 stations	【Ceiling collapse】	【Diagonal bracing】	
		Walls	To be newly begun Station/platform walls: About 20 stations			
	Train station buildings		To be newly begun Train station buildings serving more than 3,000 passengers per day: About 85 buildings	【Damage to train station buildings】	【Reinforcement of train station】	

: To be newly begun ¥22 billion : Announced on March 6 ¥43 billion Total: ¥65 billion

<Reference> Implementation status of seismic reinforcement of viaduct columns, bridge piers and train station buildings

○ Implementation status of seismic reinforcement of viaduct columns and bridge piers

				South Kanto area	Sendai, etc. area	Other area
Shinkansen	Shear failure occurs first			About 1,900 columns, about 310 piers	About 16,600 columns, about 2,030 piers	
	Flexural failure occurs first	Viaduct columns	Not used by shops, etc.	About 3,800 columns	About 2,900 columns	About 7,130 columns
			Used by shops, etc.	About 1,100 columns	About 410 columns	
		Bridge piers		About 680 columns		
Conventional lines (*1)	Shear failure occurs first			About 12,500 columns, about 530 piers	About 100 columns, about 10 piers	About 940 columns, about 820 piers
	Flexural failure occurs first	Viaduct columns	Not used by shops, etc.	About 5,460 columns	About 40 columns	
			Used by shops, etc.	About 5,630 columns	About 30 columns	
		Bridge piers		About 1,090 piers		

(*1) For the South Kanto area and Sendai, etc. area, data refers to line sections with 10 or more trains running one way per hour at peak times.
For Other areas, data refers to line sections which limited express trains are operated and line sections with five or more trains running one way per hour at peak times.

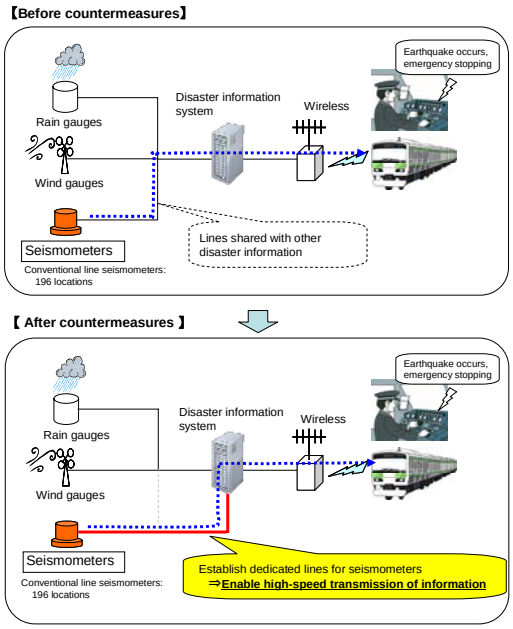
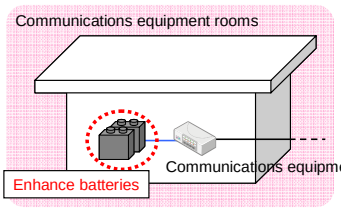
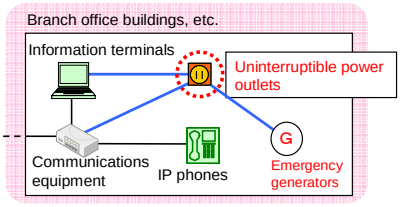
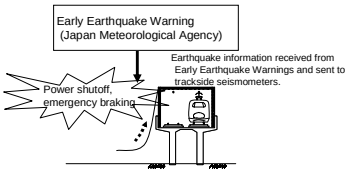
: Completed by the end of FY2009.3 : Completion planned by the end of FY2014.3 : Announced on March 6 : To be newly begun

○ Implementation status of seismic reinforcement measures for train station buildings

Seismic reinforcement measures have been completed at about 150 buildings for all stations and station buildings over the rail tracks in the South Kanto area and Sendai, etc. area, along with station buildings serving more than 10,000 passengers a day in other areas, with the exception of certain stations undergoing major renovations. In other areas, seismic reinforcement measures will be newly implemented at about 85 buildings for stations serving more than 3,000 passengers a day.

[Attachment 3]

Enhancement of communications functions, etc.

	Countermeasures	Images of countermeasures
Countermeasures to be newly begun	Enable high-speed transmission of existing seismometer measurement data (establish dedicated lines) 【Existing seismometers: 196 locations】	
	Enhance batteries for communications equipment 【Communications equipment rooms: 30 locations】	 ・Enhance batteries for communications equipment rooms (install batteries with 48 hours of power)
	Install uninterruptible power outlets for communications equipment in head office and branch office buildings 【Branch office buildings, etc.: 19 locations】	 ・Install uninterruptible power outlets
Announced on March 6	Install additional seismometers in the Tokyo metropolitan area and inland areas 【30 locations】	 ・Add 30 seismometers to prepare for an earthquake directly beneath the Tokyo metropolitan area and inland earthquakes Start of use: March 9, 2012 on conventional lines August 2012 on Shinkansen (planned)
	Implementation of Early Earthquake Warnings (Japan Meteorological Agency) on Shinkansen	 Start of use: Autumn 2012 (planned)

:To be newly begun ￥3 billion　:Announced on March 6 ￥1.2 billion　Total: ￥4.2 billion