Ministry of Transport Vietnam (MOT)

Data Collection Survey for Sustainable Transport Development Strategy in Vietnam (VITRANSS 3)

Final Report
Summary

November 2021

Japan International Cooperation Agency

ALMEC Corporation
Nippon Koei Co., Ltd.
Oriental Consultants Global Co., Ltd.
Overseas Coastal Area Development Institute of Japan

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ABBREVIATIONS

AAGR	Average Annual Growth Rate
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
BCPs	Business Contingency Plans
CMIT	Cai Mep International Terminal
COVID-19	Coronavirus Disease 2019
D/D	Detail Design
DPI	Department of Planning and Investment
F/S	Feasibility Study
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HCMC	Ho Chi Minh City
HICT	Hai Phong International Container Terminal
HSR	High Speed Railway
ICD	Inland Container Depot
IRR	Internal Rate of Return
IWT	Inland waterway transport
JICA	Japan International Cooperation Agency
JRTT	Japan Railway Construction, Transport and Technology Agency
JST	JICA Study Team
KOICA	Korea International Cooperation Agency
LCCs	Low Cost Carriers
MOT	Ministry of Transport
MPI	Ministry of Planning and Investment
NCP	National Comprehensive Development Plan
NSP	National Sector Plan
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation and Development
PDCA	Plan Do Check Act
PPP	Public Private Partnership
RIS	River Information Service
RORO	Roll-on Roll-off
ROW	Right of Way
SP	Stated Preference
TOD	Transit-Oriented Development
USD	United States Dollar
VC	Volume/Capacity
VEC	Vietnam Expressway Corporation
VINAMARINE	Vietnam Marine Administration
VITRANSS	National Transport Strategy Study for the Socialist Republic of Vietnam, 1999-2000
VITRANSS2	Comprehensive Study on the Sustainable Development of Transport System in Vietnam, 2007-2010
VIWA	Vietnam Waterway Administration
VND	Vietnam Dong
VNR	Vietnam Railway Corporation
VR-SB	Coastal Vessels

Part I STUDY SUMMARY

The Study

I.1 This is the third undertaking by JICA to contribute to the national transport plan formation in Vietnam, followed by the National Transport Strategy Study for the Socialist Republic of Vietnam in 1999–2000 (VITRANSS) and the Comprehensive Study on the Sustainable Development of Transport System in Vietnam 2007–2010 (VITRANSS2).

I.2 The third study, however, has certain differences in the study background and implementation from the previous ones.

- The Government of Vietnam enacted the Law on Planning 21/2017/QH14. Under the law, the Ministry of Transport (MOT) is responsible for an integrated transport plan as part of the National Comprehensive Plan (NCP) to be approved in 2022. In this connection, the MOT has formulated five national sector plans (NSPs) for road, railway, IWT, maritime transport and aviation respectively. There was no such legal background during the previous studies.
- The MOT allocated a budget for traffic surveys and local consultant teams. In preparing the five NSPs, the main activities were done under the MOT's budget. JICA mobilized a budget for supplementary traffic surveys, such as the SP survey and cargo owner/forwarder interview survey. JST technically supported the NSP preparation works. Such a role demarcation is quite different from the previous studies.
- In the process of integrated transport planning works based on the NSPs, JST has taken a more active role. Under the COVID-19 pandemic, however, all study-related discussions were held online in 2020. In 2021, upon the request of MOT, ten JST members worked in Hanoi (Vietnam) but they had limited working days due to a quarantine requirement and had controlled field works.

I.3 The study objective is to assist the elaboration of a new transport development strategy that will be incorporated into the new transport sector development plan as one part of the NCP and to integrate with the five NSP documents. The ultimate target year is 2050. The planning period up to 2050 is divided into short-term (2021–2025), medium-term (2026–2030), and long-term (2031–2050).

Review of Transport Development in the 2010s

I.4 Vietnam has been growing continuously in its population and economy since the 2010s. The population in 2019 was 96.4 million, or an annual average growth rate (AAGR) of 1.05%, compared with 86.9 million in 2010. The economy of the country has developed rapidly, showing some resilience at the same period and ranging AAGRs from 5.2% to 7.1%. More specifically, it has been boosted because of its improved role in global trade. The ratio of external trade per GDP (188% in 2018) was the highest among ASEAN as well as APEC member countries. A considerable growth rates' gap between population and economy allowed many Vietnamese people to enjoy a better life. However, some locals could not join it. For example, five provinces in the Mekong Delta Region reduced their population with remarkable outmigration in the 2010s.

I.5 Various traffic surveys were conducted under the budget of MOT in the first half of 2020. The results, however, were seriously affected by the COVID-19. For instance, merely 10% or less of the passengers were counted in the surveys conducted in the 1st quarter of 2020 in comparison with the same quarter of 2019. The available statistical data between 2010 and 2019 reveal the traffic trend by mode except for road traffic.

- Railway: Its long-term declining trend continued for both passenger and freight services in the 2010s. It has marginal modal shares among three land modes, 1.3% for passenger and 2.4% for freight in 2019.
- IWT: Despite the limited-service areas and waterways mostly located in the delta areas, freight traffic continuously increased by 84% in the 2010s.
- Seaport: The cargo throughput at the seaports nearby tripled in the 2010s. Domestic trade by coastal shipping also shows rapid growth, particularly in container haulage.
- Airport: Air passenger volume increased by four times in the 2010s where LCC service is the most attributable factor. Air cargo substantially increased by over two times during the same period.

I.6 Vietnam's transport sector has received VND980 trillion from 2011 to 2020, mainly for investment in infrastructure and equipment. It is equivalent to 2.2% of the aggregated yearly GDP during the same period. The largest subsector recipient was road (VND573 trillion), followed by maritime transport (VND202 trillion), air transport (VND90 trillion), and IWT (VND73 trillion). Railway merely received VND39 trillion or only 7% of the road subsector. Funding from the state account, consisting of the state budget, ODA, and government bond, accounted for 48%. The non-state account from infrastructure/ terminal operators' investment and new ones from the private sector, local governments, etc. had a higher share of 52%. Those investments expect returns from various forms of user charges such as toll fees, terminal fees, and fares. Thus, it can be said that the user-pay principle has worked well for transport sector development except for railway (Table I.1).

I.7 During the same period, the government disbursed a maintenance fund of VND115 trillion. The average disbursement ratio per request from the five subsectors is 50%. Since road and railway received less than half of their requested budgets, considerable maintenance backlogs have likely happened. The other three subsectors requested comparatively modest budgets, and the government fulfilled all. Their infrastructure/terminal operators may cover the remaining maintenance costs by their resources from various user charges (Table I.2).

Table I.1

Transport Development Funding, 2011–2020

Subsector	State Account	Non-State Account	Total Funding
Road	386,551	186,530	573,081
Railway	37,950	1,468	39,418
IWT	13,157	60,000	73,157
Seaport	28,387	173,360	201,747
Airport	5,893	84,480	90,373
Others	2,408	0	2,408
Total	474,345	505,838	980,183

Note: VND Billion
Source: DPI / MOT

Table I.2

Transport Maintenance Funding, 2011–2020

Subsector	Disburse-ment	Request	Disburse-ment Ratio
Road	72,926	158,004	46%
Railway	22,572	53,377	42%
IWT	6,311	6,311	100%
Maritime Transport	7,620	7,620	100%
Air Transport	5,151	5,151	100%
Total	114,580	230,463	50%

Note: VND Billion
Source: DPI / MOT

I.8 **Expressways.** Since the foundation of the Vietnam Expressway Corporation (VEC) in 2004, Vietnam started expressway network development. The first expressway was opened in 2010 and has been extended to a network of 1,411 km in 2020. Currently, those expressways demonstrate their high-speed performance in 29 provinces and special cities of the north, the central, and the south. The remaining provinces strongly request to take part in the expanding expressway network.

I.9 The MOT adopted the PPP scheme for many expressway sections. As confirmed by JST, there are 13 PPP arrangements, mostly BOT, of which eight are operational (as of June 2021). The PPP Law took effect in January 2021. Then the MOT started to renew the contracts with the concessionaires from May 2021.

I.10 **National Highway.** It has a network of 25,151 km in 2020 as it was largely extended by 7,923 km between 2008 and 2020. Most of the national highways are narrow, only low graded III to IV two-lane (95%), and some of them are badly maintained (22%) due to insufficient maintenance funds.

I.11 **Railway market.** The conventional railway network of 3,143 km has barely maintained train operation at the same level for a long time, and thus it has lost its share in the growing domestic market. The old railway system, initially constructed in the French Indochina era from 1897 to 1902, requires considerable rehabilitation costs every year. In this situation, VNR seems at a loss what to do. Some recent business collaborations, however, show a real possibility to survive in the logistics market. These include (i) an 86-hour block train service by a forwarder on the Hanoi–HCMC line, (ii) a new car wagon by another transporter that can carry twice as many cars as before, and (iii) LG Electronics using the Vietnam–China–Europe rail service.

I.12 **Foreign assistance.** In the last decade, it is reported that many foreign donors conducted railway studies in Vietnam. These include, among others, JICA's North–South HSR studies (2011–2013 and 2018–2019), KOICA's Bien Hoa–Vung Tau railway (2016–2017) and Vientiane–Vung Ang railway (2015–2017), the World Bank's railway sector study (2017–2019), China's Lao Cai–Hanoi–Hai Phone railway (2018–2020). However, no concrete action was made even after those studies. The railway subsector may not have enough absorptive capacity in this regard.

I.13 **Constraints on IWT.** IWT has been favorably surviving with a comparatively small state budget and successfully attracting private investment in the 2010s. Among several constraints, the low clearance of old bridges is the most critical. In the Red River Delta, only small barges are allowed to pass under the problematic bridges. For the same reason, container service between Hanoi and Hai Phong is difficult. In the Mekong Delta, the low clearance bridges severely hamper the upgrade of local IWT service to be like Europe.

I.14 **Opportunities for IWT.** IWT in Vietnam is a historical transport mode, but there are still many opportunities to modernize the system. When the government policy changed to support IWT ship size enlargement in 2014, the number of IWT registered ships over 1,500DWT sharply increased from 737 ships to 1,334 ships in 2018. IWT operators with larger ships must request better port and waterway services to ensure investment returns. Many IWT-ICDs are planned in the Red River Delta to start exclusive container haulage service and in the Southeast and the Mekong Delta to support new industrial parks to be developed outside HCMC. The efforts of VIWA to provide an information service are appreciated to introduce a nationwide river information system (RIS) in the future.

I.15 **Gateway ports.** Vietnam has remarkably developed two deep seaports. In 2011, the Vung Tau–Thi Vai Fairway (49 km long, 250–280 m wide, and 12–14 m deep) opened in order to support port clusters along the route. The Cai Mep International Terminal (CMIT) started operation in 2015, while the Hai Phong International Container Terminal (HICT) at Lach Huyen in 2018. Since the country adopts an open investment policy to the two gateway ports, Vietnam is now a destination of leading professional port operators and shipping lines. The Thi Vai River does not have headwaters; thus, no river flow, requiring no maintenance dredging. On the contrary, the Lach Huyen Channel constantly carries sediment from the upstream, requiring periodical maintenance dredging.

I.16 **Port system.** The government determined the 34-seaport system in 2014, consisting of 13 national and regional general ports and 21 local general ports. The Mekong Delta Region, or Port Group-5 under VINAMARINE's definition, has only one national and regional seaport that is the Can Tho Port, located inland and accommodates ships of several thousand dwt only. The 34 seaports have common issues: (i) improvement of intermodal transport capacity, (ii) strengthening of the logistics function, and (iii) replacement of old and low-productivity port facilities.

I.17 **Airport terminals.** There are 22 airports in Vietnam, consisting of 12 international airports and 10 domestic airports. In the 2010s, airport capacity has expanded, such as the Noi Bai Airport Second Terminal (2014) and the Da Nang Airport Second Terminal (2017), and other airports have had many terminal expansions. Due to a sharp increase in aviation passengers, however, many airports are already congested. In particular, the three gateway airports' (Noi Bai, Da Nang, Tan Son Nhat) actual throughput in 2019 were all over their terminal capacities. The COVID-19 pandemic currently pushes down passenger demand to the bottom, but the demand will normally re-appear after the pandemic. Ongoing and committed airport investment projects must be implemented on schedule.

I.18 **Air freight.** As international air freight is growing, cargo terminal capacities at the gateway airports have been increased. In 2017, Samsung SDS (with its local partner ALS) established a dedicated cargo terminal in the Noi Bai Airport. The air freight market is open to international air freight carriers in Vietnam while there is still no Vietnamese carrier. Regarding domestic air routes and cargo demand, three routes among the three gateway airports are dominant, over 80% of the total domestic air cargo. But those cargo carried by the belly freight of passenger planes. When air freighter service commences on the three domestic routes, voluminous shippers will gain benefits.

Growth in Traffic

I.19 To offset the traffic survey results affected by the COVID-19 pandemic in the first half of 2020, JST conducted two supplementary interview surveys in the second half of 2020: (i) stated preference (SP) survey on selected transport corridors and (ii) freight owner and forwarder survey. The SP survey interviewed 1,436 inter-city travelers at transport terminal facilities in Hanoi, Vinh, Danang, and HCMC. The results were used to understand current inter-city trip conditions and the respondents' preferred modes in the future. The cargo owner and forwarder survey collected 538 questionnaires from 63 provinces and special cities. Based on the results, JST estimated transport cost and transport time by mode.

I.20 In the last two decades, we observed explosive traffic demand increase in Vietnam.

Compared with VITRANSS traffic database in 1999, interprovincial passenger demand increased over 3 times and interprovincial freight demand over 10 times to the present (in 2019).

I.21 Vietnam's socio-economic profile will continue to expand during the planning period 2021–2050. The total population will be 25% larger, and 56% of them or 20% more will reside in urban areas from the present (36% in 2019). Economic growth will continue up to 2030. Although it is slightly slow down between 2031 and 2050, the GDP will be increased by 5.9 times during the planning period.

I.22 Such socio-economic development in the future is translated into traffic demand forecast by way of the four-step model for passengers and freight. As a result, interprovincial passenger and freight traffic in 2050 will be 2.4 times and 6.4 times bigger than at present, respectively. Although the growth pace is slower, the yearly increase in traffic volume during the planning period 2021–2050 will be larger than in the previous 20-year experience, putting more burden on transport infrastructure.

Table I.3 Demand Forecast in Passenger and Freight Traffic

		2019	2030	2050	Yearly Growth	
					2019–2030	2030–2050
Passenger (per day)	Passenger Trip (000)	1,981	2,978	4,668	3.8%	2.3%
	Passenger-km (million)	383	649	991	4.9%	2.1%
	Average Trip Distance (km)	193	218	212	–	–
Freight (per day)	Ton (000)	4,760	9,282	30,564	6.3%	6.1%
	Ton-km (million)	2,193	4,384	13,645	6.5%	5.8%
	Average Trip Distance (km)	461	472	446	–	–

Note: Traffic data indicate inter-provincial movement only.
Source: JST

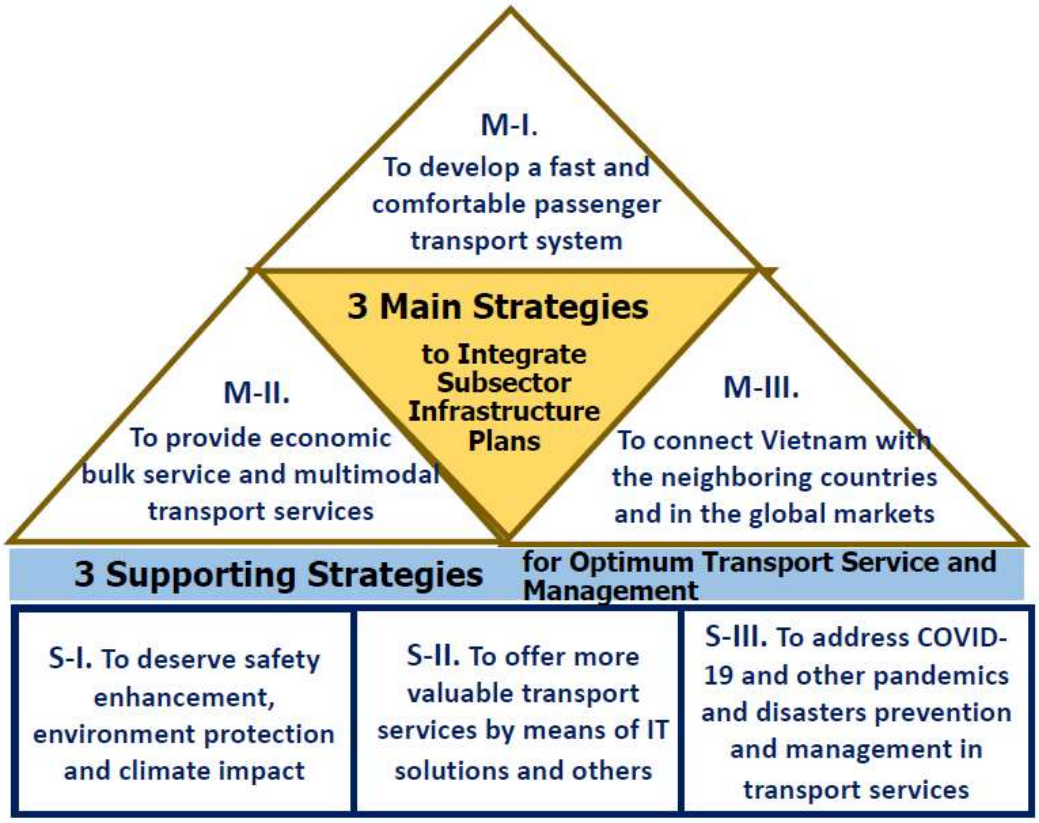
Transport Development Strategy

I.23 Vietnam's transport system must evolve in line with its socio-economic development. Transport does not only serve for increased traffic demand but also guides urban and industrial development and eventually contributes to the enhancement of economic competitiveness and living quality where all people and entities belong to a transport society.

I.24 The MPI envisions becoming a member of the high middle-income group in 2030 when the country's GDP per capita on a purchasing power parity basis jumps up to USD7,500. It will likely happen around 2030. Another long-term goal is to become a high-income developed country in 2045, according to the Resolution of the 13th National Party Congress in February 2021.

I.25 Not a few countries have faced difficulties to smooth economic transformation from high middle-income countries to high-income developed countries such as South Africa, Brazil and Malaysia. According to the World Bank's definition, a country in the middle-income trap has lost its competitive edge in the export of manufactured goods due to rising wages. No one knows that Vietnam might get stuck in such a trap beyond 2030.

I.26 The Study has elaborated 3 main strategies in order to integrate all subsectors' infrastructure development plans at the different levels such as passenger service, freight service and external linkage. For optimum transport service and management in a sustainable manner, the Study adds 3 supporting strategies which can therefore work only with 3 main strategies. (Refer to Figure I.1)



Source: Prepared by JST

Figure I.1 Transport Development Strategies

I.27 In order to realize the proposed strategies, a series of development projects are identified in the Study. Since development projects have different timelines and priorities among transport subsectors, 'back-casting method' is applied to set priority projects to be implemented during the period 2021–2030. It is noted that back-casting is a planning method that starts with a desirable future and then works backwards to identify projects that will connect that specified future to the present. In the Study, Vietnam's desirable future is set at 2050 when a well-developed transport system is furnished as a high-income developed country (refer to Table I.4).

Table I.4 Transport Development Strategies, Desirable Future in 2050 and Priority Projects during the period 2021–2030

Transport Development Strategy	Desirable Future in 2050	Priority Projects in 2021–2030
(M-I) To develop a fast and comfortable passenger transport system by the combination of air, hsr and expressway services	♦ Vietnamese nationals will enable a one-day return trip from their places to anywhere over the country	(Aviation) More airport capacity to meet domestic demand (Expressway) Provision of a wider expressway network to serve most of provincial capitals (HSR) Starting partial operation on the North–South route (until 2032)
(M-II) To provide economic bulk transport and efficient multimodal transport services	♦ Vietnam's optimum freight service system will be realized among road, rail, IWT, coastal shipping where an outstanding road truck share, e.g., over 50%, must be avoided.	(Railway) Provision of direct freight rail service to Lach Huyen and Cai Mep terminals (IWT) Investment in bigger and modern IWT fleet including VR-SB together with IWT-ICDs and replacement of bottleneck bridges (Maritime Transport) Seaport expansion to meet domestic demand. Introduction of RORO shipping service

Transport Development Strategy	Desirable Future in 2050	Priority Projects in 2021–2030
(M-III) To connect Vietnam with the neighboring countries and in the global markets	♦ Vietnam will enjoy robust trading activities and wider people flows for foreign and Vietnamese tourists.	(Maritime Transport) Expansion of Lach Huyen and Cai Mep terminals. Development of Lien Chieu Port. Preparation of a new regional hub port at Tran De. (Aviation) Expansion of Noi Bai Airport. Construction of Long Thanh Airport. More airport facilities at other 12 international airport. (Railway) Preparation of new rail connections with Lao PDR and Cambodia in addition to the existing Chinese links. (Road) Development of many expressways to the borders: 4 with Chinese borders, 2 with Lao borders and 5 with Cambodia borders.
(S-I) To deserve safety enhancement, environment protection and climate change impact	♦ Vietnam will develop a socially and environmentally sustainable transport system.	(Railway) Rehabilitation of existing outdated assets including brides, viaducts, tunnels, level crossings, curves, etc. (IWT) Safety management and training (Maritime Transport) Search and rescue, Navigational aids (All) Encourage less CO_2 emissions by modal shift and technology innovation
(S-II) To offer more valuable transport services by means of it solutions and others	♦ Vietnam will provide high-quality transport services to boost economic competitive edge.	(IWT) River information system (RIS) (Maritime Transport) AI terminal and automated port operation (Aviation) Air cargo village, Cold-chain service
(S-III) To address COVID-19 and other pandemics and disasters prevention and management in transport services	♦ Vietnam's transport system will be enough resilient against disasters and pandemics.	(Aviation) Fast travel initiative with 'One ID' (Aviation, Railway, Road) Terminal operation with high sanitary level (All) Increasing tracking and tracing capability in both passenger and cargo services (All) Preparation of BCPs

Source: Prepared by JST

Project Identification

I.28 In the course of the Study, the MOT appointed local consultants worked out 5 NSP documents. JST made some collaborative works especially to demand forecast, development strategy including new transport services in Vietnam and evaluation on a future network.

I.29 As a results, two project packages to meet traffic demand of 2030 and 2050 have been prepared. The project package during the implementation period 2021-2030 includes the projects listed in 5 NSP documents and JST suggested projects deemed important to realize the proposed transport development strategy. On the other hand, the project package during the implementation period 2031-2050 is used to check the relation between demand and capacity on a future network.

I.30 The project package during the period 2021-2030 is summarized in Table I.5. Total investment amounts to VND 2,376 trillion or equivalent to 2.6% of the aggregated GDP during the same period. The table indicates that all subsectors will mobilize more investment fund in comparison with the previous investment in the last decade. Railway investment budget, VND 698 trillion, is 18 times larger than the actual funding in the last decade, i.e., VND 39 trillion. The railway subsector needs capacity development for project

implementation.

Table I.5 Proposed Project Package (2021-2030)

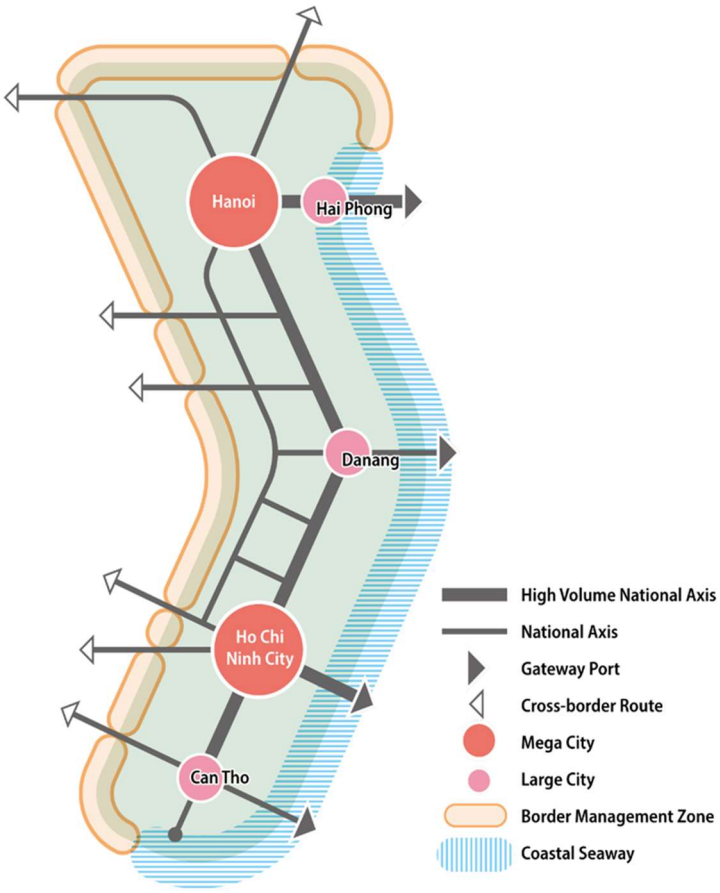
No	Sub Sector	Major Investment	VND Trillion
1	Road	♦ Additional expressways (4,139 km) ♦ New or improving national highways (1,605 km)	933.7
2	Rail	♦ Upgrading existing railway lines (Hanoi – HCMC, Hanoi – Haiphong, Hanoi – Lao Cai, Hanoi – Dong Dang, Hanoi – Thai Nguyen, 2,318 km in total) ♦ Completion of Yen Vien – Pha Lai – Ha Long – Cai Lan Line ♦ Rail connection to Lach Huyen, Vung Tau (60%) ♦ Hanoi Eastern Ring-railway (25%) ♦ New railway lines to Laos, Cambodia and Mekong (10% for project preparation only) ♦ HSR priority sections (up to 2032)	697.5
3	IWT	♦ Improvement of Waterways ♦ Improvement of Riverports ♦ Removal and replacement of Low-clearance bridges ♦ Development of IWT-ICDs	120.7
4	Maritime	♦ Gateway ports: Expansion of Lach Huyen and Cai Mep terminals, Construction of Lien Chieu, Preparation of Tran De ♦ Improvement of Other ports, Port access channels, ATN ♦ Conversion to RORO terminals	220.5
5	Aviation	♦ New construction (Long Thanh, Phan Thiet, Sa Pa, Lai Chau, Na San, Quang Tri) ♦ Capacity expansion of existing airports	403.1
Total Investment			**2,375.5**
Per GDP (2021-2030)*			**2.6%**

Note*: Aggregated yearly GDP between 2021 and 2030 at year 2019 constant price or VND 89,190 trillion
Source: Prepared by JST

Vietnam's Future Transport Network

I.31 Vietnam has an inherent national structure, which has been defined geographically and historically. Transport development has followed and reinforced the structure pattern. In the past, present, and future, one critical transport issue for Vietnam is how to connect two megacities (Hanoi and HCM cities) via Danang. It is suggested to develop this north–south linkage on a ladder shape by 2050. The eastern pole of the ladder, the most important corridor after the country's reunification, will be strengthened by expressway, HSR, and innovative coastal shipping. The western pole of the ladder, the so-called "HCM route," will be developed primarily by expressway. Air transport can serve both the poles from point to point. Several ladders provide east–west connections, including international with the neighboring countries. Such a ladder-shaped network is resilient against disasters or not to separate the national society and economy into the north and the south.

I.32 Major transport corridors in the structure plan are divided into high-volume national axes and ordinary national axes. High-volume national axes need to achieve a balanced modal split on their corridors so as to deal with large and diversified demand segments. The structure plan holds four gateway seaports. The way to realize the national transport structure plan is indicated in Table I.6.



Source: Prepared by JST

Figure I.2 National Transport Structure Plan 2050

Table I.6 Development Path to National Transport Structure Plan 2050

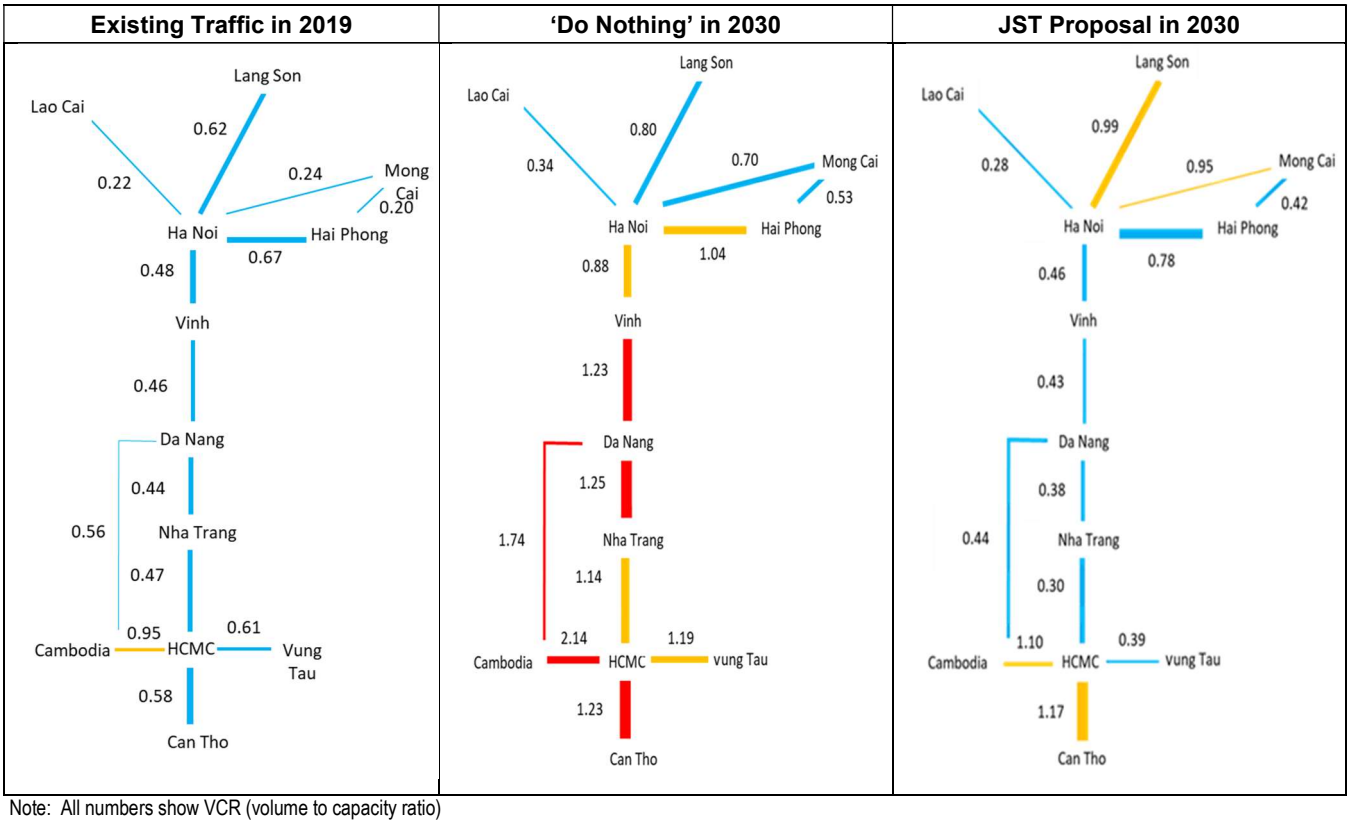
Structure Element	2019	2030	2050
Expressway	1,294 km	5,433 km	8,500 km
HSR	Not available	651 km (Hanoi–Vinh, HCMC–Nha Trang)	1,700 km (Hanoi–Can Tho)
Gateway Port	Lach Huyen, Cai Mep	Lach Huyen, Lien Chieu, Cai Mep	Lach Huyen, Lien Chieu, Cai Mep, Tran De
Gateway Airport	Noi Bai, Danang, Tan Son Nhat	Noi Bai, Danang, Tan Son Nhat, Long Thanh	Noi Bai, Danang, Tan Son Nhat, Long Thanh

Source: Prepared by JST

Evaluation on Future Transport Network

I.33 The Study has evaluated the proposed future transport network from various viewpoints, including (i) anticipated road traffic congestions, (ii) infrastructure investment per GDP, (iii) benefit and cost analysis, and (iv) impact on CO_2 emissions.

I.34 **Anticipated road traffic congestions**. Several demand forecast simulation results showed that the proposed network would largely alleviate road traffic congestions throughout the country in comparison with the “Do Nothing” case both in the future. The proposed network would maintain the same volume to capacity ratios (VCR) of the present network on many corridors because a denser expressway network serves the demand in the case of year 2030. The same VCR also means faster vehicular traffic.



Note: All numbers show VCR (volume to capacity ratio)
Source: JST

Figure I.3 Road Traffic Congestions by Corridors under Different Networks in 2019 and 2030

I.35 **Infrastructure investment per GDP**. The Study has analyzed the experiences of other countries on transport investment amounts in relation with their economic sizes. Table I.7 indicates the 10 countries' actual transport infrastructure spending and their % to GDP. It should be noted that the selected countries except China are OECD members.

I.36 The proposed network in 2030 can be realized by all the projects amounting to VND2,375 trillion at the current price or equivalent to 2.6% of the GDP in 2021–2030. The equivalent investment of GDP 2.6% is lower than China (5.6%) but substantially higher than the nine OECD members (0.5%–1.7%). Logically, Vietnam will have to mobilize more transport infrastructure investment than the nine OCED members do in terms of a share of GDP if Vietnam intends to catch up with their economies.

Table I.7 Transport Investment per GDP at Selected 10 Countries and Future Vietnam

	Country	Investment in Transport Infrastructure (million EUR)*1	Investment per GDP (%)	GDP per Capita (current USD)*2
1	China	655,815	5.6	10,500
2	Australia	19,744	1.7	51,812
3	South Korea	21,764	1.6	31,489
4	Turkey	7,871	1.3	8,538
5	Russia	11,710	1.2	10,122
6	Japan	42,450	1.0	40,113
7	UK	22,408	0.9	40,285
8	France	19,758	0.8	38,625
9	Germany	22,685	0.7	45,724
10	USA	91,250	0.5	63,544
Vietnam, 2021-2030		VND 2,375 trillion	2.6	4,170 in 2030
Vietnam, 2031- 2050		VND 6,659 trillion	1.5	11,193 in 2050

Note: It includes road, railway, IWT, seaport and airport.
Source: *1 OECD Statistics 2020, Data years ranging from 2015 to 2018. *2 The World Bank Data, 2021

I.37 **Benefit and cost analysis.** In the Study, development benefits accrued from infrastructure investments are gauged by the differences between the "Do Nothing" case and the JST proposed network case. The two benefits identified quantitatively are reduction in vehicle operating cost and reduction in travel time of passengers and cargo. As a result, the benefit and cost analysis indicates favorable results, such as benefit/cost of 1.93 and internal rate of return at 15%, to recommend network development from the viewpoint of the national economy (refer to Table I.8).

Table I.8 Benefit and Cost Analysis of the JST Proposed Network

Benefit	Year 2030	VND 313,087 billion
	Year 2050	VND 1,216,492 billion
	Aggregated Benefit 2021–2050	VND 17,469 trillion
Cost	Infrastructure Investment 2021–2030	VND 2,375 trillion
	Infrastructure Investment 2031–2050	VND 6,659 trillion
	Total	VND 9,034 trillion
Benefit and Cost Analysis	Benefit-Cost	VND 8,435 trillion
	Benefit / Cost	1.93
	IRR	15%

Source: JST

I.38 **Impact on CO_2 emissions.** The Study has also calculated the CO_2 equivalent emissions through the comparison between the "Do Nothing" cases and the proposed network by JST in both 2030 and 2050. As a result, the proposed network can reduce CO_2 by 7%. In the coming 30 years, Vietnam's traffic demand will significantly grow; therefore, transport-generated CO_2 emissions volume cannot be reduced. However, transport development can contribute to CO_2 emissions reduction per traffic activity by a modal shift to a smaller emission coefficient mode and by technology innovation to decrease an emission coefficient within the same mode.

Regional Transport Development Plans

I.39 **Eastern North–South Corridor.** This is the most important corridor in Vietnam to link the megacities of Hanoi and HMC via Danang. Currently, national highways, conventional railway, coastal shipping, and commercial flights provide corridor-wide services. During the planning period up to 2050, a couple of game-changers, which may largely affect the corridor's modal split, are expected to appear.

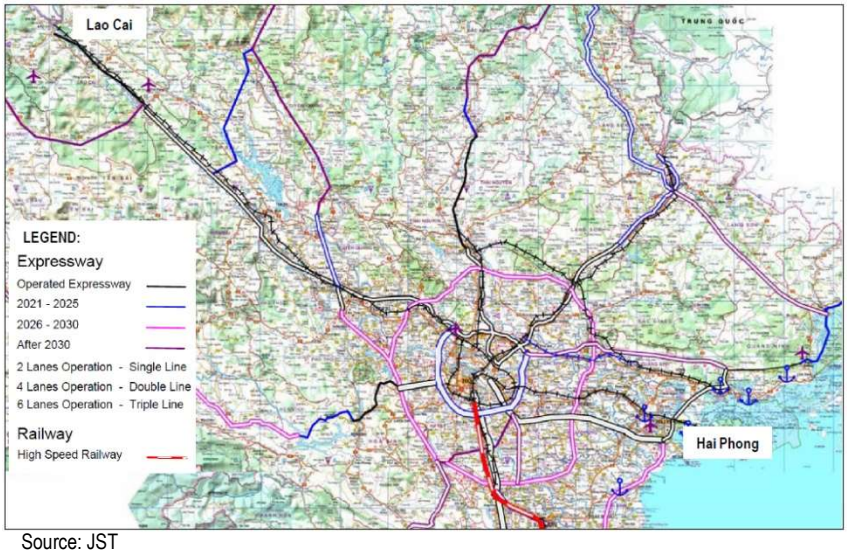
(i) Expressway. The first game-changer must be the expressway. The whole stretch of the Eastern North–South Expressway between the cities of Hanoi and HCM is scheduled to be operational in 2025. Fast and economical expressway buses may kick the conventional passenger rail service out of the market. Fast trucks also may take a considerable share of the present coastal shipping service, particularly container haulage.

(ii) HSR. To compete with expressway in passenger service, HSR from the railway subsector will be the next game-changer. As the experiences of HSR in other countries show, it is more attractive in the middle-distance service than expressway buses and commercial flights. Taking into account the country's spatial configuration, the 350 km/hr system is suggested to take a wider market share.

(iii) RORO Shipping. The third game changer is suggested to be invited in freight service, i.e., RORO shipping from the maritime transport subsector. A RORO system can provide faster and more convenient freight service in addition to the existing container

shipping service.

I.40 The Study considers the Hanoi–HCMC Railway Line will not continue as it is. There may be two ways. One is a moribund rail business at the end of declining market shares in passenger and freight from the 1990s, while the other is to be restructured and reborn as a brand new HSR. The latter enables two advantages compared with the present HSR development plan: (i) utilization of part of the existing conventional railway's right of way and (ii) a greater opportunity for transit-oriented development (TOD) because many existing stations are in the cities.



Source: JST

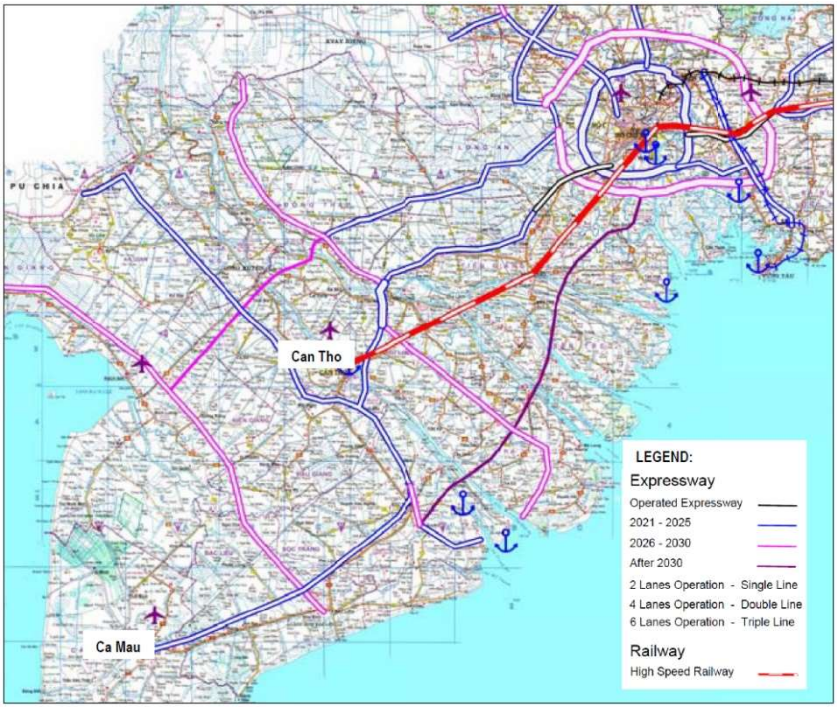
Figure I.4 Future Haiphong–Hanoi–Lao Cai Corridor

I.41 **Hai Phong – Hanoi – Lao Cai Corridor.** At around 400 km, it is the longest transport corridor in the north of Vietnam, as well as the cross-border corridor with China. Available modes on the corridor are road, railway, and IWT. Air service is expected between the proposed Sapa Airport, Lao Cai, and Noi Bai Airport in Hanoi / Cat Bi Airport in Haiphong in the future. The transport network configuration of the corridor is depicted in Figure I.4.

I.42 Road has improved one step ahead of railway and IWT. The 245-km Noi Bai–Lao Cai expressway was opened in 2014. The 106-km Hanoi–Haiphong Expressway was opened in 2015. By 2030, two ring roads around Hanoi City, No. 4 (6-lane, 98 km) and No. 5 (4-lane, 200 km), will be constructed.

I.43 For developing a balanced transport system on the corridor, historical railway assets in the north will be utilized and further developed, and the historical IWT system will also be modernized. An exclusive freight branch line to the Lach Huyen Port Terminal is proposed to ease road traffic congestion around the port. Some IWT investment projects are required, such as the replacement of old and low-clearance bridges, improvement of canals and waterways, riverports, and ICDs, and adding modern and large fleets (including sea-cum-river ships).

I.44 **South Delta Spine (HCMC – Can Tho – Ca Mau).** The Mekong Delta Region has suffered from a weakened economy compared with other regions and social migration, particularly to HCM City. The progress and level of transport infrastructure and services have largely affected such a sluggish economy and society.



Source: JSTI.

Figure I.5 Future South Delta Spine

I.45 The Mekong Delta is endowed with a crisscross of waterways suitable for IWT operation. But increased traffic volume now causes some transport problems, such as eroded waterway embarkment due to congested barge traffic and low bridge clearance. IWT must be modernized while the corridor badly needs a balanced transport system.

I.46 The southernmost section of the Eastern North–South expressway from Ho Chi Minh to Ca Mau will be operational by 2025. In addition, there are two parallel expressways and three east–west expressways in the long-term expressway development plan.

I.47 The MOT envisions a 170-km Mekong railway between HCMC and Can Tho in the long run. The Study suggests selecting the HSR system in order to compete with expressway buses in passenger service and connect with the proposed North–South HSR in HCMC.

I.48 A regional gateway port will be developed at Tran De, the estuary of the Hau River for efficient cargo distribution with lowering logistics costs.

Recommendations

(For Transport Sector Development)

I.49 The role of the transport sector is not limited to supporting socio-economic activities without serious traffic congestions. Under the development context of Vietnam, transport must take a greater role in unifying the country and promoting balanced national development while avoiding the separation of the two large economies of the north and the south even when an unprecedented disaster happens. Therefore, a ladder-shaped structure between the two megacities of Hanoi and HCM is recommended so as to provide an alternative route with high resiliency and redundancy in the network. It should be noted that the transport system is a multi-facet asset in the country to solve various development issues. For instance, transport can expand the coverage of the digital economy, and it can

enhance environmental sustainability. Thus, transport is the driving force to turn Vietnam from a middle-income developing country to a high-income developed country in the coming 30 years.

I.50 For a modern transport system, the Study introduced plenty of game changers. These are the expressway network serving all the provinces, an HSR operation from Hanoi City to HCMC and even to Can Tho, freight train service to gateway seaports, coastal RORO shipping service, AI terminal, modern IWT service for container haulage in the north, more usage of sea cum river ships, point-to-point domestic air service, air freight cold chain service, etc. The MOT is suggested to constantly adapt and innovate to ensure their successful services at the right time in the growing markets.

I.51 On the other hand, some outdated services will be phased out. Small barges to transport bulk cargo will be replaced by a modern convoy of large barges after removing bottlenecks, such as low clearance bridges. Numerous small IWT operators will be restructured. The historical long conventional rail line of 1,726 km between the cities of Hanoi and HCM has been losing its share since the 1990s. The completion of the North–South Expressway in the mid-2020s will further worsen the business predicament. Utilizing the historical rail asset is suggested for the creation of a new HSR system.

I.52 Among the proposed game-changers in the Study, HSR is the newest travel mode in passenger services. It is a railway system but quite different from conventional railways in terms of travel speed, ride quality, and impact on society. A successful HSR development cannot be gauged from a transport business only. Its value must be in a balanced modal split among expressway, HSR, and air for inter-city passenger movement. It also greatly affects the physical structure, such as urban conurbation along the route and transit-oriented development (TOD) around the stations.

I.53 Containerization and multimodal transport will be more important for domestic freight services in Vietnam. Truck service is convenient because it has no first-mile/last-mile arrangement required. It will also be definitely more competitive because of the nationwide expressway network in the future. In order to avoid too much truck dependency, it is suggested to the government to carefully support alternative modes, such as freight rail, IWT, and coastal shipping. The Study particularly proposes direct freight rail connection to gateway port terminals, deployment of IWT-ICDs with removal of low clearance bridges, and introduction of RORO shipping service together with existing container ships, which will complement each other.

I.54 One sophisticated measure to maximize the impact of transport infrastructure investments is to keep good connectivity among them. Accessibility is a determinant factor to utilize transport facilities and terminals, such as ports, airports, rail stations, etc. In this sense, a well-developed road network consisting of expressways, national highways and other roads is highly appreciated.

(For Transport Project Implementation)

I.55 The Study appreciated recent government's efforts to diversify and mobilize funding sources in infrastructure development and maintenance, namely collecting user charges to invest additional infrastructure and cover recurrent costs, inviting the private sector in infrastructure investment and operation, and promoting active local government participation. It is suggested to strengthen this policy direction to implement the proposed project package of VND 2,376 trillion in total during the period 2021 to 2030. The policy

can enhance efficiency of project implementation and operation by involving various stakeholders and ease a burden on the state account which sets a financial ceiling by aggregated government debts.

I.56 After reviewing the 20 years of experience of Vietnam in transport development, one critical issue in the project implementation stage is ROW acquisition and resettlement. The normal procedure is to undertake ROW acquisition and resettlement within the construction phase. A suggested alternative is to pre-purchase ROW before D/D or soon after F/S in the project cycle. A project implementing body benefits greatly from the alternative because the implementing body can easily stick to the project schedule during the construction phase.

I.57 The government adopted the PPP scheme to accelerate expressway development in the 2010s, but the scale of investment was pointed out to be large for Vietnamese concessionaires. Some delayed implementations of the PPP projects are attributed to restrictions on toll setting that directly affects business profitability, foreign exchange risk, and its associated convertible risk to foreign investors. Under such situations, the PPP Law was enacted in January 2021. The articles stipulate revenue/loss sharing mechanism, foreign exchange risk, and so on, but the details will be specified in a relevant guideline to be issued.

I.58 When the government considers revenue/loss sharing with an expressway operator it should also pay attention to other competing modes, such as rail (including HSR), IWT, and coastal shipping. The present toll fee level of VND1,500 per km for a car is a threat to other modes. How will the government compensate for the business damage of other competing modes by emerging expressway service although the government can share an expressway business deficit by viability gap fund (VGF) or other means under the PPP Law? This is one typical “silo mentality” example. For a balanced transport system with less financial burden for the government on a certain corridor, the fare or toll setting should be flexible and interrelated among the competing modes.

I.59 The full life-cycle cost of transport infrastructure should be recovered from their direct beneficiaries to a feasible extent. In the last decade, such a cost-recovery mechanism worked well in seaports, riverports, and airports, while it partly worked in roads and almost none in railways. Because of the previously mentioned institutional reform of expressway by the PPP Law, a better demarcation between the government and concessionaires will be done. Only the railway subsector is left behind accordingly.

I.60 Railway is a unique system which must use substructure, superstructure, and rolling stock altogether on a linear alignment with professional operation and maintenance skills. When developing the railway subsector in Vietnam, the government has two choices: (i) to develop a self-contained railway system, including supporting industries for construction and operation and maintenance with relevant personnel; or (ii) to allow new service providers under the vertical separation scheme between infrastructure and operation. In the case of Japan, the first choice is adopted for conventional intercity railways while the second choice is for HSR, i.e., JRTT for infrastructure and JR operators for services. Since Vietnam has made insufficient efforts to meet both the choices so far, a clear railway policy must be decided.

I.61 Inter-provincial road network in Vietnam consists of expressways and national highways. The MOT has prioritized to extend the existing expressways to a nationwide network over 5,000 km in the next decade in order to meet multi-facet needs. There is

growing apprehension that the existing insufficient national highway network will remain. But expressways cannot totally substitute the role of national highways. For instance, an adequate national highway density is required to guide and serve urban and industrial development. Therefore, it is suggested that national highways be designed and prepared together with large-scale urban and industrial developments. Under such situations, pre-purchase ROW must be workable.

I.62 IWT development will largely depend on private investment particularly in IWT fleet, riverports and IWT-ICDs. As the IWT system is modernized by accumulated private investments, government funds must be tapped into more delicate aspects of the system in order to succeed those private investments. They are waterway improvement and maintenance, bottleneck removals such as replacement of old and low-clearance bridges, river information system for safe operation and management and so on.

I.63 Vietnam will maintain a hierarchical port system including over 30 general seaports. Common development issues are replacement of low-productivity port facilities, port access improvement and good connection between domestic coastal shipping and international shipping. The beneficiary-pays principle will be basically kept to maintain and improve daily port operation. Smart port concept will bring a great opportunity to enhance operation productivity. Government funds will be strategically used to develop/expand port compounds with ship access channels and port access from hinterlands. The gateway seaports will be prioritized in this regard.

I.64 Airport development will also take the beneficiary-pays principle. Since the damage of the COVID-19 could be recovered within a couple of years, it is suggested that airport facilities for passenger service be developed on schedule. In Vietnam, there are still many tasks for air freight service to become a full-fledged industry, including air cargo village around the gateway airports, cold-chain system to store and distribute air cargo and exclusive air freight service on domestic routes. Although all require private investments, the government role to coordinate them for enhancing air service is critical.

I.65 The state budget must be allocated for part of infrastructure maintenance, particularly for non-earning infrastructure and safety and environment protection purposes. The state budget has constantly increased in the last decade, but there is no infrastructure maintenance plan. It is suggested that the MOT develop an infrastructure maintenance system including infrastructure inventory, infrastructure maintenance plan, and its monitoring and evaluation.

I.66 As the economy takes off from the underdeveloped situations, it also lessens the role of ODA loan. From the 2020s, it is suggested for Vietnam to implement a limited ODA loan projects with strategical importance. They are the projects (i) requiring large and long-term low-interest funds, (ii) facing with implementation difficulties by domestic technologies and experiences only, and (iii) expecting large and unique development impact such as introduction of new type infrastructure and service.

(For Transport Planning Works)

I.67 In planning, another “silo mentality” (when the subsector authority looks only at its own without regard to other subsectors) was observed in the preparation of NSP documents. Without sufficient subsector coordination, their planning outputs are likely to be a wish list. The poor coordination issue is not only within the transport sector. It is considered one of the reasons for Vietnam to enact the Law on Planning.

I.68 Only the MOT can make a breakthrough in subsector planning works through the orientation and coordination at the following three levels:

(i) **Traffic demand.** The same traffic demand database at present and in the future should be prepared under the MOT/TDSI and shared among the subsector authorities. It helps subsector planning to identify its role and opportunities of subsector connection and competition.

(ii) **Infrastructure plan.** Traffic demand is logically converted to necessary infrastructure capacity. Then, it gives an important target for an infrastructure plan which is largely done by engineering works. Access service sometimes generate associated infrastructure needs. The MOT supervises and coordinates such infrastructure plans.

(iii) **Investment preparation.** Infrastructure plans are finally converted to necessary investment plans. The MOT decides or approves an implementation method with a funding source per project.

I.69 The Study contributed to forming a 10-year transport development plan with a long-term strategy up to 2050. Although such plans are only approved after a necessary internal procedure in Vietnam, a long-term transport planning document should not be treated dogmatically. A practical planning document should be equipped with an adequate monitoring and revision mechanism, such as the plan-do-check-act (PDCA) cycle.

Part II PROJECT IDENTIFICATION TOWARDS 2030 AND BEYOND

Project Identification Process

II.1 Generally, the review of the preliminary project lists of the five NSP documents focused on two main aspects: (i) proposed transport development strategies of JST and (ii) forecast and network evaluation results of JST. As mentioned in previous chapters, the back-casting planning method is applied to this Study. According to this method, a desirable future target is defined for the year 2050 then JST works backwards to identify the project that connects the specific future target to the present. The transport network plan (or proposed project lists) is further examined by demand forecast model and network evaluation, then a project list by subsector is finalized.

1) Road

II.2 According to the Road-NSP documents, spatial development orientations for the national road network plan are as follows:

(i) formulation of North-South national corridors;

(ii) a radial road pattern in the central point of Hanoi City in the north;

(iii) East-West corridors in the central;

(iv) combination of north–south and east–west corridors in the south; and

(v) application of radial and circular road patterns to two special cities (i.e., Hanoi and Ho Chi Minh Cities).

II.3 Based on such orientations, the proposed were expressway and national highway network. However, Road-NSP has a list of projects of national significance and projects with prioritized investment in the period of 2021–2030. In accordance with the orientations from the Document of 13th National Party Congress, all proposed projects are expressways.

II.4 For passenger transport, the first main target for the year 2050 is to enable a one-day return trip for Vietnamese nationals from one point to anywhere in the country. Expansion of the expressway network to serve most provincial capitals is necessary to achieve this target; hence, the connections of expressways to provincial capitals will be reviewed. Additionally, JST proposed improving the international connectivity of transport networks to ensure robust trade and people flows. Following this, expressways connecting to border gates will be considered. Based on this orientation, a list of expressway projects in both periods of 2021–2030 and 2031–2050 is finalized.

2) Railway

II.5 According to the Railway-NSP documents, spatial development orientations for the national railway network plan are as follows: (i) a railway backbone on the north–south corridor; (ii) connection railway lines in two railway hubs in Hanoi and Ho Chi Minh Cities; (iii) international railway lines to China, Lao PDR, and Cambodia; (iv) a railway line through Central Highlands; and (v) branch lines to transport hubs (airports, seaports, and logistic centers). Following such orientation, Railway-NSP has a list of projects of national significance and projects with prioritized investment for 2021–2030. Basically, the proposed projects focus on improving existing railway lines as well as preparing investment for new lines (especially for two sections of the high-speed railway).

II.6 As for the first main target of JST for passenger transport, the development of a high-speed railway is required in combination with air and expressway services. Additionally, the second main target for the year 2050 is to develop a balance freight system among roads, IWT, coastal shipping, and railway. For this, the competitive capability of traditional railway lines needs further enhancement through upgrade and improvement of existing lines and new lines to seaports. Based on these orientations, a list of railway projects for both 2021–2030 and 2031–2050 was finalized.

3) Inland Waterway

II.7 For the vision to 2050, IWT-NSP has some main orientations for IWT development; for instance, increasing the share of IWT in freight transport on main corridors and developing inland container depots for IWT. Following these orientations, IWT-NSP proposed a list of projects with prioritized investments for 2021–2030.

II.8 As mentioned above, the second main target of JST for the year 2050 is to develop a balance freight system among roads, IWT, coastal shipping, and railway. To reduce the dependency on road trucks for freight transport, the competitive capability of IWT needs further improvement not only through waterways but also through the development of vessels and ICDs. Following this, projects on waterways, IWT infrastructure, and vessels were reviewed, and a list of IWT projects for 2021–2030 and 2031–2050 was subsequently finalized.

4) Seaport

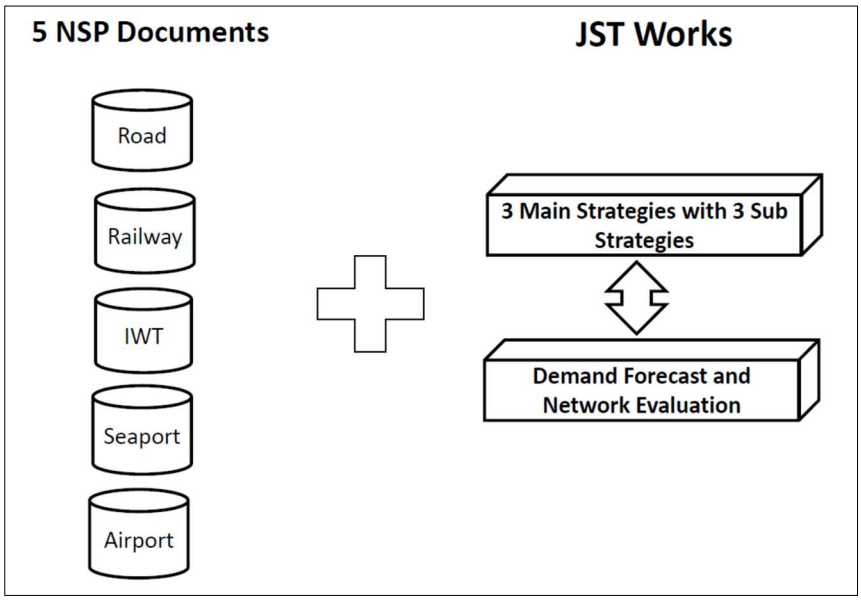
II.9 According to the Seaport-NSP document, there are some development orientations, including (i) further development of international gateway and transshipment ports at Lach Huyen (Hai Phong) and Cai Mep (Ba Ria–Vung Tau), (ii) development of seaport groups in five regions, (iii) development of international passenger ports in connection with tourism centers, and (iv) investment of special-type ports in parallel with the development of industrial parks and special economic zones. Following these orientations, the Seaport-NSP proposed a list of projects with prioritized investment for 2021–2030.

II.10 Several aspects of the seaport project list of Seaport-NSP were reviewed based on the main targets of JST for the year 2050, including (i) improvement of seaport capacity and maritime transport services for the competition with road truck and international connectivity, (ii) improvement of capacity for rescue and search, and (iii) improvement of navigation aids and safety. A list of seaport projects for 2021–2030 and 2031–2050 was then finalized.

5) Airport

II.11 Airport-NSP has a clear development orientation for both 2021–2030 and 2031–2050. For 2021–2030, there will be 28 airports for construction in total, of which 14 are international airports and 14 domestic airports. For 2031–2050, only one new domestic airport will be for construction. According to the Airport-NSP, the growth rate of passengers and cargo by air transport will be 8.1% and 10.3%, respectively, in 2021–2030. Following this, the Airport-NSP has a list of estimated costs for implementing the airport plan in 2021–2030 and 2031–2050.

II.12 The airport projects of NSP were reviewed for their capacity improvement and expansion of existing facilities to develop a high-quality passenger transport system and improved international connectivity. A list of airport projects for 2021–2030 and 2031–2050 was then finalized.



Source: JST

Figure II.1 Working Process of Project Identification

Summary of Expressway Projects

II.13 In 2010–2020, the investment for road network development accounted for the most share of the state budget in the transport sector, but the supply of road infrastructure did not match the increase in demand due to rapid motorization and industrialization. Traffic congestion has occurred along main corridors, especially in the main economic centers such as Hanoi and Ho Chi Minh cities. In comparison with other Asian countries, Vietnam's primary road network remains low, especially for the network of expressways. This limits accessibility and leads to the concentration of traffic demand on national highways. A strong and systematic arterial network must be established by reinforcing the development of the expressway network. According to the Socio-Economic Development Strategy in 2021–2030 from Documentation of 13th National Party Congress in 2021, Vietnam aims to have an expressway network of 5000 km by 2030.

II.14 To meet the above-mentioned target, the expressway network of Vietnam needs further improvement and development in terms of capacity, connectivity, and accessibility. Through the review of the VITRANSS2 proposals and existing government plans as well as the discussions with Vietnam counterpart, a long list of candidate expressway projects grouped into six was proposed, as follows:

(a) **North–South Expressway in the East**. The project, which is the most important for 2021–2025, will enhance the capacity and connectivity of north–south transport corridor through the finalization of north–south backbone expressway.

(b) **North–South Expressway in the West.** The project will enhance the capacity and accessibility of the north–south transport corridor by the development of second north–south backbone expressway. This expressway is parallel with the North–South Expressway in the east and will serve as an alternative route.

(c) **Expressways in Northern Region.** The projects will generally improve the connectivity of the expressway network in the north as well as accessibility from major cities and industrial areas to border gates and seaports through the development of radial links.

(d) **Expressways in Central Region.** The projects will improve the connectivity between areas in the west and seaports in the east via the east–west links development.

(e) **Expressways in Southern Region.** The projects will improve the connectivity of the expressway network in the south as well as accessibility from major cities and industrial areas to border gates and seaports via the development of radial links from Ho Chi Minh City and east–west links in the Mekong Delta area.

(f) **Ring Roads.** Those projects will ease traffic congestion in Hanoi and Ho Chi Minh and improve the connectivity of adjacent provinces through the development of ring roads.

II.15 In comparison with the NSP for Road, JST added the following expressway sections and constructed some sections earlier as a result of the consultation with local highway planners.

(i) Missing links of the expressway networks: E21-3 (Duc Hoa–Thanh Hoa section), E21-4 (Thanh Hoa–Tan Thanh section), E21-5 (Tan Thanh–My An section)

(ii) The section already under construction: E25 (Ninh Binh–Hai Phong section)

(iii) Importance of network connectivity: E45 (Dau Giay–Lien Khuong–Da Lat)

(iv) Promotion of Tran De Port development: E49-2 (Can Tho–Soc Trang section)

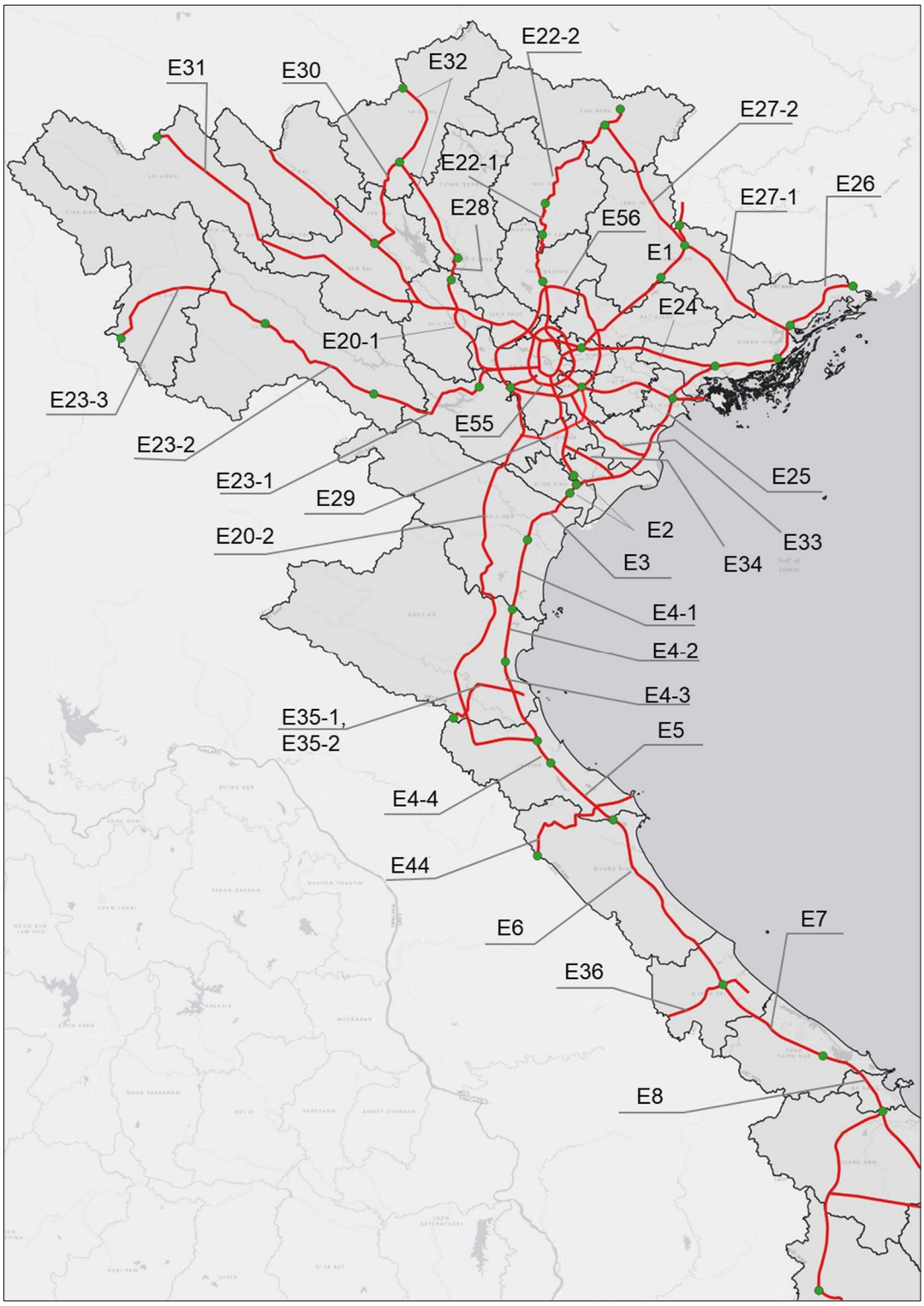
II.16 Table II.1 shows the summarized list of expressway projects. Figure II.2 and Figure II.3 illustrate the project alignments.

Table II.1 List of Expressway Projects

Project Group	Code & Name of Projects	Cost (Billion VND)
North–South expressway in the East	E1: Huu Nghi Quan–Chi Lang	6,087
	E2: Cao Bo–Mai Son	2,628
	E3: Ninh Binh (Mai Son)–Thanh Hoa (NH45)	10,960
	E4-1: Thanh Hoa–Vinh (Thanh Hoa (NH45)–Nghi Son section)	7,433
	E4-2: Thanh Hoa–Vinh (Nghi Son–Dien Chau section)	8,643
	E4-3: Thanh Hoa–Vinh (Dien Chau–Bai Vot section)	8,643
	E4-4: Thanh Hoa–Vinh (Bai Vot–Ham Nghi)	7,403
	E5: Ha Tinh–Vung Ang	10,186
	E6: Vung Ang–Cam Lo (Quang Tri)	32,902
	E7: Quang Tri (Cam Lo)–Hue (La Son)	17,044
	E8: Hue (La Son)–Da Nang (Tuy Loan)	11,409
	E9: Quang Ngai–Quy Nhon	33,195
	E10: Quy Nhon–Nha Trang	34,590
	E11: Nha Trang–Phan Thiet (Nha Trang–Cam Lam section)	5,013
	E12: Nha Trang–Phan Thiet (Cam Lam–Vinh Hao section)	15,731
	E13: Nha Trang–Phan Thiet (Vinh Hao–Phan Thiet section)	17,421
	E14: Phan Thiet–Dau Giay	17,113
	E15: Long Thanh–Nhon Trach–Ben Luc	N/A
	E16: Trung Luong–My Thuan	8,816
	E17: My Thuan Bridge No.2	1,210
	E18: My Thuan–Can Tho	3,976
	E19: Can Tho–Ca Mau	34,316
North–South expressway in the West	E20-1: Doan Hung–Hoa Lac–Khe Co (Doan Hung (Phu Tho)–Hoa Lac–Cho Ben section)	9,860
	E20-2: Doan Hung–Hoa Lac–Khe Co (Cho Ben–Khe Co section)	103,802
	E21-1: Ngoc Hoi–Chon Thanh–Rach Gia (Ngoc Hoi–Chon Thanh section)	68,112
	E21-2: Ngoc Hoi–Chon Thanh–Rach Gia (Chon Thanh–Duc Hoa section)	6,800
	E21-3: Ngoc Hoi–Chon Thanh–Rach Gia (Duc Hoa–Thanh Hoa)	4,350
	E21-4: Ngoc Hoi–Chon Thanh–Rach Gia (Thanh Hoa–Tan Thanh section)	2,610
	E21-5: Ngoc Hoi–Chon Thanh–Rach Gia (Tan Thanh–My An section)	3,480
	E21-5: Ngoc Hoi–Chon Thanh–Rach Gia (My An–Cao Lanh section)	4,524
Expressways in Northern Region	E22-1: Ha Noi–Thai Nguyen–Bac Kan–Cao Bang (Cho Moi–Bac Kan section)	2,243
	E22-2: Ha Noi–Thai Nguyen–Bac Kan–Cao Bang (Bac Kan–Cao Bang section)	6,988
	E23-1: Hoa Binh–Son La–Dien Bien (Hoa Binh–Son La (Moc Chau) section)	21,577
	E23-2: Hoa Binh–Son La–Dien Bien Son La (Moc Chau)–Son La section)	8,360
	E23-3: Hoa Binh–Son La–Dien Bien (Son La–Dien Bien section)	29,844
	E24: Noi Bai–Bac Ninh–Ha Long (Bac Ninh–Ha Long section)	21,537
	E25: Ninh Binh–Hai Phong–Quang Ninh (Ninh Binh–Hai Phong section)	21,221
	E26: Hai Phong–Ha Long–Van Don–Mong Cai (Van Don–Mong Cai section)	12,669
	E27-1: Tien Yen–Lang Son–Cao Bang (Tien Yen (Quang Ninh)–Lang Son section)	6,631
	E27-2: Tien Yen–Lang Son–Cao Bang (Dong Dang (Lang Son)–Tra Linh (Cao Bang) section)	12,546
	E28: Doan Hung (Phu Tho)–Tuyen Quang	3,113
	E29: Cho Ben (Hoa Binh)–Yen My (Hung Yen)	2,710
	E30: Connection Road from Noi Bai–Lao Cai Expressway to Ha Giang	7,800

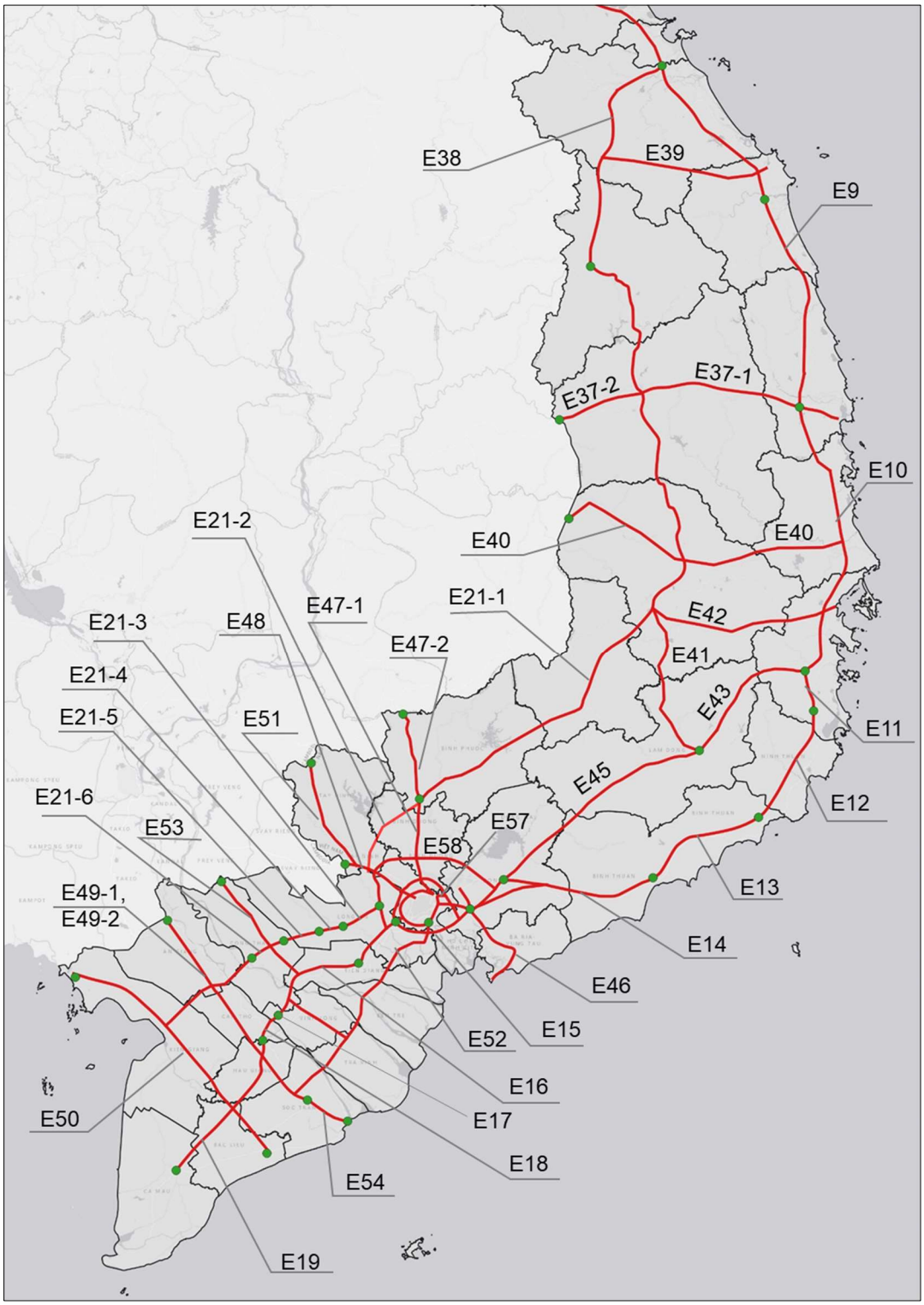
Project Group	Code & Name of Projects	Cost (Billion VND)
	E31: Bao Ha–Lai Chau	9,778
	E32: Tuyen Quang–Ha Giang	9,778
	E33: Hung Yen–Thai Binh	10,841
	E34: Nam Dinh–Phu Ly (Ha Nam)	8,518
Expressways in Central Region	E35-1: Vinh–Thanh Thuy (Cao Lo–Vinh section)	3,185
	E35-2: Vinh–Thanh Thuy (Vinh–Thanh Thuy section)	10,350
	E36: Cam Lo–Lao Bao	11,146
	E37-1: Quy Nhon–Pleiku–Le Thanh (Quy Nhon–Pleiku section)	25,478
	E37-2: Quy Nhon–Pleiku–Le Thanh (Pleiku–Le Thanh section)	7,962
	E38: Da Nang–Ngoc Hoi–Bo Y	57,644
	E39: Quang Nam–Quang Ngai	31,848
	E40: Phu Yen–Dak Lak	70,065
	E41: Lien Khuong–Buon Ma Thuot	36,625
	E42: Khanh Hoa–Buon Ma Thuot	22,583
	E43: Nha Trang–Da Lat	18,293
	E44: Vung Ang–Cha Lo	36,623
Expressways in Southern Region	E45: Dau Giay–Lien Khuong–Da Lat	40,306
	E46: Bien Hoa–Vung Tau	18,805
	E47-1: Ho Chi Minh City–Chon Thanh–Hoa Lu (HCMC–Thu Dau Mot–Chon Thanh section)	21,200
	E47-2: Ho Chi Minh City–Chon Thanh–Hoa Lu (Chon Thanh–Hoa Lu section)	3,550
	E48: Ho Chi Minh City–Moc Bai	13,600
	E49-1: Soc Trang–Can Tho–Chau Doc (Chau Doc–Can Tho section)	24,100
	E49-2: Soc Trang–Can Tho–Chau Doc (Can Tho–Soc Trang section)	9,800
	E50: Ha Tien–Rach Gia–Bac Lieu	60,000
	E51: Go Dau–Xa Mat	10,350
	E52: Nha Be (HCM City)–My Tho (Tien Giang)–Ben Tre–Tra Vinh	16,560
	E53: Hong Ngu–Tra Vinh	11,378
	E54: Soc Trang–Tran De	7,477
Ring Roads	E55: Ring Road No.4 in Ha Noi	31,210
	E56: Ring Road No.5 in Ha Noi	36,000
	E57: Ring Road No.3 in HCMC	55,879
	E58: Ring Road No.4 in HCMC	33,281
Total		1,419,709

Source: JST



Source: JST

Figure II.2 Location of Expressway Projects in the North and Northern Central



Source: JST

Figure II.3 Location of Expressway Projects in Northern Central, Central Highland, and the South

Summary of Railway Projects

II.17 According to Decision No. 318/QĐ-TTg, "Approval of the Strategy for Development of Transportation Services to 2020, and Orientation toward 2030," dated 4 March 2014, the government of Vietnam has the policy to prioritize and promote the development of railway transportation, mainly for medium- and long-distance (from 300km and above) transport of cargos as well as intercity transport of passengers on main transport corridors. Additionally, the Document of 13th National Party Congress indicated that the railway sector would receive adequate attention and construction of some sections of the high-speed railway will be by 2030. However, the capacity of the existing railway is unable to compete with other transport modes due to deteriorating facilities and limited line capacity under a single-track operation.

II.18 To meet the previously mentioned target, railway networks need further improvement in terms of capacity, connectivity, accessibility, and safety. Similarly, through the review of VITRANSS2 proposals and existing government plans as well as discussions with Vietnam counterparts, a long list of candidate railway projects complied into four groups were proposed as follows:

(a) **Upgrade and Improvements of Existing Railway Lines.** The projects will enhance the capacity and safety of railway transport through reinforcement of core railway lines, removal of bottlenecks, and improvement of operational safety.

(b) **Construction of New Normal Railway Lines.** The projects will improve the connectivity and accessibility of the national railway network.

(c) **Construction of High-Speed Railway.** The projects will improve the capacity and accessibility of railway passenger transport through the formulation of a high-quality north–south backbone line.

(d) **Replacement of Old Railway Bridges.** The projects will improve the operations of the existing railway lines in terms of safety and efficiency.

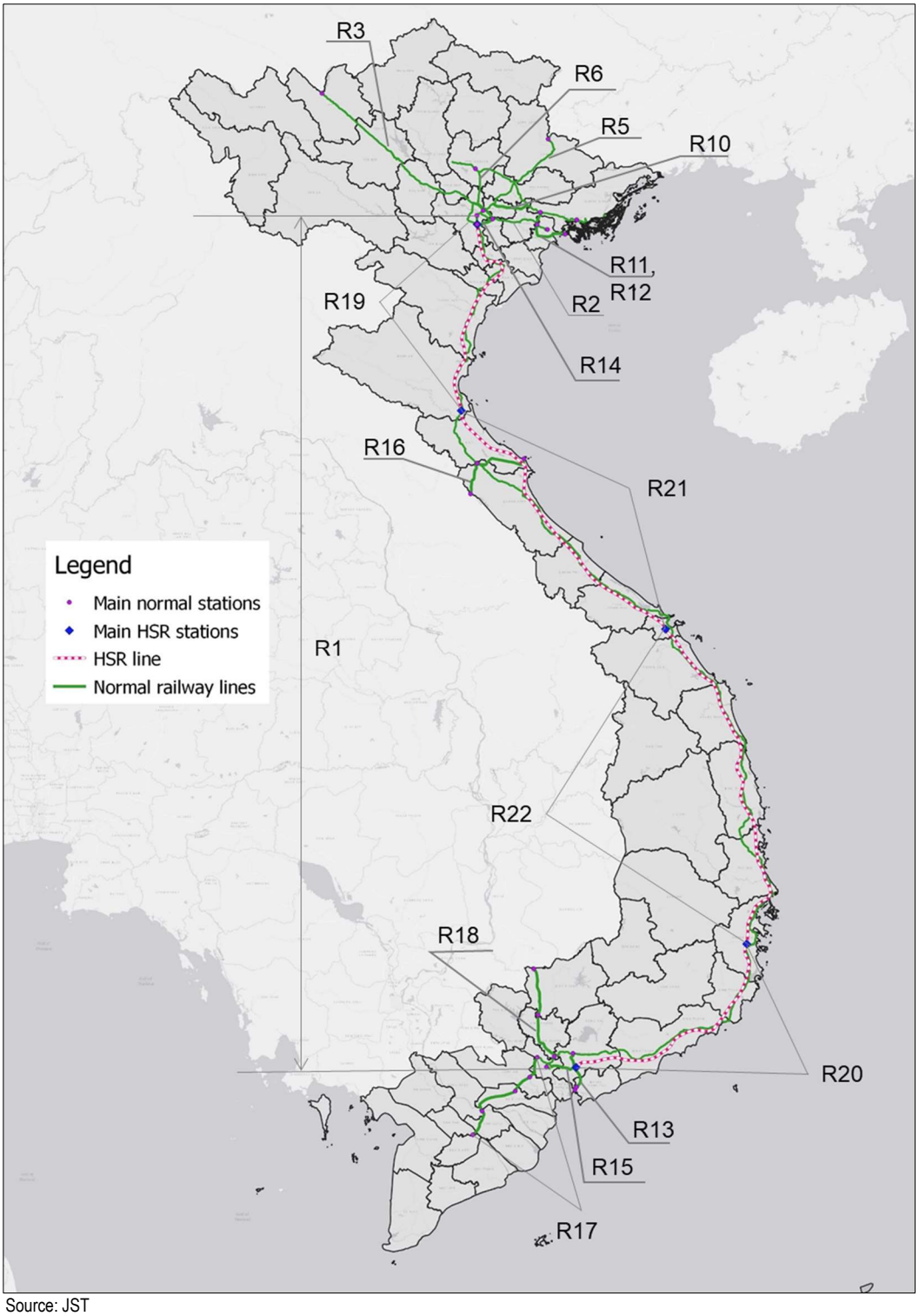
II.19 Table II.2 shows the summary list of railway projects, and Figure II.4 illustrates the project alignments.

Table II.2 List of Railway Projects

Project Group	Code & Name of Projects	Cost (Billion VND)
Upgrade and improvement of existing lines	R1: Upgrading North–South railway	107,222
	R2: Upgrading Hà Nội– Hải Phòng railway	3,900
	R3: Upgrading Hà Nội–Lào Cai railway	2,500
	R4: Connecting of Lào Cai station and Hà Khẩu Bắc Station	614
	R5: Upgrading Hà Nội–Đồng Đăng railway	1,872
	R6: Upgrading Hà Nội–Thái Nguyên railway	660
	R7: Upgrading railway stations	2,400
	R8: Railway overpasses	3,050
	R9: Railway connecting to seaports	923
Construction of new normal railway lines	R10: Yên Viên–Phả Lại–Hạ Long–Cái Lân railway	6,000
	R11: Mạo Khê–Dụ Nghĩa Section (connecting Yên Viên–Cái Lân railway to Hải Phòng)	12,900
	R12: Railway connecting to Lạch Huyện port (Đình Vũ, Lạch Huyện)	35,500
	R13: Biên Hòa–Vũng Tàu railway	56,883
	R14: Ngọc Hồi–Lạc Đạo railway (Hà Nội Eastern ring-railway)	40,000
	R15: Thủ Thiêm–Long Thành light railway	6600
	R16: Tân Ấp –Mụ Giạ–Vũng Áng railway	17,352
	R17: HCM city–Cần Thơ railway	157,254

Project Group	Code & Name of Projects	Cost (Billion VND)
	R18: Dĩ An–Lộc Ninh railway	20,938
Construction of HSR	R19: Hà Nội–Vinh section	273,237
	R20: Nha Trang–Hồ Chí Minh city section	288,361
	R21: Vinh–Da Nang section	313,597
	R22: Da Nang–Nha Trang section	459,048
Others	R23: Replacing old railway bridges	
Total		1,810,811

Source: JST



Source: JST

Figure II.4 Location of Railway Projects

Summary of Inland Waterway Projects

II.20 According to Decision No. 318/QĐ-TTg, the government of Vietnam has a policy to prioritize and promote the development of inland waterway and river-sea transportation, mainly for the transport of industrial products to large seaports and industrial and service centers, especially in the Mekong and Red River Delta Regions. The inland waterway is more cost-effective means of transport for industrial products, such as construction materials, and it will ease the demand for heavy trucks on road facilities. Additionally, greenhouse gas (GHG) emissions could be reduced. According to the Updated Nationally Determined Contribution in 2020 (VN-NDC 2020), changing the freight transport model from road to the inland waterway is a committed measure to reduce GHG emissions.

II.21 To meet the previously mentioned target, inland waterway networks need further improvement in terms of capacity, connectivity, accessibility, and safety. A long list of candidate IWT projects complied into six groups, as follows, were proposed after the review of VITRANSS2 proposals and existing government plans as well as discussions with Vietnam counterparts.

(a) **Waterway Improvements.** The projects will enhance the capacity and connectivity of the waterway transport network by reinforcing core waterway transport corridors, removing bottlenecks, and developing river-sea transport routes via estuaries.

(b) **Waterway Maintenance.** The projects will maintain the capacity and smooth traffic on the existing waterway routes.

(c) **Improvement of River Ports.** The projects will improve the capacity of river ports in the aspects of accessibility of large-sized vessels, upgrade of loading system, modernization, and efficiency in port operation.

(d) **Development of Inland Container Deport for Inland Waterway (IWT-ICDs).** The projects will improve the connectivity of IWT transport with other transport modes and industrial centres.

(e) **Replacement of Low-Clearance Bridges.** The projects will enhance the capacity and connectivity of waterway transport routes.

(f) **Traffic Safety Improvement.** The projects will ensure traffic safety and enhance the reliability of inland waterway navigation.

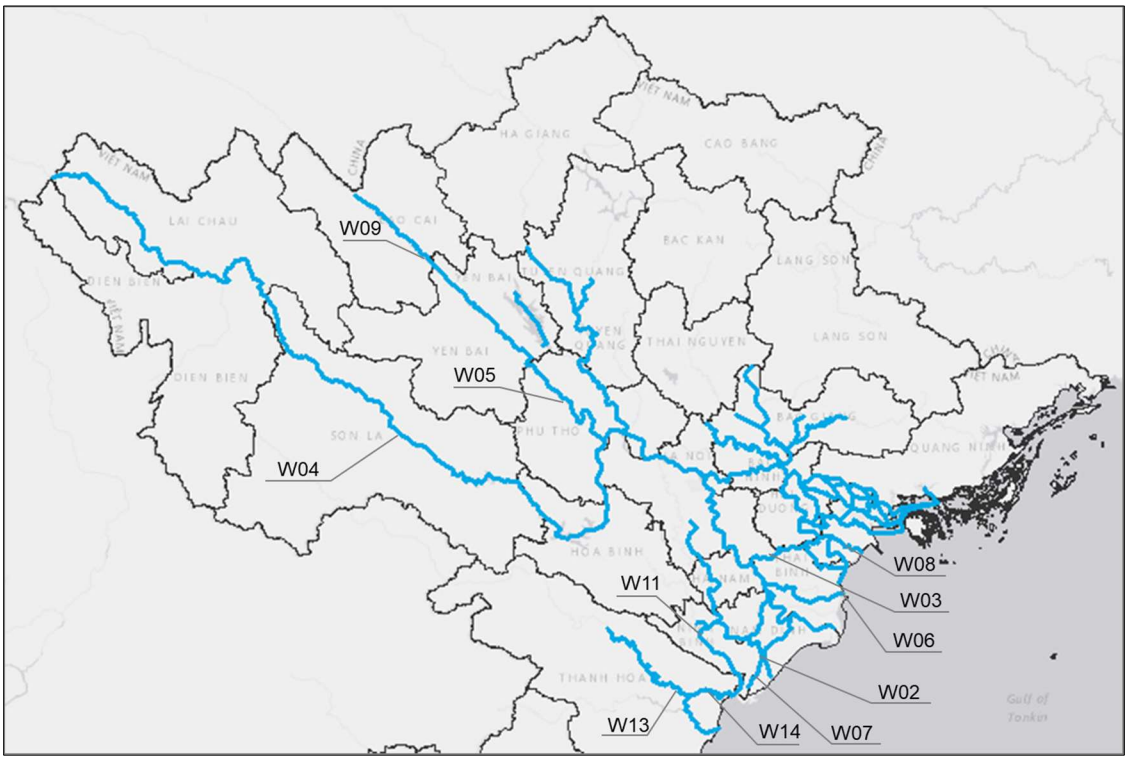
II.22 The NSP for IWT plans as many as 25 IWT-ICDs that are, in principle, suitable for private investment. Due to its strategic role to convey containers on inland waterways to gateway ports, JST selected four IWT-ICDs in the north and four more in the south. A synergy effect can be expected when operating IWT-ICDs and replacing old bridges with low clearance on the same waterways.

II.23 Table II.3 shows the summary list of IWT projects. Figure II.5 and Figure II.6 illustrate the project alignments.

Table II.3 List of IWT Projects

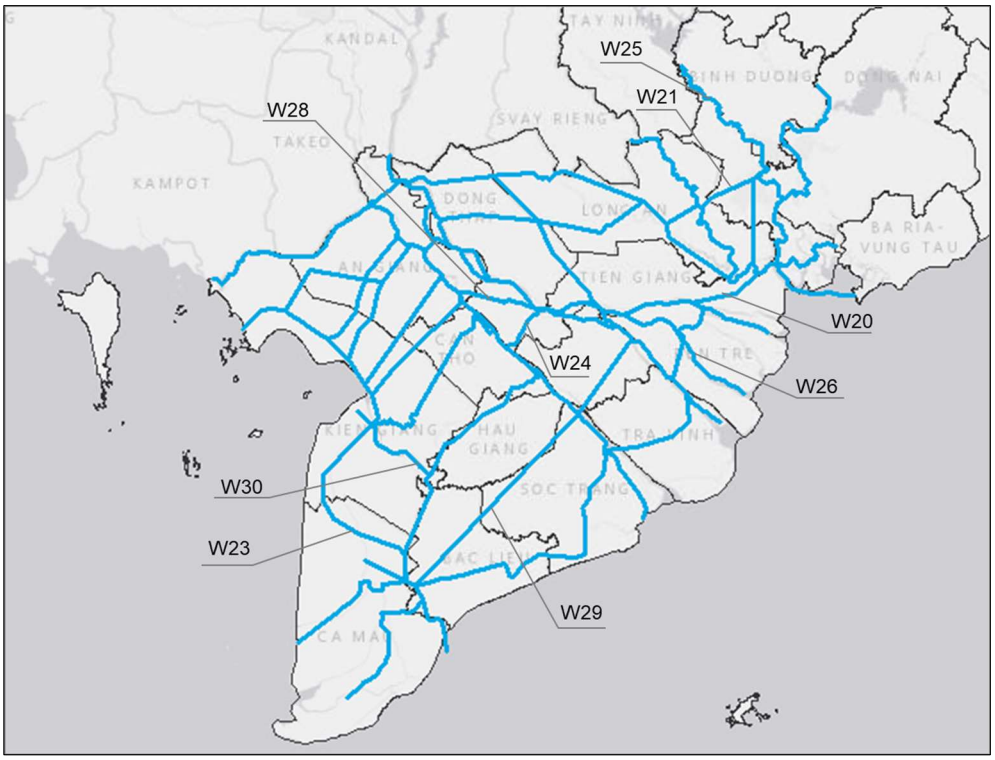
Project Group	Code & Name of Projects	Cost (Billion VND)
Waterway improvements	W02: Construction of the canal linking Day River and Ninh Co River	1,800
	W03: Quang Ninh–Ninh Binh route over Luoc river–Phase I	7,200
	W04: Waterway transport route of Hoa Binh–Son La–Lai Chau	300
	W05: Viet Tri–Yen Bai–Lao Cai route (Viet Tri–Yen Bai section)	1,500
	W06: Sea-river transport route via Tra Ly estuary	3,500
	W07: Waterway transport route of Day estuary–Ninh Binh–Phu Ly	2,500
	W08: Hai Phong–Hanoi waterway transport route via	2,200
	W09: Viet Tri–Lao Cao route (Yen Bai–Lao Cai section)	15,000
	W11: Ninh Binh–Thanh Hoa waterway route	450
	W13: Ma river (section from Bong junction to Vinh Ninh junction)	80
	W14: Upgrade of Len River in Thanh Hoa Province	120
	W15: Waterway transport route over Lam River	120
	W16: Ho Do–Cua Sot waterway transport route (Ha Tinh Province)	60
	W17: Upgrade of Giang River–Phase 2 (Quang Binh Province)	250
	W18: Huong-river route from Thuan An estuary to Tuan junction (Thua Thien Hue Province)	200
	W19: Co Co–Truong Giang River route from Han-–Cua Dai confluence to Ky Ha Port (Quang Nam–Da Nang)	350
	W20: Cho Gao Canal	1,500
	W21: Cho Dem–Ben Luc waterway transport route	200
	W22: Development of logistics and waterway corridors in the south	5,800
	W23: Improvement of Rach Gia–Ca Mau route	1,800
	W24: Upgrade of Muong Khai–Doc Phu Hien Canal	2,300
	W25: Waterway route on Sai Gon River (Ben Suc–Ben Cui section)	450
	W26: Waterway route on Ham Luong river from confluence of Tien River to Ham Luong estuary	500
	W29: Upgrade of Sai Gon–Ca Mau route (Can Tho – Ca Mau section)	1,700
	W30: Upgrade of Rach Soi–Hau Giang Canal	1,550
	W31: Rach Gia bypass route	2,500
Waterway maintenance	W28: Dredging Sai Gon–Kien Luong route (section from Lo Vap–Sa Dec to Kien Luong)	1,660
Improvement of river ports	W32: Improvement of river ports in the north (Phases I & II)	150,000
	W33: Improvement of river ports in the central (Phases I & II)	12,500
	W34: Improvement of river ports in the south (Phases I & II)	87,500
Development of IWT-ICD	W35: Development of IWT-ICD in the north (Phase I)	4,473
	W36: Development of IWT-ICD in the south (Phase I)	7,868
Replacement of low-clearance bridges	W01: Clearance Lifting for Duong bridges	2,300
	W10: Upgrade of low-clearance bridges in the north	6,000
	W27: Upgrade of low-clearance bridges in the south	15,700
Traffic safety improvement	W12: Strengthening IWT signaling system for waterway transport routes in the Central Region	300
	W37: Traffic safety management and training	3,000
Total		345,231

Source: JST



Source: JST

Figure II.5 Location of IWT Projects in the North



Source: JST

Figure II.6 Location of IWT Projects in the South

Summary of Seaport Projects

II.24 According to Resolution No. 36-NQ/TW, "Strategy for Sustainable Development of Vietnam Ocean Economy by 2030, Vision to 2050," dated 22 October 2018, the central point of a maritime economy is the development and improvement of seaports and maritime transport services. Vietnam is experiencing high growth of shipping traffic due to the demands of national industrialization and modernization as well as the positive effects of free trade agreements, leading to much pressure on the ports and shipping subsector. Generally, ports in Vietnam are mainly upstream of rivers, resulting in limited seaside accessibility and vessel entry due to the allowable size. Construction of the Cai Mep International Container Terminal in the south and Lach Huyen port in the north partially solved these issues. The system of seaports and maritime transport services needs further improvement on its capacity, connectivity, sea-side accessibility, and safety. A long list of candidate seaport projects grouped into five was proposed, as follows, after a review of VITRANSS2 proposals and existing government plans as well as after discussions with Vietnam counterparts.

(a) **Upgrade or Expansion of Existing Ports.** The projects will enhance the capacity of existing ports by constructing new berths and enhance productivity.

(b) **Construction of New Ports and ICD.** The projects will improve the capacity and connectivity of the national system in general and of a certain region.

(c) **Improvement or Upgrade of Channels to Ports.** The projects will improve seaside accessibility to existing seaports via the improvement of the port access channels.

(d) **Ship Building & Procurement.** The projects will improve the capacity of maritime search and rescue as well as resupply to remote islands.

(e) **Navigation Facilities/System.** The projects will ensure traffic safety and enhance the reliability of maritime navigation.

II.25 JST added one project, the P32 for RORO shipping network, to the NSP for Seaport. To compete with the high-speed truck service on the completed North–South Expressway by mid-2020s, faster container haulage service on the seaways than container ships, i.e., RORO ships, will be introduced. Then RORO terminals will be constructed at selective ports.

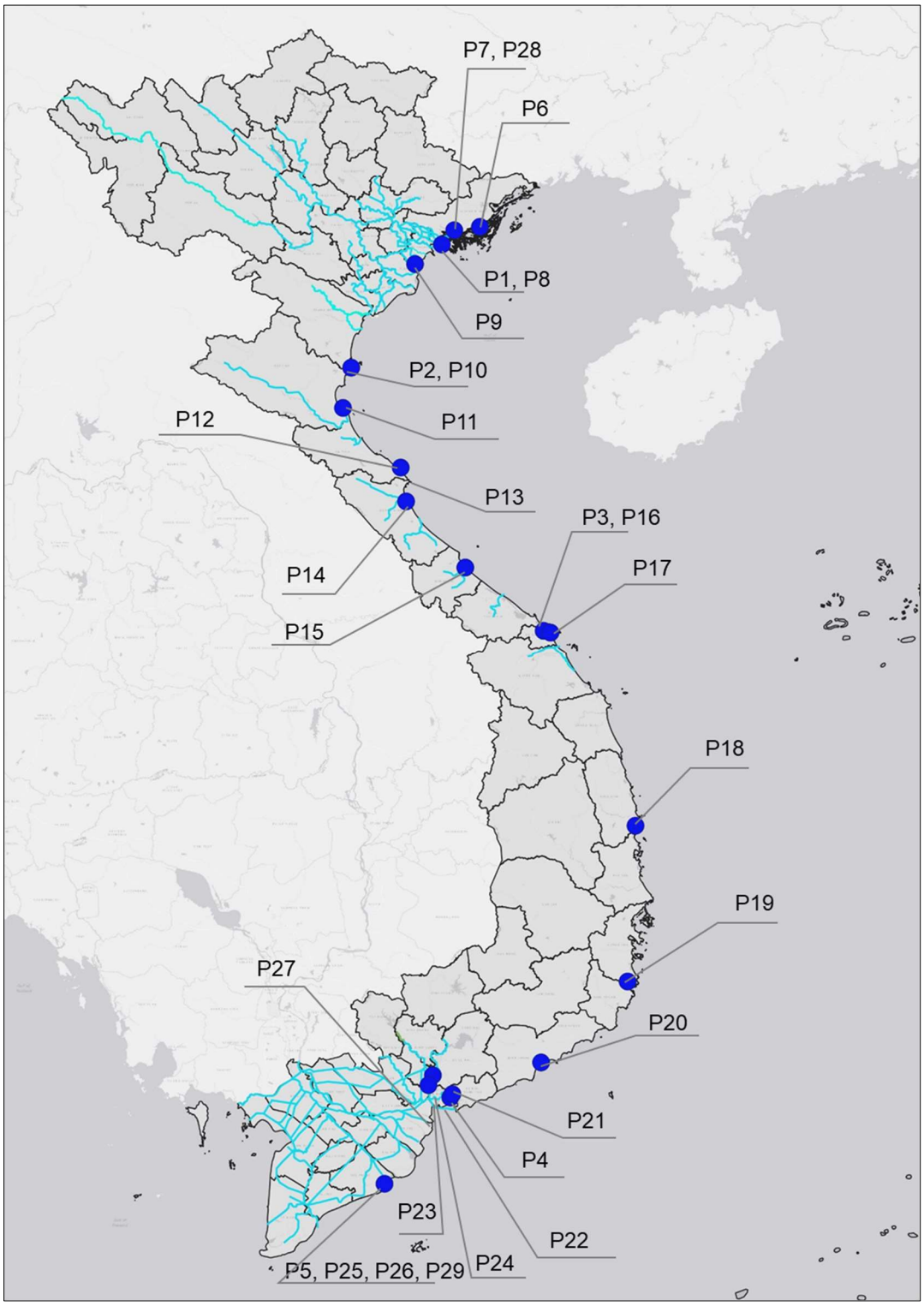
II.26 Table II.4 shows the summary list of seaport projects. Figure II.7 illustrates the project location.

Table II.4 List of Seaport Projects

Project Group	Code and Name of Projects	Cost (Billion VND)
Upgrade or expansion of existing ports	P1: Development of berths No. 3, 4, 5, 6 and roads to those berths in Lach Huyen seaport	13,971
	P2: Expansion of berths in Nghi Son port, Thanh Hoa Province	7,600
	P3: Seaport development projects	138,043
	P32: RoRo network development projects	7,800
Construction of new ports and ICD	P3: Development of breakwaters and channel to Lien Chieu port for vessels of 100,000tons	10,910
	P4: Development of berths and logistic centers in Cai Mep Ha Port	23,000
	P5: Development of Tran De Port	32,000
	P30: ICD development projects	6,500
	P6: Dredging of navigation channels in Cam Pha area and Hon Net transshipment are	150
	P7: Upgrade of the Hon Gai–Cai Lan navigation channel and the return zone	200

Project Group	Code and Name of Projects	Cost (Billion VND)
Improvement or upgrade of channels to ports	P8: Expansion of Lach Huyen–Hai Phong navigation channel	76
	P9: Improvement and upgrade of Diem Dien navigation channel	200
	P10: Upgrade of navigation channel to ports in Nghi Son, Thanh Hoa provinces	636
	P11: Improvement and upgrade of channel to Cua Lo Port	1,018
	P12: Improvement of channel to Vung Ang Port	280
	P13: Upgrade of Hon La navigation Channel	68
	P14: Construction of sand dyke for Cua Gianh Channel	566
	P15: Upgrade of sand dyke for Cua Viet Channel	400
	P16: Upgrade of Da Nang Channel for vessels of 50,000DWT	100
	P17: Development of a channel to Tho Quang port, Da Nang	82
	P18: Upgrade of Quy Nhon channel for vessels of 50,000DWT	421
	P19: Upgrade of Ba Ngoi channel for vessels of 50,000DWT	156
	P20: Dredging of Phan Thiet navigation channel	28
	P21: Upgrade of Cai Mep–Thi Vai Channel	1,400
	P22: Upgrade of Sai Gon–Vung Tau Channel	290
	P23: Upgrade of Soai Rap Channel	500
	P24: Upgrade of navigation channel on Dua River	162
	P25: Navigation channel to Hau River	2,225
	P26: Dredging of navigation channel through Tran De estuary	151
	P27: Dredging of navigation channel to Tien River	300
Ship building & procurement	P33: Ship procurement for search and rescue	424
	P34: Ship procurement for resupply activities in the South	250
	P35: Ship procurement for resupply activities in the North	134
Navigation facilities/system	P28: Vessel management system (VTS) for Hon Gai–Cai Lan channel	110
	P29: Vessel management system (VTS) for larger ships entering Hau River	110
	P36: Cospas Sarsat Satellite Station	109
	P37: Construction of lighthouses (1)	140
	P38: Construction of lighthouses (2)	550
	P39: Development of navigation channel management stations	48
	P40: Development of Coastal Information Station	117
Total		251,225

Source: JST



Source: JST

Figure II.7 Location of Seaport Projects

Summary of Airport Projects

II.27 According to Decision No. 236/QĐ-TTg, "Approval of Adjusted Plan for Development of Air Transport by 2020 and Orientation Towards 2030," dated 23rd February 2018, there will be 28 airports by 2030, of which 15 are domestic and 13 are international. Additionally, the projected growth rates of air passenger and cargo transports are 8% and 12% per year, respectively, in 2020–2030. While the slowdown in the global economy and negative impacts of the COVID-19 pandemic significantly reduce air travel demand in short and medium terms, high growth in air travel in Vietnam is expected and would continue up to the long term.

II.28 To meet the growth of air travel demand, airport facilities need further improvement in terms of capacity, the efficiency of operation, and safety. Through the review of VITRANSS2 proposals and existing government plans as well as discussions with Vietnam counterparts, a long list of candidate air transportation projects grouped into two was proposed, as follows:

(a) **Capacity Expansion of Existing Airports.** The projects aim to enhance the capacity of existing airports through the construction of new terminals, expansion of airport aprons, and construction of additional runways and taxiways.

(b) **Construction of New Airports.** The projects aim to expand the catchment areas of the national airport network in general and develop new flight routes in particular.

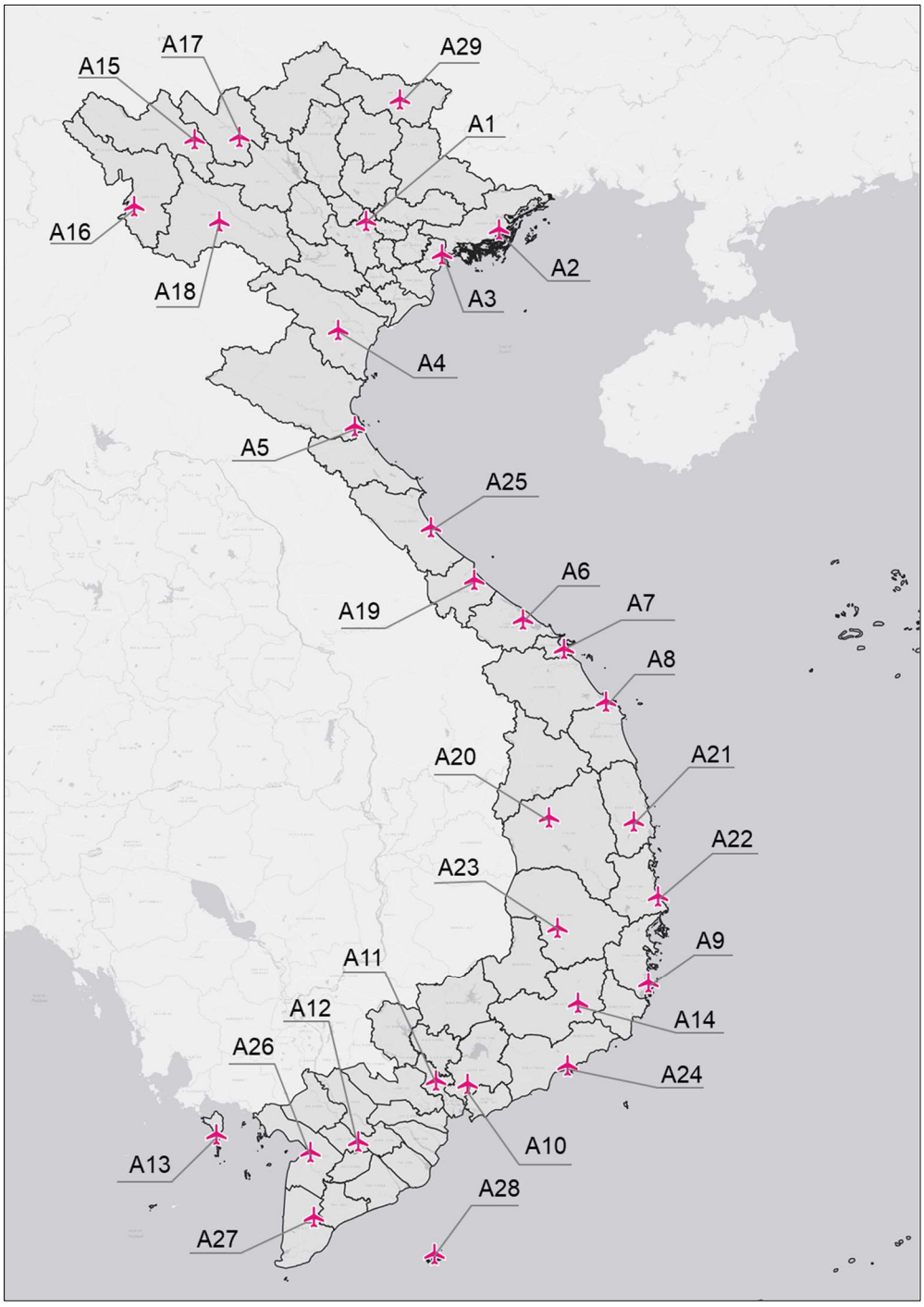
II.29 Table II.5 shows the list of airport projects. Figure II.8 illustrates the project location.

Table II.5 List of Airport Projects

Project Group	Code & Name of Projects	Cost (Billion VND)
Capacity expansion of existing airports	A1: Construction of terminal T3 and expansion of apron in Noi Bai International Airport	96,599
	A2: Construction of taxiway, expansion of terminal and apron in Van Don International Airport	5,280
	A3: Construction of taxiway, expansion of terminal and apron in Cat Bi International Airport	10,568
	A4: Construction of new terminal and expansion of apron in Tho Xuan International Airport	8,887
	A5: Construction of new terminal and expansion of apron in Vinh International Airport	14,942
	A6: Construction of new terminal and expansion of apron in Phu Bai International Airport	16,578
	A7: Construction of new terminal and expansion of apron in Phu Bai International Airport	19,505
	A8: Construction of new terminal and expansion of apron in Chu Lai International Airport	10,579
	A9: Construction of new terminal and expansion of apron in Cam Ranh International Airport	23,760
	A11: Construction of new terminal and taxiway, expansion of apron in Tan Son Nhat International Airport	12,223
	A12: Construction of new terminal and taxiway, expansion of apron in Can Tho International Airport	7,462
	A13: Construction of new terminal and runway, expansion of apron in Phu Quoc International Airport	9,595
	A14: Construction of new terminal and taxiway, expansion of apron in Lien Khuong International Airport	4,591
	A16: Extension of runway, construction of new terminal and expansion of apron in Dien Bien Airport	3,100
	A20: Extension of runway, construction of new terminal and expansion of apron in Pleiku Airport	4,583
	A21: Construction of new terminal and expansion of apron in Phu Cat Airport	2,864
	A22: Construction of new terminal and expansion of apron in Tuy Hoa Airport	1,385
	A23: Construction of taxiway and new terminal, expansion of apron in Buon Ma Thuot Airport	3,814
	A25: Construction of new terminal and expansion of apron in Dong Hoi Airport	2,804
	A26: Extension of runway and expansion of apron in Rach Gia Airport	4,454
	A27: Construction of new terminal, expansion of apron and extension of runway in Ca Mau Airport	3,117
	A28: Construction of new terminal and expansion of apron in Con Dao Airport	1,605
	A10: Construction of Long Thanh International Airport	109,000

Project Group	Code & Name of Projects	Cost (Billion VND)
Construction of new airports	A15: Construction of Lai Chau Airport	4,350
	A17: Construction of Sa Pa Airport	4,200
	A18: Construction of Na San Airport	5,688
	A19: Construction of Quang Tri Airport	3,885
	A24: Construction of Phan Thiet Airport	7,714
	A29: Construction of Cao Bang Airport	
Total		403,132

Source: JST



Source: JST

Figure II.8 Location of Airport Projects