APPENDIX 3 - PRESENTATION MATERIAL ON THE TRAINING SEMINAR IN JAPAN

5th December 2011

Japan International Cooperation Agency (JICA)

- JICA's Cooperation for Railway System Development

Japan Railway Construction, Transport and Technology Agency (JRTT)

- Introduction of JRTT
- Electric System of Shinkansen
- Slab Track in Japan

Ministry of Land, Infrastructure, Transport and Tourism (MLIT)

- High-Speed Railway in Japan
- Technical Standards System of Japan

JICA's Cooperation for Railway System Development



December 19, 2011

KOIZUMI Yukihiro
Economic Infrastructure Department
Japan International Cooperation Agency (JICA)

国際協力機構

A3-2

Contents of the presentation

1. JICA's Cooperation Scheme
2. Importance of Human Resource Development in Railway System
3. JICA's Cooperation for Capacity Development
4. Closing

0. Introduce Myself

1993 M.D. of Civil Engineering at Tokyo Institute of Technology
1993 JICA Grant-aid Department (Road, Bridge)
1995 Ministry of Transport (Port Bureau)
2000 JICA Cambodia Office (Infrastructure)
2004 JICA Asia Department (Cambodia, Mekong)
2007 JICA Indonesia
2009 JICA Economic Infrastructure Dev.
(Urban Transport, Railway, Port etc)

国際協力機構

国際協力機構

1. JICA's Cooperation Scheme

JICA's Schemes for development assistance

- ODA
  - Bilateral Assistance
    - Technical Cooperation
    - ODA Loans
    - Grant Aid
  - Multilateral Assistance
    - PPP

国際協力機構

JICA's Cooperation for Railway Development

Technical Cooperation

Formulation of M/P, F/S
- Policy, Strategy, Measurement

Technical Cooperation Project
- Advisory Service, Training Program

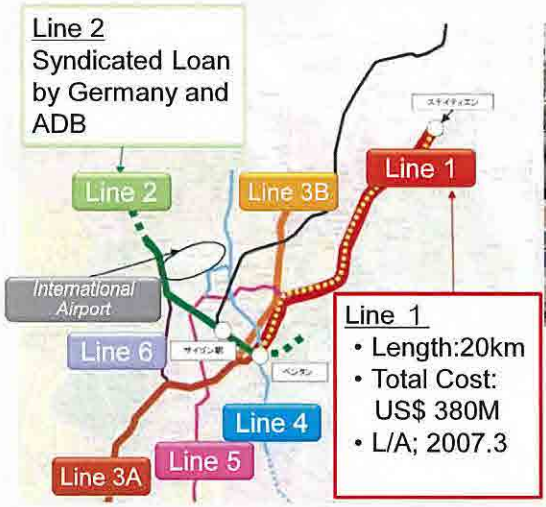
ODA Loans, Grant
- Financial Assistance

Railway System

Organization Operation & Management	Civil Work, Rolling Stocks, etc

Good Practice : Urban Railway

✓ Ho Chi Minh City Urban Mass Rapid Transit Line 1 (Vietnam)



Complete Image

国際協力機構

✓ Ho Chi Minh City Urban Mass Rapid Transit Line 1 (Vietnam)

M/P
- Master Plan ; HOUTRANS (2002-2004)

ODA Loan
- Construction Stage (2007-)

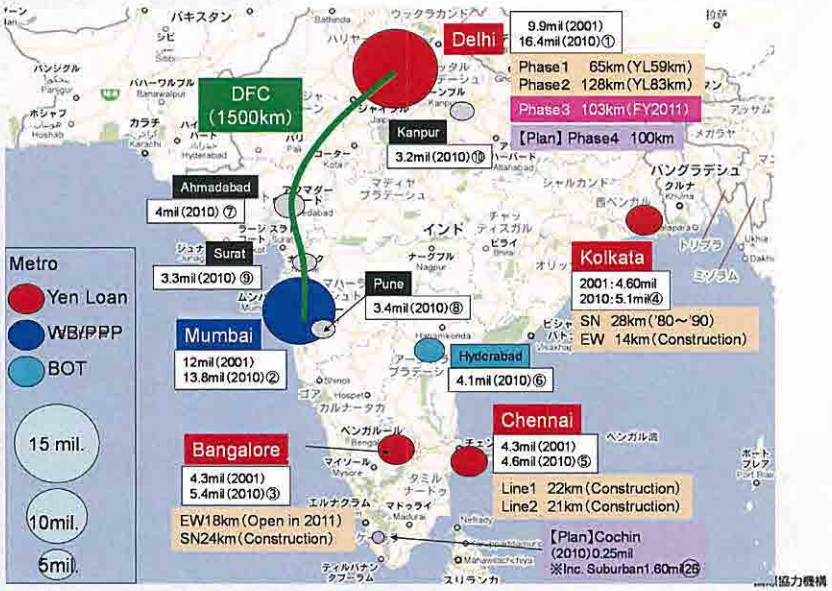
T/C
- SAPI : Company line, Work plan etc..

T/C
Support on Set up of Operation and Management Company of Urban Railways Phase1 (2011-2013) / Phase2 (2014-2015)

T/C

Open of Urban Mass Rapid Transit (2016)

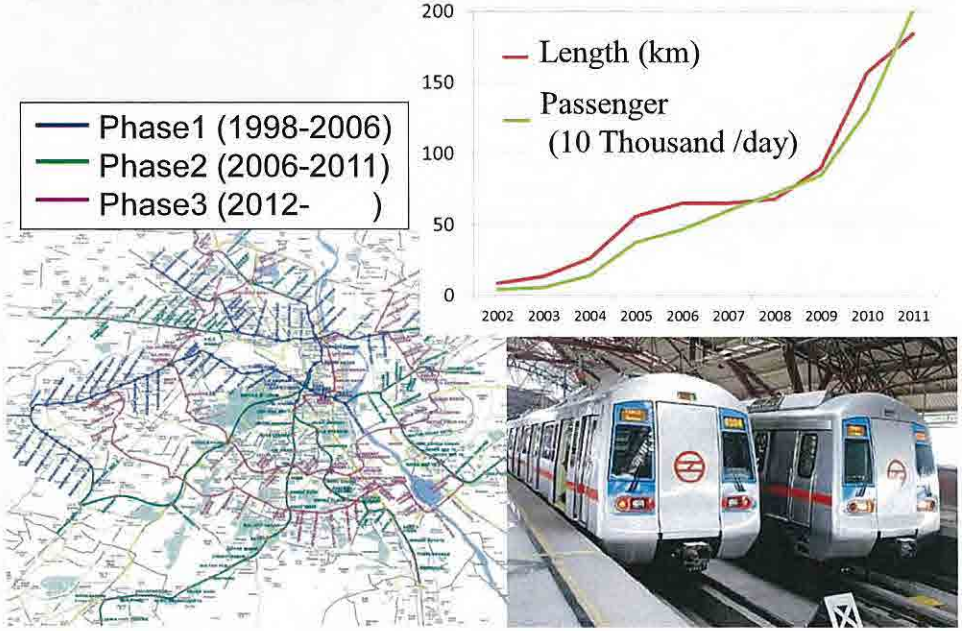
Major Cooperation in Railway Sector in India



国際協力機構

8

Continued Support for Delhi Metro



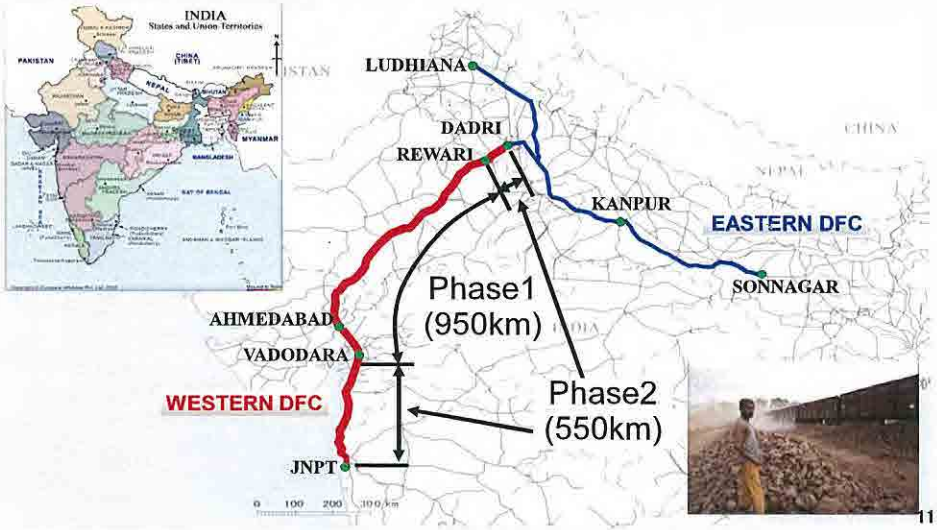
A3-4

国際協力機構

9

Support for Large Scale Project

✓ Dedicated Freight Corridor (India)



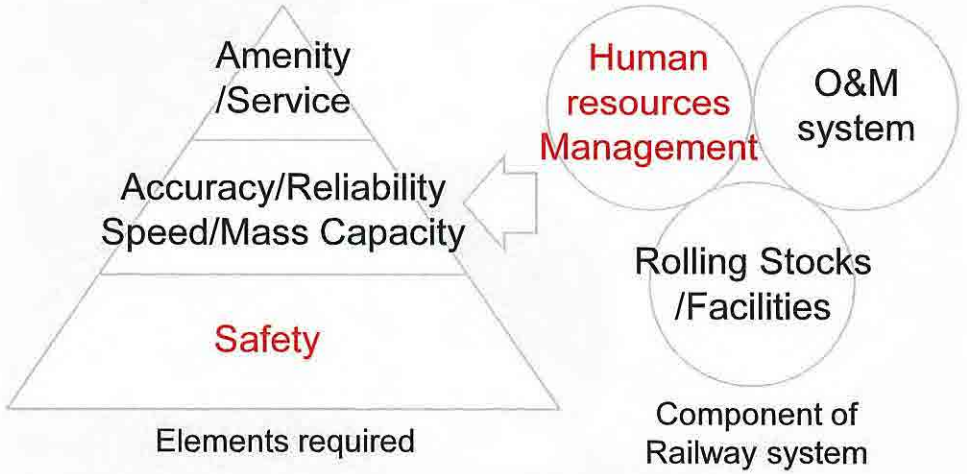
11

2. Importance of Skill Development in Railway System

✓ Safety is the most basic and important component in railway system

- ✓ Quality of Rolling Stocks or Facilities
- ✓ Inadequate maintenance
- ✓ Human errors

✓ Human resource development is indispensable for safety operation



✓ Toward "Maximized Safety"

Continuous efforts of Skill development for safety


Training center


Safety Education Seminar


Driving simulator

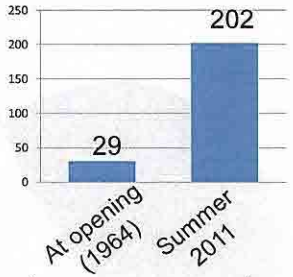
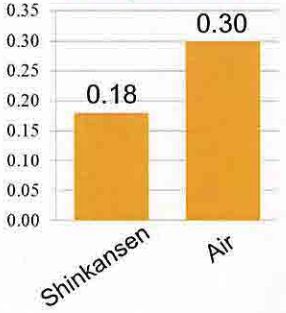

Computer training tool

Zero of the death accident continues from the opening

Number of Incidents(/year)

http://www.jreast.co.jp/safe/index.html

Effect expected by the skill development

Accuracy	Frequency	Reliability
Average Delay Time	Number of Daily Operation (Tokaido Shinkansen)	Rate of Suspension
Less than 1 min		

Securing Operation ↑ Skill Development ↑ Securing Maintenance

Source: JR Central

Significant Increased of Frequency of Tokaido Shinkansen at Tokyo station

Timetable (In 1964)

6	00 30
7	00 30
8	00 30
9	00 30

Blue:HIKARI Brack:KODAMA

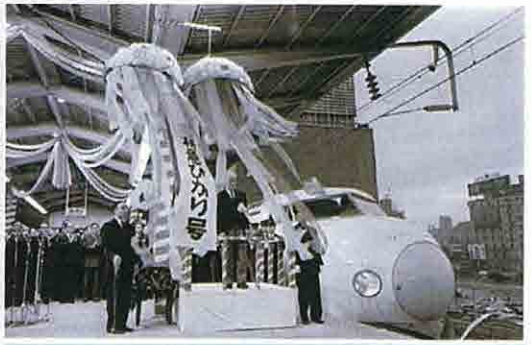
Timetable (Summer in 2011)

6	00 (04) 16 (20) 26 30 33 43 (47) 50 56
7	00 03 10 (13) 20 (23) 26 70 33 40 (47) 50 56
8	00 03 10 (13) 20 (23) 26 30 33 (40) 47 50 56
9	00 03 10 (13) 20 (23) 26 30 33 (40) (47) 50 56

Red:NOZOMI Blue:HIKARI Brack:KODAMA
( ):Extra train for peak season

Ice Breaking

Do you know?



Super-Express "Shinkansen" (Tokyo-Osaka) 1964

A. Financed by the World Bank.
(Japan was a recipient country by the WB.)

Shinkansen Network

In service

Construction

JICA's Cooperation in Railway Sector

Ongoing & Scheduled Project

3. JICA's Support for Capacity Development

✓ Japan's experience and know-how through "Technical Cooperation Project"

Dispatch of Experts	• Guidance of operation and maintenance etc..
Acceptance of Training Participants	• Visiting of site • Training on the site etc..
Provision of Equipment	• Rolling stocks • Training equipment etc..

Good Practice of Technical Cooperation Project

Indonesia;

✓ Bring up of specialists for railway operation & maintenance

Thailand;

✓ Development of the systematic technical training curriculum

Malaysia;

✓ Realization of the sustainable railway system

Indonesia;

✓ Bring up of specialists for railway operation & maintenance

ODA Loan

✓ Rolling Stocks

✓ Facilities/Rail yard

Dispatch of Experts

✓ Project on Improvement of Railway Safety Management

+

Acceptance of Training Participants

✓ Training in Japan

Thailand;

✓ Development of the systematic technical training curriculum

Provision of Equipment

✓ Driving simulator etc..

+

Acceptance of Training Participants

✓ Training in Japan

Dispatch of Experts

✓ Development for 21 training programs (Driving, Maintenance、Operation, Signal, etc..)

Malaysia;

✓ Realization of the sustainable railway system

Provision of Equipment

（Secondhand rolling stocks are provided by private base）

(By Kyodo Tsushin)

Dispatch of Experts

✓ Adviser to the maintenance of rolling stocks

+

Acceptance of Training Participants

✓ Maintenance Training of rolling stocks to the staff of railway public corporation

Acceptance of Training Participants

Lineup of JICA Training and Dialogue Programs related to railway in 2011

- ✓ Colloquium on Urban Public Transport
- ✓ Environmentally Sustainable Transportation
- ✓ Planning the Operation and Maintenance System for Urban Railways
- ✓ Comprehensive Urban Transportation Planning and Project

Order made training program will also be arranged:
(e.g. South Africa Railway training program 2011)

4. Closing

- ✓ JICA can offer total support program for planning, construction, and O&M.
- ✓ JICA can offer various programs for human resource development for development of railway system.
- ✓ Japan's experience and know-how can contribute to improve safety level of the railway system.

Introduction of JRTT

- ***Foundation & Works of JRTT***
- ***Experience of Railway Construction***
- ***Shinkansen Construction in Japan***

International Affairs Division,
Corporate Planning Department, JRTT

Foundation of JRTT

JRCC : Japan Railway Construction Public Corporation

JRCC was founded in 1964 that was independent from the Construction Headquarters of Japanese National Railways (JNR) in order to construct new lines with public works projects.

＋

CATT : Corporation for Advanced Transport and Technology

↓

JRTT : Japan Railway Construction ,
Transport and Technology Agency

JRTT was founded in October 2003, as an Independent Administrative Agency by the integration of JRCC and CATT.

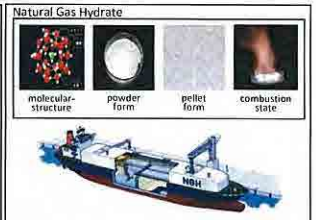
Works of JRTT

(Kyushu Shinkansen)

Railway construction

(Construction SES)

Joint ownership shipbuilding scheme of coastal ships



Research and development of advanced ship technologies

(Seat Structure Equipped with Seat Sensor System)

Fundamental studies in the field of transportations

(Hiroshima Electric Railway)

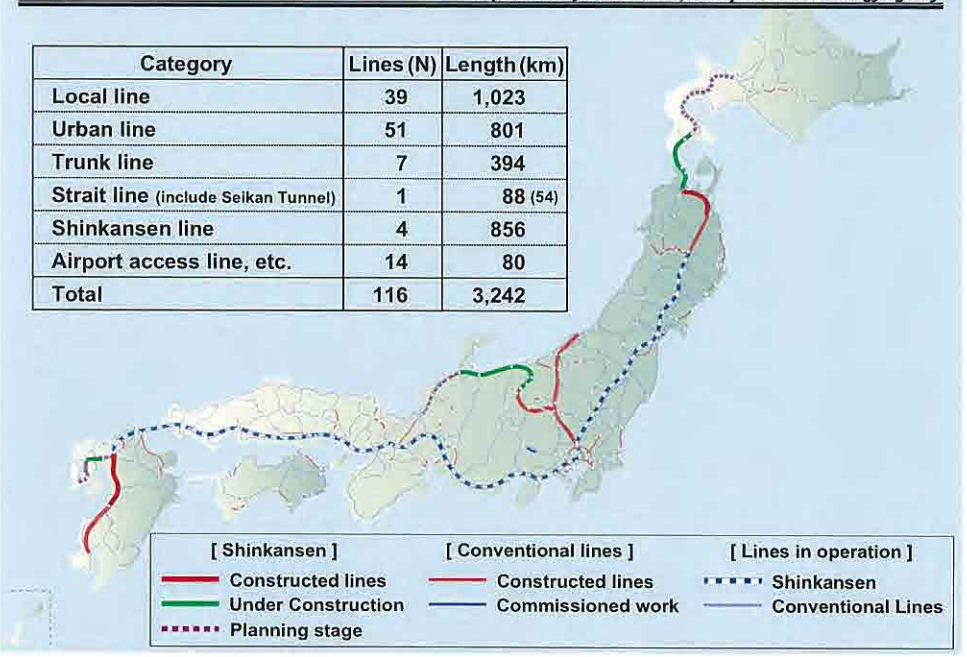
Subsidies for Railways

(Umeda District)

Settlement of JNR

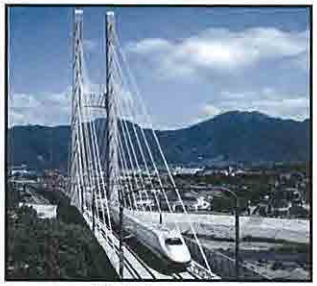
Experience of Railway Construction

Category	Lines (N)	Length (km)
Local line	39	1,023
Urban line	51	801
Trunk line	7	394
Strait line (include Seikan Tunnel)	1	88 (54)
Shinkansen line	4	856
Airport access line, etc.	14	80
Total	116	3,242



Various types of railway Construction

JRTT
Japan Railway Construction, Transport and Technology Agency



Shinkansen
(Hokuriku Shinkansen)

Urban Railway
(Tsukuba Express)

Maglev Test Line
(Yamanashi Maglev Test Line)

Longest Undersea Tunnel
(Seikan Tunnel : 53.85km)

Subway
(Minatomirai Line)

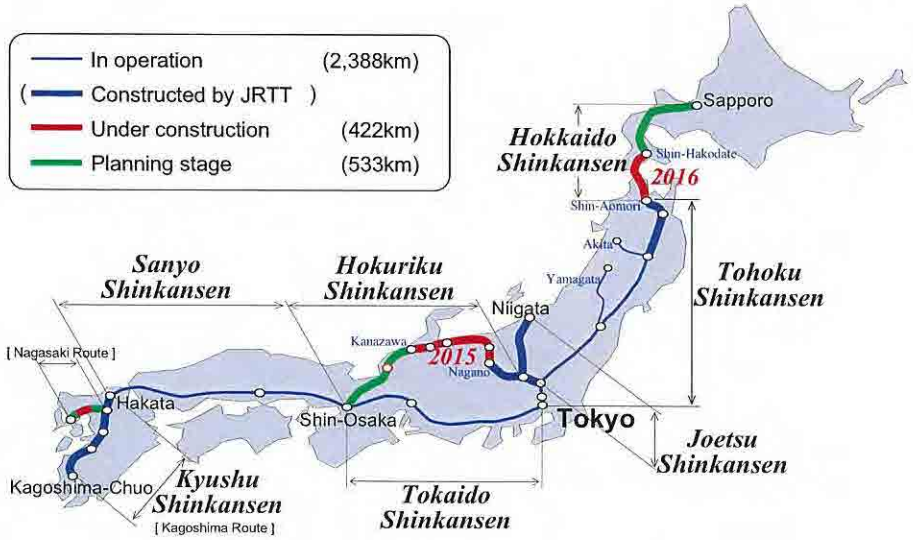
Airport access railway
(Tokyo Monorail)

5

A3-11

Shinkansen Network

JRTT
Japan Railway Construction, Transport and Technology Agency



6

Main Features of the Shinkansen

JRTT
Japan Railway Construction, Transport and Technology Agency

Safety

No passenger fatalities in 47 years

High Density

Up to 14trains per hour

Reliability

Average delay time
less than **1 min**

Mass Transit

Approx. **850,000 passengers**
Per day

7

Framework for implementation of Shinkansen Project

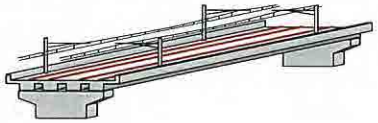
Japan Railway Construction, Transport and Technology Agency

☐ Separation of infrastructure and operation

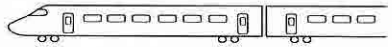
JRTT (Government Agency)
(Infrastructure construction and ownership)

Lease of facilities →

JR (Private Companies)
(Shinkansen operation)



← Lease fees



☐ Financing

National (2/3) and local (1/3) governments bear financing burden for the Shinkansen infrastructure. (Public works)

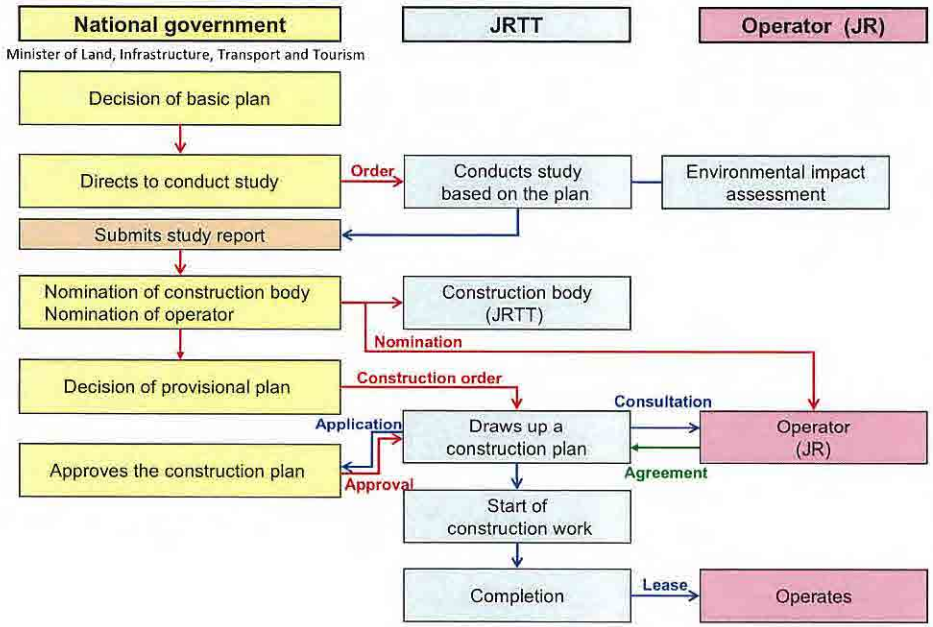
National Government	Local Governments
67 %	33 %
2	1

JRTT: Japan Railway Construction, Transport and Technology Agency

8

Procedure of Shinkansen construction

JRTT
Japan Railway Construction, Transport and Technology Agency



Flow of Railway Construction Projects and Roles of JRTT

Japan Railway Construction, Transport and Technology Agency

A case of Shinkansen line construction

JRTT

Organizing the whole railway construction project using various specialized technologies

Private Companies

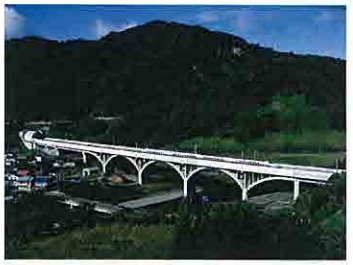
Involved in specific fields of expertise
Implementing works under JRTT's guidance and supervision

- Formulation of the overall construction plan
- Briefing to local communities
- Location and geological surveys — Contracts → Land survey / geological research firms
- Consultations with local governments
- Structure designing — Contracts → Design consulting firm
- Land acquisition
- Order for construction works — Contracts → **General contractors:** Construction of roadbeds, tunnels, bridges, station buildings, etc. **Specialized contractors:** Construction of rail tracks, Electric equipment, Mechanical equipment
- Construction management
- Completion inspection
- Completion — Lease → Operator (JR)

Structures on Shinkansen

JRTT
Japan Railway Construction, Transport and Technology Agency

Tunnel
(Kyushu Shinkansen)



Bridge
(Tohoku Shinkansen)

Viaduct
(Hokuriku Shinkansen)

Earth Structure
(Kyushu Shinkansen)

Track Structure(Slab Track)

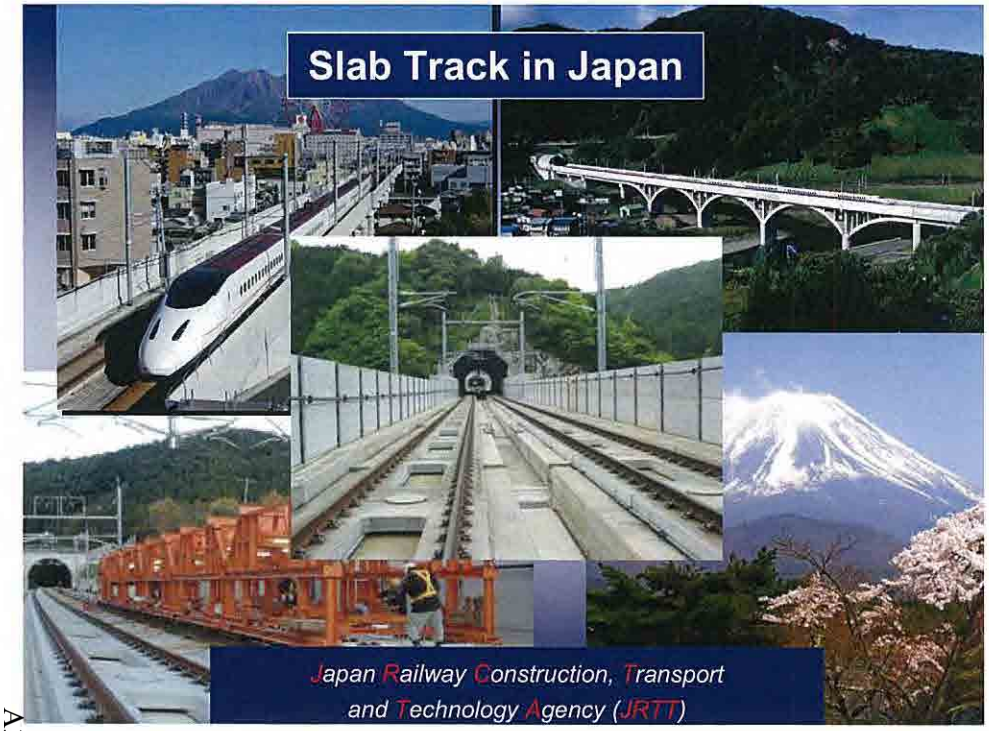
JRTT
Japan Railway Construction, Transport and Technology Agency

Tunnel
(Kyushu Shinkansen)

Bridge
(Kyushu Shinkansen)

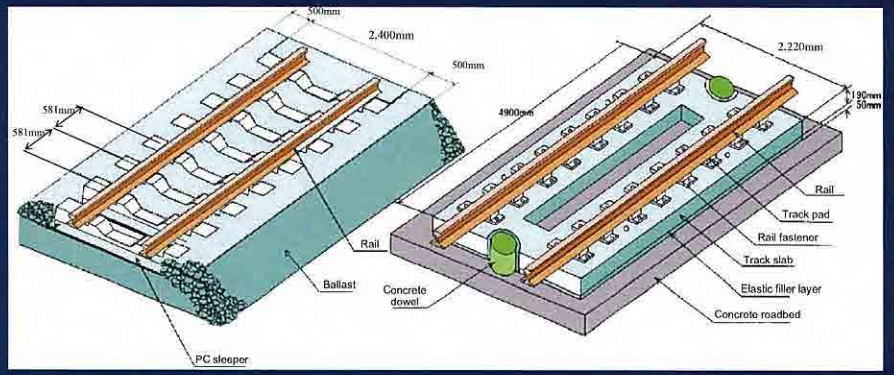

Thank you for your attention.

Slab Track in Japan



Japan Railway Construction, Transport and Technology Agency (JRTT)

Ballasted Tracks and Slab Tracks



Ballasted track

Slab track
(Frame type and flat type)

Safe and stable railway transportation and high-speed performance shall be secured.

(Source: JRTT Shinkansen Implementation Standards)

Minimum radius of curve	4000 m
Maximum cant	200 mm
Track-center distance	4.3 m
Basic track structure	**Slab track**
Type of rail	60-kg rail
Electric system	AC 25000V

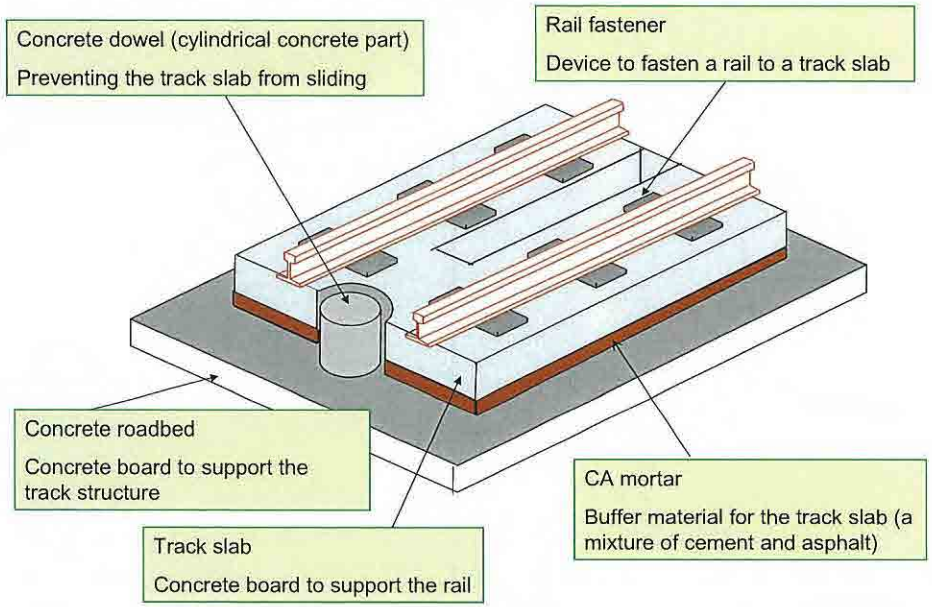
Safe, comfortable to ride, and high-speed slab tracks using continuous welded rails in principle and rail surfaces of high-precision and high adjustability as a basic structure shall be achieved.

Track Structure

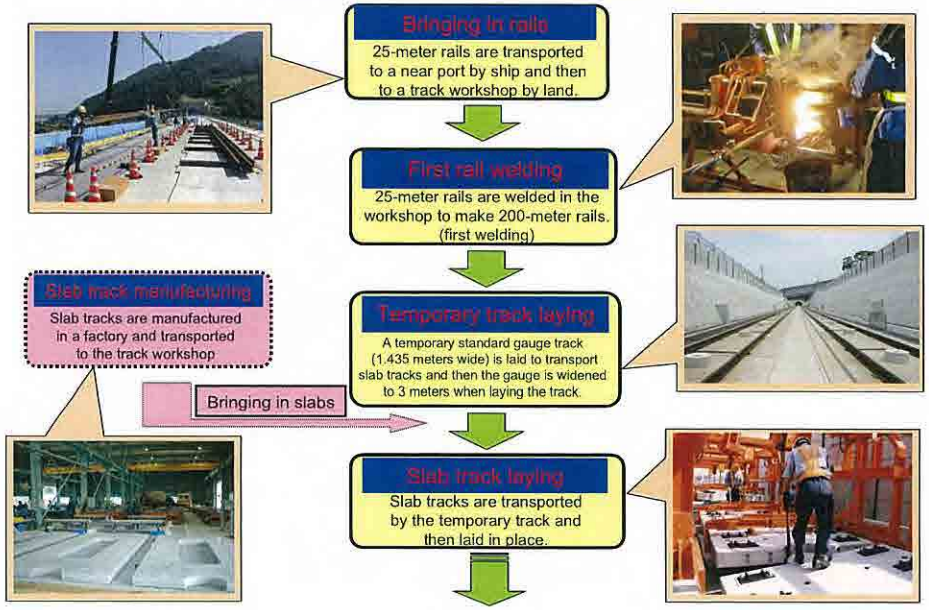
In an open-air section
(Plat type slab track)

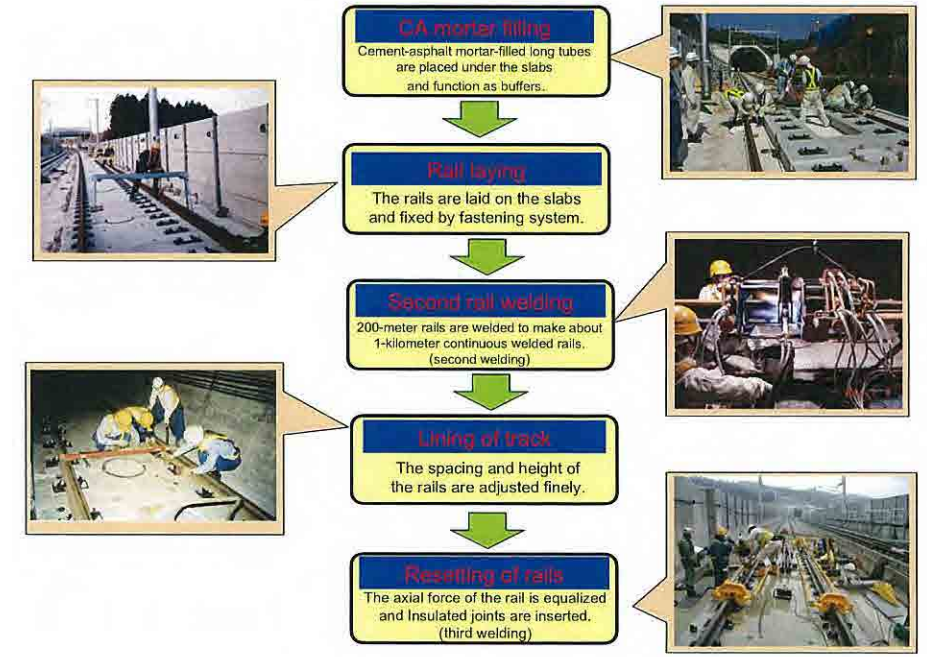
In a tunnel (Frame type slab track)

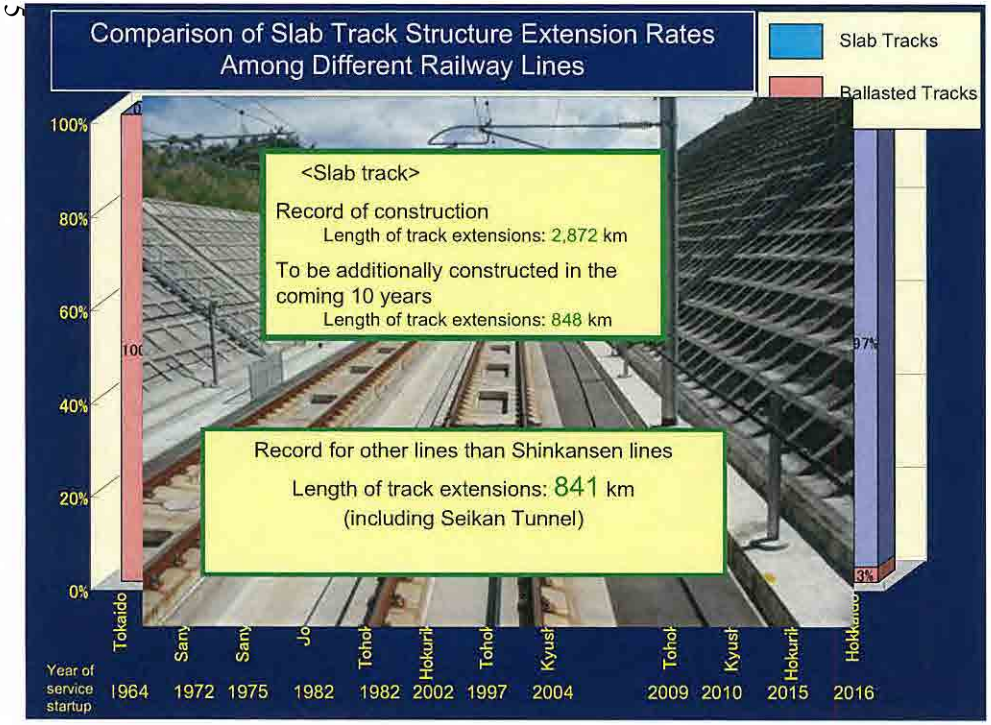
Structure of Slab Tracks



Construction process

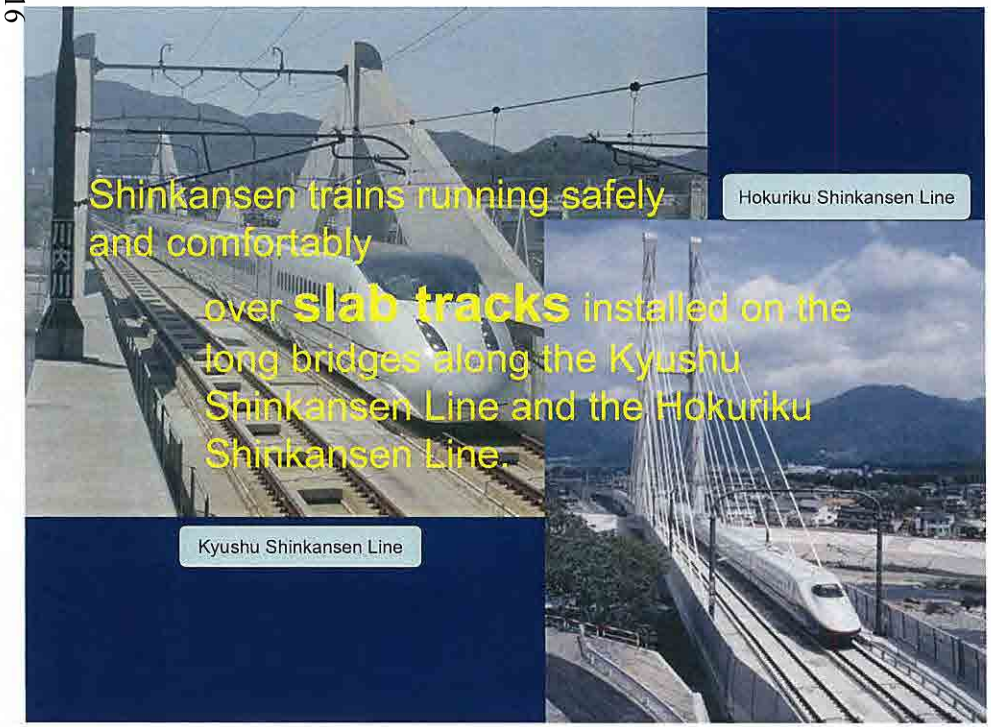







Construction of temporary track
construction base


Shinkansen trains running safely and comfortably over slab tracks in cut-out sections and earth-filled sections.
Tohoku Shinkansen Line
Kyushu Shinkansen Line


Shinkansen trains running safely and comfortably over slab tracks installed on the long bridges along the Kyushu Shinkansen Line and the Hokuriku Shinkansen Line.
Hokuriku Shinkansen Line
Kyushu Shinkansen Line


THANK YOU
J—Slab （Taiwan Shinkansen ）