



Report and Recommendation of the President to the Board of Directors

Project Number: 41123
December 2007

Proposed Loan and Administration of Grant from the
Government of Australia
Kingdom of Cambodia: Road Asset Management
Project

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 5 December 2007)

Currency Unit (Cambodia)	–	riel (KR)
KR1.00	=	\$0.00025
\$1.00	=	KR3,980

ABBREVIATIONS

ADB	–	Asian Development Bank
AusAID	–	Australian Agency for International Development
DGPW	–	Directorate General of Public Works
EA	–	executing agency
EIRR	–	economic internal rate of return
EMP	–	environmental management plan
IA	–	implementing agency
ICB	–	international competitive bidding
ICCRRM	–	Interministerial Committee for Coordinating Road Repair and Maintenance
IDA	–	International Development Agency
JICA	–	Japan International Cooperation Agency
km	–	kilometer
MEF	–	Ministry of Economy and Finance
MPWT	–	Ministry of Public Works and Transport
NCB	–	national competitive bidding
NR	–	national road
PDPWT	–	Provincial Department of Public Works and Transport
PPTA	–	project preparatory technical assistance
RAMO	–	Road Asset Management Office
SOE	–	statement of expenditure
TA	–	technical assistance

NOTE

In this report, "\$" refers to US dollars unless otherwise stated.

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CONTENTS

	Page
LOAN AND PROJECT SUMMARY	i
MAP	
I. THE PROPOSAL	1
II. RATIONALE: SECTOR PERFORMANCE, PROBLEMS, AND OPPORTUNITIES	1
A. Performance Indicators and Analysis	1
B. Analysis of Key Problems and Opportunities	3
III. THE PROPOSED PROJECT	6
A. Impact and Outcome	6
B. Outputs	6
C. Special Features	8
D. Project Investment Plan	8
E. Financing Plan	8
F. Implementation Arrangements	10
IV. PROJECT BENEFITS, IMPACTS, ASSUMPTIONS, AND RISKS	14
A. Project Benefits	14
B. Project Impacts	15
C. Project Risks	16
V. ASSURANCES	17
A. Specific Assurances	17
B. Conditions for Loan Effectiveness	19
VI. RECOMMENDATION	19
APPENDIXES	
1. Design and Monitoring Framework	20
2. Sector Analysis	23
3. External Assistance	26
4. Summary of Proposed Civil Works	28
5. Detailed Cost Estimates and Financing Plan	29
6. Implementation Schedule	32
7. Contract Packages	33
8. Outline Terms of Reference for Consultants	36
9. Benefit Monitoring	43
10. Economic Analysis	44
11. Summary Poverty Reduction and Social Strategy	52
12. Summary Initial Environmental Examination	56

LOAN AND PROJECT SUMMARY

Borrower	Kingdom of Cambodia
Classification	Targeting classification: General intervention Sector: Transport and communications Subsector: Roads and highways Themes: Sustainable economic growth; capacity development; private sector development Subthemes: Promoting economic efficiency and enabling markets; institutional development; privatization.
Environment Assessment	Category B. The Project is limited to the resurfacing of existing road pavements and has few environmental risks associated with it. An environmental impact assessment is not required. An initial environmental examination (IEE) has been prepared and a summary is in Appendix 12. Impacts during the implementation of the Project have been reviewed and mitigation measures have been integrated into the project design. These measures will be managed through the environmental management plan (EMP).
Project Description	<p>The Project will assist the Government of Cambodia with periodic maintenance of the national and provincial roads administered by Ministry of Public Works and Transport (the MPWT roads). The Project will (i) assist the Government in periodic maintenance of about 950 kilometers (km) of MPWT roads; and (ii) help to build capacity at MPWT to improve the management and maintenance of its roads network and start a process of privatizing MPWT's force account units.</p> <p>The institutional strengthening of MPWT will include supporting a permanent and dedicated road asset management office (RAMO) within the general department of works of MPWT. This office will be formally established before loan effectiveness. RAMO will be responsible for systematic maintenance planning for the MPWT roads and will support and train MPWT management and line organizations to become efficient road asset managers.</p>

Rationale Without a periodic road maintenance works program, the significant investment in rehabilitating MPWT's paved roads (more than \$800 million since the mid-1990s) will quickly lose value as traffic and environmental effects lead to deterioration. The proposed periodic maintenance works program will help preserve MPWT roads that are in a maintainable condition, and correct deficiencies affecting the sustainability and safety of the network. If the long-term sustainability of the MPWT roads is to be secured, the institutional capacity of the ministry needs to be strengthened so it can provide effective future road asset management. Preserving the roads will prevent travel times and vehicle operating costs from increasing, and secure the accessibility that is essential for economic growth, particularly for the majority of the population living in rural areas. It will also improve Cambodia's connections with its neighbors.

Impact and Outcome The impact of the Project will be a contribution to achieving the long-term sustainability of the MPWT roads by preserving vulnerable parts of the road network and establishing a consistent and prioritized road management system within MPWT. This will assist economic growth by reducing future transport costs and preserving road connections. The outcome of the Project will be a more sustainable road sector based on a sound network of MPWT roads and effective road asset management.

Project Investment Plan The investment cost of the Project is estimated at \$58.35 million, including taxes and duties of \$6.28 million.

Financing Plan

Source	Total (\$ million)	%
Asian Development Bank	6.00	10.3
International Development Agency	30.00	51.4
Government of Australia ^a	4.80	8.2
Government of Cambodia	17.55	30.1
Total	58.35	100.0

^a This amount includes ADB's administration fee, audit cost, bank charges and provision for foreign exchange fluctuations (if any), to the extent that these items are not covered by the interest and investment income earned on this grant, or any additional grant contribution by the Government of Australia. Source: Asian Development Bank estimates.

Loan Amounts and Terms	<p>The Government has requested a loan of special drawing rights (SDR) 3,761,000 (about \$6 million equivalent) to be provided by ADB from ADB's Special Funds resources. The loan will have a term of 32 years, including a grace period of 8 years. There will be an interest charge of 1% per annum during the grace period and 1.5% per annum thereafter. The International Development Association (IDA) of the World Bank Group will provide cofinancing for the Project through an IDA credit of \$30 million and the Government of Australia through the Australian Agency for International Development (AusAID) will provide a grant for A\$6 million (about \$4.8 million equivalent). The grant from the Government of Australia will be administered by ADB whereas the IDA credit will be provided on a parallel basis and will be administered by IDA. The Government will provide counterpart funding of \$17.55 million equivalent (30.1%) of total Project cost.</p>
Period of Utilization	Until 31 December 2013
Estimated Project Completion Date	30 June 2013
Executing Agency	Ministry of Public Works and Transport
Implementation Arrangements	<p>The MPWT will be the Executing Agency (EA) for the Project, and the Directorate General of Public Works (DGPW) in MPWT will be the Implementing Agency (IA). MPWT has extensive experience of implementing externally funded projects. The Project will not establish a separate project management unit. The Minister of MPWT will appoint a deputy director general from DGPW as a full-time project director, who will be responsible for project supervision and will be accountable to the DGPW director general. DGPW will be responsible for day-to-day management of the Project and for coordinating the work of the line organizations in MPWT including RAMO. DGPW will engage and direct all consultants, be responsible for procurement of works, and be the employer on all civil works contracts. It will have overall responsibility for implementation of the EMP in the design and construction stages.</p> <p>The existing Interministerial Committee for Coordinating Road Repair and Maintenance (ICCRRM) will act as the steering committee for the Project. The ICCRRM is coordinating the Ministry of Finance (MEF) and MPWT in all matters pertaining to maintenance planning, implementation and disbursement for the national roads.</p>

Procurement

Procurement of all ADB and AusAID financed works will be in accordance with ADB's *Procurement Guidelines* (2007, as amended from time to time). DGPW is familiar with ADB procurement requirements and has performed satisfactorily under previous ADB-funded projects. Procurement of civil works financed by IDA will be subject to IDA's procurement guidelines and procedures.

DGPW may carry out advance contracting for civil works to accelerate implementation.

Consulting Services

Consulting services financed by ADB and AusAID will be selected and recruited in accordance with ADB's *Guidelines on the Use of Consultants* (2007, as amended from time to time). Consulting services financed by IDA will be recruited using IDA's guidelines.

DGPW may carry out advance recruitment for consulting services to accelerate implementation.

Project Benefits and Beneficiaries

The Project's economic benefits are primarily derived from savings in future vehicle operating costs that accrue because the proposed periodic maintenance will improve road surface conditions and slow their future deterioration. The economic internal rate of return (EIRR) for the Project, which was calculated by comparing with-project and without-project situations, is estimated at 97.0%, showing that it is economically viable. Extensive sensitivity testing and risk analyses show that there is no risk that the EIRR would fall below the cut-off rate of 12%.

Risks and Assumptions

The Project has been designed to reduce potential risks, which include delays in implementation or poor technical quality of works caused by the inadequate implementation capacity of MPWT, delayed counterpart financing, and an inability to maintain the project roads adequately in future. These risks are mitigated through the Project's technical advisory component.

Preserving the MPWT roads will perpetuate adverse social impacts from roads, such as traffic accidents and spreading of HIV/AIDS. To mitigate this, the supervision consulting services will undertake road safety audits and fund road safety awareness campaigns under the national road safety action plan. IDA and the Government will finance an HIV/AIDS prevention campaign under the Project.

The Project will restore and maintain existing road surfaces and there will be no land acquisition or involuntary resettlement. However, future traffic increases will require extension and widening of the project roads. ADB technical assistance is assisting the Government to prepare a new resettlement subdecree that will ensure uniform and sufficient resettlement of affected people in all infrastructure projects, irrespective of

funding source and implementing agency. To support implementation of this subdecree, the Project will provide funding for training of officers at concerned ministries and agencies.

I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on (i) a proposed loan to the Kingdom of Cambodia for the Road Asset Management Project and (ii) proposed administration of grant from the Government of Australia for the Project. The design and monitoring framework is in Appendix 1.

II. RATIONALE: SECTOR PERFORMANCE, PROBLEMS, AND OPPORTUNITIES

A. Performance Indicators and Analysis

2. The principal mode for the movement of goods and people in Cambodia is by road. The Cambodian road network covers about 39,400 kilometers (km) and includes seven national roads (NRs 1–7), which are considered the primary highways and have a combined length of about 4,800 km, and provincial roads, which are considered the secondary highways and have a combined length of 6,600 km. The management of the road network is split between the Ministry of Public Works and Transport (MPWT), which is responsible for about 11,400 km of national and provincial roads (the MPWT roads) and the Ministry for Rural Development, which is responsible for about 28,000 km of rural roads. In addition, MPWT also administers certain minor roads with relatively high traffic loads, currently defined as more than 300 vehicles per day, on behalf of the Ministry of Rural Development. Some provincial and most rural roads are in a poor condition and parts of the country are effectively isolated during the wet season. Cross-border traffic in the Greater Mekong Subregion (GMS) is still in its infancy but Cambodia and its neighbors are making concerted efforts to promote and ease such traffic by adopting the GMS road traffic cross-border agreement¹ and developing border crossing infrastructure and access roads. All of Cambodia's national roads except for NR 2 form part of either the southern corridor of the GMS,² which connects Bangkok via Cambodia to Ho Chi Minh City and other centers in southern Viet Nam, or the central corridor which connects the Lao People's Democratic Republic to the port in Sihanoukville.³

3. By the early 1990s, years of civil strife had led to widespread and severe deterioration of Cambodia's road infrastructure. In 1992, the Asian Development Bank (ADB) approved the Special Rehabilitation Assistance Loan⁴ to support the country's rehabilitation of critical physical and social infrastructure. The project focused on rehabilitation of damaged infrastructure, which was recognized as a serious constraint on the economic development and physical integration of the country. The Government has since focused road investment on rehabilitating the core national roads to stimulate sustainable economic recovery. Rehabilitation of the primary national roads has been implemented over the last 15 years with substantial support from ADB and other development partners and is now nearing completion.

4. The length of the rehabilitated national road network is now about 2,700 km. The rehabilitated national roads connect the major population centers and Cambodia with its neighbors. The asset value of the network is about \$800 million but the network is deteriorating rapidly because of lack of adequate road maintenance combined with rapidly growing traffic,

¹ ADB. 2004. *Implementation of the Greater Mekong Subregion Cross-Border Transport Agreement*. Manila (approved in March 2004 for \$800,000)

² The roads involved are NRs 1 and 5, parts of NRs 3 and 6, and provincial roads 33 and 48.

³ The roads involved are NRs 4 and 7.

⁴ ADB. 1992. *Proposed Loan to the Kingdom of Cambodia for the Special Rehabilitation Assistance Project*. Manila (approved in November 1992 for \$67.7 million).

poor road construction standards, and design and construction deficiencies. This means that large parts of the investment in rehabilitating the national roads could be lost within the next 5–6 years unless MPWT's road asset preservation works program is significantly expanded and accelerated.

5. Inadequate road maintenance is primarily due to a shortage of financial resources,⁵ poor organization of road management, and weak technical capacity. Shortage of funds for road maintenance is a common problem in least developed countries. Cambodia's economic and social development requires a minimum network of trafficable roads but built or rehabilitated roads are often not maintained because economic activity is low and traffic minimal (with the result that revenues from fuel and other road user taxes are insufficient to finance the upkeep of the network). This is particularly so in Cambodia, where population densities and traffic levels are low, but roads are relatively long. This low revenue-generating capacity is equally true in many other subsectors of the economy so there is limited scope for using domestic resources to subsidize the roads until the economy and the associated traffic-related revenues have caught up. Other consequences of this situation include a limited capacity for planning and implementing road maintenance and a scarcity of capable domestic road works contractors who could undertake maintenance works and who would require a reliable and reasonably predictable market for their services.

6. This situation will change relatively quickly given Cambodia's strong and stable economic growth—averaging about 8.1% per year over the last 10 years. In recent years, the Government's increasing budget allocations for road maintenance make it likely that sustainable road financing may be achievable within the next 5–6 years. The proposed Project seeks to span this interim period by injecting supplementary funding that will enable MPWT to preserve the rehabilitated network until adequate national funding becomes available, and to equip MPWT to manage its road assets effectively when such national funding does become available. The Project will do this by: (i) providing supplementary periodic maintenance; and (ii) assisting MPWT with internal restructuring, including supporting the development of a permanent Road Asset Management Office (RAMO). In due course RAMO would be responsible for planning the maintenance of the MPWT roads and would become MPWT's road asset manager. It would advise MPWT on the process of gradually privatizing its force account units. This process will reallocate human and physical resources to the private sector while, at the same time, help to create a relatively predictable captive market for domestic road contractors.

7. During preparation of the Project, MPWT requested support and advice on the possibility of setting up road toll collection on selected high-traffic volume highways, e.g., NR 1, NR 5, and NR 6, to generate additional sources of revenue for road maintenance. A study carried out under the project preparatory technical assistance (PPTA)⁶ indicated that there is potential for generating additional revenue from road tolls. Once road maintenance is in place and, if

⁵ Road maintenance is partially financed from the Fund for Road Repair and Maintenance, which is a road fund established by the Government in 2000 and financed by a surcharge on fuel. The road fund's revenue potential is constrained by fuel prices in Thailand and Viet Nam, which are significantly lower than in Cambodia. As a result, there is a danger that raising fuel taxation rates in Cambodia would lead to more fuel smuggling, which is already substantial, and that this would undercut the fiscal efficacy of the tax rate increase.

⁶ ADB. 2006. *Preparing the Transport Infrastructure Development and Maintenance Project*, Manila (approved in November 2006 for \$1,000,000).

requested by Government, ADB will consider providing an advisory TA outside this Project to develop an action plan to establish road toll collection on selected road sections.⁷

B. Analysis of Key Problems and Opportunities

8. During rehabilitation of the MPWT roads, the Government and its development partners focused on rehabilitating the maximum possible length of the national roads in the shortest possible time. Since at the time most of these roads were barely if at all passable, a quick and simple approach to restoring the network was essential for an early restoration of economic activity. Faced with limited government budgets and initially with very low traffic levels, most rehabilitation projects elected to adopt low construction standards; often with a design life of 10 years or less. Paving of shoulders was omitted in some projects to further stretch budgets. This enabled rapid rehabilitation of the core network but came at the expense of heavier future maintenance requirements, the effects of which must now be addressed.

9. Traffic is increasing rapidly in Cambodia, in step with rehabilitation of the road network and high and stable economic growth. The precise magnitude of traffic growth cannot be determined in the absence of comprehensive traffic counts over time but indicators such as the growth in petrol imports (averaging 15.4% per annum between 2002 and 2005), the growth in the fleet of registered motor vehicles (averaging 19.3% per annum between 2004 and 2006), and rapid economic growth indicate that traffic has probably grown at an average about 10% per annum in recent years, equivalent to doubling every 7 years. This is much faster than had been assumed when the road rehabilitation projects were prepared. As the economy grows, this rate of traffic growth will be maintained, if not exceeded. The wear and tear from higher than expected traffic growth has decreased the already short design life of the roads and thereby accelerated the need for periodic maintenance and, in many instances, pavement strengthening. The rehabilitated roads are now 5–6 years old and periodic maintenance is becoming urgent if they are to remain usable, and if the investment in their rehabilitation is not to be lost.

10. In 2002, an ADB transport sector strategy study⁸ for Cambodia noted that, although Cambodia's fuel taxes are high compared with those of its neighbors, road maintenance could not be fully funded from existing road user revenues and would need to be subsidized from the general budget. The study noted that the shortfall was temporary and would eventually disappear because of the combined effect of a growth in traffic (which would increase road user revenues), and falling road repair requirements (because of the rehabilitation of the network). The study predicted that a balance between funding and requirements might be attained around 2010–2011. Faster traffic growth has helped accelerate road revenues but this has at the same time accelerated maintenance needs, which, together with increasing labor and material costs, have outpaced the increase in revenues. As a result, it now seems likely that sustainable road maintenance funding might be attained around 2013–2014.⁹ General budget funds cannot cover the shortfall in road maintenance funding without breaking the existing regime of fiscal prudence pursued by the Government. Interim supplementary funding is therefore required to secure the road network in the medium term, until revenues from the road transport sector become sufficient to fully meet road maintenance requirements.

⁷ Road users would be unwilling to pay tolls to use roads that are in poor condition and adequate road maintenance must therefore be in place through the Project before implementation of road tolls can be considered.

⁸ ADB. 2001. *Transport Sector Strategy Study*, Manila (approved in April 2001 for \$850,000).

⁹ Source: ADB staff estimate based on an update of the analysis in the transport sector strategy study.

11. Until recently, expenditures on road maintenance were minimal because (i) public funding available for road maintenance was inadequate, (ii) the institutional capacity of MPWT to plan and implement road maintenance was (and remains) weak; and (iii) cooperation between MPWT and the Ministry of Economy and Finance (MEF), which is funding road maintenance, was not well-structured. To address these deficiencies, and the last point in particular, in 2005 the Government established an interministerial committee for road repair and maintenance (ICCRRM), consisting of representatives of MEF and MPWT. ICCRRM is designed to implement effective road maintenance financing and implementation systems. As a result, outlays for routine maintenance and repairs have accelerated sharply, partly because of increasing Government revenues from road user taxes and partly because of the streamlining of planning and disbursement procedures. For 2007, the national budget allocated \$25.6 million for road works, nearly all of which is to be spent on the national highways. Of this amount, \$5.6 million was allocated for routine maintenance and about \$10 million for repairs. Spending on provincial roads remains minimal and funding of an effective periodic maintenance works program, which is essential for the long-term sustainability of the MPWT roads, is still beyond Government's means.

12. The \$10 million for repairs is mostly being spent on repairing pavements that have developed premature defects. There are two main causes of these defects: inadequate pavement design for the climatic and hydrological conditions in Cambodia, and poor construction practices. An example of inadequate design is the use of unpaved earth shoulders to save money, despite the recurrent flooding and high precipitation in Cambodia and the consequent risk of pavement failure due to hydraulic pressure.¹⁰ Examples of poor construction practices include uneven application of spray seals because of badly configured spraying equipment and pavements that are of uneven thickness or thinner than designed, caused by poor workmanship and insufficient supervision and quality control. This reflects weak technical skills on the part of the contractors and MPWT. Securing the long-term sustainability of the road network will require adequate construction standards to be enforced and comprehensive works supervision and quality control systems to be established in MPWT.

13. While the road maintenance effort has improved considerably in Cambodia in 2005–2007, its effectiveness remains low. This is partly because of weak capacity to monitor road conditions and prioritize maintenance works within MPWT, but also because MPWT lacks the data and expertise to prove its point, so selection and prioritization is often done outside the ministry, by provincial governments and by other ministries. As a result, in effect MPWT is an administrator of day-to-day operations but not the road manager or the center of road expertise with the final word on which actions should be undertaken in the subsector. A comprehensive and prioritized road maintenance planning system needs to be set up in MPWT to enable it to effectively manage its road network.

14. The Project does not in itself entail social or environmental risks but the rapid growth in traffic does have social costs that should be addressed. Cambodia has now one of the highest incidences of road accidents in the world and, in 2006, an average of four people a day were killed and more than 100 injured on the roads. The road accident incidence in that year was 18

¹⁰ Hydraulic pressure damage is caused by heavy traffic on a soaked pavement. Moving wheel loads impart considerable and sudden pressure on water on a soaked road pavement, which forces the water into the road fabric and breaks it up. During floods or heavy rains, water seeps into the pavement from the road edges. With a paved shoulder, it is the shoulder that gets soaked which is a lesser concern since it does not carry regular traffic. Without the paved shoulder, it is the edge of the carriageway that gets soaked with the result that the pavement gets damaged in the outer wheel path where moving wheel loads and soaking intersect.

fatalities per 10,000 vehicles, a 50% increase over the 2000 figure. By comparison, in Thailand there were 6.5 fatalities per 10,000 vehicles in 2005. At the Government's request, the Project includes an allocation to fund implementation of parts of the national road safety action plan. Another persistent issue is the spread of HIV/AIDS for which road transport is a recognized vector. IDA will be funding a project component that addresses this. Finally, social issues will arise from the need, in the near future, to expand the network and widen existing roads to accommodate the growing traffic demand. Large investments will be required for future infrastructure development, which will need to be funded from many sources. The Government, with assistance from ADB, is formulating an involuntary resettlement subdecree¹¹ that will offer adequate and timely compensation to affected people in all subsectors irrespective of funding source and implementing agency. The subdecree is expected to be approved early in 2008. In response to the Government's request, the Project includes an allocation to help implementing the subdecree by funding training in affected ministries and agencies, including MPWT and MEF.

1. ADB's Strategy

15. ADB's strategy for Cambodia's road subsector has emphasized restoration of the national road network in order to provide safe and economical travel between the main centers of population and economic activity, and to provide reliable land transport links to neighboring countries. The strategy has focused on road infrastructure rehabilitation and the developing the institutional capacity to plan, manage, and maintain the transport system.

16. In line with the priorities and strategies identified in the Government's Rectangular Strategy, ADB's overarching goal is sustainable poverty reduction. The Government's strategy focuses on three strategic pillars: (i) broad-based economic growth through investment in physical infrastructure, development of the financial sector, support for greater regional integration, sustainable development of small and medium-sized enterprises, and investments in agriculture and irrigation; (ii) inclusive social development through basic education, empowering vulnerable groups such as women and ethnic minorities, control of communicable diseases, provision of rural water supply and sanitation facilities, and community-based sustainable management and conservation of natural resources in the Tonle Sap Basin; and (iii) good governance, through improvements in public financial management to enhance the development effectiveness of public expenditures, and decentralization and deconcentration initiatives to strengthen local participation in government, and improve public service delivery.

2. External Assistance

17. Cambodia's road subsector has in recent years received assistance from ADB and the World Bank and the governments of Australia, the People's Republic of China, Japan, the Republic of Korea, Thailand, and Viet Nam. Most of the assistance has been directed to restoring a basic level of access to as much of the country as possible through rehabilitation of the MPWT roads, including major programs for construction of bridges that were damaged or destroyed by conflict or neglect. ADB, the World Bank and the Government of Japan have also provided significant technical assistance to strengthen MPWT and other ministries and agencies involved in the roads subsector. A list of external assistance to the subsector is in Appendix 3. ADB has provided loans for six transport projects, with three focusing on the road network.

¹¹ ADB. 2004. *Enhancing the Resettlement Legal Framework and Institutional Capacity*. Manila (approved in December 2004 for \$400,000).

3. Lessons Learned

18. The main lesson learned in the road subsector is that when projects are designed and implemented they have to take into account, and actively address, MPWT's institutional and financing deficiencies. There need to be more effective network planning and road maintenance mechanisms that lead to better road design, construction and maintenance; more involvement by private sector interests, including the development of a domestic contracting industry; better procedures for procurement and tendering documentation, financial management, and performance monitoring; and standardization of road designs, especially pavement design. Since it is likely that there will be more outsourcing of works, contract management will have to be significantly improved and MPWT officials and contractors trained. MPWT needs to make more effort to retrain staff for effective project supervision. Enforcement of truck overloading policies, roadworthiness inspection, collection of penalties, and road safety awareness and driver training all need to be strengthened.

19. Another lesson is that national design standards must be complied with to ensure that road designs are adequate for the prevailing conditions, even when funding levels are tight. Close quality control and supervision must be in place to ensure that the desired level of quality is achieved at all stages from project design through to construction.

20. The Government of Japan is providing technical assistance to MPWT to address a number of these issues, including establishing axle load control and enforcement, developing road maintenance guidelines, establishing regular road condition monitoring, and outsourcing routine maintenance to the private sector. The Project will use the road maintenance guidelines and other outputs of this technical assistance to address issues that have not been covered so far. It will focus on bridging the temporary funding gap for periodic road maintenance and on helping MPWT develop an efficient road asset management organization that can cope with the needs of the road network.

III. THE PROPOSED PROJECT

A. Impact and Outcome

21. The proposed Road Asset Management Project will help to preserve the rehabilitated and maintainable national roads until adequate national funds become available for their upkeep. The impact will be the preservation of the MPWT roads so they can continue to support future economic development. The Project will contribute to the long-term sustainability of the MPWT roads by establishing a consistent and prioritized road management system at MPWT that will allow it to make future road maintenance allocations more effectively. The Project will achieve this by assisting MPWT with (i) periodic maintenance of the MPWT roads; (ii) establishing and mainstreaming RAMO's capacity to undertake systematic road maintenance planning for the MPWT roads; and (iii) providing institutional and management support and training to MPWT to strengthen its road management and quality assurance capacity at all levels and to start a process of privatizing its force account units. The outcome will be a more sustainable road sector based on a sound MPWT network and sustained road maintenance.

B. Outputs

22. The Project will provide periodic maintenance for about 950 km of the MPWT roads, thereby helping to cover the gap between road maintenance requirements and available resources. It will develop the road asset management capacity of MPWT to enable it to

effectively carry out road maintenance and road asset management. To achieve these outputs, the Project will be implemented as two related components.

1. Component A: Road Maintenance

23. This component encompasses two activities: (i) the periodic maintenance works, and (ii) support to the implementing agency (IA) in managing and implementing these works.

24. An indicative annual works program has been prepared for the periodic maintenance works under the Project. The planned works are reseals, associated preparatory works such as crack and pothole repairs, and ancillary works such as shoulder reinstatement, line work, and installation of road signs on about 950 km of the MPWT roads. Shoulder reconstruction and sealing is not normally considered part of periodic maintenance but where necessary to secure the integrity of the network, up to 20% of the annual works cost may be used for this. The Project will not implement any works that would require resettlement. Force account units will not be employed for project works. All works performed under the Project will be implemented by private contractors. Details of the proposed civil works are in Appendix 4.

25. The proposed first-year works program is firm but those for the subsequent 4 years are for planning purposes only. RAMO will select road sections for periodic maintenance in these years, based on regular monitoring of their condition. The condition of the network will be affected by with the amount of traffic on the individual roads, the impact of maintenance activities undertaken outside the Project, and future events, such as larger than normal seasonal floods. The ADB loan and the AusAID grant will in the first-year works program on NR 5 from km 3.9 to Kampong Chhnang western city limit. In subsequent years it is anticipated that ADB and AusAID will finance periodic maintenance of NR 5 from Kampong Chhnang to Pursat.

26. Implementation support to DGPW encompasses (i) a project implementation advisor who will assist DGPW with implementing the Project, (ii) works supervision, (iii) a short-term consultant to assist DGPW prepare the first-year work program, encompassing contracting of civil works and contracting of consulting services, (iv) an intermittent consultant to perform regular independent technical audits, and (v) independent financial audits of the project accounts. The ADB loan and the AusAID grant will finance the short-term consultant preparing the first-year program and the technical audit consultant. IDA will finance the remainder of the support for management and implementation of the Project.

2. Component B: Capacity Development

27. Under this component the Project will (i) strengthen MPWT's road management processes, systems and staff capacity to undertake effective road asset management and privatize five to six of MPWT's force account units; and (ii) provide financial support to general programs aimed at mitigating negative impacts of road traffic.

28. To strengthen MPWT's road management capacity, the Project will help to develop the capacity of RAMO to: report to the Directorate General of Public Works (DGPW) on the condition and performance of road network assets, recommend maintenance strategies to optimize returns on investment, prioritize road candidates for periodic maintenance and rehabilitation, and prepare annual and 3-year rolling budgets for road maintenance. RAMO's functions will include: (i) collection of road asset data on the condition of the roads, the amount of traffic, and road users' vehicle operating costs; (ii) data processing using the road

management decision support (RMDS)¹² system to generate strategic analysis, prepare the annual maintenance works program, perform project evaluation, and assess overall network performance; and (iii) reporting on the condition of the MPWT roads, the effectiveness of road maintenance and the recommended annual works programs. The main output will be MPWT's annual road maintenance works program and budget. RAMO will be formally established before loan effectiveness.

29. The Project will provide advice to strengthen MPWT's organization and management, strengthen MPWT's technical capacity for road management, enhance the private sector's capacity to undertake road maintenance works and ensure adequate quality of such works. It will also help MPWT start privatizing force account units. It will support independent monitoring and evaluation of project benefits, and implementation of an HIV/AIDS awareness program.

30. The Project will fund implementation of parts of the Government's national road safety action plan and of the draft resettlement decree (the decree is currently being developed with support from ADB, which is funding training of officials in the line ministries and provinces). IDA is proposing to fund a merit-based pay program¹³ in MPWT.

31. ADB and AusAID will finance (i) independent monitoring and evaluation of project benefits, (ii) parts of the national road safety action plan, and (iii) resettlement training. IDA will finance the remainder of the capacity development component and the proposed merit-based pay program in MPWT.

C. Special Features

32. Privatization of five to six of MPWT's force account units will help create a responsive contracting industry that can undertake future road works effectively. It will reduce MPWT's reliance on force account work.¹⁴

D. Project Investment Plan

33. The total cost of the Project is estimated at \$58.35 million (Table 1 and Appendix 5).

E. Financing Plan

34. The Government has requested ADB to provide a loan in the amount of SDR 3,761,000 (about \$6 million equivalent) from ADB's Special Funds resources to cover about 10.3% of the entire project cost. The loan will have a term of 32 years and a grace period of 8 years. There will be an interest charge of 1% per annum during the grace period and 1.5% per annum thereafter. The Borrower will be the Kingdom of Cambodia. AusAID intends to provide a grant of A\$6 million (about \$4.8 million equivalent). The Government of Australia financing, if approved, will be provided as joint cofinancing and will be administered by ADB. IDA intends to cofinance the Project by providing a credit of \$30 million. The IDA credit, if approved, will be provided as parallel cofinancing and will be administered by IDA. The Government of Cambodia will contribute about \$17.55 million equivalent (30.1% of total costs) to cover the remaining project

¹² The RMDS was developed with funding from the World Bank and is now being updated and extended to cover all phases of road maintenance.

¹³ Merit-based pay aims to reward the work ethic and effectiveness of government employees. It is a joint initiative of the Government and its development partners, including ADB and the World Bank.

¹⁴ The legal basis for the privatization of MPWT's force account units already exists in the form of the Financial Management Law, 1995.

costs, inclusive of part of works, all local taxes and duties and project management. The Project's financing plan is summarized in Table 2.

35. ADB typically seeks Board approval for the administration of grant and loan funds from cofinanciers only when cofinancing commitments are in place. In the case of the proposed grant funding from AusAID, the expected approval will be on or before 31 January 2008. To facilitate project implementation, the Board is requested to approve the administration of the proposed grant in an amount not exceeding A\$6 million (about \$4.8 million equivalent) from AusAID in the event that it is not confirmed before the date of Board approval. Approval from the cofinancier will be reported to the Board in accordance with the standard reporting procedures. If the Government of Australia does not approve the grant financing, the portion that would have been financed by AusAID will not be financed under the Project. Alternatively, the Government of Cambodia may make alternative arrangements, satisfactory to ADB, to cover the funding shortfall.

Table 1: Project Cost Estimate
(\$ million)

Item	Total Cost
A. Investment Costs^a	
1. Civil Works	45.83
2. Implementation Consultants	
a. First-Year Implementation Consultant	0.13
b. Supervision Consultant	1.68
c. Project Management Advisor	1.41
d. Institutional Strengthening Advisory	1.85
e. Technical Audit Consultant	0.18
f. Impact Monitoring Consultant	0.15
3. General	
a. HIV/AIDS Action Plan	0.20
b. Resettlement Decree Training	0.30
c. Road Safety Action Plan	0.23
d. Merit-Based Pay Initiative	0.50
4. Project Management	0.43
Subtotal (A)	52.89
B. Contingencies	
1. Physical ^b	2.54
2. Price ^c	2.75
Subtotal (B)	5.29
C. Financing Charges During Implementation	
1. Interest During Implementation	0.18
Subtotal (C)	0.18
Total Project Cost (A+B+C)	58.35

^a In mid-2007 prices. ^b Physical contingencies are computed at 5% of base costs. ^c Price contingencies are computed based on an international cost escalation factor of 2.5% and includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate. Source: Asian Development Bank Estimates

Table 2: Financing Plan
(\$ million)

Item	Total Cost	Percentage
Asian Development Bank	6.00	10.3
International Development Agency	30.00	51.4
Government of Australia ^a	4.80	8.2
Government	17.55	30.1
Total	58.35	100.0

^a This amount includes the Asian Development Bank's administration fee, audit cost, bank charges and provision for foreign exchange fluctuations (if any), to the extent that these items are not covered by the interest and investment income earned on this grant, or any additional grant contribution by the Government of Australia.

Source: Asian Development Bank estimates.

36. Over the duration of the Project, the Government will fund approximately 30.1% and the cofinanciers 69.9% of the total cost, following a sliding scale under which the cofinanciers will fund most of the initial works and the Government will progressively increase its funding as the Project proceeds. The cofinanciers will fund about 82% of works cost in the first year and only about 48% in the last year. The intended duration of the Project is 5 years, thus the Government and its co-financiers will provide an average of about \$10 million per year for periodic road maintenance and consulting services. The indicative cost allocation for works over time and the indicative variable disbursement rates are in Appendix 5.

D. Implementation Arrangements

1. Project Management

37. MPWT will be the Executing Agency (EA) and will be responsible for the overall technical supervision and execution of the Project. DGPW will be the IA and will be responsible for the direct supervision and day-to-day implementation of the Project. No separate project management unit will be established. The director general for public works will appoint a deputy director general for public works to act as project director for the Project. The project director will (i) coordinate the work of the line organizations in MPWT, including RAMO; (ii) provide overall works supervision, (iii) carry out a public awareness campaign on HIV/AIDS and human trafficking, (iv) monitor and supervise all project management activities, (v) engage consultants and carry out procurement, (vi) organize monitoring and evaluation activities, (vii) prepare project progress and project completion reports to be submitted to an Interministerial Committee for Coordinating Road Repair and Maintenance (ICCRRM), ADB, AusAID, and the IDA; and (viii) ensure full compliance with ADB's and the World Bank's resettlement, environment, and other safeguard policies. The project director will receive support from other DGPW staff and the implementation support consultants.

38. MPWT has substantial experience implementing ADB and World Bank projects as well as projects funded through bilateral assistance. It has performed satisfactorily in previous ADB projects. The Project will be overseen by the ICCRRM which will act as the steering committee for the Project.

39. Funding from the cofinanciers will be subject to independent financial audit, and to supervision and approval of claims by a construction supervision consultant engaged under the Project. ADB, AusAID, and IDA have agreed that they will seek to harmonize their reporting requirements (such as financial and technical audit reports, progress reports and monitoring

reports) to enable the MPWT to produce single harmonized versions of such reports acceptable to all cofinanciers.

2. Implementation Period

40. The implementation period for the Project will be about 5 years to June 2013. The implementation schedule is in Appendix 6.

3. Procurement

41. The civil works, goods and services to be financed by the ADB loan and the AusAID grant will be procured in accordance with ADB's *Procurement Guidelines* (2007, as amended from time to time). Procurement financed by IDA will be undertaken using IDA procedures and be through an independent international procurement agent. Based on the current state of MPWT roads, two contract packages have been identified for ADB's portion of the civil works. However, depending on the physical condition of MPWT roads from 2009, the civil works packages for both the ADB- and AusAID-financed portion and the IDA-financed portion of the Project are subject to change.

42. Procurement for works contracts greater than \$1 million will be through international competitive bidding (ICB) and for works less than \$1 million through national competitive bidding (NCB). Procurement of goods for contracts greater than \$500,000 will be through ICB and for goods less than \$500,000 through NCB. Goods and services for less than \$100,000 will be procured using shopping procedures. Bid documents for civil works will be prepared for single-stage two-envelope bids. The conditions of the environmental management plan will be reflected in the bidding and contract documents.

43. A procurement plan for the first year of project implementation has been prepared. The procurement plan outlines (i) the contracts for ADB-financed civil works, (ii) the proposed method of procurement of goods and works financed by ADB and (iii) the related ADB review procedures. MPWT will update the procurement plan during the Project. The procurement plan, procurement procedures, and details of proposed contract packages for the ADB- and AusAID-financed portion of the Project are set out in Appendix 7.

4. Consulting Services

44. Consultants for the ADB- and AusAID-funded portion of the Project will be recruited by MPWT in accordance with ADB's *Guidelines on the Use of Consultants* (2007, as amended from time to time). Individual consultants will be recruited under two contracts: (i) an individual consultant will prepare the 2008–2009 works program and help MPWT to procure contracting services; and (ii) a technical audit consultant will ensure quality control of the works implemented. The total input of consultants for the ADB and AusAID portion of the Project is estimated at 12 person-months of international consultants and 20 person-months of national consultants. Outline terms of reference are in Appendix 8.

45. Early in 2008, MPWT will start recruiting a long-term supervision consultant who will help MPWT to supervise the 2010–2013 periodic maintenance program and the management strengthening component of the Project. This component will provide training and consulting services to (i) develop MPWT's ability to monitor the road network, (ii) plan its maintenance, (iii) develop its capacity to undertake effective road works supervision, and (iv) carry out quality control. These consultants will be funded by IDA.

5. Advance Contracting

46. MPWT may carry out advance contracting for procurement of works and consultants to enable selection and preparation of bidding. Advance contracting will not include the signing of contracts or the award of contracts for works. The Government has been advised that approval of advance contracting does not commit ADB to finance the ensuing Project.

6. Anticorruption Policy

47. The Government was advised of ADB's *Anticorruption Policy* (1998, as amended to date) and *Combating Money Laundering and the Financing of Terrorism Policy* (2003). Consistent with its commitment to good governance, accountability and transparency, ADB will require the Government to institute, maintain, and comply with internal procedures and controls following international best practice standards for the purpose of preventing corruption or money laundering activities or the financing of terrorism and to covenant with ADB to refrain from engaging in such activities. The loan documentation between ADB and the Government will further allow ADB to investigate any violation or potential violation of these undertakings. 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 MPWT and all contractors, suppliers, consultants, and other service providers as they relate to the Project.

48. The Project incorporates several other measures to deter corruption and increase transparency, in addition to the standard ADB requirements. The project design includes measures to build capacity within MPWT so staff understand and comply with ADB and government procedures as outlined in the project administration manual. A Project website will be developed to disclose information about project matters, including procurement. With regard to procurement, the website will include information on, among others, the list of participating bidders, name of the winning bidder, basic details of bidding procedures adopted, the amount of the contract awarded, and the list of goods and services procured. A grievance redress mechanism will be set up to encourage more stakeholder vigilance and ensure greater accountability. It will receive and resolve complaints and act upon stakeholders' reports of irregularities on matters relating to the Project, including grievances arising from resettlement. MPWT will publicize the existence of this mechanism widely to ensure that stakeholders are aware that there is a venue to address their concerns or grievances relating to fraud, corruption, or abuse in project implementation.

49. The Government will sign a good governance framework for the Project with IDA. This will include various requirements and measures that the Government needs to comply with and implement (including the establishment of a project website and grievance redress mechanism). In order to avoid duplication, the Government, ADB and IDA agree that, with respect to those requirements under the good governance framework that are similar to the ADB requirements, the Government will be required to comply with or implement these only once. For example, the Government is required to establish only one project website and one grievance redress mechanism to meet the conditions of both the good governance framework and ADB. The Government will need to consult with both ADB and IDA to ensure that the project website and the grievance redress mechanisms are acceptable to both ADB and IDA.

7. Disbursement Arrangements

50. Disbursements from the ADB loan and the AusAID grant for contracts for consulting services and civil works bid under ICB procedures will be through direct payment procedures defined in ADB's *Loan Disbursement Handbook* (2007, as amended from time to time).

Disbursements for incremental expenditures and shopping will be through two imprest accounts. MEF will establish one imprest account for the ADB loan and one for the AusAID grant. MEF will delegate administration of the accounts to MPWT by means of arrangements satisfactory to ADB. Initial deposits to the two imprest accounts will be based on estimated expenditures to be paid from the each imprest account for the first 6 months of project implementation or 10% of the loan (or grant as relevant) amount respectively, whichever is less. Both imprest accounts will be established, managed, replenished, and liquidated in accordance with ADB's *Loan Disbursement Handbook* and detailed arrangements agreed upon between the Borrower and ADB. A statement of expenditure will be used to reimburse eligible expenditures and liquidate advances to the imprest accounts to ensure speedy project implementation. The ceiling for statements of expenditure will be \$50,000 per invoice. Arrangements for disbursement of funds made available from the IDA will follow IDA's procedures, which are similar to those of ADB.

8. Accounting, Auditing, and Reporting

51. DGPW will maintain separate records and accounts adequate to identify the goods and services financed from the proceeds of the ADB and AusAID loan and grant and the IDA credit. These accounts will detail funds received, expenditures incurred for the Project, and the use of local funds. Within 6 months of the end of each fiscal year, DGPW will submit audited annual project accounts to ADB, AusAID, and IDA, which will provide a detailed description of the source of funds and expenditures made. The annual project accounts will be reported in a common format for all cofinanciers and will be audited by an independent auditor acceptable to ADB, AusAID, and IDA. The auditor's terms of reference will be approved by ADB, AusAID, and IDA before commencement of work. The annual audit will include an opinion on operation of the imprest account and statements of expenditure. Beginning in 2009, a yearly technical audit will be conducted by the technical audit consultant assigned to the Project and will be submitted by DGPW to ADB, AusAID, and IDA.

52. Regular progress reports for the Project will be prepared by DGPW, assisted by the consultants, and will be submitted by DGPW to ADB, AusAID and IDA every quarter. The reports will be in a common format for all cofinanciers and will include a description of the physical progress, status of implementation plans, procurement and contractual status, and any implementation issues. The reports will contain a summary of project accounts, including details of the latest project expenditures and contract amounts. They will include an evaluation of progress in implementing the Project. Within 6 months of physical completion of the Project, DGPW will prepare a project completion report and submit it to ADB, AusAID and IDA. The report will cover details of project implementation, success in meeting performance targets, project costs, performance of contractors and consultants, social and economic impact, economic rate of return, and other details as may be requested by ADB, AusAID, and IDA.

9. Project Performance Monitoring and Evaluation

53. DGPW, assisted by the consultants, will establish project performance monitoring and evaluation for the Project in accordance with ADB's *Guidelines for Preparing a Design and Monitoring Framework (2007)* and integrate it with the existing management information system. Within 12 months of ADB loan effectiveness, DGPW will conduct surveys to establish baseline data for subsequent performance monitoring. A second round of surveys will be carried out before a midterm review of the Project and a third round will be carried out 6 months before project completion. The baseline and impact surveys will include appropriate control areas and will assess all interventions under the Project. The main sources of data will include, but not be limited to, (i) secondary data from the Borrower's sources, (ii) traffic counts, (iii) freight and

passenger surveys, and (iv) traffic accident statistics. In addition, a set of indicators reflecting transport costs, tariffs, and mobility will be developed to assess the effects of the improved roads. DGPW will submit a report to ADB summarizing the key findings of monitoring at inception, midterm review and project completion. Sample indicators, to be reviewed at the start of project implementation, are shown in Appendix 9.

10. Project Review

54. Regular six monthly reviews will be undertaken jointly by the Government, ADB, AusAID, and IDA. In addition, MPWT and staff of ADB, AusAID and IDA will jointly undertake a midterm review in about mid-2010 to assess (i) the status of implementation, (ii) the performance of consultants and contractors, (iii) the impacts of the Project, (iv) the progress of implementation, (v) the status of compliance with the loan covenants stipulated in the Loan Agreement, and (vi) the need for any changes in the project scope or schedule to achieve the Project's impact and objectives.

IV. PROJECT BENEFITS, IMPACTS, ASSUMPTIONS, AND RISKS

55. The Project's benefits and impacts were assessed along with potential risks associated with the assumptions made in the project design. The combined benefits and impacts are expected to outweigh the costs, given the likelihood of risks occurring.

A. Project Benefits

56. **Economic.** The economic internal rate of return (EIRR) for the Project was calculated by comparing the with-Project and without-Project situations for the project roads. In the without-Project scenario, the roads are assumed to receive only minimal maintenance and will continue to deteriorate. The with-Project scenario assumes sufficient routine and periodic maintenance to preserve the functionality of the project roads. The feasibility study considered various maintenance alternatives for the project roads, and the proposed Project is based on the most cost-effective option. Without the Project, the roads would continue to deteriorate rapidly leading to increases in vehicle operating costs. With the Project, these costs will remain as at present or escalate more slowly, thus preserving the economic utility of the network.

57. The economic analysis was carried out using the highway development and management system model (HDM-4).¹⁵ The model evaluates the project investment by considering periodic and recurrent maintenance costs as well as the benefits derived from savings in road user costs. The project life was taken to be 20 years. The economic analysis subdivided the project roads into homogeneous sections, defined by traffic volumes derived from the traffic analysis, roughness observed during the surveys, and the altitude and gradient of the road. The EIRR was estimated for the Project as a whole and was estimated to be 97%, indicating that the Project is economically viable. The economic analysis is summarized in Appendix 10.

58. Several sensitivity test cases were examined; (i) periodic maintenance costs increase by 20%, (ii) benefits decrease by 20%, (iii) traffic growth rates decrease by 20%, (iv) no periodic

¹⁵ The HDM-4 software was developed as part of the International Study of Highway Development and Management Tools, sponsored by the World Bank, ADB, Swedish National Road Administration, the Department for International Development of the United Kingdom, and others.

maintenance is undertaken after implementation of the Project,¹⁶ and (v) a combination of a 20% increase in periodic maintenance costs and a 20% reduction in benefits. The results show that the quantified economic benefits are robust to the various sensitivity tests and the Project remains economically viable in all cases. A risk analysis was undertaken to determine the probability of the EIRR falling below 12%, the opportunity cost of capital, and the economic viability of the Project. The risk analysis used the @Risk computer program and a full description of the methodology and assumptions used is in Appendix 10.

59. The high EIRR generated by the Project arises because the cost of originally rehabilitating the roads is considered a sunk cost which, in conformity with the principles of welfare economic analysis, is not taken into account when estimating the Project's costs and benefits. However, without these earlier investments there would not have been a road network to maintain, so it may be argued that the Project should be seen as an extension of the earlier rehabilitation projects and evaluated as such. An analysis including the sunk¹⁷ costs of the road network has therefore been performed. This analysis yields an EIRR of 23.8%, confirming that the project roads were viable at the time of reconstruction and remain so even when the cost of periodic maintenance is considered.

B. Project Impacts

60. **Social.** The Project has been formulated to minimize potential social risks. The periodic maintenance will lower transport costs and improve the access of the poor to markets and schools, medical facilities and other social services. Farmers will benefit from lower input prices caused by lower freight rates. Poor and nonpoor will benefit from cheaper transport and shorter travel times. Better access to public sector services will make them more cost-effective. The Project will contribute to economic growth and help to expand economic opportunities. However, the extent to which women will be able to take advantage of these opportunities will depend on economic, social, and cultural factors.

61. The summary poverty and social strategy is set out in Appendix 11. Temporary labor camps will not be required since MPWT maintains permanent work camps in all the provinces that will be used by the contractors. The Project is not expected to have any impacts related to HIV/AIDS, but roads are a recognized vector for transmission of sexually transmitted infections and an HIV/AIDS prevention component has been included in the Project, financed by IDA. The socioeconomic survey indicates that the Project is not expected to have any particular impact on ethnic minority groups. ADB's *Policy on Indigenous Peoples* (1998) is therefore not triggered. Everyone people in the project road areas will benefit from the economic development generated by the Project. Since there are no impacts on ethnic minority groups, an ethnic minority development plan is not required.

62. **Resettlement.** As the Project will maintain only existing road surfaces, there will be no impact in terms of involuntary resettlement. The roads being considered for periodic maintenance work were rehabilitated within the past 5 years and any necessary resettlement was completed at that time. Site visits to sections of the roads where the periodic maintenance is to be undertaken showed that the right-of-way was fully cleared and no permanent structures were located within the right-of-way. All the periodic maintenance work will be within the right-of-

¹⁶ A risk to the Project could be that no further periodic maintenance is undertaken after the Project is implemented. The sensitivity test shows that this has little effect on the overall EIRR of the Project (see Appendix 10).

¹⁷ Sunk costs are costs that were previously spent on rehabilitating the road network (para. 4), estimated at about \$800 million at market prices. Sunk costs are not normally considered in economic analysis because previously expended resources have no alternative usage and therefore no alternative value.

way and hence no new land acquisition is anticipated, as the proposed works do not involve any widening, heightening or realignment of the roads. Some temporary structures (wooden poles and thatched roofs) serving small shops and stalls have been observed on some of the project roads in the right-of-way and resurfacing works could have a minor impact on these temporary structures. However, most of the work will be done within a short period of time so these local shops should not suffer a loss of income. There may also be brief impacts on access to the road due to shoulder reconstruction and resurfacing.

63. **Environmental.** The proposed works will be limited to the top of the road formation with most of the work being limited to the paved surface itself. DGPW and the supervision consultant (para. 45) will ensure that contractors limit their operations to the top of the road formation. The maintenance works (e.g., resurfacing, shoulder reconstruction, and pavement strengthening) could have minor environmental impacts during construction. Sites for extraction of construction materials (gravel and crushed stone) could have an impact on soil, water and the natural environment. Material piled along the roads could encroach on land and create runoff into agriculture land and drainage systems. There may be temporary smoke and dust emissions, and noise and vibration at work sites. However, these impacts will be short term. There could be spills of fuel, bitumen, oil, and acid at work sites, workshops and garages. These impacts would be temporary and would be mitigated with appropriate measures. An environmental management plan (EMP) has been prepared to mitigate potential impacts during construction.

C. Project Risks

64. The Project has been designed to reduce potential risks, including delays in implementation because of the inadequate implementation capacity of MPWT in Cambodia, failure to provide counterpart financing on time, and inadequate enforcement of contracts, specifications and procedures. The Project includes a number of measures to mitigate the risk of delays. A short-term individual consultant is to be engaged to prepare the first-year works program and procure contracting services. The Government has been made aware of ADB's emphasis on the timely provision of counterpart funds, and has assured the project processing missions that it can provide the funds for all ADB-financed road projects on time. Possible failure to deliver quality project-related decisions, designs and periodic maintenance works is an important risk, which will be mitigated by requiring a quality management system for the Project, ensuring that all stages of the works process are fully documented, that the contractors use equipment that is capable of performing, and is properly calibrated for, the job at hand, and that contractors' sealing crews and MPWT's supervision staff are fully trained. This will be overseen by the supervision consultant, who will work with the contractors and MPWT staff to help in developing better sealing methods and the systems required to monitor performance.

65. There is also a risk that the project roads will not be properly maintained in future and thus the full benefits of the Project will not be realized. The Government is aware of the importance of road maintenance. The project design addresses the risks of inadequate financing for the project roads and the Government has agreed to loan assurances requiring the allocation of specific levels of financing for maintaining the project roads, in addition to assurances regarding levels of financing for road maintenance nationwide.

66. Completion of the Project would preserve the project roads, which could perpetuate road traffic accidents, human trafficking, and the spreading of HIV/AIDS. To mitigate this, the Project includes (i) HIV/AIDS awareness and prevention measures during project implementation financed by IDA, (ii) financial support for the national road safety action plan, and (iii) road safety auditing of the project roads as part of preparing works.

V. ASSURANCES

A. Specific Assurances

67. In addition to the standard assurances, the Government and MPWT have given the following assurances, which are incorporated in the legal documents:

- (i) The Government will provide counterpart funds for project implementation on time. MPWT will make a timely submission of an annual budgetary appropriation request to MEF and MEF will ensure prompt disbursement of appropriated funds during each year of Project implementation.
- (ii) In the event the funding from AusAID cannot be obtained, the portions thereof will not be financed under the Project. The Borrower may make alternative arrangements, satisfactory to ADB, to cover the funding shortfall.
- (iii) The Government, through MPWT, will ensure that the project roads are properly maintained and that proper technical supervision and adequate routine funds will be provided. The Government and MPWT will prepare annual road maintenance plans prepared throughout the project period and after the Project is completed based on the agreed maintenance standards, traffic volume and assessment of needs.
- (iv) Within 9 months of ADB loan effectiveness, MPWT will create a project website to disclose information about various matters on the Project, including procurement. With regard to procurement, the website will include information on the list of participating bidders, name of the winning bidder, basic details on bidding procedures adopted amount of contract awarded, and the list of goods and services procured.
- (v) Within 9 months of ADB loan effectiveness, MPWT will prepare a grievance redress mechanism, acceptable to ADB, and establish a task force at the DGPW to receive and resolve complaints/grievances or act upon reports from stakeholders on misuse of funds and other irregularities, including grievances due to resettlement and environmental issues. The task force will (i) make public the existence of this grievance redress mechanism, through a public awareness campaign, (ii) review and address grievances of stakeholders of the Project, in relation to either the Project, any of the service providers, or any person responsible for carrying out any aspect of the Project; and (iii) proactively and constructively respond to them.
- (vi) The Government and MPWT will sign and implement the governance framework. With respect to the several requirements under the governance framework that are similar with the governance and anticorruption measures contained in paragraphs 47, 48 and 49 of this document, such as the requirements to establish a project website and grievance redress mechanism, the Government, ADB and IDA agree that the Government will only be required to comply with one or implement once to be considered as having complied with both IDA and ADB's requirements. For example, the Government is only required to establish one project website and one grievance redress mechanism to meet the conditions under both the governance framework and ADB requirements. The Government will consult with both ADB and IDA to ensure that the project website and the grievance redress mechanism are acceptable to both ADB and IDA.

- (vii) The Government and MPWT will ensure that civil works contractors engaged under the Project (i) provide for equal pay to men and women for equal work and make prompt payment of wages; (ii) provide safe working conditions and water and sanitation facilities for male and female workers; (iii) do not violate any prohibitions against child labor under the Government's laws and international treaty obligations; and (iv) require the contractor to include information on the risk of transmission of sexually transmitted diseases, including HIV/AIDS, in health and safety programs for all construction workers employed under the Project. Specific provisions to this effect will be included in bidding documents and civil works contracts, and compliance will be monitored by MPWT.
- (viii) The Government and MPWT will ensure that the Project will be carried out in accordance with the initial environmental examination (IEE) and the environmental management plan (EMP) prepared under the IEE, and will comply with the Government's environmental laws and regulations and ADB's Environment Policy (2002). If there is any discrepancy between the Government's laws and regulations and ADB's environment policy, ADB's policy will prevail. The Government will implement the environmental mitigation and management measures, and other recommendations specified in EMP to minimize any adverse environmental impacts arising from the implementation of the Project. MPWT will be responsible for the implementation of the EMP and will be responsible for the monitoring during resurfacing of the pavements, associated pavement works such as edge repair, line marking and repair and surfacing of shoulders and during the operation phases. MPWT will monitor the contractor's compliance with the provisions of the EMP. The Government will ensure that the portion of the Project that is to be funded by other cofinanciers will adopt the provisions of the IEE and EMP.
- (ix) When project roads pass through near-protected or sensitive areas (nature reserves parks, conservation areas, biodiversity reserves, cultural and historical sites, etc.), the Government will ensure cooperation between MPWT and the area authority responsible for preparing and implementing the protective measure. The measures may include any combination of area demarcation, fencing, checkpoints, speed bumps, wildlife passage zones, patrols, or other measures to preserve the integrity of the area from encroachment or environmental degradation.
- (x) The Government and MPWT will ensure that the Project will not involve involuntary resettlement according to ADB's Involuntary Resettlement Policy (1995). The Project confined to resurfacing of pavements and associated pavement works such as edge repair, line marking and repair and surfacing of shoulders of existing roads. The periodic maintenance work to be undertaken under the Project does not involve any widening, heightening or realignment of the project roads.

B. Conditions for Loan Effectiveness

68. Prior to loan effectiveness, the following will have been completed:
- (i) the Government will have issued a *prakas*¹⁸ on the establishment of RAMO. The *prakas* will clearly set out the functions, structure and officers responsible for managing RAMO;
 - (ii) the Government will have appointed a deputy director general of DGPW as the project director; and
 - (iii) the IDA Credit Agreement will have been signed between the Borrower and IDA and all conditions precedent to its effectiveness (other than a condition requiring the effectiveness of ADB's Loan Agreement) have been fulfilled.

VI. RECOMMENDATION

69. I am satisfied that the proposed loan would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve

- (i) the loan in various currencies equivalent to Special Drawing Rights 3,761,000 to the Kingdom of Cambodia for the Road Asset Management Project from ADB's Special Funds resources with an interest charge at the rate of 1.0% per annum during the grace period and 1.5% per annum thereafter; a term of 32 years, including a grace period of 8 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft Loan Agreement presented to the Board; and
- (ii) in the event the Government of Australia approves grant financing not exceeding the equivalent of A\$6,000,000 to the Kingdom of Cambodia for the Road Asset Management Project, the administration by ADB of such grant in accordance with the proposal set out in paragraph 34 of this report.

Haruhiko Kuroda
President

18 December 2007

¹⁸ *Prakas* is the Khmer name for regulations or instructions issued by a government minister.

DESIGN AND MONITORING FRAMEWORK

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
<p>Impact</p> <p>Help to secure sustainable economic growth</p>	<p>Traffic volumes of passengers and freight increase in step with economic development</p> <p>The value of MPWT's rehabilitated road assets is constant or increasing</p>	<p>Baseline traffic data and collection of comparable data over time (collected as part of MPWT's road asset management activities)</p> <p>National accounts and other indicators of economic growth</p> <p>Baseline road condition survey and systematic road condition surveys over time (collected as part of MPWT's road asset management activities)</p>	<p>Assumptions</p> <p>The Government is committed to maintaining the road infrastructure.</p> <p>Risks</p> <p>Restructuring of institutions to improve the management of road asset maintenance is unsuccessful</p>
<p>Outcome</p> <p>MPWT effectively and systematically plans and implements road asset management on its rehabilitated road network and MEF budget accordingly and disburses without delay and road safety is improved</p>	<p>Passenger and freight vehicle operating costs are constant or decreasing in constant prices by 2014</p> <p>The share of MPWT's rehabilitated roads that are in average or good condition is constant or increasing by 2014</p> <p>50% of road maintenance on the rehabilitated network is performed by private contractors by 2014</p> <p>Road traffic casualty rates reduced to 12/10,000 vehicles by 2013</p>	<p>Field surveys and interviews of road transport operators and road users to determine operating costs and transport service prices</p> <p>Traffic counts on the rehabilitated road network</p> <p>Road maintenance budget allocation and expenditure reports</p> <p>MPWT records</p> <p>Road traffic casualty statistics</p>	<p>Assumptions</p> <p>Road improvements are undertaken satisfactorily and pavement quality is sustainable</p> <p>Contractors with adequate qualifications are available and willing to undertake the works</p> <p>Risks</p> <p>Insufficient future funding for road maintenance</p> <p>Road traffic safety programs are ineffective</p>

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
<p>Outputs</p> <p>Regular routine, recurrent and periodic maintenance is instituted on MPWT's rehabilitated road network</p> <p>RAMO is established and operating effectively, demonstrating completion of civil works contracts on schedule, in compliance with conditions of contract and all defects rectified by end of defects liability period</p> <p>Adequate pavement design and adequate quality of works is achieved during maintenance of the rehabilitated network</p> <p>Road safety campaigns to raise public awareness and improve enforcement of traffic and road right-of-way rules have been completed</p>	<p>About 950 km of the MPWT's rehabilitated roads have received periodic maintenance by 2013</p> <p>The rehabilitated roads receive adequate routine, recurrent and periodic maintenance by 2010</p> <p>Outlays for repair of failed pavements and emergency repair of flood damages on the rehabilitated road network are reduced by 50% by 2013</p> <p>The legal basis for RAMO is established before loan effectiveness and RAMO is operating effectively without need for further day-to-day outside support by 2013</p> <p>Procedures and systems are established to effectively implement (by 2009):</p> <ul style="list-style-type: none"> ▪ Identification of work needs (identification of faults and selection of adequate treatment) ▪ Preparation of projects (design, justification and cost estimation) ▪ Procurement (prequalification and bidding) ▪ Contract administration ▪ Project supervision and management ▪ Monitoring and reporting (physical works progress and costs) ▪ Financial accounting and ▪ Technical auditing <p>National Road Safety Action Plan has been implemented by 2010</p>	<p>Monthly and quarterly Project progress reports</p> <p>Project completion report</p> <p>MEF road maintenance and repair disbursements</p> <p>MPWT annual road maintenance works program</p> <p>Advice from MPWT</p> <p>Progress reports and project completion report</p> <p>Project accounts</p> <p>Project review missions</p> <p>Technical audit records</p> <p>MPWT records</p>	<p>Assumptions</p> <p>Procurement processes ensure bidders are qualified</p> <p>Quality management and cost control of civil works are effective</p> <p>Provincial authorities have the capacity to manage environmental management and social action plans</p> <p>Commitment to road safety campaigns</p> <p>Targeted communities apply the road safety principles, especially vulnerable groups</p> <p>Risks</p> <p>Insufficient number of bids are received from qualified, eligible bidders</p> <p>Delays in completion of procurement to start works</p> <p>Increased construction costs reduce the scope of work achievable within the Project</p> <p>Contractors fail to perform as required</p>

Design Summary	Performance Targets/Indicators	Data Sources/Reporting Mechanisms	Assumptions and Risks
HIV/AIDS awareness and prevention programs have been completed on the Project road	Vulnerable groups and contractor personnel have been exposed to HIV/AIDS awareness and prevention programs before the start of civil works	Progress reports and project completion report	
Activities with Milestones 1 Civil Works for Periodic Maintenance. Target: Beginning of 2008 to 2013. 2 Selection and commencement of consultant for preparation of 2008 and 2009 works program. Target: Early 2008. 3 Selection and commencement of institutional and management consultants for assisting MPWT. Target: Mid-2008. 4 Selection and commencement of supervision consultant to conduct work identified for 2008/2009 works program and to identify future works programs. Target: End of 2008. 5 Bidding for Civil Works Contractors. Target: Beginning of 2008. 6 Civil Works for Periodic Maintenance. Target: Beginning of 2008 to 2013. 7 Selection and commencement of technical audit consultant. Target: End of 2009. 8 Support for road safety campaign. Target: Beginning of 2009 to 2010. 9 Implement resettlement training. Target: Early 2008 and ending in 2010. 10 Implement HIV/AIDS awareness and prevention programs. Target: Beginning in 2008.			Inputs (\$ million) ADB 6.00 Civil Works 4.86 Consultants 0.13 General 1.01 IDA 30.00 Civil Works 21.73 Consultants 4.94 General 3.33 Gov. of Australia 4.80 Civil Works 3.80 Consultants 0.33 General 0.67 Government 17.55 Civil Works 9.14 Consultants 0.00 General 8.41 Total 58.35

ADB = Asian Development Bank, IDA = International Development Agency, MPWT = Ministry of Public Works and Transport, RAMO = Road Asset Management Office.

SECTOR ANALYSIS

A. Background

1. While Cambodia is serviced by road, rail, air and water transport, road transport dominates the domestic transport of goods and passengers. Roads are critical to the social and economic development of Cambodia.

2. The Ministry of Public Works and Transport (MPWT) is responsible for road transport and its Directorate General of Public Works is responsible for road maintenance management. The responsibility of MPWT in relation to roads is to:

- (i) manage and develop national policies on public civil works (such as roads) and collaborate with stake holders;
- (ii) improve, maintain and manage the roads and other transport infrastructure;
- (iii) develop road and other transport infrastructure regulations; and
- (iv) assist in development of laws, rules and regulations concerning construction.

3. The Directorate General of Public Works is made up of four departments, three of which are related to roads:

- (i) Road Infrastructure Department (RID)—responsible for the management and administration of the national and provincial road networks;
- (ii) Heavy Equipment Centre (HEC)—an operations unit involved in road and bridge reconstruction and major construction works; and
- (iii) Technical Research Centre (TRC)—responsible for road standard and specification development.

4. RID is the key road management organization within MPWT. Eight of its ten operational units are referred to as “offices” and two are construction units. The Planning and Technical Office (PTO) and the Inventory and Road Maintenance Office (IOMO) are directly involved in road planning, maintenance, and operational management. There are a 24 city and provincial departments of public works and transport (PDPWT) throughout Cambodia who are involved in implementing road maintenance.

5. MPWT is responsible for about 11,400 kilometers (km) of roads, of which 2,070 km are primary national highways, 2,710 km are secondary national highways, and 6,620 km are provincial highways. Of the roads administered by MPWT, 2,155 km are surfaced with double bitumen surface treatment (DBST) or asphalt concrete. The balance (about 9,245 km) is of gravel or earth construction.

6. The Cambodian road network covers about 39,400 km, including approximately 4,800 km of national roads, 6,600 km of provincial roads, and 28,000 km of rural roads. The roads have a significant number of bridges, about 1,020 on the primary highways and 1,210 more on provincial roads. Much of the provincial and rural road network is dilapidated and large parts of the country are effectively isolated during the wet season. Most bridges on the minor road networks are seriously damaged or failed. MPWT has indicated that, while much of the primary national highway network is in good condition, most of the secondary highway network and nearly all provincial and rural roads are in need of urgent repair, rehabilitation, or reconstruction. Road condition surveys in 2005 confirmed that only about 2,700 km of the 11,400 km managed by MPWT was in good to average condition, the remainder being in a poor or very poor condition. Of particular interest to the proposed Project are highways that have been

rehabilitated in the last 3–8 years which are not performing as well as they should do and require repairs. These absorb about 35% of the domestic road budget for routine maintenance, repairs, rehabilitation and reconstruction, or \$26 million in 2007. These additional funds are being used for the repair of failures or defects that should not be happening.

7. The road network managed by MPWT can be characterized as a mixture of average to good paved roads (rehabilitated in the last 5–6 years) and poor to very poor unpaved roads, most of which have not received maintenance and repair funds in at least the last 5–6 years. The paved roads have been constructed to various standards, some with paved shoulders and some without. Those without sealed shoulders are starting to fail in the outer wheel path. The decision to not seal the shoulders, intended to save costs, is resulting in higher maintenance and reinvestment costs. Poor DBST sealing in recent upgrading and rehabilitation projects has resulted in seals with short lives and a poor appearance.

8. Road traffic on rural roads consists of both motorized and non-motorized traffic, with the latter making up to 30% of the traffic on many roads. Of the motorized traffic, 75–90% is motorcycles. Medium to large trucks and buses are underrepresented on most rural roads and represent less than 3% of the motorized traffic.

9. Vehicles that transport freight and people include motorcycles, mini buses, and light trucks. These vehicles carry from 120 kg (in the case of motorcycles) to 3.5 tons for light trucks and from an average of 1.5 passengers on motorcycles to more than 20 passengers on minibuses and light trucks. In many instances the vehicles carry both freight and passengers. Commercial vehicles are both overloaded and poorly loaded, with two-axle vehicles carrying much of their load on their rear axle and much less on the front wheels, making steering difficult.

10. MPWT intends to improve its monitoring and control of axle loads. Eight automated “weigh in motion” sites have been established and were fully operational by September 2006. MPWT is implementing a project that will install seven permanent weigh bridges by early 2008.

B. Government Strategy

11. The primary tools of the Government's strategy since 1994 have been (i) to focus road investments on rehabilitating national highways and selected provincial, rural, and urban roads; (ii) to undertake comprehensive privatization of transport provision; (iii) to selectively relax restrictive regulations, such as most restrictions on importing motor vehicles and all restrictions on access by foreign airlines; and (iv) to franchise the operation, maintenance, and development of National Road 4, the two international airports in Phnom Penh and Siem Reap, and air traffic control to the private sector. The Government's strategy has restored a core transport system that connects the country's main centers and has significantly contributed to integrating the national economy with the regional and global economies.

12. The Government has initiated a process of decentralization and reforms. For example, the delivery of transport infrastructure services, which was previously centrally managed by MPWT, is now delegated to the provincial level. The MPWT itself is in the process of shifting its focus away from direct management of transport infrastructure toward planning and oversight of the sector, supported by ADB, the World Bank, and the Japan International Cooperation Agency. However, it is encumbered by shortages of skills and resources in the provinces and centrally to undertake these new roles. The reform process is necessary, but given the lack of capacity, is fraught with difficulty in the short term. For example, disbursement for road maintenance is now directly to the provinces, but the provinces are not able to produce credible road maintenance plans or adequately justified budgets. As a result, road maintenance is generally poor even though uncommitted funds are available.

13. The MPWT is currently preparing a revised strategy for future development of the transport sector based on the Cambodia transport sector strategy study, financed by ADB and completed in December 2002. In terms of the transport sector's development and operation, the draft strategy is likely to emphasize the following objectives and goals.

- (i) **Support sustained economic growth and promote external trade and foreign direct investment.** Transport is an integral part of the production of nearly all goods and services. Good transport infrastructure and cost-effective transport are preconditions for Cambodia's export drive and for realizing its tourism potential. They are also a major factor in containing the cost of living and improving rural livelihoods. More diversity in transport supply and better transport logistics using multimodal transport chains will improve Cambodia's international competitiveness and its attractiveness to direct foreign investors.
- (ii) **Support poverty reduction and the integration of Cambodia.** By enabling cost-effective and reliable access to economic opportunities (including new productive activities in areas not previously open to economic exchange) and social services, transport creates the foundations for more inclusive and pro-poor economic growth. Accessible and dependable transport networks, especially provincial roads, are needed to link the provinces together and to integrate rural areas into the mainstream economy.
- (iii) **Streamline and focus sector institutions and expand private sector involvement in infrastructure provision.** The Government regards the strengthening of sector institutions, especially the creation of clear mandates for their activities, as the basis for institutional reform. It also recognizes that the private sector, including foreign investors, has an important role to play in the financing, development, and management of transport infrastructure.
- (iv) **Secure the sustainability of transport.** Fuel taxation is a major source of revenue for the Government, and charging for the use of infrastructure has been introduced. However, the scope for charging full user costs is limited by low traffic loads. As direct Government funding for transport infrastructure is equally limited, meeting the funding requirements for infrastructure development and maintenance in the short to medium term will require supplementary funding from the private sector and cofinanciers.
- (v) **Improve safety and enforcement.** The Government is aware of the rapidly growing social and economic costs of poor traffic safety and recognizes that inefficient enforcement because of a weak legal foundation, inadequate resources, and corrupt practices is a root cause of the problem.

EXTERNAL ASSISTANCE

Table A3.1: Externally Funded Capital Projects in the Transport Sector in Cambodia

ADB Loan No.	Project Type	Scope	Source	Start Year	Completion Year	Value (\$ million)
	Road Rehabilitation	NR 5	Thailand	1992	1993	6.4
	Emergency Repair	NR 5	UNDP	1992	1993	0.4
1199	Bridge Reconstruction	NRs 5, 6	Australia	1992	1996	9.0
	Road Rehabilitation	NRs 1, 2, 3, 5, 6, 11	ADB	1993	1997	67.7
	Road Rehabilitation	Various	Sida	1993	1997	5.0
	Road Reconstruction	NR 4	USAID	1994	1996	30.6
	Road Reconstruction	NRs 6, 7	Japan	1994	1999	109.0
	Ferry Rehabilitation	NRs 1, 6, 7	Danida	1995	1999	2.5
1503	Airport Improvement	Siem Reap	ADB	1997	2003	15.0
	Bridge Construction	NR 7	Japan	1998	2001	53.2
1659	Road Improvement	NR 1	ADB	1999	2003	50.5
1824	Emergency Flood Repair	NRs 1, 2, 5, 6, 7, 11, 21, 41	ADB	2000	2002	65.0
1697	Road Rehabilitation	NRs 5, 6, 7	ADB	2000	2003	74.8
	Road Improvement	NR 6	Japan	2001	2002	10.4
	Bridge Reconstruction	NR 6	Japan	2001	2002	11.3
	Road Improvement	NR 7	Japan	2001	2003	15.4
	Port Modernization	Sihanoukville	Japan	2001	2007	—
	Road Rehabilitation	NR 51	Japan	2002	2003	5.0
	Road Rehabilitation	NR 2	Japan	2002	2003	10.0
	Emergency Flood Repair	Various	World Bank	2002	2003	50.0
	Road Reconstruction	NR 48	Thailand	2002	2004	7.6
	Road Rehabilitation	NR 3, 6	World Bank	2002	2004	45.0
	Road Rehabilitation	NR 51	World Bank	2002	2004	5.0
	Road Rehabilitation	NR 3	Korea	2004	2007	17.0
	Road Rehabilitation	NR 7	PRC	2004	2008	65.0
	Road Improvement	NR 1	Japan	2005	2009	42.1
	Road Rehabilitation	NR 67	Thailand	2005	2009	37.0
	Bridge Rehabilitation	Various	Japan	2005	2006	6.6
	Road Reconstruction	NR 48	Thailand	2006	2008	28.3
1945	Road Rehabilitation	NRs 5, 6, 56, 68	ADB	2006	2008	60.0
	Road Rehabilitation	NR 78	Viet Nam	2006	2009	26.0
2373	Road Rehabilitation	NRs 31, 33	ADB	2007	2010	13.0
2288	Railway Rehabilitation	Entire network	ADB	2007	2011	42.0
	Railway Rehabilitation	Entire network	OFID	2007	2011	15.0
	Bridge Construction	NR 1	Japan	2009	2012	—

— = not available, ADB = Asian Development Bank, Danida = Danish Government International Development Aid, NR = national road, OFID = OPEC Fund for International Development, PRC = People's Republic of China, Sida = Swedish International Development Cooperation Agency, UNDP = United Nations Development Programme.

Source: Asian Development Bank.

Table A3.2: Asian Development Bank Technical Assistance for the Transport Sector in Cambodia

Technical Assistance No.	Title	Year Approved	Amount (\$)
1866/1996	Transport Rehabilitation Study (Financed by United Nations Development Programme and Swedish International Development Cooperation Agency)	1993	1,319,400
2059	Rural Infrastructure Improvement	1994	98,000
2197	Airports Improvement Project	1994	500,000
2406	Strengthening of the Ministry of Rural Development	1995	1,500,000
2416	Developing a Planning Capability in the Ministry of Public Works and Transport	1995	800,000
2722	Transport Network Improvement	1996	600,000
2706	Siem Reap Airport Project	1996	15,000,000
3164	Project Preparation and Implementation Assistance to the Ministry of Public Works and Transport	1999	150,000
3257	Strengthening the Maintenance Planning and Management Capabilities at the Ministry of Public Works and Transport	1999	375,000
3398	Primary Roads Restoration Project (Australia)	1999	—
3414	Capacity Building for Public–Private Partnerships in Transport	2000	150,000
3651	Transport Sector Strategy	2001	850,000
3852	Economic Analysis of the Cambodia Road Improvement Project	2002	150,000
3854	Environmental Assessment for the Cambodia Road Improvement Project	2002	60,000
3855	Resettlement Study and Social Impact Assessment for the Cambodia Road Improvement Project	2002	150,000
3868	Engineering Design Update for the Greater Mekong Subregion: Cambodia Road Improvement Project	2002	400,000
9048	Mainstreaming Labor-Based Maintenance in the National Road Network (Financed by Japan Fund for Poverty Reduction)	2004	2,000,000
4645	Restructuring of the Railway in Cambodia (France)	2005	1,500,000
6251	Rehabilitation of the Railway in Cambodia (Financed by Japan Special Fund)	2005	650,000
4691	Preparing the Transport Infrastructure Development and Maintenance Project	2005	1,000,000

Source: Asian Development Bank.

SUMMARY OF PROPOSED CIVIL WORKS

A. Project Scope

1. The proposed project roads are mainly primary highways (referred to as single digit roads in Cambodia), the exception is NR 11. Sections of all primary highways, except for NR 11 are included in the works program as they were rehabilitated after 2002 and will need periodic maintenance between 2008 and 2013. The proposed works are reseals (asphalt concrete, single bitumen surface treatment [SBST] and slurry seals) and associated works, including shoulder reinstatement, pavement failure and crack repairs, line work, and signs. Reconstruction and sealing of shoulders is planned for specific road sections.

B. Periodic Maintenance Works

2. The Project is intended to renew the seal surface (to correct defects and arrest the aging of the existing seals) and to add new surface texture, thus ensuring the integrity of the seals and providing safer driving conditions. Repairs will ensure that the new seals are applied to sound pavements and other ancillary works are carried out, such as shoulder reinstatement (shaping and/or adding gravel), line work and road furniture to improve road safety. Problems caused by previous design and construction will be rectified. Resealing will be carried out a few years earlier than planned in many instances and for some sections extensive repairs and reconstruction of the shoulders will be carried out.

3. Road sections, the type of periodic maintenance treatment, and the year maintenance will be carried out have been identified, but it is possible that priorities will change in the next 12–18 months. The consultants engaged to assist MPWT will review the work program and modify it as required.

4. The treatments to be used included 30 mm asphalt concrete seals, SBST and slurry seals. It has been assumed that an asphalt concrete surfaced road will be resurfaced with asphalt concrete and a double or single bitumen surface treatment surfaced road will be resealed with an SBST or slurry seal, although the reverse may sometimes be required, depending on road surface conditions at the time of final evaluation.

5. Lack of adequate maintenance is a major issue. The Project will provide technical support to MPWT as follows.

- (i) **Maintenance Planning.** Planning will aim to determine the most economically efficient regime to keep a road in a maintainable condition throughout its economic life.
- (ii) **Maintenance Implementation.** Most maintenance undertaken so far has been through force accounts, using the resources of the provincial departments of public works and transport (PDPWT). This system needs to be replaced by implementation through competitively bid contracts to improve efficiency and determine market rates for work, instead of negotiated rates.

DETAILED COST ESTIMATES AND FINANCING PLAN

Table A5.1: Detailed Cost Estimates by Expenditure Category
(\$ million)

Item	Total Cost
A. Investment Costs^a	
1. Civil Works	45.83
2. Implementation Consultants	
a. First-Year Implementation Consultant	0.13
b. Supervision Consultant	1.68
c. Project Management Advisor	1.41
d. Institutional Strengthening Advisory	1.85
e. Technical Audit Consultant	0.18
f. Impact Monitoring Consultant	0.15
3. General	
a. HIV/AIDS Action Plan	0.20
b. Resettlement Decree Training	0.30
c. Road Safety Action Plan	0.23
d. Merit-Based Pay Initiative	0.50
4. Project Management	0.43
Subtotal (A)	52.89
B. Contingencies	
1. Physical ^b	2.54
2. Price ^c	2.75
Subtotal (B)	5.29
C. Financing Charges During Implementation	
1. Interest During Implementation	0.18
Subtotal (C)	0.18
Total Project Cost (A+B+C)	58.35

^a In mid-2007 prices.

^b Physical contingencies are computed at 5% of base costs.

^c Price contingencies are computed based on an international cost escalation factor of 2.5% and includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

Source: Asian Development Bank estimates.

Table A5.2: Detailed Cost Estimates by Financier
(\$ million)

Item	Total	ADB		IDA		AusAID ^a		Government	
		Amount	% of Cost	Amount	% of Cost	Amount	% of Cost	Amount	% of Cost
A. Investment Costs^b									
1. Civil Works									
a. ADB and Australia funding	9.30	4.86	52.3	0.00	0.0	3.80	40.9	0.63	6.8
b. World Bank Funding	30.25	0.00	0.0	21.73	71.9	0.00	0.0	8.52	28.2
2. Implementation Consultants									
a. First-year Implementation Consultant	0.13	0.13	100.0	0.00	0.0	0.00	0.0	0.00	0.0
b. Supervision Consultant	1.68	0.00	0.0	1.68	100.0	0.00	0.0	0.00	0.0
c. Project Management Advisor	1.41	0.00	0.0	1.41	100.0	0.00	0.0	0.00	0.0
d. Institutional Strengthening Advisory	1.85	0.00	0.0	1.85	100.0	0.00	0.0	0.00	0.0
e. Technical Audit Consultant	0.18	0.00	0.0	0.00	0.0	0.18	100.0	0.00	0.0
f. Impact Monitoring Consultant	0.15	0.00	0.0	0.00	0.0	0.15	100.0	0.00	0.0
3. General									
a. HIV/AIDS Action Plan	0.20	0.00	0.0	0.10	50.0	0.00	0.0	0.10	50.0
b. Resettlement Decree Training	0.30	0.30	100.0	0.00	0.0	0.00	0.0	0.00	0.0
c. Road Safety Action Plan	0.23	0.00	0.0	0.00	0.0	0.23	100.0	0.00	0.0
d. Merit-Based Pay Initiative	0.50	0.00	0.0	0.50	100.0	0.00	0.0	0.00	0.0
4. Project Management	0.43	0.00	0.0	0.00	0.0	0.00	0.0	0.43	100.0
5. Taxes (14% of civil works costs)	6.28	0.00	0.0	0.00	0.0	0.00	0.0	6.28	100.0
Subtotal (A)	52.89	5.29	10.0	27.27	51.6	4.36	8.3	15.95	30.2
B. Contingencies	5.29	0.53	10.0	2.73	51.6	0.44	8.3	1.60	30.2
C. Financing Charges During Implementation	0.18	0.18	100.0	0.00	0.0	0.00	0.0	0.00	0.0
Total Project Cost (A+B+C)	58.35	6.00		30.00		4.80		17.55	

ADB = Asian Development Bank, AusAID = Australian Agency for International Development, IDA = International Development Agency.

^a This amount includes ADB's administration fee, audit cost, bank charges and provision for foreign exchange fluctuations (if any), to the extent that these items are not covered by the interest and investment income earned on this grant, or any additional grant contribution by the Government of Australia.

^b In mid-2007 prices.

Source: Asian Development Bank estimates.

Table A5.3: Indicative Works Cost Estimate by Year and Financier
(\$ million)

Year	Total	ADB/AusAID		IDA		Government	
		Amount	% of Cost	Amount	% of Cost	Amount	% of Cost
Year 1	3.59	1.86	51.8	1.60	44.5	0.13	3.7
Year 2	9.44	2.59	27.4	5.72	60.5	1.14	12.1
Year 3	9.69	2.59	26.7	5.00	51.6	2.10	21.7
Year 4	10.92	2.59	23.7	5.20	47.6	3.13	28.7
Year 5	11.19	0.00	0.0	6.94	62.0	4.25	38.0
Total works (sum of years 1–5)	44.84	9.63	21.5	24.46	54.5	10.75	24.0
Taxes	6.28	0.0	0.0	0.0	0.0	6.28	100.0
Other expenses	7.24	1.2	16.1	5.5	76.6	0.53	7.3
Total budget	58.35	10.8	18.5	30.0	51.4	17.56	30.1

ADB = Asian Development Bank, AusAID = Australian Agency for International Development, IDA = International Development Agency.
Source: Asian Development Bank estimates.

Table A5.4: Indicative Disbursement as a Percentage of Expenditure for Works by Year and Financier (%)

Year	ADB/AusAID-financed works		IDA-financed works		Government's counterpart funding		
	Inclusive of taxes	Exclusive of taxes	Inclusive of taxes	Exclusive of taxes	Share of Works	Taxes	Total
Year 1	80.7%	94.7%	80.7%	94.7%	5.3%	14.0%	19.3%
Year 2	68.7%	82.7%	68.7%	82.7%	17.3%	14.0%	31.3%
Year 3	57.9%	71.9%	57.9%	71.9%	28.1%	14.0%	42.1%
Year 4	49.8%	63.8%	49.8%	63.8%	36.2%	14.0%	50.2%
Year 5	37.7%	51.7%	37.7%	51.7%	48.3%	14.0%	62.3%

ADB = Asian Development Bank, AusAID = Australian Agency for International Development, IDA = International Development Agency.

Source: Asian Development Bank estimates.

IMPLEMENTATION SCHEDULE

Item	2007				2008				2009				2010				2011				2012				2013															
	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2				
ADB/AusAID																																								
Recruitment of 2008–2009 Works Plan Consultant																																								
2008–2009 Works Plan Consulting Services																																								
Inspection of Contractors Equipment for 2008–2009 Periodic Maintenance Program																																								
Procurement of Civil Works Contract no. 1 (NR 5 - Km 3.9 to Kampong Channan)																																								
Procurement of Civil Works contract no. 2 (NR 5 - Kampong Channan to Pusat)																																								
Implementation of Periodic Maintenance Works																																								
Recruitment of Technical Audit Consultant																																								
Technical Auditing Services																																								
World Bank																																								
Recruitment of Project Management Advisory Consulting Services																																								
Recruitment of Contract Supervision Consulting Services																																								
Implementation of Project Management Advisory Services																																								
Implementation of Contract Supervision Consulting Services																																								
Contractor equipment certification																																								
Procurement of Civil Works for 2008–2009 Program																																								
Procurement of Civil Works for 2010–2013 Program																																								
Implementation of Periodic Maintenance Works																																								
Road Asset Management Office Capability Development																																								
Recruitment of Institutional and Management Training Consultant																																								
Recruitment of Institutional and Management Training Consultant Services																																								

NR = National Road
Source: Asian Development Bank estimates.

CONTRACT PACKAGES

Table A7.1: Procurement Plan

Project Information

Country	Kingdom of Cambodia
Name of Borrower	Kingdom of Cambodia
Project Name	Road Asset Management Project
Loan or TA Reference	Loan: None
Date of Effectiveness	Not decided
Amount (\$)	10.8 million (ADB: 6 million equivalent; AusAID: 4.8 million equivalent)
Of which Committed (\$)	Loan not yet approved
Executing Agency:	Ministry of Public Works and Transport
Approval Date of Original Procurement Plan	Not yet approved
Approval of most recent Procurement Plan	-
Publication for Local Advertisements	
Period Covered by this Plan	2008–2013

Procurement Thresholds, Goods & Related Services, Works and Supply and Installation

Procurement Method	Value (\$)
ICB Works	>1 million
ICB Goods	>0.5 million
NCB Works	<1 million
NCB Goods	<0.5 million
Shopping	<100,000

Table A7.2: Indicative List of Contract Packages and Modes of Procurement

Reference	Contract Description	Estimated Cost (\$ million)	Procurement Method	Expected Date of Advertisements	Prior Review
A. Civil Works^a					
CW1	National Road 5 : Km 3.9 to Kampong Chhnang Western City Limits (87.2 km)	1.87	ICB	April 2008	Yes
CW2	Kampong Chhnang to Pursat (76.9 km)	9.02	ICB	April 2009	Yes
	Subtotal (A)	10.89			
B. Miscellaneous Goods and Services					
MSG1	Funding for resettlement decree training of government officers, various goods and services	0.30	Direct	April 2008	No
MSG2	Funding for national road safety initiative, various goods and services	0.23	Direct	May 2008	No
	Subtotal (B)	0.53			
C. Consulting Services					
	First-year Implementation Consultant	0.13	Individual	Dec. 2007	Yes
CS2	Technical Audit Consultant	0.19	Individual	July 2010	Yes
	Subtotal (C)	0.32			
	Total	11.74			

CS = civil works, CW = civil works, ICB = international competitive bidding, MSG = Miscellaneous goods and services.

^a Civil works including physical contingencies and price escalation, taxes and duties.

Notes: 1. Out of 997.7 km of roads identified for periodic maintenance under the Project, ADB and AusAID are funding 164.1 km of national road (NR) 5 through two civil works contracts. IDA is providing finance for the remainder through eight civil works contracts encompassing 833.6 km on NRs 1, 2, 5, 6, 7 and 11.

2. Depending on road conditions from 2009 onwards, the civil works for the ADB, AusAID and IDA portions of the Project are subject to change.

Source: Asian Development Bank estimates.

1. **Direct Contracting.** Shopping will not exceed \$530,000 and will be limited to \$300,000 for funding training of government officers in the resettlement decree and \$230,000 for implementation of part of the national road safety action plan. Related goods and services include but are not limited to (i) hiring of short-term advisors, vehicles, purchase of computers, and office equipment (e.g., printers, scanners, photocopiers, and stationery) and funding of training activities and workshops for training in the resettlement decree, and (ii) funding of training and awareness activities, purchase of television advertising and radar and other enforcement equipment for the national road safety action plan.

2. **Civil Works.** For the ICB civil works contracts, the procurement method will be ADB's single-stage two-envelope system. Invitations for bids and all related documents (including the proposed post-qualification factors, methodology, and criteria) must be reviewed and approved by ADB before they are issued. For each ICB contract, three sets of bid documents should be submitted to ADB for review and approval before issuance to bidders. Invitations shall be advertised in accordance with ADB's *Procurement Guidelines* (2007, as amended from time to time). ADB will be given a report on the advertising as part of the review requirements. Bids will

be opened in public and ADB's prior approval of both technical and financial evaluation reports must be obtained.

3. **Recruitment of Individual Consultants.** Several weeks before an individual consulting assignment is scheduled to start, MPWT will prepare a short list of at least three qualified candidates. MPWT will include no more than one candidate from any ADB member country. MPWT will rank the candidates, and then submit their names and qualifications and the draft contract it will use for the engagement to ADB for its approval. ADB will:

- (i) review MPWT's documents, and
- (ii) approve MPWT's documents, or
- (iii) identify revisions to be carried out before ADB gives its approval.

OUTLINE TERMS OF REFERENCE FOR CONSULTANTS

I. Consulting Package CS1: First-Year Implementation Consultant

A. Introduction

1. This proposed Project will be implemented over a 5-year period (2008–2012). The first-year program will be a preparatory period of about 12 months during which the 2008–2009 periodic maintenance program will be developed.
2. Within MPWT, the roads maintenance program is currently planned, managed and monitored by the Inventory and Road Maintenance Office (IRMO) for routine maintenance and repairs, and the Planning and Technical Office (PTO) for periodic maintenance rehabilitation and capital works. Routine maintenance and repairs works are carried out by the Provincial Departments of Public Works (PDPWT) while the army engineering units, various MPWT construction units, and some PDPWTs carry out periodic maintenance works. Although government-funded programs will continue to be implemented in the same way, in the short to medium term, the proposed periodic maintenance program will be managed by the Road Asset Management Office (RAMO), assisted by a project management advisor. As this consultant may not be available until early 2009, a short-term consultant needs to be recruited during 2008 to prepare design and bid documentation for the first-year program.
3. An earlier study identified a list of roads for the 2008–2009 periodic maintenance program and their likely periodic maintenance treatments, along with a candidate list for the periodic maintenance program beyond 2010. This candidate list will be finalized following a detailed evaluation by a project management advisor in a separate consulting assignment.

B. Objective and Outline of Works

4. The overall objective of this consulting work is to assist MPWT to prepare the periodic maintenance program for 2008–2009. The tasks will include an evaluation of selected roads, the selection and design of appropriate treatments, and associated preliminary works, and the preparation of bidding documentation based on existing standard documentation.
5. This first-year program will consist of surface treatments of 30 mm thick asphalt concrete overlay, and single bitumen surface treatment (SBST) and slurry seals, including associated pre-treatments, such as reinstatement of shoulders and the repair of failed areas. A total of \$4 million will be allocated (including consulting services) for this first-year program.

C. Work Activities

6. The consultant shall perform the tasks listed below, while additional details deemed necessary are given in paras. 7 and 8.
 - (i) evaluate the roads identified for the first-year program of 2008–2009 (Table A8.1) and prepare periodic maintenance treatment designs for these roads;
 - (ii) prepare bill of quantities and a simple map showing the type and approximate location of proposed works;
 - (iii) prepare the cost estimates for civil works, as required, at the end of the design process;
 - (iv) prepare bid documents for the identified road sections in accordance with the standard ADB bid documents for the ADB and AusAID contract and in

accordance with bid documents prepared by the Provincial Road Improvement Project (PRIP) for the World Bank-financed contract (as indicated in para. 8 below). The PRIP bid documents should also be a reference document for the ADB- and AusAID-financed contract; and

- (v) prepare special specification clauses to be used with the MPWT standard specifications.

Table A8.1: Road Sections Identified for the Periodic Maintenance Program

NR	Road Section	Financier	Existing Surface Type	Length (km)	Proposed Treatments	Cost Estimate (\$ million)
1	Km 69.2 to km 165.4	World Bank	DBST	90.5	SBST, some SS and ancillary works	2.01
5	Km 3.9 to Kampong Chhnang (western city limits)	ADB–AusAID	DBST	87.2	SBST and ancillary works	1.87

ADB = Asian Development Bank, AusAID = Australian Agency for International Development, DBST = double bitumen surface treatment, NR = national road, SBST = single bitumen surface treatment, SS = slurry seal.

Note: Ancillary works include repairs of failed areas and potholes, crack sealing, seal edge repairs, reinstatement of shoulders, line work and other pavement markings and road signs.

Source: Asian Development Bank.

7. **Pavement Evaluation and Treatment Design.** The selected roads are generally in good condition, but need resurfacing to seal and stabilize the road surface which is starting strip and crack. It is envisaged that the selection and design of treatments for the first-year program will be based on visual evaluations and the review of available traffic and historical data. The evaluation should include the identification of all surfacing and pavement defects, failures and related problems. The assessment should also be of sufficient detail to estimate the bill of quantities and to indicate, on a longitudinal map, the type of works, to be carried out.

8. **Preparation of Bid Documents.** Standard bid documents have been prepared by previous projects for use in small works covered by ICB and NCB contracts, based on the World Bank's small works sample documents. These documents are generally complete, except for the details of the road section. The proposed works will require the inclusion of the bill of quantities, line drawings and appropriate extracts from the MPWT standard specifications that will need to be reviewed, updated, and modified. The final bidding documents for World Bank contracts only will be prepared by a separate procurement agent who will also assist MPWT with the bidding process and the award of contract.

D. Time Schedule, Consultant's Qualifications, Reporting and Cost Estimate

1. Time Schedule

9. The first-year implementation consultant will be an individual international consultant who will be engaged for 4 months, in two assignments over a period of 9 months, starting in January 2008. The first-year implementation consultant will hire a local consultant to assist him/her in his task for a period of 4 months, in two assignments to coincide with the first-year implementation consultant's inputs.

2. Consultant's Qualifications Requirement

10. The consultant will be a road maintenance specialist and/or road engineer with a minimum of 10 years' of experience (at least 5 years in developing countries within the region) with experience in pavement engineering, identification of road maintenance needs, treatment design, sealing equipment inspection and certification, preparation of bidding documentation, and bid evaluation. The consultant should also have a sound knowledge of ADB and World Bank procurement procedures and guidelines. The local consultant should be a roads engineer who is familiar with the workings of MPWT, has had some involvement in previous foreign-funded projects and has sufficient English to communicate with the first-year implementation consultant.

3. Reporting Requirements

11. Fifteen copies each of the following reports, all in the English language, shall be submitted by the consultants to MPWT:

- (i) A road evaluation and design report, for the roads of the first-year program; and
- (ii) bidding documents for the associated civil works contracts.

4. Cost Estimate

12. The cost estimated for this consulting work is \$130,000 (Table A8.2).

Table A8.2: Cost Estimate for First-Year Implementation Consulting Services

Item	Cost (\$)
1. Remuneration	
International Consultant (\$17,000 per month x 4 months)	68,000
Local Consultant (\$1,000 per month for 4 months)	4,000
2. Per Diem (\$125 per day x 30 days x 4 months)	15,000
3. Travel Cost (lump sum)	30,000
4. Communications etc. (lump sum)	3,000
Subtotal	120,000
5. Contingencies	10,000
Total	130,000

II. Consulting Package CS2: Technical Audit Consultant

A. Introduction

13. Specialist consulting services are sought from a consultant to audit the periodic maintenance program (covering approximately 950 km of MPWT roads over 5 years), and the consulting services provided by the construction supervision consultant, the project management advisor, and the institutional and management training consultants.

B. Objective and Outline of Works

14. The overall objective of the technical audit is to help MPWT to ensure that periodic maintenance works are effectively implemented, that they are of an appropriate quality, and that available funds are used effectively. The audit will need to ensure (i) that the road evaluation and design process led to an appropriate selection of pavement treatments and their proper application, (ii) the acceptance criteria for the works carried out were appropriate, and (iii) the skills of MPWT staff have been improved and the required systems established (including by technical assistance to contractors to improve their sealing and paving operations).

15. The technical audit will provide an independent professional opinion on the effectiveness of the management and implementation of the periodic maintenance program. A key element of the audit will be verification that the contracted works have been designed and completed to acceptable minimum standards, and that the tendering processes have followed accepted practices.

16. Due to the nature of these tasks and uncertainties about the timing and length of engagement of audits, MPWT reserves the right to either extend the contract to cover later years of the Project or to begin a new contract.

C. Scope of Works

17. **Civil Works.** The technical audit consultant will review the operations of RAMO and the implementation and civil works procurement process, from the evaluation and design process through to the evaluation of the quality of the completed works. Management of these processes by MPWT units will also be reviewed to establish their effectiveness in promoting quality and completing contracts. Special attention will need to be given to reporting procedures and the processing and payment of invoices.

18. The audit report will discuss the processes of conducting the civil works, including their strengths and weakness and any proposals to correct weaknesses. It will comment on whether:

- (i) RAMO and its management system can deliver cost-effective road maintenance works of the right quality;
- (ii) previously identified design, sealing and paving problems are being remedied;
- (iii) human resources have or will be adequately developed with respect to pavement evaluation and design, project management, and construction supervision;
- (iv) the evaluation, designs and procurement are based on professional, systematic and timely procedures;
- (v) the financial monitoring of the Project is being followed and action is being taken, when required, by those involved, to ensure that the financial data are complete and accurate;

- (vi) the internal technical and financial auditing procedures in RAMO and DGPW are adequate to monitor the Project;
- (vii) the contractors' payments are not being unnecessarily delayed, and action is taken to correct identified problems;
- (viii) the maintenance works implemented by MPWT are of an acceptable quality and the work progress and quality monitoring system is operational and being used;
- (ix) management of the maintenance program can at any time verify all steps between the evaluation and design phase through to final payment and disbursement by the financing institution;
- (x) for the second and subsequent audits, previous periodic maintenance audit reports are distributed correctly to MPWT management, the road maintenance interministerial committee, and MEF;
- (xi) the Project, in general, is being implemented cost-effectively in accordance with the agreed implementation schedule;
- (xii) the internal technical auditing procedures set up in RAMO and DGPW are adequate to monitor the Project; and
- (xiii) construction site journals, site meetings minutes and other documents on quality and quantity are maintained and archived in an orderly and professional way.

19. **Road Asset Management.** The technical audit consultant will review the performance of the project management advisor and the independent supervision consultant supervising the civil works. The key tasks will be:

- (i) to ensure that the systems and processes required to ensure the periodic maintenance program of the Project are being delivered and are of an acceptable quality, starting with pavement evaluation, and treatment selection and design;
- (ii) to ensure that every effort has been made by the consultant to ensure that the road asset management database and planning system have been updated and are being used in the development of strategic and annual plans;
- (iii) to ensure that the systems, manuals, and other materials required to support the role of RAMO have been prepared, are widely available, and are being used;
- (iv) to ensure that RAMO engineers and other technical staff are directly involved in decision making, inspection, and contract management; and
- (v) to ensure that the processes, mechanisms and training materials required for the establishment and implementation of a RAMO skills development program have been prepared and that the program targets actual needs and addresses site problems, including site operations of sealing and paving.

20. **Institutional and Management Training.** The technical audit consultant will review the performance of the institutional and management training consultant. The key tasks will be to ensure that every effort has been made by the consultant:

- (i) to ensure that MPWT has accepted its responsibility for road asset management and that long-term plans are being developed and accepted by the MEF and other related government entities;
- (ii) to make certain that developments within DGPW are consistent with those of a strong and capable road management organization, including the establishment of a basic quality management system and culture;

- (iii) to make certain that a skills development capability within DGPW has been established and is operational and that resources and training materials have been prepared;
- (iv) to ensure that action has been initiated on changing the roles and responsibilities of key DGPW departments; and
- (v) to ensure that MPWT management is taking action to improve its technical capacity and to embrace its responsibility as the manager of the road network.

D. Time Schedule, Consultant's Qualifications, Reporting, and Cost Estimate

1. Time Schedule

21. The technical audit consultant will be an individual international consultant who will be required for a period of 8 months, in five assignments of 1.5 months each, except for the first audit which will be for 2 months. Annual audits will start in May 2009. While it is intended that one consultant be engaged for the five audits, this may not be possible and the recruitment process may need to be repeated. The technical audit consultant will hire two local consultants to assist him or her. Each local consultant will be hired for a period coinciding with the technical audit consultant's engagement periods for the five audits.

2. Consultant's Qualifications

22. The consultant will be a road management and maintenance specialist with a minimum of 15 years' experience (at least 5 years in developing countries within the region) with experience in road asset management, road organization development, and road maintenance operations including international procurement processes. Both local consultants should be road engineers, with a sound knowledge of the workings of MPWT, previous involvement in foreign-funded projects and sufficient English to communicate with the technical audit consultant. One local consultant should have a sound understanding of MPWT organization and its operations while the other should have a sound understanding of the technical aspects of MPWT's road maintenance planning and operations.

3. Reporting

23. The technical audit consultant will keep MPWT well informed of his or her activities and intermediate findings. The highlights of the technical audit, including the audit findings related to works quality, will be presented to RAMO for its review and comment, before being printed and distributed. Fifteen copies of an annual comprehensive report on the audit, in the English language, shall be submitted by the consultant to MPWT.

24. In addition to the opinions and findings contained in these reports, the technical audit consultant will also need to:

- (i) list weaknesses of the system and organization and propose remedial measures, identifying who will be responsible for implementing the changes;
- (ii) describe any other factors which would affect future audits;
- (iii) comment on the capacity of MPWT and contractors and their preparedness to adopt maintenance methods and technologies; and
- (iv) indicate and bottlenecks that need to be addressed.

4. Cost Estimate

25. The cost for this consulting work is estimated at \$180,000 (Table A8.3).

Table A8.3: Cost Estimate for the Technical Audit Consulting Services

Item	Cost (\$)
1. Remuneration	
International Consultant (\$19,500 per month x 8 months)	112,000
Local Consultants (2) (\$750 per month x 8 months x 2)	9,600
2. Per Diem (\$125 per day x 30 days x 8 months)	24,000
3. Travel Cost (lump sum)	24,000
4. Communications etc. (lump sum)	2,000
Subtotal	171,600
5. Contingencies	8,400
Total	180,000

BENEFIT MONITORING

1. Periodic maintenance along the national road network will preserve the condition of existing road surfaces. This will prevent future transportation costs for passengers and freight from increasing and maintain the accessibility provided by the road network. Existing economic activity will be sustained and new activities will begin. A benefit monitoring framework with a series of key performance indicators has been established.
2. Indicators will include (i) economic development in the project area; (ii) transport costs and times for specific types of vehicles and trips; (iii) transport services and charges; (iv) accident rates; (v) incomes per capita; (vi) access to work, schools, markets and social services; and (vii) jobs created during construction and maintenance.
3. Data collection will consist of (i) secondary data from central and local government statistics, (ii) project data and other road and traffic information collected by MPWT, and (iii) sample surveys of vehicle operators, road users and road neighbors. MPWT will measure performance against the indicators at project inception, midterm review, completion, and annually for 5 years after completion. MPWT will be responsible for providing data on (i) average road roughness, (ii) classified traffic counts, (iii) annual expenditures on routine and periodic maintenance of national roads and bridges, and (iv) social and economic impact indicators. MPWT will provide baseline data and be responsible for (i) the impact of the road safety awareness campaign on attitudes toward road and pedestrian safety, and (ii) average one-way passenger fares and freight transport rates for general cargo to and from predetermined points on the rehabilitated project roads. Comments and findings on performance against these indicators will be included in the midterm review. Examples of the indicators are in Table A9.

Table A9: Monitoring Indicators

No.	Indicators
(i)	Average road roughness over the rehabilitated road segments, measured in international roughness index units.
(ii)	Continuous 24-hour classified traffic counts carried out over a 1-day period under representative conditions in April or November.
(iii)	Annual expenditures on routine and periodic maintenance of roads and bridges in the national road network in the project areas.
(iv)	Average one-way passenger fares and freight transport rates for general cargo to and from predetermined points on the rehabilitated road links.
(v)	Social impact of road improvements on the lives, time savings, incomes, and economic activities of representative road users and road neighbors, determined through structured interview surveys.
(vi)	Impact of the road safety awareness campaign on attitudes towards road safety and safe pedestrian practices in representative communities, determined through structured interview surveys.

Source: Asian Development Bank.

ECONOMIC ANALYSIS

A. Introduction

1. The Project consists of about 950 km of national roads throughout Cambodia. The economic analysis was carried out for various periodic maintenance alternatives for each road in the project road network by comparing the with-Project and without-Project scenarios. In the without-Project scenario, the roads are assumed to receive only minimal maintenance and as a result they continue to deteriorate. The with-Project scenario includes routine and periodic maintenance according to international standards. Various alternative maintenance strategies have been examined to determine the most cost-effective and least-cost option for each of the project roads. The economic analysis covers the period 2009–2032. The maintenance strategies will be implemented during the period 2009–2013. The analysis covers the economic benefits from the period 2013–2032. All benefits and costs are in constant 2007 prices. The economic prices are expressed using the world price numeraire.

B. Road Condition and Traffic

1. Road Condition

2. The existing road condition of the road network under investigation has been assessed using the loan referencing and condition survey (LRCS) database of the Ministry of Public Works and Transport (MPWT) and updated by observations by the road engineer during the field trips. The condition of the roads includes both pavement condition surveys and road roughness surveys. This updated road condition information was applied to the LRCS link data and used in the economic evaluation model. The average surface roughness levels in accordance with the international roughness index (IRI) for each section of the road network ranged from IRI 4.0 m/km to IRI 6.0 m/km. The rate of road deterioration used in the economic analysis is based on the levels of surface roughness that existed before the Project, i.e., the without-Project case. These are compared with the roughness values in the with-Project case, i.e., after periodic maintenance treatments have been applied and vehicle operating cost savings due to the road improvement are calculated. The highway design and maintenance standards model 4 (HDM-4) was then used to analyze the sections. The road roughness level after improvement of the project roads by various periodic maintenance treatments (i.e., the with-Project case) varies from IRI 2.0 m/km to IRI 3.0 m/km after completion of the works.

2. Traffic Volume

3. Traffic volumes on the project roads were determined from traffic surveys undertaken to compile the LRCS database. Traffic counts were undertaken over several days accompanied by origin–destination surveys. These survey results were normalized through the application of seasonal factors to obtain annual average daily traffic (AADT) figures for the base year. Traffic volumes on the project road sections ranged from 1,177 vehicles per day to 15,383 vehicles per day (Table A10.1). The traffic counts were classified according to vehicle type before they were fed into the economic evaluation model. Only motorized traffic was modeled as non-motorized traffic does not significantly affect road deterioration and accounts for only 10% of all traffic using the roads in the network.

Table A10.1: Traffic on the Project Road Sections

Road Section	AADT
NH1 km 60.2–69.2	2,923
NH1 km 159.7–165.4	2,198
NH1 km 69.2–159.7	2,198
NH2 km 0–8.7	15,383
NH2 km 8.7–70.5	7,159
NH2 km 70.5–113	4,783
NH3 km 180–200.5	1,177
NH5 km 0–3.9	14,509
NH5 km 3.9–91.1	8,428
NH5 km 91.1–168	5,988
NH5 km 168–286.8	4,040
NH5 km 288.1–353.1	4,950
NH6 km 0–89.2	4,170
NH6 km 89.2–161.2	4,790
NH6 km 161.2–171.6	1,886
NH6 km 161.2–221.2	4,790
NH7 km 44.7–68	5,334
NH7 km 68–253	2,177
NH11 km 0–90	3,272

AADT = Annual Average Daily Traffic.

Source: Ministry of Public Works and Transport.

3. Traffic Growth Rate Assumptions

4. Traffic growth rates were based on a number of variables, including transport demand elasticity; past trends; Government gross domestic product (GDP) forecasts at national, regional, and provincial levels; population growth; and growth in per capita income. Elasticity values used in previous studies in Cambodia over the last decade range from 1.2 to 1.5 for estimating demand passenger transport growth and from 1.0 to 1.4 for freight transport growth. Motorcycle demand has regularly been based on an elasticity of 2.0. Traffic growth rates range from 6% per annum to 10.2% per annum, depending on the vehicle type and the year. The estimates take into account past traffic growth and recent studies in Cambodia. Because forecasts of future traffic are determined by elasticity of demand and growth in GDP, an allowance has been made in the sensitivity and risk analysis for variations of traffic growth to take account of possible variations in the values of the elasticity of demand which determines overall traffic growth. Traffic growth rates used to forecast future traffic are shown in Table A10.2.

5. Future traffic usually has three components: normal, generated, and diverted traffic. Normal traffic is simply an extension of existing traffic. Generated traffic is traffic that is induced to use the road because of lower vehicle operating costs (VOCs) and shorter travel times. To be conservative, no generated traffic or diverted traffic is assumed in this study. The economic analysis examines only savings in operating costs for normal traffic, that traffic that will continue to travel even if the roads in the network are not improved.

Table A10.2: Traffic Growth Rates (% per annum)

Vehicle Type	Growth Period		
	2006–2011	2011–2016	2016 and on
Cars	9.8	9.1	7.8
Buses	9.1	8.4	7.2
Trucks	10.2	7.7	6.6
Motorcycles	10.0	8.0	6.0

Source: Asian Development Bank estimates.

C. Costs

6. The Project's economic costs were derived from the financial costs and include costs of periodic maintenance, routine maintenance, and construction supervision. Maintenance costs were derived from rates of individual items of works. The economic costs exclude price contingencies, taxes, duties, and interest during construction. A standard conversion factor (SCF) of 0.90 was applied to the financial costs of non-traded inputs to calculate economic prices.

D. Benefits

7. The major economic benefits of the Project were quantified as VOC savings because of improvements in the road surface condition. VOC savings accrue to normal traffic, i.e., traffic that would continue to use the road even if the improvement had not been made. The economic evaluation was conservative and assumed no generated traffic.

8. Benefits to road users were estimated from the difference between costs in the without-Project case and costs in the with-Project case. The HDM-4 model was used to estimate the benefits over time. The model predicts pavement deterioration and estimates yearly VOCs over the life of the investment for various strategies of improvement. In both the with-Project and without-Project cases the road roughness level varies from year to year according to traffic movement and the maintenance applied. The roughness level, expressed in terms of the IRI has a direct impact on the VOC and hence on the level of benefits. The model then compares life-cycle costs for the with-Project case with the costs for the without-Project case, computes the net present value (NPV), and estimates the economic internal rate of return (EIRR).

9. Typical VOCs for various vehicle types, based on typical road roughness levels in the without-Project case (i.e., minimal road maintenance) compared with the with-Project case (which has reduced the road roughness by the application of periodic maintenance treatments) are shown in Table A10.3. The rate of road deterioration used in the economic analysis is based on the levels of surface roughness that existed when the project roads had had only basic routine maintenance, i. e. the without-Project case, compared with the roughness values in the with-Project case under various maintenance treatments. VOCs due to the improvements were then calculated.

Table A10.3: Typical Vehicle Operating Costs With-Project and Without-Project (\$ per km)

Vehicle Type	Without-Project (IRI = 6)	With-Project (IRI = 2.0)
Car	0.42	0.15
Light Truck	0.21	0.12
Medium Truck	0.33	0.21
Heavy Truck	0.64	0.37
Medium Bus	0.28	0.17
Large Bus	0.52	0.30
Light Commercial Vehicle	0.23	0.14
Motorcycle	0.04	0.03

IRI = international roughness index (meters/km).

Source: Ministry of Public Works and Transport.

10. In economic theory the value of work time savings for passengers can be high. In general, these people belong to higher income groups and it is assumed that their saved travel time on work trips allows them to conduct more high-priority work. That is to say, their saved travel time is used to increase the productive output. The way in which time itself is valued is dependent upon the wage rate paid. Time saved during nonworking time will not necessarily be used to increase productive output and may merely be used to increase leisure time. The value of time saved during nonworking time is therefore lower than time saved during working hours. Typically, nonworking time is valued at one third working time.

11. Time savings in a developing country like Cambodia are not highly significant, because the actual time savings made (if any) may not be put to other productive uses. By concentrating on more tangible benefits such as VOC savings, a less misleading picture will be given than if time savings benefits were introduced. This also makes the economic evaluations more conservative. If a particular maintenance alternative is economically feasible on VOC savings alone, any additional benefits from time savings will be bonus.

E. Results of Economic Analysis

12. The EIRR for the Project was 97.0% with a NPV of \$1,089.1 million, using a 12% discount rate. Table A10.4 presents the base case calculation for the Project.

Table A10.4: Economic Internal Rate of Return on the Project (\$ million)

Year	Project Investment Costs	Periodic Maintenance Costs	Routine Maintenance Costs	VOC Savings	Net Benefits
2009	6.46		(0.09)		(6.37)
2010	11.05		(0.09)		(10.96)
2011	13.13		(0.12)		(13.01)
2012	7.93		(0.63)		(7.30)
2013	5.41		(1.02)	57.71	53.31
2014		1.39	(0.97)	133.88	133.46
2015		1.18	(0.90)	205.94	205.65
2016		4.79	(0.81)	260.06	256.08
2017		10.35	(0.50)	280.73	270.89
2018		7.61	(0.24)	271.79	264.41
2019		6.72	(0.19)	273.52	266.99
2020		6.54	(0.21)	300.22	293.90
2021		2.12	(0.30)	327.42	325.60
2022		1.39	(0.28)	353.62	352.51
2023		2.01	(0.29)	380.90	379.18
2024		3.77	(0.27)	414.02	410.51
2025		3.13	(0.23)	451.57	448.67
2026		7.12	(0.26)	493.29	486.43
2027		9.64	(0.24)	549.56	540.16
2028		0.22	(0.25)	608.17	608.20
2029		7.59	(0.26)	654.87	647.54
2030		0.28	(0.27)	710.08	710.07
2031		1.04	(0.27)	760.65	759.87
2032		1.58	(0.27)	808.48	807.17
				EIRR	97.0
				NPV	1,089.1

() = negative, EIRR = economic internal rate of return, NPV = net present value. VOC = vehicle operating costs

Notes:

1. Negative recurrent maintenance costs indicate a saving between the with-Project and without-Project scenarios.
2. The EIRR of this Project is high relative to typical road rehabilitation projects because (i) maintaining a road is less costly than rehabilitating it periodically; and (ii) maintenance prevents losses of road user benefits while the road deteriorates towards impassability. When evaluating the result it should be considered that, although the effectiveness of the Project is high, no change in road accessibility is envisaged compared with the current situation so development impacts are limited to retaining access, as opposed to creating new access, which is achieved in road rehabilitation projects.
3. NPV is discounted at 12%.

Source: Asian Development Bank estimates.

F. Sensitivity and Risk Analysis

13. Several sensitivity test cases were examined: (i) project periodic maintenance costs increase by 20%; (ii) benefits decrease by 20%, (iii) traffic growth rates decrease by 20%, (iv) no periodic maintenance is undertaken after implementation of the Project;¹⁹ and (v) a combination of an increase in project periodic maintenance costs of 20% and a decrease in benefits of 20%. The results show that the quantified economic benefits are robust to the various sensitivity tests and the Project remains economically viable in all cases. Finally, an analysis including the sunk²⁰ costs of the road network was performed to reconfirm that project roads were viable at the time of reconstruction and remain so even when the cost of periodic maintenance is considered (Table A10.5).

14. The results show that the quantified economic benefits are robust to the various sensitivity tests and the Project remains economically viable. The sensitivity test that assumes no periodic maintenance takes place after Project implementation only reduces the EIRR by 1%, from 97.0% to 96.0%. The reason for this is that most project benefits occur within the first 10 years after completion of the Project. These benefits are so high that, even assuming that no future periodic maintenance takes place every 5–6 years, this has little overall effect on the EIRR. The sensitivity test that assumes that the sunk costs of the road network are included reduces the EIRR from 97.0% to 23.8%. Including the entire \$800 million already invested in the road network is an extreme assumption but it still shows that the EIRR remains robust at 23.8%.

Table A10.5: Results of Sensitivity Tests

Section	EIRR (%)	NPV (\$ million)
Base case	97.0	1,089.1
Capital costs increase by 20%	90.2	1,084.4
Benefits reduced by 20%	88.2	863.8
Decrease in traffic growth rates by 20%	83.1	875.1
No periodic maintenance after project implementation	96.0	547.9
Including sunk costs of road network investment	23.8	698.3
Capital costs + 20% and benefits – 20%	81.8	859.1

EIRR = economic internal rate of return, NPV = net present value.

Note: NPV is discounted at 12%.

Source: Asian Development Bank estimates.

15. A risk analysis was undertaken for the project road using the @Risk computer software program and taking into account the uncertainty present in the estimates of the input parameters. The risk analysis was based on triangular probability distributions for the main input parameters. It runs a simulation in which possible values of the variables were randomly sampled 5,000 times using a Monte Carlo non-stratified technique. Risk analysis then uses this information to analyze every possible outcome, executing hundreds of what-if scenarios.

¹⁹ A risk to the Project could be that no further periodic maintenance is undertaken after the Project is implemented. The sensitivity test shows that this would have little effect on the overall EIRR of the Project.

²⁰ Sunk costs are the costs that were previously spent on rehabilitating the road network (para 4. refers), estimated at about \$800 million in market prices. Sunk cost is not normally considered in economic analysis because previously expended resources have no alternative usage and therefore no alternative value.

16. In the triangular probability distributions, the first multiplier defines the minimum possible value of the input parameter (there is zero possibility that the actual value will be lower than the minimum value). For example, if the multiplier is set to 0.7, the minimum possible value for that parameter is 70% of the estimated most likely value used in the economic evaluation. The second multiplier defines the maximum possible value of the input parameter (there is zero possibility that the actual value will be higher than the maximum value). For example, if the multiplier is set to 1.2, this means that the maximum possible value for that parameter is 20% higher than the estimated most likely value entered into the economic evaluation. Table A10.6 gives the estimated triangular probability distribution minimum and maximum possible values for the variables tested in the risk analysis. It can be seen in the table that some minimum or maximum possible values are the same as the model input value, e.g., the maximum traffic growth rate is the same as the model input value for the traffic growth rate. Similarly, the minimum value of the project investment cost is not expected to be lower than the model input value. This has been undertaken to enable the risk analysis program (@Risk) to use the most pessimistic scenarios in estimating the probability of the EIRR for each option falling below 12%.

Table A10.6: Variable Probabilities for Risk Analysis of the Project

Variable Number	Variable Description	Triangular Distributions Multiplying Factors		
		Minimum Possible Value	Model Input Value	Maximum Possible Value
1	Base Normal Traffic	0.50	1.00	1.00
2	Traffic Growth Rate	0.50 ²¹	1.00	1.00
3	Project Maintenance Costs	1.00	1.00	1.50

17. The risk analysis with the input variable distributions has the immediate effect of replacing the original (most likely) values with the mean values for the new distributions and thus recalculates the base case EIRR. The new base case EIRR becomes 80.9%. The results from the risk analysis indicate that there is a zero probability of the EIRR for the Project falling below 12%. The @Risk model calculated the new mean EIRR as 80.9%. The minimum value of the EIRR was calculated as 57.7% and the maximum as 94.8% (Table A10.7). The probability of the EIRR falling below 12% is based upon extremely pessimistic possibilities, such as only 50% of the estimated traffic growth rate and capital costs increasing by 50%.

²¹ Traffic growth rate is an important determinant of the future vehicle operating cost benefits for the Project. A pessimistic view has been taken of the estimated growth in traffic not taking place. The minimum value has been set to 0.50, i.e., traffic growth may only be 50% of that estimated.

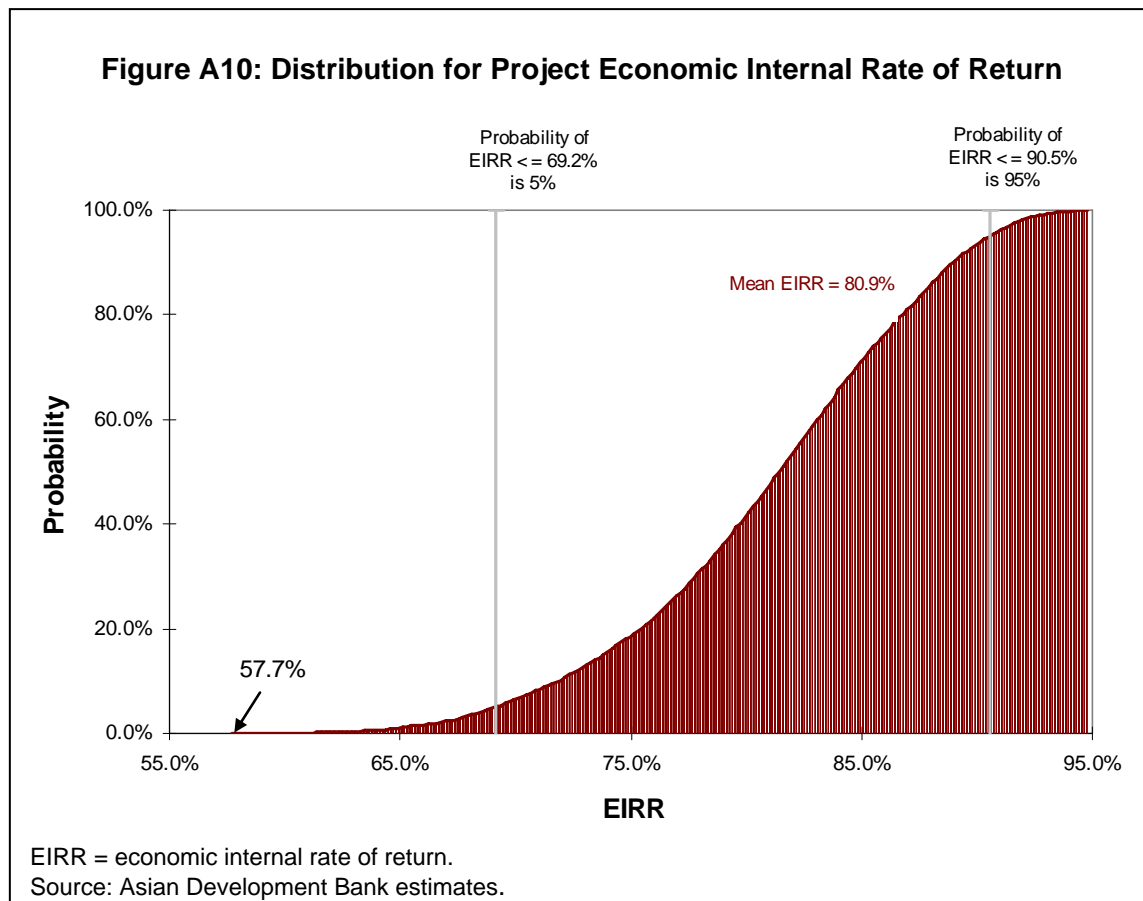
Table A10.7: Results of Risk Analysis for the Project

Scenario	%
New Base EIRR from @Risk	80.9
Probability of EIRR less than 12%	0.0
Minimum EIRR estimate	57.7
Maximum EIRR estimate	94.8
Mean EIRR estimate	80.9

EIRR = economic internal rate of return.

Source: Asian Development Bank estimates.

18. The results of the risk analysis for the Project are presented in Figure A10. This distribution shows the percentage probability of the EIRR falling below a certain value. There is a 95% probability that the EIRR will be between 57.7% and 94.8%. At the lower end of the probability range there is a 5% probability that the EIRR will be between 57.7% and 69.2% and at the higher end of the probability scale a 5% probability that the EIRR will be between 90.5% and 94.8%. From the results, there is a 90% probability that the EIRR for the Project will be between 69.2% and 90.5%. There is a zero probability that the EIRR will fall below 12% for the Project based on the risk analysis assumptions.



SUMMARY POVERTY REDUCTION AND SOCIAL STRATEGY

A. Linkages to the Country Poverty Analysis

<p>Is the sector identified as a national priority in country poverty analysis?</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>Is the sector identified as a national priority in country poverty partnership agreement?</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>
<p>Contribution of the sector or subsector to reduce poverty in Cambodia</p> <p>The infrastructure sector can strengthen links between rural and urban areas and between different regions of the country to promote economic growth and geographically balanced development.</p> <p>Most of the poor in Cambodia live in rural areas and their livelihoods are based on agriculture. Many of them face food shortages for several months and are vulnerable to external shocks because of their reliance on subsistence agriculture. Better roads will help communities deprived of access to information, markets, off-farm employment, and social services.</p> <p>The country's infrastructure was destroyed during decades of civil war and conflict, and its socioeconomic indicators are poor. According to census data for 2004, the population was 12.8 million, 35% of whom lived below the poverty line. The incidence of poverty has declined only modestly in recent years and the poor are excluded from the mainstream economy. Improvements to Cambodia's basic infrastructure are critical for its economic development.</p> <p>The Project will assist the Government of Cambodia to protect existing road assets that have recently been rehabilitated. Poor construction standards; high traffic growth, especially of heavy traffic; and cases of bad design and construction quality mean that urgent action is required to establish comprehensive and prioritized road maintenance planning and to begin periodic maintenance. This would enable MPWT to apply future road maintenance allocations effectively and, in the short to medium term, preserve the road network so it can contribute to future economic growth by lowering transport costs and improving access for the movement of goods and people.</p>	

B. Poverty Analysis**Targeting Classification: General Intervention**

Following ADB's enhanced poverty reduction strategy (December 2004), projects classified as general interventions no longer require poverty assessments.

Poverty Profile

Cambodia was ranked 129th out of 177 countries in the 2006 Human Development Report. Approximately 36% of Cambodia's population falls below the poverty line. The rural population has substantially lower social indicators than the urban population and poverty is widely distributed through out the country. Since Cambodia's reentry into the international community in 1991, it has made significant advances in both human and economic terms. Since 1993, GDP has grown 40% and the country has developed a vibrant and growing export industry. This has reduced poverty and led to human development.

HIV/AIDS

Cambodia has the highest reported adult prevalence of people living with HIV/AIDS in Asia and the Pacific. There is an increased risk of infection of HIV/AIDS during the maintenance work period although this will depend on the scale of the works. Road workers may contribute to the spread of HIV/AIDS and other sexually transmitted infections in the communities around the construction sites and in their communities of origin. The Project will include an HIV/AIDS awareness and prevention program and a participatory approach to raising HIV/AIDS awareness will be followed. This will be based on best practices developed under previous TA, Preventing HIV/AIDS Among Mobile Population in the Greater Mekong Subregion.

Expected Impacts on Poverty and Vulnerability

The preservation of the national road network will help to further economic growth by (i) reducing transport costs and inducing more efficient movement of passengers and goods; (ii) providing better road connectivity; and (iii) strengthening general economic development in all parts of Cambodia.

Because the project roads have been rehabilitated and paved in the last 10 years, the short-term impact of road maintenance works will be limited. However, in the medium and long term, preserving the road network will ensure future economic growth by lowering transport costs and improving access for the movement of goods and people.

Part of the maintenance will be to the pavement of non-paved shoulders. This will help the circulation of slow traffic (including bicycles, carts and pedestrians) mainly used by poor people.

C. Participation Process

Is there a stakeholder analysis? Yes No

Environmental impact assessments or initial environment examinations, and resettlement plans were prepared for each road project during the last 10 years. During the preparation of these documents, stakeholder analyses were conducted in each affected community. However for this project no further stakeholder analysis was conducted.

Is there a participation strategy? Yes No

The HIV/AIDS prevention program includes community participation during implementation.

D. Gender Development

Strategy to maximize impacts on women:

In Cambodia, women are key players in the domestic and economic aspects of the households and are active in community affairs. Women make up half of the population living along the road and, on average, adult women head 25% of the households. In several communities, the proportion of households headed by women is as high as 40%, which is largely a consequence of the civil war. Over 40% of women who head households are engaged in some kind of business (e.g., a small shop or petty trading) and this constitutes their main source of income. However, women earn less than men.

Gender relations and values, and in particular traditional tolerance of prostitution has posed a challenge to the battle against HIV/AIDS. In general, the public health system does not serve women well.

An HIV/AIDS and human trafficking awareness campaign will be conducted only if a large construction camp is needed. It will be conducted by the maintenance contractors and MPWT with active involvement of communities, relevant government agencies and NGOs, the women's union, the youth union, health workers, and female community leaders and members.

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
Resettlement	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None	Civil works will cover only the asphalt overlay within the carriageway. No new land acquisition will be necessary.	<input type="checkbox"/> Full <input type="checkbox"/> Short <input checked="" type="checkbox"/> None
Affordability	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Labor	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	In case construction camp sites are needed, labor standards will be maintained and basic facilities (water and sanitation) provided for the workers. No trafficked or child labor will be used for construction and maintenance.	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Indigenous Peoples	<input type="checkbox"/> Significant <input type="checkbox"/> Not significant <input checked="" type="checkbox"/> None		<input type="checkbox"/> Yes <input checked="" type="checkbox"/>

Item	Significant/ Not Significant/ None	Strategy to Address Issues	Plan Required
Other Risks and/or Vulnerabilities	<input type="checkbox"/> Significant <input checked="" type="checkbox"/> Not significant <input type="checkbox"/> None	There is potential risk of HIV/AIDS transmission if worksites are needed. In this case an HIV/AIDS prevention component will be prepared.	<input checked="" type="checkbox"/> Yes HIV/AIDS prevention program is included in the Project. <input type="checkbox"/> No

ADB = Asian Development Bank, GDP = gross domestic product, NGOs = non-governmental organizations, MPWT = Ministry of Public Works and Transport.

Sources: Asian Development Bank estimates.

SUMMARY INITIAL ENVIRONMENTAL EXAMINATION

A. Introduction

1. The Government of Cambodia has requested the Asian Development Bank (ADB) to strengthen the capacity of the Ministry of Public Works and Transport (MPWT) to conduct road maintenance planning, management and monitoring and funding for periodic maintenance of the paved national road network.
2. An environmental assessment of the proposed Project has been conducted following ADB's *Environment Policy (2002)* and *Environmental Assessment Guidelines (2003)* and the Government's environmental assessment regulations and guidelines.
3. The proposed Project has been categorized as B; therefore no environmental impact assessment is required. However, the environmental implications of the Project have been reviewed and mitigation measures will be directly integrated into the project design. In addition, an environmental management plan (EMP) has been prepared.
4. The paved national road network has been rehabilitated over the last 10 years. Most of the projects were funded by ADB, World Bank, and the Japan Bank for International Cooperation (JBIC). An environmental impact assessment (EIA) or environmental impact evaluation (EIE) has been prepared for each national road rehabilitation project under this Project.

B. Description of the Proposed Project

5. The proposed Project aims to protect existing road assets. The national roads under this Project have recently been rehabilitated. The types of maintenance work anticipated under the Project are resurfacing of pavements and associated pavement works such as edge repair, line marking, and repair and surfacing of shoulders.

C. Description of the Environment

6. The paved national road network in Cambodia encompasses about 2,000 km of primary and secondary highways, located all over the country. These national roads link Phnom Penh to the Thailand border in the northwest (national roads [NRs] 5 and 6), to the Lao People's Democratic Republic border in the north (NR 7), to the Viet Nam border in the south (NRs 1 and 2) and to Sihanoukville in the southeast (NRs 3 and 4).
7. Cambodia's climate is dominated by the monsoon which causes distinct wet and dry seasons. The southwest monsoon brings the rainy season from May to October. The northeast monsoon brings drier and cooler air from early November to March, then hotter air in April and early May. The southern part of the country has a 2-month dry season and the northern areas a 4-month dry season.
8. Topographically Cambodia is divided into three distinct parts: the central plains, the flat coastal areas, and the mountain ranges with high plateaus. The central plains form 75% of the country and consist of the alluvial plains of the Mekong River and the Tonle Sap Basin. These are Cambodia's two dominant topographical features. Most national roads are located in the central plains.
9. Forests make up a major part of the country's natural resources. Hill evergreen, tropical rain, and dry land evergreen forests are found in the humid coastal ranges, humid northeastern uplands, and the very humid to subhumid low altitude areas. Freshwater inundated forests are

found in the Tonle Sap Lake and in areas of the Mekong River. Mangrove forests are found along the coasts of Kampot and Koh Kong provinces.

10. Cambodia has a rich biodiversity. The forests, wetlands and other habitats support many species of flora and fauna, including 130 species of mammals, more than 600 species of birds, more than 2,300 plants, and an unknown number of reptiles and amphibians.

11. Twenty-three protected areas have been designated, covering 3,402,200 hectares (ha) or 19% of the country's total area. The protected areas cover representative ecosystems including evergreen, deciduous, and edaphic forests, and examples of fragile and critical habitats. These areas are well distributed throughout the country.

12. The Tonle Sap is the largest freshwater lake in Southeast Asia. In 1997 it was nominated as a Biosphere Reserve under the Man and the Biosphere Reserve Program of United Nations Education and Scientific Cooperation Organization (UNESCO). NRs 5 and 6 surround this reserve.

13. Poverty is widespread in Cambodia. Some provinces are inhabited by refugees and there are large areas of unexploded ordnance and land mines. Rice cultivation is the dominant agricultural activity, but yields are frequently erratic due to flooding. Safe drinking water is a major concern as the quality of groundwater and surface water supplies are poor during the dry season. Malaria is endemic.

D. Review of Environmental Implications

14. Road maintenance operations may potentially affect the environment in a number of ways, including construction camp maintenance, storage and handling of wastes and hazardous materials, materials stockpiling, and the location of borrow pits and quarry sites. Poorly executed maintenance may create soil erosion and affect streams or other water bodies. If there are no clear plans for environmental management solid waste materials may be disposed of inappropriately and uncontrolled noise and dust can create a nuisance for individuals and communities. These concerns are heightened where roads pass through protected areas or other sites of a sensitive ecological nature, such as wetlands, streams or forest areas and protected areas.

15. An EMP has been prepared for this Project. Table A12 presents the main anticipated environmental impacts due to road maintenance works under this Project and the proposed mitigation measures.

Table A12: Potential Impacts and Proposed Mitigation Measures linked to Maintenance Works

Activity	Potential impacts	Mitigation measures
Resurfacing of pavements and associated pavement works and repair and surfacing of shoulders	- Possible pollution of waterways or groundwater by bituminous products or solvents	- Strict control to avoid spills; contractors to have adequate clean up procedures
	- Works can have temporary effects on irrigation or washing or drinking water supplies	- Contractors to take into account local water uses
	- Dust, noise and vibrations	- Specifications for watering to be included in the contract - Noise and vibrations from contractors' equipment to be controlled, especially close to settlements - Construction activities to be avoided at night when close to residential areas
	- Effect on traffic and pedestrian safety	- Contractors to employ safe traffic control measures and to limit possible disruption to nonconstruction traffic
Transport of materials	- Air and noise pollution for any nearby settlements and damage to existing roads	- Contractors' vehicle speeds to be controlled, noise and weight of loads to be controlled, dust and flying debris to be reduced by covering loads or wetting material if necessary - Locally available construction material to be used wherever possible to minimize transport distances
Materials stockpiling on shoulders	- Possible pollution of waterways by solids - Possible impacts on road users safety	- Appropriate location for materials stockpiling to be selected, well away from any waterways, irrigation or washing or drinking water supplies - Encroachment on carriageways to be avoided - Trees to be preserved during material stockpiling
Borrow areas	- Quarries and borrow pits can have impacts on soils, water and the natural environment	- Borrow areas to be located away from residential or other environmentally sensitive areas, such as hospitals, intensive livestock production areas or wildlife breeding areas - Farmlands and forests to be avoided as much as possible, work to be restricted to daylight hours, size and frequency of blasting to be limited - Borrow areas to be restored and re-vegetated
Worksite installation (if needed)	- Degradation of plant cover - Soil and water pollution (trash dumping, oil spills)	- Work site installations to be situated in order to reduce impacts on the environment and on the people living in the immediate vicinity - Fuel and oil, and bitumen storage areas to be located well away from any watercourses - These storage areas will be provided with interceptor traps so that accidental spills do not contaminate the environment - All waste oil will be stored and disposed of to acceptable oil industry standards - Wherever possible, refueling will be carried out at a fuel storage area and not permitted within or adjacent to watercourses - On completion of the work, contractors shall restore the sites to their original state

E. Findings and Recommendations

16. Because the Project will be limited to resurfacing of existing pavements and reconstruction of shoulders, there are few environmental risks associated with it. Any environmental issues associated with the Project will be temporary and localized. However, for large resurfacing works, construction camps will increase the environmental risks.

17. The environmental review of the Project indicates that overall environmental impacts are acceptable. Mitigation measures have been identified that are necessary and sufficient to satisfy all environmental requirements in accordance with ADB requirements and Cambodian regulations. The types of effects of the anticipated maintenance works are well understood and documented. Mitigation measures are known and if applied in practice can eliminate the environmental risks.

F. Conclusion

18. Potential impacts have been identified and mitigation measures drawn up. Implementation of the proposed mitigation measures and the EMP will reduce environmental impacts.