8 MASTER PLAN (Up To 2020)

8.1 Approach

8.1 At present, there are a lot of projects that have been proposed to address the transportation problems in Vietnam. However, the budget for transportation development is limited; therefore, to use investments effectively and efficiently investments, these projects have to be evaluated from the perspective of a comprehensive and integrated package that can be appropriate for the target periods. In consideration of the issues and development strategies by subsector as well as the overall development direction proposed by VITRANSS 2, these existing projects, both committed/ongoing and proposed outside of VITRANSS 2, as well as new ones that have been identified by this study, were compiled into a long list of projects that are expected to help Vietnam achieve a comprehensive and sustainable transportation development.

8.2 Although VITRANSS 2's main focus is on the improvement and development of the primary and secondary interprovincial transportation networks and operation, due consideration is also given to the integration and development of the tertiary, as well as the rural and urban transportation networks, so that the entire transportation network functions as a system with no missing links or bottlenecks. The VITRANSS 2 does not, of course, make optimistic assumptions that the country will be provided with a brand-new, modern transportation infrastructure and equipment within the coming 5 or 10 years, but that the country will be effectively integrated with better-maintained transportation system and affordable transportation services.

8.3 Even though Vietnam is at the midpoint of high economic development, its transportation funding capacity is limited. Available resources should thus be effectively allocated. For this, broad priorities have been set in allocating the likely available budget of the government. Broadly, these are as follows:

(i) Urban transportation projects, routine maintenance/rehabilitation activities, and minor improvements are not included in the project list;

(ii) Projects that remove traffic bottlenecks and strengthen the network to meet the demand;

(iii) Growth corridors in the north, south, and center which are expected to act as engines of national economic growth. Strategic infrastructures for land, water, and air transportation should be provided and integrated with each other, and linked to the global market and neighboring countries; and

(iv) Strengthening of the north-south integration and facilitation of the smooth movement of goods and people.

1) Roads and Road Transportation

8.4 Over the last decade, Vietnam has invested heavily in road network development; despite this, demand-supply gaps have widened due to rapid motorization and industrialization. Traffic congestion has spread rapidly along main corridors, especially in the vicinity of large urban areas like Hanoi and HCMC and the gateway ports. Compared to other countries, Vietnam's road network is relatively dense; however, the primary road network density remains low, and at the same the capacity of the individual road segments is limited with nearly all of the primary roads having only two lanes. Another issue is the weak secondary road network (or the provincial roads). It is only 30% longer than the primary road network and the quality is poor, with 24% of the network either earth or gravel roads. This limits accessibility and hinders intraprovincial traffic, as well as concentrates demand

on national roads. A strong and systematic arterial network has to be established by reinforcing primary roads to include the development of an expressway network, while intensifying the development of provincial roads.

8.5 How to keep or improve the quality of existing road facilities is also an important issue. If traffic volume continues to increase as the current trend shows, the quality of road infrastructure will even be worse. Establishing a proper road maintenance system with adequate finance is vital for the country's economy, because reducing expenditure on maintenance not only increases vehicle-operating costs, but will also cost the country much more in the end. Resolving the main institutional constraints in road maintenance and finance in the future is likewise necessary to safeguard past and ongoing road transportation investments.

8.6 The major criteria in identifying improvement projects in road and road transportation are as follows:

(i) Expressways are to be constructed on the primary and secondary arterial networks, in addition to the improvement of national highways. Based on economic development and motorization trends, road traffic demand will continue to increase at a high rate. Therefore, roads and road transportation systems have to be strengthened and maintained properly. Moreover, road infrastructure modernization, including the construction of expressways, has to be proposed. Expressways will provide faster, safer, and reliable traffic flows. An expressway network can connect major focal economic points such as Hanoi, HCMC, Hai Phong, Danang, and others;

(ii) At present, the primary and secondary national highways are not maintained properly to the quality required to handle growing traffic volume and have to be improved or rehabilitated. Adequate standards have to be introduced and good pavement conditions need to be guaranteed;

(iii) Bottlenecks, especially in and around large urban areas, which are expected to hinder smooth interprovincial transportation, must be improved before the situation becomes critical and costlier;

(iv) Whereas rural roads are given high priority, the improvement of the network of provincial roads to link them with primary / secondary national highway network and rural roads should likewise be given importance; and

(v) Increasing traffic demand and the mix of vehicle types (mainly motorcycle, car, and truck) is worsening traffic safety levels in Vietnam. Measures to improve infrastructure, traffic management, and driving manner are important.

2) Railway

8.7 The existing railway lines not only serve the domestic transportation of passenger and freight, but also serve as links to the ASEAN railway and the Singapore–Kunming Railway Link (SKRL) project. When the HSR becomes fully operational, present train operations should be revised from super-long-distance train operation (between Hanoi and Saigon: 1,726km) to middle/ long-distance services (80–100km/400–500km) that will also cover the stations of the HSR to provide appropriate railway operation service.

8.8 The potential demand for railway transportation at present and in the future is relatively high; however, the transportation capacity of the existing railway is unable to cover the current demand due to deteriorated facilities as a result of natural disasters and war, and also due to limited line capacity under a single track operation. However, modern railway transportation is now required worldwide from the point of view of saving the envi-

ronment and energy sources.

8.9 Any project that aims to strengthen transportation capacity would require a longer time and huge investment costs. In addition, when improvement works of existing lines coincide with the construction of the HSR, project costs will reach an astronomical amount. Hence, the improvement program for strengthening transportation capacity should be prepared step by step.

8.10 In VITRANSS 2, a three-stage improvement concept was used to identify projects in order to provide modern transportation services covering the potential demand for railway. The details of each item are explained below.

(a) **Function Improvement Items (FII):** refer to discrete or low-cost improvements at key sections of the tracks to improve service up to 50 trains/day, such as additional signal stations.

(b) **System Reinforcement Items (SRI):** refer to technical modifications on tracks meant to increase speed and capacity above 50 trains/day, such as through partial double-tracking, improving vertical and horizontal alignments, bridge replacements or re-enforcements.

(c) **System Modernization Items (SMI)** involve introduction of higher technical standards as to require a change in technology, such as via full double-tracking, electrification, shift to wider standard gauge, grade-separation at road intersections, and more advanced signalling system. The rail capacity is higher than can be achieved with FII or SRI.

These items were identified in the light of Decision No. 1686/QD-TTg (Nov 20, 2008) and Decision No.35/2009/QD-TTg (Mar 3, 2009) as much as possible.

(d) **Ports and Shipping**

8.11 Vietnam is experiencing sustained and extremely high growth in shipping traffic, brought about by the demands of industrialization. This puts significant pressure on the ports and shipping subsector, and capacity enhancements through new berths or productivity enhancement are urgent issues. Compounding this matter is that ports in Vietnam are mainly located upstream of rivers, resulting in poor seaside accessibility, limiting the size of vessels that could enter its ports, or resorting to waiting for favorable tidal conditions.

8.12 The seaside accessibility of ports in Vietnam is constrained mainly by its limited depth. Compared to the main terminals of other ASEAN countries, Vietnam ports are lagging behind. Several proposals for a deep-sea port have been put forward, to address this problem, including the Cai Mep International Container Terminal in the south and Lach Huyen Port in the north.

8.13 Many projects are currently planned by various entities including state-owned enterprises (SOEs), joint ventures (JVs), and private companies in the maritime and industrial /energy sector. These projects are included in the list of potential projects by the VITRANSS 2 Study Team.

8.14 The key criteria to indentify port and shipping projects are as follows:

(a) **Development of Competitive International Gateway Ports and Key Regional Ports:** Deep-sea ports and access channels that can accommodate very large container vessels at any time should be developed in the South Focal Economic Zone (SFEZ) and the North Focal Economic Zone (NFEZ). In the central area, ports which contribute to the import and export of raw materials and products for economic zones

(EZs) should be developed. Furthermore, to promote a modal shift from land transportation to coastal sea transportation, facilities for a RORO system should be developed at key coastal shipping ports.

(b) **Enhancement of Connection between Sea and Land Transportation:** Effective road connection to all the gateway ports should be secured. In order to enhance the function of distribution centers and reduce their adverse effects on road traffic and the environment, plural domestic transportation modes including railway, inland waterway, and coastal shipping should be secured at gateway ports in the south FEZ and the north FEZ.

(c) **International Transshipment of Container:** Private investment, including foreign direct investment (FDI), and not state fund should be used in developing the international transshipment container port planned in Van Phong. Possible investors can be the global shipping lines, which deploy big numbers of ultra large vessels. Theer may only be a few such shipping lines, but they may have the capacity to raise funds needed to develop the Van Phong Port. Deep-sea gateway ports in the SFEZ can also function as an international transshipment site, so that shipping lines transporting cargo to/from the SFEZ need not incur additional costs associated with trunk-line vessels making port calls.

3) Inland Waterway

8.15 The role of inland waterway transportation is expected to become more significant, particularly in the north and south, as it will cater to the transportation of industrial products, such as construction materials (aggregates) and cement, fertilizer, coal and ore, Using IWT will continue to be more cost-effective for these products and will ease the demand for heavy trucks which degrade road facilities.

8.16 Regarding infrastructure management, to achieve more efficient and competitive inland waterway operation, the reinforcement of the core axes, removal of bottlenecks, and improvement of river port functions will be necessary, while improved maintenance will be crucial. The provision of navigational aids that allow nighttime navigation is also essential to raise vessels productivity.

8.17 Key investment areas for the Master Plan period are as follows:

(i) Forming a network of waterways in the delta region will improve the use of the waterways. It should include core axes through the region, industrial trunk lines for bulk and mass cargo, connection of hinterlands to coastal and gateway ports, and cross-border routes to Cambodia and China;

(ii) Enhancing port function to promote the modernization of and efficiency in port operation, including smooth interconnection at ports, and to promote passenger transportation via inland waterways;

(iii) Providing landing stages that can double as social infrastructure to support daily life and local industries;

(iv) Improving safety by installing navigation aids and establishing search and rescue systems;

(v) Constructing and expanding shipbuilding yards; and

(vi) Improving institutions.

4) Aviation

8.18 The aviation traffic in Vietnam is significantly high, brought about not only by international travel but also domestic travel. While the slowdown in the global economy may dampen air travel, it is expected that the high growth in air travel in Vietnam will continue up to the medium term. Already Noi Bai terminal is congested, and TSN just opened a new terminal. There are already plans to expand the primary terminals of Noi Bai, and a new terminal in HCMC is already being contemplated (i.e., Long Thanh). However, other airports in the country remain uncongested. While these new terminals are being prepared, there should be more focus on efficiency or productivity enhancements to relieve congested terminals, particularly Noi Bai.

8.19 The areas to be covered in the identification of projects for the short and medium terms are as follows:

(a) **Construction of New Airport:** The development of the Long Thanh International Airport has high development priority, since it is being eyed as an alternative to the Tan Son Nhat International Airport due to the increasing demand in the south.

(b) **Capacity Expansion of Existing Airports:** In consideration of the dense air traffic volume, national airport network, and importance of international air transportation, it is necessary to provide adequate capacity to major international airports. If the capacity of an airport has been reached, flight delays, congestion in the airside and landside, inconvenience to passengers, etc., will occur. To avoid these situations and the resulting bottleneck in economic activities, major international airports should be developed with sufficient capacity. At the same time, some domestic airports have experienced high traffic growth in the last decade. Therefore, the capacity of secondary airports should also be increased.

(c) **Improvement of Navigation Facilities:** In view of higher air passenger and cargo traffic in the future, navigation facilities have to be modernized.

5) Multimodal Transportation and Other Aspects

8.20 The development of an efficient multimodal transportation system in Vietnam is essential to promote foreign trade. It requires both investments in container handling facilities and the introduction of new systems. Infrastructure and institutional bottlenecks must be reduced to promote cross-border transportation of all types. Policy recommendations support these with proposals for introducing/simplifying the regulatory framework, encouraging foreign participation in investment and targeting government investment in the most effective way.

8.2 Identification of Candidate Master Plan Projects

8.21 The identified projects are categorized by subsector, as shown in Table 8.2.1. The categorization reflects major provisions to address transportation issues in each subsector. Projects with settled investment scheme are categorized as “committed” while other prpjects for which investments are not settled are categorized as “proposed”. For making “proposed” project list, VITRANSS2 study reviewed exisiting plans in Vietnam and removed some projects which is proper to be developed after 2030 while added some new proposed projects created by VITRANSS2.

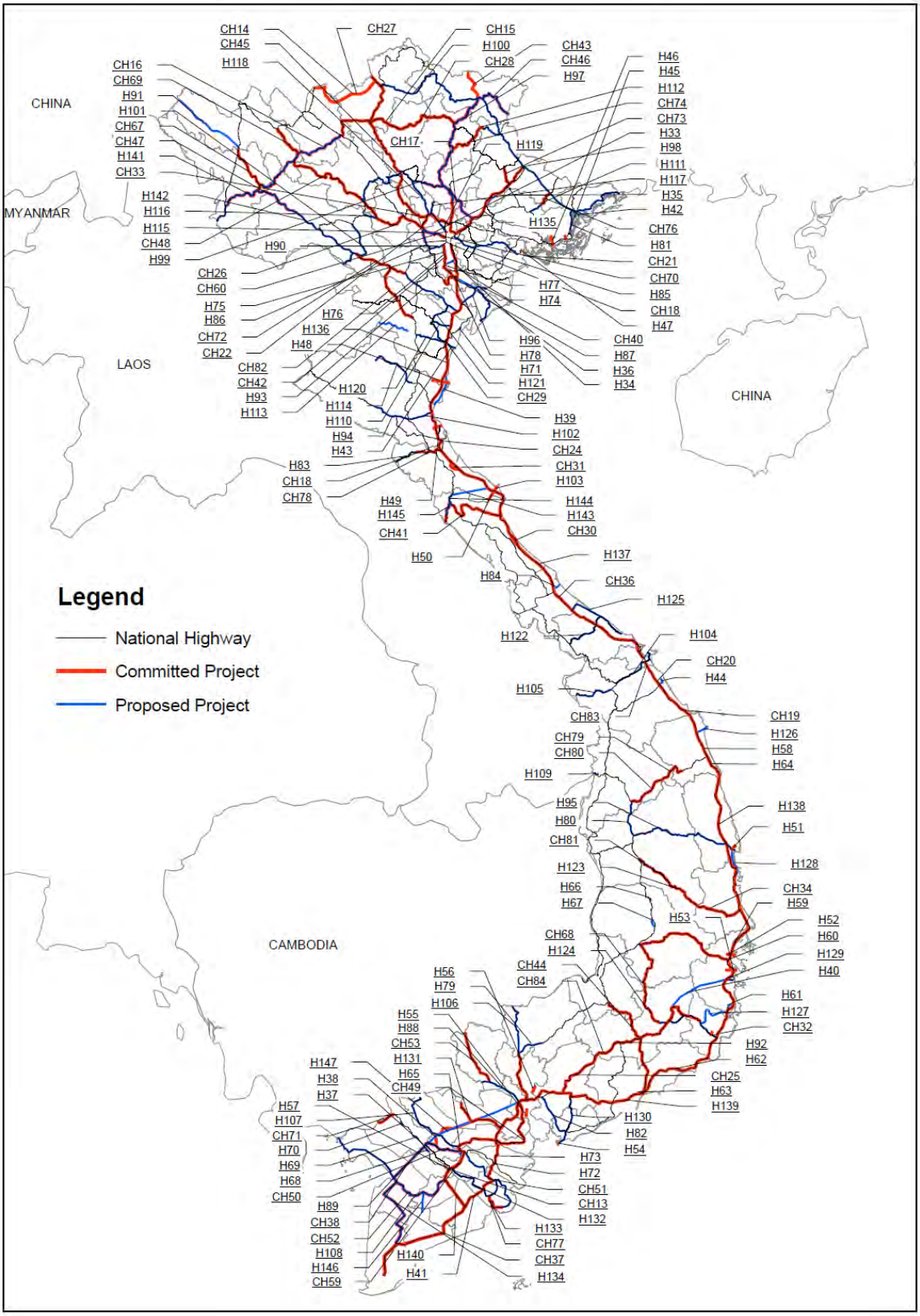
Table 8.2.1 Categories of Identified Transportation Projects by Subsector

Subsector	Project
1. Road	• Construction of new expressways (Proposed:32 projects committed:12 projects) • Construction of new roads (Proposed: 25 projects Committed:16 projects) • Construction of bypasses (Proposed: 21 projects Comiitted: 5 projects) • Improvement of roads/bridges (Proposed: 62 projects Committed: 51 projects) • Securing all-weather 2-lane roads on corridors (Proposed: 7 projects) • Improvement of traffic safety (Proposed: 9 projects Committed: 3 project)
2. Railway	• Improvement of existing lines for capacity expansion (Proposed: 6 projects Committed: 2 project) • Construction of new lines (Proposed: 5 projects Committed: 3 projects)
3. Ports & Shipping	• Expansion and upgrading of ports (Proposed: 25 projects Committed 13 projects)
4. IWT	• Waterway improvement (Proposed: 37 projects Committed: 9 projects) • Improvement of river port Proposed: 6 projects Committed: 3 projects) • Landing stages improvement (Proposed: 1 project Committed: 1 project) • Safety improvement (Proposed: 2 projects) • Ship building (Proposed: 2 projects) • Institution improvement (Proposed: 3 projects Committed: 2 projects) • Maintenance (Proposed: 1 project Committed: 1 project)
5. Aviation	• Construction of new airport (Proposed: 1 project Committed: 1 project) • Capacity Expansion of existing airport (Proposed: 13 projects Committed: 7 projects) • Improvement of navigation facility (Proposed: 2 project Committed: 2 projects)
6. Multimodal (Logistics)	• Construction of new facility for multimodal cargo handling (Proposed: 5 projects)

Note: NSHSR project is excluded in this table. Refer chapter.10 for description and evaluaton of NSHSR project.

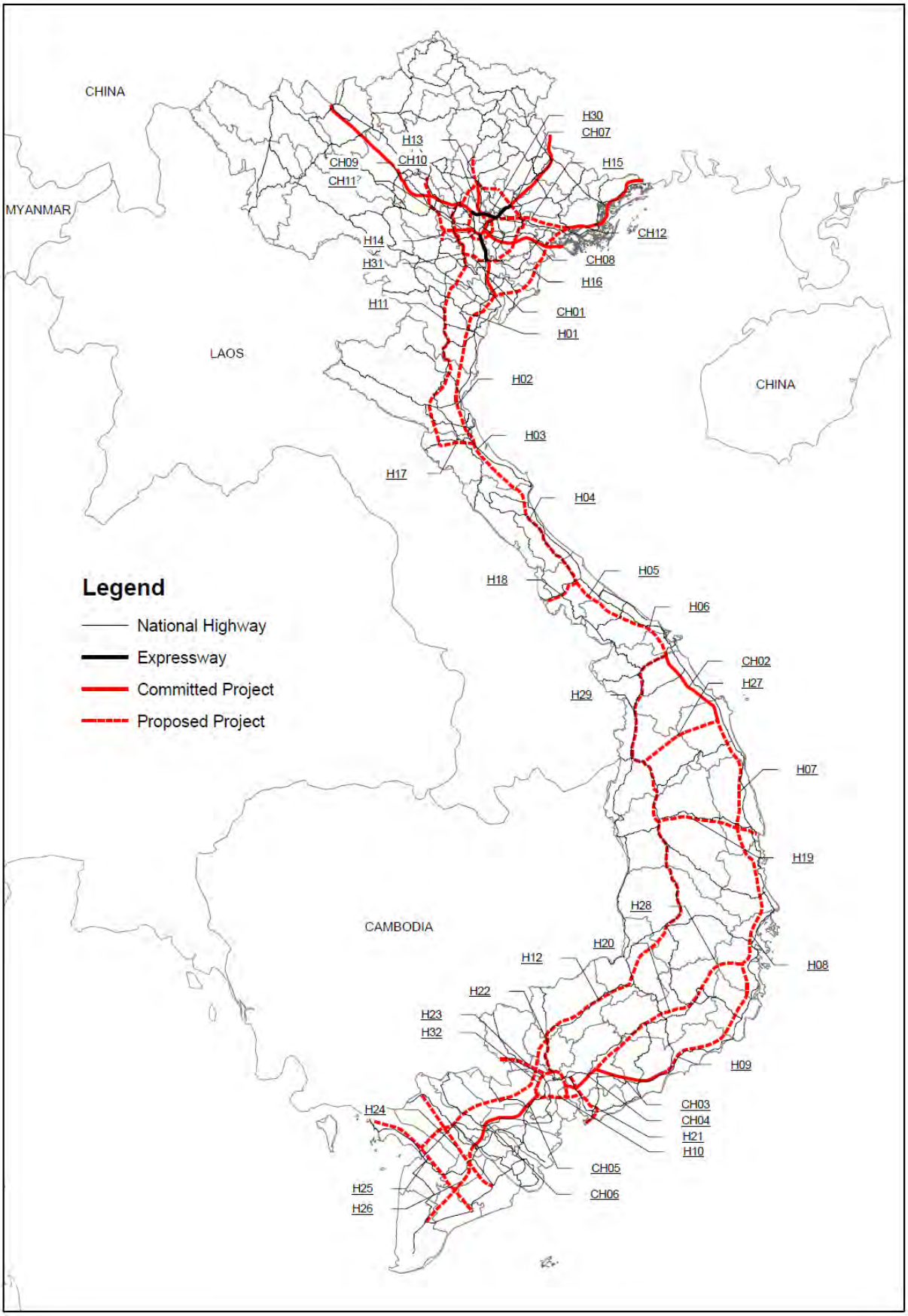
8.22 The total cost of ongoing/committed projects and proposed projects is around USD27 billion and USD140 billion, respectively. Both projects are listed in ***Appendix 8A***. All ongoing/committed projects are automatically included in the master plan up to 2020. However, proposed projects are still candidates and are subject to the evaluation described in the next section. Figures 8.2.1 through 8.2.6 show the location of these projects.

Figure 8.2.1 Candidate Road and Road Transportation Projects up to 2030 (National Highways)



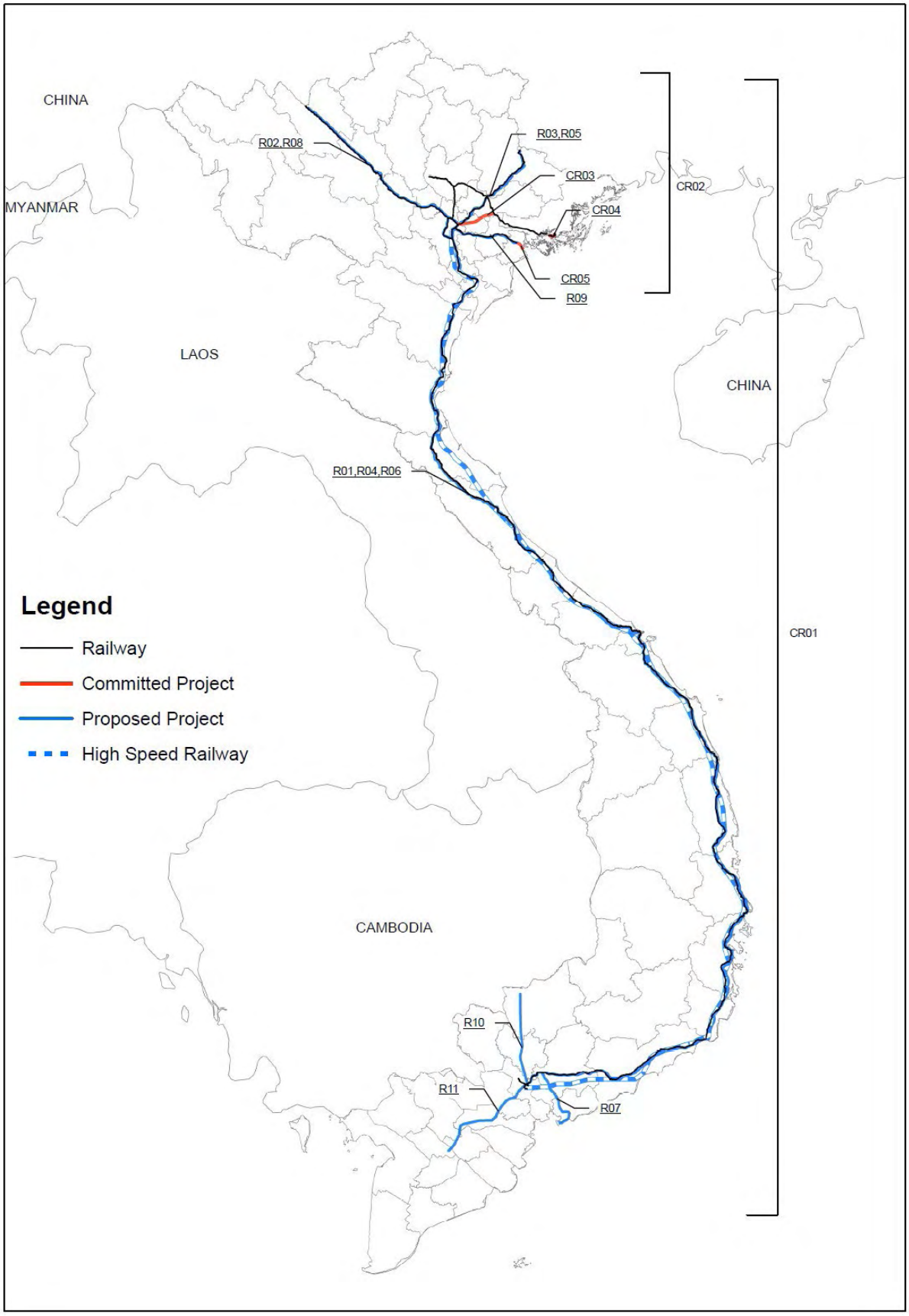
Source: VITRANSS 2 Study Team.

Figure 8.2.2 Candidate Road and Road Transportation Projects up to 2030 (Expressways)



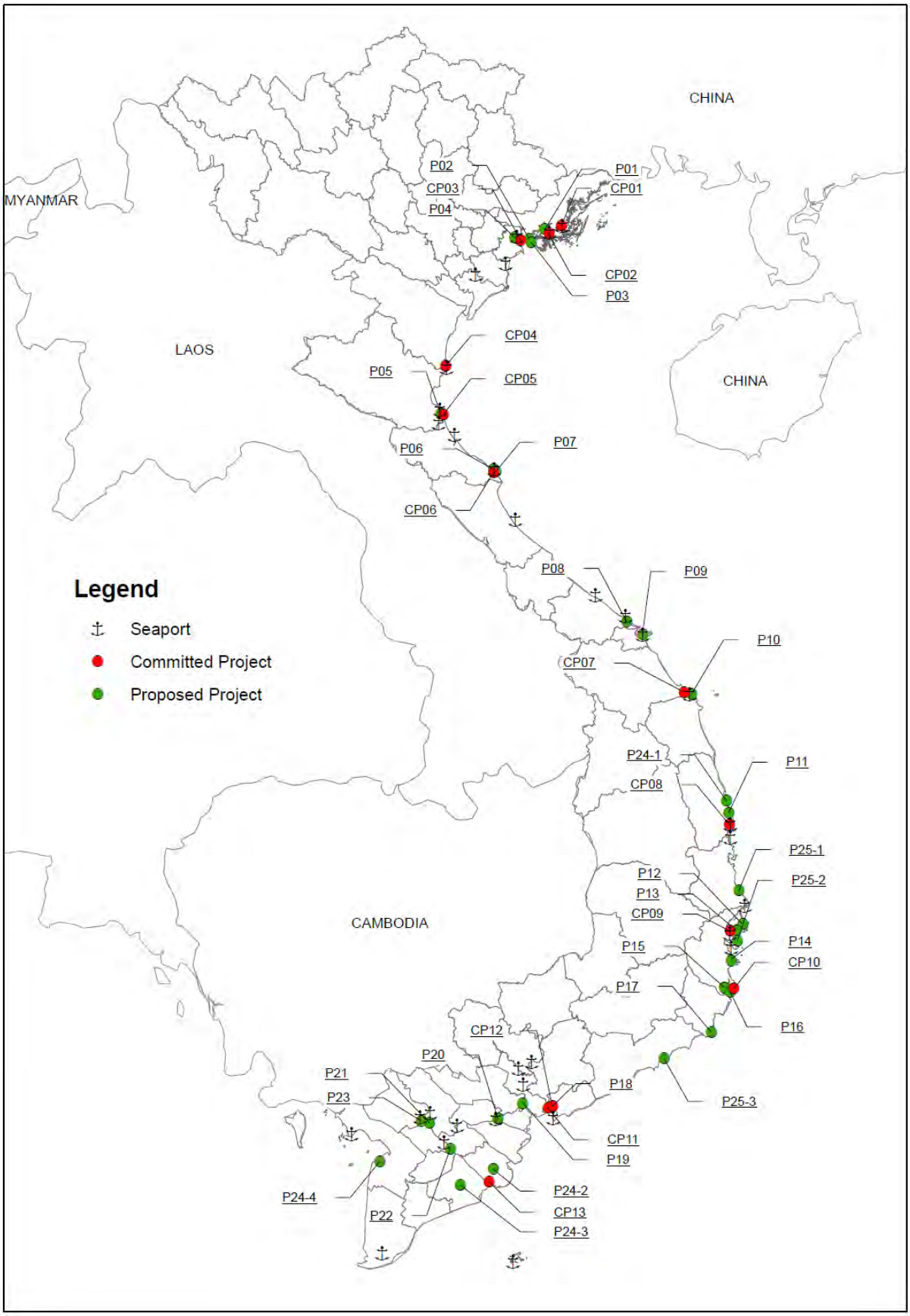
Source: VITRANSS 2 Study Team.

Figure 8.2.3 Candidate Railway Projects up to 2030



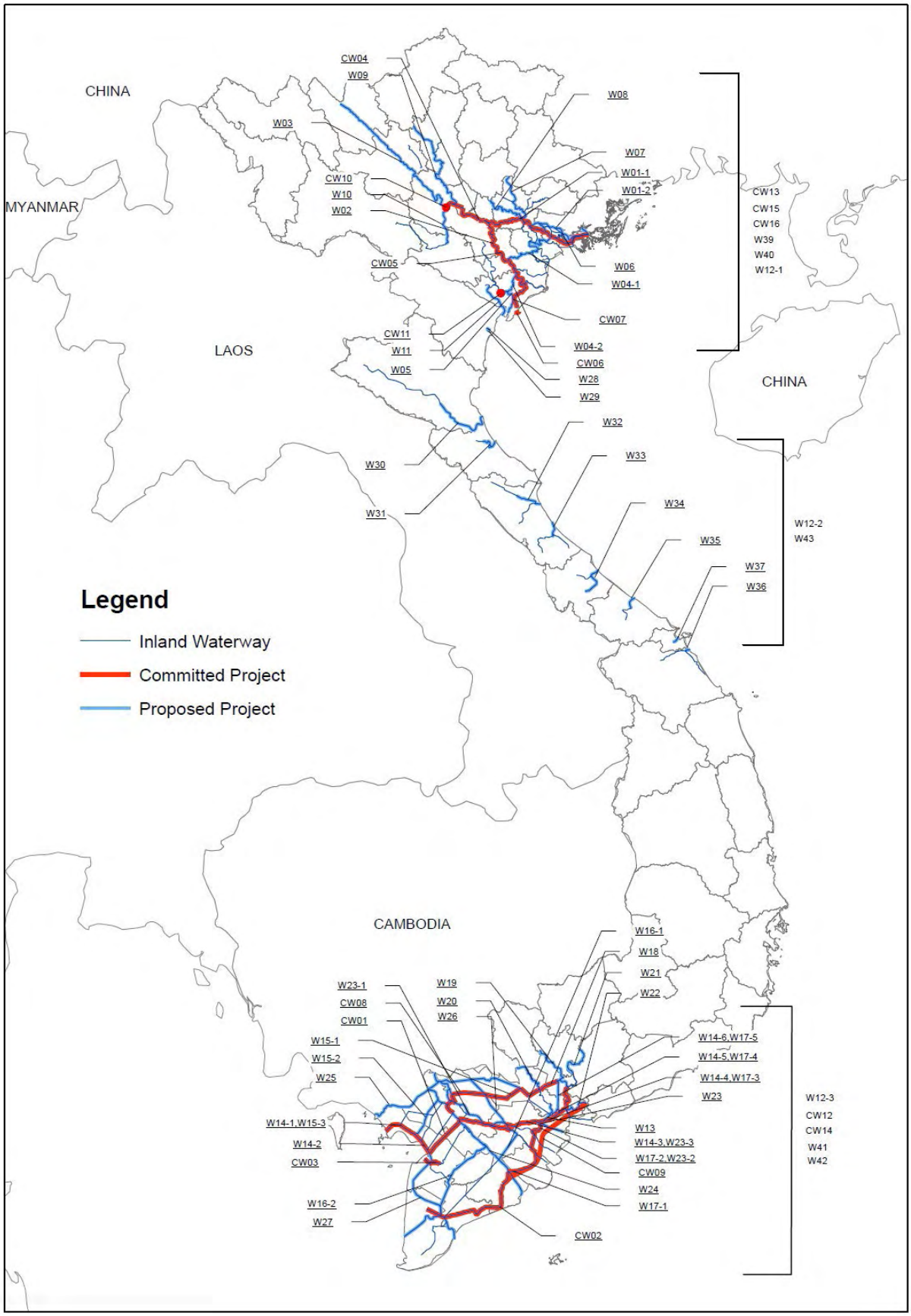
Source: VITRANSS 2 Study Team.

Figure 8.2.4 Candidate Port and Shipping Projects up to 2030



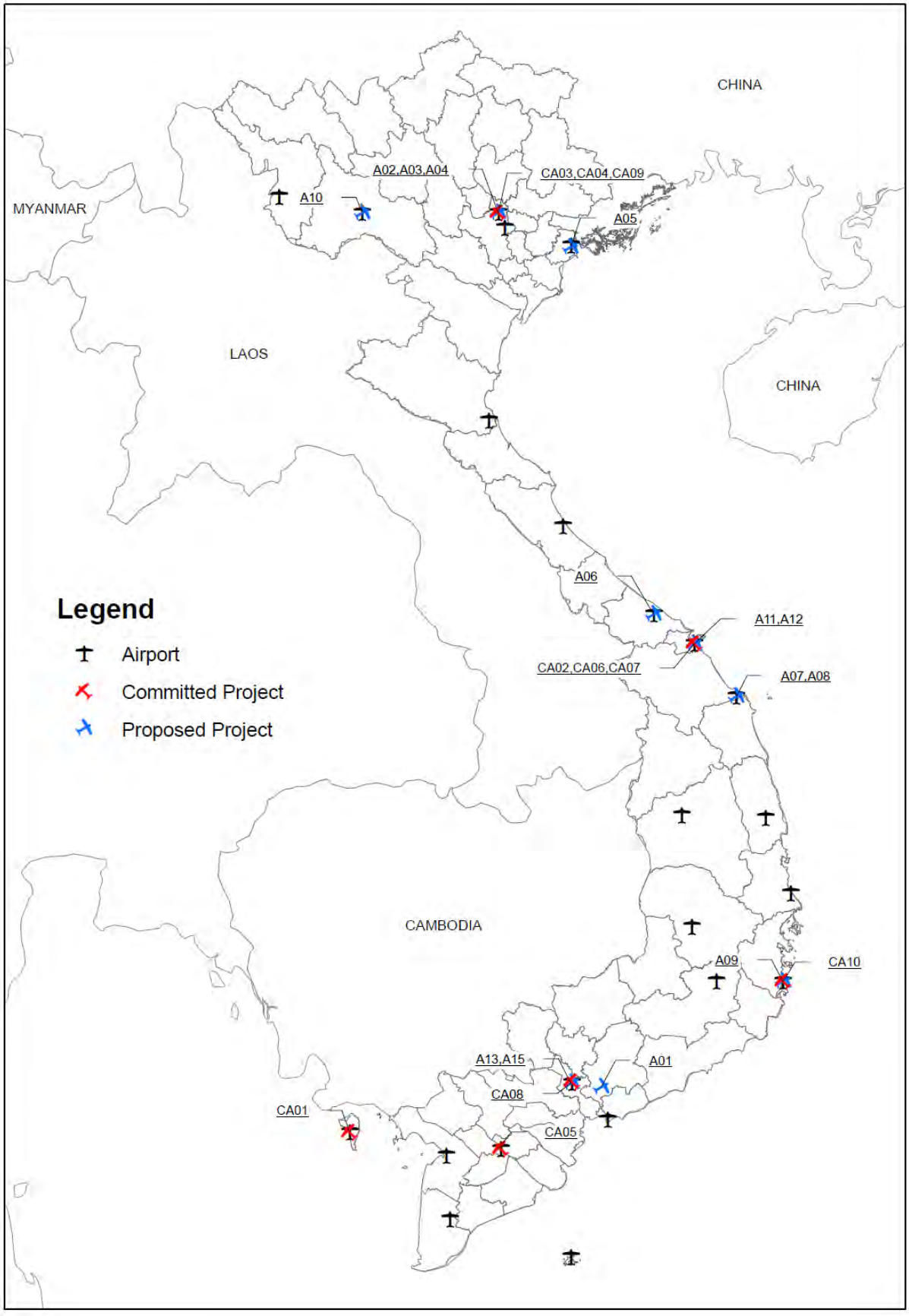
Source: VITRANSS 2 Study Team.

Figure 8.2.5 Candidate Inland Waterway Projects up to 2030



Source: VITRANSS 2 Study Team.

Figure 8.2.6 Candidate Air Transportation Projects up to 2030



Source: VITRANSS 2 Study Team.

8.3 Evaluation of Candidate Projects

1) Methodology

(1) Background

8.23 Many candidate projects have been prepared for the VITRANSS Master Plan as shown in the previous section, total cost of which reach around USD167 billion. However, the available budget for investment in the coming 10 years is limited, presumably at a level far below the total cost of the candidate projects. Consequently, prioritization of the candidate projects is important.

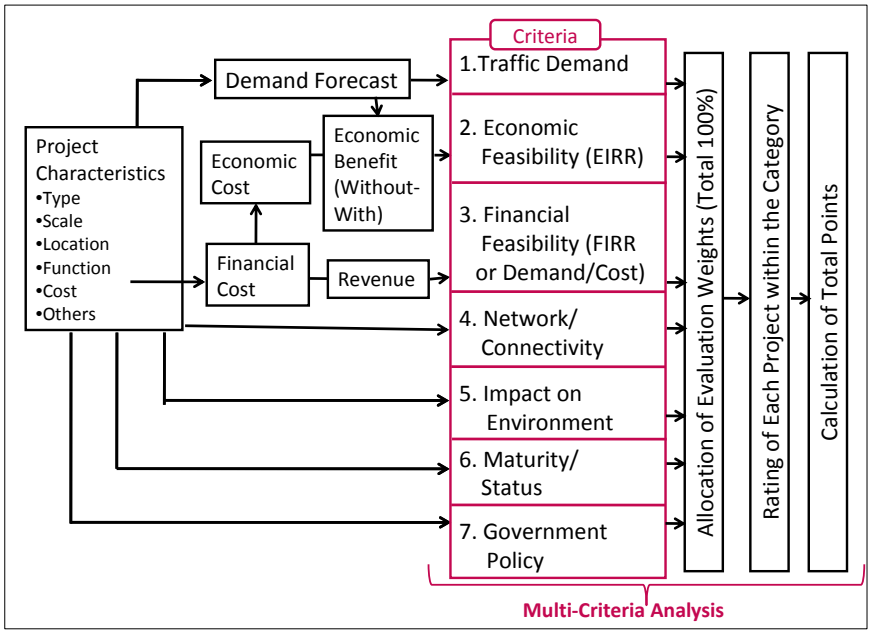
8.24 Among the criteria for project evaluation, economic feasibility seems to be one of the most important criteria with regard to the present situation in Vietnam, where a rapid economic growth is regarded as a national goal. To prioritize the projects, an economic evaluation, then a preliminary environmental assessment of the candidate projects were carried out.

8.25 In principle, the economic benefits of the projects were estimated based on a comparison of the "with and without project" scenarios. The parameters for this procedure are as follows: (i) the cargo transportation demand was preloaded before passenger OD volumes were assigned on the network, and, (ii) the modal share was re-forecasted for each project because the modal share is supposed to be affected by a project to be evaluated.

8.26 Finally, a multicriteria analysis (MCA) was conducted, adopting the following items as evaluation criteria: (i) demand, (ii) economic feasibility, (iii) financial feasibility, (iv) network connectivity, (v) environmental impact, (vi) maturity of the project for implementation, and (vii) harmonization with the national development policy.

8.27 In order to make an analysis on relative priority, a project was assumed to be implemented from 2016 to 2019 and open for service by 2020. Project life was assumed to be 30 years until 2050 with no residual value at the end of a project's life. The methodology is shown in Figure 8.3.1.

Figure 8.3.1 Project Prioritization



(2) Assumptions for Simplified Benefit Estimate

8.28 Annual demand from 2020 to 2030 was interpolated using the growth rate of 2020 to 2030 and beyond 2030 until 2050. This resulted in a 4.87% average overall growth rate in trip generation.

8.29 In case the output of the with-and-without-project comparison was not within the reasonable range, a more simplified method was applied where only the direct user's benefit was estimated. The basic data used for the estimation are future time value, VOC, and unit cost of cargo transportation as shown in tables 8.3.1 to 8.3.4.

(a) **Expressways and Bypasses:** Travel speed on expressways was assumed to be 80km/h, while that on an ordinary road was 30km/h if the traffic volume on the expressway was more than 60,000pcu/day; otherwise, it was assumed to be 40km/h. The EIRRs of expressway projects were estimated using the steps described below. These were also used to estimate the EIRRs of highways and all-weather roads.

  (i) **Step 1:** Convert the financial cost of the project to evaluate the economic cost by multiplying the conversion factor of 0.85 and distributing the economic cost among years within the investment period of 2016 to 2019 at a rate of 10: 30: 30 and 30.

  (ii) **Step 2:** Estimate demand in terms of pcu-km by retrieving traffic volume on project links from the resulting traffic assignments for years 2020 and 2030.

  (iii) **Step 3:** Estimate pcu-km of internal traffic by adopting the method stated in the next item of (3) Assumptions on Intrazonal Traffic. The resulting figure is added to the above pcu-km.

  (iv) **Step 4:** Estimate the economic benefit from using the project expressway by referring to the unit VOC shown in Table 8.3.2. For the period beyond 2030, the trend in the preceding 10 years was extrapolated but this leveled off after reaching the capacity.

  (v) **Step 5:** Estimate IRR. It should be noted that the IRR cannot be obtained if the simple sum of costs and benefits during the project life of 35 years is negative with a large absolute value.

(b) **Highway Improvement:** For a newly built highway, a travel speed of 80km/h was assumed. That on a new highway with a widening component was assumed at 30km/h and 60km/h before and after project completion, respectively. If the project does not include widening, travel speeds of 20km/h and 40km/h before and after project completion were assumed.

(c) **All-weather Roads:** The travel speed on roads that will be upgraded to all-weather roads including widening was assumed at 20km/h and 40 km/h before and after project completion. If the project does not include widening, 30km/h and 40km/h travel speeds were assumed before and after project completion.

(d) **Railway:** Double tracking project will significantly reduce travel time. The operating speed of a train was assumed at 40km/h on a single-track railway and 80km/h on a double track section. Cargo transportation cost is reduced by 30% if an improvement project was assumed to be done on the single track and 40% by a double tracking project. In the case of a new railway, all the demands of passengers and cargoes were assumed to be converted from road transportation. EIRRs of railway, as well as port, inland waterway and aviation projects, were estimated using the following procedure:

Table 8.3.1 Future Time Value by Mode

(USD)

Item	Mode	2008	2010	2020	2030
Average Income	Car/Air	400	422	694	1057
(USD/month)	Bus/Rail/IWT	200	211	347	529
Passenger Time	Car/Air	2.50	2.63	4.34	6.61
Cost (USD/hour)	Bus/Rail/IWT	1.25	1.32	2.17	3.30

Source: VITRANSS 2 Study Team.

Notes: 1) 160 working hours per month. 2) Income growth in proportion to per capita GDP, 3) Official salary of government employee is VND1.7million for a month (21 days). This was doubled for demand forecast.

Table 8.3.2 Vehicle Operating Cost

(USD/1000km/Vehicle)

Velocity (km/h)	Car	S.Bus	N.Bus	S.Truck	L.Truck
60	153.2	206.8	392.3	307.3	320.3
40	169.4	249.9	375.8	340.9	370.3
30	198.2	306.6	434.6	386.4	450.2
20	251.6	421.1	540.1	500.2	616.3

Source: VITRANSS 2 Study Team.

Table 8.3.3 Transportation Unit Cost by Mode by Cargo Type

(USD/ton/km)

Mode	Cargo Type				
	Dry Bulk	Liquid Bulk	Perishables	Bag	General /Container
Road	0.098815	0.098815	0.098815	0.098815	0.033243
Rail	0.012350	0.012529	0.014324	0.012529	0.013824
IWT	0.008870	0.009588	0.009588	0.010161	0.009588
Sea	0.006118	0.006118	0.006118	0.006118	0.006118
Air	0.588235	0.588235	0.588235	0.588235	0.588235

Source: VITRANSS 2 Study Team.

Table 8.3.4 Transshipment Cost between Mode by Cargo Type

(USD/ton)

Mode		Cargo Type				
		Dry Bulk	Liquid Bulk	Perishables	Bag	General/ Container
Road→	Rail	2.915	2.941	3.382	2.941	3.235
	IWT	3.106	3.382	3.382	3.573	3.382
	Sea	7.824	7.824	7.824	7.824	7.824
	Air	224.118	224.118	224.118	224.118	224.118
Rail→	Road	2.915	2.941	3.382	2.941	3.235
	IWT	4.845	5.147	5.588	5.338	5.441
	Sea	9.562	9.588	10.029	9.588	9.882
	Air	225.856	225.882	226.324	225.882	226.176
IWT→	Road	3.106	3.382	3.382	3.573	3.382
	Rail	4.845	5.147	5.588	5.338	5.441
	Sea	9.753	10.029	10.029	10.220	10.029
	Air	226.047	226.324	226.324	226.515	226.324
Sea→	Road	7.824	7.824	7.824	7.824	7.824
	Rail	9.562	9.588	10.029	9.588	9.882
	IWT	9.753	10.029	10.029	10.220	10.029
	Air	230.765	230.765	230.765	230.765	230.765
Air→	Road	224.118	224.118	224.118	224.118	224.118
	Rail	225.856	225.882	226.324	225.882	226.176
	IWT	226.047	226.324	226.324	226.515	226.324
	Sea	230.765	230.765	230.765	230.765	230.765

(i) **Step 1:** Convert the financial cost of the project to evaluate into the economic cost by multiplying a conversion factor of 0.85 and distributing the economic cost among the investing period of 2016 to 2019 at the rate of 10: 30: 30 and 30.

(ii) **Step 2:** Estimate transportation demand of the project in terms of passenger-km and ton-km by retrieving the traffic volume on project links from the resultant file of traffic assignment in years of 2020 and 2030.

(iii) **Step 3:** As for railway passengers, estimate reduction of travel time based on above-mentioned improvement in operating speed and convert it to economic benefit by multiplying future time value shown in Table 8.3.1. The estimate was done for the years 2020 and 2030.

(iv) **Step 4:** As for cargo transportation, estimate transportation cost in case of "without project". In this case, it was assumed that all the passengers of a new railway project were converted from bus transportation and in the case of a single track improvement, 20% of passengers were converted from bus transportation and 40% of passengers in the case of a double track improvement. As a result, transportation cost would be reduced by 85% for a new line, 30% for a single line improvement and 40% for a double track improvement.

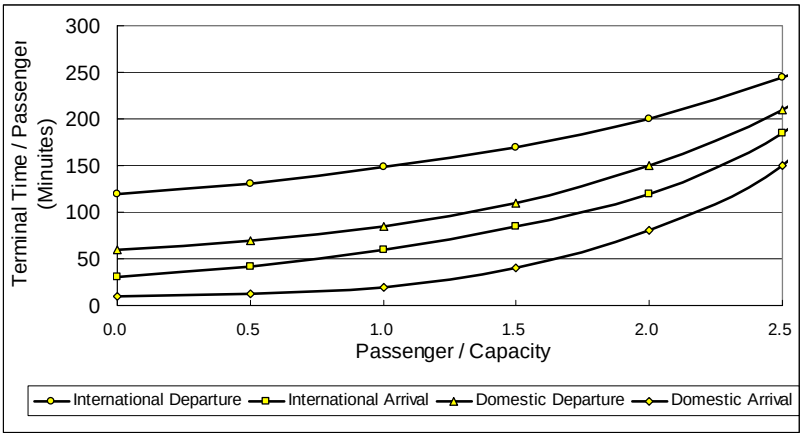
(v) **Step 5:** Estimate the total economic benefit from using the project railway by adding the benefits enjoyed by passengers and cargoes.

(vi) **Step 6:** Estimate IRRs. It should be noted that the IRR does not exist if a simple sum of costs and benefits during the project life of 35 years is negative with a large absolute value.

(e) **Port and Inland Waterway Transportation:** There are two kinds of projects: improvement of channels and development/improvement of a port. The former will cause a reduction in shipping costs and the latter will bring about a reduction in cargo-handling costs at ports. By improving channels, a cost reduction of about 10-20% was assumed by type of commodity. Savings in cargo-handling cost was assumed at 30 50% according to cargo type.

(f) **Aviation:** The new airport was compared under a "with-and-without project" scenario. The economic benefit of a terminal building project is savings in terminal time. To measure it, the relationship between terminal time and congestion ratio was assumed as shown in Figure 8.3.2. To evaluate a runway extension project, air transportation cost was assumed to decrease by 20% due to the operation of larger aircraft.

Figure 8.3.2 Terminal Time of Air Passengers and Terminal Congestion



Source: VITRANSS 2 Study Team

(3) Assumptions on Intrazonal Traffic

8.30 In the VITRANSS studies, provinces were used as traffic zones to undertake a series of traffic surveys, develop database, and forecast traffic. Consequently, the main concern was interprovincial traffic and transportation. Internal traffic (traffic with trips starting and ending in the same zone) was ignored based on an assumption that the network for assignment consists of main traffic routes which are mainly used by interzonal traffic, while internal traffic will use other secondary or minor routes. In reality, however, traffic routes other than the main routes are rather limited and disregarding internal traffic resulted in underestimations of traffic demand which in turn led to underevaluation of projects. This tendency is generally true especially in road projects.

8.31 The OD survey of VITRANSS was principally conducted at zonal boundaries (i.e., provincial boundaries). Therefore, internal traffic was not captured. Internal traffic data is very limited because it was obtained only through interview surveys. In this study, it was boldly assumed based on the experience of the VITRANSS 2 Study Team. The assumed internal traffic was treated in the same way with interzonal traffic on the calculation of benefit.

8.32 For the first step, land use in the area of the assumed road project was identified based on the district's population density in 2005. This identification was done assuming the following simplified categorization:

X = 0	unutilized, mountainous, or forest land
0 < X <= 30	agricultural land
3 < X <=60	semi-urbanized area
60	X <=100 urbanized area

Where, X = percentage in the total length of the link length located in an area with a population density of 10 or more persons per square kilometer.

8.33 The ratios of internal traffic (intrazonal traffic) to road capacity were assumed based on road category and land use along the road, as shown in Table 8.3.5. The ratios were set based on the experiences in Japan and have to be verified with the Vietnamese data as they are accumulated.

Table 8.3.5 Ratio of Internal Traffic to the Road Capacity

(%)

Land Categiry	Expressway Construction	Highway Construction	Highway Improvement	All-weather Road
Unutilized, Mountainous, or Forest Land	30	10	5	-
Agricultural Land	40	20	10	-
Semi-urbanized Area	50	50	20	50
Urbanized Area	70	60	30	70

Source: VITRANSS 2 Study Team.

2) Economic Evaluation

(1) Evaluation by Subsector

8.34 Prior to the evaluation of individual projects, all the candidate projects were economically evaluated by subsector. Table 8.3.6 shows the results of the analysis. Expressway, railway, port and aviation projects are not feasible as a whole. They include many subprojects that are not feasible or whose demand was not forecast properly. For example, some urban expressway projects were not properly evaluated and which used with in-

terprovincial traffic only without the intraurban movement.

Table 8.3.6 Economic Benefit and EIRRs of all Projects by Subsector

(USD million at 2008 price)

Network	Total Cost	Economic Benefit		EIRR (%)
		2020	2030	
Expressway Projects	60,902	1,678	4,641	10.1
Road Projects	7,150	357	679	13.4
Railway Projects	41,083	775	2,224	4.1
Port Projects	8,673	678	990	11.3
IWT Projects	1,026	249	420	24.8
Aviation Projects	7,400	269	543	7.1

Source: VITRANSS 2 Study Team.

Notes: 1) Projects in the table are limited to infrastructure projects selected for EIRR analysis, exclusive of maintenance and rehabilitation projects.
2) Projects, which were not evaluated in the following sections, are not included in the evaluation of this table.

(2) Roads Subsector

8.35 Projects in the road subsector were subdivided into three categories of expressway, highway, and bypass projects and evaluated based on the assumption that no modal shift would occur due to any road project. Then, the economic benefit of a project was assumed to accrue only from a diversion of traffic to the project.

(a) Expressway Construction

8.36 The following were assumed in estimating the EIRR:

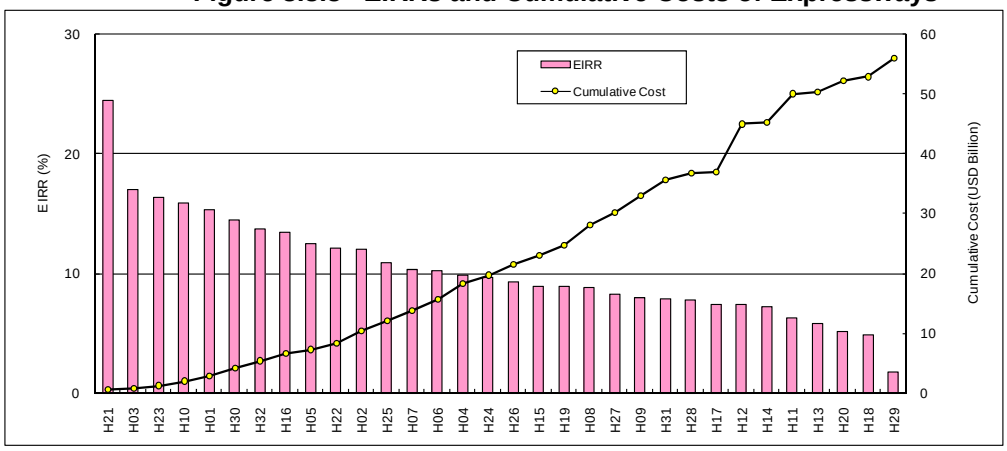
(i) Travel speed on the project expressway is 80km/h regardless of traffic volume;

(ii) Travel speed on an ordinary road before being converted into an expressway is 40km/h if the daily traffic volume after conversion is less than 60000pcu; otherwise, it is 30km/h; and

(iii) Toll rate on the expressway is USD0.05 per pcu-km.

8.37 Figure 8.3.2 shows the EIRR of expressway projects in descending order, together with the cumulative costs. If there is a budgetary constraint in expressway development, projects have to be selected. This can be done by finding the intersecting point between cost and feasible EIRRs. Projects to the left of that intersection are those to be implemented using the budget.

Figure 8.3.3 EIRRs and Cumulative Costs of Expressways



Source: VITRANSS 2 Study Team

8.38 Elveven (11) out of 32 expressway projects are judged economically feasible having EIRRs higher than 12%.

(b) Road/Highway Construction

8.39 The following were assumed to estimate the EIRRs:

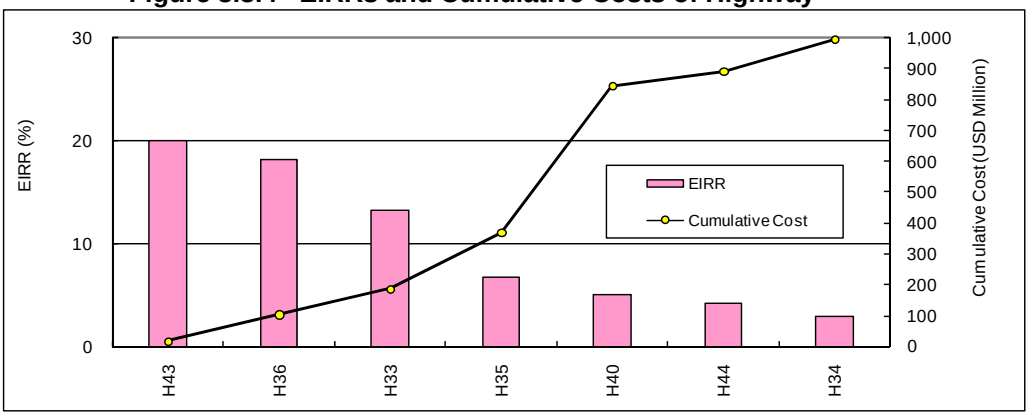
(i) Travel speed on a widened highway was assumed to be 60km/h and that on an improved highway was 40km/h, regardless of traffic volume;

(ii) Travel speed on a widened ordinary road was assumed to be 30km/h and that on an improved road was 20km/h; and

(iii) The share of business trips was assumed at 50%.

8.40 There are 14 projects examined, three of which were identified to be economically feasible. Seven (7) projects have no calculated IRR due to low benefit or lack of traffic forecast.

Figure 8.3.4 EIRRs and Cumulative Costs of Highway



Source: VITRANSS 2 Study Team.

(c) Bypass Construction

8.41 Most of the local cities in Vietnam straddle a highway or an intersection with no detour route, forcing through traffic to pass through the town center, which in turn causes traffic congestion and accidents. Therefore, the need for a bypass will remarkably increase in the future along with the progress of urbanization and motorization. As part of the road plan, the development of urban bypasses was proposed by checking traffic volume on the nationwide highway network and urban size in terms of population, which identified 21 bypass projects (H58 H78), the.total cost of which was estimated at USD798 million. The average cost of one bypass is about USD38 million. The lengths of the bypasses differ by town size but were assumed to be at least 10km with four lanes in both directions.

8.42 The following were assumed to estimate the EIRR of bypass projects:

(i) Travel speed on a bypass was assumed at 60km/h. That on an ordinary highway before bypass construction, travel speed was assumed at 20km/h, regardless of traffic volume;

(ii) Unit VOC and TTC are estimated as shown in Table 8.3.7;

(iii) Some bypasses are proposed as toll roads by the Government of Vietnam and desirably implemented under a BOT or PPP scheme. Therefore, a financial analysis was conducted to examine the applicability of these schemes. A distance-proportional fare of USD0.05/km/pcu was assumed for all the projects, also assuming that this fare

charge would not affect traffic volume taking the bypass. Annual operating and maintenance cost was assumed to be 2% of the project cost plus 10% or toll revenue; and

(iv) In this simplified economic evaluation, only users' direct benefit was quantified as economic benefit. Other benefits, such as alleviation of traffic congestion in the city and decrease in traffic accidents, would be generated by the project. Consequently, the resultant EIRR should be a rather conservative estimate. Out of 21 projects, 6 projects have an EIRR higher than 12% and are judged economically feasible; the other 15 projects are deemed to be still premature to open in 2020.

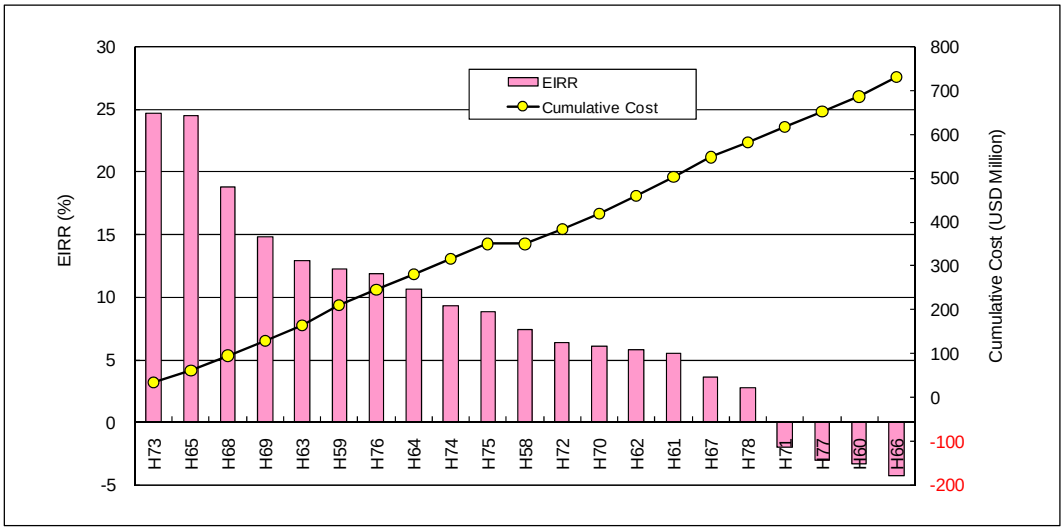
Table 8.3.7 Economic Benefits of Urban Bypasses

(USD /1000vehicle-km)

Item	Speed	Car	Bus	Truck
VOC	20km/h	251.6	540.1	616.3
	60kn/hour	153.2	392.3	320.3
TTC	20km/h	991.5	2392.5	-
	60kn/hour	330.5	797.5	-
Total	20km/h	1243.1	2932.6	616.3
	60kn/hour	483.7	1189.8	320.3
Economic Benefit		759.4	1742.8	296.0

Source: VITRANSS 2 Study Team

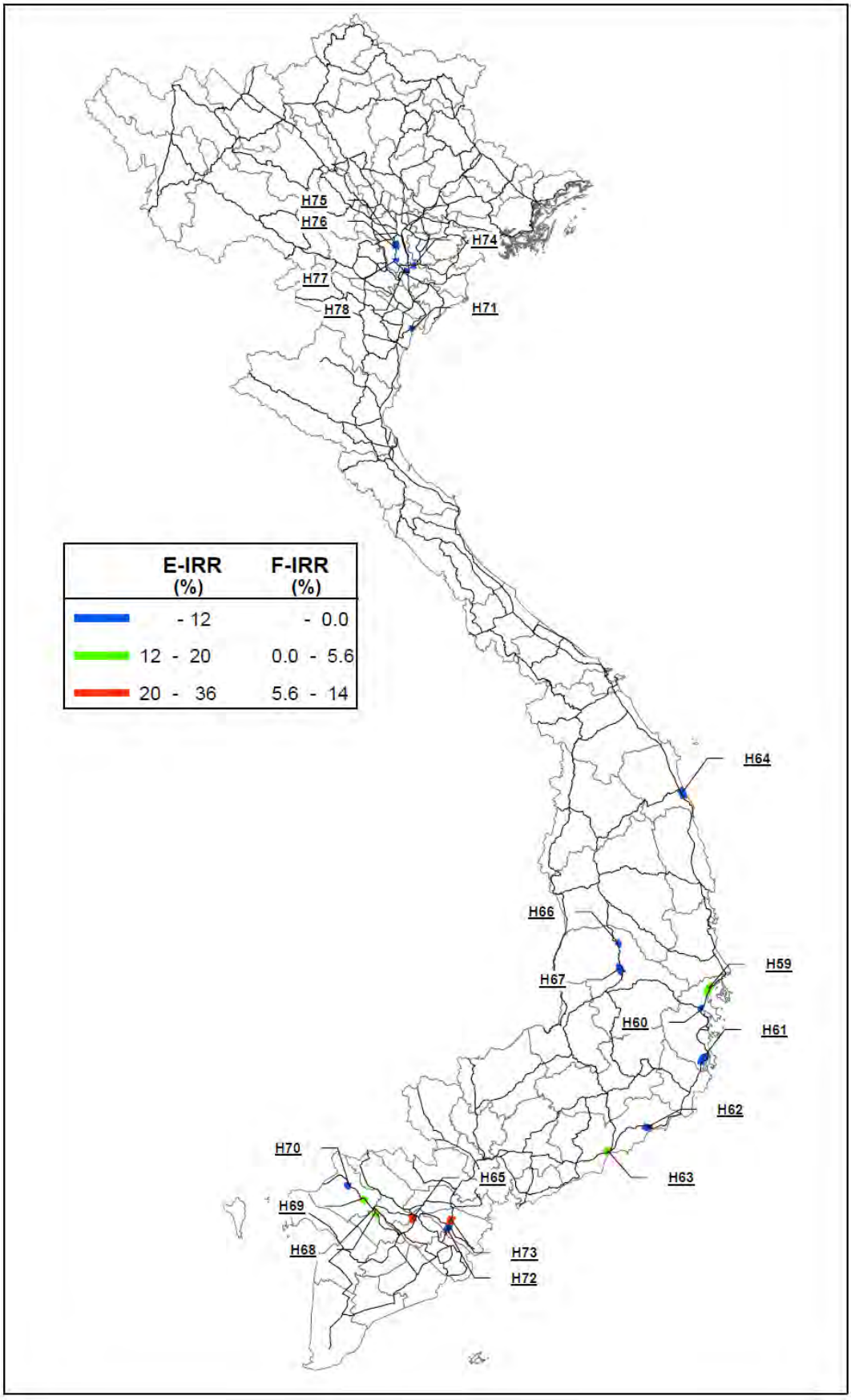
Figure 8.3.5 EIRRs and Cumulative Costs of Bypasses



Source: VITRANSS 2 Study Team

8.43 As Figure 8.3.6 shows, bypass projects with high EIRRs are located between the Southeast and Mekong River Delta regions. On the other hand, around Hanoi–Nam Dinh–Thanh Hoa Corridor in the northern region, EIRRs of bypass projects are low. This is because existing and/or committed/ongoing expressways will play a role as bypass and the additional bypass projects will just provide extra capacity and lead to overinvestment

Figure 8.3.6 Location of Bypass Projects with High EIRRs



Source: VITRANSS 2 Study Team.

(d) Improvement of Roads and Bridges

8.44 Proposed 56 projects for road and bridge improvement were evaluated. Out of them, 21 projects showed EIRR higher than 12%.

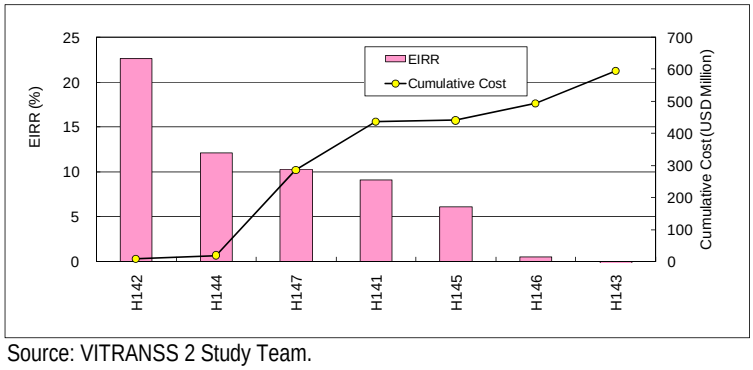
Figure 8.3.7 EIRRs and Cumulative Costs of Road/Bridge Projects

Source: VITRANSS 2 Study Team.

(e) Securing All-weather 2 Lane Roads on Corridors

Figure 8.3.8 presents the result of economic evaluation for the seven (7) "all-weather 2-lane road" projects. The roads that are located in between major corridors and function as semi-arterials have higher EIRRs. In contrast, EIRRs are low for the roads located near the border area with little traffic volume.

Figure 8.3.8 EIRRs and Cumulative Costs of Securing All-weather 2-Lane Roads

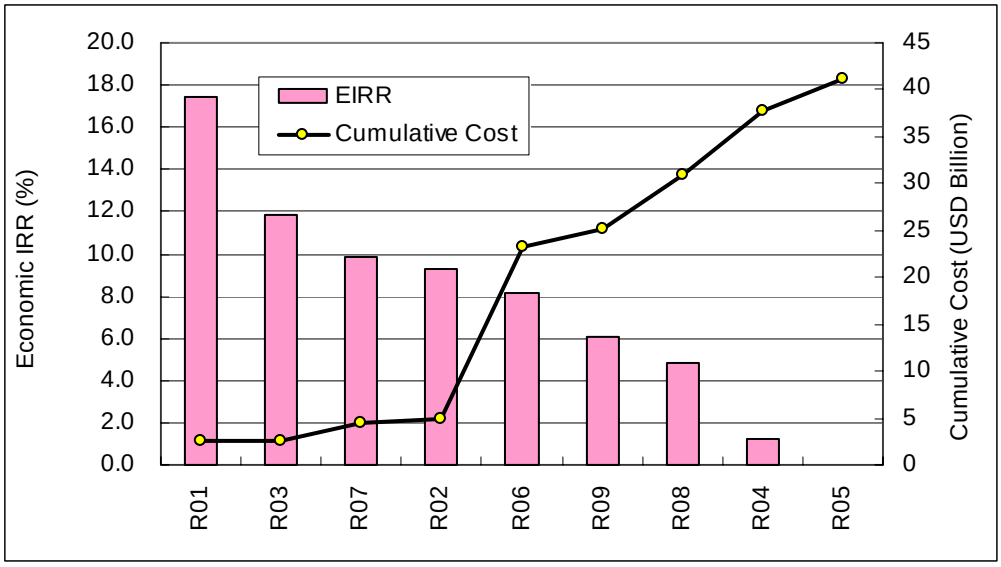


Source: VITRANSS 2 Study Team.

(3) Railway Subsector

8.45 In the same way as other modes, railway projects were evaluated by estimating direct user benefit of passengers and cargoes. However, a project with large-scale investment becomes hardly feasible without taking into consideration the benefits it brings to another mode and/or some regional development benefit. Out of nine candidate projects, only one project (R01) was judged feasible. The others are not necessarily unfeasible if scrutinized. In this study, however, the main purpose is to set prioritities. Estimated EIRRs are shown in Figure 8.3.9.

Figure 8.3.9 EIRRs and Cumulative Costs of Railway Projects

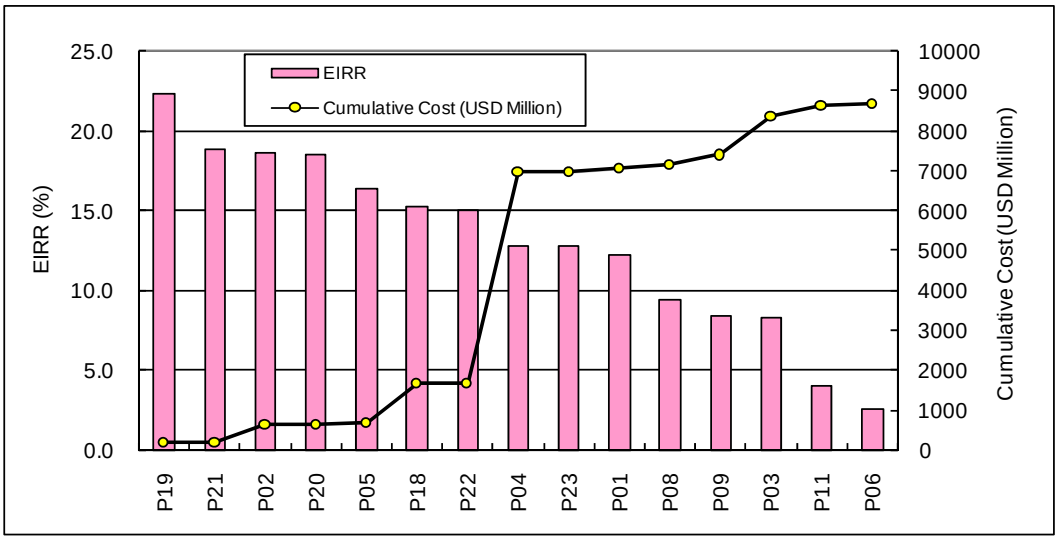


Source: VITRANSS 2 Study Team.

(4) Maritime Subsector

8.46 By counting the decrease in shipping and transshipment costs as an economic benefit of a port development and improvement project, ten (10) projects were judged feasible, as shown in Figure 8.3.10.

Figure 8.3.10 EIRRs and Cumulative Costs of Port Projects

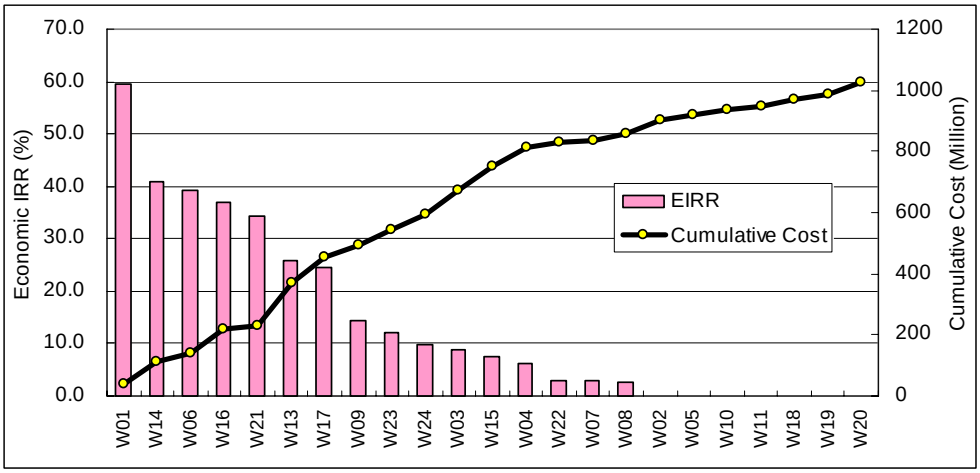


Source: VITRANSS 2 Study Team.

(5) IWT Subsector

8.47 IWT projects were classified into two categories: channel improvement and port development/improvement. Savings in shipping cost is the main benefit from the former, while savings in transshipment cost is from the latter. The investment costs of IWT projectsare are rather small in scale and EIRRs tend to become very high in general, as shown in Figure 8.3.11. Out of 23 projects, eight projects were judged economically feasible.

Figure 8.3.11 EIRRs and Cumulative Costs of IWT Projects

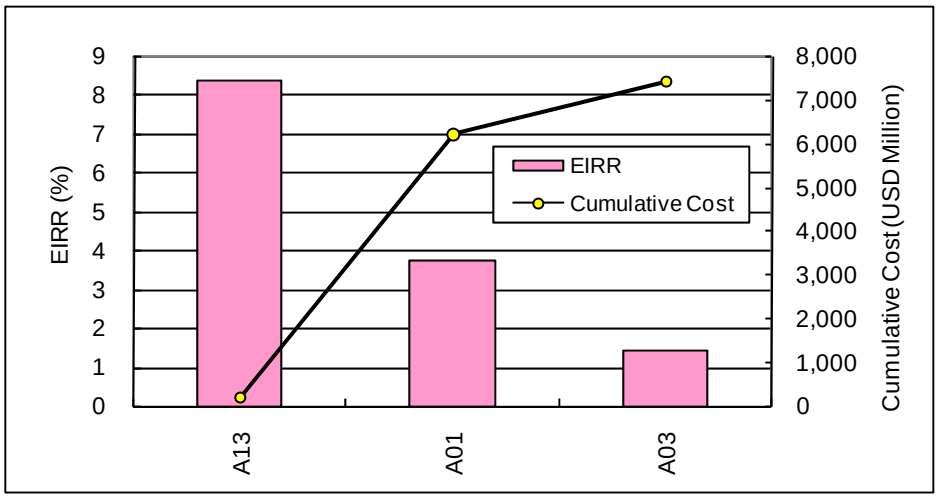


Source: VITRANSS 2 Study Team.

(6) Aviation Subsector

8.48 In Vietnam's three largest cities, construction projects of air terminal buildings are proposed due to a rapid increase in air passenger numbers, which exceeds the existing capacity one after another. Due to congestion in terminals, a huge volume of time is lost.

Figure 8.3.12 EIRRs and Cumulative Costs of Aviation Projects



Source: VITRANSS 2 Study Team.

3) Environmental Impact Overview

(1) Environmental Sensitivity

8.49 The main objective of the environmental sensitivity analysis is to identify the areas that are considered sensitive in terms of land development. The analysis area covered the whole Vietnam. To determine environmental sensitivity, the following four (4) factors were considered: topography (elevation, slope), land cover, hazards (landslide, flood, typhoon), and protection areas. Each factor was given any of five (5) grades ranging from zero (0) to five (5). "Zero" has the lowest sensitivity and "5" the highest sensitivity. Higher grades reflect higher environmental sensitivity; therefore, land development is discouraged in these areas. The following formulas were used to calculate the environmental sensitivity grade:

1) Topography Grade =	(Elevation Grade x 50%) + (Slope Grade x 50%)
2) Land Cover =	(Land Cover Grade)
3) Hazard Grade =	(Landslide Grade x 50%) + (Flood Grade x 50%) + (Typhoon Grade x 50%)
Overall Grade =	(Topography Grade x 50%) + (Land Cover Grade x 50%) + (Hazard Grade x 50%)

8.50 GIS techniques were used to perform environmental sensitivity analysis. The analysis required large amounts of data to cover Vietnam's different topographic, land cover, and hazard characteristics. The ability of GIS to handle large amounts of data makes it ideal for use in site selection applications such as the environmental sensitivity analysis.

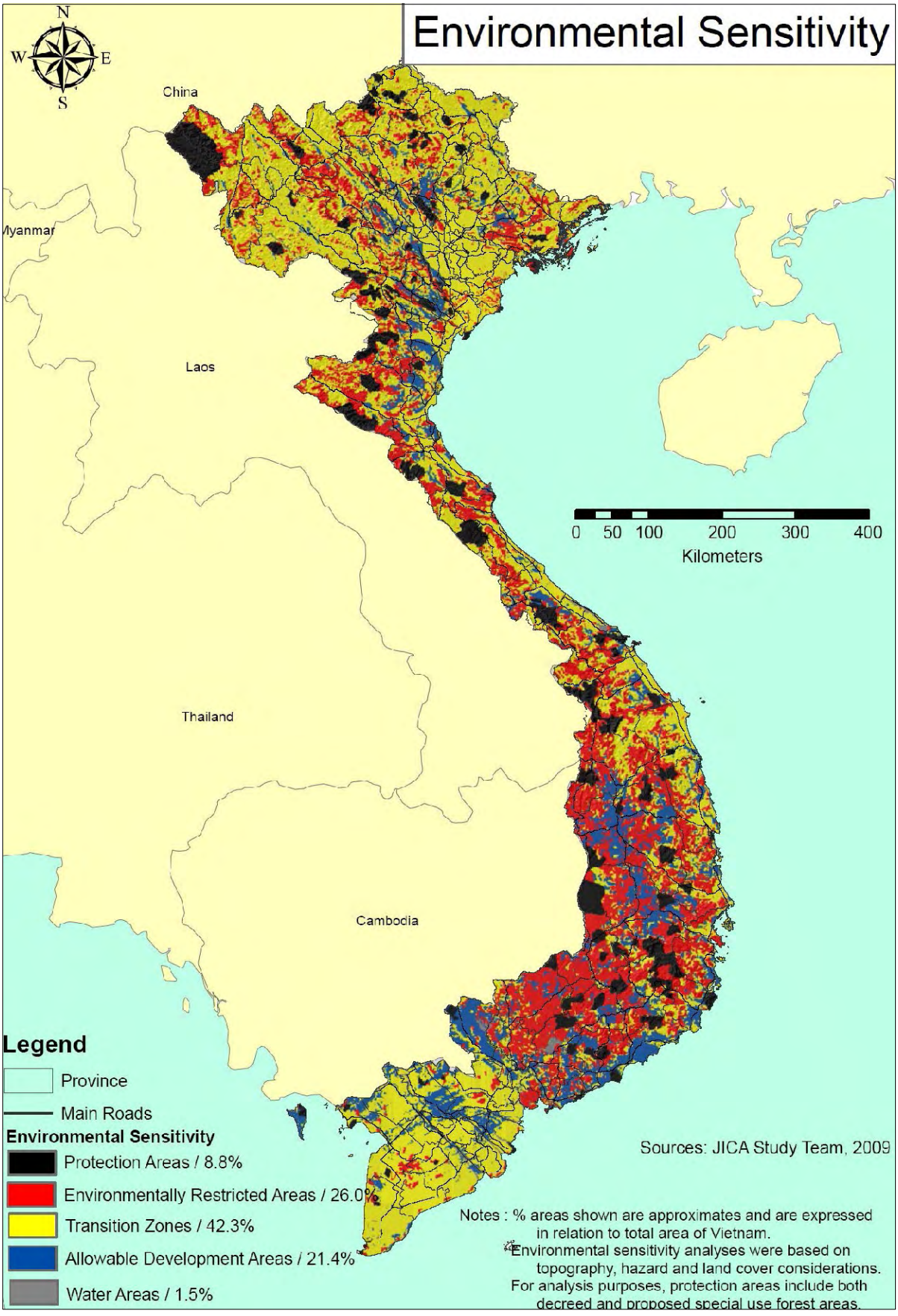
8.51 Table 8.3.8 shows the classification and description of the overall grades, which indicate the environmental sensitivity of the land.

Table 8.3.8 Classification of Environmental Sensitivity Analysis

Grade	Class	Coverage Ratio (%)	Description
5	Protection Areas	8.8	These areas include nature reserves and special use forests (decreed and proposed). Land development activities in these areas are discouraged.
3	Environmentally Restricted Areas	26.0	These areas include highly environmentally sensitive areas based on analysis prepared by the study teams. Land development activities in these areas are also discouraged.
2	Transition Zones	42.3	These areas are considered buffer areas between environmentally restricted areas and areas where land development activities are allowed. Land development activities in these areas are can be allowed but controlled.
1	Allowable Development Areas	21.4	These are areas where land development is allowed. These areas are areas with relatively low environmental sensitivity ratings based on the parameters set for the study.
0	Water Areas	1.5	Water areas include wide rivers and lakes. These areas are excluded from the inventory of land considered for development.

Source: VITRANSS 2 Study Team.

Figure 8.3.13 Environmental Sensitivity Map



Source: VITRANSS 2 Study Team.

(2) Carbon and Energy Constraints

8.52 Since the 1987, report entitled “Our Common Future” came out, the central importance and interconnected dimensions of sustainability have slowly gained prominence. Not only is this a necessary national goal, it has become an urgent global imperative. Controlling greenhouse gases (GHGs) through greater energy efficiency and changing the energy mix have particular implications for the transportation sector, which remains heavily dependent on CO2-intensive fuels. Solutions therefore require a holistic approach to land-use development and accessibility, as well as energy efficiency.

8.53 It is the opinion of the VITRANSS 2 Study Team, that this “green imperative” may not have a strong influence in the medium term. Beyond 2020, Vietnam would have to move in concert with the international community in the directions indicated in Table 8.3.9.

Table 8.3.9 Policy to Tackle Climate and Energy

Fuel/ GHG Emissions =	No. of vehicles X	Kms/vehicle X	Fuel/ GHG emissions/ veh-km
Policy implications	Reduce need for travel Influence mode choice	Increase urban densities	Regulate vehicles and fuels Manage traffic
Examples	Support NMT	Plan for city expansion	Regulate vehicle efficiency
	Improve bus operations	Target smart growth	Introduce efficient/non-carbon fuels
	Segregate buses		Control in-use emissions
	Introduce demand management		Manage road traffic

Source: VITRANSS 2 Study Team.

8.54 The principle of full capital-cost recovery has been difficult to implement in the transportation sector in most developing countries. It has been difficult to charge road users at the point-of-use on the road network. Studies in other countries have shown that car users in urban areas are subsidized unwittingly by society. Overbuilding roads have this similar effect. A long-term agenda, therefore, is to re-examine the cost to society of each transportation mode so that their true social, economic, and environmental costs are accounted properly. Imposition of a carbon tax would probably become necessary in the future – the proceeds of which can be channeled back to maintenance of transportation assets.

4) Overall Assessment and Prioritization (Multi-criteria Analysis)

8.55 There are many criteria to determine priority upon projects. Here in this analysis, seven criteria shown in Table 8.3.10 were selected and applied in the multi-criteria analysis. Note that there are a few projects that cannot be evaluated quantitatively due to the nature of the project and/or the lack of information (urban traffic, etc.).

(a) **Demand:** By comparing demand volume (transportation density such as Ton-km/km and pcu-km/km in case of road and railway), the projects with top 10% demand are given point 5, likewise point 4 to next 20%, point 3 to next 40%, point 2 to next 20% and point 1 to the last 10%.

(b) **Economic Feasibility:** In the same way as demand, each project is given point corresponding to the EIRR. Thresholds were set independently by subsector.

(c) **Financial Feasibility:** In the same way as economic feasibility, a point is given according to the FIRR or demand divided by Cost as a substitute of FIRR. Point zero was given to non-income-generating project.

(d) **Network Composition (connectivity):** A point was given according to the impor-

tance to compose the national transportation network. In case of the road Subsector, point 5 was given to a project to compose N-S national highway, point 4 to other national highway, point 3 to main provincial road and 2 or 1 to other minor road.

(e) **Natural Environmental Impact:** (Refer to the previous section)

(f) **Maturity/ Progress:** In the order of (9) DD completed, (8) DD in Process, (7) FS completed, (6) FS in process, (5) Pre-FS completed, (4)Pre-FS in process, (3) Listed in Master Plan, (2) Still in concept stage, (1) No progress, each point was given.

(g) **Consistency Upper Plan or National Development Policy:** (Refer to Chapter 4)

8.56 The results of the analysis are shown in Table 8.3.11 to Table 8.3.17. Referring to those priorities, together with the budget envelope, implementation programs are developed in the following chapter.

Table 8.3.10 MCA Criteria for Project Prioritization

Criteria		Indicator	No. of Categories
1	Demand	(ton-km + pax-km)/km	5
2	Economic feasibility	EIRR	5
3	Financial feasibility	FIRR or Demand/Cost	5
4	Network Composition	5: Truck Line/ Main Corridor	5
		4-2: Semi-Truck Line/ Secondary Corridor	
		1: Local	
5	Natural Environmental Impact	% of Length passing Restricted Area	5
6	Maturity/Progress	9: DD (completed)	9
		8: DD (ongoing)	
		7: FS (completed)	
		6: FS(ongoing	
		5: Pre-FS (completed)	
		4: Pre-FS (ongoing)	
		3: MP	
		2: Idea	
		1: No Progress	
7	Consistency with Upper Plan or National Development Policy	3: Listed in Formal Plan	3
		2: Seemingly Consistent	
		1: Unknown/ Inconsistent	

Source: VITRANSS 2 Study Team.

8.57 It is always a headache for the government to determine the priority of proposed projects within limited fund availability. It is almost impossible to set a ranking 100% objectively for a number of projects of various sectors. The MCA carried out in VITRANSS2 as presented here can be a good basis to conduct the project prioritization. Though not 100% scientific, it provides, at least, a common and transparent ground for discussion to attain a consensus among stakeholders. This will make decision making much easier and clearer.

Table 8.3.11 Comprehensive Evaluation of Expressway Projects

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
Construction of new expressway											
H01	Ninh Binh – Thanh Hoa Ex-pressway (75km)	827.6	15.3	5	5	4	5	5	6	3	5
H02	Thanh Hoa – Vinh Expressway (140km)	2128.0	12.1	5	4	3	5	5	6	3	5
H03	Vinh – Ha Tinh Expressway (20km)	201.5	17.0	5	5	5	5	5	6	3	5
H04	Ha Tinh – Quang Tri Express-way (277km)	2641.2	9.9	4	3	3	5	5	3	2	3
H05	Quang Tri – Hue Expressway (73km)	711.9	12.5	5	4	3	5	5	3	3	4
H06	Hue – Da Nang Expressway (105km)	1778.0	10.3	4	3	2	5	5	7	3	4
H07	Quang Ngai – Quy Nhon Ex-pressway (150km)	1787.8	10.3	4	3	3	5	5	6	2	3
H08	Quy Nhon – Nha Trang Ex-pressway (240km)	3390.1	8.9	4	3	2	5	5	3	2	3
H09	Nha Trang – Phan Thiet Ex-pressway (280km)	2890.2	8.0	3	3	2	5	5	5	3	3
H10	Long Thanh – Nhon Trach – Ben Luc Expressway (45km)	738.6	15.9	4	5	3	5	5	8	3	5
H11	Doan Hung – Hoa Lac – Pho Chau Expressway (457km)	4813.1	6.3	1	3	1	4	5	3	2	2
H13	Thai Nguyen – Cho Moi Ex-pressway (28km)	256.9	5.8	3	3	2	4	5	3	2	3
H14	Hoa Lac – Hoa Binh Express-way (26km)	214.0	7.3	2	3	1	4	5	6	2	3
H16	Ninh Binh – Hai Phong – Quang Ninh Expressway (160km)	1189.4	13.5	3	4	2	4	5	3	2	3
H17	Hong Linh – Huong Son Ex-pressway (34km)	302.0	7.4	1	3	1	4	5	3	2	2
H18	Cam Lo – Lao Bao Expressway (70km)	699.1	4.9	1	3	1	4	5	3	2	2
H20	Dau Giay – Da Lat Expressway (189km)	1871.0	5.2	3	3	2	4	5	6	3	3
H21	Bien Hoa – Vung Tau Express-way (76km)	696.5	24.4	5	5	5	5	5	7	3	5
H22	HCMC – Thu Dau Mot – Chon Thanh Expressway (69km)	996.3	12.2	5	4	3	4	5	3	2	4
H23	HCMC – Moc Bai Expressway (55km)	410.5	16.4	4	5	4	4	5	3	2	4
H24	Soc Trang – Can Tho – Chau Doc Expressway (200km)	1439.6	9.7	2	3	1	4	5	3	2	2
H25	Ha Tien – Rach Gia – Bac Lieu Expressway (225km)	1619.5	10.9	1	3	1	4	5	3	2	2
H26	Can Tho – Ca Mau Expressway (150km)	1755.7	9.3	3	3	2	5	5	3	2	3
H27	Quang Ngai – Dak To Express-way (170km)	2073.6	8.3	1	3	1	4	5	1	1	1
H28	Nha Trang – Da Lat Express-way (80km)	1062.5	7.8	2	3	2	4	1	1	1	1
H29	Da Nang – Ngoc Hoi Express-way (250km)	3094.2	1.8	1	2	1	4	3	1	1	1
H30	Ring Road No.4 in Ha Noi (90km)	1350.5	14.5	4	4	4	5	5	6	3	5
H31	Ring Road No.5 in Ha Noi (320km)	2583.2	7.9	2	3	3	5	5	6	1	3
H32	Ring Road No.3 in HCMC (83km)	1226.9	13.7	5	4	4	5	5	6	3	5

Source: VITRANSS 2 Study Team.

Table 8.3.12 Comprehensive Evaluation of Highway Projects

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
Construction of New Road											
H33	Economic axle-road Construc-tion (24km)	82.8	13.3	2	4	1	4	5	7	2	5
H34	Do Xa - Quan Son Highway Construction (30km)	103.4	2.9	1	2	1	4	5	7	2	3
H35	NH1A (Chi Lang - Bac Giang) Construction (Pho Gio)) (40km)	182.1	6.7	2	3	1	4	5	7	2	5
H36	NH21 Construction (Phu Ly – Nam Dinh) (25km)	86.2	18.2	4	4	4	3	5	7	2	5
H37	Vam Cong Bridge Construc-tion (An Giang&Can Tho)	316.0	-	-	-	-	-	-	-	-	1*
H38	Cao Lanh Bridge Construc-tion (Dong Thap)	236.0	-	-	-	-	-	-	-	-	1*
H39	New Coastal Road Construc-tion (100km)	344.8	-	-	-	-	-	-	-	-	2*
H40	NH20 Extension(Da Lat – Nha Trang) (85km)	476.6	5.1	1	2	2	3	3	7	2	3
H41	Hau River Bridge Construction (NH60, Soc Trang) (4lane)	500.0	-	-	-	-	-	-	-	-	4*
H42	Van Tien Bridge Construction (Quang Ninh)(1341m)	200.0	-	-	-	-	-	-	-	-	3*
H43	NH47 Construction (Sam Son – Thanh Hoa City) (5km)	17.2	20.0	1	5	2	3	5	7	2	3
H44	NH14E Extension(Ha Lam along PR 613 – Binh Duong) (21.2km)	47.0	4.3	1	2	4	3	5	7	2	4
H45	Road Access between Cam Pha Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
H46	Road Access between Hon Gai Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
H47	Road Access between Hai Phong Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
H48	Road Access between Nghi Son Port and Expressway	30.0	-	-	-	-	-	-	-	-	4*
H49	Road Access between Cua Lo Port and Expressway	24.0	-	-	-	-	-	-	-	-	4*
H50	Road Access between Vung Ang Port and Expressway	30.0	-	-	-	-	-	-	-	-	2*
H51	Road Access between Quy Nhon Port and Expressway	32.0	-	-	-	-	-	-	-	-	2*
H52	Road Access between Van Phong Port and Expressway	26.0	-	-	-	-	-	-	-	-	2*
H53	Road Access between Nha Trang Port and Expressway	36.0	-	-	-	-	-	-	-	-	2*
H54	Road Access between Vung Tau Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
H55	Road Access between Sai Gon Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
H56	Road Access between Dong Nai Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*
H57	Road Access between Can Tho Port and Expressway	20.0	-	-	-	-	-	-	-	-	4*

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
Construction of Bypass											
H58	NH1 Bypass (La Ha, Quang Ngai) (15km)	68.3	-	-	-	-	-	-	-	-	4*
H59	NH1A Bypass (Van Gia, Khanh Hoa) (10km)	46.3	12.2	5	4	2	4	5	3	2	5
H60	NH1A Bypass (Ninh Hoa, Khanh Hoa) (10km)	34.5	-	1	1	3	4	5	3	2	2
H61	NH1A Bypass (Cam Ranh, Khanh Hoa) (10km)	44.6	5.5	2	2	3	4	4	6	2	3
H62	NH1A Bypass (Cho Lau, Binh Thuan) (10km)	39.8	5.8	4	2	2	4	5	3	2	4
H63	NH1A Bypass (Phan Thiet, Binh Thuan) (10km)	34.5	12.9	5	4	3	4	5	3	2	5
H64	NH1A Bypass (Duc Pho, Quang Ngai) (9.7km)	36.3	10.7	5	3	3	4	5	6	2	5
H65	NH1A Bypass (Vinh Long) (7.5km)	25.9	24.5	3	5	3	4	5	7	2	5
H66	NH14 Bypass (Ea Drang, Dak Lak)(10km)	44.4	-	1	1	2	3	5	3	2	2
H67	NH14 Bypass (Buo Ho, Dak Lak)(10km)	44.4	3.7	1	2	2	3	4	3	2	3
H68	NH91 Bypass (Thot Not, Can Tho)(10km)	34.5	18.8	5	4	3	3	5	3	2	5
H69	NH91 Bypass (An Chau, An Giang)(10km)	34.5	14.8	1	4	2	3	5	3	2	3
H70	NH91 Bypass (Cai Dau, An Giang)(10km)	34.5	6.1	1	3	4	3	5	3	2	3
H71	NH10 Bypass (Nga Son, Thanh Hoa)(10km)	34.5	-	1	1	3	3	5	3	2	2
H72	NH60 Bypass (Mo Cay, Ben Tre)(10km)	34.5	6.3	3	3	4	3	5	3	2	4
H73	NH60 Bypass (Ham Luong (Ben Tre – Mo Cay))(10km)	34.5	24.7	5	5	4	3	5	3	2	5
H74	NH38 Bypass (Hoa Mac, An Giang)(10km)	34.5	9.3	5	3	3	3	5	3	2	5
H75	NH21B Bypass (Binh Da, Ha-noi)(10km)	34.5	8.9	2	3	3	4	5	3	2	4
H76	NH21B Bypass (Kim Bai, Ha-noi)(10km)	34.5	11.8	2	3	3	4	5	3	2	4
H77	NH21B Bypass (Van Dinh, Ben Tre)(10km)	34.5	-	2	1	3	4	5	3	2	3
H78	NH21B Bypass (Que, Ha Nam)(10km)	34.5	2.8	3	2	3	4	5	3	2	3
Improvement of Roads and Bridges											
H79	NH 14 Widening (Dong Xoai - Chon Thanh)(34km)	115.4	12.4	4	4	1	3	4	3	2	5
H80	NH 14 Widening (Gia Lai - Kon Tum)(50km)	184.0	4.4	2	2	1	3	5	3	2	3
H81	NH 18A Upgrading (Mong Duong - Mong Cai)(122km)	150.8	2.8	1	2	1	3	5	3	2	3
H82	NH 51 Widening(Dong Nai - Vung Tau)(73.6km)	184.1	25.3	5	5	1	3	5	7	2	5
H83	NH8 Upgrading (Hong Linh - Cau Treo Border) (77km)	164.6	0.3	1	2	1	3	5	3	2	3

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
H84	NH9 Upgrading (Pho Lai (Song) - Cua Viet) (14km)	21.7	5.9	1	2	1	3	5	3	2	3
H85	NH5 Upgrading (106km)	155.8	15.6	2	4	1	4	5	3	2	5
H86	NH21 Upgrading(Son Tay - Xuan Mai) (32km)	31.1	-	1	1	1	3	5	3	2	2
H87	NH21 Upgrading (Nam Dinh - Thinh Long) (61km)	59.4	15.0	1	4	1	4	5	3	2	3
H88	NH22 Upgrading (HCMC - Moc Bai) (82km)	82.1	7.0	1	3	1	3	5	3	2	3
H89	NH80 Upgrading (Cau My Thuan - Xa Xia) (213km)	207.3	1.9	1	2	1	3	5	3	2	3
H90	NH 6 Widening (Ba La - Xuan Mai) (20km)	52.7	14.5	3	4	1	3	5	3	2	5
H91	NH6 Extension (PR 127 Lai Chau – border corridor line in Muong Te, through Pac Ma – Nam La border) (120km)	180.1	6.9	1	3	1	3	1	3	2	3
H92	NH 20 Improvement(Dau Giay - Lien Khuong)(250km)	201.8	15.1	3	4	1	3	5	3	2	5
H93	NH12B Upgrading (Tam Diep - Hang Tram) (46km)	85.3	9.7	1	3	1	3	5	3	2	3
H94	NH7 Upgrading (Do Luong - Con Cuong) (54km)	100.1	4.2	1	2	1	3	5	3	2	3
H95	NH19 Upgrading(Quy Nhon - NH14) (169km)	357.8	9.1	1	3	1	3	5	3	2	3
H96	NH10 Improvement (Lai Thanh - Tao Xuyen) (50km)	24.3	32.7	2	5	1	3	5	3	2	5
H97	NH3 Improvement (Thai Nguyen - Ta Lung) (274km)	161.3	7.5	1	3	1	4	5	3	2	3
H98	NH4A, 4B Improvement (Cao Bang - Tien Yen) (225km)	132.8	-	1	1	1	3	5	3	2	2
H99	NH37 Improvement (Sao Do - Co Noi) (533km)	316.7	-	1	1	1	3	5	3	2	2
H100	NH34 Improvement (Ha Giang - Cao Bang) (260km)	168.8	-	1	1	1	3	5	3	2	2
H101	NH43 Improvement (Gia Phu - Pa Hang) (113km)	72.5	-	1	1	1	3	5	3	2	2
H102	NH7 Improvement (Dien Chau - Do Luong) (36km)	17.5	0.0	1	1	1	3	5	3	2	2
H103	NH12A Improvement (Vung Ang - NH1(connection to Vung Ang port), Ha Tinh) (10km)	4.9	4.1	1	2	1	3	5	3	2	3
H104	NH14B Improvement (Da Nang - Thanh My) (78km)	41.9	18.6	1	4	1	3	4	3	2	3
H105	NH14D Improvement (HCM Road - Lao Border) (75km)	48.3	-	1	1	1	3	5	3	2	2
H106	NH13 Improvement (Chon Thanh - Hoa Lu Border) (142km)	92.9	-	1	1	1	3	5	3	2	2
H107	NH30 Improvement (An Huu - Dinh Ba Border) (121km)	58.9	12.3	1	4	1	3	5	3	2	3
H108	NH61 Improvement(Tan Phu - Vinh Loi) (96km)	46.7	12.4	1	4	1	3	5	3	2	3
H109	NH 40 Rehabilitation (24km)	9.8	3.8	1	2	1	3	3	3	2	5**

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
H110	NH217 Wideining (NH217 – NH1, Thanh Hoa) (30km)	87.1	-	1	1	1	3	5	3	2	2
H111	NH31 Rehabilitation (An Chau - Dinh Lap) (48km)	23.7	15.0	1	4	1	3	5	3	2	5**
H112	NH3B Rehabilitation (Yen Lac - That Khe) (44km)	21.7	18.8	1	4	1	3	5	3	2	5**
H113	PR507(NH47) Rehabilitation (Thuong Xuan - Kheo Border) (60km)	32.9	13.2	1	4	1	3	1	3	2	5**
H114	NH48 Rehabilitation (Thai Hoa - Kim Son) (74km)	40.6	12.7	1	4	1	3	5	3	2	5**
H115	NH32 Widening (Hanoi - Son Tay) (32km)	84.3	-	1	1	1	3	5	3	2	2
H116	NH32B Rehabilitation (Xom Giac - Muong Coi) (21km)	8.4	10.6	1	3	1	3	5	3	2	5**
H117	NH2B Rehabilitation (Vinh Yen - Tam Dao) (25km)	10.6	4.0	1	2	1	4	1	3	2	5**
H118	NH2C Rehabilitation (Vinh Yen - Son Duong) (60km)	23.7	6.5	1	3	1	4	5	3	2	5**
H119	NH23 Rehabilitation (NH2 - Phuc Yen) (27km)	10.0	16.1	1	4	1	3	5	3	2	5**
H120	NH47 Rehabilitation(NH1 - NH15) (61km)	21.8	10.8	1	3	1	3	5	3	2	5**
H121	NH45 Rehabilitation(Pho Ria - Thanh Hoa - Yen Cat) (136km)	49.3	1.5	1	2	1	3	5	3	2	5**
H122	NH49 Rehabilitation(Cang Thuan An - HCM Road) (75km)	28.0	6.7	1	3	1	3	5	3	2	5**
H123	NH25 Rehabilitation (Tuy Hoa - HCM Road) (180km)	72.9	14.3	1	4	1	3	5	3	2	5**
H124	NH27 Rehabilitation(Phan Rang Thap Cham - Buon Ma Thuot) (276km)	113.1	8.2	1	3	1	3	5	3	2	5**
H125	NH49B Rehabilitation (Cau My Chanh - Vinh Hien, Thu Thien Hue) (89km)	31.1	6.8	1	3	1	3	5	3	2	5**
H126	NH24B Rehabilitation (NH1 - An Hai, Quang Ngai) (18km)	6.3	21.8	1	5	1	3	5	3	2	5**
H127	NH27B Rehabilitation(Tan Son - NH1) (48km)	17.3	-	1	1	1	3	5	3	2	5**
H128	NH1D Rehabilitation(Quy Nhon - Song Cau, Binh Dinh & Phu Yen) (33km)	11.5	15.0	1	4	1	4	5	3	2	5**
H129	NH1C Rehabilitation (Dien Khanh - Nha Trang) (17km)	5.9	25.0	2	5	1	4	5	3	2	5**
H130	NH56 Rehabilitation (Xuan Thanh - Ba Ria) (50km)	17.5	7.4	1	3	1	3	5	3	2	5**
H131	NH62 Rehabilitation (Tan An - Binh Hiep) (77km)	26.9	14.5	1	4	1	3	5	3	2	5**
H132	NH54Rehabilitation (Cai Von - Tieu Can) (167km)	58.3	-	1	1	1	3	5	3	2	5**
H133	NH53Rehabilitation (Vinh Long - Duyen Hai - NH54) (132km)	46.1	11.4	1	3	1	3	5	3	2	5**

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
H134	NH63 Rehabilitation(Minh Luong - Ca Mau) (109km)	38.1	14.7	1	4	1	3	5	3	2	5**
H135	NH1 Widening (to 4 lane,Lang Son - Hanoi) (185km)	150.0	-	-	-	-	-	-	-	-	2*
H136	NH1 Widening (to 4 lane, Ha-noi - Vinh) (365km)	365.0	-	-	-	-	-	-	-	-	4*
H137	NH1 Widening (to 4 lane, Vinh - Danang) (650km)	570.0	-	-	-	-	-	-	-	-	3*
H138	NH1 Widening (to 4 lane, Da-nang - Nha Trang) (510km)	485.0	-	-	-	-	-	-	-	-	3*
H139	NH1 Widening (to 4 lane, Nha Trang - HCMC) (350km)	280.0	-	-	-	-	-	-	-	-	4*
H140	NH1 Widening (to 4 lane, HCMC - Ca Mau) (385km)	310.0	-	-	-	-	-	-	-	-	2*
Securing All-weather 2 Lane Roads on Corridors											
H141	NH279 Improvement(Tay Trang - Viet Quang) (242km)	151.2	9.1	1	3	1	5	5	1	1	3
H142	NH6 Improvement (Moung Khen - Lai Chau) (19km)	9.8	22.6	1	5	1	5	5	1	1	3
H143	New Road Construction(Ky Anh - Tan Son) (45km)	100.7	-	2	1	1	5	1	1	1	1
H144	NH15Improvement (Tan Son - Thanh Lan) (20km)	10.8	12.1	2	4	1	5	5	1	1	3
H145	NH12AImprovement (Thanh Lan - Cha Lo) (7km)	3.4	6.1	1	3	1	5	5	1	1	3
H146	New RoadConstruction (Ngan Dua - Vi Thanh) (25km)	53.1	0.5	2	2	1	5	5	1	1	3
H147	New RoadConstruction (HCMC - Long Xuyen) (140km)	264.4	10.2	3	3	1	5	5	1	1	3
Improvement of Traffic Safety											
H148	Black Spot Improvement Plan	95.0	-	-	-	-	-	-	-	-	5*
H149	Traffic Safety Audit Develop-ment Plan	40.0	-	-	-	-	-	-	-	-	5*
H150	Traffic Safety Corridor Devel-opment Plan	40.0	-	-	-	-	-	-	-	-	5*
H151	Highway Traffic Safety Facility Enhancement Plan	1110.0	-	-	-	-	-	-	-	-	4*
H152	Vulnerable Road User Acci-dent Prevention Plan	75.0	-	-	-	-	-	-	-	-	5*
H153	Expressway Safety Develop-ment Plan	112.5	-	-	-	-	-	-	-	-	5*
H154	Road Work Traffic Safety De-velopment Plan	20.0	-	-	-	-	-	-	-	-	5*
H155	Traffic Safety Monitoring and Maintenance Plan	35.0	-	-	-	-	-	-	-	-	5*
H156	Urban Road Traffic Safety Development Plan	272.5	-	-	-	-	-	-	-	-	5*

Source: VITRANSS 2 Study Team

Note: * For projects not suitable for quantitative evaluation due to the nature of the project or the lack of sufficient information, overall evaluation was done based on expert's judgement. ** Based on the basic strategy of VITRANSS2 which promotes the maxixmam use of exsiting transport properties, road rehabilitation projects should be lanked 5 although some projects may have low evaluation on criterias partly because of the evaluation of EIRR and traffic demand based on inter-provincial tranffic. (excluding intra-provincial traffic due to the lack of information)

Table 8.3.13 Comprehensive Evaluation of Railway Projects

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
Improvement of existing line for capacity expansion											
R01	Function-Improvement Items (Hanoi-Saigon Line)	2465.3	17.4	4	5	3	5	3	3	3	5
R02	Function-Improvement Items (Hanoi-Lao Cai Line)	401.9	9.3	3	3	4	4	2	3	3	3
R03	Function-Improvement Items (Hanoi-Dong Dang Line)	116.4	11.8	2	4	5	4	4	3	3	4
R04	System Reinforcement Items (Hanoi-Saigon Line)	6747.5	1.2	5	1	3	5	5	3	3	3
R05	System Reinforcement Items & System Modernization Items (Hanoi-Dong Dang Line)	3431.7	-	2	1	1	4	3	3	3	1
R06	System Modernization Items (Hanoi-Saigon Line)	18508.8	8.2	5	3	1	5	3	3	3	3
Construction of new line											
R07	Trang Bone – Vung Tau New Railway Construction (SRI & SMI) (71.3km)	1847.8	9.8	5	3	4	5	4	6	2	5
R08	Hanoi-Lao Cail New Railway Constrcution (SRI &SMI)	5671.1	4.8	3	2	2	4	4	3	3	3
R09	Hanoi-Hai Phong New Railway Constrcution (SRI &SMI)	1892.8	6.1	4	2	3	5	5	3	3	3
R10	HCMC – Loc Ninh New Railway Line Construction	670.0	-	-	-	-	-	-	-	-	2*
R11	HCMC – Can Tho New Railway Line Construction (146km)	3796.0	-	-	-	-	-	-	-	-	3*

Source: VITRANSS 2 Study Team.

Table 8.3.14 Comprehensive Evaluation of Port Projects

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
Expansion and upgrading of port functions											
P01	Hon Gia Seaport (Cai Lan) Ter-minal Development	90.0	12.2	4	3	3	3	5	2	1	4
P02	Hai Phong Seaport (Lach Huyen) Development (Stage 1, original schedule: 2010-2015)	450.0	18.6	5	4	3	5	5	7	3	5
P03	Hai Phong Seaport (Lach Huyen) Development (Stage 2, original schedule: 2015-2020)	945.0	8.3	5	2	2	5	5	5	3	4
P04	Hai Phong Seaport (Lach Huyen) Development (Stage3, original schedule: 2020-2030)	5270.0	12.8	5	3	1	5	5	3	2	4
P05	Cua Lo Seport Channel & Ter-minal Development	26.0	16.4	3	4	3	3	5	6	3	5
P06	Vung Ang Seaport Terminal Development	50.0	2.6	2	1	2	3	5	7	3	3
P07	Son Duong Breakwater Devel-opment	200.0	-	2	1	2	3	3	3	1	1
P08	Chan May Seaport Terninal De-velopment	80.0	9.5	4	2	3	4	5	7	2	4
P09	Danang Seaport Terminal De-velopment	258.0	8.5	4	2	2	5	3	3	3	4

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
P10	Dung Quat Seaport Terminal & Breakwater/Revetment Devel-opment	340.0	-	2	1	1	5	5	9	2	3
P11	Quy Nhon Seaport Terminal Development	270.0	4.0	3	1	2	4	5	2	2	3
P12	Van Phong International Tran-ship Terminal Development (Stage 2, original schedule: 2010-2015)	395.0	-	1	1	1	3	5	3	2	1
P13	Van Phong International Tran-ship Terminal Development (Stage 3, original schedule: 2015-2020)	925.0	-	1	1	1	3	5	3	2	1
P14	Nha Trang Seaport Channel & Terminal Development	1.0	-	4	1	5	5	5	3	3	4
P15	Ba Ngoi Seaport (Cam Ranh) Terminal development Devel-opment (Stage 1B, original schedule: -2010)	15.0	-	1	1	1	4	5	7	1	1
P16	Ba Ngoi Seaport (Cam Ranh) Terminal development Devel-opment (Stage2: original sche-dule: 2010-2020)	265.0	-	1	1	1	4	5	2	1	1
P17	Ca Na Seaport Industrial Port Facility Development	10.0	-	1	1	1	5	5	5	1	1
P18	Vung Tau Seaport (Cai Mep Thi Vai - stage2 + other) Terminal Development	980.0	15.3	2	4	1	5	5	3	2	4
P19	Ho Chi Minh Seaport (Hiep Phuoc - Stage2 + other) Chan-nel and Terminal Development	220.0	22.3	5	5	3	4	5	3	2	5
P20	Expansion of terminal in My Tho seaport	2.0	18.5	2	4	4	3	5	2	1	4
P21	Expansion of terminal in Dong Thap seaport	2.0	18.8	2	4	4	5	5	2	1	4
P22	Expansion of terminal in Can Tho seaport	25.0	15.1	2	4	3	5	5	9	2	5
P23	Expansion of terminal in My Thoi seaport	5.0	12.7	2	3	3	3	5	2	1	3
P24	Coal Fired Thermal Power Sta-tions Port Facility Development	60.0	-	1	1	1	3	5	6	2	1
P25	Industrial Terminal Development	20.0	-	1	1	1	3	5	3	2	1

Source: VITRANSS 2 Study Team.

Table 8.3.15 Comprehensive Evaluation of IWT Projects

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
Waterway Improvement											
W01	Upgrading of Quang Ninh/Hai Phong - Ha Noi Route (to Clas-sII) (166km)	38.2	59.6	5	5	5	5	5	6	3	5
W02	Upgrading of Lach Giang - Ha Noi Route (to Class I) (192km)	210.1	9.2	3	2	1	5	5	6	3	3
W03	Upgrading of Ha Noi – Viet Tri - Lao Cai Route (to Class II III	133.3	15.1	4	3	2	4	5	6	3	4

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
	and IV) (362 km)										
W04	Improvement of Quang Ninh - Ninh Binh Route (266.5km)	61.2	6.3	3	2	1	5	5	3	3	3
W05	Upgrading of Cua Day - Ninh Binh (to Class I)(74.0km)	17.0	-	1	1	1	4	5	3	3	1
W06	Upgrading of Quang Ninh - Pha Lai Route (to ClassII) (128km)	29.4	59.6	4	5	4	5	5	6	3	5
W07	Upgrading of Pha Lai - A Lu Route (to Class III) (33.0 km)	7.6	9.2	1	2	1	4	5	3	3	2
W08	Upgrading of Pha Lai - Da Phuc Route (to ClassIII) (87km)	20.0	15.1	2	3	1	4	5	3	3	3
W09	Upgrading of Viet Tri - Tuyen Quang – Na Hang Route (to class III and IV/V) (115km)	36.8	6.3	4	2	3	4	5	9	3	4
W10	Improvement of Hong Đa T-Junction - Hoa Binh Port Route (58.0km)	13.3	-	1	1	1	4	5	3	3	1
W11	Improvement of Ninh Binh-Thanh Hoa	11.5	-	1	1	1	5	5	3	3	1
W12	Various Regional/Feeder Routes	50.0	-	-	-	-	-	-	-	-	4*
W13	Upgrading Cho Gao Canal Route (11km)	138.0	-	-	-	-	-	-	-	-	5*
W14	Improvement of Sai Gon - Kien Luong/Lap Vo canal Route (315km)	72.5	40.9	5	4	5	4	5	3	3	5
W15	Improvement of Sai Gon - Kien Luong/Dong Thap Muoi area Route (334km)	76.8	7.5	3	2	1	4	5	3	3	3
W16	Improvement of Sai Gon - Ca Mau/Xa No canal Route (336km)	77.3	37.0	5	4	5	5	5	3	3	5
W17	Improvement of Sai Gon - Ca Mau/coastal Route (367km)	84.4	24.6	5	4	4	5	5	3	3	5
W18	Improvement of Sai Gon - Moc Hoa Route (96km)	22.1	-	1	1	1	4	5	3	3	1
W19	Improvement of Sai Gon - Ben Suc Route (89km)	20.5	-	1	1	1	4	5	3	3	1
W20	Improvement of Sai Gon - Ben Keo Route (166km)	38.2	-	1	1	1	4	5	3	3	1
W21	Improvement of Sai Gon - Hieu Liem Route (88km)	15.0	34.2	4	4	4	4	5	3	3	5
W22	Improvement of Mekong river Delta – Thi Vai - Vung Tau Route (75km)	17.3	2.9	1	1	1	5	5	3	3	1
W23	Improvement of Cua Tieu – Cambodia Route (223km)	51.3	12.0	4	3	2	5	5	3	3	4
W24	Improvement of Dinh An estuary - Tan Chau Route (214km)	49.2	9.8	3	2	2	4	5	3	3	3
W25	Improvement of Moc Hoa - Ha Tien (108km)	24.8	-	1	1	1	4	5	3	3	1
W26	Upgrading of Phuoc Xuyen – Tien river (canal 28) (to Class III) (75km)	17.3	-	1	1	1	4	5	3	3	1
W27	Upgrading of Rach Gia - Ca Mau (to Class III) (149km)	34.3	-	1	1	1	4	5	3	3	1

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
W28	Improvement of Lach Trao-Ham Rong	2.0	-	-	-	-	-	-	-	-	4*
W29	Improvement of Lach Sung-Len Bridge	2.0	-	-	-	-	-	-	-	-	4*
W30	Improvement of Cua Hoi-Ben Thuy-Do Luong	4.6	-	-	-	-	-	-	-	-	4*
W31	Improvement of Cua Sot – Nghen Bridge	2.0	-	-	-	-	-	-	-	-	4*
W32	Improvement of Cua Gianh-Quang Truong	2.0	-	-	-	-	-	-	-	-	4*
W33	Improvement of Nhat Le Estuary –Long Dai bridge	2.0	-	-	-	-	-	-	-	-	4*
W34	Improvement of Cua Viet-Dap Tran (spillway)	2.0	-	-	-	-	-	-	-	-	4*
W35	Improvement of Thuan An-Tuan T-junction	2.3	-	-	-	-	-	-	-	-	4*
W36	Improvement of Hoi An –Cua Dai– Cu Lao Cham	2.3	-	-	-	-	-	-	-	-	4*
W37	Improvement of Ky Ha Estuary-Hoi An – Vinh Dien T – junction - Cua Han	13.8	-	-	-	-	-	-	-	-	4*
Maintenance											
W38	Maintenance Dredging to re-duce backlogs	120.0	-	-	-	-	-	-	-	-	5*
Port Improvement and Others											
W39	Improvement/upgrading of car-go port system in the northern region	130.1	-	-	-	-	-	-	-	-	4*
W40	Improvement/upgrading of pas-senger port system in the north-ern region	20.0	-	-	-	-	-	-	-	-	2*
W41	Improvement/upgrading of car-go port system in the southern region	20.0	-	-	-	-	-	-	-	-	4*
W42	Improvement /upgrading of pas-senger port system in the southern region	20.0	-	-	-	-	-	-	-	-	2*
W43	Improvement/upgrading of car-go port system in the central region	20.0	-	-	-	-	-	-	-	-	2*
W44	Selective Ports Investment Package	50.0	-	-	-	-	-	-	-	-	4*
Landing Stage Improvement											
W45	Improvement of landing stages	2.0	-	-	-	-	-	-	-	-	3*
Safety Improvement											
W46	Installment and improvement of navigation aids	5.0	-	-	-	-	-	-	-	-	4*
W47	Search and rescue	5.0	-	-	-	-	-	-	-	-	5*
Ship Building											
W48	Ship building	2,080.0	-	-	-	-	-	-	-	-	3*
W49	Ship building and repair factory	15.0	-	-	-	-	-	-	-	-	4*
Institution Improvement											
W50	Organizational Reforms	2.0	-	-	-	-	-	-	-	-	4*
W51	Capacity development	2.0	-	-	-	-	-	-	-	-	4*

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
W52	Database: River Surveys and Vessel Registry	20.0	-	-	-	-	-	-	-	-	5*

Source: VITRANSS 2 Study Team.

Table 8.3.16 Comprehensive Evaluation of Aviation Projects

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov't Policy	Overall Evaluation
A01	Long Thanh Airport	6,000.0	3.7	5	2	2	5	4	6	3	5
A02	T1&T2 Terminal Expan-sion at Noi Bai Interna-tional Airport	900.0	-	5	1	4	5	5	3	3	4
A03	T3 Terminal Construction at Noi Bai International Airport	1,200.0	1.5	2	2	2	3	5	3	3	3
A04	Runway Construction at Noi Bai International Air-port	500.0	-	-	-	-	-	-	-	-	3*
A05	Cat Bi Airport Upgrading	300.0	-	-	-	-	-	-	-	-	3*
A06	Phu Bai Airport Upgrading	400.0	-	-	-	-	-	-	-	-	3*
A07	Chu Lai Airport Upgrading for Cargo Transport (Stage1: original schedule: 2009-2015)	300.0	-	-	-	-	-	-	-	-	3*
A08	Chu Lai Airport Upgrading for Cargo Transport (Stage2: original schedule: 2015-2025)	400.0	-	-	-	-	-	-	-	-	2*
A09	Cam Ranh Airport Expan-sion	100.0	-	-	-	-	-	-	-	-	3*
A10	Runway Upgrading at Na San Airport	60.0	-	-	-	-	-	-	-	-	2*
A11	Runway Improvement at Danang international Air-port	-	-	-	-	-	-	-	-	-	5*
A12	Taixway Construction at Danang international Air-port	-	-	-	-	-	-	-	-	-	4*
A13	Expansion of Tan Son Nhat International Airport	200.0	8.4	5	3	5	5	5	2	3	5
A14	Other Tertiary Airport Im-provement	50.0	-	-	-	-	-	-	-	-	3*
A15	Control tower Construction at Tan Son Nhat Interna-tional Airport	50.0	-	-	-	-	-	-	-	-	5*
A16	Air Navigation System	100.0	-	-	-	-	-	-	-	-	5*

Source: VITRANSS 2 Study Team.

Table 8.3.17 Comprehensive Evaluation of Logistics

Project Code	Project	Cost (USD Mil.)	EIRR	Demand	Econo-mic	Finan-cial	Network Composit'n	Natural Environm't	Maturity of Plan	Gov.'s Policy	Overall Evaluation
L01	North Logistic Park Development	199.8	-	-	-	-	-	-	-	-	5*
L02	South Logistic Park Development	40.0	-	-	-	-	-	-	-	-	5*
L03	Lao Cai Cross-border gate im-provement	6.0	-	-	-	-	-	-	-	-	5*
L04	Lang Son Cross-border gate im-provement	9.0	-	-	-	-	-	-	-	-	4*
L05	Moc Bai Cross-border gate im-provement	9.0	-	-	-	-	-	-	-	-	3*

Source: VITRANSS 2 Study Team.

5) Evaluation Results

8.58 Results of the MCA are summarized in Table 8.3.18. Of the total cost of USD167 billion, the committed projects account for 16.1% and the A-rated projects, 13.3% and the B- rated 9.5%, respectively. Note that the High-Speed Railway is not included.

8.59 In the committed projects, the road subsector stands for 77% of the total investment, followed by 11% of the port subsector. In the A- and B- rated projects, however, the road's share will drastically drop to 44% and the port Subsector will have 22%, the railway 12% and the aviation 19%. Thus, the past trend of overemphasizing the road subsector will be corrected.

Table 8.3.18 Investment by Rank and Subsector

(USD mil.)

Subsector	Type of Project	Committed	Proposed					Total
			A Rated	B Rated	C Rated	D Rated	E Rated	
Road	Construction of new expressway	11,690.8	7,169.5	3,896.6	28,172.8	10,488.4	6,230.2	67,648.3
	Construction of new road	1,459.1	351.1	741.0	797.3	468.8	552.0	4,369.3
	Construction of bypass	166.2	246.4	211.5	226.9	113.4	0.0	964.4
	Improvement of road/bridge	7,310.1	1,459.3	645.0	2,961.8	1,512.0	0.0	13,888.2
	Securing All-weather 2-Lane Roads on Corridors	0.0	0.0	0.0	492.6	0.0	100.7	593.3
	Improvement of Traffic Safety	135.9	690.0	1,110.0	0.0	0.0	0.0	1,935.9
Rail	Improvement of existing line for capacity expansion	1,257.1	2,465.3	116.4	25,658.2	0.0	3,431.7	32,928.7
	Construction of new line	245.0	1,847.8	0.0	11,359.9	670.0	0.0	14,122.8
Port & Shipping	Expansion and upgrading of port functions	3,076.0	721.0	7,628.0	665.0	0.0	1,890.0	13,980.0
Inland waterway	Waterway Improvement	245.3	454.7	306.3	417.3	7.6	216.2	1,647.4
	Improvement of river port	7.0	0.0	200.1	0.0	60.0	0.0	267.1
	Landing Stages Improvement	4.6	0.0	0.0	2.0	0.0	0.0	6.6
	Safety improvement	0.0	5.0	5.0	0.0	0.0	0.0	10.0
	Ship Building	0.0	0.0	15.0	2,080.0	0.0	0.0	2,095.0
	Institution improvement	6.7	20.0	4.0	0.0	0.0	0.0	30.7
	Maintenance	1.0	120.0	0.0	0.0	0.0	0.0	121.0
Air	Construction of new airport	56.0	6,000.0	0.0	0.0	0.0	0.0	6,056.0
	Capacity Expansion of existing airport	1,152.0	200.0	900.0	2,850.0	460.0	0.0	5,562.0
	Improvement of navigation facility	112.5	150.0	0.0	0.0	0.0	0.0	262.5
Multimodal (Logistics)	Construction of new facility for multi-modal cargo handling	0.0	245.8	9.0	9.0	0.0	0.0	263.8
Total		26,925.2	22,145.9	15,787.9	75,692.9	13,780.2	12,420.9	166,753.0

Source: VITRANSS 2 Study Team.

8.60 Table 8.3.19 counts the number of projects in the same classification as Table 8.3.18. Thirty-three percent (33%) of the total projects are committed, with a share of 16.1% of the total cost. Therefore, committed projects are relatively small in terms of investment cost.

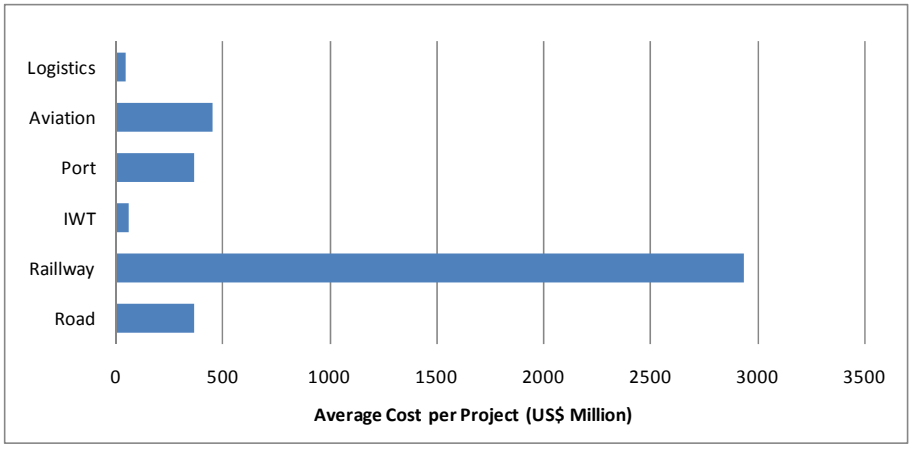
8.61 Judging from the subsectorwise average project cost shown in Figure 8.3.14, Railway projects are remarkably large in investment scale among others. Logistics projects are the smallest.

Table 8.3.19 Number of Projects by Rank and Subsector

Subsector	Type of Project	Committed	Proposed					Total
			A Rated	B Rated	C Rated	D Rated	E Rated	
Road	Construction of new expressway	12	7	4	12	6	3	44
	Construction of new road	16	3	11	4	5	2	41
	Construction of bypass	5	7	5	6	3	0	26
	Improvement of road/bridge	51	30	2	18	12	0	113
	Securing All-weather 2-Lane Roads on Corridors	0	0	0	6	0	1	7
	Improvement of Traffic Safety	3	8	1	0	0	0	12
Rail	Improvement of existing line for capacity expansion	2	1	1	3	0	1	8
	Construction of new line	3	1	0	3	1	0	8
Port & Shipping	Expansion and upgrading of port functions	13	4	9	4		8	38
Inland waterway	Waterway Improvement	9	7	14	5	1	10	46
	Improvement of river port	3	0	3	0	3	0	9
	Landing Stages Improvement	1	0	0	1	0	0	2
	Safety improvement	0	1	1	0	0	0	2
	Ship Building	0	0	1	1	0	0	2
	Institution improvement	2	1	2	0	0	0	5
	Maintenance	1	1	0	0	0	0	2
Air	Construction of new airport	1	1	0	0	0	0	2
	Capacity Expansion of existing airport	7	2	2	7	2	0	20
	Improvement of navigation facility	2	2	0	0	0	0	4
Multi-Modal (Logistics)	Construction of new facility for multi-modal cargo handling	0	3	1	1	0	0	5
Total		131	79	57	71	33	25	396

Source: VITRANSS 2 Study Team.

Figure 8.3.14 Average Project Cost by Subsector (Committed & Proposed Project)



Source: VITRANSS 2 Study Team.

8.4 Master Plan Projects

1) Selection of Master Plan Projects from the Candidate Projects

(1) Available Public Funding vs. Estimated Project Cost

8.62 What VITRANSS 2 proposes is a combination of the closer integration of priorities to transportation strategy, so that the division of expenditure between subsectors would not be a hostage to past trends, but be based on stringent priorities established by analysis, recognizing the level of commitments and the potential for private sector involvement in funding. Front-loading of more viable (financially and economically) projects would then expand the budget envelope in future years.

8.63 Table 8.4.1 compares the budget envelope and the project cost by priority rank. As the budget envelope has a wide range, it is difficult to clearly say to what extent the available public fund can finance the proposed projects. However, the following can be concluded:

(i) All of the estimated available public fund cannot be invested in the proposed projects, since VITRANSS 2 neither covers urban transportation nor rural transportation, and the maintenance cost of the existing, and increasing, infrastructure is shouldered also by public funding. Roughly 40% of the fund should be deducted for these purposes. Thus, the amount of available fund spendable for the master plan period of 2009– 020 decreases to USD22–58 billion.

(ii) Taking the above into account, it is obvious that all the proposed projects cannot be implemented by 2020. Thus, projects should be screened and selected for prioritized implementation;

(iii) Committed projects can be financed even with the most pessimistic scenario. Presumably the Rank 5 projects (ranked highest) can be included by 2020. If the central scenario (5% GDP and medium economic growth) is taken, the Rank 4 projects (ranked second-highest) could be included too. In this case, however, the implementation of the NSHSR will become difficult even partially; and

(iv) The fund constraint will be alleviated to some extent, if funding from non-State Budget sources expands. However, as mentioned in earlier sections, this will not be substantial in the medium-term period. Moreover, its effect would be equivalent to an expectation that the upper range of estimates in the budget envelope would occur.

Table 8.4.1 Comparison of Available Public Fund with Project Cost

Available fund (USD billion)	
2009-2020	37–96
2009-2030	91–264

Project Cost (USD billion)	
Committed	27
Rank5 (highest)	22
Rank4 (med-high)	16
Rank3 (medium)	76
Rank2(med-low)	14
Rank1(low)	12
NSHSR (excluding rolling stock)	45
Total	211

Source: VITRANSS 2 Study Team.

(2) Selection of Master Plan Core Program from Long List (Candidate Projects)

8.64 Based on the analysis above, priority projects were selected as the core investment program (master plan) by 2020. Major assumptions adopted are as follows:

(i) The core program comprises the committed projects and the highest-ranked projects (Rank A); and

(ii) Considering PSP, the cost to government was calculated. The ratio is: expressway - 70%, maritime - 70%, river port - 90%, airport - 80%, and logistics - 50%.

8.65 The results are shown in Table 8.4.2. The cost to government accounts for about USD41 billion without NSHSR or USD60 billion with Hanoi–Vinh and HCMC–Nha Trang section of NSHSR.

Table 8.4.2 Selection of Core Program from Long List (Candidate Projects)

Subsector		0. Candidate Projects (2009–2030)			1. Committed Projects			2. RankA Proposed Projects (2009–2020)			1+2. Core Program (2009–2020)		
		No.	Cost (USD million)		No.	Cost (USD million)		No.	Cost (USD million)		No.	Cost (USD million)	
			Total	To Gov't		Total	To Gov't		Total	To Gov't		Total	To Gov't
1. Road	Expressway	44	67,648	47,354	12	11,691	8,184	7	7,169	5,019	19	18,860	13,202
	Nat'l Highway	187	19,815	19,815	72	8,935	8,935	40	2,057	2,057	112	10,992	10,992
	Others	12	1,936	1,936	3	136	136	8	690	690	11	826	826
	Subtotal	243	89,399	69,105	87	20,762	17,255	55	9,916	7,765	142	30,678	25,020
2. Vietnam Railway (excluding NSHSR)		16	47,051	47,051	5	1,502	1,502	2	4,313	4,313	7	5,815	5,815
3. Maritime		38	13,980	9,786	13	3,076	2,153	4	721	505	17	3,797	2,658
4. IWT	River Port	9	267	240	3	7	6	0	0	0	3	7	6
	Waterway	46	1,647	1,647	9	245	245	7	455	455	16	700	700
	Others	13	2,263	2,263	4	12	12	3	145	145	7	157	157
	Subtotal	68	4,178	4,151	16	265	264	10	600	600	26	864	864
5. Aviation	New Airport	2	6,056	4,845	1	56	45	1	6,000	4,800	2	6,056	4,845
	Existing Airport	20	5,562	4,450	7	1,152	922	2	200	160	9	1,352	1,082
	Navigation Facility	4	263	263	2	113	113	2	150	150	4	263	263
	Subtotal	26	11,881	9,557	10	1,321	1,079	5	6,350	5,110	15	7,671	6,189
6. Logistics		5	264	132	0	0	0	3	246	123	3	246	123
Total (without NSHSR)		396	166,753	139,782	131	26,925	22,253	79	22,146	18,416	210	49,071	40,669
(NSHSR)		4	44,531	44,531	0	0	0	2	19,094	19,094	2	19,094	19,094
Total (with NSHSR)		400	211,284	184,313	131	26,925	22,253	81	41,240	37,510	212	68,165	59,763

Source: VITRANSS 2 Study Team.

Notes: 1) NSHSR was tentatively assumed to have four sections; i.e., Hanoi-Vinh, HCMC-Nha Trang, Vinh-Da Nang, and Nha Trang-Da Nang. The former two sections are included. The cost of NSHSR excludes that of rolling stock that is likely to be acquired by the operator.
2) % of cost to government: expressway - 70%, maritime - 70%, river port - 90%, airport - 80%, logistics - 50%.
3) The cost of NSHSR is that of infrastructure only, excluding rolling stock and O&M cost.
4) The cost of expressway was assumed to be shoulderd by the private sector by 30% on average. This becomes 100% (BOT) sometimes or 0% (public investment) depending on the traffic demand and cost

8.66 Table 8.4.3 compares the investment requirement and the available fund amount. Assuming that the cost of maintenance/minor projects, urban transportation and rural transportation not covered by VITRANSS 2 are 20%, 20%, and 5%, respectively, of the central value of the budget envelope, the total investment requirement was calculated at USD 70.0 billion without the NSHSR and USD89.1 billion with a partial completion of the NSHSR. This amount falls in the range of the budget envelope, albeit at its high end. The percentage of the transportation sector investment in the GDP should be 6–7%, which is usually a difficult target and seldom experienced in the world.

Table 8.4.3 Investment Requirement vs. Fund Availability

Investment Requirement for the Master Plan Period (2011–2020) (USD billion)	
1. Outside of VITRNASS2	
1) Maintenance/minor projects not covered (20% of assumed budget envelope)	13.0
2) Urban transportation (20% of assumed budget envelope)	13.0
3) Rural transportation (5% of assumed budget envelope)	3.3
Subtotal	29.3
2. VITRANSS 2 Projects	
1) Ongoing/committed Projects	22.3
2) New Projects (Proposed Projects)	18.4 (without NSHSR) or 37.5 (with NSHSR)
Subtotal	USD billion 40.7 or 59.8
Total	USD billion 70.0 or 89.1
Ref: Possible Available fund 2009-2020[2]	USD billion 37-96

Source: VITRANSS 2 Study Team.
[1] The budget equal to 5% of GDP under the medium growth scenario was assumed
[2] The budget equal to 3% of GDP under the low growth scenario was assumed (37 USD billion) as low side while the budget equal to 7% of GDP under the high growth scenario was assumed as high side.

(3) Effectiveness of Core Program (Master Plan Projects)

8.67 Each of the master plan projects has been evaluated as explained in the previous section. In addition to this evaluation, traffic assignment has been conducted for the road subsector to confirm the effectiveness of the road projects included in the master plan.

8.68 Table 8.4.4 and figures 8.4.1 through 8.4.6 compare three (3) scenarios for 2020. As shown clearly, the proposed master plan will reduce the time of transportation as well as enhance the travel speed. Although traffic congestion will still remain in some sections even with the master plan projects, the extent is much less compared to other scenarios (Do-nothing and Do-committed).

Table 8.4.4 Evaluation Indicators for 2020 Scenarios for Road Subsector

		Pax-km(Mil.)	Pax-h(Mil.)	Ton-km(Mil.)	Ton-h(Mil.)	Ave. Speed(km/h)
2,008		143.1	4.4	75.2	2.5	30.8
2,020	Do Nothing	322.5	14.2	216.1	9.2	23.2
	Do Committed	325.9	11.1	218.6	7.6	29.0
	Do Master Plan	321.3	9.3	218.0	6.4	34.4

Figure 8.4.1 Voume-Capacity Ratio, 2020 (Do-nothing Scenario)

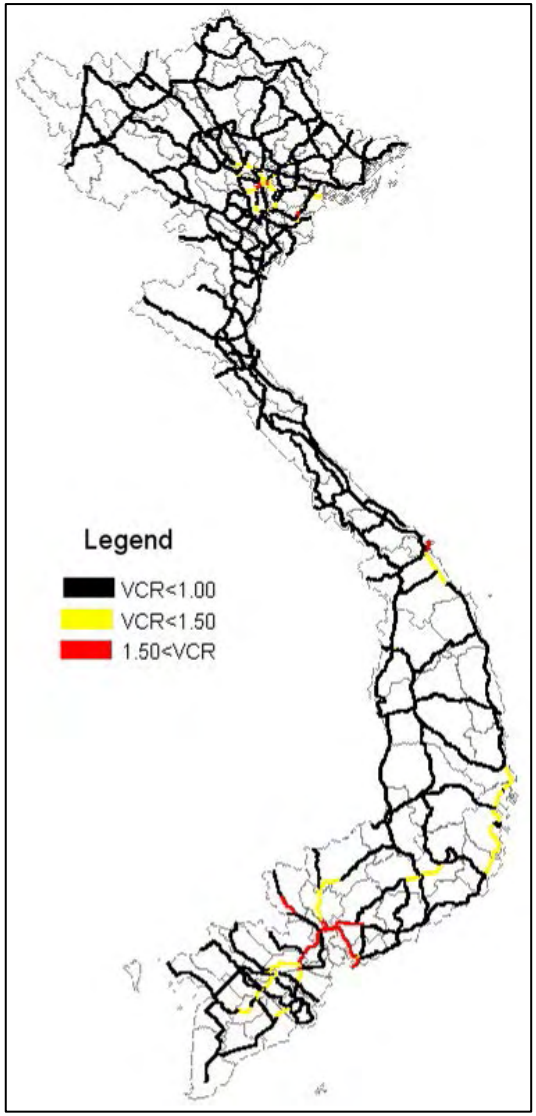


Figure 8.4.2 Volume-Capacity Ratio, 2020 (Do-committed-projects Scenario)

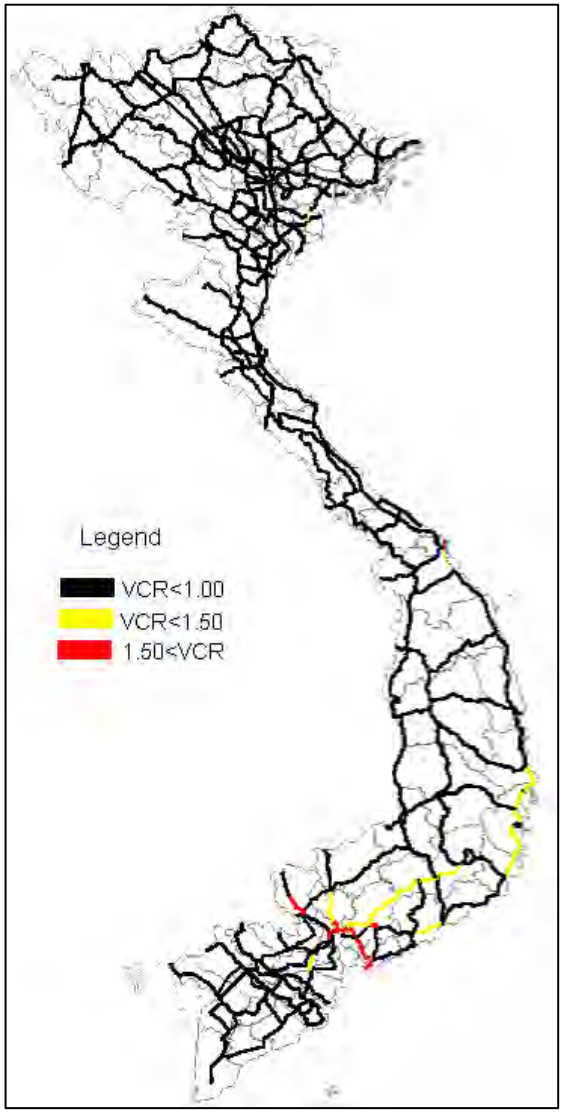


Figure 8.4.3 Volume-Capacity Ratio, 2020 (Do-master-plan Scenario)

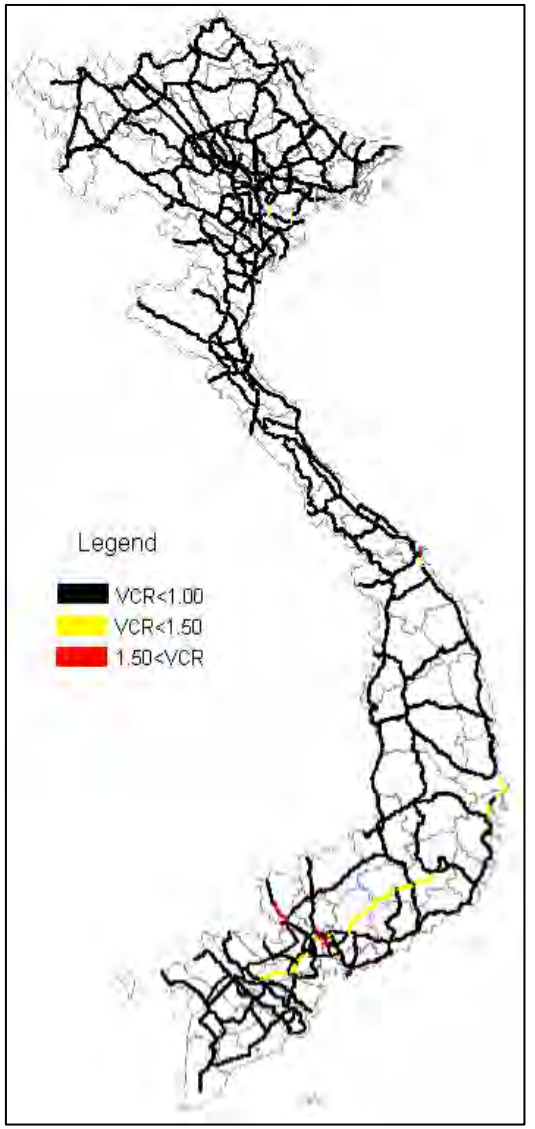


Figure 8.4.4 Volume-Capacity Ratio in Northern & Southern Regions, 2020 (Do-Nothing)

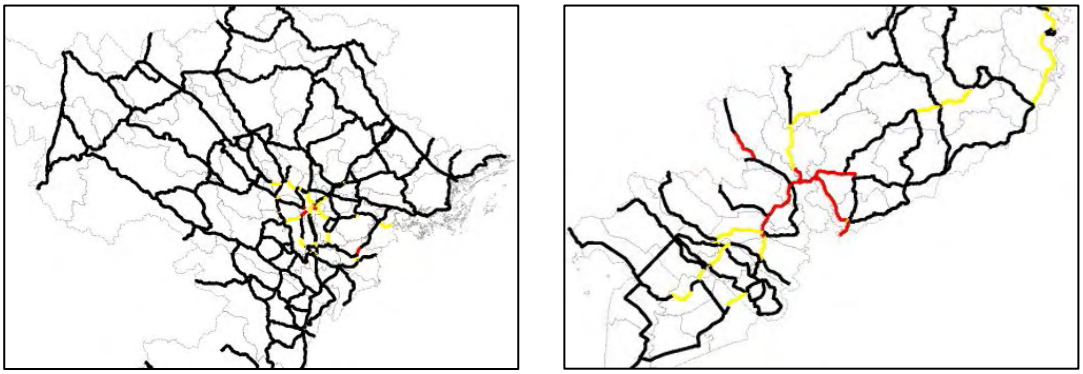


Figure 8.4.5 Volume-Capacity Ratio in Northern & Southern Regions, 2020 (Do-Committed)

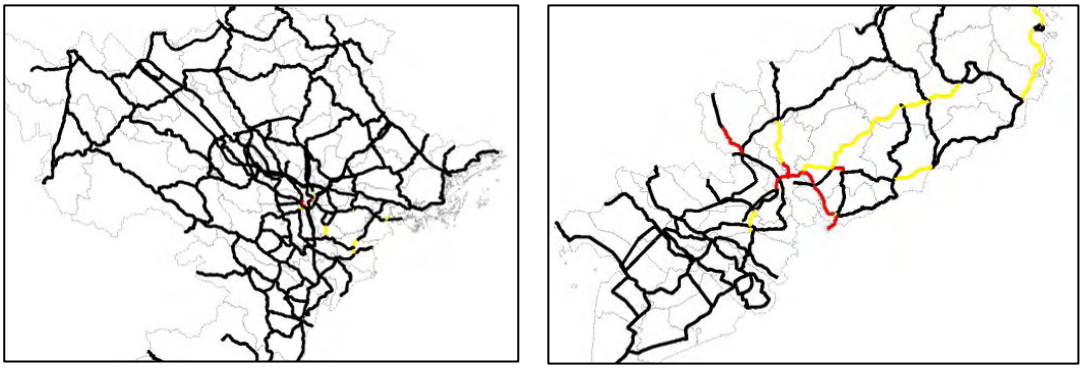
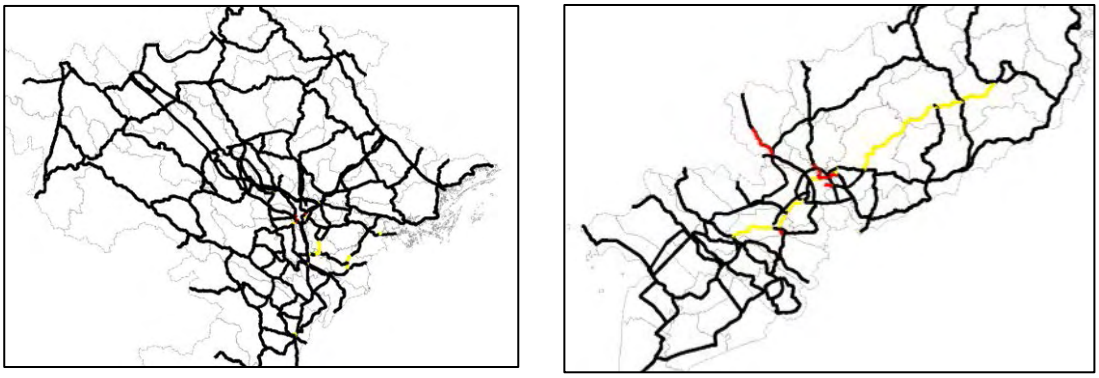


Figure 8.4.6 Volume-Capacity Ratio in Northern & Southern Regions, 2020 (Do-Master Plan)



2) List of Master Plan Projects

8.69 Table 8.4.5 is the list of projects for the VITRANSS 2 Master Plan (proposed projects only). ***Appendix 8A*** lists the committed projects, which are also part of the master plan. Figures 8.4.7 through 8.4.12 present the location of the master plan projects.

Table 8.4.5 Projects for the VITRANSS 2 Master Plan (~2020) (Proposed Project only)

Subsector		Proj. No.	Project Title	Project Description	Proj.Cost (USD mil.)
1. Road	Construction of new express-way	H01	Ninh Binh – Thanh Hoa Expressway (75km)	A part of North-South expressway in the East. (75km, 6 lane)	827.6
		H02	Thanh Hoa – Vinh Expressway (140km)	A part of North-South expressway in the East. (140km, 6 lane)	2128.0
		H03	Vinh – Ha Tinh Expressway (20km)	A part of North-South expressway in the East. (20 km, 4-6 lane)	201.5
		H10	Long Thanh – Nhon Trach – Ben Luc Expressway (45km)	A part of North-South expressway in the East. (45km, 6-8 lane)	738.6
		H21	Bien Hoa – Vung Tau Expressway (76km)	Expressway in Southern Region connecting with Vung Tau Port. (76km, 6 lane)	696.5
		H30	Ring Road No.4 in Ha Noi (90km)	Ring road system in Hanoi. (90km, 4-6 lane)	1350.5
		H32	Ring Road No.3 in HCMC (83km)	Ring road system in HCMC. (83km, 6-8 lane)	1226.9
	Construction of new road	H33	Economic axle-road Construction (24km)	New road in Dan Phuong - Phuc Tho - Son Tay section in Ha Tay Province. (24km).	82.8
		H35	NH1A (Chi Lang - Bac Giang) Construction (Pho Gio)) (40km)	New road in Chi Lang - Bac Giang (Pho Gio) section. (40km, 4lane)	182.1
		H36	NH21 Construction (Phu Ly – Nam Dinh) (25km)	New Class-I road from Liem Tuyen intersection. (25kmm 4lane).	86.2
	Construction of bypass	H59	NH1A Bypass (Van Gia, Khanh Hoa) (10km)	Bypass road for diversion of thru traffic from urban area.(10km,4lane)	46.3
		H63	NH1A Bypass (Phan Thiet, Binh Thuan) (10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
		H64	NH1A Bypass (Duc Pho, Quang Ngai) (9.7km)	Bypass road for diversion of thru traffic from urban area. (9,7km,4lane)	36.3
		H65	NH1A Bypass (Vinh Long) (7.5km)	Bypass road for diversion of thru traffic from urban area. (7.5km,4lane)	25.9
		H68	NH91 Bypass (Thot Not, Can Tho)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
		H73	NH60 Bypass (Ham Luong (Ben Tre – Mo Cay))(10km)	Bypass road for diversion of thru traffic from urban area.. (10km,4lane)	34.5
		H74	NH38 Bypass (Hoa Mac, An Giang)(10km)	Bypass road for diversion of thru traffic from urban area. (10km,4lane)	34.5
	Improvement of road/ bridge	H79	NH 14 Widening (Dong Xoai - Chon Thanh)(34km)	To widen 2-lane section to 4-lane.(34km)	115.4
		H82	NH 51 Widening(Dong Nai - Vung Tau)(73.6km)	To widen 4-lane section to 6-lane.(73.6km)	184.1
		H85	NH5 Upgrading (106km)	To upgrade to required standard.(106km)	155.8
		H90	NH 6 Widening (Ba La - Xuan Mai) (20km)	To widen 2-lane section to 4-lane.(20km)	52.7
		H92	NH 20 Improvement(Dau Giay - Lien Khuong)(250km)	To improve to minimum requirement.(250km)	201.8
		H96	NH10 Improvement (Lai Thanh - Tao Xuyen) (50km)	To improve to minimum requirement.(50km)	24.3
		H109	NH 40 Rehabilitation (24km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (24km)	9.8
		H111	NH31 Rehabilitation (An Chau - Dinh Lap) (48km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (48km)	23.7
		H112	NH3B Rehabilitation (Yen Lac - That Khe) (44km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (44km)	21.7
		H113	PR507(NH47) Rehabilitation (Thuong Xuan - Kheo Border) (60km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (60km)	32.9
		H114	NH48 Rehabilitation (Thai Hoa	To provide minimum, all-weather accessibility wiith the	40.6

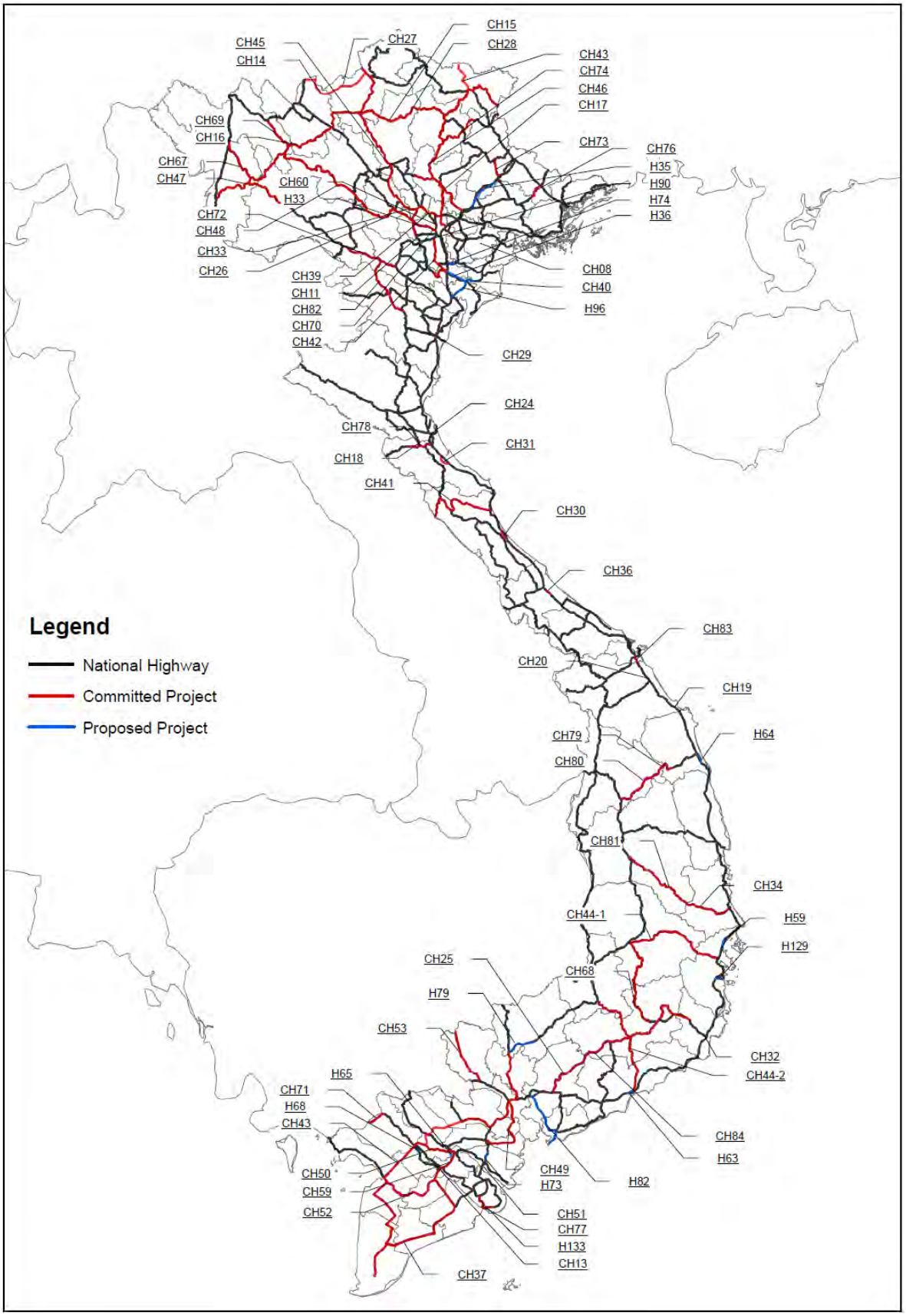
Subsector		Proj. No.	Project Title	Project Description	Proj.Cost (USD mil.)
			- Kim Son) (74km)	existing ROW or road width (74km)	
		H116	NH32B Rehabilitation (Xom Giac - Muong Coi) (21km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (21km)	8.4
		H117	NH2B Rehabilitation (Vinh Yen - Tam Dao) (25km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (25km)	10.6
		H118	NH2C Rehabilitation (Vinh Yen - Son Duong) (60km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (60km)	23.7
		H119	NH23 Rehabilitation (NH2 - Phuc Yen) (27km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (27km)	10.0
		H120	NH47 Rehabilitation(NH1 - NH15) (61km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (61km)	21.8
		H121	NH45 Rehabilitation(Pho Ria - Thanh Hoa - Yen Cat) (136km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (136km)	49.3
		H122	NH49 Rehabilitation(Cang Thuan An - HCM Road) (75km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (75km)	28.0
		H123	NH25 Rehabilitation (Tuy Hoa - HCM Road) (180km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (180km)	72.9
		H124	NH27 Rehabilitation(Phan Rang Thap Cham - Buon Ma Thuot) (276km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (276km)	113.1
		H125	NH49B Rehabilitation (Cau My Chanh - Vinh Hien, Thu Thien Hue) (89km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (89km)	31.1
		H126	NH24B Rehabilitation (NH1 - An Hai, Quang Ngai) (18km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (18km)	6.3
		H127	NH27B Rehabilitation(Tan Son - NH1) (48km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (48km)	17.3
		H128	NH1D Rehabilitation(Quy Nhon - Song Cau, Binh Dinh & Phu Yen) (33km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (33km)	11.5
		H129	NH1C Rehabilitation (Dien Khanh - Nha Trang) (17km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (17km)	5.9
		H130	NH56 Rehabilitation (Xuan Thanh - Ba Ria) (50km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (50km)	17.5
		H131	NH62 Rehabilitation (Tan An - Binh Hiep) (77km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (77km)	26.9
		H132	NH54Rehabilitation (Cai Von - Tieu Can) (167km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (167km)	58.3
		H133	NH53Rehabilitation (Vinh Long - Duyen Hai - NH54) (132km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (132km)	46.1
		H134	NH63 Rehabilitation(Minh Luong - Ca Mau) (109km)	To provide minimum, all-weather accessibility wiith the existing ROW or road width (109km)	38.1
	Improvement of traffic safety	H148	Black Spot Improvement Plan	To review the black spot improvement guideline, implement the black spot improvement pilot project including training for engineers and capacity development, develop an exchage system for human resources and techniques/expertise related to black spot improvement system, promote understanding of black spot improvement system to the road management authorities and promote black spot improvement implementation to local governments	95.0
		H149	Traffic Safety Audit Development Plan	To revise RSA guideline, RSA pilot project, and promote RSA system to the road management authorities	40.0
		H150	Traffic Safety Corridor Development Plan	To develop the database for inventory of encroachment and road conditions, set land value based on market price and apply to land land acquition, improve the compensation system for affected people, improve the public consultation system and mandatory requirement of resettlement plan in road projects, strengthen and enforce sanctions against returning illegal dwellers, development planning focusing on heavy access sections, strengthen regulation for access from heavy traffic generating road side facilities, and legal system improvement for encroachment	40.0
		H152	Vulnerable Road User Acci-	To improve pedestrian facilities along school routes and	75.0

Subsector		Proj. No.	Project Title	Project Description	Proj.Cost (USD mil.)
			dent Prevention Plan	for high-risk accident areas and develop exclusive bicycle lane facilities	
		H153	Expressway Safety Development Plan	To establish an efficient cooperation body between VEC and traffic police for expressway traffic control and develop traffic regulation for expressways, traffic safety measures guidelines for expressways, and advanced traffic control system (ETC) for expressways	112.5
		H154	Road Work Traffic Safety Development Plan	To develop road maintenance database, a comprehensive management system for national highways, regulations, and guidelines for safety measures during road construction and maintenance	20.0
		H155	Traffic Safety Monitoring and Maintenance Plan	To establish a monitoring and evaluation unit of road safety plan, and develop monitoring and evaluation system for local planning	35.0
		H156	Urban Road Traffic Safety Development Plan	To improve traffic regulations for urban road, develop coordinated traffic signal systems, wide area and flexible signal control systems , illegal parking prevention facilities, and an efficient parking regulation system, formulate regulations making parking facilities compulsory in every building, develop comprehensive parking system plan, public transport prioritizing facilities, promote public transport usage facilitation, and develop measures promoting traffic dispersion during peak hour and park and ride systems	272.5
	Subtotal				9,916
2. Railway	Improvement of existing line for capacity expansion	R01	Function-Improvement Items (Hanoi-Saigon Line)	To improve facilities (signal station, automatic level crossing & fence/barrier, depot, workshop etc) to provide 50 trains/day flequency of service on a single truck in Hanoi-Saigon Line.	2465.3
	Construction of new line	R07	Trang Bone – Vung Tau New Railway Construction (SRI & SMI) (71.3km)	To develop a new railway (standard gage double track) between Trang Bone and Vung Tau (71.3km)	1847.8
	Subtotal				4,313
3. Ports and Shipping	Expansion and upgrading of port function	P02	Hai Phong Seaport (Lach Huyen) Development (Stage 1, original schedule: 2010-2015)	To upgrade navigation channel for Lach Huyen Area to -10.3m including construction of sand dyke, develop new deep-water terminals at Lach Huyen for container/general and liquid cargo, and convert the function of part of Hoang Dieu Terminal for other public interest in Hai Phong Seaport	450.0
		P05	Cua Lo Seport Channel & Terminal Development	To construct sand dyke for Nothern Channel and expand the terminal in Cua Lo seaport to handle cargo to/from the northern central zone	26.0
		P19	Ho Chi Minh Seaport (Hiep Phuoc - Stage2 + other) Channel and Terminal Development	To upgrade navigation chalnnel for Hiep Huoc Area to accommodate vessels up to 25,000-30,000 DWT, develop new deep-water container terminal at Hiep Phuoc area to handle container cargo, convert of the function of Nha Rong-Khanh Hoi Terminal into cruise ship terminal and others, and develop new terminal which will substitute for Ben Nghe Terminal	220.0
		P22	Expansion of terminal in Can Tho seaport	To expand a terminal at Cai Cui and at Tra Noc in Can Tho seaport to handle container/general cargo to/from Mekong Delta Area	25.0
	Subtotal				721
4. IWT	Waterway improvement	W01	Upgrading of Quang Ninh/Hai Phong - Ha Noi Route (to ClassII) (166km)	To upgrade the grade of the section of 166 km to class II through the route	38.2
		W06	Upgrading of Quang Ninh - Pha Lai Route (to ClassII) (128km)	To upgrade the grade of the section of 128.0 km to class II through the route	29.4
		W13	Upgrading Cho Gao Canal Route (11km)	improvement of section of 11km among 28km for connecting the north and south routes (dredging, widening, bench cutting, bank protection, up shifting bridges)	138.0
		W14	Improvement of Sai Gon - Kien Luong/Lap Vo canal Route (315km)	To improve the section of 315km for consistent channel conditions	72.5
		W16	Improvement of Sai Gon - Ca Mau/Xa No canal Route (336km)	To improve the section of 336km for consistent channel conditions	77.3

Subsector		Proj. No.	Project Title	Project Description	Proj.Cost (USD mil.)
		W17	Improvement of Sai Gon - Ca Mau/coastal Route (367km)	To improve the section of 367km for consistent channel conditions	84.4
		W21	Improvement of Sai Gon - Hieu Liem Route (88km)	To improve the section of 88km for consistent channel conditions	15.0
	Maintenance	W38	Maintenance Dredging to reduce backlogs	Underdake a 10-year program of dredging to de-silt channels and to re-establich declared class standards	120.0
	Safety Imrpvement	W47	Search and rescue	To establish the search and rescue system with necessary equipment and its operation	5.0
	Institution Improvement	W52	Database: River Surveys and Vessel Registry	To develop capability for continuous surveys of channel status (depth, width, bends, etc.) and to improve vessel registry system	20.0
	Subtotal				600
5. Aviation	Construction of new airport	A01	Long Thanh Airport	To construct a new international airport with the capacity of 8 to 10 mppa.	6000.0
	Capacity expansion of existing airport	A11	Runway Improvement at Danang international Airport	Shifting of taxiway E6 to widen clearance from 75 m to 150m	-
		A13	Expansion of Tan Son Nhat International Airport	To expand capacity of Tan Son Nhat International Airport to handle 25 mppa	200.0
	Improvement of navigation facility	A15	Control tower Construction at Tan Son Nhat International Airport	To construct a new control tower	50.0
		A16	Air Navigation System	Modernization of the air traffic management system	100.0
	Subtotal				6,350
Multi-modal (Logistics)	Construction of new facility for multimodal cargo handling	L01	North Logistic Park Development	To develop the LP facility which has an area of 500,000 square meters and be desighed to have the services of customs clearance for inbound and putbound shipments, warehousing of goods for regional destribution and for exports to cater to the requirement of FDI enterprises in the nearby industrial parks, cross-docking facility, consolidation and deconsolidation, customs-bonded warehouse, container transportation management system, and value-added logistics servises.	199.8
		L02	South Logistic Park Development	To construct a distribution / collection center for international container traffic via international container terminal and international airport	40.0
		L03	Lao Cai Cross-border gate improvement	To Improve, expand and provide a customs clearance office, inspection area, a truck terminal, etc. for trade facilitation with China	6.0
	Subtotal				246
	Total				22,146

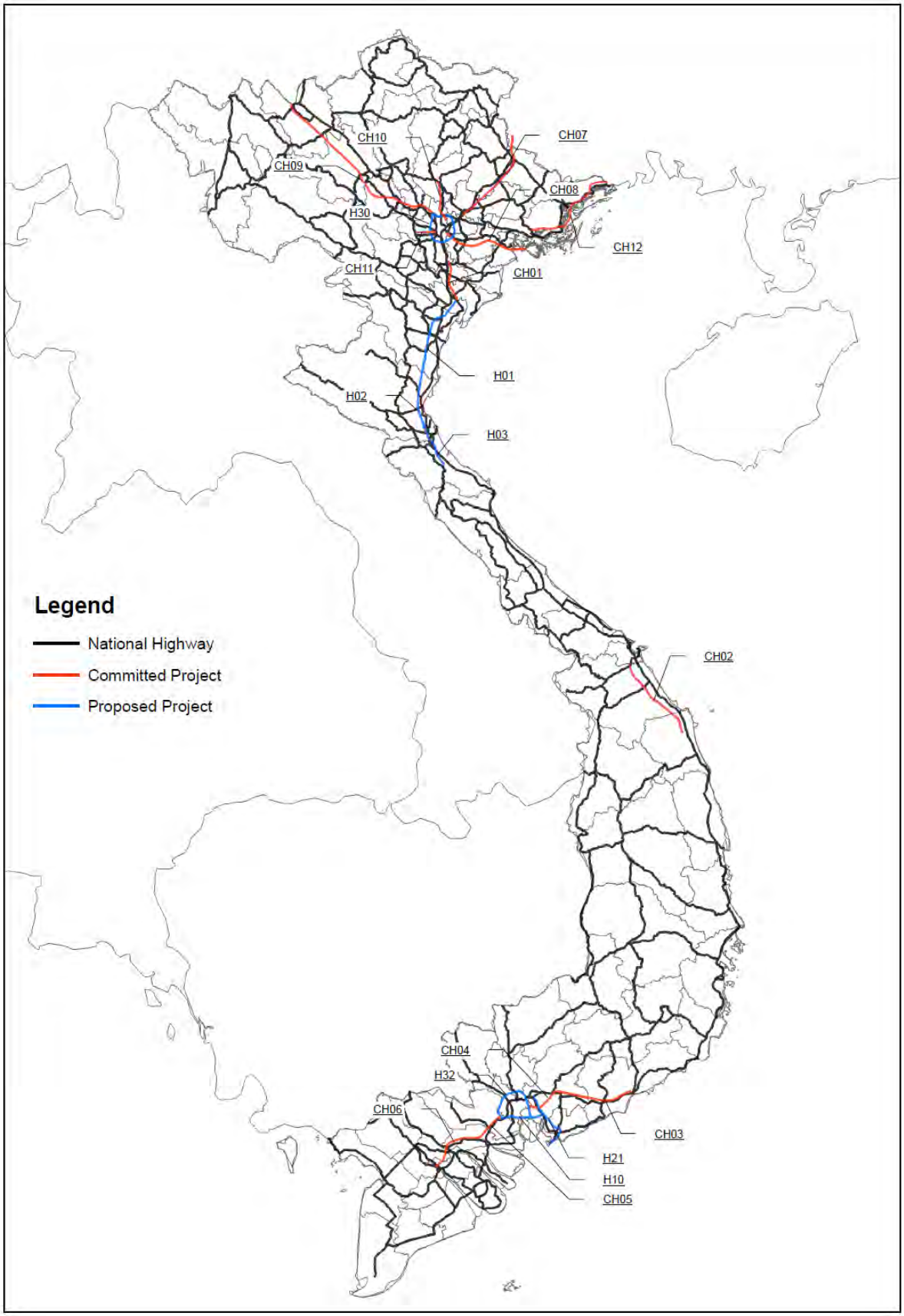
Source: VITRANSS 2 Study Team.

Figure 8.4.7 Location of Master Plan Projects (National Highways)



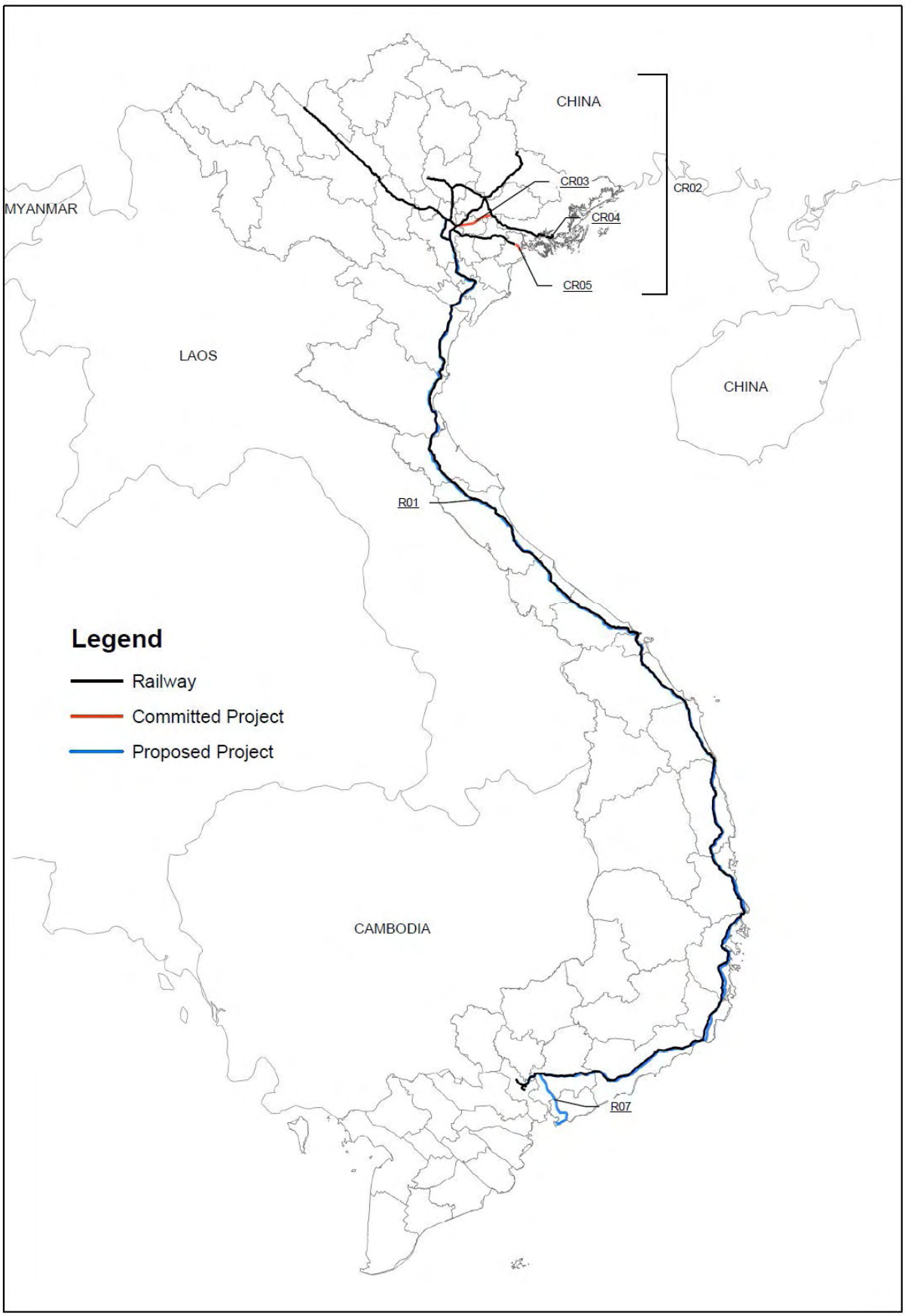
Source: VITRANSS 2 Study Team.

Figure 8.4.8 Location of Master Plan Projects (Expressways)



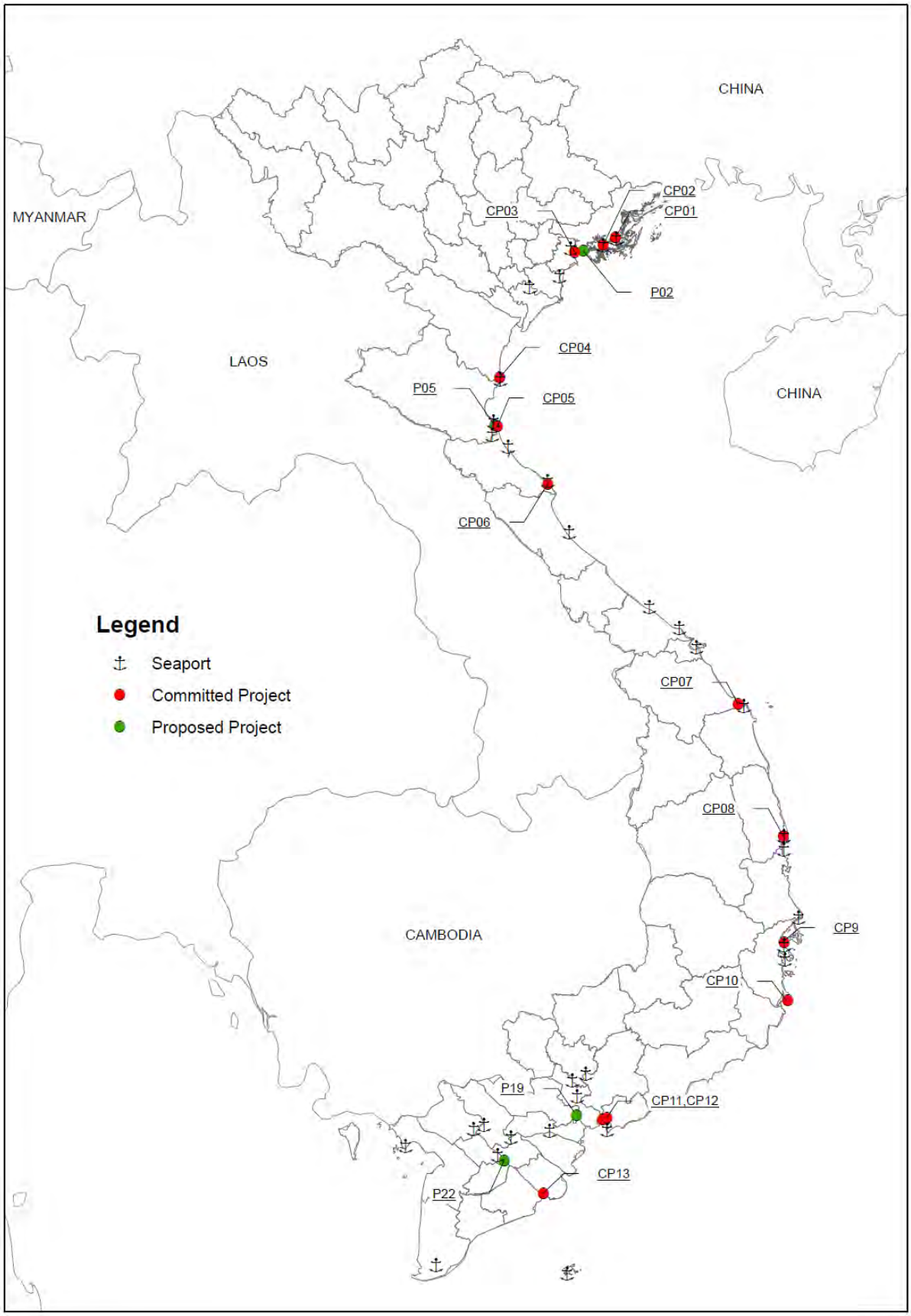
Source: VITRANSS 2 Study Team.

Figure 8.4.9 Location of Master Plan Projects (Railway)



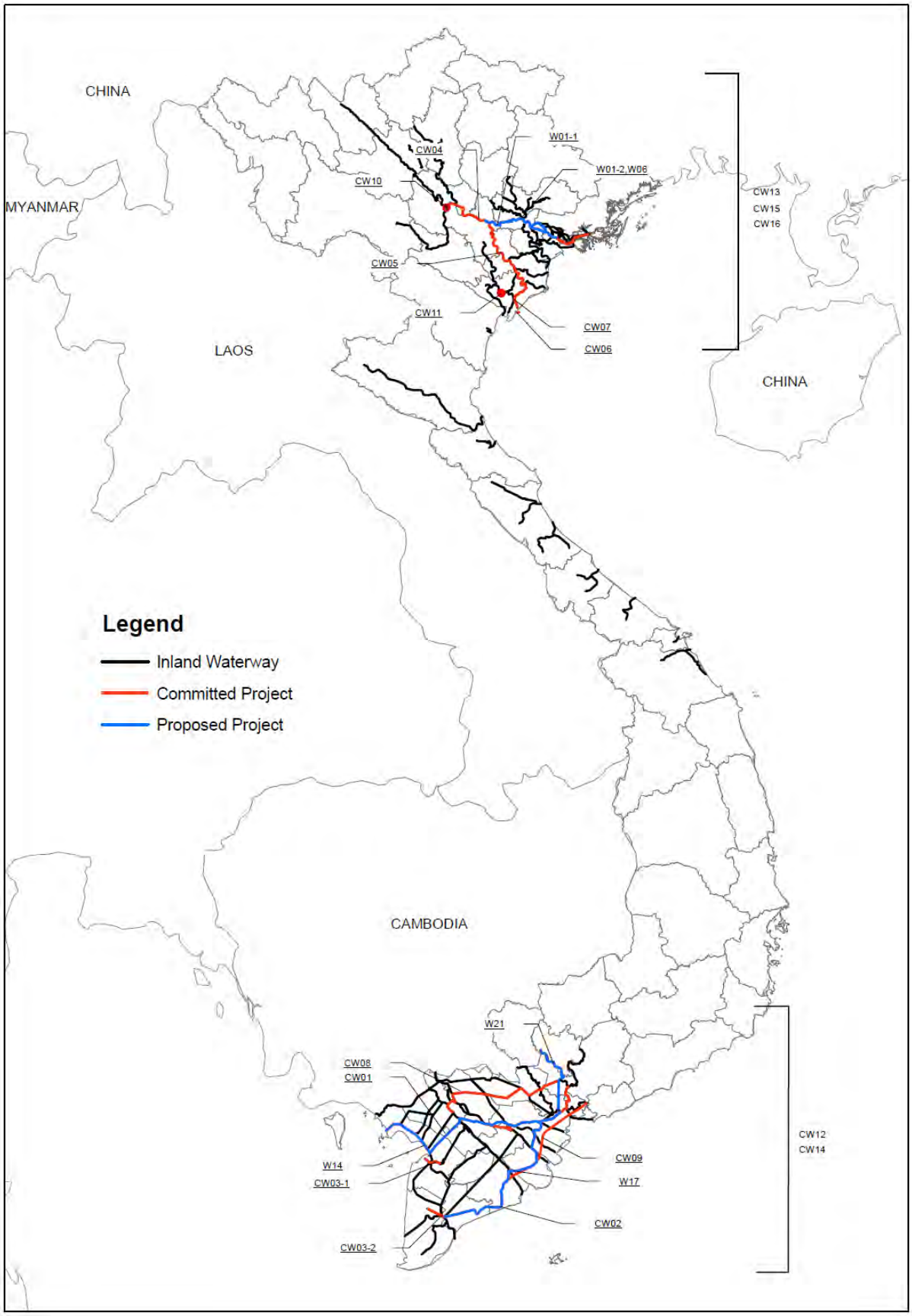
Source: VITRANSS 2 Study Team.

Figure 8.4.10 Location of Master Plan Projects (Port)



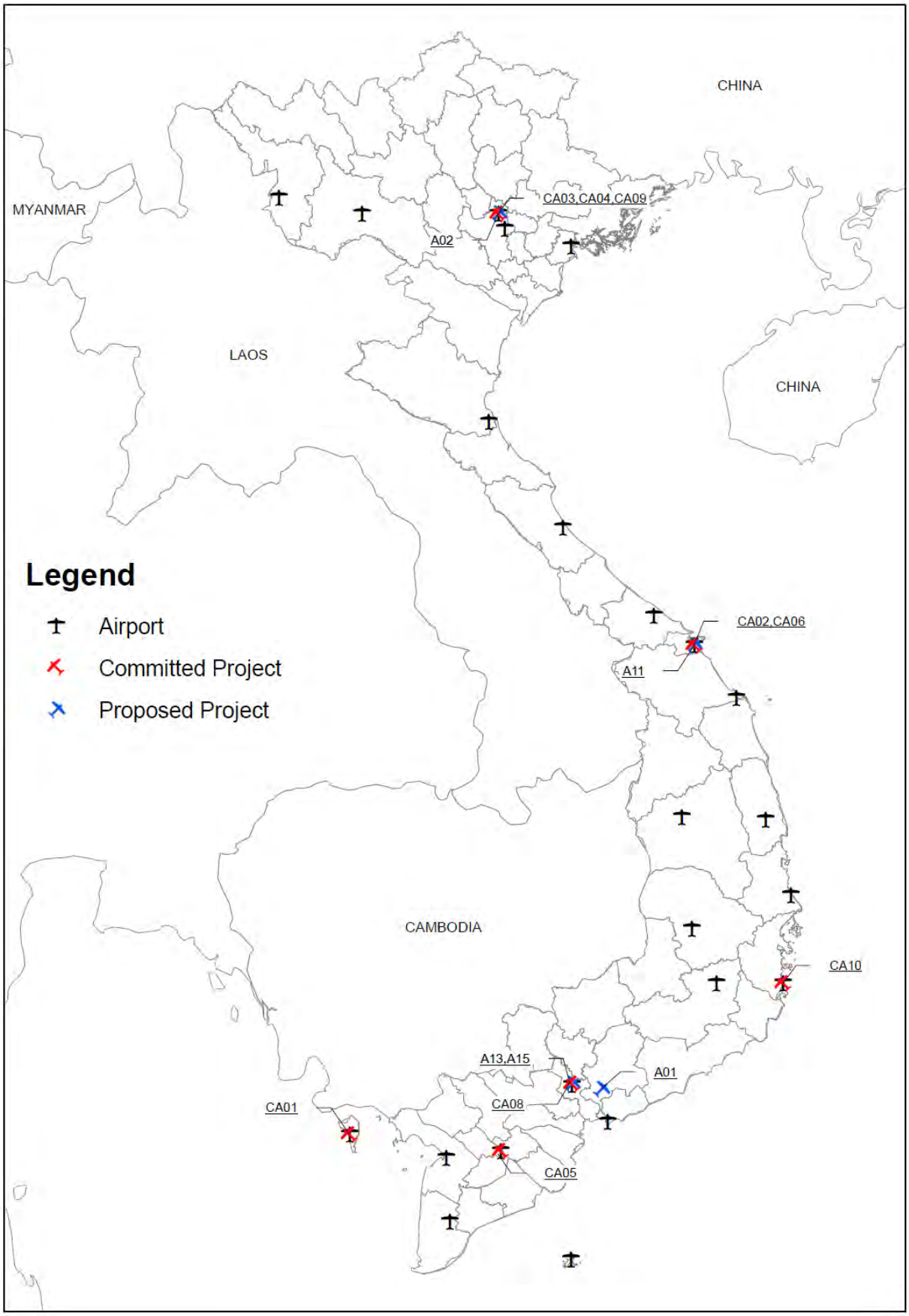
Source: VITRANSS 2 Study Team.

Figure 8.4.11 Location of Master Plan Projects (IWT)



Source: VITRANSS 2 Study Team.

Figure 8.4.12 Location of Master Plan Projects (Aviation)



Source: VITRANSS 2 Study Team.

9 MEDIUM-TERM PLAN

9.1 Priorities and Strategies

1) Budget Envelope and Financial Constraints

9.1 As described earlier in Chapter 7, the public fund availability is limited. For the medium-term up to 2015, the budget envelope is only USD19–46 billion as shown in Table 9.1.1. Since this amount includes those costs for maintenance and urban/rural transportation which are not covered by VITRANSS 2, the public fund availability for this period is more or less USD18 billion only. This cannot cover even the cost for the committed projects.

Table 9.1.1 Public Fund Availability vs. Project Cost

Available fund (USD billion)	
2009–2015	19–46
2009–2020	37–96
2009–2030	91–264

Project Cost (USD billion)	
Committed	27
Rank5 (highest)	22
Rank4 (med-high)	16
Rank3 (medium)	76
Rank2(med-low)	14
Rank1 (low)	12
NSHSR (excluding rolling stock)	45
Total	211

9.2 The cost of the committed projects is not necessarily to be paid during this period, and the government could borrow, if needed. Considering the financial sustainability of the country, however, an ambitious plan is not recommended. Hence, the medium-term plan proposed here takes this financial constraint into account seriously.

2) Subsector Priorities in the Medium Term

(1) Roads

9.3 Based on rapid economic development and motorization trends, road traffic demand will continue to increase at a high rate. Therefore, roads and road transportation systems have to be strengthened and properly maintained. For the medium term, the considerations in selecting road projects are as follows:

(i) Expressways that connect major focal economic points, such as Hanoi, HCMC, Hai Phong, and Danang, should be developed to enhance economic competitiveness and improve accessibility and convenience;

(ii) Bottlenecks at river crossings and near Hanoi and HCMC which hinder smooth inter-provincial transportation should be improved before the situation becomes even more serious; and

(iii) Improvement of existing arterial highways, where problems emerge, is essential to secure network connectivity with provincial/rural roads, and to upgrade traffic safety and accessibility to transportation services.

9.4 In support of these investments, various measures are required. The most important actions, among others, are: (i) to establish a road asset management system that enables proper road maintenance in a timely manner, and (ii) to improve road traffic safety in both infrastructure and institutional aspects.

(2) Railway

9.5 Projects aiming at increasing transportation capacity would require a longer time and huge investment costs to implement. In VITRANSS 2, a three-stage improvement strategy was adopted, i.e., (i) Function Improvement Item (FII) for urgent projects; (ii) System Reinforcement Item (SRI) for the intermediate target; and (iii) System Modernization Item (SMI) to address potential demand for modern railway services. Hence, the railway projects for the medium-term plan should be selected from the FII category.

9.6 With the FII projects, railway aims to provide safe and punctual services. To ensure this, there should be a balance among ground facilities, rolling stock, signal and safety devices, telecommunications, etc. When a higher transportation demand is predicted for some single track lines, the construction of signal stations, including installation of signals and safety devices, should be implemented urgently to meet the target of 50 trains a day.

(3) Ports and Shiping

9.7 At present, the seaside accessibility of major Vietnamese ports located upstream of rivers is constrained mainly by the rivers' limited depths. Some proposals for deep-sea ports, including the Cai Mep International Container Terminal in the south and Lach Huyen Port in the north, have been put forward to address this problem,. The poor landside accessibility is also another serious problem.

9.8 The focus of the mid-term plan should therefore be on the following:

(i) Deep-sea ports and access channels for large container vessels should be developed in the South Focal Economic Zone (SFEZ) and the North Focal Economic Zone (NFEZ). In the Central Focal Economic Zone (CFEZ), ports should be developed to promote import and export of raw materials and products;

(ii) To enhance the ports' function as distribution centers and to alleviate the adverse effects from related traffic, plural domestic transportation modes, including road, railway, inland waterway, and coastal shipping, should be secured at gateway ports in the SFEZ and the NFEZ; and

(iii) To promote a modal shift from land transportation to coastal shipping, facilities for a RORO system should be developed at key ports.

(4) Inland Waterway

9.9 IWT will remain to be one of the most cost-effective modes of transporting industrial products, such as construction materials, cement, fertilizer, coal, and ore. The role of inland waterways in the Red River delta and Mekong River Delta will become more significant in the future, as they will ease the use of roads by heavy trucks which degrade road facilities.

9.10 While the master plan includes such projects as the reinforcement of the core axes, removal of bottlenecks, and improvement of river ports, and in view of fund constraints, the focus should be on improving maintenance work on the arterial channels of

higher class. Improved maintenance is crucial to enhance safety levels in the industry and protect life and property.

(5) Aviation

9.11 It is foreseen that the high growth in air traffic will continue in the future particularly for Noi Bai (Hanoi) and Tan Son Nhat (HCMC) airports. Already, Noi Bai terminal is congested, and TSN just opened a new terminal. There are already plans to expand the primary terminals of Noi Bai, and a new terminal in HCMC is also already being contemplated (i.e., Long Thanh).

9.12 Considering the fact that most of the other airports still remain uncongested, the priority of the mid-term plan would be on these international airports. Modernization of navigational facilities should be included as well.

(6) Multimodal Transportation (Logistics)

9.13 The development of an efficient multimodal transportation system is needed for efficient container handling, which is in turn crucial in promoting foreign trade. This requires investments in facilities and the introduction of new systems, both of which are mostly implemented by the private sector.

9.14 The mid-term plan should therefore focus on supplementary measures wherein the Government can take the lead, such as the establishment of inland container depots (ICDs)—possibly through PPP schemes with government providing funding for the infrastructure—and improvement of cross-border gates/facilities.

3) Corridor Priorities in the Medium Term

9.15 In VITRANSS 2, some 32 transportation corridors were identified. These were classified into the following five (5) types:

(a) **National Backbone Corridor:** Transportation corridors connecting NFEZ, CFEZ, and SFEZ passing through the country from north to south and serving as the backbone of the country's economy and life.

(b) **International Gateway Corridor:** Transportation corridors connecting to FEZs for the growth of the national economy, and functions as the gateway to and from the international market (consumption areas) and sources (production areas).

(c) **Land-bridge Corridor:** Transportation corridors linking Vietnam's major activity centers, such as FEZs and neighboring countries, i.e., China with NFEZ; Cambodia and Thailand with SFEZ; and Thailand, Lao PDR and Myanmar with CFEZ.

(d) **Regional Corridor:** Transportation corridors linking transportation hubs and regional/local production/consumption areas.

(e) **Metropolitan Ring Corridor:** Transportation corridors serving inter-city traffic around Hanoi and HCMC, which are located on both ends of the National Backbone Corridor,

9.16 From the viewpoint of the economic development of Vietnam, the most important corridors are those that belong to category 1 and 2 above. These are shown in Table 9.1.2. However, the "North–South Upland Corridor" shows a relatively small transportation demand, and would be regarded as one of the future corridors. Moreover, the "CFEZ Gateway Corridor" is actually part of the "North–South Coastal Corridor." Therefore, the corridors that should be emphasized from the national economic point of view are the following three:

(i) No.1 North–South Coastal Corridor;

(ii) No.3 NFEZ Gateway Corridor; and

(iii) No.4 SFEZ Gateway Corridor.

Table 9.1.2 National Backbone and International Gateway Corridors

Type/Name of Corridor		Terminal Point		Length (km)
National Backbone Corridor				
1	North - South Coastal	Hanoi	HCMC	1,790
2	North - South Upland	Hanoi	HCMC	1,750
International Gateway Corridor				
3	NFEZ Gateway	Hanoi	Hai Phong	120
4	SFEZ Gateway	HCMC	Ba Ria–Vung Tau	110
5	CFEZ Gateway	Quang Ngai	Hue	190

9.17 Therefore, the first priority should be given to projects located in these corridors. Another priority should be projects that connect strategic points or those that enhance the synergy of the proposed projects. For instance, logistics projects promoting multimodal transportation between road and railway and arterial road projects linking key transportation facilities and urban centers should be prioritized. The prioritized projects may not be confined in a single corridor.

9.2 Selected Projects and Implementation Program

9.18 Core projects have been selected for the mid-term plan up to 2015 based on the criteria described above. For each project, the implementation schedule was assumed based on government plans, project scale, and priorities. Adjustments were made so that the investment amount falls within the budget envelope.

9.19 All ongoing/committed projects are included in this program as shown in Table 9.2.1. The total cost of these projects amounts to about USD27 billion, out of which about USD21 billion will be spent during the mid-term period.

9.20 Table 9.2.2 shows the priority mid-term projects selected from the projects included in the master plan (see Chapter 8). The total cost will be around USD22 billion, out of which, about USD11 billion will be spent by 2015.

9.21 Therefore, the total cost of the mid-term plan is about USD49 billion with an assumed actual expenditure of USD32 billion by 2015.

Table 9.2.1 Implementation Program of Ongoing/Committed Transportation Projects up to 2015and 2020

Project		Project Cost (USD mil.)		Assumed Schedule	Schedule			
No.	Name	Total	2009-2015		-2013	-2015	-2018	-2020
Road								
Construction of New Expressway								
CH01	Cau Gie – Ninh Binh Expressway (50km)	452.4	180.9	06-10				
CH02	Da Nang – Quang Ngai Expressway (131km)	1048.2	1048.2	11-15				
CH03	Phan Thiet – Dau Giay Expressway (100km)	1003.8	1003.8	11-15				
CH04	HCMC – Long Thanh – Dau Giay Expressway (55km)	1110.8	888.7	08-12				
CH05	HCMC- Trung Luong Expressway (40km)	776.5	129.4	04-09				
CH06	Trung Luong – My Thuan – Can Tho Expressway (92km)	1510.0	1510.0	11-15				
CH07	Lang Son – Bac Giang – Bac Ninh Expressway (130km)	1176.3	705.8	13-17				
CH08	Ha Noi – Hai Phong Expressway (105km)	1441.2	1441.2	11-15				
CH09	Ha Noi – Lao Cai Expressway (264km)	1218.7	1218.7	09-12				
CH10	Ha Noi – Thai Nguyen Expressway (62km)	248.2	82.7	05-10				
CH11	Lang – Hoa Lac Expressway (30km)	450.0	112.5	06-09				
CH12	Ha Long – Mong Cai Expressway (128km)	1254.7	250.9	15-19				
Construction of New Road								
CH13	Can Tho Bridge Construction	284.8	35.6	02-09				
CH14	Border Ring No1 Construction (Hai Giang - Lao Cai) (151km)	300.4	136.5	03-13				
CH15	Border Ring No2 Construction (Northern Part)	17.2	1.9	01-09				
CH16	Border Ring No2 Construction (Northwest Part, Pho Rang - Minh Thang) (160km)	140.9	94.0	07-12				
CH17	Border Ring C3 Construction	30.1	20.0	07-12				
CH18	Linh Dam Bridge Construction (NH15, Ha Tinh)(2 lane)	13.6	13.6	10-12				
CH19	Ong Bo Bridge Construction (NH1A, Quang Nam)(2 lane,108m)	1.4	0.9	06-13				
CH20	Huong Anh bridge Construction (NH1A, Quang Nam)(4lane, 250m)	8.4	8.4	11-13				
CH21	Dinh Vu Bridge	200.0	200.0	11-13				
CH22	Vinh Thinh Bridge Construction (Ha Tay)	80.0	80.0	11-15				
CH23	45 Rural Traffic Bridges in Central and Central Highland Provinces	32.8	6.6	01-10				
CH24	Ben Thuy II bridge Construction (NH1&NH8B, Nghe An-Ha Tinh) (2lane, 1km)	74.1	74.1	09-11				
CH25	Dong Nai bridge Construction	121.8	121.8	12-13				
CH26	Cau Phung Bridge Construction (NH32)	18.6	15.5	08-13				
CH27	Border Ring Road No 1 Construction (Ha Giang – Lao Cai) (151km)	67.8	67.8	11-15				
CH28	NH279 Construction (Tuyen Quang – Bac Can) (94.5km)	67.3	67.3	10-13				
Construction of Bypass								
CH29	NH1A Bypass (Thanh Hoa) (10km)	38.3	38.3	11-15				
CH30	NH1A Bypass (Dong Hoi, Quang Binh) (19.3km)	38.6	38.6	11-15				
CH31	NH1A Bypass (Ha Tinh) (16.3km)	20.8	20.8	11-15				
CH32	NH1A Bypass (Phan Rang, Ninh Thuan) (8.3km)	32.2	32.2	11-15				
CH33	NH2 Bypass (Vinh Yen (Vinh Yen – Vinh Phuc)) (10.6km)	36.2	36.2	11-13				
Construction of Road/Bridge								
CH34	NH 25 Upgrading (Le Bac Bridge - To No pass) (11.5km)	4.6	4.6	11-13				
CH35	Mekong Delta River Infrastructure Development (NH53,N54,NH91 & PHs; WB5)	119.5	85.4	07-13				
CH36	NH 1 Widening (Dong Ha - Quang Tri)	31.5	31.5	13-15				
CH37	Highway Rehabilitation Project III (NH1, Can Tho - Nam Can) (288km)	186.0	46.5	03-10				
CH38	Bridge Rehabilitation Project - Phase III (NH1)	84.9	33.9	06-10				
CH39	NH2 Upgrading (Noi Bai - Vinh Yen) (22km)	66.8	13.4	05-09				
CH40	NH10 Upgrading (Tan De bridge - La Uyen bridge) (5.5km)	25.5	14.1	05-13				
CH41	East-West Corridor Improvement (NH12A) (182.3km)	98.9	22.0	02-10				
CH42	NH 21B & NH21 Upgrading (Hanoi)(76km)	44.2	44.2	13-15				
CH43	Ho Chi Minh Highway Phase 2 Upgrading (Pac Bo - Dat Mui excluding Hoa Lac - Ngoc Hoi) (2,072km)	1591.1	1193.3	08-11				
CH44	Rehabilitation Project (NH19, NH20, NH26, NH27, NH28)	85.4	71.2	08-13				
CH45	NH 2 Improvement (Hanoi - Ha Giang) (261km)	107.2	13.4	02-09				
CH46	NH 3 Improvement (Hanoi - Cao Bang) (310km)	155.3	77.6	05-12				
CH47	NH 6 Improvement Phase 2 (Son La - Dien Bien)	68.9	11.5	04-09				
CH48	NH 32 Improvement (Hanoi - Lai Chau) (358km)	178.8	39.7	02-10				
CH49	NH 50 Improvement (HCMC - My Tho) (88km)	148.8	148.8	09-13				
CH50	NH 80 Improvement (My Thuan - Vam Cong) (50km)	35.2	10.1	04-10				

Project		Project Cost (USD mil.)		Assumed	Schedule			
No.	Name	Total	2009-2015	Schedule	-2013	-2015	-2018	-2020
CH51	NH 60 road and bridges Improvement	168.5	140.4	08-13				
CH52	NH 61 Improvement (Can Tho - Kien Giang)	23.8	6.0	06-09				
CH53	NH22B Improvement (Go Dau - Xa Ma) (73km)	23.9	4.0	04-09				
CH54	Secondary Road Network rehabilitation Program	664.4	553.7	08-13				
CH55	Tertiary Road Improvement Project	201.9	144.2	07-13				
CH56	Rural Road Projects improvement III (2,500km)	155.6	103.8	07-12				
CH57	Improvement of Rural Bridges in Central Coast & Central Highland Provinces	32.3	4.0	02-09				
CH58	Other Roads and Bridges Improvement	202.0	202.0	11-13				
CH59	NH1 Upgrading (My Thuan - Can Tho) (38.4km)	108.4	108.4	11-13				
CH60	Thang Long Bridge Surface Repair	3.5	3.5	12-13				
CH61	Road Network Improvement and Upgrading of (WB4) (Improvement component) (629km)	310.5	258.8	08-13				
CH62	Road Network Improvement and Upgrading (WB4) (maintenance and institutional improvement component)	112.5	112.5	09-13				
CH63	NH 1 Rehabilitation (Phase 3)	87.4	87.4	11-13				
CH64	Rural Traffic Project No.3 (3150km)	155.6	129.7	08-13				
CH65	Rehabilitation of Weak bridges (140 bridges) ((Phase 1)	98.1	98.1	09-13				
CH66	Southern Coastal Corridor Upgrading (NH80 & NH63) (225km)	290.9	242.4	08-13				
CH67	NH6 Upgrading (Tuan Giao – Lai Chau) (96km)	138.8	138.8	11-13				
CH68	NH 27 Upgrading (98km)	56.9	40.6	07-13				
CH69	NH 32 Upgrading (Vach Kim – Binh Luu) (72km)	33.8	33.8	09-13				
CH70	NH 32 Upgrading (Dien – Nhon) (7km)	57.7	57.7	10-13				
CH71	NH 91 Upgrading (Chau Doc- Tinh Bien) (27.3km)	55.7	55.7	11-13				
CH72	Storm No.5 Recovery Projects on NH6 (Hoa Binh – Son La)	4.6	4.6	11-13				
CH73	NH 279 Upgrading (Ttan Son – Than Muoi, Dong Mo – Tu Don)	14.8	12.4	08-13				
CH74	NH3B Upgrading (Xuat Hoa-Po Ma) (60km)	79.8	79.8	10-13				
Ch75	Weak Bridge Rehabilitation Project (Stage 2: 83 bridges)	207.5	207.5	11-13				
CH76	NH 31 Upgrading (Huu San – ban Chat) (61km)	59.4	59.4	11-13				
CH77	NH53 (not including Km56-Km60 and Km130-Km139 in WBS project) (121km)	81.1	81.1	11-13				
CH78	NH8A Upgrading (Ha Tinh) (37km)	69.2	69.2	11-13				
CH79	NH24 Upgrading (Pho Phong – Quang Ngai) (8km)	23.3	23.3	11-13				
CH80	NH24 Upgrading (Pho Phong – Kon Tum) (160km)	294.1	294.1	11-13				
CH81	NH25 Upgrading (Phu Yen – Gia Lai)(160km)	294.1	294.1	11-13				
CH82	NH15 Upgrading (Mai Chau - Hoi Xuan) (109km)	117.6	117.6	11-13				
CH83	NH1A Upgrading (Hoa Cam – Hoa Phuoc, Danang) (8.4km)	32.8	0.0	16-18				
CH84	NH20 and Other Sections Repairment and Upgrading (268km)	16.6	16.6	10-13				
Improvement of Traffic Safety								
CH85	Road Safety Improvement Program	33.4	33.4	10-13				
CH86	Northern Vietnam National Roads Traffic Safety Improvement Project (NH 3, NH 5, NH 10, NH 18)	60.7	60.7	09-13				
CH87	Railway and Road Safety Traffic System Building	41.7	41.7	10-13				
	Subtotal	20762.0	15465.4					
Railway								
Improvement of Exisitng Line for Capacity Expansion								
CR01	Improvement and Upgrading in North – South Railway Line	965.4	965.4	10-15				
CR02	Improvement of Railway Routes in the North	291.6	102.1	01-20				
Construction of New Line								
CR03	Yen Vien-Pha Lai railway line	118.4	84.5	07-13				
CR04	Ha Long- Cai Lan railway line	58.9	42.1	07-13				
CR05	Railway line from Chua Ve to DAP factory-Dinh Vu (Hai Phong)	67.7	67.7	10-13				
	Subtotal	1502.1	1261.9					
Port & Shipping								
Expansion and Upgrading of Port Functions								
CP01	Cam Pha Seaport Channel Development	7.0	7.0	12-13				
CP02	Hon Gai Seaport (Cai Lan) Terminal Development (Committed Stage)	120.0	120.0	10-13				
CP03	Hai Phong Seaport (Dinh Vu) Channel & Terminal Development	411.0	411.0	11-13				
CP04	Nghi Sonr Seaport Channel & Terminal Development	24.0	24.0	11-13				
CP05	Cua Lo Seaport Channel Development (Committed Stage)	4.0	4.0	11-13				
CP06	Vung Ang Seaport Terminal Development (Committed Stage)	40.0	40.0	11-13				
CP07	Dung Quat Seaport Terminal Development (Committed Stage)	41.0	41.0	11-13				

Project		Project Cost (USD mil.)		Assumed	Schedule			
No.	Name	Total	2009-2015	Schedule	-2013	-2015	-2018	-2020
CP08	Quy Nhon Seaport Channel & Terminal Development (Committed Stage)	74.0	74.0	11-13				
CP09	Van Phong Seaport Terminal Development (Stage 1)	190.0	190.0	11-13				
CP10	Ba Ngoi Seaport (Cam Ranh) Terminal Development (Stage 1A)	88.0	88.0	11-13				
CP11	Vung Tau Seaport (Cai Mep - Thi Vai) Channel and Terminal Development (Stage 1)	1675.0	1675.0	11-13				
CP12	Ho Chi Minh Seaport (Hiep Phuoc) Channel & Terminal Development (Stage1)	204.0	204.0	11-13				
CP13	Quan Chanh Bo Channel Development Project	198.0	198.0	11-13				
Subtotal		3076.0	3076.0					
Inland waterway								
Inland Waterway Improvement								
CW01	Upgrading of Northern Trans Mekong coriddor (to Class III)(253km)	99.3	99.3	11-13				
CW02	Updating of Southern coastal coriddor (to Class III) (153km)			13-15				
CW03	Upgrading of the feeder canals in Mekong Delta region (to Class IV) (58km)	8.5	8.5	11-13				
CW04	Improvement of the east-west northern corridor in the northern delat regeion (Viet Tri - Quang Ninh) (280km)	59.8	59.8	11-13				
CW05	Upgrading of the north-south western corridor in the northern delta region (to Class I) (295km)	6.5	6.5	11-13				
CW06	Improvement to Ninh Co River Estuary	63.7	63.7	11-13				
CW07	Inter-connecting canal between the Day and Ninh Co River	0.0		11-13				
CW08	Improvement of Sai Gon-DongThap-Long Xuyen Route	4.4	4.4	11-13				
CW09	Improvement of Thi-Vai-Nuoc ManCanal Route	3.1	3.1	11-13				
Improvement of River Port								
CW10	Improvement of Viet Tri Port	4.3	4.3	11-13				
CW11	Improvement of Ninh Phuc Port	2.8	2.8	11-13				
CW12	Demonstration investment for provincial port facilities in Mikong Delta region			11-13				
Land Stages Improvement								
CW13	Invesgtment of small ferry boats stages	4.6	4.6	11-13				
Institutional Improvement								
CW14	Institutional development concerned with Mekong Delta Inland waterways	1.6	1.6	11-13				
CW15	Institutional development concerned with Northern delta Region Inland waterways	5.1	5.1	11-13				
Maintenance								
CW16	Pilot maintenance project	1.0	1.0	11-13				
Subtotal		264.6	264.6					
Aviation								
Construction of New Airport								
CA01	Phu Quoc Island Airport	56.0	56.0	11-13				
Capacity Expansion of Existing Airport								
CA02	Terminal Construction at Danang International Airport	84.0	84.0	10-13				
CA03	T2 Terminal Construction at Noi Bai International Airport	800.0	800.0	12-13				
CA04	Cargo Terminal Expansion at Noi Bai International Airport	20.0	20.0	10-13				
CA05	Runway upgrading and terminal Construction at Can Tho Airport	23.0	23.0	09-13				
CA06	Runway Extension and Apron Expansion at Danang International Airport	75.0	45.0	13-17				
CA07	Passenger Terminal Expansion at Danang Internaitional Airport	100.0	0.0	18-23				
CA08	Cargo Terminal Constrcution at Tan Son Nhat International Airport	50.0	50.0	09-15				
Improvement of Navigation Facility								
CA09	Control Tower Construction at Noi Bai International Airport	100.0	100.0	12-13				
CA10	Terminal Building and Control Tower Construction at Cam Ranh Airport	12.5	12.5	11-13				
Subtotal		1320.5	1190.5					
Total		26925.2	21258.4					

Source: VITRANSS 2 Study Team

Table 9.2.2 Implementation Program of Proposed Transportation Projects up to 2015 and 2020

Project		Project Cost (USD mil.)		Assumed	Schedule			
No.	Name	Total	2009-2015	Schedule	-2013	-2015	-2018	-2020
Road								
Construction of New Expressway								
H01	Ninh Binh – Thanh Hoa Expressway (75km)	827.6	413.8	13-18		■	■	
H02	Thanh Hoa – Vinh Expressway (140km)	2128.0	0.0	16-20			■	■
H03	Vinh – Ha Tinh Expressway (20km)	201.5	0.0	16-20			■	■
H10	Long Thanh – Nhon Trach – Ben Luc Expressway (45km)	738.6	738.6	11-15	■	■		
H21	Bien Hoa – Vung Tau Expressway (76km)	696.5	417.9	13-17		■	■	
H30	Ring Road No.4 in Ha Noi (90km)	1350.5	1350.5	11-15	■	■		
H32	Ring Road No.3 in HCMC (83km)	1226.9	1226.9	11-15	■	■		
Construction of New Road								
H33	Economic axle-road Construction (24km)	82.8	82.8	11-15	■	■		
H35	NH1A (Chi Lang - Bac Giang) Construction (Pho Gio)) (40km)	182.1	0.0	16-20			■	■
H36	NH21 Construction (Phu Ly – Nam Dinh) (25km)	86.2	0.0	16-20			■	■
Construction of Bypass								
H59	NH1A Bypass (Van Gia, Khanh Hoa) (10km)	46.3	0.0	16-20			■	■
H63	NH1A Bypass (Phan Thiet, Binh Thuan) (10km)	34.5	0.0	16-20			■	■
H64	NH1A Bypass (Duc Pho, Quang Ngai) (9.7km)	36.3	0.0	16-20			■	■
H65	NH1A Bypass (Vinh Long) (7.5km)	25.9	25.9	11-15	■	■		
H68	NH91 Bypass Construction (Thot Not, Can Tho) (10km)	34.5	34.5	11-15	■	■		
H73	NH60 Bypass (Ham Luong (Ben Tre – Mo Cay))(10km)	34.5	0.0	16-20			■	■
H74	NH38 Bypass (Hoa Mac, An Giang)(10km)	34.5	34.5	11-15	■	■		
Construction of Road/Bridge								
H79	NH 14 Widening (Dong Xoai - Chon Thanh)(34km)	115.4	115.4	13-15		■		
H82	NH 51 Widening(Dong Nai - Vung Tau)(73.6km)	184.1	184.1	11-13	■			
H85	NH5 Upgrading (106km)	155.8	155.8	11-13	■			
H90	NH 6 Widening (Ba La - Xuan Mai) (20km)	52.7	52.7	11-13	■			
H92	NH 20 Improvement(Dau Giay - Lien Khuong) (250km)	201.8	201.8	11-13	■			
H96	NH10 Improvement (Lai Thanh - Tao Xuyen) (50km)	24.3	24.3	11-13	■			
H109	NH 40 Rehabilitation (24km)	9.8	9.8	11-13	■			
H111	NH31 Rehabilitation (An Chau - Dinh Lap) (48km)	23.7	23.7	11-13	■			
H112	NH3B Rehabilitation (Yen Lac - That Khe) (44km)	21.7	21.7	11-13	■			
H113	PR507(NH47) Rehabilitation (Thuong Xuan - Kheo Border) (60km)	32.9	32.9	11-13	■			
H114	NH48 Rehabilitation (Thai Hoa - Kim Son) (74km)	40.6	40.6	11-13	■			
H116	NH32B Rehabilitation (Xom Giac - Muong Coi) (21km)	8.4	8.4	11-13	■			
H117	NH2B Rehabilitation (Vinh Yen - Tam Dao) (25km)	10.6	10.6	11-13	■			
H118	NH2C Rehabilitation (Vinh Yen - Son Duong) (60km)	23.7	23.7	11-13	■			
H119	NH23 Rehabilitation (NH2 - Phuc Yen) (27km)	10.0	10.0	11-13	■			
H120	NH47 Rehabilitation(NH1 - NH15) (61km)	21.8	21.8	11-13	■			
H121	NH45 Rehabilitation(Pho Ria - Thanh Hoa - Yen Cat) (136km)	49.3	49.3	11-13	■			
H122	NH49 Rehabilitation(Cang Thuan An – HCM Road) (75km)	28.0	28.0	11-13	■			
H123	NH25 Rehabilitation (Tuy Hoa - HCM Road) (180km)	72.9	72.9	11-13	■			
H124	NH27 Rehabilitation(Phan Rang Thap Cham - Buon Ma Thuot) (276km)	113.1	113.1	11-13	■			
H125	NH49B Rehabilitation (Cau My Chanh - Vinh Hien, Thu Thien Hue) (89km)	31.1	31.1	11-13	■			
H126	NH24B Rehabilitation (NH1 - An Hai, Quang Ngai) (18km)	6.3	6.3	11-13	■			
H127	NH27B Rehabilitation(Tan Son - NH1) (48km)	17.3	17.3	11-13	■			
H128	NH1D Rehabilitation(Quy Nhon - Song Cau, Binh Dinh & Phu Yen) (33km)	11.5	11.5	11-13	■			
H129	NH1C Rehabilitation (Dien Khanh - Nha Trang) (17km)	5.9	5.9	11-13	■			
H130	NH56 Rehabilitation (Xuan Thanh - Ba Ria) (50km)	17.5	17.5	11-13	■			
H131	NH62 Rehabilitation (Tan An - Binh Hiep) (77km)	26.9	26.9	11-13	■			
H132	NH54Rehabilitation (Cai Von - Tieu Can) (167km)	58.3	58.3	11-13	■			
H133	NH53 Rehabilitation (Vinh Long - Duyen Hai - NH54) (132km)	46.1	46.1	11-13	■			
H134	NH63 Rehabilitation(Minh Luong - Camau) (109km)	38.1	38.1	11-13	■			
Improvement of Traffic Safety								
H148	Black Spot Improvement Plan	95.0	95.0	11-13	■			
H149	Traffic Safety Audit Development Plan	40.0	40.0	11-13	■			
H150	Traffic Safety Corridor Development Plan	40.0	40.0	11-13	■			
H152	Vulnerable Road User Accident Prevention Plan	75.0	75.0	11-13	■			
H153	Expressway Safety Development Plan	112.5	112.5	11-13	■			
H154	Road Work Traffic Safety Development Plan	20.0	20.0	11-13	■			
H155	Traffic Safety Monitoring and Maintenance Plan	35.0	35.0	11-13	■			

Project		Project Cost (USD mil.)		Assumed	Schedule			
No.	Name	Total	2009-2015	Schedule	-2013	-2015	-2018	-2020
H156	Urban Road Traffic Safety Development Plan	272.5	272.5	11-13				
	Subtotal	9916.3	6474.6					
Railway								
Improvement of Exisitng Line for Capacity Expansion								
R01	Function-Improvement Items (Hanoi-Saigon Line)	2465.3	0.0	16-20				
Construction of New Line								
R07	Trang Bone – Vung Tau New Railway Construction (SRI & SMI) (71.3km)	1847.8	0.0	16-20				
	Subtotal	4313.1	0.0					
Port & Shipping								
Expansion and Upgrading of Port Functions								
P02	Hai Phong Seaport (Lach Huyen) Development (Stage 1, original schedule: 2010-2015)	450.0	270.0	13-17				
P05	Cua Lo Seport Channel & Terminal Development	26.0	0.0	16-20				
P19	Ho Chi Minh Seaport (Hiep Phuoc - Stage2 + other) Channel and Terminal Development	220.0	132.0	13-17				
P22	Expansion of terminal in Can Tho seaport	25.0	25.0	11-13				
	Subtotal	721.0	427.0					
Inland waterway								
Inland Waterway Improvement								
W01	Upgrading of Quang Ninh/Hai Phong - Ha Noi Route (to ClassII) (166km)	38.2	38.2	11-13				
W06	Upgrading of Quang Ninh - Pha Lai Route (to ClassII) (128km)	29.4	29.4	11-13				
W13	Upgrading Cho Gao Canal Route (11km)	138.0	138.0	11-13				
W14	Improvement of Sai Gon - Kien Luong/Lap Vo canal Route (315km)	72.5	72.5	11-13				
W16	Improvement of Sai Gon - Ca Mau/Xa No canal Route (336km)	77.3	0.0	16-18				
W17	Improvement of Sai Gon - Ca Mau/coastal Route (367km)	84.4	0.0	18-20				
W21	Improvement of Sai Gon - Hieu Liem Route (88km)	15.0	0.0	16-18				
Maintenance								
W38	Maintenance Dredging to reduce backlogs	120.0	60.0	11-20				
Safety Improvement								
W47	Search and rescue	5.0	5.0	11-13				
Institutional Improcement								
W52	Database: River Surveys and Vessel Registry	20.0	20.0	11-13				
	Subtotal	599.7	363.1					
Aviation								
Construction of New Airport								
A01	Long Thanh Airport	6000.0	3000.0	11-20				
Capacity Expansion of Existing Airport								
A11	Runway Improvement at Danang international Airport	-	-	13-17				
A13	Expansion of Tan Son Nhat International Airport	200.0	200.0	11-15				
Improvement of Navigation Facility								
A15	Control tower Construction at Tan Son Nhat International Airport	50.0	50.0	11-13				
A16	Air Navigation System	100.0	100.0	11-13				
	Subtotal	6350.0	3350.0					
Logistics								
Construction of New Facility for Multimodal Cargo Handling								
L01	North Logistic Park Development	199.8	199.8	11-13				
L02	South Logistic Park Development	40.0	40.0	11-13				
L03	Lao Cai Cross-border gate improvement	6.0	6.0	11-13				
	Subtotal	245.8	245.8					
	Total	22145.9	10860.4					

Source: VITRANSS 2 Study Team

9.3 Investment Requirement

9.22 Table 9.3.1 presents the investment requirement for the selected mid-term projects up to 2015 according to the assumed implementation schedule above. Although the total expenditure during the medium term up to 2015 amounts to about USD32 billion, the "cost to the Government" was estimated at USD26.3 billion for both ongoing/committed and newly planned projects.

Table 9.3.1 Investment Requirement for Mid-Term Projects up to 2015

		Master Plan Projects (2009–2020)			1. Committed Projects (2009-2015)			2. New Projects (2009–2015)			1+2. Mid-term Plan (2009–2015)		
		No.	Cost (USD million)		No.	Cost (USD million)		No.	Cost (USD million)		No.	Cost (USD million)	
			Total	To Gov't[3)]		Total	To Gov't[3)]		Total	To Gov't[3)]		Total	To Gov't[3)]
1. Road	Expressway	19	18,860	13,202	12	8,573	6,001	7	4,148	2,903	19	12,721	8,904
	Nat'l Highway	112	10,992	10,992	72	6,757	6,757	40	1,637	1,637	112	8,394	8,394
	Others	11	826	826	3	136	136	8	690	690	11	826	826
	Subtotal	142	30,678	25,020	87	15,498	12,926	55	6,475	5,230	142	21,973	18,157
2. Vietnam Railway (excluding NSHSR)		7	5,815	5,815	5	1,262	1,262	2	0	0	7	1,262	1,262
3. Maritime		17	3,797	2,658	13	3,076	2,153	4	427	299	17	3,503	2,452
4. IWT	River Port	3	7	6	3	7	6	0	0	0	3	7	6
	Waterway	16	700	700	9	245	245	7	278	278	16	523	523
	Others	7	157	157	4	12	12	3	85	85	7	97	97
	Subtotal	26	864	864	16	265	264	10	363	363	26	628	627
5. Aviation	New Airport	2	6,056	4,845	1	56	45	1	3,000	2,400	2	3,056	2,445
	Existing Airport	9	1,352	1,082	7	1,022	818	2	200	160	9	1,222	978
	Nav'l Facility	4	263	263	2	113	113	2	150	150	4	263	263
	Subtotal	15	7,671	6,189	10	1,191	975	5	3,350	2,710	15	4,541	3,685
6. Logistics		3	246	123	0	0	0	3	246	123	3	246	123
Total (without NSHSR)		210	49,071	40,669	131	21,258	17,547	79	10,860	8,725	210	32,119	26,273
(NSHSR)[2)]		2	19,094	19,094	0	0	0	0	0	0	0	0	0

Source: VITRANSS 2 Study Team.

Notes: [1] Partially spent before 2009.[2] NSHSR was tentatively assumed to have four sections; i.e., Hanoi-Vinh, HCMC-Nha Trang, Vinh-Da Nang, and Nha Trang-Da Nang. The former two sections are included. The cost of NSHSR excludes that of rolling stock that is likely to be acquired by the operator.[3] % of cost to government: expressway - 70%, maritime - 70%, river port - 90%, airport - 80%, logistics - 50%.

9.23 Table 9.3.2 compares the investment requirement and availability of public fund. The investment requirements of the proposed projects for the medium term are more or less within public funding level. However, if the HSR project starts during this period, the financial situation will become tight and the Government will have to seek additional funds.

Table 9.3.2 Required Investment vs. Fund Availability for the Medium-term Plan[1]

Investment Requirement for the Medium-term Plan Period (2011–2015) (USD billion)	
1. Outside of VITRNASS2	
1) Maintenance/minor projects not covered (20% of assumed budget envelope)	6.4
2) Urban transportation (20% of assumed budget envelope)	6.4
3) Rural transportation (5% of assumed budget envelope)	1.6
Subtotal	14.4
2. VITRANSS 2 Projects	
1) Ongoing/committed Projects	17.6
2) New Projects (Proposed Projects)	8.7
Subtotal	26.3
Total	40.7
Ref: Possible Available fund 2009-2015[2]	19–46

Source: VITRANSS 2 Study Team.

[1] The budget equal to 5% of GDP under the medium growth scenario was assumed, [2] The budget equal to 3% of GDP under the low growth scenario was assumed (19 USD billion) as low side while the budget equal to 7% of GDP under the high growth scenario was assumed (46 USD billion) as high side.

9.4 Indicators Over Plan Periods

9.24 It is, of course, possible to convert the preceding list of projects into resulting output indicators. Project completions over time changed the state of the transportation system by sub-sector – which can be reflected in terms of such indicators as speed, lane-km of new roads, paved roads, port berth capacities, railway speed, and the like. They are in accord with the institutional recommendation of Vitranss2 to monitor overall impact of the transport investment program over time. For practical reasons, however, the conversion into output indicators was not done. One, many of the proposed projects lack detailed feasibility studies to support this exercise. Two, the focus of Vitranss2 program is to meet forecasted demand and overcome anticipated capacity constraints. Because of funding constraint, this demand cannot be fully met. Three, Vitranss 2 emphasizes investment efficiency in resource allocation and adherence to criteria in setting project priorities over setting “product ion targets”. For example, so many kilometers of double-track railway looks appealing as sector performance target or indicator, but may in fact represent poor investment for seeking higher standards in a corridor where demand can be served by an improved single-track system. Level of service indicator is a sound indicator for a specific road segment, but meaningless as a national average for a national set of roads.