

A stylized map of Hokkaido, Japan, in dark blue. A white line represents the Shinkansen route, starting from Sapporo in the north, passing through Shin-Hakodate-Hokuto, and ending at Shin-Aomori. Each station is marked with a white star. The background is a light blue gradient with soft, out-of-focus light spots.

# Hokkaido Shinkansen



**Japan Railway Construction,  
Transport and Technology Agency**

# Outline of Hokkaido Shinkansen

● Hokkaido Shinkansen ●

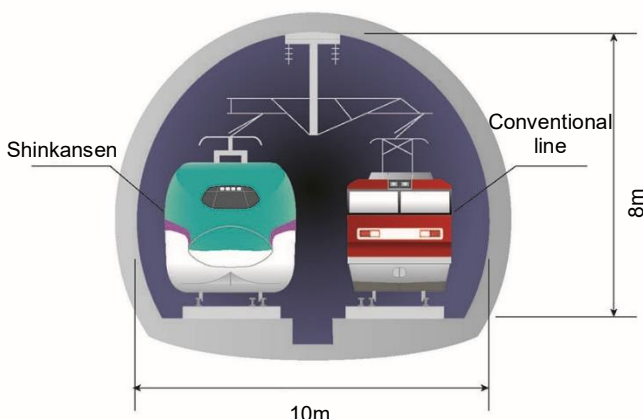
Between Shin-Aomori and Shin-Hakodate-Hokuto stations	Section	Between Shin-Hakodate-Hokuto and Sapporo stations
149 km	Line length	212 km
Aomori, Yomogita, Sotogahama, Imabetsu, Nakadomari, Fukushima, Shiriuchi, Kikonai, Hokuto, Nanae	Municipalities along the line	Hokuto, Assabu, Yakumo, Oshamambe, Kuromatsunai, Rankoshi, Toyoura, Niseko, Kutchan, Niki, Akaigawa, Yoichi, Otaru, Sapporo
Shin-Aomori, Okutsugaru-Imabetsu, Kikonai, Shin-Hakodate-Hokuto	Station	Shin-Hakodate-Hokuto, Shin-Yakumo (name TBD), Oshamambe, Kutchan, Shin-Otaru (name TBD), Sapporo
Maximum design speed: 260km/h Minimum curve radius: 4,000m (2,500 m in some sections) Maximum gradient: 20.8‰ Track spacing: 4.3m Electricity of overhead line: AC 25,000V	Construction criteria	Maximum design speed: 260km/h Minimum curve radius: 4,000m (600m in some sections) Maximum gradient: 30‰ Track spacing: 4.3m Electricity of overhead line: AC 25,000V
<b>● Tunnel</b> Tsugaru Yomogida tunnel 6,190m Satsukari tunnel 1,235m Koren tunnel 1,410m Izumisawa tunnel 1,720m Oshima Tobetsu tunnel 8,073m Shin-Moheji tunnel 3,345m  <b>● Bridge</b> Oyachi railway bridge 185m Kikonai river bridge 164m Moheji river bridge 186m Hekirichi river bridge 198m Onogawa river bridge 164m	Major structures	<b>● Tunnel</b> Oshima tunnel 32,675m Nodaoi tunnel 8,165m Tateiwa tunnel 17,035m Uchiura tunnel 15,565m Kombu tunnel 10,410m Yotei tunnel 9,750m Futatsumori tunnel 12,630m Shiribeshi tunnel 17,990m Sasson tunnel 26,230m  <b>● Bridge</b> Yurappu river bridge 245m Shiribetsu river bridge 340m Minami Kutosan river bridge 210m

## Outline of Shared Section with Conventional Line

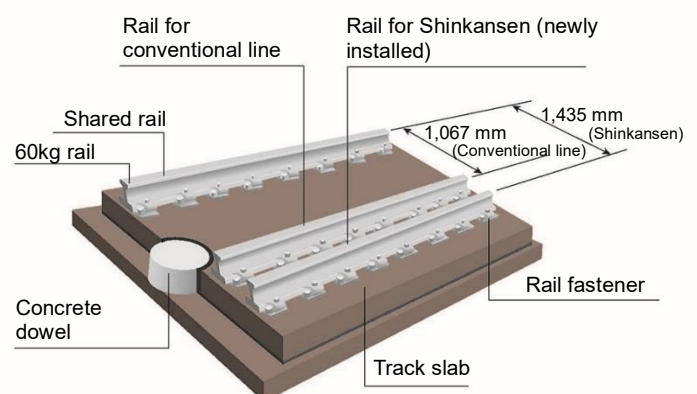
● Hokkaido Shinkansen ●

Although conventional freight trains have been running through the Seikan Tunnel, additional rail for wider gauge was laid to share the tunnel section with Shinkansen high speed rail.

Tunnel Cross Section



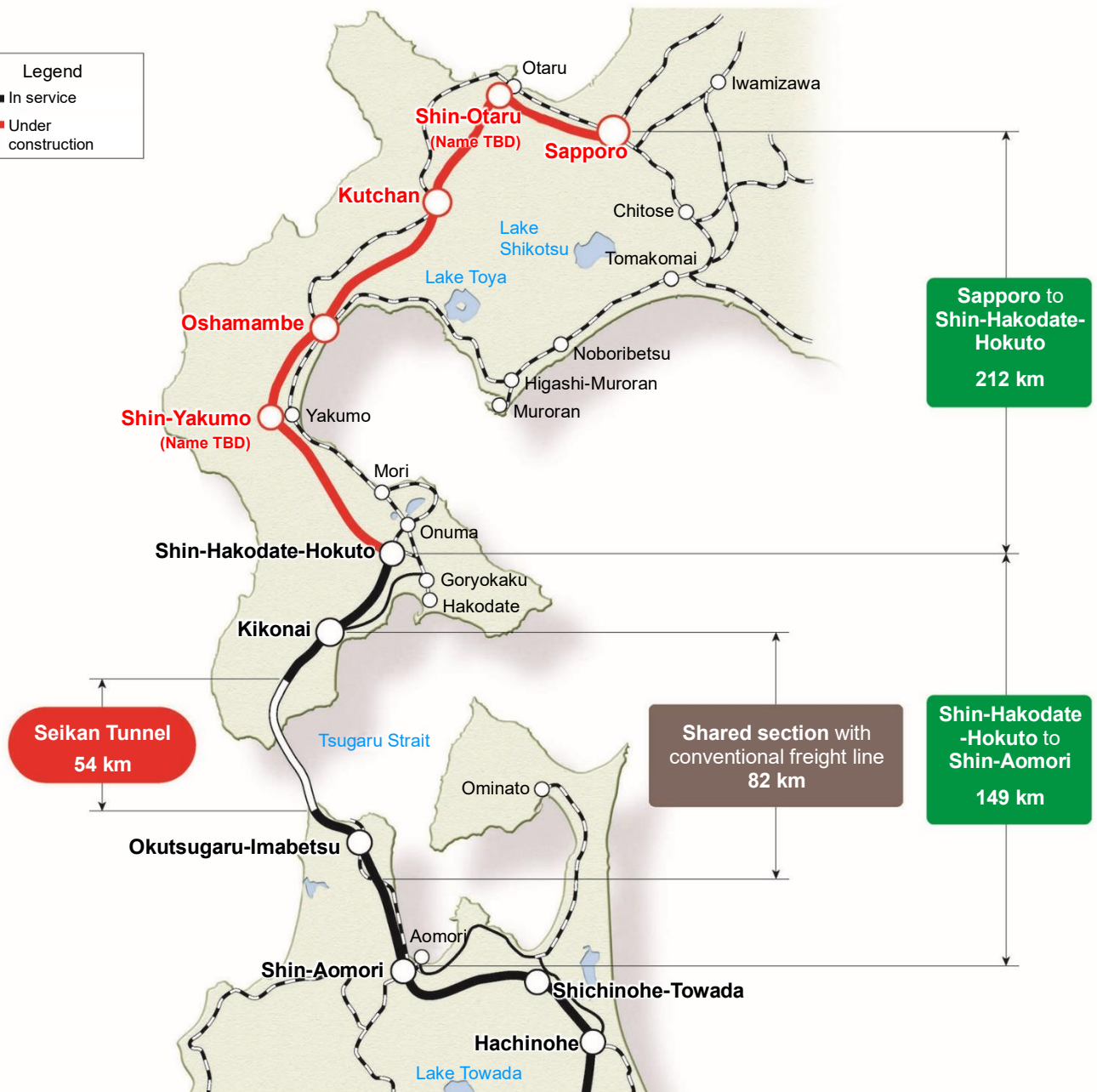
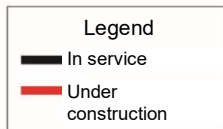
Three-rail Dual Gauge





# Hokkaido Shinkansen Schematic View

● Hokkaido Shinkansen ●



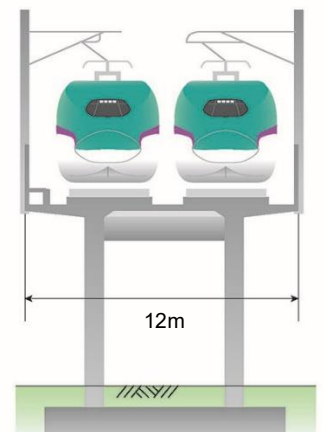
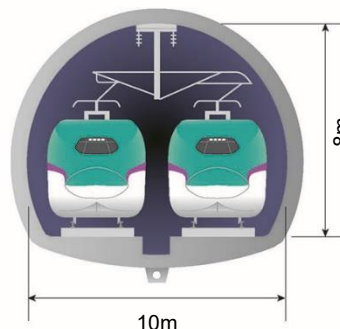
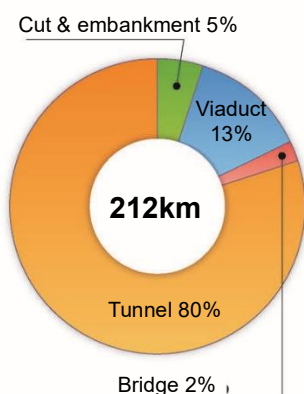
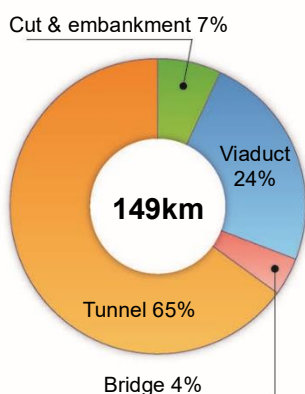
## Length of Structures by Type

## Cross Section of Tunnel

## Cross Section of Viaduct

**Shin-Aomori to Shin-Hakodate-Hokuto**

**Shin-Hakodate-Hokuto to Sapporo**

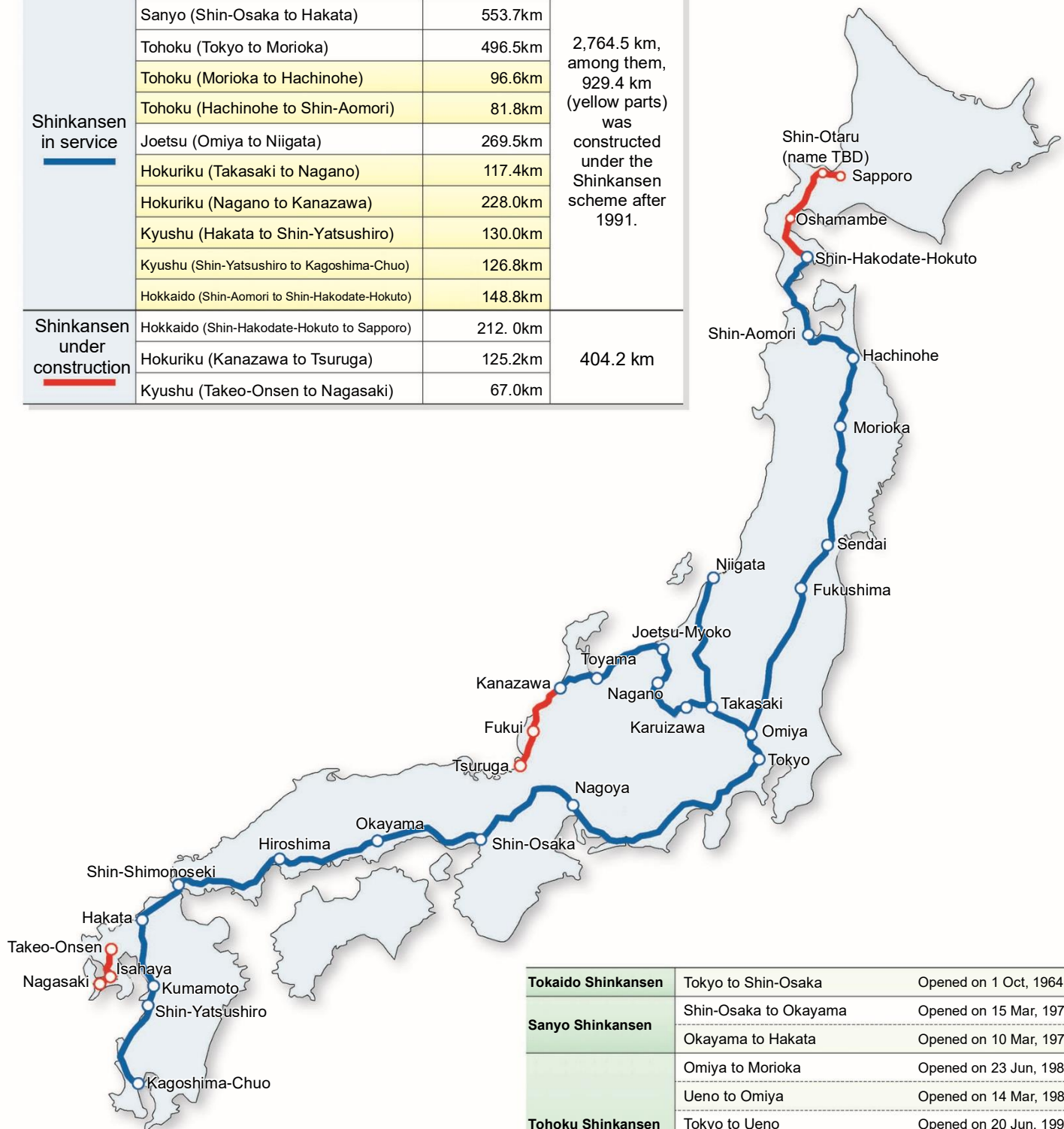


# Nationwide Shinkansen Network

● Hokkaido Shinkansen ●

as of 1<sup>st</sup> April 2017

	Section	Line length	Total
Shinkansen in service	Tokaido (Tokyo to Shin-Osaka)	515.4km	2,764.5 km, among them, 929.4 km (yellow parts) was constructed under the Shinkansen scheme after 1991.
	Sanyo (Shin-Osaka to Hakata)	553.7km	
	Tohoku (Tokyo to Morioka)	496.5km	
	Tohoku (Morioka to Hachinohe)	96.6km	
	Tohoku (Hachinohe to Shin-Aomori)	81.8km	
	Joetsu (Omiya to Niigata)	269.5km	
	Hokuriku (Takasaki to Nagano)	117.4km	
	Hokuriku (Nagano to Kanazawa)	228.0km	
	Kyushu (Hakata to Shin-Yatsushiro)	130.0km	
	Kyushu (Shin-Yatsushiro to Kagoshima-Chuo)	126.8km	
Shinkansen under construction	Hokkaido (Shin-Aomori to Shin-Hakodate-Hokuto)	148.8km	404.2 km
	Hokkaido (Shin-Hakodate-Hokuto to Sapporo)	212.0km	
	Hokuriku (Kanazawa to Tsuruga)	125.2km	
	Kyushu (Takeo-Onsen to Nagasaki)	67.0km	

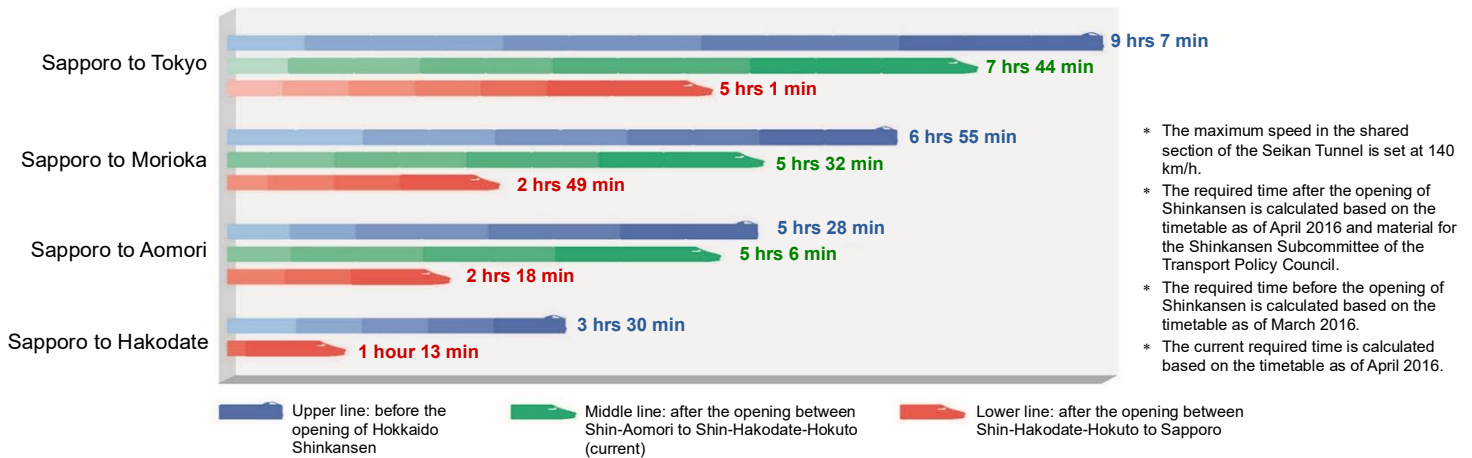


Tokaido Shinkansen	Tokyo to Shin-Osaka	Opened on 1 Oct, 1964
	Shin-Osaka to Okayama	Opened on 15 Mar, 1972
Sanyo Shinkansen	Okayama to Hakata	Opened on 10 Mar, 1975
	Omiya to Morioka	Opened on 23 Jun, 1982
Tohoku Shinkansen	Ueno to Omiya	Opened on 14 Mar, 1985
	Tokyo to Ueno	Opened on 20 Jun, 1991
	Morioka to Hachinohe	Opened on 1 Dec, 2002
	Hachinohe to Shin-Aomori	Opened on 4 Dec, 2010
Joetsu Shinkansen	Omiya to Niigata	Opened on 15 Nov, 1982
Hokuriku Shinkansen	Takasaki to Nagano	Opened on 1 Oct, 1997
	Nagano to Kanazawa	Opened on 14 Mar, 2015
Kyushu Shinkansen	Shin-Yatsushiro to Kagoshima-Chuo	Opened on 13 Mar, 2004
	Hakata to Shin-Yatsushiro	Opened on 12 Mar 12, 2011
Hokkaido Shinkansen	Shin-Aomori to Shin-Hakodate-Hokuto	Opened on 26 Mar, 2016

# Effects of Development for Hokkaido Shinkansen (Between Shin-Hakodate-Hokuto and Sapporo stations)

Hokkaido Shinkansen

Tokyo and Tohoku will be closer to Hokkaido.



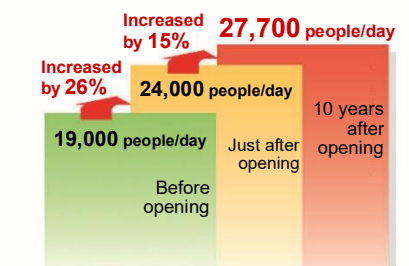
## Travel time of each mode of transportation

Section	Shinkansen	Airplane
Sapporo to Tokyo	5 hrs 1 min	3 hrs 30 min
Sapporo to Morioka	2 hrs 49 min	2 hrs 30 min
Sapporo to Aomori	2 hrs 18 min	2 hrs 50 min
Sapporo to Hakodate	1 hour 13 min	2 hrs 30 min

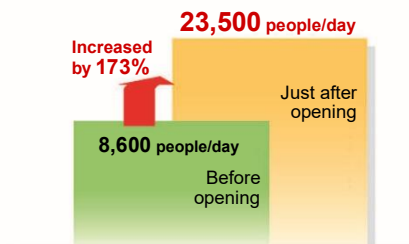
- \* The required time after the opening is calculated based on the timetable in April 2016 and the material by the Shinkansen Subcommittee of the Council for Transport Policy.
- \* The required time for airplane includes the times of movement from main stations to airports and from airports to main stations.

The number of users in previously opened sections has been steadily increasing.

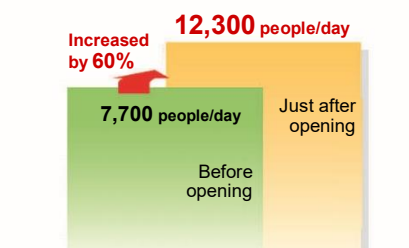
Hokuriku Shinkansen  
(Takasaki to Nagano)  
(Opened on 1 October 1997)



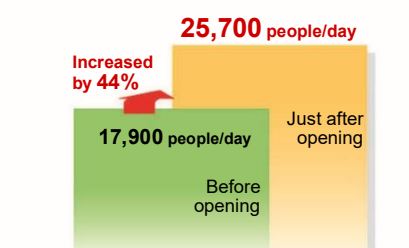
Hokuriku Shinkansen  
(Nagano to Kanazawa)  
(Opened on 14 March 2015)



Tohoku Shinkansen  
(Hachinohe to Shin-Aomori)  
(Opened on 4 December 2010)



Kyushu Shinkansen  
(Hakata to Shin-Yatsushiro)  
(Opened on 12 March 2011)



\*Source: Hokuriku Shinkansen (Takasaki to Nagano):

Hokuriku Shinkansen (Nagano to Kanazawa):

Tohoku Shinkansen (Hachinohe to Shin-Aomori):  
Kyushu Shinkansen (Hakata to Shin-Yatsushiro):

Before and just after opening: Edited "JR East News" by East Japan Railway Company  
10 years after opening: Edited "Annual Statistics on Railways and Transportation" by MLIT.  
Edited "News Release" by West Japan Railway Company (\*The number of users is based on the data between Joetsu-Myoko and Itoigawa).  
Edited "Press Release" by East Japan Railway Company  
Edited "Press Release" by Kyushu Railway Company (\*The number of passengers is based on the data between Hakata and Kumamoto).



# Environmental Measures

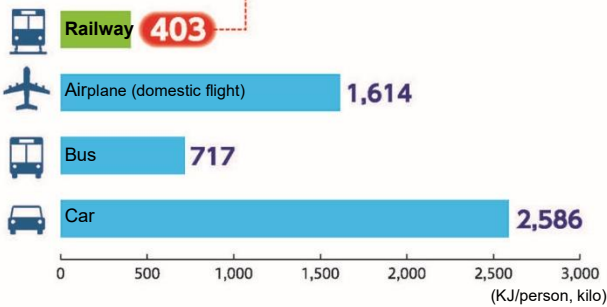
Hokkaido Shinkansen

## Most eco-friendly transportation mode

### Energy efficiency

Energy consumed to transport a person for 1km.

The energy consumption of railway is a quarter of airplane and one-sixth of car.

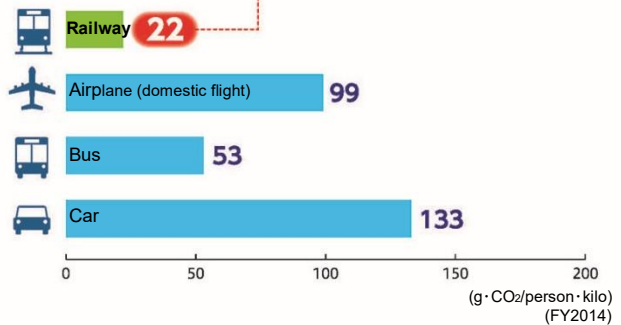


\* The amount of railway is the total of JR companies and private railways  
 \* Source: "Transportation-related energy directory (2009 version)"

### CO<sub>2</sub> emissions

CO<sub>2</sub> emitted to transport a person for 1km.

The CO<sub>2</sub> emissions of railway is a quarter of airplane and one-sixth of car.



\* Source: Website of MLIT  
 ([http://www.mlit.go.jp/sogoseisaku/environment/sosei\\_environment\\_tk\\_000007.html](http://www.mlit.go.jp/sogoseisaku/environment/sosei_environment_tk_000007.html))

## Environmental measures for Shinkansen



### Noise Mitigation Measures

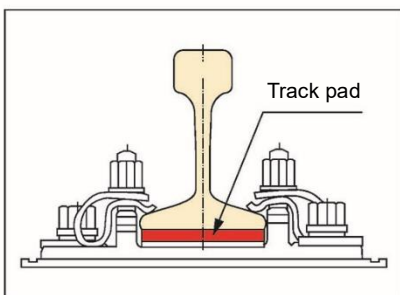
The noise from Shinkansen is strictly regulated by the "Environmental Standard for Shinkansen Noise". To mitigate the noise to the required level, the height and shape of the sound-proof wall is analytically designed with several factors such as train speed, height of civil structure and so forth. In addition, welded rail without joints is also one of the effective measures.



### Micro-pressure Wave Mitigation Measures

When the train enters a tunnel in high speed, disgusting noise is heard around the opposite side of the tunnel. This is caused by the micro-pressure wave, also called as the piston effect, generated by air pressure in the tunnel.

Entrance hood at the portal is effective to mitigate the noise. The shape and size of the hood is analytically designed according to the surrounding situation and train speed.



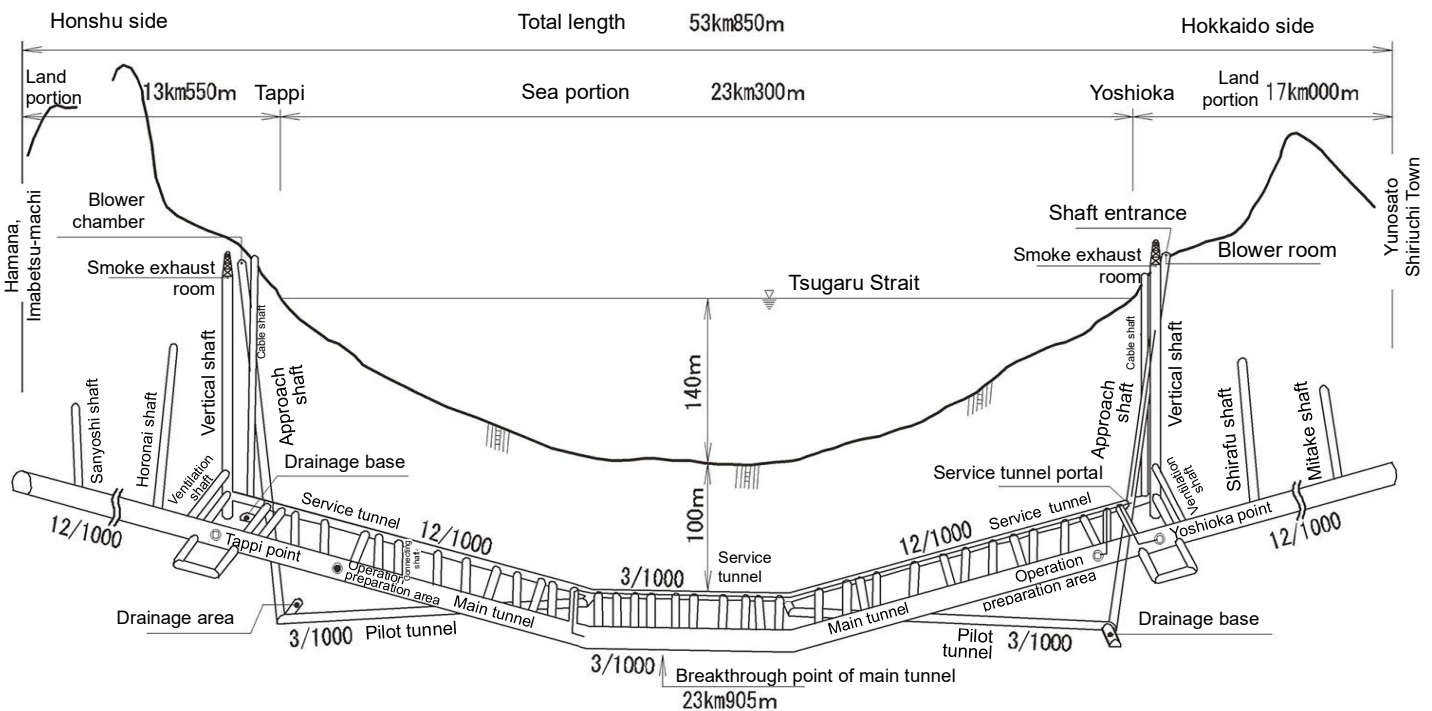
### Anti-vibration Measures

Vibration from Shinkansen is also environmentally problematic, and the Government encourages to take measures as it should be urgently solved. To mitigate the vibration, rubber pad with soft elasticity between the rail and sleeper is developed and applied in Shinkansen track.

# Seikan Tunnel

● Hokkaido Shinkansen ●

## Seikan Tunnel Overview



## Outline

The Seikan Tunnel is a 53.85km -long undersea tunnel and connects Japan's two largest islands, Honshu and Hokkaido. It was constructed by JRCC, predecessor agency of JRJT, and revenue service started in 1988. The tunnel consists of three tubes, namely pilot tunnel, service tunnel and main tunnel for train operation. The size of the main tunnel is designed for Shinkansen trainset, which is wider than conventional trainsets in Japan.

To overcome tough undersea geological conditions including excessive softness, fissures, and high-pressure water seepages and flooding, JRCC had exerted various geotechnical measures such as advanced boring, grouting, shotcrete, etc. during construction. Now JRJT owns the tunnel and leases it to the railway operator, JR Hokkaido.

## Tunnel Renovation Project

The Seikan Tunnel is equipped with various facilities for maintenance and security such as drainage controllers and fire detectors. These facilities are especially vulnerable under excessive humidity and floating salt in undersea tunnel.

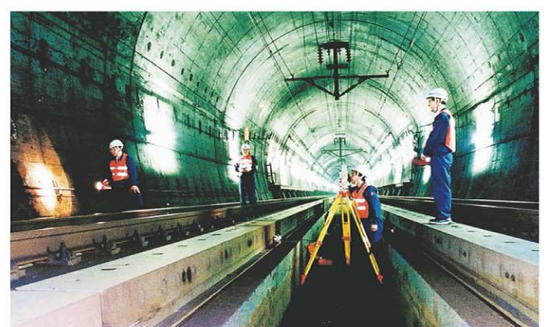
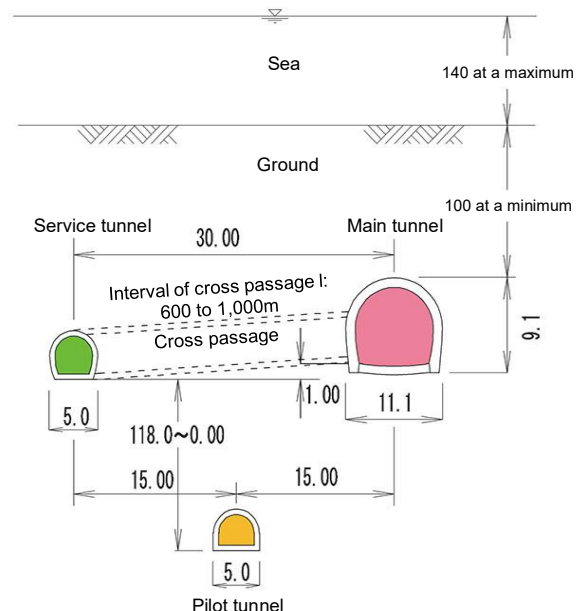
Therefore, continuous check and maintenance are required. Severely deteriorated parts are thoroughly renovated under the governmental disaster prevention program.

## Tunnel Maintenance

Based on the knowledge obtained through construction of the Seikan Tunnel, JRJT has inspected structures of the tunnel at undersea section to preserve tunnel soundness and being conducted renovation work since its starting operation.

## Standard cross section of under sea

(Unit: meter)



JRJT was established in 2003 by merger of two transport-related agencies to realize sound economic growth and people's prosperity through the development of transportation in Japan. JRCC, one of the predecessor agencies, used to be responsible for railway construction before the merger and thus JRJT succeeded this function as the only public agency to build mass-transit network for regional development and enhancement of urban function in Japan.

JRJT, including era of JRCC, has constructed various railways including the Seikan Undersea Tunnel, Shinkansen high speed rail (Joetsu, Hokuriku, Tohoku, and Kyushu Shinkansen line), urban railways (Keiyo line, Rinkai line, Minatomirai line, Tsukuba Express line, Sendai Airport access line, Narita Airport access line, etc.) and plenty of regional rails. Recently opened lines are, Tohoku Shinkansen in 2010, Kyushu Shinkansen in 2011, and Hokkaido Shinkansen in 2016.

### History of the Hokkaido Shinkansen Construction Project

- |             |   |
|-------------|---|
| 18 May 1970 | Enacted the Nationwide Shinkansen Railway Development Act   |
| 13 Mar 1988 | Started operation of the Seikan Tunnel  |
| 3 Feb 1998  | Determined station locations and route outline (Okutsugaru (name TBD), Kikonai, Shin-Hakodate (name TBD), Shin-Yakumo (name TBD), Oshamambe, Kutchan, Shin-Otaru (name TBD), Sapporo) |
| 8 Jan 2002  | Applied for approval of the 1st construction plan from Shin-Aomori to Sapporo. Announced environmental impacts assessment for the section from Shin-Aomori to Sapporo.                |
| 27 Apr 2005 | Approved the 1st construction plan for the section from Shin-Aomori to Shin-Hakodate (name TBD).  |
| 19 May 2010 | Approved the 2nd construction plan for the section from Shin-Aomori to Shin-Hakodate (name TBD)   |
| 29 Jun 2012 | Approved the 1st construction plan for the section from Shin-Hakodate (name TBD) to Sapporo   |
| 26 Mar 2016 | Inaugurated the line between Shin-Aomori and Shin-Hakodate-Hokuto   |



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