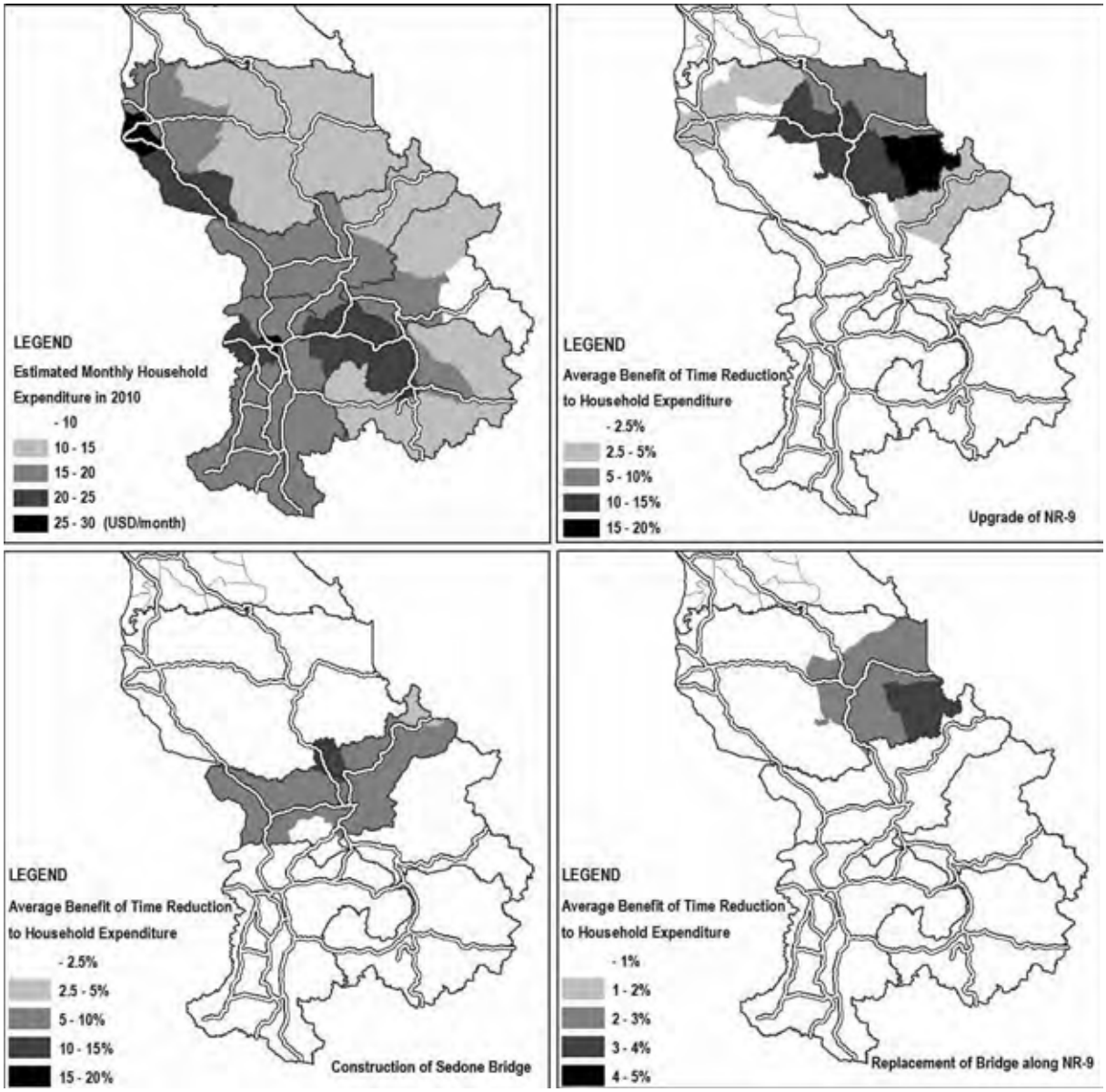


Source: JICA Study Team

Figure 4.5.4 Percentage of Average Benefit by Priority Projects to Household Expenditure

4.6 Project Profiling

4.6.1 Project Profile of Priority Projects

The overall result of this study was the compilation of project features and aspects for each priority project into the project profile for that particular project. Each priority project was summarized as a profile in the following items; project background, overall goal and project purpose, justification of the project, scope of the project, implementing agency and other stakeholders, implementation schedule, project cost, possible financial source, related activities and requirement for implementation of the project. The scope of each project was detailed in a separate table, including project road length, design condition, typical cross section, geometric standards, pavement structure, and so forth.

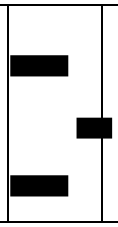
Table 4.6.1 Project Profile (Upgrade of NR-9)

Project Name	Upgrade of NR-9		SN	N-1-NR9
Project Background	The location of Lao PDR offers strategic prospects, transforming itself from "land-locked" to "land-linked" country particularly by developing international infrastructure networks. In this respect, road links, in particular, are of vital importance. The transport system in Laos significantly depends on the road network, and is critical for national integration, and is also highly valued for improving accessibility to surrounding countries. Especially the East – West Corridor between Vietnam and Thailand is essential in securing access to the sea ports. In addition, the improvement of the road network is domestically important for improving accessibility of the rural communities to the livelihood assets e.g. goods, services and opportunities; and for realizing the potential of economic growth. The Government of Lao PDR has made intensive efforts to improve the trunk road network in Southern Lao. These efforts include road improvements along NR-13 (South), NR-9 and construction of the Second Mekong Bridge, under the support of both bilateral and multilateral donors, such as ADB, World Bank and JICA. In spite of the afore-mentioned, there is still need for significant injection of funds into road rehabilitation/development in Southern Lao. Unpaved roads and un-rehabilitated bridges, frequently observed in the Southern Lao, all contribute to the deterioration of the road network, hence hindering trade of both goods and people. As such, the economic development of Southern Lao lags behind that of the other regions in Lao PDR.			
Overall Goal and Project Purpose	Overall Goal: ・ To promote international/domestic traffic along the East-West Corridor and to generate economic growth in the GMS/Laos. Project Purpose: ・ To reduce travel time and transport costs along the NR-9 and to establish a safe and reliable road network, hence promoting trade of goods and passengers along the East-West Corridor. ・ To improve accessibility to social infrastructures, markets and public transport services and to enhance income and employment opportunities, hence reducing poverty along the NR-9.			
Justification of the Project	Consistency with Upper Plan	・ Previous National Socio-economic Development Plan (2006-10) set major goals and targets, including strengthening socio-economic infrastructure as fundamentals for development. The draft National Socio-economic Development Plan (2011-15) sets development directions, including strengthening international cooperation and integrating the economy into the regional and global organizations. ・ In the Provincial Socio-economic Plan of Savannakhet, improvement of roads and bridges in the rural area (2006-10) and elimination of poverty and development of the local economy (2011-15) are set as focal targets of the province. ・ There is development potential, industrial development in particular, along the NR-9. For instance, Savan-Seno SEZ develops 4 SEZs along the NR-9. Gold and copper mining at Sepon, which significantly contributes to national economic growth, expands its production. ・ In this study, the road section of this project is selected as one of three priority projects from among 16 long listed road and bridge improvement projects.		
	Urgency of the Project	・ An inventory survey by JICA's Follow-up Study on NR-9 found that the road section of this project is considerably deteriorated and is in a bad/poor surface condition. Due to the insufficient amount of maintenance funds, the deteriorated road section cannot be properly maintained and contributes to increasing travel time and transport costs and high occurrence of traffic accidents. ・ A socio-economic survey was carried out at the sampled villages along the NR-9. It revealed that there is an urgent demand for road improvement to improve accessibility to social infrastructure and markets and sustain the livelihood of the villagers.		

	Necessity of the Project	• The road section of this project is part of the Asian Highway No. 16 and GMS Economic Corridor (East-West Corridor). The design standards of the Asian Highway (Class II) suggest that this road section be upgraded to AC surfaced roads to allow maximum load of 11.0 ton. • The international traffic observed along the NR-9, estimated by the traffic demand forecast, will increase to 58% of the traffic and the NR-9 is expected to function as an important international corridor. • Based on comprehensive analysis by this study, the traffic volume of this road section is estimated to increase to 8,500 vehicles (PCU) per day by 2025. The volume capacity ratio along the NR-9 will reach 0.55 by 2025, showing the highest ratio among the long-listed projects.
	Adverse Impact of the Project	• IEE study suggests that there would be no significant adverse impact during the construction and operation of the project. Some critical environmental factors to be carefully studied are (i) impact on regional drainage system including irrigation for agricultural land, (ii) potential for soil erosion along road bank, (iii) temporal water quality degradation during construction period, (iv) roadside air quality and noise during construction period, (v) worsened traffic safety during construction period, and (vi) risk of soil contamination due to accidental spill of construction chemicals.
	Beneficiaries and Benefits generated from the Project	• The road users along the NR-9 would be direct beneficiaries. 239,000 persons, including 82,000 persons under poverty, who stay near the project site (within 5 km buffer) are potential indirect beneficiaries. Amongst these people, there are 77,000 persons living in villages without schools and 217,000 persons without hospital/clinics. • The result of the economic analysis on this particular project is summarized below: EIRR= 11.9%. Thus, the economical validity of this project is justified. • Economic benefits derived from the project would contribute to poverty reduction. This project would contribute to generating income for 132,000 households in the eastern part of Savannakehet Province, where most severe poverty is observed.
Scope of Project	Replacement of pavement for 43km of road and application of overlay for 31km of road along NR-9. The scope of the project is detailed in separate table (Table 4.6.2).	
Implementing Agency	Ministry of Public Works and Transport	
Other Stakeholders	Savannakhet Province, WREA, Traffic Police, Roadside Communities, Regional Tourism Industry (long-distance bus company, hotel, restaurants and others), Cargo Company	

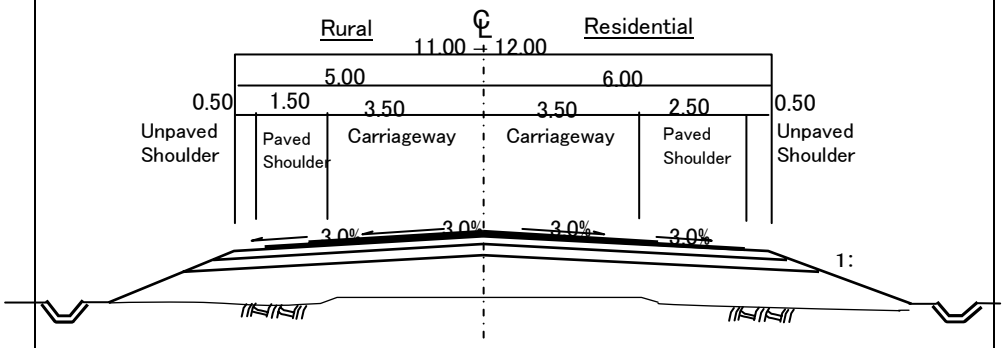
Implementation Schedule

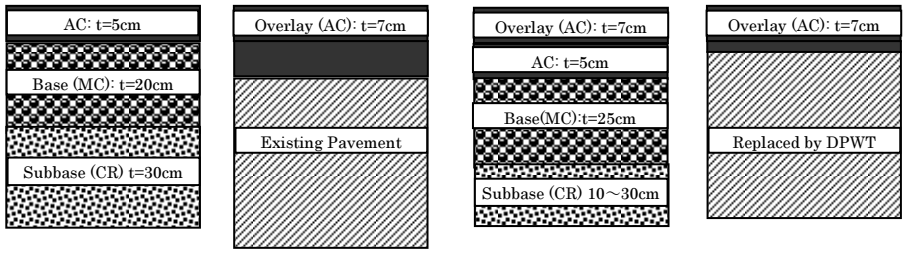
	1st	2nd	3rd	4th	5th	6th	7th	8th - Year
Design Works - B/D - D/D								
Tendering - E/N - Tender								
Construction - Preparation - Works								

	EIA - EIA/EMP/RAP - License - (Land Acquisition)								
Project Cost	Construction cost: 3,305 million yen Design and supervision work: 198 million yen Administration cost: 66 million yen Total cost: 3,569 million yen								
Possible Financial Source	The Government of Japan								
Related Activities	JICA is to conduct the basic design for the project and the scope of the project will be finalized, including the project cost.								
Requirement	Planning Requirement	• The following surveys may be required: Topographic survey, Pavement condition survey, Geotechnical survey (boring), Hydrological survey and Traffic survey.							
	Technical Requirement	• N/A							
	Environmental Requirement	• Environmental approval shall be obtained prior to construction, by conducting either IEE or EIA. Type of environmental study for official environmental approval is determined at Project Screening Process with WREA. • It is recommended that discussions be held with WREA about Project Screening Process to determine ToR of relevant environmental study after upgrading outline of NR-9 is finalized.							

Source: Prepared by JICA Study Team

Table 4.6.2 Scope of Project (Upgrade of NR-9)

<table>
<tr><td>Scope of Works</td><td>Improvement of Pavement Structure and Rehabilitation</td></tr>
<tr><td>(1) Length</td><td>Replacement of pavement for 43km of road and application of overlay for 31km road along NR-9</td></tr>
<tr><td>(2)Design Conditions</td><td>Road class:Class II (3000～8000PCU/day),
Design speed:100km/h(Flat), 70km (Rolling) ,50km(Residential)</td></tr>
<tr><td>(3)Cross-section</td><td> 

Total width:11-12m＝0.5m(Un-paved shoulder)+1.5m(Paved shoulder)+3.5m x 2（Carriageway）+2.5m （Paved shoulder: Residential） +0.5m （Unpaved shoulder）</td></tr>
<tr><td>(4)Geometric Standards</td><td>Cross-fall
Min horizontal curve applied:R=200m, Max. Grade:5.0 - 7.0%</td></tr>
<tr><td>(5)Pavement Structure</td><td> 

Carriageway:AC, Shoulder: BTB
Design Life: 20 years (subject to deviations in traffic demand forecasts)</td></tr>
<tr><td>(6)Drainage Facility</td><td>Type:side ditch, transverse pipe culvert, Design method:Rational formula, Design rainfall intensity:120mm/h （5year return period）</td></tr>
<tr><td>(7) Reference Index</td><td>Crack Ratio including DBST patching by Section (Follow-up Study)
<table>
<tr><td rowspan="2">Ph se</td><td colspan="2">Phase-1</td><td colspan="2">Phase -2</td><td colspan="2">Phase -3</td><td colspan="2" rowspan="2">Total</td></tr>
<tr><td colspan="2">Xeno-MuanPharan</td><td colspan="2">Muan Pharan-Muan Phin</td><td colspan="2">MuanPhin-Densavanh</td></tr>
<tr><td>Donor</td><td colspan="4">Japan</td><td colspan="2">ADB</td><td colspan="2"></td></tr>
<tr><td></td><td>km</td><td>%</td><td>km</td><td>%</td><td>km</td><td>%</td><td>km</td><td>%</td></tr>
<tr><td>Serious</td><td>22</td><td>30.14</td><td>10</td><td>16.95</td><td>11</td><td>13.92</td><td>43</td><td>20.38</td></tr>
<tr><td>Bad</td><td>13</td><td>17.81</td><td>16</td><td>27.12</td><td>2</td><td>2 53</td><td>31</td><td>14.69</td></tr>
<tr><td>Fair</td><td>38</td><td>52.05</td><td>33</td><td>55.93</td><td>66</td><td>83.54</td><td>137</td><td>64.93</td></tr>
<tr><td>Total</td><td>73</td><td>100.00</td><td>5</td><td>10 .00</td><td>79</td><td>100.00</td><td>211</td><td>100.00</td></tr>
</table></td></tr>
</table>

Source: Prepared by JICA Study Team

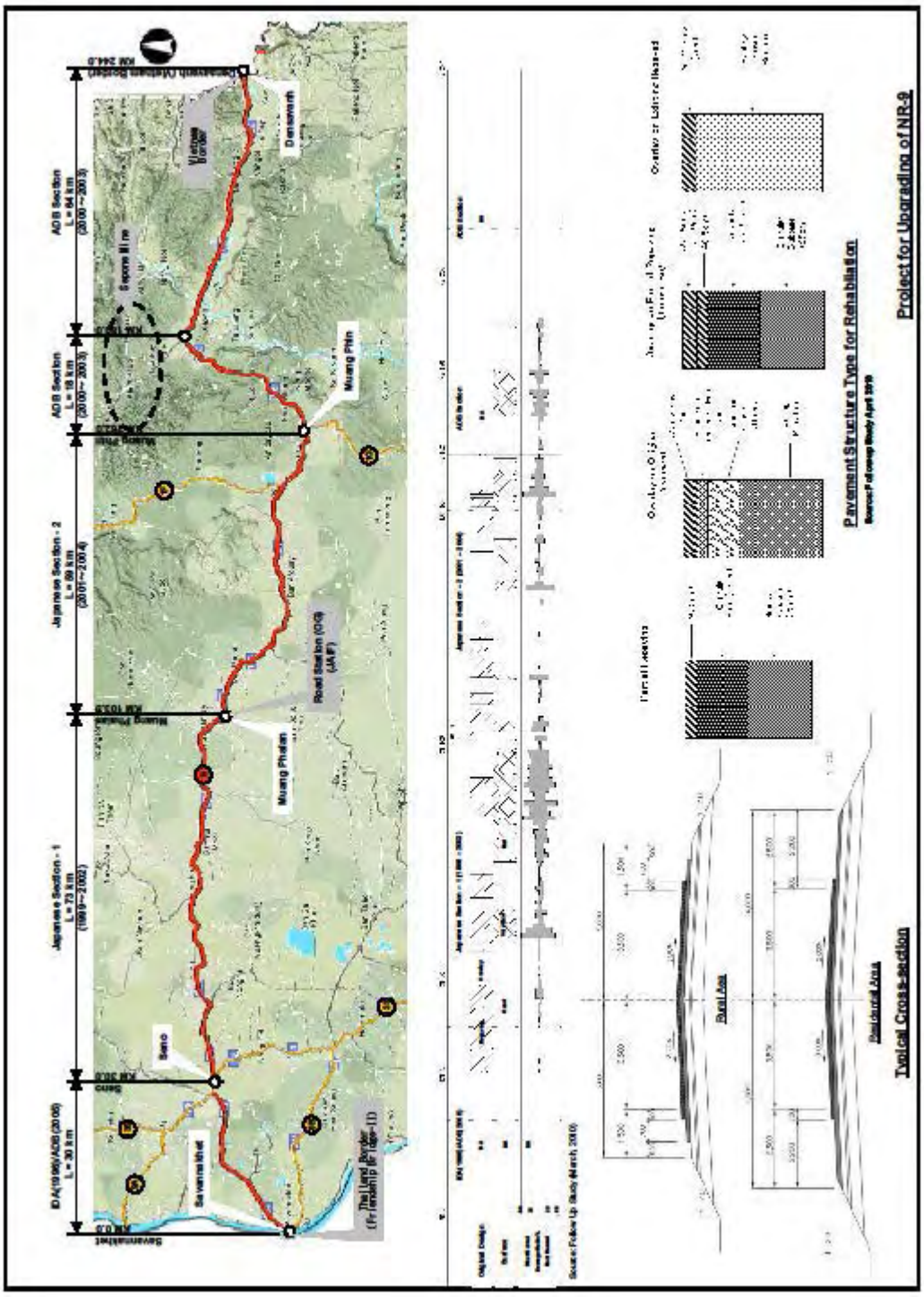
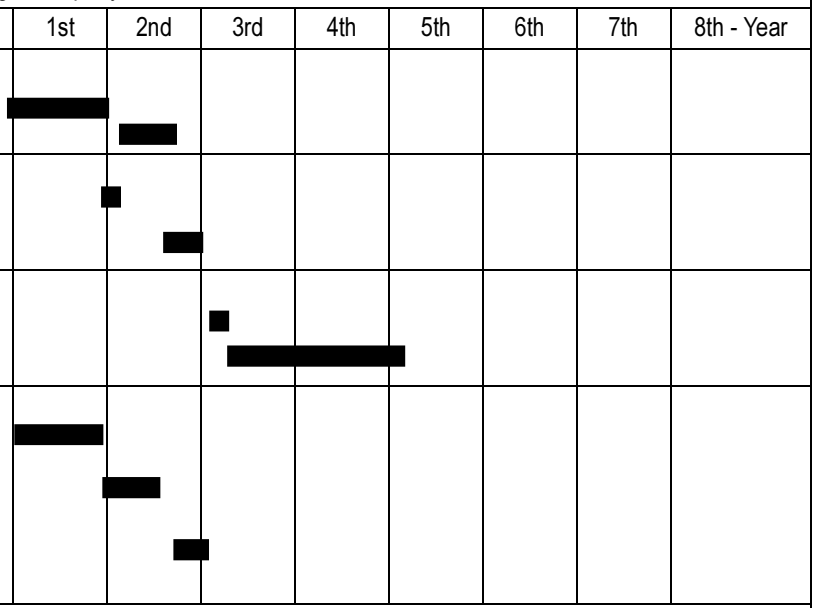


Figure 4.6.1 Project Profile (Upgrade of NR-9)

Table 4.6.3 Project Profile (Construction of Sedone Bridge)

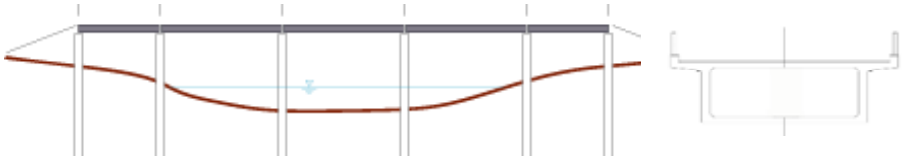
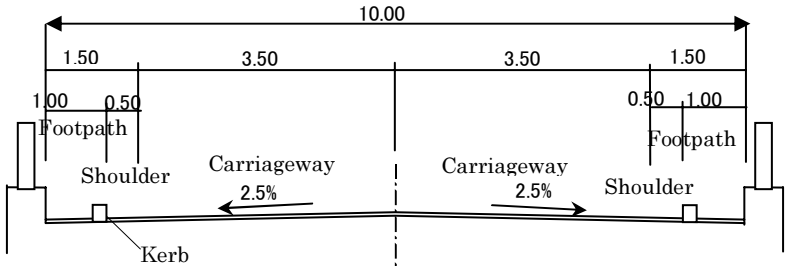
Project Name	Construction of Sedone Bridge		SN	N-2-NR15A
Project Background	The Sedone Bridge is located in the middle of the road section of the NR-15A, where there is a river crossing point at the Sedone River. The NR-15A is expected to accommodate the inner and inter-regional traffic, generated from Saravane Province. It is also expected to become the international corridor which accommodates international traffic between Thailand and Vietnam, when the on-going improvement project of the NR-15B is completed, and to provide the alternative international route of the East-West Economic Corridor. However, the NR-15A is often impassable, due to the flood of the Sedone River, where the existing sunk bridge is located and the small ferry boat operates during this flood season. The NR-15A is expected to accommodate more traffic when the NR-15A is improved under the ADB/13 project. Thus, the river crossing point of the NR-15A may become the bottleneck and which hinters the development of the regional economy. The construction of the Sedone Bridge, together with the road improvement of the NR-15A, will contribute to reduction in the vehicle operating costs and travel time, through diverting the traffic from the NR-16 and NR-20 and therefore, contribute to revitalizing the regional economy of Saravane Province.			
Overall Goal and Project Purpose	Overall Goal: ・ To promote regional economic growth, especially that in Saravan Province, and alleviate poverty in Saravane Province, one of the poorest provinces in Laos. Project Purpose: ・ To reduce travel time and transport costs along the NR-15A and to establish a safe and reliable road network, hence promoting trade of goods and passengers to/from Saravan Province. ・ To improve accessibility to social infrastructures, markets and public transport services and to enhance income and employment opportunities, hence reducing poverty in Saravan Province.			
Justification of the Project	Consistency with Upper Plan	・ Previous National Socio-economic Development Plan (2006-10) set major goals and targets, including strengthening socio-economic infrastructure as fundamentals for development. The draft National Socio-economic Development Plan (2011-15) sets development directions, including socio-economic development of the country, by balancing economic growth and socio-cultural development. ・ In the Provincial Socio-economic Plan of Saravan, improvement of roads and bridges and promotion of export of local products (2006-10) and development of tourism and service industries (2011-15) are set as focal targets of the province. ・ There is also potential of industrial development. Saravan, has existing and prospective mines of coal and ironstones. ・ In this study, the road section of this project is selected as one of three priority projects from among 16 long listed road and bridge improvement projects.		
	Urgency of the Project	・ A preliminary hydrological survey found that the water level of Sedone River fluctuates between 10-12 meters throughout the year. A rapid increase in water level and flow rate is frequently observed during the rainy season. Several causalities are often reported at the project site. In August 2010, one passenger was washed away by the flood and drowned to death. ・ The existing bridge is a submerged bridge and is not passable during the rainy season, totaling between 1-3 months in a year. A ferry boat operates when the bridge is not passable. ・ A socio-economic survey was carried out at the sampled villages along the NR-15. It revealed that there is an urgent demand for road and bridge improvement to improve accessibility to social infrastructure and markets and sustain the livelihood of the villagers.		

	Necessity of the Project	• Together with NR-15A (to be implemented by ADB/13) and 15B (implemented under local funding), the project bridge consists of an alternative international corridor, connecting Thai-Lao-Vietnam. • Based on comprehensive analysis by this study, the traffic volume of this road section is estimated to increase to 4,000 vehicles (PCU) per day by 2025. The volume capacity ratio along the NR-15A will reach 0.6 by 2025, showing the highest ratio among the long-listed projects.
	Adverse Impact of the Project	• IEE study suggests that both hydrological and hydrodynamic factors, considering local river morphology, would be critical for proper design of bridge and approach roads. Other critical environmental factors to be carefully studied are (i) potential for soil erosion, (ii) temporal water quality degradation during construction period, (iii) roadside noise and air quality during construction phase, (iv) worsened traffic safety during construction period and (v) risk of soil contamination due to accidental spill of construction chemicals. • Therefore, a future study is required to minimize the environmental impact caused by the project by proposing mitigation measures.
	Beneficiaries and Benefits generated from the Project	• The road users along the NR-15A would be direct beneficiaries. 71,000 persons, who stay near the project site (within 5 km buffer) are potential indirect beneficiaries. Amongst these people, there are 7,000 persons living in villages without schools and 61,000 persons without hospital/clinics. • The result of the economic analysis on this particular project is summarized below: EIRR= 13.2%. Thus, the economical validity of this project is justified. • Economic benefits derived from the project would contribute to poverty reduction. This project would contribute towards generating income for 73,000 households in Saravane Province.
Scope of Project	Construction of 220 m bridge with approach road. The scope of the project is detailed in separate table (Table 4.6.4)	
Implementing Agency	Ministry of Public Works and Transport	
Other Stakeholders	Saravane Province, WREA, Traffic Police, ADB (possibly, donor for 15A improvement), Roadside Communities, Cargo Company	
Implementation Schedule		
Project Cost	Construction cost: 1,029 million yen Design and supervision work: 62 million yen	

	Administration cost: 21 million yen Total cost:1,112 million yen	
Possible Financial Source	Multi-lateral and bi-lateral donors	
Related Activities	The whole road section of NR-15A will be improved under ADB/13. ADB is going to conduct the project preparatory study to narrow down the scope of the project. The construction of Sedone Bridge will be excluded from the scope of the project, due to the limited funds allocated by ADB.	
Requirement	Planning Requirement	・ The following surveys may be required: Topographic survey, Geotechnical survey (boring), Hydrological survey, Environmental survey and Traffic survey.
	Technical Requirement	・ N/A
	Environmental Requirement	・ Environmental approval shall be obtained prior to construction, by conducting either IEE or EIA. Type of environmental study for official environmental approval is determined at Project Screening Process with WREA. ・ It is recommended that discussions be held with WREA about Project Screening Process to determine ToR of relevant environmental study after design of Sedone Bridge is finalized.

Source: Prepared by JICA Study Team

Table 4.6.4 Scope of Project (Construction of Sedone Bridge)

Scope of Works	Construction of Bridge with Approach Roads
(1)Bridge length /Span	 220m=35m+50m+50m+50m+35m　　PC-Box Girder
(2)Width formation	 Effective width:10m=1.0m(footpath)+ 0.5m(shoulder)+3.5m x 2(carriageway) +0.5m(shoulder)+1.0m(footpath)
(3)Design Loads	Live Load: HS20-44 x 1.25
(4)Superstructure	
・Structural type	5span continuous PC box girder type
・Erection method	Incremental launching method
(5)Substructure	Two (2) abutments and 4 piers
(6)Foundation	Spread foundation / Pile foundation
(7) Ancillary Facility	Lighting, Newel post, Drainage facility
(8)Others	Loading water supply pipe, electric pipe and telephone pipe for future extension
Approach Roads	
(1) Length	Right bank:200m, Left bank:200m
(2)Design Conditions	Road class:Class III Design speed:60km/h Design traffic volume(1000～3000PCU/day), Terrain:Flat,
(3)Cross-section	Total width:11m＝0.5m(Un-paved shoulder)+1.5m(Paved shoulder)+3.5m x 2（Carriageway） +1.5m（Paved shoulder）+0.5m（Unpaved shoulder）
(4)Geometric Standards	Geometric standards according to the design speed of 60km/h Min horizontal curve applied:R=200m, Max. longitudinal gradient applied:4.0%
(5)Pavement Structure	Carriageway:DBST, Shoulder: SBST Design Spec.:Road Note 31, Design Life:10 year, Design traffic volume: Assumed based on the traffic count survey
(6)Drainage Facility	Type:side ditch, transverse pipe culvert, box culvert, etc.

Source: Prepared by JICA Study Team

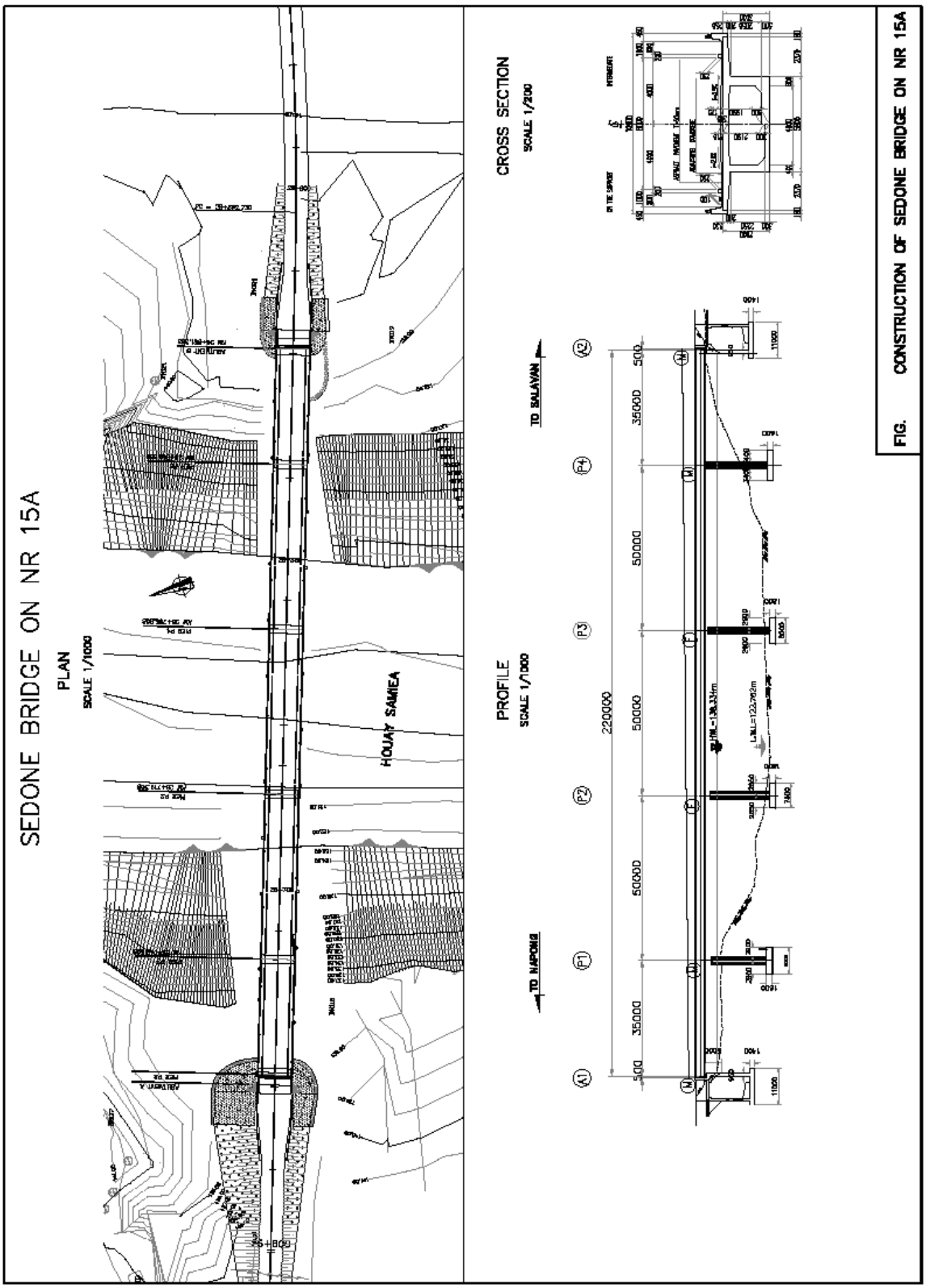


Figure 4.6.2 Plan and Profile (Construction of Sedone Bridge)

Table 4.6.5 Project Profile (Replacement of Bridges along NR-9)

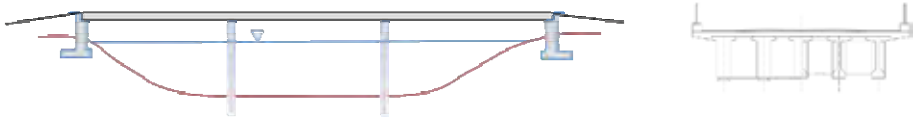
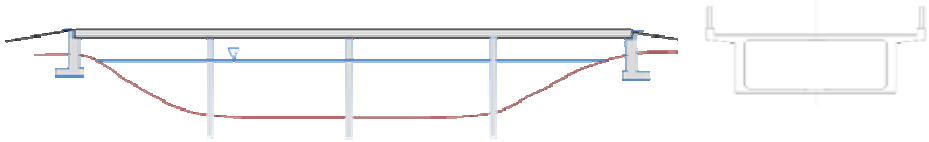
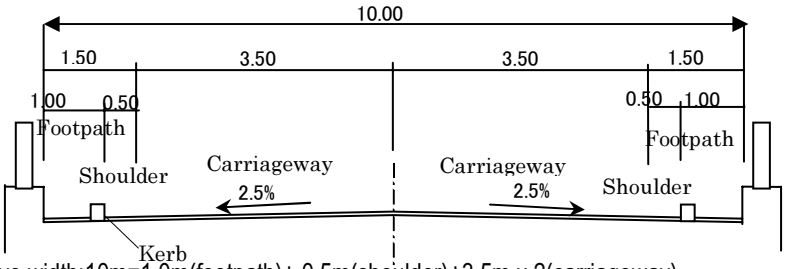
Project Name	Replacement of Bridge along NR-9	SN	N-3-NR9
Project Background	The location of Lao PDR offers strategic prospects, transforming itself from "land-locked" to "land-linked" country particularly by developing international infrastructure networks. In this respect, road links, in particular, are of vital importance. The transport system in Laos significantly depends on the road network, and is critical for national integration, and is also highly valued for improving accessibility to surrounding countries. Especially the East – West Corridor between Vietnam and Thailand is essential in securing access to the sea ports. In addition, the improvement of the road network is domestically important for improving accessibility of the rural communities to the livelihood assets e.g. goods, services and opportunities; and for realizing the potentials of economic growth. The Government of Lao PDR has made intensive efforts to improve the trunk road network in Southern Lao. These efforts include road improvements along NR-13 (South), NR-9 and construction of the Second Mekong Bridge, under the support of both bilateral and multilateral donors, such as ADB, World Bank and JICA. In spite of the afore-mentioned, there is still need for significant injection of funds into road rehabilitation/development in Southern Lao. Unpaved roads and un-rehabilitated bridges, frequently observed in the Southern Lao, all contribute to the deterioration of the road network, hence hindering trade of both goods and people. As such, the economic development of Southern Lao lags behind that of other regions in Lao PDR.		
Overall Goal and Project Purpose	Overall Goal: ・ To promote international/domestic traffic along the East-West Corridor and to generate economic growth in the GMS/Laos. Project Purpose: ・ To establish a safe and reliable road network, hence promoting trade of goods and passengers along the East-West Corridor. ・ To ensure accessibility to social infrastructure, markets and public transport services and to enhance income and employment opportunities, hence reducing poverty along the NR-9.		
Justification of the Project	Consistency with Upper Plan	・ Previous National Socio-economic Development Plan (2006-10) set major goals and targets, including strengthening socio-economic infrastructures as fundamentals for development. The draft National Socio-economic Development Plan (2011-15) sets development directions, including strengthening international cooperation and integrating the economy into the regional and global organizations. ・ In the Provincial Socio-economic Plan of Savannakhet, improvement of roads and bridges in the rural area (2006-10) and elimination of poverty and development of the local economy (2011-15) are set as focal targets of the province. ・ There is development potential, industrial development in particular, along the NR-9. For instance, Savan-Seno SEZ develops 4 SEZs along the NR-9. Gold and copper mining at Sepon, which significantly contributes to national economic growth, expands production. ・ In this study, the road section of this project is selected as one of three priority projects from among 16 long listed road and bridge improvement projects.	

	Urgency of the Project	• There are 51 concrete and steel bridges along the NR-9, mostly constructed in the mid 1980s. One of the concrete bridges along the NR-9 collapsed due to heavy loaded truck and was replaced by the local funding in 2010. • An inventory survey on the bridges along the NR-9 found structural cracks caused by shearing force and bending moments, inadequate concrete filling, damaged expansion joints, absence of bearing shoes (concrete bridges) and damaged reinforcement posts, residual deflection, and absence of appropriate gap between abutment and steel girders (steel bridges). • Due to the insufficient amount of maintenance funds, the deteriorated bridges cannot be properly maintained, hence the high risk of bridge collapse. • A socio-economic survey was carried out at the sampled villages along the NR-9. It revealed that there is an urgent demand for road improvement to improve accessibility to social infrastructure and markets and sustain the livelihood of the villagers.
	Necessity of the Project	• The road section of this project is part of the Asian Highway No. 16 and GMS Economic Corridor (East-West Corridor). The design standards of the Asian Highway (Class II) suggest that this road section be upgraded to AC surfaced roads to allow maximum load of 11.0 ton. • The international traffic observed along the NR-9, estimated by the traffic demand forecast, will increase to 58% of the traffic and the NR-9 is expected to function as an important international corridor. • Based on comprehensive analysis by this study, the traffic volume of this road section is estimated to increase to 8,500 vehicles (PCU) per day by 2025. The volume capacity ratio along the NR-9 will reach 0.55 by 2025, showing the highest ratio among the long-listed projects.
	Adverse Impact of the Project	• IEE study suggests that both hydrological, hydrodynamic factors, considering local river morphology, would be critical for proper design of bridges and approach roads. Other critical environmental factors to be carefully studied are (i) potential for soil erosion of riverbank, (ii) temporal water quality degradation during construction period, (iii) roadside noise and air quality during construction phase, (iv) worsened traffic safety during construction period and (v) risk of soil contamination due to accidental spill of construction chemicals.
	Beneficiaries and Benefits generated from the Project	• The road users along the NR-9 are potential direct beneficiaries. 239,000 persons, including 82,000 persons under poverty, who stay near the project site (within 5 km buffer) are potential indirect beneficiaries. Amongst these people, there are 77,000 persons living in villages without schools and 217,000 persons without hospital/clinics. • The result of the economic analysis on this particular project is summarized below: EIRR= 12.8%. Thus, the economical validity of this project is justified. • Economic benefits derived from the project would contribute to poverty reduction. This project would contribute to generating income for 1,000 households in the eastern part of Savannakehet Province, where most severe poverty is observed.
Scope of Project	Replacement of 2 bridges with construction of approach roads along NR-9. The scope of the project is detailed in separate table (Table 4.6.6).	

Implementing Agency	Ministry of Public Works and Transport								
Other Stakeholders	Savannakhet Province, WREA, Traffic Police, Roadside Communities, Regional Tourism Industry (long-distance bus company, hotel, restaurants and others), Cargo Company								
Implementation Schedule		1st	2nd	3rd	4th	5th	6th	7th	8th - Year
	Design Works - B/D - D/D								
	Tendering - E/N - Tender								
	Construction - Preparation - Works								
	EIA - EIA/EMP/RAP - License - Land Acquisition								
Project Cost	Construction cost: 1,245 million yen Design and supervision work: 75 million yen Administration cost: 25 million yen Total cost: 1,345 million yen								
Possible Financial Source	Multi-lateral and bi-lateral donors								
Related Activities	Curerntly, the DPWT of Savannakhet Province maintains the existing concrete bridges along the NR-9.								
Requirement	Planning Requirement	• The following surveys may be required: Topographic survey, Geotechnical survey (boring), Hydrological survey and Traffic survey.							
	Technical Requirement	• N/A							
	Environmental Requirement	• Environmental approval shall be obtained prior to construction, by conducting either IEE or EIA. Type of environmental study for official environmental approval is determined at Project Screening Process with WREA. • It is recommended that discussions be held with WREA about Project Screening Process to determine ToR of relevant environmental study after replacement outline of all bridges along NR-9 is finalized.							

Source: Prepared by JICA Study Team

Table 4.6.6 Scope of Project (Replacement of Bridges along NR-9)

Scope of Works	Replacement of Two Bridges with approach road	
(1) Bridge length /Span	 No.13 95m=31.7m+31.7m+31.7m PC-I Girder	
	 No.17_165m=35m+47.5m+47.5m+35m PC-Box Girder	
(2)Width formation	 Effective width:10m=1.0m(footpath)+ 0.5m(shoulder)+3.5m x 2(carriageway) +0.5m(shoulder)+1.0m(footpath)	
(3)Design Loads	Live Load: HS20-44 x 1.25	
(4)Superstructure	No.13	No.17
・Structural type	PC post-tension 3 span simple girder	PC post-tension 4span continuous PC box girder type
・Erection method	Crane erection	All staging method
(5)Substructure	Two (2) abutments and 2 piers	Two (2) abutments and 3 piers
(6)Foundation	Spread foundation / Pile foundation	
(7) Ancillary Facility	Lighting, Newel post, Drainage facility	
(8)Others	Loading water supply pipe, electric pipe and telephone pipe for future extension	
2..Approach Roads		
(1) Length	Right bank:200m, Left bank:200m	
(2)Design Conditions	Road class:Class II Design speed:100km/h Design traffic volume(3000～8000PCU/day), Terrain:Flat,	
(3)Cross-section	Total width:11m＝0.5m(Un-paved shoulder)+1.5m(Paved shoulder)+3.5m x 2（Carriageway）+1.5m（Paved shoulder）+0.5m（Unpaved shoulder）	
(4)Geometric Standards	Cross-fall 2.5% Min horizontal curve applied:R=200m, Max. gradient applied:4.0%	
(5)Pavement Structure	Carriageway:Asphalt Design Spec.:Road Note AASHTO, Design Life:10 year, Design traffic volume: assumed based on the traffic count survey	
(6)Drainage Facility	Type:side ditch, transverse pipe culvert, box culvert, etc.	

Source: Prepared by JICA Study Team

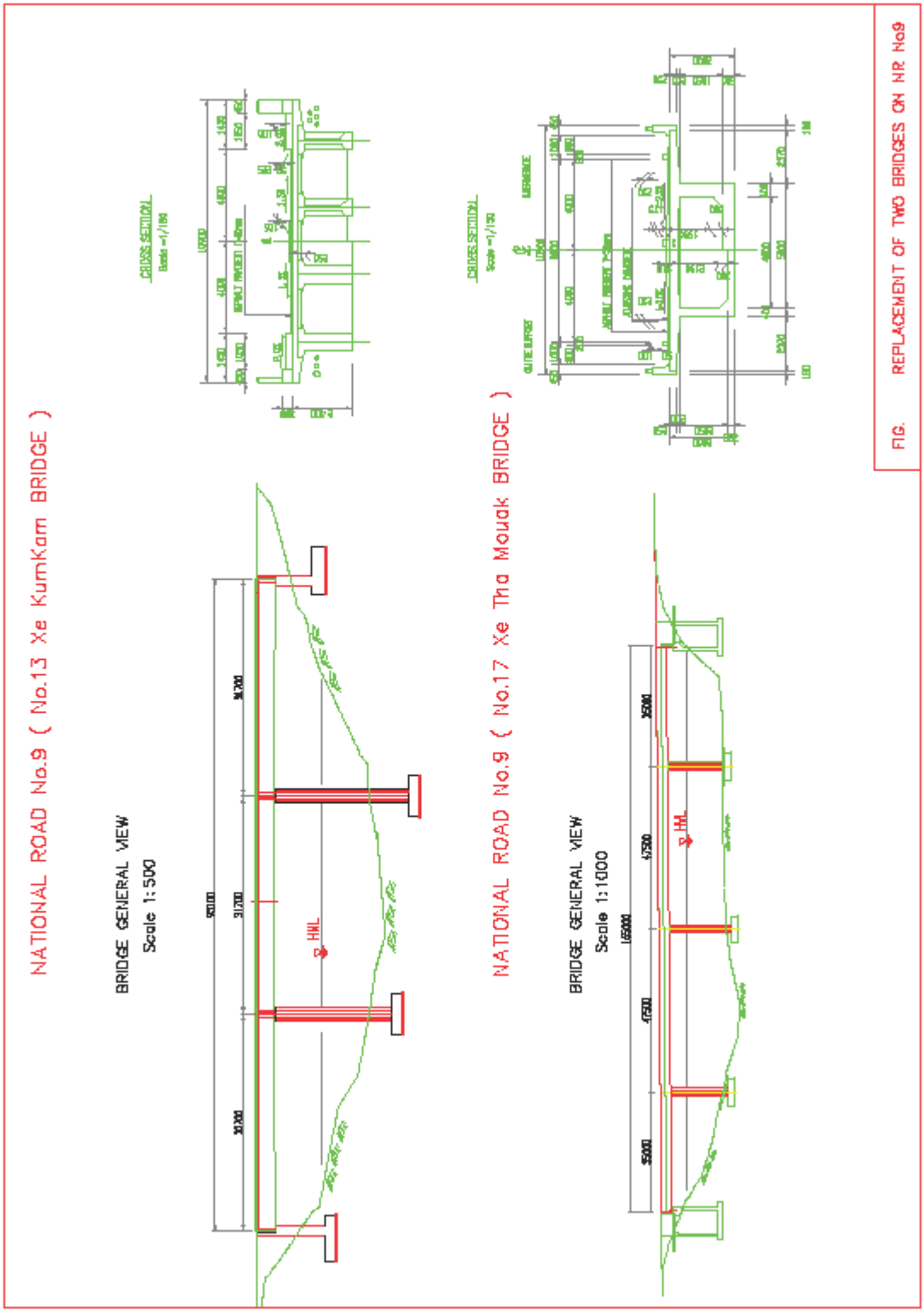


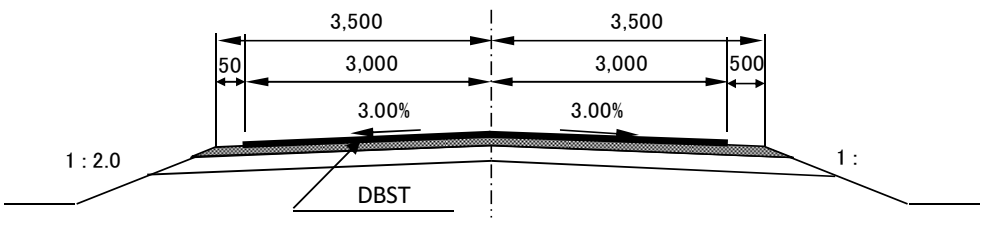
Figure 4.6.3 Plan and Profile (Replacement of Bridges along NR-9)

4.6.2 Project Profile of Related Projects

The discussion explored in the entire study is limited to the national roads in the southern region since the scope of this study is to review and revise the previous road improvement master plan study. However, the improvement of the national roads can only generate the benefits to roadside districts and the multiple impacts of road improvement projects when accessibility to these improved national roads is enhanced.

During the stakeholder meetings and seminars for this study, most attendees expressed their concern as regards provincial and district roads: they suggested that there was need for supplementary studies on these local roads as well as formulation of road improvement projects for such roads. Accordingly, the following discussion identifies some potential local road improvement projects. In order to maximize the benefits of the priority projects, proposed in this study, the provincial roads connecting to the NR-9 were investigated and the road improvement projects for these provincial roads were formulated through preliminary engineering and socio-economic studies. These 5 provincial roads are located in Savannakhet Province and are denoted by the following labels: No. 2.6312, 2.6311, 2.6303, 2.6306, and 2.6307.

Table 4.6.7 Project Profile (Improvement of Provincial Road No. 2.6312)

Project Name	Improvement of Provincial Road No. 2.6312	SN	D-1
Road Length	37.73km (Ban Donmhee, NR-9 Intersection - Ban Nasarn, NR13s Intersection)		
Existing Road Conditions	Paved N/A Gravel 30.23km (improved by (ADB) Earth 7.5km Bridge 7 nos (all bailey) Passable Months 12 (Ban Phang heng - Ban Nasam 28.73km is 6 months)		
Overall Goal and Project Purpose	First priority is to upgrade the pavement structure from gravel/earth to DBST unless the existing crossing facilities are unstable and require urgent rehabilitation. After the pavement is improved, the bridges are to be reconstructed to (concrete bridge).		
Necessity of the Project	Provincial Road No. 2.6312 is located at approximately 20km east of Seno connecting between NR-9 and NR13S at the both ends. After the road is upgraded, it will make a shortcut link between NR-9 and NR13S and that would relieve the current traffic congestion in Seno Town. NADOU village is a relatively large rural community. Rice production is highest in the country. There are several tourist attractions such as monkey forest and Beukgong lake. The road development will bring certain benefits to this region and the expansion of the regional economy will alleviate the poor status of the central region of Savannakhet Province.		
Scope of Project	The project road is upgraded to DBST and bridges along the project road are replaced. Typical cross section of the project road is illustrated below.  		
Implementing Agency	DPWT Savannakhet		
Other Stakeholders	Roadside district and communities		

<table>
<tr><td rowspan="4">Implementation Schedule</td><td></td><td>1st</td><td>2nd</td><td>3rd</td><td>4th</td><td>5th</td><td>6th</td><td>7th</td><td>8th - Year</td></tr>
<tr><td>Design Works</td><td colspan="8"></td></tr>
<tr><td>Tendering</td><td colspan="8"></td></tr>
<tr><td>Construction</td><td colspan="8"></td></tr>
<tr><td>Project Cost</td><td colspan="9">Construction: 1,303 million yen
Design and supervision: 78 million yen
Administration: 26 million yen
Total: 1,408 million yen</td></tr>
<tr><td>Economic/Social Viability</td><td colspan="9">The road users along the project road would be direct beneficiaries. 66,000 persons who stay near the project site (within 5 km buffer) are potential indirect beneficiaries. Amongst these people, there are 5,800 persons living in villages without schools and 54,000 persons without hospital/clinics.
Travel time, fuel consumption and vehicle operation costs for existing traffic to/from NR-9 and NR-13S would be reduced. NADOU village is a relatively big rural community and agriculture is highly developed. Economic conditions along this road would be improved by improvement of this road.</td></tr>
<tr><td>Environmental Impact</td><td colspan="9">Right of way is secured and land acquisition and resettlement are not required.</td></tr>
</table>

Intersection NR13s

Good Gravel Section

Bad Earth Section

Irrigation Pipe Broken

Good Paddy Field

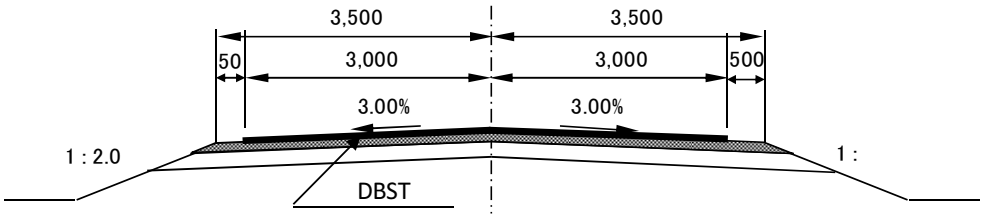
DBST at NADOU Village

Truss Bridge

Intersection NR9

Source: Prepared by JICA Study Team

Table 4.6.8 Project Profile (Improvement of Provincial Road No. 2.6311)

Project Name	Improvement of Provincial Road No. 2.6311	SN	D-2
Road Length	26.0km (Ban Atsaphon - Atsaphangthong, NR-9 Intersection)		
Existing Road Conditions	Paved N/A Gravel 26.0km (Improved by ADB) Earth N/A Bridge 6 nos (all wooden) Passable Months 9, Difficult to pass in during heavy rain		
Overall Goal and Project Purpose	First priority is to upgrade the pavement structure from gravel/earth to DBST unless the existing crossing facilities are unstable and require urgent rehabilitation. After the pavement is improved, the bridges are to be reconstructed to (concrete bridge).		
Necessity of the Project	Provincial Road No. 2.6311 links Ban Atsaphon with Atsaphangthong on NR-9. Ban Atsaphon is a district center that has a large community with public facilities such as school, hospital and utility stations. Improvement of rural community networks enhances transportation of local products that will boost the regional development particularly for local trading with Savannkahet city via NR-9. Accessibility is increased and people can utilize the public facilities to alleviate the status of poverty in this district.		
Scope of Project	The project road is upgraded to DBST and bridges along the project road are replaced. Typical cross section of the project road is illustrated below.  		
Implementing Agency	DPWT Savannakhet		
Other Stakeholders	Roadside district and communities		
Implementation Schedule	1st / 2nd / 3rd / 4th / 5th / 6th / 7th / 8th - Year Design Works Tendering Construction		
Project Cost	Construction: 931 million yen Design and supervision: 56 million yen Administration: 19 million yen Total : 1,006 million yen		
Economic/Social Viability	The road users along the project road would be direct beneficiaries. The 29,000 persons who stay near the project site (within 5 km buffer) would be indirect beneficiaries. Amongst these people, there are 2,000 persons living in villages without schools and 25,000 persons without hospital/clinics. Ban Atsaphon is a big rural community and agriculture is highly developed along this road. Economic conditions of Ban Atsaphon and villages along this road would improve with the road improvement.		
Environmental Impact	Right of way is secured and land acquisition and resettlement are not required.		

Intersection NR9

Entrance from NR9

Good Gravel Section

Paddy and Fishing Pond

Long Bailey Bridge

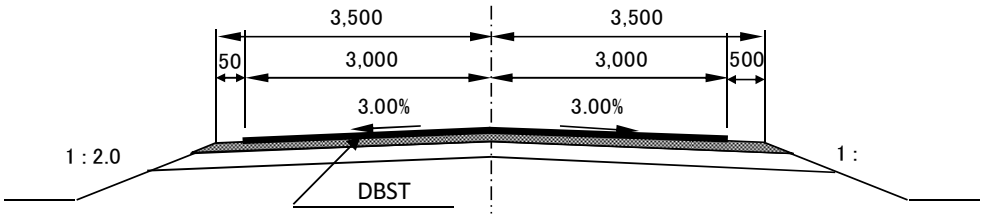
Short Bailey Bridge

Ban Atsaphon (DBST)

Ban Atsaphon (DBST)

Source: Prepared by JICA Study Team

Table 4.6.9 Project Profile (Improvement of Provincial Road No. 2.6303)

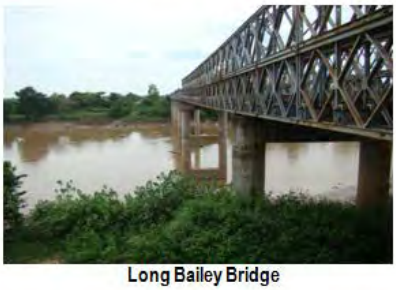
<table>
<tr><td>Project Name</td><td colspan="5">Improvement of Provincial Road No. 2.6303</td><td>SN</td><td colspan="2">D-3</td></tr>
<tr><td>Road Length</td><td colspan="8">87.64km (NR13s Intersection - Pha lan xay District Border, NR-9 Intersection)</td></tr>
<tr><td>Existing Road Conditions</td><td colspan="8">Paved 5.0km (DBST)
Gravel 48.34km (Improved by ADB)
Earth 34.30km
Bridge 28 nos (22-bailiey, 6-wooden)
Passable Months 12 (from/to Ban Beung xang and Pha lanxay 44km is 6 months)</td></tr>
<tr><td>Overall Goal and Project Purpose</td><td colspan="8">First priority is to upgrade the pavement structure from gravel/earth to DBST unless the existing crossing facilities are unstable and require urgent rehabilitation. After the pavement is improved, the bridges are to be reconstructed to (concrete bridge).</td></tr>
<tr><td>Necessity of the Project</td><td colspan="8">Provincial Road No. 2.6303 runs through the centre of Champhon District linking with Xonbouri District and running parallel to NR-9. The upgrading of this road will bring certain benefits to the local people by accelerating the local trading of abundant rice in the region. Also, 2 district centers are linked via this road so that the synergy of community access will enhance local trading of flourishing agro-products, hence contributing to poverty alleviation. In addition, certain impacts on tourism may be expected by developing existing potential spots such as Turtle lake and Beukgong lake located close to the road.</td></tr>
<tr><td>Scope of Project</td><td colspan="8">The project road is upgraded to DBST and bridges along the project road are replaced. Typical cross section of the project road is illustrated below.
 
</td></tr>
<tr><td>Implementing Agency</td><td colspan="8">DPWT Savannakhet</td></tr>
<tr><td>Other Stakeholders</td><td colspan="8">Roadside district and communities</td></tr>
<tr><td rowspan="4">Implementation Schedule</td><td></td><td>1st</td><td>2nd</td><td>3rd</td><td>4th</td><td>5th</td><td>6th</td><td>7th</td><td>8th - Year</td></tr>
<tr><td>Design Works</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Tendering</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Construction</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Project Cost</td><td colspan="8">Construction: 3,716 million yen
Design and supervision: 223 million yen
Administration: 74 million yen
Total: 4,014 million yen</td></tr>
<tr><td>Economic/Social Viability</td><td colspan="8">The road users along the project road would be direct beneficiaries. 84,000 persons, including 34,000 persons under poverty, who stay near the project site (within 5 km buffer) would be indirect beneficiaries. Amongst these people, there are 12,000 persons living in villages without schools and 74,000 persons without hospital/clinics.
Champhon and Xonbouri district centers are relatively large rural communities and agriculture is highly developed along this road. Economic conditions along this road would improve with the road improvement.</td></tr>
<tr><td>Environmental Impact</td><td colspan="8">Right of way is secured and land acquisition and resettlement are not required.</td></tr>
</table>

Intersection NR9

Good Gravel Section

Bad Earth Section

Submarine Bridge



Long Bailey Bridge

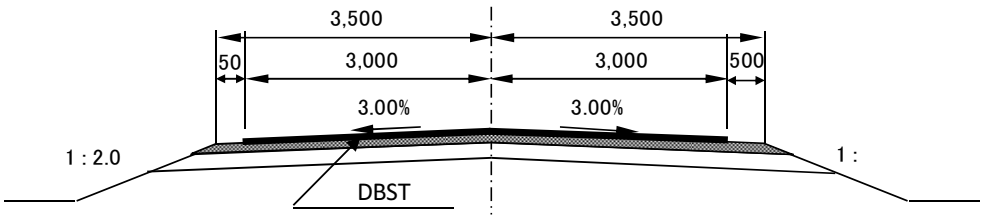
Paddy Field

Turtle Lake

DBST in NADOU

Source: Prepared by JICA Study Team

Table 4.6.10 Project Profile (Improvement of Provincial Road No. 2.6306)

Project Name	Improvement of Provincial Road No. 2.6306	SN	D-4
Road Length	42.7km (Saleo, NR-9 Intersection - Vietnam Border)		
Existing Road Conditions	Paved N/A Gravel 42.7km (Improved by ADB for 10km from NR)) Earth N/A Bridge N/A Passable Months 6, difficult to pass in during heavy rains because of absence of bridges		
Overall Goal and Project Purpose	Project is to upgrade pavement structure from gravel to DBST.		
Necessity of the Project	Provincial Road No. 2.6306 connects NR-9 and the rural community near the border with Vietnam. All crossing facilities are submerged bridges. As such, many minority villages dotted along the road are isolated in the rainy season. In order to secure all-weather access, the improvement of crossing facilities is necessary. The better access between the local communities and NR-9 will perhaps enhance local trading with core towns along NR-9 and in Vietnam. Road improvement works funded by ADB remain in good condition such that further improvement is not necessary at those sections.		
Scope of Project	The project road is upgraded to DBST and bridges along the project road are replaced. Typical cross section of the project road is illustrated below.  		
Implementing Agency	DPWT Savannakhet		
Other Stakeholders	Roadside district and communities		

Implementation Schedule	1st	2nd	3rd	4th	5th	6th	7th	8th - Year
Design Works								
Tendering								
Construction								

Project Cost	Construction: 1,444 million yen Design and supervision: 87 million yen Administration: 29 million yen Total: 1,559 million yen
Economic/Social Viability	The road users along the project road would be direct beneficiaries. The 6,300 people who stay near the project site (within 5 km buffer) would be indirect beneficiaries. Amongst these people, there are 3,900 persons living in villages without schools and 5,500 persons without hospital/clinics.
Environmental Impact	Right of way is secured and land acquisition and resettlement are not required.

NR9 Intersection

Small Submarine Bridge

Good Gravel Section

Good Gravel Section

Mountain Cut Section

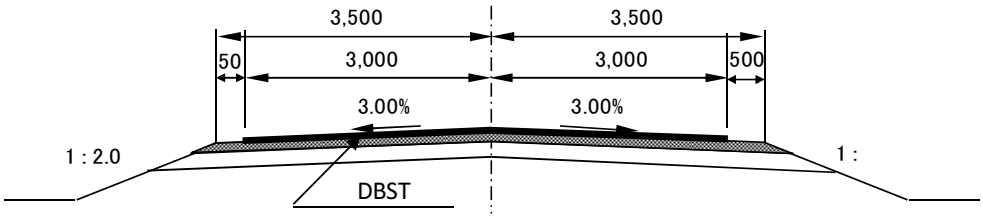
Scattered House

Entrance Toheua Village

Toheua Village

Source: Prepared by JICA Study Team

Table 4.6.11 Project Profile (Improvement of Provincial Road No. 2.6307)

Project Name	Improvement of Provincial Road No. 2.6307	SN	D-5
Road Length	36.0km (Saleo, NR-9 Intersection - Nong)		
Existing Road Conditions	Paved N/A Gravel 36.0km (Improved by ADB) Earth N/A Bridge 9 nos (6-bailey, 2-wooden, 1-suspension) Passable Months 12		
Overall Goal and Project Purpose	First priority is to upgrade the pavement structure from gravel/earth to DBST unless the existing crossing facilities are unstable and require urgent rehabilitation. After the pavement is improved, the bridges are to be reconstructed to concrete bridges.		
Necessity of the Project	Provincial Road No. 2.6307 connects NR-9 and the District Center of Nong. This road runs through the historical Ho Chi Minh trail that was built during the Indochina War. Some section of the Ho Chi Minh trail is preserved alongside the road as a tourist attraction. Minority villages are dotted along the road. It seems that the subsistence way of life is still the norm for the people in this region. Road improvement works by ADB remain in good condition such that improvement works are not required at the sections.		
Scope of Project	The project road is upgraded to DBST and bridges along the project road are replaced. Typical cross section of the project road is illustrated below.  		
Implementing Agency	DPWT Savannakhet		
Other Stakeholders	Roadside district and communities		

Implementation Schedule

	1st	2nd	3rd	4th	5th	6th	7th	8th - Year
Design Works								
Tendering								
Construction								

Project Cost	Construction: 1,782 million yen Design and supervision: 107 million yen Administration: 36 million yen Total: 1,925 million yen
Economic/Social Viability	The road users along the project road would be direct beneficiaries. The 12,000 persons who stay near the project site (within 5 km buffer) would be indirect beneficiaries. Amongst these people, there are 4,300 persons living in villages without schools and 10,000 persons without hospital/clinics.
Environmental Impact	Right of way is secured and land acquisition and resettlement are not required.

NR9 Intersection

Suspension Bridge (one lane)

Bailey Bridge

DBST Section
(steep longitudinal gradient)

Good Gravel Section

Bad Section

Nakong Village

Ho Chi Minh Trail Ruin

Source: Prepared by JICA Study Team

Appendix 1: Bridge Inventory Survey

(1) Background

National Route 9 (NR-9) is a part of East West Economic Corridor (EWEC) running through four countries of Indochina Peninsula. As a most important gateway link between Thailand and Vietnam, approximately 250km road was initially upgraded from earth road to the surface dressing road between 1982 and 1988. Some of 30 bridges were constructed during the upgrading of pavement. Whereas 163km section between Seno and Sepon applying with 7m wide carriageway was designed by the Russian Design Institute and constructed by the MCTPC (MPWT) during 1984 - 88. The 45km section from Xepone to Densavan applying with 6m wide carriageway lastly upgraded was designed and constructed by Vietnamese firms during 1982 - 86. The Savannakhet – Seno section was upgraded to DBST road by IDA loan in 1997. In 1998, the recent upgrading of road for changing the pavement structure from DBST to Asphalt concrete (AC) was started by the section via both the grant aid assistance of Japan and ADB. In 2004, by the completion of the last ADB section between M.Phin and Xepone, the road section between Xeno and Denssavan has been completely linked via AC paved road. On the other hand, the bridges along R9 have not been upgraded since the initial construction, it is lately reported that most of them are damaged by a recent heavy loaded traffic.

(2) Schedule of Bridge Inventory Survey

The bridge inventory survey was carried out by JICA Study Team as scheduled below;

April .01: Vientiane - Savannakhet

April. 02: Interview to Savannakhet DPWT

April .02-15: Bridge Inventory Survey on 51 bridges on NR 9

(3) Target Bridges

The number of the target bridges located along R9 is 51 in total as below (See Location Map). The description of each bridge is given in the following table.

Table A.1.1 Target Bridges on Route 9

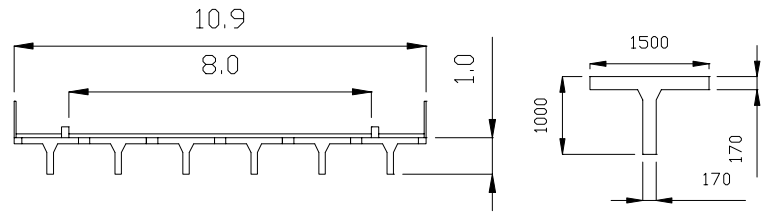
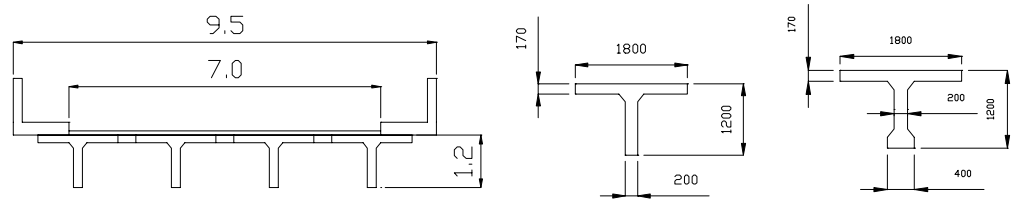
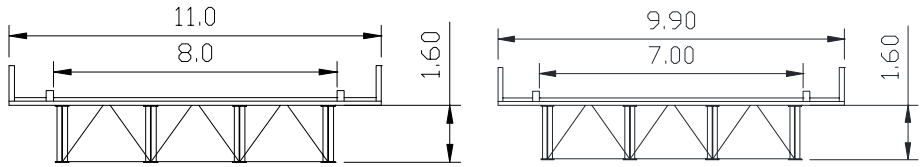
Type		No. of Bridges	Total Length (m)*	Occupancy Ratio by length	Remarks
RCTG	(i)	27	969.8	43%	Russia
	(ii)	15	561.0	25%	Vietnam
STB	(i)	3	407.7	18%	Russia, Bulgaria, Hungary
	(ii)	2	249.0	11%	Czech
Others (Minor RC)		4	51.1	2%	Included No.45 PCI girder bridge replaced by DPWT in 2010
Total		51	2,238.6	100%	

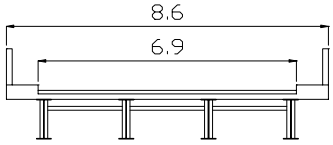
Note * The length tabulated above quoted from the actual length of present bridges

(4) Bridge Feature and Observations

The bridge feature and typical observation by category are described in the table below.

Table A.1.2 Bridge Feature and Observation by Category

<table>
<tr><td>Structure</td><td colspan="3">Bridge Feature</td></tr>
<tr><td rowspan="8">Concrete</td><td>RC T simple girder bridge</td><td>RCTG(i)</td><td>Russia</td></tr>
<tr><td colspan="3"> 
</td></tr>
<tr><td colspan="3">■ Six (6) standard T shaped girder in combination with girders' length by 12m, 15m and 18m.
■ Structural cracks caused by shearing force and bending moment are observed throughout the almost girders and the width of crack varies 0.1to 0.5mm
■ The severity in the damage level is slightly different by span length rather than by the bridge length. Girder length 12m span is severer than others.</td></tr>
<tr><td>RC T simple girder bridge</td><td>RCTG(ii)</td><td>Vietnam</td></tr>
<tr><td colspan="3"> 
</td></tr>
<tr><td colspan="3">■ Four (4) standard T shaped girder in combination with girders' length; l=15m,18m and 21m
■ Structural cracks are observed similarly in RCTG (ii) built by Russia
■ Narrow bridge width does not have lateral clearance is concerned for traffic accident</td></tr>
<tr><td colspan="4"></td></tr>
<tr><td colspan="4"></td></tr>
<tr><td rowspan="8">Steel</td><td>Steel I-girder bridge</td><td>STG (i)</td><td>CIS (Soviet Union)</td></tr>
<tr><td colspan="3"> 

No.6 and No.17 No.7</td></tr>
<tr><td colspan="3">■ Steel I girder with RC slab
■ Strengthen by additional steel truss might disturb river flow at the level of 50-100 year's return period of flood. It might result in affecting in the whole bridge structure.</td></tr>
<tr><td>Steel I-girder bridge</td><td>STG (ii)</td><td>Czech (Soviet Union)</td></tr>
<tr><td colspan="3"> 

No.13 & 17</td></tr>
<tr><td colspan="3">■ Steel I girder bridges with RC Slab using pin-roller hinges
■ Strengthen by additional steel truss might disturb river flow at the level of 50-100 year's return period of flood. It might result in affecting the whole bridge structure.
■ The unique profile and deflection of the bridge affect a safe travelling</td></tr>
<tr><td colspan="4"></td></tr>
</table>

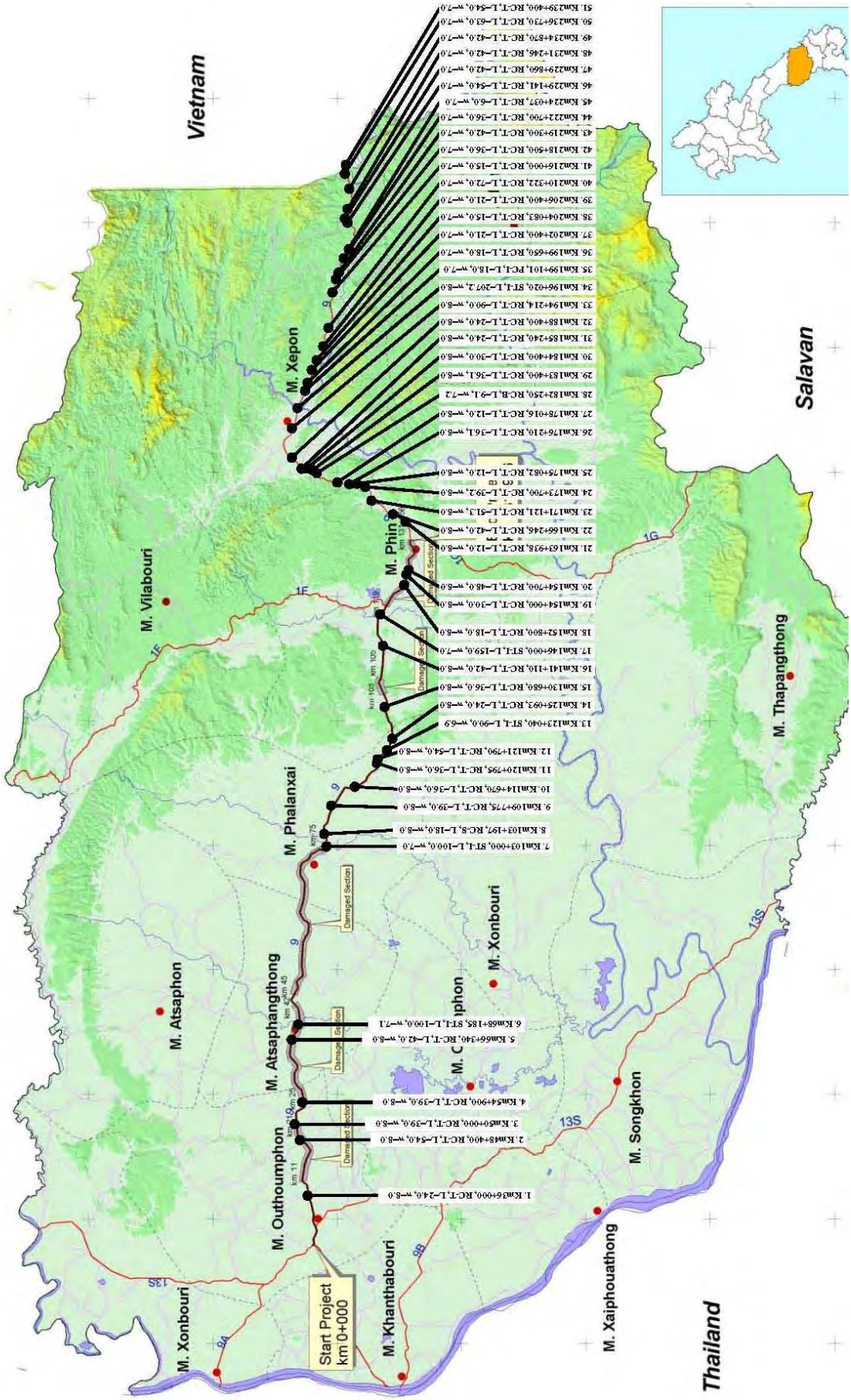

Vietnam
Salavan
Thailand
M. Xepon
M. Phin
M. Vilabouri
M. Thapangthong
M. Phalanxai
M. Xonbouri
M. Atsaphon
M. Atsaphangthong
M. Outhoumphon
M. Songkhon
M. Khanthabouri
M. Xaiphouathong
M. Xonbouri
Start Project
km 0+000
Damaged Section
1F
1G
13S
9
9B
94

Table A.1.3 List of Bridge on NR-9

No.	Location (km)	Bridge Name	Bridge Type	No. of Span	Bridge Length (m)	Bridge width (m)	Effective Width (m)	Year Completion	Donor	Remarks
1	36+000	Houay Lay	RC T-Girder	2@12	24.0	10.9	8.0	1984	Russia	Japan Grant Aid (Phase -1)
2	48+400	Houay Ka Sae	RC T-Girder	3@18	54.0	10.9	8.0	1986	Russia	
3	50+000	Houay Long Kong	RC T-Girder	12+15+12	39.0	11.0	8.0	1985	Russia	
4	54+900	Houay Moung	RC T-Girder	12+15+12	39.0	11.0	8.0	1985	Russia	
5	66+340	Houay Ta Bong Phet	RC T-Girder	12+18+12	42.0	11.0	8.0	1988	Russia	
6	68+185	Xe Cham Phone	Steel and RC	34+3@22	100.0	9.7	7.1	1984	Bulgaria	
7	103+000	Xe Xam Xoy	Steel I-Girder	34+32+34	100.0	9.9	7.0	1984	Hungary	
8	103+197	Houay Koa	RC Slab	1@18	18.0	10.9	8.0	1987	Russia	Japan Grant Aid (Phase -2)
9	109+775	Houay Ya Phuid	RC T-Girder	12+15+12	39.0	11.0	8.0	1986	Russia	
10	114+670	Houay Ngoa	RC T-Girder	3@12	36.0	10.9	8.0	1986	Russia	
11	120+795	Houay Sa Loung	RC T-Girder	3@12	36.0	10.9	8.0	1986	Russia	
12	121+790	Houay Sa Leang	RC T-Girder	3@18	54.0	10.9	8.0	1987	Russia	
13	123+040	Xe Kum Kam	Steel I-Girder	18+22+32+18	90.0	8.6	6.9	1985	Czecho	
14	125+093	Houay Jon	RC T-Girder	2@12	24.0	10.9	8.0	1987	Russia	
15	130+680	Houay Tho	RC T-Girder	3@12	36.0	11.0	8.0	1987	Russia	
16	141+110	Houay La Kouay	RC T-Girder	12+18+12	42.0	11.0	8.0	1987	Russia	
17	146+000	Xe Tha Mouak	Steel I-Girder	!8+32+21.2 +33.6+22.2+32	159.0	10.0	7.0	1984	Czecho	
18	152+800	Houay Ta Sap	RC T-Girder	1@18	18.0	10.0	8.0	1986	Russia	
19	154+000	Houay Po Lo	RC T-Girder	2@15	30.0	11.0	8.0	1986	Russia	
20	154+700	Houay Ta Yeung	RC T-Girder	15+18+15	48.0	10.9	8.0	1986	Russia	
21	163+938	Houay Pa Khi	RC T-Girder	1@12	12.0	10.9	8.0	1986	Russia	ADB Loan
22	166+246	Houay A Lang	RC T-Girder	12+18+12	42.0	11.0	8.0	1986	Russia	
23	171+121	Houay A Kai	RC T-Girder	18.1+18.1+15.1	51.3	10.9	8.0	1986	Russia	
24	173+700	Houay Xe Chon 1	RC T-Girder	12+15+12	39.2	10.9	8.0	1986	Russia	
25	175+082	Houay Koy	RC T-Girder	1@12	12.0	10.9	8.0	1986	Russia	
26	176+210	Houay Xe Chon 2	RC T-Girder	3@12	36.1	11.0	8.0	1986	Russia	
27	178+016	Houay Xe Chon 3	RC T-Girder	1@12	12.0	11.0	8.0	1986	Russia	
28	182+250	Houay La Vi	RC Beam	1@12	9.1	9.0	7.2	1986	Russia	
29	183+400	Houay Ki	RC T-Girder	3@12	36.1	11.0	8.0	1986	Russia	
30	184+400	Houay Yone	RC T-Girder	2@15	30.1	10.9	8.0	1986	Russia	
31	185+240	Houay Xay	RC T-Girder	2@12	24.0	10.9	8.0	1986	Russia	
32	188+400	Houay Kok 2	RC T-Girder	2@12	24.0	11.0	8.0	1986	Russia	
33	194+214	Houay Kok 1	RC T-Girder	5@18	90.0	11.0	8.0	1987	Russia	
34	196+020	Xe Bang Hiang	Steel and RC	18+4@42.8+18	207.7	11.0	8.0	1986	Russia	
35	199+101	Houay Cheng	PC I-Girder	1@18	18.0	9.5	7.0	2010	Laos	
36	199+650	Houay Sa Niam	RC T-Girder	1@18	18.0	9.5	7.0	1984	Vietnam	
37	202+400	Houay Ma Houn	RC T-Girder	1@21	21.0	9.5	7.0	1984	Vietnam	
38	204+083	Houay Sa Mang	RC T-Girder	1@15	15.0	9.5	7.0	1984	Vietnam	
39	206+400	Houay None	RC T-Girder	1@21	21.0	9.5	7.0	1984	Vietnam	
40	210+322	Houay Ta Pouan	RC T-Girder	4@18	72.0	9.6	7.8	1984	Vietnam	
41	216+000	Houay Luang	RC T-Girder	1@15	15.0	9.5	7.0	1984	Vietnam	
42	218+500	Houay Ma Heng	RC T-Girder	2@18	36.0	9.5	7.0	1984	Vietnam	
43	219+300	Houay Pa Xuoan	RC T-Girder	2@21	42.0	9.6	7.0	1984	Vietnam	
44	222+700	Houay Pa Lin	RC T-Girder	2@18	36.0	9.5	7.0	1984	Vietnam	
45	224+037	Houay Ta Khoan	RC Slab	1@6	6.0	10.0	7.0	2010	Vietnam	
46	229+141	Houay Sa Ki	RC T-Girder	3@18	54.0	9.5	7.0	1984	Vietnam	
47	229+860	Houay Sa Moun	RC T-Girder	2@15	30.0	9.2	7.0	1984	Vietnam	
48	231+246	Houay Lua	RC T-Girder	2@21	42.0	9.5	7.0	1984	Vietnam	
49	234+870	Houay Ka Hanh	RC T-Girder	2@21	42.0	9.5	7.0	1984	Vietnam	
50	236+730	Houay Pa Lath	RC T-Girder	3@21	63.0	9.5	7.0	1984	Vietnam	
51	239+400	Houay A Lone	RC T-Girder	3@18	54.0	9.7	7.0	1984	Vietnam	

Type	Length (m)	Ratio
RCTG (i)	969.8	43%
RCTG (ii)	561.0	25%
STG(ii)	407.7	18%
STG(ii)	249.0	11%
Others	51.1	2%
	2238.6	

The result of bridge inventory survey was summarized in Table below.

Table A.1.4 Results of Bridge Inventory Survey

No.	Bridge Name	Bridge Type	Findings Rate					Assesment	Rank	Remarks
			A	B	C	D	E	(A<E)	(I <II<III)	
1	Houay Lay	RC T-Girder	0	5	4	14	0	D	II	Japan Grant Aid (Phase -1)
2	Houay Ka Sae	RC T-Girder	0	5	3	15	0	D	II	
3	Houay Long Kong	RC T-Girder	0	3	4	16	0	D	II	
4	Houay Moung	RC T-Girder	0	6	3	14	0	D	II	
5	Houay Ta Bong Phet	RC T-Girder	0	5	4	14	0	D	II	
6	Xe Cham Phone	Steel and RC	0	11	6	8	0	D	II	
7	Xe Xam Xoy	Steel I-Girder	0	5	5	15	0	D	II	
8	Houay Koa	RC Slab	1	3	2	15	0	D	II	Japan Grant Aid (Phase -2)
9	Houay Ya Phuid	RC T-Girder	0	1	2	20	0	D	II	
10	Houay Ngoa	RC T-Girder	0	1	4	18	0	D	II	
11	Houay Sa Loung	RC T-Girder	0	1	4	18	0	D	II	
12	Houay Sa Leang	RC T-Girder	0	5	3	15	0	D	II	
13	Xe Kum Kam	Steel I-Girder	0	13	2	9	1	E	III	
14	Houay Jon	RC T-Girder	0	5	2	16	0	D	II	
15	Houay Tho	RC T-Girder	0	2	5	16	0	D	II	
16	Houay La Kouay	RC T-Girder	0	4	4	15	0	D	II	
17	Xe Tha Mouak	Steel I-Girder	0	6	8	10	1	E	III	
18	Houay Ta Sap	RC T-Girder	0	6	3	14	0	D	II	
19	Houay Po Lo	RC T-Girder	0	5	3	15	0	D	II	
20	Houay Ta Yeung	RC T-Girder	0	4	6	13	0	D	II	
21	Houay Pa Khi	RC T-Girder	0	9	3	11	0	D	II	ADB Loan
22	Houay A Lang	RC T-Girder	0	4	4	15	0	D	II	
23	Houay A Kai	RC T-Girder	0	6	4	13	0	D	II	
24	Houay Xe Chon 1	RC T-Girder	1	2	4	16	0	D	II	
25	Houay Koy	RC T-Girder	0	12	4	7	0	D	II	
26	Houay Xe Chon 2	RC T-Girder	0	4	4	15	0	D	II	
27	Houay Xe Chon 3	RC T-Girder	0	8	4	11	0	D	II	
28	Houay La Vi	RC Beam	0	12	4	7	0	D	II	
29	Houay Ki	RC T-Girder	0	5	4	14	0	D	II	
30	Houay Yone	RC T-Girder	0	3	4	16	0	D	II	
31	Houay Xay	RC T-Girder	0	4	4	15	0	D	II	
32	Houay Kok 2	RC T-Girder	0	7	3	13	0	D	II	
33	Houay Kok 1	RC T-Girder	0	2	4	17	0	D	II	
34	Xe Bang Hiang	Steel and RC	0	10	4	13	0	D	II	
35	Houay Cheng	PC I-Girder	18	2	2	1	0	D	II	
36	Houay Sa Niam	RC T-Girder	0	17	5	1	0	D	II	
37	Houay Ma Houn	RC T-Girder	0	12	4	7	0	D	II	
38	Houay Sa Mang	RC T-Girder	0	11	4	8	0	D	II	
39	Houay None	RC T-Girder	0	16	4	3	0	D	II	
40	Houay Ta Pouan	RC T-Girder	0	9	4	10	0	D	II	
41	Houay Luang	RC T-Girder	0	16	5	2	0	D	II	
42	Houay Ma Heng	RC T-Girder	0	11	4	8	0	D	II	
43	Houay Pa Xuoan	RC T-Girder	0	8	4	11	0	D	II	
44	Houay Pa Lin	RC T-Girder	0	10	4	9	0	D	II	
45	Houay Ta Khoan	RC Slab	3	12	3	3	0	D	II	
46	Houay Sa Ki	RC T-Girder	0	11	4	8	0	D	II	
47	Houay Sa Moun	RC T-Girder	0	6	4	13	0	D	II	
48	Houay Lua	RC T-Girder	0	14	4	5	0	D	II	
49	Houay Ka Hanh	RC T-Girder	0	9	4	10	0	D	II	
50	Houay Pa Lath	RC T-Girder	0	7	4	12	0	D	II	
51	Houay A Lone	RC T-Girder	0	15	4	4	0	D	II	

The description for damage observation recorded for each bridge at the inventory survey are given in Table. A.1.5.

Table A.1.5 Results of Bridge Inventory Survey

No.	Bridge Name	Bridge Type	Findings Rate					Assesment	Rank	Damage/ Observation
			A	B	C	D	E	(A<E)	(I <II<III)	
1	Houay Lay	RC T-Girder	0	5	4	14	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel are confirmed in the girders and concrete slab. ・ Damage of concrete bearing at P1, P2 and A2 bearing. ・ Crack on pavement, damage on exp. joint and handrils
2	Houay Ka Sae	RC T-Girder	0	5	3	15	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at girders and concrete slab. ・ Corrosion at all of the bearing. ・ Crack on pavement, damage on exp. joint and handrails
3	Houay Long Kong	RC T-Girder	0	3	4	16	0	D	II	・ Structural cracks at all of the girders ・ Corrosions in the steel bearing is progessed. ・ Crack on pavement and observed near the exp. joint area. ・ Different gap at the exp. joints
4	Houay Moung	RC T-Girder	0	6	3	14	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing ・ Crack on pavement, damage on exp. joint and handrails
5	Houay Ta Bong Phet	RC T-Girder	0	5	4	14	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing, exp. joint and handrails ・ Crack on pavement, and abutment
6	Xe Cham Phone	Steel and RC	0	11	6	8	0	D	II	・ Corrosion of strengthening girder but no corrosion at main girder ・ Exposure of steel at the concrete slab ・ Exposure of steel at the abutment ・ Crack of pavement at the joint of each span.
7	Xe Xam Xoy	Steel I-Girder	0	5	5	15	0	D	II	・ Corrosion of strengthening girder but no corrosion at main girder ・ Exposure of steel at the concrete slab ・ Exposure of steel at the abutment ・ Crack of pavement at the joint between each span.
8	Houay Koa	RC Slab	1	3	2	15	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and corrosion of steel bearing ・ Crack on pavement and abutment
9	Houay Ya Phuid	RC T-Girder	0	1	2	20	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and corrosion of steel bearing ・ Crack on pavement, damage on exp. joint and handrails
10	Houay Ngoa	RC T-Girder	0	1	4	18	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and corrosion of steel bearing ・ Crack on pavement, damage on exp. joint and handrails
11	Houay Sa Loung	RC T-Girder	0	1	4	18	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and corrosion of steel bearing ・ Free lime at main girders and slab.
12	Houay Sa Leang	RC T-Girder	0	5	3	15	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and corrosion of steel bearing ・ Crack on pavement, damage on exp. joint and handrails
13	Xe Kum Kam	Steel I-Girder	0	13	2	9	1	E	III	・ Corrosion of strengthening girder but no corrosion at main girder ・ Exposure of steel at the concrete slab ・ Exposure of steel at the abutment ・ Abrupt profile of bridge in danger of accident
14	Houay Jon	RC T-Girder	0	5	2	16	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and corrosion of steel bearing ・ Crack on pavement, damage on exp. joint and handrails
15	Houay Tho	RC T-Girder	0	2	5	16	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and corrosion of steel bearing ・ Crack on pavement, damage on exp. joint and handrail
16	Houay La Kouay	RC T-Girder	0	4	4	15	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and corrosion of steel bearing ・ Damage and free lime at main girders and the slab.
17	Xe Tha Mouak	Steel I-Girder	0	6	8	10	1	E	III	・ Corrosion of strengthening girder but no corrosion at main girder ・ Exposure of steel at the concrete slab ・ Exposure of steel at the abutment ・ Abrupt profile of bridge in danger of accident
18	Houay Ta Sap	RC T-Girder	0	6	3	14	0	D	II	・ Damage of concrete bearing and corrosion of steel bearing ・ Crack on pavement, damage on exp. joint and handrails ・ Damage and cracks at abutment. 0
19	Houay Po Lo	RC T-Girder	0	5	3	15	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at girders and concrete slab. ・ Damage of concrete bearing and corrosion of steel bearing. ・ Crack on pavement and abutment, damage on exp. joint and handrails
20	Houay Ta Yeung	RC T-Girder	0	4	6	13	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and corrosion of steel bearing ・ Damage and cracks at abutment
21	Houay Pa Khi	RC T-Girder	0	9	3	11	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and corrosion of steel bearing ・ Crack on pavement and abutment, damage on exp. joint and handrails

22	Houay A Lang	RC T-Girder	0	4	4	15	0	D	II	• Structural cracks at all of main girders. • Exposure of steel at the girders and concrete slab. • Damage of concrete bearing and corrosion of steel bearing • Crack on pavement and abutment, damage on exp. joint and handrails
23	Houay A Kai	RC T-Girder	0	6	4	13	0	D	II	• Structural cracks at all of main girders. • Exposure of steel at the girders and concrete slab. • Damage of concrete bearing and corrosion of steel bearing • Crack on pavement, damage on exp. joint and handrails
24	Houay Xe Chon 1	RC T-Girder	1	2	4	16	0	D	II	• Structural cracks at all of main girders. • Exposure of steel at the girders and concrete slab. • Damage of concrete bearing and exp. joint and handrails • Crack on pavement and abutment with free lime
25	Houay Koy	RC T-Girder	0	12	4	7	0	D	II	• Structural cracks at all of main girders. • Crack on pavement, damage on exp. joint and handrails • Cracking at abutment
26	Houay Xe Chon 2	RC T-Girder	0	4	4	15	0	D	II	• Structural cracks at all of main girders. • Exposure of steel at the girders and concrete slab. • Damage of concrete bearing and corrosion of steel bearing • Crack on pavement, damage on exp. joint and handrails
27	Houay Xe Chon 3	RC T-Girder	0	8	4	11	0	D	II	• Structural cracks at all of the girders • Damage on concrete bearing and corrosion on steel bearing • Damage on handrail, exp. joint and crack on pavement • Crack on abutment
28	Houay La Vi	RC Beam	0	12	4	7	0	D	II	• Structural cracks at all of main girders. • Damage of concrete bearing and corrosion of steel bearing • Crack on pavement, damage on exp. joint and handrails • Cracking at the Abutment
29	Houay Ki	RC T-Girder	0	5	4	14	0	D	II	• Structural cracks at all of main girders. • Damage of concrete bearing and corrosion of steel bearing • Crack on pavement, damage on exp. joint and handrails • Damage and cracking at the Abutment
30	Houay Yone	RC T-Girder	0	3	4	16	0	D	II	• Structural cracks at all of main girders. • Exposure of steel at the girders and concrete slab. • Damage of concrete bearing, exp. joint and handrails • Crack on pavement and abutment
31	Houay Xay	RC T-Girder	0	4	4	15	0	D	II	• Structural cracks at all of main girders. • Exposure of steel at the girders and concrete slab. • Damage of concrete bearing, exp joint and corrosion of steel bearing • Crack on pavement and abutment with free lime
32	Houay Kok 2	RC T-Girder	0	7	3	13	0	D	II	• Structural cracks at all of main girders • Damage of concrete bearing and corrosion of steel bearing • Crack on pavement, damage on expansion joint and handrils • Free limes at the abutment
33	Houay Kok 1	RC T-Girder	0	2	4	17	0	D	II	• Structural cracks at all of main girders. • Exposure of steel at the girders and concrete slab. • Damage of concrete bearing, exp. joint, handrails and bearing • Crack on pavement and abutment with free lime
34	Xe Bang Hiang	Steel and RC	0	10	4	13	0	D	II	• Structural cracks at all of main girders. • Exposure of steel at the girders and concrete slab. • Different gap at the expansion joint between girders 0
35	Houay Cheng	PC I-Girder	18	2	2	1	0	D	II	• Cracks on the pavement and damage on handrils 0 0 0
36	Houay Sa Niam	RC T-Girder	0	17	5	1	0	D	II	• Structural cracks at all of main girders. • Damage of concrete bearing, exp. joint, handrails and bearing • Crack on pavement 0
37	Houay Ma Houn	RC T-Girder	0	12	4	7	0	D	II	• Structural cracks at all of main girders. • Exposure of steel at the girders and concrete slab. • Damage of bearing, exp. Joint, and handrails • Crack on pavement and abutment with free lime
38	Houay Sa Mang	RC T-Girder	0	11	4	8	0	D	II	• Structural cracks at all of main girders. • Damage of concrete bearing and corrosion of steel bearing • Crack pavement, damage on exp. joint and handrils 0
39	Houay None	RC T-Girder	0	16	4	3	0	D	II	• Structural cracks at all of main girders. • Damage of concrete bearing and corrosion of steel bearing • Crack pavement, damage on exp. joint and handrils 0
40	Houay Ta Pouan	RC T-Girder	0	9	4	10	0	D	II	• Structural cracks at all of main girders. • Damage of concrete bearing and corrosion of steel bearing • Crack on pavement, damage on exp.joint and handrils • Damage and cracking the abutment
41	Houay Luang	RC T-Girder	0	16	5	2	0	D	II	• Structural cracks at all of main girders. • Exposure of steel at the girders and concrete slab. • Damage of concrete bearing and exp. joint and handrails • Crack on pavement
42	Houay Ma Heng	RC T-Girder	0	11	4	8	0	D	II	• Structural cracks at all of main girders. • Damage of concrete bearing and exp. joint and handrails • Crack on pavement and abutment with free lime 0
43	Houay Pa Xuoan	RC T-Girder	0	8	4	11	0	D	II	• Structural cracks at all of main girders. • Exposure of steel at the girders and concrete slab. • Damage of concrete bearing and exp. joint and handrails • Crack on pavement and abutment with free lime

44	Houay Pa Lin	RC T-Girder	0	10	4	9	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and exp.joint and handrails ・ Crack on pavement and abutment
45	Houay Ta Khoan	RC Slab	3	12	3	3	0	D	II	・ Crack on pavement, damage on exp. joint and handrils 0 0 0
46	Houay Sa Ki	RC T-Girder	0	11	4	8	0	D	II	・ Structural cracks at all of main girders. ・ Damage of concrete bearing and exp. joint and handrails ・ Crack on pavement and abutment 0
47	Houay Sa Moun	RC T-Girder	0	6	4	13	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and exp. joint and handrails ・ Crack on pavement and abutment with free lime
48	Houay Lua	RC T-Girder	0	14	4	5	0	D	II	・ Structural cracks at all of main girders. ・ Damage of concrete bearing and exp. joint and handrails ・ Crack on pavement and abutment 0
49	Houay Ka Hanh	RC T-Girder	0	9	4	10	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and exp. joint and handrails ・ Crack on pavement and abutment
50	Houay Pa Lath	RC T-Girder	0	7	4	12	0	D	II	・ Structural cracks at all of main girders. ・ Exposure of steel at the girders and concrete slab. ・ Damage of concrete bearing and exp. joint and handrails ・ Crack on pavement and abutment
51	Houay A Lone	RC T-Girder	0	15	4	4	0	D	II	・ Structural cracks at all of main girders. ・ Damage of concrete bearing and exp. joint and handrails ・ Crack on pavement 0

CD-ROM, containing the data file of the bridge inventory survey is attactched to this report.

Appendix 2: Traffic Survey and Social Condition Survey

A. Traffic Survey

(1) Objectives

Traffic survey was performed in order to calibrate existing traffic demand (OD matrices). The survey consists of traffic count survey including ferry operation at Sekong ferry and roadside driver interview survey.

(2) Survey Locations and Schedules

Traffic count survey was conducted at 9 locations and roadside interview survey was conducted at 9 locations on the provincial / district boundary of study area as illustrated in following figure. Survey was performed on 30th and 31st March 2010 as shown in Table A.2.1.

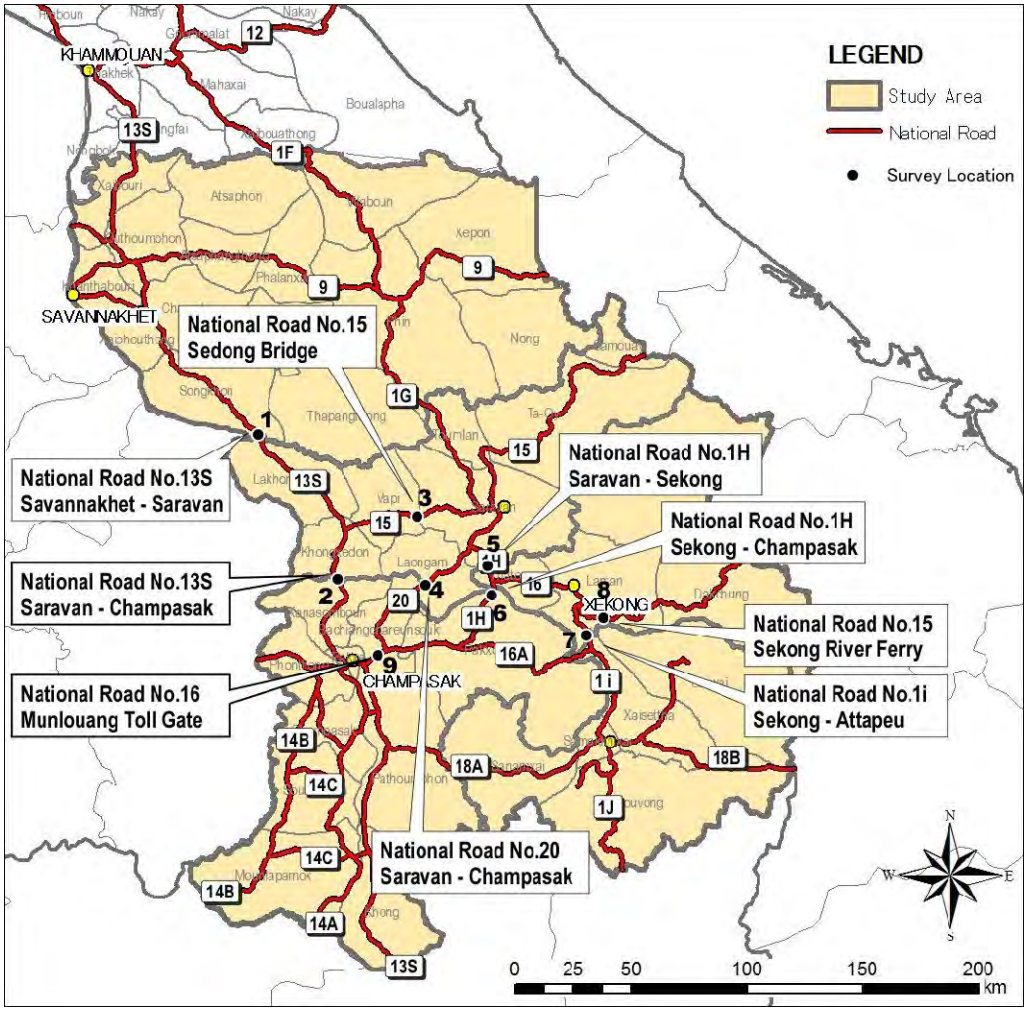


Figure A.2.1 Survey Location

Table A.2.1 Survey Location and Survey Date

No	Road	Location	Traffic Count	Roadside Interview	Survey Date (Mar 2010)
1	NR-13S	Boundary of Savannakhet - Saravane	6:00 - 18:00 (12h)	None	30th (Tue)
2	NR-13S	Boundary of Saravane - Champasak	6:00 - 18:00 (12h)	None	30th (Tue)
3	NR-15	Sekong Bridge	6:00 - 18:00 (12h)	None	30th (Tue)
4	NR-20	Boundary of Saravane - Champasak	6:00 - 18:00 (12h)	None	30th (Tue)
5	NR-1H	Boundary of Saravane - Sekong	6:00 - 18:00 (12h)	None	31st (Wed)
6	NR-1H	Boundary of Sekong - Champasak	6:00 - 18:00 (12h)	None	31st (Wed)
7	NR-1i	Boundary of Sekong - Attapeu	6:00 - 18:00 (12h)	None	31st (Wed)
8	NR-15	Sekong River Ferry	6:00 - 18:00 (12h)	None	31st (Wed)
9	NR-16	Munlouang Toll gate	6:00 - 18:00 (12h)	6:00 - 18:00	31st (Wed)

(3) Survey Results

Following tables show the results of traffic count survey at each survey location and direction.

Table A.2.2 Traffic Volume at Survey Location 1

1. NR-13S Boundary of Savannakhet - Saravane (Northbound)

				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	38	0	6	0	0	0	10	10	0	0	64
7 - 8	34	0	21	5	0	0	18	2	6	5	91
8 - 9	14	0	11	0	0	2	6	4	2	4	43
9 - 10	20	0	11	0	0	2	5	0	5	6	49
10 - 11	19	0	7	0	0	1	10	3	2	2	44
11 - 12	19	0	14	0	0	1	12	1	0	2	49
12 - 13	21	0	11	2	0	1	7	0	2	8	52
13 - 14	25	0	8	0	0	2	11	1	5	3	55
14 - 15	35	0	9	0	0	0	8	2	3	0	57
15 - 16	26	0	5	0	0	0	2	0	2	0	35
16 - 17	23	0	19	3	0	2	9	1	2	3	62
17 - 18	15	0	17	0	0	0	5	0	1	1	39
Total	289	0	139	10	0	11	103	24	30	34	640

1. NR-13S Boundary of Savannakhet - Saravane (Southbound)

				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	20	0	20	5	1	0	9	1	3	1	60
7 - 8	14	0	9	1	0	1	8	0	3	3	39
8 - 9	16	0	13	1	0	0	13	0	0	3	46
9 - 10	17	0	15	2	0	1	10	0	0	0	45
10 - 11	14	0	10	1	0	3	6	0	0	3	37
11 - 12	15	0	12	4	0	2	15	1	0	2	51
12 - 13	12	0	21	3	0	1	8	0	0	0	45
13 - 14	5	0	13	1	0	2	4	2	1	3	31
14 - 15	6	5	13	2	0	4	3	2	1	1	37
15 - 16	7	0	6	0	0	3	5	0	0	2	23
16 - 17	18	0	12	1	0	1	8	1	1	0	42
17 - 18	13	0	3	0	0	2	5	1	1	2	27
Total	157	5	147	21	1	20	94	8	10	20	483

Table A.2.3 Traffic Volume at Survey Location 2

2. NR-13S Boundary of Saravane - Champasak (Northbound)

				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	15	0	17	0	0	0	1	1	0	2	36
7 - 8	16	8	3	0	0	1	5	0	0	7	40
8 - 9	15	0	9	0	0	1	5	3	1	1	35
9 - 10	11	0	6	0	0	0	3	1	1	1	23
10 - 11	9	0	6	0	0	0	4	3	0	1	23
11 - 12	14	0	11	0	1	1	3	1	0	2	33
12 - 13	11	0	4	0	0	1	6	2	9	0	33
13 - 14	12	0	8	0	0	1	5	3	1	1	31
14 - 15	12	0	4	0	0	1	3	0	1	2	23
15 - 16	12	0	13	0	0	2	10	0	0	4	41
16 - 17	32	0	7	0	0	1	3	2	1	2	48
17 - 18	21	0	13	0	1	2	15	0	1	4	57
Total	180	8	101	0	2	11	63	16	15	27	423

2. NR-13S Boundary of Saravane - Champasak (Southbound)

				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	11	0	2	0	0	0	0	0	0	2	15
7 - 8	28	0	5	0	0	2	8	0	0	1	44
8 - 9	15	0	6	0	1	2	5	1	0	3	33
9 - 10	10	0	5	1	0	2	7	1	0	0	26
10 - 11	15	0	11	0	0	3	7	4	0	0	40
11 - 12	16	0	12	0	0	4	8	1	0	2	43
12 - 13	13	0	13	1	0	2	1	2	0	1	33
13 - 14	13	0	11	0	0	2	5	0	0	1	32
14 - 15	9	0	9	0	0	1	6	0	0	1	26
15 - 16	19	0	7	0	1	3	10	1	2	0	43
16 - 17	24	0	10	0	0	2	7	4	7	3	57
17 - 18	17	0	18	0	0	4	6	0	1	4	50
Total	190	0	109	2	2	27	70	14	10	18	442

Table A.2.4 Traffic Volume at Survey Location 3

3. NR-15 Sekong Bridge (Saravane to NR-13)

				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	21	0	0	0	2	0	5	0	0	1	29
7 - 8	44	0	7	0	0	0	5	1	0	1	58
8 - 9	34	0	4	0	0	1	4	1	0	0	44
9 - 10	34	0	1	0	0	0	0	0	0	4	39
10 - 11	24	0	2	0	0	0	4	0	2	2	34
11 - 12	26	0	5	0	0	0	6	0	0	1	38
12 - 13	21	0	6	0	0	0	4	0	0	1	32
13 - 14	24	0	6	0	1	0	2	0	0	1	34
14 - 15	22	0	2	0	0	0	2	1	0	1	28
15 - 16	20	0	2	0	1	0	2	0	0	3	28
16 - 17	23	0	2	0	0	0	3	0	1	3	32
17 - 18	21	0	3	0	0	0	5	0	0	0	29
Total	314	0	40	0	4	1	42	3	3	18	425

3. NR-15 Sekong Bridge (NR-13 to Saravane)

				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	12	0	1	0	0	0	2	0	0	1	16
7 - 8	15	0	5	2	0	0	1	1	0	1	25
8 - 9	17	0	7	1	0	0	3	2	1	0	31
9 - 10	33	0	3	1	0	0	5	3	1	1	47
10 - 11	35	0	5	0	0	0	2	3	1	1	47
11 - 12	27	0	1	2	0	0	7	0	0	1	38
12 - 13	37	0	8	0	1	0	5	0	0	2	53
13 - 14	14	0	2	0	0	0	3	0	1	1	21
14 - 15	17	0	1	0	1	0	4	0	0	2	25
15 - 16	25	0	3	0	0	0	6	0	0	2	36
16 - 17	58	0	6	0	0	0	5	0	0	2	71
17 - 18	34	0	2	0	0	0	6	0	0	3	45
Total	324	0	44	6	2	0	49	9	4	17	455

Table A.2.5 Traffic Volume at Survey Location 4

4. NR-20 Boundary of Saravane - Champasak (Saravane to Pakse)											
				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	39	0	5	0	4	0	10	2	0	0	60
7 - 8	79	0	1	2	5	0	10	0	2	0	99
8 - 9	43	5	3	0	0	0	9	1	2	0	63
9 - 10	40	0	9	0	0	1	14	3	1	1	69
10 - 11	35	0	5	0	0	1	15	4	0	2	62
11 - 12	15	0	4	0	1	1	11	2	0	2	36
12 - 13	24	0	15	0	2	0	10	4	0	0	55
13 - 14	17	0	6	0	0	0	8	1	0	2	34
14 - 15	29	0	7	0	2	2	2	1	0	3	46
15 - 16	40	0	16	0	0	1	5	3	1	2	68
16 - 17	36	0	11	1	0	1	7	1	0	1	58
17 - 18	44	0	14	0	0	0	5	0	0	2	65
Total	441	5	96	3	14	7	106	22	6	15	715
4. NR-20 Boundary of Saravane - Champasak (Pakse to Saravane)											
				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	39	0	4	0	1	2	3	0	1	1	51
7 - 8	67	0	4	0	1	0	8	0	0	2	82
8 - 9	40	0	6	0	0	1	12	0	2	0	61
9 - 10	62	0	5	0	0	1	16	3	1	0	88
10 - 11	30	0	15	0	5	2	20	4	2	2	80
11 - 12	44	0	11	2	2	3	8	4	0	2	76
12 - 13	22	0	6	2	1	1	8	2	1	0	43
13 - 14	17	0	3	0	1	0	10	0	0	1	32
14 - 15	21	0	6	2	0	0	11	1	0	0	41
15 - 16	43	0	11	1	0	0	8	2	1	0	66
16 - 17	66	0	14	0	1	1	8	0	1	1	92
17 - 18	21	0	7	1	0	0	4	2	0	0	35
Total	472	0	92	8	12	11	116	18	9	9	747

Table A.2.6 Traffic Volume at Survey Location 5

5. NR-1H Boundary of Saravan - Sekong (Saravane to Sekong)											
				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	15	0	1	0	0	0	3	0	1	1	21
7 - 8	9	0	0	0	0	0	7	0	0	1	17
8 - 9	8	0	2	1	0	0	3	0	0	4	18
9 - 10	9	0	6	0	0	0	1	2	0	2	20
10 - 11	8	0	4	1	0	0	2	1	0	2	18
11 - 12	6	0	2	1	0	0	3	3	0	1	16
12 - 13	13	0	1	0	0	0	1	0	0	0	15
13 - 14	11	0	2	0	0	0	2	0	0	1	16
14 - 15	1	0	0	1	0	0	2	0	0	0	4
15 - 16	31	0	2	0	0	0	5	1	0	1	40
16 - 17	15	0	1	0	0	0	2	0	0	0	18
17 - 18	8	0	2	0	0	0	5	1	1	0	17
Total	134	0	23	4	0	0	36	8	2	13	220
5. NR-1H Boundary of Saravan - Sekong (Sekong to Saravane)											
				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	10	0	0	0	0	0	3	1	0	0	14
7 - 8	11	0	1	0	0	0	1	2	0	2	17
8 - 9	9	0	4	0	0	0	3	0	0	0	16
9 - 10	5	0	5	0	0	0	3	1	0	2	16
10 - 11	12	0	4	2	0	0	2	2	2	2	26
11 - 12	12	0	2	0	0	0	5	1	0	0	20
12 - 13	10	0	0	0	0	0	3	0	1	1	15
13 - 14	7	0	5	1	0	0	7	3	0	2	25
14 - 15	3	0	3	0	0	0	3	0	0	1	10
15 - 16	19	0	3	1	0	0	6	0	0	2	31
16 - 17	10	0	2	0	0	0	2	1	0	2	17
17 - 18	11	0	0	0	0	0	3	0	0	0	14
Total	119	0	29	4	0	0	41	11	3	14	221

Table A.2.7 Traffic Volume at Survey Location 6

6. NR-1H Boundary of Sekong - Champasak (Sekong to Pakse)											
				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	18	0	5	3	0	0	7	1	0	0	34
7 - 8	19	0	4	1	0	0	5	0	1	0	30
8 - 9	20	0	6	0	1	0	6	2	0	1	36
9 - 10	15	6	2	0	0	1	5	2	2	3	36
10 - 11	7	0	3	0	0	3	5	0	0	1	19
11 - 12	11	0	8	0	0	1	4	1	0	2	27
12 - 13	12	1	4	0	0	1	6	0	0	0	24
13 - 14	7	0	4	0	0	2	4	1	0	1	19
14 - 15	10	0	8	0	0	6	9	0	1	1	35
15 - 16	26	0	12	0	0	0	7	1	0	1	47
16 - 17	19	0	5	0	0	0	5	0	1	2	32
17 - 18	14	0	10	0	0	1	6	1	0	1	33
Total	178	7	71	4	1	15	69	9	5	13	372
6. NR-1H Boundary of Sekong - Champasak (Pakse to Sekong)											
				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	16	0	3	0	1	0	7	0	0	0	27
7 - 8	21	0	3	0	0	2	6	0	0	1	33
8 - 9	13	0	9	0	0	2	5	0	0	4	33
9 - 10	30	0	7	0	0	2	11	0	0	2	52
10 - 11	23	0	9	0	1	0	5	0	0	1	39
11 - 12	7	0	9	1	1	2	7	1	0	1	29
12 - 13	7	0	5	1	0	2	10	4	0	0	29
13 - 14	3	1	3	0	2	1	6	0	0	0	16
14 - 15	12	0	7	0	0	1	12	2	0	0	34
15 - 16	22	0	12	1	0	3	8	0	0	1	47
16 - 17	18	0	12	0	0	2	9	0	0	1	42
17 - 18	19	0	7	0	0	0	8	1	5	0	40
Total	191	1	86	3	5	17	94	8	5	11	421

Table A.2.8 Traffic Volume at Survey Location 7

7. NR-1i Boundary of Sekong - Attapeu (Sekong to Attapeu)											
				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	9	0	0	1	0	0	1	0	1	0	12
7 - 8	5	0	1	0	0	0	1	3	17	0	27
8 - 9	7	0	3	1	0	0	4	0	2	0	17
9 - 10	14	0	3	0	0	2	2	2	0	0	23
10 - 11	9	0	7	1	0	1	1	0	0	3	22
11 - 12	14	0	5	0	0	1	0	0	0	1	21
12 - 13	13	1	1	0	0	0	3	1	0	1	20
13 - 14	9	0	6	0	0	0	5	1	0	0	21
14 - 15	13	0	2	0	0	2	2	0	0	0	19
15 - 16	18	0	4	0	0	0	2	0	0	0	24
16 - 17	16	0	10	0	0	0	4	0	0	0	30
17 - 18	11	0	12	0	0	1	0	0	1	0	25
Total	138	1	54	3	0	7	25	7	21	5	261
7. NR-1i Boundary of Sekong - Attapeu (Attapeu to Sekong)											
				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	14	0	0	1	0	0	2	0	0	0	17
7 - 8	19	0	4	0	0	0	1	0	0	0	24
8 - 9	11	0	3	0	0	2	2	0	1	0	19
9 - 10	17	0	2	0	0	2	1	0	0	0	22
10 - 11	15	0	10	1	0	2	1	0	0	1	30
11 - 12	11	0	3	1	0	1	2	2	1	0	21
12 - 13	2	0	4	1	0	0	2	0	1	3	13
13 - 14	9	0	15	1	0	1	3	0	0	0	29
14 - 15	9	0	8	1	0	1	2	0	0	0	21
15 - 16	5	0	3	0	0	1	0	0	0	0	9
16 - 17	10	0	9	0	0	0	1	0	1	0	21
17 - 18	3	0	4	1	0	0	2	0	1	0	11
Total	125	0	65	7	0	10	19	2	5	4	237

Table A.2.9 Traffic Volume at Survey Location 8

8. NR-15 Sekong River Ferry (Sekong to Dakschung)											
				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	9	0	0	0	0	0	0	0	0	0	9
7 - 8	4	0	2	0	0	0	0	0	0	0	6
8 - 9	2	0	4	0	0	0	0	0	0	0	6
9 - 10	3	0	2	0	0	0	0	0	0	1	6
10 - 11	1	0	0	0	0	0	0	0	0	0	1
11 - 12	9	0	2	0	0	0	0	3	0	0	14
12 - 13	3	0	3	0	0	0	2	0	0	0	8
13 - 14	8	0	1	0	0	0	0	0	0	0	9
14 - 15	13	0	4	0	0	0	1	1	0	0	19
15 - 16	4	0	0	0	0	0	1	1	0	0	6
16 - 17	6	0	2	0	0	0	0	0	0	0	8
17 - 18	10	0	0	0	0	0	1	0	0	0	11
Total	72	0	20	0	0	0	5	5	0	1	103
8. NR-15 Sekong River Ferry (Dakschung to Sekong)											
				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	4	0	3	0	0	0	0	0	0	0	7
7 - 8	4	0	5	0	0	0	0	0	0	1	10
8 - 9	2	0	0	0	0	0	0	0	0	0	2
9 - 10	9	0	2	0	0	0	0	3	0	0	14
10 - 11	2	0	1	0	0	0	0	0	0	0	3
11 - 12	5	0	2	0	0	0	2	0	0	0	9
12 - 13	5	0	1	0	0	0	0	0	0	0	6
13 - 14	9	0	2	0	0	0	1	1	0	0	13
14 - 15	7	0	2	0	0	0	1	1	0	0	11
15 - 16	6	0	2	0	0	0	0	0	0	0	8
16 - 17	10	0	0	0	0	0	1	0	0	0	11
17 - 18	0	0	0	0	0	0	0	0	0	0	0
Total	63	0	20	0	0	0	5	5	0	1	94

Table A.2.10 Traffic Volume at Survey Location 9

9. NR-16 Munlouang Toll gate (Saravane to Pakse)											
				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	65	2	16	0	0	0	17	2	0	2	104
7 - 8	162	5	37	0	1	0	29	0	1	1	236
8 - 9	122	2	18	0	0	1	53	2	2	2	202
9 - 10	95	1	34	0	0	2	53	4	1	5	195
10 - 11	66	1	37	0	0	2	37	4	2	0	149
11 - 12	65	2	21	0	0	1	26	0	1	0	116
12 - 13	68	0	30	1	0	6	22	0	2	1	130
13 - 14	61	0	29	0	0	2	32	3	1	0	128
14 - 15	60	4	34	0	1	4	35	3	3	1	145
15 - 16	62	1	44	0	0	2	27	8	3	0	147
16 - 17	121	2	47	0	0	4	29	2	6	3	214
17 - 18	113	0	59	0	2	4	16	1	3	2	200
Total	1060	20	406	1	4	28	376	29	25	17	1966
9. NR-16 Munlouang Toll gate (Pakse to Saravane)											
				Buses			Trucks				
Period	Motorcycle	Tuk-tuk	Cars	Sonteo	Medium Bus	Large Bus	2 Axles	3 Axles +	Trailer	Others	Total
6 - 7	67	0	34	0	0	5	9	3	2	0	120
7 - 8	120	4	28	0	2	5	15	2	1	1	178
8 - 9	130	2	57	0	0	4	43	0	0	2	238
9 - 10	90	6	55	0	0	3	36	4	3	2	199
10 - 11	93	2	58	1	0	4	31	14	6	0	209
11 - 12	85	3	44	18	2	0	54	10	5	4	225
12 - 13	87	2	43	0	0	2	41	8	1	1	185
13 - 14	67	2	41	3	0	1	44	1	0	1	160
14 - 15	36	0	32	3	0	0	40	4	4	3	122
15 - 16	72	1	67	0	0	2	34	5	5	2	188
16 - 17	117	0	55	0	1	3	53	2	2	1	234
17 - 18	106	2	47	1	0	1	41	2	7	4	211
Total	1070	24	561	26	5	30	441	55	36	21	2269

At survey location No.9 (Munlouang Toll Gate at NR-16), driver interview survey was conducted. The interview survey includes, i) number of passengers, ii) origin (Province and District), and iii) destination. Table A.2.11 shows the sample ratio by type of vehicle.

Table A.2.11 Sample Ratio of Roadside Interview Survey

Type of Vehicle	Direction	
	Saravane to Pakse	Pakse to Saravane
Motorcycle	2.2%	1.8%
Tuk-tuk	50.0%	25.0%
Passenger Car	18.7%	14.4%
Sonteo	77.8%	46.2%
Medium Bus	50.0%	87.5%
Large Bus	82.1%	44.4%
2 Axles Truck	14.9%	8.4%
3 Axles and more Truck	24.1%	20.0%
Trailer	40.0%	36.1%
Others	5.9%	9.5%

Based on the results of roadside interview survey, relationship between number of samples and estimated distance traveled based on the origin-destination are shown in Figure A.2.2. Motorcycle and Tuk-tuk are used for short distance trip less than 100km. Another peak found around 700km at passenger car, buses and trucks is the trips between Vientiane Municipality.

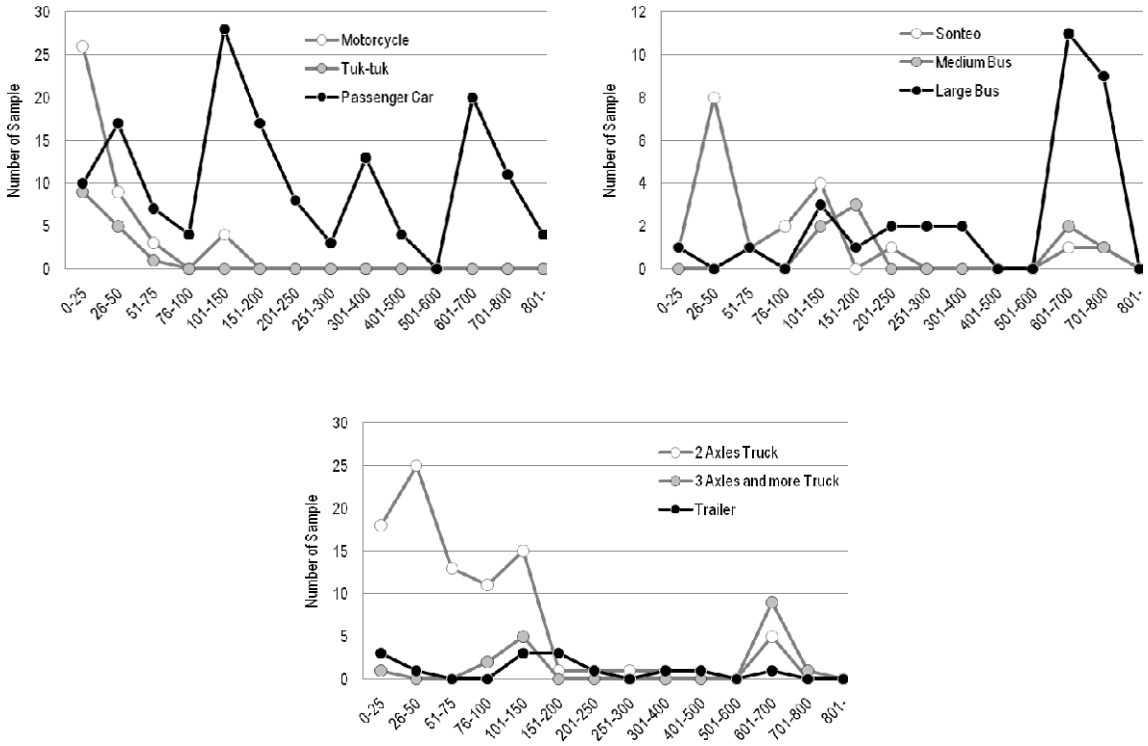


Figure A.2.2 Travel Distance and Number of Samples

Table A.2.12 shows the average occupancy by type of vehicle and Figure A.2.3 shows the total passenger OD distribution at the survey location No.9. Large traffics are observed at among each

Provincial centers except Sekong and Vientiane Municipality.

Table A.2.12 Average Occupancy by Sample

Type of Vehicle	Vehicle	Passenger	Ave. Occupancy
Motorcycle	42	69	1.6
Tuk-tuk	16	81	5.1
Passenger Car	157	515	3.3
Sonteo	19	193	10.2
Medium Bus	9	215	23.9
Large Bus	35	860	24.6
2 Axles Truck	92	500	5.4
3 Axles and more Truck	18	33	1.8
Trailer	23	41	1.8
Others	3	13	4.3

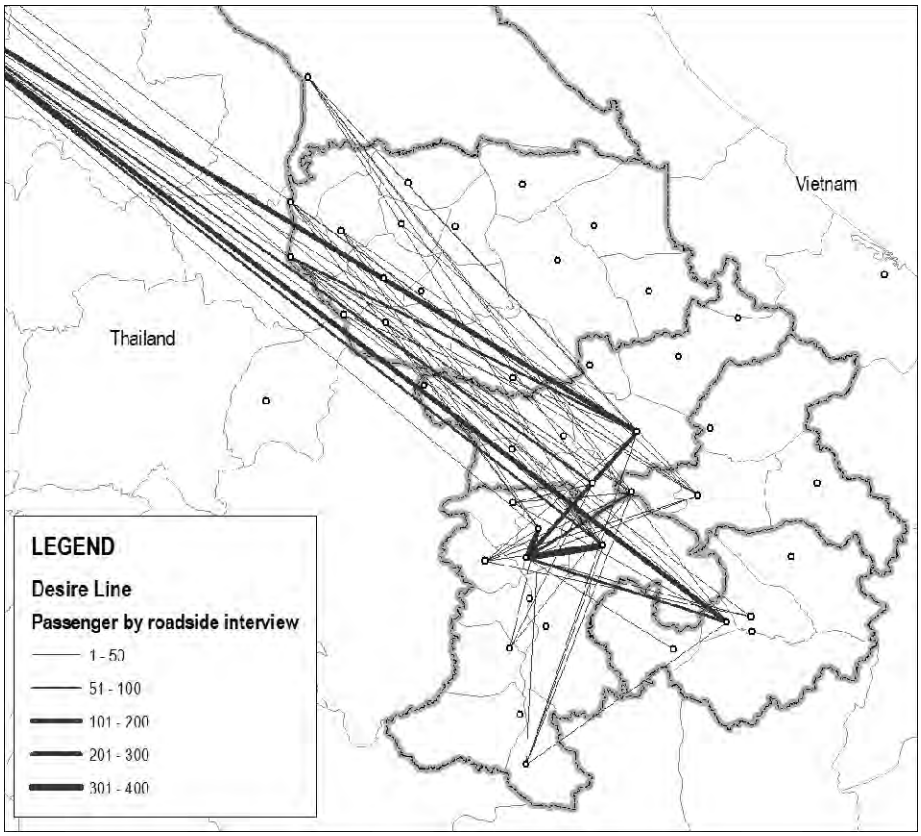


Figure A.2.3 Desire Line (Passenger Total of Sample)

B. Trip Generation Survey

(1) Objectives

In the study area, there are not a few large-scale development plan in agricultural and industrial sectors. For the forecasting future traffic volume in the study area, traffic demand relevant to existing development plan should be considered.

Trip generation survey was conducted in order to estimate trip generation rate, interviewing 18 factories, 14 mining places and 8 plantation farms in the whole of Lao PDR including the study area.

(2) Survey Facilities

Survey facilities are totally 40 firms including Study Area as shown in Table A.2.13 and Survey items are;

- Location of facility (Province, District, Village),
- Major Products,
- Scale of facility (initial investment, area, number of employee), and
- Average number of vehicle inbound by type of vehicle.

Table A.2.13 Number of Samples

Province	Facility			
	Factory	Mining Place	Plantation Farm	Total
Vientiane Capital	5	6	6	17
Vientiane Province	2	-	-	2
Xiengkhuang	-	1	-	1
Khammouane	2	-	-	2
Savannakhet	8	6	1	15
Champasak	1	1	1	3
Total	18	14	8	40

(3) Survey Results

As the results of the analysis on trip generation survey, following liner regression model for forecasting vehicular trip attraction model is estimated.

$$TA_i = \alpha_i \cdot P + \beta_i$$

where, TA_i : Vehicular trip attraction of mode i (vehicle / day)
α_i : Coefficient of mode i
β_i : Constant of mode i
P : Initial investment cost (million USD)

Table A.2.14 Vehicular Trip Attraction Model

		Factory			Mining Place			Plantation Farm		
		Coefficient	Constant	R2	Coefficient	Constant	R2	Coefficient	Constant	R2
Motorcycle		10.22	33.08	0.95	117.48	-24.78	0.82	7.74	7.3	0.76
Passenger Car		8.27	-0.14	0.99	599.88	-162.89	0.89	7.43	1.76	0.86
Buses		N/A	N/A	N/A	122.56	-32.13	0.99	N/A	N/A	N/A
2 Axles Truck	Loading	1.03	1.86	0.99	17.9	-2.4	0.76	0.64	0.73	0.99
	Empty	2.15	2.46	0.99	28.13	-5.86	0.97	0.64	0.73	0.99
3 Axles and more	Loading	0.97	1.86	0.99	74.78	-3.96	0.98	2.83	-0.76	0.77
	Empty	1.55	2.46	0.99	44.06	-10.06	0.79	2.83	-0.76	0.77
Trailer	Loading	0.81	0.84	0.99	37.33	-12.19	0.97	N/A	N/A	N/A
	Empty	0.81	0.84	0.99	37.33	-12.19	0.97	N/A	N/A	N/A

C. Social Condition Survey

(1) Objectives

The objectives of social condition survey are i) to obtain information enable to evaluate road improvement project on the view of household along the road, ii) to understand the priority and requirement of road improvement in comparison with other infrastructure.

(2) Survey Locations and Survey Items

The survey was conducted by interview with village leader at 18 villages in Savannakhet Province and 32 villages in Saravane Province. These sample villages were;

- divided in three equal corridors (NR-9, NR-15A and NR-15B),
- were scattered on distance from village to nearest national road and Province center.

Table A.2.15 Number of Sample Village

	Savannakhet	Saravane	Total
Poor Village	13	13	26
Not Poor Village	5	19	24
Total	18	32	50

Social Condition Survey includes following items;

- poor village or not poor village,
- number of household and population,
- water supply and electricity,
- number of workers by industry,
- average household income and expenditure, percentage of transport cost in expenditure,
- land price (housing land, agricultural land and common land),
- overall evaluation of infrastructure and evaluation of each infrastructure (road, water supply, electricity, school, hospital/health center and job opportunity),
- travel distance and time from village to nearest national road, District center and Province center in dry season and rainy season, and

- evaluation of road surface and public transport services by trip purpose and road class.

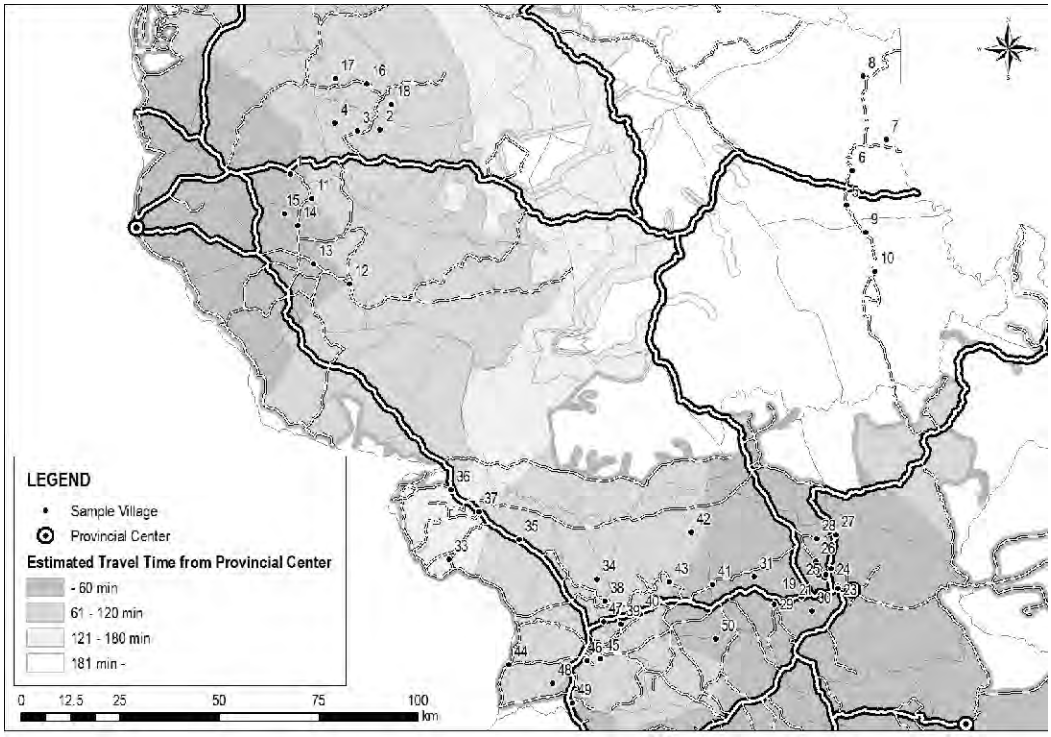
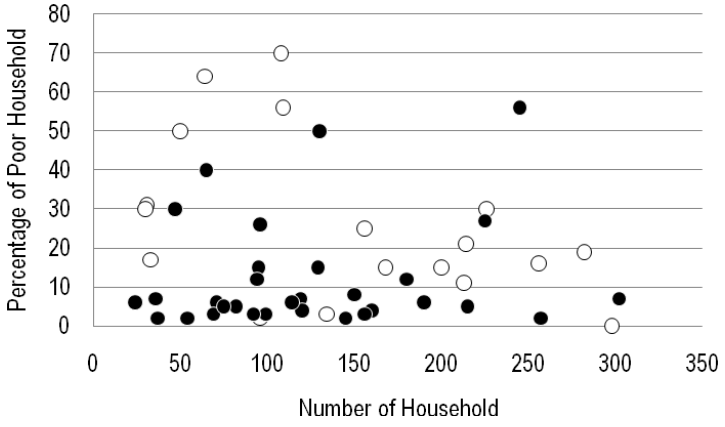


Figure A.2.4 Location of Sample Villages

(3) Survey Results – Simple and Cross Aggregation

1) Number of Household



Note: Savannhakhet (white), Saravane (black)

Figure A.2.5 Number of Household

2) Number of Household Members

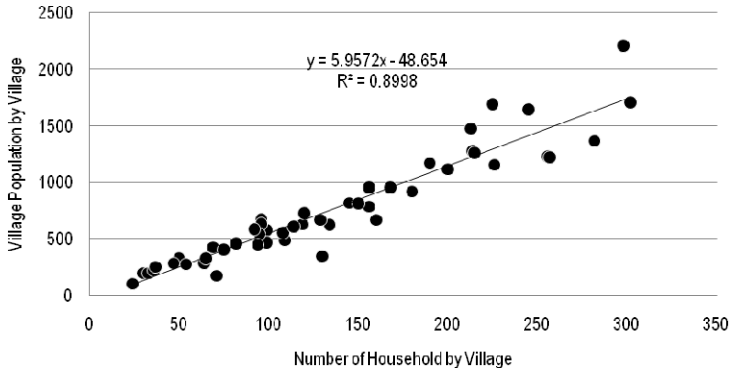


Figure A.2.6 Number of Household Members

3) Electricity and Water Supply

Table A.2.16 Electricity and Water Supply

Electricity	Water Supply		
	1: network	2: well spring	Total
1: network	4	28	32
2: generator or no-electricity	0	18	18
Total	4	46	50

4) Share of Primary and Tertiary Workers by Village

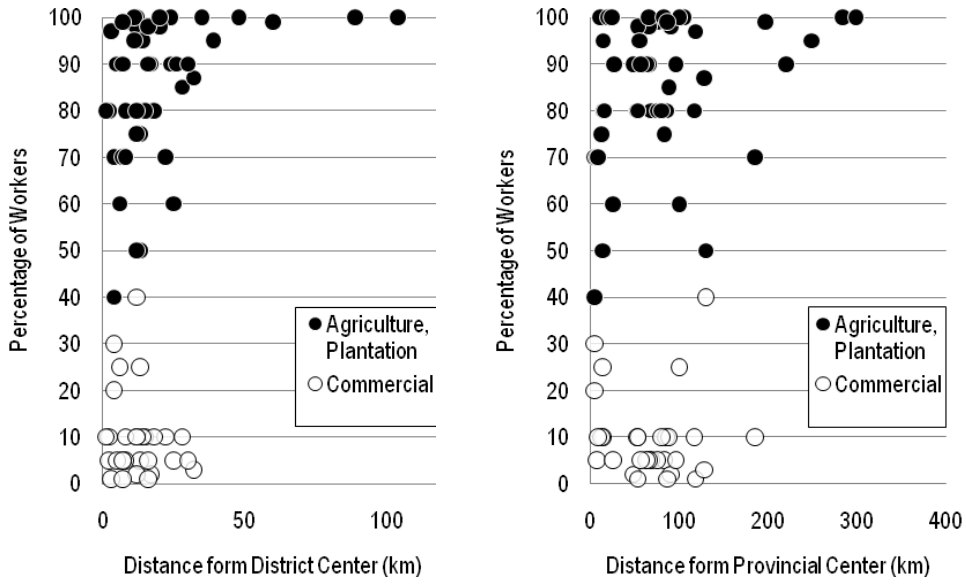


Figure A.2.7 Share of Primary and Tertiary Workers by Village

5) Share of Primary and Tertiary Workers by Village

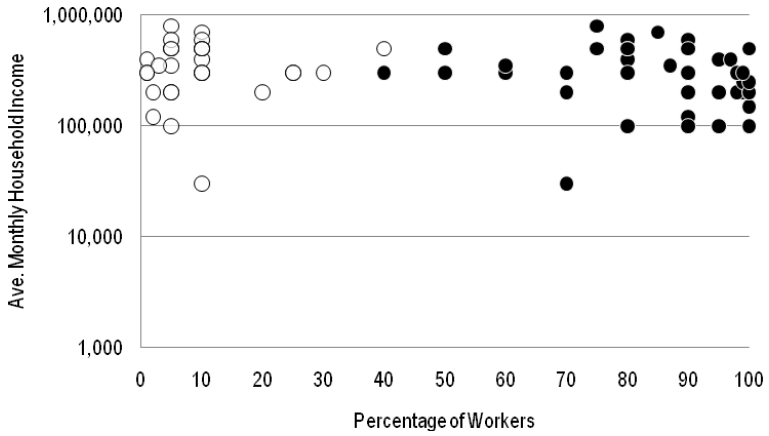


Figure A.2.8 Share of Primary and Tertiary Workers by Village

6) Average Household Income and Distance from District or Provincial Center

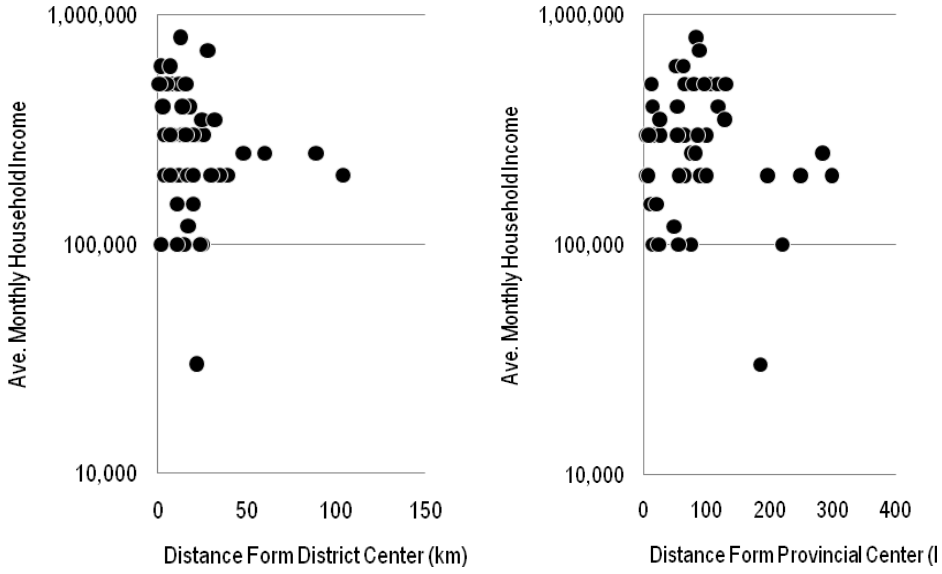


Figure A.2.9 Average Household Income and Distance from District or Provincial Center

7) Average Household Income and Expenditure

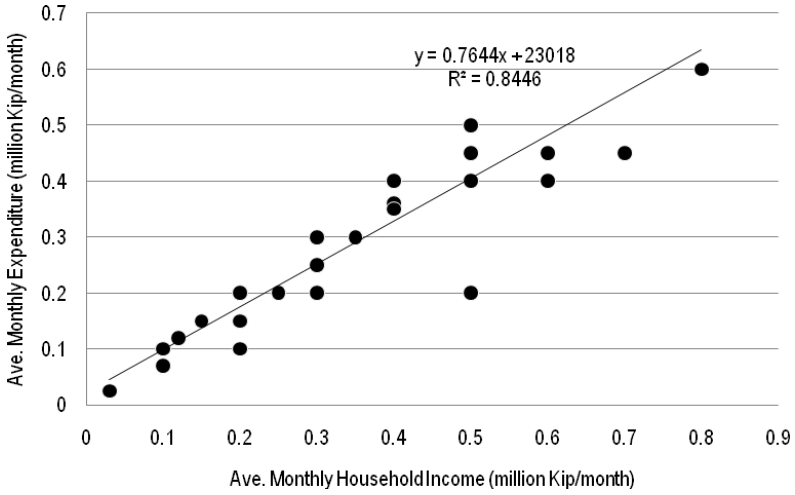


Figure A.2.10 Average Household Income and Expenditure

8) Average Household Expenditure and Share of Transport Cost

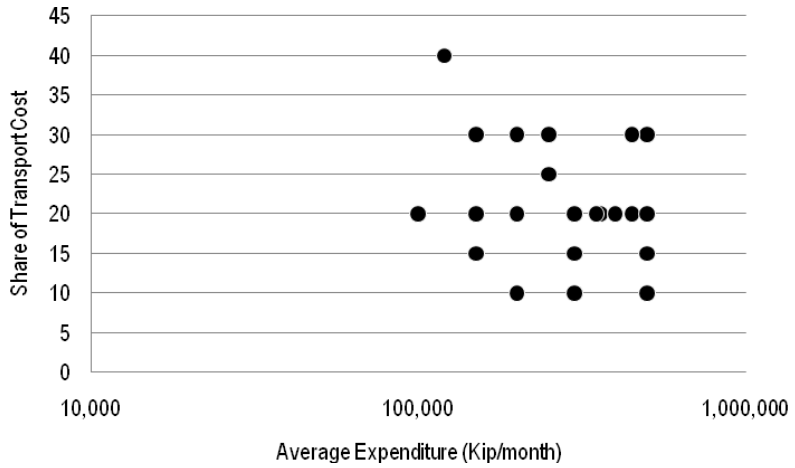


Figure A.2.11 Average Household Expenditure and Share of Transport Cost

9) Agricultural and Housing Land Price

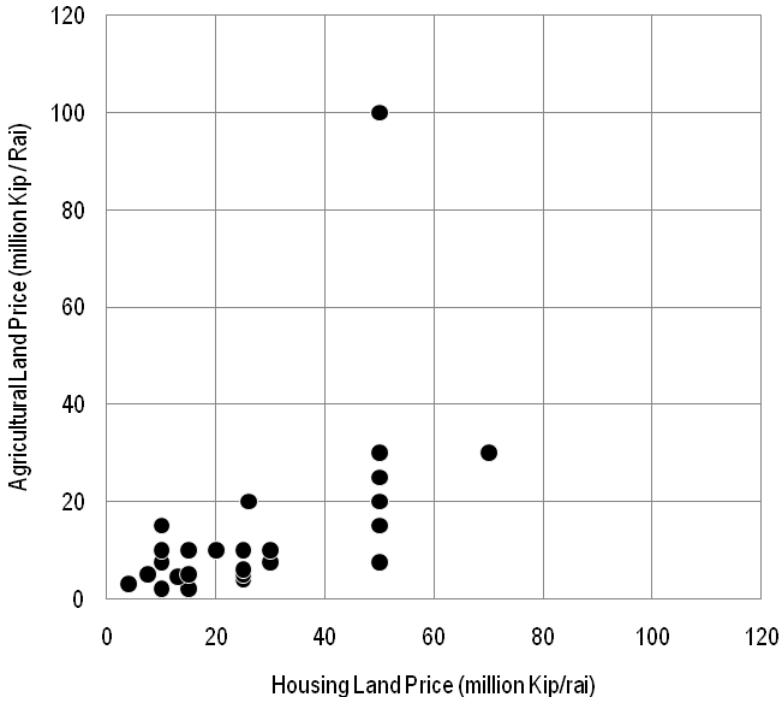


Figure A.2.12 Agricultural and Housing Land Price

10) Overall Evaluation of Infrastructure and Land Price

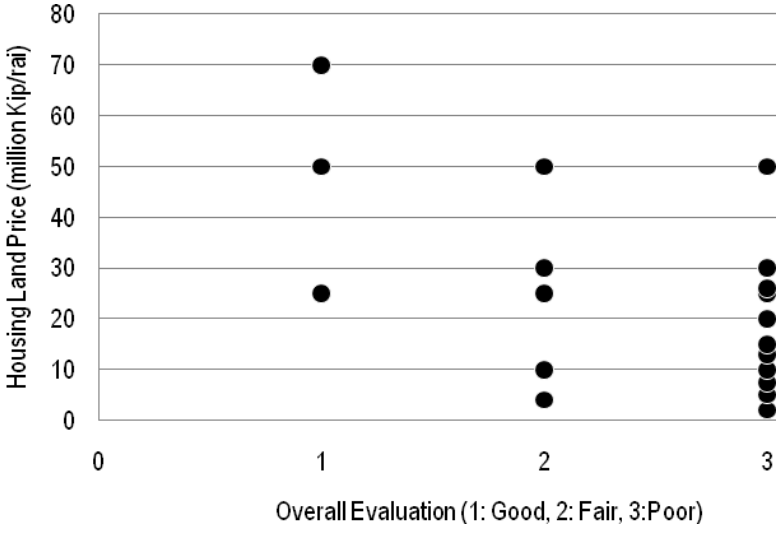


Figure A.2.13 Overall Evaluation of Infrastructure and Land Price

11) Evaluation of Infrastructure

Table A.2.17 Evaluation of Infrastructure

		Road	Water supply	Electricity	School	Hospital/Health center	Working (job opprtunity)
Worst	1st	20	6	9	8	4	3
↑	2nd	9	12	4	16	5	4
	3rd	10	14	2	8	13	3
	4th	6	6	4	12	12	10
↓	5th	2	10	6	5	13	14
Good	6th	3	2	25	1	3	16
	Average	2.4	3.2	4.4	2.9	3.7	4.5

12) Travel Time from Village to National Road

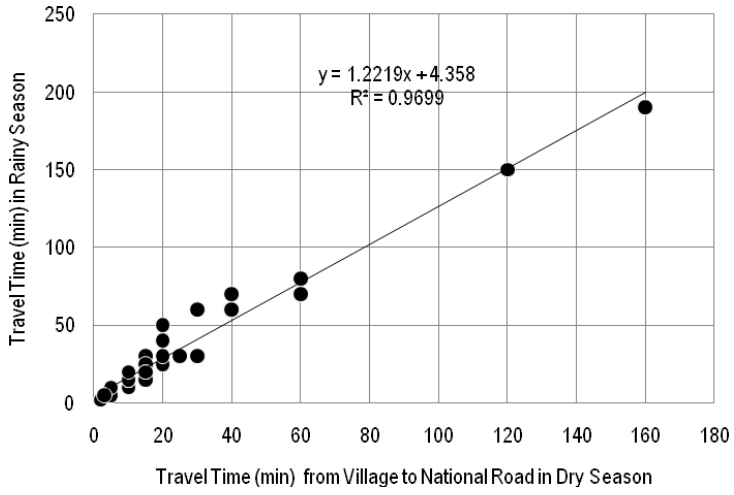


Figure A.2.14 Travel Time from Village to National Road

13) Travel Time from Village to District Center

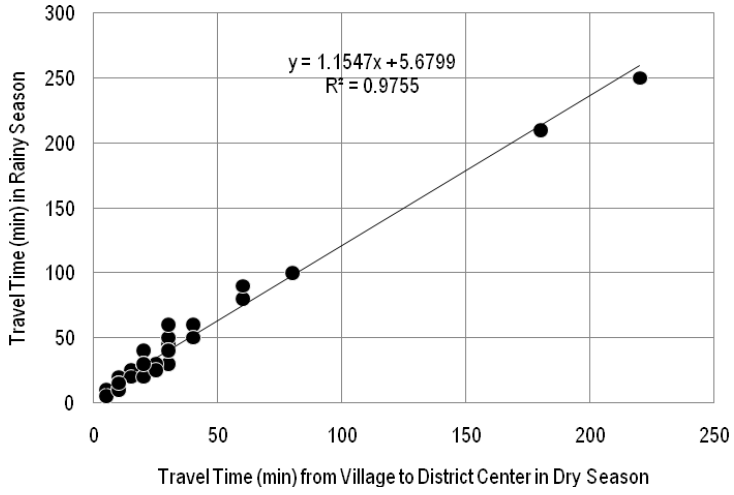


Figure A.2.15 Travel Time from Village to District Center

14) Travel Time from Village to Provincial Center

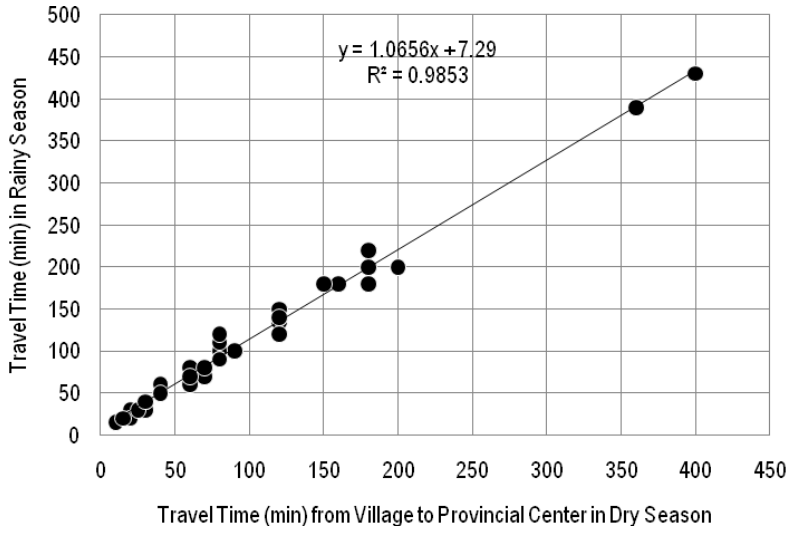


Figure A.2.16 Travel Time from Village to Provincial Center

15) Trip Frequency and Distance to each District Center

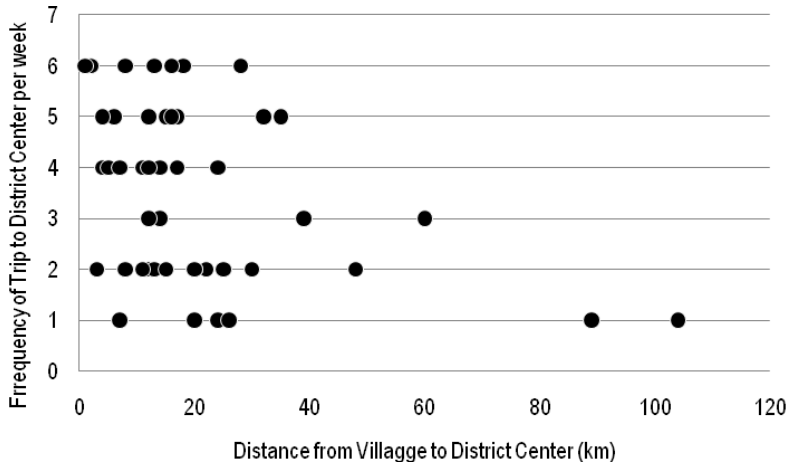


Figure A.2.17 Trip Frequency and Distance to each District Center

16) Trip Frequency and Distance to each Provincial Center

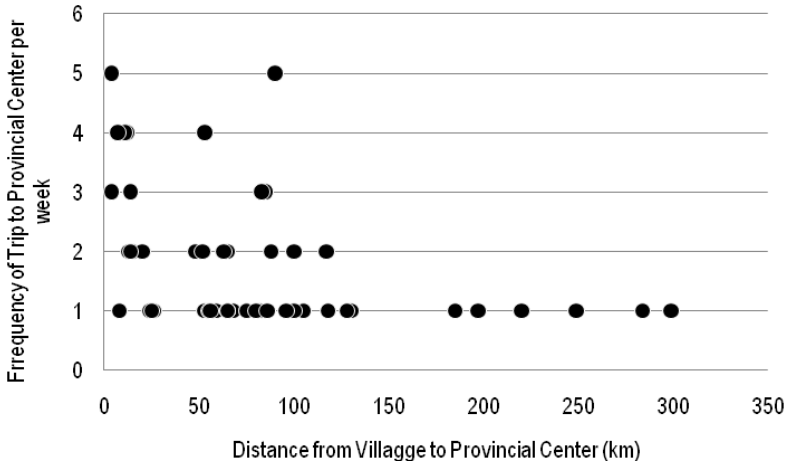


Figure A.2.18 Trip Frequency and Distance to each Provincial Center

17) Evaluation of Road Condition

Table A.2.18 Evaluation of Road Condition

Evaluation of Road Condition and Others 1: Very effective, 2: effective, 3: slightly effective	to working place	to school	to shopping/ selling	to hospital / health center
Road Surface (Rural road: village, district and provincial road)	2.92	2.92	2.92	2.92
Road Surface (National Road)	1.86	1.86	1.86	1.86
Bridges (Rural road)	2.88	2.88	2.88	2.88
Bridges (National road)	1.94	1.94	1.94	1.94
Flooding in rainy season (Rural road)	2.92	2.92	2.92	2.92
Flooding in rainy season (National road)	1.98	1.98	1.98	1.98
Public transport (bus, sonteo, tuk-tuk)	2.68	2.68	2.68	2.68

18) Importance of Road and Facilities

Table A.2.19 Importance of Road and Facilities

Importance	Road surface of village road	Ferry or old bridge at village road	Road surface of rural road	Ferry or old bridge at rural road	Road surface of national road	Ferry or old bridge at national road
1st	50	0	0	0	0	0
2nd	0	11	0	0	0	0
3rd	0	0	47	0	0	0
4th	0	0	0	32	0	0
5th	0	0	0	0	0	0
6th	0	0	0	0	0	0
Average	1	2	3	4	N/A	N/A

(4) Survey Results – Land Price Model

1) Land Price Model 1 (Time Reduction in Access to Nearest National Road)

$$\log10(LP) = a \times TA + b \times Dammy_e + c \times Dummy_w + C \quad (R=0.62)$$

whereas:

LP: Land Price (kip/m2)

TA: Travel time from village centre to national road (min)

Dummy e: Electricity dummy (1: available 0: not available)

Dummy w: Water dummy (1: available 0: not available)

a, b, c: Variables

C: Constant

Table A.2.20 Variables of Land Price Model

	Value	T-Value
C	6.94	45.45
a	0.47	3.09
b	0.27	1.54
c	-0.001	-0.50

Table A.2.21 Result of Land Price Model (50% Time Reduction in Access to Nearest National Road)

Village name	Surveyed Land Price (Kip/m2)	Estimated Land Price (Kip/m2) (A)	Estimated Land Price in case of road improvement (Kip/m2) (B)	(B/A)
B. Khanthoungxai	2,000,000	8,006,346	8,307,949	104%
B. Kang-Gnai	4,000,000	6,044,805	7,218,847	119%
B. Taleo	5,000,000	8,369,620	8,494,338	101%
B. Sisaphanxai	7,500,000	8,125,651	8,369,620	103%
B. Songkhon	10,000,000	25,070,368	25,144,642	100%
B. Nongpho	10,000,000	25,070,368	25,144,642	100%
B. Non	10,000,000	24,484,015	24,848,858	101%
B. Koutlamli	10,000,000	24,848,858	25,033,313	101%
B. Dongnangam	13,000,000	22,404,739	23,770,321	106%
B. Nachan	15,000,000	24,124,529	24,665,762	102%
B. Nongmakpa	15,000,000	24,124,529	24,665,762	102%
B. Nakok	15,000,000	24,848,858	25,033,313	101%
B. Nala-Ong	20,000,000	23,770,321	24,484,015	103%
B. Taleo-Mai	25,000,000	22,404,739	23,770,321	106%
B. Pakxenot	25,000,000	24,848,858	25,033,313	101%
B. Phouangsavan	25,000,000	46,450,404	46,588,020	100%
B. Nongpheung	25,000,000	23,770,321	24,484,015	103%
B. Tangxouay	26,000,000	8,494,338	8,557,392	101%

B. Dongkum	30,000,000	24,124,529	24,665,762	102%
B. Khanchom	30,000,000	24,484,015	24,848,858	101%
B. Phakpheoset	30,000,000	8,369,620	8,494,338	101%
B. Phonmakgna	50,000,000	24,848,858	25,033,313	101%
B. Laosouligna	50,000,000	23,770,321	24,484,015	103%
B. Dongtaliang	50,000,000	44,041,677	45,364,009	103%
B. Khokleng	50,000,000	22,404,739	23,770,321	106%
B. Nakhaomun	50,000,000	21,117,608	23,077,431	109%
B. Khanthalat	50,000,000	24,484,015	24,848,858	101%
B. Kaxa-Gnai	50,000,000	24,484,015	24,848,858	101%
B. Bung-Kang	50,000,000	46,039,990	46,381,748	101%
B. Kenghouat-Gnai	50,000,000	24,996,312	25,107,478	100%
B. Nondinxay	70,000,000	46,450,404	46,588,020	100%
Average	28,145,161	23,705,735	24,229,918	102%

2) Land Price Model 2 (Time Reduction in Access to Provincial Centre)

$$\log10(LP) = a \times TP + b \times Dammy_e + c \times Dummy_w + C \quad (R=0.65)$$

whereas:

LP: Land Price (kip/m2)

TP: Travel time from village centre to provincial center (min)

Dummy e: Electricity dummy (1: available 0: not available)

Dummy w: Water dummy (1: available 0: not available)

a, b, c: Variables

C: Constant

Table A.2.22 Variables of Land Price Model

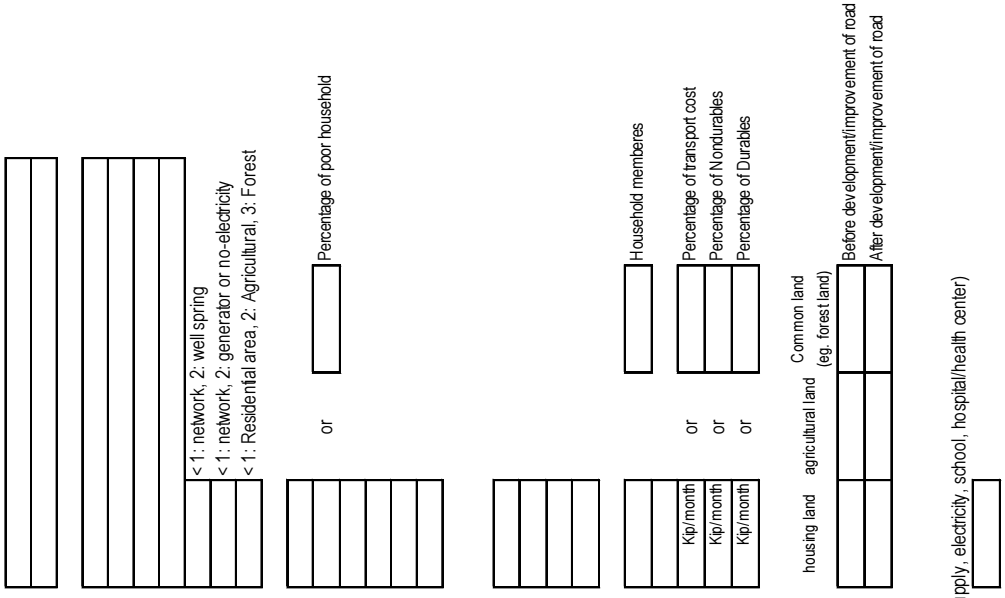
	Value	T-Value
C	7.07	40.65
a	0.44	3.07
b	0.33	1.92
c	-0.0019	-1.41

Table A.2.23 Result of Land Price Model (15% Time Reduction in Access to Provincial Centre)

Village name	Surveyed Land Price (Kip/m2)	Estimated Land Price (Kip/m2) (A)	Estimated Land Price in case of road improvement (Kip/m2) (B)	(B/A)
B. Khanthoungxai	2,000,000	6,885,536	7,448,978	108%
B. Kang-Gnai	4,000,000	5,297,545	5,960,917	113%
B. Taleo	5,000,000	9,766,866	10,026,320	103%
B. Sisaphanxai	7,500,000	6,885,536	7,448,978	108%
B. Songkhon	10,000,000	28,316,360	28,878,668	102%
B. Nongpho	10,000,000	19,109,211	20,672,914	108%

B. Non	10,000,000	27,105,676	27,825,729	103%
B. Koutlamli	10,000,000	24,837,385	25,833,624	104%
B. Dongnangam	13,000,000	19,109,211	20,672,914	108%
B. Nachan	15,000,000	21,785,840	23,109,658	106%
B. Nongmakpa	15,000,000	28,316,360	28,878,668	102%
B. Nakok	15,000,000	23,775,447	24,891,710	105%
B. Nala-Ong	20,000,000	22,758,912	23,984,138	105%
B. Taleo-Mai	25,000,000	22,758,912	23,984,138	105%
B. Pakxenot	25,000,000	30,234,529	30,533,253	101%
B. Phouangsavan	25,000,000	40,556,200	43,874,905	108%
B. Nongpheung	25,000,000	22,758,912	23,984,138	105%
B. Tangxouay	26,000,000	9,766,866	10,026,320	103%
B. Dongkum	30,000,000	19,109,211	20,672,914	108%
B. Khanchom	30,000,000	30,902,371	31,105,585	101%
B. Phakpheoset	30,000,000	9,766,866	10,026,320	103%
B. Phonmakgna	50,000,000	24,837,385	25,833,624	104%
B. Laosouligna	50,000,000	21,785,840	23,109,658	106%
B. Dongtaliang	50,000,000	52,713,320	54,827,676	104%
B. Khokleng	50,000,000	24,837,385	25,833,624	104%
B. Nakhaomun	50,000,000	16,761,435	18,493,106	110%
B. Khanthalat	50,000,000	29,581,120	29,971,451	101%
B. Kaxa-Gnai	50,000,000	29,581,120	29,971,451	101%
B. Bung-Kang	50,000,000	50,459,528	52,828,615	105%
B. Kenghouat-Gnai	50,000,000	22,758,912	23,984,138	105%
B. Nondinxay	70,000,000	40,556,200	43,874,905	108%
Average	28,145,161	23,989,548	25,115,130	105%

3) Questionnaire



Evaluation of problems/issues in daily life

Please rank the following items by seriousness of problems	Road	Water supply	Electricity	School	Hospital/Health center	Working (job opprtunity)
(1 to 6: 1: worst; 2: 2nd worst…)						

Accessibility to National, Provincial and District Road

	Distance (km)	Dry Season	Rainy Season
Village to National, Provincial or District road (by Car)	km	min	min
Village to District Center (by Car)	km	min	min
Village to Provincial Center (by Car)	km	min	min

Access to District Center and Provincial Center (Typical activity of village people)

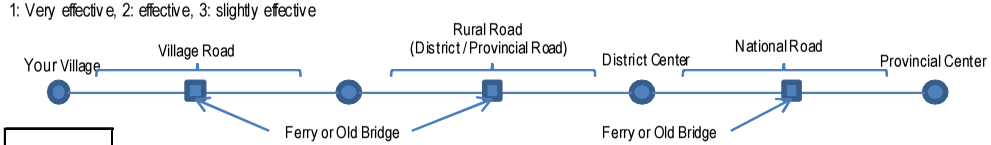
District Center	Frequency		per week/month/year	Mojor purposes	(Shopping, business trip, visit relatives,)
Provincial Center	Frequency		per week/month/year	Mojor purposes	(Shopping, business trip, visit relatives,)

Evaluation of Road Condition and Others

	to working place	to school	to shopping/selling	to hospital / health center
Road Surface (Rural road: village, district and provincial road)				
Road Surface (National Road)				
Bridges (Rural road)				
Bridges (National road)				
Flooding in rainy season (Rural road)				
Flooding in rainy season (National road)				
Public transport (bus, sonteo, tuk-tuk)				

1: Very effective, 2: effective, 3: slightly effective

Please Imagine and fill numerical order (1 -6) by importance



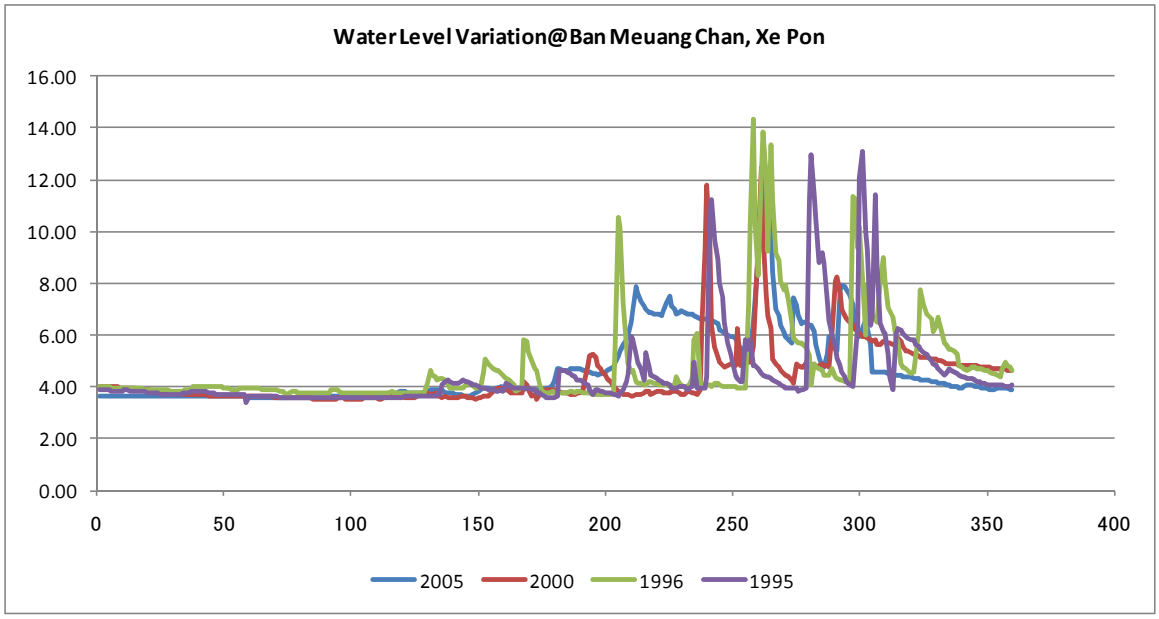
Road surface of village road	
Ferry or old bridge at village road	
Road surface of rural road	
Ferry or old bridge at rural road	
Road surface of natioal road	
Ferry or old bridge at national road	

Expected effect of road improvement (ex. By pavement of district road, agricultura product will be shipped to Provincial Center and expected higher income)

Rural road	
National road	
Bridges (Rural road)	
Bridges (National road)	

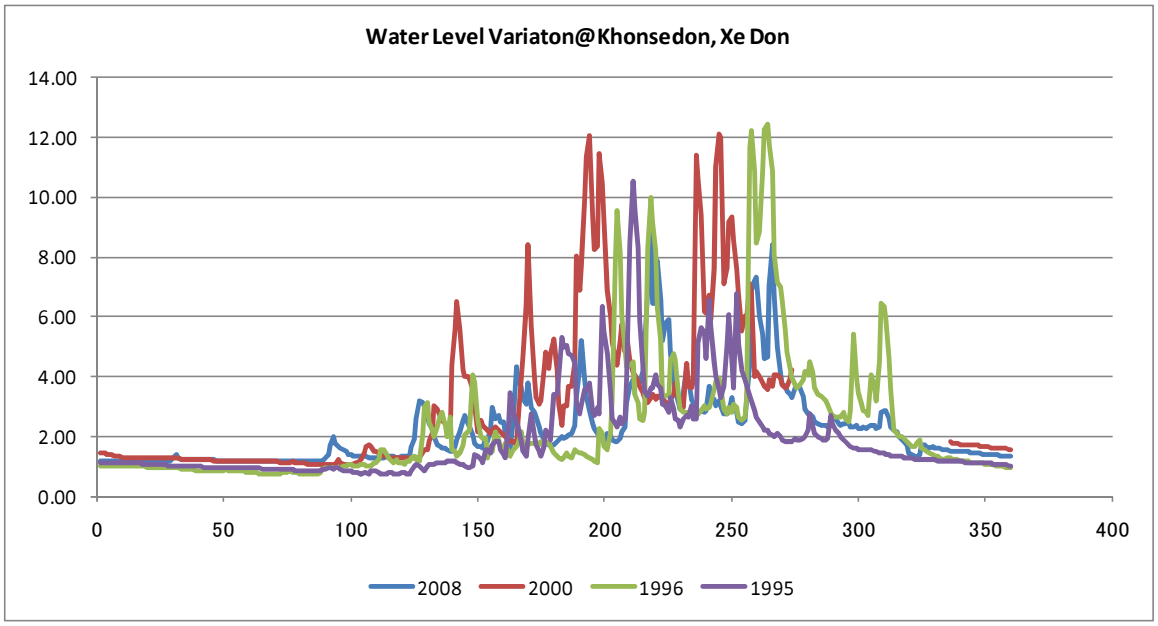
What is most urgent improvement for your village (relevant to road sector only)? Please indicate the point on map.

Appendix 3: Observed Water Level Records in Southern Laos



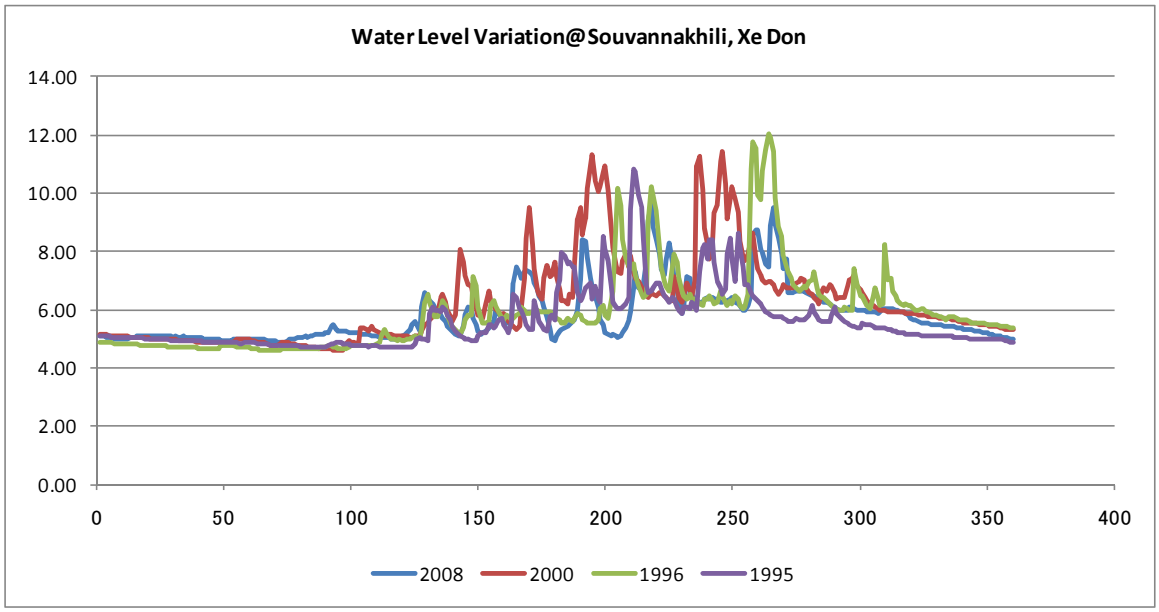
Note that X-axis corresponds to monitoring date, starting from January 1st while Y-axis to the measured value of the water gauge. Exact elevation corresponding to "zero-point" of the water gauge is unknown (Source: This Study, 2010).

Figure A.3.1 Water Level Variation of Xe Pon River (Ban Meuang, Savannakhet Province)



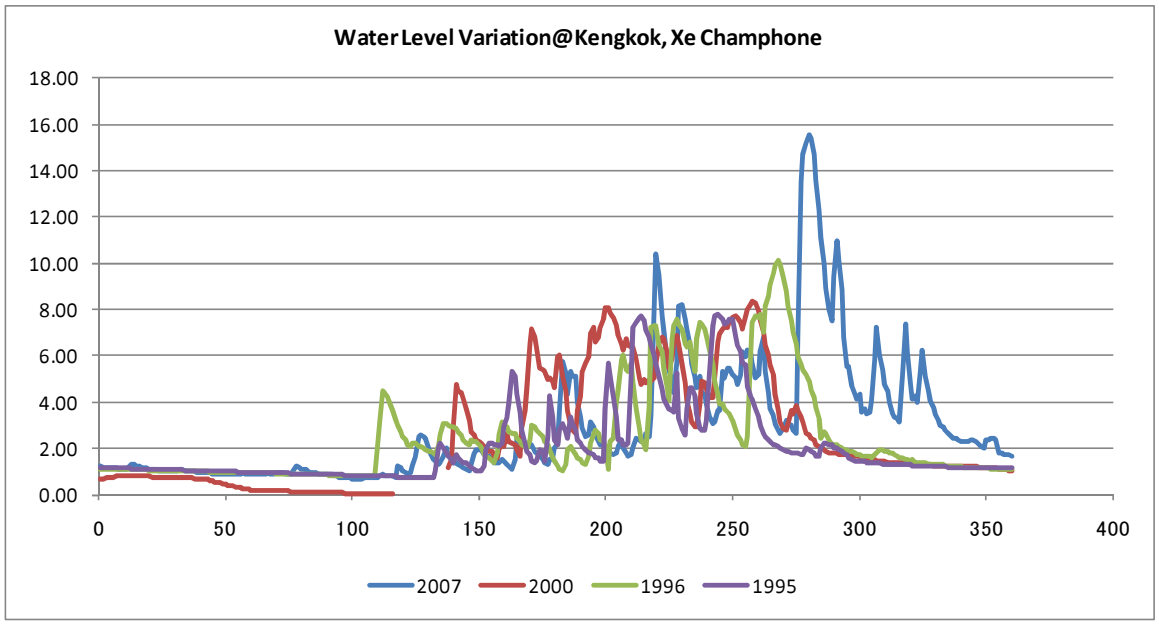
Note that X-axis corresponds to monitoring date, starting from January 1st while Y-axis to the measured value of the water gauge. Exact elevation corresponding to "zero-point" of the water gauge is unknown (Source: This Study, 2010).

Figure A.3.2 Water Level Variation of Sedon River (Khonsedon, Saravane Province)



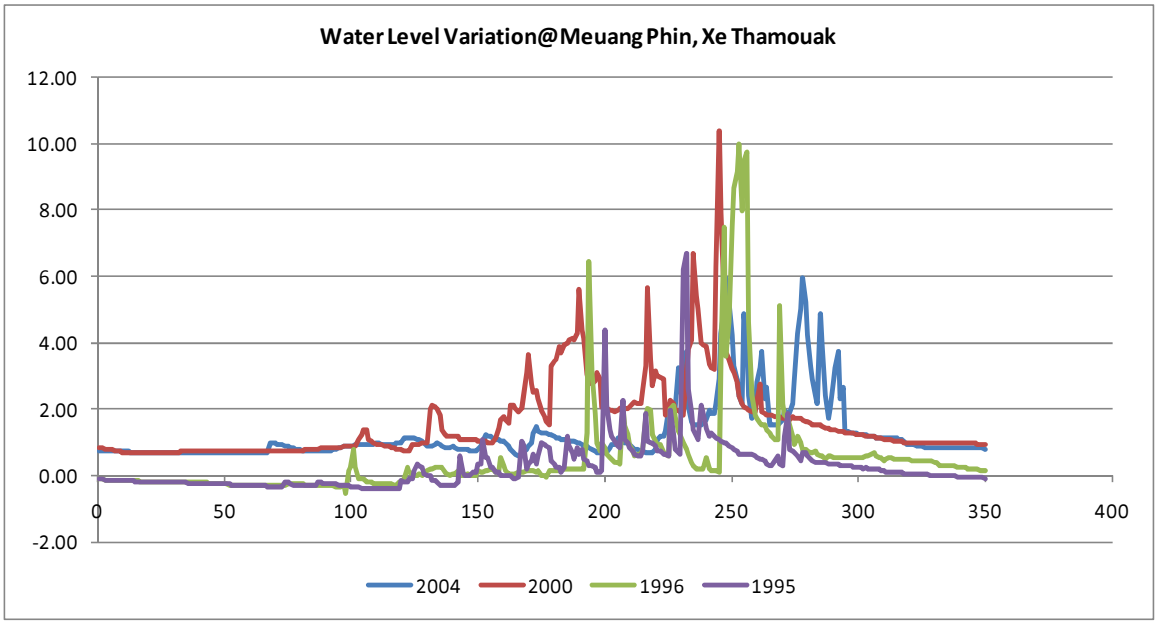
Note that X-axis corresponds to monitoring date, starting from January 1st while Y-axis to the measured value of the water gauge. Exact elevation corresponding to "zero-point" of the water gauge is unknown (Source: This Study, 2010).

Figure A.3.3. Water Level Variation of Sedon River (Souvannakhili, Champasak Province)



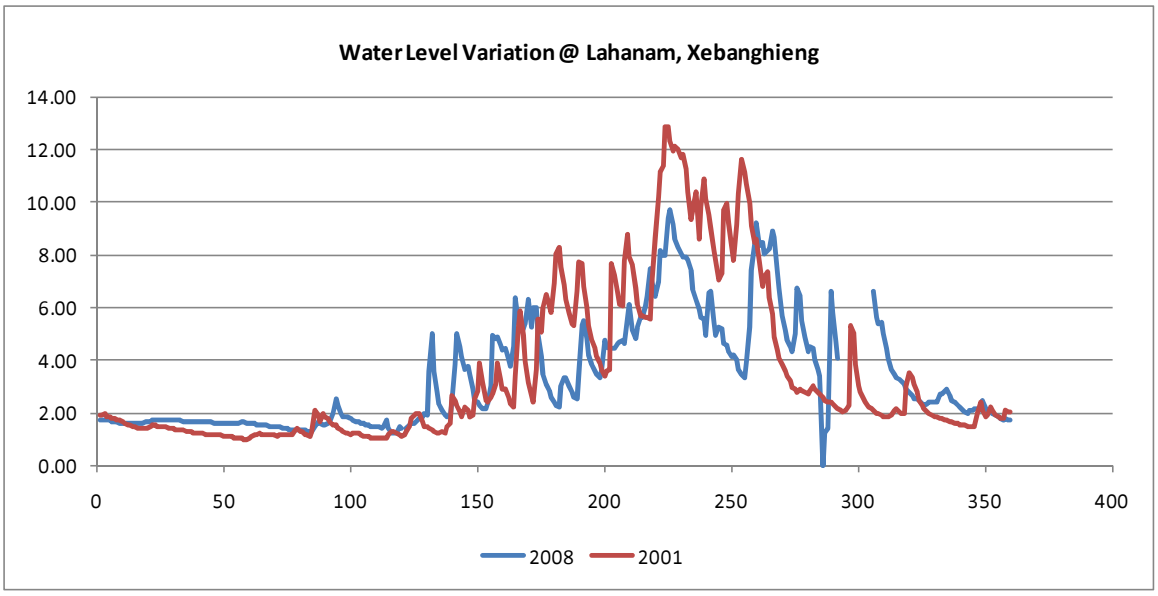
Note that X-axis corresponds to monitoring date, starting from January 1st while Y-axis to the measured value of the water gauge. Exact elevation corresponding to "zero-point" of the water gauge is unknown (Source: This Study, 2010).

Figure A.3.4 Water Level Variation of Xe Champhone River (Kengok, Savannakhet Province)



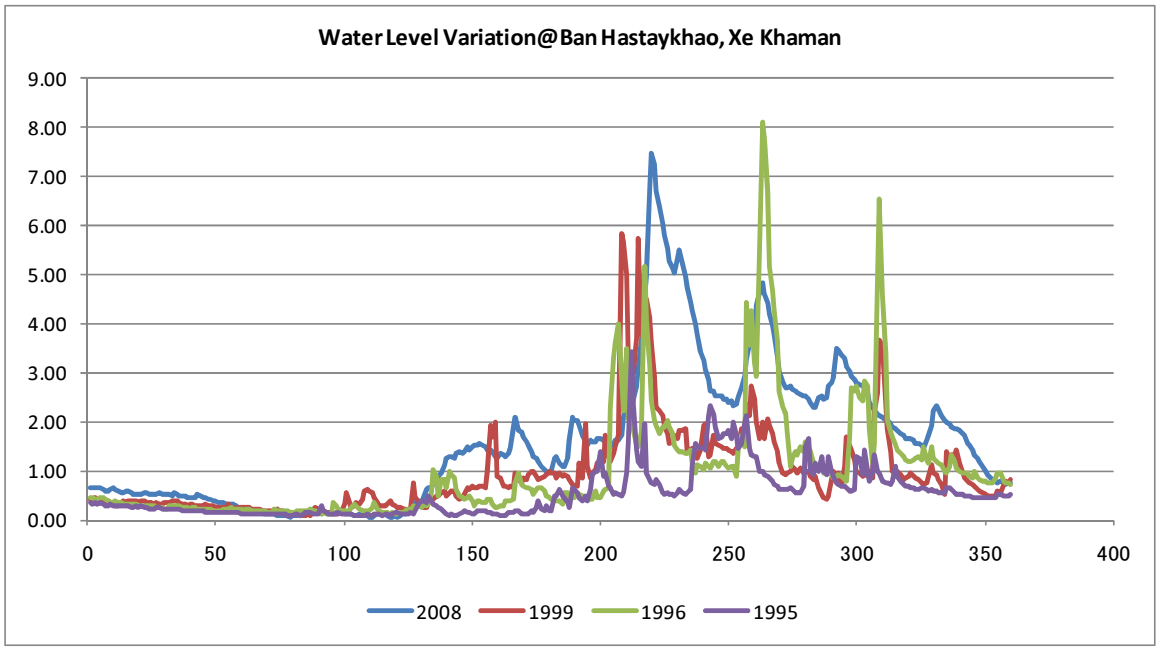
Note that X-axis corresponds to monitoring date, starting from January 1st while Y-axis to the measured value of the water gauge. Exact elevation corresponding to "zero-point" of the water gauge is unknown (Source: This Study, 2010).

Figure A.3.5 Water Level Variation of Xe Thamouak River (Meuang Phin, Savannakhet Province)



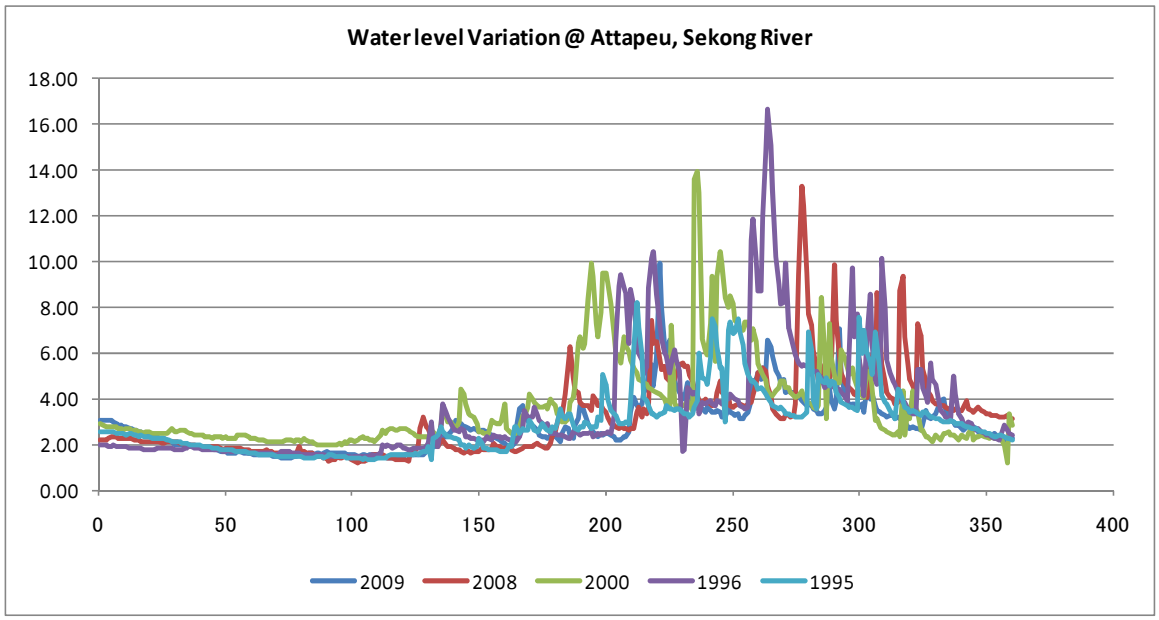
Note that X-axis corresponds to monitoring date, starting from January 1st while Y-axis to the measured value of the water gauge. Exact elevation corresponding to "zero-point" of the water gauge is unknown (Source: This Study, 2010).

Figure A.3.6 Water Level Variation of Xe Banghieng River (Lahanam, Savannakhet Province)



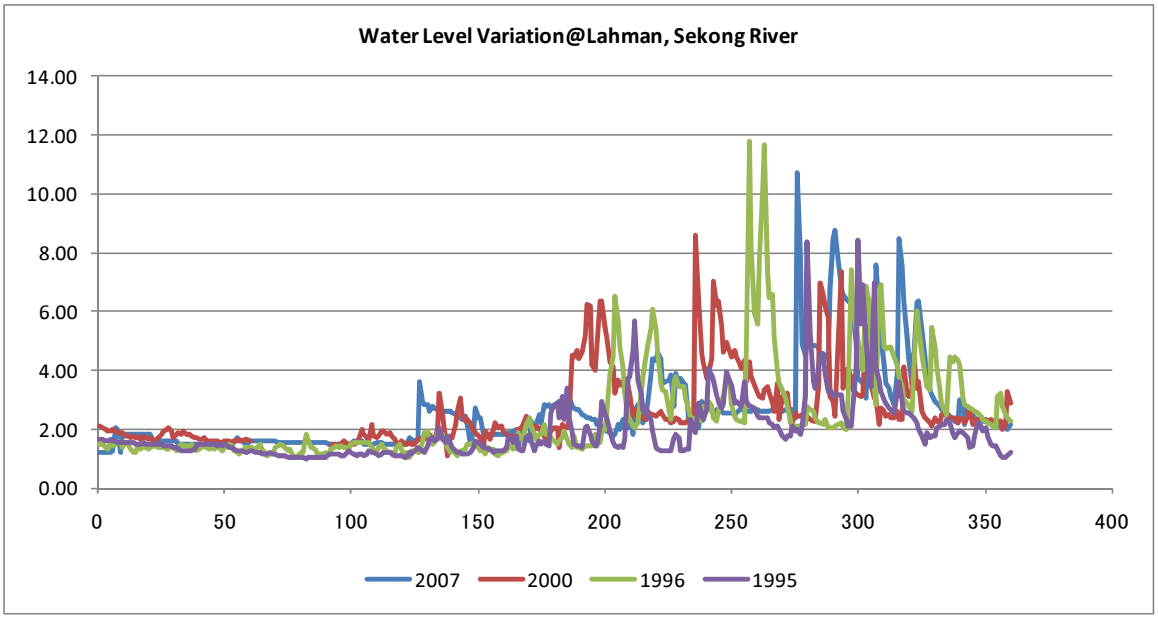
Note that X-axis corresponds to monitoring date, starting from January 1st while Y-axis to the measured value of the water gauge. Exact elevation corresponding to "zero-point" of the water gauge is unknown (Source: This Study, 2010).

Figure A.3.7 Water Level Variation of Xe Khaman River (Attapeu Province)



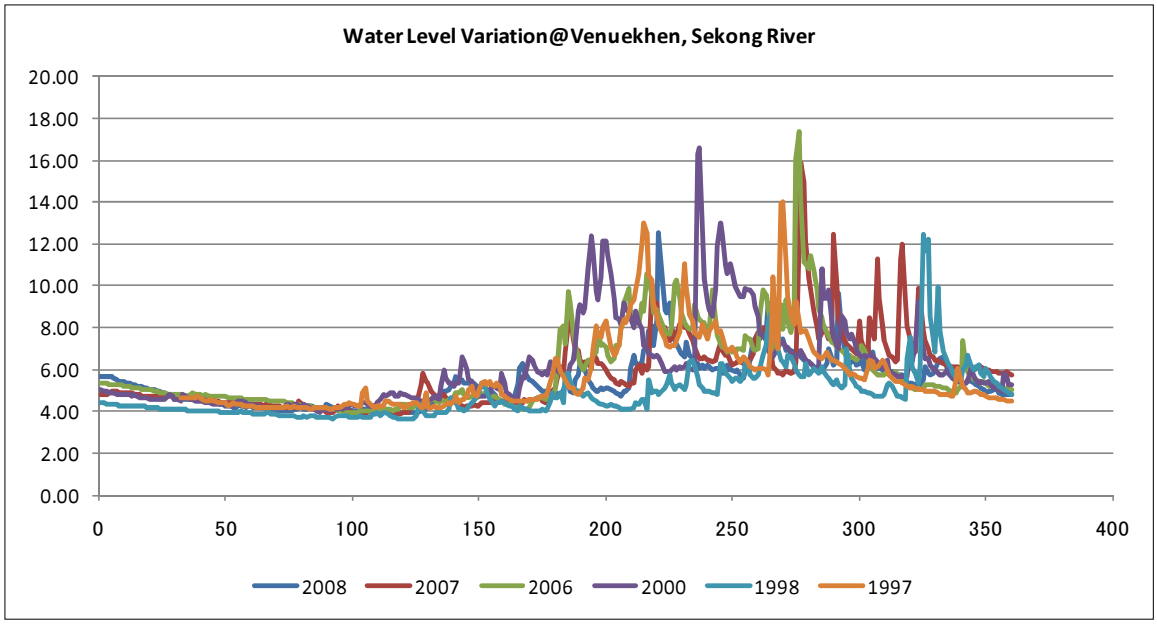
Note that X-axis corresponds to monitoring date, starting from January 1st while Y-axis to the measured value of the water gauge. Exact elevation corresponding to "zero-point" of the water gauge is unknown (Source: This Study, 2010).

Figure A.3.8 Water Level Variation of Sekong River (Attapeu, Attapeu Province)



Note that X-axis corresponds to monitoring date, starting from January 1st while Y-axis to the measured value of the water gauge. Exact elevation corresponding to "zero-point" of the water gauge is unknown (Source: This Study, 2010).

Figure A.3.9 Water Level Variation of Sekong River (Lahman, Sekong Province)



Note that X-axis corresponds to monitoring date, starting from January 1st while Y-axis to the measured value of the water gauge. Exact elevation corresponding to "zero-point" of the water gauge is unknown (Source: This Study, 2010).

Figure A.3.10 Water Level Variation of Sekong River (Venuekhen, Attapeu Province)

Appendix 4: Minutes of Meeting

MINUTES OF MEETING
ON
THE INCEPTION REPORT
FOR
THE PREPARATORY STUDY ON IMPROVEMENT OF ROADS AND BRIDGES
IN
THE SOUTHERN REGION
IN
LAO PEOPLE'S DEMOCRATIC REPUBLIC

Agreed upon between

THE MINISTRY OF PUBLIC WORKS AND TRANSPORT

AND

JICA STUDY TEAM

Vientiane, 23rd March, 2010

Mr. Laokham Sompheth	Mr. Kiminari Takahashi
Director General,	Team Leader,
Department of Roads	JICA Study Team

Introduction

The Japan International Cooperation Agency (hereinafter referred to as "JICA") has dispatched a preparatory study team (hereinafter referred to as "the JICA Study Team") on 27th February 2010, to conduct the study, namely, the Preparatory Study on Improvement of Roads and Bridges in the Southern Region in Lao PDR (hereinafter referred to as "the Study").

The JICA Study Team has held a series of meetings with the officials of the Ministry of Public Works and Transport (hereinafter referred to as "MPWT") and the Department of Public Works and Transport at the provincial level (hereinafter referred to as "DPWT") and demonstrated the scope of the Study, explored in the Inception Report of the Study, in the premises of the MPWT on 23rd March 2010.

The major items discussed and agreed between both parties are summarized below.

1. Executing Agencies

MPWT will act as an executing agency for utilization of the outputs of the Study to realize development of the Southern Regions of Lao PDR.

2. Steering Committee

A Steering Committee will be organized for effective and smooth implementation of the Study. The Steering Committee will give key directions of the Study. The Steering Committee will comprise the following members.

Chaired by the Minister for Public Works and Transport

- Permanent Secretary
- Director General of Department of Roads
- Director of Project Management Division
- Director of Local Road Division
- Director of Road Administration Division
- Director of Technical and Environment Division
- Deputy of Technical and Environment Division
- Counterpart of the Study

3. Counterpart

The Department of Roads (hereinafter referred to as "DOR") will act as a counterpart agency. The DOR will assign a counterpart personnel on the part-time basis, to work with the JICA Study Team.

Scope of the Study

The JICA Study Team demonstrated the scope of the Study, explored in the Inception Report of the Study. The major items discussed and agreed between both parties are summarized below.

1. **Objectives of the Study**

The objectives of the Study are:

- To revise the previous JICA study (the Study on Improvement of Roads in the Southern Region in Lao PDR) and formulate the road improvement master plan in the target year of 2025.
- To select priority road and bridge improvement projects and narrow down the scope of projects by the Japanese grant aid.

2. **Study Area**

The area of the Study covers five provinces in the Southern Region in Lao PDR; Savannhakhet, Saravan, Sekong, Champasack and Attapu.

3. **Scope of the Study**

In order to achieve the objectives mentioned above, the Study will cover following items.

(i) Review and analysis of present situation

(ii) Revision of the previous master plan

- Preparation of socio-economic framework
- Traffic demand forecast
- Initial environmental examination
- Formulation of road improvement plan and maintenance plan
- Economic analysis

(iii) Identification of the development issues and selection of priority projects

4. **Study Schedule**

The Study will be carried out within 9 months period in accordance with the tentative schedule shown below.

Work Item / Month '10	2	3	4	5	6	7	8	9	10
1. Review and analysis of present situation									
2. Revision of the previous master plan									
Preparation of socio-economic framework									
Traffic demand forecast									
Initial environmental examination									
Formulation of road improvement plan and maintenance plan									
Economic analysis									
3. Identification of the development issues and selection of priority projects									
Report & Steering Committee (provisional)		▲			▲		▲		▲

5. **Study Team**

The JICA Study Team is composed of the following expertise.

- Team Leader/Transport Planner
- Road Planner
- Bridge Planner
- Socio-economic Specialist
- Demand Forecast Specialist
- Environmental Specialist

6. **Deliverables**

The JICA Study Team will prepare and submit the following reports to the MPWT.

- Inception Report which covers the methodology of the Study: 30 copies in English
- Interim Report which covers review and revision of the previous road improvement master plan: 30 copies in English
- Draft Final Report which covers all the result of the Study: 30 copies in English
- Final Report which reflects the comments on the Draft Final Report: 30 copies of both main report and summary in English

7. **Comments on the Inception Report**

After the presentation of the Inception Report of the Study, the members of the Steering Committee were requested to ask questions and provide comments. The members of the

Committee provided the following comments and suggestions to the Study Team;

- It is highly appreciated if the JICA Study Team brings forward the pace of the Study and demonstrates the preliminary outcome of the Study in April or May.
- Amongst six projects requested for Japanese grant aid, the government priority, at the moment, is NR9 as the top priority project for Japanese grant aid, Sekong Bridge as the second, Sedong Bridge as the third.
- Information sharing and coordination among stakeholders is essential to formulate road improvement master plan in the southern region. The Department of Road (DoR) is a coordinating body within the ministry and JICA Study Team should closely work with the DoR.
- Regarding ADB/13 project, ADB will dispatch a mission this week. The JICA Study Team should collect updated information on the progress of the ADB/13 project from this mission.
- Development of the road network is a necessary component for poverty reduction. However, the road network development cannot solely bring about poverty reduction. The road network development plan should incorporate with other social development sectors, such as education and health and community development.
- Trucks and trailers from mining companies deteriorate access roads. In addition to that, the weight control station does not seem to work. The Study should incorporate these issues.
- The current situation of six projects Lao Government requested for Japanese grant aid is summarized: NR1G is waiting for singing MOU with Korean company, improvement of NR9 is valid as a candidate project for Japanese grand aid project, NR15A is a candidate project to be implemented under ADB/13, NR16A is contracted out to the Lao private company, Sekong Bridge is another candidate project by Japanese grant aid. NR1J, partly improved by Japan ASEAN Integrated Fund, is also another candidate project for Japanese grant aid.
- A map, showing on-going projects, urgent projects and projects of which the MOU is singed for feasibility study, can help the stakeholders to understand the progress of the projects.
- Clarification is needed whether the Study will focus only national roads or both national and provincial roads.
- The community development plan may be an essential source to understand the priority projects at the community level.

In response to comments raised by the members of the Steering Committee, the JICA Study Team responded as summarized below;

- In the course of the Study, the JICA Study Team will submit Interim Report and Draft Final Report and demonstrate the outcome of the Study in the Steering Committee, inviting multilateral and bilateral donors.

- The JICA Study Team also will arrange meetings with counselors of Korean and Chinese Embassy to understand current involvement and future direction in the transport infrastructure development in Laos.
- The JICA Study Team is going to conduct social condition survey and collect information on current social conditions of villages and accessibility to the social infrastructure like schools and health facilities. Based on the result of the survey, the JICA Study Team is going to analyze impact of road improvement to the poverty reduction.
- The JICA Study Team is going to identify potential development projects, including mining industry, and will incorporate these projects into the socio-economic framework and traffic demand forecast.
- The road design manual allows maximum axle load of 9.1 tons and the Study will propose to apply new design standard of 11 tons axle load, for instance for NR 9 update project. The issue on weight control station should be addressed through discussion on law enforcement.
- The JICA Study Team will prepare the map, showing on-going projects, urgent projects and the projects of which MOU is singed for feasibility study, based on the GIS database obtained in this Study. Once is prepared, the Study Team will distribute it to all the members.
- The Study will initially identify the priority road improvement project on the national road and analyze the impact generated from this priority project, considering provincial and other local roads connecting the priority road.
- The JICA Study Team will collect the community development plan as part of the social condition survey and utilize it for formulation of the road development master plan.

8. Undertakings of the MPWT

To facilitate smooth implementation of the Study, the MPWT will take the following necessary measures;

- To permit the members of the JICA Study Team to enter, leave and sojourn in Lao PDR for the duration of their assignments therein and exempt them from foreign requirements and consular fees.
- To exempt the members of the JICA Study Team from taxes, duties and any other charges on equipment, machinery and other material brought into Laos for the implementation of the Study.
- To exempt the members of the Team from income tax and charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the JICA Study Team for their services in connection with the implementation of the Study.
- To provide necessary facilities to the JICA Study Team for the remittance as well as

utilization of the funds introduced into Laos from Japan in connection with the implementation of the Study.

The DOR will, at its own expense, provide the JICA Study Team with the followings, in cooperation with other organizations concerned:

- Security-related information on as well as measures to ensure the safety of the JICA Study Team;
- Available data and information related to the Study;
- Counterpart personnel;
- Suitable office space with basic office equipment and facilities; and
- Credentials or identification cards.

ATTACHMENT 1

Attendants of the 1th Meeting are listed below.

COMMITTEE MEMEBERS

1	Mr. Sommad Pholsena	Minister of MPWT	Chairperson
2	Mr. Pothong Ngouphachanh	Deputy Director General, Dept. of Raods	Member
3	Mr. Ounheuan Siriamphone	Senior Engineer, TED, Dept. of Raods	Member
3	Mrs. Manivone Khayavong	Deputy Director, TED, Dept. of Raods	Member
4	Mr. Daochinda Silarath	Deputy Director, PMD, Dept. of Raods	Member
5	Mr. Nolasack Sisouphanh	Deputy Director, LRD, Dept. of Roads	Member
6	Mr. Linseng	Engineer, NRAD, Dept. of Roads	Member
7	Mr. Khanngeun Khamvongsa	Deputy Director, Permanent Secretary	Invited
8	Mr. Kazumitsu Muraoka	JICA Expert to MPWT	Invited

DONOR AGENCY

1	Mr. Stefan Ekelund	Senior Portfolio Management Specialist, ADB	Invited
2	Mr. Daovong Vongsay	Senior Programme Officer	Invited

JICA (LAO OFFICE)

1	Mr. Yoshiharu Yoneyama	Senior Representative	Invited
2	Ms. Yoko Hattori	Representative	Invited

JICA STUDY TEAM

1	Mr. Kiminari Takahashi	Team Leader / Transport Planer	Invited
2	Mr. Masakata Fujikuma	Road Planner2/Bridge Planner	Invited
3	Mr. Yoji Sakakibara	Socio - Economist	Invited
4	Mr. Yoshiyuki Arita	Traffic Demand Forecast / GIS Specialist	Invited

OTHER CONSULTANT

1	Mr. Philip Sayeg	ADB Consultant	Invited

MINUTES OF MEETING
ON
THE INTERIM REPORT
FOR
PREPARATORY STUDY FOR IMPROVEMENT OF ROADS AND BRIDGES
IN
THE SOUTHERN REGION
IN
LAO PEOPLE'S DEMOCRATIC REPUBLIC

Agreed upon between

THE MINISTRY OF PUBLIC WORKS AND TRANSPORT

AND

JICA STUDY TEAM

Vientiane, 7th June, 2010

Mr. Laokham Sompheth	for	Mr. Kiminari Takahashi
Director General,		Team Leader,
Department of Roads		JICA Study Team

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1. Introduction

The Japan International Cooperation Agency (hereinafter referred to as "JICA") has dispatched a preparatory study team (hereinafter referred to as "the JICA Study Team") on 27th February 2010, to conduct the study, namely, the Preparatory Study on Improvement of Roads and Bridges in the Southern Region in Lao PDR (hereinafter referred to as "the Study").

After the first committee meeting held on 23rd March, the JICA Study Team carried out a series of sub-contract surveys (traffic count survey and social condition survey), field surveys, and made present situation analysis and reviewed and revised the previous master plan, following the scope of the Study. The result of surveys and tasks were compiled into the Interim Report.

2. Submission of Interim Report

Prior to the committee meeting, JICA Study Team submitted 30 copies of the Interim Report to the Ministry of Public Works and Transport (hereinafter referred to as "the MPWT") on 27th May, 2010 and briefed major contents of the report to the counterparts.

3. Presentation by JICA Study Team

A committee meeting to explain and discuss the Interim Report was held at meeting room No. 2 of the MPWT on 7th June, 2010, chaired by the Director General of the Department of Roads. Participants of the meeting are listed in the attachment 1. In the meeting, Mr. Takahashi, Team Leader of the JICA Study Team made a presentation of the Interim Report, mainly discussing the following tasks of the Study:

- Major progress of the Study;
- General understanding of the study area;
- Review and revision of the previous master plan; and
- Way forward

4. Comments on the Interim Report

After the presentation of the Interim Report, the committee members were requested to ask questions and provide comments. The members of the committee provided the following comments and suggestions to the Study Team:

- The committee in general agreed with preliminary outputs explored in the Interim Report, including priority projects suggested in the Interim Report. The MPWT confirmed to provide necessary supports to conduct further studies for preparation of the Draft Final Report.
- The MPWT well recognizes necessity of bridge replacement on NR 9. MPWT considers that the most prioritized project is road improvement of NR-9. Other important projects include construction of Sedone Bridge, Sekong Bridge and replacement of bridges along

NR-20.

- Budget for ADB/13 is limited. Therefore, it is ideal to demarcate improvement of NR-15A between JICA (Sedone Bridge) and ADB (road improvement).
- Lao PDR has a vision to graduate from LDC (Least Developed Country) by 2020. In this regard, every district center should be connected with paved road before 2020.
- It is highly appreciated if the JICA Study Team supplementally studies local roads to improve accessibility to national roads in provincial and district level to alleviate poverty.
- It is highly appreciated if the JICA Study Team invites officials of DPWT and OPWT to promote provincial/district road development together with development of national roads when the dissemination seminar is to be held in the southern region.
- In order to develop/improve the road network for poverty reduction, it would be better to use other evaluation criteria, in addition to Economic Internal Rate of Return (EIRR).
- It is highly appreciated if the JICA Study Team includes NR-1F in the project long list.

In response to comments raised by the members of the committee, the JICA Study Team responded as summarized below:

- JICA Study Team agreed to include NR-1F in the project long list and evaluate the project in the Draft Final Report.
- JICA Study Team is going to conduct interview survey at village level along the priority projects once priority projects are confirmed. Information to evaluate the projects, especially on how the projects contribute to poverty reduction, will be collected in this survey.
- Regarding the supplemental study on local roads, JICA Study Team will convey comments of the committee to JICA headquarters for further discussion to determine the scope of the Study.

5. Tasks toward Draft Final Report

JICA Study Team will re-mobilize in August, and conduct initial environmental examination, economic analysis and preparation for implementation of grant aid project. The following priority projects are confirmed through evaluation results, explored in the Interim Report, and agreed between the MPWT and JICA Study Team for further study.

- Replacement of bridges on NR-9; and
- Construction of Sedone Bridge on NR-15A.

Regarding the supplemental study on local roads, detailed study scope will be determined based on further discussion among the MPWT, JICA and JICA Study Team.

ATTACHMENT 1

Attendants of the 2nd committee meeting are listed below.

COMMITTEE MEMEBERS

1	Mr. Sommad Pholsena	Minister of MPWT	Chairperson
2	Mr. Laokham Somphet	Director General, Dept. of Roads	Member
3	Mr. Ounheuan Siriamphone	Senior Engineer, TED, Dept. of Roads	Member
3	Mr. Dedsongkham Thammavong	TED, Dept. of Roads	Member
4	Ms. Douangtavanh	Officer, PMD, Dept. of Roads	Member
5	Mr. Nolasack Sisouphanh	Deputy Director, LRD, Dept. of Roads	Member
6	Mr. Viengvilay Soulinthone	Engineer, NRAD, Dept. of Roads	Member
7	Mr. Santisouk Simmalavong	Deputy Director, Permanent Secretary	Invited

DONOR AGENCY

1	Mr. Phomma Chanthirath	Senior Portfolio Management Specialist, ADB	Invited

JICA (LAO OFFICE)

1	Ms. Yoko Hattori	Representative	Invited

JICA STUDY TEAM

1	Mr. Kiminari Takahashi	Team Leader / Transport Planer	Invited
2	Mr. Nobuo Monoe	Road Planner1	Invited
3	Mr. Masataka Fujikuma	Road Planner2/Bridge Planner	Invited
4	Mr. Yoji Sakakibara	Socio – Economist	Invited
5	Mr. Takanori Hayashida	Environmental Specialist	Invited

MINUTES OF MEETING
FOR
DISSEMINATION SEMINAR IN PAKSE
FOR
PREPARATORY STUDY FOR IMPROVEMENT OF ROADS AND BRIDGES
IN
THE SOUTHERN REGION
IN
LAO PEOPLE'S DEMOCRATIC REPUBLIC

Agreed upon between

THE MINISTRY OF PUBLIC WORKS AND TRANSPORT

AND

JICA STUDY TEAM

Pakse, 8th September, 2010

Dr. Santisouk Simmalavong	Mr. Kiminari Takahashi
Deputy Permanent Secretary,	Team Leader,
MPWT	JICA Study Team

1. General

A dissemination seminar for JICA Study, titled as "Preparatory Study for Improvement of Roads and Bridges in the Southern Region in Lao PDR" was held at the conference room of the Champasak Grand Hotel on 8th September, 2010, chaired by Dr. Santisouk Simmalavong, Deputy Permanent Secretary of the Ministry of Public Works and Transport. Participants of the seminar are listed in the attachment 1.

2. Opening Remarks

On behalf of the Ministry of Public Works and Transport and H.E. Minister Sommad Pholsena, Dr. Santisouk Simmalavong, as a chairperson of the seminar, welcomed all the participants of the dissemination seminar from five provinces in Southern Laos and explained the objectives and progress of the JICA Study. Ms. Yoko Hattori, representative of JICA Lao Office, made opening remakes and the seminar started at 10:30 AM.

3. Presentation by JICA Study Team

Mr. Takahashi, Team Leader of the JICA Study Team made a presentation, mainly discussing the following tasks of the Study:

- Major progress of the Study;
- General understanding of the study area;
- Review and revision of the previous master plan; and
- Way forward

4. Comment and Answer

After the presentation, the participants were requested to ask questions and provide comments. The participants provided the following comments and suggestions to the Study Team:

- Sekong Province is the poorest province in Laos. To accelerate poverty reduction in the province, Construction of Sekong Bridge should be listed in the Road Development Plan 2011-15. (DPI/Sekong Province)
- Local roads should be supplementally studied by JICA Study Team, which could improve accessibility to the national roads and contribute to poverty reduction in the region. (DPWT/Saravan Province, DPWT/Sekong Province, DPWT/Savannakhet Province, DPWT/Attapue Province)
- In Saravan Province, the access road, connecting between 1G (Tumlan) and 15B is important and should be studied. (DPI/Saravan Province)
- The previous master plan proposed NR-14A and 16A as priority projects, whereas this study

proposes NR-9 and Sedone Bridge. Inconsistent outputs between two studies need an explanation. (DPWT/Saravan Province)

- There is a huge development potential in Champassak Province, including urbanization of Pakse, transforming into Pakse City, and industrial development, especially bauxite mining along the NR-18A. Thus, construction of another Mekong Bridge, widening of the NR-16, construction of bypass route around Pakse, including construction of the Sedone Bridge along the NR-16, all are very important projects. (DWPT/Champassak Province)
- The future traffic demands projected by JICA Study Team and Korean company are very distorted. An explanation for these two different outputs is needed. (DPWT/Savannakhet Province)
- In Savannakhet Province, Seno, the crossing point between the NR-9 and NR-13, is very crowded and a bypass route in Seno needs to be considered. (DPWT/Savannakhet Province)
- In order to determine the location of international border along the NR-1J and hence alignment of the NR-1J, the border clarification between the Ministry of Foreign Affair of Laos and Cambodia is necessary. (DPWT/Attapu Province)
- In Attapu Province, urbanization of the city is very rapid and there is a need to construct a bypass route in the city. (DPWT/Attapu Province)
- All the priority projects, suggested by JICA Study Team, may be required for a full scale EIA. It is very important to carry out the social impact assessment and to ensure community participation for these particular projects. (Water and Environment Office /Savannakhet Province)

All the participants principally agreed with the interim output of the study and priority projects proposed by JICA Study Team. In response to comments raised by the participants, the JICA Study Team responded as summarized below:

- JICA Study Team explained about the inconsistent outputs between current and previous studies, pointing out that neither NR-9 or NR-15A were selected as priority projects in the previous study because NR-9 was not included in the scope of the previous study and the external agency at that time committed to improving NR-15A.
- JICA Study Team proposed to review the output of Korean company's study on the NR-1G.
- Responding requests made by most of participants, JICA Study Team will work for a supplemental study on some local roads in specific areas where the impact derived from the priority projects is significant.
- JICA Study Team requested all the participants to submit written comments on both presentation material and the report to the Study Team by early 3rd week of September.

5. Closing Remarks

Dr. Santisouk Simmalavong appreciated constructive comments and suggestions made by the participants for JICA Study and the success of the seminar, inviting local governments and concerned agencies. Ms. Yoko Hattori, representative of JICA Lao Office, made closing remakes and the seminar ended at 12:30 PM.

ATTACHMENT 1

Attendants of the dissemination seminar are listed below.

COMMITTEE MEMEBERS

1	Mr. Santisouk Sinnalavong	Deputy Permanent Secretary	Chairperson
2	Mr. Bounma Sinmayvong	Deputy Director General, Dept. of Roads	Member
3	Mr. Ounheuan Sitiamphone	Senior Engineer, TED, Dept. of Roads	Member
4	Mr. Soukkaseum Parkdeemaneevong	Director, DPWT, Champasak	Invited
5	Mr. Chanthaviseuk Vansiry	Deputy Director, DPWT, Champasak	Invited
6	Mr. Souksawan Phengphachanh	Vice of Planning Sector, DPI, Champasak	Invited
7	Mr. Sakhone Sibounheuang	Officer, WREA, Champasak	Invited
8	Mr. Ngampasong Meuangmany	Deputy Director, DPWT, Savannakhet	Invited
9	Mr. Xayasene Keovilaysak	Chief of Road Office, DPWT, Savannakhet	Invited
10	Mr. Souvanh Songchamphone	Engineer, DPWT, Savannakhet	Invited
11	Mr. Khamphan Khousavan	Deputy Director, DPI, Savannakhet	Invited
12	Mr. Khanmouan Souvannaphoum	Deputy Director, WREA, Savannakhet	Invited
13	Mr. Sengdarith Kattignasak	Director, DPWT, Saravan	Invited
14	Mr. Pasanmith Keokingsamai	Engineer, DPWT, Saravan	Invited
15	Mr. saisamone Inthisen	Deputy Director, DPI, Saravan	Invited
16	Mr. Bounchar Chanthachack	Officer, WREA, Saravan	Invited
17	Mr. Southsana Sihavong	Deputy Director, DPWT, Sekong	Invited
18	Mr. Khouphone Khemmalay	Director, DPI, Sekong	Invited
19	Mr. Vanhsone Peuadbervong	Deputy Director, WREA, Sekong	Invited
20	Mr. Lattanaphone Thepsoukan	Deputy Director, DPWT, Attapeu	Invited
21	Mr. Vilaphol Southavong	Officer, DPI, Attapeu	Invited
22	Mr. Sayasinh Phichith	Officer, WREA, Attapeu	Invited

JICA (LAO OFFICE)

1	Ms. Yoko Hattori	Representative	Invited

JICA STUDY TEAM

1	Mr. Kiminari Takahashi	Team Leader / Transport Planer	Invited
2	Mr. Nobuo Monoe	Road Planner1	Invited
3	Mr. Masataka Fujikuma	Road Planner2/Bridge Planner	Invited
4	Mr. Yoshiuki Arita	Traffic Demand Forecast / GIS Specialist	Invited