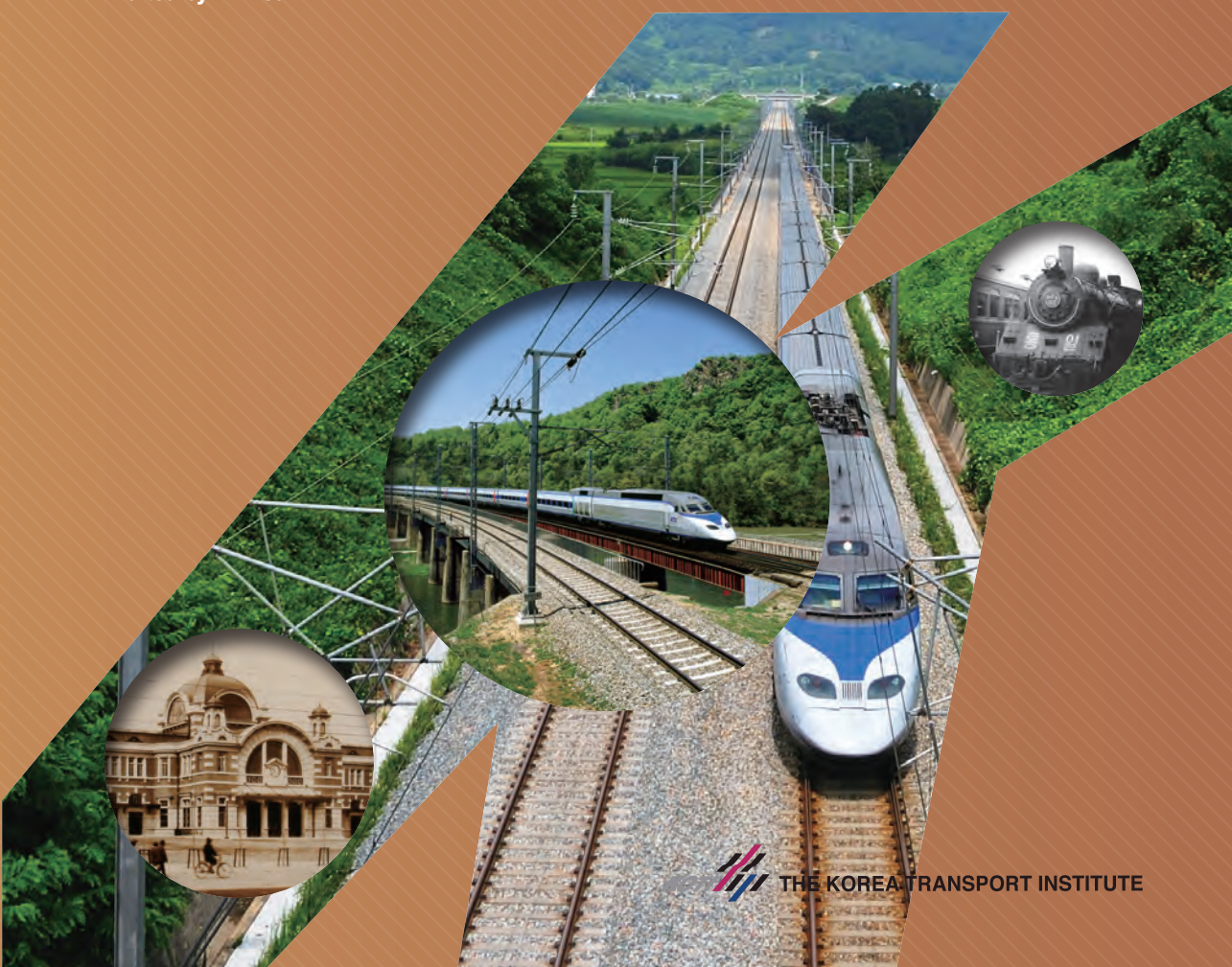
ISSUE 17

KOTI Knowledge Sharing Report

KOREA'S BEST PRACTICES IN THE TRANSPORT SECTOR

The History of Korean Railway by Photographs

Edited by LEE Jun



THE KOREA TRANSPORT INSTITUTE

Korea's Best Practices in the Transport Sector

The History of Korean Railway by Photographs

• Editor

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KOTI Knowledge Sharing Report: Korea's Best Practices in the Transport Sector

Issue 17: The History of Korean Railway by Photographs

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Published by The Korea Transport Institute (KOTI)
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Not for sale

ISBN 978-89-5503-654-1 93320

Photos courtesy:
Gyeonggi Provincial Government, Hyundai Rotem Company, Korea Automobile Culture Institute (JEON Young Sun), Korea Rail Network Authority, Korea Railroad Corporation (KORAIL), Korea Railroad Research Institute (KRRI), Ministry of Land, Infrastructure and Transport (MOLIT), National Archives of Korea, Seoul Line9 Operation Co., Ltd., Seoul Metro, Seoul Metropolitan Government, Seoul Metropolitan Rapid Transit Corp., and Shinbundang Railroad Co., Ltd.

※ *We deeply appreciate the related organization provided pictures*

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THE KOREA TRANSPORT INSTITUTE

• Contents

• Preface

Compared to other modes of transport, railways are rated very highly in terms of safety and reliability. They are capable of large-scale passenger and freight transport. So, they are considered an ideal mode of transport from environmental as well as economic perspectives. These merits make it possible to predict that railways will continue to develop as a means of providing travel convenience for a very long time to come.

It is a good way to begin preparations for the future of railways to take a fresh look at their history. The history shows not just the timeline of development of railways as a mode of transport. It can also offer indicators showing how people in a particular nation underwent changes in their quality of life. It will be worthwhile to identify the extent of satisfaction of people in relation to the benefits generated by railways. The results will surely be used as useful data when developing future plans for the railway system. Conversely, the future developmental aspects of railways could vary depending on what people want from the rail system. Historically, the rail industry has experienced ups and downs. Sometimes it was in a slump. At other times, it boomed. This is because demand for rail transport as well as related technologies and services keeps changing depending on people's desires and needs.

It is particularly worthwhile to take note of the beginning and the development process of the Korean rail industry. Its history began with the construction of railways for military and political purposes when the nation was under Japanese colonial rule. Nevertheless, the Korean rail sector attained significant achievements while undergoing, after national liberation, various important developments such as the Korean War, the post-war recovery, and the nation's full-fledged economic growth. It deserves to take pride in the contributions it has made to the nation's development. As mentioned in the main text, railways have maintained their impressive presence throughout Korea's modern and contemporary history.

Of all the developments, the opening of the high-speed railway system merits particular attention. Not only has it provided convenience in relation to transportation, it has also had significant impacts on the creation of new culture and industrial developments. Korea built its high-speed railway system through technology transfer from France. Even after launching the high-speed train services, the Korean government continued to make related investments, eventually succeeding in developing its own design standards and localizing relevant technologies. Thus, Korea has become the world's fifth nation that has the capacity to operate high-speed railways on its own. The opening of the era of high-speed railways will be recorded as a most important development in the nation's railway history.

Seoul subway construction represents a development that has a lot to do with Korea's rapid economic growth. As of 2014, Seoul is closely connected to the cities and towns in its vicinity. Seoul Subway Line 9 and New Bundang Line played particularly important roles in ensuring the connections. Subway Line 9 operates express and local trains alternately. It is Seoul's first subway route that offers such service. New Bundang Line is known for providing unmanned subway services, the first of its kind in Korea. With its automated system, it is expected to make further progress in the future.

As mentioned above, railways are continuing to make progress even in contemporary times. While trying to ensure passenger safety and provide more convenient services, the Korean rail industry will exert an effort to increase its brand value based on its own technologies. This book will definitely help you predict the future trends related to Korean railways.

LEE Chang Woon
President
The Korea Transport Institute

The history of Korean railways began in 1899 during the Great Korean Empire with the Gyeongin Line but major routes were exploited later by foreign nations, including Japan, for military and political purposes spanning from 1910 to 1949.

CHAPTER 1

Future Development of Railway Technologies

Korean Railway History

1899
Opening of Gyeongin Line (33.8 km) with Mogul type steam locomotives (22 km/h)

1925
Gyeongseong Station (later renamed as Seoul Station)

1905
Opening of Gyeongbu Line (445.6 km)

1906
Opening of Gyeongui Line (499 km)

1956
Yeongam Line, Electric Locomotives for Industrial Rail Line

Great Korean Empire | Japanese Colonial Period | The Postwar Reconstruction Period

1910 | 1945

1904-1905
Russo-Japanese Wars

1914
X-shape rail network

1938
Second Sino-Japanese War

1939-1945
World War II

1950-1953
The Korean War

2010
KTX-Sancheon operating using domestic technology

2004
Opening of Gyeongbu High Speed Railway (KTX, 300 km/h)

1975
Opening of Electric Locomotives for Industrial Rail Line (Yeongdong Line, 320.8 km)

1972
Start of Electrified Railway Era

Industry Development

1970

Economic Growth

1990

2004

Becoming Advanced Country

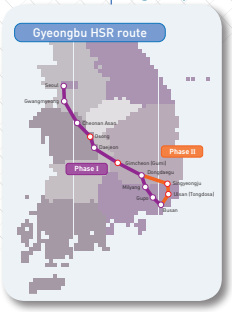
2015
HEMU 430X operation (430 km/h)

1997
IMF Crisis

2009
Subway Line 9 Operation

1988
1988 Summer Olympic Games

1992~2010
Construction begins on Gyeongbu High Speed Railway



▼ **Korea's first tram**
A tram imported from the U.S. and assembled in May 1899

◀ Passengers in front of a street car ticket booth in around 1905

By the time the first streetcar opened, there were eight 40-seat streetcars and one VIP cars for the royal family in operation. Tickets were divided into the first class and general. As there were no fixed stops, the streetcar stopped wherever passengers asked to stop. Unfortunately, a streetcar hit a child ten days after its opening and incurred public resentment.

◀▼ **Korea's first tram**
Opening ceremony for Korea's first tram in May 1899. Residents of Hanseong (later renamed as Seoul) flocked to Dongdaemun for the opening ceremony
Photo (bottom) by KIM Yeong-jun

Trams during the Japanese Colonial Era 01

Seoul Electric Corporation was established in 1898 after diplomatic ties were established with the United States in 1882. Later, a tramline was opened between Seodaemun and Dongdaemun in 1899.

◀ **Construction of tracks between Seodaemun and Dongdaemun (November 1898)**
Trams were a completely new concept for people, as bicycles and rickshaws were the major means of transportation at that time

▶ **Stations**
There were no designated stations and people just waved their hands to stop the tram

▼ **Korea's first locomotive**
The first Mogul locomotive was operated until the opening of the Gyeongin Line. Korea's first locomotive was a Mogul tank locomotive produced in the U.S. and ran at 22 km/h

Since the opening of streetcars in Hanseong in May 1899, the 33 km-long Gyeongin Line between Jemulpo in Incheon and Noryangjin in Seoul opened four months later on September 18, which marked the first train in Korea and signaled a revolution in mass transportation.

◀ **Opening of Gyeongin Line**
The 1899 opening of the Gyeongin Line was the beginning of Korea's rail history.
The opening ceremony was held in Incheon Station on September 18, 1899

▶ The 1st groundbreaking ceremony of the Gyeongin Line on March 22, 1897

The Beginning of Korean Railways during the Japanese Colonial Era

02

With the opening of Gyeongin Line (Seoul - Incheon), Gyeongbu Line (Seoul - Busan) and Gyeongui Line (Seoul - Sinuiju), transport volume by rail significantly increased in Korea.

▲ Korea's first train ticket for Gyeongin Line

▲ **Guests invited to the opening ceremony of Gyeongin Line**
A large number of prominent figures were invited to the ceremony, which was a grand event.

◀ VIP train at the time of the opening of the Gyeongin Line

▶ **Hangang Bridge**
The opening of Gyeongin Line was completed when bridge construction finished in 1900

Construction of the Gyeongbu Line, which began on August 21, 1901, in Yeongdeungpo, Seoul, and September 21 in Choryang, Busan, was completed four years later on December 27, 1904. The opening ceremony of the line was held on May 25, 1904, in Namdaemun Station in Seoul. However, operation of the entire line (445.6 km) began on January 1, 1905.

▲ Choryang Station, Busan, at the time of the opening of the Gyeongbu Line

▼ **Gyeongbu Railroad Inc.**
The Seoul office of Gyeongbu Railroad Inc. was located in Japan in 1901

▲ **Groundbreaking ceremony of Gyeongbu Line in Busan, 1901**
Gyeongbu Line was constructed within three years and nine months with a budget of 30 million won.

Imperial Japan started exploring the topography of the Korean Peninsula since the mid 1880s for the construction of the Gyeongbu Line. It founded the Gyeongbu Railroad in 1896 and pushed ahead with the construction of the Gyeongbu Railway in 1901 as a means of invasion to Korea, despite the opposition of the Korean Empire. When the Gyeongbu Line opened first in May 1905, it took 13 hours and 45 minutes between Seoul and Busan. In September 1905, Japan linked the GyeongbuLine and the Japan Railroad with the launch of a ferry between Busan, Korea, and Shimonoseki, Japan.

▶ The opening ceremony of the Gyeongbu line was held at Namdaemun Station in Seoul on May 25, 1905

◀ **The first train of the Gyeongbu Line in 1903**
The opening of the Gyeongbu Line reduced travel time between Seoul and Busan from 14 days to 11 hours

▶ The opening ceremony of the line was held in Choryang, Busan on May 25, 1905)

▲ **Construction of Gyeongeui Line**
Gyeongui Line (Seoul - Sinuiju) was constructed in 1903 during the Japanese colonial era.

▶ **The train of Gyeongui Line on Daedonggang Railway Bridge**
Gyeongui Line was opened with the completion of Daedonggang Railway Bridge in 1906

◀ Japan mobilized its army to promptly complete the Gyeongui Line

The Gyeongui Line between Seoul and Sinuiju opened completely in around two years on April 3, 1906. It was completed in a relatively short time because Japan undertook railway construction at a rapid pace for the transport of soldiers and war supplies. The line now runs between Seoul and Munsan due to the division of Korea.

▶ Pyeongyang Station, a central station of the Gyeongui Line between Seoul and Sinuiju (1920s)

◀ **Human-powered railcar in Pyeongyang used for construction of Gyeongui Line**
These human-powered railcars were used for transporting materials and workers.

▶ Track work in the 1930s

▲ Korean workers exploited for construction of the line in 1905

▶ The seat layout of the Royal Court train

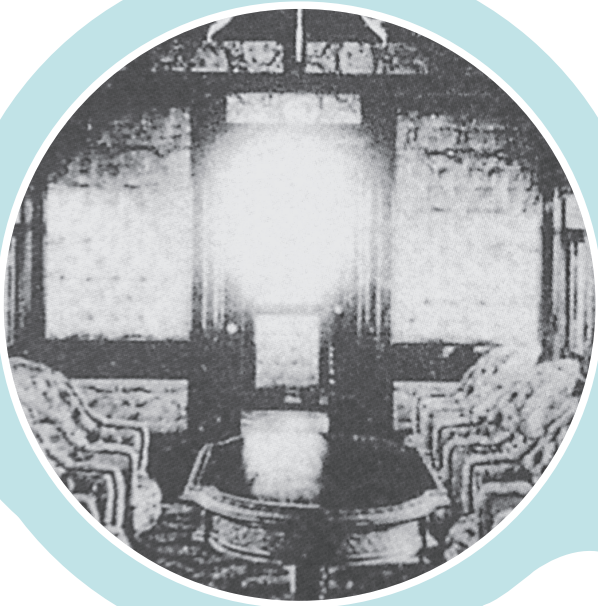
◀ Emperor Yunghui (Sunjong) on a royal tour on February 2, 1910 at Gaeseong Station

▼ The Royal Court train at Daegu Station during Emperor Yunghui's royal tour in the south

Photo by KWON Sang-gu

▲ A special train for the Royal Court

The direct express train between Namdaemun in Seoul and Choryang in Busan was named after the imperial name of Sunjong, the Emperor Yunghui, in 1907 and the Yunghui direct express train began operation between Busan and Sinuiju in April 1908.



▲ Interior of the VIP cabin

▼ The VIP train around opening of the Gyeongin Line

Construction of the 22.7 km long Gyeongwon Line, which ran between Yongsan in Seoul and Wonsan in Gangwon Province, began on October 15, 1910, after the groundbreaking ceremony in Yongsan and completed and started operation along its entire route from September 16, 1914. Currently, the Gyeongwon Line runs the 88.8 km section between Yongsan, Seoul, and Sintan-ri, Gyeonggi Province due to the division of Korea. The Honam Railway Line began operation on July 11, 1911, with the opening of the 39.9 km section between Daejeon and Yeonsan with an opening ceremony in Mokpo on January 22, 1914.

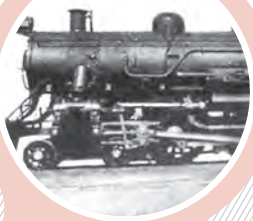
▲ Gyeongseong Station (now Seoul Station) was completed within three years (1925)

▼ The opening ceremony of Cheolwon Station on the Gyeongwon Line On December 21, 1912

▲ **Cheongnyangni Station, Seoul**
The opening of Honam Line (Seoul - Mokpo) and Gyeongwon Line in 1914 increased the traffic volume of Cheongnyangni Station.

Passenger volume increased faster than that of freight

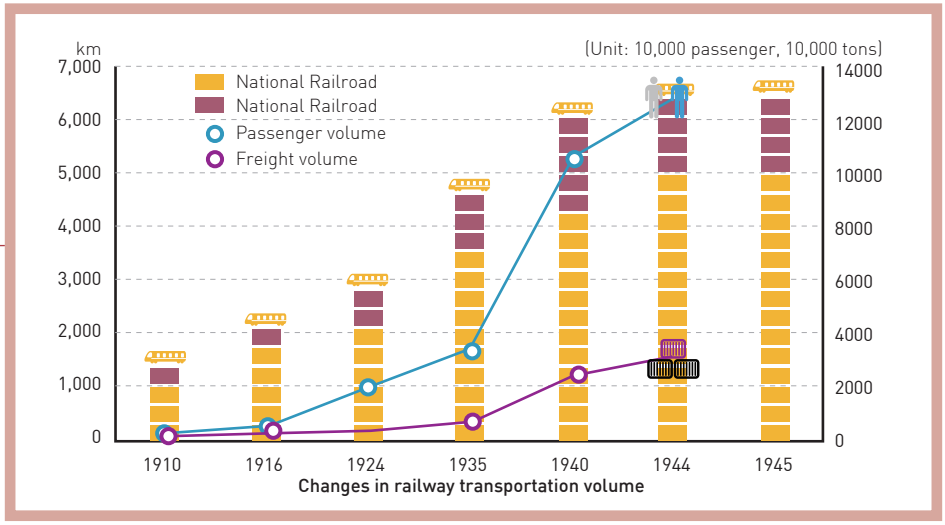
◀ the Akatsuki Special Express,which covered the distance between Seoul and Busan in 6 hours 45 minutes (after May 1933)



◀ 4-6-0 Type 6 steam locomotive, developed with local technology (1927, Gyeongseong Factory)

◀ **X-shaped trans-Korea railway network (1905-1914)**
Gyeongbu Line (580 km), Gyeongui Line (716 km), Honam Line (286 km), Gyeongwon Line (226 km)

▲ First class observation car of the Akatsuki Special Express



Changes in railway transportation volume

Korean railways were divided as the country was split into North and South after the liberation August 15 1945, and operation of the railways between the North and South was suspended by the North (Soviet military government) around August 24 and 26.

◀ Narrow gauge steam locomotive. It is a tender locomotive that ran on the Suin Line and Suryeo Line from the mid 1930s to the early 1950s. Characterized by its narrow track, the narrow gauge steam train ran up to 40 km/h and was called the "kid train."

▶ **The Joseon Liberator**
The Joseon Liberator, a steam locomotive developed by Korea's domestic technology in 1945, ran between Seoul and Busan. It was an express train that covered the distance between the two cities in 13 hours.

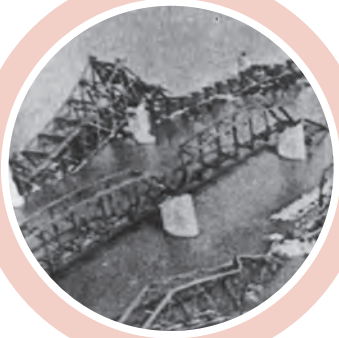
Korean Railways after Liberation 03

After the liberation of Korea in 1945, rail volume decreased sharply. For example, 1946 rail passengers reduced by 39 percent and cargo by 13 percent.

Gyeongseong Station during liberation
People shouting for joy due to liberation on August 15, 1945

◀ The Korean War destroyed 50% of passenger cars and 55% of the electrical grid

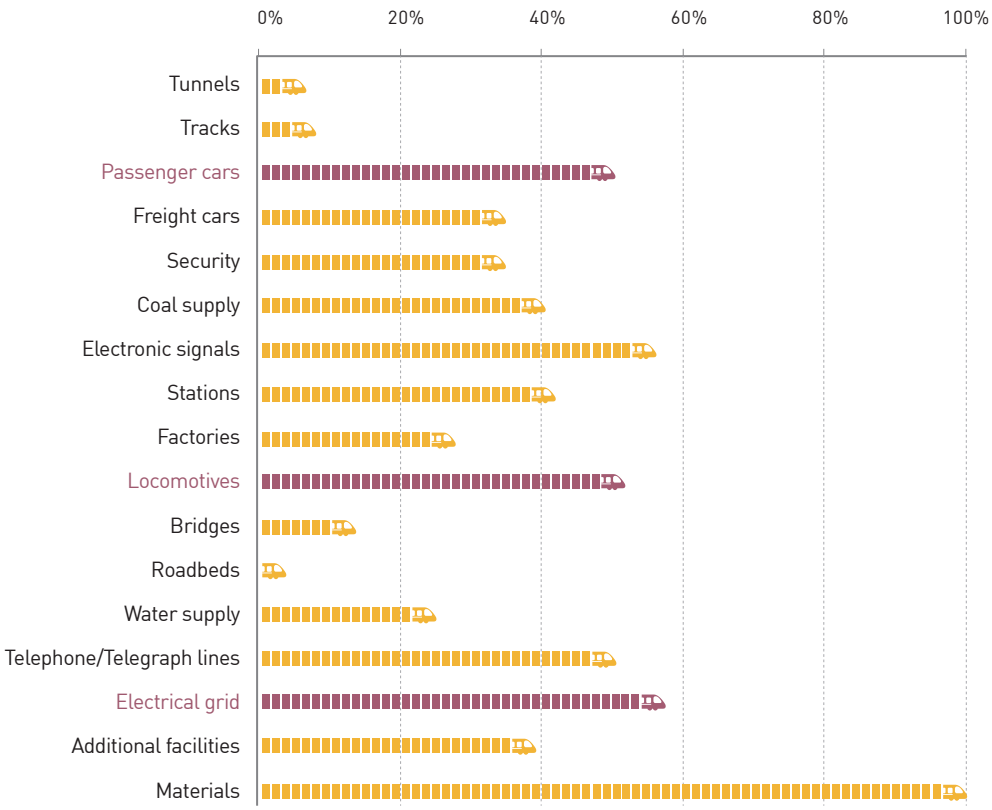
▲ The interior of Seoul Station after being bombed



▲ Hangang Railroad bombed during the Korean War

The Korean War and Korean Railways 04

The Korean War destroyed railway sections not only at the Military Demarcation Line, but throughout the Korean Peninsula. The war damaged more than 75% of the entire railway system.



Destroyed infrastructure after the Korean War (25 June 1950 – 27 July 1953)

Korean railways during the industrial development between the 1960s and 1970s maintained a strong position despite the growing use of automobiles and airplanes. But aging facilities and lack of services led to deterioration of the railways' financial position in the 1980s.

CHAPTER 2

Railways during Industrial Development

▼ **The Unification Train**
The Unification Train began operation between Seoul and Busan at 47 km/h on August 15, 1955 and at 63 km/h in 1959 (7 hours)

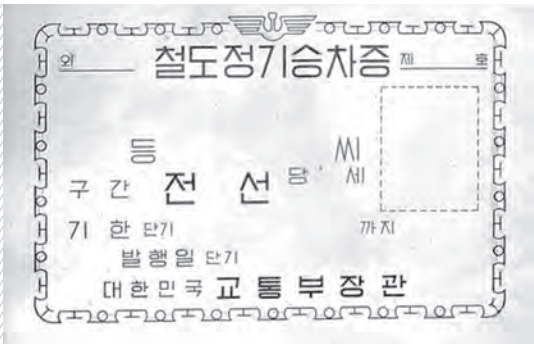
◀ Steam locomotive provided by the United States Army

Railway Development for Restoration and Economic Growth

01

The country increased efforts to build railways along with roads and harbors in line with the growing economy. And the use of diesel locomotives brought an end to steam locomotives in 1967.

▲▶ **UN donated diesel-electric locomotives**
UN forces donated four diesel-electric locomotives following the Korean Armistice Agreement marking the beginning of these locomotives in Korea



◀ Commuter ticket in 1957

The construction of Yeongam Line (Yeongju - Cheoram, 86.4 km) was marked as Korea's first plan for industrial development after liberation. After establishment of the national government in 1949, it was imperative to construct a railway that would connect regions rich in natural resources and their production sites. Opened in 1955, the Yeongam Line played a vital role as Korea's largest industrial railroad.

◀ A train running at the opening ceremony of the Yeongam Line

▲ Yeongam Line, which was opened gradually from December 31, 1955, was an industrial railway for transporting natural resources from Samcheock such as anthracite and cement.

A construction site of the Yeongam Line

The inaugural train between Songhak and Ssangyong at the opening ceremony of the Hambaek Line in January 16, 1956

Large 5,000 series diesel locomotives were imported with foreign aid provided by the International Cooperation Agency (ICA)

With the introduction of high-performance locomotives and comfortable passenger cars, each railway line operated express trains. The express train Mugungwha, which traveled between Seoul and Busan in around six hours and 40 minutes (average 67 km/h), began operations on February 21, 1960. In early 1969, the train transversed between Seoul and Busan in 4 hours and 50 minutes (average 92 km/h).

▼▶ The steam locomotive's official retirement ceremony was held at Seoul Station on August 31, 1967. The train, which had operated for 68 years, was replaced with a diesel version which ran as an extra train before it completely retired.

▲▶ The Mugunghwa began to run between Seoul and Busan at 47 km/h from August 15, 1955 and at 63 km/h in 1959

The express train, which was renamed Saemaeul, started operations between Seoul and Busan on February 10, 1969. It covered the distance in four hours and 50 minutes.

Korea imported ten mid-size diesel cars and six large-size diesel cars on the second foreign aid (May 31, 1966)

A ceremony was held for the completion of diesel locomotive service at the repair shop (March 30, 1960)

Opening of the Jeongseon Line (Najin-Yeoryang) on May 21, 1971

Opening of the Donghae Bukbu Line on November 6, 1962

Opening of the Hwangji branch line on December 20, 1962

▼ Launch of the Korean-made electro-diesel locomotive (September 18, 1979)

▲ Completion of an electric railroad in the 10.7 km long section between Jeungsan and Gohan was celebrated with a trial run on June 9, 1972, signaling the era of electric railways

▼ A train running in celebration of the completion of an industrial railway on December 5, 1975

▼ **Beginning of container freight** (1972)
Freight transportation by railways brought logistics innovation

Electric Locomotives 02

The era of electric railways began upon completion of the Jungang Line, Taebaek Line, and Yeongdong Line, which were industrial railways in the 1970s. Electric locomotives (No. 8000~) with a great pulling capacity were mainly used in order to transport anthracite and cement from Yeongseo and Yeongdong. In the 1990s, electric locomotives were gradually introduced to Chungbuk Line, Gyeongbu Line, and Honam Line.

▲ Subway construction ceremony for the metropolitan area - Gyeongin/Gyeongsu (1971)

▼ The inaugural ceremony of the new Korean made Saemaeul train on April 10, 1980

◀ **Ceremony for operation of domestic electric excellent cars**
The ceremony for operation of domestic electric high-grade rolling stock was held in November 1, 1980. The electric excellent cars ran at 110 km/h and had features including automatic control and 3860 horsepower. They were manufactured by Daewoo Heavy Industries & Machinery Ltd.

▶ **The 88 Olympic World Peace Train**
Various special trains ran in the 1980s

◀ The latest streamlined train Saemaeul running between Seoul and Busan on July 21, 1986

Korean Railways in the 1980s 03

In the 1980s, Korea produced various rolling stock with local technology and introduced domestic electric high-grade rolling stock to Taebaek Line and Yeongdong Line. In line with increasing demand, Chungbuk Line and Honam Line were converted to double-track.

▼ The Saemaeul diesel locomotive
The Saemaeul push-pull diesel train operated at 150 km/h from July 6, 1987

Construction of the Gyeongbu High Speed Railway between Seoul and Busan began as the subway went into operation in Seoul with lines 1 - 4.

CHAPTER 3

Railways during Economic Growth

Plans developed for Gyeongbu High Speed Railway
200 km/h double-track sections between Seoul and Busan at and Gyeongbu High Speed Railway were decided, and a technical survey for Gyeongbu High Speed Railway was conducted (1989)


시속 200㎞ 달리는 환상특급

서울~부산 공정률44%…4년후 개통
축적된 철단기술 中·대만서 도입 원해

▲ "A Fantastic Express Train That Runs at 200 km/h"
Maeil Business Newspaper
(December 17, 1999)

International High-Speed Railway Symposium (1989)
Korea Transport Institute, review of overseas high-speed railways and magnetic levitation technologies, 100 participants from 11 countries

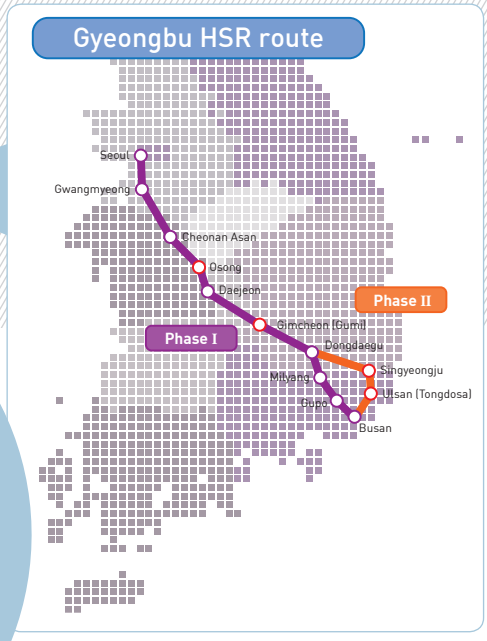
Discussion for High-Speed Railways 01

Construction of Gyeongbu High Speed Railway was decided in 1989, and the master plan & routes were developed in the 1990s.

Master Plan for the Project & Revision

	Master plan (Jun. 14, 1990)	1st revision (Jun.14, 1993)	2nd revision (Jul. 31, 1998)	
			Phase I	Phase II
Routes	Seoul-Cheonan-Daejeon-Daegu-Gyeongju-Busan	Seoul-Cheonan-Daejeon-Daegu-Gyeongju-Busan	Seoul-Cheonan-Daejeon-Daegu-Busan	Seoul-Cheonan-Daejeon-Daegu-Gyeongju-Busan
Distance	409 km	430.7 km	409.8 km	412 km
Project period	Aug.1991-Aug.1998	Jun.1992-May 2002	Jun.1992-Apr. 2004	May 2004-Oct.2010
Project budget	5.846 trillion won	70.74 trillion won	12.738 trillion won	5.698 trillion won
Stations	Seoul, Cheonan, Daejeon, Daegu, Gyeongju, Busan	Seoul, Gwangmyeong, Cheonan, Daejeon, Daegu, Gyeongju, Busan	- Gwangmyeong, Cheonan, Daejeon, Daegu, Busan - Extension of Seoul Station & Yongsan Station	Gwangmyeong, Cheonan, Daejeon, Daegu, Gyeongju, Busan
Travel time (Seoul-Busan)	101 min.	124 min.	160 min.	116 min.
Speed	350 km/h (design maximum speed)	300 km/h (maximum speed)	300 km/h (maximum speed)	300 km/h (maximum speed)
Train sets	46	46	46 (overseas 12, domestic 34)	46
Financial plans	-	Financial support 45% Independent fund raising 55%	Financial support 45% Independent fund raising 55%	-
Major changes	-	- Seoul/Daejeon/ Daegu Station: Use of the existing stations - Seoul-Anyang: Use of Gyeongbu Line - Construction of Gwangmyeong Station	- Daegu-Busan, sections of Daejeon & Daegu: Use of the existing line - Seoul-Gwangmyeong: Use of the existing line	- Construction of Daegu - Busan - Construction of Gyeongju Station - Underground construction for Daejeon & Daegu sections

Source: Gyeongbu HSR Construction History, Korea Rail Network Authority, 2011.



Construction for Gyeongbu High Speed Railway began in 1992 and took 12 years
(About 13 trillion won)

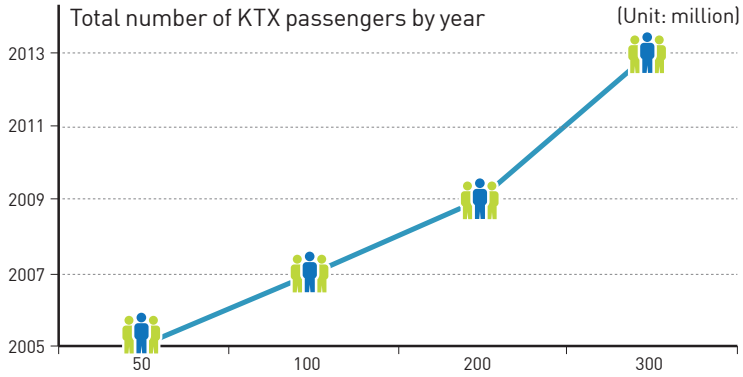
Phase I opening (Apr. 1, 2004)
Phase II opening (Nov. 1, 2010)

Travel time between Seoul and Busan reduced by KTX: 4 hrs 40 min → 2 hrs 30 min

Number of KTX passengers reached 10 million within 142 days from opening!

Introduction of Gyeongbu High Speed Railway 02

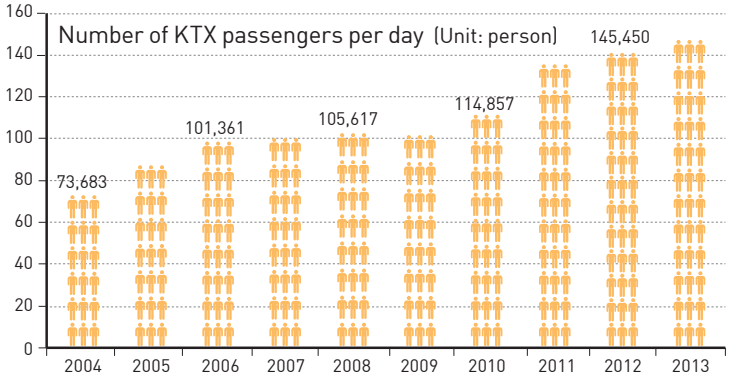
The trend of KTX passengers



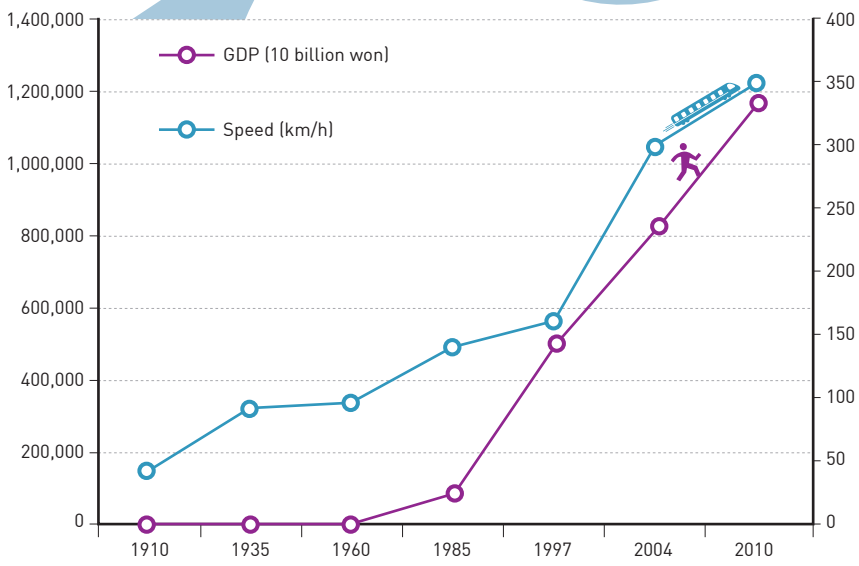
April 1, 2007

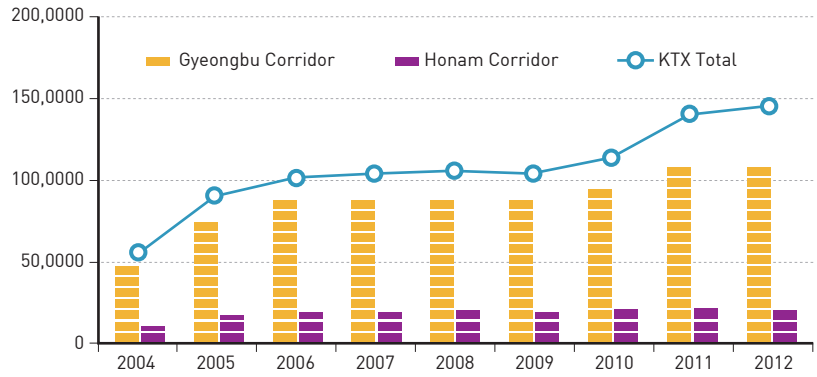
December 19, 2009

February 21, 2012



Korea's economic development is closely related to the speed of trains.





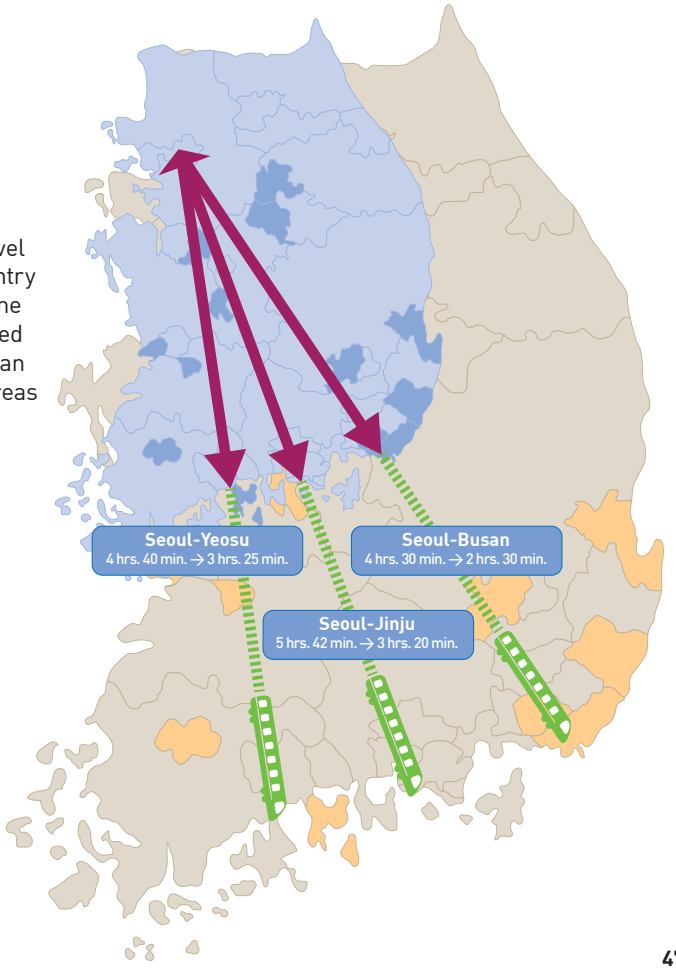
Gyeongbu Corridor: 110,000 persons per a day
Honam Corridor: 20,000 persons per a day

Changes from the Introduction of High- Speed Railway

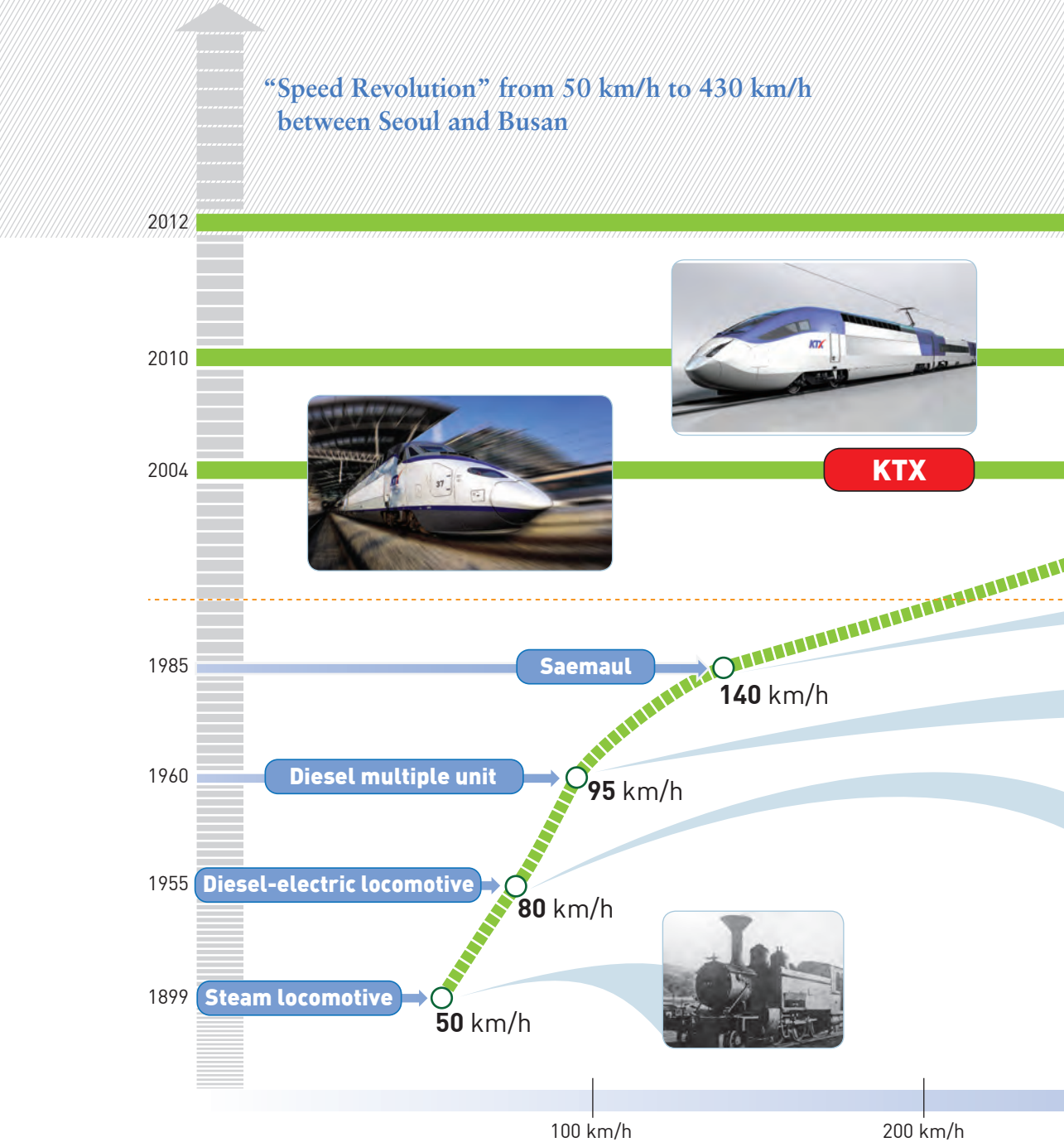
03

Introduction of high-speed railways increased transportation volume and reduced travel time. The combination of X-shaped and □-shaped railway network was determined with the national railway network plans in order to establish the shortest route connecting various parts of the country.

The opening of KTX has shortened travel time between regions while making it possible to travel from one side of the country to another within the same day. It has also contributed to integrating metropolitan and non-metropolitan areas



"Speed Revolution" from 50 km/h to 430 km/h between Seoul and Busan



HEMU-430X

430 km/h

KTX-Sancheon

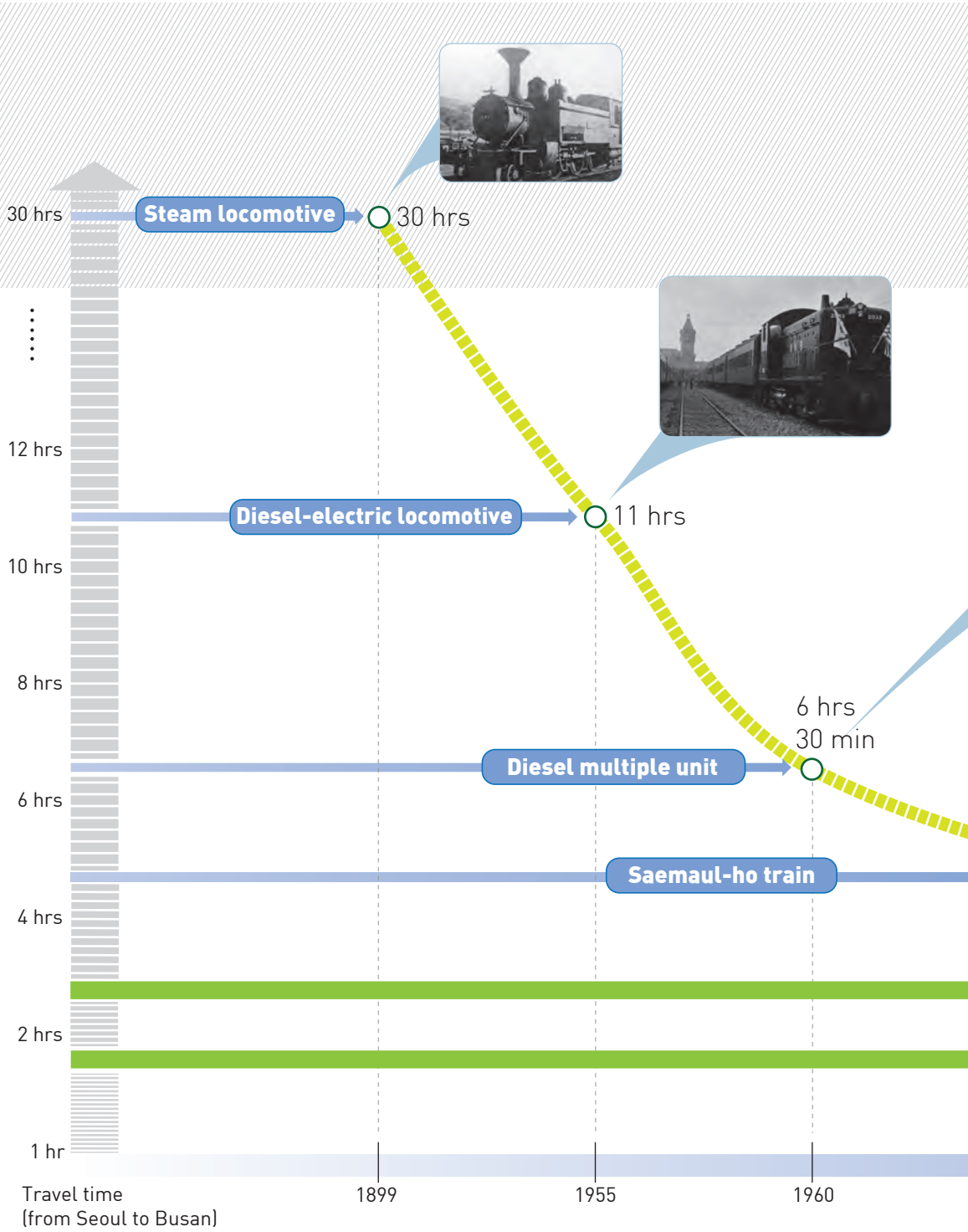
350 km/h

300 km/h

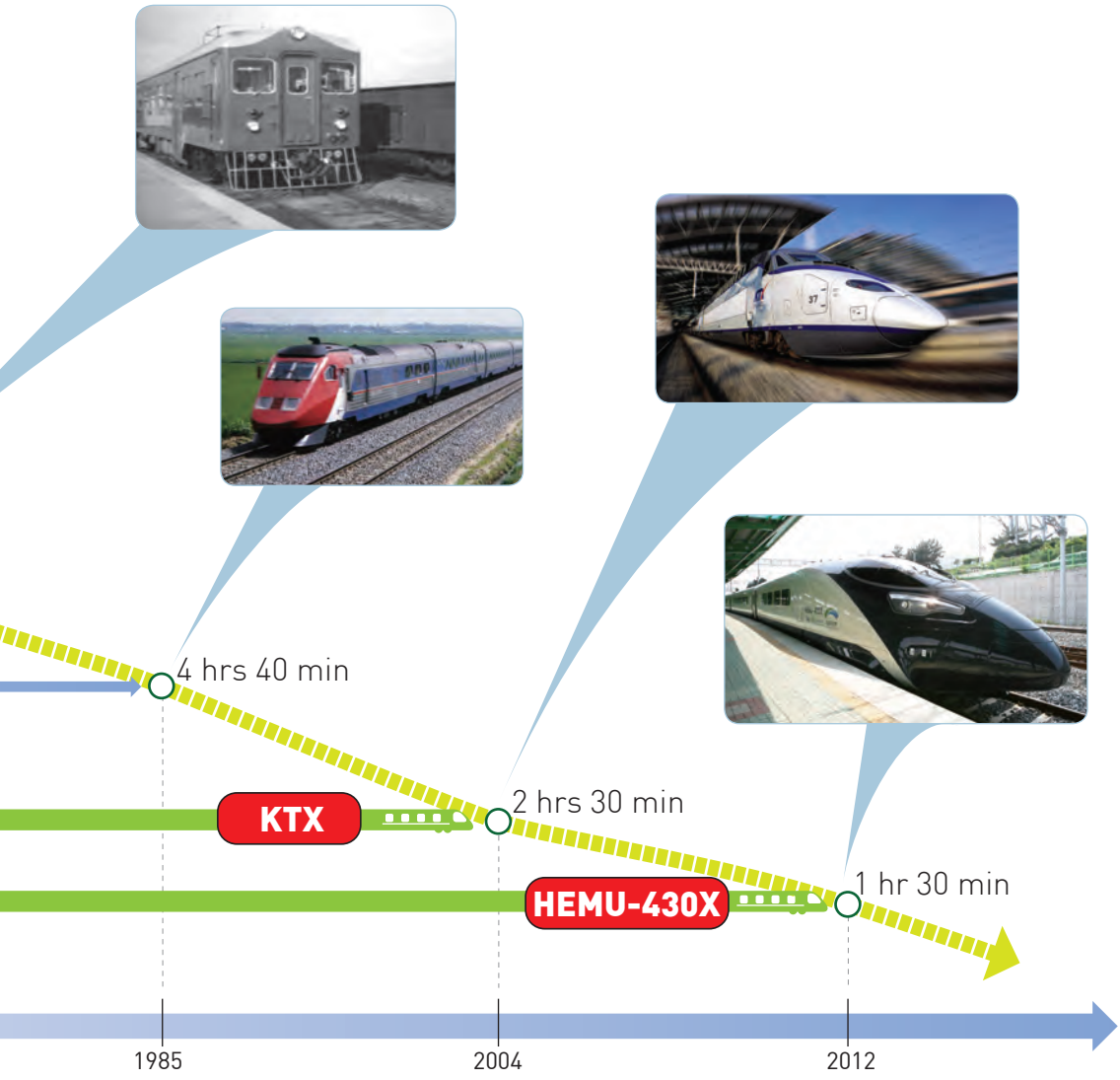
High-speed railway era

300 km/h

400 km/h

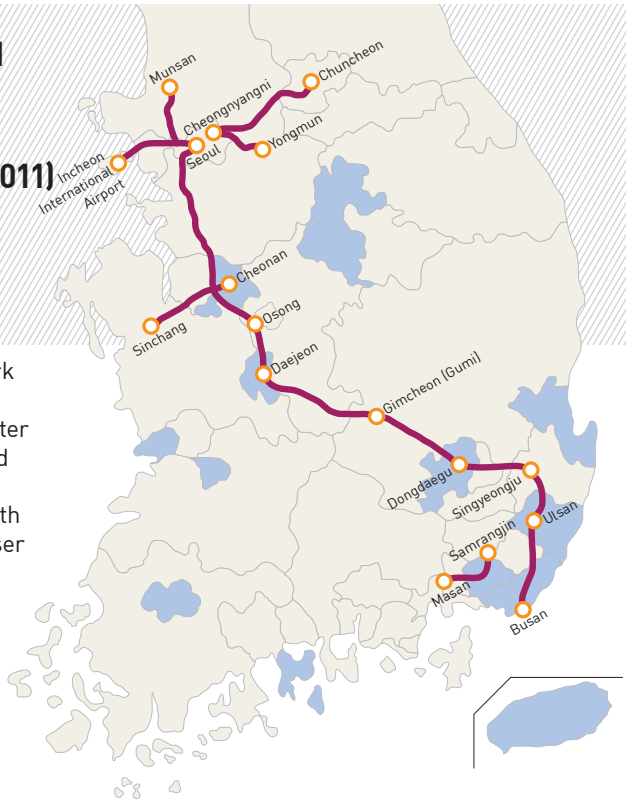

30 hrs
Steam locomotive
30 hrs
12 hrs
Diesel-electric locomotive
11 hrs
10 hrs
8 hrs
6 hrs
30 min
Diesel multiple unit
6 hrs
Saemaul-ho train
4 hrs
2 hrs
1 hr
Travel time
(from Seoul to Busan)
1899
1955
1960

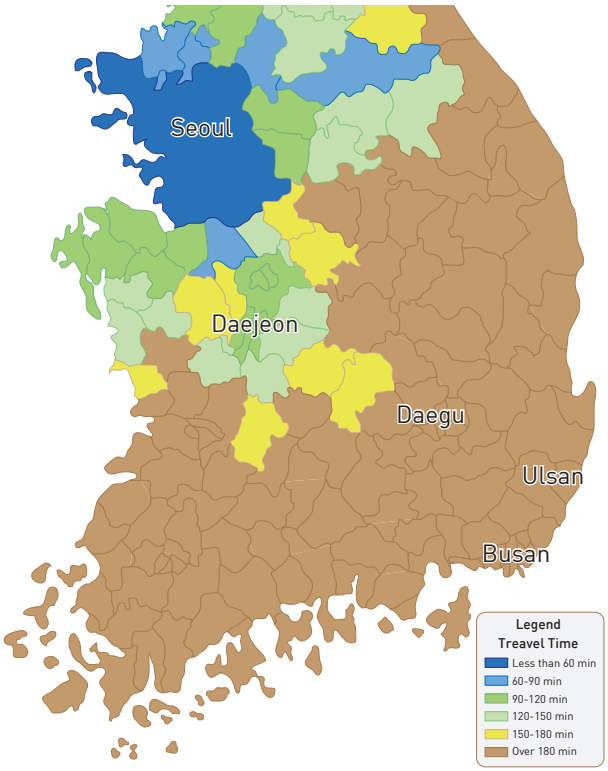
"Temporal Revolution" from 30 hrs to 1.5 hrs between Seoul and Busan



The Second National Railway Network (2011)

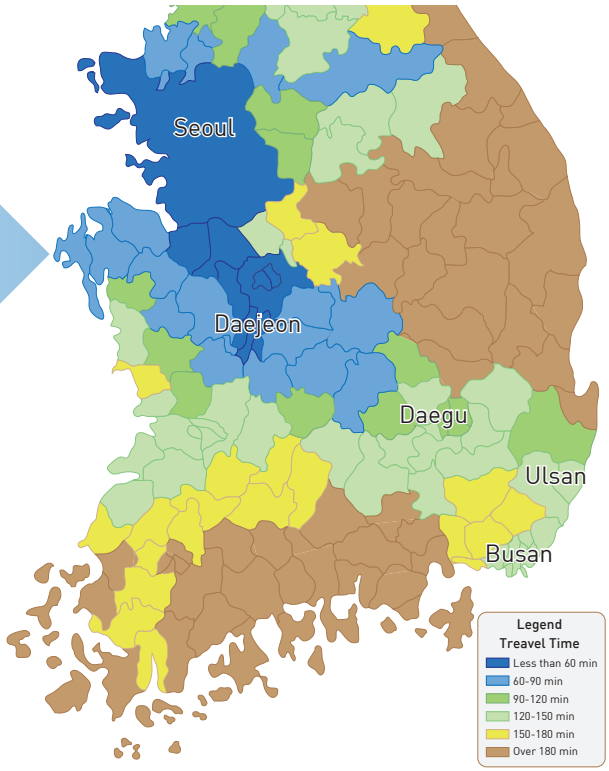
Railway network becomes more various and faster with high-speed railways, the territory of South Korea gets closer and closer.





The Second National Railway Network (2020)

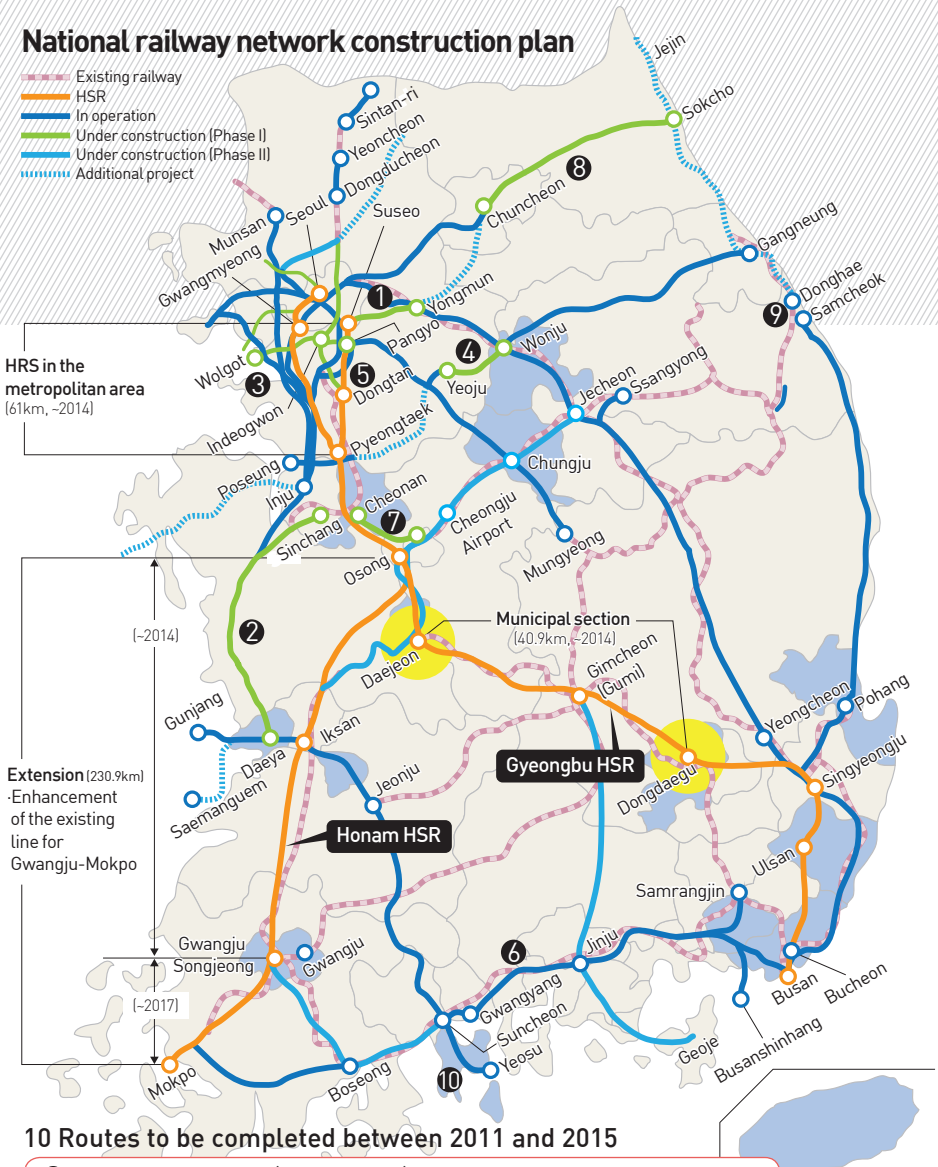
National railway network: Shortest route by the combination of X-shaped & □ -shaped railway networks



Introduction of the high-speed railways has reduced the travel time between Seoul and Busan to two hours.


HEMU-430X

National railway network construction plan



10 Routes to be completed between 2011 and 2015

1. Suseo-Yongmun Line (double-track)
2. Janghang Line (Sinchang-Daeya, double-track)
3. Wolgot-Pangyo Line (double-track)
4. Yeoju-Wonju Line (double-track)
5. Indeogwon-Suwon Line (Indeogwon-Dongtan, double-track)
6. Gyeongjeon Line (Jinju-Gwangyang, construction of the subway)
7. Cheonan-Cheongju Airport Line (double-track)
8. Chuncheon-Sokcho Line (double-track)
9. Eastern Coast Train (Donghae-Donghae Port, single-track)
10. Entrance Railway to Yeosu Yulchon Industrial Complex (Deongnyang-Yeosu Yulchon, single track)

* Cheonan-Cheongju Airport Line is decided based on a feasibility study
* The scale of Chuncheon-Sokcho Line will be decided based on a feasibility study
Source: Ministry of Land, Infrastructure and Transport

Construction of Gyeongbu High Speed Railway increased transportation capacity for passengers by 3.4 times and for freight by 7.7 times. Core technologies transferred from advanced countries during the high-speed railways introduction can be applied to other industries including materials, automation, information, aerospace, and so forth.

CHAPTER 4

Introduction of Advanced Railway Technologies

1989

International High-Speed Railway Symposium

1989

Construction Promotion Committee for Gyeongbu High-Speed Railway and a new airport

1991

Design for the route between Seoul and Busan

1992

Establishment of the Korea Train eXpress (KTX)

Needs Discussed

1989

Introduction Preparation

1997

Technology Transfer

1992

Construction of Gyeongbu High Speed Railway began

ALSTOM

1993

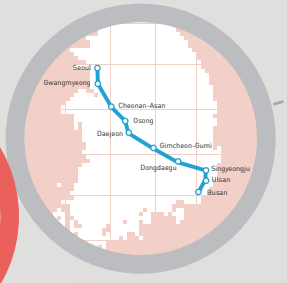
Selection of Alstom from France as a priority negotiator

2004

KTX Phase I opening (Seoul Station)

2004

Opening of KTX



2004

KTX Seoul - Busan route completed

2004

Technology Development

2010

Advanced Technology

2007

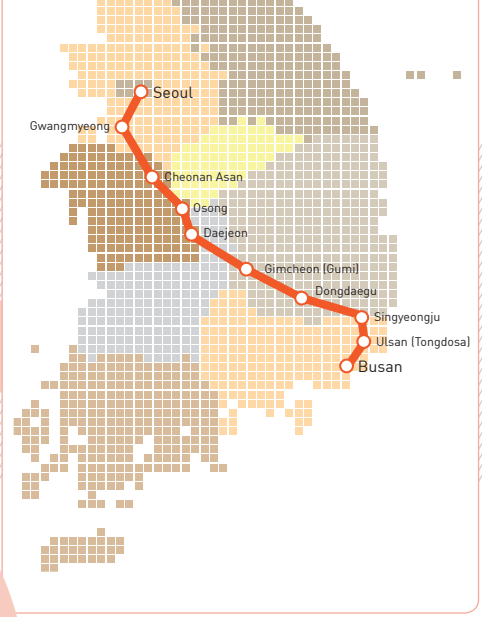
Number of KTX users reached 100 million

2010

Opening of KTX-Sancheon that only used local technology

2012

Trial operation of HEMU-430X



Plans developed for Gyeongbu High Speed Railway
- Project budget: 5.846 trillion won (1990)
- Project period: 1992-1998

14 construction sections between Seoul and Busan
Roadbed working design (1991)

Request for proposal (RFP) for the vehicle type sent (1991)
Target countries: Japan, France, and Germany

Conclusion of vehicle introduction agreement and public loan agreement
Construction of Gyeongbu High Speed Railway
Cheonan - Daejeon (1992)


고속철도건설公團 출범

▲ **Establishment of the Korea High Speed Rail Construction Authority** (1992)
The agency was in charge of constructing the high-speed railway, which would contribute to the country's economic growth

Introduction of the High-Speed Railway 01

From among ICE from Siemens in Germany, TGV from GEC Alsthom (later Alstom) from France and Shinkansen from Mitsubishi in Japan, TGV was selected on June 14, 1994 for Korea's high-speed railways.

- Alstom, was selected as a priority negotiator (1993)

  Introduction of the vehicle and core technologies (1993-1994)

  Agreement on the introduction of the high-speed vehicles (1994)

After KTX was introduced from France, the KTX-Sancheon, which was developed with Korean local technology, began operation in 2010. For KTX, one train set is made up of 20 cars (two powered and 18 unpowered passenger cars) with a total of 46 train sets. For KTX-Sancheon, one train set is made up of 10 cars (two powered and eight unpowered passenger cars) with a total of 19 train sets. In 2011, the trains had transported a total of 50,309,000 passengers.

KTX
(Korea Train eXpress)

- Maximum speed: 300 km/h
- Total length: 388 m
- Weight (empty): 692 tons
- Increased cold resistance: Up to -25°C
- Seoul-Busan: 4hrs → 2 hrs 30 min
- 12 traction motors
- Operation began in 2004

The maximum speed of Korea's first high-speed railway is 300 km/h, total length 388 m, and weight (empty) 692 tons. With the increased cold resistance, the train can endure up to -25°C, and the travel time from Seoul to Busan was reduced from 4 hours to 2 hours and 30 minutes saving 1 hour and 30 minutes.

Korean High-Speed Railways 02

KTX-Sancheon
(Mass production of HSR-350x)

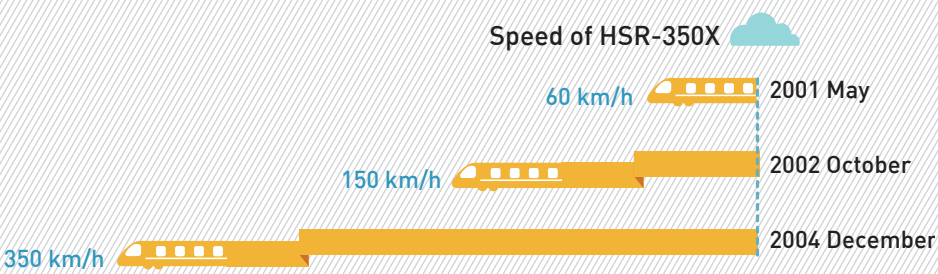
- Maximum speed: 350 km/h
- Total length : 201 m
- Weight (empty): 403 tons
- Increased cold resistance: Up to -35°c
- Developed by domestic technologies (87%)
- Rotating seats
- Operation began in 2010

The maximum speed of this train is 350 km/h, total length 201 m, and weight (empty) 403 tons. With the increased cold resistance, the train can endure up to -35°c, and most parts were developed by domestic technologies (87%). All seats can be rotated.

HSR-350x
(High-Speed Rail-350km/h eXperiment)

- Maximum speed: 350 km/h
- Total length: 145 m
- Project for high-speed railway development (G7 Project)
- Period: Nov. 1996 - Oct. 2002
- 129 agencies participated including the Korea Railroad Research Institute and Hyundai Rotem
- World's 4th high-speed railway running at 300 km/h developed by domestic technologies (after Japan, France, and Germany)

The maximum speed of this pilot train, developed under the G7 Project, is 350 km/h and the total length 145 m. This is the world's 4th train that can run at 300 km/h.



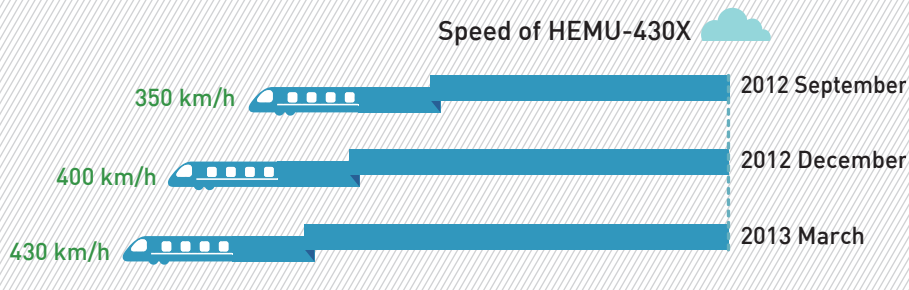
The initial speed was only 60 km/h, relatively slow considering the train is HSR, but the speed went up to 350 km/h at the trial operation in 2004.

HEMU-430X

(High-speed Electric Multiple Unit - 430km/h eXperiment)

- Maximum speed: 430 km/h
- Regular 192 m, Prototype 149 m
- Weight (empty): Regular 402 tons, Prototype 308
- Removal of an engine locomotive: Capacity increased from 363 to 456 (by 16%)
- Trial operation in 2012 (Gyeongbu HSR Phase II)
- Seoul~Busan: 1.5 hrs (to be commercialized in 2015)

The maximum speed of this train is 430 km/h, regular total length 192 m, and weight (empty) 402 tons. The center locomotive was removed which increased capacity by 16%. The trial operation began in 2012 and it is expected to reduce the travel time between Seoul and Busan to 1 hour and 30 minutes.



After starting at 350 km/h in 2012, the speed of the train was recorded at 430 km/h in March 2013.

Introduction of HSR and Technological Development

03

Types	KTX	HSR-350x	KTX-Sancheon	Improvements
Pictures				
Maximum speed	330 km/h	350 km/h	350 km/h	The official speed of KTX-Sancheon is 330 km/h but it recorded 350 km/h during trial operation in March. 2010
Materials	Mild steel	Mild steel + aluminum + extruded materials	Aluminum alloy + composite materials (scud door)	Reduction of air resistance by changing the power car shape and installing a cover
Brake systems	Air + regenerative + dynamic	Air + regenerative + dynamic + Eddy current	Air + regenerative + dynamic	Improved braking power through enhanced air braking & regenerative braking Eddy current braking was not applied to KTX-Sancheon, as the technologyw as not suitable for domestic railway systems
Control	Thyristor phase control	Variable voltage variable frequency)	Variable voltage variable frequency	Improved power conversion efficiency

Development of the subway, has brought the convenience of transportation of citizens in big cities.

CHAPTER 5

Development of the Subway

1st Phase (–1985)

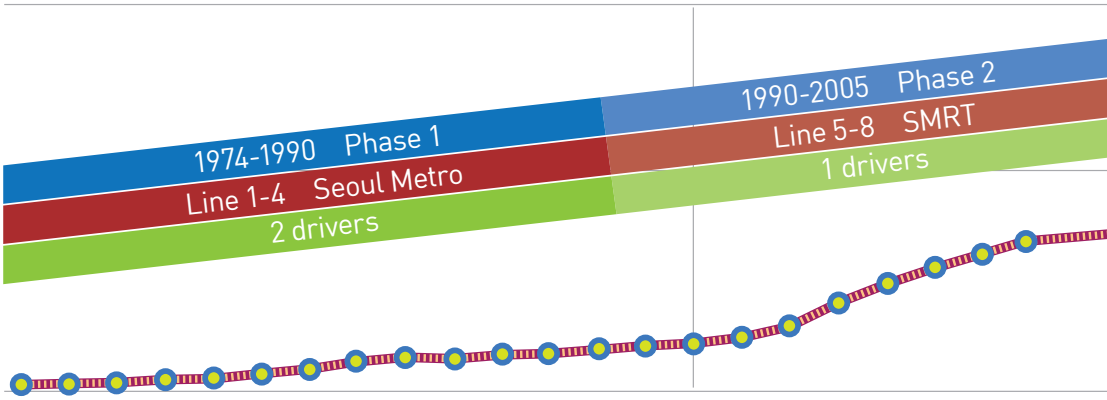
2nd Phase (–2001)

The 1st phase of subway started with 4 lines, 115 stations and the operated length was 134.9 km.

The 2nd phase of subway had 8 lines, 262 stations and the operated length was 286.9 km.

The beginning of Seoul's economic growth

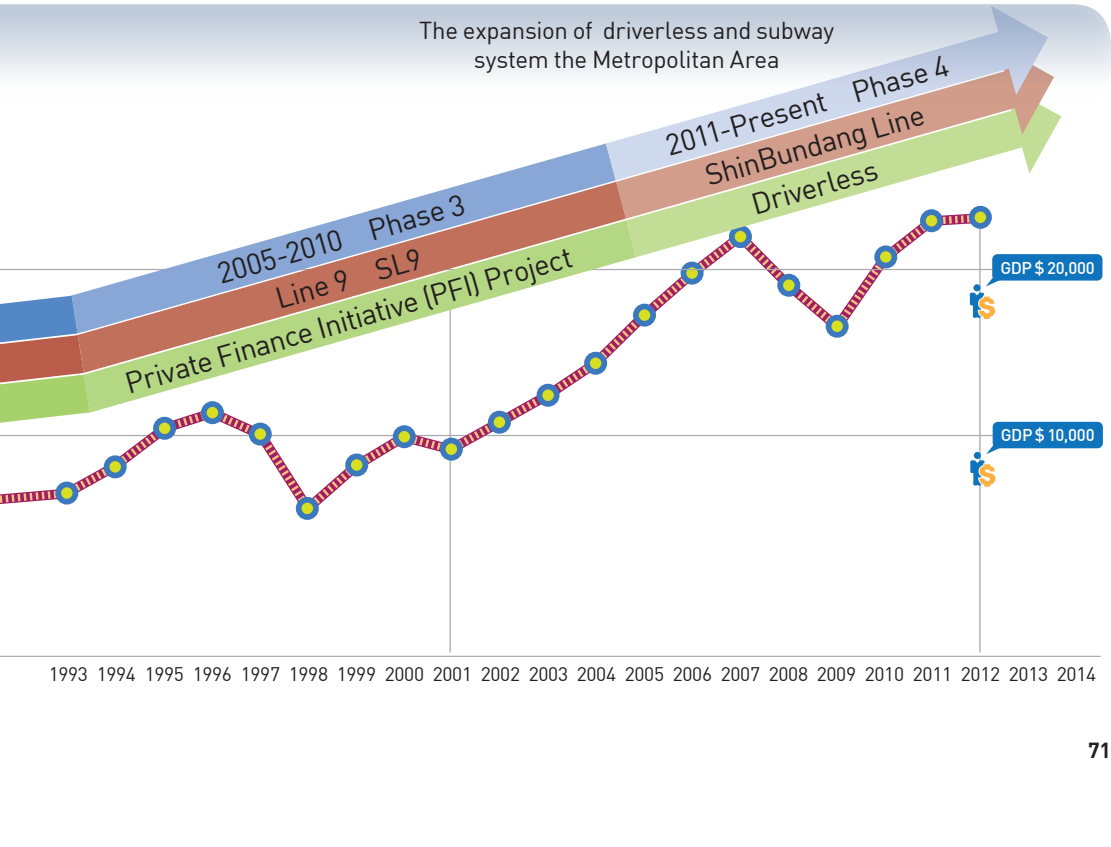
The expansion of economic growth to the Metropolitan Area



The Seoul subway developed in three phases, and GDP rapidly grew after the opening of the subway in 1985.

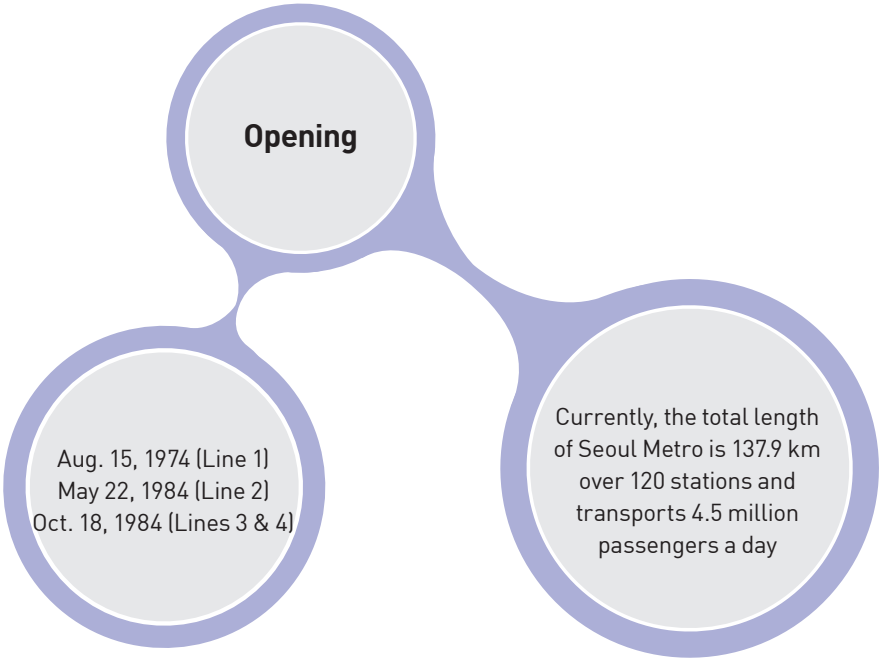
3rd Phase (–2012)

The 3rd phase of subway had 13 lines, 521 stations and the operated length was 825.2 km.



Seoul Metropolitan Subway has played a central role in public transit in Seoul since the 1970s. Starting with the opening of Line 1 on August 15, 1974, trains on lines 1-4 have traveled over 570 million km and delivered over 36.1 billion rides by 2011.

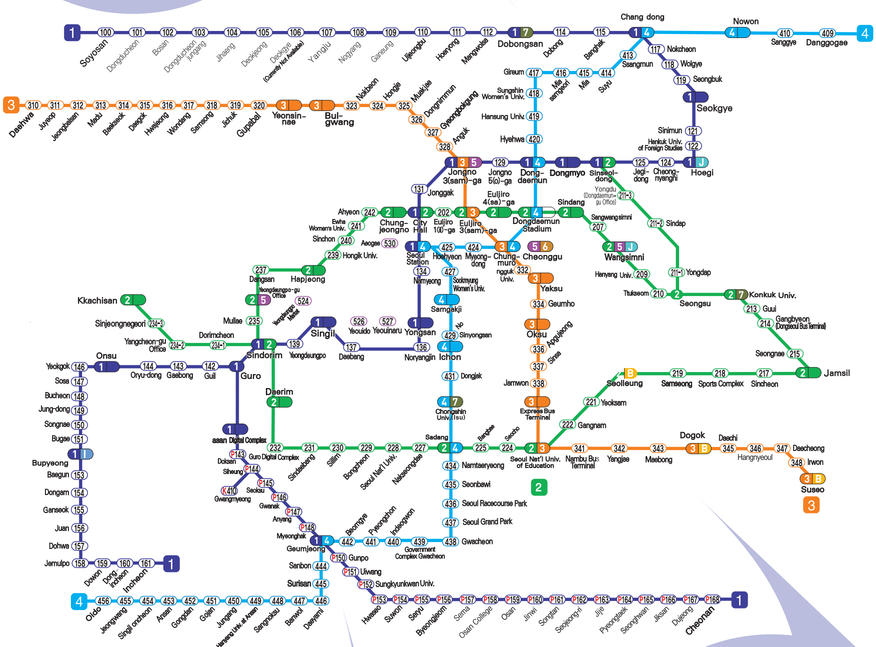
		Total	Line 1	Line 2	Line 3	Line 4
Sections		4 routes	Seoul Station-Cheongnyangni	Seongsu-Seongsu	Jichuk-Ogeum	Namgogae-Namtaeryeong
Length	Operated	137.9 km	7.8	60.2	38.2	31.7
	Constructed	146.8 km	9.9	62.1	41.4	33.4
No. of stations		120	10	50	34	26



Operating rolling stock	Rush hour	162 sets	13	62	4	3	40	40
	Normal hour	87 sets	8	31	3	3	23	19
Total trains		200 sets	16	79	5	4	49	47

Seoul Metro Lines 1-4

01



Lines 5-8 of the Seoul Metropolitan Rapid Transit (SMRT) covers 162.2 km and has an average daily ridership of 2.63 million rides. The accumulated passenger load stood at 12.9 billion and the accumulated operating distance had reached 32,196 million km by February 2014.

5678 SMRT
서울도시철도
Seoul Metropolitan Rapid Transit Corporation
Opened 1995
Now, a total of 162.2 km

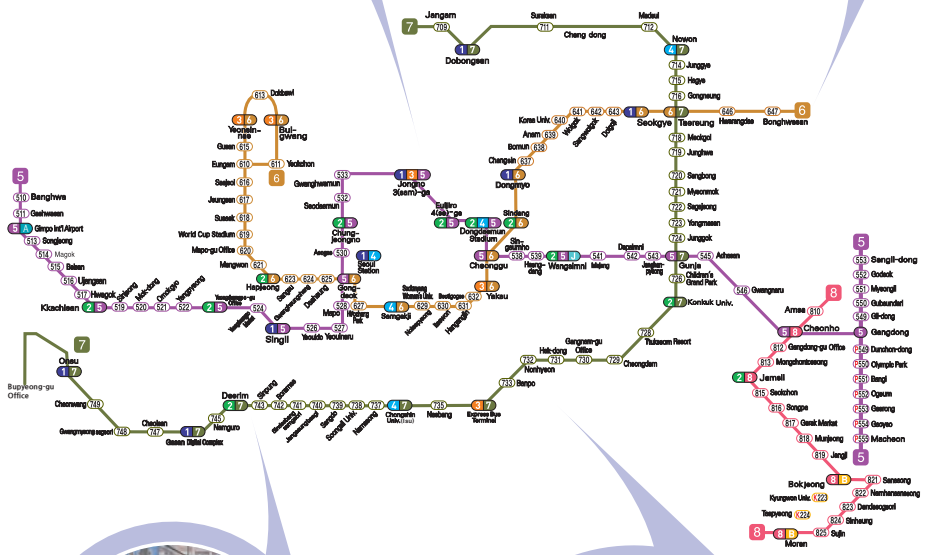
		Total	Line 5	Line 6	Line 7	Line 8
Sections		4 routes	Banghwa-Sangil-dong/ Macheon	Eungam-Bonghwasan	Jangam-Bupyeong-gu Office	Amsa-Moran
Length (km)		162.2	52.3	35.1	57.1	17.7
No. of stations		157	51	38	51	17
Rolling stock	Operating sets	207 (8/6)	76 (8)	41 (8)	70 (8)	20 (6)
	Total sets	1,617	608	328	561	120

Opening

Nov. 15, 1995 (Line 5)
Nov. 23, 1996 (Line 8)
Aug. 7, 2001 (Line 6)
Oct. 11, 2000 (Line 7)

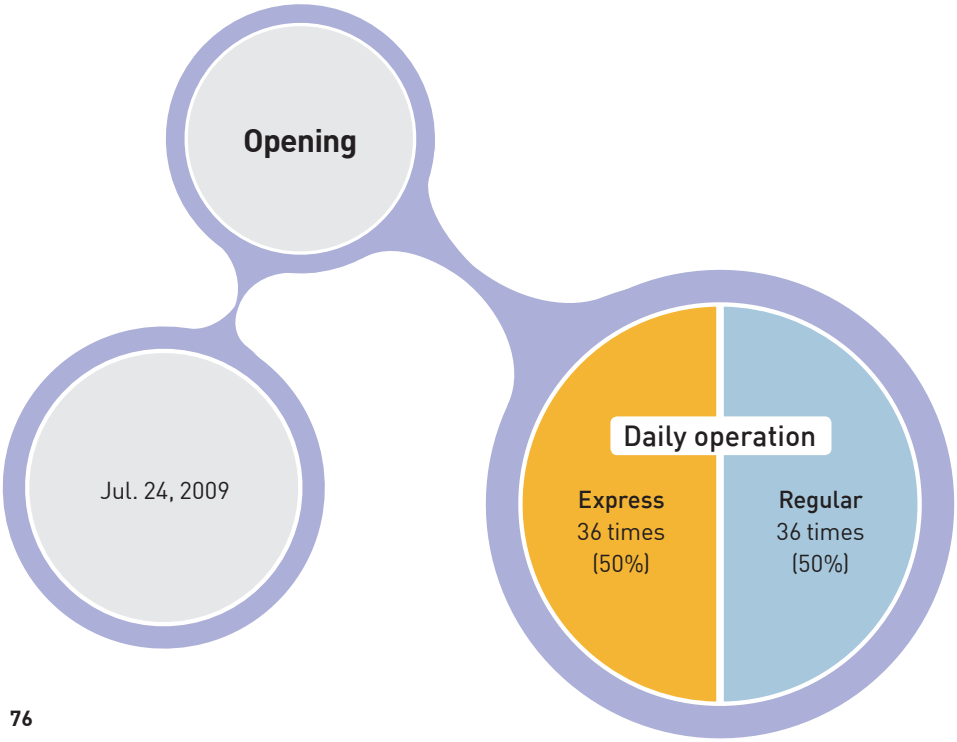
SMRT Lines 5-8

02



Opened in July 2009, Metro Line 9 is the subway that links the Geongseo area and the Gangnam area in Seoul, carrying over 320,000 passengers daily. It is Korea's first urban rapid transit that has both local and express service.

Agency	Seoul Metro Line 9 Corporation
Length	27.0 km
Track gage	1,435 mm
No. of stations	25
Power	DC 1500V catenary
Signal	ATO
Scheduled speed	31.7 km/h (average)
Depot	Gimpo Depot
Opened sections	Gaehwa - Sinnonhyeon
History	Jul. 24, 2009 Gaehwa - Sinnonhyeon May 24, 2014 Magongnaru



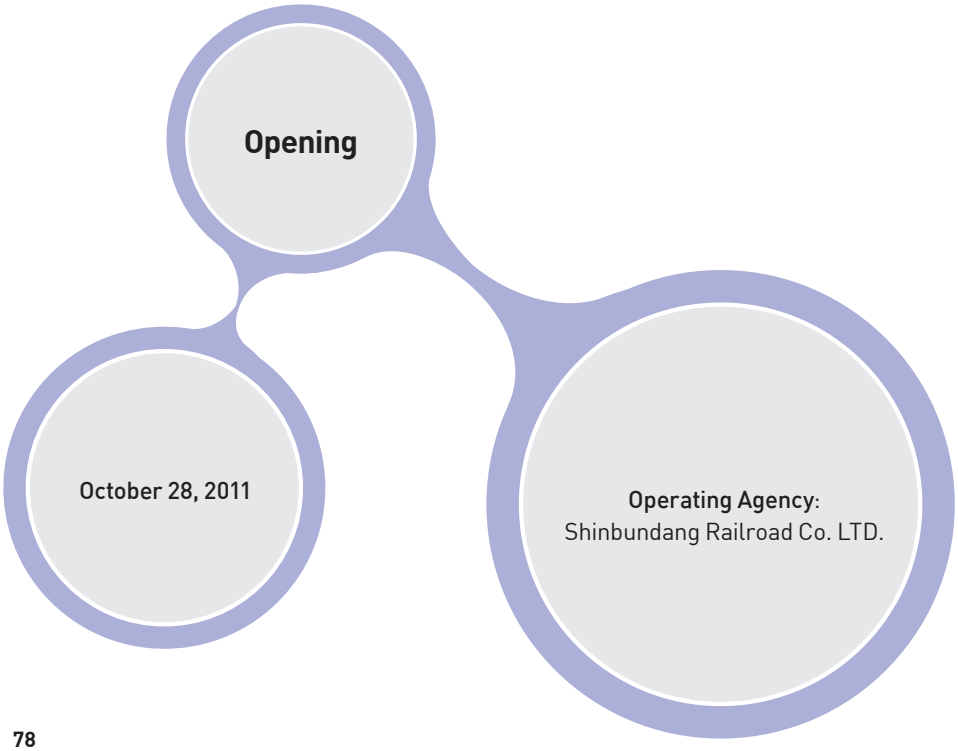
Seoul Metro Line 9

03

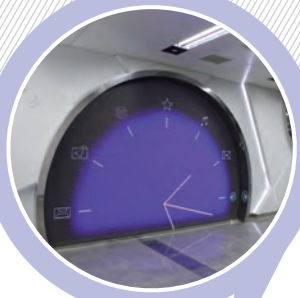
9 Gaehwa Sinbanghwa Magongnaru Yangcheon Hyanggyo Gyang Jeungmi Deungchon Yeomchang Sinmokdong Seonyudo **Gimpo Int'l Airport** Airport Market **Dangsan** National Assembly **Yeouido** Saetgang **Noryangjin** Nodeul Heukseok **Dongjak** Gubanpo Sinbanpo **Express Bus Terminal** Sapyeong Sinnonhyeon 9

Launched three years ago, the Shinbundang Line is Korea's first unmanned subway that reaches a top speed of 90 km/h (120 km/h design speed) and covers the distance between Gangnam Station in Seoul and Jeongja Station in Seongnam in about 16 minutes, contributing to easing the chronic traffic congestion in the southeastern area.

Project name	Shinbundang Line Driverless System Private Investment Project
Project purpose	Construction and operation of double track railway connecting Gangnam in Seoul with Bundang in Gyeonggi Province
Overview	Establish subway network based on private investment in order to reduce traffic congestion caused by growing population in the southern part of the capital area and construction of Pangyo BTO (build-transfer-operate)
Section and scales	Gangnam, Seoul - Jeongja, Bundang 18.5 km, double track Total budget 1.169 trillion won
Project operation period	30 years after completion
Participants	Competent office: Ministry of Land, Transport and Maritime Affairs, Korea Rail Network Authority Developer: Shinbundang Railroad Co. LTD.



Shinbundang Line 04



Railway technology has evolved in a variety of ways.

CHAPTER 6

Future Development

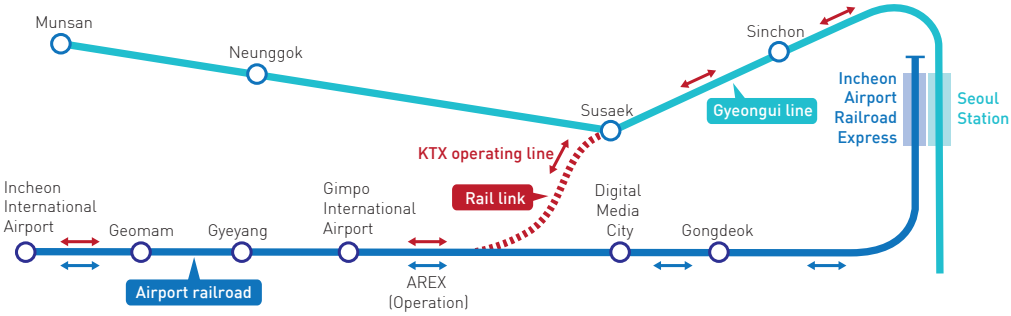
The route opened on June 30, 2014 and is an extension of the Honam Line connecting to Incheon International Airport. It has reduced travel time between Seoul Station and Incheon Airport to 47 minutes. It operates 20 times per day.

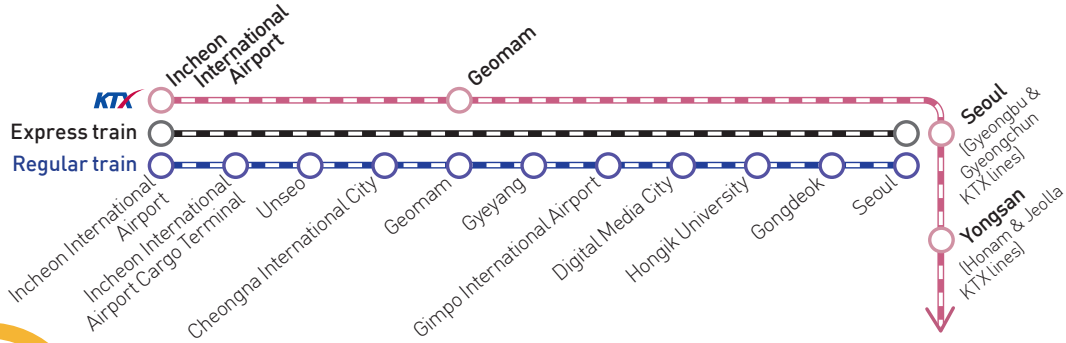
◀ **Direct to Incheon International Airport via KTX with no transfer**
KTX-Sancheon crossing over the Magok Railway Bridge

▼ KTX-Sancheon stationed at Incheon International Airport Station

▼ Incheon International Airport

HSR (KTX) Airport Connection 01





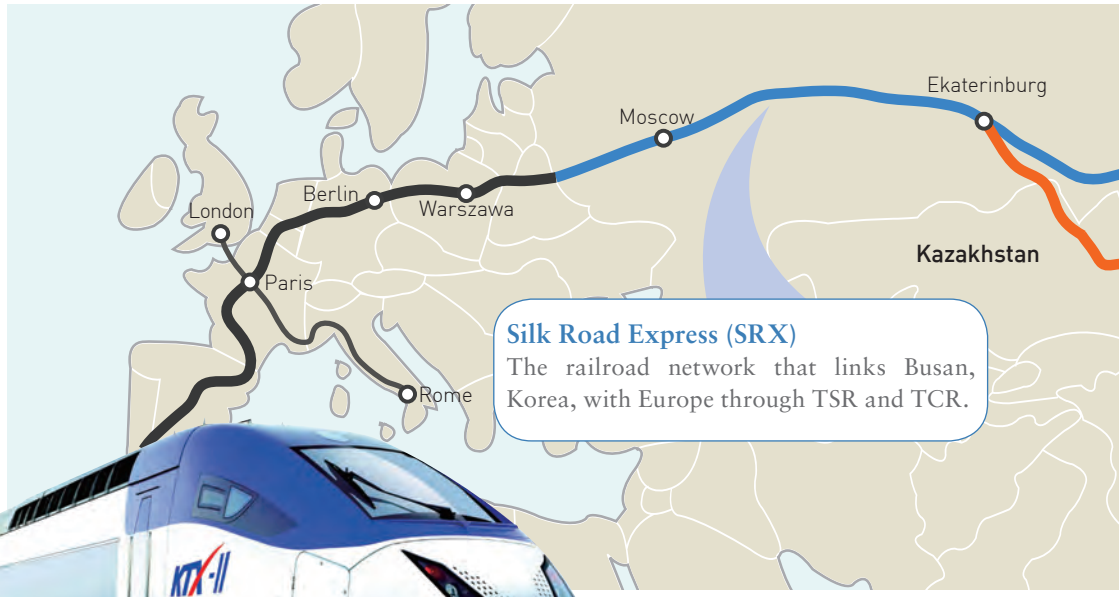
◀ It is now possible to take the KTX from Busan and ride directly to Incheon International Airport without transfers

▶ Launch of the non-stop KTX service to Incheon International Airport on June 30, 2014

Silk Road Express (SRX) will be economic artery in the unified era

Trans-Siberian Railway (TSR)

The world's longest railway connects Vladivostok and Moscow in Russia and can travel to Western Europe as well The total length is 9,289 km.



Silk Road Express (SRX)

The railroad network that links Busan, Korea, with Europe through TSR and TCR.

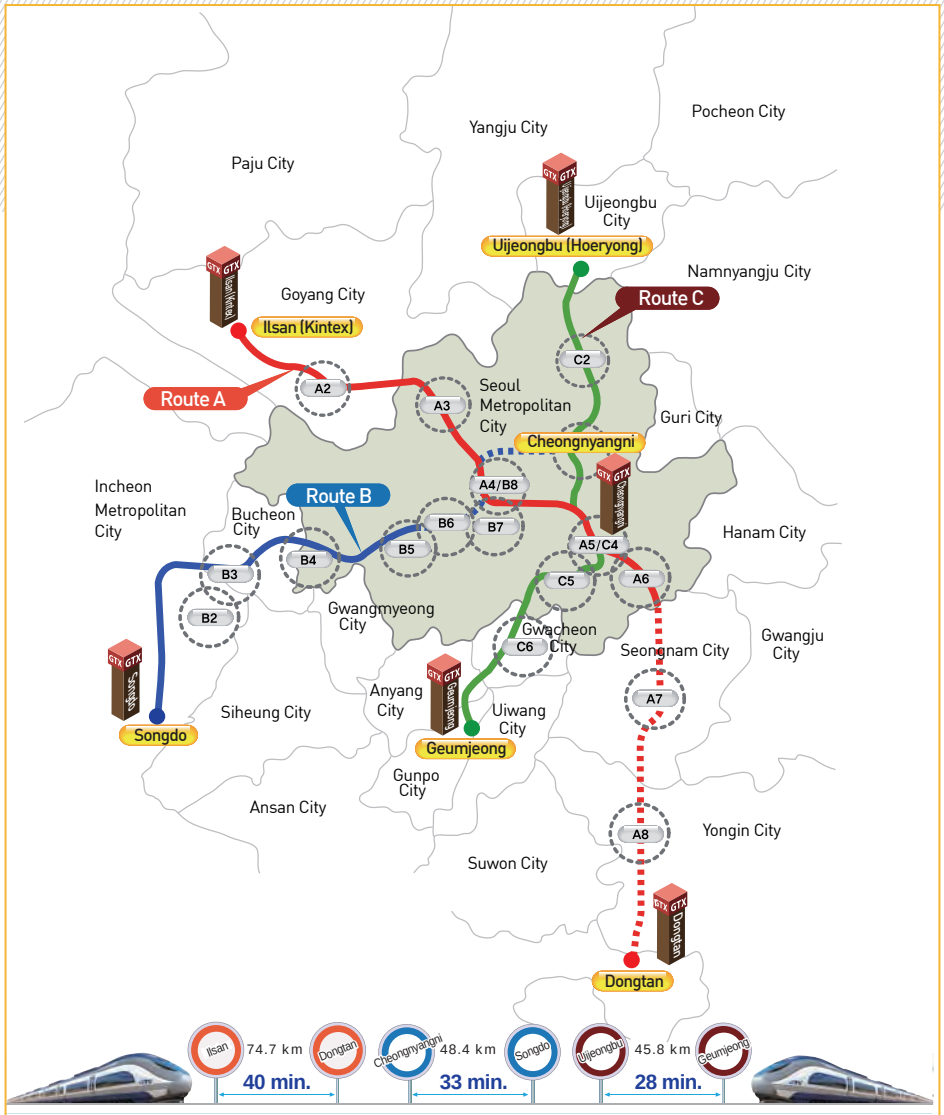
The SRX is the key to linking together Eurasia as one continent

Silk Road Express (SRX) 02

The Korean government is pushing ahead with the proposed Silk Road Express in accordance with the Eurasian Initiative to link together Eurasia by re-reconnecting the Silk Road and promoting peace in Northeast Asia with a gigantic single market as an engine of global growth.

Trans-China Railway (TCR)
This railway traverses China to Europe, passing through the western part of China & Kazakhstan and finally meeting TSR in Ekaterinburg

Proposed GTX routes



구분	Section	Route A	Route B	Route C
Overview	Starting point	Ilsan-Suseo	Cheongnyangni	Uijeongbu
	End point	Dongtan	Songdo	Geumjeong
Length		46.2 km (74.7 km)	48.7 km	45.8 km
Travel time (expected)		40 min.	33 min.	28 min.

Suseo-Dongtan is shared with KTX

Cheongnyangni - Yeouido segment might be shared with Sinansan Line's Phase 2

Great Train eXpress (GTX) 03

GTX will strengthen the competitiveness of the Seoul Capital Area through operation of express trains not only in Gyeonggi Province and Seoul but also within Seoul, serving as a national driving force for low-carbon green growth.

With GTX, one could travel from one side of the capital area to another within an hour, bringing significant changes to the lives of the public, economy, society, and culture of the nation. GTX is being developed based on safe, low-cost, and high-efficiency advanced environmentally friendly technologies, offering a new means of transportation in the country.

Quick and convenient mobility
The GTX in Seoul and Gyeonggi Province

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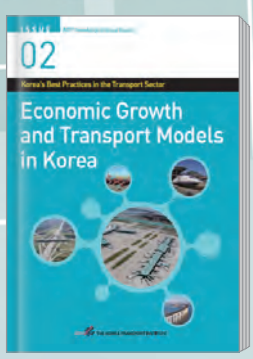
http://www.carlife.net

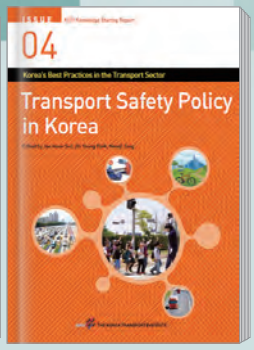
※ *We deeply appreciate the related organization provided pictures*

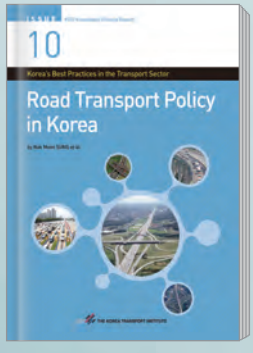
KOTI Knowledge Sharing Reports

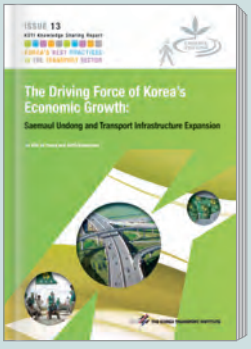
Recently, developing countries have shown interest in Korea's transport policy establishment and infrastructure construction experience on the premise that those changes have enabled the nation to promote economic growth. Against this backdrop, Korea Transport Institute (KOTI) publishes a series of Knowledge Sharing Reports series regarding Korea's transport system and policy accomplishments in the fields of roadway, railway, aviation, logistics, and public transport.

The reports are available to download for free in PDF format on our website at http://english.koti.re.kr.









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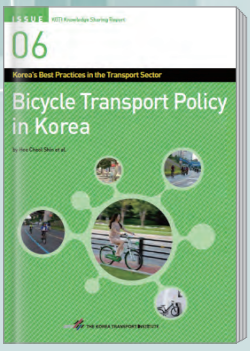

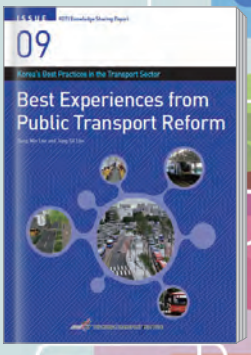

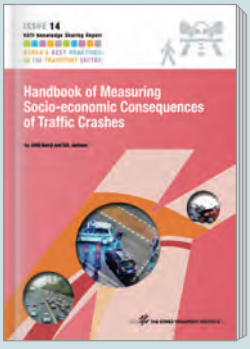

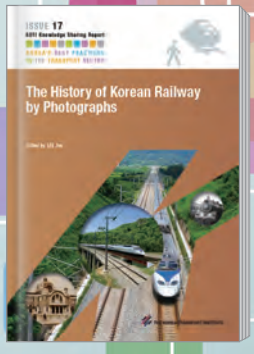

The History of Korean Railway by Photographs

The Korea Transport Institute (KOTI) is a comprehensive research institute specializing in national transport policies. As such, it has carried out numerous studies on transport policies and technologies for the Korean government.

Based on this experience and related expertise, KOTI has launched a research and publication series entitled "Knowledge Sharing Report: Korea's Best Practices in the Transport Sector." The project is designed to share with developing countries lessons learned and implications experienced by Korea in implementing its transport policies. The 17th output of this project deals with the theme of "Korean Railway by Photographs."

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