

Project Administration Manual

Project Number: 45030
November 2013

People's Republic of China: Yunnan Sustainable
Road Maintenance (Sector) Project

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Project Administration Manual Purpose and Process

The project administration manual (PAM) describes the essential administrative and management requirements to implement the project on time, within budget, and in accordance with Government and Asian Development Bank (ADB) policies and procedures. The PAM should include references to all available templates and instructions either through linkages to relevant URLs or directly incorporated in the PAM.

The Yunnan Provincial Department of Transport (Executing Agency [EA]) and Yunnan Highway Administration Board (Implementing Agency [IA]) are wholly responsible for the implementation of ADB-financed projects, as agreed jointly between the borrower and ADB, and in accordance with Government and ADB's policies and procedures. ADB staff is responsible to support implementation including compliance by the EA and IA of their obligations and responsibilities for project implementation in accordance with ADB's policies and procedures.

At Loan Negotiations, the borrower and ADB shall agree to the PAM and ensure consistency with the Loan Agreement. Such agreement shall be reflected in the minutes of the Loan Negotiations. In the event of any discrepancy or contradiction between the PAM and the Loan Agreement, the provisions of the Loan Agreement shall prevail.

After ADB Board approval of the project's report and recommendations of the President (RRP), changes in implementation arrangements are subject to agreement and approval pursuant to relevant Government and ADB administrative procedures (including the Project Administration Instructions) and upon such approval they will be subsequently incorporated in the PAM.

ABBREVIATIONS

ADB	– Asian Development Bank
DSC	– Design and Supervision Consultant
EA	– executing agency
EARF	– Environmental Assessment Review Framework
EIA	– environmental impact assessment
EIRR	– economic internal rate of return
EMDP	– Ethnic Minorities Development Plan
EMP	– Environmental Management Plan
EMoP	– Environmental Monitoring Plan
FDI	– foreign direct investment
FFA	– Framework Financing Agreement
FIRR	– financial internal rate of return
FMAP	– Financial Management Action Plan
GDP	– gross domestic product
HDM-4	– Highway Design and Maintenance 4 Software
HAHTP	– HIV/AIDS and Human Trafficking Prevention Plan
IDP	– Institutional Development Plan
IEE	– initial environmental examination
IRI	– international roughness index (IRI m/km)
km	– kilometer
MOC	– Ministry of Communications
MOT	– Ministry of Transport
NGO	– nongovernment organization
OM	– Operations Manual
PAM	– Project Administration Manual
PMO	– project management office
PPMS	– project performance monitoring system
PPTA	– project preparatory technical assistance
RAMS	– Road Asset Management System
RP	– Resettlement Plan
RSAP	– Road Safety Action Plan
SDAP	– Social Development Action Plan
YEPB	– Yunnan Environmental Protection Bureau
YHAB	– Yunnan Highway Administration Bureau
YPDOT	– Yunnan Provincial Department of Transport
YSRI	– Yunnan Science and Technology Research Institute of Highways
YSRM	– Yunnan Sustainable Road Maintenance

NOTES

- (i) The fiscal year (FY) of the Government and its agencies ends on 31 December.
- (ii) In this report, "\$" refers to US dollars.

I. PROJECT DESCRIPTION

A. Rationale

1. Yunnan is poor, mountainous, and, with 46 million people, densely populated. Because the province is landlocked, trade with the rest of the PRC and with foreign countries involves land transport over long distances, which makes its products less competitive. The large pockets of poverty that exist in the province are linked to inadequate road access, the limited availability of land, and cultural barriers to outmigration. In 2011, 27% of Yunnan's rural people were living under the PRC's official poverty line of CNY2,300 in annual income.

2. Yunnan is strategically located along the PRC's border with the Lao People's Democratic Republic, Myanmar, and Viet Nam. About 60% of freight and 80% of passenger transport is by road. The Yunnan Highway Administration Bureau (YHAB) of the Yunnan Provincial Department of Transport (YPDOT) manages a trunk road network of 24,089 km, including 45% of the province's paved roads. These roads connect with or form part of the northern and north-south transport corridors of the Greater Mekong Subregion.

3. With strong support from central government, Yunnan has invested heavily in upgrading its transport network, and allotted an amount equivalent to 10% of the provincial gross domestic product in 2011. Nonetheless, the trunk road network has been inadequately maintained and is often in poor condition. This reduces the province's economic competitiveness and slows the pace of poverty reduction. In 2011, YHAB rated only 37% of the trunk road network as being in good condition; about 31% of the network was designated as very poor. The project preparatory TA consultant estimated that the pavement on almost one-half of the roads will soon need to be completely reconstructed. Despite this, traffic on the network has been rapidly increasing, which not only further damages substandard roads but threatens to degrade newly built ones prematurely. Yunnan's economy is therefore suffering the effects of a vicious cycle afflicting the trunk road network. Overemphasis on new road construction, along with funding and spending inefficiencies, leaves little budget for necessary maintenance. The lack of maintenance increases the life cycle cost of pavement care and thus widens the future maintenance demand-resource gap.

4. Poor trunk road conditions have also reduced road safety. In 2009, the risk of being killed in a road accident on the network was almost five times the rate in some developed countries—30 fatalities per billion vehicle-kilometers, compared to about 6 in France and the United Kingdom. Although the road fatality rate has fallen since 2004, it could rise again as traffic volume increases on older roads that are being ill-maintained and therefore becoming more dangerous to use.

5. The project design is based on a detailed analysis of how to make Yunnan's trunk road network more sustainable. The network's current condition is the product of YHAB's historically low maintenance budgets and high management costs. In 2011, YHAB's maintenance budget reached \$350 million, or about \$14,600 per network km. Of that total, \$263 million was spent on labor and management costs, \$47 million on routine maintenance and only \$40 million on rehabilitation works. If past trends continue, future revenue increases will be absorbed by rising staff costs. Meanwhile, road condition modeling studies show that the share of the network in very poor condition may rise from 31% in 2011 to 40% in 2016 and 50% by 2021. To stop the degradation and bring the network to a generally good condition, YHAB will need to double its

maintenance budget over a 10-year period. Such additional spending on rehabilitation works would bring economic benefits to Yunnan worth 6–10 times the costs.¹

6. The project also envisages raising the cost-effectiveness and efficiency of YHAB maintenance spending. As is a common practice in the PRC, YHAB uses its own work force to carry out maintenance. International experience has shown, however, that outsourcing maintenance, particularly through performance-based contracts, can substantially reduce costs.² Improved maintenance planning and programming methods would help to make better use of YHAB resources. Road condition modeling studies show that using a road asset management system and prioritizing works based on works' economic returns would increase the economic benefits of YHAB maintenance by 20% (footnote 1).

7. Making road maintenance in the PRC more sustainable is a strategic objective under the government's 12th Five-Year Plan (2011–2015). The government intends to achieve this by raising the priority accorded to maintenance relative to construction; increasing road rehabilitation efforts; reducing management costs and improving the efficiency of maintenance; and introducing market-based delivery mechanisms on a pilot basis. It is also emphasizing greater road safety, the strengthening of environmental management practices, and the use of modern maintenance planning systems. To reach these goals, YPDOT established a series of medium-term targets for road maintenance through policy dialogue with the Asian Development Bank (ADB). YPDOT aims to (i) raise the proportion of roads rated in good condition from 40% of the trunk road network in 2011 to 50% in 2017, (ii) reduce the gap between maintenance financing needs and budgets from an estimated 50% to about 20%, (iii) increase the share of the network that is rehabilitated each year from 0.5% to 4.0%, and (iv) modernize YHAB's management systems and operational processes.

8. Yunnan's road maintenance strategy entails policy and institutional changes. The government has committed to increase YHAB's maintenance budget resources to about \$550 million annually in 2017, or \$24,000 per km. This is to be done initially by supplementing YHAB's budgetary resources with loans from development partners and gradually increasing fuel tax allocations to YHAB from CNY1.7 billion in 2011 to CNY3.0 billion in 2017, with additional resources to be spent on rehabilitation. To reduce costs and improve efficiency, YHAB will also gradually outsource road maintenance operations and reduce its management and staff costs. Institutional capacity will be strengthened by establishing a road asset management system, creating the internal capacity and skills necessary to manage the environmental and social impacts of road maintenance works, and monitoring progress toward the road sector targets. YHAB will incorporate road safety improvements in the rehabilitation works it undertakes.

9. These changes will be rolled out gradually with project support. Four documents developed during project preparation will guide implementation: (i) a road sector maintenance strategy; (ii) an institutional development plan; (iii) a road sector roadmap that sets annual targets for key performance and sustainability indicators, as well as policy reform milestones; and (iv) an operational manual. The manual will be used to improve YHAB's processes for planning; environmental, social, and safety management; monitoring systems; and procurement.³

¹ Road Network Sustainability Analysis (accessible from the list of linked documents in Appendix 2 of the Report and Recommendations of the President [RRP]).

² See, for example, World Bank. 2009. Performance-Based Contracting for Preservation and Improvement of Road Assets. *Transport Research Notes*. Washington, DC.

³ Sector Maintenance Strategy, Institutional Development Plan, Road Sector Roadmap, and Operational Manual (accessible from the list of linked documents in Appendix 2 of the RRP).

10. The government has asked ADB to support YHAB's trunk road maintenance program and assist in sector reform and institutional strengthening. The project represents a second phase of ADB support to road maintenance in Yunnan. In 2010, ADB approved lending support for, among others, rehabilitation by YHAB of 605 km of trunk roads, and also helped YPDOT pilot new forms of rural road maintenance.⁴

B. Impact and Outcome

11. The impact of the project will be improved access for the people of Yunnan to a quality and safe trunk road network. The outcome will be improved sustainability of Yunnan's trunk road network.

C. Outputs

12. The project will deliver four outputs: (i) 890 km of trunk roads rehabilitated, (ii) performance-based road maintenance piloted on 164 km of trunk roads, (iii) road asset management system enhanced, and (iv) institutional capacity of the YHAB strengthened.

1. Output 1: Trunk Road Rehabilitation

13. **Rehabilitation program.** The project will restore about 890 km of trunk road pavements to good condition through asphaltic overlays on about 180 km of road and the reconstruction of pavement on 710 km of road. The estimated cost is \$208.7 million, \$67.8 million of which will come from the ADB loan. The project is part of YHAB's 2013–2016 program to overlay, strengthen, or reconstruct pavement on about 2,250 km of trunk highways. The program prioritizes (i) pavement strengthening, reconstruction, or asphaltic overlay for roads with high traffic of more than 2,000 vehicles per day that are rated in poor or very poor condition, and (ii) pavement reconstruction for roads with medium traffic of 1,000–2,000 vehicles per day that are already rated in very poor condition. Where the sub-base has failed, pavement will be reconstructed. Where the pavement is still in fair condition but shows signs of deterioration, an asphaltic overlay will be applied to extend pavement life. Where current or future traffic is higher than planned for in the road's original design, the pavement will be strengthened.

14. **Subprojects.** The works will be implemented in four phases, corresponding to YHAB's annual road maintenance plans for 2014, 2015, 2016, and 2017. Seven highway sections of 192 km in total length were selected for phase I of the project based on their high traffic volume and poor condition.⁵ The roads were built 20–40 years ago, with satisfactory geometry and adequate capacity, but the pavement has failed due to age and heavy traffic. At the start of the three subsequent annual phases, YHAB will identify highway segments that require rehabilitation, and give priority to the maintenance works that bring the highest economic returns. This will be determined through evaluation using a road asset management system and data from annual traffic and road condition surveys. YHAB will prepare data on each subproject to be considered, with information on its rationale; environmental, social, and road safety assessments; technical solutions; cost estimates; economic evaluation; and schedule. Subprojects will conform to the agreed selection criteria, as confirmed by YHAB and endorsed by ADB.⁶

⁴ ADB. 2010. *Report and Recommendation of the President to the Board of Directors: Proposed Loan to the People's Republic of China for the Yunnan Integrated Road Network Development Project*. Manila.

⁵ ADB financing will be applied to four subprojects on highways G213, G320, and S211. The government will fully finance three subprojects on G108, S321, and X214.

⁶ Selection Criteria (accessible from the list of linked documents in Appendix 2 of the RRP).

Table 1: Road Sector Roadmap

Indicator	Baseline	2013	2014	2015	2016	2017
1. Improving trunk road network condition						
1. Allocation of fuel tax to the YHAB per km of trunk road network	CNY71,000/km in 2011	At least CNY80,000/km allocated to the YHAB from the fuel tax	At least CNY90,000/km allocated to the YHAB from the fuel tax	At least CNY95,000/km allocated to the YHAB from the fuel tax	At least CNY110,000/km allocated to the YHAB from the fuel tax	At least CNY125,000/km allocated to the YHAB from the fuel tax
2. Percentage of network receiving heavy or intermediate maintenance	0.5% in 2011 (1.4% in 2010)	At least 1.5% of the YHAB network receives intermediate or heavy maintenance	At least 2% of the YHAB network receives intermediate or heavy maintenance	At least 2% of the YHAB network receives intermediate or heavy maintenance	At least 3% of the YHAB network receives intermediate or heavy maintenance	At least 4% of the YHAB network receives intermediate or heavy maintenance
2. Improving trunk road maintenance cost-efficiency						
3. Percentage of trunk road network included in annual condition survey	55% of network length in 2011	Road condition survey in 2011 and 2012 covers at least 95% of network length	Road condition survey in 2013 and 2014 covers at least 95% of network length	Road condition survey in 2014 and 2015 covers at least 95% of network length	Road condition survey in 2015 and 2016 covers at least 95% of network length	Road condition survey in 2016 and 2017 covers at least 95% of network length
4. Percentage of intermediate and heavy maintenance works according to asset management planning	0% of network length in 2011	At least 50% of intermediate/heavy maintenance works in line with optimized maintenance strategy	At least 60% of intermediate/heavy maintenance works in line with optimized maintenance strategy	Road asset management system operational and staffed with skilled people	At least 70% of intermediate/heavy maintenance works in line with optimized maintenance strategy	At least 80% of intermediate/heavy maintenance works in line with optimized maintenance strategy
5. Percentage of YHAB maintenance budget allocated to implementation	25% in 2011 (31% in 2010)	At least 30% of YHAB maintenance budget allocated to maintenance implementation	At least 35% of YHAB maintenance budget allocated to maintenance implementation	At least 35% of YHAB maintenance budget allocated to maintenance implementation	At least 40% of YHAB maintenance budget allocated to maintenance implementation	At least 45% of YHAB maintenance budget allocated to maintenance implementation
6. Number of km per management and station staff member	5.4 km per management staff in 2011 and 2.3 km per station staff in 2011		Ratio of station staff per km of network reduced to 1 for 2.5 km.	Ratio of manager/engineer/ technician per km of network reduced to 1 for 7 km.	Ratio of station staff per km of network reduced to 1 for 2.7 km.	Ratio of station staff per km of network reduced to 1 for 3 km.
7. Percentage of intermediate/heavy maintenance carried out through open bidding and performance-based contracts	No open bidding conducted No performance-based maintenance	At least 10% of new intermediate/heavy maintenance works contracted out through open bidding	At least 2 performance-based maintenance contracts awarded and ongoing	At least 20% of new intermediate/heavy maintenance works contracted out through open bidding	Comparative cost-efficiency of internal, outsourced, and performance-based maintenance delivery mechanisms evaluated	

Indicator	Baseline	2013	2014	2015	2016	2017
3. Improving trunk road safety and environmental sustainability						
8. Environmental management indicators	No environmental practices in maintenance works	An environmental, social, and road safety unit with at least 1 full-time qualified environmental specialist is set up in the YHAB	Environmental management process for project works fully compliant with OM requirements	Environmental management instruction covering environmental assessment, management planning and implementation covering all the YHAB intermediate and heavy maintenance issued by the YHAB	General and maintenance sections performance management framework revised to include environment and safety indicators	All the YHAB intermediate and heavy maintenance works fully compliant with environmental management instruction
9. Road safety indicators	No road safety practices in maintenance works	An environmental, social and road safety unit with at least 1 full-time qualified road safety specialist is set up in the YHAB	Road safety management process and safety designs for all project works fully compliant with OM requirements	Road safety management instruction covering risk assessment, auditing, and design covering all the YHAB intermediate and heavy maintenance issued by the YHAB	An environmental, social and road safety unit with at least 2 full-time qualified road safety specialists is set up in the YHAB	All the YHAB intermediate and heavy maintenance works fully compliant with road safety management instruction

CNY = yuan, km = kilometer, YHAB = Yunnan Provincial Highway Administration Bureau.

Note: "intermediate" and "heavy" maintenance are direct translation here of PRC standard definitions, which are most convenient for monitoring purposes. Intermediate maintenance includes pavement periodic maintenance (overlays and seals). Heavy maintenance includes pavement reconstruction.

Source: Asian Development Bank.

15. Phase I includes 192 km of works, including 36 km of overlays and 156 km of pavement rehabilitation works. Phase II and Phase III will include a target of 290 km of works each, and Phase IV a target 120 km. Periodic maintenance will account for at least 20% of the length of works under Phase II, Phase III and Phase IV, the rest being pavement rehabilitation (Table 2). Box 1 provides the correspondence between the English definitions used throughout the documents and those used in the selection criteria and the Loan and Project Agreement, which are based on the Ministry of Transport (MOT) technical standards.

Table 2: Target Phase Lengths

Item	Year	Length (km)		
		Overlays	Rehabilitation	Total
Phase I	2013	36	156	192
Phase II	2014	60	230	290
Phase III	2015	60	230	290
Phase IV	2016	30	95	120
Total		181	711	892

Source: Asian Development Bank.

Box 1: Definition of Road Maintenance Categories

MOT classifies maintenance as *routine*, *intermediate* and *heavy*.^a The two latter ones correspond reasonably well to the English-language concepts of *periodic* maintenance and of *rehabilitation* respectively. In the documents, 'rehabilitation' is used generically to include intermediate and heavy maintenance, except when specified otherwise. MOT categories include the following main activities:

Routine Maintenance: routine maintenance (cleaning, removal of debris, clearing of water or snow, repainting, clearing of culverts, cutting of vegetation), and small repairs (crack sealing, patching, cuts and shoulders, retaining walls and other masonry, fencing).

Intermediate Maintenance: pavement sealing and overlays, punctual widening within right of way (RoW) (<50 m e.g. for curve safety), comprehensive repair of retaining walls, shoulders and ditches, minor bridge repairs, clearing of long stretches of ditches, full replacement of curbs, widening of narrow bridges by <1m, river bed training around existing bridges, culvert replacement.

Heavy Maintenance: reconstruction of entire pavement (possibly including subgrade) on sections longer than 10 km, construction of small interchanges within RoW, tunnel reinforcement works, placement of new guardrails, full replacement of fencing, roadway minor realignment within RoW, reconstruction of large retaining walls or slope protection, clearing of large landslides (>1 km),^b widening and upgrading of roads from Class IV to Class III,^b replacement of bridge decks, widening and strengthening of bridges (>30 m),^b new short tunnel construction,^b construction of new short road corridors.^b

^a Ministry of Transport of the People's Republic of China. 2009. *Technical Specifications for Maintenance of Highways*. Beijing.

^b Activities generally not considered in other countries part of road maintenance, or that due to their technicality require to be treated separately from road pavement maintenance.

16. A due diligence of subprojects included in phase I was carried out during project preparation by ADB. The technical appendix to the Project Administration Manual provides details on the technical specifications of these subprojects, including on road safety. Subprojects to be included in phases II, III, and IV will require ADB approval. They will be selected annually, in order of their economic returns, based on rankings prepared each year by the YHAB, subject to the criteria below. The Operations Manual (OM) describes the steps necessary to select, prepare and implement the subprojects, as well as provides template forms.

- (i) The subproject concerns rehabilitation of road pavement.
- (ii) The subproject does not involve:
 - (a) bridge construction widening or rehabilitation of more than 30 meters in length (while bridge rehabilitation of less than 30 meters can be included);
 - (b) any tunnel rehabilitation or upgrading (widening, structural strengthening, etc.);
 - (c) widening outside of the existing right-of-way, and the width of the increase does not exceed 1 meter, unless the length of such increase does not exceed 5% as a percentage of the total length of the road section undergoing heavy or intermediate maintenance works;
 - (d) upgrading from one road class to another road class;
 - (e) paving of gravel or dirt roads;
 - (f) extension or change in alignment of more than 1 meter, unless such realignment is directly required to improve the safety of an intersection, of a curve, or a steep grade in the road;
 - (g) major slope protection works, where "major" means more than 25% of the estimated costs of the works.
- (iii) Unless otherwise agreed, the subproject should involve at least 10 continuous kilometers in length.
- (iv) The type of maintenance is aligned with first priority tasks under the Road Sector Maintenance Strategy.⁷
- (v) The subproject is a high priority road maintenance project, meaning a road maintenance project identified in a preliminary subproject list, which, based on a prioritization carried out with a road asset management software,⁸ applied to annual traffic and road condition data, is among those presenting the highest benefits to cost ratio for maintenance work.
- (vi) The subproject has undergone environmental impact assessment and social impact assessment and has been found not to involve any significant environmental or social impacts or any negative impacts on ethnic minorities.
- (vii) The subproject has an estimated economic internal rate of return of at least 12% when using a minimum eight year evaluation period using life cycle cost and benefits.
- (viii) YHAB has prepared and submitted for the subproject a data sheet in the form set out in the OM.

17. **Safety enhancement.** The project will take steps to improve road safety on the subproject roads. YHAB will coordinate road safety education activities with schools, village groups, and local governments after works are completed. The rehabilitation will include safety feature upgrades such as better signage, rumble strips, and improved grade and curve design. The safety features to be undertaken will be chosen based on an assessment procedure set out in the manual prepared for the project. The operational manual provides a guide for classifying safety risks as very high, high, moderate, and low, and prescribes the type and extent of the safety features needed to match the level of risk. Based on preliminary design, about 10% of the cost of the phase I subprojects will be allocated to safety features. YHAB will conduct an independent road safety audit of all subprojects at the detailed design and completion stages.

⁷ Road Sector Maintenance Strategy (available from the list of Supplementary Linked Documents in Appendix 2 of the RRP).

⁸ Highway Design and Management IV or Chinese Pavement Management System.

2. Output 2: Performance-Based Road Maintenance

18. The project will introduce performance-based road maintenance on a pilot basis. Under the performance-based road maintenance schemes, contractors will be paid for consistently maintaining the road at a contractually stated performance standard over several years. This differs from other mechanisms linking payments to inputs, or outputs. To increase the potential for lessons and replication, the project will pilot two performance-based modalities, one using outsourcing and the other a contract with YHAB's own maintenance work force.

19. The first pilot will be for ADB-funded rehabilitation and routine maintenance of a 57 km segment of the G-323 highway in Wenshan Prefecture over 5 years. This will test the feasibility of contracting-out of performance-based maintenance operations. During the first year, the contractor will reconstruct 40 km of pavement and overlay an additional 17 km. During the following 4 years, the contractor will undertake routine maintenance. The second pilot, funded by YHAB, will be for the periodic and the routine maintenance of a network of 107 km of paved roads within Ruili County in Dehong Prefecture for 3 years. This will test the feasibility of improving the efficiency of YHAB's internally delivered maintenance operations by introducing contractual and performance-based mechanisms. To implement the pilot, YHAB will enter into a contractual arrangement with its Ruili County maintenance section at a negotiated contract price and with a performance agreement. An independent supervision engineer will undertake monthly inspections to assess compliance with the performance standards under each of the pilots. In case of nonperformance, YHAB will make only partial payments to the contractor.⁹

3. Output 3: Road Asset Management System

20. The project will introduce and launch a computerized road asset management system in YHAB. A new road database will consolidate YHAB's existing road inventory, road condition, equipment, and traffic databases. The highway network will be spatially referenced and use a geographic information system. The system will also include (i) a road condition evaluation system, (ii) a pavement management system, (iii) a routine maintenance management system, and (iv) an interface with Highway Development and Management Model (HDM-4) software for works planning. It will make information on road conditions available online through a traffic information subsystem. To set up and maintain the road asset management system, the Yunnan Scientific Research Institute under YHAB will carry out pavement condition surveys each year and update the road inventory. This system will be used by YHAB as an input in the preparation of annual and medium-term maintenance strategies and programs.

4. Output 4: Institutional Development

21. The project will increase YHAB's capacity to manage new approaches to road maintenance, help implement the road sector maintenance strategy and the institutional development plan, and assist in monitoring the road sector roadmap.

22. **Environment, social, and safety management.** YHAB will establish a new environment, social, and safety unit (ESSU) with three full-time staff members. The ESSU will help YHAB to (i) ensure that the project meets environmental, social, and safety requirements; (ii) conduct road safety audits, consultations, and environmental and social assessments; (iii) develop environmental management instructions for maintenance works; (iv) prepare road safety engineering guidelines and design and evaluate safety engineering measures; and (v) monitor YHAB's environmental, social, and safety performance.

⁹ Appendix 3 (Technical Appendix).

23. **Performance and sustainability assessment.** The project will strengthen YHAB's performance management. YHAB will prepare a performance and sustainability assessment report each year and submit it to ADB (footnote 11). The report will give a comprehensive picture of YHAB's maintenance program, including its efficiency, effectiveness, and management performance, as well as the quality of its environmental, social, and safety management processes. YHAB and ADB will jointly review progress, based on the indicators and annual targets set out in the road sector roadmap, and agree on any remedial action needed.

24. **Project management.** A project management consultant will be recruited to provide support to YHAB to implement the project; select and prepare the subprojects for its second, third, and fourth phases; provide training for the staff of the new ESSU; and advise in setting up the ESSU procedures and guidelines.

25. **Training.** The project will finance a 4-year program to provide training abroad and in the PRC for YHAB personnel. The personnel will receive 100 person-months of international training and about 500 person-months of training in-country in road maintenance engineering, road asset management, performance-based maintenance, and the management of road safety and environmental and social safeguards.

II. IMPLEMENTATION PLAN

A. Project-Readiness Activities

Table 3: Project-Readiness Activities

Indicative Activities	2013			2014			Who Responsible						
	Q3		Q4		Q1			Q2					
	7	8	9	10	11	12		1	2	3	4	5	6
1. Advance contracting actions													YPDOT, YHAB
2. Retroactive financing actions													YPDOT, YHAB
3. Establish Project Office and ESSU													YHAB
4. Recruit PMC													YPDOT, YHAB
5. ADB Board Approval													ADB
6. Loan Signing													ADB, MOF, YPDOT
7. Government Legal Opinion Provided													YPG, MOF
8. Government Budget Inclusion													YPDOT, YHAB
9. Loan Effectiveness													YPG

ADB = Asian Development Bank; ESSU = Environment, Social, and Safety Unit; MOF = Ministry of Finance; PMC = project management consultant; YHAB = Yunnan Highway Administration Bureau; YPDOT = Yunnan Provincial Department of Transport; YPG = Yunnan provincial government.

Source: ADB.

B. Overall Project Implementation Plan

Table 4: Overall Project Implementation Plan

ID	Task Name	2013		2014				2015				2016				2017				2018			
		Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	
1.	Trunk Road Rehabilitation																						
1.1	Phase 1																						
1.1.1	Program Preparation																						
1.1.2	Design and Safeguards Plans Preparation																						
1.1.3	Procurement																						
1.1.4	Civil Works Implementation																						
	T1/KUN/LUQ/G108																						
	T1/KUN/JIN/G213a																						
	T1/YUX/YUX/G213b																						
	T1/DAL/XIA/G320																						
	T1/KUN/SON/S211																						
	T1/DEH/RUI/X214																						
	T1/LIN/YAN/S321																						
1.1.5	Safeguard Plans Implementation																						
1.2	Phase 2																						
1.2.1	Program Preparation																						
1.2.2	Design and Safeguards Plans Preparation																						
1.2.3	Procurement																						
1.2.4	Civil Works and Safeguard Plans Implementation																						
1.3	Phase 3																						
1.3.1	Program Preparation																						
1.3.2	Design and Safeguards Plans Preparation																						
1.3.3	Procurement																						
1.3.4	Civil Works and Safeguard Plans Implementation																						
1.4	Phase 4																						
1.4.1	Program Preparation																						
1.4.2	Design and Safeguards Plans Preparation																						
1.4.3	Procurement																						
1.4.4	Civil Works and Safeguard Plans Implementation																						
1.5	Community-Based Safety Program																						
2.	Performance-Based Maintenance Pilots																						
2.1	PBMC - Ruili - T1/DEH/G320-2/S234/P																						
2.2	OPBM - Wenshan - T1/WEN/G323/P																						
3.	Road Asset Management System																						
3.1	Equipment and Software																						
3.2	Surveys																						
3.3	Development and Installation																						
4.	Institutional Strengthening																						
4.1	Implement Institutional Development Action Plans																						
4.2	Consultant Recruitment																						
4.3	Consultant Services																						
4.4	Training																						

Source: Asian Development Bank.

2 Implement 4 Procure

III. PROJECT MANAGEMENT ARRANGEMENTS

A. Project Stakeholders – Roles and Responsibilities

26. The Yunnan provincial government, through YPDOT, will be the executing agency (EA) responsible for overall implementation of the project. The YHAB will be the implementing agency (IA), responsible for day-to-day implementation of all project components. The YHAB will (i) engage a procurement agent for procuring the civil works contracts and consultant selection, (ii) establish field offices at prefecture level, (iii) engage a project management consultant (PMC), and (iv) engage domestic consulting firms for construction supervision. The Science and Research Institute

under the YHAB, in coordination with its Planning Division, will implement the road asset management system component.

27. YHAB will expand the existing ADB Project Office (ADBPO) under its Road Maintenance Division, established for Yunnan Integrated Road Network Development Project to manage Yunnan Sustainable Road Maintenance Project (YSRMP) on a day-to-day basis. It will include additional six full time staff: project coordinator, civil works component coordinator, project monitoring/institutional specialist, liaison officer, contract management specialist, and interpreter. ADBPO will coordinate with (i) PMC on all aspects of project implementation, (ii) the YHAB Maintenance Division and field offices for civil works, (iii) the YHAB ESSU on compliance with social and environmental safeguards and road safety, (iv) the YHAB Science and Research Institute and Planning Division on implementation of road asset management system component, (v) procurement agents on procurement matters, and (vi) YHAB financial division on disbursement and audit related issues. Deputy Director of the YHAB Maintenance Division will be assigned as project coordinator responsible for overall project implementation and preparation of next phases of the project, the YHAB Maintenance Division will assign its three senior engineers as coordinator for civil works, project monitoring/institutional development specialist, and liaison officer. The latter will have good English language skills. The YHAB will also engage an experienced civil works contract management specialist for handling civil works contractual issues, and a professional interpreter on a full-time basis to ensure smooth communications with ADB and PMC team.

28. **Environment, social, and safety unit.** The YHAB will set up a new ESSU under its Maintenance Division before loan effectiveness. During the project, the YHAB will (i) develop procedures for road safety audits, consultations, and environmental and social assessment; procedures will apply to new rehabilitation works and be implemented by the ESSU;¹⁰ (ii) define standard health, environmental, and safety operating procedures for contractors, and monitoring requirements for supervision consultants; (iii) prepare road safety engineering guidelines; (iv) design and evaluate new safety engineering measures; and (v) routinely monitor its environmental, social, and road safety performance.

29. The unit will at least be staffed with one environmental specialist, one road safety specialist, and one social development specialist, who will all be employed full time during project implementation. The qualifications and key tasks of the staff will be as follows.

- (i) **Environmental specialist** will have at least 10 years of experience in environmental management for civil works with extensive experience in preparing environmental assessments and management plans, environmental supervision and delivery of training. The key responsibilities will include (a) carrying out environmental surveys and assessments of subprojects; (b) assisting in screening and categorizing subprojects; (c) preparing IEEs and EMPs; (d) working with design consultants to optimize design and ensure that construction contracts include environmental management clauses and adhere to IEE and EMP; (e) advising supervision consultants and contractors on environmental compliance and reporting; (f) carrying out regular audits of civil works; (g) preparing guidelines and procedures for environmental management in the YHAB; (h) monitoring against environmental indicators for reporting in the PPMS; (i) preparing and delivering environmental training; and (j) generally coordinating all aspects of the EARF, OM.
- (ii) **Road safety specialist** will be an engineer with at least 10 years of experience in road safety design. The key responsibilities will include (a) carrying out road safety

¹⁰ Procedures applied under the Project are included in the Operational Manual.

surveys and assessments of subprojects; (b) ensure that road safety requirements are included in the detailed design; (c) recommend road safety enhancement measures, (d) ensuring that construction contracts include clauses related to traffic management during works; (e) carry out road safety audits of subproject designs, implementation, and completion; (f) preparing guidelines and procedures for environmental management in the YHAB; (g) collect road safety indicators for use in the PPMS; and (h) generally coordinating all aspects of the OM, and institutional development plan related to road safety.

- (iii) **Social development specialist** will have a bachelor’s degree in social sciences, and at least 5 years of experience in carrying out social assessments and prior experience with designing land acquisition and resettlement plans. The key responsibilities will include (a) carrying out social consultations and assessments of subprojects; (b) assisting in screening and categorizing subprojects; (c) preparing RPs and subproject specific social development actions; (d) ensuring that construction contracts include clauses related to health and safety of workers; (e) carrying out consultations after works to assess remaining issues; (f) coordinating the implementation of the SDAP for each subproject; (g) preparing guidelines and procedures for social management in the YHAB; (h) collecting social indicators for use in the PPMS; and (i) generally coordinating all aspects of the RF, OM, and institutional development plan related to social development and resettlement.

Table 5: Project Implementation Organizations – Roles and Responsibilities

Project Implementation Organizations	Management Roles and Responsibilities
Yunnan Provincial Department of Transport (YPDOT), on behalf of YPG, the Executing Agency	<ul style="list-style-type: none"> • Responsible for the overall project implementation; • Deputy Director General to be assigned for project management; • Monitoring the project’s impacts; • Ensuring achievement of the project’s outcomes, outputs and activities; and reporting to ADB on their status; • Providing guidance to the IA on project implementation; • Securing the agreed counterpart funds for project activities; • Monitoring and evaluation of project activities and outputs; • Public disclosure of project outputs; • Complying with all loan covenants; • Ensuring the compliance with financial audit recommendations; • Reviewing of regular periodic progress reports and project completion reports prepared by IA and ensure their timely submission to ADB.
Yunnan Highway Administration Bureau (YHAB), the Implementing Agency	<ul style="list-style-type: none"> • Responsible for day-to-day implementation of all project components; • Strengthening the existing Project Office with six fulltime staff for coordinating and monitoring the project activities; • Ensuring achievement of the project’s outputs and their sustainability; • Coordinating with concerned provincial agencies; • Involving beneficiaries and civil society representatives in all stages of project design and implementation; • Preparing regular periodic progress reports, monitoring and evaluation reports, and project completion report and their timely submission to EA and ADB; • Public disclosure of project outputs; • Complying with all loan covenants; • Maintenance Division will be responsible for civil works component including

Project Implementation Organizations	Management Roles and Responsibilities
	<ul style="list-style-type: none"> ○ Preparing and updating the project implementation plan; scope of next project phases, procurement plans for the entire loan period and detailed procurement plan for the next 18 months; annual projections for contract awards and disbursement; ○ Coordinating surveys and preparing preliminary and detailed design documents; ○ Ensuring the approval of land acquisition and resettlement plans by the Government and ADB, and implementing them; ○ Through a procurement agent, undertaking procurement actions and consultant selection including preparation and securing approval by ADB of bidding documents, bid evaluation reports and contract awards; ○ Engaging construction supervision firms for construction management and validating the quantities and quality of civil works, and equipment; ○ Reviewing and approving interim payment certificates, variation orders, and preparing withdrawal applications; ● Financial Division will process withdrawal applications, payments to contractors, suppliers and consultants, prepare reimbursement requests; ● Planning Division assisted by YHAB Science and Research Institute will be responsible for implementation of road assets management component; and ● Environmental, Social, and Safety Unit will be responsible for carrying out the environment, safety and social due diligence during the preparation of the new phases of work. This will involve preparing initial environmental examinations (IEE) and resettlement plans (RP) and monitoring the implementation of the environmental management plans (EMP), RPs, and social development action plans (SDAP). They will also be responsible for undertaking audits of ongoing civil works, carrying out road safety audits, public consultation, reporting related information in the quarterly monitoring reports, and coordinating the implementation of the YHAB's environment, social, and road safety action plans.
Field Offices (FO)	<ul style="list-style-type: none"> ● Employer representative at the project sites; ● Responsible for day-to-day civil works contracts management; ● Ensuring quality control; ● Processing the contractors claims; and ● Coordinating with local authorities for facilitating the contractor's works.
Project Management Consultant	<ul style="list-style-type: none"> ● Responsible for assisting the IA on all aspects of project implementation and arranging training programs.
Yunnan Provincial Finance Bureau (YPFB)	<ul style="list-style-type: none"> ● Entering into the onlending arrangements for the project; ● Monitoring the financial aspects of project implementation and providing respective coordination and facilitation; ● Timely provision of agreed counterpart funds for project activities; ● Endorsing to ADB the authorized staff with approved signatures for WAs processing; and ● Processing and submitting to ADB withdrawal applications and reimbursement requests and, if required, requests for reallocating the loan proceeds.
Ministry of Finance (MOF)	<ul style="list-style-type: none"> ● Borrower representative; ● Signing the Loan Agreement; ● Primarily responsible for supporting YPDOT in the implementation of the project; and

Project Implementation Organizations	Management Roles and Responsibilities
	<ul style="list-style-type: none"> • Practical training of YPDOT on ADB financial documentation requirements, as needed.
Asian Development Bank (ADB)	<ul style="list-style-type: none"> • Providing timely guidance to the EA and IA at each stage of the project for smooth implementation in accordance with the agreed implementation arrangements; • Reviewing all the documents that require ADB approval; • Conducting regular loan review missions, a midterm review, and project completion mission; • Ensuring compliance with all loan covenants including safeguards; • Timely processing of withdrawal applications and releasing eligible funds; • Monitoring the compliance with financial audit recommendations; • Regularly updating of the project performance review reports with the assistance of YPDOT and IA, and • Regularly posting on ADB web the updated project information documents for public disclosure, and also the safeguards documents as per disclosure provisions of the ADB Safeguards Policy Statement.

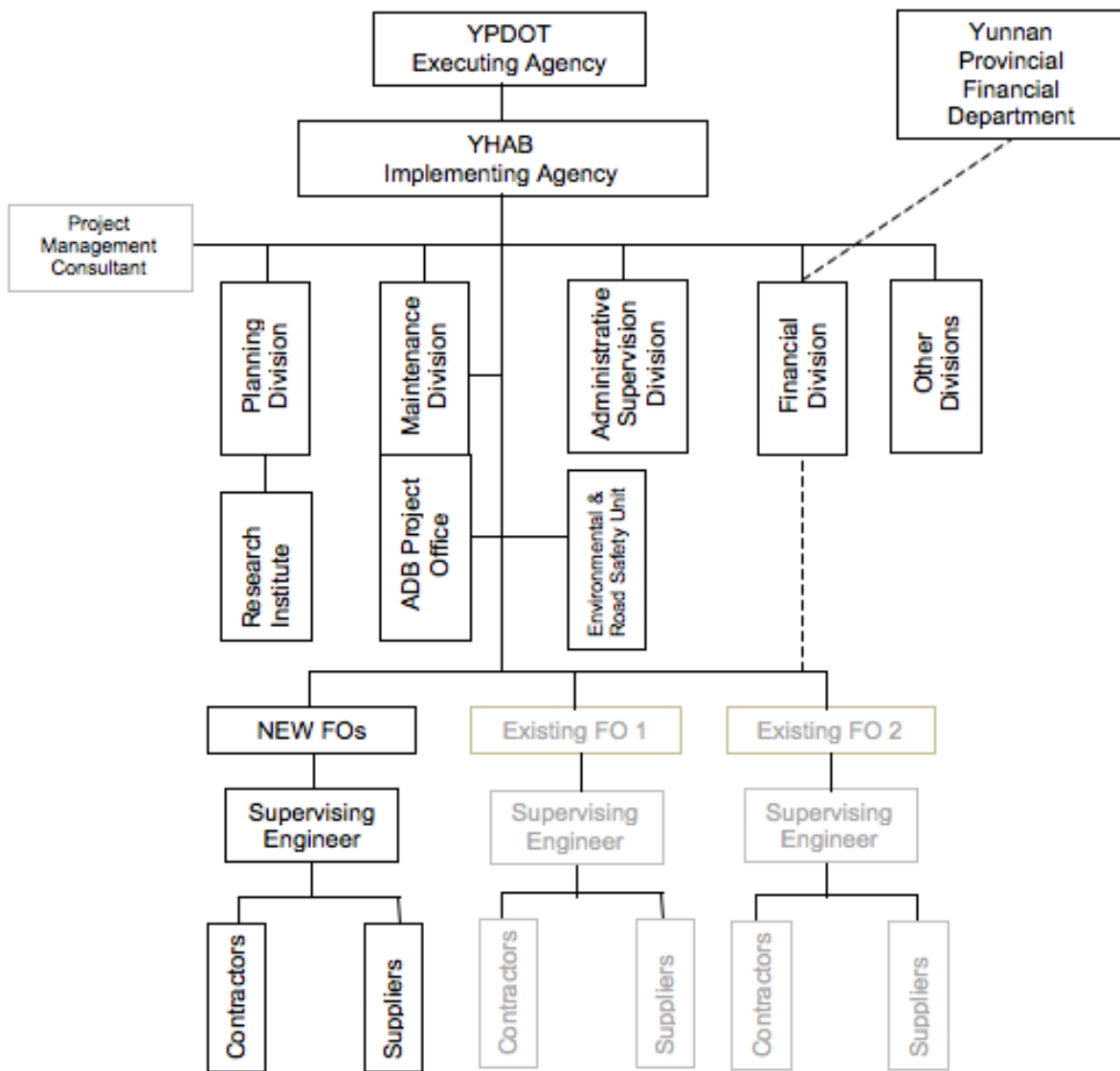
B. Key Persons Involved in Implementation

Government	
Yunnan Provincial Department of Transport (YPDOT)	Mr. Xu Caijian Deputy Executive Director, IFI-Financed Project, YPDOT Tel/Fax: +86 87163126954 Email address: ynxci@163.com 1 Huanchengxilu Road, Kunming, Yunnan Province People's Republic of China 650011
Yunnan Provincial Financial Bureau (YFPB)	Mr. Li Baochun Director of the International Cooperation Division, YFPB Fax: +86 87163631025 Email address: ymswc@126.com
Yunnan Highway Administration Bureau (YHAB)	Mr. Shen Haiping Deputy Director General, YHAB Fax: +86 87163516919 Mr. Zhang Shijun Deputy Director, Maintenance Division / Head, Project Office, YHAB Ms. Wu Likun Liaison Officer, Project Office, YHAB Tel: +86 871-63516560 Cell: +86 13987165123, Email address: wulikun163@163.com
Asian Development Bank	
Transport Division, East Asia Department	Mr. Tyrrell Duncan Director Tel: + 63 2 632 6383 (local)/Fax: + 63 2 636 2426 Email address: tduncan@adb.org 6 ADB Avenue, Mandaluyong City 1550 Metro Manila, Philippines
Mission Leader	Mr. David Fay

Transport Specialist
Transport Division, East Asia Department
Tel: +63 2 632 5063/Fax +63 2 636 2444/2426
Email address: dfay@adb.org
6 ADB Avenue, Mandaluyong City
1550 Metro Manila, Philippines

C. Project Organization Structure

Figure 1: Project Organizational Structure



IV. COSTS AND FINANCING

30. The ADB loan will finance 34.42% of the total project costs, including taxes and duties on expenditures financed by ADB. The remaining cost will be financed by the Yunnan provincial government. The Yunnan provincial government has made budgetary provisions for the counterpart funds. The financing plan is in Table 6.

Table 6: Financing Plan

Source	Amount (\$ million)	Share of Total (%)
Asian Development Bank	80.00	34.42
Yunnan Provincial Government	152.40	65.58
Total	232.40	100.00

Source: Asian Development Bank.

31. The Borrower of the loan is the PRC. The Borrower will make the loan proceeds available to the Yunnan provincial government, which will onlend the proceeds to the YHAB with the contemporaneous provision of a guarantee of repayment by the YPDOT. The YHAB will assume the foreign exchange and interest rate variation risks for the ADB loan. The Borrower has provided ADB with (i) the reasons for its decision to borrow under ADB's LIBOR-based lending facility based on these terms and conditions, and (ii) assurances that these choices were its own independent decision and not made in reliance on any communication or advice from ADB.

32. The Borrower will relend the proceeds of the loan to the Yunnan provincial government upon terms and conditions acceptable to ADB, and the Yunnan provincial government will make the proceeds of the loan available to the YHAB pursuant to onlending arrangements on terms and conditions satisfactory to ADB, with the provision of a guarantee of the obligation to repay being issued by the YPDOT to the Borrower. Except as ADB may otherwise agree, the terms for such onlending arrangements shall include (i) commitment charge and interest at the rates identical to those applied to the loan; (ii) a grace period and a principal repayment period identical to those applied to the loan; and (iii) the YHAB bearing the foreign exchange and interest rate variation risks.

33. The Borrower shall cause the Yunnan provincial government and the Yunnan provincial government shall cause the YPDOT and the YHAB to apply the proceeds of the loan to the financing of expenditures on the project in accordance with the provisions of the Loan Agreement and the Project Agreement.

A. Detailed Cost Estimates by Expenditure Category

Table 7: Detailed Cost Estimates by Expenditure Category

Item	(CNY Million)			(\$ Million)			% of Total Base cost
	Foreign Exchange	Local Currency	Total Cost	Foreign Exchange	Local Currency	Total Cost	
A. Investment Costs^a							
1. Trunk Road Rehabilitation	500.22	657.07	1,157.29	81.73	107.35	189.08	81.4%
a. Phase I	104.89	128.20	233.10	17.14	20.95	38.08	16.4%
b. Phase II	165.26	201.98	367.24	27.00	33.00	60.00	25.8%
c. Phase III	165.26	201.98	367.24	27.00	33.00	60.00	25.8%
d. Phase IV	64.81	79.22	144.03	10.59	12.94	23.53	10.1%
e. Design, Procurement, Supervision	0.00	44.46	44.46	0.00	7.26	7.26	3.1%
f. Community-Based Safety Program	0.00	1.22	1.22	0.00	0.20	0.20	0.1%
2. Performance-Based Maintenance Pilots	41.31	52.64	93.95	6.75	8.60	15.35	6.6%
a. Performance-Based Routine Maintenance	13.77	16.83	30.60	2.25	2.75	5.00	2.2%
b. Output and Performance-Based Maintenance	27.54	33.66	61.21	4.50	5.50	10.00	4.3%
c. Design, Procurement, Supervision	0.00	2.14	2.14	0.00	0.35	0.35	0.2%
3. Road Asset Management System	1.47	10.10	11.56	0.24	1.65	1.89	0.8%
a. Equipment and Software	1.47	0.37	1.84	0.24	0.06	0.30	0.1%
b. Development and Installation	0.00	9.73	9.73	0.00	1.59	1.59	0.7%
4. Institutional Strengthening	11.94	7.88	19.81	1.95	1.29	3.24	1.4%
a. Consulting Services	7.04	0.00	7.04	1.15	0.00	1.15	0.5%
b. Training	4.90	4.28	9.18	0.80	0.70	1.50	0.6%
c. ADB Project Office and ESSU	0.00	3.59	3.59	0.00	0.59	0.59	0.3%
Subtotal (A) =Total Base Cost	554.94	727.68	1,282.62	90.67	118.89	209.56	90.2%
B. Contingencies							
1. Physical ^b	19.25	28.88	48.14	3.15	4.72	7.86	3.4%
2. Price ^c	23.19	34.79	57.98	3.79	5.68	9.47	4.1%
Subtotal (B)	42.45	63.67	106.12	6.94	10.40	17.34	8.3%
C. Financing Charges during Implementation							
1. Interest During Implementation ^d	32.70	0.00	32.70	5.34	0.00	5.34	2.3%
2. Commitment Charges ^e	0.98	0.00	0.98	0.16	0.00	0.16	0.1%
Subtotal (C)	33.68	0.00	33.68	5.50	0.00	5.50	2.4%
	631.07	791.35	1,422.42	103.11	129.29	232.40	100.0%

^a Including value-added tax, customs and duties.

^b 4% on physical works.

^c Price contingency is set at 2% in 2013, 4% in 2014, 6% in 2015 and 8% in 2016.

^d Interest during construction for the ADB loan has been computed at the 5-year USD fixed swap rate plus a spread of 0.4% + 0.2% maturity premium.

^e Commitment charges for an ADB loan are 0.15% per year to be charged on the undisbursed loan amount.

B. Allocation and Withdrawal of Loan Proceeds

Table 8: Allocation and Withdrawal of Loan Proceeds

Category				ADB Financing
Number	Item	Total Amount Allocated for ADB Financing (US\$)		Percentage and Basis for Withdrawal from the Loan Account
		Category	Subcategory	
1	Civil Works	77,550,000		
1A	Trunk Road Rehabilitation - Phase I		13,210,000	62% of total expenditure
1B	Trunk Road Rehabilitation - Phase II		20,000,000	62% of total expenditure
1C	Trunk Road Rehabilitation - Phase III		20,000,000	62% of total expenditure
1D	Trunk Road Rehabilitation - Phase IV		14,590,000	62% of total expenditure
1E	Performance-Based Maintenance - Wenshan Pilot ^a		9,750,000	100% of total expenditure
2	Consulting Services and Training	2,150,000		100% of total expenditure
3	Equipment and Software	300,000		100% of total expenditure
	Total	80,000,000		

ADB = Asian Development Bank.

^a Financing allocated to this item under this Loan Agreement shall be utilized first at 100% of every claim until it has been disbursed in full. Thereafter, financing allocated to this item from Borrower sources shall be utilized at 100% of every claim.

C. Detailed Cost Estimates by Financier

Table 9: Detailed Cost Estimates by Financier
(\$ million)

Item	ADB		YHAB		Total Cost
	Amount	% of Cost Category	Amount	% of Cost Category	
A. Investment Costs					
1. Civil Works	77.55	39.40	119.27	60.60	196.82
a. Trunk Road Rehabilitation - Phase I	13.21	62.00	8.10	38.00	21.31
b. Trunk Road Rehabilitation - Phase I (Gov.)	0.00	0.00	16.78	100.00	16.78
c. Trunk Road Rehabilitation - Phase II	20.00	62.00	12.26	38.00	32.26
d. Trunk Road Rehabilitation - Phase II (Gov.)	0.00	0.0	27.74	100.00	27.74
e. Trunk Road Rehabilitation - Phase III	20.00	62.00	12.26	38.00	32.26
f. Trunk Road Rehabilitation - Phase III (Gov.)	0.00	0.0	27.74	100.00	27.74
g. Trunk Road Rehabilitation - Phase IV	14.59	62.00	8.94	38.00	23.53
h. Performance-based maintenance – Ruili Pilot	0.00	0.00	5.00	100.00	5.00
i. Performance-based maintenance – Wenshan Pilot ^a	9.75	97.50	0.25	2.50	10.00
j. Community-Based Safety Program	0.00	0.00	0.20	100.00	0.20
2. Mechanical and Equipment					
a. Equipment and Software	0.30	100.00	0.00	0.00	0.30
3. Consultants	2.15	17.20	10.28	82.4	12.44
a. Project Management Consultant	1.15	100.00	0.00	0.00	1.15
b. Training	1.00	66.67	0.50	33.33	1.50
c. ADB Project Office and ESSU	0.00	0.00	0.59	100.00	0.59
d. Design, Procurement, Supervision	0.00	0.00	7.61	100.00	7.61
e. System Development and Installation	0.00	0.00	1.59	100.00	1.59
Subtotal (A) = Total Base Cost	80.00	38.18	129.56	61.82	209.56
B. Contingencies^{b,c}	0.00	0.00	17.34	100.00	17.34
C. Financing Charges during Implementation^{d,e}	0.00	0.00	5.50	100.0	5.50
Total Project Cost (A+B+C)	80.00	34.42	152.40	65.58	232.40
% Total Project Cost	34.42%		65.58%		100.00%

ADB = Asian Development Bank; ESSU = Environment, Social, and Safety Unit; IDC = interest during construction; Gov. = government-financed contracts; YHAB = Yunnan Highway Administration Bureau.

^a ADB financing under the Wenshan pilot will be front-loaded to 100% of any claim submitted, which has been determined appropriate as (i) ADB financing covers 97.5% of the costs, and as (ii) the remaining costs to be financed by the government involve only routine maintenance and as such does not involve material risk to the success of the project.

^b 4% on physical works.

^c Price contingency is set at 2% in 2013, 4% in 2014, 6% in 2015, and 8% in 2016.

^d Interest during construction for the ADB loan has been computed at the 5-year USD fixed swap rate plus a spread of 0.4% + 0.2% maturity premium.

^e Commitment charges for an ADB loan are 0.15% per year to be charged on the undisbursed loan amount.

Source: ADB estimates.

D. Detailed Cost Estimates by Outputs

Table 10: Detailed Cost Estimates by Outputs
(\$ million)

Item	Total Cost	Output 1		Output 2		Output 3		Output 4	
		Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category	Amount	% of Cost Category
A. Investment Costs									
1. Civil Works	196.82	181.82	92.38	15.00	7.62	0.00	0.00	0.00	0.00
2. Mechanical and Equipment									
a. Equipment and Software	0.30	0.00	0.00	0.00	0.30	0.30	100.00	0.00	0.00
3. Consultants									
a. Project Management Consultant	1.15	0.00	0.00	0.00	0.00	0.00	0.00	1.15	100.00
b. Training	1.50	0.00	0.00	0.00	0.00	0.00	0.00	1.50	100.00
c. ADB Project Office and ESSU	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.59	100.00
d. Design, Procurement, Supervision	7.61	7.26	95.40	0.35	4.60	0.00	0.00	0.00	0.00
e. System Development and Installation	1.59	0.00	0.00	0.00	0.00	1.59	100.00	0.00	0.00
Subtotal (A) =Total Base Cost	209.56	189.08	90.23	15.35	88.53	1.89	0.00	3.24	0.00
B. Contingencies									
1. Physical ^a	7.86	7.26	92.37	0.60	3.46	0.00	0.00	0.00	0.00
2. Price ^b	9.47	8.73	92.15	0.55	5.84	0.03	0.32	0.16	1.69
Subtotal (B)	17.34	15.99	92.25	1.15	6.65	0.03	0.18	0.16	0.92
C. Financing Charges during Implementation									
1. Interest During Implementation ^c	5.34	4.39	82.25	0.78	14.60	0.03	0.53	0.14	2.61
2. Commitment Charges ^d	0.16	0.15	90.67	0.01	6.46	0.00	0.00	0.00	2.87
Subtotal (C)	5.50	4.54	82.50	0.79	14.37	0.03	0.52	0.14	2.62
Total Project Cost (A+B+C)	232.40	209.61	90.20	17.29	7.44	1.95	0.84	3.54	1.52
% Total Project Cost	100.00								

ADB = Asian Development Bank; ESSU = Environment, Social, and Safety Unit.

^a 4% on physical works.

^b Price contingency is set at 2% in 2013, 4% in 2014, 6% in 2015 and 8% in 2016.

^c Interest during construction for the ADB loan has been computed at the 5-year USD fixed swap rate plus a spread of 0.4% + 0.2% maturity premium.

^d Commitment charges for an ADB loan are 0.15% per year to be charged on the undisbursed loan amount.

E. Detailed Cost Estimates by Year

Table 11: Detailed Cost Estimates by Year
(\$ million)

Item	Total Cost	2013	2014	2015	2016	2017	2018
A. Investment Costs							
1. Trunk Road Rehabilitation							
a. Phase I	38.08	-	19.46	18.63	-	-	-
b. Phase II	60.00	-	10.00	40.00	10.00	-	-
c. Phase III	60.00	-	-	20.00	40.00	-	-
d. Phase IV	23.53	-	-	-	11.77	11.77	-
e. Design, Procurement, Supervision	7.26	0.95	1.94	2.68	1.51	0.18	-
f. Community-Based Safety Program	0.20	-	0.03	0.07	0.07	0.03	-
2. Performance-Based Maintenance Pilots							
a. Performance-Based Routine Maintenance	5.00	-	2.09	2.09	0.41	0.42	-
b. Output and Performance-Based Maintenance	10.00	-	4.20	4.65	0.45	0.45	0.25
c. Design, Procurement, Supervision	0.35	0.13	0.09	0.10	0.01	0.01	0.00
3. Road Asset Management System							
a. Equipment and Software	0.30	-	0.30	-	-	-	-
b. Development and Installation	1.59	0.36	1.23	-	-	-	-
4. Institutional Strengthening							
a. Consulting Services	1.15	-	0.12	0.47	0.37	0.19	-
b. Training	1.50	-	0.40	0.40	0.30	0.30	0.10
c. ADB Project Office and ESSU	0.59	0.13	0.12	0.12	0.12	0.12	-
Subtotal (A) = Total Base Cost	209.56	1.56	39.98	89.20	65.00	13.46	0.35
B. Contingencies							
1. Physical ^a	7.86	-	1.43	3.41	2.51	0.51	0.01
2. Price ^b	9.47	-	0.80	3.57	3.97	1.10	0.04
Subtotal (B)	17.34	-	2.23	6.98	6.47	1.61	0.05
C. Financing Charges during Implementation							
1. Interest During Implementation ^c	5.34	-	0.30	0.99	1.52	1.69	0.84
2. Commitment Charges ^d	0.16	-	0.10	0.05	0.01	0.00	0.00
Subtotal (C)	5.50	-	0.40	1.04	1.53	1.69	0.84
Total Project Cost (A+B+C)	232.40	1.56	42.61	97.22	73.00	16.76	1.24
% Total Project Cost	100%	1%	18%	42%	31%	7%	1%

ADB = Asian Development Bank; ESSU = Environment, Social, and Safety Unit.

^a 4% on physical works.

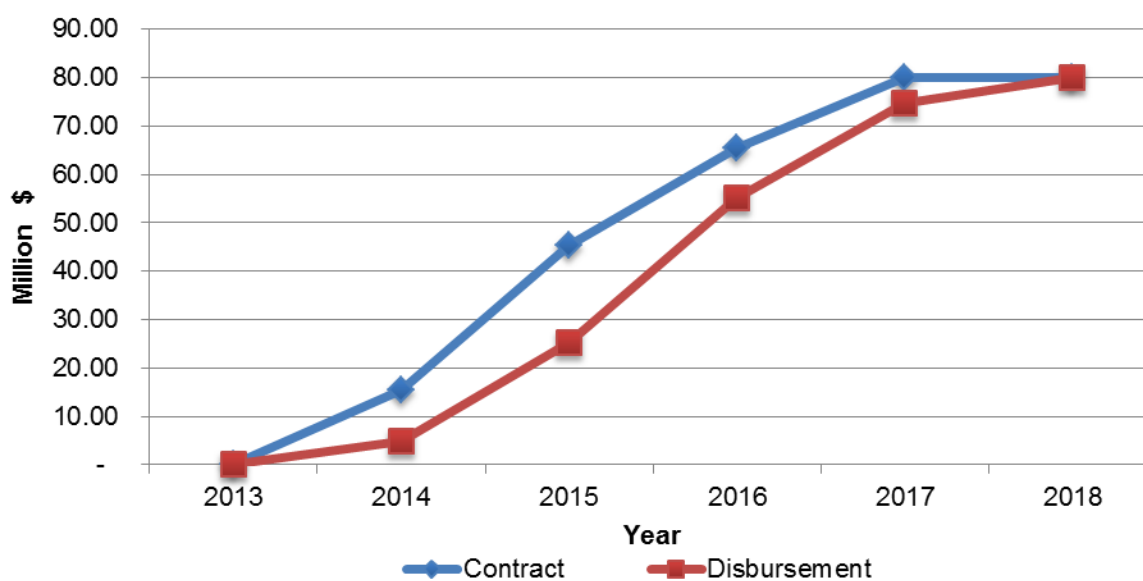
^b Price contingency is set at 2% in 2013, 4% in 2014, 6% in 2015 and 8% in 2016.

^c Interest during construction for the ADB loan has been computed at the 5-year USD fixed swap rate plus a spread of 0.4% + 0.2% maturity premium.

^d Commitment charges for an ADB loan are 0.15% per year to be charged on the undisbursed loan amount.

F. Contract and Disbursement S-Curve

Figure 2: Contract and Disbursement Projections

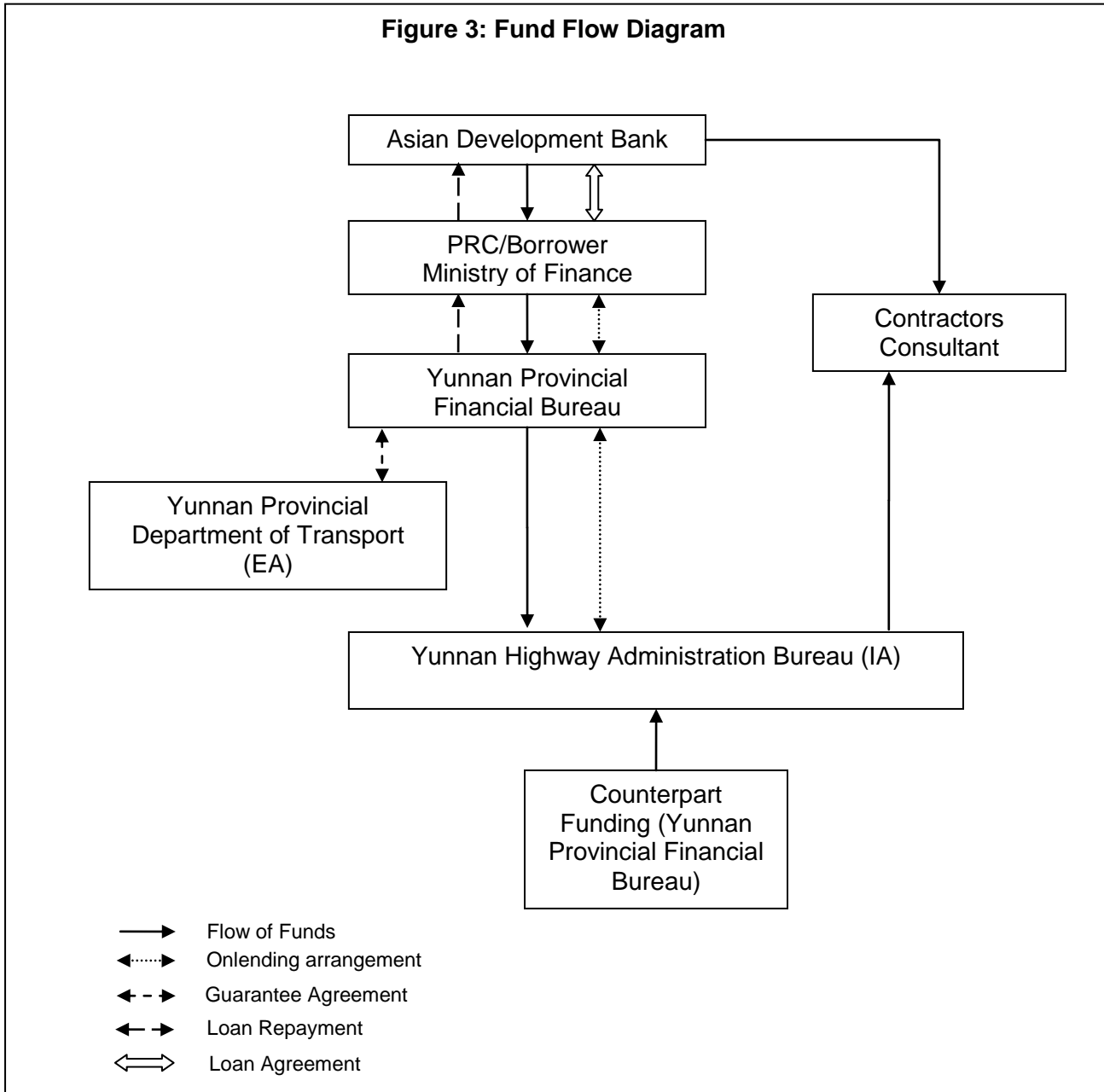


Source: ADB

Table 12: Project Contract Awards and Disbursements

Year	Contract	Disbursement	Cumulative	
			Contract	Disbursement
2013	0.00	0.00	0.00	0.00
2014	15.36	4.81	15.36	4.81
2015	30.05	20.44	45.41	25.25
2016	20.00	29.96	65.41	55.21
2017	14.59	19.36	80.00	74.58
2018	0.00	5.42	80.00	80.00
Total	80.00	80.00		

G. Fund Flow Diagram



V. FINANCIAL MANAGEMENT

A. Financial Management Assessment

34. A financial management assessment was undertaken for the YHAB. The YHAB satisfies the ADB minimum financial management requirements for IA. The YHAB's current financial management system is adequate to (i) record required financial transactions and balances; (ii) provide regular and reliable financial statements and monitoring reports during project

implementation; (iii) safeguard the financial assets; and (iv) provide the required audited financial documents acceptable to ADB. The identified capacity constraints include lack of English speaking staff and limited experience in ADB disbursement procedure.

35. Detailed financial arrangements under the project are as follows.

- (i) **Funds Flow.** The project counterpart fund will come from the national and the Yunnan provincial government. The flow of the counterpart funds will follow existing government arrangements. The flow of ADB funds will follow ADB's direct payment and reimbursement procedures.
- (ii) **Staffing.** The YHAB financial division handles disbursements of ADB funds. Staff will undergo training on ADB reporting and disbursement procedures to ensure maintenance of ADB standards for project accounting and financial management. The YHAB financial division needs to engage a professional translator to ensure timely and quality submissions to ADB in English language.
- (iii) **Accounting Policies and Procedures.** The YHAB financial division will use an automated accounting system. Subsidiary ledgers will be adequately reconciled with the general ledger. All reports and supporting documents on all transactions will be stored and retained properly. There will be a clear segregation of the accounting and management duties.
- (iv) **Budgeting System.** The project office will prepare annual physical and financial budgets. Budgets will be prepared annually by the budget officers. The Deputy Director General of the YHAB will approve the final budget before endorsement to the YPDOT and the Yunnan provincial government. Monthly and annual reports will be prepared comparing the budgeted and actual amounts showing variances in accounts.
- (v) **Payments.** Payment vouchers will be prepared for all payments. All project payments will be done by using bank transfers. The direct payment procedures will be applied for large civil works contracts.
- (vi) **Project Accounts.** The YHAB financial division will maintain a separate bank accounts for counterpart funds. All transfers will be signed by the director and the head of financial division of the YHAB. Bank reconciliations will be prepared at the end of each month.
- (vii) **Safeguard over Assets.** Sufficient controls will be established over project assets to safeguard and protect assets from fraud, waste, and abuse. The project office will maintain the record of all assets. An annual physical inventory will be done to ensure existence of all assets.
- (viii) **Internal Audit.** An internal audit unit will undertake timely audits of project accounts in accordance with generally accepted accounting principles.
- (ix) **External Audit.** Project accounts will be audited annually by the National Audit Office. Audit will be carried out in accordance to the international auditing standards and requirements of the government.
- (x) **Reporting and Monitoring.** The project financial reports will be prepared using an excel-based electronic spreadsheet on a quarterly basis. The project reports will highlight the physical and financial progress of projects being implemented. During the loan implementation period, certified copies of annual audited accounts and financial statements (in English) will be submitted within 6 months after the end of each fiscal year.
- (xi) **Information Systems.** The project office will have a computerized management information system. The reporting and monitoring system will be capable of

generating project reports for both external and internal use. The project staffs will be trained for the smooth operation of the system.

B. Disbursement

36. The loan proceeds will be disbursed in accordance with ADB's *Loan Disbursement Handbook* (2012),¹¹ and detailed arrangements agreed upon between the government and ADB.

37. Pursuant to ADB's *Safeguard Policy Statement* (2009) (SPS), ADB funds may not be applied to the activities described on the ADB Prohibited Investment Activities List set forth at Appendix 5 of the SPS. All financial institutions will ensure that their investments are in compliance with applicable national laws and regulations and will apply the prohibited investment activities list to subprojects financed by ADB.

38. The YPDOT on behalf of the Yunnan provincial government, will be responsible for (i) requesting budgetary allocations for counterpart funds, (ii) collecting supporting documents, and (iii) preparing and sending withdrawal applications to ADB.

39. For large contracts, direct payment procedures will be used to withdraw the loan funds. If the government funds are used first for eligible expenditures, ADB's reimbursement procedure will be used. Statement of expenditures will be applied to reimburse eligible expenditures for any individual payment not exceeding \$200,000 to expedite fund flows. SOE records should be maintained and made readily available for review by ADB's disbursement and review mission or upon ADB's request for submission of supporting documents on a sampling basis, and for independent audit.¹²

40. Before the submission of the first withdrawal application (WA) or reimbursement request (RR), the Borrower should submit to ADB sufficient evidence of the authority of the person(s) who will sign the WAs and RRs on behalf of the Borrower, together with the authenticated signature for each authorized person. The minimum value per WA or RR is \$100,000, unless otherwise approved by ADB. The YHAB is to consolidate claims to meet the limit for reimbursement claims. WAs, RRs, and supporting documents will demonstrate, among others things that the goods and/or services were produced in or from ADB members, and are eligible for ADB financing. RRs will be submitted on quarterly basis.

C. Accounting

41. The YPDOT will maintain, or cause to be maintained, separate books and records by funding source for all expenditures incurred on the project. The YPDOT will prepare consolidated project financial statements in accordance with the government's accounting laws and regulations which are consistent with international accounting principles and practices.

¹¹ Available at: <http://www.adb.org/documents/loan-disbursement-handbook>.

¹² Checklist for SOE procedures and formats are available at:
http://www.adb.org/documents/handbooks/loan_disbursement/chap-09.pdf.
http://www.adb.org/documents/handbooks/loan_disbursement/SOE-Contracts-100-Below.xls.

D. Auditing and Public Disclosure

42. The YPDOT will cause the detailed consolidated project financial statements to be audited in accordance with International Standards on Auditing and with the Government's audit regulations, by an independent auditor acceptable to ADB. The audited project financial statements will be submitted in the English language to ADB within six months of the end of the fiscal year by the YPDOT.

43. The annual audit report for the project accounts will include an audit management letter and audit opinions which cover (i) whether the project financial statements present a true and fair view or are presented fairly, in all material respects, in accordance with the applicable financial reporting framework; (ii) whether loan and grant proceeds were used only for the purposes of the project or not; (iii) the level of compliance for each financial covenant contained in the legal agreements for the project; (iv) use of the imprest fund procedure; and (v) the use of the statement of expenditure procedure certifying to the eligibility of those expenditures claimed under SOE procedures, and proper use of the SOE and imprest procedures in accordance with ADB's Loan Disbursement Handbook and the project documents.

44. Compliance with financial reporting and auditing requirements will be monitored by review missions and during normal program supervision, and followed up regularly with all concerned, including the external auditor.

45. The Government, YPDOT and YHAB have been made aware of ADB's policy on delayed submission, and the requirements for satisfactory and acceptable quality of the audited project financial statements¹³. ADB reserves the right to require a change in the auditor (in a manner consistent with the constitution of the borrower), or for additional support to be provided to the auditor, if the audits required are not conducted in a manner satisfactory to ADB, or if the audits are substantially delayed. ADB reserves the right to verify the project's financial accounts to confirm that the share of ADB's financing is used in accordance with ADB's policies and procedures.

46. Public disclosure of the project financial statements, including the audit report on the project financial statements, will be guided by ADB's Public Communications Policy (2011)¹⁴. After review, ADB will disclose the project financial statements for the project and the opinion of the auditors on the financial statements within 30 days of the date of their receipt by posting them on ADB's website. The Audit Management Letter will not be disclosed.

¹³ ADB Policy on delayed submission of audited project financial statements:

- When audited project financial statements are not received by the due date, ADB will write to the executing agency advising that (i) the audit documents are overdue; and (ii) if they are not received within the next six months, requests for new contract awards and disbursement such as new replenishment of imprest accounts, processing of new reimbursement, and issuance of new commitment letters will not be processed.
- When audited project financial statements have not been received within 6 months after the due date, ADB will withhold processing of requests for new contract awards and disbursement such as new replenishment of imprest accounts, processing of new reimbursement, and issuance of new commitment letters. ADB will (i) inform the executing agency of ADB's actions; and (ii) advise that the loan may be suspended if the audit documents are not received within the next six months.

¹⁴ Available from <http://www.adb.org/documents/pcp-2011?ref=site/disclosure/publications>.

VI. PROCUREMENT AND CONSULTING SERVICES

A. Advance Contracting and Retroactive Financing

47. All advance contracting and retroactive financing will be undertaken in conformity with ADB's *Procurement Guidelines* (2013, as amended from time to time)¹⁵ and ADB's *Guidelines on the Use of Consultants* (2013, as amended from time to time).¹⁶ The issuance of invitations to bid under advance contracting and retroactive financing will be subject to ADB approval. ADB's approval of advance contracting will not commit ADB to subsequently approve the project or to finance the procurement costs; and ADB will not finance expenditures paid by the borrower prior to loan or grant effectiveness, even if advance contracting is approved, unless retroactive financing has also been approved by ADB. Advance contracting and retroactive financing may apply to categories 1A (Trunk Road Rehabilitation – Phase I), 1E (Performance-based Maintenance – Wenshan Pilot), 2 (Consulting Services and Training), and 3 (Equipment and Software).

48. The YPDOT was advised that retroactive financing could only apply up to \$8 million, the equivalent of 10% of the total ADB loan, with respect to expenditures incurred before loan effectiveness, but not more than 12 months before the signing of the Loan Agreement.

B. Procurement of Goods, Works, and Consulting Services

49. All procurement of goods and works where there is any ADB funding will be undertaken in accordance with ADB's *Procurement Guidelines*. During the first year of the project, the ADB-funded civil works will be divided into 6 packages and procured through national competitive bidding (NCB). Out of the six packages, one will be a 5-year output and performance-based maintenance contract. A further three packages will be procured solely under government funding and procured through government procurement procedures. One of these is a 3-year performance-based maintenance contract. A well-qualified tendering company will be recruited by the YHAB to handle competitive bidding.

50. **Bids by Dependent State Owned Enterprises.** Under the ADB Procurement Guidelines, bidders which are state-owned enterprises must be independent and not have a conflict of interest. The YHAB may restructure some of the state-owned enterprises currently subordinated to its general sections to grant them full independence, with the objective to increase competition. Determination of whether any bidder is qualified to NCB will be made in accordance with ADB's *Procurement Guideline*. In order to establish eligibility, the government-owned enterprises or institutions shall be eligible only if they can demonstrate, *inter alia*, that they are (i) legally and financially autonomous, (ii) operate under commercial law, and (iii) are not dependent agencies of the YPDOT or YHAB.

51. During the second, third, and fourth year of the project, the YHAB will select and appraise new subprojects under Output 1. The YHAB will submit a revised procurement plan to ADB for approval prior to procurement of each phase of works. It is estimated that 14 additional ADB-funded contract packages will be procured through NCB during the project, and that 11 solely government-funded contract packages will be procured through government procurement procedures.

¹⁵ Available at: <http://www.adb.org/Documents/Guidelines/Procurement/Guidelines-Procurement.pdf>.

¹⁶ Available at: <http://www.adb.org/Documents/Guidelines/Consulting/Guidelines-Consultants.pdf>.

52. The YPDOT and YHAB shall not award, any Works contract in respect of Works under each Phase II, Phase III and Phase IV, until YPDOT, YHAB and ADB shall have concluded a memorandum of understanding in respect of the corresponding Phase, following a joint review of preparatory steps, including selection of the proposed Subprojects for the upcoming Phase, and of the status of agreed measures under the road sector roadmap.

53. An 18-month procurement plan indicating threshold and review procedures, goods, works, and consulting service contract packages and national competitive bidding guidelines is in Section C.

54. The project will finance 49 person-months (pm) of international consulting services and 62 pm of capacity building through international training. An international consulting firm will be selected and contracted according to the ADB's *Guidelines on the Use of Consultants* (2013, as amended from time to time), using the quality and cost-based selection method at the quality-to-cost ratio of 80:20.¹⁷

¹⁷ Checklists for actions required to contract consultants by method available in e-Handbook on Project Implementation at: <http://www.adb.org/documents/handbooks/project-implementation/>.

C. Procurement Plan

Table 13: Basic Data

Country	People's Republic of China
Borrower	People's Republic of China
Project Name	Yunnan Sustainable Road Maintenance (Sector) Project
Executing Agency	Yunnan Provincial Department of Transport
Loan Amount	\$80 million
Period Covered by this Plan	2013–2018
Date of this Procurement Plan	25 September 2013

Source: Asian Development Bank.

1. Process Thresholds, Review, and 18-Month Procurement Plan

a. Project Procurement Thresholds

55. Except as ADB may otherwise agree, the following process thresholds shall apply to procurement of goods and works.

Table 14: Procurement Thresholds for Goods and Works

Procurement Method	Description
ICB for Works	\$10,000,000 and above
ICB for Goods	\$1,000,000 and above
NCB for Works	\$200,000 and above, less than \$10,000,000
NCB for Goods	\$100,000 and above, less than \$1,000,000
Shopping for Goods	Less than \$100,000

ICB = international competitive bidding, NCB = national competitive bidding.

Source: Asian Development Bank.

Table 15: Procurement Threshold for Consulting Services

Procurement Method	To be used above/below (\$)
Quality- and Cost-Based Selection	\$200,000 and above
Single-Source Selection	Up to \$200,000

Source: Asian Development Bank.

b. ADB Prior or Post Review

56. Except as ADB may otherwise agree, the following prior or post-review requirements apply to various procurement and consultant recruitment methods used for this project.

Table 16: Various Procurement and Consultant Recruitment Methods

Procurement of Goods and Works	
Procurement Method	Prior or Post
ICB Works	Prior
ICB Goods	Prior
NCB Works	Prior
NCB Goods	Prior
SHOPPING for Goods	Post
Recruitment of Consulting Firms	
Quality- and Cost-Based Selection (QCBS) (80:20 ratio, full technical proposal)	Prior

Recruitment of Individuals	
Individual Consultants Selection	Prior
ICB = international competitive bidding, NCB = national competitive bidding. Source: Asian Development Bank.	

c. Works Contracts Estimated to Cost more than \$1 million

57. Table 17 lists works contracts, while Table 18 lists consulting services contract for which procurement activity is expected to commence within the next 18 months.

Table 17: ADB-Financed Civil Works Contract Packages
(to commence within the next 18 months)

Contract Package	Description	Length (km)	Contract Value (\$ million)	Procurement Method	Advertisement Date (quarter/year)	Remarks
T1/KUN/JIN/G213a	K2118+235-K2139+000	46.0	6.65	NCB	Q1/2014	ADB Financed
T1/YUX/YUX/G213b	K2163+890-K2178	15.0	3.05	NCB	Q1/2014	ADB Financed
T1/DAL/XIA/G320	K3063-K3194	17.0	3.09	NCB	Q1/2014	ADB Financed
T1/KUN/SON/S211	K98+286-K111+860	31.0	7.78	NCB	Q1/2014	ADB Financed
T1/WEN/G323/P	K1622-K1712	57.0	9.75	NCB	Q1/2014	ADB Financed/ Performance-based contract
Total		166.0	30.3			

NCB = national competitive bidding.

Note: The contract values do not include costs for design (1.5%), procurement (1%), and supervision (1.5%).

Table 18: Consulting Services Contract Packages

General Description	Contract Value (\$ million)	Recruitment Method	Advertisement Date (quarter/year)	International or National Assignment	Comments
Project Management and Training	2.66	QCBS (80:20)	Q4/2013	International	

QCBS = quality- and cost-based selection.

d. Procurement Plan for Non-ADB Financed Contracts

58. Table 19 lists goods and works contracts that are not financed by ADB for which procurement will be expected to commence within the first 18 months, following government procurement procedures (GPP).

Table 19: Contracts of Goods and Works Not Financed by ADB
(within 18 months)

Contract Package	Description	Length (km)	Contract Value (\$ million)	Procurement Method	Advertisement Date (quarter/year)	Remarks
T1/DEH/RUI/X214	K10+600-K26+700	16.0	2.51	GPP	Q1/2014	Financed by the Borrower
T1/KUN/LUQ/G108	K3290-K3303	46.0	9.32	GPP	Q1/2014	Financed by the Borrower
T1/LIN/YAN/S321	K71-K85, K185-K193	22.0	4.37	GPP	Q1/2014	Financed by the Borrower
T1/DEH/G320-2/S234/P	K3585-K3635 K8-K37, K190-218	55.8	4.62	GPP	Q1/2014	Financed by the Borrower
Total		139.8	20.8			

GPP = government procurement procedures.

Note: The contract values do not include costs for design (1.5%), procurement (1%), and supervision (1.5%).

2. Procurement After 18 months for ADB and Non-ADB Financed¹⁸

Table 20: Contract Packages for ADB and Non-ADB Financed
(after 18 months)

Contract Package	Description	Length (km)	Contract Value (\$ million)	Estimated Number of GPP	Estimated Number of NCB	Advertisement Date (quarter/year)
Phase II packages		290.0	60.00	5	5	Q4/2014
Phase III packages	Rehabilitation Works	290.0	60.00	5	5	Q4/2015
Phase IV packages		120.0	23.96	2	2	Q4/2016
	Total	700.0	143.96	12	12	

GPP = government procurement procedures, NCB = national competitive bidding.

3. Procurement of Goods Less than \$100,000 by ADB

Table 21: Contracts of Goods Less than \$100,000

Contract Package	Description	Units	Contract Value (US \$)	Procurement Method	Advertisement Date (quarter/year)	Remarks
T1-GPS	Handheld GPS units: Accuracy: Horiz < 5m, Vert < 3m USB, RS232 communications	130	61,000	Shopping for Goods	Q1/2014	ADB Financed
T1-HWARE	Database server (2 units), Optical Switches (2 units), SAN disk array, Fiber tape library		81,000	Shopping for Goods	Q1/2014	ADB Financed
T1-DMS	Anti-Intrusion Detection, Firewall Database Management Software	1	47,000	Shopping for Goods	Q1/2014	ADB Financed
T1-MIDD	Data Backup Software	1	32,000	Shopping for Goods	Q1/2014	ADB Financed
T1-DATA	Application middleware	1	79,000	Shopping for Goods	Q1/2014	ADB Financed
	Data exchange and integration platform	1	79,000	Shopping for Goods	Q1/2014	ADB Financed
	Total		300,000			

D. Consultant's Terms of Reference

59. International and national consultants will assist the EA and the IA in ensuring that (i) designs are carried out to the appropriate engineering and road safety standards, (ii) all activities related to implementation of the project are carried out in an environmentally and socially sound manner, (iii) all reporting requirements of ADB are carried out in accordance with the Project Administration Memorandum (PAM), (iv) preparation and implementation of subprojects under Output 1 is carried out in accordance with the OM and Maintenance Strategy, (v) YHAB is advised on all aspects of the implementation of the Institutional Development Plan, and (vi) EA and IAs' personnel receive in-country and overseas training in selected areas of expressway engineering and management. While carrying out their responsibilities, the international consultants will have as an objective to maximize technology transfer to and learning by the IAs and should take a pro-active approach to identify areas where international best practices could be applied and to advise and train IA's staff on such practices.

60. ADB will fund the services of Project Management Consultant (PMC). The international consultant team will comprise (i) team leader/highway engineer (23 person-months), (ii)

¹⁸ The minimum length of rehabilitation works for each contract should be 10 km which is expected to correspond with minimum contract value of \$1.0 million.

environmental specialist (5 person-months), (iii) road safety specialist (5 person-months), (iv) HDM-4/RAMS specialist (5 person-months), and (v) PBMC specialist (2 person-months). The national team will comprise social safeguards specialist (3 person-months). The project will also finance 100 pm of capacity building through international training in construction management, environment and social safeguard management, highway maintenance, highway financing, and road safety.

61. Key activities of the PMC will include:

- (i) Overall management support of the loan, funding, monitoring, and reporting, in assistance to the ADB Project Management Office;
- (ii) Assist the YHAB in assembling financing requests reports for each phase of works under Output 1, including review of the performance and sustainability report;
- (iii) Assist the YHAB in monitoring all aspects of ongoing subprojects;
- (iv) Oversee and organize the training implementation plan, including overseas training;
- (v) Directly provide some of the training components of the training plan;
- (vi) Assist the YHAB in preparing bid documents, procurement aspects, and contract award;
- (vii) Oversee the implementation of the pilot road maintenance projects;
- (viii) Assist the YHAB in implementing the Institutional Development Plan; and
- (ix) Liaise between the Client and ADB on all project matters.

Table 22: ADB-Financed Consulting Services

Specialist Position	Person Months	Type	Key Areas of Responsibilities
Team Leader/Highway Engineer	23	International	<ul style="list-style-type: none"> • Managing the team • Providing sector policy advice • Advise on preparation of Phase II, Phase III and Phase IV works • Advice in implementation of Institutional Development Plan, including training • Assist YHAB for reporting to ADB and compliance with loan documentation • Development and implementation of PPMS including monitoring of the Project's design and monitoring framework indicators • Procurement / implementation support
Road Safety Specialist	5	International	<ul style="list-style-type: none"> • Road safety assessments • Preliminary design of road safety treatments • Road safety audits • Advice in implementation of Institutional Development Plan
Environmental Specialist	5	International	<ul style="list-style-type: none"> • Oversee environmental assessment and selection of subprojects • Preparation of IEEs and EMPs, under the EARF • Monitoring and auditing of EMP implementation • Advice on implementation of Institutional Development Plan
HDM-4 Specialist	5	International	<ul style="list-style-type: none"> • Prioritization of future subprojects works • Design and Implementation of Road Asset Management System • Preliminary design and economic evaluation of subprojects • Updating of Maintenance Strategy

Specialist Position	Person Months	Type	Key Areas of Responsibilities
Performance-Based Contract Specialist	2	International	<ul style="list-style-type: none"> • Oversight of implementation of pilot road maintenance projects • Training to contractors, supervision consultant and project manager • Evaluation of pilot results
Social Safeguards Specialist	3	National	<ul style="list-style-type: none"> • Overseeing conduct of social surveys and screening and selection of subprojects for IR impacts • Preparation of RPs, as required by RF. Monitoring and reporting of RP implementation or due-diligence • Monitoring and reporting of SDAP implementation

62. Government procedures will be used to appoint design agencies, procurement agencies, and supervision consultants for each project contract. Design agencies will use the model bidding documents supplied in the OM. The designers will be provided with the road safety requirements from the road safety assessment. They will also be provided the Environmental Management Plan (EMP) and social safeguard mitigation, which they are to incorporate into the design process and bid documentation.

63. The Construction Supervision (CS) consultant will be an independent consultant funded by the government and working from a Project Supervision office in the General Section. The CS consultant will receive full bid documentation, EMP, road safety requirements, and social safeguards plans. The CS will ensure that the Contractor carries out all requirements of road safety, environmental and social mitigation plans, and will report compliance with these plans to the ADB Project Office in the YHAB on a monthly basis.

E. National Competitive Bidding

64. The Borrower's *Law of the People's Republic of China on Bid Invitation and Bidding* promulgated by Order No. 21 of the President of the People's Republic of China on 30 August 1999, executed on 1 January 2000, are subject to the following clarifications required for compliance with the Guidelines:

- (i) All invitations to prequalify or to bid shall be advertised in the national press, official gazette, or a free and open access website in the Borrower's country. Such advertisement shall be made in sufficient time for prospective bidders to obtain prequalification or bidding documents and prepare and submit their responses. In any event, a minimum preparation period of 30 days shall be given. The preparation period shall count (a) from the date of advertisement, or (b) when the documents are available for issue, whichever date is later. The advertisement and the prequalification and bidding documents shall specify the deadline for such submission.
- (ii) Qualification requirements of bidders and the method of evaluating the qualification of each bidder shall be specified in detail in the bidding documents, and in the prequalification documents if the bidding is preceded by a prequalification process.
- (iii) If bidding is preceded by a prequalification process, all bidders that meet the qualification criteria set out in the prequalification document shall be allowed to bid and there shall be no limit on the number of pre-qualified bidders.
- (iv) All bidders shall be required to provide a performance security in an amount sufficient to protect the Borrower/Project EA in case of breach of contract by the

- contractor, and the bidding documents shall specify the required form and amount of such performance security.
- (v) Bidders shall be allowed to submit bids by mail or by hand.
 - (vi) All bids shall be opened in public; all bidders shall be afforded an opportunity to be present (either in person or through their representatives) at the time of bid opening, but bidders shall not be required to be present at the bid opening.
 - (vii) All bid evaluation criteria shall be disclosed in the bidding documents and quantified in monetary terms or expressed in the form of pass/fail requirements.
 - (viii) No bid may be rejected solely on the basis that the bid price falls outside any standard contract estimate, or margin or bracket of average bids established by the Borrower/Project EA.
 - (ix) Each contract shall be awarded to the lowest evaluated responsive bidder, that is, the bidder who meets the appropriate standards of capability and resources and whose bid has been determined (a) to be substantially responsive to the bidding documents, and (b) to offer the lowest evaluated cost. The winning bidder shall not be required, as a condition of award, to undertake responsibilities for work not stipulated in the bidding documents or otherwise to modify the bid as originally submitted.
 - (x) Each contract financed with the proceeds of the loan shall provide that the suppliers and contractors shall permit ADB, at its request, to inspect their accounts and records relating to the performance of the contract and to have said accounts and records audited by auditors appointed by ADB.
 - (xi) Government-owned enterprises in the Borrower's country may be permitted to bid if they can establish that they (a) are legally and financially autonomous, (b) operate under commercial law, and (c) are not a dependent agency of the Borrower/Project EA.
 - (xii) Re-bidding shall not be allowed solely because the number of bids is less than three.

VII. SAFEGUARDS

A. Environment

65. **Environmental impacts.** The project is classified as environment category B. The proposed maintenance activities will be confined to the original right-of-way of existing national, provincial, and county roads. Maintenance activities may have some localized short-term negative environmental impacts that can be managed through effective implementation of the EMP. Maintenance activities overall will alleviate environmental issues associated with current poor road conditions, such as dust mobilization, congestion, inefficient driving practice and associated emissions. Maintenance also provides the opportunity to improve drainage and slope stability and to adopt resource efficient practices such as recycling of pavement materials.

66. **Environmental safeguards.** During project preparation, the financing modality was changed from a project to sector loan. In line with safeguard requirements for this modality, a Consolidated Initial Environmental Examination (CIEE) and EMP have been prepared for the subprojects that have already been identified and were disclosed on the ADB website on 25 April 2013. These documents address the seven subprojects identified for rehabilitation during Phase I (Output 1) and the two performance-based road maintenance pilot projects (Output 2). Domestic environmental laws exclude road maintenance works.

67. **Implementation.** An environmental assessment review framework (EARF) has been prepared to guide the preparation and implementation of subprojects to be identified annually between 2013 and 2016 (Phases II–IV). The EARF has a range of templates and tools to facilitate environmental impact assessment of future subprojects, including a (i) generic EMP that identifies all anticipated impacts, mitigation, and monitoring measures for the full range of maintenance activities that may be carried out; (ii) template for a compliance monitoring checklist to be used by the ESSU; (iii) sample environmental clauses for inclusion in contract documents for subprojects; (iv) template for public consultation and guidance on information disclosure; (v) template excel spreadsheet for costing environmental mitigation and monitoring; and (vi) template for Contractor Construction Environmental Work Plan.

68. The Operational Manual, prepared under Output 1 of this project, includes criteria for selection and categorization of future subprojects. These criteria include an environmental checklist, which will be used to determine the environmental categorization of future subprojects in combination with the EARF Table 5, which provides guidance on the likely environmental category associated with each type of maintenance activity proposed for future phases. All environment category A projects will be excluded. The CIEEs and EMPs to address subprojects proposed for each subsequent phase will be reviewed, cleared, and disclosed by ADB in line with the EARF.

69. During project preparation, environmental institutional capacity development needs were assessed. As described above, the YHAB has committed to establishing a new unit (ESSU) to manage and monitor the environmental aspects of all road maintenance works funded under the loan. International and national environmental consultant services will be supported through the loan to provide ongoing technical support for the ESSU and to develop and deliver environmental training for the YHAB and their contractors.

70. **Environmental monitoring and reporting.** The procedures for monitoring project implementation are described in detail in the IEE and EARF. Contractors will complete a Construction Environmental Workplan monthly to record progress with implementation of the EMP. The ESSU will undertake quarterly compliance audits of the YHAB and their contractors, evaluate performance against project environmental indicators, and submit a quarterly monitoring report to the YHAB. These quarterly environmental reports will be included as an appendix in the quarterly project progress report and will inform the annual performance and sustainability assessment report that will be submitted to ADB, as described in Section VIII, X of the PAM. The project team will review this environmental appendix and disclose it on the ADB website within 14 calendar days of receipt from the Borrower in line with ADB Public Communications Policy (2011). Separate periodic environmental monitoring reports will not be required unless specific environmental issues are identified in the quarterly project progress reports, annual report or during review missions and subsequently requested by ADB. The effectiveness of this system of EMP reporting will be reviewed annually through consideration of the baseline performance and sustainability assessment report.¹⁹ The ESSU will also prepare environmental inputs for the project completion report.

B. Social Safeguards

71. **Social safeguards.** The proposed project is being financed by ADB under the sector lending financial modality. The project will be implemented under four different phases over a

¹⁹ Refer to PAM Appendix 2.

period of 5 years. To ensure that the project meets ADB's Safeguards Policy Statement (2009) requirements on "Involuntary Resettlement" (IR) and "Indigenous Peoples" (IP), the EA agreed to assess impacts/risks and prepare necessary documentations. The project is categorized as "category B" for IR and "category C" for IP.

72. For IR, as required under the sector lending modality (SPS 2009), a resettlement framework (RF) has been prepared by the EA. For all the four phases of the project, the RF will guide subproject selection, screening and categorization, social impact assessment, and preparation and implementation of resettlement plans (RPs) if found necessary. For the first phase, due diligence was conducted for all road sections and it was concluded that no land acquisition or resettlement impact will occur. Therefore, a sample RP is also prepared to guide RP preparation and implementation if any project sub-section will result in land acquisition and relocation. As the project is classified as category C for IP, no planning framework is required; nonetheless, participation of local communities will be encouraged as specified in the SDAP.

73. **Due diligence for land acquisition and Resettlement impacts.** The whole project spread over four implementation phases targets minimal land acquisition and resettlement. For the first year, seven subprojects under Output 1 and two subprojects under Output 2 have been selected for rehabilitation and maintenance. The project works will be confined within the existing right of way and will only involve road pavement repair without road widening and reconstruction. Road maintenance work under the first year subprojects will not result in any land acquisition and resettlement (LAR) and will have no adverse impacts on income and livelihood of the local people. Initially, it was found that for S211 (Songyu Road in Kunming General Section), the project work may temporarily require acquisition of 5 to 10 mu (0.3–0.6 hectare) of wasteland for blending of construction material. During project preparation, the EA identified an alternative arrangement, so that temporary acquisition is no more required. During the implementation, the project management office (PMO) will ensure that the project does not result in loss of income of local population including road side vendors and if required will take corrective measures as outlined in the RF. The EA will immediately inform ADB of any change in project scope that would result in LAR and will prepare RP in accordance with the steps outlined in the RF, and get it approved by ADB prior to dispossession of land or assets.

74. Selection of subprojects for subsequent phases will require screening and assessing LAR impacts by the ESSU. Only those subprojects found not to involve significant LAR impacts (under the definitions of the SPS)²⁰ will be financed; those with non-significant LAR impacts will require a resettlement plan to be prepared.

75. For subsequent project phases, the EA will be guided by the RF for subproject selection, screening and categorization, social impact assessment, and preparation and implementation of resettlement plans if found necessary. During the process of subproject selection and screening if it is found that any subproject will result in any land acquisition and relocation, the EA will inform ADB of such LAR impacts and will prepare a RP to address these impacts and get the plan approved by ADB prior award of relevant civil works.

76. **Resettlement cost and funding.** Though road maintenance work under the project targets zero LAR impacts and as such does not include a resettlement budget, the EA will

²⁰ The involuntary resettlement impacts of an ADB-supported project are considered significant if 200 or more persons will experience major impacts, which are defined as (i) being physically displaced from housing, or (ii) losing 10% or more of their productive assets (income generating).

ensure availability of counterpart funds in case budgetary requirements arise to meet unforeseen LAR impacts and costs.

77. **Public consultation and information dissemination.** The EA will establish a participatory consultation and information dissemination process to ensure that local peoples' work and other daily activities are not adversely affected due to the road maintenance work. The process will guide scheduling of maintenance work and its timely disclosure to local communities to minimize construction related inconvenience and income losses.

78. **Capacity building.** Adequate and trained staff is essential to ensure social safeguards monitoring for Phase 1 as well as for subproject selection, screening and categorization, social impact assessment, including ethnic minority issues, preparation and implementation of resettlement plans if necessary for subsequent phases of the project and implementation of SDAP. The EA/IA will ensure availability of adequate staff and resources. The EA will ensure that the social safeguards staff establishes a database for socio-economic indicators and undertakes annual evaluation to assess project impacts.

79. **Monitoring and reporting.** The EA will ensure that the social safeguards are constantly monitored throughout the project implementation and are reported to ADB as outlined in the RF and RPs if required. The ESSU will undertake quarterly audits of social safeguards and submit a quarterly monitoring report to YHAB. The ESSU report will inform the quarterly progress report that will be submitted to ADB. ADB reserves the request at any time the EA to recruit an independent consultant to monitor implementation of the resettlement plans, under terms of reference satisfactory to ADB.

80. **Policy framework.** The RF is prepared in accordance with policies at national, provincial, and municipal levels related to land in the PRC, as well as ADB's SPS (2009). The EA will ensure that all project subprojects will be guided by the following principles: (i) avoid involuntary resettlement wherever possible; (ii) minimize involuntary resettlement by exploring project and design alternatives; (iii) enhance, or at least restore, the livelihoods of all displaced persons in real terms relative to pre-project levels; (iv) improve the standards of living of the displaced poor and other vulnerable groups; (v) compensation will be based on replacement cost of lost assets; (vi) compensation and entitlements provided to affected persons (APs) will be adequate to improve their living standard; (vii) all APs will be provided with resettlement assistance and fair compensation; (viii) all APs will be informed of the eligibility, compensation standards, livelihood, and income restoration plans, and project schedule to ensure that they will be able to participate in the RP implementation process; (ix) no land should be acquired unless replacement land or sufficient compensation for resettlement is provided to AP; (x) the ESSU will monitor compensation and resettlement work; (xi) vulnerable groups should receive special assistance to ensure they can live a better life and the APs will benefit from the project; and (xii) the resettlement budget will cover all aspects of compensation and rehabilitation assistance and will be part of the overall project budget. In case the cumulative impact of approved subprojects becomes close to, but below, the 'significant level' threshold, no additional subproject involving any major LAR impacts will be approved.

81. **Indigenous peoples.** The EA shall ensure that the project (including the Phase 1 Subprojects, the Output 2 Subprojects and Phase II–IV Subprojects) shall not have adverse impacts on indigenous peoples and that all outputs shall be implemented in a culturally appropriate and participatory manner to meet the needs of various peoples. In the event that the project or any subproject or activities under any of them are later determined to potentially involve any significant impacts on indigenous peoples, as outlined under the SPS 2009, the EA

shall take all steps required to ensure that the project complies with the applicable laws and regulations of the Borrower and the SPS (2009), including preparation of an EMDP and its clearance by ADB.

C. Grievance Redress Mechanism

82. The Yunnan provincial government shall ensure that within 90 days from the effective date, an environmental and social safeguards grievance redress mechanism acceptable to ADB is established in accordance with the provisions of the IEE, EARF, EMDP or RP at the project management office, within the timeframes specified in the relevant IEE, EARF, EMDP or RP, to consider environmental and social safeguards complaints. In each case, such grievance redress mechanism shall function to (i) review and document eligible complaints of project stakeholders; (ii) proactively address grievances; (iii) provide the complainants with notice of the chosen mechanism and/or action; and (iv) prepare and make available to ADB upon request periodic reports to summarize (a) the number of complaints received and resolved, (b) chosen actions, and (c) final outcomes of the grievances and make these reports available to ADB upon request.

VIII. GENDER AND SOCIAL DIMENSIONS

83. **Gender issues.** The project maintenance will be carried out by skilled road maintenance crews. The gender mainstreaming category for the project is “Some Gender Elements” (SGE). To ensure some gender elements are included in the project, the YPDOT will ensure that some of the non-skilled jobs will be provided to local women (at least 20%), and project activities targeting road safety awareness (including at least 40% of female participants), road safety for nonmotorized transport and public transport promotion, which particularly benefit women, are carried out. ADB requirements for projects need to address risks related to the spread of HIV/AIDS. The YPDOT has developed measures to address these issues as part of the social development action plan (SDAP).

84. **Social development action plan.** In order to address impacts caused by the project and enhance benefits for local affected communities, an SDAP has been prepared by the YHAB. The proposed actions under the plan are mainly the IA’s responsibility. In a few cases, the YPDOT and the YHAB will coordinate with other government agencies to implement some of the measures outlined in the attached plan. The YPDOT and the YHAB will pay special attention to the vulnerable groups and will make provision that some of the unskilled jobs created during road maintenance work are provided to the women, ethnic minority people, and poor people. To ensure that the local communities get some benefits during the maintenance work, the YPDOT will encourage use of local material and resources by the project contractors. These provisions have been incorporated in the SDAP and will be monitored by the social safeguards focal point in the ESSU.

Table 23: Social Development Action Plan (SDAP)

Enhancement of Social Benefits Mitigation Measures of Social Risks	Target Groups	Responsible Agencies	Timing	Funding Source	Monitoring Indicators
1. Facilitating Local Public Transport Services <ul style="list-style-type: none"> Coordinating with local transport service agencies to provide or improve public transport Construction/restoration of bus laybys/stops 	Local communities	YHAB transportation bureaus	2014-2018	Project funds Gov funds	<ul style="list-style-type: none"> Number of bus services restored and number of bus frequencies increased Number of bus stops constructed or repaired Increased access for women
2. Ensuring Road Safety <ul style="list-style-type: none"> Community awareness training on road safety for local residents especially women and local schools. Encouraging local communities and local women's groups to participate in road safety monitoring 	Local communities nearby project roads. Women, children and elderly	Local women groups Local communities Local primary and secondary schools YHAB	2014-2018	Project funds	<ul style="list-style-type: none"> Number of roads safety signs installed Number of measures taken for speed limitation. Number of local communities covered by road safety awareness programs Number of schools covered by road safety awareness programs Number of local communities involved in road safety monitoring % of women in activities
3. Minimization of Disturbances during Construction <ul style="list-style-type: none"> Avoidance/restoration of water sources occupation. Avoidance of construction work at night nearby residential areas. Minimization of dusts caused by construction. Site clean up on work completion Restoring approach road access to households after works Community based monitoring 	Construction workers Local residents by the project roads	YHAB Construction companies	2014-2018	Project funds	<ul style="list-style-type: none"> Number of local residents complaining on construction related disturbance
4. Public Consultation with Local Communities <ul style="list-style-type: none"> Community consultation on road safety issues. Community consultation on human trafficking issues Community consultations before and after works to identify and address unresolved issues 	Local people living along project roads.	Public security bureaus; women federations; YHAB, township, and village leaders	2014-2018	Project funds NGO funds	<ul style="list-style-type: none"> Number of communities covered by consultation Number of consultations held % of people satisfied with completed works
5. Provision of Employment Opportunities <ul style="list-style-type: none"> Priority of unskilled labor to local people especially, women, ethnic minorities and poor in jobs such as drainage cleaning etc. Encouraging use of local construction material and resources 	Rural women. Poor people Ethnic minorities Local enterprises	YHAB and Construction companies.	2014-2018	No additional costs	<ul style="list-style-type: none"> % of local women, ethnic people and poor people employed as unskilled labor. % of use of local sand/stone and other materials
6. Prevention of HIV/AIDS Spread <ul style="list-style-type: none"> Training for construction workers on prevention knowledge and methods of control HIV/AIDS Training for local communities on prevention knowledge and basic methods of HIV/AIDS control 	All construction workers, along project roads Local communities	YHAB, construction companies, Health Bureaus, Governmental AIDS protection Office,	2014-2018	Project funds Gov funds	<ul style="list-style-type: none"> % of construction workers trained. % of communities next to project roads covered by training by health bureaus
7. Facilitating Tourism Development <ul style="list-style-type: none"> Setting up of signage along the roads indicating tourist attractions Coordinate with tourism bureaus to promote these attractions 	Local communities with special agro-products, cultural products, and natural attractions	YHAB Local tourism bureaus	2014-2018	Project funds	<ul style="list-style-type: none"> Number of signage put along the project roads Promotional material produced and disseminated (including through web) on tourist attractions along the project roads

IX. PERFORMANCE MONITORING, EVALUATION, REPORTING, AND COMMUNICATION

A. Project Design and Monitoring Framework

85. The project design and monitoring framework for the project is shown in Table 24.

Table 24: Design and Monitoring Framework

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
<p>Impact The people of Yunnan have improved access to a quality and safe trunk road network.</p>	<p>Percentage of population in counties where the average trunk road condition is good or better (RQI>80) increased to 60% by 2021 (2011 baseline: 17%)</p> <p>Average vehicle operating costs per vehicle-km on trunk roads reduced by 10% in 2021 (2011 baseline: \$0.56/km)</p> <p>Road accident fatalities on national and provincial roads per 1 billion vehicle-km of registered vehicles in Yunnan reduced to 21 in 2021 (2009 baseline: 30)</p>	<p>YHAB road data and YSRI road condition survey</p> <p>Traffic police reports</p>	<p>Assumptions The current level of attention paid by the PRC government to road maintenance and road safety continues to increase in the 13th 5-year plan (2016–2021).</p> <p>Road transport cost inflation is in line with PRC-wide inflation.</p> <p>Risk Large natural disasters significantly damage Yunnan's trunk road network.</p>
<p>Outcome The sustainability of Yunnan's trunk road network improved.</p>	<p>Percentage of the surveyed trunk road length in good or excellent condition (RQI≥80) increased from 37% in 2011 to 50% by 2018</p> <p>Safety risk of 1,050 km of the trunk network lowered to low or medium, as assessed by a safety audit by 2018 against medium to high in 2011</p> <p>Percentage of the paved trunk network rehabilitated every year increased to 4% by 2018 (2010 baseline: 1.4%)</p> <p>Percentage of YHAB budget allocated to maintenance implementation (as defined in the PSAR) increased to 45% by 2018 (baseline: 25%)</p> <p>Percentage of rehabilitation works carried out by YHAB after an environmental screening and with an environmental management plan reaches 100% by 2018 (2011 baseline: 0%)</p>	<p>YSRI road condition survey, YHAB PSAR</p> <p>YHAB PSAR</p> <p>YHAB PSAR</p> <p>YHAB PSAR</p> <p>ESSU/YHAB PSAR</p>	<p>Assumptions Yunnan Provincial Department of Transport fuel tax revenues rise steadily as expected.</p> <p>No major negative policy or institutional changes occur in the road sector.</p> <p>Risk The YHAB is given responsibility for new roads that are in poor condition, which depresses the overall average condition of the trunk road network and increases the maintenance burden.</p>
<p>Outputs 1. Trunk roads rehabilitated</p>	<p>Rehabilitation carried out on 890 km of trunk roads by 2018</p> <p>Road safety risk assessment and audits carried out and road safety engineering and awareness measures implemented on all project roads (890 km) by 2018</p>	<p>Progress reports</p> <p>Progress reports</p>	<p>Assumption Cooperation of YHAB with local government representative's local public safety bureaus is effective.</p> <p>Risk Commodity prices rise well beyond normal price contingency allowances.</p>

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
<p>2. Performance-based road maintenance piloted</p> <p>3. Road asset management system enhanced</p> <p>4. Institutional capacity of YHAB strengthened</p>	<p>Multiannual contracts for performance-based maintenance of 164 km of trunk roads signed by 2014 and evaluated by 2018</p> <p>RAMS installed by 2016 and ready for operation, with all relevant road data incorporated, by 2018</p> <p>Percentage of maintenance works in line with prioritization by RAMS increased to 80% by 2018</p> <p>YHAB PSAR is completed each year of project implementation and shows improvement in line with the targets set in the road sector roadmap</p> <p>100 person-months of international training provided to staff of YHAB by 2018</p> <p>ESSU created and institutional development plan in YHAB implemented by 2018</p>	<p>Contract and bidding documents, inspection reports</p> <p>Progress reports</p> <p>YHAB PSAR</p> <p>Training reports</p> <p>YHAB PSAR</p>	<p>Risk Private sector contractors are reluctant to bid and/or raise prices unduly to cover risks.</p> <p>Assumption The Ministry of Transport continues to promote road asset management standards and systems.</p> <p>Assumptions The PRC government continues to promote performance assessments and raise the priority of sustainability in the road sector.</p> <p>Trainees have the opportunity to apply what they have learned to their work.</p>
<p>Activities with Milestones</p> <p>1. Rehabilitate Trunk Roads</p> <p>1.1 Carry out the prioritization and selection of project roads for phases II (October 2013), III (October 2014), and IV (October 2015), including environmental and resettlement screening of all subprojects, as required by environmental assessment and review framework and resettlement framework;</p> <p>1.2 Prepare the detailed designs and cost estimates for the project roads in phases I (November 2013), II (November 2014), III (November 2015), and IV (November 2016)</p> <p>1.3 Carry out bidding procedures for the implementation of the works for phases I (March 2014), II (March 2015), III (March 2016), and IV (March 2017)</p> <p>1.4 Implement periodic maintenance and rehabilitation works on the project roads for phases I (March 2015), II (March 2016), III (September 2016), and IV (September 2017)</p> <p>1.5 Carry out road safety risk assessment and include safety measures in detailed designs for all project roads (June 2013–September 2018)</p> <p>1.6 Carry out road safety audits after works and carry out community-based road safety program (June 2014–September 2018)</p> <p>1.7 Carry out environmental and resettlement screening of all subprojects and prepare and implement management and resettlement plans, as required by environmental assessment and review framework and resettlement framework (September 2013–September 2018)</p> <p>1.8 Implement social development action plan for all project roads (June 2013–September 2018)</p> <p>2. Pilot Performance-based Road Maintenance</p> <p>2.1 Prepare detailed design and finalize bidding and contract documents for performance-based maintenance pilots (by March 2014)</p> <p>2.2 Carry out procurement for the performance-based maintenance pilot projects (by December 2014)</p> <p>2.3 Carry out performance-based maintenance pilots (December 2014–December 2018)</p> <p>2.4 Implement environmental management and social development action plans on all project roads (December 2014–December 2018)</p> <p>3. Enhance road asset management system</p> <p>3.1 Purchase the RAMS equipment and software (by December 2014)</p>			<p>Inputs</p> <p>ADB: \$80 million</p> <p>Civil works: \$77.55 million</p> <p>Equipment and software: \$0.3 million</p> <p>Consulting services and training: \$2.15 million</p> <p>Yunnan Provincial Government: \$152.4 million</p> <p>Civil works: \$119.3 million</p> <p>Design, procurement, and supervision: \$7.6 million</p> <p>RAMS development: \$1.6 million</p> <p>Training: \$0.5 million</p> <p>ADB project office and ESSU: \$0.6 million</p> <p>Financing charges: \$5.5 million</p> <p>Contingencies: \$17.3 million</p>

Design Summary	Performance Targets and Indicators with Baselines	Data Sources and Reporting Mechanisms	Assumptions and Risks
3.2 Collect the necessary road condition, geometric, traffic, and GIS data to populate the RAMS database (by December 2015) 3.3 Provide training in the use of the RAMS software (by June 2015) 3.4 Use the RAMS software in preparing long-term and annual maintenance plans (by June 2016 and June 2017) 4. Strengthen Institutional Capacity of YHAB 4.1 Fill in the YHAB PSAR at the start of each year (by December 2013, June 2014, June 2015, June 2016, and June 2017) 4.2 Provide training in, among others, road safety, environmental management, maintenance planning, and performance-based contracting (complete by September 2018) 4.3 Create an ESSU with at least three qualified professionals (by June 2013) 4.4 Implement YHAB institutional plan in procurement, planning, safety, environment, and social safeguards areas (by September 2018)			

“≥” = superior or equal; ADB = Asian Development Bank; ESSU = environmental, social, and safety unit of YHAB; PRC = People’s Republic of China; RAMS = road asset management system; PSAR = performance and sustainability assessment report; RQI = Riding Quality Index; YHAB = Yunnan Highway Administration Bureau; YSRI = Yunnan Science and Research Institute.

Source: ADB.

B. Monitoring

86. **Project performance monitoring.** Within 3 months of loan effectiveness, the YHAB with support of the PMC will establish a project performance monitoring system (PPMS). The PPMS will monitor three levels of information:

- (i) **Project progress.** The ADB Project Office will monitor on a yearly basis data corresponding to the indicators and targets set in the DMF. The indicators will be submitted as part of the quarterly progress reports to ADB. They will provide information necessary to update ADB’s PPMS.
- (ii) **YHAB performance and sustainability.** The ADB Project Office will monitor the performance and sustainability of YHAB’s road maintenance program. YHAB will carry out annually road network condition surveys. ADB Project Office will collect data and information necessary to prepare an Annual YHAB Performance and Sustainability Report. This will include setting up of new targets for the following year. The report monitors the effectiveness, efficiency, management performance of the program, as well as its social and environmental sustainability.
- (iii) **Subproject progress.** Information on the progress of each subproject under outputs 1 and 2 will be monitored by the field offices and reported to the ADB Project Office; information includes (a) baseline social data; (b) procurement, physical and financial progress; and (c) status of implementation of EMP, RP, and SDAP. The ADB Project Office will update the information on a quarterly basis and report in the quarterly progress reports. Within 6 months after the completion of a subproject, the ADB Project Office will update social data, finalize physical and financial information, finalize information on the implementation of EMPs, RPs and SDAP, and reevaluate economic benefits based on new traffic count results.

87. **Compliance monitoring.** Status of compliance with loan covenants will be monitored and reported by the ADB Project Office through the quarterly progress reports. This includes compliance with the project Results Agreement, which includes commitments by the YHAB and the YPDOT in financial, technical, managerial, safety, environment, and road safety areas.

88. **Safeguards and social dimension monitoring.** Status of the implementation of the EMPs, RPs, and SDAP will be integrated in the quarterly progress reports and reviewed during ADB's annual missions. The information will be prepared by the ESSU and reported to the ADB Project Office.

C. Evaluation

89. ADB will visit the project at least once a year to monitor performance during implementation. Within 18 months after the effectiveness, ADB will conduct a midterm review to identify problems and constraints encountered and suggest measures to address them, including appropriateness of scope, design, implementation arrangements, schedule of activities, and compliance with safeguard and other covenants. Within 6 months of physical completion of the project, the EA will submit a project completion report to ADB.²¹

D. Reporting

90. The EA will provide ADB with:

- (i) **Quarterly progress reports** in a format consistent with the template provided in **Appendix 3**; the reports will include updated information on the implementation of the EMP, the SDAP and RPs; the first report will be due within 1 month after project effectiveness;
- (ii) **Requests for financing** of new subprojects under Output 1; three requests will be presented by January 2014, October 2014, and October 2015 for phase II, phase III, and phase IV respectively; the requests will be presented in a format consistent with the template provided in the **Operational Manual**, and include (a) confirmation that all subprojects meet agreed eligibility criteria, (b) completed information forms on each subproject, (c) detailed budget and implementation schedule, (d) procurement plan, (e) completed environmental and resettlement categorization checklists and records of consultations, and (f) list of first 1,000 km priority maintenance works identified by a road asset management software.
- (iii) **Annual Performance and Sustainability Assessment report** of YHAB in a format consistent with the template provided in **Appendix 2**; the report will also include a review of the achievement of targets set in the **Road Sector Roadmap**; the report will be sent by the end of June of each year of project implementation; the report covering 2012 will be sent within 1 month after loan effectiveness.
- (iv) **Project completion report** within 6 months of physical completion of the project.
- (v) **Audited project accounts and financial statements**, together with the associated auditor's report, by the end of June of each year of project implementation.

E. Stakeholder Communication Strategy

91. The ADB Project Office will set up a website within 2 months from the loan effectiveness and disclose all key project-related information, including the scope, cost, and financial and institutional arrangements of the project, annual performance and sustainability report, and project progress such as procurement, contract award, and disbursement in a language culturally appropriate and easily understood by the project affected people.

92. Consultation is an important aspect of the project. The YHAB will ensure that local communities affected by the project are consulted before each subproject implementation under the provisions of the SDAP, the RF and EARF, and after subproject implementation, to assess and

²¹ Project completion report format available at <http://www.adb.org/Consulting/consultants-toolkits/PCR-Public-Sector-Landscape.rar>.

remedy any residual concerns. Also public awareness programs for road safety, HIV-AIDS, and human trafficking will be coordinated by the ESSU.

X. ANTICORRUPTION POLICY

93. ADB reserves the right to investigate, directly or through its agents, any violations of the Anticorruption Policy relating to the project.²² All contracts financed by ADB shall include provisions specifying the right of ADB to audit and examine the records and accounts of the EA and all project contractors, suppliers, consultants, and other service providers. Individuals/entities on ADB's anticorruption debarment list are ineligible to participate in ADB-financed activity and may not be awarded any contracts under the project.²³

94. To support these efforts, relevant provisions are included in the Loan Agreement and the bidding documents for the project. In particular, all contracts financed by ADB in connection with the project shall include provisions specifying the right of ADB to audit and examine the records and accounts of the EA and all contractors, suppliers, consultants, and other service providers as they relate to the project. In relation to the project, the EA will ensure that (i) a supervisory body is established for prevention of undue interference in business practices, and adequate resources are made available for its effective operation; (ii) a leading group of officials from the supervision division of the EA is located in offices involved in bidding, installation, and other operational activities under the project; and (iii) periodic inspections on the contractor's activities related to fund withdrawals and settlements are carried out. The EA shall also initiate liaison meetings with the Prosecutor's Office, as needed, to discuss any warnings about, or information on, alleged corrupt, fraudulent, collusive, or coercive practices relating to the project.

XI. ACCOUNTABILITY MECHANISM

95. People who are, or may in the future be, adversely affected by the project may submit complaints to ADB's Accountability Mechanism. The Accountability Mechanism provides an independent forum and process whereby people adversely affected by ADB-assisted projects can voice, and seek a resolution of their problems, as well as report alleged violations of ADB's operational policies and procedures. Before submitting a complaint to the Accountability Mechanism, affected people should make a good faith effort to solve their problems by working with the concerned ADB operations department. Only after doing that, and if they are still dissatisfied, should they approach the Accountability Mechanism.²⁴

XII. RECORD OF PAM CHANGES

96. All revisions/updates during the course of implementation are retained in this Section to provide a chronological history of changes to implemented arrangements recorded in the PAM.

No.	PAM Changes/Updates	Date	Remarks
1	Initial draft	26 August 2012	First draft provided to EA during tripartite mission
2	Second draft	27 September 2012	Draft finalized and agreed with EA during loan fact-finding mission
3	Third draft	27 May 2013	Draft updated prior to loan

²² Available at: <http://www.adb.org/Documents/Policies/Anticorruption-Integrity/Policies-Strategies.pdf>

²³ ADB's Integrity Office web site is available at: <http://www.adb.org/integrity/unit.asp>

²⁴ For further information see: <http://compliance.adb.org/>.

			negotiations
4	Fourth draft	25 September 2013	Draft agreed during loan negotiations
5	Fifth draft	27 Oct 2013	PAM updated before submission of RRP to ADB's board

Updated and confirmed by:

Mr. Adrien Veron-Okamoto
Transport Economist, EATC
East Asia Department
Asian Development Bank

OUTLINE OF QUARTERLY PROGRESS MONITORING REPORT

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2011 BASELINE PERFORMANCE AND SUSTAINABILITY ASSESSMENT REPORT OF YHAB'S MAINTENANCE PROGRAM

ROAD NETWORK

The road network under YHAB has increased by 812 km from 23,277 km in 2010 to 24,089 km in 2011. This increase is the result of newly upgraded class 2 roads that were transferred from prefecture level (these are still under the defect liability period and are not yet maintained by YHAB).

Class/Pavement	Road data (km)					
	Total	National Highway	Provincial Highway	County Road	Construction / Upgrading	Transfer
Expressway	-	-	-	-	-	-
Class 1	226.729	116.210	98.319	12.200	20.641	44.702
Class 2	5,811.172	1,685.041	3,872.175	253.956	1,551.574	877.633
Class 3	5,962.070	1,486.391	2,903.538	1,572.141	-	-829.820
Class 4	10,826.646	1,684.862	5,989.393	3,152.391	-	-823.329
Under Class	1,262.207	133.000	355.644	773.563	-	-29.750
Total	24,088.824	5,105.504	13,219.069	5,764.251	1,572.215	-760.564
Asphalt concrete	12,613.532	2,873.453	8,210.519	1,529.560	1,526.341	1,093.386
Cement concrete	235.899	73.400	31.511	130.988	29.919	-5.295
Simple pavement	8,207.463	1,804.954	4,118.031	2,284.478	15.955	-1,466.514
Stone paved	764.188	203.833	287.196	273.159	-	-100.945
Gravel	2,258.242	149.864	571.812	1,536.566	-	-220.696
Earthen	9.500	-	-	9.500	-	-60.500
Total	24,088.824	5,105.504	13,219.069	5,764.251	1,572.215	-760.564

ROAD CONDITIONS

In 2011, 13,206 km of the network was surveyed compared to 8,113 km in 2010. Overall, average road conditions were found to have worsened, although this is mainly due to the fact that many poorer roads were included in the survey, bringing down the percentage of roads in good and excellent condition.

PQI	Road conditions (km)					
	Surveyed	Excellent PQI≥90	Good 90>PQI≥80	Fair 80>PQI≥70	Poor 70>PQI≥60	Very poor PQI<60
Length 2011	13,206.00	3,050.00	4,441.00	2,465.00	1,397.00	1,853.00
% 2011	100.0%	23.1%	33.6%	18.7%	10.6%	14.0%
% 2010	100.0%	28.6%	32.5%	14.3%	7.3%	17.2%
IRI	Length surveyed	Excellent IRI≤3.1	Good 3.1<IRI≤4.5	Fair 4.5<IRI≤5.4	Poor 5.4<IRI≤6.2	Very poor IRI>6.2
Length 2011	12,933.00	1,575.00	3,213.00	2,464.00	1,684.00	3,997.00
% 2011	100.0%	12.2%	24.8%	19.1%	13.0%	30.9%
% 2010	100.0%	23.4%	30.4%	16.3%	9.1%	20.8%
DR	Length surveyed	Excellent DR≤0.4	Good 0.4<DR≤2.0	Fair 2.0<DR≤5.4	Poor 5.4<DR≤10.8	Very poor DR>10.8
Length 2011	8,647.00	3,619.00	2,710.00	1,127.00	508.00	683.00
% 2011	100.0%	41.9%	31.3%	13.0%	5.9%	7.9%
% 2010	n/a	n/a	n/a	n/a	n/a	n/a

MAINTENANCE FUNDING

The allocation from the fuel tax in 2012 increased by 20% compared to 2011. The income from tolls reduced as these were phased out for class 2 roads.

Maintenance funding data (CNY '000)		
Source	2010	2011
Fuel tax	1,415,000	1,700,000
Overloading	317,975	369,780
Tolls	156,000	62,017
Contracting and hiring out	n/a	n/a
Multilateral project	n/a	n/a
MOT funding	n/a	n/a
Remaining payments previous year	0	4,840
Total	1,888,975	2,136,637

MAINTENANCE EXPENDITURE

Compared to 2010, maintenance implementation expenditure in 2011 reduced by 12% with only expenditure for flood damage repair increasing. Maintenance management expenditure increased by 173%, mainly as a result of the expenditure on performance bonuses. Expenditure for salaries and pensions also increased by X%.

Expenditure and implementation data (CNY '000)		
Item	2010	2011
Maintenance implementation	642,271.30	566,863.60
Minor maintenance	387,012.70	371,383.00
Intermediate and heavy maintenance	192,839.60	159,548.30
Emergency repair	15,969.90	10,000.00
Flood damage repair	2,091.10	5,610.80
Dangerous bridge repair	7,740.00	2,701.80
Special road	2,000.00	2,000.00
Greening	2,460.00	1,200.00
Maintenance equipment	32,158.00	14,419.70
Maintenance management	111,206.60	190,725.40
Buildings	22,246.30	57,140.00
Overloading management	50,727.00	82,829.80
Traffic and condition survey	1,430.00	1,430.00
Safety management	7,110.00	12,000.00
Performance bonuses	18,358.70	163,490.40
Rural roads	4,500.00	5,500.00
Other	25,193.30	31,825.60
Salaries and pensions	1,335,677.70	1,480,809.40
Salaries	602,762.00	602,762.00
Performance bonuses	18,358.70	163,490.40
Pensions	714,557.00	714,557.00
TOTAL	2,089,155.60	2,238,398.40

MAINTENANCE STAFFING

During 2011 a total of 145 new staff members were added, while 424 existing staff members retired, 44 died and 134 left YHAB, resulting in the number of staff reducing from 15,384 to 14,927. The number of retired staff increased from 20,830 to 21,045 with 424 new retirees and 209 deaths.

Maintenance staffing		
Staff	2010	2011
Management	2,323	2,367
Engineer/technician	2,188	2,106
Station staff	10,873	10,454
Subtotal	15,384	14,927
Retired	20,830	21,045
Total	36,214	35,972

MAINTENANCE IMPLEMENTATION

In 2011 a total of 24,089 km were put under minor maintenance, 3% more/less than in 2010. Intermediate maintenance was carried out in 0 km of the network, 47km more/less than in 2010. Heavy maintenance was carried out in 119 km of the network, 63% less than in 2010.

Maintenance implementation				
Maintenance type	2010		2011	
	Length (km)	Cost (CNY)	Length (km)	Cost (CNY)
Minor maintenance	23,277	351,118,800	24,089	379,730,000
Intermediate maintenance (internal)	47 km	14,159,800	n/a	n/a
Intermediate maintenance (outsourced)	0 km	0	0 km	0
Heavy maintenance (internal)	322 km	166,422,500	119 km	66,060,000
Heavy maintenance (outsourced)	0 km	0	0 km	0

PERFORMANCE INDICATORS

The following page provides the performance indicators for the unit for 2011, comparing these to the indicators for 2010.

Effectiveness				
Indicator	2010 actual	2011 target	2011 actual	2012 target
% of road length with PQI≥80	(% 61%	-	57%	60%
% of road length with PQI<60	(% 17%	-	14%	15%
% of road length with IRI≤4.5	(% 54%	-	37%	40%
% of road length with IRI≤5.0	(% 64%	-	48%	50%
% of road length with IRI>6.2	(% 21%	-	31%	30%
% of road length with IRI>7.5	(% 13%	-	18%	17%
% of road length with DR≤2.0	(% n/a	-	73%	75%
% of road length with DR>10.8	(% n/a	-	8%	10%
Road user cost	(CNY/ki n/a	-	n/a	-
% of network receiving minor maintenance	(% 100%	-	100%	100%
% of network receiving intermediate/heavy maintenance	(% 1.4%	-	0.5%	2%

Efficiency				
Indicator	2010 actual	2011 target	2011 actual	2012 target
Month of availability of 80% of budget	July	-	July	June
Maintenance budget spent on implementation	(% 31%	-	25%	35%
Cost of minor maintenance	(‘000 CNY/ki 15	-	16	-
Cost of intermediate maintenance	(‘000 CNY/ki 302	-	700	-
Cost of heavy maintenance	(‘000 CNY/ki 800	-	1,010	-
Kilometers per worker or equipment operator	(ki 2.1km	-	2.3km	2.2km
Kilometers per engineer, technician or manager	(ki 5.8km	-	5.4km	5.2km

Road Safety				
Indicator	2010 actual	2011 target	2011 actual	2012 target
Number of road safety specialists in unit	(0	-	0	2
% of intermediate/heavy maintenance with Road Safety Study, Design and Audit in line with Safety Risk	(n/a	-	n/a	20%
Kilometers of roads with safety improved from high risk to moderate or low	(n/a	-	n/a	200

Social				
Indicator	2010 actual	2011 target	2011 actual	2012 target
Number of social specialists in unit	(# 0	-	0	1
% of heavy maintenance works with social development action plan in place	(% n/a	-	n/a	50%
% of heavy maintenance including land acquisition or involuntary resettlement with resettlement plan in place	(% n/a	-	n/a	50%

Environment				
Indicator	2010 actual	2011 target	2011 actual	2012 target
Number of environmental specialists in unit	(0	-	0	2
% of intermediate/heavy maintenance works compliant with environmental guidelines	(% n/a	-	n/a	-
% of heavy maintenance with environmental screening	(% n/a	-	n/a	-
% of heavy maintenance with compliance monitoring in line with assessment results	(% n/a	-	n/a	-
% of intermediate/heavy maintenance using pavement recycling	(% n/a	-	n/a	10%

Management				
Indicator	2010 actual	2011 target	2011 actual	2012 target
Month of approval of the plan	April	-	April	April
% of maintenance plan according to RAMS/HDM prioritization	(% 0%	-	0%	20%
% of works implementation according to plan	(% 100%	-	100%	100%
% of works according to technical solution in operational manual	(% 100%	-	100%	100%
% of road network surveyed (traffic+condition)	(% 35%	-	55%	95%

DETAILED EXPLANATION

Road network - this table should include the official road length statistics as presented in the Yunnan Road Statistics Yearbook.

Road conditions - The road condition data is collected by YSRI through the annual surveys. The data is presented here as the length of road in different condition categories according to PQI, IRI and DR. Percentages are calculated by dividing the length in a particular condition category by the total length surveyed.

Maintenance funding - For all of the different sources of funding used for maintenance of YHAB's network, the amounts must be indicated here. This should also include funding sources and amounts used for salaries and pensions. It should also include income that maintenance centers and maintenance stations earn with the sale of materials, the hiring out of equipment and the carrying out of contracts. The total income amount should be equal to the total expenditure amount in the next table.

Maintenance expenditure - The total expenditure is listed according to the items indicated. Items may be added if considered necessary, but this must be done for both years to allow comparison. Expenditure items must be grouped under the correct category. Maintenance implementation expenditure refers to all expenditure that is directly dependent on the length of road being maintained. Maintenance management expenditure is not dependent on the length of road being maintained and includes building maintenance, overloading management, surveys, safety management, performance bonuses, maintenance on non-YHAB roads and other management expenditure. Salaries and pension expenditure is grouped under a separate category.

Maintenance staffing - The number of staff members are listed according to the function of the staff. Managers are involved in the general management, engineers and technicians are involved in regular site visits to identify and supervise the necessary works, and station staff is directly involved in the implementation of the works.

Maintenance implementation - The length of road maintained under small, intermediate and heavy maintenance is listed here, together with the investment in terms of materials and equipment. Where works are outsourced, the full contract sum is listed as expenditure.

Performance indicators - the following points explain the objective and calculation of the different performance indicators.

Effectiveness

- **PQI \geq 80** - This indicator serves to show the percentage of the road network in excellent or good condition based on the pavement quality index. It is calculated by dividing the total length of roads with PQI \geq 80 by the total length of roads surveyed.
- **PQI $<$ 60** - This indicator serves to show the percentage of the road network in very poor condition based on the pavement quality index. It is calculated by dividing the total length of roads with PQI $<$ 60 by the total length of roads surveyed.
- **IRI \leq 4.5** - This indicator serves to show the percentage of the road network in excellent or good condition based on the international roughness indicator (the IRI is an indicator of road user costs). It is calculated by dividing the total length of roads with IRI \leq 3.1 by the total length of roads surveyed. The boundary of IRI \leq 4.5 is based on the boundary of RQI \geq 80.
- **IRI \leq 5.0** - This indicator is similar to the one above, but is more in line with internationally recognized condition categories as used in HDM-4. It is calculated by dividing the total length of roads with IRI \leq 5.0 by the total length of roads surveyed.
- **IRI $>$ 6.2** - This indicator serves to show the percentage of the road network in very poor condition based on the international roughness indicator (the IRI is an indicator of road

user costs). It is calculated by dividing the total length of roads with $IRI > 6.2$ by the total length of roads surveyed. The boundary of $IRI > 6.2$ is based on the boundary of $RQI < 60$.

- **IRI > 7.5** - This indicator is similar to the one above, but is more in line with internationally recognized condition categories as used in HDM-4. It is calculated by dividing the total length of roads with $IRI > 7.5$ by the total length of roads surveyed.
- **DR ≤ 2.0** - This indicator serves to show the percentage of the road network in excellent or good condition based on the distress ratio (the DR is an indicator of the percentage of the pavement affected by damage). It is calculated by dividing the total length of roads with $DR \leq 2.0$ by the total length of roads surveyed. The boundary of $DR \leq 2.0$ is based on the boundary of $PCI \geq 80$.
- **DR > 10.8** - This indicator serves to show the percentage of the road network in very poor condition based on distress ratio (the DR is an indicator of the percentage of the pavement affected by damage). It is calculated by dividing the total length of roads with $DR > 10.8$ by the total length of roads surveyed. The boundary of $DR > 10.8$ is based on the boundary of $PCI < 60$.
- **Road user cost** - The objective is to show the total road user costs resulting from existing road conditions, whereby the aim is to reduce the road user costs as much as possible. The total road user cost can be calculated using a road asset management system such as HDM4.
- **Percentage minor maintenance** - Ideally the whole network should receive minor maintenance each year. This indicator can be calculated by dividing the road length receiving minor maintenance by the total road network length.
- **Percentage intermediate/heavy maintenance** - The objective of this indicator is to show whether sufficient intermediate and heavy maintenance is carried out to ensure the sustainability of the network. The required amount of intermediate and heavy maintenance depends on the average lifespan of the road. For instance, an average lifespan of 8 years means that each year an average of 12.5% of the network needs to receive intermediate or heavy maintenance. The indicator is calculated by dividing the length of intermediate and heavy maintenance by the total network length.

Efficiency

- **Availability 80% budget** - This indicator serves to show to which degree the implementation of maintenance works is hampered by late budget availability. The calendar month in which at least 80% of the planned budget is made available for use should be indicated here.
- **Budget spent on implementation** - This indicator serves to show to which degree the maintenance budget is used for maintenance works. To calculate this indicator, the maintenance implementation expenditure is divided by the total budget.
- **Minor maintenance cost** - This is to determine the efficiency of minor maintenance. It is calculated by dividing the budget spent on minor maintenance (equipment and materials) by the total length of road receiving minor maintenance.
- **Intermediate maintenance cost** - This is to determine the efficiency of intermediate maintenance. It is calculated by dividing the equipment and material costs of intermediate maintenance by the length of road receiving intermediate maintenance.
- **Heavy maintenance cost** - This is to determine the efficiency of heavy maintenance. It is calculated by dividing the equipment and material costs of heavy maintenance by the length of road receiving heavy maintenance.
- **Kilometers per worker/operator** - This indicator serves to see how efficiently maintenance workers and equipment operators are used in carrying out maintenance.

The number of maintenance workers and equipment operators in the maintenance stations is divided by the total network length.

- **Kilometers per manager/engineer/technician** - This indicator serves to see how efficiently managers, engineers and technicians are operating in the management and supervision of works. The number of managers, engineers and technicians in YHAB, the general divisions and the maintenance divisions is divided by the total network length.

Road Safety

- **Road safety specialists** - This indicator serves to show the commitment to road safety assessments by the unit being assessed, in terms of the number of road safety specialists hired by the unit. This number should reflect the number of full-time specialists.
- **Road Safety Study, Design and Audit** – The Operational Manual for the Yunnan Sustainable Road Maintenance Project includes guidelines for the level of road safety planning, design and auditing required based on the safety risk of the road concerned. This indicator verifies to which degree these guidelines have been followed and the required Road Safety Plans, Designs and Audits have been prepared. It is calculated by dividing the length of intermediate and heavy works with all required road safety documentation in place, by the total length of intermediate and heavy maintenance.
- **Road Safety Action Plan** - YHAB is required to approve a Safety Action Plan under the YSRM project, including investments in safety measures. This indicator serves to define to which degree the safety investments have been carried out. It is calculated by dividing the planned costs of the investments carried out by the total planned investments.

Social

- **Social specialists** - This indicator serves to show the commitment to social assessments by the unit being assessed, in terms of the number of social specialists hired by the unit. This number should reflect the number of full-time specialists.
- **Social assessment** - Although social impact in maintenance tends to be limited, for heavy maintenance social impact can still be significant, especially in densely populated areas. For this purpose, a social assessment is required for each heavy maintenance project. This consists of a simple screening to determine if a land acquisition or involuntary resettlement are significant or not, resulting in a short report indicating the findings. This report should be prepared and available for each heavy maintenance project, irrespective of its size. The indicator is calculated by dividing the number of heavy maintenance projects with reports available by the total number of heavy maintenance projects.
- **Resettlement Plan** – In projects where the land acquisition of involuntary resettlement is found to be significant, a resettlement plan should be prepared. This indicator assesses to which degree the heavy maintenance projects comply with this requirement. The indicator is calculated by dividing the number of projects with resettlement plans by the total number of projects considered to have significant impact in terms of land acquisition or involuntary resettlement.

Environment

- **Environmental specialists** - This indicator serves to show the commitment to environmental assessments by the unit being assessed, in terms of the number of environmental specialists hired by the unit. This number should reflect the number of full-time specialists.

- **Compliance with environmental guidelines** - This indicator serves to determine the percentage of intermediate and maintenance works that are in compliance with the environmental guidelines to be promulgated by YHAB during the first year of the YSRM project. It is calculated by dividing the length of intermediate and heavy maintenance works complying with the guidelines by the total length of intermediate and heavy maintenance works carried out.
- **Environmental screening** - Although environmental impact in maintenance tends to be limited, for heavy maintenance environmental impact can still be significant, especially in environmentally sensitive areas. For this purpose, environmental screening is required for each heavy maintenance project. This consists of a simple screening to determine if a more intensive environmental assessment is required or not, resulting in a short report indicating the findings. This report should be prepared and available for each heavy maintenance project, irrespective of its size. The indicator is calculated by dividing the number of heavy maintenance projects with reports available by the total number of heavy maintenance projects.
- **Environmental compliance monitoring** - In those heavy maintenance projects where an environmental assessment (IEE or EIA) is carried out after the initial screening, this will result in a report with prevention and mitigation actions to be taken to minimize the negative environmental impact. These actions need to be implemented during the carrying out of the works. The compliance of this implementation with the prevention and mitigation actions needs to be monitored for the duration of the works. This indicator defines the percentage of works with environmental assessments carried out, where compliance during implementation is monitored (as demonstrated by regular compliance monitoring reports). The indicator is calculated by the number of heavy maintenance projects with such compliance monitoring reports divided by the total number of heavy maintenance projects where an environmental assessment was carried out.
- **Pavement recycling** - This indicator serves to show to which degree pavement recycling is applied in intermediate and heavy maintenance works, as a means of reducing the environmental impact. It is calculated by dividing the length of intermediate/heavy maintenance works where pavement recycling is carried out by the total length of intermediate/heavy maintenance works.

Management

- **Month of approval of annual plan** - This indicator shows how far into the financial year the road maintenance plan is approved. It is an approximation to show how long the roads have to go without planned maintenance between the start of the financial year and the approval of the plan.
- **Maintenance plan** - This indicator serves to show that proper planning has been carried out using a road asset management system such as HDM4 or RAMS. The percentage of the current maintenance plan that is in line with the HDM4/RAMS results is determined for the unit.
- **Maintenance implementation** - This indicator serves to determine to which degree the existing plan is followed during implementation. It is calculated by dividing the planned costs of the works that are carried out according to plan by the total costs of the entire plan.
- **Technical solution** - This indicator serves to show to which degree proper technical solutions are applied in the implementation of maintenance works. These technical solutions are defined in the operational manual in accordance with national standards and ADB recommendations. The indicator is calculated by dividing the actual cost of the

works that are in accordance with the proposed technical solutions, by the total maintenance expenditure.

- **Annual survey** - This indicator serves to show what portion of the YHAB network has been surveyed with respect to traffic volume and road pavement condition. It is calculated by dividing the length of the YHAB network for which up-to-date traffic and condition data is available, by the total YHAB network length. It is important to remove any overlapping sections to avoid double counting (i.e. the total YHAB network length according to the traffic and road condition data should be equal to the official road length statistics).

TECHNICAL APPENDIX – FIRST YEAR SUBPROJECTS

Trunk Road Rehabilitation: Phase I

1. Summary of Design Approach and Technical Standards

1. Phase 1 will improve 189.3 kilometers (km) of national highways, provincial or tourism roads. The Phase 1 program covers 7 roads including Class 2, 3 and 4 roads in five Prefectures. The proposed road sections are mostly asphalt concrete (AC) pavement with 28 km of roads being surface treatment (called simple pavement in the PRC). The surface treatment sections require rehabilitation. The proposed improvements vary from rehabilitation to light overlays with AC of 4 cm. No widening or realignments are included in the program. The roads have received a road safety assessment that recommends appropriate road safety treatments to improve existing safety risks and to mitigate potential safety risks brought about by maintenance works.

2. The PPTA Consultant conducted the feasibility study for the project roads and prepared preliminary designs (Table 2) resulting from the application of optimum treatment strategies based on detailed data surveys at 200 m intervals. All roads require detailed designs to be prepared using standard government procedures. The designs will incorporate the road safety improvements and ensure adherence to environmental and social mitigation plans that have been prepared. Traffic counts were updated for all roads during the study, with the exception of X214 (where existing database values were used). The detailed surveys collected, roughness, cracking, potholes and deflection data. No major work is being planned on any bridges or culverts.

3. Each proposed road section, and any intervening sections between actual maintenance sections, have been assessed for road safety. Each road has been classified based on its class, terrain, width and traffic volumes. From the risk assessment approximate quantities and costs for recommended additional features have been calculated. Normal maintenance practices include lane marking and basic signage. The safety assessment results and major road safety elements considered for the project include:

- (i) General features (e.g. laybys and simple laybys)
- (ii) Bends and Steep Grades (e.g. warning signs, rumble strips, signs for climbing lanes)
- (iii) Markings (e.g. edge and centerlines, enhanced centerlines)
- (iv) Junctions (e.g. turning lanes, side road signage, traffic islands)
- (v) Forgiving Roadside (e.g. shoulder sealing or paving, reduced edge dropoff, safety barriers)
- (vi) Traffic Calming (e.g. reduced lane widths, footpaths, crossings, speed limit signing and markings, speed tables, rumble strips)

Table 1: Safety Assessment Results

Route	Safety Risk
G108 Kunming – Luquan	Very High
G213 Kunming – Yuxi	Very High
G320a Dali Section	Medium
S211 Songyi Line	High
X214 Zhangcheng Line	Very High
S321 Yangmeng Line	Medium

Table 2 Details of Preliminary Design of Phase I Subprojects

	Kunming	Kunming	Yuxi	Dali	Kunming	Dehong	Lincang																												
	Kunming Luquan Fumin	Jinning	Yuxi	Dali	Songyu	Zhangcheng	Yangmeng																												
Road Number	G108	G213a	G213b	G320	S211	X214	S321																												
Length (km)	46	46 ⁽¹⁾	15.0	17	31	16	22																												
Class	2	3	3	2	3	3	4																												
Number of Lanes	2	2	2	2	2	2	2																												
Traffic	12,000 - 16,000	8,000-13,000	11,000	3,500	2,000-5,000	4,500	1,500-4,000																												
Pavement width																																			
Current	9	7	7.5-10.5	7-7.5	7	7	7.2																												
Design	9	7	7.5-10.5	7-7.5	7	7	7.2																												
Shoulder Width																																			
Current	ND	ND	ND	ND	ND	ND	ND																												
Design																																			
Environmental	Mainly farm land. Some environmentally sensitive features along this road. Mostly medium maintenance planned: resurfacing of 1 medium and 2 small bridge decks. Category C. IEE prepared	Extensive roadside agro-industrial zone, e.g. greenhouse operations and materials production sites: aggregate, cement, and concrete. Short, intermittent road rebuilding. Category C, construction period EMP has been prepared for G213a and G213b	Only repair of cracks and a few sections where the 2-lane roadway will need resurfacing for <1 km - resulting in minor environmental impact. Category C. Standard Environmental Operating Procedures (SEOP) will need to be followed.	Intermittent resurfacing, shoulder and curb repair, pavement strengthening at curves. Category C. Contractors required to adhere to SEOP.	Slope instability and erosion exist at higher elevation. Reconstruction/enlarging of 12 culverts. Heavily used by haul trucks: aggregate, sand, coal haul trucks. No environmentally sensitive features. Category B due to extensive and varied works. IEE prepared	Rural agriculture and villages. Major reconstruction with new subgrade and pavement, reconstruction of more than 40 irrigation canals, passing under the road. No environmentally sensitive features impacted. Category B, with a construction and operating period EMP.	Maintenance sections are in mountainous terrain but with very stable roadside conditions. Category C. SEOP required.																												
Social	No land acquisition (LA) or resettlement (RP). Safety issues: lack of clear safety signs at intersections connecting villages and local markets. Frequent traffic accidents. Disturbance of locals during construction including: leaving construction wastes on the road, or in side drains. Category C			Unsafe driving due to many intersections without clear signs. Lack effective measures of speed limitation. Heavy traffic during construction. Category C	Heavy traffic during construction. High pressure on routine and minor maintenance after rehabilitation due to severe overloading. Category C	Poor road condition causing income decline (sugarcane). High traffic accident frequency. Small business opportunities reduced due to dust or mud. Many trees cut along road, despite rules for protecting road and road environment. Category C	Secondary Data only Category C																												
Improvement Type	Major/Medium					Major/Medium					Major					Major					Major					Major									
Pavement Typical	km	AC cm	CTG cm	G cm	ST m2	km	AC cm	CTG cm	G cm	ST m2	km	AC cm	CTG cm	G cm	ST m2	km	AC cm	CTG cm	G cm	ST m2	km	AC cm	CTG cm	G cm	ST m2	km	AC cm	CTG cm	G cm	ST m2	km	AC cm	CTG cm	G cm	ST m2
Major	7	8	30	20		3	8	30	10		13	8	25			6	8	25	20		31	8	20			16	8	20			8	8	25	20	
Major	4	8	30			9	6	25																											
Major	13	8	25																																
Major	8	10																																	
Medium	7	8				12	10				2	4																							
Medium	3	6				22	8																												
Medium	4	4																																	
Road Safety: US \$	1,435,331	Risk: V - Very High	888,801		Risk: V - Very High	311,577	Risk: V - Very High	241,325		Risk: M - Medium	562,303	Risk: H - High	355,521		Risk: V - Very High	198,738	Risk: M - Medium																		
Total Cost: US \$ ²	10,070,000					7,180,000					3,290,000					3,340,000					8,400,000					2,710,000					4,720,000				

Source: PPTA Consultant, No Detailed Designs were available, Proposed Design data prepared by HDM-4 Analysis. ND - No data available

1 YHAB proposed only 35.1 km of road for G213a, however the HDM-4 analysis recommends 46 km

2 The Total Construction cost includes allowance for quantity escalation and design and supervision costs

2. Road Safety Preliminary Design Recommendations

4. **G108.** This route should be equipped with ample safety provisions to mitigate the risk associated with speed and high composition of heavy vehicles on both the hilly and flatter sections of the highway. An analysis of collisions in the past five years is required to identify the precise safety problems. Overloading of heavy vehicles should be monitored along the steep section. An overhaul of the existing safety works will be required and candidates for safety improvement works are:

- (i) Climbing lanes and overtaking management
- (ii) Strengthening of safety barriers
- (iii) Laybys and inspection areas
- (iv) Arrester bed
- (v) Systematic signing of bends, steep grades and safety provisions

Table 3: G108 - Safety Recommendations

Area of Improvements	Recommendations
Alignment and Cross-sections	<ul style="list-style-type: none"> • Provide shoulders • Provide laybys on steep grades
Bends and Steep Grades	<ul style="list-style-type: none"> • Improve signing of sharp bends • Improve signing of steep grades
Overtaking Management	<ul style="list-style-type: none"> • Provide basic and enhanced solid centerline markings
Junctions	<ul style="list-style-type: none"> • Provide give-way signs on major side roads • Provide turning lanes at busier junctions • Ensure visibility
Traffic Calming	<ul style="list-style-type: none"> • Provide basic measures e.g. rumble strip + village sign + speed limit + pedestrian crossing + lane reassignment
Roadside Safety	<ul style="list-style-type: none"> • Eliminate edge drops where feasible • Delineate hazards • Provide more safety barriers over high slopes

5. **G213.** This route should be equipped with ample safety provisions to mitigate the heavy traffic, high composition of heavy vehicles and high density of vulnerable road-users. Measures will need to address the heterogeneity of highway classes of this route. Effective traffic calming measures around villages shall be an important component of these measures.

Table 4: G213 - Safety Recommendations

Area of Improvements	Recommendations
Alignment and Cross-sections	<ul style="list-style-type: none"> • Provide shoulders • Provide laybys
Bends and Steep Grades	<ul style="list-style-type: none"> • Improve signing of sharp bends
Overtaking Management	<ul style="list-style-type: none"> • Provide basic and enhanced solid centerline markings
Junctions	<ul style="list-style-type: none"> • Provide give-way signs on major side roads • Provide turning lanes at busier junctions • Ensure visibility • Improve directional signing
Traffic Calming	<ul style="list-style-type: none"> • Provide basic measures e.g. rumble strip + village sign + speed limit + pedestrian crossing + lane reassignment • Provide footpaths around villages wherever practical
Roadside Safety	<ul style="list-style-type: none"> • Delineate hazards • Provide safety barriers at more risky sections

6. **G320a.** This route should be equipped with basic safety provisions.

Table 5: G320a - Safety Recommendations

Area of Improvements	Recommendations
Alignment and Cross-sections	<ul style="list-style-type: none"> • Provide shoulders • Provide laybys
Bends and Steep Grades	<ul style="list-style-type: none"> • Improve signing of sharp bends
Overtaking Management	<ul style="list-style-type: none"> • Provide basic and enhanced solid centerline markings
Junctions	<ul style="list-style-type: none"> • Provide give-way signs on major side roads • Provide turning lanes at busier junctions • Ensure visibility
Traffic Calming	<ul style="list-style-type: none"> • Provide basic measures e.g. rumble strip + village sign + speed limit + pedestrian crossing + lane reassignment
Roadside Safety	<ul style="list-style-type: none"> • Delineate hazards • Provide safety barriers at more risky sections

7. **S211.** This route should be equipped with basic safety provisions but safety of the sections on steep grade may require enhanced treatments. Overloading of heavy vehicles should be monitored at mines along the route.

Table 6: S211 - Safety Recommendations

Area of Improvements	Recommendations
Alignment and Cross-sections	<ul style="list-style-type: none"> • Provide shoulders • Provide laybys on steep grades
Bends and Steep Grades	<ul style="list-style-type: none"> • Improve signing of sharp bends • Improve signing of steep grades • Investigate need for enhanced treatments
Overtaking Management	<ul style="list-style-type: none"> • Provide basic solid centerline markings
Junctions	<ul style="list-style-type: none"> • Provide give-way signs on major side roads • Ensure visibility
Traffic Calming	<ul style="list-style-type: none"> • Provide basic measures e.g. rumble strip + village sign + speed limit + pedestrian crossing + lane reassignment
Roadside Safety	<ul style="list-style-type: none"> • Eliminate edge drops where feasible • Delineate hazards • Provide more safety barriers over high slopes

8. **X214.** This route should be equipped with ample safety provisions. Limitation of traffic speeds and provision of safe shoulders or footpaths will be a major focus of improvement. A speed limit of 70km/h should be considered for the entire route with 50km/h through towns and villages.

Table 7: X214 - Safety Recommendations

Area of Improvements	Recommendations
Alignment and Cross-sections	<ul style="list-style-type: none"> • Provide shoulders • Reassign lane width
Bends and Steep Grades	<ul style="list-style-type: none"> • Provide signing for isolated sharp bends
Overtaking Management	<ul style="list-style-type: none"> • Provide basic and enhanced solid centerline markings
Junctions	<ul style="list-style-type: none"> • Provide give-way signs on major side roads • Provide turning lanes at busier junctions • Ensure visibility • Improve directional signing
Traffic Calming	<ul style="list-style-type: none"> • Provide basic measures e.g. rumble strip + village sign + speed limit + pedestrian crossing + lane reassignment • Provide footpaths around and between villages wherever practical
Roadside Safety	<ul style="list-style-type: none"> • Delineate hazards • Provide safety barriers at more risky sections

9. **S321.** Signing of bends, steep grades and improvement of roadside safety over high slopes should be a primary focus. The few elongated towns along the road are particularly suitable for demonstration of traffic calming on a Class 3 highway. Short sections of 30km/h zone are recommended in the center of these towns.

Table 8: S321 - Safety Recommendations

Area of Improvements	Recommendations
Alignment and Cross-sections	<ul style="list-style-type: none"> • Provide shoulders • Reassign lane width
Bends and Steep Grades	<ul style="list-style-type: none"> • Improve signing of sharp bends and steep grades • Provide laybys
Overtaking Management	<ul style="list-style-type: none"> • Provide basic and enhanced solid centerline markings
Junctions	<ul style="list-style-type: none"> • Ensure visibility
Traffic Calming	<ul style="list-style-type: none"> • Provide basic measures e.g. rumble strip + village sign + speed limit + pedestrian crossing + lane reassignment • Provide raised plateau at the centre of towns
Roadside Safety	<ul style="list-style-type: none"> • Delineate hazards • Provide safety barriers at more risky sections

E. Output 2 - Performance-Based Maintenance Pilots

10. The Project includes two pilot contracts that introduce two different forms of Performance-Based Maintenance.

3. Performance-Based Contract Specifics

11. **Output and Performance-based Road Contract (OPRC):** This form of performance-based contract includes initial Repair Works (intermediate and/or heavy maintenance) to restore the road to good condition, followed by routine/minor Maintenance Services to maintain the road at a prescribed service level for the duration of the contract. The Repair Works are paid on a volume basis (BOQ), while the subsequent Maintenance Services are paid on a performance basis. The contract may also include Emergency Works to repair damage from an extraordinary event (flood, earthquake, serious road crash or collapse of a utility which affects the road). The OPRC contract is suitable for roads which are in poor condition and require considerable Repair Works. The contract period for all services will be five years during which the contractor will be required to complete the initial Repair Works expeditiously, within 12-18 months.

12. A section of G323 in Wenshan has been selected for the OPRC pilot as shown in Table 10. The contract will be awarded through open bidding (NCB) which should provide greater competition resulting in lower prices and the selection of a well-qualified contractor. The MOF Model Bidding Document has been modified to include the additional contract provisions needed for an OPRC contract. YHAB will be the Employer and an independent Project Supervisor will be appointed by YHAB.

13. **Performance-based Intermediate and Routine Maintenance (PBMR):** This form of contract also includes Repair Works, Maintenance Services and Emergency Works, but will be signed with a Maintenance Section for the roads under its responsibility. Due to the limited capacity of the Maintenance Sections, the agreement will only include roads in good to fair condition where the required repairs are limited. Because the scope of works is limited, the contract duration will be only three years. The Maintenance Section will use its own staff and that of the Maintenance and Equipment Stations under it. The contract sum will only cover equipment and material costs, while staff costs will be paid separately by YHAB. Apart from

introducing performance-based maintenance, the aim of this pilot is to introduce contractual agreements in the context of force account operations, and facilitate future commercialization of maintenance implementation.

14. Ruili Maintenance Section (MS) has been selected for the PBMR pilot. It will include 50km of G320 and 57km of S324 as shown in Table A9.2. A contract between the Dehong General Section and Ruili MS will be negotiated for this pilot. It will include the same level of service requirements and performance standards as the Wenshan OPRC pilot and it will require Ruili MS to provide a technical proposal and work program for review and approval prior to commencement of the work, as if it were a contractor. Similarly, an independent Project Supervisor will be appointed to ensure compliance with the provisions of the contract.

15. **Payment Linked to Performance:** In both pilots the contractor (Ruili MS is considered the contractor) will be paid for the Repair Works based on measured quantities and unit prices contained in the BOQ. Similarly they will be paid for Emergency Works which are approved by the Employer based on output quantities and unit prices. For the Maintenance Services, the contractor is responsible for designing and carrying out the works, services and actions necessary to maintain the service level as defined by the performance standards contained in the contract. The definition of the exact nature of the maintenance works, their timing, their costing and their implementation is left to the judgment of the contractor. The Employer will pay the contractor a fixed monthly lump-sum covering the expenses of these maintenance works (including both maintenance and management charges).

16. The Project Supervisor (acting for the Employer) and the contractor will jointly carry out monthly formal inspections to determine if the road is in compliance with the performance standards. Deductions will be made from the monthly lump-sum payment where any defects are found exceeding the performance standards. The Project Supervisor may also carry out informal inspections at any time and alert the contractor of defects but deductions will only be made for non-compliances at the time of formal inspections.

17. The proposed performance standards cover all important road features. Each describes either a condition to be achieved in clearly understandable terms, or provides the allowance of the defect which must not be exceeded. The standards are shown in Table A9.2. The road features are consistent with the typology used in MOT maintenance categories, while the allowances for the pavement defects are consistent with the allowable distress levels for a road in good condition according to the MOT Highway Performance Assessment Standards. If a defect exceeds the allowance defined in the performance standards, then the contractor is required to repair the defect according to the Ministry of Transport technical specifications for road maintenance and construction which are prescribed in the contract. The standards also prescribe the amount of deduction from the monthly lump-sum in case of non-compliance. During the formal inspections each kilometer of road is inspected independently and a percentage of the payment is deducted for each defect found in that kilometer, with the qualification that the deduction will not exceed 100% of the payment for that kilometer.

18. **Other Contract Requirements:** The contractor is taking over responsibility for the operation and maintenance of the road and, as such, must comply with a broad range of Employer requirements covering public safety, the environment and the contractor's obligations under Chinese law. The contractor will be required to complete the following plans and submit them to the Employer for approval: Contractor's Quality Assurance Plan; Health and Safety Plan; Emergency Procedures and Contingency Plan; Traffic Management Plan; Monthly Statements; and Handover Reports. The contractor must also comply with the Environmental

Management Plan (EMP). On the basis of these management plans, deductions will be made from the monthly lump-sum payment (i) if the road is closed for longer than a prescribed period (e.g. six hours) or (ii) if the contractor fails to comply with requirements of the different management plans.

19. **Emergency Works:** The contract contains threshold quantities for various types of Emergency Works such as landslides, road failures or blockages. The contractor is responsible for repairs below these threshold values as part of his Maintenance Services. If a threshold value is exceeded, the Employer will authorize and pay for the Emergency Works based on unit rates contained in the BOQ.

Table 9: Performance Standards

Defect type	Allowance	Deduction
Right-of-Way and Roadbed		
Drains and ditches	<ul style="list-style-type: none"> No more than 10% of the cross section of a drain or ditch is obstructed at any location Lined ditches do not have structural damage and are firmly contained by surrounding soil or material 	30%
Vegetation control	<ul style="list-style-type: none"> Height is <10cm within 5m of the edge of the pavement or side drain No vegetation obstructs the view of road signs No vegetation is located in structures or sealed surfaces Vertical clearance of vegetation over the pavement or shoulder is >6m 	20%
Retaining walls	<ul style="list-style-type: none"> Retaining walls are stable, without damage and weep holes are clear 	10%
Slopes and fences	<ul style="list-style-type: none"> Slopes are intact with no loose rocks and free of erosion Fences are in good repair with no missing sections 	10%
Greening	<ul style="list-style-type: none"> Trees, flower beds are properly tended and fertilized and trees are whitewashed as needed 	10%
Carriageway and Shoulders		
Block/alligator cracks	<ul style="list-style-type: none"> No cracks >3mm wide Total area of cracks is $\leq 20\text{m}^2$ per 1km section 	50%
Longitudinal/transverse cracks	<ul style="list-style-type: none"> No unsealed cracks >3mm wide Total length of unsealed cracks $\leq 100\text{m}$ per 1km section 	50%
Potholes	<ul style="list-style-type: none"> No potholes >15cm diameter or >3cm depth Total number of potholes is ≤ 5 per 1km section 	50%
Ravelling	<ul style="list-style-type: none"> Total area of ravelling is $\leq 20\text{m}^2$ per 1km section 	50%
Rutting	<ul style="list-style-type: none"> No ruts >3cm deep Total length of rutting is $\leq 25\text{m}$ per 1km section 	50%
Depressions	<ul style="list-style-type: none"> No depressions >3cm depth Total area of depressions is $\leq 20\text{m}^2$ per 1km section 	50%
Shoving	<ul style="list-style-type: none"> No shoving >3cm height difference Total area of shoving $\leq 20\text{m}^2$ per 1km section 	50%
Bleeding	<ul style="list-style-type: none"> Total area of bleeding is $\leq 20\text{m}^2$ per 1km section 	50%
Edge break	<ul style="list-style-type: none"> No loose or breaking pavement edges Pavement width is at least 95% of design width as mentioned in contract 	50%

Defect type	Allowance	Deduction
Shoulder	<ul style="list-style-type: none"> Shoulders not >3cm lower than pavement and shoulders not higher than pavement Maximum continuous length permitted with defects = 25m 	30%
Cleanliness	<ul style="list-style-type: none"> No soil, debris, trash, other objects or oil/chemical spills on pavement or shoulder 	10%
Bridge, Culverts and Tunnels		
Bridges	<ul style="list-style-type: none"> Guardrails are present and not deformed All metal parts of the overall structure are painted or otherwise protected and free of corrosion The bridge deck is clean and the deck material is fully intact and bolted down The drainage system is in good condition and fully functional Expansion joints are clean and in good condition There are no obstacles to the free flow of water under the bridge and up to 100m upstream The clearance under the bridge is according to design There is no erosion around bridge abutments and piers 	50%
Culverts	<ul style="list-style-type: none"> No more than 10% of the cross section is obstructed at any location in the culvert There is no structural damage and culverts are firmly contained by surrounding soil or material 	20%
Tunnels	<ul style="list-style-type: none"> Lighting, ventilation and emergency equipment are fully operational The drainage system is in good condition and fully functional Footpaths are clear of debris and in good repair External structures are in good repair and clear of vegetation Entrances are painted with reflective paint and clearly visible at night 	50%
Traffic Engineering		
Signs	<ul style="list-style-type: none"> Information signs are present, complete, clean, legible, and structurally sound Warning and traffic signs are present, complete, clean, legible, structurally sound and clearly visible at night 	20%
Horizontal demarcation	<ul style="list-style-type: none"> Horizontal demarcation is present, legible and firmly attached to pavement 	20%
Guardrails	<ul style="list-style-type: none"> Guardrails are present, clean, without structural damage No guardrail sections are missing 	20%
Lighting	<ul style="list-style-type: none"> Lighting is functioning with no more than 5% of total lights unserviceable 	20%
Traffic Signals	<ul style="list-style-type: none"> Traffic signals are functioning with no lights unserviceable 	50%
Kilometer posts	<ul style="list-style-type: none"> Kilometer and guidance posts are present clean, legible and structurally sound 	10%

Source: Asian Development Bank.

4. Details of Preliminary Design of Output 2 Subprojects

Table 10: Details of Preliminary Resign for Output

	Wenshan					Ruili Pilot										
	Wenshan					Dehong										
Road Number	G323					G320b					S234					
Length (km)	57					50					57					
Class	4					2					2					
Number of Lanes	2					2					2					
Traffic	1,600					8,200					7,500					
Pavement width	Current					11.2					9.2					
	Design					11.2					9.2					
Shoulder Width	Current					ND					ND					
	Design					ND					ND					
Environmental	Medium-major repairs with limited resurfacing, and subgrade strengthening. Category C. Only SEOP required					300-400m south of the intersection with X212 is the Swan Lake Park, a local recreation area. It is the only such designated area anywhere along the road, but has no official classification and is not protected under PRC law. The proposed work proposed is not near this park. No environmental effects. Category C assessment, so SEOP required.					Well maintained, but requires some improvement to subsections. Given that the carriageway is already wide and there are wide shoulders and all work will take place within the existing RoW, no significant impact will be felt on this heavily travelled provincial highway. Cat C, SEOP prepared					
Social						Unsafe drive due to many intersections without easy-identified safe signs. Lack of effective measures of speed limitation. Heavy traffic during construction. High pressure on routine and minor maintenance after rehabilitation due to severe overloads.										
Improvement Type	Major/Medium					Medium					Medium					
Pavement Typical	km	AC cm	CTG cm	G cm	ST m2	km	AC cm	CTG cm	G cm	ST m2	km	AC cm	CTG cm	G cm	ST m2	
Major	40	6	17													
Medium	7	6				6.8	6				4	6				
Medium	10	4				21				X	24				X	
Road Safety Costs: US \$	809,148		Risk:	M - Medium		906,940		Risk:	H - High			522,397		Risk:	H - High	
Total Cost: US \$ ²	9,630,000					2,840,000					2,190,000					

Source: PPTA Consultant, No Detailed Designs were available

Proposed Design data prepared by HDM-4 Analysis. ND - No data available

2 The Total Construction cost includes allowances for quantity escalation and design and supervision

5. Road Safety Assessment and Preliminary Design Recommendations

20. The road safety risk assessment for the pilot roads is as follows.

Table 11: Safety Assessment Results

Route		Safety Risk
G320b	Ruili Section	H
G323	Luocunkou – Yanshan	M
S234 N	Baoshan - Ruili	H
S234 W	Ruili - Longdao	M

21. **G320b.** This route should be equipped with ample safety provisions.

Table 12: G320b - Safety Recommendations

Area of Improvements	Recommendations
Alignment and Cross-sections	<ul style="list-style-type: none"> • Provide shoulders • Reassign lane width
Bends and Steep Grades	<ul style="list-style-type: none"> • Improve signing of sharp bends • Improve signing of steep grade • Provide laybys on long steep grade • Investigate need for arrester bed
Overtaking Management	<ul style="list-style-type: none"> • Provide basic and enhanced solid centerline markings
Junctions	<ul style="list-style-type: none"> • Provide give-way signs on major side roads • Provide turning lanes at busier junctions • Ensure visibility • Improve directional signing
Traffic Calming	<ul style="list-style-type: none"> • Provide basic measures e.g. rumble strip + village sign + speed limit + pedestrian crossing + lane reassignment • Provide footpaths around villages wherever practical
Roadside Safety	<ul style="list-style-type: none"> • Delineate hazards • Provide safety barriers at more risky sections

22. **G323.** It is desirable to assign a higher budget for road safety as a demonstration due to this road being a pilot. The thriving towns of Zhesang and Guichao are particularly suitable for demonstration of traffic calming on a Class 3 highway. Short sections of 30km/h zone are recommended in the centre of these towns with raised plateau.

Table 13: G320b - Safety Recommendations

Area of Improvements	Recommendations
Alignment and Cross-sections	<ul style="list-style-type: none"> • Provide shoulders • Reassign lane width
Bends and Steep Grades	<ul style="list-style-type: none"> • Improve signing of sharp bends and steep grades • Provide laybys
Overtaking Management	<ul style="list-style-type: none"> • Provide basic and enhanced solid centerline markings
Junctions	<ul style="list-style-type: none"> • Provide give-way signs on major side roads • Provide turning lanes at busier junctions • Ensure visibility
Traffic Calming	<ul style="list-style-type: none"> • Provide basic measures e.g. rumble strip + village sign + speed limit + pedestrian crossing + lane reassignment • Provide raised plateau at the centre of Zhesang and Guichao • Provide footpaths at Zhesang and Guichao
Roadside Safety	<ul style="list-style-type: none"> • Delineate hazards • Provide safety barriers at more risky sections

23. **S324.** This route should be equipped with enhanced safety provisions. An analysis of collisions in the past five years is required for the long steep grade section to identify the precise safety problems. This will then ascertain the need for climbing lanes, inspection areas and arrester bed.

Table 14: S324 - Safety Recommendations

Area of Improvements	Recommendations
Alignment and Cross-sections	<ul style="list-style-type: none"> • Provide shoulders • Provide laybys on steep grades
Bends and Steep Grades	<ul style="list-style-type: none"> • Improve signing of sharp bends • Improve signing of steep grades
Overtaking Management	<ul style="list-style-type: none"> • Provide basic and enhanced solid centerline markings
Junctions	<ul style="list-style-type: none"> • Provide give-way signs on major side roads • Provide turning lanes at busier junctions • Ensure visibility
Traffic Calming	<ul style="list-style-type: none"> • Provide basic measures e.g. rumble strip + village sign + speed limit + pedestrian crossing + lane reassignment

Roadside Safety	<ul style="list-style-type: none">• Eliminate edge drops where feasible• Delineate hazards• Provide more safety barriers over high slopes
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