

Characteristics of Railway in Japan & Safety Measurement for Railway Structures



FUJITA Kozo

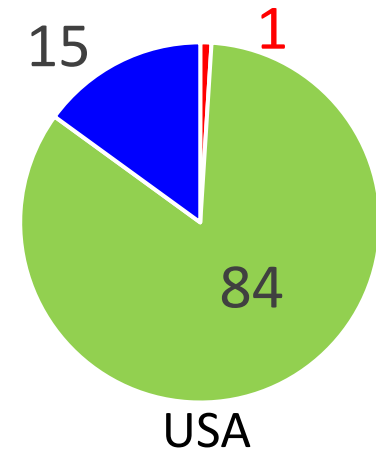
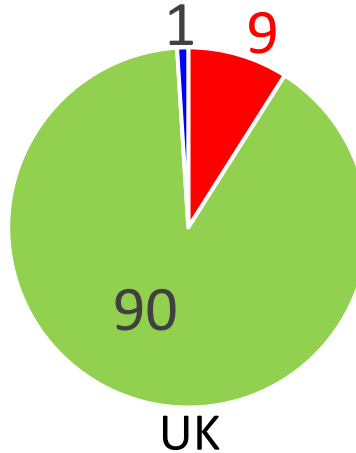
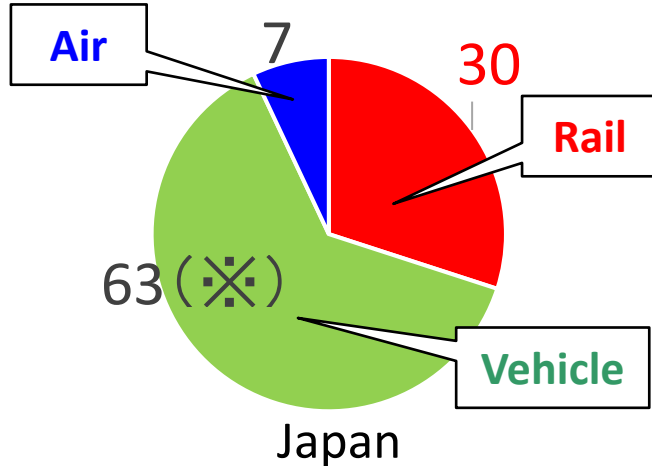
*President,
Japan Railway Construction, Transport and Technology Agency*

Former Vice Minister of Land, Infrastructure, Transport and Tourism

1. Characteristics of Railway in Japan
2. Roles of the Railway Administration in Japan
3. Overview of JRTT
4. Safety for Railway Constructing

1. Characteristics <SHARE>

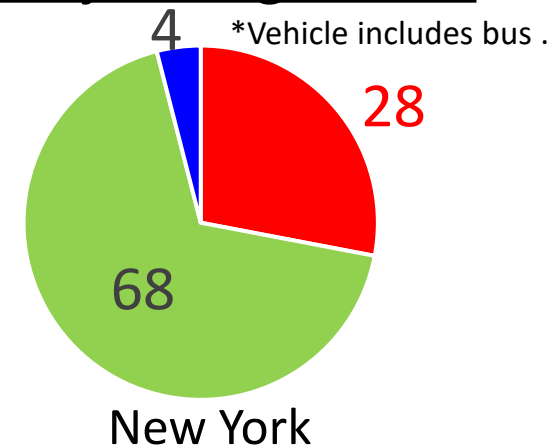
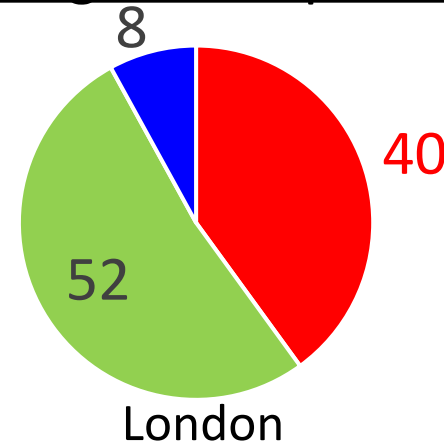
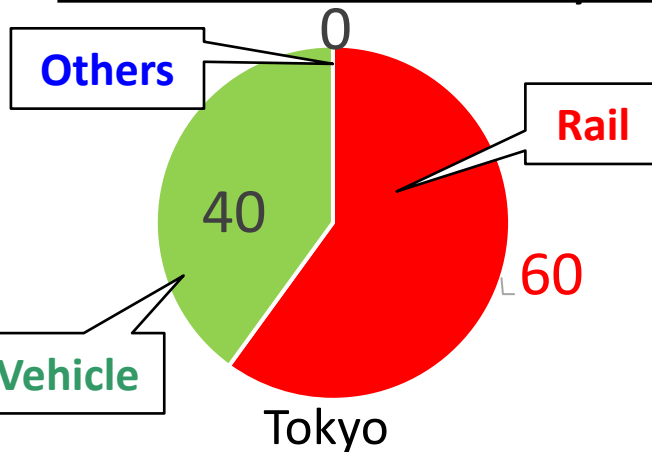
The Share of Railway Passenger-km in the World (FY2019)



Source: Ministry of Land, Infrastructure, Transport and Tourism

(※) Person-kilometers transported by cars in Japan are estimates based on model equations.

The Share of Railway Passenger Transport in the Major Mega-Cities



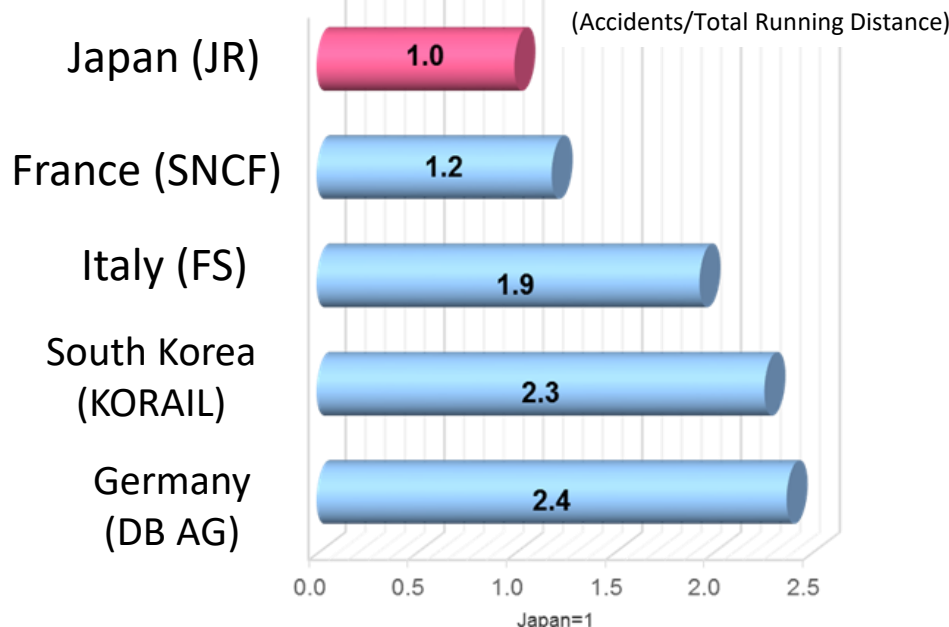
Source: Tokyo: Annual Japanese Urban Transport Report for 2011, New York: New York State 2009 NHTS Comparison Report

London: Travel in London, Report 8 (Update 16/2/16)

The level of reliability and safety of Railway in Japan is **extremely high**.

Safety

Comparison of Railway Accident



*the number represents the probability of accidents when that of Japan is 1.

The number of fatal accidents after the start of Shinkansen service: **Zero (0)**

Reliability

Train delay (Tokaido Shinkansen) :
1.6 min per train on average



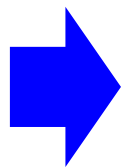
Tokaido Shinkansen N700 series

Most railway infrastructures are owned, maintained and operated by private companies.

The number of Railway Operator : **219**

Operated by Private Sectors	208※ ¹
(※ ¹ Including 7 privatized ex-national railways)	
Operated by Public Sectors※ ²	11
(※ ² Mostly managed by local governments)	

Source: Ministry of Land,
Infrastructure, Transport and
Tourism
As of April 1, 2024



The railway administration seeks to achieve both efficient management by private sectors and protection of passengers' interests.

2. Roles of the Railway Administration in Japan

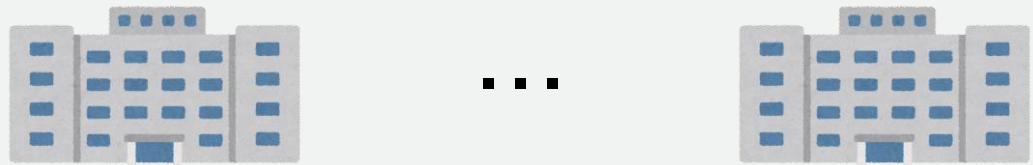
Structure of the Railway Administration

Central Body



MLIT (Railway Bureau)

Regional Bodies



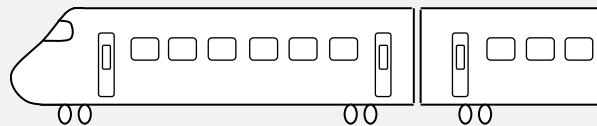
District Transport Bureau (9 Bureaus)

Permit Operation



Supervise & Audit

Railway Operators



All Operators in Japan

Objects of the Railway Administration

① Secure
the safety of Railway

② Protect
the Interests of Passengers

③ Develop
the Railway

2. Roles of the Railway Administration of Japan

① Secure the safety of Railway

【In terms of **facilities and operations**】

Establish technical regulatory standards



【In terms of **skilled workers**】

Maintain and improve professional qualification system (ex. driving license)



【In terms of an **organization**】

Regulate and promote organizational safety management of railway companies



Audit regarding of security



Publish safety information



2. Roles of the Railway Administration of Japan

② Protect the Interests of Passengers

Regulate passenger fares



Approve conditions of carriage



Enhance accessibility of
passengers with disabilities



[Source] 2nd and 3rd images from JR-East

2. Roles of the Railway Administration of Japan

③ Develop the Railway



Shinkansen (High Speed Rail)

The Central Government takes charge of high-speed rail development.

*JRTT constructs Shinkansen, designated by the minister of land, infrastructure, transport and tourism.

Urban Railway

The Central Government grants a subsidy to railway companies who develop urban rails.



3. Overview of JRTT

Name	J<u>a</u>pan <u>R</u>ailway Construction, <u>T</u>ransport and <u>T</u>echnology Agency (JRTT)
Founded	March 1964 (Including former era as “Japan Railway Construction Public Corporation (JRCC)”)
Employees	1,374 (As of April 2024)
Characteristics	<ul style="list-style-type: none">•The unique public agency for railway construction in Japan•Total management of railway construction by inhouse engineerscivil, track, electric, architecture, machinery, etc.

3. Overview of JR TT

Railway lines by JR TT: Total approx. 3,800 km



Shinkansen HSR



Urban Railway



Subway



Monorail

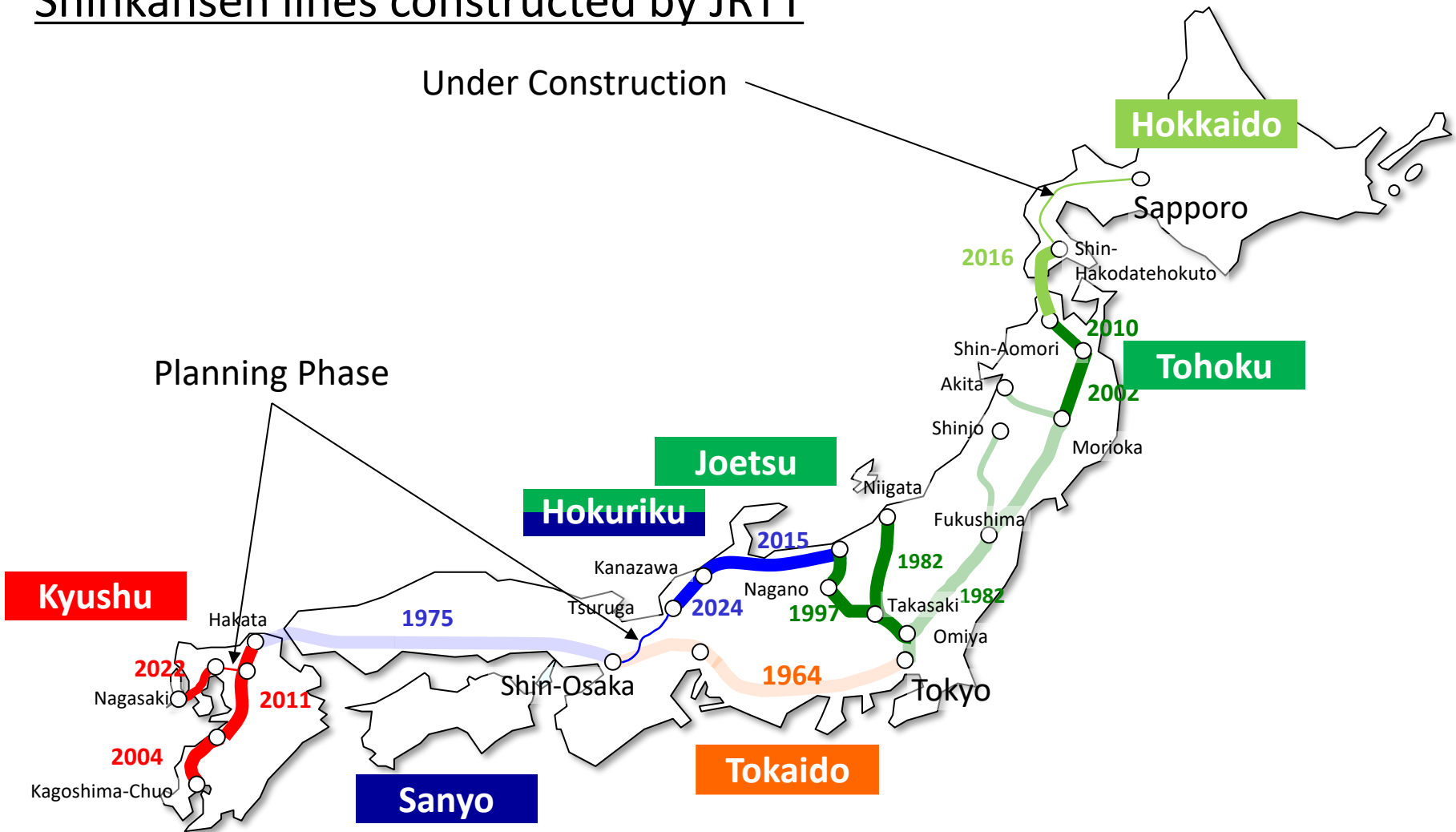


Maglev
(Magnetic levitation train)

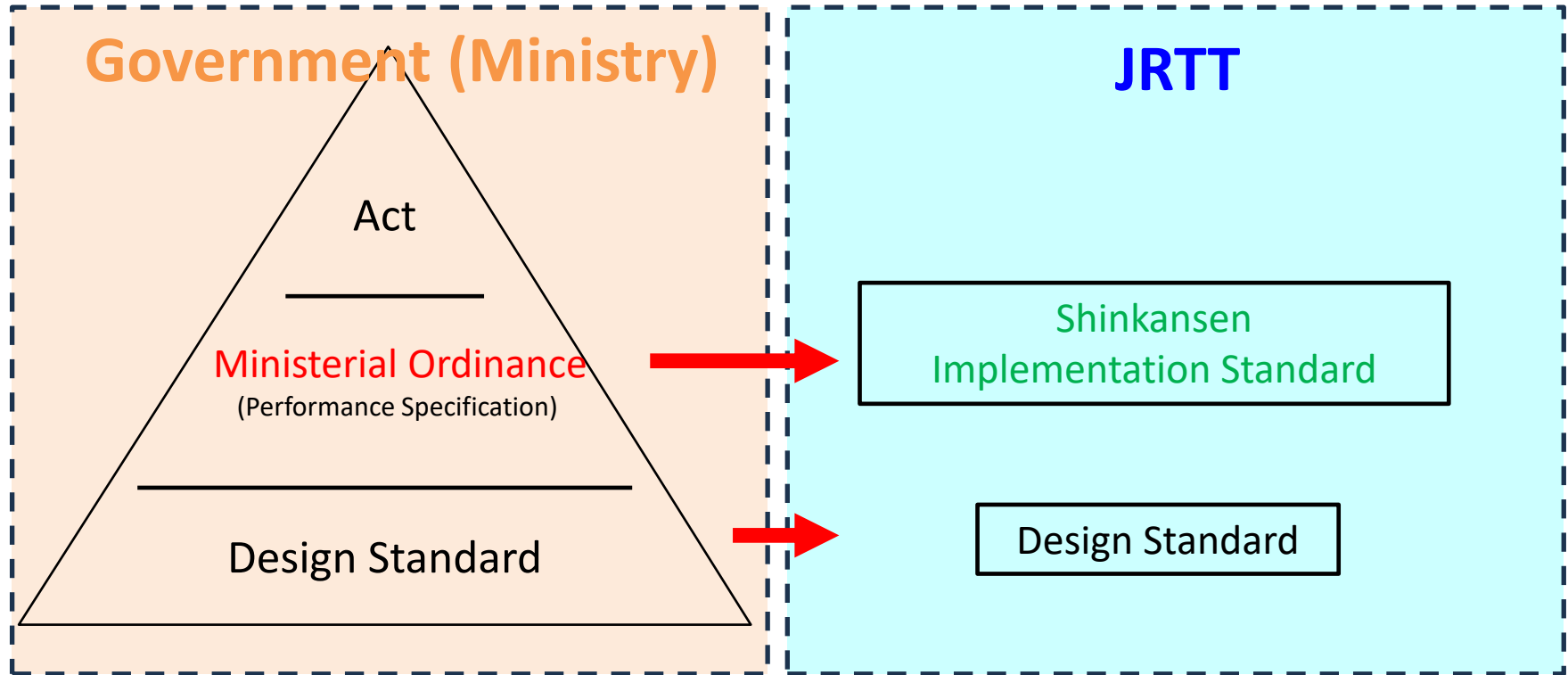


Undersea Tunnel

Shinkansen lines constructed by JR TT



4. Safety for Railway Constructing <Design Standard>



The ministry regulates minimum requirements for the railway development to secure railway company's freedom of technical development. (while restricting excessive pursuit of profit)

Shinkansen Implementation Standard describes applicable specifications for actual Shinkansen projects.

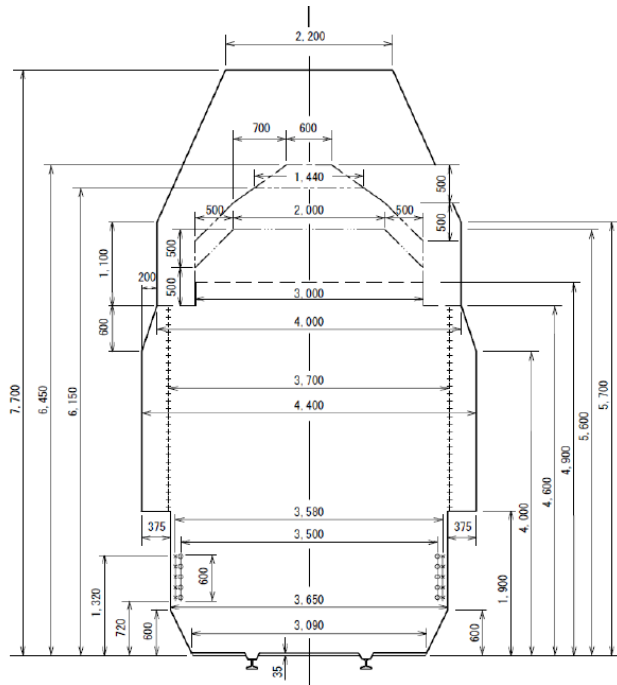
According to the implementation standard and the design standard for railway structure, safe and secure railway structures are designed and constructed.

Standard >

Shinkansen Implementation Standard

Basic Requirements

(Rolling Stock Gauge, **Structure Gauge**,
Formation Width, height and width of platform)

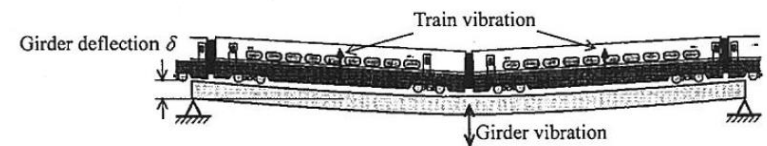


Structure Gauge

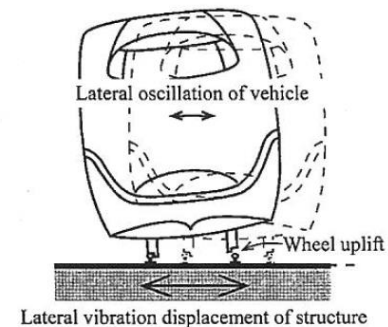
Design Standard for Railway Structure

Detail Designs

- Concrete Structure
- Earthquake Resistance
- Tunnel
- **Displacement Limit**
- Others



(a) Runability in ordinary conditions



(b) Runability in a seismic condition

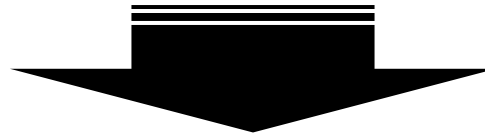
Figure 1 Phenomena Covered by the Displacement Limit Standard

Image of Displacement Limit Standard

Railway structure ensuring safety, reliability and, highspeed operation are secured based on these standards.

Constructions are finished, but...

Do structures and facilities meet these standards?



To **CONFIRM** this, Audit and Inspection for Opening is conducted by

**JRTT**

as an owner

JR

as an operator

Audit and Inspection of Structures and Facilities

To **CONFIRM** that the Structures and Facilities are in line with the **REQUIRED SPECIFICATION**

Land acquisition
Civil structure
Station
Track
Machinery
Architecture
Electrical
Passenger Service
Operation

9 sections



Civil structure (Hammering Test in Tunnel)



Electric (Communication Equipment Test)

Audit starts **about two years before the opening** .
(Varies depending on the lines.)

4. Safety for Railway Constructing <Audit & Inspection>

Comprehensive Audit and Inspection

To **CONFIRM** that the Structures and Facilities could meet the requirement set for **SAFE OPERATION**

- 1 Train Entering Test/
Overhead Contact Line
- 2 ATC Indication Test
(signal)
- 3 Speed Up Test
- 4 Running Test with Two Trainsets



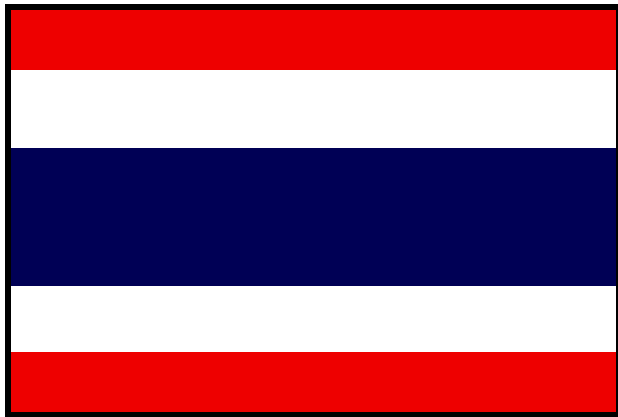
Train Entering Test



Measurement of Wheel Load & Lateral Pressure

Comprehensive Audit starts **about six months before the opening** . (Varies depending on the lines.)

I hope that the relationship between Thailand and JRTT will be deepened even more!



Thank you for your listening!

