

Kyushu Shinkansen
Western Line
(Takeo Onsen to Nagasaki)



Japan Railway Construction,
Transport and Technology Agency

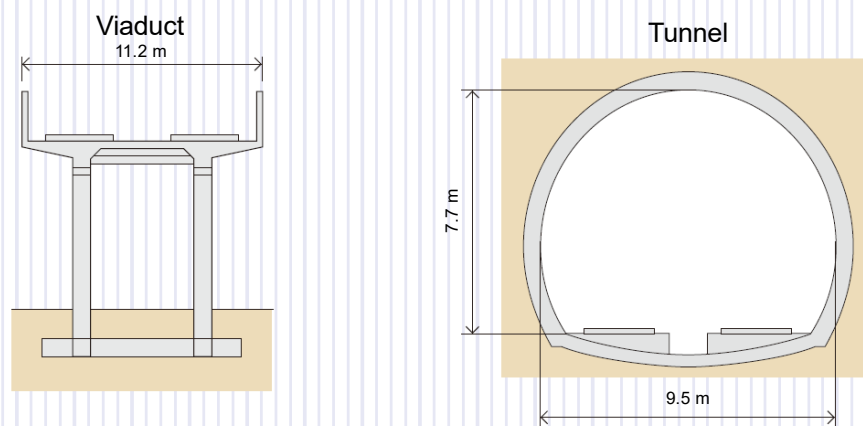
Outline of the Western Line of Kyushu Shinkansen

1. Section	Takeo Onsen station to Nagasaki station			
2. Construction length	67 km			
3. Municipalities along the line	Takeo, Ureshino, Higashi Sonogi, Omura, Isahaya, Nagasaki			
4. Stations	Takeo Onsen, Ureshino Onsen (name TBD), Shin-Omura (name TBD), Isahaya, Nagasaki			
5. Construction standards	Design maximum speed	260 km/h		
	Minimum curve radius	4,000m		
	Maximum gradient	30‰		
	Gauge	1,435mm		
	Electricity of overhead line	25,000V (AC)		
6. Major structures	Tunnel: Tawarazaka tunnel	5,705m	Bridge: Hakamano viaduct bridge	152m
	Sonogi tunnel	2,075m	Chiwatagawa river bridge	213m
	Koba tunnel	2,885m	Second Honmyo river bridge	265m
	Kuyama tunnel	4,990m	Eida intersection bridge	181m
	Shin-Nagasaki tunnel	7,460m	Yachiyo intersection bridge	194m

Length of Structures by Type



Cross Section of Structures



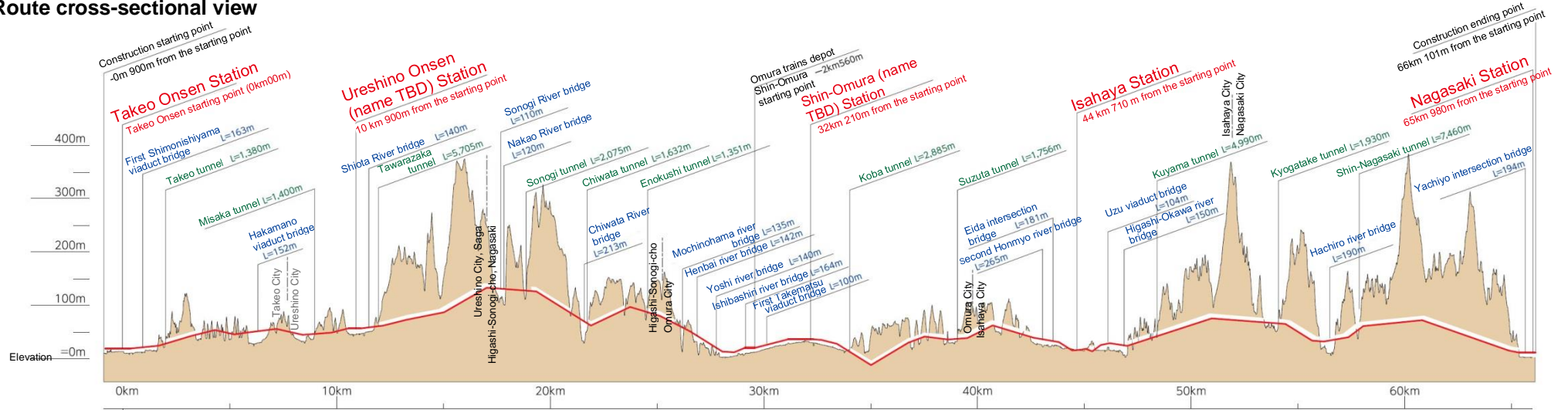
History of the Western Line of Kyushu Shinkansen (Takeo Onsen to Nagasaki)

13 Nov 1973	The Government appointed the Shinkansen route from Fukuoka to Nagasaki via Saga as one of the prioritized routes.
12 Sep 1986	Draft report of the Environmental Impact Assessment for the route was completed and published.
25 Aug 1994	Governor of Nagasaki prefecture announced that negotiation with stakeholders along the shortcut route between Takeo Onsen station and Shin-Omura station had completed.
3 Feb 1998	Rough route description between Takeo Onsen and Shin-Omura was publicized.
26 Dec 2001	The route was determined to be constructed as so-called 'Shinkansen-spec new line*', which means narrow gauge track (1067mm) is laid on the Shinkansen civil structures.
8 Jan 2002	Environmental Impact Assessment Report for the route (Takeo Onsen to Nagasaki) was submitted to the Government.
8 Jan 2002	Construction Implementation Plan (narrow gauge) for civil structures between Takeo Onsen and Nagasaki was applied to the Government.
16 Dec 2004	The Government and the ruling party LDP agreed that the route could start construction after the issue of parallel conventional line is solved.
26 Mar 2008	Construction Implementation Plan (narrow gauge) for civil structures between Takeo Onsen and Isahaya was approved.
26 Dec 2011	The Government and the ruling party LDP agreed that Construction Implementation Plan for civil structures between Isahaya and Nagasaki should be combined to the previous plan between Takeo Onsen and Isahaya (2008) with track doubling plan of Sasebo conventional line. Moreover, it was determined that the track would be constructed as standard gauge (1435mm) under the condition that the gauge-changeable train would be available at the time of inauguration.
12 Jun 2012	New construction implementation plan (standard gauge) for civil structures was approved. (Takeo Onsen to Nagasaki)
29 Jun 2012	New Construction implementation plan (standard gauge) for civil structures was approved (Takeo Onsen to Nagasaki)
22 Mar 2017	Construction implementation plan for railway facilities was applied to the Government. (Takeo Onsen to Nagasaki)
19 May 2017	Construction implementation plan for the railway facilities was approved (Takeo Onsen to Nagasaki)

* In this spec, it is expected that conventional express train run on the track at the speed up to 200km/h. Because the structures' spec is for Shinkansen, it is available to convert the line to full-spec Shinkansen in the future.



Route cross-sectional view



Aiming toward Environmental Friendliness

1. Environmental measures during construction

Noise & vibration mitigation measures

In order to mitigate noise and vibration due to operation with heavy machinery and travelling of construction vehicles, we take noise and vibration mitigation measures such as adopting low-noise/low-vibration machinery, restricting the number, operating hours and speed of construction vehicles. We proceed the construction with the understanding of people in the area.

Drought management

In a case where a drought damage occurs due to tunnel excavation, we will promptly take emergency measures while simultaneously holding discussion with affected local residents, thereby taking permanent measures.

Safety management

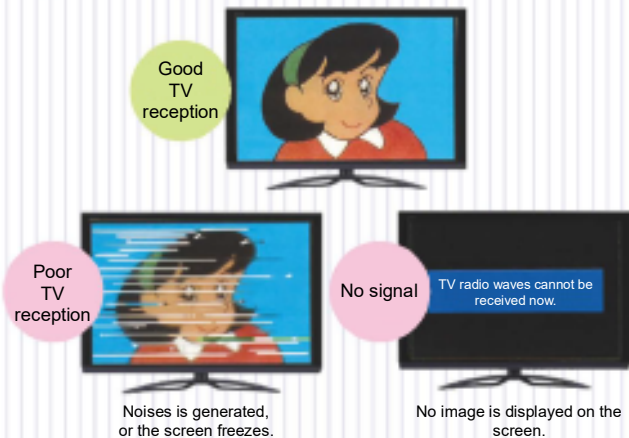
Parties concerned in the construction work closely together to prevent accidents which may hurt a third party and construction accidents.

TV radio disturbance, etc.

In areas close to Shinkansen line, TV radio disturbance may arise due to installation of railway structures. We will promptly take emergency measures when a reception disturbance occurs, and also implement permanent measures before inauguration of Shinkansen.

In addition, sunlight may be obstructed by viaduct or the like. In such a case, we will handle properly according to the compensation standards.

- Symptom of poor digital television wave reception



2. Measures for train operation

2-1 Noise & vibration mitigation measures

Noise mitigation measures

The noise from Shinkansen is strictly regulated by the 'Environmental Standards 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 like train speed, height of civil structure etc. Besides, welded rail without joints is also one of the effective measures.



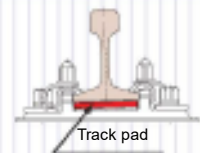
Micro-pressure wave mitigation measures

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.



Anti-vibration measures

The 'Measures for Vibration Caused by Shinkansen Trains Urgently Required to Preserve the Environment' has been recommended against the vibration of Shinkansen. In order to meet the recommendation, a rubber pad using soft materials is adopted to mitigate vibration.



2-2 Verifying effectiveness of measures & follow-up

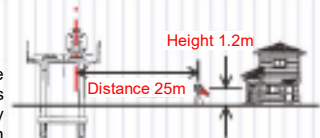
Follow-up measures

As shown above, several mitigation measures for noise and vibration are prepared before the inauguration based on the situation of the area alongside the rail and pre-analyses of the noise and vibration.

Even after inauguration, actual noise and vibration are measured to check the effectiveness of the measures and additional measures are taken if required. If additional measures are not effective enough to mitigate the noise and vibration to meet the environmental criteria, noise and vibration insulations are installed in the suffering houses and buildings.

- Measurement location of Shinkansen noise

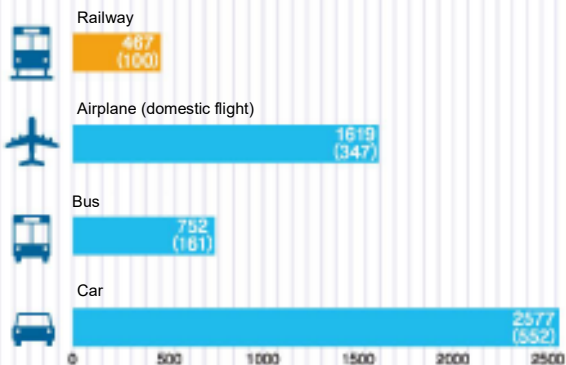
Whether or not Shinkansen noise meets the environmental standards is checked at a location 25m away from the center line of Shinkansen track at 1.2m-height from the ground.



Effects of Shinkansen

Energy efficiency

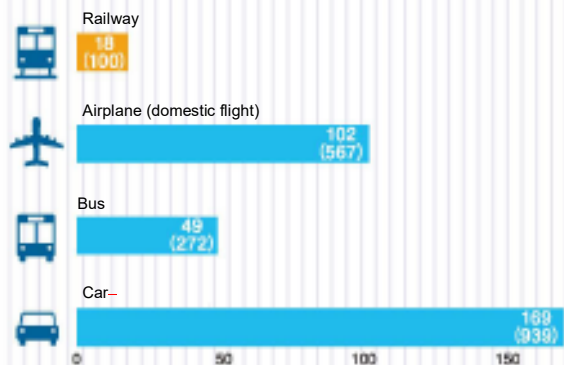
Energy consumed to transport a person for 1 km



Energy consumption of railway is one-third of airplane and one-sixth of car.

CO₂ emissions

CO₂ emitted to transport a person for 1 km



CO₂ emissions of railway is one-sixth of airplane and one-ninth of car.

kJ/person, kilo

g-CO₂/passenger-kilo

*The amount of railway are the total of JR and private railways.

*Numbers in parentheses indicate energy efficiency / carbon dioxide emission, provided that of a railroad is 100.

*Source: "Transportation-related energy directory [2007 version]"

*Source: Website of MLIT

(http://www.mlit.go.jp/sogoseisaku/environment/sosei_environment_tk_000007.html)

Western Line of Kyushu Shinkansen (Takeo-Onsen to Nagasaki)



Takeo

Takeo Onsen Romon Gate



Ureshino

Siebold's Hot Spring



Higashi Sonogi

Tea Garden of Sonogi Tea



Omura

Irises in Omura Park



Isahaya

Isahaya Park



Nagasaki

Glover Garden



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Jun. 2017 edition